**STRUCTURAL ENGINEERING CALCULATIONS**

**FOR**

**PARAGON STAR NORTH VILLAGE**
**3200 NW PARAGON PKWY**
**LEE'S SUMMIT, MO 64081**

**PREPARED BY**

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**FOR**

**FINKLE + WILLIAMS ARCHITECTURE**
**8787 RENNER BLVD**
**SUITE 100**
**LENEXA, KANSAS 66219**
**913-498-1550**

**JULY 22, 2022**



# Hazards by Location

## Search Information

**Coordinates:** 38.937763635387014, -94.44629573285171

**Elevation:** 814 ft

**Timestamp:** 2021-10-21T18:47:16.828Z

**Hazard Type:** Snow




**ASCE 7-16**

Ground Snow Load ..... 20 lb/sqft

**ASCE 7-10**

Ground Snow Load ..... 20 lb/sqft

**ASCE 7-05**

Ground Snow Load ..... 20 lb/sqft

*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 interpolated from data provided in ASCE 7 and rounded up to the nearest whole integer.

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# Hazards by Location

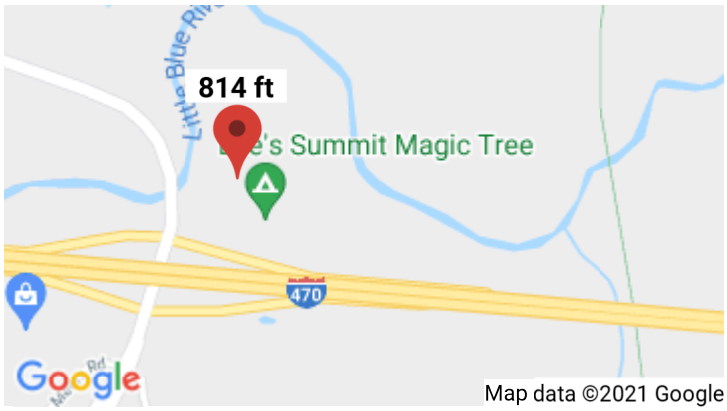
## Search Information

**Coordinates:** 38.937763635387014, -94.44629573285171

**Elevation:** 814 ft

**Timestamp:** 2021-10-21T18:45:59.597Z

**Hazard Type:** Wind




| ASCE 7-16 | | ASCE 7-10 | | ASCE 7-05 | |
|---|---|---|---|---|---|
| MRI 10-Year | 76 mph | MRI 10-Year | 76 mph | ASCE 7-05 Wind Speed | 90 mph |
| MRI 25-Year | 83 mph | MRI 25-Year | 84 mph | | |
| MRI 50-Year | 88 mph | MRI 50-Year | 90 mph | | |
| MRI 100-Year | 94 mph | MRI 100-Year | 96 mph | | |
| Risk Category I | 103 mph | Risk Category I | 105 mph | | |
| Risk Category II | 109 mph | Risk Category II | 115 mph | | |
| Risk Category III | 117 mph | Risk Category III-IV | 120 mph | | |
| Risk Category IV | 122 mph | | | | |

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## Disclaimer

Hazard loads are interpolated from data provided in ASCE 7 and rounded up to the nearest whole integer. Per ASCE 7, islands and coastal areas outside the last contour should use the last wind speed contour of the coastal area – in some cases, this website will extrapolate past the last wind speed contour and therefore, provide a wind speed that is slightly higher. NOTE: For queries near wind-borne debris region boundaries, the resulting determination is sensitive to rounding which may affect whether or not it is considered to be within a wind-borne debris region.

Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.

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# Hazards by Location

## Search Information

**Coordinates:** 38.937763635387014, -94.44629573285171

**Elevation:** 814 ft

**Timestamp:** 2021-10-21T18:48:15.397Z

**Hazard Type:** Seismic

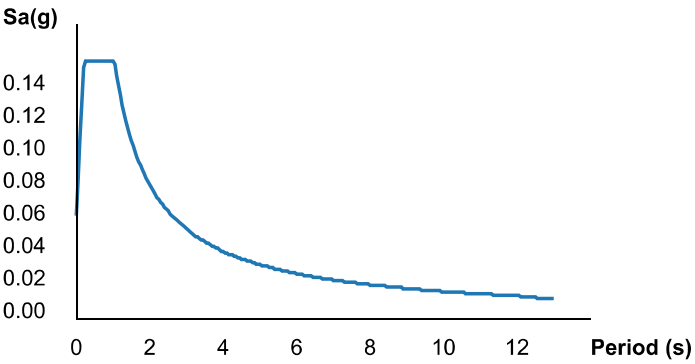
**Reference Document:** ASCE7-16

**Risk Category:** II

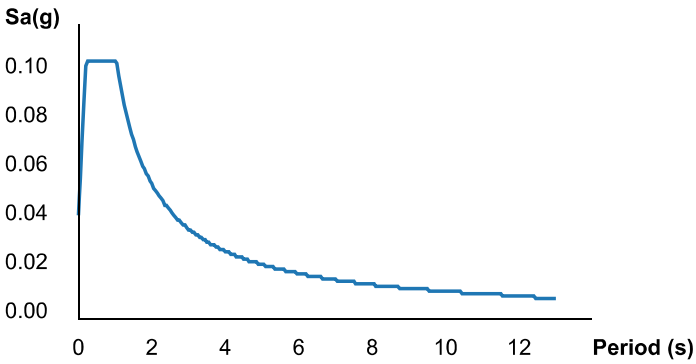
**Site Class:** D




## MCER Horizontal Response Spectrum




## Design Horizontal Response Spectrum




## Basic Parameters

| Name | Value | Description |
|---|---|---|
| $S_S$ | 0.099 | $MCE_R$ ground motion (period=0.2s) |
| $S_1$ | 0.068 | $MCE_R$ ground motion (period=1.0s) |
| $S_{MS}$ | 0.158 | Site-modified spectral acceleration value |
| $S_{M1}$ | 0.164 | Site-modified spectral acceleration value |
| $S_{DS}$ | 0.105 | Numeric seismic design value at 0.2s SA |
| $S_{D1}$ | 0.109 | Numeric seismic design value at 1.0s SA |

## Additional Information

| Name | Value | Description |
|---|---|---|
| SDC | B | Seismic design category |
| $F_a$ | 1.6 | Site amplification factor at 0.2s |
| $F_v$ | 2.4 | Site amplification factor at 1.0s |
| $CR_S$ | 0.928 | Coefficient of risk (0.2s) |
| $CR_1$ | 0.877 | Coefficient of risk (1.0s) |

| | | |
|---|---|---|
| PGA | 0.047 | $MCE_G$ peak ground acceleration |
| $F_{PGA}$ | 1.6 | Site amplification factor at PGA |
| $PGA_M$ | 0.075 | Site modified peak ground acceleration |
| $T_L$ | 12 | Long-period transition period (s) |
| SsRT | 0.099 | Probabilistic risk-targeted ground motion (0.2s) |
| SsUH | 0.106 | Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years) |
| SsD | 1.5 | Factored deterministic acceleration value (0.2s) |
| S1RT | 0.068 | Probabilistic risk-targeted ground motion (1.0s) |
| S1UH | 0.078 | 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) |

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## Disclaimer

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

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# Hazards by Location

## Search Information

**Coordinates:** 38.937763635387014, -94.44629573285171

**Elevation:** 814 ft

**Timestamp:** 2021-10-21T18:47:28.628Z

**Hazard Type:** Tornado




## ASCE 7-16

Wind Speed ..... ⚠ 250 mph

Sections 423.3 and 423.4 of the 2015 edition of the International Building Code (IBC) require that 911 call stations, emergency operations centers, fire, rescue, ambulance and police stations, and schools with an occupant load of 50 or more, to have an ICC 500 compliant tornado shelter in areas where the design wind speed is 250 mph. The 2018 editions of the IBC and the International Existing Buildings Code (IEBC) extend these tornado shelter requirements to also include additions to existing school campuses.

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Project Name: Paragon Star

Date: 6/24/2019

**Snow Loads per ASCE 7-16 - Flat Roofs Section 7.3**

Building Criteria:

| | | | | |
|---|---|---|---|---|
| Ground Snow Load: | $p_g$ = | 20 | (psf) | (Figure 7-1) |
| Terrain Category: | | B | | (Section 26.7.3) |
| Exposure: | | Partially Exposed | | |
| Exposure Factor: | $C_e$ = | 1 | | (Table 7-2) |
| Thermal Factor: | $C_t$ = | 1.2 | | (Table 7-3) |
| Risk Category: | | II | | (Table 1.5-1) |
| Snow Importance Factor: | $I_S$ = | 1.0 | | (Table 1.5-2) |
| Roof Pitch (inches per foot): | $r_p$ = | 0.25 | (in) | |
| Eave-to-Ridge Distance | W = | 64 | (ft) | |

Balanced Roof Snow Calculations:

| | | | | |
|---|---|---|---|---|
| $p_f$= $0.7C_eC_tI_sp_g$ = | 16.8 | psf | | (Flat Roof EQ. 7.3-1) |
| $p_m$= if($P_g$<20, 20$I_s$, $I_sP_g$) = | 20 | psf | | (Section 7.3.4) |

Rain-On-Snow Calculations:

| | | | | |
|---|---|---|---|---|
| Roof Slope | θ = | 1.19 | (deg) | |
| | W/50 = | 1.28 | | |
| $p_r$= if(and($p_g$≤ 20 psf, θ<W/50),5 psf, 0 psf) = | | 5 | psf | (Section 7.10) |

Snow Load Cases

$S_1$= max($p_f$, $p_m$ ,$p_f$+$p_r$) = 21.8 psf

$S_2$= $p_f$ + $p_d$ = 16.8psf + Snow Drift

Snow Drift:

Y = if(0.13$p_g$ + 14 pcf>30 pcf, 30 pcf, 0.13$p_g$ + 14 pcf) = 16.6 pcf

$h_b$= $p_f$/g = 1.01 ft

Sample Drift Calculations for $l_u$ of 100 ft:

Leeward:

$h_{dl}$ = 0.43 x $(100)^{-3}$x$(p_g+10)^{-4}$-1.5 = 3.2 ft Note:

$W_l$ = 4 x $h_{dl}$ = 12.66 ft If $h_c$<$h_d$,w=4$h_d^2$/$h_c$

$p_{dl}$ = $h_{dl}$ x g = 53 psf

Windward:

$h_{dW}$ = 0.75[0.43 x $(100)^{-3}$x$(p_g+10)^{-4}$-1.5]= 2.4 ft

$W_W$ = 4 x $h_{dl}$ = 9.49 ft

$p_{dl}$ = $h_{dl}$ x g = 40 psf

Parapet:

$h_{dW}$ = 0.75[0.43 x $(100)^{-3}$x$(p_g+10)^{-4}$-1.5]= 2.4 ft

$W_W$ = 4 x $h_{dl}$ = 9.49 ft

$p_{dl}$ = $h_{dl}$ x g = 40 psf

| $l_u$ | $h_d$ (ft) | | | W (ft) | | | $p_d$ (psf) | | |
|---|---|---|---|---|---|---|---|---|---|
| (ft) | leeward | windward | parapet | leeward | windward | parapet | leeward | windward | parapet |
| 100 | 3.2 | 2.4 | 2.4 | 12.7 | 9.5 | 9.5 | 53 | 39 | 39 |
| 315 | 5.3 | 4.0 | 4.0 | 21.4 | 16.0 | 16.0 | 89 | 67 | 67 |
| 410 | 6.0 | 4.5 | 4.5 | 23.9 | 17.9 | 17.9 | 99 | 74 | 74 |
| 158 | 3.9 | 3.0 | 3.0 | 15.8 | 11.8 | 11.8 | 65 | 49 | 49 |
| 310 | 5.3 | 4.0 | 4.0 | 21.2 | 15.9 | 15.9 | 88 | 66 | 66 |
| 300 | 5.2 | 3.9 | 3.9 | 20.9 | 15.7 | 15.7 | 87 | 65 | 65 |
| 162 | 4.0 | 3.0 | 3.0 | 15.9 | 12.0 | 12.0 | 66 | 50 | 50 |
| 98 | 3.1 | 2.4 | 2.4 | 12.6 | 9.4 | 9.4 | 52 | 39 | 39 |
| 128 | 3.6 | 2.7 | 2.7 | 14.3 | 10.7 | 10.7 | 59 | 44 | 44 |
| 210 | 4.5 | 3.4 | 3.4 | 17.9 | 13.4 | 13.4 | 74 | 56 | 56 |
| 140 | 3.7 | 2.8 | 2.8 | 14.9 | 11.2 | 11.2 | 62 | 46 | 46 |

**Paragon Star** **Bob D. Campbell & Co.**

**ASCE 7-16 - Components and Cladding: Parapets, Wall and Roof Loads** 7/22/2022

**General Data**

| | | | |
|---|---|---|---|
| $z_g$ = | 814 ft | Ground Elevation | |
| $h_w$= | 60.00 ft | Wall Height | |
| $h_p$= | 4.00 ft | Parapet Height | |
| L = | 200.0 ft | Dim Parallel to Wind | (Long Dimension) |
| B = | 200.0 ft | Dim Normal to Wind | (Short Dimension) |
| Roof Type: | Flat | | |
| Slope, θ = | 1.19 deg | | |

**Step 1 - Risk Category** **(Section 1.5)**

| | | |
|---|---|---|
| Category = | II | (Table 1.5-1) |

**Step 2 - Basic Wind Speed** **(Section 26.5.1)**

| | | |
|---|---|---|
| V = | 109 mph | (Figure 26.5-1a-c) |

**Step 3 -Wind Load Parameters** **(Section 26)**

| | | | |
|---|---|---|---|
| $K_d$ = | 0.85 | Wind Directionality Factor | (Table 26.6-1) |
| Exposure: | C | Exposure Category | (Section 26.7) |
| $K_{zt}$ = | 1.00 | Topographic Factor | (Section 26.8.2) |
| $K_e$ = | 0.97 | Ground Elevation Factor | (Section 26.9) |
| Classification: | Enclosed | Enclosure Classifcation | (Section 26.12) |
| $(GC_{pi})$ = | +/- .18 | Internal Pressure Coefficient | (Table 26.13-1) |

**Step 4 -Velocity Pressure Exposure Coefficient**

| | | | |
|---|---|---|---|
| α = | 9.5 | (3 sec gust speed power law exponent) | (Table 26.11-1) |
| $z_g$ = | 900 | (Nominal height of atmospheric bounday layer) | (Table 26.11-1) |
| $K_h$ = | 1.14 | Velocity Pressure Coefficient at Wall Height | (Table 26.10-1) |
| $K_p$ = | 0.85 | Velocity Pressure Coefficient at Parapet Height | (Table 26.10-1) |

**Step 5 -Velocity Pressure**

| | | | |
|---|---|---|---|
| $q_h$ = | 28.53 psf | Velocity Pressure at Wall Height | (EQ 26.10-1) |
| $q_p$ = | 21.31 psf | Velocity Pressure at Parapet Height | (EQ 26.10-1) |

**Step 6 - External Pressure Coefficient (Flat Roof, H < 60ft)**

| | | |
|---|---|---|
| Span, l = | 5 | Span Length of Component |
| TW = | 2 | Tributary Width of Component |
| EWA = | 10 | Effective Wind Area |
| a = | 8 | |

| | Zone | [-] $GC_p$ | [+] $GC_p$ | |
|---|---|---|---|---|
| Roof | 1' | -0.90 | 0.30 | (Figure 30.3-2) |
| | 1 | -1.70 | 0.30 | (Figure 30.3-2) |
| | 2 | -2.30 | 0.30 | (Figure 30.3-2) |
| | 3 | -3.20 | 0.30 | (Figure 30.3-2) |
| Wall | 4 | -1.10 | 1.00 | (Figure 30.3-1) |
| | 5 | -1.40 | 1.00 | (Figure 30.3-1) |

**Step 7 -Wind Pressure, p** **(EQ 30.8-1)**

| | Zone: | $GC_p$ | p | 0.6 p |
|---|---|---|---|---|
| Wall | 4 | 1.10 | 36.52 psf | 21.91 psf |
| | 5 | 1.40 | 33.67 psf | 20.20 psf |
| Roof | 1' | -0.90 | -19.18 psf | -11.51 psf |
| | 1 | -1.70 | -36.23 psf | -21.74 psf |
| | 2 | -2.30 | -49.01 psf | -29.41 psf |
| | 3 | -3.20 | -68.19 psf | -40.91 psf |
| ılift | 1' | -0.90 | -19.18 psf | -11.51 psf |
| | 1 | -1.70 | -36.23 psf | -21.74 psf |

**Paragon Star - Apartments** **Bob D. Campbell & Co.**

**ASCE 7-16 - Main Wind Force Reinforcing System: Directional Procedure** 7/22/2022

**ASCE 7-16 - Seismic Design Requirements for Building Structures: Equivalent Lateral Force Procedure**

**General Data**

| | | |
|---|---|---|
| $z_g$ = | 814 ft | Ground Elevation |
| z = | 57.00 ft | Eave Height |
| L = | 76.0 ft | |
| B = | 238.0 ft | |
| Parapet | 60.00 ft | |
| Roof | 57.00 ft | |
| 5th Floor | 48.00 ft | |
| 4th Floor | 37.33 ft | |
| 3rd Floor | 26.67 ft | |
| 2nd Floor | 16.00 ft | |

| **Risk Category** | | | **(Section 1.5)** |
|---|---|---|---|
| Category = | II | | (Table 1.5-1) |

| **Wind Load Parameters** | | | **(Section 26)** |
|---|---|---|---|
| V = | 109 mph | | (Figure 26.5-1 & 2) |
| $K_d$ = | 0.85 | Wind Directionality Factor | (Table 26.6-1) |
| Exposure: | C | Exposure Category | (Section 26.7) |
| $K_{zt}$ = | 1.00 | Topographic Factor | (Section 26.8.2) |
| $K_e$ = | 0.97 | Ground Elevation Factor | (Table 26.9-1) |
| G = | 0.85 | Gust Effect Factor | (Section 26.11.1) |
| Classification: | Enclosed | Enclosure Classifcation | (Section 26.12) |
| $(GC_{pi})$ = | +/- .18 | Internal Pressure Coefficient | (Table 26.13-1) |

**Seismic Load Parameters**

| | | | |
|---|---|---|---|
| $I_e$= | 1 | Importance Factor | (Table 1.5-2) |
| Site Class | D | Wind Directionality Factor | (Geotech Report) |
| $S_S$= | 0.099 | Mapped Acceleration Parameter - 0.2s | (ATC Hazards Report) |
| $S_1$ = | 0.068 | Mapped Acceleration Parameter - 1.0s | (ATC Hazards Report) |
| $F_a$= | 1.6 | Site Coefficient_Short Period | (Table 11.4-1) |
| $F_v$= | 2.4 | Site Coefficient_Long Period | (Table 11.4-2) |
| R= | 2 | Response Modification Factor | (Table 12.2-1) |
| k= | 1 | Site Coefficient_Long Period | (Equation 12.8-12) |

**Paragon Star - Apartments** **Bob D. Campbell & Co.**

**ASCE 7-16 - Main Wind Force Reinforcing System: Directional Procedure** 7/22/2022

(Table 27.2-1)

**General Data**

L = 76 ft
B = 238 ft

**Risk Category** **(Section 1.5)**

Category = II (Table 1.5-1)

**Basic Wind Speed** **(Section 26.5.1)**

V = 109 mph (Figure 26.5-1 & 2)

**Wind Load Parameters** **(Section 26)**

| | | | |
|---|---|---|---|
| $K_d$ = | 0.85 | Wind Directionality Factor | (Table 26.6-1) |
| Exposure: | C | Exposure Category | (Section 26.7) |
| $K_{zt}$ = | 1.00 | Topographic Factor | (Section 26.8.2) |
| $K_e$ = | 0.97 | Ground Elevation Factor | (Table 26.9-1) |
| G = | 0.85 | Gust Effect Factor | (Section 26.11.1) |
| Classification: | Enclosed | Enclosure Classifcation | (Section 26.12) |
| $(GC_{pi})$ = | 0.18 | Internal Pressure Coefficient | (Table 26.13-1) |

**Velocity Pressure Exposure Coefficient** **(Section 26.10)**

| | | | |
|---|---|---|---|
| $\alpha$ = | 9.5 | (3 sec gust speed power law exponent) | (Table 26.11-1) |
| $z_g$ = | 900 | (Nominal height of atmospheric boundary layer) | (Table 26.11-1) |

**External Pressure Coefficient** **(Fig 27.3-1)**

| | L/B | $C_p$ | |
|---|---|---|---|
| | | 0.8 | Windward |
| Wall | 0.32 | -0.50 | Leeward |
| | | -0.7 | Side |

| | h/L = | 0.79 | |
|---|---|---|---|
| | $C_p$ = | -0.18 | Windward (min) |
| Roof | $C_p$ = | #REF! | Windward (max) |

**Wind Pressure, p** **(EQ 27.3-1)**

| Level | h (ft) | $K_h$ | $q_h$ (psf) | $p_{windward}$ (psf) | $p_{leeward}$ (psf) | $p_{total}$ (psf) | $w_{total}$ (plf) | $F_x$ (k) | | $0.6F_x$ (k) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | L | B | L | B |
| Parapet | 60 | 1.14 | 28.53 | 42.80 | -28.53 | 71.33 | - | - | - | - | - |
| Roof | 57 | 1.12 | 28.22 | 19.19 | -12.00 | 31.19 | 360 | 27.4 | 85.7 | 16.4 | 51.4 |
| 5th Floor | 48 | 1.08 | 27.22 | 18.51 | -12.00 | 30.51 | 310 | 23.6 | 73.8 | 14.1 | 44.3 |
| 4th Floor | 37.33 | 1.03 | 25.82 | 17.56 | -12.00 | 29.55 | 320 | 24.3 | 76.2 | 14.6 | 45.7 |
| 3rd Floor | 26.67 | 0.96 | 24.05 | 16.36 | -12.00 | 28.35 | 310 | 23.6 | 73.8 | 14.1 | 44.3 |
| 2nd Floor | 16 | 0.86 | 21.60 | 14.69 | -12.00 | 26.68 | 360 | 27.4 | 85.7 | 16.4 | 51.4 |

**Paragon Star - Apartments** **Bob D. Campbell & Co.**

**ASCE 7-16 - Seismic Design Requirements for Building Structures: Equivalent Lateral Force Procedure** 7/22/2022

**General Data**

| | | |
|---|---|---|
| L = | 76.0 ft | |
| B = | 238.0 ft | |

**Seismic Load Parameters**

| | | | |
|---|---|---|---|
| $I_e$= | 1.00 | Importance Factor | (Table 1.5-2) |
| Site Class | D | Wind Directionality Factor | (Geotech Report) |
| $S_S$= | 0.099 | Mapped Acceleration Parameter - 0.2s | (ATC Hazards Report) |
| $S_1$= | 0.068 | Mapped Acceleration Parameter - 1.0s | (ATC Hazards Report) |
| $F_a$= | 1.60 | Site Coefficient_Short Period | (Table 11.4-1) |
| $F_v$= | 2.40 | Site Coefficient_Long Period | (Table 11.4-2) |
| R= | 2.00 | Response Modification Factor | (Table 12.2-1) |
| k= | 1.00 | Structure Period Coefficient | (Equation 12.8-12) |

**Design Spectral Acceleration Parameters** **(Section 11.4.5)**

| | | | |
|---|---|---|---|
| $S_{MS}$= | 0.158 | $MCE_R$ Spectral Response Acceleration Parameter - 0.2s | (Equation 11.4-1) |
| $S_{M1}$= | 0.163 | $MCE_R$ Spectral Response Acceleration Parameter - 1.0s | (Equation 11.4-2) |
| $S_{DS}$= | 0.106 | Design Spectral Response Acceleration Parameter - 0.2s | (Equation 11.4-3) |
| $S_{D1}$= | 0.109 | Design Spectral Response Acceleration Parameter - 1.0s | (Equation 11.4-4) |

**Fundamental Period** **(Section 12.8.2)**

| | | | |
|---|---|---|---|
| $h_n$= | 60.00 ft | Structural Height | (Section 11.2) |
| $C_t$= | 0.02 | Period Parameter Coefficient | (Table 12.8-2) |
| x= | 0.75 | Period Parameter Coefficient | (Table 12.8-2) |
| $T_L$= | 12s | Long Period Transistion Period | (Figures 22-14 thru 22-17) |
| **$T_a$=** | **0.431s** | **Approximate Fundamental Period** | **(Equation 12.8-7)** |

**Seismic Response Coefficient** **(Section 12.8.2)**

| | | | |
|---|---|---|---|
| $C_s$= | 0.0528 | Seismic Response Coefficient | (Equation 12.8-2) |
| $C_{s,min}$= | 0.010 | Seismic Response Coefficient_Minimum | (Equations 12.8-5, 12.8-6) |
| $C_{s,max}$= | 0.126 | Seismic Response Coefficient_Maximum | (Equations 12.8-3, 12.8-4) |
| **$C_s$=** | **0.0528** | **Design Seismic Response Coefficient** | |

**Vertical Distribution of Seismic Forces** **(Section 12.8.3)**

| | | |
|---|---|---|
| H= | Height of Level | |
| A= | Area of Level | |
| DL= | Dead Load of Level | |
| W= | Weight of Level | |
| $C_{vx}$= | Vertical Distribution Factor of Level | (Equation 12.8-12) |
| $F_x$= | Force at Level | (Equation 12.8-11) |

| Floor | $H_X$ (ft) | $A_X$ ($ft^2$) | $DL_X$ (psf) | $W_X$ (k) | $W_X H_X^k$ | $C_{vx}$ | $F_x$ | $0.7F_x$ |
|---|---|---|---|---|---|---|---|---|
| Roof | 57 | 18088 | 20 | 361.76 | 20620.32 | 0.26 | 30.1 k | 21.1 k |
| 5th Floor | 48 | 18088 | 25 | 452.20 | 21705.60 | 0.28 | 31.7 k | 22.2 k |
| 4th Floor | 37.33 | 18088 | 25 | 452.20 | 16880.63 | 0.22 | 24.6 k | 17.3 k |
| 3rd Floor | 26.67 | 18088 | 25 | 452.20 | 12060.17 | 0.15 | 17.6 k | 12.3 k |
| 2nd Floor | 16 | 18088 | 25 | 452.20 | 7235.20 | 0.09 | 10.6 k | 7.4 k |
| | | | Total | 2170.56 | 78501.92 | 1.00 | 114.6 k | 80.2 k |

**Seismic Base Shear** **(Section 12.8.1)**

| | | | |
|---|---|---|---|
| **V=** | **114.61 k** | **Seismic Base Shear** | (Equation 12.8-1) |

**Wind vs Seismic - Controlling Loads**

| Apply Wind Multiplier[1] | "B" | | | Level | "L" | | | Apply Wind Multiplier[1] |
|---|---|---|---|---|---|---|---|---|
| | Controls | Wind $0.6F_x$ (k) | Seismic $0.7F_x$ (k) | | Seismic $0.7F_x$ (k) | Wind $0.6F_x$ (k) | Controls | |
| YES | **Wind** | 51.4 | 21.1 | **Roof** | 21.1 | 16.4 | **Seismic** | NO |
| YES | **Wind** | 44.3 | 22.2 | **5th Floor** | 22.2 | 14.1 | **Seismic** | NO |
| YES | **Wind** | 45.7 | 17.3 | **4th Floor** | 17.3 | 14.6 | **Seismic** | NO |
| YES | **Wind** | 44.3 | 12.3 | **3rd Floor** | 12.3 | 14.1 | **Wind** | NO |
| YES | **Wind** | 51.4 | 7.4 | **2nd Floor** | 7.4 | 16.4 | **Wind** | YES |

[1] Applies to Wood-Framed Shearwalls only. See SDPWS-2015 Table 4.3A, shear capacities for wind loads are 1.4x higher than for seismic

**ACP Loads**

Paragon Star

| Dead Loads | | |
|---|---|---|
| Item | Weight | |
| | (psf) | (plf) |
| 13'x30" TT + 5psf | 81 | |
| 24x24 Column | | 600 |
| 24x28 Column | | 699 |
| 28x28 Column | | 814 |
| 40IT30 + Wash | | 1075 |
| 40IT40 + Wash | | 1325 |
| 3" Wash | | 57 |
| Grade Beam | | 1125 |
| 6" Topping (+4") | 50 | |
| 10" Ext Wall | 125 | |
| 12" Litewall | 120 | |
| Residential Flr | 35 | |
| Residential Wall | 15 | |

| Live Loads (psf) | |
|---|---|
| Floor | 40 |
| Roof | 60 |
| Stairs | 100 |
| Residential | 40 |

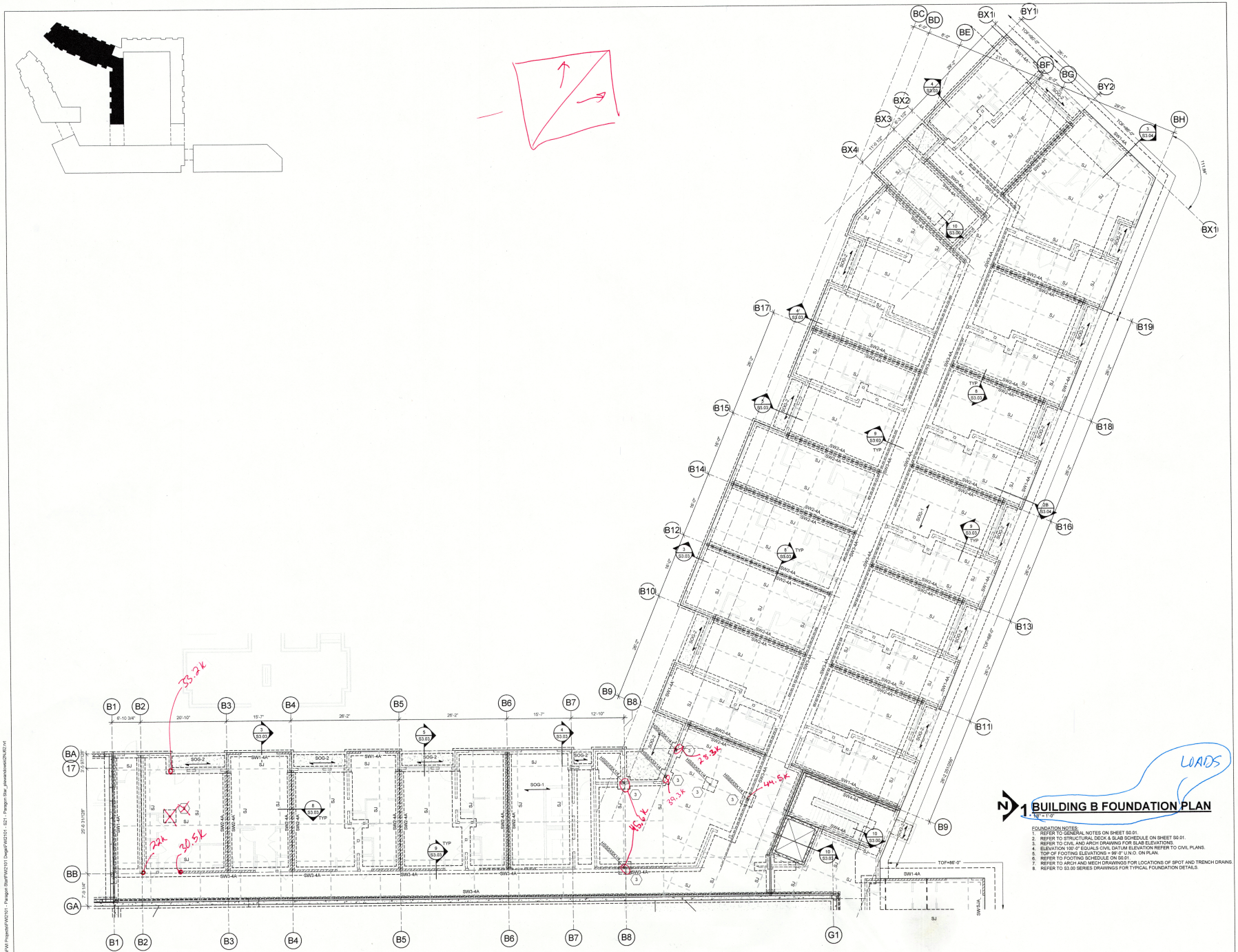
| Podium | |
|---|---|
| DL | 0.35 k |
| LL | 0.19 k |
| Brick | 1.84 klf |

| Pile Capacity | | | | |
|---|---|---|---|---|
| Size | Bearing | Shear | Uplift | 0.6DL Pile* |
| 18"Ø | 300 k | 12 k | 20 k | 8 k |
| 14"Ø | 120 k | 5 k | 4 k | 5 k |

defletion of approx 3/8"

* Based on 50' long pile

| Location | Tributarty Area | Floor Levels | Roof Levels | Column 24x24 | Column 24x28 | Column 28x28 | 40IT30 | 40IT40 | 3" Wash | Grade Beam | 6" Topping | 10" Ext Wall | 12" Litewall | Res Floor | Res Wall | Pile Cap | DL | LL | TL | Gravity | | Lateral | | Spacing Provided | Vertical Load | Shear Load | Total Piles Over-Ride | Shear Load Per Pile Over-Ride | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | # of 18"Ø ACP | Spacing of ACP | Lateral Load | Spacing of ACP | | | | | | |
| | ($ft^2$) | | | (lf) | (lf) | (lf) | (lf) | (lf) | (lf) | (lf) | ($ft^2$) | (lf) or ($ft^2$) | (lf) or ($ft^2$) | ($ft^2$) | (lf) | (lbs) | | | | (#) | (ft) | (klf) | (ft) | (ft) | (k) | (k) | | (k) | |
| **Precast Garage** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GA Cont | 31 | 3 | 1 | | | | | | 4 | 1 | | 54 | | 14 | 50 | | 19.26 klf | 6.05 klf | 25.31 klf | | 11.85 | 0.91 klf | 13.24 | 9.63 | 244 k | 8.73 k | 24 | 7.14 k | |
| GB Cont | 61 | 3 | 1 | | | | | | 8 | 1 | | | 57 | | | | 28.02 klf | 10.89 klf | 38.91 klf | | 7.71 | 1.23 klf | 9.77 | 7.67 | 298 k | 9.42 k | 26 | 6.85 k | |
| GC Cont | 31 | 3 | 1 | | | | | | 4 | 1 | | 54 | | 14 | 50 | | 19.23 klf | 6.05 klf | 25.28 klf | | 11.87 | 0.92 klf | 12.99 | 10.13 | 256 k | 9.36 k | 24 | 7.28 k | |
| G1 Cont | 1 | 3 | 1 | | | | | | 4 | 1 | | 53 | | 14 | 50 | | 9.54 klf | 0.74 klf | 10.28 klf | | 29.18 | 2.63 klf | 4.56 | 4.50 | 46 k | 11.84 k | 30 | 10.76 k | |
| G4 Ramp | 1 | 1 | 1 | | | | | | 1 | 1 | 4 | 12 | | | | | 2.98 klf | 0.10 klf | 3.08 klf | | 97.36 | 0.00 klf | #DIV/0! | 20.17 | 62 k | 0.00 k | | | |
| G6 | | | | | | | | | | | | | | | | | | | | | | 3.25 klf | 3.69 | 4.50 | 0 k | 14.62 k | 12 | 10 k | |
| E. Stair | | | | | | | | | | | | | | | | | | | | | | 0.44 klf | 27.43 | 6.33 | 0 k | 2.77 k | 3 | 2 k | |
| N. Stair | | | | | | | | | | | | | | | | | | | | | | 2.38 klf | 5.05 | | 0 k | 0.00 k | 4 | 11 k | |
| S. Stair | | | | | | | | | | | | | | | | | | | | | | 2.05 klf | 5.84 | | 0 k | 0.00 k | 3 | 12 k | |
| GB/G1 | 514 | 1 | 0 | 56 | | | 9 | | 36 | | | 477 | | | | 36,450 | 182.52 k | 20.57 k | 786.74 k | 3 | | | | | | | | | |
| | 1301 | 2 | 1 | | | | | 65 | | | | | | | | | 401.54 k | 182.11 k | | | | | | | | | | | |
| GB/G2 | 1301 | 1 | 0 | 17 | | | 22 | | | | | | | | | 16,200 | 154.87 k | 52.03 k | 206.90 k | 1 | | | | | | | | | |
| GB/G3 | 787 | 1 | 0 | 56 | | | 13 | | | | | | | | | 36,450 | 147.73 k | 31.46 k | 762.84 k | 3 | | | | | | | | | |
| | 1301 | 2 | 1 | | | | | 65 | | | | | | | | | 401.54 k | 182.11 | | | | | | | | | | | |
| GB/G6 | 1301 | 3 | 1 | | | | | | | | | | 1580 | | | 82,031 | 693.07 k | 234.14 | 927.21 | 4 | | | | | | | | | |
| GB/G7 | 2602 | 3 | 1 | 56 | | | | 22 | | | 1301 | | 860 | | | 113,906 | 1187.78 k | 468.27 | 1656.05 | 6 | | | | | | | | | |
| GB/G8 | 1341 | 3 | 1 | 56 | | | | 89 | | | 1341 | 2420 | | | | 72,900 | 1028.00 k | 241.38 | 1269.38 | 5 | | | | | | | | | |
| GA/G8 | 670 | 3 | 1 | 56 | | | | | 210 | | 670 | 2100 | | | | 36,450 | 595.26 k | 120.69 | 715.95 | 3 | | | | | | | | | |
| GA/G7 | 1334 | 3 | 1 | 56 | | | | | 176 | | 844 | 1763 | | | | 36,450 | 774.80 k | 240.04 | 1014.85 | 4 | | | | | | | | | |
| | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Podium Loads - Equations Change Below this Line** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TYP Int Podium | 644 | 0 | 0 | 17 | | | | | | | | | | | | 16,200 | 248.58 k | 119.14 | 367.72 | 2 | | | | | | | | | |
| TYP Ext Podium | 448 | 0 | 0 | 17 | | | | | | | | | | | | 16,200 | 180.96 k | 82.88 | 263.84 | 1 | | | | | | | | | |




## 1 BUILDING B FOUNDATION PLAN

3/32" = 1'-0"

FOUNDATION NOTES:

1. REFER TO GENERAL NOTES ON SHEET S0.01.
2. REFER TO STRUCTURAL DECK & SLAB SCHEDULE ON SHEET S0.01.
3. REFER TO CIVIL AND ARCH DRAWING FOR SLAB ELEVATIONS.
4. ELEVATION 100'-0" EQUALS CIVIL DATUM ELEVATION REFER TO CIVIL PLANS.
5. TOP OF FOOTING ELEVATIONS = 99'-0" U.N.O. ON PLAN.
6. REFER TO FOOTING SCHEDULE ON S0.01.
7. REFER TO ARCH AND MECH DRAWINGS FOR LOCATIONS OF SPOT AND TRENCH DRAINS.
8. REFER TO S3.00 SERIES DRAWINGS FOR TYPICAL FOUNDATION DETAILS.

paragon star

FW1 21C

PARAGON STAR
NORTH VILLAGE

3200 NW PARAGON PKWY
LEE'S SUMMIT, MO 64081

| | |
|---|---|
| Project No.: | 18017.19050.07,19050.08 |
| Date: | 02.23.2022 |
| Issued For: | BLDG 1 & 2 75% SET |

REVISIONS

| No. | Date | Description |
|---|---|---|

REGISTRATION

NOT FOR CONSTRUCTION

PROJECT TEAM

| | |
|---|---|
| ARCHITECT | FINKLE+WILLIAMS ARCHITECTURE |
| CIVIL | GBA ENGINEERS |
| LANDSCAPE | LAND 3 |
| STRUCTURAL | BOB D. CAMPBELL |
| PLUMBING | LATIMER SOMMERS |
| MECHANICAL | LATIMER SOMMERS |
| ELECTRICAL | LATIMER SOMMERS |
| FIRE PROTECTION | LATIMER SOMMERS |
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SHEET TITLE

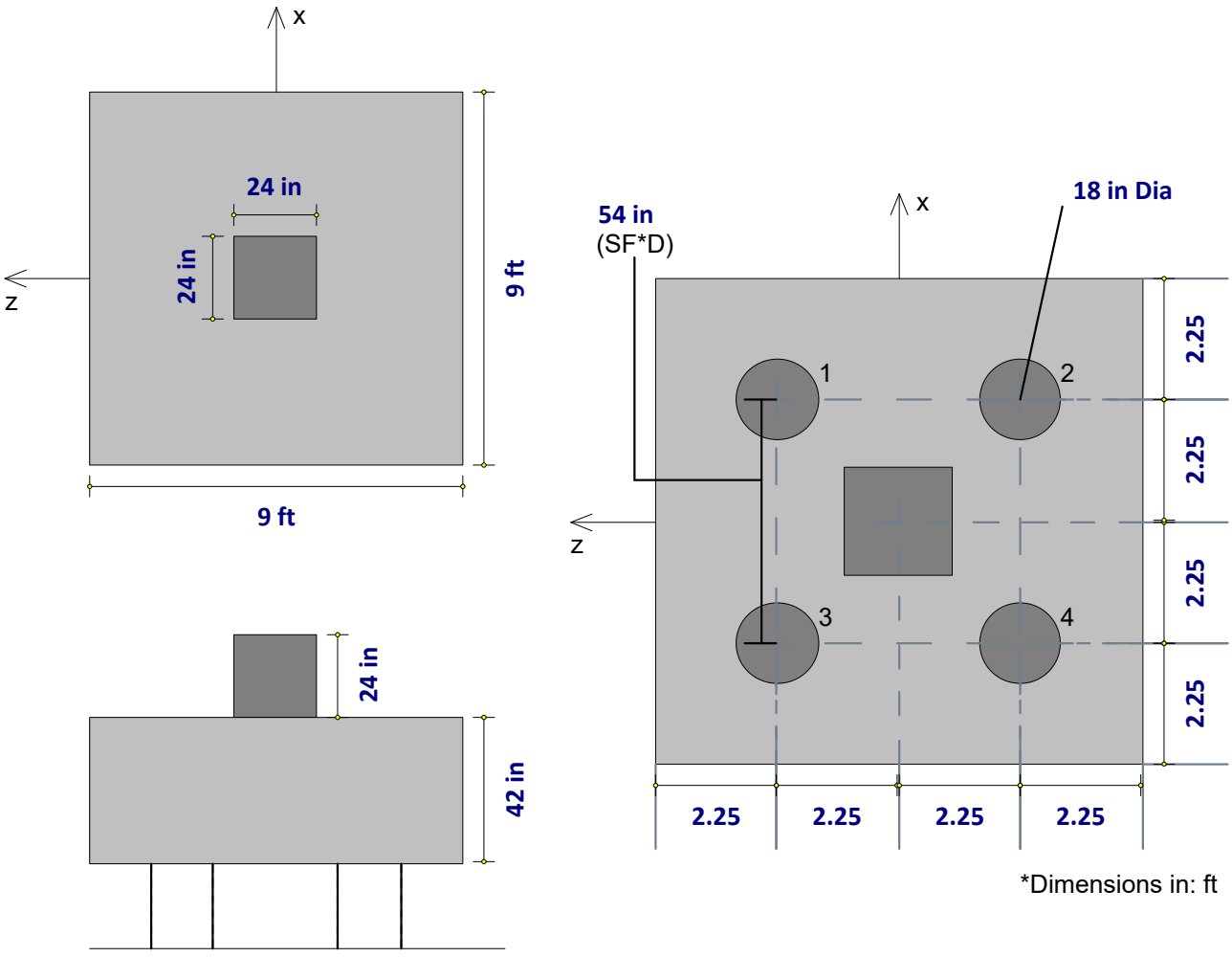
BUILDING B
FOUNDATION
PLAN

SHEET NUMBER

S1.21B

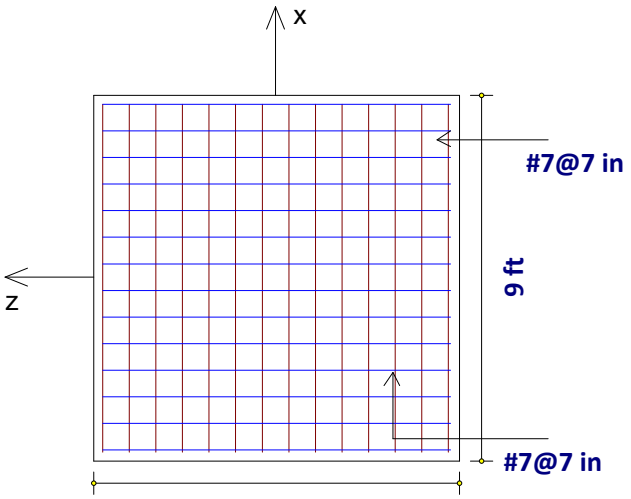
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## *Sketch*



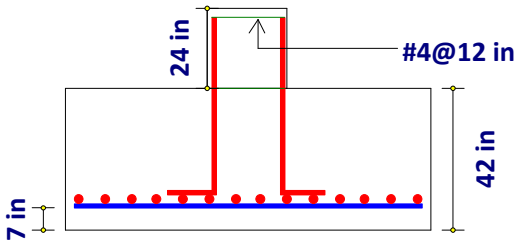

*Dimensions in: ft

## Details

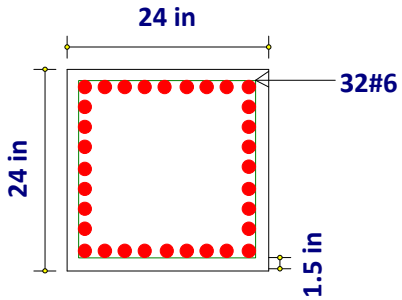



x Dir. Steel : **8.418 in^2 (14 #7)**
z Dir. Steel : **8.418 in^2 (14 #7)**

**Bottom Rebar Plan**




**Pile Cap Elevation**




**Pedestal Rebar Plan**

## Geometry, Materials and Criteria

| | | | | | |
|---|---|---|---|---|---|
| Point | : **N1** | Concrete Weight | : **0.145 k/ft^3** | Steel fy | : **60 ksi** |
| Length | : **9 ft** | Concrete f'c | : **3.5 ksi** | Minimum Steel | : **0.001800** |
| Width | : **9 ft** | Design Code | : **ACI 318-14** | Maximum Steel | : **0.007500** |
| Thickness | : **42 in** | Pile Definition | : **Pile 1** | | |
| Ped. Height | : **24 in** | Soil Overburden | : **0 ksf** | | |
| Ped. X | : **24 in** | | | | |
| Ped. Z | : **24 in** | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Cap Top Bar Cover | : **1.5 in** | Allow Shear | : **16 k** | Rotation Angle | : **0 deg** |
| Cap Bot Bar Cover | : **3 in** | Allow Axial Comp | : **300 k** | Group Red Fact (V) | : **1** |
| Ped Long Bar Cover | : **1.5 in** | Allow Axial Tens | : **20 k** | Group Red Fact (P) | : **1** |
| Pile Embedment | : **4 in** | Phi for Flexure | : **0.9** | Pile Tolerance | : **3 in** |
| Pile Dia/Side Dims | : **18 in** | Phi for Shear | : **0.75** | | |
| Pile Spacing Factor | : **3** | | | | |
| Pile Min Spacing | : **54 in** | | | | |
| Pile Min Edge Dist | : **27 in** | | | | |

## Pile Capacity Checks

Pile Allow Tens : **20 k**
Pile Allow Comp : **300 k**
Pile Allow Shear : **16 k**

| Shear UC Max | Gov Pile for Shear | Gov Shear LC | Axial Comp UC Max | Gov Pile for Axial Comp | Gov Axial Comp LC | Axial Tens UC Max | Gov Pile for Axial Tens | Gov Axial Tens LC |
|---|---|---|---|---|---|---|---|---|
| 0 | NC | NC | 0.851 | 1 | 1 | 0 | NC | NC |

Note: See Expanded View for information for each individual pile for each load combination
Pile capacity checks are only given for Service LC's

## Soil Results

| Soil Comp UC Max | Gov Pile for Soil Comp | Gov Soil Comp LC | Soil Tens UC Max | Gov Pile for Soil Tens | Gov Soil Tens LC | Total Skin Friction (k) | Tip Bearing (k) |
|---|---|---|---|---|---|---|---|
| 0 | NC | NC | 0 | NC | NC | 0 | 0 |

Note: See Expanded View for information for each individual pile for each load combination
Pile capacity checks are only given for Service LC's

## Pile Cap Flexural Design

As-min x-dir (Top Flexure): **8.165 in^2**
As-min z-dir (Top Flexure): **8.165 in^2**
As-min x-dir (Bot Flexure): **8.165 in^2**
As-min z-dir (Bot Flexure): **8.165 in^2**
As-min x-dir (T & S): **8.165 in^2**
As-min z-dir (T & S): **8.165 in^2**

**Bottom Bar Reinforcement**

| Mu-xx UC Max | Gov Mu-xx LC | Mu-xx (k-ft) | z-Dir As Required (in^2) | z-Dir As Provided (in^2) | Mu-zz UC Max | Gov Mu-zz LC | Mu-zz (k-ft) | x-Dir As Required (in^2) | x-Dir As Provided (in^2) |
|---|---|---|---|---|---|---|---|---|---|
| 0.758 | 2 | 957.033 | 6.342 | 8.418 | 0.758 | 2 | 957.033 | 6.342 | 8.418 |

**Top Bar Reinforcement**

| Mu-xx UC Max | Gov Mu-xx LC | Mu-xx (k-ft) | z-Dir As Required (in^2) | z-Dir As Provided (in^2) | Mu-zz UC Max | Gov Mu-zz LC | Mu-zz (k-ft) | x-Dir As Required (in^2) | x-Dir As Provided (in^2) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | NC | 0 | 0 | 0 | 0 | NC | 0 | 0 | 0 |

## Pedestal Punching Shear Check

Phi : **0.75**

| Gov LC | UC | Punching Shear Location | Punching Shear (k) | Muz (k-ft) | Mux (k-ft) | Total Stress (ksi) | Phi * Vny (ksi) |
|---|---|---|---|---|---|---|---|
| 2 | 0 | INTERIOR | 0 | 0 | 0 | 0 | 0.177 |

## Pile Punching Shear Check

Phi : **0.55**

| Gov LC | Gov Pile | Punching Shear Location | Punching Shear Cap (k) | Punching Shear (k) | Punching Shear UC |
|---|---|---|---|---|---|
| **2** | **1** | **CORNER** | **357.912** | **330.201** | **0.923** |

Note: See Expanded View for information for each individual pile for each load combination
Punching shear checks are only given for Strength LC's

## Punching Shear Geometry

Pedestal Shape : **CRECT24X24** Pile Shape : **RND18**

| Gov Pile/ Pedestal | Location | Effective Depth (in) | L1 (in) | L2 (in) | Polar Moment-xx (in^4) | Polar Moment-zz (in^4) | Gamma-x | Gamma-z |
|---|---|---|---|---|---|---|---|---|
| **Pedestal** | **INTERIOR** | **34.125** | **58.125** | **58.125** | **4.853e+6** | **4.853e+6** | **0.4** | **0.4** |
| **1** | **CORNER** | **38** | **53.069** | **53.069** | **0** | **0** | **0** | **0** |

Note: See Expanded View for information for each individual pile for each load combination

## One Way (Deep Beam) Shear Check

w : **18 in**
d : **34.125 in**
Vu : **641.219 k**
Mu-xx: **957.033 k-ft**

w : **18 in**
d : **34.125 in**
Vu : **641.219 k**
Mu-zz: **957.033 k-ft**

Phi : **0.75** Vc(x-Dir Cut) : **1884.676 k** Vc(z-Dir Cut) : **1884.676 k**

| UC | x-Dir Cut Vu (k) | Gov LC | UC | z-Dir Cut Vu (k) | Gov LC |
|---|---|---|---|---|---|
| **0.454** | **641.219** | **2** | **0.454** | **641.219** | **2** |

Note: One way (beam) shear failures associated with the pile locations are not considered.

## Pedestal Design

**Shear Check Results (Envelope):**

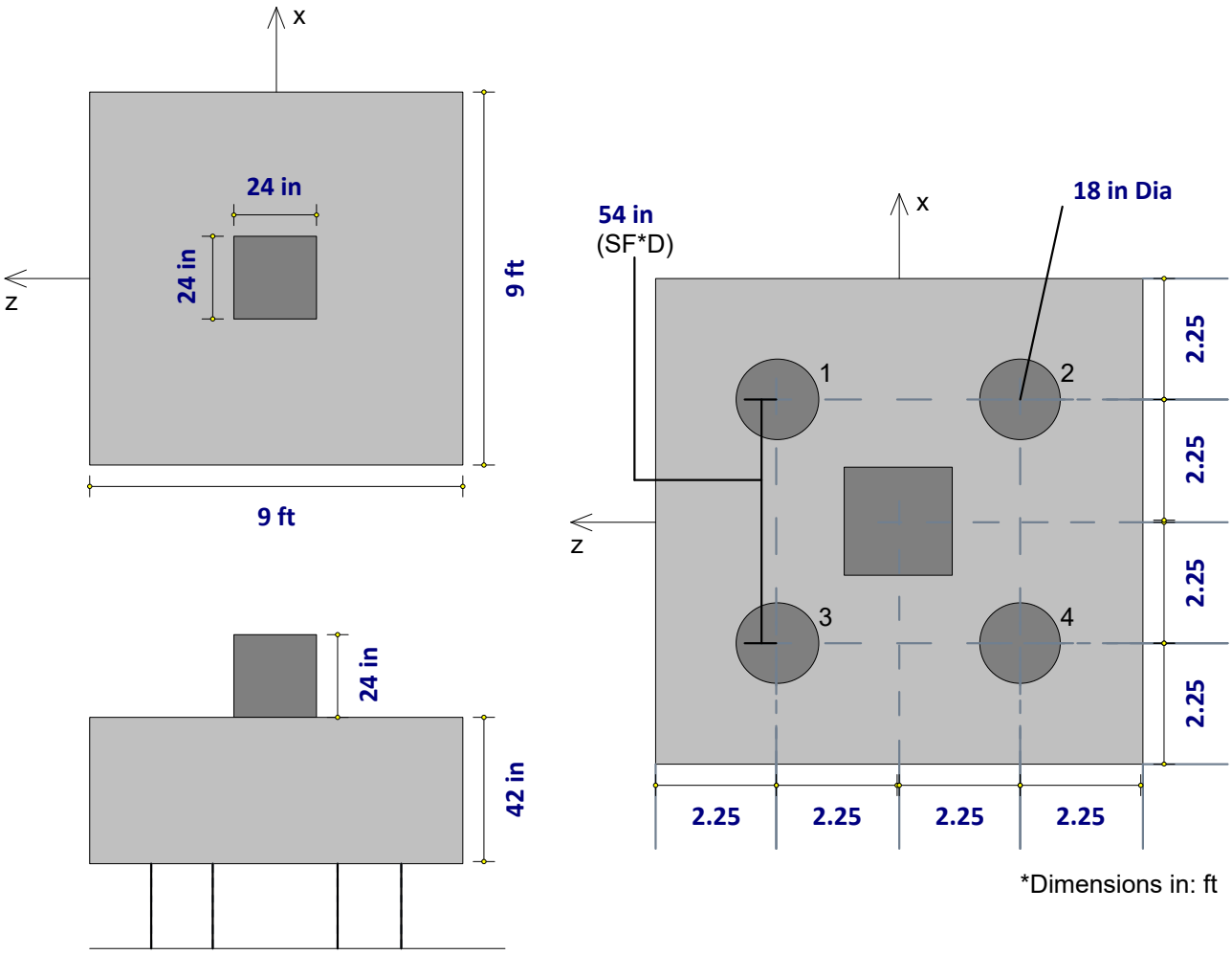
| | Vc | Vs | Vu | Vu/phi*Vn | phi |
|---|---|---|---|---|---|
| Shear Along x Direction: | **61.409** | **42.461** | **0** | **0** | **0.75** |
| Shear Along z Direction: | **61.409** | **42.461** | **0** | **0** | **0.75** |

Pedestal Ties : **#4@12 in**

**Bending Check Results (Envelope): PCA Load Contour Method (for biaxial)**

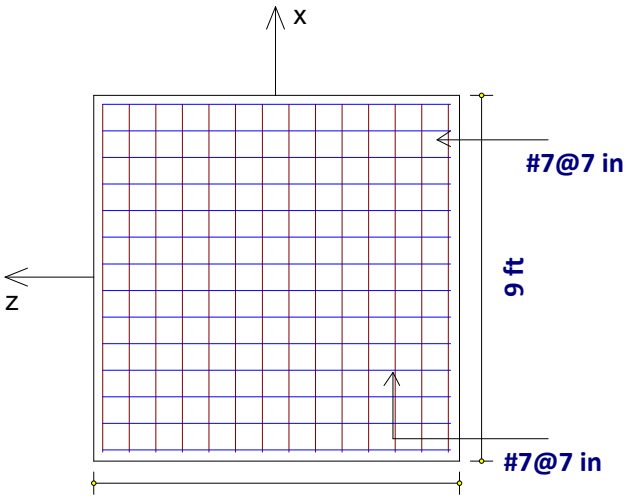
| | | | | | |
|---|---|---|---|---|---|
| Unity Check | : **0.97** | Phi | : **0.65** | Parme Beta | : **0.65** |
| Pu | : **1271.476 k** | Mux | : **0 k-ft** | Muz | : **0 k-ft** |
| Pn | : **2015.818 k** | Mnx | : **NC** | Mnz | : **NC** |
| Governing LC | : **2** | Mnox | : **NC** | Mnoz | : **NC** |
| Pedestal Bars | : **32 #6** | % Steel | : **2.454** | | |

## *Sketch*



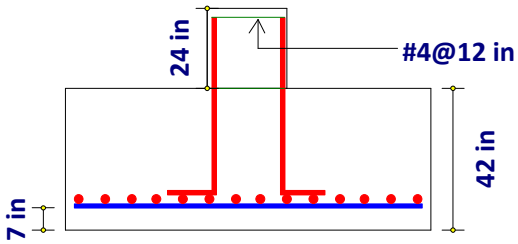

*Dimensions in: ft

## Details

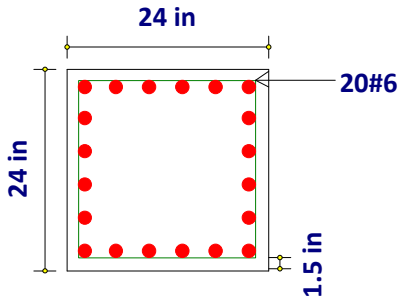



x Dir. Steel : **8.418 in^2 (14 #7)**
z Dir. Steel : **8.418 in^2 (14 #7)**

**Bottom Rebar Plan**




**Pile Cap Elevation**




**Pedestal Rebar Plan**

## Geometry, Materials and Criteria

| | | | | | |
|---|---|---|---|---|---|
| Point | : **N1** | Concrete Weight | : **0.145 k/ft^3** | Steel fy | : **60 ksi** |
| Length | : **9 ft** | Concrete f'c | : **3.5 ksi** | Minimum Steel | : **0.001800** |
| Width | : **9 ft** | Design Code | : **ACI 318-14** | Maximum Steel | : **0.007500** |
| Thickness | : **42 in** | Pile Definition | : **Pile 1** | | |
| Ped. Height | : **24 in** | Soil Overburden | : **0 ksf** | | |
| Ped. X | : **24 in** | | | | |
| Ped. Z | : **24 in** | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Cap Top Bar Cover | : **1.5 in** | Allow Shear | : **16 k** | Rotation Angle | : **0 deg** |
| Cap Bot Bar Cover | : **3 in** | Allow Axial Comp | : **300 k** | Group Red Fact (V) | : **1** |
| Ped Long Bar Cover | : **1.5 in** | Allow Axial Tens | : **20 k** | Group Red Fact (P) | : **1** |
| Pile Embedment | : **4 in** | Phi for Flexure | : **0.9** | Pile Tolerance | : **3 in** |
| Pile Dia/Side Dims | : **18 in** | Phi for Shear | : **0.75** | | |
| Pile Spacing Factor | : **3** | | | | |
| Pile Min Spacing | : **54 in** | | | | |
| Pile Min Edge Dist | : **27 in** | | | | |

## Pile Capacity Checks

Pile Allow Tens : **20 k**
Pile Allow Comp : **300 k**
Pile Allow Shear : **16 k**

| Shear UC Max | Gov Pile for Shear | Gov Shear LC | Axial Comp UC Max | Gov Pile for Axial Comp | Gov Axial Comp LC | Axial Tens UC Max | Gov Pile for Axial Tens | Gov Axial Tens LC |
|---|---|---|---|---|---|---|---|---|
| 0 | NC | NC | 0.74 | 1 | 1 | 0 | NC | NC |

Note: See Expanded View for information for each individual pile for each load combination
Pile capacity checks are only given for Service LC's

## Soil Results

| Soil Comp UC Max | Gov Pile for Soil Comp | Gov Soil Comp LC | Soil Tens UC Max | Gov Pile for Soil Tens | Gov Soil Tens LC | Total Skin Friction (k) | Tip Bearing (k) |
|---|---|---|---|---|---|---|---|
| 0 | NC | NC | 0 | NC | NC | 0 | 0 |

Note: See Expanded View for information for each individual pile for each load combination
Pile capacity checks are only given for Service LC's

## Pile Cap Flexural Design

As-min x-dir (Top Flexure): **8.165 in^2**
As-min z-dir (Top Flexure): **8.165 in^2**
As-min x-dir (Bot Flexure): **8.165 in^2**
As-min z-dir (Bot Flexure): **8.165 in^2**
As-min x-dir (T & S): **8.165 in^2**
As-min z-dir (T & S): **8.165 in^2**

**Bottom Bar Reinforcement**

| Mu-xx UC Max | Gov Mu-xx LC | Mu-xx (k-ft) | z-Dir As Required (in^2) | z-Dir As Provided (in^2) | Mu-zz UC Max | Gov Mu-zz LC | Mu-zz (k-ft) | x-Dir As Required (in^2) | x-Dir As Provided (in^2) |
|---|---|---|---|---|---|---|---|---|---|
| 0.661 | 2 | 835.373 | 5.523 | 8.418 | 0.661 | 2 | 835.373 | 5.523 | 8.418 |

**Top Bar Reinforcement**

| Mu-xx UC Max | Gov Mu-xx LC | Mu-xx (k-ft) | z-Dir As Required (in^2) | z-Dir As Provided (in^2) | Mu-zz UC Max | Gov Mu-zz LC | Mu-zz (k-ft) | x-Dir As Required (in^2) | x-Dir As Provided (in^2) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | NC | 0 | 0 | 0 | 0 | NC | 0 | 0 | 0 |

## Pedestal Punching Shear Check

Phi : **0.75**

| Gov LC | UC | Punching Shear Location | Punching Shear (k) | Muz (k-ft) | Mux (k-ft) | Total Stress (ksi) | Phi * Vny (ksi) |
|---|---|---|---|---|---|---|---|
| 2 | 0 | INTERIOR | 0 | 0 | 0 | 0 | 0.177 |

## Pile Punching Shear Check

Phi : **0.55**

| Gov LC | Gov Pile | Punching Shear Location | Punching Shear Cap (k) | Punching Shear (k) | Punching Shear UC |
|---|---|---|---|---|---|
| **2** | **1** | **CORNER** | **357.912** | **289.648** | **0.809** |

Note: See Expanded View for information for each individual pile for each load combination
Punching shear checks are only given for Strength LC's

## Punching Shear Geometry

Pedestal Shape : **CRECT24X24** Pile Shape : **RND18**

| Gov Pile/ Pedestal | Location | Effective Depth (in) | L1 (in) | L2 (in) | Polar Moment-xx (in^4) | Polar Moment-zz (in^4) | Gamma-x | Gamma-z |
|---|---|---|---|---|---|---|---|---|
| **Pedestal** | **INTERIOR** | **34.125** | **58.125** | **58.125** | **4.853e+6** | **4.853e+6** | **0.4** | **0.4** |
| **1** | **CORNER** | **38** | **53.069** | **53.069** | **0** | **0** | **0** | **0** |

Note: See Expanded View for information for each individual pile for each load combination

## One Way (Deep Beam) Shear Check

w : **18 in**
d : **34.125 in**
Vu : **560.112 k**
Mu-xx: **835.373 k-ft**

w : **18 in**
d : **34.125 in**
Vu : **560.112 k**
Mu-zz: **835.373 k-ft**

Phi : **0.75** Vc(x-Dir Cut) : **1885.617 k** Vc(z-Dir Cut) : **1885.617 k**

| UC | x-Dir Cut Vu (k) | Gov LC | UC | z-Dir Cut Vu (k) | Gov LC |
|---|---|---|---|---|---|
| **0.396** | **560.112** | **2** | **0.396** | **560.112** | **2** |

Note: One way (beam) shear failures associated with the pile locations are not considered.

## Pedestal Design

**Shear Check Results (Envelope):**

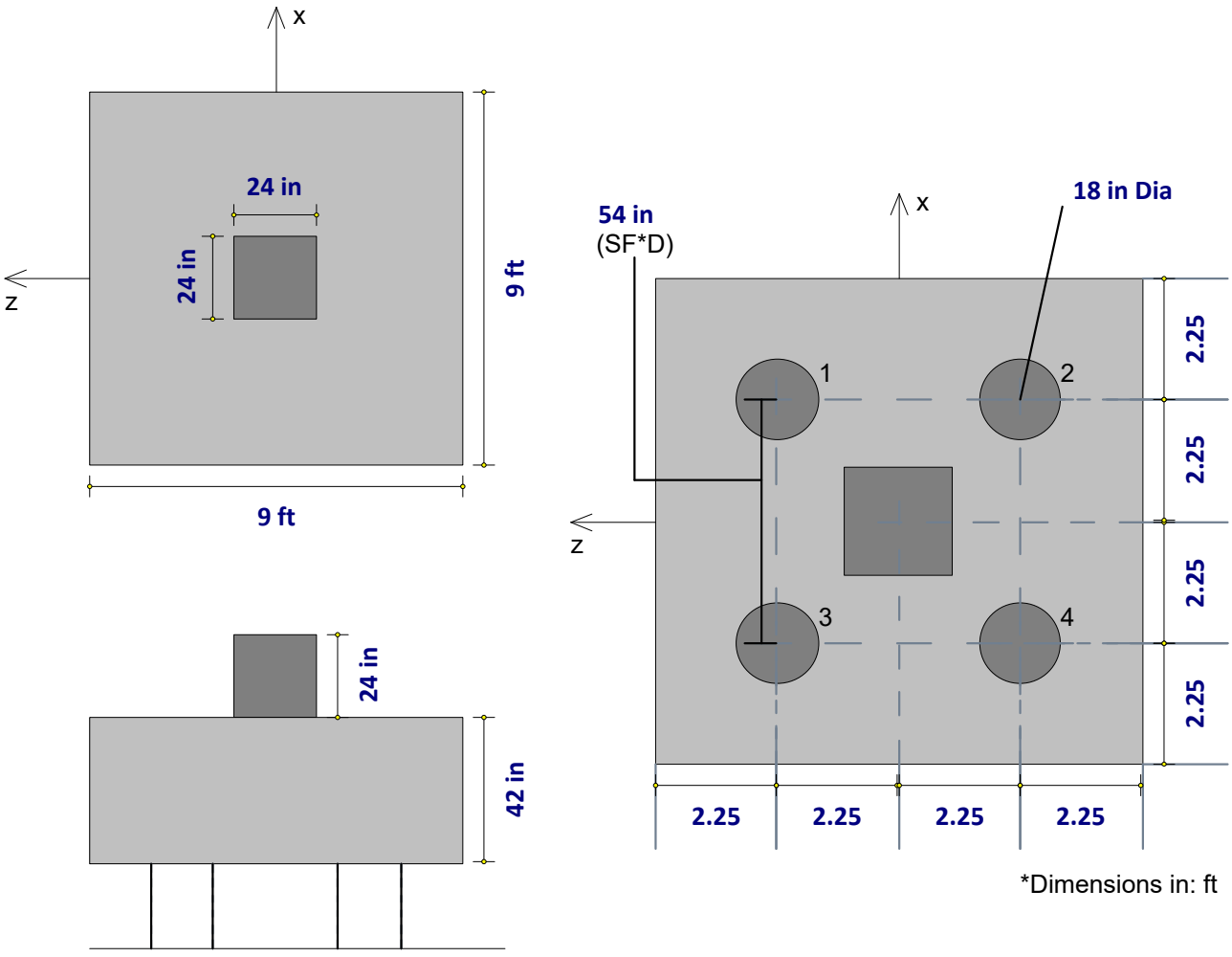
| | Vc | Vs | Vu | Vu/phi*Vn | phi |
|---|---|---|---|---|---|
| Shear Along x Direction: | **61.409** | **42.461** | **0** | **0** | **0.75** |
| Shear Along z Direction: | **61.409** | **42.461** | **0** | **0** | **0.75** |

Pedestal Ties : **#4@12 in**

**Bending Check Results (Envelope): PCA Load Contour Method (for biaxial)**

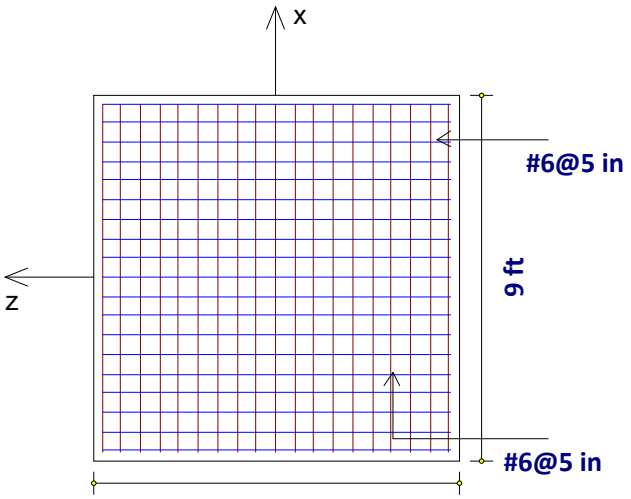
| | | | | | |
|---|---|---|---|---|---|
| Unity Check | : **0.962** | Phi | : **0.65** | Parme Beta | : **0.65** |
| Pu | : **1109.263 k** | Mux | : **0 k-ft** | Muz | : **0 k-ft** |
| Pn | : **1773.966 k** | Mnx | : **NC** | Mnz | : **NC** |
| Governing LC | : **2** | Mnox | : **NC** | Mnoz | : **NC** |
| Pedestal Bars | : **20 #6** | % Steel | : **1.534** | | |

## *Sketch*



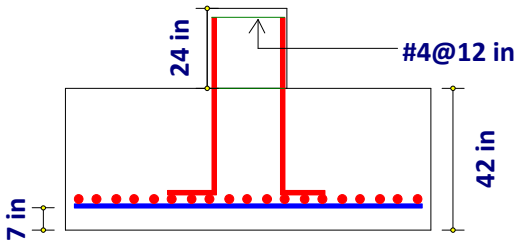

*Dimensions in: ft

## Details

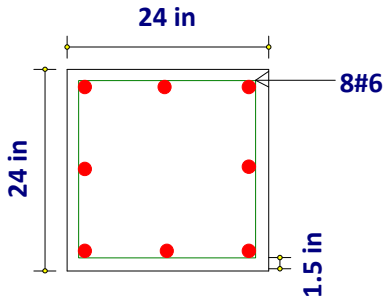



x Dir. Steel : **8.394 in^2 (19 #6)**
z Dir. Steel : **8.394 in^2 (19 #6)**

**Bottom Rebar Plan**




**Pile Cap Elevation**




**Pedestal Rebar Plan**

## Geometry, Materials and Criteria

| | | | | | |
|---|---|---|---|---|---|
| Point | : **N1** | Concrete Weight | : **0.145 k/ft^3** | Steel fy | : **60 ksi** |
| Length | : **9 ft** | Concrete f'c | : **3.5 ksi** | Minimum Steel | : **0.001800** |
| Width | : **9 ft** | Design Code | : **ACI 318-14** | Maximum Steel | : **0.007500** |
| Thickness | : **42 in** | Pile Definition | : **Pile 1** | | |
| Ped. Height | : **24 in** | Soil Overburden | : **0 ksf** | | |
| Ped. X | : **24 in** | | | | |
| Ped. Z | : **24 in** | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Cap Top Bar Cover | : **1.5 in** | Allow Shear | : **16 k** | Rotation Angle | : **0 deg** |
| Cap Bot Bar Cover | : **3 in** | Allow Axial Comp | : **300 k** | Group Red Fact (V) | : **1** |
| Ped Long Bar Cover | : **1.5 in** | Allow Axial Tens | : **20 k** | Group Red Fact (P) | : **1** |
| Pile Embedment | : **4 in** | Phi for Flexure | : **0.9** | Pile Tolerance | : **3 in** |
| Pile Dia/Side Dims | : **18 in** | Phi for Shear | : **0.75** | | |
| Pile Spacing Factor | : **3** | | | | |
| Pile Min Spacing | : **54 in** | | | | |
| Pile Min Edge Dist | : **27 in** | | | | |

## Pile Capacity Checks

Pile Allow Tens : **20 k**
Pile Allow Comp : **300 k**
Pile Allow Shear : **16 k**

| Shear UC Max | Gov Pile for Shear | Gov Shear LC | Axial Comp UC Max | Gov Pile for Axial Comp | Gov Axial Comp LC | Axial Tens UC Max | Gov Pile for Axial Tens | Gov Axial Tens LC |
|---|---|---|---|---|---|---|---|---|
| 0 | NC | NC | 0.601 | 1 | 1 | 0 | NC | NC |

Note: See Expanded View for information for each individual pile for each load combination
Pile capacity checks are only given for Service LC's

## Soil Results

| Soil Comp UC Max | Gov Pile for Soil Comp | Gov Soil Comp LC | Soil Tens UC Max | Gov Pile for Soil Tens | Gov Soil Tens LC | Total Skin Friction (k) | Tip Bearing (k) |
|---|---|---|---|---|---|---|---|
| 0 | NC | NC | 0 | NC | NC | 0 | 0 |

Note: See Expanded View for information for each individual pile for each load combination
Pile capacity checks are only given for Service LC's

## Pile Cap Flexural Design

As-min x-dir (Top Flexure): **8.165 in^2**
As-min z-dir (Top Flexure): **8.165 in^2**
As-min x-dir (Bot Flexure): **8.165 in^2**
As-min z-dir (Bot Flexure): **8.165 in^2**
As-min x-dir (T & S): **8.165 in^2**
As-min z-dir (T & S): **8.165 in^2**

**Bottom Bar Reinforcement**

| Mu-xx UC Max | Gov Mu-xx LC | Mu-xx (k-ft) | z-Dir As Required (in^2) | z-Dir As Provided (in^2) | Mu-zz UC Max | Gov Mu-zz LC | Mu-zz (k-ft) | x-Dir As Required (in^2) | x-Dir As Provided (in^2) |
|---|---|---|---|---|---|---|---|---|---|
| 0.516 | 2 | 652.227 | 4.282 | 8.394 | 0.516 | 2 | 652.227 | 4.282 | 8.394 |

**Top Bar Reinforcement**

| Mu-xx UC Max | Gov Mu-xx LC | Mu-xx (k-ft) | z-Dir As Required (in^2) | z-Dir As Provided (in^2) | Mu-zz UC Max | Gov Mu-zz LC | Mu-zz (k-ft) | x-Dir As Required (in^2) | x-Dir As Provided (in^2) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | NC | 0 | 0 | 0 | 0 | NC | 0 | 0 | 0 |

## Pedestal Punching Shear Check

Phi : **0.75**

| Gov LC | UC | Punching Shear Location | Punching Shear (k) | Muz (k-ft) | Mux (k-ft) | Total Stress (ksi) | Phi * Vny (ksi) |
|---|---|---|---|---|---|---|---|
| 2 | 0 | INTERIOR | 0 | 0 | 0 | 0 | 0.177 |

## Pile Punching Shear Check

Phi : **0.55**

| Gov LC | Gov Pile | Punching Shear Location | Punching Shear Cap (k) | Punching Shear (k) | Punching Shear UC |
|---|---|---|---|---|---|
| **2** | **1** | **CORNER** | **357.912** | **228.599** | **0.639** |

Note: See Expanded View for information for each individual pile for each load combination
Punching shear checks are only given for Strength LC's

## Punching Shear Geometry

Pedestal Shape : **CRECT24X24** Pile Shape : **RND18**

| Gov Pile/ Pedestal | Location | Effective Depth (in) | L1 (in) | L2 (in) | Polar Moment-xx (in^4) | Polar Moment-zz (in^4) | Gamma-x | Gamma-z |
|---|---|---|---|---|---|---|---|---|
| **Pedestal** | **INTERIOR** | **34.25** | **58.25** | **58.25** | **4.903e+6** | **4.903e+6** | **0.4** | **0.4** |
| **1** | **CORNER** | **38** | **53.069** | **53.069** | **0** | **0** | **0** | **0** |

Note: See Expanded View for information for each individual pile for each load combination

## One Way (Deep Beam) Shear Check

w : **18 in**
d : **34.25 in**
Vu : **438.015 k**
Mu-xx: **652.227 k-ft**

w : **18 in**
d : **34.25 in**
Vu : **438.015 k**
Mu-zz: **652.227 k-ft**

Phi : **0.75** Vc(x-Dir Cut) : **1905.201 k** Vc(z-Dir Cut) : **1905.201 k**

| UC | x-Dir Cut Vu (k) | Gov LC | UC | z-Dir Cut Vu (k) | Gov LC |
|---|---|---|---|---|---|
| **0.307** | **438.015** | **2** | **0.307** | **438.015** | **2** |

Note: One way (beam) shear failures associated with the pile locations are not considered.

## Pedestal Design

**Shear Check Results (Envelope):**

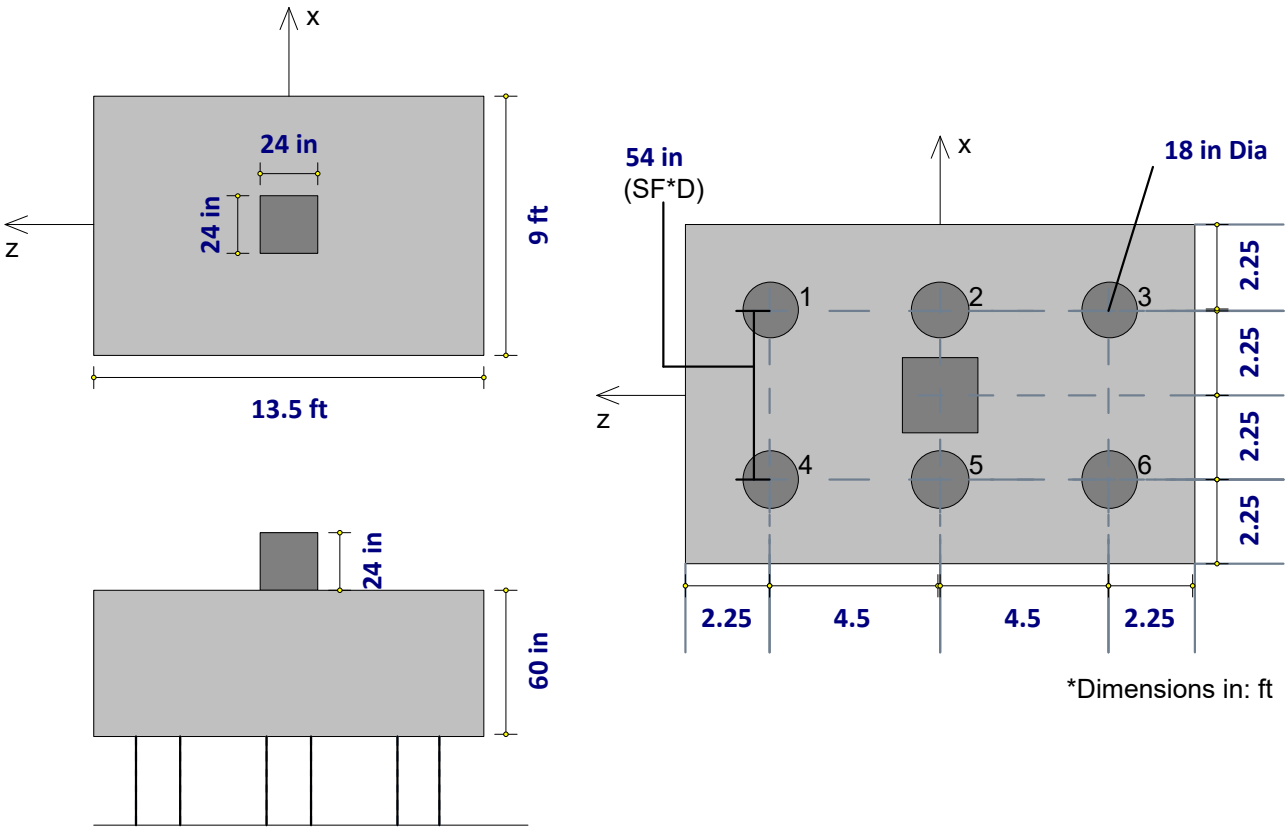
| | Vc | Vs | Vu | Vu/phi*Vn | phi |
|---|---|---|---|---|---|
| Shear Along x Direction: | **61.409** | **42.461** | **0** | **0** | **0.75** |
| Shear Along z Direction: | **61.409** | **42.461** | **0** | **0** | **0.75** |

Pedestal Ties : **#4@12 in**

**Bending Check Results (Envelope): PCA Load Contour Method (for biaxial)**

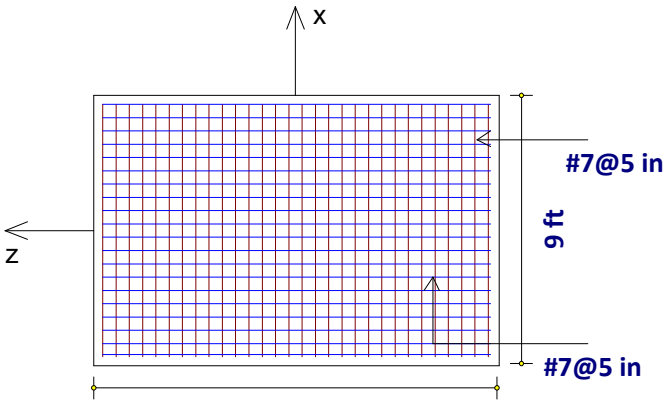
| | | | | | |
|---|---|---|---|---|---|
| Unity Check | : **0.869** | Phi | : **0.65** | Parme Beta | : **0.65** |
| Pu | : **865.068 k** | Mux | : **0 k-ft** | Muz | : **0 k-ft** |
| Pn | : **1532.114 k** | Mnx | : **NC** | Mnz | : **NC** |
| Governing LC | : **2** | Mnox | : **NC** | Mnoz | : **NC** |
| Pedestal Bars | : **8 #6** | % Steel | : **0.614** | | |

## *Sketch*



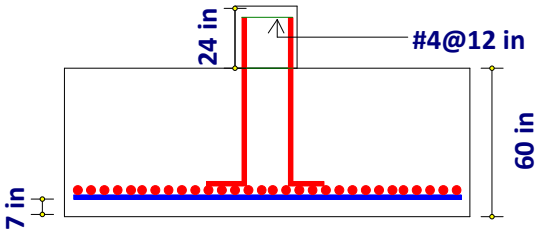

*Dimensions in: ft

## Details

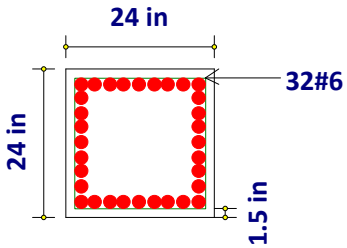



x Dir. Steel : **18.04 in^2 (30 #7)**
z Dir. Steel : **12.026 in^2 (20 #7)**

**Bottom Rebar Plan**




**Pile Cap Elevation**




**Pedestal Rebar Plan**

## Geometry, Materials and Criteria

| | | | | | |
|---|---|---|---|---|---|
| Point | : **N1** | Concrete Weight | : **0.145 k/ft^3** | Steel fy | : **60 ksi** |
| Length | : **13.5 ft** | Concrete f'c | : **3.5 ksi** | Minimum Steel | : **0.001800** |
| Width | : **9 ft** | Design Code | : **ACI 318-14** | Maximum Steel | : **0.007500** |
| Thickness | : **60 in** | Pile Definition | : **Pile 1** | | |
| Ped. Height | : **24 in** | Soil Overburden | : **0 ksf** | | |
| Ped. X | : **24 in** | | | | |
| Ped. Z | : **24 in** | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Cap Top Bar Cover | : **1.5 in** | Allow Shear | : **12 k** | Rotation Angle | : **0 deg** |
| Cap Bot Bar Cover | : **3 in** | Allow Axial Comp | : **300 k** | Group Red Fact (V) | : **1** |
| Ped Long Bar Cover | : **1.5 in** | Allow Axial Tens | : **20 k** | Group Red Fact (P) | : **1** |
| Pile Embedment | : **4 in** | Phi for Flexure | : **0.9** | Pile Tolerance | : **3 in** |
| Pile Dia/Side Dims | : **18 in** | Phi for Shear | : **0.75** | | |
| Pile Spacing Factor | : **3** | | | | |
| Pile Min Spacing | : **54 in** | | | | |
| Pile Min Edge Dist | : **27 in** | | | | |

## Pile Capacity Checks

Pile Allow Tens : **20 k**
Pile Allow Comp : **300 k**
Pile Allow Shear : **12 k**

| Shear UC Max | Gov Pile for Shear | Gov Shear LC | Axial Comp UC Max | Gov Pile for Axial Comp | Gov Axial Comp LC | Axial Tens UC Max | Gov Pile for Axial Tens | Gov Axial Tens LC |
|---|---|---|---|---|---|---|---|---|
| 0 | NC | NC | 0.714 | 1 | 1 | 0 | NC | NC |

Note: See Expanded View for information for each individual pile for each load combination
Pile capacity checks are only given for Service LC's

## Soil Results

| Soil Comp UC Max | Gov Pile for Soil Comp | Gov Soil Comp LC | Soil Tens UC Max | Gov Pile for Soil Tens | Gov Soil Tens LC | Total Skin Friction (k) | Tip Bearing (k) |
|---|---|---|---|---|---|---|---|
| 0 | NC | NC | 0 | NC | NC | 0 | 0 |

Note: See Expanded View for information for each individual pile for each load combination
Pile capacity checks are only given for Service LC's

## Pile Cap Flexural Design

As-min x-dir (Top Flexure): **17.496 in^2**
As-min z-dir (Top Flexure): **11.664 in^2**
As-min x-dir (Bot Flexure): **17.496 in^2**
As-min z-dir (Bot Flexure): **11.664 in^2**
As-min x-dir (T & S): **17.496 in^2**
As-min z-dir (T & S): **11.664 in^2**

**Bottom Bar Reinforcement**

| Mu-xx UC Max | Gov Mu-xx LC | Mu-xx (k-ft) | z-Dir As Required (in^2) | z-Dir As Provided (in^2) | Mu-zz UC Max | Gov Mu-zz LC | Mu-zz (k-ft) | x-Dir As Required (in^2) | x-Dir As Provided (in^2) |
|---|---|---|---|---|---|---|---|---|---|
| 0.695 | 2 | 1919.692 | 8.308 | 12.026 | 0.28 | 2 | 1157.541 | 4.964 | 18.04 |

**Top Bar Reinforcement**

| Mu-xx UC Max | Gov Mu-xx LC | Mu-xx (k-ft) | z-Dir As Required (in^2) | z-Dir As Provided (in^2) | Mu-zz UC Max | Gov Mu-zz LC | Mu-zz (k-ft) | x-Dir As Required (in^2) | x-Dir As Provided (in^2) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | NC | 0 | 0 | 0 | 0 | NC | 0 | 0 | 0 |

## Pedestal Punching Shear Check

Phi : **0.75**

| Gov LC | UC | Punching Shear Location | Punching Shear (k) | Muz (k-ft) | Mux (k-ft) | Total Stress (ksi) | Phi * Vny (ksi) |
|---|---|---|---|---|---|---|---|
| 2 | 0.363 | INTERIOR | 1022.177 | 0 | 0 | 0.064 | 0.177 |

## Pile Punching Shear Check

Phi : **0.55**

| Gov LC | Gov Pile | Punching Shear Location | Punching Shear Cap (k) | Punching Shear (k) | Punching Shear UC |
|---|---|---|---|---|---|
| 2 | 1 | CORNER | 616.901 | 273.218 | 0.443 |

Note: See Expanded View for information for each individual pile for each load combination
Punching shear checks are only given for Strength LC's

## Punching Shear Geometry

Pedestal Shape : **CRECT24X24** Pile Shape : **RND18**

| Gov Pile/ Pedestal | Location | Effective Depth (in) | L1 (in) | L2 (in) | Polar Moment-xx (in^4) | Polar Moment-zz (in^4) | Gamma-x | Gamma-z |
|---|---|---|---|---|---|---|---|---|
| Pedestal | INTERIOR | 52.125 | 76.125 | 76.125 | 1.713e+7 | 1.713e+7 | 0.4 | 0.4 |
| 1 | CORNER | 56 | 62.069 | 62.069 | 0 | 0 | 0 | 0 |

Note: See Expanded View for information for each individual pile for each load combination

***Piles with overlapping punching shear perimeters. No group punching shear check done.***

## One Way (Deep Beam) Shear Check

w : **45 in**
d : **52.125 in**
Vu : **501.413 k**
Mu-xx: **1919.692 k-ft**

w : **18 in**
d : **52.125 in**
Vu : **778.545 k**
Mu-zz: **1157.541 k-ft**

Phi : **0.75** Vc(x-Dir Cut) : **1001.541 k** Vc(z-Dir Cut) : **4995.686 k**

| UC | x-Dir Cut Vu (k) | Gov LC | UC | z-Dir Cut Vu (k) | Gov LC |
|---|---|---|---|---|---|
| 0.668 | 501.413 | 2 | 0.208 | 778.545 | 2 |

Note: One way (beam) shear failures associated with the pile locations are not considered.

## Pedestal Design

**Shear Check Results (Envelope):**

| | Vc | Vs | Vu | Vu/phi*Vn | phi |
|---|---|---|---|---|---|
| Shear Along x Direction: | 61.409 | 42.461 | 0 | 0 | 0.75 |
| Shear Along z Direction: | 61.409 | 42.461 | 0 | 0 | 0.75 |

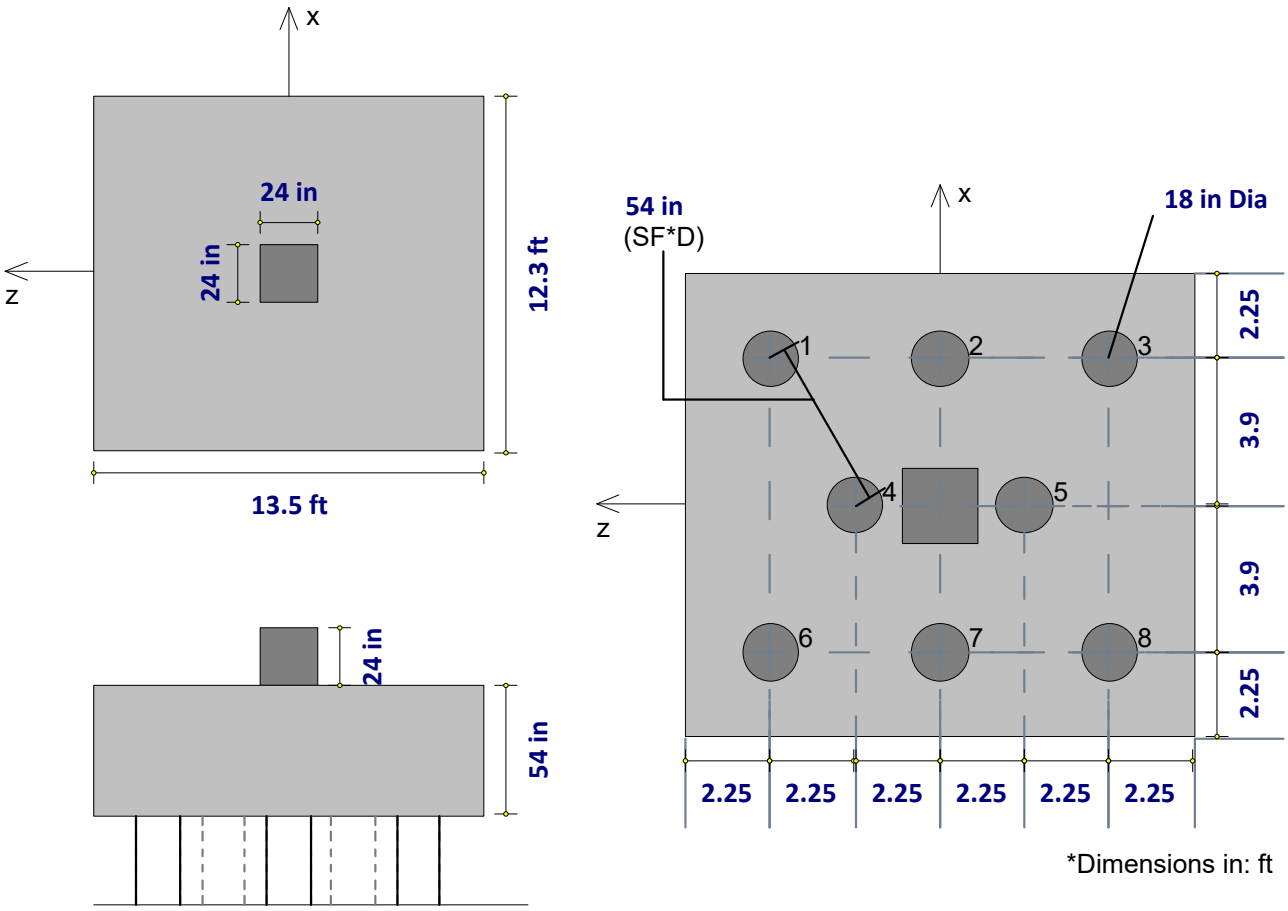
Pedestal Ties : **#4@12 in**

**Bending Check Results (Envelope): PCA Load Contour Method (for biaxial)**

| | | | | | |
|---|---|---|---|---|---|
| Unity Check | : 1.17 | Phi | : 0.65 | Parme Beta | : 0.65 |
| Pu | : 1533.6 k | Mux | : 0 k-ft | Muz | : 0 k-ft |
| Pn | : 2015.818 k | Mnx | : NC | Mnz | : NC |
| Governing LC | : 2 | Mnox | : NC | Mnoz | : NC |
| Pedestal Bars | : 32 #6 | % Steel | : 2.454 | | |

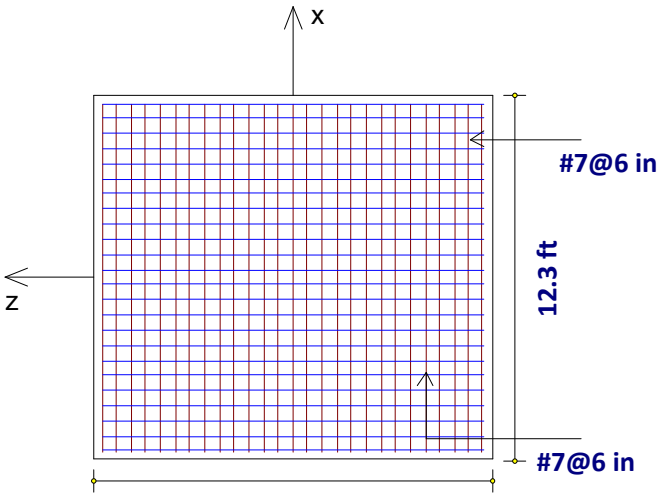
Only used to design PC and not the pedestal - pedestal is really the column and reinforced adequately
CB/BDC

## *Sketch*



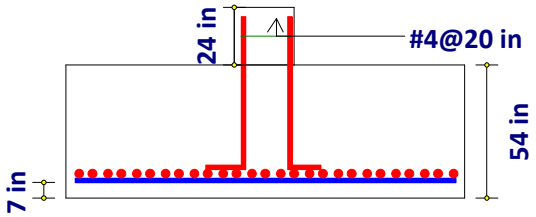

*Dimensions in: ft

## Details

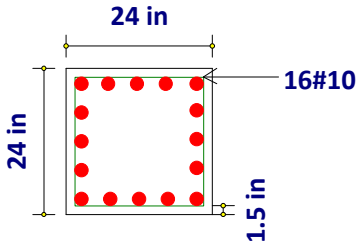



x Dir. Steel : **16.236 in^2 (27 #7)**
z Dir. Steel : **14.432 in^2 (24 #7)**

**Bottom Rebar Plan**




**Pile Cap Elevation**




**Pedestal Rebar Plan**

## Geometry, Materials and Criteria

| | | | | | |
|---|---|---|---|---|---|
| Point | : **N1** | Concrete Weight | : **0.145 k/ft^3** | Steel fy | : **60 ksi** |
| Length | : **13.5 ft** | Concrete f'c | : **3.5 ksi** | Minimum Steel | : **0.001800** |
| Width | : **12.333 ft** | Design Code | : **ACI 318-14** | Maximum Steel | : **0.007500** |
| Thickness | : **54 in** | Pile Definition | : **Pile 1** | | |
| Ped. Height | : **24 in** | Soil Overburden | : **0 ksf** | | |
| Ped. X | : **24 in** | | | | |
| Ped. Z | : **24 in** | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Cap Top Bar Cover | : **1.5 in** | Allow Shear | : **16 k** | Rotation Angle | : **0 deg** |
| Cap Bot Bar Cover | : **3 in** | Allow Axial Comp | : **300 k** | Group Red Fact (V) | : **1** |
| Ped Long Bar Cover | : **1.5 in** | Allow Axial Tens | : **20 k** | Group Red Fact (P) | : **1** |
| Pile Embedment | : **4 in** | Phi for Flexure | : **0.9** | Pile Tolerance | : **3 in** |
| Pile Dia/Side Dims | : **18 in** | Phi for Shear | : **0.75** | | |
| Pile Spacing Factor | : **3** | | | | |
| Pile Min Spacing | : **54 in** | | | | |
| Pile Min Edge Dist | : **27 in** | | | | |

## Pile Capacity Checks

Pile Allow Tens : **20 k**
Pile Allow Comp : **300 k**
Pile Allow Shear : **16 k**

| Shear UC Max | Gov Pile for Shear | Gov Shear LC | Axial Comp UC Max | Gov Pile for Axial Comp | Gov Axial Comp LC | Axial Tens UC Max | Gov Pile for Axial Tens | Gov Axial Tens LC |
|---|---|---|---|---|---|---|---|---|
| 0 | NC | NC | 0.688 | 1 | 1 | 0 | NC | NC |

Note: See Expanded View for information for each individual pile for each load combination
Pile capacity checks are only given for Service LC's

## Soil Results

| Soil Comp UC Max | Gov Pile for Soil Comp | Gov Soil Comp LC | Soil Tens UC Max | Gov Pile for Soil Tens | Gov Soil Tens LC | Total Skin Friction (k) | Tip Bearing (k) |
|---|---|---|---|---|---|---|---|
| 0 | NC | NC | 0 | NC | NC | 0 | 0 |

Note: See Expanded View for information for each individual pile for each load combination
Pile capacity checks are only given for Service LC's

## Pile Cap Flexural Design

As-min x-dir (Top Flexure): **15.746 in^2**
As-min z-dir (Top Flexure): **14.386 in^2**
As-min x-dir (Bot Flexure): **15.746 in^2**
As-min z-dir (Bot Flexure): **14.386 in^2**
As-min x-dir (T & S): **15.746 in^2**
As-min z-dir (T & S): **14.386 in^2**

**Bottom Bar Reinforcement**

| Mu-xx UC Max | Gov Mu-xx LC | Mu-xx (k-ft) | z-Dir As Required (in^2) | z-Dir As Provided (in^2) | Mu-zz UC Max | Gov Mu-zz LC | Mu-zz (k-ft) | x-Dir As Required (in^2) | x-Dir As Provided (in^2) |
|---|---|---|---|---|---|---|---|---|---|
| 0.778 | 2 | 2280.735 | 11.173 | 14.432 | 0.734 | 2 | 2418.962 | 11.843 | 16.236 |

**Top Bar Reinforcement**

| Mu-xx UC Max | Gov Mu-xx LC | Mu-xx (k-ft) | z-Dir As Required (in^2) | z-Dir As Provided (in^2) | Mu-zz UC Max | Gov Mu-zz LC | Mu-zz (k-ft) | x-Dir As Required (in^2) | x-Dir As Provided (in^2) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | NC | 0 | 0 | 0 | 0 | NC | 0 | 0 | 0 |

## Pedestal Punching Shear Check

Phi : **0.75**

| Gov LC | UC | Punching Shear Location | Punching Shear (k) | Muz (k-ft) | Mux (k-ft) | Total Stress (ksi) | Phi * Vny (ksi) |
|---|---|---|---|---|---|---|---|
| 2 | 0.664 | INTERIOR | 1523.701 | 0 | 0 | 0.118 | 0.177 |

## Pile Punching Shear Check

Phi : **0.55**

| Gov LC | Gov Pile | Punching Shear Location | Punching Shear Cap (k) | Punching Shear (k) | Punching Shear UC |
|---|---|---|---|---|---|
| **2** | **1** | **CORNER** | **524.182** | **271.153** | **0.517** |

Note: See Expanded View for information for each individual pile for each load combination
Punching shear checks are only given for Strength LC's

## Punching Shear Geometry

Pedestal Shape : **CRECT24X24** Pile Shape : **RND18**

| Gov Pile/ Pedestal | Location | Effective Depth (in) | L1 (in) | L2 (in) | Polar Moment-xx (in^4) | Polar Moment-zz (in^4) | Gamma-x | Gamma-z |
|---|---|---|---|---|---|---|---|---|
| **Pedestal** | **INTERIOR** | **46.125** | **70.125** | **70.125** | **1.175e+7** | **1.175e+7** | **0.4** | **0.4** |
| **1** | **CORNER** | **50** | **59.069** | **59.069** | **0** | **0** | **0** | **0** |

Note: See Expanded View for information for each individual pile for each load combination

***Piles with overlapping punching shear perimeters. No group punching shear check done.***

## One Way (Deep Beam) Shear Check

w : **45 in**
d : **46.125 in**
Vu : **757.931 k**
Mu-xx: **2280.735 k-ft**

w : **37.765 in**
d : **46.125 in**
Vu : **758.845 k**
Mu-zz: **2418.962 k-ft**

Phi : **0.75** Vc(x-Dir Cut) : **3215.854 k** Vc(z-Dir Cut) : **1548.862 k**

| UC | x-Dir Cut Vu (k) | Gov LC | UC | z-Dir Cut Vu (k) | Gov LC |
|---|---|---|---|---|---|
| **0.314** | **757.931** | **2** | **0.653** | **758.845** | **2** |

Note: One way (beam) shear failures associated with the pile locations are not considered.

## Pedestal Design

**Shear Check Results (Envelope):**

| | Vc | Vs | Vu | Vu/phi*Vn | phi |
|---|---|---|---|---|---|
| Shear Along x Direction: | **60.671** | **25.17** | **0** | **0** | **0.75** |
| Shear Along z Direction: | **60.671** | **25.17** | **0** | **0** | **0.75** |

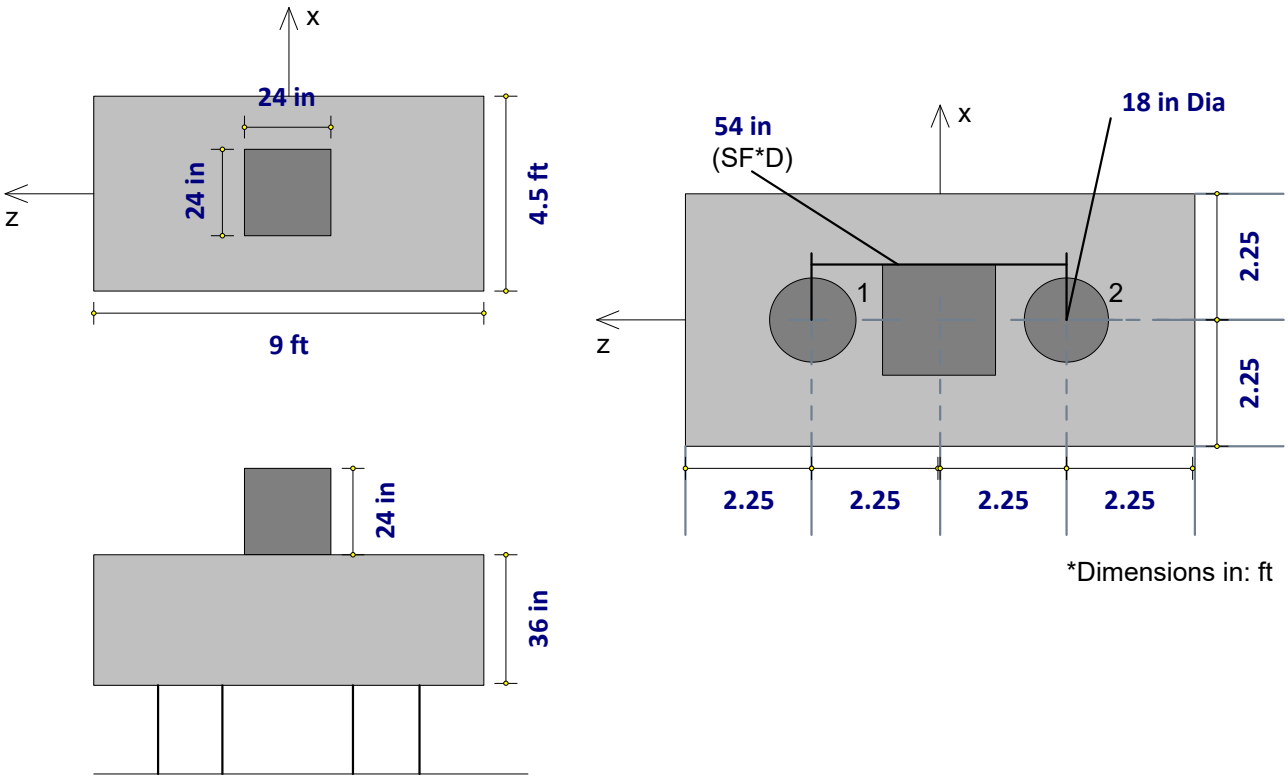
Pedestal Ties : **#4@20 in**

**Bending Check Results (Envelope): PCA Load Contour Method (for biaxial)**

| | | | | | |
|---|---|---|---|---|---|
| Unity Check | : **1.367** | Phi | : **0.65** | Parme Beta | : **0.65** |
| Pu | : **2039.268 k** | Mux | : **0 k-ft** | Muz | : **0 k-ft** |
| Pn | : **2295.52 k** | Mnx | : **NC** | Mnz | : **NC** |
| Governing LC | : **2** | Mnox | : **NC** | Mnoz | : **NC** |
| Pedestal Bars | : **16 #10** | % Steel | : **3.519** | | |

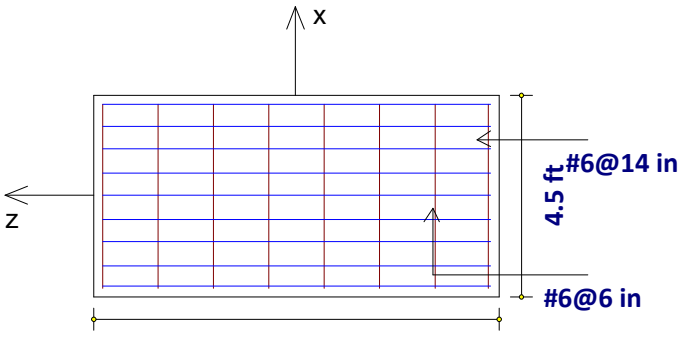
Only used to design PC and not the pedestal - pedestal is really the column and reinforced adequately
CB/BDC

## *Sketch*



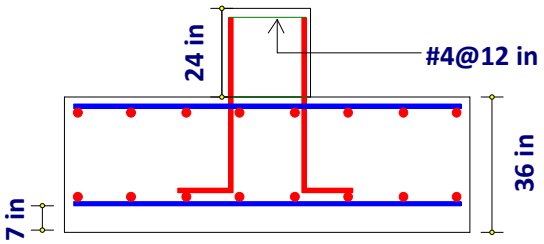

*Dimensions in: ft

## Details

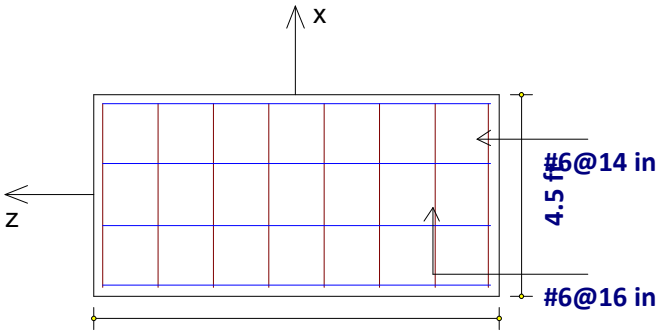



x Dir. Steel : **3.534 in^2 (8 #6)**
z Dir. Steel : **3.976 in^2 (9 #6)**

**Bottom Rebar Plan**

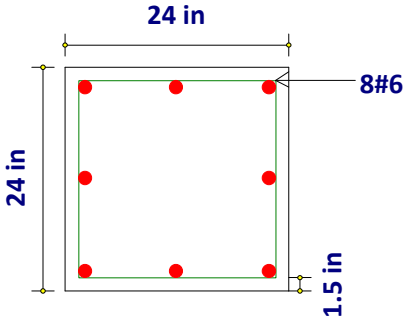



**Pile Cap Elevation**




x Dir. Steel : **3.534 in^2 (8 #6)**
z Dir. Steel : **1.767 in^2 (4 #6)**

**Top Rebar Plan**




**Pedestal Rebar Plan**

## Geometry, Materials and Criteria

| | | | | | |
|---|---|---|---|---|---|
| Point | : **N1** | Concrete Weight | : **0.145 k/ft^3** | Steel fy | : **60 ksi** |
| Length | : **9 ft** | Concrete f'c | : **3.5 ksi** | Minimum Steel | : **0.001800** |
| Width | : **4.5 ft** | Design Code | : **ACI 318-14** | Maximum Steel | : **0.007500** |
| Thickness | : **36 in** | Pile Definition | : **Pile 1** | | |
| Ped. Height | : **24 in** | Soil Overburden | : **0 ksf** | | |
| Ped. X | : **24 in** | | | | |
| Ped. Z | : **24 in** | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Cap Top Bar Cover | : **1.5 in** | Allow Shear | : **16 k** | Rotation Angle | : **0 deg** |
| Cap Bot Bar Cover | : **3 in** | Allow Axial Comp | : **300 k** | Group Red Fact (V) | : **1** |
| Ped Long Bar Cover | : **1.5 in** | Allow Axial Tens | : **20 k** | Group Red Fact (P) | : **1** |
| Pile Embedment | : **4 in** | Phi for Flexure | : **0.9** | Pile Tolerance | : **3 in** |
| Pile Dia/Side Dims | : **18 in** | Phi for Shear | : **0.75** | | |
| Pile Spacing Factor | : **3** | | | | |
| Pile Min Spacing | : **54 in** | | | | |
| Pile Min Edge Dist | : **27 in** | | | | |

## Pile Capacity Checks

Pile Allow Tens : **20 k**
Pile Allow Comp : **300 k**
Pile Allow Shear : **16 k**

| Shear UC Max | Gov Pile for Shear | Gov Shear LC | Axial Comp UC Max | Gov Pile for Axial Comp | Gov Axial Comp LC | Axial Tens UC Max | Gov Pile for Axial Tens | Gov Axial Tens LC |
|---|---|---|---|---|---|---|---|---|
| 0 | NC | NC | 0.773 | 1 | 1 | 0 | NC | NC |

Note: See Expanded View for information for each individual pile for each load combination
Pile capacity checks are only given for Service LC's

## Soil Results

| Soil Comp UC Max | Gov Pile for Soil Comp | Gov Soil Comp LC | Soil Tens UC Max | Gov Pile for Soil Tens | Gov Soil Tens LC | Total Skin Friction (k) | Tip Bearing (k) |
|---|---|---|---|---|---|---|---|
| 0 | NC | NC | 0 | NC | NC | 0 | 0 |

Note: See Expanded View for information for each individual pile for each load combination
Pile capacity checks are only given for Service LC's

## Pile Cap Flexural Design

As-min x-dir (Top Flexure): **6.998 in^2**
As-min z-dir (Top Flexure): **3.499 in^2**
As-min x-dir (Bot Flexure): **6.998 in^2**
As-min z-dir (Bot Flexure): **3.499 in^2**
As-min x-dir (T & S): **6.998 in^2**
As-min z-dir (T & S): **3.499 in^2**

**Bottom Bar Reinforcement**

| Mu-xx UC Max | Gov Mu-xx LC | Mu-xx (k-ft) | z-Dir As Required (in^2) | z-Dir As Provided (in^2) | Mu-zz UC Max | Gov Mu-zz LC | Mu-zz (k-ft) | x-Dir As Required (in^2) | x-Dir As Provided (in^2) |
|---|---|---|---|---|---|---|---|---|---|
| 0.912 | 2 | 448.912 | 3.618 | 3.976 | 0 | NC | 0 | 0 | 3.534 |

**Top Bar Reinforcement**

| Mu-xx UC Max | Gov Mu-xx LC | Mu-xx (k-ft) | z-Dir As Required (in^2) | z-Dir As Provided (in^2) | Mu-zz UC Max | Gov Mu-zz LC | Mu-zz (k-ft) | x-Dir As Required (in^2) | x-Dir As Provided (in^2) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | NC | 0 | 0 | 1.767 | 0.007 | 2 | 3.67 | 0.024 | 3.534 |

## Pedestal Punching Shear Check

Phi : **0.75**

| Gov LC | UC | Punching Shear Location | Punching Shear (k) | Muz (k-ft) | Mux (k-ft) | Total Stress (ksi) | Phi * Vny (ksi) |
|---|---|---|---|---|---|---|---|
| 2 | 0.579 | INTERIOR | 606.488 | 0 | 0 | 0.103 | 0.177 |

## Pile Punching Shear Check

Phi : **0.75**

| Gov LC | Gov Pile | Punching Shear Location | Punching Shear Cap (k) | Punching Shear (k) | Punching Shear UC |
|---|---|---|---|---|---|
| **2** | **1** | **CORNER** | **516.854** | **308.867** | **0.598** |

Note: See Expanded View for information for each individual pile for each load combination
Punching shear checks are only given for Strength LC's

## Punching Shear Geometry

Pedestal Shape : **CRECT24X24** Pile Shape : **RND18**

| Gov Pile/ Pedestal | Location | Effective Depth (in) | L1 (in) | L2 (in) | Polar Moment-xx (in^4) | Polar Moment-zz (in^4) | Gamma-x | Gamma-z |
|---|---|---|---|---|---|---|---|---|
| **Pedestal** | **INTERIOR** | **28.25** | **52.25** | **52.25** | **2.883e+6** | **2.883e+6** | **0.4** | **0.4** |
| **1** | **CORNER** | **29.75** | **48.944** | **48.944** | **0** | **0** | **0** | **0** |

Note: See Expanded View for information for each individual pile for each load combination

## One Way (Deep Beam) Shear Check

w : **18 in**
d : **28.25 in**
Vu : **300.645 k**
Mu-xx: **448.912 k-ft**

w : **0 in**
d : **28.25 in**
Vu : **0 k**
Mu-zz: **3.67 k-ft**

Phi : **0.75** Vc(x-Dir Cut) : **562.273 k** Vc(z-Dir Cut) : **1804.996 k**

| UC | x-Dir Cut Vu (k) | Gov LC | UC | z-Dir Cut Vu (k) | Gov LC |
|---|---|---|---|---|---|
| **0.713** | **300.645** | **2** | **0** | **0** | **NC** |

Note: One way (beam) shear failures associated with the pile locations are not considered.

## Pedestal Design

**Shear Check Results (Envelope):**

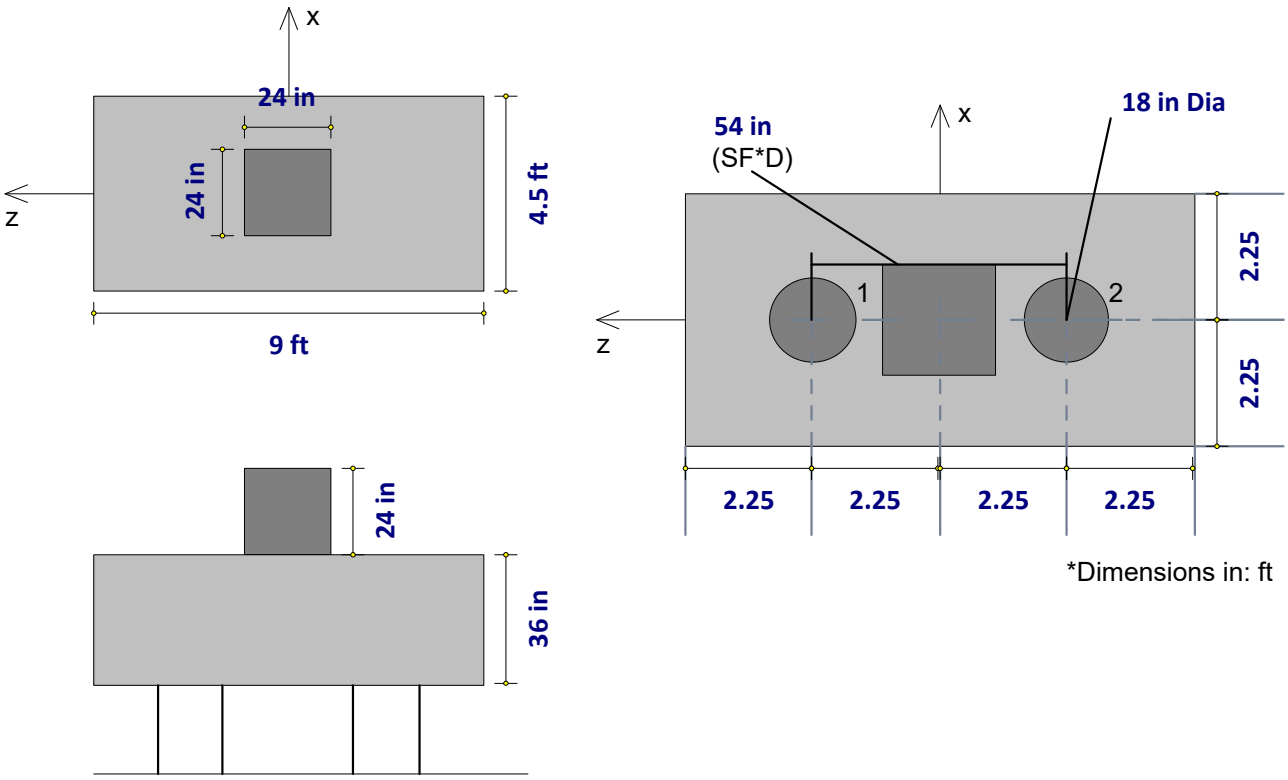
| | Vc | Vs | Vu | Vu/phi*Vn | phi |
|---|---|---|---|---|---|
| Shear Along x Direction: | **61.409** | **42.461** | **0** | **0** | **0.75** |
| Shear Along z Direction: | **61.409** | **42.461** | **0** | **0** | **0.75** |

Pedestal Ties : **#4@12 in**

**Bending Check Results (Envelope): PCA Load Contour Method (for biaxial)**

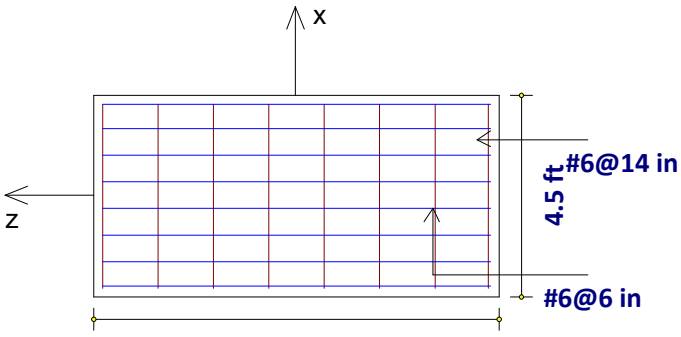
| | | | | | |
|---|---|---|---|---|---|
| Unity Check | : **0.599** | Phi | : **0.65** | Parme Beta | : **0.65** |
| Pu | : **596.592 k** | Mux | : **0 k-ft** | Muz | : **0 k-ft** |
| Pn | : **1532.114 k** | Mnx | : **NC** | Mnz | : **NC** |
| Governing LC | : **2** | Mnox | : **NC** | Mnoz | : **NC** |
| Pedestal Bars | : **8 #6** | % Steel | : **0.614** | | |

## *Sketch*



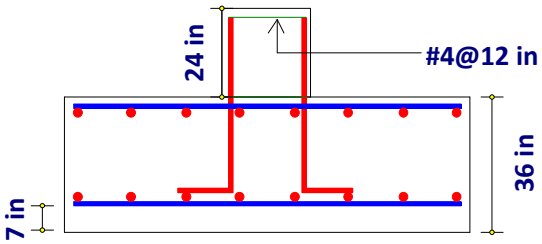

*Dimensions in: ft

## Details

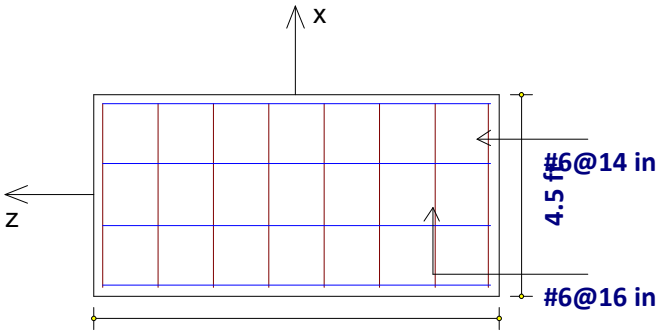



x Dir. Steel : **3.534 in^2 (8 #6)**
z Dir. Steel : **3.534 in^2 (8 #6)**

**Bottom Rebar Plan**

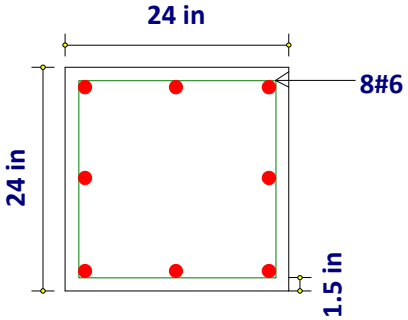



**Pile Cap Elevation**




x Dir. Steel : **3.534 in^2 (8 #6)**
z Dir. Steel : **1.767 in^2 (4 #6)**

**Top Rebar Plan**




**Pedestal Rebar Plan**

## Geometry, Materials and Criteria

| | | | | | |
|---|---|---|---|---|---|
| Point | : **N1** | Concrete Weight | : **0.145 k/ft^3** | Steel fy | : **60 ksi** |
| Length | : **9 ft** | Concrete f'c | : **3.5 ksi** | Minimum Steel | : **0.001800** |
| Width | : **4.5 ft** | Design Code | : **ACI 318-14** | Maximum Steel | : **0.007500** |
| Thickness | : **36 in** | Pile Definition | : **Pile 1** | | |
| Ped. Height | : **24 in** | Soil Overburden | : **0 ksf** | | |
| Ped. X | : **24 in** | | | | |
| Ped. Z | : **24 in** | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Cap Top Bar Cover | : **1.5 in** | Allow Shear | : **16 k** | Rotation Angle | : **0 deg** |
| Cap Bot Bar Cover | : **3 in** | Allow Axial Comp | : **300 k** | Group Red Fact (V) | : **1** |
| Ped Long Bar Cover | : **1.5 in** | Allow Axial Tens | : **20 k** | Group Red Fact (P) | : **1** |
| Pile Embedment | : **4 in** | Phi for Flexure | : **0.9** | Pile Tolerance | : **3 in** |
| Pile Dia/Side Dims | : **18 in** | Phi for Shear | : **0.75** | | |
| Pile Spacing Factor | : **3** | | | | |
| Pile Min Spacing | : **54 in** | | | | |
| Pile Min Edge Dist | : **27 in** | | | | |

## Pile Capacity Checks

Pile Allow Tens : **20 k**
Pile Allow Comp : **300 k**
Pile Allow Shear : **16 k**

| Shear UC Max | Gov Pile for Shear | Gov Shear LC | Axial Comp UC Max | Gov Pile for Axial Comp | Gov Axial Comp LC | Axial Tens UC Max | Gov Pile for Axial Tens | Gov Axial Tens LC |
|---|---|---|---|---|---|---|---|---|
| 0 | NC | NC | 0.444 | 1 | 1 | 0 | NC | NC |

Note: See Expanded View for information for each individual pile for each load combination
Pile capacity checks are only given for Service LC's

## Soil Results

| Soil Comp UC Max | Gov Pile for Soil Comp | Gov Soil Comp LC | Soil Tens UC Max | Gov Pile for Soil Tens | Gov Soil Tens LC | Total Skin Friction (k) | Tip Bearing (k) |
|---|---|---|---|---|---|---|---|
| 0 | NC | NC | 0 | NC | NC | 0 | 0 |

Note: See Expanded View for information for each individual pile for each load combination
Pile capacity checks are only given for Service LC's

## Pile Cap Flexural Design

As-min x-dir (Top Flexure): **6.998 in^2**
As-min z-dir (Top Flexure): **3.499 in^2**
As-min x-dir (Bot Flexure): **6.998 in^2**
As-min z-dir (Bot Flexure): **3.499 in^2**
As-min x-dir (T & S): **6.998 in^2**
As-min z-dir (T & S): **3.499 in^2**

**Bottom Bar Reinforcement**

| Mu-xx UC Max | Gov Mu-xx LC | Mu-xx (k-ft) | z-Dir As Required (in^2) | z-Dir As Provided (in^2) | Mu-zz UC Max | Gov Mu-zz LC | Mu-zz (k-ft) | x-Dir As Required (in^2) | x-Dir As Provided (in^2) |
|---|---|---|---|---|---|---|---|---|---|
| 0.57 | 2 | 250.252 | 1.995 | 3.534 | 0 | NC | 0 | 0 | 3.534 |

**Top Bar Reinforcement**

| Mu-xx UC Max | Gov Mu-xx LC | Mu-xx (k-ft) | z-Dir As Required (in^2) | z-Dir As Provided (in^2) | Mu-zz UC Max | Gov Mu-zz LC | Mu-zz (k-ft) | x-Dir As Required (in^2) | x-Dir As Provided (in^2) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | NC | 0 | 0 | 1.767 | 0.007 | 2 | 3.67 | 0.024 | 3.534 |

## Pedestal Punching Shear Check

Phi : **0.75**

| Gov LC | UC | Punching Shear Location | Punching Shear (k) | Muz (k-ft) | Mux (k-ft) | Total Stress (ksi) | Phi * Vny (ksi) |
|---|---|---|---|---|---|---|---|
| 2 | 0.326 | INTERIOR | 341.608 | 0 | 0 | 0.058 | 0.177 |

## Pile Punching Shear Check

Phi : **0.75**

| Gov LC | Gov Pile | Punching Shear Location | Punching Shear Cap (k) | Punching Shear (k) | Punching Shear UC |
|---|---|---|---|---|---|
| **2** | **1** | **CORNER** | **516.854** | **176.427** | **0.341** |

Note: See Expanded View for information for each individual pile for each load combination
Punching shear checks are only given for Strength LC's

## Punching Shear Geometry

Pedestal Shape : **CRECT24X24** Pile Shape : **RND18**

| Gov Pile/ Pedestal | Location | Effective Depth (in) | L1 (in) | L2 (in) | Polar Moment-xx (in^4) | Polar Moment-zz (in^4) | Gamma-x | Gamma-z |
|---|---|---|---|---|---|---|---|---|
| **Pedestal** | **INTERIOR** | **28.25** | **52.25** | **52.25** | **2.883e+6** | **2.883e+6** | **0.4** | **0.4** |
| **1** | **CORNER** | **29.75** | **48.944** | **48.944** | **0** | **0** | **0** | **0** |

Note: See Expanded View for information for each individual pile for each load combination

## One Way (Deep Beam) Shear Check

w : **18 in**
d : **28.25 in**
Vu : **168.205 k**
Mu-xx: **250.252 k-ft**

w : **0 in**
d : **28.25 in**
Vu : **0 k**
Mu-zz: **3.67 k-ft**

Phi : **0.75** Vc(x-Dir Cut) : **558.856 k** Vc(z-Dir Cut) : **1804.996 k**

| UC | x-Dir Cut Vu (k) | Gov LC | UC | z-Dir Cut Vu (k) | Gov LC |
|---|---|---|---|---|---|
| **0.401** | **168.205** | **2** | **0** | **0** | **NC** |

Note: One way (beam) shear failures associated with the pile locations are not considered.

## Pedestal Design

**Shear Check Results (Envelope):**

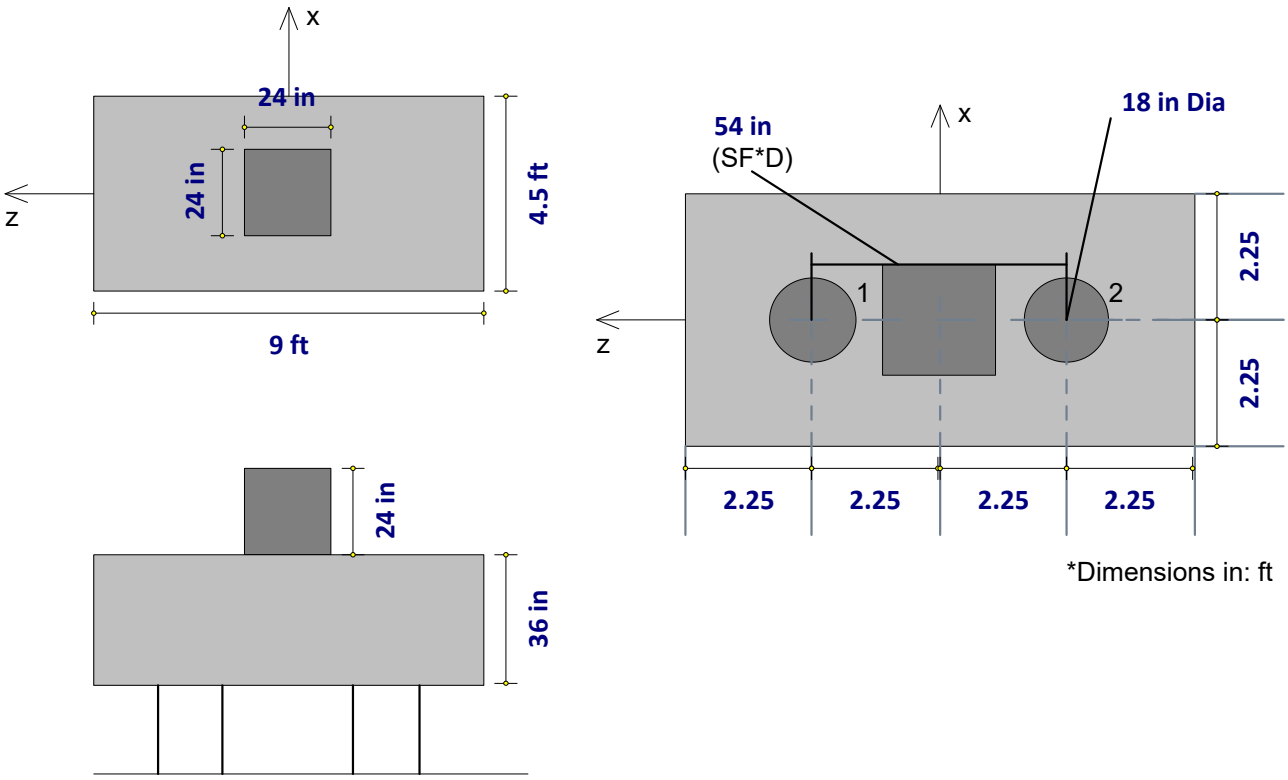
| | Vc | Vs | Vu | Vu/phi*Vn | phi |
|---|---|---|---|---|---|
| Shear Along x Direction: | **61.409** | **42.461** | **0** | **0** | **0.75** |
| Shear Along z Direction: | **61.409** | **42.461** | **0** | **0** | **0.75** |

Pedestal Ties : **#4@12 in**

**Bending Check Results (Envelope): PCA Load Contour Method (for biaxial)**

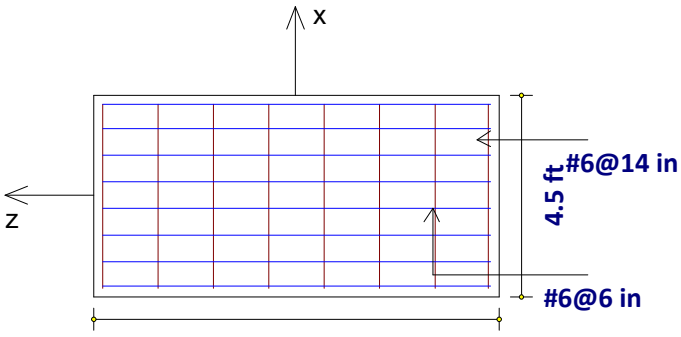
| | | | | | |
|---|---|---|---|---|---|
| Unity Check | : **0.333** | Phi | : **0.65** | Parme Beta | : **0.65** |
| Pu | : **331.712 k** | Mux | : **0 k-ft** | Muz | : **0 k-ft** |
| Pn | : **1532.114 k** | Mnx | : **NC** | Mnz | : **NC** |
| Governing LC | : **2** | Mnox | : **NC** | Mnoz | : **NC** |
| Pedestal Bars | : **8 #6** | % Steel | : **0.614** | | |

## *Sketch*



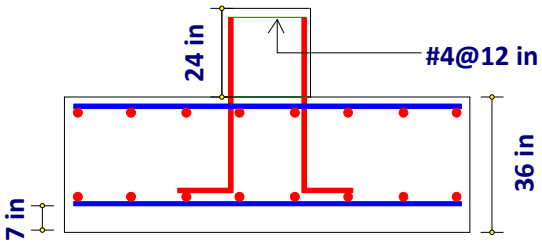

*Dimensions in: ft

## Details

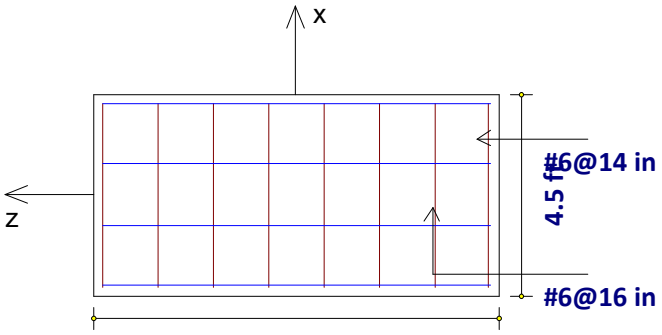



x Dir. Steel : **3.534 in^2 (8 #6)**
z Dir. Steel : **3.534 in^2 (8 #6)**

**Bottom Rebar Plan**

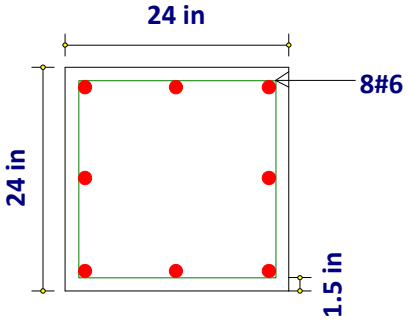



**Pile Cap Elevation**




x Dir. Steel : **3.534 in^2 (8 #6)**
z Dir. Steel : **1.767 in^2 (4 #6)**

**Top Rebar Plan**




**Pedestal Rebar Plan**

## Geometry, Materials and Criteria

| | | | | | |
|---|---|---|---|---|---|
| Point | : **N1** | Concrete Weight | : **0.145 k/ft^3** | Steel fy | : **60 ksi** |
| Length | : **9 ft** | Concrete f'c | : **3.5 ksi** | Minimum Steel | : **0.001800** |
| Width | : **4.5 ft** | Design Code | : **ACI 318-14** | Maximum Steel | : **0.007500** |
| Thickness | : **36 in** | Pile Definition | : **Pile 1** | | |
| Ped. Height | : **24 in** | Soil Overburden | : **0 ksf** | | |
| Ped. X | : **24 in** | | | | |
| Ped. Z | : **24 in** | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Cap Top Bar Cover | : **1.5 in** | Allow Shear | : **16 k** | Rotation Angle | : **0 deg** |
| Cap Bot Bar Cover | : **3 in** | Allow Axial Comp | : **300 k** | Group Red Fact (V) | : **1** |
| Ped Long Bar Cover | : **1.5 in** | Allow Axial Tens | : **20 k** | Group Red Fact (P) | : **1** |
| Pile Embedment | : **4 in** | Phi for Flexure | : **0.9** | Pile Tolerance | : **3 in** |
| Pile Dia/Side Dims | : **18 in** | Phi for Shear | : **0.75** | | |
| Pile Spacing Factor | : **3** | | | | |
| Pile Min Spacing | : **54 in** | | | | |
| Pile Min Edge Dist | : **27 in** | | | | |

## Pile Capacity Checks

Pile Allow Tens : **20 k**
Pile Allow Comp : **300 k**
Pile Allow Shear : **16 k**

| Shear UC Max | Gov Pile for Shear | Gov Shear LC | Axial Comp UC Max | Gov Pile for Axial Comp | Gov Axial Comp LC | Axial Tens UC Max | Gov Pile for Axial Tens | Gov Axial Tens LC |
|---|---|---|---|---|---|---|---|---|
| 0 | NC | NC | 0.349 | 1 | 1 | 0 | NC | NC |

Note: See Expanded View for information for each individual pile for each load combination
Pile capacity checks are only given for Service LC's

## Soil Results

| Soil Comp UC Max | Gov Pile for Soil Comp | Gov Soil Comp LC | Soil Tens UC Max | Gov Pile for Soil Tens | Gov Soil Tens LC | Total Skin Friction (k) | Tip Bearing (k) |
|---|---|---|---|---|---|---|---|
| 0 | NC | NC | 0 | NC | NC | 0 | 0 |

Note: See Expanded View for information for each individual pile for each load combination
Pile capacity checks are only given for Service LC's

## Pile Cap Flexural Design

As-min x-dir (Top Flexure): **6.998 in^2**
As-min z-dir (Top Flexure): **3.499 in^2**
As-min x-dir (Bot Flexure): **6.998 in^2**
As-min z-dir (Bot Flexure): **3.499 in^2**
As-min x-dir (T & S): **6.998 in^2**
As-min z-dir (T & S): **3.499 in^2**

**Bottom Bar Reinforcement**

| Mu-xx UC Max | Gov Mu-xx LC | Mu-xx (k-ft) | z-Dir As Required (in^2) | z-Dir As Provided (in^2) | Mu-zz UC Max | Gov Mu-zz LC | Mu-zz (k-ft) | x-Dir As Required (in^2) | x-Dir As Provided (in^2) |
|---|---|---|---|---|---|---|---|---|---|
| 0.432 | 2 | 189.751 | 1.508 | 3.534 | 0 | NC | 0 | 0 | 3.534 |

**Top Bar Reinforcement**

| Mu-xx UC Max | Gov Mu-xx LC | Mu-xx (k-ft) | z-Dir As Required (in^2) | z-Dir As Provided (in^2) | Mu-zz UC Max | Gov Mu-zz LC | Mu-zz (k-ft) | x-Dir As Required (in^2) | x-Dir As Provided (in^2) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | NC | 0 | 0 | 1.767 | 0.007 | 2 | 3.67 | 0.024 | 3.534 |

## Pedestal Punching Shear Check

Phi : **0.75**

| Gov LC | UC | Punching Shear Location | Punching Shear (k) | Muz (k-ft) | Mux (k-ft) | Total Stress (ksi) | Phi * Vny (ksi) |
|---|---|---|---|---|---|---|---|
| 2 | 0.249 | INTERIOR | 260.94 | 0 | 0 | 0.044 | 0.177 |

## Pile Punching Shear Check

Phi : **0.75**

| Gov LC | Gov Pile | Punching Shear Location | Punching Shear Cap (k) | Punching Shear (k) | Punching Shear UC |
|---|---|---|---|---|---|
| **2** | **1** | **CORNER** | **516.854** | **136.093** | **0.263** |

Note: See Expanded View for information for each individual pile for each load combination
Punching shear checks are only given for Strength LC's

## Punching Shear Geometry

Pedestal Shape : **CRECT24X24** Pile Shape : **RND18**

| Gov Pile/ Pedestal | Location | Effective Depth (in) | L1 (in) | L2 (in) | Polar Moment-xx (in^4) | Polar Moment-zz (in^4) | Gamma-x | Gamma-z |
|---|---|---|---|---|---|---|---|---|
| **Pedestal** | **INTERIOR** | **28.25** | **52.25** | **52.25** | **2.883e+6** | **2.883e+6** | **0.4** | **0.4** |
| **1** | **CORNER** | **29.75** | **48.944** | **48.944** | **0** | **0** | **0** | **0** |

Note: See Expanded View for information for each individual pile for each load combination

## One Way (Deep Beam) Shear Check

w : **18 in**
d : **28.25 in**
Vu : **127.871 k**
Mu-xx: **189.751 k-ft**

w : **0 in**
d : **28.25 in**
Vu : **0 k**
Mu-zz: **3.67 k-ft**

Phi : **0.75** Vc(x-Dir Cut) : **560.157 k** Vc(z-Dir Cut) : **1804.996 k**

| UC | x-Dir Cut Vu (k) | Gov LC | UC | z-Dir Cut Vu (k) | Gov LC |
|---|---|---|---|---|---|
| **0.304** | **127.871** | **2** | **0** | **0** | **NC** |

Note: One way (beam) shear failures associated with the pile locations are not considered.

## Pedestal Design

**Shear Check Results (Envelope):**

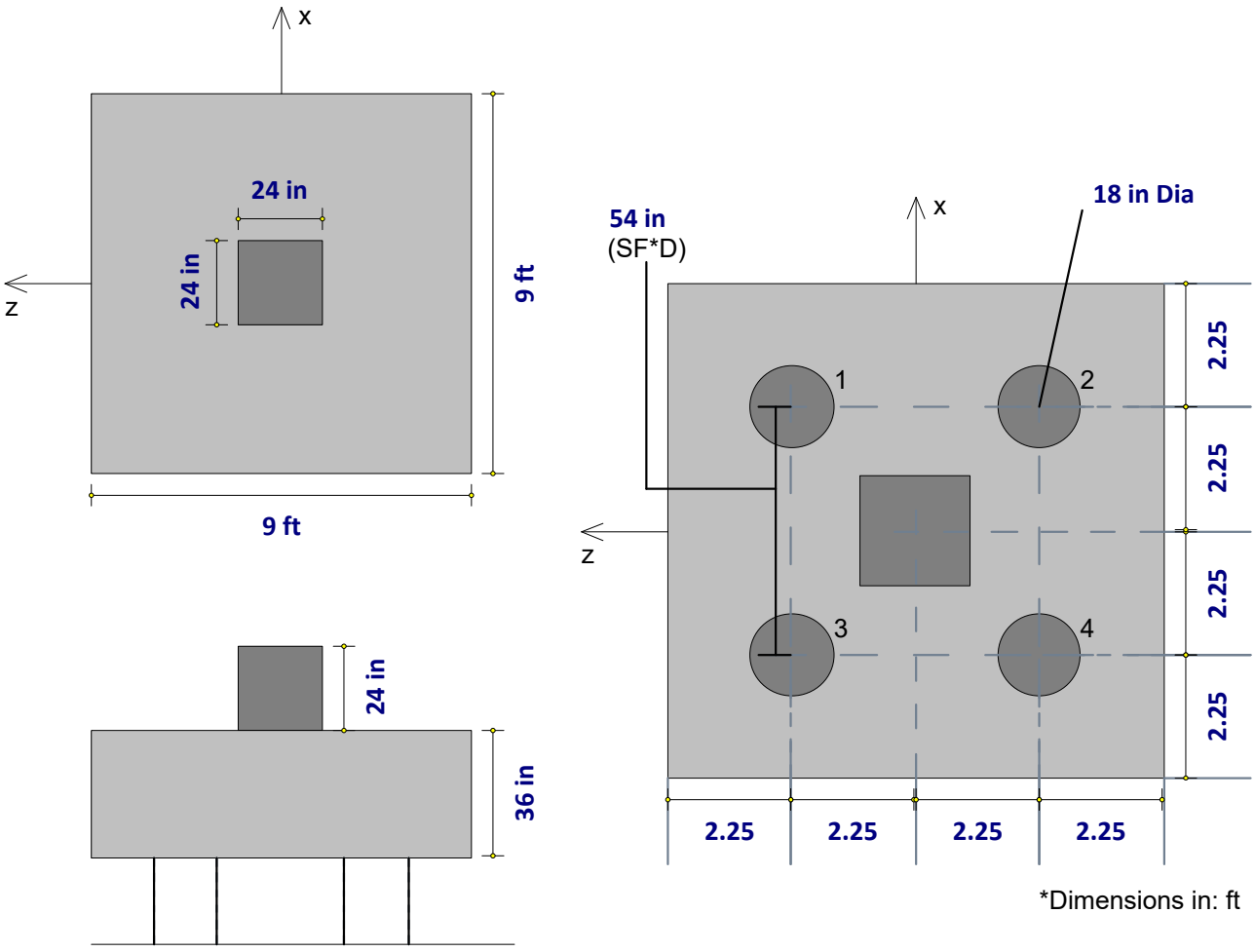
| | Vc | Vs | Vu | Vu/phi*Vn | phi |
|---|---|---|---|---|---|
| Shear Along x Direction: | **61.409** | **42.461** | **0** | **0** | **0.75** |
| Shear Along z Direction: | **61.409** | **42.461** | **0** | **0** | **0.75** |

Pedestal Ties : **#4@12 in**

**Bending Check Results (Envelope): PCA Load Contour Method (for biaxial)**

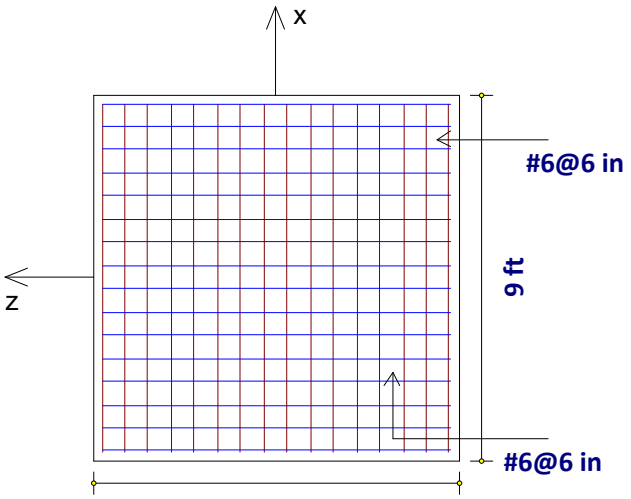
| | | | | | |
|---|---|---|---|---|---|
| Unity Check | : **0.252** | Phi | : **0.65** | Parme Beta | : **0.65** |
| Pu | : **251.044 k** | Mux | : **0 k-ft** | Muz | : **0 k-ft** |
| Pn | : **1532.114 k** | Mnx | : **NC** | Mnz | : **NC** |
| Governing LC | : **2** | Mnox | : **NC** | Mnoz | : **NC** |
| Pedestal Bars | : **8 #6** | % Steel | : **0.614** | | |

## *Sketch*



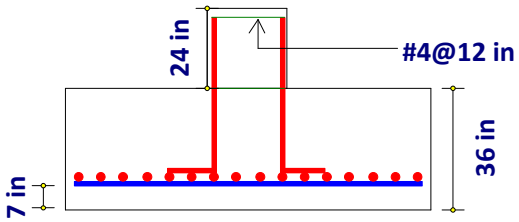

*Dimensions in: ft

## Details

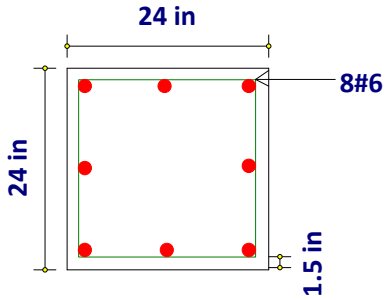



x Dir. Steel : **7.069 in^2 (16 #6)**
z Dir. Steel : **7.069 in^2 (16 #6)**

**Bottom Rebar Plan**




**Pile Cap Elevation**




**Pedestal Rebar Plan**

## Geometry, Materials and Criteria

| | | | | | |
|---|---|---|---|---|---|
| Point | : **N1** | Concrete Weight | : **0.145 k/ft^3** | Steel fy | : **60 ksi** |
| Length | : **9 ft** | Concrete f'c | : **3.5 ksi** | Minimum Steel | : **0.001800** |
| Width | : **9 ft** | Design Code | : **ACI 318-14** | Maximum Steel | : **0.007500** |
| Thickness | : **36 in** | Pile Definition | : **Pile 1** | | |
| Ped. Height | : **24 in** | Soil Overburden | : **0 ksf** | | |
| Ped. X | : **24 in** | | | | |
| Ped. Z | : **24 in** | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Cap Top Bar Cover | : **1.5 in** | Allow Shear | : **16 k** | Rotation Angle | : **0 deg** |
| Cap Bot Bar Cover | : **3 in** | Allow Axial Comp | : **300 k** | Group Red Fact (V) | : **1** |
| Ped Long Bar Cover | : **1.5 in** | Allow Axial Tens | : **20 k** | Group Red Fact (P) | : **1** |
| Pile Embedment | : **4 in** | Phi for Flexure | : **0.9** | Pile Tolerance | : **3 in** |
| Pile Dia/Side Dims | : **18 in** | Phi for Shear | : **0.75** | | |
| Pile Spacing Factor | : **3** | | | | |
| Pile Min Spacing | : **54 in** | | | | |
| Pile Min Edge Dist | : **27 in** | | | | |

## Pile Capacity Checks

Pile Allow Tens : **20 k**
Pile Allow Comp : **300 k**
Pile Allow Shear : **16 k**

| Shear UC Max | Gov Pile for Shear | Gov Shear LC | Axial Comp UC Max | Gov Pile for Axial Comp | Gov Axial Comp LC | Axial Tens UC Max | Gov Pile for Axial Tens | Gov Axial Tens LC |
|---|---|---|---|---|---|---|---|---|
| 0 | NC | NC | 0.636 | 1 | 1 | 0 | NC | NC |

Note: See Expanded View for information for each individual pile for each load combination
Pile capacity checks are only given for Service LC's

## Soil Results

| Soil Comp UC Max | Gov Pile for Soil Comp | Gov Soil Comp LC | Soil Tens UC Max | Gov Pile for Soil Tens | Gov Soil Tens LC | Total Skin Friction (k) | Tip Bearing (k) |
|---|---|---|---|---|---|---|---|
| 0 | NC | NC | 0 | NC | NC | 0 | 0 |

Note: See Expanded View for information for each individual pile for each load combination
Pile capacity checks are only given for Service LC's

## Pile Cap Flexural Design

As-min x-dir (Top Flexure): **6.998 in^2**
As-min z-dir (Top Flexure): **6.998 in^2**
As-min x-dir (Bot Flexure): **6.998 in^2**
As-min z-dir (Bot Flexure): **6.998 in^2**
As-min x-dir (T & S): **6.998 in^2**
As-min z-dir (T & S): **6.998 in^2**

**Bottom Bar Reinforcement**

| Mu-xx UC Max | Gov Mu-xx LC | Mu-xx (k-ft) | z-Dir As Required (in^2) | z-Dir As Provided (in^2) | Mu-zz UC Max | Gov Mu-zz LC | Mu-zz (k-ft) | x-Dir As Required (in^2) | x-Dir As Provided (in^2) |
|---|---|---|---|---|---|---|---|---|---|
| 0.822 | 2 | 721.811 | 5.789 | 7.069 | 0.822 | 2 | 721.811 | 5.789 | 7.069 |

**Top Bar Reinforcement**

| Mu-xx UC Max | Gov Mu-xx LC | Mu-xx (k-ft) | z-Dir As Required (in^2) | z-Dir As Provided (in^2) | Mu-zz UC Max | Gov Mu-zz LC | Mu-zz (k-ft) | x-Dir As Required (in^2) | x-Dir As Provided (in^2) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | NC | 0 | 0 | 0 | 0 | NC | 0 | 0 | 0 |

## Pedestal Punching Shear Check

Phi : **0.75**

| Gov LC | UC | Punching Shear Location | Punching Shear (k) | Muz (k-ft) | Mux (k-ft) | Total Stress (ksi) | Phi * Vny (ksi) |
|---|---|---|---|---|---|---|---|
| 2 | 0.924 | INTERIOR | 968.396 | 0 | 0 | 0.164 | 0.177 |

## Pile Punching Shear Check

Phi : **0.55**

| Gov LC | Gov Pile | Punching Shear Location | Punching Shear Cap (k) | Punching Shear (k) | Punching Shear UC |
|---|---|---|---|---|---|
| **2** | **1** | **CORNER** | **284.361** | **250.196** | **0.88** |

Note: See Expanded View for information for each individual pile for each load combination
Punching shear checks are only given for Strength LC's

## Punching Shear Geometry

Pedestal Shape : **CRECT24X24** Pile Shape : **RND18**

| Gov Pile/ Pedestal | Location | Effective Depth (in) | L1 (in) | L2 (in) | Polar Moment-xx (in^4) | Polar Moment-zz (in^4) | Gamma-x | Gamma-z |
|---|---|---|---|---|---|---|---|---|
| **Pedestal** | **INTERIOR** | **28.25** | **52.25** | **52.25** | **2.883e+6** | **2.883e+6** | **0.4** | **0.4** |
| **1** | **CORNER** | **32** | **50.069** | **50.069** | **0** | **0** | **0** | **0** |

Note: See Expanded View for information for each individual pile for each load combination

## One Way (Deep Beam) Shear Check

w : **18 in**
d : **28.25 in**
Vu : **483.948 k**
Mu-xx: **721.811 k-ft**

w : **18 in**
d : **28.25 in**
Vu : **483.948 k**
Mu-zz: **721.811 k-ft**

Phi : **0.75** Vc(x-Dir Cut) : **1115.199 k** Vc(z-Dir Cut) : **1115.199 k**

| UC | x-Dir Cut Vu (k) | Gov LC | UC | z-Dir Cut Vu (k) | Gov LC |
|---|---|---|---|---|---|
| **0.579** | **483.948** | **2** | **0.579** | **483.948** | **2** |

Note: One way (beam) shear failures associated with the pile locations are not considered.

## Pedestal Design

**Shear Check Results (Envelope):**

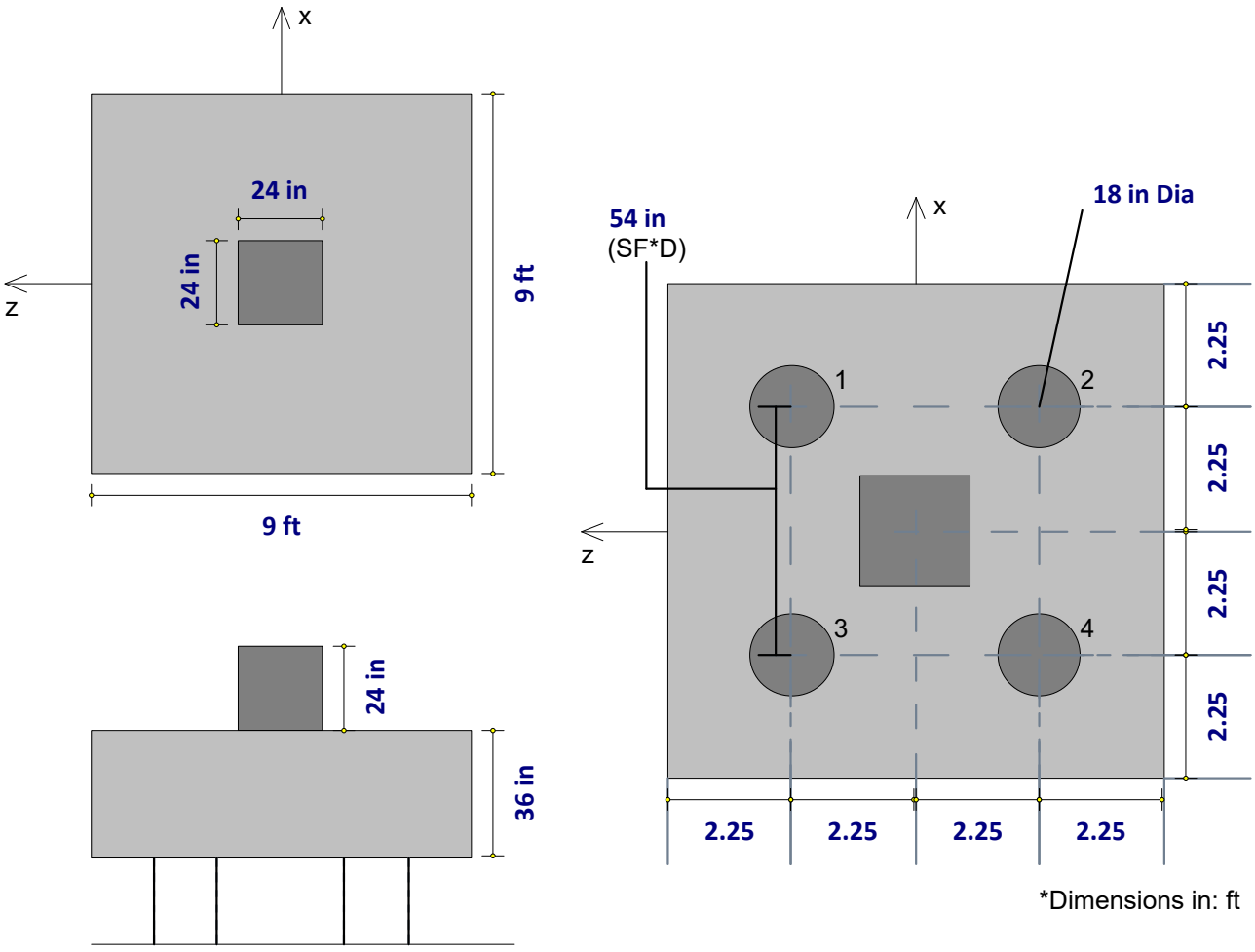
| | Vc | Vs | Vu | Vu/phi*Vn | phi |
|---|---|---|---|---|---|
| Shear Along x Direction: | **61.409** | **42.461** | **0** | **0** | **0.75** |
| Shear Along z Direction: | **61.409** | **42.461** | **0** | **0** | **0.75** |

Pedestal Ties : **#4@12 in**

**Bending Check Results (Envelope): PCA Load Contour Method (for biaxial)**

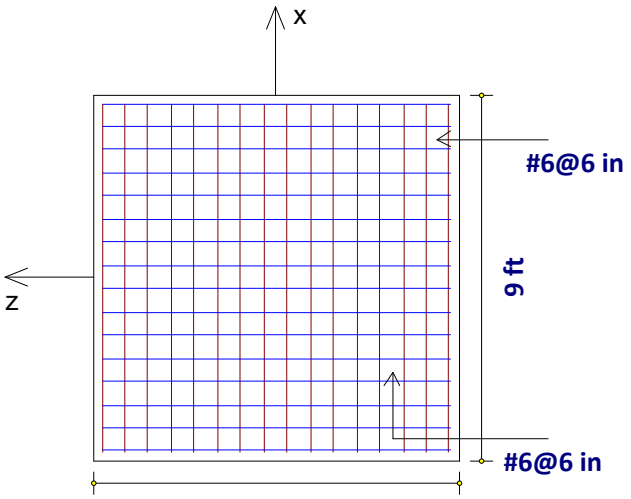
| | | | | | |
|---|---|---|---|---|---|
| Unity Check | : **0.962** | Phi | : **0.65** | Parme Beta | : **0.65** |
| Pu | : **958.5 k** | Mux | : **0 k-ft** | Muz | : **0 k-ft** |
| Pn | : **1532.114 k** | Mnx | : **NC** | Mnz | : **NC** |
| Governing LC | : **2** | Mnox | : **NC** | Mnoz | : **NC** |
| Pedestal Bars | : **8 #6** | % Steel | : **0.614** | | |

## *Sketch*



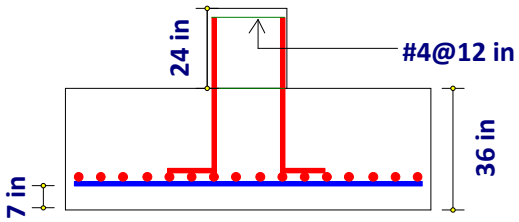

*Dimensions in: ft

## Details

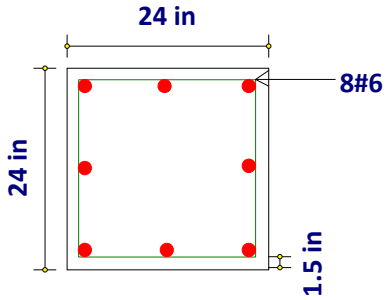



x Dir. Steel : **7.069 in^2 (16 #6)**
z Dir. Steel : **7.069 in^2 (16 #6)**

**Bottom Rebar Plan**




**Pile Cap Elevation**




**Pedestal Rebar Plan**

## Geometry, Materials and Criteria

| | | | | | |
|---|---|---|---|---|---|
| Point | : **N1** | Concrete Weight | : **0.145 k/ft^3** | Steel fy | : **60 ksi** |
| Length | : **9 ft** | Concrete f'c | : **3.5 ksi** | Minimum Steel | : **0.001800** |
| Width | : **9 ft** | Design Code | : **ACI 318-14** | Maximum Steel | : **0.007500** |
| Thickness | : **36 in** | Pile Definition | : **Pile 1** | | |
| Ped. Height | : **24 in** | Soil Overburden | : **0 ksf** | | |
| Ped. X | : **24 in** | | | | |
| Ped. Z | : **24 in** | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Cap Top Bar Cover | : **1.5 in** | Allow Shear | : **16 k** | Rotation Angle | : **0 deg** |
| Cap Bot Bar Cover | : **3 in** | Allow Axial Comp | : **300 k** | Group Red Fact (V) | : **1** |
| Ped Long Bar Cover | : **1.5 in** | Allow Axial Tens | : **20 k** | Group Red Fact (P) | : **1** |
| Pile Embedment | : **4 in** | Phi for Flexure | : **0.9** | Pile Tolerance | : **3 in** |
| Pile Dia/Side Dims | : **18 in** | Phi for Shear | : **0.75** | | |
| Pile Spacing Factor | : **3** | | | | |
| Pile Min Spacing | : **54 in** | | | | |
| Pile Min Edge Dist | : **27 in** | | | | |

## Pile Capacity Checks

Pile Allow Tens : **20 k**
Pile Allow Comp : **300 k**
Pile Allow Shear : **16 k**

| Shear UC Max | Gov Pile for Shear | Gov Shear LC | Axial Comp UC Max | Gov Pile for Axial Comp | Gov Axial Comp LC | Axial Tens UC Max | Gov Pile for Axial Tens | Gov Axial Tens LC |
|---|---|---|---|---|---|---|---|---|
| 0 | NC | NC | 0.656 | 1 | 1 | 0 | NC | NC |

Note: See Expanded View for information for each individual pile for each load combination
Pile capacity checks are only given for Service LC's

## Soil Results

| Soil Comp UC Max | Gov Pile for Soil Comp | Gov Soil Comp LC | Soil Tens UC Max | Gov Pile for Soil Tens | Gov Soil Tens LC | Total Skin Friction (k) | Tip Bearing (k) |
|---|---|---|---|---|---|---|---|
| 0 | NC | NC | 0 | NC | NC | 0 | 0 |

Note: See Expanded View for information for each individual pile for each load combination
Pile capacity checks are only given for Service LC's

## Pile Cap Flexural Design

As-min x-dir (Top Flexure): **6.998 in^2**
As-min z-dir (Top Flexure): **6.998 in^2**
As-min x-dir (Bot Flexure): **6.998 in^2**
As-min z-dir (Bot Flexure): **6.998 in^2**
As-min x-dir (T & S): **6.998 in^2**
As-min z-dir (T & S): **6.998 in^2**

**Bottom Bar Reinforcement**

| Mu-xx UC Max | Gov Mu-xx LC | Mu-xx (k-ft) | z-Dir As Required (in^2) | z-Dir As Provided (in^2) | Mu-zz UC Max | Gov Mu-zz LC | Mu-zz (k-ft) | x-Dir As Required (in^2) | x-Dir As Provided (in^2) |
|---|---|---|---|---|---|---|---|---|---|
| 0.843 | 2 | 740.045 | 5.938 | 7.069 | 0.843 | 2 | 740.045 | 5.938 | 7.069 |

**Top Bar Reinforcement**

| Mu-xx UC Max | Gov Mu-xx LC | Mu-xx (k-ft) | z-Dir As Required (in^2) | z-Dir As Provided (in^2) | Mu-zz UC Max | Gov Mu-zz LC | Mu-zz (k-ft) | x-Dir As Required (in^2) | x-Dir As Provided (in^2) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | NC | 0 | 0 | 0 | 0 | NC | 0 | 0 | 0 |

## Pedestal Punching Shear Check

Phi : **0.75**

| Gov LC | UC | Punching Shear Location | Punching Shear (k) | Muz (k-ft) | Mux (k-ft) | Total Stress (ksi) | Phi * Vny (ksi) |
|---|---|---|---|---|---|---|---|
| 2 | 0.947 | INTERIOR | 992.708 | 0 | 0 | 0.168 | 0.177 |

## Pile Punching Shear Check

Phi : **0.55**

| Gov LC | Gov Pile | Punching Shear Location | Punching Shear Cap (k) | Punching Shear (k) | Punching Shear UC |
|---|---|---|---|---|---|
| **2** | **1** | **CORNER** | **284.361** | **256.274** | **0.901** |

Note: See Expanded View for information for each individual pile for each load combination
Punching shear checks are only given for Strength LC's

## Punching Shear Geometry

Pedestal Shape : **CRECT24X24** Pile Shape : **RND18**

| Gov Pile/ Pedestal | Location | Effective Depth (in) | L1 (in) | L2 (in) | Polar Moment-xx (in^4) | Polar Moment-zz (in^4) | Gamma-x | Gamma-z |
|---|---|---|---|---|---|---|---|---|
| **Pedestal** | **INTERIOR** | **28.25** | **52.25** | **52.25** | **2.883e+6** | **2.883e+6** | **0.4** | **0.4** |
| **1** | **CORNER** | **32** | **50.069** | **50.069** | **0** | **0** | **0** | **0** |

Note: See Expanded View for information for each individual pile for each load combination

## One Way (Deep Beam) Shear Check

w : **18 in**
d : **28.25 in**
Vu : **496.104 k**
Mu-xx: **740.045 k-ft**

w : **18 in**
d : **28.25 in**
Vu : **496.104 k**
Mu-zz: **740.045 k-ft**

Phi : **0.75** Vc(x-Dir Cut) : **1115.059 k** Vc(z-Dir Cut) : **1115.059 k**

| UC | x-Dir Cut Vu (k) | Gov LC | UC | z-Dir Cut Vu (k) | Gov LC |
|---|---|---|---|---|---|
| **0.593** | **496.104** | **2** | **0.593** | **496.104** | **2** |

Note: One way (beam) shear failures associated with the pile locations are not considered.

## Pedestal Design

**Shear Check Results (Envelope):**

| | Vc | Vs | Vu | Vu/phi*Vn | phi |
|---|---|---|---|---|---|
| Shear Along x Direction: | **61.409** | **42.461** | **0** | **0** | **0.75** |
| Shear Along z Direction: | **61.409** | **42.461** | **0** | **0** | **0.75** |

Pedestal Ties : **#4@12 in**

**Bending Check Results (Envelope): PCA Load Contour Method (for biaxial)**

| | | | | | |
|---|---|---|---|---|---|
| Unity Check | : **0.987** | Phi | : **0.65** | Parme Beta | : **0.65** |
| Pu | : **982.812 k** | Mux | : **0 k-ft** | Muz | : **0 k-ft** |
| Pn | : **1532.114 k** | Mnx | : **NC** | Mnz | : **NC** |
| Governing LC | : **2** | Mnox | : **NC** | Mnoz | : **NC** |
| Pedestal Bars | : **8 #6** | % Steel | : **0.614** | | |

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Structural Engineers Since 1957
4338 Belleview Ave. 816.531.4144
Kansas City, MO 64111 www.bdc-engrs.com

Project PARAGON

Date _____ Page ___ of ___

LOADS ON PODIUM

| | DL | LL |
|---|---|---|
| ROOF | 25psf | 25psf |
| 5th | 35psf | 40psf |
| 4th | 35psf | 40psf |
| 3RD | 35psf | 40psf |
| PODIUM (15" SLAB) | 205psf | 40psf |
| | 335psf | 185psf |

AREA F - GRID 9

↔FLAT PLATE/SLAB DESIGN (2cycle analysis)
FOR DESIGNING CONTINUOUS SLABS WITH UNIFORM DISTRIBUTED LOADS by bdc

The program is for continuous spans with uniform loads designed per ACI 318 83. Corrections for 'equivalent columns are incorporated in the program, but beam tables 13-1 & 13-2 of ACI 318 commentary are not activated unless the column depth/span ratio exceeds 15%.
SEE ACI 318- & PCA 'CONTINUITY IN CONCRETE BUILDING FRAMES'

job # = 0 job name: PARAGON STAR date: run by: CAB

********* THIS IS ECHO PRINT ***********

H = 12 ROOF SLAB dd = DROP

| COL# | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| SPAN | 1 | 2 | 3 | 4 | |
| N=NAME | 1 | 2 | 3 | 4 | |
| L = | 23.00 | 11.50 | 11.50 | 23.17 | |
| B = | 213.00 | 213.00 | 213.00 | 213.00 | |
| T = | 15.00 | 15.00 | 15.00 | 15.00 | |
| W1 = | 6.60 | 6.60 | 6.60 | 6.60 | |
| W2 = | 3.30 | 3.30 | 3.30 | 3.30 | |
| B1= | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 |
| D1= | 0.1 | 24.0 | 24.0 | 24.0 | 0.1 |

CANT M (K-FT) L DL= 41.00 TL= 63.00 V (K) = 34.00
CANT M (K-FT) R DL= 30.00 TL= 66.00 V (K) = 30.00

*** NOTE HAUNCH DISTRIBUTION ROUTINE ***

Routine approximating tables 13-1 & 13-2 'ACI 318-77' commentary activated. Errors of approximation sometimes are additive, and have been found as high as 3% of average; the answers however, are much more accurate than ignoring the effect of large column depth/span ratios.

2 CYCLE OUTPUT

*** COL CENTERLINE MOM AND SHEARS ***

| | LEFT END | | | MIDSPAN | | | | RT END |
|---|---|---|---|---|---|---|---|---|
| SPAN NO. | -MOM (K-FT) | SHEAR (K) | P.I. (FT) | M+ (K-FT) | M- (K-FT) | P.I. (FT) | SHEAR (K) | -MOM (K-FT) |
| 1 | -63.00 | 94.14 | 0.67 | 381.34 | 235.43 | 4.45 | 133.56 | -516.30 |
| 2 | -360.71 | 82.61 | 5.55 | 28.96 | -29.96 | 0.00 | 31.24 | -65.30 |
| 3 | -62.67 | 28.94 | 0.00 | 26.09 | -33.66 | 5.76 | 84.91 | -384.50 |
| 4 | -526.93 | 134.58 | 4.41 | 391.32 | 239.21 | 0.48 | 94.80 | -66.00 |

*** DESIGN MOMENTS AND SHEARS ***

| | LEFT END | | | | MIDSPAN | | | RT END |
|---|---|---|---|---|---|---|---|---|
| SPAN NO. | L COL M(K-FT) | -MOM (K-FT) | SHEAR (K) | P.I. (FT) | M+ (K-FT) | P.I. (FT) | SHEAR (K) | -MOM (K-FT) |
| 1 | 22.00 | -62.74 | 94.10 | 0.69 | 378.03 | 4.68 | 123.66 | -427.26 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2 | -101.11 | -305.63 | 72.71 | 6.55 | 22.36 | 1.36 | 21.34 | -65.30 |
| 3 | -1.46 | -62.67 | 19.04 | 0.89 | 19.49 | 6.55 | 75.01 | -327.90 |
| 4 | 92.38 | -437.20 | 124.68 | 4.74 | 388.00 | 0.72 | 94.76 | -65.74 |

RT COL MOM 36.00

*** FLEXURAL & SHEAR DESIGN ***

COMMON STRENGTHS & FACTORS ARE

| 1) f'c | 2) fyb | 3) fyv | 4) WT | 5) F/DL | 6) F/LL | 7) CVR | 8) Phb | 9) Phv |
|---|---|---|---|---|---|---|---|---|
| 5000.00 | 60.00 | 60.00 | 150.00 | 1.40 | 1.70 | 1.88 | 0.90 | 0.85 |
| PSI | KSI | KSI | #/CF | | | IN | | |

$\frac{106.5}{12} \times 0.44 = 3.905$

*** COL STRIP REBAR CALCULATIONS ***

| MOMENT K-FT | Mu LT. BM K-FT | WIDTH IN | DEPTH IN | A s SQ IN | BARS NO. | SELECTED SIZE | a IN | AVE. SPCG IN |
|---|---|---|---|---|---|---|---|---|
| SPAN # 1 | | | | | | | | |
| -47.05 | 70.58 | 106.50 | 13.13 | 1.20 | 4 | 5 | 0.16 | 26.63 |
| 10.4 Z= 223 > 175, LIMIT OF ACCEPTABLE CRACKS/INT CONSTR. | | | | | | | | |
| 226.82 | 340.22 | 106.50 | 13.13 | 5.94 +5 | 8 | 8 | 0.79 | 13.31 |
| FORMULA 10.4 OK FOR INTERIOR CONSTRUCTION @ Z =171 | | | | | | | | |
| -320.44 | 480.67 | 106.50 | 13.13 | 8.50 | 11 | 8 | 1.12 | 9.68 |
| FORMULA 10.4 OK FOR INTERIOR CONSTRUCTION @ Z =160 | | | | | | | | |
| INSTANTANEOUS T.L. DEFL SIMPLE =- 0.811 ACTUAL =- 0.452 L/360 =- 0.767 | | | | | | | | |
| | | | | | 15#7 | | | |
| SPAN # 2 | | | | | | | | |
| -229.22 | 343.83 | 106.50 | 13.13 | 6.00 | 8 | 8 | 0.80 | 13.31 |
| FORMULA 10.4 OK FOR INTERIOR CONSTRUCTION @ Z =173 | | | | | | | | |
| 13.42 | 20.13 | 106.50 | 13.13 | 0.34 | 6 | 8 | 0.05 | 17.75 |
| 4.66 SQ. IN. MIN. REBAR REQUIRED | | | | | | | | |
| -48.98 | 73.46 | 106.50 | 13.13 | 1.25 | 4 | 5 | 0.17 | 26.63 |
| 10.4 Z= 232 > 175, LIMIT OF ACCEPTABLE CRACKS/INT CONSTR. | | | | | | | | |
| INSTANTANEOUS T.L. DEFL SIMPLE =- 0.003 ACTUAL =- 0.000 L/360 =- 0.383 | | | | | | | | |
| SPAN # 3 | | | | | | | | |
| -47.00 | 70.51 | 106.50 | 13.13 | 1.20 | 4 | 5 | 0.16 | 26.63 |
| 10.4 Z= 223 > 175, LIMIT OF ACCEPTABLE CRACKS/INT CONSTR. | | | | | | | | |
| 11.70 | 17.54 | 106.50 | 13.13 | 0.30 | 6 | 8 | 0.04 | 17.75 |
| 4.66 SQ. IN. MIN. REBAR REQUIRED | | | | | | | | |
| -245.92 | 368.88 | 106.50 | 13.13 | 6.46 | 9 | 8 | 0.86 | 11.83 |
| FORMULA 10.4 OK FOR INTERIOR CONSTRUCTION @ Z =159 | | | | | | | | |
| INSTANTANEOUS T.L. DEFL SIMPLE =- 0.002 ACTUAL =- 0.000 L/360 =- 0.383 | | | | | | | | |
| | | | | | 15#7 | | | |
| SPAN # 4 | | | | | | | | |
| -327.90 | 491.85 | 106.50 | 13.13 | 8.71 | 11 | 8 | 1.15 | 9.68 |
| FORMULA 10.4 OK FOR INTERIOR CONSTRUCTION @ Z =164 | | | | | | | | |
| 232.80 | 349.20 | 106.50 | 13.13 | 6.10 +5 | 8 | 8 | 0.81 | 13.31 |
| 10.4 Z= 175 > 175, LIMIT OF ACCEPTABLE CRACKS/INT CONSTR. | | | | | | | | |
| -49.30 | 73.95 | 106.50 | 13.13 | 1.26 | 5 | 5 | 0.17 | 21.30 |
| FORMULA 10.4 OK FOR INTERIOR CONSTRUCTION @ Z =173 | | | | | | | | |
| INSTANTANEOUS T.L. DEFL SIMPLE =- 0.836 ACTUAL =- 0.473 L/360 =- 0.772 | | | | | | | | |

## *** MID STRIP REBAR CALCULATIONS ***

| MOMENT K-FT | Mu LT. BM K-FT | WIDTH IN | DEPTH IN | A s SQ IN | BARS NO. | SELECTED SIZE | a IN | AVE. SPCG IN |
|---|---|---|---|---|---|---|---|---|
| SPAN # 1 | | | | | | | | |
| -15.68 | 23.53 | 106.50 | 13.13 | 0.40 | 4 | 4 | 0.06 | 26.63 |
| 151.21 | 226.82 | 106.50 | 13.13 | 3.92 | 6 | 8 | 0.52 | 17.75 |
| 4.66 SQ. IN. MIN. REBAR REQUIRED | | | | | | | | |
| FORMULA 10.4 OK FOR INTERIOR CONSTRUCTION @ Z =165 | | | | | | | | |
| -106.81 | 160.22 | 106.50 | 13.13 | 2.75 | 4 | 8 | 0.37 | 26.63 |
| 10.4 Z= 199 > 175, LIMIT OF ACCEPTABLE CRACKS/INT CONSTR. | | | | | | | | |
| SPAN # 2 | | | | | | | | |
| -76.41 | 114.61 | 106.50 | 13.13 | 1.96 | 4 | 7 | 0.26 | 26.63 |
| 10.4 Z= 185 > 175, LIMIT OF ACCEPTABLE CRACKS/INT CONSTR. | | | | | | | | |
| 8.94 | 13.42 | 106.50 | 13.13 | 0.23 | 6 | 8 | 0.04 | 17.75 |
| 4.66 SQ. IN. MIN. REBAR REQUIRED | | | | | | | | |
| -16.33 | 24.49 | 106.50 | 13.13 | 0.42 | 4 | 4 | 0.06 | 26.63 |
| SPAN # 3 | | | | | | | | |
| -15.67 | 23.50 | 106.50 | 13.13 | 0.40 | 4 | 4 | 0.06 | 26.63 |
| 7.80 | 11.70 | 106.50 | 13.13 | 0.20 | 6 | 8 | 0.03 | 17.75 |
| 4.66 SQ. IN. MIN. REBAR REQUIRED | | | | | | | | |
| -81.97 | 122.96 | 106.50 | 13.13 | 2.10 | 4 | 7 | 0.28 | 26.63 |
| 10.4 Z= 199 > 175, LIMIT OF ACCEPTABLE CRACKS/INT CONSTR. | | | | | | | | |
| SPAN # 4 | | | | | | | | |
| -109.30 | 163.95 | 106.50 | 13.13 | 2.82 | 4 | 8 | 0.38 | 26.63 |
| 10.4 Z= 204 > 175, LIMIT OF ACCEPTABLE CRACKS/INT CONSTR. | | | | | | | | |
| 155.20 | 232.80 | 106.50 | 13.13 | 4.02 | 6 | 8 | 0.54 | 17.75 |
| 4.66 SQ. IN. MIN. REBAR REQUIRED | | | | | | | | |
| FORMULA 10.4 OK FOR INTERIOR CONSTRUCTION @ Z =170 | | | | | | | | |
| -16.43 | 24.65 | 106.50 | 13.13 | 0.42 | 4 | 4 | 0.06 | 26.63 |

## BEAM SHEAR DESIGN

| V face K | Vn@ face K | Vn@d K | B IN. | D IN. | VC K | Av min IN2/U | GROUP #&BAR | Lv FT |
|---|---|---|---|---|---|---|---|---|
| SPAN 1 | | | | | | | | |
| 94.10 | 166.06 | 146.95 | 213.00 | 13.13 | 395.36 | NO STIRRUPS REQD | | |
| 123.66 | 218.22 | 199.11 | 213.00 | 13.13 | 395.36 | NO STIRRUPS REQD | | |
| SPAN 2 | | | | | | | | |
| 72.71 | 128.32 | 109.21 | 213.00 | 13.13 | 395.36 | NO STIRRUPS REQD | | |
| 21.34 | 37.65 | 18.55 | 213.00 | 13.13 | 395.36 | NO STIRRUPS REQD | | |
| SPAN 3 | | | | | | | | |
| 19.04 | 33.60 | 14.49 | 213.00 | 13.13 | 395.36 | NO STIRRUPS REQD | | |
| 75.01 | 132.37 | 113.26 | 213.00 | 13.13 | 395.36 | NO STIRRUPS REQD | | |
| SPAN 4 | | | | | | | | |
| 124.68 | 220.03 | 200.92 | 213.00 | 13.13 | 395.36 | NO STIRRUPS REQD | | |
| 94.76 | 167.22 | 148.11 | 213.00 | 13.13 | 395.36 | NO STIRRUPS REQD | | |

PUNCHING SHEAR DESIGN/CHECK

| COL NO | Mv FT-K | CRIT V KIPS | b IN. | d IN. | v(AVE) psi | v @ L psi | v @ R psi | V(fs) | As(c) sq-in |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 22.00 | 126.24 | 100.70 | 13.13 | 95.51 | 95.51 | 95.51 | 1.27 | 0.41 |
| Vs CRANKSHAFT BARS W/AREA (MIN. CONTROLS) = 1.10 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | | 123.01 | 153.20 | 13.13 | 61.18 | 61.18 | 61.18 | 1.98 | 0.39 |
| 2 | -101.11 | 210.83 | 148.50 | 13.13 | 108.17 | 109.80 | 106.55 | 2.19 | 1.60 |
| 3 | -1.46 | 54.84 | 148.50 | 13.13 | 28.14 | 28.16 | 28.11 | 8.54 | 0.02 |
| 4 | 92.38 | 214.16 | 148.50 | 13.13 | 109.88 | 111.36 | 108.39 | 2.16 | 1.46 |
| 5 | 36.00 | 122.90 | 100.70 | 13.13 | 92.98 | 92.98 | 92.98 | 1.30 | 0.68 |
| Vs CRANKSHAFT BARS W/AREA (MIN. CONTROLS) = 1.10 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | | 119.67 | 153.20 | 13.13 | 59.51 | 59.51 | 59.51 | 2.04 | 0.64 |

job #: 0 name: PARAGON STAR date: 06:20:02 12-23-2009 run by: CAB

COST OF RUN IS $12.89

AREA F - GRID 8

↔FLAT PLATE/SLAB DESIGN (2cycle analysis)
FOR DESIGNING CONTINUOUS SLABS WITH UNIFORM DISTRIBUTED LOADS by bdc

The program is for continuous spans with uniform loads designed per ACI 318 83. Corrections for 'equivalent columns are incorporated in the program, but beam tables 13-1 & 13-2 of ACI 318 commentary are not activated unless the column depth/span ratio exceeds 15%.
SEE ACI 318- & PCA 'CONTINUITY IN CONCRETE BUILDING FRAMES'

job # = 0 job name: PARAGON STAR date: _____ run by: CAB

********* THIS IS ECHO PRINT ***********

H = 12 ROOF SLAB dd = DROP

| COL# | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| SPAN | 1 | 2 | 3 | |
| N=NAME | 1 | 2 | 3 | |
| L = | 23.00 | 23.00 | 23.17 | |
| B = | 348.00 | 348.00 | 348.00 | |
| T = | 15.00 | 15.00 | 15.00 | |
| W1 = | 9.90 | 10.40 | 9.90 | |
| W2 = | 5.40 | 5.40 | 5.40 | |
| B1= | 24.0 | 24.0 | 24.0 | 24.0 |
| D1= | 0.1 | 24.0 | 24.0 | 0.1 |

CANT M (K-FT) L DL= 65.00 TL= 101.00 V (K) = 55.00
CANT M (K-FT) R DL= 49.00 TL= 75.00 V (K) = 48.00

2 CYCLE OUTPUT

*** COL CENTERLINE MOM AND SHEARS ***

| | LEFT END | | | MIDSPAN | | | | RT END |
|---|---|---|---|---|---|---|---|---|
| SPAN NO. | -MOM (K-FT) | SHEAR (K) | P.I. (FT) | M+ (K-FT) | M- (K-FT) | P.I. (FT) | SHEAR (K) | -MOM (K-FT) |
| 1 | -101.00 | 141.91 | 0.72 | 597.60 | 282.91 | 4.75 | 209.99 | -883.84 |
| 2 | -844.64 | 181.24 | 5.40 | 423.76 | 164.26 | 5.49 | 182.16 | -855.20 |
| 3 | -898.25 | 212.78 | 4.81 | 613.39 | 299.04 | 0.54 | 141.72 | -75.00 |

*** DESIGN MOMENTS AND SHEARS ***

| | LEFT END | | | | MIDSPAN | | | RT END |
|---|---|---|---|---|---|---|---|---|
| SPAN NO. | L COL M(K-FT) | -MOM (K-FT) | SHEAR (K) | P.I. (FT) | M+ (K-FT) | P.I. (FT) | SHEAR (K) | -MOM (K-FT) |
| 1 | 36.00 | -100.61 | 141.85 | 0.74 | 592.48 | 5.19 | 194.69 | -743.85 |
| 2 | -32.85 | -723.81 | 165.44 | 6.50 | 413.23 | 6.56 | 166.36 | -733.76 |
| 3 | 36.46 | -756.40 | 197.48 | 5.19 | 608.27 | 0.55 | 141.66 | -74.61 |

RT COL MOM 26.00

*** FLEXURAL & SHEAR DESIGN ***

COMMON STRENGTHS & FACTORS ARE

| 1) f'c | 2) fyb | 3) fyv | 4) WT | 5) F/DL | 6) F/LL | 7) CVR | 8) Phb | 9) Phv |
|---|---|---|---|---|---|---|---|---|
| 5000.00 | 60.00 | 60.00 | 150.00 | 1.40 | 1.70 | 1.88 | 0.90 | 0.85 |
| PSI | KSI | KSI | #/CF | | | IN | | |

$\frac{174}{12} \times 0.44 = 6.38$

*** COL STRIP REBAR CALCULATIONS ***

| MOMENT K-FT | Mu LT. K-FT | BM WIDTH IN | BM DEPTH IN | A s SQ IN | BARS SELECTED NO. | SIZE | a IN | AVE. SPCG IN |
|---|---|---|---|---|---|---|---|---|
| SPAN # 1 | | | | | | | | |
| -75.45 | 113.63 | 174.00 | 13.13 | 1.94 | 7 | 5 | 0.16 | 24.86 |
| 10.4 Z= 200 > 175, LIMIT OF ACCEPTABLE CRACKS/INT CONSTR. | | | | | | | | |
| 355.49 | 535.32 | 174.00 | 13.13 | 9.33 +7 | 12 | 8 | 0.76 | 14.50 |
| 10.4 Z= 183 > 175, LIMIT OF ACCEPTABLE CRACKS/INT CONSTR. | | | | | | | | |
| -557.89 | 840.12 | 174.00 | 13.13 | 14.91 | 19 | 8 | 1.20 | 9.16 |
| FORMULA 10.4 OK FOR INTERIOR CONSTRUCTION @ Z =159 | | | | | | | | |
| INSTANTANEOUS T.L. DEFL SIMPLE =- 0.767 ACTUAL =- 0.436 L/360 =- 0.767 | | | | | | | | |
| | | | | 25 #7 | | | | |
| SPAN # 2 | | | | | | | | |
| -542.86 | 815.66 | 174.00 | 13.13 | 14.46 | 19 | 8 | 1.17 | 9.16 |
| FORMULA 10.4 OK FOR INTERIOR CONSTRUCTION @ Z =154 | | | | | | | | |
| 247.94 | 372.54 | 174.00 | 13.13 | 6.44 +1 | 10 | 8 | 0.53 | 17.40 |
| 7.61 SQ. IN. MIN. REBAR REQUIRED | | | | | | | | |
| FORMULA 10.4 OK FOR INTERIOR CONSTRUCTION @ Z =161 | | | | | | | | |
| -550.32 | 826.87 | 174.00 | 13.13 | 14.66 | 19 | 8 | 1.18 | 9.16 |
| FORMULA 10.4 OK FOR INTERIOR CONSTRUCTION @ Z =156 | | | | | | | | |
| INSTANTANEOUS T.L. DEFL SIMPLE =- 0.656 ACTUAL =- 0.242 L/360 =- 0.767 | | | | | | | | |
| | | | | 26 #7 | | | | |
| SPAN # 3 | | | | | | | | |
| -567.30 | 854.28 | 174.00 | 13.13 | 15.18 | 19 | 8 | 1.23 | 9.16 |
| FORMULA 10.4 OK FOR INTERIOR CONSTRUCTION @ Z =161 | | | | | | | | |
| 364.96 | 549.59 | 174.00 | 13.13 | 9.59 +8 | 12 | 8 | 0.78 | 14.50 |
| 10.4 Z= 188 > 175, LIMIT OF ACCEPTABLE CRACKS/INT CONSTR. | | | | | | | | |
| -55.95 | 84.26 | 174.00 | 13.13 | 1.43 | 8 | 4 | 0.12 | 21.75 |
| 10.4 Z= 193 > 175, LIMIT OF ACCEPTABLE CRACKS/INT CONSTR. | | | | | | | | |
| INSTANTANEOUS T.L. DEFL SIMPLE =- 0.791 ACTUAL =- 0.456 L/360 =- 0.772 | | | | | | | | |

*** MID STRIP REBAR CALCULATIONS ***

| MOMENT K-FT | Mu LT. K-FT | BM WIDTH IN | BM DEPTH IN | A s SQ IN | BARS SELECTED NO. | SIZE | a IN | AVE. SPCG IN |
|---|---|---|---|---|---|---|---|---|
| SPAN # 1 | | | | | | | | |
| -25.15 | 37.88 | 174.00 | 13.13 | 0.64 | 6 | 4 | 0.06 | 30.00 |
| 236.99 | 356.88 | 174.00 | 13.13 | 6.16 ✓ | 10 | 8 | 0.50 | 17.40 |
| 7.61 SQ. IN. MIN. REBAR REQUIRED | | | | | | | | |
| FORMULA 10.4 OK FOR INTERIOR CONSTRUCTION @ Z =154 | | | | | | | | |
| -185.96 | 280.04 | 174.00 | 13.13 | 4.81 | 7 | 8 | 0.40 | 24.86 |
| 10.4 Z= 194 > 175, LIMIT OF ACCEPTABLE CRACKS/INT CONSTR. | | | | | | | | |
| | | | | 11 #6 | | | | |
| SPAN # 2 | | | | | | | | |
| -180.95 | 271.89 | 174.00 | 13.13 | 4.67 | 6 | 8 | 0.38 | 29.00 |
| 10.4 Z= 232 > 175, LIMIT OF ACCEPTABLE CRACKS/INT CONSTR. | | | | | | | | |
| 165.29 | 248.36 | 174.00 | 13.13 | 4.26 ✓ | 10 | 8 | 0.35 | 17.40 |
| 7.61 SQ. IN. MIN. REBAR REQUIRED | | | | | | | | |

```
  -183.44    275.62    174.00     13.13      4.74       6        8       0.39     29.00
10.4 Z=     235 > 175, LIMIT OF ACCEPTABLE CRACKS/INT CONSTR.

  SPAN  #  3
  -189.10    284.76    174.00     13.13      4.90       7        8       0.40     24.86
10.4 Z=     197 > 175, LIMIT OF ACCEPTABLE CRACKS/INT CONSTR.
   243.31    366.39    174.00     13.13      6.33      10        8       0.52     17.40
    7.61  SQ. IN. MIN. REBAR REQUIRED
FORMULA 10.4 OK FOR INTERIOR CONSTRUCTION @ Z =158
   -18.65     28.09    174.00     13.13      0.48       6        4       0.04     30.00
```

BEAM SHEAR DESIGN

| V face K | Vn@ face K | Vn@d K | B IN. | D IN. | VC K | Av min IN2/U | GROUP #&BAR | Lv FT |
|---|---|---|---|---|---|---|---|---|
| SPAN 1 | | | | | | | | |
| 141.85 | 251.30 | 221.66 | 348.00 | 13.13 | 645.94 | NO STIRRUPS REQD | | |
| 194.69 | 344.91 | 315.26 | 348.00 | 13.13 | 645.94 | NO STIRRUPS REQD | | |
| SPAN 2 | | | | | | | | |
| 165.44 | 292.45 | 261.90 | 348.00 | 13.13 | 645.94 | NO STIRRUPS REQD | | |
| 166.36 | 294.07 | 263.52 | 348.00 | 13.13 | 645.94 | NO STIRRUPS REQD | | |
| SPAN 3 | | | | | | | | |
| 197.48 | 349.86 | 320.22 | 348.00 | 13.13 | 645.94 | NO STIRRUPS REQD | | |
| 141.66 | 250.96 | 221.31 | 348.00 | 13.13 | 645.94 | NO STIRRUPS REQD | | |

PUNCHING SHEAR DESIGN/CHECK

| COL NO | Mv FT-K | CRIT V KIPS | b IN. | d IN. | v(AVE) psi | v @ L psi | v @ R psi | V(fs) | As(c) sq-in |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 36.00 | 195.11 | 100.70 | 13.13 | 147.63 | 147.63 | 147.63 | 0.82 | 0.68 |
| Vs CRANKSHAFT BARS W/AREA (MIN. CONTROLS) = 1.10 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | 192.06 | 153.20 | 13.13 | | 95.52 | 95.52 | 95.52 | 1.27 | 0.64 |
| Vs CRANKSHAFT BARS W/AREA (MIN. CONTROLS) = 1.68 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | 187.75 | 205.70 | 13.13 | | 69.54 | 69.54 | 69.54 | 1.74 | 0.62 |
| 2 | -32.85 | 386.01 | 148.50 | 13.13 | 198.05 | 198.58 | 197.52 | 1.21 | 0.52 |
| Vs CRANKSHAFT BARS W/AREA = 4.24 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | 381.67 | 201.00 | 13.13 | | 144.68 | 144.97 | 144.38 | 1.66 | 0.52 |
| 3 | 36.46 | 389.89 | 148.50 | 13.13 | 200.04 | 200.63 | 199.45 | 1.20 | 0.58 |
| Vs CRANKSHAFT BARS W/AREA = 4.35 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | 385.69 | 201.00 | 13.13 | | 146.20 | 146.52 | 145.87 | 1.64 | 0.58 |
| 4 | 26.00 | 187.92 | 100.70 | 13.13 | 142.18 | 142.18 | 142.18 | 0.85 | 0.49 |
| Vs CRANKSHAFT BARS W/AREA (MIN. CONTROLS) = 1.10 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | 184.87 | 153.20 | 13.13 | | 91.94 | 91.94 | 91.94 | 1.32 | 0.46 |
| Vs CRANKSHAFT BARS W/AREA (MIN. CONTROLS) = 1.68 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | 180.55 | 205.70 | 13.13 | | 66.88 | 66.88 | 66.88 | 1.81 | 0.45 |

job #: 0  name:  PARAGON STAR  date: 06:14:09  12-23-2009  run by:  CAB
COST OF RUN IS  $11.98

AREA F- GRID 3

↔FLAT PLATE/SLAB DESIGN (2cycle analysis)
FOR DESIGNING CONTINUOUS SLABS WITH UNIFORM DISTRIBUTED LOADS by bdc

The program is for continuous spans with uniform loads designed per ACI 318 83. Corrections for 'equivalent columns are incorporated in the program, but beam tables 13-1 & 13-2 of ACI 318 commentary are not activated unless the column depth/span ratio exceeds 15%.
SEE ACI 318 & PCA 'CONTINUITY IN CONCRETE BUILDING FRAMES'

job # = 0 job name: PARAGON STAR date: run by: CAB

********* THIS IS ECHO PRINT ***********

H = 12 ROOF SLAB dd = DROP

| COL# | (1) | (2) | (3) |
|---|---|---|---|
| SPAN | 1 | 2 | |
| N=NAME | 1 | 2 | |
| L = | 23.00 | 23.00 | |
| B = | 342.00 | 342.00 | |
| T = | 15.00 | 15.00 | |
| W1 = | 9.60 | 9.60 | |
| W2 = | 5.30 | 5.30 | |
| B1= | 24.0 | 24.0 | 24.0 |
| D1= | 0.1 | 24.0 | 0.1 |

CANT M (K-FT) L DL= 65.00 TL= 101.00 V (K) = 55.00

2 CYCLE OUTPUT

*** COL CENTERLINE MOM AND SHEARS ***

| SPAN | LEFT END -MOM (K-FT) | SHEAR (K) | P.I. (FT) | MIDSPAN M+ (K-FT) | M- (K-FT) | P.I. (FT) | SHEAR (K) | RT END -MOM (K-FT) |
|---|---|---|---|---|---|---|---|---|
| 1 | -101.00 | 133.73 | 0.78 | 585.53 | 277.20 | 5.67 | 208.97 | -966.16 |
| 2 | -971.86 | 213.61 | 5.56 | 608.48 | 312.86 | 0.00 | 129.10 | -0.00 |

*** DESIGN MOMENTS AND SHEARS ***

| SPAN | LEFT END L COL M(K-FT) | -MOM (K-FT) | SHEAR (K) | P.I. (FT) | MIDSPAN M+ (K-FT) | P.I. (FT) | SHEAR (K) | RT END -MOM (K-FT) |
|---|---|---|---|---|---|---|---|---|
| 1 | 36.00 | -100.63 | 133.67 | 0.79 | 580.55 | 5.84 | 194.07 | -826.85 |
| 2 | 8.86 | -829.46 | 198.70 | 5.67 | 603.49 | 0.00 | 129.03 | -0.00 |
| RT COL MOM | | | | | | | | -0.00 |

*** FLEXURAL & SHEAR DESIGN ***

COMMON STRENGTHS & FACTORS ARE

| 1)f'c | 2)fyb | 3)fyv | 4)WT | 5)F/DL | 6)F/LL | 7)CVR | 8)Phb | 9)Phv |
|---|---|---|---|---|---|---|---|---|
| 5000.00 | 60.00 | 60.00 | 150.00 | 1.40 | 1.70 | 1.88 | 0.90 | 0.85 |
| PSI | KSI | KSI | #/CF | | | IN | | |

$\frac{171}{12} \times 0.44 = 6.27$

*** COL STRIP REBAR CALCULATIONS ***

| MOMENT K-FT | Mu LT. BM K-FT | WIDTH IN | DEPTH IN | A s SQ IN | BARS NO. | SELECTED SIZE | a IN | AVE. SPCG IN |
|---|---|---|---|---|---|---|---|---|
| SPAN # 1 | | | | | | | | |
| -75.47 | 113.71 | 171.00 | 13.13 | 1.94 | 7 | 5 | 0.16 | 24.43 |
| 10.4 Z= 198 > 175, LIMIT OF ACCEPTABLE CRACKS/INT CONSTR. | | | | | | | | |
| 348.33 | 524.83 | 171.00 | 13.13 | 9.15 +7 | 12 | 8 | 0.76 | 14.25 |
| 10.4 Z= 179 > 175, LIMIT OF ACCEPTABLE CRACKS/INT CONSTR. | | | | | | | | |
| -620.14 | 934.37 | 171.00 | 13.13 | 16.69 | 21 | 8 | 1.37 | 8.14 |
| FORMULA 10.4 OK FOR INTERIOR CONSTRUCTION @ Z =154 | | | | | | | | |
| INSTANTANEOUS T.L. DEFL SIMPLE =- 0.760 ACTUAL =- 0.435 L/360 =- 0.767 | | | | | | | | |
| SPAN # 2 | | | | | | | | |
| -622.10 | 937.32 | 171.00 | 13.13 | 16.75 | 21 | 8 | 1.38 | 8.14 |
| FORMULA 10.4 OK FOR INTERIOR CONSTRUCTION @ Z =155 | | | | | | | | |
| 362.10 | 545.58 | 171.00 | 13.13 | 9.52 +9 | 12 | 8 | 0.79 | 14.25 |
| 10.4 Z= 186 > 175, LIMIT OF ACCEPTABLE CRACKS/INT CONSTR. | | | | | | | | |
| -0.00 | 0.00 | 171.00 | 13.13 | 0.00 | 6 | 4 | 0.01 | 28.50 |
| INSTANTANEOUS T.L. DEFL SIMPLE =- 0.760 ACTUAL =- 0.459 L/360 =- 0.767 | | | | | | | | |

28 #7

*** MID STRIP REBAR CALCULATIONS ***

| MOMENT K-FT | Mu LT. BM K-FT | WIDTH IN | DEPTH IN | A s SQ IN | BARS NO. | SELECTED SIZE | a IN | AVE. SPCG IN |
|---|---|---|---|---|---|---|---|---|
| SPAN # 1 | | | | | | | | |
| -25.16 | 37.90 | 171.00 | 13.13 | 0.64 | 6 | 4 | 0.06 | 28.50 |
| 232.22 | 349.89 | 171.00 | 13.13 | 6.04 ✓ | 10 | 8 | 0.50 | 17.10 |
| 7.48 SQ. IN. MIN. REBAR REQUIRED | | | | | | | | |
| FORMULA 10.4 OK FOR INTERIOR CONSTRUCTION @ Z =150 | | | | | | | | |
| -206.71 | 311.46 | 171.00 | 13.13 | 5.36 | 7 | 8 | 0.45 | 24.43 |
| 10.4 Z= 215 > 175, LIMIT OF ACCEPTABLE CRACKS/INT CONSTR. | | | | | | | | |
| SPAN # 2 | | | | | | | | |
| -207.37 | 312.44 | 171.00 | 13.13 | 5.38 | 7 | 8 | 0.45 | 24.43 |
| 10.4 Z= 215 > 175, LIMIT OF ACCEPTABLE CRACKS/INT CONSTR. | | | | | | | | |
| 241.40 | 363.72 | 171.00 | 13.13 | 6.28 ✓ | 10 | 8 | 0.52 | 17.10 |
| 7.48 SQ. IN. MIN. REBAR REQUIRED | | | | | | | | |
| FORMULA 10.4 OK FOR INTERIOR CONSTRUCTION @ Z =156 | | | | | | | | |
| -0.00 | 0.00 | 171.00 | 13.13 | 0.00 | 6 | 4 | 0.01 | 28.50 |

13 # 8

BEAM SHEAR DESIGN

| V face K | Vn@ face K | Vn@d K | B IN. | D IN. | VC K | Av min IN2/U | GROUP #&BAR | Lv FT |
|---|---|---|---|---|---|---|---|---|
| SPAN 1 | | | | | | | | |
| 133.67 | 236.95 | 208.06 | 342.00 | 13.13 | 634.81 | NO STIRRUPS REQD | | |
| 194.07 | 344.00 | 315.11 | 342.00 | 13.13 | 634.81 | NO STIRRUPS REQD | | |

SPAN 2

| | | | | | | |
|---|---|---|---|---|---|---|
| 198.70 | 352.22 | 323.34 | 342.00 | 13.13 | 634.81 | NO STIRRUPS REQD |
| 129.03 | 228.72 | 199.84 | 342.00 | 13.13 | 634.81 | NO STIRRUPS REQD |

## PUNCHING SHEAR DESIGN/CHECK

| COL NO | Mv FT-K | CRIT V KIPS | b IN. | d IN. | v(AVE) psi | v @ L psi | v @ R psi | V(fs) | As(c) sq-in |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 36.00 | 186.95 | 100.70 | 13.13 | 141.45 | 141.45 | 141.45 | 0.86 | 0.68 |
| Vs CRANKSHAFT BARS W/AREA (MIN. CONTROLS) = 1.10 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | | 183.93 | 153.20 | 13.13 | 91.47 | 91.47 | 91.47 | 1.33 | 0.64 |
| Vs CRANKSHAFT BARS W/AREA (MIN. CONTROLS) = 1.68 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | | 179.65 | 205.70 | 13.13 | 66.54 | 66.54 | 66.54 | 1.82 | 0.62 |
| 2 | 8.86 | 417.57 | 148.50 | 13.13 | 214.24 | 214.38 | 214.10 | 1.12 | 0.14 |
| Vs CRANKSHAFT BARS W/AREA = 5.09 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | | 413.40 | 201.00 | 13.13 | 156.70 | 156.78 | 156.62 | 1.53 | 0.14 |
| 3 | -0.00 | 128.20 | 50.45 | 13.13 | 193.61 | 193.61 | 193.61 | 0.63 | 0.00 |
| Vs CRANKSHAFT BARS W/AREA = 1.35 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | | 126.68 | 76.70 | 13.13 | 125.84 | 125.84 | 125.84 | 0.96 | 0.00 |
| Vs CRANKSHAFT BARS W/AREA (MIN. CONTROLS) = 0.84 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | | 124.54 | 102.95 | 13.13 | 92.17 | 92.17 | 92.17 | 1.32 | 0.00 |
| Vs CRANKSHAFT BARS W/AREA (MIN. CONTROLS) = 1.13 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | | 121.78 | 129.20 | 13.13 | 71.81 | 71.81 | 71.81 | 1.69 | 0.00 |

job #: 0 name: PARAGON STAR date: 06:27:15 12-23-2009 run by: CAB

COST OF RUN IS $11.07

28'-6" WIDTH
23/23/23.17

AREA F - N/S DIR

GRIDS 4, 5, 6, 7

↔FLAT PLATE/SLAB DESIGN (2cycle analysis)
FOR DESIGNING CONTINUOUS SLABS WITH UNIFORM DISTRIBUTED LOADS by bdc

The program is for continuous spans with uniform loads designed per ACI 318
Corrections for 'equivalent columns are incorporated in the program, but beam
tables 13-1 & 13-2 of ACI 318 commentary are not activated unless the column
depth/span ratio exceeds 15%.
SEE ACI 318 & PCA 'CONTINUITY IN CONCRETE BUILDING FRAMES'

job # = 0 job name: PARAGON STAR date: run by: CAB

DL = 335 psf
LL = 185 psf

********* THIS IS ECHO PRINT **********

H = 12 ROOF SLAB dd = DROP

| COL# | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| SPAN | 1 | 2 | 3 | |
| N=NAME | 1 | 2 | 3 | |
| L = | 23.00 | 23.00 | 23.17 | |
| B = | 342.00 | 342.00 | 342.00 | |
| T = | 15.00 | 15.00 | 15.00 | |
| W1 = | 9.60 | 9.60 | 9.60 | |
| W2 = | 5.30 | 5.30 | 5.30 | |
| B1= | 24.0 | 24.0 | 24.0 | 24.0 |
| D1= | 0.1 | 24.0 | 24.0 | 0.1 |

CANT M (K-FT) L DL= 65.00 TL= 101.00 V (K) = 55.00
CANT M (K-FT) R DL= 49.00 TL= 75.00 V (K) = 48.00

2 CYCLE OUTPUT

*** COL CENTERLINE MOM AND SHEARS ***

| | LEFT END | | | MIDSPAN | | | | RT END |
|---|---|---|---|---|---|---|---|---|
| SPAN NO. | -MOM (K-FT) | SHEAR (K) | P.I. (FT) | M+ (K-FT) | M- (K-FT) | P.I. (FT) | SHEAR (K) | -MOM (K-FT) |
| 1 | -101.00 | 138.78 | 0.74 | 585.53 | 277.20 | 4.65 | 203.92 | -850.15 |
| 2 | -806.46 | 170.90 | 5.51 | 395.65 | 142.03 | 5.61 | 171.80 | -816.80 |
| 3 | -864.40 | 206.69 | 4.71 | 601.01 | 293.07 | 0.55 | 138.55 | -75.00 |

*** DESIGN MOMENTS AND SHEARS ***

| | LEFT END | | | MIDSPAN | | | | RT END |
|---|---|---|---|---|---|---|---|---|
| SPAN NO. | L COL M(K-FT) | -MOM (K-FT) | SHEAR (K) | P.I. (FT) | M+ (K-FT) | P.I. (FT) | SHEAR (K) | -MOM (K-FT) |
| 1 | 36.00 | -100.61 | 138.72 | 0.76 | 580.55 | 5.13 | 189.02 | -714.20 |
| 2 | -37.11 | -692.52 | 156.00 | 6.64 | 385.71 | 6.70 | 156.90 | -702.27 |
| 3 | 40.79 | -726.61 | 191.79 | 5.13 | 596.02 | 0.56 | 138.48 | -74.62 |

RT COL MOM 26.00

*** FLEXURAL & SHEAR DESIGN ***

COMMON STRENGTHS & FACTORS ARE

| 1)f'c | 2)fyb | 3)fyv | 4)WT | 5)F/DL | 6)F/LL | 7)CVR | 8)Phb | 9)Phv |
|---|---|---|---|---|---|---|---|---|
| 5000.00 | 60.00 | 60.00 | 150.00 | 1.40 | 1.70 | 1.88 | 0.90 | 0.85 |
| PSI | KSI | KSI | #/CF | | | IN | | |

TYP BOTT: #6 @ 12" o.c.

$\frac{171}{12} \times 0.44 = 6.27$

*** COL STRIP REBAR CALCULATIONS ***

| MOMENT K-FT | Mu LT. BM K-FT | WIDTH IN | DEPTH IN | A s SQ IN | BARS NO. | SELECTED SIZE | a IN | AVE. SPCG IN |
|---|---|---|---|---|---|---|---|---|
| SPAN # 1 | | | | | | | | |
| -75.46 | 113.70 | 171.00 | 13.13 | 1.94 | 7 | 5 | 0.16 | 24.43 |
| 10.4 Z= 198 > 175, LIMIT OF ACCEPTABLE CRACKS/INT CONSTR. | | | | | | | | |
| 348.33 | 524.83 | 171.00 | 13.13 | 9.15 | +7 12 | 8 | 0.76 | 14.25 |
| 10.4 Z= 179 > 175, LIMIT OF ACCEPTABLE CRACKS/INT CONSTR. | | | | | | | | |
| -535.65 | 807.07 | 171.00 | 13.13 | 14.31 | 18 | 8 | 1.18 | 9.50 |
| FORMULA 10.4 OK FOR INTERIOR CONSTRUCTION @ Z =163 | | | | | | | | |
| INSTANTANEOUS T.L. DEFL SIMPLE =- 0.760 ACTUAL =- 0.435 L/360 =- 0.767 | | | | | | | | |
| 24 #7 | | | | | | | | |
| SPAN # 2 | | | | | | | | |
| -519.39 | 782.58 | 171.00 | 13.13 | 13.85 | 18 | 8 | 1.14 | 9.50 |
| FORMULA 10.4 OK FOR INTERIOR CONSTRUCTION @ Z =157 | | | | | | | | |
| 231.43 | 348.70 | 171.00 | 13.13 | 6.02 ✓ | 10 | 8 | 0.50 | 17.10 |
| 7.48 SQ. IN. MIN. REBAR REQUIRED | | | | | | | | |
| FORMULA 10.4 OK FOR INTERIOR CONSTRUCTION @ Z =150 | | | | | | | | |
| -526.70 | 793.58 | 171.00 | 13.13 | 14.06 | 18 | 8 | 1.16 | 9.50 |
| FORMULA 10.4 OK FOR INTERIOR CONSTRUCTION @ Z =160 | | | | | | | | |
| INSTANTANEOUS T.L. DEFL SIMPLE =- 0.629 ACTUAL =- 0.229 L/360 =- 0.767 | | | | | | | | |
| 25 #7 | | | | | | | | |
| SPAN # 3 | | | | | | | | |
| -544.96 | 821.10 | 171.00 | 13.13 | 14.57 | 19 | 8 | 1.20 | 9.00 |
| FORMULA 10.4 OK FOR INTERIOR CONSTRUCTION @ Z =154 | | | | | | | | |
| 357.61 | 538.82 | 171.00 | 13.13 | 9.40 | +8 12 | 8 | 0.78 | 14.25 |
| 10.4 Z= 183 > 175, LIMIT OF ACCEPTABLE CRACKS/INT CONSTR. | | | | | | | | |
| -55.96 | 84.32 | 171.00 | 13.13 | 1.43 | 8 | 4 | 0.12 | 21.38 |
| 10.4 Z= 192 > 175, LIMIT OF ACCEPTABLE CRACKS/INT CONSTR. | | | | | | | | |
| INSTANTANEOUS T.L. DEFL SIMPLE =- 0.784 ACTUAL =- 0.456 L/360 =- 0.772 | | | | | | | | |

*** MID STRIP REBAR CALCULATIONS ***

| MOMENT K-FT | Mu LT. BM K-FT | WIDTH IN | DEPTH IN | A s SQ IN | BARS NO. | SELECTED SIZE | a IN | AVE. SPCG IN |
|---|---|---|---|---|---|---|---|---|
| SPAN # 1 | | | | | | | | |
| -25.15 | 37.90 | 171.00 | 13.13 | 0.64 ✓ | 6 | 4 | 0.06 | 28.50 |
| 232.22 | 349.89 | 171.00 | 13.13 | 6.04 ✓ | 10 | 8 | 0.50 | 17.10 |
| 7.48 SQ. IN. MIN. REBAR REQUIRED | | | | | | | | |
| FORMULA 10.4 OK FOR INTERIOR CONSTRUCTION @ Z =150 | | | | | | | | |
| -178.55 | 269.02 | 171.00 | 13.13 | 4.62 | 6 | 8 | 0.39 | 28.50 |
| 10.4 Z= 227 > 175, LIMIT OF ACCEPTABLE CRACKS/INT CONSTR. | | | | | | | | |
| 11 #6 | | | | | | | | |
| SPAN # 2 | | | | | | | | |
| -173.13 | 260.86 | 171.00 | 13.13 | 4.48 | 6 | 8 | 0.37 | 28.50 |
| 10.4 Z= 220 > 175, LIMIT OF ACCEPTABLE CRACKS/INT CONSTR. | | | | | | | | |
| 154.29 | 232.46 | 171.00 | 13.13 | 3.99 ✓ | 10 | 8 | 0.33 | 17.10 |
| 7.48 SQ. IN. MIN. REBAR REQUIRED | | | | | | | | |

```
   -175.57    264.53    171.00     13.13      4.54       6        8        0.38     28.50
10.4 Z=     223 > 175, LIMIT OF ACCEPTABLE CRACKS/INT CONSTR.
```

11 #6

```
   SPAN  #  3
   -181.65    273.70    171.00     13.13      4.70       6        8        0.39     28.50
10.4 Z=     231 > 175, LIMIT OF ACCEPTABLE CRACKS/INT CONSTR.
    238.41    359.21    171.00     13.13      6.20      10        8        0.52     17.10
    7.48  SQ. IN. MIN. REBAR REQUIRED
FORMULA 10.4 OK FOR INTERIOR CONSTRUCTION @ Z =154
    -18.65     28.11    171.00     13.13      0.48       6        4        0.04     28.50
```

## BEAM SHEAR DESIGN

| V face K | Vn@ face K | Vn@d K | B IN. | D IN. | VC K | Av min IN2/U | GROUP #&BAR | Lv FT |
|---|---|---|---|---|---|---|---|---|
| SPAN 1 | | | | | | | | |
| 138.72 | 245.89 | 217.00 | 342.00 | 13.13 | 634.81 | NO STIRRUPS REQD | | |
| 189.02 | 335.06 | 306.17 | 342.00 | 13.13 | 634.81 | NO STIRRUPS REQD | | |
| SPAN 2 | | | | | | | | |
| 156.00 | 276.53 | 247.64 | 342.00 | 13.13 | 634.81 | NO STIRRUPS REQD | | |
| 156.90 | 278.12 | 249.23 | 342.00 | 13.13 | 634.81 | NO STIRRUPS REQD | | |
| SPAN 3 | | | | | | | | |
| 191.79 | 339.96 | 311.07 | 342.00 | 13.13 | 634.81 | NO STIRRUPS REQD | | |
| 138.48 | 245.48 | 216.59 | 342.00 | 13.13 | 634.81 | NO STIRRUPS REQD | | |

## PUNCHING SHEAR DESIGN/CHECK

| COL NO | Mv FT-K | CRIT V KIPS | b IN. | d IN. | v(AVE) psi | v @ L psi | v @ R psi | V(fs) | As(c) sq-in |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 36.00 | 192.00 | 100.70 | 13.13 | 145.27 | 145.27 | 145.27 | 0.83 | 0.68 |
| Vs CRANKSHAFT BARS W/AREA (MIN. CONTROLS) = 1.10 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | 188.97 | 153.20 | 13.13 | | 93.98 | 93.98 | 93.98 | 1.29 | 0.64 |
| Vs CRANKSHAFT BARS W/AREA (MIN. CONTROLS) = 1.68 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | 184.70 | 205.70 | 13.13 | | 68.41 | 68.41 | 68.41 | 1.77 | 0.62 |
| 2 | -37.11 | 369.82 | 148.50 | 13.13 | 189.74 | 190.34 | 189.14 | 1.26 | 0.59 |
| Vs CRANKSHAFT BARS W/AREA = 3.79 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | 365.65 | 201.00 | 13.13 | | 138.60 | 138.93 | 138.27 | 1.73 | 0.59 |
| 3 | 40.79 | 373.48 | 148.50 | 13.13 | 191.62 | 192.28 | 190.97 | 1.25 | 0.64 |
| Vs CRANKSHAFT BARS W/AREA = 3.90 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | 369.32 | 201.00 | 13.13 | | 139.99 | 140.36 | 139.63 | 1.71 | 0.64 |
| 4 | 26.00 | 184.76 | 100.70 | 13.13 | 139.79 | 139.79 | 139.79 | 0.87 | 0.49 |
| Vs CRANKSHAFT BARS W/AREA (MIN. CONTROLS) = 1.10 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | 181.74 | 153.20 | 13.13 | | 90.38 | 90.38 | 90.38 | 1.34 | 0.46 |
| Vs CRANKSHAFT BARS W/AREA (MIN. CONTROLS) = 1.68 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | 177.46 | 205.70 | 13.13 | | 65.73 | 65.73 | 65.73 | 1.84 | 0.45 |

job #: 0 name: PARAGON STAR date: 02:14:55 12-23-2009 run by: CAB

COST OF RUN IS $11.98

AREA F - E|W @ GRID B|C
W| 20' SLAB @ WEST BAY

↔FLAT PLATE/SLAB DESIGN (2cycle analysis)
FOR DESIGNING CONTINUOUS SLABS WITH UNIFORM DISTRIBUTED LOADS by bdc

The program is for continuous spans with uniform loads designed per ACI 318 83. Corrections for 'equivalent columns are incorporated in the program, but beam tables 13-1 & 13-2 of ACI 318 commentary are not activated unless the column depth/span ratio exceeds 15%.
SEE ACI 318 .. & PCA 'CONTINUITY IN CONCRETE BUILDING FRAMES'

job # = 0 job name: PARAGON STAR date: run by: CAB

********* THIS IS ECHO PRINT **********

H = 12 ROOF SLAB dd = DROP

| COL# | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|---|---|---|---|
| SPAN | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
| N=NAME | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
| L = | 29.50 | 28.50 | 28.50 | 28.50 | 28.50 | 30.17 | 11.00 | 15.75 | |
| B = | 277.00 | 277.00 | 277.00 | 277.00 | 277.00 | 277.00 | 277.00 | 277.00 | |
| T = | 20.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | |
| W1 = | 8.50 | 8.00 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | 7.80 | |
| W2 = | 4.30 | 4.30 | 4.30 | 4.30 | 4.30 | 4.30 | 4.30 | 4.30 | |
| B1= | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 |
| D1= | 0.1 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 0.1 |

*** NOTE HAUNCH DISTRIBUTION ROUTINE ***

Routine approximating tables 13-1 & 13-2 'ACI 318-77' commentary activated. Errors of approximation sometimes are additive, and have been found as high as 3% of average; the answers however, are much more accurate than ignoring the effect of large column depth/span ratios.

2 CYCLE OUTPUT

*** COL CENTERLINE MOM AND SHEARS ***

| | LEFT END | | | MIDSPAN | | | | RT END |
|---|---|---|---|---|---|---|---|---|
| SPAN NO. | -MOM (K-FT) | SHEAR (K) | P.I. (FT) | M+ (K-FT) | M- (K-FT) | P.I. (FT) | SHEAR (K) | -MOM (K-FT) |
| 1 | 0.00 | 150.67 | 0.00 | 919.67 | 484.77 | 5.60 | 226.93 | -1124.95 |
| 2 | -996.25 | 179.96 | 6.50 | 463.23 | 211.98 | 5.60 | 170.59 | -862.61 |
| 3 | -862.22 | 172.25 | 5.39 | 470.83 | 198.02 | 5.33 | 172.60 | -867.09 |
| 4 | -864.38 | 172.39 | 5.30 | 472.30 | 199.48 | 5.26 | 172.46 | -865.41 |
| 5 | -858.54 | 170.48 | 5.33 | 466.07 | 187.95 | 5.92 | 174.37 | -914.00 |
| 6 | -958.73 | 187.66 | 5.97 | 551.96 | 304.29 | 4.77 | 177.39 | -803.84 |
| 7 | -600.77 | 104.51 | 6.73 | -46.16 | -168.91 | 0.00 | 28.59 | -183.23 |
| 8 | -250.29 | 111.18 | 1.73 | 233.53 | 138.04 | 0.00 | 79.40 | -0.00 |

*** DESIGN MOMENTS AND SHEARS ***

| | LEFT END | | | | MIDSPAN | | | RT END |
|---|---|---|---|---|---|---|---|---|
| SPAN | L COL | -MOM | SHEAR | P.I. | M+ | P.I. | SHEAR | -MOM |

| NO. | M(K-FT) | (K-FT) | (K) | (FT) | (K-FT) | (FT) | (K) | (K-FT) |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.00 | 0.00 | 150.61 | 0.00 | 915.39 | 5.96 | 214.13 | -973.66 |
| 2 | -106.56 | -876.27 | 167.66 | 7.41 | 455.03 | 6.65 | 158.29 | -748.89 |
| 3 | -6.00 | -747.38 | 160.15 | 6.48 | 462.76 | 6.51 | 160.50 | -752.02 |
| 4 | 0.58 | -749.46 | 160.29 | 6.49 | 464.23 | 6.50 | 160.36 | -750.44 |
| 5 | -6.25 | -744.89 | 158.38 | 6.57 | 458.00 | 6.89 | 162.27 | -797.75 |
| 6 | 56.36 | -833.62 | 175.56 | 6.45 | 543.89 | 5.60 | 165.29 | -685.58 |
| 7 | -120.95 | -531.10 | 92.41 | 3.67 | -54.23 | 0.00 | 16.49 | -164.17 |
| 8 | 70.45 | -219.25 | 99.08 | 2.63 | 229.48 | 0.00 | 79.35 | -0.00 |
| RT COL MOM | | | | | | | | -0.00 |

*** FLEXURAL & SHEAR DESIGN ***

COMMON STRENGTHS & FACTORS ARE

| 1)f'c | 2)fyb | 3)fyv | 4)WT | 5)F/DL | 6)F/LL | 7)CVR | 8)Phb | 9)Phv |
|---|---|---|---|---|---|---|---|---|
| 5000.00 | 60.00 | 60.00 | 150.00 | 1.40 | 1.70 | 1.00 | 0.90 | 0.85 |
| PSI | KSI | KSI | #/CF | | | IN | | |

TYP BOTT #6 @ 12"
138.5/12 x 0.44 = 5.07

*** COL STRIP REBAR CALCULATIONS ***

| MOMENT K-FT | Mu LT. K-FT | BM WIDTH IN | BM DEPTH IN | A s SQ IN | BARS SELECTED NO. | SIZE | a IN | AVE. SPCG IN |
|---|---|---|---|---|---|---|---|---|
| SPAN # 1 | | | | | | | | |
| 0.00 | 0.00 | 138.50 | 19.00 | 0.00 | 6 | 11 | 0.01 | 23.08 |
| 8.77 SQ. IN. MIN. REBAR REQUIRED | | | | | | | | |
| 549.23 | 824.28 | 138.50 | 19.00 | 9.90 | 7 | 11 | 1.00 | 19.79 |
| -730.24 | 1095.93 | 138.50 | 19.00 | 13.29 | 9 | 11 | 1.35 | 15.39 |
| INSTANTANEOUS T.L. DEFL SIMPLE =- 0.958 ACTUAL =- 0.618 L/360 =- 0.983 | | | | | | | | |
| | | | | 2#7 | | | | |
| SPAN # 2 | | | | | | | | |
| -657.21 | 989.01 | 138.50 | 14.00 | 16.71 | 21 | 8 | 1.70 | 6.60 |
| 273.02 | 410.86 | 138.50 | 14.00 | 6.69 | 9 | 8 | 0.69 | 15.39 |
| -561.67 | 845.24 | 138.50 | 14.00 | 14.14 | 18 | 8 | 1.44 | 7.69 |
| INSTANTANEOUS T.L. DEFL SIMPLE =- 1.631 ACTUAL =- 0.499 L/360 =- 0.950 | | | | | | | | |
| | | | | 2#8 | | | | |
| SPAN # 3 | | | | | | | | |
| -560.54 | 844.51 | 138.50 | 14.00 | 14.13 | 18 | 8 | 1.43 | 7.69 |
| 277.66 | 418.32 | 138.50 | 14.00 | 6.81 | 9 | 8 | 0.70 | 15.39 |
| -564.02 | 849.75 | 138.50 | 14.00 | 14.22 | 18 | 8 | 1.44 | 7.69 |
| INSTANTANEOUS T.L. DEFL SIMPLE =- 1.605 ACTUAL =- 0.518 L/360 =- 0.950 | | | | | | | | |
| | | | | 2#8 | | | | |
| SPAN # 4 | | | | | | | | |
| -562.09 | 846.86 | 138.50 | 14.00 | 14.17 | 18 | 8 | 1.44 | 7.69 |
| 278.54 | 419.65 | 138.50 | 14.00 | 6.83 | 9 | 8 | 0.70 | 15.39 |
| -562.83 | 847.96 | 138.50 | 14.00 | 14.19 | 18 | 8 | 1.44 | 7.69 |
| INSTANTANEOUS T.L. DEFL SIMPLE =- 1.605 ACTUAL =- 0.521 L/360 =- 0.950 | | | | | | | | |
| | | | | 2#8 | | | | |
| SPAN # 5 | | | | | | | | |
| -558.67 | 841.69 | 138.50 | 14.00 | 14.08 | 18 | 8 | 1.43 | 7.69 |
| 274.80 | 414.02 | 138.50 | 14.00 | 6.74 | 9 | 8 | 0.69 | 15.39 |
| -598.32 | 901.43 | 138.50 | 14.00 | 15.14 | 19 | 8 | 1.54 | 7.29 |
| INSTANTANEOUS T.L. DEFL SIMPLE =- 1.605 ACTUAL =- 0.509 L/360 =- 0.950 | | | | | | | | |
| | | | | 2#8 | | | | |
| SPAN # 6 | | | | | | | | |
| -625.22 | 941.96 | 138.50 | 14.00 | 15.86 | 20 | 8 | 1.61 | 6.93 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 326.34 | 491.66 | 138.50 | 14.00 | 8.04 +6 | 11 | 8 | 0.82 | 12.59 |
| -514.19 | 774.68 | 138.50 | 14.00 | 12.90 | 17 | 8 | 1.31 | 8.15 |

INSTANTANEOUS T.L. DEFL SIMPLE =- 2.051 ACTUAL =- 0.705 L/360 =- 1.006

SPAN # 7

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| -398.32 | 600.12 | 138.50 | 14.00 | 9.88 | 13 | 8 | 1.00 | 10.65 |
| -32.54 | 49.02 | 138.50 | 14.00 | 0.78 | 5 | 4 | 0.08 | 27.70 |
| -123.13 | 185.50 | 138.50 | 14.00 | 2.98 | 5 | 7 | 0.31 | 27.70 |

FORMULA 10.4 OK FOR INTERIOR CONSTRUCTION @ Z =149

INSTANTANEOUS T.L. DEFL SIMPLE =- 0.010 ACTUAL =--0.007 L/360 =- 0.367

SPAN # 8

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| -164.44 | 247.75 | 138.50 | 14.00 | 3.99 | 5 | 8 | 0.41 | 27.70 |

FORMULA 10.4 OK FOR INTERIOR CONSTRUCTION @ Z =153

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 137.69 | 207.44 | 138.50 | 14.00 | 3.33 | 9 | 8 | 0.34 | 15.39 |

6.46 SQ. IN. MIN. REBAR REQUIRED

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| -0.00 | 0.00 | 138.50 | 14.00 | 0.00 | 5 | 4 | 0.01 | 27.70 |

INSTANTANEOUS T.L. DEFL SIMPLE =- 0.152 ACTUAL =- 0.097 L/360 =- 0.525

## *** MID STRIP REBAR CALCULATIONS ***

| MOMENT K-FT | Mu LT. BM K-FT | WIDTH IN | BM DEPTH IN | A s SQ IN | BARS SELECTED NO. | SIZE | a IN | AVE. SPCG IN |
|---|---|---|---|---|---|---|---|---|

SPAN # 1

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0.00 | 0.00 | 138.50 | 19.00 | 0.00 | 6 | 11 | 0.01 | 23.08 |

8.77 SQ. IN. MIN. REBAR REQUIRED

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 366.16 | 549.52 | 138.50 | 19.00 | 6.54 | 6 | 11 | 0.67 | 23.08 |

8.77 SQ. IN. MIN. REBAR REQUIRED

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| -243.41 | 365.31 | 138.50 | 19.00 | 4.32 | 4 | 10 | 0.45 | 34.63 |

SPAN # 2

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| -219.07 | 329.67 | 138.50 | 14.00 | 5.34 | 7 | 8 | 0.55 | 19.79 |
| 182.01 | 273.91 | 138.50 | 14.00 | 4.42 ✓ | 9 | 8 | 0.46 | 15.39 |

6.46 SQ. IN. MIN. REBAR REQUIRED

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| -187.22 | 281.75 | 138.50 | 14.00 | 4.55 | 6 | 8 | 0.47 | 23.08 |

SPAN # 3

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| -186.85 | 281.50 | 138.50 | 14.00 | 4.54 ✓ | 6 | 8 | 0.47 | 23.08 |
| 185.11 | 278.88 | 138.50 | 14.00 | 4.50 ✓ | 9 | 8 | 0.46 | 15.39 |

6.46 SQ. IN. MIN. REBAR REQUIRED

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| -188.01 | 283.25 | 138.50 | 14.00 | 4.57 | 6 | 8 | 0.47 | 23.08 |

SPAN # 4

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| -187.36 | 282.29 | 138.50 | 14.00 | 4.56 ✓ | 6 | 8 | 0.47 | 23.08 |
| 185.69 | 279.77 | 138.50 | 14.00 | 4.52 ✓ | 9 | 8 | 0.47 | 15.39 |

6.46 SQ. IN. MIN. REBAR REQUIRED

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| -187.61 | 282.65 | 138.50 | 14.00 | 4.56 | 6 | 8 | 0.47 | 23.08 |

SPAN # 5

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| -186.22 | 280.56 | 138.50 | 14.00 | 4.53 ✓ | 6 | 8 | 0.47 | 23.08 |
| 183.20 | 276.01 | 138.50 | 14.00 | 4.45 ✓ | 9 | 8 | 0.46 | 15.39 |

6.46 SQ. IN. MIN. REBAR REQUIRED

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| -199.44 | 300.48 | 138.50 | 14.00 | 4.86 | 7 | 8 | 0.50 | 19.79 |

SPAN # 6

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| -208.41 | 313.99 | 138.50 | 14.00 | 5.08 | 7 | 8 | 0.52 | 19.79 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 217.56 | 327.77 | 138.50 | 14.00 | 5.31 | 9 | 8 | 0.55 | 15.39 |
| 6.46 SQ. IN. MIN. REBAR REQUIRED | | | | | | | | |
| -171.40 | 258.23 | 138.50 | 14.00 | 4.16 | 6 | 8 | 0.43 | 23.08 |
| SPAN # 7 | | | | | | | | |
| -132.77 | 200.04 | 138.50 | 14.00 | 3.21 | 5 | 8 | 0.33 | 27.70 |
| -21.69 | 32.68 | 138.50 | 14.00 | 0.52 | 5 | 4 | 0.06 | 27.70 |
| -41.04 | 61.83 | 138.50 | 14.00 | 0.99 | 5 | 4 | 0.11 | 27.70 |
| FORMULA 10.4 OK FOR INTERIOR CONSTRUCTION @ Z =151 | | | | | | | | |
| SPAN # 8 | | | | | | | | |
| -54.81 | 82.58 | 138.50 | 14.00 | 1.32 | 5 | 5 | 0.14 | 27.70 |
| 91.79 | 138.29 | 138.50 | 14.00 | 2.21 | 9 | 8 | 0.23 | 15.39 |
| 6.46 SQ. IN. MIN. REBAR REQUIRED | | | | | | | | |
| -0.00 | 0.00 | 138.50 | 14.00 | 0.00 | 5 | 4 | 0.01 | 27.70 |

## BEAM SHEAR DESIGN

| V face K | Vn@ face K | Vn@d K | B IN. | D IN. | VC K | Av min IN2/U | GROUP #&BAR | Lv FT |
|---|---|---|---|---|---|---|---|---|
| SPAN 1 | | | | | | | | |
| 150.61 | 265.93 | 230.14 | 277.00 | 19.00 | 744.30 | NO STIRRUPS REQD | | |
| 214.13 | 378.08 | 342.30 | 277.00 | 19.00 | 744.30 | NO STIRRUPS REQD | | |
| SPAN 2 | | | | | | | | |
| 167.66 | 296.84 | 271.43 | 277.00 | 14.00 | 548.43 | NO STIRRUPS REQD | | |
| 158.29 | 280.24 | 254.83 | 277.00 | 14.00 | 548.43 | NO STIRRUPS REQD | | |
| SPAN 3 | | | | | | | | |
| 160.15 | 283.87 | 258.85 | 277.00 | 14.00 | 548.43 | NO STIRRUPS REQD | | |
| 160.50 | 284.48 | 259.45 | 277.00 | 14.00 | 548.43 | NO STIRRUPS REQD | | |
| SPAN 4 | | | | | | | | |
| 160.29 | 284.11 | 259.09 | 277.00 | 14.00 | 548.43 | NO STIRRUPS REQD | | |
| 160.36 | 284.24 | 259.22 | 277.00 | 14.00 | 548.43 | NO STIRRUPS REQD | | |
| SPAN 5 | | | | | | | | |
| 158.38 | 280.72 | 255.70 | 277.00 | 14.00 | 548.43 | NO STIRRUPS REQD | | |
| 162.27 | 287.62 | 262.60 | 277.00 | 14.00 | 548.43 | NO STIRRUPS REQD | | |
| SPAN 6 | | | | | | | | |
| 175.56 | 311.18 | 286.16 | 277.00 | 14.00 | 548.43 | NO STIRRUPS REQD | | |
| 165.29 | 292.98 | 267.96 | 277.00 | 14.00 | 548.43 | NO STIRRUPS REQD | | |
| SPAN 7 | | | | | | | | |
| 92.41 | 163.79 | 138.77 | 277.00 | 14.00 | 548.43 | NO STIRRUPS REQD | | |
| 16.49 | 29.23 | 4.21 | 277.00 | 14.00 | 548.43 | NO STIRRUPS REQD | | |
| SPAN 8 | | | | | | | | |
| 99.08 | 175.62 | 150.59 | 277.00 | 14.00 | 548.43 | NO STIRRUPS REQD | | |
| 79.35 | 140.64 | 115.62 | 277.00 | 14.00 | 548.43 | NO STIRRUPS REQD | | |

## PUNCHING SHEAR DESIGN/CHECK

| COL NO | Mv FT-K | CRIT V KIPS | b IN. | d IN. | v(AVE) psi | v @ L psi | v @ R psi | V(fs) | As(c) sq-in |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.00 | 149.08 | 62.20 | 19.00 | 126.14 | 126.14 | 126.14 | 0.96 | 0.00 |
| Vs CRANKSHAFT BARS W/AREA (MIN. CONTROLS) = 0.98 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | | 146.11 | 100.20 | 19.00 | 76.74 | 76.74 | 76.74 | 1.58 | 0.00 |
| 2 | -106.56 | 401.55 | 152.00 | 14.00 | 188.70 | 190.23 | 187.17 | 1.26 | 1.58 |
| Vs CRANKSHAFT BARS W/AREA = 4.13 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | | 396.89 | 208.00 | 14.00 | 136.30 | 137.12 | 135.47 | 1.75 | 1.58 |
| 3 | -6.00 | 337.58 | 152.00 | 14.00 | 158.64 | 158.73 | 158.55 | 1.51 | 0.09 |
| 4 | 0.58 | 339.73 | 152.00 | 14.00 | 159.65 | 159.66 | 159.64 | 1.51 | 0.01 |
| Vs CRANKSHAFT BARS W/AREA = 2.33 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | | 335.14 | 208.00 | 14.00 | 115.09 | 115.09 | 115.09 | 2.09 | 0.01 |
| 5 | -6.25 | 337.68 | 152.00 | 14.00 | 158.69 | 158.78 | 158.60 | 1.51 | 0.09 |
| 6 | 56.36 | 356.78 | 152.00 | 14.00 | 167.66 | 168.47 | 166.85 | 1.43 | 0.84 |
| Vs CRANKSHAFT BARS W/AREA = 2.85 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | | 352.19 | 208.00 | 14.00 | 120.94 | 121.38 | 120.51 | 1.98 | 0.84 |
| 7 | -120.95 | 276.65 | 152.00 | 14.00 | 130.00 | 131.74 | 128.27 | 1.82 | 1.79 |
| 8 | 70.45 | 134.51 | 152.00 | 14.00 | 63.21 | 64.22 | 62.20 | 3.74 | 1.04 |
| 9 | -0.00 | 78.41 | 52.20 | 14.00 | 107.30 | 107.30 | 107.30 | 1.13 | 0.00 |
| Vs CRANKSHAFT BARS W/AREA (MIN. CONTROLS) = 0.61 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | | 76.73 | 80.20 | 14.00 | 68.34 | 68.34 | 68.34 | 1.77 | 0.00 |

job #: 0 name: PARAGON STAR date: 05:58:24 12-23-2009 run by: CAB

COST OF RUN IS $16.53

AREA F - E|W @ GRID B|C
W| 15" SLAB FOR MID-STRIP REINF @ WEST BAY

↔FLAT PLATE/SLAB DESIGN (2cycle analysis)
FOR DESIGNING CONTINUOUS SLABS WITH UNIFORM DISTRIBUTED LOADS by bdc 78

The program is for continuous spans with uniform loads designed per ACI 318 83. Corrections for 'equivalent columns are incorporated in the program, but beam tables 13-1 & 13-2 of ACI 318 commentary are not activated unless the column depth/span ratio exceeds 15%.
SEE ACI 318-77 & PCA 'CONTINUITY IN CONCRETE BUILDING FRAMES'

job # = 0 job name: PARAGON STAR date: 12-23-2009 run by: CAB

********* THIS IS ECHO PRINT **********

H = 12 ROOF SLAB dd = DROP

| COL# | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| SPAN | 1 | 2 | 3 | 4 | |
| N=NAME | 1 | 2 | 3 | 4 | |
| L = | 29.50 | 28.50 | 28.50 | 28.50 | |
| B = | 277.00 | 277.00 | 277.00 | 277.00 | |
| T = | 15.00 | 15.00 | 15.00 | 15.00 | |
| W1 = | 8.50 | 8.00 | 7.80 | 7.80 | |
| W2 = | 4.30 | 4.30 | 4.30 | 4.30 | |
| B1= | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 |
| D1= | 0.1 | 24.0 | 24.0 | 24.0 | 0.1 |

2 CYCLE OUTPUT

*** COL CENTERLINE MOM AND SHEARS ***

| | LEFT END | | | MIDSPAN | | | | RT END |
|---|---|---|---|---|---|---|---|---|
| SPAN NO. | -MOM (K-FT) | SHEAR (K) | P.I. (FT) | M+ (K-FT) | M- (K-FT) | P.I. (FT) | SHEAR (K) | -MOM (K-FT) |
| 1 | -0.00 | 147.57 | 0.00 | 844.30 | 478.35 | 6.17 | 230.03 | -1216.39 |
| 2 | -1068.95 | 182.21 | 7.05 | 479.55 | 189.92 | 5.52 | 168.34 | -871.25 |
| 3 | -871.06 | 168.02 | 5.55 | 478.12 | 192.11 | 6.56 | 176.83 | -996.60 |
| 4 | -1100.34 | 211.03 | 6.11 | 738.95 | 391.15 | 0.00 | 133.82 | -0.00 |

*** DESIGN MOMENTS AND SHEARS ***

| | LEFT END | | | | MIDSPAN | | | RT END |
|---|---|---|---|---|---|---|---|---|
| SPAN NO. | L COL M(K-FT) | -MOM (K-FT) | SHEAR (K) | P.I. (FT) | M+ (K-FT) | P.I. (FT) | SHEAR (K) | -MOM (K-FT) |
| 1 | -0.00 | -0.00 | 147.51 | 0.00 | 840.01 | 6.44 | 217.23 | -1063.04 |
| 2 | -126.13 | -947.48 | 169.91 | 8.06 | 471.35 | 6.93 | 156.04 | -759.03 |
| 3 | 1.25 | -759.05 | 155.92 | 6.90 | 470.05 | 7.63 | 164.73 | -878.71 |
| 4 | 91.67 | -959.65 | 198.93 | 6.38 | 734.90 | 0.00 | 133.77 | -0.00 |
| RT COL MOM | | | | | | | | -0.00 |

*** FLEXURAL & SHEAR DESIGN ***

COMMON STRENGTHS & FACTORS ARE

| 1) f'c | 2) fyb | 3) fyv | 4) WT | 5) F/DL | 6) F/LL | 7) CVR | 8) Phb | 9) Phv |
|---|---|---|---|---|---|---|---|---|
| 5000.00 | 60.00 | 60.00 | 150.00 | 1.40 | 1.70 | 1.00 | 0.90 | 0.85 |
| PSI | KSI | KSI | #/CF | | | IN | | |

## *** COL STRIP REBAR CALCULATIONS ***

| MOMENT K-FT | Mu LT. BM K-FT | WIDTH IN | DEPTH IN | A s SQ IN | BARS NO. | SELECTED SIZE | a IN | AVE. SPCG IN |
|---|---|---|---|---|---|---|---|---|
| SPAN # 1 | | | | | | | | |
| -0.00 | 0.00 | 138.50 | 14.00 | 0.00 | 5 | 4 | 0.01 | 27.70 |
| 504.01 | 756.40 | 138.50 | 14.00 | 12.58 | 16 | 8 | 1.28 | 8.66 |
| -797.28 | 1196.54 | 138.50 | 14.00 | 20.52 | 26 | 8 | 2.09 | 5.33 |
| INSTANTANEOUS T.L. DEFL SIMPLE =- 2.274 ACTUAL =- 1.309 L/360 =- 0.983 | | | | | | | | |
| SPAN # 2 | | | | | | | | |
| -710.61 | 1069.38 | 138.50 | 14.00 | 18.18 | 23 | 8 | 1.85 | 6.02 |
| 282.81 | 425.59 | 138.50 | 14.00 | 6.93 | 9 | 8 | 0.71 | 15.39 |
| -569.27 | 856.68 | 138.50 | 14.00 | 14.35 | 18 | 8 | 1.46 | 7.69 |
| INSTANTANEOUS T.L. DEFL SIMPLE =- 1.632 ACTUAL =- 0.528 L/360 =- 0.950 | | | | | | | | |
| SPAN # 3 | | | | | | | | |
| -569.28 | 857.69 | 138.50 | 14.00 | 14.36 | 18 | 8 | 1.46 | 7.69 |
| 282.03 | 424.91 | 138.50 | 14.00 | 6.92 | 9 | 8 | 0.71 | 15.39 |
| -659.03 | 992.91 | 138.50 | 14.00 | 16.79 | 21 | 8 | 1.71 | 6.60 |
| INSTANTANEOUS T.L. DEFL SIMPLE =- 1.605 ACTUAL =- 0.531 L/360 =- 0.950 | | | | | | | | |
| SPAN # 4 | | | | | | | | |
| -719.74 | 1084.37 | 138.50 | 14.00 | 18.45 | 24 | 8 | 1.88 | 5.77 |
| 440.94 | 664.33 | 138.50 | 14.00 | 10.98 | 14 | 8 | 1.11 | 9.89 |
| -0.00 | 0.00 | 138.50 | 14.00 | 0.00 | 5 | 4 | 0.01 | 27.70 |
| INSTANTANEOUS T.L. DEFL SIMPLE =- 1.863 ACTUAL =- 1.064 L/360 =- 0.950 | | | | | | | | |

## *** MID STRIP REBAR CALCULATIONS ***

| MOMENT K-FT | Mu LT. BM K-FT | WIDTH IN | DEPTH IN | A s SQ IN | BARS NO. | SELECTED SIZE | a IN | AVE. SPCG IN |
|---|---|---|---|---|---|---|---|---|
| SPAN # 1 | | | | | | | | |
| -0.00 | 0.00 | 138.50 | 14.00 | 0.00 | 5 | 4 | 0.01 | 27.70 |
| 336.00 | 504.27 | 138.50 | 14.00 | 8.25 +3 | 11 | 8 | 0.85 | 12.59 |
| -265.76 | 398.85 | 138.50 | 14.00 | 6.49 | 9 | 8 | 0.67 | 15.39 |
| SPAN # 2 | | | | | | | | |
| -236.87 | 356.46 | 138.50 | 14.00 | 5.78 ✓ | 8 | 8 | 0.59 | 17.31 |
| 188.54 | 283.73 | 138.50 | 14.00 | 4.58 ✓ | 9 | 8 | 0.47 | 15.39 |
| 6.46 SQ. IN. MIN. REBAR REQUIRED | | | | | | | | |
| -189.76 | 285.56 | 138.50 | 14.00 | 4.61 | 6 | 8 | 0.48 | 23.08 |
| SPAN # 3 | | | | | | | | |
| -189.76 | 285.90 | 138.50 | 14.00 | 4.62 ✓ | 6 | 8 | 0.48 | 23.08 |
| 188.02 | 283.27 | 138.50 | 14.00 | 4.57 ✓ | 9 | 8 | 0.47 | 15.39 |
| 6.46 SQ. IN. MIN. REBAR REQUIRED | | | | | | | | |
| -219.68 | 330.97 | 138.50 | 14.00 | 5.36 | 7 | 8 | 0.55 | 19.79 |

SPAN # 4

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| -239.91 | 361.46 | 138.50 | 14.00 | 5.86 | 8 | 8 | 0.60 | 17.31 |
| 293.96 | 442.88 | 138.50 | 14.00 | 7.22 | 10 | 8 | 0.74 | 13.85 |
| -0.00 | 0.00 | 138.50 | 14.00 | 0.00 | 5 | 4 | 0.01 | 27.70 |

## BEAM SHEAR DESIGN

| V face K | Vn@ face K | Vn@d K | B IN. | D IN. | VC K | Av min IN2/U | GROUP #&BAR | Lv FT |
|---|---|---|---|---|---|---|---|---|
| SPAN 1 | | | | | | | | |
| 147.51 | 260.45 | 234.09 | 277.00 | 14.00 | 548.43 | NO STIRRUPS REQD | | |
| 217.23 | 383.55 | 357.19 | 277.00 | 14.00 | 548.43 | NO STIRRUPS REQD | | |
| SPAN 2 | | | | | | | | |
| 169.91 | 300.82 | 275.41 | 277.00 | 14.00 | 548.43 | NO STIRRUPS REQD | | |
| 156.04 | 276.26 | 250.85 | 277.00 | 14.00 | 548.43 | NO STIRRUPS REQD | | |
| SPAN 3 | | | | | | | | |
| 155.92 | 276.37 | 251.34 | 277.00 | 14.00 | 548.43 | NO STIRRUPS REQD | | |
| 164.73 | 291.98 | 266.96 | 277.00 | 14.00 | 548.43 | NO STIRRUPS REQD | | |
| SPAN 4 | | | | | | | | |
| 198.93 | 352.61 | 327.58 | 277.00 | 14.00 | 548.43 | NO STIRRUPS REQD | | |
| 133.77 | 237.10 | 212.08 | 277.00 | 14.00 | 548.43 | NO STIRRUPS REQD | | |

## PUNCHING SHEAR DESIGN/CHECK

| COL NO | Mv FT-K | CRIT V KIPS | b IN. | d IN. | v(AVE) psi | v @ L psi | v @ R psi | V(fs) | As(c) sq-in |
|---|---|---|---|---|---|---|---|---|---|
| 1 | -0.00 | 146.53 | 52.20 | 14.00 | 200.50 | 200.50 | 200.50 | 0.60 | 0.00 |
| Vs CRANKSHAFT BARS W/AREA = 1.63 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | | 144.74 | 80.20 | 14.00 | 128.91 | 128.91 | 128.91 | 0.94 | 0.00 |
| Vs CRANKSHAFT BARS W/AREA (MIN. CONTROLS) = 0.94 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | | 142.20 | 108.20 | 14.00 | 93.88 | 93.88 | 93.88 | 1.29 | 0.00 |
| Vs CRANKSHAFT BARS W/AREA (MIN. CONTROLS) = 1.26 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | | 138.91 | 136.20 | 14.00 | 72.85 | 72.85 | 72.85 | 1.66 | 0.00 |
| 2 | -126.13 | 406.90 | 152.00 | 14.00 | 191.21 | 193.02 | 189.40 | 1.25 | 1.87 |
| Vs CRANKSHAFT BARS W/AREA = 4.30 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | | 402.24 | 208.00 | 14.00 | 138.13 | 139.11 | 137.15 | 1.73 | 1.87 |
| 3 | 1.25 | 331.10 | 152.00 | 14.00 | 155.59 | 155.61 | 155.58 | 1.54 | 0.02 |
| 4 | 91.67 | 382.61 | 152.00 | 14.00 | 179.80 | 181.11 | 178.48 | 1.33 | 1.36 |
| Vs CRANKSHAFT BARS W/AREA = 3.59 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | | 378.02 | 208.00 | 14.00 | 129.81 | 130.53 | 129.10 | 1.84 | 1.36 |
| 5 | -0.00 | 132.83 | 52.20 | 14.00 | 181.77 | 181.77 | 181.77 | 0.67 | 0.00 |
| Vs CRANKSHAFT BARS W/AREA = 1.25 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | | 131.15 | 80.20 | 14.00 | 116.80 | 116.80 | 116.80 | 1.04 | 0.00 |
| Vs CRANKSHAFT BARS W/AREA (MIN. CONTROLS) = 0.94 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | | 128.75 | 108.20 | 14.00 | 84.99 | 84.99 | 84.99 | 1.43 | 0.00 |
| Vs CRANKSHAFT BARS W/AREA (MIN. CONTROLS) = 1.26 SQ. IN. REQ'D @ CRIT.SECT. | | | | | | | | | |
| NEXT CRT SECT | | 125.63 | 136.20 | 14.00 | 65.89 | 65.89 | 65.89 | 1.84 | 0.00 |

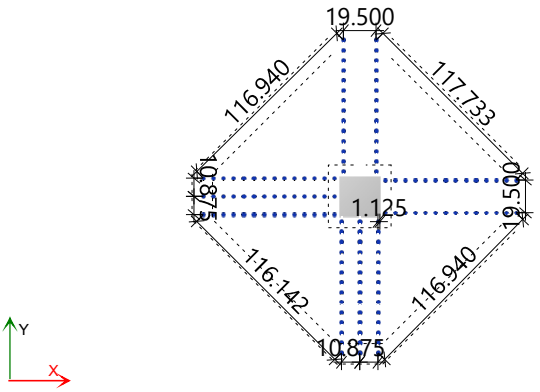
**Designer:**
Company:
Address:
Phone:
E-Mail:
Name:

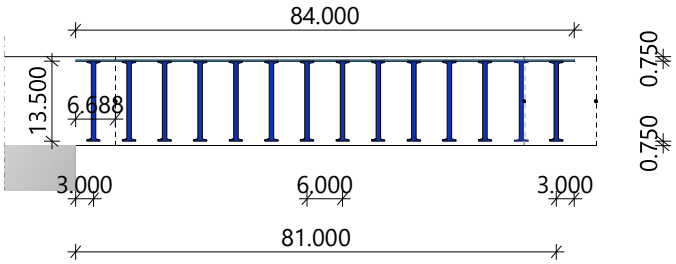
**Project:**
Title: Shear Rails.pddbx
Location:
Contact Person:
Comments:
Design Norm: ACI 318-14
Unit system: Imperial

This design applies exclusively to proprietary PEIKKO products and can't be used to validate properties of third party products, might they appear to be identical.

# Type A - 24x24

Number of Identical Columns: 1




10x ARMATA-0.75-13.5-14-3-6

## Materials

| | | | |
|---|---|---|---|
| Concrete compressive strength | $f'_c$ = | 5,000 | psi |
| Concrete density | | Normal | |
| Yield strength of studs | $f_{yv}$ = | **60,000** | psi |

## Geometry

| | | | | | |
|---|---|---|---|---|---|
| Slab Thickness | h = | 15.000 | in | | |
| Effective depth of slab | $d_x$ = | 12.938 | in | $d_y$ = | 13.813 in |
| Cover of Punching Reinforcement | $c_t$ = | 0.750 | in | $c_b$ = | 0.750 in |
| Square column | a = | 24.000 | in | | |
| Location | | Middle | | | |

## Openings

| X | Y | Size X | Size Y | Diameter |
|---|---|---|---|---|
| 15.00 | 0.00 | - | - | 6.00 |
| 0.00 | 15.00 | - | - | 6.00 |

## Loads

| | | | | | |
|---|---|---|---|---|---|
| Punching Load | $V_u$ = | 575.0 | kips | | |
| Bending moments | $M_{uOx}$ = | 65.0 | kip-ft | $M_{uOy}$ = | 65.0 kip-ft |
| Prestress | $f_{pc}$ = | 1 | psi | | |

## Basic critical section

| | | | |
|---|---|---|---|
| Length of critical section | $b_0$ = | 134.242 | in |
| Area of critical section | $A_c$ = | 1,795.5 | in² |

## Neutral axis properties

| | | | |
|---|---|---|---|
| Centroid coordinates | $x_0$ = | -1.062 | in |
| | $y_0$ = | -1.062 | in |
| Moment of inertia | $J_x$ = | $4.274 \times 10^5$ | in⁴ |
| | $J_y$ = | $4.274 \times 10^5$ | in⁴ |

## Principal axis properties

| | | | |
|---|---|---|---|
| Centroid coordinates | $x_0$ = | -1.502 | in |
| | $y_0$ = | 0.000 | in |
| Moment of inertia | $J_1$ = | $4.294 \times 10^5$ | in⁴ |
| | $J_2$ = | $4.253 \times 10^5$ | in⁴ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Polar moment of inertia | $J_{xy}$ = | -2025.162 | in⁴ | | | | |
| Rotation of principal axis | Θ = | 45.0 | ° | | | | |
| | | | | Length of sides | $l_1$ = | 52.856 | in |
| | | | | | $l_2$ = | 52.856 | in |
| | | | | Moment coefficients | $\gamma_{v1}$ = | 0.4 | |
| | | | | | $\gamma_{v2}$ = | 0.4 | |
| **Neutral axis loads** | | | | **Principal axis loads** | | | |
| Punching Load | $V_u$ = | 575.0 | kips | Punching Load | $V_u$ = | 575.0 | kips |
| Bending moments | $M_{ux}$ = | 14.1 | kip-ft | Bending moments | $M_{u1}$ = | 91.9 | kip-ft |
| | $M_{uy}$ = | 115.9 | kip-ft | | $M_{u2}$ = | 72.0 | kip-ft |

| | | | | | | |
|---|---|---|---|---|---|---|
| Resistance without punching reinforcement | $\Phi \cdot v_n$ = | 212.132 psi | < | $v_u$ = | 348.624 | psi |
| Maximum slab resistance | $\Phi \cdot 8\lambda \cdot \sqrt{f'_c}$ | 424.264 psi | > | $v_u$ = | 348.624 | psi |
| Resistance with punching reinforcement | $\Phi \cdot v_{n,prov}$ = | 405.922 psi | > | $v_u$ = | 348.624 | psi |

## Outer Critical Section

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Required distance | $c_{req}$ = | 75.585 | in | | | | |
| Required length of outer perimeter | $b_{req}$ = | 452.961 | in | | | | |
| **Provided critical section** | | | | | | | |
| Length of critical section | $b_1$ = | 509.817 | in | | | | |
| Area of critical section | $A_{c,out}$ = | 6,818.8 | in² | | | | |
| **Neutral axis properties** | | | | **Principal axis properties** | | | |
| Centroid coordinates | $x_{0,prov}$ = | -7.953 | in | Centroid coordinates | $x_{0,prov}$ = | -9.025 | in |
| | $y_{0,prov}$ = | -6.729 | in | | $y_{0,prov}$ = | -5.204 | in |
| Moment of inertia | $J_{x,prov}$ = | $2.721 \times 10^7$ | in⁴ | Moment of inertia | $J_{1,prov}$ = | $2.725 \times 10^7$ | in⁴ |
| | $J_{y,prov}$ = | $2.613 \times 10^7$ | in⁴ | | $J_{2,prov}$ = | $2.609 \times 10^7$ | in⁴ |
| Polar moment of inertia | $J_{xy,prov}$ = | 0 | in⁴ | | | | |
| Rotation of principal axis | Θ = | 10.3 | ° | | | | |
| | | | | Length of sides | $l_{1,prov}$ = | 201.047 | in |
| | | | | | $l_{2,prov}$ = | 201.047 | in |
| | | | | Moment coefficients | $\gamma_{v1,prov}$ = | 0.4 | |
| | | | | | $\gamma_{v2,prov}$ = | 0.4 | |
| **Neutral axis loads** | | | | **Principal axis loads** | | | |
| Punching Load | $V_{u,prov}$ = | 575.0 | kips | Punching Load | $V_{u,prov}$ = | 575.0 | kips |
| Bending moments | $M_{ux,prov}$ = | -257.4 | kip-ft | Bending moment | $M_{u1,prov}$ = | -173.8 | kip-ft |
| | $M_{uy,prov}$ = | 446.1 | kip-ft | | $M_{u2,prov}$ = | 484.8 | kip-ft |

| | | | | | | |
|---|---|---|---|---|---|---|
| Resistance of outer critical section | $\Phi \cdot 2\lambda \cdot \sqrt{f'_c}$ | 106.066 psi | > | $v_{u,out}$ = | 94.124 | psi |

**Punching Reinforcement**

Design of reinforcement

1-st rail — 10x ARMATA-0.75-13.5-14-3-6

Color Code

Resistance of reinforcement — $v_s$ = 329.097 psi

# B.5/1 - No Rails Needed

Number of Identical Columns: 1

**Materials**

| | | | |
|---|---|---|---|
| Concrete compressive strength | $f'_c$ = | 5,000 | psi |
| Concrete density | | Normal | |
| Yield strength of studs | $f_{yv}$ = | **60,000** | psi |

**Geometry**

| | | | | | | |
|---|---|---|---|---|---|---|
| Slab Thickness | h = | 15.000 | in | | | |
| Effective depth of slab | $d_x$ = | 12.938 | in | $d_y$ = | 13.813 | in |
| Cover of Punching Reinforcement | $c_t$ = | 0.750 | in | $c_b$ = | 0.750 | in |
| Square column | a = | 24.000 | in | | | |
| Location | | Right edge middle | | | | |
| Edge distance | $r_a$ = | 27.000 | in | | | |

**Loads**

| | | | | | | |
|---|---|---|---|---|---|---|
| Punching Load | $V_u$ = | 325.0 | kips | | | |
| Bending moments | $M_{uOx}$ = | 40.0 | kip-ft | $M_{uOy}$ = | 40.0 | kip-ft |
| Prestress | $f_{pc}$ = | 1 | psi | | | |

**Basic critical section**

| | | | |
|---|---|---|---|
| Length of critical section | $b_0$ = | 152.750 | in |
| Area of critical section | $A_c$ = | 2,043.0 | in² |

**Neutral axis properties**

| | | | |
|---|---|---|---|
| Centroid coordinates | $x_0$ = | 3.099 | in |
| | $y_0$ = | 0.000 | in |
| Moment of inertia | $J_x$ = | $5.971 \times 10^5$ | in⁴ |
| | $J_y$ = | $7.421 \times 10^5$ | in⁴ |
| Polar moment of inertia | $J_{xy}$ = | 0 | in⁴ |
| Rotation of principal axis | Θ = | 90.0 | ° |

**Principal axis properties**

| | | | |
|---|---|---|---|
| Centroid coordinates | $x_0$ = | 0.000 | in |
| | $y_0$ = | -3.099 | in |
| Moment of inertia | $J_1$ = | $7.421 \times 10^5$ | in⁴ |
| | $J_2$ = | $5.971 \times 10^5$ | in⁴ |
| Length of sides | $l_1$ = | 37.375 | in |
| | $l_2$ = | 57.688 | in |
| Moment coefficients | $\gamma_{v1}$ = | 0.453 | |
| | $\gamma_{v2}$ = | 0.3085 | |

**Neutral axis loads**

| | | | |
|---|---|---|---|
| Punching Load | $V_u$ = | 325.0 | kips |
| Bending moments | $M_{ux}$ = | 40.0 | kip-ft |
| | $M_{uy}$ = | -43.9 | kip-ft |

**Principal axis loads**

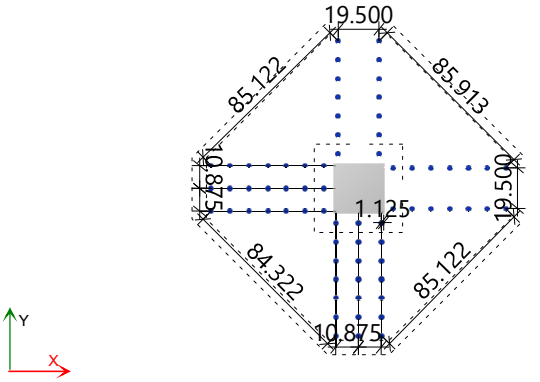
| | | | |
|---|---|---|---|
| Punching Load | $V_u$ = | 325.0 | kips |
| Bending moments | $M_{u1}$ = | -43.9 | kip-ft |
| | $M_{u2}$ = | -40.0 | kip-ft |

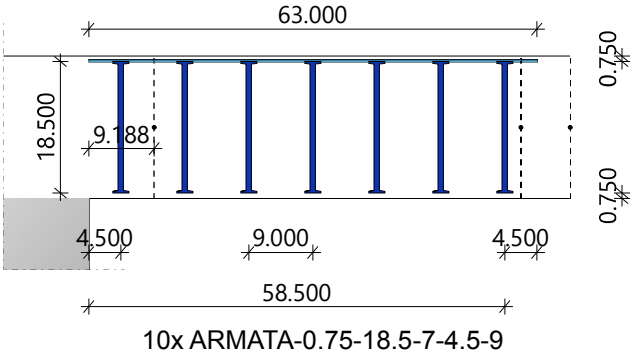
| | | | | | | |
|---|---|---|---|---|---|---|
| Resistance without punching reinforcement | Φ•$v_n$ = | 212.132 | psi | > | $v_u$ = | 170.723 psi |
| Maximum slab resistance | $\Phi \cdot 8\lambda \cdot \sqrt{f'_c}$ | 424.264 | psi | > | $v_u$ = | 170.723 psi |

**No punching reinforcement needed**

# Type B - 24x24

Number of Identical Columns: 1




10x ARMATA-0.75-18.5-7-4.5-9

## Materials

| | | | |
|---|---|---|---|
| Concrete compressive strength | $f'_c$ = | 5,000 | psi |
| Concrete density | Normal | | |
| Yield strength of studs | $f_{yv}$ = | **60,000** | psi |

## Geometry

| | | | | | |
|---|---|---|---|---|---|
| Slab Thickness | h = | 20.000 | in | | |
| Effective depth of slab | $d_x$ = | 17.938 | in | $d_y$ = | 18.813 in |
| Cover of Punching Reinforcement | $c_t$ = | 0.750 | in | $c_b$ = | 0.750 in |
| Square column | a = | 24.000 | in | | |
| Location | Middle | | | | |

## Openings

| X | Y | Size X | Size Y | Diameter |
|---|---|---|---|---|
| 15.00 | 0.00 | - | - | 6.00 |
| 0.00 | 15.00 | - | - | 6.00 |

## Loads

| | | | | | |
|---|---|---|---|---|---|
| Punching Load | $V_u$ = | 675.0 | kips | | |
| Bending moments | $M_{uOx}$ = | 75.0 | kip-ft | $M_{uOy}$ = | 75.0 kip-ft |
| Prestress | $f_{pc}$ = | 1 | psi | | |

## Basic critical section

| | | | |
|---|---|---|---|
| Length of critical section | $b_0$ = | 152.200 | in |
| Area of critical section | $A_c$ = | 2,796.7 | in² |

## Neutral axis properties

| | | | |
|---|---|---|---|
| Centroid coordinates | $x_0$ = | -1.204 | in |
| | $y_0$ = | -1.204 | in |
| Moment of inertia | $J_x$ = | $8.557 \times 10^5$ | in⁴ |
| | $J_y$ = | $8.557 \times 10^5$ | in⁴ |
| Polar moment of inertia | $J_{xy}$ = | -4054.889 | in⁴ |
| Rotation of principal axis | Θ = | 45.0 | ° |

## Principal axis properties

| | | | |
|---|---|---|---|
| Centroid coordinates | $x_0$ = | -1.703 | in |
| | $y_0$ = | 0.000 | in |
| Moment of inertia | $J_1$ = | $8.598 \times 10^5$ | in⁴ |
| | $J_2$ = | $8.517 \times 10^5$ | in⁴ |
| Length of sides | $l_1$ = | 59.927 | in |
| | $l_2$ = | 59.927 | in |
| Moment coefficients | $\gamma_{v1}$ = | 0.4 | |
| | $\gamma_{v2}$ = | 0.4 | |

## Neutral axis loads

| | | | |
|---|---|---|---|
| Punching Load | $V_u$ = | 675.0 | kips |
| Bending moments | $M_{ux}$ = | 7.3 | kip-ft |

## Principal axis loads

| | | | |
|---|---|---|---|
| Punching Load | $V_u$ = | 675.0 | kips |
| Bending moments | $M_{u1}$ = | 106.1 | kip-ft |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | $M_{uy}$ = | 142.7 | kip-ft | | | $M_{u2}$ = | 95.8 kip-ft |

| | | | | | | |
|---|---|---|---|---|---|---|
| Resistance without punching reinforcement | $\Phi \cdot v_n$ = | 212.132 | psi | < | $v_u$ = | 260.020 psi |
| Maximum slab resistance | $\Phi \cdot 8\lambda \cdot \sqrt{f'_c}$ | 424.264 | psi | > | $v_u$ = | 260.020 psi |
| Resistance with punching reinforcement | $\Phi \cdot v_{n,prov}$ = | 304.232 | psi | > | $v_u$ = | 260.020 psi |

**Outer Critical Section**

| | | | |
|---|---|---|---|
| Required distance | $c_{req}$ = | 60.762 | in |
| Required length of outer perimeter | $b_{req}$ = | 386.474 | in |

**Provided critical section**

| | | | |
|---|---|---|---|
| Length of critical section | $b_1$ = | 0.000 | in |
| Area of critical section | $A_{c,out}$ = | 0.0 | in² |

| **Neutral axis properties** | | | | **Principal axis properties** | | | |
|---|---|---|---|---|---|---|---|
| Centroid coordinates | $x_{0,prov}$ = | 0.000 | in | Centroid coordinates | $x_{0,prov}$ = | 0.000 | in |
| | $y_{0,prov}$ = | 0.000 | in | | $y_{0,prov}$ = | 0.000 | in |
| Moment of inertia | $J_{x,prov}$ = | 0 | in⁴ | Moment of inertia | $J_{1,prov}$ = | 0 | in⁴ |
| | $J_{y,prov}$ = | 0 | in⁴ | | $J_{2,prov}$ = | 0 | in⁴ |
| Polar moment of inertia | $J_{xy,prov}$ = | 0 | in⁴ | | | | |
| Rotation of principal axis | Θ = | 0.0 | ° | | | | |
| | | | | Length of sides | $l_{1,prov}$ = | 0.000 | in |
| | | | | | $l_{2,prov}$ = | 0.000 | in |
| | | | | Moment coefficients | $\gamma_{v1,prov}$ = | 0 | |
| | | | | | $\gamma_{v2,prov}$ = | 0 | |

| **Neutral axis loads** | | | | **Principal axis loads** | | | |
|---|---|---|---|---|---|---|---|
| Punching Load | $V_{u,prov}$ = | 675.0 | kips | Punching Load | $V_{u,prov}$ = | 675.0 | kips |
| Bending moments | $M_{ux,prov}$ = | 0.0 | kip-ft | Bending moment | $M_{u1,prov}$ = | 0.0 | kip-ft |
| | $M_{uy,prov}$ = | 0.0 | kip-ft | | $M_{u2,prov}$ = | 0.0 | kip-ft |

| | | | | | | |
|---|---|---|---|---|---|---|
| Resistance of outer critical section | $\Phi \cdot 2\lambda \cdot \sqrt{f'_c}$ | 106.066 | psi | > | $v_{u,out}$ = | 0.000 psi |

**Punching Reinforcement**

Design of reinforcement

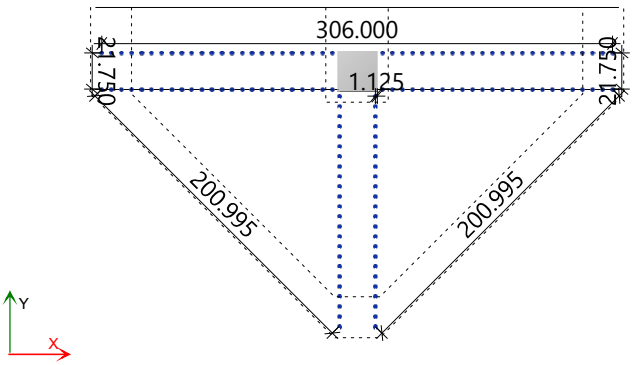
1-st rail: 10x ARMATA-0.75-18.5-7-4.5-9

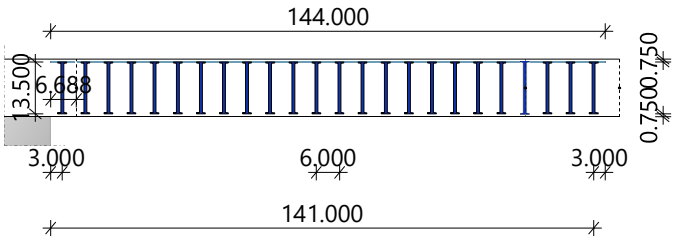
Color Code

Resistance of reinforcement: $v_s$ = 193.511 psi

# Type C - 24x24- EDGE

Number of Identical Columns: 1




6x ARMATA-0.75-13.5-24-3-6

## Materials

| | | | |
|---|---|---|---|
| Concrete compressive strength | $f'_c$ = | 5,000 | psi |
| Concrete density | | Normal | |
| Yield strength of studs | $f_{yv}$ = | **60,000** | psi |

## Geometry

| | | | | | |
|---|---|---|---|---|---|
| Slab Thickness | h = | 15.000 | in | | |
| Effective depth of slab | $d_x$ = | 12.938 | in | $d_y$ = | 13.813 in |
| Cover of Punching Reinforcement | $c_t$ = | 0.750 | in | $c_b$ = | 0.750 in |
| Square column | a = | 24.000 | in | | |
| Location | Up edge middle | | | | |
| Edge distance | | | | $r_b$ = | 26.000 in |

## Loads

| | | | | | |
|---|---|---|---|---|---|
| Punching Load | $V_u$ = | 400.0 | kips | | |
| Bending moments | $M_{uOx}$ = | 50.0 | kip-ft | $M_{uOy}$ = | 50.0 kip-ft |
| Prestress | $f_{pc}$ = | 1 | psi | | |

## Basic critical section

| | | | |
|---|---|---|---|
| Length of critical section | $b_0$ = | 150.750 | in |
| Area of critical section | $A_c$ = | 2,016.3 | in² |

## Neutral axis properties

| | | | |
|---|---|---|---|
| Centroid coordinates | $x_0$ = | 0.000 | in |
| | $y_0$ = | 2.629 | in |
| Moment of inertia | $J_x$ = | $7.081 \times 10^5$ | in⁴ |
| | $J_y$ = | $5.877 \times 10^5$ | in⁴ |
| Polar moment of inertia | $J_{xy}$ = | 0 | in⁴ |
| Rotation of principal axis | Θ = | 0.0 | ° |

## Principal axis properties

| | | | |
|---|---|---|---|
| Centroid coordinates | $x_0$ = | 0.000 | in |
| | $y_0$ = | 2.629 | in |
| Moment of inertia | $J_1$ = | $7.081 \times 10^5$ | in⁴ |
| | $J_2$ = | $5.877 \times 10^5$ | in⁴ |
| Length of sides | $l_1$ = | 37.375 | in |
| | $l_2$ = | 56.688 | in |
| Moment coefficients | $\gamma_{v1}$ = | 0.4509 | |
| | $\gamma_{v2}$ = | 0.3112 | |

## Neutral axis loads

| | | | |
|---|---|---|---|
| Punching Load | $V_u$ = | 400.0 | kips |
| Bending moments | $M_{ux}$ = | 137.6 | kip-ft |
| | $M_{uy}$ = | 50.0 | kip-ft |

## Principal axis loads

| | | | |
|---|---|---|---|
| Punching Load | $V_u$ = | 400.0 | kips |
| Bending moments | $M_{u1}$ = | 137.6 | kip-ft |
| | $M_{u2}$ = | 50.0 | kip-ft |

| | | | | | | |
|---|---|---|---|---|---|---|
| Resistance without punching reinforcement | $\Phi \cdot v_n$ = | 212.132 | psi | < | $v_u$ = | 226.739 psi |
| Maximum slab resistance | $\Phi \cdot 8\lambda \cdot \sqrt{f'_c}$ | 424.264 | psi | > | $v_u$ = | 226.739 psi |

| | | | | | | |
|---|---|---|---|---|---|---|
| Resistance with punching reinforcement | $\Phi \cdot v_{n,prov}$ = | 290.975 psi | > | $v_u$ = | 226.739 psi | |

**Outer Critical Section**

| | | | | | | |
|---|---|---|---|---|---|---|
| Required distance | $c_{req}$ = | 123.223 in | | | | |
| Required length of outer perimeter | $b_{req}$ = | 474.454 in | | | | |

**Provided critical section**

| | | | | | | |
|---|---|---|---|---|---|---|
| Length of critical section | $b_1$ = | 0.000 in | | | | |
| Area of critical section | $A_{c,out}$ = | 0.0 in² | | | | |
| **Neutral axis properties** | | | **Principal axis properties** | | | |
| Centroid coordinates | $x_{0,prov}$ = | 0.000 in | Centroid coordinates | $x_{0,prov}$ = | 0.000 in | |
| | $y_{0,prov}$ = | 0.000 in | | $y_{0,prov}$ = | 0.000 in | |
| Moment of inertia | $J_{x,prov}$ = | 0 in⁴ | Moment of inertia | $J_{1,prov}$ = | 0 in⁴ | |
| | $J_{y,prov}$ = | 0 in⁴ | | $J_{2,prov}$ = | 0 in⁴ | |
| Polar moment of inertia | $J_{xy,prov}$ = | 0 in⁴ | | | | |
| Rotation of principal axis | Θ = | 0.0 ° | | | | |
| | | | Length of sides | $l_{1,prov}$ = | 0.000 in | |
| | | | | $l_{2,prov}$ = | 0.000 in | |
| | | | Moment coefficients | $\gamma_{v1,prov}$ = | 0 | |
| | | | | $\gamma_{v2,prov}$ = | 0 | |
| **Neutral axis loads** | | | **Principal axis loads** | | | |
| Punching Load | $V_{u,prov}$ = | 400.0 kips | Punching Load | $V_{u,prov}$ = | 400.0 kips | |
| Bending moments | $M_{ux,prov}$ = | 0.0 kip-ft | Bending moment | $M_{u1,prov}$ = | 0.0 kip-ft | |
| | $M_{uy,prov}$ = | 0.0 kip-ft | | $M_{u2,prov}$ = | 0.0 kip-ft | |

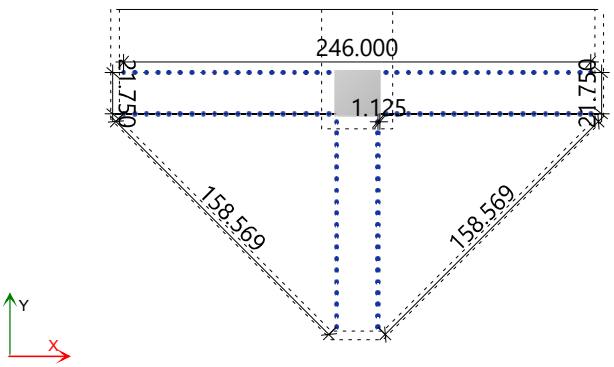
| | | | | | |
|---|---|---|---|---|---|
| Resistance of outer critical section | $\Phi \cdot 2\lambda \cdot \sqrt{f'_c}$ | 106.066 psi | > | $v_{u,out}$ = | 0.000 psi |

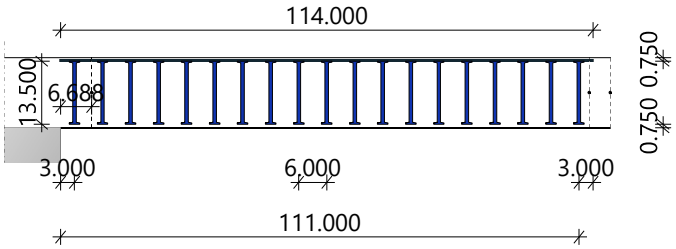
**Punching Reinforcement**

| | | | |
|---|---|---|---|
| Design of reinforcement | | | |
| 1-st rail | | | 6x ARMATA-0.75-13.5-24-3-6 |
| Color Code | | | |
| Resistance of reinforcement | $v_s$ = | 175.835 psi | |

# Type D - 24x24- EDGE

Number of Identical Columns: 1




6x ARMATA-0.75-13.5-19-3-6

## Materials

| | | | |
|---|---|---|---|
| Concrete compressive strength | $f'_c$ = | 5,000 | psi |
| Concrete density | Normal | | |
| Yield strength of studs | $f_{yv}$ = | **60,000** | psi |

## Geometry

| | | | | | | |
|---|---|---|---|---|---|---|
| Slab Thickness | h = | 15.000 | in | | | |
| Effective depth of slab | $d_x$ = | 12.938 | in | $d_y$ = | 13.813 | in |
| Cover of Punching Reinforcement | $c_t$ = | 0.750 | in | $c_b$ = | 0.750 | in |
| Square column | a = | 24.000 | in | | | |
| Location | Up edge middle | | | | | |
| Edge distance | | | | $r_b$ = | 32.000 | in |

## Loads

| | | | | | | |
|---|---|---|---|---|---|---|
| Punching Load | $V_u$ = | 400.0 | kips | | | |
| Bending moments | $M_{uOx}$ = | 50.0 | kip-ft | $M_{uOy}$ = | 50.0 | kip-ft |
| Prestress | $f_{pc}$ = | 1 | psi | | | |

## Basic critical section

| | | | |
|---|---|---|---|
| Length of critical section | $b_0$ = | 162.750 | in |
| Area of critical section | $A_c$ = | 2,176.8 | in² |

## Neutral axis properties

| | | | |
|---|---|---|---|
| Centroid coordinates | $x_0$ = | 0.000 | in |
| | $y_0$ = | 5.458 | in |
| Moment of inertia | $J_x$ = | $9.275 \times 10^5$ | in⁴ |
| | $J_y$ = | $6.438 \times 10^5$ | in⁴ |
| Polar moment of inertia | $J_{xy}$ = | 0 | in⁴ |
| Rotation of principal axis | Θ = | 0.0 | ° |

## Principal axis properties

| | | | |
|---|---|---|---|
| Centroid coordinates | $x_0$ = | 0.000 | in |
| | $y_0$ = | 5.458 | in |
| Moment of inertia | $J_1$ = | $9.275 \times 10^5$ | in⁴ |
| | $J_2$ = | $6.438 \times 10^5$ | in⁴ |
| Length of sides | $l_1$ = | 37.375 | in |
| | $l_2$ = | 62.688 | in |
| Moment coefficients | $\gamma_{v1}$ = | 0.4633 | |
| | $\gamma_{v2}$ = | 0.2956 | |

## Neutral axis loads

| | | | |
|---|---|---|---|
| Punching Load | $V_u$ = | 400.0 | kips |
| Bending moments | $M_{ux}$ = | 231.9 | kip-ft |
| | $M_{uy}$ = | 50.0 | kip-ft |

## Principal axis loads

| | | | |
|---|---|---|---|
| Punching Load | $V_u$ = | 400.0 | kips |
| Bending moments | $M_{u1}$ = | 231.9 | kip-ft |
| | $M_{u2}$ = | 50.0 | kip-ft |

| | | | | | | |
|---|---|---|---|---|---|---|
| Resistance without punching reinforcement | $\Phi \cdot v_n$ = | 212.132 | psi | < | $v_u$ = | 222.480 psi |
| Maximum slab resistance | $\Phi \cdot 8\lambda \cdot \sqrt{f'_c}$ | 424.264 | psi | > | $v_u$ = | 222.480 psi |

| | | | | | | |
|---|---|---|---|---|---|---|
| Resistance with punching reinforcement | $\Phi \bullet v_{n,prov}$ = | 281.252 psi | > | $v_u$ = | 222.480 psi | |

**Outer Critical Section**

| | | | | | | |
|---|---|---|---|---|---|---|
| Required distance | $c_{req}$ = | 113.184 in | | | | |
| Required length of outer perimeter | $b_{req}$ = | 458.059 in | | | | |
| **Provided critical section** | | | | | | |
| Length of critical section | $b_1$ = | 0.000 in | | | | |
| Area of critical section | $A_{c,out}$ = | 0.0 in² | | | | |
| **Neutral axis properties** | | | **Principal axis properties** | | | |
| Centroid coordinates | $x_{0,prov}$ = | 0.000 in | Centroid coordinates | $x_{0,prov}$ = | 0.000 in | |
| | $y_{0,prov}$ = | 0.000 in | | $y_{0,prov}$ = | 0.000 in | |
| Moment of inertia | $J_{x,prov}$ = | 0 in⁴ | Moment of inertia | $J_{1,prov}$ = | 0 in⁴ | |
| | $J_{y,prov}$ = | 0 in⁴ | | $J_{2,prov}$ = | 0 in⁴ | |
| Polar moment of inertia | $J_{xy,prov}$ = | 0 in⁴ | | | | |
| Rotation of principal axis | $\Theta$ = | 0.0 ° | | | | |
| | | | Length of sides | $l_{1,prov}$ = | 0.000 in | |
| | | | | $l_{2,prov}$ = | 0.000 in | |
| | | | Moment coefficients | $\gamma_{v1,prov}$ = | 0 | |
| | | | | $\gamma_{v2,prov}$ = | 0 | |
| **Neutral axis loads** | | | **Principal axis loads** | | | |
| Punching Load | $V_{u,prov}$ = | 400.0 kips | Punching Load | $V_{u,prov}$ = | 400.0 kips | |
| Bending moments | $M_{ux,prov}$ = | 0.0 kip-ft | Bending moment | $M_{u1,prov}$ = | 0.0 kip-ft | |
| | $M_{uy,prov}$ = | 0.0 kip-ft | | $M_{u2,prov}$ = | 0.0 kip-ft | |

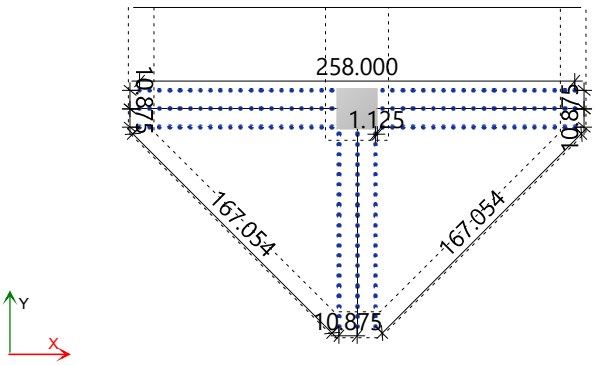
| | | | | | |
|---|---|---|---|---|---|
| Resistance of outer critical section | $\Phi \cdot 2\lambda \cdot \sqrt{f_c}$ | 106.066 psi | > | $v_{u,out}$ = | 0.000 psi |

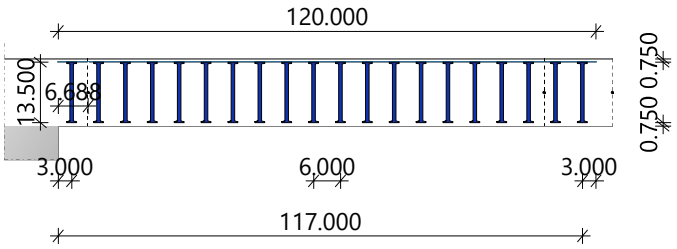
**Punching Reinforcement**

| | | |
|---|---|---|
| Design of reinforcement | | |
| 1-st rail | | 6x ARMATA-0.75-13.5-19-3-6 |
| Color Code | | |
| Resistance of reinforcement | $v_s$ = | 162.870 psi |

# Type E - 24x24- EDGE

Number of Identical Columns: 1




9x ARMATA-0.75-13.5-20-3-6

## Materials

| | | | |
|---|---|---|---|
| Concrete compressive strength | $f'_c$ = | 5,000 | psi |
| Concrete density | Normal | | |
| Yield strength of studs | $f_{yv}$ = | **60,000** | psi |

## Geometry

| | | | | | |
|---|---|---|---|---|---|
| Slab Thickness | h = | 15.000 | in | | |
| Effective depth of slab | $d_x$ = | 12.938 | in | $d_y$ = | 13.813 in |
| Cover of Punching Reinforcement | $c_t$ = | 0.750 | in | $c_b$ = | 0.750 in |
| Square column | a = | 24.000 | in | | |
| Location | Up edge middle | | | | |
| Edge distance | | | | $r_b$ = | 48.000 in |

## Loads

| | | | | | |
|---|---|---|---|---|---|
| Punching Load | $V_u$ = | 450.0 | kips | | |
| Bending moments | $M_{uOx}$ = | 50.0 | kip-ft | $M_{uOy}$ = | 50.0 kip-ft |
| Prestress | $f_{pc}$ = | 1 | psi | | |

## Basic critical section

| | | | |
|---|---|---|---|
| Length of critical section | $b_0$ = | 194.750 | in |
| Area of critical section | $A_c$ = | 2,604.8 | in² |

## Neutral axis properties

| | | | |
|---|---|---|---|
| Centroid coordinates | $x_0$ = | 0.000 | in |
| | $y_0$ = | 13.106 | in |
| Moment of inertia | $J_x$ = | $1.711 \times 10^6$ | in⁴ |
| | $J_y$ = | $7.933 \times 10^5$ | in⁴ |
| Polar moment of inertia | $J_{xy}$ = | 0 | in⁴ |
| Rotation of principal axis | Θ = | 0.0 | ° |

## Principal axis properties

| | | | |
|---|---|---|---|
| Centroid coordinates | $x_0$ = | 0.000 | in |
| | $y_0$ = | 13.106 | in |
| Moment of inertia | $J_1$ = | $1.711 \times 10^6$ | in⁴ |
| | $J_2$ = | $7.933 \times 10^5$ | in⁴ |
| Length of sides | $l_1$ = | 37.375 | in |
| | $l_2$ = | 78.688 | in |
| Moment coefficients | $\gamma_{v1}$ = | 0.4917 | |
| | $\gamma_{v2}$ = | 0.259 | |

## Neutral axis loads

| | | | |
|---|---|---|---|
| Punching Load | $V_u$ = | 450.0 | kips |
| Bending moments | $M_{ux}$ = | 541.5 | kip-ft |
| | $M_{uy}$ = | 50.0 | kip-ft |

## Principal axis loads

| | | | |
|---|---|---|---|
| Punching Load | $V_u$ = | 450.0 | kips |
| Bending moments | $M_{u1}$ = | 541.5 | kip-ft |
| | $M_{u2}$ = | 50.0 | kip-ft |

| | | | | | | |
|---|---|---|---|---|---|---|
| Resistance without punching reinforcement | $\Phi \cdot v_n$ = | 212.132 | psi | < | $v_u$ = | 235.773 psi |
| Maximum slab resistance | $\Phi \cdot 8\lambda \cdot \sqrt{f'_c}$ | 424.264 | psi | > | $v_u$ = | 235.773 psi |

| | | | | | | |
|---|---|---|---|---|---|---|
| Resistance with punching reinforcement | $\Phi \cdot v_{n,prov}$ = | 312.221 psi | > | $v_u$ = | 235.773 psi | |

**Outer Critical Section**

| | | | | | | |
|---|---|---|---|---|---|---|
| Required distance | $c_{req}$ = | 108.459 in | | | | |
| Required length of outer perimeter | $b_{req}$ = | 476.696 in | | | | |
| **Provided critical section** | | | | | | |
| Length of critical section | $b_1$ = | 0.000 in | | | | |
| Area of critical section | $A_{c,out}$ = | 0.0 in² | | | | |
| **Neutral axis properties** | | | **Principal axis properties** | | | |
| Centroid coordinates | $x_{0,prov}$ = | 0.000 in | Centroid coordinates | $x_{0,prov}$ = | 0.000 in | |
| | $y_{0,prov}$ = | 0.000 in | | $y_{0,prov}$ = | 0.000 in | |
| Moment of inertia | $J_{x,prov}$ = | 0 in⁴ | Moment of inertia | $J_{1,prov}$ = | 0 in⁴ | |
| | $J_{y,prov}$ = | 0 in⁴ | | $J_{2,prov}$ = | 0 in⁴ | |
| Polar moment of inertia | $J_{xy,prov}$ = | 0 in⁴ | | | | |
| Rotation of principal axis | $\Theta$ = | 0.0 ° | | | | |
| | | | Length of sides | $l_{1,prov}$ = | 0.000 in | |
| | | | | $l_{2,prov}$ = | 0.000 in | |
| | | | Moment coefficients | $\gamma_{v1,prov}$ = | 0 | |
| | | | | $\gamma_{v2,prov}$ = | 0 | |
| **Neutral axis loads** | | | **Principal axis loads** | | | |
| Punching Load | $V_{u,prov}$ = | 450.0 kips | Punching Load | $V_{u,prov}$ = | 450.0 kips | |
| Bending moments | $M_{ux,prov}$ = | 0.0 kip-ft | Bending moment | $M_{u1,prov}$ = | 0.0 kip-ft | |
| | $M_{uy,prov}$ = | 0.0 kip-ft | | $M_{u2,prov}$ = | 0.0 kip-ft | |

| | | | | | |
|---|---|---|---|---|---|
| Resistance of outer critical section | $\Phi \cdot 2\lambda \cdot \sqrt{f'_c}$ | 106.066 psi | > | $v_{u,out}$ = | 0.000 psi |

**Punching Reinforcement**

Design of reinforcement

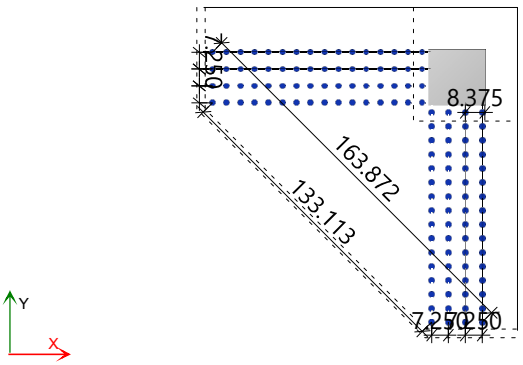
1-st rail — 9x ARMATA-0.75-13.5-20-3-6

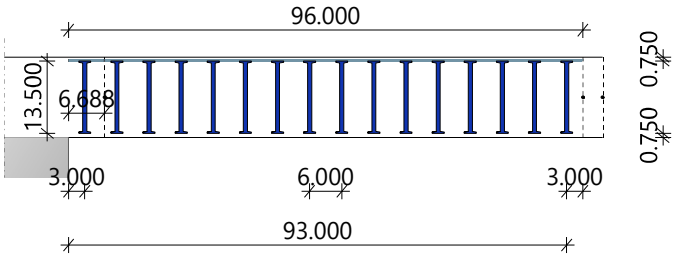
Color Code

Resistance of reinforcement $v_s$ = 204.163 psi

# Type F - 24x24- CORNER

Number of Identical Columns: 1




8x ARMATA-0.75-13.5-16-3-6

## Materials

| | | | |
|---|---|---|---|
| Concrete compressive strength | $f'_c$ = | 5,000 | psi |
| Concrete density | | Normal | |
| Yield strength of studs | $f_{yv}$ = | **60,000** | psi |

## Geometry

| | | | | | | |
|---|---|---|---|---|---|---|
| Slab Thickness | h = | 15.000 | in | | | |
| Effective depth of slab | $d_x$ = | 12.938 | in | $d_y$ = | 13.813 | in |
| Cover of Punching Reinforcement | $c_t$ = | 0.750 | in | $c_b$ = | 0.750 | in |
| Square column | a = | 24.000 | in | | | |
| Location | Up right corner | | | | | |
| Edge distance | $r_a$ = | 14.000 | in | $r_b$ = | 18.000 | in |

## Loads

| | | | | | | |
|---|---|---|---|---|---|---|
| Punching Load | $V_u$ = | 300.0 | kips | | | |
| Bending moments | $M_{uOx}$ = | 25.0 | kip-ft | $M_{uOy}$ = | 25.0 | kip-ft |
| Prestress | $f_{pc}$ = | 1 | psi | | | |

## Basic critical section

| | | | |
|---|---|---|---|
| Length of critical section | $b_0$ = | 93.375 | in |
| Area of critical section | $A_c$ = | 1,248.9 | in² |

## Neutral axis properties

| | | | |
|---|---|---|---|
| Centroid coordinates | $x_0$ = | -7.994 | in |
| | $y_0$ = | -5.994 | in |
| Moment of inertia | $J_x$ = | $3.133 \times 10^5$ | in⁴ |
| | $J_y$ = | $2.551 \times 10^5$ | in⁴ |
| Polar moment of inertia | $J_{xy}$ = | -169515.827 | in⁴ |
| Rotation of principal axis | Θ = | 40.1 | ° |

## Principal axis properties

| | | | |
|---|---|---|---|
| Centroid coordinates | $x_0$ = | -9.976 | in |
| | $y_0$ = | 0.568 | in |
| Moment of inertia | $J_1$ = | $4.562 \times 10^5$ | in⁴ |
| | $J_2$ = | $1.122 \times 10^5$ | in⁴ |
| Length of sides | $l_1$ = | 34.171 | in |
| | $l_2$ = | 66.028 | in |
| Moment coefficients | $\gamma_{v1}$ = | 0.4 | |
| | $\gamma_{v2}$ = | 0.2731 | |

## Neutral axis loads

| | | | |
|---|---|---|---|
| Punching Load | $V_u$ = | 300.0 | kips |
| Bending moments | $M_{ux}$ = | -124.9 | kip-ft |
| | $M_{uy}$ = | 224.9 | kip-ft |

## Principal axis loads

| | | | |
|---|---|---|---|
| Punching Load | $V_u$ = | 300.0 | kips |
| Bending moments | $M_{u1}$ = | 49.4 | kip-ft |
| | $M_{u2}$ = | 252.4 | kip-ft |

| | | | | | | |
|---|---|---|---|---|---|---|
| Resistance without punching reinforcement | $\Phi \cdot v_n$ = | 212.132 | psi | < | $v_u$ = | 387.985 psi |
| Maximum slab resistance | $\Phi \cdot 8\lambda \cdot \sqrt{f'_c}$ = | 424.264 | psi | > | $v_u$ = | 387.985 psi |

| | | | | | | |
|---|---|---|---|---|---|---|
| Resistance with punching reinforcement | $\Phi \bullet v_{n,prov}$ = | 442.978 psi | > | $v_u$ = | 387.985 psi | |

**Outer Critical Section**

| | | | | | | |
|---|---|---|---|---|---|---|
| Required distance | $c_{req}$ = | 96.058 in | | | | |
| Required length of outer perimeter | $b_{req}$ = | 216.810 in | | | | |
| **Provided critical section** | | | | | | |
| Length of critical section | $b_1$ = | 0.000 in | | | | |
| Area of critical section | $A_{c,out}$ = | 0.0 in² | | | | |
| **Neutral axis properties** | | | **Principal axis properties** | | | |
| Centroid coordinates | $x_{0,prov}$ = | 0.000 in | Centroid coordinates | $x_{0,prov}$ = | 0.000 in | |
| | $y_{0,prov}$ = | 0.000 in | | $y_{0,prov}$ = | 0.000 in | |
| Moment of inertia | $J_{x,prov}$ = | 0 in⁴ | Moment of inertia | $J_{1,prov}$ = | 0 in⁴ | |
| | $J_{y,prov}$ = | 0 in⁴ | | $J_{2,prov}$ = | 0 in⁴ | |
| Polar moment of inertia | $J_{xy,prov}$ = | 0 in⁴ | | | | |
| Rotation of principal axis | Θ = | 0.0 ° | | | | |
| | | | Length of sides | $l_{1,prov}$ = | 0.000 in | |
| | | | | $l_{2,prov}$ = | 0.000 in | |
| | | | Moment coefficients | $\gamma_{v1,prov}$ = | 0 | |
| | | | | $\gamma_{v2,prov}$ = | 0 | |
| **Neutral axis loads** | | | **Principal axis loads** | | | |
| Punching Load | $V_{u,prov}$ = | 300.0 kips | Punching Load | $V_{u,prov}$ = | 300.0 kips | |
| Bending moments | $M_{ux,prov}$ = | 0.0 kip-ft | Bending moment | $M_{u1,prov}$ = | 0.0 kip-ft | |
| | $M_{uy,prov}$ = | 0.0 kip-ft | | $M_{u2,prov}$ = | 0.0 kip-ft | |

| | | | | | |
|---|---|---|---|---|---|
| Resistance of outer critical section | $\Phi \cdot 2\lambda \cdot \sqrt{f'_c}$ | 106.066 psi | > | $v_{u,out}$ = | 0.000 psi |

**Punching Reinforcement**

Design of reinforcement

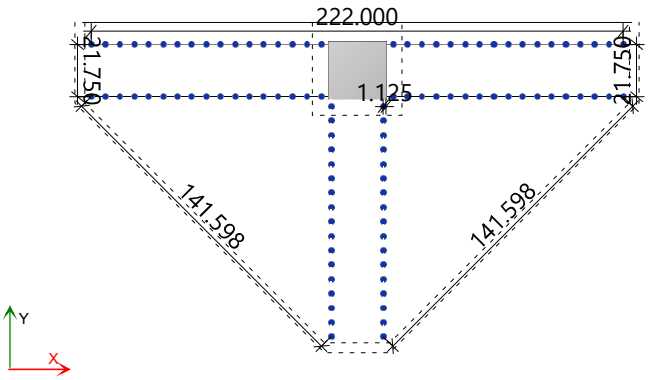
1-st rail 8x ARMATA-0.75-13.5-16-3-6

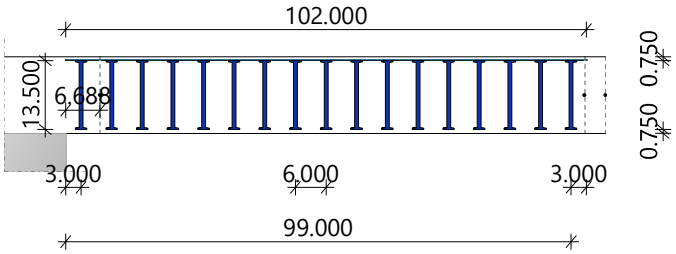
Color Code

Resistance of reinforcement $v_s$ = 378.505 psi

# Type G - 24x24- EDGE

Number of Identical Columns: 1




6x ARMATA-0.75-13.5-17-3-6

## Materials

| | | | |
|---|---|---|---|
| Concrete compressive strength | $f'_c$ = | 5,000 | psi |
| Concrete density | Normal | | |
| Yield strength of studs | $f_{yv}$ = | **60,000** | psi |

## Geometry

| | | | | | |
|---|---|---|---|---|---|
| Slab Thickness | h = | 15.000 | in | | |
| Effective depth of slab | $d_x$ = | 12.938 | in | $d_y$ = | 13.813 in |
| Cover of Punching Reinforcement | $c_t$ = | 0.750 | in | $c_b$ = | 0.750 in |
| Square column | a = | 24.000 | in | | |
| Location | Up edge middle | | | | |
| Edge distance | | | | $r_b$ = | 8.000 in |

## Loads

| | | | | | |
|---|---|---|---|---|---|
| Punching Load | $V_u$ = | 300.0 | kips | | |
| Bending moments | $M_{uOx}$ = | 35.0 | kip-ft | $M_{uOy}$ = | 35.0 kip-ft |
| Prestress | $f_{pc}$ = | 1 | psi | | |

## Basic critical section

| | | | |
|---|---|---|---|
| Length of critical section | $b_0$ = | 114.750 | in |
| Area of critical section | $A_c$ = | 1,534.8 | in² |

## Neutral axis properties

| | | | |
|---|---|---|---|
| Centroid coordinates | $x_0$ = | 0.000 | in |
| | $y_0$ = | -5.644 | in |
| Moment of inertia | $J_x$ = | $2.552 \times 10^5$ | in⁴ |
| | $J_y$ = | $4.196 \times 10^5$ | in⁴ |
| Polar moment of inertia | $J_{xy}$ = | 0 | in⁴ |
| Rotation of principal axis | Θ = | 90.0 | ° |

## Principal axis properties

| | | | |
|---|---|---|---|
| Centroid coordinates | $x_0$ = | -5.644 | in |
| | $y_0$ = | 0.000 | in |
| Moment of inertia | $J_1$ = | $4.196 \times 10^5$ | in⁴ |
| | $J_2$ = | $2.552 \times 10^5$ | in⁴ |
| Length of sides | $l_1$ = | 38.688 | in |
| | $l_2$ = | 37.375 | in |
| Moment coefficients | $\gamma_{v1}$ = | 0.3959 | |
| | $\gamma_{v2}$ = | 0.3786 | |

## Neutral axis loads

| | | | |
|---|---|---|---|
| Punching Load | $V_u$ = | 300.0 | kips |
| Bending moments | $M_{ux}$ = | -106.1 | kip-ft |
| | $M_{uy}$ = | 35.0 | kip-ft |

## Principal axis loads

| | | | |
|---|---|---|---|
| Punching Load | $V_u$ = | 300.0 | kips |
| Bending moments | $M_{u1}$ = | 35.0 | kip-ft |
| | $M_{u2}$ = | 106.1 | kip-ft |

| | | | | | | |
|---|---|---|---|---|---|---|
| Resistance without punching reinforcement | $\Phi \cdot v_n$ = | 212.132 | psi | < | $v_u$ = | 251.309 psi |
| Maximum slab resistance | $\Phi \cdot 8\lambda \cdot \sqrt{f'_c}$ = | 424.264 | psi | > | $v_u$ = | 251.309 psi |

| | | | | | | |
|---|---|---|---|---|---|---|
| Resistance with punching reinforcement | $\Phi \bullet v_{n,prov}$ = | 332.348 psi | > | $v_u$ = | 251.309 psi | |

**Outer Critical Section**

| | | | | | | |
|---|---|---|---|---|---|---|
| Required distance | $c_{req}$ = | 101.569 in | | | | |
| Required length of outer perimeter | $b_{req}$ = | 377.209 in | | | | |
| **Provided critical section** | | | | | | |
| Length of critical section | $b_1$ = | 0.000 in | | | | |
| Area of critical section | $A_{c,out}$ = | 0.0 in² | | | | |
| **Neutral axis properties** | | | **Principal axis properties** | | | |
| Centroid coordinates | $x_{0,prov}$ = | 0.000 in | Centroid coordinates | $x_{0,prov}$ = | 0.000 in | |
| | $y_{0,prov}$ = | 0.000 in | | $y_{0,prov}$ = | 0.000 in | |
| Moment of inertia | $J_{x,prov}$ = | 0 in⁴ | Moment of inertia | $J_{1,prov}$ = | 0 in⁴ | |
| | $J_{y,prov}$ = | 0 in⁴ | | $J_{2,prov}$ = | 0 in⁴ | |
| Polar moment of inertia | $J_{xy,prov}$ = | 0 in⁴ | | | | |
| Rotation of principal axis | $\Theta$ = | 0.0 ° | | | | |
| | | | Length of sides | $l_{1,prov}$ = | 0.000 in | |
| | | | | $l_{2,prov}$ = | 0.000 in | |
| | | | Moment coefficients | $\gamma_{v1,prov}$ = | 0 | |
| | | | | $\gamma_{v2,prov}$ = | 0 | |
| **Neutral axis loads** | | | **Principal axis loads** | | | |
| Punching Load | $V_{u,prov}$ = | 300.0 kips | Punching Load | $V_{u,prov}$ = | 300.0 kips | |
| Bending moments | $M_{ux,prov}$ = | 0.0 kip-ft | Bending moment | $M_{u1,prov}$ = | 0.0 kip-ft | |
| | $M_{uy,prov}$ = | 0.0 kip-ft | | $M_{u2,prov}$ = | 0.0 kip-ft | |

| | | | | | |
|---|---|---|---|---|---|
| Resistance of outer critical section | $\Phi \cdot 2\lambda \cdot \sqrt{f_c}$ | 106.066 psi | > | $v_{u,out}$ = | 0.000 psi |

**Punching Reinforcement**

Design of reinforcement

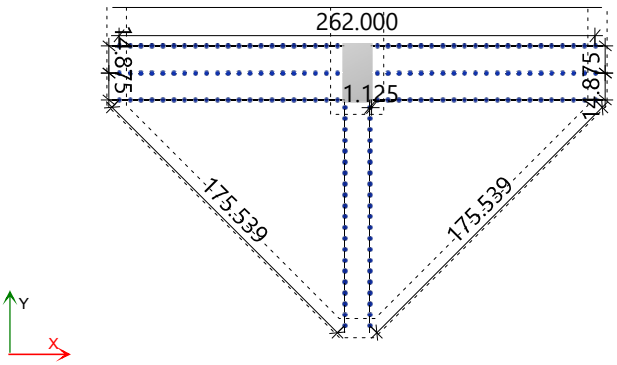
1-st rail 6x ARMATA-0.75-13.5-17-3-6

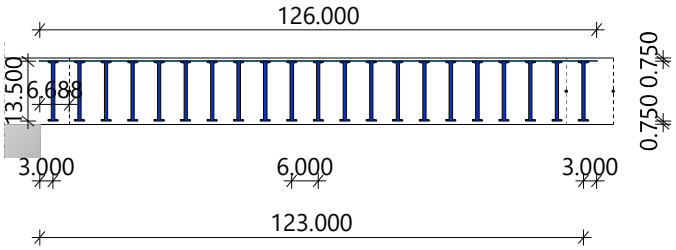
Color Code

Resistance of reinforcement $v_s$ = 230.999 psi

# Type H - 24x24- EDGE

Number of Identical Columns: 1




8x ARMATA-0.75-13.5-21-3-6

## Materials

| | | | |
|---|---|---|---|
| Concrete compressive strength | $f'_c$ = | 5,000 | psi |
| Concrete density | | Normal | |
| Yield strength of studs | $f_{yv}$ = | **60,000** | psi |

## Geometry

| | | | | | | |
|---|---|---|---|---|---|---|
| Slab Thickness | h = | 15.000 | in | | | |
| Effective depth of slab | $d_x$ = | 12.938 | in | $d_y$ = | 13.813 | in |
| Cover of Punching Reinforcement | $c_t$ = | 0.750 | in | $c_b$ = | 0.750 | in |
| Rectangular column | a = | 16.000 | in | b = | 32.000 | in |
| Location | Up edge middle | | | | | |
| Edge distance | | | | $r_b$ = | 20.000 | in |

## Loads

| | | | | | | |
|---|---|---|---|---|---|---|
| Punching Load | $V_u$ = | 380.0 | kips | | | |
| Bending moments | $M_{uOx}$ = | 45.0 | kip-ft | $M_{uOy}$ = | 45.0 | kip-ft |
| Prestress | $f_{pc}$ = | 1 | psi | | | |

## Basic critical section

| | | | |
|---|---|---|---|
| Length of critical section | $b_0$ = | 146.750 | in |
| Area of critical section | $A_c$ = | 1,962.8 | in² |

## Neutral axis properties

| | | | |
|---|---|---|---|
| Centroid coordinates | $x_0$ = | 0.000 | in |
| | $y_0$ = | 0.783 | in |
| Moment of inertia | $J_x$ = | 7.212 x10 $^5$ | in⁴ |
| | $J_y$ = | 3.669 x10 $^5$ | in⁴ |
| Polar moment of inertia | $J_{xy}$ = | 0 | in⁴ |
| Rotation of principal axis | Θ = | 0.0 | ° |

## Principal axis properties

| | | | |
|---|---|---|---|
| Centroid coordinates | $x_0$ = | 0.000 | in |
| | $y_0$ = | 0.783 | in |
| Moment of inertia | $J_1$ = | 7.212 x10 $^5$ | in⁴ |
| | $J_2$ = | 3.669 x10 $^5$ | in⁴ |
| Length of sides | $l_1$ = | 29.375 | in |
| | $l_2$ = | 58.688 | in |
| Moment coefficients | $\gamma_{v1}$ = | 0.4851 | |
| | $\gamma_{v2}$ = | 0.2677 | |

## Neutral axis loads

| | | | |
|---|---|---|---|
| Punching Load | $V_u$ = | 380.0 | kips |
| Bending moments | $M_{ux}$ = | 69.8 | kip-ft |
| | $M_{uy}$ = | 45.0 | kip-ft |

## Principal axis loads

| | | | |
|---|---|---|---|
| Punching Load | $V_u$ = | 380.0 | kips |
| Bending moments | $M_{u1}$ = | 69.8 | kip-ft |
| | $M_{u2}$ = | 45.0 | kip-ft |

| | | | | | | |
|---|---|---|---|---|---|---|
| Resistance without punching reinforcement | $\Phi \cdot v_n$ = | 212.132 | psi | < | $v_u$ = | 212.609 psi |
| Maximum slab resistance | $\Phi \cdot 8\lambda \cdot \sqrt{f'_c}$ | 424.264 | psi | > | $v_u$ = | 212.609 psi |

| | | | | | | |
|---|---|---|---|---|---|---|
| Resistance with punching reinforcement | $\Phi \cdot v_{n,prov}$ = | 339.727 psi | > | $v_u$ = | 212.609 psi | |

**Outer Critical Section**

| | | | | | | |
|---|---|---|---|---|---|---|
| Required distance | $c_{req}$ = | 119.089 in | | | | |
| Required length of outer perimeter | $b_{req}$ = | 458.982 in | | | | |
| **Provided critical section** | | | | | | |
| Length of critical section | $b_1$ = | 0.000 in | | | | |
| Area of critical section | $A_{c,out}$ = | 0.0 in² | | | | |
| **Neutral axis properties** | | | **Principal axis properties** | | | |
| Centroid coordinates | $x_{0,prov}$ = | 0.000 in | Centroid coordinates | $x_{0,prov}$ = | 0.000 in | |
| | $y_{0,prov}$ = | 0.000 in | | $y_{0,prov}$ = | 0.000 in | |
| Moment of inertia | $J_{x,prov}$ = | 0 in⁴ | Moment of inertia | $J_{1,prov}$ = | 0 in⁴ | |
| | $J_{y,prov}$ = | 0 in⁴ | | $J_{2,prov}$ = | 0 in⁴ | |
| Polar moment of inertia | $J_{xy,prov}$ = | 0 in⁴ | | | | |
| Rotation of principal axis | $\Theta$ = | 0.0 ° | | | | |
| | | | Length of sides | $l_{1,prov}$ = | 0.000 in | |
| | | | | $l_{2,prov}$ = | 0.000 in | |
| | | | Moment coefficients | $\gamma_{v1,prov}$ = | 0 | |
| | | | | $\gamma_{v2,prov}$ = | 0 | |
| **Neutral axis loads** | | | **Principal axis loads** | | | |
| Punching Load | $V_{u,prov}$ = | 380.0 kips | Punching Load | $V_{u,prov}$ = | 380.0 kips | |
| Bending moments | $M_{ux,prov}$ = | 0.0 kip-ft | Bending moment | $M_{u1,prov}$ = | 0.0 kip-ft | |
| | $M_{uy,prov}$ = | 0.0 kip-ft | | $M_{u2,prov}$ = | 0.0 kip-ft | |

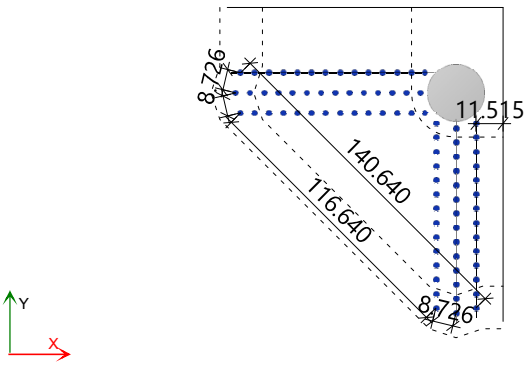
| | | | | | |
|---|---|---|---|---|---|
| Resistance of outer critical section | $\Phi \cdot 2\lambda \cdot \sqrt{f'_c}$ | 106.066 psi | > | $v_{u,out}$ = | 0.000 psi |

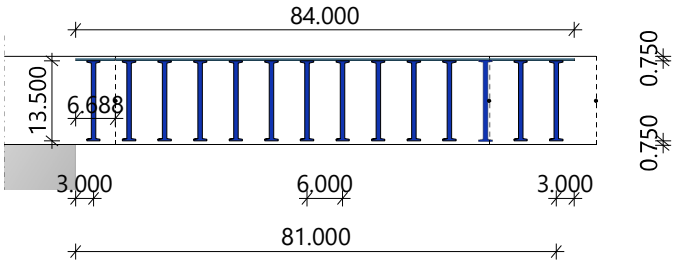
**Punching Reinforcement**

| | | |
|---|---|---|
| Design of reinforcement | | |
| 1-st rail | | 8x ARMATA-0.75-13.5-21-3-6 |
| Color Code | | |
| Resistance of reinforcement | $v_s$ = | 240.837 psi |

# Type J - 24x24- CORNER-Round

Number of Identical Columns: 1




6x ARMATA-0.75-13.5-14-3-6

## Materials

| | | | |
|---|---|---|---|
| Concrete compressive strength | $f'_c$ = | 5,000 | psi |
| Concrete density | | Normal | |
| Yield strength of studs | $f_{yv}$ = | **60,000** | psi |

## Geometry

| | | | | | |
|---|---|---|---|---|---|
| Slab Thickness | h = | 15.000 | in | | |
| Effective depth of slab | $d_x$ = | 12.938 | in | $d_y$ = | 13.813 in |
| Cover of Punching Reinforcement | $c_t$ = | 0.750 | in | $c_b$ = | 0.750 in |
| Circular column | $d_s$ = | 24.000 | in | | |
| Location | Up right corner | | | | |
| Edge distance | $r_a$ = | 8.000 | in | $r_b$ = | 24.000 in |

## Loads

| | | | | | |
|---|---|---|---|---|---|
| Punching Load | $V_u$ = | 200.0 | kips | | |
| Bending moments | $M_{uOx}$ = | 25.0 | kip-ft | $M_{uOy}$ = | 25.0 kip-ft |
| Prestress | $f_{pc}$ = | 1 | psi | | |

## Basic critical section

| | | | |
|---|---|---|---|
| Length of critical section | $b_0$ = | 85.354 | in |
| Area of critical section | $A_c$ = | 1,141.6 | in² |

## Neutral axis properties

| | | | |
|---|---|---|---|
| Centroid coordinates | $x_0$ = | -9.630 | in |
| | $y_0$ = | -0.878 | in |
| Moment of inertia | $J_x$ = | $3.691 \times 10^5$ | in⁴ |
| | $J_y$ = | $1.665 \times 10^5$ | in⁴ |
| Polar moment of inertia | $J_{xy}$ = | -177967.988 | in⁴ |
| Rotation of principal axis | Θ = | 30.2 | ° |

## Principal axis properties

| | | | |
|---|---|---|---|
| Centroid coordinates | $x_0$ = | -8.767 | in |
| | $y_0$ = | 4.081 | in |
| Moment of inertia | $J_1$ = | $4.726 \times 10^5$ | in⁴ |
| | $J_2$ = | $6.302 \times 10^4$ | in⁴ |
| Length of sides | $l_1$ = | 26.584 | in |
| | $l_2$ = | 66.723 | in |
| Moment coefficients | $\gamma_{v1}$ = | 0.4 | |
| | $\gamma_{v2}$ = | 0.229 | |

## Neutral axis loads

| | | | |
|---|---|---|---|
| Punching Load | $V_u$ = | 200.0 | kips |
| Bending moments | $M_{ux}$ = | 10.4 | kip-ft |
| | $M_{uy}$ = | 185.5 | kip-ft |

## Principal axis loads

| | | | |
|---|---|---|---|
| Punching Load | $V_u$ = | 200.0 | kips |
| Bending moments | $M_{u1}$ = | 102.2 | kip-ft |
| | $M_{u2}$ = | 155.2 | kip-ft |

| | | | | | | |
|---|---|---|---|---|---|---|
| Resistance without punching reinforcement | $\Phi \cdot v_n$ = | 212.132 | psi | < | $v_u$ = | 319.355 psi |
| Maximum slab resistance | $\Phi \cdot 8\lambda \cdot \sqrt{f'_c}$ | 424.264 | psi | > | $v_u$ = | 319.355 psi |

| | | | | | | |
|---|---|---|---|---|---|---|
| Resistance with punching reinforcement | $\Phi \bullet v_{n,prov}$ = | 392.015 psi | > | $v_u$ = | 319.355 psi | |

**Outer Critical Section**

| | | | | | | |
|---|---|---|---|---|---|---|
| Required distance | $c_{req}$ = | 69.680 in | | | | |
| Required length of outer perimeter | $b_{req}$ = | 180.564 in | | | | |
| **Provided critical section** | | | | | | |
| Length of critical section | $b_1$ = | 0.000 in | | | | |
| Area of critical section | $A_{c,out}$ = | 0.0 in² | | | | |
| **Neutral axis properties** | | | **Principal axis properties** | | | |
| Centroid coordinates | $x_{0,prov}$ = | 0.000 in | Centroid coordinates | $x_{0,prov}$ = | 0.000 in | |
| | $y_{0,prov}$ = | 0.000 in | | $y_{0,prov}$ = | 0.000 in | |
| Moment of inertia | $J_{x,prov}$ = | 0 in⁴ | Moment of inertia | $J_{1,prov}$ = | 0 in⁴ | |
| | $J_{y,prov}$ = | 0 in⁴ | | $J_{2,prov}$ = | 0 in⁴ | |
| Polar moment of inertia | $J_{xy,prov}$ = | 0 in⁴ | | | | |
| Rotation of principal axis | $\Theta$ = | 0.0 ° | | | | |
| | | | Length of sides | $l_{1,prov}$ = | 0.000 in | |
| | | | | $l_{2,prov}$ = | 0.000 in | |
| | | | Moment coefficients | $\gamma_{v1,prov}$ = | 0 | |
| | | | | $\gamma_{v2,prov}$ = | 0 | |
| **Neutral axis loads** | | | **Principal axis loads** | | | |
| Punching Load | $V_{u,prov}$ = | 200.0 kips | Punching Load | $V_{u,prov}$ = | 200.0 kips | |
| Bending moments | $M_{ux,prov}$ = | 0.0 kip-ft | Bending moment | $M_{u1,prov}$ = | 0.0 kip-ft | |
| | $M_{uy,prov}$ = | 0.0 kip-ft | | $M_{u2,prov}$ = | 0.0 kip-ft | |

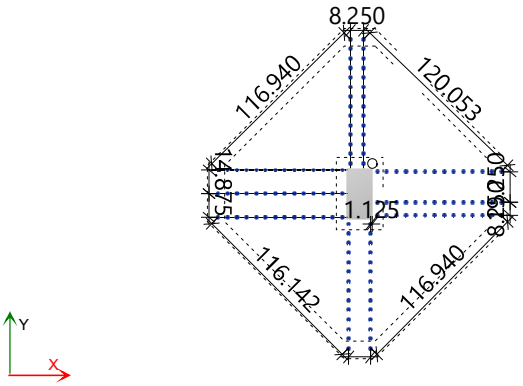
| | | | | | |
|---|---|---|---|---|---|
| Resistance of outer critical section | $\Phi \cdot 2\lambda \cdot \sqrt{f_c}$ | 106.066 psi | > | $v_{u,out}$ = | 0.000 psi |

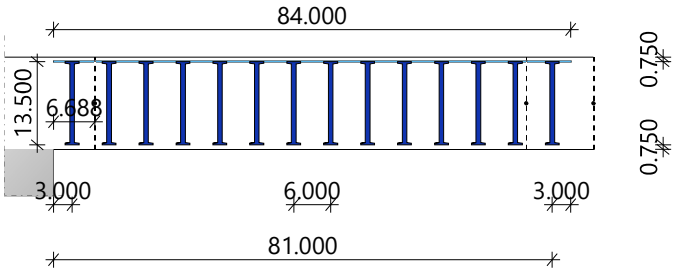
**Punching Reinforcement**

| | | |
|---|---|---|
| Design of reinforcement | | |
| 1-st rail | | 6x ARMATA-0.75-13.5-14-3-6 |
| Color Code | | |
| Resistance of reinforcement | $v_s$ = | 310.555 psi |

# Type K - 16x32

Number of Identical Columns: 1




10x ARMATA-0.75-13.5-14-3-6

## Materials

| | | | |
|---|---|---|---|
| Concrete compressive strength | $f'_c$ = | 5,000 | psi |
| Concrete density | Normal | | |
| Yield strength of studs | $f_{yv}$ = | **60,000** | psi |

## Geometry

| | | | | | |
|---|---|---|---|---|---|
| Slab Thickness | h = | 15.000 | in | | |
| Effective depth of slab | $d_x$ = | 12.938 | in | $d_y$ = | 13.813 in |
| Cover of Punching Reinforcement | $c_t$ = | 0.750 | in | $c_b$ = | 0.750 in |
| Rectangular column | a = | 16.000 | in | b = | 32.000 in |
| Location | Middle | | | | |

## Openings

| X | Y | Size X | Size Y | Diameter |
|---|---|---|---|---|
| 11.00 | 0.00 | - | - | 6.00 |
| 8.00 | 19.00 | - | - | 6.00 |

## Loads

| | | | | | |
|---|---|---|---|---|---|
| Punching Load | $V_u$ = | 575.0 | kips | | |
| Bending moments | $M_{uOx}$ = | 65.0 | kip-ft | $M_{uOy}$ = | 65.0 kip-ft |
| Prestress | $f_{pc}$ = | 1 | psi | | |

## Basic critical section

| | | | |
|---|---|---|---|
| Length of critical section | $b_0$ = | 133.285 | in |
| Area of critical section | $A_c$ = | 1,782.7 | in² |

## Neutral axis properties

| | | | |
|---|---|---|---|
| Centroid coordinates | $x_0$ = | -1.497 | in |
| | $y_0$ = | -1.343 | in |
| Moment of inertia | $J_x$ = | $5.546 \times 10^5$ | in⁴ |
| | $J_y$ = | $2.796 \times 10^5$ | in⁴ |
| Polar moment of inertia | $J_{xy}$ = | -27032.065 | in⁴ |
| Rotation of principal axis | Θ = | 5.6 | ° |

## Principal axis properties

| | | | |
|---|---|---|---|
| Centroid coordinates | $x_0$ = | -1.620 | in |
| | $y_0$ = | -1.191 | in |
| Moment of inertia | $J_1$ = | $5.572 \times 10^5$ | in⁴ |
| | $J_2$ = | $2.77 \times 10^5$ | in⁴ |
| Length of sides | $l_1$ = | 33.635 | in |
| | $l_2$ = | 48.009 | in |
| Moment coefficients | $\gamma_{v1}$ = | 0.4434 | |
| | $\gamma_{v2}$ = | 0.3582 | |

## Neutral axis loads

| | | | |
|---|---|---|---|
| Punching Load | $V_u$ = | 575.0 | kips |
| Bending moments | $M_{ux}$ = | 0.7 | kip-ft |

## Principal axis loads

| | | | |
|---|---|---|---|
| Punching Load | $V_u$ = | 575.0 | kips |
| Bending moments | $M_{u1}$ = | 13.9 | kip-ft |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | $M_{uy}$ = | 136.7 | kip-ft | | | $M_{u2}$ = | 136.0 kip-ft |
| Resistance without punching reinforcement | $\Phi \cdot v_n$ = | 212.132 | psi | < | $v_u$ = | 358.492 | psi |
| Maximum slab resistance | $\Phi \cdot 8\lambda \cdot \sqrt{f'_c}$ | 424.264 | psi | > | $v_u$ = | 358.492 | psi |
| Resistance with punching reinforcement | $\Phi \cdot v_{n,prov}$ = | 407.693 | psi | > | $v_u$ = | 358.492 | psi |

**Outer Critical Section**

| | | | |
|---|---|---|---|
| Required distance | $c_{req}$ = | 76.766 | in |
| Required length of outer perimeter | $b_{req}$ = | 459.823 | in |

**Provided critical section**

| | | | |
|---|---|---|---|
| Length of critical section | $b_1$ = | 0.000 | in |
| Area of critical section | $A_{c,out}$ = | 0.0 | in² |

| **Neutral axis properties** | | | | **Principal axis properties** | | | |
|---|---|---|---|---|---|---|---|
| Centroid coordinates | $x_{0,prov}$ = | 0.000 | in | Centroid coordinates | $x_{0,prov}$ = | 0.000 | in |
| | $y_{0,prov}$ = | 0.000 | in | | $y_{0,prov}$ = | 0.000 | in |
| Moment of inertia | $J_{x,prov}$ = | 0 | in⁴ | Moment of inertia | $J_{1,prov}$ = | 0 | in⁴ |
| | $J_{y,prov}$ = | 0 | in⁴ | | $J_{2,prov}$ = | 0 | in⁴ |
| Polar moment of inertia | $J_{xy,prov}$ = | 0 | in⁴ | | | | |
| Rotation of principal axis | Θ = | 0.0 | ° | | | | |
| | | | | Length of sides | $l_{1,prov}$ = | 0.000 | in |
| | | | | | $l_{2,prov}$ = | 0.000 | in |
| | | | | Moment coefficients | $\gamma_{v1,prov}$ = | 0 | |
| | | | | | $\gamma_{v2,prov}$ = | 0 | |

| **Neutral axis loads** | | | | **Principal axis loads** | | | |
|---|---|---|---|---|---|---|---|
| Punching Load | $V_{u,prov}$ = | 575.0 | kips | Punching Load | $V_{u,prov}$ = | 575.0 | kips |
| Bending moments | $M_{ux,prov}$ = | 0.0 | kip-ft | Bending moment | $M_{u1,prov}$ = | 0.0 | kip-ft |
| | $M_{uy,prov}$ = | 0.0 | kip-ft | | $M_{u2,prov}$ = | 0.0 | kip-ft |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Resistance of outer critical section | $\Phi \cdot 2\lambda \cdot \sqrt{f'_c}$ | 106.066 | psi | > | $v_{u,out}$ = | 0.000 | psi |

**Punching Reinforcement**

Design of reinforcement

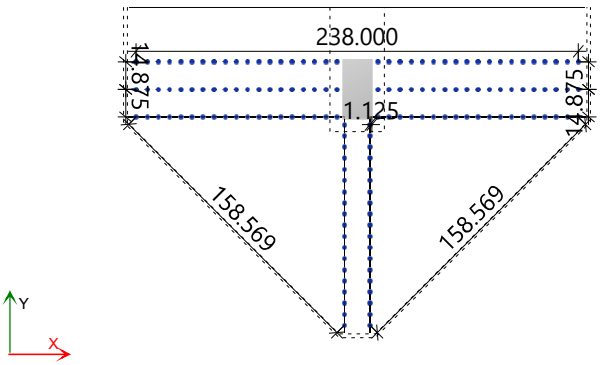
1-st rail 10x ARMATA-0.75-13.5-14-3-6

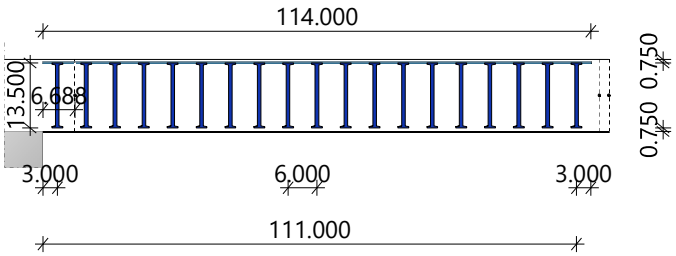
Color Code

Resistance of reinforcement $v_s$ = 331.459 psi

# Type L - 16x32 - EDGE

Number of Identical Columns: 1




8x ARMATA-0.75-13.5-19-3-6

## Materials

| | | | |
|---|---|---|---|
| Concrete compressive strength | $f'_c$ = | 5,000 | psi |
| Concrete density | | Normal | |
| Yield strength of studs | $f_{yv}$ = | **60,000** | psi |

## Geometry

| | | | | | | |
|---|---|---|---|---|---|---|
| Slab Thickness | h = | 15.000 | in | | | |
| Effective depth of slab | $d_x$ = | 12.938 | in | $d_y$ = | 13.813 | in |
| Cover of Punching Reinforcement | $c_t$ = | 0.750 | in | $c_b$ = | 0.750 | in |
| Rectangular column | a = | 16.000 | in | b = | 32.000 | in |
| Location | Up edge middle | | | | | |
| Edge distance | | | | $r_b$ = | 28.000 | in |

## Loads

| | | | | | | |
|---|---|---|---|---|---|---|
| Punching Load | $V_u$ = | 400.0 | kips | | | |
| Bending moments | $M_{uOx}$ = | 50.0 | kip-ft | $M_{uOy}$ = | 50.0 | kip-ft |
| Prestress | $f_{pc}$ = | 1 | psi | | | |

## Basic critical section

| | | | |
|---|---|---|---|
| Length of critical section | $b_0$ = | 162.750 | in |
| Area of critical section | $A_c$ = | 2,176.8 | in² |

### Neutral axis properties

| | | | |
|---|---|---|---|
| Centroid coordinates | $x_0$ = | 0.000 | in |
| | $y_0$ = | 4.638 | in |
| Moment of inertia | $J_x$ = | $1.019 \times 10^6$ | in⁴ |
| | $J_y$ = | $4.131 \times 10^5$ | in⁴ |
| Polar moment of inertia | $J_{xy}$ = | 0 | in⁴ |
| Rotation of principal axis | Θ = | 0.0 | ° |

### Principal axis properties

| | | | |
|---|---|---|---|
| Centroid coordinates | $x_0$ = | 0.000 | in |
| | $y_0$ = | 4.638 | in |
| Moment of inertia | $J_1$ = | $1.019 \times 10^6$ | in⁴ |
| | $J_2$ = | $4.131 \times 10^5$ | in⁴ |
| Length of sides | $l_1$ = | 29.375 | in |
| | $l_2$ = | 66.688 | in |
| Moment coefficients | $\gamma_{v1}$ = | 0.5011 | |
| | $\gamma_{v2}$ = | 0.2464 | |

### Neutral axis loads

| | | | |
|---|---|---|---|
| Punching Load | $V_u$ = | 400.0 | kips |
| Bending moments | $M_{ux}$ = | 204.6 | kip-ft |
| | $M_{uy}$ = | 50.0 | kip-ft |

### Principal axis loads

| | | | |
|---|---|---|---|
| Punching Load | $V_u$ = | 400.0 | kips |
| Bending moments | $M_{u1}$ = | 204.6 | kip-ft |
| | $M_{u2}$ = | 50.0 | kip-ft |

| | | | | | |
|---|---|---|---|---|---|
| Resistance without punching reinforcement | $\Phi \cdot v_n$ = | 212.132 | psi | < | $v_u$ = 222.004 psi |
| Maximum slab resistance | $\Phi \cdot 8\lambda \cdot \sqrt{f'_c}$ | 424.264 | psi | > | $v_u$ = 222.004 psi |

| | | | | | | |
|---|---|---|---|---|---|---|
| Resistance with punching reinforcement | $\Phi \cdot v_{n,prov}$ = | 321.969 psi | > | $v_u$ = | 222.004 psi | |

**Outer Critical Section**

| | | | | | | |
|---|---|---|---|---|---|---|
| Required distance | $c_{req}$ = | 115.743 in | | | | |
| Required length of outer perimeter | $b_{req}$ = | 465.517 in | | | | |
| **Provided critical section** | | | | | | |
| Length of critical section | $b_1$ = | 0.000 in | | | | |
| Area of critical section | $A_{c,out}$ = | 0.0 in² | | | | |
| **Neutral axis properties** | | | **Principal axis properties** | | | |
| Centroid coordinates | $x_{0,prov}$ = | 0.000 in | Centroid coordinates | $x_{0,prov}$ = | 0.000 in | |
| | $y_{0,prov}$ = | 0.000 in | | $y_{0,prov}$ = | 0.000 in | |
| Moment of inertia | $J_{x,prov}$ = | 0 in⁴ | Moment of inertia | $J_{1,prov}$ = | 0 in⁴ | |
| | $J_{y,prov}$ = | 0 in⁴ | | $J_{2,prov}$ = | 0 in⁴ | |
| Polar moment of inertia | $J_{xy,prov}$ = | 0 in⁴ | | | | |
| Rotation of principal axis | $\Theta$ = | 0.0 ° | | | | |
| | | | Length of sides | $l_{1,prov}$ = | 0.000 in | |
| | | | | $l_{2,prov}$ = | 0.000 in | |
| | | | Moment coefficients | $\gamma_{v1,prov}$ = | 0 | |
| | | | | $\gamma_{v2,prov}$ = | 0 | |
| **Neutral axis loads** | | | **Principal axis loads** | | | |
| Punching Load | $V_{u,prov}$ = | 400.0 kips | Punching Load | $V_{u,prov}$ = | 400.0 kips | |
| Bending moments | $M_{ux,prov}$ = | 0.0 kip-ft | Bending moment | $M_{u1,prov}$ = | 0.0 kip-ft | |
| | $M_{uy,prov}$ = | 0.0 kip-ft | | $M_{u2,prov}$ = | 0.0 kip-ft | |

| | | | | | |
|---|---|---|---|---|---|
| Resistance of outer critical section | $\Phi \cdot 2\lambda \cdot \sqrt{f'_c}$ | 106.066 psi | > | $v_{u,out}$ = | 0.000 psi |

**Punching Reinforcement**

Design of reinforcement

1-st rail 8x ARMATA-0.75-13.5-19-3-6

Color Code

Resistance of reinforcement $v_s$ = 217.161 psi

## Paragon Star Garage

## MFWRS Wind Pressures

**Bob D. Campbell & Co.**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | Roof Angle = | 3° | | |
| Kzt= | 1.0 | Leeward Kh= | **0.80** | Ridge Dirr. = | Flat (<10°) | | |
| Kd= | 0.85 | G= | 0.85 | **Roof Coefficients** | | Parapet GCp+= | 1.5 |
| V= | 109 mph | Windward Cp= | 0.8 | Long. Windward | 0.80 | Parapet GCp-= | -1 |
| I= | 1.00 | Leeward Cp= | -0.5 | Long. Leeward | -0.50 | | |
| Exposure | B | Side Wall Cp= | -0.7 | Trans. Windward | 0.00 | **Parapet Pres. =** | 51.7 |
| Roof Ht. | 48 | qh= | **20.7** | Trans. Leeward | 0.00 | | |

| Height (ft.) | Kz | qz (psf) | Windward Pressure (psf) | Leeward Pressure (psf) | Total Pressure (psf) | Va = 0.6Vu | Side Wall Pressure (psf) |
|---|---|---|---|---|---|---|---|
| 15 | 0.57 | 14.7 | 10.0 | -8.8 | 18.8 | 11.3 | -12.3 |
| 20 | 0.62 | 16.0 | 10.9 | -8.8 | 19.7 | 11.8 | -12.3 |
| 25 | 0.66 | 17.1 | 11.6 | -8.8 | 20.4 | 12.2 | -12.3 |
| 30 | 0.7 | 18.1 | 12.3 | -8.8 | 21.1 | 12.7 | -12.3 |
| 40 | 0.76 | 19.6 | 13.4 | -8.8 | 22.2 | 13.3 | -12.3 |
| 50 | 0.81 | 20.9 | 14.2 | -8.8 | 23.0 | 13.8 | -12.3 |
| 60 | 0.85 | 22.0 | 14.9 | -8.8 | 23.7 | 14.2 | -12.3 |
| 70 | 0.89 | 23.0 | 15.6 | -8.8 | 24.4 | 14.7 | -12.3 |
| 80 | 0.93 | 24.0 | 16.3 | -8.8 | 25.1 | 15.1 | -12.3 |
| 90 | 0.96 | 24.8 | 16.9 | -8.8 | 25.7 | 15.4 | -12.3 |
| 100 | 0.99 | 25.6 | 17.4 | -8.8 | 26.2 | 15.7 | -12.3 |
| 120 | 1.04 | 26.9 | 18.3 | -8.8 | 27.1 | 16.2 | -12.3 |
| 140 | 1.09 | 28.2 | 19.2 | -8.8 | 28.0 | 16.8 | -12.3 |
| 160 | 1.13 | 29.2 | 19.9 | -8.8 | 28.7 | 17.2 | -12.3 |
| 180 | 1.17 | 30.2 | 20.6 | -8.8 | 29.4 | 17.6 | -12.3 |

**Ultimate Wind Load Per Floor**

| Floor | Elev. | TTL P. | Bldg Length | Load to FLR | Total Load | TTL P. | Bldg Width | Load to FLR | Total Load |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| 5th | 48 | 22.9 | 275 | 33 k | 33 k | 22.9 | 123 | 15 k | 15 k |
| 4th | 37.42 | 21.9 | 275 | 64 k | 97 k | 21.9 | 123 | 29 k | 43 k |
| 3rd | 26.76 | 20.6 | 275 | 61 k | 158 k | 20.6 | 123 | 27 k | 71 k |
| 2nd | 16 | 19.0 | 275 | 70 k | 228 k | 19.0 | 123 | 31 k | 102 k |

**Bob D. Campbell & Co.**

# Paragon Star Garage
# Seismic Load Distribution

SDC = B

A.17 Ordinay Precast Shear Walls (N/S Direction)

| | |
|---|---|
| R = | 3 |
| I = | 1 |
| Ta = | 0.36 |
| Sds = | 0.105 |
| Sd1 = | 0.109 |
| k = | 1 |

| Cs |
|---|
| 0.035 |
| 0.100 |
| 0.035 |

**Seismic Force Distribution**

| Floor | Height | Area | DL (psf) | Weight (k) | $WxHx^k$ | Cvx | Fx |
|---|---|---|---|---|---|---|---|
| 5th | 48 | 33825 | 145 | 4904.63 | 235422 | 0.37 | 257.1 k |
| 4th | 37.42 | 33825 | 145 | 4904.63 | 183531.1 | 0.29 | 200.5 k |
| 3rd | 26.76 | 33825 | 145 | 4904.63 | 131247.8 | 0.21 | 143.4 k |
| 2nd | 16 | 33825 | 145 | 4904.63 | 78474 | 0.12 | 85.7 k |
| **Total** | | | | 19,619 | 628,675 | 1 | 687 k |

Base V = 687 k

SDC = B

B.9 Ordinay Precast Shear Walls (E/W Direction)

| | |
|---|---|
| R = | 4 |
| I = | 1 |
| Ta = | 0.36 |
| Sds = | 0.105 |
| Sd1 = | 0.109 |
| k = | 1 |

| Cs |
|---|
| 0.026 |
| 0.075 |
| 0.026 |

**Seismic Force Distribution**

| Floor | Height | Area | DL (psf) | Weight (k) | $WxHx^k$ | Cvx | Fx |
|---|---|---|---|---|---|---|---|
| 5th | 48 | 33825 | 130 | 4397.25 | 211068 | 0.35 | 176.7 k |
| 4th | 37.42 | 33825 | 145 | 4904.63 | 183531.1 | 0.30 | 153.7 k |
| 3rd | 26.76 | 33825 | 145 | 4904.63 | 131247.8 | 0.22 | 109.9 k |
| 2nd | 16 | 33825 | 155 | 5242.88 | 83886 | 0.14 | 70.2 k |
| **Total** | | | | 19,449 | 609,733 | 1 | 511 k |

Base V = 511 k

**Bob D. Campbell & Co.**

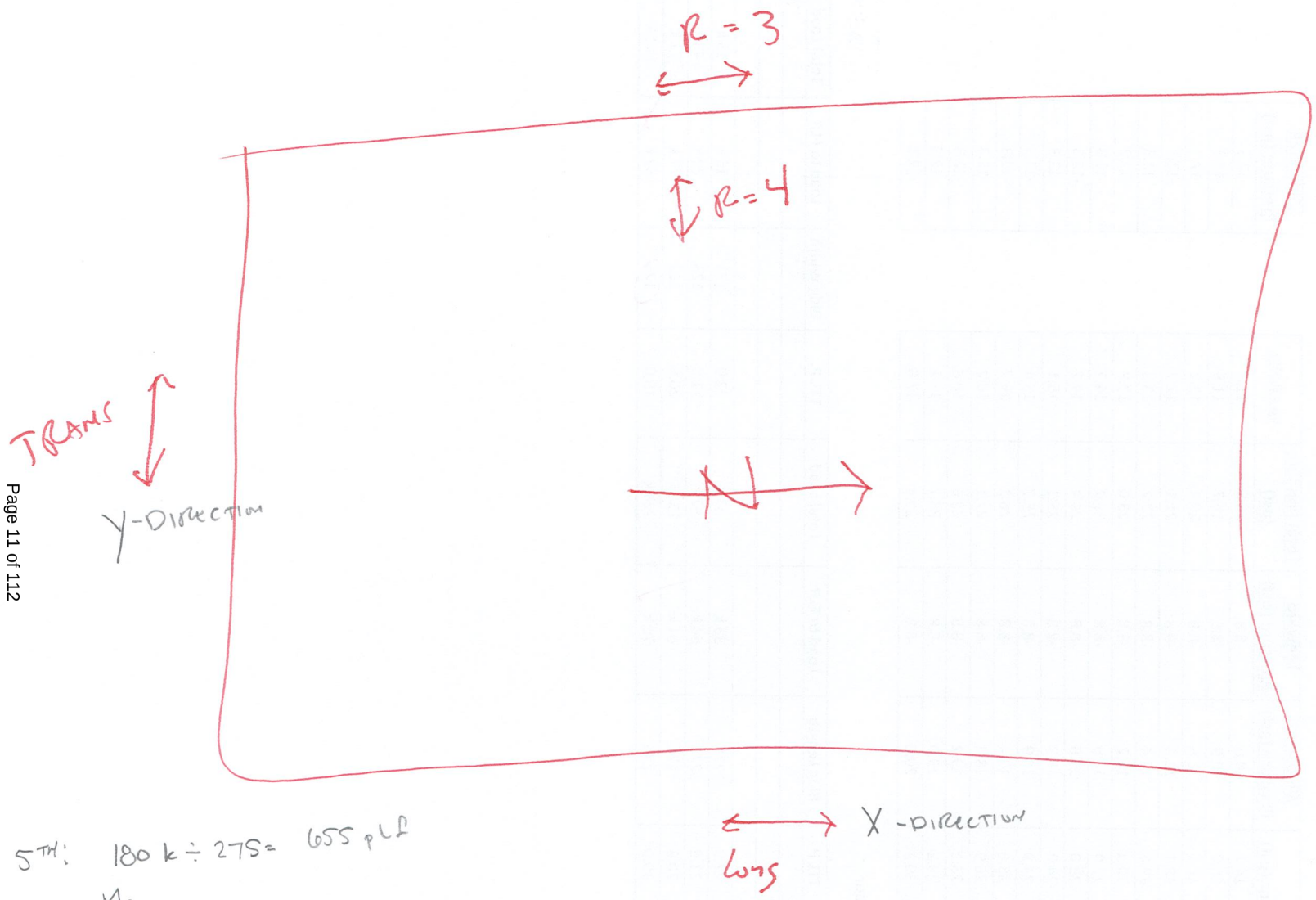
# Paragon Star Garage
# Controlling Lateral Forces

**Transverse Lateral Loads**

| | Wind | | | Seismic (R=4) | | | |
|---|---|---|---|---|---|---|---|
| | **Fx** | **0.6 Fx** | **TTL Fx** | **Fx** | **0.7 Fx** | **TTL Fx** | |
| 5th | 33 k | 20 k | 20 k | 176.73 | 124 k | 124 k | |
| 4th | 64 k | 38 k | 38 k | 153.68 | 108 k | 108 k | Seismic Controls |
| 3rd | 61 k | 36 k | 75 k | 109.9 | 77 k | 185 k | Seismic Controls |
| 2nd | 70 k | 42 k | 117 k | 70.24 | 49 k | 234 k | Seismic Controls |
| | 228 k | 137 k | | 511 k | 357 k | | |

**Longitudinal Lateral Loads**

| | Wind | | | Seismic (R=3) | | | |
|---|---|---|---|---|---|---|---|
| | **Fx** | **0.6 Fx** | **TTL Fx** | **Fx** | **0.7 Fx** | **TTL Fx** | |
| 5th | 15 k | 9 k | 9 k | **257.13** | 180 k | 180 k | |
| 4th | 29 k | 17 k | 17 k | **200.46** | 140 k | 140 k | Seismic Controls |
| 3rd | 27 k | 16 k | 33 k | **143.35** | 100 k | 241 k | Seismic Controls |
| 2nd | 31 k | 19 k | 52 k | **85.71** | 60 k | 301 k | Seismic Controls |
| | 102 k | 61 k | | 687 k | 481 k | | |




5TH: 180 k ÷ 275 = 655 plf

M=



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**Transverse Direction (Seismic) (Y-Direction or E/W Walls)** (R=4)

| Seismic Dead Load at Roof Level 5 at 148'-0" | | | | | | |
|---|---|---|---|---|---|---|
| Material | Weight | | Length | Area | W | |
| | (plf) | (psf) | (ft) | ($ft^2$) | (kips) | |
| 13.71DT28" + 15psf | | 91 | | 33825 | 3079 | |
| Columns | 817 | | 52.9 | | 44 | |
| Inverted Tee | 1175 | | 88 | | 104 | |
| Walls @ GA | 1162 | | 275 | | 320 | |
| Walls @ GB | 1162 | | 186 | | 217 | |
| Walls @ GC | 1162 | | 275 | | 320 | |
| Stair Wall - East | 1162 | | 13.75 | | 16 | |
| CMU Walls | 502 | | 120 | | 61 | |
| Spantrel Beam | 730 | | 60 | | 44 | |
| 3" Wash | 56 | | 1408 | | 80 | Equivalent PSF |
| | | | | $W_{Level\ 5}$= | 4285 | 130 |

| Seismic Dead Load at Level 4 at 137'-5" | | | | | | |
|---|---|---|---|---|---|---|
| Material | Weight | | Length | Area | W | |
| | (plf) | (psf) | (ft) | ($ft^2$) | (kips) | |
| 13.71DT28" + 15psf | | 91 | | 33825 | 3079 | |
| Columns | 817 | | 106.25 | | 87 | |
| Inverted Tee | 1175 | | 88 | | 104 | |
| Walls @ GA | 1829 | | 275 | | 503 | |
| Walls @ GB | 1829 | | 186 | | 341 | |
| Walls @ GC | 1829 | | 275 | | 503 | |
| Stair Wall - East | 1829 | | 13.75 | | 26 | |
| CMU Walls | 502 | | 120 | | 61 | |
| 3" Wash | 56 | | 1408 | | 80 | Equivalent PSF |
| | | | | $W_{Level\ 4}$= | 4784 | 145 |

| Seismic Dead Load at Level 3 at 126'-9" | | | | | | |
|---|---|---|---|---|---|---|
| Material | Weight | | Length | Area | W | |
| | (plf) | (psf) | (ft) | ($ft^2$) | (kips) | |
| 13.71DT28" + 15psf | | 91 | | 33825 | 3079 | |
| Columns | 817 | | 107.1 | | 88 | |
| Inverted Tee | 1175 | | 88 | | 104 | |
| Walls @ GA | 1839 | | 275 | | 506 | |
| Walls @ GB | 1839 | | 186 | | 343 | |
| Walls @ GC | 1839 | | 275 | | 506 | |
| Stair Wall - East | 1839 | | 13.75 | | 26 | |
| CMU Walls | 502 | | 120 | | 61 | |
| 3" Wash | 56 | | 1408 | | 80 | Equivalent PSF |
| | | | | $W_{Level\ 3}$= | 4793 | 145 |

**Transverse Direction (Seismic) (Y-Direction or E/W Walls)** (R=4)

| Seismic Dead Load at Level 2 at 116'-0" | | | | | |
|---|---|---|---|---|---|
| Material | Weight | | Length | Area | W |
| | (plf) | (psf) | (ft) | ($ft^2$) | (kips) |
| 13.71DT28" + 15psf | | 91 | | 33825 | 3079 |
| Columns | 817 | | 133.75 | | 110 |
| Inverted Tee | 1175 | | 88 | | 104 |
| Walls @ GA | 2172 | | 275 | | 598 |
| Walls @ GB | 2172 | | 186 | | 404 |
| Walls @ GC | 2172 | | 275 | | 598 |
| Stair Wall - East | 2172 | | 13.75 | | 30 |
| CMU Walls | 502 | | 120 | | 61 |
| 2" Addt'l Top at Retail | | 25 | | 5904 | 148 |
| 3" Wash | 56 | | 1408 | | 80 |
| | | | | $W_{Level\ 2}$= | 5212 |

Equivalent PSF: 155

**Base Shear**

$V_E=C_sW$ → 495.9 kips (Eq 12.8-1)

Where:

Cs= 0.026 (See Hand Calc)

W= 19074 kips

**Direct Shear**

| Vertical Distribution of Seismic Forces | | | | |
|---|---|---|---|---|
| Level | $W_x$ | $h_x^k$ | $W_xh_x^k$ | $F_x$ |
| | (kips) | (ft) | (kip-ft) | (kips) |
| Level 5 | 4285 | 48 | 205680 | 171.0 |
| Level 4 | 4784 | 37.42 | 179017 | 148.9 |
| Level 3 | 4793 | 26.76 | 128261 | 106.7 |
| Level 2 | 5212 | 16 | 83392 | 69.3 |
| Sum | 19074 | | 596350 | 495.9 |

(Eq 12.8-11 and 12)

**Longitudnal Direction (Seismic) (X-Direction or N/S Walls)** (R=3)

| Seismic Dead Load at Roof Level 5 at 148'-0" | | | | | | |
|---|---|---|---|---|---|---|
| Material | Weight | | Length | Area | W | |
| | (plf) | (psf) | (ft) | ($ft^2$) | (kips) | |
| 13.71DT28" + 15psf | | 91 | | 33825 | 3079 | |
| Columns | 817 | | 52.9 | | 44 | |
| Inverted Tee | 1175 | | 88 | | 104 | |
| Walls @ G1 | 1162 | | 123 | | 143 | |
| Walls @ G6 | 1162 | | 30 | | 35 | |
| Walls @ G8 | 1162 | | 123 | | 143 | |
| Stair Wall - N&S | 1162 | | 36 | | 42 | |
| CMU Walls | 502 | | 120 | | 61 | |
| 3" Wash | 56 | | 1408 | | 80 | Equivalent PSF |
| | | | | $W_{Level\ 5}$= | 3731 | 115 |

| Seismic Dead Load at Level 4 at 137'-5" | | | | | | |
|---|---|---|---|---|---|---|
| Material | Weight | | Length | Area | W | |
| | (plf) | (psf) | (ft) | ($ft^2$) | (kips) | |
| 13.71DT28" + 15psf | | 91 | | 33825 | 3079 | |
| Columns | 817 | | 106.25 | | 87 | |
| Inverted Tee | 1175 | | 88 | | 104 | |
| Walls @ G1 | 1829 | | 123 | | 225 | |
| Walls @ G6 | 1829 | | 30 | | 55 | |
| Walls @ G8 | 1829 | | 123 | | 225 | |
| Stair Wall - N&S | 1829 | | 36 | | 66 | |
| CMU Walls | 502 | | 120 | | 61 | |
| 3" Wash | 56 | | 1408 | | 80 | Equivalent PSF |
| | | | | $W_{Level\ 4}$= | 3982 | 120 |

| Seismic Dead Load at Level 3 at 126'-9" | | | | | | |
|---|---|---|---|---|---|---|
| Material | Weight | | Length | Area | W | |
| | (plf) | (psf) | (ft) | ($ft^2$) | (kips) | |
| 13.71DT28" + 15psf | | 91 | | 33825 | 3079 | |
| Columns | 817 | | 107.1 | | 88 | |
| Inverted Tee | 1175 | | 88 | | 104 | |
| Walls @ G1 | 1839 | | 123 | | 227 | |
| Walls @ G6 | 1839 | | 30 | | 56 | |
| Walls @ G8 | 1839 | | 123 | | 227 | |
| Stair Wall - N&S | 1839 | | 36 | | 67 | |
| CMU Walls | 502 | | 120 | | 61 | |
| 3" Wash | 56 | | 1408 | | 80 | Equivalent PSF |
| | | | | $W_{Level\ 3}$= | 3989 | 120 |

**Longitudnal Direction (Seismic) (X-Direction or N/S Walls)** (R=3)

| Seismic Dead Load at Level 2 | | | | | |
|---|---|---|---|---|---|
| Material | Weight | | Length | Area | W |
| | (plf) | (psf) | (ft) | ($ft^2$) | (kips) |
| 13.71DT28" + 15psf | | 91 | | 33825 | 3079 |
| Columns | 817 | | 133.75 | | 110 |
| Inverted Tee | 1175 | | 88 | | 104 |
| Walls @ G1 | 2172 | | 123 | | 268 |
| Walls @ G6 | 2172 | | 30 | | 66 |
| Walls @ G8 | 2172 | | 123 | | 268 |
| Stair Wall - N&S | 2172 | | 36 | | 79 |
| CMU Walls | 502 | | 120 | | 61 |
| 2" Addt'l Top at Retail | | 25 | | 5904 | 148 |
| 3" Wash | 56 | | 1408 | | 80 |
| | | | | $W_{Level\ 2}$= | 4263 |

Equivalent PSF: 130

**Base Shear**

$V_E=C_sW$ → 558.8 kips (Eq 12.8-1)

Where:

Cs= 0.035 (See Hand Calc)

W= 15965 kips

**Direct Shear**

| Vertical Distribution of Seismic Forces | | | | |
|---|---|---|---|---|
| Level | $W_x$ | $h_x^k$ | $W_xh_x^k$ | $F_x$ |
| | (kips) | (ft) | (kip-ft) | (kips) |
| Level 5 | 3731 | 48 | 179088 | 198.9 |
| Level 4 | 3982 | 37.42 | 149006 | 165.5 |
| Level 3 | 3989 | 26.76 | 106746 | 118.6 |
| Level 2 | 4263 | 16 | 68208 | 75.8 |
| Sum | 15965 | | 503048 | 558.8 |

(Eq 12.8-11 and 12)

# Torsional Analysis of Rigid Diaphragm

File: FWI2101 - Paragon Star.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: 5th Floor

## General Information

IBC 2018, CBC 2019, ASCE 7-16

| | | | |
|---|---|---|---|
| Applied Lateral Force in "X" DIrection | 210.0 k | Center of Shear Application : | |
| Applied Lateral Force in "Y" DIrection | 180.0 k | Distance from "X" datum point | 137.340 ft |
| | | Distance from "Y" datum point | 61.340 ft |
| Note: These loads are resolved into X & Y components when applied to the system of elements at angular increments. | | Accidental Torsion values per ASCE 7-05 12.8.4.2 | |
| | | Ecc. as % of Maximum Dimension | 5.00 % |
| Load Orientation Angular Increment | 15.0 deg | | |
| Load Location Angular Increment | 15.0 deg | Maximum Dimensions : | |
| | | Along "X" Axis | 274.670 ft |
| Center of Rigidity Location (calculated) . . . | | Along "Y" Axis | 122.670 ft |
| "X" dist. from Datum | 209.538 ft | | |
| "Y" dist. from Datum | 61.774 ft | | |

Accidental Eccentricity +/- from "Y" Coord. of Center of Load Application : 13.734 ft

Accidental Eccentricity +/- from "X" Coord. of Center of Load Application : 6.134 ft

## Wall Information

| | | | | | |
|---|---|---|---|---|---|
| Label : G1 | | X Wall C.G. Location | 274.25 ft | Length | 122.67 ft |
| | | Y Wall C.G. Location | 61.33 ft | Height | 10.67 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 90 deg | Thickness | 10 in |
| Along Wall "y" Dir | 8.7859E-006 in | Wall Fixity | Fix-Pin | E - Bending | 3 Mpsi |
| Along Wall "x" Dir | 1.9100E+002 in | | | E - Shear | 1.2 Mpsi |
| Label : G6 | | X Wall C.G. Location | 86.67 ft | Length | 36 ft |
| | | Y Wall C.G. Location | 61.33 ft | Height | 10.67 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 90 deg | Thickness | 12 in |
| Along Wall "y" Dir | 2.7592E-005 in | Wall Fixity | Fix-Pin | E - Bending | 3 Mpsi |
| Along Wall "x" Dir | 3.7739E+002 in | | | E - Shear | 1.2 Mpsi |
| Label : GA | | X Wall C.G. Location | 180.17 ft | Length | 189 ft |
| | | Y Wall C.G. Location | 122.25 ft | Height | 10.67 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 0 deg | Thickness | 10 in |
| Along Wall "y" Dir | 5.6695E-006 in | Wall Fixity | Fix-Pin | E - Bending | 3 Mpsi |
| Along Wall "x" Dir | 1.2397E+002 in | | | E - Shear | 1.2 Mpsi |
| Label : GB | | X Wall C.G. Location | 158.42 ft | Length | 142.5 ft |
| | | Y Wall C.G. Location | 61.33 ft | Height | 10.67 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 0 deg | Thickness | 10 in |
| Along Wall "y" Dir | 3.7718E-006 in | Wall Fixity | Fix-Pin | E - Bending | 6 Mpsi |
| Along Wall "x" Dir | 8.2211E+001 in | | | E - Shear | 2.4 Mpsi |
| Label : GC | | X Wall C.G. Location | 180.25 ft | Length | 188.83 ft |
| | | Y Wall C.G. Location | 0.42 ft | Height | 10.63 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 0 deg | Thickness | 10 in |
| Along Wall "y" Dir | 5.6532E-006 in | Wall Fixity | Fix-Pin | E - Bending | 3 Mpsi |
| Along Wall "x" Dir | 1.2269E+002 in | | | E - Shear | 1.2 Mpsi |
| Label : Stair - East Wall | | X Wall C.G. Location | 93.71 ft | Length | 13.75 ft |
| | | Y Wall C.G. Location | 104.25 ft | Height | 10.67 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 0 deg | Thickness | 10 in |
| Along Wall "y" Dir | 1.3991E-004 in | Wall Fixity | Fix-Pin | E - Bending | 3 Mpsi |
| Along Wall "x" Dir | 1.7040E+003 in | | | E - Shear | 1.2 Mpsi |
| Label : Stair - North Wall | | X Wall C.G. Location | 100.17 ft | Length | 18 ft |
| | | Y Wall C.G. Location | 112.83 ft | Height | 10.67 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 90 deg | Thickness | 12 in |
| Along Wall "y" Dir | 7.2542E-005 in | Wall Fixity | Fix-Pin | E - Bending | 3 Mpsi |
| Along Wall "x" Dir | 7.5479E+002 in | | | E - Shear | 1.2 Mpsi |
| Label : Stair - South Wall | | X Wall C.G. Location | 87.25 ft | Length | 18 ft |
| | | Y Wall C.G. Location | 112.83 ft | Height | 10.67 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 90 deg | Thickness | 10 in |
| Along Wall "y" Dir | 8.7050E-005 in | Wall Fixity | Fix-Pin | E - Bending | 3 Mpsi |
| Along Wall "x" Dir | 1.3017E+003 in | | | E - Shear | 1.2 Mpsi |

# Torsional Analysis of Rigid Diaphragm

File: FWI2101 - Paragon Star.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: 5th Floor

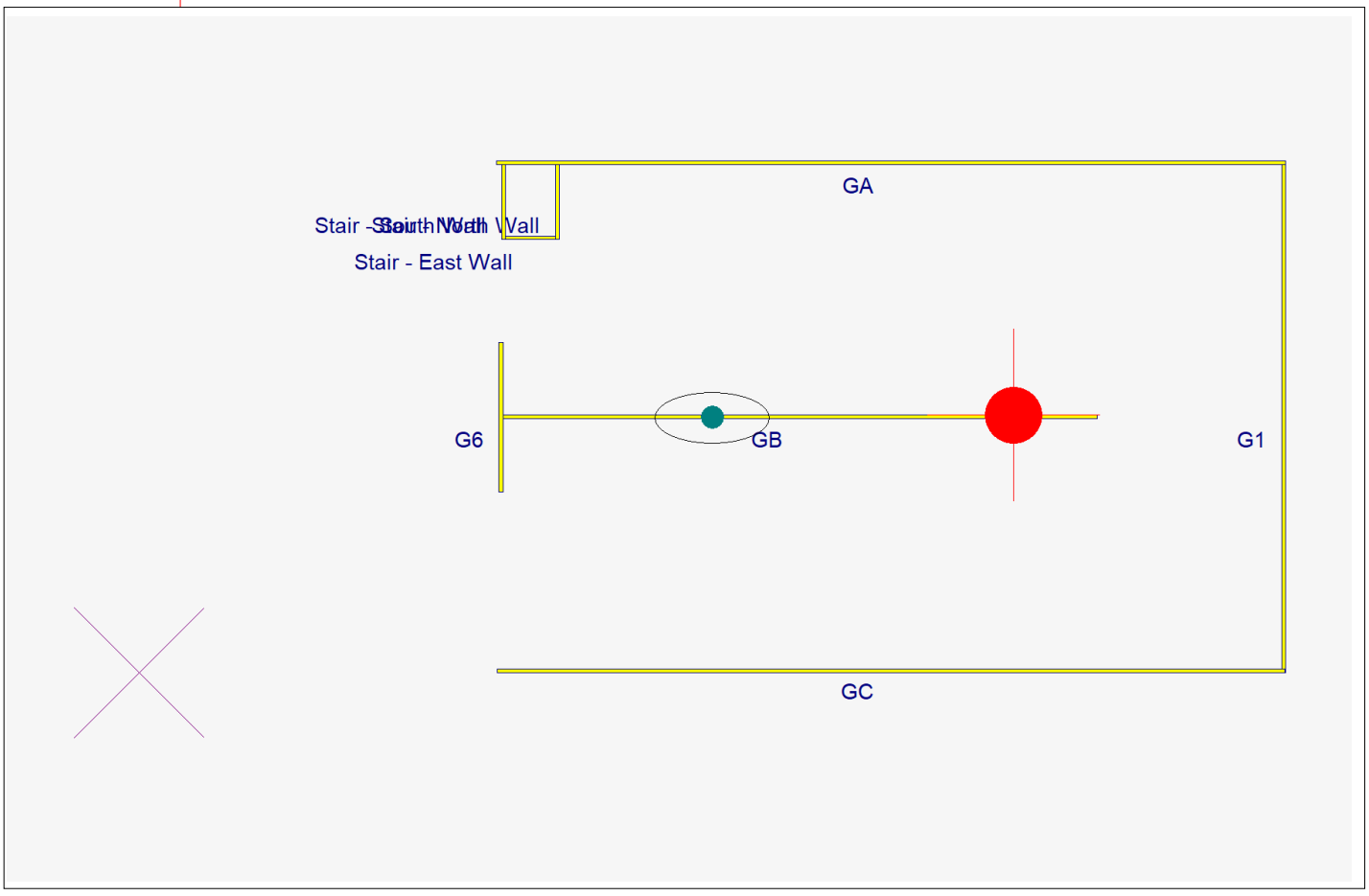
## ANALYSIS SUMMARY

Maximum shear forces applied to resisting elements. Eccentricity with respect to Center of Rigidity

| Resisting Element | Max Shear along Member Local "y-y" Axis | | | | Max Shear along Member Local "x-x" Axis | | | |
|---|---|---|---|---|---|---|---|---|
| | Load Angle | X-Ecc (ft) | Y-Ecc (ft) | Shear Force (k) | Load Angle | X-Ecc (ft) | Y-Ecc (ft) | Shear Force (k) |
| G1 | 90 | 85.93 | -0.43 | 159.289 | 0 | 85.93 | -0.43 | 0.000 |
| G6 | 90 | 68.64 | 5.49 | 57.704 | 0 | 85.93 | -0.43 | 0.000 |
| GA | 225 | 84.09 | 2.63 | 85.955 | 90 | 85.93 | -0.43 | 0.000 |
| GB | 0 | 72.20 | -6.57 | 89.064 | 90 | 85.93 | -0.43 | 0.000 |
| GC | 135 | 84.09 | -3.50 | 87.365 | 90 | 85.93 | -0.43 | 0.000 |
| Stair - East Wall | 30 | 81.91 | 3.90 | 2.992 | 90 | 85.93 | -0.43 | 0.000 |
| Stair - North Wall | 90 | 68.64 | 5.49 | 21.092 | 0 | 85.93 | -0.43 | 0.000 |
| Stair - South Wall | 90 | 68.64 | 5.49 | 18.259 | 0 | 85.93 | -0.43 | 0.000 |

## Layout of Resisting Elements

Legend : Defined Wall, X Datum, Center of Rigidity, Center of Mass, Accidental eccentricity application boundary



# Torsional Analysis of Rigid Diaphragm


Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24


DESCRIPTION: 5th Floor

## Analysis Notes

This program is designed to distribute an applied shear load to a set of resisting elements.

Each resisting element data entry specifies a deflection along a "major" and "minor" axis due to a 1,000 lb load. Each resisting element may be entered as a wall or a column (whereby the deflection is calculated), or as a generic resisting element with specified deflection. The deflections define the stiffness of each resisting element.

Each resisting element is defined at an (X,Y) location from a datum the user has previously defined. A counter-clockwise rotation of the element can be entered with respect to a traditional "+X" axis line.

A main "shear" load and an optional orthogonal shear load are specified for distribution to the system of resisting elements. In addition the maximum orthogonal dimensions of the structure and minimum accidental eccentricity percentage are specified.

From the entered loads the program calculates resultant force vectors for each angular orientation that is requested. The force is applied to the resisting elements in angular increments to generate a series of resulting direct and torsional shear loads on each element. This application of force is then repeated at angular intervals along an elliptical path defined by the minimum accidental eccentricity.

The end result is a table of direct shear and torsional shear values for each element from the iterated angles of load application and accidental eccentricity. These values are then searched to find the maximum major and minor axis shears applied to each resisting element.

# Torsional Analysis of Rigid Diaphragm

File: FWI2101 - Paragon Star.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24



DESCRIPTION: 4th Floor

## General Information

IBC 2018, CBC 2019, ASCE 7-16

| | | | |
|---|---|---|---|
| Applied Lateral Force in "X" DIrection | 170.0 k | Center of Shear Application : | |
| Applied Lateral Force in "Y" DIrection | 155.0 k | Distance from "X" datum point | 137.340 ft |
| | | Distance from "Y" datum point | 61.340 ft |
| Note: These loads are resolved into X & Y components when applied to the system of elements at angular increments. | | Accidental Torsion values per ASCE 7-05 12.8.4.2 | |
| | | Ecc. as % of Maximum Dimension | 5.00 % |
| Load Orientation Angular Increment | 15.0 deg | | |
| Load Location Angular Increment | 15.0 deg | Maximum Dimensions : | |
| | | Along "X" Axis | 274.670 ft |
| Center of Rigidity Location (calculated) . . . | | Along "Y" Axis | 122.670 ft |
| "X" dist. from Datum | 209.538 ft | | |
| "Y" dist. from Datum | 61.774 ft | | |

Accidental Eccentricity +/- from "Y" Coord. of Center of Load Application : 13.734 ft

Accidental Eccentricity +/- from "X" Coord. of Center of Load Application : 6.134 ft

## Wall Information

| | | | | | |
|---|---|---|---|---|---|
| Label : G1 | | X Wall C.G. Location | 274.25 ft | Length | 122.67 ft |
| | | Y Wall C.G. Location | 61.33 ft | Height | 10.67 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 90 deg | Thickness | 10 in |
| Along Wall "y" Dir | 8.7859E-006 in | Wall Fixity | Fix-Pin | E - Bending | 3 Mpsi |
| Along Wall "x" Dir | 1.9100E+002 in | | | E - Shear | 1.2 Mpsi |
| Label : G6 | | X Wall C.G. Location | 86.67 ft | Length | 36 ft |
| | | Y Wall C.G. Location | 61.33 ft | Height | 10.67 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 90 deg | Thickness | 12 in |
| Along Wall "y" Dir | 2.7592E-005 in | Wall Fixity | Fix-Pin | E - Bending | 3 Mpsi |
| Along Wall "x" Dir | 3.7739E+002 in | | | E - Shear | 1.2 Mpsi |
| Label : GA | | X Wall C.G. Location | 180.17 ft | Length | 189 ft |
| | | Y Wall C.G. Location | 122.25 ft | Height | 10.67 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 0 deg | Thickness | 10 in |
| Along Wall "y" Dir | 5.6695E-006 in | Wall Fixity | Fix-Pin | E - Bending | 3 Mpsi |
| Along Wall "x" Dir | 1.2397E+002 in | | | E - Shear | 1.2 Mpsi |
| Label : GB | | X Wall C.G. Location | 158.42 ft | Length | 142.5 ft |
| | | Y Wall C.G. Location | 61.33 ft | Height | 10.67 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 0 deg | Thickness | 10 in |
| Along Wall "y" Dir | 3.7718E-006 in | Wall Fixity | Fix-Pin | E - Bending | 6 Mpsi |
| Along Wall "x" Dir | 8.2211E+001 in | | | E - Shear | 2.4 Mpsi |
| Label : GC | | X Wall C.G. Location | 180.25 ft | Length | 188.83 ft |
| | | Y Wall C.G. Location | 0.42 ft | Height | 10.63 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 0 deg | Thickness | 10 in |
| Along Wall "y" Dir | 5.6532E-006 in | Wall Fixity | Fix-Pin | E - Bending | 3 Mpsi |
| Along Wall "x" Dir | 1.2269E+002 in | | | E - Shear | 1.2 Mpsi |
| Label : Stair - East Wall | | X Wall C.G. Location | 93.71 ft | Length | 13.75 ft |
| | | Y Wall C.G. Location | 104.25 ft | Height | 10.67 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 0 deg | Thickness | 10 in |
| Along Wall "y" Dir | 1.3991E-004 in | Wall Fixity | Fix-Pin | E - Bending | 3 Mpsi |
| Along Wall "x" Dir | 1.7040E+003 in | | | E - Shear | 1.2 Mpsi |
| Label : Stair - North Wall | | X Wall C.G. Location | 100.17 ft | Length | 18 ft |
| | | Y Wall C.G. Location | 112.83 ft | Height | 10.67 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 90 deg | Thickness | 12 in |
| Along Wall "y" Dir | 7.2542E-005 in | Wall Fixity | Fix-Pin | E - Bending | 3 Mpsi |
| Along Wall "x" Dir | 7.5479E+002 in | | | E - Shear | 1.2 Mpsi |
| Label : Stair - South Wall | | X Wall C.G. Location | 87.25 ft | Length | 18 ft |
| | | Y Wall C.G. Location | 112.83 ft | Height | 10.67 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 90 deg | Thickness | 10 in |
| Along Wall "y" Dir | 8.7050E-005 in | Wall Fixity | Fix-Pin | E - Bending | 3 Mpsi |
| Along Wall "x" Dir | 1.3017E+003 in | | | E - Shear | 1.2 Mpsi |

# Torsional Analysis of Rigid Diaphragm

File: FWI2101 - Paragon Star.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: 4th Floor

## ANALYSIS SUMMARY

Maximum shear forces applied to resisting elements. Eccentricity with respect to Center of Rigidity

| Resisting Element | Max Shear along Member Local "y-y" Axis | | | | Max Shear along Member Local "x-x" Axis | | | |
|---|---|---|---|---|---|---|---|---|
| | Load Angle | X-Ecc (ft) | Y-Ecc (ft) | Shear Force (k) | Load Angle | X-Ecc (ft) | Y-Ecc (ft) | Shear Force (k) |
| G1 | 90 | 85.93 | -0.43 | 137.165 | 0 | 85.93 | -0.43 | 0.000 |
| G6 | 90 | 68.64 | 5.49 | 49.689 | 0 | 85.93 | -0.43 | 0.000 |
| GA | 45 | 84.09 | 2.63 | 71.777 | 90 | 85.93 | -0.43 | 0.000 |
| GB | 0 | 72.20 | -6.57 | 72.099 | 90 | 85.93 | -0.43 | 0.000 |
| GC | 315 | 84.09 | -3.50 | 72.956 | 90 | 85.93 | -0.43 | 0.000 |
| Stair - East Wall | 30 | 81.91 | 3.90 | 2.465 | 90 | 85.93 | -0.43 | 0.000 |
| Stair - North Wall | 90 | 68.64 | 5.49 | 18.162 | 0 | 85.93 | -0.43 | 0.000 |
| Stair - South Wall | 90 | 68.64 | 5.49 | 15.723 | 0 | 85.93 | -0.43 | 0.000 |

## Layout of Resisting Elements

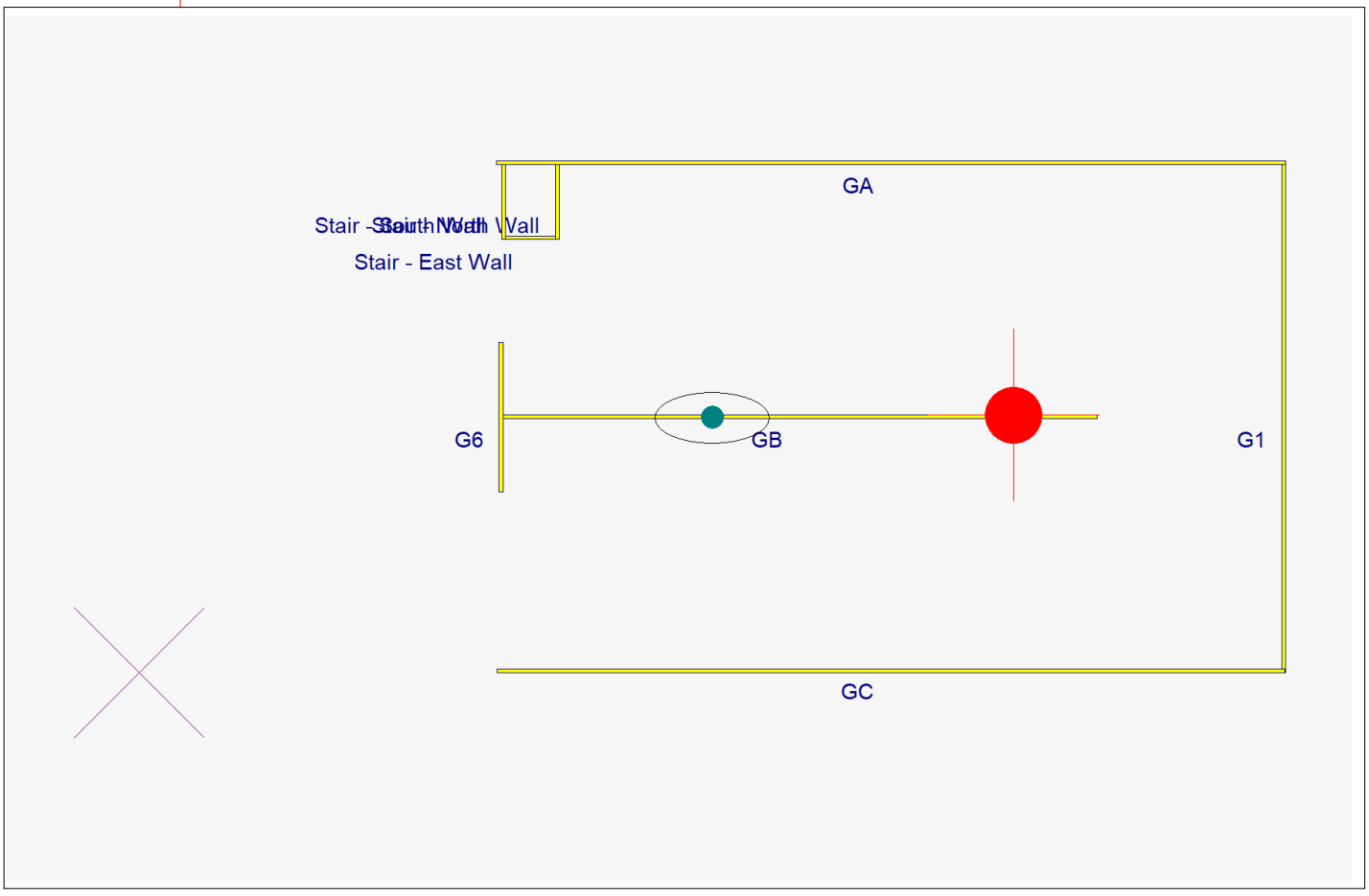
Legend : Defined Wall

X Datum

Center of Rigidity

Center of Mass

Accidental eccentricity application boundary



# Torsional Analysis of Rigid Diaphragm


Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24


DESCRIPTION: 4th Floor

## Analysis Notes

This program is designed to distribute an applied shear load to a set of resisting elements.

Each resisting element data entry specifies a deflection along a "major" and "minor" axis due to a 1,000 lb load. Each resisting element may be entered as a wall or a column (whereby the deflection is calculated), or as a generic resisting element with specified deflection. The deflections define the stiffness of each resisting element.

Each resisting element is defined at an (X,Y) location from a datum the user has previously defined. A counter-clockwise rotation of the element can be entered with respect to a traditional "+X" axis line.

A main "shear" load and an optional orthogonal shear load are specified for distribution to the system of resisting elements. In addition the maximum orthogonal dimensions of the structure and minimum accidental eccentricity percentage are specified.

From the entered loads the program calculates resultant force vectors for each angular orientation that is requested. The force is applied to the resisting elements in angular increments to generate a series of resulting direct and torsional shear loads on each element. This application of force is then repeated at angular intervals along an elliptical path defined by the minimum accidental eccentricity.

The end result is a table of direct shear and torsional shear values for each element from the iterated angles of load application and accidental eccentricity. These values are then searched to find the maximum major and minor axis shears applied to each resisting element.

# Torsional Analysis of Rigid Diaphragm

File: FWI2101 - Paragon Star.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: 3rd Floor

## General Information

IBC 2018, CBC 2019, ASCE 7-16

| | | | |
|---|---|---|---|
| Applied Lateral Force in "X" DIrection | 125.0 k | Center of Shear Application : | |
| Applied Lateral Force in "Y" DIrection | 110.0 k | Distance from "X" datum point | 137.340 ft |
| | | Distance from "Y" datum point | 61.340 ft |
| Note: These loads are resolved into X & Y components when applied to the system of elements at angular increments. | | Accidental Torsion values per ASCE 7-05 12.8.4.2 | |
| | | Ecc. as % of Maximum Dimension | 5.00 % |
| Load Orientation Angular Increment | 15.0 deg | | |
| Load Location Angular Increment | 15.0 deg | Maximum Dimensions : | |
| | | Along "X" Axis | 274.670 ft |
| Center of Rigidity Location (calculated) . . . | | Along "Y" Axis | 122.670 ft |
| "X" dist. from Datum | 209.538 ft | | |
| "Y" dist. from Datum | 61.774 ft | | |

Accidental Eccentricity +/- from "Y" Coord. of Center of Load Application : 13.734 ft

Accidental Eccentricity +/- from "X" Coord. of Center of Load Application : 6.134 ft

## Wall Information

| | | | | | |
|---|---|---|---|---|---|
| Label : G1 | | X Wall C.G. Location | 274.25 ft | Length | 122.67 ft |
| | | Y Wall C.G. Location | 61.33 ft | Height | 10.67 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 90 deg | Thickness | 10 in |
| Along Wall "y" Dir | 8.7859E-006 in | Wall Fixity | Fix-Pin | E - Bending | 3 Mpsi |
| Along Wall "x" Dir | 1.9100E+002 in | | | E - Shear | 1.2 Mpsi |
| Label : G6 | | X Wall C.G. Location | 86.67 ft | Length | 36 ft |
| | | Y Wall C.G. Location | 61.33 ft | Height | 10.67 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 90 deg | Thickness | 12 in |
| Along Wall "y" Dir | 2.7592E-005 in | Wall Fixity | Fix-Pin | E - Bending | 3 Mpsi |
| Along Wall "x" Dir | 3.7739E+002 in | | | E - Shear | 1.2 Mpsi |
| Label : GA | | X Wall C.G. Location | 180.17 ft | Length | 189 ft |
| | | Y Wall C.G. Location | 122.25 ft | Height | 10.67 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 0 deg | Thickness | 10 in |
| Along Wall "y" Dir | 5.6695E-006 in | Wall Fixity | Fix-Pin | E - Bending | 3 Mpsi |
| Along Wall "x" Dir | 1.2397E+002 in | | | E - Shear | 1.2 Mpsi |
| Label : GB | | X Wall C.G. Location | 158.42 ft | Length | 142.5 ft |
| | | Y Wall C.G. Location | 61.33 ft | Height | 10.67 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 0 deg | Thickness | 10 in |
| Along Wall "y" Dir | 3.7718E-006 in | Wall Fixity | Fix-Pin | E - Bending | 6 Mpsi |
| Along Wall "x" Dir | 8.2211E+001 in | | | E - Shear | 2.4 Mpsi |
| Label : GC | | X Wall C.G. Location | 180.25 ft | Length | 188.83 ft |
| | | Y Wall C.G. Location | 0.42 ft | Height | 10.63 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 0 deg | Thickness | 10 in |
| Along Wall "y" Dir | 5.6532E-006 in | Wall Fixity | Fix-Pin | E - Bending | 3 Mpsi |
| Along Wall "x" Dir | 1.2269E+002 in | | | E - Shear | 1.2 Mpsi |
| Label : Stair - East Wall | | X Wall C.G. Location | 93.71 ft | Length | 13.75 ft |
| | | Y Wall C.G. Location | 104.25 ft | Height | 10.67 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 0 deg | Thickness | 10 in |
| Along Wall "y" Dir | 1.3991E-004 in | Wall Fixity | Fix-Pin | E - Bending | 3 Mpsi |
| Along Wall "x" Dir | 1.7040E+003 in | | | E - Shear | 1.2 Mpsi |
| Label : Stair - North Wall | | X Wall C.G. Location | 100.17 ft | Length | 18 ft |
| | | Y Wall C.G. Location | 112.83 ft | Height | 10.67 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 90 deg | Thickness | 12 in |
| Along Wall "y" Dir | 7.2542E-005 in | Wall Fixity | Fix-Pin | E - Bending | 3 Mpsi |
| Along Wall "x" Dir | 7.5479E+002 in | | | E - Shear | 1.2 Mpsi |
| Label : Stair - South Wall | | X Wall C.G. Location | 87.25 ft | Length | 18 ft |
| | | Y Wall C.G. Location | 112.83 ft | Height | 10.67 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 90 deg | Thickness | 10 in |
| Along Wall "y" Dir | 8.7050E-005 in | Wall Fixity | Fix-Pin | E - Bending | 3 Mpsi |
| Along Wall "x" Dir | 1.3017E+003 in | | | E - Shear | 1.2 Mpsi |

# Torsional Analysis of Rigid Diaphragm

File: FWI2101 - Paragon Star.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: 3rd Floor

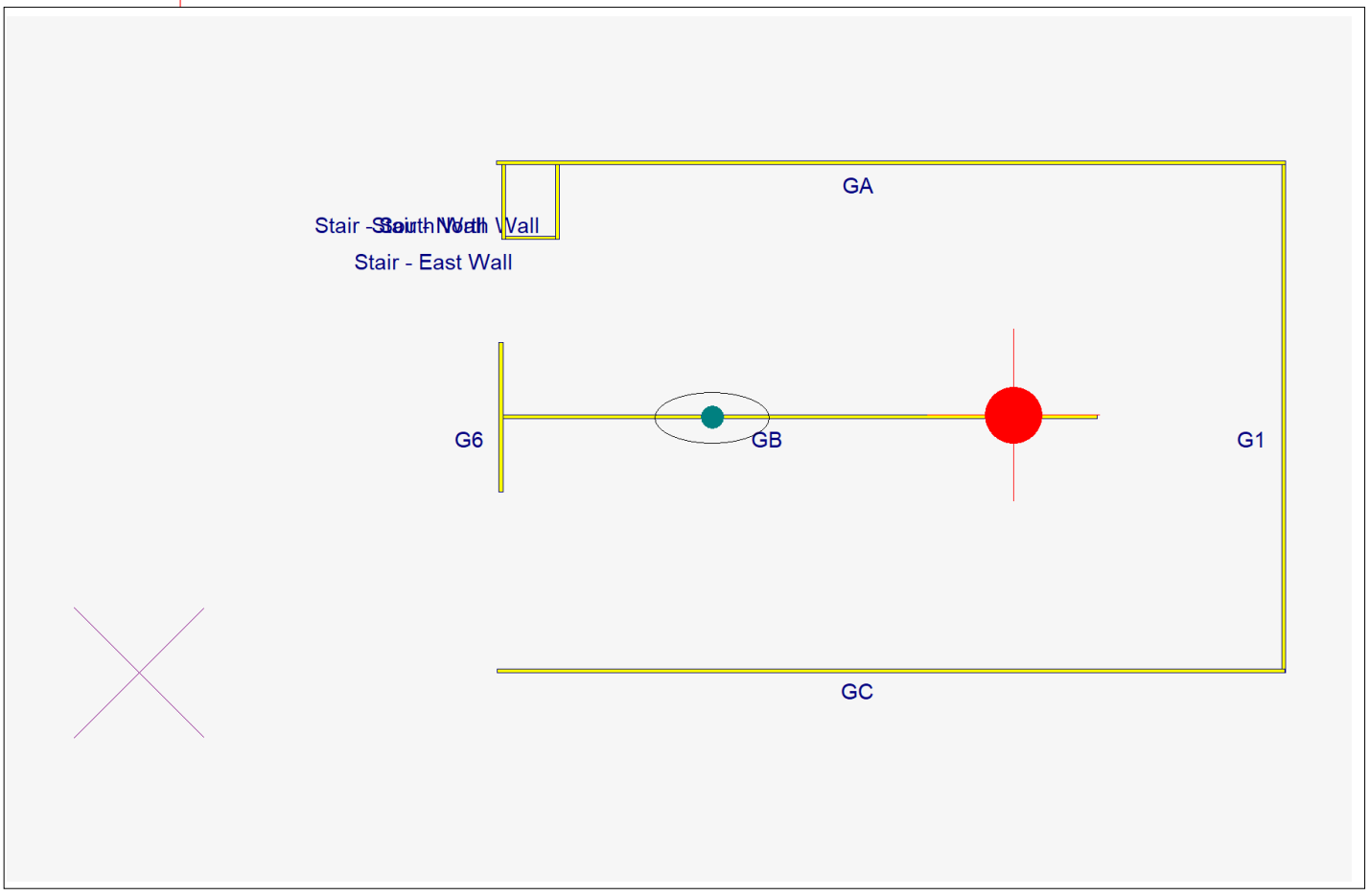
## ANALYSIS SUMMARY

Maximum shear forces applied to resisting elements. Eccentricity with respect to Center of Rigidity

| Resisting Element | Max Shear along Member Local "y-y" Axis | | | | Max Shear along Member Local "x-x" Axis | | | |
|---|---|---|---|---|---|---|---|---|
| | Load Angle | X-Ecc (ft) | Y-Ecc (ft) | Shear Force (k) | Load Angle | X-Ecc (ft) | Y-Ecc (ft) | Shear Force (k) |
| G1 | 90 | 85.93 | -0.43 | 97.343 | 0 | 85.93 | -0.43 | 0.000 |
| G6 | 90 | 68.64 | 5.49 | 35.263 | 0 | 85.93 | -0.43 | 0.000 |
| GA | 45 | 84.09 | 2.63 | 51.839 | 90 | 85.93 | -0.43 | 0.000 |
| GB | 0 | 72.20 | -6.57 | 53.014 | 90 | 85.93 | -0.43 | 0.000 |
| GC | 315 | 84.09 | -3.50 | 52.690 | 90 | 85.93 | -0.43 | 0.000 |
| Stair - East Wall | 30 | 81.91 | 3.90 | 1.794 | 90 | 85.93 | -0.43 | 0.000 |
| Stair - North Wall | 90 | 68.64 | 5.49 | 12.889 | 0 | 85.93 | -0.43 | 0.000 |
| Stair - South Wall | 90 | 68.64 | 5.49 | 11.159 | 0 | 85.93 | -0.43 | 0.000 |

## Layout of Resisting Elements

Legend : Defined Wall, X Datum, Center of Rigidity, Center of Mass, Accidental eccentricity application boundary



# Torsional Analysis of Rigid Diaphragm


Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24


DESCRIPTION: 3rd Floor

## Analysis Notes

This program is designed to distribute an applied shear load to a set of resisting elements.

Each resisting element data entry specifies a deflection along a "major" and "minor" axis due to a 1,000 lb load. Each resisting element may be entered as a wall or a column (whereby the deflection is calculated), or as a generic resisting element with specified deflection. The deflections define the stiffness of each resisting element.

Each resisting element is defined at an (X,Y) location from a datum the user has previously defined. A counter-clockwise rotation of the element can be entered with respect to a traditional "+X" axis line.

A main "shear" load and an optional orthogonal shear load are specified for distribution to the system of resisting elements. In addition the maximum orthogonal dimensions of the structure and minimum accidental eccentricity percentage are specified.

From the entered loads the program calculates resultant force vectors for each angular orientation that is requested. The force is applied to the resisting elements in angular increments to generate a series of resulting direct and torsional shear loads on each element. This application of force is then repeated at angular intervals along an elliptical path defined by the minimum accidental eccentricity.

The end result is a table of direct shear and torsional shear values for each element from the iterated angles of load application and accidental eccentricity. These values are then searched to find the maximum major and minor axis shears applied to each resisting element.

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# Torsional Analysis of Rigid Diaphragm

DESCRIPTION: 2nd Floor

## General Information

IBC 2018, CBC 2019, ASCE 7-16

| | | | |
|---|---|---|---|
| Applied Lateral Force in "X" DIrection | 80.0 k | Center of Shear Application : | |
| Applied Lateral Force in "Y" DIrection | 75.0 k | Distance from "X" datum point | 137.340 ft |
| | | Distance from "Y" datum point | 61.340 ft |
| Note: These loads are resolved into X & Y components when applied to the system of elements at angular increments. | | Accidental Torsion values per ASCE 7-05 12.8.4.2 | |
| | | Ecc. as % of Maximum Dimension | 5.00 % |
| Load Orientation Angular Increment | 15.0 deg | | |
| Load Location Angular Increment | 15.0 deg | Maximum Dimensions : | |
| | | Along "X" Axis | 274.670 ft |
| Center of Rigidity Location (calculated) . . . | | Along "Y" Axis | 122.670 ft |
| "X" dist. from Datum | 209.538 ft | | |
| "Y" dist. from Datum | 61.774 ft | | |

Accidental Eccentricity +/- from "Y" Coord. of Center of Load Application : 13.734 ft

Accidental Eccentricity +/- from "X" Coord. of Center of Load Application : 6.134 ft

## Wall Information

| | | | | | |
|---|---|---|---|---|---|
| Label : G1 | | X Wall C.G. Location | 274.25 ft | Length | 122.67 ft |
| | | Y Wall C.G. Location | 61.33 ft | Height | 10.67 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 90 deg | Thickness | 10 in |
| Along Wall "y" Dir | 8.7859E-006 in | Wall Fixity | Fix-Pin | E - Bending | 3 Mpsi |
| Along Wall "x" Dir | 1.9100E+002 in | | | E - Shear | 1.2 Mpsi |
| Label : G6 | | X Wall C.G. Location | 86.67 ft | Length | 36 ft |
| | | Y Wall C.G. Location | 61.33 ft | Height | 10.67 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 90 deg | Thickness | 12 in |
| Along Wall "y" Dir | 2.7592E-005 in | Wall Fixity | Fix-Pin | E - Bending | 3 Mpsi |
| Along Wall "x" Dir | 3.7739E+002 in | | | E - Shear | 1.2 Mpsi |
| Label : GA | | X Wall C.G. Location | 180.17 ft | Length | 189 ft |
| | | Y Wall C.G. Location | 122.25 ft | Height | 10.67 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 0 deg | Thickness | 10 in |
| Along Wall "y" Dir | 5.6695E-006 in | Wall Fixity | Fix-Pin | E - Bending | 3 Mpsi |
| Along Wall "x" Dir | 1.2397E+002 in | | | E - Shear | 1.2 Mpsi |
| Label : GB | | X Wall C.G. Location | 158.42 ft | Length | 142.5 ft |
| | | Y Wall C.G. Location | 61.33 ft | Height | 10.67 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 0 deg | Thickness | 10 in |
| Along Wall "y" Dir | 3.7718E-006 in | Wall Fixity | Fix-Pin | E - Bending | 6 Mpsi |
| Along Wall "x" Dir | 8.2211E+001 in | | | E - Shear | 2.4 Mpsi |
| Label : GC | | X Wall C.G. Location | 180.25 ft | Length | 188.83 ft |
| | | Y Wall C.G. Location | 0.42 ft | Height | 10.63 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 0 deg | Thickness | 10 in |
| Along Wall "y" Dir | 5.6532E-006 in | Wall Fixity | Fix-Pin | E - Bending | 3 Mpsi |
| Along Wall "x" Dir | 1.2269E+002 in | | | E - Shear | 1.2 Mpsi |
| Label : Stair - East Wall | | X Wall C.G. Location | 93.71 ft | Length | 13.75 ft |
| | | Y Wall C.G. Location | 104.25 ft | Height | 10.67 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 0 deg | Thickness | 10 in |
| Along Wall "y" Dir | 1.3991E-004 in | Wall Fixity | Fix-Pin | E - Bending | 3 Mpsi |
| Along Wall "x" Dir | 1.7040E+003 in | | | E - Shear | 1.2 Mpsi |
| Label : Stair - North Wall | | X Wall C.G. Location | 100.17 ft | Length | 18 ft |
| | | Y Wall C.G. Location | 112.83 ft | Height | 10.67 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 90 deg | Thickness | 12 in |
| Along Wall "y" Dir | 7.2542E-005 in | Wall Fixity | Fix-Pin | E - Bending | 3 Mpsi |
| Along Wall "x" Dir | 7.5479E+002 in | | | E - Shear | 1.2 Mpsi |
| Label : Stair - South Wall | | X Wall C.G. Location | 87.25 ft | Length | 18 ft |
| | | Y Wall C.G. Location | 112.83 ft | Height | 10.67 ft |
| Wall Deflections (Stiffness) for 1.0 kip load : | | Wall Angle CCW | 90 deg | Thickness | 10 in |
| Along Wall "y" Dir | 8.7050E-005 in | Wall Fixity | Fix-Pin | E - Bending | 3 Mpsi |
| Along Wall "x" Dir | 1.3017E+003 in | | | E - Shear | 1.2 Mpsi |

# Torsional Analysis of Rigid Diaphragm

File: FWI2101 - Paragon Star.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: 2nd Floor

## ANALYSIS SUMMARY

Maximum shear forces applied to resisting elements. Eccentricity with respect to Center of Rigidity

| Resisting Element | Max Shear along Member Local "y-y" Axis | | | | Max Shear along Member Local "x-x" Axis | | | |
|---|---|---|---|---|---|---|---|---|
| | Load Angle | X-Ecc (ft) | Y-Ecc (ft) | Shear Force (k) | Load Angle | X-Ecc (ft) | Y-Ecc (ft) | Shear Force (k) |
| G1 | 90 | 85.93 | -0.43 | 66.370 | 0 | 85.93 | -0.43 | 0.000 |
| G6 | 90 | 68.64 | 5.49 | 24.043 | 0 | 85.93 | -0.43 | 0.000 |
| GA | 45 | 84.09 | 2.63 | 34.264 | 90 | 85.93 | -0.43 | 0.000 |
| GB | 0 | 72.20 | -6.57 | 33.929 | 90 | 85.93 | -0.43 | 0.000 |
| GC | 315 | 84.09 | -3.50 | 34.827 | 90 | 85.93 | -0.43 | 0.000 |
| Stair - East Wall | 30 | 81.91 | 3.90 | 1.170 | 90 | 85.93 | -0.43 | 0.000 |
| Stair - North Wall | 90 | 68.64 | 5.49 | 8.788 | 0 | 85.93 | -0.43 | 0.000 |
| Stair - South Wall | 90 | 68.64 | 5.49 | 7.608 | 0 | 85.93 | -0.43 | 0.000 |

## Layout of Resisting Elements

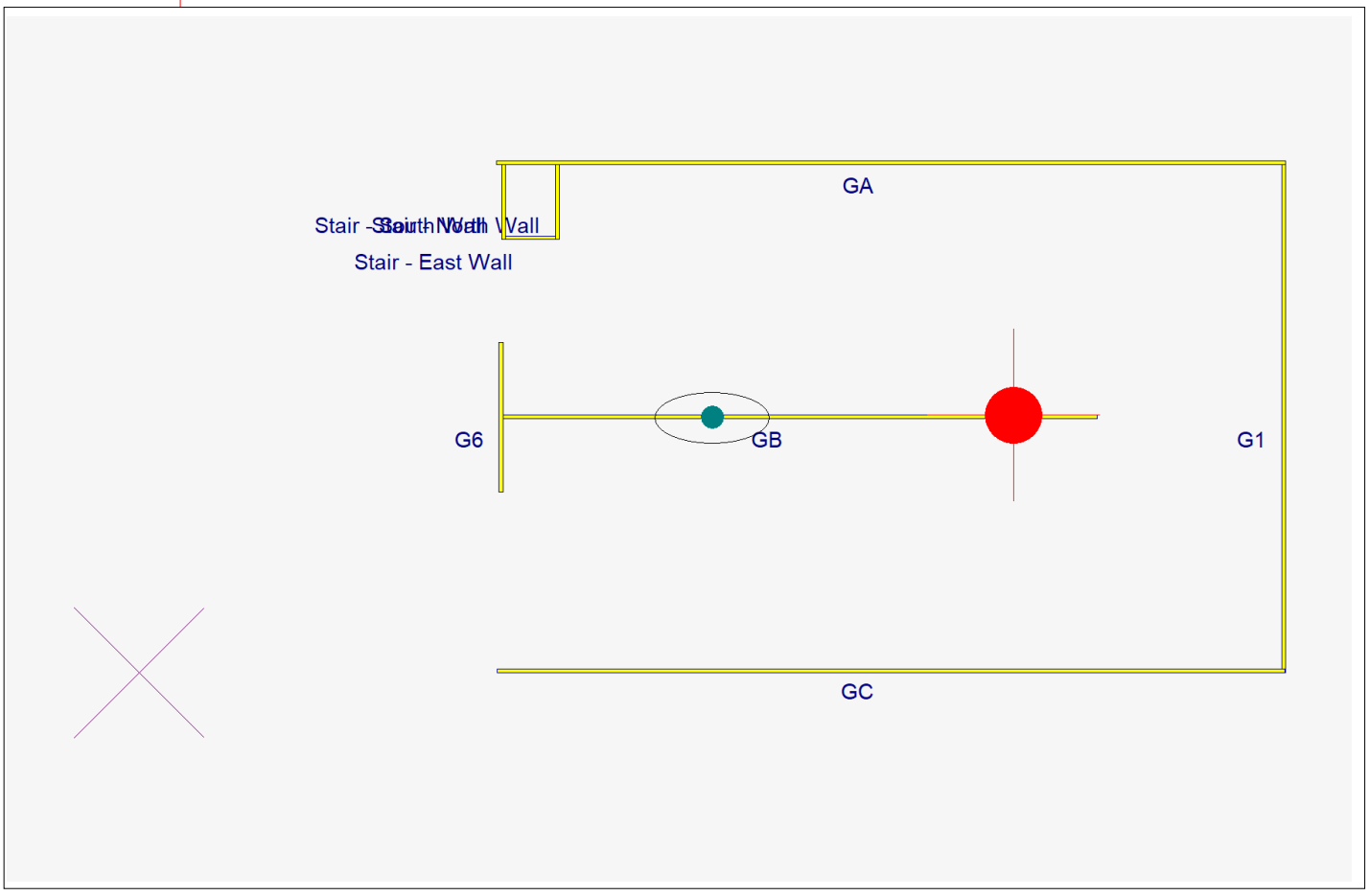
Legend : Defined Wall

X Datum

Center of Rigidity

Center of Mass

Accidental eccentricity application boundary



# Torsional Analysis of Rigid Diaphragm


Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24


DESCRIPTION: 2nd Floor

## Analysis Notes

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Each resisting element is defined at an (X,Y) location from a datum the user has previously defined. A counter-clockwise rotation of the element can be entered with respect to a traditional "+X" axis line.

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# Concrete Beam

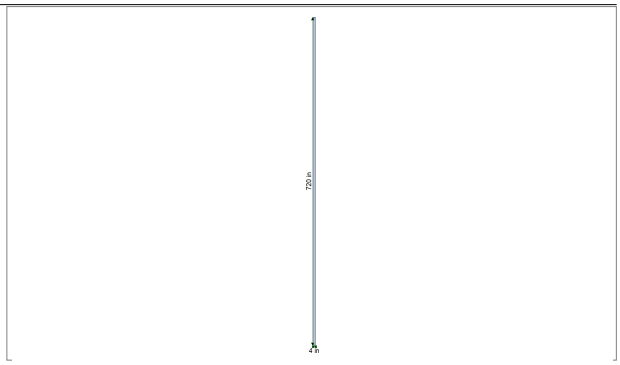
DESCRIPTION: Garage Diaphragm - 4th Floor - Chord Steel

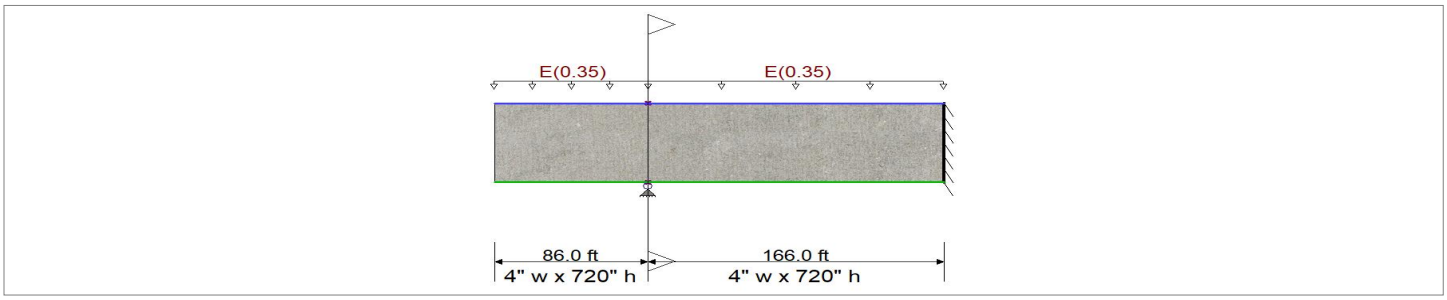
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 6.0 ksi | $\phi$ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 580.95 psi | | Shear : | 0.750 |
| $\psi$ Density | = | 145.0 pcf | $\beta_1$ | = | 0.750 |
| $\lambda$ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,463.15 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 3 |
| | | | Number of Resisting Legs Per Stirrup = | | 1.0 |






## Cross Section & Reinforcing Details

Rectangular Section, Width = 4.0 in, Height = 720.0 in
Span #1 Reinforcing....
3-#4 at 3.0 in from Top, from 0.0 to 86.0 ft in this span
3-#4 at 3.0 in from Bottom, from 0.0 to 86.0 ft in this span
Span #2 Reinforcing....
3-#4 at 3.0 in from Top, from 0.0 to 166.0 ft in this span
3-#4 at 3.0 in from Bottom, from 0.0 to 166.0 ft in this span

Load for Span Number 1
Uniform Load : E = 0.350 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : E = 0.350 k/ft, Tributary Width = 1.0 ft

## DESIGN SUMMARY

**Design OK**

| | | | | | |
|---|---|---|---|---|---|
| Maximum Bending Stress Ratio | = | **0.669** : 1 | Maximum Deflection | | |
| Section used for this span | | **Typical Section** | Max Downward Transient Deflection | 0.013 in | Ratio = 160476 >=360. |
| Mu : Applied | | -1,294.30 k-ft | Max Upward Transient Deflection | 0.000 in | Ratio = 0 <360.0 |
| Mn * Phi : Allowable | | 1,933.97 k-ft | Max Downward Total Deflection | 0.013 in | Ratio = 160476 >=180. |
| Location of maximum on span | | 0.000 ft | Max Upward Total Deflection | 0.000 in | Ratio = 0 <180.0 |
| Span # where maximum occurs | | Span # 2 | | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 |
|---|---|---|---|
| Overall MAXimum | | 63.611 | 24.589 |
| Overall MINimum | | 33.396 | 12.909 |
| +D+0.70E+0.60H | | 44.528 | 17.212 |
| +D+0.750L+0.750S+0.5250E+H | | 33.396 | 12.909 |
| +0.60D+0.70E+H | | 44.528 | 17.212 |
| E Only | | 63.611 | 24.589 |
| H Only | | | |

# Concrete Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24



DESCRIPTION: Garage Diaphragm - 4th Floor - Chord Steel

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +0.90D+E+0.90H | 1 | 0.00 | 717.00 | -0.00 | 0.00 | 0.00 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 2.11 | 717.00 | -0.74 | 0.74 | 0.78 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 4.21 | 717.00 | -1.47 | 1.47 | 3.11 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 6.32 | 717.00 | -2.21 | 2.21 | 6.99 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 8.42 | 717.00 | -2.95 | 2.95 | 12.42 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 10.53 | 717.00 | -3.69 | 3.69 | 19.41 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 12.64 | 717.00 | -4.42 | 4.42 | 27.95 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 14.74 | 717.00 | -5.16 | 5.16 | 38.04 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 16.85 | 717.00 | -5.90 | 5.90 | 49.68 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 18.96 | 717.00 | -6.63 | 6.63 | 62.88 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 21.06 | 717.00 | -7.37 | 7.37 | 77.63 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 23.17 | 717.00 | -8.11 | 8.11 | 93.93 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 25.27 | 717.00 | -8.85 | 8.85 | 111.78 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 27.38 | 717.00 | -9.58 | 9.58 | 131.19 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 29.49 | 717.00 | -10.32 | 10.32 | 152.15 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 31.59 | 717.00 | -11.06 | 11.06 | 174.66 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 33.70 | 717.00 | -11.79 | 11.79 | 198.72 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 35.80 | 717.00 | -12.53 | 12.53 | 224.34 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 37.91 | 717.00 | -13.27 | 13.27 | 251.51 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 40.02 | 717.00 | -14.01 | 14.01 | 280.23 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 42.12 | 717.00 | -14.74 | 14.74 | 310.50 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 44.23 | 717.00 | -15.48 | 15.48 | 342.33 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 46.33 | 717.00 | -16.22 | 16.22 | 375.71 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 48.44 | 717.00 | -16.95 | 16.95 | 410.64 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 50.55 | 717.00 | -17.69 | 17.69 | 447.12 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 52.65 | 717.00 | -18.43 | 18.43 | 485.16 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 54.76 | 717.00 | -19.17 | 19.17 | 524.75 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 56.87 | 717.00 | -19.90 | 19.90 | 565.89 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 58.97 | 717.00 | -20.64 | 20.64 | 608.59 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 61.08 | 717.00 | -21.38 | 21.38 | 652.83 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 63.18 | 717.00 | -22.11 | 22.11 | 698.63 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 65.29 | 717.00 | -22.85 | 22.85 | 745.98 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 67.40 | 717.00 | -23.59 | 23.59 | 794.89 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 69.50 | 717.00 | -24.33 | 24.33 | 845.34 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 71.61 | 717.00 | -25.06 | 25.06 | 897.35 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 73.71 | 717.00 | -25.80 | 25.80 | 950.91 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 75.82 | 717.00 | -26.54 | 26.54 | 1,006.03 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 77.93 | 717.00 | -27.27 | 27.27 | 1,062.70 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 80.03 | 717.00 | -28.01 | 28.01 | 1,120.91 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 82.14 | 717.00 | -28.75 | 28.75 | 1,180.69 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 84.24 | 717.00 | -29.49 | 29.49 | 1,242.01 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 86.68 | 717.00 | 33.27 | 33.27 | 1,271.68 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 90.74 | 717.00 | 31.85 | 31.85 | 1,139.30 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 94.81 | 717.00 | 30.43 | 30.43 | 1,012.71 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 98.87 | 717.00 | 29.01 | 29.01 | 891.90 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 102.94 | 717.00 | 27.58 | 27.58 | 776.88 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 107.00 | 717.00 | 26.16 | 26.16 | 667.64 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 111.07 | 717.00 | 24.74 | 24.74 | 564.19 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 115.13 | 717.00 | 23.31 | 23.31 | 466.52 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 119.20 | 717.00 | 21.89 | 21.89 | 374.63 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 123.27 | 717.00 | 20.47 | 20.47 | 288.53 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 127.33 | 717.00 | 19.05 | 19.05 | 208.21 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 131.40 | 717.00 | 17.62 | 17.62 | 133.68 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 135.46 | 717.00 | 16.20 | 16.20 | 64.93 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |

# Concrete Beam

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DESCRIPTION: Garage Diaphragm - 4th Floor - Chord Steel

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +0.90D+E+0.90H | 2 | 139.53 | 717.00 | 14.78 | 14.78 | 1.97 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 143.59 | 717.00 | 13.35 | 13.35 | 55.21 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 147.66 | 717.00 | 11.93 | 11.93 | 106.60 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 151.72 | 717.00 | 10.51 | 10.51 | 152.22 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 155.79 | 717.00 | 9.09 | 9.09 | 192.04 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 159.85 | 717.00 | 7.66 | 7.66 | 226.08 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 163.92 | 717.00 | 6.24 | 6.24 | 254.34 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 167.98 | 717.00 | 4.82 | 4.82 | 276.81 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 172.05 | 717.00 | 3.39 | 3.39 | 293.50 | 0.69 | 317.35 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.3 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 176.11 | 717.00 | 1.97 | 1.97 | 304.41 | 0.39 | 317.01 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.0 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 180.18 | 717.00 | 0.55 | 0.55 | 309.53 | 0.11 | 316.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 316.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 184.24 | 717.00 | -0.87 | 0.87 | 308.86 | 0.17 | 316.76 | Vu < PhiVc/2 | lot Reqd 9.6. | 316.8 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 188.31 | 717.00 | -2.30 | 2.30 | 302.41 | 0.45 | 317.08 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.1 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 192.38 | 717.00 | -3.72 | 3.72 | 290.18 | 0.77 | 317.43 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.4 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 196.44 | 717.00 | -5.14 | 5.14 | 272.16 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 200.51 | 717.00 | -6.57 | 6.57 | 248.36 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 204.57 | 717.00 | -7.99 | 7.99 | 218.78 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 208.64 | 717.00 | -9.41 | 9.41 | 183.41 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 212.70 | 717.00 | -10.83 | 10.83 | 142.25 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 216.77 | 717.00 | -12.26 | 12.26 | 95.31 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 220.83 | 717.00 | -13.68 | 13.68 | 42.59 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 224.90 | 717.00 | -15.10 | 15.10 | 15.92 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 228.96 | 717.00 | -16.53 | 16.53 | 80.21 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 233.03 | 717.00 | -17.95 | 17.95 | 150.29 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 237.09 | 717.00 | -19.37 | 19.37 | 226.15 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 241.16 | 717.00 | -20.79 | 20.79 | 307.79 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 245.22 | 717.00 | -22.22 | 22.22 | 395.22 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 249.29 | 717.00 | -23.64 | 23.64 | 488.44 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 86.000 | -1,283.76 | 1,933.97 | 0.66 |
| Span # 2 | 2 | ##.### | -1,294.30 | 1,933.97 | 0.67 |
| +1.40D+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -1,294.30 | 1,933.97 | 0.67 |
| Span # 2 | 2 | ##.### | -1,294.30 | 1,933.97 | 0.67 |
| +1.20D+0.50Lr+1.60L+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -1,294.30 | 1,933.97 | 0.67 |
| Span # 2 | 2 | ##.### | -1,294.30 | 1,933.97 | 0.67 |
| +1.20D+1.60L+0.50S+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -1,294.30 | 1,933.97 | 0.67 |
| Span # 2 | 2 | ##.### | -1,294.30 | 1,933.97 | 0.67 |
| +1.20D+1.60Lr+L+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -1,294.30 | 1,933.97 | 0.67 |
| Span # 2 | 2 | ##.### | -1,294.30 | 1,933.97 | 0.67 |
| +1.20D+1.60Lr+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -1,294.30 | 1,933.97 | 0.67 |
| Span # 2 | 2 | ##.### | -1,294.30 | 1,933.97 | 0.67 |
| +1.20D+L+1.60S+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -1,294.30 | 1,933.97 | 0.67 |
| Span # 2 | 2 | ##.### | -1,294.30 | 1,933.97 | 0.67 |
| +1.20D+1.60S+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -1,294.30 | 1,933.97 | 0.67 |
| Span # 2 | 2 | ##.### | -1,294.30 | 1,933.97 | 0.67 |
| +1.20D+0.50Lr+L+W+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -1,294.30 | 1,933.97 | 0.67 |
| Span # 2 | 2 | ##.### | -1,294.30 | 1,933.97 | 0.67 |
| +1.20D+L+0.50S+W+1.60H | | | | | |

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# Concrete Beam

DESCRIPTION: Garage Diaphragm - 4th Floor - Chord Steel

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 1 | 1 | 86.000 | -1,294.30 | 1,933.97 | 0.67 |
| Span # 2 | 2 | ##.### | -1,294.30 | 1,933.97 | 0.67 |
| +0.90D+W+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -1,294.30 | 1,933.97 | 0.67 |
| Span # 2 | 2 | ##.### | -1,294.30 | 1,933.97 | 0.67 |
| +1.20D+L+0.20S+E+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -1,283.76 | 1,933.97 | 0.66 |
| Span # 2 | 2 | ##.### | -1,294.30 | 1,933.97 | 0.67 |
| +0.90D+E+0.90H | | | | | |
| Span # 1 | 1 | 86.000 | -1,283.76 | 1,933.97 | 0.66 |
| Span # 2 | 2 | ##.### | -1,294.30 | 1,933.97 | 0.67 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| E Only | 1 | 0.0129 | 0.000 | E Only | -0.0001 | 88.371 |
| E Only | 2 | 0.0010 | 101.971 | E Only | -0.0006 | 21.343 |

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# Concrete Beam

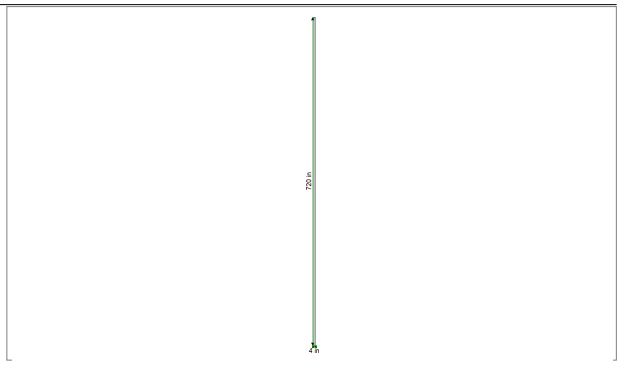
DESCRIPTION: Garage Diaphragm - 3rd Floor - Chord Steel

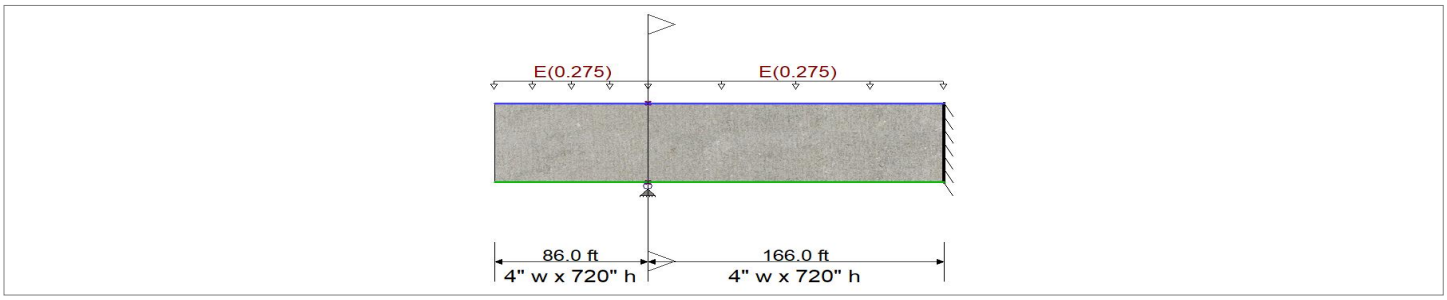
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 6.0 ksi | ϕ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 580.95 psi | | Shear : | 0.750 |
| ψ Density | = | 145.0 pcf | $\beta_1$ | = | 0.750 |
| λ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,463.15 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 3 |
| | | | Number of Resisting Legs Per Stirrup = | | 1.0 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 4.0 in, Height = 720.0 in
Span #1 Reinforcing....
3-#4 at 3.0 in from Top, from 0.0 to 86.0 ft in this span
3-#4 at 3.0 in from Bottom, from 0.0 to 86.0 ft in this span
Span #2 Reinforcing....
3-#4 at 3.0 in from Top, from 0.0 to 166.0 ft in this span
3-#4 at 3.0 in from Bottom, from 0.0 to 166.0 ft in this span

Load for Span Number 1
Uniform Load : E = 0.2750 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : E = 0.2750 k/ft, Tributary Width = 1.0 ft

## DESIGN SUMMARY

**Design OK**

| | | | | | |
|---|---|---|---|---|---|
| Maximum Bending Stress Ratio | = | **0.526** : 1 | Maximum Deflection | | |
| Section used for this span | | **Typical Section** | Max Downward Transient Deflection | 0.010 in | Ratio = 204244 >=360. |
| Mu : Applied | | -1,016.95 k-ft | Max Upward Transient Deflection | 0.000 in | Ratio = 0 <360.0 |
| Mn * Phi : Allowable | | 1,933.97 k-ft | Max Downward Total Deflection | 0.010 in | Ratio = 204244 >=180. |
| Location of maximum on span | | 0.000 ft | Max Upward Total Deflection | 0.000 in | Ratio = 0 <180.0 |
| Span # where maximum occurs | | Span # 2 | | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 |
|---|---|---|---|
| Overall MAXimum | | 49.980 | 19.320 |
| Overall MINimum | | 26.239 | 10.143 |
| +D+0.70E+0.60H | | 34.986 | 13.524 |
| +D+0.750L+0.750S+0.5250E+H | | 26.239 | 10.143 |
| +0.60D+0.70E+H | | 34.986 | 13.524 |
| E Only | | 49.980 | 19.320 |
| H Only | | | |

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# Concrete Beam

DESCRIPTION: Garage Diaphragm - 3rd Floor - Chord Steel

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +0.90D+E+0.90H | 1 | 0.00 | 717.00 | -0.00 | 0.00 | 0.00 | 0.20 | 316.80 | Vu < PhiVc/2 | lot Reqd 9.6. | 316.8 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 2.11 | 717.00 | -0.58 | 0.58 | 0.61 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 4.21 | 717.00 | -1.16 | 1.16 | 2.44 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 6.32 | 717.00 | -1.74 | 1.74 | 5.49 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 8.42 | 717.00 | -2.32 | 2.32 | 9.76 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 10.53 | 717.00 | -2.90 | 2.90 | 15.25 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 12.64 | 717.00 | -3.48 | 3.48 | 21.96 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 14.74 | 717.00 | -4.05 | 4.05 | 29.89 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 16.85 | 717.00 | -4.63 | 4.63 | 39.03 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 18.96 | 717.00 | -5.21 | 5.21 | 49.40 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 21.06 | 717.00 | -5.79 | 5.79 | 60.99 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 23.17 | 717.00 | -6.37 | 6.37 | 73.80 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 25.27 | 717.00 | -6.95 | 6.95 | 87.83 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 27.38 | 717.00 | -7.53 | 7.53 | 103.08 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 29.49 | 717.00 | -8.11 | 8.11 | 119.54 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 31.59 | 717.00 | -8.69 | 8.69 | 137.23 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 33.70 | 717.00 | -9.27 | 9.27 | 156.14 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 35.80 | 717.00 | -9.85 | 9.85 | 176.27 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 37.91 | 717.00 | -10.43 | 10.43 | 197.61 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 40.02 | 717.00 | -11.00 | 11.00 | 220.18 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 42.12 | 717.00 | -11.58 | 11.58 | 243.97 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 44.23 | 717.00 | -12.16 | 12.16 | 268.97 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 46.33 | 717.00 | -12.74 | 12.74 | 295.20 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 48.44 | 717.00 | -13.32 | 13.32 | 322.65 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 50.55 | 717.00 | -13.90 | 13.90 | 351.31 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 52.65 | 717.00 | -14.48 | 14.48 | 381.20 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 54.76 | 717.00 | -15.06 | 15.06 | 412.30 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 56.87 | 717.00 | -15.64 | 15.64 | 444.63 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 58.97 | 717.00 | -16.22 | 16.22 | 478.17 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 61.08 | 717.00 | -16.80 | 16.80 | 512.94 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 63.18 | 717.00 | -17.38 | 17.38 | 548.92 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 65.29 | 717.00 | -17.95 | 17.95 | 586.13 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 67.40 | 717.00 | -18.53 | 18.53 | 624.55 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 69.50 | 717.00 | -19.11 | 19.11 | 664.20 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 71.61 | 717.00 | -19.69 | 19.69 | 705.06 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 73.71 | 717.00 | -20.27 | 20.27 | 747.15 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 75.82 | 717.00 | -20.85 | 20.85 | 790.45 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 77.93 | 717.00 | -21.43 | 21.43 | 834.97 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 80.03 | 717.00 | -22.01 | 22.01 | 880.72 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 82.14 | 717.00 | -22.59 | 22.59 | 927.68 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 84.24 | 717.00 | -23.17 | 23.17 | 975.87 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 86.68 | 717.00 | 26.14 | 26.14 | 999.17 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 90.74 | 717.00 | 25.03 | 25.03 | 895.16 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 94.81 | 717.00 | 23.91 | 23.91 | 795.70 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 98.87 | 717.00 | 22.79 | 22.79 | 700.78 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 102.94 | 717.00 | 21.67 | 21.67 | 610.40 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 107.00 | 717.00 | 20.55 | 20.55 | 524.57 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 111.07 | 717.00 | 19.44 | 19.44 | 443.29 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 115.13 | 717.00 | 18.32 | 18.32 | 366.55 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 119.20 | 717.00 | 17.20 | 17.20 | 294.35 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 123.27 | 717.00 | 16.08 | 16.08 | 226.70 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 127.33 | 717.00 | 14.96 | 14.96 | 163.60 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 131.40 | 717.00 | 13.85 | 13.85 | 105.04 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 135.46 | 717.00 | 12.73 | 12.73 | 51.02 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |

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# Concrete Beam



DESCRIPTION: Garage Diaphragm - 3rd Floor - Chord Steel

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +0.90D+E+0.90H | 2 | 139.53 | 717.00 | 11.61 | 11.61 | 1.55 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 143.59 | 717.00 | 10.49 | 10.49 | 43.38 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 147.66 | 717.00 | 9.37 | 9.37 | 83.76 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 151.72 | 717.00 | 8.26 | 8.26 | 119.60 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 155.79 | 717.00 | 7.14 | 7.14 | 150.89 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 159.85 | 717.00 | 6.02 | 6.02 | 177.64 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 163.92 | 717.00 | 4.90 | 4.90 | 199.84 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 167.98 | 717.00 | 3.78 | 3.78 | 217.50 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 172.05 | 717.00 | 2.67 | 2.67 | 230.61 | 0.69 | 317.35 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.3 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 176.11 | 717.00 | 1.55 | 1.55 | 239.18 | 0.39 | 317.01 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.0 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 180.18 | 717.00 | 0.43 | 0.43 | 243.20 | 0.11 | 316.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 316.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 184.24 | 717.00 | -0.69 | 0.69 | 242.68 | 0.17 | 316.76 | Vu < PhiVc/2 | lot Reqd 9.6. | 316.8 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 188.31 | 717.00 | -1.81 | 1.81 | 237.61 | 0.45 | 317.08 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.1 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 192.38 | 717.00 | -2.92 | 2.92 | 228.00 | 0.77 | 317.43 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.4 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 196.44 | 717.00 | -4.04 | 4.04 | 213.84 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 200.51 | 717.00 | -5.16 | 5.16 | 195.14 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 204.57 | 717.00 | -6.28 | 6.28 | 171.90 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 208.64 | 717.00 | -7.40 | 7.40 | 144.10 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 212.70 | 717.00 | -8.51 | 8.51 | 111.77 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 216.77 | 717.00 | -9.63 | 9.63 | 74.89 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 220.83 | 717.00 | -10.75 | 10.75 | 33.46 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 224.90 | 717.00 | -11.87 | 11.87 | 12.51 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 228.96 | 717.00 | -12.98 | 12.98 | 63.02 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 233.03 | 717.00 | -14.10 | 14.10 | 118.08 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 237.09 | 717.00 | -15.22 | 15.22 | 177.69 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 241.16 | 717.00 | -16.34 | 16.34 | 241.84 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 245.22 | 717.00 | -17.46 | 17.46 | 310.53 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 249.29 | 717.00 | -18.57 | 18.57 | 383.77 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 86.000 | -1,008.67 | 1,933.97 | 0.52 |
| Span # 2 | 2 | ##.### | -1,016.95 | 1,933.97 | 0.53 |
| +1.40D+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -1,016.95 | 1,933.97 | 0.53 |
| Span # 2 | 2 | ##.### | -1,016.95 | 1,933.97 | 0.53 |
| +1.20D+0.50Lr+1.60L+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -1,016.95 | 1,933.97 | 0.53 |
| Span # 2 | 2 | ##.### | -1,016.95 | 1,933.97 | 0.53 |
| +1.20D+1.60L+0.50S+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -1,016.95 | 1,933.97 | 0.53 |
| Span # 2 | 2 | ##.### | -1,016.95 | 1,933.97 | 0.53 |
| +1.20D+1.60Lr+L+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -1,016.95 | 1,933.97 | 0.53 |
| Span # 2 | 2 | ##.### | -1,016.95 | 1,933.97 | 0.53 |
| +1.20D+1.60Lr+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -1,016.95 | 1,933.97 | 0.53 |
| Span # 2 | 2 | ##.### | -1,016.95 | 1,933.97 | 0.53 |
| +1.20D+L+1.60S+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -1,016.95 | 1,933.97 | 0.53 |
| Span # 2 | 2 | ##.### | -1,016.95 | 1,933.97 | 0.53 |
| +1.20D+1.60S+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -1,016.95 | 1,933.97 | 0.53 |
| Span # 2 | 2 | ##.### | -1,016.95 | 1,933.97 | 0.53 |
| +1.20D+0.50Lr+L+W+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -1,016.95 | 1,933.97 | 0.53 |
| Span # 2 | 2 | ##.### | -1,016.95 | 1,933.97 | 0.53 |
| +1.20D+L+0.50S+W+1.60H | | | | | |

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# Concrete Beam



DESCRIPTION: Garage Diaphragm - 3rd Floor - Chord Steel

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 1 | 1 | 86.000 | -1,016.95 | 1,933.97 | 0.53 |
| Span # 2 | 2 | ##.### | -1,016.95 | 1,933.97 | 0.53 |
| +0.90D+W+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -1,016.95 | 1,933.97 | 0.53 |
| Span # 2 | 2 | ##.### | -1,016.95 | 1,933.97 | 0.53 |
| +1.20D+L+0.20S+E+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -1,008.67 | 1,933.97 | 0.52 |
| Span # 2 | 2 | ##.### | -1,016.95 | 1,933.97 | 0.53 |
| +0.90D+E+0.90H | | | | | |
| Span # 1 | 1 | 86.000 | -1,008.67 | 1,933.97 | 0.52 |
| Span # 2 | 2 | ##.### | -1,016.95 | 1,933.97 | 0.53 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| E Only | 1 | 0.0101 | 0.000 | E Only | -0.0001 | 88.371 |
| E Only | 2 | 0.0008 | 101.971 | E Only | -0.0005 | 21.343 |

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# Concrete Beam

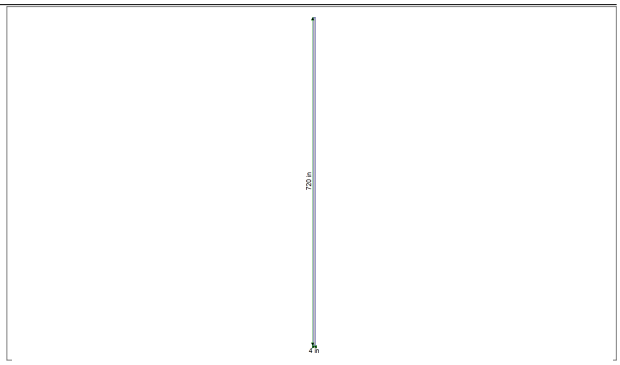
DESCRIPTION: Garage Diaphragm - 2nd Floor - Chord Steel

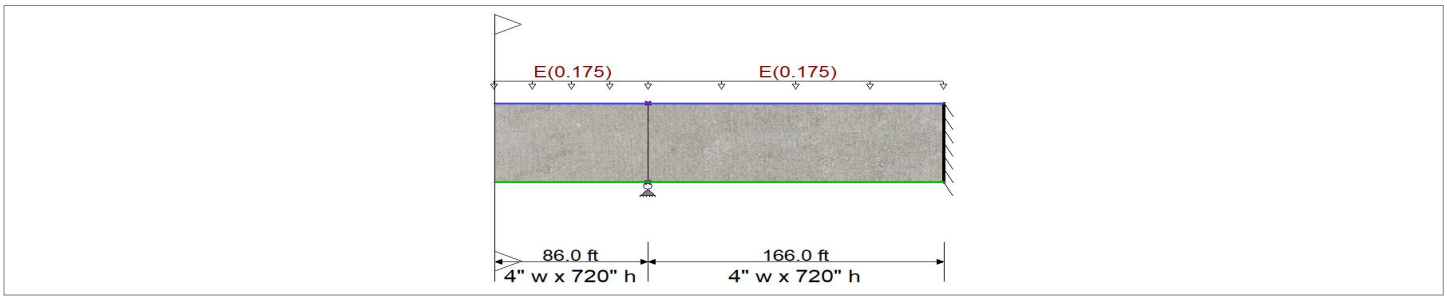
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 6.0 ksi | $\phi$ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 580.95 psi | | Shear : | 0.750 |
| $\psi$ Density | = | 145.0 pcf | $\beta_1$ | = | 0.750 |
| $\lambda$ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,463.15 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 3 |
| | | | Number of Resisting Legs Per Stirrup = | | 1.0 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 4.0 in, Height = 720.0 in
Span #1 Reinforcing....
3-#4 at 3.0 in from Top, from 0.0 to 86.0 ft in this span
3-#4 at 3.0 in from Bottom, from 0.0 to 86.0 ft in this span
Span #2 Reinforcing....
3-#4 at 3.0 in from Top, from 0.0 to 166.0 ft in this span
3-#4 at 3.0 in from Bottom, from 0.0 to 166.0 ft in this span

Load for Span Number 1
Uniform Load : E = 0.1750 k/ft, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : E = 0.1750 k/ft, Tributary Width = 1.0 ft

## DESIGN SUMMARY

**Design OK**

| | | | | | |
|---|---|---|---|---|---|
| Maximum Bending Stress Ratio | = | **0.335** : 1 | Maximum Deflection | | |
| Section used for this span | | **Typical Section** | Max Downward Transient Deflection | 0.006 in | Ratio = 320954 >=360 |
| Mu : Applied | | -647.15 k-ft | Max Upward Transient Deflection | 0.000 in | Ratio = 0 <360.0 |
| Mn * Phi : Allowable | | 1,933.97 k-ft | Max Downward Total Deflection | 0.006 in | Ratio = 320954 >=180 |
| Location of maximum on span | | 0.000 ft | Max Upward Total Deflection | 0.000 in | Ratio = 0 <180.0 |
| Span # where maximum occurs | | Span # 2 | | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 |
|---|---|---|---|
| Overall MAXimum | | 31.805 | 12.295 |
| Overall MINimum | | 16.698 | 6.455 |
| +D+0.70E+0.60H | | 22.264 | 8.606 |
| +D+0.750L+0.750S+0.5250E+H | | 16.698 | 6.455 |
| +0.60D+0.70E+H | | 22.264 | 8.606 |
| E Only | | 31.805 | 12.295 |
| H Only | | | |

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# Concrete Beam

DESCRIPTION: Garage Diaphragm - 2nd Floor - Chord Steel

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +0.90D+E+0.90H | 1 | 0.00 | 717.00 | -0.00 | 0.00 | 0.00 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 2.11 | 717.00 | -0.37 | 0.37 | 0.39 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 4.21 | 717.00 | -0.74 | 0.74 | 1.55 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 6.32 | 717.00 | -1.11 | 1.11 | 3.49 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 8.42 | 717.00 | -1.47 | 1.47 | 6.21 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 10.53 | 717.00 | -1.84 | 1.84 | 9.70 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 12.64 | 717.00 | -2.21 | 2.21 | 13.97 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 14.74 | 717.00 | -2.58 | 2.58 | 19.02 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 16.85 | 717.00 | -2.95 | 2.95 | 24.84 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 18.96 | 717.00 | -3.32 | 3.32 | 31.44 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 21.06 | 717.00 | -3.69 | 3.69 | 38.81 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 23.17 | 717.00 | -4.05 | 4.05 | 46.96 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 25.27 | 717.00 | -4.42 | 4.42 | 55.89 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 27.38 | 717.00 | -4.79 | 4.79 | 65.59 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 29.49 | 717.00 | -5.16 | 5.16 | 76.07 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 31.59 | 717.00 | -5.53 | 5.53 | 87.33 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 33.70 | 717.00 | -5.90 | 5.90 | 99.36 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 35.80 | 717.00 | -6.27 | 6.27 | 112.17 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 37.91 | 717.00 | -6.63 | 6.63 | 125.75 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 40.02 | 717.00 | -7.00 | 7.00 | 140.11 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 42.12 | 717.00 | -7.37 | 7.37 | 155.25 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 44.23 | 717.00 | -7.74 | 7.74 | 171.16 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 46.33 | 717.00 | -8.11 | 8.11 | 187.85 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 48.44 | 717.00 | -8.48 | 8.48 | 205.32 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 50.55 | 717.00 | -8.85 | 8.85 | 223.56 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 52.65 | 717.00 | -9.21 | 9.21 | 242.58 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 54.76 | 717.00 | -9.58 | 9.58 | 262.37 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 56.87 | 717.00 | -9.95 | 9.95 | 282.95 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 58.97 | 717.00 | -10.32 | 10.32 | 304.29 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 61.08 | 717.00 | -10.69 | 10.69 | 326.42 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 63.18 | 717.00 | -11.06 | 11.06 | 349.32 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 65.29 | 717.00 | -11.43 | 11.43 | 372.99 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 67.40 | 717.00 | -11.79 | 11.79 | 397.44 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 69.50 | 717.00 | -12.16 | 12.16 | 422.67 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 71.61 | 717.00 | -12.53 | 12.53 | 448.68 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 73.71 | 717.00 | -12.90 | 12.90 | 475.46 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 75.82 | 717.00 | -13.27 | 13.27 | 503.01 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 77.93 | 717.00 | -13.64 | 13.64 | 531.35 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 80.03 | 717.00 | -14.01 | 14.01 | 560.46 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 82.14 | 717.00 | -14.37 | 14.37 | 590.34 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 1 | 84.24 | 717.00 | -14.74 | 14.74 | 621.01 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 86.68 | 717.00 | 16.64 | 16.64 | 635.84 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 90.74 | 717.00 | 15.93 | 15.93 | 569.65 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 94.81 | 717.00 | 15.21 | 15.21 | 506.35 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 98.87 | 717.00 | 14.50 | 14.50 | 445.95 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 102.94 | 717.00 | 13.79 | 13.79 | 388.44 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 107.00 | 717.00 | 13.08 | 13.08 | 333.82 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 111.07 | 717.00 | 12.37 | 12.37 | 282.09 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 115.13 | 717.00 | 11.66 | 11.66 | 233.26 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 119.20 | 717.00 | 10.95 | 10.95 | 187.32 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 123.27 | 717.00 | 10.23 | 10.23 | 144.26 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 127.33 | 717.00 | 9.52 | 9.52 | 104.11 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 131.40 | 717.00 | 8.81 | 8.81 | 66.84 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 135.46 | 717.00 | 8.10 | 8.10 | 32.47 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |

# Concrete Beam

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DESCRIPTION: Garage Diaphragm - 2nd Floor - Chord Steel

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +0.90D+E+0.90H | 2 | 139.53 | 717.00 | 7.39 | 7.39 | 0.98 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 143.59 | 717.00 | 6.68 | 6.68 | 27.60 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 147.66 | 717.00 | 5.97 | 5.97 | 53.30 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 151.72 | 717.00 | 5.25 | 5.25 | 76.11 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 155.79 | 717.00 | 4.54 | 4.54 | 96.02 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 159.85 | 717.00 | 3.83 | 3.83 | 113.04 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 163.92 | 717.00 | 3.12 | 3.12 | 127.17 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 167.98 | 717.00 | 2.41 | 2.41 | 138.41 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 172.05 | 717.00 | 1.70 | 1.70 | 146.75 | 0.69 | 317.35 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.3 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 176.11 | 717.00 | 0.99 | 0.99 | 152.20 | 0.39 | 317.01 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.0 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 180.18 | 717.00 | 0.27 | 0.27 | 154.76 | 0.11 | 316.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 316.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 184.24 | 717.00 | -0.44 | 0.44 | 154.43 | 0.17 | 316.76 | Vu < PhiVc/2 | lot Reqd 9.6. | 316.8 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 188.31 | 717.00 | -1.15 | 1.15 | 151.21 | 0.45 | 317.08 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.1 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 192.38 | 717.00 | -1.86 | 1.86 | 145.09 | 0.77 | 317.43 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.4 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 196.44 | 717.00 | -2.57 | 2.57 | 136.08 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 200.51 | 717.00 | -3.28 | 3.28 | 124.18 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 204.57 | 717.00 | -3.99 | 3.99 | 109.39 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 208.64 | 717.00 | -4.71 | 4.71 | 91.70 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 212.70 | 717.00 | -5.42 | 5.42 | 71.13 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 216.77 | 717.00 | -6.13 | 6.13 | 47.66 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 220.83 | 717.00 | -6.84 | 6.84 | 21.29 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 224.90 | 717.00 | -7.55 | 7.55 | 7.96 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 228.96 | 717.00 | -8.26 | 8.26 | 40.11 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 233.03 | 717.00 | -8.97 | 8.97 | 75.14 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 237.09 | 717.00 | -9.69 | 9.69 | 113.07 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 241.16 | 717.00 | -10.40 | 10.40 | 153.90 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 245.22 | 717.00 | -11.11 | 11.11 | 197.61 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |
| +0.90D+E+0.90H | 2 | 249.29 | 717.00 | -11.82 | 11.82 | 244.22 | 1.00 | 317.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 317.7 | 0.0 | 0.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 86.000 | -641.88 | 1,933.97 | 0.33 |
| Span # 2 | 2 | ##.### | -647.15 | 1,933.97 | 0.33 |
| +1.40D+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -647.15 | 1,933.97 | 0.33 |
| Span # 2 | 2 | ##.### | -647.15 | 1,933.97 | 0.33 |
| +1.20D+0.50Lr+1.60L+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -647.15 | 1,933.97 | 0.33 |
| Span # 2 | 2 | ##.### | -647.15 | 1,933.97 | 0.33 |
| +1.20D+1.60L+0.50S+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -647.15 | 1,933.97 | 0.33 |
| Span # 2 | 2 | ##.### | -647.15 | 1,933.97 | 0.33 |
| +1.20D+1.60Lr+L+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -647.15 | 1,933.97 | 0.33 |
| Span # 2 | 2 | ##.### | -647.15 | 1,933.97 | 0.33 |
| +1.20D+1.60Lr+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -647.15 | 1,933.97 | 0.33 |
| Span # 2 | 2 | ##.### | -647.15 | 1,933.97 | 0.33 |
| +1.20D+L+1.60S+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -647.15 | 1,933.97 | 0.33 |
| Span # 2 | 2 | ##.### | -647.15 | 1,933.97 | 0.33 |
| +1.20D+1.60S+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -647.15 | 1,933.97 | 0.33 |
| Span # 2 | 2 | ##.### | -647.15 | 1,933.97 | 0.33 |
| +1.20D+0.50Lr+L+W+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -647.15 | 1,933.97 | 0.33 |
| Span # 2 | 2 | ##.### | -647.15 | 1,933.97 | 0.33 |
| +1.20D+L+0.50S+W+1.60H | | | | | |

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# Concrete Beam



DESCRIPTION: Garage Diaphragm - 2nd Floor - Chord Steel

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 1 | 1 | 86.000 | -647.15 | 1,933.97 | 0.33 |
| Span # 2 | 2 | ##.### | -647.15 | 1,933.97 | 0.33 |
| +0.90D+W+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -647.15 | 1,933.97 | 0.33 |
| Span # 2 | 2 | ##.### | -647.15 | 1,933.97 | 0.33 |
| +1.20D+L+0.20S+E+1.60H | | | | | |
| Span # 1 | 1 | 86.000 | -641.88 | 1,933.97 | 0.33 |
| Span # 2 | 2 | ##.### | -647.15 | 1,933.97 | 0.33 |
| +0.90D+E+0.90H | | | | | |
| Span # 1 | 1 | 86.000 | -641.88 | 1,933.97 | 0.33 |
| Span # 2 | 2 | ##.### | -647.15 | 1,933.97 | 0.33 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| E Only | 1 | 0.0064 | 0.000 | E Only | -0.0001 | 88.371 |
| E Only | 2 | 0.0005 | 101.971 | E Only | -0.0003 | 21.343 |

# Masonry Slender Wall

File: FWI2101 - Paragon Star.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: Wall BTWN Garage and Retail - Grid G7.3

## Code References

Calculations per TMS 402-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

## General Information

**Calculations per TMS 402-16, IBC 2018, CBC 2019, ASCE 7-16**

Construction Type : Grouted Hollow Concrete Masonry

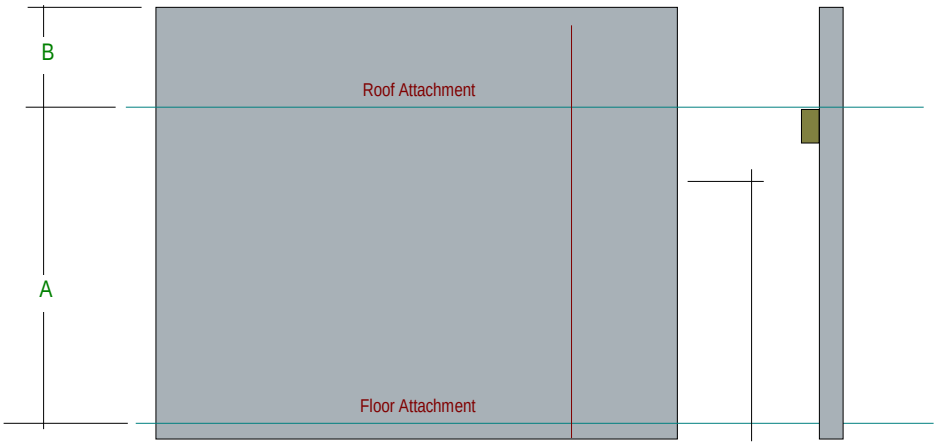
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| F'm | = | 1.50 ksi | Nom. Wall Thickness | 8 in | Temp Diff across thickness | = | | deg F |
| Fy - Yield | = | 60.0 ksi | Actual Thickness | 7.625 in | Min Allow Out-of-plane Defl Ratio | = | 0.0 | |
| Fr - Rupture | = | 61.0 psi | Rebar "d" distance | 3.750 in | | | | |
| Em = f'm * | = | 900.0 | Lower Level Rebar . . . | | Minimum Vertical Steel % | = | 0.0020 | |
| Max % of ρ bal. | = | 0.008909 | Bar Size | # 5 | | | | |
| Grout Density | = | 140 pcf | Bar Spacing | 32 in | | | | |
| Block Weight | | Normal Weight | | | | | | |
| Wall Weight | = | 84.0 psf | | | | | | |

Wall is Solid Grouted

## One-Story Wall Dimensions

A Clear Height = 16.0 ft
B Parapet height = ft

Wall Support Condition Top & Bottom Pinned




## Lateral Loads

Wind Loads :
Full area WIND load 25.0 psf

Seismic Loads :
Wall Weight Seismic Load Input Method : Direct entry of Lateral Wall Weight
Seismic Wall Lateral Load 25.0 psf

Fp 1.0 = 25.0 psf

# Masonry Slender Wall



DESCRIPTION: Wall BTWN Garage and Retail - Grid G7.3

## DESIGN SUMMARY

**Results reported for "Strip Width" of 12.0 in**

| | Governing Load Combination . . . | Actual Values . . . | | Allowable Values . . . | |
|---|---|---|---|---|---|
| PASS | Moment Capacity Check<br>+0.90D+W+1.60H | Maximum Bending Stress Ratio = | **0.4318** | | |
| | | Max Mu | 0.8124 k-ft | Phi * Mn | 1.881 k-ft |
| PASS | Service Deflection Check<br>W Only | Actual Defl. Ratio L/ | 609 | Allowable Defl. Ratio | 150.0 |
| | | Max. Deflection | 0.3151 in | | |
| PASS | Axial Load Check<br>+1.20D+0.50Lr+L+W+1.60H | Max Pu / Ag | 9.432 psi | Max. Allow. Defl. | 1.280 in |
| | | Location | 7.733 ft | 0.2 * f'm | 300.0 psi |
| PASS | Reinforcing Limit Check | Actual As/bd | 0.00250 | Max Allow As/bd | 0.008909 |

| Maximum Reactions . . . | *for Load Combination....* | |
|---|---|---|
| Top Horizontal | W Only | 0.20 k |
| Base Horizontal | W Only | 0.20 k |
| Vertical Reaction | +D+0.750Lr+0.750L+0.450W+H | 1.344 k |

## Design Maximum Combinations - Moments

**Results reported for "Strip Width" = 12 in.**

| Load Combination | Axial Load Pu k | Axial Load 0.2*f'm*b*t k | Mcr k-ft | Mu k-ft | Phi | Phi Mn k-ft | As in^2 | As Ratio | 0.6 * rho bal |
|---|---|---|---|---|---|---|---|---|---|
| | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 | 0.0000 | 0.0000 |
| | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 | 0.0000 | 0.0000 |
| | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 | 0.0000 | 0.0000 |
| | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 | 0.0000 | 0.0000 |
| +1.20D+1.60Lr+0.50W+1.60H at 7.47 to 8.00 | 0.860 | 27.360 | 0.59 | 0.40 | 0.90 | 1.95 | 0.116 | 0.0025 | 0.0086 |
| | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 | 0.0000 | 0.0000 |
| +1.20D+1.60S+0.50W+1.60H at 7.47 to 8.00 | 0.860 | 27.360 | 0.59 | 0.40 | 0.90 | 1.95 | 0.116 | 0.0025 | 0.0086 |
| +1.20D+0.50Lr+L+W+1.60H at 7.47 to 8.00 | 0.860 | 27.360 | 0.59 | 0.82 | 0.90 | 1.95 | 0.116 | 0.0025 | 0.0086 |
| +1.20D+L+0.50S+W+1.60H at 7.47 to 8.00 | 0.860 | 27.360 | 0.59 | 0.82 | 0.90 | 1.95 | 0.116 | 0.0025 | 0.0086 |
| +0.90D+W+1.60H at 7.47 to 8.00 | 0.645 | 27.360 | 0.59 | 0.81 | 0.90 | 1.89 | 0.116 | 0.0025 | 0.0087 |
| +1.20D+L+0.20S+E+1.60H at 7.47 to 8.00 | 0.860 | 27.360 | 0.59 | 0.82 | 0.90 | 1.95 | 0.116 | 0.0025 | 0.0086 |
| +0.90D+E+0.90H at 7.47 to 8.00 | 0.645 | 27.360 | 0.59 | 0.81 | 0.90 | 1.89 | 0.116 | 0.0025 | 0.0087 |

## Design Maximum Combinations - Deflections

**Results reported for "Strip Width" = 12 in.**

| Load Combination | Axial Load Pu k | Moment Values Mcr k-ft | Moment Values Mactual k-ft | Stiffness I gross in^4 | Stiffness I cracked in^4 | Stiffness I effective in^4 | Deflections Deflection in | Deflections Defl. Ratio |
|---|---|---|---|---|---|---|---|---|
| | 0.000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.0 |
| | 0.000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.0 |
| | 0.000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.0 |
| | 0.000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.0 |
| | 0.000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.0 |
| | 0.000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.0 |
| +D+0.60W+H at 7.47 to 8.00 | 0.717 | 0.59 | 0.48 | 443.30 | 26.52 | 443.300 | 0.037 | 5,184.5 |
| +D+0.750Lr+0.750L+0.450W+H at 7.47 to 8.0 | 0.717 | 0.59 | 0.36 | 443.30 | 26.52 | 443.300 | 0.028 | 6,912.7 |
| +D+0.750L+0.750S+0.450W+H at 7.47 to 8.00 | 0.717 | 0.59 | 0.36 | 443.30 | 26.52 | 443.300 | 0.028 | 6,912.7 |
| +0.60D+0.60W+0.60H at 7.47 to 8.00 | 0.430 | 0.59 | 0.48 | 443.30 | 25.74 | 443.300 | 0.037 | 5,193.3 |
| +D+0.70E+0.60H at 7.47 to 8.00 | 0.717 | 0.59 | 0.56 | 443.30 | 26.52 | 443.300 | 0.043 | 4,443.9 |
| +D+0.750L+0.750S+0.5250E+H at 7.47 to 8.0 | 0.717 | 0.59 | 0.42 | 443.30 | 26.52 | 443.300 | 0.032 | 5,925.1 |
| +0.60D+0.70E+H at 7.47 to 8.00 | 0.430 | 0.59 | 0.56 | 443.30 | 25.74 | 443.300 | 0.043 | 4,451.4 |
| | 0.000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.0 |
| | 0.000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.0 |

# Masonry Slender Wall


Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24


DESCRIPTION: Wall BTWN Garage and Retail - Grid G7.3

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 0.000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.0 |
| | 0.000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.0 |
| W Only at 8.00 to 8.53 | 0.000 | 0.59 | 0.80 | 443.30 | 24.55 | 28.731 | 0.315 | 609.2 |
| E Only at 8.00 to 8.53 | 0.000 | 0.59 | 0.80 | 443.30 | 24.55 | 28.731 | 0.315 | 609.2 |
| | 0.000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.0 |

## Reactions - Vertical & Horizontal

| Load Combination | Base Horizontal | Top Horizontal | Vertical @ Wall Base |
|---|---|---|---|
| +D+H | 0.0 k | 0.00 k | 1.344 k |
| +D+L+H | 0.0 k | 0.00 k | 1.344 k |
| +D+Lr+H | 0.0 k | 0.00 k | 1.344 k |
| +D+S+H | 0.0 k | 0.00 k | 1.344 k |
| +D+0.750Lr+0.750L+H | 0.0 k | 0.00 k | 1.344 k |
| +D+0.750L+0.750S+H | 0.0 k | 0.00 k | 1.344 k |
| +D+0.60W+H | 0.1 k | 0.12 k | 1.344 k |

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24


# Masonry Slender Wall

DESCRIPTION: Wall BTWN Garage and Retail - Grid G7.3

## Reactions - Vertical & Horizontal

| Load Combination | Base Horizontal | Top Horizontal | Vertical @ Wall Base |
|---|---|---|---|
| +D+0.750Lr+0.750L+0.450W+H | 0.1 k | 0.09 k | 1.344 k |
| +D+0.750L+0.750S+0.450W+H | 0.1 k | 0.09 k | 1.344 k |
| +0.60D+0.60W+0.60H | 0.1 k | 0.12 k | 0.806 k |
| +D+0.70E+0.60H | 0.1 k | 0.14 k | 1.344 k |
| +D+0.750L+0.750S+0.5250E+H | 0.1 k | 0.11 k | 1.344 k |
| +0.60D+0.70E+H | 0.1 k | 0.14 k | 0.806 k |
| D Only | 0.0 k | 0.00 k | 1.344 k |
| Lr Only | 0.0 k | 0.00 k | 0.000 k |
| L Only | 0.0 k | 0.00 k | 0.000 k |
| S Only | 0.0 k | 0.00 k | 0.000 k |
| W Only | 0.2 k | 0.20 k | 0.000 k |
| E Only | 0.2 k | 0.20 k | 0.000 k |
| H Only | 0.0 k | 0.00 k | 0.000 k |

# Steel Beam

File: FWI2101 - Paragon Star.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403 — Bob D. Campbell and Co., Inc.

DESCRIPTION: Beam Supporting Steel Stair - 4th Floor

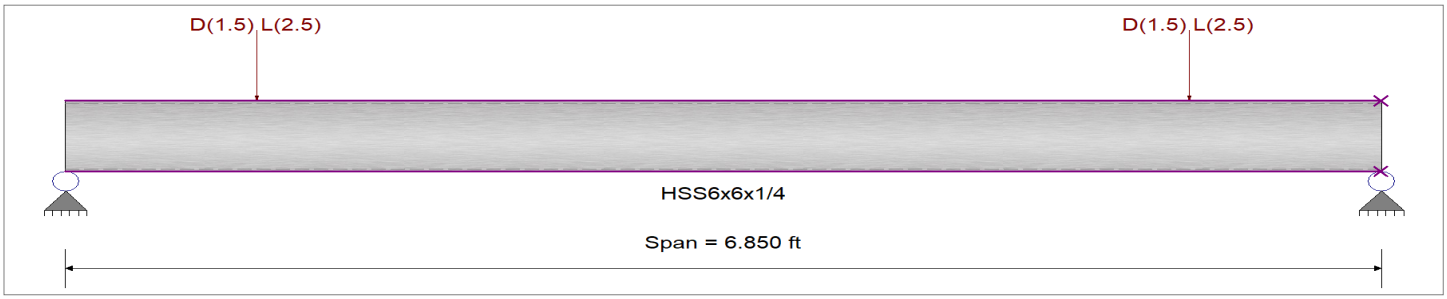
## CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

### Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
Bending Axis : Minor Axis Bending

Fy : Steel Yield : 46.0 ksi
E: Modulus : 29,000.0 ksi




### Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load(s) for Span Number 1
Point Load : D = 1.50, L = 2.50 k @ 1.0 ft, (Stringer)

Point Load : D = 1.50, L = 2.50 k @ 5.850 ft, (Stringer)

## DESIGN SUMMARY

**Design OK**

| | | | |
|---|---|---|---|
| Maximum Bending Stress Ratio = | 0.160 : 1 | Maximum Shear Stress Ratio = | 0.100 : 1 |
| Section used for this span | HSS6x6x1/4 | Section used for this span | HSS6x6x1/4 |
| Ma : Applied | 4.111 k-ft | Va : Applied | 4.065 k |
| Mn / Omega : Allowable | 25.709 k-ft | Vn/Omega : Allowable | 40.826 k |
| Load Combination | +D+L+H | Load Combination | +D+L+H |
| Location of maximum on span | 3.425 ft | Location of maximum on span | 6.850 ft |
| Span # where maximum occurs | Span # 1 | Span # where maximum occurs | Span # 1 |

Maximum Deflection

| | | | |
|---|---|---|---|
| Max Downward Transient Deflection | 0.030 in | Ratio = | 2,755 >=480. |
| Max Upward Transient Deflection | 0.000 in | Ratio = | 0 <480.0 |
| Max Downward Total Deflection | 0.049 in | Ratio = | 1682 >=360. |
| Max Upward Total Deflection | 0.000 in | Ratio = | 0 <360.0 |

### Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | Summary of Moment Values Mmax + | Mmax - | Ma Max | Mny | Mny/Omega | Cb | Rm | Summary of Shear Values Va Max | Vny | Vny/Omega |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +D+H | | | | | | | | | | | | | |
| Dsgn. L = 6.85 ft | 1 | 0.063 | 0.038 | 1.61 | | 1.61 | 42.93 | 25.71 | 1.00 | 1.00 | 1.57 | 68.18 | 40.83 |
| +D+L+H | | | | | | | | | | | | | |
| Dsgn. L = 6.85 ft | 1 | 0.160 | 0.100 | 4.11 | | 4.11 | 42.93 | 25.71 | 1.00 | 1.00 | 4.07 | 68.18 | 40.83 |
| +D+Lr+H | | | | | | | | | | | | | |
| Dsgn. L = 6.85 ft | 1 | 0.063 | 0.038 | 1.61 | | 1.61 | 42.93 | 25.71 | 1.00 | 1.00 | 1.57 | 68.18 | 40.83 |
| +D+S+H | | | | | | | | | | | | | |
| Dsgn. L = 6.85 ft | 1 | 0.063 | 0.038 | 1.61 | | 1.61 | 42.93 | 25.71 | 1.00 | 1.00 | 1.57 | 68.18 | 40.83 |
| +D+0.750Lr+0.750L+H | | | | | | | | | | | | | |
| Dsgn. L = 6.85 ft | 1 | 0.136 | 0.084 | 3.49 | | 3.49 | 42.93 | 25.71 | 1.00 | 1.00 | 3.44 | 68.18 | 40.83 |
| +D+0.750L+0.750S+H | | | | | | | | | | | | | |
| Dsgn. L = 6.85 ft | 1 | 0.136 | 0.084 | 3.49 | | 3.49 | 42.93 | 25.71 | 1.00 | 1.00 | 3.44 | 68.18 | 40.83 |
| +D+0.60W+H | | | | | | | | | | | | | |
| Dsgn. L = 6.85 ft | 1 | 0.063 | 0.038 | 1.61 | | 1.61 | 42.93 | 25.71 | 1.00 | 1.00 | 1.57 | 68.18 | 40.83 |
| +D+0.750Lr+0.750L+0.450W+H | | | | | | | | | | | | | |
| Dsgn. L = 6.85 ft | 1 | 0.136 | 0.084 | 3.49 | | 3.49 | 42.93 | 25.71 | 1.00 | 1.00 | 3.44 | 68.18 | 40.83 |
| +D+0.750L+0.750S+0.450W+H | | | | | | | | | | | | | |
| Dsgn. L = 6.85 ft | 1 | 0.136 | 0.084 | 3.49 | | 3.49 | 42.93 | 25.71 | 1.00 | 1.00 | 3.44 | 68.18 | 40.83 |
| +0.60D+0.60W+0.60H | | | | | | | | | | | | | |
| Dsgn. L = 6.85 ft | 1 | 0.038 | 0.023 | 0.97 | | 0.97 | 42.93 | 25.71 | 1.00 | 1.00 | 0.94 | 68.18 | 40.83 |

# Steel Beam

File: FWI2101 - Paragon Star.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24



DESCRIPTION: Beam Supporting Steel Stair - 4th Floor

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | Summary of Moment Values Mmax + | Mmax - | Ma Max | Mnx | Mnx/Omega | Cb | Rm | Summary of Shear Values Va Max | Vnx | Vnx/Omega |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +D+0.70E+0.60H | | | | | | | | | | | | | |
| Dsgn. L = 6.85 ft | 1 | 0.063 | 0.038 | 1.61 | | 1.61 | 42.93 | 25.71 | 1.00 | 1.00 | 1.57 | 68.18 | 40.83 |
| +D+0.750L+0.750S+0.5250E+H | | | | | | | | | | | | | |
| Dsgn. L = 6.85 ft | 1 | 0.136 | 0.084 | 3.49 | | 3.49 | 42.93 | 25.71 | 1.00 | 1.00 | 3.44 | 68.18 | 40.83 |
| +0.60D+0.70E+H | | | | | | | | | | | | | |
| Dsgn. L = 6.85 ft | 1 | 0.038 | 0.023 | 0.97 | | 0.97 | 42.93 | 25.71 | 1.00 | 1.00 | 0.94 | 68.18 | 40.83 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|---|---|---|---|---|---|---|
| +D+L+H | 1 | 0.0489 | 3.445 | | 0.0000 | 0.000 |

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Overall MAXimum | 4.065 | 4.065 |
| Overall MINimum | 0.939 | 0.939 |
| +D+H | 1.565 | 1.565 |
| +D+L+H | 4.065 | 4.065 |
| +D+Lr+H | 1.565 | 1.565 |
| +D+S+H | 1.565 | 1.565 |
| +D+0.750Lr+0.750L+H | 3.440 | 3.440 |
| +D+0.750L+0.750S+H | 3.440 | 3.440 |
| +D+0.60W+H | 1.565 | 1.565 |
| +D+0.750Lr+0.750L+0.450W+H | 3.440 | 3.440 |
| +D+0.750L+0.750S+0.450W+H | 3.440 | 3.440 |
| +0.60D+0.60W+0.60H | 0.939 | 0.939 |
| +D+0.70E+0.60H | 1.565 | 1.565 |
| +D+0.750L+0.750S+0.5250E+H | 3.440 | 3.440 |
| +0.60D+0.70E+H | 0.939 | 0.939 |
| D Only | 1.565 | 1.565 |
| L Only | 2.500 | 2.500 |
| H Only | | |

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# Steel Beam

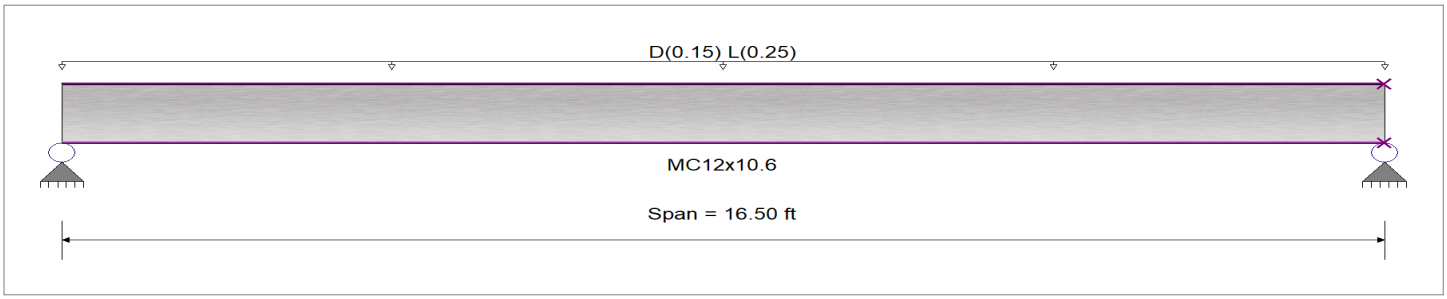
DESCRIPTION: Steel Stair Stringer - 4th-5th

## CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

### Material Properties

| | | | |
|---|---|---|---|
| Analysis Method : | Allowable Strength Design | Fy : Steel Yield : | 36.0 ksi |
| Beam Bracing : | Beam is Fully Braced against lateral-torsional buckling | E: Modulus : | 29,000.0 ksi |
| Bending Axis : | Major Axis Bending | | |




### Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Uniform Load : D = 0.060, L = 0.10 ksf, Tributary Width = 2.50 ft, (Stair Load)

## DESIGN SUMMARY

**Design OK**

| | | | |
|---|---|---|---|
| Maximum Bending Stress Ratio = | 0.671 : 1 | Maximum Shear Stress Ratio = | 0.115 : 1 |
| Section used for this span | MC12x10.6 | Section used for this span | MC12x10.6 |
| Ma : Applied | 13.973 k-ft | Va : Applied | 3.387 k |
| Mn / Omega : Allowable | 20.838 k-ft | Vn/Omega : Allowable | 29.490 k |
| Load Combination | +D+L+H | Load Combination | +D+L+H |
| Location of maximum on span | 8.250 ft | Location of maximum on span | 0.000 ft |
| Span # where maximum occurs | Span # 1 | Span # where maximum occurs | Span # 1 |

**Maximum Deflection**

| | | | |
|---|---|---|---|
| Max Downward Transient Deflection | 0.261 in | Ratio = | 758 >=480. |
| Max Upward Transient Deflection | 0.000 in | Ratio = | 0 <480.0 |
| Max Downward Total Deflection | 0.429 in | Ratio = | 462 >=360. |
| Max Upward Total Deflection | 0.000 in | Ratio = | 0 <360.0 |

### Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | Max Stress Ratios V | Summary of Moment Values Mmax + | Mmax - | Ma Max | Mnx | Mnx/Omega | Cb | Rm | Summary of Shear Values Va Max | Vnx | Vnx/Omega |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +D+H | | | | | | | | | | | | | |
| Dsgn. L = 16.50 ft | 1 | 0.262 | 0.045 | 5.47 | | 5.47 | 34.80 | 20.84 | 1.00 | 1.00 | 1.32 | 49.25 | 29.49 |
| +D+L+H | | | | | | | | | | | | | |
| Dsgn. L = 16.50 ft | 1 | 0.671 | 0.115 | 13.97 | | 13.97 | 34.80 | 20.84 | 1.00 | 1.00 | 3.39 | 49.25 | 29.49 |
| +D+Lr+H | | | | | | | | | | | | | |
| Dsgn. L = 16.50 ft | 1 | 0.262 | 0.045 | 5.47 | | 5.47 | 34.80 | 20.84 | 1.00 | 1.00 | 1.32 | 49.25 | 29.49 |
| +D+S+H | | | | | | | | | | | | | |
| Dsgn. L = 16.50 ft | 1 | 0.262 | 0.045 | 5.47 | | 5.47 | 34.80 | 20.84 | 1.00 | 1.00 | 1.32 | 49.25 | 29.49 |
| +D+0.750Lr+0.750L+H | | | | | | | | | | | | | |
| Dsgn. L = 16.50 ft | 1 | 0.568 | 0.097 | 11.85 | | 11.85 | 34.80 | 20.84 | 1.00 | 1.00 | 2.87 | 49.25 | 29.49 |
| +D+0.750L+0.750S+H | | | | | | | | | | | | | |
| Dsgn. L = 16.50 ft | 1 | 0.568 | 0.097 | 11.85 | | 11.85 | 34.80 | 20.84 | 1.00 | 1.00 | 2.87 | 49.25 | 29.49 |
| +D+0.60W+H | | | | | | | | | | | | | |
| Dsgn. L = 16.50 ft | 1 | 0.262 | 0.045 | 5.47 | | 5.47 | 34.80 | 20.84 | 1.00 | 1.00 | 1.32 | 49.25 | 29.49 |
| +D+0.750Lr+0.750L+0.450W+H | | | | | | | | | | | | | |
| Dsgn. L = 16.50 ft | 1 | 0.568 | 0.097 | 11.85 | | 11.85 | 34.80 | 20.84 | 1.00 | 1.00 | 2.87 | 49.25 | 29.49 |
| +D+0.750L+0.750S+0.450W+H | | | | | | | | | | | | | |
| Dsgn. L = 16.50 ft | 1 | 0.568 | 0.097 | 11.85 | | 11.85 | 34.80 | 20.84 | 1.00 | 1.00 | 2.87 | 49.25 | 29.49 |
| +0.60D+0.60W+0.60H | | | | | | | | | | | | | |
| Dsgn. L = 16.50 ft | 1 | 0.157 | 0.027 | 3.28 | | 3.28 | 34.80 | 20.84 | 1.00 | 1.00 | 0.79 | 49.25 | 29.49 |
| +D+0.70E+0.60H | | | | | | | | | | | | | |
| Dsgn. L = 16.50 ft | 1 | 0.262 | 0.045 | 5.47 | | 5.47 | 34.80 | 20.84 | 1.00 | 1.00 | 1.32 | 49.25 | 29.49 |
| +D+0.750L+0.750S+0.5250E+H | | | | | | | | | | | | | |
| Dsgn. L = 16.50 ft | 1 | 0.568 | 0.097 | 11.85 | | 11.85 | 34.80 | 20.84 | 1.00 | 1.00 | 2.87 | 49.25 | 29.49 |

# Steel Beam

File: FWI2101 - Paragon Star.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24



DESCRIPTION: Steel Stair Stringer - 4th-5th

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | Summary of Moment Values Mmax + | Mmax - | Ma Max | Mnx | Mnx/Omega | Cb | Rm | Summary of Shear Values Va Max | Vnx | Vnx/Omega |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +0.60D+0.70E+H | | | | | | | | | | | | | |
| Dsgn. L = 16.50 ft | 1 | 0.157 | 0.027 | 3.28 | | 3.28 | 34.80 | 20.84 | 1.00 | 1.00 | 0.79 | 49.25 | 29.49 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|---|---|---|---|---|---|---|
| +D+L+H | 1 | 0.4289 | 8.297 | | 0.0000 | 0.000 |

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Overall MAXimum | 3.387 | 3.387 |
| Overall MINimum | 0.795 | 0.795 |
| +D+H | 1.325 | 1.325 |
| +D+L+H | 3.387 | 3.387 |
| +D+Lr+H | 1.325 | 1.325 |
| +D+S+H | 1.325 | 1.325 |
| +D+0.750Lr+0.750L+H | 2.872 | 2.872 |
| +D+0.750L+0.750S+H | 2.872 | 2.872 |
| +D+0.60W+H | 1.325 | 1.325 |
| +D+0.750Lr+0.750L+0.450W+H | 2.872 | 2.872 |
| +D+0.750L+0.750S+0.450W+H | 2.872 | 2.872 |
| +0.60D+0.60W+0.60H | 0.795 | 0.795 |
| +D+0.70E+0.60H | 1.325 | 1.325 |
| +D+0.750L+0.750S+0.5250E+H | 2.872 | 2.872 |
| +0.60D+0.70E+H | 0.795 | 0.795 |
| D Only | 1.325 | 1.325 |
| L Only | 2.063 | 2.063 |
| H Only | | |

# Concrete Beam

File: FWI2101 - Paragon Star.ec6
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Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

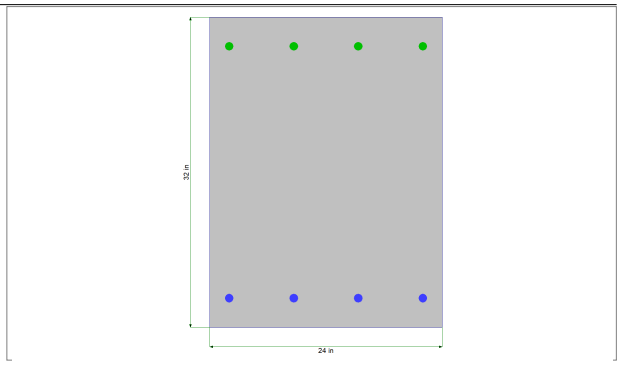
DESCRIPTION: GRBM - G1 - Under 10" PC Wall

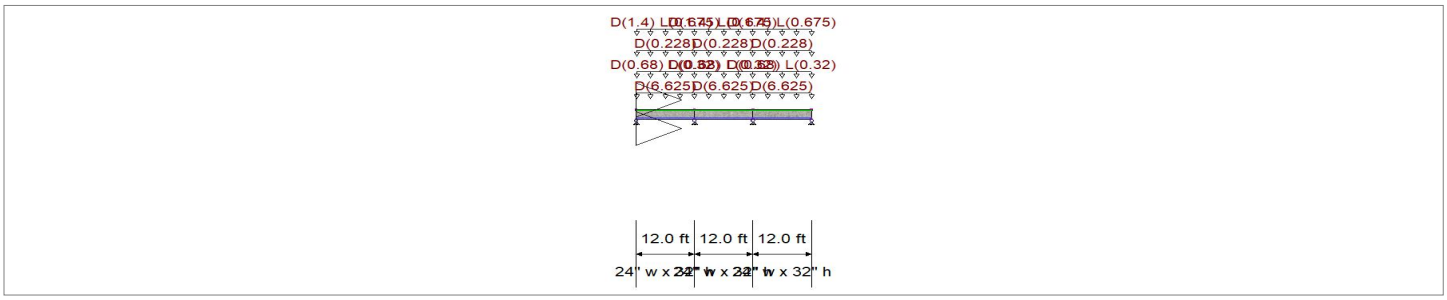
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 3.50 ksi | $\phi$ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 443.706 psi | | Shear : | 0.750 |
| $\psi$ Density | = | 145.0 pcf | $\beta_1$ | = | 0.850 |
| $\lambda$ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 3,122.0 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 2 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 24.0 in, Height = 32.0 in

Span #1 Reinforcing....
- 4-#7 at 3.0 in from Bottom, from 0.0 to 12.0 ft in this span
- 4-#7 at 3.0 in from Top, from 0.0 to 12.0 ft in this span

Span #2 Reinforcing....
- 4-#7 at 3.0 in from Bottom, from 0.0 to 12.0 ft in this span
- 4-#7 at 3.0 in from Top, from 0.0 to 12.0 ft in this span

Span #3 Reinforcing....
- 4-#7 at 3.0 in from Bottom, from 0.0 to 12.0 ft in this span
- 4-#7 at 3.0 in from Top, from 0.0 to 12.0 ft in this span

Beam self weight calculated and added to loads

Load for Span Number 1
- Uniform Load : D = 0.1250 ksf, Tributary Width = 53.0 ft, (10" PC Wall - With Opngs)
- Uniform Load : D = 0.0850, L = 0.040 ksf, Tributary Width = 8.0 ft, (4-Floors)
- Uniform Load : D = 0.0570 ksf, Tributary Width = 4.0 ft, (Wash - 4-Floors)
- Uniform Load : D = 1.40, L = 0.6750 k/ft, Tributary Width = 1.0 ft, (Apartment)

Load for Span Number 2
- Uniform Load : D = 0.1250 ksf, Tributary Width = 53.0 ft, (10" PC Wall - With Opngs)
- Uniform Load : D = 0.0850, L = 0.040 ksf, Tributary Width = 8.0 ft, (4-Floors)
- Uniform Load : D = 0.0570 ksf, Tributary Width = 4.0 ft, (Wash - 4-Floors)
- Uniform Load : D = 1.40, L = 0.6750 k/ft, Tributary Width = 1.0 ft, (Apartment)

Load for Span Number 3
- Uniform Load : D = 0.1250 ksf, Tributary Width = 53.0 ft, (10" PC Wall - With Opngs)
- Uniform Load : D = 0.0850, L = 0.040 ksf, Tributary Width = 8.0 ft, (4-Floors)
- Uniform Load : D = 0.0570 ksf, Tributary Width = 4.0 ft, (Wash - 4-Floors)
- Uniform Load : D = 1.40, L = 0.6750 k/ft, Tributary Width = 1.0 ft, (Apartment)

# Concrete Beam

File: FWI2101 - Paragon Star.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: GRBM - G1 - Under 10" PC Wall

## DESIGN SUMMARY

**Design OK**

| | | | |
|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.644** : 1 | Maximum Deflection | |
| Section used for this span | **Typical Section** | Max Downward Transient Deflection | 0.002 in Ratio = 83655 >=360. |
| Mu : Applied | -195.680 k-ft | Max Upward Transient Deflection | -0.001 in Ratio = 132433 >=360. |
| Mn * Phi : Allowable | 303.639 k-ft | Max Downward Total Deflection | 0.013 in Ratio = 10759 >=180. |
| Location of maximum on span | 0.000 ft | Max Upward Total Deflection | -0.001 in Ratio = 121211 >=180. |
| Span # where maximum occurs | Span # 3 | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| Overall MAXimum | 51.963 | 142.452 | 142.452 | 51.963 |
| Overall MINimum | 0.199 | -1.194 | -1.194 | 0.199 |
| +D+H | 46.590 | 128.124 | 128.124 | 46.590 |
| +D+L+H, LL Comb Run (**L) | 46.789 | 126.930 | 135.885 | 51.764 |
| +D+L+H, LL Comb Run (*L*) | 45.993 | 134.691 | 134.691 | 45.993 |
| +D+L+H, LL Comb Run (*LL) | 46.192 | 133.497 | 142.452 | 51.167 |
| +D+L+H, LL Comb Run (L**) | 51.764 | 135.885 | 126.930 | 46.789 |
| +D+L+H, LL Comb Run (L*L) | 51.963 | 134.691 | 134.691 | 51.963 |
| +D+L+H, LL Comb Run (LL*) | 51.167 | 142.452 | 133.497 | 46.192 |
| +D+L+H, LL Comb Run (LLL) | 51.366 | 141.258 | 141.258 | 51.366 |
| +D+Lr+H, LL Comb Run (**L) | 46.590 | 128.124 | 128.124 | 46.590 |
| +D+Lr+H, LL Comb Run (*L*) | 46.590 | 128.124 | 128.124 | 46.590 |
| +D+Lr+H, LL Comb Run (*LL) | 46.590 | 128.124 | 128.124 | 46.590 |
| +D+Lr+H, LL Comb Run (L**) | 46.590 | 128.124 | 128.124 | 46.590 |
| +D+Lr+H, LL Comb Run (L*L) | 46.590 | 128.124 | 128.124 | 46.590 |
| +D+Lr+H, LL Comb Run (LL*) | 46.590 | 128.124 | 128.124 | 46.590 |
| +D+Lr+H, LL Comb Run (LLL) | 46.590 | 128.124 | 128.124 | 46.590 |
| +D+S+H | 46.590 | 128.124 | 128.124 | 46.590 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 46.740 | 127.228 | 133.944 | 50.471 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 46.143 | 133.049 | 133.049 | 46.143 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 46.292 | 132.153 | 138.870 | 50.023 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 50.471 | 133.944 | 127.228 | 46.740 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 50.620 | 133.049 | 133.049 | 50.620 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 50.023 | 138.870 | 132.153 | 46.292 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 50.172 | 137.974 | 137.974 | 50.172 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 46.740 | 127.228 | 133.944 | 50.471 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 46.143 | 133.049 | 133.049 | 46.143 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 46.292 | 132.153 | 138.870 | 50.023 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 50.471 | 133.944 | 127.228 | 46.740 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 50.620 | 133.049 | 133.049 | 50.620 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 50.023 | 138.870 | 132.153 | 46.292 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 50.172 | 137.974 | 137.974 | 50.172 |
| +D+0.60W+H | 46.590 | 128.124 | 128.124 | 46.590 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 46.740 | 127.228 | 133.944 | 50.471 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 46.143 | 133.049 | 133.049 | 46.143 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 46.292 | 132.153 | 138.870 | 50.023 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 50.471 | 133.944 | 127.228 | 46.740 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 50.620 | 133.049 | 133.049 | 50.620 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 50.023 | 138.870 | 132.153 | 46.292 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 50.172 | 137.974 | 137.974 | 50.172 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 46.740 | 127.228 | 133.944 | 50.471 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 46.143 | 133.049 | 133.049 | 46.143 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 46.292 | 132.153 | 138.870 | 50.023 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 50.471 | 133.944 | 127.228 | 46.740 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 50.620 | 133.049 | 133.049 | 50.620 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 50.023 | 138.870 | 132.153 | 46.292 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 50.172 | 137.974 | 137.974 | 50.172 |
| +0.60D+0.60W+0.60H | 27.954 | 76.874 | 76.874 | 27.954 |
| +D+0.70E+0.60H | 46.590 | 128.124 | 128.124 | 46.590 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 46.740 | 127.228 | 133.944 | 50.471 |

# Concrete Beam

File: FWI2101 - Paragon Star.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: GRBM - G1 - Under 10" PC Wall

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| +D+0.750L+0.750S+0.5250E+H, LL Com | 46.143 | 133.049 | 133.049 | 46.143 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 46.292 | 132.153 | 138.870 | 50.023 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 50.471 | 133.944 | 127.228 | 46.740 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 50.620 | 133.049 | 133.049 | 50.620 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 50.023 | 138.870 | 132.153 | 46.292 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 50.172 | 137.974 | 137.974 | 50.172 |
| +0.60D+0.70E+H | 27.954 | 76.874 | 76.874 | 27.954 |
| D Only | 46.590 | 128.124 | 128.124 | 46.590 |
| L Only, LL Comb Run (**L) | 0.199 | -1.194 | 7.761 | 5.174 |
| L Only, LL Comb Run (*L*) | -0.597 | 6.567 | 6.567 | -0.597 |
| L Only, LL Comb Run (*LL) | -0.398 | 5.373 | 14.328 | 4.577 |
| L Only, LL Comb Run (L**) | 5.174 | 7.761 | -1.194 | 0.199 |
| L Only, LL Comb Run (L*L) | 5.373 | 6.567 | 6.567 | 5.373 |
| L Only, LL Comb Run (LL*) | 4.577 | 14.328 | 5.373 | -0.398 |
| L Only, LL Comb Run (LLL) | 4.776 | 13.134 | 13.134 | 4.776 |
| H Only | | | | |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.40D+1.60H | 1 | 0.00 | 29.00 | 65.23 | 65.23 | 0.00 | 1.00 | 63.18 | PhiVc < Vu | 2.051 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 1 | 0.48 | 29.00 | 58.70 | 58.70 | 29.74 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 1 | 0.96 | 29.00 | 52.18 | 52.18 | 56.36 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 1 | 1.44 | 29.00 | 45.66 | 45.66 | 79.84 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 1 | 1.92 | 29.00 | 39.14 | 39.14 | 100.19 | 0.94 | 62.92 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.2 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.40 | 29.00 | 32.73 | 32.73 | 116.68 | 0.68 | 61.73 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 99.0 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.88 | 29.00 | 26.38 | 26.38 | 130.87 | 0.49 | 60.87 | Vu < PhiVc/2 | lot Reqd 9.6. | 60.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.36 | 29.00 | 20.02 | 20.02 | 142.00 | 0.34 | 60.21 | Vu < PhiVc/2 | lot Reqd 9.6. | 60.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.84 | 29.00 | 13.67 | 13.67 | 150.09 | 0.22 | 59.67 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.32 | 29.00 | 7.31 | 7.31 | 155.12 | 0.11 | 59.19 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.80 | 29.00 | 0.96 | 0.96 | 157.11 | 0.01 | 58.74 | Vu < PhiVc/2 | lot Reqd 9.6. | 58.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.28 | 29.00 | -6.67 | 6.67 | 149.31 | 0.11 | 59.16 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.2 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 5.76 | 29.00 | -13.05 | 13.05 | 150.28 | 0.21 | 59.62 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.6 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 6.24 | 29.00 | -19.57 | 19.57 | 142.45 | 0.33 | 60.17 | Vu < PhiVc/2 | lot Reqd 9.6. | 60.2 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 6.72 | 29.00 | -26.09 | 26.09 | 131.50 | 0.48 | 60.83 | Vu < PhiVc/2 | lot Reqd 9.6. | 60.8 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 7.20 | 29.00 | -32.61 | 32.61 | 117.41 | 0.67 | 61.70 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 99.0 | 14.5 | 14.0 |
| +1.40D+1.60H | 1 | 7.68 | 29.00 | -39.14 | 39.14 | 100.19 | 0.94 | 62.92 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.2 | 14.5 | 14.0 |
| +1.40D+1.60H | 1 | 8.16 | 29.00 | -45.66 | 45.66 | 79.84 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 1 | 8.64 | 29.00 | -52.18 | 52.18 | 56.36 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 1 | 9.12 | 29.00 | -58.70 | 58.70 | 29.74 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 1 | 9.60 | 29.00 | -65.23 | 65.23 | 0.00 | 1.00 | 63.18 | PhiVc < Vu | 2.051 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 1 | 10.08 | 29.00 | -71.75 | 71.75 | 32.87 | 1.00 | 63.18 | PhiVc < Vu | 8.574 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 1 | 10.56 | 29.00 | -78.27 | 78.27 | 68.88 | 1.00 | 63.18 | PhiVc < Vu | 15.096 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 1 | 11.04 | 29.00 | -84.79 | 84.79 | 108.02 | 1.00 | 63.18 | PhiVc < Vu | 21.619 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 1 | 11.52 | 29.00 | -91.32 | 91.32 | 150.28 | 1.00 | 63.18 | PhiVc < Vu | 28.142 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 2 | 12.00 | 29.00 | 81.53 | 81.53 | 195.68 | 1.00 | 63.18 | PhiVc < Vu | 18.358 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 2 | 12.48 | 29.00 | 75.01 | 75.01 | 158.11 | 1.00 | 63.18 | PhiVc < Vu | 11.835 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 2 | 12.96 | 29.00 | 68.49 | 68.49 | 123.67 | 1.00 | 63.18 | PhiVc < Vu | 5.312 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 2 | 13.44 | 29.00 | 61.97 | 61.97 | 92.36 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 13.92 | 29.00 | 55.61 | 55.61 | 63.30 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 14.40 | 29.00 | 49.25 | 49.25 | 38.13 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 14.88 | 29.00 | 42.90 | 42.90 | 16.01 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 15.36 | 29.00 | 36.54 | 36.54 | 3.05 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 15.84 | 29.00 | 30.19 | 30.19 | 19.07 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 16.32 | 29.00 | 23.83 | 23.83 | 32.04 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 16.80 | 29.00 | 17.48 | 17.48 | 41.65 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 17.28 | 29.00 | 11.12 | 11.12 | 48.82 | 0.55 | 61.15 | Vu < PhiVc/2 | lot Reqd 9.6. | 61.2 | 0.0 | 0.0 |

# Concrete Beam

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DESCRIPTION: GRBM - G1 - Under 10" PC Wall

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 17.76 | 29.00 | 4.77 | 4.77 | 52.63 | 0.22 | 59.66 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 18.24 | 29.00 | -4.77 | 4.77 | 52.63 | 0.22 | 59.66 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 18.72 | 29.00 | -11.12 | 11.12 | 48.82 | 0.55 | 61.15 | Vu < PhiVc/2 | lot Reqd 9.6. | 61.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 19.20 | 29.00 | -17.48 | 17.48 | 41.95 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 19.68 | 29.00 | -23.83 | 23.83 | 32.04 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 20.16 | 29.00 | -30.19 | 30.19 | 19.07 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 20.64 | 29.00 | -36.54 | 36.54 | 3.05 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 21.12 | 29.00 | -42.90 | 42.90 | 16.01 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 21.60 | 29.00 | -49.25 | 49.25 | 38.13 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 22.08 | 29.00 | -55.61 | 55.61 | 63.30 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 2 | 22.56 | 29.00 | -61.97 | 61.97 | 92.36 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 2 | 23.04 | 29.00 | -68.49 | 68.49 | 123.67 | 1.00 | 63.18 | PhiVc < Vu | 5.312 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 2 | 23.52 | 29.00 | -75.01 | 75.01 | 158.11 | 1.00 | 63.18 | PhiVc < Vu | 11.835 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 3 | 24.00 | 29.00 | 97.84 | 97.84 | 195.68 | 1.00 | 63.18 | PhiVc < Vu | 34.664 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 3 | 24.48 | 29.00 | 91.32 | 91.32 | 150.28 | 1.00 | 63.18 | PhiVc < Vu | 28.142 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 3 | 24.96 | 29.00 | 84.79 | 84.79 | 108.02 | 1.00 | 63.18 | PhiVc < Vu | 21.619 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 3 | 25.44 | 29.00 | 78.27 | 78.27 | 68.88 | 1.00 | 63.18 | PhiVc < Vu | 15.096 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 3 | 25.92 | 29.00 | 71.75 | 71.75 | 32.87 | 1.00 | 63.18 | PhiVc < Vu | 8.574 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 3 | 26.40 | 29.00 | 65.23 | 65.23 | 0.00 | 1.00 | 63.18 | PhiVc < Vu | 2.051 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 3 | 26.88 | 29.00 | 58.70 | 58.70 | 29.74 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 3 | 27.36 | 29.00 | 52.18 | 52.18 | 56.36 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 3 | 27.84 | 29.00 | 45.66 | 45.66 | 79.84 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 3 | 28.32 | 29.00 | 39.14 | 39.14 | 100.19 | 0.94 | 62.92 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.2 | 14.5 | 14.0 |
| +1.40D+1.60H | 3 | 28.80 | 29.00 | 32.61 | 32.61 | 117.41 | 0.67 | 61.70 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 99.0 | 14.5 | 14.0 |
| +1.40D+1.60H | 3 | 29.28 | 29.00 | 26.09 | 26.09 | 131.50 | 0.48 | 60.83 | Vu < PhiVc/2 | lot Reqd 9.6. | 60.8 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 29.76 | 29.00 | 19.57 | 19.57 | 142.45 | 0.33 | 60.17 | Vu < PhiVc/2 | lot Reqd 9.6. | 60.2 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 30.24 | 29.00 | 13.05 | 13.05 | 150.28 | 0.21 | 59.62 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 30.72 | 29.00 | 6.67 | 6.67 | 149.31 | 0.11 | 59.16 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 31.20 | 29.00 | -0.96 | 0.96 | 157.11 | 0.01 | 58.74 | Vu < PhiVc/2 | lot Reqd 9.6. | 58.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 31.68 | 29.00 | -7.31 | 7.31 | 155.12 | 0.11 | 59.19 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 32.16 | 29.00 | -13.67 | 13.67 | 150.09 | 0.22 | 59.67 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 32.64 | 29.00 | -20.02 | 20.02 | 142.00 | 0.34 | 60.21 | Vu < PhiVc/2 | lot Reqd 9.6. | 60.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 33.12 | 29.00 | -26.38 | 26.38 | 130.87 | 0.49 | 60.87 | Vu < PhiVc/2 | lot Reqd 9.6. | 60.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 33.60 | 29.00 | -32.73 | 32.73 | 116.68 | 0.68 | 61.73 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 99.0 | 14.5 | 14.0 |
| +1.40D+1.60H | 3 | 34.08 | 29.00 | -39.14 | 39.14 | 100.19 | 0.94 | 62.92 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.2 | 14.5 | 14.0 |
| +1.40D+1.60H | 3 | 34.56 | 29.00 | -45.66 | 45.66 | 79.84 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 3 | 35.04 | 29.00 | -52.18 | 52.18 | 56.36 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 3 | 35.52 | 29.00 | -58.70 | 58.70 | 29.74 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 3 | 36.00 | 29.00 | -65.23 | 65.23 | 0.00 | 1.00 | 63.18 | PhiVc < Vu | 2.051 | 100.5 | 14.5 | 14.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 12.000 | -187.90 | 303.64 | 0.62 |
| Span # 2 | 2 | 12.000 | -195.68 | 303.64 | 0.64 |
| Span # 3 | 3 | 12.000 | -195.68 | 303.64 | 0.64 |
| +1.40D+1.60H | | | | | |
| Span # 1 | 1 | 12.000 | -187.90 | 303.64 | 0.62 |
| Span # 2 | 2 | 12.000 | -195.68 | 303.64 | 0.64 |
| Span # 3 | 3 | 12.000 | -195.68 | 303.64 | 0.64 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 12.000 | -157.26 | 303.64 | 0.52 |
| Span # 2 | 2 | 12.000 | -177.33 | 303.64 | 0.58 |
| Span # 3 | 3 | 12.000 | -183.01 | 303.64 | 0.60 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 12.000 | -172.44 | 303.64 | 0.57 |

# Concrete Beam

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DESCRIPTION: GRBM - G1 - Under 10" PC Wall

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 2 | 2 | 12.000 | -179.19 | 303.64 | 0.59 |
| Span # 3 | 3 | 12.000 | -179.19 | 303.64 | 0.59 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 12.000 | -168.64 | 303.64 | 0.56 |
| Span # 2 | 2 | 12.000 | -188.03 | 303.64 | 0.62 |
| Span # 3 | 3 | 12.000 | -194.47 | 303.64 | 0.64 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 12.000 | -175.48 | 303.64 | 0.58 |
| Span # 2 | 2 | 12.000 | -183.01 | 303.64 | 0.60 |
| Span # 3 | 3 | 12.000 | -163.90 | 303.64 | 0.54 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 12.000 | -171.68 | 303.64 | 0.57 |
| Span # 2 | 2 | 12.000 | -179.19 | 303.64 | 0.59 |
| Span # 3 | 3 | 12.000 | -179.19 | 303.64 | 0.59 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 12.000 | -186.86 | 303.64 | 0.62 |
| Span # 2 | 2 | 12.000 | -194.47 | 303.64 | 0.64 |
| Span # 3 | 3 | 12.000 | -175.37 | 303.64 | 0.58 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 12.000 | -183.07 | 303.64 | 0.60 |
| Span # 2 | 2 | 12.000 | -190.65 | 303.64 | 0.63 |
| Span # 3 | 3 | 12.000 | -190.65 | 303.64 | 0.63 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 12.000 | -157.26 | 303.64 | 0.52 |
| Span # 2 | 2 | 12.000 | -177.33 | 303.64 | 0.58 |
| Span # 3 | 3 | 12.000 | -183.01 | 303.64 | 0.60 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 12.000 | -172.44 | 303.64 | 0.57 |
| Span # 2 | 2 | 12.000 | -179.19 | 303.64 | 0.59 |
| Span # 3 | 3 | 12.000 | -179.19 | 303.64 | 0.59 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 12.000 | -168.64 | 303.64 | 0.56 |
| Span # 2 | 2 | 12.000 | -188.03 | 303.64 | 0.62 |
| Span # 3 | 3 | 12.000 | -194.47 | 303.64 | 0.64 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 12.000 | -175.48 | 303.64 | 0.58 |
| Span # 2 | 2 | 12.000 | -183.01 | 303.64 | 0.60 |
| Span # 3 | 3 | 12.000 | -163.90 | 303.64 | 0.54 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 12.000 | -171.68 | 303.64 | 0.57 |
| Span # 2 | 2 | 12.000 | -179.19 | 303.64 | 0.59 |
| Span # 3 | 3 | 12.000 | -179.19 | 303.64 | 0.59 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 12.000 | -186.86 | 303.64 | 0.62 |
| Span # 2 | 2 | 12.000 | -194.47 | 303.64 | 0.64 |
| Span # 3 | 3 | 12.000 | -175.37 | 303.64 | 0.58 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 12.000 | -183.07 | 303.64 | 0.60 |
| Span # 2 | 2 | 12.000 | -190.65 | 303.64 | 0.63 |
| Span # 3 | 3 | 12.000 | -190.65 | 303.64 | 0.63 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 12.000 | -158.68 | 303.64 | 0.52 |
| Span # 2 | 2 | 12.000 | -171.64 | 303.64 | 0.57 |
| Span # 3 | 3 | 12.000 | -177.28 | 303.64 | 0.58 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 12.000 | -168.17 | 303.64 | 0.55 |
| Span # 2 | 2 | 12.000 | -174.89 | 303.64 | 0.58 |
| Span # 3 | 3 | 12.000 | -174.89 | 303.64 | 0.58 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 12.000 | -165.80 | 303.64 | 0.55 |
| Span # 2 | 2 | 12.000 | -178.33 | 303.64 | 0.59 |
| Span # 3 | 3 | 12.000 | -184.44 | 303.64 | 0.61 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 12.000 | -170.07 | 303.64 | 0.56 |
| Span # 2 | 2 | 12.000 | -177.28 | 303.64 | 0.58 |
| Span # 3 | 3 | 12.000 | -165.34 | 303.64 | 0.54 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 12.000 | -167.70 | 303.64 | 0.55 |
| Span # 2 | 2 | 12.000 | -174.89 | 303.64 | 0.58 |

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# Concrete Beam

DESCRIPTION: GRBM - G1 - Under 10" PC Wall

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 3 | 3 | 12.000 | -174.89 | 303.64 | 0.58 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 12.000 | -177.18 | 303.64 | 0.58 |
| Span # 2 | 2 | 12.000 | -184.44 | 303.64 | 0.61 |
| Span # 3 | 3 | 12.000 | -172.50 | 303.64 | 0.57 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 12.000 | -174.81 | 303.64 | 0.58 |
| Span # 2 | 2 | 12.000 | -182.05 | 303.64 | 0.60 |
| Span # 3 | 3 | 12.000 | -182.05 | 303.64 | 0.60 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 12.000 | -161.05 | 303.64 | 0.53 |
| Span # 2 | 2 | 12.000 | -167.73 | 303.64 | 0.55 |
| Span # 3 | 3 | 12.000 | -167.73 | 303.64 | 0.55 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 12.000 | -161.05 | 303.64 | 0.53 |
| Span # 2 | 2 | 12.000 | -167.73 | 303.64 | 0.55 |
| Span # 3 | 3 | 12.000 | -167.73 | 303.64 | 0.55 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 12.000 | -161.05 | 303.64 | 0.53 |
| Span # 2 | 2 | 12.000 | -167.73 | 303.64 | 0.55 |
| Span # 3 | 3 | 12.000 | -167.73 | 303.64 | 0.55 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 12.000 | -161.05 | 303.64 | 0.53 |
| Span # 2 | 2 | 12.000 | -167.73 | 303.64 | 0.55 |
| Span # 3 | 3 | 12.000 | -167.73 | 303.64 | 0.55 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 12.000 | -161.05 | 303.64 | 0.53 |
| Span # 2 | 2 | 12.000 | -167.73 | 303.64 | 0.55 |
| Span # 3 | 3 | 12.000 | -167.73 | 303.64 | 0.55 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 12.000 | -161.05 | 303.64 | 0.53 |
| Span # 2 | 2 | 12.000 | -167.73 | 303.64 | 0.55 |
| Span # 3 | 3 | 12.000 | -167.73 | 303.64 | 0.55 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 12.000 | -161.05 | 303.64 | 0.53 |
| Span # 2 | 2 | 12.000 | -167.73 | 303.64 | 0.55 |
| Span # 3 | 3 | 12.000 | -167.73 | 303.64 | 0.55 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 12.000 | -158.68 | 303.64 | 0.52 |
| Span # 2 | 2 | 12.000 | -171.64 | 303.64 | 0.57 |
| Span # 3 | 3 | 12.000 | -177.28 | 303.64 | 0.58 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 12.000 | -168.17 | 303.64 | 0.55 |
| Span # 2 | 2 | 12.000 | -174.89 | 303.64 | 0.58 |
| Span # 3 | 3 | 12.000 | -174.89 | 303.64 | 0.58 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 12.000 | -165.80 | 303.64 | 0.55 |
| Span # 2 | 2 | 12.000 | -178.33 | 303.64 | 0.59 |
| Span # 3 | 3 | 12.000 | -184.44 | 303.64 | 0.61 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 12.000 | -170.07 | 303.64 | 0.56 |
| Span # 2 | 2 | 12.000 | -177.28 | 303.64 | 0.58 |
| Span # 3 | 3 | 12.000 | -165.34 | 303.64 | 0.54 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 12.000 | -167.70 | 303.64 | 0.55 |
| Span # 2 | 2 | 12.000 | -174.89 | 303.64 | 0.58 |
| Span # 3 | 3 | 12.000 | -174.89 | 303.64 | 0.58 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 12.000 | -177.18 | 303.64 | 0.58 |
| Span # 2 | 2 | 12.000 | -184.44 | 303.64 | 0.61 |
| Span # 3 | 3 | 12.000 | -172.50 | 303.64 | 0.57 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 12.000 | -174.81 | 303.64 | 0.58 |
| Span # 2 | 2 | 12.000 | -182.05 | 303.64 | 0.60 |
| Span # 3 | 3 | 12.000 | -182.05 | 303.64 | 0.60 |
| +1.20D+1.60S+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 12.000 | -161.05 | 303.64 | 0.53 |
| Span # 2 | 2 | 12.000 | -167.73 | 303.64 | 0.55 |
| Span # 3 | 3 | 12.000 | -167.73 | 303.64 | 0.55 |

# Concrete Beam

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DESCRIPTION: GRBM - G1 - Under 10" PC Wall

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 12.000 | -158.68 | 303.64 | 0.52 |
| Span # 2 | 2 | 12.000 | -171.64 | 303.64 | 0.57 |
| Span # 3 | 3 | 12.000 | -177.28 | 303.64 | 0.58 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 12.000 | -168.17 | 303.64 | 0.55 |
| Span # 2 | 2 | 12.000 | -174.89 | 303.64 | 0.58 |
| Span # 3 | 3 | 12.000 | -174.89 | 303.64 | 0.58 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 12.000 | -165.80 | 303.64 | 0.55 |
| Span # 2 | 2 | 12.000 | -178.33 | 303.64 | 0.59 |
| Span # 3 | 3 | 12.000 | -184.44 | 303.64 | 0.61 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 12.000 | -170.07 | 303.64 | 0.56 |
| Span # 2 | 2 | 12.000 | -177.28 | 303.64 | 0.58 |
| Span # 3 | 3 | 12.000 | -165.34 | 303.64 | 0.54 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 12.000 | -167.70 | 303.64 | 0.55 |
| Span # 2 | 2 | 12.000 | -174.89 | 303.64 | 0.58 |
| Span # 3 | 3 | 12.000 | -174.89 | 303.64 | 0.58 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 12.000 | -177.18 | 303.64 | 0.58 |
| Span # 2 | 2 | 12.000 | -184.44 | 303.64 | 0.61 |
| Span # 3 | 3 | 12.000 | -172.50 | 303.64 | 0.57 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 12.000 | -174.81 | 303.64 | 0.58 |
| Span # 2 | 2 | 12.000 | -182.05 | 303.64 | 0.60 |
| Span # 3 | 3 | 12.000 | -182.05 | 303.64 | 0.60 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 12.000 | -158.68 | 303.64 | 0.52 |
| Span # 2 | 2 | 12.000 | -171.64 | 303.64 | 0.57 |
| Span # 3 | 3 | 12.000 | -177.28 | 303.64 | 0.58 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 12.000 | -168.17 | 303.64 | 0.55 |
| Span # 2 | 2 | 12.000 | -174.89 | 303.64 | 0.58 |
| Span # 3 | 3 | 12.000 | -174.89 | 303.64 | 0.58 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 12.000 | -165.80 | 303.64 | 0.55 |
| Span # 2 | 2 | 12.000 | -178.33 | 303.64 | 0.59 |
| Span # 3 | 3 | 12.000 | -184.44 | 303.64 | 0.61 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 12.000 | -170.07 | 303.64 | 0.56 |
| Span # 2 | 2 | 12.000 | -177.28 | 303.64 | 0.58 |
| Span # 3 | 3 | 12.000 | -165.34 | 303.64 | 0.54 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 12.000 | -167.70 | 303.64 | 0.55 |
| Span # 2 | 2 | 12.000 | -174.89 | 303.64 | 0.58 |
| Span # 3 | 3 | 12.000 | -174.89 | 303.64 | 0.58 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 12.000 | -177.18 | 303.64 | 0.58 |
| Span # 2 | 2 | 12.000 | -184.44 | 303.64 | 0.61 |
| Span # 3 | 3 | 12.000 | -172.50 | 303.64 | 0.57 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 12.000 | -174.81 | 303.64 | 0.58 |
| Span # 2 | 2 | 12.000 | -182.05 | 303.64 | 0.60 |
| Span # 3 | 3 | 12.000 | -182.05 | 303.64 | 0.60 |
| +0.90D+W+1.60H | | | | | |
| Span # 1 | 1 | 12.000 | -120.79 | 303.64 | 0.40 |
| Span # 2 | 2 | 12.000 | -125.79 | 303.64 | 0.41 |
| Span # 3 | 3 | 12.000 | -125.79 | 303.64 | 0.41 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 12.000 | -158.68 | 303.64 | 0.52 |
| Span # 2 | 2 | 12.000 | -171.64 | 303.64 | 0.57 |
| Span # 3 | 3 | 12.000 | -177.28 | 303.64 | 0.58 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 12.000 | -168.17 | 303.64 | 0.55 |
| Span # 2 | 2 | 12.000 | -174.89 | 303.64 | 0.58 |
| Span # 3 | 3 | 12.000 | -174.89 | 303.64 | 0.58 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (*LL) | | | | | |

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# Concrete Beam

DESCRIPTION: GRBM - G1 - Under 10" PC Wall

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 1 | 1 | 12.000 | -165.80 | 303.64 | 0.55 |
| Span # 2 | 2 | 12.000 | -178.33 | 303.64 | 0.59 |
| Span # 3 | 3 | 12.000 | -184.44 | 303.64 | 0.61 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 12.000 | -170.07 | 303.64 | 0.56 |
| Span # 2 | 2 | 12.000 | -177.28 | 303.64 | 0.58 |
| Span # 3 | 3 | 12.000 | -165.34 | 303.64 | 0.54 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 12.000 | -167.70 | 303.64 | 0.55 |
| Span # 2 | 2 | 12.000 | -174.89 | 303.64 | 0.58 |
| Span # 3 | 3 | 12.000 | -174.89 | 303.64 | 0.58 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 12.000 | -177.18 | 303.64 | 0.58 |
| Span # 2 | 2 | 12.000 | -184.44 | 303.64 | 0.61 |
| Span # 3 | 3 | 12.000 | -172.50 | 303.64 | 0.57 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 12.000 | -174.81 | 303.64 | 0.58 |
| Span # 2 | 2 | 12.000 | -182.05 | 303.64 | 0.60 |
| Span # 3 | 3 | 12.000 | -182.05 | 303.64 | 0.60 |
| +0.90D+E+0.90H | | | | | |
| Span # 1 | 1 | 12.000 | -120.79 | 303.64 | 0.40 |
| Span # 2 | 2 | 12.000 | -125.79 | 303.64 | 0.41 |
| Span # 3 | 3 | 12.000 | -125.79 | 303.64 | 0.41 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H, LL Comb Run (L*L) | 1 | 0.0134 | 5.520 | +D+L+H, LL Comb Run (L*L) | -0.0003 | 12.240 |
| +D+L+H, LL Comb Run (*L*) | 2 | 0.0021 | 6.000 | +D+L+H, LL Comb Run (L*L) | -0.0012 | 10.320 |
| +D+L+H, LL Comb Run (L*L) | 3 | 0.0134 | 6.480 | | 0.0000 | 10.320 |

# Concrete Beam

File: FWI2101 - Paragon Star.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

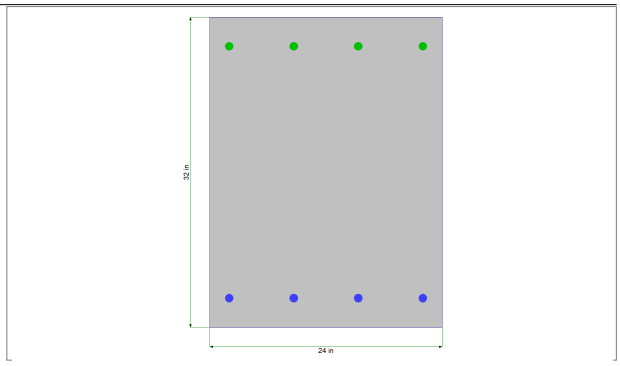
DESCRIPTION: GRBM - GA + GC - Under 10" PC Wall

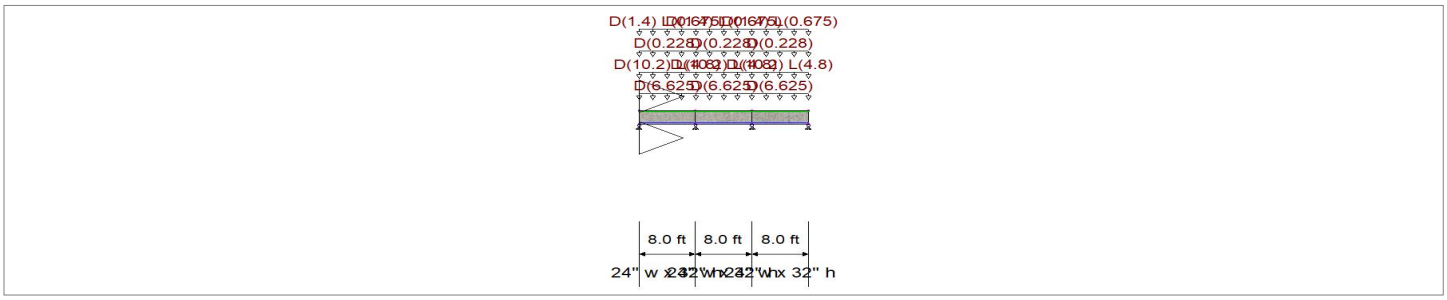
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 3.50 ksi | $\phi$ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 443.706 psi | | Shear : | 0.750 |
| $\psi$ Density | = | 145.0 pcf | $\beta_1$ | = | 0.850 |
| $\lambda$ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 3,122.0 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup | = | 2 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 24.0 in, Height = 32.0 in

Span #1 Reinforcing....
- 4-#7 at 3.0 in from Bottom, from 0.0 to 8.0 ft in this span
- 4-#7 at 3.0 in from Top, from 0.0 to 8.0 ft in this span

Span #2 Reinforcing....
- 4-#7 at 3.0 in from Bottom, from 0.0 to 8.0 ft in this span
- 4-#7 at 3.0 in from Top, from 0.0 to 8.0 ft in this span

Span #3 Reinforcing....
- 4-#7 at 3.0 in from Bottom, from 0.0 to 8.0 ft in this span
- 4-#7 at 3.0 in from Top, from 0.0 to 8.0 ft in this span

Beam self weight calculated and added to loads

Load for Span Number 1
- Uniform Load : D = 0.1250 ksf, Tributary Width = 53.0 ft, (10" PC Wall - With Opngs)
- Uniform Load : D = 0.0850, L = 0.040 ksf, Tributary Width = 120.0 ft, (4-Floors)
- Uniform Load : D = 0.0570 ksf, Tributary Width = 4.0 ft, (Wash - 4-Floors)
- Uniform Load : D = 1.40, L = 0.6750 k/ft, Tributary Width = 1.0 ft, (Apartment)

Load for Span Number 2
- Uniform Load : D = 0.1250 ksf, Tributary Width = 53.0 ft, (10" PC Wall - With Opngs)
- Uniform Load : D = 0.0850, L = 0.040 ksf, Tributary Width = 120.0 ft, (4-Floors)
- Uniform Load : D = 0.0570 ksf, Tributary Width = 4.0 ft, (Wash - 4-Floors)
- Uniform Load : D = 1.40, L = 0.6750 k/ft, Tributary Width = 1.0 ft, (Apartment)

Load for Span Number 3
- Uniform Load : D = 0.1250 ksf, Tributary Width = 53.0 ft, (10" PC Wall - With Opngs)
- Uniform Load : D = 0.0850, L = 0.040 ksf, Tributary Width = 120.0 ft, (4-Floors)
- Uniform Load : D = 0.0570 ksf, Tributary Width = 4.0 ft, (Wash - 4-Floors)
- Uniform Load : D = 1.40, L = 0.6750 k/ft, Tributary Width = 1.0 ft, (Apartment)

# Concrete Beam

File: FWI2101 - Paragon Star.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403 — Bob D. Campbell and Co., Inc.

DESCRIPTION: GRBM - GA + GC - Under 10" PC Wall

## DESIGN SUMMARY

**Design OK**

| | | | | | | |
|---|---|---|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.702** : 1 | | Maximum Deflection | | | |
| Section used for this span | **Typical Section** | | Max Downward Transient Deflection | 0.002 in | Ratio = | 51310 >=360. |
| Mu : Applied | -213.066 k-ft | | Max Upward Transient Deflection | -0.001 in | Ratio = | 81229 >=360. |
| Mn * Phi : Allowable | 303.639 k-ft | | Max Downward Total Deflection | 0.006 in | Ratio = | 14920 >=180. |
| Location of maximum on span | 0.000 ft | | Max Upward Total Deflection | 0.000 in | Ratio = | 0 <180.0 |
| Span # where maximum occurs | Span # 3 | | | | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| Overall MAXimum | 81.234 | 221.752 | 221.752 | 81.234 |
| Overall MINimum | 0.730 | -4.380 | -4.380 | 0.730 |
| +D+H | 61.524 | 169.192 | 169.192 | 61.524 |
| +D+L+H, LL Comb Run (**L) | 62.254 | 164.812 | 197.662 | 80.504 |
| +D+L+H, LL Comb Run (*L*) | 59.334 | 193.282 | 193.282 | 59.334 |
| +D+L+H, LL Comb Run (*LL) | 60.064 | 188.902 | 221.752 | 78.314 |
| +D+L+H, LL Comb Run (L**) | 80.504 | 197.662 | 164.812 | 62.254 |
| +D+L+H, LL Comb Run (L*L) | 81.234 | 193.282 | 193.282 | 81.234 |
| +D+L+H, LL Comb Run (LL*) | 78.314 | 221.752 | 188.902 | 60.064 |
| +D+L+H, LL Comb Run (LLL) | 79.044 | 217.372 | 217.372 | 79.044 |
| +D+Lr+H, LL Comb Run (**L) | 61.524 | 169.192 | 169.192 | 61.524 |
| +D+Lr+H, LL Comb Run (*L*) | 61.524 | 169.192 | 169.192 | 61.524 |
| +D+Lr+H, LL Comb Run (*LL) | 61.524 | 169.192 | 169.192 | 61.524 |
| +D+Lr+H, LL Comb Run (L**) | 61.524 | 169.192 | 169.192 | 61.524 |
| +D+Lr+H, LL Comb Run (L*L) | 61.524 | 169.192 | 169.192 | 61.524 |
| +D+Lr+H, LL Comb Run (LL*) | 61.524 | 169.192 | 169.192 | 61.524 |
| +D+Lr+H, LL Comb Run (LLL) | 61.524 | 169.192 | 169.192 | 61.524 |
| +D+S+H | 61.524 | 169.192 | 169.192 | 61.524 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 62.072 | 165.907 | 190.544 | 75.759 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 59.882 | 187.259 | 187.259 | 59.882 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 60.429 | 183.974 | 208.612 | 74.117 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 75.759 | 190.544 | 165.907 | 62.072 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 76.307 | 187.259 | 187.259 | 76.307 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 74.117 | 208.612 | 183.974 | 60.429 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 74.664 | 205.327 | 205.327 | 74.664 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 62.072 | 165.907 | 190.544 | 75.759 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 59.882 | 187.259 | 187.259 | 59.882 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 60.429 | 183.974 | 208.612 | 74.117 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 75.759 | 190.544 | 165.907 | 62.072 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 76.307 | 187.259 | 187.259 | 76.307 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 74.117 | 208.612 | 183.974 | 60.429 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 74.664 | 205.327 | 205.327 | 74.664 |
| +D+0.60W+H | 61.524 | 169.192 | 169.192 | 61.524 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 62.072 | 165.907 | 190.544 | 75.759 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 59.882 | 187.259 | 187.259 | 59.882 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 60.429 | 183.974 | 208.612 | 74.117 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 75.759 | 190.544 | 165.907 | 62.072 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 76.307 | 187.259 | 187.259 | 76.307 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 74.117 | 208.612 | 183.974 | 60.429 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 74.664 | 205.327 | 205.327 | 74.664 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 62.072 | 165.907 | 190.544 | 75.759 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 59.882 | 187.259 | 187.259 | 59.882 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 60.429 | 183.974 | 208.612 | 74.117 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 75.759 | 190.544 | 165.907 | 62.072 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 76.307 | 187.259 | 187.259 | 76.307 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 74.117 | 208.612 | 183.974 | 60.429 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 74.664 | 205.327 | 205.327 | 74.664 |
| +0.60D+0.60W+0.60H | 36.915 | 101.515 | 101.515 | 36.915 |
| +D+0.70E+0.60H | 61.524 | 169.192 | 169.192 | 61.524 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 62.072 | 165.907 | 190.544 | 75.759 |

# Concrete Beam

File: FWI2101 - Paragon Star.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: GRBM - GA + GC - Under 10" PC Wall

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| +D+0.750L+0.750S+0.5250E+H, LL Com | 59.882 | 187.259 | 187.259 | 59.882 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 60.429 | 183.974 | 208.612 | 74.117 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 75.759 | 190.544 | 165.907 | 62.072 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 76.307 | 187.259 | 187.259 | 76.307 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 74.117 | 208.612 | 183.974 | 60.429 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 74.664 | 205.327 | 205.327 | 74.664 |
| +0.60D+0.70E+H | 36.915 | 101.515 | 101.515 | 36.915 |
| D Only | 61.524 | 169.192 | 169.192 | 61.524 |
| L Only, LL Comb Run (**L) | 0.730 | -4.380 | 28.470 | 18.980 |
| L Only, LL Comb Run (*L*) | -2.190 | 24.090 | 24.090 | -2.190 |
| L Only, LL Comb Run (*LL) | -1.460 | 19.710 | 52.560 | 16.790 |
| L Only, LL Comb Run (L**) | 18.980 | 28.470 | -4.380 | 0.730 |
| L Only, LL Comb Run (L*L) | 19.710 | 24.090 | 24.090 | 19.710 |
| L Only, LL Comb Run (LL*) | 16.790 | 52.560 | 19.710 | -1.460 |
| L Only, LL Comb Run (LLL) | 17.520 | 48.180 | 48.180 | 17.520 |
| H Only | | | | |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.00 | 29.00 | 105.37 | 105.37 | 0.00 | 1.00 | 63.18 | PhiVc < Vu | 42.189 | 106.7 | 12.4 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.32 | 29.00 | 95.18 | 95.18 | 32.09 | 1.00 | 63.18 | PhiVc < Vu | 32.003 | 106.7 | 14.5 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.64 | 29.00 | 84.99 | 84.99 | 60.91 | 1.00 | 63.18 | PhiVc < Vu | 21.817 | 106.7 | 14.5 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.96 | 29.00 | 74.81 | 74.81 | 86.48 | 1.00 | 63.18 | PhiVc < Vu | 11.631 | 106.7 | 14.5 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.28 | 29.00 | 64.62 | 64.62 | 108.79 | 1.00 | 63.18 | PhiVc < Vu | 1.445 | 106.7 | 14.5 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.60 | 29.00 | 54.43 | 54.43 | 127.84 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.92 | 29.00 | 44.25 | 44.25 | 143.63 | 0.74 | 62.03 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 99.3 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.24 | 29.00 | 34.06 | 34.06 | 156.16 | 0.53 | 61.05 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 98.3 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.56 | 29.00 | 23.88 | 23.88 | 165.43 | 0.35 | 60.25 | Vu < PhiVc/2 | lot Reqd 9.6. | 60.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.88 | 29.00 | 13.69 | 13.69 | 171.44 | 0.19 | 59.54 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.20 | 29.00 | 3.50 | 3.50 | 174.19 | 0.05 | 58.89 | Vu < PhiVc/2 | lot Reqd 9.6. | 58.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.52 | 29.00 | -11.35 | 11.35 | 157.24 | 0.17 | 59.46 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.84 | 29.00 | -21.54 | 21.54 | 151.97 | 0.34 | 60.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 60.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.16 | 29.00 | -31.73 | 31.73 | 143.45 | 0.53 | 61.08 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 98.4 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.48 | 29.00 | -41.91 | 41.91 | 131.67 | 0.77 | 62.14 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 99.4 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.80 | 29.00 | -52.10 | 52.10 | 116.63 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.12 | 29.00 | -62.28 | 62.28 | 98.33 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.44 | 29.00 | -72.47 | 72.47 | 76.76 | 1.00 | 63.18 | PhiVc < Vu | 9.295 | 167.6 | 14.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.76 | 29.00 | -82.66 | 82.66 | 51.94 | 1.00 | 63.18 | PhiVc < Vu | 19.481 | 167.6 | 14.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 6.08 | 29.00 | -92.84 | 92.84 | 23.86 | 1.00 | 63.18 | PhiVc < Vu | 29.667 | 167.6 | 14.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 6.40 | 29.00 | -103.03 | 103.03 | 7.48 | 1.00 | 63.18 | PhiVc < Vu | 39.853 | 167.6 | 13.1 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 6.72 | 29.00 | -113.22 | 113.22 | 42.07 | 1.00 | 63.18 | PhiVc < Vu | 50.040 | 167.6 | 10.4 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 7.04 | 29.00 | -123.40 | 123.40 | 79.93 | 1.00 | 63.18 | PhiVc < Vu | 60.226 | 167.6 | 8.7 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 7.36 | 29.00 | -133.59 | 133.59 | 121.05 | 1.00 | 63.18 | PhiVc < Vu | 70.412 | 167.6 | 7.4 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 7.68 | 29.00 | -143.77 | 143.77 | 165.43 | 1.00 | 63.18 | PhiVc < Vu | 80.598 | 167.6 | 6.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 8.00 | 29.00 | 133.17 | 133.17 | 213.07 | 1.00 | 63.18 | PhiVc < Vu | 69.991 | 167.6 | 7.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 8.32 | 29.00 | 122.98 | 122.98 | 172.08 | 1.00 | 63.18 | PhiVc < Vu | 59.805 | 167.6 | 8.7 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 8.64 | 29.00 | 112.79 | 112.79 | 134.36 | 1.00 | 63.18 | PhiVc < Vu | 49.619 | 167.6 | 10.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 8.96 | 29.00 | 102.61 | 102.61 | 99.89 | 1.00 | 63.18 | PhiVc < Vu | 39.432 | 167.6 | 13.2 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 9.28 | 29.00 | 92.42 | 92.42 | 68.69 | 1.00 | 63.18 | PhiVc < Vu | 29.246 | 167.6 | 14.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 9.60 | 29.00 | 82.24 | 82.24 | 40.74 | 1.00 | 63.18 | PhiVc < Vu | 19.060 | 167.6 | 14.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 9.92 | 29.00 | 72.05 | 72.05 | 16.06 | 1.00 | 63.18 | PhiVc < Vu | 8.874 | 167.6 | 14.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 10.24 | 29.00 | 61.86 | 61.86 | 5.37 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 10.56 | 29.00 | 51.68 | 51.68 | 23.53 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 10.88 | 29.00 | 41.49 | 41.49 | 38.44 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 11.20 | 29.00 | 31.31 | 31.31 | 50.09 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 11.52 | 29.00 | 21.12 | 21.12 | 58.48 | 0.87 | 62.60 | Vu < PhiVc/2 | lot Reqd 9.6. | 62.6 | 0.0 | 0.0 |

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# Concrete Beam

DESCRIPTION: GRBM - GA + GC - Under 10" PC Wall

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 11.84 | 29.00 | 10.93 | 10.93 | 63.60 | 0.42 | 60.54 | Vu < PhiVc/2 | lot Reqd 9.6. | 60.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 12.16 | 29.00 | -10.93 | 10.93 | 63.60 | 0.42 | 60.54 | Vu < PhiVc/2 | lot Reqd 9.6. | 60.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 12.48 | 29.00 | -21.12 | 21.12 | 58.48 | 0.87 | 62.60 | Vu < PhiVc/2 | lot Reqd 9.6. | 62.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 12.80 | 29.00 | -31.31 | 31.31 | 50.09 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 13.12 | 29.00 | -41.49 | 41.49 | 38.44 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 13.44 | 29.00 | -51.68 | 51.68 | 23.53 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 13.76 | 29.00 | -61.86 | 61.86 | 5.37 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 14.08 | 29.00 | -72.05 | 72.05 | 16.06 | 1.00 | 63.18 | PhiVc < Vu | 8.874 | 167.6 | 14.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 14.40 | 29.00 | -82.24 | 82.24 | 40.74 | 1.00 | 63.18 | PhiVc < Vu | 19.060 | 167.6 | 14.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 14.72 | 29.00 | -92.42 | 92.42 | 68.69 | 1.00 | 63.18 | PhiVc < Vu | 29.246 | 167.6 | 14.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 15.04 | 29.00 | -102.61 | 102.61 | 99.89 | 1.00 | 63.18 | PhiVc < Vu | 39.432 | 167.6 | 13.2 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 15.36 | 29.00 | -112.79 | 112.79 | 134.36 | 1.00 | 63.18 | PhiVc < Vu | 49.619 | 167.6 | 10.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 15.68 | 29.00 | -122.98 | 122.98 | 172.08 | 1.00 | 63.18 | PhiVc < Vu | 59.805 | 167.6 | 8.7 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 16.00 | 29.00 | 153.96 | 153.96 | 213.07 | 1.00 | 63.18 | PhiVc < Vu | 90.784 | 167.6 | 5.7 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 16.32 | 29.00 | 143.77 | 143.77 | 165.43 | 1.00 | 63.18 | PhiVc < Vu | 80.598 | 167.6 | 6.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 16.64 | 29.00 | 133.59 | 133.59 | 121.05 | 1.00 | 63.18 | PhiVc < Vu | 70.412 | 167.6 | 7.4 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 16.96 | 29.00 | 123.40 | 123.40 | 79.93 | 1.00 | 63.18 | PhiVc < Vu | 60.226 | 167.6 | 8.7 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 17.28 | 29.00 | 113.22 | 113.22 | 42.07 | 1.00 | 63.18 | PhiVc < Vu | 50.040 | 167.6 | 10.4 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 17.60 | 29.00 | 103.03 | 103.03 | 7.48 | 1.00 | 63.18 | PhiVc < Vu | 39.853 | 167.6 | 13.1 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 17.92 | 29.00 | 92.84 | 92.84 | 23.86 | 1.00 | 63.18 | PhiVc < Vu | 29.667 | 167.6 | 14.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 18.24 | 29.00 | 82.66 | 82.66 | 51.94 | 1.00 | 63.18 | PhiVc < Vu | 19.481 | 167.6 | 14.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 18.56 | 29.00 | 72.47 | 72.47 | 76.76 | 1.00 | 63.18 | PhiVc < Vu | 9.295 | 167.6 | 14.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 18.88 | 29.00 | 62.28 | 62.28 | 98.33 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 19.20 | 29.00 | 52.10 | 52.10 | 116.63 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 19.52 | 29.00 | 41.91 | 41.91 | 131.67 | 0.77 | 62.14 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 99.4 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 19.84 | 29.00 | 31.73 | 31.73 | 143.45 | 0.53 | 61.08 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 98.4 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 20.16 | 29.00 | 21.54 | 21.54 | 151.97 | 0.34 | 60.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 60.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 20.48 | 29.00 | 11.35 | 11.35 | 157.24 | 0.17 | 59.46 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 20.80 | 29.00 | -3.50 | 3.50 | 174.19 | 0.05 | 58.89 | Vu < PhiVc/2 | lot Reqd 9.6. | 58.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 21.12 | 29.00 | -13.69 | 13.69 | 171.44 | 0.19 | 59.54 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 21.44 | 29.00 | -23.88 | 23.88 | 165.43 | 0.35 | 60.25 | Vu < PhiVc/2 | lot Reqd 9.6. | 60.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 21.76 | 29.00 | -34.06 | 34.06 | 156.16 | 0.53 | 61.05 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 98.3 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 22.08 | 29.00 | -44.25 | 44.25 | 143.63 | 0.74 | 62.03 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 99.3 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 22.40 | 29.00 | -54.43 | 54.43 | 127.84 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 22.72 | 29.00 | -64.62 | 64.62 | 108.79 | 1.00 | 63.18 | PhiVc < Vu | 1.445 | 106.7 | 14.5 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 23.04 | 29.00 | -74.81 | 74.81 | 86.48 | 1.00 | 63.18 | PhiVc < Vu | 11.631 | 106.7 | 14.5 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 23.36 | 29.00 | -84.99 | 84.99 | 60.91 | 1.00 | 63.18 | PhiVc < Vu | 21.817 | 106.7 | 14.5 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 23.68 | 29.00 | -95.18 | 95.18 | 32.09 | 1.00 | 63.18 | PhiVc < Vu | 32.003 | 106.7 | 14.5 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 24.00 | 29.00 | -105.37 | 105.37 | 0.00 | 1.00 | 63.18 | PhiVc < Vu | 42.189 | 106.7 | 12.4 | 12.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 8.000 | -204.90 | 303.64 | 0.67 |
| Span # 2 | 2 | 8.000 | -213.07 | 303.64 | 0.70 |
| Span # 3 | 3 | 8.000 | -213.07 | 303.64 | 0.70 |
| +1.40D+1.60H | | | | | |
| Span # 1 | 1 | 8.000 | -165.42 | 303.64 | 0.54 |
| Span # 2 | 2 | 8.000 | -172.27 | 303.64 | 0.57 |
| Span # 3 | 3 | 8.000 | -172.27 | 303.64 | 0.57 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 8.000 | -132.50 | 303.64 | 0.44 |
| Span # 2 | 2 | 8.000 | -179.83 | 303.64 | 0.59 |
| Span # 3 | 3 | 8.000 | -185.03 | 303.64 | 0.61 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 8.000 | -169.63 | 303.64 | 0.56 |

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DESCRIPTION: GRBM - GA + GC - Under 10" PC Wall

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 2 | 2 | 8.000 | -175.69 | 303.64 | 0.58 |
| Span # 3 | 3 | 8.000 | -175.69 | 303.64 | 0.58 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 8.000 | -160.35 | 303.64 | 0.53 |
| Span # 2 | 2 | 8.000 | -206.01 | 303.64 | 0.68 |
| Span # 3 | 3 | 8.000 | -213.07 | 303.64 | 0.70 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 8.000 | -177.06 | 303.64 | 0.58 |
| Span # 2 | 2 | 8.000 | -185.03 | 303.64 | 0.61 |
| Span # 3 | 3 | 8.000 | -138.31 | 303.64 | 0.46 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 8.000 | 174.38 | 303.64 | 0.57 |
| Span # 2 | 2 | 8.000 | -175.69 | 303.64 | 0.58 |
| Span # 3 | 3 | 8.000 | -175.69 | 303.64 | 0.58 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 8.000 | -204.90 | 303.64 | 0.67 |
| Span # 2 | 2 | 8.000 | -213.07 | 303.64 | 0.70 |
| Span # 3 | 3 | 8.000 | -166.35 | 303.64 | 0.55 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 8.000 | -195.62 | 303.64 | 0.64 |
| Span # 2 | 2 | 8.000 | -203.72 | 303.64 | 0.67 |
| Span # 3 | 3 | 8.000 | -203.72 | 303.64 | 0.67 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 8.000 | -132.50 | 303.64 | 0.44 |
| Span # 2 | 2 | 8.000 | -179.83 | 303.64 | 0.59 |
| Span # 3 | 3 | 8.000 | -185.03 | 303.64 | 0.61 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 8.000 | -169.63 | 303.64 | 0.56 |
| Span # 2 | 2 | 8.000 | -175.69 | 303.64 | 0.58 |
| Span # 3 | 3 | 8.000 | -175.69 | 303.64 | 0.58 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 8.000 | -160.35 | 303.64 | 0.53 |
| Span # 2 | 2 | 8.000 | -206.01 | 303.64 | 0.68 |
| Span # 3 | 3 | 8.000 | -213.07 | 303.64 | 0.70 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 8.000 | -177.06 | 303.64 | 0.58 |
| Span # 2 | 2 | 8.000 | -185.03 | 303.64 | 0.61 |
| Span # 3 | 3 | 8.000 | -138.31 | 303.64 | 0.46 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 8.000 | 174.38 | 303.64 | 0.57 |
| Span # 2 | 2 | 8.000 | -175.69 | 303.64 | 0.58 |
| Span # 3 | 3 | 8.000 | -175.69 | 303.64 | 0.58 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 8.000 | -204.90 | 303.64 | 0.67 |
| Span # 2 | 2 | 8.000 | -213.07 | 303.64 | 0.70 |
| Span # 3 | 3 | 8.000 | -166.35 | 303.64 | 0.55 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 8.000 | -195.62 | 303.64 | 0.64 |
| Span # 2 | 2 | 8.000 | -203.72 | 303.64 | 0.67 |
| Span # 3 | 3 | 8.000 | -203.72 | 303.64 | 0.67 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 8.000 | -135.98 | 303.64 | 0.45 |
| Span # 2 | 2 | 8.000 | -165.93 | 303.64 | 0.55 |
| Span # 3 | 3 | 8.000 | -171.02 | 303.64 | 0.56 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 8.000 | -159.19 | 303.64 | 0.52 |
| Span # 2 | 2 | 8.000 | -165.18 | 303.64 | 0.54 |
| Span # 3 | 3 | 8.000 | -165.18 | 303.64 | 0.54 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 8.000 | -153.39 | 303.64 | 0.51 |
| Span # 2 | 2 | 8.000 | -182.29 | 303.64 | 0.60 |
| Span # 3 | 3 | 8.000 | -188.54 | 303.64 | 0.62 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 8.000 | -163.83 | 303.64 | 0.54 |
| Span # 2 | 2 | 8.000 | -171.02 | 303.64 | 0.56 |
| Span # 3 | 3 | 8.000 | -141.82 | 303.64 | 0.47 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 8.000 | -158.03 | 303.64 | 0.52 |
| Span # 2 | 2 | 8.000 | -165.18 | 303.64 | 0.54 |

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# Concrete Beam

DESCRIPTION: GRBM - GA + GC - Under 10" PC Wall

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 3 | 3 | 8.000 | -165.18 | 303.64 | 0.54 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 8.000 | -181.23 | 303.64 | 0.60 |
| Span # 2 | 2 | 8.000 | -188.54 | 303.64 | 0.62 |
| Span # 3 | 3 | 8.000 | -159.34 | 303.64 | 0.52 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 8.000 | -175.43 | 303.64 | 0.58 |
| Span # 2 | 2 | 8.000 | -182.70 | 303.64 | 0.60 |
| Span # 3 | 3 | 8.000 | -182.70 | 303.64 | 0.60 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 8.000 | -141.78 | 303.64 | 0.47 |
| Span # 2 | 2 | 8.000 | -147.66 | 303.64 | 0.49 |
| Span # 3 | 3 | 8.000 | -147.66 | 303.64 | 0.49 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 8.000 | -141.78 | 303.64 | 0.47 |
| Span # 2 | 2 | 8.000 | -147.66 | 303.64 | 0.49 |
| Span # 3 | 3 | 8.000 | -147.66 | 303.64 | 0.49 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 8.000 | -141.78 | 303.64 | 0.47 |
| Span # 2 | 2 | 8.000 | -147.66 | 303.64 | 0.49 |
| Span # 3 | 3 | 8.000 | -147.66 | 303.64 | 0.49 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 8.000 | -141.78 | 303.64 | 0.47 |
| Span # 2 | 2 | 8.000 | -147.66 | 303.64 | 0.49 |
| Span # 3 | 3 | 8.000 | -147.66 | 303.64 | 0.49 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 8.000 | -141.78 | 303.64 | 0.47 |
| Span # 2 | 2 | 8.000 | -147.66 | 303.64 | 0.49 |
| Span # 3 | 3 | 8.000 | -147.66 | 303.64 | 0.49 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 8.000 | -141.78 | 303.64 | 0.47 |
| Span # 2 | 2 | 8.000 | -147.66 | 303.64 | 0.49 |
| Span # 3 | 3 | 8.000 | -147.66 | 303.64 | 0.49 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 8.000 | -141.78 | 303.64 | 0.47 |
| Span # 2 | 2 | 8.000 | -147.66 | 303.64 | 0.49 |
| Span # 3 | 3 | 8.000 | -147.66 | 303.64 | 0.49 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 8.000 | -135.98 | 303.64 | 0.45 |
| Span # 2 | 2 | 8.000 | -165.93 | 303.64 | 0.55 |
| Span # 3 | 3 | 8.000 | -171.02 | 303.64 | 0.56 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 8.000 | -159.19 | 303.64 | 0.52 |
| Span # 2 | 2 | 8.000 | -165.18 | 303.64 | 0.54 |
| Span # 3 | 3 | 8.000 | -165.18 | 303.64 | 0.54 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 8.000 | -153.39 | 303.64 | 0.51 |
| Span # 2 | 2 | 8.000 | -182.29 | 303.64 | 0.60 |
| Span # 3 | 3 | 8.000 | -188.54 | 303.64 | 0.62 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 8.000 | -163.83 | 303.64 | 0.54 |
| Span # 2 | 2 | 8.000 | -171.02 | 303.64 | 0.56 |
| Span # 3 | 3 | 8.000 | -141.82 | 303.64 | 0.47 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 8.000 | -158.03 | 303.64 | 0.52 |
| Span # 2 | 2 | 8.000 | -165.18 | 303.64 | 0.54 |
| Span # 3 | 3 | 8.000 | -165.18 | 303.64 | 0.54 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 8.000 | -181.23 | 303.64 | 0.60 |
| Span # 2 | 2 | 8.000 | -188.54 | 303.64 | 0.62 |
| Span # 3 | 3 | 8.000 | -159.34 | 303.64 | 0.52 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 8.000 | -175.43 | 303.64 | 0.58 |
| Span # 2 | 2 | 8.000 | -182.70 | 303.64 | 0.60 |
| Span # 3 | 3 | 8.000 | -182.70 | 303.64 | 0.60 |
| +1.20D+1.60S+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 8.000 | -141.78 | 303.64 | 0.47 |
| Span # 2 | 2 | 8.000 | -147.66 | 303.64 | 0.49 |
| Span # 3 | 3 | 8.000 | -147.66 | 303.64 | 0.49 |

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# Concrete Beam

DESCRIPTION: GRBM - GA + GC - Under 10" PC Wall

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 8.000 | -135.98 | 303.64 | 0.45 |
| Span # 2 | 2 | 8.000 | -165.93 | 303.64 | 0.55 |
| Span # 3 | 3 | 8.000 | -171.02 | 303.64 | 0.56 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 8.000 | -159.19 | 303.64 | 0.52 |
| Span # 2 | 2 | 8.000 | -165.18 | 303.64 | 0.54 |
| Span # 3 | 3 | 8.000 | -165.18 | 303.64 | 0.54 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 8.000 | -153.39 | 303.64 | 0.51 |
| Span # 2 | 2 | 8.000 | -182.29 | 303.64 | 0.60 |
| Span # 3 | 3 | 8.000 | -188.54 | 303.64 | 0.62 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 8.000 | -163.83 | 303.64 | 0.54 |
| Span # 2 | 2 | 8.000 | -171.02 | 303.64 | 0.56 |
| Span # 3 | 3 | 8.000 | -141.82 | 303.64 | 0.47 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 8.000 | -158.03 | 303.64 | 0.52 |
| Span # 2 | 2 | 8.000 | -165.18 | 303.64 | 0.54 |
| Span # 3 | 3 | 8.000 | -165.18 | 303.64 | 0.54 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 8.000 | -181.23 | 303.64 | 0.60 |
| Span # 2 | 2 | 8.000 | -188.54 | 303.64 | 0.62 |
| Span # 3 | 3 | 8.000 | -159.34 | 303.64 | 0.52 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 8.000 | -175.43 | 303.64 | 0.58 |
| Span # 2 | 2 | 8.000 | -182.70 | 303.64 | 0.60 |
| Span # 3 | 3 | 8.000 | -182.70 | 303.64 | 0.60 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 8.000 | -135.98 | 303.64 | 0.45 |
| Span # 2 | 2 | 8.000 | -165.93 | 303.64 | 0.55 |
| Span # 3 | 3 | 8.000 | -171.02 | 303.64 | 0.56 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 8.000 | -159.19 | 303.64 | 0.52 |
| Span # 2 | 2 | 8.000 | -165.18 | 303.64 | 0.54 |
| Span # 3 | 3 | 8.000 | -165.18 | 303.64 | 0.54 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 8.000 | -153.39 | 303.64 | 0.51 |
| Span # 2 | 2 | 8.000 | -182.29 | 303.64 | 0.60 |
| Span # 3 | 3 | 8.000 | -188.54 | 303.64 | 0.62 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 8.000 | -163.83 | 303.64 | 0.54 |
| Span # 2 | 2 | 8.000 | -171.02 | 303.64 | 0.56 |
| Span # 3 | 3 | 8.000 | -141.82 | 303.64 | 0.47 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 8.000 | -158.03 | 303.64 | 0.52 |
| Span # 2 | 2 | 8.000 | -165.18 | 303.64 | 0.54 |
| Span # 3 | 3 | 8.000 | -165.18 | 303.64 | 0.54 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 8.000 | -181.23 | 303.64 | 0.60 |
| Span # 2 | 2 | 8.000 | -188.54 | 303.64 | 0.62 |
| Span # 3 | 3 | 8.000 | -159.34 | 303.64 | 0.52 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 8.000 | -175.43 | 303.64 | 0.58 |
| Span # 2 | 2 | 8.000 | -182.70 | 303.64 | 0.60 |
| Span # 3 | 3 | 8.000 | -182.70 | 303.64 | 0.60 |
| +0.90D+W+1.60H | | | | | |
| Span # 1 | 1 | 8.000 | -106.34 | 303.64 | 0.35 |
| Span # 2 | 2 | 8.000 | -110.74 | 303.64 | 0.36 |
| Span # 3 | 3 | 8.000 | -110.74 | 303.64 | 0.36 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 8.000 | -135.98 | 303.64 | 0.45 |
| Span # 2 | 2 | 8.000 | -165.93 | 303.64 | 0.55 |
| Span # 3 | 3 | 8.000 | -171.02 | 303.64 | 0.56 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 8.000 | -159.19 | 303.64 | 0.52 |
| Span # 2 | 2 | 8.000 | -165.18 | 303.64 | 0.54 |
| Span # 3 | 3 | 8.000 | -165.18 | 303.64 | 0.54 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (*LL) | | | | | |

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# Concrete Beam

DESCRIPTION: GRBM - GA + GC - Under 10" PC Wall

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 1 | 1 | 8.000 | -153.39 | 303.64 | 0.51 |
| Span # 2 | 2 | 8.000 | -182.29 | 303.64 | 0.60 |
| Span # 3 | 3 | 8.000 | -188.54 | 303.64 | 0.62 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 8.000 | -163.83 | 303.64 | 0.54 |
| Span # 2 | 2 | 8.000 | -171.02 | 303.64 | 0.56 |
| Span # 3 | 3 | 8.000 | -141.82 | 303.64 | 0.47 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 8.000 | -158.03 | 303.64 | 0.52 |
| Span # 2 | 2 | 8.000 | -165.18 | 303.64 | 0.54 |
| Span # 3 | 3 | 8.000 | -165.18 | 303.64 | 0.54 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 8.000 | -181.23 | 303.64 | 0.60 |
| Span # 2 | 2 | 8.000 | -188.54 | 303.64 | 0.62 |
| Span # 3 | 3 | 8.000 | -159.34 | 303.64 | 0.52 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 8.000 | -175.43 | 303.64 | 0.58 |
| Span # 2 | 2 | 8.000 | -182.70 | 303.64 | 0.60 |
| Span # 3 | 3 | 8.000 | -182.70 | 303.64 | 0.60 |
| +0.90D+E+0.90H | | | | | |
| Span # 1 | 1 | 8.000 | -106.34 | 303.64 | 0.35 |
| Span # 2 | 2 | 8.000 | -110.74 | 303.64 | 0.36 |
| Span # 3 | 3 | 8.000 | -110.74 | 303.64 | 0.36 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H, LL Comb Run (L*L) | 1 | 0.0064 | 3.680 | +D+L+H, LL Comb Run (L*L) | -0.0002 | 8.160 |
| +D+L+H, LL Comb Run (*L*) | 2 | 0.0016 | 4.000 | +D+L+H, LL Comb Run (L*L) | -0.0009 | 5.920 |
| +D+L+H, LL Comb Run (L*L) | 3 | 0.0064 | 4.320 | | 0.0000 | 5.920 |

# Concrete Beam

File: FWI2101 - Paragon Star.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

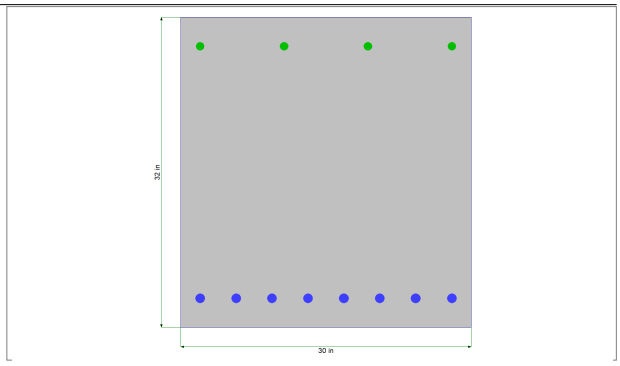
DESCRIPTION: GRBM - GA.4 - at West Stair 10" wall

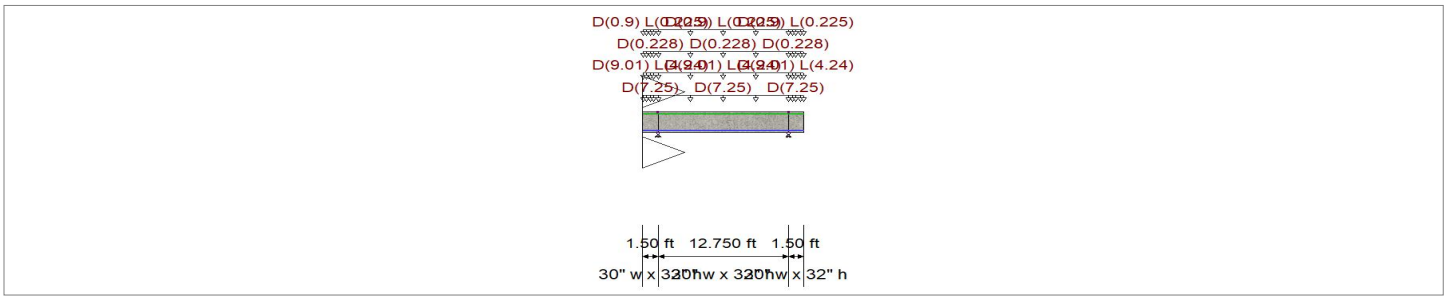
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 3.50 ksi | $\phi$ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 443.706 psi | | Shear : | 0.750 |
| $\psi$ Density | = | 145.0 pcf | $\beta_1$ | = | 0.850 |
| $\lambda$ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 3,122.0 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup | = | 2 |






## Cross Section & Reinforcing Details

Rectangular Section, Width = 30.0 in, Height = 32.0 in

Span #1 Reinforcing....
- 8-#8 at 3.0 in from Bottom, from 0.0 to 1.50 ft in this span
- 4-#7 at 3.0 in from Top, from 0.0 to 1.50 ft in this span

Span #2 Reinforcing....
- 8-#8 at 3.0 in from Bottom, from 0.0 to 12.750 ft in this span
- 4-#7 at 3.0 in from Top, from 0.0 to 12.750 ft in this span

Span #3 Reinforcing....
- 8-#8 at 3.0 in from Bottom, from 0.0 to 1.50 ft in this span
- 4-#7 at 3.0 in from Top, from 0.0 to 1.50 ft in this span

Beam self weight calculated and added to loads

Load for Span Number 1
- Uniform Load : D = 0.1250 ksf, Tributary Width = 58.0 ft, (10" PC Wall - With Opngs)
- Uniform Load : D = 0.0850, L = 0.040 ksf, Tributary Width = 106.0 ft, (4-Floors)
- Uniform Load : D = 0.0570 ksf, Tributary Width = 4.0 ft, (Wash - 4-Floors)
- Uniform Load : D = 0.10, L = 0.0250 ksf, Tributary Width = 9.0 ft, (8" Stair Roof)

Load for Span Number 2
- Uniform Load : D = 0.1250 ksf, Tributary Width = 58.0 ft, (10" PC Wall - With Opngs)
- Uniform Load : D = 0.0850, L = 0.040 ksf, Tributary Width = 106.0 ft, (4-Floors)
- Uniform Load : D = 0.0570 ksf, Tributary Width = 4.0 ft, (Wash - 4-Floors)
- Uniform Load : D = 0.10, L = 0.0250 ksf, Tributary Width = 9.0 ft, (8" Stair Roof)

Load for Span Number 3
- Uniform Load : D = 0.1250 ksf, Tributary Width = 58.0 ft, (10" PC Wall - With Opngs)
- Uniform Load : D = 0.0850, L = 0.040 ksf, Tributary Width = 106.0 ft, (4-Floors)
- Uniform Load : D = 0.0570 ksf, Tributary Width = 4.0 ft, (Wash - 4-Floors)
- Uniform Load : D = 0.10, L = 0.0250 ksf, Tributary Width = 9.0 ft, (8" Stair Roof)

# Concrete Beam

File: FWI2101 - Paragon Star.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403 — Bob D. Campbell and Co., Inc.

DESCRIPTION: GRBM - GA.4 - at West Stair 10" wall

## DESIGN SUMMARY

**Design OK**

| | | | | | |
|---|---|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.739** : 1 | Maximum Deflection | | | |
| Section used for this span | **Typical Section** | Max Downward Transient Deflection | 0.010 in | Ratio = | 14767 >=360. |
| Mu : Applied | 567.96 k-ft | Max Upward Transient Deflection | -0.004 in | Ratio = | 9210 >=360. |
| Mn * Phi : Allowable | 768.36 k-ft | Max Downward Total Deflection | 0.116 in | Ratio = | 1318 >=180. |
| Location of maximum on span | 6.375 ft | Max Upward Total Deflection | -0.040 in | Ratio = | 892 >=180. |
| Span # where maximum occurs | Span # 2 | | | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| Overall MAXimum | | 180.099 | 180.099 | |
| Overall MINimum | | -0.394 | -0.394 | |
| +D+H | | 144.543 | 144.543 | |
| +D+L+H, LL Comb Run (**L) | | 144.149 | 151.634 | |
| +D+L+H, LL Comb Run (*L*) | | 173.007 | 173.007 | |
| +D+L+H, LL Comb Run (*LL) | | 172.613 | 180.099 | |
| +D+L+H, LL Comb Run (L**) | | 151.634 | 144.149 | |
| +D+L+H, LL Comb Run (L*L) | | 151.241 | 151.240 | |
| +D+L+H, LL Comb Run (LL*) | | 180.099 | 172.613 | |
| +D+L+H, LL Comb Run (LLL) | | 179.705 | 179.705 | |
| +D+Lr+H, LL Comb Run (**L) | | 144.543 | 144.543 | |
| +D+Lr+H, LL Comb Run (*L*) | | 144.543 | 144.543 | |
| +D+Lr+H, LL Comb Run (*LL) | | 144.543 | 144.543 | |
| +D+Lr+H, LL Comb Run (L**) | | 144.543 | 144.543 | |
| +D+Lr+H, LL Comb Run (L*L) | | 144.543 | 144.543 | |
| +D+Lr+H, LL Comb Run (LL*) | | 144.543 | 144.543 | |
| +D+Lr+H, LL Comb Run (LLL) | | 144.543 | 144.543 | |
| +D+S+H | | 144.543 | 144.543 | |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | | 144.248 | 149.862 | |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | | 165.891 | 165.891 | |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | | 165.596 | 171.210 | |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | | 149.862 | 144.248 | |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | | 149.566 | 149.566 | |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | | 171.210 | 165.596 | |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | | 170.914 | 170.914 | |
| +D+0.750L+0.750S+H, LL Comb Run (* | | 144.248 | 149.862 | |
| +D+0.750L+0.750S+H, LL Comb Run (* | | 165.891 | 165.891 | |
| +D+0.750L+0.750S+H, LL Comb Run (* | | 165.596 | 171.210 | |
| +D+0.750L+0.750S+H, LL Comb Run (L | | 149.862 | 144.248 | |
| +D+0.750L+0.750S+H, LL Comb Run (L | | 149.566 | 149.566 | |
| +D+0.750L+0.750S+H, LL Comb Run (L | | 171.210 | 165.596 | |
| +D+0.750L+0.750S+H, LL Comb Run (L | | 170.914 | 170.914 | |
| +D+0.60W+H | | 144.543 | 144.543 | |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | | 144.248 | 149.862 | |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | | 165.891 | 165.891 | |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | | 165.596 | 171.210 | |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | | 149.862 | 144.248 | |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | | 149.566 | 149.566 | |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | | 171.210 | 165.596 | |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | | 170.914 | 170.914 | |
| +D+0.750L+0.750S+0.450W+H, LL Comb | | 144.248 | 149.862 | |
| +D+0.750L+0.750S+0.450W+H, LL Comb | | 165.891 | 165.891 | |
| +D+0.750L+0.750S+0.450W+H, LL Comb | | 165.596 | 171.210 | |
| +D+0.750L+0.750S+0.450W+H, LL Comb | | 149.862 | 144.248 | |
| +D+0.750L+0.750S+0.450W+H, LL Comb | | 149.566 | 149.566 | |
| +D+0.750L+0.750S+0.450W+H, LL Comb | | 171.210 | 165.596 | |
| +D+0.750L+0.750S+0.450W+H, LL Comb | | 170.914 | 170.914 | |
| +0.60D+0.60W+0.60H | | 86.726 | 86.726 | |
| +D+0.70E+0.60H | | 144.543 | 144.543 | |
| +D+0.750L+0.750S+0.5250E+H, LL Com | | 144.248 | 149.862 | |

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# Concrete Beam



DESCRIPTION: GRBM - GA.4 - at West Stair 10" wall

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| +D+0.750L+0.750S+0.5250E+H, LL Com | | 165.891 | 165.891 | |
| +D+0.750L+0.750S+0.5250E+H, LL Com | | 165.596 | 171.210 | |
| +D+0.750L+0.750S+0.5250E+H, LL Com | | 149.862 | 144.248 | |
| +D+0.750L+0.750S+0.5250E+H, LL Com | | 149.566 | 149.566 | |
| +D+0.750L+0.750S+0.5250E+H, LL Com | | 171.210 | 165.596 | |
| +D+0.750L+0.750S+0.5250E+H, LL Com | | 170.914 | 170.914 | |
| +0.60D+0.70E+H | | 86.726 | 86.726 | |
| D Only | | 144.543 | 144.543 | |
| L Only, LL Comb Run (**L) | | -0.394 | 7.091 | |
| L Only, LL Comb Run (*L*) | | 28.464 | 28.464 | |
| L Only, LL Comb Run (*LL) | | 28.070 | 35.556 | |
| L Only, LL Comb Run (L**) | | 7.091 | -0.394 | |
| L Only, LL Comb Run (L*L) | | 6.697 | 6.697 | |
| L Only, LL Comb Run (LL*) | | 35.556 | 28.070 | |
| L Only, LL Comb Run (LLL) | | 35.162 | 35.162 | |
| H Only | | | | |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60S+0.50W+1.60H | 1 | 0.00 | 29.00 | -0.00 | 0.00 | 0.00 | 1.00 | 85.19 | Vu < PhiVc/2 | lot Reqd 9.6. | 85.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.06 | 29.00 | -1.75 | 1.75 | 0.05 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.12 | 29.00 | -3.50 | 3.50 | 0.21 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.18 | 29.00 | -5.25 | 5.25 | 0.47 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.24 | 29.00 | -7.00 | 7.00 | 0.84 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.30 | 29.00 | -8.75 | 8.75 | 1.31 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.36 | 29.00 | -10.50 | 10.50 | 1.89 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.42 | 29.00 | -12.25 | 12.25 | 2.57 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.48 | 29.00 | -14.00 | 14.00 | 3.36 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.54 | 29.00 | -15.75 | 15.75 | 4.25 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.60 | 29.00 | -17.50 | 17.50 | 5.25 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.66 | 29.00 | -19.25 | 19.25 | 6.35 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.72 | 29.00 | -21.00 | 21.00 | 7.56 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.78 | 29.00 | -22.75 | 22.75 | 8.87 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.84 | 29.00 | -24.50 | 24.50 | 10.29 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.90 | 29.00 | -26.25 | 26.25 | 11.81 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.96 | 29.00 | -28.00 | 28.00 | 13.44 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.02 | 29.00 | -29.75 | 29.75 | 15.17 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.08 | 29.00 | -31.50 | 31.50 | 17.01 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.14 | 29.00 | -33.25 | 33.25 | 18.95 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.20 | 29.00 | -35.00 | 35.00 | 21.00 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.26 | 29.00 | -36.75 | 36.75 | 23.15 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.32 | 29.00 | -38.50 | 38.50 | 25.41 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.38 | 29.00 | -40.25 | 40.25 | 27.78 | 1.00 | 77.84 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 115.1 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.44 | 29.00 | -42.00 | 42.00 | 30.24 | 1.00 | 77.84 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 115.1 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 1.50 | 29.00 | 186.59 | 186.59 | 32.82 | 1.00 | 77.84 | PhiVc < Vu | 108.742 | 208.3 | 4.8 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 2.01 | 29.00 | 171.71 | 171.71 | 58.55 | 1.00 | 85.19 | PhiVc < Vu | 86.515 | 215.7 | 6.0 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 2.52 | 29.00 | 156.83 | 156.83 | 142.33 | 1.00 | 85.19 | PhiVc < Vu | 71.639 | 215.7 | 7.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 3.03 | 29.00 | 141.96 | 141.96 | 218.52 | 1.00 | 85.19 | PhiVc < Vu | 56.762 | 215.7 | 9.2 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 3.54 | 29.00 | 127.08 | 127.08 | 287.12 | 1.00 | 85.19 | PhiVc < Vu | 41.886 | 215.7 | 12.5 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 4.05 | 29.00 | 112.20 | 112.20 | 348.14 | 0.78 | 82.57 | PhiVc < Vu | 29.630 | 213.1 | 14.5 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 4.56 | 29.00 | 97.33 | 97.33 | 401.57 | 0.59 | 80.29 | PhiVc < Vu | 17.042 | 210.8 | 14.5 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 5.07 | 29.00 | 82.45 | 82.45 | 447.42 | 0.45 | 78.62 | PhiVc < Vu | 3.829 | 209.1 | 14.5 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 5.58 | 29.00 | 67.57 | 67.57 | 485.67 | 0.34 | 77.33 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 114.6 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 6.09 | 29.00 | 52.70 | 52.70 | 516.34 | 0.25 | 76.27 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 113.6 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 6.60 | 29.00 | 37.82 | 37.82 | 530.12 | 0.17 | 75.35 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 112.6 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 7.11 | 29.00 | 22.95 | 22.95 | 554.92 | 0.10 | 74.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 74.5 | 0.0 | 0.0 |

# Concrete Beam

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DESCRIPTION: GRBM - GA.4 - at West Stair 10" wall

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 7.62 | 29.00 | 8.07 | 8.07 | 562.83 | 0.03 | 73.76 | Vu < PhiVc/2 | lot Reqd 9.6. | 73.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 8.13 | 29.00 | -8.07 | 8.07 | 562.83 | 0.03 | 73.76 | Vu < PhiVc/2 | lot Reqd 9.6. | 73.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 8.64 | 29.00 | -22.95 | 22.95 | 554.92 | 0.10 | 74.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 74.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 9.15 | 29.00 | -37.82 | 37.82 | 539.42 | 0.17 | 75.35 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 112.6 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 9.66 | 29.00 | -52.70 | 52.70 | 516.34 | 0.25 | 76.27 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 113.6 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 10.17 | 29.00 | -67.57 | 67.57 | 485.67 | 0.34 | 77.33 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 114.6 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 10.68 | 29.00 | -82.45 | 82.45 | 447.42 | 0.45 | 78.62 | PhiVc < Vu | 3.829 | 209.1 | 14.5 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 11.19 | 29.00 | -97.33 | 97.33 | 401.57 | 0.59 | 80.29 | PhiVc < Vu | 17.042 | 210.8 | 14.5 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 11.70 | 29.00 | -112.20 | 112.20 | 348.14 | 0.78 | 82.57 | PhiVc < Vu | 29.630 | 213.1 | 14.5 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 12.21 | 29.00 | -127.08 | 127.08 | 287.12 | 1.00 | 85.19 | PhiVc < Vu | 41.886 | 215.7 | 12.5 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 12.72 | 29.00 | -141.96 | 141.96 | 218.52 | 1.00 | 85.19 | PhiVc < Vu | 56.762 | 215.7 | 9.2 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 13.23 | 29.00 | -156.83 | 156.83 | 142.33 | 1.00 | 85.19 | PhiVc < Vu | 71.639 | 215.7 | 7.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 13.74 | 29.00 | -171.71 | 171.71 | 58.55 | 1.00 | 85.19 | PhiVc < Vu | 86.515 | 215.7 | 6.0 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 14.25 | 29.00 | 43.75 | 43.75 | 32.82 | 1.00 | 77.84 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 115.1 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 14.31 | 29.00 | 42.00 | 42.00 | 30.24 | 1.00 | 77.84 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 115.1 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 14.37 | 29.00 | 40.25 | 40.25 | 27.78 | 1.00 | 77.84 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 115.1 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 14.43 | 29.00 | 38.50 | 38.50 | 25.41 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 14.49 | 29.00 | 36.75 | 36.75 | 23.15 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 14.55 | 29.00 | 35.00 | 35.00 | 21.00 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 14.61 | 29.00 | 33.25 | 33.25 | 18.95 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 14.67 | 29.00 | 31.50 | 31.50 | 17.01 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 14.73 | 29.00 | 29.75 | 29.75 | 15.17 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 14.79 | 29.00 | 28.00 | 28.00 | 13.44 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 14.85 | 29.00 | 26.25 | 26.25 | 11.81 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 14.91 | 29.00 | 24.50 | 24.50 | 10.29 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 14.97 | 29.00 | 22.75 | 22.75 | 8.87 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 15.03 | 29.00 | 21.00 | 21.00 | 7.56 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 15.09 | 29.00 | 19.25 | 19.25 | 6.35 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 15.15 | 29.00 | 17.50 | 17.50 | 5.25 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 15.21 | 29.00 | 15.75 | 15.75 | 4.25 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 15.27 | 29.00 | 14.00 | 14.00 | 3.36 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 15.33 | 29.00 | 12.25 | 12.25 | 2.57 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 15.39 | 29.00 | 10.50 | 10.50 | 1.89 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 15.45 | 29.00 | 8.75 | 8.75 | 1.31 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 15.51 | 29.00 | 7.00 | 7.00 | 0.84 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 15.57 | 29.00 | 5.25 | 5.25 | 0.47 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 15.63 | 29.00 | 3.50 | 3.50 | 0.21 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 15.69 | 29.00 | 1.75 | 1.75 | 0.05 | 1.00 | 77.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.8 | 0.0 | 0.0 |
| +1.20D+1.60S+0.50W+1.60H | 3 | 15.75 | 29.00 | 0.00 | 0.00 | 0.00 | 1.00 | 85.19 | Vu < PhiVc/2 | lot Reqd 9.6. | 85.2 | 0.0 | 0.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 1.500 | -32.38 | 309.26 | 0.10 |
| Span # 2 | 2 | 12.750 | 567.96 | 768.36 | 0.74 |
| Span # 3 | 3 | 1.500 | -32.82 | 309.26 | 0.11 |
| +1.40D+1.60H | | | | | |
| Span # 1 | 1 | 1.500 | -28.52 | 309.26 | 0.09 |
| Span # 2 | 2 | 12.750 | 493.25 | 768.36 | 0.64 |
| Span # 3 | 3 | 1.500 | -28.91 | 309.26 | 0.09 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 1.500 | -24.45 | 309.26 | 0.08 |
| Span # 2 | 2 | 12.750 | 418.77 | 768.36 | 0.55 |
| Span # 3 | 3 | 1.500 | -32.82 | 309.26 | 0.11 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 1.500 | -24.45 | 309.26 | 0.08 |

# Concrete Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24



DESCRIPTION: GRBM - GA.4 - at West Stair 10" wall

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 2 | 2 | 12.750 | 567.96 | 768.36 | 0.74 |
| Span # 3 | 3 | 1.500 | -24.78 | 309.26 | 0.08 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 1.500 | -24.45 | 309.26 | 0.08 |
| Span # 2 | 2 | 12.750 | 563.94 | 768.36 | 0.73 |
| Span # 3 | 3 | 1.500 | -32.82 | 309.26 | 0.11 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 1.500 | -32.38 | 309.26 | 0.10 |
| Span # 2 | 2 | 12.750 | 418.77 | 768.36 | 0.55 |
| Span # 3 | 3 | 1.500 | -24.78 | 309.26 | 0.08 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 1.500 | -32.38 | 309.26 | 0.10 |
| Span # 2 | 2 | 12.750 | 414.75 | 768.36 | 0.54 |
| Span # 3 | 3 | 1.500 | -32.82 | 309.26 | 0.11 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 1.500 | -32.38 | 309.26 | 0.10 |
| Span # 2 | 2 | 12.750 | 563.94 | 768.36 | 0.73 |
| Span # 3 | 3 | 1.500 | -24.78 | 309.26 | 0.08 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 1.500 | -32.38 | 309.26 | 0.10 |
| Span # 2 | 2 | 12.750 | 559.92 | 768.36 | 0.73 |
| Span # 3 | 3 | 1.500 | -32.82 | 309.26 | 0.11 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 1.500 | -24.45 | 309.26 | 0.08 |
| Span # 2 | 2 | 12.750 | 418.77 | 768.36 | 0.55 |
| Span # 3 | 3 | 1.500 | -32.82 | 309.26 | 0.11 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 1.500 | -24.45 | 309.26 | 0.08 |
| Span # 2 | 2 | 12.750 | 567.96 | 768.36 | 0.74 |
| Span # 3 | 3 | 1.500 | -24.78 | 309.26 | 0.08 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 1.500 | -24.45 | 309.26 | 0.08 |
| Span # 2 | 2 | 12.750 | 563.94 | 768.36 | 0.73 |
| Span # 3 | 3 | 1.500 | -32.82 | 309.26 | 0.11 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 1.500 | -32.38 | 309.26 | 0.10 |
| Span # 2 | 2 | 12.750 | 418.77 | 768.36 | 0.55 |
| Span # 3 | 3 | 1.500 | -24.78 | 309.26 | 0.08 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 1.500 | -32.38 | 309.26 | 0.10 |
| Span # 2 | 2 | 12.750 | 414.75 | 768.36 | 0.54 |
| Span # 3 | 3 | 1.500 | -32.82 | 309.26 | 0.11 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 1.500 | -32.38 | 309.26 | 0.10 |
| Span # 2 | 2 | 12.750 | 563.94 | 768.36 | 0.73 |
| Span # 3 | 3 | 1.500 | -24.78 | 309.26 | 0.08 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 1.500 | -32.38 | 309.26 | 0.10 |
| Span # 2 | 2 | 12.750 | 559.92 | 768.36 | 0.73 |
| Span # 3 | 3 | 1.500 | -32.82 | 309.26 | 0.11 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 1.500 | -24.45 | 309.26 | 0.08 |
| Span # 2 | 2 | 12.750 | 420.28 | 768.36 | 0.55 |
| Span # 3 | 3 | 1.500 | -29.80 | 309.26 | 0.10 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 1.500 | -24.45 | 309.26 | 0.08 |
| Span # 2 | 2 | 12.750 | 513.52 | 768.36 | 0.67 |
| Span # 3 | 3 | 1.500 | -24.78 | 309.26 | 0.08 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 1.500 | -24.45 | 309.26 | 0.08 |
| Span # 2 | 2 | 12.750 | 511.01 | 768.36 | 0.67 |
| Span # 3 | 3 | 1.500 | -29.80 | 309.26 | 0.10 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 1.500 | -29.41 | 309.26 | 0.10 |
| Span # 2 | 2 | 12.750 | 420.28 | 768.36 | 0.55 |
| Span # 3 | 3 | 1.500 | -24.78 | 309.26 | 0.08 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 1.500 | -29.41 | 309.26 | 0.10 |
| Span # 2 | 2 | 12.750 | 417.77 | 768.36 | 0.54 |

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# Concrete Beam

DESCRIPTION: GRBM - GA.4 - at West Stair 10" wall

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 3 | 3 | 1.500 | -29.80 | 309.26 | 0.10 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 1.500 | -29.41 | 309.26 | 0.10 |
| Span # 2 | 2 | 12.750 | 511.01 | 768.36 | 0.67 |
| Span # 3 | 3 | 1.500 | -24.78 | 309.26 | 0.08 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 1.500 | -29.41 | 309.26 | 0.10 |
| Span # 2 | 2 | 12.750 | 508.50 | 768.36 | 0.66 |
| Span # 3 | 3 | 1.500 | -29.80 | 309.26 | 0.10 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 1.500 | -24.45 | 309.26 | 0.08 |
| Span # 2 | 2 | 12.750 | 422.79 | 768.36 | 0.55 |
| Span # 3 | 3 | 1.500 | -24.78 | 309.26 | 0.08 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 1.500 | -24.45 | 309.26 | 0.08 |
| Span # 2 | 2 | 12.750 | 422.79 | 768.36 | 0.55 |
| Span # 3 | 3 | 1.500 | -24.78 | 309.26 | 0.08 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 1.500 | -24.45 | 309.26 | 0.08 |
| Span # 2 | 2 | 12.750 | 422.79 | 768.36 | 0.55 |
| Span # 3 | 3 | 1.500 | -24.78 | 309.26 | 0.08 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 1.500 | -24.45 | 309.26 | 0.08 |
| Span # 2 | 2 | 12.750 | 422.79 | 768.36 | 0.55 |
| Span # 3 | 3 | 1.500 | -24.78 | 309.26 | 0.08 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 1.500 | -24.45 | 309.26 | 0.08 |
| Span # 2 | 2 | 12.750 | 422.79 | 768.36 | 0.55 |
| Span # 3 | 3 | 1.500 | -24.78 | 309.26 | 0.08 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 1.500 | -24.45 | 309.26 | 0.08 |
| Span # 2 | 2 | 12.750 | 422.79 | 768.36 | 0.55 |
| Span # 3 | 3 | 1.500 | -24.78 | 309.26 | 0.08 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 1.500 | -24.45 | 309.26 | 0.08 |
| Span # 2 | 2 | 12.750 | 422.79 | 768.36 | 0.55 |
| Span # 3 | 3 | 1.500 | -24.78 | 309.26 | 0.08 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 1.500 | -24.45 | 309.26 | 0.08 |
| Span # 2 | 2 | 12.750 | 420.28 | 768.36 | 0.55 |
| Span # 3 | 3 | 1.500 | -29.80 | 309.26 | 0.10 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 1.500 | -24.45 | 309.26 | 0.08 |
| Span # 2 | 2 | 12.750 | 513.52 | 768.36 | 0.67 |
| Span # 3 | 3 | 1.500 | -24.78 | 309.26 | 0.08 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 1.500 | -24.45 | 309.26 | 0.08 |
| Span # 2 | 2 | 12.750 | 511.01 | 768.36 | 0.67 |
| Span # 3 | 3 | 1.500 | -29.80 | 309.26 | 0.10 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 1.500 | -29.41 | 309.26 | 0.10 |
| Span # 2 | 2 | 12.750 | 420.28 | 768.36 | 0.55 |
| Span # 3 | 3 | 1.500 | -24.78 | 309.26 | 0.08 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 1.500 | -29.41 | 309.26 | 0.10 |
| Span # 2 | 2 | 12.750 | 417.77 | 768.36 | 0.54 |
| Span # 3 | 3 | 1.500 | -29.80 | 309.26 | 0.10 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 1.500 | -29.41 | 309.26 | 0.10 |
| Span # 2 | 2 | 12.750 | 511.01 | 768.36 | 0.67 |
| Span # 3 | 3 | 1.500 | -24.78 | 309.26 | 0.08 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 1.500 | -29.41 | 309.26 | 0.10 |
| Span # 2 | 2 | 12.750 | 508.50 | 768.36 | 0.66 |
| Span # 3 | 3 | 1.500 | -29.80 | 309.26 | 0.10 |
| +1.20D+1.60S+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 1.500 | -24.45 | 309.26 | 0.08 |
| Span # 2 | 2 | 12.750 | 422.79 | 768.36 | 0.55 |
| Span # 3 | 3 | 1.500 | -24.78 | 309.26 | 0.08 |

# Concrete Beam

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DESCRIPTION: GRBM - GA.4 - at West Stair 10" wall

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 1.500 | -24.45 | 309.26 | 0.08 |
| Span # 2 | 2 | 12.750 | 420.28 | 768.36 | 0.55 |
| Span # 3 | 3 | 1.500 | -29.80 | 309.26 | 0.10 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 1.500 | -24.45 | 309.26 | 0.08 |
| Span # 2 | 2 | 12.750 | 513.52 | 768.36 | 0.67 |
| Span # 3 | 3 | 1.500 | -24.78 | 309.26 | 0.08 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 1.500 | -24.45 | 309.26 | 0.08 |
| Span # 2 | 2 | 12.750 | 511.01 | 768.36 | 0.67 |
| Span # 3 | 3 | 1.500 | -29.80 | 309.26 | 0.10 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 1.500 | -29.41 | 309.26 | 0.10 |
| Span # 2 | 2 | 12.750 | 420.28 | 768.36 | 0.55 |
| Span # 3 | 3 | 1.500 | -24.78 | 309.26 | 0.08 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 1.500 | -29.41 | 309.26 | 0.10 |
| Span # 2 | 2 | 12.750 | 417.77 | 768.36 | 0.54 |
| Span # 3 | 3 | 1.500 | -29.80 | 309.26 | 0.10 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 1.500 | -29.41 | 309.26 | 0.10 |
| Span # 2 | 2 | 12.750 | 511.01 | 768.36 | 0.67 |
| Span # 3 | 3 | 1.500 | -24.78 | 309.26 | 0.08 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 1.500 | -29.41 | 309.26 | 0.10 |
| Span # 2 | 2 | 12.750 | 508.50 | 768.36 | 0.66 |
| Span # 3 | 3 | 1.500 | -29.80 | 309.26 | 0.10 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 1.500 | -24.45 | 309.26 | 0.08 |
| Span # 2 | 2 | 12.750 | 420.28 | 768.36 | 0.55 |
| Span # 3 | 3 | 1.500 | -29.80 | 309.26 | 0.10 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 1.500 | -24.45 | 309.26 | 0.08 |
| Span # 2 | 2 | 12.750 | 513.52 | 768.36 | 0.67 |
| Span # 3 | 3 | 1.500 | -24.78 | 309.26 | 0.08 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 1.500 | -24.45 | 309.26 | 0.08 |
| Span # 2 | 2 | 12.750 | 511.01 | 768.36 | 0.67 |
| Span # 3 | 3 | 1.500 | -29.80 | 309.26 | 0.10 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 1.500 | -29.41 | 309.26 | 0.10 |
| Span # 2 | 2 | 12.750 | 420.28 | 768.36 | 0.55 |
| Span # 3 | 3 | 1.500 | -24.78 | 309.26 | 0.08 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 1.500 | -29.41 | 309.26 | 0.10 |
| Span # 2 | 2 | 12.750 | 417.77 | 768.36 | 0.54 |
| Span # 3 | 3 | 1.500 | -29.80 | 309.26 | 0.10 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 1.500 | -29.41 | 309.26 | 0.10 |
| Span # 2 | 2 | 12.750 | 511.01 | 768.36 | 0.67 |
| Span # 3 | 3 | 1.500 | -24.78 | 309.26 | 0.08 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 1.500 | -29.41 | 309.26 | 0.10 |
| Span # 2 | 2 | 12.750 | 508.50 | 768.36 | 0.66 |
| Span # 3 | 3 | 1.500 | -29.80 | 309.26 | 0.10 |
| +0.90D+W+1.60H | | | | | |
| Span # 1 | 1 | 1.500 | -18.34 | 309.26 | 0.06 |
| Span # 2 | 2 | 12.750 | 317.09 | 768.36 | 0.41 |
| Span # 3 | 3 | 1.500 | -18.58 | 309.26 | 0.06 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 1.500 | -24.45 | 309.26 | 0.08 |
| Span # 2 | 2 | 12.750 | 420.28 | 768.36 | 0.55 |
| Span # 3 | 3 | 1.500 | -29.80 | 309.26 | 0.10 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 1.500 | -24.45 | 309.26 | 0.08 |
| Span # 2 | 2 | 12.750 | 513.52 | 768.36 | 0.67 |
| Span # 3 | 3 | 1.500 | -24.78 | 309.26 | 0.08 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (*LL) | | | | | |

# Concrete Beam

File: FWI2101 - Paragon Star.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24



DESCRIPTION: GRBM - GA.4 - at West Stair 10" wall

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 1 | 1 | 1.500 | -24.45 | 309.26 | 0.08 |
| Span # 2 | 2 | 12.750 | 511.01 | 768.36 | 0.67 |
| Span # 3 | 3 | 1.500 | -29.80 | 309.26 | 0.10 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 1.500 | -29.41 | 309.26 | 0.10 |
| Span # 2 | 2 | 12.750 | 420.28 | 768.36 | 0.55 |
| Span # 3 | 3 | 1.500 | -24.78 | 309.26 | 0.08 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 1.500 | -29.41 | 309.26 | 0.10 |
| Span # 2 | 2 | 12.750 | 417.77 | 768.36 | 0.54 |
| Span # 3 | 3 | 1.500 | -29.80 | 309.26 | 0.10 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 1.500 | -29.41 | 309.26 | 0.10 |
| Span # 2 | 2 | 12.750 | 511.01 | 768.36 | 0.67 |
| Span # 3 | 3 | 1.500 | -24.78 | 309.26 | 0.08 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 1.500 | -29.41 | 309.26 | 0.10 |
| Span # 2 | 2 | 12.750 | 508.50 | 768.36 | 0.66 |
| Span # 3 | 3 | 1.500 | -29.80 | 309.26 | 0.10 |
| +0.90D+E+0.90H | | | | | |
| Span # 1 | 1 | 1.500 | -18.34 | 309.26 | 0.06 |
| Span # 2 | 2 | 12.750 | 317.09 | 768.36 | 0.41 |
| Span # 3 | 3 | 1.500 | -18.58 | 309.26 | 0.06 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H, LL Comb Run (*L*) | 1 | 0.0069 | 1.755 | +D+L+H, LL Comb Run (*L*) | -0.0403 | 0.000 |
| +D+L+H, LL Comb Run (*L*) | 2 | 0.1160 | 6.375 | +D+L+H, LL Comb Run (*L*) | -0.0008 | 12.780 |
| | 3 | 0.0000 | 6.375 | +D+L+H, LL Comb Run (*L*) | -0.0403 | 1.500 |

# Concrete Beam

File: FWI2101 - Paragon Star.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

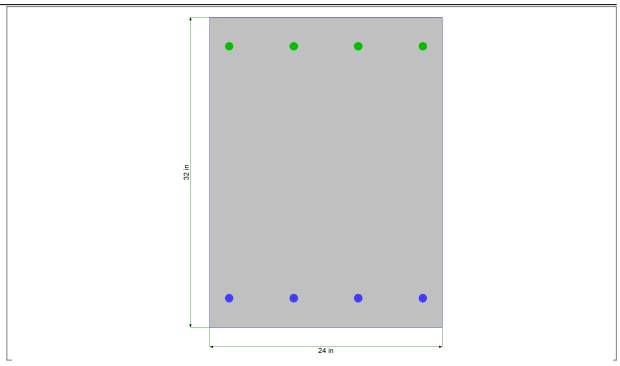
DESCRIPTION: GRBM - GA.4 - at West Stair 10" wall - 3 Piles

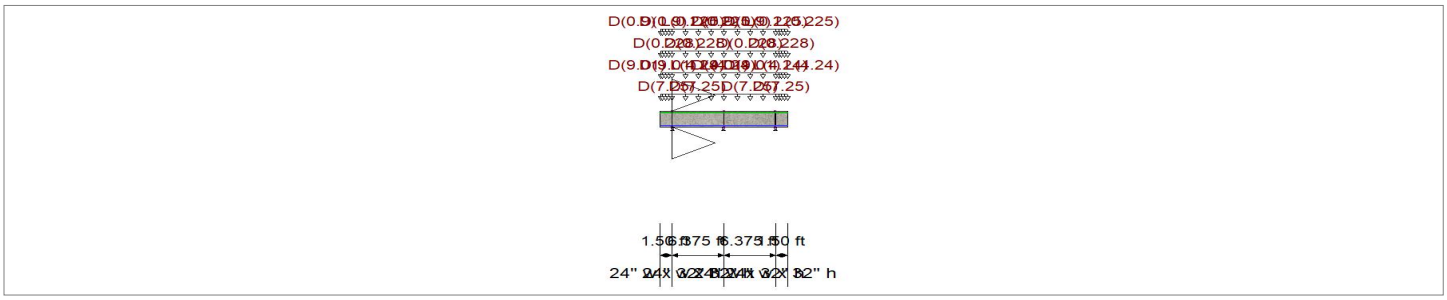
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 3.50 ksi | $\phi$ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 443.706 psi | | Shear : | 0.750 |
| $\psi$ Density | = | 145.0 pcf | $\beta_1$ | = | 0.850 |
| $\lambda$ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 3,122.0 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 2 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 24.0 in, Height = 32.0 in

Span #1 Reinforcing....
- 4-#7 at 3.0 in from Bottom, from 0.0 to 1.50 ft in this span
- 4-#7 at 3.0 in from Top, from 0.0 to 1.50 ft in this span

Span #2 Reinforcing....
- 4-#7 at 3.0 in from Bottom, from 0.0 to 6.375 ft in this span
- 4-#7 at 3.0 in from Top, from 0.0 to 6.375 ft in this span

Span #3 Reinforcing....
- 4-#7 at 3.0 in from Bottom, from 0.0 to 6.375 ft in this span
- 4-#7 at 3.0 in from Top, from 0.0 to 6.375 ft in this span

Span #4 Reinforcing....
- 4-#7 at 3.0 in from Bottom, from 0.0 to 1.50 ft in this span
- 4-#7 at 3.0 in from Top, from 0.0 to 1.50 ft in this span

Beam self weight calculated and added to loads

Load for Span Number 1
- Uniform Load : D = 0.1250 ksf, Tributary Width = 58.0 ft, (10" PC Wall - With Opngs)
- Uniform Load : D = 0.0850, L = 0.040 ksf, Tributary Width = 106.0 ft, (4-Floors)
- Uniform Load : D = 0.0570 ksf, Tributary Width = 4.0 ft, (Wash - 4-Floors)
- Uniform Load : D = 0.10, L = 0.0250 ksf, Tributary Width = 9.0 ft, (8" Stair Roof)

Load for Span Number 2
- Uniform Load : D = 0.1250 ksf, Tributary Width = 58.0 ft, (10" PC Wall - With Opngs)
- Uniform Load : D = 0.0850, L = 0.040 ksf, Tributary Width = 106.0 ft, (4-Floors)
- Uniform Load : D = 0.0570 ksf, Tributary Width = 4.0 ft, (Wash - 4-Floors)
- Uniform Load : D = 0.10, L = 0.0250 ksf, Tributary Width = 9.0 ft, (8" Stair Roof)

Load for Span Number 3
- Uniform Load : D = 0.1250 ksf, Tributary Width = 58.0 ft, (10" PC Wall - With Opngs)
- Uniform Load : D = 0.0850, L = 0.040 ksf, Tributary Width = 106.0 ft, (4-Floors)
- Uniform Load : D = 0.0570 ksf, Tributary Width = 4.0 ft, (Wash - 4-Floors)
- Uniform Load : D = 0.10, L = 0.0250 ksf, Tributary Width = 9.0 ft, (8" Stair Roof)

Load for Span Number 4
- Uniform Load : D = 0.1250 ksf, Tributary Width = 58.0 ft, (10" PC Wall - With Opngs)

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# Concrete Beam

DESCRIPTION: GRBM - GA.4 - at West Stair 10" wall - 3 Piles

## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.0850, L = 0.040 ksf, Tributary Width = 106.0 ft, (4-Floors)
Uniform Load : D = 0.0570 ksf, Tributary Width = 4.0 ft, (Wash - 4-Floors)
Uniform Load : D = 0.10, L = 0.0250 ksf, Tributary Width = 9.0 ft, (8" Stair Roof)

## DESIGN SUMMARY

**Design OK**

| | | | |
|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.444** : 1 | Maximum Deflection | |
| Section used for this span | **Typical Section** | Max Downward Transient Deflection | 0.000 in Ratio = 0 <360.0 |
| Mu : Applied | -134.746 k-ft | Max Upward Transient Deflection | 0.000 in Ratio = 0 <360.0 |
| Mn * Phi : Allowable | 303.639 k-ft | Max Downward Total Deflection | 0.002 in Ratio = 44651 >=180. |
| Location of maximum on span | 0.000 ft | Max Upward Total Deflection | -0.001 in Ratio = 29822 >=180. |
| Span # where maximum occurs | Span # 3 | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 | Support 5 |
|---|---|---|---|---|---|
| Overall MAXimum | | 95.799 | 170.689 | 95.799 | |
| Overall MINimum | | 0.197 | -1.182 | 0.197 | |
| +D+H | | 75.466 | 135.108 | 75.466 | |
| +D+L+H, LL Comb Run (***L) | | 75.663 | 133.926 | 83.149 | |
| +D+L+H, LL Comb Run (**L*) | | 73.687 | 152.899 | 87.920 | |
| +D+L+H, LL Comb Run (**LL) | | 73.884 | 151.717 | 95.602 | |
| +D+L+H, LL Comb Run (*L**) | | 87.920 | 152.899 | 73.687 | |
| +D+L+H, LL Comb Run (*L*L) | | 88.116 | 151.717 | 81.370 | |
| +D+L+H, LL Comb Run (*LL*) | | 86.140 | 170.689 | 86.140 | |
| +D+L+H, LL Comb Run (*LLL) | | 86.337 | 169.507 | 93.823 | |
| +D+L+H, LL Comb Run (L***) | | 83.149 | 133.926 | 75.663 | |
| +D+L+H, LL Comb Run (L**L) | | 83.346 | 132.744 | 83.346 | |
| +D+L+H, LL Comb Run (L*L*) | | 81.370 | 151.717 | 88.116 | |
| +D+L+H, LL Comb Run (L*LL) | | 81.567 | 150.535 | 95.799 | |
| +D+L+H, LL Comb Run (LL**) | | 95.602 | 151.717 | 73.884 | |
| +D+L+H, LL Comb Run (LL*L) | | 95.799 | 150.535 | 81.567 | |
| +D+L+H, LL Comb Run (LLL*) | | 93.823 | 169.507 | 86.337 | |
| +D+L+H, LL Comb Run (LLLL) | | 94.020 | 168.325 | 94.020 | |
| +D+Lr+H, LL Comb Run (***L) | | 75.466 | 135.108 | 75.466 | |
| +D+Lr+H, LL Comb Run (**L*) | | 75.466 | 135.108 | 75.466 | |
| +D+Lr+H, LL Comb Run (**LL) | | 75.466 | 135.108 | 75.466 | |
| +D+Lr+H, LL Comb Run (*L**) | | 75.466 | 135.108 | 75.466 | |
| +D+Lr+H, LL Comb Run (*L*L) | | 75.466 | 135.108 | 75.466 | |
| +D+Lr+H, LL Comb Run (*LL*) | | 75.466 | 135.108 | 75.466 | |
| +D+Lr+H, LL Comb Run (*LLL) | | 75.466 | 135.108 | 75.466 | |
| +D+Lr+H, LL Comb Run (L***) | | 75.466 | 135.108 | 75.466 | |
| +D+Lr+H, LL Comb Run (L**L) | | 75.466 | 135.108 | 75.466 | |
| +D+Lr+H, LL Comb Run (L*L*) | | 75.466 | 135.108 | 75.466 | |
| +D+Lr+H, LL Comb Run (L*LL) | | 75.466 | 135.108 | 75.466 | |
| +D+Lr+H, LL Comb Run (LL**) | | 75.466 | 135.108 | 75.466 | |
| +D+Lr+H, LL Comb Run (LL*L) | | 75.466 | 135.108 | 75.466 | |
| +D+Lr+H, LL Comb Run (LLL*) | | 75.466 | 135.108 | 75.466 | |
| +D+Lr+H, LL Comb Run (LLLL) | | 75.466 | 135.108 | 75.466 | |
| +D+S+H | | 75.466 | 135.108 | 75.466 | |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | | 75.614 | 134.222 | 81.228 | |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | | 74.132 | 148.451 | 84.806 | |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | | 74.280 | 147.565 | 90.568 | |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | | 84.806 | 148.451 | 74.132 | |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | | 84.954 | 147.565 | 79.894 | |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | | 83.472 | 161.794 | 83.472 | |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | | 83.620 | 160.907 | 89.234 | |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | | 81.228 | 134.222 | 75.614 | |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | | 81.376 | 133.335 | 81.376 | |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | | 79.894 | 147.565 | 84.954 | |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | | 80.042 | 146.678 | 90.716 | |

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# Concrete Beam

DESCRIPTION: GRBM - GA.4 - at West Stair 10" wall - 3 Piles

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 | Support 5 |
|---|---|---|---|---|---|
| +D+0.750Lr+0.750L+H, LL Comb Run ( | | 90.568 | 147.565 | 74.280 | |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | | 90.716 | 146.678 | 80.042 | |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | | 89.234 | 160.907 | 83.620 | |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | | 89.382 | 160.021 | 89.382 | |
| +D+0.750L+0.750S+H, LL Comb Run (* | | 75.614 | 134.222 | 81.228 | |
| +D+0.750L+0.750S+H, LL Comb Run (* | | 74.132 | 148.451 | 84.806 | |
| +D+0.750L+0.750S+H, LL Comb Run (* | | 74.280 | 147.565 | 90.568 | |
| +D+0.750L+0.750S+H, LL Comb Run (* | | 84.806 | 148.451 | 74.132 | |
| +D+0.750L+0.750S+H, LL Comb Run (* | | 84.954 | 147.565 | 79.894 | |
| +D+0.750L+0.750S+H, LL Comb Run (* | | 83.472 | 161.794 | 83.472 | |
| +D+0.750L+0.750S+H, LL Comb Run (* | | 83.620 | 160.907 | 89.234 | |
| +D+0.750L+0.750S+H, LL Comb Run (L | | 81.228 | 134.222 | 75.614 | |
| +D+0.750L+0.750S+H, LL Comb Run (L | | 81.376 | 133.335 | 81.376 | |
| +D+0.750L+0.750S+H, LL Comb Run (L | | 79.894 | 147.565 | 84.954 | |
| +D+0.750L+0.750S+H, LL Comb Run (L | | 80.042 | 146.678 | 90.716 | |
| +D+0.750L+0.750S+H, LL Comb Run (L | | 90.568 | 147.565 | 74.280 | |
| +D+0.750L+0.750S+H, LL Comb Run (L | | 90.716 | 146.678 | 80.042 | |
| +D+0.750L+0.750S+H, LL Comb Run (L | | 89.234 | 160.907 | 83.620 | |
| +D+0.750L+0.750S+H, LL Comb Run (L | | 89.382 | 160.021 | 89.382 | |
| +D+0.60W+H | | 75.466 | 135.108 | 75.466 | |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | | 75.614 | 134.222 | 81.228 | |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | | 74.132 | 148.451 | 84.806 | |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | | 74.280 | 147.565 | 90.568 | |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | | 84.806 | 148.451 | 74.132 | |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | | 84.954 | 147.565 | 79.894 | |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | | 83.472 | 161.794 | 83.472 | |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | | 83.620 | 160.907 | 89.234 | |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | | 81.228 | 134.222 | 75.614 | |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | | 81.376 | 133.335 | 81.376 | |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | | 79.894 | 147.565 | 84.954 | |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | | 80.042 | 146.678 | 90.716 | |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | | 90.568 | 147.565 | 74.280 | |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | | 90.716 | 146.678 | 80.042 | |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | | 89.234 | 160.907 | 83.620 | |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | | 89.382 | 160.021 | 89.382 | |
| +D+0.750L+0.750S+0.450W+H, LL Comb | | 75.614 | 134.222 | 81.228 | |
| +D+0.750L+0.750S+0.450W+H, LL Comb | | 74.132 | 148.451 | 84.806 | |
| +D+0.750L+0.750S+0.450W+H, LL Comb | | 74.280 | 147.565 | 90.568 | |
| +D+0.750L+0.750S+0.450W+H, LL Comb | | 84.806 | 148.451 | 74.132 | |
| +D+0.750L+0.750S+0.450W+H, LL Comb | | 84.954 | 147.565 | 79.894 | |
| +D+0.750L+0.750S+0.450W+H, LL Comb | | 83.472 | 161.794 | 83.472 | |
| +D+0.750L+0.750S+0.450W+H, LL Comb | | 83.620 | 160.907 | 89.234 | |
| +D+0.750L+0.750S+0.450W+H, LL Comb | | 81.228 | 134.222 | 75.614 | |
| +D+0.750L+0.750S+0.450W+H, LL Comb | | 81.376 | 133.335 | 81.376 | |
| +D+0.750L+0.750S+0.450W+H, LL Comb | | 79.894 | 147.565 | 84.954 | |
| +D+0.750L+0.750S+0.450W+H, LL Comb | | 80.042 | 146.678 | 90.716 | |
| +D+0.750L+0.750S+0.450W+H, LL Comb | | 90.568 | 147.565 | 74.280 | |
| +D+0.750L+0.750S+0.450W+H, LL Comb | | 90.716 | 146.678 | 80.042 | |
| +D+0.750L+0.750S+0.450W+H, LL Comb | | 89.234 | 160.907 | 83.620 | |
| +D+0.750L+0.750S+0.450W+H, LL Comb | | 89.382 | 160.021 | 89.382 | |
| +0.60D+0.60W+0.60H | | 45.280 | 81.065 | 45.280 | |
| +D+0.70E+0.60H | | 75.466 | 135.108 | 75.466 | |
| +D+0.750L+0.750S+0.5250E+H, LL Com | | 75.614 | 134.222 | 81.228 | |
| +D+0.750L+0.750S+0.5250E+H, LL Com | | 74.132 | 148.451 | 84.806 | |
| +D+0.750L+0.750S+0.5250E+H, LL Com | | 74.280 | 147.565 | 90.568 | |
| +D+0.750L+0.750S+0.5250E+H, LL Com | | 84.806 | 148.451 | 74.132 | |
| +D+0.750L+0.750S+0.5250E+H, LL Com | | 84.954 | 147.565 | 79.894 | |
| +D+0.750L+0.750S+0.5250E+H, LL Com | | 83.472 | 161.794 | 83.472 | |
| +D+0.750L+0.750S+0.5250E+H, LL Com | | 83.620 | 160.907 | 89.234 | |

# Concrete Beam

File: FWI2101 - Paragon Star.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: GRBM - GA.4 - at West Stair 10" wall - 3 Piles

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 | Support 5 |
|---|---|---|---|---|---|
| +D+0.750L+0.750S+0.5250E+H, LL Com | | 81.228 | 134.222 | 75.614 | |
| +D+0.750L+0.750S+0.5250E+H, LL Com | | 81.376 | 133.335 | 81.376 | |
| +D+0.750L+0.750S+0.5250E+H, LL Com | | 79.894 | 147.565 | 84.954 | |
| +D+0.750L+0.750S+0.5250E+H, LL Com | | 80.042 | 146.678 | 90.716 | |
| +D+0.750L+0.750S+0.5250E+H, LL Com | | 90.568 | 147.565 | 74.280 | |
| +D+0.750L+0.750S+0.5250E+H, LL Com | | 90.716 | 146.678 | 80.042 | |
| +D+0.750L+0.750S+0.5250E+H, LL Com | | 89.234 | 160.907 | 83.620 | |
| +D+0.750L+0.750S+0.5250E+H, LL Com | | 89.382 | 160.021 | 89.382 | |
| +0.60D+0.70E+H | | 45.280 | 81.065 | 45.280 | |
| D Only | | 75.466 | 135.108 | 75.466 | |
| L Only, LL Comb Run (***L) | | 0.197 | -1.182 | 7.682 | |
| L Only, LL Comb Run (**L*) | | -1.779 | 17.790 | 12.453 | |
| L Only, LL Comb Run (**LL) | | -1.582 | 16.608 | 20.136 | |
| L Only, LL Comb Run (*L**) | | 12.453 | 17.790 | -1.779 | |
| L Only, LL Comb Run (*L*L) | | 12.650 | 16.608 | 5.903 | |
| L Only, LL Comb Run (*LL*) | | 10.674 | 35.580 | 10.674 | |
| L Only, LL Comb Run (*LLL) | | 10.871 | 34.399 | 18.357 | |
| L Only, LL Comb Run (L***) | | 7.682 | -1.182 | 0.197 | |
| L Only, LL Comb Run (L**L) | | 7.879 | -2.364 | 7.879 | |
| L Only, LL Comb Run (L*L*) | | 5.903 | 16.608 | 12.650 | |
| L Only, LL Comb Run (L*LL) | | 6.100 | 15.426 | 20.333 | |
| L Only, LL Comb Run (LL**) | | 20.136 | 16.608 | -1.582 | |
| L Only, LL Comb Run (LL*L) | | 20.333 | 15.426 | 6.100 | |
| L Only, LL Comb Run (LLL*) | | 18.357 | 34.399 | 10.871 | |
| L Only, LL Comb Run (LLLL) | | 18.554 | 33.217 | 18.554 | |
| H Only | | | | | |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+L+0.20S+E+1.60H, LL Comb Ru | 1 | 0.00 | 29.00 | -0.00 | 0.00 | 0.00 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.09 | 29.00 | -2.74 | 2.74 | 0.13 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.19 | 29.00 | -5.48 | 5.48 | 0.52 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.28 | 29.00 | -8.22 | 8.22 | 1.17 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.38 | 29.00 | -10.97 | 10.97 | 2.08 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.47 | 29.00 | -13.71 | 13.71 | 3.25 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.57 | 29.00 | -16.45 | 16.45 | 4.67 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.66 | 29.00 | -19.19 | 19.19 | 6.36 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.76 | 29.00 | -21.93 | 21.93 | 8.31 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.85 | 29.00 | -24.67 | 24.67 | 10.52 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.95 | 29.00 | -27.41 | 27.41 | 12.99 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.04 | 29.00 | -30.16 | 30.16 | 15.71 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.14 | 29.00 | -32.90 | 32.90 | 18.70 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.23 | 29.00 | -35.64 | 35.64 | 21.95 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.33 | 29.00 | -38.38 | 38.38 | 25.45 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.42 | 29.00 | -41.12 | 41.12 | 29.22 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 1.57 | 29.00 | 77.74 | 77.74 | 27.27 | 1.00 | 63.18 | PhiVc < Vu | 14.568 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 1.97 | 29.00 | 66.09 | 66.09 | 1.68 | 1.00 | 63.18 | PhiVc < Vu | 2.917 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 2.37 | 29.00 | 54.44 | 54.44 | 25.95 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 2.78 | 29.00 | 42.79 | 42.79 | 45.52 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 3.18 | 29.00 | 31.14 | 31.14 | 60.41 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 3.58 | 29.00 | 19.49 | 19.49 | 70.60 | 0.67 | 61.68 | Vu < PhiVc/2 | lot Reqd 9.6. | 61.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 3.98 | 29.00 | 7.84 | 7.84 | 76.10 | 0.25 | 59.80 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 4.39 | 29.00 | -8.55 | 8.55 | 71.28 | 0.29 | 59.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 60.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 4.79 | 29.00 | -20.20 | 20.20 | 65.49 | 0.75 | 62.03 | Vu < PhiVc/2 | lot Reqd 9.6. | 62.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 5.19 | 29.00 | -31.85 | 31.85 | 55.01 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 5.59 | 29.00 | -43.51 | 43.51 | 39.83 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |

# Concrete Beam

File: FWI2101 - Paragon Star.ec6
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DESCRIPTION: GRBM - GA.4 - at West Stair 10" wall - 3 Piles

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 6.00 | 29.00 | -55.16 | 55.16 | 19.97 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 6.40 | 29.00 | -66.81 | 66.81 | 4.58 | 1.00 | 63.18 | PhiVc < Vu | 3.633 | 110.6 | 14.5 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 6.80 | 29.00 | -78.46 | 78.46 | 33.83 | 1.00 | 63.18 | PhiVc < Vu | 15.284 | 110.6 | 14.5 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 7.20 | 29.00 | -90.11 | 90.11 | 67.76 | 1.00 | 63.18 | PhiVc < Vu | 26.935 | 110.6 | 14.5 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 7.61 | 29.00 | -101.76 | 101.76 | 106.39 | 1.00 | 63.18 | PhiVc < Vu | 38.586 | 110.6 | 13.5 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 8.01 | 29.00 | 105.65 | 105.65 | 120.31 | 1.00 | 63.18 | PhiVc < Vu | 42.470 | 110.6 | 12.3 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 8.41 | 29.00 | 93.99 | 93.99 | 80.12 | 1.00 | 63.18 | PhiVc < Vu | 30.819 | 110.6 | 14.5 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 8.81 | 29.00 | 82.34 | 82.34 | 44.62 | 1.00 | 63.18 | PhiVc < Vu | 19.168 | 110.6 | 14.5 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 9.22 | 29.00 | 70.69 | 70.69 | 13.81 | 1.00 | 63.18 | PhiVc < Vu | 7.516 | 110.6 | 14.5 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 9.62 | 29.00 | 59.04 | 59.04 | 12.31 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 10.02 | 29.00 | 47.39 | 47.39 | 33.74 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 10.43 | 29.00 | 35.74 | 35.74 | 50.47 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 10.83 | 29.00 | 24.09 | 24.09 | 62.51 | 0.93 | 62.87 | Vu < PhiVc/2 | lot Reqd 9.6. | 62.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 11.23 | 29.00 | 12.44 | 12.44 | 69.87 | 0.43 | 60.61 | Vu < PhiVc/2 | lot Reqd 9.6. | 60.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 11.63 | 29.00 | -3.95 | 3.95 | 76.89 | 0.12 | 59.23 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 12.04 | 29.00 | -15.60 | 15.60 | 72.95 | 0.52 | 61.00 | Vu < PhiVc/2 | lot Reqd 9.6. | 61.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 12.44 | 29.00 | -27.25 | 27.25 | 64.32 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 12.84 | 29.00 | -38.91 | 38.91 | 51.01 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 13.24 | 29.00 | -50.56 | 50.56 | 32.99 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 13.65 | 29.00 | -62.21 | 62.21 | 10.29 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 14.05 | 29.00 | -73.86 | 73.86 | 17.10 | 1.00 | 63.18 | PhiVc < Vu | 10.684 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 14.30 | 29.00 | 42.04 | 42.04 | 30.53 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 14.39 | 29.00 | 39.29 | 39.29 | 26.68 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 14.49 | 29.00 | 36.55 | 36.55 | 23.09 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 14.58 | 29.00 | 33.81 | 33.81 | 19.75 | 1.00 | 63.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 100.5 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 14.68 | 29.00 | 31.07 | 31.07 | 16.68 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 14.77 | 29.00 | 28.33 | 28.33 | 13.87 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 14.87 | 29.00 | 25.59 | 25.59 | 11.31 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 14.96 | 29.00 | 22.85 | 22.85 | 9.02 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 15.06 | 29.00 | 20.10 | 20.10 | 6.98 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 15.15 | 29.00 | 17.36 | 17.36 | 5.21 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 15.24 | 29.00 | 14.62 | 14.62 | 3.69 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 15.34 | 29.00 | 11.88 | 11.88 | 2.44 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 15.43 | 29.00 | 9.14 | 9.14 | 1.44 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 15.53 | 29.00 | 6.40 | 6.40 | 0.71 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 15.62 | 29.00 | 3.66 | 3.66 | 0.23 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 15.72 | 29.00 | 0.91 | 0.91 | 0.01 | 1.00 | 63.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 63.2 | 0.0 | 0.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 1.500 | -31.87 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -127.46 | 303.64 | 0.42 |
| Span # 3 | 3 | 6.375 | -134.75 | 303.64 | 0.44 |
| Span # 4 | 4 | 1.500 | -32.55 | 303.64 | 0.11 |
| +1.40D+1.60H | | | | | |
| Span # 1 | 1 | 1.500 | -28.01 | 303.64 | 0.09 |
| Span # 2 | 2 | 6.375 | -108.57 | 303.64 | 0.36 |
| Span # 3 | 3 | 6.375 | -114.86 | 303.64 | 0.38 |
| Span # 4 | 4 | 1.500 | -28.60 | 303.64 | 0.09 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (***L) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -91.08 | 303.64 | 0.30 |
| Span # 3 | 3 | 6.375 | -96.45 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -32.55 | 303.64 | 0.11 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (**L*) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |

# Concrete Beam

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DESCRIPTION: GRBM - GA.4 - at West Stair 10" wall - 3 Piles

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 2 | 2 | 6.375 | -111.02 | 303.64 | 0.37 |
| Span # 3 | 3 | 6.375 | -116.60 | 303.64 | 0.38 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (**LL) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -109.03 | 303.64 | 0.36 |
| Span # 3 | 3 | 6.375 | -114.59 | 303.64 | 0.38 |
| Span # 4 | 4 | 1.500 | -32.55 | 303.64 | 0.11 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*L**) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -109.51 | 303.64 | 0.36 |
| Span # 3 | 3 | 6.375 | -116.60 | 303.64 | 0.38 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*L*L) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -107.52 | 303.64 | 0.35 |
| Span # 3 | 3 | 6.375 | -114.59 | 303.64 | 0.38 |
| Span # 4 | 4 | 1.500 | -32.55 | 303.64 | 0.11 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*LL*) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -127.46 | 303.64 | 0.42 |
| Span # 3 | 3 | 6.375 | -134.75 | 303.64 | 0.44 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*LLL) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -125.47 | 303.64 | 0.41 |
| Span # 3 | 3 | 6.375 | -132.74 | 303.64 | 0.44 |
| Span # 4 | 4 | 1.500 | -32.55 | 303.64 | 0.11 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L***) | | | | | |
| Span # 1 | 1 | 1.500 | -31.87 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -91.16 | 303.64 | 0.30 |
| Span # 3 | 3 | 6.375 | -96.45 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L**L) | | | | | |
| Span # 1 | 1 | 1.500 | -31.87 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -89.17 | 303.64 | 0.29 |
| Span # 3 | 3 | 6.375 | -94.44 | 303.64 | 0.31 |
| Span # 4 | 4 | 1.500 | -32.55 | 303.64 | 0.11 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L*L*) | | | | | |
| Span # 1 | 1 | 1.500 | -31.87 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -109.11 | 303.64 | 0.36 |
| Span # 3 | 3 | 6.375 | -114.59 | 303.64 | 0.38 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L*LL) | | | | | |
| Span # 1 | 1 | 1.500 | -31.87 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -107.13 | 303.64 | 0.35 |
| Span # 3 | 3 | 6.375 | -112.58 | 303.64 | 0.37 |
| Span # 4 | 4 | 1.500 | -32.55 | 303.64 | 0.11 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LL**) | | | | | |
| Span # 1 | 1 | 1.500 | -31.87 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -107.60 | 303.64 | 0.35 |
| Span # 3 | 3 | 6.375 | -114.59 | 303.64 | 0.38 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LL*L) | | | | | |
| Span # 1 | 1 | 1.500 | -31.87 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -105.61 | 303.64 | 0.35 |
| Span # 3 | 3 | 6.375 | -112.58 | 303.64 | 0.37 |
| Span # 4 | 4 | 1.500 | -32.55 | 303.64 | 0.11 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LLL*) | | | | | |
| Span # 1 | 1 | 1.500 | -31.87 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -125.56 | 303.64 | 0.41 |
| Span # 3 | 3 | 6.375 | -132.74 | 303.64 | 0.44 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LLLL) | | | | | |
| Span # 1 | 1 | 1.500 | -31.87 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -123.57 | 303.64 | 0.41 |
| Span # 3 | 3 | 6.375 | -130.73 | 303.64 | 0.43 |
| Span # 4 | 4 | 1.500 | -32.55 | 303.64 | 0.11 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (***L) | | | | | |

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DESCRIPTION: GRBM - GA.4 - at West Stair 10" wall - 3 Piles

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -91.08 | 303.64 | 0.30 |
| Span # 3 | 3 | 6.375 | -96.45 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -32.55 | 303.64 | 0.11 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (**L*) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -111.02 | 303.64 | 0.37 |
| Span # 3 | 3 | 6.375 | -116.60 | 303.64 | 0.38 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (**LL) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -109.03 | 303.64 | 0.36 |
| Span # 3 | 3 | 6.375 | -114.59 | 303.64 | 0.38 |
| Span # 4 | 4 | 1.500 | -32.55 | 303.64 | 0.11 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L**) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -109.51 | 303.64 | 0.36 |
| Span # 3 | 3 | 6.375 | -116.60 | 303.64 | 0.38 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L*L) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -107.52 | 303.64 | 0.35 |
| Span # 3 | 3 | 6.375 | -114.59 | 303.64 | 0.38 |
| Span # 4 | 4 | 1.500 | -32.55 | 303.64 | 0.11 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LL*) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -127.46 | 303.64 | 0.42 |
| Span # 3 | 3 | 6.375 | -134.75 | 303.64 | 0.44 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LLL) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -125.47 | 303.64 | 0.41 |
| Span # 3 | 3 | 6.375 | -132.74 | 303.64 | 0.44 |
| Span # 4 | 4 | 1.500 | -32.55 | 303.64 | 0.11 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L***) | | | | | |
| Span # 1 | 1 | 1.500 | -31.87 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -91.16 | 303.64 | 0.30 |
| Span # 3 | 3 | 6.375 | -96.45 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L**L) | | | | | |
| Span # 1 | 1 | 1.500 | -31.87 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -89.17 | 303.64 | 0.29 |
| Span # 3 | 3 | 6.375 | -94.44 | 303.64 | 0.31 |
| Span # 4 | 4 | 1.500 | -32.55 | 303.64 | 0.11 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*L*) | | | | | |
| Span # 1 | 1 | 1.500 | -31.87 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -109.11 | 303.64 | 0.36 |
| Span # 3 | 3 | 6.375 | -114.59 | 303.64 | 0.38 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*LL) | | | | | |
| Span # 1 | 1 | 1.500 | -31.87 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -107.13 | 303.64 | 0.35 |
| Span # 3 | 3 | 6.375 | -112.58 | 303.64 | 0.37 |
| Span # 4 | 4 | 1.500 | -32.55 | 303.64 | 0.11 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL**) | | | | | |
| Span # 1 | 1 | 1.500 | -31.87 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -107.60 | 303.64 | 0.35 |
| Span # 3 | 3 | 6.375 | -114.59 | 303.64 | 0.38 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL*L) | | | | | |
| Span # 1 | 1 | 1.500 | -31.87 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -105.61 | 303.64 | 0.35 |
| Span # 3 | 3 | 6.375 | -112.58 | 303.64 | 0.37 |
| Span # 4 | 4 | 1.500 | -32.55 | 303.64 | 0.11 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLL*) | | | | | |
| Span # 1 | 1 | 1.500 | -31.87 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -125.56 | 303.64 | 0.41 |
| Span # 3 | 3 | 6.375 | -132.74 | 303.64 | 0.44 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |

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# Concrete Beam

DESCRIPTION: GRBM - GA.4 - at West Stair 10" wall - 3 Piles

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLLL) | | | | | |
| Span # 1 | 1 | 1.500 | -31.87 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -123.57 | 303.64 | 0.41 |
| Span # 3 | 3 | 6.375 | -130.73 | 303.64 | 0.43 |
| Span # 4 | 4 | 1.500 | -32.55 | 303.64 | 0.11 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (***L) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -91.82 | 303.64 | 0.30 |
| Span # 3 | 3 | 6.375 | -97.20 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (**L*) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -104.29 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -109.80 | 303.64 | 0.36 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (**LL) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -103.04 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -108.54 | 303.64 | 0.36 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (*L**) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -103.34 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -109.80 | 303.64 | 0.36 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (*L*L) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -102.10 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -108.54 | 303.64 | 0.36 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (*LL*) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -114.56 | 303.64 | 0.38 |
| Span # 3 | 3 | 6.375 | -121.14 | 303.64 | 0.40 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (*LLL) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -113.32 | 303.64 | 0.37 |
| Span # 3 | 3 | 6.375 | -119.88 | 303.64 | 0.39 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (L***) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -91.87 | 303.64 | 0.30 |
| Span # 3 | 3 | 6.375 | -97.20 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (L**L) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -90.63 | 303.64 | 0.30 |
| Span # 3 | 3 | 6.375 | -95.94 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (L*L*) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -103.10 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -108.54 | 303.64 | 0.36 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (L*LL) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -101.85 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -107.28 | 303.64 | 0.35 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (LL**) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -102.15 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -108.54 | 303.64 | 0.36 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (LL*L) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -100.91 | 303.64 | 0.33 |
| Span # 3 | 3 | 6.375 | -107.28 | 303.64 | 0.35 |

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# Concrete Beam

DESCRIPTION: GRBM - GA.4 - at West Stair 10" wall - 3 Piles

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (LLL*) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -113.37 | 303.64 | 0.37 |
| Span # 3 | 3 | 6.375 | -119.88 | 303.64 | 0.39 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (LLLL) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -112.13 | 303.64 | 0.37 |
| Span # 3 | 3 | 6.375 | -118.63 | 303.64 | 0.39 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (***L) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -93.06 | 303.64 | 0.31 |
| Span # 3 | 3 | 6.375 | -98.45 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (**L*) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -93.06 | 303.64 | 0.31 |
| Span # 3 | 3 | 6.375 | -98.45 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (**LL) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -93.06 | 303.64 | 0.31 |
| Span # 3 | 3 | 6.375 | -98.45 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*L**) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -93.06 | 303.64 | 0.31 |
| Span # 3 | 3 | 6.375 | -98.45 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*L*L) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -93.06 | 303.64 | 0.31 |
| Span # 3 | 3 | 6.375 | -98.45 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*LL*) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -93.06 | 303.64 | 0.31 |
| Span # 3 | 3 | 6.375 | -98.45 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*LLL) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -93.06 | 303.64 | 0.31 |
| Span # 3 | 3 | 6.375 | -98.45 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L***) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -93.06 | 303.64 | 0.31 |
| Span # 3 | 3 | 6.375 | -98.45 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L**L) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -93.06 | 303.64 | 0.31 |
| Span # 3 | 3 | 6.375 | -98.45 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L*L*) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -93.06 | 303.64 | 0.31 |
| Span # 3 | 3 | 6.375 | -98.45 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L*LL) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -93.06 | 303.64 | 0.31 |
| Span # 3 | 3 | 6.375 | -98.45 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LL**) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -93.06 | 303.64 | 0.31 |

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DESCRIPTION: GRBM - GA.4 - at West Stair 10" wall - 3 Piles

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 3 | 3 | 6.375 | -98.45 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LL*L) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -93.06 | 303.64 | 0.31 |
| Span # 3 | 3 | 6.375 | -98.45 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LLL*) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -93.06 | 303.64 | 0.31 |
| Span # 3 | 3 | 6.375 | -98.45 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LLLL) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -93.06 | 303.64 | 0.31 |
| Span # 3 | 3 | 6.375 | -98.45 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (***L) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -91.82 | 303.64 | 0.30 |
| Span # 3 | 3 | 6.375 | -97.20 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (**L*) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -104.29 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -109.80 | 303.64 | 0.36 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (**LL) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -103.04 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -108.54 | 303.64 | 0.36 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (*L**) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -103.34 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -109.80 | 303.64 | 0.36 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (*L*L) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -102.10 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -108.54 | 303.64 | 0.36 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (*LL*) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -114.56 | 303.64 | 0.38 |
| Span # 3 | 3 | 6.375 | -121.14 | 303.64 | 0.40 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (*LLL) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -113.32 | 303.64 | 0.37 |
| Span # 3 | 3 | 6.375 | -119.88 | 303.64 | 0.39 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (L***) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -91.87 | 303.64 | 0.30 |
| Span # 3 | 3 | 6.375 | -97.20 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (L**L) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -90.63 | 303.64 | 0.30 |
| Span # 3 | 3 | 6.375 | -95.94 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (L*L*) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -103.10 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -108.54 | 303.64 | 0.36 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (L*LL) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |

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DESCRIPTION: GRBM - GA.4 - at West Stair 10" wall - 3 Piles

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 2 | 2 | 6.375 | -101.85 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -107.28 | 303.64 | 0.35 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (LL**) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -102.15 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -108.54 | 303.64 | 0.36 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (LL*L) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -100.91 | 303.64 | 0.33 |
| Span # 3 | 3 | 6.375 | -107.28 | 303.64 | 0.35 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (LLL*) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -113.37 | 303.64 | 0.37 |
| Span # 3 | 3 | 6.375 | -119.88 | 303.64 | 0.39 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (LLLL) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -112.13 | 303.64 | 0.37 |
| Span # 3 | 3 | 6.375 | -118.63 | 303.64 | 0.39 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+1.60S+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -93.06 | 303.64 | 0.31 |
| Span # 3 | 3 | 6.375 | -98.45 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (***L) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -91.82 | 303.64 | 0.30 |
| Span # 3 | 3 | 6.375 | -97.20 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (**L*) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -104.29 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -109.80 | 303.64 | 0.36 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (**LL) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -103.04 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -108.54 | 303.64 | 0.36 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*L**) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -103.34 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -109.80 | 303.64 | 0.36 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*L*L) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -102.10 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -108.54 | 303.64 | 0.36 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*LL*) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -114.56 | 303.64 | 0.38 |
| Span # 3 | 3 | 6.375 | -121.14 | 303.64 | 0.40 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*LLL) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -113.32 | 303.64 | 0.37 |
| Span # 3 | 3 | 6.375 | -119.88 | 303.64 | 0.39 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L***) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -91.87 | 303.64 | 0.30 |
| Span # 3 | 3 | 6.375 | -97.20 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L**L) | | | | | |

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# Concrete Beam



DESCRIPTION: GRBM - GA.4 - at West Stair 10" wall - 3 Piles

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -90.63 | 303.64 | 0.30 |
| Span # 3 | 3 | 6.375 | -95.94 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L*L*) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -103.10 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -108.54 | 303.64 | 0.36 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L*LL) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -101.85 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -107.28 | 303.64 | 0.35 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LL**) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -102.15 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -108.54 | 303.64 | 0.36 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LL*L) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -100.91 | 303.64 | 0.33 |
| Span # 3 | 3 | 6.375 | -107.28 | 303.64 | 0.35 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LLL*) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -113.37 | 303.64 | 0.37 |
| Span # 3 | 3 | 6.375 | -119.88 | 303.64 | 0.39 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LLLL) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -112.13 | 303.64 | 0.37 |
| Span # 3 | 3 | 6.375 | -118.63 | 303.64 | 0.39 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (***L) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -91.82 | 303.64 | 0.30 |
| Span # 3 | 3 | 6.375 | -97.20 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (**L*) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -104.29 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -109.80 | 303.64 | 0.36 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (**LL) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -103.04 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -108.54 | 303.64 | 0.36 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (*L**) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -103.34 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -109.80 | 303.64 | 0.36 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (*L*L) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -102.10 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -108.54 | 303.64 | 0.36 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (*LL*) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -114.56 | 303.64 | 0.38 |
| Span # 3 | 3 | 6.375 | -121.14 | 303.64 | 0.40 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (*LLL) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -113.32 | 303.64 | 0.37 |
| Span # 3 | 3 | 6.375 | -119.88 | 303.64 | 0.39 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |

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DESCRIPTION: GRBM - GA.4 - at West Stair 10" wall - 3 Piles

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (L***) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -91.87 | 303.64 | 0.30 |
| Span # 3 | 3 | 6.375 | -97.20 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (L**L) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -90.63 | 303.64 | 0.30 |
| Span # 3 | 3 | 6.375 | -95.94 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (L*L*) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -103.10 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -108.54 | 303.64 | 0.36 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (L*LL) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -101.85 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -107.28 | 303.64 | 0.35 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (LL**) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -102.15 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -108.54 | 303.64 | 0.36 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (LL*L) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -100.91 | 303.64 | 0.33 |
| Span # 3 | 3 | 6.375 | -107.28 | 303.64 | 0.35 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (LLL*) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -113.37 | 303.64 | 0.37 |
| Span # 3 | 3 | 6.375 | -119.88 | 303.64 | 0.39 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (LLLL) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -112.13 | 303.64 | 0.37 |
| Span # 3 | 3 | 6.375 | -118.63 | 303.64 | 0.39 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +0.90D+W+1.60H | | | | | |
| Span # 1 | 1 | 1.500 | -18.00 | 303.64 | 0.06 |
| Span # 2 | 2 | 6.375 | -69.80 | 303.64 | 0.23 |
| Span # 3 | 3 | 6.375 | -73.84 | 303.64 | 0.24 |
| Span # 4 | 4 | 1.500 | -18.39 | 303.64 | 0.06 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (***L) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -91.82 | 303.64 | 0.30 |
| Span # 3 | 3 | 6.375 | -97.20 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (**L*) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -104.29 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -109.80 | 303.64 | 0.36 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (**LL) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -103.04 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -108.54 | 303.64 | 0.36 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (*L**) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -103.34 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -109.80 | 303.64 | 0.36 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (*L*L) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -102.10 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -108.54 | 303.64 | 0.36 |

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# Concrete Beam

DESCRIPTION: GRBM - GA.4 - at West Stair 10" wall - 3 Piles

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (*LL*) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -114.56 | 303.64 | 0.38 |
| Span # 3 | 3 | 6.375 | -121.14 | 303.64 | 0.40 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (*LLL) | | | | | |
| Span # 1 | 1 | 1.500 | -24.00 | 303.64 | 0.08 |
| Span # 2 | 2 | 6.375 | -113.32 | 303.64 | 0.37 |
| Span # 3 | 3 | 6.375 | -119.88 | 303.64 | 0.39 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (L***) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -91.87 | 303.64 | 0.30 |
| Span # 3 | 3 | 6.375 | -97.20 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (L**L) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -90.63 | 303.64 | 0.30 |
| Span # 3 | 3 | 6.375 | -95.94 | 303.64 | 0.32 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (L*L*) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -103.10 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -108.54 | 303.64 | 0.36 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (L*LL) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -101.85 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -107.28 | 303.64 | 0.35 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (LL**) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -102.15 | 303.64 | 0.34 |
| Span # 3 | 3 | 6.375 | -108.54 | 303.64 | 0.36 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (LL*L) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -100.91 | 303.64 | 0.33 |
| Span # 3 | 3 | 6.375 | -107.28 | 303.64 | 0.35 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (LLL*) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -113.37 | 303.64 | 0.37 |
| Span # 3 | 3 | 6.375 | -119.88 | 303.64 | 0.39 |
| Span # 4 | 4 | 1.500 | -24.52 | 303.64 | 0.08 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (LLLL) | | | | | |
| Span # 1 | 1 | 1.500 | -28.92 | 303.64 | 0.10 |
| Span # 2 | 2 | 6.375 | -112.13 | 303.64 | 0.37 |
| Span # 3 | 3 | 6.375 | -118.63 | 303.64 | 0.39 |
| Span # 4 | 4 | 1.500 | -29.54 | 303.64 | 0.10 |
| +0.90D+E+0.90H | | | | | |
| Span # 1 | 1 | 1.500 | -18.00 | 303.64 | 0.06 |
| Span # 2 | 2 | 6.375 | -69.80 | 303.64 | 0.23 |
| Span # 3 | 3 | 6.375 | -73.84 | 303.64 | 0.24 |
| Span # 4 | 4 | 1.500 | -18.39 | 303.64 | 0.06 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H, LL Comb Run (*L*L) | 1 | 0.0001 | 1.668 | +D+L+H, LL Comb Run (*L*L) | -0.0012 | 0.000 |
| +D+L+H, LL Comb Run (*L*L) | 2 | 0.0017 | 2.852 | | 0.0000 | 0.000 |
| +D+L+H, LL Comb Run (L*L*) | 3 | 0.0017 | 3.523 | +D+L+H, LL Comb Run (L*L*) | -0.0000 | 6.414 |
| | 4 | 0.0000 | 3.523 | +D+L+H, LL Comb Run (L*L*) | -0.0012 | 1.500 |

# Concrete Beam

File: FWI2101 - Paragon Star.ec6
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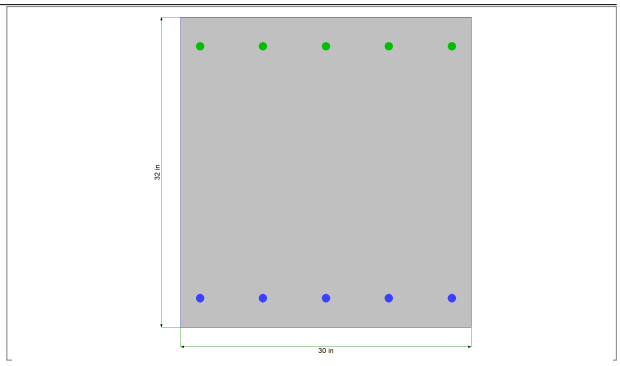
DESCRIPTION: GRBM - GB - Under LT Wall

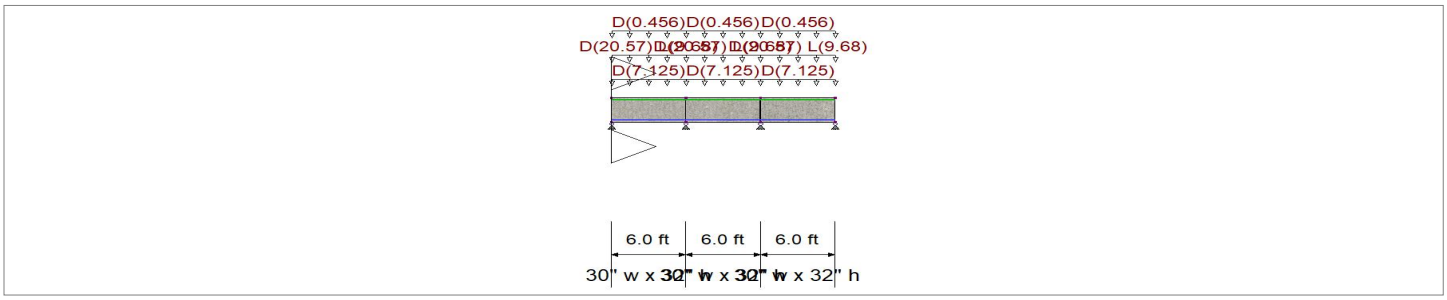
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 3.50 ksi | $\phi$ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 443.706 psi | | Shear : | 0.750 |
| $\psi$ Density | = | 145.0 pcf | $\beta_1$ | = | 0.850 |
| $\lambda$ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 3,122.0 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 2 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 30.0 in, Height = 32.0 in

Span #1 Reinforcing....
- 5-#7 at 3.0 in from Bottom, from 0.0 to 6.0 ft in this span
- 5-#7 at 3.0 in from Top, from 0.0 to 6.0 ft in this span

Span #2 Reinforcing....
- 5-#7 at 3.0 in from Bottom, from 0.0 to 6.0 ft in this span
- 5-#7 at 3.0 in from Top, from 0.0 to 6.0 ft in this span

Span #3 Reinforcing....
- 5-#7 at 3.0 in from Bottom, from 0.0 to 6.0 ft in this span
- 5-#7 at 3.0 in from Top, from 0.0 to 6.0 ft in this span

Beam self weight calculated and added to loads

Load for Span Number 1
- Uniform Load : D = 0.1250 ksf, Tributary Width = 57.0 ft, (12" PC Wall - With Opngs)
- Uniform Load : D = 0.0850, L = 0.040 ksf, Tributary Width = 242.0 ft, (4-Floors)
- Uniform Load : D = 0.0570 ksf, Tributary Width = 8.0 ft, (Wash - 4-Floors)

Load for Span Number 2
- Uniform Load : D = 0.1250 ksf, Tributary Width = 57.0 ft, (12" PC Wall - With Opngs)
- Uniform Load : D = 0.0850, L = 0.040 ksf, Tributary Width = 242.0 ft, (4-Floors)
- Uniform Load : D = 0.0570 ksf, Tributary Width = 8.0 ft, (Wash - 4 Floors)

Load for Span Number 3
- Uniform Load : D = 0.1250 ksf, Tributary Width = 57.0 ft, (12" PC Wall - With Opngs)
- Uniform Load : D = 0.0850, L = 0.040 ksf, Tributary Width = 242.0 ft, (4-Floors)
- Uniform Load : D = 0.0570 ksf, Tributary Width = 8.0 ft, (Wash - 4 Floors)

## DESIGN SUMMARY

**Design OK**

| | | | | | | |
|---|---|---|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.503** : 1 | Maximum Deflection | | | | |
| Section used for this span | **Typical Section** | Max Downward Transient Deflection | 0.000 in | Ratio = | 0 | <360.0 |
| Mu : Applied | -190.838 k-ft | Max Upward Transient Deflection | 0.000 in | Ratio = | 0 | <360.0 |
| Mn * Phi : Allowable | 379.549 k-ft | Max Downward Total Deflection | 0.003 in | Ratio = | 27835 | >=180. |
| Location of maximum on span | 0.000 ft | Max Upward Total Deflection | 0.000 in | Ratio = | 0 | <180.0 |
| Span # where maximum occurs | Span # 3 | | | | | |

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# Concrete Beam

DESCRIPTION: GRBM - GB - Under LT Wall

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| Overall MAXimum | 96.018 | 261.873 | 261.873 | 96.018 |
| Overall MINimum | 0.968 | -5.808 | -5.808 | 0.968 |
| +D+H | 69.882 | 192.177 | 192.177 | 69.882 |
| +D+L+H, LL Comb Run (**L) | 70.850 | 186.369 | 229.929 | 95.050 |
| +D+L+H, LL Comb Run (*L*) | 66.978 | 224.121 | 224.121 | 66.978 |
| +D+L+H, LL Comb Run (*LL) | 67.946 | 218.313 | 261.873 | 92.146 |
| +D+L+H, LL Comb Run (L**) | 95.050 | 229.929 | 186.369 | 70.850 |
| +D+L+H, LL Comb Run (L*L) | 96.018 | 224.121 | 224.121 | 96.018 |
| +D+L+H, LL Comb Run (LL*) | 92.146 | 261.873 | 218.313 | 67.946 |
| +D+L+H, LL Comb Run (LLL) | 93.114 | 256.065 | 256.065 | 93.114 |
| +D+Lr+H, LL Comb Run (**L) | 69.882 | 192.177 | 192.177 | 69.882 |
| +D+Lr+H, LL Comb Run (*L*) | 69.882 | 192.177 | 192.177 | 69.882 |
| +D+Lr+H, LL Comb Run (*LL) | 69.882 | 192.177 | 192.177 | 69.882 |
| +D+Lr+H, LL Comb Run (L**) | 69.882 | 192.177 | 192.177 | 69.882 |
| +D+Lr+H, LL Comb Run (L*L) | 69.882 | 192.177 | 192.177 | 69.882 |
| +D+Lr+H, LL Comb Run (LL*) | 69.882 | 192.177 | 192.177 | 69.882 |
| +D+Lr+H, LL Comb Run (LLL) | 69.882 | 192.177 | 192.177 | 69.882 |
| +D+S+H | 69.882 | 192.177 | 192.177 | 69.882 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 70.608 | 187.821 | 220.491 | 88.758 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 67.704 | 216.135 | 216.135 | 67.704 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 68.430 | 211.779 | 244.449 | 86.580 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 88.758 | 220.491 | 187.821 | 70.608 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 89.484 | 216.135 | 216.135 | 89.484 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 86.580 | 244.449 | 211.779 | 68.430 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 87.306 | 240.093 | 240.093 | 87.306 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 70.608 | 187.821 | 220.491 | 88.758 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 67.704 | 216.135 | 216.135 | 67.704 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 68.430 | 211.779 | 244.449 | 86.580 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 88.758 | 220.491 | 187.821 | 70.608 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 89.484 | 216.135 | 216.135 | 89.484 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 86.580 | 244.449 | 211.779 | 68.430 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 87.306 | 240.093 | 240.093 | 87.306 |
| +D+0.60W+H | 69.882 | 192.177 | 192.177 | 69.882 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 70.608 | 187.821 | 220.491 | 88.758 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 67.704 | 216.135 | 216.135 | 67.704 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 68.430 | 211.779 | 244.449 | 86.580 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 88.758 | 220.491 | 187.821 | 70.608 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 89.484 | 216.135 | 216.135 | 89.484 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 86.580 | 244.449 | 211.779 | 68.430 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 87.306 | 240.093 | 240.093 | 87.306 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 70.608 | 187.821 | 220.491 | 88.758 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 67.704 | 216.135 | 216.135 | 67.704 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 68.430 | 211.779 | 244.449 | 86.580 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 88.758 | 220.491 | 187.821 | 70.608 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 89.484 | 216.135 | 216.135 | 89.484 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 86.580 | 244.449 | 211.779 | 68.430 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 87.306 | 240.093 | 240.093 | 87.306 |
| +0.60D+0.60W+0.60H | 41.929 | 115.306 | 115.306 | 41.929 |
| +D+0.70E+0.60H | 69.882 | 192.177 | 192.177 | 69.882 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 70.608 | 187.821 | 220.491 | 88.758 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 67.704 | 216.135 | 216.135 | 67.704 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 68.430 | 211.779 | 244.449 | 86.580 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 88.758 | 220.491 | 187.821 | 70.608 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 89.484 | 216.135 | 216.135 | 89.484 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 86.580 | 244.449 | 211.779 | 68.430 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 87.306 | 240.093 | 240.093 | 87.306 |
| +0.60D+0.70E+H | 41.929 | 115.306 | 115.306 | 41.929 |
| D Only | 69.882 | 192.177 | 192.177 | 69.882 |
| L Only, LL Comb Run (**L) | 0.968 | -5.808 | 37.752 | 25.168 |

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# Concrete Beam

DESCRIPTION: GRBM - GB - Under LT Wall

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| L Only, LL Comb Run (*L*) | -2.904 | 31.944 | 31.944 | -2.904 |
| L Only, LL Comb Run (*LL) | -1.936 | 26.136 | 69.696 | 22.264 |
| L Only, LL Comb Run (L**) | 25.168 | 37.752 | -5.808 | 0.968 |
| L Only, LL Comb Run (L*L) | 26.136 | 31.944 | 31.944 | 26.136 |
| L Only, LL Comb Run (LL*) | 22.264 | 69.696 | 26.136 | -1.936 |
| L Only, LL Comb Run (LLL) | 23.232 | 63.888 | 63.888 | 23.232 |
| H Only | | | | |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.00 | 29.00 | 125.68 | 125.68 | 0.00 | 1.00 | 78.97 | PhiVc < Vu | 46.707 | 126.4 | 11.2 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.24 | 29.00 | 113.57 | 113.57 | 28.71 | 1.00 | 78.97 | PhiVc < Vu | 34.604 | 126.4 | 14.5 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.48 | 29.00 | 101.47 | 101.47 | 54.52 | 1.00 | 78.97 | PhiVc < Vu | 22.501 | 126.4 | 14.5 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.72 | 29.00 | 89.37 | 89.37 | 77.42 | 1.00 | 78.97 | PhiVc < Vu | 10.398 | 126.4 | 14.5 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.96 | 29.00 | 77.26 | 77.26 | 97.41 | 1.00 | 78.97 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 116.3 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.20 | 29.00 | 65.16 | 65.16 | 114.50 | 1.00 | 78.97 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 116.3 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.44 | 29.00 | 53.06 | 53.06 | 128.69 | 1.00 | 78.95 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 116.2 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.68 | 29.00 | 40.96 | 40.96 | 139.97 | 0.71 | 77.32 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 114.6 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.92 | 29.00 | 28.85 | 28.85 | 148.35 | 0.47 | 75.99 | Vu < PhiVc/2 | lot Reqd 9.6. | 76.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.16 | 29.00 | 16.75 | 16.75 | 153.82 | 0.26 | 74.82 | Vu < PhiVc/2 | lot Reqd 9.6. | 74.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.40 | 29.00 | 4.65 | 4.65 | 156.39 | 0.07 | 73.75 | Vu < PhiVc/2 | lot Reqd 9.6. | 73.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.64 | 29.00 | -13.65 | 13.65 | 139.69 | 0.24 | 74.67 | Vu < PhiVc/2 | lot Reqd 9.6. | 74.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.88 | 29.00 | -25.75 | 25.75 | 134.97 | 0.46 | 75.94 | Vu < PhiVc/2 | lot Reqd 9.6. | 75.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.12 | 29.00 | -37.86 | 37.86 | 127.33 | 0.72 | 77.39 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.36 | 29.00 | -49.96 | 49.96 | 116.79 | 1.00 | 78.97 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 116.3 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.60 | 29.00 | -62.06 | 62.06 | 103.35 | 1.00 | 78.97 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 116.3 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.84 | 29.00 | -74.17 | 74.17 | 87.00 | 1.00 | 78.97 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 116.3 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.08 | 29.00 | -86.27 | 86.27 | 67.75 | 1.00 | 78.97 | PhiVc < Vu | 7.30 | 183.4 | 14.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.32 | 29.00 | -98.37 | 98.37 | 45.59 | 1.00 | 78.97 | PhiVc < Vu | 19.403 | 183.4 | 14.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.56 | 29.00 | -110.48 | 110.48 | 20.53 | 1.00 | 78.97 | PhiVc < Vu | 31.506 | 183.4 | 14.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.80 | 29.00 | -122.58 | 122.58 | 7.43 | 1.00 | 78.97 | PhiVc < Vu | 43.609 | 183.4 | 12.0 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.04 | 29.00 | -134.68 | 134.68 | 38.31 | 1.00 | 78.97 | PhiVc < Vu | 55.712 | 183.4 | 9.4 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.28 | 29.00 | -146.78 | 146.78 | 72.08 | 1.00 | 78.97 | PhiVc < Vu | 67.815 | 183.4 | 7.7 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.52 | 29.00 | -158.89 | 158.89 | 108.76 | 1.00 | 78.97 | PhiVc < Vu | 79.918 | 183.4 | 6.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.76 | 29.00 | -170.99 | 170.99 | 148.35 | 1.00 | 78.97 | PhiVc < Vu | 92.021 | 183.4 | 5.7 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 6.00 | 29.00 | 159.03 | 159.03 | 190.84 | 1.00 | 78.97 | PhiVc < Vu | 80.062 | 183.4 | 6.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 6.24 | 29.00 | 146.93 | 146.93 | 154.12 | 1.00 | 78.97 | PhiVc < Vu | 67.959 | 183.4 | 7.7 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 6.48 | 29.00 | 134.83 | 134.83 | 120.31 | 1.00 | 78.97 | PhiVc < Vu | 55.856 | 183.4 | 9.3 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 6.72 | 29.00 | 122.72 | 122.72 | 89.41 | 1.00 | 78.97 | PhiVc < Vu | 43.753 | 183.4 | 11.9 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 6.96 | 29.00 | 110.62 | 110.62 | 61.41 | 1.00 | 78.97 | PhiVc < Vu | 31.650 | 183.4 | 14.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 7.20 | 29.00 | 98.52 | 98.52 | 36.31 | 1.00 | 78.97 | PhiVc < Vu | 19.547 | 183.4 | 14.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 7.44 | 29.00 | 86.41 | 86.41 | 14.12 | 1.00 | 78.97 | PhiVc < Vu | 7.444 | 183.4 | 14.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 7.68 | 29.00 | 74.31 | 74.31 | 5.17 | 1.00 | 78.97 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 116.3 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 7.92 | 29.00 | 62.21 | 62.21 | 21.55 | 1.00 | 78.97 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 116.3 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 8.16 | 29.00 | 50.10 | 50.10 | 35.03 | 1.00 | 78.97 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 116.3 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 8.40 | 29.00 | 38.00 | 38.00 | 45.60 | 1.00 | 78.97 | Vu < PhiVc/2 | lot Reqd 9.6. | 79.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 8.64 | 29.00 | 25.90 | 25.90 | 53.27 | 1.00 | 78.97 | Vu < PhiVc/2 | lot Reqd 9.6. | 79.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 8.88 | 29.00 | 13.80 | 13.80 | 58.03 | 0.57 | 76.58 | Vu < PhiVc/2 | lot Reqd 9.6. | 76.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 9.12 | 29.00 | -13.80 | 13.80 | 58.03 | 0.57 | 76.58 | Vu < PhiVc/2 | lot Reqd 9.6. | 76.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 9.36 | 29.00 | -25.90 | 25.90 | 53.27 | 1.00 | 78.97 | Vu < PhiVc/2 | lot Reqd 9.6. | 79.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 9.60 | 29.00 | -38.00 | 38.00 | 45.60 | 1.00 | 78.97 | Vu < PhiVc/2 | lot Reqd 9.6. | 79.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 9.84 | 29.00 | -50.10 | 50.10 | 35.03 | 1.00 | 78.97 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 116.3 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 10.08 | 29.00 | -62.21 | 62.21 | 21.55 | 1.00 | 78.97 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 116.3 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 10.32 | 29.00 | -74.31 | 74.31 | 5.17 | 1.00 | 78.97 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 116.3 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 10.56 | 29.00 | -86.41 | 86.41 | 14.12 | 1.00 | 78.97 | PhiVc < Vu | 7.444 | 183.4 | 14.5 | 5.0 |

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# Concrete Beam

DESCRIPTION: GRBM - GB - Under LT Wall

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 10.80 | 29.00 | -98.52 | 98.52 | 36.31 | 1.00 | 78.97 | PhiVc < Vu | 19.547 | 183.4 | 14.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 11.04 | 29.00 | -110.62 | 110.62 | 61.41 | 1.00 | 78.97 | PhiVc < Vu | 31.650 | 183.4 | 14.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 11.28 | 29.00 | -122.72 | 122.72 | 89.41 | 1.00 | 78.97 | PhiVc < Vu | 43.753 | 183.4 | 11.9 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 11.52 | 29.00 | -134.83 | 134.83 | 120.31 | 1.00 | 78.97 | PhiVc < Vu | 55.856 | 183.4 | 9.3 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 11.76 | 29.00 | -146.93 | 146.93 | 154.12 | 1.00 | 78.97 | PhiVc < Vu | 67.959 | 183.4 | 7.7 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 12.00 | 29.00 | 183.09 | 183.09 | 190.84 | 1.00 | 78.97 | PhiVc < Vu | 104.124 | 183.4 | 5.0 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 12.24 | 29.00 | 170.99 | 170.99 | 148.35 | 1.00 | 78.97 | PhiVc < Vu | 92.021 | 183.4 | 5.7 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 12.48 | 29.00 | 158.89 | 158.89 | 108.76 | 1.00 | 78.97 | PhiVc < Vu | 79.918 | 183.4 | 6.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 12.72 | 29.00 | 146.78 | 146.78 | 72.08 | 1.00 | 78.97 | PhiVc < Vu | 67.815 | 183.4 | 7.7 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 12.96 | 29.00 | 134.68 | 134.68 | 38.31 | 1.00 | 78.97 | PhiVc < Vu | 55.712 | 183.4 | 9.4 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 13.20 | 29.00 | 122.58 | 122.58 | 7.43 | 1.00 | 78.97 | PhiVc < Vu | 43.609 | 183.4 | 12.0 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 13.44 | 29.00 | 110.48 | 110.48 | 20.53 | 1.00 | 78.97 | PhiVc < Vu | 31.506 | 183.4 | 14.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 13.68 | 29.00 | 98.37 | 98.37 | 45.59 | 1.00 | 78.97 | PhiVc < Vu | 19.403 | 183.4 | 14.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 13.92 | 29.00 | 86.27 | 86.27 | 67.75 | 1.00 | 78.97 | PhiVc < Vu | 7.30 | 183.4 | 14.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 14.16 | 29.00 | 74.17 | 74.17 | 87.00 | 1.00 | 78.97 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 116.3 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 14.40 | 29.00 | 62.06 | 62.06 | 103.35 | 1.00 | 78.97 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 116.3 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 14.64 | 29.00 | 49.96 | 49.96 | 116.79 | 1.00 | 78.97 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 116.3 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 14.88 | 29.00 | 37.86 | 37.86 | 127.33 | 0.72 | 77.39 | Vu < PhiVc/2 | lot Reqd 9.6. | 77.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 15.12 | 29.00 | 25.75 | 25.75 | 134.97 | 0.46 | 75.94 | Vu < PhiVc/2 | lot Reqd 9.6. | 75.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 15.36 | 29.00 | 13.65 | 13.65 | 139.69 | 0.24 | 74.67 | Vu < PhiVc/2 | lot Reqd 9.6. | 74.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 15.60 | 29.00 | -4.65 | 4.65 | 156.39 | 0.07 | 73.75 | Vu < PhiVc/2 | lot Reqd 9.6. | 73.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 15.84 | 29.00 | -16.75 | 16.75 | 153.82 | 0.26 | 74.82 | Vu < PhiVc/2 | lot Reqd 9.6. | 74.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 16.08 | 29.00 | -28.85 | 28.85 | 148.35 | 0.47 | 75.99 | Vu < PhiVc/2 | lot Reqd 9.6. | 76.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 16.32 | 29.00 | -40.96 | 40.96 | 139.97 | 0.71 | 77.32 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 114.6 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 16.56 | 29.00 | -53.06 | 53.06 | 128.69 | 1.00 | 78.95 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 116.2 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 16.80 | 29.00 | -65.16 | 65.16 | 114.50 | 1.00 | 78.97 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 116.3 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 17.04 | 29.00 | -77.26 | 77.26 | 97.41 | 1.00 | 78.97 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 116.3 | 14.5 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 17.28 | 29.00 | -89.37 | 89.37 | 77.42 | 1.00 | 78.97 | PhiVc < Vu | 10.398 | 126.4 | 14.5 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 17.52 | 29.00 | -101.47 | 101.47 | 54.52 | 1.00 | 78.97 | PhiVc < Vu | 22.501 | 126.4 | 14.5 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 17.76 | 29.00 | -113.57 | 113.57 | 28.71 | 1.00 | 78.97 | PhiVc < Vu | 34.604 | 126.4 | 14.5 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 18.00 | 29.00 | -125.68 | 125.68 | 0.00 | 1.00 | 78.97 | PhiVc < Vu | 46.707 | 126.4 | 11.2 | 11.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 6.000 | -183.55 | 379.55 | 0.48 |
| Span # 2 | 2 | 6.000 | -190.84 | 379.55 | 0.50 |
| Span # 3 | 3 | 6.000 | -190.84 | 379.55 | 0.50 |
| +1.40D+1.60H | | | | | |
| Span # 1 | 1 | 6.000 | -140.92 | 379.55 | 0.37 |
| Span # 2 | 2 | 6.000 | -146.75 | 379.55 | 0.39 |
| Span # 3 | 3 | 6.000 | -146.75 | 379.55 | 0.39 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 6.000 | -111.55 | 379.55 | 0.29 |
| Span # 2 | 2 | 6.000 | -158.48 | 379.55 | 0.42 |
| Span # 3 | 3 | 6.000 | -162.96 | 379.55 | 0.43 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 6.000 | -148.48 | 379.55 | 0.39 |
| Span # 2 | 2 | 6.000 | -153.67 | 379.55 | 0.40 |
| Span # 3 | 3 | 6.000 | -153.67 | 379.55 | 0.40 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 6.000 | -139.25 | 379.55 | 0.37 |
| Span # 2 | 2 | 6.000 | -184.52 | 379.55 | 0.49 |
| Span # 3 | 3 | 6.000 | -190.84 | 379.55 | 0.50 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 6.000 | -155.86 | 379.55 | 0.41 |
| Span # 2 | 2 | 6.000 | -162.96 | 379.55 | 0.43 |
| Span # 3 | 3 | 6.000 | -116.50 | 379.55 | 0.31 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L*L) | | | | | |

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DESCRIPTION: GRBM - GB - Under LT Wall

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 1 | 1 | 6.000 | 156.60 | 379.55 | 0.41 |
| Span # 2 | 2 | 6.000 | -153.67 | 379.55 | 0.40 |
| Span # 3 | 3 | 6.000 | 156.60 | 379.55 | 0.41 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 6.000 | -183.55 | 379.55 | 0.48 |
| Span # 2 | 2 | 6.000 | -190.84 | 379.55 | 0.50 |
| Span # 3 | 3 | 6.000 | -144.37 | 379.55 | 0.38 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 6.000 | -174.32 | 379.55 | 0.46 |
| Span # 2 | 2 | 6.000 | -181.55 | 379.55 | 0.48 |
| Span # 3 | 3 | 6.000 | -181.55 | 379.55 | 0.48 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 6.000 | -111.55 | 379.55 | 0.29 |
| Span # 2 | 2 | 6.000 | -158.48 | 379.55 | 0.42 |
| Span # 3 | 3 | 6.000 | -162.96 | 379.55 | 0.43 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 6.000 | -148.48 | 379.55 | 0.39 |
| Span # 2 | 2 | 6.000 | -153.67 | 379.55 | 0.40 |
| Span # 3 | 3 | 6.000 | -153.67 | 379.55 | 0.40 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 6.000 | -139.25 | 379.55 | 0.37 |
| Span # 2 | 2 | 6.000 | -184.52 | 379.55 | 0.49 |
| Span # 3 | 3 | 6.000 | -190.84 | 379.55 | 0.50 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 6.000 | -155.86 | 379.55 | 0.41 |
| Span # 2 | 2 | 6.000 | -162.96 | 379.55 | 0.43 |
| Span # 3 | 3 | 6.000 | -116.50 | 379.55 | 0.31 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 6.000 | 156.60 | 379.55 | 0.41 |
| Span # 2 | 2 | 6.000 | -153.67 | 379.55 | 0.40 |
| Span # 3 | 3 | 6.000 | 156.60 | 379.55 | 0.41 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 6.000 | -183.55 | 379.55 | 0.48 |
| Span # 2 | 2 | 6.000 | -190.84 | 379.55 | 0.50 |
| Span # 3 | 3 | 6.000 | -144.37 | 379.55 | 0.38 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 6.000 | -174.32 | 379.55 | 0.46 |
| Span # 2 | 2 | 6.000 | -181.55 | 379.55 | 0.48 |
| Span # 3 | 3 | 6.000 | -181.55 | 379.55 | 0.48 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 6.000 | -115.02 | 379.55 | 0.30 |
| Span # 2 | 2 | 6.000 | -144.66 | 379.55 | 0.38 |
| Span # 3 | 3 | 6.000 | -149.02 | 379.55 | 0.39 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 6.000 | -138.09 | 379.55 | 0.36 |
| Span # 2 | 2 | 6.000 | -143.21 | 379.55 | 0.38 |
| Span # 3 | 3 | 6.000 | -143.21 | 379.55 | 0.38 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 6.000 | -132.32 | 379.55 | 0.35 |
| Span # 2 | 2 | 6.000 | -160.93 | 379.55 | 0.42 |
| Span # 3 | 3 | 6.000 | -166.44 | 379.55 | 0.44 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 6.000 | -142.71 | 379.55 | 0.38 |
| Span # 2 | 2 | 6.000 | -149.02 | 379.55 | 0.39 |
| Span # 3 | 3 | 6.000 | -119.98 | 379.55 | 0.32 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 6.000 | -136.94 | 379.55 | 0.36 |
| Span # 2 | 2 | 6.000 | -143.21 | 379.55 | 0.38 |
| Span # 3 | 3 | 6.000 | -143.21 | 379.55 | 0.38 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 6.000 | -160.02 | 379.55 | 0.42 |
| Span # 2 | 2 | 6.000 | -166.44 | 379.55 | 0.44 |
| Span # 3 | 3 | 6.000 | -137.40 | 379.55 | 0.36 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 6.000 | -154.25 | 379.55 | 0.41 |
| Span # 2 | 2 | 6.000 | -160.64 | 379.55 | 0.42 |
| Span # 3 | 3 | 6.000 | -160.64 | 379.55 | 0.42 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 6.000 | -120.78 | 379.55 | 0.32 |

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DESCRIPTION: GRBM - GB - Under LT Wall

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 2 | 2 | 6.000 | -125.79 | 379.55 | 0.33 |
| Span # 3 | 3 | 6.000 | -125.79 | 379.55 | 0.33 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 6.000 | -120.78 | 379.55 | 0.32 |
| Span # 2 | 2 | 6.000 | -125.79 | 379.55 | 0.33 |
| Span # 3 | 3 | 6.000 | -125.79 | 379.55 | 0.33 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 6.000 | -120.78 | 379.55 | 0.32 |
| Span # 2 | 2 | 6.000 | -125.79 | 379.55 | 0.33 |
| Span # 3 | 3 | 6.000 | -125.79 | 379.55 | 0.33 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 6.000 | -120.78 | 379.55 | 0.32 |
| Span # 2 | 2 | 6.000 | -125.79 | 379.55 | 0.33 |
| Span # 3 | 3 | 6.000 | -125.79 | 379.55 | 0.33 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 6.000 | -120.78 | 379.55 | 0.32 |
| Span # 2 | 2 | 6.000 | -125.79 | 379.55 | 0.33 |
| Span # 3 | 3 | 6.000 | -125.79 | 379.55 | 0.33 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 6.000 | -120.78 | 379.55 | 0.32 |
| Span # 2 | 2 | 6.000 | -125.79 | 379.55 | 0.33 |
| Span # 3 | 3 | 6.000 | -125.79 | 379.55 | 0.33 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 6.000 | -120.78 | 379.55 | 0.32 |
| Span # 2 | 2 | 6.000 | -125.79 | 379.55 | 0.33 |
| Span # 3 | 3 | 6.000 | -125.79 | 379.55 | 0.33 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 6.000 | -115.02 | 379.55 | 0.30 |
| Span # 2 | 2 | 6.000 | -144.66 | 379.55 | 0.38 |
| Span # 3 | 3 | 6.000 | -149.02 | 379.55 | 0.39 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 6.000 | -138.09 | 379.55 | 0.36 |
| Span # 2 | 2 | 6.000 | -143.21 | 379.55 | 0.38 |
| Span # 3 | 3 | 6.000 | -143.21 | 379.55 | 0.38 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 6.000 | -132.32 | 379.55 | 0.35 |
| Span # 2 | 2 | 6.000 | -160.93 | 379.55 | 0.42 |
| Span # 3 | 3 | 6.000 | -166.44 | 379.55 | 0.44 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 6.000 | -142.71 | 379.55 | 0.38 |
| Span # 2 | 2 | 6.000 | -149.02 | 379.55 | 0.39 |
| Span # 3 | 3 | 6.000 | -119.98 | 379.55 | 0.32 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 6.000 | -136.94 | 379.55 | 0.36 |
| Span # 2 | 2 | 6.000 | -143.21 | 379.55 | 0.38 |
| Span # 3 | 3 | 6.000 | -143.21 | 379.55 | 0.38 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 6.000 | -160.02 | 379.55 | 0.42 |
| Span # 2 | 2 | 6.000 | -166.44 | 379.55 | 0.44 |
| Span # 3 | 3 | 6.000 | -137.40 | 379.55 | 0.36 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 6.000 | -154.25 | 379.55 | 0.41 |
| Span # 2 | 2 | 6.000 | -160.64 | 379.55 | 0.42 |
| Span # 3 | 3 | 6.000 | -160.64 | 379.55 | 0.42 |
| +1.20D+1.60S+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 6.000 | -120.78 | 379.55 | 0.32 |
| Span # 2 | 2 | 6.000 | -125.79 | 379.55 | 0.33 |
| Span # 3 | 3 | 6.000 | -125.79 | 379.55 | 0.33 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 6.000 | -115.02 | 379.55 | 0.30 |
| Span # 2 | 2 | 6.000 | -144.66 | 379.55 | 0.38 |
| Span # 3 | 3 | 6.000 | -149.02 | 379.55 | 0.39 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 6.000 | -138.09 | 379.55 | 0.36 |
| Span # 2 | 2 | 6.000 | -143.21 | 379.55 | 0.38 |
| Span # 3 | 3 | 6.000 | -143.21 | 379.55 | 0.38 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 6.000 | -132.32 | 379.55 | 0.35 |
| Span # 2 | 2 | 6.000 | -160.93 | 379.55 | 0.42 |

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# Concrete Beam

DESCRIPTION: GRBM - GB - Under LT Wall

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 3 | 3 | 6.000 | -166.44 | 379.55 | 0.44 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 6.000 | -142.71 | 379.55 | 0.38 |
| Span # 2 | 2 | 6.000 | -149.02 | 379.55 | 0.39 |
| Span # 3 | 3 | 6.000 | -119.98 | 379.55 | 0.32 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 6.000 | -136.94 | 379.55 | 0.36 |
| Span # 2 | 2 | 6.000 | -143.21 | 379.55 | 0.38 |
| Span # 3 | 3 | 6.000 | -143.21 | 379.55 | 0.38 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 6.000 | -160.02 | 379.55 | 0.42 |
| Span # 2 | 2 | 6.000 | -166.44 | 379.55 | 0.44 |
| Span # 3 | 3 | 6.000 | -137.40 | 379.55 | 0.36 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 6.000 | -154.25 | 379.55 | 0.41 |
| Span # 2 | 2 | 6.000 | -160.64 | 379.55 | 0.42 |
| Span # 3 | 3 | 6.000 | -160.64 | 379.55 | 0.42 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 6.000 | -115.02 | 379.55 | 0.30 |
| Span # 2 | 2 | 6.000 | -144.66 | 379.55 | 0.38 |
| Span # 3 | 3 | 6.000 | -149.02 | 379.55 | 0.39 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 6.000 | -138.09 | 379.55 | 0.36 |
| Span # 2 | 2 | 6.000 | -143.21 | 379.55 | 0.38 |
| Span # 3 | 3 | 6.000 | -143.21 | 379.55 | 0.38 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 6.000 | -132.32 | 379.55 | 0.35 |
| Span # 2 | 2 | 6.000 | -160.93 | 379.55 | 0.42 |
| Span # 3 | 3 | 6.000 | -166.44 | 379.55 | 0.44 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 6.000 | -142.71 | 379.55 | 0.38 |
| Span # 2 | 2 | 6.000 | -149.02 | 379.55 | 0.39 |
| Span # 3 | 3 | 6.000 | -119.98 | 379.55 | 0.32 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 6.000 | -136.94 | 379.55 | 0.36 |
| Span # 2 | 2 | 6.000 | -143.21 | 379.55 | 0.38 |
| Span # 3 | 3 | 6.000 | -143.21 | 379.55 | 0.38 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 6.000 | -160.02 | 379.55 | 0.42 |
| Span # 2 | 2 | 6.000 | -166.44 | 379.55 | 0.44 |
| Span # 3 | 3 | 6.000 | -137.40 | 379.55 | 0.36 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 6.000 | -154.25 | 379.55 | 0.41 |
| Span # 2 | 2 | 6.000 | -160.64 | 379.55 | 0.42 |
| Span # 3 | 3 | 6.000 | -160.64 | 379.55 | 0.42 |
| +0.90D+W+1.60H | | | | | |
| Span # 1 | 1 | 6.000 | -90.59 | 379.55 | 0.24 |
| Span # 2 | 2 | 6.000 | -94.34 | 379.55 | 0.25 |
| Span # 3 | 3 | 6.000 | -94.34 | 379.55 | 0.25 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 6.000 | -115.02 | 379.55 | 0.30 |
| Span # 2 | 2 | 6.000 | -144.66 | 379.55 | 0.38 |
| Span # 3 | 3 | 6.000 | -149.02 | 379.55 | 0.39 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 6.000 | -138.09 | 379.55 | 0.36 |
| Span # 2 | 2 | 6.000 | -143.21 | 379.55 | 0.38 |
| Span # 3 | 3 | 6.000 | -143.21 | 379.55 | 0.38 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 6.000 | -132.32 | 379.55 | 0.35 |
| Span # 2 | 2 | 6.000 | -160.93 | 379.55 | 0.42 |
| Span # 3 | 3 | 6.000 | -166.44 | 379.55 | 0.44 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 6.000 | -142.71 | 379.55 | 0.38 |
| Span # 2 | 2 | 6.000 | -149.02 | 379.55 | 0.39 |
| Span # 3 | 3 | 6.000 | -119.98 | 379.55 | 0.32 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 6.000 | -136.94 | 379.55 | 0.36 |
| Span # 2 | 2 | 6.000 | -143.21 | 379.55 | 0.38 |
| Span # 3 | 3 | 6.000 | -143.21 | 379.55 | 0.38 |

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# Concrete Beam

DESCRIPTION: GRBM - GB - Under LT Wall

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 6.000 | -160.02 | 379.55 | 0.42 |
| Span # 2 | 2 | 6.000 | -166.44 | 379.55 | 0.44 |
| Span # 3 | 3 | 6.000 | -137.40 | 379.55 | 0.36 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 6.000 | -154.25 | 379.55 | 0.41 |
| Span # 2 | 2 | 6.000 | -160.64 | 379.55 | 0.42 |
| Span # 3 | 3 | 6.000 | -160.64 | 379.55 | 0.42 |
| +0.90D+E+0.90H | | | | | |
| Span # 1 | 1 | 6.000 | -90.59 | 379.55 | 0.24 |
| Span # 2 | 2 | 6.000 | -94.34 | 379.55 | 0.25 |
| Span # 3 | 3 | 6.000 | -94.34 | 379.55 | 0.25 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H, LL Comb Run (L*L) | 1 | 0.0026 | 2.760 | +D+L+H, LL Comb Run (L*L) | -0.0001 | 6.120 |
| +D+L+H, LL Comb Run (*L*) | 2 | 0.0007 | 3.000 | +D+L+H, LL Comb Run (L*L) | -0.0004 | 4.440 |
| +D+L+H, LL Comb Run (L*L) | 3 | 0.0026 | 3.240 | | 0.0000 | 4.440 |

# Concrete Beam

File: FWI2101 - Paragon Star.ec6
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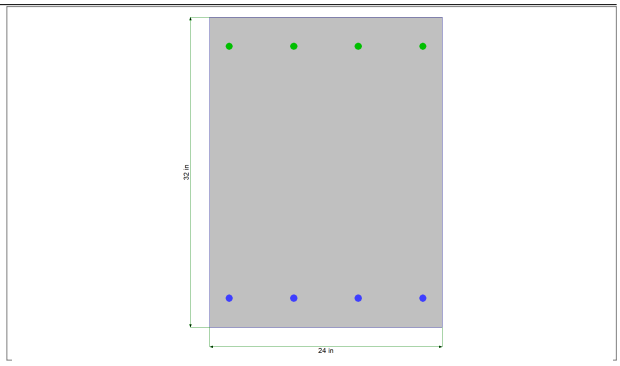
DESCRIPTION: GRBM - G3 - Under 10" PC Ramp End Wall

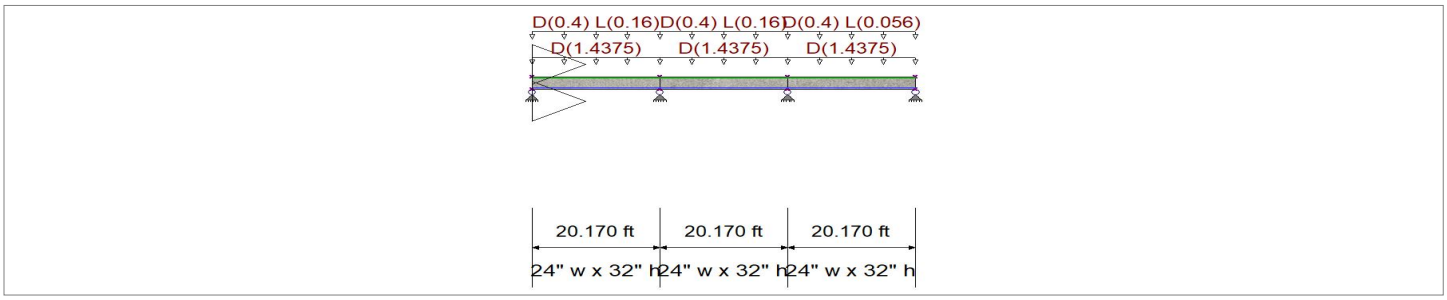
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 3.50 ksi | ϕ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 443.706 psi | | Shear : | 0.750 |
| ψ Density | = | 145.0 pcf | $\beta_1$ | = | 0.850 |
| λ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 3,122.0 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 2 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 24.0 in, Height = 32.0 in

Span #1 Reinforcing....
- 4-#6 at 3.0 in from Bottom, from 0.0 to 20.170 ft in this span
- 4-#6 at 3.0 in from Top, from 0.0 to 20.170 ft in this span

Span #2 Reinforcing....
- 4-#6 at 3.0 in from Bottom, from 0.0 to 20.170 ft in this span
- 4-#6 at 3.0 in from Top, from 0.0 to 20.170 ft in this span

Span #3 Reinforcing....
- 4-#6 at 3.0 in from Bottom, from 0.0 to 20.170 ft in this span
- 4-#6 at 3.0 in from Top, from 0.0 to 20.170 ft in this span

Beam self weight calculated and added to loads

Load for Span Number 1
- Uniform Load : D = 0.1250 ksf, Tributary Width = 11.50 ft, (10" PC Wall)
- Uniform Load : D = 0.10, L = 0.040 ksf, Tributary Width = 4.0 ft, (Hinge Slab)

Load for Span Number 2
- Uniform Load : D = 0.1250 ksf, Tributary Width = 11.50 ft, (10" PC Wall)
- Uniform Load : D = 0.10, L = 0.040 ksf, Tributary Width = 4.0 ft, (Hinge Slab)

Load for Span Number 3
- Uniform Load : D = 0.1250 ksf, Tributary Width = 11.50 ft, (10" PC Wall)
- Uniform Load : D = 0.10, L = 0.0140 ksf, Tributary Width = 4.0 ft, (Hinge Slab)

## DESIGN SUMMARY

**Design OK**

| | | | | | |
|---|---|---|---|---|---|
| Maximum Bending Stress Ratio | = | **0.654** : 1 | Maximum Deflection | | |
| Section used for this span | | **Typical Section** | Max Downward Transient Deflection | 0.002 in | Ratio = 117316 >=360. |
| Mu : Applied | | -148.703 k-ft | Max Upward Transient Deflection | 0.000 in | Ratio = 0 <360.0 |
| Mn * Phi : Allowable | | 227.495 k-ft | Max Downward Total Deflection | 0.027 in | Ratio = 8930 >=180. |
| Location of maximum on span | | 0.000 ft | Max Upward Total Deflection | -0.002 in | Ratio = 122999 >=180. |
| Span # where maximum occurs | | Span # 2 | | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| Overall MAXimum | 22.481 | 61.799 | 60.436 | 21.607 |

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DESCRIPTION: GRBM - G3 - Under 10" PC Ramp End Wall

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| Overall MINimum | 0.019 | -0.113 | -0.323 | 0.054 |
| +D+H | 21.064 | 57.927 | 57.927 | 21.064 |
| +D+L+H, LL Comb Run (**L) | 21.083 | 57.814 | 58.661 | 21.554 |
| +D+L+H, LL Comb Run (*L*) | 20.903 | 59.702 | 59.702 | 20.903 |
| +D+L+H, LL Comb Run (*LL) | 20.922 | 59.589 | 60.436 | 21.392 |
| +D+L+H, LL Comb Run (L**) | 22.463 | 60.024 | 57.604 | 21.118 |
| +D+L+H, LL Comb Run (L*L) | 22.481 | 59.911 | 58.338 | 21.607 |
| +D+L+H, LL Comb Run (LL*) | 22.301 | 61.799 | 59.379 | 20.957 |
| +D+L+H, LL Comb Run (LLL) | 22.320 | 61.686 | 60.113 | 21.446 |
| +D+Lr+H, LL Comb Run (**L) | 21.064 | 57.927 | 57.927 | 21.064 |
| +D+Lr+H, LL Comb Run (*L*) | 21.064 | 57.927 | 57.927 | 21.064 |
| +D+Lr+H, LL Comb Run (*LL) | 21.064 | 57.927 | 57.927 | 21.064 |
| +D+Lr+H, LL Comb Run (L**) | 21.064 | 57.927 | 57.927 | 21.064 |
| +D+Lr+H, LL Comb Run (L*L) | 21.064 | 57.927 | 57.927 | 21.064 |
| +D+Lr+H, LL Comb Run (LL*) | 21.064 | 57.927 | 57.927 | 21.064 |
| +D+Lr+H, LL Comb Run (LLL) | 21.064 | 57.927 | 57.927 | 21.064 |
| +D+S+H | 21.064 | 57.927 | 57.927 | 21.064 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 21.078 | 57.842 | 58.477 | 21.431 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 20.943 | 59.258 | 59.258 | 20.943 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 20.957 | 59.173 | 59.808 | 21.310 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 22.113 | 59.500 | 57.685 | 21.105 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 22.127 | 59.415 | 58.235 | 21.472 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 21.992 | 60.831 | 59.016 | 20.984 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 22.006 | 60.746 | 59.566 | 21.351 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 21.078 | 57.842 | 58.477 | 21.431 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 20.943 | 59.258 | 59.258 | 20.943 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 20.957 | 59.173 | 59.808 | 21.310 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 22.113 | 59.500 | 57.685 | 21.105 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 22.127 | 59.415 | 58.235 | 21.472 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 21.992 | 60.831 | 59.016 | 20.984 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 22.006 | 60.746 | 59.566 | 21.351 |
| +D+0.60W+H | 21.064 | 57.927 | 57.927 | 21.064 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 21.078 | 57.842 | 58.477 | 21.431 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 20.943 | 59.258 | 59.258 | 20.943 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 20.957 | 59.173 | 59.808 | 21.310 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 22.113 | 59.500 | 57.685 | 21.105 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 22.127 | 59.415 | 58.235 | 21.472 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 21.992 | 60.831 | 59.016 | 20.984 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 22.006 | 60.746 | 59.566 | 21.351 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 21.078 | 57.842 | 58.477 | 21.431 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 20.943 | 59.258 | 59.258 | 20.943 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 20.957 | 59.173 | 59.808 | 21.310 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 22.113 | 59.500 | 57.685 | 21.105 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 22.127 | 59.415 | 58.235 | 21.472 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 21.992 | 60.831 | 59.016 | 20.984 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 22.006 | 60.746 | 59.566 | 21.351 |
| +0.60D+0.60W+0.60H | 12.639 | 34.756 | 34.756 | 12.639 |
| +D+0.70E+0.60H | 21.064 | 57.927 | 57.927 | 21.064 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 21.078 | 57.842 | 58.477 | 21.431 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 20.943 | 59.258 | 59.258 | 20.943 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 20.957 | 59.173 | 59.808 | 21.310 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 22.113 | 59.500 | 57.685 | 21.105 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 22.127 | 59.415 | 58.235 | 21.472 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 21.992 | 60.831 | 59.016 | 20.984 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 22.006 | 60.746 | 59.566 | 21.351 |
| +0.60D+0.70E+H | 12.639 | 34.756 | 34.756 | 12.639 |
| D Only | 21.064 | 57.927 | 57.927 | 21.064 |
| L Only, LL Comb Run (**L) | 0.019 | -0.113 | 0.734 | 0.489 |
| L Only, LL Comb Run (*L*) | -0.161 | 1.775 | 1.775 | -0.161 |

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# Concrete Beam

DESCRIPTION: GRBM - G3 - Under 10" PC Ramp End Wall

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| L Only, LL Comb Run (*LL) | -0.143 | 1.662 | 2.509 | 0.328 |
| L Only, LL Comb Run (L**) | 1.398 | 2.098 | -0.323 | 0.054 |
| L Only, LL Comb Run (L*L) | 1.417 | 1.985 | 0.411 | 0.543 |
| L Only, LL Comb Run (LL*) | 1.237 | 3.873 | 1.452 | -0.108 |
| L Only, LL Comb Run (LLL) | 1.256 | 3.760 | 2.186 | 0.382 |
| H Only | | | | |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.40D+1.60H | 1 | 0.00 | 29.00 | 29.49 | 29.49 | 0.00 | 1.00 | 61.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 62.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 0.81 | 29.00 | 26.54 | 26.54 | 22.60 | 1.00 | 61.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 62.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 1.61 | 29.00 | 23.59 | 23.59 | 42.83 | 1.00 | 61.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 62.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 2.42 | 29.00 | 20.64 | 20.64 | 60.67 | 0.82 | 61.39 | Vu < PhiVc/2 | lot Reqd 9.6. | 61.4 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 3.23 | 29.00 | 17.69 | 17.69 | 76.14 | 0.56 | 60.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 60.5 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 4.03 | 29.00 | 14.74 | 14.74 | 89.22 | 0.40 | 59.99 | Vu < PhiVc/2 | lot Reqd 9.6. | 60.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 4.84 | 29.00 | 11.80 | 11.80 | 99.93 | 0.29 | 59.62 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.6 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 5.65 | 29.00 | 8.85 | 8.85 | 108.26 | 0.20 | 59.33 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 6.45 | 29.00 | 5.90 | 5.90 | 114.20 | 0.12 | 59.09 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.1 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 7.26 | 29.00 | 2.95 | 2.95 | 117.77 | 0.06 | 58.88 | Vu < PhiVc/2 | lot Reqd 9.6. | 58.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 8.07 | 29.00 | -0.26 | 0.26 | 99.88 | 0.01 | 58.70 | Vu < PhiVc/2 | lot Reqd 9.6. | 58.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 8.87 | 29.00 | -2.95 | 2.95 | 117.77 | 0.06 | 58.88 | Vu < PhiVc/2 | lot Reqd 9.6. | 58.9 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 9.68 | 29.00 | -5.90 | 5.90 | 114.20 | 0.12 | 59.09 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.1 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 10.49 | 29.00 | -8.85 | 8.85 | 108.26 | 0.20 | 59.33 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 11.30 | 29.00 | -11.80 | 11.80 | 99.93 | 0.29 | 59.62 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.6 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 12.10 | 29.00 | -14.74 | 14.74 | 89.22 | 0.40 | 59.99 | Vu < PhiVc/2 | lot Reqd 9.6. | 60.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 12.91 | 29.00 | -17.69 | 17.69 | 76.14 | 0.56 | 60.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 60.5 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 13.72 | 29.00 | -20.64 | 20.64 | 60.67 | 0.82 | 61.39 | Vu < PhiVc/2 | lot Reqd 9.6. | 61.4 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 14.52 | 29.00 | -23.59 | 23.59 | 42.83 | 1.00 | 61.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 62.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 15.33 | 29.00 | -26.54 | 26.54 | 22.60 | 1.00 | 61.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 62.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 16.14 | 29.00 | -29.49 | 29.49 | 0.00 | 1.00 | 61.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 62.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 16.94 | 29.00 | -32.44 | 32.44 | 24.98 | 1.00 | 61.98 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 99.3 | 14.5 | 14.0 |
| +1.40D+1.60H | 1 | 17.75 | 29.00 | -35.39 | 35.39 | 52.34 | 1.00 | 61.98 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 99.3 | 14.5 | 14.0 |
| +1.40D+1.60H | 1 | 18.56 | 29.00 | -38.34 | 38.34 | 82.08 | 1.00 | 61.98 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 99.3 | 14.5 | 14.0 |
| +1.40D+1.60H | 1 | 19.36 | 29.00 | -41.29 | 41.29 | 114.20 | 0.87 | 61.56 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 98.8 | 14.5 | 14.0 |
| +1.40D+1.60H | 2 | 20.17 | 29.00 | 36.86 | 36.86 | 148.70 | 0.60 | 60.65 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 97.9 | 14.5 | 14.0 |
| +1.40D+1.60H | 2 | 20.98 | 29.00 | 33.91 | 33.91 | 120.15 | 0.68 | 60.93 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 98.2 | 14.5 | 14.0 |
| +1.40D+1.60H | 2 | 21.78 | 29.00 | 30.96 | 30.96 | 93.98 | 0.80 | 61.30 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 98.6 | 14.5 | 14.0 |
| +1.40D+1.60H | 2 | 22.59 | 29.00 | 28.02 | 28.02 | 70.19 | 0.96 | 61.86 | Vu < PhiVc/2 | lot Reqd 9.6. | 61.9 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 23.40 | 29.00 | 25.07 | 25.07 | 48.77 | 1.00 | 61.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 62.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 24.20 | 29.00 | 22.12 | 22.12 | 29.74 | 1.00 | 61.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 62.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 25.01 | 29.00 | 19.17 | 19.17 | 13.09 | 1.00 | 61.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 62.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 25.82 | 29.00 | 16.22 | 16.22 | 1.19 | 1.00 | 61.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 62.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 26.62 | 29.00 | 13.27 | 13.27 | 13.09 | 1.00 | 61.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 62.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 27.43 | 29.00 | 10.32 | 10.32 | 22.60 | 1.00 | 61.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 62.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 28.24 | 29.00 | 7.37 | 7.37 | 29.74 | 0.60 | 60.65 | Vu < PhiVc/2 | lot Reqd 9.6. | 60.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 29.04 | 29.00 | 4.53 | 4.53 | 34.07 | 0.32 | 59.74 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 29.85 | 29.00 | 1.80 | 1.80 | 36.62 | 0.12 | 59.07 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 30.66 | 29.00 | -1.52 | 1.52 | 38.43 | 0.10 | 58.99 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 31.47 | 29.00 | -4.42 | 4.42 | 34.50 | 0.31 | 59.70 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 32.27 | 29.00 | -7.37 | 7.37 | 29.74 | 0.60 | 60.65 | Vu < PhiVc/2 | lot Reqd 9.6. | 60.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 33.08 | 29.00 | -10.32 | 10.32 | 22.60 | 1.00 | 61.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 62.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 33.89 | 29.00 | -13.27 | 13.27 | 13.09 | 1.00 | 61.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 62.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 34.69 | 29.00 | -16.22 | 16.22 | 1.19 | 1.00 | 61.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 62.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 35.50 | 29.00 | -19.17 | 19.17 | 13.09 | 1.00 | 61.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 62.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 36.31 | 29.00 | -22.12 | 22.12 | 29.74 | 1.00 | 61.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 62.0 | 0.0 | 0.0 |

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# Concrete Beam



DESCRIPTION: GRBM - G3 - Under 10" PC Ramp End Wall

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.40D+1.60H | 2 | 37.11 | 29.00 | -25.07 | 25.07 | 48.77 | 1.00 | 61.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 62.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 37.92 | 29.00 | -28.02 | 28.02 | 70.19 | 0.96 | 61.86 | Vu < PhiVc/2 | lot Reqd 9.6. | 61.9 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 38.73 | 29.00 | -30.96 | 30.96 | 93.98 | 0.80 | 61.30 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 98.6 | 14.5 | 14.0 |
| +1.40D+1.60H | 2 | 39.53 | 29.00 | -33.91 | 33.91 | 120.15 | 0.68 | 60.93 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 98.2 | 14.5 | 14.0 |
| +1.40D+1.60H | 3 | 40.34 | 29.00 | 44.23 | 44.23 | 148.70 | 0.72 | 61.05 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 98.3 | 14.5 | 14.0 |
| +1.40D+1.60H | 3 | 41.15 | 29.00 | 41.29 | 41.29 | 114.20 | 0.87 | 61.56 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 98.8 | 14.5 | 14.0 |
| +1.40D+1.60H | 3 | 41.95 | 29.00 | 38.34 | 38.34 | 82.08 | 1.00 | 61.98 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 99.3 | 14.5 | 14.0 |
| +1.40D+1.60H | 3 | 42.76 | 29.00 | 35.39 | 35.39 | 52.34 | 1.00 | 61.98 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 99.3 | 14.5 | 14.0 |
| +1.40D+1.60H | 3 | 43.57 | 29.00 | 32.44 | 32.44 | 24.98 | 1.00 | 61.98 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 99.3 | 14.5 | 14.0 |
| +1.40D+1.60H | 3 | 44.37 | 29.00 | 29.49 | 29.49 | 0.00 | 1.00 | 61.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 62.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 45.18 | 29.00 | 26.54 | 26.54 | 22.60 | 1.00 | 61.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 62.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 45.99 | 29.00 | 23.59 | 23.59 | 42.83 | 1.00 | 61.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 62.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 46.79 | 29.00 | 20.64 | 20.64 | 60.67 | 0.82 | 61.39 | Vu < PhiVc/2 | lot Reqd 9.6. | 61.4 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 47.60 | 29.00 | 17.69 | 17.69 | 76.14 | 0.56 | 60.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 60.5 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 48.41 | 29.00 | 14.74 | 14.74 | 89.22 | 0.40 | 59.99 | Vu < PhiVc/2 | lot Reqd 9.6. | 60.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 49.21 | 29.00 | 11.80 | 11.80 | 99.93 | 0.29 | 59.62 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.6 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 50.02 | 29.00 | 8.85 | 8.85 | 108.26 | 0.20 | 59.33 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 50.83 | 29.00 | 5.90 | 5.90 | 114.20 | 0.12 | 59.09 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.1 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 51.64 | 29.00 | 2.95 | 2.95 | 117.77 | 0.06 | 58.88 | Vu < PhiVc/2 | lot Reqd 9.6. | 58.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 52.44 | 29.00 | 0.26 | 0.26 | 99.88 | 0.01 | 58.70 | Vu < PhiVc/2 | lot Reqd 9.6. | 58.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 53.25 | 29.00 | -2.95 | 2.95 | 117.77 | 0.06 | 58.88 | Vu < PhiVc/2 | lot Reqd 9.6. | 58.9 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 54.06 | 29.00 | -5.90 | 5.90 | 114.20 | 0.12 | 59.09 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.1 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 54.86 | 29.00 | -8.85 | 8.85 | 108.26 | 0.20 | 59.33 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 55.67 | 29.00 | -11.80 | 11.80 | 99.93 | 0.29 | 59.62 | Vu < PhiVc/2 | lot Reqd 9.6. | 59.6 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 56.48 | 29.00 | -14.74 | 14.74 | 89.22 | 0.40 | 59.99 | Vu < PhiVc/2 | lot Reqd 9.6. | 60.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 57.28 | 29.00 | -17.69 | 17.69 | 76.14 | 0.56 | 60.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 60.5 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 58.09 | 29.00 | -20.64 | 20.64 | 60.67 | 0.82 | 61.39 | Vu < PhiVc/2 | lot Reqd 9.6. | 61.4 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 58.90 | 29.00 | -23.59 | 23.59 | 42.83 | 1.00 | 61.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 62.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 59.70 | 29.00 | -26.54 | 26.54 | 22.60 | 1.00 | 61.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 62.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 60.51 | 29.00 | -29.49 | 29.49 | 0.00 | 1.00 | 61.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 62.0 | 0.0 | 0.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 20.170 | -142.79 | 227.49 | 0.63 |
| Span # 2 | 2 | 20.170 | -148.70 | 227.49 | 0.65 |
| Span # 3 | 3 | 20.170 | -148.70 | 227.49 | 0.65 |
| +1.40D+1.60H | | | | | |
| Span # 1 | 1 | 20.170 | -142.79 | 227.49 | 0.63 |
| Span # 2 | 2 | 20.170 | -148.70 | 227.49 | 0.65 |
| Span # 3 | 3 | 20.170 | -148.70 | 227.49 | 0.65 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 20.170 | -121.79 | 227.49 | 0.54 |
| Span # 2 | 2 | 20.170 | -126.85 | 227.49 | 0.56 |
| Span # 3 | 3 | 20.170 | -129.89 | 227.49 | 0.57 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 20.170 | -127.56 | 227.49 | 0.56 |
| Span # 2 | 2 | 20.170 | -132.67 | 227.49 | 0.58 |
| Span # 3 | 3 | 20.170 | -132.67 | 227.49 | 0.58 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 20.170 | -126.96 | 227.49 | 0.56 |
| Span # 2 | 2 | 20.170 | -132.06 | 227.49 | 0.58 |
| Span # 3 | 3 | 20.170 | -135.10 | 227.49 | 0.59 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 20.170 | -128.94 | 227.49 | 0.57 |
| Span # 2 | 2 | 20.170 | -134.40 | 227.49 | 0.59 |
| Span # 3 | 3 | 20.170 | -125.72 | 227.49 | 0.55 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 20.170 | -128.34 | 227.49 | 0.56 |

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# Concrete Beam



DESCRIPTION: GRBM - G3 - Under 10" PC Ramp End Wall

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 2 | 2 | 20.170 | -133.80 | 227.49 | 0.59 |
| Span # 3 | 3 | 20.170 | -128.15 | 227.49 | 0.56 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 20.170 | -134.11 | 227.49 | 0.59 |
| Span # 2 | 2 | 20.170 | -139.61 | 227.49 | 0.61 |
| Span # 3 | 3 | 20.170 | -130.93 | 227.49 | 0.58 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 20.170 | -133.51 | 227.49 | 0.59 |
| Span # 2 | 2 | 20.170 | -139.00 | 227.49 | 0.61 |
| Span # 3 | 3 | 20.170 | -133.36 | 227.49 | 0.59 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 20.170 | -121.79 | 227.49 | 0.54 |
| Span # 2 | 2 | 20.170 | -126.85 | 227.49 | 0.56 |
| Span # 3 | 3 | 20.170 | -129.89 | 227.49 | 0.57 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 20.170 | -127.56 | 227.49 | 0.56 |
| Span # 2 | 2 | 20.170 | -132.67 | 227.49 | 0.58 |
| Span # 3 | 3 | 20.170 | -132.67 | 227.49 | 0.58 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 20.170 | -126.96 | 227.49 | 0.56 |
| Span # 2 | 2 | 20.170 | -132.06 | 227.49 | 0.58 |
| Span # 3 | 3 | 20.170 | -135.10 | 227.49 | 0.59 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 20.170 | -128.94 | 227.49 | 0.57 |
| Span # 2 | 2 | 20.170 | -134.40 | 227.49 | 0.59 |
| Span # 3 | 3 | 20.170 | -125.72 | 227.49 | 0.55 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 20.170 | -128.34 | 227.49 | 0.56 |
| Span # 2 | 2 | 20.170 | -133.80 | 227.49 | 0.59 |
| Span # 3 | 3 | 20.170 | -128.15 | 227.49 | 0.56 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 20.170 | -134.11 | 227.49 | 0.59 |
| Span # 2 | 2 | 20.170 | -139.61 | 227.49 | 0.61 |
| Span # 3 | 3 | 20.170 | -130.93 | 227.49 | 0.58 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 20.170 | -133.51 | 227.49 | 0.59 |
| Span # 2 | 2 | 20.170 | -139.00 | 227.49 | 0.61 |
| Span # 3 | 3 | 20.170 | -133.36 | 227.49 | 0.59 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 20.170 | -122.01 | 227.49 | 0.54 |
| Span # 2 | 2 | 20.170 | -127.08 | 227.49 | 0.56 |
| Span # 3 | 3 | 20.170 | -128.98 | 227.49 | 0.57 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 20.170 | -125.62 | 227.49 | 0.55 |
| Span # 2 | 2 | 20.170 | -130.71 | 227.49 | 0.57 |
| Span # 3 | 3 | 20.170 | -130.71 | 227.49 | 0.57 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 20.170 | -125.25 | 227.49 | 0.55 |
| Span # 2 | 2 | 20.170 | -130.33 | 227.49 | 0.57 |
| Span # 3 | 3 | 20.170 | -132.23 | 227.49 | 0.58 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 20.170 | -126.48 | 227.49 | 0.56 |
| Span # 2 | 2 | 20.170 | -131.80 | 227.49 | 0.58 |
| Span # 3 | 3 | 20.170 | -126.37 | 227.49 | 0.56 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 20.170 | -126.11 | 227.49 | 0.55 |
| Span # 2 | 2 | 20.170 | -131.42 | 227.49 | 0.58 |
| Span # 3 | 3 | 20.170 | -127.89 | 227.49 | 0.56 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 20.170 | -129.72 | 227.49 | 0.57 |
| Span # 2 | 2 | 20.170 | -135.05 | 227.49 | 0.59 |
| Span # 3 | 3 | 20.170 | -129.63 | 227.49 | 0.57 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 20.170 | -129.34 | 227.49 | 0.57 |
| Span # 2 | 2 | 20.170 | -134.67 | 227.49 | 0.59 |
| Span # 3 | 3 | 20.170 | -131.15 | 227.49 | 0.58 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 20.170 | -122.39 | 227.49 | 0.54 |
| Span # 2 | 2 | 20.170 | -127.46 | 227.49 | 0.56 |

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DESCRIPTION: GRBM - G3 - Under 10" PC Ramp End Wall

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 3 | 3 | 20.170 | -127.46 | 227.49 | 0.56 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 20.170 | -122.39 | 227.49 | 0.54 |
| Span # 2 | 2 | 20.170 | -127.46 | 227.49 | 0.56 |
| Span # 3 | 3 | 20.170 | -127.46 | 227.49 | 0.56 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 20.170 | -122.39 | 227.49 | 0.54 |
| Span # 2 | 2 | 20.170 | -127.46 | 227.49 | 0.56 |
| Span # 3 | 3 | 20.170 | -127.46 | 227.49 | 0.56 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 20.170 | -122.39 | 227.49 | 0.54 |
| Span # 2 | 2 | 20.170 | -127.46 | 227.49 | 0.56 |
| Span # 3 | 3 | 20.170 | -127.46 | 227.49 | 0.56 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 20.170 | -122.39 | 227.49 | 0.54 |
| Span # 2 | 2 | 20.170 | -127.46 | 227.49 | 0.56 |
| Span # 3 | 3 | 20.170 | -127.46 | 227.49 | 0.56 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 20.170 | -122.39 | 227.49 | 0.54 |
| Span # 2 | 2 | 20.170 | -127.46 | 227.49 | 0.56 |
| Span # 3 | 3 | 20.170 | -127.46 | 227.49 | 0.56 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 20.170 | -122.39 | 227.49 | 0.54 |
| Span # 2 | 2 | 20.170 | -127.46 | 227.49 | 0.56 |
| Span # 3 | 3 | 20.170 | -127.46 | 227.49 | 0.56 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 20.170 | -122.01 | 227.49 | 0.54 |
| Span # 2 | 2 | 20.170 | -127.08 | 227.49 | 0.56 |
| Span # 3 | 3 | 20.170 | -128.98 | 227.49 | 0.57 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 20.170 | -125.62 | 227.49 | 0.55 |
| Span # 2 | 2 | 20.170 | -130.71 | 227.49 | 0.57 |
| Span # 3 | 3 | 20.170 | -130.71 | 227.49 | 0.57 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 20.170 | -125.25 | 227.49 | 0.55 |
| Span # 2 | 2 | 20.170 | -130.33 | 227.49 | 0.57 |
| Span # 3 | 3 | 20.170 | -132.23 | 227.49 | 0.58 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 20.170 | -126.48 | 227.49 | 0.56 |
| Span # 2 | 2 | 20.170 | -131.80 | 227.49 | 0.58 |
| Span # 3 | 3 | 20.170 | -126.37 | 227.49 | 0.56 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 20.170 | -126.11 | 227.49 | 0.55 |
| Span # 2 | 2 | 20.170 | -131.42 | 227.49 | 0.58 |
| Span # 3 | 3 | 20.170 | -127.89 | 227.49 | 0.56 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 20.170 | -129.72 | 227.49 | 0.57 |
| Span # 2 | 2 | 20.170 | -135.05 | 227.49 | 0.59 |
| Span # 3 | 3 | 20.170 | -129.63 | 227.49 | 0.57 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 20.170 | -129.34 | 227.49 | 0.57 |
| Span # 2 | 2 | 20.170 | -134.67 | 227.49 | 0.59 |
| Span # 3 | 3 | 20.170 | -131.15 | 227.49 | 0.58 |
| +1.20D+1.60S+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 20.170 | -122.39 | 227.49 | 0.54 |
| Span # 2 | 2 | 20.170 | -127.46 | 227.49 | 0.56 |
| Span # 3 | 3 | 20.170 | -127.46 | 227.49 | 0.56 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 20.170 | -122.01 | 227.49 | 0.54 |
| Span # 2 | 2 | 20.170 | -127.08 | 227.49 | 0.56 |
| Span # 3 | 3 | 20.170 | -128.98 | 227.49 | 0.57 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 20.170 | -125.62 | 227.49 | 0.55 |
| Span # 2 | 2 | 20.170 | -130.71 | 227.49 | 0.57 |
| Span # 3 | 3 | 20.170 | -130.71 | 227.49 | 0.57 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 20.170 | -125.25 | 227.49 | 0.55 |
| Span # 2 | 2 | 20.170 | -130.33 | 227.49 | 0.57 |
| Span # 3 | 3 | 20.170 | -132.23 | 227.49 | 0.58 |

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# Concrete Beam



DESCRIPTION: GRBM - G3 - Under 10" PC Ramp End Wall

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 20.170 | -126.48 | 227.49 | 0.56 |
| Span # 2 | 2 | 20.170 | -131.80 | 227.49 | 0.58 |
| Span # 3 | 3 | 20.170 | -126.37 | 227.49 | 0.56 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 20.170 | -126.11 | 227.49 | 0.55 |
| Span # 2 | 2 | 20.170 | -131.42 | 227.49 | 0.58 |
| Span # 3 | 3 | 20.170 | -127.89 | 227.49 | 0.56 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 20.170 | -129.72 | 227.49 | 0.57 |
| Span # 2 | 2 | 20.170 | -135.05 | 227.49 | 0.59 |
| Span # 3 | 3 | 20.170 | -129.63 | 227.49 | 0.57 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 20.170 | -129.34 | 227.49 | 0.57 |
| Span # 2 | 2 | 20.170 | -134.67 | 227.49 | 0.59 |
| Span # 3 | 3 | 20.170 | -131.15 | 227.49 | 0.58 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 20.170 | -122.01 | 227.49 | 0.54 |
| Span # 2 | 2 | 20.170 | -127.08 | 227.49 | 0.56 |
| Span # 3 | 3 | 20.170 | -128.98 | 227.49 | 0.57 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 20.170 | -125.62 | 227.49 | 0.55 |
| Span # 2 | 2 | 20.170 | -130.71 | 227.49 | 0.57 |
| Span # 3 | 3 | 20.170 | -130.71 | 227.49 | 0.57 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 20.170 | -125.25 | 227.49 | 0.55 |
| Span # 2 | 2 | 20.170 | -130.33 | 227.49 | 0.57 |
| Span # 3 | 3 | 20.170 | -132.23 | 227.49 | 0.58 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 20.170 | -126.48 | 227.49 | 0.56 |
| Span # 2 | 2 | 20.170 | -131.80 | 227.49 | 0.58 |
| Span # 3 | 3 | 20.170 | -126.37 | 227.49 | 0.56 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 20.170 | -126.11 | 227.49 | 0.55 |
| Span # 2 | 2 | 20.170 | -131.42 | 227.49 | 0.58 |
| Span # 3 | 3 | 20.170 | -127.89 | 227.49 | 0.56 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 20.170 | -129.72 | 227.49 | 0.57 |
| Span # 2 | 2 | 20.170 | -135.05 | 227.49 | 0.59 |
| Span # 3 | 3 | 20.170 | -129.63 | 227.49 | 0.57 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 20.170 | -129.34 | 227.49 | 0.57 |
| Span # 2 | 2 | 20.170 | -134.67 | 227.49 | 0.59 |
| Span # 3 | 3 | 20.170 | -131.15 | 227.49 | 0.58 |
| +0.90D+W+1.60H | | | | | |
| Span # 1 | 1 | 20.170 | -91.79 | 227.49 | 0.40 |
| Span # 2 | 2 | 20.170 | -95.59 | 227.49 | 0.42 |
| Span # 3 | 3 | 20.170 | -95.59 | 227.49 | 0.42 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 20.170 | -122.01 | 227.49 | 0.54 |
| Span # 2 | 2 | 20.170 | -127.08 | 227.49 | 0.56 |
| Span # 3 | 3 | 20.170 | -128.98 | 227.49 | 0.57 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 20.170 | -125.62 | 227.49 | 0.55 |
| Span # 2 | 2 | 20.170 | -130.71 | 227.49 | 0.57 |
| Span # 3 | 3 | 20.170 | -130.71 | 227.49 | 0.57 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 20.170 | -125.25 | 227.49 | 0.55 |
| Span # 2 | 2 | 20.170 | -130.33 | 227.49 | 0.57 |
| Span # 3 | 3 | 20.170 | -132.23 | 227.49 | 0.58 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 20.170 | -126.48 | 227.49 | 0.56 |
| Span # 2 | 2 | 20.170 | -131.80 | 227.49 | 0.58 |
| Span # 3 | 3 | 20.170 | -126.37 | 227.49 | 0.56 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 20.170 | -126.11 | 227.49 | 0.55 |
| Span # 2 | 2 | 20.170 | -131.42 | 227.49 | 0.58 |
| Span # 3 | 3 | 20.170 | -127.89 | 227.49 | 0.56 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (LL*) | | | | | |

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# Concrete Beam

DESCRIPTION: GRBM - G3 - Under 10" PC Ramp End Wall

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 1 | 1 | 20.170 | -129.72 | 227.49 | 0.57 |
| Span # 2 | 2 | 20.170 | -135.05 | 227.49 | 0.59 |
| Span # 3 | 3 | 20.170 | -129.63 | 227.49 | 0.57 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 20.170 | -129.34 | 227.49 | 0.57 |
| Span # 2 | 2 | 20.170 | -134.67 | 227.49 | 0.59 |
| Span # 3 | 3 | 20.170 | -131.15 | 227.49 | 0.58 |
| +0.90D+E+0.90H | | | | | |
| Span # 1 | 1 | 20.170 | -91.79 | 227.49 | 0.40 |
| Span # 2 | 2 | 20.170 | -95.59 | 227.49 | 0.42 |
| Span # 3 | 3 | 20.170 | -95.59 | 227.49 | 0.42 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H, LL Comb Run (L*L) | 1 | 0.0271 | 9.278 | +D+L+H, LL Comb Run (L*L) | -0.0006 | 20.573 |
| +D+L+H, LL Comb Run (*L*) | 2 | 0.0034 | 10.085 | +D+L+H, LL Comb Run (L*L) | -0.0020 | 2.824 |
| +D+L+H, LL Comb Run (L*L) | 3 | 0.0260 | 10.892 | | 0.0000 | 2.824 |

# Concrete Beam

File: FWI2101 - Paragon Star.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

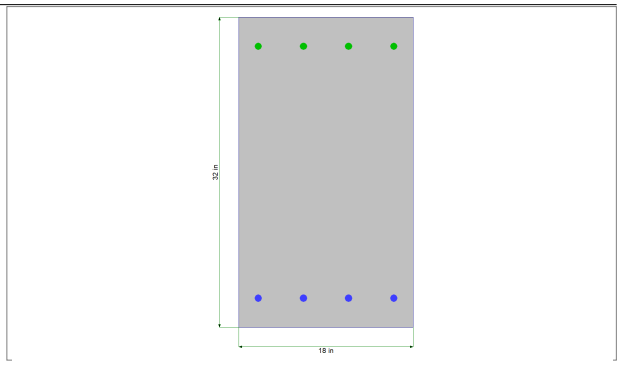
DESCRIPTION: GRBM - G7.3 - Under 8" Full Grouted CMU Wall

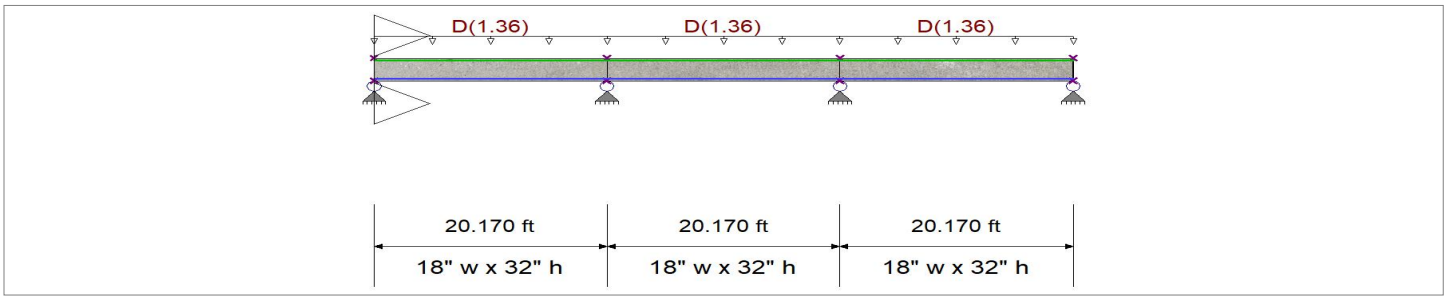
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 3.50 ksi | $\phi$ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 443.706 psi | | Shear : | 0.750 |
| $\psi$ Density | = | 145.0 pcf | $\beta_1$ | = | 0.850 |
| $\lambda$ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 3,122.0 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 2 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 18.0 in, Height = 32.0 in

Span #1 Reinforcing....
4-#6 at 3.0 in from Bottom, from 0.0 to 20.170 ft in this span
4-#6 at 3.0 in from Top, from 0.0 to 20.170 ft in this span

Span #2 Reinforcing....
4-#6 at 3.0 in from Bottom, from 0.0 to 20.170 ft in this span
4-#6 at 3.0 in from Top, from 0.0 to 20.170 ft in this span

Span #3 Reinforcing....
4-#6 at 3.0 in from Bottom, from 0.0 to 20.170 ft in this span
4-#6 at 3.0 in from Top, from 0.0 to 20.170 ft in this span

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.0850 ksf, Tributary Width = 16.0 ft, (8" Full Grouted CMU)
Load for Span Number 2
Uniform Load : D = 0.0850 ksf, Tributary Width = 16.0 ft, (8" Full Grouted CMU)
Load for Span Number 3
Uniform Load : D = 0.0850 ksf, Tributary Width = 16.0 ft, (8" Full Grouted CMU)

## DESIGN SUMMARY

**Design OK**

| | | | | | |
|---|---|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.496** : 1 | Maximum Deflection | | | |
| Section used for this span | **Typical Section** | Max Downward Transient Deflection | 0.000 in | Ratio = | 0 <360.0 |
| Mu : Applied | -110.495 k-ft | Max Upward Transient Deflection | 0.000 in | Ratio = | 0 <360.0 |
| Mn * Phi : Allowable | 222.989 k-ft | Max Downward Total Deflection | 0.025 in | Ratio = | 9756 >=180. |
| Location of maximum on span | 0.000 ft | Max Upward Total Deflection | -0.001 in | Ratio = | 166730 >=180. |
| Span # where maximum occurs | Span # 3 | | | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| Overall MAXimum | 15.652 | 43.043 | 43.043 | 15.652 |
| Overall MINimum | 9.391 | 25.826 | 25.826 | 9.391 |
| +D+H | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+L+H, LL Comb Run (**L) | 15.652 | 43.043 | 43.043 | 15.652 |

# Concrete Beam

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**Lic. # : KW-06011403** **Bob D. Campbell and Co., Inc.**

DESCRIPTION: GRBM - G7.3 - Under 8" Full Grouted CMU Wall

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| +D+L+H, LL Comb Run (*L*) | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+L+H, LL Comb Run (*LL) | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+L+H, LL Comb Run (L**) | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+L+H, LL Comb Run (L*L) | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+L+H, LL Comb Run (LL*) | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+L+H, LL Comb Run (LLL) | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+Lr+H, LL Comb Run (**L) | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+Lr+H, LL Comb Run (*L*) | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+Lr+H, LL Comb Run (*LL) | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+Lr+H, LL Comb Run (L**) | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+Lr+H, LL Comb Run (L*L) | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+Lr+H, LL Comb Run (LL*) | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+Lr+H, LL Comb Run (LLL) | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+S+H | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.60W+H | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 15.652 | 43.043 | 43.043 | 15.652 |
| +0.60D+0.60W+0.60H | 9.391 | 25.826 | 25.826 | 9.391 |
| +D+0.70E+0.60H | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 15.652 | 43.043 | 43.043 | 15.652 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 15.652 | 43.043 | 43.043 | 15.652 |
| +0.60D+0.70E+H | 9.391 | 25.826 | 25.826 | 9.391 |
| D Only | 15.652 | 43.043 | 43.043 | 15.652 |
| H Only | | | | |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.40D+1.60H | 1 | 0.00 | 29.00 | 21.91 | 21.91 | 0.00 | 1.00 | 47.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 47.3 | 0.0 | 0.0 |

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DESCRIPTION: GRBM - G7.3 - Under 8" Full Grouted CMU Wall

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.40D+1.60H | 1 | 0.81 | 29.00 | 19.72 | 19.72 | 16.80 | 1.00 | 47.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 47.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 1.61 | 29.00 | 17.53 | 17.53 | 31.82 | 1.00 | 47.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 47.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 2.42 | 29.00 | 15.34 | 15.34 | 45.08 | 0.82 | 46.72 | Vu < PhiVc/2 | lot Reqd 9.6. | 46.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 3.23 | 29.00 | 13.15 | 13.15 | 56.57 | 0.56 | 45.86 | Vu < PhiVc/2 | lot Reqd 9.6. | 45.9 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 4.03 | 29.00 | 10.96 | 10.96 | 66.30 | 0.40 | 45.32 | Vu < PhiVc/2 | lot Reqd 9.6. | 45.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 4.84 | 29.00 | 8.77 | 8.77 | 74.25 | 0.29 | 44.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 44.9 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 5.65 | 29.00 | 6.57 | 6.57 | 80.44 | 0.20 | 44.66 | Vu < PhiVc/2 | lot Reqd 9.6. | 44.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 6.45 | 29.00 | 4.38 | 4.38 | 84.86 | 0.12 | 44.42 | Vu < PhiVc/2 | lot Reqd 9.6. | 44.4 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 7.26 | 29.00 | 2.19 | 2.19 | 87.51 | 0.06 | 44.21 | Vu < PhiVc/2 | lot Reqd 9.6. | 44.2 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 8.07 | 29.00 | 0.00 | 0.00 | 88.40 | 0.00 | 44.01 | Vu < PhiVc/2 | lot Reqd 9.6. | 44.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 8.87 | 29.00 | -2.19 | 2.19 | 87.51 | 0.06 | 44.21 | Vu < PhiVc/2 | lot Reqd 9.6. | 44.2 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 9.68 | 29.00 | -4.38 | 4.38 | 84.86 | 0.12 | 44.42 | Vu < PhiVc/2 | lot Reqd 9.6. | 44.4 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 10.49 | 29.00 | -6.57 | 6.57 | 80.44 | 0.20 | 44.66 | Vu < PhiVc/2 | lot Reqd 9.6. | 44.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 11.30 | 29.00 | -8.77 | 8.77 | 74.25 | 0.29 | 44.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 44.9 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 12.10 | 29.00 | -10.96 | 10.96 | 66.30 | 0.40 | 45.32 | Vu < PhiVc/2 | lot Reqd 9.6. | 45.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 12.91 | 29.00 | -13.15 | 13.15 | 56.57 | 0.56 | 45.86 | Vu < PhiVc/2 | lot Reqd 9.6. | 45.9 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 13.72 | 29.00 | -15.34 | 15.34 | 45.08 | 0.82 | 46.72 | Vu < PhiVc/2 | lot Reqd 9.6. | 46.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 14.52 | 29.00 | -17.53 | 17.53 | 31.82 | 1.00 | 47.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 47.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 15.33 | 29.00 | -19.72 | 19.72 | 16.80 | 1.00 | 47.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 47.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 16.14 | 29.00 | -21.91 | 21.91 | 0.00 | 1.00 | 47.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 47.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 16.94 | 29.00 | -24.10 | 24.10 | 18.56 | 1.00 | 47.31 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 84.6 | 14.5 | 14.0 |
| +1.40D+1.60H | 1 | 17.75 | 29.00 | -26.30 | 26.30 | 38.89 | 1.00 | 47.31 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 84.6 | 14.5 | 14.0 |
| +1.40D+1.60H | 1 | 18.56 | 29.00 | -28.49 | 28.49 | 60.99 | 1.00 | 47.31 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 84.6 | 14.5 | 14.0 |
| +1.40D+1.60H | 1 | 19.36 | 29.00 | -30.68 | 30.68 | 84.86 | 0.87 | 46.89 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 84.2 | 14.5 | 14.0 |
| +1.40D+1.60H | 2 | 20.17 | 29.00 | 27.39 | 27.39 | 110.49 | 0.60 | 45.98 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 83.3 | 14.5 | 14.0 |
| +1.40D+1.60H | 2 | 20.98 | 29.00 | 25.20 | 25.20 | 89.28 | 0.68 | 46.26 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 83.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 2 | 21.78 | 29.00 | 23.01 | 23.01 | 69.83 | 0.80 | 46.63 | Vu < PhiVc/2 | lot Reqd 9.6. | 46.6 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 22.59 | 29.00 | 20.82 | 20.82 | 52.15 | 0.96 | 47.19 | Vu < PhiVc/2 | lot Reqd 9.6. | 47.2 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 23.40 | 29.00 | 18.63 | 18.63 | 36.24 | 1.00 | 47.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 47.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 24.20 | 29.00 | 16.43 | 16.43 | 22.10 | 1.00 | 47.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 47.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 25.01 | 29.00 | 14.24 | 14.24 | 9.72 | 1.00 | 47.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 47.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 25.82 | 29.00 | 12.05 | 12.05 | 0.88 | 1.00 | 47.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 47.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 26.62 | 29.00 | 9.86 | 9.86 | 9.72 | 1.00 | 47.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 47.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 27.43 | 29.00 | 7.67 | 7.67 | 16.80 | 1.00 | 47.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 47.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 28.24 | 29.00 | 5.48 | 5.48 | 22.10 | 0.60 | 45.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 46.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 29.04 | 29.00 | 3.29 | 3.29 | 25.63 | 0.31 | 45.03 | Vu < PhiVc/2 | lot Reqd 9.6. | 45.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 29.85 | 29.00 | 1.10 | 1.10 | 27.40 | 0.10 | 44.33 | Vu < PhiVc/2 | lot Reqd 9.6. | 44.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 30.66 | 29.00 | -1.10 | 1.10 | 27.40 | 0.10 | 44.33 | Vu < PhiVc/2 | lot Reqd 9.6. | 44.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 31.47 | 29.00 | -3.29 | 3.29 | 25.63 | 0.31 | 45.03 | Vu < PhiVc/2 | lot Reqd 9.6. | 45.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 32.27 | 29.00 | -5.48 | 5.48 | 22.10 | 0.60 | 45.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 46.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 33.08 | 29.00 | -7.67 | 7.67 | 16.80 | 1.00 | 47.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 47.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 33.89 | 29.00 | -9.86 | 9.86 | 9.72 | 1.00 | 47.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 47.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 34.69 | 29.00 | -12.05 | 12.05 | 0.88 | 1.00 | 47.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 47.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 35.50 | 29.00 | -14.24 | 14.24 | 9.72 | 1.00 | 47.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 47.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 36.31 | 29.00 | -16.43 | 16.43 | 22.10 | 1.00 | 47.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 47.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 37.11 | 29.00 | -18.63 | 18.63 | 36.24 | 1.00 | 47.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 47.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 37.92 | 29.00 | -20.82 | 20.82 | 52.15 | 0.96 | 47.19 | Vu < PhiVc/2 | lot Reqd 9.6. | 47.2 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 38.73 | 29.00 | -23.01 | 23.01 | 69.83 | 0.80 | 46.63 | Vu < PhiVc/2 | lot Reqd 9.6. | 46.6 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 39.53 | 29.00 | -25.20 | 25.20 | 89.28 | 0.68 | 46.26 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 83.5 | 14.5 | 14.0 |
| +1.40D+1.60H | 3 | 40.34 | 29.00 | 32.87 | 32.87 | 110.49 | 0.72 | 46.38 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 83.7 | 14.5 | 14.0 |
| +1.40D+1.60H | 3 | 41.15 | 29.00 | 30.68 | 30.68 | 84.86 | 0.87 | 46.89 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 84.2 | 14.5 | 14.0 |
| +1.40D+1.60H | 3 | 41.95 | 29.00 | 28.49 | 28.49 | 60.99 | 1.00 | 47.31 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 84.6 | 14.5 | 14.0 |
| +1.40D+1.60H | 3 | 42.76 | 29.00 | 26.30 | 26.30 | 38.89 | 1.00 | 47.31 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 84.6 | 14.5 | 14.0 |
| +1.40D+1.60H | 3 | 43.57 | 29.00 | 24.10 | 24.10 | 18.56 | 1.00 | 47.31 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 84.6 | 14.5 | 14.0 |

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DESCRIPTION: GRBM - G7.3 - Under 8" Full Grouted CMU Wall

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.40D+1.60H | 3 | 44.37 | 29.00 | 21.91 | 21.91 | 0.00 | 1.00 | 47.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 47.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 45.18 | 29.00 | 19.72 | 19.72 | 16.80 | 1.00 | 47.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 47.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 45.99 | 29.00 | 17.53 | 17.53 | 31.82 | 1.00 | 47.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 47.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 46.79 | 29.00 | 15.34 | 15.34 | 45.08 | 0.82 | 46.72 | Vu < PhiVc/2 | lot Reqd 9.6. | 46.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 47.60 | 29.00 | 13.15 | 13.15 | 56.57 | 0.56 | 45.86 | Vu < PhiVc/2 | lot Reqd 9.6. | 45.9 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 48.41 | 29.00 | 10.96 | 10.96 | 66.30 | 0.40 | 45.32 | Vu < PhiVc/2 | lot Reqd 9.6. | 45.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 49.21 | 29.00 | 8.77 | 8.77 | 74.25 | 0.29 | 44.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 44.9 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 50.02 | 29.00 | 6.57 | 6.57 | 80.44 | 0.20 | 44.66 | Vu < PhiVc/2 | lot Reqd 9.6. | 44.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 50.83 | 29.00 | 4.38 | 4.38 | 84.86 | 0.12 | 44.42 | Vu < PhiVc/2 | lot Reqd 9.6. | 44.4 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 51.64 | 29.00 | 2.19 | 2.19 | 87.51 | 0.06 | 44.21 | Vu < PhiVc/2 | lot Reqd 9.6. | 44.2 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 52.44 | 29.00 | -0.00 | 0.00 | 88.40 | 0.00 | 44.01 | Vu < PhiVc/2 | lot Reqd 9.6. | 44.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 53.25 | 29.00 | -2.19 | 2.19 | 87.51 | 0.06 | 44.21 | Vu < PhiVc/2 | lot Reqd 9.6. | 44.2 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 54.06 | 29.00 | -4.38 | 4.38 | 84.86 | 0.12 | 44.42 | Vu < PhiVc/2 | lot Reqd 9.6. | 44.4 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 54.86 | 29.00 | -6.57 | 6.57 | 80.44 | 0.20 | 44.66 | Vu < PhiVc/2 | lot Reqd 9.6. | 44.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 55.67 | 29.00 | -8.77 | 8.77 | 74.25 | 0.29 | 44.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 44.9 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 56.48 | 29.00 | -10.96 | 10.96 | 66.30 | 0.40 | 45.32 | Vu < PhiVc/2 | lot Reqd 9.6. | 45.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 57.28 | 29.00 | -13.15 | 13.15 | 56.57 | 0.56 | 45.86 | Vu < PhiVc/2 | lot Reqd 9.6. | 45.9 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 58.09 | 29.00 | -15.34 | 15.34 | 45.08 | 0.82 | 46.72 | Vu < PhiVc/2 | lot Reqd 9.6. | 46.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 58.90 | 29.00 | -17.53 | 17.53 | 31.82 | 1.00 | 47.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 47.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 59.70 | 29.00 | -19.72 | 19.72 | 16.80 | 1.00 | 47.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 47.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 60.51 | 29.00 | -21.91 | 21.91 | 0.00 | 1.00 | 47.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 47.3 | 0.0 | 0.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 20.170 | -106.10 | 222.99 | 0.48 |
| Span # 2 | 2 | 20.170 | -110.49 | 222.99 | 0.50 |
| Span # 3 | 3 | 20.170 | -110.49 | 222.99 | 0.50 |
| +1.40D+1.60H | | | | | |
| Span # 1 | 1 | 20.170 | -106.10 | 222.99 | 0.48 |
| Span # 2 | 2 | 20.170 | -110.49 | 222.99 | 0.50 |
| Span # 3 | 3 | 20.170 | -110.49 | 222.99 | 0.50 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (**L) | | | | | |

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# Concrete Beam

DESCRIPTION: GRBM - G7.3 - Under 8" Full Grouted CMU Wall

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |

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DESCRIPTION: GRBM - G7.3 - Under 8" Full Grouted CMU Wall

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+1.60S+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |

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# Concrete Beam

DESCRIPTION: GRBM - G7.3 - Under 8" Full Grouted CMU Wall

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +0.90D+W+1.60H | | | | | |
| Span # 1 | 1 | 20.170 | -68.21 | 222.99 | 0.31 |
| Span # 2 | 2 | 20.170 | -71.03 | 222.99 | 0.32 |
| Span # 3 | 3 | 20.170 | -71.03 | 222.99 | 0.32 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 20.170 | -90.94 | 222.99 | 0.41 |
| Span # 2 | 2 | 20.170 | -94.71 | 222.99 | 0.42 |
| Span # 3 | 3 | 20.170 | -94.71 | 222.99 | 0.42 |
| +0.90D+E+0.90H | | | | | |
| Span # 1 | 1 | 20.170 | -68.21 | 222.99 | 0.31 |
| Span # 2 | 2 | 20.170 | -71.03 | 222.99 | 0.32 |
| Span # 3 | 3 | 20.170 | -71.03 | 222.99 | 0.32 |

# Concrete Beam


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DESCRIPTION: GRBM - G7.3 - Under 8" Full Grouted CMU Wall

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| D Only | 1 | 0.0248 | 9.278 | D Only | -0.0005 | 20.573 |
| D Only | 2 | 0.0019 | 10.085 | D Only | -0.0015 | 18.153 |
| D Only | 3 | 0.0248 | 10.892 | | 0.0000 | 18.153 |

**ACP Loads**



| Dead Loads | | |
|---|---|---|
| Item | Weight | |
| | (psf) | (plf) |
| 13'x30" TT + 5psf | 81 | |
| 24x24 Column | | 600 |
| 24x28 Column | | 699 |
| 28x28 Column | | 814 |
| 40IT30 + Wash | | 1075 |
| 40IT40 + Wash | | 1325 |
| 3" Wash | | 57 |
| Grade Beam | | 1125 |
| 6" Topping (+4") | 50 | |
| 10" Ext Wall | 125 | |
| 12" Litewall | 120 | |
| Residential Flr | 35 | |
| Residential Wall | 15 | |

| Live Loads (psf) | |
|---|---|
| Floor | 40 |
| Roof | 60 |
| Stairs | 100 |
| Residential | 40 |

| Location | Tributarty Area | Floor Levels | Roof Levels | Column 24x24 | Column 24x28 | Column 28x28 | 40IT30 | 40IT40 | 3" Wash | Grade Beam | 6" Topping | 10" Ext Wall | 12" Litewall | Residential Floor | Residential Wall | Pile Cap | DL | LL | TL | # of 18"Ø ACP | Spacing of ACP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ($ft^2$) | | | (lf) | (lf) | (lf) | (lf) | (lf) | (lf) | (lf) | ($ft^2$) | (lf) | (lf) or ($ft^2$) | ($ft^2$) | (lf) | (lbs) | | | | (#) | (ft) |
| GA Cont | 31 | 3 | 1 | | | | | | 4 | 1 | | 56 | | 14 | 50 | | 19.48 klf | 6.05 klf | 25.53 klf | | 4.74 |
| GB Cont | 61 | 3 | 1 | | | | | | 8 | 1 | | | 53 | | | | 27.54 klf | 10.89 klf | 38.43 klf | | 3.15 |
| GC Cont | 31 | 3 | 1 | | | | | | 4 | 1 | | 56 | | 14 | 50 | | 19.48 klf | 6.05 klf | 25.53 klf | | 4.74 |
| G1 Cont | 1 | 3 | 1 | | | | | | 4 | 1 | | 56 | | 14 | 50 | | 9.92 klf | 0.74 klf | 10.66 klf | | 11.34 |
| G4 Ramp | 1 | 1 | 1 | | | | | | 1 | 1 | 4 | 8 | | | | | 2.54 klf | 0.10 klf | 2.64 klf | | 45.72 |
| GB/G1 | 514 | 1 | 0 | 56 | | | 9 | | | | | | | | | 63,563 | 147.95 k | 20.57 k | 752.17 k | 7 | |
| | 1301 | 2 | 1 | | | | | 65 | | | | | | | | | 401.54 k | 182.11 k | | | |
| GB/G2 | 1301 | 1 | 0 | 17 | | | 22 | | | | | | | | | 10,500 | 149.17 k | 52.03 k | 201.20 k | 2 | |
| GB/G3 | 787 | 1 | 0 | 56 | | | 13 | | | | | | | | | 63,563 | 174.84 k | 31.46 k | 789.95 k | 7 | |
| | 1301 | 2 | 1 | | | | | 65 | | | | | | | | | 401.54 k | 182.11 | | | |
| GB/G6 | 1301 | 3 | 1 | | | | | | | | | | 1580 | | | 82,031 | 693.07 k | 234.14 | 927.21 | 8 | |
| GB/G7 | 2602 | 3 | 1 | 56 | | | | 22 | | | 1301 | | 860 | | | 195,075 | 1268.29 k | 468.27 | 1736.56 | 15 | |
| GB/G8 | 0 | 3 | 1 | | | | | | | | | | | | | | 0.00 k | 0.00 | 0.00 | 0 | |
| | 0 | 3 | 1 | | | | | | | | | | | | | | | | | | |
| | 0 | 1 | | | | | | | | | | | | | | | | | | | |
| | 0 | 3 | 1 | | | | | | | | | | | | | | | | | | |
| | 0 | 3 | 1 | | | | | | | | | | | | | | | | | | |
| | 0 | 3 | 1 | | | | | | | | | | | | | | | | | | |
| | 0 | 3 | 1 | | | | | | | | | | | | | | | | | | |
| | 0 | 3 | 1 | | | | | | | | | | | | | | | | | | |
| | 0 | 3 | 1 | | | | | | | | | | | | | | | | | | |
| | 0 | 3 | 1 | | | | | | | | | | | | | | | | | | |
| | 0 | 3 | 1 | | | | | | | | | | | | | | | | | | |
| | 0 | 3 | 1 | | | | | | | | | | | | | | | | | | |
| | 0 | 3 | 1 | | | | | | | | | | | | | | | | | | |

Paragon Star
Auger Cast Piles

| | | | | |
|---|---|---|---|---|
| 40 | ksf | Allowable End Bearing | | |
| 0.15 | kcf | Weight of Concrete | | |
| 50 | ft | Depth to Sandstone / Limestone (from 100'-0") | | |
| 0 | psf | Skin Friction Bearing | | |
| 2160 | psf | Skin Friction in Shale | (Equal to 15psi) | 1440 |
| 720 | psf | Skin Friction Uplift | (Equal to 5psi) | 720 |

| Pier Diameter | Bearing Area of Pier | Unreduced DL of Pier | Embedment Depth | Area for Skin Friction | Skin Friction Bearing | Skin Friction Uplift | End Bearing w/o Skin Friction | Allowable Bearing w/ Skin Friction | Allowable Uplift w/ Skin Friction 0.6D+Skin |
|---|---|---|---|---|---|---|---|---|---|
| (in) | ($ft^2$) | (kips) | (ft) | ($ft^2$) | (kips) | (kips) | (kips) | (kips) | (kips) |
| 16 | 1.4 | 11 | 5 | 21 | 45 | 33 | 50 | 95 | 39 |
| 18 | 1.8 | 14 | 5 | 24 | 51 | 37 | 70 | 121 | 45 |
| 24 | 3.1 | 25 | 5 | 31 | 68 | 49 | 120 | 188 | 64 |
| | 0.0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0.0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0.0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0.0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0.0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0.0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0.0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0.0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0.0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |

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Project PARAGON GARAGE

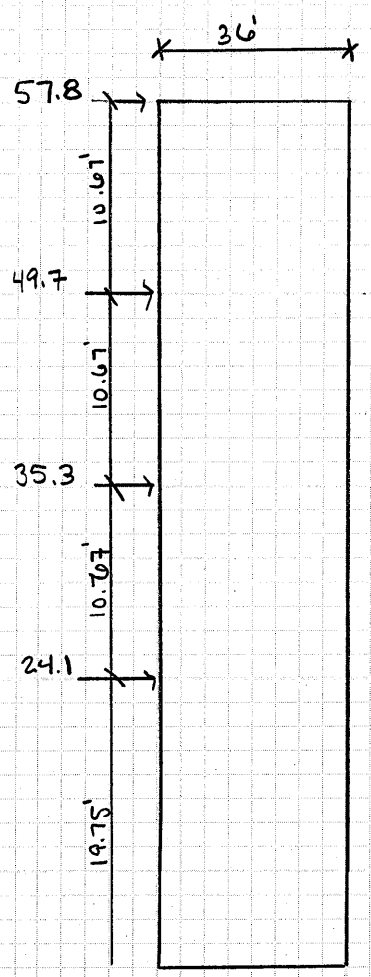
Date _____ Page ___ of ___

GARAGE GRID G6 FDN

OVERTURNING MOMENT

$M_{OT_E}$ = 24.1k (19.75)
35.1k (30.42)
49.7k (41.09)
+ 57.8k (51.76)

$M_{OT_E}$ = 6577.62 k-ft $M_{OT_{0.7E}}$ = 4605 k-ft




DEAD LOAD PANEL

12"/12 x 150 x 36' x 55' → 297k

DEAD LOAD SPANDREL SOUTH OF G6

12/12 x 150 x 4'-6" x 4 LEVELS x $\frac{41.67'}{2}$ → 56k

DEAD LOAD OF DBL TEES ON SPANDREL

4 LEVELS x $\frac{121'}{2}$ x $\frac{41.67}{2}$ x 76psf → 383k

RESISTING MOMENT

$0.6M_R$ = 0.6 (297 + 56 + 384) (36/2)
= 0.6 (13,266)
= 7959.6 k-ft

NO UPLIFT SINCE $0.6R_m > M_{OT_{0.7E}}$

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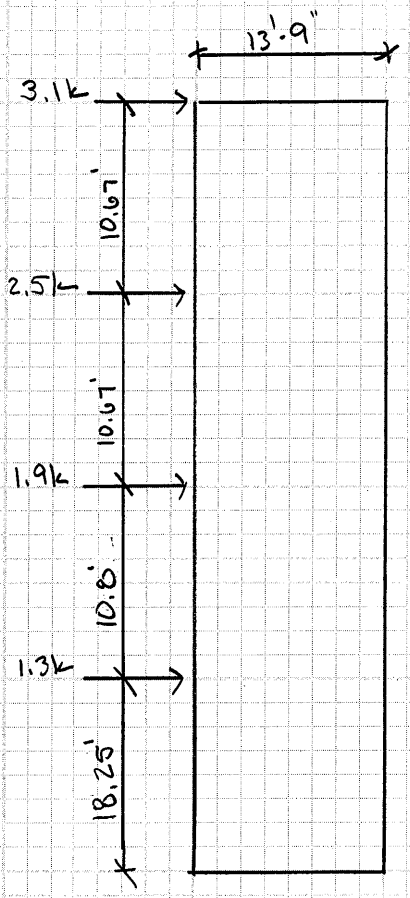
Date _____ Page ___ of ___

GARAGE EAST STAIR WALL

OVERTURNING MOMENT

$M_{OT_E}$ = 1.3k (18.25 ft)
1.9k (29.05 ft)
2.5k (39.72 ft)
+ 3.1k (50.39 ft)

$M_{OT_E}$ = 334.43 → $M_{OT_{0.7E}}$ = 235 k-ft




DEAD LOAD PANEL

$\frac{10}{12}$ x 150 x 13.75 x 50.4' → 86.6 k

DEAD LOAD STAIRS

$\frac{13}{12}$ x 150pcf x 4 x $\frac{4.25}{2}$ x 13.75' → 19k

DEAD LOAD OF DBL TEES ON SPANDREL

4 LEVELS x $\frac{42}{2}$ x 13.75 x 76 psf → 87.8k

RESISTING MOMENT

0.6 $M_R$ = 0.6 (86.6 + 19 + 87.8k) (13.75/2)
= 0.6 (1329.63)
= 797k

No uplift since 0.6 $R_m$ > $M_{OT_{0.7E}}$

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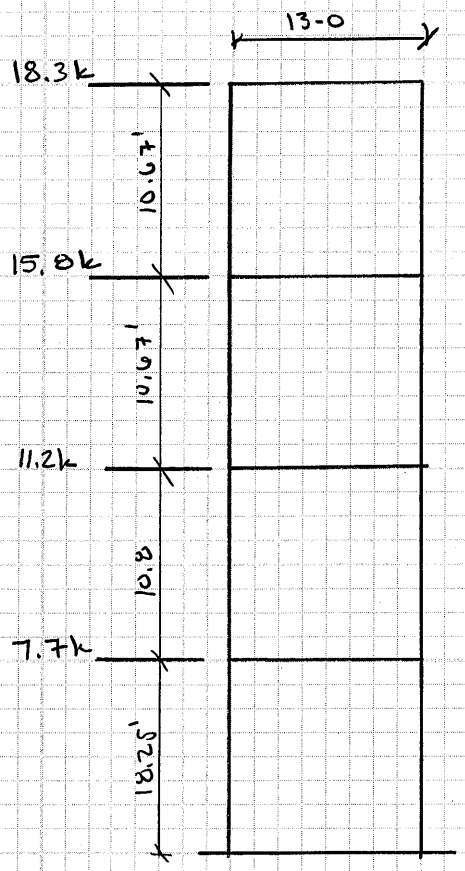
Date _____ Page ___ of ___

GARAGE SOUTH STAIR WALL

OVERTURNING MOMENT

$M_{OT_E}$ = 7.7k (18.25 ft)
11.2k (29.05 ft)
15.8k (39.72 ft)
+ 18.3k (50.39 ft)

$M_{OT_E}$ = 2015.6 k-ft → $M_{OT_{0.7E}}$ = 1410.92 k




DEAD LOAD PANEL

10/12 x 150 x 13 x 50.4 → 81.9k

DEAD LOAD STAIRS

= 60k

RESISTING MOMENT

$0.6R_m$ = 0.6 (81.9k + 60)(13/2)
= 0.6 (922.35k-ft)
= 553 k-ft

$T$ = uplift = $\frac{-1410.92 + 553}{13'}$ → 66 k

ATTACH / CONNECT TO PERP WALL
TO TRANSFER $\frac{66}{0.6}$ → 110k DEAD LOAD

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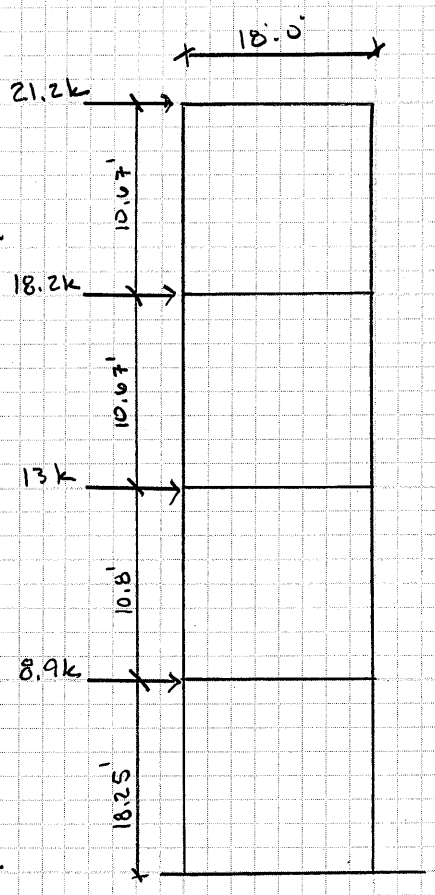
Date _____ Page ___ of ___

GARAGE NORTH STAIR WALL

OVERTURNING MOMENT

$M_{OT_E}$ = 8.9k (18.25ft)
13k (29.05ft)
18.2k (39.72ft)
+ 21.2k (50.39ft)

$M_{OT_E}$ = 2331.25 kft → $M_{OT}$ = 1632 k-ft
0.7E




DEAD LOAD PANEL

$\frac{10}{12}$ x 150 x 18 x 50.4ft → 113.4 k

DEAD LOAD STAIRS

$\frac{13}{12}$ x 150pcf x 4 x 17 x 5.42 → 60k

RESISTING MOMENT

0.6MR = 0.6(113.4k + 60k)(18/2)
= 0.6(1560.6)
= 936.36 k-ft

T = Uplift = $\frac{-1632\text{k-ft} + 936.36}{18'}$ = -38.64 k

ATTACH / CONNECT TO PERP WALL
TO TRANSFER $\frac{38.64}{0.6}$ → 65 k DEAD LOAD

**Paragon Star**
Header and Jamb Design at SOG

**Bob D. Campbell & Co.**
7/22/2022

**Level Loadings**

| Type | DL | LL | TL |
|---|---|---|---|
| Balcony (Private) | 55 psf | 60 psf | 115 psf |
| Balcony (Public) | 55 psf | 100 psf | 155 psf |
| Floor (Private) | 35 psf | 40 psf | 75 psf |
| Floor (Public) | 35 psf | 100 psf | 135 psf |
| Roof (Flat) | 25 psf | 20 psf | 45 psf |
| Roof (Sloped) | 25 psf | 20 psf | 45 psf |
| Roof (MECH) | 25 psf | 45 psf | 70 psf |
| Storage | 35 psf | 125 psf | 160 psf |

| Header Grade | Fb |
|---|---|
| Stud | 700 |
| No. 2 | 900 |
| No. 1 | 1000 |
| LVL | 2600 |
| PSL | 2900 |

| Jamb Grade | Fc |
|---|---|
| Stud | 850 |
| No. 2 | 1350 |
| No. 1 | 1500 |
| Sel. Struct. | 1700 |

TL Deflection Criteria L/ 360
Interior WL 5 psf
Exterior WL 20 psf

**Note: Jack Studs assumed to be braced at 24"oc (weak axis) and L = Stud Height - 1 ft**

**Notes:**
-Refer to ' Wood Header and Jamb Design Key' for member locations
- *Refer to Forte Calculations for beam/header design on where specified

| Header Species: | Southern Yellow Pine | | |
|---|---|---|---|
| Size | $F_b$ | | |
| | DF | SYP | Ratio |
| 2x4 | 1350 | 1100 | 81.5% |
| 2x6 | 1170 | 1000 | 85.5% |
| 2x8 | 1080 | 925 | 85.6% |
| 2x10 | 990 | 800 | 80.8% |
| 2x12 | 900 | 750 | 83.3% |

| Jamb Species: | Southern Yellow Pine | | |
|---|---|---|---|
| Size | $F_c$ | | |
| | DF | SYP | Ratio |
| 2x4 | 1552 | 1450 | 93.4% |
| 2x6 | 1485 | 1400 | 94.3% |
| 2x8 | 1417 | 1350 | 95.3% |
| 2x10 | 1350 | 1300 | 96.3% |
| 2x12 | 1350 | 1250 | 92.6% |

**Exterior**

REVIEWED **3'-0" - Roof Brg + Balc**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Header Length | Header WTTL | Header Type | Header Size | Header Grade | Header Lu | Header WAllow | Header Unity | Jamb Size WTTL | Jamb Size Grade | Jamb Size Jamb Size | Jamb Size Int or Ext | Jamb Size WL | Jamb Size Stud Spcg | Jack HT | Jack Pactual | Jack BRG W Req'd | Jack | Jack Pallow | Jack Unity | King HT | King Pactual | King Lu | King | King Pallow | King Unity | #N/A Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 15.0 ft | 50 plf | 2.0 ft | 3 ft | 950 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.45 | 985 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 1477 lb | 0.46 | 1 | 5201 lb | 0.28 | 9 ft | 656 lb | 60 in. | 1 | 1639 lb | 0.40 | D1 | 1477 lb | 656 lb | 2133 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.5 ft | 175 plf | 2.0 ft | 3 ft | 712 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.34 | 732 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 1098 lb | 0.34 | 1 | 5201 lb | 0.21 | 9 ft | 488 lb | 60 in. | 1 | 1639 lb | 0.30 | D1 | 1098 lb | 488 lb | 3720 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.5 ft | 175 plf | 2.0 ft | 3 ft | 712 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.34 | 732 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 1098 lb | 0.34 | 1 | 5201 lb | 0.21 | 9 ft | 488 lb | 60 in. | 1 | 1639 lb | 0.30 | D1 | 1098 lb | 488 lb | 5307 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.5 ft | 175 plf | 2.0 ft | 3 ft | 712 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.34 | 732 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 1098 lb | 0.34 | 1 | 5201 lb | 0.21 | 14 ft | 1692 lb | 60 in. | 2 | 3573 lb | 0.47 | D1 | 1098 lb | 488 lb | 6893 lb |

REVIEWED **3'-0" - Roof + Floor + Balc (D3)**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Header Length | Header WTTL | Header Type | Header Size | Header Grade | Header Lu | Header WAllow | Header Unity | Jamb Size WTTL | Jamb Size Grade | Jamb Size Jamb Size | Jamb Size Int or Ext | Jamb Size WL | Jamb Size Stud Spcg | Jack HT | Jack Pactual | Jack BRG W Req'd | Jack | Jack Pallow | Jack Unity | King HT | King Pactual | King Lu | King | King Pallow | King Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 6.0 ft | 50 plf | 2.0 ft | 3 ft | 410 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.19 | 424 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 636 lb | 0.20 | 1 | 5201 lb | 0.12 | 9 ft | 283 lb | 60 in. | 1 | 1639 lb | 0.17 | D2 | 636 lb | 283 lb | 918 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 2.5 ft | 1075 plf | 2.0 ft | 3 ft | 1458 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.69 | 1473 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 2210 lb | 0.70 | 1 | 5201 lb | 0.42 | 9 ft | 982 lb | 60 in. | 2 | 10731 lb | 0.09 | D2 | 2210 lb | 982 lb | 4110 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 2.5 ft | 1075 plf | 2.0 ft | 3 ft | 1458 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.69 | 1473 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 2210 lb | 0.70 | 1 | 5201 lb | 0.42 | 9 ft | 2101 lb | 60 in. | 2 | 10731 lb | 0.20 | D2 | 2210 lb | 982 lb | 7302 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 2.5 ft | 1075 plf | 2.0 ft | 3 ft | 1458 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.69 | 1473 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 2210 lb | 0.70 | 1 | 5201 lb | 0.42 | 14 ft | 5292 lb | 60 in. | 3 | 6686 lb | 0.79 | D2 | 2210 lb | 982 lb | 10493 lb |

REVIEWED **6'-0" - Roof Brg**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Header Length | Header WTTL | Header Type | Header Size | Header Grade | Header Lu | Header WAllow | Header Unity | Jamb Size WTTL | Jamb Size Grade | Jamb Size Jamb Size | Jamb Size Int or Ext | Jamb Size WL | Jamb Size Stud Spcg | Jack HT | Jack Pactual | Jack BRG W Req'd | Jack | Jack Pallow | Jack Unity | King HT | King Pactual | King Lu | King | King Pallow | King Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 21.0 ft | 50 plf | 2.0 ft | 6 ft | 995 plf | (3) 2x | 2 x 12 | No. 2 | Span | 1272 plf | 0.78 | 1081 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 3243 lb | 0.96 | 1 | 5201 lb | 0.62 | 9 ft | 721 lb | 60 in. | 1 | 1111 lb | 0.65 | F1 | 3243 lb | 721 lb | 3963 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 1.0 ft | 100 plf | 2.0 ft | 6 ft | 175 plf | (3) 2x | 2 x 8 | No. 2 | Span | 635 plf | 0.28 | 182 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 545 lb | 0.17 | 1 | 5201 lb | 0.10 | 9 ft | 121 lb | 60 in. | 1 | 1111 lb | 0.11 | D1 | 545 lb | 121 lb | 4630 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 1.0 ft | 100 plf | 2.0 ft | 6 ft | 175 plf | (3) 2x | 2 x 8 | No. 2 | Span | 635 plf | 0.28 | 182 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 545 lb | 0.17 | 1 | 5201 lb | 0.10 | 9 ft | 121 lb | 60 in. | 1 | 1111 lb | 0.11 | D1 | 545 lb | 121 lb | 5297 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 1.0 ft | 100 plf | 2.0 ft | 6 ft | 175 plf | (3) 2x | 2 x 8 | No. 2 | Span | 635 plf | 0.28 | 182 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 545 lb | 0.17 | 1 | 5201 lb | 0.10 | 14 ft | 762 lb | 60 in. | 2 | 1746 lb | 0.44 | D1 | 545 lb | 121 lb | 5963 lb |

REVIEWED **6'-0" - Floor Brg**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Header Length | Header WTTL | Header Type | Header Size | Header Grade | Header Lu | Header WAllow | Header Unity | Jamb Size WTTL | Jamb Size Grade | Jamb Size Jamb Size | Jamb Size Int or Ext | Jamb Size WL | Jamb Size Stud Spcg | Jack HT | Jack Pactual | Jack BRG W Req'd | Jack | Jack Pallow | Jack Unity | King HT | King Pactual | King Lu | King | King Pallow | King Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 6 ft | 140 plf | (3) 2x | 2 x 8 | No. 2 | Span | 635 plf | 0.22 | 148 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 445 lb | 0.14 | 1 | 5201 lb | 0.09 | 9 ft | 99 lb | 60 in. | 1 | 1111 lb | 0.09 | | 445 lb | 99 lb | 543 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 7.0 ft | 100 plf | 2.0 ft | 6 ft | 625 plf | (3) 2x | 2 x 10 | No. 2 | Span | 946 plf | 0.66 | 673 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 2018 lb | 0.60 | 1 | 5201 lb | 0.39 | 9 ft | 448 lb | 60 in. | 1 | 1111 lb | 0.40 | E2 | 2018 lb | 448 lb | 3010 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 7.0 ft | 100 plf | 2.0 ft | 6 ft | 625 plf | (3) 2x | 2 x 10 | No. 2 | Span | 946 plf | 0.66 | 673 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 2018 lb | 0.60 | 1 | 5201 lb | 0.39 | 9 ft | 448 lb | 60 in. | 2 | 9734 lb | 0.05 | E2 | 2018 lb | 448 lb | 5477 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 7.0 ft | 100 plf | 2.0 ft | 6 ft | 625 plf | (3) 2x | 2 x 10 | No. 2 | Span | 946 plf | 0.66 | 673 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 2018 lb | 0.60 | 1 | 5201 lb | 0.39 | 14 ft | 2742 lb | 60 in. | 3 | 4772 lb | 0.57 | E2 | 2018 lb | 448 lb | 7943 lb |

REVIEWED **6'-0" - Roof + Floor Brg (E2)**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Header Length | Header WTTL | Header Type | Header Size | Header Grade | Header Lu | Header WAllow | Header Unity | Jamb Size WTTL | Jamb Size Grade | Jamb Size Jamb Size | Jamb Size Int or Ext | Jamb Size WL | Jamb Size Stud Spcg | Jack HT | Jack Pactual | Jack BRG W Req'd | Jack | Jack Pallow | Jack Unity | King HT | King Pactual | King Lu | King | King Pallow | King Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 14.0 ft | 50 plf | 2.0 ft | 6 ft | 680 plf | (3) 2x | 2 x 12 | No. 2 | Span | 1272 plf | 0.53 | 737 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 2212 lb | 0.66 | 1 | 5201 lb | 0.43 | 9 ft | 492 lb | 60 in. | 1 | 1111 lb | 0.44 | F1 | 2212 lb | 492 lb | 2703 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 5.0 ft | 100 plf | 2.0 ft | 6 ft | 475 plf | (3) 2x | 2 x 8 | No. 2 | Span | 635 plf | 0.75 | 509 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 1527 lb | 0.46 | 1 | 5201 lb | 0.29 | 9 ft | 339 lb | 60 in. | 2 | 9734 lb | 0.03 | D2 | 1527 lb | 339 lb | 4570 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 5.0 ft | 100 plf | 2.0 ft | 6 ft | 475 plf | (3) 2x | 2 x 8 | No. 2 | Span | 635 plf | 0.75 | 509 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 1527 lb | 0.46 | 1 | 5201 lb | 0.29 | 9 ft | 1236 lb | 60 in. | 2 | 9734 lb | 0.13 | D2 | 1527 lb | 339 lb | 6437 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 5.0 ft | 100 plf | 2.0 ft | 6 ft | 475 plf | (3) 2x | 2 x 8 | No. 2 | Span | 635 plf | 0.75 | 509 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 1527 lb | 0.46 | 1 | 5201 lb | 0.29 | 14 ft | 3102 lb | 60 in. | 3 | 4772 lb | 0.65 | D2 | 1527 lb | 339 lb | 8303 lb |

REVIEWED **6'-0" - Roof Brg + Balc**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Header Length | Header WTTL | Header Type | Header Size | Header Grade | Header Lu | Header WAllow | Header Unity | Jamb Size WTTL | Jamb Size Grade | Jamb Size Jamb Size | Jamb Size Int or Ext | Jamb Size WL | Jamb Size Stud Spcg | Jack HT | Jack Pactual | Jack BRG W Req'd | Jack | Jack Pallow | Jack Unity | King HT | King Pactual | King Lu | King | King Pallow | King Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 15.0 ft | 50 plf | 2.0 ft | 6 ft | 725 plf | (3) 2x | 2 x 10 | No. 2 | Span | 946 plf | 0.77 | 786 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 2359 lb | 0.70 | 1 | 5201 lb | 0.45 | 9 ft | 524 lb | 60 in. | 1 | 1111 lb | 0.47 | E1 | 2359 lb | 524 lb | 2883 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 2.5 ft | 175 plf | 2.0 ft | 6 ft | 463 plf | (3) 2x | 2 x 8 | No. 2 | Span | 635 plf | 0.73 | 489 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 1466 lb | 0.45 | 1 | 5201 lb | 0.28 | 9 ft | 326 lb | 60 in. | 1 | 1111 lb | 0.29 | D2 | 1466 lb | 326 lb | 4675 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 2.5 ft | 175 plf | 2.0 ft | 6 ft | 463 plf | (3) 2x | 2 x 8 | No. 2 | Span | 635 plf | 0.73 | 489 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 1466 lb | 0.45 | 1 | 5201 lb | 0.28 | 9 ft | 1266 lb | 60 in. | 2 | 9734 lb | 0.13 | D2 | 1466 lb | 326 lb | 6467 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 2.5 ft | 175 plf | 2.0 ft | 6 ft | 463 plf | (3) 2x | 2 x 8 | No. 2 | Span | 635 plf | 0.73 | 489 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 1466 lb | 0.45 | 1 | 5201 lb | 0.28 | 14 ft | 3057 lb | 60 in. | 3 | 4772 lb | 0.64 | D2 | 1466 lb | 326 lb | 8258 lb |

REVIEWED **6'-0" - Roof Brg + Balc (Unit D4)**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Header Length | Header WTTL | Header Type | Header Size | Header Grade | Header Lu | Header WAllow | Header Unity | Jamb Size WTTL | Jamb Size Grade | Jamb Size Jamb Size | Jamb Size Int or Ext | Jamb Size WL | Jamb Size Stud Spcg | Jack HT | Jack Pactual | Jack BRG W Req'd | Jack | Jack Pallow | Jack Unity | King HT | King Pactual | King Lu | King | King Pallow | King Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 14.0 ft | 50 plf | 2.0 ft | 6 ft | 680 plf | (3) 2x | 2 x 10 | No. 2 | Span | 946 plf | 0.72 | 737 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 2212 lb | 0.66 | 1 | 5201 lb | 0.43 | 9 ft | 492 lb | 60 in. | 1 | 1111 lb | 0.44 | | 2212 lb | 492 lb | 2703 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.5 ft | 175 plf | 2.0 ft | 6 ft | 578 plf | (3) 2x | 2 x 10 | No. 2 | Span | 946 plf | 0.61 | 614 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 1842 lb | 0.56 | 1 | 5201 lb | 0.35 | 9 ft | 409 lb | 60 in. | 1 | 1111 lb | 0.37 | E2 | 1842 lb | 409 lb | 4955 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.5 ft | 175 plf | 2.0 ft | 6 ft | 578 plf | (3) 2x | 2 x 10 | No. 2 | Span | 946 plf | 0.61 | 614 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 1842 lb | 0.56 | 1 | 5201 lb | 0.35 | 9 ft | 2006 lb | 60 in. | 2 | 9734 lb | 0.21 | E2 | 1842 lb | 409 lb | 7207 lb |

REVIEWED **6'-0" - Roof + Floor + Balc (D4)**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Header Length | Header WTTL | Header Type | Header Size | Header Grade | Header Lu | Header WAllow | Header Unity | Jamb Size WTTL | Jamb Size Grade | Jamb Size Jamb Size | Jamb Size Int or Ext | Jamb Size WL | Jamb Size Stud Spcg | Jack HT | Jack Pactual | Jack BRG W Req'd | Jack | Jack Pallow | Jack Unity | King HT | King Pactual | King Lu | King | King Pallow | King Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 17.0 ft | 50 plf | 2.0 ft | 6 ft | 815 plf | (3) 2x | 2 x 10 | No. 2 | Span | 946 plf | 0.86 | 885 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 2654 lb | 0.79 | 1 | 5201 lb | 0.51 | 9 ft | 590 lb | 60 in. | 1 | 1111 lb | 0.53 | E1 | 2654 lb | 590 lb | 3243 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.5 ft | 588 plf | 2.0 ft | 6 ft | 990 plf | (3) 2x | 2 x 12 | No. 2 | Span | 1272 plf | 0.78 | 1027 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 3080 lb | 0.96 | 1 | 5201 lb | 0.59 | 9 ft | 1807 lb | 60 in. | 2 | 9734 lb | 0.19 | F2 | 3080 lb | 684 lb | 7008 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.5 ft | 588 plf | 2.0 ft | 6 ft | 990 plf | (3) 2x | 2 x 12 | No. 2 | Span | 1272 plf | 0.78 | 1027 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 3080 lb | 0.96 | 1 | 5201 lb | 0.59 | 9 ft | 5571 lb | 60 in. | 2 | 9734 lb | 0.57 | F2 | 3080 lb | 684 lb | 10772 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.5 ft | 588 plf | 2.0 ft | 6 ft | 990 plf | (3) 2x | 2 x 12 | No. 2 | Span | 1272 plf | 0.78 | 1027 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 3080 lb | 0.96 | 1 | 5201 lb | 0.59 | 14 ft | 9335 lb | 60 in. | 5 | 10918 lb | 0.86 | F2 | 3080 lb | 684 lb | 14536 lb |

REVIEWED **7'-6" - Roof + Floor + Balc (D3) (RAISED PL)**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Header Length | Header WTTL | Header Type | Header Size | Header Grade | Header Lu | Header WAllow | Header Unity | Jamb Size WTTL | Jamb Size Grade | Jamb Size Jamb Size | Jamb Size Int or Ext | Jamb Size WL | Jamb Size Stud Spcg | Jack HT | Jack Pactual | Jack BRG W Req'd | Jack | Jack Pallow | Jack Unity | King HT | King Pactual | King Lu | King | King Pallow | King Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 13.0 ft | 50 plf | 2.0 ft | 8 ft | 635 plf | (3) 2x | 2 x 12 | No. 2 | Span | 714 plf | 0.89 | 677 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 2707 lb | 0.82 | 1 | 5201 lb | 0.52 | 12 ft | 451 lb | 60 in. | 2 | 3283 lb | 0.14 | F1 | 2707 lb | 451 lb | 3158 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 2.0 ft | 700 plf | 2.0 ft | 8 ft | 930 plf | 3 LVL | 9.25 | LVL | Span | 1904 plf | 0.49 | 946 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 5442 lb | 1.20 | 2 | 10731 lb | 0.51 | 9 ft | 631 lb | 60 in. | 2 | 9130 lb | 0.07 | L2 | 5442 lb | 631 lb | 9231 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 2.0 ft | 700 plf | 2.0 ft | 8 ft | 930 plf | 3 LVL | 9.25 | LVL | Span | 1904 plf | 0.49 | 946 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 5442 lb | 1.20 | 2 | 10731 lb | 0.51 | 9 ft | 4573 lb | 60 in. | 2 | 9130 lb | 0.50 | L2 | 5442 lb | 631 lb | 15304 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 2.0 ft | 700 plf | 2.0 ft | 8 ft | 930 plf | 3 LVL | 9.25 | LVL | Span | 1904 plf | 0.49 | 946 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 5442 lb | 1.20 | 2 | 10731 lb | 0.51 | 14 ft | 10646 lb | 60 in. | 5 | 10251 lb | 1.04 | L2 | 5442 lb | 631 lb | 21377 lb |

REVIEWED **9'-0" - Roof Bearing**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 21.0 ft | 50 plf | 2.0 ft | 9 ft | 1100 plf | 3 LVL | 9.25 | LVL | Span | 1337 plf | 0.82 | 1147 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 5163 lb | 1.59 | 2 | 10731 lb | 0.48 | 9 ft | 765 lb | 60 in. | 2 | 9130 lb | 0.08 | L1 | 5163 lb | 765 lb | 5928 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 1.0 ft | 100 plf | 2.0 ft | 9 ft | 183 plf | (3) 2x | 2 x 8 | No. 2 | Span | 282 plf | 0.65 | 187 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 842 lb | 0.27 | 1 | 5201 lb | 0.16 | 9 ft | 1694 lb | 60 in. | 2 | 9130 lb | 0.19 | D2 | 842 lb | 125 lb | 6895 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 1.0 ft | 100 plf | 2.0 ft | 9 ft | 183 plf | (3) 2x | 2 x 8 | No. 2 | Span | 282 plf | 0.65 | 187 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 842 lb | 0.27 | 1 | 5201 lb | 0.16 | 9 ft | 2661 lb | 60 in. | 2 | 9130 lb | 0.29 | D2 | 842 lb | 125 lb | 7862 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 1.0 ft | 100 plf | 2.0 ft | 9 ft | 183 plf | (3) 2x | 2 x 8 | No. 2 | Span | 282 plf | 0.65 | 187 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 842 lb | 0.27 | 1 | 5201 lb | 0.16 | 14 ft | 3627 lb | 60 in. | 3 | 4171 lb | 0.87 | D2 | 842 lb | 125 lb | 8828 lb |

REVIEWED **9'-0" - Roof + Floor Bearing (D3)**

| | | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 8.0 ft | 50 plf | 2.0 ft | 9 ft | 450 plf | (3) 2x | 2 x 12 | No. 2 | Span | 564 plf | 0.80 | 468 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 2106 lb | 0.65 | 1 | 5201 lb | 0.40 | 9 ft | 312 lb | 60 in. | 1 | 898 lb | 0.35 | F1 | 2106 lb | 312 lb | 2418 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 9 ft | 1225 plf | 3 LVL | 11.25 | LVL | Span | 2363 plf | 0.52 | 1276 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 5741 lb | 1.77 | 2 | 10731 lb | 0.53 | 9 ft | 851 lb | 60 in. | 2 | 9130 lb | 0.09 | N2 | 5741 lb | 851 lb | 9010 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 9 ft | 1225 plf | 3 LVL | 11.25 | LVL | Span | 2363 plf | 0.52 | 1276 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 5741 lb | 1.77 | 2 | 10731 lb | 0.53 | 9 ft | 4870 lb | 60 in. | 2 | 9130 lb | 0.53 | N2 | 5741 lb | 851 lb | 15602 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 9 ft | 1225 plf | 3 LVL | 11.25 | LVL | Span | 2363 plf | 0.52 | 1276 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 5741 lb | 1.77 | 2 | 10731 lb | 0.53 | 14 ft | 11462 lb | 60 in. | 5x5 PSL | 12890 lb | 0.89 | N2 | 5741 lb | 851 lb | 22193 lb |

REVIEWED **9'-0" - Floor Bearing (D5)**

| | | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 1.0 ft | 50 plf | 2.0 ft | 9 ft | 100 plf | (3) 2x | 2 x 8 | No. 2 | Span | 282 plf | 0.35 | 102 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 460 lb | 0.14 | 1 | 5201 lb | 0.09 | 9 ft | 68 lb | 60 in. | 1 | 898 lb | 0.08 | D1 | 460 lb | 68 lb | 528 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 7.0 ft | 100 plf | 2.0 ft | 9 ft | 683 plf | 3 LVL | 9.25 | LVL | Span | 1337 plf | 0.51 | 710 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 3194 lb | 0.99 | 2 | 10731 lb | 0.30 | 9 ft | 473 lb | 60 in. | 2 | 9130 lb | 0.05 | N2 | 3194 lb | 473 lb | 4195 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 7.0 ft | 100 plf | 2.0 ft | 9 ft | 683 plf | 3 LVL | 9.25 | LVL | Span | 1337 plf | 0.51 | 710 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 3194 lb | 0.99 | 2 | 10731 lb | 0.30 | 9 ft | 473 lb | 60 in. | 2 | 9130 lb | 0.05 | N2 | 3194 lb | 473 lb | 7862 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 7.0 ft | 100 plf | 2.0 ft | 9 ft | 683 plf | 3 LVL | 9.25 | LVL | Span | 1337 plf | 0.51 | 710 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 3194 lb | 0.99 | 2 | 10731 lb | 0.30 | 14 ft | 797 lb | 60 in. | 5x5 PSL | 12890 lb | 0.06 | N2 | 3194 lb | 473 lb | 11528 lb |

REVIEWED **3'-0" - Roof + Balc Brg (RAISED PL)**

| | | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 14.5 ft | 50 plf | 2.0 ft | 3 ft | 920 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.44 | 953 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 1430 lb | 0.44 | 1 | 5201 lb | 0.27 | 11 ft | 636 lb | 60 in. | 1 | 1219 lb | 0.52 | D1 | 1430 lb | 636 lb | 2066 lb |

REVIEWED **4'-0" - Roof + Balc Brg (RAISED PL)**

| | | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 6.5 ft | 50 plf | 2.0 ft | 4 ft | 343 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.24 | 379 plf | No. 2 | 2x6 | Exterior | 50 plf | 16 in. oc | 8 ft | 758 lb | 0.22 | 1 | 5201 lb | 0.15 | 11 ft | 253 lb | 60 in. | 1 | 923 lb | 0.27 | D1 | 758 lb | 253 lb | 1011 lb |

REVIEWED **6'-0" - Roof Brg (RAISED PL)**

| | | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 17.0 ft | 50 plf | 2.0 ft | 6 ft | 815 plf | (3) 2x | 2 x 12 | No. 2 | Span | 1272 plf | 0.64 | 885 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 2654 lb | 0.79 | 1 | 5201 lb | 0.51 | 11 ft | 590 lb | 60 in. | 2 | 5376 lb | 0.11 | F1 | 2654 lb | 590 lb | 3243 lb |

NEEDS REVIEW **6'-0" - Roof Brg (RAISED PL)**

| | | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 4.0 ft | 50 plf | 2.0 ft | 6 ft | 230 plf | (3) 2x | 2 x 8 | No. 2 | Span | 635 plf | 0.36 | 246 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 739 lb | 0.22 | 1 | 5201 lb | 0.14 | 11 ft | 164 lb | 60 in. | 1 | 54 lb | 3.07 | D2 | 739 lb | 164 lb | 903 lb |

REVIEWED **6'-0" - Roof + Balc Brg (RAISED PL)**

| | | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 14.5 ft | 50 plf | 2.0 ft | 6 ft | 703 plf | (3) 2x | 2 x 10 | No. 2 | Span | 946 plf | 0.74 | 762 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 2285 lb | 0.68 | 1 | 5201 lb | 0.44 | 11 ft | 508 lb | 60 in. | 2 | 5376 lb | 0.09 | E1 | 2285 lb | 508 lb | 2793 lb |

REVIEWED **3'-0" Stair Exit - Joists Parallel**

| | | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Floor (Public) | 25 psf | 100 psf | 125 psf | 1.0 ft | 1210 plf | 2.0 ft | 3 ft | 1377 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.65 | 1383 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 2075 lb | 0.66 | 1 | 5201 lb | 0.40 | 14 ft | 922 lb | 60 in. | 2 | 3573 lb | 0.26 | D1 | 2075 lb | 922 lb | 2997 lb |

**Balcony**

REVIEWED **1 - 13'-8"**

| | | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 3.0 ft | 50 plf | 2.0 ft | 14 ft | 185 plf | (3) 2x | 2 x 12 | No. 2 | Span | 232 plf | 0.80 | 191 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 0 lb | 0.42 | 0 | 0 lb | NA | 9 ft | 1463 lb | 60 in. | 2 | 9130 lb | 0.16 | F1 | 1336 lb | 127 lb | 1463 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 4.0 ft | 0 plf | 2.0 ft | 14 ft | 460 plf | 3 LVL | 11.25 | LVL | Span | 639 plf | 0.72 | 480 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 0 lb | 1.04 | 0 | 0 lb | NA | 9 ft | 5143 lb | 60 in. | 2 | 9130 lb | 0.56 | D1 | 3360 lb | 320 lb | 5143 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 4.0 ft | 0 plf | 2.0 ft | 14 ft | 460 plf | 3 LVL | 11.25 | LVL | Span | 639 plf | 0.72 | 480 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 0 lb | 1.04 | 0 | 0 lb | NA | 9 ft | 8823 lb | 60 in. | 3 | 15501 lb | 0.57 | D1 | 3360 lb | 320 lb | 8823 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 4.0 ft | 0 plf | 2.0 ft | 14 ft | 460 plf | 3 LVL | 11.25 | LVL | Span | 639 plf | 0.72 | 480 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 0 lb | 1.04 | 0 | 0 lb | NA | 14 ft | 12503 lb | 60 in. | 5 | 10251 lb | 1.22 | D1 | 3360 lb | 320 lb | 12503 lb |

REVIEWED **1 - 15'-3"**

| | | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 15 ft | 146 plf | (3) 2x | 2 x 12 | No. 2 | Span | 202 plf | 0.72 | 149 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 0 lb | 0.35 | 0 | 0 lb | NA | 9 ft | 1218 lb | 60 in. | 2 | 9130 lb | 0.13 | F1 | 1119 lb | 99 lb | 1218 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 4.0 ft | 0 plf | 2.0 ft | 15 ft | 491 plf | 3 LVL | 11.25 | LVL | Span | 520 plf | 0.94 | 507 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 0 lb | 1.18 | 0 | 0 lb | NA | 9 ft | 5358 lb | 60 in. | 2 | 9130 lb | 0.59 | | 3802 lb | 338 lb | 5358 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 4.0 ft | 0 plf | 2.0 ft | 15 ft | 491 plf | 3 LVL | 11.25 | LVL | Span | 520 plf | 0.94 | 507 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 0 lb | 1.18 | 0 | 0 lb | NA | 9 ft | 9498 lb | 60 in. | 3 | 15501 lb | 0.61 | | 3802 lb | 338 lb | 9498 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 4.0 ft | 0 plf | 2.0 ft | 15 ft | 491 plf | 3 LVL | 11.25 | LVL | Span | 520 plf | 0.94 | 507 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 0 lb | 1.18 | 0 | 0 lb | NA | 14 ft | 13638 lb | 60 in. | 5 | 10251 lb | 1.33 | | 3802 lb | 338 lb | 13638 lb |

REVIEWED **2 - 9'-0"**

| | | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 9 ft | 150 plf | (3) 2x | 2 x 10 | No. 2 | Span | 420 plf | 0.36 | 155 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 0 lb | 0.22 | 0 | 0 lb | NA | 9 ft | 798 lb | 60 in. | 2 | 9130 lb | 0.09 | E1 | 695 lb | 103 lb | 798 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 4.0 ft | 0 plf | 2.0 ft | 9 ft | 511 plf | 3 LVL | 11.25 | LVL | Span | 2363 plf | 0.22 | 534 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 0 lb | 0.74 | 0 | 0 lb | NA | 9 ft | 3558 lb | 60 in. | 2 | 9130 lb | 0.39 | D1 | 2404 lb | 356 lb | 3558 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 4.0 ft | 0 plf | 2.0 ft | 9 ft | 511 plf | 3 LVL | 11.25 | LVL | Span | 2363 plf | 0.22 | 534 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 0 lb | 0.74 | 0 | 0 lb | NA | 9 ft | 6318 lb | 60 in. | 3 | 15501 lb | 0.41 | D1 | 2404 lb | 356 lb | 6318 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 4.0 ft | 0 plf | 2.0 ft | 9 ft | 511 plf | 3 LVL | 11.25 | LVL | Span | 2363 plf | 0.22 | 534 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 0 lb | 0.74 | 0 | 0 lb | NA | 14 ft | 9078 lb | 60 in. | 5 | 10251 lb | 0.89 | D1 | 2404 lb | 356 lb | 9078 lb |

REVIEWED **1 - 13'-8" (RAISED PL)**

| | | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 4.0 ft | 50 plf | 2.0 ft | 14 ft | 230 plf | (3) 2x | 2 x 10 | No. 2 | Span | 173 plf | 1.33 | 238 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 0 lb | 0.52 | 0 | 0 lb | NA | 11 ft | 1823 lb | 60 in. | 2 | 4780 lb | 0.38 | E1 | 1665 lb | 159 lb | 1823 lb |

**Corridor**

REVIEWED **5'-0" - Inset Door**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | | King | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 19.5 ft | 50 plf | 2.0 ft | 5 ft | 1103 plf | 1 LVL | 1 8 | LVL | Span | 2394 plf | 0.46 | 1158 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.39 | 0 | 0 lb | NA | 9 ft | 3668 lb | 60 in. | 3 | 6245 lb | 0.59 | G1 | 2896 lb | 772 lb | 3668 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 2.0 ft | 5 ft | 460 plf | 1 LVL | 1 8 | LVL | Span | 2394 plf | 0.19 | 479 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.58 | 0 | 0 lb | NA | 9 ft | 5185 lb | 60 in. | 3 | 6245 lb | 0.83 | G1 | 1197 lb | 319 lb | 5185 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 2.0 ft | 5 ft | 460 plf | 1 LVL | 1 8 | LVL | Span | 2394 plf | 0.19 | 479 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.58 | 0 | 0 lb | NA | 9 ft | 6702 lb | 60 in. | 4 | 8490 lb | 0.79 | G1 | 1197 lb | 319 lb | 6702 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 2.0 ft | 5 ft | 460 plf | 1 LVL | 1 8 | LVL | Span | 2394 plf | 0.19 | 479 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.37 | 0 | 0 lb | NA | 14 ft | 8218 lb | 60 in. | 3 | 9901 lb | 0.83 | G1 | 1197 lb | 319 lb | 8218 lb |
| | | | | | | | Pre-Eng Truss to Span Opening | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

REVIEWED **3'-0"**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | | King | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 19.5 ft | 50 plf | 2.0 ft | 3 ft | 1220 plf | 1 LVL | 1 8 | LVL | Span | 3990 plf | 0.31 | 1265 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.93 | 0 | 0 lb | NA | 9 ft | 2741 lb | 60 in. | 2 | 3598 lb | 0.76 | G1 | 1898 lb | 843 lb | 2741 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 2.0 ft | 3 ft | 500 plf | 1 LVL | 1 8 | LVL | Span | 3990 plf | 0.13 | 515 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.38 | 0 | 0 lb | NA | 9 ft | 3858 lb | 60 in. | 3 | 5850 lb | 0.66 | G1 | 773 lb | 344 lb | 3858 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 2.0 ft | 3 ft | 500 plf | 1 LVL | 1 8 | LVL | Span | 3990 plf | 0.13 | 515 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.38 | 0 | 0 lb | NA | 9 ft | 4974 lb | 60 in. | 4 | 8042 lb | 0.62 | G1 | 773 lb | 344 lb | 4974 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 2.0 ft | 3 ft | 500 plf | 1 LVL | 1 8 | LVL | Span | 3990 plf | 0.13 | 515 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.24 | 0 | 0 lb | NA | 14 ft | 6091 lb | 60 in. | 3 | 9227 lb | 0.66 | G1 | 773 lb | 344 lb | 6091 lb |
| | | | | | | | Pre-Eng Truss to Span Opening | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

REVIEWED **5'-0" + 3'-0" Shared Jamb**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | | King | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 19.5 ft | 50 plf | 2.0 ft | 3 ft | 1220 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.58 | 1265 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.93 | 0 | 0 lb | NA | 9 ft | 4794 lb | 60 in. | 3 | 6245 lb | 0.77 | G1 | 4794 lb | 0 lb | 4794 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 2.0 ft | 3 ft | 500 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.24 | 515 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.38 | 0 | 0 lb | NA | 9 ft | 6764 lb | 60 in. | 4 | 8490 lb | 0.80 | G1 | 1970 lb | 0 lb | 6764 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 2.0 ft | 3 ft | 500 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.24 | 515 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.38 | 0 | 0 lb | NA | 9 ft | 8734 lb | 60 in. | 5 | 10750 lb | 0.81 | G1 | 1970 lb | 0 lb | 8734 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 2.0 ft | 3 ft | 500 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.24 | 515 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.24 | 0 | 0 lb | NA | 14 ft | 10705 lb | 60 in. | 5 | 17091 lb | 0.63 | G1 | 1970 lb | 0 lb | 10705 lb |

REVIEWED **3'-0"**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | | King | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 17.5 ft | 50 plf | 2.0 ft | 3 ft | 1100 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.52 | 1140 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 1711 lb | 0.83 | 1 | 2775 lb | 0.62 | 9 ft | 760 lb | 60 in. | 2 | 3598 lb | 0.21 | A1 | 1711 lb | 760 lb | 2471 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 2.0 ft | 3 ft | 500 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.24 | 515 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 773 lb | 0.38 | 1 | 2775 lb | 0.28 | 9 ft | 812 lb | 60 in. | 2 | 3598 lb | 0.23 | A1 | 773 lb | 344 lb | 3588 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 2.0 ft | 3 ft | 500 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.24 | 515 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 773 lb | 0.38 | 1 | 2775 lb | 0.28 | 9 ft | 1929 lb | 60 in. | 2 | 3598 lb | 0.54 | A1 | 773 lb | 344 lb | 4704 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 2.0 ft | 3 ft | 500 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.24 | 515 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 773 lb | 0.24 | 1 | 5201 lb | 0.15 | 14 ft | 620 lb | 60 in. | 2 | 5786 lb | 0.11 | D1 | 773 lb | 344 lb | 5821 lb |

REVIEWED **5'-0" + 3'-0" - No Internal Jamb - Bldg B**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | | King | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 9.5 ft | 50 plf | 2.0 ft | 3 ft | 620 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.29 | 642 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.47 | 0 | 0 lb | NA | 9 ft | 963 lb | 60 in. | 3 | 6245 lb | 0.15 | G1 | 963 lb | 0 lb | 963 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 3 ft | 1450 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.69 | 1502 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.10 | 0 | 0 lb | NA | 9 ft | 5835 lb | 60 in. | 4 | 8490 lb | 0.69 | T1 | 4872 lb | 0 lb | 5835 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 3 ft | 1450 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.69 | 1502 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.10 | 0 | 0 lb | NA | 9 ft | 10707 lb | 60 in. | 5 | 10750 lb | 1.00 | T1 | 4872 lb | 0 lb | 10707 lb |

REVIEWED **D3 - 3'-0"**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | | King | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 18.0 ft | 50 plf | 2.0 ft | 3 ft | 1130 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.54 | 1172 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 1757 lb | 0.86 | 1 | 2775 lb | 0.63 | 9 ft | 781 lb | 60 in. | 2 | 3598 lb | 0.22 | A1 | 1757 lb | 781 lb | 2538 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 6.0 ft | 100 plf | 2.0 ft | 3 ft | 700 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.33 | 723 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 1085 lb | 0.53 | 1 | 2775 lb | 0.39 | 9 ft | 1330 lb | 60 in. | 2 | 3598 lb | 0.37 | A1 | 1085 lb | 482 lb | 4105 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 6.0 ft | 100 plf | 2.0 ft | 3 ft | 700 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.33 | 723 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 1085 lb | 0.53 | 1 | 2775 lb | 0.39 | 9 ft | 2897 lb | 60 in. | 2 | 3598 lb | 0.81 | A1 | 1085 lb | 482 lb | 5672 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 6.0 ft | 100 plf | 2.0 ft | 3 ft | 700 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.33 | 723 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1085 lb | 0.34 | 1 | 5201 lb | 0.21 | 14 ft | 2037 lb | 60 in. | 2 | 5786 lb | 0.35 | D1 | 1085 lb | 482 lb | 7238 lb |

REVIEWED **3'-0" - Garage Entrace**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | | King | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 7.5 ft | 50 plf | 2.0 ft | 3 ft | 500 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.24 | 517 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 776 lb | 0.24 | 1 | 5201 lb | 0.15 | 9 ft | 345 lb | 60 in. | 1 | 2087 lb | 0.17 | D1 | 776 lb | 345 lb | 1121 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 7.5 ft | 100 plf | 2.0 ft | 3 ft | 850 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.40 | 879 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1318 lb | 0.41 | 1 | 5201 lb | 0.25 | 9 ft | 586 lb | 60 in. | 1 | 2087 lb | 0.28 | D1 | 1318 lb | 586 lb | 3025 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 7.5 ft | 100 plf | 2.0 ft | 3 ft | 850 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.40 | 879 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1318 lb | 0.41 | 1 | 5201 lb | 0.25 | 9 ft | 586 lb | 60 in. | 1 | 2087 lb | 0.28 | D1 | 1318 lb | 586 lb | 4929 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 7.5 ft | 100 plf | 2.0 ft | 3 ft | 850 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.40 | 879 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1318 lb | 0.41 | 1 | 5201 lb | 0.25 | 14 ft | 1632 lb | 60 in. | 2 | 5786 lb | 0.28 | D1 | 1318 lb | 586 lb | 6833 lb |

REVIEWED **6'-0" - Corridor Corners - Typ**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | | King | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 5.0 ft | 50 plf | 2.0 ft | 6 ft | 275 plf | (2) 2x | 2 x 8 | No. 2 | Span | 421 plf | 0.65 | 295 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.42 | 0 | 0 lb | NA | 9 ft | 1083 lb | 60 in. | 2 | 3959 lb | 0.27 | B2 | 886 lb | 197 lb | 1083 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 7.0 ft | 0 plf | 2.0 ft | 6 ft | 525 plf | (2) 2x | 2 x 10 | No. 2 | Span | 627 plf | 0.84 | 573 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.80 | 0 | 0 lb | NA | 9 ft | 3183 lb | 60 in. | 3 | 6245 lb | 0.51 | B2 | 1718 lb | 382 lb | 3183 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 7.0 ft | 0 plf | 2.0 ft | 6 ft | 525 plf | (2) 2x | 2 x 10 | No. 2 | Span | 627 plf | 0.84 | 573 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.80 | 0 | 0 lb | NA | 9 ft | 5283 lb | 60 in. | 4 | 8490 lb | 0.62 | B2 | 1718 lb | 382 lb | 5283 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 7.0 ft | 0 plf | 2.0 ft | 6 ft | 525 plf | (2) 2x | 2 x 10 | No. 2 | Span | 627 plf | 0.84 | 573 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.51 | 0 | 0 lb | NA | 14 ft | 7383 lb | 60 in. | 4 | 13484 lb | 0.55 | B2 | 1718 lb | 382 lb | 7383 lb |

REVIEWED **6'-0" - Stair Lobbies**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | | King | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 5.0 ft | 50 plf | 2.0 ft | 6 ft | 275 plf | (2) 2x | 2 x 8 | No. 2 | Span | 421 plf | 0.65 | 295 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.42 | 0 | 0 lb | NA | 9 ft | 1083 lb | 60 in. | 2 | 3959 lb | 0.27 | T1 | 886 lb | 197 lb | 1083 lb |
| Floor (Public) | 25 psf | 100 psf | 125 psf | 6.0 ft | 0 plf | 2.0 ft | 6 ft | 750 plf | 1 LVL | 1 8 | LVL | Span | 1995 plf | 0.38 | 818 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.14 | 0 | 0 lb | NA | 9 ft | 4083 lb | 60 in. | 3 | 6245 lb | 0.65 | T1 | 2455 lb | 545 lb | 4083 lb |
| Floor (Public) | 25 psf | 100 psf | 125 psf | 6.0 ft | 0 plf | 2.0 ft | 6 ft | 750 plf | 1 LVL | 1 8 | LVL | Span | 1995 plf | 0.38 | 818 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.14 | 0 | 0 lb | NA | 9 ft | 7083 lb | 60 in. | 4 | 8490 lb | 0.83 | T1 | 2455 lb | 545 lb | 7083 lb |
| Floor (Public) | 25 psf | 100 psf | 125 psf | 6.0 ft | 0 plf | 2.0 ft | 6 ft | 750 plf | 1 LVL | 1 8 | LVL | Span | 1995 plf | 0.38 | 818 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.72 | 0 | 0 lb | NA | 14 ft | 10083 lb | 60 in. | 4 | 13484 lb | 0.75 | T1 | 2455 lb | 545 lb | 10083 lb |

REVIEWED **2 Ply Header above 2x3's @ Firewall Doors**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | | King | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 17.5 ft | 50 plf | 2.0 ft | 3 ft | 1100 plf | (2) 2x | 2 x 10 | No. 2 | Span | 1794 plf | 0.61 | 1140 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.83 | 0 | 0 lb | NA | 9 ft | 2471 lb | 60 in. | 2 | 3598 lb | 0.69 | G1 | 1711 lb | 760 lb | 2471 lb |
| Floor (Private) | 30 psf | 40 psf | 70 psf | 4.0 ft | 100 plf | 2.0 ft | 3 ft | 473 plf | (2) 2x | 2 x 10 | No. 2 | Span | 1794 plf | 0.26 | 488 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.36 | 0 | 0 lb | NA | 9 ft | 3528 lb | 60 in. | 3 | 5850 lb | 0.60 | G1 | 732 lb | 325 lb | 3528 lb |
| Floor (Private) | 30 psf | 40 psf | 70 psf | 4.0 ft | 100 plf | 2.0 ft | 3 ft | 473 plf | (2) 2x | 2 x 10 | No. 2 | Span | 1794 plf | 0.26 | 488 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.36 | 0 | 0 lb | NA | 9 ft | 4584 lb | 60 in. | 3 | 5850 lb | 0.78 | G1 | 732 lb | 325 lb | 4584 lb |
| Floor (Private) | 30 psf | 40 psf | 70 psf | 4.0 ft | 100 plf | 2.0 ft | 3 ft | 473 plf | (2) 2x | 2 x 10 | No. 2 | Span | 1794 plf | 0.26 | 488 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.23 | 0 | 0 lb | NA | 14 ft | 5641 lb | 60 in. | 3 | 9227 lb | 0.61 | G1 | 732 lb | 325 lb | 5641 lb |

**Stair/Elevator**

REVIEWED **Bldg A/B**

| | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 17.5 ft | 50 plf | 2.0 ft | 3 ft | 1100 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.78 | 1140 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1711 lb | 0.53 | 1 | 5201 lb | 0.33 | 9 ft | 760 lb | 60 in. | 1 | 2087 lb | 0.36 | | 1711 lb | 760 lb | 2471 lb |
| Floor (Public) | 25 psf | 100 psf | 125 psf | 4.0 ft | 170 plf | 2.0 ft | 3 ft | 837 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.60 | 862 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1293 lb | 0.40 | 1 | 5201 lb | 0.25 | 9 ft | 575 lb | 60 in. | 1 | 2087 lb | 0.28 | D1 | 1293 lb | 575 lb | 4339 lb |
| Floor (Public) | 25 psf | 100 psf | 125 psf | 4.0 ft | 170 plf | 2.0 ft | 3 ft | 837 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.60 | 862 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1293 lb | 0.40 | 1 | 5201 lb | 0.25 | 9 ft | 1007 lb | 60 in. | 1 | 2087 lb | 0.48 | D1 | 1293 lb | 575 lb | 6208 lb |
| Floor (Public) | 25 psf | 100 psf | 125 psf | 4.0 ft | 170 plf | 2.0 ft | 3 ft | 837 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.60 | 862 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1293 lb | 0.40 | 1 | 5201 lb | 0.25 | 14 ft | 2875 lb | 60 in. | 2 | 5786 lb | 0.50 | D1 | 1293 lb | 575 lb | 8076 lb |

REVIEWED **Bldg C**

| | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 17.5 ft | 50 plf | 2.0 ft | 3 ft | 1100 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.78 | 1140 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1711 lb | 0.53 | 1 | 5201 lb | 0.33 | 9 ft | 760 lb | 60 in. | 1 | 2087 lb | 0.36 | | 1711 lb | 760 lb | 2471 lb |
| Floor (Public) | 25 psf | 100 psf | 125 psf | 1.0 ft | 380 plf | 2.0 ft | 3 ft | 547 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.39 | 553 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 830 lb | 0.26 | 1 | 5201 lb | 0.16 | 9 ft | 369 lb | 60 in. | 1 | 2087 lb | 0.18 | D1 | 830 lb | 369 lb | 3669 lb |
| Floor (Public) | 25 psf | 100 psf | 125 psf | 1.0 ft | 380 plf | 2.0 ft | 3 ft | 547 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.39 | 553 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 830 lb | 0.26 | 1 | 5201 lb | 0.16 | 9 ft | 369 lb | 60 in. | 1 | 2087 lb | 0.18 | D1 | 830 lb | 369 lb | 4868 lb |
| Floor (Public) | 25 psf | 100 psf | 125 psf | 1.0 ft | 380 plf | 2.0 ft | 3 ft | 547 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.39 | 553 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 830 lb | 0.26 | 1 | 5201 lb | 0.16 | 14 ft | 865 lb | 60 in. | 2 | 5786 lb | 0.15 | D1 | 830 lb | 369 lb | 6066 lb |

REVIEWED **Bldg A/B**

| | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Floor (Public) | 35 psf | 100 psf | 135 psf | 0.0 ft | 550 plf | 2.0 ft | 3 ft | 550 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.26 | 550 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 825 lb | 0.27 | 1 | 5201 lb | 0.16 | 14 ft | 367 lb | 60 in. | 2 | 5786 lb | 0.06 | D1 | 825 lb | 367 lb | 1192 lb |

**Unit Partition**

REVIEWED **C1 - 2'-10"**

| | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 3 ft | 170 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.08 | 175 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 262 lb | 0.08 | 1 | 5201 lb | 0.05 | 9 ft | 116 lb | 60 in. | 1 | 2087 lb | 0.06 | | 262 lb | 116 lb | 378 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 3 ft | 1450 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.69 | 1502 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2253 lb | 0.70 | 1 | 5201 lb | 0.43 | 9 ft | 1001 lb | 60 in. | 1 | 2087 lb | 0.48 | D1 | 2253 lb | 1001 lb | 3633 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.0 ft | 100 plf | 2.0 ft | 3 ft | 1400 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.66 | 1450 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2175 lb | 0.68 | 1 | 5201 lb | 0.42 | 9 ft | 1573 lb | 60 in. | 1 | 2087 lb | 0.75 | D1 | 2175 lb | 967 lb | 6774 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.0 ft | 100 plf | 2.0 ft | 3 ft | 1400 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.66 | 1450 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2175 lb | 0.68 | 1 | 5201 lb | 0.42 | 14 ft | 4715 lb | 60 in. | 2 | 5786 lb | 0.81 | D1 | 2175 lb | 967 lb | 9916 lb |

REVIEWED **C1 - 3'-8" Upset**

| | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 4 ft | 140 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.10 | 151 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.09 | 0 | 0 lb | NA | 9 ft | 403 lb | 60 in. | 1 | 2087 lb | 0.19 | | 303 lb | 101 lb | 403 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 4 ft | 1113 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.78 | 1239 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.72 | 0 | 0 lb | NA | 9 ft | 3708 lb | 60 in. | 2 | 10731 lb | 0.35 | D2 | 2478 lb | 826 lb | 3708 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 4 ft | 1113 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.78 | 1239 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.72 | 0 | 0 lb | NA | 9 ft | 7012 lb | 60 in. | 2 | 10731 lb | 0.65 | D2 | 2478 lb | 826 lb | 7012 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 4 ft | 1113 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.78 | 1239 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.72 | 0 | 0 lb | NA | 14 ft | 10316 lb | 60 in. | 4 | 12720 lb | 0.81 | D2 | 2478 lb | 826 lb | 10316 lb |

REVIEWED **C1 - 2'-10" + 3'-8" Upset - Shared Jamb**

| | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 3 ft | 170 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.08 | 175 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.08 | 0 | 0 lb | NA | 9 ft | 564 lb | 60 in. | 1 | 2087 lb | 0.27 | | 564 lb | 0 lb | 564 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 3 ft | 1450 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.69 | 1502 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.70 | 0 | 0 lb | NA | 9 ft | 5295 lb | 60 in. | 2 | 10731 lb | 0.49 | | 4731 lb | 0 lb | 5295 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 3 ft | 1450 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.69 | 1502 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.70 | 0 | 0 lb | NA | 9 ft | 9949 lb | 60 in. | 3 | 15501 lb | 0.64 | | 4653 lb | 0 lb | 9949 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 3 ft | 1450 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.69 | 1502 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.70 | 0 | 0 lb | NA | 14 ft | 14602 lb | 60 in. | 5 | 16247 lb | 0.90 | | 4653 lb | 0 lb | 14602 lb |

REVIEWED **C1 - 2'-10" Supporting Upset**

| | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 3 ft | 170 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.08 | 175 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 262 lb | 0.08 | 1 | 5201 lb | 0.05 | 9 ft | 116 lb | 60 in. | 1 | 2087 lb | 0.06 | | 262 lb | 116 lb | 378 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 10.5 ft | 100 plf | 2.0 ft | 3 ft | 1150 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.55 | 1190 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1786 lb | 0.56 | 1 | 5201 lb | 0.34 | 9 ft | 794 lb | 60 in. | 1 | 2087 lb | 0.38 | D1 | 1786 lb | 794 lb | 2958 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 10.5 ft | 100 plf | 2.0 ft | 3 ft | 1150 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.55 | 1190 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1786 lb | 0.56 | 1 | 5201 lb | 0.34 | 9 ft | 794 lb | 60 in. | 1 | 2087 lb | 0.38 | D1 | 1786 lb | 794 lb | 5537 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 10.5 ft | 100 plf | 2.0 ft | 3 ft | 1150 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.55 | 1190 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1786 lb | 0.56 | 1 | 5201 lb | 0.34 | 14 ft | 2915 lb | 60 in. | 2 | 5786 lb | 0.50 | D1 | 1786 lb | 794 lb | 8116 lb |

REVIEWED **C3 - 2'-10"**

| | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 3 ft | 170 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.08 | 175 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 262 lb | 0.08 | 1 | 5201 lb | 0.05 | 9 ft | 116 lb | 60 in. | 1 | 2087 lb | 0.06 | | 262 lb | 116 lb | 378 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 11.5 ft | 100 plf | 2.0 ft | 3 ft | 1250 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.59 | 1294 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1941 lb | 0.60 | 1 | 5201 lb | 0.37 | 9 ft | 863 lb | 60 in. | 1 | 2087 lb | 0.41 | D1 | 1941 lb | 863 lb | 3183 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 11.5 ft | 100 plf | 2.0 ft | 3 ft | 1250 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.59 | 1294 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1941 lb | 0.60 | 1 | 5201 lb | 0.37 | 9 ft | 863 lb | 60 in. | 1 | 2087 lb | 0.41 | D1 | 1941 lb | 863 lb | 5987 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 11.5 ft | 100 plf | 2.0 ft | 3 ft | 1250 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.59 | 1294 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1941 lb | 0.60 | 1 | 5201 lb | 0.37 | 14 ft | 3590 lb | 60 in. | 2 | 5786 lb | 0.62 | D1 | 1941 lb | 863 lb | 8791 lb |

REVIEWED **C3 - 3'-8" Upset**

| | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 4 ft | 140 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.10 | 151 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.09 | 0 | 0 lb | NA | 9 ft | 403 lb | 60 in. | 1 | 2087 lb | 0.19 | | 303 lb | 101 lb | 403 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 11.5 ft | 100 plf | 2.0 ft | 4 ft | 963 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.67 | 1070 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.62 | 0 | 0 lb | NA | 9 ft | 3258 lb | 60 in. | 3 | 15501 lb | 0.21 | D2 | 2141 lb | 714 lb | 3258 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 11.5 ft | 100 plf | 2.0 ft | 4 ft | 963 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.67 | 1070 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.62 | 0 | 0 lb | NA | 9 ft | 6112 lb | 60 in. | 3 | 15501 lb | 0.39 | D2 | 2141 lb | 714 lb | 6112 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 11.5 ft | 100 plf | 2.0 ft | 4 ft | 963 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.67 | 1070 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.62 | 0 | 0 lb | NA | 14 ft | 8966 lb | 60 in. | 4 | 12720 lb | 0.70 | D2 | 2141 lb | 714 lb | 8966 lb |

REVIEWED **C5 - 2'-10"**

| | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 3 ft | 170 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.08 | 175 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 262 lb | 0.08 | 1 | 5201 lb | 0.05 | 9 ft | 116 lb | 60 in. | 1 | 2087 lb | 0.06 | | 262 lb | 116 lb | 378 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 14.5 ft | 100 plf | 2.0 ft | 3 ft | 1550 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.73 | 1606 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2409 lb | 0.75 | 1 | 5201 lb | 0.46 | 9 ft | 1071 lb | 60 in. | 2 | 10731 lb | 0.10 | D2 | 2409 lb | 1071 lb | 3858 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 14.5 ft | 100 plf | 2.0 ft | 3 ft | 1550 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.73 | 1606 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2409 lb | 0.75 | 1 | 5201 lb | 0.46 | 9 ft | 2136 lb | 60 in. | 2 | 10731 lb | 0.20 | D2 | 2409 lb | 1071 lb | 7337 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 14.5 ft | 100 plf | 2.0 ft | 3 ft | 1550 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.73 | 1606 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2409 lb | 0.75 | 1 | 5201 lb | 0.46 | 14 ft | 5615 lb | 60 in. | 3 | 9227 lb | 0.61 | D2 | 2409 lb | 1071 lb | 10816 lb |

REVIEWED **C5 - 2'-10"**

| | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 3 ft | 170 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.08 | 175 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 262 lb | 0.08 | 1 | 5201 lb | 0.05 | 9 ft | 116 lb | 60 in. | 1 | 2087 lb | 0.06 | | 262 lb | 116 lb | 378 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 14.5 ft | 100 plf | 2.0 ft | 3 ft | 1550 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.73 | 1606 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2409 lb | 0.75 | 1 | 5201 lb | 0.46 | 9 ft | 1071 lb | 60 in. | 1 | 2087 lb | 0.51 | D2 | 2409 lb | 1071 lb | 3858 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 14.5 ft | 100 plf | 2.0 ft | 3 ft | 1550 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.73 | 1606 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2409 lb | 0.75 | 1 | 5201 lb | 0.46 | 9 ft | 2136 lb | 60 in. | 2 | 10731 lb | 0.20 | D2 | 2409 lb | 1071 lb | 7337 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 14.5 ft | 100 plf | 2.0 ft | 3 ft | 1550 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.73 | 1606 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2409 lb | 0.75 | 1 | 5201 lb | 0.46 | 14 ft | 5615 lb | 60 in. | 3 | 9227 lb | 0.61 | D2 | 2409 lb | 1071 lb | 10816 lb |

REVIEWED **C5 - 3'-8" Upset**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 4 ft | 140 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.10 | 151 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.09 | 0 | 0 lb | NA | 9 ft | 403 lb | 60 in. | 1 | 2087 lb | 0.19 | | 303 lb | 101 lb | 403 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 14.5 ft | 100 plf | 2.0 ft | 4 ft | 1188 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.83 | 1323 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.76 | 0 | 0 lb | NA | 9 ft | 3933 lb | 60 in. | 2 | 10731 lb | 0.37 | D4 | 2647 lb | 882 lb | 3933 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 14.5 ft | 100 plf | 2.0 ft | 4 ft | 1188 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.83 | 1323 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.76 | 0 | 0 lb | NA | 9 ft | 7462 lb | 60 in. | 2 | 10731 lb | 0.70 | D4 | 2647 lb | 882 lb | 7462 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 14.5 ft | 100 plf | 2.0 ft | 4 ft | 1188 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.83 | 1323 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.76 | 0 | 0 lb | NA | 14 ft | 10991 lb | 60 in. | 4 | 12720 lb | 0.86 | D4 | 2647 lb | 882 lb | 10991 lb |

REVIEWED **C5 - 2'-10" + 3'-8" Upset - Shared Jamb**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 3 ft | 170 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.08 | 175 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.08 | 0 | 0 lb | NA | 9 ft | 564 lb | 60 in. | 1 | 2087 lb | 0.27 | | 564 lb | 0 lb | 564 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 14.5 ft | 100 plf | 2.0 ft | 3 ft | 1550 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.73 | 1606 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.75 | 0 | 0 lb | NA | 9 ft | 5620 lb | 60 in. | 3 | 15501 lb | 0.36 | D4 | 5056 lb | 0 lb | 5620 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 14.5 ft | 100 plf | 2.0 ft | 3 ft | 1550 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.73 | 1606 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.75 | 0 | 0 lb | NA | 9 ft | 10675 lb | 60 in. | 3 | 15501 lb | 0.69 | D4 | 5056 lb | 0 lb | 10675 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 14.5 ft | 100 plf | 2.0 ft | 3 ft | 1550 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.73 | 1606 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.75 | 0 | 0 lb | NA | 14 ft | 15731 lb | 60 in. | 5 | 16247 lb | 0.97 | D4 | 5056 lb | 0 lb | 15731 lb |

REVIEWED **D3 - 2'-10"**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 17.5 ft | 50 plf | 2.0 ft | 3 ft | 1100 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.52 | 1140 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1711 lb | 0.53 | 1 | 5201 lb | 0.33 | 9 ft | 760 lb | 60 in. | 1 | 2087 lb | 0.36 | | 1711 lb | 760 lb | 2471 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 7.0 ft | 100 plf | 2.0 ft | 3 ft | 800 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.38 | 827 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1240 lb | 0.39 | 1 | 5201 lb | 0.24 | 9 ft | 551 lb | 60 in. | 1 | 2087 lb | 0.26 | D1 | 1240 lb | 551 lb | 4263 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 7.0 ft | 100 plf | 2.0 ft | 3 ft | 800 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.38 | 827 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1240 lb | 0.39 | 1 | 5201 lb | 0.24 | 9 ft | 853 lb | 60 in. | 1 | 2087 lb | 0.41 | D1 | 1240 lb | 551 lb | 6054 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 7.0 ft | 100 plf | 2.0 ft | 3 ft | 800 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.38 | 827 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1240 lb | 0.39 | 1 | 5201 lb | 0.24 | 14 ft | 2645 lb | 60 in. | 2 | 5786 lb | 0.46 | D1 | 1240 lb | 551 lb | 7846 lb |

REVIEWED **D3 - 2'-10"2**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 13.0 ft | 50 plf | 2.0 ft | 3 ft | 830 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.39 | 860 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1290 lb | 0.40 | 1 | 5201 lb | 0.25 | 9 ft | 573 lb | 60 in. | 1 | 2087 lb | 0.27 | | 1290 lb | 573 lb | 1863 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.5 ft | 100 plf | 2.0 ft | 3 ft | 1850 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.88 | 1917 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2876 lb | 0.89 | 1 | 5201 lb | 0.55 | 9 ft | 1278 lb | 60 in. | 2 | 10731 lb | 0.12 | D2 | 2876 lb | 1278 lb | 6018 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.5 ft | 100 plf | 2.0 ft | 3 ft | 1850 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.88 | 1917 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2876 lb | 0.89 | 1 | 5201 lb | 0.55 | 9 ft | 4971 lb | 60 in. | 2 | 10731 lb | 0.46 | D2 | 2876 lb | 1278 lb | 10172 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.5 ft | 100 plf | 2.0 ft | 3 ft | 1850 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.88 | 1917 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2876 lb | 0.89 | 1 | 5201 lb | 0.55 | 14 ft | 9125 lb | 60 in. | 3 | 9227 lb | 0.99 | D2 | 2876 lb | 1278 lb | 14326 lb |

REVIEWED ***D3 - 16'-0"**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 17.5 ft | 50 plf | 2.0 ft | 16 ft | 838 plf | 3 LVL | 18 | LVL | Span | 1734 plf | 0.48 | 868 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 2.16 | 0 | 0 lb | NA | 9 ft | 0 lb | 60 in. | 1 | 2158 lb | 0.00 | | 0 lb | 0 lb | 0 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 7.0 ft | 100 plf | 2.0 ft | 16 ft | 625 plf | 3 LVL | 18 | LVL | Span | 1734 plf | 0.36 | 645 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.61 | 0 | 0 lb | NA | 9 ft | 9000 lb | 60 in. | 3 | 15501 lb | 0.58 | D1 | 9000 lb | 0 lb | 9000 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 7.0 ft | 100 plf | 2.0 ft | 16 ft | 625 plf | 3 LVL | 18 | LVL | Span | 1734 plf | 0.36 | 645 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.61 | 0 | 0 lb | NA | 9 ft | 18000 lb | 60 in. | 4 | 20271 lb | 0.89 | D1 | 9000 lb | 0 lb | 18000 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 7.0 ft | 100 plf | 2.0 ft | 16 ft | 625 plf | 3 LVL | 18 | LVL | Span | 1734 plf | 0.36 | 645 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.61 | 0 | 0 lb | NA | 14 ft | 27000 lb | 60 in. | 5.25x7 | 59312 lb | 0.46 | D1 | 9000 lb | 0 lb | 27000 lb |

*Refer to Forte Calcs for Beam Design

REVIEWED **D4 - 2'-8"**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 16.0 ft | 50 plf | 2.0 ft | 3 ft | 1010 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.48 | 1047 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1570 lb | 0.49 | 1 | 5201 lb | 0.30 | 9 ft | 698 lb | 60 in. | 1 | 2087 lb | 0.33 | | 1570 lb | 698 lb | 2268 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 8.5 ft | 100 plf | 2.0 ft | 3 ft | 950 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.45 | 983 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1474 lb | 0.46 | 1 | 5201 lb | 0.28 | 9 ft | 655 lb | 60 in. | 1 | 2087 lb | 0.31 | D1 | 1474 lb | 655 lb | 4398 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 8.5 ft | 100 plf | 2.0 ft | 3 ft | 950 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.45 | 983 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1474 lb | 0.46 | 1 | 5201 lb | 0.28 | 9 ft | 1326 lb | 60 in. | 1 | 2087 lb | 0.64 | D1 | 1474 lb | 655 lb | 6527 lb |

REVIEWED **D4 - 3'-4" Upset**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 4 ft | 140 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.10 | 151 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.09 | 0 | 0 lb | NA | 9 ft | 403 lb | 60 in. | 1 | 2087 lb | 0.19 | | 303 lb | 101 lb | 403 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 16.0 ft | 100 plf | 2.0 ft | 4 ft | 1300 plf | (3) 2x | 2 x 10 | No. 2 | Span | 2018 plf | 0.64 | 1450 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.84 | 0 | 0 lb | NA | 9 ft | 4270 lb | 60 in. | 2 | 10731 lb | 0.40 | E3 | 2900 lb | 967 lb | 4270 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 16.0 ft | 100 plf | 2.0 ft | 4 ft | 1300 plf | (3) 2x | 2 x 10 | No. 2 | Span | 2018 plf | 0.64 | 1450 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.84 | 0 | 0 lb | NA | 9 ft | 8137 lb | 60 in. | 2 | 10731 lb | 0.76 | E3 | 2900 lb | 967 lb | 8137 lb |

REVIEWED **D4 - 5'-0" Upset**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 6.0 ft | 50 plf | 2.0 ft | 5 ft | 374 plf | (3) 2x | 2 x 8 | No. 2 | Span | 915 plf | 0.41 | 391 plf | No. 2 | 2x6 | Interior | 20 plf | 16 in. oc | 8 ft | 0 lb | 0.30 | 0 | 0 lb | NA | 9 ft | 1238 lb | 60 in. | 2 | 10731 lb | 0.12 | GT | 978 lb | 261 lb | 1238 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 16.5 ft | 100 plf | 2.0 ft | 5 ft | 1585 plf | (3) 2x | 2 x 12 | No. 2 | Span | 1833 plf | 0.86 | 1663 plf | No. 2 | 2x6 | Interior | 20 plf | 16 in. oc | 8 ft | 0 lb | 1.28 | 0 | 0 lb | NA | 9 ft | 6505 lb | 60 in. | 3 | 15501 lb | 0.42 | F1 | 4158 lb | 1109 lb | 6505 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 16.5 ft | 100 plf | 2.0 ft | 5 ft | 1585 plf | (3) 2x | 2 x 12 | No. 2 | Span | 1833 plf | 0.86 | 1663 plf | No. 2 | 2x6 | Interior | 20 plf | 16 in. oc | 8 ft | 0 lb | 1.28 | 0 | 0 lb | NA | 9 ft | 11772 lb | 60 in. | 3 | 15501 lb | 0.76 | F1 | 4158 lb | 1109 lb | 11772 lb |

REVIEWED **D5 - 3'-4" Upset**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 4 ft | 140 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.10 | 151 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.09 | 0 | 0 lb | NA | 9 ft | 403 lb | 60 in. | 1 | 2158 lb | 0.19 | | 303 lb | 101 lb | 403 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.5 ft | 100 plf | 2.0 ft | 4 ft | 1413 plf | (3) 2x | 2 x 10 | No. 2 | Span | 2018 plf | 0.70 | 1577 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.91 | 0 | 0 lb | NA | 9 ft | 4608 lb | 60 in. | 2 | 10731 lb | 0.43 | E3 | 3153 lb | 1051 lb | 4608 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.5 ft | 100 plf | 2.0 ft | 4 ft | 1413 plf | (3) 2x | 2 x 10 | No. 2 | Span | 2018 plf | 0.70 | 1577 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.91 | 0 | 0 lb | NA | 9 ft | 8812 lb | 60 in. | 2 | 10731 lb | 0.82 | E3 | 3153 lb | 1051 lb | 8812 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.5 ft | 100 plf | 2.0 ft | 3 ft | 1850 plf | (3) 2x | 2 x 10 | No. 2 | Span | 2691 plf | 0.69 | 1917 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.89 | 0 | 0 lb | NA | 14 ft | 12966 lb | 60 in. | 5 | 17091 lb | 0.76 | E3 | 2876 lb | 1278 lb | 12966 lb |

NEEDS REVIEW **D5 - 6'-6" Upset 2x6 Jamb**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 7 ft | 153 plf | (3) 2x | 2 x 8 | No. 2 | Span | 466 plf | 0.33 | 158 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.17 | 0 | 0 lb | NA | 9 ft | 658 lb | 60 in. | 1 | 2158 lb | 0.31 | | 553 lb | 105 lb | 658 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.0 ft | 100 plf | 2.0 ft | 7 ft | 1557 plf | 3 LVL | 7.25 | LVL | Span | 1733 plf | 0.90 | 1630 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.75 | 0 | 0 lb | NA | 9 ft | 7450 lb | 60 in. | 3 | 15501 lb | 0.48 | J3 | 5705 lb | 1087 lb | 7450 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.0 ft | 100 plf | 2.0 ft | 7 ft | 1557 plf | 3 LVL | 7.25 | LVL | Span | 1733 plf | 0.90 | 1630 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.75 | 0 | 0 lb | NA | 9 ft | 14242 lb | 60 in. | 5 | 25040 lb | 0.57 | J3 | 5705 lb | 1087 lb | 14242 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.0 ft | 100 plf | 2.0 ft | 7 ft | 1557 plf | 3 LVL | 7.25 | LVL | Span | 1733 plf | 0.90 | 1630 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.75 | 0 | 0 lb | NA | 14 ft | 21033 lb | 60 in. | 5 | 17091 lb | 1.23 | J3 | 5705 lb | 1087 lb | 21033 lb |

REVIEWED **D5 - 9'-0" Upset**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 9 ft | 150 plf | (3) 2x | 2 x 8 | No. 2 | Span | 282 plf | 0.53 | 155 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.22 | 0 | 0 lb | NA | 9 ft | 798 lb | 60 in. | 1 | 2158 lb | 0.37 | | 695 lb | 103 lb | 798 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.0 ft | 100 plf | 2.0 ft | 9 ft | 1517 plf | 3 LVL | 11.25 | LVL | Span | 2363 plf | 0.64 | 1581 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 2.20 | 0 | 0 lb | NA | 9 ft | 8965 lb | 60 in. | 3 | 15501 lb | 0.58 | N2 | 7113 lb | 1054 lb | 8965 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.0 ft | 100 plf | 2.0 ft | 9 ft | 1517 plf | 3 LVL | 11.25 | LVL | Span | 2363 plf | 0.64 | 1581 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 2.20 | 0 | 0 lb | NA | 9 ft | 17132 lb | 60 in. | 5 | 25040 lb | 0.68 | N2 | 7113 lb | 1054 lb | 17132 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.0 ft | 100 plf | 2.0 ft | 9 ft | 1517 plf | 3 LVL | 11.25 | LVL | Span | 2363 plf | 0.64 | 1581 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 2.20 | 0 | 0 lb | NA | 14 ft | 25298 lb | 60 in. | 5.25x9.25 | 29000 lb | 0.87 | N2 | 7113 lb | 1054 lb | 25298 lb |

REVIEWED **D10 - 2'-10" Supporting Upset**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | | |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 3 ft | 170 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.08 | 175 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.13 | 1 | 2775 lb | 0.00 | 9 ft | 0 lb | 60 in. | 1 | 552 lb | 0.00 | | 0 lb | 0 lb | 0 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 2.0 ft | 100 plf | 2.0 ft | 3 ft | 300 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.14 | 308 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 1971 lb | 0.23 | 1 | 2775 lb | 0.71 | 9 ft | 0 lb | 60 in. | 2 | 3598 lb | 0.00 | E3 | 1971 lb | 0 lb | 1971 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 2.0 ft | 100 plf | 2.0 ft | 3 ft | 300 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.14 | 308 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 1971 lb | 0.23 | 1 | 2775 lb | 0.71 | 9 ft | 1167 lb | 60 in. | 2 | 3598 lb | 0.32 | E3 | 1971 lb | 0 lb | 3942 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 2.0 ft | 100 plf | 2.0 ft | 3 ft | 300 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.14 | 308 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 1971 lb | 0.23 | 1 | 2775 lb | 0.71 | 14 ft | 3138 lb | 60 in. | 5 | 3886 lb | 0.81 | E3 | 1971 lb | 0 lb | 5913 lb |

REVIEWED **D11 - 2'-10"**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | | |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 9.5 ft | 50 plf | 2.0 ft | 3 ft | 620 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.29 | 642 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 963 lb | 0.30 | 1 | 5201 lb | 0.19 | 9 ft | 428 lb | 60 in. | 1 | 2087 lb | 0.21 | | 963 lb | 428 lb | 1391 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.0 ft | 100 plf | 2.0 ft | 3 ft | 1400 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.66 | 1450 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2175 lb | 0.68 | 1 | 5201 lb | 0.42 | 9 ft | 967 lb | 60 in. | 1 | 2087 lb | 0.46 | D2 | 2175 lb | 967 lb | 4533 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.0 ft | 100 plf | 2.0 ft | 3 ft | 1400 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.66 | 1450 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2175 lb | 0.68 | 1 | 5201 lb | 0.42 | 9 ft | 2473 lb | 60 in. | 2 | 10731 lb | 0.23 | D2 | 2175 lb | 967 lb | 7674 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.0 ft | 100 plf | 2.0 ft | 3 ft | 1400 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.66 | 1450 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2175 lb | 0.68 | 1 | 5201 lb | 0.42 | 14 ft | 5615 lb | 60 in. | 3 | 9227 lb | 0.61 | D2 | 2175 lb | 967 lb | 10816 lb |

REVIEWED **D11 - 3'-4" Upset**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | | |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 9.5 ft | 50 plf | 2.0 ft | 4 ft | 478 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.33 | 531 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.31 | 0 | 0 lb | NA | 9 ft | 1416 lb | 60 in. | 1 | 2158 lb | 0.66 | | 1062 lb | 354 lb | 1416 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.0 ft | 100 plf | 2.0 ft | 4 ft | 1075 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.75 | 1197 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.69 | 0 | 0 lb | NA | 9 ft | 4608 lb | 60 in. | 2 | 10731 lb | 0.43 | D2 | 2394 lb | 798 lb | 4608 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.0 ft | 100 plf | 2.0 ft | 4 ft | 1075 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.75 | 1197 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.69 | 0 | 0 lb | NA | 9 ft | 7799 lb | 60 in. | 3 | 15501 lb | 0.50 | D2 | 2394 lb | 798 lb | 7799 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.0 ft | 100 plf | 2.0 ft | 4 ft | 1075 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.75 | 1197 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.69 | 0 | 0 lb | NA | 14 ft | 10991 lb | 60 in. | 4 | 13484 lb | 0.82 | D2 | 2394 lb | 798 lb | 10991 lb |

REVIEWED **D11 - 2'-10" + 3'-8" Upset - Shared Jamb**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | | |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 3 ft | 170 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.08 | 175 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.08 | 0 | 0 lb | NA | 9 ft | 2025 lb | 60 in. | 1 | 2087 lb | 0.97 | | 2025 lb | 0 lb | 2025 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.0 ft | 100 plf | 2.0 ft | 3 ft | 1400 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.66 | 1450 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.68 | 0 | 0 lb | NA | 9 ft | 6594 lb | 60 in. | 2 | 10731 lb | 0.61 | D3 | 4569 lb | 0 lb | 6594 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.0 ft | 100 plf | 2.0 ft | 3 ft | 1400 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.66 | 1450 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.68 | 0 | 0 lb | NA | 9 ft | 11162 lb | 60 in. | 3 | 15501 lb | 0.72 | D3 | 4569 lb | 0 lb | 11162 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.0 ft | 100 plf | 2.0 ft | 3 ft | 1400 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.66 | 1450 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.68 | 0 | 0 lb | NA | 14 ft | 15731 lb | 60 in. | 5 | 16247 lb | 0.97 | D3 | 4569 lb | 0 lb | 15731 lb |

REVIEWED **E - 3'-8" Upset**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | | |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 3 ft | 170 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.08 | 175 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.08 | 0 | 0 lb | NA | 9 ft | 378 lb | 60 in. | 1 | 2087 lb | 0.18 | | 262 lb | 116 lb | 378 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.5 ft | 100 plf | 2.0 ft | 3 ft | 1850 plf | (3) 2x | 2 x 10 | No. 2 | Span | 2691 plf | 0.69 | 1917 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.89 | 0 | 0 lb | NA | 9 ft | 4533 lb | 60 in. | 2 | 10731 lb | 0.42 | E3 | 2876 lb | 1278 lb | 4533 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.5 ft | 100 plf | 2.0 ft | 3 ft | 1850 plf | (3) 2x | 2 x 10 | No. 2 | Span | 2691 plf | 0.69 | 1917 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.89 | 0 | 0 lb | NA | 9 ft | 8687 lb | 60 in. | 2 | 10731 lb | 0.81 | E3 | 2876 lb | 1278 lb | 8687 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.5 ft | 100 plf | 2.0 ft | 3 ft | 1850 plf | (3) 2x | 2 x 10 | No. 2 | Span | 2691 plf | 0.69 | 1917 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.89 | 0 | 0 lb | NA | 14 ft | 12841 lb | 60 in. | 5 | 16247 lb | 0.79 | E3 | 2876 lb | 1278 lb | 12841 lb |

REVIEWED **E - 2'-10"**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | | |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 3 ft | 170 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.08 | 175 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 262 lb | 0.08 | 1 | 5201 lb | 0.05 | 9 ft | 116 lb | 60 in. | 1 | 2087 lb | 0.06 | | 262 lb | 116 lb | 378 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 12.0 ft | 100 plf | 2.0 ft | 3 ft | 1300 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.62 | 1346 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2019 lb | 0.63 | 1 | 5201 lb | 0.39 | 9 ft | 897 lb | 60 in. | 1 | 2087 lb | 0.43 | D1 | 2019 lb | 897 lb | 3295 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 12.0 ft | 100 plf | 2.0 ft | 3 ft | 1300 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.62 | 1346 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2019 lb | 0.63 | 1 | 5201 lb | 0.39 | 9 ft | 1011 lb | 60 in. | 1 | 2087 lb | 0.48 | D1 | 2019 lb | 897 lb | 6212 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 12.0 ft | 100 plf | 2.0 ft | 3 ft | 1300 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.62 | 1346 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2019 lb | 0.63 | 1 | 5201 lb | 0.39 | 14 ft | 3927 lb | 60 in. | 2 | 5786 lb | 0.68 | D1 | 2019 lb | 897 lb | 9128 lb |

REVIEWED **PH7 - 2'-10"**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Header | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | | |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 17.0 ft | 50 plf | 2.0 ft | 3 ft | 1070 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.76 | 1109 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1664 lb | 0.52 | 1 | 5201 lb | 0.32 | 9 ft | 739 lb | 60 in. | 1 | 2087 lb | 0.35 | A1 | 1664 lb | 739 lb | 2403 lb |

**Paragon Star**
Header and Jamb Design - Atop Podium

**Bob D. Campbell & Co.**
7/22/2022

**Level Loadings**

| Type | DL | LL | TL |
|---|---|---|---|
| Balcony (Private) | 55 psf | 60 psf | 115 psf |
| Balcony (Public) | 55 psf | 100 psf | 155 psf |
| Floor (Private) | 35 psf | 40 psf | 75 psf |
| Floor (Public) | 35 psf | 100 psf | 135 psf |
| Roof (Flat) | 25 psf | 20 psf | 45 psf |
| Roof (Sloped) | 25 psf | 20 psf | 45 psf |
| Roof (MECH) | 25 psf | 45 psf | 70 psf |
| Storage | 35 psf | 125 psf | 160 psf |

| Header Grade | Fb |
|---|---|
| Stud | 700 |
| No. 2 | 900 |
| No. 1 | 1000 |
| LVL | 2600 |
| PSL | 2900 |

| Jamb Grade | Fc |
|---|---|
| Stud | 850 |
| No. 2 | 1350 |
| No. 1 | 1500 |
| Sel. Struct. | 1700 |

TL Deflection Criteria L/ 360
Interior WL 5 psf
Exterior WL 20 psf

**Note: Jack Studs assumed to be braced at 24"oc (weak axis) and L = Stud Height - 1 ft**

**Notes:**
-Refer to ' Wood Header and Jamb Design Key' for member locations
- *Refer to Forte Calculations for beam/header design on where specified

| Header Species: | Southern Yellow Pine | | |
|---|---|---|---|
| Size | $F_b$ | | |
| | DF | SYP | Ratio |
| 2x4 | 1350 | 1100 | 81.5% |
| 2x6 | 1170 | 1000 | 85.5% |
| 2x8 | 1080 | 925 | 85.6% |
| 2x10 | 990 | 800 | 80.8% |
| 2x12 | 900 | 750 | 83.3% |

| Jamb Species: | Southern Yellow Pine | | |
|---|---|---|---|
| Size | $F_c$ | | |
| | DF | SYP | Ratio |
| 2x4 | 1552 | 1450 | 93.4% |
| 2x6 | 1485 | 1400 | 94.3% |
| 2x8 | 1417 | 1350 | 95.3% |
| 2x10 | 1350 | 1300 | 96.3% |
| 2x12 | 1350 | 1250 | 92.6% |

**Exterior**

REVIEWED **3'-0" - Roof Brg + Balc**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Header Length | Header WTTL | Header Type | Header Size | Header Grade | Header Lu | Header WAllow | Header Unity | Jamb Size WTTL | Jamb Size Grade | Jamb Size | Jamb Size Int or Ext | Jamb Size WL | Jamb Size Stud Spcg | Jack HT | Jack Pactual | Jack BRG W Req'd | Jack | Jack Pallow | Jack Unity | King HT | King Pactual | King Lu | King | King Pallow | King Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 15.0 ft | 50 plf | 2.0 ft | 3 ft | 950 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.45 | 985 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 1477 lb | 0.46 | 1 | 5201 lb | 0.28 | 9 ft | 656 lb | 60 in. | 1 | 1639 lb | 0.40 | D1 | 1477 lb | 656 lb | 2133 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.5 ft | 175 plf | 2.0 ft | 3 ft | 712 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.34 | 732 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 1098 lb | 0.34 | 1 | 5201 lb | 0.21 | 9 ft | 488 lb | 60 in. | 1 | 1639 lb | 0.30 | D1 | 1098 lb | 488 lb | 3720 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.5 ft | 175 plf | 2.0 ft | 3 ft | 712 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.34 | 732 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 1098 lb | 0.34 | 1 | 5201 lb | 0.21 | 9 ft | 488 lb | 60 in. | 1 | 1639 lb | 0.30 | D1 | 1098 lb | 488 lb | 5307 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.5 ft | 175 plf | 2.0 ft | 3 ft | 712 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.34 | 732 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 1098 lb | 0.34 | 1 | 5201 lb | 0.21 | 9 ft | 1692 lb | 60 in. | 2 | 10731 lb | 0.16 | D1 | 1098 lb | 488 lb | 6893 lb |

REVIEWED **3'-0" - Floor Brg (C4)**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Header Length | Header WTTL | Header Type | Header Size | Header Grade | Header Lu | Header WAllow | Header Unity | Jamb Size WTTL | Jamb Size Grade | Jamb Size | Jamb Size Int or Ext | Jamb Size WL | Jamb Size Stud Spcg | Jack HT | Jack Pactual | Jack BRG W Req'd | Jack | Jack Pallow | Jack Unity | King HT | King Pactual | King Lu | King | King Pallow | King Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 4.0 ft | 50 plf | 2.0 ft | 3 ft | 290 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.14 | 299 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 449 lb | 0.14 | 1 | 5201 lb | 0.09 | 9 ft | 199 lb | 60 in. | 1 | 1639 lb | 0.12 | E1 | 449 lb | 199 lb | 648 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 1.0 ft | 625 plf | 2.0 ft | 3 ft | 778 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.37 | 784 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 1176 lb | 0.38 | 1 | 5201 lb | 0.23 | 9 ft | 523 lb | 60 in. | 1 | 1639 lb | 0.32 | D1 | 1176 lb | 523 lb | 2348 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 1.0 ft | 625 plf | 2.0 ft | 3 ft | 778 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.37 | 784 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 1176 lb | 0.38 | 1 | 5201 lb | 0.23 | 9 ft | 523 lb | 60 in. | 1 | 1639 lb | 0.32 | D1 | 1176 lb | 523 lb | 4047 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 1.0 ft | 625 plf | 2.0 ft | 3 ft | 778 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.37 | 784 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 1176 lb | 0.38 | 1 | 5201 lb | 0.23 | 9 ft | 545 lb | 60 in. | 2 | 10731 lb | 0.05 | D1 | 1176 lb | 523 lb | 5746 lb |

REVIEWED **3'-0" - Roof + Floor + Balc (D3)**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Header Length | Header WTTL | Header Type | Header Size | Header Grade | Header Lu | Header WAllow | Header Unity | Jamb Size WTTL | Jamb Size Grade | Jamb Size | Jamb Size Int or Ext | Jamb Size WL | Jamb Size Stud Spcg | Jack HT | Jack Pactual | Jack BRG W Req'd | Jack | Jack Pallow | Jack Unity | King HT | King Pactual | King Lu | King | King Pallow | King Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 6.0 ft | 50 plf | 2.0 ft | 3 ft | 410 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.19 | 424 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 636 lb | 0.20 | 1 | 5201 lb | 0.12 | 9 ft | 283 lb | 60 in. | 1 | 1639 lb | 0.17 | D2 | 636 lb | 283 lb | 918 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 2.5 ft | 1075 plf | 2.0 ft | 3 ft | 1458 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.69 | 1473 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 2210 lb | 0.70 | 1 | 5201 lb | 0.42 | 9 ft | 982 lb | 60 in. | 2 | 10731 lb | 0.09 | D2 | 2210 lb | 982 lb | 4110 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 2.5 ft | 1075 plf | 2.0 ft | 3 ft | 1458 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.69 | 1473 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 2210 lb | 0.70 | 1 | 5201 lb | 0.42 | 9 ft | 2101 lb | 60 in. | 2 | 10731 lb | 0.20 | D2 | 2210 lb | 982 lb | 7302 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 2.5 ft | 1075 plf | 2.0 ft | 3 ft | 1458 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.69 | 1473 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 2210 lb | 0.70 | 1 | 5201 lb | 0.42 | 9 ft | 5292 lb | 60 in. | 3 | 15501 lb | 0.34 | D2 | 2210 lb | 982 lb | 10493 lb |

REVIEWED **3'-0" - Roof + Floor + Balc (D6)**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Header Length | Header WTTL | Header Type | Header Size | Header Grade | Header Lu | Header WAllow | Header Unity | Jamb Size WTTL | Jamb Size Grade | Jamb Size | Jamb Size Int or Ext | Jamb Size WL | Jamb Size Stud Spcg | Jack HT | Jack Pactual | Jack BRG W Req'd | Jack | Jack Pallow | Jack Unity | King HT | King Pactual | King Lu | King | King Pallow | King Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 6.0 ft | 50 plf | 2.0 ft | 3 ft | 410 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.19 | 424 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 636 lb | 0.20 | 1 | 5201 lb | 0.12 | 9 ft | 283 lb | 60 in. | 1 | 1639 lb | 0.17 | D2 | 636 lb | 283 lb | 918 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.0 ft | 850 plf | 2.0 ft | 3 ft | 1310 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.62 | 1328 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 1992 lb | 0.63 | 1 | 5201 lb | 0.38 | 9 ft | 885 lb | 60 in. | 2 | 10731 lb | 0.08 | D2 | 1992 lb | 885 lb | 3795 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.0 ft | 850 plf | 2.0 ft | 3 ft | 1310 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.62 | 1328 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 1992 lb | 0.63 | 1 | 5201 lb | 0.38 | 9 ft | 1471 lb | 60 in. | 2 | 10731 lb | 0.14 | D2 | 1992 lb | 885 lb | 6672 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.0 ft | 850 plf | 2.0 ft | 3 ft | 1310 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.62 | 1328 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 1992 lb | 0.63 | 1 | 5201 lb | 0.38 | 9 ft | 4347 lb | 60 in. | 3 | 15501 lb | 0.28 | D2 | 1992 lb | 885 lb | 9548 lb |

REVIEWED **3'-0" - Balc + Floor Bearing (E1)**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Header Length | Header WTTL | Header Type | Header Size | Header Grade | Header Lu | Header WAllow | Header Unity | Jamb Size WTTL | Jamb Size Grade | Jamb Size | Jamb Size Int or Ext | Jamb Size WL | Jamb Size Stud Spcg | Jack HT | Jack Pactual | Jack BRG W Req'd | Jack | Jack Pallow | Jack Unity | King HT | King Pactual | King Lu | King | King Pallow | King Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 4.0 ft | 50 plf | 2.0 ft | 3 ft | 290 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.14 | 299 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 449 lb | 0.14 | 1 | 5201 lb | 0.09 | 9 ft | 199 lb | 60 in. | 1 | 1639 lb | 0.12 | E1 | 449 lb | 199 lb | 648 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.0 ft | 663 plf | 2.0 ft | 3 ft | 1123 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.53 | 1140 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 1710 lb | 0.54 | 1 | 5201 lb | 0.33 | 9 ft | 760 lb | 60 in. | 1 | 1639 lb | 0.46 | D1 | 1710 lb | 760 lb | 3119 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.0 ft | 663 plf | 2.0 ft | 3 ft | 1123 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.53 | 1140 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 1710 lb | 0.54 | 1 | 5201 lb | 0.33 | 9 ft | 760 lb | 60 in. | 1 | 1639 lb | 0.46 | D1 | 1710 lb | 760 lb | 5589 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.0 ft | 663 plf | 2.0 ft | 3 ft | 1123 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.53 | 1140 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 1710 lb | 0.54 | 1 | 5201 lb | 0.33 | 9 ft | 2859 lb | 60 in. | 2 | 10731 lb | 0.27 | D1 | 1710 lb | 760 lb | 8060 lb |

REVIEWED **3'-0" - Roof + Floor + Balc Bearing (F1)**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Header Length | Header WTTL | Header Type | Header Size | Header Grade | Header Lu | Header WAllow | Header Unity | Jamb Size WTTL | Jamb Size Grade | Jamb Size | Jamb Size Int or Ext | Jamb Size WL | Jamb Size Stud Spcg | Jack HT | Jack Pactual | Jack BRG W Req'd | Jack | Jack Pallow | Jack Unity | King HT | King Pactual | King Lu | King | King Pallow | King Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 14.0 ft | 50 plf | 2.0 ft | 3 ft | 890 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.42 | 922 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 1383 lb | 0.43 | 1 | 5201 lb | 0.27 | 9 ft | 615 lb | 60 in. | 1 | 1639 lb | 0.38 | D2 | 1383 lb | 615 lb | 1998 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.0 ft | 925 plf | 2.0 ft | 3 ft | 1385 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.66 | 1403 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 2104 lb | 0.67 | 1 | 5201 lb | 0.40 | 9 ft | 935 lb | 60 in. | 1 | 1639 lb | 0.57 | D2 | 2104 lb | 935 lb | 5038 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.0 ft | 925 plf | 2.0 ft | 3 ft | 1385 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.66 | 1403 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 2104 lb | 0.67 | 1 | 5201 lb | 0.40 | 9 ft | 2876 lb | 60 in. | 2 | 10731 lb | 0.27 | D2 | 2104 lb | 935 lb | 8077 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.0 ft | 925 plf | 2.0 ft | 3 ft | 1385 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.66 | 1403 plf | No. 2 | 2x6 | Exterior | 40 plf | 16 in. oc | 8 ft | 2104 lb | 0.67 | 1 | 5201 lb | 0.40 | 9 ft | 5915 lb | 60 in. | 3 | 15501 lb | 0.38 | D2 | 2104 lb | 935 lb | 11116 lb |

REVIEWED **4'-0" - Roof + Floor + Balc Bearing (F1)**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Header Length | Header WTTL | Header Type | Header Size | Header Grade | Header Lu | Header WAllow | Header Unity | Jamb Size WTTL | Jamb Size Grade | Jamb Size | Jamb Size Int or Ext | Jamb Size WL | Jamb Size Stud Spcg | Jack HT | Jack Pactual | Jack BRG W Req'd | Jack | Jack Pallow | Jack Unity | King HT | King Pactual | King Lu | King | King Pallow | King Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 14.0 ft | 50 plf | 2.0 ft | 4 ft | 680 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.48 | 759 plf | No. 2 | 2x6 | Exterior | 50 plf | 16 in. oc | 8 ft | 1518 lb | 0.44 | 1 | 5201 lb | 0.29 | 9 ft | 506 lb | 60 in. | 1 | 1476 lb | 0.34 | D2 | 1518 lb | 506 lb | 2023 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.0 ft | 813 plf | 2.0 ft | 4 ft | 1158 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.81 | 1201 plf | No. 2 | 2x6 | Exterior | 50 plf | 16 in. oc | 8 ft | 2401 lb | 0.74 | 1 | 5201 lb | 0.46 | 9 ft | 800 lb | 60 in. | 1 | 1476 lb | 0.54 | D2 | 2401 lb | 800 lb | 5225 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.0 ft | 813 plf | 2.0 ft | 4 ft | 1158 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.81 | 1201 plf | No. 2 | 2x6 | Exterior | 50 plf | 16 in. oc | 8 ft | 2401 lb | 0.74 | 1 | 5201 lb | 0.46 | 9 ft | 3226 lb | 60 in. | 2 | 10731 lb | 0.30 | D2 | 2401 lb | 800 lb | 8427 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.0 ft | 813 plf | 2.0 ft | 4 ft | 1158 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.81 | 1201 plf | No. 2 | 2x6 | Exterior | 50 plf | 16 in. oc | 8 ft | 2401 lb | 0.74 | 1 | 5201 lb | 0.46 | 9 ft | 6427 lb | 60 in. | 3 | 15501 lb | 0.41 | D2 | 2401 lb | 800 lb | 11628 lb |

REVIEWED **6'-0" - Roof Brg**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Header Length | Header WTTL | Header Type | Header Size | Header Grade | Header Lu | Header WAllow | Header Unity | Jamb Size WTTL | Jamb Size Grade | Jamb Size | Jamb Size Int or Ext | Jamb Size WL | Jamb Size Stud Spcg | Jack HT | Jack Pactual | Jack BRG W Req'd | Jack | Jack Pallow | Jack Unity | King HT | King Pactual | King Lu | King | King Pallow | King Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 21.0 ft | 50 plf | 2.0 ft | 6 ft | 995 plf | (3) 2x | 2 x 12 | No. 2 | Span | 1272 plf | 0.78 | 1081 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 3243 lb | 0.96 | 1 | 5201 lb | 0.62 | 9 ft | 721 lb | 60 in. | 1 | 1111 lb | 0.65 | F1 | 3243 lb | 721 lb | 3963 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 1.0 ft | 100 plf | 2.0 ft | 6 ft | 175 plf | (3) 2x | 2 x 8 | No. 2 | Span | 635 plf | 0.28 | 182 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 545 lb | 0.17 | 1 | 5201 lb | 0.10 | 9 ft | 121 lb | 60 in. | 1 | 1111 lb | 0.11 | D1 | 545 lb | 121 lb | 4630 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 1.0 ft | 100 plf | 2.0 ft | 6 ft | 175 plf | (3) 2x | 2 x 8 | No. 2 | Span | 635 plf | 0.28 | 182 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 545 lb | 0.17 | 1 | 5201 lb | 0.10 | 9 ft | 121 lb | 60 in. | 1 | 1111 lb | 0.11 | D1 | 545 lb | 121 lb | 5297 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 1.0 ft | 100 plf | 2.0 ft | 6 ft | 175 plf | (3) 2x | 2 x 8 | No. 2 | Span | 635 plf | 0.28 | 182 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 545 lb | 0.17 | 1 | 5201 lb | 0.10 | 9 ft | 762 lb | 60 in. | 2 | 9734 lb | 0.08 | D1 | 545 lb | 121 lb | 5963 lb |

REVIEWED **6'-0" - Floor Brg**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Header Length | Header WTTL | Header Type | Header Size | Header Grade | Header Lu | Header WAllow | Header Unity | Jamb Size WTTL | Jamb Size Grade | Jamb Size | Jamb Size Int or Ext | Jamb Size WL | Jamb Size Stud Spcg | Jack HT | Jack Pactual | Jack BRG W Req'd | Jack | Jack Pallow | Jack Unity | King HT | King Pactual | King Lu | King | King Pallow | King Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 6 ft | 140 plf | (3) 2x | 2 x 8 | No. 2 | Span | 635 plf | 0.22 | 148 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 445 lb | 0.14 | 1 | 5201 lb | 0.09 | 9 ft | 99 lb | 60 in. | 1 | 1111 lb | 0.09 | D1 | 445 lb | 99 lb | 543 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 7.0 ft | 100 plf | 2.0 ft | 6 ft | 625 plf | (3) 2x | 2 x 10 | No. 2 | Span | 946 plf | 0.66 | 673 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 2018 lb | 0.60 | 1 | 5201 lb | 0.39 | 9 ft | 448 lb | 60 in. | 1 | 1111 lb | 0.40 | E1 | 2018 lb | 448 lb | 3010 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 7.0 ft | 100 plf | 2.0 ft | 6 ft | 625 plf | (3) 2x | 2 x 10 | No. 2 | Span | 946 plf | 0.66 | 673 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 2018 lb | 0.60 | 1 | 5201 lb | 0.39 | 9 ft | 448 lb | 60 in. | 1 | 1111 lb | 0.40 | E1 | 2018 lb | 448 lb | 5477 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 7.0 ft | 100 plf | 2.0 ft | 6 ft | 625 plf | (3) 2x | 2 x 10 | No. 2 | Span | 946 plf | 0.66 | 673 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 2018 lb | 0.60 | 1 | 5201 lb | 0.39 | 9 ft | 2742 lb | 60 in. | 2 | 9734 lb | 0.28 | E1 | 2018 lb | 448 lb | 7943 lb |

REVIEWED **6'-0" - Floor Brg (C10)**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 6 ft | 140 plf | (3) 2x | 2 x 8 | No. 2 | Span | 635 plf | 0.22 | 148 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 445 lb | 0.14 | 1 | 5201 lb | 0.09 | 9 ft | 99 lb | 60 in. | 1 | 1111 lb | 0.09 | D1 | 445 lb | 99 lb | 543 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 12.0 ft | 100 plf | 2.0 ft | 6 ft | 1000 plf | (3) 2x | 2 x 12 | No. 2 | Span | 1272 plf | 0.79 | 1082 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 3245 lb | 0.97 | 1 | 5201 lb | 0.62 | 9 ft | 721 lb | 60 in. | 1 | 1111 lb | 0.65 | F1 | 3245 lb | 721 lb | 4510 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 12.0 ft | 100 plf | 2.0 ft | 6 ft | 1000 plf | (3) 2x | 2 x 12 | No. 2 | Span | 1272 plf | 0.79 | 1082 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 3245 lb | 0.97 | 1 | 5201 lb | 0.62 | 9 ft | 3276 lb | 60 in. | 2 | 9734 lb | 0.34 | F1 | 3245 lb | 721 lb | 8477 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 12.0 ft | 100 plf | 2.0 ft | 6 ft | 1000 plf | (3) 2x | 2 x 12 | No. 2 | Span | 1272 plf | 0.79 | 1082 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 3245 lb | 0.97 | 1 | 5201 lb | 0.62 | 9 ft | 7242 lb | 60 in. | 2 | 9734 lb | 0.74 | F1 | 3245 lb | 721 lb | 12443 lb |

REVIEWED **6'-0" - Roof Brg + Balc (D7)**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 15.0 ft | 50 plf | 2.0 ft | 6 ft | 725 plf | 3 LVL | 7.25 | No. 2 | Span | 1907 plf | 0.38 | 786 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 4323 lb | 0.70 | 1 | 5201 lb | 0.83 | 9 ft | 524 lb | 60 in. | 1 | 1111 lb | 0.47 | J1 | 4323 lb | 524 lb | 4847 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.0 ft | 175 plf | 2.0 ft | 6 ft | 520 plf | (3) 2x | 2 x 8 | No. 2 | Span | 635 plf | 0.82 | 551 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 1654 lb | 0.50 | 1 | 5201 lb | 0.32 | 9 ft | 1668 lb | 60 in. | 2 | 9734 lb | 0.17 | D2 | 1654 lb | 368 lb | 6869 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.0 ft | 175 plf | 2.0 ft | 6 ft | 520 plf | (3) 2x | 2 x 8 | No. 2 | Span | 635 plf | 0.82 | 551 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 1654 lb | 0.50 | 1 | 5201 lb | 0.32 | 9 ft | 3690 lb | 60 in. | 2 | 9734 lb | 0.38 | D2 | 1654 lb | 368 lb | 8891 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.0 ft | 175 plf | 2.0 ft | 6 ft | 520 plf | (3) 2x | 2 x 8 | No. 2 | Span | 635 plf | 0.82 | 551 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 1654 lb | 0.50 | 1 | 5201 lb | 0.32 | 9 ft | 5711 lb | 60 in. | 3 | 15501 lb | 0.37 | D2 | 1654 lb | 368 lb | 10912 lb |

REVIEWED **6'-0" - Floor Brg (E1)**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 4.0 ft | 50 plf | 2.0 ft | 6 ft | 230 plf | (3) 2x | 2 x 8 | No. 2 | Span | 635 plf | 0.36 | 246 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 739 lb | 0.22 | 1 | 5201 lb | 0.14 | 9 ft | 164 lb | 60 in. | 1 | 1111 lb | 0.15 | E1 | 739 lb | 164 lb | 903 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 5.5 ft | 100 plf | 2.0 ft | 6 ft | 513 plf | (3) 2x | 2 x 10 | No. 2 | Span | 946 plf | 0.54 | 550 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 1650 lb | 0.49 | 1 | 5201 lb | 0.32 | 9 ft | 367 lb | 60 in. | 1 | 1111 lb | 0.33 | E1 | 1650 lb | 367 lb | 2920 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 5.5 ft | 100 plf | 2.0 ft | 6 ft | 513 plf | (3) 2x | 2 x 10 | No. 2 | Span | 946 plf | 0.54 | 550 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 1650 lb | 0.49 | 1 | 5201 lb | 0.32 | 9 ft | 367 lb | 60 in. | 1 | 1111 lb | 0.33 | E1 | 1650 lb | 367 lb | 4937 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 5.5 ft | 100 plf | 2.0 ft | 6 ft | 513 plf | (3) 2x | 2 x 10 | No. 2 | Span | 946 plf | 0.54 | 550 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 1650 lb | 0.49 | 1 | 5201 lb | 0.32 | 9 ft | 1752 lb | 60 in. | 2 | 9734 lb | 0.18 | E1 | 1650 lb | 367 lb | 6953 lb |

REVIEWED **6'-0" - Floor Brg (E1)**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 4.0 ft | 50 plf | 2.0 ft | 6 ft | 230 plf | (3) 2x | 2 x 8 | No. 2 | Span | 635 plf | 0.36 | 246 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 739 lb | 0.22 | 1 | 5201 lb | 0.14 | 9 ft | 164 lb | 60 in. | 1 | 1111 lb | 0.15 | E1 | 739 lb | 164 lb | 903 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 5.5 ft | 100 plf | 2.0 ft | 6 ft | 513 plf | (3) 2x | 2 x 10 | No. 2 | Span | 946 plf | 0.54 | 550 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 1650 lb | 0.49 | 1 | 5201 lb | 0.32 | 9 ft | 367 lb | 60 in. | 1 | 1111 lb | 0.33 | E1 | 1650 lb | 367 lb | 2920 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 5.5 ft | 100 plf | 2.0 ft | 6 ft | 513 plf | (3) 2x | 2 x 10 | No. 2 | Span | 946 plf | 0.54 | 550 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 1650 lb | 0.49 | 1 | 5201 lb | 0.32 | 9 ft | 367 lb | 60 in. | 1 | 1111 lb | 0.33 | E1 | 1650 lb | 367 lb | 4937 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 5.5 ft | 100 plf | 2.0 ft | 6 ft | 513 plf | (3) 2x | 2 x 10 | No. 2 | Span | 946 plf | 0.54 | 550 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 1650 lb | 0.49 | 1 | 5201 lb | 0.32 | 9 ft | 1752 lb | 60 in. | 2 | 9734 lb | 0.18 | E1 | 1650 lb | 367 lb | 6953 lb |

REVIEWED **6'-0" - Roof Brg + Balc**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 15.0 ft | 50 plf | 2.0 ft | 6 ft | 725 plf | (3) 2x | 2 x 10 | No. 2 | Span | 946 plf | 0.77 | 786 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 2359 lb | 0.70 | 1 | 5201 lb | 0.45 | 9 ft | 524 lb | 60 in. | 1 | 1111 lb | 0.47 | E | 2359 lb | 524 lb | 2883 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 2.5 ft | 175 plf | 2.0 ft | 6 ft | 463 plf | (3) 2x | 2 x 8 | No. 2 | Span | 635 plf | 0.73 | 489 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 1466 lb | 0.45 | 1 | 5201 lb | 0.28 | 9 ft | 326 lb | 60 in. | 2 | 9734 lb | 0.03 | D2 | 1466 lb | 326 lb | 4675 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 2.5 ft | 175 plf | 2.0 ft | 6 ft | 463 plf | (3) 2x | 2 x 8 | No. 2 | Span | 635 plf | 0.73 | 489 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 1466 lb | 0.45 | 1 | 5201 lb | 0.28 | 9 ft | 1266 lb | 60 in. | 2 | 9734 lb | 0.13 | D2 | 1466 lb | 326 lb | 6467 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 2.5 ft | 175 plf | 2.0 ft | 6 ft | 463 plf | (3) 2x | 2 x 8 | No. 2 | Span | 635 plf | 0.73 | 489 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 1466 lb | 0.45 | 1 | 5201 lb | 0.28 | 9 ft | 3057 lb | 60 in. | 3 | 15501 lb | 0.20 | D2 | 1466 lb | 326 lb | 8258 lb |

REVIEWED **6'-0" - Floor bearing (A5)**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 13.0 ft | 50 plf | 2.0 ft | 6 ft | 635 plf | (3) 2x | 2 x 10 | No. 2 | Span | 946 plf | 0.67 | 688 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 2065 lb | 0.61 | 1 | 5201 lb | 0.40 | 9 ft | 459 lb | 60 in. | 1 | 1111 lb | 0.41 | D1 | 2065 lb | 459 lb | 2523 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 10.0 ft | 100 plf | 2.0 ft | 6 ft | 850 plf | (3) 2x | 2 x 12 | No. 2 | Span | 1272 plf | 0.67 | 918 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 2755 lb | 0.82 | 1 | 5201 lb | 0.53 | 9 ft | 689 lb | 60 in. | 1 | 1111 lb | 0.62 | E1 | 2755 lb | 612 lb | 5890 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 10.0 ft | 100 plf | 2.0 ft | 6 ft | 850 plf | (3) 2x | 2 x 12 | No. 2 | Span | 1272 plf | 0.67 | 918 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 2755 lb | 0.82 | 1 | 5201 lb | 0.53 | 9 ft | 4056 lb | 60 in. | 2 | 9734 lb | 0.42 | E1 | 2755 lb | 612 lb | 9257 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 10.0 ft | 100 plf | 2.0 ft | 6 ft | 850 plf | (3) 2x | 2 x 12 | No. 2 | Span | 1272 plf | 0.67 | 918 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 2755 lb | 0.82 | 1 | 5201 lb | 0.53 | 9 ft | 7422 lb | 60 in. | 2 | 9734 lb | 0.76 | E1 | 2755 lb | 612 lb | 12623 lb |

REVIEWED **6'-0" - Floor bearing (D1)**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 4.0 ft | 50 plf | 2.0 ft | 6 ft | 230 plf | (3) 2x | 2 x 8 | No. 2 | Span | 635 plf | 0.36 | 246 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 739 lb | 0.22 | 1 | 5201 lb | 0.14 | 9 ft | 164 lb | 60 in. | 1 | 1111 lb | 0.15 | D1 | 739 lb | 164 lb | 903 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 6.0 ft | 100 plf | 2.0 ft | 6 ft | 550 plf | (3) 2x | 2 x 10 | No. 2 | Span | 946 plf | 0.58 | 591 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 1773 lb | 0.53 | 1 | 5201 lb | 0.34 | 9 ft | 394 lb | 60 in. | 1 | 1111 lb | 0.35 | E1 | 1773 lb | 394 lb | 3070 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 6.0 ft | 100 plf | 2.0 ft | 6 ft | 550 plf | (3) 2x | 2 x 10 | No. 2 | Span | 946 plf | 0.58 | 591 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 1773 lb | 0.53 | 1 | 5201 lb | 0.34 | 9 ft | 394 lb | 60 in. | 1 | 1111 lb | 0.35 | E1 | 1773 lb | 394 lb | 5237 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 6.0 ft | 100 plf | 2.0 ft | 6 ft | 550 plf | (3) 2x | 2 x 10 | No. 2 | Span | 946 plf | 0.58 | 591 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 1773 lb | 0.53 | 1 | 5201 lb | 0.34 | 9 ft | 2202 lb | 60 in. | 2 | 9734 lb | 0.23 | E1 | 1773 lb | 394 lb | 7403 lb |

REVIEWED **6'-0" - Roof Brg + Flr + Balc (D6)**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 17.0 ft | 50 plf | 2.0 ft | 6 ft | 815 plf | (3) 2x | 2 x 12 | No. 2 | Span | 1272 plf | 0.64 | 885 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 2654 lb | 0.79 | 1 | 5201 lb | 0.51 | 9 ft | 590 lb | 60 in. | 1 | 1111 lb | 0.53 | F1 | 2654 lb | 590 lb | 3243 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.0 ft | 850 plf | 2.0 ft | 6 ft | 1195 plf | 3 LVL | 7.25 | LVL | Span | 2360 plf | 0.51 | 1226 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 3679 lb | 1.15 | 2 | 10731 lb | 0.34 | 9 ft | 818 lb | 60 in. | 2 | 9734 lb | 0.08 | J2 | 3679 lb | 818 lb | 7740 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.0 ft | 850 plf | 2.0 ft | 6 ft | 1195 plf | 3 LVL | 7.25 | LVL | Span | 2360 plf | 0.51 | 1226 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 3679 lb | 1.15 | 2 | 10731 lb | 0.34 | 9 ft | 1505 lb | 60 in. | 2 | 9734 lb | 0.15 | J2 | 3679 lb | 818 lb | 12237 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.0 ft | 850 plf | 2.0 ft | 6 ft | 1195 plf | 3 LVL | 7.25 | LVL | Span | 2360 plf | 0.51 | 1226 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 3679 lb | 1.15 | 2 | 10731 lb | 0.34 | 9 ft | 6002 lb | 60 in. | 3 | 15501 lb | 0.39 | J2 | 3679 lb | 818 lb | 16733 lb |

REVIEWED **6'-0" - Roof Brg + Balc (D10)**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 15.0 ft | 50 plf | 2.0 ft | 6 ft | 725 plf | (3) 2x | 2 x 10 | No. 2 | Span | 946 plf | 0.77 | 786 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 2359 lb | 0.70 | 1 | 5201 lb | 0.45 | 9 ft | 524 lb | 60 in. | 1 | 1111 lb | 0.47 | E | 2359 lb | 524 lb | 2883 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.0 ft | 175 plf | 2.0 ft | 6 ft | 520 plf | (3) 2x | 2 x 12 | No. 2 | Span | 1272 plf | 0.41 | 551 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 4277 lb | 0.50 | 1 | 5201 lb | 0.82 | 9 ft | 2327 lb | 60 in. | 2 | 9734 lb | 0.24 | F1 | 4277 lb | 368 lb | 7528 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.0 ft | 175 plf | 2.0 ft | 6 ft | 520 plf | (3) 2x | 2 x 12 | No. 2 | Span | 1272 plf | 0.41 | 551 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 4277 lb | 0.50 | 1 | 5201 lb | 0.82 | 9 ft | 6972 lb | 60 in. | 2 | 9734 lb | 0.72 | F1 | 4277 lb | 368 lb | 12172 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.0 ft | 175 plf | 2.0 ft | 6 ft | 520 plf | (3) 2x | 2 x 12 | No. 2 | Span | 1272 plf | 0.41 | 551 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 4277 lb | 0.50 | 1 | 5201 lb | 0.82 | 9 ft | 11616 lb | 60 in. | 3 | 15501 lb | 0.75 | F1 | 4277 lb | 368 lb | 16817 lb |

REVIEWED **6'-0" - Roof + Floor bearing (F1)**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 15.0 ft | 50 plf | 2.0 ft | 6 ft | 725 plf | (3) 2x | 2 x 10 | No. 2 | Span | 946 plf | 0.77 | 786 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 2359 lb | 0.70 | 1 | 5201 lb | 0.45 | 9 ft | 524 lb | 60 in. | 1 | 1111 lb | 0.47 | E2 | 2359 lb | 524 lb | 2883 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 8.0 ft | 100 plf | 2.0 ft | 6 ft | 700 plf | (3) 2x | 2 x 10 | No. 2 | Span | 946 plf | 0.74 | 755 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 2264 lb | 0.68 | 1 | 5201 lb | 0.44 | 9 ft | 503 lb | 60 in. | 1 | 1111 lb | 0.45 | E2 | 2264 lb | 503 lb | 5650 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 8.0 ft | 100 plf | 2.0 ft | 6 ft | 700 plf | (3) 2x | 2 x 10 | No. 2 | Span | 946 plf | 0.74 | 755 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 2264 lb | 0.68 | 1 | 5201 lb | 0.44 | 9 ft | 3216 lb | 60 in. | 2 | 9734 lb | 0.33 | E2 | 2264 lb | 503 lb | 8417 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 8.0 ft | 100 plf | 2.0 ft | 6 ft | 700 plf | (3) 2x | 2 x 10 | No. 2 | Span | 946 plf | 0.74 | 755 plf | No. 2 | 2x6 | Exterior | 70 plf | 16 in. oc | 8 ft | 2264 lb | 0.68 | 1 | 5201 lb | 0.44 | 9 ft | 5982 lb | 60 in. | 3 | 15501 lb | 0.39 | E2 | 2264 lb | 503 lb | 11183 lb |

REVIEWED **9'-0" - Roof Bearing**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 21.0 ft | 50 plf | 2.0 ft | 9 ft | 1100 plf | 3 LVL | 9.25 | LVL | Span | 1337 plf | 0.82 | 1147 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 5163 lb | 1.59 | 2 | 10731 lb | 0.48 | 9 ft | 765 lb | 60 in. | 2 | 9130 lb | 0.08 | L1 | 5163 lb | 765 lb | 5928 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 1.0 ft | 100 plf | 2.0 ft | 9 ft | 183 plf | (3) 2x | 2 x 8 | No. 2 | Span | 282 plf | 0.65 | 187 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 842 lb | 0.27 | 1 | 5201 lb | 0.16 | 9 ft | 1694 lb | 60 in. | 2 | 9130 lb | 0.19 | D2 | 842 lb | 125 lb | 6895 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 1.0 ft | 100 plf | 2.0 ft | 9 ft | 183 plf | (3) 2x | 2 x 8 | No. 2 | Span | 282 plf | 0.65 | 187 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 842 lb | 0.27 | 1 | 5201 lb | 0.16 | 9 ft | 2661 lb | 60 in. | 2 | 9130 lb | 0.29 | D2 | 842 lb | 125 lb | 7862 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 1.0 ft | 100 plf | 2.0 ft | 9 ft | 183 plf | (3) 2x | 2 x 8 | No. 2 | Span | 282 plf | 0.65 | 187 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 842 lb | 0.27 | 1 | 5201 lb | 0.16 | 9 ft | 3627 lb | 60 in. | 3 | 15501 lb | 0.23 | D2 | 842 lb | 125 lb | 8828 lb |

REVIEWED **9'-0" - Floor bearing (D1/D2)**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 4.0 ft | 50 plf | 2.0 ft | 9 ft | 250 plf | (3) 2x | 2 x 10 | No. 2 | Span | 420 plf | 0.60 | 259 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 1166 lb | 0.36 | 1 | 5201 lb | 0.22 | 9 ft | 173 lb | 60 in. | 1 | 898 lb | 0.19 | E1 | 1166 lb | 173 lb | 1338 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 6.0 ft | 100 plf | 2.0 ft | 9 ft | 600 plf | 3 LVL | 7.25 | LVL | Span | 671 plf | 0.89 | 623 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 2802 lb | 0.87 | 1 | 5201 lb | 0.54 | 9 ft | 415 lb | 60 in. | 1 | 898 lb | 0.46 | J3 | 2802 lb | 415 lb | 4555 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 6.0 ft | 100 plf | 2.0 ft | 9 ft | 600 plf | 3 LVL | 7.25 | LVL | Span | 671 plf | 0.89 | 623 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 2802 lb | 0.87 | 1 | 5201 lb | 0.54 | 9 ft | 2571 lb | 60 in. | 2 | 9130 lb | 0.28 | J3 | 2802 lb | 415 lb | 7772 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 6.0 ft | 100 plf | 2.0 ft | 9 ft | 600 plf | 3 LVL | 7.25 | LVL | Span | 671 plf | 0.89 | 623 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 2802 lb | 0.87 | 1 | 5201 lb | 0.54 | 9 ft | 5787 lb | 60 in. | 2 | 9130 lb | 0.63 | J3 | 2802 lb | 415 lb | 10988 lb |

REVIEWED ***9'-0" - Supporting Beam (D1)**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 21.0 ft | 50 plf | 2.0 ft | 9 ft | 1100 plf | 3 LVL | 9.25 | LVL | Span | 1337 plf | 0.82 | 1147 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 5163 lb | 1.59 | 2 | 10731 lb | 0.48 | 9 ft | 765 lb | 60 in. | 2 | 9130 lb | 0.08 | | 5163 lb | 765 lb | 5928 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 1.0 ft | 100 plf | 2.0 ft | 9 ft | 183 plf | (3) 2x | 2 x 8 | No. 2 | Span | 282 plf | 0.65 | 187 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 9030 lb | 0.27 | 2 | 10731 lb | 0.84 | 9 ft | 4352 lb | 60 in. | 3 | 15501 lb | 0.28 | F3 | 9030 lb | 125 lb | 15083 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 1.0 ft | 100 plf | 2.0 ft | 9 ft | 183 plf | (3) 2x | 2 x 8 | No. 2 | Span | 282 plf | 0.65 | 187 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 9030 lb | 0.27 | 2 | 10731 lb | 0.84 | 9 ft | 13506 lb | 60 in. | 4 | 20271 lb | 0.67 | F3 | 9030 lb | 125 lb | 24238 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 1.0 ft | 100 plf | 2.0 ft | 9 ft | 183 plf | (3) 2x | 2 x 8 | No. 2 | Span | 282 plf | 0.65 | 187 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 9030 lb | 0.27 | 2 | 10731 lb | 0.84 | 9 ft | 22661 lb | 60 in. | 5 | 25040 lb | 0.90 | F3 | 9030 lb | 125 lb | 33393 lb |

*Refer to Forte Calcs for Beam Design

REVIEWED **9'-0" - Balc + Floor Bearing (E1)**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 4.0 ft | 50 plf | 2.0 ft | 9 ft | 250 plf | (3) 2x | 2 x 10 | No. 2 | Span | 420 plf | 0.60 | 259 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 1166 lb | 0.36 | 1 | 5201 lb | 0.22 | 9 ft | 173 lb | 60 in. | 1 | 898 lb | 0.19 | E1 | 1166 lb | 173 lb | 1338 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.0 ft | 663 plf | 2.0 ft | 9 ft | 1046 plf | 3 LVL | 9.25 | LVL | Span | 1337 plf | 0.78 | 1063 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 4784 lb | 1.51 | 2 | 10731 lb | 0.45 | 9 ft | 709 lb | 60 in. | 1 | 898 lb | 0.79 | L1 | 4784 lb | 709 lb | 6831 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.0 ft | 663 plf | 2.0 ft | 9 ft | 1046 plf | 3 LVL | 9.25 | LVL | Span | 1337 plf | 0.78 | 1063 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 4784 lb | 1.51 | 2 | 10731 lb | 0.45 | 9 ft | 1593 lb | 60 in. | 2 | 9130 lb | 0.17 | L1 | 4784 lb | 709 lb | 12324 lb |
| Balcony (Private) | 55 psf | 60 psf | 115 psf | 3.0 ft | 663 plf | 2.0 ft | 9 ft | 1046 plf | 3 LVL | 9.25 | LVL | Span | 1337 plf | 0.78 | 1063 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 4784 lb | 1.51 | 2 | 10731 lb | 0.45 | 9 ft | 7086 lb | 60 in. | 2 | 9130 lb | 0.78 | L1 | 4784 lb | 709 lb | 17817 lb |

REVIEWED **9'-6" - Corridor (Bldg D)**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 4.0 ft | 50 plf | 2.0 ft | 10 ft | 230 plf | (3) 2x | 2 x 10 | No. 2 | Span | 340 plf | 0.68 | 241 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 1203 lb | 0.37 | 1 | 5201 lb | 0.23 | 10 ft | 160 lb | 60 in. | 1 | 330 lb | 0.49 | E1 | 1203 lb | 160 lb | 1363 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 3.0 ft | 100 plf | 2.0 ft | 10 ft | 325 plf | (3) 2x | 2 x 12 | No. 2 | Span | 456 plf | 0.71 | 338 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 1691 lb | 0.52 | 1 | 5201 lb | 0.33 | 10 ft | 225 lb | 60 in. | 1 | 330 lb | 0.68 | F1 | 1691 lb | 225 lb | 3280 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 3.0 ft | 100 plf | 2.0 ft | 10 ft | 325 plf | (3) 2x | 2 x 12 | No. 2 | Span | 456 plf | 0.71 | 338 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 1691 lb | 0.52 | 1 | 5201 lb | 0.33 | 10 ft | 225 lb | 60 in. | 2 | 6715 lb | 0.03 | F1 | 1691 lb | 225 lb | 5197 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 3.0 ft | 100 plf | 2.0 ft | 10 ft | 325 plf | (3) 2x | 2 x 12 | No. 2 | Span | 456 plf | 0.71 | 338 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 1691 lb | 0.52 | 1 | 5201 lb | 0.33 | 10 ft | 1912 lb | 60 in. | 3 | 12602 lb | 0.15 | F1 | 1691 lb | 225 lb | 7113 lb |

REVIEWED **16'-3" - Corridor (Bldg F)**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 4.0 ft | 50 plf | 2.0 ft | 16 ft | 230 plf | 3 LVL | 11.25 | LVL | Span | 428 plf | 0.54 | 237 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 1895 lb | 0.59 | 1 | 5201 lb | 0.36 | 10 ft | 158 lb | 60 in. | 1 | 330 lb | 0.48 | L2 | 1895 lb | 158 lb | 2053 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 3.0 ft | 100 plf | 2.0 ft | 16 ft | 325 plf | 3 LVL | 11.25 | LVL | Span | 428 plf | 0.76 | 334 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 2669 lb | 0.84 | 1 | 5201 lb | 0.51 | 10 ft | 222 lb | 60 in. | 1 | 330 lb | 0.67 | N3 | 2669 lb | 222 lb | 4945 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 3.0 ft | 100 plf | 2.0 ft | 16 ft | 325 plf | 3 LVL | 11.25 | LVL | Span | 428 plf | 0.76 | 334 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 2669 lb | 0.84 | 1 | 5201 lb | 0.51 | 10 ft | 2636 lb | 60 in. | 2 | 6715 lb | 0.39 | N3 | 2669 lb | 222 lb | 7837 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 3.0 ft | 100 plf | 2.0 ft | 16 ft | 325 plf | 3 LVL | 11.25 | LVL | Span | 428 plf | 0.76 | 334 plf | No. 2 | 2x6 | Exterior | 80 plf | 16 in. oc | 8 ft | 2669 lb | 0.84 | 1 | 5201 lb | 0.51 | 10 ft | 5527 lb | 60 in. | 3 | 12602 lb | 0.44 | N3 | 2669 lb | 222 lb | 10728 lb |

**Corridor**

REVIEWED **5'-0" - Inset Door**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 19.5 ft | 50 plf | 2.0 ft | 5 ft | 1103 plf | 1 LVL | 18 | LVL | Span | 2394 plf | 0.46 | 1158 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.39 | 0 | 0 lb | NA | 9 ft | 3668 lb | 60 in. | 3 | 6245 lb | 0.59 | G1 | 2896 lb | 772 lb | 3668 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 2.0 ft | 5 ft | 460 plf | 1 LVL | 18 | LVL | Span | 2394 plf | 0.19 | 479 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.58 | 0 | 0 lb | NA | 9 ft | 5185 lb | 60 in. | 3 | 6245 lb | 0.83 | G1 | 1197 lb | 319 lb | 5185 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 2.0 ft | 5 ft | 460 plf | 1 LVL | 18 | LVL | Span | 2394 plf | 0.19 | 479 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.58 | 0 | 0 lb | NA | 9 ft | 6702 lb | 60 in. | 4 | 8490 lb | 0.79 | G1 | 1197 lb | 319 lb | 6702 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 2.0 ft | 5 ft | 460 plf | 1 LVL | 18 | LVL | Span | 2394 plf | 0.19 | 479 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.58 | 0 | 0 lb | NA | 9 ft | 8218 lb | 60 in. | 5 | 10750 lb | 0.76 | G1 | 1197 lb | 319 lb | 8218 lb |

Pre-Eng Truss to Span Opening

REVIEWED **3'-0"**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 19.5 ft | 50 plf | 2.0 ft | 3 ft | 1220 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.87 | 1265 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.93 | 0 | 0 lb | NA | 9 ft | 2741 lb | 60 in. | 2 | 3598 lb | 0.76 | G1 | 1898 lb | 843 lb | 2741 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 2.0 ft | 3 ft | 500 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.36 | 515 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.38 | 0 | 0 lb | NA | 9 ft | 3858 lb | 60 in. | 3 | 5850 lb | 0.66 | G1 | 773 lb | 344 lb | 3858 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 2.0 ft | 3 ft | 500 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.36 | 515 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.38 | 0 | 0 lb | NA | 9 ft | 4974 lb | 60 in. | 3 | 5850 lb | 0.85 | G1 | 773 lb | 344 lb | 4974 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 2.0 ft | 3 ft | 500 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.36 | 515 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.38 | 0 | 0 lb | NA | 9 ft | 6091 lb | 60 in. | 4 | 8042 lb | 0.76 | G1 | 773 lb | 344 lb | 6091 lb |

REVIEWED **5'-0" + 3'-0" Shared Jamb**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 3 ft | 170 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.08 | 175 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.13 | 0 | 0 lb | NA | 9 ft | 4794 lb | 60 in. | 3 | 6245 lb | 0.77 | G1 | 4794 lb | 0 lb | 4794 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 3 ft | 1450 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.69 | 1502 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.10 | 0 | 0 lb | NA | 9 ft | 6764 lb | 60 in. | 4 | 8490 lb | 0.80 | G1 | 1970 lb | 0 lb | 6764 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 3 ft | 1450 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.69 | 1502 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.10 | 0 | 0 lb | NA | 9 ft | 8734 lb | 60 in. | 5 | 10750 lb | 0.81 | G1 | 1970 lb | 0 lb | 8734 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 3 ft | 1450 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.69 | 1502 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.10 | 0 | 0 lb | NA | 9 ft | 10705 lb | 60 in. | 5 | 10750 lb | 1.00 | G1 | 1970 lb | 0 lb | 10705 lb |

REVIEWED **3'-0" - Garage Wall**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 4.0 ft | 50 plf | 2.0 ft | 3 ft | 290 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.21 | 299 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 449 lb | 0.22 | 1 | 2775 lb | 0.16 | 9 ft | 199 lb | 60 in. | 1 | 552 lb | 0.36 | | 449 lb | 199 lb | 648 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 2.0 ft | 3 ft | 500 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.36 | 515 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 773 lb | 0.38 | 1 | 2775 lb | 0.28 | 9 ft | 344 lb | 60 in. | 1 | 552 lb | 0.62 | A1 | 773 lb | 344 lb | 1765 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 2.0 ft | 3 ft | 500 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.36 | 515 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 773 lb | 0.38 | 1 | 2775 lb | 0.28 | 9 ft | 344 lb | 60 in. | 2 | 3598 lb | 0.10 | A1 | 773 lb | 344 lb | 2882 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 2.0 ft | 3 ft | 500 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.24 | 515 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 773 lb | 0.24 | 1 | 5201 lb | 0.15 | 9 ft | 344 lb | 60 in. | 2 | 10731 lb | 0.03 | A1 | 773 lb | 344 lb | 3998 lb |

REVIEWED **3'-0" - Area D - Stair**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 5.0 ft | 50 plf | 2.0 ft | 3 ft | 350 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.25 | 362 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 542 lb | 0.27 | 1 | 2775 lb | 0.20 | 9 ft | 241 lb | 60 in. | 1 | 552 lb | 0.44 | | 542 lb | 241 lb | 783 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 5.0 ft | 100 plf | 2.0 ft | 3 ft | 600 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.43 | 619 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 929 lb | 0.46 | 1 | 2775 lb | 0.33 | 9 ft | 413 lb | 60 in. | 1 | 552 lb | 0.75 | A1 | 929 lb | 413 lb | 2125 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 5.0 ft | 100 plf | 2.0 ft | 3 ft | 600 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.43 | 619 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 929 lb | 0.46 | 1 | 2775 lb | 0.33 | 9 ft | 692 lb | 60 in. | 2 | 3598 lb | 0.19 | A1 | 929 lb | 413 lb | 3467 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 5.0 ft | 100 plf | 2.0 ft | 3 ft | 600 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.43 | 619 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 929 lb | 0.46 | 1 | 2775 lb | 0.33 | 9 ft | 2033 lb | 60 in. | 2 | 3598 lb | 0.57 | A1 | 929 lb | 413 lb | 4808 lb |

REVIEWED **3'-0" - Unit D6**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | King | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 5.0 ft | 50 plf | 2.0 ft | 3 ft | 350 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.25 | 362 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 542 lb | 0.27 | 1 | 2775 lb | 0.20 | 9 ft | 241 lb | 60 in. | 1 | 552 lb | 0.44 | | 542 lb | 241 lb | 783 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 9.5 ft | 100 plf | 2.0 ft | 3 ft | 1050 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.75 | 1087 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 1630 lb | 0.80 | 1 | 2775 lb | 0.59 | 9 ft | 724 lb | 60 in. | 2 | 3598 lb | 0.20 | A1 | 1630 lb | 724 lb | 3138 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 9.5 ft | 100 plf | 2.0 ft | 3 ft | 1050 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.75 | 1087 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 1630 lb | 0.80 | 1 | 2775 lb | 0.59 | 9 ft | 2717 lb | 60 in. | 2 | 3598 lb | 0.76 | A1 | 1630 lb | 724 lb | 5492 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 9.5 ft | 100 plf | 2.0 ft | 3 ft | 1050 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.75 | 1087 plf | No. 2 | 2x4 | Interior | 10 plf | 16 in. oc | 8 ft | 1630 lb | 0.80 | 1 | 2775 lb | 0.59 | 9 ft | 5071 lb | 60 in. | 3 | 5850 lb | 0.87 | A1 | 1630 lb | 724 lb | 7846 lb |

REVIEWED **Unit C11 - Penthouse**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | King | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 9.0 ft | 50 plf | 2.0 ft | 3 ft | 590 plf | (2) 2x | 2 x 12 | No. 2 | Span | 2182 plf | 0.27 | 611 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 4991 lb | 0.28 | 2 | 10731 lb | 0.47 | 9 ft | 407 lb | 60 in. | 1 | 2087 lb | 0.20 | | 4991 lb | 407 lb | 5398 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.5 ft | 100 plf | 2.0 ft | 3 ft | 550 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.39 | 567 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 851 lb | 0.27 | 1 | 5201 lb | 0.16 | 9 ft | 1426 lb | 60 in. | 1 | 2087 lb | 0.68 | A1 | 851 lb | 378 lb | 6627 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.5 ft | 100 plf | 2.0 ft | 3 ft | 550 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.39 | 567 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 851 lb | 0.27 | 1 | 5201 lb | 0.16 | 9 ft | 2656 lb | 60 in. | 2 | 10731 lb | 0.25 | A1 | 851 lb | 378 lb | 7857 lb |

REVIEWED **5'-0" - Unit F1**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | King | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 4.5 ft | 50 plf | 2.0 ft | 5 ft | 293 plf | 2 LVL | 18 | LVL | Span | 4788 plf | 0.06 | 306 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.37 | 0 | 0 lb | NA | 9 ft | 968 lb | 60 in. | 3 | 6245 lb | 0.16 | GT | 764 lb | 204 lb | 968 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 15.0 ft | 0 plf | 2.0 ft | 5 ft | 1350 plf | 2 LVL | 18 | LVL | Span | 4788 plf | 0.28 | 1421 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.71 | 0 | 0 lb | NA | 9 ft | 5468 lb | 60 in. | 4 | 8490 lb | 0.64 | | 3553 lb | 947 lb | 5468 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 15.0 ft | 0 plf | 2.0 ft | 5 ft | 1350 plf | 2 LVL | 18 | LVL | Span | 4788 plf | 0.28 | 1421 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.71 | 0 | 0 lb | NA | 9 ft | 9968 lb | 60 in. | 5 | 10750 lb | 0.93 | | 3553 lb | 947 lb | 9968 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 15.0 ft | 0 plf | 2.0 ft | 5 ft | 1350 plf | 2 LVL | 18 | LVL | Span | 4788 plf | 0.28 | 1421 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.71 | 0 | 0 lb | NA | 9 ft | 14468 lb | 60 in. | 5 | 10750 lb | 1.35 | | 3553 lb | 947 lb | 14468 lb |

REVIEWED **5'-0" - Unit F2**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | King | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 19.5 ft | 50 plf | 2.0 ft | 5 ft | 1103 plf | 1 LVL | 18 | LVL | Span | 2394 plf | 0.46 | 1158 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.39 | 0 | 0 lb | NA | 9 ft | 3668 lb | 60 in. | 3 | 6245 lb | 0.59 | GT | 2896 lb | 772 lb | 3668 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 2.0 ft | 5 ft | 460 plf | 1 LVL | 18 | LVL | Span | 2394 plf | 0.19 | 479 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.58 | 0 | 0 lb | NA | 9 ft | 5185 lb | 60 in. | 4 | 8490 lb | 0.61 | | 1197 lb | 319 lb | 5185 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 2.0 ft | 5 ft | 460 plf | 1 LVL | 18 | LVL | Span | 2394 plf | 0.19 | 479 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.58 | 0 | 0 lb | NA | 9 ft | 6702 lb | 60 in. | 4 | 8490 lb | 0.79 | | 1197 lb | 319 lb | 6702 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 2.0 ft | 5 ft | 460 plf | 1 LVL | 18 | LVL | Span | 2394 plf | 0.19 | 479 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.58 | 0 | 0 lb | NA | 9 ft | 8218 lb | 60 in. | 5 | 10750 lb | 0.76 | | 1197 lb | 319 lb | 8218 lb |

REVIEWED **6'-0" - Corridor Corners**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | King | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 5.0 ft | 50 plf | 2.0 ft | 6 ft | 275 plf | (2) 2x | 2 x 8 | No. 2 | Span | 421 plf | 0.65 | 295 plf | No. 2 | 2x4 | Interior | 20 plf | 16 in. oc | 8 ft | 0 lb | 0.42 | 0 | 0 lb | NA | 9 ft | 1083 lb | 60 in. | 2 | 3052 lb | 0.35 | B2 | 886 lb | 197 lb | 1083 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 7.0 ft | 0 plf | 2.0 ft | 6 ft | 525 plf | (2) 2x | 2 x 10 | No. 2 | Span | 627 plf | 0.84 | 573 plf | No. 2 | 2x4 | Interior | 20 plf | 16 in. oc | 8 ft | 0 lb | 0.80 | 0 | 0 lb | NA | 9 ft | 3183 lb | 60 in. | 3 | 5265 lb | 0.60 | B2 | 1718 lb | 382 lb | 3183 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 7.0 ft | 0 plf | 2.0 ft | 6 ft | 525 plf | (2) 2x | 2 x 10 | No. 2 | Span | 627 plf | 0.84 | 573 plf | No. 2 | 2x4 | Interior | 20 plf | 16 in. oc | 8 ft | 0 lb | 0.80 | 0 | 0 lb | NA | 9 ft | 5283 lb | 60 in. | 4 | 7379 lb | 0.72 | B2 | 1718 lb | 382 lb | 5283 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 7.0 ft | 0 plf | 2.0 ft | 6 ft | 525 plf | (2) 2x | 2 x 10 | No. 2 | Span | 627 plf | 0.84 | 573 plf | No. 2 | 2x4 | Interior | 20 plf | 16 in. oc | 8 ft | 0 lb | 0.80 | 0 | 0 lb | NA | 9 ft | 7383 lb | 60 in. | 5 | 9523 lb | 0.78 | B2 | 1718 lb | 382 lb | 7383 lb |

REVIEWED **6'-0" - Stair Lobbies**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | King | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 5.0 ft | 50 plf | 2.0 ft | 6 ft | 275 plf | (2) 2x | 2 x 8 | No. 2 | Span | 421 plf | 0.65 | 295 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.42 | 0 | 0 lb | NA | 9 ft | 1083 lb | 60 in. | 2 | 3959 lb | 0.27 | T1 | 886 lb | 197 lb | 1083 lb |
| Floor (Public) | 25 psf | 100 psf | 125 psf | 6.0 ft | 0 plf | 2.0 ft | 6 ft | 750 plf | 1 LVL | 18 | LVL | Span | 1995 plf | 0.38 | 818 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.14 | 0 | 0 lb | NA | 9 ft | 4083 lb | 60 in. | 3 | 6245 lb | 0.65 | T1 | 2455 lb | 545 lb | 4083 lb |
| Floor (Public) | 25 psf | 100 psf | 125 psf | 6.0 ft | 0 plf | 2.0 ft | 6 ft | 750 plf | 1 LVL | 18 | LVL | Span | 1995 plf | 0.38 | 818 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.14 | 0 | 0 lb | NA | 9 ft | 7083 lb | 60 in. | 4 | 8490 lb | 0.83 | T1 | 2455 lb | 545 lb | 7083 lb |
| Floor (Public) | 25 psf | 100 psf | 125 psf | 6.0 ft | 0 plf | 2.0 ft | 6 ft | 750 plf | 1 LVL | 18 | LVL | Span | 1995 plf | 0.38 | 818 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.14 | 0 | 0 lb | NA | 9 ft | 10083 lb | 60 in. | 5 | 10750 lb | 0.94 | T1 | 2455 lb | 545 lb | 10083 lb |

**Stair/Elevator**

REVIEWED **Bldg D/E/F**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | King | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 17.5 ft | 50 plf | 2.0 ft | 3 ft | 1100 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.78 | 1140 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1711 lb | 0.53 | 1 | 5201 lb | 0.33 | 9 ft | 760 lb | 60 in. | 1 | 2087 lb | 0.36 | | 1711 lb | 760 lb | 2471 lb |
| Floor (Public) | 25 psf | 100 psf | 125 psf | 4.0 ft | 170 plf | 2.0 ft | 3 ft | 837 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.60 | 862 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1293 lb | 0.40 | 1 | 5201 lb | 0.25 | 9 ft | 575 lb | 60 in. | 1 | 2087 lb | 0.28 | D1 | 1293 lb | 575 lb | 4339 lb |
| Floor (Public) | 25 psf | 100 psf | 125 psf | 4.0 ft | 170 plf | 2.0 ft | 3 ft | 837 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.60 | 862 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1293 lb | 0.40 | 1 | 5201 lb | 0.25 | 9 ft | 1007 lb | 60 in. | 1 | 2087 lb | 0.48 | D1 | 1293 lb | 575 lb | 6208 lb |
| Floor (Public) | 25 psf | 100 psf | 125 psf | 4.0 ft | 170 plf | 2.0 ft | 3 ft | 837 plf | (2) 2x | 2 x 8 | No. 2 | Span | 1406 plf | 0.60 | 862 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1293 lb | 0.40 | 1 | 5201 lb | 0.25 | 9 ft | 2875 lb | 60 in. | 2 | 10731 lb | 0.27 | D1 | 1293 lb | 575 lb | 8076 lb |

**Unit Partition**

REVIEWED **C - 2'-10"**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | King | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 3 ft | 170 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.08 | 175 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 262 lb | 0.08 | 1 | 5201 lb | 0.05 | 9 ft | 116 lb | 60 in. | 1 | 2087 lb | 0.06 | | 262 lb | 116 lb | 378 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.0 ft | 100 plf | 2.0 ft | 3 ft | 1400 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.66 | 1450 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2175 lb | 0.68 | 1 | 5201 lb | 0.42 | 9 ft | 967 lb | 60 in. | 1 | 2087 lb | 0.46 | D1 | 2175 lb | 967 lb | 3520 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.0 ft | 100 plf | 2.0 ft | 3 ft | 1400 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.66 | 1450 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2175 lb | 0.68 | 1 | 5201 lb | 0.42 | 9 ft | 1461 lb | 60 in. | 1 | 2087 lb | 0.70 | D1 | 2175 lb | 967 lb | 6662 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.0 ft | 100 plf | 2.0 ft | 3 ft | 1400 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.66 | 1450 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2175 lb | 0.68 | 1 | 5201 lb | 0.42 | 9 ft | 4602 lb | 60 in. | 2 | 10731 lb | 0.43 | D1 | 2175 lb | 967 lb | 9803 lb |

REVIEWED **C - 3'-8" Upset**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | King | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 4 ft | 140 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.10 | 151 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.09 | 0 | 0 lb | NA | 9 ft | 403 lb | 60 in. | 1 | 2087 lb | 0.19 | | 303 lb | 101 lb | 403 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 4 ft | 1113 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.78 | 1239 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.72 | 0 | 0 lb | NA | 9 ft | 3708 lb | 60 in. | 2 | 10731 lb | 0.35 | D1 | 2478 lb | 826 lb | 3708 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 4 ft | 1113 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.78 | 1239 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.72 | 0 | 0 lb | NA | 9 ft | 7012 lb | 60 in. | 2 | 10731 lb | 0.65 | D1 | 2478 lb | 826 lb | 7012 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 4 ft | 1113 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.78 | 1239 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.72 | 0 | 0 lb | NA | 9 ft | 10316 lb | 60 in. | 3 | 15501 lb | 0.67 | D1 | 2478 lb | 826 lb | 10316 lb |

REVIEWED **C - 2'-10" + 3'-8" Upset - Shared Jamb**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | | Jack | | | | | | King | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 3 ft | 170 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.08 | 175 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.08 | 0 | 0 lb | NA | 9 ft | 564 lb | 60 in. | 1 | 2087 lb | 0.27 | | 564 lb | 0 lb | 564 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 3 ft | 1450 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.69 | 1502 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.70 | 0 | 0 lb | NA | 9 ft | 5218 lb | 60 in. | 2 | 10731 lb | 0.49 | D3 | 4653 lb | 0 lb | 5218 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 3 ft | 1450 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.69 | 1502 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.70 | 0 | 0 lb | NA | 9 ft | 9871 lb | 60 in. | 3 | 15501 lb | 0.64 | D3 | 4653 lb | 0 lb | 9871 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 3 ft | 1450 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.69 | 1502 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.70 | 0 | 0 lb | NA | 9 ft | 14524 lb | 60 in. | 4 | 20271 lb | 0.72 | D3 | 4653 lb | 0 lb | 14524 lb |

REVIEWED **C - 2'-8" Supporting Upset**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Header Length | Header WTTL | Header Type | Header Size | Header Grade | Header Lu | Header WAllow | Header Unity | Jamb Size WTTL | Jamb Size Grade | Jamb Size Jamb Size | Jamb Size Int or Ext | Jamb Size WL | Jamb Size Stud Spcg | Jack HT | Jack Pactual | Jack BRG W Req'd | Jack Jack | Jack Pallow | Jack Unity | King HT | King Pactual | King Lu | King King | King Pallow | King Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 3 ft | 170 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.08 | 175 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 262 lb | 0.08 | 1 | 5201 lb | 0.05 | 9 ft | 116 lb | 60 in. | 1 | 2087 lb | 0.06 | | 262 lb | 116 lb | 378 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 10.5 ft | 100 plf | 2.0 ft | 3 ft | 1150 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.55 | 1190 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1786 lb | 0.56 | 1 | 5201 lb | 0.34 | 9 ft | 794 lb | 60 in. | 1 | 2087 lb | 0.38 | D1 | 1786 lb | 794 lb | 2958 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 10.5 ft | 100 plf | 2.0 ft | 3 ft | 1150 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.55 | 1190 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1786 lb | 0.56 | 1 | 5201 lb | 0.34 | 9 ft | 794 lb | 60 in. | 1 | 2087 lb | 0.38 | D1 | 1786 lb | 794 lb | 5537 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 10.5 ft | 100 plf | 2.0 ft | 3 ft | 1150 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.55 | 1190 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 1786 lb | 0.56 | 1 | 5201 lb | 0.34 | 9 ft | 2915 lb | 60 in. | 2 | 10731 lb | 0.27 | D1 | 1786 lb | 794 lb | 8116 lb |

REVIEWED **C2 - 4'-6" Upset**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Header Length | Header WTTL | Header Type | Header Size | Header Grade | Header Lu | Header WAllow | Header Unity | Jamb Size WTTL | Jamb Size Grade | Jamb Size Jamb Size | Jamb Size Int or Ext | Jamb Size WL | Jamb Size Stud Spcg | Jack HT | Jack Pactual | Jack BRG W Req'd | Jack Jack | Jack Pallow | Jack Unity | King HT | King Pactual | King Lu | King King | King Pallow | King Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 5 ft | 158 plf | (3) 2x | 2 x 8 | No. 2 | Span | 915 plf | 0.17 | 164 plf | No. 2 | 2x6 | Interior | 20 plf | 16 in. oc | 8 ft | 0 lb | 0.13 | 0 | 0 lb | NA | 9 ft | 518 lb | 60 in. | 1 | 1944 lb | 0.27 | | 409 lb | 109 lb | 518 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 12.0 ft | 100 plf | 2.0 ft | 5 ft | 1180 plf | (3) 2x | 2 x 10 | No. 2 | Span | 1364 plf | 0.87 | 1237 plf | No. 2 | 2x6 | Interior | 20 plf | 16 in. oc | 8 ft | 0 lb | 0.95 | 0 | 0 lb | NA | 9 ft | 4435 lb | 60 in. | 2 | 10731 lb | 0.41 | E1 | 3092 lb | 825 lb | 4435 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 12.0 ft | 100 plf | 2.0 ft | 5 ft | 1180 plf | (3) 2x | 2 x 10 | No. 2 | Span | 1364 plf | 0.87 | 1237 plf | No. 2 | 2x6 | Interior | 20 plf | 16 in. oc | 8 ft | 0 lb | 0.95 | 0 | 0 lb | NA | 9 ft | 8352 lb | 60 in. | 2 | 10731 lb | 0.78 | E1 | 3092 lb | 825 lb | 8352 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 12.0 ft | 100 plf | 2.0 ft | 5 ft | 1180 plf | (3) 2x | 2 x 10 | No. 2 | Span | 1364 plf | 0.87 | 1237 plf | No. 2 | 2x6 | Interior | 20 plf | 16 in. oc | 8 ft | 0 lb | 0.95 | 0 | 0 lb | NA | 9 ft | 12268 lb | 60 in. | 3 | 15501 lb | 0.79 | E1 | 3092 lb | 825 lb | 12268 lb |

REVIEWED **C7 - 2'-10"**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Header Length | Header WTTL | Header Type | Header Size | Header Grade | Header Lu | Header WAllow | Header Unity | Jamb Size WTTL | Jamb Size Grade | Jamb Size Jamb Size | Jamb Size Int or Ext | Jamb Size WL | Jamb Size Stud Spcg | Jack HT | Jack Pactual | Jack BRG W Req'd | Jack Jack | Jack Pallow | Jack Unity | King HT | King Pactual | King Lu | King King | King Pallow | King Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 0 plf | 2.0 ft | 3 ft | 120 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.06 | 125 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 187 lb | 0.06 | 1 | 5201 lb | 0.04 | 9 ft | 83 lb | 60 in. | 1 | 2087 lb | 0.04 | | 187 lb | 83 lb | 270 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 0 plf | 2.0 ft | 3 ft | 1350 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.64 | 1402 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2103 lb | 0.65 | 1 | 5201 lb | 0.40 | 9 ft | 935 lb | 60 in. | 1 | 2087 lb | 0.45 | D1 | 2103 lb | 935 lb | 3308 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 0 plf | 2.0 ft | 3 ft | 1350 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.64 | 1402 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2103 lb | 0.65 | 1 | 5201 lb | 0.40 | 9 ft | 1144 lb | 60 in. | 1 | 2087 lb | 0.55 | D1 | 2103 lb | 935 lb | 6345 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 0 plf | 2.0 ft | 3 ft | 1350 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.64 | 1402 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2103 lb | 0.65 | 1 | 5201 lb | 0.40 | 9 ft | 4182 lb | 60 in. | 2 | 10731 lb | 0.39 | D1 | 2103 lb | 935 lb | 9383 lb |

REVIEWED **C7 - 4'-6" - Upset**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Header Length | Header WTTL | Header Type | Header Size | Header Grade | Header Lu | Header WAllow | Header Unity | Jamb Size WTTL | Jamb Size Grade | Jamb Size Jamb Size | Jamb Size Int or Ext | Jamb Size WL | Jamb Size Stud Spcg | Jack HT | Jack Pactual | Jack BRG W Req'd | Jack Jack | Jack Pallow | Jack Unity | King HT | King Pactual | King Lu | King King | King Pallow | King Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 0 plf | 2.0 ft | 5 ft | 108 plf | (3) 2x | 2 x 8 | No. 2 | Span | 915 plf | 0.12 | 114 plf | No. 2 | 2x6 | Interior | 20 plf | 16 in. oc | 8 ft | 284 lb | 0.09 | 1 | 5201 lb | 0.05 | 9 ft | 76 lb | 60 in. | 1 | 1944 lb | 0.04 | | 284 lb | 76 lb | 360 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 16.0 ft | 0 plf | 2.0 ft | 5 ft | 1440 plf | (3) 2x | 2 x 12 | No. 2 | Span | 1833 plf | 0.79 | 1516 plf | No. 2 | 2x6 | Interior | 20 plf | 16 in. oc | 8 ft | 3789 lb | 1.16 | 1 | 5201 lb | 0.73 | 9 ft | 1011 lb | 60 in. | 2 | 10731 lb | 0.09 | F1 | 3789 lb | 1011 lb | 5160 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 16.0 ft | 0 plf | 2.0 ft | 5 ft | 1440 plf | (3) 2x | 2 x 12 | No. 2 | Span | 1833 plf | 0.79 | 1516 plf | No. 2 | 2x6 | Interior | 20 plf | 16 in. oc | 8 ft | 3789 lb | 1.16 | 1 | 5201 lb | 0.73 | 9 ft | 4759 lb | 60 in. | 2 | 10731 lb | 0.44 | F1 | 3789 lb | 1011 lb | 9960 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 16.0 ft | 0 plf | 2.0 ft | 5 ft | 1440 plf | (3) 2x | 2 x 12 | No. 2 | Span | 1833 plf | 0.79 | 1516 plf | No. 2 | 2x6 | Interior | 20 plf | 16 in. oc | 8 ft | 3789 lb | 1.16 | 1 | 5201 lb | 0.73 | 9 ft | 9559 lb | 60 in. | 2 | 10731 lb | 0.89 | F1 | 3789 lb | 1011 lb | 14760 lb |

REVIEWED **C11 - 4'-6" Upset**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Header Length | Header WTTL | Header Type | Header Size | Header Grade | Header Lu | Header WAllow | Header Unity | Jamb Size WTTL | Jamb Size Grade | Jamb Size Jamb Size | Jamb Size Int or Ext | Jamb Size WL | Jamb Size Stud Spcg | Jack HT | Jack Pactual | Jack BRG W Req'd | Jack Jack | Jack Pallow | Jack Unity | King HT | King Pactual | King Lu | King King | King Pallow | King Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 5 ft | 158 plf | (3) 2x | 2 x 8 | No. 2 | Span | 915 plf | 0.17 | 164 plf | No. 2 | 2x6 | Interior | 20 plf | 16 in. oc | 8 ft | 0 lb | 0.13 | 0 | 0 lb | NA | 9 ft | 518 lb | 60 in. | 1 | 1944 lb | 0.27 | | 409 lb | 109 lb | 518 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 5 ft | 1315 plf | (3) 2x | 2 x 10 | No. 2 | Span | 1364 plf | 0.96 | 1379 plf | No. 2 | 2x6 | Interior | 20 plf | 16 in. oc | 8 ft | 0 lb | 1.06 | 0 | 0 lb | NA | 9 ft | 4885 lb | 60 in. | 2 | 10731 lb | 0.46 | E1 | 3447 lb | 919 lb | 4885 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 5 ft | 1315 plf | (3) 2x | 2 x 10 | No. 2 | Span | 1364 plf | 0.96 | 1379 plf | No. 2 | 2x6 | Interior | 20 plf | 16 in. oc | 8 ft | 0 lb | 1.06 | 0 | 0 lb | NA | 9 ft | 9252 lb | 60 in. | 2 | 10731 lb | 0.86 | E1 | 3447 lb | 919 lb | 9252 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 5 ft | 1315 plf | (3) 2x | 2 x 10 | No. 2 | Span | 1364 plf | 0.96 | 1379 plf | No. 2 | 2x6 | Interior | 20 plf | 16 in. oc | 8 ft | 0 lb | 1.06 | 0 | 0 lb | NA | 9 ft | 13618 lb | 60 in. | 3 | 15501 lb | 0.88 | E1 | 3447 lb | 919 lb | 13618 lb |

REVIEWED **C11 - 4'-6" Upset - Under PH**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Header Length | Header WTTL | Header Type | Header Size | Header Grade | Header Lu | Header WAllow | Header Unity | Jamb Size WTTL | Jamb Size Grade | Jamb Size Jamb Size | Jamb Size Int or Ext | Jamb Size WL | Jamb Size Stud Spcg | Jack HT | Jack Pactual | Jack BRG W Req'd | Jack Jack | Jack Pallow | Jack Unity | King HT | King Pactual | King Lu | King King | King Pallow | King Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 5 ft | 158 plf | (3) 2x | 2 x 8 | No. 2 | Span | 915 plf | 0.17 | 164 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.13 | 0 | 0 lb | NA | 9 ft | 17184 lb | 60 in. | 4 | 20271 lb | 0.85 | | 17075 lb | 109 lb | 17184 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 5 ft | 1315 plf | (3) 2x | 2 x 10 | No. 2 | Span | 1364 plf | 0.96 | 1379 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.06 | 0 | 0 lb | NA | 9 ft | 21551 lb | 60 in. | 5 | 25040 lb | 0.86 | E1 | 3447 lb | 919 lb | 21551 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 5 ft | 1315 plf | (3) 2x | 2 x 10 | No. 2 | Span | 1364 plf | 0.96 | 1379 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.06 | 0 | 0 lb | NA | 9 ft | 25917 lb | 60 in. | 5 | 25040 lb | 1.04 | E1 | 3447 lb | 919 lb | 25917 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 5 ft | 1315 plf | (3) 2x | 2 x 10 | No. 2 | Span | 1364 plf | 0.96 | 1379 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.06 | 0 | 0 lb | NA | 9 ft | 30284 lb | 60 in. | 5 | 25040 lb | 1.21 | E1 | 3447 lb | 919 lb | 30284 lb |

REVIEWED **C12 - 9'-0"**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Header Length | Header WTTL | Header Type | Header Size | Header Grade | Header Lu | Header WAllow | Header Unity | Jamb Size WTTL | Jamb Size Grade | Jamb Size Jamb Size | Jamb Size Int or Ext | Jamb Size WL | Jamb Size Stud Spcg | Jack HT | Jack Pactual | Jack BRG W Req'd | Jack Jack | Jack Pallow | Jack Unity | King HT | King Pactual | King Lu | King King | King Pallow | King Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 9 ft | 150 plf | (3) 2x | 2 x 8 | No. 2 | Span | 282 plf | 0.53 | 155 plf | No. 2 | 2x6 | Interior | 30 plf | 16 in. oc | 8 ft | 0 lb | 0.22 | 0 | 0 lb | NA | 9 ft | 798 lb | 60 in. | 1 | 1795 lb | 0.44 | | 695 lb | 103 lb | 798 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 10.0 ft | 100 plf | 2.0 ft | 9 ft | 933 plf | 3 LVL | 9.25 | LVL | Span | 1337 plf | 0.70 | 971 plf | No. 2 | 2x6 | Interior | 30 plf | 16 in. oc | 8 ft | 0 lb | 1.35 | 0 | 0 lb | NA | 9 ft | 5815 lb | 60 in. | 2 | 10731 lb | 0.54 | L1 | 4369 lb | 647 lb | 5815 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 10.0 ft | 100 plf | 2.0 ft | 9 ft | 933 plf | 3 LVL | 9.25 | LVL | Span | 1337 plf | 0.70 | 971 plf | No. 2 | 2x6 | Interior | 30 plf | 16 in. oc | 8 ft | 0 lb | 1.35 | 0 | 0 lb | NA | 9 ft | 10832 lb | 60 in. | 4 | 20271 lb | 0.53 | L1 | 4369 lb | 647 lb | 10832 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 10.0 ft | 100 plf | 2.0 ft | 9 ft | 933 plf | 3 LVL | 9.25 | LVL | Span | 1337 plf | 0.70 | 971 plf | No. 2 | 2x6 | Interior | 30 plf | 16 in. oc | 8 ft | 0 lb | 1.35 | 0 | 0 lb | NA | 9 ft | 15848 lb | 60 in. | 4 | 20271 lb | 0.78 | L1 | 4369 lb | 647 lb | 15848 lb |

REVIEWED **D1 - 2'-10"**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Header Length | Header WTTL | Header Type | Header Size | Header Grade | Header Lu | Header WAllow | Header Unity | Jamb Size WTTL | Jamb Size Grade | Jamb Size Jamb Size | Jamb Size Int or Ext | Jamb Size WL | Jamb Size Stud Spcg | Jack HT | Jack Pactual | Jack BRG W Req'd | Jack Jack | Jack Pallow | Jack Unity | King HT | King Pactual | King Lu | King King | King Pallow | King Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 9.5 ft | 50 plf | 2.0 ft | 3 ft | 620 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.29 | 642 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 963 lb | 0.30 | 1 | 5201 lb | 0.19 | 9 ft | 428 lb | 60 in. | 1 | 2087 lb | 0.21 | | 963 lb | 428 lb | 1391 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 15.0 ft | 100 plf | 2.0 ft | 3 ft | 1600 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.76 | 1658 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2487 lb | 0.77 | 1 | 5201 lb | 0.48 | 9 ft | 1105 lb | 60 in. | 1 | 2087 lb | 0.53 | D2 | 2487 lb | 1105 lb | 4983 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 15.0 ft | 100 plf | 2.0 ft | 3 ft | 1600 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.76 | 1658 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2487 lb | 0.77 | 1 | 5201 lb | 0.48 | 9 ft | 3373 lb | 60 in. | 2 | 10731 lb | 0.31 | D2 | 2487 lb | 1105 lb | 8574 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 15.0 ft | 100 plf | 2.0 ft | 3 ft | 1600 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.76 | 1658 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2487 lb | 0.77 | 1 | 5201 lb | 0.48 | 9 ft | 6965 lb | 60 in. | 3 | 15501 lb | 0.45 | D2 | 2487 lb | 1105 lb | 12166 lb |

REVIEWED ***D1 - 7'-6" - 2x6 Jamb**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Header Length | Header WTTL | Header Type | Header Size | Header Grade | Header Lu | Header WAllow | Header Unity | Jamb Size WTTL | Jamb Size Grade | Jamb Size Jamb Size | Jamb Size Int or Ext | Jamb Size WL | Jamb Size Stud Spcg | Jack HT | Jack Pactual | Jack BRG W Req'd | Jack Jack | Jack Pallow | Jack Unity | King HT | King Pactual | King Lu | King King | King Pallow | King Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 1.0 ft | 50 plf | 2.0 ft | 8 ft | 95 plf | (3) 2x | 2 x 12 | No. 2 | Span | 714 plf | 0.13 | 98 plf | No. 2 | 2x6 | Interior | 20 plf | 16 in. oc | 8 ft | 0 lb | 0.12 | 0 | 0 lb | NA | 9 ft | 0 lb | 60 in. | 1 | 1944 lb | 0.00 | | 0 lb | 0 lb | 0 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 15.0 ft | 100 plf | 2.0 ft | 8 ft | 1225 plf | 3 LVL | 9.25 | LVL | Span | 1904 plf | 0.64 | 1305 plf | No. 2 | 2x6 | Interior | 20 plf | 16 in. oc | 8 ft | 0 lb | 1.58 | 0 | 0 lb | NA | 9 ft | 4682 lb | 60 in. | 3 | 15501 lb | 0.30 | L1 | 4682 lb | 0 lb | 4682 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 15.0 ft | 100 plf | 2.0 ft | 8 ft | 1225 plf | 3 LVL | 9.25 | LVL | Span | 1904 plf | 0.64 | 1305 plf | No. 2 | 2x6 | Interior | 20 plf | 16 in. oc | 8 ft | 0 lb | 1.58 | 0 | 0 lb | NA | 9 ft | 9364 lb | 60 in. | 4 | 20271 lb | 0.46 | L1 | 4682 lb | 0 lb | 9364 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 15.0 ft | 100 plf | 2.0 ft | 8 ft | 1225 plf | 3 LVL | 9.25 | LVL | Span | 1904 plf | 0.64 | 1305 plf | No. 2 | 2x6 | Interior | 20 plf | 16 in. oc | 8 ft | 0 lb | 1.58 | 0 | 0 lb | NA | 9 ft | 14046 lb | 60 in. | 4 | 20271 lb | 0.69 | L1 | 4682 lb | 0 lb | 14046 lb |

*Refer to Forte Calcs for Beam Design

NEEDS REVIEW ***D1 - 7'-6" - 2x4 Jamb**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Header Length | Header WTTL | Header Type | Header Size | Header Grade | Header Lu | Header WAllow | Header Unity | Jamb Size WTTL | Jamb Size Grade | Jamb Size Jamb Size | Jamb Size Int or Ext | Jamb Size WL | Jamb Size Stud Spcg | Jack HT | Jack Pactual | Jack BRG W Req'd | Jack Jack | Jack Pallow | Jack Unity | King HT | King Pactual | King Lu | King King | King Pallow | King Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 1.0 ft | 50 plf | 2.0 ft | 14 ft | 95 plf | (3) 2x | 2 x 12 | No. 2 | Span | 232 plf | 0.41 | 97 plf | No. 2 | 2x4 | Interior | 40 plf | 16 in. oc | 8 ft | 0 lb | 0.34 | 0 | 0 lb | NA | 9 ft | 0 lb | 60 in. | 2 | 2188 lb | 0.00 | | 0 lb | 0 lb | 0 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 15.0 ft | 100 plf | 2.0 ft | 14 ft | 1225 plf | 3 LVL | 18 | LVL | Span | 2284 plf | 0.54 | 1274 plf | No. 2 | 2x4 | Interior | 40 plf | 16 in. oc | 8 ft | 0 lb | 4.34 | 0 | 0 lb | NA | 9 ft | 4682 lb | 60 in. | 4 | 6385 lb | 0.73 | | 4682 lb | 0 lb | 4682 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 15.0 ft | 100 plf | 2.0 ft | 14 ft | 1225 plf | 3 LVL | 18 | LVL | Span | 2284 plf | 0.54 | 1274 plf | No. 2 | 2x4 | Interior | 40 plf | 16 in. oc | 8 ft | 0 lb | 4.34 | 0 | 0 lb | NA | 9 ft | 9364 lb | 60 in. | 5 | 8434 lb | 1.11 | | 4682 lb | 0 lb | 9364 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 15.0 ft | 100 plf | 2.0 ft | 14 ft | 1225 plf | 3 LVL | 18 | LVL | Span | 2284 plf | 0.54 | 1274 plf | No. 2 | 2x4 | Interior | 40 plf | 16 in. oc | 8 ft | 0 lb | 4.34 | 0 | 0 lb | NA | 9 ft | 14046 lb | 60 in. | 5 | 8434 lb | 1.67 | | 4682 lb | 0 lb | 14046 lb |

*Refer to Forte Calcs for Beam Design

REVIEWED ***D1 - 14'-10"**

| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Header Length | Header WTTL | Header Type | Header Size | Header Grade | Header Lu | Header WAllow | Header Unity | Jamb Size WTTL | Jamb Size Grade | Jamb Size Jamb Size | Jamb Size Int or Ext | Jamb Size WL | Jamb Size Stud Spcg | Jack HT | Jack Pactual | Jack BRG W Req'd | Jack Jack | Jack Pallow | Jack Unity | King HT | King Pactual | King Lu | King King | King Pallow | King Unity | Sched. | Header | Stud | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 1.0 ft | 50 plf | 2.0 ft | 14 ft | 95 plf | (3) 2x | 2 x 12 | No. 2 | Span | 232 plf | 0.41 | 97 plf | No. 2 | 2x6 | Interior | 40 plf | 16 in. oc | 8 ft | 0 lb | 0.21 | 0 | 0 lb | NA | 9 ft | 0 lb | 60 in. | 1 | 1639 lb | 0.00 | | 0 lb | 0 lb | 0 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 15.0 ft | 100 plf | 2.0 ft | 14 ft | 1225 plf | 3 LVL | 18 | LVL | Span | 2284 plf | 0.54 | 1274 plf | No. 2 | 2x6 | Interior | 40 plf | 16 in. oc | 8 ft | 0 lb | 2.76 | 0 | 0 lb | NA | 9 ft | 8828 lb | 60 in. | 3 | 15501 lb | 0.57 | U2 | 8828 lb | 0 lb | 8828 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 15.0 ft | 100 plf | 2.0 ft | 14 ft | 1225 plf | 3 LVL | 18 | LVL | Span | 2284 plf | 0.54 | 1274 plf | No. 2 | 2x6 | Interior | 40 plf | 16 in. oc | 8 ft | 0 lb | 2.76 | 0 | 0 lb | NA | 9 ft | 17656 lb | 60 in. | 4 | 20271 lb | 0.87 | U2 | 8828 lb | 0 lb | 17656 lb |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Floor (Private) | 35 psf | 40 psf | 75 psf | 15.0 ft | 100 plf | 2.0 ft | 14 ft | 1225 plf | 3 LVL | 18 | LVL | Span | 2284 plf | 0.54 | 1274 plf | No. 2 | 2x6 | Interior | 40 plf | 16 in. oc | 8 ft | 0 lb | 2.76 | 0 | 0 lb | NA | 9 ft | 26484 lb | 60 in. | 5.25x7 | 31300 lb | 0.85 | U2 | 8828 lb | 0 lb | 26484 lb |

*Refer to Forte Calcs for Beam Design

| REVIEWED | D2 - 2'-10" | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 9.5 ft | 50 plf | 2.0 ft | 3 ft | 620 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.29 | 642 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 963 lb | 0.30 | 1 | 5201 lb | 0.19 | 9 ft | 428 lb | 60 in. | 1 | 2087 lb | 0.21 | | 963 lb | 428 lb | 1391 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.0 ft | 100 plf | 2.0 ft | 3 ft | 1400 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.66 | 1450 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2175 lb | 0.68 | 1 | 5201 lb | 0.42 | 9 ft | 967 lb | 60 in. | 2 | 10731 lb | 0.09 | D5 | 2175 lb | 967 lb | 4533 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.0 ft | 100 plf | 2.0 ft | 3 ft | 1400 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.66 | 1450 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2175 lb | 0.68 | 1 | 5201 lb | 0.42 | 9 ft | 2473 lb | 60 in. | 2 | 10731 lb | 0.23 | D5 | 2175 lb | 967 lb | 7674 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.0 ft | 100 plf | 2.0 ft | 3 ft | 1400 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.66 | 1450 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2175 lb | 0.68 | 1 | 5201 lb | 0.42 | 9 ft | 5615 lb | 60 in. | 3 | 15501 lb | 0.36 | D5 | 2175 lb | 967 lb | 10816 lb |

| REVIEWED | D2 - 3'-5" - Upset - 2x4 Jamb | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 9.5 ft | 50 plf | 2.0 ft | 4 ft | 478 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.33 | 531 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.48 | 0 | 0 lb | NA | 9 ft | 1416 lb | 60 in. | 2 | 3959 lb | 0.36 | | 1062 lb | 354 lb | 1416 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.0 ft | 100 plf | 2.0 ft | 4 ft | 1075 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.75 | 1197 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.09 | 0 | 0 lb | NA | 9 ft | 4021 lb | 60 in. | 3 | 6245 lb | 0.64 | D5 | 1807 lb | 798 lb | 4021 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.0 ft | 100 plf | 2.0 ft | 4 ft | 1075 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.75 | 1197 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.09 | 0 | 0 lb | NA | 9 ft | 6626 lb | 60 in. | 4 | 8490 lb | 0.78 | D5 | 1807 lb | 798 lb | 6626 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.0 ft | 100 plf | 2.0 ft | 4 ft | 1075 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.75 | 1197 plf | No. 2 | 2x4 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.09 | 0 | 0 lb | NA | 9 ft | 9231 lb | 60 in. | 5 | 10750 lb | 0.86 | D5 | 1807 lb | 798 lb | 9231 lb |

| REVIEWED | D2 - 5'-5" Upset | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 9.5 ft | 50 plf | 2.0 ft | 6 ft | 478 plf | (3) 2x | 2 x 8 | No. 2 | Span | 635 plf | 0.75 | 516 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.46 | 0 | 0 lb | NA | 9 ft | 1893 lb | 60 in. | 2 | 10731 lb | 0.18 | | 1549 lb | 344 lb | 1893 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.3 ft | 100 plf | 2.0 ft | 6 ft | 1094 plf | (3) 2x | 2 x 12 | No. 2 | Span | 1272 plf | 0.86 | 1184 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.06 | 0 | 0 lb | NA | 9 ft | 6235 lb | 60 in. | 2 | 10731 lb | 0.58 | | 3552 lb | 789 lb | 6235 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.3 ft | 100 plf | 2.0 ft | 6 ft | 1094 plf | (3) 2x | 2 x 12 | No. 2 | Span | 1272 plf | 0.86 | 1184 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.06 | 0 | 0 lb | NA | 9 ft | 10577 lb | 60 in. | 2 | 10731 lb | 0.99 | | 3552 lb | 789 lb | 10577 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.3 ft | 100 plf | 2.0 ft | 6 ft | 1094 plf | (3) 2x | 2 x 12 | No. 2 | Span | 1272 plf | 0.86 | 1184 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.06 | 0 | 0 lb | NA | 9 ft | 14918 lb | 60 in. | 3 | 15501 lb | 0.96 | | 3552 lb | 789 lb | 14918 lb |

| REVIEWED | *D2 - 17' Cont Upset - Exterior Jamb | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 1.0 ft | 50 plf | 2.0 ft | 18 ft | 95 plf | (3) 2x | 2 x 12 | No. 2 | Span | 140 plf | 0.68 | 97 plf | No. 2 | 2x6 | Interior | 50 plf | 16 in. oc | 8 ft | 0 lb | 0.28 | 0 | 0 lb | NA | 9 ft | 0 lb | 60 in. | 1 | 1476 lb | 0.00 | | 0 lb | 0 lb | 0 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 18 ft | 1113 plf | 3 LVL | 18 | LVL | Span | 1231 plf | 0.90 | 1147 plf | No. 2 | 2x6 | Interior | 50 plf | 16 in. oc | 8 ft | 0 lb | 3.22 | 0 | 0 lb | NA | 9 ft | 5500 lb | 60 in. | 2 | 10731 lb | 0.51 | | 5500 lb | 0 lb | 5500 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 18 ft | 1113 plf | 3 LVL | 18 | LVL | Span | 1231 plf | 0.90 | 1147 plf | No. 2 | 2x6 | Interior | 50 plf | 16 in. oc | 8 ft | 0 lb | 3.22 | 0 | 0 lb | NA | 9 ft | 11000 lb | 60 in. | 3 | 15501 lb | 0.71 | | 5500 lb | 0 lb | 11000 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 18 ft | 1113 plf | 3 LVL | 18 | LVL | Span | 1231 plf | 0.90 | 1147 plf | No. 2 | 2x6 | Interior | 50 plf | 16 in. oc | 8 ft | 0 lb | 3.22 | 0 | 0 lb | NA | 9 ft | 16500 lb | 60 in. | 4 | 20271 lb | 0.81 | | 5500 lb | 0 lb | 16500 lb |

*Refer to Forte Calcs for Beam Design

| REVIEWED | *D2 - 17' Cont Upset - Intermediate Jamb | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 1.0 ft | 50 plf | 2.0 ft | 18 ft | 95 plf | (3) 2x | 2 x 12 | No. 2 | Span | 140 plf | 0.68 | 97 plf | No. 2 | 2x6 | Interior | 50 plf | 16 in. oc | 8 ft | 0 lb | 0.28 | 0 | 0 lb | NA | 9 ft | 0 lb | 60 in. | 1 | 1476 lb | 0.00 | | 0 lb | 0 lb | 0 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 18 ft | 1113 plf | 3 LVL | 18 | LVL | Span | 1231 plf | 0.90 | 1147 plf | No. 2 | 2x6 | Interior | 50 plf | 16 in. oc | 8 ft | 0 lb | 3.22 | 0 | 0 lb | NA | 9 ft | 12816 lb | 60 in. | 3 | 15501 lb | 0.83 | | 12816 lb | 0 lb | 12816 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 18 ft | 1113 plf | 3 LVL | 18 | LVL | Span | 1231 plf | 0.90 | 1147 plf | No. 2 | 2x6 | Interior | 50 plf | 16 in. oc | 8 ft | 0 lb | 3.22 | 0 | 0 lb | NA | 9 ft | 25632 lb | 60 in. | 5 | 25040 lb | 1.02 | | 12816 lb | 0 lb | 25632 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2.0 ft | 18 ft | 1113 plf | 3 LVL | 18 | LVL | Span | 1231 plf | 0.90 | 1147 plf | No. 2 | 2x6 | Interior | 50 plf | 16 in. oc | 8 ft | 0 lb | 3.22 | 0 | 0 lb | NA | 9 ft | 38448 lb | 60 in. | 6 | #REF! | #REF! | | 12816 lb | 0 lb | 38448 lb |

*Refer to Forte Calcs for Beam Design

| REVIEWED | D6 - 2'-10" | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 9.5 ft | 50 plf | 2.0 ft | 3 ft | 620 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.29 | 642 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 963 lb | 0.30 | 1 | 5201 lb | 0.19 | 9 ft | 428 lb | 60 in. | 1 | 2087 lb | 0.21 | | 963 lb | 428 lb | 1391 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 16.0 ft | 100 plf | 2.0 ft | 3 ft | 1700 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.81 | 1762 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2642 lb | 0.82 | 1 | 5201 lb | 0.51 | 9 ft | 1174 lb | 60 in. | 2 | 10731 lb | 0.11 | D2 | 2642 lb | 1174 lb | 5208 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 16.0 ft | 100 plf | 2.0 ft | 3 ft | 1700 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.81 | 1762 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2642 lb | 0.82 | 1 | 5201 lb | 0.51 | 9 ft | 3823 lb | 60 in. | 2 | 10731 lb | 0.36 | D2 | 2642 lb | 1174 lb | 9024 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 16.0 ft | 100 plf | 2.0 ft | 3 ft | 1700 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.81 | 1762 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2642 lb | 0.82 | 1 | 5201 lb | 0.51 | 9 ft | 7640 lb | 60 in. | 3 | 15501 lb | 0.49 | D2 | 2642 lb | 1174 lb | 12841 lb |

| REVIEWED | *D7 - 15'-4" | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 1.0 ft | 50 plf | 2.0 ft | 15 ft | 98 plf | (3) 2x | 2 x 12 | No. 2 | Span | 202 plf | 0.49 | 100 plf | No. 2 | 2x6 | Interior | 40 plf | 16 in. oc | 8 ft | 0 lb | 0.24 | 0 | 0 lb | NA | 9 ft | 0 lb | 60 in. | 1 | 1639 lb | 0.00 | | 0 lb | 0 lb | 0 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 15.0 ft | 100 plf | 2.0 ft | 15 ft | 1300 plf | 3 LVL | 18 | LVL | Span | 1982 plf | 0.66 | 1340 plf | No. 2 | 2x6 | Interior | 40 plf | 16 in. oc | 8 ft | 0 lb | 3.14 | 0 | 0 lb | NA | 9 ft | 10172 lb | 60 in. | 3 | 15501 lb | 0.66 | U2 | 10172 lb | 0 lb | 10172 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 15.0 ft | 100 plf | 2.0 ft | 15 ft | 1300 plf | 3 LVL | 18 | LVL | Span | 1982 plf | 0.66 | 1340 plf | No. 2 | 2x6 | Interior | 40 plf | 16 in. oc | 8 ft | 0 lb | 3.14 | 0 | 0 lb | NA | 9 ft | 20344 lb | 60 in. | 5 | 25040 lb | 0.81 | U2 | 10172 lb | 0 lb | 20344 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 15.0 ft | 100 plf | 2.0 ft | 15 ft | 1300 plf | 3 LVL | 18 | LVL | Span | 1982 plf | 0.66 | 1340 plf | No. 2 | 2x6 | Interior | 40 plf | 16 in. oc | 8 ft | 0 lb | 3.14 | 0 | 0 lb | NA | 9 ft | 30516 lb | 60 in. | 5.25x7 | 31300 lb | 0.97 | U2 | 10172 lb | 0 lb | 30516 lb |

*Refer to Forte Calcs for Beam Design

| REVIEWED | D11 - 2'-10" | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 9.5 ft | 50 plf | 2.0 ft | 3 ft | 620 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.29 | 642 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 963 lb | 0.30 | 1 | 5201 lb | 0.19 | 9 ft | 428 lb | 60 in. | 1 | 2087 lb | 0.21 | | 963 lb | 428 lb | 1391 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.0 ft | 100 plf | 2.0 ft | 3 ft | 1400 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.66 | 1450 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2175 lb | 0.68 | 1 | 5201 lb | 0.42 | 9 ft | 967 lb | 60 in. | 1 | 2087 lb | 0.46 | D2 | 2175 lb | 967 lb | 4533 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.0 ft | 100 plf | 2.0 ft | 3 ft | 1400 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.66 | 1450 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2175 lb | 0.68 | 1 | 5201 lb | 0.42 | 9 ft | 2473 lb | 60 in. | 2 | 10731 lb | 0.23 | D2 | 2175 lb | 967 lb | 7674 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.0 ft | 100 plf | 2.0 ft | 3 ft | 1400 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.66 | 1450 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2175 lb | 0.68 | 1 | 5201 lb | 0.42 | 9 ft | 5615 lb | 60 in. | 3 | 15501 lb | 0.36 | D2 | 2175 lb | 967 lb | 10816 lb |

| REVIEWED | D11 - 3'-4" Upset | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 9.5 ft | 50 plf | 2.0 ft | 4 ft | 478 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.33 | 531 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.31 | 0 | 0 lb | NA | 9 ft | 1416 lb | 60 in. | 1 | 2158 lb | 0.66 | | 1062 lb | 354 lb | 1416 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.0 ft | 100 plf | 2.0 ft | 4 ft | 1075 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.75 | 1197 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.69 | 0 | 0 lb | NA | 9 ft | 4608 lb | 60 in. | 2 | 10731 lb | 0.43 | D2 | 2394 lb | 798 lb | 4608 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.0 ft | 100 plf | 2.0 ft | 4 ft | 1075 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.75 | 1197 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.69 | 0 | 0 lb | NA | 9 ft | 7799 lb | 60 in. | 3 | 15501 lb | 0.50 | D2 | 2394 lb | 798 lb | 7799 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.0 ft | 100 plf | 2.0 ft | 4 ft | 1075 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.75 | 1197 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.69 | 0 | 0 lb | NA | 9 ft | 10991 lb | 60 in. | 4 | 20271 lb | 0.54 | D2 | 2394 lb | 798 lb | 10991 lb |

| REVIEWED | D11 - 2'-10" + 3'-8" Upset - Shared Jamb | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 3 ft | 170 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.08 | 175 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.08 | 0 | 0 lb | NA | 9 ft | 2025 lb | 60 in. | 1 | 2087 lb | 0.97 | | 2025 lb | 0 lb | 2025 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.0 ft | 100 plf | 2.0 ft | 3 ft | 1400 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.66 | 1450 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.68 | 0 | 0 lb | NA | 9 ft | 6594 lb | 60 in. | 2 | 10731 lb | 0.61 | D3 | 4569 lb | 0 lb | 6594 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.0 ft | 100 plf | 2.0 ft | 3 ft | 1400 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.66 | 1450 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.68 | 0 | 0 lb | NA | 9 ft | 11162 lb | 60 in. | 3 | 15501 lb | 0.72 | D3 | 4569 lb | 0 lb | 11162 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.0 ft | 100 plf | 2.0 ft | 3 ft | 1400 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.66 | 1450 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 0 lb | 0.68 | 0 | 0 lb | NA | 9 ft | 15731 lb | 60 in. | 4 | 20271 lb | 0.78 | D3 | 4569 lb | 0 lb | 15731 lb |

| REVIEWED | E1/E3 - 2'-10" | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | Truss Spcg | Length | WTTL | Type | Size | Grade | Lu | WAllow | Unity | WTTL | Grade | Jamb Size | Int or Ext | WL | Stud Spcg | HT | Pactual | BRG W Req'd | Jack | Pallow | Unity | HT | Pactual | Lu | King | Pallow | Unity | Sched. | Header | Stud | Total |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 3 ft | 170 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.08 | 175 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 262 lb | 0.08 | 1 | 5201 lb | 0.05 | 9 ft | 116 lb | 60 in. | 1 | 2087 lb | 0.06 | | 262 lb | 116 lb | 378 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 14.0 ft | 100 plf | 2.0 ft | 3 ft | 1500 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.71 | 1554 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2331 lb | 0.72 | 1 | 5201 lb | 0.45 | 9 ft | 1036 lb | 60 in. | 1 | 2087 lb | 0.50 | D1 | 2331 lb | 1036 lb | 3745 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 14.0 ft | 100 plf | 2.0 ft | 3 ft | 1500 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.71 | 1554 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2331 lb | 0.72 | 1 | 5201 lb | 0.45 | 9 ft | 1911 lb | 60 in. | 1 | 2087 lb | 0.92 | D1 | 2331 lb | 1036 lb | 7112 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 14.0 ft | 100 plf | 2.0 ft | 3 ft | 1500 plf | (3) 2x | 2 x 8 | No. 2 | Span | 2109 plf | 0.71 | 1554 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 2331 lb | 0.72 | 1 | 5201 lb | 0.45 | 9 ft | 5277 lb | 60 in. | 2 | 10731 lb | 0.49 | D1 | 2331 lb | 1036 lb | 10478 lb |

REVIEWED **E1/E3 - 3'-6" Upset**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Level** | **DL** | **LL** | **TL** | **TW** | **Adt'l Ld** | **Truss Spcg** | **Length** | **WTTL** | **Type** | **Size** | **Grade** | **Lu** | **WAllow** | **Unity** | **WTTL** | **Grade** | **Jamb Size** | **Int or Ext** | **WL** | **Stud Spcg** | **HT** | **Pactual** | **BRG W Req'd** | **Jack** | **Pallow** | **Unity** | **HT** | **Pactual** | **Lu** | **King** | **Pallow** | **Unity** | **Sched.** | **Header** | **Stud** | **Total** |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 2.0 ft | 50 plf | 2.0 ft | 4 ft | 140 plf | (3) 2x | 2 x 8 | No. 2 | Span | 1430 plf | 0.10 | 151 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 303 lb | 0.09 | 1 | 5201 lb | 0.06 | 9 ft | 101 lb | 60 in. | 1 | 2087 lb | 0.05 | | 303 lb | 101 lb | 403 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.3 ft | 100 plf | 2.0 ft | 4 ft | 1394 plf | (3) 2x | 2 x 10 | No. 2 | Span | 2018 plf | 0.69 | 1555 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 3111 lb | 0.90 | 1 | 5201 lb | 0.60 | 9 ft | 1037 lb | 60 in. | 1 | 2087 lb | 0.50 | E | 3111 lb | 1037 lb | 4551 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.3 ft | 100 plf | 2.0 ft | 4 ft | 1394 plf | (3) 2x | 2 x 10 | No. 2 | Span | 2018 plf | 0.69 | 1555 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 3111 lb | 0.90 | 1 | 5201 lb | 0.60 | 9 ft | 3498 lb | 60 in. | 2 | 10731 lb | 0.33 | E | 3111 lb | 1037 lb | 8699 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.3 ft | 100 plf | 2.0 ft | 4 ft | 1394 plf | (3) 2x | 2 x 10 | No. 2 | Span | 2018 plf | 0.69 | 1555 plf | No. 2 | 2x6 | Interior | 10 plf | 16 in. oc | 8 ft | 3111 lb | 0.90 | 1 | 5201 lb | 0.60 | 9 ft | 7646 lb | 60 in. | 2 | 10731 lb | 0.71 | E | 3111 lb | 1037 lb | 12847 lb |

REVIEWED **F1 - 5'-9" Upset**

| | | | | | | | Header | | | | | | | | Jamb Size | | | | | | Jack | | | | | | King | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Level** | **DL** | **LL** | **TL** | **TW** | **Adt'l Ld** | **Truss Spcg** | **Length** | **WTTL** | **Type** | **Size** | **Grade** | **Lu** | **WAllow** | **Unity** | **WTTL** | **Grade** | **Jamb Size** | **Int or Ext** | **WL** | **Stud Spcg** | **HT** | **Pactual** | **BRG W Req'd** | **Jack** | **Pallow** | **Unity** | **HT** | **Pactual** | **Lu** | **King** | **Pallow** | **Unity** | **Sched.** | **Header** | **Stud** | **Total** |
| Roof (Flat) | 25 psf | 20 psf | 45 psf | 9.5 ft | 50 plf | 2.0 ft | 6 ft | 478 plf | (3) 2x | 2 x 8 | No. 2 | Span | 635 plf | 0.75 | 516 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 0.46 | 0 | 0 lb | NA | 9 ft | 1893 lb | 60 in. | 2 | 10731 lb | 0.18 | | 1549 lb | 344 lb | 1893 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.0 ft | 100 plf | 2.0 ft | 6 ft | 1375 plf | 3 LVL | 7.25 | LVL | Span | 2360 plf | 0.58 | 1491 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.33 | 0 | 0 lb | NA | 9 ft | 7360 lb | 60 in. | 2 | 10731 lb | 0.69 | | 4473 lb | 994 lb | 7360 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.0 ft | 100 plf | 2.0 ft | 6 ft | 1375 plf | 3 LVL | 7.25 | LVL | Span | 2360 plf | 0.58 | 1491 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.33 | 0 | 0 lb | NA | 9 ft | 12827 lb | 60 in. | 3 | 15501 lb | 0.83 | | 4473 lb | 994 lb | 12827 lb |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.0 ft | 100 plf | 2.0 ft | 6 ft | 1375 plf | 3 LVL | 7.25 | LVL | Span | 2360 plf | 0.58 | 1491 plf | No. 2 | 2x6 | Open | 5 plf | 16 in. oc | 8 ft | 0 lb | 1.33 | 0 | 0 lb | NA | 9 ft | 18293 lb | 60 in. | 4 | 20271 lb | 0.90 | | 4473 lb | 994 lb | 18293 lb |

**Paragon Star**
Stud Wall Design - Over SOG

**Bob D. Campbell & Co.**
7/22/2022

**Level Loadings**

| Type | DL | LL | TL |
|---|---|---|---|
| Balcony (Private) | 55 psf | 60 psf | 115 psf |
| Balcony (Public) | 55 psf | 100 psf | 155 psf |
| Floor (Private) | 35 psf | 40 psf | 75 psf |
| Floor (Public) | 35 psf | 100 psf | 135 psf |
| Roof (Flat) | 25 psf | 25 psf | 50 psf |
| Roof (Sloped) | 25 psf | 25 psf | 50 psf |
| Storage | 35 psf | 125 psf | 160 psf |

**Notes:**

**Wood Properties**

| Grade | Fb | Fc |
|---|---|---|
| Stud | 700 | 850 |
| No. 2 | 900 | 1350 |
| No. 1 | 1000 | 1500 |
| Sel. Struct. | 1500 | 1700 |

**Wind Pressure**

| | |
|---|---|
| Exterior | 25 psf |
| Interior | 5 psf |
| Special | - |

**Built-up Col Design (L=12', Lu=60")**

| | | P allow |
|---|---|---|
| (4) 2x4 @ 16"oc | 5 psf | 3656 plf |
| (4.5) 2x4 @ 16"oc | 5 psf | 4165 plf |
| (5) 2x4 @ 16"oc | 5 psf | 4673 plf |
| (5.5) 2x4 @ 16"oc | 5 psf | 5187 plf |
| (6) 2x4 @ 16"oc | 5 psf | 5700 plf |

**Truss Bearing Check**

| | |
|---|---|
| Allowable Bearing Stress | 565 psi |
| Number of Truss Verticals | 2 |

**Rim Board Check**

| | |
|---|---|
| Rim Board Width | 1.25 in. |
| Rim Board Depth | 18 in. |
| Allowable Uniform Load | 4340 plf |
| Allowable Bearing Stress | 710 psi |

## Exterior

| REVIEWED | Roof Bearing | | | | | | Wood Stud Properties | | | | | | | | | Rim Board Unity Checks | | | Truss | Additional | Truss Bearing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | TL | Number | Size | Spacing | Grade | Lu (in.) | Height | Wall Condition | Lateral Force | P allow. | Unity | Has Rim Board | Uniform Load | Concentrated Load | Spacing | Squash Blocks | Check |
| Roof (Flat) | 25 psf | 25 psf | 50 psf | 21.0 ft | 50 plf | 1100 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Exterior | 35 plf | 3931 plf | 0.28 | No | - | - | 24 in. | 0 | 0.37 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 1.0 ft | 100 plf | 1275 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Exterior | 35 plf | 3931 plf | 0.32 | Yes | 0.25 | 0.37 | 16 in. | 0 | 0.04 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 1.0 ft | 100 plf | 1450 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Exterior | 35 plf | 3931 plf | 0.37 | Yes | 0.29 | 0.43 | 16 in. | 0 | 0.04 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 1.0 ft | 100 plf | 1625 plf | 1.5 | 2x6 | 16.0 in. | No. 2 | 12 in. | 14 ft | Exterior | 35 plf | 2001 plf | 0.81 | Yes | 0.33 | 0.48 | 16 in. | 0 | 0.04 |

| REVIEWED | Roof Bearing - RAISED PL | | | | | | Wood Stud Properties | | | | | | | | | Rim Board Unity Checks | | | Truss | Additional | Truss Bearing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | TL | Number | Size | Spacing | Grade | Lu (in.) | Height | Wall Condition | Lateral Force | P allow. | Unity | Has Rim Board | Uniform Load | Concentrated Load | Spacing | Squash Blocks | Check |
| Roof (Flat) | 25 psf | 25 psf | 50 psf | 21.0 ft | 50 plf | 1100 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 11 ft | Exterior | 35 plf | 2227 plf | 0.49 | No | - | - | 24 in. | 0 | 0.37 |

| REVIEWED | Roof + Balc Bearing | | | | | | Wood Stud Properties | | | | | | | | | Rim Board Unity Checks | | | Truss | Additional | Truss Bearing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | TL | Number | Size | Spacing | Grade | Lu (in.) | Height | Wall Condition | Lateral Force | P allow. | Unity | Has Rim Board | Uniform Load | Concentrated Load | Spacing | Squash Blocks | Check |
| Roof (Flat) | 25 psf | 25 psf | 50 psf | 21.0 ft | 50 plf | 1100 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Exterior | 35 plf | 3931 plf | 0.28 | No | - | - | 24 in. | 0 | 0.37 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 1.0 ft | 100 plf | 1275 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Exterior | 35 plf | 3931 plf | 0.32 | Yes | 0.25 | 0.37 | 16 in. | 0 | 0.04 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 1.0 ft | 100 plf | 1450 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Exterior | 35 plf | 3931 plf | 0.37 | Yes | 0.29 | 0.43 | 16 in. | 0 | 0.04 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 1.0 ft | 100 plf | 1625 plf | 1.5 | 2x6 | 16.0 in. | No. 2 | 12 in. | 14 ft | Exterior | 35 plf | 2001 plf | 0.81 | Yes | 0.33 | 0.48 | 16 in. | 0 | 0.04 |

| REVIEWED | Floor Bearing | | | | | | Wood Stud Properties | | | | | | | | | Rim Board Unity Checks | | | Truss | Additional | Truss Bearing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | TL | Number | Size | Spacing | Grade | Lu (in.) | Height | Wall Condition | Lateral Force | P allow. | Unity | Has Rim Board | Uniform Load | Concentrated Load | Spacing | Squash Blocks | Check |
| Roof (Flat) | 25 psf | 25 psf | 50 psf | 12.0 ft | 50 plf | 650 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Exterior | 35 plf | 3931 plf | 0.17 | No | - | - | 24 in. | 0 | 0.22 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 14.0 ft | 100 plf | 1800 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Exterior | 35 plf | 3931 plf | 0.46 | Yes | 0.15 | 0.22 | 16 in. | 0 | 0.26 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 14.0 ft | 100 plf | 2950 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Exterior | 35 plf | 3931 plf | 0.75 | Yes | 0.41 | 0.60 | 16 in. | 0 | 0.26 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 14.0 ft | 100 plf | 4100 plf | 2.5 | 2x6 | 16.0 in. | No. 2 | 12 in. | 14 ft | Exterior | 35 plf | 4341 plf | 0.94 | Yes | 0.68 | 0.98 | 16 in. | 0 | 0.26 |

## Corridor

| REVIEWED | Roof Bearing | | | | | | Wood Stud Properties | | | | | | | | | Rim Board Unity Checks | | | Truss | Additional | Truss Bearing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | TL | Number | Size | Spacing | Grade | Lu (in.) | Height | Wall Condition | Lateral Force | P allow. | Unity | Has Rim Board | Uniform Load | Concentrated Load | Spacing | Squash Blocks | Check |
| Roof (Flat) | 25 psf | 25 psf | 50 psf | 19.5 ft | 50 plf | 1025 plf | 1.0 | 2x4 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 1323 plf | 0.77 | No | - | - | 24 in. | 0 | 0.35 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 1425 plf | 1.5 | 2x4 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 2123 plf | 0.67 | Yes | 0.24 | 0.34 | 16 in. | 0 | 0.09 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 1825 plf | 1.5 | 2x4 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 2123 plf | 0.86 | Yes | 0.33 | 0.41 | 16 in. | 0 | 0.09 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 2225 plf | 1.5 | 2x6 | 16.0 in. | No. 2 | 12 in. | 14 ft | Interior | 8 plf | 3337 plf | 0.67 | Yes | 0.42 | 0.52 | 16 in. | 0 | 0.09 |

| REVIEWED | Roof + Floor Bearing | | | | | | Wood Stud Properties | | | | | | | | | Rim Board Unity Checks | | | Truss | Additional | Truss Bearing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | TL | Number | Size | Spacing | Grade | Lu (in.) | Height | Wall Condition | Lateral Force | P allow. | Unity | Has Rim Board | Uniform Load | Concentrated Load | Spacing | Squash Blocks | Check |
| Roof (Flat) | 25 psf | 25 psf | 50 psf | 15.0 ft | 50 plf | 800 plf | 1.0 | 2x4 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 1323 plf | 0.60 | No | - | - | 24 in. | 0 | 0.27 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.0 ft | 100 plf | 2175 plf | 2.0 | 2x4 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 2938 plf | 0.74 | Yes | 0.18 | 0.27 | 16 in. | 0 | 0.31 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.0 ft | 100 plf | 3550 plf | 3.0 | 2x4 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 4591 plf | 0.77 | Yes | 0.50 | 0.54 | 16 in. | 0 | 0.31 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.0 ft | 100 plf | 4925 plf | 2.5 | 2x6 | 16.0 in. | No. 2 | 12 in. | 14 ft | Interior | 8 plf | 5943 plf | 0.83 | Yes | 0.82 | 0.71 | 16 in. | 0 | 0.31 |

## Unit Partition

| REVIEWED | Typical | | | | | | Wood Stud Properties | | | | | | | | | Rim Board Unity Checks | | | Truss | Additional | Truss Bearing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | TL | Number | Size | Spacing | Grade | Lu (in.) | Height | Wall Condition | Lateral Force | P allow. | Unity | Has Rim Board | Uniform Load | Concentrated Load | Spacing | Squash Blocks | Check |
| Roof (Flat) | 25 psf | 25 psf | 50 psf | 2.0 ft | 50 plf | 150 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 4047 plf | 0.04 | No | - | - | 24 in. | 0 | 0.05 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 1263 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 4047 plf | 0.31 | Yes | 0.03 | 0.05 | 16 in. | 0 | 0.25 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2375 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 4047 plf | 0.59 | Yes | 0.29 | 0.42 | 16 in. | 0 | 0.25 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 3488 plf | 2.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 14 ft | Interior | 8 plf | 4632 plf | 0.75 | Yes | 0.55 | 0.79 | 16 in. | 0 | 0.25 |

| REVIEWED | D3 | | | | | | Wood Stud Properties | | | | | | | | | Rim Board Unity Checks | | | Truss | Additional | Truss Bearing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | TL | Number | Size | Spacing | Grade | Lu (in.) | Height | Wall Condition | Lateral Force | P allow. | Unity | Has Rim Board | Uniform Load | Concentrated Load | Spacing | Squash Blocks | Check |
| Roof (Flat) | 25 psf | 25 psf | 50 psf | 2.0 ft | 50 plf | 150 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 4047 plf | 0.04 | No | - | - | 24 in. | 0 | 0.05 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 20.0 ft | 100 plf | 1750 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 4047 plf | 0.43 | Yes | 0.03 | 0.05 | 16 in. | 0 | 0.36 |

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Floor (Private) | 35 psf | 40 psf | 75 psf | 20.0 ft | 100 plf | 3350 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 4047 plf | 0.83 | Yes | 0.40 | 0.58 | 16 in. | 0 | 0.36 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 20.0 ft | 100 plf | 4950 plf | 2.5 | 2x6 | 16.0 in. | No. 2 | 12 in. | 14 ft | Interior | 8 plf | 5943 plf | 0.83 | Yes | 0.77 | 1.12 | 16 in. | 0 | 0.36 |

| REVIEWED | D5 | | | | | | Wood Stud Properties | | | | | | | | | | Rim Board Unity Checks | | | Truss | Additional | Truss Bearing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | TL | Number | Size | Spacing | Grade | Lu (in.) | Height | Wall Condition | Lateral Force | P allow. | Unity | Has Rim Board | Uniform Load | Concentrated Load | Spacing | Squash Blocks | Check |
| Roof (Flat) | 25 psf | 25 psf | 50 psf | 2.0 ft | 50 plf | 150 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 4047 plf | 0.04 | No | - | - | 24 in. | 0 | 0.05 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.0 ft | 100 plf | 1525 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 4047 plf | 0.38 | Yes | 0.03 | 0.05 | 16 in. | 0 | 0.31 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.0 ft | 100 plf | 2900 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 4047 plf | 0.72 | Yes | 0.35 | 0.51 | 16 in. | 0 | 0.31 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.0 ft | 100 plf | 4275 plf | 2.5 | 2x6 | 16.0 in. | No. 2 | 12 in. | 14 ft | Interior | 8 plf | 5943 plf | 0.72 | Yes | 0.67 | 0.97 | 16 in. | 0 | 0.31 |

**Unit Demising**

| REVIEWED | Typical | | | | | | Wood Stud Properties | | | | | | | | | | Rim Board Unity Checks | | | Truss | Additional | Truss Bearing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | TL | Number | Size | Spacing | Grade | Lu (in.) | Height | Wall Condition | Lateral Force | P allow. | Unity | Has Rim Board | Uniform Load | Concentrated Load | Spacing | Squash Blocks | Check |
| Roof (Flat) | 25 psf | 25 psf | 50 psf | 2.0 ft | 50 plf | 150 plf | 1.0 | 2x4 | 16.0 in. | No. 2 | 60 in. | 9 ft | Interior | 8 plf | 920 plf | 0.16 | No | - | - | 24 in. | 0 | 0.05 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 8.0 ft | 100 plf | 850 plf | 1.5 | 2x4 | 16.0 in. | No. 2 | 60 in. | 9 ft | Interior | 8 plf | 2119 plf | 0.40 | Yes | 0.03 | 0.05 | 16 in. | 0 | 0.16 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 8.0 ft | 100 plf | 1550 plf | 1.5 | 2x4 | 16.0 in. | No. 2 | 60 in. | 9 ft | Interior | 8 plf | 2119 plf | 0.73 | Yes | 0.20 | 0.24 | 16 in. | 0 | 0.16 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 8.0 ft | 100 plf | 2250 plf | 1.5 | 2x6 | 16.0 in. | No. 2 | 60 in. | 14 ft | Interior | 8 plf | 3324 plf | 0.68 | Yes | 0.36 | 0.44 | 16 in. | 0 | 0.16 |

| REVIEWED | D3 | | | | | | Wood Stud Properties | | | | | | | | | | Rim Board Unity Checks | | | Truss | Additional | Truss Bearing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | TL | Number | Size | Spacing | Grade | Lu (in.) | Height | Wall Condition | Lateral Force | P allow. | Unity | Has Rim Board | Uniform Load | Concentrated Load | Spacing | Squash Blocks | Check |
| Roof (Flat) | 25 psf | 25 psf | 50 psf | 2.0 ft | 50 plf | 150 plf | 1.0 | 2x4 | 16.0 in. | No. 2 | 60 in. | 9 ft | Interior | 8 plf | 920 plf | 0.16 | No | - | - | 24 in. | 0 | 0.05 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 14.0 ft | 100 plf | 1300 plf | 1.5 | 2x4 | 16.0 in. | No. 2 | 60 in. | 9 ft | Interior | 8 plf | 2119 plf | 0.61 | Yes | 0.03 | 0.05 | 16 in. | 0 | 0.26 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 14.0 ft | 100 plf | 2450 plf | 2.0 | 2x4 | 16.0 in. | No. 2 | 60 in. | 9 ft | Interior | 8 plf | 2935 plf | 0.83 | Yes | 0.30 | 0.37 | 16 in. | 0 | 0.26 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 14.0 ft | 100 plf | 3600 plf | 1.5 | 2x6 | 16.0 in. | No. 2 | 60 in. | 14 ft | Interior | 8 plf | 3324 plf | 1.08 | Yes | 0.56 | 0.61 | 16 in. | 0 | 0.26 |

| REVIEWED | E3 | | | | | | Wood Stud Properties | | | | | | | | | | Rim Board Unity Checks | | | Truss | Additional | Truss Bearing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | TL | Number | Size | Spacing | Grade | Lu (in.) | Height | Wall Condition | Lateral Force | P allow. | Unity | Has Rim Board | Uniform Load | Concentrated Load | Spacing | Squash Blocks | Check |
| Roof (Flat) | 25 psf | 25 psf | 50 psf | 2.0 ft | 50 plf | 150 plf | 1.0 | 2x4 | 16.0 in. | No. 2 | 60 in. | 9 ft | Interior | 8 plf | 920 plf | 0.16 | No | - | - | 24 in. | 0 | 0.05 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 11.0 ft | 100 plf | 1075 plf | 1.5 | 2x4 | 16.0 in. | No. 2 | 60 in. | 9 ft | Interior | 8 plf | 2119 plf | 0.51 | Yes | 0.03 | 0.05 | 16 in. | 0 | 0.21 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 11.0 ft | 100 plf | 2000 plf | 2.0 | 2x4 | 16.0 in. | No. 2 | 60 in. | 9 ft | Interior | 8 plf | 2935 plf | 0.68 | Yes | 0.25 | 0.31 | 16 in. | 0 | 0.21 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 11.0 ft | 100 plf | 2925 plf | 1.5 | 2x6 | 16.0 in. | No. 2 | 60 in. | 14 ft | Interior | 8 plf | 3324 plf | 0.88 | Yes | 0.46 | 0.50 | 16 in. | 0 | 0.21 |

**Stair/Elevator**

| REVIEWED | Exterior Wall - Roof + Landing Brg | | | | | | Wood Stud Properties | | | | | | | | | | Rim Board Unity Checks | | | Truss | Additional | Truss Bearing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | TL | Number | Size | Spacing | Grade | Lu (in.) | Height | Wall Condition | Lateral Force | P allow. | Unity | Has Rim Board | Uniform Load | Concentrated Load | Spacing | Squash Blocks | Check |
| Roof (Flat) | 25 psf | 25 psf | 50 psf | 13.0 ft | 50 plf | 700 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 60 in. | 9 ft | Exterior | 35 plf | 1329 plf | 0.53 | No | - | - | 24 in. | 0 | 0.24 |
| Floor (Public) | 35 psf | 100 psf | 135 psf | 4.0 ft | 100 plf | 1340 plf | 1.5 | 2x6 | 16.0 in. | No. 2 | 60 in. | 9 ft | Exterior | 35 plf | 4497 plf | 0.30 | Yes | 0.16 | 0.23 | 16 in. | 0 | 0.14 |
| Floor (Public) | 35 psf | 100 psf | 135 psf | 4.0 ft | 100 plf | 1980 plf | 1.5 | 2x6 | 16.0 in. | No. 2 | 60 in. | 9 ft | Exterior | 35 plf | 4497 plf | 0.44 | Yes | 0.31 | 0.38 | 16 in. | 0 | 0.14 |
| Floor (Public) | 35 psf | 100 psf | 135 psf | 4.0 ft | 100 plf | 2620 plf | 2.0 | 2x6 | 16.0 in. | No. 2 | 60 in. | 14 ft | Exterior | 35 plf | 3142 plf | 0.83 | Yes | 0.46 | 0.57 | 16 in. | 0 | 0.14 |

| REVIEWED | Interior Wall - Roof + Landing Brg | | | | | | Wood Stud Properties | | | | | | | | | | Rim Board Unity Checks | | | Truss | Additional | Truss Bearing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | TL | Number | Size | Spacing | Grade | Lu (in.) | Height | Wall Condition | Lateral Force | P allow. | Unity | Has Rim Board | Uniform Load | Concentrated Load | Spacing | Squash Blocks | Check |
| Roof (Flat) | 25 psf | 25 psf | 50 psf | 13.0 ft | 50 plf | 700 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 60 in. | 9 ft | Interior | 8 plf | 1601 plf | 0.44 | No | - | - | 24 in. | 0 | 0.24 |
| Floor (Public) | 35 psf | 100 psf | 135 psf | 4.0 ft | 100 plf | 1340 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 60 in. | 9 ft | Interior | 8 plf | 1601 plf | 0.84 | Yes | 0.16 | 0.23 | 16 in. | 0 | 0.14 |
| Floor (Public) | 35 psf | 100 psf | 135 psf | 4.0 ft | 100 plf | 1980 plf | 1.5 | 2x6 | 16.0 in. | No. 2 | 60 in. | 9 ft | Interior | 8 plf | 5021 plf | 0.39 | Yes | 0.31 | 0.45 | 16 in. | 0 | 0.14 |
| Floor (Public) | 35 psf | 100 psf | 135 psf | 4.0 ft | 100 plf | 2620 plf | 1.5 | 2x6 | 16.0 in. | No. 2 | 60 in. | 14 ft | Interior | 8 plf | 3324 plf | 0.79 | Yes | 0.46 | 0.57 | 16 in. | 0 | 0.14 |

**Paragon Star**
Stud Wall Design - Podium

**Bob D. Campbell & Co.**
7/22/2022

**Level Loadings**

| Type | DL | LL | TL |
|---|---|---|---|
| Balcony (Private) | 55 psf | 60 psf | 115 psf |
| Balcony (Public) | 55 psf | 100 psf | 155 psf |
| Floor (Private) | 35 psf | 40 psf | 75 psf |
| Floor (Public) | 35 psf | 100 psf | 135 psf |
| Roof (Flat) | 25 psf | 25 psf | 50 psf |
| Roof (Sloped) | 25 psf | 25 psf | 50 psf |
| Storage | 35 psf | 125 psf | 160 psf |

**Notes:**

**Wood Properties**

| Grade | Fb | Fc |
|---|---|---|
| Stud | 700 | 850 |
| No. 2 | 900 | 1350 |
| No. 1 | 1000 | 1500 |
| Sel. Struct. | 1500 | 1700 |

**Wind Pressure**

| | |
|---|---|
| Exterior | 25 psf |
| Interior | 5 psf |
| Special | - |

**Built-up Col Design (L=12', Lu=60")**

| | | P allow |
|---|---|---|
| (4) 2x4 @ 16"oc | 5 psf | 3656 plf |
| (4.5) 2x4 @ 16"oc | 5 psf | 4165 plf |
| (5) 2x4 @ 16"oc | 5 psf | 4673 plf |
| (5.5) 2x4 @ 16"oc | 5 psf | 5187 plf |
| (6) 2x4 @ 16"oc | 5 psf | 5700 plf |

**Truss Bearing Check**

| | |
|---|---|
| Allowable Bearing Stress | 565 psi |
| Number of Truss Verticals | 2 |

**Rim Board Check**

| | |
|---|---|
| Rim Board Width | 1.25 in. |
| Rim Board Depth | 18 in. |
| Allowable Uniform Load | 4340 plf |
| Allowable Bearing Stress | 710 psi |

## Exterior

| REVIEWED | Roof Bearing | | | | | | Wood Stud Properties | | | | | | | | | Rim Board Unity Checks | | | Truss | Additional | Truss Bearing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | TL | Number | Size | Spacing | Grade | Lu (in.) | Height | Wall Condition | Lateral Force | P allow. | Unity | Has Rim Board | Uniform Load | Concentrated Load | Spacing | Squash Blocks | Check |
| Roof (Flat) | 25 psf | 25 psf | 50 psf | 21.0 ft | 50 plf | 1100 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Exterior | 35 plf | 3931 plf | 0.28 | No | - | - | 24 in. | 0 | 0.37 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 1.0 ft | 100 plf | 1275 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Exterior | 35 plf | 3931 plf | 0.32 | Yes | 0.25 | 0.37 | 16 in. | 0 | 0.04 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 1.0 ft | 100 plf | 1450 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Exterior | 35 plf | 3931 plf | 0.37 | Yes | 0.29 | 0.43 | 16 in. | 0 | 0.04 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 1.0 ft | 100 plf | 1625 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Exterior | 35 plf | 3931 plf | 0.41 | Yes | 0.33 | 0.48 | 16 in. | 0 | 0.04 |

| REVIEWED | Roof + Balc | | | | | | Wood Stud Properties | | | | | | | | | Rim Board Unity Checks | | | Truss | Additional | Truss Bearing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | TL | Number | Size | Spacing | Grade | Lu (in.) | Height | Wall Condition | Lateral Force | P allow. | Unity | Has Rim Board | Uniform Load | Concentrated Load | Spacing | Squash Blocks | Check |
| Roof (Flat) | 25 psf | 25 psf | 50 psf | 21.0 ft | 50 plf | 1100 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Exterior | 35 plf | 3931 plf | 0.28 | No | - | - | 24 in. | 0 | 0.37 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 1.0 ft | 100 plf | 1275 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Exterior | 35 plf | 3931 plf | 0.32 | Yes | 0.25 | 0.37 | 16 in. | 0 | 0.04 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 1.0 ft | 100 plf | 1450 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Exterior | 35 plf | 3931 plf | 0.37 | Yes | 0.29 | 0.43 | 16 in. | 0 | 0.04 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 1.0 ft | 100 plf | 1625 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Exterior | 35 plf | 3931 plf | 0.41 | Yes | 0.33 | 0.48 | 16 in. | 0 | 0.04 |

| REVIEWED | Floor Bearing | | | | | | Wood Stud Properties | | | | | | | | | Rim Board Unity Checks | | | Truss | Additional | Truss Bearing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | TL | Number | Size | Spacing | Grade | Lu (in.) | Height | Wall Condition | Lateral Force | P allow. | Unity | Has Rim Board | Uniform Load | Concentrated Load | Spacing | Squash Blocks | Check |
| Roof (Flat) | 25 psf | 25 psf | 50 psf | 12.0 ft | 50 plf | 650 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Exterior | 35 plf | 3931 plf | 0.17 | No | - | - | 24 in. | 0 | 0.22 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 14.0 ft | 100 plf | 1800 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Exterior | 35 plf | 3931 plf | 0.46 | Yes | 0.15 | 0.22 | 16 in. | 0 | 0.26 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 14.0 ft | 100 plf | 2950 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Exterior | 35 plf | 3931 plf | 0.75 | Yes | 0.41 | 0.60 | 16 in. | 0 | 0.26 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 14.0 ft | 100 plf | 4100 plf | 1.5 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Exterior | 35 plf | 5665 plf | 0.72 | Yes | 0.68 | 0.98 | 16 in. | 0 | 0.26 |

## Corridor

| REVIEWED | Roof Bearing | | | | | | Wood Stud Properties | | | | | | | | | Rim Board Unity Checks | | | Truss | Additional | Truss Bearing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | TL | Number | Size | Spacing | Grade | Lu (in.) | Height | Wall Condition | Lateral Force | P allow. | Unity | Has Rim Board | Uniform Load | Concentrated Load | Spacing | Squash Blocks | Check |
| Roof (Flat) | 25 psf | 25 psf | 50 psf | 19.5 ft | 50 plf | 1025 plf | 1.0 | 2x4 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 1323 plf | 0.77 | No | - | - | 24 in. | 0 | 0.35 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 1425 plf | 1.5 | 2x4 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 2123 plf | 0.67 | Yes | 0.24 | 0.34 | 16 in. | 0 | 0.09 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 1825 plf | 1.5 | 2x4 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 2123 plf | 0.86 | Yes | 0.33 | 0.41 | 16 in. | 0 | 0.09 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 4.0 ft | 100 plf | 2225 plf | 2.0 | 2x4 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 2938 plf | 0.76 | Yes | 0.42 | 0.52 | 16 in. | 0 | 0.09 |

| REVIEWED | Roof + Floor Bearing | | | | | | Wood Stud Properties | | | | | | | | | Rim Board Unity Checks | | | Truss | Additional | Truss Bearing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | TL | Number | Size | Spacing | Grade | Lu (in.) | Height | Wall Condition | Lateral Force | P allow. | Unity | Has Rim Board | Uniform Load | Concentrated Load | Spacing | Squash Blocks | Check |
| Roof (Flat) | 25 psf | 25 psf | 50 psf | 15.0 ft | 50 plf | 800 plf | 1.0 | 2x4 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 1323 plf | 0.60 | No | - | - | 24 in. | 0 | 0.27 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.0 ft | 100 plf | 2175 plf | 2.0 | 2x4 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 2938 plf | 0.74 | Yes | 0.18 | 0.27 | 16 in. | 0 | 0.31 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.0 ft | 100 plf | 3550 plf | 3.0 | 2x4 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 4591 plf | 0.77 | Yes | 0.50 | 0.54 | 16 in. | 0 | 0.31 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.0 ft | 100 plf | 4925 plf | 3.5 | 2x4 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 5425 plf | 0.91 | Yes | 0.82 | 0.71 | 16 in. | 0 | 0.31 |

## Unit Partition

| REVIEWED | Typical | | | | | | Wood Stud Properties | | | | | | | | | Rim Board Unity Checks | | | Truss | Additional | Truss Bearing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | TL | Number | Size | Spacing | Grade | Lu (in.) | Height | Wall Condition | Lateral Force | P allow. | Unity | Has Rim Board | Uniform Load | Concentrated Load | Spacing | Squash Blocks | Check |
| Roof (Flat) | 25 psf | 25 psf | 50 psf | 2.0 ft | 50 plf | 150 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 4047 plf | 0.04 | No | - | - | 24 in. | 0 | 0.05 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 1263 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 4047 plf | 0.31 | Yes | 0.03 | 0.05 | 16 in. | 0 | 0.25 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 2375 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 4047 plf | 0.59 | Yes | 0.29 | 0.42 | 16 in. | 0 | 0.25 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 13.5 ft | 100 plf | 3488 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 4047 plf | 0.86 | Yes | 0.55 | 0.79 | 16 in. | 0 | 0.25 |

| REVIEWED | D3 | | | | | | Wood Stud Properties | | | | | | | | | Rim Board Unity Checks | | | Truss | Additional | Truss Bearing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | TL | Number | Size | Spacing | Grade | Lu (in.) | Height | Wall Condition | Lateral Force | P allow. | Unity | Has Rim Board | Uniform Load | Concentrated Load | Spacing | Squash Blocks | Check |
| Roof (Flat) | 25 psf | 25 psf | 50 psf | 2.0 ft | 50 plf | 150 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 4047 plf | 0.04 | No | - | - | 24 in. | 0 | 0.05 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 20.0 ft | 100 plf | 1750 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 4047 plf | 0.43 | Yes | 0.03 | 0.05 | 16 in. | 0 | 0.36 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 20.0 ft | 100 plf | 3350 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 4047 plf | 0.83 | Yes | 0.40 | 0.58 | 16 in. | 0 | 0.36 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 20.0 ft | 100 plf | 4950 plf | 1.5 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 5665 plf | 0.87 | Yes | 0.77 | 1.12 | 16 in. | 0 | 0.36 |

| REVIEWED | D5 | | | | | | Wood Stud Properties | | | | | | | | | Rim Board Unity Checks | | | Truss | Additional | Truss Bearing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| Level | DL | LL | TL | TW | Adt'l Ld | TL | Number | Size | Spacing | Grade | Lu (in.) | Height | Wall Condition | Lateral Force | P allow. | Unity | Has Rim Board | Uniform Load | Concentrated Load | Spacing | Squash Blocks | Check |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof (Flat) | 25 psf | 25 psf | 50 psf | 2.0 ft | 50 plf | 150 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 4047 plf | 0.04 | No | - | - | 24 in. | 0 | 0.05 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.0 ft | 100 plf | 1525 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 4047 plf | 0.38 | Yes | 0.03 | 0.05 | 16 in. | 0 | 0.31 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.0 ft | 100 plf | 2900 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 4047 plf | 0.72 | Yes | 0.35 | 0.51 | 16 in. | 0 | 0.31 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 17.0 ft | 100 plf | 4275 plf | 1.5 | 2x6 | 16.0 in. | No. 2 | 12 in. | 9 ft | Interior | 8 plf | 5665 plf | 0.75 | Yes | 0.67 | 0.97 | 16 in. | 0 | 0.31 |

**Unit Demising**

| REVIEWED | Typical | | | | | | Wood Stud Properties | | | | | | | | | | Rim Board Unity Checks | | | Truss | Additional | Truss Bearing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | TL | Number | Size | Spacing | Grade | Lu (in.) | Height | Wall Condition | Lateral Force | P allow. | Unity | Has Rim Board | Uniform Load | Concentrated Load | Spacing | Squash Blocks | Check |
| Roof (Flat) | 25 psf | 25 psf | 50 psf | 2.0 ft | 50 plf | 150 plf | 1.0 | 2x4 | 16.0 in. | No. 2 | 60 in. | 9 ft | Interior | 8 plf | 920 plf | 0.16 | No | - | - | 24 in. | 0 | 0.05 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 8.0 ft | 100 plf | 850 plf | 1.5 | 2x4 | 16.0 in. | No. 2 | 60 in. | 9 ft | Interior | 8 plf | 2119 plf | 0.40 | Yes | 0.03 | 0.05 | 16 in. | 0 | 0.16 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 8.0 ft | 100 plf | 1550 plf | 1.5 | 2x4 | 16.0 in. | No. 2 | 60 in. | 9 ft | Interior | 8 plf | 2119 plf | 0.73 | Yes | 0.20 | 0.24 | 16 in. | 0 | 0.16 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 8.0 ft | 100 plf | 2250 plf | 2.0 | 2x4 | 16.0 in. | No. 2 | 60 in. | 9 ft | Interior | 8 plf | 2935 plf | 0.77 | Yes | 0.36 | 0.44 | 16 in. | 0 | 0.16 |

| REVIEWED | D3 | | | | | | Wood Stud Properties | | | | | | | | | | Rim Board Unity Checks | | | Truss | Additional | Truss Bearing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | TL | Number | Size | Spacing | Grade | Lu (in.) | Height | Wall Condition | Lateral Force | P allow. | Unity | Has Rim Board | Uniform Load | Concentrated Load | Spacing | Squash Blocks | Check |
| Roof (Flat) | 25 psf | 25 psf | 50 psf | 2.0 ft | 50 plf | 150 plf | 1.0 | 2x4 | 16.0 in. | No. 2 | 60 in. | 9 ft | Interior | 8 plf | 920 plf | 0.16 | No | - | - | 24 in. | 0 | 0.05 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 14.0 ft | 100 plf | 1300 plf | 1.5 | 2x4 | 16.0 in. | No. 2 | 60 in. | 9 ft | Interior | 8 plf | 2119 plf | 0.61 | Yes | 0.03 | 0.05 | 16 in. | 0 | 0.26 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 14.0 ft | 100 plf | 2450 plf | 2.0 | 2x4 | 16.0 in. | No. 2 | 60 in. | 9 ft | Interior | 8 plf | 2935 plf | 0.83 | Yes | 0.30 | 0.37 | 16 in. | 0 | 0.26 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 14.0 ft | 100 plf | 3600 plf | 2.5 | 2x4 | 16.0 in. | No. 2 | 60 in. | 9 ft | Interior | 8 plf | 3759 plf | 0.96 | Yes | 0.56 | 0.61 | 16 in. | 0 | 0.26 |

| REVIEWED | E3 | | | | | | Wood Stud Properties | | | | | | | | | | Rim Board Unity Checks | | | Truss | Additional | Truss Bearing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | TL | Number | Size | Spacing | Grade | Lu (in.) | Height | Wall Condition | Lateral Force | P allow. | Unity | Has Rim Board | Uniform Load | Concentrated Load | Spacing | Squash Blocks | Check |
| Roof (Flat) | 25 psf | 25 psf | 50 psf | 2.0 ft | 50 plf | 150 plf | 1.0 | 2x4 | 16.0 in. | No. 2 | 60 in. | 9 ft | Interior | 8 plf | 920 plf | 0.16 | No | - | - | 24 in. | 0 | 0.05 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 11.0 ft | 100 plf | 1075 plf | 1.5 | 2x4 | 16.0 in. | No. 2 | 60 in. | 9 ft | Interior | 8 plf | 2119 plf | 0.51 | Yes | 0.03 | 0.05 | 16 in. | 0 | 0.21 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 11.0 ft | 100 plf | 2000 plf | 2.0 | 2x4 | 16.0 in. | No. 2 | 60 in. | 9 ft | Interior | 8 plf | 2935 plf | 0.68 | Yes | 0.25 | 0.31 | 16 in. | 0 | 0.21 |
| Floor (Private) | 35 psf | 40 psf | 75 psf | 11.0 ft | 100 plf | 2925 plf | 2.5 | 2x4 | 16.0 in. | No. 2 | 60 in. | 9 ft | Interior | 8 plf | 3759 plf | 0.78 | Yes | 0.46 | 0.50 | 16 in. | 0 | 0.21 |

**Stair/Elevator**

| REVIEWED | Exterior Wall - Roof + Landing Brg | | | | | | Wood Stud Properties | | | | | | | | | | Rim Board Unity Checks | | | Truss | Additional | Truss Bearing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | TL | Number | Size | Spacing | Grade | Lu (in.) | Height | Wall Condition | Lateral Force | P allow. | Unity | Has Rim Board | Uniform Load | Concentrated Load | Spacing | Squash Blocks | Check |
| Roof (Flat) | 25 psf | 25 psf | 50 psf | 13.0 ft | 50 plf | 700 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 60 in. | 9 ft | Exterior | 35 plf | 1329 plf | 0.53 | No | - | - | 24 in. | 0 | 0.24 |
| Floor (Public) | 35 psf | 100 psf | 135 psf | 4.0 ft | 100 plf | 1340 plf | 1.5 | 2x6 | 16.0 in. | No. 2 | 60 in. | 9 ft | Exterior | 35 plf | 4497 plf | 0.30 | Yes | 0.16 | 0.23 | 16 in. | 0 | 0.14 |
| Floor (Public) | 35 psf | 100 psf | 135 psf | 4.0 ft | 100 plf | 1980 plf | 1.5 | 2x6 | 16.0 in. | No. 2 | 60 in. | 9 ft | Exterior | 35 plf | 4497 plf | 0.44 | Yes | 0.31 | 0.38 | 16 in. | 0 | 0.14 |
| Floor (Public) | 35 psf | 100 psf | 135 psf | 4.0 ft | 100 plf | 2620 plf | 1.5 | 2x6 | 16.0 in. | No. 2 | 60 in. | 9 ft | Exterior | 35 plf | 4497 plf | 0.58 | Yes | 0.46 | 0.57 | 16 in. | 0 | 0.14 |

| REVIEWED | Interior Wall - Roof + Landing Brg | | | | | | Wood Stud Properties | | | | | | | | | | Rim Board Unity Checks | | | Truss | Additional | Truss Bearing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | DL | LL | TL | TW | Adt'l Ld | TL | Number | Size | Spacing | Grade | Lu (in.) | Height | Wall Condition | Lateral Force | P allow. | Unity | Has Rim Board | Uniform Load | Concentrated Load | Spacing | Squash Blocks | Check |
| Roof (Flat) | 25 psf | 25 psf | 50 psf | 13.0 ft | 50 plf | 700 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 60 in. | 9 ft | Interior | 8 plf | 1601 plf | 0.44 | No | - | - | 24 in. | 0 | 0.24 |
| Floor (Public) | 35 psf | 100 psf | 135 psf | 4.0 ft | 100 plf | 1340 plf | 1.0 | 2x6 | 16.0 in. | No. 2 | 60 in. | 9 ft | Interior | 8 plf | 1601 plf | 0.84 | Yes | 0.16 | 0.23 | 16 in. | 0 | 0.14 |
| Floor (Public) | 35 psf | 100 psf | 135 psf | 4.0 ft | 100 plf | 1980 plf | 1.5 | 2x6 | 16.0 in. | No. 2 | 60 in. | 9 ft | Interior | 8 plf | 5021 plf | 0.39 | Yes | 0.31 | 0.45 | 16 in. | 0 | 0.14 |
| Floor (Public) | 35 psf | 100 psf | 135 psf | 4.0 ft | 100 plf | 2620 plf | 1.5 | 2x6 | 16.0 in. | No. 2 | 60 in. | 9 ft | Interior | 8 plf | 5021 plf | 0.52 | Yes | 0.46 | 0.57 | 16 in. | 0 | 0.14 |

Project Title:
Engineer:
Project ID:
Project Descr:

# Steel Beam

Project File: FWI2101 - Paragon Star.ec6

LIC# : KW-06017302, Build:20.22.6.12 Bob D. Campbell and Co., Inc. (c) ENERCALC INC 1983-2022

**DESCRIPTION:** Yoga - Supporting Wood Beams - Btwn Grid B5/6

## CODE REFERENCES

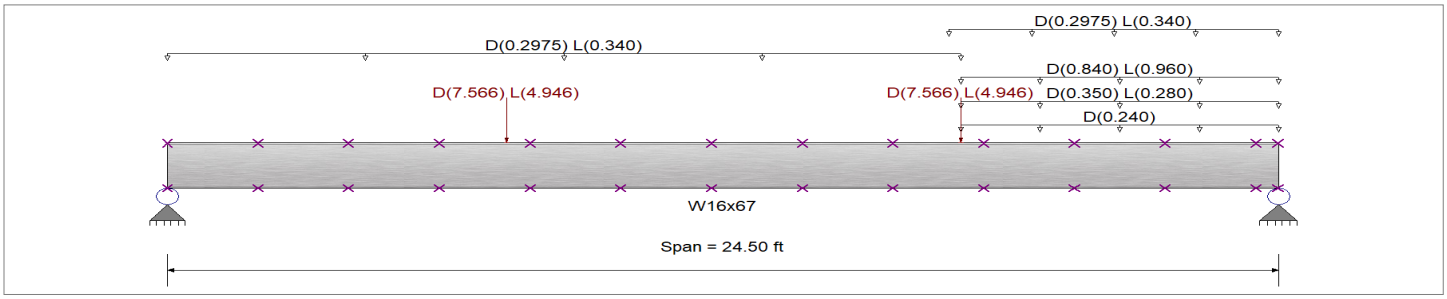
Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-10

## Material Properties

| | | | |
|---|---|---|---|
| Analysis Method : | Allowable Strength Design | Fy : Steel Yield : | 36.0 ksi |
| Beam Bracing : | Beam bracing is defined as a set spacing over all spans | E: Modulus : | 29,000.0 ksi |
| Bending Axis : | Major Axis Bending | | |

## Unbraced Lengths

First Brace starts at ft from Left-Most support
Regular spacing of lateral supports on length of beam = 2.0 ft




## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1

Uniform Load : D = 0.0080 ksf, Extent = 17.50 -->> 24.50 ft, Tributary Width = 30.0 ft, (Wall Self Weight Above)

Uniform Load : D = 0.0250, L = 0.020 ksf, Extent = 17.50 -->> 24.50 ft, Tributary Width = 14.0 ft, (Roof Load Above)

Uniform Load : D = 0.0350, L = 0.040 ksf, Extent = 17.50 -->> 24.50 ft, Tributary Width = 24.0 ft, ((2) Floor Load)

Uniform Load : D = 0.0350, L = 0.040 ksf, Extent = 0.0 -->> 17.50 ft, Tributary Width = 8.50 ft, (Floor Load)

Uniform Load : D = 0.0350, L = 0.040 ksf, Extent = 17.250 -->> 24.50 ft, Tributary Width = 8.50 ft, (Floor Load)

Point Load : D = 7.566, L = 4.946 k @ 17.50 ft, (Wood Beam Reaction)

Point Load : D = 7.566, L = 4.946 k @ 7.50 ft, (Wood Beam Reaction)

## DESIGN SUMMARY

**Design OK**

| | | | |
|---|---|---|---|
| Maximum Bending Stress Ratio = | 0.776 : 1 | Maximum Shear Stress Ratio = | 0.405 : 1 |
| Section used for this span | W16x67 | Section used for this span | W16x67 |
| Ma : Applied | 181.145 k-ft | Va : Applied | 37.531 k |
| Mn / Omega : Allowable | 233.533 k-ft | Vn/Omega : Allowable | 92.714 k |
| Load Combination | +D+L | Load Combination | +D+L |
| | | Location of maximum on span | 24.500 ft |
| Span # where maximum occurs | Span # 1 | Span # where maximum occurs | Span # 1 |

Maximum Deflection

| | | | | |
|---|---|---|---|---|
| Max Downward Transient Deflection | 0.318 in | Ratio = | 923 | >=480. |
| Max Upward Transient Deflection | 0.000 in | Ratio = | 0 | <480.0 Span: 1 : L Only |
| Max Downward Total Deflection | 0.733 in | Ratio = | 401 | >=360. Span: 1 : +D+L |
| Max Upward Total Deflection | 0.000 in | Ratio = | 0 | <360.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | Summary of Moment Values Mmax + | Mmax - | Ma Max | Mnx | Mnx/Omega | Cb | Rm | Summary of Shear Values Va Max | VnxVnx/Omega |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D Only | | | | | | | | | | | | |
| Dsgn. L = 1.96 ft | 1 | 0.109 | 0.144 | 25.42 | | 25.42 | 390.00 | 233.53 | 1.65 | 1.00 | 13.33 | 139.07 92.71 |

Project Title:
Engineer:
Project ID:
Project Descr:

# Steel Beam

Project File: FWI2101 - Paragon Star.ec6

LIC# : KW-06017302, Build:20.22.6.12 Bob D. Campbell and Co., Inc. (c) ENERCALC INC 1983-2022

**DESCRIPTION:** Yoga - Supporting Wood Beams - Btwn Grid B5/6

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | Summary of Moment Values Mmax + | Mmax - | Ma Max | Mnx | Mnx/Omega | Cb | Rm | Summary of Shear Values Va Max | VnxVnx/Omega |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dsgn. L = 2.03 ft | 1 | 0.215 | 0.136 | 50.28 | 25.42 | 50.28 | 390.00 | 233.53 | 1.25 | 1.00 | 12.61 | 139.07 | 92.71 |
| Dsgn. L = 1.96 ft | 1 | 0.312 | 0.128 | 72.85 | 50.28 | 72.85 | 390.00 | 233.53 | 1.14 | 1.00 | 11.87 | 139.07 | 92.71 |
| Dsgn. L = 2.03 ft | 1 | 0.390 | 0.120 | 91.12 | 72.85 | 91.12 | 390.00 | 233.53 | 1.07 | 1.00 | 11.16 | 139.07 | 92.71 |
| Dsgn. L = 1.96 ft | 1 | 0.411 | 0.031 | 96.02 | 91.12 | 96.02 | 390.00 | 233.53 | 1.02 | 1.00 | 2.85 | 139.07 | 92.71 |
| Dsgn. L = 2.03 ft | 1 | 0.427 | 0.023 | 99.61 | 96.02 | 99.61 | 390.00 | 233.53 | 1.01 | 1.00 | 2.14 | 139.07 | 92.71 |
| Dsgn. L = 2.03 ft | 1 | 0.435 | 0.015 | 101.70 | 99.61 | 101.70 | 390.00 | 233.53 | 1.01 | 1.00 | 1.40 | 139.07 | 92.71 |
| Dsgn. L = 1.96 ft | 1 | 0.438 | 0.007 | 102.29 | 101.70 | 102.29 | 390.00 | 233.53 | 1.00 | 1.00 | 0.66 | 139.07 | 92.71 |
| Dsgn. L = 2.03 ft | 1 | 0.438 | 0.099 | 102.29 | 97.50 | 102.29 | 390.00 | 233.53 | 1.00 | 1.00 | 9.14 | 139.07 | 92.71 |
| Dsgn. L = 1.96 ft | 1 | 0.418 | 0.136 | 97.50 | 76.15 | 97.50 | 390.00 | 233.53 | 1.09 | 1.00 | 12.65 | 139.07 | 92.71 |
| Dsgn. L = 2.03 ft | 1 | 0.326 | 0.176 | 76.15 | 46.76 | 76.15 | 390.00 | 233.53 | 1.16 | 1.00 | 16.30 | 139.07 | 92.71 |
| Dsgn. L = 1.96 ft | 1 | 0.200 | 0.214 | 46.76 | 11.38 | 46.76 | 390.00 | 233.53 | 1.41 | 1.00 | 19.81 | 139.07 | 92.71 |
| Dsgn. L = 0.56 ft | 1 | 0.049 | 0.225 | 11.38 | | 11.38 | 390.00 | 233.53 | 1.66 | 1.00 | 20.82 | 139.07 | 92.71 |
| +D+L | | | | | | | | | | | | | |
| Dsgn. L = 1.96 ft | 1 | 0.192 | 0.255 | 44.91 | | 44.91 | 390.00 | 233.53 | 1.65 | 1.00 | 23.60 | 139.07 | 92.71 |
| Dsgn. L = 2.03 ft | 1 | 0.379 | 0.240 | 88.57 | 44.91 | 88.57 | 390.00 | 233.53 | 1.25 | 1.00 | 22.22 | 139.07 | 92.71 |
| Dsgn. L = 1.96 ft | 1 | 0.548 | 0.224 | 127.97 | 88.57 | 127.97 | 390.00 | 233.53 | 1.14 | 1.00 | 20.79 | 139.07 | 92.71 |
| Dsgn. L = 2.03 ft | 1 | 0.685 | 0.209 | 159.92 | 127.97 | 159.92 | 390.00 | 233.53 | 1.07 | 1.00 | 19.41 | 139.07 | 92.71 |
| Dsgn. L = 1.96 ft | 1 | 0.725 | 0.059 | 169.28 | 159.92 | 169.28 | 390.00 | 233.53 | 1.02 | 1.00 | 5.47 | 139.07 | 92.71 |
| Dsgn. L = 2.03 ft | 1 | 0.754 | 0.044 | 176.13 | 169.28 | 176.13 | 390.00 | 233.53 | 1.02 | 1.00 | 4.09 | 139.07 | 92.71 |
| Dsgn. L = 2.03 ft | 1 | 0.771 | 0.029 | 180.07 | 176.13 | 180.07 | 390.00 | 233.53 | 1.01 | 1.00 | 2.66 | 139.07 | 92.71 |
| Dsgn. L = 1.96 ft | 1 | 0.776 | 0.013 | 181.15 | 180.07 | 181.15 | 390.00 | 233.53 | 1.00 | 1.00 | 1.23 | 139.07 | 92.71 |
| Dsgn. L = 2.03 ft | 1 | 0.776 | 0.168 | 181.13 | 172.82 | 181.13 | 390.00 | 233.53 | 1.00 | 1.00 | 15.56 | 139.07 | 92.71 |
| Dsgn. L = 1.96 ft | 1 | 0.740 | 0.239 | 172.82 | 135.83 | 172.82 | 390.00 | 233.53 | 1.09 | 1.00 | 22.18 | 139.07 | 92.71 |
| Dsgn. L = 2.03 ft | 1 | 0.582 | 0.313 | 135.83 | 83.86 | 135.83 | 390.00 | 233.53 | 1.16 | 1.00 | 29.03 | 139.07 | 92.71 |
| Dsgn. L = 1.96 ft | 1 | 0.359 | 0.384 | 83.86 | 20.49 | 83.86 | 390.00 | 233.53 | 1.41 | 1.00 | 35.64 | 139.07 | 92.71 |
| Dsgn. L = 0.56 ft | 1 | 0.088 | 0.405 | 20.49 | | 20.49 | 390.00 | 233.53 | 1.66 | 1.00 | 37.53 | 139.07 | 92.71 |
| +D+0.750L | | | | | | | | | | | | | |
| Dsgn. L = 1.96 ft | 1 | 0.171 | 0.227 | 40.04 | | 40.04 | 390.00 | 233.53 | 1.65 | 1.00 | 21.03 | 139.07 | 92.71 |
| Dsgn. L = 2.03 ft | 1 | 0.338 | 0.214 | 79.00 | 40.04 | 79.00 | 390.00 | 233.53 | 1.25 | 1.00 | 19.82 | 139.07 | 92.71 |
| Dsgn. L = 1.96 ft | 1 | 0.489 | 0.200 | 114.19 | 79.00 | 114.19 | 390.00 | 233.53 | 1.14 | 1.00 | 18.56 | 139.07 | 92.71 |
| Dsgn. L = 2.03 ft | 1 | 0.611 | 0.187 | 142.72 | 114.19 | 142.72 | 390.00 | 233.53 | 1.07 | 1.00 | 17.35 | 139.07 | 92.71 |
| Dsgn. L = 1.96 ft | 1 | 0.646 | 0.052 | 150.97 | 142.72 | 150.97 | 390.00 | 233.53 | 1.02 | 1.00 | 4.82 | 139.07 | 92.71 |
| Dsgn. L = 2.03 ft | 1 | 0.672 | 0.039 | 157.00 | 150.97 | 157.00 | 390.00 | 233.53 | 1.02 | 1.00 | 3.60 | 139.07 | 92.71 |
| Dsgn. L = 2.03 ft | 1 | 0.687 | 0.025 | 160.48 | 157.00 | 160.48 | 390.00 | 233.53 | 1.01 | 1.00 | 2.34 | 139.07 | 92.71 |
| Dsgn. L = 1.96 ft | 1 | 0.691 | 0.012 | 161.43 | 160.48 | 161.43 | 390.00 | 233.53 | 1.00 | 1.00 | 1.09 | 139.07 | 92.71 |
| Dsgn. L = 2.03 ft | 1 | 0.691 | 0.151 | 161.42 | 153.99 | 161.42 | 390.00 | 233.53 | 1.00 | 1.00 | 13.96 | 139.07 | 92.71 |
| Dsgn. L = 1.96 ft | 1 | 0.659 | 0.214 | 153.99 | 120.91 | 153.99 | 390.00 | 233.53 | 1.09 | 1.00 | 19.80 | 139.07 | 92.71 |
| Dsgn. L = 2.03 ft | 1 | 0.518 | 0.279 | 120.91 | 74.59 | 120.91 | 390.00 | 233.53 | 1.16 | 1.00 | 25.84 | 139.07 | 92.71 |
| Dsgn. L = 1.96 ft | 1 | 0.319 | 0.342 | 74.59 | 18.21 | 74.59 | 390.00 | 233.53 | 1.41 | 1.00 | 31.68 | 139.07 | 92.71 |
| Dsgn. L = 0.56 ft | 1 | 0.078 | 0.360 | 18.21 | | 18.21 | 390.00 | 233.53 | 1.66 | 1.00 | 33.35 | 139.07 | 92.71 |
| +0.60D | | | | | | | | | | | | | |
| Dsgn. L = 1.96 ft | 1 | 0.065 | 0.086 | 15.25 | | 15.25 | 390.00 | 233.53 | 1.65 | 1.00 | 8.00 | 139.07 | 92.71 |
| Dsgn. L = 2.03 ft | 1 | 0.129 | 0.082 | 30.17 | 15.25 | 30.17 | 390.00 | 233.53 | 1.25 | 1.00 | 7.57 | 139.07 | 92.71 |
| Dsgn. L = 1.96 ft | 1 | 0.187 | 0.077 | 43.71 | 30.17 | 43.71 | 390.00 | 233.53 | 1.14 | 1.00 | 7.12 | 139.07 | 92.71 |
| Dsgn. L = 2.03 ft | 1 | 0.234 | 0.072 | 54.67 | 43.71 | 54.67 | 390.00 | 233.53 | 1.07 | 1.00 | 6.70 | 139.07 | 92.71 |
| Dsgn. L = 1.96 ft | 1 | 0.247 | 0.018 | 57.61 | 54.67 | 57.61 | 390.00 | 233.53 | 1.02 | 1.00 | 1.71 | 139.07 | 92.71 |
| Dsgn. L = 2.03 ft | 1 | 0.256 | 0.014 | 59.76 | 57.61 | 59.76 | 390.00 | 233.53 | 1.01 | 1.00 | 1.28 | 139.07 | 92.71 |
| Dsgn. L = 2.03 ft | 1 | 0.261 | 0.009 | 61.02 | 59.76 | 61.02 | 390.00 | 233.53 | 1.01 | 1.00 | 0.84 | 139.07 | 92.71 |
| Dsgn. L = 1.96 ft | 1 | 0.263 | 0.004 | 61.38 | 61.02 | 61.38 | 390.00 | 233.53 | 1.00 | 1.00 | 0.40 | 139.07 | 92.71 |
| Dsgn. L = 2.03 ft | 1 | 0.263 | 0.059 | 61.37 | 58.50 | 61.37 | 390.00 | 233.53 | 1.00 | 1.00 | 5.48 | 139.07 | 92.71 |
| Dsgn. L = 1.96 ft | 1 | 0.251 | 0.082 | 58.50 | 45.69 | 58.50 | 390.00 | 233.53 | 1.09 | 1.00 | 7.59 | 139.07 | 92.71 |
| Dsgn. L = 2.03 ft | 1 | 0.196 | 0.105 | 45.69 | 28.06 | 45.69 | 390.00 | 233.53 | 1.16 | 1.00 | 9.78 | 139.07 | 92.71 |
| Dsgn. L = 1.96 ft | 1 | 0.120 | 0.128 | 28.06 | 6.83 | 28.06 | 390.00 | 233.53 | 1.41 | 1.00 | 11.89 | 139.07 | 92.71 |
| Dsgn. L = 0.56 ft | 1 | 0.029 | 0.135 | 6.83 | | 6.83 | 390.00 | 233.53 | 1.66 | 1.00 | 12.49 | 139.07 | 92.71 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|---|---|---|---|---|---|---|
| +D+L | 1 | 0.7328 | 12.600 | | 0.0000 | 0.000 |

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Overall MAXimum | 23.603 | 37.530 |
| Overall MINimum | 7.997 | 12.491 |

Project Title:
Engineer:
Project ID:
Project Descr:

# Steel Beam

Project File: FWI2101 - Paragon Star.ec6

LIC# : KW-06017302, Build:20.22.6.12 Bob D. Campbell and Co., Inc. (c) ENERCALC INC 1983-2022

**DESCRIPTION:** Yoga - Supporting Wood Beams - Btwn Grid B5/6

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| D Only | 13.328 | 20.818 |
| +D+L | 23.603 | 37.530 |
| +D+0.750L | 21.034 | 33.352 |
| +0.60D | 7.997 | 12.491 |
| L Only | 10.275 | 16.712 |

Project Title:
Engineer:
Project ID:
Project Descr:

# Steel Beam

Project File: FWI2101 - Paragon Star.ec6

LIC# : KW-06017302, Build:20.22.6.12 Bob D. Campbell and Co., Inc. (c) ENERCALC INC 1983-2022

**DESCRIPTION:** Fitness Center - Unit Partition Above - Paralled w/ Grid B8

## CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-10

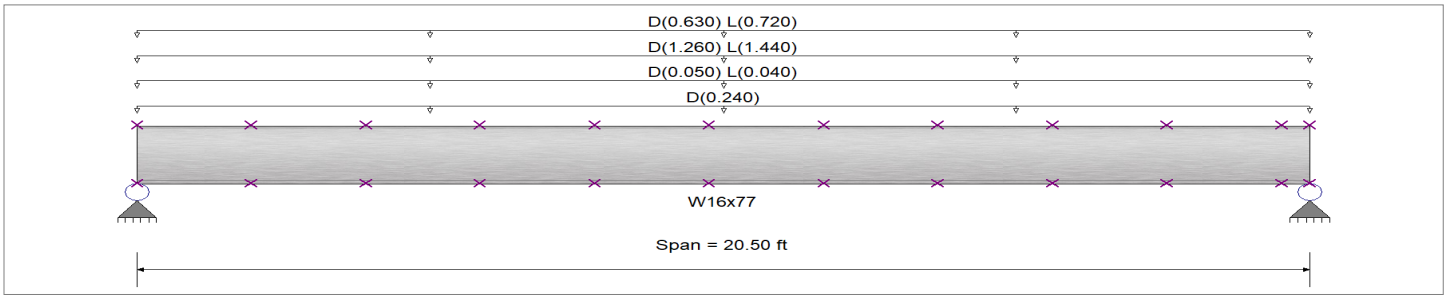
## Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam bracing is defined as a set spacing over all spans
Bending Axis : Major Axis Bending

Fy : Steel Yield : 36.0 ksi
E: Modulus : 29,000.0 ksi

## Unbraced Lengths

First Brace starts at ft from Left-Most support
Regular spacing of lateral supports on length of beam = 2.0 ft




## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Uniform Load : D = 0.0080 ksf, Tributary Width = 30.0 ft, (Wall Self Weight Above)

Uniform Load : D = 0.0250, L = 0.020 ksf, Tributary Width = 2.0 ft, (Roof Load Above)

Uniform Load : D = 0.0350, L = 0.040 ksf, Tributary Width = 36.0 ft, ((2) Floor Load Above)

Uniform Load : D = 0.0350, L = 0.040 ksf, Tributary Width = 18.0 ft, (Floor Load)

## DESIGN SUMMARY

**Design OK**

| | | | |
|---|---|---|---|
| Maximum Bending Stress Ratio = | 0.869 : 1 | Maximum Shear Stress Ratio = | 0.423 : 1 |
| Section used for this span | W16x77 | Section used for this span | W16x77 |
| Ma : Applied | 234.132 k-ft | Va : Applied | 45.684 k |
| Mn / Omega : Allowable | 269.461 k-ft | Vn/Omega : Allowable | 108.108 k |
| Load Combination | +D+L | Load Combination | +D+L |
| | | Location of maximum on span | 0.000 ft |
| Span # where maximum occurs | Span # 1 | Span # where maximum occurs | Span # 1 |

Maximum Deflection

| | | | | | |
|---|---|---|---|---|---|
| Max Downward Transient Deflection | 0.273 in | Ratio = | 901 | >=480. | |
| Max Upward Transient Deflection | 0.000 in | Ratio = | 0 | <480.0 | Span: 1 : L Only |
| Max Downward Total Deflection | 0.553 in | Ratio = | 445 | >=360. | Span: 1 : +D+L |
| Max Upward Total Deflection | 0.000 in | Ratio = | 0 | <360.0 | |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | Summary of Moment Values Mmax + | Mmax - | Ma Max | Mnx | Mnx/Omega | Cb | Rm | Summary of Shear Values Va Max | VnxVnx/Omega | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D Only | | | | | | | | | | | | | |
| Dsgn. L = 1.99 ft | 1 | 0.154 | 0.214 | 41.59 | | 41.59 | 450.00 | 269.46 | 1.64 | 1.00 | 23.13 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.276 | 0.172 | 74.24 | 41.59 | 74.24 | 450.00 | 269.46 | 1.20 | 1.00 | 18.64 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.363 | 0.131 | 97.93 | 74.24 | 97.93 | 450.00 | 269.46 | 1.10 | 1.00 | 14.14 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.418 | 0.089 | 112.67 | 97.93 | 112.67 | 450.00 | 269.46 | 1.05 | 1.00 | 9.65 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.440 | 0.048 | 118.47 | 112.67 | 118.47 | 450.00 | 269.46 | 1.01 | 1.00 | 5.16 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.440 | 0.035 | 118.56 | 115.31 | 118.56 | 450.00 | 269.46 | 1.01 | 1.00 | 3.83 | 162.16 | 108.11 |
| Dsgn. L = 2.05 ft | 1 | 0.428 | 0.078 | 115.31 | 102.71 | 115.31 | 450.00 | 269.46 | 1.04 | 1.00 | 8.46 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.381 | 0.120 | 102.71 | 81.38 | 102.71 | 450.00 | 269.46 | 1.08 | 1.00 | 12.96 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.302 | 0.161 | 81.38 | 51.11 | 81.38 | 450.00 | 269.46 | 1.16 | 1.00 | 17.45 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.190 | 0.203 | 51.11 | 11.88 | 51.11 | 450.00 | 269.46 | 1.40 | 1.00 | 21.94 | 162.16 | 108.11 |

Project Title:
Engineer:
Project ID:
Project Descr:

# Steel Beam

Project File: FWI2101 - Paragon Star.ec6

LIC# : KW-06017302, Build:20.22.6.12 Bob D. Campbell and Co., Inc. (c) ENERCALC INC 1983-2022

**DESCRIPTION:** Fitness Center - Unit Partition Above - Paralled w/ Grid B8

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | Summary of Moment Values Mmax + | Mmax - | Ma Max | Mnx | Mnx/Omega | Cb | Rm | Summary of Shear Values Va Max | VnxVnx/Omega | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dsgn. L = 0.53 ft | 1 | 0.044 | 0.214 | 11.88 | | 11.88 | 450.00 | 269.46 | 1.54 | 1.00 | 23.13 | 162.16 | 108.11 |
| +D+L | | | | | | | | | | | | | |
| Dsgn. L = 1.99 ft | 1 | 0.305 | 0.423 | 82.14 | | 82.14 | 450.00 | 269.46 | 1.64 | 1.00 | 45.68 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.544 | 0.340 | 146.60 | 82.14 | 146.60 | 450.00 | 269.46 | 1.20 | 1.00 | 36.81 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.718 | 0.258 | 193.39 | 146.60 | 193.39 | 450.00 | 269.46 | 1.10 | 1.00 | 27.93 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.826 | 0.176 | 222.50 | 193.39 | 222.50 | 450.00 | 269.46 | 1.05 | 1.00 | 19.06 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.868 | 0.094 | 233.94 | 222.50 | 233.94 | 450.00 | 269.46 | 1.01 | 1.00 | 10.18 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.869 | 0.070 | 234.13 | 227.70 | 234.13 | 450.00 | 269.46 | 1.01 | 1.00 | 7.57 | 162.16 | 108.11 |
| Dsgn. L = 2.05 ft | 1 | 0.845 | 0.155 | 227.70 | 202.82 | 227.70 | 450.00 | 269.46 | 1.04 | 1.00 | 16.71 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.753 | 0.237 | 202.82 | 160.71 | 202.82 | 450.00 | 269.46 | 1.08 | 1.00 | 25.58 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.596 | 0.319 | 160.71 | 100.92 | 160.71 | 450.00 | 269.46 | 1.16 | 1.00 | 34.46 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.375 | 0.401 | 100.92 | 23.46 | 100.92 | 450.00 | 269.46 | 1.40 | 1.00 | 43.33 | 162.16 | 108.11 |
| Dsgn. L = 0.53 ft | 1 | 0.087 | 0.423 | 23.46 | | 23.46 | 450.00 | 269.46 | 1.54 | 1.00 | 45.68 | 162.16 | 108.11 |
| +D+0.750L | | | | | | | | | | | | | |
| Dsgn. L = 1.99 ft | 1 | 0.267 | 0.370 | 72.00 | | 72.00 | 450.00 | 269.46 | 1.64 | 1.00 | 40.05 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.477 | 0.298 | 128.51 | 72.00 | 128.51 | 450.00 | 269.46 | 1.20 | 1.00 | 32.27 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.629 | 0.226 | 169.53 | 128.51 | 169.53 | 450.00 | 269.46 | 1.10 | 1.00 | 24.49 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.724 | 0.155 | 195.05 | 169.53 | 195.05 | 450.00 | 269.46 | 1.05 | 1.00 | 16.71 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.761 | 0.083 | 205.07 | 195.05 | 205.07 | 450.00 | 269.46 | 1.01 | 1.00 | 8.92 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.762 | 0.061 | 205.24 | 199.60 | 205.24 | 450.00 | 269.46 | 1.01 | 1.00 | 6.64 | 162.16 | 108.11 |
| Dsgn. L = 2.05 ft | 1 | 0.741 | 0.135 | 199.60 | 177.79 | 199.60 | 450.00 | 269.46 | 1.04 | 1.00 | 14.65 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.660 | 0.207 | 177.79 | 140.88 | 177.79 | 450.00 | 269.46 | 1.08 | 1.00 | 22.43 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.523 | 0.279 | 140.88 | 88.47 | 140.88 | 450.00 | 269.46 | 1.16 | 1.00 | 30.21 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.328 | 0.351 | 88.47 | 20.57 | 88.47 | 450.00 | 269.46 | 1.40 | 1.00 | 37.99 | 162.16 | 108.11 |
| Dsgn. L = 0.53 ft | 1 | 0.076 | 0.370 | 20.57 | | 20.57 | 450.00 | 269.46 | 1.54 | 1.00 | 40.05 | 162.16 | 108.11 |
| +0.60D | | | | | | | | | | | | | |
| Dsgn. L = 1.99 ft | 1 | 0.093 | 0.128 | 24.96 | | 24.96 | 450.00 | 269.46 | 1.64 | 1.00 | 13.88 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.165 | 0.103 | 44.54 | 24.96 | 44.54 | 450.00 | 269.46 | 1.20 | 1.00 | 11.18 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.218 | 0.079 | 58.76 | 44.54 | 58.76 | 450.00 | 269.46 | 1.10 | 1.00 | 8.49 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.251 | 0.054 | 67.60 | 58.76 | 67.60 | 450.00 | 269.46 | 1.05 | 1.00 | 5.79 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.264 | 0.029 | 71.08 | 67.60 | 71.08 | 450.00 | 269.46 | 1.01 | 1.00 | 3.09 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.264 | 0.021 | 71.14 | 69.18 | 71.14 | 450.00 | 269.46 | 1.01 | 1.00 | 2.30 | 162.16 | 108.11 |
| Dsgn. L = 2.05 ft | 1 | 0.257 | 0.047 | 69.18 | 61.62 | 69.18 | 450.00 | 269.46 | 1.04 | 1.00 | 5.08 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.229 | 0.072 | 61.62 | 48.83 | 61.62 | 450.00 | 269.46 | 1.08 | 1.00 | 7.77 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.181 | 0.097 | 48.83 | 30.66 | 48.83 | 450.00 | 269.46 | 1.16 | 1.00 | 10.47 | 162.16 | 108.11 |
| Dsgn. L = 1.99 ft | 1 | 0.114 | 0.122 | 30.66 | 7.13 | 30.66 | 450.00 | 269.46 | 1.40 | 1.00 | 13.17 | 162.16 | 108.11 |
| Dsgn. L = 0.53 ft | 1 | 0.026 | 0.128 | 7.13 | | 7.13 | 450.00 | 269.46 | 1.54 | 1.00 | 13.88 | 162.16 | 108.11 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|---|---|---|---|---|---|---|
| +D+L | 1 | 0.5527 | 10.309 | | 0.0000 | 0.000 |

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Overall MAXimum | 45.684 | 45.684 |
| Overall MINimum | 13.881 | 13.881 |
| D Only | 23.134 | 23.134 |
| +D+L | 45.684 | 45.684 |
| +D+0.750L | 40.047 | 40.047 |
| +0.60D | 13.881 | 13.881 |
| L Only | 22.550 | 22.550 |

Project Title:
Engineer:
Project ID:
Project Descr:

# Steel Beam

Project File: FWI2101 - Paragon Star.ec6

LIC# : KW-06017302, Build:20.22.6.12 Bob D. Campbell and Co., Inc. (c) ENERCALC INC 1983-2022

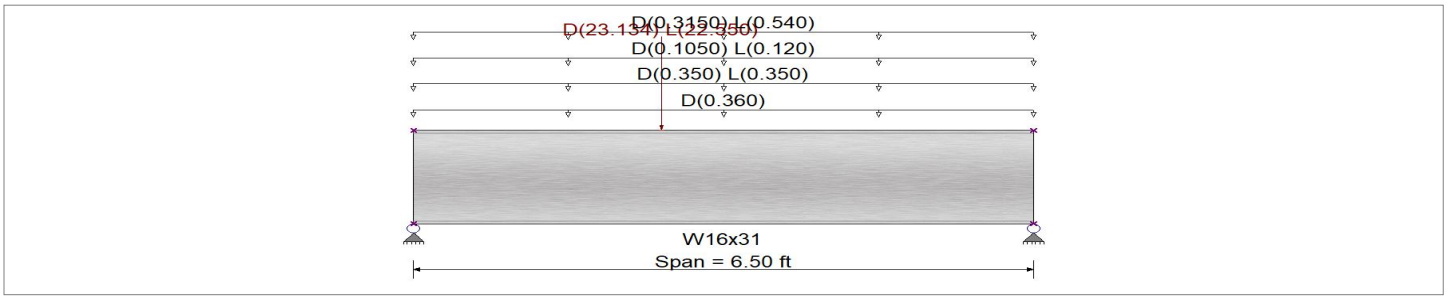
**DESCRIPTION:** Fitness Center - Header Supporting Steel Beam

## CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-10

## Material Properties

| | | | |
|---|---|---|---|
| Analysis Method : | Allowable Strength Design | Fy : Steel Yield : | 36.0 ksi |
| Beam Bracing : | Completely Unbraced | E: Modulus : | 29,000.0 ksi |
| Bending Axis : | Major Axis Bending | | |




## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Uniform Load : D = 0.0120 ksf, Tributary Width = 30.0 ft, (Wall Self Weight Above)

Uniform Load : D = 0.0250, L = 0.0250 ksf, Tributary Width = 14.0 ft, (Roof Load Above)

Uniform Load : D = 0.0350, L = 0.040 ksf, Tributary Width = 3.0 ft, ((3) Floor Load Above)

Uniform Load : D = 0.0350, L = 0.060 ksf, Tributary Width = 9.0 ft, ((3) Balcony Load Above)

Point Load : D = 23.134, L = 22.550 k @ 2.60 ft, (Steel Beam Reaction)

## DESIGN SUMMARY

**Design OK**

| | | | |
|---|---|---|---|
| Maximum Bending Stress Ratio = | 0.848 : 1 | Maximum Shear Stress Ratio = | 0.547 : 1 |
| Section used for this span | W16x31 | Section used for this span | W16x31 |
| Ma : Applied | 82.274 k-ft | Va : Applied | 34.466 k |
| Mn / Omega : Allowable | 97.006 k-ft | Vn/Omega : Allowable | 62.964 k |
| Load Combination | +D+L | Load Combination | +D+L |
| | | Location of maximum on span | 0.000 ft |
| Span # where maximum occurs | Span # 1 | Span # where maximum occurs | Span # 1 |

Maximum Deflection

| | | | | | |
|---|---|---|---|---|---|
| Max Downward Transient Deflection | 0.023 in | Ratio = | 3,352 | >=480. | |
| Max Upward Transient Deflection | 0.000 in | Ratio = | 0 | <480.0 | Span: 1 : L Only |
| Max Downward Total Deflection | 0.048 in | Ratio = | 1639 | >=360. | Span: 1 : +D+L |
| Max Upward Total Deflection | 0.000 in | Ratio = | 0 | <360.0 | |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | Summary of Moment Values Mmax + | Mmax - | Ma Max | Mnx | Mnx/Omega | Cb | Rm | Summary of Shear Values Va Max | VnxVnx/Omega |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D Only | | | | | | | | | | | | |
| Dsgn. L = 6.50 ft | 1 | 0.433 | 0.280 | 41.98 | | 41.98 | 162.00 | 97.01 | 1.35 | 1.00 | 17.65 | 94.45 62.96 |
| +D+L | | | | | | | | | | | | |
| Dsgn. L = 6.50 ft | 1 | 0.848 | 0.547 | 82.27 | | 82.27 | 162.00 | 97.01 | 1.35 | 1.00 | 34.47 | 94.45 62.96 |
| +D+0.750L | | | | | | | | | | | | |
| Dsgn. L = 6.50 ft | 1 | 0.744 | 0.481 | 72.20 | | 72.20 | 162.00 | 97.01 | 1.35 | 1.00 | 30.26 | 94.45 62.96 |
| +0.60D | | | | | | | | | | | | |
| Dsgn. L = 6.50 ft | 1 | 0.260 | 0.168 | 25.19 | | 25.19 | 162.00 | 97.01 | 1.35 | 1.00 | 10.59 | 94.45 62.96 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|---|---|---|---|---|---|---|
| +D+L | 1 | 0.0476 | 3.101 | | 0.0000 | 0.000 |

Project Title:
Engineer:
Project ID:
Project Descr:

# Steel Beam

Project File: FWI2101 - Paragon Star.ec6

LIC# : KW-06017302, Build:20.22.6.12 Bob D. Campbell and Co., Inc. (c) ENERCALC INC 1983-2022

**DESCRIPTION:** Fitness Center - Header Supporting Steel Beam

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Overall MAXimum | 34.466 | 25.329 |
| Overall MINimum | 10.592 | 7.816 |
| D Only | 17.654 | 13.027 |
| +D+L | 34.466 | 25.329 |
| +D+0.750L | 30.263 | 22.254 |
| +0.60D | 10.592 | 7.816 |
| L Only | 16.813 | 12.303 |

Project Title:
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: FWI2101 - Paragon Star.ec6

LIC# : KW-06017302, Build:20.22.3.31 Bob D. Campbell and Co., Inc. (c) ENERCALC INC 1983-2022

**DESCRIPTION:** Balcony 3/S2.21 - Cantilevered Beam

## CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-10

## Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-10

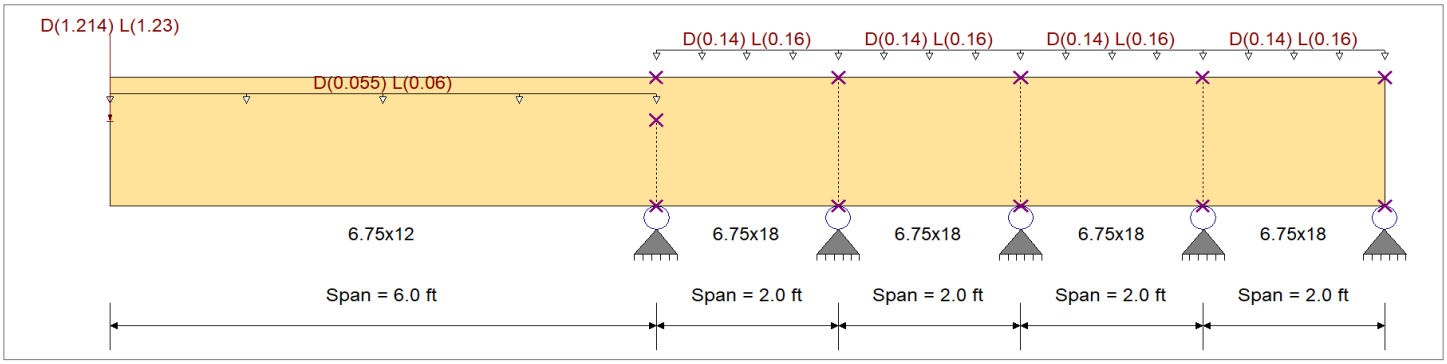
Wood Species : DF/DF
Wood Grade : 24F-V8

Beam Bracing : Completely Unbraced

| | |
|---|---|
| Fb + | 2,400.0 psi |
| Fb - | 2,400.0 psi |
| Fc - Prll | 1,650.0 psi |
| Fc - Perp | 650.0 psi |
| Fv | 265.0 psi |
| Ft | 1,100.0 psi |

*E : Modulus of Elasticity*

| | |
|---|---|
| Ebend- xx | 1,800.0 ksi |
| Eminbend - xx | 950.0 ksi |
| Ebend- yy | 1,600.0 ksi |
| Eminbend - yy | 850.0 ksi |
| Density | 31.210 pcf |




## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.0550, L = 0.060 , Tributary Width = 1.0 ft, (Balcony Load)
Point Load : D = 1.214, L = 1.230 k @ 0.0 ft, (Edge Beam)
Load for Span Number 2
Uniform Load : D = 0.140, L = 0.160 , Tributary Width = 1.0 ft, (Floor Load)
Load for Span Number 3
Uniform Load : D = 0.140, L = 0.160 , Tributary Width = 1.0 ft
Load for Span Number 4
Uniform Load : D = 0.140, L = 0.160 , Tributary Width = 1.0 ft
Load for Span Number 5
Uniform Load : D = 0.140, L = 0.160 , Tributary Width = 1.0 ft

## DESIGN SUMMARY

**Design OK**

| | | | | | |
|---|---|---|---|---|---|
| Maximum Bending Stress Ratio | = | 0.529 : 1 | Maximum Shear Stress Ratio | = | 0.739 : 1 |
| Section used for this span | | 6.75x12 | Section used for this span | | 6.75x12 |
| fb: Actual | = | 1,262.96 psi | fv: Actual | = | 195.88 psi |
| Fb: Allowable | = | 2,389.35 psi | Fv: Allowable | = | 265.00 psi |
| Load Combination | | +D+L | Load Combination | | +D+L |
| Location of maximum on span | = | 6.000 ft | Location of maximum on span | = | 6.000 ft |
| Span # where maximum occurs | = | Span # 1 | Span # where maximum occurs | = | Span # 1 |

### Maximum Deflection

| | | | | |
|---|---|---|---|---|
| Max Downward Transient Deflection | 0.106 in | Ratio = | 1352 >=480 | Span: 5 : L Only |
| Max Upward Transient Deflection | 0 in | Ratio = | 0 <480 | n/a |
| Max Downward Total Deflection | 0.214 in | Ratio = | 672 >=360 | Span: 5 : +D+L |
| Max Upward Total Deflection | -0.001 in | Ratio = | 23842 >=360 | Span: 4 : +D+L |

## Maximum Forces & Stresses for Load Combinations

| Load Combination | | Max Stress Ratios | | | | | | | | | Moment Values | | | Shear Values | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Segment Length | Span # | M | V | $C_d$ | $C_{F/V}$ | $C_i$ | $C_r$ | $C_m$ | $C_t$ | $C_L$ | M | fb | F'b | V | fv | F'v |
| D Only | | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 |
| Length = 6.0 ft | 1 | 0.296 | 0.414 | 0.90 | 1.000 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 8.59 | 636.30 | 2151.44 | 5.33 | 98.66 | 238.50 |

Project Title:
Engineer:
Project ID:
Project Descr:

# Wood Beam

Project File: FWI2101 - Paragon Star.ec6

LIC# : KW-06017302, Build:20.22.3.31 Bob D. Campbell and Co., Inc. (c) ENERCALC INC 1983-2022

**DESCRIPTION:** Balcony 3/S2.21 - Cantilevered Beam

## Maximum Forces & Stresses for Load Combinations

| Load Combination | | Max Stress Ratios | | | | | | | | | Moment Values | | | Shear Values | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Segment Length | Span # | M | V | $C_d$ | $C_{F/V}$ | $C_i$ | $C_r$ | $C_m$ | $C_t$ | $C_L$ | M | fb | F'b | V | fv | F'v |
| Length = 2.0 ft | **2** | 0.131 | 0.276 | 0.90 | 1.000 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 8.59 | 282.80 | 2155.87 | 5.33 | 65.77 | 238.50 |
| Length = 2.0 ft | **3** | 0.034 | 0.276 | 0.90 | 1.000 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.23 | 73.40 | 2155.87 | 1.53 | 65.77 | 238.50 |
| Length = 2.0 ft | **4** | 0.010 | 0.276 | 0.90 | 1.000 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.66 | 21.76 | 2155.87 | 0.29 | 65.77 | 238.50 |
| Length = 2.0 ft | **5** | 0.002 | 0.276 | 0.90 | 1.000 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.13 | 4.26 | 2155.87 | 0.13 | 65.77 | 238.50 |
| +D+L | | | | | 1.000 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 0.00 | 0.00 | 0.00 | 0.00 |
| Length = 6.0 ft | **1** | 0.529 | 0.739 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 17.05 | 1,262.96 | 2389.35 | 10.58 | 195.88 | 265.00 |
| Length = 2.0 ft | **2** | 0.234 | 0.493 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 17.05 | 561.32 | 2394.88 | 10.58 | 130.59 | 265.00 |
| Length = 2.0 ft | **3** | 0.061 | 0.493 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 4.43 | 145.75 | 2394.88 | 3.04 | 130.59 | 265.00 |
| Length = 2.0 ft | **4** | 0.018 | 0.493 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.31 | 43.16 | 2394.88 | 0.58 | 130.59 | 265.00 |
| Length = 2.0 ft | **5** | 0.004 | 0.493 | 1.00 | 1.000 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.26 | 8.42 | 2394.88 | 0.25 | 130.59 | 265.00 |
| +D+0.750L | | | | | 1.000 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 0.00 | 0.00 | 0.00 | 0.00 |
| Length = 6.0 ft | **1** | 0.371 | 0.518 | 1.25 | 1.000 | 1.00 | 1.00 | 1.00 | 1.00 | 0.99 | 14.94 | 1,106.30 | 2983.02 | 9.27 | 171.57 | 331.25 |
| Length = 2.0 ft | **2** | 0.164 | 0.345 | 1.25 | 1.000 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 14.94 | 491.69 | 2991.92 | 9.27 | 114.38 | 331.25 |
| Length = 2.0 ft | **3** | 0.043 | 0.345 | 1.25 | 1.000 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 3.88 | 127.66 | 2991.92 | 2.66 | 114.38 | 331.25 |
| Length = 2.0 ft | **4** | 0.013 | 0.345 | 1.25 | 1.000 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.15 | 37.81 | 2991.92 | 0.50 | 114.38 | 331.25 |
| Length = 2.0 ft | **5** | 0.002 | 0.345 | 1.25 | 1.000 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.22 | 7.38 | 2991.92 | 0.22 | 114.38 | 331.25 |
| +0.60D | | | | | 1.000 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 0.00 | 0.00 | 0.00 | 0.00 |
| Length = 6.0 ft | **1** | 0.100 | 0.140 | 1.60 | 1.000 | 1.00 | 1.00 | 1.00 | 1.00 | 0.99 | 5.15 | 381.78 | 3811.37 | 3.20 | 59.20 | 424.00 |
| Length = 2.0 ft | **2** | 0.044 | 0.093 | 1.60 | 1.000 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 5.15 | 169.68 | 3826.58 | 3.20 | 39.46 | 424.00 |
| Length = 2.0 ft | **3** | 0.012 | 0.093 | 1.60 | 1.000 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.34 | 44.04 | 3826.58 | 0.92 | 39.46 | 424.00 |
| Length = 2.0 ft | **4** | 0.003 | 0.093 | 1.60 | 1.000 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.40 | 13.06 | 3826.58 | 0.17 | 39.46 | 424.00 |
| Length = 2.0 ft | **5** | 0.001 | 0.093 | 1.60 | 1.000 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.08 | 2.55 | 3826.58 | 0.08 | 39.46 | 424.00 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|---|---|---|---|---|---|---|
| +D+L | 1 | 0.2140 | 0.000 | | 0.0000 | 0.000 |
| | 2 | 0.0000 | 0.000 | +D+L | -0.0010 | 0.785 |
| +D+L | 3 | 0.0003 | 0.785 | | 0.0000 | 0.785 |
| | 4 | 0.0000 | 0.785 | +D+L | -0.0001 | 0.759 |
| +D+L | 5 | 0.0000 | 0.962 | | 0.0000 | 0.759 |

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 | Support 5 | Support 6 |
|---|---|---|---|---|---|---|
| Overall MAXimum | | 14.304 | -12.955 | 4.260 | -0.167 | 0.409 |
| Overall MINimum | | 7.079 | -6.522 | 2.110 | -0.080 | 0.201 |
| D Only | | 7.225 | -6.522 | 2.150 | -0.080 | 0.207 |
| +D+L | | 14.304 | -12.955 | 4.260 | -0.167 | 0.409 |
| +D+0.750L | | 12.535 | -11.347 | 3.732 | -0.146 | 0.358 |
| +0.60D | | 4.335 | -3.913 | 1.290 | -0.048 | 0.124 |
| L Only | | 7.079 | -6.432 | 2.110 | -0.087 | 0.201 |

Title Block Line 1
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using the "Settings" menu item
and then using the "Printing &
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Title Block Line 6

Project Title:
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Printed: 13 DEC 2021, 3:15PM

# Wood Column

File: FWI2101 - Paragon Star.ec6

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: 5' Corridor Opening Jamb - 2x4

## Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-10

## General Information

Analysis Method : Allowable Stress Design
End Fixities : Top & Bottom Pinned
Overall Column Height : 14 ft
*( Used for non-slender calculations )*

Wood Species : iLevel Truss Joist
Wood Grade : Parallam PSL 1.8E

| | | | |
|---|---|---|---|
| Fb + | 2,400.0 psi | Fv | 190.0 psi |
| Fb - | 2,400.0 psi | Ft | 1,755.0 psi |
| Fc - Prll | 2,500.0 psi | Density | 45.070 pcf |
| Fc - Perp | 425.0 psi | | |

| E : Modulus of Elasticity . . . | x-x Bending | y-y Bending | Axial |
|---|---|---|---|
| Basic | 1,800.0 | 1,800.0 | 1,800.0 ksi |
| Minimum | 914.88 | 914.88 | |

Wood Section Name : **3.5x5.25**
Wood Grading/Manuf. : Trus-Joist
Wood Member Type : Parallam PSL

| | | |
|---|---|---|
| Exact Width | **3.50** | in |
| Exact Depth | **5.250** | in |
| Area | 18.375 | in^2 |
| Ix | 42.205 | in^4 |
| Iy | 18.758 | in^4 |

Allow Stress Modification Factors

| | |
|---|---|
| Cf or Cv for Bending | 1.096 |
| Cf or Cv for Compression | 1.0 |
| Cf or Cv for Tension | 1.0 |
| Cm : Wet Use Factor | 1.0 |
| Ct : Temperature Factor | 1.0 |
| Cfu : Flat Use Factor | 1.0 |
| Kf : Built-up columns | 1.0 *NDS 15.3.2* |
| Use Cr : Repetitive ? | No |

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for buckling ABOUT Y-Y Axis = 7 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 14 ft, K = 1.0

## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 80.516 lbs * Dead Load Factor
AXIAL LOADS . . .
Concentrated Load: Axial Load at 14.0 ft, Yecc = 0.8750 in, D = 4.104, L = 4.104 k

## *DESIGN SUMMARY*

### Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.8908** : 1
Load Combination : +D+L
Governing NDS Forumla : 1Comp + Mxx, NDS Eq. 3.9-3
Location of max.above base : 13.906 ft
At maximum location values are . . .
Applied Axial : 8.289 k
Applied Mx : -0.5945 k-ft
Applied My : 0.0 k-ft
Fc : Allowable : 706.57 psi

PASS Maximum Shear Stress Ratio = **0.01837** : 1
Load Combination : +D+L
Location of max.above base : 14.0 ft
Applied Design Shear : 3.490 psi
Allowable Shear : 190.0 psi

**Maximum SERVICE Lateral Load Reactions . .**

| | | | |
|---|---|---|---|
| Top along Y-Y | 0.04275 k | Bottom along Y-Y | 0.04275 k |
| Top along X-X | 0.0 k | Bottom along X-X | 0.0 k |

Maximum SERVICE Load Lateral Deflections . . .
Along Y-Y : -0.1727 in at 8.175 ft above base
for load combination : +D+L
Along X-X : 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

| | Bending | Compression | Tension |
|---|---|---|---|

## Load Combination Results

| Load Combination | $C_D$ | $C_P$ | Maximum Axial + Bending Stress Ratios: Stress Ratio | Status | Location | Maximum Shear Ratios: Stress Ratio | Status | Location |
|---|---|---|---|---|---|---|---|---|
| D Only | 0.900 | 0.312 | 0.3243 | PASS | 13.906 ft | 0.01020 | PASS | 14.0 ft |
| +D+L | 1.000 | 0.283 | 0.8908 | PASS | 13.906 ft | 0.01837 | PASS | 14.0 ft |
| +D+0.750L | 1.250 | 0.228 | 0.5903 | PASS | 13.906 ft | 0.01286 | PASS | 14.0 ft |
| +0.60D | 1.600 | 0.180 | 0.1902 | PASS | 13.906 ft | 0.003444 | PASS | 14.0 ft |

## Maximum Reactions

Note: Only non-zero reactions are listed.

| Load Combination | X-X Axis Reaction k @ Base | @ Top | Y-Y Axis Reaction @ Base | @ Top | Axial Reaction @ Base | My - End Moments k-ft @ Base | @ Top | Mx - End Moments @ Base | @ Top |
|---|---|---|---|---|---|---|---|---|---|
| D Only | | | -0.021 | 0.021 | 4.185 | | | | |
| +D+L | | | -0.043 | 0.043 | 8.289 | | | | |
| +D+0.750L | | | -0.037 | 0.037 | 7.263 | | | | |

Title Block Line 1
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using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 13 DEC 2021, 3:15PM

# Wood Column

File: FWI2101 - Paragon Star.ec6

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Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: 5' Corridor Opening Jamb - 2x4

## Maximum Reactions

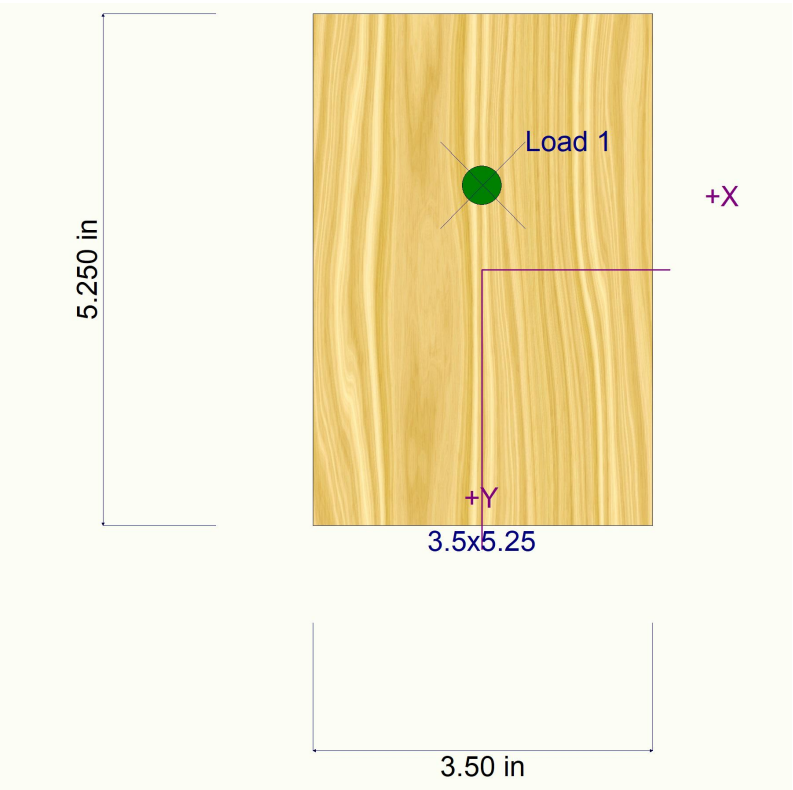
Note: Only non-zero reactions are listed.

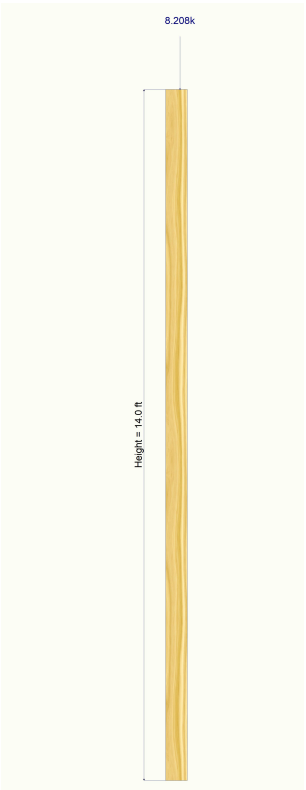
| Load Combination | X-X Axis Reaction @ Base | @ Top | k | Y-Y Axis Reaction @ Base | @ Top | Axial Reaction @ Base | My - End Moments @ Base | @ Top | k-ft | Mx - End Moments @ Base | @ Top |
|---|---|---|---|---|---|---|---|---|---|---|---|
| +0.60D | | | | -0.013 | 0.013 | 2.511 | | | | | |
| L Only | | | | -0.021 | 0.021 | 4.104 | | | | | |

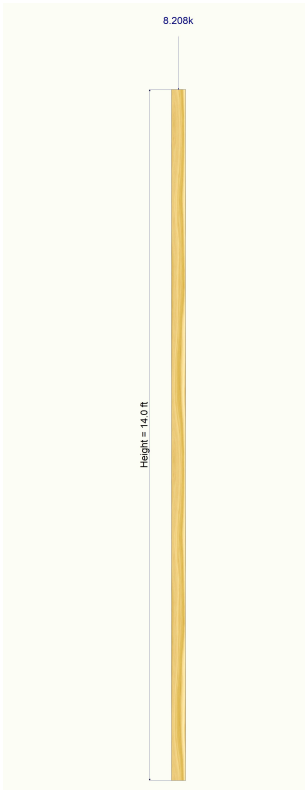
## Maximum Deflections for Load Combinations

| Load Combination | Max. X-X Deflection | | Distance | | Max. Y-Y Deflection | | Distance | |
|---|---|---|---|---|---|---|---|---|
| D Only | 0.0000 | in | 0.000 | ft | -0.0863 | in | 8.174 | ft |
| +D+L | 0.0000 | in | 0.000 | ft | -0.1727 | in | 8.174 | ft |
| +D+0.750L | 0.0000 | in | 0.000 | ft | -0.1511 | in | 8.174 | ft |
| +0.60D | 0.0000 | in | 0.000 | ft | -0.0518 | in | 8.174 | ft |
| L Only | 0.0000 | in | 0.000 | ft | -0.0863 | in | 8.174 | ft |

## Sketches



Project Title:
Engineer:
Project ID:
Project Descr:

# Wood Column

Project File: FWI2101 - Paragon Star.ec6

LIC# : KW-06017302, Build:20.22.6.12 Bob D. Campbell and Co., Inc. (c) ENERCALC INC 1983-2022

**DESCRIPTION:** 14' Post Height - Capacity - (5) 2x6's - 13.2k

## Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-10

## General Information

| | | | | | |
|---|---|---|---|---|---|
| Analysis Method | Allowable Stress Design | | | | |
| End Fixities | Top & Bottom Pinned | | | | |
| Overall Column Height | 14 ft | | | | |
| *( Used for non-slender calculations )* | | | | | |
| Wood Species | Southern Pine | | | | |
| Wood Grade | No.2: 2"-4" Thick: 2"-4" Wide | | | | |
| Fb + | 1,100.0 psi | Fv | 175.0 psi | | |
| Fb - | 1,100.0 psi | Ft | 675.0 psi | | |
| Fc - Prll | 1,450.0 psi | Density | 34.330 pcf | | |
| Fc - Perp | 565.0 psi | | | | |

| E : Modulus of Elasticity . . . | x-x Bending | y-y Bending | Axial |
|---|---|---|---|
| Basic | 1,400.0 | 1,400.0 | 1,400.0 ksi |
| Minimum | 510.0 | 510.0 | |

| | | | |
|---|---|---|---|
| Wood Section Name | **5-2x6** | | |
| Wood Grading/Manuf. | Southern Pine | | |
| Wood Member Type | Sawn | | |
| Exact Width | **7.50** in | Allow Stress Modification Factors | |
| Exact Depth | **5.50** in | Cf or Cv for Bending | 1.0 |
| Area | 41.250 in^2 | Cf or Cv for Compressio | 1.0 |
| Ix | 103.984 in^4 | Cf or Cv for Tension | 1.0 |
| Iy | 193.359 in^4 | Cm : Wet Use Factor | 1.0 |
| | | Ct : Temperature Fact | 1.0 |
| | | Cfu : Flat Use Factor | 1.0 |
| | | Kf : Built-up columns | 0.60 *NDS 15.3.2* |
| | | Use Cr : Repetitive ? | No |

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for buckling ABOUT Y-Y Axis = 14 ft, k
Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 14 ft, k

## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 137.678 lbs * Dead Load Factor
AXIAL LOADS . . .
Concentrated Load: Axial Load at 14.0 ft, Xecc = 0.8750 in, D = 6.60, L = 6.60 k
BENDING LOADS . . .
Internal Wind Pressure: Lat. Uniform Load creating My-y, W = 0.0050 k/ft

## DESIGN SUMMARY

Bending & Shear Check Results

**PASS** Max. Axial+Bending Stress Ratio = **0.8952 : 1**

| | |
|---|---|
| Load Combination | +D+L |
| Governing NDS Forumla | Comp + Myy, NDS Eq. 3.9-3 |
| Location of max.above base | 13.906 ft |
| At maximum location values are . | |
| Applied Axial | 13.338 k |
| Applied Mx | 0.0 k-ft |
| Applied My | -0.9560 k-ft |
| Fc : Allowable | 431.075 psi |

**PASS** Maximum Shear Stress Ratio = **0.01429 : 1**

| | |
|---|---|
| Load Combination | +D+L |
| Location of max.above base | 14.0 ft |
| Applied Design Shear | 2.50 psi |
| Allowable Shear | 175.0 psi |

**Maximum SERVICE Lateral Load Reactions . .**

| | | | |
|---|---|---|---|
| Top along Y-Y | 0.0 k | Bottom along Y-Y | 0.0 k |
| Top along X-X | 0.07591 k | Bottom along X-X | 0.06875 k |

**Maximum SERVICE Load Lateral Deflections . . .**

Along Y-Y 0.0 in at 0.0 ft above base
for load combination : n/a

Along X-X -0.07792 in at 8.175 ft above base
for load combination : +D+L

**Other Factors used to calculate allowable stresses . . .**

| | Bending | Compression | Tension |
|---|---|---|---|

## Load Combination Results

| Load Combination | $C_D$ | $C_P$ | Maximum Axial + Bending Stress Ratios: Stress Ratio | Status | Location | Maximum Shear Ratios: Stress Ratio | Status | Location |
|---|---|---|---|---|---|---|---|---|
| D Only | 0.900 | 0.328 | 0.3813 | PASS | 0.0 ft | 0.007937 | PASS | 14.0 ft |
| +D+L | 1.000 | 0.297 | 0.8952 | PASS | 13.906 ft | 0.01429 | PASS | 14.0 ft |
| +D+0.750L | 1.250 | 0.240 | 0.6505 | PASS | 0.0 ft | 0.010 | PASS | 14.0 ft |
| +D+0.60W | 1.600 | 0.189 | 0.3720 | PASS | 0.0 ft | 0.007192 | PASS | 14.0 ft |
| +D+0.750L+0.450W | 1.600 | 0.189 | 0.6453 | PASS | 0.0 ft | 0.009858 | PASS | 14.0 ft |
| +0.60D+0.60W | 1.600 | 0.189 | 0.2232 | PASS | 0.0 ft | 0.005406 | PASS | 14.0 ft |
| +0.60D | 1.600 | 0.189 | 0.2232 | PASS | 0.0 ft | 0.002679 | PASS | 14.0 ft |

Project Title:
Engineer:
Project ID:
Project Descr:

# Wood Column

Project File: FWI2101 - Paragon Star.ec6

LIC# : KW-06017302, Build:20.22.6.12 Bob D. Campbell and Co., Inc. (c) ENERCALC INC 1983-2022

**DESCRIPTION:** 14' Post Height - Capacity - (5) 2x6's - 13.2k

## Maximum Reactions

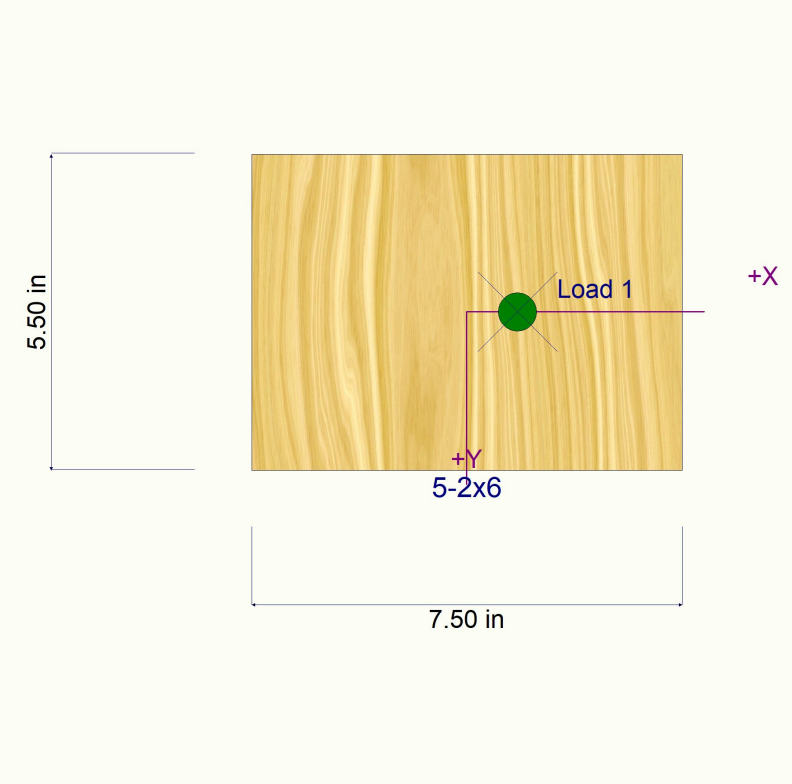
Note: Only non-zero reactions are listed.

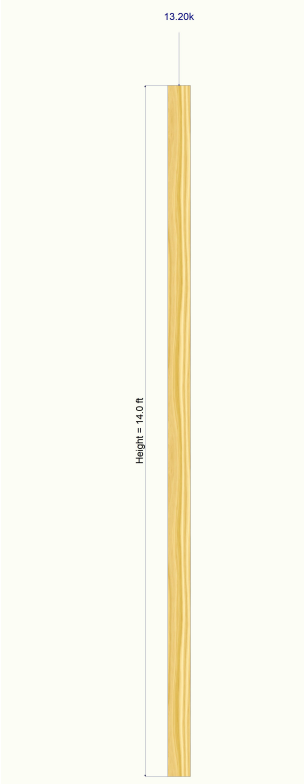
| Load Combination | X-X Axis Reaction @ Base | @ Top | k | Y-Y Axis Reaction @ Base | @ Top | Axial Reaction @ Base | My - End Moments @ Base | @ Top | k-ft | Mx - End Moments @ Base | @ Top |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D Only | -0.034 | 0.034 | | | | 6.738 | | | | | |
| +D+L | -0.069 | 0.069 | | | | 13.338 | | | | | |
| +D+0.750L | -0.060 | 0.060 | | | | 11.688 | | | | | |
| +D+0.60W | -0.013 | 0.055 | | | | 6.738 | | | | | |
| +D+0.750L+0.450W | -0.044 | 0.076 | | | | 11.688 | | | | | |
| +0.60D+0.60W | 0.000 | 0.042 | | | | 4.043 | | | | | |
| +0.60D | -0.021 | 0.021 | | | | 4.043 | | | | | |
| L Only | -0.034 | 0.034 | | | | 6.600 | | | | | |
| W Only | 0.035 | 0.035 | | | | | | | | | |

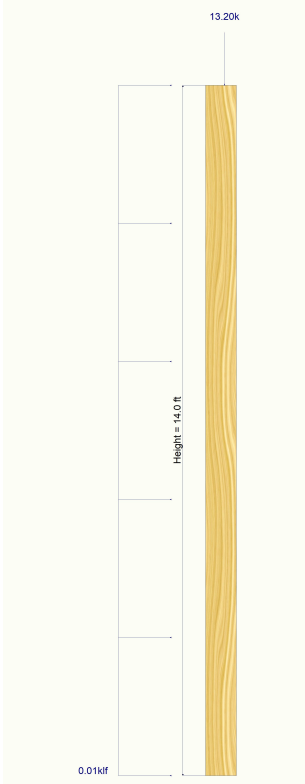
## Maximum Deflections for Load Combinations

| Load Combination | Max. X-X Deflection | Distance | Max. Y-Y Deflection | Distance |
|---|---|---|---|---|
| D Only | -0.0390 in | 8.174ft | 0.000 in | 0.000 ft |
| +D+L | -0.0779 in | 8.174ft | 0.000 in | 0.000 ft |
| +D+0.750L | -0.0682 in | 8.174ft | 0.000 in | 0.000 ft |
| +D+0.60W | -0.0296 in | 8.456ft | 0.000 in | 0.000 ft |
| +D+0.750L+0.450W | -0.0612 in | 8.268ft | 0.000 in | 0.000 ft |
| +0.60D+0.60W | -0.0142 in | 8.926ft | 0.000 in | 0.000 ft |
| +0.60D | -0.0234 in | 8.174ft | 0.000 in | 0.000 ft |
| L Only | -0.0390 in | 8.174ft | 0.000 in | 0.000 ft |
| W Only | 0.0161 in | 7.047ft | 0.000 in | 0.000 ft |

## Sketches



Title Block Line 1
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and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 14 DEC 2021, 9:11AM

# Wood Column

File: FWI2101 - Paragon Star.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24
Lic. # : KW-06011403
Bob D. Campbell and Co., Inc.

DESCRIPTION: 14' Post Height - Capacity - (5) 2x4's - 4.0k

## Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-10

## General Information

Analysis Method : Allowable Stress Design
End Fixities : Top & Bottom Pinned
Overall Column Height : 14 ft
*( Used for non-slender calculations )*

Wood Species : Southern Pine
Wood Grade : No.2: 2"-4" Thick: 2"-4" Wide

| | | | |
|---|---|---|---|
| Fb + | 1,100.0 psi | Fv | 175.0 psi |
| Fb - | 1,100.0 psi | Ft | 675.0 psi |
| Fc - Prll | 1,450.0 psi | Density | 34.330 pcf |
| Fc - Perp | 565.0 psi | | |

| E : Modulus of Elasticity . . . | x-x Bending | y-y Bending | Axial |
|---|---|---|---|
| Basic | 1,400.0 | 1,400.0 | 1,400.0 ksi |
| Minimum | 510.0 | 510.0 | |

Wood Section Name : **5-2x4**
Wood Grading/Manuf. : Southern Pine
Wood Member Type : Sawn

| | | |
|---|---|---|
| Exact Width | **7.50** | in |
| Exact Depth | **3.50** | in |
| Area | 26.250 | in^2 |
| Ix | 26.797 | in^4 |
| Iy | 123.047 | in^4 |

Allow Stress Modification Factors

| | |
|---|---|
| Cf or Cv for Bending | 1.0 |
| Cf or Cv for Compression | 1.0 |
| Cf or Cv for Tension | 1.0 |
| Cm : Wet Use Factor | 1.0 |
| Ct : Temperature Factor | 1.0 |
| Cfu : Flat Use Factor | 1.0 |
| Kf : Built-up columns | 0.60 *NDS 15.3.2* |
| Use Cr : Repetitive ? | No |

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for buckling ABOUT Y-Y Axis = 14 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 14 ft, K = 1.0

## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 87.613 lbs * Dead Load Factor
AXIAL LOADS . . .
Concentrated Load: Axial Load at 14.0 ft, Xecc = 0.8750 in, D = 2.0, L = 2.0 k
BENDING LOADS . . .
Internal Wind Pressure: Lat. Uniform Load creating My-y, W = 0.0050 k/ft

## *DESIGN SUMMARY*

### Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.8746** : 1
Load Combination +D+L
Governing NDS Forumla Comp + Myy, NDS Eq. 3.9-3
Location of max.above base 13.906 ft
At maximum location values are . . .
Applied Axial 4.088 k
Applied Mx 0.0 k-ft
Applied My -0.2897 k-ft
Fc : Allowable 179.420 psi

PASS Maximum Shear Stress Ratio = **0.006935** : 1
Load Combination +D+0.750L+0.450W
Location of max.above base 14.0 ft
Applied Design Shear 1.942 psi
Allowable Shear 280.0 psi

**Maximum SERVICE Lateral Load Reactions . .**

| | | | |
|---|---|---|---|
| Top along Y-Y | 0.0 k | Bottom along Y-Y | 0.0 k |
| Top along X-X | 0.0350 k | Bottom along X-X | 0.0350 k |

Maximum SERVICE Load Lateral Deflections . . .
Along Y-Y 0.0 in at 0.0 ft above base
for load combination : n/a
Along X-X -0.03711 in at 8.175 ft above base
for load combination : +D+L

Other Factors used to calculate allowable stresses . . .

| | Bending | Compression | Tension |
|---|---|---|---|

## Load Combination Results

| Load Combination | $C_D$ | $C_P$ | Maximum Axial + Bending Stress Ratios: Stress Ratio | Status | Location | Maximum Shear Ratios: Stress Ratio | Status | Location |
|---|---|---|---|---|---|---|---|---|
| D Only | 0.900 | 0.137 | 0.4440 | PASS | 0.0 ft | 0.003779 | PASS | 14.0 ft |
| +D+L | 1.000 | 0.124 | 0.8746 | PASS | 13.906 ft | 0.006803 | PASS | 14.0 ft |
| +D+0.750L | 1.250 | 0.099 | 0.7594 | PASS | 0.0 ft | 0.004762 | PASS | 14.0 ft |
| +D+0.60W | 1.600 | 0.078 | 0.4408 | PASS | 0.0 ft | 0.006412 | PASS | 14.0 ft |
| +D+0.750L+0.450W | 1.600 | 0.078 | 0.7575 | PASS | 0.0 ft | 0.006935 | PASS | 14.0 ft |
| +0.60D+0.60W | 1.600 | 0.078 | 0.2645 | PASS | 0.0 ft | 0.005561 | PASS | 14.0 ft |
| +0.60D | 1.600 | 0.078 | 0.2645 | PASS | 0.0 ft | 0.001276 | PASS | 14.0 ft |

# Wood Column

File: FWI2101 - Paragon Star.ec6
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Lic. # : KW-06011403
Bob D. Campbell and Co., Inc.

DESCRIPTION: 14' Post Height - Capacity - (5) 2x4's - 4.0k

## Maximum Reactions

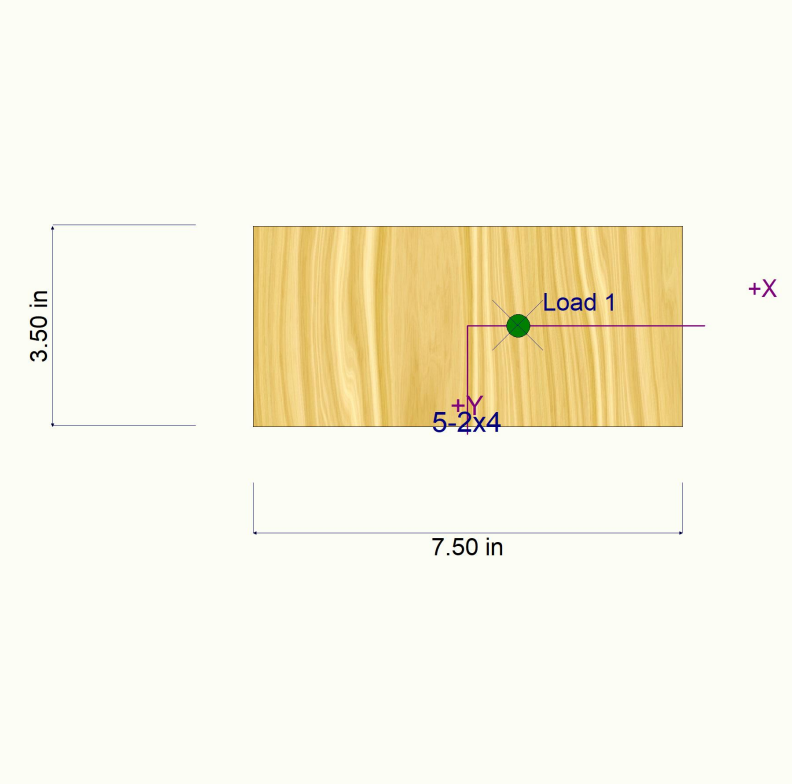
Note: Only non-zero reactions are listed.

| Load Combination | X-X Axis Reaction k @ Base | @ Top | Y-Y Axis Reaction @ Base | @ Top | Axial Reaction @ Base | My - End Moments k-ft @ Base | @ Top | Mx - End Moments @ Base | @ Top |
|---|---|---|---|---|---|---|---|---|---|
| D Only | -0.010 | 0.010 | | | 2.088 | | | | |
| +D+L | -0.021 | 0.021 | | | 4.088 | | | | |
| +D+0.750L | -0.018 | 0.018 | | | 3.588 | | | | |
| +D+0.60W | 0.011 | 0.031 | | | 2.088 | | | | |
| +D+0.750L+0.450W | -0.002 | 0.034 | | | 3.588 | | | | |
| +0.60D+0.60W | 0.015 | 0.027 | | | 1.253 | | | | |
| +0.60D | -0.006 | 0.006 | | | 1.253 | | | | |
| L Only | -0.010 | 0.010 | | | 2.000 | | | | |
| W Only | 0.035 | 0.035 | | | | | | | |

## Maximum Deflections for Load Combinations

| Load Combination | Max. X-X Deflection | | Distance | | Max. Y-Y Deflection | | Distance | |
|---|---|---|---|---|---|---|---|---|
| D Only | -0.0186 | in | 8.174 | ft | 0.0000 | in | 0.000 | ft |
| +D+L | -0.0371 | in | 8.174 | ft | 0.0000 | in | 0.000 | ft |
| +D+0.750L | -0.0325 | in | 8.174 | ft | 0.0000 | in | 0.000 | ft |
| +D+0.60W | -0.0050 | in | 10.617 | ft | 0.0000 | in | 0.000 | ft |
| +D+0.750L+0.450W | -0.0216 | in | 8.738 | ft | 0.0000 | in | 0.000 | ft |
| +0.60D+0.60W | 0.0048 | in | 5.544 | ft | 0.0000 | in | 0.000 | ft |
| +0.60D | -0.0111 | in | 8.174 | ft | 0.0000 | in | 0.000 | ft |
| L Only | -0.0186 | in | 8.174 | ft | 0.0000 | in | 0.000 | ft |
| W Only | 0.0254 | in | 7.047 | ft | 0.0000 | in | 0.000 | ft |

## Sketches



Title Block Line 1
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Engineer:
Project ID:
Project Descr:

Printed: 16 DEC 2021, 8:54AM

# Wood Column

File: FWI2101 - Paragon Star.ec6

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: 14' Post Height - Capacity - 5.25"x9.25" PSL - 29.0k

## Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-10

## General Information

Analysis Method : Allowable Stress Design
End Fixities : Top & Bottom Pinned
Overall Column Height : 14 ft
*( Used for non-slender calculations )*

Wood Species : iLevel Truss Joist
Wood Grade : Parallam PSL 1.8E

| | | | |
|---|---|---|---|
| Fb + | 2,400.0 psi | Fv | 190.0 psi |
| Fb - | 2,400.0 psi | Ft | 1,755.0 psi |
| Fc - Prll | 2,500.0 psi | Density | 45.070 pcf |
| Fc - Perp | 425.0 psi | | |

| E : Modulus of Elasticity . . . | x-x Bending | y-y Bending | Axial |
|---|---|---|---|
| Basic | 1,800.0 | 1,800.0 | 1,800.0 ksi |
| Minimum | 914.88 | 914.88 | |

Wood Section Name : **5.25x9.25**
Wood Grading/Manuf. : Trus-Joist
Wood Member Type : Parallam PSL

Exact Width : **5.250** in
Exact Depth : **9.250** in

| | | |
|---|---|---|
| Area | 48.563 | in^2 |
| Ix | 346.261 | in^4 |
| Iy | 111.542 | in^4 |

Allow Stress Modification Factors

| | |
|---|---|
| Cf or Cv for Bending | 1.029 |
| Cf or Cv for Compression | 1.0 |
| Cf or Cv for Tension | 1.0 |
| Cm : Wet Use Factor | 1.0 |
| Ct : Temperature Factor | 1.0 |
| Cfu : Flat Use Factor | 1.0 |
| Kf : Built-up columns | 1.0 *NDS 15.3.2* |
| Use Cr : Repetitive ? | Yes |

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for buckling ABOUT Y-Y Axis = 14 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 14 ft, K = 1.0

## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 212.794 lbs * Dead Load Factor
AXIAL LOADS . . .
Concentrated Load: Axial Load at 14.0 ft, Yecc = 0.8750 in, D = 14.50, L = 14.50 k
BENDING LOADS . . .
Internal Wind Pressure: Lat. Uniform Load creating Mx-x, W = 0.0050 k/ft

## *DESIGN SUMMARY*

### Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.9108** : 1

| | |
|---|---|
| Load Combination | +D+L |
| Governing NDS Forumla | 1Comp + Mxx, NDS Eq. 3.9-3 |
| Location of max.above base | 13.906 ft |
| At maximum location values are . . . | |
| Applied Axial | 29.213 k |
| Applied Mx | -2.10 k-ft |
| Applied My | 0.0 k-ft |
| Fc : Allowable | 706.57 psi |

PASS Maximum Shear Stress Ratio = **0.02456** : 1

| | |
|---|---|
| Load Combination | +D+L |
| Location of max.above base | 14.0 ft |
| Applied Design Shear | 4.665 psi |
| Allowable Shear | 190.0 psi |

**Maximum SERVICE Lateral Load Reactions . .**

| | | | |
|---|---|---|---|
| Top along Y-Y | 0.1510 k | Bottom along Y-Y | 0.1510 k |
| Top along X-X | 0.0 k | Bottom along X-X | 0.0 k |

Maximum SERVICE Load Lateral Deflections . . .
Along Y-Y -0.07435 in at 8.175 ft above base
for load combination : +D+L
Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

| | Bending | Compression | Tension |
|---|---|---|---|

## Load Combination Results

| Load Combination | $C_D$ | $C_P$ | Maximum Axial + Bending Stress Ratios: Stress Ratio | Status | Location | Maximum Shear Ratios: Stress Ratio | Status | Location |
|---|---|---|---|---|---|---|---|---|
| D Only | 0.900 | 0.312 | 0.4315 | PASS | 13.906 ft | 0.01364 | PASS | 14.0 ft |
| +D+L | 1.000 | 0.283 | 0.9108 | PASS | 13.906 ft | 0.02456 | PASS | 14.0 ft |
| +D+0.750L | 1.250 | 0.228 | 0.7395 | PASS | 13.906 ft | 0.01719 | PASS | 14.0 ft |
| +D+0.60W | 1.600 | 0.180 | 0.4218 | PASS | 13.906 ft | 0.009807 | PASS | 14.0 ft |
| +D+0.750L+0.450W | 1.600 | 0.180 | 0.7339 | PASS | 13.906 ft | 0.01503 | PASS | 14.0 ft |
| +0.60D+0.60W | 1.600 | 0.180 | 0.2530 | PASS | 13.906 ft | 0.006738 | PASS | 14.0 ft |
| +0.60D | 1.600 | 0.180 | 0.2530 | PASS | 13.906 ft | 0.004604 | PASS | 14.0 ft |

Title Block Line 1
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and then using the "Printing &
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Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

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# Wood Column

File: FWI2101 - Paragon Star.ec6

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: 14' Post Height - Capacity - 5.25"x9.25" PSL - 29.0k

## Maximum Reactions

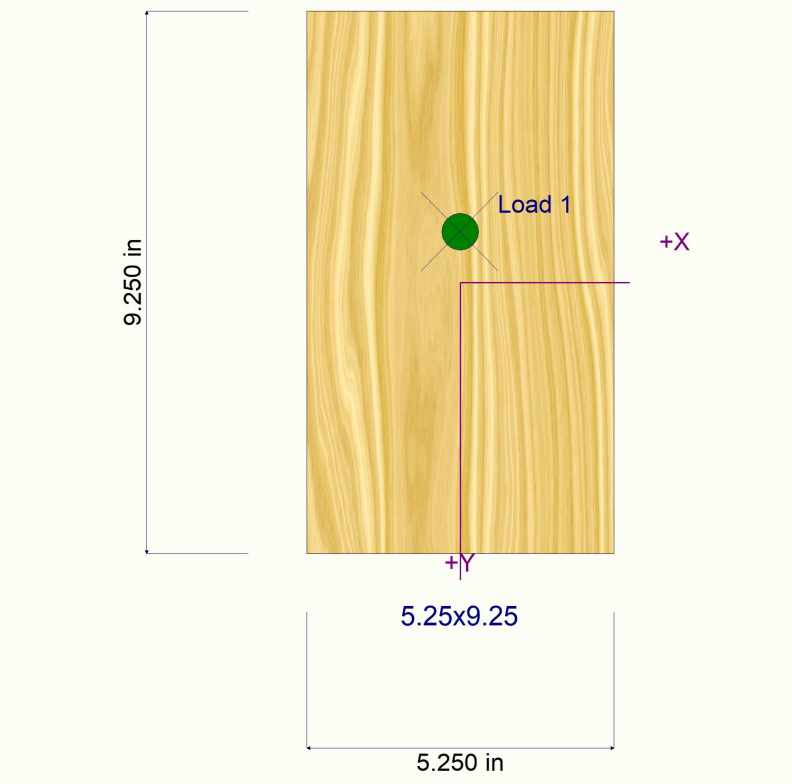
Note: Only non-zero reactions are listed.

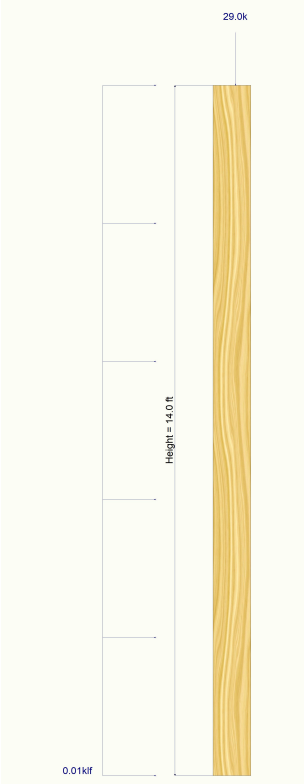
| Load Combination | X-X Axis Reaction k @ Base | @ Top | Y-Y Axis Reaction @ Base | @ Top | Axial Reaction @ Base | My - End Moments k-ft @ Base | @ Top | Mx - End Moments @ Base | @ Top |
|---|---|---|---|---|---|---|---|---|---|
| D Only | | | -0.076 | 0.076 | 14.713 | | | | |
| +D+L | | | -0.151 | 0.151 | 29.213 | | | | |
| +D+0.750L | | | -0.132 | 0.132 | 25.588 | | | | |
| +D+0.60W | | | -0.055 | 0.097 | 14.713 | | | | |
| +D+0.750L+0.450W | | | -0.116 | 0.148 | 25.588 | | | | |
| +0.60D+0.60W | | | -0.024 | 0.066 | 8.828 | | | | |
| +0.60D | | | -0.045 | 0.045 | 8.828 | | | | |
| L Only | | | -0.076 | 0.076 | 14.500 | | | | |
| W Only | | | 0.035 | 0.035 | | | | | |

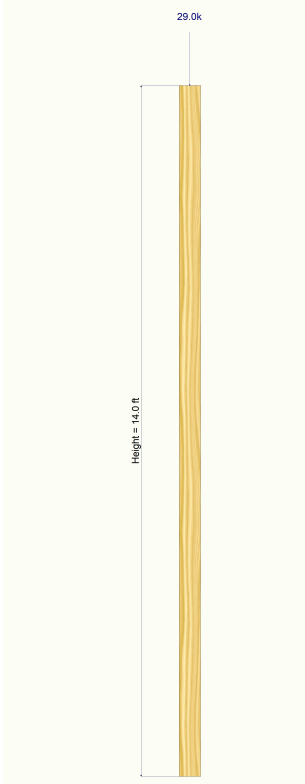
## Maximum Deflections for Load Combinations

| Load Combination | Max. X-X Deflection | | Distance | | Max. Y-Y Deflection | | Distance | |
|---|---|---|---|---|---|---|---|---|
| D Only | 0.0000 | in | 0.000 | ft | -0.0372 | in | 8.174 | ft |
| +D+L | 0.0000 | in | 0.000 | ft | -0.0744 | in | 8.174 | ft |
| +D+0.750L | 0.0000 | in | 0.000 | ft | -0.0651 | in | 8.174 | ft |
| +D+0.60W | 0.0000 | in | 0.000 | ft | -0.0331 | in | 8.268 | ft |
| +D+0.750L+0.450W | 0.0000 | in | 0.000 | ft | -0.0620 | in | 8.174 | ft |
| +0.60D+0.60W | 0.0000 | in | 0.000 | ft | -0.0182 | in | 8.362 | ft |
| +0.60D | 0.0000 | in | 0.000 | ft | -0.0223 | in | 8.174 | ft |
| L Only | 0.0000 | in | 0.000 | ft | -0.0372 | in | 8.174 | ft |
| W Only | 0.0000 | in | 0.000 | ft | 0.0070 | in | 7.047 | ft |

## Sketches



Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 16 DEC 2021, 8:53AM

# Wood Column

File: FWI2101 - Paragon Star.ec6

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: 14' Post Height - Capacity - 5.25"x7" PSL - 20.2k

## Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-10

## General Information

Analysis Method : Allowable Stress Design
End Fixities : Top & Bottom Pinned
Overall Column Height : 14 ft
*( Used for non-slender calculations )*

Wood Species : iLevel Truss Joist
Wood Grade : Parallam PSL 1.8E

| | | | |
|---|---|---|---|
| Fb + | 2,400.0 psi | Fv | 190.0 psi |
| Fb - | 2,400.0 psi | Ft | 1,755.0 psi |
| Fc - Prll | 2,500.0 psi | Density | 45.070 pcf |
| Fc - Perp | 425.0 psi | | |

| E : Modulus of Elasticity . . . | x-x Bending | y-y Bending | Axial |
|---|---|---|---|
| Basic | 1,800.0 | 1,800.0 | 1,800.0 ksi |
| Minimum | 914.88 | 914.88 | |

Wood Section Name : **5.25x7.0**
Wood Grading/Manuf. : Trus-Joist
Wood Member Type : Parallam PSL

| | | |
|---|---|---|
| Exact Width | **5.250** | in |
| Exact Depth | **7.0** | in |
| Area | 36.750 | in^2 |
| Ix | 150.063 | in^4 |
| Iy | 84.410 | in^4 |

Allow Stress Modification Factors

| | |
|---|---|
| Cf or Cv for Bending | 1.062 |
| Cf or Cv for Compression | 1.0 |
| Cf or Cv for Tension | 1.0 |
| Cm : Wet Use Factor | 1.0 |
| Ct : Temperature Factor | 1.0 |
| Cfu : Flat Use Factor | 1.0 |
| Kf : Built-up columns | 1.0 *NDS 15.3.2* |
| Use Cr : Repetitive ? | Yes |

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for buckling ABOUT Y-Y Axis = 14 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 14 ft, K = 1.0

## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 161.031 lbs * Dead Load Factor
AXIAL LOADS . . .
Concentrated Load: Axial Load at 14.0 ft, Yecc = 0.8750 in, D = 10.10, L = 10.10 k
BENDING LOADS . . .
Internal Wind Pressure: Lat. Uniform Load creating Mx-x, W = 0.0050 k/ft

## *DESIGN SUMMARY*

### Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.9029** : 1
Load Combination +D+L
Governing NDS Forumla 1Comp + Mxx, NDS Eq. 3.9-3
Location of max.above base 13.906 ft
At maximum location values are . . .
Applied Axial 20.361 k
Applied Mx -1.463 k-ft
Applied My 0.0 k-ft
Fc : Allowable 706.57 psi

PASS Maximum Shear Stress Ratio = **0.02260** : 1
Load Combination +D+L
Location of max.above base 14.0 ft
Applied Design Shear 4.294 psi
Allowable Shear 190.0 psi

**Maximum SERVICE Lateral Load Reactions . .**

| | | | |
|---|---|---|---|
| Top along Y-Y | 0.1078 k | Bottom along Y-Y | 0.1052 k |
| Top along X-X | 0.0 k | Bottom along X-X | 0.0 k |

Maximum SERVICE Load Lateral Deflections . . .
Along Y-Y -0.1195 in at 8.175 ft above base
for load combination : +D+L
Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

| | Bending | Compression | Tension |
|---|---|---|---|

## Load Combination Results

| Load Combination | $C_D$ | $C_P$ | Maximum Axial + Bending Stress Ratios: Stress Ratio | Status | Location | Maximum Shear Ratios: Stress Ratio | Status | Location |
|---|---|---|---|---|---|---|---|---|
| D Only | 0.900 | 0.312 | 0.3977 | PASS | 13.906 ft | 0.01256 | PASS | 14.0 ft |
| +D+L | 1.000 | 0.283 | 0.9029 | PASS | 13.906 ft | 0.02260 | PASS | 14.0 ft |
| +D+0.750L | 1.250 | 0.228 | 0.6811 | PASS | 13.906 ft | 0.01582 | PASS | 14.0 ft |
| +D+0.60W | 1.600 | 0.180 | 0.3887 | PASS | 13.906 ft | 0.009882 | PASS | 14.0 ft |
| +D+0.750L+0.450W | 1.600 | 0.180 | 0.6760 | PASS | 13.906 ft | 0.01448 | PASS | 14.0 ft |
| +0.60D+0.60W | 1.600 | 0.180 | 0.2332 | PASS | 13.906 ft | 0.007057 | PASS | 14.0 ft |
| +0.60D | 1.600 | 0.180 | 0.2332 | PASS | 13.906 ft | 0.004238 | PASS | 14.0 ft |

Title Block Line 1
You can change this area
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and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 16 DEC 2021, 8:53AM

# Wood Column

File: FWI2101 - Paragon Star.ec6

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: 14' Post Height - Capacity - 5.25"x7" PSL - 20.2k

## Maximum Reactions

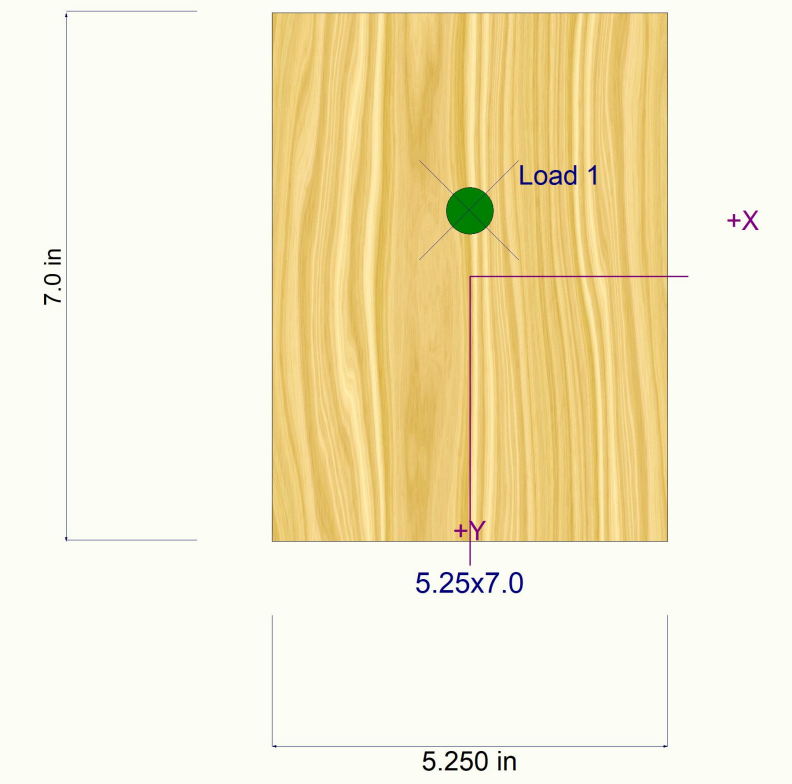
Note: Only non-zero reactions are listed.

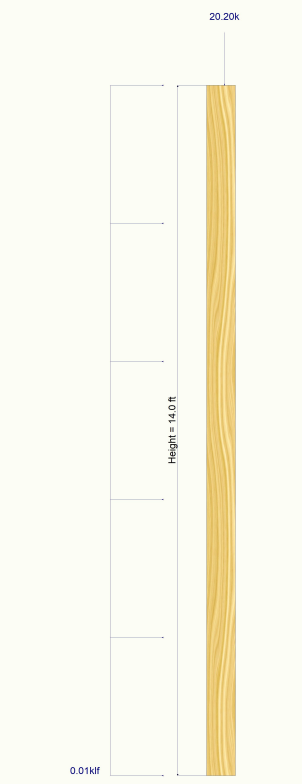
| Load Combination | X-X Axis Reaction k @ Base | @ Top | Y-Y Axis Reaction @ Base | @ Top | Axial Reaction @ Base | My - End Moments k-ft @ Base | @ Top | Mx - End Moments @ Base | @ Top |
|---|---|---|---|---|---|---|---|---|---|
| D Only | | | -0.053 | 0.053 | 10.261 | | | | |
| +D+L | | | -0.105 | 0.105 | 20.361 | | | | |
| +D+0.750L | | | -0.092 | 0.092 | 17.836 | | | | |
| +D+0.60W | | | -0.032 | 0.074 | 10.261 | | | | |
| +D+0.750L+0.450W | | | -0.076 | 0.108 | 17.836 | | | | |
| +0.60D+0.60W | | | -0.011 | 0.053 | 6.157 | | | | |
| +0.60D | | | -0.032 | 0.032 | 6.157 | | | | |
| L Only | | | -0.053 | 0.053 | 10.100 | | | | |
| W Only | | | 0.035 | 0.035 | | | | | |

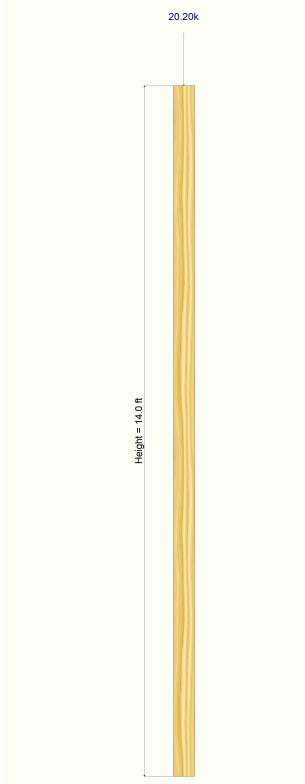
## Maximum Deflections for Load Combinations

| Load Combination | Max. X-X Deflection | | Distance | | Max. Y-Y Deflection | | Distance | |
|---|---|---|---|---|---|---|---|---|
| D Only | 0.0000 | in | 0.000 | ft | -0.0598 | in | 8.174 | ft |
| +D+L | 0.0000 | in | 0.000 | ft | -0.1195 | in | 8.174 | ft |
| +D+0.750L | 0.0000 | in | 0.000 | ft | -0.1046 | in | 8.174 | ft |
| +D+0.60W | 0.0000 | in | 0.000 | ft | -0.0504 | in | 8.362 | ft |
| +D+0.750L+0.450W | 0.0000 | in | 0.000 | ft | -0.0975 | in | 8.174 | ft |
| +0.60D+0.60W | 0.0000 | in | 0.000 | ft | -0.0265 | in | 8.550 | ft |
| +0.60D | 0.0000 | in | 0.000 | ft | -0.0359 | in | 8.174 | ft |
| L Only | 0.0000 | in | 0.000 | ft | -0.0598 | in | 8.174 | ft |
| W Only | 0.0000 | in | 0.000 | ft | 0.0162 | in | 7.047 | ft |

## Sketches



Title Block Line 1
You can change this area
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Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 15 DEC 2021, 4:27PM

# Wood Column

File: FWI2101 - Paragon Star.ec6

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: 14' Post Height - Capacity - 5.25"x5.25" PSL - 12.5k

## Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-10

## General Information

Analysis Method : Allowable Stress Design
End Fixities : Top & Bottom Pinned
Overall Column Height : 14 ft
*( Used for non-slender calculations )*

Wood Species : iLevel Truss Joist
Wood Grade : Parallam PSL 1.8E

| | | | |
|---|---|---|---|
| Fb + | 2,400.0 psi | Fv | 190.0 psi |
| Fb - | 2,400.0 psi | Ft | 1,755.0 psi |
| Fc - Prll | 2,500.0 psi | Density | 45.070 pcf |
| Fc - Perp | 425.0 psi | | |

| E : Modulus of Elasticity . . . | x-x Bending | y-y Bending | Axial |
|---|---|---|---|
| Basic | 1,800.0 | 1,800.0 | 1,800.0 ksi |
| Minimum | 914.88 | 914.88 | |

Wood Section Name : **5.25x5.25**
Wood Grading/Manuf. : Trus-Joist
Wood Member Type : Parallam PSL

| | | |
|---|---|---|
| Exact Width | **5.250** | in |
| Exact Depth | **5.250** | in |
| Area | 27.563 | in^2 |
| Ix | 63.308 | in^4 |
| Iy | 63.308 | in^4 |

Allow Stress Modification Factors

| | |
|---|---|
| Cf or Cv for Bending | 1.096 |
| Cf or Cv for Compression | 1.0 |
| Cf or Cv for Tension | 1.0 |
| Cm : Wet Use Factor | 1.0 |
| Ct : Temperature Factor | 1.0 |
| Cfu : Flat Use Factor | 1.0 |
| Kf : Built-up columns | 1.0 *NDS 15.3.2* |
| Use Cr : Repetitive ? | Yes |

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for buckling ABOUT Y-Y Axis = 14 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 14 ft, K = 1.0

## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 120.776 lbs * Dead Load Factor
AXIAL LOADS . . .
Concentrated Load: Axial Load at 14.0 ft, Yecc = 0.8750 in, D = 6.250, L = 6.250 k
BENDING LOADS . . .
Internal Wind Pressure: Lat. Uniform Load creating Mx-x, W = 0.0120 k/ft

## *DESIGN SUMMARY*

### Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.8993** : 1

| | |
|---|---|
| Load Combination | +D+L |
| Governing NDS Forumla | 1Comp + Mxx, NDS Eq. 3.9-3 |
| Location of max.above base | 13.906 ft |
| At maximum location values are . . . | |
| Applied Axial | 12.621 k |
| Applied Mx | -0.9053 k-ft |
| Applied My | 0.0 k-ft |
| Fc : Allowable | 706.57 psi |

PASS Maximum Shear Stress Ratio = **0.01865** : 1

| | |
|---|---|
| Load Combination | +D+L |
| Location of max.above base | 14.0 ft |
| Applied Design Shear | 3.543 psi |
| Allowable Shear | 190.0 psi |

**Maximum SERVICE Lateral Load Reactions . .**

| | | | |
|---|---|---|---|
| Top along Y-Y | 0.09477 k | Bottom along Y-Y | 0.0840 k |
| Top along X-X | 0.0 k | Bottom along X-X | 0.0 k |

Maximum SERVICE Load Lateral Deflections . . .
Along Y-Y -0.1753 in at 8.175 ft above base
for load combination : +D+L
Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

| | Bending | Compression | Tension |
|---|---|---|---|

## Load Combination Results

| Load Combination | $C_D$ | $C_P$ | Maximum Axial + Bending Stress Ratios: Stress Ratio | Status | Location | Maximum Shear Ratios: Stress Ratio | Status | Location |
|---|---|---|---|---|---|---|---|---|
| D Only | 0.900 | 0.312 | 0.3292 | PASS | 13.906 ft | 0.01036 | PASS | 14.0 ft |
| +D+L | 1.000 | 0.283 | 0.8993 | PASS | 13.906 ft | 0.01865 | PASS | 14.0 ft |
| +D+0.750L | 1.250 | 0.228 | 0.5948 | PASS | 13.906 ft | 0.01305 | PASS | 14.0 ft |
| +D+0.60W | 1.600 | 0.180 | 0.3218 | PASS | 13.906 ft | 0.01485 | PASS | 14.0 ft |
| +D+0.750L+0.450W | 1.600 | 0.180 | 0.5587 | PASS | 13.906 ft | 0.01697 | PASS | 14.0 ft |
| +0.60D+0.60W | 1.600 | 0.180 | 0.1930 | PASS | 13.906 ft | 0.01252 | PASS | 14.0 ft |
| +0.60D | 1.600 | 0.180 | 0.1930 | PASS | 13.906 ft | 0.003496 | PASS | 14.0 ft |

Title Block Line 1
You can change this area
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and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 15 DEC 2021, 4:27PM

# Wood Column

File: FWI2101 - Paragon Star.ec6

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: 14' Post Height - Capacity - 5.25"x5.25" PSL - 12.5k

## Maximum Reactions

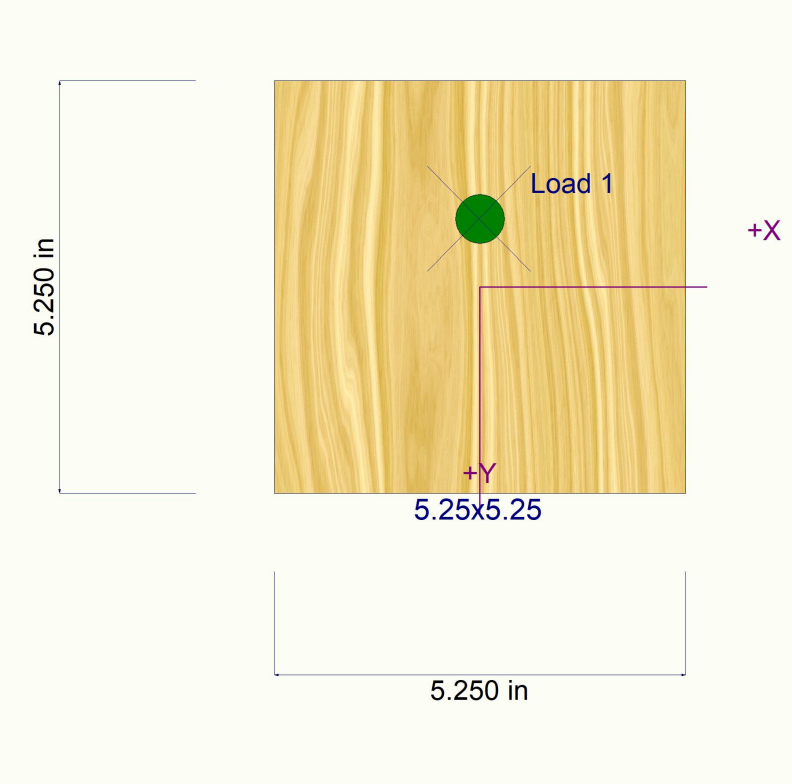
Note: Only non-zero reactions are listed.

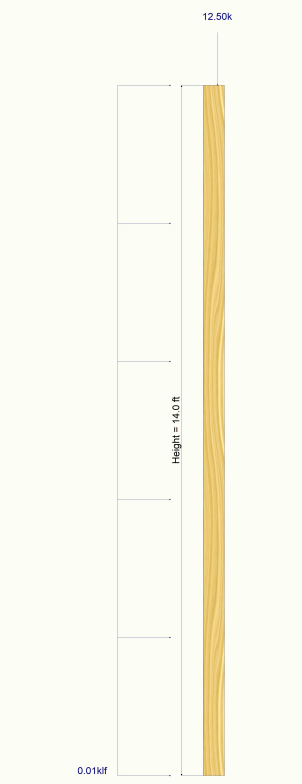
| Load Combination | X-X Axis Reaction @ Base | X-X Axis Reaction @ Top | k | Y-Y Axis Reaction @ Base | Y-Y Axis Reaction @ Top | Axial Reaction @ Base | My - End Moments @ Base | My - End Moments @ Top | k-ft | Mx - End Moments @ Base | Mx - End Moments @ Top |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D Only | | | | -0.033 | 0.033 | 6.371 | | | | | |
| +D+L | | | | -0.065 | 0.065 | 12.621 | | | | | |
| +D+0.750L | | | | -0.057 | 0.057 | 11.058 | | | | | |
| +D+0.60W | | | | 0.018 | 0.083 | 6.371 | | | | | |
| +D+0.750L+0.450W | | | | -0.019 | 0.095 | 11.058 | | | | | |
| +0.60D+0.60W | | | | 0.031 | 0.070 | 3.822 | | | | | |
| +0.60D | | | | -0.020 | 0.020 | 3.822 | | | | | |
| L Only | | | | -0.033 | 0.033 | 6.250 | | | | | |
| W Only | | | | 0.084 | 0.084 | | | | | | |

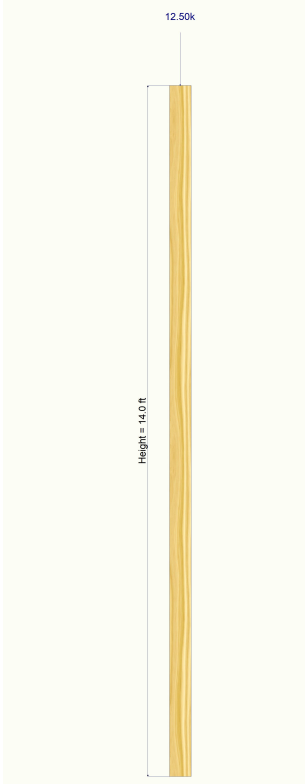
## Maximum Deflections for Load Combinations

| Load Combination | Max. X-X Deflection | | Distance | | Max. Y-Y Deflection | | Distance | |
|---|---|---|---|---|---|---|---|---|
| D Only | 0.0000 | in | 0.000 | ft | -0.0876 | in | 8.174 | ft |
| +D+L | 0.0000 | in | 0.000 | ft | -0.1753 | in | 8.174 | ft |
| +D+0.750L | 0.0000 | in | 0.000 | ft | -0.1534 | in | 8.174 | ft |
| +D+0.60W | 0.0000 | in | 0.000 | ft | -0.0364 | in | 9.678 | ft |
| +D+0.750L+0.450W | 0.0000 | in | 0.000 | ft | -0.1136 | in | 8.550 | ft |
| +0.60D+0.60W | 0.0000 | in | 0.000 | ft | 0.0076 | in | 4.228 | ft |
| +0.60D | 0.0000 | in | 0.000 | ft | -0.0526 | in | 8.174 | ft |
| L Only | 0.0000 | in | 0.000 | ft | -0.0876 | in | 8.174 | ft |
| W Only | 0.0000 | in | 0.000 | ft | 0.0920 | in | 7.047 | ft |

## Sketches



Title Block Line 1
You can change this area
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and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 14 DEC 2021, 9:14AM

# Wood Column

File: FWI2101 - Paragon Star.ec6

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: 14' Post Height - Capacity - 3.25"x7" PSL - 7.0k

## Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-10

## General Information

Analysis Method : Allowable Stress Design
End Fixities : Top & Bottom Pinned
Overall Column Height : 14 ft
*( Used for non-slender calculations )*

Wood Species : iLevel Truss Joist
Wood Grade : Parallam PSL 1.8E

| | | | |
|---|---|---|---|
| Fb + | 2,400.0 psi | Fv | 190.0 psi |
| Fb - | 2,400.0 psi | Ft | 1,755.0 psi |
| Fc - Prll | 2,500.0 psi | Density | 45.070 pcf |
| Fc - Perp | 425.0 psi | | |

| E : Modulus of Elasticity . . . | x-x Bending | y-y Bending | Axial |
|---|---|---|---|
| Basic | 1,800.0 | 1,800.0 | 1,800.0 ksi |
| Minimum | 914.88 | 914.88 | |

Wood Section Name : **3.5x7.0**
Wood Grading/Manuf. : Trus-Joist
Wood Member Type : Parallam PSL

| | | |
|---|---|---|
| Exact Width | **3.50** | in |
| Exact Depth | **7.0** | in |
| Area | 24.50 | in^2 |
| Ix | 100.042 | in^4 |
| Iy | 25.010 | in^4 |

Allow Stress Modification Factors

| | |
|---|---|
| Cf or Cv for Bending | 1.062 |
| Cf or Cv for Compression | 1.0 |
| Cf or Cv for Tension | 1.0 |
| Cm : Wet Use Factor | 1.0 |
| Ct : Temperature Factor | 1.0 |
| Cfu : Flat Use Factor | 1.0 |
| Kf : Built-up columns | 1.0 *NDS 15.3.2* |
| Use Cr : Repetitive ? | Yes |

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for buckling ABOUT Y-Y Axis = 14 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 14 ft, K = 1.0

## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 107.354 lbs * Dead Load Factor
AXIAL LOADS . . .
Concentrated Load: Axial Load at 14.0 ft, Yecc = 0.8750 in, D = 3.50, L = 3.50 k
BENDING LOADS . . .
Internal Wind Pressure: Lat. Uniform Load creating Mx-x, W = 0.0050 k/ft

## *DESIGN SUMMARY*

### Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.9265** : 1
Load Combination +D+L
Governing NDS Forumla 1Comp + Mxx, NDS Eq. 3.9-3
Location of max.above base 13.906 ft
At maximum location values are . . .
Applied Axial 7.107 k
Applied Mx -0.5070 k-ft
Applied My 0.0 k-ft
Fc : Allowable 321.653 psi

PASS Maximum Shear Stress Ratio = **0.01175** : 1
Load Combination +D+L
Location of max.above base 14.0 ft
Applied Design Shear 2.232 psi
Allowable Shear 190.0 psi

**Maximum SERVICE Lateral Load Reactions . .**

| | | | |
|---|---|---|---|
| Top along Y-Y | 0.04765 k | Bottom along Y-Y | 0.03646 k |
| Top along X-X | 0.0 k | Bottom along X-X | 0.0 k |

Maximum SERVICE Load Lateral Deflections . . .
Along Y-Y -0.06212 in at 8.175 ft above base
for load combination : +D+L
Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

| | Bending | Compression | Tension |
|---|---|---|---|

## Load Combination Results

| Load Combination | $C_D$ | $C_P$ | Maximum Axial + Bending Stress Ratios: Stress Ratio | Status | Location | Maximum Shear Ratios: Stress Ratio | Status | Location |
|---|---|---|---|---|---|---|---|---|
| D Only | 0.900 | 0.143 | 0.4589 | PASS | 13.906 ft | 0.006527 | PASS | 14.0 ft |
| +D+L | 1.000 | 0.129 | 0.9265 | PASS | 13.906 ft | 0.01175 | PASS | 14.0 ft |
| +D+0.750L | 1.250 | 0.103 | 0.7892 | PASS | 13.906 ft | 0.008224 | PASS | 14.0 ft |
| +D+0.60W | 1.600 | 0.081 | 0.4554 | PASS | 13.906 ft | 0.007901 | PASS | 14.0 ft |
| +D+0.750L+0.450W | 1.600 | 0.081 | 0.7871 | PASS | 13.906 ft | 0.009597 | PASS | 14.0 ft |
| +0.60D+0.60W | 1.600 | 0.081 | 0.2731 | PASS | 13.906 ft | 0.006432 | PASS | 14.0 ft |
| +0.60D | 1.600 | 0.081 | 0.2731 | PASS | 13.906 ft | 0.002203 | PASS | 14.0 ft |

# Wood Column

File: FWI2101 - Paragon Star.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: 14' Post Height - Capacity - 3.25"x7" PSL - 7.0k

## Maximum Reactions

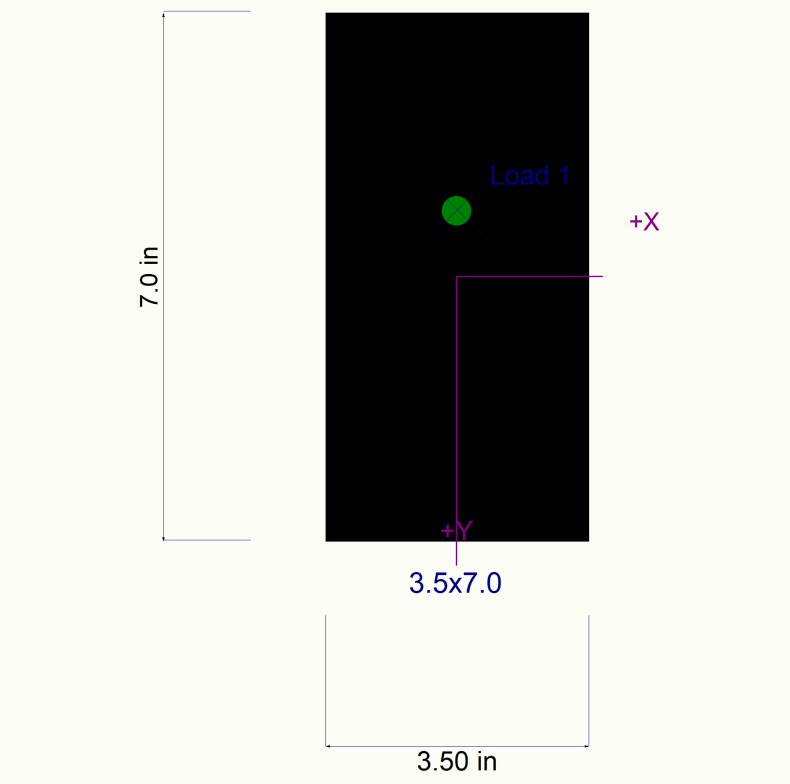
Note: Only non-zero reactions are listed.

| Load Combination | X-X Axis Reaction @ Base | X-X Axis Reaction @ Top | k | Y-Y Axis Reaction @ Base | Y-Y Axis Reaction @ Top | Axial Reaction @ Base | My - End Moments @ Base | My - End Moments @ Top | k-ft | Mx - End Moments @ Base | Mx - End Moments @ Top |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D Only | | | | -0.018 | 0.018 | 3.607 | | | | | |
| +D+L | | | | -0.036 | 0.036 | 7.107 | | | | | |
| +D+0.750L | | | | -0.032 | 0.032 | 6.232 | | | | | |
| +D+0.60W | | | | 0.003 | 0.039 | 3.607 | | | | | |
| +D+0.750L+0.450W | | | | -0.016 | 0.048 | 6.232 | | | | | |
| +0.60D+0.60W | | | | 0.010 | 0.032 | 2.164 | | | | | |
| +0.60D | | | | -0.011 | 0.011 | 2.164 | | | | | |
| L Only | | | | -0.018 | 0.018 | 3.500 | | | | | |
| W Only | | | | 0.035 | 0.035 | | | | | | |

## Maximum Deflections for Load Combinations

| Load Combination | Max. X-X Deflection | | Distance | | Max. Y-Y Deflection | | Distance | |
|---|---|---|---|---|---|---|---|---|
| D Only | 0.0000 | in | 0.000 | ft | -0.0311 | in | 8.174 | ft |
| +D+L | 0.0000 | in | 0.000 | ft | -0.0621 | in | 8.174 | ft |
| +D+0.750L | 0.0000 | in | 0.000 | ft | -0.0544 | in | 8.174 | ft |
| +D+0.60W | 0.0000 | in | 0.000 | ft | -0.0173 | in | 9.020 | ft |
| +D+0.750L+0.450W | 0.0000 | in | 0.000 | ft | -0.0438 | in | 8.456 | ft |
| +0.60D+0.60W | 0.0000 | in | 0.000 | ft | -0.0055 | in | 10.336 | ft |
| +0.60D | 0.0000 | in | 0.000 | ft | -0.0186 | in | 8.174 | ft |
| L Only | 0.0000 | in | 0.000 | ft | -0.0311 | in | 8.174 | ft |
| W Only | 0.0000 | in | 0.000 | ft | 0.0243 | in | 7.047 | ft |

## Sketches



Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 14 DEC 2021, 9:10AM

# Wood Column

File: FWI2101 - Paragon Star.ec6

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: 14' Post Height - Capacity - 3.25"x5.25" PSL - 5.0k

## Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-10

## General Information

Analysis Method : Allowable Stress Design
End Fixities : Top & Bottom Pinned
Overall Column Height : 14 ft
*( Used for non-slender calculations )*

Wood Species : iLevel Truss Joist
Wood Grade : Parallam PSL 1.8E

| | | | |
|---|---|---|---|
| Fb + | 2,400.0 psi | Fv | 190.0 psi |
| Fb - | 2,400.0 psi | Ft | 1,755.0 psi |
| Fc - Prll | 2,500.0 psi | Density | 45.070 pcf |
| Fc - Perp | 425.0 psi | | |

| E : Modulus of Elasticity . . . | x-x Bending | y-y Bending | Axial |
|---|---|---|---|
| Basic | 1,800.0 | 1,800.0 | 1,800.0 ksi |
| Minimum | 914.88 | 914.88 | |

Wood Section Name : **3.5x5.25**
Wood Grading/Manuf. : Trus-Joist
Wood Member Type : Parallam PSL

| | | |
|---|---|---|
| Exact Width | **3.50** | in |
| Exact Depth | **5.250** | in |
| Area | 18.375 | in^2 |
| Ix | 42.205 | in^4 |
| Iy | 18.758 | in^4 |

Allow Stress Modification Factors

| | |
|---|---|
| Cf or Cv for Bending | 1.096 |
| Cf or Cv for Compression | 1.0 |
| Cf or Cv for Tension | 1.0 |
| Cm : Wet Use Factor | 1.0 |
| Ct : Temperature Factor | 1.0 |
| Cfu : Flat Use Factor | 1.0 |
| Kf : Built-up columns | 1.0 *NDS 15.3.2* |
| Use Cr : Repetitive ? | Yes |

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for buckling ABOUT Y-Y Axis = 14 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 14 ft, K = 1.0

## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 80.516 lbs * Dead Load Factor
AXIAL LOADS . . .
Concentrated Load: Axial Load at 14.0 ft, Yecc = 0.8750 in, D = 2.50, L = 2.50 k
BENDING LOADS . . .
Internal Wind Pressure: Lat. Uniform Load creating Mx-x, W = 0.0050 k/ft

## *DESIGN SUMMARY*

### Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.9162** : 1
Load Combination +D+L
Governing NDS Forumla 1Comp + Mxx, NDS Eq. 3.9-3
Location of max.above base 13.906 ft
At maximum location values are . . .
Applied Axial 5.081 k
Applied Mx -0.3621 k-ft
Applied My 0.0 k-ft
Fc : Allowable 321.653 psi

PASS Maximum Shear Stress Ratio = **0.01119** : 1
Load Combination +D+L
Location of max.above base 14.0 ft
Applied Design Shear 2.126 psi
Allowable Shear 190.0 psi

**Maximum SERVICE Lateral Load Reactions . .**

| | | | |
|---|---|---|---|
| Top along Y-Y | 0.03854 k | Bottom along Y-Y | 0.0350 k |
| Top along X-X | 0.0 k | Bottom along X-X | 0.0 k |

Maximum SERVICE Load Lateral Deflections . . .
Along Y-Y -0.1052 in at 8.175 ft above base
for load combination : +D+L
Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

| | Bending | Compression | Tension |
|---|---|---|---|

## Load Combination Results

| Load Combination | $C_D$ | $C_P$ | Maximum Axial + Bending Stress Ratios: Stress Ratio | Status | Location | Maximum Shear Ratios: Stress Ratio | Status | Location |
|---|---|---|---|---|---|---|---|---|
| D Only | 0.900 | 0.143 | 0.4377 | PASS | 13.906 ft | 0.006216 | PASS | 14.0 ft |
| +D+L | 1.000 | 0.129 | 0.9162 | PASS | 13.906 ft | 0.01119 | PASS | 14.0 ft |
| +D+0.750L | 1.250 | 0.103 | 0.7522 | PASS | 13.906 ft | 0.007832 | PASS | 14.0 ft |
| +D+0.60W | 1.600 | 0.081 | 0.4343 | PASS | 13.906 ft | 0.009136 | PASS | 14.0 ft |
| +D+0.750L+0.450W | 1.600 | 0.081 | 0.7502 | PASS | 13.906 ft | 0.01035 | PASS | 14.0 ft |
| +0.60D+0.60W | 1.600 | 0.081 | 0.2605 | PASS | 13.906 ft | 0.007737 | PASS | 14.0 ft |
| +0.60D | 1.600 | 0.081 | 0.2605 | PASS | 13.906 ft | 0.002098 | PASS | 14.0 ft |

# Wood Column

File: FWI2101 - Paragon Star.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403
Bob D. Campbell and Co., Inc.

DESCRIPTION: 14' Post Height - Capacity - 3.25"x5.25" PSL - 5.0k

## Maximum Reactions

Note: Only non-zero reactions are listed.

| Load Combination | X-X Axis Reaction @ Base | X-X Axis Reaction @ Top | k | Y-Y Axis Reaction @ Base | Y-Y Axis Reaction @ Top | Axial Reaction @ Base | My - End Moments @ Base | My - End Moments @ Top | k-ft | Mx - End Moments @ Base | Mx - End Moments @ Top |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D Only | | | | -0.013 | 0.013 | 2.581 | | | | | |
| +D+L | | | | -0.026 | 0.026 | 5.081 | | | | | |
| +D+0.750L | | | | -0.023 | 0.023 | 4.456 | | | | | |
| +D+0.60W | | | | 0.008 | 0.034 | 2.581 | | | | | |
| +D+0.750L+0.450W | | | | -0.007 | 0.039 | 4.456 | | | | | |
| +0.60D+0.60W | | | | 0.013 | 0.029 | 1.548 | | | | | |
| +0.60D | | | | -0.008 | 0.008 | 1.548 | | | | | |
| L Only | | | | -0.013 | 0.013 | 2.500 | | | | | |
| W Only | | | | 0.035 | 0.035 | | | | | | |

## Maximum Deflections for Load Combinations

| Load Combination | Max. X-X Deflection | | Distance | | Max. Y-Y Deflection | | Distance | |
|---|---|---|---|---|---|---|---|---|
| D Only | 0.0000 | in | 0.000 | ft | -0.0526 | in | 8.174 | ft |
| +D+L | 0.0000 | in | 0.000 | ft | -0.1052 | in | 8.174 | ft |
| +D+0.750L | 0.0000 | in | 0.000 | ft | -0.0920 | in | 8.174 | ft |
| +D+0.60W | 0.0000 | in | 0.000 | ft | -0.0207 | in | 9.772 | ft |
| +D+0.750L+0.450W | 0.0000 | in | 0.000 | ft | -0.0672 | in | 8.550 | ft |
| +0.60D+0.60W | 0.0000 | in | 0.000 | ft | 0.0057 | in | 4.510 | ft |
| +0.60D | 0.0000 | in | 0.000 | ft | -0.0316 | in | 8.174 | ft |
| L Only | 0.0000 | in | 0.000 | ft | -0.0526 | in | 8.174 | ft |
| W Only | 0.0000 | in | 0.000 | ft | 0.0575 | in | 7.047 | ft |

Title Block Line 1
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Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 9 MAR 2022, 8:55AM
File: FWI2101 - Paragon Star.ec6

# Concrete Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403 — Bob D. Campbell and Co., Inc.

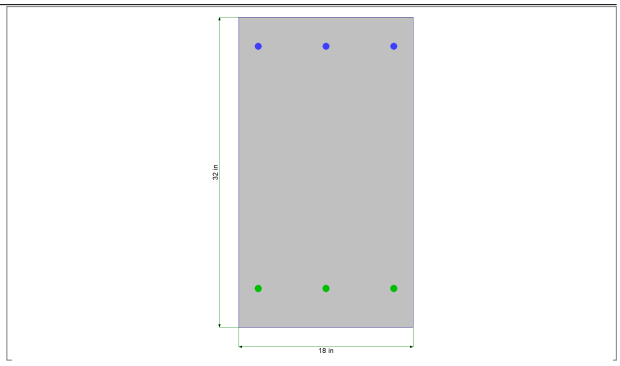
DESCRIPTION: Exterior Grade Beam

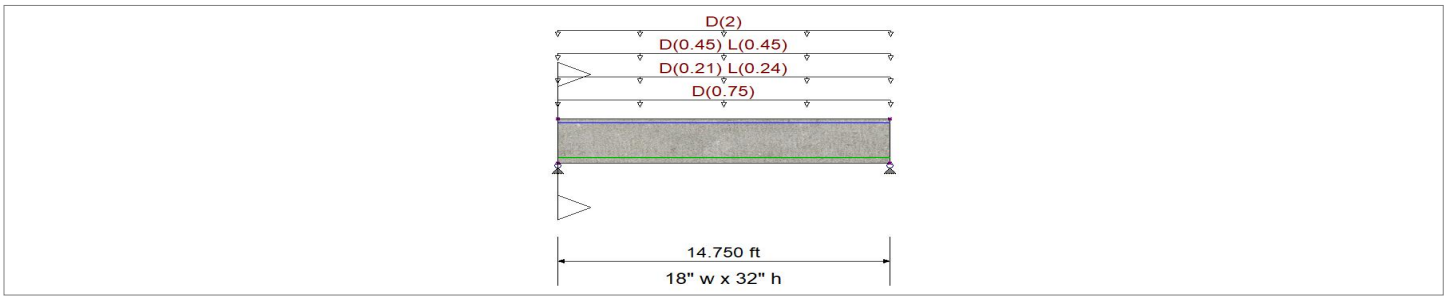
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 3.50 ksi | ϕ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 443.706 psi | | Shear : | 0.750 |
| ψ Density | = | 145.0 pcf | $\beta_1$ | = | 0.850 |
| λ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 3,122.0 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 2 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 18.0 in, Height = 32.0 in
Span #1 Reinforcing....
3-#6 at 3.0 in from Top, from 0.0 to 14.750 ft in this span
3-#6 at 4.0 in from Bottom, from 0.0 to 14.750 ft in this span

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.0150 ksf, Tributary Width = 50.0 ft, (Wall Self Weight)
Uniform Load : D = 0.0350, L = 0.040 ksf, Tributary Width = 6.0 ft, (2nd, 3rd, 4th)
Uniform Load : D = 0.0250, L = 0.0250 ksf, Tributary Width = 18.0 ft, (Roof Load)
Uniform Load : D = 2.0 k/ft, Tributary Width = 1.0 ft, (Brick)

## DESIGN SUMMARY

**Design OK**

| | | | | | | |
|---|---|---|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.973** : 1 | Maximum Deflection | | | | |
| Section used for this span | **Typical Section** | Max Downward Transient Deflection | 0.005 in | Ratio = | 36973 | >=360. |
| Mu : Applied | 160.234 k-ft | Max Upward Transient Deflection | 0.000 in | Ratio = | 0 | <360.0 |
| Mn * Phi : Allowable | 164.681 k-ft | Max Downward Total Deflection | 0.039 in | Ratio = | 4543 | >=180. |
| Location of maximum on span | 7.362 ft | Max Upward Total Deflection | 0.000 in | Ratio = | 0 | <180.0 |
| Span # where maximum occurs | Span # 1 | | | | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Overall MAXimum | 34.515 | 34.515 |
| Overall MINimum | 5.089 | 5.089 |
| +D+H | 29.426 | 29.426 |
| +D+L+H | 34.515 | 34.515 |
| +D+Lr+H | 29.426 | 29.426 |
| +D+S+H | 29.426 | 29.426 |
| +D+0.750Lr+0.750L+H | 33.243 | 33.243 |
| +D+0.750L+0.750S+H | 33.243 | 33.243 |
| +D+0.60W+H | 29.426 | 29.426 |

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# Concrete Beam

DESCRIPTION: Exterior Grade Beam

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| +D+0.750Lr+0.750L+0.450W+H | 33.243 | 33.243 |
| +D+0.750L+0.750S+0.450W+H | 33.243 | 33.243 |
| +0.60D+0.60W+0.60H | 17.656 | 17.656 |
| +D+0.70E+0.60H | 29.426 | 29.426 |
| +D+0.750L+0.750S+0.5250E+H | 33.243 | 33.243 |
| +0.60D+0.70E+H | 17.656 | 17.656 |
| D Only | 29.426 | 29.426 |
| L Only | 5.089 | 5.089 |
| H Only | | |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.00 | 28.00 | 43.45 | 43.45 | 0.00 | 1.00 | 44.96 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 81.0 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.16 | 28.00 | 42.50 | 42.50 | 6.93 | 1.00 | 44.96 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 81.0 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.32 | 28.00 | 41.55 | 41.55 | 13.70 | 1.00 | 44.96 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 81.0 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.48 | 28.00 | 40.60 | 40.60 | 20.33 | 1.00 | 44.96 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 81.0 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.64 | 28.00 | 39.65 | 39.65 | 26.79 | 1.00 | 44.96 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 81.0 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.81 | 28.00 | 38.70 | 38.70 | 33.11 | 1.00 | 44.96 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 81.0 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.97 | 28.00 | 37.75 | 37.75 | 39.27 | 1.00 | 44.96 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 81.0 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.13 | 28.00 | 36.80 | 36.80 | 45.28 | 1.00 | 44.96 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 81.0 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.29 | 28.00 | 35.86 | 35.86 | 51.14 | 1.00 | 44.96 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 81.0 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.45 | 28.00 | 34.91 | 34.91 | 56.84 | 1.00 | 44.96 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 81.0 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.61 | 28.00 | 33.96 | 33.96 | 62.39 | 1.00 | 44.96 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 81.0 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.77 | 28.00 | 33.01 | 33.01 | 67.79 | 1.00 | 44.96 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 81.0 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.93 | 28.00 | 32.06 | 32.06 | 73.03 | 1.00 | 44.96 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 81.0 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.10 | 28.00 | 31.11 | 31.11 | 78.12 | 0.93 | 44.79 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 80.8 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.26 | 28.00 | 30.16 | 30.16 | 83.06 | 0.85 | 44.59 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 80.6 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.42 | 28.00 | 29.21 | 29.21 | 87.85 | 0.78 | 44.41 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 80.4 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.58 | 28.00 | 28.26 | 28.26 | 92.48 | 0.71 | 44.25 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 80.3 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.74 | 28.00 | 27.31 | 27.31 | 96.96 | 0.66 | 44.12 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 80.1 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.90 | 28.00 | 26.36 | 26.36 | 101.28 | 0.61 | 43.99 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 80.0 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.06 | 28.00 | 25.41 | 25.41 | 105.45 | 0.56 | 43.88 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 79.9 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.22 | 28.00 | 24.46 | 24.46 | 109.47 | 0.52 | 43.78 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 79.8 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.39 | 28.00 | 23.51 | 23.51 | 113.34 | 0.48 | 43.69 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 79.7 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.55 | 28.00 | 22.56 | 22.56 | 117.05 | 0.45 | 43.60 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 79.6 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.71 | 28.00 | 21.61 | 21.61 | 120.61 | 0.42 | 43.52 | Vu < PhiVc/2 | lot Reqd 9.6. | 43.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.87 | 28.00 | 20.66 | 20.66 | 124.02 | 0.39 | 43.45 | Vu < PhiVc/2 | lot Reqd 9.6. | 43.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.03 | 28.00 | 19.71 | 19.71 | 127.27 | 0.36 | 43.38 | Vu < PhiVc/2 | lot Reqd 9.6. | 43.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.19 | 28.00 | 18.76 | 18.76 | 130.37 | 0.34 | 43.32 | Vu < PhiVc/2 | lot Reqd 9.6. | 43.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.35 | 28.00 | 17.81 | 17.81 | 133.32 | 0.31 | 43.26 | Vu < PhiVc/2 | lot Reqd 9.6. | 43.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.51 | 28.00 | 16.86 | 16.86 | 136.12 | 0.29 | 43.20 | Vu < PhiVc/2 | lot Reqd 9.6. | 43.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.67 | 28.00 | 15.91 | 15.91 | 138.76 | 0.27 | 43.15 | Vu < PhiVc/2 | lot Reqd 9.6. | 43.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.84 | 28.00 | 14.96 | 14.96 | 141.24 | 0.25 | 43.10 | Vu < PhiVc/2 | lot Reqd 9.6. | 43.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.00 | 28.00 | 14.01 | 14.01 | 143.58 | 0.23 | 43.05 | Vu < PhiVc/2 | lot Reqd 9.6. | 43.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.16 | 28.00 | 13.06 | 13.06 | 145.76 | 0.21 | 43.01 | Vu < PhiVc/2 | lot Reqd 9.6. | 43.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.32 | 28.00 | 12.11 | 12.11 | 147.79 | 0.19 | 42.96 | Vu < PhiVc/2 | lot Reqd 9.6. | 43.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.48 | 28.00 | 11.16 | 11.16 | 149.67 | 0.17 | 42.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 42.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.64 | 28.00 | 10.21 | 10.21 | 151.39 | 0.16 | 42.88 | Vu < PhiVc/2 | lot Reqd 9.6. | 42.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.80 | 28.00 | 9.26 | 9.26 | 152.96 | 0.14 | 42.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 42.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.96 | 28.00 | 8.31 | 8.31 | 154.37 | 0.13 | 42.80 | Vu < PhiVc/2 | lot Reqd 9.6. | 42.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.13 | 28.00 | 7.36 | 7.36 | 155.64 | 0.11 | 42.76 | Vu < PhiVc/2 | lot Reqd 9.6. | 42.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.29 | 28.00 | 6.41 | 6.41 | 156.75 | 0.10 | 42.73 | Vu < PhiVc/2 | lot Reqd 9.6. | 42.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.45 | 28.00 | 5.46 | 5.46 | 157.70 | 0.08 | 42.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 42.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.61 | 28.00 | 4.51 | 4.51 | 158.51 | 0.07 | 42.65 | Vu < PhiVc/2 | lot Reqd 9.6. | 42.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.77 | 28.00 | 3.56 | 3.56 | 159.16 | 0.05 | 42.62 | Vu < PhiVc/2 | lot Reqd 9.6. | 42.6 | 0.0 | 0.0 |

# Concrete Beam

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DESCRIPTION: Exterior Grade Beam

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.93 | 28.00 | 2.61 | 2.61 | 159.66 | 0.04 | 42.58 | Vu < PhiVc/2 | lot Reqd 9.6. | 42.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.09 | 28.00 | 1.66 | 1.66 | 160.00 | 0.02 | 42.55 | Vu < PhiVc/2 | lot Reqd 9.6. | 42.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.25 | 28.00 | 0.71 | 0.71 | 160.19 | 0.01 | 42.51 | Vu < PhiVc/2 | lot Reqd 9.6. | 42.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.42 | 28.00 | -0.24 | 0.24 | 160.23 | 0.00 | 42.50 | Vu < PhiVc/2 | lot Reqd 9.6. | 42.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.58 | 28.00 | -1.19 | 1.19 | 160.12 | 0.02 | 42.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 42.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.74 | 28.00 | -2.14 | 2.14 | 159.85 | 0.03 | 42.57 | Vu < PhiVc/2 | lot Reqd 9.6. | 42.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.90 | 28.00 | -3.09 | 3.09 | 159.43 | 0.05 | 42.60 | Vu < PhiVc/2 | lot Reqd 9.6. | 42.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 8.06 | 28.00 | -4.04 | 4.04 | 158.85 | 0.06 | 42.64 | Vu < PhiVc/2 | lot Reqd 9.6. | 42.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 8.22 | 28.00 | -4.99 | 4.99 | 158.12 | 0.07 | 42.67 | Vu < PhiVc/2 | lot Reqd 9.6. | 42.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 8.38 | 28.00 | -5.94 | 5.94 | 157.24 | 0.09 | 42.71 | Vu < PhiVc/2 | lot Reqd 9.6. | 42.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 8.54 | 28.00 | -6.89 | 6.89 | 156.21 | 0.10 | 42.74 | Vu < PhiVc/2 | lot Reqd 9.6. | 42.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 8.70 | 28.00 | -7.84 | 7.84 | 155.02 | 0.12 | 42.78 | Vu < PhiVc/2 | lot Reqd 9.6. | 42.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 8.87 | 28.00 | -8.79 | 8.79 | 153.68 | 0.13 | 42.82 | Vu < PhiVc/2 | lot Reqd 9.6. | 42.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.03 | 28.00 | -9.74 | 9.74 | 152.19 | 0.15 | 42.86 | Vu < PhiVc/2 | lot Reqd 9.6. | 42.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.19 | 28.00 | -10.69 | 10.69 | 150.55 | 0.17 | 42.90 | Vu < PhiVc/2 | lot Reqd 9.6. | 42.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.35 | 28.00 | -11.64 | 11.64 | 148.75 | 0.18 | 42.94 | Vu < PhiVc/2 | lot Reqd 9.6. | 42.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.51 | 28.00 | -12.58 | 12.58 | 146.79 | 0.20 | 42.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 43.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.67 | 28.00 | -13.53 | 13.53 | 144.69 | 0.22 | 43.03 | Vu < PhiVc/2 | lot Reqd 9.6. | 43.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.83 | 28.00 | -14.48 | 14.48 | 142.43 | 0.24 | 43.08 | Vu < PhiVc/2 | lot Reqd 9.6. | 43.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.99 | 28.00 | -15.43 | 15.43 | 140.02 | 0.26 | 43.13 | Vu < PhiVc/2 | lot Reqd 9.6. | 43.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.16 | 28.00 | -16.38 | 16.38 | 137.45 | 0.28 | 43.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 43.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.32 | 28.00 | -17.33 | 17.33 | 134.74 | 0.30 | 43.23 | Vu < PhiVc/2 | lot Reqd 9.6. | 43.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.48 | 28.00 | -18.28 | 18.28 | 131.87 | 0.32 | 43.29 | Vu < PhiVc/2 | lot Reqd 9.6. | 43.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.64 | 28.00 | -19.23 | 19.23 | 128.84 | 0.35 | 43.35 | Vu < PhiVc/2 | lot Reqd 9.6. | 43.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.80 | 28.00 | -20.18 | 20.18 | 125.67 | 0.37 | 43.42 | Vu < PhiVc/2 | lot Reqd 9.6. | 43.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.96 | 28.00 | -21.13 | 21.13 | 122.34 | 0.40 | 43.49 | Vu < PhiVc/2 | lot Reqd 9.6. | 43.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.12 | 28.00 | -22.08 | 22.08 | 118.85 | 0.43 | 43.56 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 79.6 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.28 | 28.00 | -23.03 | 23.03 | 115.22 | 0.47 | 43.64 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 79.6 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.45 | 28.00 | -23.98 | 23.98 | 111.43 | 0.50 | 43.73 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 79.7 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.61 | 28.00 | -24.93 | 24.93 | 107.48 | 0.54 | 43.83 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 79.8 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.77 | 28.00 | -25.88 | 25.88 | 103.39 | 0.58 | 43.94 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 79.9 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.93 | 28.00 | -26.83 | 26.83 | 99.14 | 0.63 | 44.05 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 80.1 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.09 | 28.00 | -27.78 | 27.78 | 94.74 | 0.68 | 44.18 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 80.2 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.25 | 28.00 | -28.73 | 28.73 | 90.18 | 0.74 | 44.33 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 80.3 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.41 | 28.00 | -29.68 | 29.68 | 85.47 | 0.81 | 44.49 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 80.5 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.57 | 28.00 | -30.63 | 30.63 | 80.61 | 0.89 | 44.68 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 80.7 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.73 | 28.00 | -31.58 | 31.58 | 75.60 | 0.97 | 44.90 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 80.9 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.90 | 28.00 | -32.53 | 32.53 | 70.43 | 1.00 | 44.96 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 81.0 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.06 | 28.00 | -33.48 | 33.48 | 65.11 | 1.00 | 44.96 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 81.0 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.22 | 28.00 | -34.43 | 34.43 | 59.64 | 1.00 | 44.96 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 81.0 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.38 | 28.00 | -35.38 | 35.38 | 54.01 | 1.00 | 44.96 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 81.0 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.54 | 28.00 | -36.33 | 36.33 | 48.23 | 1.00 | 44.96 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 81.0 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.70 | 28.00 | -37.28 | 37.28 | 42.30 | 1.00 | 44.96 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 81.0 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.86 | 28.00 | -38.23 | 38.23 | 36.21 | 1.00 | 44.96 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 81.0 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.02 | 28.00 | -39.18 | 39.18 | 29.97 | 1.00 | 44.96 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 81.0 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.19 | 28.00 | -40.13 | 40.13 | 23.58 | 1.00 | 44.96 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 81.0 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.35 | 28.00 | -41.08 | 41.08 | 17.03 | 1.00 | 44.96 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 81.0 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.51 | 28.00 | -42.03 | 42.03 | 10.33 | 1.00 | 44.96 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 81.0 | 14.0 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.67 | 28.00 | -42.98 | 42.98 | 3.48 | 1.00 | 44.96 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 81.0 | 14.0 | 14.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 14.750 | 160.23 | 164.68 | 0.97 |

# Concrete Beam

File: FWI2101 - Paragon Star.ec6
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Lic. # : KW-06011403
Bob D. Campbell and Co., Inc.

DESCRIPTION: Exterior Grade Beam

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| +1.40D+1.60H | | | | | |
| Span # 1 | 1 | 14.750 | 151.91 | 164.68 | 0.92 |
| +1.20D+0.50Lr+1.60L+1.60H | | | | | |
| Span # 1 | 1 | 14.750 | 160.23 | 164.68 | 0.97 |
| +1.20D+1.60L+0.50S+1.60H | | | | | |
| Span # 1 | 1 | 14.750 | 160.23 | 164.68 | 0.97 |
| +1.20D+1.60Lr+L+1.60H | | | | | |
| Span # 1 | 1 | 14.750 | 148.98 | 164.68 | 0.90 |
| +1.20D+1.60Lr+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 14.750 | 130.21 | 164.68 | 0.79 |
| +1.20D+L+1.60S+1.60H | | | | | |
| Span # 1 | 1 | 14.750 | 148.98 | 164.68 | 0.90 |
| +1.20D+1.60S+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 14.750 | 130.21 | 164.68 | 0.79 |
| +1.20D+0.50Lr+L+W+1.60H | | | | | |
| Span # 1 | 1 | 14.750 | 148.98 | 164.68 | 0.90 |
| +1.20D+L+0.50S+W+1.60H | | | | | |
| Span # 1 | 1 | 14.750 | 148.98 | 164.68 | 0.90 |
| +0.90D+W+1.60H | | | | | |
| Span # 1 | 1 | 14.750 | 97.66 | 164.68 | 0.59 |
| +1.20D+L+0.20S+E+1.60H | | | | | |
| Span # 1 | 1 | 14.750 | 148.98 | 164.68 | 0.90 |
| +0.90D+E+0.90H | | | | | |
| Span # 1 | 1 | 14.750 | 97.66 | 164.68 | 0.59 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H | 1 | 0.0390 | 7.375 | | 0.0000 | 0.000 |

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Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 9 MAR 2022, 3:56PM

# Concrete Beam

File: FWI2101 - Paragon Star.ec6

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Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

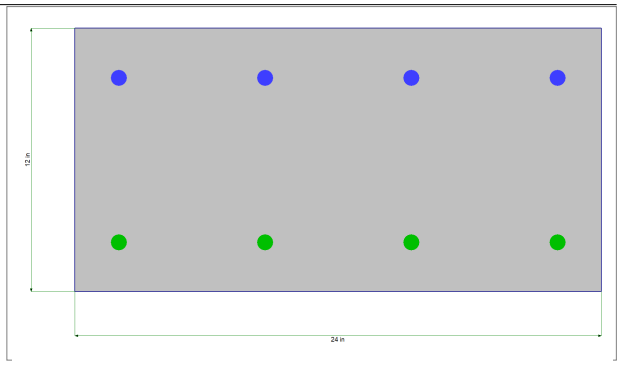
DESCRIPTION: Interior Thickned Slab - 4-Span

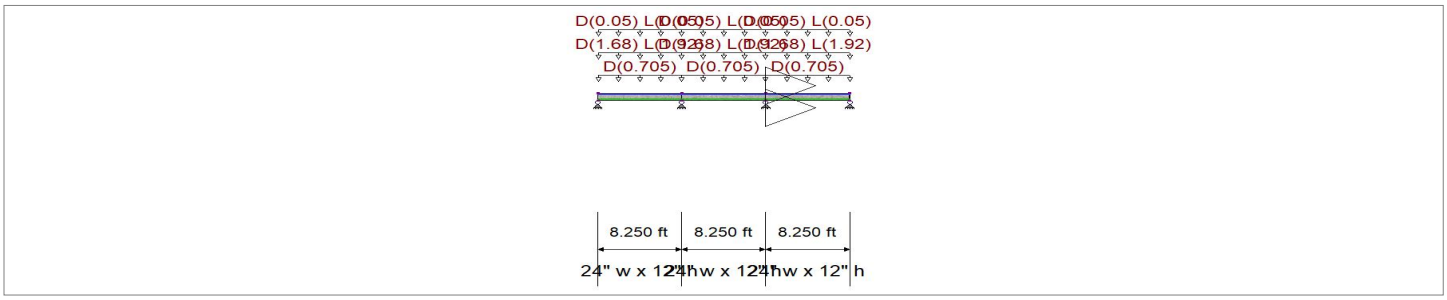
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 3.50 ksi | $\phi$ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 443.706 psi | | Shear : | 0.750 |
| $\psi$ Density | = | 145.0 pcf | $\beta_1$ | = | 0.850 |
| $\lambda$ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 3,408.79 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 3 |
| | | | Number of Resisting Legs Per Stirrup = | | 2 |






## Cross Section & Reinforcing Details

Rectangular Section, Width = 24.0 in, Height = 12.0 in

Span #1 Reinforcing....
4-#6 at 2.250 in from Top, from 0.0 to 8.250 ft in this span
4-#6 at 2.250 in from Bottom, from 0.0 to 8.250 ft in this span

Span #2 Reinforcing....
4-#6 at 2.250 in from Top, from 0.0 to 8.250 ft in this span
4-#6 at 2.250 in from Bottom, from 0.0 to 8.250 ft in this span

Span #3 Reinforcing....
4-#6 at 2.250 in from Top, from 0.0 to 8.250 ft in this span
4-#6 at 2.250 in from Bottom, from 0.0 to 8.250 ft in this span

Beam self weight calculated and added to loads

Load for Span Number 1
Uniform Load : D = 0.0150 ksf, Tributary Width = 47.0 ft, (Wall Self Weight)
Uniform Load : D = 0.0350, L = 0.040 ksf, Tributary Width = 48.0 ft, (2nd, 3rd, 4th)
Uniform Load : D = 0.0250, L = 0.0250 ksf, Tributary Width = 2.0 ft, (Roof Load)

Load for Span Number 2
Uniform Load : D = 0.0150 ksf, Tributary Width = 47.0 ft, (Wall Self Weight)
Uniform Load : D = 0.0350, L = 0.040 ksf, Tributary Width = 48.0 ft, (2nd, 3rd, 4th)
Uniform Load : D = 0.0250, L = 0.0250 ksf, Tributary Width = 2.0 ft, (Roof Load)

Load for Span Number 3
Uniform Load : D = 0.0150 ksf, Tributary Width = 47.0 ft, (Wall Self Weight)
Uniform Load : D = 0.0350, L = 0.040 ksf, Tributary Width = 48.0 ft, (2nd, 3rd, 4th)
Uniform Load : D = 0.0250, L = 0.0250 ksf, Tributary Width = 2.0 ft, (Roof Load)

## DESIGN SUMMARY

**Design OK**

| | | | | | | |
|---|---|---|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.655** : 1 | Maximum Deflection | | | | |
| Section used for this span | **Typical Section** | Max Downward Transient Deflection | 0.013 in | Ratio = | 7486 | >=360. |
| Mu : Applied | -47.285 k-ft | Max Upward Transient Deflection | -0.008 in | Ratio = | 11852 | >=360. |
| Mn * Phi : Allowable | 72.202 k-ft | Max Downward Total Deflection | 0.039 in | Ratio = | 2559 | >=180. |
| Location of maximum on span | 0.000 ft | Max Upward Total Deflection | -0.011 in | Ratio = | 8698 | >=180. |
| Span # where maximum occurs | Span # 3 | | | | | |

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# Concrete Beam

DESCRIPTION: Interior Thickned Slab - 4-Span

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| Overall MAXimum | 15.925 | 43.192 | 43.192 | 15.925 |
| Overall MINimum | 0.271 | -1.625 | -1.625 | 0.271 |
| +D+H | 8.993 | 24.729 | 24.729 | 8.993 |
| +D+L+H, LL Comb Run (**L) | 9.329 | 22.722 | 35.861 | 15.784 |
| +D+L+H, LL Comb Run (*L*) | 8.226 | 33.622 | 33.622 | 8.226 |
| +D+L+H, LL Comb Run (*LL) | 8.344 | 32.724 | 43.192 | 15.689 |
| +D+L+H, LL Comb Run (L**) | 15.784 | 35.861 | 22.722 | 9.329 |
| +D+L+H, LL Comb Run (L*L) | 15.925 | 34.049 | 34.049 | 15.925 |
| +D+L+H, LL Comb Run (LL*) | 15.689 | 43.192 | 32.724 | 8.344 |
| +D+L+H, LL Comb Run (LLL) | 15.657 | 42.444 | 42.444 | 15.657 |
| +D+Lr+H, LL Comb Run (**L) | 8.993 | 24.729 | 24.729 | 8.993 |
| +D+Lr+H, LL Comb Run (*L*) | 8.993 | 24.729 | 24.729 | 8.993 |
| +D+Lr+H, LL Comb Run (*LL) | 8.993 | 24.729 | 24.729 | 8.993 |
| +D+Lr+H, LL Comb Run (L**) | 8.993 | 24.729 | 24.729 | 8.993 |
| +D+Lr+H, LL Comb Run (L*L) | 8.993 | 24.729 | 24.729 | 8.993 |
| +D+Lr+H, LL Comb Run (LL*) | 8.993 | 24.729 | 24.729 | 8.993 |
| +D+Lr+H, LL Comb Run (LLL) | 8.993 | 24.729 | 24.729 | 8.993 |
| +D+S+H | 8.993 | 24.729 | 24.729 | 8.993 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 9.216 | 23.391 | 32.830 | 14.196 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 8.383 | 31.433 | 31.433 | 8.383 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 8.514 | 30.663 | 38.676 | 13.969 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 14.196 | 32.830 | 23.391 | 9.216 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 14.331 | 31.580 | 31.580 | 14.331 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 13.969 | 38.676 | 30.663 | 8.514 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 14.004 | 38.002 | 38.002 | 14.004 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 9.216 | 23.391 | 32.830 | 14.196 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 8.383 | 31.433 | 31.433 | 8.383 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 8.514 | 30.663 | 38.676 | 13.969 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 14.196 | 32.830 | 23.391 | 9.216 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 14.331 | 31.580 | 31.580 | 14.331 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 13.969 | 38.676 | 30.663 | 8.514 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 14.004 | 38.002 | 38.002 | 14.004 |
| +D+0.60W+H | 8.993 | 24.729 | 24.729 | 8.993 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 9.216 | 23.391 | 32.830 | 14.196 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 8.383 | 31.433 | 31.433 | 8.383 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 8.514 | 30.663 | 38.676 | 13.969 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 14.196 | 32.830 | 23.391 | 9.216 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 14.331 | 31.580 | 31.580 | 14.331 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 13.969 | 38.676 | 30.663 | 8.514 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 14.004 | 38.002 | 38.002 | 14.004 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 9.216 | 23.391 | 32.830 | 14.196 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 8.383 | 31.433 | 31.433 | 8.383 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 8.514 | 30.663 | 38.676 | 13.969 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 14.196 | 32.830 | 23.391 | 9.216 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 14.331 | 31.580 | 31.580 | 14.331 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 13.969 | 38.676 | 30.663 | 8.514 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 14.004 | 38.002 | 38.002 | 14.004 |
| +0.60D+0.60W+0.60H | 5.396 | 14.838 | 14.838 | 5.396 |
| +D+0.70E+0.60H | 8.993 | 24.729 | 24.729 | 8.993 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 9.216 | 23.391 | 32.830 | 14.196 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 8.383 | 31.433 | 31.433 | 8.383 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 8.514 | 30.663 | 38.676 | 13.969 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 14.196 | 32.830 | 23.391 | 9.216 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 14.331 | 31.580 | 31.580 | 14.331 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 13.969 | 38.676 | 30.663 | 8.514 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 14.004 | 38.002 | 38.002 | 14.004 |
| +0.60D+0.70E+H | 5.396 | 14.838 | 14.838 | 5.396 |
| D Only | 8.993 | 24.729 | 24.729 | 8.993 |
| L Only, LL Comb Run (**L) | 0.271 | -1.625 | 10.564 | 7.043 |

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# Concrete Beam

DESCRIPTION: Interior Thickned Slab - 4-Span

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| L Only, LL Comb Run (*L*) | -0.813 | 8.939 | 8.939 | -0.813 |
| L Only, LL Comb Run (*LL) | -0.542 | 7.314 | 19.503 | 6.230 |
| L Only, LL Comb Run (L**) | 7.043 | 10.564 | -1.625 | 0.271 |
| L Only, LL Comb Run (L*L) | 7.314 | 8.939 | 8.939 | 7.314 |
| L Only, LL Comb Run (LL*) | 6.230 | 19.503 | 7.314 | -0.542 |
| L Only, LL Comb Run (LLL) | 6.501 | 17.878 | 17.878 | 6.501 |
| H Only | | | | |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.00 | 9.75 | 22.49 | 22.49 | 0.00 | 1.00 | 23.03 | PhiVc/2 < Vu <= | <0.5W, Not F | 23.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.33 | 9.75 | 20.37 | 20.37 | 7.07 | 1.00 | 23.03 | PhiVc/2 < Vu <= | <0.5W, Not F | 23.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.66 | 9.75 | 18.25 | 18.25 | 13.45 | 1.00 | 23.03 | PhiVc/2 < Vu <= | <0.5W, Not F | 23.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.99 | 9.75 | 16.14 | 16.14 | 19.12 | 0.69 | 21.99 | PhiVc/2 < Vu <= | <0.5W, Not F | 22.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.32 | 9.75 | 14.02 | 14.02 | 24.10 | 0.47 | 21.29 | PhiVc/2 < Vu <= | <0.5W, Not F | 21.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.65 | 9.75 | 11.90 | 11.90 | 28.37 | 0.34 | 20.85 | PhiVc/2 < Vu <= | <0.5W, Not F | 20.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.98 | 9.75 | 9.78 | 9.78 | 31.95 | 0.25 | 20.55 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.31 | 9.75 | 7.66 | 7.66 | 34.82 | 0.18 | 20.32 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.64 | 9.75 | 5.54 | 5.54 | 37.00 | 0.12 | 20.13 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.97 | 9.75 | 3.42 | 3.42 | 38.48 | 0.07 | 19.97 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.30 | 9.75 | 1.30 | 1.30 | 39.26 | 0.03 | 19.82 | Vu < PhiVc/2 | lot Reqd 9.6. | 19.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.63 | 9.75 | -2.55 | 2.55 | 33.04 | 0.06 | 19.93 | Vu < PhiVc/2 | lot Reqd 9.6. | 19.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.96 | 9.75 | -4.67 | 4.67 | 31.85 | 0.12 | 20.12 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.29 | 9.75 | -6.79 | 6.79 | 29.96 | 0.18 | 20.33 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.62 | 9.75 | -8.91 | 8.91 | 27.37 | 0.26 | 20.60 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.95 | 9.75 | -11.03 | 11.03 | 24.08 | 0.37 | 20.96 | PhiVc/2 < Vu <= | <0.5W, Not F | 21.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.28 | 9.75 | -13.15 | 13.15 | 20.09 | 0.53 | 21.48 | PhiVc/2 < Vu <= | <0.5W, Not F | 21.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.61 | 9.75 | -15.27 | 15.27 | 15.40 | 0.81 | 22.39 | PhiVc/2 < Vu <= | <0.5W, Not F | 22.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.94 | 9.75 | -17.39 | 17.39 | 10.01 | 1.00 | 23.03 | PhiVc/2 < Vu <= | <0.5W, Not F | 23.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 6.27 | 9.75 | -19.51 | 19.51 | 3.93 | 1.00 | 23.03 | PhiVc/2 < Vu <= | <0.5W, Not F | 23.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 6.60 | 9.75 | -21.63 | 21.63 | 2.86 | 1.00 | 23.03 | PhiVc/2 < Vu <= | <0.5W, Not F | 23.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 6.93 | 9.75 | -23.75 | 23.75 | 10.35 | 1.00 | 23.03 | PhiVc < Vu | 0.7181 | 47.2 | 4.9 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 7.26 | 9.75 | -25.86 | 25.86 | 18.53 | 1.00 | 23.03 | PhiVc < Vu | 2.837 | 47.2 | 4.9 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 7.59 | 9.75 | -27.98 | 27.98 | 27.42 | 0.83 | 22.46 | PhiVc < Vu | 5.520 | 46.6 | 4.9 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 7.92 | 9.75 | -30.10 | 30.10 | 37.00 | 0.66 | 21.91 | PhiVc < Vu | 8.195 | 46.0 | 4.9 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 8.25 | 9.75 | 28.66 | 28.66 | 47.29 | 0.49 | 21.35 | PhiVc < Vu | 7.306 | 45.5 | 4.9 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 8.58 | 9.75 | 26.54 | 26.54 | 38.18 | 0.56 | 21.59 | PhiVc < Vu | 4.948 | 45.7 | 4.9 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 8.91 | 9.75 | 24.42 | 24.42 | 29.77 | 0.67 | 21.93 | PhiVc < Vu | 2.493 | 46.1 | 4.9 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 9.24 | 9.75 | 22.30 | 22.30 | 22.06 | 0.82 | 22.44 | PhiVc/2 < Vu <= | <0.5W, Not F | 22.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 9.57 | 9.75 | 20.18 | 20.18 | 15.05 | 1.00 | 23.03 | PhiVc/2 < Vu <= | <0.5W, Not F | 23.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 9.90 | 9.75 | 18.06 | 18.06 | 8.74 | 1.00 | 23.03 | PhiVc/2 < Vu <= | <0.5W, Not F | 23.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 10.23 | 9.75 | 15.94 | 15.94 | 3.13 | 1.00 | 23.03 | PhiVc/2 < Vu <= | <0.5W, Not F | 23.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 10.56 | 9.75 | 13.82 | 13.82 | 1.78 | 1.00 | 23.03 | PhiVc/2 < Vu <= | <0.5W, Not F | 23.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 10.89 | 9.75 | 11.70 | 11.70 | 5.99 | 1.00 | 23.03 | PhiVc/2 < Vu <= | <0.5W, Not F | 23.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 11.22 | 9.75 | 9.58 | 9.58 | 9.50 | 0.82 | 22.43 | Vu < PhiVc/2 | lot Reqd 9.6. | 22.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 11.55 | 9.75 | 7.47 | 7.47 | 12.32 | 0.49 | 21.35 | Vu < PhiVc/2 | lot Reqd 9.6. | 21.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 11.88 | 9.75 | 5.35 | 5.35 | 14.43 | 0.30 | 20.72 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 12.21 | 9.75 | 3.23 | 3.23 | 15.85 | 0.17 | 20.27 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 12.54 | 9.75 | -3.23 | 3.23 | 15.85 | 0.17 | 20.27 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 12.87 | 9.75 | -5.35 | 5.35 | 14.43 | 0.30 | 20.72 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 13.20 | 9.75 | -7.47 | 7.47 | 12.32 | 0.49 | 21.35 | Vu < PhiVc/2 | lot Reqd 9.6. | 21.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 13.53 | 9.75 | -9.58 | 9.58 | 9.50 | 0.82 | 22.43 | Vu < PhiVc/2 | lot Reqd 9.6. | 22.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 13.86 | 9.75 | -11.70 | 11.70 | 5.99 | 1.00 | 23.03 | PhiVc/2 < Vu <= | <0.5W, Not F | 23.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 14.19 | 9.75 | -13.82 | 13.82 | 1.78 | 1.00 | 23.03 | PhiVc/2 < Vu <= | <0.5W, Not F | 23.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 14.52 | 9.75 | -15.94 | 15.94 | 3.13 | 1.00 | 23.03 | PhiVc/2 < Vu <= | <0.5W, Not F | 23.0 | 0.0 | 0.0 |

# Concrete Beam

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DESCRIPTION: Interior Thickned Slab - 4-Span

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 14.85 | 9.75 | -18.06 | 18.06 | 8.74 | 1.00 | 23.03 | PhiVc/2 < Vu <= | <0.5W, Not F | 23.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 15.18 | 9.75 | -20.18 | 20.18 | 15.05 | 1.00 | 23.03 | PhiVc/2 < Vu <= | <0.5W, Not F | 23.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 15.51 | 9.75 | -22.30 | 22.30 | 22.06 | 0.82 | 22.44 | PhiVc/2 < Vu <= | <0.5W, Not F | 22.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 15.84 | 9.75 | -24.42 | 24.42 | 29.77 | 0.67 | 21.93 | PhiVc < Vu | 2.493 | 46.1 | 4.9 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 16.17 | 9.75 | -26.54 | 26.54 | 38.18 | 0.56 | 21.59 | PhiVc < Vu | 4.948 | 45.7 | 4.9 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 16.50 | 9.75 | 32.22 | 32.22 | 47.29 | 0.55 | 21.55 | PhiVc < Vu | 10.668 | 45.7 | 4.9 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 16.83 | 9.75 | 30.10 | 30.10 | 37.00 | 0.66 | 21.91 | PhiVc < Vu | 8.195 | 46.0 | 4.9 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 17.16 | 9.75 | 27.98 | 27.98 | 27.42 | 0.83 | 22.46 | PhiVc < Vu | 5.520 | 46.6 | 4.9 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 17.49 | 9.75 | 25.86 | 25.86 | 18.53 | 1.00 | 23.03 | PhiVc < Vu | 2.837 | 47.2 | 4.9 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 17.82 | 9.75 | 23.75 | 23.75 | 10.35 | 1.00 | 23.03 | PhiVc < Vu | 0.7181 | 47.2 | 4.9 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 18.15 | 9.75 | 21.63 | 21.63 | 2.86 | 1.00 | 23.03 | PhiVc/2 < Vu <= | <0.5W, Not F | 23.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 18.48 | 9.75 | 19.51 | 19.51 | 3.93 | 1.00 | 23.03 | PhiVc/2 < Vu <= | <0.5W, Not F | 23.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 18.81 | 9.75 | 17.39 | 17.39 | 10.01 | 1.00 | 23.03 | PhiVc/2 < Vu <= | <0.5W, Not F | 23.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 19.14 | 9.75 | 15.27 | 15.27 | 15.40 | 0.81 | 22.39 | PhiVc/2 < Vu <= | <0.5W, Not F | 22.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 19.47 | 9.75 | 13.15 | 13.15 | 20.09 | 0.53 | 21.48 | PhiVc/2 < Vu <= | <0.5W, Not F | 21.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 19.80 | 9.75 | 11.03 | 11.03 | 24.08 | 0.37 | 20.96 | PhiVc/2 < Vu <= | <0.5W, Not F | 21.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 20.13 | 9.75 | 8.91 | 8.91 | 27.37 | 0.26 | 20.60 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 20.46 | 9.75 | 6.79 | 6.79 | 29.96 | 0.18 | 20.33 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 20.79 | 9.75 | 4.67 | 4.67 | 31.85 | 0.12 | 20.12 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 21.12 | 9.75 | 2.55 | 2.55 | 33.04 | 0.06 | 19.93 | Vu < PhiVc/2 | lot Reqd 9.6. | 19.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 21.45 | 9.75 | -1.30 | 1.30 | 39.26 | 0.03 | 19.82 | Vu < PhiVc/2 | lot Reqd 9.6. | 19.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 21.78 | 9.75 | -3.42 | 3.42 | 38.48 | 0.07 | 19.97 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 22.11 | 9.75 | -5.54 | 5.54 | 37.00 | 0.12 | 20.13 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 22.44 | 9.75 | -7.66 | 7.66 | 34.82 | 0.18 | 20.32 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 22.77 | 9.75 | -9.78 | 9.78 | 31.95 | 0.25 | 20.55 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 23.10 | 9.75 | -11.90 | 11.90 | 28.37 | 0.34 | 20.85 | PhiVc/2 < Vu <= | <0.5W, Not F | 20.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 23.43 | 9.75 | -14.02 | 14.02 | 24.10 | 0.47 | 21.29 | PhiVc/2 < Vu <= | <0.5W, Not F | 21.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 23.76 | 9.75 | -16.14 | 16.14 | 19.12 | 0.69 | 21.99 | PhiVc/2 < Vu <= | <0.5W, Not F | 22.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 24.09 | 9.75 | -18.25 | 18.25 | 13.45 | 1.00 | 23.03 | PhiVc/2 < Vu <= | <0.5W, Not F | 23.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 24.42 | 9.75 | -20.37 | 20.37 | 7.07 | 1.00 | 23.03 | PhiVc/2 < Vu <= | <0.5W, Not F | 23.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 24.75 | 9.75 | -22.49 | 22.49 | 0.00 | 1.00 | 23.03 | PhiVc/2 < Vu <= | <0.5W, Not F | 23.0 | 0.0 | 0.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 8.250 | -45.52 | 72.20 | 0.63 |
| Span # 2 | 2 | 8.250 | -47.29 | 72.20 | 0.65 |
| Span # 3 | 3 | 8.250 | -47.29 | 72.20 | 0.65 |
| +1.40D+1.60H | | | | | |
| Span # 1 | 1 | 8.250 | -24.93 | 72.20 | 0.35 |
| Span # 2 | 2 | 8.250 | -25.97 | 72.20 | 0.36 |
| Span # 3 | 3 | 8.250 | -25.97 | 72.20 | 0.36 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 8.250 | 19.26 | 72.20 | 0.27 |
| Span # 2 | 2 | 8.250 | -35.70 | 72.20 | 0.49 |
| Span # 3 | 3 | 8.250 | 37.88 | 72.20 | 0.52 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 8.250 | -32.03 | 72.20 | 0.44 |
| Span # 2 | 2 | 8.250 | -32.98 | 72.20 | 0.46 |
| Span # 3 | 3 | 8.250 | -32.98 | 72.20 | 0.46 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 8.250 | -28.47 | 72.20 | 0.39 |
| Span # 2 | 2 | 8.250 | -45.72 | 72.20 | 0.63 |
| Span # 3 | 3 | 8.250 | -47.29 | 72.20 | 0.65 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 8.250 | 37.88 | 72.20 | 0.52 |
| Span # 2 | 2 | 8.250 | -36.56 | 72.20 | 0.51 |
| Span # 3 | 3 | 8.250 | 19.26 | 72.20 | 0.27 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L*L) | | | | | |

# Concrete Beam

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DESCRIPTION: Interior Thickned Slab - 4-Span

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 1 | 1 | 8.250 | 39.39 | 72.20 | 0.55 |
| Span # 2 | 2 | 8.250 | -32.98 | 72.20 | 0.46 |
| Span # 3 | 3 | 8.250 | 39.39 | 72.20 | 0.55 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 8.250 | -45.52 | 72.20 | 0.63 |
| Span # 2 | 2 | 8.250 | -47.29 | 72.20 | 0.65 |
| Span # 3 | 3 | 8.250 | -29.41 | 72.20 | 0.41 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 8.250 | -41.97 | 72.20 | 0.58 |
| Span # 2 | 2 | 8.250 | -43.71 | 72.20 | 0.61 |
| Span # 3 | 3 | 8.250 | -43.71 | 72.20 | 0.61 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 8.250 | 19.26 | 72.20 | 0.27 |
| Span # 2 | 2 | 8.250 | -35.70 | 72.20 | 0.49 |
| Span # 3 | 3 | 8.250 | 37.88 | 72.20 | 0.52 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 8.250 | -32.03 | 72.20 | 0.44 |
| Span # 2 | 2 | 8.250 | -32.98 | 72.20 | 0.46 |
| Span # 3 | 3 | 8.250 | -32.98 | 72.20 | 0.46 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 8.250 | -28.47 | 72.20 | 0.39 |
| Span # 2 | 2 | 8.250 | -45.72 | 72.20 | 0.63 |
| Span # 3 | 3 | 8.250 | -47.29 | 72.20 | 0.65 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 8.250 | 37.88 | 72.20 | 0.52 |
| Span # 2 | 2 | 8.250 | -36.56 | 72.20 | 0.51 |
| Span # 3 | 3 | 8.250 | 19.26 | 72.20 | 0.27 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 8.250 | 39.39 | 72.20 | 0.55 |
| Span # 2 | 2 | 8.250 | -32.98 | 72.20 | 0.46 |
| Span # 3 | 3 | 8.250 | 39.39 | 72.20 | 0.55 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 8.250 | -45.52 | 72.20 | 0.63 |
| Span # 2 | 2 | 8.250 | -47.29 | 72.20 | 0.65 |
| Span # 3 | 3 | 8.250 | -29.41 | 72.20 | 0.41 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 8.250 | -41.97 | 72.20 | 0.58 |
| Span # 2 | 2 | 8.250 | -43.71 | 72.20 | 0.61 |
| Span # 3 | 3 | 8.250 | -43.71 | 72.20 | 0.61 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 8.250 | -19.15 | 72.20 | 0.27 |
| Span # 2 | 2 | 8.250 | -30.38 | 72.20 | 0.42 |
| Span # 3 | 3 | 8.250 | -31.20 | 72.20 | 0.43 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 8.250 | -28.03 | 72.20 | 0.39 |
| Span # 2 | 2 | 8.250 | -28.96 | 72.20 | 0.40 |
| Span # 3 | 3 | 8.250 | -28.96 | 72.20 | 0.40 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 8.250 | -25.81 | 72.20 | 0.36 |
| Span # 2 | 2 | 8.250 | -36.64 | 72.20 | 0.51 |
| Span # 3 | 3 | 8.250 | -37.90 | 72.20 | 0.52 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 8.250 | 30.35 | 72.20 | 0.42 |
| Span # 2 | 2 | 8.250 | -31.20 | 72.20 | 0.43 |
| Span # 3 | 3 | 8.250 | -20.02 | 72.20 | 0.28 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 8.250 | 31.28 | 72.20 | 0.43 |
| Span # 2 | 2 | 8.250 | -28.96 | 72.20 | 0.40 |
| Span # 3 | 3 | 8.250 | 31.28 | 72.20 | 0.43 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 8.250 | -36.47 | 72.20 | 0.51 |
| Span # 2 | 2 | 8.250 | -37.90 | 72.20 | 0.52 |
| Span # 3 | 3 | 8.250 | -26.73 | 72.20 | 0.37 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 8.250 | -34.25 | 72.20 | 0.47 |
| Span # 2 | 2 | 8.250 | -35.66 | 72.20 | 0.49 |
| Span # 3 | 3 | 8.250 | -35.66 | 72.20 | 0.49 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 8.250 | -21.37 | 72.20 | 0.30 |

# Concrete Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24



DESCRIPTION: Interior Thickned Slab - 4-Span

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 2 | 2 | 8.250 | -22.26 | 72.20 | 0.31 |
| Span # 3 | 3 | 8.250 | -22.26 | 72.20 | 0.31 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 8.250 | -21.37 | 72.20 | 0.30 |
| Span # 2 | 2 | 8.250 | -22.26 | 72.20 | 0.31 |
| Span # 3 | 3 | 8.250 | -22.26 | 72.20 | 0.31 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 8.250 | -21.37 | 72.20 | 0.30 |
| Span # 2 | 2 | 8.250 | -22.26 | 72.20 | 0.31 |
| Span # 3 | 3 | 8.250 | -22.26 | 72.20 | 0.31 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 8.250 | -21.37 | 72.20 | 0.30 |
| Span # 2 | 2 | 8.250 | -22.26 | 72.20 | 0.31 |
| Span # 3 | 3 | 8.250 | -22.26 | 72.20 | 0.31 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 8.250 | -21.37 | 72.20 | 0.30 |
| Span # 2 | 2 | 8.250 | -22.26 | 72.20 | 0.31 |
| Span # 3 | 3 | 8.250 | -22.26 | 72.20 | 0.31 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 8.250 | -21.37 | 72.20 | 0.30 |
| Span # 2 | 2 | 8.250 | -22.26 | 72.20 | 0.31 |
| Span # 3 | 3 | 8.250 | -22.26 | 72.20 | 0.31 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 8.250 | -21.37 | 72.20 | 0.30 |
| Span # 2 | 2 | 8.250 | -22.26 | 72.20 | 0.31 |
| Span # 3 | 3 | 8.250 | -22.26 | 72.20 | 0.31 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 8.250 | -19.15 | 72.20 | 0.27 |
| Span # 2 | 2 | 8.250 | -30.38 | 72.20 | 0.42 |
| Span # 3 | 3 | 8.250 | -31.20 | 72.20 | 0.43 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 8.250 | -28.03 | 72.20 | 0.39 |
| Span # 2 | 2 | 8.250 | -28.96 | 72.20 | 0.40 |
| Span # 3 | 3 | 8.250 | -28.96 | 72.20 | 0.40 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 8.250 | -25.81 | 72.20 | 0.36 |
| Span # 2 | 2 | 8.250 | -36.64 | 72.20 | 0.51 |
| Span # 3 | 3 | 8.250 | -37.90 | 72.20 | 0.52 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 8.250 | 30.35 | 72.20 | 0.42 |
| Span # 2 | 2 | 8.250 | -31.20 | 72.20 | 0.43 |
| Span # 3 | 3 | 8.250 | -20.02 | 72.20 | 0.28 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 8.250 | 31.28 | 72.20 | 0.43 |
| Span # 2 | 2 | 8.250 | -28.96 | 72.20 | 0.40 |
| Span # 3 | 3 | 8.250 | 31.28 | 72.20 | 0.43 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 8.250 | -36.47 | 72.20 | 0.51 |
| Span # 2 | 2 | 8.250 | -37.90 | 72.20 | 0.52 |
| Span # 3 | 3 | 8.250 | -26.73 | 72.20 | 0.37 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 8.250 | -34.25 | 72.20 | 0.47 |
| Span # 2 | 2 | 8.250 | -35.66 | 72.20 | 0.49 |
| Span # 3 | 3 | 8.250 | -35.66 | 72.20 | 0.49 |
| +1.20D+1.60S+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 8.250 | -21.37 | 72.20 | 0.30 |
| Span # 2 | 2 | 8.250 | -22.26 | 72.20 | 0.31 |
| Span # 3 | 3 | 8.250 | -22.26 | 72.20 | 0.31 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 8.250 | -19.15 | 72.20 | 0.27 |
| Span # 2 | 2 | 8.250 | -30.38 | 72.20 | 0.42 |
| Span # 3 | 3 | 8.250 | -31.20 | 72.20 | 0.43 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 8.250 | -28.03 | 72.20 | 0.39 |
| Span # 2 | 2 | 8.250 | -28.96 | 72.20 | 0.40 |
| Span # 3 | 3 | 8.250 | -28.96 | 72.20 | 0.40 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 8.250 | -25.81 | 72.20 | 0.36 |
| Span # 2 | 2 | 8.250 | -36.64 | 72.20 | 0.51 |

# Concrete Beam

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DESCRIPTION: Interior Thickned Slab - 4-Span

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 3 | 3 | 8.250 | -37.90 | 72.20 | 0.52 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 8.250 | 30.35 | 72.20 | 0.42 |
| Span # 2 | 2 | 8.250 | -31.20 | 72.20 | 0.43 |
| Span # 3 | 3 | 8.250 | -20.02 | 72.20 | 0.28 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 8.250 | 31.28 | 72.20 | 0.43 |
| Span # 2 | 2 | 8.250 | -28.96 | 72.20 | 0.40 |
| Span # 3 | 3 | 8.250 | 31.28 | 72.20 | 0.43 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 8.250 | -36.47 | 72.20 | 0.51 |
| Span # 2 | 2 | 8.250 | -37.90 | 72.20 | 0.52 |
| Span # 3 | 3 | 8.250 | -26.73 | 72.20 | 0.37 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 8.250 | -34.25 | 72.20 | 0.47 |
| Span # 2 | 2 | 8.250 | -35.66 | 72.20 | 0.49 |
| Span # 3 | 3 | 8.250 | -35.66 | 72.20 | 0.49 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 8.250 | -19.15 | 72.20 | 0.27 |
| Span # 2 | 2 | 8.250 | -30.38 | 72.20 | 0.42 |
| Span # 3 | 3 | 8.250 | -31.20 | 72.20 | 0.43 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 8.250 | -28.03 | 72.20 | 0.39 |
| Span # 2 | 2 | 8.250 | -28.96 | 72.20 | 0.40 |
| Span # 3 | 3 | 8.250 | -28.96 | 72.20 | 0.40 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 8.250 | -25.81 | 72.20 | 0.36 |
| Span # 2 | 2 | 8.250 | -36.64 | 72.20 | 0.51 |
| Span # 3 | 3 | 8.250 | -37.90 | 72.20 | 0.52 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 8.250 | 30.35 | 72.20 | 0.42 |
| Span # 2 | 2 | 8.250 | -31.20 | 72.20 | 0.43 |
| Span # 3 | 3 | 8.250 | -20.02 | 72.20 | 0.28 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 8.250 | 31.28 | 72.20 | 0.43 |
| Span # 2 | 2 | 8.250 | -28.96 | 72.20 | 0.40 |
| Span # 3 | 3 | 8.250 | 31.28 | 72.20 | 0.43 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 8.250 | -36.47 | 72.20 | 0.51 |
| Span # 2 | 2 | 8.250 | -37.90 | 72.20 | 0.52 |
| Span # 3 | 3 | 8.250 | -26.73 | 72.20 | 0.37 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 8.250 | -34.25 | 72.20 | 0.47 |
| Span # 2 | 2 | 8.250 | -35.66 | 72.20 | 0.49 |
| Span # 3 | 3 | 8.250 | -35.66 | 72.20 | 0.49 |
| +0.90D+W+1.60H | | | | | |
| Span # 1 | 1 | 8.250 | -16.03 | 72.20 | 0.22 |
| Span # 2 | 2 | 8.250 | -16.69 | 72.20 | 0.23 |
| Span # 3 | 3 | 8.250 | -16.69 | 72.20 | 0.23 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 8.250 | -19.15 | 72.20 | 0.27 |
| Span # 2 | 2 | 8.250 | -30.38 | 72.20 | 0.42 |
| Span # 3 | 3 | 8.250 | -31.20 | 72.20 | 0.43 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 8.250 | -28.03 | 72.20 | 0.39 |
| Span # 2 | 2 | 8.250 | -28.96 | 72.20 | 0.40 |
| Span # 3 | 3 | 8.250 | -28.96 | 72.20 | 0.40 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 8.250 | -25.81 | 72.20 | 0.36 |
| Span # 2 | 2 | 8.250 | -36.64 | 72.20 | 0.51 |
| Span # 3 | 3 | 8.250 | -37.90 | 72.20 | 0.52 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 8.250 | 30.35 | 72.20 | 0.42 |
| Span # 2 | 2 | 8.250 | -31.20 | 72.20 | 0.43 |
| Span # 3 | 3 | 8.250 | -20.02 | 72.20 | 0.28 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 8.250 | 31.28 | 72.20 | 0.43 |
| Span # 2 | 2 | 8.250 | -28.96 | 72.20 | 0.40 |
| Span # 3 | 3 | 8.250 | 31.28 | 72.20 | 0.43 |

# Concrete Beam

File: FWI2101 - Paragon Star.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403
Bob D. Campbell and Co., Inc.

DESCRIPTION: Interior Thickned Slab - 4-Span

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 8.250 | -36.47 | 72.20 | 0.51 |
| Span # 2 | 2 | 8.250 | -37.90 | 72.20 | 0.52 |
| Span # 3 | 3 | 8.250 | -26.73 | 72.20 | 0.37 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 8.250 | -34.25 | 72.20 | 0.47 |
| Span # 2 | 2 | 8.250 | -35.66 | 72.20 | 0.49 |
| Span # 3 | 3 | 8.250 | -35.66 | 72.20 | 0.49 |
| +0.90D+E+0.90H | | | | | |
| Span # 1 | 1 | 8.250 | -16.03 | 72.20 | 0.22 |
| Span # 2 | 2 | 8.250 | -16.69 | 72.20 | 0.23 |
| Span # 3 | 3 | 8.250 | -16.69 | 72.20 | 0.23 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H, LL Comb Run (L*L) | 1 | 0.0387 | 3.795 | +D+L+H, LL Comb Run (L*L) | -0.0012 | 8.415 |
| +D+L+H, LL Comb Run (L*L) | 2 | 0.0015 | 8.415 | +D+L+H, LL Comb Run (L*L) | -0.0114 | 4.125 |
| +D+L+H, LL Comb Run (L*L) | 3 | 0.0387 | 4.455 | | 0.0000 | 4.125 |

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# Cantilevered Retaining Wall

File: FWI2101 - Paragon Star.ec6

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: Foundation Wall - Area B - TOF=90'-0" (sliding uses piles)

Calculations per ACI 318-14, TMS 402-16, IBC 2018, CBC 2019, ASCE 7-16

## Criteria

| | | |
|---|---|---|
| Retained Height | = | 10.00 ft |
| Wall height above soil | = | 0.00 ft |
| Slope Behind Wall | = | 0.00 : 1 |
| Height of Soil over Toe | = | 24.00 in |
| Water height over heel | = | 0.0 ft |

Vertical component of active Lateral soil pressure options:
NOT USED for Soil Pressure.
NOT USED for Sliding Resistance.
NOT USED for Overturning Resistance.

## Soil Data

| | | |
|---|---|---|
| Allow Soil Bearing | = | 4,000.0 psf |
| Equivalent Fluid Pressure Method | | |
| Heel Active Pressure | = | 50.0 psf/ft |
| Toe Active Pressure | = | 50.0 psf/ft |
| Passive Pressure | = | 290.0 psf/ft |
| Soil Density, Heel | = | 120.00 pcf |
| Soil Density, Toe | = | 120.00 pcf |
| Friction Coeff btwn Ftg & Soil | = | 0.300 |
| Soil height to ignore for passive pressure | = | 12.00 in |

## Design Summary

Wall Stability Ratios

| | | | |
|---|---|---|---|
| Overturning | = | 2.35 | OK |
| Sliding | = | 1.31 | Ratio < 1.5! |
| Total Bearing Load | = | 7,643 lbs | |
| ...resultant ecc. | = | 12.91 in | |
| Soil Pressure @ Toe | = | 2,343 psf | OK |
| Soil Pressure @ Heel | = | 8 psf | OK |
| Allowable | = | 4,000 psf | |

Soil Pressure Less Than Allowable

| | | | |
|---|---|---|---|
| ACI Factored @ Toe | = | 2,812 psf | |
| ACI Factored @ Heel | = | 10 psf | |
| Footing Shear @ Toe | = | 9.0 psi | OK |
| Footing Shear @ Heel | = | 32.2 psi | OK |
| Allowable | = | 88.7 psi | |

Sliding Calcs (Vertical Component NOT Used)

| | | | |
|---|---|---|---|
| Lateral Sliding Force | = | 3,000.0 lbs | |
| less 100% Passive Force | = - | 1,631.3 lbs | |
| less 100% Friction Force | = - | 2,292.8 lbs | |
| Added Force Req'd | = | 0.0 lbs | OK |
| ....for 1.5 : 1 Stability | = | 576.0 lbs | NG |

Load Factors

| | |
|---|---|
| Dead Load | 1.200 |
| Live Load | 1.600 |
| Earth, H | 1.600 |
| Wind, W | 1.600 |
| Seismic, E | 1.000 |

## Stem Construction

| | | Top Stem | 2nd |
|---|---|---|---|
| | | Stem OK | Stem OK |
| Design Height Above Ftg | ft = | 1.00 | 0.00 |
| Wall Material Above "Ht" | = | Concrete | Concrete |
| Thickness | in = | 12.00 | 12.00 |
| Rebar Size | = | # 5 | # 6 |
| Rebar Spacing | in = | 12.00 | 12.00 |
| Rebar Placed at | = | Edge | Edge |
| **Design Data** | | | |
| fb/FB + fa/Fa | = | 0.701 | 0.722 |
| Total Force @ Section | lbs = | 3,200.0 | 3,840.0 |
| Moment....Actual | ft-l = | 9,706.7 | 13,226.7 |
| Moment.....Allowable | ft-l = | 13,847.1 | 18,323.2 |
| Shear.....Actual | psi = | 26.2 | 33.2 |
| Shear.....Allowable | psi = | 88.7 | 88.7 |
| Wall Weight | psf = | 150.0 | 150.0 |
| Rebar Depth 'd' | in = | 10.19 | 9.63 |
| Lap splice if above | in = | 19.78 | 23.73 |
| Lap splice if below | in = | 19.78 | 4.56 |
| Hook embed into footing | in = | 19.78 | 4.56 |
| **Concrete Data** | | | |
| f'c | psi = | 3,500.0 | 3,500.0 |
| Fy | psi = | 60,000.0 | 60,000.0 |

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# Cantilevered Retaining Wall

File: FWI2101 - Paragon Star.ec6

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: Foundation Wall - Area B - TOF=90'-0" (sliding uses piles)

## Footing Dimensions & Strengths

| | | |
|---|---|---|
| Toe Width | = | 2.00 ft |
| Heel Width | = | 4.50 |
| Total Footing Width | = | 6.50 |
| Footing Thickness | = | 18.00 in |
| Key Width | = | 0.00 in |
| Key Depth | = | 0.00 in |
| Key Distance from Toe | = | 0.00 ft |

f'c = 3,500 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

## Footing Design Results

| | | Toe | Heel | |
|---|---|---|---|---|
| Factored Pressure | = | 2,812 | 10 | psf |
| Mu' : Upward | = | 5,049 | 0 | ft-lb |
| Mu' : Downward | = | 1,116 | 10,474 | ft-lb |
| Mu: Design | = | 3,933 | 10,474 | ft-lb |
| Actual 1-Way Shear | = | 9.04 | 32.18 | psi |
| Allow 1-Way Shear | = | 88.74 | 88.74 | psi |

Toe Reinforcing = # 7 @ 12.00 in
Heel Reinforcing = # 5 @ 11.25 in
Key Reinforcing = None Spec'd

Other Acceptable Sizes & Spacings

Toe: Not req'd, Mu < S * Fr
Heel: #4@ 7.25 in, #5@ 11.25 in, #6@ 16.00 in, #7@ 21.75 in, #8@ 28.50 in, #9@ 36
Key: No key defined

## Summary of Overturning & Resisting Forces & Moments

| Item | | .....OVERTURNING..... Force lbs | Distance ft | Moment ft-lb | | .....RESISTING..... Force lbs | Distance ft | Moment ft-lb |
|---|---|---|---|---|---|---|---|---|
| Heel Active Pressure | = | 3,306.3 | 3.83 | 12,674.0 | Soil Over Heel | = 4,200.0 | 4.75 | 19,950.0 |
| Surcharge over Heel | = | | | | Sloped Soil Over Heel | = | | |
| Toe Active Pressure | = | -306.3 | 1.17 | -357.3 | Surcharge Over Heel | = | | |
| Surcharge Over Toe | = | | | | Adjacent Footing Load | = | | |
| Adjacent Footing Load | = | | | | Axial Dead Load on Stem | = | | |
| Added Lateral Load | = | | | | * Axial Live Load on Stem | = | | |
| Load @ Stem Above Soil | = | | | | Soil Over Toe | = 480.0 | 1.00 | 480.0 |
| | | | | | Surcharge Over Toe | = | | |
| | | | | | Stem Weight(s) | = 1,500.0 | 2.50 | 3,750.0 |
| | | | | | Earth @ Stem Transitions | = | | |
| Total | = | 3,000.0 | O.T.M. = | 12,316.7 | Footing Weight | = 1,462.5 | 3.25 | 4,753.1 |
| | | | | | Key Weight | = | | |
| | | | | | Vert. Component | = | | |
| | | | | | Total | = 7,642.5 lbs | R.M. = | 28,933.1 |

Resisting/Overturning Ratio = 2.35
Vertical Loads used for Soil Pressure = 7,642.5 lbs

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

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# Cantilevered Retaining Wall

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Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: Foundation Wall - Area B - TOF=88'-0" (sliding uses piles)

Calculations per ACI 318-14, TMS 402-16, IBC 2018, CBC 2019, ASCE 7-16

## Criteria

| | | |
|---|---|---|
| Retained Height | = | 12.00 ft |
| Wall height above soil | = | 0.00 ft |
| Slope Behind Wall | = | 0.00 : 1 |
| Height of Soil over Toe | = | 24.00 in |
| Water height over heel | = | 0.0 ft |

Vertical component of active Lateral soil pressure options:
NOT USED for Soil Pressure.
NOT USED for Sliding Resistance.
NOT USED for Overturning Resistance.

## Soil Data

| | | |
|---|---|---|
| Allow Soil Bearing | = | 4,000.0 psf |
| Equivalent Fluid Pressure Method | | |
| Heel Active Pressure | = | 50.0 psf/ft |
| Toe Active Pressure | = | 50.0 psf/ft |
| Passive Pressure | = | 290.0 psf/ft |
| Soil Density, Heel | = | 120.00 pcf |
| Soil Density, Toe | = | 120.00 pcf |
| Friction Coeff btwn Ftg & Soil | = | 0.300 |
| Soil height to ignore for passive pressure | = | 12.00 in |

## Design Summary

Wall Stability Ratios

| | | | |
|---|---|---|---|
| Overturning | = | 2.57 | OK |
| Sliding | = | 1.18 | Ratio < 1.5! |
| Total Bearing Load | = | 11,280 lbs | |
| ...resultant ecc. | = | 14.35 in | |
| Soil Pressure @ Toe | = | 2,674 psf | OK |
| Soil Pressure @ Heel | = | 146 psf | OK |
| Allowable | = | 4,000 psf | |

Soil Pressure Less Than Allowable

| | | | |
|---|---|---|---|
| ACI Factored @ Toe | = | 3,209 psf | |
| ACI Factored @ Heel | = | 175 psf | |
| Footing Shear @ Toe | = | 10.9 psi | OK |
| Footing Shear @ Heel | = | 53.7 psi | OK |
| Allowable | = | 88.7 psi | |

Sliding Calcs (Vertical Component NOT Used)

| | | | |
|---|---|---|---|
| Lateral Sliding Force | = | 4,250.0 lbs | |
| less 100% Passive Force | = - | 1,631.3 lbs | |
| less 100% Friction Force | = - | 3,388.0 lbs | |
| Added Force Req'd | = | 0.0 lbs | OK |
| ....for 1.5 : 1 Stability | = | 1,359.8 lbs | NG |

Load Factors

| | |
|---|---|
| Dead Load | 1.200 |
| Live Load | 1.600 |
| Earth, H | 1.600 |
| Wind, W | 1.600 |
| Seismic, E | 1.000 |

## Stem Construction

| | | Top Stem | 2nd |
|---|---|---|---|
| | | Stem OK | Stem OK |
| Design Height Above Ftg | ft = | 3.00 | 0.00 |
| Wall Material Above "Ht" | = | Concrete | Concrete |
| Thickness | in = | 12.00 | 12.00 |
| Rebar Size | = | # 5 | # 7 |
| Rebar Spacing | in = | 12.00 | 12.00 |
| Rebar Placed at | = | Edge | Edge |
| **Design Data** | | | |
| fb/FB + fa/Fa | = | 0.702 | 0.938 |
| Total Force @ Section | lbs = | 3,240.0 | 5,600.0 |
| Moment....Actual | ft-l = | 9,720.0 | 22,933.3 |
| Moment.....Allowable | ft-l = | 13,847.1 | 24,453.3 |
| Shear.....Actual | psi = | 26.5 | 48.8 |
| Shear.....Allowable | psi = | 88.7 | 88.7 |
| Wall Weight | psf = | 150.0 | 150.0 |
| Rebar Depth 'd' | in = | 10.19 | 9.56 |
| Lap splice if above | in = | 19.78 | 34.79 |
| Lap splice if below | in = | 19.78 | 6.96 |
| Hook embed into footing | in = | 19.78 | 6.96 |
| **Concrete Data** | | | |
| f'c | psi = | 3,500.0 | 3,500.0 |
| Fy | psi = | 60,000.0 | 60,000.0 |

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# Cantilevered Retaining Wall

File: FWI2101 - Paragon Star.ec6

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: Foundation Wall - Area B - TOF=88'-0" (sliding uses piles)

## Footing Dimensions & Strengths

| | | |
|---|---|---|
| Toe Width | = | 2.00 ft |
| Heel Width | = | 6.00 |
| Total Footing Width | = | 8.00 |
| Footing Thickness | = | 18.00 in |
| Key Width | = | 0.00 in |
| Key Depth | = | 0.00 in |
| Key Distance from Toe | = | 0.00 ft |

f'c = 3,500 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

## Footing Design Results

| | | Toe | Heel |
|---|---|---|---|
| Factored Pressure | = | 3,209 | 175 psf |
| Mu' : Upward | = | 5,913 | 0 ft-lb |
| Mu' : Downward | = | 1,116 | 0 ft-lb |
| Mu: Design | = | 4,797 | 22,933 ft-lb |
| Actual 1-Way Shear | = | 10.94 | 53.71 psi |
| Allow 1-Way Shear | = | 88.74 | 88.74 psi |
| Toe Reinforcing | = | # 7 @ 12.00 in | |
| Heel Reinforcing | = | # 6 @ 12.00 in | |
| Key Reinforcing | = | None Spec'd | |

Other Acceptable Sizes & Spacings

Toe: Not req'd, Mu < S * Fr
Heel: #4@ 5.50 in, #5@ 8.50 in, #6@ 12.00 in, #7@ 16.25 in, #8@ 21.50 in, #9@ 27.
Key: No key defined

## Summary of Overturning & Resisting Forces & Moments

| | | .....OVERTURNING..... Force lbs | Distance ft | Moment ft-lb | | | .....RESISTING..... Force lbs | Distance ft | Moment ft-lb |
|---|---|---|---|---|---|---|---|---|---|
| Heel Active Pressure | = | 4,556.3 | 4.50 | 20,503.1 | Soil Over Heel | = | 7,200.0 | 5.50 | 39,600.0 |
| Surcharge over Heel | = | | | | Sloped Soil Over Heel | = | | | |
| Toe Active Pressure | = | -306.3 | 1.17 | -357.3 | Surcharge Over Heel | = | | | |
| Surcharge Over Toe | = | | | | Adjacent Footing Load | = | | | |
| Adjacent Footing Load | = | | | | Axial Dead Load on Stem | = | | | |
| Added Lateral Load | = | | | | * Axial Live Load on Stem | = | | | |
| Load @ Stem Above Soil | = | | | | Soil Over Toe | = | 480.0 | 1.00 | 480.0 |
| | | | | | Surcharge Over Toe | = | | | |
| | | | | | Stem Weight(s) | = | 1,800.0 | 2.50 | 4,500.0 |
| | | | | | Earth @ Stem Transitions | = | | | |
| Total | = | 4,250.0 | O.T.M. = | 20,145.8 | Footing Weight | = | 1,800.0 | 4.00 | 7,200.0 |
| | | | | | Key Weight | = | | | |
| | | | | | Vert. Component | = | | | |
| | | | | | Total | = | 11,280.0 lbs | R.M. = | 51,780.0 |

Resisting/Overturning Ratio = 2.57
Vertical Loads used for Soil Pressure = 11,280.0 lbs

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

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# Cantilevered Retaining Wall

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Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: Foundation Wall - Area B - TOF=86'-0" (sliding uses piles)

Calculations per ACI 318-14, TMS 402-16, IBC 2018, CBC 2019, ASCE 7-16

## Criteria

| | | |
|---|---|---|
| Retained Height | = | 14.00 ft |
| Wall height above soil | = | 0.00 ft |
| Slope Behind Wall | = | 0.00 : 1 |
| Height of Soil over Toe | = | 24.00 in |
| Water height over heel | = | 0.0 ft |

Vertical component of active Lateral soil pressure options:
NOT USED for Soil Pressure.
NOT USED for Sliding Resistance.
NOT USED for Overturning Resistance.

## Soil Data

| | | |
|---|---|---|
| Allow Soil Bearing | = | 4,000.0 psf |
| Equivalent Fluid Pressure Method | | |
| Heel Active Pressure | = | 50.0 psf/ft |
| Toe Active Pressure | = | 50.0 psf/ft |
| Passive Pressure | = | 290.0 psf/ft |
| Soil Density, Heel | = | 120.00 pcf |
| Soil Density, Toe | = | 120.00 pcf |
| Friction Coeff btwn Ftg & Soil | = | 0.300 |
| Soil height to ignore for passive pressure | = | 12.00 in |

## Design Summary

Wall Stability Ratios

| | | | |
|---|---|---|---|
| Overturning | = | 3.00 | OK |
| Sliding | = | 1.12 | Ratio < 1.5! |
| Total Bearing Load | = | 15,870 lbs | |
| ...resultant ecc. | = | 13.62 in | |
| Soil Pressure @ Toe | = | 2,668 psf | OK |
| Soil Pressure @ Heel | = | 506 psf | OK |
| Allowable | = | 4,000 psf | |

Soil Pressure Less Than Allowable

| | | | |
|---|---|---|---|
| ACI Factored @ Toe | = | 3,201 psf | |
| ACI Factored @ Heel | = | 607 psf | |
| Footing Shear @ Toe | = | 17.7 psi | OK |
| Footing Shear @ Heel | = | 79.9 psi | OK |
| Allowable | = | 88.7 psi | |

Sliding Calcs (Vertical Component NOT Used)

| | | | |
|---|---|---|---|
| Lateral Sliding Force | = | 5,700.0 lbs | |
| less 100% Passive Force | = - | 1,631.3 lbs | |
| less 100% Friction Force | = - | 4,760.0 lbs | |
| Added Force Req'd | = | 0.0 lbs | OK |
| ....for 1.5 : 1 Stability | = | 2,157.8 lbs | NG |

Load Factors

| | |
|---|---|
| Dead Load | 1.200 |
| Live Load | 1.600 |
| Earth, H | 1.600 |
| Wind, W | 1.600 |
| Seismic, E | 1.000 |

## Stem Construction

| | | Top Stem | 2nd |
|---|---|---|---|
| | | Stem OK | Stem OK |
| Design Height Above Ftg | ft = | 5.00 | 0.00 |
| Wall Material Above "Ht" | = | Concrete | Concrete |
| Thickness | in = | 12.00 | 12.00 |
| Rebar Size | = | # 5 | # 7 |
| Rebar Spacing | in = | 12.00 | 6.00 |
| Rebar Placed at | = | Edge | Edge |
| **Design Data** | | | |
| fb/FB + fa/Fa | = | 0.702 | 0.790 |
| Total Force @ Section | lbs = | 3,240.0 | 7,680.0 |
| Moment....Actual | ft-l = | 9,720.0 | 36,480.0 |
| Moment.....Allowable | ft-l = | 13,847.1 | 46,175.8 |
| Shear.....Actual | psi = | 26.5 | 66.9 |
| Shear.....Allowable | psi = | 88.7 | 88.7 |
| Wall Weight | psf = | 150.0 | 150.0 |
| Rebar Depth 'd' | in = | 10.19 | 9.56 |
| Lap splice if above | in = | 19.78 | 34.79 |
| Lap splice if below | in = | 19.78 | 5.73 |
| Hook embed into footing | in = | 19.78 | 5.73 |
| **Concrete Data** | | | |
| f'c | psi = | 3,500.0 | 3,500.0 |
| Fy | psi = | 60,000.0 | 60,000.0 |

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# Cantilevered Retaining Wall

File: FWI2101 - Paragon Star.ec6

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: Foundation Wall - Area B - TOF=86'-0" (sliding uses piles)

## Footing Dimensions & Strengths

| | | |
|---|---|---|
| Toe Width | = | 2.50 ft |
| Heel Width | = | 7.50 |
| Total Footing Width | = | 10.00 |
| Footing Thickness | = | 18.00 in |
| Key Width | = | 0.00 in |
| Key Depth | = | 0.00 in |
| Key Distance from Toe | = | 0.00 ft |

f'c = 3,500 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

## Footing Design Results

| | | Toe | Heel |
|---|---|---|---|
| Factored Pressure | = | 3,201 | 607 psf |
| Mu' : Upward | = | 9,329 | 0 ft-lb |
| Mu' : Downward | = | 1,744 | 0 ft-lb |
| Mu: Design | = | 7,585 | 36,480 ft-lb |
| Actual 1-Way Shear | = | 17.67 | 79.89 psi |
| Allow 1-Way Shear | = | 88.74 | 88.74 psi |
| Toe Reinforcing | = | # 7 @ 6.00 in | |
| Heel Reinforcing | = | # 6 @ 8.75 in | |
| Key Reinforcing | = | None Spec'd | |

Other Acceptable Sizes & Spacings

Toe: #4@ 7.75 in, #5@ 12.00 in, #6@ 17.00 in, #7@ 23.00 in, #8@ 30.50 in, #9@ 38
Heel: #4@ 4.00 in, #5@ 6.00 in, #6@ 8.75 in, #7@ 11.75 in, #8@ 15.50 in, #9@ 19.5
Key: No key defined

## Summary of Overturning & Resisting Forces & Moments

| | | .....OVERTURNING..... Force lbs | Distance ft | Moment ft-lb | | | .....RESISTING..... Force lbs | Distance ft | Moment ft-lb |
|---|---|---|---|---|---|---|---|---|---|
| Heel Active Pressure | = | 6,006.3 | 5.17 | 31,032.3 | Soil Over Heel | = | 10,920.0 | 6.75 | 73,710.0 |
| Surcharge over Heel | = | | | | Sloped Soil Over Heel | = | | | |
| Toe Active Pressure | = | -306.3 | 1.17 | -357.3 | Surcharge Over Heel | = | | | |
| Surcharge Over Toe | = | | | | Adjacent Footing Load | = | | | |
| Adjacent Footing Load | = | | | | Axial Dead Load on Stem | = | | | |
| Added Lateral Load | = | | | | * Axial Live Load on Stem | = | | | |
| Load @ Stem Above Soil | = | | | | Soil Over Toe | = | 600.0 | 1.25 | 750.0 |
| | | | | | Surcharge Over Toe | = | | | |
| | | | | | Stem Weight(s) | = | 2,100.0 | 3.00 | 6,300.0 |
| | | | | | Earth @ Stem Transitions | = | | | |
| Total | = | 5,700.0 | O.T.M. = | 30,675.0 | Footing Weight | = | 2,250.0 | 5.00 | 11,250.0 |
| | | | | | Key Weight | = | | | |
| | | | | | Vert. Component | = | | | |
| | | | | | Total | = | 15,870.0 lbs | R.M. = | 92,010.0 |

Resisting/Overturning Ratio = 3.00
Vertical Loads used for Soil Pressure = 15,870.0 lbs

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

# Cantilevered Retaining Wall

File: FWI2101 - Paragon Star.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403
Bob D. Campbell and Co., Inc.

DESCRIPTION: Foundation Wall - Area F

Calculations per ACI 318-14, TMS 402-16, IBC 2018, CBC 2019, ASCE 7-16

## Criteria

| | | |
|---|---|---|
| Retained Height | = | 6.00 ft |
| Wall height above soil | = | 0.00 ft |
| Slope Behind Wall | = | 0.00 : 1 |
| Height of Soil over Toe | = | 24.00 in |
| Water height over heel | = | 0.0 ft |

Vertical component of active Lateral soil pressure options:
NOT USED for Soil Pressure.
NOT USED for Sliding Resistance.
NOT USED for Overturning Resistance.

## Soil Data

| | | |
|---|---|---|
| Allow Soil Bearing | = | 3,000.0 psf |
| Equivalent Fluid Pressure Method | | |
| Heel Active Pressure | = | 50.0 psf/ft |
| Toe Active Pressure | = | 50.0 psf/ft |
| Passive Pressure | = | 290.0 psf/ft |
| Soil Density, Heel | = | 120.00 pcf |
| Soil Density, Toe | = | 120.00 pcf |
| Friction Coeff btwn Ftg & Soil | = | 0.300 |
| Soil height to ignore for passive pressure | = | 12.00 in |

## Design Summary

Wall Stability Ratios

| | | | |
|---|---|---|---|
| Overturning | = | 2.57 | OK |
| Sliding | = | 2.06 | OK |
| Total Bearing Load | = | 3,000 lbs | |
| ...resultant ecc. | = | 7.43 in | |
| Soil Pressure @ Toe | = | 1,447 psf | OK |
| Soil Pressure @ Heel | = | 53 psf | OK |
| Allowable | = | 3,000 psf | |

Soil Pressure Less Than Allowable

| | | | |
|---|---|---|---|
| ACI Factored @ Toe | = | 1,736 psf | |
| ACI Factored @ Heel | = | 64 psf | |
| Footing Shear @ Toe | = | 5.6 psi | OK |
| Footing Shear @ Heel | = | 19.1 psi | OK |
| Allowable | = | 88.7 psi | |

Sliding Calcs (Vertical Component NOT Used)

| | | | |
|---|---|---|---|
| Lateral Sliding Force | = | 1,000.0 lbs | |
| less 100% Passive Force | = - | 1,160.0 lbs | |
| less 100% Friction Force | = - | 900.0 lbs | |
| Added Force Req'd | = | 0.0 lbs | OK |
| ....for 1.5 : 1 Stability | = | 0.0 lbs | OK |

Load Factors

| | |
|---|---|
| Dead Load | 1.200 |
| Live Load | 1.600 |
| Earth, H | 1.600 |
| Wind, W | 1.600 |
| Seismic, E | 1.000 |

## Stem Construction

Top Stem

Stem OK

| | | |
|---|---|---|
| Design Height Above Ftg | ft = | 0.00 |
| Wall Material Above "Ht" | = | Concrete |
| Thickness | in = | 8.00 |
| Rebar Size | = | # 4 |
| Rebar Spacing | in = | 12.00 |
| Rebar Placed at | = | Center |

Design Data

| | | |
|---|---|---|
| fb/FB + fa/Fa | = | 0.804 |
| Total Force @ Section | lbs = | 1,280.0 |
| Moment....Actual | ft-l = | 2,773.3 |
| Moment.....Allowable | ft-l = | 3,448.3 |
| Shear.....Actual | psi = | 26.7 |
| Shear.....Allowable | psi = | 88.7 |
| Wall Weight | psf = | 100.0 |
| Rebar Depth 'd' | in = | 4.00 |
| Lap splice if above | in = | 15.82 |
| Lap splice if below | in = | 6.00 |
| Hook embed into footing | in = | 6.00 |

Concrete Data

| | | |
|---|---|---|
| f'c | psi = | 3,500.0 |
| Fy | psi = | |

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 27 JUN 2022, 8:53AM

# Cantilevered Retaining Wall

File: FWI2101 - Paragon Star.ec6

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: Foundation Wall - Area F

## Footing Dimensions & Strengths

| | | |
|---|---|---|
| Toe Width | = | 1.25 ft |
| Heel Width | = | 2.75 |
| Total Footing Width | = | 4.00 |
| Footing Thickness | = | 12.00 in |
| Key Width | = | 0.00 in |
| Key Depth | = | 0.00 in |
| Key Distance from Toe | = | 0.00 ft |

f'c = 3,500 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

## Footing Design Results

| | | Toe | Heel | |
|---|---|---|---|---|
| Factored Pressure | = | 1,736 | 64 | psf |
| Mu' : Upward | = | 1,220 | 0 | ft-lb |
| Mu' : Downward | = | 366 | 2,266 | ft-lb |
| Mu: Design | = | 855 | 2,266 | ft-lb |
| Actual 1-Way Shear | = | 5.62 | 19.08 | psi |
| Allow 1-Way Shear | = | 88.74 | 88.74 | psi |

Toe Reinforcing = # 4 @ 18.00 in
Heel Reinforcing = # 4 @ 18.00 in
Key Reinforcing = None Spec'd

Other Acceptable Sizes & Spacings

Toe: Not req'd, Mu < S * Fr
Heel: Not req'd, Mu < S * Fr
Key: No key defined

## Summary of Overturning & Resisting Forces & Moments

| | | .....OVERTURNING..... Force lbs | Distance ft | Moment ft-lb | | | .....RESISTING..... Force lbs | Distance ft | Moment ft-lb |
|---|---|---|---|---|---|---|---|---|---|
| Heel Active Pressure | = | 1,225.0 | 2.33 | 2,858.3 | Soil Over Heel | = | 1,500.0 | 2.96 | 4,437.5 |
| Surcharge over Heel | = | | | | Sloped Soil Over Heel | = | | | |
| Toe Active Pressure | = | -225.0 | 1.00 | -225.0 | Surcharge Over Heel | = | | | |
| Surcharge Over Toe | = | | | | Adjacent Footing Load | = | | | |
| Adjacent Footing Load | = | | | | Axial Dead Load on Stem | = | | | |
| Added Lateral Load | = | | | | * Axial Live Load on Stem | = | | | |
| Load @ Stem Above Soil | = | | | | Soil Over Toe | = | 300.0 | 0.63 | 187.5 |
| | | | | | Surcharge Over Toe | = | | | |
| | | | | | Stem Weight(s) | = | 600.0 | 1.58 | 950.0 |
| | | | | | Earth @ Stem Transitions | = | | | |
| Total | = | 1,000.0 | O.T.M. = | 2,633.3 | Footing Weight | = | 600.0 | 2.00 | 1,200.0 |
| | | | | | Key Weight | = | | | |
| | | | | | Vert. Component | = | | | |
| | | | | | Total | = | 3,000.0 lbs | R.M. = | 6,775.0 |

Resisting/Overturning Ratio = 2.57
Vertical Loads used for Soil Pressure = 3,000.0 lbs

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Project Title:
Engineer:
Project ID:
Project Descr:

# Steel Beam

Project File: FWI2101 - Paragon Star.ec6

LIC# : KW-06017302, Build:20.22.6.12 Bob D. Campbell and Co., Inc. (c) ENERCALC INC 1983-2022

**DESCRIPTION:** Grid DY1 - Exterior Wall Above

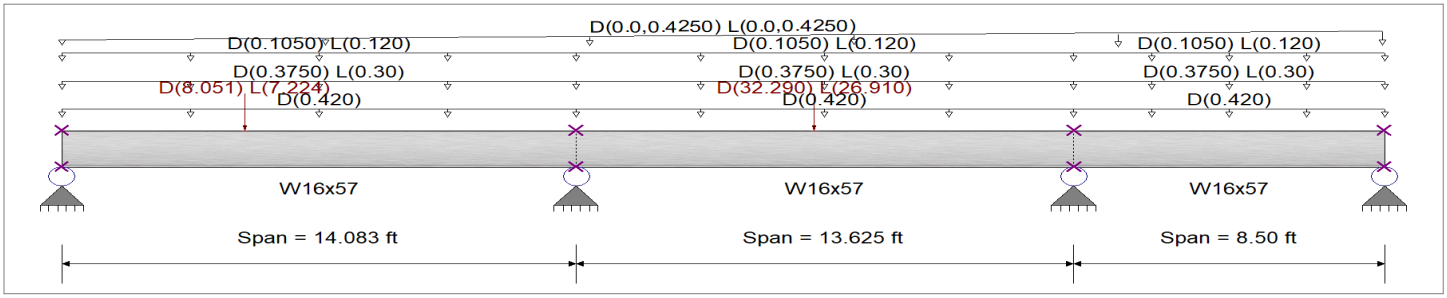
## CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-10

## Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Completely Unbraced
Bending Axis : Major Axis Bending

Fy : Steel Yield : 36.0 ksi
E: Modulus : 29,000.0 ksi




## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Loads on all spans...
Varying Uniform Load : D= 0.0->0.4250, L= 0.0->0.4250 k/ft, Extent = 0.0 -->> 36.150 ft

Load for Span Number 1
Uniform Load : D = 0.0120 ksf, Tributary Width = 35.0 ft, (Wall Weight Above)

Uniform Load : D = 0.0250, L = 0.020 ksf, Tributary Width = 15.0 ft, (Roof Load Above)

Uniform Load : D = 0.0350, L = 0.040 ksf, Tributary Width = 3.0 ft, ((3) Floor Load Above)

Point Load : D = 8.051, L = 7.224 k @ 5.033 ft, (Beam Reaction (Grid DXC))

Load for Span Number 2
Uniform Load : D = 0.0120 ksf, Tributary Width = 35.0 ft, (Wall Weight Above)

Uniform Load : D = 0.0250, L = 0.020 ksf, Tributary Width = 15.0 ft, (Roof Load Above)

Uniform Load : D = 0.0350, L = 0.040 ksf, Tributary Width = 3.0 ft, ((3) Floor Load Above)

Point Load : D = 32.290, L = 26.910 k @ 6.533 ft, (Beam Reaction (Grid DXD))

Load for Span Number 3
Uniform Load : D = 0.0120 ksf, Tributary Width = 35.0 ft, (Wall Weight Above)

Uniform Load : D = 0.0250, L = 0.020 ksf, Tributary Width = 15.0 ft, (Roof Load Above)

Uniform Load : D = 0.0350, L = 0.040 ksf, Tributary Width = 3.0 ft, ((3) Floor Load Above)

Project Title:
Engineer:
Project ID:
Project Descr:

# Steel Beam

Project File: FWI2101 - Paragon Star.ec6

LIC# : KW-06017302, Build:20.22.6.12 Bob D. Campbell and Co., Inc. (c) ENERCALC INC 1983-2022

**DESCRIPTION:** Grid DY1 - Exterior Wall Above

## *DESIGN SUMMARY*

**Design OK**

| | | | |
|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.757** : 1 | Maximum Shear Stress Ratio = | **0.439** : 1 |
| Section used for this span | **W16x57** | Section used for this span | **W16x57** |
| Ma : Applied | 142.794 k-ft | Va : Applied | 44.541 k |
| Mn / Omega : Allowable | 188.623 k-ft | Vn/Omega : Allowable | 101.549 k |
| Load Combination | +D+L | Load Combination | +D+L |
| | | Location of maximum on span | 14.083 ft |
| Span # where maximum occurs | Span # 2 | Span # where maximum occurs | Span # 1 |

**Maximum Deflection**

| | | | | | |
|---|---|---|---|---|---|
| Max Downward Transient Deflection | 0.056 in | Ratio = | 2,899 | >=480. | Span: 3 : L Only |
| Max Upward Transient Deflection | -0.011 in | Ratio = | 9,615 | >=480. | Span: 3 : L Only |
| Max Downward Total Deflection | 0.127 in | Ratio = | 1292 | >=360. | Span: 3 : +D+L |
| Max Upward Total Deflection | -0.023 in | Ratio = | 4419 | >=360. | Span: 3 : +D+L |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | Summary of Moment Values Mmax + | Mmax - | Ma Max | Mnx | Mnx/Omega | Cb | Rm | Summary of Shear Values Va Max | VnxVnx/Omega |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D Only | | | | | | | | | | | | |
| Dsgn. L = 14.08 ft | 1 | 0.339 | 0.253 | 26.50 | -64.04 | 64.04 | 315.00 | 188.62 | 2.38 | 1.00 | 25.69 | 152.32 | 101.55 |
| Dsgn. L = 13.63 ft | 2 | 0.420 | 0.253 | 79.19 | -64.04 | 79.19 | 315.00 | 188.62 | 1.65 | 1.00 | 25.69 | 152.32 | 101.55 |
| Dsgn. L = 8.50 ft | 3 | 0.277 | 0.116 | | -52.18 | 52.18 | 315.00 | 188.62 | 2.25 | 1.00 | 11.73 | 152.32 | 101.55 |
| +D+L | | | | | | | | | | | | |
| Dsgn. L = 14.08 ft | 1 | 0.586 | 0.439 | 44.40 | -110.48 | 110.48 | 315.00 | 188.62 | 2.41 | 1.00 | 44.54 | 152.32 | 101.55 |
| Dsgn. L = 13.63 ft | 2 | 0.757 | 0.439 | 142.79 | -110.48 | 142.79 | 315.00 | 188.62 | 1.65 | 1.00 | 44.54 | 152.32 | 101.55 |
| Dsgn. L = 8.50 ft | 3 | 0.487 | 0.194 | | -91.90 | 91.90 | 315.00 | 188.62 | 2.18 | 1.00 | 19.72 | 152.32 | 101.55 |
| +D+0.750L | | | | | | | | | | | | |
| Dsgn. L = 14.08 ft | 1 | 0.524 | 0.392 | 39.92 | -98.87 | 98.87 | 315.00 | 188.62 | 2.41 | 1.00 | 39.83 | 152.32 | 101.55 |
| Dsgn. L = 13.63 ft | 2 | 0.673 | 0.392 | 126.89 | -98.87 | 126.89 | 315.00 | 188.62 | 1.65 | 1.00 | 39.83 | 152.32 | 101.55 |
| Dsgn. L = 8.50 ft | 3 | 0.435 | 0.174 | | -81.97 | 81.97 | 315.00 | 188.62 | 2.19 | 1.00 | 17.72 | 152.32 | 101.55 |
| +0.60D | | | | | | | | | | | | |
| Dsgn. L = 14.08 ft | 1 | 0.204 | 0.152 | 15.90 | -38.42 | 38.42 | 315.00 | 188.62 | 2.38 | 1.00 | 15.41 | 152.32 | 101.55 |
| Dsgn. L = 13.63 ft | 2 | 0.252 | 0.152 | 47.52 | -38.42 | 47.52 | 315.00 | 188.62 | 1.65 | 1.00 | 15.41 | 152.32 | 101.55 |
| Dsgn. L = 8.50 ft | 3 | 0.166 | 0.069 | | -31.31 | 31.31 | 315.00 | 188.62 | 2.25 | 1.00 | 7.04 | 152.32 | 101.55 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|---|---|---|---|---|---|---|
| +D+L | 1 | 0.0262 | 4.694 | +D+L | -0.0131 | 12.018 |
| +D+L | 2 | 0.1266 | 6.813 | | 0.0000 | 12.018 |
| | 3 | 0.0000 | 6.813 | +D+L | -0.0231 | 3.287 |

## Vertical Reactions

Support notation : Far left is #: Values in KIPS

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| Overall MAXimum | 12.445 | 69.095 | 59.832 | -1.674 |
| Overall MINimum | 4.652 | 24.377 | 20.832 | -0.257 |
| D Only | 7.754 | 40.629 | 34.720 | -0.429 |
| +D+L | 12.445 | 69.095 | 59.832 | -1.674 |
| +D+0.750L | 11.272 | 61.979 | 53.554 | -1.363 |
| +0.60D | 4.652 | 24.377 | 20.832 | -0.257 |
| L Only | 4.691 | 28.467 | 25.112 | -1.246 |

Project Title:
Engineer:
Project ID:
Project Descr:

# Steel Beam

Project File: FWI2101 - Paragon Star.ec6

LIC# : KW-06017302, Build:20.22.6.12 Bob D. Campbell and Co., Inc. (c) ENERCALC INC 1983-2022

**DESCRIPTION:** Grid DY2 - Corridor Wall Above

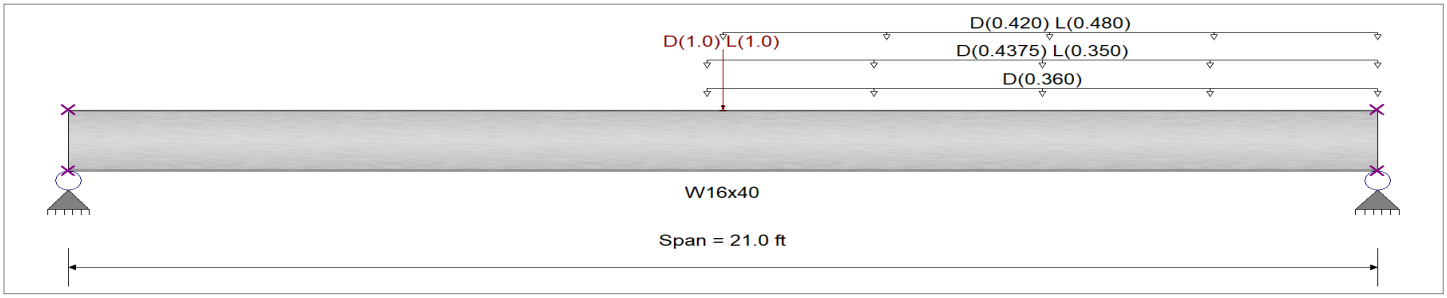
## CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-10

## Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Completely Unbraced
Bending Axis : Major Axis Bending

Fy : Steel Yield : 36.0 ksi
E: Modulus : 29,000.0 ksi




## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1

Uniform Load : D = 0.0120 ksf, Extent = 10.250 -->> 21.0 ft, Tributary Width = 30.0 ft, (Wall Weight Above)

Uniform Load : D = 0.0250, L = 0.020 ksf, Extent = 10.250 -->> 21.0 ft, Tributary Width = 17.50 ft, (Roof Load Above)

Uniform Load : D = 0.0350, L = 0.040 ksf, Extent = 10.50 -->> 21.0 ft, Tributary Width = 12.0 ft, ((3) Floor Load Above)

Point Load : D = 1.0, L = 1.0 k @ 10.50 ft, (Beam Reaction)

## DESIGN SUMMARY

**Design OK**

| | | | |
|---|---|---|---|
| Maximum Bending Stress Ratio = | 0.838 : 1 | Maximum Shear Stress Ratio = | 0.252 : 1 |
| Section used for this span | W16x40 | Section used for this span | W16x40 |
| Ma : Applied | 74.919 k-ft | Va : Applied | 17.686 k |
| Mn / Omega : Allowable | 89.428 k-ft | Vn/Omega : Allowable | 70.272 k |
| Load Combination | +D+L | Load Combination | +D+L |
| | | Location of maximum on span | 21.000 ft |
| Span # where maximum occurs | Span # 1 | Span # where maximum occurs | Span # 1 |

Maximum Deflection

| | | | | | |
|---|---|---|---|---|---|
| Max Downward Transient Deflection | 0.146 in | Ratio = | 1,721 | >=480. | |
| Max Upward Transient Deflection | 0.000 in | Ratio = | 0 | <480.0 | Span: 1 : L Only |
| Max Downward Total Deflection | 0.364 in | Ratio = | 692 | >=360. | Span: 1 : +D+L |
| Max Upward Total Deflection | 0.000 in | Ratio = | 0 | <360.0 | |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | Summary of Moment Values Mmax + | Mmax - | Ma Max | Mnx | Mnx/Omega | Cb | Rm | Summary of Shear Values Va Max | VnxVnx/Omega |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D Only | | | | | | | | | | | | |
| Dsgn. L = 21.00 ft | 1 | 0.501 | 0.151 | 44.73 | | 44.73 | 149.22 | 89.35 | 1.22 | 1.00 | 10.61 | 105.41 70.27 |
| +D+L | | | | | | | | | | | | |
| Dsgn. L = 21.00 ft | 1 | 0.838 | 0.252 | 74.92 | | 74.92 | 149.35 | 89.43 | 1.22 | 1.00 | 17.69 | 105.41 70.27 |
| +D+0.750L | | | | | | | | | | | | |
| Dsgn. L = 21.00 ft | 1 | 0.753 | 0.226 | 67.37 | | 67.37 | 149.35 | 89.43 | 1.22 | 1.00 | 15.92 | 105.41 70.27 |
| +0.60D | | | | | | | | | | | | |
| Dsgn. L = 21.00 ft | 1 | 0.300 | 0.091 | 26.84 | | 26.84 | 149.22 | 89.35 | 1.22 | 1.00 | 6.36 | 105.41 70.27 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|---|---|---|---|---|---|---|
| +D+L | 1 | 0.3640 | 11.220 | | 0.0000 | 0.000 |

Project Title:
Engineer:
Project ID:
Project Descr:

# Steel Beam

Project File: FWI2101 - Paragon Star.ec6

LIC# : KW-06017302, Build:20.22.6.12 Bob D. Campbell and Co., Inc. (c) ENERCALC INC 1983-2022

**DESCRIPTION:** Grid DY2 - Corridor Wall Above

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 | | |
|---|---|---|---|---|
| Overall MAXimum | 6.940 | 17.686 | 25.112 | -1.246 |
| Overall MINimum | 2.530 | 6.364 | 25.112 | -1.246 |
| D Only | 4.217 | 10.606 | 25.112 | -1.246 |
| +D+L | 6.940 | 17.686 | 25.112 | -1.246 |
| +D+0.750L | 6.259 | 15.916 | 25.112 | -1.246 |
| +0.60D | 2.530 | 6.364 | 25.112 | -1.246 |
| L Only | 2.723 | 7.079 | 25.112 | -1.246 |

Project Title:
Engineer:
Project ID:
Project Descr:

# Steel Beam

Project File: FWI2101 - Paragon Star.ec6

LIC# : KW-06017302, Build:20.22.6.12 Bob D. Campbell and Co., Inc. (c) ENERCALC INC 1983-2022

**DESCRIPTION:** Grid DXC - Party Wall Above

## CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-10

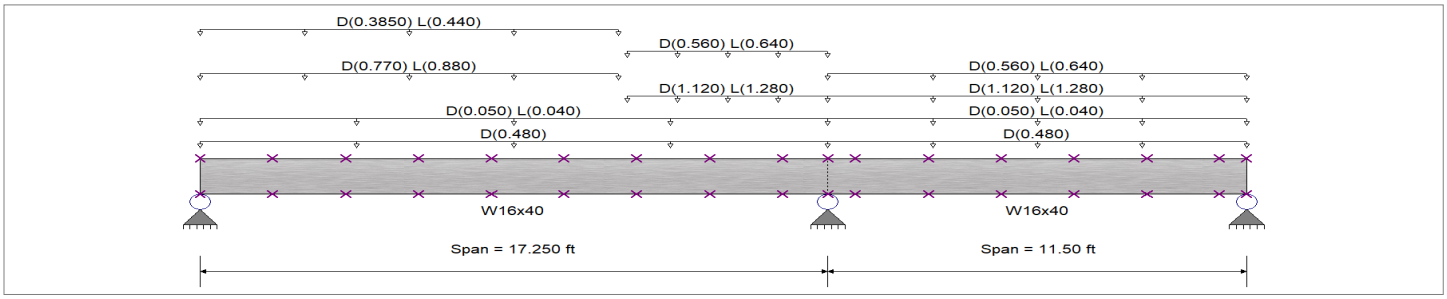
## Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam bracing is defined as a set spacing over all spans
Bending Axis : Major Axis Bending

Fy : Steel Yield : 36.0 ksi
E: Modulus : 29,000.0 ksi

## Unbraced Lengths

First Brace starts at ft from Left-Most support
Regular spacing of lateral supports on length of beam = 2.0 ft




## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.0160 ksf, Tributary Width = 30.0 ft, (Wall Weight Above)

Uniform Load : D = 0.0250, L = 0.020 ksf, Tributary Width = 2.0 ft, (Roof Load Above)

Uniform Load : D = 0.0350, L = 0.040 ksf, Extent = 11.750 -->> 17.250 ft, Tributary Width = 32.0 ft, ((2) Floor Load Above)

Uniform Load : D = 0.0350, L = 0.040 ksf, Extent = 0.0 -->> 11.50 ft, Tributary Width = 22.0 ft, ((2) Floor Load Above)

Uniform Load : D = 0.0350, L = 0.040 ksf, Extent = 11.750 -->> 17.250 ft, Tributary Width = 16.0 ft, (Floor Load Above)

Uniform Load : D = 0.0350, L = 0.040 ksf, Extent = 0.0 -->> 11.50 ft, Tributary Width = 11.0 ft, (Floor Load Above)

Load for Span Number 2
Uniform Load : D = 0.0160 ksf, Tributary Width = 30.0 ft, (Wall Weight Above)

Uniform Load : D = 0.0250, L = 0.020 ksf, Tributary Width = 2.0 ft, (Roof Load Above)

Uniform Load : D = 0.0350, L = 0.040 ksf, Extent = 0.0 -->> 11.50 ft, Tributary Width = 32.0 ft, ((2) Floor Load Above)

Uniform Load : D = 0.0350, L = 0.040 ksf, Extent = 0.0 -->> 11.50 ft, Tributary Width = 16.0 ft, (Floor Load Above)

Project Title:
Engineer:
Project ID:
Project Descr:

# Steel Beam

Project File: FWI2101 - Paragon Star.ec6

LIC# : KW-06017302, Build:20.22.6.12 Bob D. Campbell and Co., Inc. (c) ENERCALC INC 1983-2022

**DESCRIPTION:** Grid DXC - Party Wall Above

## *DESIGN SUMMARY*

**Design OK**

| | | | |
|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.783** : 1 | Maximum Shear Stress Ratio = | **0.531** : 1 |
| Section used for this span | **W16x40** | Section used for this span | **W16x40** |
| Ma : Applied | 102.723 k-ft | Va : Applied | 37.347 k |
| Mn / Omega : Allowable | 131.138 k-ft | Vn/Omega : Allowable | 70.272 k |
| Load Combination | +D+L | Load Combination | +D+L |
| | | Location of maximum on span | 17.250 ft |
| Span # where maximum occurs | Span # 1 | Span # where maximum occurs | Span # 1 |

**Maximum Deflection**

| | | | | | |
|---|---|---|---|---|---|
| Max Downward Transient Deflection | 0.098 in | Ratio = | 2,117 | >=480. | Span: 2 : L Only |
| Max Upward Transient Deflection | -0.004 in | Ratio = | 31,277 | >=480. | Span: 2 : L Only |
| Max Downward Total Deflection | 0.222 in | Ratio = | 933 | >=360. | Span: 2 : +D+L |
| Max Upward Total Deflection | -0.011 in | Ratio = | 12477 | >=360. | Span: 2 : +D+L |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | Summary of Moment Values Mmax + | Mmax - | Ma Max | Mnx | Mnx/Omega | Cb | Rm | Summary of Shear Values Va Max | VnxVnx/Omega | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D Only | | | | | | | | | | | | | |
| Dsgn. L = 1.93 ft | 1 | 0.152 | 0.171 | 19.94 | | 19.94 | 219.00 | 131.14 | 1.59 | 1.00 | 11.99 | 105.41 | 70.27 |
| Dsgn. L = 2.00 ft | 1 | 0.258 | 0.123 | 33.80 | 19.94 | 33.80 | 219.00 | 131.14 | 1.18 | 1.00 | 8.65 | 105.41 | 70.27 |
| Dsgn. L = 2.00 ft | 1 | 0.311 | 0.074 | 40.76 | 33.80 | 40.76 | 219.00 | 131.14 | 1.06 | 1.00 | 5.20 | 105.41 | 70.27 |
| Dsgn. L = 2.00 ft | 1 | 0.318 | 0.025 | 41.65 | 40.76 | 41.65 | 219.00 | 131.14 | 1.00 | 1.00 | 1.75 | 105.41 | 70.27 |
| Dsgn. L = 2.00 ft | 1 | 0.311 | 0.073 | 40.81 | 33.95 | 40.81 | 219.00 | 131.14 | 1.05 | 1.00 | 5.15 | 105.41 | 70.27 |
| Dsgn. L = 2.00 ft | 1 | 0.259 | 0.120 | 33.95 | 20.27 | 33.95 | 219.00 | 131.14 | 1.16 | 1.00 | 8.41 | 105.41 | 70.27 |
| Dsgn. L = 2.00 ft | 1 | 0.155 | 0.184 | 20.27 | -1.07 | 20.27 | 219.00 | 131.14 | 1.58 | 1.00 | 12.92 | 105.41 | 70.27 |
| Dsgn. L = 2.00 ft | 1 | 0.240 | 0.248 | -0.00 | -31.42 | 31.42 | 219.00 | 131.14 | 1.74 | 1.00 | 17.42 | 105.41 | 70.27 |
| Dsgn. L = 1.31 ft | 1 | 0.428 | 0.290 | -0.00 | -56.19 | 56.19 | 219.00 | 131.14 | 1.21 | 1.00 | 20.37 | 105.41 | 70.27 |
| Dsgn. L = 0.74 ft | 2 | 0.428 | 0.254 | -0.00 | -56.19 | 56.19 | 219.00 | 131.14 | 1.10 | 1.00 | 17.82 | 105.41 | 70.27 |
| Dsgn. L = 1.98 ft | 2 | 0.333 | 0.230 | -0.00 | -43.68 | 43.68 | 219.00 | 131.14 | 1.36 | 1.00 | 16.17 | 105.41 | 70.27 |
| Dsgn. L = 2.02 ft | 2 | 0.123 | 0.167 | 3.00 | -16.10 | 16.10 | 219.00 | 131.14 | 2.10 | 1.00 | 11.72 | 105.41 | 70.27 |
| Dsgn. L = 1.98 ft | 2 | 0.097 | 0.102 | 12.77 | 3.00 | 12.77 | 219.00 | 131.14 | 1.34 | 1.00 | 7.16 | 105.41 | 70.27 |
| Dsgn. L = 2.02 ft | 2 | 0.110 | 0.039 | 14.40 | 12.77 | 14.40 | 219.00 | 131.14 | 1.01 | 1.00 | 2.71 | 105.41 | 70.27 |
| Dsgn. L = 1.98 ft | 2 | 0.104 | 0.090 | 13.65 | 5.61 | 13.65 | 219.00 | 131.14 | 1.21 | 1.00 | 6.29 | 105.41 | 70.27 |
| Dsgn. L = 0.78 ft | 2 | 0.043 | 0.115 | 5.61 | | 5.61 | 219.00 | 131.14 | 1.55 | 1.00 | 8.05 | 105.41 | 70.27 |
| +D+L | | | | | | | | | | | | | |
| Dsgn. L = 1.93 ft | 1 | 0.272 | 0.305 | 35.66 | | 35.66 | 219.00 | 131.14 | 1.59 | 1.00 | 21.44 | 105.41 | 70.27 |
| Dsgn. L = 2.00 ft | 1 | 0.461 | 0.220 | 60.45 | 35.66 | 60.45 | 219.00 | 131.14 | 1.18 | 1.00 | 15.48 | 105.41 | 70.27 |
| Dsgn. L = 2.00 ft | 1 | 0.556 | 0.132 | 72.90 | 60.45 | 72.90 | 219.00 | 131.14 | 1.06 | 1.00 | 9.30 | 105.41 | 70.27 |
| Dsgn. L = 2.00 ft | 1 | 0.568 | 0.045 | 74.49 | 72.90 | 74.49 | 219.00 | 131.14 | 1.00 | 1.00 | 3.13 | 105.41 | 70.27 |
| Dsgn. L = 2.00 ft | 1 | 0.557 | 0.131 | 72.99 | 60.72 | 72.99 | 219.00 | 131.14 | 1.05 | 1.00 | 9.21 | 105.41 | 70.27 |
| Dsgn. L = 2.00 ft | 1 | 0.463 | 0.213 | 60.72 | 36.28 | 60.72 | 219.00 | 131.14 | 1.16 | 1.00 | 14.98 | 105.41 | 70.27 |
| Dsgn. L = 2.00 ft | 1 | 0.277 | 0.333 | 36.28 | -2.12 | 36.28 | 219.00 | 131.14 | 1.58 | 1.00 | 23.40 | 105.41 | 70.27 |
| Dsgn. L = 2.00 ft | 1 | 0.438 | 0.453 | -0.00 | -57.38 | 57.38 | 219.00 | 131.14 | 1.74 | 1.00 | 31.83 | 105.41 | 70.27 |
| Dsgn. L = 1.31 ft | 1 | 0.783 | 0.531 | -0.00 | -102.72 | 102.72 | 219.00 | 131.14 | 1.21 | 1.00 | 37.35 | 105.41 | 70.27 |
| Dsgn. L = 0.74 ft | 2 | 0.783 | 0.472 | -0.00 | -102.72 | 102.72 | 219.00 | 131.14 | 1.10 | 1.00 | 33.14 | 105.41 | 70.27 |
| Dsgn. L = 1.98 ft | 2 | 0.606 | 0.428 | -0.00 | -79.47 | 79.47 | 219.00 | 131.14 | 1.37 | 1.00 | 30.04 | 105.41 | 70.27 |
| Dsgn. L = 2.02 ft | 2 | 0.216 | 0.309 | 7.04 | -28.29 | 28.29 | 219.00 | 131.14 | 2.23 | 1.00 | 21.71 | 105.41 | 70.27 |
| Dsgn. L = 1.98 ft | 2 | 0.190 | 0.188 | 24.90 | 7.04 | 24.90 | 219.00 | 131.14 | 1.31 | 1.00 | 13.19 | 105.41 | 70.27 |
| Dsgn. L = 2.02 ft | 2 | 0.211 | 0.069 | 27.71 | 24.90 | 27.71 | 219.00 | 131.14 | 1.01 | 1.00 | 4.87 | 105.41 | 70.27 |
| Dsgn. L = 1.98 ft | 2 | 0.199 | 0.171 | 26.12 | 10.66 | 26.12 | 219.00 | 131.14 | 1.22 | 1.00 | 11.98 | 105.41 | 70.27 |
| Dsgn. L = 0.78 ft | 2 | 0.081 | 0.217 | 10.66 | | 10.66 | 219.00 | 131.14 | 1.55 | 1.00 | 15.28 | 105.41 | 70.27 |
| +D+0.750L | | | | | | | | | | | | | |
| Dsgn. L = 1.93 ft | 1 | 0.242 | 0.271 | 31.73 | | 31.73 | 219.00 | 131.14 | 1.59 | 1.00 | 19.08 | 105.41 | 70.27 |
| Dsgn. L = 2.00 ft | 1 | 0.410 | 0.196 | 53.79 | 31.73 | 53.79 | 219.00 | 131.14 | 1.18 | 1.00 | 13.77 | 105.41 | 70.27 |
| Dsgn. L = 2.00 ft | 1 | 0.495 | 0.118 | 64.86 | 53.79 | 64.86 | 219.00 | 131.14 | 1.06 | 1.00 | 8.28 | 105.41 | 70.27 |
| Dsgn. L = 2.00 ft | 1 | 0.505 | 0.040 | 66.28 | 64.86 | 66.28 | 219.00 | 131.14 | 1.00 | 1.00 | 2.79 | 105.41 | 70.27 |
| Dsgn. L = 2.00 ft | 1 | 0.495 | 0.117 | 64.94 | 54.03 | 64.94 | 219.00 | 131.14 | 1.05 | 1.00 | 8.20 | 105.41 | 70.27 |
| Dsgn. L = 2.00 ft | 1 | 0.412 | 0.190 | 54.03 | 32.28 | 54.03 | 219.00 | 131.14 | 1.16 | 1.00 | 13.34 | 105.41 | 70.27 |
| Dsgn. L = 2.00 ft | 1 | 0.246 | 0.296 | 32.28 | -1.86 | 32.28 | 219.00 | 131.14 | 1.58 | 1.00 | 20.78 | 105.41 | 70.27 |
| Dsgn. L = 2.00 ft | 1 | 0.388 | 0.402 | -0.00 | -50.89 | 50.89 | 219.00 | 131.14 | 1.74 | 1.00 | 28.23 | 105.41 | 70.27 |
| Dsgn. L = 1.31 ft | 1 | 0.695 | 0.471 | -0.00 | -91.09 | 91.09 | 219.00 | 131.14 | 1.21 | 1.00 | 33.10 | 105.41 | 70.27 |
| Dsgn. L = 0.74 ft | 2 | 0.695 | 0.417 | -0.00 | -91.09 | 91.09 | 219.00 | 131.14 | 1.10 | 1.00 | 29.31 | 105.41 | 70.27 |
| Dsgn. L = 1.98 ft | 2 | 0.538 | 0.378 | -0.00 | -70.53 | 70.53 | 219.00 | 131.14 | 1.37 | 1.00 | 26.57 | 105.41 | 70.27 |
| Dsgn. L = 2.02 ft | 2 | 0.192 | 0.273 | 6.03 | -25.24 | 25.24 | 219.00 | 131.14 | 2.21 | 1.00 | 19.21 | 105.41 | 70.27 |
| Dsgn. L = 1.98 ft | 2 | 0.167 | 0.166 | 21.87 | 6.03 | 21.87 | 219.00 | 131.14 | 1.32 | 1.00 | 11.69 | 105.41 | 70.27 |

Project Title:
Engineer:
Project ID:
Project Descr:

# Steel Beam

Project File: FWI2101 - Paragon Star.ec6

LIC# : KW-06017302, Build:20.22.6.12 Bob D. Campbell and Co., Inc. (c) ENERCALC INC 1983-2022

**DESCRIPTION:** Grid DXC - Party Wall Above

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | Summary of Moment Values Mmax + | Mmax - | Ma Max | Mnx | Mnx/Omega | Cb | Rm | Summary of Shear Values Va Max | VnxVnx/Omega | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dsgn. L = 2.02 ft | 2 | 0.186 | 0.062 | 24.38 | 21.87 | 24.38 | 219.00 | 131.14 | 1.01 | 1.00 | 4.33 | 105.41 | 70.27 |
| Dsgn. L = 1.98 ft | 2 | 0.175 | 0.150 | 23.01 | 9.40 | 23.01 | 219.00 | 131.14 | 1.22 | 1.00 | 10.56 | 105.41 | 70.27 |
| Dsgn. L = 0.78 ft | 2 | 0.072 | 0.192 | 9.40 | | 9.40 | 219.00 | 131.14 | 1.55 | 1.00 | 13.47 | 105.41 | 70.27 |
| +0.60D | | | | | | | | | | | | | |
| Dsgn. L = 1.93 ft | 1 | 0.091 | 0.102 | 11.96 | | 11.96 | 219.00 | 131.14 | 1.59 | 1.00 | 7.19 | 105.41 | 70.27 |
| Dsgn. L = 2.00 ft | 1 | 0.155 | 0.074 | 20.28 | 11.96 | 20.28 | 219.00 | 131.14 | 1.18 | 1.00 | 5.19 | 105.41 | 70.27 |
| Dsgn. L = 2.00 ft | 1 | 0.186 | 0.044 | 24.46 | 20.28 | 24.46 | 219.00 | 131.14 | 1.06 | 1.00 | 3.12 | 105.41 | 70.27 |
| Dsgn. L = 2.00 ft | 1 | 0.191 | 0.015 | 24.99 | 24.46 | 24.99 | 219.00 | 131.14 | 1.00 | 1.00 | 1.05 | 105.41 | 70.27 |
| Dsgn. L = 2.00 ft | 1 | 0.187 | 0.044 | 24.49 | 20.37 | 24.49 | 219.00 | 131.14 | 1.05 | 1.00 | 3.09 | 105.41 | 70.27 |
| Dsgn. L = 2.00 ft | 1 | 0.155 | 0.072 | 20.37 | 12.16 | 20.37 | 219.00 | 131.14 | 1.16 | 1.00 | 5.05 | 105.41 | 70.27 |
| Dsgn. L = 2.00 ft | 1 | 0.093 | 0.110 | 12.16 | -0.64 | 12.16 | 219.00 | 131.14 | 1.58 | 1.00 | 7.75 | 105.41 | 70.27 |
| Dsgn. L = 2.00 ft | 1 | 0.144 | 0.149 | -0.00 | -18.85 | 18.85 | 219.00 | 131.14 | 1.74 | 1.00 | 10.45 | 105.41 | 70.27 |
| Dsgn. L = 1.31 ft | 1 | 0.257 | 0.174 | -0.00 | -33.72 | 33.72 | 219.00 | 131.14 | 1.21 | 1.00 | 12.22 | 105.41 | 70.27 |
| Dsgn. L = 0.74 ft | 2 | 0.257 | 0.152 | -0.00 | -33.72 | 33.72 | 219.00 | 131.14 | 1.10 | 1.00 | 10.69 | 105.41 | 70.27 |
| Dsgn. L = 1.98 ft | 2 | 0.200 | 0.138 | -0.00 | -26.21 | 26.21 | 219.00 | 131.14 | 1.36 | 1.00 | 9.70 | 105.41 | 70.27 |
| Dsgn. L = 2.02 ft | 2 | 0.074 | 0.100 | 1.80 | -9.66 | 9.66 | 219.00 | 131.14 | 2.10 | 1.00 | 7.03 | 105.41 | 70.27 |
| Dsgn. L = 1.98 ft | 2 | 0.058 | 0.061 | 7.66 | 1.80 | 7.66 | 219.00 | 131.14 | 1.34 | 1.00 | 4.30 | 105.41 | 70.27 |
| Dsgn. L = 2.02 ft | 2 | 0.066 | 0.023 | 8.64 | 7.66 | 8.64 | 219.00 | 131.14 | 1.01 | 1.00 | 1.63 | 105.41 | 70.27 |
| Dsgn. L = 1.98 ft | 2 | 0.062 | 0.054 | 8.19 | 3.36 | 8.19 | 219.00 | 131.14 | 1.21 | 1.00 | 3.78 | 105.41 | 70.27 |
| Dsgn. L = 0.78 ft | 2 | 0.026 | 0.069 | 3.36 | | 3.36 | 219.00 | 131.14 | 1.55 | 1.00 | 4.83 | 105.41 | 70.27 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|---|---|---|---|---|---|---|
| +D+L | 1 | 0.2220 | 7.728 | | 0.0000 | 0.000 |
| +D+L | 2 | 0.0184 | 7.774 | +D+L | -0.0111 | 1.656 |

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 | Support 3 |
|---|---|---|---|
| Overall MAXimum | 21.438 | 70.487 | 15.275 |
| Overall MINimum | 7.192 | 22.915 | 4.831 |
| D Only | 11.987 | 38.192 | 8.051 |
| +D+L | 21.438 | 70.487 | 15.275 |
| +D+0.750L | 19.075 | 62.413 | 13.469 |
| +0.60D | 7.192 | 22.915 | 4.831 |
| L Only | 9.451 | 32.295 | 7.224 |

Project Title:
Engineer:
Project ID:
Project Descr:

# Steel Beam

Project File: FWI2101 - Paragon Star.ec6

LIC# : KW-06017302, Build:20.22.6.12 Bob D. Campbell and Co., Inc. (c) ENERCALC INC 1983-2022

**DESCRIPTION:** Grid DXD - Party Wall Above

## CODE REFERENCES

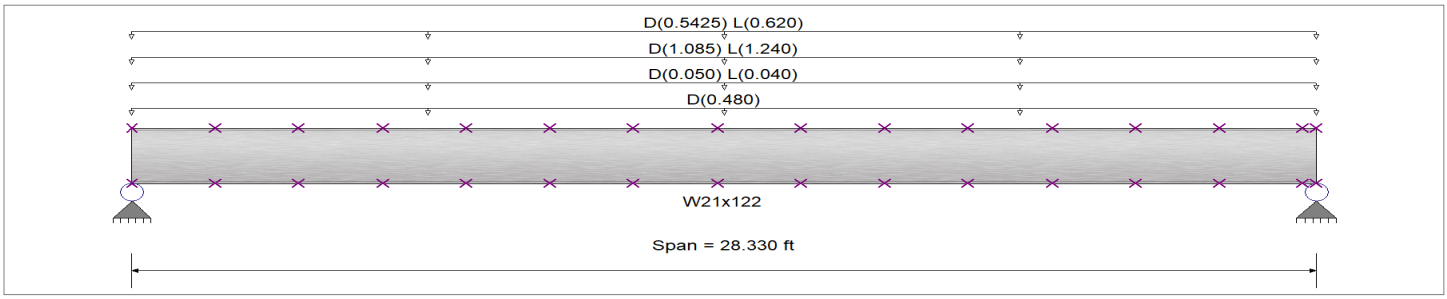
Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-10

## Material Properties

| | | | |
|---|---|---|---|
| Analysis Method : | Allowable Strength Design | Fy : Steel Yield : | 36.0 ksi |
| Beam Bracing : | Beam bracing is defined as a set spacing over all spans | E: Modulus : | 29,000.0 ksi |
| Bending Axis : | Major Axis Bending | | |

## Unbraced Lengths

First Brace starts at ft from Left-Most support
Regular spacing of lateral supports on length of beam = 2.0 ft




## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Uniform Load : D = 0.0160 ksf, Tributary Width = 30.0 ft, (Wall Weight Above)

Uniform Load : D = 0.0250, L = 0.020 ksf, Tributary Width = 2.0 ft, (Roof Load Above)

Uniform Load : D = 0.0350, L = 0.040 ksf, Tributary Width = 31.0 ft, ((2) Floor Load Above)

Uniform Load : D = 0.0350, L = 0.040 ksf, Tributary Width = 15.50 ft, (Floor Load Above)

## DESIGN SUMMARY

**Design OK**

| | | | |
|---|---|---|---|
| Maximum Bending Stress Ratio = | 0.760 : 1 | Maximum Shear Stress Ratio = | 0.316 : 1 |
| Section used for this span | W21x122 | Section used for this span | W21x122 |
| Ma : Applied | 419.303 k-ft | Va : Applied | 59.203 k |
| Mn / Omega : Allowable | 551.497 k-ft | Vn/Omega : Allowable | 187.488 k |
| Load Combination | +D+L | Load Combination | +D+L |
| | | Location of maximum on span | 0.000 ft |
| Span # where maximum occurs | Span # 1 | Span # where maximum occurs | Span # 1 |

Maximum Deflection

| | | | | | |
|---|---|---|---|---|---|
| Max Downward Transient Deflection | 0.322 in | Ratio = | 1,054 | >=480. | |
| Max Upward Transient Deflection | 0.000 in | Ratio = | 0 | <480.0 | Span: 1 : L Only |
| Max Downward Total Deflection | 0.709 in | Ratio = | 480 | >=360. | Span: 1 : +D+L |
| Max Upward Total Deflection | 0.000 in | Ratio = | 0 | <360.0 | |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | Summary of Moment Values Mmax + | Mmax - | Ma Max | Mnx | Mnx/Omega | Cb | Rm | Summary of Shear Values Va Max | VnxVnx/Omega | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D Only | | | | | | | | | | | | | |
| Dsgn. L = 1.94 ft | 1 | 0.106 | 0.172 | 58.42 | | 58.42 | 921.00 | 551.50 | 1.63 | 1.00 | 32.29 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.200 | 0.149 | 110.14 | 58.42 | 110.14 | 921.00 | 551.50 | 1.23 | 1.00 | 27.86 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.277 | 0.124 | 152.51 | 110.14 | 152.51 | 921.00 | 551.50 | 1.12 | 1.00 | 23.25 | 281.23 | 187.49 |
| Dsgn. L = 1.94 ft | 1 | 0.334 | 0.099 | 184.41 | 152.51 | 184.41 | 921.00 | 551.50 | 1.07 | 1.00 | 18.64 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.378 | 0.076 | 208.50 | 184.41 | 208.50 | 921.00 | 551.50 | 1.05 | 1.00 | 14.21 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.405 | 0.051 | 223.24 | 208.50 | 223.24 | 921.00 | 551.50 | 1.02 | 1.00 | 9.59 | 281.23 | 187.49 |
| Dsgn. L = 1.94 ft | 1 | 0.415 | 0.027 | 228.62 | 223.24 | 228.62 | 921.00 | 551.50 | 1.01 | 1.00 | 4.98 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.415 | 0.022 | 228.69 | 225.07 | 228.69 | 921.00 | 551.50 | 1.00 | 1.00 | 4.06 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.408 | 0.046 | 225.07 | 212.19 | 225.07 | 921.00 | 551.50 | 1.02 | 1.00 | 8.67 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.385 | 0.071 | 212.19 | 189.98 | 212.19 | 921.00 | 551.50 | 1.04 | 1.00 | 13.28 | 281.23 | 187.49 |

Project Title:
Engineer:
Project ID:
Project Descr:

# Steel Beam

Project File: FWI2101 - Paragon Star.ec6

LIC# : KW-06017302, Build:20.22.6.12 Bob D. Campbell and Co., Inc. (c) ENERCALC INC 1983-2022

**DESCRIPTION:** Grid DXD - Party Wall Above

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | Summary of Moment Values Mmax + | Mmax - | Ma Max | Mnx | Mnx/Omega | Cb | Rm | Summary of Shear Values Va Max | Vnx | Vnx/Omega |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dsgn. L = 1.94 ft | 1 | 0.344 | 0.094 | 189.98 | 159.87 | 189.98 | 921.00 | 551.50 | 1.06 | 1.00 | 17.71 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.290 | 0.119 | 159.87 | 119.36 | 159.87 | 921.00 | 551.50 | 1.10 | 1.00 | 22.33 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.216 | 0.144 | 119.36 | 69.51 | 119.36 | 921.00 | 551.50 | 1.18 | 1.00 | 26.94 | 281.23 | 187.49 |
| Dsgn. L = 1.94 ft | 1 | 0.126 | 0.167 | 69.51 | 12.88 | 69.51 | 921.00 | 551.50 | 1.46 | 1.00 | 31.37 | 281.23 | 187.49 |
| Dsgn. L = 0.40 ft | 1 | 0.023 | 0.172 | 12.88 | | 12.88 | 921.00 | 551.50 | 1.47 | 1.00 | 32.29 | 281.23 | 187.49 |
| +D+L | | | | | | | | | | | | | |
| Dsgn. L = 1.94 ft | 1 | 0.194 | 0.316 | 107.12 | | 107.12 | 921.00 | 551.50 | 1.63 | 1.00 | 59.20 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.366 | 0.272 | 201.94 | 107.12 | 201.94 | 921.00 | 551.50 | 1.23 | 1.00 | 51.08 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.507 | 0.227 | 279.64 | 201.94 | 279.64 | 921.00 | 551.50 | 1.12 | 1.00 | 42.63 | 281.23 | 187.49 |
| Dsgn. L = 1.94 ft | 1 | 0.613 | 0.182 | 338.13 | 279.64 | 338.13 | 921.00 | 551.50 | 1.07 | 1.00 | 34.17 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.693 | 0.139 | 382.28 | 338.13 | 382.28 | 921.00 | 551.50 | 1.05 | 1.00 | 26.05 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.742 | 0.094 | 409.32 | 382.28 | 409.32 | 921.00 | 551.50 | 1.02 | 1.00 | 17.59 | 281.23 | 187.49 |
| Dsgn. L = 1.94 ft | 1 | 0.760 | 0.049 | 419.18 | 409.32 | 419.18 | 921.00 | 551.50 | 1.01 | 1.00 | 9.13 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.760 | 0.040 | 419.30 | 412.68 | 419.30 | 921.00 | 551.50 | 1.00 | 1.00 | 7.44 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.748 | 0.085 | 412.68 | 389.06 | 412.68 | 921.00 | 551.50 | 1.02 | 1.00 | 15.90 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.705 | 0.130 | 389.06 | 348.33 | 389.06 | 921.00 | 551.50 | 1.04 | 1.00 | 24.36 | 281.23 | 187.49 |
| Dsgn. L = 1.94 ft | 1 | 0.632 | 0.173 | 348.33 | 293.12 | 348.33 | 921.00 | 551.50 | 1.06 | 1.00 | 32.48 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.532 | 0.218 | 293.12 | 218.85 | 293.12 | 921.00 | 551.50 | 1.10 | 1.00 | 40.93 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.397 | 0.263 | 218.85 | 127.45 | 218.85 | 921.00 | 551.50 | 1.18 | 1.00 | 49.39 | 281.23 | 187.49 |
| Dsgn. L = 1.94 ft | 1 | 0.231 | 0.307 | 127.45 | 23.62 | 127.45 | 921.00 | 551.50 | 1.46 | 1.00 | 57.51 | 281.23 | 187.49 |
| Dsgn. L = 0.40 ft | 1 | 0.043 | 0.316 | 23.62 | | 23.62 | 921.00 | 551.50 | 1.47 | 1.00 | 59.20 | 281.23 | 187.49 |
| +D+0.750L | | | | | | | | | | | | | |
| Dsgn. L = 1.94 ft | 1 | 0.172 | 0.280 | 94.95 | | 94.95 | 921.00 | 551.50 | 1.63 | 1.00 | 52.47 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.325 | 0.241 | 178.99 | 94.95 | 178.99 | 921.00 | 551.50 | 1.23 | 1.00 | 45.28 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.449 | 0.202 | 247.85 | 178.99 | 247.85 | 921.00 | 551.50 | 1.12 | 1.00 | 37.78 | 281.23 | 187.49 |
| Dsgn. L = 1.94 ft | 1 | 0.543 | 0.162 | 299.70 | 247.85 | 299.70 | 921.00 | 551.50 | 1.07 | 1.00 | 30.29 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.614 | 0.123 | 338.83 | 299.70 | 338.83 | 921.00 | 551.50 | 1.05 | 1.00 | 23.09 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.658 | 0.083 | 362.80 | 338.83 | 362.80 | 921.00 | 551.50 | 1.02 | 1.00 | 15.59 | 281.23 | 187.49 |
| Dsgn. L = 1.94 ft | 1 | 0.674 | 0.043 | 371.54 | 362.80 | 371.54 | 921.00 | 551.50 | 1.01 | 1.00 | 8.10 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.674 | 0.035 | 371.65 | 365.78 | 371.65 | 921.00 | 551.50 | 1.00 | 1.00 | 6.60 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.663 | 0.075 | 365.78 | 344.84 | 365.78 | 921.00 | 551.50 | 1.02 | 1.00 | 14.09 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.625 | 0.115 | 344.84 | 308.74 | 344.84 | 921.00 | 551.50 | 1.04 | 1.00 | 21.59 | 281.23 | 187.49 |
| Dsgn. L = 1.94 ft | 1 | 0.560 | 0.154 | 308.74 | 259.81 | 308.74 | 921.00 | 551.50 | 1.06 | 1.00 | 28.79 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.471 | 0.194 | 259.81 | 193.97 | 259.81 | 921.00 | 551.50 | 1.10 | 1.00 | 36.28 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.352 | 0.234 | 193.97 | 112.97 | 193.97 | 921.00 | 551.50 | 1.18 | 1.00 | 43.78 | 281.23 | 187.49 |
| Dsgn. L = 1.94 ft | 1 | 0.205 | 0.272 | 112.97 | 20.93 | 112.97 | 921.00 | 551.50 | 1.46 | 1.00 | 50.97 | 281.23 | 187.49 |
| Dsgn. L = 0.40 ft | 1 | 0.038 | 0.280 | 20.93 | | 20.93 | 921.00 | 551.50 | 1.47 | 1.00 | 52.47 | 281.23 | 187.49 |
| +0.60D | | | | | | | | | | | | | |
| Dsgn. L = 1.94 ft | 1 | 0.064 | 0.103 | 35.05 | | 35.05 | 921.00 | 551.50 | 1.63 | 1.00 | 19.37 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.120 | 0.089 | 66.08 | 35.05 | 66.08 | 921.00 | 551.50 | 1.23 | 1.00 | 16.72 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.166 | 0.074 | 91.51 | 66.08 | 91.51 | 921.00 | 551.50 | 1.12 | 1.00 | 13.95 | 281.23 | 187.49 |
| Dsgn. L = 1.94 ft | 1 | 0.201 | 0.060 | 110.65 | 91.51 | 110.65 | 921.00 | 551.50 | 1.07 | 1.00 | 11.18 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.227 | 0.045 | 125.10 | 110.65 | 125.10 | 921.00 | 551.50 | 1.05 | 1.00 | 8.52 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.243 | 0.031 | 133.95 | 125.10 | 133.95 | 921.00 | 551.50 | 1.02 | 1.00 | 5.76 | 281.23 | 187.49 |
| Dsgn. L = 1.94 ft | 1 | 0.249 | 0.016 | 137.17 | 133.95 | 137.17 | 921.00 | 551.50 | 1.01 | 1.00 | 2.99 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.249 | 0.013 | 137.21 | 135.04 | 137.21 | 921.00 | 551.50 | 1.00 | 1.00 | 2.44 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.245 | 0.028 | 135.04 | 127.32 | 135.04 | 921.00 | 551.50 | 1.02 | 1.00 | 5.20 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.231 | 0.043 | 127.32 | 113.99 | 127.32 | 921.00 | 551.50 | 1.04 | 1.00 | 7.97 | 281.23 | 187.49 |
| Dsgn. L = 1.94 ft | 1 | 0.207 | 0.057 | 113.99 | 95.92 | 113.99 | 921.00 | 551.50 | 1.06 | 1.00 | 10.63 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.174 | 0.071 | 95.92 | 71.61 | 95.92 | 921.00 | 551.50 | 1.10 | 1.00 | 13.40 | 281.23 | 187.49 |
| Dsgn. L = 2.02 ft | 1 | 0.130 | 0.086 | 71.61 | 41.71 | 71.61 | 921.00 | 551.50 | 1.18 | 1.00 | 16.16 | 281.23 | 187.49 |
| Dsgn. L = 1.94 ft | 1 | 0.076 | 0.100 | 41.71 | 7.73 | 41.71 | 921.00 | 551.50 | 1.46 | 1.00 | 18.82 | 281.23 | 187.49 |
| Dsgn. L = 0.40 ft | 1 | 0.014 | 0.103 | 7.73 | | 7.73 | 921.00 | 551.50 | 1.47 | 1.00 | 19.37 | 281.23 | 187.49 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|---|---|---|---|---|---|---|
| +D+L | 1 | 0.7089 | 14.246 | | 0.0000 | 0.000 |

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 | | |
|---|---|---|---|---|
| Overall MAXimum | 59.203 | 59.203 | 6.488 | 2.244 |
| Overall MINimum | 19.373 | 19.373 | 6.488 | 2.244 |
| D Only | 32.289 | 32.289 | 6.488 | 2.244 |

Project Title:
Engineer:
Project ID:
Project Descr:

# Steel Beam

Project File: FWI2101 - Paragon Star.ec6

LIC# : KW-06017302, Build:20.22.6.12 Bob D. Campbell and Co., Inc. (c) ENERCALC INC 1983-2022

**DESCRIPTION:** Grid DXD - Party Wall Above

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 | | |
|---|---|---|---|---|
| +D+L | 59.203 | 59.203 | 6.488 | 2.244 |
| +D+0.750L | 52.474 | 52.474 | 6.488 | 2.244 |
| +0.60D | 19.373 | 19.373 | 6.488 | 2.244 |
| L Only | 26.914 | 26.914 | 6.488 | 2.244 |

Project Title:
Engineer:
Project ID:
Project Descr:

# Steel Beam

Project File: FWI2101 - Paragon Star.ec6

LIC# : KW-06017302, Build:20.22.6.12 Bob D. Campbell and Co., Inc. (c) ENERCALC INC 1983-2022

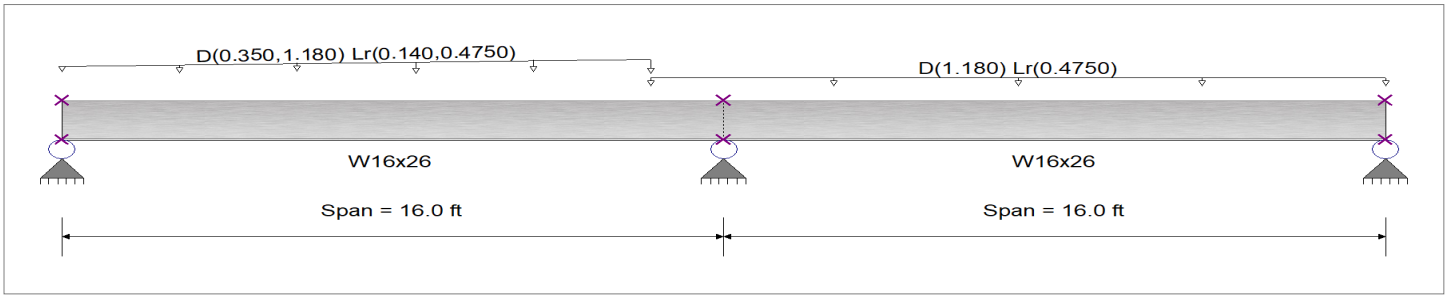
**DESCRIPTION:** CH Curtain Wall Header - E/W

## CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-10

## Material Properties

| | | | |
|---|---|---|---|
| Analysis Method : | Allowable Strength Design | Fy : Steel Yield : | 36.0 ksi |
| Beam Bracing : | Completely Unbraced | E: Modulus : | 29,000.0 ksi |
| Bending Axis : | Major Axis Bending | | |




## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Loads on all spans...
Partial Length Uniform Load : D = 1.180, Lr = 0.4750 k/ft, Extent = 14.250 -->> 36.0 ft

Varying Uniform Load : D= 0.350->1.180, Lr= 0.140->0.4750 k/ft, Extent = 0.0 -->> 14.250 ft

## DESIGN SUMMARY

**Design OK**

| | | | |
|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.741** : 1 | Maximum Shear Stress Ratio = | **0.289** : 1 |
| Section used for this span | **W16x26** | Section used for this span | **W16x26** |
| Ma : Applied | 46.281 k-ft | Va : Applied | 16.341 k |
| Mn / Omega : Allowable | 62.477 k-ft | Vn/Omega : Allowable | 56.520 k |
| Load Combination | +D+Lr | Load Combination | +D+Lr |
| | | Location of maximum on span | 16.000 ft |
| Span # where maximum occurs | Span # 2 | Span # where maximum occurs | Span # 1 |

**Maximum Deflection**

| | | | | | |
|---|---|---|---|---|---|
| Max Downward Transient Deflection | 0.040 in | Ratio = | 4,818 | >=480. | Span: 2 : Lr Only |
| Max Upward Transient Deflection | 0.000 in | Ratio = | 0 | <480.0 | Span: 2 : Lr Only |
| Max Downward Total Deflection | 0.141 in | Ratio = | 1365 | >=360. | Span: 2 : +D+Lr |
| Max Upward Total Deflection | -0.003 in | Ratio = | 57280 | >=360. | Span: 2 : +D+Lr |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | Summary of Moment Values Mmax + | Mmax - | Ma Max | Mnx | Mnx/Omega | Cb | Rm | Summary of Shear Values Va Max | VnxVnx/Omega | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D Only | | | | | | | | | | | | | |
| Dsgn. L = 16.00 ft | 1 | 0.419 | 0.207 | 11.62 | -33.24 | 33.24 | 132.60 | 79.40 | 2.54 | 1.00 | 11.73 | 84.78 | 56.52 |
| Dsgn. L = 16.00 ft | 2 | 0.531 | 0.207 | 23.76 | -33.24 | 33.24 | 104.46 | 62.55 | 1.70 | 1.00 | 11.73 | 84.78 | 56.52 |
| +D+Lr | | | | | | | | | | | | | |
| Dsgn. L = 16.00 ft | 1 | 0.583 | 0.289 | 16.09 | -46.28 | 46.28 | 132.60 | 79.40 | 2.55 | 1.00 | 16.34 | 84.78 | 56.52 |
| Dsgn. L = 16.00 ft | 2 | 0.741 | 0.289 | 33.14 | -46.28 | 46.28 | 104.34 | 62.48 | 1.70 | 1.00 | 16.34 | 84.78 | 56.52 |
| +D+0.750Lr | | | | | | | | | | | | | |
| Dsgn. L = 16.00 ft | 1 | 0.542 | 0.269 | 14.98 | -43.02 | 43.02 | 132.60 | 79.40 | 2.55 | 1.00 | 15.19 | 84.78 | 56.52 |
| Dsgn. L = 16.00 ft | 2 | 0.689 | 0.269 | 30.80 | -43.02 | 43.02 | 104.34 | 62.48 | 1.70 | 1.00 | 15.19 | 84.78 | 56.52 |
| +0.60D | | | | | | | | | | | | | |
| Dsgn. L = 16.00 ft | 1 | 0.251 | 0.124 | 6.97 | -19.94 | 19.94 | 132.60 | 79.40 | 2.54 | 1.00 | 7.04 | 84.78 | 56.52 |
| Dsgn. L = 16.00 ft | 2 | 0.319 | 0.124 | 14.26 | -19.94 | 19.94 | 104.46 | 62.55 | 1.70 | 1.00 | 7.04 | 84.78 | 56.52 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|---|---|---|---|---|---|---|
| +D+Lr | 1 | 0.0552 | 6.464 | +D+Lr | -0.0034 | 15.040 |
| +D+Lr | 2 | 0.1406 | 9.024 | | 0.0000 | 15.040 |

Project Title:
Engineer:
Project ID:
Project Descr:

# Steel Beam

Project File: FWI2101 - Paragon Star.ec6

LIC# : KW-06017302, Build:20.22.6.12 Bob D. Campbell and Co., Inc. (c) ENERCALC INC 1983-2022

**DESCRIPTION:** CH Curtain Wall Header - E/W

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 | Support 3 |
|---|---|---|---|
| Overall MAXimum | 4.719 | 30.217 | 10.555 |
| Overall MINimum | 1.307 | 8.521 | 2.985 |
| D Only | 3.412 | 21.695 | 7.570 |
| +D+Lr | 4.719 | 30.217 | 10.555 |
| +D+0.750Lr | 4.392 | 28.086 | 9.809 |
| +0.60D | 2.047 | 13.017 | 4.542 |
| Lr Only | 1.307 | 8.521 | 2.985 |

Project Title:
Engineer:
Project ID:
Project Descr:

# Steel Beam

Project File: FWI2101 - Paragon Star.ec6

LIC# : KW-06017302, Build:20.22.6.12 Bob D. Campbell and Co., Inc. (c) ENERCALC INC 1983-2022

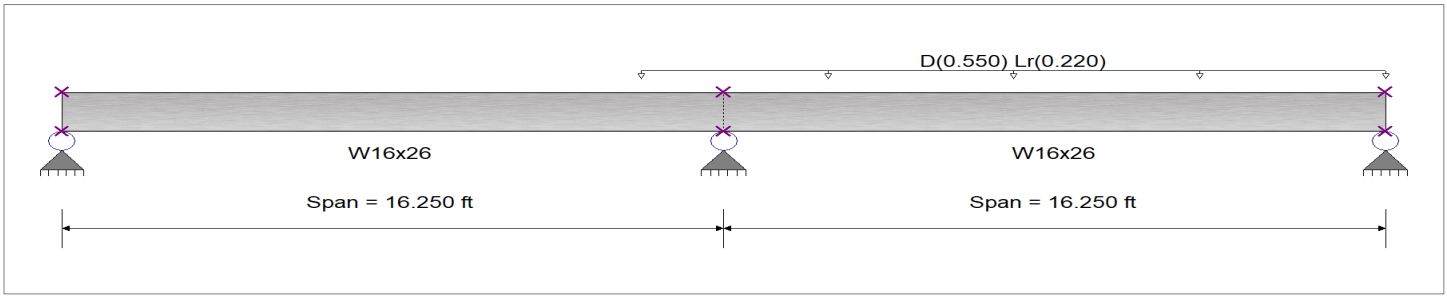
**DESCRIPTION:** CH Curtain Wall Header - N/S

## CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-10

## Material Properties

| | | | |
|---|---|---|---|
| Analysis Method : | Allowable Strength Design | Fy : Steel Yield : | 36.0 ksi |
| Beam Bracing : | Completely Unbraced | E: Modulus : | 29,000.0 ksi |
| Bending Axis : | Major Axis Bending | | |




## Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Loads on all spans...
Partial Length Uniform Load : D = 0.050, Lr = 0.020 ksf, Extent = 14.250 -->> 36.0 ft, Tributary Width = 11.0 ft

## DESIGN SUMMARY

**Design OK**

| | | | |
|---|---|---|---|
| Maximum Bending Stress Ratio = | 0.448 : 1 | Maximum Shear Stress Ratio = | 0.130 : 1 |
| Section used for this span | W16x26 | Section used for this span | W16x26 |
| Ma : Applied | 19.635 k-ft | Va : Applied | 7.344 k |
| Mn / Omega : Allowable | 43.853 k-ft | Vn/Omega : Allowable | 56.520 k |
| Load Combination | +D+Lr | Load Combination | +D+Lr |
| | | Location of maximum on span | 16.250 ft |
| Span # where maximum occurs | Span # 2 | Span # where maximum occurs | Span # 1 |

### Maximum Deflection

| | | | | | |
|---|---|---|---|---|---|
| Max Downward Transient Deflection | 0.027 in | Ratio = | 7,145 | >=480. | Span: 2 : Lr Only |
| Max Upward Transient Deflection | -0.011 in | Ratio = | 17,066 | >=480. | Span: 2 : Lr Only |
| Max Downward Total Deflection | 0.097 in | Ratio = | 2001 | >=360. | Span: 2 : +D+Lr |
| Max Upward Total Deflection | -0.038 in | Ratio = | 5087 | >=360. | Span: 2 : +D+Lr |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment Length | Span # | Max Stress Ratios M | V | Summary of Moment Values Mmax + | Mmax - | Ma Max | Mnx | Mnx/Omega | Cb | Rm | Summary of Shear Values Va Max | VnxVnx/Omega | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D Only | | | | | | | | | | | | | |
| Dsgn. L = 16.25 ft | 1 | 0.146 | 0.094 | | -10.42 | 10.42 | 119.48 | 71.54 | 1.99 | 1.00 | 5.32 | 84.78 | 56.52 |
| Dsgn. L = 16.25 ft | 2 | 0.322 | 0.094 | 14.16 | -10.42 | 14.16 | 73.36 | 43.93 | 1.22 | 1.00 | 5.32 | 84.78 | 56.52 |
| +D+Lr | | | | | | | | | | | | | |
| Dsgn. L = 16.25 ft | 1 | 0.205 | 0.130 | | -14.24 | 14.24 | 116.24 | 69.61 | 1.94 | 1.00 | 7.34 | 84.78 | 56.52 |
| Dsgn. L = 16.25 ft | 2 | 0.448 | 0.130 | 19.63 | -14.24 | 19.63 | 73.24 | 43.85 | 1.22 | 1.00 | 7.34 | 84.78 | 56.52 |
| +D+0.750Lr | | | | | | | | | | | | | |
| Dsgn. L = 16.25 ft | 1 | 0.190 | 0.121 | | -13.29 | 13.29 | 116.90 | 70.00 | 1.95 | 1.00 | 6.84 | 84.78 | 56.52 |
| Dsgn. L = 16.25 ft | 2 | 0.417 | 0.121 | 18.27 | -13.29 | 18.27 | 73.24 | 43.85 | 1.22 | 1.00 | 6.84 | 84.78 | 56.52 |
| +0.60D | | | | | | | | | | | | | |
| Dsgn. L = 16.25 ft | 1 | 0.087 | 0.056 | | -6.25 | 6.25 | 119.48 | 71.54 | 1.99 | 1.00 | 3.19 | 84.78 | 56.52 |
| Dsgn. L = 16.25 ft | 2 | 0.193 | 0.056 | 8.50 | -6.25 | 8.50 | 73.36 | 43.93 | 1.22 | 1.00 | 3.19 | 84.78 | 56.52 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl | Location in Span | Load Combination | Max. "+" Defl | Location in Span |
|---|---|---|---|---|---|---|
| | 1 | 0.0000 | 0.000 | +D+Lr | -0.0383 | 9.555 |
| +D+Lr | 2 | 0.0974 | 8.645 | | 0.0000 | 9.555 |

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 | Support 3 |
|---|---|---|---|
| Overall MAXimum | -0.571 | 9.877 | 5.591 |

Project Title:
Engineer:
Project ID:
Project Descr:

# Steel Beam

Project File: FWI2101 - Paragon Star.ec6

LIC# : KW-06017302, Build:20.22.6.12 Bob D. Campbell and Co., Inc. (c) ENERCALC INC 1983-2022

**DESCRIPTION:** CH Curtain Wall Header - N/S

## Vertical Reactions

Support notation : Far left is #1 Values in KIPS

| Load Combination | Support 1 | Support 2 | Support 3 |
|---|---|---|---|
| Overall MINimum | -0.208 | 2.671 | 1.552 |
| D Only | -0.362 | 7.206 | 4.039 |
| +D+Lr | -0.571 | 9.877 | 5.591 |
| +D+0.750Lr | -0.518 | 9.209 | 5.203 |
| +0.60D | -0.217 | 4.324 | 2.423 |
| Lr Only | -0.208 | 2.671 | 1.552 |

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 26 JAN 2022, 9:39AM

# Concrete Column

File: FWI2101 - Paragon Star.ec6

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: Typical 24x24 - H=16.67' - Interior at 28.5x23.5 Bay

## Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

## General Information

| | | |
|---|---|---|
| f'c : Concrete 28 day strength | = | 5.0 ksi |
| E = | = | 3,122.0 ksi |
| Density | = | 150.0 pcf |
| β | = | 0.80 |
| fy - Main Rebar | = | 60.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi |
| Allow. Reinforcing Limits | | *ASTM A615 Bars Used* |
| Min. Reinf. | = | 1.0 % |
| Max. Reinf. | = | 8.0 % |

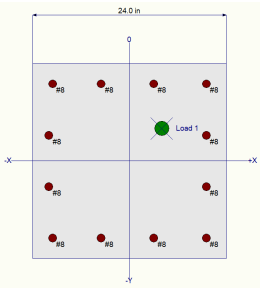
Overall Column Height = 16.670 ft
End Fixity: Top & Bottom Pinned

Brace condition for deflection (buckling) along columns :
X-X (width) axis :
Unbraced Length for buckling ABOUT Y-Y Axis = 16.67 ft, K = 1.0
Y-Y (depth) axis :
Unbraced Length for buckling ABOUT X-X Axis = 16.67 ft, K = 1.0

## Column Cross Section

Column Dimensions : 24.0in Square Column, Column Edge to Rebar Edge Cover = 2.0in

Column Reinforcing : 4 - #8 bars @ corners,, 2 - #8 bars top & bottom between corner bars, 2 - #8 bars left & right between corner bars




## Applied Loads

Entered loads are factored per load combinations specified by user.

Column self weight included : 10,002.0 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 16.670 ft above base, Xecc = 4.0in, Yecc = 4.0in, D = 235.0, L = 125.0 k

## *DESIGN SUMMARY*

Load Combination +1.20D+0.50Lr+1.60L+1.60H
Location of max.above base 16.558 ft

**Maximum Stress Ratio 0.471 : 1**
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5

| | | | |
|---|---|---|---|
| Pu = | 494.002 k | φ * Pn = | 1,041.68 k |
| Mu-x = | -159.588 k-ft | φ * Mn-x = | -336.638 k-ft |
| Mu-y = | -159.588 k-ft | φ * Mn-y = | 339.434 k-ft |
| Mu Angle = | 45.0 deg | | |
| Mu at Angle = | 225.692 k-ft | φMn at Angle = | 478.849 k-ft |

*Pn & Mn values located at Pu-Mu vector intersection with capacity curve*

Column Capacities . . .

| | |
|---|---|
| Pnmax : Nominal Max. Compressive Axial Capacity | 2,976.51 k |
| Pnmin : Nominal Min. Tension Axial Capacity | k |
| φ Pn, max : Usable Compressive Axial Capacity | 1,547.79 k |
| φ Pn, min : Usable Tension Axial Capacity | k |

Maximum SERVICE Load Reactions . .

| | | | |
|---|---|---|---|
| Top along Y-Y | 7.199 k | Bottom along Y-Y | 7.199 k |
| Top along X-X | 7.199 k | Bottom along X-X | 7.199 k |

Maximum SERVICE Load Deflections . . .
Along Y-Y -0.04320 in at 9.733 ft above base
for load combination : +D+L+H
Along X-X -0.04320 in at 9.733 ft above base
for load combination : +D+L+H

General Section Information . φ = 0.650 β = 0.80 θ = 0.80
ρ : % Reinforcing 1.646 % Rebar % Ok
Reinforcing Area 9.480 in^2
Concrete Area 576.0 in^2

## Governing Load Combination Results

| Governing Factored Load Combination | Moment X-X | Moment Y-Y | Dist. from base ft | Axial Load k Pu | φ * Pn | Bending Analysis k-ft δx | δx * Mux | δy | δy * Muy | Alpha (deg) | δ Mu | φ Mn | Utilization Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.40D+1.60H | Actual | Actual | 16.56 | 343.00 | 1,060.24 | 1.000 | -108.93 | 1.000 | -108.93 | 45.000 | 154.05 | 475.69 | 0.324 |
| +1.20D+0.50Lr+1.60L+1.60H | Actual | Actual | 16.56 | 494.00 | 1,041.68 | 1.000 | -159.59 | 1.000 | -159.59 | 45.000 | 225.69 | 478.85 | 0.471 |
| +1.20D+1.60L+0.50S+1.60H | Actual | Actual | 16.56 | 494.00 | 1,041.68 | 1.000 | -159.59 | 1.000 | -159.59 | 45.000 | 225.69 | 478.85 | 0.471 |

Title Block Line 1
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Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

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# Concrete Column

File: FWI2101 - Paragon Star.ec6
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Lic. # : KW-06011403
Bob D. Campbell and Co., Inc.

DESCRIPTION: Typical 24x24 - H=16.67' - Interior at 28.5x23.5 Bay

## Governing Load Combination Results

| Governing Factored Load Combination | Moment X-X | Moment Y-Y | Dist. from base ft | Axial Load k Pu | φ * Pn | Bending Analysis k-ft δx | δx * Mux | δy | δy * Muy | Alpha (deg) | δ Mu | φ Mn | Utilization Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60Lr+L+1.60H | Actual | Actual | 16.56 | 419.00 | 1,050.99 | 1.000 | -134.76 | 1.000 | -134.76 | 45.000 | 190.57 | 477.29 | 0.399 |
| +1.20D+1.60Lr+0.50W+1.60H | Actual | Actual | 16.56 | 294.00 | 1,060.24 | 1.000 | -93.37 | 1.000 | -93.37 | 45.000 | 132.04 | 475.69 | 0.278 |
| +1.20D+L+1.60S+1.60H | Actual | Actual | 16.56 | 419.00 | 1,050.99 | 1.000 | -134.76 | 1.000 | -134.76 | 45.000 | 190.57 | 477.29 | 0.399 |
| +1.20D+1.60S+0.50W+1.60H | Actual | Actual | 16.56 | 294.00 | 1,060.24 | 1.000 | -93.37 | 1.000 | -93.37 | 45.000 | 132.04 | 475.69 | 0.278 |
| +1.20D+0.50Lr+L+W+1.60H | Actual | Actual | 16.56 | 419.00 | 1,050.99 | 1.000 | -134.76 | 1.000 | -134.76 | 45.000 | 190.57 | 477.29 | 0.399 |
| +1.20D+L+0.50S+W+1.60H | Actual | Actual | 16.56 | 419.00 | 1,050.99 | 1.000 | -134.76 | 1.000 | -134.76 | 45.000 | 190.57 | 477.29 | 0.399 |
| +0.90D+W+1.60H | Actual | Actual | 16.56 | 220.50 | 1,060.24 | 1.000 | -70.03 | 1.000 | -70.03 | 45.000 | 99.03 | 475.69 | 0.208 |
| +1.20D+L+0.20S+E+1.60H | Actual | Actual | 16.56 | 419.00 | 1,050.99 | 1.000 | -134.76 | 1.000 | -134.76 | 45.000 | 190.57 | 477.29 | 0.399 |
| +0.90D+E+0.90H | Actual | Actual | 16.56 | 220.50 | 1,060.24 | 1.000 | -70.03 | 1.000 | -70.03 | 45.000 | 99.03 | 475.69 | 0.208 |

## Maximum Reactions

Note: Only non-zero reactions are listed.

| Load Combination | X-X Axis Reaction k @ Base | @ Top | Y-Y Axis Reaction @ Base | @ Top | Axial Reaction @ Base | My - End Moments k-ft @ Base | @ Top | Mx - End Moments @ Base | @ Top |
|---|---|---|---|---|---|---|---|---|---|
| +D+H | 4.699 | 4.699 | 4.699 | 4.699 | 245.002 | | | | |
| +D+L+H | 7.199 | 7.199 | 7.199 | 7.199 | 370.002 | | | | |
| +D+Lr+H | 4.699 | 4.699 | 4.699 | 4.699 | 245.002 | | | | |
| +D+S+H | 4.699 | 4.699 | 4.699 | 4.699 | 245.002 | | | | |
| +D+0.750Lr+0.750L+H | 6.574 | 6.574 | 6.574 | 6.574 | 338.752 | | | | |
| +D+0.750L+0.750S+H | 6.574 | 6.574 | 6.574 | 6.574 | 338.752 | | | | |
| +D+0.60W+H | 4.699 | 4.699 | 4.699 | 4.699 | 245.002 | | | | |
| +D+0.750Lr+0.750L+0.450W+H | 6.574 | 6.574 | 6.574 | 6.574 | 338.752 | | | | |
| +D+0.750L+0.750S+0.450W+H | 6.574 | 6.574 | 6.574 | 6.574 | 338.752 | | | | |
| +0.60D+0.60W+0.60H | 2.819 | 2.819 | 2.819 | 2.819 | 147.001 | | | | |
| +D+0.70E+0.60H | 4.699 | 4.699 | 4.699 | 4.699 | 245.002 | | | | |
| +D+0.750L+0.750S+0.5250E+H | 6.574 | 6.574 | 6.574 | 6.574 | 338.752 | | | | |
| +0.60D+0.70E+H | 2.819 | 2.819 | 2.819 | 2.819 | 147.001 | | | | |
| D Only | 4.699 | 4.699 | 4.699 | 4.699 | 245.002 | | | | |
| Lr Only | | | | | | | | | |
| L Only | 2.500 | 2.500 | 2.500 | 2.500 | 125.000 | | | | |
| S Only | | | | | | | | | |
| W Only | | | | | | | | | |
| E Only | | | | | | | | | |
| H Only | | | | | | | | | |

## Maximum Moment Reactions

Note: Only non-zero reactions are listed.

| Load Combination | Moment About X-X Axis @ Base | @ Top | Moment About Y-Y Axis @ Base | @ Top |
|---|---|---|---|---|
| +D+H | k-ft | | k-ft | |
| +D+L+H | k-ft | | k-ft | |
| +D+Lr+H | k-ft | | k-ft | |
| +D+S+H | k-ft | | k-ft | |
| +D+0.750Lr+0.750L+H | k-ft | | k-ft | |
| +D+0.750L+0.750S+H | k-ft | | k-ft | |
| +D+0.60W+H | k-ft | | k-ft | |
| +D+0.750Lr+0.750L+0.450W+H | k-ft | | k-ft | |
| +D+0.750L+0.750S+0.450W+H | k-ft | | k-ft | |
| +0.60D+0.60W+0.60H | k-ft | | k-ft | |
| +D+0.70E+0.60H | k-ft | | k-ft | |
| +D+0.750L+0.750S+0.5250E+H | k-ft | | k-ft | |
| +0.60D+0.70E+H | k-ft | | k-ft | |
| D Only | k-ft | | k-ft | |
| Lr Only | k-ft | | k-ft | |
| L Only | k-ft | | k-ft | |
| S Only | k-ft | | k-ft | |
| W Only | k-ft | | k-ft | |
| E Only | k-ft | | k-ft | |
| H Only | k-ft | | k-ft | |

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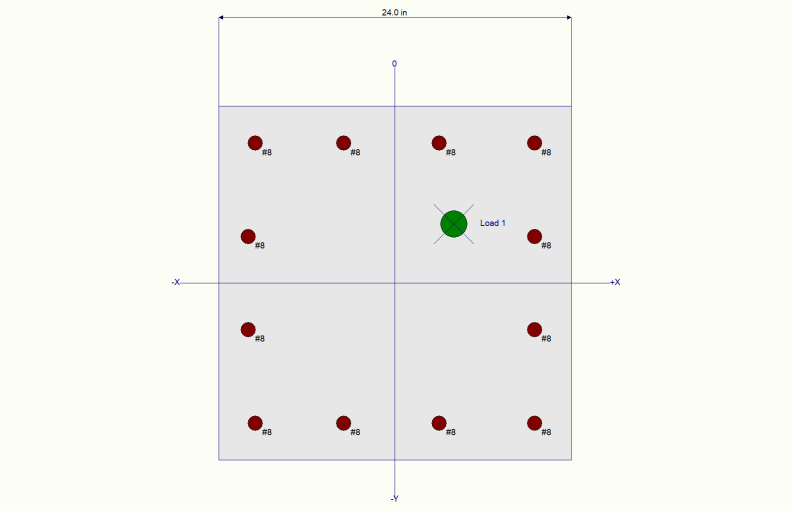

# Concrete Column

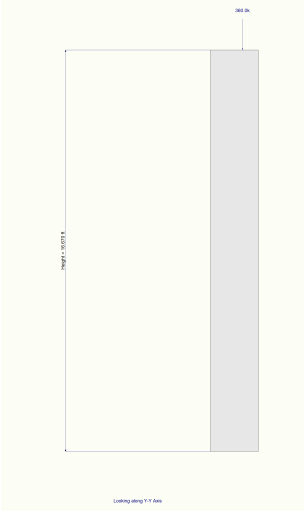
DESCRIPTION: Typical 24x24 - H=16.67' - Interior at 28.5x23.5 Bay

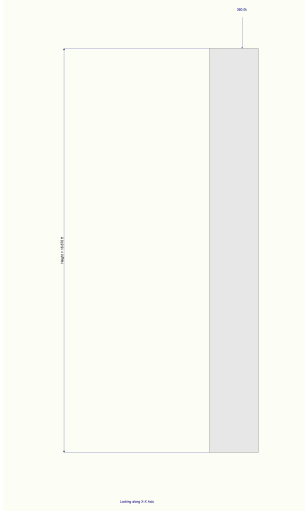
## Maximum Deflections for Load Combinations

| Load Combination | Max. X-X Deflection | | Distance | | Max. Y-Y Deflection | | Distance | |
|---|---|---|---|---|---|---|---|---|
| +D+H | -0.0282 | in | 9.733 | ft | -0.028 | in | 9.733 | ft |
| +D+L+H | -0.0432 | in | 9.733 | ft | -0.043 | in | 9.733 | ft |
| +D+Lr+H | -0.0282 | in | 9.733 | ft | -0.028 | in | 9.733 | ft |
| +D+S+H | -0.0282 | in | 9.733 | ft | -0.028 | in | 9.733 | ft |
| +D+0.750Lr+0.750L+H | -0.0394 | in | 9.733 | ft | -0.039 | in | 9.733 | ft |
| +D+0.750L+0.750S+H | -0.0394 | in | 9.733 | ft | -0.039 | in | 9.733 | ft |
| +D+0.60W+H | -0.0282 | in | 9.733 | ft | -0.028 | in | 9.733 | ft |
| +D+0.750Lr+0.750L+0.450W+H | -0.0394 | in | 9.733 | ft | -0.039 | in | 9.733 | ft |
| +D+0.750L+0.750S+0.450W+H | -0.0394 | in | 9.733 | ft | -0.039 | in | 9.733 | ft |
| +0.60D+0.60W+0.60H | -0.0169 | in | 9.733 | ft | -0.017 | in | 9.733 | ft |
| +D+0.70E+0.60H | -0.0282 | in | 9.733 | ft | -0.028 | in | 9.733 | ft |
| +D+0.750L+0.750S+0.5250E+H | -0.0394 | in | 9.733 | ft | -0.039 | in | 9.733 | ft |
| +0.60D+0.70E+H | -0.0169 | in | 9.733 | ft | -0.017 | in | 9.733 | ft |
| D Only | -0.0282 | in | 9.733 | ft | -0.028 | in | 9.733 | ft |
| Lr Only | 0.0000 | in | 0.000 | ft | 0.000 | in | 0.000 | ft |
| L Only | -0.0150 | in | 9.733 | ft | -0.015 | in | 9.733 | ft |
| S Only | 0.0000 | in | 0.000 | ft | 0.000 | in | 0.000 | ft |
| W Only | 0.0000 | in | 0.000 | ft | 0.000 | in | 0.000 | ft |
| E Only | 0.0000 | in | 0.000 | ft | 0.000 | in | 0.000 | ft |
| H Only | 0.0000 | in | 0.000 | ft | 0.000 | in | 0.000 | ft |

## Sketches





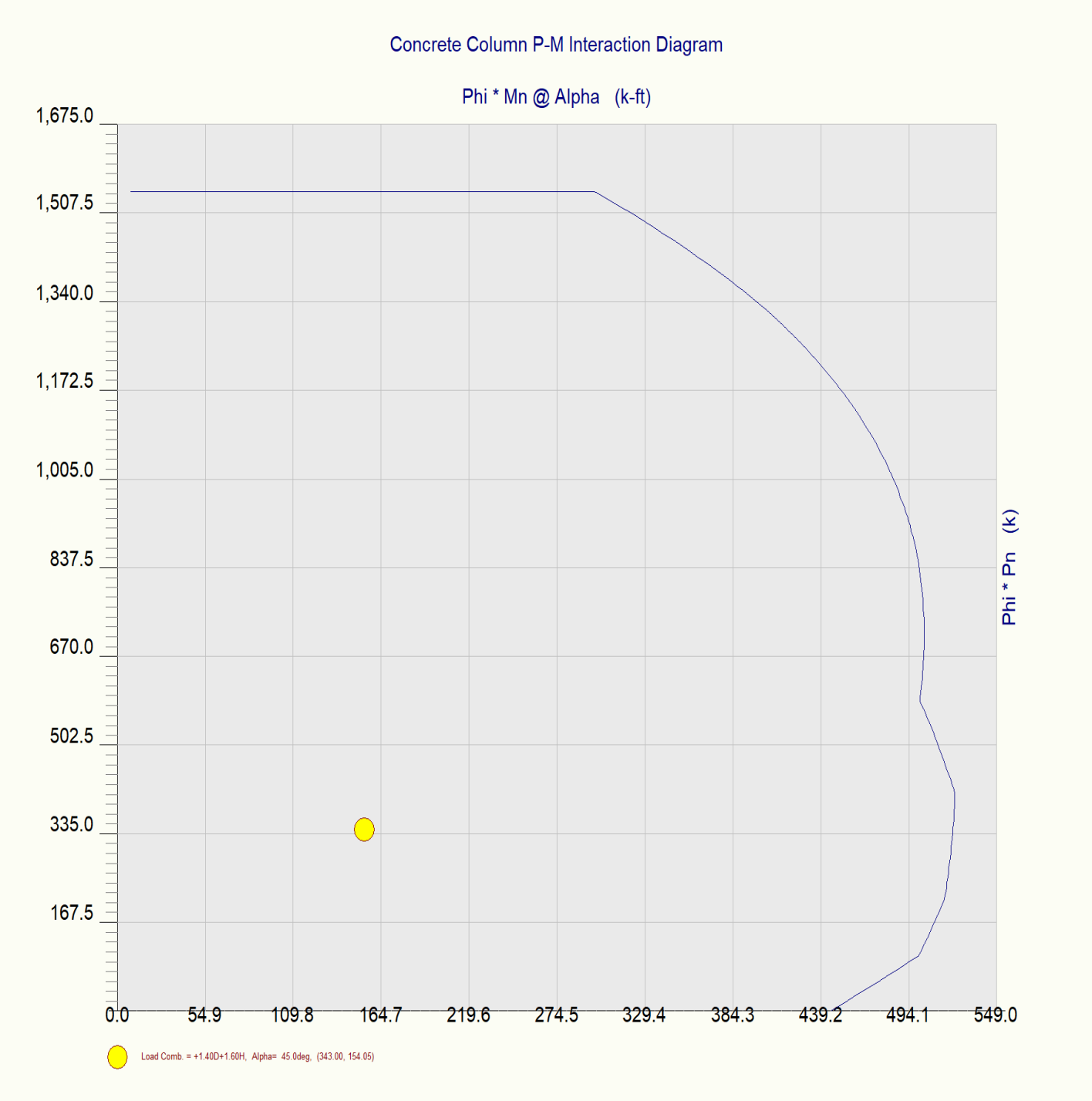
## Interaction Diagrams

# Concrete Column

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Lic. # : KW-06011403
Bob D. Campbell and Co., Inc.

DESCRIPTION: Typical 24x24 - H=16.67' - Interior at 28.5x23.5 Bay

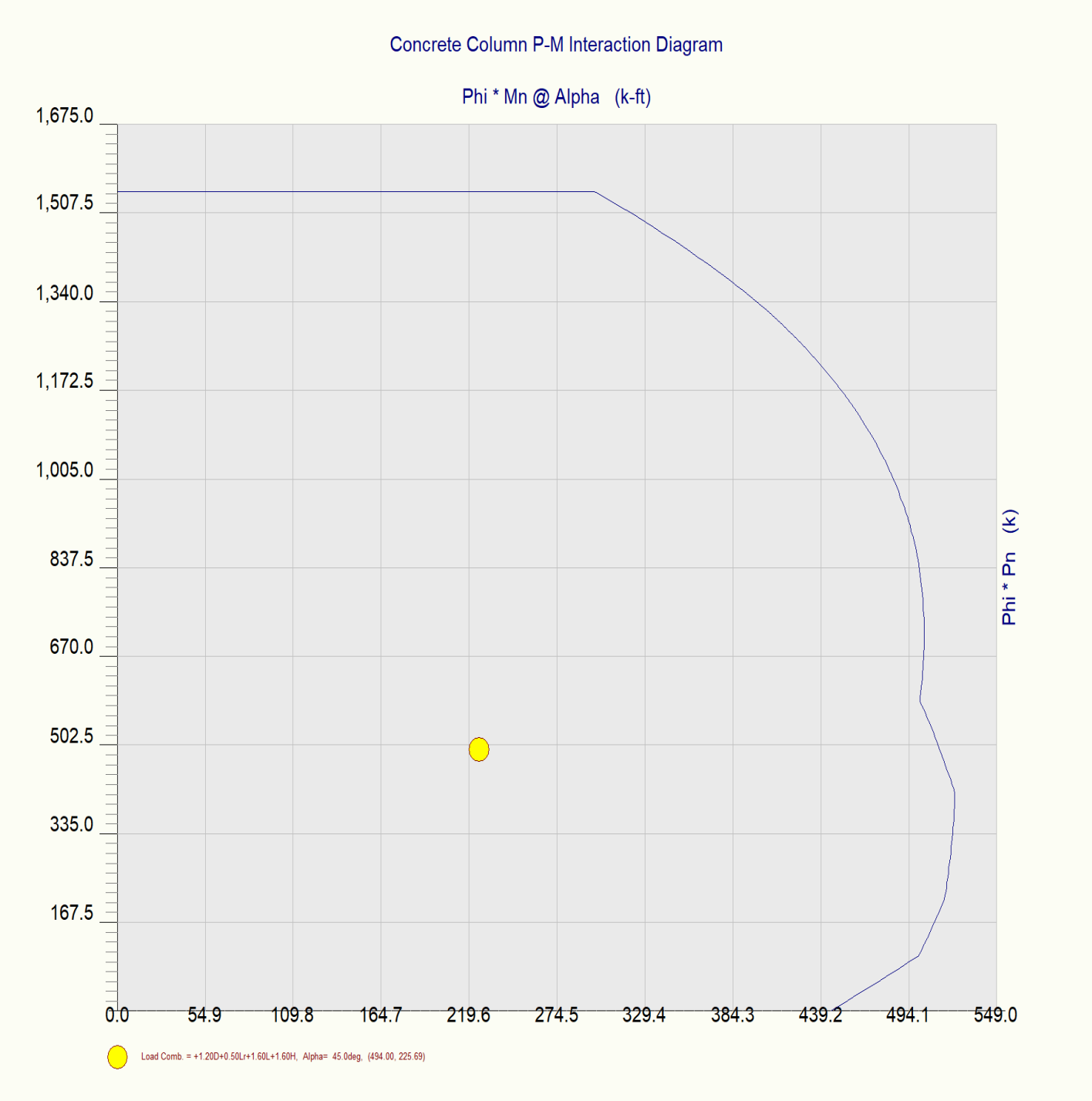


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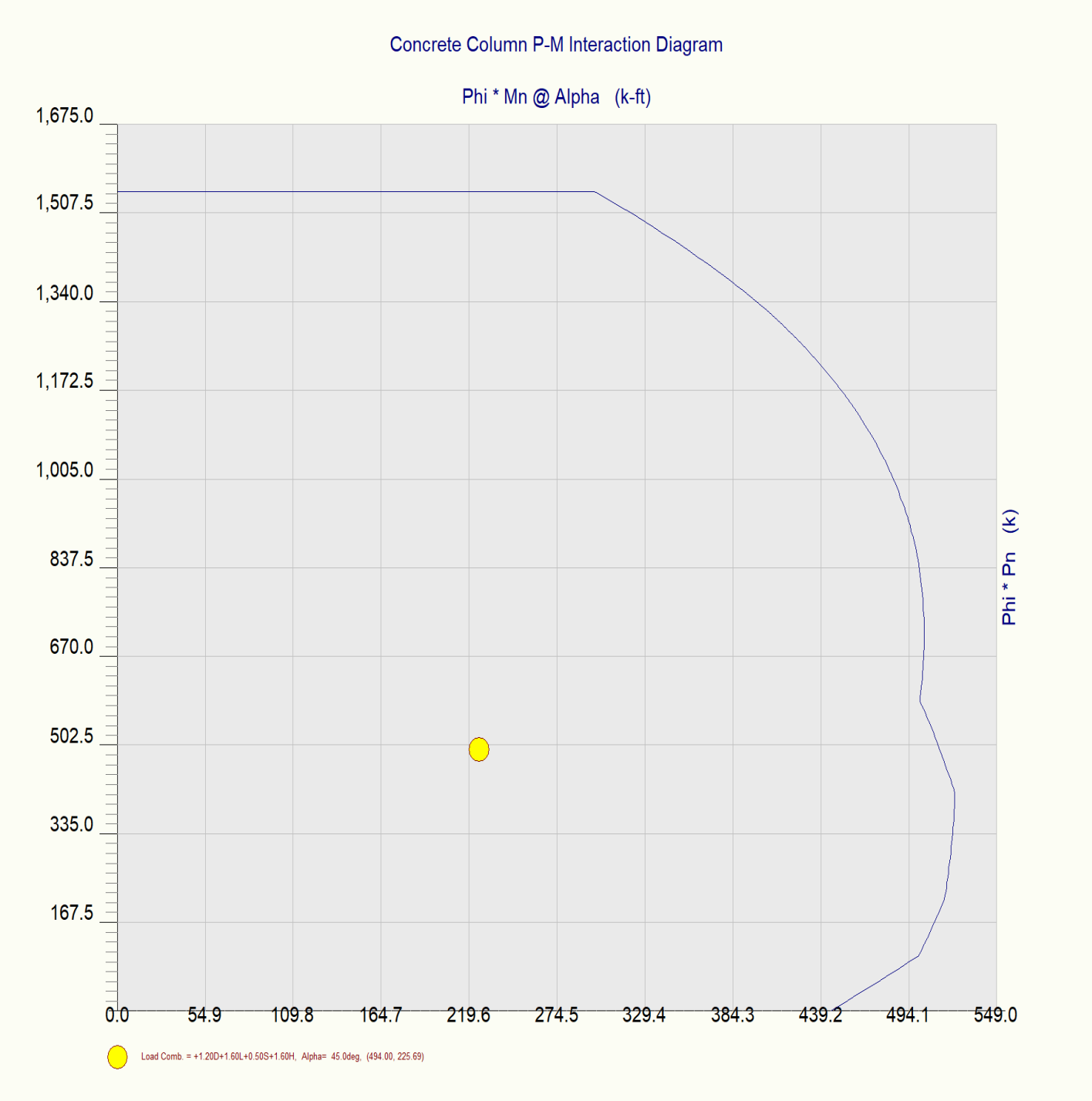


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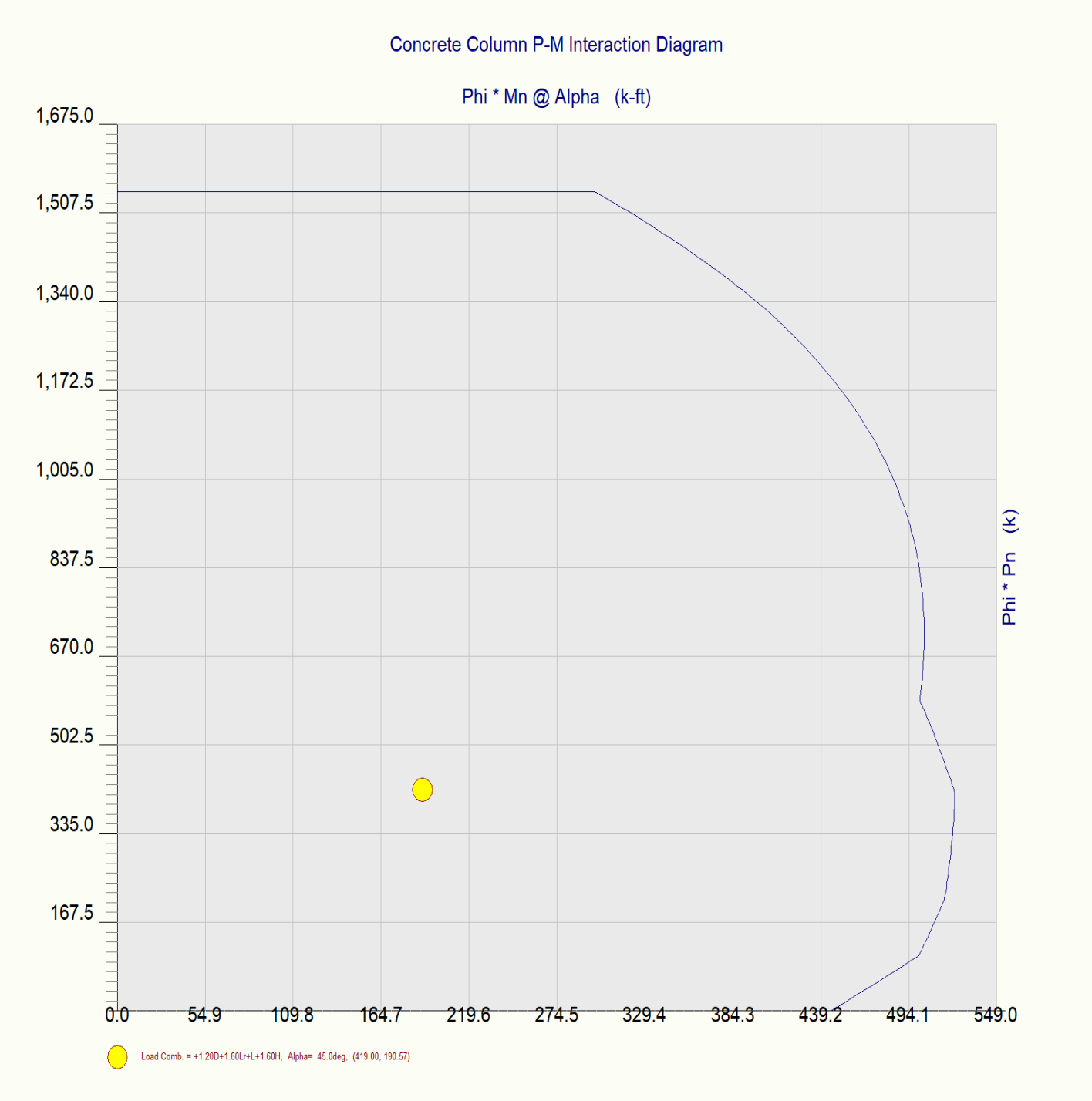
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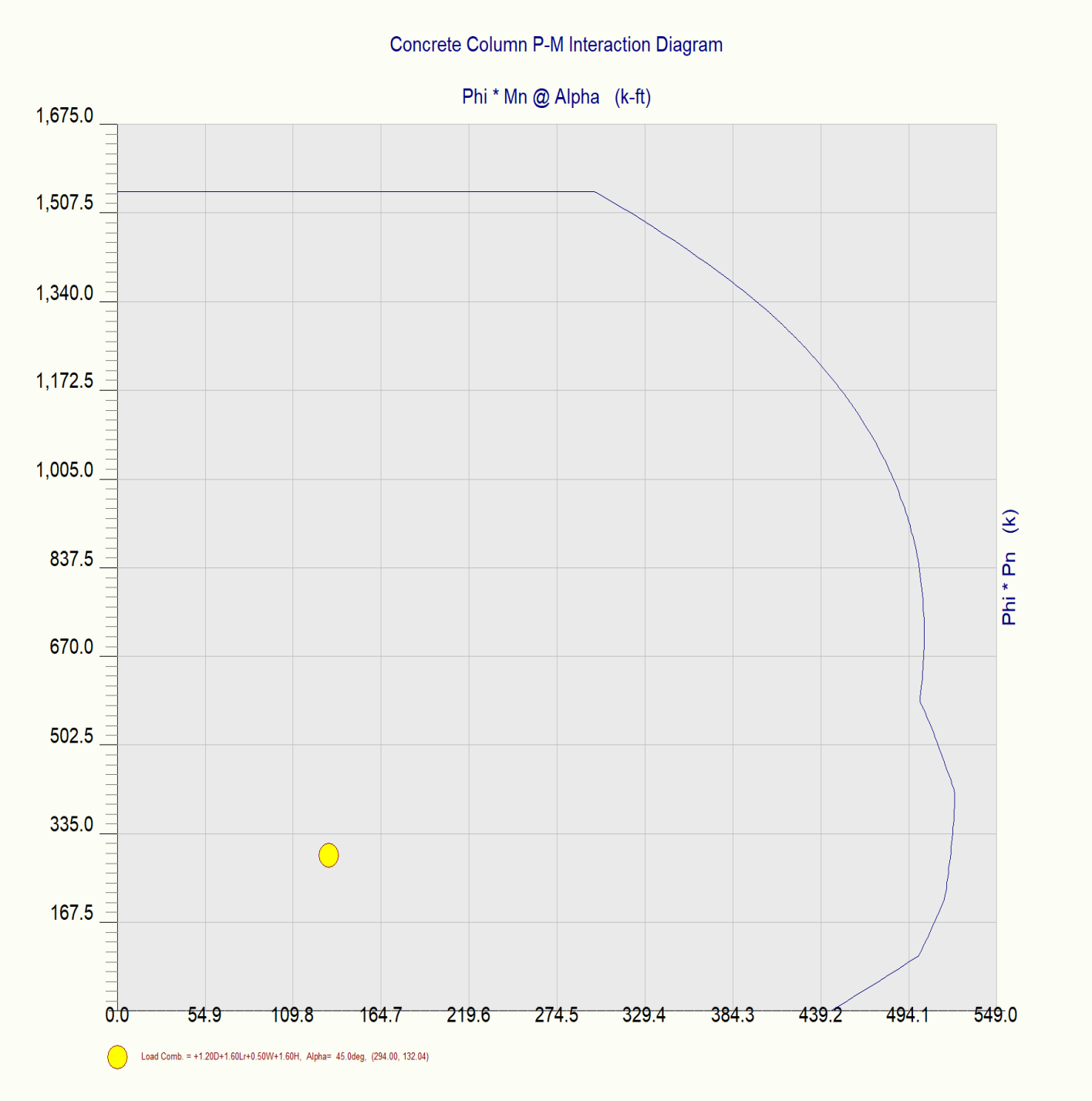


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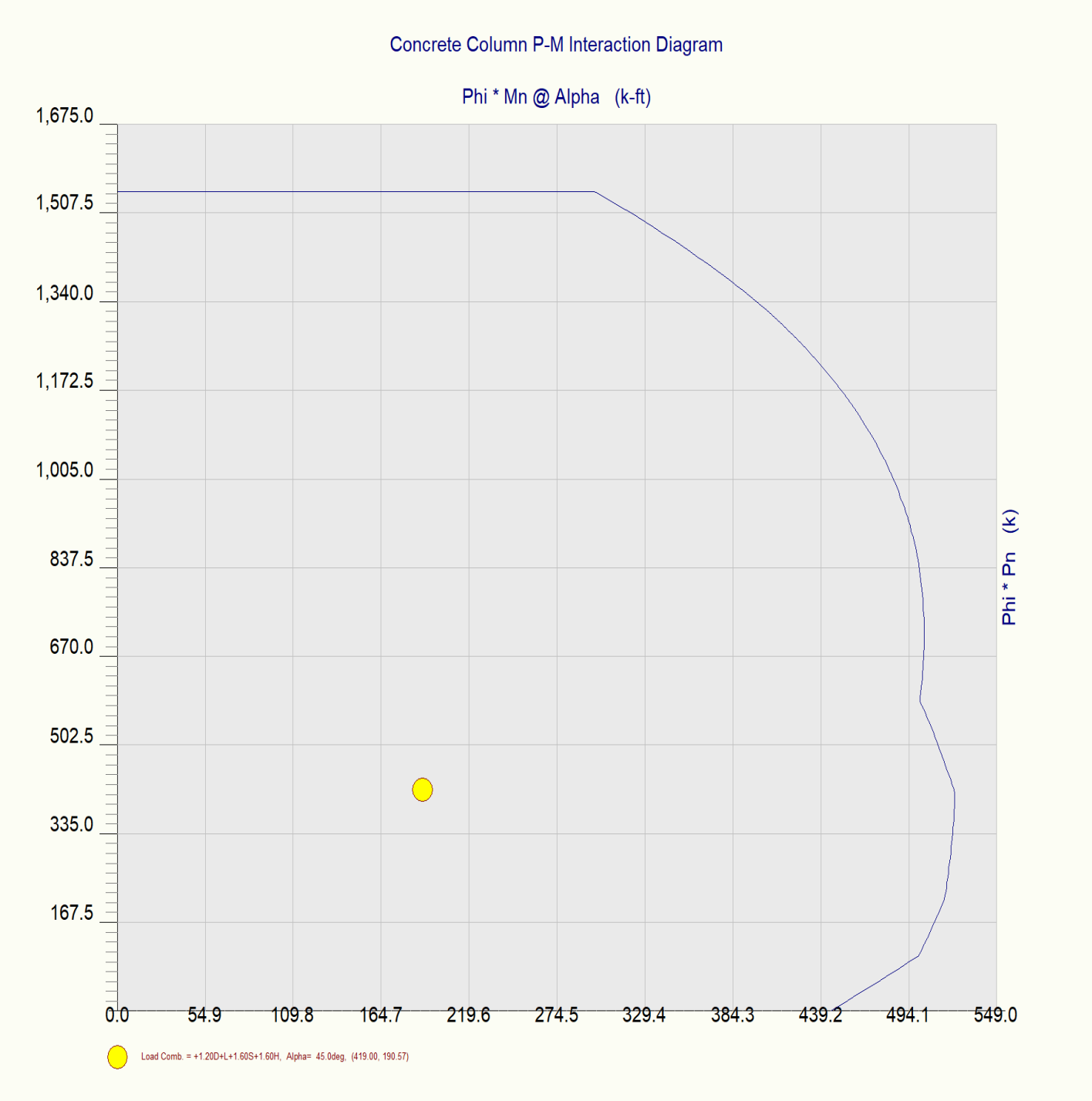


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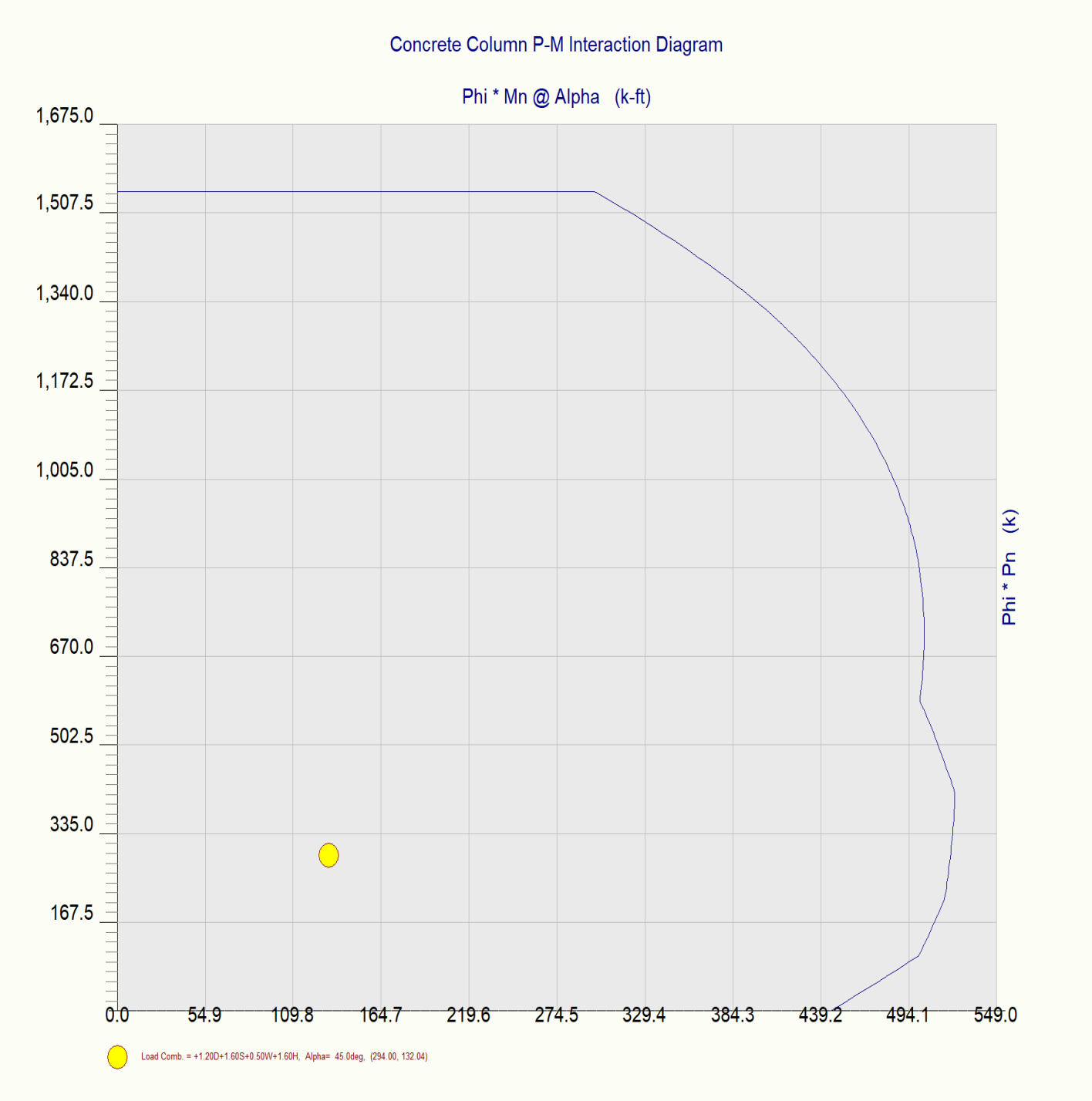
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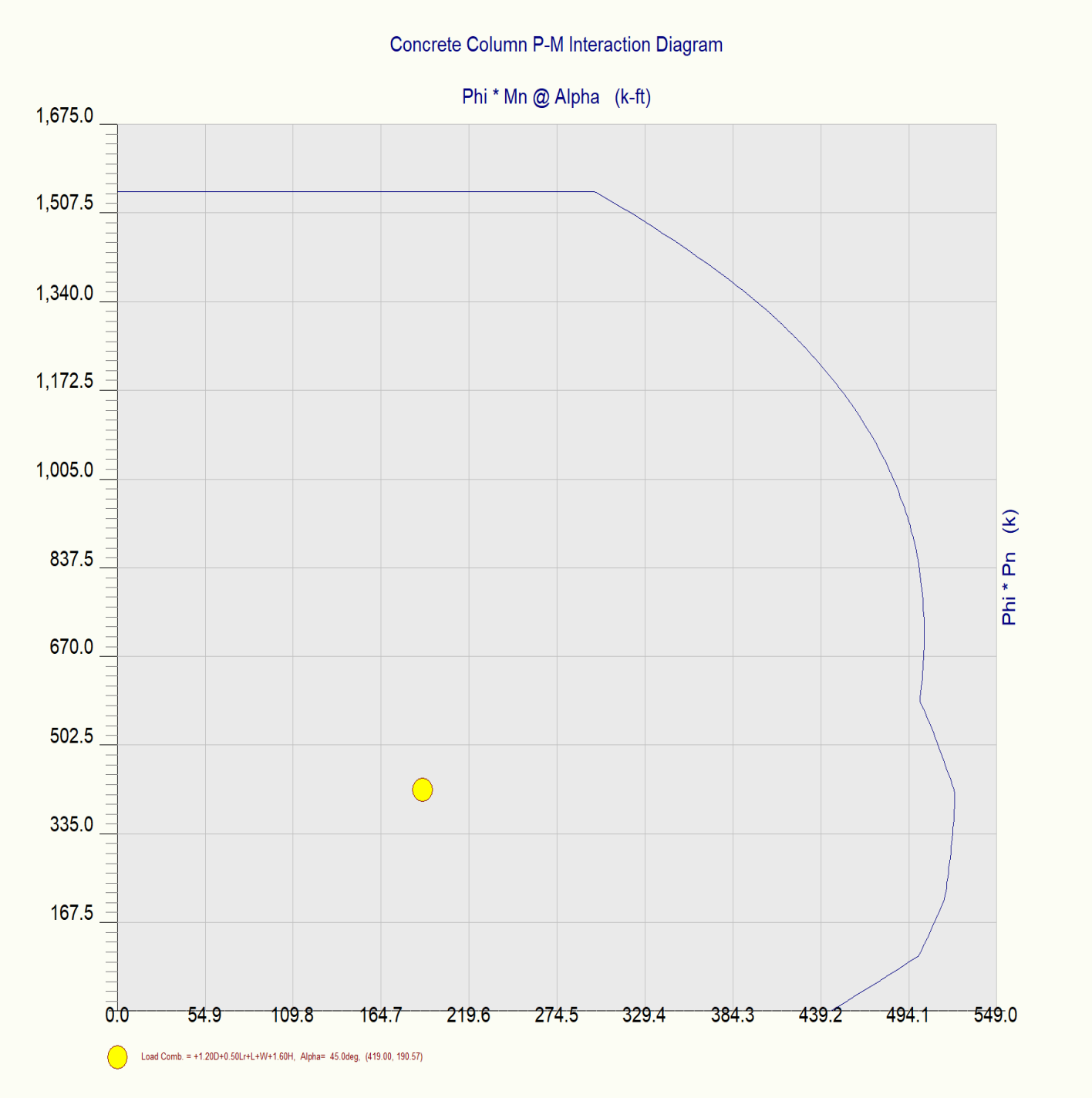

# Concrete Column

DESCRIPTION: Typical 24x24 - H=16.67' - Interior at 28.5x23.5 Bay



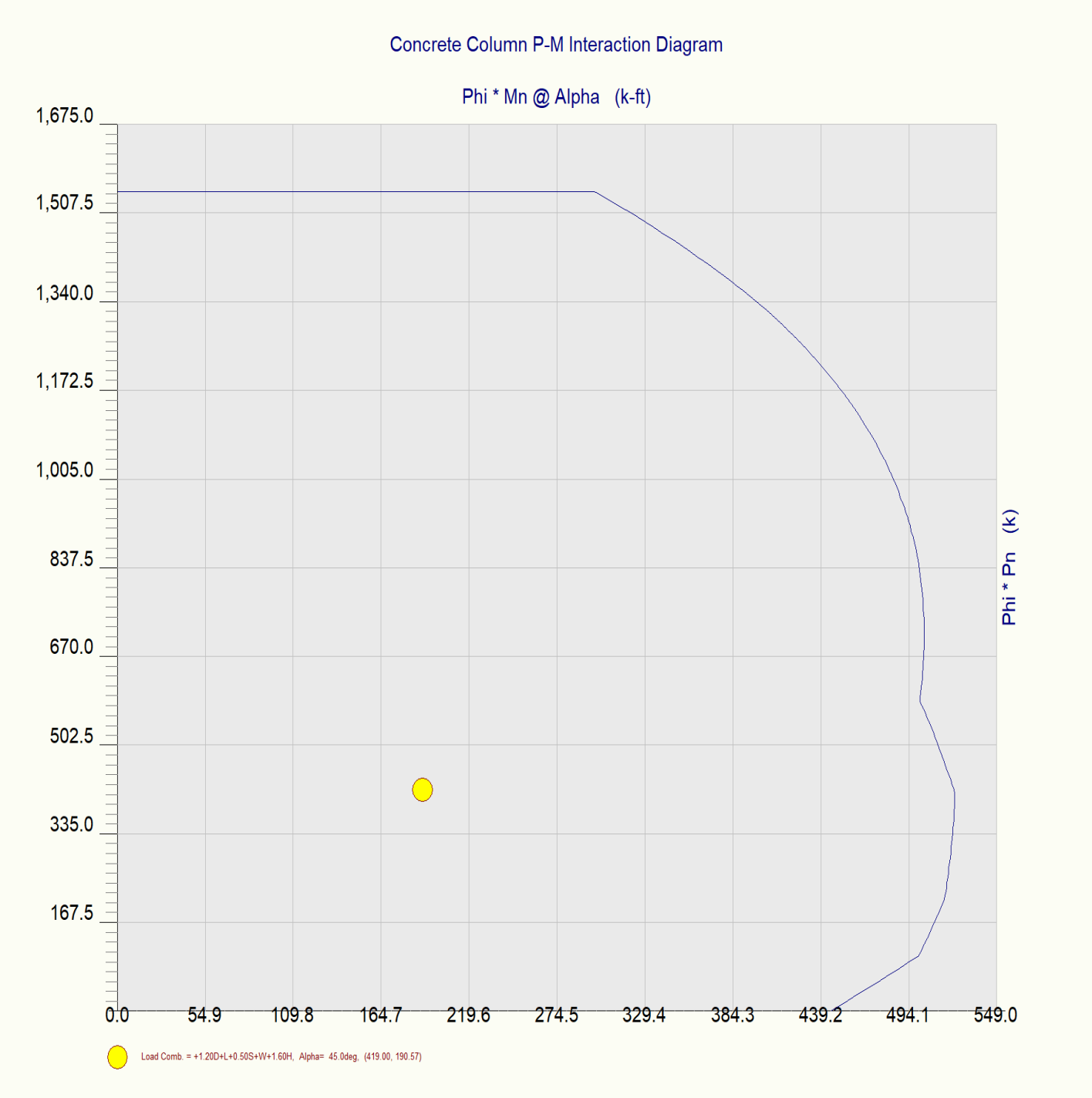
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DESCRIPTION: Typical 24x24 - H=16.67' - Interior at 28.5x23.5 Bay



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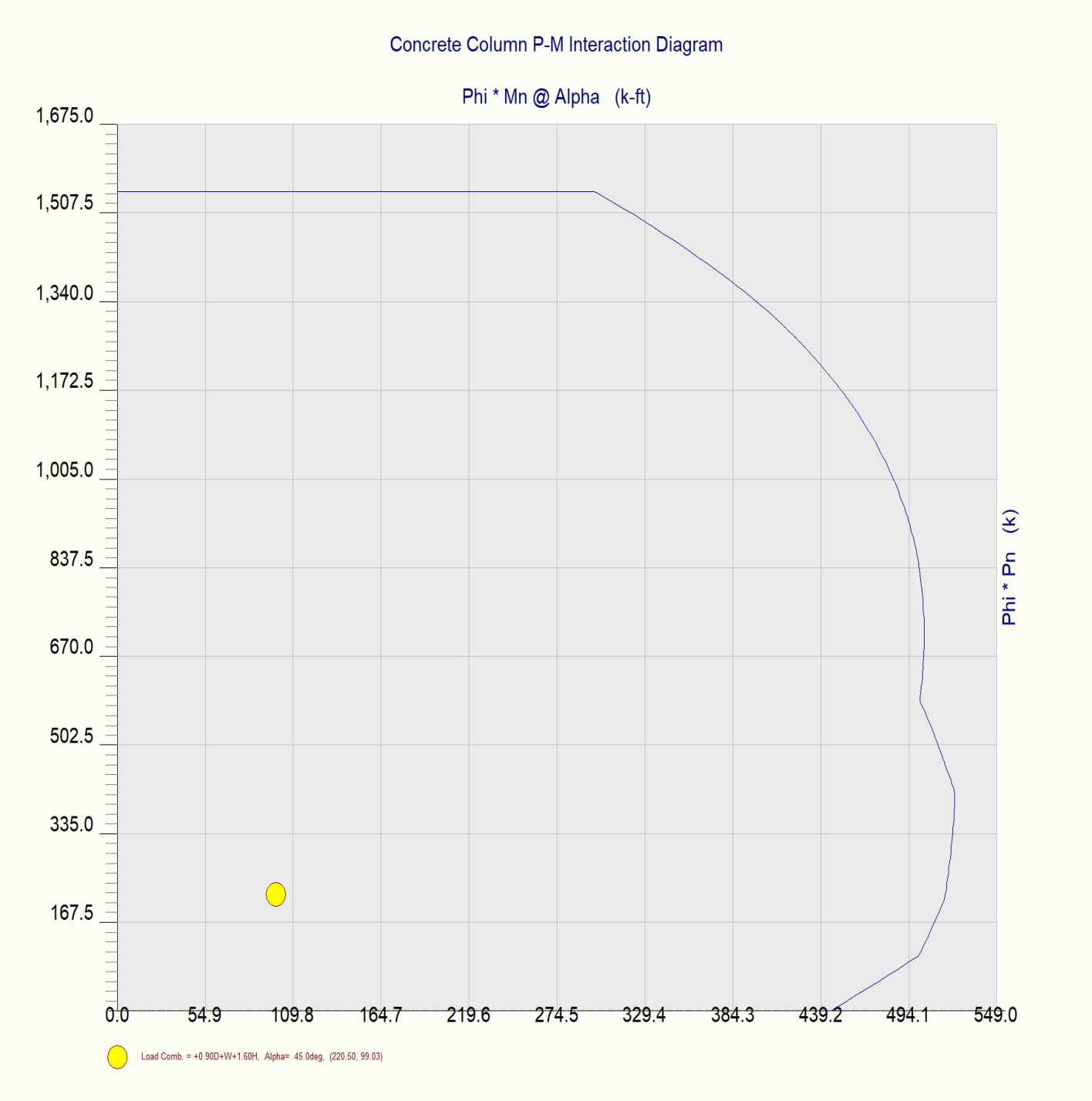

DESCRIPTION: Typical 24x24 - H=16.67' - Interior at 28.5x23.5 Bay



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# Concrete Column

DESCRIPTION: Typical 24x24 - H=16.67' - Interior at 28.5x23.5 Bay

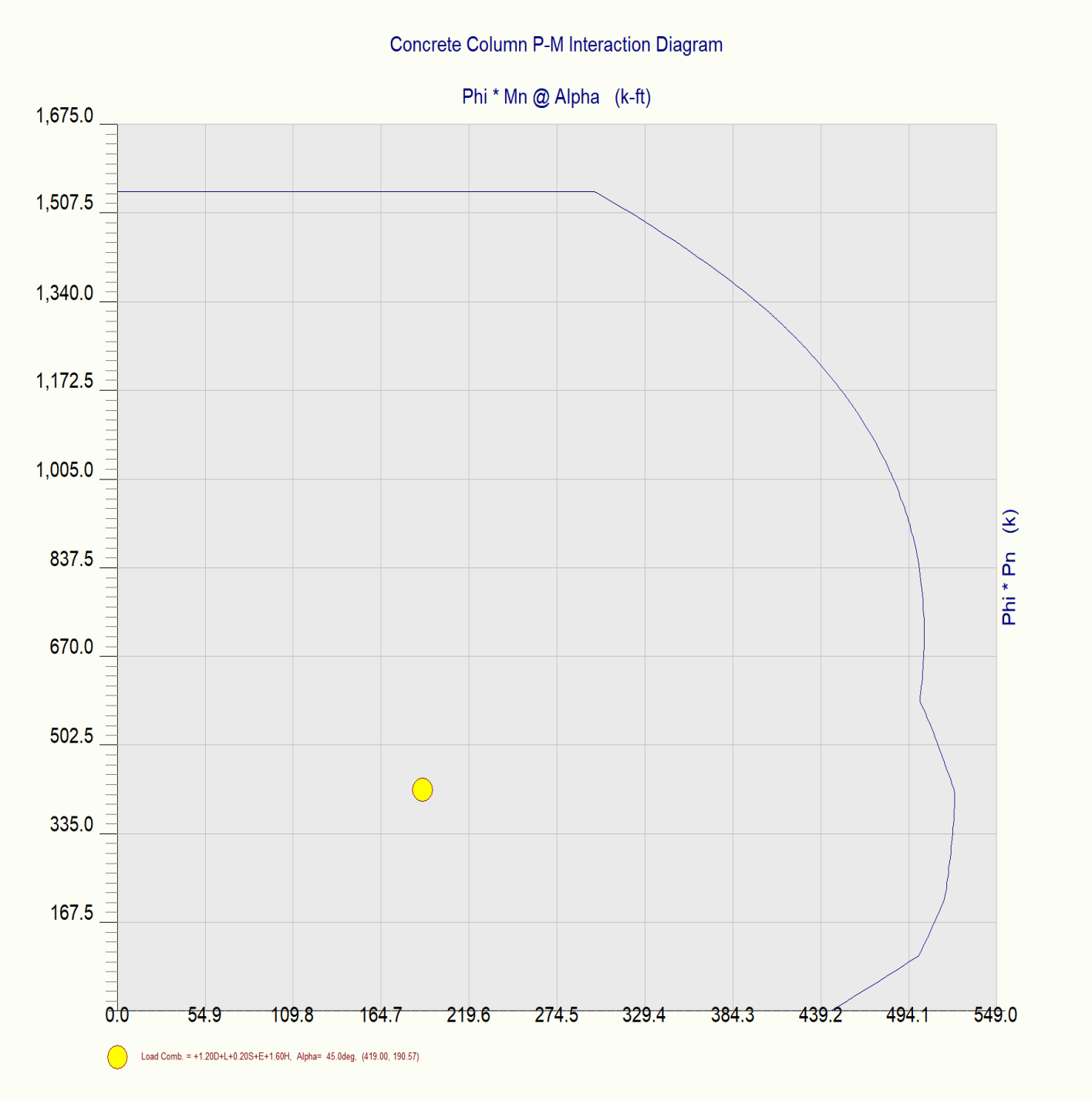


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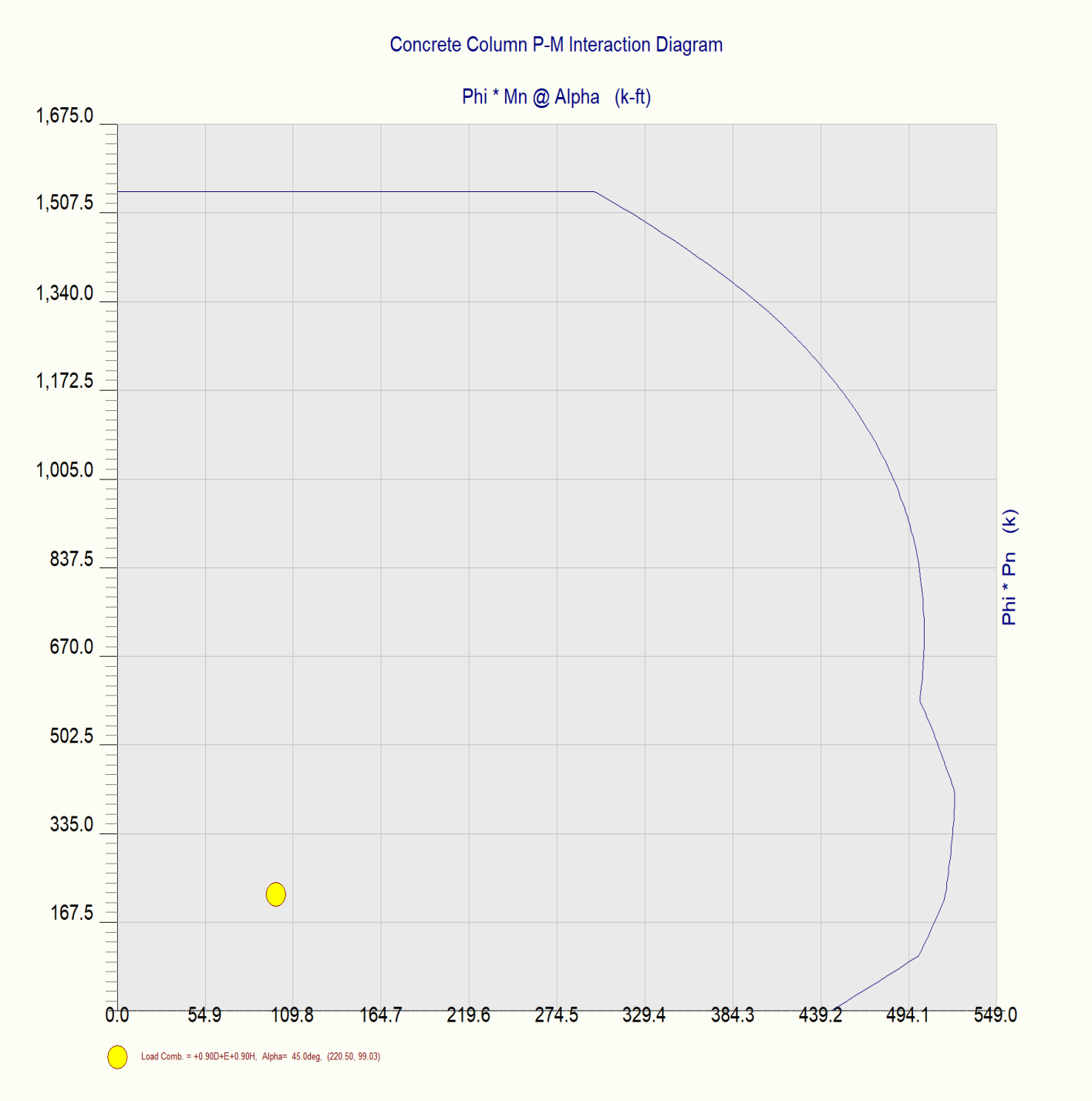
DESCRIPTION: Typical 24x24 - H=16.67' - Interior at 28.5x23.5 Bay



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# Concrete Column

DESCRIPTION: Typical 24x24 - H=16.67' - Interior at 28.5x23.5 Bay



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# Concrete Column

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DESCRIPTION: Typical 24x24 - H=20.67' - Exterior - Area F

## Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

## General Information

| | | |
|---|---|---|
| f'c : Concrete 28 day strength | = | 5.0 ksi |
| E = | = | 3,122.0 ksi |
| Density | = | 150.0 pcf |
| β | = | 0.80 |
| fy - Main Rebar | = | 60.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi |
| Allow. Reinforcing Limits | | *ASTM A615 Bars Used* |
| Min. Reinf. | = | 1.0 % |
| Max. Reinf. | = | 8.0 % |

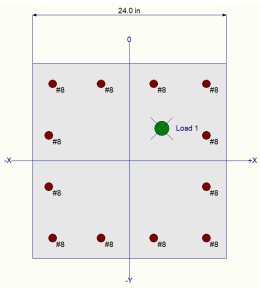
Overall Column Height = 20.670 ft
End Fixity: Top & Bottom Pinned

Brace condition for deflection (buckling) along columns :
X-X (width) axis :
Unbraced Length for buckling ABOUT Y-Y Axis = 20.67 ft, K = 1.0
Y-Y (depth) axis :
Unbraced Length for buckling ABOUT X-X Axis = 20.67 ft, K = 1.0

## Column Cross Section

Column Dimensions : 24.0in Square Column, Column Edge to Rebar Edge Cover = 2.0in

Column Reinforcing : 4 - #8 bars @ corners,, 2 - #8 bars top & bottom between corner bars, 2 - #8 bars left & right between corner bars




## Applied Loads

Entered loads are factored per load combinations specified by user.

Column self weight included : 12,402.0 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 20.670 ft above base, Xecc = 4.0in, Yecc = 4.0in, D = 235.0, L = 125.0 k

## *DESIGN SUMMARY*

Load Combination +1.20D+0.50Lr+1.60L+1.60H
Location of max.above base 20.531 ft

**Maximum Stress Ratio 0.473 : 1**
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5

| | | | |
|---|---|---|---|
| Pu = | 496.882 k | φ * Pn = | 1,050.99 k |
| Mu-x = | -159.588 k-ft | φ * Mn-x = | -335.564 k-ft |
| Mu-y = | -159.588 k-ft | φ * Mn-y = | 338.344 k-ft |
| Mu Angle = | 45.0 deg | | |
| Mu at Angle = | 225.692 k-ft | φMn at Angle = | 477.294 k-ft |

*Pn & Mn values located at Pu-Mu vector intersection with capacity curve*

Column Capacities . . .

| | |
|---|---|
| Pnmax : Nominal Max. Compressive Axial Capacity | 2,976.51 k |
| Pnmin : Nominal Min. Tension Axial Capacity | k |
| φ Pn, max : Usable Compressive Axial Capacity | 1,547.79 k |
| φ Pn, min : Usable Tension Axial Capacity | k |

Maximum SERVICE Load Reactions . .

| | | | |
|---|---|---|---|
| Top along Y-Y | 5.806 k | Bottom along Y-Y | 5.806 k |
| Top along X-X | 5.806 k | Bottom along X-X | 5.806 k |

Maximum SERVICE Load Deflections . . .
Along Y-Y -0.06642 in at 12.069 ft above base
for load combination : +D+L+H
Along X-X -0.06642 in at 12.069 ft above base
for load combination : +D+L+H

General Section Information . φ = 0.650 β = 0.80 θ = 0.80
ρ : % Reinforcing 1.646 % Rebar % Ok
Reinforcing Area 9.480 in^2
Concrete Area 576.0 in^2

## Governing Load Combination Results

| Governing Factored Load Combination | Moment X-X | Moment Y-Y | Dist. from base ft | Axial Load k Pu | φ * Pn | Bending Analysis k-ft δx | δx * Mux | δy | δy * Muy | Alpha (deg) | δ Mu | φ Mn | Utilization Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.40D+1.60H | Actual | Actual | 20.53 | 346.36 | 1,069.43 | 1.000 | -108.93 | 1.000 | -108.93 | 45.000 | 154.05 | 474.05 | 0.325 |
| +1.20D+0.50Lr+1.60L+1.60H | Actual | Actual | 20.53 | 496.88 | 1,050.99 | 1.000 | -159.59 | 1.000 | -159.59 | 45.000 | 225.69 | 477.29 | 0.473 |
| +1.20D+1.60L+0.50S+1.60H | Actual | Actual | 20.53 | 496.88 | 1,050.99 | 1.000 | -159.59 | 1.000 | -159.59 | 45.000 | 225.69 | 477.29 | 0.473 |

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# Concrete Column



DESCRIPTION: Typical 24x24 - H=20.67' - Exterior - Area F

## Governing Load Combination Results

| Governing Factored Load Combination | Moment X-X | Moment Y-Y | Dist. from base ft | Axial Load k Pu | φ * Pn | Bending Analysis k-ft δx | δx * Mux | δy | δy * Muy | Alpha (deg) | δ Mu | φ Mn | Utilization Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60Lr+L+1.60H | Actual | Actual | 20.53 | 421.88 | 1,050.99 | 1.000 | -134.76 | 1.000 | -134.76 | 45.000 | 190.57 | 477.29 | 0.399 |
| +1.20D+1.60Lr+0.50W+1.60H | Actual | Actual | 20.53 | 296.88 | 1,069.43 | 1.000 | -93.37 | 1.000 | -93.37 | 45.000 | 132.04 | 474.05 | 0.279 |
| +1.20D+L+1.60S+1.60H | Actual | Actual | 20.53 | 421.88 | 1,050.99 | 1.000 | -134.76 | 1.000 | -134.76 | 45.000 | 190.57 | 477.29 | 0.399 |
| +1.20D+1.60S+0.50W+1.60H | Actual | Actual | 20.53 | 296.88 | 1,069.43 | 1.000 | -93.37 | 1.000 | -93.37 | 45.000 | 132.04 | 474.05 | 0.279 |
| +1.20D+0.50Lr+L+W+1.60H | Actual | Actual | 20.53 | 421.88 | 1,050.99 | 1.000 | -134.76 | 1.000 | -134.76 | 45.000 | 190.57 | 477.29 | 0.399 |
| +1.20D+L+0.50S+W+1.60H | Actual | Actual | 20.53 | 421.88 | 1,050.99 | 1.000 | -134.76 | 1.000 | -134.76 | 45.000 | 190.57 | 477.29 | 0.399 |
| +0.90D+W+1.60H | Actual | Actual | 20.53 | 222.66 | 1,069.43 | 1.000 | -70.03 | 1.000 | -70.03 | 45.000 | 99.03 | 474.05 | 0.209 |
| +1.20D+L+0.20S+E+1.60H | Actual | Actual | 20.53 | 421.88 | 1,050.99 | 1.000 | -134.76 | 1.000 | -134.76 | 45.000 | 190.57 | 477.29 | 0.399 |
| +0.90D+E+0.90H | Actual | Actual | 20.53 | 222.66 | 1,069.43 | 1.000 | -70.03 | 1.000 | -70.03 | 45.000 | 99.03 | 474.05 | 0.209 |

## Maximum Reactions

Note: Only non-zero reactions are listed.

| Load Combination | X-X Axis Reaction k @ Base | @ Top | Y-Y Axis Reaction @ Base | @ Top | Axial Reaction @ Base | My - End Moments k-ft @ Base | @ Top | Mx - End Moments @ Base | @ Top |
|---|---|---|---|---|---|---|---|---|---|
| +D+H | 3.790 | 3.790 | 3.790 | 3.790 | 247.402 | | | | |
| +D+L+H | 5.806 | 5.806 | 5.806 | 5.806 | 372.402 | | | | |
| +D+Lr+H | 3.790 | 3.790 | 3.790 | 3.790 | 247.402 | | | | |
| +D+S+H | 3.790 | 3.790 | 3.790 | 3.790 | 247.402 | | | | |
| +D+0.750Lr+0.750L+H | 5.302 | 5.302 | 5.302 | 5.302 | 341.152 | | | | |
| +D+0.750L+0.750S+H | 5.302 | 5.302 | 5.302 | 5.302 | 341.152 | | | | |
| +D+0.60W+H | 3.790 | 3.790 | 3.790 | 3.790 | 247.402 | | | | |
| +D+0.750Lr+0.750L+0.450W+H | 5.302 | 5.302 | 5.302 | 5.302 | 341.152 | | | | |
| +D+0.750L+0.750S+0.450W+H | 5.302 | 5.302 | 5.302 | 5.302 | 341.152 | | | | |
| +0.60D+0.60W+0.60H | 2.274 | 2.274 | 2.274 | 2.274 | 148.441 | | | | |
| +D+0.70E+0.60H | 3.790 | 3.790 | 3.790 | 3.790 | 247.402 | | | | |
| +D+0.750L+0.750S+0.5250E+H | 5.302 | 5.302 | 5.302 | 5.302 | 341.152 | | | | |
| +0.60D+0.70E+H | 2.274 | 2.274 | 2.274 | 2.274 | 148.441 | | | | |
| D Only | 3.790 | 3.790 | 3.790 | 3.790 | 247.402 | | | | |
| Lr Only | | | | | | | | | |
| L Only | 2.016 | 2.016 | 2.016 | 2.016 | 125.000 | | | | |
| S Only | | | | | | | | | |
| W Only | | | | | | | | | |
| E Only | | | | | | | | | |
| H Only | | | | | | | | | |

## Maximum Moment Reactions

Note: Only non-zero reactions are listed.

| Load Combination | Moment About X-X Axis @ Base | @ Top | Moment About Y-Y Axis @ Base | @ Top |
|---|---|---|---|---|
| +D+H | k-ft | | k-ft | |
| +D+L+H | k-ft | | k-ft | |
| +D+Lr+H | k-ft | | k-ft | |
| +D+S+H | k-ft | | k-ft | |
| +D+0.750Lr+0.750L+H | k-ft | | k-ft | |
| +D+0.750L+0.750S+H | k-ft | | k-ft | |
| +D+0.60W+H | k-ft | | k-ft | |
| +D+0.750Lr+0.750L+0.450W+H | k-ft | | k-ft | |
| +D+0.750L+0.750S+0.450W+H | k-ft | | k-ft | |
| +0.60D+0.60W+0.60H | k-ft | | k-ft | |
| +D+0.70E+0.60H | k-ft | | k-ft | |
| +D+0.750L+0.750S+0.5250E+H | k-ft | | k-ft | |
| +0.60D+0.70E+H | k-ft | | k-ft | |
| D Only | k-ft | | k-ft | |
| Lr Only | k-ft | | k-ft | |
| L Only | k-ft | | k-ft | |
| S Only | k-ft | | k-ft | |
| W Only | k-ft | | k-ft | |
| E Only | k-ft | | k-ft | |
| H Only | k-ft | | k-ft | |

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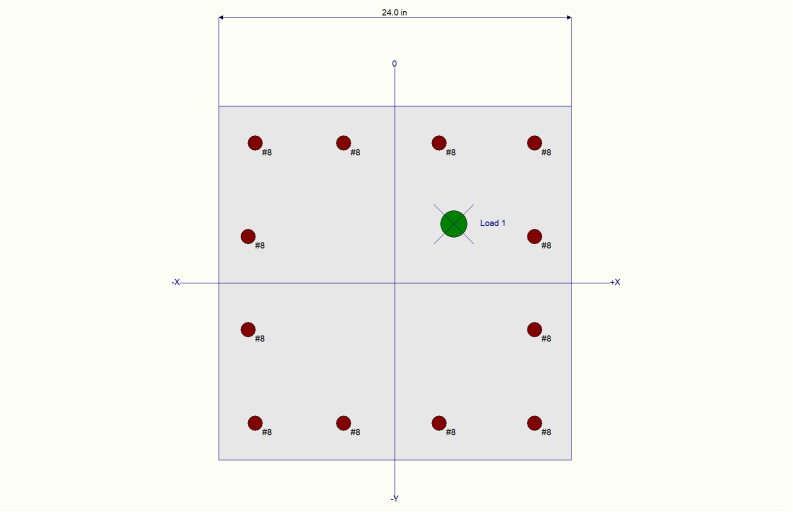

# Concrete Column

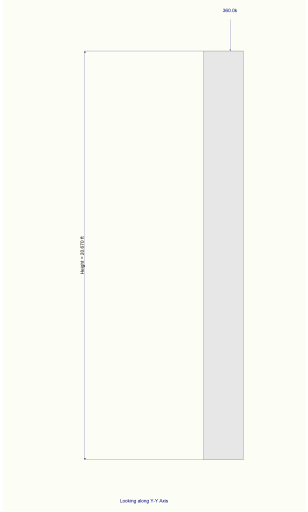
DESCRIPTION: Typical 24x24 - H=20.67' - Exterior - Area F

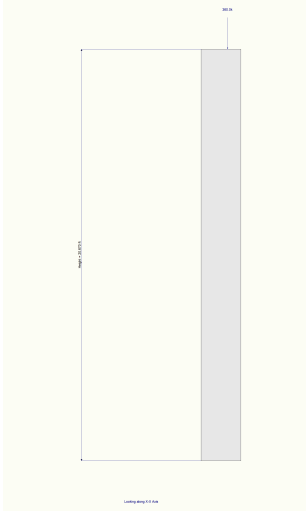
## Maximum Deflections for Load Combinations

| Load Combination | Max. X-X Deflection | | Distance | | Max. Y-Y Deflection | | Distance | |
|---|---|---|---|---|---|---|---|---|
| +D+H | -0.0434 | in | 12.069 | ft | -0.043 | in | 12.069 | ft |
| +D+L+H | -0.0664 | in | 12.069 | ft | -0.066 | in | 12.069 | ft |
| +D+Lr+H | -0.0434 | in | 12.069 | ft | -0.043 | in | 12.069 | ft |
| +D+S+H | -0.0434 | in | 12.069 | ft | -0.043 | in | 12.069 | ft |
| +D+0.750Lr+0.750L+H | -0.0606 | in | 12.069 | ft | -0.061 | in | 12.069 | ft |
| +D+0.750L+0.750S+H | -0.0606 | in | 12.069 | ft | -0.061 | in | 12.069 | ft |
| +D+0.60W+H | -0.0434 | in | 12.069 | ft | -0.043 | in | 12.069 | ft |
| +D+0.750Lr+0.750L+0.450W+H | -0.0606 | in | 12.069 | ft | -0.061 | in | 12.069 | ft |
| +D+0.750L+0.750S+0.450W+H | -0.0606 | in | 12.069 | ft | -0.061 | in | 12.069 | ft |
| +0.60D+0.60W+0.60H | -0.0260 | in | 12.069 | ft | -0.026 | in | 12.069 | ft |
| +D+0.70E+0.60H | -0.0434 | in | 12.069 | ft | -0.043 | in | 12.069 | ft |
| +D+0.750L+0.750S+0.5250E+H | -0.0606 | in | 12.069 | ft | -0.061 | in | 12.069 | ft |
| +0.60D+0.70E+H | -0.0260 | in | 12.069 | ft | -0.026 | in | 12.069 | ft |
| D Only | -0.0434 | in | 12.069 | ft | -0.043 | in | 12.069 | ft |
| Lr Only | 0.0000 | in | 0.000 | ft | 0.000 | in | 0.000 | ft |
| L Only | -0.0231 | in | 12.069 | ft | -0.023 | in | 12.069 | ft |
| S Only | 0.0000 | in | 0.000 | ft | 0.000 | in | 0.000 | ft |
| W Only | 0.0000 | in | 0.000 | ft | 0.000 | in | 0.000 | ft |
| E Only | 0.0000 | in | 0.000 | ft | 0.000 | in | 0.000 | ft |
| H Only | 0.0000 | in | 0.000 | ft | 0.000 | in | 0.000 | ft |

## Sketches



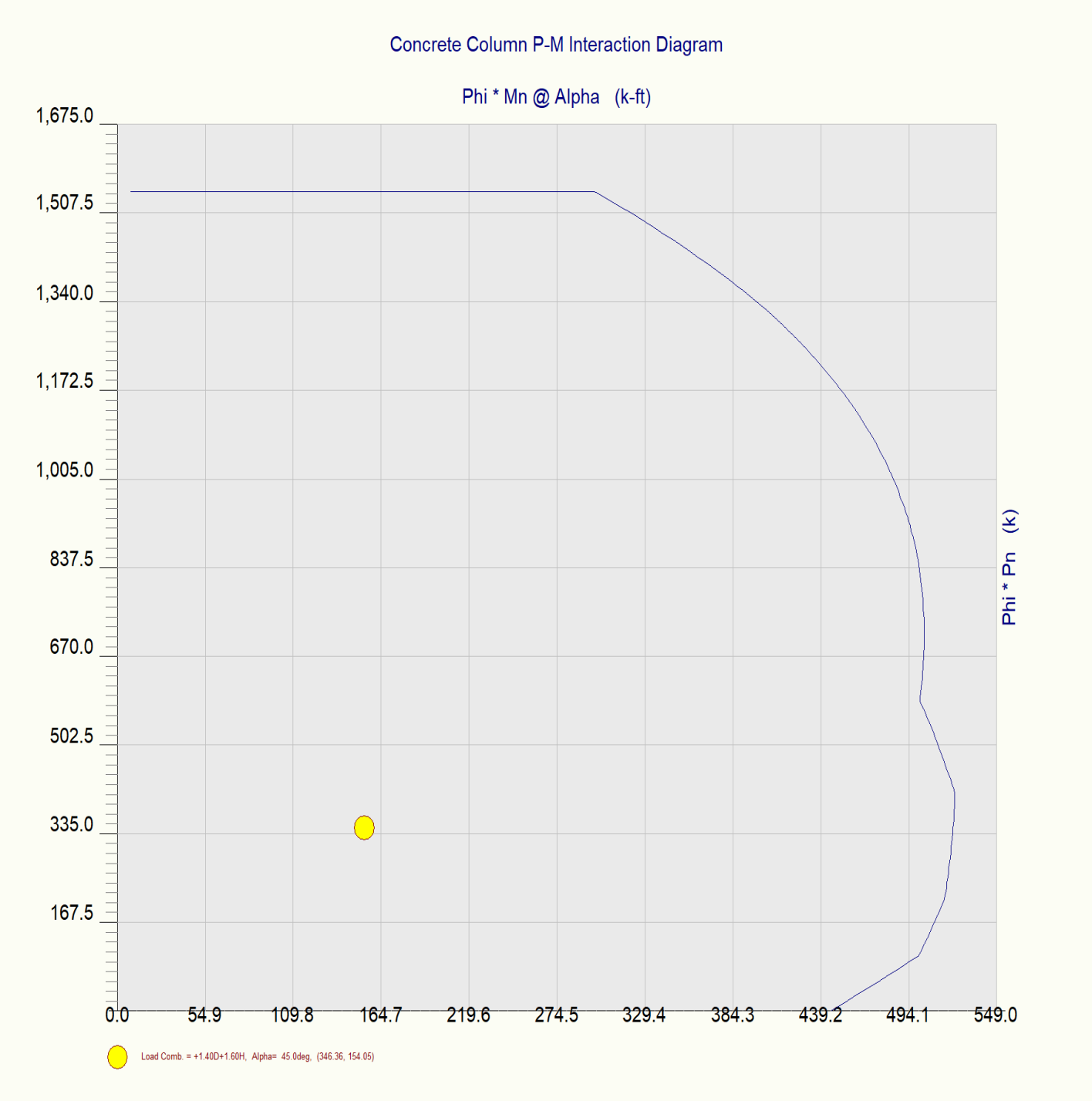


## Interaction Diagrams

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# Concrete Column

DESCRIPTION: Typical 24x24 - H=20.67' - Exterior - Area F

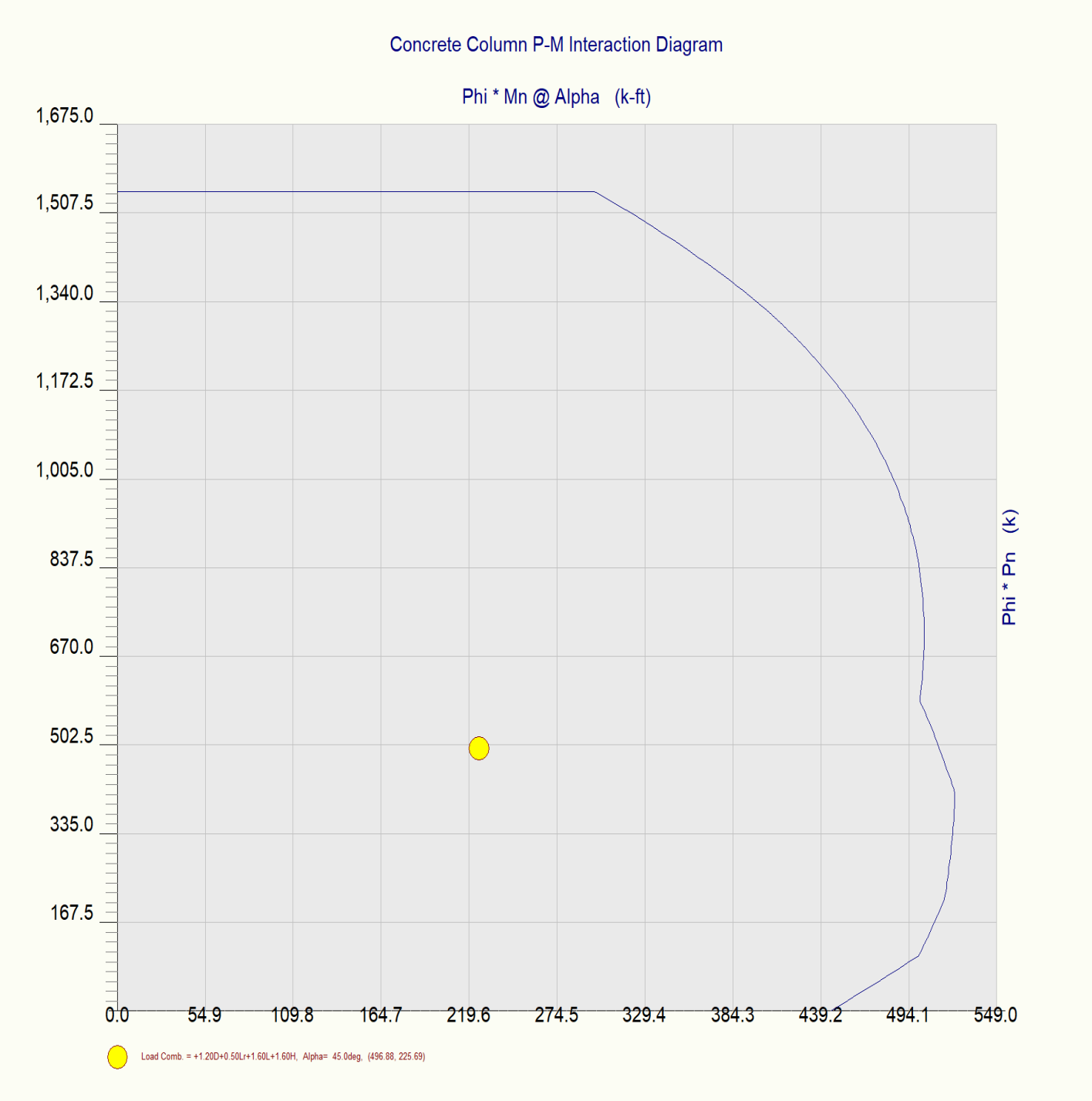


# Concrete Column

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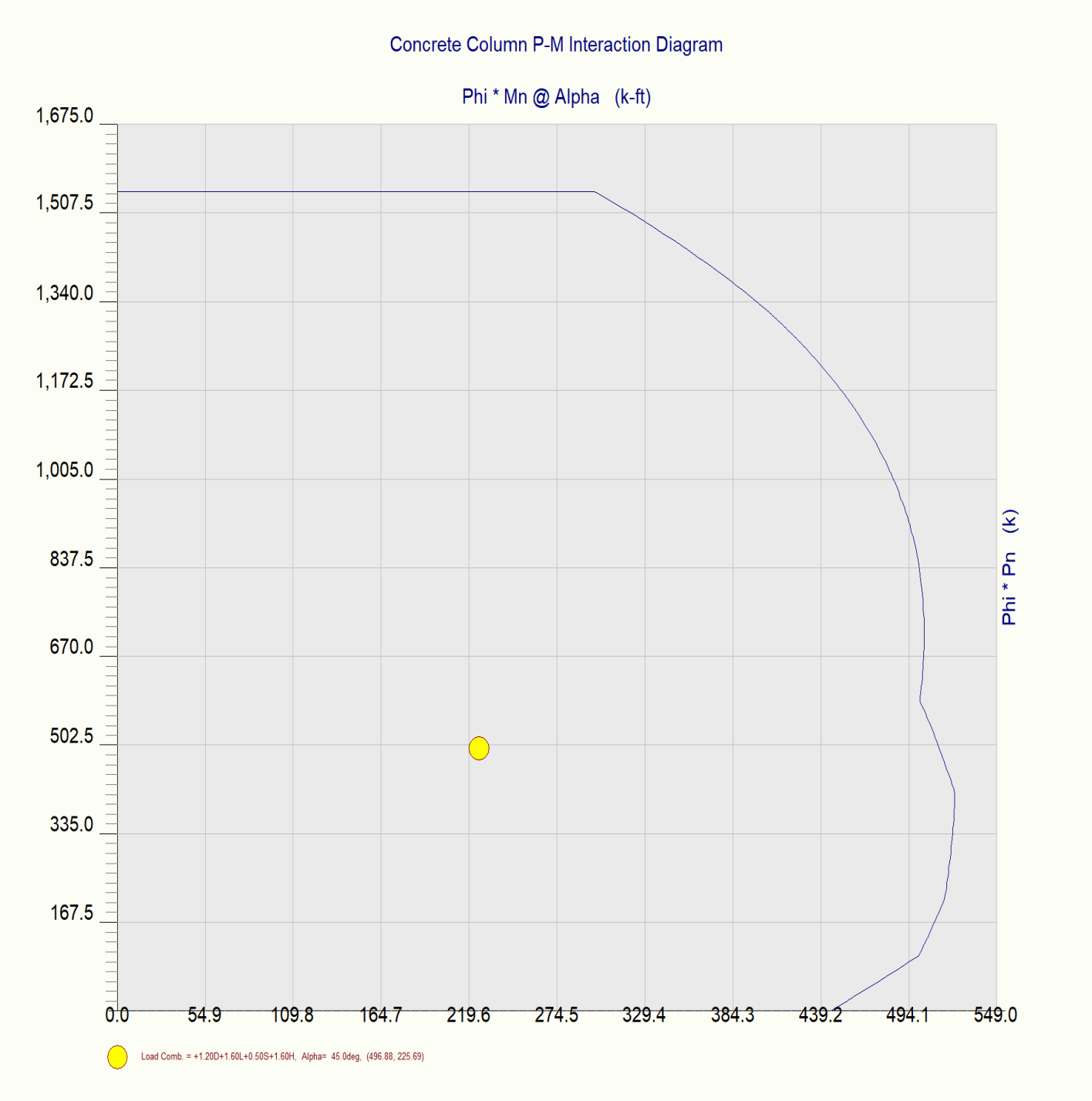
DESCRIPTION: Typical 24x24 - H=20.67' - Exterior - Area F



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# Concrete Column

DESCRIPTION: Typical 24x24 - H=20.67' - Exterior - Area F

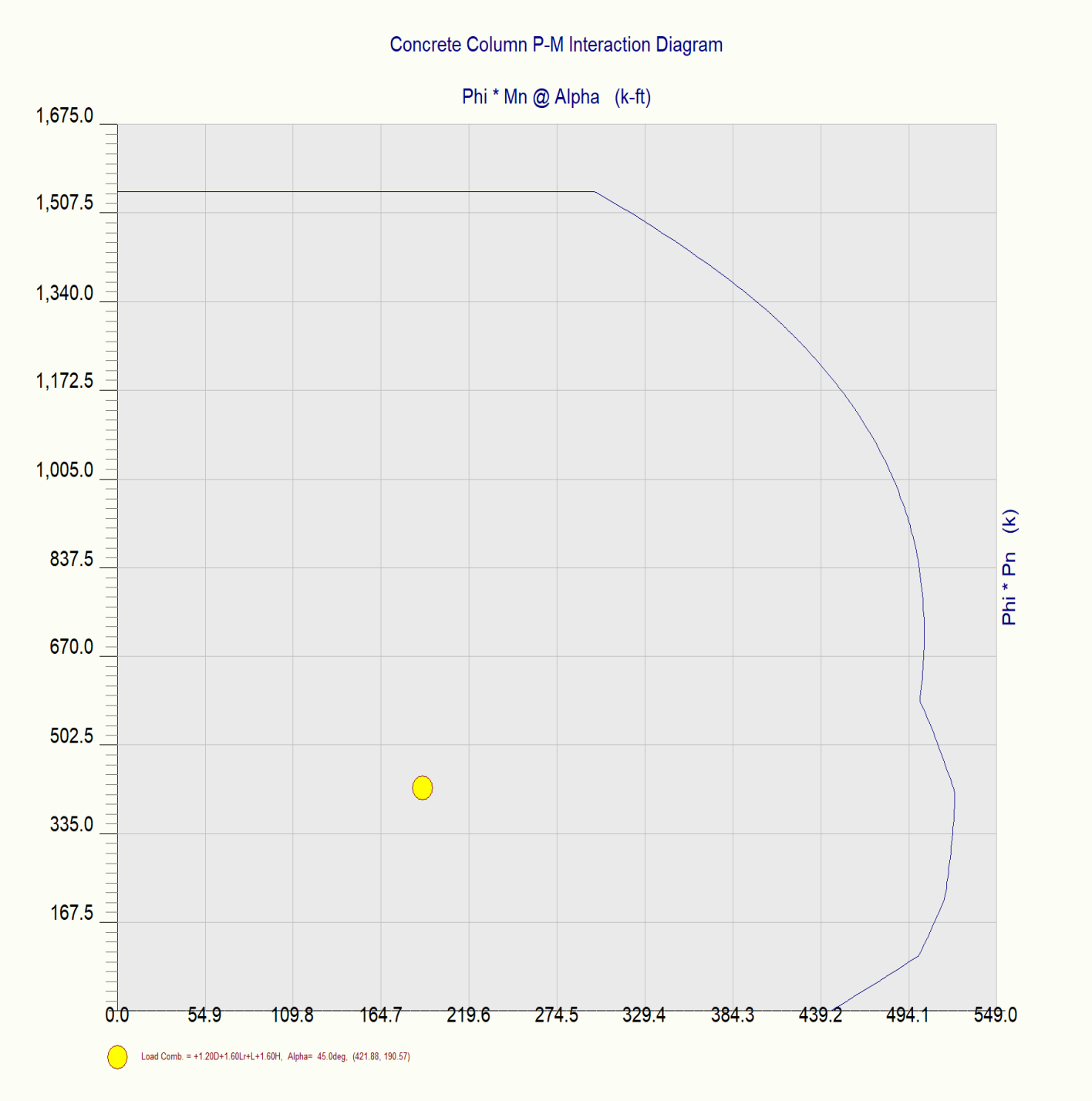


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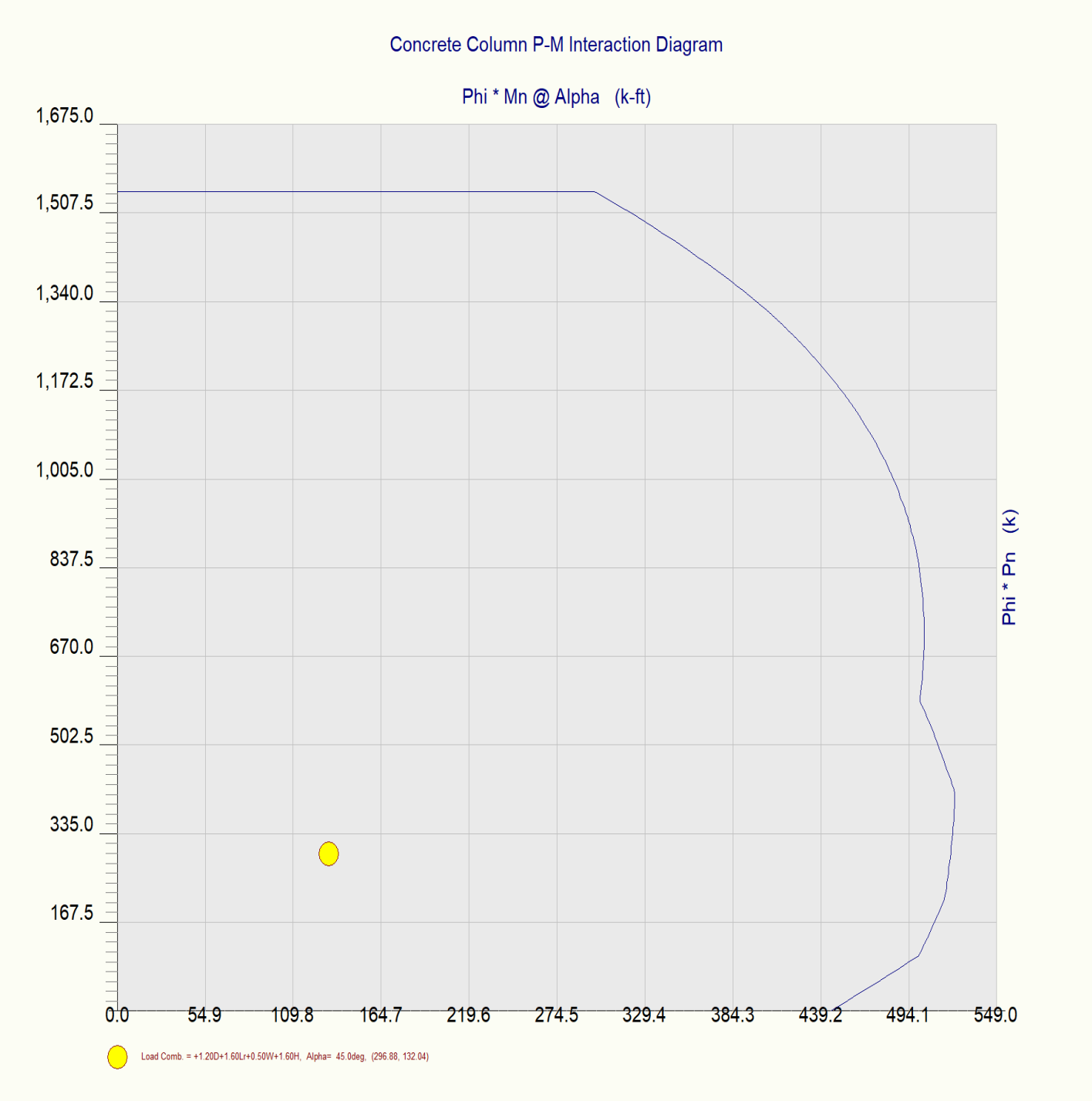
DESCRIPTION: Typical 24x24 - H=20.67' - Exterior - Area F



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# Concrete Column

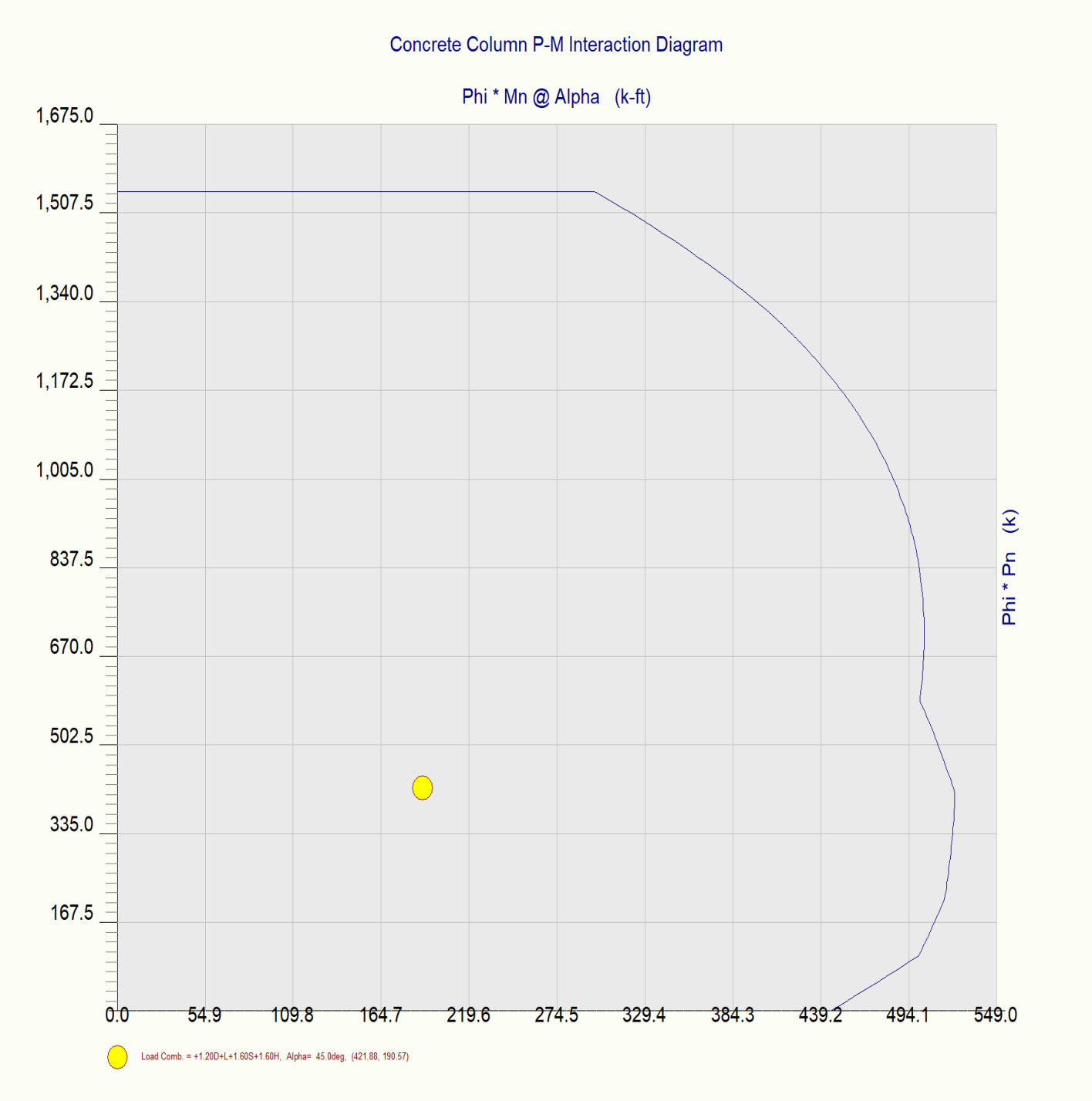
DESCRIPTION: Typical 24x24 - H=20.67' - Exterior - Area F



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# Concrete Column

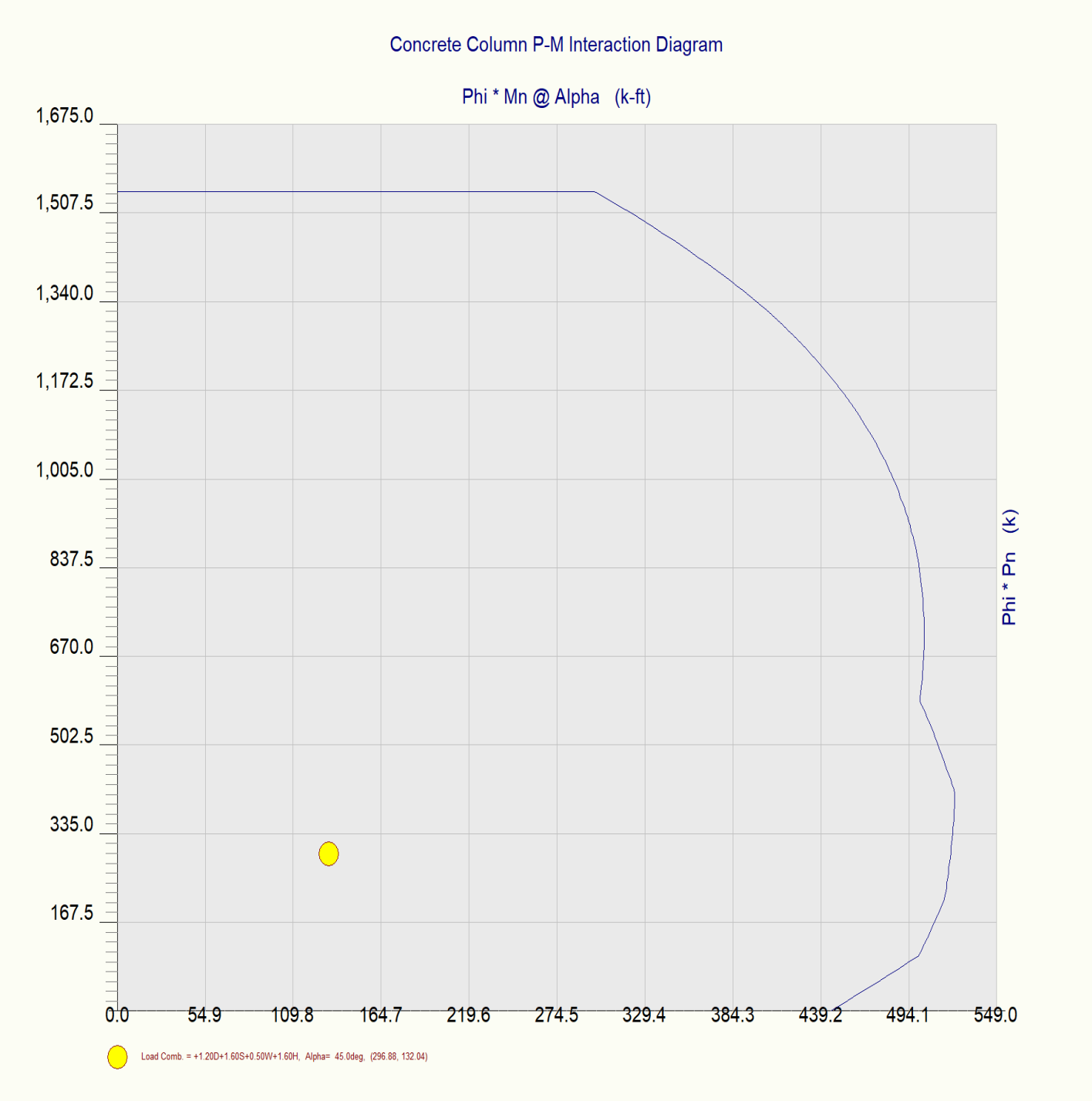
DESCRIPTION: Typical 24x24 - H=20.67' - Exterior - Area F



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DESCRIPTION: Typical 24x24 - H=20.67' - Exterior - Area F

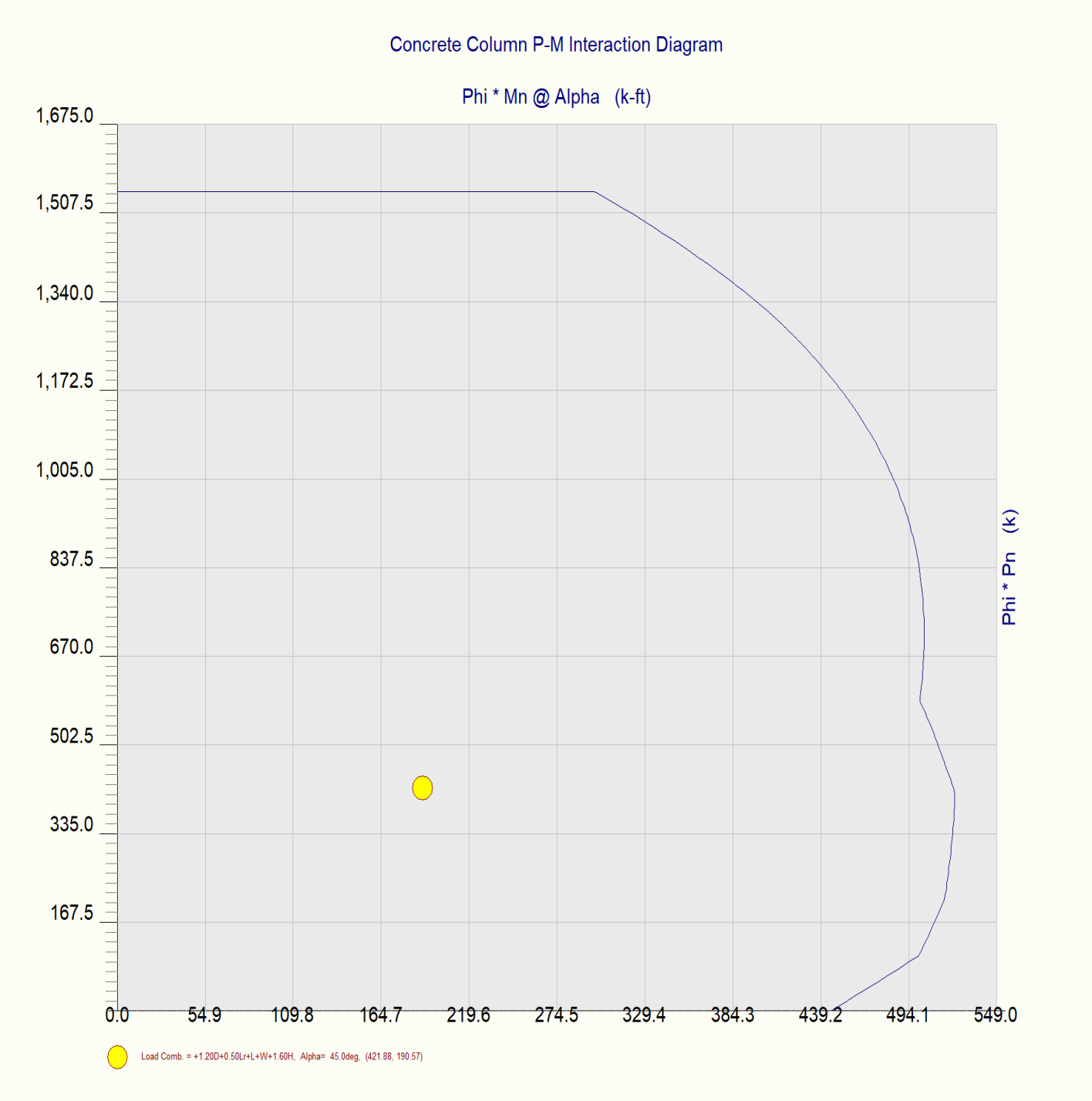


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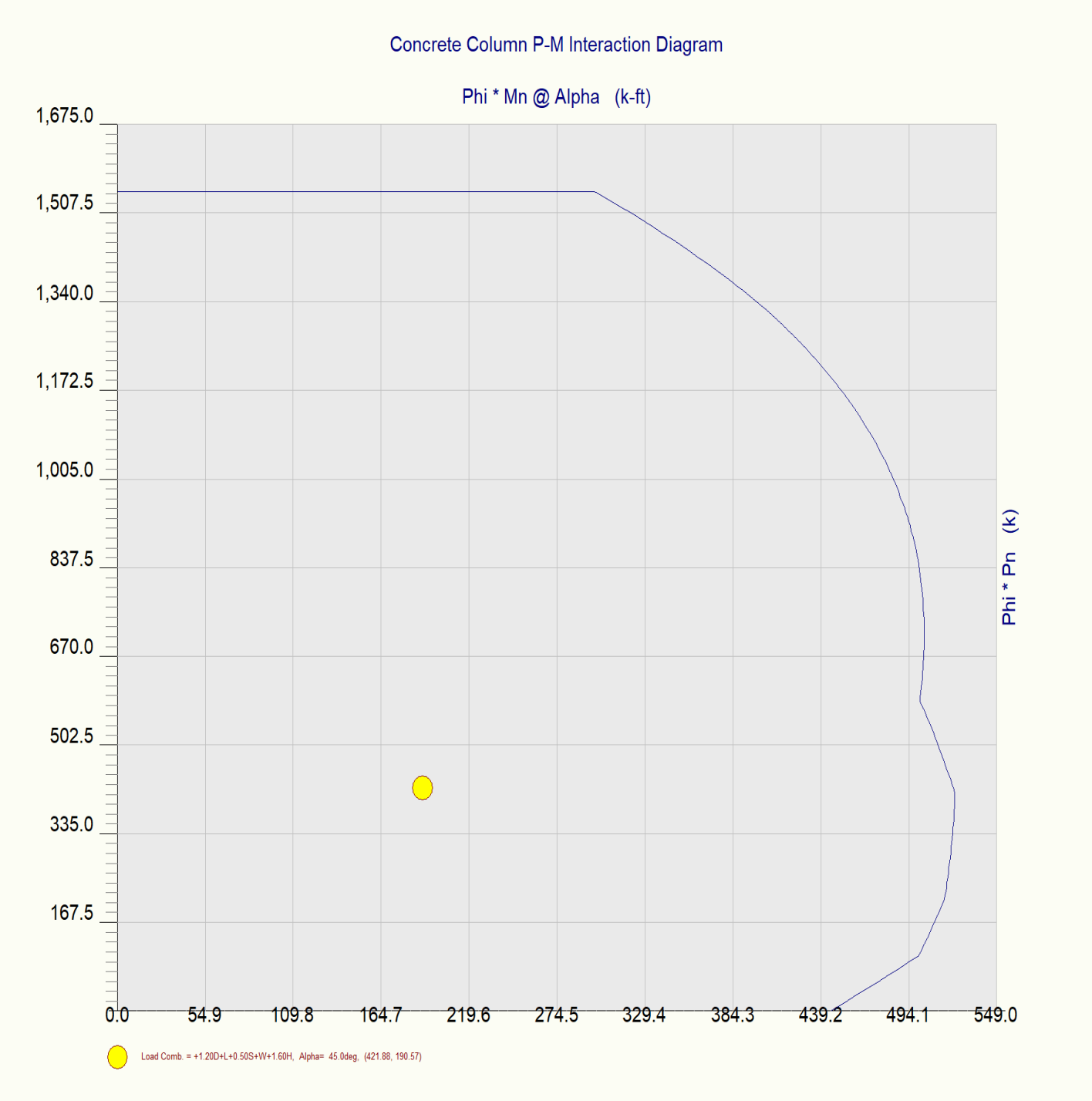
DESCRIPTION: Typical 24x24 - H=20.67' - Exterior - Area F



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# Concrete Column

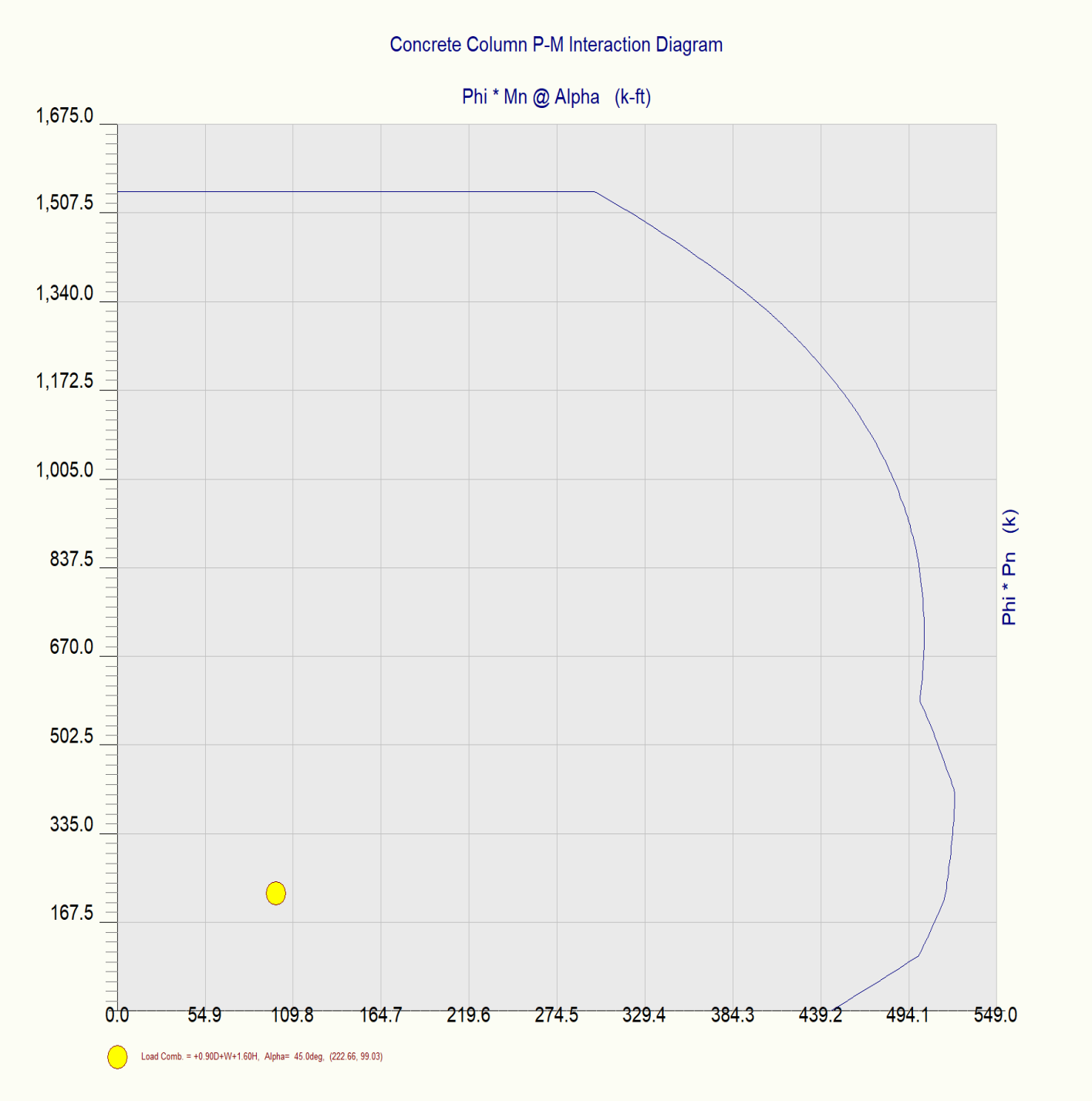
DESCRIPTION: Typical 24x24 - H=20.67' - Exterior - Area F



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# Concrete Column

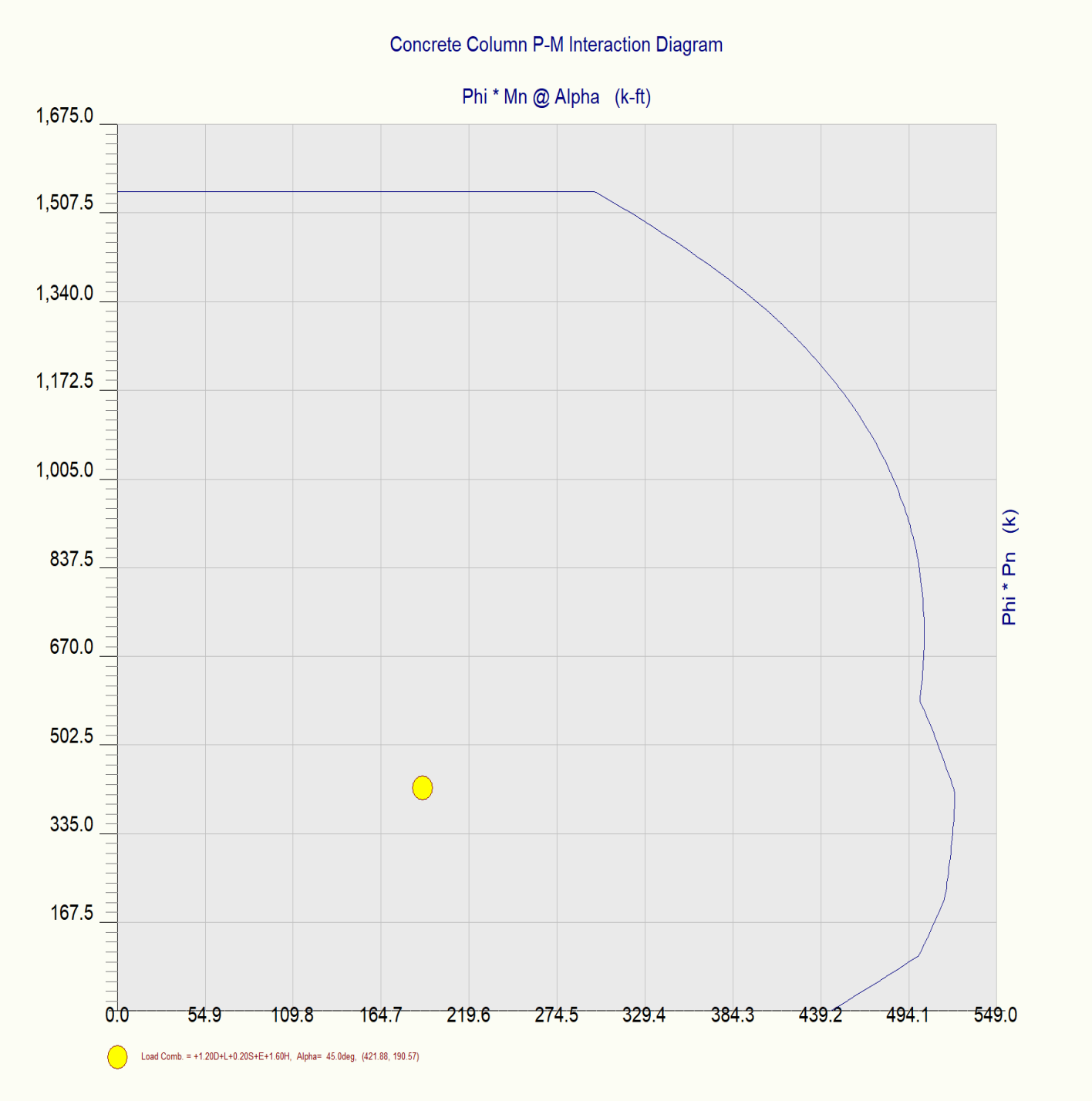
DESCRIPTION: Typical 24x24 - H=20.67' - Exterior - Area F



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# Concrete Column

DESCRIPTION: Typical 24x24 - H=20.67' - Exterior - Area F

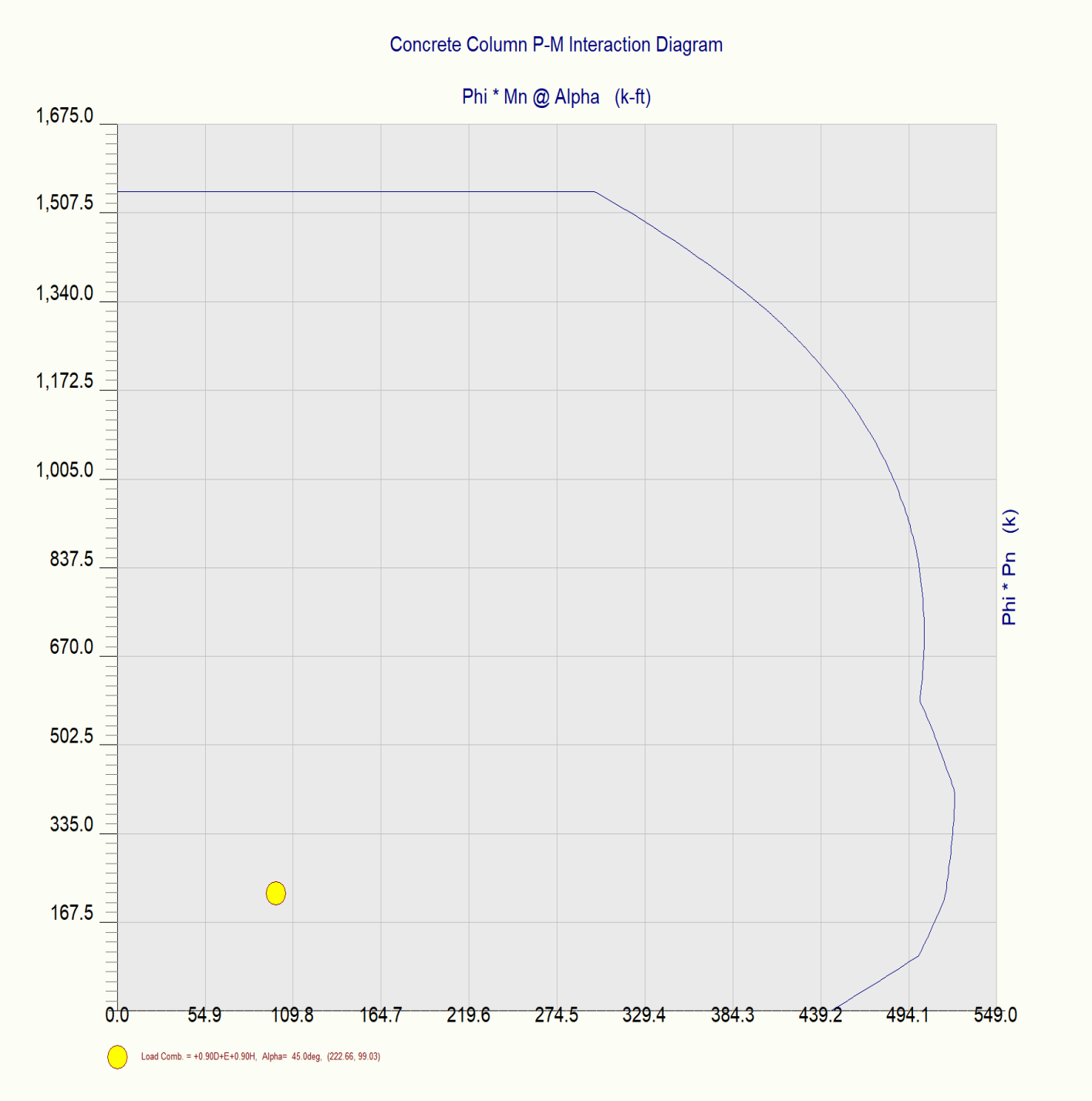


# Concrete Column

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Bob D. Campbell and Co., Inc.

DESCRIPTION: Typical 24x24 - H=20.67' - Exterior - Area F



Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 27 JAN 2022, 6:01PM

# Concrete Column

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DESCRIPTION: Grid 16/B1 Beam Bearing on 8"x32" Wall Column

## Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

## General Information

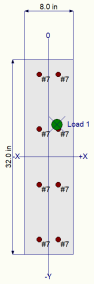
| | | |
|---|---|---|
| f'c : Concrete 28 day strength | = | 5.0 ksi |
| E = | = | 3,122.0 ksi |
| Density | = | 150.0 pcf |
| β | = | 0.80 |
| fy - Main Rebar | = | 60.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi |
| Allow. Reinforcing Limits | | *ASTM A615 Bars Used* |
| Min. Reinf. | = | 1.0 % |
| Max. Reinf. | = | 8.0 % |

Overall Column Height = 15.670 ft
End Fixity Top & Bottom Pinned
Brace condition for deflection (buckling) along columns :
X-X (width) axis :
Unbraced Length for buckling ABOUT Y-Y Axis = 15.67 ft, K = 1.0
Y-Y (depth) axis :
Unbraced Length for buckling ABOUT X-X Axis = 15.67 ft, K = 1.0

## Column Cross Section

Column Dimensions : 32.0in high x 8.0in Wide, Column Edge to Rebar Edge Cover = 2.0in

Column Reinforcing : 4 - #7 bars @ corners,, 2 - #7 bars left & right between corner bars




## Applied Loads

Entered loads are factored per load combinations specified by user.

Column self weight included : 4,178.67 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 15.670 ft above base, Xecc = 1.330in, Yecc = 5.330in, D = 15.0, L = 30.0 k

## *DESIGN SUMMARY*

Load Combination +1.20D+0.50Lr+1.60L+1.60H
Location of max.above base 15.565 ft

**Maximum Stress Ratio 0.118 : 1**
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5

| | | | |
|---|---|---|---|
| Pu = | 71.014 k | φ * Pn = | 595.87 k |
| Mu-x = | -29.118 k-ft | φ * Mn-x = | -252.319 k-ft |
| Mu-y = | -7.266 k-ft | φ * Mn-y = | 2.780 k-ft |
| Mu Angle = | 14.0 deg | | |
| Mu at Angle = | 30.011 k-ft | φMn at Angle = | 253.562 k-ft |

*Pn & Mn values located at Pu-Mu vector intersection with capacity curve*

Column Capacities . . .

| | |
|---|---|
| Pnmax : Nominal Max. Compressive Axial Capacity | 1,355.60 k |
| Pnmin : Nominal Min. Tension Axial Capacity | k |
| φ Pn, max : Usable Compressive Axial Capacity | 704.91 k |
| φ Pn, min : Usable Tension Axial Capacity | k |

Maximum SERVICE Load Reactions . .

| | | | |
|---|---|---|---|
| Top along Y-Y | 0.3183 k | Bottom along Y-Y | 0.3183 k |
| Top along X-X | 1.276 k | Bottom along X-X | 1.276 k |

Maximum SERVICE Load Deflections . . .
Along Y-Y -0.008046 in at 9.150 ft above base
for load combination : +D+L+H
Along X-X -0.03213 in at 9.150 ft above base
for load combination : +D+L+H

General Section Information . φ = 0.650 β = 0.80 θ = 0.80
ρ : % Reinforcing 1.875 % Rebar % Ok
Reinforcing Area 4.80 in^2
Concrete Area 256.0 in^2

## Governing Load Combination Results

| Governing Factored Load Combination | Moment X-X | Moment Y-Y | Dist. from base ft | Axial Load k Pu | φ * Pn | Bending Analysis k-ft δx | δx * Mux | δy | δy * Muy | Alpha (deg) | δ Mu | φ Mn | Utilization Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.40D+1.60H | Actual | Actual | 15.56 | 26.85 | 638.77 | 1.000 | -9.26 | 1.000 | -2.31 | 14.000 | 9.55 | 227.07 | 0.042 |
| +1.20D+0.50Lr+1.60L+1.60H | Actual | Actual | 15.56 | 71.01 | 595.87 | 1.000 | -29.12 | 1.000 | -7.27 | 14.000 | 30.01 | 253.56 | 0.118 |
| +1.20D+1.60L+0.50S+1.60H | Actual | Actual | 15.56 | 71.01 | 595.87 | 1.000 | -29.12 | 1.000 | -7.27 | 14.000 | 30.01 | 253.56 | 0.118 |

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# Concrete Column



DESCRIPTION: Grid 16/B1 Beam Bearing on 8"x32" Wall Column

## Governing Load Combination Results

| Governing Factored Load Combination | Moment X-X | Moment Y-Y | Dist. from base ft | Axial Load k Pu | φ * Pn | Bending Analysis k-ft δx | δx * Mux | δy | δy * Muy | Alpha (deg) | δ Mu | φ Mn | Utilization Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60Lr+L+1.60H | Actual | Actual | 15.56 | 53.01 | 604.36 | 1.000 | -21.18 | 1.000 | -5.28 | 14.000 | 21.83 | 248.67 | 0.088 |
| +1.20D+1.60Lr+0.50W+1.60H | Actual | Actual | 15.56 | 23.01 | 638.77 | 1.000 | -7.94 | 1.000 | -1.98 | 14.000 | 8.18 | 227.07 | 0.036 |
| +1.20D+L+1.60S+1.60H | Actual | Actual | 15.56 | 53.01 | 604.36 | 1.000 | -21.18 | 1.000 | -5.28 | 14.000 | 21.83 | 248.67 | 0.088 |
| +1.20D+1.60S+0.50W+1.60H | Actual | Actual | 15.56 | 23.01 | 638.77 | 1.000 | -7.94 | 1.000 | -1.98 | 14.000 | 8.18 | 227.07 | 0.036 |
| +1.20D+0.50Lr+L+W+1.60H | Actual | Actual | 15.56 | 53.01 | 604.36 | 1.000 | -21.18 | 1.000 | -5.28 | 14.000 | 21.83 | 248.67 | 0.088 |
| +1.20D+L+0.50S+W+1.60H | Actual | Actual | 15.56 | 53.01 | 604.36 | 1.000 | -21.18 | 1.000 | -5.28 | 14.000 | 21.83 | 248.67 | 0.088 |
| +0.90D+W+1.60H | Actual | Actual | 15.56 | 17.26 | 638.77 | 1.000 | -5.96 | 1.000 | -1.49 | 14.000 | 6.14 | 227.07 | 0.027 |
| +1.20D+L+0.20S+E+1.60H | Actual | Actual | 15.56 | 53.01 | 604.36 | 1.000 | -21.18 | 1.000 | -5.28 | 14.000 | 21.83 | 248.67 | 0.088 |
| +0.90D+E+0.90H | Actual | Actual | 15.56 | 17.26 | 638.77 | 1.000 | -5.96 | 1.000 | -1.49 | 14.000 | 6.14 | 227.07 | 0.027 |

## Maximum Reactions

Note: Only non-zero reactions are listed.

| Load Combination | X-X Axis Reaction k @ Base | @ Top | Y-Y Axis Reaction @ Base | @ Top | Axial Reaction @ Base | My - End Moments k-ft @ Base | @ Top | Mx - End Moments @ Base | @ Top |
|---|---|---|---|---|---|---|---|---|---|
| +D+H | 0.106 | 0.106 | 0.425 | 0.425 | 19.179 | | | | |
| +D+L+H | 0.318 | 0.318 | 1.276 | 1.276 | 49.179 | | | | |
| +D+Lr+H | 0.106 | 0.106 | 0.425 | 0.425 | 19.179 | | | | |
| +D+S+H | 0.106 | 0.106 | 0.425 | 0.425 | 19.179 | | | | |
| +D+0.750Lr+0.750L+H | 0.265 | 0.265 | 1.063 | 1.063 | 41.679 | | | | |
| +D+0.750L+0.750S+H | 0.265 | 0.265 | 1.063 | 1.063 | 41.679 | | | | |
| +D+0.60W+H | 0.106 | 0.106 | 0.425 | 0.425 | 19.179 | | | | |
| +D+0.750Lr+0.750L+0.450W+H | 0.265 | 0.265 | 1.063 | 1.063 | 41.679 | | | | |
| +D+0.750L+0.750S+0.450W+H | 0.265 | 0.265 | 1.063 | 1.063 | 41.679 | | | | |
| +0.60D+0.60W+0.60H | 0.064 | 0.064 | 0.255 | 0.255 | 11.507 | | | | |
| +D+0.70E+0.60H | 0.106 | 0.106 | 0.425 | 0.425 | 19.179 | | | | |
| +D+0.750L+0.750S+0.5250E+H | 0.265 | 0.265 | 1.063 | 1.063 | 41.679 | | | | |
| +0.60D+0.70E+H | 0.064 | 0.064 | 0.255 | 0.255 | 11.507 | | | | |
| D Only | 0.106 | 0.106 | 0.425 | 0.425 | 19.179 | | | | |
| Lr Only | | | | | | | | | |
| L Only | 0.212 | 0.212 | 0.850 | 0.850 | 30.000 | | | | |
| S Only | | | | | | | | | |
| W Only | | | | | | | | | |
| E Only | | | | | | | | | |
| H Only | | | | | | | | | |

## Maximum Moment Reactions

Note: Only non-zero reactions are listed.

| Load Combination | Moment About X-X Axis @ Base | @ Top | Moment About Y-Y Axis @ Base | @ Top |
|---|---|---|---|---|
| +D+H | k-ft | | k-ft | |
| +D+L+H | k-ft | | k-ft | |
| +D+Lr+H | k-ft | | k-ft | |
| +D+S+H | k-ft | | k-ft | |
| +D+0.750Lr+0.750L+H | k-ft | | k-ft | |
| +D+0.750L+0.750S+H | k-ft | | k-ft | |
| +D+0.60W+H | k-ft | | k-ft | |
| +D+0.750Lr+0.750L+0.450W+H | k-ft | | k-ft | |
| +D+0.750L+0.750S+0.450W+H | k-ft | | k-ft | |
| +0.60D+0.60W+0.60H | k-ft | | k-ft | |
| +D+0.70E+0.60H | k-ft | | k-ft | |
| +D+0.750L+0.750S+0.5250E+H | k-ft | | k-ft | |
| +0.60D+0.70E+H | k-ft | | k-ft | |
| D Only | k-ft | | k-ft | |
| Lr Only | k-ft | | k-ft | |
| L Only | k-ft | | k-ft | |
| S Only | k-ft | | k-ft | |
| W Only | k-ft | | k-ft | |
| E Only | k-ft | | k-ft | |
| H Only | k-ft | | k-ft | |

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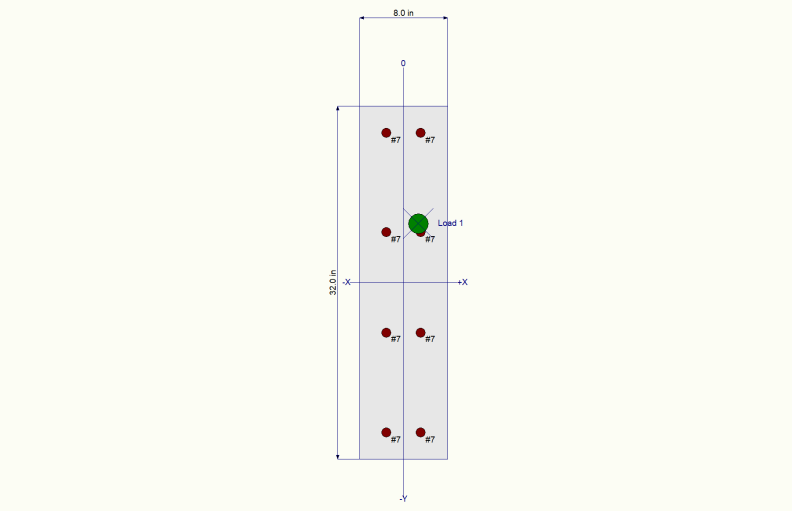

# Concrete Column

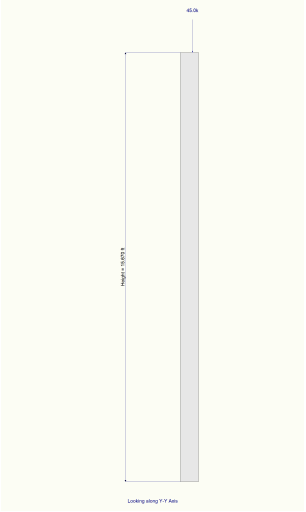
DESCRIPTION: Grid 16/B1 Beam Bearing on 8"x32" Wall Column

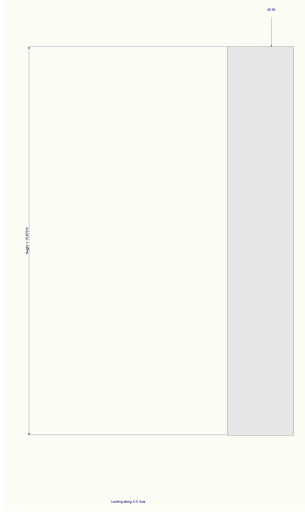
## Maximum Deflections for Load Combinations

| Load Combination | Max. X-X Deflection | | Distance | | Max. Y-Y Deflection | | Distance | |
|---|---|---|---|---|---|---|---|---|
| +D+H | -0.0107 | in | 9.150 | ft | -0.003 | in | 9.150 | ft |
| +D+L+H | -0.0321 | in | 9.150 | ft | -0.008 | in | 9.150 | ft |
| +D+Lr+H | -0.0107 | in | 9.150 | ft | -0.003 | in | 9.150 | ft |
| +D+S+H | -0.0107 | in | 9.150 | ft | -0.003 | in | 9.150 | ft |
| +D+0.750Lr+0.750L+H | -0.0268 | in | 9.150 | ft | -0.007 | in | 9.150 | ft |
| +D+0.750L+0.750S+H | -0.0268 | in | 9.150 | ft | -0.007 | in | 9.150 | ft |
| +D+0.60W+H | -0.0107 | in | 9.150 | ft | -0.003 | in | 9.150 | ft |
| +D+0.750Lr+0.750L+0.450W+H | -0.0268 | in | 9.150 | ft | -0.007 | in | 9.150 | ft |
| +D+0.750L+0.750S+0.450W+H | -0.0268 | in | 9.150 | ft | -0.007 | in | 9.150 | ft |
| +0.60D+0.60W+0.60H | -0.0064 | in | 9.150 | ft | -0.002 | in | 9.150 | ft |
| +D+0.70E+0.60H | -0.0107 | in | 9.150 | ft | -0.003 | in | 9.150 | ft |
| +D+0.750L+0.750S+0.5250E+H | -0.0268 | in | 9.150 | ft | -0.007 | in | 9.150 | ft |
| +0.60D+0.70E+H | -0.0064 | in | 9.150 | ft | -0.002 | in | 9.150 | ft |
| D Only | -0.0107 | in | 9.150 | ft | -0.003 | in | 9.150 | ft |
| Lr Only | 0.0000 | in | 0.000 | ft | 0.000 | in | 0.000 | ft |
| L Only | -0.0214 | in | 9.150 | ft | -0.005 | in | 9.150 | ft |
| S Only | 0.0000 | in | 0.000 | ft | 0.000 | in | 0.000 | ft |
| W Only | 0.0000 | in | 0.000 | ft | 0.000 | in | 0.000 | ft |
| E Only | 0.0000 | in | 0.000 | ft | 0.000 | in | 0.000 | ft |
| H Only | 0.0000 | in | 0.000 | ft | 0.000 | in | 0.000 | ft |

## Sketches



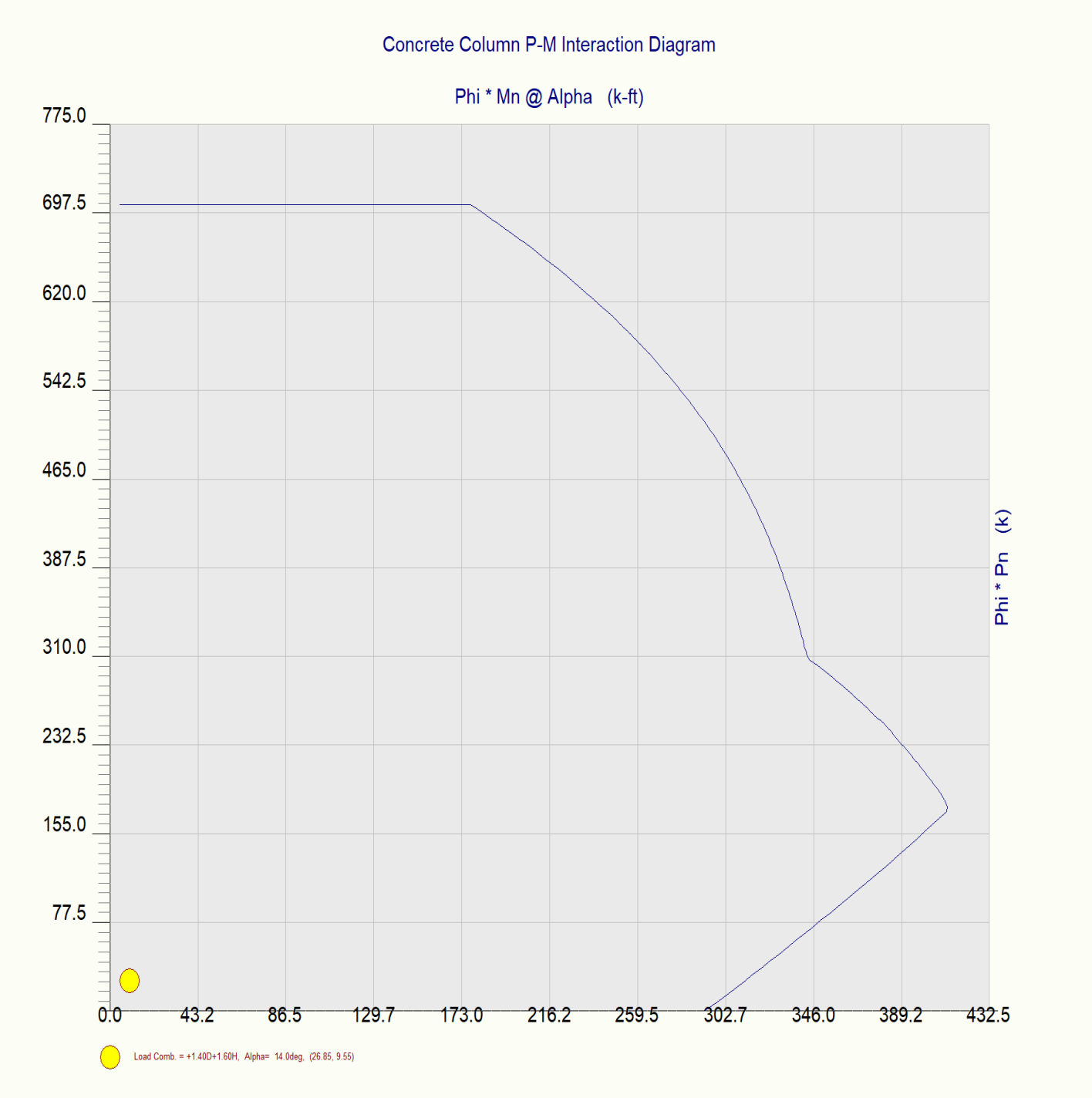


## Interaction Diagrams

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# Concrete Column

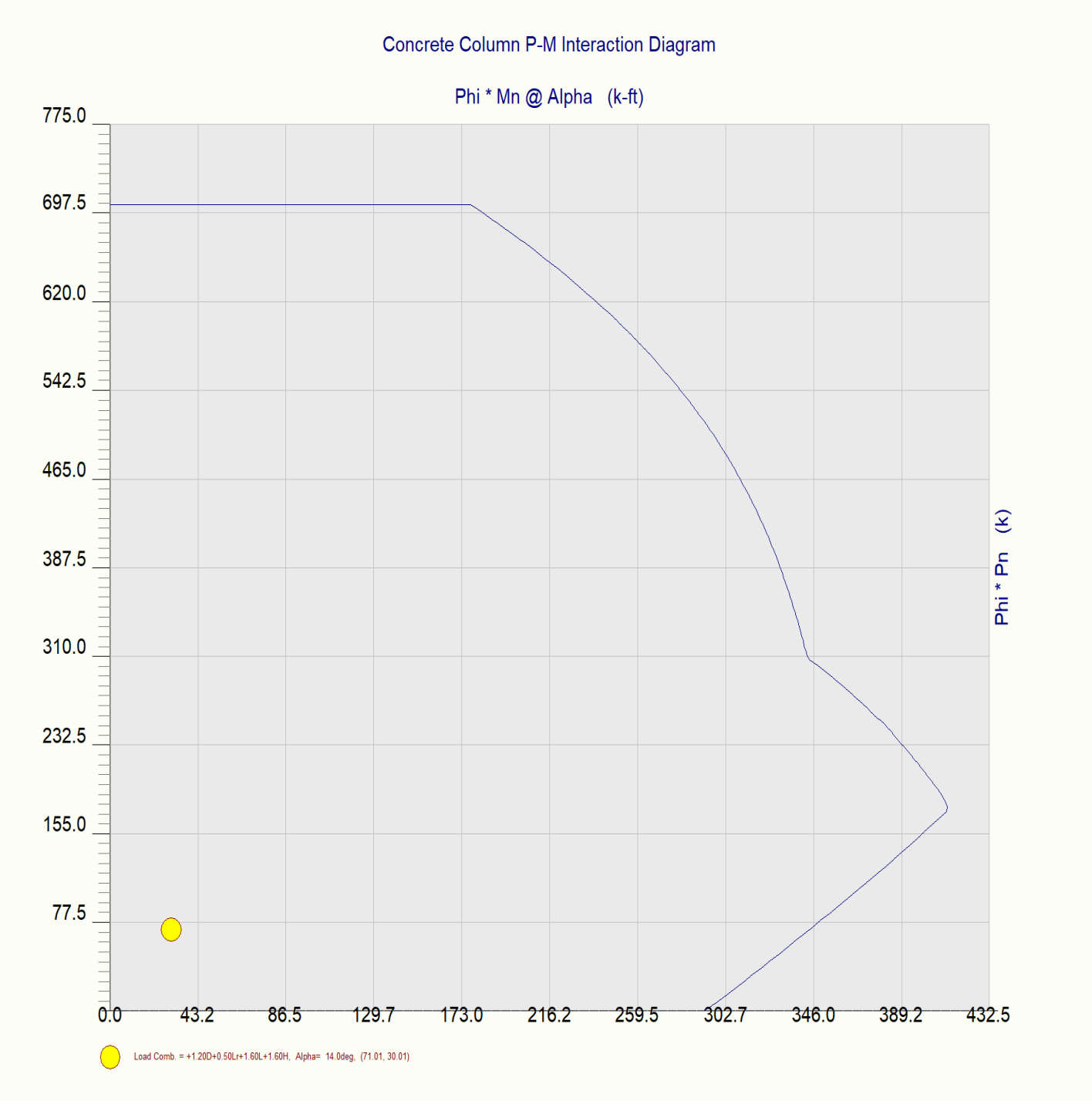
DESCRIPTION: Grid 16/B1 Beam Bearing on 8"x32" Wall Column



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# Concrete Column

DESCRIPTION: Grid 16/B1 Beam Bearing on 8"x32" Wall Column

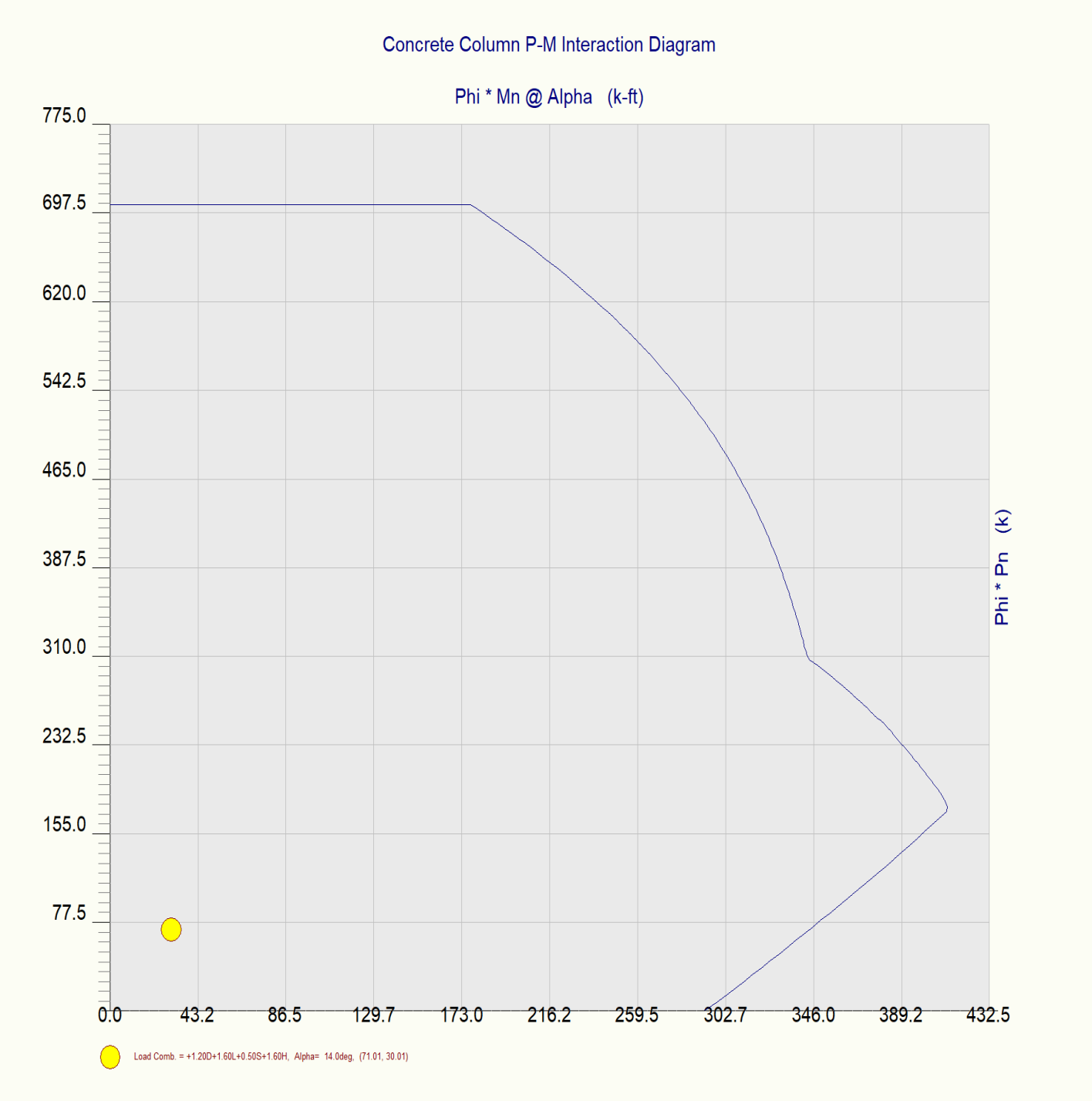


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DESCRIPTION: Grid 16/B1 Beam Bearing on 8"x32" Wall Column

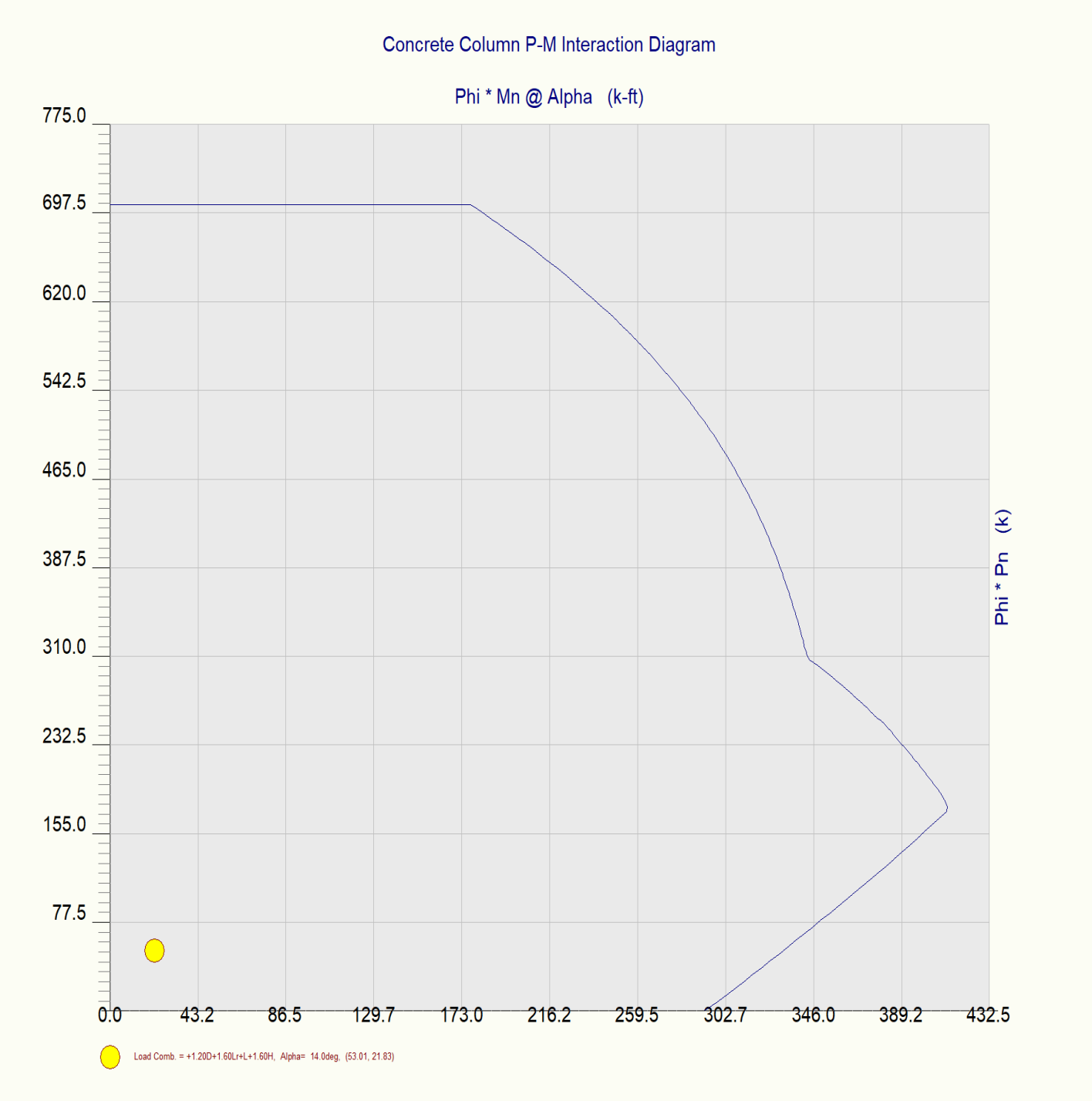


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DESCRIPTION: Grid 16/B1 Beam Bearing on 8"x32" Wall Column

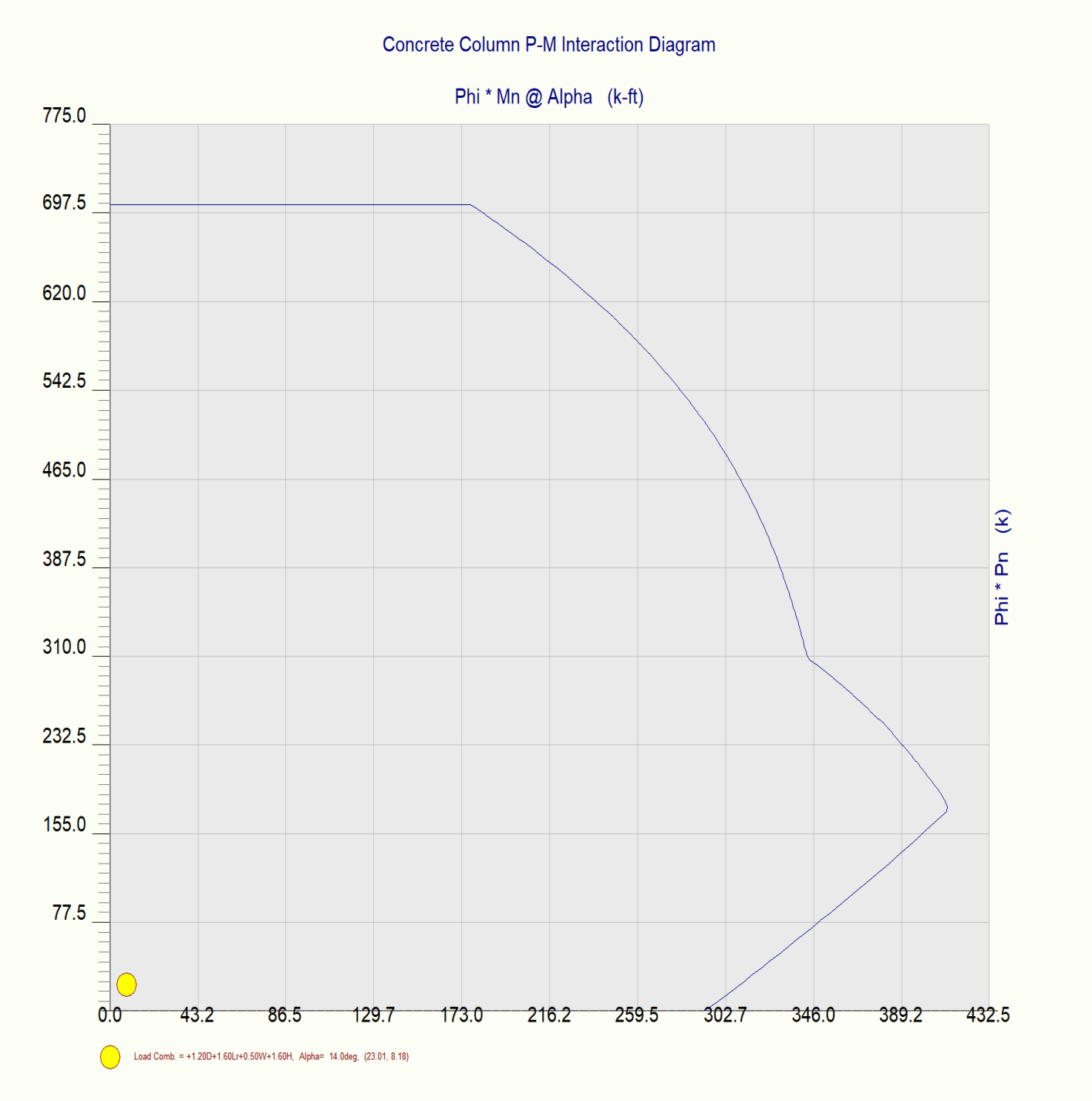


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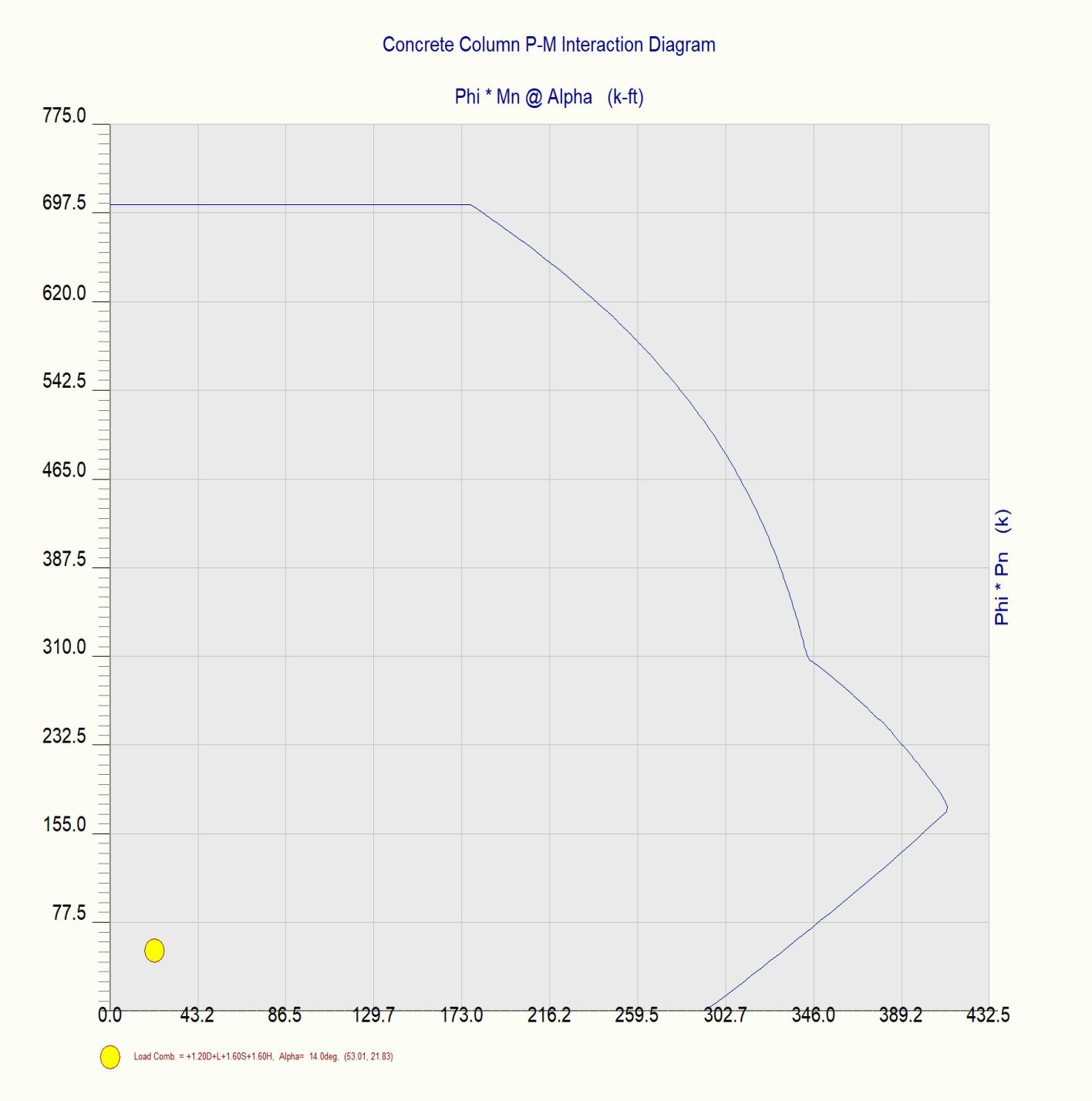


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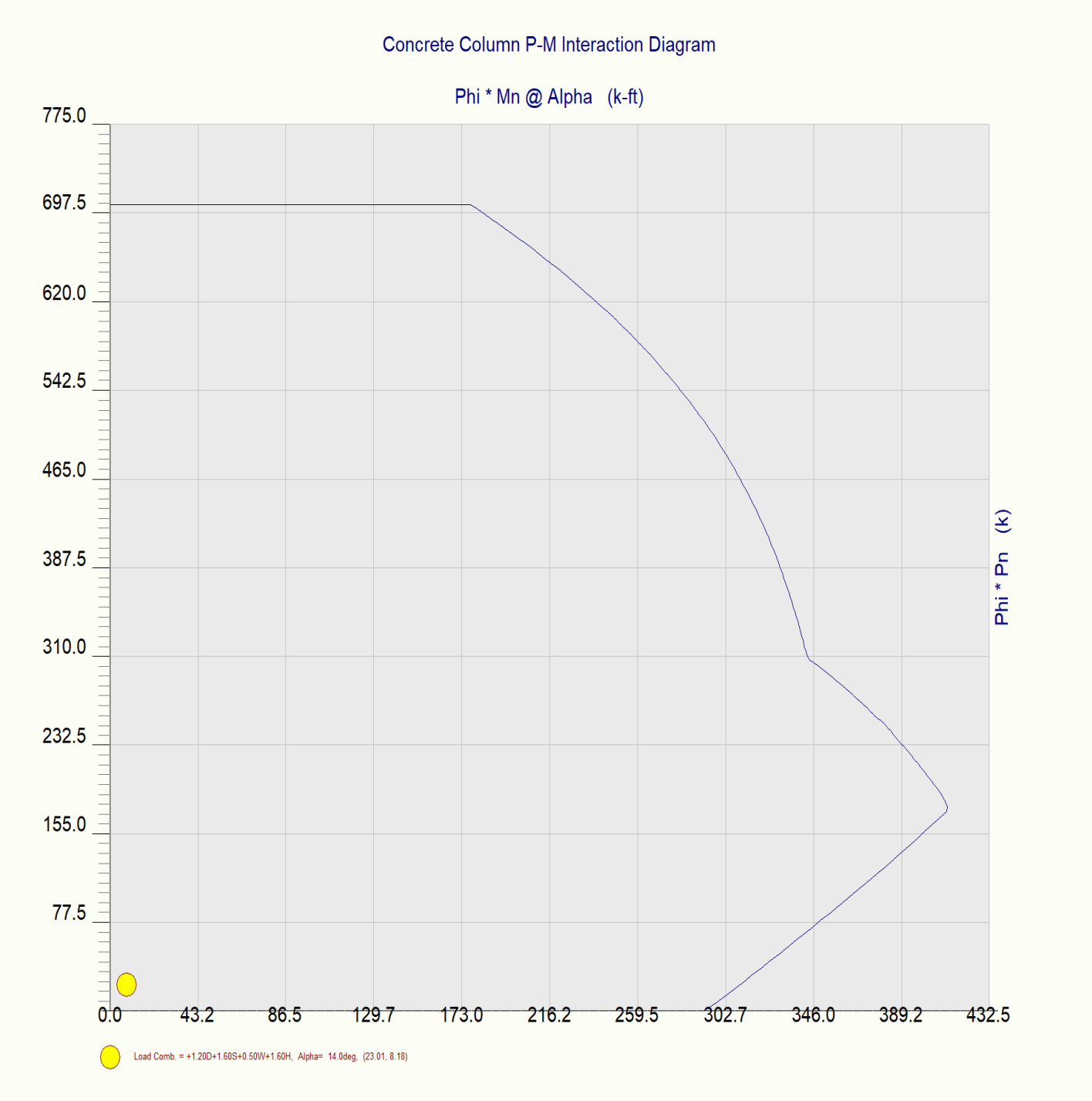


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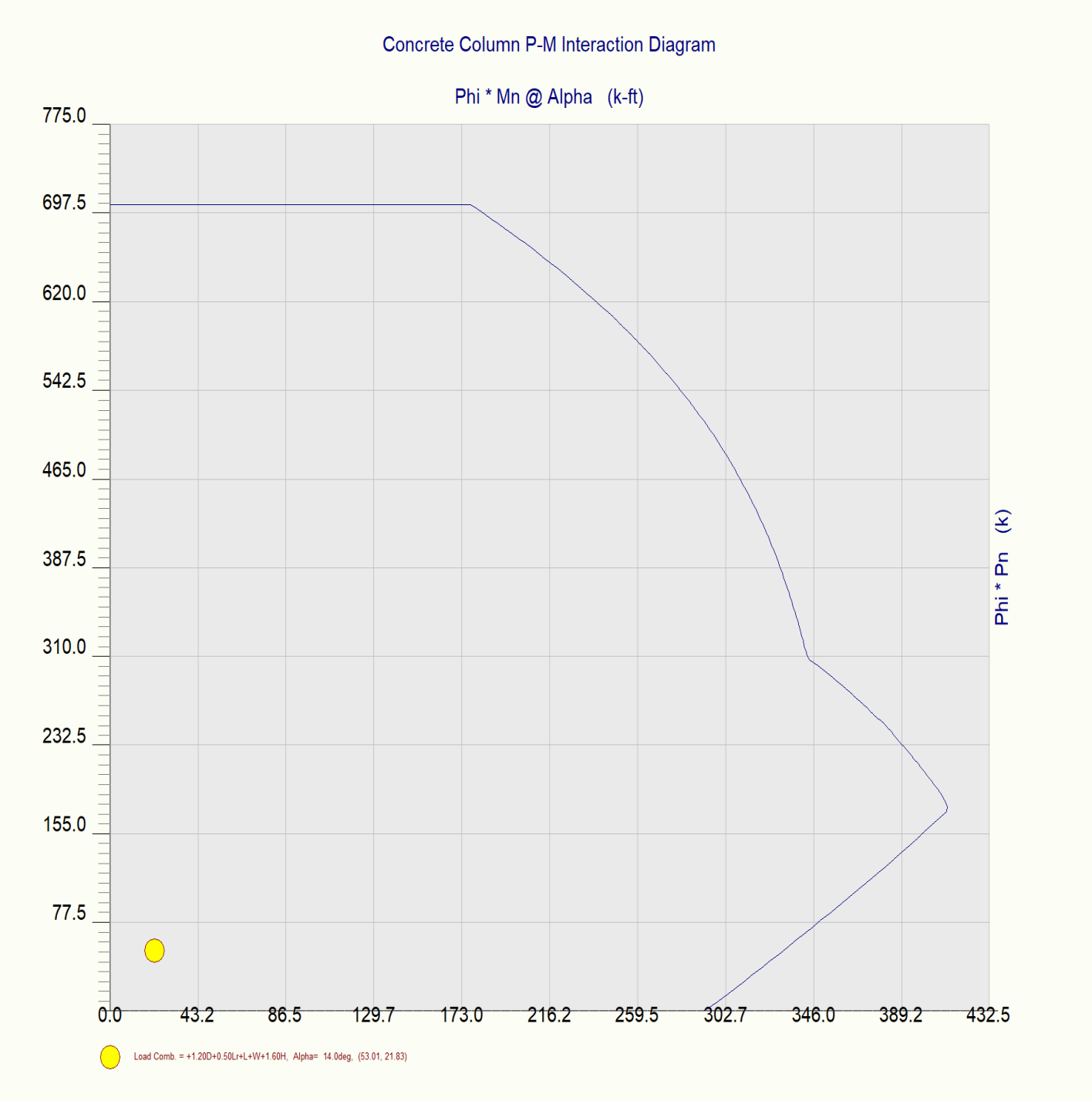


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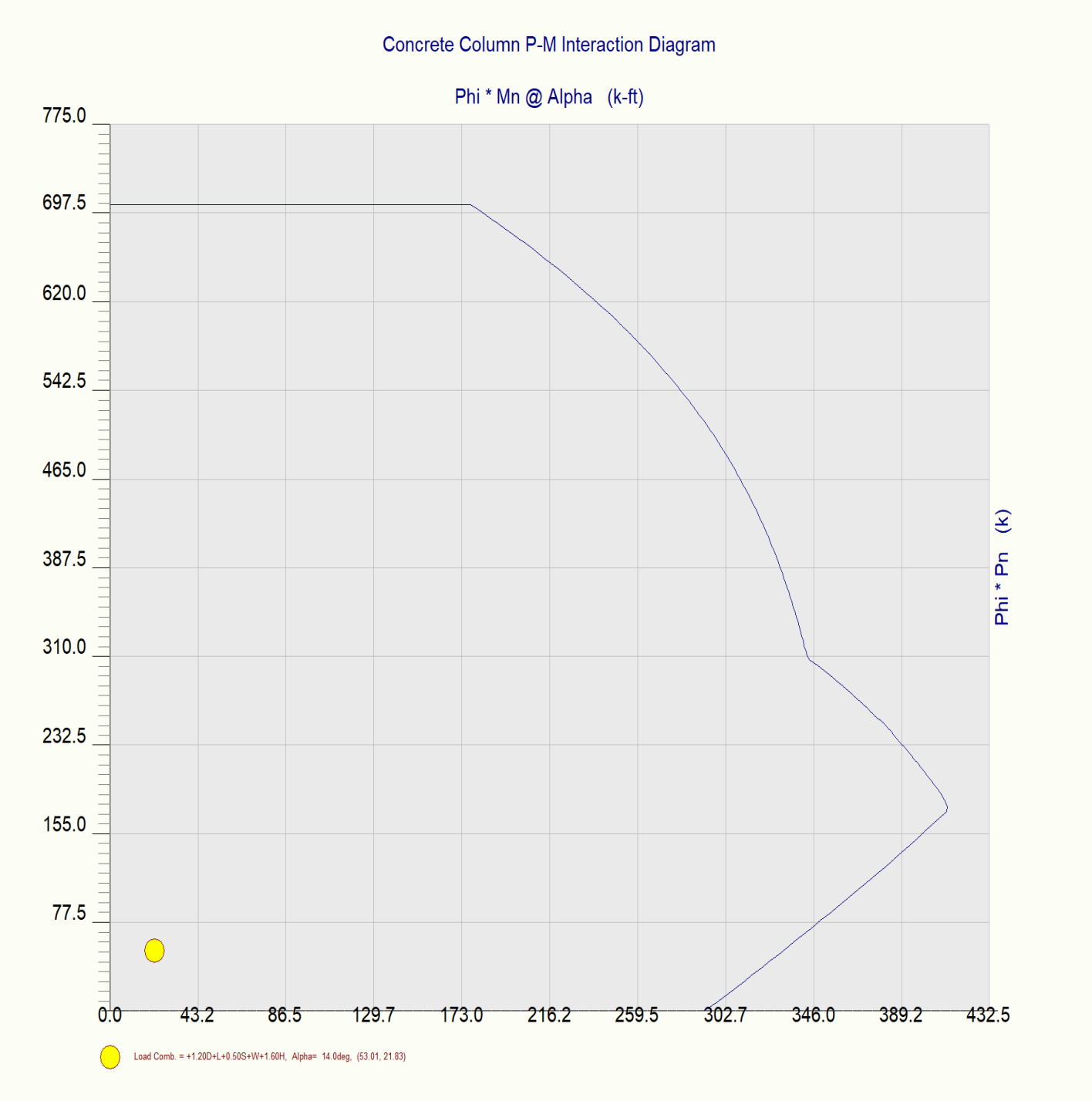


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DESCRIPTION: Grid 16/B1 Beam Bearing on 8"x32" Wall Column

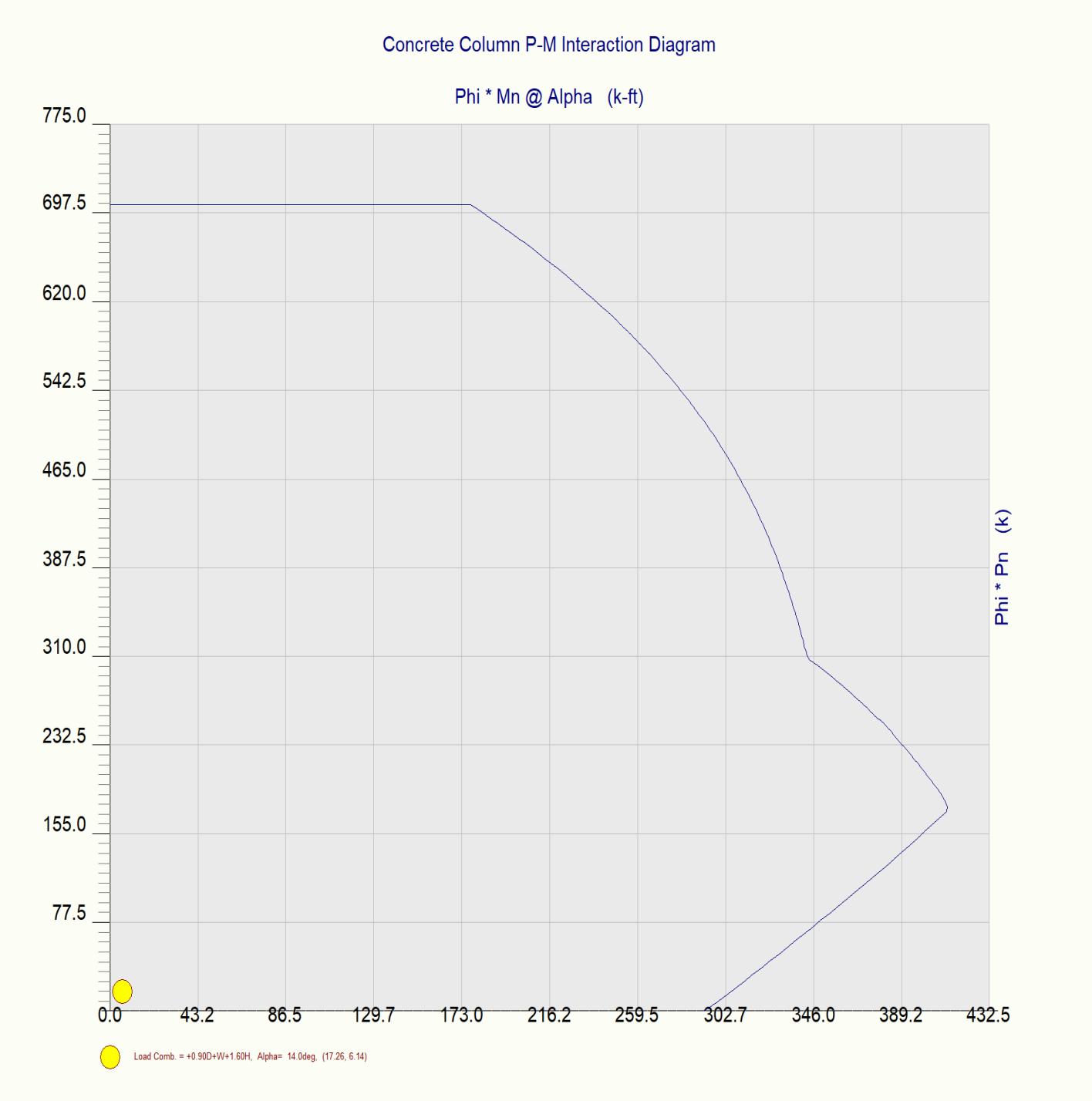


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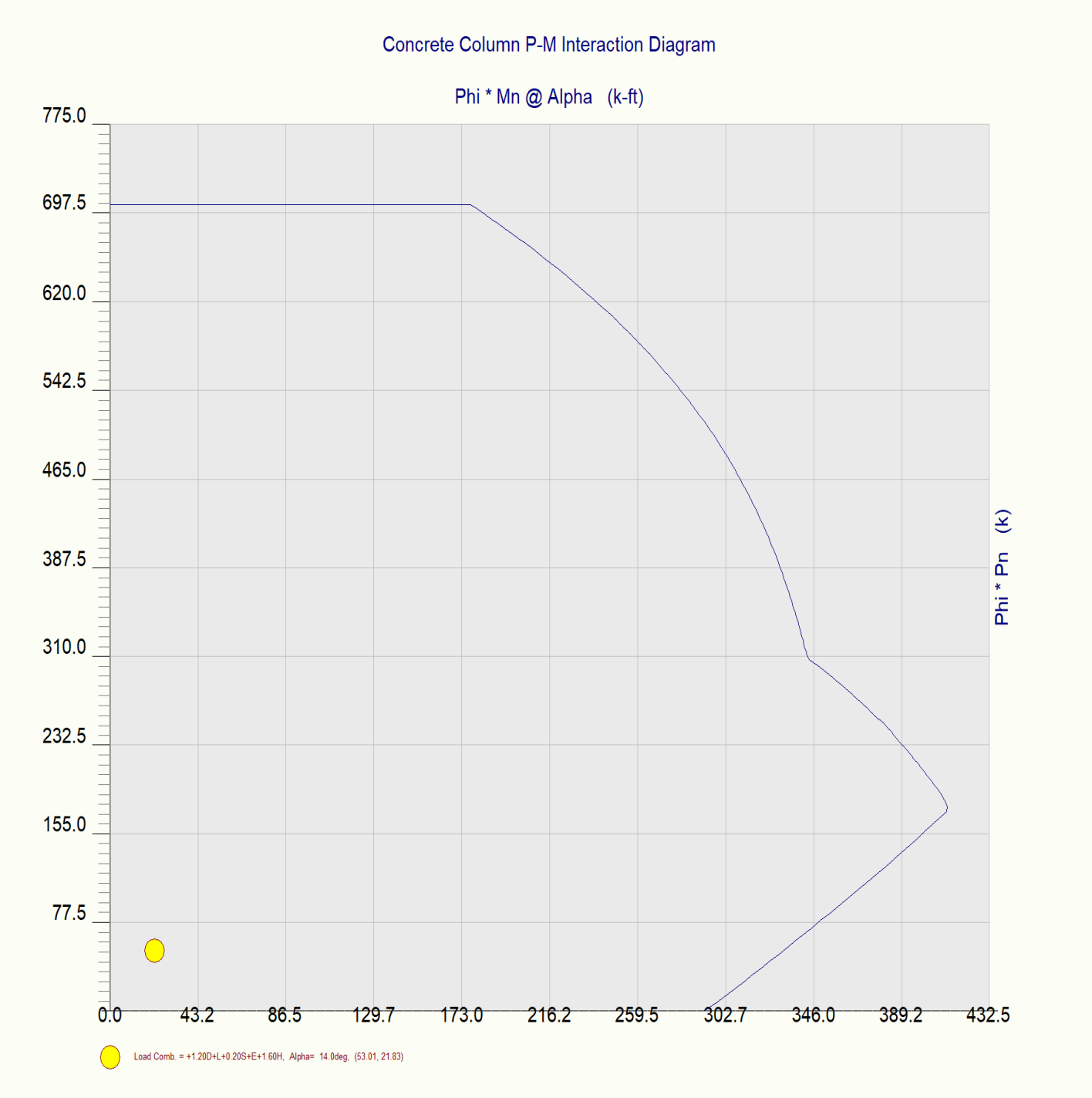
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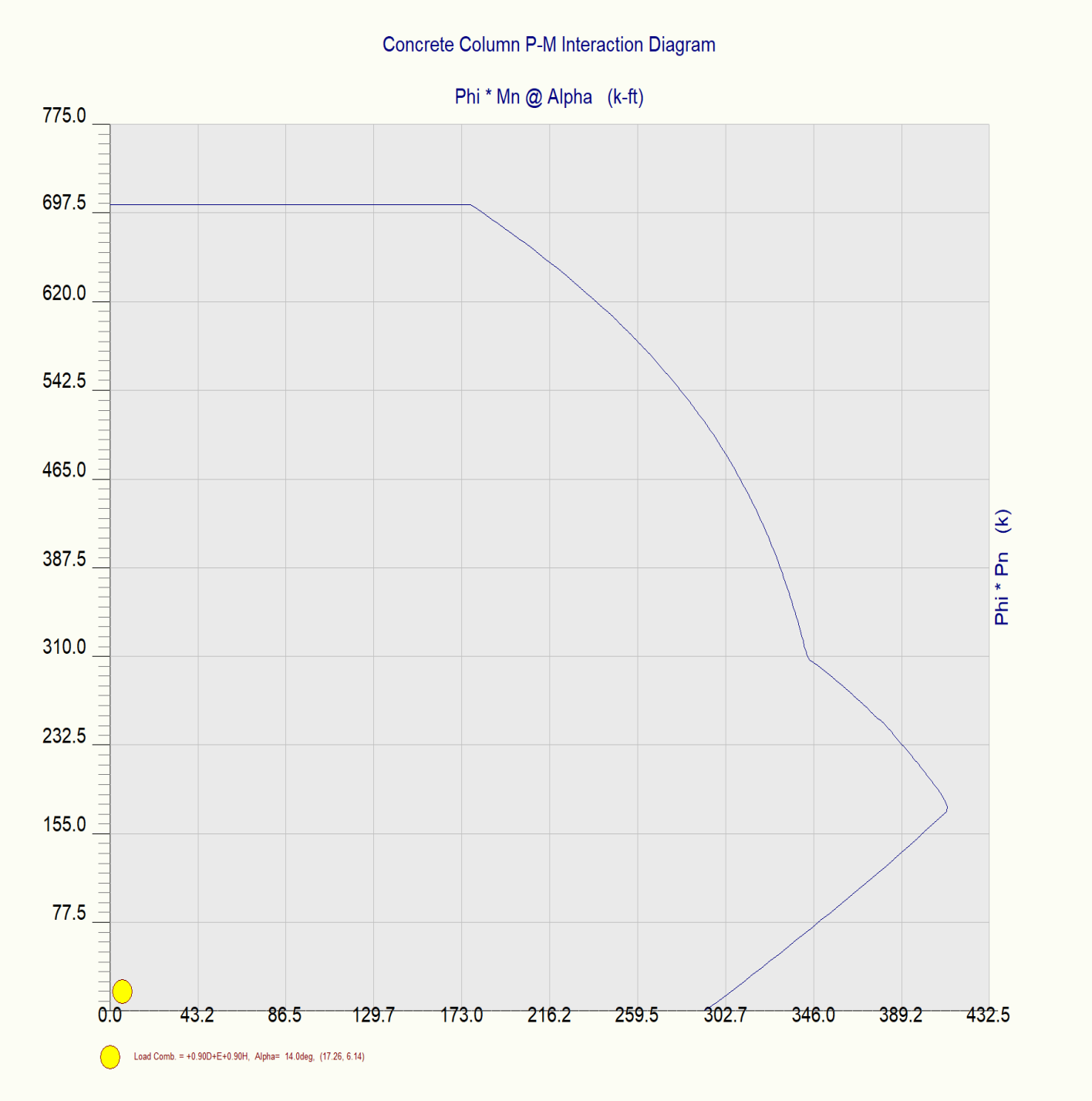


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DESCRIPTION: Grid 16/B1 Beam Bearing on 8"x32" Wall Column



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Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 27 JAN 2022, 5:55PM

# Concrete Beam

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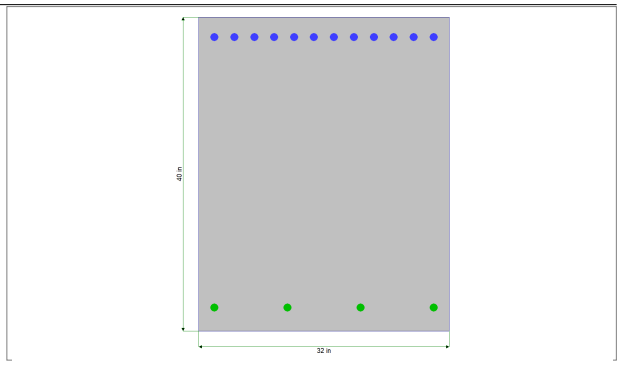
DESCRIPTION: Grid B.6

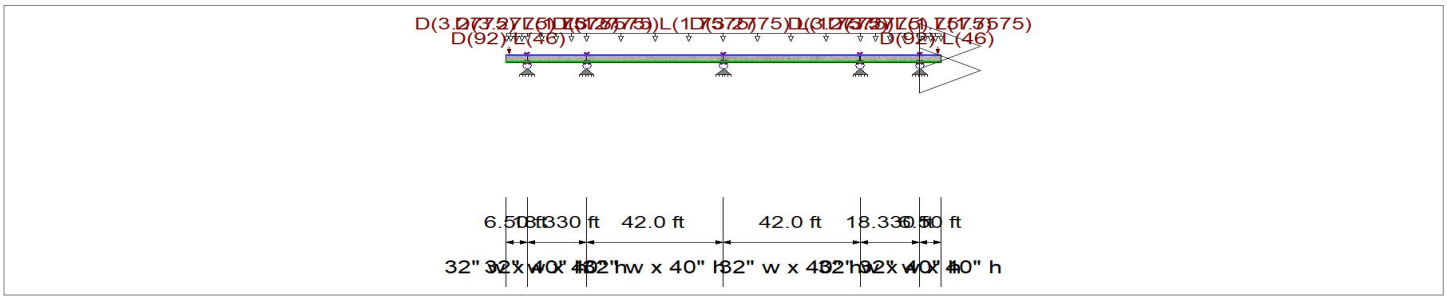
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | ϕ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| ψ Density | = | 145.0 pcf | $\beta_1$ | = | 0.80 |
| λ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 2 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 32.0 in, Height = 40.0 in

Span #1 Reinforcing....
12-#8 at 2.50 in from Top, from 0.0 to 6.50 ft in this span
4-#8 at 3.0 in from Bottom, from 0.0 to 6.50 ft in this span

Span #2 Reinforcing....
12-#8 at 2.50 in from Top, from 0.0 to 18.330 ft in this span
4-#8 at 3.0 in from Bottom, from 0.0 to 18.330 ft in this span

Span #3 Reinforcing....
14-#8 at 2.50 in from Top, from 0.0 to 42.0 ft in this span
8-#8 at 3.0 in from Bottom, from 0.0 to 42.0 ft in this span

Span #4 Reinforcing....
14-#8 at 2.50 in from Top, from 0.0 to 42.0 ft in this span
8-#8 at 3.0 in from Bottom, from 0.0 to 42.0 ft in this span

Span #5 Reinforcing....
12-#8 at 2.50 in from Top, from 0.0 to 18.330 ft in this span
4-#8 at 3.0 in from Bottom, from 0.0 to 18.330 ft in this span

Span #6 Reinforcing....
12-#8 at 2.50 in from Top, from 0.0 to 6.50 ft in this span
4-#8 at 3.0 in from Bottom, from 0.0 to 6.50 ft in this span

Beam self weight calculated and added to loads

Load for Span Number 1
Uniform Load : D = 0.3450, L = 0.1850 ksf, Tributary Width = 9.50 ft
Point Load : D = 92.0, L = 46.0 k @ 1.0 ft, (Grid 16 Beam)

Load for Span Number 2
Uniform Load : D = 0.3450, L = 0.1850 ksf, Tributary Width = 9.50 ft

Load for Span Number 3
Uniform Load : D = 0.3450, L = 0.1850 ksf, Tributary Width = 9.50 ft

Load for Span Number 4
Uniform Load : D = 0.3450, L = 0.1850 ksf, Tributary Width = 9.50 ft

Load for Span Number 5
Uniform Load : D = 0.3450, L = 0.1850 ksf, Tributary Width = 9.50 ft

Load for Span Number 6
Uniform Load : D = 0.3450, L = 0.1850 ksf, Tributary Width = 9.50 ft
Point Load : D = 92.0, L = 46.0 k @ 5.50 ft, (Beam at Grid 11)

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Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

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# Concrete Beam

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DESCRIPTION: Grid B.6

## DESIGN SUMMARY

**Design OK**

| | | | |
|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.845** : 1 | Maximum Deflection | |
| Section used for this span | **Typical Section** | Max Downward Transient Deflection | 0.037 in Ratio = 4198 >=360. |
| Mu : Applied | -1,488.18 k-ft | Max Upward Transient Deflection | -0.016 in Ratio = 13961 >=360. |
| Mn * Phi : Allowable | 1,761.03 k-ft | Max Downward Total Deflection | 0.248 in Ratio = 628 >=180. |
| Location of maximum on span | 0.000 ft | Max Upward Total Deflection | -0.094 in Ratio = 2340 >=180. |
| Span # where maximum occurs | Span # 4 | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 | Support 5 | Support 6 | Support 7 |
|---|---|---|---|---|---|---|---|
| Overall MAXimum | | 251.747 | 165.507 | 286.744 | 165.507 | 251.747 | |
| Overall MINimum | | 81.879 | 40.337 | 82.475 | 40.337 | 81.879 | |
| +D+H | | 172.493 | 123.084 | 203.191 | 123.084 | 172.493 | |
| +D+L+H | | 251.747 | 165.507 | 286.744 | 165.507 | 251.747 | |
| +D+Lr+H | | 172.493 | 123.084 | 203.191 | 123.084 | 172.493 | |
| +D+S+H | | 172.493 | 123.084 | 203.191 | 123.084 | 172.493 | |
| +D+0.750Lr+0.750L+H | | 231.194 | 156.188 | 264.760 | 156.188 | 231.194 | |
| +D+0.750L+0.750S+H | | 231.194 | 156.188 | 264.760 | 156.188 | 231.194 | |
| +D+0.60W+H | | 172.493 | 123.084 | 203.191 | 123.084 | 172.493 | |
| +D+0.750Lr+0.750L+0.450W+H | | 231.194 | 156.188 | 264.760 | 156.188 | 231.194 | |
| +D+0.750L+0.750S+0.450W+H | | 231.194 | 156.188 | 264.760 | 156.188 | 231.194 | |
| +0.60D+0.60W+0.60H | | 105.266 | 69.351 | 127.373 | 69.351 | 105.266 | |
| +D+0.70E+0.60H | | 172.493 | 123.084 | 203.191 | 123.084 | 172.493 | |
| +D+0.750L+0.750S+0.5250E+H | | 231.194 | 156.188 | 264.760 | 156.188 | 231.194 | |
| +0.60D+0.70E+H | | 105.266 | 69.351 | 127.373 | 69.351 | 105.266 | |
| D Only | | 172.493 | 123.084 | 203.191 | 123.084 | 172.493 | |
| L Only | | 81.879 | 40.337 | 82.475 | 40.337 | 81.879 | |
| H Only | | | | | | | |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +0.90D+E+0.90H | 1 | 0.00 | 37.00 | -0.00 | 0.00 | 0.00 | 1.00 | 125.23 | Vu < PhiVc/2 | lot Reqd 9.6. | 125.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.89 | 37.50 | -7.35 | 7.35 | 3.26 | 1.00 | 138.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 138.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.77 | 37.50 | -198.70 | 198.70 | 155.21 | 1.00 | 138.69 | PhiVc < Vu | 60.009 | 251.2 | 11.2 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.66 | 37.50 | -206.05 | 206.05 | 334.59 | 1.00 | 138.69 | PhiVc < Vu | 67.358 | 251.2 | 10.0 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.55 | 37.50 | -213.40 | 213.40 | 520.48 | 1.00 | 138.69 | PhiVc < Vu | 74.707 | 251.2 | 9.0 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.43 | 37.50 | -220.75 | 220.75 | 712.88 | 0.97 | 138.12 | PhiVc < Vu | 82.632 | 250.6 | 8.2 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.32 | 37.50 | -228.10 | 228.10 | 911.80 | 0.78 | 134.81 | PhiVc < Vu | 93.286 | 247.3 | 7.2 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.20 | 37.50 | -235.45 | 235.45 | 1,117.24 | 0.66 | 132.62 | PhiVc < Vu | 102.825 | 245.1 | 6.6 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 8.17 | 37.50 | 89.83 | 89.83 | 1,025.96 | 0.27 | 125.78 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 174.0 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 10.67 | 37.50 | 69.10 | 69.10 | 827.33 | 0.26 | 125.55 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 173.8 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 13.17 | 37.50 | 48.38 | 48.38 | 680.50 | 0.22 | 124.86 | Vu < PhiVc/2 | lot Reqd 9.6. | 124.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 15.67 | 37.50 | 27.65 | 27.65 | 585.47 | 0.15 | 123.54 | Vu < PhiVc/2 | lot Reqd 9.6. | 123.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 18.16 | 37.50 | 6.93 | 6.93 | 542.25 | 0.04 | 121.63 | Vu < PhiVc/2 | lot Reqd 9.6. | 121.6 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 20.66 | 37.50 | -15.28 | 15.28 | 418.58 | 0.11 | 122.94 | Vu < PhiVc/2 | lot Reqd 9.6. | 122.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 23.16 | 37.50 | -34.52 | 34.52 | 611.22 | 0.18 | 124.05 | Vu < PhiVc/2 | lot Reqd 9.6. | 124.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 26.74 | 37.50 | 139.06 | 139.06 | 399.67 | 1.00 | 141.65 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 189.9 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 32.47 | 37.00 | 91.57 | 91.57 | 260.77 | 1.00 | 131.15 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 178.7 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 38.19 | 37.00 | 44.08 | 44.08 | 649.23 | 0.21 | 121.78 | Vu < PhiVc/2 | lot Reqd 9.6. | 121.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 43.92 | 37.00 | -3.41 | 3.41 | 765.70 | 0.01 | 119.47 | Vu < PhiVc/2 | lot Reqd 9.6. | 119.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 49.65 | 37.00 | -50.90 | 50.90 | 610.20 | 0.26 | 122.35 | Vu < PhiVc/2 | lot Reqd 9.6. | 122.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 55.38 | 37.00 | -98.38 | 98.38 | 182.72 | 1.00 | 131.15 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 178.7 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 61.10 | 37.50 | -145.87 | 145.87 | 516.74 | 0.88 | 139.21 | PhiVc < Vu | 6.663 | 206.7 | 15.0 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 66.83 | 37.50 | 193.36 | 193.36 | 1,488.18 | 0.41 | 129.34 | PhiVc < Vu | 64.026 | 196.8 | 10.5 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 72.56 | 37.50 | 145.87 | 145.87 | 516.74 | 0.88 | 139.21 | PhiVc < Vu | 6.663 | 206.7 | 15.0 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 78.28 | 37.00 | 98.38 | 98.38 | 182.72 | 1.00 | 131.15 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 178.7 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 84.01 | 37.00 | 50.90 | 50.90 | 610.20 | 0.26 | 122.35 | Vu < PhiVc/2 | lot Reqd 9.6. | 122.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 89.74 | 37.00 | 3.41 | 3.41 | 765.70 | 0.01 | 119.47 | Vu < PhiVc/2 | lot Reqd 9.6. | 119.5 | 0.0 | 0.0 |

# Concrete Beam

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DESCRIPTION: Grid B.6

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 4 | 95.47 | 37.00 | -44.08 | 44.08 | 649.23 | 0.21 | 121.78 | Vu < PhiVc/2 | lot Reqd 9.6. | 121.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 101.19 | 37.00 | -91.57 | 91.57 | 260.77 | 1.00 | 131.15 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 178.7 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 106.92 | 37.50 | -139.06 | 139.06 | 399.67 | 1.00 | 141.65 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 189.9 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 5 | 110.50 | 37.50 | 34.52 | 34.52 | 611.22 | 0.18 | 124.05 | Vu < PhiVc/2 | lot Reqd 9.6. | 124.1 | 0.0 | 0.0 |
| +1.40D+1.60H | 5 | 113.00 | 37.50 | 15.28 | 15.28 | 418.58 | 0.11 | 122.94 | Vu < PhiVc/2 | lot Reqd 9.6. | 122.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 5 | 115.50 | 37.50 | -6.93 | 6.93 | 542.25 | 0.04 | 121.63 | Vu < PhiVc/2 | lot Reqd 9.6. | 121.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 5 | 118.00 | 37.50 | -27.65 | 27.65 | 585.47 | 0.15 | 123.54 | Vu < PhiVc/2 | lot Reqd 9.6. | 123.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 5 | 120.49 | 37.50 | -48.38 | 48.38 | 680.50 | 0.22 | 124.86 | Vu < PhiVc/2 | lot Reqd 9.6. | 124.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 5 | 122.99 | 37.50 | -69.10 | 69.10 | 827.33 | 0.26 | 125.55 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 173.8 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 5 | 125.49 | 37.50 | -89.83 | 89.83 | 1,025.96 | 0.27 | 125.78 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 174.0 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 6 | 127.46 | 37.50 | 235.45 | 235.45 | 1,117.24 | 0.66 | 132.62 | PhiVc < Vu | 102.825 | 245.1 | 6.6 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H | 6 | 128.34 | 37.50 | 228.10 | 228.10 | 911.80 | 0.78 | 134.81 | PhiVc < Vu | 93.286 | 247.3 | 7.2 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H | 6 | 129.23 | 37.50 | 220.75 | 220.75 | 712.88 | 0.97 | 138.12 | PhiVc < Vu | 82.632 | 250.6 | 8.2 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H | 6 | 130.11 | 37.50 | 213.40 | 213.40 | 520.48 | 1.00 | 138.69 | PhiVc < Vu | 74.707 | 251.2 | 9.0 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H | 6 | 131.00 | 37.50 | 206.05 | 206.05 | 334.59 | 1.00 | 138.69 | PhiVc < Vu | 67.358 | 251.2 | 10.0 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H | 6 | 131.89 | 37.50 | 198.70 | 198.70 | 155.21 | 1.00 | 138.69 | PhiVc < Vu | 60.009 | 251.2 | 11.2 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H | 6 | 132.77 | 37.50 | 7.35 | 7.35 | 3.26 | 1.00 | 138.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 138.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 6 | 133.66 | 37.00 | -0.00 | 0.00 | 0.00 | 1.00 | 125.23 | Vu < PhiVc/2 | lot Reqd 9.6. | 125.2 | 0.0 | 0.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 6.500 | -1,152.11 | 1,516.03 | 0.76 |
| Span # 2 | 2 | 18.330 | -1,187.16 | 1,516.03 | 0.78 |
| Span # 3 | 3 | 42.000 | 765.70 | 1,012.55 | 0.76 |
| Span # 4 | 4 | 42.000 | -1,488.18 | 1,761.03 | 0.85 |
| Span # 5 | 5 | 18.330 | -1,144.70 | 1,516.03 | 0.76 |
| Span # 6 | 6 | 6.500 | -1,187.16 | 1,516.03 | 0.78 |
| +1.40D+1.60H | | | | | |
| Span # 1 | 1 | 6.500 | -818.35 | 1,516.03 | 0.54 |
| Span # 2 | 2 | 18.330 | -843.45 | 1,516.03 | 0.56 |
| Span # 3 | 3 | 42.000 | 586.16 | 1,012.55 | 0.58 |
| Span # 4 | 4 | 42.000 | -1,140.79 | 1,761.03 | 0.65 |
| Span # 5 | 5 | 18.330 | -812.65 | 1,516.03 | 0.54 |
| Span # 6 | 6 | 6.500 | -843.45 | 1,516.03 | 0.56 |
| +1.20D+0.50Lr+1.60L+1.60H | | | | | |
| Span # 1 | 1 | 6.500 | -1,152.11 | 1,516.03 | 0.76 |
| Span # 2 | 2 | 18.330 | -1,187.16 | 1,516.03 | 0.78 |
| Span # 3 | 3 | 42.000 | 765.70 | 1,012.55 | 0.76 |
| Span # 4 | 4 | 42.000 | -1,488.18 | 1,761.03 | 0.85 |
| Span # 5 | 5 | 18.330 | -1,144.70 | 1,516.03 | 0.76 |
| Span # 6 | 6 | 6.500 | -1,187.16 | 1,516.03 | 0.78 |
| +1.20D+1.60L+0.50S+1.60H | | | | | |
| Span # 1 | 1 | 6.500 | -1,152.11 | 1,516.03 | 0.76 |
| Span # 2 | 2 | 18.330 | -1,187.16 | 1,516.03 | 0.78 |
| Span # 3 | 3 | 42.000 | 765.70 | 1,012.55 | 0.76 |
| Span # 4 | 4 | 42.000 | -1,488.18 | 1,761.03 | 0.85 |
| Span # 5 | 5 | 18.330 | -1,144.70 | 1,516.03 | 0.76 |
| Span # 6 | 6 | 6.500 | -1,187.16 | 1,516.03 | 0.78 |
| +1.20D+1.60Lr+L+1.60H | | | | | |
| Span # 1 | 1 | 6.500 | -983.11 | 1,516.03 | 0.65 |
| Span # 2 | 2 | 18.330 | -1,013.09 | 1,516.03 | 0.67 |
| Span # 3 | 3 | 42.000 | 666.97 | 1,012.55 | 0.66 |
| Span # 4 | 4 | 42.000 | -1,296.80 | 1,761.03 | 0.74 |
| Span # 5 | 5 | 18.330 | -976.65 | 1,516.03 | 0.64 |
| Span # 6 | 6 | 6.500 | -1,013.09 | 1,516.03 | 0.67 |
| +1.20D+1.60Lr+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 6.500 | -701.45 | 1,516.03 | 0.46 |
| Span # 2 | 2 | 18.330 | -722.96 | 1,516.03 | 0.48 |
| Span # 3 | 3 | 42.000 | 502.42 | 1,012.55 | 0.50 |
| Span # 4 | 4 | 42.000 | -977.82 | 1,761.03 | 0.56 |
| Span # 5 | 5 | 18.330 | -696.56 | 1,516.03 | 0.46 |

# Concrete Beam

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DESCRIPTION: Grid B.6

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 6 | 6 | 6.500 | -722.96 | 1,516.03 | 0.48 |
| +1.20D+L+1.60S+1.60H | | | | | |
| Span # 1 | 1 | 6.500 | -983.11 | 1,516.03 | 0.65 |
| Span # 2 | 2 | 18.330 | -1,013.09 | 1,516.03 | 0.67 |
| Span # 3 | 3 | 42.000 | 666.97 | 1,012.55 | 0.66 |
| Span # 4 | 4 | 42.000 | -1,296.80 | 1,761.03 | 0.74 |
| Span # 5 | 5 | 18.330 | -976.65 | 1,516.03 | 0.64 |
| Span # 6 | 6 | 6.500 | -1,013.09 | 1,516.03 | 0.67 |
| +1.20D+1.60S+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 6.500 | -701.45 | 1,516.03 | 0.46 |
| Span # 2 | 2 | 18.330 | -722.96 | 1,516.03 | 0.48 |
| Span # 3 | 3 | 42.000 | 502.42 | 1,012.55 | 0.50 |
| Span # 4 | 4 | 42.000 | -977.82 | 1,761.03 | 0.56 |
| Span # 5 | 5 | 18.330 | -696.56 | 1,516.03 | 0.46 |
| Span # 6 | 6 | 6.500 | -722.96 | 1,516.03 | 0.48 |
| +1.20D+0.50Lr+L+W+1.60H | | | | | |
| Span # 1 | 1 | 6.500 | -983.11 | 1,516.03 | 0.65 |
| Span # 2 | 2 | 18.330 | -1,013.09 | 1,516.03 | 0.67 |
| Span # 3 | 3 | 42.000 | 666.97 | 1,012.55 | 0.66 |
| Span # 4 | 4 | 42.000 | -1,296.80 | 1,761.03 | 0.74 |
| Span # 5 | 5 | 18.330 | -976.65 | 1,516.03 | 0.64 |
| Span # 6 | 6 | 6.500 | -1,013.09 | 1,516.03 | 0.67 |
| +1.20D+L+0.50S+W+1.60H | | | | | |
| Span # 1 | 1 | 6.500 | -983.11 | 1,516.03 | 0.65 |
| Span # 2 | 2 | 18.330 | -1,013.09 | 1,516.03 | 0.67 |
| Span # 3 | 3 | 42.000 | 666.97 | 1,012.55 | 0.66 |
| Span # 4 | 4 | 42.000 | -1,296.80 | 1,761.03 | 0.74 |
| Span # 5 | 5 | 18.330 | -976.65 | 1,516.03 | 0.64 |
| Span # 6 | 6 | 6.500 | -1,013.09 | 1,516.03 | 0.67 |
| +0.90D+W+1.60H | | | | | |
| Span # 1 | 1 | 6.500 | -526.09 | 1,516.03 | 0.35 |
| Span # 2 | 2 | 18.330 | -542.22 | 1,516.03 | 0.36 |
| Span # 3 | 3 | 42.000 | 376.82 | 1,012.55 | 0.37 |
| Span # 4 | 4 | 42.000 | -733.37 | 1,761.03 | 0.42 |
| Span # 5 | 5 | 18.330 | -522.42 | 1,516.03 | 0.34 |
| Span # 6 | 6 | 6.500 | -542.22 | 1,516.03 | 0.36 |
| +1.20D+L+0.20S+E+1.60H | | | | | |
| Span # 1 | 1 | 6.500 | -983.11 | 1,516.03 | 0.65 |
| Span # 2 | 2 | 18.330 | -1,013.09 | 1,516.03 | 0.67 |
| Span # 3 | 3 | 42.000 | 666.97 | 1,012.55 | 0.66 |
| Span # 4 | 4 | 42.000 | -1,296.80 | 1,761.03 | 0.74 |
| Span # 5 | 5 | 18.330 | -976.65 | 1,516.03 | 0.64 |
| Span # 6 | 6 | 6.500 | -1,013.09 | 1,516.03 | 0.67 |
| +0.90D+E+0.90H | | | | | |
| Span # 1 | 1 | 6.500 | -526.09 | 1,516.03 | 0.35 |
| Span # 2 | 2 | 18.330 | -542.22 | 1,516.03 | 0.36 |
| Span # 3 | 3 | 42.000 | 376.82 | 1,012.55 | 0.37 |
| Span # 4 | 4 | 42.000 | -733.37 | 1,761.03 | 0.42 |
| Span # 5 | 5 | 18.330 | -522.42 | 1,516.03 | 0.34 |
| Span # 6 | 6 | 6.500 | -542.22 | 1,516.03 | 0.36 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H | 1 | 0.2478 | 0.000 | +D+L+H | -0.0205 | 7.333 |
| +D+L+H | 2 | 0.0410 | 20.239 | +D+L+H | -0.0940 | 7.499 |
| +D+L+H | 3 | 0.3394 | 21.000 | | 0.0000 | 7.499 |
| +D+L+H | 4 | 0.3394 | 21.000 | +D+L+H | -0.0142 | 42.833 |
| +D+L+H | 5 | 0.0091 | 18.625 | +D+L+H | -0.0940 | 10.831 |
| +D+L+H | 6 | 0.2478 | 6.500 | | 0.0000 | 10.831 |

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Title Block Line 6

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Engineer:
Project ID:
Project Descr:

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File: FWI2101 - Paragon Star.ec6

# Concrete Beam

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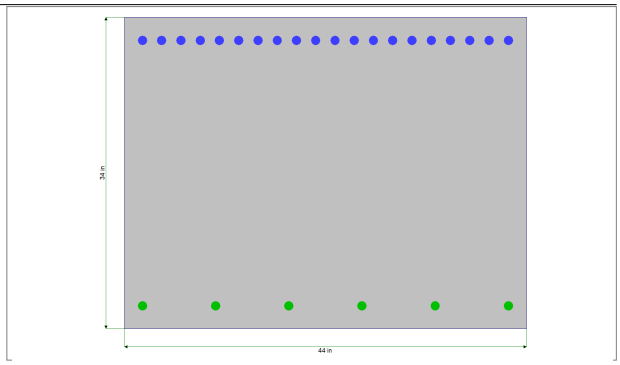
DESCRIPTION: Grid 10

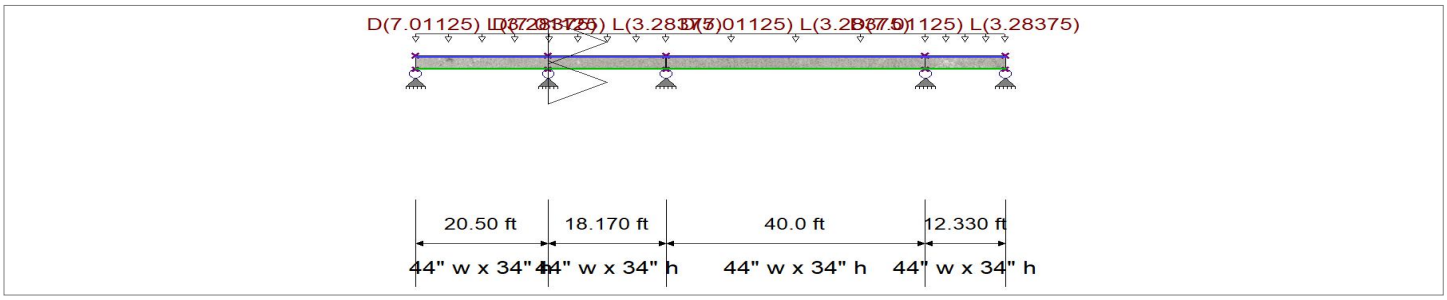
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | $\phi$ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| $\psi$ Density | = | 145.0 pcf | $\beta_1$ | = | 0.80 |
| $\lambda$ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 2 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 44.0 in, Height = 34.0 in

Span #1 Reinforcing....
- 8-#8 at 2.50 in from Top, from 0.0 to 20.50 ft in this span
- 8-#8 at 2.50 in from Bottom, from 0.0 to 20.50 ft in this span

Span #2 Reinforcing....
- 20-#8 at 2.50 in from Top, from 0.0 to 18.170 ft in this span
- 6-#8 at 2.50 in from Bottom, from 0.0 to 18.170 ft in this span

Span #3 Reinforcing....
- 20-#8 at 2.50 in from Top, from 0.0 to 40.0 ft in this span
- 16-#8 at 2.50 in from Bottom, from 0.0 to 40.0 ft in this span

Span #4 Reinforcing....
- 20-#8 at 2.50 in from Top, from 0.0 to 12.330 ft in this span
- 4-#8 at 2.50 in from Bottom, from 0.0 to 12.330 ft in this span

Beam self weight calculated and added to loads

Load for Span Number 1
- Uniform Load : D = 0.3950, L = 0.1850 ksf, Tributary Width = 17.750 ft

Load for Span Number 2
- Uniform Load : D = 0.3950, L = 0.1850 ksf, Tributary Width = 17.750 ft

Load for Span Number 3
- Uniform Load : D = 0.3950, L = 0.1850 ksf, Tributary Width = 17.750 ft

Load for Span Number 4
- Uniform Load : D = 0.3950, L = 0.1850 ksf, Tributary Width = 17.750 ft

## DESIGN SUMMARY

**Design OK**

| | | |
|---|---|---|
| Maximum Bending Stress Ratio = | **0.866** : 1 | |
| Section used for this span | **Typical Section** | |
| Mu : Applied | -1,802.75 k-ft | |
| Mn * Phi : Allowable | 2,082.14 k-ft | |
| Location of maximum on span | 0.000 ft | |
| Span # where maximum occurs | Span # 4 | |

Maximum Deflection

| | | | | |
|---|---|---|---|---|
| Max Downward Transient Deflection | 0.106 in | Ratio = | 4538 | >=600. |
| Max Upward Transient Deflection | -0.013 in | Ratio = | 17175 | >=600. |
| Max Downward Total Deflection | 0.786 in | Ratio = | 610 | >=480. |
| Max Upward Total Deflection | -0.054 in | Ratio = | 2730 | >=480. |

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Title Block Line 6

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Project ID:
Project Descr:

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File: FWI2101 - Paragon Star.ec6

# Concrete Beam

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Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: Grid 10

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 | Support 5 |
|---|---|---|---|---|---|
| Overall MAXimum | 107.014 | 184.634 | 398.557 | 425.969 | -42.248 |
| Overall MINimum | 30.115 | 51.711 | 110.045 | 117.731 | -10.780 |
| +D+H | 80.025 | 126.801 | 292.056 | 305.127 | -28.904 |
| +D+L+H | 107.014 | 184.634 | 398.557 | 425.969 | -42.248 |
| +D+Lr+H | 80.025 | 126.801 | 292.056 | 305.127 | -28.904 |
| +D+S+H | 80.025 | 126.801 | 292.056 | 305.127 | -28.904 |
| +D+0.750Lr+0.750L+H | 100.932 | 168.694 | 372.764 | 395.783 | -38.953 |
| +D+0.750L+0.750S+H | 100.932 | 168.694 | 372.764 | 395.783 | -38.953 |
| +D+0.60W+H | 80.025 | 126.801 | 292.056 | 305.127 | -28.904 |
| +D+0.750Lr+0.750L+0.450W+H | 100.932 | 168.694 | 372.764 | 395.783 | -38.953 |
| +D+0.750L+0.750S+0.450W+H | 100.932 | 168.694 | 372.764 | 395.783 | -38.953 |
| +0.60D+0.60W+0.60H | 47.022 | 79.886 | 172.493 | 180.277 | -14.616 |
| +D+0.70E+0.60H | 80.025 | 126.801 | 292.056 | 305.127 | -28.904 |
| +D+0.750L+0.750S+0.5250E+H | 100.932 | 168.694 | 372.764 | 395.783 | -38.953 |
| +0.60D+0.70E+H | 47.022 | 79.886 | 172.493 | 180.277 | -14.616 |
| D Only | 80.025 | 126.801 | 292.056 | 305.127 | -28.904 |
| L Only | 30.115 | 51.711 | 110.045 | 117.731 | -10.780 |
| H Only | | | | | |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.00 | 31.50 | 141.92 | 141.92 | 0.00 | 1.00 | 151.51 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 208.2 | 10.3 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.29 | 31.50 | 121.88 | 121.88 | 170.78 | 1.00 | 151.51 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 208.2 | 10.3 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.59 | 31.50 | 101.85 | 101.85 | 315.62 | 0.85 | 149.69 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 206.4 | 10.3 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.88 | 31.50 | 81.81 | 81.81 | 434.51 | 0.49 | 145.51 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 202.2 | 10.3 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.18 | 31.50 | 61.78 | 61.78 | 527.47 | 0.31 | 143.30 | Vu < PhiVc/2 | lot Reqd 9.6. | 143.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.47 | 31.50 | 41.74 | 41.74 | 594.48 | 0.18 | 141.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 141.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.77 | 31.50 | 21.70 | 21.70 | 635.55 | 0.09 | 140.72 | Vu < PhiVc/2 | lot Reqd 9.6. | 140.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.06 | 31.50 | 1.67 | 1.67 | 650.68 | 0.01 | 139.74 | Vu < PhiVc/2 | lot Reqd 9.6. | 139.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.36 | 31.50 | -18.37 | 18.37 | 639.87 | 0.08 | 140.55 | Vu < PhiVc/2 | lot Reqd 9.6. | 140.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.65 | 31.50 | -38.41 | 38.41 | 603.11 | 0.17 | 141.64 | Vu < PhiVc/2 | lot Reqd 9.6. | 141.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.95 | 31.50 | -58.44 | 58.44 | 540.42 | 0.28 | 143.02 | Vu < PhiVc/2 | lot Reqd 9.6. | 143.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.24 | 31.50 | -78.48 | 78.48 | 451.78 | 0.46 | 145.06 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 201.8 | 10.3 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 15.54 | 31.50 | -98.51 | 98.51 | 337.20 | 0.77 | 148.74 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 205.4 | 10.3 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 16.83 | 31.50 | -118.55 | 118.55 | 196.68 | 1.00 | 151.51 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 208.2 | 10.3 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 18.13 | 31.50 | -138.59 | 138.59 | 30.22 | 1.00 | 151.51 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 208.2 | 10.3 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 19.42 | 31.50 | -158.62 | 158.62 | 162.19 | 1.00 | 151.51 | PhiVc < Vu | 7.116 | 208.2 | 10.9 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 20.69 | 31.50 | 65.42 | 65.42 | 329.55 | 0.52 | 155.09 | Vu < PhiVc/2 | lot Reqd 9.6. | 155.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 21.84 | 31.50 | 47.66 | 47.66 | 264.66 | 0.47 | 153.66 | Vu < PhiVc/2 | lot Reqd 9.6. | 153.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 22.99 | 31.50 | 29.90 | 29.90 | 220.16 | 0.36 | 150.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 150.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 24.13 | 31.50 | 12.14 | 12.14 | 196.04 | 0.16 | 144.47 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 25.28 | 31.50 | -5.62 | 5.62 | 192.29 | 0.08 | 141.93 | Vu < PhiVc/2 | lot Reqd 9.6. | 141.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 26.43 | 31.50 | -23.38 | 23.38 | 208.93 | 0.29 | 148.36 | Vu < PhiVc/2 | lot Reqd 9.6. | 148.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 27.58 | 31.50 | -41.14 | 41.14 | 245.95 | 0.44 | 152.66 | Vu < PhiVc/2 | lot Reqd 9.6. | 152.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 28.72 | 31.50 | -58.89 | 58.89 | 303.34 | 0.51 | 154.76 | Vu < PhiVc/2 | lot Reqd 9.6. | 154.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 29.87 | 31.50 | -76.65 | 76.65 | 381.12 | 0.53 | 155.30 | Vu < PhiVc/2 | lot Reqd 9.6. | 155.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 31.02 | 31.50 | -94.41 | 94.41 | 479.27 | 0.52 | 154.98 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 211.7 | 10.3 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 32.17 | 31.50 | -112.17 | 112.17 | 597.81 | 0.49 | 154.25 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 210.9 | 10.3 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 33.31 | 31.50 | -129.93 | 129.93 | 736.73 | 0.46 | 153.37 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 210.1 | 10.3 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 34.46 | 31.50 | -147.69 | 147.69 | 896.02 | 0.43 | 152.48 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 209.2 | 10.3 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 35.61 | 31.50 | -165.45 | 165.45 | 1,075.70 | 0.40 | 151.62 | PhiVc < Vu | 13.830 | 340.6 | 10.9 | 3.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 36.76 | 31.50 | -183.21 | 183.21 | 1,275.75 | 0.38 | 150.82 | PhiVc < Vu | 32.382 | 339.8 | 10.9 | 3.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 37.90 | 31.50 | -200.97 | 200.97 | 1,496.19 | 0.35 | 150.10 | PhiVc < Vu | 50.864 | 339.1 | 10.9 | 3.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 39.51 | 31.50 | 292.76 | 292.76 | 1,402.44 | 0.55 | 155.89 | PhiVc < Vu | 136.873 | 344.9 | 4.1 | 3.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 42.04 | 31.50 | 253.67 | 253.67 | 712.21 | 0.93 | 167.36 | PhiVc < Vu | 86.314 | 356.4 | 6.6 | 3.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 44.56 | 31.50 | 214.57 | 214.57 | 120.74 | 1.00 | 169.28 | PhiVc < Vu | 45.292 | 358.3 | 10.9 | 3.0 |

# Concrete Beam

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DESCRIPTION: Grid 10

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 3 | 47.09 | 31.50 | 175.48 | 175.48 | 371.96 | 1.00 | 163.36 | PhiVc < Vu | 12.122 | 352.4 | 10.9 | 3.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 49.62 | 31.50 | 136.38 | 136.38 | 765.89 | 0.47 | 150.74 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 207.4 | 10.3 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 52.14 | 31.50 | 97.29 | 97.29 | 1,061.05 | 0.24 | 145.36 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 202.1 | 10.3 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 54.67 | 31.50 | 58.19 | 58.19 | 1,257.45 | 0.12 | 142.54 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 57.20 | 31.50 | 19.10 | 19.10 | 1,355.08 | 0.04 | 140.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 140.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 59.72 | 31.50 | -20.00 | 20.00 | 1,353.95 | 0.04 | 140.58 | Vu < PhiVc/2 | lot Reqd 9.6. | 140.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 62.25 | 31.50 | -59.09 | 59.09 | 1,254.05 | 0.12 | 142.59 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 64.78 | 31.50 | -98.19 | 98.19 | 1,055.38 | 0.24 | 145.45 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 202.1 | 10.3 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 67.30 | 31.50 | -137.28 | 137.28 | 757.94 | 0.48 | 150.93 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 207.6 | 10.3 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 69.83 | 31.50 | -176.38 | 176.38 | 361.74 | 1.00 | 163.36 | PhiVc < Vu | 13.020 | 352.4 | 10.9 | 3.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 72.35 | 31.50 | -215.47 | 215.47 | 133.23 | 1.00 | 169.28 | PhiVc < Vu | 46.191 | 358.3 | 10.9 | 3.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 74.88 | 31.50 | -254.57 | 254.57 | 726.96 | 0.92 | 166.89 | PhiVc < Vu | 87.679 | 355.9 | 6.5 | 3.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 77.41 | 31.50 | -293.66 | 293.66 | 1,419.47 | 0.54 | 155.75 | PhiVc < Vu | 137.918 | 344.7 | 4.1 | 3.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 79.06 | 31.50 | 235.59 | 235.59 | 1,709.85 | 0.36 | 150.37 | PhiVc < Vu | 85.216 | 339.4 | 6.7 | 3.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 79.84 | 31.50 | 223.54 | 223.54 | 1,531.08 | 0.38 | 151.01 | PhiVc < Vu | 72.526 | 340.0 | 7.8 | 3.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 80.62 | 31.50 | 211.49 | 211.49 | 1,361.70 | 0.41 | 151.73 | PhiVc < Vu | 59.751 | 340.7 | 9.5 | 3.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 81.40 | 31.50 | 199.43 | 199.43 | 1,201.70 | 0.44 | 152.56 | PhiVc < Vu | 46.871 | 341.6 | 10.9 | 3.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 82.17 | 31.50 | 187.38 | 187.38 | 1,051.08 | 0.47 | 153.52 | PhiVc < Vu | 33.862 | 342.5 | 10.9 | 3.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 82.95 | 31.50 | 175.33 | 175.33 | 909.85 | 0.51 | 154.64 | PhiVc < Vu | 20.689 | 343.6 | 10.9 | 3.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 83.73 | 31.50 | 163.28 | 163.28 | 778.01 | 0.55 | 155.98 | PhiVc < Vu | 7.303 | 345.0 | 10.9 | 3.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 84.51 | 31.50 | 151.23 | 151.23 | 655.55 | 0.61 | 157.60 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 214.3 | 10.3 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 85.29 | 31.50 | 139.18 | 139.18 | 542.47 | 0.67 | 159.61 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 216.3 | 10.3 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 86.07 | 31.50 | 127.13 | 127.13 | 438.78 | 0.76 | 162.19 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 218.9 | 10.3 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 86.85 | 31.50 | 115.08 | 115.08 | 344.47 | 0.88 | 165.64 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 222.3 | 10.3 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 87.63 | 31.50 | 103.03 | 103.03 | 259.55 | 1.00 | 169.28 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 226.0 | 10.3 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 88.40 | 31.50 | 90.97 | 90.97 | 184.01 | 1.00 | 169.28 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 226.0 | 10.3 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 89.18 | 31.50 | 78.92 | 78.92 | 117.86 | 1.00 | 169.28 | Vu < PhiVc/2 | lot Reqd 9.6. | 169.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 89.96 | 31.50 | 66.87 | 66.87 | 61.09 | 1.00 | 169.28 | Vu < PhiVc/2 | lot Reqd 9.6. | 169.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 90.74 | 31.50 | 54.82 | 54.82 | 13.71 | 1.00 | 169.28 | Vu < PhiVc/2 | lot Reqd 9.6. | 169.3 | 0.0 | 0.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 20.500 | 650.68 | 866.91 | 0.75 |
| Span # 2 | 2 | 18.170 | -1,614.04 | 2,089.19 | 0.77 |
| Span # 3 | 3 | 40.000 | 1,366.86 | 1,693.32 | 0.81 |
| Span # 4 | 4 | 12.330 | -1,802.75 | 2,082.14 | 0.87 |
| +1.40D+1.60H | | | | | |
| Span # 1 | 1 | 20.500 | 501.39 | 866.91 | 0.58 |
| Span # 2 | 2 | 18.170 | -1,243.73 | 2,089.19 | 0.60 |
| Span # 3 | 3 | 40.000 | 1,053.26 | 1,693.32 | 0.62 |
| Span # 4 | 4 | 12.330 | -1,389.15 | 2,082.14 | 0.67 |
| +1.20D+0.50Lr+1.60L+1.60H | | | | | |
| Span # 1 | 1 | 20.500 | 650.68 | 866.91 | 0.75 |
| Span # 2 | 2 | 18.170 | -1,614.04 | 2,089.19 | 0.77 |
| Span # 3 | 3 | 40.000 | 1,366.86 | 1,693.32 | 0.81 |
| Span # 4 | 4 | 12.330 | -1,802.75 | 2,082.14 | 0.87 |
| +1.20D+1.60L+0.50S+1.60H | | | | | |
| Span # 1 | 1 | 20.500 | 650.68 | 866.91 | 0.75 |
| Span # 2 | 2 | 18.170 | -1,614.04 | 2,089.19 | 0.77 |
| Span # 3 | 3 | 40.000 | 1,366.86 | 1,693.32 | 0.81 |
| Span # 4 | 4 | 12.330 | -1,802.75 | 2,082.14 | 0.87 |
| +1.20D+1.60Lr+L+1.60H | | | | | |
| Span # 1 | 1 | 20.500 | 567.84 | 866.91 | 0.66 |
| Span # 2 | 2 | 18.170 | -1,408.55 | 2,089.19 | 0.67 |
| Span # 3 | 3 | 40.000 | 1,192.84 | 1,693.32 | 0.70 |
| Span # 4 | 4 | 12.330 | -1,573.23 | 2,082.14 | 0.76 |
| +1.20D+1.60Lr+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 20.500 | 429.77 | 866.91 | 0.50 |

# Concrete Beam

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DESCRIPTION: Grid 10

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 2 | 2 | 18.170 | -1,066.06 | 2,089.19 | 0.51 |
| Span # 3 | 3 | 40.000 | 902.80 | 1,693.32 | 0.53 |
| Span # 4 | 4 | 12.330 | -1,190.70 | 2,082.14 | 0.57 |
| +1.20D+L+1.60S+1.60H | | | | | |
| Span # 1 | 1 | 20.500 | 567.84 | 866.91 | 0.66 |
| Span # 2 | 2 | 18.170 | -1,408.55 | 2,089.19 | 0.67 |
| Span # 3 | 3 | 40.000 | 1,192.84 | 1,693.32 | 0.70 |
| Span # 4 | 4 | 12.330 | -1,573.23 | 2,082.14 | 0.76 |
| +1.20D+1.60S+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 20.500 | 429.77 | 866.91 | 0.50 |
| Span # 2 | 2 | 18.170 | -1,066.06 | 2,089.19 | 0.51 |
| Span # 3 | 3 | 40.000 | 902.80 | 1,693.32 | 0.53 |
| Span # 4 | 4 | 12.330 | -1,190.70 | 2,082.14 | 0.57 |
| +1.20D+0.50Lr+L+W+1.60H | | | | | |
| Span # 1 | 1 | 20.500 | 567.84 | 866.91 | 0.66 |
| Span # 2 | 2 | 18.170 | -1,408.55 | 2,089.19 | 0.67 |
| Span # 3 | 3 | 40.000 | 1,192.84 | 1,693.32 | 0.70 |
| Span # 4 | 4 | 12.330 | -1,573.23 | 2,082.14 | 0.76 |
| +1.20D+L+0.50S+W+1.60H | | | | | |
| Span # 1 | 1 | 20.500 | 567.84 | 866.91 | 0.66 |
| Span # 2 | 2 | 18.170 | -1,408.55 | 2,089.19 | 0.67 |
| Span # 3 | 3 | 40.000 | 1,192.84 | 1,693.32 | 0.70 |
| Span # 4 | 4 | 12.330 | -1,573.23 | 2,082.14 | 0.76 |
| +0.90D+W+1.60H | | | | | |
| Span # 1 | 1 | 20.500 | 322.32 | 866.91 | 0.37 |
| Span # 2 | 2 | 18.170 | -799.54 | 2,089.19 | 0.38 |
| Span # 3 | 3 | 40.000 | 677.10 | 1,693.32 | 0.40 |
| Span # 4 | 4 | 12.330 | -893.02 | 2,082.14 | 0.43 |
| +1.20D+L+0.20S+E+1.60H | | | | | |
| Span # 1 | 1 | 20.500 | 567.84 | 866.91 | 0.66 |
| Span # 2 | 2 | 18.170 | -1,408.55 | 2,089.19 | 0.67 |
| Span # 3 | 3 | 40.000 | 1,192.84 | 1,693.32 | 0.70 |
| Span # 4 | 4 | 12.330 | -1,573.23 | 2,082.14 | 0.76 |
| +0.90D+E+0.90H | | | | | |
| Span # 1 | 1 | 20.500 | 322.32 | 866.91 | 0.37 |
| Span # 2 | 2 | 18.170 | -799.54 | 2,089.19 | 0.38 |
| Span # 3 | 3 | 40.000 | 677.10 | 1,693.32 | 0.40 |
| Span # 4 | 4 | 12.330 | -893.02 | 2,082.14 | 0.43 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H | 1 | 0.0943 | 9.171 | +D+L+H | -0.0049 | 20.978 |
| +D+L+H | 2 | 0.0411 | 19.223 | +D+L+H | -0.0782 | 11.954 |
| +D+L+H | 3 | 0.7856 | 20.000 | +D+L+H | -0.0082 | 40.324 |
| | 4 | 0.0000 | 20.000 | +D+L+H | -0.0542 | 4.218 |

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Engineer:
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Project Descr:

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# Concrete Beam

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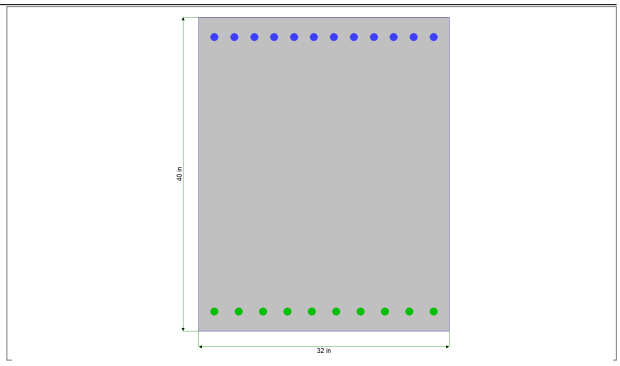
DESCRIPTION: Grid 11

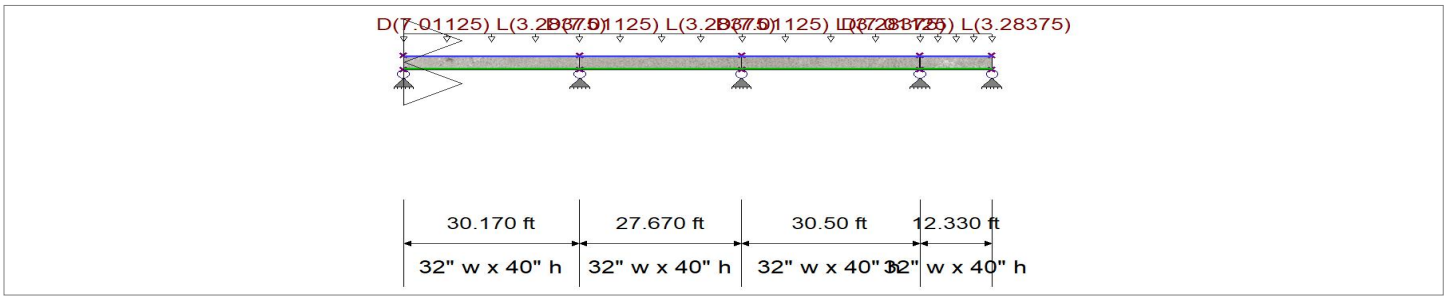
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | ϕ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| ψ Density | = | 145.0 pcf | $\beta_1$ | = | 0.80 |
| λ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 2 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 32.0 in, Height = 40.0 in

Span #1 Reinforcing....
- 12-#8 at 2.50 in from Top, from 0.0 to 30.170 ft in this span
- 10-#8 at 2.50 in from Bottom, from 0.0 to 30.170 ft in this span

Span #2 Reinforcing....
- 12-#8 at 2.50 in from Top, from 0.0 to 27.670 ft in this span
- 6-#8 at 2.50 in from Bottom, from 0.0 to 27.670 ft in this span

Span #3 Reinforcing....
- 12-#8 at 2.50 in from Top, from 0.0 to 30.50 ft in this span
- 10-#8 at 2.50 in from Bottom, from 0.0 to 30.50 ft in this span

Span #4 Reinforcing....
- 10-#8 at 2.50 in from Top, from 0.0 to 12.330 ft in this span
- 4-#8 at 2.50 in from Bottom, from 0.0 to 12.330 ft in this span

Beam self weight calculated and added to loads

Load for Span Number 1
- Uniform Load : D = 0.3950, L = 0.1850 ksf, Tributary Width = 17.750 ft

Load for Span Number 2
- Uniform Load : D = 0.3950, L = 0.1850 ksf, Tributary Width = 17.750 ft

Load for Span Number 3
- Uniform Load : D = 0.3950, L = 0.1850 ksf, Tributary Width = 17.750 ft

Load for Span Number 4
- Uniform Load : D = 0.3950, L = 0.1850 ksf, Tributary Width = 17.750 ft

## DESIGN SUMMARY

**Design OK**

| | | |
|---|---|---|
| Maximum Bending Stress Ratio = | **0.941** : 1 | |
| Section used for this span | **Typical Section** | |
| Mu : Applied | 1,200.24 k-ft | |
| Mn * Phi : Allowable | 1,276.10 k-ft | |
| Location of maximum on span | 12.703 ft | |
| Span # where maximum occurs | Span # 1 | |

Maximum Deflection

| | | | |
|---|---|---|---|
| Max Downward Transient Deflection | 0.064 in | Ratio = | 5697 >=600. |
| Max Upward Transient Deflection | -0.032 in | Ratio = | 10416 >=600. |
| Max Downward Total Deflection | 0.452 in | Ratio = | 800 >=480. |
| Max Upward Total Deflection | -0.063 in | Ratio = | 5298 >=480. |

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# Concrete Beam

DESCRIPTION: Grid 11

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 | Support 5 |
|---|---|---|---|---|---|
| Overall MAXimum | 141.079 | 390.122 | 340.379 | 312.988 | 30.578 |
| Overall MINimum | -0.044 | 0.292 | -1.084 | 4.000 | -0.620 |
| +D+H | 100.125 | 273.248 | 233.911 | 218.708 | 9.582 |
| +D+L+H, LL Comb Run (***L) | 100.133 | 273.345 | 233.407 | 240.088 | 29.091 |
| +D+L+H, LL Comb Run (**L*) | 100.684 | 264.437 | 291.623 | 288.076 | -9.091 |
| +D+L+H, LL Comb Run (**LL) | 100.667 | 264.714 | 290.649 | 310.263 | 9.925 |
| +D+L+H, LL Comb Run (*L**) | 98.918 | 318.176 | 284.442 | 213.719 | 11.181 |
| +D+L+H, LL Comb Run (*L*L) | 98.938 | 318.143 | 284.105 | 235.161 | 30.578 |
| +D+L+H, LL Comb Run (*LL*) | 99.403 | 310.556 | 340.379 | 283.053 | -6.800 |
| +D+L+H, LL Comb Run (*LLL) | 99.390 | 310.799 | 339.555 | 304.877 | 12.458 |
| +D+L+H, LL Comb Run (L***) | 140.424 | 343.872 | 219.859 | 222.351 | 8.139 |
| +D+L+H, LL Comb Run (L**L) | 140.421 | 344.031 | 219.306 | 243.628 | 27.747 |
| +D+L+H, LL Comb Run (L*L*) | 141.079 | 334.243 | 278.925 | 290.921 | -10.367 |
| +D+L+H, LL Comb Run (L*LL) | 141.064 | 334.502 | 278.006 | 312.988 | 8.728 |
| +D+L+H, LL Comb Run (LL**) | 138.668 | 390.043 | 269.803 | 216.779 | 10.214 |
| +D+L+H, LL Comb Run (LL*L) | 138.671 | 390.122 | 269.359 | 238.090 | 29.754 |
| +D+L+H, LL Comb Run (LLL*) | 139.319 | 381.425 | 327.018 | 286.026 | -8.126 |
| +D+L+H, LL Comb Run (LLLL) | 139.302 | 381.679 | 326.157 | 307.951 | 11.062 |
| +D+Lr+H, LL Comb Run (***L) | 100.125 | 273.248 | 233.911 | 218.708 | 9.582 |
| +D+Lr+H, LL Comb Run (**L*) | 100.125 | 273.248 | 233.911 | 218.708 | 9.582 |
| +D+Lr+H, LL Comb Run (**LL) | 100.125 | 273.248 | 233.911 | 218.708 | 9.582 |
| +D+Lr+H, LL Comb Run (*L**) | 100.125 | 273.248 | 233.911 | 218.708 | 9.582 |
| +D+Lr+H, LL Comb Run (*L*L) | 100.125 | 273.248 | 233.911 | 218.708 | 9.582 |
| +D+Lr+H, LL Comb Run (*LL*) | 100.125 | 273.248 | 233.911 | 218.708 | 9.582 |
| +D+Lr+H, LL Comb Run (*LLL) | 100.125 | 273.248 | 233.911 | 218.708 | 9.582 |
| +D+Lr+H, LL Comb Run (L***) | 100.125 | 273.248 | 233.911 | 218.708 | 9.582 |
| +D+Lr+H, LL Comb Run (L**L) | 100.125 | 273.248 | 233.911 | 218.708 | 9.582 |
| +D+Lr+H, LL Comb Run (L*L*) | 100.125 | 273.248 | 233.911 | 218.708 | 9.582 |
| +D+Lr+H, LL Comb Run (L*LL) | 100.125 | 273.248 | 233.911 | 218.708 | 9.582 |
| +D+Lr+H, LL Comb Run (LL**) | 100.125 | 273.248 | 233.911 | 218.708 | 9.582 |
| +D+Lr+H, LL Comb Run (LL*L) | 100.125 | 273.248 | 233.911 | 218.708 | 9.582 |
| +D+Lr+H, LL Comb Run (LLL*) | 100.125 | 273.248 | 233.911 | 218.708 | 9.582 |
| +D+Lr+H, LL Comb Run (LLLL) | 100.125 | 273.248 | 233.911 | 218.708 | 9.582 |
| +D+S+H | 100.125 | 273.248 | 233.911 | 218.708 | 9.582 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 100.131 | 273.321 | 233.533 | 234.743 | 24.214 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 100.523 | 266.772 | 276.994 | 270.856 | -4.454 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 100.517 | 266.945 | 276.381 | 287.223 | 9.990 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 99.255 | 306.800 | 272.072 | 214.590 | 11.004 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 99.268 | 306.796 | 271.806 | 230.615 | 25.603 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 99.581 | 301.302 | 313.675 | 266.877 | -2.597 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 99.574 | 301.462 | 313.149 | 283.029 | 11.990 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 130.254 | 326.429 | 223.254 | 221.411 | 8.530 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 130.252 | 326.544 | 222.844 | 237.373 | 23.230 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 130.707 | 319.439 | 267.180 | 273.119 | -5.451 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 130.700 | 319.614 | 266.558 | 289.519 | 8.969 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 129.041 | 360.859 | 260.788 | 217.255 | 10.081 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 129.045 | 360.915 | 260.462 | 233.219 | 24.751 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 129.478 | 354.514 | 303.646 | 269.108 | -3.606 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 129.466 | 354.708 | 303.027 | 285.428 | 10.876 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 100.131 | 273.321 | 233.533 | 234.743 | 24.214 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 100.523 | 266.772 | 276.994 | 270.856 | -4.454 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 100.517 | 266.945 | 276.381 | 287.223 | 9.990 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 99.255 | 306.800 | 272.072 | 214.590 | 11.004 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 99.268 | 306.796 | 271.806 | 230.615 | 25.603 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 99.581 | 301.302 | 313.675 | 266.877 | -2.597 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 99.574 | 301.462 | 313.149 | 283.029 | 11.990 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 130.254 | 326.429 | 223.254 | 221.411 | 8.530 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 130.252 | 326.544 | 222.844 | 237.373 | 23.230 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 130.707 | 319.439 | 267.180 | 273.119 | -5.451 |

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# Concrete Beam



DESCRIPTION: Grid 11

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 | Support 5 |
|---|---|---|---|---|---|
| +D+0.750L+0.750S+H, LL Comb Run (L | 130.700 | 319.614 | 266.558 | 289.519 | 8.969 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 129.041 | 360.859 | 260.788 | 217.255 | 10.081 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 129.045 | 360.915 | 260.462 | 233.219 | 24.751 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 129.478 | 354.514 | 303.646 | 269.108 | -3.606 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 129.466 | 354.708 | 303.027 | 285.428 | 10.876 |
| +D+0.60W+H | 100.125 | 273.248 | 233.911 | 218.708 | 9.582 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 100.131 | 273.321 | 233.533 | 234.743 | 24.214 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 100.523 | 266.772 | 276.994 | 270.856 | -4.454 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 100.517 | 266.945 | 276.381 | 287.223 | 9.990 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 99.255 | 306.800 | 272.072 | 214.590 | 11.004 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 99.268 | 306.796 | 271.806 | 230.615 | 25.603 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 99.581 | 301.302 | 313.675 | 266.877 | -2.597 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 99.574 | 301.462 | 313.149 | 283.029 | 11.990 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 130.254 | 326.429 | 223.254 | 221.411 | 8.530 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 130.252 | 326.544 | 222.844 | 237.373 | 23.230 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 130.707 | 319.439 | 267.180 | 273.119 | -5.451 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 130.700 | 319.614 | 266.558 | 289.519 | 8.969 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 129.041 | 360.859 | 260.788 | 217.255 | 10.081 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 129.045 | 360.915 | 260.462 | 233.219 | 24.751 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 129.478 | 354.514 | 303.646 | 269.108 | -3.606 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 129.466 | 354.708 | 303.027 | 285.428 | 10.876 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 100.131 | 273.321 | 233.533 | 234.743 | 24.214 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 100.523 | 266.772 | 276.994 | 270.856 | -4.454 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 100.517 | 266.945 | 276.381 | 287.223 | 9.990 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 99.255 | 306.800 | 272.072 | 214.590 | 11.004 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 99.268 | 306.796 | 271.806 | 230.615 | 25.603 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 99.581 | 301.302 | 313.675 | 266.877 | -2.597 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 99.574 | 301.462 | 313.149 | 283.029 | 11.990 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 130.254 | 326.429 | 223.254 | 221.411 | 8.530 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 130.252 | 326.544 | 222.844 | 237.373 | 23.230 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 130.707 | 319.439 | 267.180 | 273.119 | -5.451 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 130.700 | 319.614 | 266.558 | 289.519 | 8.969 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 129.041 | 360.859 | 260.788 | 217.255 | 10.081 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 129.045 | 360.915 | 260.462 | 233.219 | 24.751 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 129.478 | 354.514 | 303.646 | 269.108 | -3.606 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 129.466 | 354.708 | 303.027 | 285.428 | 10.876 |
| +0.60D+0.60W+0.60H | 60.579 | 162.048 | 142.188 | 131.590 | 4.941 |
| +D+0.70E+0.60H | 100.125 | 273.248 | 233.911 | 218.708 | 9.582 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 100.131 | 273.321 | 233.533 | 234.743 | 24.214 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 100.523 | 266.772 | 276.994 | 270.856 | -4.454 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 100.517 | 266.945 | 276.381 | 287.223 | 9.990 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 99.255 | 306.800 | 272.072 | 214.590 | 11.004 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 99.268 | 306.796 | 271.806 | 230.615 | 25.603 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 99.581 | 301.302 | 313.675 | 266.877 | -2.597 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 99.574 | 301.462 | 313.149 | 283.029 | 11.990 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 130.254 | 326.429 | 223.254 | 221.411 | 8.530 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 130.252 | 326.544 | 222.844 | 237.373 | 23.230 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 130.707 | 319.439 | 267.180 | 273.119 | -5.451 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 130.700 | 319.614 | 266.558 | 289.519 | 8.969 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 129.041 | 360.859 | 260.788 | 217.255 | 10.081 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 129.045 | 360.915 | 260.462 | 233.219 | 24.751 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 129.478 | 354.514 | 303.646 | 269.108 | -3.606 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 129.466 | 354.708 | 303.027 | 285.428 | 10.876 |
| +0.60D+0.70E+H | 60.579 | 162.048 | 142.188 | 131.590 | 4.941 |
| D Only | 100.125 | 273.248 | 233.911 | 218.708 | 9.582 |
| L Only, LL Comb Run (***L) | -0.044 | 0.292 | -1.084 | 22.697 | 18.627 |
| L Only, LL Comb Run (**L*) | 1.203 | -7.997 | 54.702 | 69.919 | -17.672 |
| L Only, LL Comb Run (**LL) | 1.159 | -7.705 | 53.618 | 92.616 | 0.955 |
| L Only, LL Comb Run (*L**) | -3.922 | 48.792 | 51.942 | -9.816 | 3.865 |

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# Concrete Beam

DESCRIPTION: Grid 11

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 | Support 5 |
|---|---|---|---|---|---|
| L Only, LL Comb Run (*L*L) | -3.966 | 49.084 | 50.858 | 12.881 | 22.492 |
| L Only, LL Comb Run (*LL*) | -2.719 | 40.795 | 106.644 | 60.103 | -13.807 |
| L Only, LL Comb Run (*LLL) | -2.763 | 41.087 | 105.560 | 82.800 | 4.820 |
| L Only, LL Comb Run (L***) | 42.643 | 65.913 | -11.911 | 4.000 | -1.575 |
| L Only, LL Comb Run (L**L) | 42.599 | 66.206 | -12.995 | 26.697 | 17.052 |
| L Only, LL Comb Run (L*L*) | 43.846 | 57.916 | 42.791 | 73.919 | -19.247 |
| L Only, LL Comb Run (L*LL) | 43.802 | 58.208 | 41.707 | 96.616 | -0.620 |
| L Only, LL Comb Run (LL**) | 38.721 | 114.706 | 40.031 | -5.815 | 2.290 |
| L Only, LL Comb Run (LL*L) | 38.677 | 114.998 | 38.947 | 16.882 | 20.917 |
| L Only, LL Comb Run (LLL*) | 39.924 | 106.708 | 94.733 | 64.104 | -15.382 |
| L Only, LL Comb Run (LLLL) | 39.880 | 107.000 | 93.649 | 86.800 | 3.245 |
| H Only | | | | | |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.00 | 37.50 | 191.12 | 191.12 | 0.00 | 1.00 | 135.73 | PhiVc < Vu | 55.390 | 192.0 | 12.2 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.91 | 37.50 | 162.13 | 162.13 | 336.55 | 1.00 | 135.73 | PhiVc < Vu | 26.399 | 192.0 | 15.0 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.81 | 37.50 | 133.14 | 133.14 | 617.86 | 0.67 | 130.89 | PhiVc < Vu | 2.247 | 187.1 | 15.0 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.72 | 37.50 | 104.15 | 104.15 | 843.93 | 0.39 | 126.63 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 174.8 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 7.62 | 37.50 | 75.16 | 75.16 | 1,014.76 | 0.23 | 124.34 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 172.6 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 9.53 | 37.50 | 46.17 | 46.17 | 1,130.34 | 0.13 | 122.81 | Vu < PhiVc/2 | lot Reqd 9.6. | 122.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 11.43 | 37.50 | 17.18 | 17.18 | 1,190.69 | 0.05 | 121.58 | Vu < PhiVc/2 | lot Reqd 9.6. | 121.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 13.34 | 37.50 | -20.08 | 20.08 | 1,085.49 | 0.06 | 121.77 | Vu < PhiVc/2 | lot Reqd 9.6. | 121.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 15.24 | 37.50 | -49.07 | 49.07 | 1,019.60 | 0.15 | 123.14 | Vu < PhiVc/2 | lot Reqd 9.6. | 123.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 17.15 | 37.50 | -78.06 | 78.06 | 898.47 | 0.27 | 124.94 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 173.2 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 19.05 | 37.50 | -107.05 | 107.05 | 722.10 | 0.46 | 127.78 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 176.0 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 20.96 | 37.50 | -136.04 | 136.04 | 490.49 | 0.87 | 133.75 | PhiVc < Vu | 2.291 | 302.5 | 15.0 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 22.87 | 37.50 | -165.04 | 165.04 | 203.64 | 1.00 | 135.73 | PhiVc < Vu | 29.307 | 304.5 | 15.0 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 24.77 | 37.50 | -194.03 | 194.03 | 138.45 | 1.00 | 138.69 | PhiVc < Vu | 55.335 | 307.4 | 12.2 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 26.68 | 37.50 | -223.02 | 223.02 | 535.78 | 1.00 | 138.69 | PhiVc < Vu | 84.325 | 307.4 | 8.0 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 28.58 | 37.50 | -252.01 | 252.01 | 988.35 | 0.80 | 135.08 | PhiVc < Vu | 116.927 | 303.8 | 5.8 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 30.46 | 37.50 | 227.95 | 227.95 | 1,340.65 | 0.53 | 130.36 | PhiVc < Vu | 97.591 | 299.1 | 6.9 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 32.21 | 37.50 | 201.36 | 201.36 | 965.52 | 0.65 | 132.50 | PhiVc < Vu | 68.863 | 301.2 | 9.8 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 33.96 | 37.50 | 174.77 | 174.77 | 636.85 | 0.86 | 136.16 | PhiVc < Vu | 38.616 | 304.9 | 15.0 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 35.70 | 37.50 | 148.19 | 148.19 | 354.65 | 1.00 | 138.69 | PhiVc < Vu | 9.497 | 307.4 | 15.0 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 37.45 | 37.50 | 121.60 | 121.60 | 118.92 | 1.00 | 138.69 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 186.9 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 39.20 | 37.50 | 95.01 | 95.01 | 70.35 | 1.00 | 129.80 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 178.0 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 40.95 | 37.50 | 68.42 | 68.42 | 213.16 | 1.00 | 129.80 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 178.0 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 42.69 | 37.50 | 41.84 | 41.84 | 309.50 | 0.42 | 124.67 | Vu < PhiVc/2 | lot Reqd 9.6. | 124.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 44.44 | 37.50 | 18.44 | 18.44 | 59.18 | 0.97 | 129.57 | Vu < PhiVc/2 | lot Reqd 9.6. | 129.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 46.19 | 37.50 | -37.79 | 37.79 | 332.02 | 0.36 | 124.08 | Vu < PhiVc/2 | lot Reqd 9.6. | 124.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 47.94 | 37.50 | -64.37 | 64.37 | 242.75 | 0.83 | 128.28 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 176.5 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 49.68 | 37.50 | -90.96 | 90.96 | 107.02 | 1.00 | 129.80 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 178.0 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 51.43 | 37.50 | -117.55 | 117.55 | 75.18 | 1.00 | 138.69 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 186.9 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 53.18 | 37.50 | -144.14 | 144.14 | 303.84 | 1.00 | 138.69 | PhiVc < Vu | 5.448 | 251.2 | 15.0 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 54.93 | 37.50 | -170.73 | 170.73 | 578.96 | 0.92 | 137.30 | PhiVc < Vu | 33.432 | 249.8 | 15.0 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 56.67 | 37.50 | -197.31 | 197.31 | 900.56 | 0.68 | 133.09 | PhiVc < Vu | 64.229 | 245.6 | 10.5 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 58.48 | 37.50 | 229.87 | 229.87 | 990.02 | 0.73 | 133.81 | PhiVc < Vu | 96.061 | 246.3 | 7.0 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 60.41 | 37.50 | 200.57 | 200.57 | 575.44 | 1.00 | 138.69 | PhiVc < Vu | 61.877 | 251.2 | 10.9 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 62.33 | 37.50 | 171.26 | 171.26 | 217.31 | 1.00 | 138.69 | PhiVc < Vu | 32.569 | 251.2 | 15.0 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 64.26 | 37.50 | 141.95 | 141.95 | 84.36 | 1.00 | 135.73 | PhiVc < Vu | 6.224 | 248.2 | 15.0 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 66.19 | 37.50 | 112.64 | 112.64 | 329.58 | 1.00 | 135.73 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 183.9 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 68.11 | 37.50 | 83.34 | 83.34 | 518.34 | 0.50 | 128.36 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 176.6 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 70.04 | 37.50 | 54.03 | 54.03 | 650.65 | 0.26 | 124.76 | Vu < PhiVc/2 | lot Reqd 9.6. | 124.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 71.97 | 37.50 | 24.72 | 24.72 | 726.50 | 0.11 | 122.49 | Vu < PhiVc/2 | lot Reqd 9.6. | 122.5 | 0.0 | 0.0 |

# Concrete Beam

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DESCRIPTION: Grid 11

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 73.89 | 37.50 | -19.32 | 19.32 | 819.60 | 0.07 | 122.01 | Vu < PhiVc/2 | lot Reqd 9.6. | 122.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 75.82 | 37.50 | -48.63 | 48.63 | 754.15 | 0.20 | 123.90 | Vu < PhiVc/2 | lot Reqd 9.6. | 123.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 77.75 | 37.50 | -77.94 | 77.94 | 632.24 | 0.39 | 126.62 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 174.8 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 79.67 | 37.50 | -107.24 | 107.24 | 453.89 | 0.74 | 131.85 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 180.1 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 81.60 | 37.50 | -136.55 | 136.55 | 219.07 | 1.00 | 135.73 | PhiVc < Vu | 0.8235 | 248.2 | 15.0 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 83.52 | 37.50 | -165.86 | 165.86 | 72.20 | 1.00 | 138.69 | PhiVc < Vu | 27.168 | 251.2 | 15.0 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 85.45 | 37.50 | -195.17 | 195.17 | 419.92 | 1.00 | 138.69 | PhiVc < Vu | 56.476 | 251.2 | 12.0 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 87.38 | 37.50 | -224.47 | 224.47 | 824.10 | 0.85 | 136.05 | PhiVc < Vu | 88.428 | 248.5 | 7.6 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 88.73 | 37.50 | 172.82 | 172.82 | 978.92 | 0.55 | 129.09 | PhiVc < Vu | 43.728 | 241.6 | 15.0 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 89.51 | 37.50 | 160.97 | 160.97 | 848.95 | 0.59 | 129.69 | PhiVc < Vu | 31.275 | 242.2 | 15.0 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 90.29 | 37.50 | 149.12 | 149.12 | 728.21 | 0.64 | 130.39 | PhiVc < Vu | 18.725 | 242.9 | 15.0 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 91.07 | 37.50 | 137.27 | 137.27 | 616.70 | 0.70 | 131.22 | PhiVc < Vu | 6.053 | 243.7 | 15.0 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 91.84 | 37.50 | 125.42 | 125.42 | 514.42 | 0.76 | 132.20 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 180.4 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 92.62 | 37.50 | 113.58 | 113.58 | 421.36 | 0.84 | 133.39 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 181.6 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 93.40 | 37.50 | 101.73 | 101.73 | 337.52 | 0.94 | 134.87 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 183.1 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 94.18 | 37.50 | 89.88 | 89.88 | 262.92 | 1.00 | 135.73 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 183.9 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 94.96 | 37.50 | 78.03 | 78.03 | 197.54 | 1.00 | 135.73 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 183.9 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 95.74 | 37.50 | 70.08 | 70.08 | 224.47 | 0.98 | 135.37 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 183.6 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 96.52 | 37.50 | 62.32 | 62.32 | 172.92 | 1.00 | 135.73 | Vu < PhiVc/2 | lot Reqd 9.6. | 135.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 97.30 | 37.50 | 54.56 | 54.56 | 127.41 | 1.00 | 135.73 | Vu < PhiVc/2 | lot Reqd 9.6. | 135.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 98.07 | 37.50 | 46.81 | 46.81 | 87.94 | 1.00 | 135.73 | Vu < PhiVc/2 | lot Reqd 9.6. | 135.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 98.85 | 37.50 | 39.05 | 39.05 | 54.51 | 1.00 | 135.73 | Vu < PhiVc/2 | lot Reqd 9.6. | 135.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 99.63 | 37.50 | 31.29 | 31.29 | 27.12 | 1.00 | 135.73 | Vu < PhiVc/2 | lot Reqd 9.6. | 135.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 100.41 | 37.50 | -41.88 | 41.88 | 11.38 | 1.00 | 126.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 126.8 | 0.0 | 0.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 30.170 | 1,200.24 | 1,276.10 | 0.94 |
| Span # 2 | 2 | 27.670 | -1,407.69 | 1,522.80 | 0.92 |
| Span # 3 | 3 | 30.500 | -1,140.76 | 1,524.46 | 0.75 |
| Span # 4 | 4 | 12.330 | -1,047.36 | 1,275.30 | 0.82 |
| +1.40D+1.60H | | | | | |
| Span # 1 | 1 | 30.170 | 856.92 | 1,276.10 | 0.67 |
| Span # 2 | 2 | 27.670 | -1,030.81 | 1,522.80 | 0.68 |
| Span # 3 | 3 | 30.500 | -797.86 | 1,524.46 | 0.52 |
| Span # 4 | 4 | 12.330 | -741.71 | 1,275.30 | 0.58 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (***L) | | | | | |
| Span # 1 | 1 | 30.170 | 733.66 | 1,276.10 | 0.57 |
| Span # 2 | 2 | 27.670 | -885.67 | 1,522.80 | 0.58 |
| Span # 3 | 3 | 30.500 | -675.01 | 1,524.46 | 0.44 |
| Span # 4 | 4 | 12.330 | -667.65 | 1,275.30 | 0.52 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (**L*) | | | | | |
| Span # 1 | 1 | 30.170 | 758.08 | 1,276.10 | 0.59 |
| Span # 2 | 2 | 27.670 | -885.84 | 1,522.80 | 0.58 |
| Span # 3 | 3 | 30.500 | 813.73 | 1,276.10 | 0.64 |
| Span # 4 | 4 | 12.330 | -984.38 | 1,275.30 | 0.77 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (**LL) | | | | | |
| Span # 1 | 1 | 30.170 | 757.21 | 1,276.10 | 0.59 |
| Span # 2 | 2 | 27.670 | -877.09 | 1,522.80 | 0.58 |
| Span # 3 | 3 | 30.500 | 802.43 | 1,276.10 | 0.63 |
| Span # 4 | 4 | 12.330 | -1,016.28 | 1,275.30 | 0.80 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*L**) | | | | | |
| Span # 1 | 1 | 30.170 | -1,014.37 | 1,524.46 | 0.67 |
| Span # 2 | 2 | 27.670 | -1,072.88 | 1,522.80 | 0.70 |
| Span # 3 | 3 | 30.500 | -898.02 | 1,524.46 | 0.59 |
| Span # 4 | 4 | 12.330 | -559.50 | 1,275.30 | 0.44 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*L*L) | | | | | |
| Span # 1 | 1 | 30.170 | -1,016.47 | 1,524.46 | 0.67 |
| Span # 2 | 2 | 27.670 | -1,075.00 | 1,522.80 | 0.71 |

# Concrete Beam

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DESCRIPTION: Grid 11

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 3 | 3 | 30.500 | -889.15 | 1,524.46 | 0.58 |
| Span # 4 | 4 | 12.330 | -591.40 | 1,275.30 | 0.46 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*LL*) | | | | | |
| Span # 1 | 1 | 30.170 | -956.92 | 1,524.46 | 0.63 |
| Span # 2 | 2 | 27.670 | -1,078.77 | 1,522.80 | 0.71 |
| Span # 3 | 3 | 30.500 | -1,140.76 | 1,524.46 | 0.75 |
| Span # 4 | 4 | 12.330 | -908.13 | 1,275.30 | 0.71 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*LLL) | | | | | |
| Span # 1 | 1 | 30.170 | -959.02 | 1,524.46 | 0.63 |
| Span # 2 | 2 | 27.670 | -1,070.02 | 1,522.80 | 0.70 |
| Span # 3 | 3 | 30.500 | -1,131.90 | 1,524.46 | 0.74 |
| Span # 4 | 4 | 12.330 | -940.04 | 1,275.30 | 0.74 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L***) | | | | | |
| Span # 1 | 1 | 30.170 | 1,176.32 | 1,276.10 | 0.92 |
| Span # 2 | 2 | 27.670 | -1,216.24 | 1,522.80 | 0.80 |
| Span # 3 | 3 | 30.500 | 526.71 | 1,276.10 | 0.41 |
| Span # 4 | 4 | 12.330 | -666.82 | 1,275.30 | 0.52 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L**L) | | | | | |
| Span # 1 | 1 | 30.170 | 1,175.45 | 1,276.10 | 0.92 |
| Span # 2 | 2 | 27.670 | -1,218.36 | 1,522.80 | 0.80 |
| Span # 3 | 3 | 30.500 | -649.31 | 1,524.46 | 0.43 |
| Span # 4 | 4 | 12.330 | -698.73 | 1,275.30 | 0.55 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L*L*) | | | | | |
| Span # 1 | 1 | 30.170 | 1,200.24 | 1,276.10 | 0.94 |
| Span # 2 | 2 | 27.670 | -1,158.18 | 1,522.80 | 0.76 |
| Span # 3 | 3 | 30.500 | 842.74 | 1,276.10 | 0.66 |
| Span # 4 | 4 | 12.330 | -1,015.46 | 1,275.30 | 0.80 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L*LL) | | | | | |
| Span # 1 | 1 | 30.170 | 1,199.34 | 1,276.10 | 0.94 |
| Span # 2 | 2 | 27.670 | -1,160.30 | 1,522.80 | 0.76 |
| Span # 3 | 3 | 30.500 | 831.86 | 1,276.10 | 0.65 |
| Span # 4 | 4 | 12.330 | -1,047.36 | 1,275.30 | 0.82 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LL**) | | | | | |
| Span # 1 | 1 | 30.170 | -1,318.65 | 1,524.46 | 0.86 |
| Span # 2 | 2 | 27.670 | -1,405.57 | 1,522.80 | 0.92 |
| Span # 3 | 3 | 30.500 | -810.75 | 1,524.46 | 0.53 |
| Span # 4 | 4 | 12.330 | -590.58 | 1,275.30 | 0.46 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LL*L) | | | | | |
| Span # 1 | 1 | 30.170 | -1,320.75 | 1,524.46 | 0.87 |
| Span # 2 | 2 | 27.670 | -1,407.69 | 1,522.80 | 0.92 |
| Span # 3 | 3 | 30.500 | -801.88 | 1,524.46 | 0.53 |
| Span # 4 | 4 | 12.330 | -622.48 | 1,275.30 | 0.49 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LLL*) | | | | | |
| Span # 1 | 1 | 30.170 | 1,122.80 | 1,276.10 | 0.88 |
| Span # 2 | 2 | 27.670 | -1,347.50 | 1,522.80 | 0.88 |
| Span # 3 | 3 | 30.500 | -1,053.49 | 1,524.46 | 0.69 |
| Span # 4 | 4 | 12.330 | -939.21 | 1,275.30 | 0.74 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LLLL) | | | | | |
| Span # 1 | 1 | 30.170 | 1,121.96 | 1,276.10 | 0.88 |
| Span # 2 | 2 | 27.670 | -1,349.62 | 1,522.80 | 0.89 |
| Span # 3 | 3 | 30.500 | -1,044.62 | 1,524.46 | 0.69 |
| Span # 4 | 4 | 12.330 | -971.11 | 1,275.30 | 0.76 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (***L) | | | | | |
| Span # 1 | 1 | 30.170 | 733.66 | 1,276.10 | 0.57 |
| Span # 2 | 2 | 27.670 | -885.67 | 1,522.80 | 0.58 |
| Span # 3 | 3 | 30.500 | -675.01 | 1,524.46 | 0.44 |
| Span # 4 | 4 | 12.330 | -667.65 | 1,275.30 | 0.52 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (**L*) | | | | | |
| Span # 1 | 1 | 30.170 | 758.08 | 1,276.10 | 0.59 |
| Span # 2 | 2 | 27.670 | -885.84 | 1,522.80 | 0.58 |
| Span # 3 | 3 | 30.500 | 813.73 | 1,276.10 | 0.64 |
| Span # 4 | 4 | 12.330 | -984.38 | 1,275.30 | 0.77 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (**LL) | | | | | |
| Span # 1 | 1 | 30.170 | 757.21 | 1,276.10 | 0.59 |
| Span # 2 | 2 | 27.670 | -877.09 | 1,522.80 | 0.58 |
| Span # 3 | 3 | 30.500 | 802.43 | 1,276.10 | 0.63 |
| Span # 4 | 4 | 12.330 | -1,016.28 | 1,275.30 | 0.80 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L**) | | | | | |
| Span # 1 | 1 | 30.170 | -1,014.37 | 1,524.46 | 0.67 |

# Concrete Beam

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DESCRIPTION: Grid 11

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 2 | 2 | 27.670 | -1,072.88 | 1,522.80 | 0.70 |
| Span # 3 | 3 | 30.500 | -898.02 | 1,524.46 | 0.59 |
| Span # 4 | 4 | 12.330 | -559.50 | 1,275.30 | 0.44 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L*L) | | | | | |
| Span # 1 | 1 | 30.170 | -1,016.47 | 1,524.46 | 0.67 |
| Span # 2 | 2 | 27.670 | -1,075.00 | 1,522.80 | 0.71 |
| Span # 3 | 3 | 30.500 | -889.15 | 1,524.46 | 0.58 |
| Span # 4 | 4 | 12.330 | -591.40 | 1,275.30 | 0.46 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LL*) | | | | | |
| Span # 1 | 1 | 30.170 | -956.92 | 1,524.46 | 0.63 |
| Span # 2 | 2 | 27.670 | -1,078.77 | 1,522.80 | 0.71 |
| Span # 3 | 3 | 30.500 | -1,140.76 | 1,524.46 | 0.75 |
| Span # 4 | 4 | 12.330 | -908.13 | 1,275.30 | 0.71 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LLL) | | | | | |
| Span # 1 | 1 | 30.170 | -959.02 | 1,524.46 | 0.63 |
| Span # 2 | 2 | 27.670 | -1,070.02 | 1,522.80 | 0.70 |
| Span # 3 | 3 | 30.500 | -1,131.90 | 1,524.46 | 0.74 |
| Span # 4 | 4 | 12.330 | -940.04 | 1,275.30 | 0.74 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L***) | | | | | |
| Span # 1 | 1 | 30.170 | 1,176.32 | 1,276.10 | 0.92 |
| Span # 2 | 2 | 27.670 | -1,216.24 | 1,522.80 | 0.80 |
| Span # 3 | 3 | 30.500 | 526.71 | 1,276.10 | 0.41 |
| Span # 4 | 4 | 12.330 | -666.82 | 1,275.30 | 0.52 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L**L) | | | | | |
| Span # 1 | 1 | 30.170 | 1,175.45 | 1,276.10 | 0.92 |
| Span # 2 | 2 | 27.670 | -1,218.36 | 1,522.80 | 0.80 |
| Span # 3 | 3 | 30.500 | -649.31 | 1,524.46 | 0.43 |
| Span # 4 | 4 | 12.330 | -698.73 | 1,275.30 | 0.55 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*L*) | | | | | |
| Span # 1 | 1 | 30.170 | 1,200.24 | 1,276.10 | 0.94 |
| Span # 2 | 2 | 27.670 | -1,158.18 | 1,522.80 | 0.76 |
| Span # 3 | 3 | 30.500 | 842.74 | 1,276.10 | 0.66 |
| Span # 4 | 4 | 12.330 | -1,015.46 | 1,275.30 | 0.80 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*LL) | | | | | |
| Span # 1 | 1 | 30.170 | 1,199.34 | 1,276.10 | 0.94 |
| Span # 2 | 2 | 27.670 | -1,160.30 | 1,522.80 | 0.76 |
| Span # 3 | 3 | 30.500 | 831.86 | 1,276.10 | 0.65 |
| Span # 4 | 4 | 12.330 | -1,047.36 | 1,275.30 | 0.82 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL**) | | | | | |
| Span # 1 | 1 | 30.170 | -1,318.65 | 1,524.46 | 0.86 |
| Span # 2 | 2 | 27.670 | -1,405.57 | 1,522.80 | 0.92 |
| Span # 3 | 3 | 30.500 | -810.75 | 1,524.46 | 0.53 |
| Span # 4 | 4 | 12.330 | -590.58 | 1,275.30 | 0.46 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL*L) | | | | | |
| Span # 1 | 1 | 30.170 | -1,320.75 | 1,524.46 | 0.87 |
| Span # 2 | 2 | 27.670 | -1,407.69 | 1,522.80 | 0.92 |
| Span # 3 | 3 | 30.500 | -801.88 | 1,524.46 | 0.53 |
| Span # 4 | 4 | 12.330 | -622.48 | 1,275.30 | 0.49 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLL*) | | | | | |
| Span # 1 | 1 | 30.170 | 1,122.80 | 1,276.10 | 0.88 |
| Span # 2 | 2 | 27.670 | -1,347.50 | 1,522.80 | 0.88 |
| Span # 3 | 3 | 30.500 | -1,053.49 | 1,524.46 | 0.69 |
| Span # 4 | 4 | 12.330 | -939.21 | 1,275.30 | 0.74 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLLL) | | | | | |
| Span # 1 | 1 | 30.170 | 1,121.96 | 1,276.10 | 0.88 |
| Span # 2 | 2 | 27.670 | -1,349.62 | 1,522.80 | 0.89 |
| Span # 3 | 3 | 30.500 | -1,044.62 | 1,524.46 | 0.69 |
| Span # 4 | 4 | 12.330 | -971.11 | 1,275.30 | 0.76 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (***L) | | | | | |
| Span # 1 | 1 | 30.170 | 733.97 | 1,276.10 | 0.58 |
| Span # 2 | 2 | 27.670 | -884.88 | 1,522.80 | 0.58 |
| Span # 3 | 3 | 30.500 | -678.33 | 1,524.46 | 0.44 |
| Span # 4 | 4 | 12.330 | -655.69 | 1,275.30 | 0.51 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (**L*) | | | | | |
| Span # 1 | 1 | 30.170 | 749.14 | 1,276.10 | 0.59 |
| Span # 2 | 2 | 27.670 | -847.26 | 1,522.80 | 0.56 |
| Span # 3 | 3 | 30.500 | -835.59 | 1,524.46 | 0.55 |
| Span # 4 | 4 | 12.330 | -853.65 | 1,275.30 | 0.67 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (**LL) | | | | | |

# Concrete Beam

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DESCRIPTION: Grid 11

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 1 | 1 | 30.170 | 748.60 | 1,276.10 | 0.59 |
| Span # 2 | 2 | 27.670 | -848.59 | 1,522.80 | 0.56 |
| Span # 3 | 3 | 30.500 | -830.05 | 1,524.46 | 0.54 |
| Span # 4 | 4 | 12.330 | -873.58 | 1,275.30 | 0.69 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (*L**) | | | | | |
| Span # 1 | 1 | 30.170 | -944.12 | 1,524.46 | 0.62 |
| Span # 2 | 2 | 27.670 | -1,001.88 | 1,522.80 | 0.66 |
| Span # 3 | 3 | 30.500 | -817.72 | 1,524.46 | 0.54 |
| Span # 4 | 4 | 12.330 | -588.10 | 1,275.30 | 0.46 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (*L*L) | | | | | |
| Span # 1 | 1 | 30.170 | -945.43 | 1,524.46 | 0.62 |
| Span # 2 | 2 | 27.670 | -1,003.20 | 1,522.80 | 0.66 |
| Span # 3 | 3 | 30.500 | -812.17 | 1,524.46 | 0.53 |
| Span # 4 | 4 | 12.330 | -608.03 | 1,275.30 | 0.48 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (*LL*) | | | | | |
| Span # 1 | 1 | 30.170 | -908.21 | 1,524.46 | 0.60 |
| Span # 2 | 2 | 27.670 | -965.59 | 1,522.80 | 0.63 |
| Span # 3 | 3 | 30.500 | -969.43 | 1,524.46 | 0.64 |
| Span # 4 | 4 | 12.330 | -805.99 | 1,275.30 | 0.63 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (*LLL) | | | | | |
| Span # 1 | 1 | 30.170 | -909.52 | 1,524.46 | 0.60 |
| Span # 2 | 2 | 27.670 | -966.91 | 1,522.80 | 0.63 |
| Span # 3 | 3 | 30.500 | -963.89 | 1,524.46 | 0.63 |
| Span # 4 | 4 | 12.330 | -825.93 | 1,275.30 | 0.65 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (L***) | | | | | |
| Span # 1 | 1 | 30.170 | 1,010.54 | 1,276.10 | 0.79 |
| Span # 2 | 2 | 27.670 | -1,091.48 | 1,522.80 | 0.72 |
| Span # 3 | 3 | 30.500 | -629.33 | 1,524.46 | 0.41 |
| Span # 4 | 4 | 12.330 | -655.17 | 1,275.30 | 0.51 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (L**L) | | | | | |
| Span # 1 | 1 | 30.170 | 1,009.99 | 1,276.10 | 0.79 |
| Span # 2 | 2 | 27.670 | -1,092.81 | 1,522.80 | 0.72 |
| Span # 3 | 3 | 30.500 | -626.32 | 1,524.46 | 0.41 |
| Span # 4 | 4 | 12.330 | -675.11 | 1,275.30 | 0.53 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (L*L*) | | | | | |
| Span # 1 | 1 | 30.170 | 1,025.44 | 1,276.10 | 0.80 |
| Span # 2 | 2 | 27.670 | -1,055.19 | 1,522.80 | 0.69 |
| Span # 3 | 3 | 30.500 | 713.28 | 1,276.10 | 0.56 |
| Span # 4 | 4 | 12.330 | -873.07 | 1,275.30 | 0.68 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (L*LL) | | | | | |
| Span # 1 | 1 | 30.170 | 1,024.89 | 1,276.10 | 0.80 |
| Span # 2 | 2 | 27.670 | -1,056.52 | 1,522.80 | 0.69 |
| Span # 3 | 3 | 30.500 | 706.21 | 1,276.10 | 0.55 |
| Span # 4 | 4 | 12.330 | -893.00 | 1,275.30 | 0.70 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (LL**) | | | | | |
| Span # 1 | 1 | 30.170 | 962.68 | 1,276.10 | 0.75 |
| Span # 2 | 2 | 27.670 | -1,209.81 | 1,522.80 | 0.79 |
| Span # 3 | 3 | 30.500 | -763.17 | 1,524.46 | 0.50 |
| Span # 4 | 4 | 12.330 | -607.52 | 1,275.30 | 0.48 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (LL*L) | | | | | |
| Span # 1 | 1 | 30.170 | 962.15 | 1,276.10 | 0.75 |
| Span # 2 | 2 | 27.670 | -1,211.14 | 1,522.80 | 0.80 |
| Span # 3 | 3 | 30.500 | -757.63 | 1,524.46 | 0.50 |
| Span # 4 | 4 | 12.330 | -627.46 | 1,275.30 | 0.49 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (LLL*) | | | | | |
| Span # 1 | 1 | 30.170 | 977.19 | 1,276.10 | 0.77 |
| Span # 2 | 2 | 27.670 | -1,173.52 | 1,522.80 | 0.77 |
| Span # 3 | 3 | 30.500 | -914.88 | 1,524.46 | 0.60 |
| Span # 4 | 4 | 12.330 | -825.41 | 1,275.30 | 0.65 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (LLLL) | | | | | |
| Span # 1 | 1 | 30.170 | 976.66 | 1,276.10 | 0.77 |
| Span # 2 | 2 | 27.670 | -1,174.85 | 1,522.80 | 0.77 |
| Span # 3 | 3 | 30.500 | -909.34 | 1,524.46 | 0.60 |
| Span # 4 | 4 | 12.330 | -845.35 | 1,275.30 | 0.66 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (***L) | | | | | |
| Span # 1 | 1 | 30.170 | 734.50 | 1,276.10 | 0.58 |
| Span # 2 | 2 | 27.670 | -883.55 | 1,522.80 | 0.58 |
| Span # 3 | 3 | 30.500 | -683.88 | 1,524.46 | 0.45 |
| Span # 4 | 4 | 12.330 | -635.75 | 1,275.30 | 0.50 |

# Concrete Beam

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DESCRIPTION: Grid 11

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (**L*) | | | | | |
| Span # 1 | 1 | 30.170 | 734.50 | 1,276.10 | 0.58 |
| Span # 2 | 2 | 27.670 | -883.55 | 1,522.80 | 0.58 |
| Span # 3 | 3 | 30.500 | -683.88 | 1,524.46 | 0.45 |
| Span # 4 | 4 | 12.330 | -635.75 | 1,275.30 | 0.50 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (**LL) | | | | | |
| Span # 1 | 1 | 30.170 | 734.50 | 1,276.10 | 0.58 |
| Span # 2 | 2 | 27.670 | -883.55 | 1,522.80 | 0.58 |
| Span # 3 | 3 | 30.500 | -683.88 | 1,524.46 | 0.45 |
| Span # 4 | 4 | 12.330 | -635.75 | 1,275.30 | 0.50 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*L**) | | | | | |
| Span # 1 | 1 | 30.170 | 734.50 | 1,276.10 | 0.58 |
| Span # 2 | 2 | 27.670 | -883.55 | 1,522.80 | 0.58 |
| Span # 3 | 3 | 30.500 | -683.88 | 1,524.46 | 0.45 |
| Span # 4 | 4 | 12.330 | -635.75 | 1,275.30 | 0.50 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*L*L) | | | | | |
| Span # 1 | 1 | 30.170 | 734.50 | 1,276.10 | 0.58 |
| Span # 2 | 2 | 27.670 | -883.55 | 1,522.80 | 0.58 |
| Span # 3 | 3 | 30.500 | -683.88 | 1,524.46 | 0.45 |
| Span # 4 | 4 | 12.330 | -635.75 | 1,275.30 | 0.50 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*LL*) | | | | | |
| Span # 1 | 1 | 30.170 | 734.50 | 1,276.10 | 0.58 |
| Span # 2 | 2 | 27.670 | -883.55 | 1,522.80 | 0.58 |
| Span # 3 | 3 | 30.500 | -683.88 | 1,524.46 | 0.45 |
| Span # 4 | 4 | 12.330 | -635.75 | 1,275.30 | 0.50 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*LLL) | | | | | |
| Span # 1 | 1 | 30.170 | 734.50 | 1,276.10 | 0.58 |
| Span # 2 | 2 | 27.670 | -883.55 | 1,522.80 | 0.58 |
| Span # 3 | 3 | 30.500 | -683.88 | 1,524.46 | 0.45 |
| Span # 4 | 4 | 12.330 | -635.75 | 1,275.30 | 0.50 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L***) | | | | | |
| Span # 1 | 1 | 30.170 | 734.50 | 1,276.10 | 0.58 |
| Span # 2 | 2 | 27.670 | -883.55 | 1,522.80 | 0.58 |
| Span # 3 | 3 | 30.500 | -683.88 | 1,524.46 | 0.45 |
| Span # 4 | 4 | 12.330 | -635.75 | 1,275.30 | 0.50 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L**L) | | | | | |
| Span # 1 | 1 | 30.170 | 734.50 | 1,276.10 | 0.58 |
| Span # 2 | 2 | 27.670 | -883.55 | 1,522.80 | 0.58 |
| Span # 3 | 3 | 30.500 | -683.88 | 1,524.46 | 0.45 |
| Span # 4 | 4 | 12.330 | -635.75 | 1,275.30 | 0.50 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L*L*) | | | | | |
| Span # 1 | 1 | 30.170 | 734.50 | 1,276.10 | 0.58 |
| Span # 2 | 2 | 27.670 | -883.55 | 1,522.80 | 0.58 |
| Span # 3 | 3 | 30.500 | -683.88 | 1,524.46 | 0.45 |
| Span # 4 | 4 | 12.330 | -635.75 | 1,275.30 | 0.50 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L*LL) | | | | | |
| Span # 1 | 1 | 30.170 | 734.50 | 1,276.10 | 0.58 |
| Span # 2 | 2 | 27.670 | -883.55 | 1,522.80 | 0.58 |
| Span # 3 | 3 | 30.500 | -683.88 | 1,524.46 | 0.45 |
| Span # 4 | 4 | 12.330 | -635.75 | 1,275.30 | 0.50 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LL**) | | | | | |
| Span # 1 | 1 | 30.170 | 734.50 | 1,276.10 | 0.58 |
| Span # 2 | 2 | 27.670 | -883.55 | 1,522.80 | 0.58 |
| Span # 3 | 3 | 30.500 | -683.88 | 1,524.46 | 0.45 |
| Span # 4 | 4 | 12.330 | -635.75 | 1,275.30 | 0.50 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LL*L) | | | | | |
| Span # 1 | 1 | 30.170 | 734.50 | 1,276.10 | 0.58 |
| Span # 2 | 2 | 27.670 | -883.55 | 1,522.80 | 0.58 |
| Span # 3 | 3 | 30.500 | -683.88 | 1,524.46 | 0.45 |
| Span # 4 | 4 | 12.330 | -635.75 | 1,275.30 | 0.50 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LLL*) | | | | | |
| Span # 1 | 1 | 30.170 | 734.50 | 1,276.10 | 0.58 |
| Span # 2 | 2 | 27.670 | -883.55 | 1,522.80 | 0.58 |
| Span # 3 | 3 | 30.500 | -683.88 | 1,524.46 | 0.45 |
| Span # 4 | 4 | 12.330 | -635.75 | 1,275.30 | 0.50 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LLLL) | | | | | |
| Span # 1 | 1 | 30.170 | 734.50 | 1,276.10 | 0.58 |
| Span # 2 | 2 | 27.670 | -883.55 | 1,522.80 | 0.58 |
| Span # 3 | 3 | 30.500 | -683.88 | 1,524.46 | 0.45 |

# Concrete Beam

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DESCRIPTION: Grid 11

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 4 | 4 | 12.330 | -635.75 | 1,275.30 | 0.50 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (***L) | | | | | |
| Span # 1 | 1 | 30.170 | 733.97 | 1,276.10 | 0.58 |
| Span # 2 | 2 | 27.670 | -884.88 | 1,522.80 | 0.58 |
| Span # 3 | 3 | 30.500 | -678.33 | 1,524.46 | 0.44 |
| Span # 4 | 4 | 12.330 | -655.69 | 1,275.30 | 0.51 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (**L*) | | | | | |
| Span # 1 | 1 | 30.170 | 749.14 | 1,276.10 | 0.59 |
| Span # 2 | 2 | 27.670 | -847.26 | 1,522.80 | 0.56 |
| Span # 3 | 3 | 30.500 | -835.59 | 1,524.46 | 0.55 |
| Span # 4 | 4 | 12.330 | -853.65 | 1,275.30 | 0.67 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (**LL) | | | | | |
| Span # 1 | 1 | 30.170 | 748.60 | 1,276.10 | 0.59 |
| Span # 2 | 2 | 27.670 | -848.59 | 1,522.80 | 0.56 |
| Span # 3 | 3 | 30.500 | -830.05 | 1,524.46 | 0.54 |
| Span # 4 | 4 | 12.330 | -873.58 | 1,275.30 | 0.69 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (*L**) | | | | | |
| Span # 1 | 1 | 30.170 | -944.12 | 1,524.46 | 0.62 |
| Span # 2 | 2 | 27.670 | -1,001.88 | 1,522.80 | 0.66 |
| Span # 3 | 3 | 30.500 | -817.72 | 1,524.46 | 0.54 |
| Span # 4 | 4 | 12.330 | -588.10 | 1,275.30 | 0.46 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (*L*L) | | | | | |
| Span # 1 | 1 | 30.170 | -945.43 | 1,524.46 | 0.62 |
| Span # 2 | 2 | 27.670 | -1,003.20 | 1,522.80 | 0.66 |
| Span # 3 | 3 | 30.500 | -812.17 | 1,524.46 | 0.53 |
| Span # 4 | 4 | 12.330 | -608.03 | 1,275.30 | 0.48 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (*LL*) | | | | | |
| Span # 1 | 1 | 30.170 | -908.21 | 1,524.46 | 0.60 |
| Span # 2 | 2 | 27.670 | -965.59 | 1,522.80 | 0.63 |
| Span # 3 | 3 | 30.500 | -969.43 | 1,524.46 | 0.64 |
| Span # 4 | 4 | 12.330 | -805.99 | 1,275.30 | 0.63 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (*LLL) | | | | | |
| Span # 1 | 1 | 30.170 | -909.52 | 1,524.46 | 0.60 |
| Span # 2 | 2 | 27.670 | -966.91 | 1,522.80 | 0.63 |
| Span # 3 | 3 | 30.500 | -963.89 | 1,524.46 | 0.63 |
| Span # 4 | 4 | 12.330 | -825.93 | 1,275.30 | 0.65 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (L***) | | | | | |
| Span # 1 | 1 | 30.170 | 1,010.54 | 1,276.10 | 0.79 |
| Span # 2 | 2 | 27.670 | -1,091.48 | 1,522.80 | 0.72 |
| Span # 3 | 3 | 30.500 | -629.33 | 1,524.46 | 0.41 |
| Span # 4 | 4 | 12.330 | -655.17 | 1,275.30 | 0.51 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (L**L) | | | | | |
| Span # 1 | 1 | 30.170 | 1,009.99 | 1,276.10 | 0.79 |
| Span # 2 | 2 | 27.670 | -1,092.81 | 1,522.80 | 0.72 |
| Span # 3 | 3 | 30.500 | -626.32 | 1,524.46 | 0.41 |
| Span # 4 | 4 | 12.330 | -675.11 | 1,275.30 | 0.53 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (L*L*) | | | | | |
| Span # 1 | 1 | 30.170 | 1,025.44 | 1,276.10 | 0.80 |
| Span # 2 | 2 | 27.670 | -1,055.19 | 1,522.80 | 0.69 |
| Span # 3 | 3 | 30.500 | 713.28 | 1,276.10 | 0.56 |
| Span # 4 | 4 | 12.330 | -873.07 | 1,275.30 | 0.68 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (L*LL) | | | | | |
| Span # 1 | 1 | 30.170 | 1,024.89 | 1,276.10 | 0.80 |
| Span # 2 | 2 | 27.670 | -1,056.52 | 1,522.80 | 0.69 |
| Span # 3 | 3 | 30.500 | 706.21 | 1,276.10 | 0.55 |
| Span # 4 | 4 | 12.330 | -893.00 | 1,275.30 | 0.70 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (LL**) | | | | | |
| Span # 1 | 1 | 30.170 | 962.68 | 1,276.10 | 0.75 |
| Span # 2 | 2 | 27.670 | -1,209.81 | 1,522.80 | 0.79 |
| Span # 3 | 3 | 30.500 | -763.17 | 1,524.46 | 0.50 |
| Span # 4 | 4 | 12.330 | -607.52 | 1,275.30 | 0.48 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (LL*L) | | | | | |
| Span # 1 | 1 | 30.170 | 962.15 | 1,276.10 | 0.75 |
| Span # 2 | 2 | 27.670 | -1,211.14 | 1,522.80 | 0.80 |
| Span # 3 | 3 | 30.500 | -757.63 | 1,524.46 | 0.50 |
| Span # 4 | 4 | 12.330 | -627.46 | 1,275.30 | 0.49 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (LLL*) | | | | | |
| Span # 1 | 1 | 30.170 | 977.19 | 1,276.10 | 0.77 |
| Span # 2 | 2 | 27.670 | -1,173.52 | 1,522.80 | 0.77 |

# Concrete Beam

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DESCRIPTION: Grid 11

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 3 | 3 | 30.500 | -914.88 | 1,524.46 | 0.60 |
| Span # 4 | 4 | 12.330 | -825.41 | 1,275.30 | 0.65 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (LLLL) | | | | | |
| Span # 1 | 1 | 30.170 | 976.66 | 1,276.10 | 0.77 |
| Span # 2 | 2 | 27.670 | -1,174.85 | 1,522.80 | 0.77 |
| Span # 3 | 3 | 30.500 | -909.34 | 1,524.46 | 0.60 |
| Span # 4 | 4 | 12.330 | -845.35 | 1,275.30 | 0.66 |
| +1.20D+1.60S+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 30.170 | 734.50 | 1,276.10 | 0.58 |
| Span # 2 | 2 | 27.670 | -883.55 | 1,522.80 | 0.58 |
| Span # 3 | 3 | 30.500 | -683.88 | 1,524.46 | 0.45 |
| Span # 4 | 4 | 12.330 | -635.75 | 1,275.30 | 0.50 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (***L) | | | | | |
| Span # 1 | 1 | 30.170 | 733.97 | 1,276.10 | 0.58 |
| Span # 2 | 2 | 27.670 | -884.88 | 1,522.80 | 0.58 |
| Span # 3 | 3 | 30.500 | -678.33 | 1,524.46 | 0.44 |
| Span # 4 | 4 | 12.330 | -655.69 | 1,275.30 | 0.51 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (**L*) | | | | | |
| Span # 1 | 1 | 30.170 | 749.14 | 1,276.10 | 0.59 |
| Span # 2 | 2 | 27.670 | -847.26 | 1,522.80 | 0.56 |
| Span # 3 | 3 | 30.500 | -835.59 | 1,524.46 | 0.55 |
| Span # 4 | 4 | 12.330 | -853.65 | 1,275.30 | 0.67 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (**LL) | | | | | |
| Span # 1 | 1 | 30.170 | 748.60 | 1,276.10 | 0.59 |
| Span # 2 | 2 | 27.670 | -848.59 | 1,522.80 | 0.56 |
| Span # 3 | 3 | 30.500 | -830.05 | 1,524.46 | 0.54 |
| Span # 4 | 4 | 12.330 | -873.58 | 1,275.30 | 0.69 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*L**) | | | | | |
| Span # 1 | 1 | 30.170 | -944.12 | 1,524.46 | 0.62 |
| Span # 2 | 2 | 27.670 | -1,001.88 | 1,522.80 | 0.66 |
| Span # 3 | 3 | 30.500 | -817.72 | 1,524.46 | 0.54 |
| Span # 4 | 4 | 12.330 | -588.10 | 1,275.30 | 0.46 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*L*L) | | | | | |
| Span # 1 | 1 | 30.170 | -945.43 | 1,524.46 | 0.62 |
| Span # 2 | 2 | 27.670 | -1,003.20 | 1,522.80 | 0.66 |
| Span # 3 | 3 | 30.500 | -812.17 | 1,524.46 | 0.53 |
| Span # 4 | 4 | 12.330 | -608.03 | 1,275.30 | 0.48 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*LL*) | | | | | |
| Span # 1 | 1 | 30.170 | -908.21 | 1,524.46 | 0.60 |
| Span # 2 | 2 | 27.670 | -965.59 | 1,522.80 | 0.63 |
| Span # 3 | 3 | 30.500 | -969.43 | 1,524.46 | 0.64 |
| Span # 4 | 4 | 12.330 | -805.99 | 1,275.30 | 0.63 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*LLL) | | | | | |
| Span # 1 | 1 | 30.170 | -909.52 | 1,524.46 | 0.60 |
| Span # 2 | 2 | 27.670 | -966.91 | 1,522.80 | 0.63 |
| Span # 3 | 3 | 30.500 | -963.89 | 1,524.46 | 0.63 |
| Span # 4 | 4 | 12.330 | -825.93 | 1,275.30 | 0.65 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L***) | | | | | |
| Span # 1 | 1 | 30.170 | 1,010.54 | 1,276.10 | 0.79 |
| Span # 2 | 2 | 27.670 | -1,091.48 | 1,522.80 | 0.72 |
| Span # 3 | 3 | 30.500 | -629.33 | 1,524.46 | 0.41 |
| Span # 4 | 4 | 12.330 | -655.17 | 1,275.30 | 0.51 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L**L) | | | | | |
| Span # 1 | 1 | 30.170 | 1,009.99 | 1,276.10 | 0.79 |
| Span # 2 | 2 | 27.670 | -1,092.81 | 1,522.80 | 0.72 |
| Span # 3 | 3 | 30.500 | -626.32 | 1,524.46 | 0.41 |
| Span # 4 | 4 | 12.330 | -675.11 | 1,275.30 | 0.53 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L*L*) | | | | | |
| Span # 1 | 1 | 30.170 | 1,025.44 | 1,276.10 | 0.80 |
| Span # 2 | 2 | 27.670 | -1,055.19 | 1,522.80 | 0.69 |
| Span # 3 | 3 | 30.500 | 713.28 | 1,276.10 | 0.56 |
| Span # 4 | 4 | 12.330 | -873.07 | 1,275.30 | 0.68 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L*LL) | | | | | |
| Span # 1 | 1 | 30.170 | 1,024.89 | 1,276.10 | 0.80 |
| Span # 2 | 2 | 27.670 | -1,056.52 | 1,522.80 | 0.69 |
| Span # 3 | 3 | 30.500 | 706.21 | 1,276.10 | 0.55 |
| Span # 4 | 4 | 12.330 | -893.00 | 1,275.30 | 0.70 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LL**) | | | | | |
| Span # 1 | 1 | 30.170 | 962.68 | 1,276.10 | 0.75 |

# Concrete Beam

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DESCRIPTION: Grid 11

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 2 | 2 | 27.670 | -1,209.81 | 1,522.80 | 0.79 |
| Span # 3 | 3 | 30.500 | -763.17 | 1,524.46 | 0.50 |
| Span # 4 | 4 | 12.330 | -607.52 | 1,275.30 | 0.48 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LL*L) | | | | | |
| Span # 1 | 1 | 30.170 | 962.15 | 1,276.10 | 0.75 |
| Span # 2 | 2 | 27.670 | -1,211.14 | 1,522.80 | 0.80 |
| Span # 3 | 3 | 30.500 | -757.63 | 1,524.46 | 0.50 |
| Span # 4 | 4 | 12.330 | -627.46 | 1,275.30 | 0.49 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LLL*) | | | | | |
| Span # 1 | 1 | 30.170 | 977.19 | 1,276.10 | 0.77 |
| Span # 2 | 2 | 27.670 | -1,173.52 | 1,522.80 | 0.77 |
| Span # 3 | 3 | 30.500 | -914.88 | 1,524.46 | 0.60 |
| Span # 4 | 4 | 12.330 | -825.41 | 1,275.30 | 0.65 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LLLL) | | | | | |
| Span # 1 | 1 | 30.170 | 976.66 | 1,276.10 | 0.77 |
| Span # 2 | 2 | 27.670 | -1,174.85 | 1,522.80 | 0.77 |
| Span # 3 | 3 | 30.500 | -909.34 | 1,524.46 | 0.60 |
| Span # 4 | 4 | 12.330 | -845.35 | 1,275.30 | 0.66 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (***L) | | | | | |
| Span # 1 | 1 | 30.170 | 733.97 | 1,276.10 | 0.58 |
| Span # 2 | 2 | 27.670 | -884.88 | 1,522.80 | 0.58 |
| Span # 3 | 3 | 30.500 | -678.33 | 1,524.46 | 0.44 |
| Span # 4 | 4 | 12.330 | -655.69 | 1,275.30 | 0.51 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (**L*) | | | | | |
| Span # 1 | 1 | 30.170 | 749.14 | 1,276.10 | 0.59 |
| Span # 2 | 2 | 27.670 | -847.26 | 1,522.80 | 0.56 |
| Span # 3 | 3 | 30.500 | -835.59 | 1,524.46 | 0.55 |
| Span # 4 | 4 | 12.330 | -853.65 | 1,275.30 | 0.67 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (**LL) | | | | | |
| Span # 1 | 1 | 30.170 | 748.60 | 1,276.10 | 0.59 |
| Span # 2 | 2 | 27.670 | -848.59 | 1,522.80 | 0.56 |
| Span # 3 | 3 | 30.500 | -830.05 | 1,524.46 | 0.54 |
| Span # 4 | 4 | 12.330 | -873.58 | 1,275.30 | 0.69 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (*L**) | | | | | |
| Span # 1 | 1 | 30.170 | -944.12 | 1,524.46 | 0.62 |
| Span # 2 | 2 | 27.670 | -1,001.88 | 1,522.80 | 0.66 |
| Span # 3 | 3 | 30.500 | -817.72 | 1,524.46 | 0.54 |
| Span # 4 | 4 | 12.330 | -588.10 | 1,275.30 | 0.46 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (*L*L) | | | | | |
| Span # 1 | 1 | 30.170 | -945.43 | 1,524.46 | 0.62 |
| Span # 2 | 2 | 27.670 | -1,003.20 | 1,522.80 | 0.66 |
| Span # 3 | 3 | 30.500 | -812.17 | 1,524.46 | 0.53 |
| Span # 4 | 4 | 12.330 | -608.03 | 1,275.30 | 0.48 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (*LL*) | | | | | |
| Span # 1 | 1 | 30.170 | -908.21 | 1,524.46 | 0.60 |
| Span # 2 | 2 | 27.670 | -965.59 | 1,522.80 | 0.63 |
| Span # 3 | 3 | 30.500 | -969.43 | 1,524.46 | 0.64 |
| Span # 4 | 4 | 12.330 | -805.99 | 1,275.30 | 0.63 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (*LLL) | | | | | |
| Span # 1 | 1 | 30.170 | -909.52 | 1,524.46 | 0.60 |
| Span # 2 | 2 | 27.670 | -966.91 | 1,522.80 | 0.63 |
| Span # 3 | 3 | 30.500 | -963.89 | 1,524.46 | 0.63 |
| Span # 4 | 4 | 12.330 | -825.93 | 1,275.30 | 0.65 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (L***) | | | | | |
| Span # 1 | 1 | 30.170 | 1,010.54 | 1,276.10 | 0.79 |
| Span # 2 | 2 | 27.670 | -1,091.48 | 1,522.80 | 0.72 |
| Span # 3 | 3 | 30.500 | -629.33 | 1,524.46 | 0.41 |
| Span # 4 | 4 | 12.330 | -655.17 | 1,275.30 | 0.51 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (L**L) | | | | | |
| Span # 1 | 1 | 30.170 | 1,009.99 | 1,276.10 | 0.79 |
| Span # 2 | 2 | 27.670 | -1,092.81 | 1,522.80 | 0.72 |
| Span # 3 | 3 | 30.500 | -626.32 | 1,524.46 | 0.41 |
| Span # 4 | 4 | 12.330 | -675.11 | 1,275.30 | 0.53 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (L*L*) | | | | | |
| Span # 1 | 1 | 30.170 | 1,025.44 | 1,276.10 | 0.80 |
| Span # 2 | 2 | 27.670 | -1,055.19 | 1,522.80 | 0.69 |
| Span # 3 | 3 | 30.500 | 713.28 | 1,276.10 | 0.56 |
| Span # 4 | 4 | 12.330 | -873.07 | 1,275.30 | 0.68 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (L*LL) | | | | | |

# Concrete Beam

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DESCRIPTION: Grid 11

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 1 | 1 | 30.170 | 1,024.89 | 1,276.10 | 0.80 |
| Span # 2 | 2 | 27.670 | -1,056.52 | 1,522.80 | 0.69 |
| Span # 3 | 3 | 30.500 | 706.21 | 1,276.10 | 0.55 |
| Span # 4 | 4 | 12.330 | -893.00 | 1,275.30 | 0.70 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (LL**) | | | | | |
| Span # 1 | 1 | 30.170 | 962.68 | 1,276.10 | 0.75 |
| Span # 2 | 2 | 27.670 | -1,209.81 | 1,522.80 | 0.79 |
| Span # 3 | 3 | 30.500 | -763.17 | 1,524.46 | 0.50 |
| Span # 4 | 4 | 12.330 | -607.52 | 1,275.30 | 0.48 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (LL*L) | | | | | |
| Span # 1 | 1 | 30.170 | 962.15 | 1,276.10 | 0.75 |
| Span # 2 | 2 | 27.670 | -1,211.14 | 1,522.80 | 0.80 |
| Span # 3 | 3 | 30.500 | -757.63 | 1,524.46 | 0.50 |
| Span # 4 | 4 | 12.330 | -627.46 | 1,275.30 | 0.49 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (LLL*) | | | | | |
| Span # 1 | 1 | 30.170 | 977.19 | 1,276.10 | 0.77 |
| Span # 2 | 2 | 27.670 | -1,173.52 | 1,522.80 | 0.77 |
| Span # 3 | 3 | 30.500 | -914.88 | 1,524.46 | 0.60 |
| Span # 4 | 4 | 12.330 | -825.41 | 1,275.30 | 0.65 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (LLLL) | | | | | |
| Span # 1 | 1 | 30.170 | 976.66 | 1,276.10 | 0.77 |
| Span # 2 | 2 | 27.670 | -1,174.85 | 1,522.80 | 0.77 |
| Span # 3 | 3 | 30.500 | -909.34 | 1,524.46 | 0.60 |
| Span # 4 | 4 | 12.330 | -845.35 | 1,275.30 | 0.66 |
| +0.90D+W+1.60H | | | | | |
| Span # 1 | 1 | 30.170 | 550.88 | 1,276.10 | 0.43 |
| Span # 2 | 2 | 27.670 | -662.66 | 1,522.80 | 0.44 |
| Span # 3 | 3 | 30.500 | -512.91 | 1,524.46 | 0.34 |
| Span # 4 | 4 | 12.330 | -476.81 | 1,275.30 | 0.37 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (***L) | | | | | |
| Span # 1 | 1 | 30.170 | 733.97 | 1,276.10 | 0.58 |
| Span # 2 | 2 | 27.670 | -884.88 | 1,522.80 | 0.58 |
| Span # 3 | 3 | 30.500 | -678.33 | 1,524.46 | 0.44 |
| Span # 4 | 4 | 12.330 | -655.69 | 1,275.30 | 0.51 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (**L*) | | | | | |
| Span # 1 | 1 | 30.170 | 749.14 | 1,276.10 | 0.59 |
| Span # 2 | 2 | 27.670 | -847.26 | 1,522.80 | 0.56 |
| Span # 3 | 3 | 30.500 | -835.59 | 1,524.46 | 0.55 |
| Span # 4 | 4 | 12.330 | -853.65 | 1,275.30 | 0.67 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (**LL) | | | | | |
| Span # 1 | 1 | 30.170 | 748.60 | 1,276.10 | 0.59 |
| Span # 2 | 2 | 27.670 | -848.59 | 1,522.80 | 0.56 |
| Span # 3 | 3 | 30.500 | -830.05 | 1,524.46 | 0.54 |
| Span # 4 | 4 | 12.330 | -873.58 | 1,275.30 | 0.69 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (*L**) | | | | | |
| Span # 1 | 1 | 30.170 | -944.12 | 1,524.46 | 0.62 |
| Span # 2 | 2 | 27.670 | -1,001.88 | 1,522.80 | 0.66 |
| Span # 3 | 3 | 30.500 | -817.72 | 1,524.46 | 0.54 |
| Span # 4 | 4 | 12.330 | -588.10 | 1,275.30 | 0.46 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (*L*L) | | | | | |
| Span # 1 | 1 | 30.170 | -945.43 | 1,524.46 | 0.62 |
| Span # 2 | 2 | 27.670 | -1,003.20 | 1,522.80 | 0.66 |
| Span # 3 | 3 | 30.500 | -812.17 | 1,524.46 | 0.53 |
| Span # 4 | 4 | 12.330 | -608.03 | 1,275.30 | 0.48 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (*LL*) | | | | | |
| Span # 1 | 1 | 30.170 | -908.21 | 1,524.46 | 0.60 |
| Span # 2 | 2 | 27.670 | -965.59 | 1,522.80 | 0.63 |
| Span # 3 | 3 | 30.500 | -969.43 | 1,524.46 | 0.64 |
| Span # 4 | 4 | 12.330 | -805.99 | 1,275.30 | 0.63 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (*LLL) | | | | | |
| Span # 1 | 1 | 30.170 | -909.52 | 1,524.46 | 0.60 |
| Span # 2 | 2 | 27.670 | -966.91 | 1,522.80 | 0.63 |
| Span # 3 | 3 | 30.500 | -963.89 | 1,524.46 | 0.63 |
| Span # 4 | 4 | 12.330 | -825.93 | 1,275.30 | 0.65 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (L***) | | | | | |
| Span # 1 | 1 | 30.170 | 1,010.54 | 1,276.10 | 0.79 |
| Span # 2 | 2 | 27.670 | -1,091.48 | 1,522.80 | 0.72 |
| Span # 3 | 3 | 30.500 | -629.33 | 1,524.46 | 0.41 |
| Span # 4 | 4 | 12.330 | -655.17 | 1,275.30 | 0.51 |

# Concrete Beam

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DESCRIPTION: Grid 11

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (L**L) | | | | | |
| Span # 1 | 1 | 30.170 | 1,009.99 | 1,276.10 | 0.79 |
| Span # 2 | 2 | 27.670 | -1,092.81 | 1,522.80 | 0.72 |
| Span # 3 | 3 | 30.500 | -626.32 | 1,524.46 | 0.41 |
| Span # 4 | 4 | 12.330 | -675.11 | 1,275.30 | 0.53 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (L*L*) | | | | | |
| Span # 1 | 1 | 30.170 | 1,025.44 | 1,276.10 | 0.80 |
| Span # 2 | 2 | 27.670 | -1,055.19 | 1,522.80 | 0.69 |
| Span # 3 | 3 | 30.500 | 713.28 | 1,276.10 | 0.56 |
| Span # 4 | 4 | 12.330 | -873.07 | 1,275.30 | 0.68 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (L*LL) | | | | | |
| Span # 1 | 1 | 30.170 | 1,024.89 | 1,276.10 | 0.80 |
| Span # 2 | 2 | 27.670 | -1,056.52 | 1,522.80 | 0.69 |
| Span # 3 | 3 | 30.500 | 706.21 | 1,276.10 | 0.55 |
| Span # 4 | 4 | 12.330 | -893.00 | 1,275.30 | 0.70 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (LL**) | | | | | |
| Span # 1 | 1 | 30.170 | 962.68 | 1,276.10 | 0.75 |
| Span # 2 | 2 | 27.670 | -1,209.81 | 1,522.80 | 0.79 |
| Span # 3 | 3 | 30.500 | -763.17 | 1,524.46 | 0.50 |
| Span # 4 | 4 | 12.330 | -607.52 | 1,275.30 | 0.48 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (LL*L) | | | | | |
| Span # 1 | 1 | 30.170 | 962.15 | 1,276.10 | 0.75 |
| Span # 2 | 2 | 27.670 | -1,211.14 | 1,522.80 | 0.80 |
| Span # 3 | 3 | 30.500 | -757.63 | 1,524.46 | 0.50 |
| Span # 4 | 4 | 12.330 | -627.46 | 1,275.30 | 0.49 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (LLL*) | | | | | |
| Span # 1 | 1 | 30.170 | 977.19 | 1,276.10 | 0.77 |
| Span # 2 | 2 | 27.670 | -1,173.52 | 1,522.80 | 0.77 |
| Span # 3 | 3 | 30.500 | -914.88 | 1,524.46 | 0.60 |
| Span # 4 | 4 | 12.330 | -825.41 | 1,275.30 | 0.65 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (LLLL) | | | | | |
| Span # 1 | 1 | 30.170 | 976.66 | 1,276.10 | 0.77 |
| Span # 2 | 2 | 27.670 | -1,174.85 | 1,522.80 | 0.77 |
| Span # 3 | 3 | 30.500 | -909.34 | 1,524.46 | 0.60 |
| Span # 4 | 4 | 12.330 | -845.35 | 1,275.30 | 0.66 |
| +0.90D+E+0.90H | | | | | |
| Span # 1 | 1 | 30.170 | 550.88 | 1,276.10 | 0.43 |
| Span # 2 | 2 | 27.670 | -662.66 | 1,522.80 | 0.44 |
| Span # 3 | 3 | 30.500 | -512.91 | 1,524.46 | 0.34 |
| Span # 4 | 4 | 12.330 | -476.81 | 1,275.30 | 0.37 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H, LL Comb Run (L*L*) | 1 | 0.4524 | 13.497 | +D+L+H, LL Comb Run (L*L*) | -0.0138 | 30.898 |
| +D+L+H, LL Comb Run (L*L*) | 2 | 0.0129 | 28.473 | +D+L+H, LL Comb Run (L*L*) | -0.0627 | 9.466 |
| +D+L+H, LL Comb Run (L*L*) | 3 | 0.2265 | 15.250 | +D+L+H, LL Comb Run (L*L*) | -0.0034 | 30.824 |
| +D+L+H, LL Comb Run (*L*L) | 4 | 0.0000 | 12.330 | +D+L+H, LL Comb Run (L*L*) | -0.0178 | 4.218 |

Title Block Line 1
You can change this area
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Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

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# Concrete Beam

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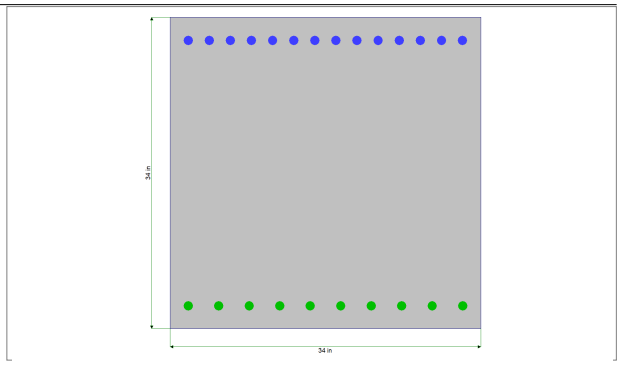
DESCRIPTION: Grid 17

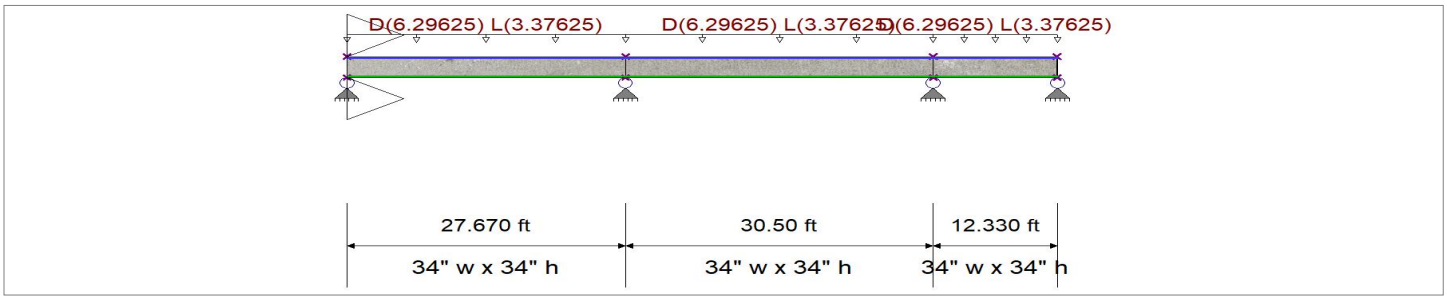
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | ϕ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| ψ Density | = | 145.0 pcf | $\beta_1$ | = | 0.80 |
| λ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 2 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 34.0 in, Height = 34.0 in

Span #1 Reinforcing....
14-#8 at 2.50 in from Top, from 0.0 to 27.670 ft in this span
10-#8 at 2.50 in from Bottom, from 0.0 to 27.670 ft in this span

Span #2 Reinforcing....
14-#8 at 2.50 in from Top, from 0.0 to 30.50 ft in this span
8-#8 at 2.50 in from Bottom, from 0.0 to 30.50 ft in this span

Span #3 Reinforcing....
10-#8 at 2.50 in from Top, from 0.0 to 12.330 ft in this span
4-#8 at 2.50 in from Bottom, from 0.0 to 12.330 ft in this span

Beam self weight calculated and added to loads

Load for Span Number 1
Uniform Load : D = 0.3450, L = 0.1850 ksf, Tributary Width = 18.250 ft

Load for Span Number 2
Uniform Load : D = 0.3450, L = 0.1850 ksf, Tributary Width = 18.250 ft

Load for Span Number 3
Uniform Load : D = 0.3450, L = 0.1850 ksf, Tributary Width = 18.250 ft

## DESIGN SUMMARY

**Design OK**

| | | | | | | |
|---|---|---|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.901** : 1 | Maximum Deflection | | | | |
| Section used for this span | **Typical Section** | Max Downward Transient Deflection | 0.068 in | Ratio = | 4860 | >=600. |
| Mu : Applied | -1,328.16 k-ft | Max Upward Transient Deflection | -0.027 in | Ratio = | 12163 | >=600. |
| Mn * Phi : Allowable | 1,474.23 k-ft | Max Downward Total Deflection | 0.391 in | Ratio = | 848 | >=480. |
| Location of maximum on span | 0.000 ft | Max Upward Total Deflection | -0.026 in | Ratio = | 5609 | >=480. |
| Span # where maximum occurs | Span # 2 | | | | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| Overall MAXimum | 118.409 | 365.215 | 286.075 | 39.016 |
| Overall MINimum | 0.193 | -1.036 | 10.877 | 0.471 |
| +D+H | 80.548 | 246.672 | 186.224 | 12.506 |
| +D+L+H, LL Comb Run (**L) | 80.638 | 246.237 | 208.035 | 32.669 |

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# Concrete Beam

DESCRIPTION: Grid 17

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| +D+L+H, LL Comb Run (*L*) | 73.560 | 302.290 | 263.316 | -10.242 |
| +D+L+H, LL Comb Run (*LL) | 73.809 | 301.321 | 286.075 | 9.349 |
| +D+L+H, LL Comb Run (L**) | 118.377 | 313.063 | 168.642 | 19.289 |
| +D+L+H, LL Comb Run (L*L) | 118.409 | 312.562 | 191.013 | 39.016 |
| +D+L+H, LL Comb Run (LL*) | 113.211 | 365.215 | 247.360 | -3.440 |
| +D+L+H, LL Comb Run (LLL) | 113.393 | 364.516 | 269.563 | 16.503 |
| +D+Lr+H, LL Comb Run (**L) | 80.548 | 246.672 | 186.224 | 12.506 |
| +D+Lr+H, LL Comb Run (*L*) | 80.548 | 246.672 | 186.224 | 12.506 |
| +D+Lr+H, LL Comb Run (*LL) | 80.548 | 246.672 | 186.224 | 12.506 |
| +D+Lr+H, LL Comb Run (L**) | 80.548 | 246.672 | 186.224 | 12.506 |
| +D+Lr+H, LL Comb Run (L*L) | 80.548 | 246.672 | 186.224 | 12.506 |
| +D+Lr+H, LL Comb Run (LL*) | 80.548 | 246.672 | 186.224 | 12.506 |
| +D+Lr+H, LL Comb Run (LLL) | 80.548 | 246.672 | 186.224 | 12.506 |
| +D+S+H | 80.548 | 246.672 | 186.224 | 12.506 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 80.616 | 246.350 | 202.560 | 27.644 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 75.532 | 287.824 | 244.709 | -4.883 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 75.698 | 287.232 | 261.430 | 10.044 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 108.881 | 296.622 | 172.710 | 17.802 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 108.898 | 296.268 | 189.458 | 32.613 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 105.042 | 335.556 | 232.179 | 0.471 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 105.161 | 335.135 | 248.564 | 15.608 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 80.616 | 246.350 | 202.560 | 27.644 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 75.532 | 287.824 | 244.709 | -4.883 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 75.698 | 287.232 | 261.430 | 10.044 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 108.881 | 296.622 | 172.710 | 17.802 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 108.898 | 296.268 | 189.458 | 32.613 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 105.042 | 335.556 | 232.179 | 0.471 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 105.161 | 335.135 | 248.564 | 15.608 |
| +D+0.60W+H | 80.548 | 246.672 | 186.224 | 12.506 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 80.616 | 246.350 | 202.560 | 27.644 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 75.532 | 287.824 | 244.709 | -4.883 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 75.698 | 287.232 | 261.430 | 10.044 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 108.881 | 296.622 | 172.710 | 17.802 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 108.898 | 296.268 | 189.458 | 32.613 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 105.042 | 335.556 | 232.179 | 0.471 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 105.161 | 335.135 | 248.564 | 15.608 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 80.616 | 246.350 | 202.560 | 27.644 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 75.532 | 287.824 | 244.709 | -4.883 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 75.698 | 287.232 | 261.430 | 10.044 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 108.881 | 296.622 | 172.710 | 17.802 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 108.898 | 296.268 | 189.458 | 32.613 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 105.042 | 335.556 | 232.179 | 0.471 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 105.161 | 335.135 | 248.564 | 15.608 |
| +0.60D+0.60W+0.60H | 47.907 | 148.513 | 112.374 | 6.775 |
| +D+0.70E+0.60H | 80.548 | 246.672 | 186.224 | 12.506 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 80.616 | 246.350 | 202.560 | 27.644 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 75.532 | 287.824 | 244.709 | -4.883 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 75.698 | 287.232 | 261.430 | 10.044 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 108.881 | 296.622 | 172.710 | 17.802 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 108.898 | 296.268 | 189.458 | 32.613 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 105.042 | 335.556 | 232.179 | 0.471 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 105.161 | 335.135 | 248.564 | 15.608 |
| +0.60D+0.70E+H | 47.907 | 148.513 | 112.374 | 6.775 |
| D Only | 80.548 | 246.672 | 186.224 | 12.506 |
| L Only, LL Comb Run (**L) | 0.193 | -1.036 | 23.310 | 19.162 |
| L Only, LL Comb Run (*L*) | -5.284 | 54.105 | 72.606 | -18.452 |
| L Only, LL Comb Run (*LL) | -5.091 | 53.069 | 95.916 | 0.710 |
| L Only, LL Comb Run (L**) | 40.584 | 60.374 | -12.433 | 4.895 |
| L Only, LL Comb Run (L*L) | 40.777 | 59.338 | 10.877 | 24.058 |

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# Concrete Beam

DESCRIPTION: Grid 17

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| L Only, LL Comb Run (LL*) | 35.300 | 114.480 | 60.174 | -13.557 |
| L Only, LL Comb Run (LLL) | 35.493 | 113.444 | 83.484 | 5.605 |
| H Only | | | | |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.00 | 31.50 | 159.35 | 159.35 | 0.00 | 1.00 | 122.73 | PhiVc < Vu | 36.626 | 163.2 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.11 | 31.50 | 143.47 | 143.47 | 167.58 | 1.00 | 122.73 | PhiVc < Vu | 20.738 | 163.2 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.21 | 31.50 | 127.58 | 127.58 | 317.58 | 1.00 | 122.73 | PhiVc < Vu | 4.851 | 163.2 | 14.1 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.32 | 31.50 | 111.69 | 111.69 | 449.99 | 0.65 | 117.57 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 161.2 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.43 | 31.50 | 95.81 | 95.81 | 564.82 | 0.45 | 114.51 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 158.1 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.53 | 31.50 | 79.92 | 79.92 | 662.07 | 0.32 | 112.61 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 156.2 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 6.64 | 31.50 | 64.03 | 64.03 | 741.73 | 0.23 | 111.27 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 154.9 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 7.75 | 31.50 | 48.14 | 48.14 | 803.81 | 0.16 | 110.25 | Vu < PhiVc/2 | lot Reqd 9.6. | 110.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 8.85 | 31.50 | 32.26 | 32.26 | 848.30 | 0.10 | 109.40 | Vu < PhiVc/2 | lot Reqd 9.6. | 109.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 9.96 | 31.50 | 16.37 | 16.37 | 875.21 | 0.05 | 108.64 | Vu < PhiVc/2 | lot Reqd 9.6. | 108.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 11.07 | 31.50 | -13.43 | 13.43 | 399.73 | 0.09 | 109.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 109.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 12.17 | 31.50 | -24.17 | 24.17 | 769.59 | 0.08 | 109.14 | Vu < PhiVc/2 | lot Reqd 9.6. | 109.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 13.28 | 31.50 | -40.06 | 40.06 | 734.05 | 0.14 | 110.04 | Vu < PhiVc/2 | lot Reqd 9.6. | 110.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 14.39 | 31.50 | -55.94 | 55.94 | 680.92 | 0.22 | 111.11 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 154.7 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 15.50 | 31.50 | -71.83 | 71.83 | 610.21 | 0.31 | 112.49 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 156.1 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 16.60 | 31.50 | -87.72 | 87.72 | 521.91 | 0.44 | 114.45 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 158.1 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 17.71 | 31.50 | -103.61 | 103.61 | 416.04 | 0.65 | 117.60 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 161.2 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 18.82 | 31.50 | -119.49 | 119.49 | 292.57 | 1.00 | 122.73 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 166.3 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 19.92 | 31.50 | -135.38 | 135.38 | 151.53 | 1.00 | 122.73 | PhiVc < Vu | 12.651 | 264.5 | 14.1 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 21.03 | 31.50 | -151.27 | 151.27 | 7.11 | 1.00 | 128.65 | PhiVc < Vu | 22.614 | 270.4 | 14.1 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 22.14 | 31.50 | -167.16 | 167.16 | 183.32 | 1.00 | 128.65 | PhiVc < Vu | 38.501 | 270.4 | 14.1 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 23.24 | 31.50 | -183.04 | 183.04 | 377.12 | 1.00 | 128.65 | PhiVc < Vu | 54.388 | 270.4 | 10.4 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 24.35 | 31.50 | -198.93 | 198.93 | 588.50 | 0.89 | 126.32 | PhiVc < Vu | 72.612 | 268.1 | 7.8 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 25.46 | 31.50 | -214.82 | 214.82 | 817.47 | 0.69 | 122.22 | PhiVc < Vu | 92.596 | 264.0 | 6.1 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 26.56 | 31.50 | -230.70 | 230.70 | 1,064.02 | 0.57 | 119.72 | PhiVc < Vu | 110.985 | 261.5 | 5.1 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 27.67 | 31.50 | 237.38 | 237.38 | 1,328.16 | 0.47 | 117.65 | PhiVc < Vu | 119.732 | 259.4 | 4.7 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 28.89 | 31.50 | 219.87 | 219.87 | 1,049.24 | 0.55 | 119.32 | PhiVc < Vu | 100.542 | 261.1 | 5.6 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 30.11 | 31.50 | 202.35 | 202.35 | 791.69 | 0.67 | 121.83 | PhiVc < Vu | 80.523 | 263.6 | 7.0 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 31.33 | 31.50 | 184.84 | 184.84 | 555.50 | 0.87 | 126.03 | PhiVc < Vu | 58.811 | 267.8 | 9.6 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 32.55 | 31.50 | 167.33 | 167.33 | 340.68 | 1.00 | 128.65 | PhiVc < Vu | 38.674 | 270.4 | 14.1 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 33.77 | 31.50 | 149.82 | 149.82 | 147.22 | 1.00 | 128.65 | PhiVc < Vu | 21.162 | 270.4 | 14.1 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 34.99 | 31.50 | 132.30 | 132.30 | 24.87 | 1.00 | 119.77 | PhiVc < Vu | 12.537 | 261.5 | 14.1 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 36.21 | 31.50 | 114.79 | 114.79 | 175.60 | 1.00 | 119.77 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 163.4 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 37.43 | 31.50 | 97.28 | 97.28 | 304.97 | 0.84 | 117.84 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 161.5 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 38.65 | 31.50 | 79.77 | 79.77 | 412.97 | 0.51 | 113.93 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 157.5 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 39.87 | 31.50 | 62.25 | 62.25 | 499.60 | 0.33 | 111.79 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 155.4 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 41.09 | 31.50 | 44.74 | 44.74 | 564.87 | 0.21 | 110.38 | Vu < PhiVc/2 | lot Reqd 9.6. | 110.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 42.31 | 31.50 | 28.20 | 28.20 | 278.00 | 0.27 | 111.07 | Vu < PhiVc/2 | lot Reqd 9.6. | 111.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 43.53 | 31.50 | 17.28 | 17.28 | 305.74 | 0.15 | 109.67 | Vu < PhiVc/2 | lot Reqd 9.6. | 109.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 44.75 | 31.50 | -21.20 | 21.20 | 683.25 | 0.08 | 108.88 | Vu < PhiVc/2 | lot Reqd 9.6. | 108.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 45.97 | 31.50 | -38.71 | 38.71 | 646.70 | 0.16 | 109.78 | Vu < PhiVc/2 | lot Reqd 9.6. | 109.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 47.19 | 31.50 | -56.23 | 56.23 | 588.79 | 0.25 | 110.89 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 154.5 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 48.41 | 31.50 | -73.74 | 73.74 | 509.51 | 0.38 | 112.42 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 156.0 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 49.63 | 31.50 | -91.25 | 91.25 | 408.86 | 0.59 | 114.86 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 158.5 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 50.85 | 31.50 | -108.76 | 108.76 | 286.85 | 1.00 | 119.71 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 163.3 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 52.07 | 31.50 | -126.28 | 126.28 | 143.48 | 1.00 | 119.77 | PhiVc < Vu | 6.509 | 214.3 | 14.1 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 53.29 | 31.50 | -143.79 | 143.79 | 21.26 | 1.00 | 128.65 | PhiVc < Vu | 15.134 | 223.2 | 14.1 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 54.51 | 31.50 | -161.30 | 161.30 | 207.37 | 1.00 | 128.65 | PhiVc < Vu | 32.647 | 223.2 | 14.1 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 55.73 | 31.50 | -178.81 | 178.81 | 414.84 | 1.00 | 128.65 | PhiVc < Vu | 50.159 | 223.2 | 11.3 | 6.0 |

# Concrete Beam

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DESCRIPTION: Grid 17

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 56.95 | 31.50 | -196.33 | 196.33 | 643.67 | 0.80 | 124.52 | PhiVc < Vu | 71.805 | 219.0 | 7.9 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 58.17 | 31.50 | 160.99 | 160.99 | 893.87 | 0.47 | 114.92 | PhiVc < Vu | 46.070 | 209.4 | 12.3 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 58.66 | 31.50 | 153.91 | 153.91 | 816.22 | 0.49 | 115.25 | PhiVc < Vu | 38.662 | 209.7 | 14.1 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 59.16 | 31.50 | 146.83 | 146.83 | 742.05 | 0.52 | 115.61 | PhiVc < Vu | 31.220 | 210.1 | 14.1 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 59.65 | 31.50 | 139.75 | 139.75 | 671.38 | 0.55 | 116.01 | PhiVc < Vu | 23.741 | 210.5 | 14.1 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 60.14 | 31.50 | 132.67 | 132.67 | 604.20 | 0.58 | 116.45 | PhiVc < Vu | 16.217 | 211.0 | 14.1 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 60.64 | 31.50 | 125.59 | 125.59 | 540.51 | 0.61 | 116.95 | PhiVc < Vu | 8.641 | 211.5 | 14.1 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 61.13 | 31.50 | 118.51 | 118.51 | 480.32 | 0.65 | 117.51 | PhiVc < Vu | 1.002 | 212.0 | 14.1 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 61.62 | 31.50 | 111.43 | 111.43 | 423.61 | 0.69 | 118.15 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 161.8 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 62.12 | 31.50 | 104.35 | 104.35 | 370.40 | 0.74 | 118.87 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 162.5 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 62.61 | 31.50 | 97.27 | 97.27 | 320.68 | 0.80 | 119.71 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 163.3 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 63.10 | 31.50 | 90.19 | 90.19 | 274.45 | 0.86 | 120.70 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 164.3 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 63.60 | 31.50 | 83.11 | 83.11 | 231.71 | 0.94 | 121.86 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 165.5 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 64.09 | 31.50 | 76.04 | 76.04 | 192.46 | 1.00 | 122.73 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 166.3 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 64.58 | 31.50 | 68.96 | 68.96 | 156.71 | 1.00 | 122.73 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 166.3 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 65.07 | 31.50 | 63.23 | 63.23 | 211.28 | 0.79 | 119.55 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 163.2 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 65.57 | 31.50 | 58.81 | 58.81 | 181.19 | 0.85 | 120.54 | Vu < PhiVc/2 | lot Reqd 9.6. | 120.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 66.06 | 31.50 | 54.40 | 54.40 | 153.27 | 0.93 | 121.72 | Vu < PhiVc/2 | lot Reqd 9.6. | 121.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 66.55 | 31.50 | 49.98 | 49.98 | 127.53 | 1.00 | 122.73 | Vu < PhiVc/2 | lot Reqd 9.6. | 122.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 67.05 | 31.50 | 45.57 | 45.57 | 103.97 | 1.00 | 122.73 | Vu < PhiVc/2 | lot Reqd 9.6. | 122.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 67.54 | 31.50 | 41.15 | 41.15 | 82.58 | 1.00 | 122.73 | Vu < PhiVc/2 | lot Reqd 9.6. | 122.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 68.03 | 31.50 | 36.74 | 36.74 | 63.37 | 1.00 | 122.73 | Vu < PhiVc/2 | lot Reqd 9.6. | 122.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 68.53 | 31.50 | 32.32 | 32.32 | 46.34 | 1.00 | 122.73 | Vu < PhiVc/2 | lot Reqd 9.6. | 122.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 69.02 | 31.50 | -32.12 | 32.12 | 63.23 | 1.00 | 113.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 113.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 69.51 | 31.50 | -39.20 | 39.20 | 45.65 | 1.00 | 113.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 113.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 70.01 | 31.50 | -46.28 | 46.28 | 24.57 | 1.00 | 113.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 113.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 70.50 | 31.50 | -53.36 | 53.36 | 0.00 | 1.00 | 113.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 113.8 | 0.0 | 0.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 27.670 | -1,282.92 | 1,475.49 | 0.87 |
| Span # 2 | 2 | 30.500 | -1,328.16 | 1,474.23 | 0.90 |
| Span # 3 | 3 | 12.330 | -893.87 | 1,064.38 | 0.84 |
| +1.40D+1.60H | | | | | |
| Span # 1 | 1 | 27.670 | -927.29 | 1,475.49 | 0.63 |
| Span # 2 | 2 | 30.500 | -960.17 | 1,474.23 | 0.65 |
| Span # 3 | 3 | 12.330 | -580.12 | 1,064.38 | 0.55 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 27.670 | -786.33 | 1,475.49 | 0.53 |
| Span # 2 | 2 | 30.500 | -814.46 | 1,474.23 | 0.55 |
| Span # 3 | 3 | 12.330 | -529.84 | 1,064.38 | 0.50 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 27.670 | -1,027.18 | 1,475.49 | 0.70 |
| Span # 2 | 2 | 30.500 | 711.46 | 857.97 | 0.83 |
| Span # 3 | 3 | 12.330 | -861.27 | 1,064.38 | 0.81 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 27.670 | -1,018.69 | 1,475.49 | 0.69 |
| Span # 2 | 2 | 30.500 | 698.89 | 857.97 | 0.81 |
| Span # 3 | 3 | 12.330 | -893.87 | 1,064.38 | 0.84 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 27.670 | 881.12 | 1,064.66 | 0.83 |
| Span # 2 | 2 | 30.500 | -1,094.24 | 1,474.23 | 0.74 |
| Span # 3 | 3 | 12.330 | -400.67 | 1,064.38 | 0.38 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 27.670 | 884.53 | 1,064.66 | 0.83 |
| Span # 2 | 2 | 30.500 | -1,085.69 | 1,474.23 | 0.74 |
| Span # 3 | 3 | 12.330 | -433.26 | 1,064.38 | 0.41 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 27.670 | -1,282.92 | 1,475.49 | 0.87 |

# Concrete Beam

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DESCRIPTION: Grid 17

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 2 | 2 | 30.500 | -1,328.16 | 1,474.23 | 0.90 |
| Span # 3 | 3 | 12.330 | -764.70 | 1,064.38 | 0.72 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 27.670 | -1,274.43 | 1,475.49 | 0.86 |
| Span # 2 | 2 | 30.500 | -1,319.62 | 1,474.23 | 0.90 |
| Span # 3 | 3 | 12.330 | -797.29 | 1,064.38 | 0.75 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 27.670 | -786.33 | 1,475.49 | 0.53 |
| Span # 2 | 2 | 30.500 | -814.46 | 1,474.23 | 0.55 |
| Span # 3 | 3 | 12.330 | -529.84 | 1,064.38 | 0.50 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 27.670 | -1,027.18 | 1,475.49 | 0.70 |
| Span # 2 | 2 | 30.500 | 711.46 | 857.97 | 0.83 |
| Span # 3 | 3 | 12.330 | -861.27 | 1,064.38 | 0.81 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 27.670 | -1,018.69 | 1,475.49 | 0.69 |
| Span # 2 | 2 | 30.500 | 698.89 | 857.97 | 0.81 |
| Span # 3 | 3 | 12.330 | -893.87 | 1,064.38 | 0.84 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 27.670 | 881.12 | 1,064.66 | 0.83 |
| Span # 2 | 2 | 30.500 | -1,094.24 | 1,474.23 | 0.74 |
| Span # 3 | 3 | 12.330 | -400.67 | 1,064.38 | 0.38 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 27.670 | 884.53 | 1,064.66 | 0.83 |
| Span # 2 | 2 | 30.500 | -1,085.69 | 1,474.23 | 0.74 |
| Span # 3 | 3 | 12.330 | -433.26 | 1,064.38 | 0.41 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 27.670 | -1,282.92 | 1,475.49 | 0.87 |
| Span # 2 | 2 | 30.500 | -1,328.16 | 1,474.23 | 0.90 |
| Span # 3 | 3 | 12.330 | -764.70 | 1,064.38 | 0.72 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 27.670 | -1,274.43 | 1,475.49 | 0.86 |
| Span # 2 | 2 | 30.500 | -1,319.62 | 1,474.23 | 0.90 |
| Span # 3 | 3 | 12.330 | -797.29 | 1,064.38 | 0.75 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 27.670 | -789.51 | 1,475.49 | 0.54 |
| Span # 2 | 2 | 30.500 | -817.66 | 1,474.23 | 0.55 |
| Span # 3 | 3 | 12.330 | -517.62 | 1,064.38 | 0.49 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 27.670 | -940.05 | 1,475.49 | 0.64 |
| Span # 2 | 2 | 30.500 | 589.20 | 857.97 | 0.69 |
| Span # 3 | 3 | 12.330 | -724.76 | 1,064.38 | 0.68 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 27.670 | -934.74 | 1,475.49 | 0.63 |
| Span # 2 | 2 | 30.500 | 581.17 | 857.97 | 0.68 |
| Span # 3 | 3 | 12.330 | -745.14 | 1,064.38 | 0.70 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 27.670 | 735.80 | 1,064.66 | 0.69 |
| Span # 2 | 2 | 30.500 | -992.53 | 1,474.23 | 0.67 |
| Span # 3 | 3 | 12.330 | -436.89 | 1,064.38 | 0.41 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 27.670 | 737.90 | 1,064.66 | 0.69 |
| Span # 2 | 2 | 30.500 | -987.18 | 1,474.23 | 0.67 |
| Span # 3 | 3 | 12.330 | -457.26 | 1,064.38 | 0.43 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 27.670 | -1,099.88 | 1,475.49 | 0.75 |
| Span # 2 | 2 | 30.500 | -1,138.73 | 1,474.23 | 0.77 |
| Span # 3 | 3 | 12.330 | -664.40 | 1,064.38 | 0.62 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 27.670 | -1,094.58 | 1,475.49 | 0.74 |
| Span # 2 | 2 | 30.500 | -1,133.39 | 1,474.23 | 0.77 |
| Span # 3 | 3 | 12.330 | -684.78 | 1,064.38 | 0.64 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 27.670 | -794.82 | 1,475.49 | 0.54 |
| Span # 2 | 2 | 30.500 | -823.00 | 1,474.23 | 0.56 |
| Span # 3 | 3 | 12.330 | -497.25 | 1,064.38 | 0.47 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 27.670 | -794.82 | 1,475.49 | 0.54 |
| Span # 2 | 2 | 30.500 | -823.00 | 1,474.23 | 0.56 |

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# Concrete Beam



DESCRIPTION: Grid 17

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 3 | 3 | 12.330 | -497.25 | 1,064.38 | 0.47 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 27.670 | -794.82 | 1,475.49 | 0.54 |
| Span # 2 | 2 | 30.500 | -823.00 | 1,474.23 | 0.56 |
| Span # 3 | 3 | 12.330 | -497.25 | 1,064.38 | 0.47 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 27.670 | -794.82 | 1,475.49 | 0.54 |
| Span # 2 | 2 | 30.500 | -823.00 | 1,474.23 | 0.56 |
| Span # 3 | 3 | 12.330 | -497.25 | 1,064.38 | 0.47 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 27.670 | -794.82 | 1,475.49 | 0.54 |
| Span # 2 | 2 | 30.500 | -823.00 | 1,474.23 | 0.56 |
| Span # 3 | 3 | 12.330 | -497.25 | 1,064.38 | 0.47 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 27.670 | -794.82 | 1,475.49 | 0.54 |
| Span # 2 | 2 | 30.500 | -823.00 | 1,474.23 | 0.56 |
| Span # 3 | 3 | 12.330 | -497.25 | 1,064.38 | 0.47 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 27.670 | -794.82 | 1,475.49 | 0.54 |
| Span # 2 | 2 | 30.500 | -823.00 | 1,474.23 | 0.56 |
| Span # 3 | 3 | 12.330 | -497.25 | 1,064.38 | 0.47 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 27.670 | -789.51 | 1,475.49 | 0.54 |
| Span # 2 | 2 | 30.500 | -817.66 | 1,474.23 | 0.55 |
| Span # 3 | 3 | 12.330 | -517.62 | 1,064.38 | 0.49 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 27.670 | -940.05 | 1,475.49 | 0.64 |
| Span # 2 | 2 | 30.500 | 589.20 | 857.97 | 0.69 |
| Span # 3 | 3 | 12.330 | -724.76 | 1,064.38 | 0.68 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 27.670 | -934.74 | 1,475.49 | 0.63 |
| Span # 2 | 2 | 30.500 | 581.17 | 857.97 | 0.68 |
| Span # 3 | 3 | 12.330 | -745.14 | 1,064.38 | 0.70 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 27.670 | 735.80 | 1,064.66 | 0.69 |
| Span # 2 | 2 | 30.500 | -992.53 | 1,474.23 | 0.67 |
| Span # 3 | 3 | 12.330 | -436.89 | 1,064.38 | 0.41 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 27.670 | 737.90 | 1,064.66 | 0.69 |
| Span # 2 | 2 | 30.500 | -987.18 | 1,474.23 | 0.67 |
| Span # 3 | 3 | 12.330 | -457.26 | 1,064.38 | 0.43 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 27.670 | -1,099.88 | 1,475.49 | 0.75 |
| Span # 2 | 2 | 30.500 | -1,138.73 | 1,474.23 | 0.77 |
| Span # 3 | 3 | 12.330 | -664.40 | 1,064.38 | 0.62 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 27.670 | -1,094.58 | 1,475.49 | 0.74 |
| Span # 2 | 2 | 30.500 | -1,133.39 | 1,474.23 | 0.77 |
| Span # 3 | 3 | 12.330 | -684.78 | 1,064.38 | 0.64 |
| +1.20D+1.60S+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 27.670 | -794.82 | 1,475.49 | 0.54 |
| Span # 2 | 2 | 30.500 | -823.00 | 1,474.23 | 0.56 |
| Span # 3 | 3 | 12.330 | -497.25 | 1,064.38 | 0.47 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 27.670 | -789.51 | 1,475.49 | 0.54 |
| Span # 2 | 2 | 30.500 | -817.66 | 1,474.23 | 0.55 |
| Span # 3 | 3 | 12.330 | -517.62 | 1,064.38 | 0.49 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 27.670 | -940.05 | 1,475.49 | 0.64 |
| Span # 2 | 2 | 30.500 | 589.20 | 857.97 | 0.69 |
| Span # 3 | 3 | 12.330 | -724.76 | 1,064.38 | 0.68 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 27.670 | -934.74 | 1,475.49 | 0.63 |
| Span # 2 | 2 | 30.500 | 581.17 | 857.97 | 0.68 |
| Span # 3 | 3 | 12.330 | -745.14 | 1,064.38 | 0.70 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 27.670 | 735.80 | 1,064.66 | 0.69 |
| Span # 2 | 2 | 30.500 | -992.53 | 1,474.23 | 0.67 |
| Span # 3 | 3 | 12.330 | -436.89 | 1,064.38 | 0.41 |

# Concrete Beam

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DESCRIPTION: Grid 17

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 27.670 | 737.90 | 1,064.66 | 0.69 |
| Span # 2 | 2 | 30.500 | -987.18 | 1,474.23 | 0.67 |
| Span # 3 | 3 | 12.330 | -457.26 | 1,064.38 | 0.43 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 27.670 | -1,099.88 | 1,475.49 | 0.75 |
| Span # 2 | 2 | 30.500 | -1,138.73 | 1,474.23 | 0.77 |
| Span # 3 | 3 | 12.330 | -664.40 | 1,064.38 | 0.62 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 27.670 | -1,094.58 | 1,475.49 | 0.74 |
| Span # 2 | 2 | 30.500 | -1,133.39 | 1,474.23 | 0.77 |
| Span # 3 | 3 | 12.330 | -684.78 | 1,064.38 | 0.64 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 27.670 | -789.51 | 1,475.49 | 0.54 |
| Span # 2 | 2 | 30.500 | -817.66 | 1,474.23 | 0.55 |
| Span # 3 | 3 | 12.330 | -517.62 | 1,064.38 | 0.49 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 27.670 | -940.05 | 1,475.49 | 0.64 |
| Span # 2 | 2 | 30.500 | 589.20 | 857.97 | 0.69 |
| Span # 3 | 3 | 12.330 | -724.76 | 1,064.38 | 0.68 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 27.670 | -934.74 | 1,475.49 | 0.63 |
| Span # 2 | 2 | 30.500 | 581.17 | 857.97 | 0.68 |
| Span # 3 | 3 | 12.330 | -745.14 | 1,064.38 | 0.70 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 27.670 | 735.80 | 1,064.66 | 0.69 |
| Span # 2 | 2 | 30.500 | -992.53 | 1,474.23 | 0.67 |
| Span # 3 | 3 | 12.330 | -436.89 | 1,064.38 | 0.41 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 27.670 | 737.90 | 1,064.66 | 0.69 |
| Span # 2 | 2 | 30.500 | -987.18 | 1,474.23 | 0.67 |
| Span # 3 | 3 | 12.330 | -457.26 | 1,064.38 | 0.43 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 27.670 | -1,099.88 | 1,475.49 | 0.75 |
| Span # 2 | 2 | 30.500 | -1,138.73 | 1,474.23 | 0.77 |
| Span # 3 | 3 | 12.330 | -664.40 | 1,064.38 | 0.62 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 27.670 | -1,094.58 | 1,475.49 | 0.74 |
| Span # 2 | 2 | 30.500 | -1,133.39 | 1,474.23 | 0.77 |
| Span # 3 | 3 | 12.330 | -684.78 | 1,064.38 | 0.64 |
| +0.90D+W+1.60H | | | | | |
| Span # 1 | 1 | 27.670 | -596.11 | 1,475.49 | 0.40 |
| Span # 2 | 2 | 30.500 | -617.25 | 1,474.23 | 0.42 |
| Span # 3 | 3 | 12.330 | -372.93 | 1,064.38 | 0.35 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 27.670 | -789.51 | 1,475.49 | 0.54 |
| Span # 2 | 2 | 30.500 | -817.66 | 1,474.23 | 0.55 |
| Span # 3 | 3 | 12.330 | -517.62 | 1,064.38 | 0.49 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 27.670 | -940.05 | 1,475.49 | 0.64 |
| Span # 2 | 2 | 30.500 | 589.20 | 857.97 | 0.69 |
| Span # 3 | 3 | 12.330 | -724.76 | 1,064.38 | 0.68 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 27.670 | -934.74 | 1,475.49 | 0.63 |
| Span # 2 | 2 | 30.500 | 581.17 | 857.97 | 0.68 |
| Span # 3 | 3 | 12.330 | -745.14 | 1,064.38 | 0.70 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 27.670 | 735.80 | 1,064.66 | 0.69 |
| Span # 2 | 2 | 30.500 | -992.53 | 1,474.23 | 0.67 |
| Span # 3 | 3 | 12.330 | -436.89 | 1,064.38 | 0.41 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 27.670 | 737.90 | 1,064.66 | 0.69 |
| Span # 2 | 2 | 30.500 | -987.18 | 1,474.23 | 0.67 |
| Span # 3 | 3 | 12.330 | -457.26 | 1,064.38 | 0.43 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 27.670 | -1,099.88 | 1,475.49 | 0.75 |
| Span # 2 | 2 | 30.500 | -1,138.73 | 1,474.23 | 0.77 |
| Span # 3 | 3 | 12.330 | -664.40 | 1,064.38 | 0.62 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (LLL) | | | | | |

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# Concrete Beam

DESCRIPTION: Grid 17

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 1 | 1 | 27.670 | -1,094.58 | 1,475.49 | 0.74 |
| Span # 2 | 2 | 30.500 | -1,133.39 | 1,474.23 | 0.77 |
| Span # 3 | 3 | 12.330 | -684.78 | 1,064.38 | 0.64 |
| +0.90D+E+0.90H | | | | | |
| Span # 1 | 1 | 27.670 | -596.11 | 1,475.49 | 0.40 |
| Span # 2 | 2 | 30.500 | -617.25 | 1,474.23 | 0.42 |
| Span # 3 | 3 | 12.330 | -372.93 | 1,064.38 | 0.35 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H, LL Comb Run (L*L) | 1 | 0.3912 | 11.621 | | 0.0000 | 0.000 |
| +D+L+H, LL Comb Run (*L*) | 2 | 0.3124 | 15.250 | +D+L+H, LL Comb Run (*L*) | -0.0038 | 30.747 |
| +D+L+H, LL Comb Run (L*L) | 3 | 0.0000 | 12.330 | +D+L+H, LL Comb Run (*L*) | -0.0264 | 3.699 |

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Engineer:
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# Concrete Beam

Lic. # : KW-06011403 — Bob D. Campbell and Co., Inc.

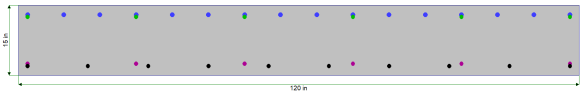
DESCRIPTION: Typical Edge Beam - without Brick

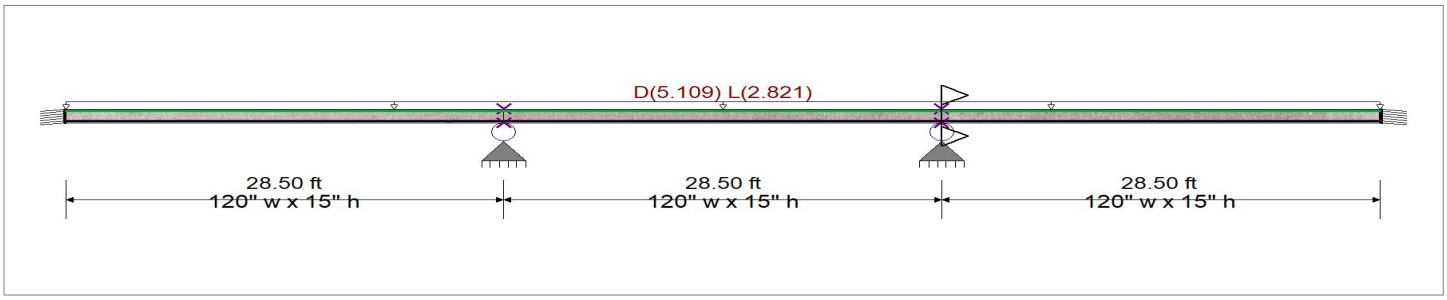
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | ϕ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| ψ Density | = | 145.0 pcf | $\beta_1$ | = | 0.80 |
| λ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 5 |
| | | | Number of Resisting Legs Per Stirrup = | | 1.0 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 120.0 in, Height = 15.0 in

Span #1 Reinforcing....
- 16-#8 at 2.0 in from Top, from 0.0 to 28.50 ft in this span
- 6-#7 at 2.50 in from Top, from 0.0 to 28.50 ft in this span
- 6-#7 at 2.50 in from Bottom, from 0.0 to 28.50 ft in this span
- 10-#7 at 2.0 in from Bottom, from 0.0 to 28.50 ft in this span

Span #2 Reinforcing....
- 16-#8 at 2.0 in from Top, from 0.0 to 28.50 ft in this span
- 6-#7 at 2.50 in from Top, from 0.0 to 28.50 ft in this span
- 6-#7 at 2.50 in from Bottom, from 0.0 to 28.50 ft in this span
- 10-#7 at 2.0 in from Bottom, from 0.0 to 28.50 ft in this span

Span #3 Reinforcing....
- 16-#8 at 2.0 in from Top, from 0.0 to 28.50 ft in this span
- 6-#7 at 2.50 in from Top, from 0.0 to 28.50 ft in this span
- 6-#7 at 2.50 in from Bottom, from 0.0 to 28.50 ft in this span
- 10-#7 at 2.0 in from Bottom, from 0.0 to 28.50 ft in this span

Loads on all spans...
D = 0.3350, L = 0.1850

Uniform Load on ALL spans : D = 0.3350, L = 0.1850 ksf, Tributary Width = 15.250 ft

## DESIGN SUMMARY

**Design OK**

| | | | | | | |
|---|---|---|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.942** : 1 | Maximum Deflection | | | | |
| Section used for this span | **Typical Section** | Max Downward Transient Deflection | 0.142 in | Ratio = | 2411 | >=360. |
| Mu : Applied | -822.34 k-ft | Max Upward Transient Deflection | -0.084 in | Ratio = | 4082 | >=360. |
| Mn * Phi : Allowable | 872.82 k-ft | Max Downward Total Deflection | 0.615 in | Ratio = | 555 | >=180. |
| Location of maximum on span | 0.000 ft | Max Upward Total Deflection | 0.018 in | Ratio = | 18709 | >=180. |
| Span # where maximum occurs | Span # 1 | | | | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| Overall MAXimum | 118.310 | 230.892 | 230.892 | 118.310 |
| Overall MINimum | 1.366 | -5.464 | -5.464 | 1.366 |
| +D+H | 72.800 | 145.599 | 145.599 | 72.800 |
| +D+L+H, LL Comb Run (**L) | 73.494 | 140.439 | 185.735 | 117.536 |
| +D+L+H, LL Comb Run (*L*) | 65.324 | 193.278 | 193.278 | 65.324 |

# Concrete Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24



DESCRIPTION: Typical Edge Beam - without Brick

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| +D+L+H, LL Comb Run (*LL) | 67.070 | 188.358 | 230.892 | 111.289 |
| +D+L+H, LL Comb Run (L**) | 117.536 | 185.735 | 140.439 | 73.494 |
| +D+L+H, LL Comb Run (L*L) | 118.310 | 180.494 | 180.494 | 118.310 |
| +D+L+H, LL Comb Run (LL*) | 111.289 | 230.892 | 188.358 | 67.070 |
| +D+L+H, LL Comb Run (LLL) | 113.003 | 226.005 | 226.005 | 113.003 |
| +D+Lr+H, LL Comb Run (**L) | 72.800 | 145.599 | 145.599 | 72.800 |
| +D+Lr+H, LL Comb Run (*L*) | 72.800 | 145.599 | 145.599 | 72.800 |
| +D+Lr+H, LL Comb Run (*LL) | 72.800 | 145.599 | 145.599 | 72.800 |
| +D+Lr+H, LL Comb Run (L**) | 72.800 | 145.599 | 145.599 | 72.800 |
| +D+Lr+H, LL Comb Run (L*L) | 72.800 | 145.599 | 145.599 | 72.800 |
| +D+Lr+H, LL Comb Run (LL*) | 72.800 | 145.599 | 145.599 | 72.800 |
| +D+Lr+H, LL Comb Run (LLL) | 72.800 | 145.599 | 145.599 | 72.800 |
| +D+S+H | 72.800 | 145.599 | 145.599 | 72.800 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 73.210 | 142.192 | 175.631 | 106.068 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 67.850 | 180.701 | 180.701 | 67.850 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 69.083 | 177.204 | 209.323 | 101.796 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 106.068 | 175.631 | 142.192 | 73.210 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 106.563 | 172.140 | 172.140 | 106.563 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 101.796 | 209.323 | 177.204 | 69.083 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 102.952 | 205.904 | 205.904 | 102.952 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 73.210 | 142.192 | 175.631 | 106.068 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 67.850 | 180.701 | 180.701 | 67.850 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 69.083 | 177.204 | 209.323 | 101.796 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 106.068 | 175.631 | 142.192 | 73.210 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 106.563 | 172.140 | 172.140 | 106.563 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 101.796 | 209.323 | 177.204 | 69.083 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 102.952 | 205.904 | 205.904 | 102.952 |
| +D+0.60W+H | 72.800 | 145.599 | 145.599 | 72.800 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 73.210 | 142.192 | 175.631 | 106.068 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 67.850 | 180.701 | 180.701 | 67.850 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 69.083 | 177.204 | 209.323 | 101.796 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 106.068 | 175.631 | 142.192 | 73.210 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 106.563 | 172.140 | 172.140 | 106.563 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 101.796 | 209.323 | 177.204 | 69.083 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 102.952 | 205.904 | 205.904 | 102.952 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 73.210 | 142.192 | 175.631 | 106.068 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 67.850 | 180.701 | 180.701 | 67.850 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 69.083 | 177.204 | 209.323 | 101.796 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 106.068 | 175.631 | 142.192 | 73.210 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 106.563 | 172.140 | 172.140 | 106.563 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 101.796 | 209.323 | 177.204 | 69.083 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 102.952 | 205.904 | 205.904 | 102.952 |
| +0.60D+0.60W+0.60H | 43.680 | 87.360 | 87.360 | 43.680 |
| +D+0.70E+0.60H | 72.800 | 145.599 | 145.599 | 72.800 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 73.210 | 142.192 | 175.631 | 106.068 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 67.850 | 180.701 | 180.701 | 67.850 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 69.083 | 177.204 | 209.323 | 101.796 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 106.068 | 175.631 | 142.192 | 73.210 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 106.563 | 172.140 | 172.140 | 106.563 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 101.796 | 209.323 | 177.204 | 69.083 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 102.952 | 205.904 | 205.904 | 102.952 |
| +0.60D+0.70E+H | 43.680 | 87.360 | 87.360 | 43.680 |
| D Only | 72.800 | 145.599 | 145.599 | 72.800 |
| L Only, LL Comb Run (**L) | 1.366 | -5.464 | 39.234 | 45.270 |
| L Only, LL Comb Run (*L*) | -6.700 | 46.903 | 46.903 | -6.700 |
| L Only, LL Comb Run (*LL) | -5.360 | 41.543 | 85.766 | 38.863 |
| L Only, LL Comb Run (L**) | 45.270 | 39.234 | -5.464 | 1.366 |
| L Only, LL Comb Run (L*L) | 46.446 | 33.960 | 33.960 | 46.446 |
| L Only, LL Comb Run (LL*) | 38.863 | 85.766 | 41.543 | -5.360 |

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# Concrete Beam



DESCRIPTION: Typical Edge Beam - without Brick

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| L Only, LL Comb Run (LLL) | 40.203 | 80.406 | 80.406 | 40.203 |
| H Only | | | | |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.00 | 13.00 | 162.40 | 162.40 | 822.34 | 0.21 | 163.70 | PhiVc/2 < Vu <= | <0.5W, Not F | 163.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.14 | 13.00 | 150.27 | 150.27 | 644.11 | 0.25 | 164.89 | PhiVc/2 < Vu <= | <0.5W, Not F | 164.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.28 | 13.00 | 138.13 | 138.13 | 479.72 | 0.31 | 166.69 | PhiVc/2 < Vu <= | <0.5W, Not F | 166.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.42 | 13.00 | 126.00 | 126.00 | 329.16 | 0.41 | 169.82 | PhiVc/2 < Vu <= | <0.5W, Not F | 169.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.56 | 13.00 | 113.87 | 113.87 | 192.44 | 0.64 | 176.71 | PhiVc/2 < Vu <= | <0.5W, Not F | 176.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.70 | 13.00 | 101.73 | 101.73 | 69.55 | 1.00 | 187.64 | PhiVc/2 < Vu <= | <0.5W, Not F | 187.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 6.84 | 13.00 | 89.60 | 89.60 | 39.51 | 1.00 | 175.19 | PhiVc/2 < Vu <= | <0.5W, Not F | 175.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 7.98 | 13.00 | 77.46 | 77.46 | 134.73 | 0.62 | 168.40 | Vu < PhiVc/2 | lot Reqd 9.6. | 168.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 9.12 | 13.00 | 65.33 | 65.33 | 216.12 | 0.33 | 163.08 | Vu < PhiVc/2 | lot Reqd 9.6. | 163.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 10.26 | 13.00 | 53.19 | 53.19 | 283.67 | 0.20 | 160.85 | Vu < PhiVc/2 | lot Reqd 9.6. | 160.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 11.40 | 13.00 | 41.06 | 41.06 | 337.39 | 0.13 | 159.56 | Vu < PhiVc/2 | lot Reqd 9.6. | 159.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 12.54 | 13.00 | 28.92 | 28.92 | 377.28 | 0.08 | 158.68 | Vu < PhiVc/2 | lot Reqd 9.6. | 158.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 13.68 | 13.00 | 16.79 | 16.79 | 403.34 | 0.05 | 158.00 | Vu < PhiVc/2 | lot Reqd 9.6. | 158.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 14.82 | 13.00 | -14.22 | 14.22 | 149.45 | 0.10 | 159.04 | Vu < PhiVc/2 | lot Reqd 9.6. | 159.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 15.96 | 13.00 | -21.20 | 21.20 | 129.26 | 0.18 | 160.39 | Vu < PhiVc/2 | lot Reqd 9.6. | 160.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 17.10 | 13.00 | -32.48 | 32.48 | 300.73 | 0.12 | 159.30 | Vu < PhiVc/2 | lot Reqd 9.6. | 159.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 18.24 | 13.00 | -44.62 | 44.62 | 256.78 | 0.19 | 160.58 | Vu < PhiVc/2 | lot Reqd 9.6. | 160.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 19.38 | 13.00 | -56.75 | 56.75 | 199.00 | 0.31 | 162.75 | Vu < PhiVc/2 | lot Reqd 9.6. | 162.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 20.52 | 13.00 | -68.89 | 68.89 | 127.39 | 0.59 | 167.73 | Vu < PhiVc/2 | lot Reqd 9.6. | 167.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 21.66 | 13.00 | -81.02 | 81.02 | 41.94 | 1.00 | 175.19 | Vu < PhiVc/2 | lot Reqd 9.6. | 175.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 22.80 | 13.00 | -93.16 | 93.16 | 57.34 | 1.00 | 187.64 | Vu < PhiVc/2 | lot Reqd 9.6. | 187.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 23.94 | 13.00 | -105.29 | 105.29 | 170.45 | 0.67 | 177.57 | PhiVc/2 < Vu <= | <0.5W, Not F | 177.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 25.08 | 13.00 | -117.42 | 117.42 | 297.40 | 0.43 | 170.21 | PhiVc/2 < Vu <= | <0.5W, Not F | 170.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 26.22 | 13.00 | -129.56 | 129.56 | 438.18 | 0.32 | 166.94 | PhiVc/2 < Vu <= | <0.5W, Not F | 166.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 27.36 | 13.00 | -141.69 | 141.69 | 592.79 | 0.26 | 165.07 | PhiVc/2 < Vu <= | <0.5W, Not F | 165.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 28.50 | 13.00 | 158.12 | 158.12 | 761.24 | 0.23 | 164.04 | PhiVc/2 < Vu <= | <0.5W, Not F | 164.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 29.64 | 13.00 | 145.98 | 145.98 | 587.90 | 0.27 | 165.38 | PhiVc/2 < Vu <= | <0.5W, Not F | 165.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 30.78 | 13.00 | 133.85 | 133.85 | 428.40 | 0.34 | 167.50 | PhiVc/2 < Vu <= | <0.5W, Not F | 167.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 31.92 | 13.00 | 121.71 | 121.71 | 282.73 | 0.47 | 171.39 | PhiVc/2 < Vu <= | <0.5W, Not F | 171.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 33.06 | 13.00 | 109.58 | 109.58 | 150.90 | 0.79 | 181.14 | PhiVc/2 < Vu <= | <0.5W, Not F | 181.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 34.20 | 13.00 | 97.44 | 97.44 | 32.90 | 1.00 | 187.64 | PhiVc/2 < Vu <= | <0.5W, Not F | 187.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 35.34 | 13.00 | 85.31 | 85.31 | 71.27 | 1.00 | 175.19 | Vu < PhiVc/2 | lot Reqd 9.6. | 175.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 36.48 | 13.00 | 73.17 | 73.17 | 161.61 | 0.49 | 166.02 | Vu < PhiVc/2 | lot Reqd 9.6. | 166.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 37.62 | 13.00 | 61.04 | 61.04 | 238.11 | 0.28 | 162.19 | Vu < PhiVc/2 | lot Reqd 9.6. | 162.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 38.76 | 13.00 | 48.90 | 48.90 | 300.78 | 0.18 | 160.36 | Vu < PhiVc/2 | lot Reqd 9.6. | 160.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 39.90 | 13.00 | 36.77 | 36.77 | 349.61 | 0.11 | 159.24 | Vu < PhiVc/2 | lot Reqd 9.6. | 159.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 41.04 | 13.00 | 24.63 | 24.63 | 384.61 | 0.07 | 158.44 | Vu < PhiVc/2 | lot Reqd 9.6. | 158.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 42.18 | 13.00 | 12.50 | 12.50 | 405.78 | 0.03 | 157.79 | Vu < PhiVc/2 | lot Reqd 9.6. | 157.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 43.32 | 13.00 | -12.50 | 12.50 | 405.78 | 0.03 | 157.79 | Vu < PhiVc/2 | lot Reqd 9.6. | 157.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 44.46 | 13.00 | -24.63 | 24.63 | 384.61 | 0.07 | 158.44 | Vu < PhiVc/2 | lot Reqd 9.6. | 158.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 45.60 | 13.00 | -36.77 | 36.77 | 349.61 | 0.11 | 159.24 | Vu < PhiVc/2 | lot Reqd 9.6. | 159.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 46.74 | 13.00 | -48.90 | 48.90 | 300.78 | 0.18 | 160.36 | Vu < PhiVc/2 | lot Reqd 9.6. | 160.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 47.88 | 13.00 | -61.04 | 61.04 | 238.11 | 0.28 | 162.19 | Vu < PhiVc/2 | lot Reqd 9.6. | 162.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 49.02 | 13.00 | -73.17 | 73.17 | 161.61 | 0.49 | 166.02 | Vu < PhiVc/2 | lot Reqd 9.6. | 166.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 50.16 | 13.00 | -85.31 | 85.31 | 71.27 | 1.00 | 175.19 | Vu < PhiVc/2 | lot Reqd 9.6. | 175.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 51.30 | 13.00 | -97.44 | 97.44 | 32.90 | 1.00 | 187.64 | PhiVc/2 < Vu <= | <0.5W, Not F | 187.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 52.44 | 13.00 | -109.58 | 109.58 | 150.90 | 0.79 | 181.14 | PhiVc/2 < Vu <= | <0.5W, Not F | 181.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 53.58 | 13.00 | -121.71 | 121.71 | 282.73 | 0.47 | 171.39 | PhiVc/2 < Vu <= | <0.5W, Not F | 171.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 54.72 | 13.00 | -133.85 | 133.85 | 428.40 | 0.34 | 167.50 | PhiVc/2 < Vu <= | <0.5W, Not F | 167.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 55.86 | 13.00 | -145.98 | 145.98 | 587.90 | 0.27 | 165.38 | PhiVc/2 < Vu <= | <0.5W, Not F | 165.4 | 0.0 | 0.0 |

# Concrete Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24



DESCRIPTION: Typical Edge Beam - without Brick

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 57.00 | 13.00 | 153.83 | 153.83 | 761.24 | 0.22 | 163.86 | PhiVc/2 < Vu <= | <0.5W, Not F | 163.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 58.14 | 13.00 | 141.69 | 141.69 | 592.79 | 0.26 | 165.07 | PhiVc/2 < Vu <= | <0.5W, Not F | 165.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 59.28 | 13.00 | 129.56 | 129.56 | 438.18 | 0.32 | 166.94 | PhiVc/2 < Vu <= | <0.5W, Not F | 166.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 60.42 | 13.00 | 117.42 | 117.42 | 297.40 | 0.43 | 170.21 | PhiVc/2 < Vu <= | <0.5W, Not F | 170.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 61.56 | 13.00 | 105.29 | 105.29 | 170.45 | 0.67 | 177.57 | PhiVc/2 < Vu <= | <0.5W, Not F | 177.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 62.70 | 13.00 | 93.16 | 93.16 | 57.34 | 1.00 | 187.64 | Vu < PhiVc/2 | lot Reqd 9.6. | 187.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 63.84 | 13.00 | 81.02 | 81.02 | 41.94 | 1.00 | 175.19 | Vu < PhiVc/2 | lot Reqd 9.6. | 175.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 64.98 | 13.00 | 68.89 | 68.89 | 127.39 | 0.59 | 167.73 | Vu < PhiVc/2 | lot Reqd 9.6. | 167.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 66.12 | 13.00 | 56.75 | 56.75 | 199.00 | 0.31 | 162.75 | Vu < PhiVc/2 | lot Reqd 9.6. | 162.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 67.26 | 13.00 | 44.62 | 44.62 | 256.78 | 0.19 | 160.58 | Vu < PhiVc/2 | lot Reqd 9.6. | 160.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 68.40 | 13.00 | 32.48 | 32.48 | 300.73 | 0.12 | 159.30 | Vu < PhiVc/2 | lot Reqd 9.6. | 159.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 69.54 | 13.00 | 21.20 | 21.20 | 129.26 | 0.18 | 160.39 | Vu < PhiVc/2 | lot Reqd 9.6. | 160.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 70.68 | 13.00 | 14.22 | 14.22 | 149.45 | 0.10 | 159.04 | Vu < PhiVc/2 | lot Reqd 9.6. | 159.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 71.82 | 13.00 | -16.79 | 16.79 | 403.34 | 0.05 | 158.00 | Vu < PhiVc/2 | lot Reqd 9.6. | 158.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 72.96 | 13.00 | -28.92 | 28.92 | 377.28 | 0.08 | 158.68 | Vu < PhiVc/2 | lot Reqd 9.6. | 158.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 74.10 | 13.00 | -41.06 | 41.06 | 337.39 | 0.13 | 159.56 | Vu < PhiVc/2 | lot Reqd 9.6. | 159.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 75.24 | 13.00 | -53.19 | 53.19 | 283.67 | 0.20 | 160.85 | Vu < PhiVc/2 | lot Reqd 9.6. | 160.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 76.38 | 13.00 | -65.33 | 65.33 | 216.12 | 0.33 | 163.08 | Vu < PhiVc/2 | lot Reqd 9.6. | 163.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 77.52 | 13.00 | -77.46 | 77.46 | 134.73 | 0.62 | 168.40 | Vu < PhiVc/2 | lot Reqd 9.6. | 168.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 78.66 | 13.00 | -89.60 | 89.60 | 39.51 | 1.00 | 175.19 | PhiVc/2 < Vu <= | <0.5W, Not F | 175.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 79.80 | 13.00 | -101.73 | 101.73 | 69.55 | 1.00 | 187.64 | PhiVc/2 < Vu <= | <0.5W, Not F | 187.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 80.94 | 13.00 | -113.87 | 113.87 | 192.44 | 0.64 | 176.71 | PhiVc/2 < Vu <= | <0.5W, Not F | 176.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 82.08 | 13.00 | -126.00 | 126.00 | 329.16 | 0.41 | 169.82 | PhiVc/2 < Vu <= | <0.5W, Not F | 169.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 83.22 | 13.00 | -138.13 | 138.13 | 479.72 | 0.31 | 166.69 | PhiVc/2 < Vu <= | <0.5W, Not F | 166.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 84.36 | 13.00 | -150.27 | 150.27 | 644.11 | 0.25 | 164.89 | PhiVc/2 < Vu <= | <0.5W, Not F | 164.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 85.50 | 13.00 | -162.40 | 162.40 | 822.34 | 0.21 | 163.70 | PhiVc/2 < Vu <= | <0.5W, Not F | 163.7 | 0.0 | 0.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 28.500 | -822.34 | 872.82 | 0.94 |
| Span # 2 | 2 | 28.500 | -761.24 | 872.82 | 0.87 |
| Span # 3 | 3 | 28.500 | -822.34 | 872.82 | 0.94 |
| +1.40D+1.60H | | | | | |
| Span # 1 | 1 | 28.500 | -484.11 | 872.82 | 0.55 |
| Span # 2 | 2 | 28.500 | -484.12 | 872.82 | 0.55 |
| Span # 3 | 3 | 28.500 | -484.12 | 872.82 | 0.55 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 28.500 | -435.32 | 872.82 | 0.50 |
| Span # 2 | 2 | 28.500 | -539.84 | 872.82 | 0.62 |
| Span # 3 | 3 | 28.500 | -801.97 | 872.82 | 0.92 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 28.500 | -600.13 | 872.82 | 0.69 |
| Span # 2 | 2 | 28.500 | 462.10 | 542.67 | 0.85 |
| Span # 3 | 3 | 28.500 | -618.65 | 872.82 | 0.71 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 28.500 | -559.80 | 872.82 | 0.64 |
| Span # 2 | 2 | 28.500 | -731.39 | 872.82 | 0.84 |
| Span # 3 | 3 | 28.500 | -761.24 | 872.82 | 0.87 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 28.500 | -801.97 | 872.82 | 0.92 |
| Span # 2 | 2 | 28.500 | -557.55 | 872.82 | 0.64 |
| Span # 3 | 3 | 28.500 | -435.32 | 872.82 | 0.50 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 28.500 | -822.34 | 872.82 | 0.94 |
| Span # 2 | 2 | 28.500 | -516.81 | 872.82 | 0.59 |
| Span # 3 | 3 | 28.500 | -822.34 | 872.82 | 0.94 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 28.500 | -732.21 | 872.82 | 0.84 |
| Span # 2 | 2 | 28.500 | -761.24 | 872.82 | 0.87 |

# Concrete Beam

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DESCRIPTION: Typical Edge Beam - without Brick

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 3 | 3 | 28.500 | -577.91 | 872.82 | 0.66 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 28.500 | -720.49 | 872.82 | 0.83 |
| Span # 2 | 2 | 28.500 | -720.50 | 872.82 | 0.83 |
| Span # 3 | 3 | 28.500 | -720.50 | 872.82 | 0.83 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 28.500 | -435.32 | 872.82 | 0.50 |
| Span # 2 | 2 | 28.500 | -539.84 | 872.82 | 0.62 |
| Span # 3 | 3 | 28.500 | -801.97 | 872.82 | 0.92 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 28.500 | -600.13 | 872.82 | 0.69 |
| Span # 2 | 2 | 28.500 | 462.10 | 542.67 | 0.85 |
| Span # 3 | 3 | 28.500 | -618.65 | 872.82 | 0.71 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 28.500 | -559.80 | 872.82 | 0.64 |
| Span # 2 | 2 | 28.500 | -731.39 | 872.82 | 0.84 |
| Span # 3 | 3 | 28.500 | -761.24 | 872.82 | 0.87 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 28.500 | -801.97 | 872.82 | 0.92 |
| Span # 2 | 2 | 28.500 | -557.55 | 872.82 | 0.64 |
| Span # 3 | 3 | 28.500 | -435.32 | 872.82 | 0.50 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 28.500 | -822.34 | 872.82 | 0.94 |
| Span # 2 | 2 | 28.500 | -516.81 | 872.82 | 0.59 |
| Span # 3 | 3 | 28.500 | -822.34 | 872.82 | 0.94 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 28.500 | -732.21 | 872.82 | 0.84 |
| Span # 2 | 2 | 28.500 | -761.24 | 872.82 | 0.87 |
| Span # 3 | 3 | 28.500 | -577.91 | 872.82 | 0.66 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 28.500 | -720.49 | 872.82 | 0.83 |
| Span # 2 | 2 | 28.500 | -720.50 | 872.82 | 0.83 |
| Span # 3 | 3 | 28.500 | -720.50 | 872.82 | 0.83 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 28.500 | -427.68 | 872.82 | 0.49 |
| Span # 2 | 2 | 28.500 | -486.82 | 872.82 | 0.56 |
| Span # 3 | 3 | 28.500 | -656.84 | 872.82 | 0.75 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 28.500 | -524.51 | 872.82 | 0.60 |
| Span # 2 | 2 | 28.500 | 366.61 | 542.67 | 0.68 |
| Span # 3 | 3 | 28.500 | -542.27 | 872.82 | 0.62 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 28.500 | -499.30 | 872.82 | 0.57 |
| Span # 2 | 2 | 28.500 | -606.55 | 872.82 | 0.69 |
| Span # 3 | 3 | 28.500 | -631.39 | 872.82 | 0.72 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 28.500 | -656.84 | 872.82 | 0.75 |
| Span # 2 | 2 | 28.500 | -504.08 | 872.82 | 0.58 |
| Span # 3 | 3 | 28.500 | -427.68 | 872.82 | 0.49 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 28.500 | -669.57 | 872.82 | 0.77 |
| Span # 2 | 2 | 28.500 | -478.61 | 872.82 | 0.55 |
| Span # 3 | 3 | 28.500 | -669.57 | 872.82 | 0.77 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 28.500 | -607.06 | 872.82 | 0.70 |
| Span # 2 | 2 | 28.500 | -631.39 | 872.82 | 0.72 |
| Span # 3 | 3 | 28.500 | -516.81 | 872.82 | 0.59 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 28.500 | -605.91 | 872.82 | 0.69 |
| Span # 2 | 2 | 28.500 | -605.92 | 872.82 | 0.69 |
| Span # 3 | 3 | 28.500 | -605.92 | 872.82 | 0.69 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 28.500 | -414.95 | 872.82 | 0.48 |
| Span # 2 | 2 | 28.500 | -414.96 | 872.82 | 0.48 |
| Span # 3 | 3 | 28.500 | -414.96 | 872.82 | 0.48 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 28.500 | -414.95 | 872.82 | 0.48 |
| Span # 2 | 2 | 28.500 | -414.96 | 872.82 | 0.48 |
| Span # 3 | 3 | 28.500 | -414.96 | 872.82 | 0.48 |

# Concrete Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24



DESCRIPTION: Typical Edge Beam - without Brick

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 28.500 | -414.95 | 872.82 | 0.48 |
| Span # 2 | 2 | 28.500 | -414.96 | 872.82 | 0.48 |
| Span # 3 | 3 | 28.500 | -414.96 | 872.82 | 0.48 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 28.500 | -414.95 | 872.82 | 0.48 |
| Span # 2 | 2 | 28.500 | -414.96 | 872.82 | 0.48 |
| Span # 3 | 3 | 28.500 | -414.96 | 872.82 | 0.48 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 28.500 | -414.95 | 872.82 | 0.48 |
| Span # 2 | 2 | 28.500 | -414.96 | 872.82 | 0.48 |
| Span # 3 | 3 | 28.500 | -414.96 | 872.82 | 0.48 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 28.500 | -414.95 | 872.82 | 0.48 |
| Span # 2 | 2 | 28.500 | -414.96 | 872.82 | 0.48 |
| Span # 3 | 3 | 28.500 | -414.96 | 872.82 | 0.48 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 28.500 | -414.95 | 872.82 | 0.48 |
| Span # 2 | 2 | 28.500 | -414.96 | 872.82 | 0.48 |
| Span # 3 | 3 | 28.500 | -414.96 | 872.82 | 0.48 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 28.500 | -427.68 | 872.82 | 0.49 |
| Span # 2 | 2 | 28.500 | -486.82 | 872.82 | 0.56 |
| Span # 3 | 3 | 28.500 | -656.84 | 872.82 | 0.75 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 28.500 | -524.51 | 872.82 | 0.60 |
| Span # 2 | 2 | 28.500 | 366.61 | 542.67 | 0.68 |
| Span # 3 | 3 | 28.500 | -542.27 | 872.82 | 0.62 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 28.500 | -499.30 | 872.82 | 0.57 |
| Span # 2 | 2 | 28.500 | -606.55 | 872.82 | 0.69 |
| Span # 3 | 3 | 28.500 | -631.39 | 872.82 | 0.72 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 28.500 | -656.84 | 872.82 | 0.75 |
| Span # 2 | 2 | 28.500 | -504.08 | 872.82 | 0.58 |
| Span # 3 | 3 | 28.500 | -427.68 | 872.82 | 0.49 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 28.500 | -669.57 | 872.82 | 0.77 |
| Span # 2 | 2 | 28.500 | -478.61 | 872.82 | 0.55 |
| Span # 3 | 3 | 28.500 | -669.57 | 872.82 | 0.77 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 28.500 | -607.06 | 872.82 | 0.70 |
| Span # 2 | 2 | 28.500 | -631.39 | 872.82 | 0.72 |
| Span # 3 | 3 | 28.500 | -516.81 | 872.82 | 0.59 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 28.500 | -605.91 | 872.82 | 0.69 |
| Span # 2 | 2 | 28.500 | -605.92 | 872.82 | 0.69 |
| Span # 3 | 3 | 28.500 | -605.92 | 872.82 | 0.69 |
| +1.20D+1.60S+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 28.500 | -414.95 | 872.82 | 0.48 |
| Span # 2 | 2 | 28.500 | -414.96 | 872.82 | 0.48 |
| Span # 3 | 3 | 28.500 | -414.96 | 872.82 | 0.48 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 28.500 | -427.68 | 872.82 | 0.49 |
| Span # 2 | 2 | 28.500 | -486.82 | 872.82 | 0.56 |
| Span # 3 | 3 | 28.500 | -656.84 | 872.82 | 0.75 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 28.500 | -524.51 | 872.82 | 0.60 |
| Span # 2 | 2 | 28.500 | 366.61 | 542.67 | 0.68 |
| Span # 3 | 3 | 28.500 | -542.27 | 872.82 | 0.62 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 28.500 | -499.30 | 872.82 | 0.57 |
| Span # 2 | 2 | 28.500 | -606.55 | 872.82 | 0.69 |
| Span # 3 | 3 | 28.500 | -631.39 | 872.82 | 0.72 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 28.500 | -656.84 | 872.82 | 0.75 |
| Span # 2 | 2 | 28.500 | -504.08 | 872.82 | 0.58 |
| Span # 3 | 3 | 28.500 | -427.68 | 872.82 | 0.49 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L*L) | | | | | |

# Concrete Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24



DESCRIPTION: Typical Edge Beam - without Brick

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 1 | 1 | 28.500 | -669.57 | 872.82 | 0.77 |
| Span # 2 | 2 | 28.500 | -478.61 | 872.82 | 0.55 |
| Span # 3 | 3 | 28.500 | -669.57 | 872.82 | 0.77 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 28.500 | -607.06 | 872.82 | 0.70 |
| Span # 2 | 2 | 28.500 | -631.39 | 872.82 | 0.72 |
| Span # 3 | 3 | 28.500 | -516.81 | 872.82 | 0.59 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 28.500 | -605.91 | 872.82 | 0.69 |
| Span # 2 | 2 | 28.500 | -605.92 | 872.82 | 0.69 |
| Span # 3 | 3 | 28.500 | -605.92 | 872.82 | 0.69 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 28.500 | -427.68 | 872.82 | 0.49 |
| Span # 2 | 2 | 28.500 | -486.82 | 872.82 | 0.56 |
| Span # 3 | 3 | 28.500 | -656.84 | 872.82 | 0.75 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 28.500 | -524.51 | 872.82 | 0.60 |
| Span # 2 | 2 | 28.500 | 366.61 | 542.67 | 0.68 |
| Span # 3 | 3 | 28.500 | -542.27 | 872.82 | 0.62 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 28.500 | -499.30 | 872.82 | 0.57 |
| Span # 2 | 2 | 28.500 | -606.55 | 872.82 | 0.69 |
| Span # 3 | 3 | 28.500 | -631.39 | 872.82 | 0.72 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 28.500 | -656.84 | 872.82 | 0.75 |
| Span # 2 | 2 | 28.500 | -504.08 | 872.82 | 0.58 |
| Span # 3 | 3 | 28.500 | -427.68 | 872.82 | 0.49 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 28.500 | -669.57 | 872.82 | 0.77 |
| Span # 2 | 2 | 28.500 | -478.61 | 872.82 | 0.55 |
| Span # 3 | 3 | 28.500 | -669.57 | 872.82 | 0.77 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 28.500 | -607.06 | 872.82 | 0.70 |
| Span # 2 | 2 | 28.500 | -631.39 | 872.82 | 0.72 |
| Span # 3 | 3 | 28.500 | -516.81 | 872.82 | 0.59 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 28.500 | -605.91 | 872.82 | 0.69 |
| Span # 2 | 2 | 28.500 | -605.92 | 872.82 | 0.69 |
| Span # 3 | 3 | 28.500 | -605.92 | 872.82 | 0.69 |
| +0.90D+W+1.60H | | | | | |
| Span # 1 | 1 | 28.500 | -311.21 | 872.82 | 0.36 |
| Span # 2 | 2 | 28.500 | -311.22 | 872.82 | 0.36 |
| Span # 3 | 3 | 28.500 | -311.22 | 872.82 | 0.36 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 28.500 | -427.68 | 872.82 | 0.49 |
| Span # 2 | 2 | 28.500 | -486.82 | 872.82 | 0.56 |
| Span # 3 | 3 | 28.500 | -656.84 | 872.82 | 0.75 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 28.500 | -524.51 | 872.82 | 0.60 |
| Span # 2 | 2 | 28.500 | 366.61 | 542.67 | 0.68 |
| Span # 3 | 3 | 28.500 | -542.27 | 872.82 | 0.62 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 28.500 | -499.30 | 872.82 | 0.57 |
| Span # 2 | 2 | 28.500 | -606.55 | 872.82 | 0.69 |
| Span # 3 | 3 | 28.500 | -631.39 | 872.82 | 0.72 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 28.500 | -656.84 | 872.82 | 0.75 |
| Span # 2 | 2 | 28.500 | -504.08 | 872.82 | 0.58 |
| Span # 3 | 3 | 28.500 | -427.68 | 872.82 | 0.49 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 28.500 | -669.57 | 872.82 | 0.77 |
| Span # 2 | 2 | 28.500 | -478.61 | 872.82 | 0.55 |
| Span # 3 | 3 | 28.500 | -669.57 | 872.82 | 0.77 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 28.500 | -607.06 | 872.82 | 0.70 |
| Span # 2 | 2 | 28.500 | -631.39 | 872.82 | 0.72 |
| Span # 3 | 3 | 28.500 | -516.81 | 872.82 | 0.59 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 28.500 | -605.91 | 872.82 | 0.69 |

# Concrete Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403
Bob D. Campbell and Co., Inc.

DESCRIPTION: Typical Edge Beam - without Brick

| Load Combination Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 2 | 2 | 28.500 | -605.92 | 872.82 | 0.69 |
| Span # 3 | 3 | 28.500 | -605.92 | 872.82 | 0.69 |
| +0.90D+E+0.90H | | | | | |
| Span # 1 | 1 | 28.500 | -311.21 | 872.82 | 0.36 |
| Span # 2 | 2 | 28.500 | -311.22 | 872.82 | 0.36 |
| Span # 3 | 3 | 28.500 | -311.22 | 872.82 | 0.36 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H, LL Comb Run (L*L) | 1 | 0.4738 | 15.390 | | 0.0000 | 0.000 |
| +D+L+H, LL Comb Run (*L*) | 2 | 0.6155 | 14.250 | | 0.0000 | 0.000 |
| +D+L+H, LL Comb Run (L*L) | 3 | 0.4738 | 13.110 | | 0.0000 | 0.000 |

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# Concrete Beam

File: FWI2101 - Paragon Star.ec6

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

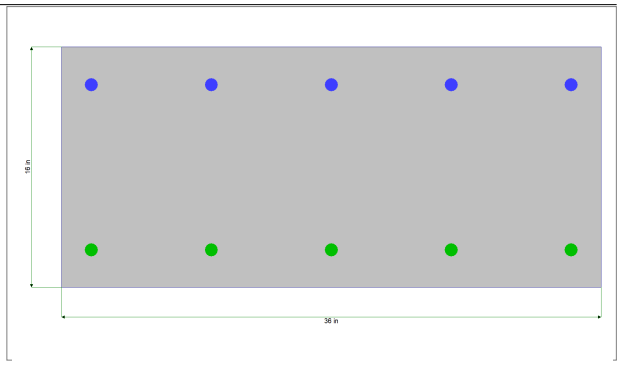
DESCRIPTION: Typical Edge Beam - At Brick Hanging

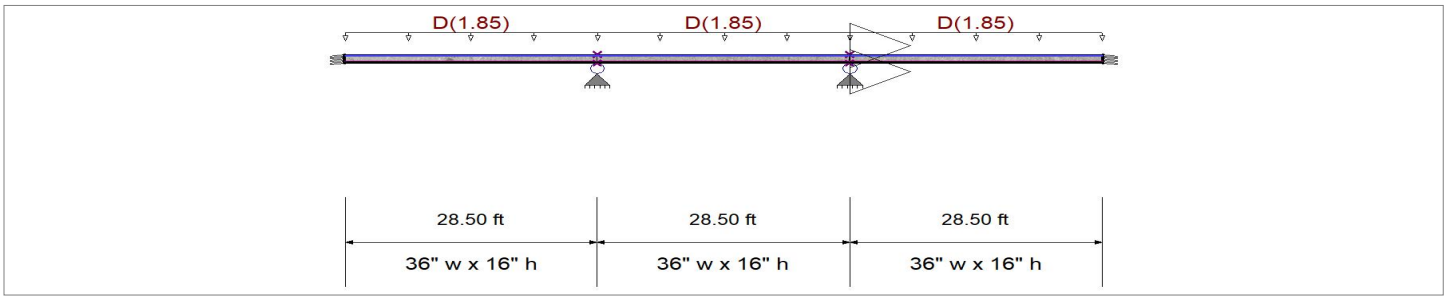
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | $\phi$ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| $\psi$ Density | = | 145.0 pcf | $\beta_1$ | = | 0.80 |
| $\lambda$ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 5 |
| | | | Number of Resisting Legs Per Stirrup | = | 1.0 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 36.0 in, Height = 16.0 in

Span #1 Reinforcing....
- 5-#7 at 2.50 in from Top, from 0.0 to 28.50 ft in this span
- 7-#7 at 2.50 in from Bottom, from 0.0 to 28.50 ft in this span
- 5-#7 at 2.50 in from Bottom, from 0.0 to 28.50 ft in this span
- 11-#7 at 2.0 in from Bottom, from 0.0 to 28.50 ft in this span

Span #2 Reinforcing....
- 5-#7 at 2.50 in from Top, from 0.0 to 28.50 ft in this span
- 7-#7 at 2.50 in from Bottom, from 0.0 to 28.50 ft in this span
- 5-#7 at 2.50 in from Bottom, from 0.0 to 28.50 ft in this span
- 11-#7 at 2.0 in from Bottom, from 0.0 to 28.50 ft in this span

Span #3 Reinforcing....
- 5-#7 at 2.50 in from Top, from 0.0 to 28.50 ft in this span
- 7-#7 at 2.50 in from Bottom, from 0.0 to 28.50 ft in this span
- 5-#7 at 2.50 in from Bottom, from 0.0 to 28.50 ft in this span
- 11-#7 at 2.0 in from Bottom, from 0.0 to 28.50 ft in this span

Load for Span Number 1
Uniform Load : D = 1.850 k/ft, Tributary Width = 1.0 ft, (Hanging Brick)

Load for Span Number 2
Uniform Load : D = 1.850 k/ft, Tributary Width = 1.0 ft, (Hanging Brick)

Load for Span Number 3
Uniform Load : D = 1.850 k/ft, Tributary Width = 1.0 ft, (Hanging Brick)

## DESIGN SUMMARY

**Design OK**

| | | | | | |
|---|---|---|---|---|---|
| Maximum Bending Stress Ratio | = | **0.964** : 1 | Maximum Deflection | | |
| Section used for this span | | **Typical Section** | Max Downward Transient Deflection | 0.000 in | Ratio = 0 <600.0 |
| Mu : Applied | | -175.311 k-ft | Max Upward Transient Deflection | 0.000 in | Ratio = 0 <600.0 |
| Mn * Phi : Allowable | | 181.876 k-ft | Max Downward Total Deflection | 0.168 in | Ratio = 2039 >=600. |
| Location of maximum on span | | 0.000 ft | Max Upward Total Deflection | 0.003 in | Ratio = 104640 >=600. |
| Span # where maximum occurs | | Span # 3 | | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| Overall MAXimum | 26.363 | 52.725 | 52.725 | 26.363 |
| Overall MINimum | 15.817 | 31.635 | 31.635 | 15.817 |

# Concrete Beam


Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24


DESCRIPTION: Typical Edge Beam - At Brick Hanging

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| +D+H | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+L+H, LL Comb Run (**L) | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+L+H, LL Comb Run (*L*) | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+L+H, LL Comb Run (*LL) | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+L+H, LL Comb Run (L**) | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+L+H, LL Comb Run (L*L) | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+L+H, LL Comb Run (LL*) | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+L+H, LL Comb Run (LLL) | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+Lr+H, LL Comb Run (**L) | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+Lr+H, LL Comb Run (*L*) | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+Lr+H, LL Comb Run (*LL) | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+Lr+H, LL Comb Run (L**) | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+Lr+H, LL Comb Run (L*L) | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+Lr+H, LL Comb Run (LL*) | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+Lr+H, LL Comb Run (LLL) | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+S+H | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750Lr+0.750L+H, LL Comb Run ( | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750L+0.750S+H, LL Comb Run (* | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750L+0.750S+H, LL Comb Run (L | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.60W+H | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750Lr+0.750L+0.450W+H, LL Com | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750L+0.750S+0.450W+H, LL Comb | 26.363 | 52.725 | 52.725 | 26.363 |
| +0.60D+0.60W+0.60H | 15.817 | 31.635 | 31.635 | 15.817 |
| +D+0.70E+0.60H | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 26.363 | 52.725 | 52.725 | 26.363 |
| +D+0.750L+0.750S+0.5250E+H, LL Com | 26.363 | 52.725 | 52.725 | 26.363 |
| +0.60D+0.70E+H | 15.817 | 31.635 | 31.635 | 15.817 |
| D Only | 26.363 | 52.725 | 52.725 | 26.363 |
| H Only | | | | |

# Concrete Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24



DESCRIPTION: Typical Edge Beam - At Brick Hanging

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.40D+1.60H | 1 | 0.00 | 13.50 | 36.91 | 36.91 | 175.31 | 0.24 | 50.30 | PhiVc/2 < Vu <= | <0.5W, Not F | 50.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 1.14 | 13.50 | 33.95 | 33.95 | 134.92 | 0.28 | 50.56 | PhiVc/2 < Vu <= | <0.5W, Not F | 50.6 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 2.28 | 13.50 | 31.00 | 31.00 | 97.89 | 0.36 | 50.97 | PhiVc/2 < Vu <= | <0.5W, Not F | 51.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 3.42 | 13.50 | 28.05 | 28.05 | 64.23 | 0.49 | 51.73 | PhiVc/2 < Vu <= | <0.5W, Not F | 51.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 4.56 | 13.50 | 25.10 | 25.10 | 33.94 | 0.83 | 53.65 | Vu < PhiVc/2 | lot Reqd 9.6. | 53.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 5.70 | 13.50 | 22.14 | 22.14 | 7.01 | 1.00 | 54.60 | Vu < PhiVc/2 | lot Reqd 9.6. | 54.6 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 6.84 | 14.00 | 19.19 | 19.19 | 16.55 | 1.00 | 76.66 | Vu < PhiVc/2 | lot Reqd 9.6. | 76.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 7.98 | 14.00 | 16.24 | 16.24 | 36.75 | 0.52 | 64.13 | Vu < PhiVc/2 | lot Reqd 9.6. | 64.1 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 9.12 | 14.00 | 13.29 | 13.29 | 53.58 | 0.29 | 58.27 | Vu < PhiVc/2 | lot Reqd 9.6. | 58.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 10.26 | 14.00 | 10.33 | 10.33 | 67.04 | 0.18 | 55.44 | Vu < PhiVc/2 | lot Reqd 9.6. | 55.4 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 11.40 | 14.00 | 7.38 | 7.38 | 77.14 | 0.11 | 53.67 | Vu < PhiVc/2 | lot Reqd 9.6. | 53.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 12.54 | 14.00 | 4.43 | 4.43 | 83.87 | 0.06 | 52.38 | Vu < PhiVc/2 | lot Reqd 9.6. | 52.4 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 13.68 | 14.00 | 1.48 | 1.48 | 87.23 | 0.02 | 51.30 | Vu < PhiVc/2 | lot Reqd 9.6. | 51.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 14.82 | 14.00 | -1.48 | 1.48 | 87.23 | 0.02 | 51.30 | Vu < PhiVc/2 | lot Reqd 9.6. | 51.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 15.96 | 14.00 | -4.43 | 4.43 | 83.87 | 0.06 | 52.38 | Vu < PhiVc/2 | lot Reqd 9.6. | 52.4 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 17.10 | 14.00 | -7.38 | 7.38 | 77.14 | 0.11 | 53.67 | Vu < PhiVc/2 | lot Reqd 9.6. | 53.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 18.24 | 14.00 | -10.33 | 10.33 | 67.04 | 0.18 | 55.44 | Vu < PhiVc/2 | lot Reqd 9.6. | 55.4 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 19.38 | 14.00 | -13.29 | 13.29 | 53.58 | 0.29 | 58.27 | Vu < PhiVc/2 | lot Reqd 9.6. | 58.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 20.52 | 14.00 | -16.24 | 16.24 | 36.75 | 0.52 | 64.13 | Vu < PhiVc/2 | lot Reqd 9.6. | 64.1 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 21.66 | 14.00 | -19.19 | 19.19 | 16.55 | 1.00 | 76.66 | Vu < PhiVc/2 | lot Reqd 9.6. | 76.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 22.80 | 13.50 | -22.14 | 22.14 | 7.01 | 1.00 | 54.60 | Vu < PhiVc/2 | lot Reqd 9.6. | 54.6 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 23.94 | 13.50 | -25.10 | 25.10 | 33.94 | 0.83 | 53.65 | Vu < PhiVc/2 | lot Reqd 9.6. | 53.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 25.08 | 13.50 | -28.05 | 28.05 | 64.23 | 0.49 | 51.73 | PhiVc/2 < Vu <= | <0.5W, Not F | 51.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 26.22 | 13.50 | -31.00 | 31.00 | 97.89 | 0.36 | 50.97 | PhiVc/2 < Vu <= | <0.5W, Not F | 51.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 1 | 27.36 | 13.50 | -33.95 | 33.95 | 134.92 | 0.28 | 50.56 | PhiVc/2 < Vu <= | <0.5W, Not F | 50.6 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 28.50 | 13.50 | 36.91 | 36.91 | 175.31 | 0.24 | 50.30 | PhiVc/2 < Vu <= | <0.5W, Not F | 50.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 29.64 | 13.50 | 33.95 | 33.95 | 134.92 | 0.28 | 50.56 | PhiVc/2 < Vu <= | <0.5W, Not F | 50.6 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 30.78 | 13.50 | 31.00 | 31.00 | 97.89 | 0.36 | 50.97 | PhiVc/2 < Vu <= | <0.5W, Not F | 51.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 31.92 | 13.50 | 28.05 | 28.05 | 64.23 | 0.49 | 51.73 | PhiVc/2 < Vu <= | <0.5W, Not F | 51.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 33.06 | 13.50 | 25.10 | 25.10 | 33.94 | 0.83 | 53.65 | Vu < PhiVc/2 | lot Reqd 9.6. | 53.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 34.20 | 13.50 | 22.14 | 22.14 | 7.01 | 1.00 | 54.60 | Vu < PhiVc/2 | lot Reqd 9.6. | 54.6 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 35.34 | 14.00 | 19.19 | 19.19 | 16.55 | 1.00 | 76.66 | Vu < PhiVc/2 | lot Reqd 9.6. | 76.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 36.48 | 14.00 | 16.24 | 16.24 | 36.74 | 0.52 | 64.13 | Vu < PhiVc/2 | lot Reqd 9.6. | 64.1 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 37.62 | 14.00 | 13.29 | 13.29 | 53.57 | 0.29 | 58.27 | Vu < PhiVc/2 | lot Reqd 9.6. | 58.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 38.76 | 14.00 | 10.33 | 10.33 | 67.04 | 0.18 | 55.44 | Vu < PhiVc/2 | lot Reqd 9.6. | 55.4 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 39.90 | 14.00 | 7.38 | 7.38 | 77.14 | 0.11 | 53.67 | Vu < PhiVc/2 | lot Reqd 9.6. | 53.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 41.04 | 14.00 | 4.43 | 4.43 | 83.87 | 0.06 | 52.38 | Vu < PhiVc/2 | lot Reqd 9.6. | 52.4 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 42.18 | 14.00 | 1.48 | 1.48 | 87.23 | 0.02 | 51.30 | Vu < PhiVc/2 | lot Reqd 9.6. | 51.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 43.32 | 14.00 | -1.48 | 1.48 | 87.23 | 0.02 | 51.30 | Vu < PhiVc/2 | lot Reqd 9.6. | 51.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 44.46 | 14.00 | -4.43 | 4.43 | 83.87 | 0.06 | 52.38 | Vu < PhiVc/2 | lot Reqd 9.6. | 52.4 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 45.60 | 14.00 | -7.38 | 7.38 | 77.14 | 0.11 | 53.67 | Vu < PhiVc/2 | lot Reqd 9.6. | 53.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 46.74 | 14.00 | -10.33 | 10.33 | 67.04 | 0.18 | 55.44 | Vu < PhiVc/2 | lot Reqd 9.6. | 55.4 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 47.88 | 14.00 | -13.29 | 13.29 | 53.57 | 0.29 | 58.27 | Vu < PhiVc/2 | lot Reqd 9.6. | 58.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 49.02 | 14.00 | -16.24 | 16.24 | 36.74 | 0.52 | 64.13 | Vu < PhiVc/2 | lot Reqd 9.6. | 64.1 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 50.16 | 14.00 | -19.19 | 19.19 | 16.55 | 1.00 | 76.66 | Vu < PhiVc/2 | lot Reqd 9.6. | 76.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 51.30 | 13.50 | -22.14 | 22.14 | 7.01 | 1.00 | 54.60 | Vu < PhiVc/2 | lot Reqd 9.6. | 54.6 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 52.44 | 13.50 | -25.10 | 25.10 | 33.94 | 0.83 | 53.65 | Vu < PhiVc/2 | lot Reqd 9.6. | 53.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 53.58 | 13.50 | -28.05 | 28.05 | 64.23 | 0.49 | 51.73 | PhiVc/2 < Vu <= | <0.5W, Not F | 51.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 54.72 | 13.50 | -31.00 | 31.00 | 97.89 | 0.36 | 50.97 | PhiVc/2 < Vu <= | <0.5W, Not F | 51.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 55.86 | 13.50 | -33.95 | 33.95 | 134.92 | 0.28 | 50.56 | PhiVc/2 < Vu <= | <0.5W, Not F | 50.6 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 57.00 | 13.50 | 36.91 | 36.91 | 175.31 | 0.24 | 50.30 | PhiVc/2 < Vu <= | <0.5W, Not F | 50.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 58.14 | 13.50 | 33.95 | 33.95 | 134.92 | 0.28 | 50.56 | PhiVc/2 < Vu <= | <0.5W, Not F | 50.6 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 59.28 | 13.50 | 31.00 | 31.00 | 97.89 | 0.36 | 50.97 | PhiVc/2 < Vu <= | <0.5W, Not F | 51.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 60.42 | 13.50 | 28.05 | 28.05 | 64.23 | 0.49 | 51.73 | PhiVc/2 < Vu <= | <0.5W, Not F | 51.7 | 0.0 | 0.0 |

# Concrete Beam

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DESCRIPTION: Typical Edge Beam - At Brick Hanging

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.40D+1.60H | 3 | 61.56 | 13.50 | 25.10 | 25.10 | 33.94 | 0.83 | 53.65 | Vu < PhiVc/2 | lot Reqd 9.6. | 53.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 62.70 | 13.50 | 22.14 | 22.14 | 7.01 | 1.00 | 54.60 | Vu < PhiVc/2 | lot Reqd 9.6. | 54.6 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 63.84 | 14.00 | 19.19 | 19.19 | 16.55 | 1.00 | 76.66 | Vu < PhiVc/2 | lot Reqd 9.6. | 76.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 64.98 | 14.00 | 16.24 | 16.24 | 36.75 | 0.52 | 64.13 | Vu < PhiVc/2 | lot Reqd 9.6. | 64.1 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 66.12 | 14.00 | 13.29 | 13.29 | 53.58 | 0.29 | 58.27 | Vu < PhiVc/2 | lot Reqd 9.6. | 58.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 67.26 | 14.00 | 10.33 | 10.33 | 67.04 | 0.18 | 55.44 | Vu < PhiVc/2 | lot Reqd 9.6. | 55.4 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 68.40 | 14.00 | 7.38 | 7.38 | 77.14 | 0.11 | 53.67 | Vu < PhiVc/2 | lot Reqd 9.6. | 53.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 69.54 | 14.00 | 4.43 | 4.43 | 83.87 | 0.06 | 52.38 | Vu < PhiVc/2 | lot Reqd 9.6. | 52.4 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 70.68 | 14.00 | 1.48 | 1.48 | 87.23 | 0.02 | 51.30 | Vu < PhiVc/2 | lot Reqd 9.6. | 51.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 71.82 | 14.00 | -1.48 | 1.48 | 87.23 | 0.02 | 51.30 | Vu < PhiVc/2 | lot Reqd 9.6. | 51.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 72.96 | 14.00 | -4.43 | 4.43 | 83.87 | 0.06 | 52.38 | Vu < PhiVc/2 | lot Reqd 9.6. | 52.4 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 74.10 | 14.00 | -7.38 | 7.38 | 77.14 | 0.11 | 53.67 | Vu < PhiVc/2 | lot Reqd 9.6. | 53.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 75.24 | 14.00 | -10.33 | 10.33 | 67.04 | 0.18 | 55.44 | Vu < PhiVc/2 | lot Reqd 9.6. | 55.4 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 76.38 | 14.00 | -13.29 | 13.29 | 53.58 | 0.29 | 58.27 | Vu < PhiVc/2 | lot Reqd 9.6. | 58.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 77.52 | 14.00 | -16.24 | 16.24 | 36.75 | 0.52 | 64.13 | Vu < PhiVc/2 | lot Reqd 9.6. | 64.1 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 78.66 | 14.00 | -19.19 | 19.19 | 16.55 | 1.00 | 76.66 | Vu < PhiVc/2 | lot Reqd 9.6. | 76.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 79.80 | 13.50 | -22.14 | 22.14 | 7.01 | 1.00 | 54.60 | Vu < PhiVc/2 | lot Reqd 9.6. | 54.6 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 80.94 | 13.50 | -25.10 | 25.10 | 33.94 | 0.83 | 53.65 | Vu < PhiVc/2 | lot Reqd 9.6. | 53.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 82.08 | 13.50 | -28.05 | 28.05 | 64.23 | 0.49 | 51.73 | PhiVc/2 < Vu <= | <0.5W, Not F | 51.7 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 83.22 | 13.50 | -31.00 | 31.00 | 97.89 | 0.36 | 50.97 | PhiVc/2 < Vu <= | <0.5W, Not F | 51.0 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 84.36 | 13.50 | -33.95 | 33.95 | 134.92 | 0.28 | 50.56 | PhiVc/2 < Vu <= | <0.5W, Not F | 50.6 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 85.50 | 13.50 | -36.91 | 36.91 | 175.31 | 0.24 | 50.30 | PhiVc/2 < Vu <= | <0.5W, Not F | 50.3 | 0.0 | 0.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 28.500 | -175.31 | 181.88 | 0.96 |
| Span # 2 | 2 | 28.500 | -175.31 | 181.88 | 0.96 |
| Span # 3 | 3 | 28.500 | -175.31 | 181.88 | 0.96 |
| +1.40D+1.60H | | | | | |
| Span # 1 | 1 | 28.500 | -175.31 | 181.88 | 0.96 |
| Span # 2 | 2 | 28.500 | -175.31 | 181.88 | 0.96 |
| Span # 3 | 3 | 28.500 | -175.31 | 181.88 | 0.96 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+0.50Lr+1.60L+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |

# Concrete Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24



DESCRIPTION: Typical Edge Beam - At Brick Hanging

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+1.60Lr+L+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L**) | | | | | |

# Concrete Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24



DESCRIPTION: Typical Edge Beam - At Brick Hanging

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+1.60Lr+0.50W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+L+1.60S+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+1.60S+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |

# Concrete Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24



DESCRIPTION: Typical Edge Beam - At Brick Hanging

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+0.50Lr+L+W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+L+0.50S+W+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +0.90D+W+1.60H | | | | | |
| Span # 1 | 1 | 28.500 | -112.70 | 181.88 | 0.62 |
| Span # 2 | 2 | 28.500 | -112.70 | 181.88 | 0.62 |
| Span # 3 | 3 | 28.500 | -112.70 | 181.88 | 0.62 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +1.20D+L+0.20S+E+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 2 | 2 | 28.500 | -150.27 | 181.88 | 0.83 |
| Span # 3 | 3 | 28.500 | -150.27 | 181.88 | 0.83 |
| +0.90D+E+0.90H | | | | | |
| Span # 1 | 1 | 28.500 | -112.70 | 181.88 | 0.62 |
| Span # 2 | 2 | 28.500 | -112.70 | 181.88 | 0.62 |

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# Concrete Beam

DESCRIPTION: Typical Edge Beam - At Brick Hanging

| Load Combination Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 3 | 3 | 28.500 | -112.70 | 181.88 | 0.62 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| D Only | 1 | 0.1677 | 14.250 | | 0.0000 | 0.000 |
| D Only | 2 | 0.1677 | 14.250 | | 0.0000 | 0.000 |
| D Only | 3 | 0.1677 | 14.250 | | 0.0000 | 0.000 |

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# Concrete Beam

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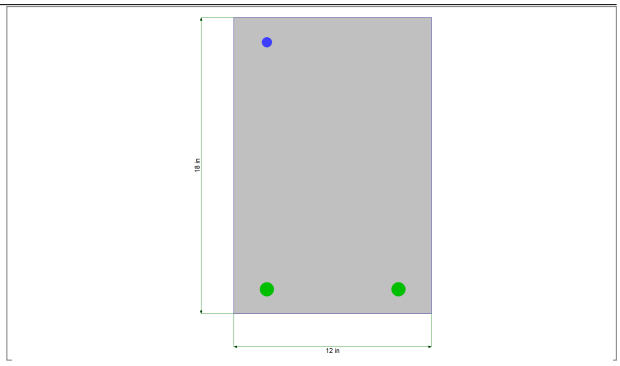
DESCRIPTION: 1-Way Slab Over Drive Land From Grid 16-17

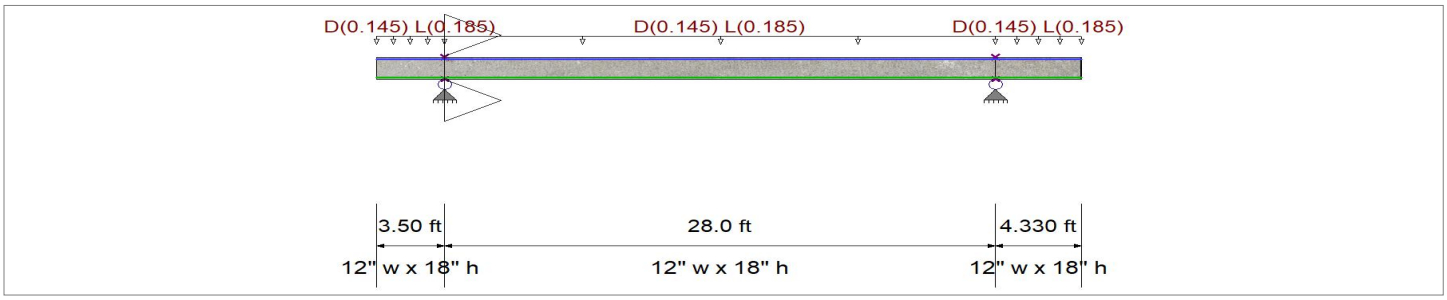
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | ϕ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| ψ Density | = | 145.0 pcf | $\beta_1$ | = | 0.80 |
| λ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 2 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 12.0 in, Height = 18.0 in

Span #1 Reinforcing....
1-#5 at 1.50 in from Top, from 0.0 to 3.50 ft in this span
1-#7 at 1.50 in from Bottom, from 0.0 to 3.50 ft in this span

Span #2 Reinforcing....
1-#5 at 1.50 in from Top, from 0.0 to 28.0 ft in this span
2-#7 at 1.50 in from Bottom, from 0.0 to 28.0 ft in this span

Span #3 Reinforcing....
1-#5 at 1.50 in from Top, from 0.0 to 4.330 ft in this span
1-#7 at 1.50 in from Bottom, from 0.0 to 4.330 ft in this span

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.1450, L = 0.1850 ksf, Tributary Width = 1.0 ft
Load for Span Number 2
Uniform Load : D = 0.1450, L = 0.1850 ksf, Tributary Width = 1.0 ft
Load for Span Number 3
Uniform Load : D = 0.1450, L = 0.1850 ksf, Tributary Width = 1.0 ft

design is satisfied as code only requires L/240 deflection cb/BDC

## DESIGN SUMMARY

**Design N.G.**

| | | | | | | |
|---|---|---|---|---|---|---|
| Maximum Bending Stress Ratio | = | **0.774** : 1 | Maximum Deflection | | | |
| Section used for this span | | **Typical Section** | Max Downward Transient Deflection | 0.097 in | Ratio = | 3454 >=600 |
| Mu : Applied | | 65.976 k-ft | Max Upward Transient Deflection | -0.038 in | Ratio = | 2206 >=600 |
| Mn * Phi : Allowable | | 85.261 k-ft | Max Downward Total Deflection | 0.682 in | Ratio = | 492 >=480 |
| Location of maximum on span | | 13.813 ft | Max Upward Total Deflection | -0.242 in | Ratio = | 346 <480.0 |
| Span # where maximum occurs | | Span # 2 | | | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| Overall MAXimum | | 9.518 | 10.099 | |
| Overall MINimum | | 3.216 | 3.413 | |
| +D+H | | 6.302 | 6.687 | |
| +D+L+H | | 9.518 | 10.099 | |

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# Concrete Beam

DESCRIPTION: 1-Way Slab Over Drive Land From Grid 16-17

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| +D+Lr+H | | 6.302 | 6.687 | |
| +D+S+H | | 6.302 | 6.687 | |
| +D+0.750Lr+0.750L+H | | 8.714 | 9.246 | |
| +D+0.750L+0.750S+H | | 8.714 | 9.246 | |
| +D+0.60W+H | | 6.302 | 6.687 | |
| +D+0.750Lr+0.750L+0.450W+H | | 8.714 | 9.246 | |
| +D+0.750L+0.750S+0.450W+H | | 8.714 | 9.246 | |
| +0.60D+0.60W+0.60H | | 3.781 | 4.012 | |
| +D+0.70E+0.60H | | 6.302 | 6.687 | |
| +D+0.750L+0.750S+0.5250E+H | | 8.714 | 9.246 | |
| +0.60D+0.70E+H | | 3.781 | 4.012 | |
| D Only | | 6.302 | 6.687 | |
| L Only | | 3.216 | 3.413 | |
| H Only | | | | |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.00 | 16.50 | 0.00 | 0.00 | 0.00 | 1.00 | 21.08 | Vu < PhiVc/2 | lot Reqd 9.6. | 21.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.14 | 16.50 | -0.10 | 0.10 | 0.01 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.28 | 16.50 | -0.20 | 0.20 | 0.03 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.42 | 16.50 | -0.31 | 0.31 | 0.06 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.56 | 16.50 | -0.41 | 0.41 | 0.11 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.70 | 16.50 | -0.51 | 0.51 | 0.18 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.84 | 16.50 | -0.61 | 0.61 | 0.26 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.98 | 16.50 | -0.72 | 0.72 | 0.35 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.12 | 16.50 | -0.82 | 0.82 | 0.46 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.26 | 16.50 | -0.92 | 0.92 | 0.58 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.40 | 16.50 | -1.02 | 1.02 | 0.72 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.54 | 16.50 | -1.13 | 1.13 | 0.87 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.68 | 16.50 | -1.23 | 1.23 | 1.03 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.82 | 16.50 | -1.33 | 1.33 | 1.21 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.96 | 16.50 | -1.43 | 1.43 | 1.40 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.10 | 16.50 | -1.54 | 1.54 | 1.61 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.24 | 16.50 | -1.64 | 1.64 | 1.83 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.38 | 16.50 | -1.74 | 1.74 | 2.07 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.52 | 16.50 | -1.84 | 1.84 | 2.32 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.66 | 16.50 | -1.94 | 1.94 | 2.59 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.80 | 16.50 | -2.05 | 2.05 | 2.87 | 0.98 | 20.52 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.94 | 16.50 | -2.15 | 2.15 | 3.16 | 0.94 | 20.49 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.08 | 16.50 | -2.25 | 2.25 | 3.47 | 0.89 | 20.47 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.22 | 16.50 | -2.35 | 2.35 | 3.79 | 0.85 | 20.45 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.36 | 16.50 | -2.46 | 2.46 | 4.13 | 0.82 | 20.43 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 3.50 | 16.50 | 10.15 | 10.15 | 4.48 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 4.62 | 16.50 | 9.33 | 9.33 | 6.43 | 1.00 | 22.20 | Vu < PhiVc/2 | lot Reqd 9.6. | 22.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 5.74 | 16.50 | 8.51 | 8.51 | 16.42 | 0.71 | 21.55 | Vu < PhiVc/2 | lot Reqd 9.6. | 21.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 6.86 | 16.50 | 7.69 | 7.69 | 25.50 | 0.41 | 20.88 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 7.98 | 16.50 | 6.87 | 6.87 | 33.66 | 0.28 | 20.58 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 9.10 | 16.50 | 6.06 | 6.06 | 40.90 | 0.20 | 20.41 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 10.22 | 16.50 | 5.24 | 5.24 | 47.22 | 0.15 | 20.29 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 11.34 | 16.50 | 4.42 | 4.42 | 52.63 | 0.12 | 20.21 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 12.46 | 16.50 | 3.60 | 3.60 | 57.12 | 0.09 | 20.15 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 13.58 | 16.50 | 2.78 | 2.78 | 60.69 | 0.06 | 20.09 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 14.70 | 16.50 | 1.96 | 1.96 | 63.34 | 0.04 | 20.05 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 15.82 | 16.50 | 1.14 | 1.14 | 65.08 | 0.02 | 20.01 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 16.94 | 16.50 | 0.32 | 0.32 | 65.91 | 0.01 | 19.97 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.0 | 0.0 | 0.0 |

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DESCRIPTION: 1-Way Slab Over Drive Land From Grid 16-17

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 2 | 18.06 | 16.50 | -0.49 | 0.49 | 65.81 | 0.01 | 19.97 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 19.18 | 16.50 | -1.31 | 1.31 | 64.80 | 0.03 | 20.01 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 20.30 | 16.50 | -2.13 | 2.13 | 62.87 | 0.05 | 20.06 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 21.42 | 16.50 | -2.95 | 2.95 | 60.02 | 0.07 | 20.10 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 22.54 | 16.50 | -3.77 | 3.77 | 56.26 | 0.09 | 20.16 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 23.66 | 16.50 | -4.59 | 4.59 | 51.58 | 0.12 | 20.23 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 24.78 | 16.50 | -5.41 | 5.41 | 45.98 | 0.16 | 20.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 25.90 | 16.50 | -6.23 | 6.23 | 39.47 | 0.22 | 20.44 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 27.02 | 16.50 | -7.04 | 7.04 | 32.04 | 0.30 | 20.63 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 28.14 | 16.50 | -7.86 | 7.86 | 23.69 | 0.46 | 20.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 21.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 29.26 | 16.50 | -8.68 | 8.68 | 14.43 | 0.83 | 21.81 | Vu < PhiVc/2 | lot Reqd 9.6. | 21.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 30.38 | 16.50 | -9.50 | 9.50 | 4.25 | 1.00 | 22.20 | Vu < PhiVc/2 | lot Reqd 9.6. | 22.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 31.50 | 16.50 | 3.17 | 3.17 | 6.85 | 0.64 | 20.32 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 31.67 | 16.50 | 3.04 | 3.04 | 6.32 | 0.66 | 20.34 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 31.85 | 16.50 | 2.91 | 2.91 | 5.80 | 0.69 | 20.35 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 32.02 | 16.50 | 2.79 | 2.79 | 5.31 | 0.72 | 20.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 32.19 | 16.50 | 2.66 | 2.66 | 4.84 | 0.76 | 20.39 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 32.37 | 16.50 | 2.53 | 2.53 | 4.39 | 0.79 | 20.41 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 32.54 | 16.50 | 2.41 | 2.41 | 3.96 | 0.84 | 20.44 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 32.71 | 16.50 | 2.28 | 2.28 | 3.55 | 0.88 | 20.46 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 32.89 | 16.50 | 2.15 | 2.15 | 3.17 | 0.93 | 20.49 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 33.06 | 16.50 | 2.03 | 2.03 | 2.81 | 0.99 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 33.23 | 16.50 | 1.90 | 1.90 | 2.47 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 33.41 | 16.50 | 1.77 | 1.77 | 2.15 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 33.58 | 16.50 | 1.65 | 1.65 | 1.85 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 33.75 | 16.50 | 1.52 | 1.52 | 1.58 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 33.92 | 16.50 | 1.39 | 1.39 | 1.33 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 34.10 | 16.50 | 1.27 | 1.27 | 1.10 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 34.27 | 16.50 | 1.14 | 1.14 | 0.89 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 34.44 | 16.50 | 1.01 | 1.01 | 0.70 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 34.62 | 16.50 | 0.89 | 0.89 | 0.54 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 34.79 | 16.50 | 0.76 | 0.76 | 0.39 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 34.96 | 16.50 | 0.63 | 0.63 | 0.27 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 35.14 | 16.50 | 0.51 | 0.51 | 0.18 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 35.31 | 16.50 | 0.38 | 0.38 | 0.10 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 35.48 | 16.50 | 0.25 | 0.25 | 0.04 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 35.66 | 16.50 | 0.13 | 0.13 | 0.01 | 1.00 | 20.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 20.5 | 0.0 | 0.0 |
| +1.20D+L+0.20S+E+1.60H | 3 | 35.83 | 16.50 | -0.00 | 0.00 | 0.00 | 1.00 | 21.08 | Vu < PhiVc/2 | lot Reqd 9.6. | 21.1 | 0.0 | 0.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 3.500 | -4.42 | 24.36 | 0.18 |
| Span # 2 | 2 | 28.000 | 65.98 | 85.26 | 0.77 |
| Span # 3 | 3 | 4.330 | -6.85 | 24.36 | 0.28 |
| +1.40D+1.60H | | | | | |
| Span # 1 | 1 | 3.500 | -3.07 | 24.36 | 0.13 |
| Span # 2 | 2 | 28.000 | 45.80 | 85.26 | 0.54 |
| Span # 3 | 3 | 4.330 | -4.76 | 24.36 | 0.20 |
| +1.20D+0.50Lr+1.60L+1.60H | | | | | |
| Span # 1 | 1 | 3.500 | -4.42 | 24.36 | 0.18 |
| Span # 2 | 2 | 28.000 | 65.98 | 85.26 | 0.77 |
| Span # 3 | 3 | 4.330 | -6.85 | 24.36 | 0.28 |
| +1.20D+1.60L+0.50S+1.60H | | | | | |
| Span # 1 | 1 | 3.500 | -4.42 | 24.36 | 0.18 |
| Span # 2 | 2 | 28.000 | 65.98 | 85.26 | 0.77 |
| Span # 3 | 3 | 4.330 | -6.85 | 24.36 | 0.28 |

# Concrete Beam

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24



DESCRIPTION: 1-Way Slab Over Drive Land From Grid 16-17

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| +1.20D+1.60Lr+L+1.60H | | | | | |
| Span # 1 | 1 | 3.500 | -3.75 | 24.36 | 0.15 |
| Span # 2 | 2 | 28.000 | 55.96 | 85.26 | 0.66 |
| Span # 3 | 3 | 4.330 | -5.81 | 24.36 | 0.24 |
| +1.20D+1.60Lr+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 3.500 | -2.63 | 24.36 | 0.11 |
| Span # 2 | 2 | 28.000 | 39.26 | 85.26 | 0.46 |
| Span # 3 | 3 | 4.330 | -4.08 | 24.36 | 0.17 |
| +1.20D+L+1.60S+1.60H | | | | | |
| Span # 1 | 1 | 3.500 | -3.75 | 24.36 | 0.15 |
| Span # 2 | 2 | 28.000 | 55.96 | 85.26 | 0.66 |
| Span # 3 | 3 | 4.330 | -5.81 | 24.36 | 0.24 |
| +1.20D+1.60S+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 3.500 | -2.63 | 24.36 | 0.11 |
| Span # 2 | 2 | 28.000 | 39.26 | 85.26 | 0.46 |
| Span # 3 | 3 | 4.330 | -4.08 | 24.36 | 0.17 |
| +1.20D+0.50Lr+L+W+1.60H | | | | | |
| Span # 1 | 1 | 3.500 | -3.75 | 24.36 | 0.15 |
| Span # 2 | 2 | 28.000 | 55.96 | 85.26 | 0.66 |
| Span # 3 | 3 | 4.330 | -5.81 | 24.36 | 0.24 |
| +1.20D+L+0.50S+W+1.60H | | | | | |
| Span # 1 | 1 | 3.500 | -3.75 | 24.36 | 0.15 |
| Span # 2 | 2 | 28.000 | 55.96 | 85.26 | 0.66 |
| Span # 3 | 3 | 4.330 | -5.81 | 24.36 | 0.24 |
| +0.90D+W+1.60H | | | | | |
| Span # 1 | 1 | 3.500 | -1.97 | 24.36 | 0.08 |
| Span # 2 | 2 | 28.000 | 29.45 | 85.26 | 0.35 |
| Span # 3 | 3 | 4.330 | -3.06 | 24.36 | 0.13 |
| +1.20D+L+0.20S+E+1.60H | | | | | |
| Span # 1 | 1 | 3.500 | -3.75 | 24.36 | 0.15 |
| Span # 2 | 2 | 28.000 | 55.96 | 85.26 | 0.66 |
| Span # 3 | 3 | 4.330 | -5.81 | 24.36 | 0.24 |
| +0.90D+E+0.90H | | | | | |
| Span # 1 | 1 | 3.500 | -1.97 | 24.36 | 0.08 |
| Span # 2 | 2 | 28.000 | 29.45 | 85.26 | 0.35 |
| Span # 3 | 3 | 4.330 | -3.06 | 24.36 | 0.13 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H | 1 | 0.0388 | 4.060 | +D+L+H | -0.2415 | 0.000 |
| +D+L+H | 2 | 0.6819 | 14.000 | +D+L+H | -0.0059 | 28.087 |
| | 3 | 0.0000 | 14.000 | +D+L+H | -0.2929 | 4.330 |

Title Block Line 1

You can change this area

using the "Settings" menu item

and then using the "Printing &

Title Block" selection.

Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 25 JUN 2022, 6:13AM

# Concrete Beam

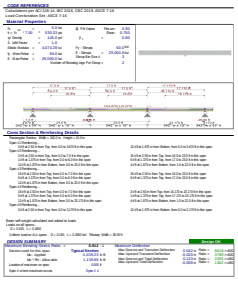
File: FWI2101 - Paragon Star.ec6

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**Lic. # : KW-06011403**

**Bob D. Campbell and Co., Inc.**

DESCRIPTION: Area F - Grids 4/5/6/7



Title Block Line 1

You can change this area

using the "Settings" menu item

and then using the "Printing &

Title Block" selection.

Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 25 JUN 2022, 6:13AM

# Concrete Beam

File: FWI2101 - Paragon Star.ec6

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: Area F - Grids 4/5/6/7

**Vertical Reactions**

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 | Support 5 | Support 6 |
|---|---|---|---|---|---|---|
| Overall Maximum | | 144.000 | 289.541 | 367.000 | 141.000 | |
| Overall Minimum | | 60.768 | 113.189 | 203.901 | 60.872 | |
| +D+Lr | | 60.768 | 113.189 | 203.901 | 60.872 | |
| +D+L | | 144.000 | 289.541 | 367.000 | 141.000 | |
| +D+0.750Lr+0.750L | | 144.000 | 289.541 | 367.000 | 141.000 | |
| +D+S | | 60.768 | 113.189 | 203.901 | 60.872 | |

**Detailed Shear Information**

| Load Combination | Span | Distance | Vu | Phi*Vn | Vu / Phi*Vn | Phi*Vc | Phi*Vs | Controls | Phi*Vs | Phi*Vs | Tributary Width |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Project Min/Max/Design | | | Max | Max | Max | Max | Max | | Min | Max | Design |
| +1.200+1.60+0.500+0.424H | 1 | 0.00 | 12.50 | -9.68 | 9.68 | 0.48 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 1.00 | 12.50 | -19.36 | 19.36 | 0.96 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 2.00 | 12.50 | -29.03 | 29.03 | 1.43 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 2.83 | 12.50 | -39.07 | 39.62 | 1.93 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 3.83 | 12.50 | -49.14 | 49.14 | 2.40 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 4.83 | 12.50 | -59.36 | 59.43 | 2.90 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 5.83 | 12.50 | -69.28 | 69.34 | 3.39 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 6.83 | 12.50 | -79.20 | 79.25 | 3.87 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 7.83 | 12.50 | -89.12 | 89.16 | 4.36 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 8.83 | 12.50 | -99.04 | 99.07 | 4.84 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 9.83 | 12.50 | -108.96 | 108.98 | 5.33 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 10.83 | 12.50 | -118.88 | 118.89 | 5.81 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 11.83 | 12.50 | -128.80 | 128.80 | 6.30 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 12.83 | 12.50 | -138.72 | 138.71 | 6.78 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 13.83 | 12.50 | -148.64 | 148.62 | 7.27 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 14.83 | 12.50 | -158.56 | 158.53 | 7.75 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 15.83 | 12.50 | -168.48 | 168.44 | 8.24 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 16.83 | 12.50 | -178.40 | 178.35 | 8.72 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 17.83 | 12.50 | -188.32 | 188.26 | 9.21 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 18.83 | 12.50 | -198.24 | 198.17 | 9.69 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 19.83 | 12.50 | -208.16 | 208.08 | 10.18 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 20.83 | 12.50 | -218.08 | 217.99 | 10.66 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 21.83 | 12.50 | -228.00 | 227.90 | 11.15 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 22.83 | 12.50 | -237.92 | 237.81 | 11.63 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 23.83 | 12.50 | -247.84 | 247.72 | 12.12 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 24.83 | 12.50 | -257.76 | 257.63 | 12.60 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 25.83 | 12.50 | -267.68 | 267.53 | 13.09 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 26.83 | 12.50 | -277.60 | 277.44 | 13.57 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 27.83 | 12.50 | -287.52 | 287.35 | 14.06 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 28.83 | 12.50 | -297.44 | 297.26 | 14.54 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 29.83 | 12.50 | -307.36 | 307.16 | 15.03 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 30.83 | 12.50 | -317.28 | 317.07 | 15.51 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 31.83 | 12.50 | -327.20 | 326.98 | 16.00 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 32.83 | 12.50 | -337.12 | 336.89 | 16.48 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 33.83 | 12.50 | -347.04 | 346.80 | 16.97 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 34.83 | 12.50 | -356.96 | 356.71 | 17.45 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 35.83 | 12.50 | -366.88 | 366.62 | 17.94 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 36.83 | 12.50 | -376.80 | 376.53 | 18.42 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 37.83 | 12.50 | -386.72 | 386.44 | 18.91 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 38.83 | 12.50 | -396.64 | 396.35 | 19.39 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 39.83 | 12.50 | -406.56 | 406.25 | 19.88 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 40.83 | 12.50 | -416.48 | 416.16 | 20.36 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 41.83 | 12.50 | -426.40 | 426.07 | 20.85 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 42.83 | 12.50 | -436.32 | 435.98 | 21.33 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 43.83 | 12.50 | -446.24 | 445.89 | 21.82 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 44.83 | 12.50 | -456.16 | 455.80 | 22.30 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 45.83 | 12.50 | -466.08 | 465.71 | 22.79 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 46.83 | 12.50 | -476.00 | 475.62 | 23.27 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 47.83 | 12.50 | -485.92 | 485.53 | 23.76 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 48.83 | 12.50 | -495.84 | 495.44 | 24.24 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 49.83 | 12.50 | -505.76 | 505.35 | 24.73 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 50.83 | 12.50 | -515.68 | 515.26 | 25.21 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 51.83 | 12.50 | -525.60 | 525.17 | 25.70 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 52.83 | 12.50 | -535.52 | 535.08 | 26.18 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 53.83 | 12.50 | -545.44 | 544.99 | 26.67 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 54.83 | 12.50 | -555.36 | 554.90 | 27.15 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 55.83 | 12.50 | -565.28 | 564.81 | 27.64 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 56.83 | 12.50 | -575.20 | 574.72 | 28.12 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 57.83 | 12.50 | -585.12 | 584.63 | 28.61 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 58.83 | 12.50 | -595.04 | 594.54 | 29.09 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 59.83 | 12.50 | -604.96 | 604.45 | 29.58 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 60.83 | 12.50 | -614.88 | 614.36 | 30.06 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 61.83 | 12.50 | -624.80 | 624.27 | 30.55 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 62.83 | 12.50 | -634.72 | 634.18 | 31.03 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 63.83 | 12.50 | -644.64 | 644.09 | 31.52 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 64.83 | 12.50 | -654.56 | 654.00 | 32.00 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 65.83 | 12.50 | -664.48 | 663.91 | 32.49 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 66.83 | 12.50 | -674.40 | 673.82 | 32.97 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 67.83 | 12.50 | -684.32 | 683.73 | 33.46 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 68.83 | 12.50 | -694.24 | 693.64 | 33.94 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 69.83 | 12.50 | -704.16 | 703.55 | 34.43 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 70.83 | 12.50 | -714.08 | 713.46 | 34.91 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 71.83 | 12.50 | -724.00 | 723.37 | 35.40 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 72.83 | 12.50 | -733.92 | 733.28 | 35.88 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 73.83 | 12.50 | -743.84 | 743.19 | 36.37 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 74.83 | 12.50 | -753.76 | 753.10 | 36.85 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 75.83 | 12.50 | -763.68 | 763.01 | 37.34 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 76.83 | 12.50 | -773.60 | 772.92 | 37.82 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 77.83 | 12.50 | -783.52 | 782.83 | 38.31 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 78.83 | 12.50 | -793.44 | 792.74 | 38.79 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 79.83 | 12.50 | -803.36 | 802.65 | 39.28 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 80.83 | 12.50 | -813.28 | 812.56 | 39.76 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 81.83 | 12.50 | -823.20 | 822.47 | 40.25 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 82.83 | 12.50 | -833.12 | 832.38 | 40.73 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 83.83 | 12.50 | -843.04 | 842.29 | 41.22 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 84.83 | 12.50 | -852.96 | 852.20 | 41.70 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 85.83 | 12.50 | -862.88 | 862.11 | 42.19 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 86.83 | 12.50 | -872.80 | 872.02 | 42.67 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 87.83 | 12.50 | -882.72 | 881.93 | 43.16 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 88.83 | 12.50 | -892.64 | 891.84 | 43.64 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 89.83 | 12.50 | -902.56 | 901.75 | 44.13 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 90.83 | 12.50 | -912.48 | 911.66 | 44.61 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 91.83 | 12.50 | -922.40 | 921.57 | 45.10 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 92.83 | 12.50 | -932.32 | 931.48 | 45.58 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 93.83 | 12.50 | -942.24 | 941.39 | 46.07 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 94.83 | 12.50 | -952.16 | 951.29 | 46.55 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 95.83 | 12.50 | -962.08 | 961.20 | 47.04 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 96.83 | 12.50 | -972.00 | 971.11 | 47.52 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 97.83 | 12.50 | -981.92 | 981.02 | 48.01 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 98.83 | 12.50 | -991.84 | 990.93 | 48.49 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 99.83 | 12.50 | -1001.76 | 1000.84 | 48.98 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |
| +1.200+1.60+0.500+0.424H | 1 | 100.00 | 12.50 | -1003.52 | 1002.60 | 49.06 | 1.00 | 439.39 | Vs<=Phi*Vc/2 | w/Reqd S-S | 439.4 | 0.0 | 0.0 |

**Maximum Forces & Stresses for Load Combinations**

| Load Combination | Span # | Location (ft) | Mu : Max | Phi*Mn | Stress Ratio |
|---|---|---|---|---|---|
| Project Min/Max/Design | | | Max | Min | Max |
| Span # 1 | 1 | 0.00 | 625.00 | 1,040.00 | 0.60 |
| Span # 2 | 2 | 20.000 | 1,110.00 | 1,760.00 | 0.63 |
| Span # 3 | 3 | 20.000 | 1,110.00 | 1,760.00 | 0.63 |
| Span # 4 | 4 | 40.000 | 1,000.00 | 1,040.00 | 0.96 |
| Span # 5 | 5 | 0.00 | 44.00 | 208.00 | 0.21 |

+1.200+1.60+0.500+0.424H

Title Block Line 1

You can change this area

using the "Settings" menu item

and then using the "Printing &

Title Block" selection.

Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 25 JUN 2022, 6:13AM

# Concrete Beam

File: FWI2101 - Paragon Star.ec6

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Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: Area F - Grids 4/5/6/7



Load Combination Segment | Span # | Location [ft] Area Begin | Bending Stress Results (k-ft) Max. Mneg | Max. Mpos | Deflection Deflection Ratio
Span # 1 | 1 | 0.000 | -10.13 | 8.97 | 0.01
Span # 2 | 2 | 23.000 | -2.13,8.85 | 1.13,9.82 | 0.00
Span # 3 | 3 | 23.000 | -2.13,8.85 | 1.13,9.82 | 0.00
Span # 4 | 4 | 0.000 | -10.13 | 8.97 | 0.01

Overall Maximum Deflections

Load Combination | Span | Max. "+" Defl [in] | Location in Span [ft] | Load Combination | Max. "-" Defl [in] | Location in Span [ft]
+D+L+H | 1 | 0.000 | 0.000 | +D+L+H | 0.000 | 0.000
+D+L+H | 2 | 0.433 | 9.405 | +D+L+H | -0.857 | 24.000
+D+L+H | 3 | 0.433 | 14.595 | +D+L+H | -0.857 | 24.000
+D+L+H | 4 | 0.000 | 0.000 | +D+L+H | 0.000 | 0.000

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 28 JUN 2022, 11:03AM

# Concrete Beam

File: FWI2101 - Paragon Star.ec6
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Lic. # : KW-06011403
Bob D. Campbell and Co., Inc.

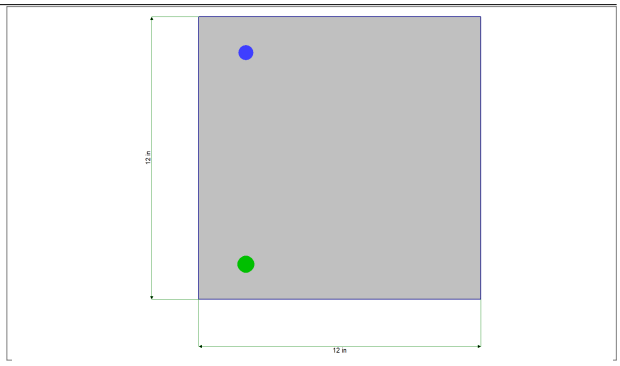
DESCRIPTION: 1-Way Slab Between Z2 and Z3 at Area F

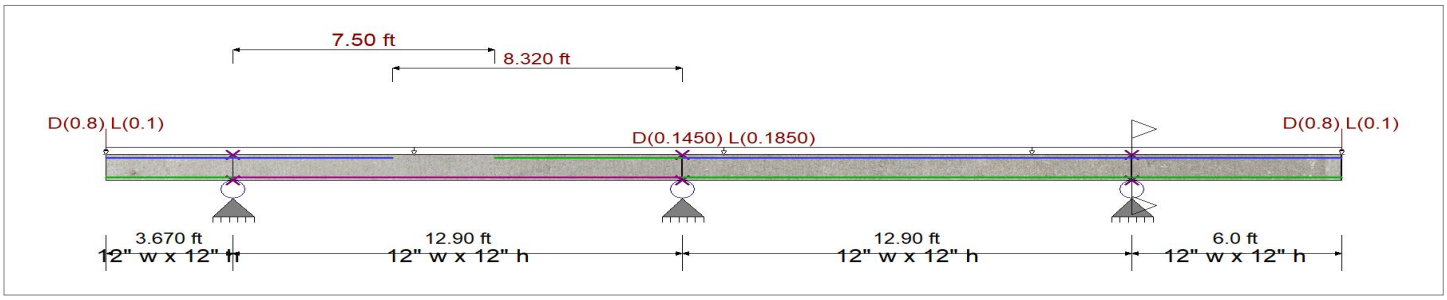
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | $\phi$ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| $\psi$ Density | = | 145.0 pcf | $\beta_1$ | = | 0.80 |
| $\lambda$ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup | = | 2 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 12.0 in, Height = 12.0 in

Span #1 Reinforcing....
- 1-#5 at 1.50 in from Top, from 0.0 to 3.670 ft in this span
- 1-#6 at 1.50 in from Bottom, from 0.0 to 3.670 ft in this span

Span #2 Reinforcing....
- 1-#5 at 1.50 in from Top, from 0.0 to 4.580 ft in this span
- 1-#6 at 1.50 in from Top, from 7.50 to 12.90 ft in this span
- 1-#6 at 1.50 in from Bottom, from 0.0 to 12.90 ft in this span

Span #3 Reinforcing....
- 1-#6 at 1.50 in from Top, from 0.0 to 12.90 ft in this span
- 1-#6 at 1.50 in from Bottom, from 0.0 to 12.90 ft in this span

Span #4 Reinforcing....
- 1-#6 at 1.50 in from Top, from 0.0 to 6.0 ft in this span
- 1-#6 at 1.50 in from Bottom, from 0.0 to 6.0 ft in this span

Beam self weight calculated and added to loads
Loads on all spans...
D = 0.1450, L = 0.1850

Uniform Load on ALL spans : D = 0.1450, L = 0.1850 k/ft

Load for Span Number 1
Point Load : D = 0.80, L = 0.10 k @ 0.0 ft, (Exterior Wall)

Load for Span Number 4
Point Load : D = 0.80, L = 0.10 k @ 6.0 ft, (Exterior Wall)

## DESIGN SUMMARY

**Design OK**

| | | | | | | |
|---|---|---|---|---|---|---|
| Maximum Bending Stress Ratio | = | **0.860** : 1 | Maximum Deflection | | | |
| Section used for this span | | **Typical Section** | Max Downward Transient Deflection | 0.017 in | Ratio = | 8258 >=600. |
| Mu : Applied | | -18.311 k-ft | Max Upward Transient Deflection | -0.002 in | Ratio = | 35870 >=600. |
| Mn * Phi : Allowable | | 21.289 k-ft | Max Downward Total Deflection | 0.077 in | Ratio = | 1876 >=420. |
| Location of maximum on span | | 0.000 ft | Max Upward Total Deflection | -0.009 in | Ratio = | 17705 >=420. |
| Span # where maximum occurs | | Span # 4 | | | | |

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# Concrete Beam

DESCRIPTION: 1-Way Slab Between Z2 and Z3 at Area F

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 | Support 5 |
|---|---|---|---|---|---|
| Overall MAXimum | | 5.841 | 5.281 | 7.525 | |
| Overall MINimum | | 1.906 | 1.766 | 2.517 | |
| +D+H | | 3.935 | 2.943 | 5.008 | |
| +D+L+H | | 5.841 | 5.281 | 7.525 | |
| +D+Lr+H | | 3.935 | 2.943 | 5.008 | |
| +D+S+H | | 3.935 | 2.943 | 5.008 | |
| +D+0.750Lr+0.750L+H | | 5.365 | 4.697 | 6.896 | |
| +D+0.750L+0.750S+H | | 5.365 | 4.697 | 6.896 | |
| +D+0.60W+H | | 3.935 | 2.943 | 5.008 | |
| +D+0.750Lr+0.750L+0.450W+H | | 5.365 | 4.697 | 6.896 | |
| +D+0.750L+0.750S+0.450W+H | | 5.365 | 4.697 | 6.896 | |
| +0.60D+0.60W+0.60H | | 2.361 | 1.766 | 3.005 | |
| +D+0.70E+0.60H | | 3.935 | 2.943 | 5.008 | |
| +D+0.750L+0.750S+0.5250E+H | | 5.365 | 4.697 | 6.896 | |
| +0.60D+0.70E+H | | 2.361 | 1.766 | 3.005 | |
| D Only | | 3.935 | 2.943 | 5.008 | |
| L Only | | 1.906 | 2.339 | 2.517 | |
| H Only | | | | | |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60S+0.50W+1.60H | 1 | 0.00 | 10.50 | -0.00 | 0.00 | 0.00 | 1.00 | 13.52 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.23 | 10.50 | -1.27 | 1.27 | 0.28 | 1.00 | 13.28 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.46 | 10.50 | -1.42 | 1.42 | 0.59 | 1.00 | 13.28 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.70 | 10.50 | -1.57 | 1.57 | 0.93 | 1.00 | 13.28 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.93 | 10.50 | -1.72 | 1.72 | 1.31 | 1.00 | 13.28 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.16 | 10.50 | -1.87 | 1.87 | 1.73 | 0.94 | 13.24 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.39 | 10.50 | -2.02 | 2.02 | 2.18 | 0.81 | 13.17 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.62 | 10.50 | -2.16 | 2.16 | 2.66 | 0.71 | 13.11 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.85 | 10.50 | -2.31 | 2.31 | 3.18 | 0.64 | 13.07 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.09 | 10.50 | -2.46 | 2.46 | 3.74 | 0.58 | 13.03 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.32 | 10.50 | -2.61 | 2.61 | 4.33 | 0.53 | 13.00 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.55 | 10.50 | -2.76 | 2.76 | 4.95 | 0.49 | 12.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.78 | 10.50 | -2.91 | 2.91 | 5.61 | 0.45 | 12.96 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.01 | 10.50 | -3.06 | 3.06 | 6.30 | 0.43 | 12.94 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.25 | 10.50 | -3.21 | 3.21 | 7.02 | 0.40 | 12.93 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.48 | 10.50 | -3.36 | 3.36 | 7.79 | 0.38 | 12.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 3.81 | 10.50 | 4.20 | 4.20 | 7.87 | 0.47 | 12.97 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 4.62 | 10.50 | 3.68 | 3.68 | 4.66 | 0.69 | 13.10 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 5.44 | 10.50 | 3.15 | 3.15 | 1.88 | 1.00 | 13.28 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 6.25 | 10.50 | 2.63 | 2.63 | 0.47 | 1.00 | 13.52 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 7.06 | 10.50 | 2.10 | 2.10 | 2.40 | 0.77 | 13.33 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 7.88 | 10.50 | 1.58 | 1.58 | 3.90 | 0.35 | 12.99 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 8.69 | 10.50 | 1.05 | 1.05 | 4.97 | 0.19 | 12.85 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.8 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 9.51 | 10.50 | 0.53 | 0.53 | 3.16 | 0.15 | 12.82 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.8 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 10.32 | 10.50 | 0.20 | 0.20 | 3.46 | 0.05 | 12.74 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 11.14 | 10.50 | -0.52 | 0.52 | 5.62 | 0.08 | 12.76 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 11.95 | 10.50 | -1.05 | 1.05 | 4.98 | 0.18 | 12.85 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 12.77 | 10.50 | -1.57 | 1.57 | 3.92 | 0.35 | 12.99 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 13.58 | 10.50 | -2.10 | 2.10 | 2.43 | 0.76 | 13.32 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 14.40 | 10.50 | -2.62 | 2.62 | 0.51 | 1.00 | 13.52 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 15.21 | 10.50 | -3.14 | 3.14 | 1.84 | 1.00 | 13.28 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 16.03 | 10.50 | -3.67 | 3.67 | 4.62 | 0.70 | 13.10 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 16.84 | 10.50 | 3.08 | 3.08 | 5.85 | 0.46 | 13.08 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 17.66 | 10.50 | 2.55 | 2.55 | 3.55 | 0.63 | 13.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 18.47 | 10.50 | 2.03 | 2.03 | 1.68 | 1.00 | 13.52 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.5 | 0.0 | 0.0 |

# Concrete Beam

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DESCRIPTION: 1-Way Slab Between Z2 and Z3 at Area F

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 3 | 19.29 | 10.50 | 1.51 | 1.51 | 0.24 | 1.00 | 13.52 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 20.10 | 10.50 | 0.98 | 0.98 | 0.77 | 1.00 | 13.52 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 20.92 | 10.50 | 0.46 | 0.46 | 1.35 | 0.29 | 12.94 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.9 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 21.73 | 10.50 | -0.31 | 0.31 | 0.56 | 0.49 | 13.10 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.1 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 22.54 | 10.50 | -0.64 | 0.64 | 0.17 | 1.00 | 13.52 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 23.36 | 10.50 | -1.12 | 1.12 | 0.54 | 1.00 | 13.52 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 24.17 | 10.50 | -1.64 | 1.64 | 0.58 | 1.00 | 13.52 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 24.99 | 10.50 | -2.17 | 2.17 | 2.13 | 0.89 | 13.43 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 25.80 | 10.50 | -2.69 | 2.69 | 4.11 | 0.57 | 13.17 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 26.62 | 10.50 | -3.22 | 3.22 | 6.52 | 0.43 | 13.05 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 27.43 | 10.50 | -3.74 | 3.74 | 9.35 | 0.35 | 12.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 28.25 | 10.50 | -4.27 | 4.27 | 12.62 | 0.30 | 12.94 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 29.06 | 10.50 | -4.79 | 4.79 | 16.31 | 0.26 | 12.91 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 29.66 | 10.50 | 4.86 | 4.86 | 17.38 | 0.24 | 12.90 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 30.04 | 10.50 | 4.62 | 4.62 | 15.58 | 0.26 | 12.91 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 30.42 | 10.50 | 4.37 | 4.37 | 13.88 | 0.28 | 12.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 30.80 | 10.50 | 4.13 | 4.13 | 12.27 | 0.29 | 12.94 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 31.18 | 10.50 | 3.89 | 3.89 | 10.75 | 0.32 | 12.96 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 31.55 | 10.50 | 3.64 | 3.64 | 9.32 | 0.34 | 12.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 31.93 | 10.50 | 3.40 | 3.40 | 7.99 | 0.37 | 13.00 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 32.31 | 10.50 | 3.15 | 3.15 | 6.75 | 0.41 | 13.03 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 32.69 | 10.50 | 2.91 | 2.91 | 5.60 | 0.45 | 13.07 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 33.07 | 10.50 | 2.67 | 2.67 | 4.54 | 0.51 | 13.12 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 33.45 | 10.50 | 2.42 | 2.42 | 3.58 | 0.59 | 13.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 33.83 | 10.50 | 2.18 | 2.18 | 2.71 | 0.70 | 13.28 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 34.21 | 10.50 | 1.93 | 1.93 | 1.93 | 0.88 | 13.42 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 34.59 | 10.50 | 1.69 | 1.69 | 1.24 | 1.00 | 13.52 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 34.96 | 10.50 | 1.45 | 1.45 | 0.65 | 1.00 | 13.52 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 35.34 | 10.50 | 1.20 | 1.20 | 0.15 | 1.00 | 13.52 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.5 | 0.0 | 0.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 3.670 | -8.31 | 15.85 | 0.52 |
| Span # 2 | 2 | 12.900 | -8.45 | 15.85 | 0.53 |
| Span # 3 | 3 | 12.900 | -17.63 | 21.29 | 0.83 |
| Span # 4 | 4 | 6.000 | -18.31 | 21.29 | 0.86 |
| +1.40D+1.60H | | | | | |
| Span # 1 | 1 | 3.670 | -6.74 | 15.85 | 0.43 |
| Span # 2 | 2 | 12.900 | -6.84 | 15.85 | 0.43 |
| Span # 3 | 3 | 12.900 | -13.56 | 21.29 | 0.64 |
| Span # 4 | 4 | 6.000 | -14.03 | 21.29 | 0.66 |
| +1.20D+0.50Lr+1.60L+1.60H | | | | | |
| Span # 1 | 1 | 3.670 | -8.31 | 15.85 | 0.52 |
| Span # 2 | 2 | 12.900 | -8.45 | 15.85 | 0.53 |
| Span # 3 | 3 | 12.900 | -17.63 | 21.29 | 0.83 |
| Span # 4 | 4 | 6.000 | -18.31 | 21.29 | 0.86 |
| +1.20D+1.60L+0.50S+1.60H | | | | | |
| Span # 1 | 1 | 3.670 | -8.31 | 15.85 | 0.52 |
| Span # 2 | 2 | 12.900 | -8.45 | 15.85 | 0.53 |
| Span # 3 | 3 | 12.900 | -17.63 | 21.29 | 0.83 |
| Span # 4 | 4 | 6.000 | -18.31 | 21.29 | 0.86 |
| +1.20D+1.60Lr+L+1.60H | | | | | |
| Span # 1 | 1 | 3.670 | -7.36 | 15.85 | 0.46 |
| Span # 2 | 2 | 12.900 | -7.48 | 15.85 | 0.47 |
| Span # 3 | 3 | 12.900 | -15.38 | 21.29 | 0.72 |
| Span # 4 | 4 | 6.000 | -15.95 | 21.29 | 0.75 |
| +1.20D+1.60Lr+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 3.670 | -5.78 | 15.85 | 0.36 |

# Concrete Beam

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DESCRIPTION: 1-Way Slab Between Z2 and Z3 at Area F

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 2 | 2 | 12.900 | -5.87 | 15.85 | 0.37 |
| Span # 3 | 3 | 12.900 | -11.62 | 21.29 | 0.55 |
| Span # 4 | 4 | 6.000 | -12.02 | 21.29 | 0.56 |
| +1.20D+L+1.60S+1.60H | | | | | |
| Span # 1 | 1 | 3.670 | -7.36 | 15.85 | 0.46 |
| Span # 2 | 2 | 12.900 | -7.48 | 15.85 | 0.47 |
| Span # 3 | 3 | 12.900 | -15.38 | 21.29 | 0.72 |
| Span # 4 | 4 | 6.000 | -15.95 | 21.29 | 0.75 |
| +1.20D+1.60S+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 3.670 | -5.78 | 15.85 | 0.36 |
| Span # 2 | 2 | 12.900 | -5.87 | 15.85 | 0.37 |
| Span # 3 | 3 | 12.900 | -11.62 | 21.29 | 0.55 |
| Span # 4 | 4 | 6.000 | -12.02 | 21.29 | 0.56 |
| +1.20D+0.50Lr+L+W+1.60H | | | | | |
| Span # 1 | 1 | 3.670 | -7.36 | 15.85 | 0.46 |
| Span # 2 | 2 | 12.900 | -7.48 | 15.85 | 0.47 |
| Span # 3 | 3 | 12.900 | -15.38 | 21.29 | 0.72 |
| Span # 4 | 4 | 6.000 | -15.95 | 21.29 | 0.75 |
| +1.20D+L+0.50S+W+1.60H | | | | | |
| Span # 1 | 1 | 3.670 | -7.36 | 15.85 | 0.46 |
| Span # 2 | 2 | 12.900 | -7.48 | 15.85 | 0.47 |
| Span # 3 | 3 | 12.900 | -15.38 | 21.29 | 0.72 |
| Span # 4 | 4 | 6.000 | -15.95 | 21.29 | 0.75 |
| +0.90D+W+1.60H | | | | | |
| Span # 1 | 1 | 3.670 | -4.33 | 15.85 | 0.27 |
| Span # 2 | 2 | 12.900 | -4.40 | 15.85 | 0.28 |
| Span # 3 | 3 | 12.900 | -8.72 | 21.29 | 0.41 |
| Span # 4 | 4 | 6.000 | -9.02 | 21.29 | 0.42 |
| +1.20D+L+0.20S+E+1.60H | | | | | |
| Span # 1 | 1 | 3.670 | -7.36 | 15.85 | 0.46 |
| Span # 2 | 2 | 12.900 | -7.48 | 15.85 | 0.47 |
| Span # 3 | 3 | 12.900 | -15.38 | 21.29 | 0.72 |
| Span # 4 | 4 | 6.000 | -15.95 | 21.29 | 0.75 |
| +0.90D+E+0.90H | | | | | |
| Span # 1 | 1 | 3.670 | -4.33 | 15.85 | 0.27 |
| Span # 2 | 2 | 12.900 | -4.40 | 15.85 | 0.28 |
| Span # 3 | 3 | 12.900 | -8.72 | 21.29 | 0.41 |
| Span # 4 | 4 | 6.000 | -9.02 | 21.29 | 0.42 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| D Only | 1 | 0.0049 | 0.000 | L Only | -0.0013 | 2.028 |
| +D+L+H | 2 | 0.0132 | 6.450 | +D+L+H | -0.0005 | 13.239 |
| +D+L+H | 3 | 0.0012 | 13.058 | +D+L+H | -0.0087 | 9.845 |
| +D+L+H | 4 | 0.0767 | 6.000 | | 0.0000 | 9.845 |

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Project ID:
Project Descr:

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# Concrete Beam

File: FWI2101 - Paragon Star.ec6

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Lic. # : KW-06011403

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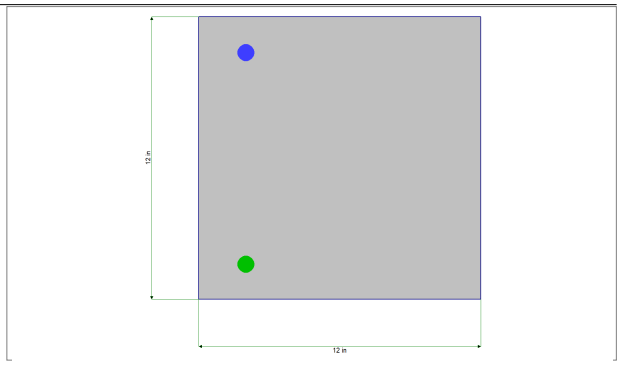
DESCRIPTION: 1-Way Slab Between 10 and 11 at Area E

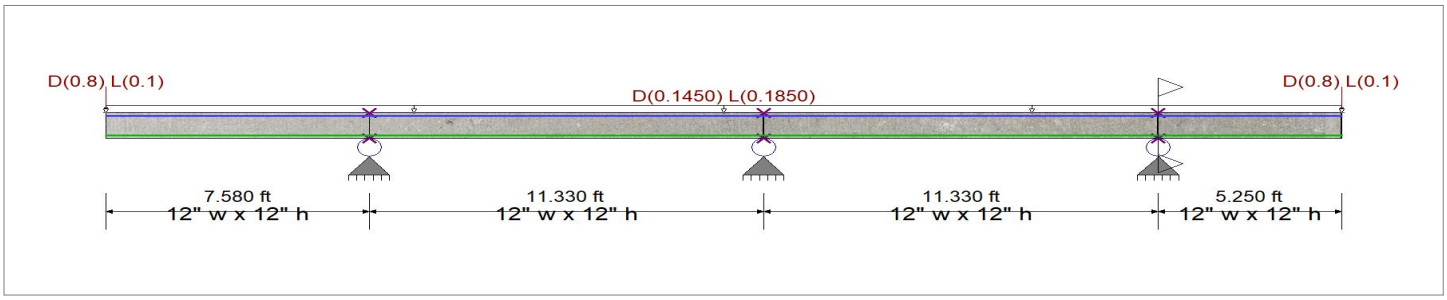
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | $\phi$ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| $\psi$ Density | = | 145.0 pcf | $\beta_1$ | = | 0.80 |
| $\lambda$ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 2 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 12.0 in, Height = 12.0 in

Span #1 Reinforcing....
2-#6 at 1.50 in from Top, from 0.0 to 7.580 ft in this span
1-#6 at 1.50 in from Bottom, from 0.0 to 7.580 ft in this span

Span #2 Reinforcing....
2-#6 at 1.50 in from Top, from 0.0 to 11.330 ft in this span
1-#6 at 1.50 in from Bottom, from 0.0 to 11.330 ft in this span

Span #3 Reinforcing....
1-#5 at 1.50 in from Top, from 0.0 to 11.330 ft in this span
1-#6 at 1.50 in from Bottom, from 0.0 to 11.330 ft in this span

Span #4 Reinforcing....
1-#5 at 1.50 in from Top, from 0.0 to 5.250 ft in this span
1-#6 at 1.50 in from Bottom, from 0.0 to 5.250 ft in this span

Beam self weight calculated and added to loads
Loads on all spans...
D = 0.1450, L = 0.1850

Uniform Load on ALL spans : D = 0.1450, L = 0.1850 k/ft

Load for Span Number 1
Point Load : D = 0.80, L = 0.10 k @ 0.0 ft, (Exterior Wall)

Load for Span Number 4
Point Load : D = 0.80, L = 0.10 k @ 5.250 ft, (Exterior Wall)

## DESIGN SUMMARY

**Design OK**

| | | | | | | |
|---|---|---|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.931** : 1 | | Maximum Deflection | | | |
| Section used for this span | **Typical Section** | | Max Downward Transient Deflection | 0.047 in | Ratio = | 3910 >=600. |
| Mu : Applied | -14.754 k-ft | | Max Upward Transient Deflection | -0.004 in | Ratio = | 30797 >=600. |
| Mn * Phi : Allowable | 15.854 k-ft | | Max Downward Total Deflection | 0.268 in | Ratio = | 676 >=420. |
| Location of maximum on span | 0.000 ft | | Max Upward Total Deflection | -0.020 in | Ratio = | 6727 >=420. |
| Span # where maximum occurs | Span # 4 | | | | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 | Support 5 |
|---|---|---|---|---|---|
| Overall MAXimum | | 9.043 | 2.489 | 7.125 | |

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# Concrete Beam

DESCRIPTION: 1-Way Slab Between 10 and 11 at Area E

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 | Support 5 |
|---|---|---|---|---|---|
| Overall MINimum | | 3.026 | 0.670 | 2.330 | |
| +D+H | | 6.000 | 1.115 | 4.777 | |
| +D+L+H | | 9.043 | 2.489 | 7.125 | |
| +D+Lr+H | | 6.000 | 1.115 | 4.777 | |
| +D+S+H | | 6.000 | 1.115 | 4.777 | |
| +D+0.750Lr+0.750L+H | | 8.280 | 2.152 | 6.535 | |
| +D+0.750L+0.750S+H | | 8.280 | 2.152 | 6.535 | |
| +D+0.60W+H | | 6.000 | 1.115 | 4.777 | |
| +D+0.750Lr+0.750L+0.450W+H | | 8.280 | 2.152 | 6.535 | |
| +D+0.750L+0.750S+0.450W+H | | 8.280 | 2.152 | 6.535 | |
| +0.60D+0.60W+0.60H | | 3.600 | 0.670 | 2.866 | |
| +D+0.70E+0.60H | | 6.000 | 1.115 | 4.777 | |
| +D+0.750L+0.750S+0.5250E+H | | 8.280 | 2.152 | 6.535 | |
| +0.60D+0.70E+H | | 3.600 | 0.670 | 2.866 | |
| D Only | | 6.000 | 1.115 | 4.777 | |
| L Only | | 3.026 | 1.409 | 2.330 | |
| H Only | | | | | |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.40D+1.60H | 1 | 0.00 | 10.50 | 0.00 | 0.00 | 0.00 | 1.00 | 13.52 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.48 | 10.50 | -1.43 | 1.43 | 0.61 | 1.00 | 14.35 | Vu < PhiVc/2 | lot Reqd 9.6. | 14.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.96 | 10.50 | -1.74 | 1.74 | 1.37 | 1.00 | 14.35 | Vu < PhiVc/2 | lot Reqd 9.6. | 14.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.44 | 10.50 | -2.04 | 2.04 | 2.27 | 0.79 | 14.00 | Vu < PhiVc/2 | lot Reqd 9.6. | 14.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.91 | 10.50 | -2.35 | 2.35 | 3.32 | 0.62 | 13.72 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.39 | 10.50 | -2.66 | 2.66 | 4.52 | 0.51 | 13.55 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.87 | 10.50 | -2.97 | 2.97 | 5.87 | 0.44 | 13.43 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.35 | 10.50 | -3.28 | 3.28 | 7.37 | 0.39 | 13.34 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.83 | 10.50 | -3.59 | 3.59 | 9.01 | 0.35 | 13.27 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.31 | 10.50 | -3.89 | 3.89 | 10.80 | 0.32 | 13.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.79 | 10.50 | -4.20 | 4.20 | 12.74 | 0.29 | 13.17 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.27 | 10.50 | -4.51 | 4.51 | 14.83 | 0.27 | 13.14 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.74 | 10.50 | -4.82 | 4.82 | 17.06 | 0.25 | 13.10 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.22 | 10.50 | -5.13 | 5.13 | 19.44 | 0.23 | 13.08 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.70 | 10.50 | -5.44 | 5.44 | 21.97 | 0.22 | 13.05 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.18 | 10.50 | -5.74 | 5.74 | 24.65 | 0.20 | 13.03 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 7.70 | 10.50 | 5.96 | 5.96 | 26.27 | 0.20 | 13.02 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 8.41 | 10.50 | 5.50 | 5.50 | 22.17 | 0.22 | 13.05 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 9.13 | 10.50 | 5.04 | 5.04 | 18.40 | 0.24 | 13.09 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 9.85 | 10.50 | 4.58 | 4.58 | 14.96 | 0.27 | 13.14 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 10.56 | 10.50 | 4.12 | 4.12 | 11.85 | 0.30 | 13.20 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 11.28 | 10.50 | 3.66 | 3.66 | 9.06 | 0.35 | 13.28 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 11.99 | 10.50 | 3.20 | 3.20 | 6.61 | 0.42 | 13.39 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 12.71 | 10.50 | 2.74 | 2.74 | 4.49 | 0.53 | 13.58 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 13.42 | 10.50 | 2.28 | 2.28 | 2.69 | 0.74 | 13.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 14.14 | 10.50 | 1.82 | 1.82 | 1.23 | 1.00 | 14.35 | Vu < PhiVc/2 | lot Reqd 9.6. | 14.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 14.86 | 10.50 | 1.35 | 1.35 | 0.09 | 1.00 | 14.35 | Vu < PhiVc/2 | lot Reqd 9.6. | 14.3 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 15.57 | 10.50 | 0.96 | 0.96 | 0.46 | 1.00 | 13.52 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.5 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 16.29 | 10.50 | 0.67 | 0.67 | 1.04 | 0.56 | 13.16 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.2 | 0.0 | 0.0 |
| +1.40D+1.60H | 2 | 17.00 | 10.50 | 0.38 | 0.38 | 1.41 | 0.23 | 12.89 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 17.72 | 10.50 | -0.49 | 0.49 | 1.14 | 0.37 | 13.00 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 18.43 | 10.50 | -0.95 | 0.95 | 0.63 | 1.00 | 13.52 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 19.15 | 10.50 | 2.18 | 2.18 | 0.64 | 1.00 | 13.52 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 19.86 | 10.50 | 1.72 | 1.72 | 2.04 | 0.74 | 13.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 20.58 | 10.50 | 1.26 | 1.26 | 3.11 | 0.36 | 12.99 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 21.30 | 10.50 | 0.80 | 0.80 | 3.84 | 0.18 | 12.85 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.8 | 0.0 | 0.0 |

# Concrete Beam

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DESCRIPTION: 1-Way Slab Between 10 and 11 at Area E

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 3 | 22.01 | 10.50 | 0.34 | 0.34 | 4.25 | 0.07 | 12.75 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.8 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 22.73 | 10.50 | -0.39 | 0.39 | 2.88 | 0.12 | 12.79 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.8 | 0.0 | 0.0 |
| +1.40D+1.60H | 3 | 23.44 | 10.50 | -0.68 | 0.68 | 2.50 | 0.24 | 12.89 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 24.16 | 10.50 | -1.04 | 1.04 | 3.50 | 0.26 | 12.91 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 24.87 | 10.50 | -1.50 | 1.50 | 2.59 | 0.51 | 13.12 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 25.59 | 10.50 | -1.96 | 1.96 | 1.35 | 1.00 | 13.52 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 26.30 | 10.50 | -2.42 | 2.42 | 0.22 | 1.00 | 13.28 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 27.02 | 10.50 | -2.89 | 2.89 | 2.12 | 1.00 | 13.28 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 27.74 | 10.50 | -3.35 | 3.35 | 4.35 | 0.67 | 13.09 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 28.45 | 10.50 | -3.81 | 3.81 | 6.91 | 0.48 | 12.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 29.17 | 10.50 | -4.27 | 4.27 | 9.80 | 0.38 | 12.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 29.88 | 10.50 | -4.73 | 4.73 | 13.02 | 0.32 | 12.88 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 30.41 | 10.50 | 4.39 | 4.39 | 14.02 | 0.27 | 12.86 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 30.74 | 10.50 | 4.18 | 4.18 | 12.60 | 0.29 | 12.86 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 31.07 | 10.50 | 3.97 | 3.97 | 11.24 | 0.31 | 12.88 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 31.40 | 10.50 | 3.75 | 3.75 | 9.96 | 0.33 | 12.89 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 31.73 | 10.50 | 3.54 | 3.54 | 8.76 | 0.35 | 12.90 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 32.06 | 10.50 | 3.33 | 3.33 | 7.62 | 0.38 | 12.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 32.40 | 10.50 | 3.11 | 3.11 | 6.55 | 0.42 | 12.94 | Vu < PhiVc/2 | lot Reqd 9.6. | 12.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 32.73 | 10.50 | 2.90 | 2.90 | 5.55 | 0.46 | 12.96 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 33.06 | 10.50 | 2.69 | 2.69 | 4.63 | 0.51 | 12.99 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 33.39 | 10.50 | 2.47 | 2.47 | 3.77 | 0.57 | 13.03 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 33.72 | 10.50 | 2.26 | 2.26 | 2.99 | 0.66 | 13.08 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 34.05 | 10.50 | 2.05 | 2.05 | 2.27 | 0.79 | 13.15 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 34.38 | 10.50 | 1.83 | 1.83 | 1.63 | 0.98 | 13.27 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 34.72 | 10.50 | 1.62 | 1.62 | 1.06 | 1.00 | 13.28 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 35.05 | 10.50 | 1.40 | 1.40 | 0.56 | 1.00 | 13.28 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 35.38 | 10.50 | 1.19 | 1.19 | 0.13 | 1.00 | 13.28 | Vu < PhiVc/2 | lot Reqd 9.6. | 13.3 | 0.0 | 0.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 7.580 | -26.51 | 39.64 | 0.67 |
| Span # 2 | 2 | 11.330 | -26.99 | 39.64 | 0.68 |
| Span # 3 | 3 | 11.330 | -14.17 | 15.85 | 0.89 |
| Span # 4 | 4 | 5.250 | -14.75 | 15.85 | 0.93 |
| +1.40D+1.60H | | | | | |
| Span # 1 | 1 | 7.580 | -19.82 | 39.64 | 0.50 |
| Span # 2 | 2 | 11.330 | -20.15 | 39.64 | 0.51 |
| Span # 3 | 3 | 11.330 | -11.07 | 15.85 | 0.70 |
| Span # 4 | 4 | 5.250 | -11.47 | 15.85 | 0.72 |
| +1.20D+0.50Lr+1.60L+1.60H | | | | | |
| Span # 1 | 1 | 7.580 | -26.51 | 39.64 | 0.67 |
| Span # 2 | 2 | 11.330 | -26.99 | 39.64 | 0.68 |
| Span # 3 | 3 | 11.330 | -14.17 | 15.85 | 0.89 |
| Span # 4 | 4 | 5.250 | -14.75 | 15.85 | 0.93 |
| +1.20D+1.60L+0.50S+1.60H | | | | | |
| Span # 1 | 1 | 7.580 | -26.51 | 39.64 | 0.67 |
| Span # 2 | 2 | 11.330 | -26.99 | 39.64 | 0.68 |
| Span # 3 | 3 | 11.330 | -14.17 | 15.85 | 0.89 |
| Span # 4 | 4 | 5.250 | -14.75 | 15.85 | 0.93 |
| +1.20D+1.60Lr+L+1.60H | | | | | |
| Span # 1 | 1 | 7.580 | -22.94 | 39.64 | 0.58 |
| Span # 2 | 2 | 11.330 | -23.35 | 39.64 | 0.59 |
| Span # 3 | 3 | 11.330 | -12.41 | 15.85 | 0.78 |
| Span # 4 | 4 | 5.250 | -12.91 | 15.85 | 0.81 |
| +1.20D+1.60Lr+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 7.580 | -16.99 | 39.64 | 0.43 |
| Span # 2 | 2 | 11.330 | -17.27 | 39.64 | 0.44 |

# Concrete Beam

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DESCRIPTION: 1-Way Slab Between 10 and 11 at Area E

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 3 | 3 | 11.330 | -9.49 | 15.85 | 0.60 |
| Span # 4 | 4 | 5.250 | -9.84 | 15.85 | 0.62 |
| +1.20D+L+1.60S+1.60H | | | | | |
| Span # 1 | 1 | 7.580 | -22.94 | 39.64 | 0.58 |
| Span # 2 | 2 | 11.330 | -23.35 | 39.64 | 0.59 |
| Span # 3 | 3 | 11.330 | -12.41 | 15.85 | 0.78 |
| Span # 4 | 4 | 5.250 | -12.91 | 15.85 | 0.81 |
| +1.20D+1.60S+0.50W+1.60H | | | | | |
| Span # 1 | 1 | 7.580 | -16.99 | 39.64 | 0.43 |
| Span # 2 | 2 | 11.330 | -17.27 | 39.64 | 0.44 |
| Span # 3 | 3 | 11.330 | -9.49 | 15.85 | 0.60 |
| Span # 4 | 4 | 5.250 | -9.84 | 15.85 | 0.62 |
| +1.20D+0.50Lr+L+W+1.60H | | | | | |
| Span # 1 | 1 | 7.580 | -22.94 | 39.64 | 0.58 |
| Span # 2 | 2 | 11.330 | -23.35 | 39.64 | 0.59 |
| Span # 3 | 3 | 11.330 | -12.41 | 15.85 | 0.78 |
| Span # 4 | 4 | 5.250 | -12.91 | 15.85 | 0.81 |
| +1.20D+L+0.50S+W+1.60H | | | | | |
| Span # 1 | 1 | 7.580 | -22.94 | 39.64 | 0.58 |
| Span # 2 | 2 | 11.330 | -23.35 | 39.64 | 0.59 |
| Span # 3 | 3 | 11.330 | -12.41 | 15.85 | 0.78 |
| Span # 4 | 4 | 5.250 | -12.91 | 15.85 | 0.81 |
| +0.90D+W+1.60H | | | | | |
| Span # 1 | 1 | 7.580 | -12.74 | 39.64 | 0.32 |
| Span # 2 | 2 | 11.330 | -12.96 | 39.64 | 0.33 |
| Span # 3 | 3 | 11.330 | -7.11 | 15.85 | 0.45 |
| Span # 4 | 4 | 5.250 | -7.38 | 15.85 | 0.47 |
| +1.20D+L+0.20S+E+1.60H | | | | | |
| Span # 1 | 1 | 7.580 | -22.94 | 39.64 | 0.58 |
| Span # 2 | 2 | 11.330 | -23.35 | 39.64 | 0.59 |
| Span # 3 | 3 | 11.330 | -12.41 | 15.85 | 0.78 |
| Span # 4 | 4 | 5.250 | -12.91 | 15.85 | 0.81 |
| +0.90D+E+0.90H | | | | | |
| Span # 1 | 1 | 7.580 | -12.74 | 39.64 | 0.32 |
| Span # 2 | 2 | 11.330 | -12.96 | 39.64 | 0.33 |
| Span # 3 | 3 | 11.330 | -7.11 | 15.85 | 0.45 |
| Span # 4 | 4 | 5.250 | -7.38 | 15.85 | 0.47 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H | 1 | 0.2685 | 0.000 | +D+L+H | -0.0044 | 7.878 |
| +D+L+H | 2 | 0.0007 | 11.628 | +D+L+H | -0.0202 | 3.280 |
| +D+L+H | 3 | 0.0052 | 3.876 | D Only | -0.0023 | 9.243 |
| +D+L+H | 4 | 0.0382 | 5.250 | | 0.0000 | 9.243 |

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 27 JUN 2022, 4:10PM
File: FWI2101 - Paragon Star.ec6

# Concrete Beam

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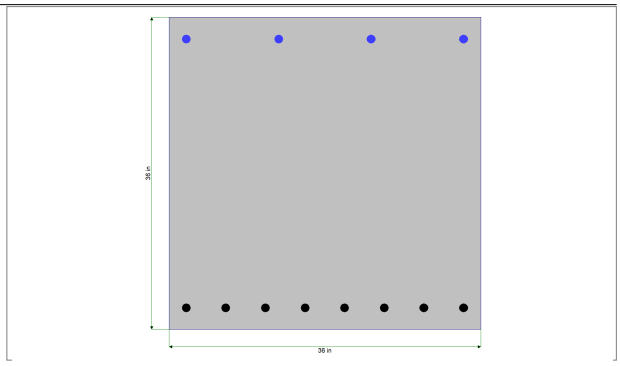
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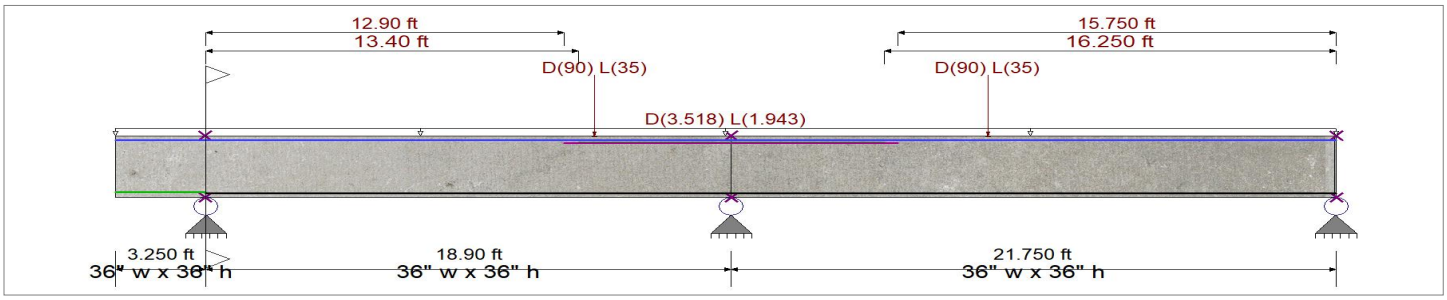
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | ϕ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| ψ Density | = | 145.0 pcf | $\beta_1$ | = | 0.80 |
| λ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 2 |






## Cross Section & Reinforcing Details

Rectangular Section, Width = 36.0 in, Height = 36.0 in

Span #1 Reinforcing....
- 8-#8 at 2.50 in from Top, from 0.0 to 3.250 ft in this span
- 4-#8 at 3.50 in from Bottom, from 0.0 to 3.250 ft in this span

Span #2 Reinforcing....
- 4-#8 at 2.50 in from Top, from 0.0 to 18.90 ft in this span
- 4-#8 at 3.50 in from Top, from 13.40 to 18.90 ft in this span
- 6-#8 at 4.0 in from Top, from 12.90 to 18.90 ft in this span
- 8-#8 at 2.50 in from Bottom, from 0.0 to 18.90 ft in this span

Span #3 Reinforcing....
- 4-#8 at 2.50 in from Top, from 0.0 to 21.750 ft in this span
- 4-#8 at 3.50 in from Top, from 0.0 to 5.50 ft in this span
- 6-#8 at 4.0 in from Top, from 0.0 to 6.0 ft in this span
- 10-#8 at 2.50 in from Bottom, from 0.0 to 21.750 ft in this span

Beam self weight calculated and added to loads
Loads on all spans...
D = 0.3350, L = 0.1850

Uniform Load on ALL spans : D = 0.3350, L = 0.1850 ksf, Tributary Width = 10.50 ft

Load for Span Number 2
Point Load : D = 90.0, L = 35.0 k @ 14.0 ft, (B3 Reaction)

Load for Span Number 3
Point Load : D = 90.0, L = 35.0 k @ 9.250 ft, (B3 Reaction)

## DESIGN SUMMARY

**Design OK**

| | | | | | | |
|---|---|---|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.694** : 1 | | Maximum Deflection | | | |
| Section used for this span | **Typical Section** | | Max Downward Transient Deflection | 0.019 in | Ratio = | 13933 >=600. |
| Mu : Applied | -1,063.35 k-ft | | Max Upward Transient Deflection | -0.003 in | Ratio = | 31008 >=600. |
| Mn * Phi : Allowable | 1,531.24 k-ft | | Max Downward Total Deflection | 0.142 in | Ratio = | 1843 >=480. |
| Location of maximum on span | 0.000 ft | | Max Upward Total Deflection | -0.009 in | Ratio = | 8678 >=480. |
| Span # where maximum occurs | Span # 3 | | | | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| Overall MAXimum | | 78.728 | 377.575 | 90.681 |

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# Concrete Beam

DESCRIPTION: Grid F2-B1/B2

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| Overall MINimum | | 22.160 | 107.644 | 25.472 |
| +D+L+H | | 78.728 | 377.575 | 90.681 |
| D Only | | 57.513 | 268.165 | 66.030 |
| L Only | | 22.160 | 107.644 | 25.472 |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.00 | 32.50 | 0.00 | 0.00 | 0.00 | 1.00 | 123.82 | Vu < PhiVc/2 | lot Reqd 9.6. | 123.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.13 | 33.50 | -1.16 | 1.16 | 0.08 | 1.00 | 133.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 133.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.26 | 33.50 | -2.31 | 2.31 | 0.30 | 1.00 | 133.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 133.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.39 | 33.50 | -3.47 | 3.47 | 0.68 | 1.00 | 133.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 133.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.52 | 33.50 | -4.63 | 4.63 | 1.20 | 1.00 | 133.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 133.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.65 | 33.50 | -5.78 | 5.78 | 1.88 | 1.00 | 133.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 133.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.78 | 33.50 | -6.94 | 6.94 | 2.71 | 1.00 | 133.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 133.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.91 | 33.50 | -8.09 | 8.09 | 3.68 | 1.00 | 133.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 133.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.04 | 33.50 | -9.25 | 9.25 | 4.81 | 1.00 | 133.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 133.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.17 | 33.50 | -10.41 | 10.41 | 6.09 | 1.00 | 133.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 133.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.30 | 33.50 | -11.56 | 11.56 | 7.52 | 1.00 | 133.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 133.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.43 | 33.50 | -12.72 | 12.72 | 9.09 | 1.00 | 133.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 133.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.56 | 33.50 | -13.88 | 13.88 | 10.82 | 1.00 | 133.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 133.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.69 | 33.50 | -15.03 | 15.03 | 12.70 | 1.00 | 133.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 133.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.82 | 33.50 | -16.19 | 16.19 | 14.73 | 1.00 | 133.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 133.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.95 | 33.50 | -17.35 | 17.35 | 16.91 | 1.00 | 133.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 133.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.08 | 33.50 | -18.50 | 18.50 | 19.24 | 1.00 | 133.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 133.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.21 | 33.50 | -19.66 | 19.66 | 21.72 | 1.00 | 133.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 133.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.34 | 33.50 | -20.81 | 20.81 | 24.35 | 1.00 | 133.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 133.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.47 | 33.50 | -21.97 | 21.97 | 27.13 | 1.00 | 133.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 133.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.60 | 33.50 | -23.13 | 23.13 | 30.07 | 1.00 | 133.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 133.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.73 | 33.50 | -24.28 | 24.28 | 33.15 | 1.00 | 133.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 133.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.86 | 33.50 | -25.44 | 25.44 | 36.38 | 1.00 | 133.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 133.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.99 | 33.50 | -26.60 | 26.60 | 39.76 | 1.00 | 133.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 133.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.12 | 33.50 | -27.75 | 27.75 | 43.29 | 1.00 | 133.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 133.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 3.25 | 33.50 | 72.80 | 72.80 | 46.98 | 1.00 | 127.44 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 177.7 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 4.01 | 33.50 | 66.08 | 66.08 | 5.52 | 1.00 | 133.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 133.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 4.76 | 33.50 | 59.35 | 59.35 | 52.93 | 1.00 | 133.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 133.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 5.52 | 33.50 | 52.63 | 52.63 | 95.26 | 1.00 | 133.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 133.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 6.27 | 33.50 | 45.90 | 45.90 | 132.50 | 0.97 | 132.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 133.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 7.03 | 33.50 | 39.18 | 39.18 | 164.66 | 0.66 | 129.39 | Vu < PhiVc/2 | lot Reqd 9.6. | 129.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 7.79 | 33.50 | 32.45 | 32.45 | 191.74 | 0.47 | 127.12 | Vu < PhiVc/2 | lot Reqd 9.6. | 127.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 8.54 | 33.50 | 25.73 | 25.73 | 213.73 | 0.34 | 125.50 | Vu < PhiVc/2 | lot Reqd 9.6. | 125.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 9.30 | 33.50 | 19.00 | 19.00 | 230.64 | 0.23 | 124.25 | Vu < PhiVc/2 | lot Reqd 9.6. | 124.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 10.05 | 33.50 | 12.28 | 12.28 | 242.46 | 0.14 | 123.20 | Vu < PhiVc/2 | lot Reqd 9.6. | 123.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 10.81 | 33.50 | 5.55 | 5.55 | 249.20 | 0.06 | 122.26 | Vu < PhiVc/2 | lot Reqd 9.6. | 122.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 11.57 | 33.50 | -1.17 | 1.17 | 250.86 | 0.01 | 121.67 | Vu < PhiVc/2 | lot Reqd 9.6. | 121.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 12.32 | 33.50 | -7.90 | 7.90 | 247.43 | 0.09 | 122.58 | Vu < PhiVc/2 | lot Reqd 9.6. | 122.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 13.08 | 33.50 | -14.62 | 14.62 | 238.92 | 0.17 | 123.54 | Vu < PhiVc/2 | lot Reqd 9.6. | 123.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 13.83 | 33.50 | -21.34 | 21.34 | 225.32 | 0.26 | 124.65 | Vu < PhiVc/2 | lot Reqd 9.6. | 124.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 14.59 | 33.50 | -28.07 | 28.07 | 206.65 | 0.38 | 126.01 | Vu < PhiVc/2 | lot Reqd 9.6. | 126.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 15.35 | 33.50 | -34.79 | 34.79 | 182.88 | 0.53 | 127.81 | Vu < PhiVc/2 | lot Reqd 9.6. | 127.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 16.10 | 33.50 | -41.52 | 41.52 | 154.04 | 0.75 | 130.44 | Vu < PhiVc/2 | lot Reqd 9.6. | 130.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 16.86 | 33.50 | -48.24 | 48.24 | 120.11 | 1.00 | 133.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 133.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 17.61 | 33.50 | -218.97 | 218.97 | 21.40 | 1.00 | 133.37 | PhiVc < Vu | 85.598 | 284.1 | 7.0 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 18.37 | 33.50 | -225.69 | 225.69 | 146.68 | 1.00 | 127.44 | PhiVc < Vu | 98.248 | 278.2 | 6.1 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 19.13 | 33.50 | -232.42 | 232.42 | 319.85 | 1.00 | 127.44 | PhiVc < Vu | 104.972 | 278.2 | 5.7 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 19.88 | 33.50 | -239.14 | 239.14 | 498.10 | 1.00 | 127.44 | PhiVc < Vu | 111.697 | 278.2 | 5.4 | 4.0 |

# Concrete Beam

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DESCRIPTION: Grid F2-B1/B2

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 2 | 20.64 | 33.50 | -245.87 | 245.87 | 681.43 | 1.00 | 127.44 | PhiVc < Vu | 118.421 | 278.2 | 5.1 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 21.39 | 33.50 | -252.59 | 252.59 | 869.85 | 0.81 | 126.32 | PhiVc < Vu | 126.268 | 277.1 | 4.8 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 22.15 | 33.50 | 239.88 | 239.88 | 1,063.35 | 0.63 | 134.58 | PhiVc < Vu | 105.296 | 285.3 | 5.7 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 23.02 | 33.50 | 232.14 | 232.14 | 858.02 | 0.76 | 137.18 | PhiVc < Vu | 94.954 | 287.9 | 6.4 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 23.89 | 33.50 | 224.40 | 224.40 | 659.43 | 0.95 | 141.22 | PhiVc < Vu | 83.178 | 292.0 | 7.2 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 24.76 | 33.50 | 216.66 | 216.66 | 467.57 | 1.00 | 142.26 | PhiVc < Vu | 74.402 | 293.0 | 8.1 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 25.63 | 33.50 | 208.92 | 208.92 | 282.44 | 1.00 | 142.26 | PhiVc < Vu | 66.664 | 293.0 | 9.0 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 26.50 | 33.50 | 201.18 | 201.18 | 104.05 | 1.00 | 142.26 | PhiVc < Vu | 58.925 | 293.0 | 10.2 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 27.37 | 33.50 | 193.44 | 193.44 | 67.62 | 1.00 | 136.33 | PhiVc < Vu | 57.111 | 287.1 | 10.6 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 28.24 | 33.50 | 185.71 | 185.71 | 232.54 | 1.00 | 136.33 | PhiVc < Vu | 49.373 | 287.1 | 12.2 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 29.11 | 33.50 | 177.97 | 177.97 | 390.74 | 1.00 | 136.33 | PhiVc < Vu | 41.634 | 287.1 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 29.98 | 33.50 | 170.23 | 170.23 | 542.21 | 0.88 | 134.50 | PhiVc < Vu | 35.725 | 285.3 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 30.85 | 33.50 | 162.49 | 162.49 | 686.94 | 0.66 | 131.30 | PhiVc < Vu | 31.188 | 282.1 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 31.72 | 33.50 | -9.25 | 9.25 | 772.46 | 0.03 | 122.01 | Vu < PhiVc/2 | lot Reqd 9.6. | 122.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 32.59 | 33.50 | -16.99 | 16.99 | 761.04 | 0.06 | 122.44 | Vu < PhiVc/2 | lot Reqd 9.6. | 122.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 33.46 | 33.50 | -24.73 | 24.73 | 742.90 | 0.09 | 122.90 | Vu < PhiVc/2 | lot Reqd 9.6. | 122.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 34.33 | 33.50 | -32.47 | 32.47 | 718.02 | 0.13 | 123.39 | Vu < PhiVc/2 | lot Reqd 9.6. | 123.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 35.20 | 33.50 | -40.20 | 40.20 | 686.41 | 0.16 | 123.94 | Vu < PhiVc/2 | lot Reqd 9.6. | 123.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 36.07 | 33.50 | -47.94 | 47.94 | 648.06 | 0.21 | 124.58 | Vu < PhiVc/2 | lot Reqd 9.6. | 124.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 36.94 | 33.50 | -55.68 | 55.68 | 602.99 | 0.26 | 125.34 | Vu < PhiVc/2 | lot Reqd 9.6. | 125.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 37.81 | 33.50 | -63.42 | 63.42 | 551.18 | 0.32 | 126.28 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 176.5 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 38.68 | 33.50 | -71.16 | 71.16 | 492.64 | 0.40 | 127.49 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 177.7 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 39.55 | 33.50 | -78.90 | 78.90 | 427.36 | 0.52 | 129.15 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 179.4 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 40.42 | 33.50 | -86.64 | 86.64 | 355.35 | 0.68 | 131.60 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 181.9 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 41.29 | 33.50 | -94.37 | 94.37 | 276.61 | 0.95 | 135.63 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 185.9 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 42.16 | 33.50 | -102.11 | 102.11 | 191.14 | 1.00 | 136.33 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 186.6 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 43.03 | 33.50 | -109.85 | 109.85 | 98.94 | 1.00 | 136.33 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 186.6 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 43.90 | 33.50 | -117.59 | 117.59 | 0.00 | 1.00 | 136.33 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 186.6 | 12.6 | 12.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 3.250 | -46.35 | 918.94 | 0.05 |
| Span # 2 | 2 | 18.900 | -1,030.74 | 1,530.23 | 0.67 |
| Span # 3 | 3 | 21.750 | -1,063.35 | 1,531.24 | 0.69 |
| +1.20D+1.60L+0.50S+1.60H | | | | | |
| Span # 1 | 1 | 3.250 | -46.35 | 918.94 | 0.05 |
| Span # 2 | 2 | 18.900 | -1,030.74 | 1,530.23 | 0.67 |
| Span # 3 | 3 | 21.750 | -1,063.35 | 1,531.24 | 0.69 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H | 1 | 0.0011 | 3.628 | +D+L+H | -0.0090 | 0.000 |
| +D+L+H | 2 | 0.0151 | 7.938 | +D+L+H | -0.0036 | 17.766 |
| +D+L+H | 3 | 0.1416 | 11.745 | | 0.0000 | 17.766 |

# Concrete Beam

File: FWI2101 - Paragon Star.ec6
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Lic. # : KW-06011403
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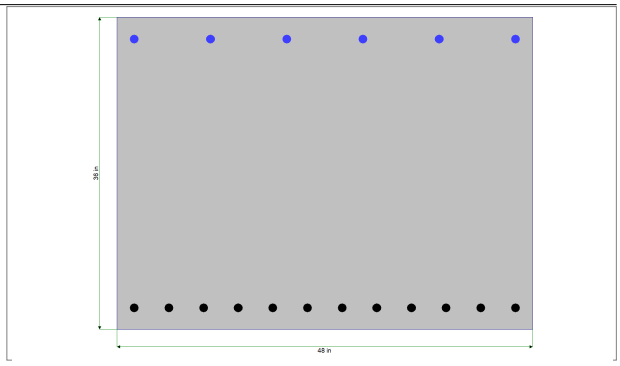
DESCRIPTION: Grid Z2.4-B3/B4

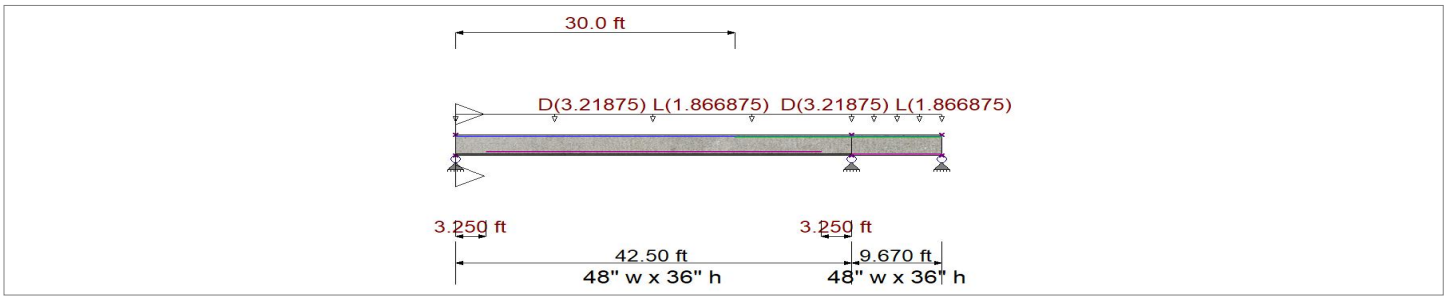
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | $\phi$ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| $\psi$ Density | = | 145.0 pcf | $\beta_1$ | = | 0.80 |
| $\lambda$ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 4.0 |






## Cross Section & Reinforcing Details

Rectangular Section, Width = 48.0 in, Height = 36.0 in

Span #1 Reinforcing....
- 6-#8 at 2.50 in from Top, from 0.0 to 42.50 ft in this span
- 8-#8 at 6.0 in from Bottom, from 3.250 to 39.250 ft in this span
- 12-#8 at 3.50 in from Top, from 30.0 to 42.50 ft in this span
- 12-#8 at 2.50 in from Bottom, from 0.0 to 42.50 ft in this span

Span #2 Reinforcing....
- 6-#8 at 2.50 in from Top, from 0.0 to 9.670 ft in this span
- 8-#8 at 2.50 in from Bottom, from 0.0 to 9.670 ft in this span
- 12-#8 at 3.50 in from Top, from 0.0 to 9.670 ft in this span

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.250, L = 0.1450 ksf, Tributary Width = 12.875 ft
Load for Span Number 2
Uniform Load : D = 0.250, L = 0.1450 ksf, Tributary Width = 12.875 ft

## DESIGN SUMMARY

**Design OK**

| | | | | | | |
|---|---|---|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.838** : 1 | | Maximum Deflection | | | |
| Section used for this span | **Typical Section** | | Max Downward Transient Deflection | 0.094 in | Ratio = | 5444 >=600. |
| Mu : Applied | -1,663.25 k-ft | | Max Upward Transient Deflection | -0.005 in | Ratio = | 24820 >=600. |
| Mn * Phi : Allowable | 1,984.78 k-ft | | Max Downward Total Deflection | 0.751 in | Ratio = | 678 >=480. |
| Location of maximum on span | 0.000 ft | | Max Upward Total Deflection | -0.031 in | Ratio = | 3791 >=480. |
| Span # where maximum occurs | Span # 2 | | | | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 |
|---|---|---|---|
| Overall MAXimum | 115.902 | 335.903 | -104.108 |
| Overall MINimum | -0.095 | 9.540 | 8.608 |
| +D+L+H, LL Comb Run (*L) | 84.577 | 250.573 | -58.399 |
| +D+L+H, LL Comb Run (L*) | 115.902 | 326.246 | -104.108 |
| +D+L+H, LL Comb Run (LL) | 115.785 | 335.903 | -95.595 |
| D Only | 84.679 | 240.997 | -66.978 |

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# Concrete Beam

DESCRIPTION: Grid Z2.4-B3/B4

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 |
|---|---|---|---|
| L Only, LL Comb Run (*L) | -0.095 | 9.540 | 8.608 |
| L Only, LL Comb Run (L*) | 31.592 | 83.260 | -35.510 |
| L Only, LL Comb Run (LL) | 31.496 | 92.800 | -26.901 |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.00 | 33.50 | 150.94 | 150.94 | 0.00 | 1.00 | 179.80 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 255.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.04 | 33.50 | 141.64 | 141.64 | 152.26 | 1.00 | 179.80 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 255.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.08 | 33.50 | 132.33 | 132.33 | 294.84 | 1.00 | 179.80 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 255.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.12 | 33.50 | 123.03 | 123.03 | 427.73 | 0.80 | 176.30 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 251.7 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.16 | 33.50 | 113.73 | 113.73 | 550.94 | 0.58 | 172.27 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 247.6 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.20 | 33.50 | 104.43 | 104.43 | 664.47 | 0.44 | 169.82 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 245.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 6.24 | 33.50 | 95.13 | 95.13 | 768.32 | 0.35 | 168.17 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 243.5 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 7.29 | 33.50 | 85.82 | 85.82 | 862.49 | 0.28 | 166.96 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 242.3 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 8.33 | 33.50 | 76.52 | 76.52 | 946.97 | 0.23 | 166.04 | Vu < PhiVc/2 | lot Reqd 9.6. | 166.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 9.37 | 33.50 | 67.22 | 67.22 | 1,021.78 | 0.18 | 165.29 | Vu < PhiVc/2 | lot Reqd 9.6. | 165.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 10.41 | 33.50 | 57.92 | 57.92 | 1,086.90 | 0.15 | 164.67 | Vu < PhiVc/2 | lot Reqd 9.6. | 164.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 11.45 | 33.50 | 48.61 | 48.61 | 1,142.34 | 0.12 | 164.14 | Vu < PhiVc/2 | lot Reqd 9.6. | 164.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 12.49 | 33.50 | 39.31 | 39.31 | 1,188.09 | 0.09 | 163.67 | Vu < PhiVc/2 | lot Reqd 9.6. | 163.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 13.53 | 33.50 | 30.01 | 30.01 | 1,224.17 | 0.07 | 163.24 | Vu < PhiVc/2 | lot Reqd 9.6. | 163.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 14.57 | 33.50 | 20.71 | 20.71 | 1,250.56 | 0.05 | 162.85 | Vu < PhiVc/2 | lot Reqd 9.6. | 162.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 15.61 | 33.50 | 11.40 | 11.40 | 1,267.27 | 0.03 | 162.47 | Vu < PhiVc/2 | lot Reqd 9.6. | 162.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 16.65 | 33.50 | 2.10 | 2.10 | 1,274.30 | 0.00 | 162.11 | Vu < PhiVc/2 | lot Reqd 9.6. | 162.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 17.69 | 33.50 | -7.35 | 7.35 | 1,268.95 | 0.02 | 162.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 162.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 18.73 | 33.50 | -16.65 | 16.65 | 1,256.46 | 0.04 | 162.68 | Vu < PhiVc/2 | lot Reqd 9.6. | 162.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 19.78 | 33.50 | -25.96 | 25.96 | 1,234.28 | 0.06 | 163.07 | Vu < PhiVc/2 | lot Reqd 9.6. | 163.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 20.82 | 33.50 | -35.26 | 35.26 | 1,202.43 | 0.08 | 163.48 | Vu < PhiVc/2 | lot Reqd 9.6. | 163.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 21.86 | 33.50 | -44.56 | 44.56 | 1,160.89 | 0.11 | 163.93 | Vu < PhiVc/2 | lot Reqd 9.6. | 163.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 22.90 | 33.50 | -53.86 | 53.86 | 1,109.67 | 0.14 | 164.44 | Vu < PhiVc/2 | lot Reqd 9.6. | 164.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 23.94 | 33.50 | -63.17 | 63.17 | 1,048.76 | 0.17 | 165.02 | Vu < PhiVc/2 | lot Reqd 9.6. | 165.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 24.98 | 33.50 | -72.47 | 72.47 | 978.18 | 0.21 | 165.70 | Vu < PhiVc/2 | lot Reqd 9.6. | 165.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 26.02 | 33.50 | -81.77 | 81.77 | 897.91 | 0.25 | 166.55 | Vu < PhiVc/2 | lot Reqd 9.6. | 166.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 27.06 | 33.50 | -91.07 | 91.07 | 807.96 | 0.31 | 167.62 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 243.0 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 28.10 | 33.50 | -100.38 | 100.38 | 708.33 | 0.40 | 169.06 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 244.4 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 29.14 | 33.50 | -109.68 | 109.68 | 599.01 | 0.51 | 171.11 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 246.5 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 30.18 | 33.50 | -118.98 | 118.98 | 480.02 | 0.69 | 174.33 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 249.7 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 31.22 | 33.50 | -128.28 | 128.28 | 351.34 | 1.00 | 179.80 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 255.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 32.27 | 33.50 | -137.58 | 137.58 | 212.98 | 1.00 | 179.80 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 255.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 33.31 | 33.50 | -146.89 | 146.89 | 64.94 | 1.00 | 179.80 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 255.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 34.35 | 33.50 | -156.19 | 156.19 | 92.78 | 1.00 | 170.91 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 246.3 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 35.39 | 33.50 | -165.49 | 165.49 | 260.19 | 1.00 | 170.91 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 246.3 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 36.43 | 33.50 | -174.79 | 174.79 | 437.27 | 1.00 | 170.91 | PhiVc < Vu | 3.880 | 246.3 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 37.47 | 33.50 | -184.10 | 184.10 | 624.04 | 0.82 | 169.35 | PhiVc < Vu | 14.750 | 244.7 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 38.51 | 33.50 | -193.40 | 193.40 | 820.49 | 0.66 | 167.87 | PhiVc < Vu | 25.524 | 243.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 39.55 | 33.50 | -202.70 | 202.70 | 1,026.63 | 0.55 | 166.93 | PhiVc < Vu | 35.775 | 242.3 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 40.59 | 33.50 | -212.00 | 212.00 | 1,242.44 | 0.48 | 166.26 | PhiVc < Vu | 45.743 | 241.6 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 41.63 | 33.50 | -221.31 | 221.31 | 1,467.94 | 0.42 | 165.77 | PhiVc < Vu | 55.538 | 241.1 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 42.54 | 33.50 | 214.86 | 214.86 | 1,654.76 | 0.36 | 171.69 | PhiVc < Vu | 43.170 | 247.1 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 42.78 | 33.50 | 212.74 | 212.74 | 1,604.13 | 0.37 | 171.90 | PhiVc < Vu | 40.847 | 247.3 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 43.01 | 33.50 | 210.63 | 210.63 | 1,554.00 | 0.38 | 172.12 | PhiVc < Vu | 38.513 | 247.5 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 43.25 | 33.50 | 208.51 | 208.51 | 1,504.37 | 0.39 | 172.34 | PhiVc < Vu | 36.168 | 247.7 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 43.49 | 33.50 | 206.39 | 206.39 | 1,455.24 | 0.40 | 172.58 | PhiVc < Vu | 33.812 | 248.0 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 43.72 | 33.50 | 204.28 | 204.28 | 1,406.62 | 0.41 | 172.84 | PhiVc < Vu | 31.442 | 248.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 43.96 | 33.50 | 202.16 | 202.16 | 1,358.49 | 0.42 | 173.10 | PhiVc < Vu | 29.059 | 248.5 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 44.20 | 33.50 | 200.05 | 200.05 | 1,310.87 | 0.43 | 173.39 | PhiVc < Vu | 26.660 | 248.8 | 16.8 | 16.0 |

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# Concrete Beam

DESCRIPTION: Grid Z2.4-B3/B4

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 44.43 | 33.50 | 197.93 | 197.93 | 1,263.74 | 0.44 | 173.68 | PhiVc < Vu | 24.245 | 249.1 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 44.67 | 33.50 | 195.81 | 195.81 | 1,217.12 | 0.45 | 174.00 | PhiVc < Vu | 21.811 | 249.4 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 44.91 | 33.50 | 193.70 | 193.70 | 1,171.00 | 0.46 | 174.34 | PhiVc < Vu | 19.357 | 249.7 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 45.14 | 33.50 | 191.58 | 191.58 | 1,125.38 | 0.48 | 174.70 | PhiVc < Vu | 16.882 | 250.1 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 45.38 | 33.50 | 189.46 | 189.46 | 1,080.26 | 0.49 | 175.08 | PhiVc < Vu | 14.382 | 250.5 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 45.62 | 33.50 | 187.35 | 187.35 | 1,035.64 | 0.51 | 175.49 | PhiVc < Vu | 11.855 | 250.9 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 45.85 | 33.50 | 185.23 | 185.23 | 991.53 | 0.52 | 175.93 | PhiVc < Vu | 9.298 | 251.3 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 46.09 | 33.50 | 183.11 | 183.11 | 947.91 | 0.54 | 176.41 | PhiVc < Vu | 6.708 | 251.8 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 46.33 | 33.50 | 181.00 | 181.00 | 904.80 | 0.56 | 176.92 | PhiVc < Vu | 4.080 | 252.3 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 46.57 | 33.50 | 178.88 | 178.88 | 862.19 | 0.58 | 177.47 | PhiVc < Vu | 1.411 | 252.8 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 46.80 | 33.50 | 176.76 | 176.76 | 820.08 | 0.60 | 178.07 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 253.4 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 47.04 | 33.50 | 174.65 | 174.65 | 778.47 | 0.63 | 178.73 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 254.1 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 47.28 | 33.50 | 172.53 | 172.53 | 737.36 | 0.65 | 179.44 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 254.8 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 47.51 | 33.50 | 170.41 | 170.41 | 696.75 | 0.68 | 180.23 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 255.6 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 47.75 | 33.50 | 168.87 | 168.87 | 688.34 | 0.68 | 180.29 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 255.7 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 47.99 | 33.50 | 167.46 | 167.46 | 648.52 | 0.72 | 181.25 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 256.6 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 48.22 | 33.50 | 166.05 | 166.05 | 609.03 | 0.76 | 182.32 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 257.7 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 48.46 | 33.50 | 164.64 | 164.64 | 569.87 | 0.81 | 183.53 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 258.9 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 48.70 | 33.50 | 163.23 | 163.23 | 531.05 | 0.86 | 184.90 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 260.3 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 48.93 | 33.50 | 161.82 | 161.82 | 492.56 | 0.92 | 186.48 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 261.9 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 49.17 | 33.50 | 160.41 | 160.41 | 454.41 | 0.99 | 188.30 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 263.7 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 49.41 | 33.50 | 159.00 | 159.00 | 416.59 | 1.00 | 188.69 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 264.1 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 49.64 | 33.50 | 157.59 | 157.59 | 379.10 | 1.00 | 188.69 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 264.1 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 49.88 | 33.50 | 156.18 | 156.18 | 341.95 | 1.00 | 188.69 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 264.1 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 50.12 | 33.50 | 154.77 | 154.77 | 305.13 | 1.00 | 188.69 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 264.1 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 50.35 | 33.50 | 153.36 | 153.36 | 268.64 | 1.00 | 188.69 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 264.1 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 50.59 | 33.50 | 151.96 | 151.96 | 232.49 | 1.00 | 188.69 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 264.1 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 50.83 | 33.50 | 150.55 | 150.55 | 196.67 | 1.00 | 188.69 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 264.1 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 51.06 | 33.50 | 149.14 | 149.14 | 161.18 | 1.00 | 188.69 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 264.1 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 51.30 | 33.50 | 147.73 | 147.73 | 126.03 | 1.00 | 188.69 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 264.1 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 51.54 | 33.50 | 146.32 | 146.32 | 91.22 | 1.00 | 188.69 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 264.1 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 51.78 | 33.50 | 144.91 | 144.91 | 56.73 | 1.00 | 188.69 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 264.1 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 52.01 | 33.50 | 143.50 | 143.50 | 22.58 | 1.00 | 188.69 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 264.1 | 16.8 | 16.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 42.500 | -1,623.65 | 1,987.21 | 0.82 |
| Span # 2 | 2 | 9.670 | -1,663.25 | 1,984.78 | 0.84 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L) | | | | | |
| Span # 1 | 1 | 42.500 | -1,087.46 | 1,987.21 | 0.55 |
| Span # 2 | 2 | 9.670 | -1,113.85 | 1,984.78 | 0.56 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*) | | | | | |
| Span # 1 | 1 | 42.500 | -1,617.21 | 1,987.21 | 0.81 |
| Span # 2 | 2 | 9.670 | -1,656.78 | 1,984.78 | 0.83 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL) | | | | | |
| Span # 1 | 1 | 42.500 | -1,623.65 | 1,987.21 | 0.82 |
| Span # 2 | 2 | 9.670 | -1,663.25 | 1,984.78 | 0.84 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H, LL Comb Run (L*) | 1 | 0.7515 | 18.821 | +D+L+H, LL Comb Run (L*) | -0.0025 | 42.638 |
| | 2 | 0.0000 | 18.821 | +D+L+H, LL Comb Run (L*) | -0.0306 | 3.454 |

# Concrete Beam

File: FWI2101 - Paragon Star.ec6
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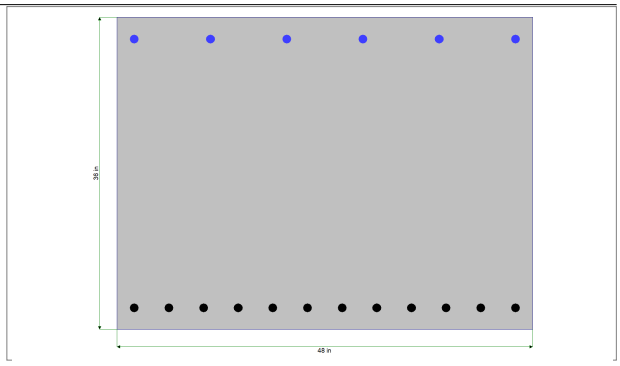
DESCRIPTION: Grid Z2.9-B3/B4

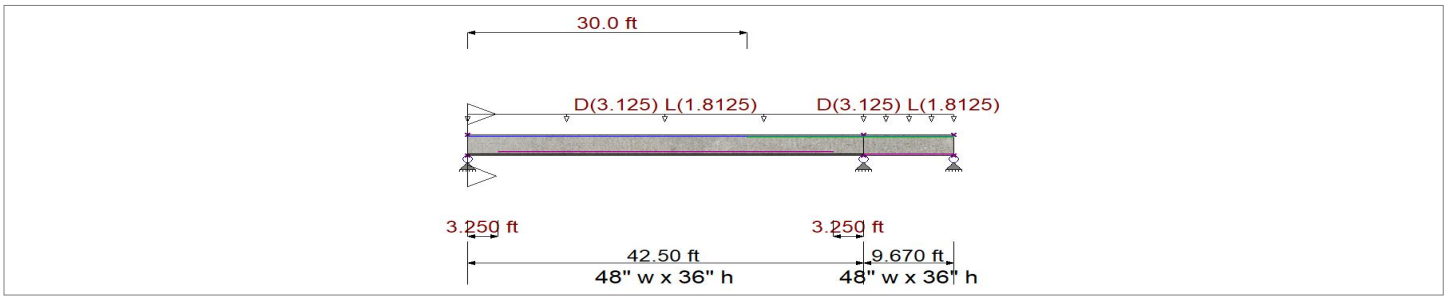
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | $\phi$ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| $\psi$ Density | = | 145.0 pcf | $\beta_1$ | = | 0.80 |
| $\lambda$ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 2 |






## Cross Section & Reinforcing Details

Rectangular Section, Width = 48.0 in, Height = 36.0 in
Span #1 Reinforcing....
6-#8 at 2.50 in from Top, from 0.0 to 42.50 ft in this span
8-#8 at 6.50 in from Bottom, from 3.250 to 39.250 ft in this span
12-#8 at 3.50 in from Top, from 30.0 to 42.50 ft in this span
12-#8 at 2.50 in from Bottom, from 0.0 to 42.50 ft in this span
Span #2 Reinforcing....
6-#8 at 2.50 in from Top, from 0.0 to 9.670 ft in this span
8-#8 at 2.50 in from Bottom, from 0.0 to 9.670 ft in this span
12-#8 at 3.50 in from Top, from 0.0 to 9.670 ft in this span

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.250, L = 0.1450 ksf, Tributary Width = 12.50 ft
Load for Span Number 2
Uniform Load : D = 0.250, L = 0.1450 ksf, Tributary Width = 12.50 ft

## DESIGN SUMMARY

**Design OK**

| | | | | | | |
|---|---|---|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.819** : 1 | Maximum Deflection | | | | |
| Section used for this span | **Typical Section** | Max Downward Transient Deflection | 0.091 in | Ratio = | 5607 | >=600. |
| Mu : Applied | -1,626.12 k-ft | Max Upward Transient Deflection | -0.005 in | Ratio = | 25564 | >=600. |
| Mn * Phi : Allowable | 1,984.78 k-ft | Max Downward Total Deflection | 0.733 in | Ratio = | 696 | >=480. |
| Location of maximum on span | 0.000 ft | Max Upward Total Deflection | -0.030 in | Ratio = | 3921 | >=480. |
| Span # where maximum occurs | Span # 2 | | | | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 |
|---|---|---|---|
| Overall MAXimum | 113.305 | 329.034 | -102.139 |
| Overall MINimum | -0.092 | 9.262 | 8.357 |
| +D+L+H, LL Comb Run (*L) | 82.982 | 245.720 | -57.368 |
| +D+L+H, LL Comb Run (L*) | 113.305 | 319.672 | -102.139 |
| +D+L+H, LL Comb Run (LL) | 113.194 | 329.034 | -93.863 |
| D Only | 83.080 | 236.431 | -65.704 |

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# Concrete Beam

DESCRIPTION: Grid Z2.9-B3/B4

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 |
|---|---|---|---|
| L Only, LL Comb Run (*L) | -0.092 | 9.262 | 8.357 |
| L Only, LL Comb Run (L*) | 30.671 | 80.835 | -34.475 |
| L Only, LL Comb Run (LL) | 30.579 | 90.097 | -26.118 |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.00 | 33.50 | 147.57 | 147.57 | 0.00 | 1.00 | 179.80 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 246.8 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.04 | 33.50 | 138.47 | 138.47 | 148.86 | 1.00 | 179.80 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 246.8 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.08 | 33.50 | 129.38 | 129.38 | 288.25 | 1.00 | 179.80 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 246.8 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.12 | 33.50 | 120.28 | 120.28 | 418.18 | 0.80 | 176.30 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 243.3 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.16 | 33.50 | 111.19 | 111.19 | 538.64 | 0.58 | 172.27 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 239.3 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.20 | 33.50 | 102.10 | 102.10 | 649.64 | 0.44 | 169.82 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 236.8 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 6.24 | 33.50 | 93.00 | 93.00 | 751.17 | 0.35 | 168.17 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 235.2 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 7.29 | 33.50 | 83.91 | 83.91 | 843.23 | 0.28 | 166.96 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 234.0 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 8.33 | 33.50 | 74.81 | 74.81 | 925.83 | 0.23 | 166.04 | Vu < PhiVc/2 | lot Reqd 9.6. | 166.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 9.37 | 33.50 | 65.72 | 65.72 | 998.96 | 0.18 | 165.29 | Vu < PhiVc/2 | lot Reqd 9.6. | 165.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 10.41 | 33.50 | 56.62 | 56.62 | 1,062.62 | 0.15 | 164.67 | Vu < PhiVc/2 | lot Reqd 9.6. | 164.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 11.45 | 33.50 | 47.53 | 47.53 | 1,116.83 | 0.12 | 164.14 | Vu < PhiVc/2 | lot Reqd 9.6. | 164.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 12.49 | 33.50 | 38.43 | 38.43 | 1,161.56 | 0.09 | 163.67 | Vu < PhiVc/2 | lot Reqd 9.6. | 163.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 13.53 | 33.50 | 29.34 | 29.34 | 1,196.83 | 0.07 | 163.24 | Vu < PhiVc/2 | lot Reqd 9.6. | 163.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 14.57 | 33.50 | 20.24 | 20.24 | 1,222.63 | 0.05 | 162.85 | Vu < PhiVc/2 | lot Reqd 9.6. | 162.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 15.61 | 33.50 | 11.15 | 11.15 | 1,238.97 | 0.03 | 162.47 | Vu < PhiVc/2 | lot Reqd 9.6. | 162.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 16.65 | 33.50 | 2.05 | 2.05 | 1,245.84 | 0.00 | 162.11 | Vu < PhiVc/2 | lot Reqd 9.6. | 162.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 17.69 | 33.50 | -7.19 | 7.19 | 1,240.63 | 0.02 | 162.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 162.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 18.73 | 33.50 | -16.28 | 16.28 | 1,228.41 | 0.04 | 162.68 | Vu < PhiVc/2 | lot Reqd 9.6. | 162.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 19.78 | 33.50 | -25.38 | 25.38 | 1,206.73 | 0.06 | 163.07 | Vu < PhiVc/2 | lot Reqd 9.6. | 163.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 20.82 | 33.50 | -34.47 | 34.47 | 1,175.59 | 0.08 | 163.48 | Vu < PhiVc/2 | lot Reqd 9.6. | 163.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 21.86 | 33.50 | -43.57 | 43.57 | 1,134.97 | 0.11 | 163.93 | Vu < PhiVc/2 | lot Reqd 9.6. | 163.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 22.90 | 33.50 | -52.66 | 52.66 | 1,084.90 | 0.14 | 164.44 | Vu < PhiVc/2 | lot Reqd 9.6. | 164.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 23.94 | 33.50 | -61.76 | 61.76 | 1,025.35 | 0.17 | 165.02 | Vu < PhiVc/2 | lot Reqd 9.6. | 165.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 24.98 | 33.50 | -70.85 | 70.85 | 956.34 | 0.21 | 165.70 | Vu < PhiVc/2 | lot Reqd 9.6. | 165.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 26.02 | 33.50 | -79.95 | 79.95 | 877.87 | 0.25 | 166.55 | Vu < PhiVc/2 | lot Reqd 9.6. | 166.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 27.06 | 33.50 | -89.04 | 89.04 | 789.92 | 0.31 | 167.62 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 234.6 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 28.10 | 33.50 | -98.13 | 98.13 | 692.52 | 0.40 | 169.06 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 236.1 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 29.14 | 33.50 | -107.23 | 107.23 | 585.64 | 0.51 | 171.11 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 238.1 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 30.18 | 33.50 | -116.32 | 116.32 | 469.30 | 0.69 | 174.33 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 241.3 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 31.22 | 33.50 | -125.42 | 125.42 | 343.50 | 1.00 | 179.80 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 246.8 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 32.27 | 33.50 | -134.51 | 134.51 | 208.23 | 1.00 | 179.80 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 246.8 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 33.31 | 33.50 | -143.61 | 143.61 | 63.49 | 1.00 | 179.80 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 246.8 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 34.35 | 33.50 | -152.70 | 152.70 | 90.71 | 1.00 | 170.91 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 237.9 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 35.39 | 33.50 | -161.80 | 161.80 | 254.38 | 1.00 | 170.91 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 237.9 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 36.43 | 33.50 | -170.89 | 170.89 | 427.51 | 1.00 | 170.91 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 237.9 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 37.47 | 33.50 | -179.99 | 179.99 | 610.11 | 0.82 | 169.35 | PhiVc < Vu | 10.641 | 229.6 | 10.0 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 38.51 | 33.50 | -189.08 | 189.08 | 802.18 | 0.66 | 167.87 | PhiVc < Vu | 21.207 | 228.2 | 10.0 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 39.55 | 33.50 | -198.18 | 198.18 | 1,003.71 | 0.55 | 166.93 | PhiVc < Vu | 31.251 | 227.2 | 10.0 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 40.59 | 33.50 | -207.27 | 207.27 | 1,214.71 | 0.48 | 166.26 | PhiVc < Vu | 41.011 | 226.6 | 10.0 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 41.63 | 33.50 | -216.37 | 216.37 | 1,435.17 | 0.42 | 165.77 | PhiVc < Vu | 50.598 | 226.1 | 10.0 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 42.54 | 33.50 | 210.07 | 210.07 | 1,617.83 | 0.36 | 171.69 | PhiVc < Vu | 38.374 | 232.0 | 10.0 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 42.78 | 33.50 | 208.00 | 208.00 | 1,568.32 | 0.37 | 171.90 | PhiVc < Vu | 36.098 | 232.2 | 10.0 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 43.01 | 33.50 | 205.93 | 205.93 | 1,519.31 | 0.38 | 172.12 | PhiVc < Vu | 33.811 | 232.4 | 10.0 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 43.25 | 33.50 | 203.86 | 203.86 | 1,470.79 | 0.39 | 172.34 | PhiVc < Vu | 31.514 | 232.6 | 10.0 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 43.49 | 33.50 | 201.79 | 201.79 | 1,422.76 | 0.40 | 172.58 | PhiVc < Vu | 29.205 | 232.9 | 10.0 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 43.72 | 33.50 | 199.72 | 199.72 | 1,375.22 | 0.41 | 172.84 | PhiVc < Vu | 26.883 | 233.1 | 10.0 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 43.96 | 33.50 | 197.65 | 197.65 | 1,328.17 | 0.42 | 173.10 | PhiVc < Vu | 24.546 | 233.4 | 10.0 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 44.20 | 33.50 | 195.58 | 195.58 | 1,281.60 | 0.43 | 173.39 | PhiVc < Vu | 22.195 | 233.7 | 10.0 | 10.0 |

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# Concrete Beam

DESCRIPTION: Grid Z2.9-B3/B4

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 44.43 | 33.50 | 193.51 | 193.51 | 1,235.53 | 0.44 | 173.68 | PhiVc < Vu | 19.826 | 234.0 | 10.0 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 44.67 | 33.50 | 191.44 | 191.44 | 1,189.95 | 0.45 | 174.00 | PhiVc < Vu | 17.440 | 234.3 | 10.0 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 44.91 | 33.50 | 189.37 | 189.37 | 1,144.86 | 0.46 | 174.34 | PhiVc < Vu | 15.034 | 234.6 | 10.0 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 45.14 | 33.50 | 187.30 | 187.30 | 1,100.26 | 0.48 | 174.70 | PhiVc < Vu | 12.605 | 235.0 | 10.0 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 45.38 | 33.50 | 185.23 | 185.23 | 1,056.15 | 0.49 | 175.08 | PhiVc < Vu | 10.153 | 235.4 | 10.0 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 45.62 | 33.50 | 183.16 | 183.16 | 1,012.53 | 0.51 | 175.49 | PhiVc < Vu | 7.673 | 235.8 | 10.0 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 45.85 | 33.50 | 181.09 | 181.09 | 969.39 | 0.52 | 175.93 | PhiVc < Vu | 5.163 | 236.2 | 10.0 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 46.09 | 33.50 | 179.03 | 179.03 | 926.75 | 0.54 | 176.41 | PhiVc < Vu | 2.621 | 236.7 | 10.0 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 46.33 | 33.50 | 176.96 | 176.96 | 884.60 | 0.56 | 176.92 | PhiVc < Vu | 0.04026 | 237.2 | 10.0 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 46.57 | 33.50 | 174.89 | 174.89 | 842.94 | 0.58 | 177.47 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 244.5 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 46.80 | 33.50 | 172.82 | 172.82 | 801.77 | 0.60 | 178.07 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 245.1 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 47.04 | 33.50 | 170.75 | 170.75 | 761.09 | 0.63 | 178.73 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 245.7 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 47.28 | 33.50 | 168.68 | 168.68 | 720.90 | 0.65 | 179.44 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 246.4 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 47.51 | 33.50 | 166.61 | 166.61 | 681.20 | 0.68 | 180.23 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 247.2 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 47.75 | 33.50 | 165.09 | 165.09 | 672.76 | 0.69 | 180.29 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 247.3 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 47.99 | 33.50 | 163.71 | 163.71 | 633.83 | 0.72 | 181.25 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 248.3 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 48.22 | 33.50 | 162.33 | 162.33 | 595.22 | 0.76 | 182.33 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 249.3 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 48.46 | 33.50 | 160.94 | 160.94 | 556.95 | 0.81 | 183.54 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 250.5 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 48.70 | 33.50 | 159.56 | 159.56 | 518.99 | 0.86 | 184.91 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 251.9 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 48.93 | 33.50 | 158.18 | 158.18 | 481.37 | 0.92 | 186.49 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 253.5 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 49.17 | 33.50 | 156.80 | 156.80 | 444.08 | 0.99 | 188.31 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 255.3 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 49.41 | 33.50 | 155.41 | 155.41 | 407.11 | 1.00 | 188.69 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 255.7 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 49.64 | 33.50 | 154.03 | 154.03 | 370.47 | 1.00 | 188.69 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 255.7 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 49.88 | 33.50 | 152.65 | 152.65 | 334.15 | 1.00 | 188.69 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 255.7 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 50.12 | 33.50 | 151.27 | 151.27 | 298.17 | 1.00 | 188.69 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 255.7 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 50.35 | 33.50 | 149.88 | 149.88 | 262.51 | 1.00 | 188.69 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 255.7 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 50.59 | 33.50 | 148.50 | 148.50 | 227.18 | 1.00 | 188.69 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 255.7 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 50.83 | 33.50 | 147.12 | 147.12 | 192.17 | 1.00 | 188.69 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 255.7 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 51.06 | 33.50 | 145.74 | 145.74 | 157.50 | 1.00 | 188.69 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 255.7 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 51.30 | 33.50 | 144.35 | 144.35 | 123.15 | 1.00 | 188.69 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 255.7 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 51.54 | 33.50 | 142.97 | 142.97 | 89.12 | 1.00 | 188.69 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 255.7 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 51.78 | 33.50 | 141.59 | 141.59 | 55.43 | 1.00 | 188.69 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 255.7 | 9.4 | 9.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 52.01 | 33.50 | 140.21 | 140.21 | 22.06 | 1.00 | 188.69 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 255.7 | 9.4 | 9.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 42.500 | -1,587.41 | 1,987.21 | 0.80 |
| Span # 2 | 2 | 9.670 | -1,626.12 | 1,984.78 | 0.82 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L) | | | | | |
| Span # 1 | 1 | 42.500 | -1,066.83 | 1,987.21 | 0.54 |
| Span # 2 | 2 | 9.670 | -1,092.72 | 1,984.78 | 0.55 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*) | | | | | |
| Span # 1 | 1 | 42.500 | -1,581.15 | 1,987.21 | 0.80 |
| Span # 2 | 2 | 9.670 | -1,619.84 | 1,984.78 | 0.82 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL) | | | | | |
| Span # 1 | 1 | 42.500 | -1,587.41 | 1,987.21 | 0.80 |
| Span # 2 | 2 | 9.670 | -1,626.12 | 1,984.78 | 0.82 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H, LL Comb Run (L*) | 1 | 0.7327 | 18.821 | +D+L+H, LL Comb Run (L*) | -0.0025 | 42.638 |
| | 2 | 0.0000 | 18.821 | +D+L+H, LL Comb Run (L*) | -0.0296 | 3.454 |

# Concrete Beam

File: FWI2101 - Paragon Star.ec6
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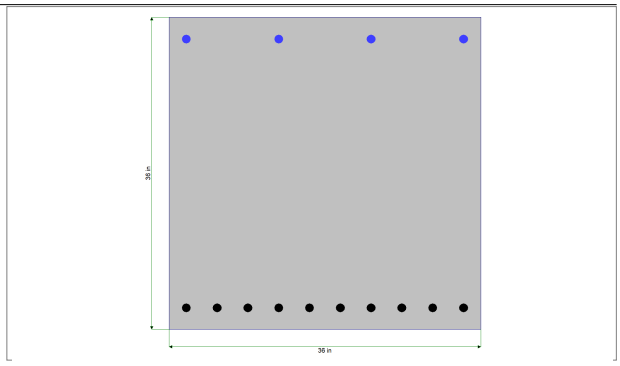
DESCRIPTION: Grid Z2-B5/B6

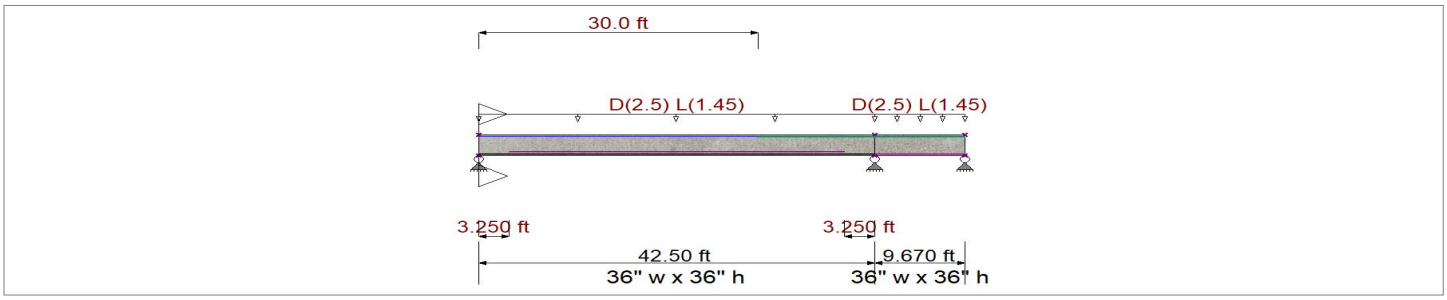
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | $\phi$ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| $\psi$ Density | = | 145.0 pcf | $\beta_1$ | = | 0.80 |
| $\lambda$ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 2.0 |






## Cross Section & Reinforcing Details

Rectangular Section, Width = 36.0 in, Height = 36.0 in
Span #1 Reinforcing....
4-#8 at 2.50 in from Top, from 0.0 to 42.50 ft in this span
4-#8 at 6.0 in from Bottom, from 3.250 to 39.250 ft in this span
10-#8 at 3.50 in from Top, from 30.0 to 42.50 ft in this span
10-#8 at 2.50 in from Bottom, from 0.0 to 42.50 ft in this span
Span #2 Reinforcing....
4-#8 at 2.50 in from Top, from 0.0 to 9.670 ft in this span
6-#8 at 2.50 in from Bottom, from 0.0 to 9.670 ft in this span
10-#8 at 3.50 in from Top, from 0.0 to 9.670 ft in this span

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.250, L = 0.1450 ksf, Tributary Width = 10.0 ft
Load for Span Number 2
Uniform Load : D = 0.250, L = 0.1450 ksf, Tributary Width = 10.0 ft

## DESIGN SUMMARY

**Design OK**

| | | | |
|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.833** : 1 | Maximum Deflection | |
| Section used for this span | **Typical Section** | Max Downward Transient Deflection | 0.097 in Ratio = 5257 >=600. |
| Mu : Applied | -1,281.47 k-ft | Max Upward Transient Deflection | -0.005 in Ratio = 23966 >=600. |
| Mn * Phi : Allowable | 1,539.18 k-ft | Max Downward Total Deflection | 0.787 in Ratio = 647 >=480. |
| Location of maximum on span | 0.000 ft | Max Upward Total Deflection | -0.032 in Ratio = 3613 >=480. |
| Span # where maximum occurs | Span # 2 | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 |
|---|---|---|---|
| Overall MAXimum | 88.743 | 261.247 | -82.361 |
| Overall MINimum | -0.074 | 7.410 | 6.686 |
| +D+L+H, LL Comb Run (*L) | 64.634 | 193.783 | -45.889 |
| +D+L+H, LL Comb Run (L*) | 88.743 | 253.749 | -82.361 |
| +D+L+H, LL Comb Run (LL) | 88.653 | 261.247 | -75.747 |
| D Only | 64.715 | 186.338 | -52.546 |

# Concrete Beam

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DESCRIPTION: Grid Z2-B5/B6

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 |
|---|---|---|---|
| L Only, LL Comb Run (*L) | -0.074 | 7.410 | 6.686 |
| L Only, LL Comb Run (L*) | 24.537 | 64.668 | -27.580 |
| L Only, LL Comb Run (LL) | 24.463 | 72.078 | -20.894 |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.00 | 33.50 | 116.29 | 116.29 | 0.00 | 1.00 | 136.33 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 186.6 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.04 | 33.50 | 109.13 | 109.13 | 117.31 | 1.00 | 136.33 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 186.6 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.08 | 33.50 | 101.96 | 101.96 | 227.16 | 1.00 | 136.33 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 186.6 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.12 | 33.50 | 94.79 | 94.79 | 329.55 | 0.80 | 133.41 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 183.7 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.16 | 33.50 | 87.63 | 87.63 | 424.48 | 0.58 | 130.06 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 180.3 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.20 | 33.50 | 80.46 | 80.46 | 511.96 | 0.44 | 128.02 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 178.3 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 6.24 | 33.50 | 73.29 | 73.29 | 591.97 | 0.35 | 126.64 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 176.9 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 7.29 | 33.50 | 66.12 | 66.12 | 664.52 | 0.28 | 125.63 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 175.9 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 8.33 | 33.50 | 58.96 | 58.96 | 729.61 | 0.23 | 124.86 | Vu < PhiVc/2 | lot Reqd 9.6. | 124.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 9.37 | 33.50 | 51.79 | 51.79 | 787.25 | 0.18 | 124.24 | Vu < PhiVc/2 | lot Reqd 9.6. | 124.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 10.41 | 33.50 | 44.62 | 44.62 | 837.42 | 0.15 | 123.72 | Vu < PhiVc/2 | lot Reqd 9.6. | 123.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 11.45 | 33.50 | 37.46 | 37.46 | 880.14 | 0.12 | 123.28 | Vu < PhiVc/2 | lot Reqd 9.6. | 123.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 12.49 | 33.50 | 30.29 | 30.29 | 915.39 | 0.09 | 122.89 | Vu < PhiVc/2 | lot Reqd 9.6. | 122.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 13.53 | 33.50 | 23.12 | 23.12 | 943.19 | 0.07 | 122.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 122.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 14.57 | 33.50 | 15.95 | 15.95 | 963.52 | 0.05 | 122.20 | Vu < PhiVc/2 | lot Reqd 9.6. | 122.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 15.61 | 33.50 | 8.79 | 8.79 | 976.40 | 0.03 | 121.89 | Vu < PhiVc/2 | lot Reqd 9.6. | 121.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 16.65 | 33.50 | 1.62 | 1.62 | 981.81 | 0.00 | 121.59 | Vu < PhiVc/2 | lot Reqd 9.6. | 121.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 17.69 | 33.50 | -5.66 | 5.66 | 977.68 | 0.02 | 121.76 | Vu < PhiVc/2 | lot Reqd 9.6. | 121.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 18.73 | 33.50 | -12.83 | 12.83 | 968.05 | 0.04 | 122.07 | Vu < PhiVc/2 | lot Reqd 9.6. | 122.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 19.78 | 33.50 | -20.00 | 20.00 | 950.97 | 0.06 | 122.39 | Vu < PhiVc/2 | lot Reqd 9.6. | 122.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 20.82 | 33.50 | -27.17 | 27.17 | 926.42 | 0.08 | 122.73 | Vu < PhiVc/2 | lot Reqd 9.6. | 122.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 21.86 | 33.50 | -34.33 | 34.33 | 894.42 | 0.11 | 123.11 | Vu < PhiVc/2 | lot Reqd 9.6. | 123.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 22.90 | 33.50 | -41.50 | 41.50 | 854.95 | 0.14 | 123.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 123.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 23.94 | 33.50 | -48.67 | 48.67 | 808.03 | 0.17 | 124.01 | Vu < PhiVc/2 | lot Reqd 9.6. | 124.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 24.98 | 33.50 | -55.83 | 55.83 | 753.65 | 0.21 | 124.58 | Vu < PhiVc/2 | lot Reqd 9.6. | 124.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 26.02 | 33.50 | -63.00 | 63.00 | 691.80 | 0.25 | 125.29 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 175.5 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 27.06 | 33.50 | -70.17 | 70.17 | 622.50 | 0.31 | 126.18 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 176.4 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 28.10 | 33.50 | -77.34 | 77.34 | 545.74 | 0.40 | 127.38 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 177.6 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 29.14 | 33.50 | -84.50 | 84.50 | 461.52 | 0.51 | 129.09 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 179.3 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 30.18 | 33.50 | -91.67 | 91.67 | 369.84 | 0.69 | 131.77 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 182.0 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 31.22 | 33.50 | -98.84 | 98.84 | 270.70 | 1.00 | 136.33 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 186.6 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 32.27 | 33.50 | -106.00 | 106.00 | 164.09 | 1.00 | 136.33 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 186.6 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 33.31 | 33.50 | -113.17 | 113.17 | 50.03 | 1.00 | 136.33 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 186.6 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 34.35 | 33.50 | -120.34 | 120.34 | 71.49 | 1.00 | 127.44 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 177.7 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 35.39 | 33.50 | -127.50 | 127.50 | 200.46 | 1.00 | 127.44 | PhiVc < Vu | 0.060 | 182.3 | 13.3 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 36.43 | 33.50 | -134.67 | 134.67 | 336.90 | 1.00 | 127.44 | PhiVc < Vu | 7.227 | 182.3 | 13.3 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 37.47 | 33.50 | -141.84 | 141.84 | 480.80 | 0.82 | 126.40 | PhiVc < Vu | 15.440 | 181.2 | 13.3 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 38.51 | 33.50 | -149.01 | 149.01 | 632.16 | 0.66 | 125.42 | PhiVc < Vu | 23.587 | 180.2 | 13.3 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 39.55 | 33.50 | -156.17 | 156.17 | 790.98 | 0.55 | 124.79 | PhiVc < Vu | 31.387 | 179.6 | 13.3 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 40.59 | 33.50 | -163.34 | 163.34 | 957.25 | 0.48 | 124.34 | PhiVc < Vu | 38.998 | 179.2 | 13.3 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 41.63 | 33.50 | -170.51 | 170.51 | 1,130.99 | 0.42 | 124.01 | PhiVc < Vu | 46.494 | 178.8 | 13.0 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 42.54 | 33.50 | 165.54 | 165.54 | 1,274.93 | 0.36 | 129.04 | PhiVc < Vu | 36.505 | 183.9 | 13.3 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 42.78 | 33.50 | 163.91 | 163.91 | 1,235.92 | 0.37 | 129.20 | PhiVc < Vu | 34.714 | 184.0 | 13.3 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 43.01 | 33.50 | 162.28 | 162.28 | 1,197.30 | 0.38 | 129.37 | PhiVc < Vu | 32.914 | 184.2 | 13.3 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 43.25 | 33.50 | 160.65 | 160.65 | 1,159.06 | 0.39 | 129.54 | PhiVc < Vu | 31.106 | 184.4 | 13.3 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 43.49 | 33.50 | 159.02 | 159.02 | 1,121.21 | 0.40 | 129.73 | PhiVc < Vu | 29.289 | 184.5 | 13.3 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 43.72 | 33.50 | 157.39 | 157.39 | 1,083.74 | 0.41 | 129.93 | PhiVc < Vu | 27.461 | 184.7 | 13.3 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 43.96 | 33.50 | 155.76 | 155.76 | 1,046.66 | 0.42 | 130.13 | PhiVc < Vu | 25.623 | 185.0 | 13.3 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 44.20 | 33.50 | 154.13 | 154.13 | 1,009.97 | 0.43 | 130.35 | PhiVc < Vu | 23.773 | 185.2 | 13.3 | 11.0 |

# Concrete Beam

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DESCRIPTION: Grid Z2-B5/B6

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 44.43 | 33.50 | 152.50 | 152.50 | 973.66 | 0.44 | 130.59 | PhiVc < Vu | 21.910 | 185.4 | 13.3 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 44.67 | 33.50 | 150.87 | 150.87 | 937.74 | 0.45 | 130.83 | PhiVc < Vu | 20.032 | 185.7 | 13.3 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 44.91 | 33.50 | 149.24 | 149.24 | 902.21 | 0.46 | 131.10 | PhiVc < Vu | 18.139 | 185.9 | 13.3 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 45.14 | 33.50 | 147.60 | 147.60 | 867.06 | 0.48 | 131.38 | PhiVc < Vu | 16.229 | 186.2 | 13.3 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 45.38 | 33.50 | 145.97 | 145.97 | 832.30 | 0.49 | 131.67 | PhiVc < Vu | 14.30 | 186.5 | 13.3 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 45.62 | 33.50 | 144.34 | 144.34 | 797.92 | 0.51 | 131.99 | PhiVc < Vu | 12.351 | 186.8 | 13.3 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 45.85 | 33.50 | 142.71 | 142.71 | 763.93 | 0.52 | 132.33 | PhiVc < Vu | 10.377 | 187.2 | 13.3 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 46.09 | 33.50 | 141.08 | 141.08 | 730.33 | 0.54 | 132.70 | PhiVc < Vu | 8.378 | 187.5 | 13.3 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 46.33 | 33.50 | 139.45 | 139.45 | 697.11 | 0.56 | 133.10 | PhiVc < Vu | 6.350 | 187.9 | 13.3 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 46.57 | 33.50 | 137.82 | 137.82 | 664.28 | 0.58 | 133.53 | PhiVc < Vu | 4.289 | 188.3 | 13.3 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 46.80 | 33.50 | 136.19 | 136.19 | 631.84 | 0.60 | 134.00 | PhiVc < Vu | 2.191 | 188.8 | 13.3 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 47.04 | 33.50 | 134.56 | 134.56 | 599.78 | 0.63 | 134.51 | PhiVc < Vu | 0.05084 | 189.3 | 13.3 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 47.28 | 33.50 | 132.93 | 132.93 | 568.11 | 0.65 | 135.07 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 185.3 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 47.51 | 33.50 | 131.30 | 131.30 | 536.82 | 0.68 | 135.68 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 185.9 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 47.75 | 33.50 | 130.11 | 130.11 | 530.54 | 0.68 | 135.72 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 186.0 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 47.99 | 33.50 | 129.03 | 129.03 | 499.86 | 0.72 | 136.46 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 186.7 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 48.22 | 33.50 | 127.95 | 127.95 | 469.43 | 0.76 | 137.30 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 187.5 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 48.46 | 33.50 | 126.86 | 126.86 | 439.26 | 0.81 | 138.24 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 188.5 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 48.70 | 33.50 | 125.78 | 125.78 | 409.34 | 0.86 | 139.31 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 189.6 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 48.93 | 33.50 | 124.70 | 124.70 | 379.68 | 0.92 | 140.53 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 190.8 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 49.17 | 33.50 | 123.62 | 123.62 | 350.28 | 0.99 | 141.95 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 192.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 49.41 | 33.50 | 122.54 | 122.54 | 321.13 | 1.00 | 142.26 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 192.5 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 49.64 | 33.50 | 121.46 | 121.46 | 292.24 | 1.00 | 142.26 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 192.5 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 49.88 | 33.50 | 120.38 | 120.38 | 263.60 | 1.00 | 142.26 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 192.5 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 50.12 | 33.50 | 119.30 | 119.30 | 235.23 | 1.00 | 142.26 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 192.5 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 50.35 | 33.50 | 118.21 | 118.21 | 207.10 | 1.00 | 142.26 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 192.5 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 50.59 | 33.50 | 117.13 | 117.13 | 179.24 | 1.00 | 142.26 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 192.5 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 50.83 | 33.50 | 116.05 | 116.05 | 151.62 | 1.00 | 142.26 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 192.5 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 51.06 | 33.50 | 114.97 | 114.97 | 124.27 | 1.00 | 142.26 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 192.5 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 51.30 | 33.50 | 113.89 | 113.89 | 97.17 | 1.00 | 142.26 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 192.5 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 51.54 | 33.50 | 112.81 | 112.81 | 70.33 | 1.00 | 142.26 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 192.5 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 51.78 | 33.50 | 111.73 | 111.73 | 43.74 | 1.00 | 142.26 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 192.5 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 52.01 | 33.50 | 110.64 | 110.64 | 17.41 | 1.00 | 142.26 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 192.5 | 12.6 | 12.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 42.500 | -1,250.96 | 1,541.90 | 0.81 |
| Span # 2 | 2 | 9.670 | -1,281.47 | 1,539.18 | 0.83 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L) | | | | | |
| Span # 1 | 1 | 42.500 | -834.50 | 1,541.90 | 0.54 |
| Span # 2 | 2 | 9.670 | -854.75 | 1,539.18 | 0.56 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*) | | | | | |
| Span # 1 | 1 | 42.500 | -1,245.95 | 1,541.90 | 0.81 |
| Span # 2 | 2 | 9.670 | -1,276.44 | 1,539.18 | 0.83 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL) | | | | | |
| Span # 1 | 1 | 42.500 | -1,250.96 | 1,541.90 | 0.81 |
| Span # 2 | 2 | 9.670 | -1,281.47 | 1,539.18 | 0.83 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H, LL Comb Run (L*) | 1 | 0.7871 | 18.821 | +D+L+H, LL Comb Run (L*) | -0.0026 | 42.638 |
| | 2 | 0.0000 | 18.821 | +D+L+H, LL Comb Run (L*) | -0.0321 | 3.730 |

Title Block Line 1
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and then using the "Printing &
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Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

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# Concrete Beam

File: FWI2101 - Paragon Star.ec6
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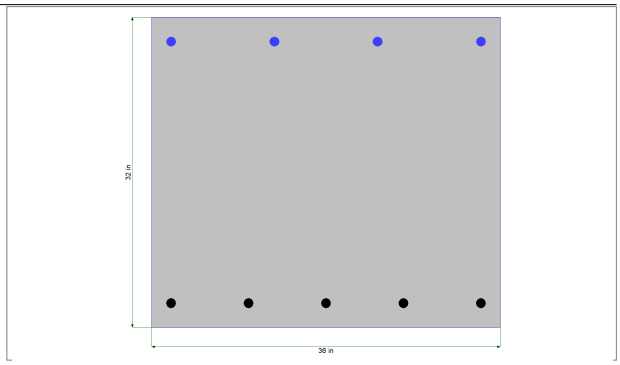
DESCRIPTION: Grid 16.9 - B7/B8/B9

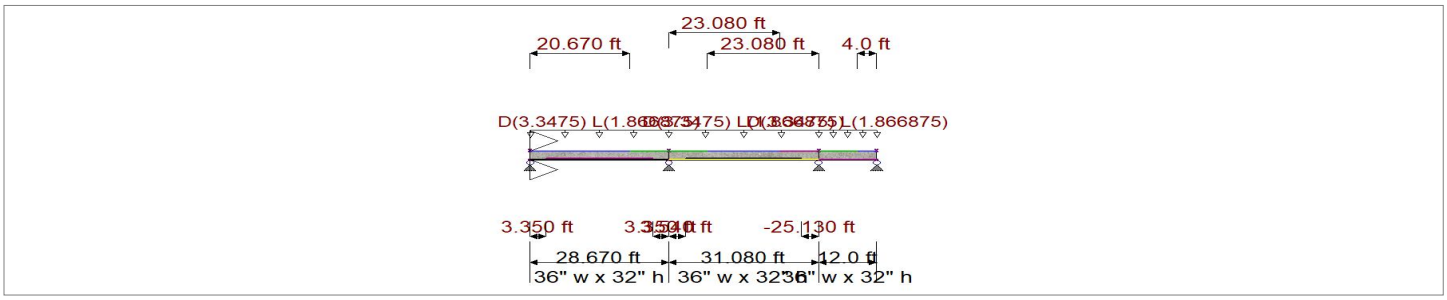
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | ϕ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| ψ Density | = | 145.0 pcf | $\beta_1$ | = | 0.80 |
| λ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 2.0 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 36.0 in, Height = 32.0 in

Span #1 Reinforcing....
- 4-#8 at 2.50 in from Top, from 0.0 to 28.670 ft in this span
- 3-#8 at 6.50 in from Bottom, from 3.350 to 25.320 ft in this span
- 6-#8 at 3.0 in from Top, from 20.670 to 28.670 ft in this span
- 5-#8 at 2.50 in from Bottom, from 0.0 to 28.670 ft in this span

Span #2 Reinforcing....
- 4-#8 at 2.50 in from Top, from 0.0 to 31.080 ft in this span
- 3-#8 at 3.0 in from Top, from 23.080 to 31.080 ft in this span
- 4-#8 at 2.50 in from Bottom, from 0.0 to 31.080 ft in this span
- 6-#8 at 3.0 in from Top, from 0.0 to 8.0 ft in this span
- 2-#8 at 6.0 in from Bottom, from 3.540 to 27.540 ft in this span

Span #3 Reinforcing....
- 3-#8 at 2.50 in from Top, from 0.0 to 12.0 ft in this span
- 6-#8 at 2.50 in from Bottom, from 0.0 to 12.0 ft in this span
- 4-#8 at 3.0 in from Top, from 0.0 to 8.0 ft in this span

Beam self weight calculated and added to loads

Load for Span Number 1
Uniform Load : D = 0.260, L = 0.1450 ksf, Tributary Width = 12.875 ft

Load for Span Number 2
Uniform Load : D = 0.260, L = 0.1450 ksf, Tributary Width = 12.875 ft

Load for Span Number 3
Uniform Load : D = 0.260, L = 0.1450 ksf, Tributary Width = 12.875 ft

## DESIGN SUMMARY

**Design OK**

| | | | | | | |
|---|---|---|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.834** : 1 | Maximum Deflection | | | | |
| Section used for this span | **Typical Section** | Max Downward Transient Deflection | 0.049 in | Ratio = | 7018 | >=600. |
| Mu : Applied | -821.02 k-ft | Max Upward Transient Deflection | -0.019 in | Ratio = | 18316 | >=600. |
| Mn * Phi : Allowable | 984.87 k-ft | Max Downward Total Deflection | 0.264 in | Ratio = | 1304 | >=480. |
| Location of maximum on span | 0.000 ft | Max Upward Total Deflection | -0.012 in | Ratio = | 12384 | >=480. |
| Span # where maximum occurs | Span # 2 | | | | | |

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# Concrete Beam

DESCRIPTION: Grid 16.9 - B7/B8/B9

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| Overall MAXimum | 73.319 | 214.552 | 168.998 | 18.793 |
| Overall MINimum | 0.094 | -0.512 | 4.981 | -0.725 |
| +D+L+H, LL Comb Run (**L) | 51.395 | 150.846 | 129.235 | 14.339 |
| +D+L+H, LL Comb Run (*L*) | 49.199 | 180.597 | 157.524 | -5.883 |
| +D+L+H, LL Comb Run (*LL) | 49.262 | 180.414 | 168.998 | 5.164 |
| +D+L+H, LL Comb Run (L**) | 73.319 | 188.929 | 106.314 | 8.374 |
| +D+L+H, LL Comb Run (L*L) | 73.316 | 188.633 | 118.596 | 18.793 |
| +D+L+H, LL Comb Run (LL*) | 72.766 | 214.552 | 150.799 | -3.158 |
| +D+L+H, LL Comb Run (LLL) | 72.764 | 214.464 | 162.326 | 7.807 |
| D Only | 51.357 | 151.235 | 116.868 | 3.954 |
| L Only, LL Comb Run (**L) | 0.094 | -0.512 | 12.481 | 10.340 |
| L Only, LL Comb Run (*L*) | -2.885 | 30.285 | 41.688 | -11.066 |
| L Only, LL Comb Run (*LL) | -2.791 | 29.773 | 54.169 | -0.725 |
| L Only, LL Comb Run (L**) | 23.219 | 34.751 | -7.500 | 3.053 |
| L Only, LL Comb Run (L*L) | 23.313 | 34.239 | 4.981 | 13.394 |
| L Only, LL Comb Run (LL*) | 20.334 | 65.037 | 34.188 | -8.013 |
| L Only, LL Comb Run (LLL) | 20.428 | 64.524 | 46.669 | 2.328 |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.00 | 29.50 | 96.49 | 96.49 | 0.00 | 1.00 | 114.42 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 158.7 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.15 | 29.50 | 86.86 | 86.86 | 105.13 | 1.00 | 114.42 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 158.7 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.29 | 29.50 | 77.23 | 77.23 | 199.22 | 0.95 | 114.07 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 158.3 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.44 | 29.50 | 67.60 | 67.60 | 282.26 | 0.59 | 111.37 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 155.6 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.59 | 29.50 | 57.97 | 57.97 | 354.27 | 0.40 | 109.99 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 154.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.73 | 29.50 | 48.34 | 48.34 | 415.23 | 0.29 | 109.13 | Vu < PhiVc/2 | lot Reqd 9.6. | 109.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 6.88 | 29.50 | 38.71 | 38.71 | 465.15 | 0.20 | 108.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 108.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 8.03 | 29.50 | 29.09 | 29.09 | 504.02 | 0.14 | 108.06 | Vu < PhiVc/2 | lot Reqd 9.6. | 108.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 9.17 | 29.50 | 19.46 | 19.46 | 531.86 | 0.09 | 107.68 | Vu < PhiVc/2 | lot Reqd 9.6. | 107.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 10.32 | 29.50 | 9.83 | 9.83 | 548.65 | 0.04 | 107.34 | Vu < PhiVc/2 | lot Reqd 9.6. | 107.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 11.47 | 29.50 | -7.46 | 7.46 | 270.12 | 0.07 | 107.51 | Vu < PhiVc/2 | lot Reqd 9.6. | 107.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 12.61 | 29.50 | -14.19 | 14.19 | 488.99 | 0.07 | 107.54 | Vu < PhiVc/2 | lot Reqd 9.6. | 107.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 13.76 | 29.50 | -23.82 | 23.82 | 467.19 | 0.13 | 107.94 | Vu < PhiVc/2 | lot Reqd 9.6. | 107.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 14.91 | 29.50 | -33.45 | 33.45 | 434.35 | 0.19 | 108.41 | Vu < PhiVc/2 | lot Reqd 9.6. | 108.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 16.06 | 29.50 | -43.08 | 43.08 | 390.46 | 0.27 | 109.02 | Vu < PhiVc/2 | lot Reqd 9.6. | 109.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 17.20 | 29.50 | -52.71 | 52.71 | 335.54 | 0.39 | 109.87 | Vu < PhiVc/2 | lot Reqd 9.6. | 109.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 18.35 | 29.50 | -62.34 | 62.34 | 269.57 | 0.57 | 111.22 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 155.5 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 19.50 | 29.50 | -71.97 | 71.97 | 192.56 | 0.92 | 113.81 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 158.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 20.64 | 29.50 | -81.59 | 81.59 | 104.51 | 1.00 | 114.42 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 158.7 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 21.79 | 29.50 | -91.22 | 91.22 | 5.42 | 1.00 | 114.42 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 158.7 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 22.94 | 29.50 | -100.85 | 100.85 | 104.71 | 1.00 | 112.94 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 157.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 24.08 | 29.50 | -110.48 | 110.48 | 225.89 | 1.00 | 112.94 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 157.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 25.23 | 29.50 | -120.11 | 120.11 | 358.11 | 0.82 | 111.90 | PhiVc < Vu | 8.213 | 152.7 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 26.38 | 29.50 | -129.74 | 129.74 | 501.37 | 0.64 | 110.78 | PhiVc < Vu | 18.957 | 151.6 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 27.52 | 29.50 | -139.36 | 139.36 | 655.67 | 0.52 | 110.11 | PhiVc < Vu | 29.259 | 151.0 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 28.67 | 29.50 | 142.01 | 142.01 | 821.02 | 0.43 | 113.31 | PhiVc < Vu | 28.705 | 154.2 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 29.91 | 29.50 | 131.58 | 131.58 | 650.95 | 0.50 | 114.37 | PhiVc < Vu | 17.206 | 155.2 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 31.16 | 29.50 | 121.14 | 121.14 | 493.87 | 0.60 | 115.94 | PhiVc < Vu | 5.196 | 156.8 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 32.40 | 29.50 | 110.70 | 110.70 | 349.76 | 0.78 | 118.54 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 162.8 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 33.64 | 29.50 | 100.26 | 100.26 | 218.62 | 1.00 | 121.82 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 166.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 34.89 | 29.50 | 89.82 | 89.82 | 100.46 | 1.00 | 121.82 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 166.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 36.13 | 29.50 | 79.39 | 79.39 | 4.72 | 1.00 | 112.94 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 157.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 37.37 | 29.50 | 68.95 | 68.95 | 96.92 | 1.00 | 112.94 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 157.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 38.62 | 29.50 | 58.51 | 58.51 | 176.15 | 0.82 | 111.85 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 156.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 39.86 | 29.50 | 48.07 | 48.07 | 242.40 | 0.49 | 109.90 | Vu < PhiVc/2 | lot Reqd 9.6. | 109.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 41.10 | 29.50 | 37.63 | 37.63 | 295.68 | 0.31 | 108.86 | Vu < PhiVc/2 | lot Reqd 9.6. | 108.9 | 0.0 | 0.0 |

# Concrete Beam

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DESCRIPTION: Grid 16.9 - B7/B8/B9

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 42.35 | 29.50 | 27.20 | 27.20 | 335.98 | 0.20 | 108.19 | Vu < PhiVc/2 | lot Reqd 9.6. | 108.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 43.59 | 29.50 | 17.48 | 17.48 | 174.02 | 0.25 | 109.20 | Vu < PhiVc/2 | lot Reqd 9.6. | 109.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 44.83 | 29.50 | 10.76 | 10.76 | 191.57 | 0.14 | 108.24 | Vu < PhiVc/2 | lot Reqd 9.6. | 108.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 46.07 | 29.50 | -11.90 | 11.90 | 410.33 | 0.07 | 107.64 | Vu < PhiVc/2 | lot Reqd 9.6. | 107.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 47.32 | 29.50 | -22.34 | 22.34 | 389.05 | 0.14 | 108.26 | Vu < PhiVc/2 | lot Reqd 9.6. | 108.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 48.56 | 29.50 | -32.78 | 32.78 | 354.79 | 0.23 | 109.03 | Vu < PhiVc/2 | lot Reqd 9.6. | 109.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 49.80 | 29.50 | -43.22 | 43.22 | 307.55 | 0.35 | 110.08 | Vu < PhiVc/2 | lot Reqd 9.6. | 110.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 51.05 | 29.50 | -53.65 | 53.65 | 247.34 | 0.53 | 111.75 | Vu < PhiVc/2 | lot Reqd 9.6. | 111.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 52.29 | 29.50 | -64.09 | 64.09 | 174.15 | 0.90 | 115.05 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 159.3 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 53.53 | 29.50 | -74.53 | 74.53 | 87.98 | 1.00 | 115.90 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 160.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 54.78 | 29.50 | -84.97 | 84.97 | 11.16 | 1.00 | 121.82 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 166.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 56.02 | 29.50 | -95.40 | 95.40 | 123.28 | 1.00 | 121.82 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 166.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 57.26 | 29.50 | -105.84 | 105.84 | 248.38 | 1.00 | 121.82 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 166.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 58.51 | 29.50 | -116.28 | 116.28 | 386.45 | 0.74 | 117.97 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 162.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 59.75 | 29.50 | 95.17 | 95.17 | 537.50 | 0.44 | 111.52 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 155.8 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 60.23 | 29.50 | 91.14 | 91.14 | 492.79 | 0.45 | 111.72 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 156.0 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 60.71 | 29.50 | 87.11 | 87.11 | 450.01 | 0.48 | 111.94 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 156.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 61.19 | 29.50 | 83.08 | 83.08 | 409.16 | 0.50 | 112.19 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 156.4 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 61.67 | 29.50 | 79.05 | 79.05 | 370.25 | 0.52 | 112.45 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 156.7 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 62.15 | 29.50 | 75.02 | 75.02 | 333.28 | 0.55 | 112.75 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 157.0 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 62.63 | 29.50 | 70.99 | 70.99 | 298.24 | 0.59 | 113.08 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 157.3 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 63.11 | 29.50 | 66.96 | 66.96 | 265.13 | 0.62 | 113.45 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 157.7 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 63.59 | 29.50 | 62.93 | 62.93 | 233.96 | 0.66 | 113.87 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 158.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 64.07 | 29.50 | 58.90 | 58.90 | 204.72 | 0.71 | 114.34 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 158.6 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 64.55 | 29.50 | 54.87 | 54.87 | 177.42 | 0.76 | 114.89 | Vu < PhiVc/2 | lot Reqd 9.6. | 114.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 65.03 | 29.50 | 50.84 | 50.84 | 152.05 | 0.82 | 115.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 115.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 65.51 | 29.50 | 46.81 | 46.81 | 128.61 | 0.89 | 116.29 | Vu < PhiVc/2 | lot Reqd 9.6. | 116.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 65.99 | 29.50 | 42.78 | 42.78 | 107.11 | 0.98 | 117.19 | Vu < PhiVc/2 | lot Reqd 9.6. | 117.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 66.47 | 29.50 | 39.52 | 39.52 | 133.27 | 0.73 | 114.57 | Vu < PhiVc/2 | lot Reqd 9.6. | 114.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 66.95 | 29.50 | 36.92 | 36.92 | 114.92 | 0.79 | 115.20 | Vu < PhiVc/2 | lot Reqd 9.6. | 115.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 67.43 | 29.50 | 34.33 | 34.33 | 97.82 | 0.86 | 115.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 116.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 67.91 | 29.50 | 31.73 | 31.73 | 81.97 | 0.95 | 116.88 | Vu < PhiVc/2 | lot Reqd 9.6. | 116.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 68.39 | 29.50 | 29.13 | 29.13 | 67.36 | 1.00 | 117.38 | Vu < PhiVc/2 | lot Reqd 9.6. | 117.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 68.87 | 29.50 | 26.54 | 26.54 | 54.00 | 1.00 | 117.38 | Vu < PhiVc/2 | lot Reqd 9.6. | 117.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 69.35 | 29.50 | 23.94 | 23.94 | 41.88 | 1.00 | 117.38 | Vu < PhiVc/2 | lot Reqd 9.6. | 117.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 69.83 | 29.50 | 21.35 | 21.35 | 31.01 | 1.00 | 117.38 | Vu < PhiVc/2 | lot Reqd 9.6. | 117.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 70.31 | 29.50 | 18.75 | 18.75 | 21.39 | 1.00 | 117.38 | Vu < PhiVc/2 | lot Reqd 9.6. | 117.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 70.79 | 29.50 | -20.11 | 20.11 | 23.18 | 1.00 | 115.90 | Vu < PhiVc/2 | lot Reqd 9.6. | 115.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 71.27 | 29.50 | -24.14 | 24.14 | 12.56 | 1.00 | 115.90 | Vu < PhiVc/2 | lot Reqd 9.6. | 115.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 71.75 | 29.50 | -28.17 | 28.17 | 0.00 | 1.00 | 115.90 | Vu < PhiVc/2 | lot Reqd 9.6. | 115.9 | 0.0 | 0.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 28.670 | -792.69 | 984.97 | 0.80 |
| Span # 2 | 2 | 31.080 | -821.02 | 984.87 | 0.83 |
| Span # 3 | 3 | 12.000 | -537.50 | 699.60 | 0.77 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 28.670 | -503.66 | 984.97 | 0.51 |
| Span # 2 | 2 | 31.080 | -521.86 | 984.87 | 0.53 |
| Span # 3 | 3 | 12.000 | -325.04 | 699.60 | 0.46 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 28.670 | -639.40 | 984.97 | 0.65 |
| Span # 2 | 2 | 31.080 | 425.17 | 585.00 | 0.73 |
| Span # 3 | 3 | 12.000 | -520.97 | 699.60 | 0.74 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LL) | | | | | |

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# Concrete Beam



DESCRIPTION: Grid 16.9 - B7/B8/B9

| Load Combination Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 1 | 1 | 28.670 | -635.13 | 984.97 | 0.64 |
| Span # 2 | 2 | 31.080 | -511.42 | 701.46 | 0.73 |
| Span # 3 | 3 | 12.000 | -537.50 | 699.60 | 0.77 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 28.670 | 552.68 | 760.77 | 0.73 |
| Span # 2 | 2 | 31.080 | -688.67 | 984.87 | 0.70 |
| Span # 3 | 3 | 12.000 | -249.89 | 699.60 | 0.36 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 28.670 | 554.40 | 760.77 | 0.73 |
| Span # 2 | 2 | 31.080 | -684.37 | 984.87 | 0.69 |
| Span # 3 | 3 | 12.000 | -266.42 | 699.60 | 0.38 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 28.670 | -792.69 | 984.97 | 0.80 |
| Span # 2 | 2 | 31.080 | -821.02 | 984.87 | 0.83 |
| Span # 3 | 3 | 12.000 | -462.35 | 699.60 | 0.66 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 28.670 | -788.42 | 984.97 | 0.80 |
| Span # 2 | 2 | 31.080 | -816.72 | 984.87 | 0.83 |
| Span # 3 | 3 | 12.000 | -478.88 | 699.60 | 0.68 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H, LL Comb Run (L*L) | 1 | 0.2637 | 12.041 | +D+L+H, LL Comb Run (L*L) | -0.0045 | 29.292 |
| +D+L+H, LL Comb Run (*L*) | 2 | 0.1412 | 15.540 | +D+L+H, LL Comb Run (*L*) | -0.0016 | 31.320 |
| +D+L+H, LL Comb Run (L*L) | 3 | 0.0000 | 12.000 | +D+L+H, LL Comb Run (*L*) | -0.0116 | 4.560 |

Title Block Line 1
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Project Title:
Engineer:
Project ID:
Project Descr:

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# Concrete Beam

File: FWI2101 - Paragon Star.ec6

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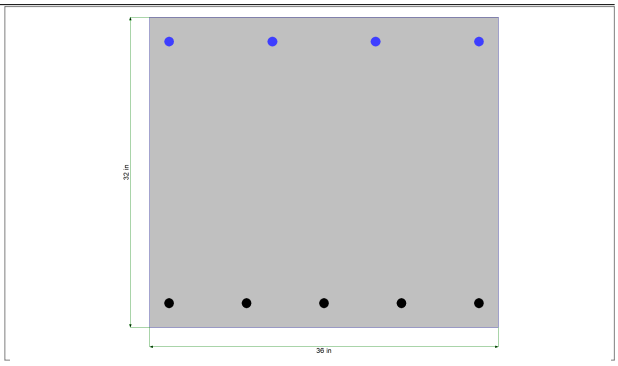
DESCRIPTION: Grid 16.5 - B7/B8/B9

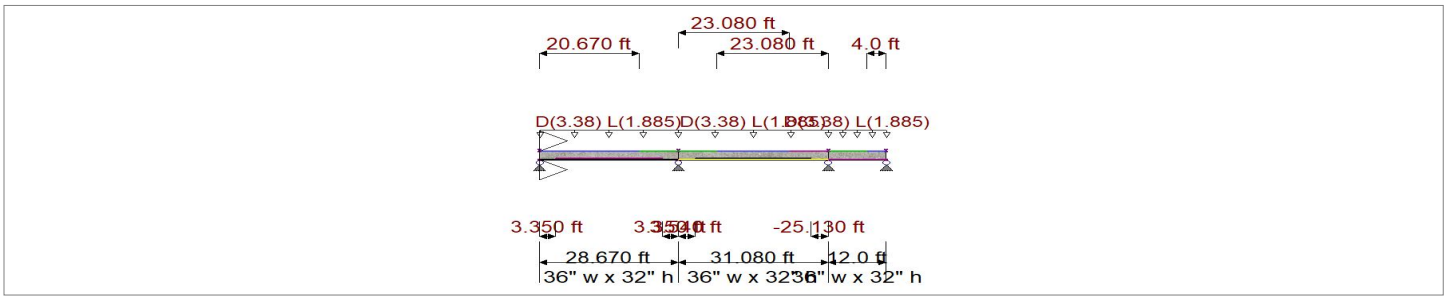
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | $\phi$ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| $\psi$ Density | = | 145.0 pcf | $\beta_1$ | = | 0.80 |
| $\lambda$ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 2.0 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 36.0 in, Height = 32.0 in

Span #1 Reinforcing....
- 4-#8 at 2.50 in from Top, from 0.0 to 28.670 ft in this span
- 3-#8 at 6.50 in from Bottom, from 3.350 to 25.320 ft in this span
- 6-#8 at 3.0 in from Top, from 20.670 to 28.670 ft in this span
- 5-#8 at 2.50 in from Bottom, from 0.0 to 28.670 ft in this span

Span #2 Reinforcing....
- 4-#8 at 2.50 in from Top, from 0.0 to 31.080 ft in this span
- 3-#8 at 3.0 in from Top, from 23.080 to 31.080 ft in this span
- 4-#8 at 2.50 in from Bottom, from 0.0 to 31.080 ft in this span
- 6-#8 at 3.0 in from Top, from 0.0 to 8.0 ft in this span
- 2-#8 at 6.0 in from Bottom, from 3.540 to 27.540 ft in this span

Span #3 Reinforcing....
- 3-#8 at 2.50 in from Top, from 0.0 to 12.0 ft in this span
- 6-#8 at 2.50 in from Bottom, from 0.0 to 12.0 ft in this span
- 4-#8 at 3.0 in from Top, from 0.0 to 8.0 ft in this span

Beam self weight calculated and added to loads

Load for Span Number 1
Uniform Load : D = 0.260, L = 0.1450 ksf, Tributary Width = 13.0 ft

Load for Span Number 2
Uniform Load : D = 0.260, L = 0.1450 ksf, Tributary Width = 13.0 ft

Load for Span Number 3
Uniform Load : D = 0.260, L = 0.1450 ksf, Tributary Width = 13.0 ft

## DESIGN SUMMARY

**Design OK**

| | | | | | | |
|---|---|---|---|---|---|---|
| Maximum Bending Stress Ratio | = | **0.840** : 1 | Maximum Deflection | | | |
| Section used for this span | | **Typical Section** | Max Downward Transient Deflection | 0.049 in | Ratio = | 6951 >=600. |
| Mu : Applied | | -827.67 k-ft | Max Upward Transient Deflection | -0.019 in | Ratio = | 18139 >=600. |
| Mn * Phi : Allowable | | 984.87 k-ft | Max Downward Total Deflection | 0.269 in | Ratio = | 1278 >=480. |
| Location of maximum on span | | 0.000 ft | Max Upward Total Deflection | -0.012 in | Ratio = | 12196 >=480. |
| Span # where maximum occurs | | Span # 2 | | | | |

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# Concrete Beam

DESCRIPTION: Grid 16.5 - B7/B8/B9

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| Overall MAXimum | 73.873 | 216.373 | 170.397 | 19.001 |
| Overall MINimum | 0.095 | -0.517 | 5.029 | -0.732 |
| +D+L+H, LL Comb Run (**L) | 51.809 | 151.836 | 130.287 | 14.434 |
| +D+L+H, LL Comb Run (*L*) | 49.541 | 181.974 | 158.794 | -5.978 |
| +D+L+H, LL Comb Run (*LL) | 49.608 | 181.781 | 170.397 | 5.164 |
| +D+L+H, LL Comb Run (L**) | 73.873 | 190.455 | 106.979 | 8.480 |
| +D+L+H, LL Comb Run (L*L) | 73.870 | 190.156 | 119.381 | 19.001 |
| +D+L+H, LL Comb Run (LL*) | 73.298 | 216.373 | 151.829 | -3.126 |
| +D+L+H, LL Comb Run (LLL) | 73.297 | 216.285 | 163.463 | 7.949 |
| D Only | 51.771 | 152.226 | 117.801 | 3.947 |
| L Only, LL Comb Run (**L) | 0.095 | -0.517 | 12.602 | 10.441 |
| L Only, LL Comb Run (*L*) | -2.913 | 30.579 | 42.093 | -11.173 |
| L Only, LL Comb Run (*LL) | -2.819 | 30.062 | 54.695 | -0.732 |
| L Only, LL Comb Run (L**) | 23.444 | 35.088 | -7.573 | 3.083 |
| L Only, LL Comb Run (L*L) | 23.539 | 34.571 | 5.029 | 13.524 |
| L Only, LL Comb Run (LL*) | 20.531 | 65.668 | 34.520 | -8.090 |
| L Only, LL Comb Run (LLL) | 20.626 | 65.150 | 47.122 | 2.351 |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.00 | 29.50 | 97.27 | 97.27 | 0.00 | 1.00 | 114.42 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 158.7 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.15 | 29.50 | 87.57 | 87.57 | 105.99 | 1.00 | 114.42 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 158.7 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.29 | 29.50 | 77.86 | 77.86 | 200.85 | 0.95 | 114.07 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 158.3 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.44 | 29.50 | 68.16 | 68.16 | 284.57 | 0.59 | 111.37 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 155.6 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.59 | 29.50 | 58.45 | 58.45 | 357.17 | 0.40 | 109.99 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 154.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.73 | 29.50 | 48.74 | 48.74 | 418.63 | 0.29 | 109.13 | Vu < PhiVc/2 | lot Reqd 9.6. | 109.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 6.88 | 29.50 | 39.04 | 39.04 | 468.96 | 0.20 | 108.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 108.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 8.03 | 29.50 | 29.33 | 29.33 | 508.16 | 0.14 | 108.06 | Vu < PhiVc/2 | lot Reqd 9.6. | 108.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 9.17 | 29.50 | 19.62 | 19.62 | 536.23 | 0.09 | 107.68 | Vu < PhiVc/2 | lot Reqd 9.6. | 107.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 10.32 | 29.50 | 9.92 | 9.92 | 553.17 | 0.04 | 107.34 | Vu < PhiVc/2 | lot Reqd 9.6. | 107.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 11.47 | 29.50 | -7.53 | 7.53 | 271.94 | 0.07 | 107.51 | Vu < PhiVc/2 | lot Reqd 9.6. | 107.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 12.61 | 29.50 | -14.31 | 14.31 | 492.94 | 0.07 | 107.54 | Vu < PhiVc/2 | lot Reqd 9.6. | 107.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 13.76 | 29.50 | -24.02 | 24.02 | 470.97 | 0.13 | 107.94 | Vu < PhiVc/2 | lot Reqd 9.6. | 107.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 14.91 | 29.50 | -33.72 | 33.72 | 437.86 | 0.19 | 108.41 | Vu < PhiVc/2 | lot Reqd 9.6. | 108.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 16.06 | 29.50 | -43.43 | 43.43 | 393.62 | 0.27 | 109.02 | Vu < PhiVc/2 | lot Reqd 9.6. | 109.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 17.20 | 29.50 | -53.14 | 53.14 | 338.25 | 0.39 | 109.87 | Vu < PhiVc/2 | lot Reqd 9.6. | 109.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 18.35 | 29.50 | -62.84 | 62.84 | 271.75 | 0.57 | 111.22 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 155.5 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 19.50 | 29.50 | -72.55 | 72.55 | 194.12 | 0.92 | 113.81 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 158.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 20.64 | 29.50 | -82.25 | 82.25 | 105.36 | 1.00 | 114.42 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 158.7 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 21.79 | 29.50 | -91.96 | 91.96 | 5.46 | 1.00 | 114.42 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 158.7 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 22.94 | 29.50 | -101.67 | 101.67 | 105.57 | 1.00 | 112.94 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 157.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 24.08 | 29.50 | -111.37 | 111.37 | 227.73 | 1.00 | 112.94 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 157.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 25.23 | 29.50 | -121.08 | 121.08 | 361.02 | 0.82 | 111.90 | PhiVc < Vu | 9.186 | 152.7 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 26.38 | 29.50 | -130.79 | 130.79 | 505.44 | 0.64 | 110.78 | PhiVc < Vu | 20.008 | 151.6 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 27.52 | 29.50 | -140.49 | 140.49 | 660.99 | 0.52 | 110.11 | PhiVc < Vu | 30.388 | 151.0 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 28.67 | 29.50 | 143.17 | 143.17 | 827.67 | 0.43 | 113.31 | PhiVc < Vu | 29.857 | 154.2 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 29.91 | 29.50 | 132.64 | 132.64 | 656.23 | 0.50 | 114.37 | PhiVc < Vu | 18.272 | 155.2 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 31.16 | 29.50 | 122.12 | 122.12 | 497.87 | 0.60 | 115.94 | PhiVc < Vu | 6.178 | 156.8 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 32.40 | 29.50 | 111.60 | 111.60 | 352.59 | 0.78 | 118.54 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 162.8 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 33.64 | 29.50 | 101.08 | 101.08 | 220.39 | 1.00 | 121.82 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 166.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 34.89 | 29.50 | 90.55 | 90.55 | 101.28 | 1.00 | 121.82 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 166.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 36.13 | 29.50 | 80.03 | 80.03 | 4.76 | 1.00 | 112.94 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 157.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 37.37 | 29.50 | 69.51 | 69.51 | 97.71 | 1.00 | 112.94 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 157.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 38.62 | 29.50 | 58.99 | 58.99 | 177.58 | 0.82 | 111.85 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 156.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 39.86 | 29.50 | 48.46 | 48.46 | 244.37 | 0.49 | 109.90 | Vu < PhiVc/2 | lot Reqd 9.6. | 109.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 41.10 | 29.50 | 37.94 | 37.94 | 298.08 | 0.31 | 108.86 | Vu < PhiVc/2 | lot Reqd 9.6. | 108.9 | 0.0 | 0.0 |

# Concrete Beam

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DESCRIPTION: Grid 16.5 - B7/B8/B9

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 42.35 | 29.50 | 27.42 | 27.42 | 338.71 | 0.20 | 108.19 | Vu < PhiVc/2 | lot Reqd 9.6. | 108.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 43.59 | 29.50 | 17.62 | 17.62 | 175.13 | 0.25 | 109.21 | Vu < PhiVc/2 | lot Reqd 9.6. | 109.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 44.83 | 29.50 | 10.85 | 10.85 | 192.83 | 0.14 | 108.24 | Vu < PhiVc/2 | lot Reqd 9.6. | 108.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 46.07 | 29.50 | -12.01 | 12.01 | 413.72 | 0.07 | 107.64 | Vu < PhiVc/2 | lot Reqd 9.6. | 107.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 47.32 | 29.50 | -22.53 | 22.53 | 392.25 | 0.14 | 108.27 | Vu < PhiVc/2 | lot Reqd 9.6. | 108.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 48.56 | 29.50 | -33.05 | 33.05 | 357.69 | 0.23 | 109.03 | Vu < PhiVc/2 | lot Reqd 9.6. | 109.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 49.80 | 29.50 | -43.58 | 43.58 | 310.06 | 0.35 | 110.08 | Vu < PhiVc/2 | lot Reqd 9.6. | 110.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 51.05 | 29.50 | -54.10 | 54.10 | 249.34 | 0.53 | 111.75 | Vu < PhiVc/2 | lot Reqd 9.6. | 111.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 52.29 | 29.50 | -64.62 | 64.62 | 175.55 | 0.90 | 115.05 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 159.3 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 53.53 | 29.50 | -75.14 | 75.14 | 88.67 | 1.00 | 115.90 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 160.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 54.78 | 29.50 | -85.67 | 85.67 | 11.29 | 1.00 | 121.82 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 166.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 56.02 | 29.50 | -96.19 | 96.19 | 124.33 | 1.00 | 121.82 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 166.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 57.26 | 29.50 | -106.71 | 106.71 | 250.46 | 1.00 | 121.82 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 166.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 58.51 | 29.50 | -117.23 | 117.23 | 389.66 | 0.74 | 117.97 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 162.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 59.75 | 29.50 | 95.95 | 95.95 | 541.95 | 0.44 | 111.52 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 155.8 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 60.23 | 29.50 | 91.88 | 91.88 | 496.87 | 0.45 | 111.72 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 156.0 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 60.71 | 29.50 | 87.82 | 87.82 | 453.74 | 0.48 | 111.94 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 156.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 61.19 | 29.50 | 83.76 | 83.76 | 412.56 | 0.50 | 112.18 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 156.4 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 61.67 | 29.50 | 79.70 | 79.70 | 373.33 | 0.52 | 112.45 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 156.7 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 62.15 | 29.50 | 75.63 | 75.63 | 336.05 | 0.55 | 112.75 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 157.0 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 62.63 | 29.50 | 71.57 | 71.57 | 300.72 | 0.59 | 113.08 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 157.3 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 63.11 | 29.50 | 67.51 | 67.51 | 267.34 | 0.62 | 113.45 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 157.7 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 63.59 | 29.50 | 63.44 | 63.44 | 235.92 | 0.66 | 113.86 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 158.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 64.07 | 29.50 | 59.38 | 59.38 | 206.44 | 0.71 | 114.34 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 158.6 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 64.55 | 29.50 | 55.32 | 55.32 | 178.91 | 0.76 | 114.89 | Vu < PhiVc/2 | lot Reqd 9.6. | 114.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 65.03 | 29.50 | 51.26 | 51.26 | 153.33 | 0.82 | 115.53 | Vu < PhiVc/2 | lot Reqd 9.6. | 115.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 65.51 | 29.50 | 47.19 | 47.19 | 129.70 | 0.89 | 116.28 | Vu < PhiVc/2 | lot Reqd 9.6. | 116.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 65.99 | 29.50 | 43.13 | 43.13 | 108.03 | 0.98 | 117.19 | Vu < PhiVc/2 | lot Reqd 9.6. | 117.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 66.47 | 29.50 | 39.85 | 39.85 | 134.46 | 0.73 | 114.56 | Vu < PhiVc/2 | lot Reqd 9.6. | 114.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 66.95 | 29.50 | 37.23 | 37.23 | 115.96 | 0.79 | 115.19 | Vu < PhiVc/2 | lot Reqd 9.6. | 115.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 67.43 | 29.50 | 34.62 | 34.62 | 98.72 | 0.86 | 115.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 115.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 67.91 | 29.50 | 32.00 | 32.00 | 82.73 | 0.95 | 116.87 | Vu < PhiVc/2 | lot Reqd 9.6. | 116.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 68.39 | 29.50 | 29.39 | 29.39 | 67.99 | 1.00 | 117.38 | Vu < PhiVc/2 | lot Reqd 9.6. | 117.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 68.87 | 29.50 | 26.77 | 26.77 | 54.51 | 1.00 | 117.38 | Vu < PhiVc/2 | lot Reqd 9.6. | 117.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 69.35 | 29.50 | 24.16 | 24.16 | 42.29 | 1.00 | 117.38 | Vu < PhiVc/2 | lot Reqd 9.6. | 117.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 69.83 | 29.50 | 21.54 | 21.54 | 31.32 | 1.00 | 117.38 | Vu < PhiVc/2 | lot Reqd 9.6. | 117.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 70.31 | 29.50 | 18.93 | 18.93 | 21.61 | 1.00 | 117.38 | Vu < PhiVc/2 | lot Reqd 9.6. | 117.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 70.79 | 29.50 | -20.31 | 20.31 | 23.39 | 1.00 | 115.90 | Vu < PhiVc/2 | lot Reqd 9.6. | 115.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 71.27 | 29.50 | -24.37 | 24.37 | 12.67 | 1.00 | 115.90 | Vu < PhiVc/2 | lot Reqd 9.6. | 115.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 71.75 | 29.50 | -28.43 | 28.43 | 0.00 | 1.00 | 115.90 | Vu < PhiVc/2 | lot Reqd 9.6. | 115.9 | 0.0 | 0.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 28.670 | -799.12 | 984.97 | 0.81 |
| Span # 2 | 2 | 31.080 | -827.67 | 984.87 | 0.84 |
| Span # 3 | 3 | 12.000 | -541.95 | 699.60 | 0.77 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 28.670 | -507.28 | 984.97 | 0.52 |
| Span # 2 | 2 | 31.080 | -525.61 | 984.87 | 0.53 |
| Span # 3 | 3 | 12.000 | -327.42 | 699.60 | 0.47 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 28.670 | -644.34 | 984.97 | 0.65 |
| Span # 2 | 2 | 31.080 | 428.70 | 585.00 | 0.73 |
| Span # 3 | 3 | 12.000 | -525.26 | 699.60 | 0.75 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LL) | | | | | |

# Concrete Beam

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DESCRIPTION: Grid 16.5 - B7/B8/B9

| Load Combination Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 1 | 1 | 28.670 | -640.02 | 984.97 | 0.65 |
| Span # 2 | 2 | 31.080 | -515.66 | 701.46 | 0.74 |
| Span # 3 | 3 | 12.000 | -541.95 | 699.60 | 0.77 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 28.670 | 557.24 | 760.77 | 0.73 |
| Span # 2 | 2 | 31.080 | -694.04 | 984.87 | 0.70 |
| Span # 3 | 3 | 12.000 | -251.54 | 699.60 | 0.36 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 28.670 | 558.98 | 760.77 | 0.73 |
| Span # 2 | 2 | 31.080 | -689.70 | 984.87 | 0.70 |
| Span # 3 | 3 | 12.000 | -268.23 | 699.60 | 0.38 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 28.670 | -799.12 | 984.97 | 0.81 |
| Span # 2 | 2 | 31.080 | -827.67 | 984.87 | 0.84 |
| Span # 3 | 3 | 12.000 | -466.07 | 699.60 | 0.67 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 28.670 | -794.81 | 984.97 | 0.81 |
| Span # 2 | 2 | 31.080 | -823.33 | 984.87 | 0.84 |
| Span # 3 | 3 | 12.000 | -482.76 | 699.60 | 0.69 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H, LL Comb Run (L*L) | 1 | 0.2691 | 12.041 | +D+L+H, LL Comb Run (L*L) | -0.0046 | 29.292 |
| +D+L+H, LL Comb Run (*L*) | 2 | 0.1446 | 15.540 | +D+L+H, LL Comb Run (*L*) | -0.0016 | 31.320 |
| +D+L+H, LL Comb Run (L*L) | 3 | 0.0000 | 12.000 | +D+L+H, LL Comb Run (*L*) | -0.0118 | 4.560 |

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and then using the "Printing &
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Title Block Line 6

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Printed: 27 JUN 2022, 5:38PM

# Concrete Beam

File: FWI2101 - Paragon Star.ec6

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Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

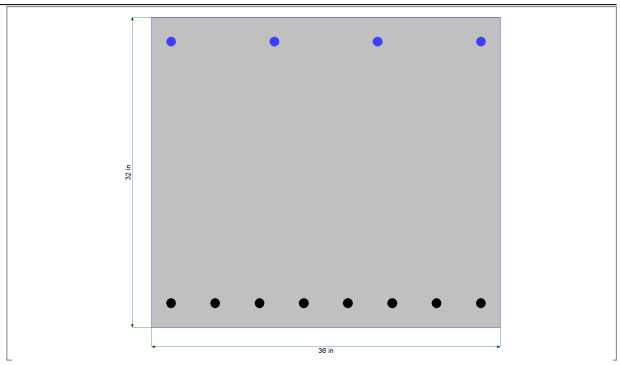
DESCRIPTION: Grid 16 - B10/B11/B8/B9

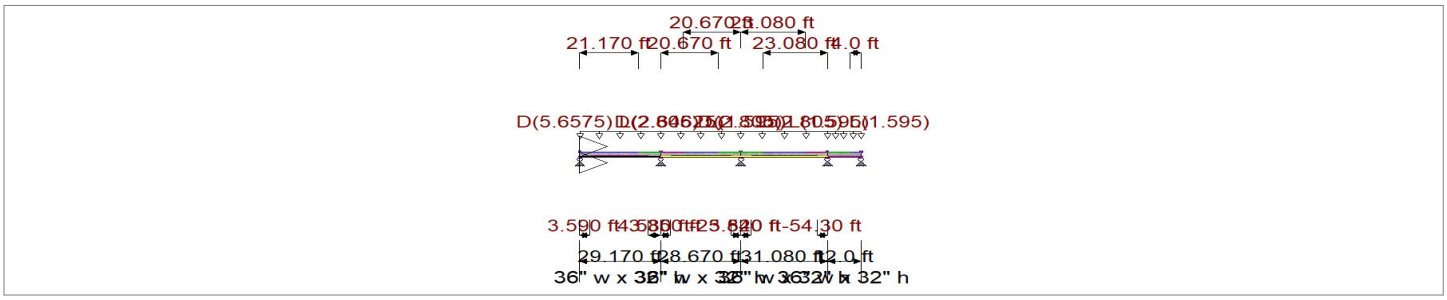
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | ϕ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| ψ Density | = | 145.0 pcf | $\beta_1$ | = | 0.80 |
| λ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 2.0 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 36.0 in, Height = 32.0 in

Span #1 Reinforcing....
- 4-#8 at 2.50 in from Top, from 0.0 to 29.170 ft in this span
- 4-#8 at 6.50 in from Bottom, from 3.590 to 24.590 ft in this span
- 8-#8 at 3.0 in from Top, from 21.170 to 29.170 ft in this span
- 8-#8 at 2.50 in from Bottom, from 0.0 to 29.170 ft in this span

Span #2 Reinforcing....
- 4-#8 at 2.50 in from Top, from 0.0 to 28.670 ft in this span
- 8-#8 at 3.0 in from Top, from 0.0 to 8.0 ft in this span
- 4-#8 at 2.50 in from Bottom, from 0.0 to 28.670 ft in this span
- 6-#8 at 3.0 in from Top, from 20.670 to 28.670 ft in this span
- 2-#8 at 6.50 in from Bottom, from 3.350 to 25.320 ft in this span

Span #3 Reinforcing....
- 4-#8 at 2.50 in from Top, from 0.0 to 31.080 ft in this span
- 3-#8 at 3.0 in from Top, from 23.080 to 31.080 ft in this span
- 4-#8 at 2.50 in from Bottom, from 0.0 to 31.080 ft in this span
- 6-#8 at 3.0 in from Top, from 0.0 to 8.0 ft in this span
- 2-#8 at 6.0 in from Bottom, from 3.540 to 27.540 ft in this span

Span #4 Reinforcing....
- 3-#8 at 2.50 in from Top, from 0.0 to 12.0 ft in this span
- 6-#8 at 2.50 in from Bottom, from 0.0 to 12.0 ft in this span
- 4-#8 at 3.0 in from Top, from 0.0 to 8.0 ft in this span

Beam self weight calculated and added to loads

Load for Span Number 1
Uniform Load : D = 0.310, L = 0.1450 ksf, Tributary Width = 18.250 ft

Load for Span Number 2
Uniform Load : D = 0.2550, L = 0.1450 ksf, Tributary Width = 11.0 ft

Load for Span Number 3
Uniform Load : D = 0.2550, L = 0.1450 ksf, Tributary Width = 11.0 ft

Load for Span Number 4
Uniform Load : D = 0.2550, L = 0.1450 ksf, Tributary Width = 11.0 ft

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# Concrete Beam

File: FWI2101 - Paragon Star.ec6

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Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: Grid 16 - B10/B11/B8/B9

## DESIGN SUMMARY

**Design OK**

| | | | | | |
|---|---|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.835** : 1 | Maximum Deflection | | | |
| Section used for this span | **Typical Section** | Max Downward Transient Deflection | 0.077 in | Ratio = | 4557 >=600. |
| Mu : Applied | 942.59 k-ft | Max Upward Transient Deflection | -0.038 in | Ratio = | 9151 >=600. |
| Mn * Phi : Allowable | 1,128.60 k-ft | Max Downward Total Deflection | 0.574 in | Ratio = | 610 >=480. |
| Location of maximum on span | 12.282 ft | Max Upward Total Deflection | -0.103 in | Ratio = | 3349 >=480. |
| Span # where maximum occurs | Span # 1 | | | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 | Support 5 |
|---|---|---|---|---|---|
| Overall MAXimum | 113.034 | 261.922 | 159.450 | 154.812 | 11.739 |
| Overall MINimum | -0.021 | 0.128 | -0.472 | -2.188 | 0.409 |
| +D+L+H, LL Comb Run (***L) | 80.399 | 186.562 | 105.366 | 120.926 | 9.242 |
| +D+L+H, LL Comb Run (**L*) | 80.664 | 182.537 | 134.714 | 141.609 | -6.596 |
| +D+L+H, LL Comb Run (**LL) | 80.659 | 182.635 | 134.478 | 151.479 | 2.817 |
| +D+L+H, LL Comb Run (*L**) | 79.902 | 207.457 | 134.685 | 104.139 | 2.901 |
| +D+L+H, LL Comb Run (*L*L) | 79.902 | 207.534 | 134.256 | 114.793 | 11.739 |
| +D+L+H, LL Comb Run (*LL*) | 79.824 | 205.884 | 159.450 | 139.069 | -5.570 |
| +D+L+H, LL Comb Run (*LLL) | 79.828 | 205.915 | 159.288 | 148.995 | 3.770 |
| +D+L+H, LL Comb Run (L***) | 112.648 | 240.003 | 94.576 | 114.709 | -1.389 |
| +D+L+H, LL Comb Run (L**L) | 112.645 | 240.082 | 94.178 | 125.261 | 7.521 |
| +D+L+H, LL Comb Run (L*L*) | 113.034 | 235.118 | 125.116 | 144.795 | -7.945 |
| +D+L+H, LL Comb Run (L*LL) | 113.022 | 235.275 | 124.760 | 154.812 | 1.390 |
| +D+L+H, LL Comb Run (LL**) | 111.741 | 261.830 | 122.972 | 108.680 | 1.052 |
| +D+L+H, LL Comb Run (LL*L) | 111.736 | 261.922 | 122.526 | 119.347 | 9.885 |
| +D+L+H, LL Comb Run (LLL*) | 111.938 | 258.643 | 150.462 | 141.155 | -6.351 |
| +D+L+H, LL Comb Run (LLLL) | 111.937 | 258.704 | 150.271 | 151.061 | 3.015 |
| D Only | 80.403 | 186.474 | 105.810 | 110.259 | 0.409 |
| L Only, LL Comb Run (***L) | -0.021 | 0.128 | -0.472 | 10.675 | 8.830 |
| L Only, LL Comb Run (**L*) | 0.643 | -3.935 | 26.919 | 35.250 | -9.305 |
| L Only, LL Comb Run (**LL) | 0.622 | -3.807 | 26.447 | 45.926 | -0.475 |
| L Only, LL Comb Run (*L**) | -2.191 | 24.849 | 26.130 | -5.158 | 2.100 |
| L Only, LL Comb Run (*L*L) | -2.212 | 24.976 | 25.658 | 5.517 | 10.930 |
| L Only, LL Comb Run (*LL*) | -1.549 | 20.914 | 53.049 | 30.092 | -7.205 |
| L Only, LL Comb Run (*LLL) | -1.570 | 21.042 | 52.577 | 40.767 | 1.625 |
| L Only, LL Comb Run (L***) | 33.388 | 50.505 | -8.462 | 2.970 | -1.209 |
| L Only, LL Comb Run (L**L) | 33.367 | 50.633 | -8.934 | 13.645 | 7.621 |
| L Only, LL Comb Run (L*L*) | 34.030 | 46.570 | 18.457 | 38.220 | -10.514 |
| L Only, LL Comb Run (L*LL) | 34.009 | 46.698 | 17.985 | 48.895 | -1.684 |
| L Only, LL Comb Run (LL**) | 31.196 | 75.354 | 17.667 | -2.188 | 0.891 |
| L Only, LL Comb Run (LL*L) | 31.176 | 75.481 | 17.195 | 8.487 | 9.721 |
| L Only, LL Comb Run (LLL*) | 31.839 | 71.419 | 44.586 | 33.062 | -8.414 |
| L Only, LL Comb Run (LLLL) | 31.818 | 71.547 | 44.115 | 43.737 | 0.416 |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.00 | 29.50 | 152.99 | 152.99 | 0.00 | 1.00 | 118.86 | PhiVc < Vu | 34.126 | 159.7 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.84 | 29.50 | 130.11 | 130.11 | 260.78 | 1.00 | 118.86 | PhiVc < Vu | 11.254 | 159.7 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.68 | 29.50 | 107.24 | 107.24 | 479.42 | 0.55 | 113.53 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 157.8 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.53 | 29.50 | 84.37 | 84.37 | 655.92 | 0.32 | 110.76 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 155.0 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 7.37 | 29.50 | 61.50 | 61.50 | 790.29 | 0.19 | 109.28 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 153.5 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 9.21 | 29.50 | 38.62 | 38.62 | 882.52 | 0.11 | 108.28 | Vu < PhiVc/2 | lot Reqd 9.6. | 108.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 11.05 | 29.50 | 15.75 | 15.75 | 932.61 | 0.04 | 107.50 | Vu < PhiVc/2 | lot Reqd 9.6. | 107.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 12.90 | 29.50 | -11.69 | 11.69 | 881.65 | 0.03 | 107.40 | Vu < PhiVc/2 | lot Reqd 9.6. | 107.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 14.74 | 29.50 | -34.56 | 34.56 | 839.05 | 0.10 | 108.21 | Vu < PhiVc/2 | lot Reqd 9.6. | 108.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 16.58 | 29.50 | -57.43 | 57.43 | 754.31 | 0.19 | 109.23 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 153.5 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 18.42 | 29.50 | -80.31 | 80.31 | 627.43 | 0.31 | 110.74 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 155.0 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 20.27 | 29.50 | -103.18 | 103.18 | 458.41 | 0.55 | 113.57 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 157.8 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 22.11 | 29.50 | -126.05 | 126.05 | 247.26 | 1.00 | 118.86 | PhiVc < Vu | 7.190 | 225.1 | 13.3 | 5.0 |

# Concrete Beam

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DESCRIPTION: Grid 16 - B10/B11/B8/B9

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 23.95 | 29.50 | -148.92 | 148.92 | 6.03 | 1.00 | 112.94 | PhiVc < Vu | 35.987 | 219.1 | 13.3 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 25.79 | 29.50 | -171.79 | 171.79 | 301.46 | 1.00 | 112.94 | PhiVc < Vu | 58.860 | 219.1 | 9.0 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 27.63 | 29.50 | -194.67 | 194.67 | 639.03 | 0.75 | 111.45 | PhiVc < Vu | 83.220 | 217.6 | 6.4 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 29.47 | 29.50 | 123.74 | 123.74 | 914.85 | 0.33 | 112.92 | PhiVc < Vu | 10.824 | 219.1 | 13.3 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 31.28 | 29.50 | 110.51 | 110.51 | 702.77 | 0.39 | 113.88 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 158.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 33.09 | 29.50 | 97.27 | 97.27 | 514.65 | 0.46 | 115.27 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 159.5 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 34.90 | 29.50 | 84.04 | 84.04 | 350.50 | 0.59 | 117.49 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 161.7 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 36.71 | 29.50 | 70.80 | 70.80 | 210.32 | 0.83 | 121.72 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 166.0 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 38.53 | 29.50 | 57.56 | 57.56 | 94.10 | 1.00 | 124.79 | Vu < PhiVc/2 | lot Reqd 9.6. | 124.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 40.34 | 29.50 | 44.33 | 44.33 | 1.86 | 1.00 | 124.79 | Vu < PhiVc/2 | lot Reqd 9.6. | 124.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 42.15 | 29.50 | 31.09 | 31.09 | 66.42 | 1.00 | 115.90 | Vu < PhiVc/2 | lot Reqd 9.6. | 115.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 43.96 | 29.50 | 19.34 | 19.34 | 44.05 | 1.00 | 124.79 | Vu < PhiVc/2 | lot Reqd 9.6. | 124.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 45.77 | 29.50 | -11.54 | 11.54 | 136.86 | 0.21 | 108.85 | Vu < PhiVc/2 | lot Reqd 9.6. | 108.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 47.58 | 29.50 | -24.78 | 24.78 | 103.97 | 0.59 | 112.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 112.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 49.39 | 29.50 | -38.02 | 38.02 | 47.12 | 1.00 | 115.90 | Vu < PhiVc/2 | lot Reqd 9.6. | 115.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 51.20 | 29.50 | -51.25 | 51.25 | 33.70 | 1.00 | 124.79 | Vu < PhiVc/2 | lot Reqd 9.6. | 124.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 53.01 | 29.50 | -64.49 | 64.49 | 138.50 | 1.00 | 124.79 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 169.0 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 54.82 | 29.50 | -77.73 | 77.73 | 267.25 | 0.71 | 119.72 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 164.0 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 56.63 | 29.50 | -90.96 | 90.96 | 419.98 | 0.53 | 116.47 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 160.7 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 58.49 | 29.50 | 110.99 | 110.99 | 460.93 | 0.59 | 115.78 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 160.0 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 60.46 | 29.50 | 96.64 | 96.64 | 257.15 | 0.92 | 120.69 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 164.9 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 62.42 | 29.50 | 82.29 | 82.29 | 81.54 | 1.00 | 121.82 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 166.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 64.38 | 29.50 | 67.94 | 67.94 | 65.90 | 1.00 | 115.90 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 160.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 66.35 | 29.50 | 53.59 | 53.59 | 185.18 | 0.71 | 113.33 | Vu < PhiVc/2 | lot Reqd 9.6. | 113.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 68.31 | 29.50 | 39.24 | 39.24 | 276.29 | 0.35 | 110.11 | Vu < PhiVc/2 | lot Reqd 9.6. | 110.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 70.27 | 29.50 | 24.89 | 24.89 | 339.23 | 0.18 | 108.61 | Vu < PhiVc/2 | lot Reqd 9.6. | 108.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 72.23 | 29.50 | 10.54 | 10.54 | 374.01 | 0.07 | 107.63 | Vu < PhiVc/2 | lot Reqd 9.6. | 107.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 74.20 | 29.50 | -12.10 | 12.10 | 424.99 | 0.07 | 107.63 | Vu < PhiVc/2 | lot Reqd 9.6. | 107.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 76.16 | 29.50 | -26.45 | 26.45 | 387.15 | 0.17 | 108.50 | Vu < PhiVc/2 | lot Reqd 9.6. | 108.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 78.12 | 29.50 | -40.80 | 40.80 | 321.14 | 0.31 | 109.79 | Vu < PhiVc/2 | lot Reqd 9.6. | 109.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 80.09 | 29.50 | -55.15 | 55.15 | 226.97 | 0.60 | 112.32 | Vu < PhiVc/2 | lot Reqd 9.6. | 112.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 82.05 | 29.50 | -69.50 | 69.50 | 104.64 | 1.00 | 115.90 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 160.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 84.01 | 29.50 | -83.85 | 83.85 | 45.87 | 1.00 | 121.82 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 166.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 85.98 | 29.50 | -98.20 | 98.20 | 224.54 | 1.00 | 121.82 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 166.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 87.94 | 29.50 | -112.55 | 112.55 | 431.38 | 0.64 | 116.51 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 160.8 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 89.30 | 29.50 | 86.54 | 86.54 | 512.04 | 0.42 | 111.32 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 155.6 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 90.06 | 29.50 | 81.00 | 81.00 | 448.55 | 0.44 | 111.61 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 155.9 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 90.81 | 29.50 | 75.46 | 75.46 | 389.27 | 0.48 | 111.95 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 156.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 91.57 | 29.50 | 69.92 | 69.92 | 334.18 | 0.51 | 112.34 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 156.6 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 92.33 | 29.50 | 64.38 | 64.38 | 283.29 | 0.56 | 112.80 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 157.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 93.09 | 29.50 | 58.84 | 58.84 | 236.60 | 0.61 | 113.35 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 157.6 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 93.85 | 29.50 | 53.30 | 53.30 | 194.11 | 0.67 | 114.01 | Vu < PhiVc/2 | lot Reqd 9.6. | 114.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 94.60 | 29.50 | 47.75 | 47.75 | 155.82 | 0.75 | 114.82 | Vu < PhiVc/2 | lot Reqd 9.6. | 114.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 95.36 | 29.50 | 42.21 | 42.21 | 121.72 | 0.85 | 115.85 | Vu < PhiVc/2 | lot Reqd 9.6. | 115.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 96.12 | 29.50 | 38.55 | 38.55 | 130.24 | 0.73 | 110.24 | Vu < PhiVc/2 | lot Reqd 9.6. | 110.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 96.88 | 29.50 | 34.95 | 34.95 | 102.39 | 0.84 | 110.74 | Vu < PhiVc/2 | lot Reqd 9.6. | 110.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 97.64 | 29.50 | 31.34 | 31.34 | 77.27 | 1.00 | 111.44 | Vu < PhiVc/2 | lot Reqd 9.6. | 111.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 98.39 | 29.50 | 27.73 | 27.73 | 54.88 | 1.00 | 111.45 | Vu < PhiVc/2 | lot Reqd 9.6. | 111.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 99.15 | 29.50 | 24.13 | 24.13 | 35.23 | 1.00 | 111.45 | Vu < PhiVc/2 | lot Reqd 9.6. | 111.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 99.91 | 29.50 | 20.52 | 20.52 | 18.31 | 1.00 | 111.45 | Vu < PhiVc/2 | lot Reqd 9.6. | 111.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 100.67 | 29.50 | 16.92 | 16.92 | 4.12 | 1.00 | 111.45 | Vu < PhiVc/2 | lot Reqd 9.6. | 111.5 | 0.0 | 0.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|

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# Concrete Beam



DESCRIPTION: Grid 16 - B10/B11/B8/B9

| | | | | | |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 29.170 | 942.59 | 1,128.60 | 0.84 |
| Span # 2 | 2 | 28.670 | -952.53 | 1,171.26 | 0.81 |
| Span # 3 | 3 | 31.080 | 439.67 | 585.00 | 0.75 |
| Span # 4 | 4 | 12.000 | -545.36 | 699.60 | 0.78 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (***L) | | | | | |
| Span # 1 | 1 | 29.170 | 593.01 | 1,128.60 | 0.53 |
| Span # 2 | 2 | 28.670 | -607.20 | 1,171.26 | 0.52 |
| Span # 3 | 3 | 31.080 | -319.08 | 701.46 | 0.45 |
| Span # 4 | 4 | 12.000 | -343.49 | 699.60 | 0.49 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (**L*) | | | | | |
| Span # 1 | 1 | 29.170 | 605.82 | 1,128.60 | 0.54 |
| Span # 2 | 2 | 28.670 | -576.23 | 1,171.26 | 0.49 |
| Span # 3 | 3 | 31.080 | 417.47 | 585.00 | 0.71 |
| Span # 4 | 4 | 12.000 | -507.93 | 699.60 | 0.73 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (**LL) | | | | | |
| Span # 1 | 1 | 29.170 | 605.41 | 1,128.60 | 0.54 |
| Span # 2 | 2 | 28.670 | -577.20 | 1,171.26 | 0.49 |
| Span # 3 | 3 | 31.080 | 412.61 | 585.00 | 0.71 |
| Span # 4 | 4 | 12.000 | -522.15 | 699.60 | 0.75 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L**) | | | | | |
| Span # 1 | 1 | 29.170 | -664.78 | 1,173.01 | 0.57 |
| Span # 2 | 2 | 28.670 | -708.49 | 1,171.26 | 0.60 |
| Span # 3 | 3 | 31.080 | -414.10 | 984.87 | 0.42 |
| Span # 4 | 4 | 12.000 | -288.96 | 699.60 | 0.41 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L*L) | | | | | |
| Span # 1 | 1 | 29.170 | -665.75 | 1,173.01 | 0.57 |
| Span # 2 | 2 | 28.670 | -709.47 | 1,171.26 | 0.61 |
| Span # 3 | 3 | 31.080 | -410.17 | 984.87 | 0.42 |
| Span # 4 | 4 | 12.000 | -303.17 | 699.60 | 0.43 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LL*) | | | | | |
| Span # 1 | 1 | 29.170 | -635.11 | 1,173.01 | 0.54 |
| Span # 2 | 2 | 28.670 | -678.50 | 1,171.26 | 0.58 |
| Span # 3 | 3 | 31.080 | 381.54 | 585.00 | 0.65 |
| Span # 4 | 4 | 12.000 | -467.62 | 699.60 | 0.67 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LLL) | | | | | |
| Span # 1 | 1 | 29.170 | -636.07 | 1,173.01 | 0.54 |
| Span # 2 | 2 | 28.670 | -679.47 | 1,171.26 | 0.58 |
| Span # 3 | 3 | 31.080 | 376.31 | 585.00 | 0.64 |
| Span # 4 | 4 | 12.000 | -481.83 | 699.60 | 0.69 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L***) | | | | | |
| Span # 1 | 1 | 29.170 | 929.96 | 1,128.60 | 0.82 |
| Span # 2 | 2 | 28.670 | -849.28 | 1,171.26 | 0.73 |
| Span # 3 | 3 | 31.080 | 280.70 | 585.00 | 0.48 |
| Span # 4 | 4 | 12.000 | -352.49 | 699.60 | 0.50 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L**L) | | | | | |
| Span # 1 | 1 | 29.170 | 929.55 | 1,128.60 | 0.82 |
| Span # 2 | 2 | 28.670 | -850.26 | 1,171.26 | 0.73 |
| Span # 3 | 3 | 31.080 | -341.37 | 701.46 | 0.49 |
| Span # 4 | 4 | 12.000 | -366.70 | 699.60 | 0.52 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*L*) | | | | | |
| Span # 1 | 1 | 29.170 | 942.59 | 1,128.60 | 0.84 |
| Span # 2 | 2 | 28.670 | -819.29 | 1,171.26 | 0.70 |
| Span # 3 | 3 | 31.080 | 439.67 | 585.00 | 0.75 |
| Span # 4 | 4 | 12.000 | -531.15 | 699.60 | 0.76 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*LL) | | | | | |
| Span # 1 | 1 | 29.170 | 942.18 | 1,128.60 | 0.83 |
| Span # 2 | 2 | 28.670 | -820.26 | 1,171.26 | 0.70 |
| Span # 3 | 3 | 31.080 | 435.00 | 585.00 | 0.74 |
| Span # 4 | 4 | 12.000 | -545.36 | 699.60 | 0.78 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL**) | | | | | |
| Span # 1 | 1 | 29.170 | 887.55 | 1,128.60 | 0.79 |
| Span # 2 | 2 | 28.670 | -951.55 | 1,171.26 | 0.81 |
| Span # 3 | 3 | 31.080 | 243.68 | 585.00 | 0.42 |
| Span # 4 | 4 | 12.000 | -312.17 | 699.60 | 0.45 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL*L) | | | | | |
| Span # 1 | 1 | 29.170 | 887.15 | 1,128.60 | 0.79 |
| Span # 2 | 2 | 28.670 | -952.53 | 1,171.26 | 0.81 |
| Span # 3 | 3 | 31.080 | -302.66 | 701.46 | 0.43 |

# Concrete Beam

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DESCRIPTION: Grid 16 - B10/B11/B8/B9

| Load Combination Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 4 | 4 | 12.000 | -326.39 | 699.60 | 0.47 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLL*) | | | | | |
| Span # 1 | 1 | 29.170 | 899.86 | 1,128.60 | 0.80 |
| Span # 2 | 2 | 28.670 | -921.56 | 1,171.26 | 0.79 |
| Span # 3 | 3 | 31.080 | 401.86 | 585.00 | 0.69 |
| Span # 4 | 4 | 12.000 | -490.83 | 699.60 | 0.70 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLLL) | | | | | |
| Span # 1 | 1 | 29.170 | 899.46 | 1,128.60 | 0.80 |
| Span # 2 | 2 | 28.670 | -922.54 | 1,171.26 | 0.79 |
| Span # 3 | 3 | 31.080 | 396.82 | 585.00 | 0.68 |
| Span # 4 | 4 | 12.000 | -505.04 | 699.60 | 0.72 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H, LL Comb Run (L*L*) | 1 | 0.5737 | 13.050 | +D+L+H, LL Comb Run (L*L*) | -0.0214 | 29.924 |
| +D+L+H, LL Comb Run (L*L*) | 2 | 0.0101 | 29.488 | +D+L+H, LL Comb Run (L*L*) | -0.1027 | 9.808 |
| +D+L+H, LL Comb Run (L*L*) | 3 | 0.1555 | 15.540 | +D+L+H, LL Comb Run (L*L*) | -0.0021 | 31.396 |
| +D+L+H, LL Comb Run (*L*L) | 4 | 0.0000 | 12.000 | +D+L+H, LL Comb Run (L*L*) | -0.0120 | 4.737 |

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Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

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# Concrete Beam

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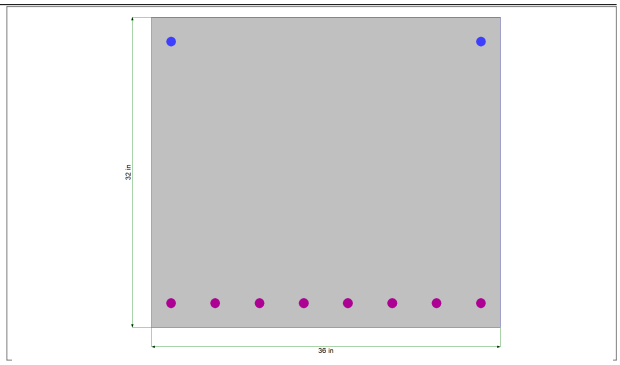
DESCRIPTION: Grid F - B12/B13

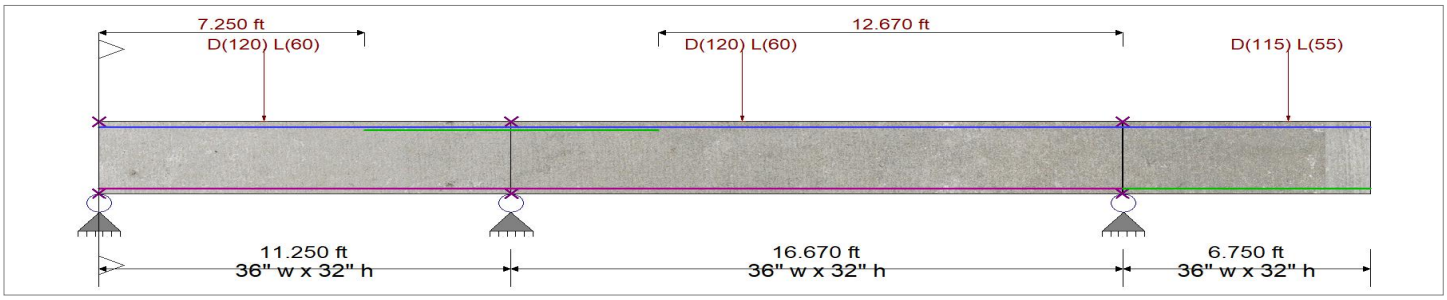
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | ϕ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| ψ Density | = | 145.0 pcf | $\beta_1$ | = | 0.80 |
| λ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup | = | 2.0 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 36.0 in, Height = 32.0 in

Span #1 Reinforcing....
- 2-#8 at 2.50 in from Top, from 0.0 to 11.250 ft in this span
- 8-#8 at 2.50 in from Bottom, from 0.0 to 11.250 ft in this span
- 14-#8 at 3.50 in from Top, from 7.250 to 11.250 ft in this span

Span #2 Reinforcing....
- 14-#8 at 2.50 in from Top, from 0.0 to 16.670 ft in this span
- 8-#8 at 2.50 in from Bottom, from 0.0 to 16.670 ft in this span
- 2-#8 at 3.50 in from Top, from 0.0 to 4.0 ft in this span

Span #3 Reinforcing....
- 14-#8 at 2.50 in from Top, from 0.0 to 6.750 ft in this span
- 6-#8 at 2.50 in from Bottom, from 0.0 to 6.750 ft in this span

Beam self weight calculated and added to loads

Load for Span Number 1
- Point Load : D = 120.0, L = 60.0 k @ 4.50 ft

Load for Span Number 2
- Point Load : D = 120.0, L = 60.0 k @ 6.270 ft, (B9 Reaction)

Load for Span Number 3
- Point Load : D = 115.0, L = 55.0 k @ 4.50 ft, (B9 Reaction)

## DESIGN SUMMARY

**Design OK**

| | | | | | | |
|---|---|---|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.762** : 1 | Maximum Deflection | | | | |
| Section used for this span | **Typical Section** | Max Downward Transient Deflection | 0.050 in | Ratio = | 3214 | >=600. |
| Mu : Applied | -1,048.71 k-ft | Max Upward Transient Deflection | -0.017 in | Ratio = | 9570 | >=600. |
| Mn * Phi : Allowable | 1,375.65 k-ft | Max Downward Total Deflection | 0.243 in | Ratio = | 664 | >=480. |
| Location of maximum on span | 0.000 ft | Max Upward Total Deflection | -0.046 in | Ratio = | 4304 | >=480. |
| Span # where maximum occurs | Span # 3 | | | | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| Overall MAXimum | 99.258 | 219.441 | 290.682 | |
| Overall MINimum | -3.546 | 4.950 | -2.741 | |

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# Concrete Beam

DESCRIPTION: Grid F - B12/B13

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| +D+L+H, LL Comb Run (**L) | 71.644 | 103.113 | 275.460 | |
| +D+L+H, LL Comb Run (*L*) | 51.269 | 189.518 | 214.430 | |
| +D+L+H, LL Comb Run (*LL) | 60.759 | 158.776 | 290.682 | |
| +D+L+H, LL Comb Run (L**) | 91.652 | 168.747 | 194.818 | |
| +D+L+H, LL Comb Run (L*L) | 99.258 | 141.161 | 269.798 | |
| +D+L+H, LL Comb Run (LL*) | 83.734 | 219.441 | 212.042 | |
| +D+L+H, LL Comb Run (LLL) | 90.443 | 193.359 | 286.416 | |
| D Only | 62.643 | 133.035 | 199.539 | |
| L Only, LL Comb Run (**L) | 6.568 | -25.847 | 74.279 | |
| L Only, LL Comb Run (*L*) | -10.114 | 54.371 | 15.742 | |
| L Only, LL Comb Run (*LL) | -3.546 | 28.524 | 90.021 | |
| L Only, LL Comb Run (L**) | 31.943 | 30.797 | -2.741 | |
| L Only, LL Comb Run (L*L) | 38.511 | 4.950 | 71.539 | |
| L Only, LL Comb Run (LL*) | 21.830 | 85.169 | 13.001 | |
| L Only, LL Comb Run (LLL) | 28.397 | 59.322 | 87.281 | |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.00 | 29.50 | 135.80 | 135.80 | 0.00 | 1.00 | 118.86 | PhiVc < Vu | 16.944 | 251.6 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.45 | 29.50 | 135.18 | 135.18 | 60.97 | 1.00 | 118.86 | PhiVc < Vu | 16.318 | 251.6 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.90 | 29.50 | 134.55 | 134.55 | 121.66 | 1.00 | 118.86 | PhiVc < Vu | 15.692 | 251.6 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.35 | 29.50 | 133.93 | 133.93 | 182.07 | 1.00 | 118.86 | PhiVc < Vu | 15.065 | 251.6 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.80 | 29.50 | 133.30 | 133.30 | 242.19 | 1.00 | 118.86 | PhiVc < Vu | 14.439 | 251.6 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.25 | 29.50 | 132.67 | 132.67 | 302.04 | 1.00 | 118.86 | PhiVc < Vu | 13.812 | 251.6 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.70 | 29.50 | 132.05 | 132.05 | 361.60 | 0.90 | 117.65 | PhiVc < Vu | 14.398 | 250.4 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.15 | 29.50 | 131.42 | 131.42 | 420.88 | 0.77 | 116.11 | PhiVc < Vu | 15.313 | 248.9 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.60 | 29.50 | 130.79 | 130.79 | 479.88 | 0.67 | 114.95 | PhiVc < Vu | 15.843 | 247.7 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.05 | 29.50 | 130.17 | 130.17 | 538.59 | 0.59 | 114.05 | PhiVc < Vu | 16.116 | 246.8 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.50 | 29.50 | -137.15 | 137.15 | 476.72 | 0.71 | 115.39 | PhiVc < Vu | 21.759 | 248.1 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.95 | 29.50 | -137.78 | 137.78 | 414.86 | 0.82 | 116.68 | PhiVc < Vu | 21.092 | 249.4 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.40 | 29.50 | -138.40 | 138.40 | 352.72 | 0.96 | 118.44 | PhiVc < Vu | 19.962 | 251.2 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.85 | 29.50 | -139.03 | 139.03 | 290.30 | 1.00 | 118.86 | PhiVc < Vu | 20.169 | 251.6 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 6.30 | 29.50 | -139.66 | 139.66 | 227.60 | 1.00 | 118.86 | PhiVc < Vu | 20.795 | 251.6 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 6.75 | 29.50 | -140.28 | 140.28 | 164.61 | 1.00 | 118.86 | PhiVc < Vu | 21.422 | 251.6 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 7.20 | 29.50 | -140.91 | 140.91 | 101.34 | 1.00 | 118.86 | PhiVc < Vu | 22.048 | 251.6 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 7.65 | 29.50 | -141.53 | 141.53 | 37.79 | 1.00 | 118.86 | PhiVc < Vu | 22.675 | 251.6 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 8.10 | 29.50 | -142.16 | 142.16 | 26.04 | 1.00 | 109.97 | PhiVc < Vu | 32.188 | 242.7 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 8.55 | 29.50 | -142.79 | 142.79 | 90.15 | 1.00 | 109.97 | PhiVc < Vu | 32.815 | 242.7 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 9.00 | 29.50 | -143.41 | 143.41 | 154.55 | 1.00 | 109.97 | PhiVc < Vu | 33.441 | 242.7 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 9.45 | 29.50 | -144.04 | 144.04 | 219.23 | 1.00 | 109.97 | PhiVc < Vu | 34.068 | 242.7 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 9.90 | 29.50 | -144.67 | 144.67 | 284.18 | 1.00 | 109.97 | PhiVc < Vu | 34.694 | 242.7 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 10.35 | 29.50 | -145.29 | 145.29 | 349.43 | 1.00 | 109.97 | PhiVc < Vu | 35.320 | 242.7 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 10.80 | 29.50 | -145.92 | 145.92 | 414.95 | 0.86 | 109.57 | PhiVc < Vu | 36.348 | 242.3 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 11.25 | 29.50 | 151.02 | 151.02 | 480.75 | 0.77 | 125.31 | PhiVc < Vu | 25.705 | 258.1 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 11.92 | 29.50 | 150.09 | 150.09 | 380.36 | 0.97 | 130.00 | PhiVc < Vu | 20.089 | 262.7 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 12.58 | 29.50 | 149.16 | 149.16 | 280.59 | 1.00 | 130.71 | PhiVc < Vu | 18.451 | 263.5 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 13.25 | 29.50 | 148.23 | 148.23 | 181.44 | 1.00 | 130.71 | PhiVc < Vu | 17.522 | 263.5 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 13.92 | 29.50 | 147.30 | 147.30 | 82.91 | 1.00 | 130.71 | PhiVc < Vu | 16.594 | 263.5 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 14.58 | 29.50 | 146.38 | 146.38 | 15.00 | 1.00 | 118.86 | PhiVc < Vu | 27.516 | 251.6 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 15.25 | 29.50 | 145.45 | 145.45 | 112.30 | 1.00 | 118.86 | PhiVc < Vu | 26.588 | 251.6 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 15.92 | 29.50 | 144.52 | 144.52 | 208.97 | 1.00 | 118.86 | PhiVc < Vu | 25.660 | 251.6 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 16.58 | 29.50 | 143.59 | 143.59 | 305.03 | 1.00 | 118.86 | PhiVc < Vu | 24.731 | 251.6 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 17.25 | 29.50 | 142.66 | 142.66 | 400.46 | 0.88 | 117.39 | PhiVc < Vu | 25.275 | 250.1 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 17.92 | 29.50 | -133.50 | 133.50 | 356.15 | 0.92 | 117.93 | PhiVc < Vu | 15.568 | 250.7 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 18.58 | 29.50 | -134.43 | 134.43 | 266.83 | 1.00 | 118.86 | PhiVc < Vu | 15.565 | 251.6 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 19.25 | 29.50 | -135.35 | 135.35 | 176.88 | 1.00 | 118.86 | PhiVc < Vu | 16.493 | 251.6 | 13.3 | 4.0 |

# Concrete Beam

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DESCRIPTION: Grid F - B12/B13

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 19.92 | 29.50 | -136.28 | 136.28 | 86.32 | 1.00 | 118.86 | PhiVc < Vu | 17.422 | 251.6 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 20.59 | 29.50 | -137.21 | 137.21 | 4.86 | 1.00 | 130.71 | PhiVc < Vu | 6.50 | 263.5 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 21.25 | 29.50 | -138.14 | 138.14 | 96.66 | 1.00 | 130.71 | PhiVc < Vu | 7.428 | 263.5 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 21.92 | 29.50 | -139.07 | 139.07 | 189.08 | 1.00 | 130.71 | PhiVc < Vu | 8.356 | 263.5 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 22.59 | 29.50 | -139.99 | 139.99 | 282.12 | 1.00 | 130.71 | PhiVc < Vu | 9.284 | 263.5 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 23.25 | 29.50 | -140.92 | 140.92 | 375.78 | 0.92 | 128.86 | PhiVc < Vu | 12.063 | 261.6 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 23.92 | 29.50 | -141.85 | 141.85 | 470.05 | 0.74 | 124.59 | PhiVc < Vu | 17.259 | 257.3 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 24.59 | 29.50 | -142.78 | 142.78 | 564.95 | 0.62 | 121.73 | PhiVc < Vu | 21.044 | 254.5 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 25.25 | 29.50 | -143.71 | 143.71 | 660.46 | 0.53 | 119.69 | PhiVc < Vu | 24.020 | 252.4 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 25.92 | 29.50 | -144.64 | 144.64 | 756.60 | 0.47 | 118.15 | PhiVc < Vu | 26.488 | 250.9 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 26.59 | 29.50 | -145.56 | 145.56 | 853.35 | 0.42 | 116.95 | PhiVc < Vu | 28.615 | 249.7 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 27.25 | 29.50 | -146.49 | 146.49 | 950.72 | 0.38 | 115.99 | PhiVc < Vu | 30.504 | 248.7 | 13.3 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 27.92 | 29.50 | 235.40 | 235.40 | 1,048.71 | 0.55 | 118.45 | PhiVc < Vu | 116.943 | 251.2 | 4.5 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 28.19 | 29.50 | 235.02 | 235.02 | 985.21 | 0.59 | 119.17 | PhiVc < Vu | 115.849 | 251.9 | 4.6 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 28.46 | 29.50 | 234.64 | 234.64 | 921.80 | 0.63 | 119.99 | PhiVc < Vu | 114.657 | 252.7 | 4.6 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 28.73 | 29.50 | 234.27 | 234.27 | 858.50 | 0.67 | 120.92 | PhiVc < Vu | 113.347 | 253.7 | 4.7 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 29.00 | 29.50 | 233.89 | 233.89 | 795.30 | 0.72 | 122.00 | PhiVc < Vu | 111.890 | 254.8 | 4.7 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 29.27 | 29.50 | 233.52 | 233.52 | 732.20 | 0.78 | 123.27 | PhiVc < Vu | 110.248 | 256.0 | 4.8 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 29.54 | 29.50 | 233.14 | 233.14 | 669.20 | 0.86 | 124.77 | PhiVc < Vu | 108.370 | 257.5 | 4.9 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 29.81 | 29.50 | 232.77 | 232.77 | 606.30 | 0.94 | 126.58 | PhiVc < Vu | 106.183 | 259.3 | 5.0 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 30.08 | 29.50 | 232.39 | 232.39 | 543.50 | 1.00 | 127.75 | PhiVc < Vu | 104.642 | 260.5 | 5.1 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 30.35 | 29.50 | 232.01 | 232.01 | 480.81 | 1.00 | 127.75 | PhiVc < Vu | 104.266 | 260.5 | 5.1 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 30.62 | 29.50 | 231.64 | 231.64 | 418.22 | 1.00 | 127.75 | PhiVc < Vu | 103.890 | 260.5 | 5.1 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 30.89 | 29.50 | 231.26 | 231.26 | 355.72 | 1.00 | 127.75 | PhiVc < Vu | 103.514 | 260.5 | 5.1 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 31.16 | 29.50 | 230.89 | 230.89 | 293.33 | 1.00 | 127.75 | PhiVc < Vu | 103.138 | 260.5 | 5.1 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 31.43 | 29.50 | 230.51 | 230.51 | 231.05 | 1.00 | 127.75 | PhiVc < Vu | 102.763 | 260.5 | 5.2 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 31.70 | 29.50 | 230.13 | 230.13 | 168.86 | 1.00 | 127.75 | PhiVc < Vu | 102.387 | 260.5 | 5.2 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 31.97 | 29.50 | 229.76 | 229.76 | 106.77 | 1.00 | 127.75 | PhiVc < Vu | 102.011 | 260.5 | 5.2 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 32.24 | 29.50 | 229.38 | 229.38 | 44.79 | 1.00 | 127.75 | PhiVc < Vu | 101.635 | 260.5 | 5.2 | 4.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 32.51 | 29.50 | 3.01 | 3.01 | 3.25 | 1.00 | 127.75 | Vu < PhiVc/2 | lot Reqd 9.6. | 127.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 32.78 | 29.50 | 2.63 | 2.63 | 2.49 | 1.00 | 127.75 | Vu < PhiVc/2 | lot Reqd 9.6. | 127.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 33.05 | 29.50 | 2.26 | 2.26 | 1.83 | 1.00 | 127.75 | Vu < PhiVc/2 | lot Reqd 9.6. | 127.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 33.32 | 29.50 | 1.88 | 1.88 | 1.27 | 1.00 | 127.75 | Vu < PhiVc/2 | lot Reqd 9.6. | 127.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 33.59 | 29.50 | 1.50 | 1.50 | 0.81 | 1.00 | 127.75 | Vu < PhiVc/2 | lot Reqd 9.6. | 127.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 33.86 | 29.50 | 1.13 | 1.13 | 0.46 | 1.00 | 127.75 | Vu < PhiVc/2 | lot Reqd 9.6. | 127.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 34.13 | 29.50 | 0.75 | 0.75 | 0.20 | 1.00 | 127.75 | Vu < PhiVc/2 | lot Reqd 9.6. | 127.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 34.40 | 29.50 | 0.38 | 0.38 | 0.05 | 1.00 | 127.75 | Vu < PhiVc/2 | lot Reqd 9.6. | 127.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 34.67 | 29.50 | -0.00 | 0.00 | 0.00 | 1.00 | 115.90 | Vu < PhiVc/2 | lot Reqd 9.6. | 115.9 | 0.0 | 0.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 11.250 | 596.83 | 803.60 | 0.74 |
| Span # 2 | 2 | 16.670 | -1,035.62 | 1,377.36 | 0.75 |
| Span # 3 | 3 | 6.750 | -1,048.71 | 1,375.65 | 0.76 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 11.250 | 366.91 | 803.60 | 0.46 |
| Span # 2 | 2 | 16.670 | -1,035.14 | 1,377.36 | 0.75 |
| Span # 3 | 3 | 6.750 | -1,048.71 | 1,375.65 | 0.76 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 11.250 | 246.81 | 803.60 | 0.31 |
| Span # 2 | 2 | 16.670 | 477.95 | 802.91 | 0.60 |
| Span # 3 | 3 | 6.750 | -652.71 | 1,375.65 | 0.47 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 11.250 | 294.10 | 803.60 | 0.37 |
| Span # 2 | 2 | 16.670 | -1,032.34 | 1,377.36 | 0.75 |
| Span # 3 | 3 | 6.750 | -1,048.71 | 1,375.65 | 0.76 |

# Concrete Beam

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DESCRIPTION: Grid F - B12/B13

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 11.250 | 549.54 | 803.60 | 0.68 |
| Span # 2 | 2 | 16.670 | -643.05 | 1,377.36 | 0.47 |
| Span # 3 | 3 | 6.750 | -652.71 | 1,375.65 | 0.47 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 11.250 | 596.83 | 803.60 | 0.74 |
| Span # 2 | 2 | 16.670 | -1,035.62 | 1,377.36 | 0.75 |
| Span # 3 | 3 | 6.750 | -1,048.71 | 1,375.65 | 0.76 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 11.250 | 476.72 | 803.60 | 0.59 |
| Span # 2 | 2 | 16.670 | 432.45 | 802.91 | 0.54 |
| Span # 3 | 3 | 6.750 | -652.71 | 1,375.65 | 0.47 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 11.250 | 524.01 | 803.60 | 0.65 |
| Span # 2 | 2 | 16.670 | -1,032.82 | 1,377.36 | 0.75 |
| Span # 3 | 3 | 6.750 | -1,048.71 | 1,375.65 | 0.76 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H, LL Comb Run (L*L) | 1 | 0.0298 | 4.725 | +D+L+H, LL Comb Run (L*L) | -0.0016 | 11.583 |
| +D+L+H, LL Comb Run (L*L) | 2 | 0.0034 | 16.805 | +D+L+H, LL Comb Run (L*L) | -0.0465 | 12.336 |
| +D+L+H, LL Comb Run (L*L) | 3 | 0.2434 | 6.750 | | 0.0000 | 12.336 |

Title Block Line 1
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and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 27 JUN 2022, 6:02PM

# Concrete Beam

File: FWI2101 - Paragon Star.ec6
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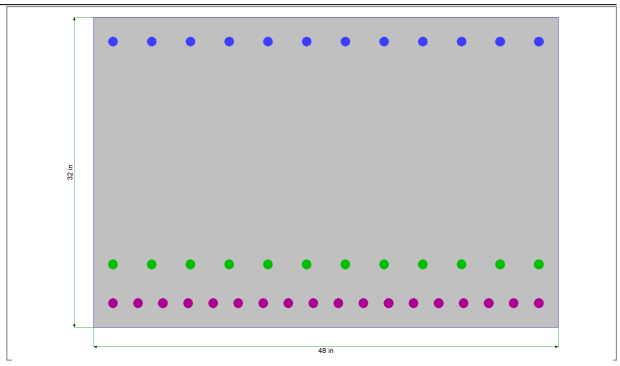
DESCRIPTION: Grid E - B14

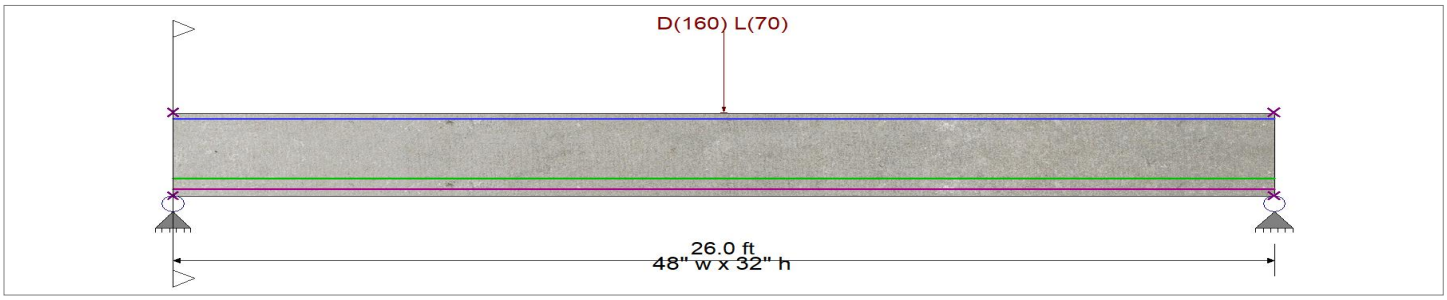
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | ϕ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| ψ Density | = | 145.0 pcf | $\beta_1$ | = | 0.80 |
| λ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 4.0 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 48.0 in, Height = 32.0 in
Span #1 Reinforcing....
12-#8 at 2.50 in from Top, from 0.0 to 26.0 ft in this span
18-#8 at 2.50 in from Bottom, from 0.0 to 26.0 ft in this span
12-#8 at 6.50 in from Bottom, from 0.0 to 26.0 ft in this span

Beam self weight calculated and added to loads
Point Load : D = 160.0, L = 70.0 k @ 13.0 ft, (B9 Reaction)

## DESIGN SUMMARY

**Design OK**

| | | | | | | |
|---|---|---|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.784** : 1 | Maximum Deflection | | | | |
| Section used for this span | **Typical Section** | Max Downward Transient Deflection | 0.091 in | Ratio = | 3417 | >=600. |
| Mu : Applied | 2,129.23 k-ft | Max Upward Transient Deflection | 0.000 in | Ratio = | 0 | <600.0 |
| Mn * Phi : Allowable | 2,716.80 k-ft | Max Downward Total Deflection | 0.525 in | Ratio = | 594 | >=480. |
| Location of maximum on span | 13.024 ft | Max Upward Total Deflection | 0.000 in | Ratio = | 0 | <480.0 |
| Span # where maximum occurs | Span # 1 | | | | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Overall MAXimum | 135.107 | 135.107 |
| Overall MINimum | 35.000 | 35.000 |
| +D+L+H | 135.107 | 135.107 |
| D Only | 100.107 | 100.107 |
| L Only | 35.000 | 35.000 |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.00 | 29.50 | 176.13 | 176.13 | 0.00 | 1.00 | 187.12 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 263.0 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.28 | 29.50 | 175.60 | 175.60 | 49.97 | 1.00 | 187.12 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 263.0 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.57 | 29.50 | 175.07 | 175.07 | 99.79 | 1.00 | 187.12 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 263.0 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.85 | 29.50 | 174.55 | 174.55 | 149.47 | 1.00 | 187.12 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 263.0 | 14.8 | 14.0 |

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# Concrete Beam

DESCRIPTION: Grid E - B14

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.14 | 29.50 | 174.02 | 174.02 | 198.99 | 1.00 | 187.12 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 263.0 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.42 | 29.50 | 173.49 | 173.49 | 248.36 | 1.00 | 187.12 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 263.0 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.70 | 29.50 | 172.96 | 172.96 | 297.59 | 1.00 | 187.12 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 263.0 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.99 | 29.50 | 172.44 | 172.44 | 346.66 | 1.00 | 187.12 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 263.0 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.27 | 29.50 | 171.91 | 171.91 | 395.58 | 1.00 | 187.12 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 263.0 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.56 | 29.50 | 171.38 | 171.38 | 444.36 | 0.95 | 184.81 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 260.7 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.84 | 29.50 | 170.85 | 170.85 | 492.98 | 0.85 | 180.54 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 256.4 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.13 | 29.50 | 170.33 | 170.33 | 541.45 | 0.77 | 177.04 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 252.9 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.41 | 29.50 | 169.80 | 169.80 | 589.78 | 0.71 | 174.13 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 250.0 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.69 | 29.50 | 169.27 | 169.27 | 637.95 | 0.65 | 171.67 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 247.5 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.98 | 29.50 | 168.74 | 168.74 | 685.98 | 0.60 | 169.55 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 245.4 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.26 | 29.50 | 168.22 | 168.22 | 733.85 | 0.56 | 167.72 | PhiVc < Vu | 0.4961 | 243.6 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.55 | 29.50 | 167.69 | 167.69 | 781.57 | 0.53 | 166.12 | PhiVc < Vu | 1.571 | 242.0 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.83 | 29.50 | 167.16 | 167.16 | 829.15 | 0.50 | 164.70 | PhiVc < Vu | 2.458 | 240.6 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.11 | 29.50 | 166.64 | 166.64 | 876.57 | 0.47 | 163.45 | PhiVc < Vu | 3.188 | 239.3 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.40 | 29.50 | 166.11 | 166.11 | 923.85 | 0.44 | 162.32 | PhiVc < Vu | 3.786 | 238.2 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.68 | 29.50 | 165.58 | 165.58 | 970.97 | 0.42 | 161.31 | PhiVc < Vu | 4.271 | 237.2 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.97 | 29.50 | 165.05 | 165.05 | 1,017.95 | 0.40 | 160.39 | PhiVc < Vu | 4.660 | 236.2 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.25 | 29.50 | 164.53 | 164.53 | 1,064.77 | 0.38 | 159.56 | PhiVc < Vu | 4.966 | 235.4 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.54 | 29.50 | 164.00 | 164.00 | 1,111.45 | 0.36 | 158.80 | PhiVc < Vu | 5.199 | 234.7 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.82 | 29.50 | 163.47 | 163.47 | 1,157.98 | 0.35 | 158.10 | PhiVc < Vu | 5.369 | 234.0 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.10 | 29.50 | 162.94 | 162.94 | 1,204.35 | 0.33 | 157.46 | PhiVc < Vu | 5.483 | 233.3 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.39 | 29.50 | 162.42 | 162.42 | 1,250.58 | 0.32 | 156.87 | PhiVc < Vu | 5.548 | 232.7 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.67 | 29.50 | 161.89 | 161.89 | 1,296.65 | 0.31 | 156.32 | PhiVc < Vu | 5.570 | 232.2 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.96 | 29.50 | 161.36 | 161.36 | 1,342.58 | 0.30 | 155.81 | PhiVc < Vu | 5.552 | 231.7 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 8.24 | 29.50 | 160.83 | 160.83 | 1,388.36 | 0.28 | 155.34 | PhiVc < Vu | 5.499 | 231.2 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 8.52 | 29.50 | 160.31 | 160.31 | 1,433.98 | 0.27 | 154.89 | PhiVc < Vu | 5.414 | 230.7 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 8.81 | 29.50 | 159.78 | 159.78 | 1,479.46 | 0.27 | 154.48 | PhiVc < Vu | 5.301 | 230.3 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.09 | 29.50 | 159.25 | 159.25 | 1,524.79 | 0.26 | 154.09 | PhiVc < Vu | 5.162 | 229.9 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.38 | 29.50 | 158.72 | 158.72 | 1,569.96 | 0.25 | 153.72 | PhiVc < Vu | 5.0 | 229.6 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.66 | 29.50 | 158.20 | 158.20 | 1,614.99 | 0.24 | 153.38 | PhiVc < Vu | 4.816 | 229.2 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.95 | 29.50 | 157.67 | 157.67 | 1,659.87 | 0.23 | 153.06 | PhiVc < Vu | 4.613 | 228.9 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.23 | 29.50 | 157.14 | 157.14 | 1,704.59 | 0.23 | 152.75 | PhiVc < Vu | 4.391 | 228.6 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.51 | 29.50 | 156.61 | 156.61 | 1,749.17 | 0.22 | 152.46 | PhiVc < Vu | 4.153 | 228.3 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.80 | 29.50 | 156.09 | 156.09 | 1,793.60 | 0.21 | 152.19 | PhiVc < Vu | 3.90 | 228.0 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.08 | 29.50 | 155.56 | 155.56 | 1,837.88 | 0.21 | 151.93 | PhiVc < Vu | 3.633 | 227.8 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.37 | 29.50 | 155.03 | 155.03 | 1,882.00 | 0.20 | 151.68 | PhiVc < Vu | 3.354 | 227.5 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.65 | 29.50 | 154.51 | 154.51 | 1,925.98 | 0.20 | 151.44 | PhiVc < Vu | 3.062 | 227.3 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.93 | 29.50 | 153.98 | 153.98 | 1,969.81 | 0.19 | 151.22 | PhiVc < Vu | 2.758 | 227.1 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.22 | 29.50 | 153.45 | 153.45 | 2,013.49 | 0.19 | 151.01 | PhiVc < Vu | 2.445 | 226.9 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.50 | 29.50 | 152.92 | 152.92 | 2,057.02 | 0.18 | 150.80 | PhiVc < Vu | 2.122 | 226.7 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.79 | 29.50 | 152.40 | 152.40 | 2,100.40 | 0.18 | 150.61 | PhiVc < Vu | 1.789 | 226.5 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.07 | 29.50 | -152.13 | 152.13 | 2,122.03 | 0.18 | 150.51 | PhiVc < Vu | 1.620 | 226.4 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.36 | 29.50 | -152.66 | 152.66 | 2,078.73 | 0.18 | 150.70 | PhiVc < Vu | 1.957 | 226.6 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.64 | 29.50 | -153.19 | 153.19 | 2,035.27 | 0.19 | 150.90 | PhiVc < Vu | 2.284 | 226.8 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.92 | 29.50 | -153.71 | 153.71 | 1,991.67 | 0.19 | 151.11 | PhiVc < Vu | 2.603 | 227.0 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.21 | 29.50 | -154.24 | 154.24 | 1,947.92 | 0.19 | 151.33 | PhiVc < Vu | 2.911 | 227.2 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.49 | 29.50 | -154.77 | 154.77 | 1,904.01 | 0.20 | 151.56 | PhiVc < Vu | 3.209 | 227.4 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.78 | 29.50 | -155.30 | 155.30 | 1,859.96 | 0.21 | 151.80 | PhiVc < Vu | 3.495 | 227.7 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 15.06 | 29.50 | -155.82 | 155.82 | 1,815.76 | 0.21 | 152.05 | PhiVc < Vu | 3.769 | 227.9 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 15.34 | 29.50 | -156.35 | 156.35 | 1,771.40 | 0.22 | 152.32 | PhiVc < Vu | 4.029 | 228.2 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 15.63 | 29.50 | -156.88 | 156.88 | 1,726.90 | 0.22 | 152.60 | PhiVc < Vu | 4.274 | 228.5 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 15.91 | 29.50 | -157.41 | 157.41 | 1,682.25 | 0.23 | 152.90 | PhiVc < Vu | 4.504 | 228.8 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 16.20 | 29.50 | -157.93 | 157.93 | 1,637.45 | 0.24 | 153.22 | PhiVc < Vu | 4.717 | 229.1 | 14.8 | 14.0 |

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# Concrete Beam

DESCRIPTION: Grid E - B14

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 1 | 16.48 | 29.50 | -158.46 | 158.46 | 1,592.50 | 0.24 | 153.55 | PhiVc < Vu | 4.910 | 229.4 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 16.77 | 29.50 | -158.99 | 158.99 | 1,547.39 | 0.25 | 153.90 | PhiVc < Vu | 5.084 | 229.8 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 17.05 | 29.50 | -159.52 | 159.52 | 1,502.14 | 0.26 | 154.28 | PhiVc < Vu | 5.235 | 230.1 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 17.33 | 29.50 | -160.04 | 160.04 | 1,456.74 | 0.27 | 154.68 | PhiVc < Vu | 5.361 | 230.5 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 17.62 | 29.50 | -160.57 | 160.57 | 1,411.19 | 0.28 | 155.11 | PhiVc < Vu | 5.460 | 231.0 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 17.90 | 29.50 | -161.10 | 161.10 | 1,365.49 | 0.29 | 155.57 | PhiVc < Vu | 5.529 | 231.4 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 18.19 | 29.50 | -161.62 | 161.62 | 1,319.64 | 0.30 | 156.06 | PhiVc < Vu | 5.565 | 231.9 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 18.47 | 29.50 | -162.15 | 162.15 | 1,273.63 | 0.31 | 156.59 | PhiVc < Vu | 5.564 | 232.4 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 18.75 | 29.50 | -162.68 | 162.68 | 1,227.48 | 0.33 | 157.16 | PhiVc < Vu | 5.522 | 233.0 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 19.04 | 29.50 | -163.21 | 163.21 | 1,181.18 | 0.34 | 157.77 | PhiVc < Vu | 5.433 | 233.6 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 19.32 | 29.50 | -163.73 | 163.73 | 1,134.73 | 0.35 | 158.44 | PhiVc < Vu | 5.291 | 234.3 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 19.61 | 29.50 | -164.26 | 164.26 | 1,088.13 | 0.37 | 159.17 | PhiVc < Vu | 5.091 | 235.0 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 19.89 | 29.50 | -164.79 | 164.79 | 1,041.38 | 0.39 | 159.97 | PhiVc < Vu | 4.823 | 235.8 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 20.17 | 29.50 | -165.32 | 165.32 | 994.48 | 0.41 | 160.84 | PhiVc < Vu | 4.477 | 236.7 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 20.46 | 29.50 | -165.84 | 165.84 | 947.43 | 0.43 | 161.80 | PhiVc < Vu | 4.042 | 237.7 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 20.74 | 29.50 | -166.37 | 166.37 | 900.23 | 0.45 | 162.87 | PhiVc < Vu | 3.502 | 238.7 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 21.03 | 29.50 | -166.90 | 166.90 | 852.88 | 0.48 | 164.06 | PhiVc < Vu | 2.841 | 239.9 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 21.31 | 29.50 | -167.43 | 167.43 | 805.38 | 0.51 | 165.39 | PhiVc < Vu | 2.036 | 241.2 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 21.60 | 29.50 | -167.95 | 167.95 | 757.73 | 0.54 | 166.89 | PhiVc < Vu | 1.060 | 242.8 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 21.88 | 29.50 | -168.48 | 168.48 | 709.93 | 0.58 | 168.61 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 244.5 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 22.16 | 29.50 | -169.01 | 169.01 | 661.98 | 0.63 | 170.57 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 246.4 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 22.45 | 29.50 | -169.54 | 169.54 | 613.88 | 0.68 | 172.85 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 248.7 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 22.73 | 29.50 | -170.06 | 170.06 | 565.63 | 0.74 | 175.52 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 251.4 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 23.02 | 29.50 | -170.59 | 170.59 | 517.24 | 0.81 | 178.71 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 254.6 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 23.30 | 29.50 | -171.12 | 171.12 | 468.69 | 0.90 | 182.56 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 258.4 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 23.58 | 29.50 | -171.65 | 171.65 | 419.99 | 1.00 | 187.12 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 263.0 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 23.87 | 29.50 | -172.17 | 172.17 | 371.14 | 1.00 | 187.12 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 263.0 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 24.15 | 29.50 | -172.70 | 172.70 | 322.14 | 1.00 | 187.12 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 263.0 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 24.44 | 29.50 | -173.23 | 173.23 | 272.99 | 1.00 | 187.12 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 263.0 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 24.72 | 29.50 | -173.75 | 173.75 | 223.70 | 1.00 | 187.12 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 263.0 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 25.01 | 29.50 | -174.28 | 174.28 | 174.25 | 1.00 | 187.12 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 263.0 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 25.29 | 29.50 | -174.81 | 174.81 | 124.65 | 1.00 | 187.12 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 263.0 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 25.57 | 29.50 | -175.34 | 175.34 | 74.90 | 1.00 | 187.12 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 263.0 | 14.8 | 14.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 25.86 | 29.50 | -175.86 | 175.86 | 25.00 | 1.00 | 187.12 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 263.0 | 14.8 | 14.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 26.000 | 2,129.23 | 2,716.80 | 0.78 |
| +1.20D+1.60L+0.50S+1.60H | | | | | |
| Span # 1 | 1 | 26.000 | 2,129.23 | 2,716.80 | 0.78 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H | 1 | 0.5251 | 13.000 | | 0.0000 | 0.000 |

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 27 JUN 2022, 6:08PM

# Concrete Beam

File: FWI2101 - Paragon Star.ec6
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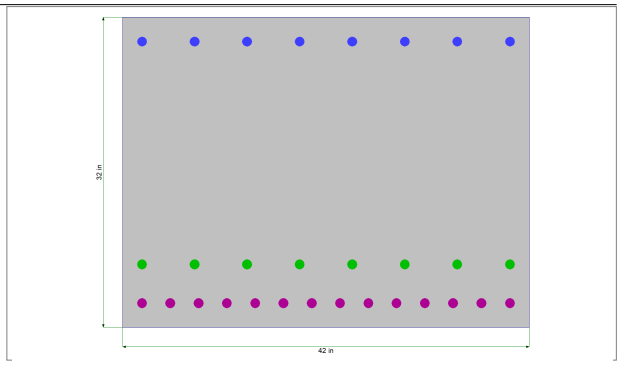
DESCRIPTION: Grid C.9 - B15

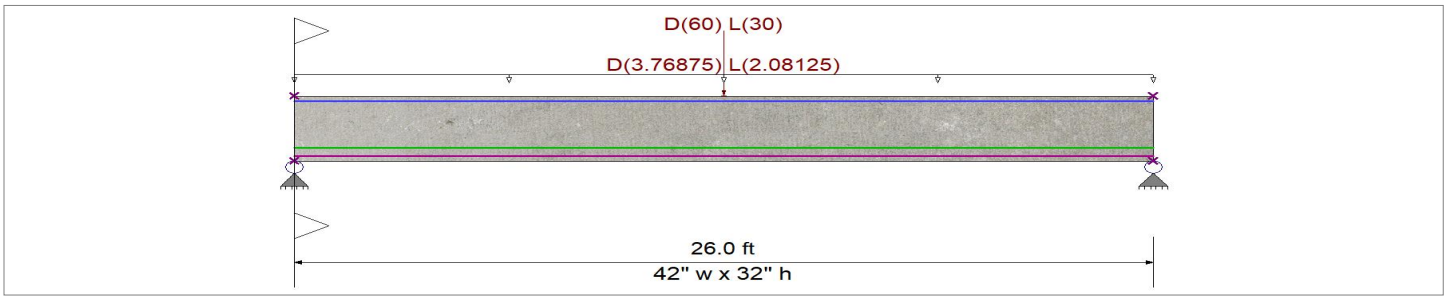
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | ϕ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| ψ Density | = | 145.0 pcf | $\beta_1$ | = | 0.80 |
| λ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 2.0 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 42.0 in, Height = 32.0 in
Span #1 Reinforcing....
8-#8 at 2.50 in from Top, from 0.0 to 26.0 ft in this span
14-#8 at 2.50 in from Bottom, from 0.0 to 26.0 ft in this span
8-#8 at 6.50 in from Bottom, from 0.0 to 26.0 ft in this span

Beam self weight calculated and added to loads
Point Load : D = 60.0, L = 30.0 k @ 13.0 ft, (B9 Reaction)
Uniform Load : D = 0.3350, L = 0.1850 ksf, Tributary Width = 11.250 ft

## DESIGN SUMMARY

**Design OK**

| | | | | | | |
|---|---|---|---|---|---|---|
| Maximum Bending Stress Ratio | = | **0.783** : 1 | Maximum Deflection | | | |
| Section used for this span | | **Typical Section** | Max Downward Transient Deflection | 0.094 in | Ratio = | 3311 >=600. |
| Mu : Applied | | 1,579.34 k-ft | Max Upward Transient Deflection | 0.000 in | Ratio = | 0 <600.0 |
| Mn * Phi : Allowable | | 2,017.85 k-ft | Max Downward Total Deflection | 0.550 in | Ratio = | 567 >=480. |
| Location of maximum on span | | 12.976 ft | Max Upward Total Deflection | 0.000 in | Ratio = | 0 <480.0 |
| Span # where maximum occurs | | Span # 1 | | | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Overall MAXimum | 138.643 | 138.643 |
| Overall MINimum | 42.056 | 42.056 |
| +D+L+H | 138.643 | 138.643 |
| D Only | 96.587 | 96.587 |
| L Only | 42.056 | 42.056 |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.00 | 29.50 | 183.19 | 183.19 | 0.00 | 1.00 | 157.43 | PhiVc < Vu | 25.762 | 205.7 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.28 | 29.50 | 180.50 | 180.50 | 51.67 | 1.00 | 157.43 | PhiVc < Vu | 23.069 | 205.7 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.57 | 29.50 | 177.81 | 177.81 | 102.58 | 1.00 | 157.43 | PhiVc < Vu | 20.376 | 205.7 | 11.4 | 11.0 |

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# Concrete Beam

DESCRIPTION: Grid C.9 - B15

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.85 | 29.50 | 175.12 | 175.12 | 152.72 | 1.00 | 157.43 | PhiVc < Vu | 17.684 | 205.7 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.14 | 29.50 | 172.42 | 172.42 | 202.10 | 1.00 | 157.43 | PhiVc < Vu | 14.991 | 205.7 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.42 | 29.50 | 169.73 | 169.73 | 250.71 | 1.00 | 157.43 | PhiVc < Vu | 12.298 | 205.7 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.70 | 29.50 | 167.04 | 167.04 | 298.56 | 1.00 | 157.43 | PhiVc < Vu | 9.605 | 205.7 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.99 | 29.50 | 164.35 | 164.35 | 345.64 | 1.00 | 157.43 | PhiVc < Vu | 6.913 | 205.7 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.27 | 29.50 | 161.65 | 161.65 | 391.96 | 1.00 | 157.43 | PhiVc < Vu | 4.220 | 205.7 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.56 | 29.50 | 158.96 | 158.96 | 437.51 | 0.89 | 153.95 | PhiVc < Vu | 5.008 | 202.2 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.84 | 29.50 | 156.27 | 156.27 | 482.29 | 0.80 | 150.80 | PhiVc < Vu | 5.465 | 199.1 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.13 | 29.50 | 153.57 | 153.57 | 526.32 | 0.72 | 148.22 | PhiVc < Vu | 5.353 | 196.5 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.41 | 29.50 | 150.88 | 150.88 | 569.57 | 0.65 | 146.07 | PhiVc < Vu | 4.815 | 194.3 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.69 | 29.50 | 148.19 | 148.19 | 612.06 | 0.60 | 144.24 | PhiVc < Vu | 3.947 | 192.5 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.98 | 29.50 | 145.50 | 145.50 | 653.79 | 0.55 | 142.67 | PhiVc < Vu | 2.823 | 190.9 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.26 | 29.50 | 142.80 | 142.80 | 694.75 | 0.51 | 141.31 | PhiVc < Vu | 1.491 | 189.6 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.55 | 29.50 | 140.11 | 140.11 | 734.94 | 0.47 | 140.12 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 193.2 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.83 | 29.50 | 137.42 | 137.42 | 774.37 | 0.44 | 139.06 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 192.2 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.11 | 29.50 | 134.72 | 134.72 | 813.04 | 0.41 | 138.12 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 191.2 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.40 | 29.50 | 132.03 | 132.03 | 850.94 | 0.38 | 137.28 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 190.4 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.68 | 29.50 | 129.34 | 129.34 | 888.07 | 0.36 | 136.51 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 189.6 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.97 | 29.50 | 126.65 | 126.65 | 924.44 | 0.34 | 135.82 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 188.9 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.25 | 29.50 | 123.95 | 123.95 | 960.05 | 0.32 | 135.19 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 188.3 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.54 | 29.50 | 121.26 | 121.26 | 994.89 | 0.30 | 134.61 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 187.7 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.82 | 29.50 | 118.57 | 118.57 | 1,028.96 | 0.28 | 134.08 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 187.2 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.10 | 29.50 | 115.88 | 115.88 | 1,062.27 | 0.27 | 133.58 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 186.7 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.39 | 29.50 | 113.18 | 113.18 | 1,094.81 | 0.25 | 133.13 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 186.2 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.67 | 29.50 | 110.49 | 110.49 | 1,126.59 | 0.24 | 132.70 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 185.8 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.96 | 29.50 | 107.80 | 107.80 | 1,157.60 | 0.23 | 132.30 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 185.4 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 8.24 | 29.50 | 105.10 | 105.10 | 1,187.85 | 0.22 | 131.93 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 185.0 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 8.52 | 29.50 | 102.41 | 102.41 | 1,217.34 | 0.21 | 131.58 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 184.7 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 8.81 | 29.50 | 99.72 | 99.72 | 1,246.05 | 0.20 | 131.26 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 184.4 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.09 | 29.50 | 97.03 | 97.03 | 1,274.01 | 0.19 | 130.95 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 184.0 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.38 | 29.50 | 94.33 | 94.33 | 1,301.19 | 0.18 | 130.65 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 183.8 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.66 | 29.50 | 91.64 | 91.64 | 1,327.62 | 0.17 | 130.37 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 183.5 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.95 | 29.50 | 88.95 | 88.95 | 1,353.27 | 0.16 | 130.11 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 183.2 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.23 | 29.50 | 86.25 | 86.25 | 1,378.17 | 0.15 | 129.86 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 183.0 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.51 | 29.50 | 83.56 | 83.56 | 1,402.29 | 0.15 | 129.62 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 182.7 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.80 | 29.50 | 80.87 | 80.87 | 1,425.65 | 0.14 | 129.39 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 182.5 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.08 | 29.50 | 78.18 | 78.18 | 1,448.25 | 0.13 | 129.17 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 182.3 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.37 | 29.50 | 75.48 | 75.48 | 1,470.08 | 0.13 | 128.96 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 182.1 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.65 | 29.50 | 72.79 | 72.79 | 1,491.15 | 0.12 | 128.76 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 181.9 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.93 | 29.50 | 70.10 | 70.10 | 1,511.45 | 0.11 | 128.56 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 181.7 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.22 | 29.50 | 67.41 | 67.41 | 1,530.99 | 0.11 | 128.37 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 181.5 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.50 | 29.50 | 64.71 | 64.71 | 1,549.76 | 0.10 | 128.19 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 181.3 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.79 | 29.50 | 62.02 | 62.02 | 1,567.76 | 0.10 | 128.01 | Vu < PhiVc/2 | lot Reqd 9.6. | 128.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.07 | 29.50 | -60.67 | 60.67 | 1,576.48 | 0.09 | 127.93 | Vu < PhiVc/2 | lot Reqd 9.6. | 127.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.36 | 29.50 | -63.37 | 63.37 | 1,558.85 | 0.10 | 128.10 | Vu < PhiVc/2 | lot Reqd 9.6. | 128.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.64 | 29.50 | -66.06 | 66.06 | 1,540.47 | 0.11 | 128.28 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 181.4 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.92 | 29.50 | -68.75 | 68.75 | 1,521.31 | 0.11 | 128.47 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 181.6 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.21 | 29.50 | -71.44 | 71.44 | 1,501.39 | 0.12 | 128.66 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 181.8 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.49 | 29.50 | -74.14 | 74.14 | 1,480.71 | 0.12 | 128.86 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 182.0 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.78 | 29.50 | -76.83 | 76.83 | 1,459.26 | 0.13 | 129.06 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 182.2 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 15.06 | 29.50 | -79.52 | 79.52 | 1,437.05 | 0.14 | 129.28 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 182.4 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 15.34 | 29.50 | -82.22 | 82.22 | 1,414.07 | 0.14 | 129.50 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 182.6 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 15.63 | 29.50 | -84.91 | 84.91 | 1,390.32 | 0.15 | 129.74 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 182.8 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 15.91 | 29.50 | -87.60 | 87.60 | 1,365.82 | 0.16 | 129.98 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 183.1 | 10.8 | 10.0 |

# Concrete Beam

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DESCRIPTION: Grid C.9 - B15

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 1 | 16.20 | 29.50 | -90.29 | 90.29 | 1,340.54 | 0.17 | 130.24 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 183.3 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 16.48 | 29.50 | -92.99 | 92.99 | 1,314.50 | 0.17 | 130.51 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 183.6 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 16.77 | 29.50 | -95.68 | 95.68 | 1,287.70 | 0.18 | 130.80 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 183.9 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 17.05 | 29.50 | -98.37 | 98.37 | 1,260.13 | 0.19 | 131.10 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 184.2 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 17.33 | 29.50 | -101.06 | 101.06 | 1,231.79 | 0.20 | 131.42 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 184.5 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 17.62 | 29.50 | -103.76 | 103.76 | 1,202.69 | 0.21 | 131.76 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 184.9 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 17.90 | 29.50 | -106.45 | 106.45 | 1,172.82 | 0.22 | 132.12 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 185.2 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 18.19 | 29.50 | -109.14 | 109.14 | 1,142.19 | 0.23 | 132.50 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 185.6 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 18.47 | 29.50 | -111.84 | 111.84 | 1,110.80 | 0.25 | 132.91 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 186.0 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 18.75 | 29.50 | -114.53 | 114.53 | 1,078.64 | 0.26 | 133.35 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 186.5 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 19.04 | 29.50 | -117.22 | 117.22 | 1,045.71 | 0.28 | 133.83 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 186.9 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 19.32 | 29.50 | -119.91 | 119.91 | 1,012.02 | 0.29 | 134.34 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 187.4 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 19.61 | 29.50 | -122.61 | 122.61 | 977.56 | 0.31 | 134.89 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 188.0 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 19.89 | 29.50 | -125.30 | 125.30 | 942.34 | 0.33 | 135.50 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 188.6 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 20.17 | 29.50 | -127.99 | 127.99 | 906.35 | 0.35 | 136.16 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 189.3 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 20.46 | 29.50 | -130.69 | 130.69 | 869.60 | 0.37 | 136.88 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 190.0 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 20.74 | 29.50 | -133.38 | 133.38 | 832.08 | 0.39 | 137.69 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 190.8 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 21.03 | 29.50 | -136.07 | 136.07 | 793.80 | 0.42 | 138.58 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 191.7 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 21.31 | 29.50 | -138.76 | 138.76 | 754.75 | 0.45 | 139.57 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 192.7 | 10.8 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 21.60 | 29.50 | -141.46 | 141.46 | 714.94 | 0.49 | 140.70 | PhiVc < Vu | 0.7609 | 189.0 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 21.88 | 29.50 | -144.15 | 144.15 | 674.36 | 0.53 | 141.97 | PhiVc < Vu | 2.180 | 190.2 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 22.16 | 29.50 | -146.84 | 146.84 | 633.02 | 0.57 | 143.43 | PhiVc < Vu | 3.414 | 191.7 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 22.45 | 29.50 | -149.53 | 149.53 | 590.91 | 0.62 | 145.12 | PhiVc < Vu | 4.417 | 193.4 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 22.73 | 29.50 | -152.23 | 152.23 | 548.04 | 0.68 | 147.10 | PhiVc < Vu | 5.130 | 195.4 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 23.02 | 29.50 | -154.92 | 154.92 | 504.40 | 0.76 | 149.45 | PhiVc < Vu | 5.470 | 197.7 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 23.30 | 29.50 | -157.61 | 157.61 | 460.00 | 0.84 | 152.29 | PhiVc < Vu | 5.319 | 200.6 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 23.58 | 29.50 | -160.31 | 160.31 | 414.83 | 0.95 | 155.80 | PhiVc < Vu | 4.503 | 204.1 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 23.87 | 29.50 | -163.00 | 163.00 | 368.89 | 1.00 | 157.43 | PhiVc < Vu | 5.566 | 205.7 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 24.15 | 29.50 | -165.69 | 165.69 | 322.20 | 1.00 | 157.43 | PhiVc < Vu | 8.259 | 205.7 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 24.44 | 29.50 | -168.38 | 168.38 | 274.73 | 1.00 | 157.43 | PhiVc < Vu | 10.952 | 205.7 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 24.72 | 29.50 | -171.08 | 171.08 | 226.50 | 1.00 | 157.43 | PhiVc < Vu | 13.645 | 205.7 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 25.01 | 29.50 | -173.77 | 173.77 | 177.51 | 1.00 | 157.43 | PhiVc < Vu | 16.337 | 205.7 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 25.29 | 29.50 | -176.46 | 176.46 | 127.75 | 1.00 | 157.43 | PhiVc < Vu | 19.030 | 205.7 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 25.57 | 29.50 | -179.16 | 179.16 | 77.22 | 1.00 | 157.43 | PhiVc < Vu | 21.723 | 205.7 | 11.4 | 11.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 25.86 | 29.50 | -181.85 | 181.85 | 25.93 | 1.00 | 157.43 | PhiVc < Vu | 24.416 | 205.7 | 11.4 | 11.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 26.000 | 1,579.34 | 2,017.85 | 0.78 |
| +1.20D+1.60L+0.50S+1.60H | | | | | |
| Span # 1 | 1 | 26.000 | 1,579.34 | 2,017.85 | 0.78 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H | 1 | 0.5498 | 13.000 | | 0.0000 | 0.000 |

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Title Block Line 6

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Engineer:
Project ID:
Project Descr:

Printed: 28 JUN 2022, 10:49AM

# Concrete Beam

File: FWI2101 - Paragon Star.ec6

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Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

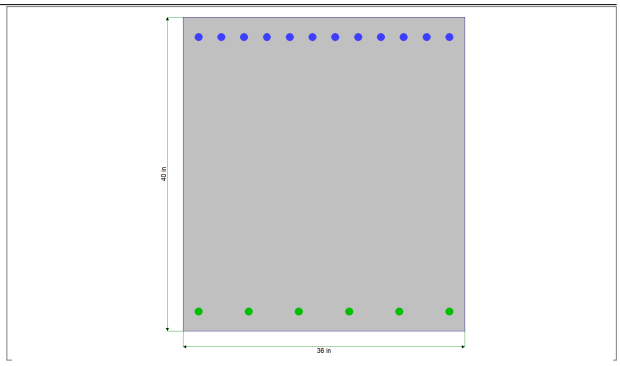
DESCRIPTION: Grid B.6 - B16 / B17 / B17R / B18 / B19

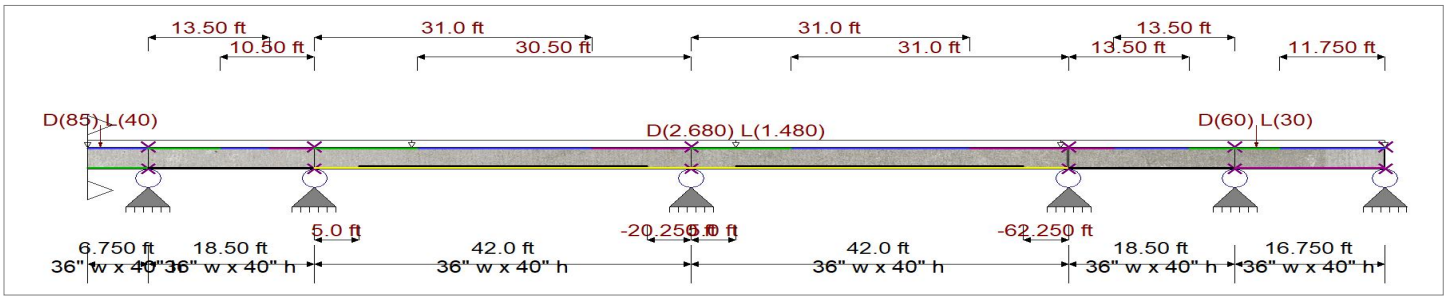
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | $\phi$ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| $\psi$ Density | = | 145.0 pcf | $\beta_1$ | = | 0.80 |
| $\lambda$ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 2.0 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 36.0 in, Height = 40.0 in

Span #1 Reinforcing....
- 12-#8 at 2.50 in from Top, from 0.0 to 6.750 ft in this span
- 6-#8 at 2.50 in from Bottom, from 0.0 to 6.750 ft in this span

Span #2 Reinforcing....
- 8-#8 at 2.50 in from Top, from 0.0 to 18.50 ft in this span
- 4-#8 at 3.0 in from Top, from 0.0 to 8.0 ft in this span
- 4-#8 at 3.0 in from Top, from 13.50 to 18.50 ft in this span
- 6-#8 at 2.50 in from Bottom, from 0.0 to 18.50 ft in this span

Span #3 Reinforcing....
- 4-#8 at 2.50 in from Top, from 0.0 to 42.0 ft in this span
- 8-#8 at 3.0 in from Top, from 0.0 to 11.50 ft in this span
- 8-#8 at 3.0 in from Top, from 31.0 to 42.0 ft in this span
- 4-#8 at 6.50 in from Bottom, from 5.0 to 37.0 ft in this span
- 4-#8 at 2.50 in from Bottom, from 0.0 to 42.0 ft in this span

Span #4 Reinforcing....
- 4-#8 at 2.50 in from Top, from 0.0 to 42.0 ft in this span
- 8-#8 at 3.0 in from Top, from 0.0 to 11.0 ft in this span
- 8-#8 at 3.0 in from Top, from 31.0 to 42.0 ft in this span
- 4-#8 at 6.0 in from Bottom, from 5.0 to 37.0 ft in this span
- 4-#8 at 2.50 in from Bottom, from 0.0 to 42.0 ft in this span

Span #5 Reinforcing....
- 4-#8 at 2.50 in from Top, from 0.0 to 18.50 ft in this span
- 4-#8 at 3.0 in from Top, from 13.50 to 18.50 ft in this span
- 8-#8 at 3.0 in from Top, from 0.0 to 5.0 ft in this span
- 6-#8 at 2.50 in from Bottom, from 0.0 to 18.50 ft in this span

Span #6 Reinforcing....
- 4-#8 at 2.50 in from Top, from 0.0 to 16.750 ft in this span
- 4-#8 at 3.0 in from Top, from 0.0 to 5.0 ft in this span
- 6-#8 at 2.50 in from Bottom, from 0.0 to 16.750 ft in this span

Beam self weight calculated and added to loads
Loads on all spans...
D = 0.3350, L = 0.1850

Uniform Load on ALL spans : D = 0.3350, L = 0.1850 ksf, Tributary Width = 8.0 ft

Load for Span Number 1
Point Load : D = 85.0, L = 40.0 k @ 1.50 ft, (B10 Reaction)

Load for Span Number 6
Point Load : D = 60.0, L = 30.0 k @ 2.330 ft, (B20 Reaction)

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You can change this area
using the "Settings" menu item
and then using the "Printing &
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Title Block Line 6

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Engineer:
Project ID:
Project Descr:

Printed: 28 JUN 2022, 10:49AM

# Concrete Beam

File: FWI2101 - Paragon Star.ec6

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Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: Grid B.6 - B16 / B17 / B17R / B18 / B19

## DESIGN SUMMARY

**Design OK**

| | | | | | | |
|---|---|---|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.843** : 1 | | Maximum Deflection | | | |
| Section used for this span | **Typical Section** | | Max Downward Transient Deflection | 0.029 in | Ratio = | 5590 >=600. |
| Mu : Applied | -1,275.0 k-ft | | Max Upward Transient Deflection | -0.012 in | Ratio = | 18437 >=600. |
| Mn * Phi : Allowable | 1,512.54 k-ft | | Max Downward Total Deflection | 0.170 in | Ratio = | 954 >=480. |
| Location of maximum on span | 0.000 ft | | Max Upward Total Deflection | -0.057 in | Ratio = | 3911 >=480. |
| Span # where maximum occurs | Span # 4 | | | | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 | Support 5 | Support 6 | Support 7 |
|---|---|---|---|---|---|---|---|
| Overall MAXimum | | 225.669 | 154.318 | 243.299 | 193.807 | 156.840 | 51.712 |
| Overall MINimum | | 70.444 | 34.652 | 68.147 | 47.731 | 49.030 | 13.856 |
| +D+L+H | | 225.669 | 154.318 | 243.299 | 193.807 | 156.840 | 51.712 |
| D Only | | 159.288 | 111.476 | 182.309 | 140.959 | 110.469 | 37.284 |
| L Only | | 70.444 | 34.652 | 68.147 | 47.731 | 49.030 | 13.856 |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.00 | 37.50 | -0.00 | 0.00 | 0.00 | 1.00 | 144.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.92 | 37.50 | -6.74 | 6.74 | 3.10 | 1.00 | 153.80 | Vu < PhiVc/2 | lot Reqd 9.6. | 153.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.84 | 37.50 | -179.48 | 179.48 | 69.00 | 1.00 | 153.80 | PhiVc < Vu | 25.678 | 221.3 | 13.3 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.76 | 37.50 | -186.22 | 186.22 | 237.31 | 1.00 | 153.80 | PhiVc < Vu | 32.420 | 221.3 | 13.3 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.68 | 37.50 | -192.97 | 192.97 | 411.82 | 1.00 | 153.80 | PhiVc < Vu | 39.161 | 221.3 | 13.3 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.60 | 37.50 | -199.71 | 199.71 | 592.54 | 1.00 | 153.80 | PhiVc < Vu | 45.902 | 221.3 | 13.3 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.52 | 37.50 | -206.45 | 206.45 | 779.47 | 0.83 | 150.74 | PhiVc < Vu | 55.707 | 218.2 | 12.1 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.44 | 37.50 | -213.19 | 213.19 | 972.59 | 0.68 | 148.21 | PhiVc < Vu | 64.984 | 215.7 | 10.4 | 10.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 8.43 | 37.50 | 78.28 | 78.28 | 896.34 | 0.27 | 140.88 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 197.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 10.95 | 37.50 | 59.80 | 59.80 | 722.16 | 0.26 | 140.63 | Vu < PhiVc/2 | lot Reqd 9.6. | 140.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 13.48 | 37.50 | 41.33 | 41.33 | 594.60 | 0.22 | 139.89 | Vu < PhiVc/2 | lot Reqd 9.6. | 139.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 16.00 | 37.50 | 22.85 | 22.85 | 513.65 | 0.14 | 138.50 | Vu < PhiVc/2 | lot Reqd 9.6. | 138.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 18.52 | 37.50 | 4.37 | 4.37 | 479.31 | 0.03 | 136.54 | Vu < PhiVc/2 | lot Reqd 9.6. | 136.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 21.05 | 37.50 | -14.10 | 14.10 | 491.58 | 0.09 | 137.62 | Vu < PhiVc/2 | lot Reqd 9.6. | 137.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 2 | 23.57 | 37.50 | -32.58 | 32.58 | 550.46 | 0.18 | 139.32 | Vu < PhiVc/2 | lot Reqd 9.6. | 139.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 27.16 | 37.50 | 124.12 | 124.12 | 365.30 | 1.00 | 153.80 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 210.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 32.89 | 37.50 | 82.18 | 82.18 | 225.46 | 1.00 | 141.95 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 198.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 38.61 | 37.50 | 40.23 | 40.23 | 575.98 | 0.22 | 137.32 | Vu < PhiVc/2 | lot Reqd 9.6. | 137.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 44.34 | 37.50 | -1.72 | 1.72 | 686.26 | 0.01 | 136.08 | Vu < PhiVc/2 | lot Reqd 9.6. | 136.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 50.07 | 37.50 | -43.66 | 43.66 | 556.30 | 0.25 | 137.48 | Vu < PhiVc/2 | lot Reqd 9.6. | 137.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 55.80 | 37.50 | -85.61 | 85.61 | 186.11 | 1.00 | 141.95 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 198.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H | 3 | 61.52 | 37.50 | -127.56 | 127.56 | 424.33 | 0.94 | 152.73 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 209.0 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 67.25 | 37.50 | 166.44 | 166.44 | 1,275.00 | 0.41 | 143.28 | PhiVc < Vu | 23.162 | 195.2 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 72.98 | 37.50 | 124.50 | 124.50 | 441.86 | 0.88 | 151.68 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 207.9 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 78.70 | 37.50 | 82.55 | 82.55 | 151.05 | 1.00 | 147.88 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 204.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 84.43 | 37.50 | 40.60 | 40.60 | 503.72 | 0.25 | 139.01 | Vu < PhiVc/2 | lot Reqd 9.6. | 139.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 90.16 | 37.50 | -1.34 | 1.34 | 616.15 | 0.01 | 136.11 | Vu < PhiVc/2 | lot Reqd 9.6. | 136.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 95.89 | 37.50 | -43.29 | 43.29 | 488.34 | 0.28 | 139.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 139.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 101.61 | 37.50 | -85.24 | 85.24 | 120.29 | 1.00 | 147.88 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 204.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H | 4 | 107.34 | 37.50 | -127.18 | 127.18 | 488.00 | 0.81 | 150.51 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 206.8 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H | 5 | 110.93 | 37.50 | 84.97 | 84.97 | 590.88 | 0.45 | 138.69 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 194.9 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H | 5 | 113.45 | 37.50 | 66.49 | 66.49 | 399.83 | 0.52 | 139.11 | Vu < PhiVc/2 | lot Reqd 9.6. | 139.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 5 | 115.98 | 37.50 | 48.02 | 48.02 | 255.39 | 0.59 | 139.51 | Vu < PhiVc/2 | lot Reqd 9.6. | 139.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 5 | 118.50 | 37.50 | 29.54 | 29.54 | 157.57 | 0.59 | 139.50 | Vu < PhiVc/2 | lot Reqd 9.6. | 139.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 5 | 121.02 | 37.50 | 11.06 | 11.06 | 106.35 | 0.33 | 137.96 | Vu < PhiVc/2 | lot Reqd 9.6. | 138.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 5 | 123.55 | 37.50 | -7.41 | 7.41 | 101.74 | 0.23 | 137.38 | Vu < PhiVc/2 | lot Reqd 9.6. | 137.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 5 | 126.07 | 37.50 | -25.89 | 25.89 | 143.75 | 0.56 | 139.36 | Vu < PhiVc/2 | lot Reqd 9.6. | 139.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 6 | 128.51 | 37.50 | 170.87 | 170.87 | 65.43 | 1.00 | 141.95 | PhiVc < Vu | 28.915 | 193.9 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H | 6 | 130.80 | 37.50 | 34.14 | 34.14 | 219.89 | 0.49 | 140.34 | Vu < PhiVc/2 | lot Reqd 9.6. | 140.3 | 0.0 | 0.0 |

# Concrete Beam

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DESCRIPTION: Grid B.6 - B16 / B17 / B17R / B18 / B19

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 6 | 133.08 | 37.50 | 17.41 | 17.41 | 278.77 | 0.20 | 137.76 | Vu < PhiVc/2 | lot Reqd 9.6. | 137.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 6 | 135.36 | 37.50 | 0.68 | 0.68 | 299.44 | 0.01 | 136.09 | Vu < PhiVc/2 | lot Reqd 9.6. | 136.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 6 | 137.65 | 37.50 | -16.05 | 16.05 | 281.89 | 0.18 | 137.61 | Vu < PhiVc/2 | lot Reqd 9.6. | 137.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 6 | 139.93 | 37.50 | -32.77 | 32.77 | 226.14 | 0.45 | 140.05 | Vu < PhiVc/2 | lot Reqd 9.6. | 140.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 6 | 142.22 | 37.50 | -49.50 | 49.50 | 132.17 | 1.00 | 144.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 6 | 144.50 | 37.50 | -66.23 | 66.23 | 0.00 | 1.00 | 144.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.9 | 0.0 | 0.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 6.750 | -1,005.39 | 1,527.92 | 0.66 |
| Span # 2 | 2 | 18.500 | -1,038.35 | 1,520.81 | 0.68 |
| Span # 3 | 3 | 42.000 | -1,116.54 | 1,512.54 | 0.74 |
| Span # 4 | 4 | 42.000 | -1,275.00 | 1,512.54 | 0.84 |
| Span # 5 | 5 | 18.500 | -346.51 | 529.93 | 0.65 |
| Span # 6 | 6 | 16.750 | 299.44 | 780.53 | 0.38 |
| +1.20D+1.60L+0.50S+1.60H | | | | | |
| Span # 1 | 1 | 6.750 | -1,005.39 | 1,527.92 | 0.66 |
| Span # 2 | 2 | 18.500 | -1,038.35 | 1,520.81 | 0.68 |
| Span # 3 | 3 | 42.000 | -1,116.54 | 1,512.54 | 0.74 |
| Span # 4 | 4 | 42.000 | -1,275.00 | 1,512.54 | 0.84 |
| Span # 5 | 5 | 18.500 | -346.51 | 529.93 | 0.65 |
| Span # 6 | 6 | 16.750 | 299.44 | 780.53 | 0.38 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H | 1 | 0.1697 | 0.000 | +D+L+H | -0.0133 | 7.591 |
| +D+L+H | 2 | 0.0254 | 20.409 | +D+L+H | -0.0568 | 7.568 |
| +D+L+H | 3 | 0.2197 | 21.000 | | 0.0000 | 7.568 |
| +D+L+H | 4 | 0.1683 | 21.000 | +D+L+H | -0.0048 | 42.841 |
| +D+L+H | 5 | 0.0023 | 19.261 | +D+L+H | -0.0187 | 7.568 |
| +D+L+H | 6 | 0.0154 | 8.375 | | 0.0000 | 7.568 |

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 28 JUN 2022, 10:56AM

# Concrete Beam

File: FWI2101 - Paragon Star.ec6

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Lic. # : KW-06011403

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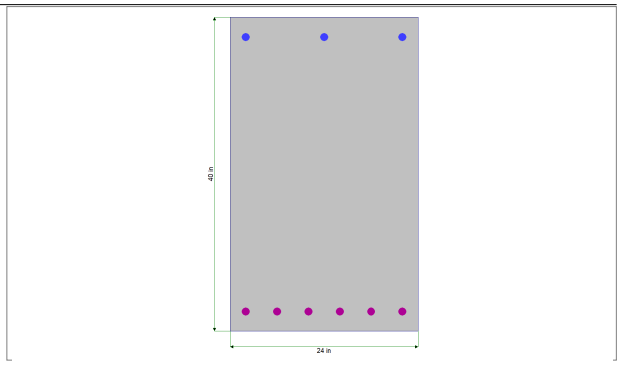
DESCRIPTION: Grid 11.1 - B20

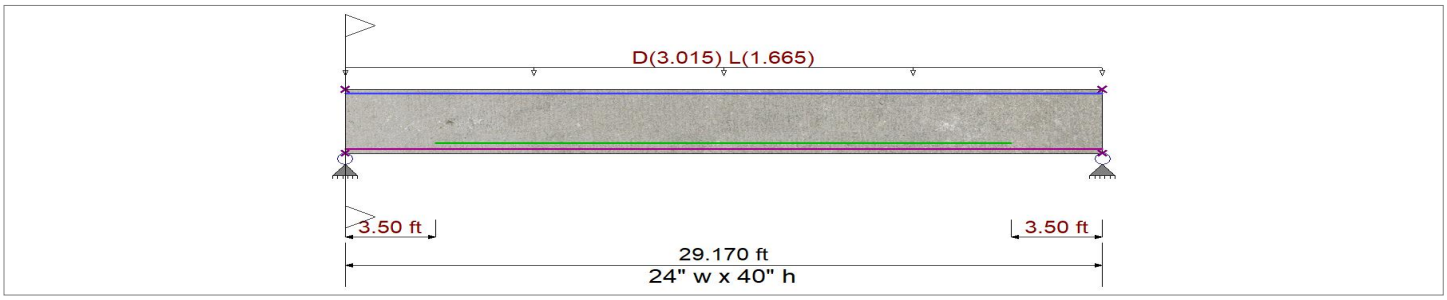
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | ϕ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| ψ Density | = | 145.0 pcf | $\beta_1$ | = | 0.80 |
| λ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 2.0 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 24.0 in, Height = 40.0 in
Span #1 Reinforcing....
4-#8 at 2.50 in from Top, from 0.0 to 29.170 ft in this span
6-#8 at 2.50 in from Bottom, from 0.0 to 29.170 ft in this span
2-#8 at 6.50 in from Bottom, from 3.50 to 25.670 ft in this span

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.3350, L = 0.1850 ksf, Tributary Width = 9.0 ft

## DESIGN SUMMARY

**Design OK**

| | | | | | | |
|---|---|---|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.799** : 1 | | Maximum Deflection | | | |
| Section used for this span | **Typical Section** | | Max Downward Transient Deflection | 0.052 in | Ratio = | 6732 >=600. |
| Mu : Applied | 791.54 k-ft | | Max Upward Transient Deflection | 0.000 in | Ratio = | 0 <600.0 |
| Mn * Phi : Allowable | 990.17 k-ft | | Max Downward Total Deflection | 0.455 in | Ratio = | 768 >=480. |
| Location of maximum on span | 14.612 ft | | Max Upward Total Deflection | 0.000 in | Ratio = | 0 <480.0 |
| Span # where maximum occurs | Span # 1 | | | | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Overall MAXimum | 82.357 | 82.357 |
| Overall MINimum | 24.284 | 24.284 |
| +D+L+H | 82.357 | 82.357 |
| D Only | 58.073 | 58.073 |
| L Only | 24.284 | 24.284 |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.00 | 37.50 | 108.54 | 108.54 | 0.00 | 1.00 | 99.57 | PhiVc < Vu | 8.968 | 137.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.32 | 37.50 | 106.17 | 106.17 | 34.22 | 1.00 | 99.57 | PhiVc < Vu | 6.595 | 137.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.64 | 37.50 | 103.80 | 103.80 | 67.69 | 1.00 | 99.57 | PhiVc < Vu | 4.223 | 137.1 | 18.8 | 18.0 |

# Concrete Beam

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DESCRIPTION: Grid 11.1 - B20

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.96 | 37.50 | 101.42 | 101.42 | 100.40 | 1.00 | 99.57 | PhiVc < Vu | 1.850 | 137.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.28 | 37.50 | 99.05 | 99.05 | 132.36 | 1.00 | 99.57 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 137.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.59 | 37.50 | 96.68 | 96.68 | 163.56 | 1.00 | 99.57 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 137.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.91 | 37.50 | 94.31 | 94.31 | 194.00 | 1.00 | 99.57 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 137.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.23 | 37.50 | 91.93 | 91.93 | 223.69 | 1.00 | 99.57 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 137.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.55 | 37.50 | 89.56 | 89.56 | 252.62 | 1.00 | 99.57 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 137.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.87 | 37.50 | 87.19 | 87.19 | 280.79 | 0.97 | 99.31 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 136.8 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.19 | 37.50 | 84.82 | 84.82 | 308.21 | 0.86 | 98.33 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 135.8 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.51 | 37.50 | 82.44 | 82.44 | 334.87 | 0.77 | 97.52 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 135.0 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.83 | 37.50 | 80.07 | 80.07 | 360.78 | 0.69 | 96.85 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 134.4 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.14 | 37.50 | 77.70 | 77.70 | 385.93 | 0.63 | 96.28 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 133.8 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.46 | 37.50 | 75.33 | 75.33 | 410.32 | 0.57 | 95.79 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 133.3 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.78 | 37.50 | 72.95 | 72.95 | 433.95 | 0.53 | 95.36 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 132.9 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.10 | 37.50 | 70.58 | 70.58 | 456.83 | 0.48 | 94.98 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 132.5 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.42 | 37.50 | 68.21 | 68.21 | 478.96 | 0.45 | 94.64 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 132.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.74 | 37.50 | 65.84 | 65.84 | 500.32 | 0.41 | 94.34 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 131.8 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.06 | 37.50 | 63.46 | 63.46 | 520.93 | 0.38 | 94.07 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 131.6 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.38 | 37.50 | 61.09 | 61.09 | 540.79 | 0.35 | 93.82 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 131.3 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.69 | 37.50 | 58.72 | 58.72 | 559.88 | 0.33 | 93.60 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 131.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.01 | 37.50 | 56.35 | 56.35 | 578.23 | 0.30 | 93.39 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 130.9 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.33 | 37.50 | 53.97 | 53.97 | 595.81 | 0.28 | 93.20 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 130.7 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.65 | 37.50 | 51.60 | 51.60 | 612.64 | 0.26 | 93.03 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 130.5 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.97 | 37.50 | 49.23 | 49.23 | 628.71 | 0.24 | 92.86 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 130.4 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 8.29 | 37.50 | 46.86 | 46.86 | 644.03 | 0.23 | 92.71 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 130.2 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 8.61 | 37.50 | 44.48 | 44.48 | 658.59 | 0.21 | 92.56 | Vu < PhiVc/2 | lot Reqd 9.6. | 92.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 8.93 | 37.50 | 42.11 | 42.11 | 672.39 | 0.20 | 92.43 | Vu < PhiVc/2 | lot Reqd 9.6. | 92.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.25 | 37.50 | 39.74 | 39.74 | 685.44 | 0.18 | 92.30 | Vu < PhiVc/2 | lot Reqd 9.6. | 92.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.56 | 37.50 | 37.37 | 37.37 | 697.73 | 0.17 | 92.17 | Vu < PhiVc/2 | lot Reqd 9.6. | 92.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.88 | 37.50 | 34.99 | 34.99 | 709.26 | 0.15 | 92.06 | Vu < PhiVc/2 | lot Reqd 9.6. | 92.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.20 | 37.50 | 32.62 | 32.62 | 720.04 | 0.14 | 91.94 | Vu < PhiVc/2 | lot Reqd 9.6. | 91.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.52 | 37.50 | 30.25 | 30.25 | 730.06 | 0.13 | 91.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 91.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.84 | 37.50 | 27.88 | 27.88 | 739.33 | 0.12 | 91.73 | Vu < PhiVc/2 | lot Reqd 9.6. | 91.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.16 | 37.50 | 25.50 | 25.50 | 747.84 | 0.11 | 91.63 | Vu < PhiVc/2 | lot Reqd 9.6. | 91.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.48 | 37.50 | 23.13 | 23.13 | 755.59 | 0.10 | 91.54 | Vu < PhiVc/2 | lot Reqd 9.6. | 91.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.80 | 37.50 | 20.76 | 20.76 | 762.59 | 0.09 | 91.44 | Vu < PhiVc/2 | lot Reqd 9.6. | 91.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.11 | 37.50 | 18.39 | 18.39 | 768.83 | 0.07 | 91.35 | Vu < PhiVc/2 | lot Reqd 9.6. | 91.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.43 | 37.50 | 16.01 | 16.01 | 774.31 | 0.06 | 91.26 | Vu < PhiVc/2 | lot Reqd 9.6. | 91.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.75 | 37.50 | 13.64 | 13.64 | 779.04 | 0.05 | 91.17 | Vu < PhiVc/2 | lot Reqd 9.6. | 91.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.07 | 37.50 | 11.27 | 11.27 | 783.01 | 0.04 | 91.09 | Vu < PhiVc/2 | lot Reqd 9.6. | 91.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.39 | 37.50 | 8.90 | 8.90 | 786.22 | 0.04 | 91.00 | Vu < PhiVc/2 | lot Reqd 9.6. | 91.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.71 | 37.50 | 6.52 | 6.52 | 788.68 | 0.03 | 90.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 90.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.03 | 37.50 | 4.15 | 4.15 | 790.38 | 0.02 | 90.83 | Vu < PhiVc/2 | lot Reqd 9.6. | 90.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.35 | 37.50 | 1.78 | 1.78 | 791.33 | 0.01 | 90.75 | Vu < PhiVc/2 | lot Reqd 9.6. | 90.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.66 | 37.50 | -0.59 | 0.59 | 791.52 | 0.00 | 90.71 | Vu < PhiVc/2 | lot Reqd 9.6. | 90.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.98 | 37.50 | -2.97 | 2.97 | 790.95 | 0.01 | 90.79 | Vu < PhiVc/2 | lot Reqd 9.6. | 90.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 15.30 | 37.50 | -5.34 | 5.34 | 789.62 | 0.02 | 90.87 | Vu < PhiVc/2 | lot Reqd 9.6. | 90.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 15.62 | 37.50 | -7.71 | 7.71 | 787.54 | 0.03 | 90.96 | Vu < PhiVc/2 | lot Reqd 9.6. | 91.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 15.94 | 37.50 | -10.08 | 10.08 | 784.71 | 0.04 | 91.04 | Vu < PhiVc/2 | lot Reqd 9.6. | 91.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 16.26 | 37.50 | -12.46 | 12.46 | 781.12 | 0.05 | 91.13 | Vu < PhiVc/2 | lot Reqd 9.6. | 91.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 16.58 | 37.50 | -14.83 | 14.83 | 776.77 | 0.06 | 91.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 91.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 16.90 | 37.50 | -17.20 | 17.20 | 771.66 | 0.07 | 91.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 91.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 17.22 | 37.50 | -19.57 | 19.57 | 765.80 | 0.08 | 91.40 | Vu < PhiVc/2 | lot Reqd 9.6. | 91.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 17.53 | 37.50 | -21.95 | 21.95 | 759.18 | 0.09 | 91.49 | Vu < PhiVc/2 | lot Reqd 9.6. | 91.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 17.85 | 37.50 | -24.32 | 24.32 | 751.81 | 0.10 | 91.58 | Vu < PhiVc/2 | lot Reqd 9.6. | 91.6 | 0.0 | 0.0 |

# Concrete Beam

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DESCRIPTION: Grid 11.1 - B20

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 1 | 18.17 | 37.50 | -26.69 | 26.69 | 743.68 | 0.11 | 91.68 | Vu < PhiVc/2 | lot Reqd 9.6. | 91.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 18.49 | 37.50 | -29.06 | 29.06 | 734.79 | 0.12 | 91.78 | Vu < PhiVc/2 | lot Reqd 9.6. | 91.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 18.81 | 37.50 | -31.44 | 31.44 | 725.15 | 0.14 | 91.89 | Vu < PhiVc/2 | lot Reqd 9.6. | 91.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 19.13 | 37.50 | -33.81 | 33.81 | 714.75 | 0.15 | 92.00 | Vu < PhiVc/2 | lot Reqd 9.6. | 92.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 19.45 | 37.50 | -36.18 | 36.18 | 703.59 | 0.16 | 92.11 | Vu < PhiVc/2 | lot Reqd 9.6. | 92.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 19.77 | 37.50 | -38.55 | 38.55 | 691.68 | 0.17 | 92.23 | Vu < PhiVc/2 | lot Reqd 9.6. | 92.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 20.08 | 37.50 | -40.93 | 40.93 | 679.01 | 0.19 | 92.36 | Vu < PhiVc/2 | lot Reqd 9.6. | 92.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 20.40 | 37.50 | -43.30 | 43.30 | 665.58 | 0.20 | 92.49 | Vu < PhiVc/2 | lot Reqd 9.6. | 92.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 20.72 | 37.50 | -45.67 | 45.67 | 651.40 | 0.22 | 92.63 | Vu < PhiVc/2 | lot Reqd 9.6. | 92.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 21.04 | 37.50 | -48.04 | 48.04 | 636.46 | 0.24 | 92.78 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 130.3 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 21.36 | 37.50 | -50.42 | 50.42 | 620.77 | 0.25 | 92.94 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 130.4 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 21.68 | 37.50 | -52.79 | 52.79 | 604.32 | 0.27 | 93.11 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 130.6 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 22.00 | 37.50 | -55.16 | 55.16 | 587.11 | 0.29 | 93.30 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 130.8 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 22.32 | 37.50 | -57.53 | 57.53 | 569.15 | 0.32 | 93.49 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 131.0 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 22.63 | 37.50 | -59.91 | 59.91 | 550.43 | 0.34 | 93.71 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 131.2 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 22.95 | 37.50 | -62.28 | 62.28 | 530.95 | 0.37 | 93.94 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 131.4 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 23.27 | 37.50 | -64.65 | 64.65 | 510.72 | 0.40 | 94.20 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 131.7 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 23.59 | 37.50 | -67.02 | 67.02 | 489.73 | 0.43 | 94.49 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 132.0 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 23.91 | 37.50 | -69.40 | 69.40 | 467.99 | 0.46 | 94.80 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 132.3 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 24.23 | 37.50 | -71.77 | 71.77 | 445.49 | 0.50 | 95.16 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 132.7 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 24.55 | 37.50 | -74.14 | 74.14 | 422.23 | 0.55 | 95.56 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 133.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 24.87 | 37.50 | -76.51 | 76.51 | 398.22 | 0.60 | 96.02 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 133.5 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 25.19 | 37.50 | -78.89 | 78.89 | 373.45 | 0.66 | 96.55 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 134.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 25.50 | 37.50 | -81.26 | 81.26 | 347.92 | 0.73 | 97.17 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 134.7 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 25.82 | 37.50 | -83.63 | 83.63 | 321.64 | 0.81 | 97.91 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 135.4 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 26.14 | 37.50 | -86.00 | 86.00 | 294.60 | 0.91 | 98.79 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 136.3 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 26.46 | 37.50 | -88.38 | 88.38 | 266.80 | 1.00 | 99.57 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 137.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 26.78 | 37.50 | -90.75 | 90.75 | 238.25 | 1.00 | 99.57 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 137.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 27.10 | 37.50 | -93.12 | 93.12 | 208.94 | 1.00 | 99.57 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 137.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 27.42 | 37.50 | -95.49 | 95.49 | 178.88 | 1.00 | 99.57 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 137.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 27.74 | 37.50 | -97.87 | 97.87 | 148.05 | 1.00 | 99.57 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 137.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 28.05 | 37.50 | -100.24 | 100.24 | 116.48 | 1.00 | 99.57 | PhiVc < Vu | 0.6639 | 137.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 28.37 | 37.50 | -102.61 | 102.61 | 84.14 | 1.00 | 99.57 | PhiVc < Vu | 3.036 | 137.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 28.69 | 37.50 | -104.98 | 104.98 | 51.05 | 1.00 | 99.57 | PhiVc < Vu | 5.409 | 137.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 29.01 | 37.50 | -107.36 | 107.36 | 17.21 | 1.00 | 99.57 | PhiVc < Vu | 7.781 | 137.1 | 18.8 | 18.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 29.170 | 791.54 | 990.17 | 0.80 |
| +1.20D+1.60L+0.50S+1.60H | | | | | |
| Span # 1 | 1 | 29.170 | 791.54 | 990.17 | 0.80 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H | 1 | 0.4555 | 14.585 | | 0.0000 | 0.000 |

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# Concrete Beam

File: FWI2101 - Paragon Star.ec6

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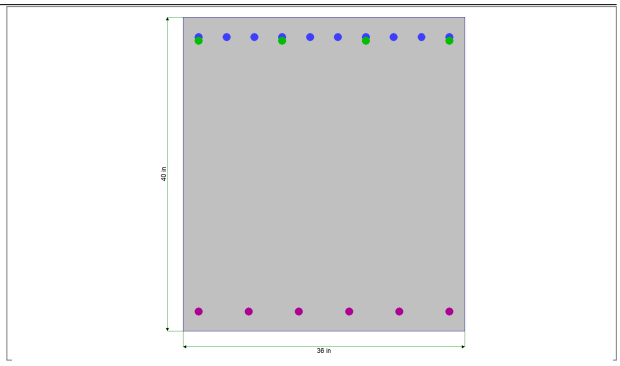
DESCRIPTION: Grid 10.9 - B21/B22/B23

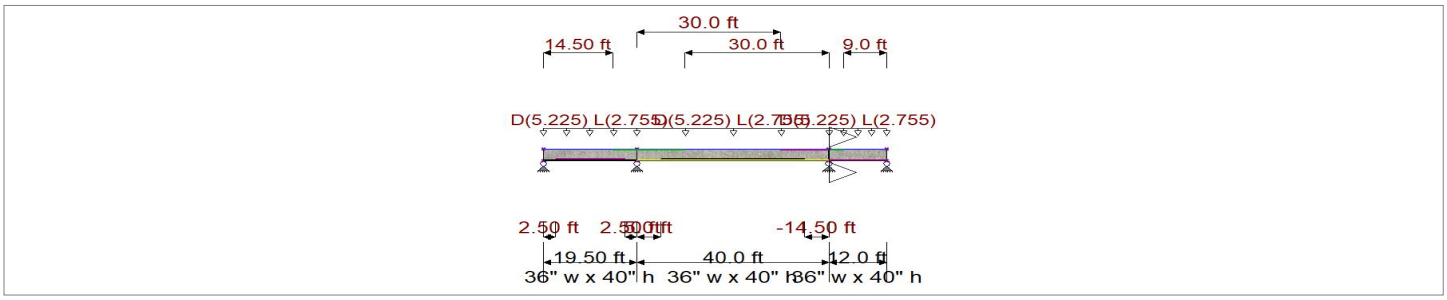
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | ϕ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| ψ Density | = | 145.0 pcf | $\beta_1$ | = | 0.80 |
| λ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 2.0 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 36.0 in, Height = 40.0 in

Span #1 Reinforcing....
- 10-#8 at 2.50 in from Top, from 0.0 to 19.50 ft in this span
- 2-#6 at 6.50 in from Bottom, from 2.50 to 17.0 ft in this span
- 4-#8 at 3.0 in from Top, from 14.50 to 19.50 ft in this span
- 4-#8 at 2.50 in from Bottom, from 0.0 to 19.50 ft in this span

Span #2 Reinforcing....
- 4-#8 at 2.50 in from Top, from 0.0 to 40.0 ft in this span
- 10-#8 at 3.0 in from Top, from 30.0 to 40.0 ft in this span
- 6-#8 at 2.50 in from Bottom, from 0.0 to 40.0 ft in this span
- 10-#8 at 3.0 in from Top, from 0.0 to 10.0 ft in this span
- 6-#8 at 6.0 in from Bottom, from 5.0 to 35.0 ft in this span

Span #3 Reinforcing....
- 10-#8 at 2.50 in from Top, from 0.0 to 12.0 ft in this span
- 6-#8 at 2.50 in from Bottom, from 0.0 to 12.0 ft in this span
- 4-#8 at 3.0 in from Top, from 0.0 to 3.0 ft in this span

Beam self weight calculated and added to loads

Load for Span Number 1
Uniform Load : D = 0.2750, L = 0.1450 ksf, Tributary Width = 19.0 ft

Load for Span Number 2
Uniform Load : D = 0.2750, L = 0.1450 ksf, Tributary Width = 19.0 ft

Load for Span Number 3
Uniform Load : D = 0.2750, L = 0.1450 ksf, Tributary Width = 19.0 ft

## DESIGN SUMMARY

**Design OK**

| | | | | | | |
|---|---|---|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.827** : 1 | | Maximum Deflection | | | |
| Section used for this span | **Typical Section** | | Max Downward Transient Deflection | 0.073 in | Ratio = | 6534 >=600 |
| Mu : Applied | -1,460.73 k-ft | | Max Upward Transient Deflection | -0.014 in | Ratio = | 16618 >=600 |
| Mn * Phi : Allowable | 1,766.70 k-ft | | Max Downward Total Deflection | 0.533 in | Ratio = | 899 >=480 |
| Location of maximum on span | 0.000 ft | | Max Upward Total Deflection | -0.036 in | Ratio = | 4053 >=480 |
| Span # where maximum occurs | Span # 3 | | | | | |

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# Concrete Beam

DESCRIPTION: Grid 10.9 - B21/B22/B23

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| Overall MAXimum | 53.364 | 337.682 | 340.325 | -52.447 |
| Overall MINimum | 0.227 | -0.666 | -3.286 | 1.580 |
| +D+L+H, LL Comb Run (**L) | 27.087 | 236.287 | 253.070 | -6.122 |
| +D+L+H, LL Comb Run (*L*) | 9.681 | 308.341 | 321.888 | -52.447 |
| +D+L+H, LL Comb Run (*LL) | 10.017 | 307.438 | 340.325 | -37.258 |
| +D+L+H, LL Comb Run (L**) | 53.153 | 264.745 | 234.362 | -21.275 |
| +D+L+H, LL Comb Run (L*L) | 53.364 | 264.260 | 251.733 | -5.312 |
| +D+L+H, LL Comb Run (LL*) | 35.107 | 337.682 | 319.691 | -51.295 |
| +D+L+H, LL Comb Run (LLL) | 35.456 | 336.765 | 338.112 | -36.088 |
| D Only | 26.863 | 236.810 | 235.611 | -22.021 |
| L Only, LL Comb Run (**L) | 0.227 | -0.666 | 18.064 | 15.435 |
| L Only, LL Comb Run (*L*) | -13.425 | 66.992 | 83.564 | -26.930 |
| L Only, LL Comb Run (*LL) | -13.199 | 66.326 | 101.628 | -11.495 |
| L Only, LL Comb Run (L**) | 24.334 | 31.095 | -3.286 | 1.580 |
| L Only, LL Comb Run (L*L) | 24.560 | 30.429 | 14.778 | 17.014 |
| L Only, LL Comb Run (LL*) | 10.908 | 98.086 | 80.278 | -25.350 |
| L Only, LL Comb Run (LLL) | 11.135 | 97.421 | 98.342 | -9.915 |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.00 | 37.50 | 71.67 | 71.67 | 0.00 | 1.00 | 141.95 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 198.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.78 | 37.50 | 61.98 | 61.98 | 52.13 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.56 | 37.50 | 52.30 | 52.30 | 96.69 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.34 | 37.50 | 42.61 | 42.61 | 133.71 | 1.00 | 141.93 | Vu < PhiVc/2 | lot Reqd 9.6. | 141.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.12 | 37.50 | 32.93 | 32.93 | 163.17 | 0.63 | 139.77 | Vu < PhiVc/2 | lot Reqd 9.6. | 139.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.90 | 37.50 | 23.24 | 23.24 | 185.07 | 0.39 | 138.35 | Vu < PhiVc/2 | lot Reqd 9.6. | 138.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.68 | 37.50 | -26.59 | 26.59 | 36.74 | 1.00 | 150.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 150.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.46 | 37.50 | -32.84 | 32.84 | 59.92 | 1.00 | 150.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 150.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 6.24 | 37.50 | -39.09 | 39.09 | 87.97 | 1.00 | 150.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 150.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 7.02 | 37.50 | -45.34 | 45.34 | 120.90 | 1.00 | 150.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 150.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 7.80 | 37.50 | -51.59 | 51.59 | 158.70 | 1.00 | 150.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 150.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 8.58 | 37.50 | -57.83 | 57.83 | 201.37 | 0.90 | 149.32 | Vu < PhiVc/2 | lot Reqd 9.6. | 149.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 9.36 | 37.50 | -66.41 | 66.41 | 77.59 | 1.00 | 150.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 150.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 10.14 | 37.50 | -76.09 | 76.09 | 133.16 | 1.00 | 150.84 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 207.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 10.92 | 37.50 | -85.78 | 85.78 | 196.29 | 1.00 | 150.84 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 207.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 11.70 | 37.50 | -95.46 | 95.46 | 266.98 | 1.00 | 150.84 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 207.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 12.48 | 37.50 | -105.15 | 105.15 | 345.22 | 0.95 | 150.13 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 206.4 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 13.26 | 37.50 | -114.84 | 114.84 | 431.01 | 0.83 | 148.36 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 204.6 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 14.04 | 37.50 | -124.52 | 124.52 | 524.36 | 0.74 | 147.02 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 203.3 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 14.82 | 37.50 | -134.21 | 134.21 | 625.27 | 0.67 | 145.97 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 202.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 15.60 | 37.50 | -143.89 | 143.89 | 733.73 | 0.61 | 145.11 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 201.4 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 16.38 | 37.50 | -153.58 | 153.58 | 849.74 | 0.56 | 144.40 | PhiVc < Vu | 9.184 | 256.9 | 13.3 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 17.16 | 37.50 | -163.27 | 163.27 | 973.31 | 0.52 | 143.79 | PhiVc < Vu | 19.472 | 256.3 | 13.3 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 17.94 | 37.50 | -172.95 | 172.95 | 1,104.44 | 0.49 | 143.28 | PhiVc < Vu | 29.674 | 255.8 | 13.3 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 18.72 | 37.50 | -182.64 | 182.64 | 1,243.12 | 0.46 | 142.83 | PhiVc < Vu | 39.808 | 255.3 | 13.3 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 19.50 | 37.50 | 247.86 | 247.86 | 1,389.35 | 0.56 | 147.59 | PhiVc < Vu | 100.269 | 260.1 | 6.7 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 21.10 | 37.50 | 227.99 | 227.99 | 1,008.67 | 0.71 | 150.68 | PhiVc < Vu | 77.313 | 263.2 | 8.7 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 22.70 | 37.50 | 208.12 | 208.12 | 659.78 | 0.99 | 156.47 | PhiVc < Vu | 51.650 | 269.0 | 13.1 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 24.30 | 37.50 | 188.25 | 188.25 | 342.68 | 1.00 | 156.77 | PhiVc < Vu | 31.486 | 269.3 | 13.3 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 25.90 | 37.50 | 168.38 | 168.38 | 57.37 | 1.00 | 156.77 | PhiVc < Vu | 11.617 | 269.3 | 13.3 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 27.50 | 37.50 | 148.52 | 148.52 | 196.15 | 1.00 | 144.92 | PhiVc < Vu | 3.598 | 257.4 | 13.3 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 29.10 | 37.50 | 128.65 | 128.65 | 417.88 | 0.96 | 144.58 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 200.8 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 30.70 | 37.50 | 108.78 | 108.78 | 607.82 | 0.56 | 141.00 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 197.3 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 32.30 | 37.50 | 88.91 | 88.91 | 765.97 | 0.36 | 139.25 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 195.5 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 33.90 | 37.50 | 69.04 | 69.04 | 892.33 | 0.24 | 138.18 | Vu < PhiVc/2 | lot Reqd 9.6. | 138.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 35.50 | 37.50 | 49.17 | 49.17 | 986.90 | 0.16 | 137.41 | Vu < PhiVc/2 | lot Reqd 9.6. | 137.4 | 0.0 | 0.0 |

# Concrete Beam

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DESCRIPTION: Grid 10.9 - B21/B22/B23

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 37.10 | 37.50 | 29.30 | 29.30 | 1,049.68 | 0.09 | 136.80 | Vu < PhiVc/2 | lot Reqd 9.6. | 136.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 38.70 | 37.50 | 9.43 | 9.43 | 1,080.67 | 0.03 | 136.27 | Vu < PhiVc/2 | lot Reqd 9.6. | 136.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 40.30 | 37.50 | -13.87 | 13.87 | 1,094.41 | 0.04 | 136.38 | Vu < PhiVc/2 | lot Reqd 9.6. | 136.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 41.90 | 37.50 | -33.74 | 33.74 | 1,056.32 | 0.10 | 136.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 136.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 43.50 | 37.50 | -53.60 | 53.60 | 986.45 | 0.17 | 137.54 | Vu < PhiVc/2 | lot Reqd 9.6. | 137.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 45.10 | 37.50 | -73.47 | 73.47 | 884.79 | 0.26 | 138.34 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 194.6 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 46.70 | 37.50 | -93.34 | 93.34 | 751.34 | 0.39 | 139.48 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 195.7 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 48.30 | 37.50 | -113.21 | 113.21 | 586.09 | 0.60 | 141.39 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 197.6 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 49.90 | 37.50 | -133.08 | 133.08 | 389.06 | 1.00 | 144.92 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 201.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 51.50 | 37.50 | -152.95 | 152.95 | 160.24 | 1.00 | 144.92 | PhiVc < Vu | 8.031 | 257.4 | 13.3 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 53.10 | 37.50 | -172.82 | 172.82 | 100.38 | 1.00 | 156.77 | PhiVc < Vu | 16.050 | 269.3 | 13.3 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 54.70 | 37.50 | -192.69 | 192.69 | 392.78 | 1.00 | 156.77 | PhiVc < Vu | 35.919 | 269.3 | 13.3 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 56.30 | 37.50 | -212.56 | 212.56 | 716.97 | 0.93 | 155.24 | PhiVc < Vu | 57.313 | 267.7 | 11.8 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 57.90 | 37.50 | -232.42 | 232.42 | 1,072.95 | 0.68 | 150.07 | PhiVc < Vu | 82.356 | 262.6 | 8.2 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 59.50 | 37.50 | 196.24 | 196.24 | 1,460.73 | 0.42 | 142.25 | PhiVc < Vu | 53.987 | 254.7 | 12.5 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 59.98 | 37.50 | 190.27 | 190.27 | 1,367.97 | 0.43 | 142.47 | PhiVc < Vu | 47.807 | 255.0 | 13.3 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 60.46 | 37.50 | 184.31 | 184.31 | 1,278.06 | 0.45 | 142.71 | PhiVc < Vu | 41.609 | 255.2 | 13.3 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 60.94 | 37.50 | 178.35 | 178.35 | 1,191.02 | 0.47 | 142.96 | PhiVc < Vu | 35.392 | 255.5 | 13.3 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 61.42 | 37.50 | 172.39 | 172.39 | 1,106.85 | 0.49 | 143.24 | PhiVc < Vu | 29.154 | 255.7 | 13.3 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 61.90 | 37.50 | 166.43 | 166.43 | 1,025.53 | 0.51 | 143.54 | PhiVc < Vu | 22.890 | 256.0 | 13.3 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 62.38 | 37.50 | 160.47 | 160.47 | 947.07 | 0.53 | 143.87 | PhiVc < Vu | 16.599 | 256.4 | 13.3 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 62.86 | 37.50 | 154.51 | 154.51 | 871.47 | 0.55 | 144.24 | PhiVc < Vu | 10.274 | 256.7 | 13.3 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 63.34 | 37.50 | 148.55 | 148.55 | 798.74 | 0.58 | 144.64 | PhiVc < Vu | 3.912 | 257.1 | 13.3 | 6.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 63.82 | 37.50 | 142.59 | 142.59 | 728.87 | 0.61 | 145.09 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 201.3 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 64.30 | 37.50 | 136.63 | 136.63 | 661.85 | 0.65 | 145.59 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 201.8 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 64.78 | 37.50 | 130.67 | 130.67 | 597.70 | 0.68 | 146.15 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 202.4 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 65.26 | 37.50 | 124.71 | 124.71 | 536.41 | 0.73 | 146.79 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 203.0 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 65.74 | 37.50 | 118.75 | 118.75 | 477.98 | 0.78 | 147.53 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 203.8 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 66.22 | 37.50 | 114.21 | 114.21 | 491.36 | 0.73 | 146.79 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 203.0 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 66.70 | 37.50 | 110.36 | 110.36 | 437.47 | 0.79 | 147.71 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 204.0 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 67.18 | 37.50 | 106.52 | 106.52 | 385.42 | 0.86 | 148.82 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 205.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 67.66 | 37.50 | 102.67 | 102.67 | 335.21 | 0.96 | 150.21 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 206.5 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 68.14 | 37.50 | 98.83 | 98.83 | 286.85 | 1.00 | 150.84 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 207.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 68.62 | 37.50 | 94.98 | 94.98 | 240.33 | 1.00 | 150.84 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 207.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 69.10 | 37.50 | 91.14 | 91.14 | 195.66 | 1.00 | 150.84 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 207.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 69.58 | 37.50 | 87.29 | 87.29 | 152.84 | 1.00 | 150.84 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 207.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 70.06 | 37.50 | 83.45 | 83.45 | 111.86 | 1.00 | 150.84 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 207.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 70.54 | 37.50 | 79.60 | 79.60 | 72.73 | 1.00 | 150.84 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 207.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 71.02 | 37.50 | 75.76 | 75.76 | 35.44 | 1.00 | 150.84 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 207.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 71.50 | 37.50 | 71.91 | 71.91 | 0.00 | 1.00 | 144.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.9 | 0.0 | 0.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 19.500 | -1,364.45 | 1,763.80 | 0.77 |
| Span # 2 | 2 | 40.000 | -1,393.89 | 1,756.04 | 0.79 |
| Span # 3 | 3 | 12.000 | -1,460.73 | 1,766.70 | 0.83 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 19.500 | -868.57 | 1,763.80 | 0.49 |
| Span # 2 | 2 | 40.000 | -900.85 | 1,756.04 | 0.51 |
| Span # 3 | 3 | 12.000 | -943.68 | 1,766.70 | 0.53 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 19.500 | -1,291.67 | 1,763.80 | 0.73 |
| Span # 2 | 2 | 40.000 | -1,373.05 | 1,756.04 | 0.78 |
| Span # 3 | 3 | 12.000 | -1,439.70 | 1,766.70 | 0.81 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LL) | | | | | |

# Concrete Beam

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DESCRIPTION: Grid 10.9 - B21/B22/B23

| Load Combination Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 1 | 1 | 19.500 | -1,284.65 | 1,763.80 | 0.73 |
| Span # 2 | 2 | 40.000 | -1,393.89 | 1,756.04 | 0.79 |
| Span # 3 | 3 | 12.000 | -1,460.73 | 1,766.70 | 0.83 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 19.500 | -948.37 | 1,763.80 | 0.54 |
| Span # 2 | 2 | 40.000 | -970.48 | 1,756.04 | 0.55 |
| Span # 3 | 3 | 12.000 | -892.32 | 1,766.70 | 0.51 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 19.500 | -941.35 | 1,763.80 | 0.53 |
| Span # 2 | 2 | 40.000 | -963.41 | 1,756.04 | 0.55 |
| Span # 3 | 3 | 12.000 | -913.35 | 1,766.70 | 0.52 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 19.500 | -1,364.45 | 1,763.80 | 0.77 |
| Span # 2 | 2 | 40.000 | -1,389.35 | 1,756.04 | 0.79 |
| Span # 3 | 3 | 12.000 | -1,409.37 | 1,766.70 | 0.80 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 19.500 | -1,357.43 | 1,763.80 | 0.77 |
| Span # 2 | 2 | 40.000 | -1,382.28 | 1,756.04 | 0.79 |
| Span # 3 | 3 | 12.000 | -1,430.40 | 1,766.70 | 0.81 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H, LL Comb Run (*L*) | 1 | 0.0202 | 20.300 | +D+L+H, LL Comb Run (*L*) | -0.0469 | 13.650 |
| +D+L+H, LL Comb Run (*L*) | 2 | 0.5334 | 20.000 | +D+L+H, LL Comb Run (*L*) | -0.0043 | 40.240 |
| | 3 | 0.0000 | 20.000 | +D+L+H, LL Comb Run (*L*) | -0.0355 | 4.080 |

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# Concrete Beam

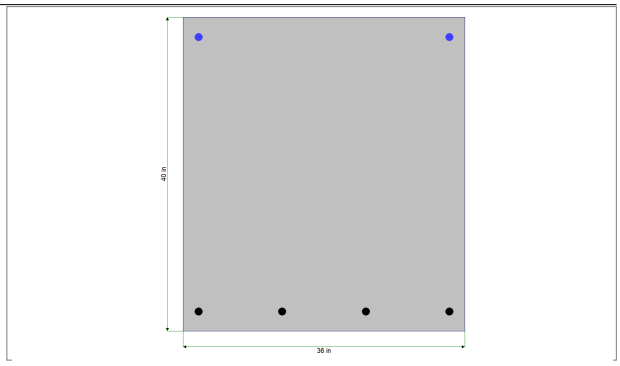
DESCRIPTION: Grid 10.5 - B24/B25/B26B/27

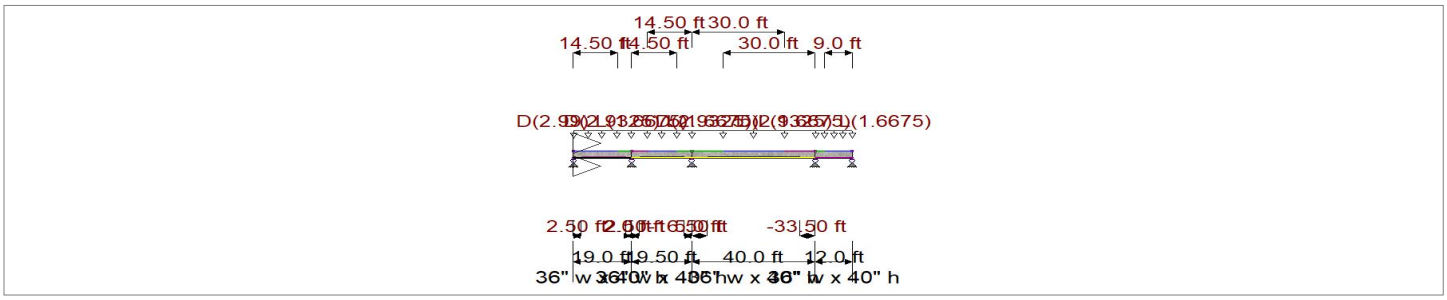
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | $\phi$ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| $\psi$ Density | = | 145.0 pcf | $\beta_1$ | = | 0.80 |
| $\lambda$ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 2.0 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 36.0 in, Height = 40.0 in

Span #1 Reinforcing....
- 2-#8 at 2.50 in from Top, from 0.0 to 19.0 ft in this span
- 2-#6 at 6.50 in from Bottom, from 2.50 to 17.0 ft in this span
- 4-#8 at 3.0 in from Top, from 14.50 to 19.0 ft in this span
- 4-#8 at 2.50 in from Bottom, from 0.0 to 19.0 ft in this span

Span #2 Reinforcing....
- 4-#8 at 2.50 in from Top, from 0.0 to 19.50 ft in this span
- 2-#8 at 3.0 in from Top, from 0.0 to 5.0 ft in this span
- 4-#8 at 2.50 in from Bottom, from 0.0 to 19.50 ft in this span
- 4-#8 at 3.0 in from Top, from 14.50 to 19.50 ft in this span
- 2-#8 at 6.50 in from Bottom, from 2.50 to 17.0 ft in this span

Span #3 Reinforcing....
- 4-#8 at 2.50 in from Top, from 0.0 to 40.0 ft in this span
- 6-#8 at 3.0 in from Top, from 30.0 to 40.0 ft in this span
- 4-#8 at 2.50 in from Bottom, from 0.0 to 40.0 ft in this span
- 4-#8 at 3.0 in from Top, from 0.0 to 10.0 ft in this span
- 4-#8 at 6.0 in from Bottom, from 5.0 to 35.0 ft in this span

Span #4 Reinforcing....
- 6-#8 at 2.50 in from Top, from 0.0 to 12.0 ft in this span
- 6-#8 at 2.50 in from Bottom, from 0.0 to 12.0 ft in this span
- 4-#8 at 3.0 in from Top, from 0.0 to 3.0 ft in this span

Beam self weight calculated and added to loads

Load for Span Number 1
- Uniform Load : D = 0.260, L = 0.1450 ksf, Tributary Width = 11.50 ft

Load for Span Number 2
- Uniform Load : D = 0.2550, L = 0.1450 ksf, Tributary Width = 11.50 ft

Load for Span Number 3
- Uniform Load : D = 0.2550, L = 0.1450 ksf, Tributary Width = 11.50 ft

Load for Span Number 4
- Uniform Load : D = 0.2550, L = 0.1450 ksf, Tributary Width = 11.50 ft

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 28 JUN 2022, 12:02PM

# Concrete Beam

File: FWI2101 - Paragon Star.ec6

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Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: Grid 10.5 - B24/B25/B26B/27

## DESIGN SUMMARY

**Design OK**

| | | | | | |
|---|---|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.850** : 1 | Maximum Deflection | | | |
| Section used for this span | **Typical Section** | Max Downward Transient Deflection | 0.044 in | Ratio = | 10834 >=600. |
| Mu : Applied | -869.87 k-ft | Max Upward Transient Deflection | -0.008 in | Ratio = | 27972 >=600. |
| Mn * Phi : Allowable | 1,023.84 k-ft | Max Downward Total Deflection | 0.234 in | Ratio = | 2054 >=480. |
| Location of maximum on span | 0.000 ft | Max Upward Total Deflection | -0.023 in | Ratio = | 10257 >=480. |
| Span # where maximum occurs | Span # 3 | | | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 | Support 5 |
|---|---|---|---|---|---|
| Overall MAXimum | 54.243 | 108.690 | 209.156 | 212.435 | -28.064 |
| Overall MINimum | -0.037 | 0.218 | -0.451 | 0.489 | -0.235 |
| +D+L+H, LL Comb Run (***L) | 37.710 | 69.562 | 149.341 | 166.935 | -5.830 |
| +D+L+H, LL Comb Run (**L*) | 40.336 | 55.472 | 194.831 | 201.821 | -28.052 |
| +D+L+H, LL Comb Run (**LL) | 40.295 | 55.672 | 194.488 | 212.435 | -18.471 |
| +D+L+H, LL Comb Run (*L**) | 35.878 | 88.383 | 165.642 | 155.288 | -14.967 |
| +D+L+H, LL Comb Run (*L*L) | 35.851 | 88.541 | 165.281 | 166.124 | -5.563 |
| +D+L+H, LL Comb Run (*LL*) | 38.214 | 75.864 | 209.156 | 201.572 | -27.882 |
| +D+L+H, LL Comb Run (*LLL) | 38.178 | 76.040 | 208.851 | 212.127 | -18.261 |
| +D+L+H, LL Comb Run (L***) | 51.537 | 89.608 | 147.132 | 156.644 | -15.530 |
| +D+L+H, LL Comb Run (L**L) | 51.521 | 89.697 | 146.923 | 167.146 | -5.886 |
| +D+L+H, LL Comb Run (L*L*) | 54.243 | 75.027 | 193.100 | 201.785 | -28.064 |
| +D+L+H, LL Comb Run (L*LL) | 54.201 | 75.232 | 192.747 | 212.417 | -18.496 |
| +D+L+H, LL Comb Run (LL**) | 49.686 | 108.534 | 163.182 | 155.605 | -15.100 |
| +D+L+H, LL Comb Run (LL*L) | 49.659 | 108.690 | 162.827 | 166.426 | -5.685 |
| +D+L+H, LL Comb Run (LLL*) | 52.110 | 95.482 | 207.355 | 201.544 | -27.884 |
| +D+L+H, LL Comb Run (LLLL) | 52.073 | 95.661 | 207.043 | 212.117 | -18.277 |
| D Only | 37.729 | 69.457 | 149.585 | 156.357 | -15.419 |
| L Only, LL Comb Run (***L) | -0.037 | 0.218 | -0.451 | 10.943 | 9.338 |
| L Only, LL Comb Run (**L*) | 2.218 | -12.911 | 43.390 | 50.049 | -16.045 |
| L Only, LL Comb Run (**LL) | 2.180 | -12.693 | 42.939 | 60.992 | -6.708 |
| L Only, LL Comb Run (*L**) | -1.801 | 18.614 | 16.513 | -1.559 | 0.750 |
| L Only, LL Comb Run (*L*L) | -1.838 | 18.832 | 16.062 | 9.383 | 10.088 |
| L Only, LL Comb Run (*LL*) | 0.417 | 5.703 | 59.902 | 48.490 | -15.296 |
| L Only, LL Comb Run (*LLL) | 0.379 | 5.921 | 59.451 | 59.432 | -5.958 |
| L Only, LL Comb Run (L***) | 13.789 | 20.269 | -2.630 | 0.489 | -0.235 |
| L Only, LL Comb Run (L**L) | 13.752 | 20.487 | -3.081 | 11.432 | 9.103 |
| L Only, LL Comb Run (L*L*) | 16.007 | 7.358 | 40.760 | 50.538 | -16.281 |
| L Only, LL Comb Run (L*LL) | 15.969 | 7.576 | 40.309 | 61.481 | -6.943 |
| L Only, LL Comb Run (LL**) | 11.988 | 38.884 | 13.883 | -1.070 | 0.515 |
| L Only, LL Comb Run (LL*L) | 11.951 | 39.102 | 13.432 | 9.872 | 9.852 |
| L Only, LL Comb Run (LLL*) | 14.206 | 25.973 | 57.272 | 48.979 | -15.531 |
| L Only, LL Comb Run (LLLL) | 14.168 | 26.191 | 56.821 | 59.922 | -6.193 |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.00 | 37.50 | 70.87 | 70.87 | 0.00 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.20 | 37.50 | 61.27 | 61.27 | 79.28 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.40 | 37.50 | 51.68 | 51.68 | 147.05 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.60 | 37.50 | 42.08 | 42.08 | 203.30 | 0.65 | 139.86 | Vu < PhiVc/2 | lot Reqd 9.6. | 139.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.80 | 37.50 | 32.48 | 32.48 | 248.04 | 0.41 | 138.45 | Vu < PhiVc/2 | lot Reqd 9.6. | 138.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 6.00 | 37.50 | 22.89 | 22.89 | 281.26 | 0.25 | 137.54 | Vu < PhiVc/2 | lot Reqd 9.6. | 137.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 7.20 | 37.50 | 13.29 | 13.29 | 302.98 | 0.14 | 136.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 136.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 8.40 | 37.50 | 4.05 | 4.05 | 221.97 | 0.06 | 136.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 136.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 9.60 | 37.50 | -12.39 | 12.39 | 249.55 | 0.16 | 136.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 136.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 10.80 | 37.50 | -21.98 | 21.98 | 228.93 | 0.30 | 137.81 | Vu < PhiVc/2 | lot Reqd 9.6. | 137.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 12.00 | 37.50 | -31.58 | 31.58 | 196.79 | 0.50 | 139.00 | Vu < PhiVc/2 | lot Reqd 9.6. | 139.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 13.20 | 37.50 | -41.17 | 41.17 | 153.15 | 0.84 | 141.01 | Vu < PhiVc/2 | lot Reqd 9.6. | 141.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 14.40 | 37.50 | -50.77 | 50.77 | 97.98 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |

# Concrete Beam

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DESCRIPTION: Grid 10.5 - B24/B25/B26B/27

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 15.60 | 37.50 | -60.36 | 60.36 | 31.31 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 16.80 | 37.50 | -69.96 | 69.96 | 46.89 | 1.00 | 138.99 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 195.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 18.00 | 37.50 | -79.55 | 79.55 | 136.59 | 1.00 | 138.99 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 195.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 19.21 | 37.50 | 56.83 | 56.83 | 208.31 | 0.85 | 143.61 | Vu < PhiVc/2 | lot Reqd 9.6. | 143.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 20.44 | 37.50 | 47.06 | 47.06 | 144.34 | 1.00 | 144.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 21.67 | 37.50 | 37.30 | 37.30 | 92.39 | 1.00 | 144.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 22.90 | 37.50 | 27.54 | 27.54 | 52.46 | 1.00 | 144.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 24.13 | 37.50 | 17.78 | 17.78 | 24.55 | 1.00 | 144.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 25.36 | 37.50 | -23.11 | 23.11 | 75.04 | 0.96 | 144.58 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 26.59 | 37.50 | -29.59 | 29.59 | 107.49 | 0.86 | 143.67 | Vu < PhiVc/2 | lot Reqd 9.6. | 143.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 27.83 | 37.50 | -36.07 | 36.07 | 147.92 | 0.76 | 142.80 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 29.06 | 37.50 | -42.54 | 42.54 | 196.33 | 0.68 | 142.05 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 30.29 | 37.50 | -52.24 | 52.24 | 173.78 | 0.94 | 144.38 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 31.52 | 37.50 | -62.00 | 62.00 | 244.12 | 0.79 | 143.08 | Vu < PhiVc/2 | lot Reqd 9.6. | 143.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 32.75 | 37.50 | -71.76 | 71.76 | 326.50 | 0.69 | 142.13 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 198.4 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 33.98 | 37.50 | -81.53 | 81.53 | 420.89 | 0.61 | 141.41 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 197.7 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 35.22 | 37.50 | -91.29 | 91.29 | 527.31 | 0.54 | 140.84 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 197.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 36.45 | 37.50 | -101.05 | 101.05 | 645.75 | 0.49 | 140.38 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 196.6 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 37.68 | 37.50 | -110.81 | 110.81 | 776.21 | 0.45 | 139.99 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 196.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 39.34 | 37.50 | 150.94 | 150.94 | 739.95 | 0.64 | 143.58 | PhiVc < Vu | 7.357 | 195.5 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 41.87 | 37.50 | 130.91 | 130.91 | 383.92 | 1.00 | 147.88 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 204.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 44.39 | 37.50 | 110.89 | 110.89 | 78.49 | 1.00 | 147.88 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 204.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 46.92 | 37.50 | 90.86 | 90.86 | 176.36 | 1.00 | 141.95 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 198.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 49.45 | 37.50 | 70.84 | 70.84 | 380.61 | 0.58 | 139.48 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 195.7 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 51.97 | 37.50 | 50.81 | 50.81 | 534.27 | 0.30 | 137.79 | Vu < PhiVc/2 | lot Reqd 9.6. | 137.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 54.50 | 37.50 | 30.78 | 30.78 | 637.34 | 0.15 | 136.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 136.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 57.03 | 37.50 | 10.76 | 10.76 | 689.81 | 0.05 | 136.32 | Vu < PhiVc/2 | lot Reqd 9.6. | 136.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 59.55 | 37.50 | -11.40 | 11.40 | 700.42 | 0.05 | 136.63 | Vu < PhiVc/2 | lot Reqd 9.6. | 136.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 62.08 | 37.50 | -31.43 | 31.43 | 646.31 | 0.15 | 137.83 | Vu < PhiVc/2 | lot Reqd 9.6. | 137.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 64.61 | 37.50 | -51.45 | 51.45 | 541.62 | 0.30 | 139.55 | Vu < PhiVc/2 | lot Reqd 9.6. | 139.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 67.13 | 37.50 | -71.48 | 71.48 | 386.33 | 0.58 | 142.88 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 199.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 69.66 | 37.50 | -91.51 | 91.51 | 180.45 | 1.00 | 147.88 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 204.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 72.18 | 37.50 | -111.53 | 111.53 | 76.02 | 1.00 | 147.88 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 204.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 74.71 | 37.50 | -131.56 | 131.56 | 383.08 | 1.00 | 147.88 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 204.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 77.24 | 37.50 | -151.59 | 151.59 | 740.74 | 0.64 | 143.61 | PhiVc < Vu | 7.978 | 195.5 | 13.3 | 13.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 78.88 | 37.50 | 122.77 | 122.77 | 891.45 | 0.43 | 139.85 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 196.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 79.64 | 37.50 | 116.76 | 116.76 | 800.68 | 0.46 | 140.08 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 196.3 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 80.39 | 37.50 | 110.75 | 110.75 | 714.46 | 0.48 | 140.34 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 196.6 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 81.15 | 37.50 | 104.75 | 104.75 | 632.80 | 0.52 | 140.63 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 196.9 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 81.91 | 37.50 | 98.74 | 98.74 | 555.69 | 0.56 | 140.96 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 197.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 82.67 | 37.50 | 92.73 | 92.73 | 483.13 | 0.60 | 141.36 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 197.6 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 83.43 | 37.50 | 86.72 | 86.72 | 415.13 | 0.65 | 141.83 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 198.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 84.18 | 37.50 | 80.71 | 80.71 | 351.68 | 0.72 | 142.40 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 198.7 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 84.94 | 37.50 | 74.82 | 74.82 | 334.61 | 0.70 | 142.24 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 198.5 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 85.70 | 37.50 | 70.83 | 70.83 | 279.42 | 0.79 | 143.07 | Vu < PhiVc/2 | lot Reqd 9.6. | 143.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 86.46 | 37.50 | 66.85 | 66.85 | 227.24 | 0.92 | 144.20 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 87.22 | 37.50 | 62.86 | 62.86 | 178.09 | 1.00 | 144.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 87.97 | 37.50 | 58.88 | 58.88 | 131.96 | 1.00 | 144.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 88.73 | 37.50 | 54.89 | 54.89 | 88.85 | 1.00 | 144.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 89.49 | 37.50 | 50.90 | 50.90 | 48.76 | 1.00 | 144.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 90.25 | 37.50 | 46.92 | 46.92 | 11.69 | 1.00 | 144.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.9 | 0.0 | 0.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|

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DESCRIPTION: Grid 10.5 - B24/B25/B26B/27

| | | | | | |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 19.000 | 314.01 | 652.89 | 0.48 |
| Span # 2 | 2 | 19.500 | -845.95 | 1,023.84 | 0.83 |
| Span # 3 | 3 | 40.000 | -869.87 | 1,023.84 | 0.85 |
| Span # 4 | 4 | 12.000 | -620.37 | 780.62 | 0.79 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (***L) | | | | | |
| Span # 1 | 1 | 19.000 | 191.66 | 652.89 | 0.29 |
| Span # 2 | 2 | 19.500 | -546.49 | 1,023.84 | 0.53 |
| Span # 3 | 3 | 40.000 | -561.73 | 1,023.84 | 0.55 |
| Span # 4 | 4 | 12.000 | -625.95 | 1,272.98 | 0.49 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (**L*) | | | | | |
| Span # 1 | 1 | 19.000 | 223.51 | 652.89 | 0.34 |
| Span # 2 | 2 | 19.500 | -813.63 | 1,023.84 | 0.79 |
| Span # 3 | 3 | 40.000 | -832.44 | 1,023.84 | 0.81 |
| Span # 4 | 4 | 12.000 | -616.99 | 780.62 | 0.79 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (**LL) | | | | | |
| Span # 1 | 1 | 19.000 | 222.96 | 652.89 | 0.34 |
| Span # 2 | 2 | 19.500 | -809.19 | 1,023.84 | 0.79 |
| Span # 3 | 3 | 40.000 | -827.95 | 1,023.84 | 0.81 |
| Span # 4 | 4 | 12.000 | -590.30 | 780.62 | 0.76 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L**) | | | | | |
| Span # 1 | 1 | 19.000 | 168.49 | 652.89 | 0.26 |
| Span # 2 | 2 | 19.500 | -583.25 | 1,023.84 | 0.57 |
| Span # 3 | 3 | 40.000 | -603.65 | 1,023.84 | 0.59 |
| Span # 4 | 4 | 12.000 | -375.99 | 780.62 | 0.48 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L*L) | | | | | |
| Span # 1 | 1 | 19.000 | 168.01 | 652.89 | 0.26 |
| Span # 2 | 2 | 19.500 | -578.81 | 1,023.84 | 0.57 |
| Span # 3 | 3 | 40.000 | -599.16 | 1,023.84 | 0.59 |
| Span # 4 | 4 | 12.000 | -611.56 | 1,272.98 | 0.48 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LL*) | | | | | |
| Span # 1 | 1 | 19.000 | 197.89 | 652.89 | 0.30 |
| Span # 2 | 2 | 19.500 | -845.95 | 1,023.84 | 0.83 |
| Span # 3 | 3 | 40.000 | -869.87 | 1,023.84 | 0.85 |
| Span # 4 | 4 | 12.000 | -606.24 | 780.62 | 0.78 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LLL) | | | | | |
| Span # 1 | 1 | 19.000 | 197.38 | 652.89 | 0.30 |
| Span # 2 | 2 | 19.500 | -841.52 | 1,023.84 | 0.82 |
| Span # 3 | 3 | 40.000 | -865.38 | 1,023.84 | 0.85 |
| Span # 4 | 4 | 12.000 | -579.54 | 780.62 | 0.74 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L***) | | | | | |
| Span # 1 | 1 | 19.000 | 283.37 | 652.89 | 0.43 |
| Span # 2 | 2 | 19.500 | -539.96 | 1,023.84 | 0.53 |
| Span # 3 | 3 | 40.000 | -554.48 | 1,023.84 | 0.54 |
| Span # 4 | 4 | 12.000 | -390.13 | 780.62 | 0.50 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L**L) | | | | | |
| Span # 1 | 1 | 19.000 | 282.86 | 652.89 | 0.43 |
| Span # 2 | 2 | 19.500 | -535.53 | 1,023.84 | 0.52 |
| Span # 3 | 3 | 40.000 | -549.99 | 1,023.84 | 0.54 |
| Span # 4 | 4 | 12.000 | -630.47 | 1,272.98 | 0.50 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*L*) | | | | | |
| Span # 1 | 1 | 19.000 | 314.01 | 652.89 | 0.48 |
| Span # 2 | 2 | 19.500 | -802.67 | 1,023.84 | 0.78 |
| Span # 3 | 3 | 40.000 | -820.70 | 1,023.84 | 0.80 |
| Span # 4 | 4 | 12.000 | -620.37 | 780.62 | 0.79 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*LL) | | | | | |
| Span # 1 | 1 | 19.000 | 313.48 | 652.89 | 0.48 |
| Span # 2 | 2 | 19.500 | -798.23 | 1,023.84 | 0.78 |
| Span # 3 | 3 | 40.000 | -816.21 | 1,023.84 | 0.80 |
| Span # 4 | 4 | 12.000 | -593.67 | 780.62 | 0.76 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL**) | | | | | |
| Span # 1 | 1 | 19.000 | 259.61 | 652.89 | 0.40 |
| Span # 2 | 2 | 19.500 | -572.29 | 1,023.84 | 0.56 |
| Span # 3 | 3 | 40.000 | -591.91 | 1,023.84 | 0.58 |
| Span # 4 | 4 | 12.000 | -379.37 | 780.62 | 0.49 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL*L) | | | | | |
| Span # 1 | 1 | 19.000 | 259.13 | 652.89 | 0.40 |
| Span # 2 | 2 | 19.500 | -567.85 | 1,023.84 | 0.55 |
| Span # 3 | 3 | 40.000 | -587.42 | 1,023.84 | 0.57 |

# Concrete Beam

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DESCRIPTION: Grid 10.5 - B24/B25/B26B/27

| Load Combination Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 4 | 4 | 12.000 | -616.07 | 1,272.98 | 0.48 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLL*) | | | | | |
| Span # 1 | 1 | 19.000 | 288.97 | 652.89 | 0.44 |
| Span # 2 | 2 | 19.500 | -834.99 | 1,023.84 | 0.82 |
| Span # 3 | 3 | 40.000 | -858.13 | 1,023.84 | 0.84 |
| Span # 4 | 4 | 12.000 | -609.61 | 780.62 | 0.78 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLLL) | | | | | |
| Span # 1 | 1 | 19.000 | 288.46 | 652.89 | 0.44 |
| Span # 2 | 2 | 19.500 | -830.56 | 1,023.84 | 0.81 |
| Span # 3 | 3 | 40.000 | -853.63 | 1,023.84 | 0.83 |
| Span # 4 | 4 | 12.000 | -582.92 | 780.62 | 0.75 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H, LL Comb Run (L*L*) | 1 | 0.0192 | 9.500 | +D+L+H, LL Comb Run (L*L*) | -0.0014 | 19.513 |
| +D+L+H, LL Comb Run (L*L*) | 2 | 0.0126 | 20.553 | +D+L+H, LL Comb Run (L*L*) | -0.0228 | 12.829 |
| +D+L+H, LL Comb Run (L*L*) | 3 | 0.2337 | 20.000 | +D+L+H, LL Comb Run (L*L*) | -0.0024 | 40.316 |
| | 4 | 0.0000 | 20.000 | +D+L+H, LL Comb Run (L*L*) | -0.0137 | 4.105 |

Title Block Line 1
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and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 28 JUN 2022, 11:52AM

# Concrete Beam

File: FWI2101 - Paragon Star.ec6
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Lic. # : KW-06011403
Bob D. Campbell and Co., Inc.

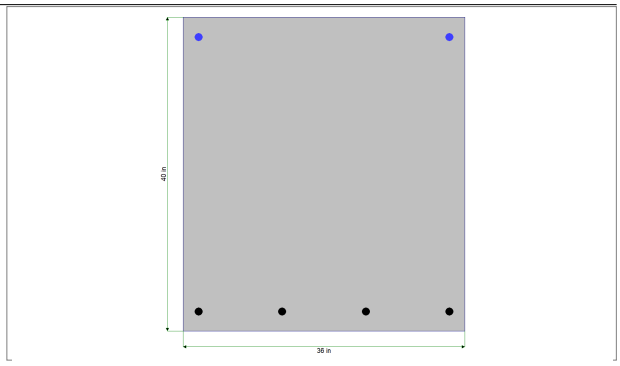
DESCRIPTION: Grid 10 - B24/B25/B26B/27

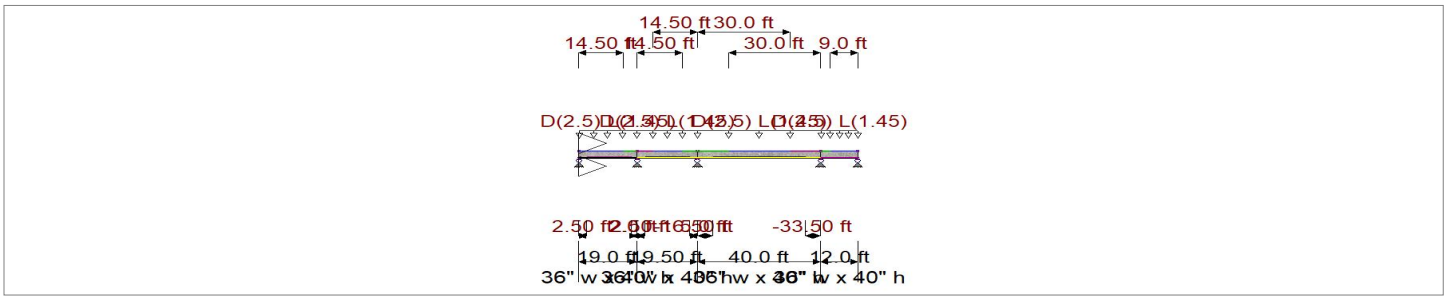
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | ϕ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| ψ Density | = | 145.0 pcf | $\beta_1$ | = | 0.80 |
| λ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 2.0 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 36.0 in, Height = 40.0 in

Span #1 Reinforcing....
- 2-#8 at 2.50 in from Top, from 0.0 to 19.0 ft in this span
- 2-#6 at 6.50 in from Bottom, from 2.50 to 17.0 ft in this span
- 4-#8 at 3.0 in from Top, from 14.50 to 19.0 ft in this span
- 4-#8 at 2.50 in from Bottom, from 0.0 to 19.0 ft in this span

Span #2 Reinforcing....
- 4-#8 at 2.50 in from Top, from 0.0 to 19.50 ft in this span
- 2-#8 at 3.0 in from Top, from 0.0 to 5.0 ft in this span
- 4-#8 at 2.50 in from Bottom, from 0.0 to 19.50 ft in this span
- 4-#8 at 3.0 in from Top, from 14.50 to 19.50 ft in this span
- 2-#8 at 6.50 in from Bottom, from 2.50 to 17.0 ft in this span

Span #3 Reinforcing....
- 4-#8 at 2.50 in from Top, from 0.0 to 40.0 ft in this span
- 6-#8 at 3.0 in from Top, from 30.0 to 40.0 ft in this span
- 4-#8 at 2.50 in from Bottom, from 0.0 to 40.0 ft in this span
- 4-#8 at 3.0 in from Top, from 0.0 to 10.0 ft in this span
- 4-#8 at 6.0 in from Bottom, from 5.0 to 35.0 ft in this span

Span #4 Reinforcing....
- 6-#8 at 2.50 in from Top, from 0.0 to 12.0 ft in this span
- 6-#8 at 2.50 in from Bottom, from 0.0 to 12.0 ft in this span
- 4-#8 at 3.0 in from Top, from 0.0 to 3.0 ft in this span

Beam self weight calculated and added to loads

Load for Span Number 1
- Uniform Load : D = 0.250, L = 0.1450 ksf, Tributary Width = 10.0 ft

Load for Span Number 2
- Uniform Load : D = 0.250, L = 0.1450 ksf, Tributary Width = 10.0 ft

Load for Span Number 3
- Uniform Load : D = 0.250, L = 0.1450 ksf, Tributary Width = 10.0 ft

Load for Span Number 4
- Uniform Load : D = 0.250, L = 0.1450 ksf, Tributary Width = 10.0 ft

Title Block Line 1
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and then using the "Printing &
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# Concrete Beam

File: FWI2101 - Paragon Star.ec6

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Lic. # : KW-06011403

Bob D. Campbell and Co., Inc.

DESCRIPTION: Grid 10 - B24/B25/B26B/27

## DESIGN SUMMARY

**Design OK**

| | | | |
|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.757** : 1 | Maximum Deflection | |
| Section used for this span | **Typical Section** | Max Downward Transient Deflection | 0.039 in Ratio = 12459 >=600. |
| Mu : Applied | -774.66 k-ft | Max Upward Transient Deflection | -0.007 in Ratio = 32168 >=600. |
| Mn * Phi : Allowable | 1,023.84 k-ft | Max Downward Total Deflection | 0.169 in Ratio = 2847 >=480. |
| Location of maximum on span | 0.000 ft | Max Upward Total Deflection | -0.019 in Ratio = 12311 >=480. |
| Span # where maximum occurs | Span # 3 | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 | Support 5 |
|---|---|---|---|---|---|
| Overall MAXimum | 47.711 | 95.989 | 186.491 | 188.601 | -24.072 |
| Overall MINimum | -0.033 | 0.189 | -0.392 | 0.425 | -0.205 |
| +D+L+H, LL Comb Run (***L) | 33.542 | 62.159 | 134.355 | 151.151 | -6.332 |
| +D+L+H, LL Comb Run (**L*) | 35.633 | 50.408 | 174.019 | 179.482 | -24.067 |
| +D+L+H, LL Comb Run (**LL) | 35.612 | 50.517 | 173.810 | 188.601 | -15.664 |
| +D+L+H, LL Comb Run (*L**) | 32.001 | 78.197 | 149.021 | 140.455 | -13.924 |
| +D+L+H, LL Comb Run (*L*L) | 31.971 | 78.372 | 148.659 | 149.910 | -5.761 |
| +D+L+H, LL Comb Run (*LL*) | 33.816 | 68.077 | 186.491 | 179.367 | -24.000 |
| +D+L+H, LL Comb Run (*LLL) | 33.797 | 68.173 | 186.303 | 188.447 | -15.571 |
| +D+L+H, LL Comb Run (L***) | 45.564 | 79.601 | 132.447 | 142.089 | -14.675 |
| +D+L+H, LL Comb Run (L**L) | 45.534 | 79.776 | 132.086 | 151.540 | -6.510 |
| +D+L+H, LL Comb Run (L*L*) | 47.711 | 67.506 | 172.406 | 179.475 | -24.072 |
| +D+L+H, LL Comb Run (L*LL) | 47.687 | 67.624 | 172.186 | 188.598 | -15.671 |
| +D+L+H, LL Comb Run (LL**) | 43.993 | 95.814 | 146.751 | 140.846 | -14.104 |
| +D+L+H, LL Comb Run (LL*L) | 43.963 | 95.989 | 146.389 | 150.300 | -5.941 |
| +D+L+H, LL Comb Run (LLL*) | 45.891 | 85.184 | 184.867 | 179.360 | -24.003 |
| +D+L+H, LL Comb Run (LLLL) | 45.872 | 85.282 | 184.678 | 188.443 | -15.575 |
| D Only | 33.572 | 61.984 | 134.716 | 141.699 | -14.497 |
| L Only, LL Comb Run (***L) | -0.033 | 0.189 | -0.392 | 9.515 | 8.120 |
| L Only, LL Comb Run (**L*) | 1.928 | -11.227 | 37.730 | 43.521 | -13.952 |
| L Only, LL Comb Run (**LL) | 1.896 | -11.038 | 37.338 | 53.036 | -5.833 |
| L Only, LL Comb Run (*L**) | -1.566 | 16.186 | 14.359 | -1.356 | 0.652 |
| L Only, LL Comb Run (*L*L) | -1.599 | 16.376 | 13.967 | 8.159 | 8.772 |
| L Only, LL Comb Run (*LL*) | 0.362 | 4.959 | 52.089 | 42.165 | -13.301 |
| L Only, LL Comb Run (*LLL) | 0.330 | 5.149 | 51.697 | 51.680 | -5.181 |
| L Only, LL Comb Run (L***) | 11.990 | 17.626 | -2.287 | 0.425 | -0.205 |
| L Only, LL Comb Run (L**L) | 11.958 | 17.815 | -2.679 | 9.941 | 7.915 |
| L Only, LL Comb Run (L*L*) | 13.919 | 6.398 | 35.443 | 43.947 | -14.157 |
| L Only, LL Comb Run (L*LL) | 13.886 | 6.588 | 35.051 | 53.462 | -6.037 |
| L Only, LL Comb Run (LL**) | 10.424 | 33.812 | 12.072 | -0.931 | 0.447 |
| L Only, LL Comb Run (LL*L) | 10.392 | 34.002 | 11.680 | 8.585 | 8.567 |
| L Only, LL Comb Run (LLL*) | 12.353 | 22.585 | 49.802 | 42.590 | -13.505 |
| L Only, LL Comb Run (LLLL) | 12.320 | 22.774 | 49.410 | 52.106 | -5.385 |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.00 | 37.50 | 62.54 | 62.54 | 0.00 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.20 | 37.50 | 54.07 | 54.07 | 69.97 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.40 | 37.50 | 45.60 | 45.60 | 129.77 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.60 | 37.50 | 37.13 | 37.13 | 179.41 | 0.65 | 139.86 | Vu < PhiVc/2 | lot Reqd 9.6. | 139.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.80 | 37.50 | 28.66 | 28.66 | 218.88 | 0.41 | 138.45 | Vu < PhiVc/2 | lot Reqd 9.6. | 138.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 6.00 | 37.50 | 20.18 | 20.18 | 248.19 | 0.25 | 137.54 | Vu < PhiVc/2 | lot Reqd 9.6. | 137.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 7.20 | 37.50 | 11.71 | 11.71 | 267.33 | 0.14 | 136.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 136.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 8.40 | 37.50 | 3.54 | 3.54 | 197.00 | 0.06 | 136.36 | Vu < PhiVc/2 | lot Reqd 9.6. | 136.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 9.60 | 37.50 | -10.87 | 10.87 | 220.93 | 0.15 | 136.94 | Vu < PhiVc/2 | lot Reqd 9.6. | 136.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 10.80 | 37.50 | -19.35 | 19.35 | 202.79 | 0.30 | 137.80 | Vu < PhiVc/2 | lot Reqd 9.6. | 137.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 12.00 | 37.50 | -27.82 | 27.82 | 174.49 | 0.50 | 138.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 139.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 13.20 | 37.50 | -36.29 | 36.29 | 136.03 | 0.83 | 140.97 | Vu < PhiVc/2 | lot Reqd 9.6. | 141.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 14.40 | 37.50 | -44.76 | 44.76 | 87.40 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |

# Concrete Beam

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DESCRIPTION: Grid 10 - B24/B25/B26B/27

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 15.60 | 37.50 | -53.23 | 53.23 | 28.60 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 16.80 | 37.50 | -61.71 | 61.71 | 40.37 | 1.00 | 138.99 | Vu < PhiVc/2 | lot Reqd 9.6. | 139.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 18.00 | 37.50 | -70.18 | 70.18 | 119.50 | 1.00 | 138.99 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 195.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 19.21 | 37.50 | 50.16 | 50.16 | 182.76 | 0.86 | 143.65 | Vu < PhiVc/2 | lot Reqd 9.6. | 143.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 20.44 | 37.50 | 41.47 | 41.47 | 126.34 | 1.00 | 144.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 21.67 | 37.50 | 32.77 | 32.77 | 80.62 | 1.00 | 144.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 22.90 | 37.50 | 24.08 | 24.08 | 45.61 | 1.00 | 144.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 24.13 | 37.50 | 15.38 | 15.38 | 21.31 | 1.00 | 144.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 25.36 | 37.50 | -20.38 | 20.38 | 65.43 | 0.97 | 144.68 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 26.59 | 37.50 | -26.21 | 26.21 | 94.12 | 0.87 | 143.77 | Vu < PhiVc/2 | lot Reqd 9.6. | 143.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 27.83 | 37.50 | -32.05 | 32.05 | 130.00 | 0.77 | 142.88 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 29.06 | 37.50 | -37.89 | 37.89 | 173.06 | 0.68 | 142.11 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 30.29 | 37.50 | -46.53 | 46.53 | 154.69 | 0.94 | 144.38 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 31.52 | 37.50 | -55.22 | 55.22 | 217.34 | 0.79 | 143.09 | Vu < PhiVc/2 | lot Reqd 9.6. | 143.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 32.75 | 37.50 | -63.92 | 63.92 | 290.71 | 0.69 | 142.14 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 33.98 | 37.50 | -72.61 | 72.61 | 374.78 | 0.61 | 141.41 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 197.7 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 35.22 | 37.50 | -81.31 | 81.31 | 469.56 | 0.54 | 140.84 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 197.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 36.45 | 37.50 | -90.00 | 90.00 | 575.05 | 0.49 | 140.38 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 196.6 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 37.68 | 37.50 | -98.70 | 98.70 | 691.24 | 0.45 | 140.00 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 196.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 39.34 | 37.50 | 134.42 | 134.42 | 658.95 | 0.64 | 143.58 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 199.8 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 41.87 | 37.50 | 116.59 | 116.59 | 341.89 | 1.00 | 147.88 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 204.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 44.39 | 37.50 | 98.75 | 98.75 | 69.88 | 1.00 | 147.88 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 204.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 46.92 | 37.50 | 80.92 | 80.92 | 157.07 | 1.00 | 141.95 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 198.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 49.45 | 37.50 | 63.08 | 63.08 | 338.96 | 0.58 | 139.48 | Vu < PhiVc/2 | lot Reqd 9.6. | 139.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 51.97 | 37.50 | 45.24 | 45.24 | 475.79 | 0.30 | 137.79 | Vu < PhiVc/2 | lot Reqd 9.6. | 137.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 54.50 | 37.50 | 27.41 | 27.41 | 567.57 | 0.15 | 136.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 136.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 57.03 | 37.50 | 9.57 | 9.57 | 614.28 | 0.05 | 136.32 | Vu < PhiVc/2 | lot Reqd 9.6. | 136.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 59.55 | 37.50 | -10.12 | 10.12 | 623.52 | 0.05 | 136.63 | Vu < PhiVc/2 | lot Reqd 9.6. | 136.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 62.08 | 37.50 | -27.95 | 27.95 | 575.43 | 0.15 | 137.83 | Vu < PhiVc/2 | lot Reqd 9.6. | 137.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 64.61 | 37.50 | -45.79 | 45.79 | 482.28 | 0.30 | 139.55 | Vu < PhiVc/2 | lot Reqd 9.6. | 139.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 67.13 | 37.50 | -63.63 | 63.63 | 344.07 | 0.58 | 142.88 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 69.66 | 37.50 | -81.46 | 81.46 | 160.80 | 1.00 | 147.88 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 204.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 72.18 | 37.50 | -99.30 | 99.30 | 67.53 | 1.00 | 147.88 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 204.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 74.71 | 37.50 | -117.13 | 117.13 | 340.92 | 1.00 | 147.88 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 204.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 77.24 | 37.50 | -134.97 | 134.97 | 659.36 | 0.64 | 143.61 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 199.9 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 78.88 | 37.50 | 109.31 | 109.31 | 793.55 | 0.43 | 139.86 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 196.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 79.64 | 37.50 | 103.96 | 103.96 | 712.74 | 0.46 | 140.08 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 196.3 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 80.39 | 37.50 | 98.61 | 98.61 | 635.98 | 0.48 | 140.34 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 196.6 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 81.15 | 37.50 | 93.26 | 93.26 | 563.27 | 0.52 | 140.63 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 196.9 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 81.91 | 37.50 | 87.91 | 87.91 | 494.62 | 0.56 | 140.97 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 197.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 82.67 | 37.50 | 82.55 | 82.55 | 430.02 | 0.60 | 141.36 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 197.6 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 83.43 | 37.50 | 77.20 | 77.20 | 369.48 | 0.65 | 141.83 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 198.1 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 84.18 | 37.50 | 71.85 | 71.85 | 313.00 | 0.72 | 142.41 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 198.7 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 84.94 | 37.50 | 66.60 | 66.60 | 296.94 | 0.70 | 142.26 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 85.70 | 37.50 | 63.01 | 63.01 | 247.83 | 0.79 | 143.09 | Vu < PhiVc/2 | lot Reqd 9.6. | 143.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 86.46 | 37.50 | 59.41 | 59.41 | 201.44 | 0.92 | 144.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 87.22 | 37.50 | 55.82 | 55.82 | 157.77 | 1.00 | 144.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 87.97 | 37.50 | 52.23 | 52.23 | 116.82 | 1.00 | 144.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 88.73 | 37.50 | 48.64 | 48.64 | 78.60 | 1.00 | 144.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 89.49 | 37.50 | 45.05 | 45.05 | 43.10 | 1.00 | 144.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 4 | 90.25 | 37.50 | 41.45 | 41.45 | 10.32 | 1.00 | 144.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.9 | 0.0 | 0.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|

# Concrete Beam

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DESCRIPTION: Grid 10 - B24/B25/B26B/27

| | | | | | |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 19.000 | 277.03 | 652.89 | 0.42 |
| Span # 2 | 2 | 19.500 | -753.36 | 1,023.84 | 0.74 |
| Span # 3 | 3 | 40.000 | -774.66 | 1,023.84 | 0.76 |
| Span # 4 | 4 | 12.000 | -551.65 | 780.62 | 0.71 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (***L) | | | | | |
| Span # 1 | 1 | 19.000 | 170.64 | 652.89 | 0.26 |
| Span # 2 | 2 | 19.500 | -492.95 | 1,023.84 | 0.48 |
| Span # 3 | 3 | 40.000 | -506.71 | 1,023.84 | 0.49 |
| Span # 4 | 4 | 12.000 | -563.67 | 1,272.98 | 0.44 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (**L*) | | | | | |
| Span # 1 | 1 | 19.000 | 198.31 | 652.89 | 0.30 |
| Span # 2 | 2 | 19.500 | -725.25 | 1,023.84 | 0.71 |
| Span # 3 | 3 | 40.000 | -742.11 | 1,023.84 | 0.72 |
| Span # 4 | 4 | 12.000 | -548.72 | 780.62 | 0.70 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (**LL) | | | | | |
| Span # 1 | 1 | 19.000 | 197.84 | 652.89 | 0.30 |
| Span # 2 | 2 | 19.500 | -721.39 | 1,023.84 | 0.70 |
| Span # 3 | 3 | 40.000 | -738.20 | 1,023.84 | 0.72 |
| Span # 4 | 4 | 12.000 | -525.50 | 780.62 | 0.67 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L**) | | | | | |
| Span # 1 | 1 | 19.000 | 150.47 | 652.89 | 0.23 |
| Span # 2 | 2 | 19.500 | -524.92 | 1,023.84 | 0.51 |
| Span # 3 | 3 | 40.000 | -543.16 | 1,023.84 | 0.53 |
| Span # 4 | 4 | 12.000 | -339.15 | 780.62 | 0.43 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L*L) | | | | | |
| Span # 1 | 1 | 19.000 | 150.05 | 652.89 | 0.23 |
| Span # 2 | 2 | 19.500 | -521.06 | 1,023.84 | 0.51 |
| Span # 3 | 3 | 40.000 | -539.26 | 1,023.84 | 0.53 |
| Span # 4 | 4 | 12.000 | -551.15 | 1,272.98 | 0.43 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LL*) | | | | | |
| Span # 1 | 1 | 19.000 | 176.06 | 652.89 | 0.27 |
| Span # 2 | 2 | 19.500 | -753.36 | 1,023.84 | 0.74 |
| Span # 3 | 3 | 40.000 | -774.66 | 1,023.84 | 0.76 |
| Span # 4 | 4 | 12.000 | -539.36 | 780.62 | 0.69 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LLL) | | | | | |
| Span # 1 | 1 | 19.000 | 175.61 | 652.89 | 0.27 |
| Span # 2 | 2 | 19.500 | -749.50 | 1,023.84 | 0.73 |
| Span # 3 | 3 | 40.000 | -770.75 | 1,023.84 | 0.75 |
| Span # 4 | 4 | 12.000 | -516.15 | 780.62 | 0.66 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L***) | | | | | |
| Span # 1 | 1 | 19.000 | 250.38 | 652.89 | 0.38 |
| Span # 2 | 2 | 19.500 | -487.28 | 1,023.84 | 0.48 |
| Span # 3 | 3 | 40.000 | -500.41 | 1,023.84 | 0.49 |
| Span # 4 | 4 | 12.000 | -351.44 | 780.62 | 0.45 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L**L) | | | | | |
| Span # 1 | 1 | 19.000 | 249.94 | 652.89 | 0.38 |
| Span # 2 | 2 | 19.500 | -483.42 | 1,023.84 | 0.47 |
| Span # 3 | 3 | 40.000 | -496.50 | 1,023.84 | 0.48 |
| Span # 4 | 4 | 12.000 | -567.59 | 1,272.98 | 0.45 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*L*) | | | | | |
| Span # 1 | 1 | 19.000 | 277.03 | 652.89 | 0.42 |
| Span # 2 | 2 | 19.500 | -715.72 | 1,023.84 | 0.70 |
| Span # 3 | 3 | 40.000 | -731.90 | 1,023.84 | 0.71 |
| Span # 4 | 4 | 12.000 | -551.65 | 780.62 | 0.71 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*LL) | | | | | |
| Span # 1 | 1 | 19.000 | 276.57 | 652.89 | 0.42 |
| Span # 2 | 2 | 19.500 | -711.86 | 1,023.84 | 0.70 |
| Span # 3 | 3 | 40.000 | -727.99 | 1,023.84 | 0.71 |
| Span # 4 | 4 | 12.000 | -528.44 | 780.62 | 0.68 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL**) | | | | | |
| Span # 1 | 1 | 19.000 | 229.71 | 652.89 | 0.35 |
| Span # 2 | 2 | 19.500 | -515.39 | 1,023.84 | 0.50 |
| Span # 3 | 3 | 40.000 | -532.95 | 1,023.84 | 0.52 |
| Span # 4 | 4 | 12.000 | -342.09 | 780.62 | 0.44 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL*L) | | | | | |
| Span # 1 | 1 | 19.000 | 229.29 | 652.89 | 0.35 |
| Span # 2 | 2 | 19.500 | -511.53 | 1,023.84 | 0.50 |
| Span # 3 | 3 | 40.000 | -529.05 | 1,023.84 | 0.52 |

# Concrete Beam

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DESCRIPTION: Grid 10 - B24/B25/B26B/27

| Load Combination Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 4 | 4 | 12.000 | -555.08 | 1,272.98 | 0.44 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLL*) | | | | | |
| Span # 1 | 1 | 19.000 | 255.25 | 652.89 | 0.39 |
| Span # 2 | 2 | 19.500 | -743.83 | 1,023.84 | 0.73 |
| Span # 3 | 3 | 40.000 | -764.45 | 1,023.84 | 0.75 |
| Span # 4 | 4 | 12.000 | -542.30 | 780.62 | 0.69 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLLL) | | | | | |
| Span # 1 | 1 | 19.000 | 254.81 | 652.89 | 0.39 |
| Span # 2 | 2 | 19.500 | -739.97 | 1,023.84 | 0.72 |
| Span # 3 | 3 | 40.000 | -760.54 | 1,023.84 | 0.74 |
| Span # 4 | 4 | 12.000 | -519.08 | 780.62 | 0.66 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H, LL Comb Run (L*L*) | 1 | 0.0168 | 9.500 | +D+L+H, LL Comb Run (L*L*) | -0.0012 | 19.513 |
| +D+L+H, LL Comb Run (L*L*) | 2 | 0.0093 | 20.553 | +D+L+H, LL Comb Run (L*L*) | -0.0190 | 11.803 |
| +D+L+H, LL Comb Run (L*L*) | 3 | 0.1686 | 20.000 | +D+L+H, LL Comb Run (L*L*) | -0.0018 | 40.316 |
| | 4 | 0.0000 | 20.000 | +D+L+H, LL Comb Run (L*L*) | -0.0106 | 4.737 |

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Engineer:
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Project Descr:

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# Concrete Beam

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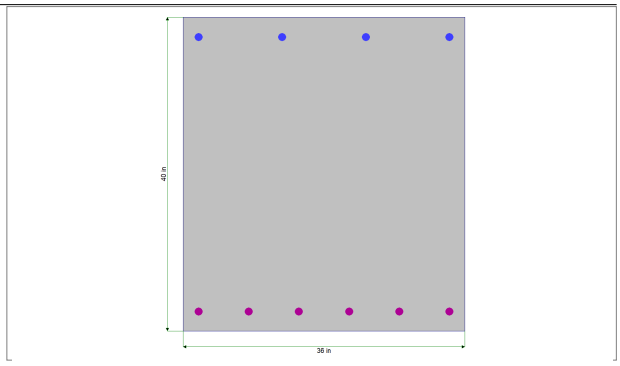
DESCRIPTION: Grid F - B28/B29

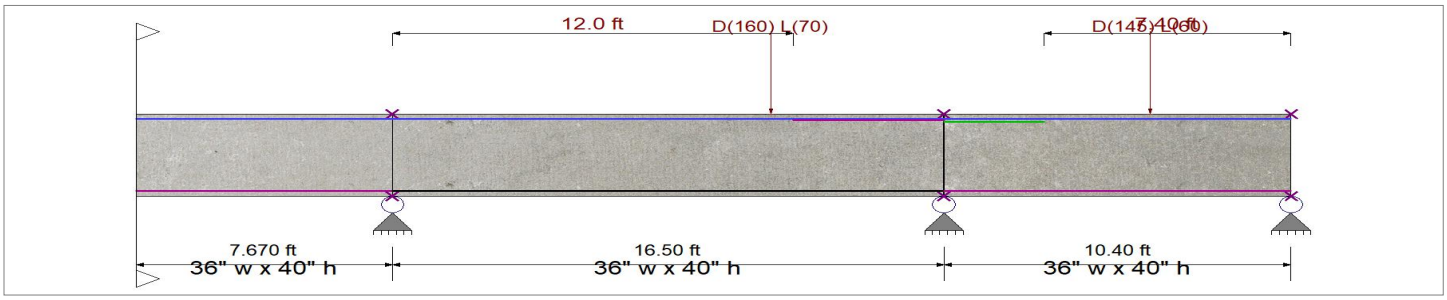
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | ϕ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| ψ Density | = | 145.0 pcf | $\beta_1$ | = | 0.80 |
| λ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 2.0 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 36.0 in, Height = 40.0 in

Span #1 Reinforcing....
- 4-#8 at 2.50 in from Top, from 0.0 to 7.670 ft in this span
- 6-#8 at 2.50 in from Bottom, from 0.0 to 7.670 ft in this span

Span #2 Reinforcing....
- 4-#8 at 2.50 in from Top, from 0.0 to 16.50 ft in this span
- 4-#8 at 3.0 in from Top, from 12.0 to 16.50 ft in this span
- 8-#8 at 2.50 in from Bottom, from 0.0 to 16.50 ft in this span

Span #3 Reinforcing....
- 4-#8 at 2.50 in from Top, from 0.0 to 10.40 ft in this span
- 4-#8 at 3.50 in from Top, from 0.0 to 3.0 ft in this span
- 6-#8 at 2.50 in from Bottom, from 0.0 to 10.40 ft in this span

Beam self weight calculated and added to loads
Load for Span Number 2
Point Load : D = 160.0, L = 70.0 k @ 11.330 ft, (B26/B27 Reactions)
Load for Span Number 3
Point Load : D = 145.0, L = 60.0 k @ 6.170 ft, (B26/B27 Reaction)

## DESIGN SUMMARY

**Design OK**

| | | | | | |
|---|---|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.760** : 1 | Maximum Deflection | | | |
| Section used for this span | **Typical Section** | Max Downward Transient Deflection | 0.007 in | Ratio = | 28249 >=600. |
| Mu : Applied | -772.24 k-ft | Max Upward Transient Deflection | -0.009 in | Ratio = | 19970 >=600. |
| Mn * Phi : Allowable | 1,016.58 k-ft | Max Downward Total Deflection | 0.022 in | Ratio = | 9202 >=480. |
| Location of maximum on span | 0.000 ft | Max Upward Total Deflection | -0.026 in | Ratio = | 7172 >=480. |
| Span # where maximum occurs | Span # 3 | | | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| Overall MAXimum | | 66.565 | 340.969 | 85.160 |
| Overall MINimum | | -2.482 | 30.822 | -12.360 |
| +D+L+H, LL Comb Run (**L) | | 48.069 | 281.898 | 85.160 |
| +D+L+H, LL Comb Run (*L*) | | 66.565 | 314.451 | 44.111 |

# Concrete Beam

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DESCRIPTION: Grid F - B28/B29

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 | Support 4 |
|---|---|---|---|---|
| +D+L+H, LL Comb Run (*LL) | | 65.748 | 340.969 | 78.410 |
| +D+L+H, LL Comb Run (L**) | | 50.497 | 251.214 | 53.416 |
| +D+L+H, LL Comb Run (L*L) | | 48.069 | 281.898 | 85.160 |
| +D+L+H, LL Comb Run (LL*) | | 66.565 | 314.451 | 44.111 |
| +D+L+H, LL Comb Run (LLL) | | 65.748 | 340.969 | 78.410 |
| D Only | | 50.497 | 251.214 | 53.416 |
| L Only, LL Comb Run (**L) | | -2.482 | 30.822 | 31.659 |
| L Only, LL Comb Run (*L*) | | 14.143 | 68.218 | -12.360 |
| L Only, LL Comb Run (*LL) | | 11.661 | 99.040 | 19.299 |
| L Only, LL Comb Run (L*L) | | -2.482 | 30.822 | 31.659 |
| L Only, LL Comb Run (LL*) | | 14.143 | 68.218 | -12.360 |
| L Only, LL Comb Run (LLL) | | 11.661 | 99.040 | 19.299 |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.00 | 37.50 | 0.00 | 0.00 | 0.00 | 1.00 | 144.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 144.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.31 | 37.50 | -0.53 | 0.53 | 0.08 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.61 | 37.50 | -1.07 | 1.07 | 0.33 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.92 | 37.50 | -1.60 | 1.60 | 0.74 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.23 | 37.50 | -2.14 | 2.14 | 1.31 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.53 | 37.50 | -2.67 | 2.67 | 2.05 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.84 | 37.50 | -3.20 | 3.20 | 2.95 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.15 | 37.50 | -3.74 | 3.74 | 4.01 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.45 | 37.50 | -4.27 | 4.27 | 5.24 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.76 | 37.50 | -4.80 | 4.80 | 6.63 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.07 | 37.50 | -5.34 | 5.34 | 8.19 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.37 | 37.50 | -5.87 | 5.87 | 9.91 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.68 | 37.50 | -6.41 | 6.41 | 11.79 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.99 | 37.50 | -6.94 | 6.94 | 13.84 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.30 | 37.50 | -7.47 | 7.47 | 16.05 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.60 | 37.50 | -8.01 | 8.01 | 18.43 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.91 | 37.50 | -8.54 | 8.54 | 20.96 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.22 | 37.50 | -9.08 | 9.08 | 23.67 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.52 | 37.50 | -9.61 | 9.61 | 26.53 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.83 | 37.50 | -10.14 | 10.14 | 29.56 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 6.14 | 37.50 | -10.68 | 10.68 | 32.76 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 6.44 | 37.50 | -11.21 | 11.21 | 36.11 | 0.97 | 141.78 | Vu < PhiVc/2 | lot Reqd 9.6. | 141.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 6.75 | 37.50 | -11.74 | 11.74 | 39.63 | 0.93 | 141.52 | Vu < PhiVc/2 | lot Reqd 9.6. | 141.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 7.06 | 37.50 | -12.28 | 12.28 | 43.32 | 0.89 | 141.28 | Vu < PhiVc/2 | lot Reqd 9.6. | 141.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 7.36 | 37.50 | -12.81 | 12.81 | 47.17 | 0.85 | 141.06 | Vu < PhiVc/2 | lot Reqd 9.6. | 141.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 7.67 | 37.50 | 69.88 | 69.88 | 51.18 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 8.33 | 37.50 | 68.73 | 68.73 | 5.44 | 1.00 | 141.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 8.99 | 37.50 | 67.58 | 67.58 | 39.54 | 1.00 | 147.88 | Vu < PhiVc/2 | lot Reqd 9.6. | 147.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 9.65 | 37.50 | 66.43 | 66.43 | 83.77 | 1.00 | 147.88 | Vu < PhiVc/2 | lot Reqd 9.6. | 147.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 10.31 | 37.50 | 65.28 | 65.28 | 127.23 | 1.00 | 147.88 | Vu < PhiVc/2 | lot Reqd 9.6. | 147.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 10.97 | 37.50 | 64.14 | 64.14 | 169.94 | 1.00 | 147.88 | Vu < PhiVc/2 | lot Reqd 9.6. | 147.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 11.63 | 37.50 | 62.99 | 62.99 | 211.89 | 0.93 | 147.04 | Vu < PhiVc/2 | lot Reqd 9.6. | 147.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 12.29 | 37.50 | 61.84 | 61.84 | 253.09 | 0.76 | 145.08 | Vu < PhiVc/2 | lot Reqd 9.6. | 145.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 12.95 | 37.50 | 60.69 | 60.69 | 293.52 | 0.65 | 143.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 143.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 13.61 | 37.50 | 59.54 | 59.54 | 333.20 | 0.56 | 142.65 | Vu < PhiVc/2 | lot Reqd 9.6. | 142.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 14.27 | 37.50 | 58.39 | 58.39 | 372.12 | 0.49 | 141.84 | Vu < PhiVc/2 | lot Reqd 9.6. | 141.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 14.93 | 37.50 | 57.25 | 57.25 | 410.28 | 0.44 | 141.20 | Vu < PhiVc/2 | lot Reqd 9.6. | 141.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 15.59 | 37.50 | 56.10 | 56.10 | 447.68 | 0.39 | 140.67 | Vu < PhiVc/2 | lot Reqd 9.6. | 140.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 16.25 | 37.50 | 54.95 | 54.95 | 484.33 | 0.35 | 140.23 | Vu < PhiVc/2 | lot Reqd 9.6. | 140.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 16.91 | 37.50 | 53.80 | 53.80 | 520.22 | 0.32 | 139.86 | Vu < PhiVc/2 | lot Reqd 9.6. | 139.9 | 0.0 | 0.0 |

# Concrete Beam

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DESCRIPTION: Grid F - B28/B29

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 17.57 | 37.50 | 52.65 | 52.65 | 555.35 | 0.30 | 139.54 | Vu < PhiVc/2 | lot Reqd 9.6. | 139.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 18.23 | 37.50 | 51.50 | 51.50 | 589.72 | 0.27 | 139.26 | Vu < PhiVc/2 | lot Reqd 9.6. | 139.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 18.89 | 37.50 | 50.36 | 50.36 | 623.33 | 0.25 | 139.02 | Vu < PhiVc/2 | lot Reqd 9.6. | 139.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 19.55 | 37.50 | -258.76 | 258.76 | 441.82 | 1.00 | 147.88 | PhiVc < Vu | 110.884 | 282.9 | 6.1 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 20.21 | 37.50 | -259.91 | 259.91 | 270.65 | 1.00 | 147.88 | PhiVc < Vu | 112.032 | 282.9 | 6.0 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 20.87 | 37.50 | -261.06 | 261.06 | 98.73 | 1.00 | 147.88 | PhiVc < Vu | 113.181 | 282.9 | 6.0 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 21.53 | 37.50 | -262.21 | 262.21 | 73.95 | 1.00 | 141.95 | PhiVc < Vu | 120.254 | 277.0 | 5.6 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 22.19 | 37.50 | -263.36 | 263.36 | 247.38 | 1.00 | 141.95 | PhiVc < Vu | 121.402 | 277.0 | 5.6 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 22.85 | 37.50 | -264.51 | 264.51 | 421.58 | 1.00 | 141.95 | PhiVc < Vu | 122.551 | 277.0 | 5.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 23.51 | 37.50 | -265.65 | 265.65 | 596.53 | 1.00 | 141.95 | PhiVc < Vu | 123.699 | 277.0 | 5.5 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 24.17 | 37.50 | 193.12 | 193.12 | 772.24 | 0.78 | 145.29 | PhiVc < Vu | 47.829 | 280.3 | 13.3 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 24.59 | 37.50 | 192.40 | 192.40 | 692.05 | 0.87 | 146.32 | PhiVc < Vu | 46.071 | 281.3 | 13.3 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 25.00 | 37.50 | 191.67 | 191.67 | 612.17 | 0.98 | 147.62 | PhiVc < Vu | 44.047 | 282.6 | 13.3 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 25.42 | 37.50 | 190.95 | 190.95 | 532.58 | 1.00 | 147.88 | PhiVc < Vu | 43.068 | 282.9 | 13.3 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 25.83 | 37.50 | 190.22 | 190.22 | 453.30 | 1.00 | 147.88 | PhiVc < Vu | 42.344 | 282.9 | 13.3 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 26.25 | 37.50 | 189.50 | 189.50 | 374.32 | 1.00 | 147.88 | PhiVc < Vu | 41.620 | 282.9 | 13.3 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 26.67 | 37.50 | 188.78 | 188.78 | 295.63 | 1.00 | 147.88 | PhiVc < Vu | 40.896 | 282.9 | 13.3 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 27.08 | 37.50 | 188.05 | 188.05 | 217.25 | 1.00 | 147.88 | PhiVc < Vu | 40.173 | 282.9 | 13.3 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 27.50 | 37.50 | 187.33 | 187.33 | 139.17 | 1.00 | 147.88 | PhiVc < Vu | 39.449 | 282.9 | 13.3 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 27.91 | 37.50 | 186.60 | 186.60 | 61.40 | 1.00 | 147.88 | PhiVc < Vu | 38.725 | 282.9 | 13.3 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 28.33 | 37.50 | 185.88 | 185.88 | 16.08 | 1.00 | 144.92 | PhiVc < Vu | 40.964 | 279.9 | 13.3 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 28.75 | 37.50 | 185.16 | 185.16 | 93.26 | 1.00 | 144.92 | PhiVc < Vu | 40.240 | 279.9 | 13.3 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 29.16 | 37.50 | 184.43 | 184.43 | 170.13 | 1.00 | 144.92 | PhiVc < Vu | 39.516 | 279.9 | 13.3 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 29.58 | 37.50 | 183.71 | 183.71 | 246.70 | 1.00 | 144.92 | PhiVc < Vu | 38.792 | 279.9 | 13.3 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 29.99 | 37.50 | 182.99 | 182.99 | 322.98 | 1.00 | 144.92 | PhiVc < Vu | 38.068 | 279.9 | 13.3 | 5.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 30.41 | 37.50 | -107.52 | 107.52 | 462.32 | 0.73 | 142.49 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 198.7 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 30.83 | 37.50 | -108.24 | 108.24 | 417.44 | 0.81 | 143.23 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 199.5 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 31.24 | 37.50 | -108.96 | 108.96 | 372.26 | 0.91 | 144.16 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 200.4 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 31.66 | 37.50 | -109.69 | 109.69 | 326.78 | 1.00 | 144.92 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 201.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 32.07 | 37.50 | -110.41 | 110.41 | 281.00 | 1.00 | 144.92 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 201.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 32.49 | 37.50 | -111.13 | 111.13 | 234.92 | 1.00 | 144.92 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 201.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 32.91 | 37.50 | -111.86 | 111.86 | 188.54 | 1.00 | 144.92 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 201.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 33.32 | 37.50 | -112.58 | 112.58 | 141.86 | 1.00 | 144.92 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 201.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 33.74 | 37.50 | -113.31 | 113.31 | 94.87 | 1.00 | 144.92 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 201.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 34.15 | 37.50 | -114.03 | 114.03 | 47.59 | 1.00 | 144.92 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 201.2 | 12.6 | 12.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 3 | 34.57 | 37.50 | -114.75 | 114.75 | 0.00 | 1.00 | 144.92 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 201.2 | 12.6 | 12.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 7.670 | -50.50 | 529.93 | 0.10 |
| Span # 2 | 2 | 16.500 | -742.90 | 1,023.56 | 0.73 |
| Span # 3 | 3 | 10.400 | -772.24 | 1,016.58 | 0.76 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (**L) | | | | | |
| Span # 1 | 1 | 7.670 | -50.50 | 529.93 | 0.10 |
| Span # 2 | 2 | 16.500 | -547.06 | 1,023.56 | 0.53 |
| Span # 3 | 3 | 10.400 | 469.77 | 780.53 | 0.60 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L*) | | | | | |
| Span # 1 | 1 | 7.670 | -50.50 | 529.93 | 0.10 |
| Span # 2 | 2 | 16.500 | -677.83 | 1,023.56 | 0.66 |
| Span # 3 | 3 | 10.400 | -706.73 | 1,016.58 | 0.70 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*LL) | | | | | |
| Span # 1 | 1 | 7.670 | -50.50 | 529.93 | 0.10 |
| Span # 2 | 2 | 16.500 | -742.90 | 1,023.56 | 0.73 |
| Span # 3 | 3 | 10.400 | -772.24 | 1,016.58 | 0.76 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L**) | | | | | |
| Span # 1 | 1 | 7.670 | -50.50 | 529.93 | 0.10 |

# Concrete Beam

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DESCRIPTION: Grid F - B28/B29

| Load Combination Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| Span # 2 | 2 | 16.500 | -481.98 | 1,023.56 | 0.47 |
| Span # 3 | 3 | 10.400 | -501.05 | 1,016.58 | 0.49 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*L) | | | | | |
| Span # 1 | 1 | 7.670 | -50.50 | 529.93 | 0.10 |
| Span # 2 | 2 | 16.500 | -547.06 | 1,023.56 | 0.53 |
| Span # 3 | 3 | 10.400 | 469.77 | 780.53 | 0.60 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL*) | | | | | |
| Span # 1 | 1 | 7.670 | -50.50 | 529.93 | 0.10 |
| Span # 2 | 2 | 16.500 | -677.83 | 1,023.56 | 0.66 |
| Span # 3 | 3 | 10.400 | -706.73 | 1,016.58 | 0.70 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LLL) | | | | | |
| Span # 1 | 1 | 7.670 | -50.50 | 529.93 | 0.10 |
| Span # 2 | 2 | 16.500 | -742.90 | 1,023.56 | 0.73 |
| Span # 3 | 3 | 10.400 | -772.24 | 1,016.58 | 0.76 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H, LL Comb Run (LL*) | 1 | 0.0012 | 8.000 | +D+L+H, LL Comb Run (LL*) | -0.0257 | 0.000 |
| +D+L+H, LL Comb Run (LL*) | 2 | 0.0215 | 8.910 | +D+L+H, LL Comb Run (LL*) | -0.0004 | 16.708 |
| +D+L+H, LL Comb Run (L*L) | 3 | 0.0042 | 6.448 | +D+L+H, LL Comb Run (LL*) | -0.0018 | 2.288 |

# Concrete Beam

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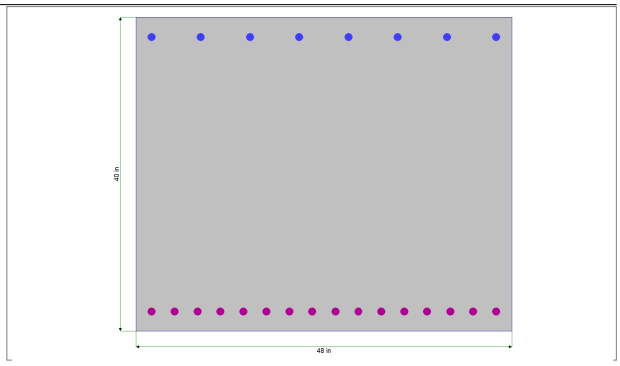
DESCRIPTION: Grid B30

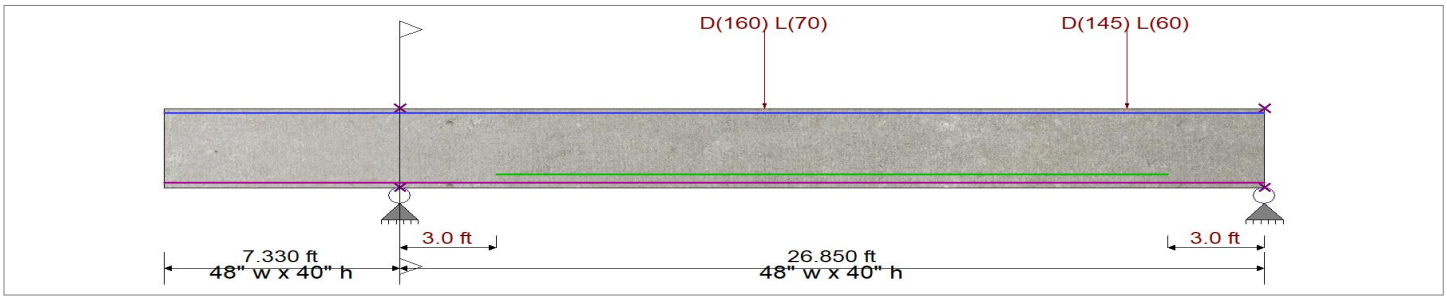
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | $\phi$ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| $\psi$ Density | = | 145.0 pcf | $\beta_1$ | = | 0.80 |
| $\lambda$ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup | = | 4.0 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 48.0 in, Height = 40.0 in

Span #1 Reinforcing....
- 8-#8 at 2.50 in from Top, from 0.0 to 7.330 ft in this span
- 6-#8 at 2.50 in from Bottom, from 0.0 to 7.330 ft in this span

Span #2 Reinforcing....
- 8-#8 at 2.50 in from Top, from 0.0 to 26.850 ft in this span
- 10-#8 at 6.50 in from Bottom, from 3.0 to 23.850 ft in this span
- 16-#8 at 2.50 in from Bottom, from 0.0 to 26.850 ft in this span

Beam self weight calculated and added to loads
Load for Span Number 2
- Point Load : D = 160.0, L = 70.0 k @ 11.330 ft, (B25/B26 Reaction)
- Point Load : D = 145.0, L = 60.0 k @ 22.580 ft, (B25/B26 Reaction)

## DESIGN SUMMARY

**Design OK**

| | | | | | | |
|---|---|---|---|---|---|---|
| Maximum Bending Stress Ratio | = | **0.850** : 1 | Maximum Deflection | | | |
| Section used for this span | | **Typical Section** | Max Downward Transient Deflection | 0.064 in | Ratio = | 5068 >=600. |
| Mu : Applied | | 2,640.07 k-ft | Max Upward Transient Deflection | -0.053 in | Ratio = | 3326 >=600. |
| Mn * Phi : Allowable | | 3,106.26 k-ft | Max Downward Total Deflection | 0.491 in | Ratio = | 656 >=420. |
| Location of maximum on span | | 11.398 ft | Max Upward Total Deflection | -0.386 in | Ratio = | 454 >=420. |
| Span # where maximum occurs | | Span # 2 | | | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 | Support 3 |
|---|---|---|---|
| Overall MAXimum | | 207.608 | 293.473 |
| Overall MINimum | | 50.004 | 79.996 |
| +D+L+H, LL Comb Run (*L) | | 207.608 | 293.473 |
| +D+L+H, LL Comb Run (L*) | | 157.604 | 213.477 |
| +D+L+H, LL Comb Run (LL) | | 207.608 | 293.473 |
| D Only | | 157.604 | 213.477 |
| L Only, LL Comb Run (*L) | | 50.004 | 79.996 |
| L Only, LL Comb Run (LL) | | 50.004 | 79.996 |

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# Concrete Beam

DESCRIPTION: Grid B30

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.00 | 37.50 | 0.00 | 0.00 | 0.00 | 1.00 | 190.26 | Vu < PhiVc/2 | lot Reqd 9.6. | 190.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.18 | 37.50 | -0.42 | 0.42 | 0.04 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.36 | 37.50 | -0.83 | 0.83 | 0.15 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.54 | 37.50 | -1.25 | 1.25 | 0.34 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.72 | 37.50 | -1.67 | 1.67 | 0.60 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 0.90 | 37.50 | -2.08 | 2.08 | 0.93 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.08 | 37.50 | -2.50 | 2.50 | 1.35 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.26 | 37.50 | -2.92 | 2.92 | 1.83 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.44 | 37.50 | -3.33 | 3.33 | 2.39 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.62 | 37.50 | -3.75 | 3.75 | 3.03 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.80 | 37.50 | -4.16 | 4.16 | 3.74 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 1.97 | 37.50 | -4.58 | 4.58 | 4.52 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.15 | 37.50 | -5.00 | 5.00 | 5.38 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.33 | 37.50 | -5.41 | 5.41 | 6.32 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.51 | 37.50 | -5.83 | 5.83 | 7.33 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.69 | 37.50 | -6.25 | 6.25 | 8.41 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 2.87 | 37.50 | -6.66 | 6.66 | 9.57 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.05 | 37.50 | -7.08 | 7.08 | 10.80 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.23 | 37.50 | -7.50 | 7.50 | 12.11 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.41 | 37.50 | -7.91 | 7.91 | 13.49 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.59 | 37.50 | -8.33 | 8.33 | 14.95 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.77 | 37.50 | -8.75 | 8.75 | 16.48 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 3.95 | 37.50 | -9.16 | 9.16 | 18.09 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.13 | 37.50 | -9.58 | 9.58 | 19.77 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.31 | 37.50 | -10.00 | 10.00 | 21.53 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.49 | 37.50 | -10.41 | 10.41 | 23.36 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.67 | 37.50 | -10.83 | 10.83 | 25.27 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 4.85 | 37.50 | -11.24 | 11.24 | 27.25 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.03 | 37.50 | -11.66 | 11.66 | 29.31 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.21 | 37.50 | -12.08 | 12.08 | 31.44 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.39 | 37.50 | -12.49 | 12.49 | 33.64 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.56 | 37.50 | -12.91 | 12.91 | 35.92 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.74 | 37.50 | -13.33 | 13.33 | 38.28 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 5.92 | 37.50 | -13.74 | 13.74 | 40.71 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 6.10 | 37.50 | -14.16 | 14.16 | 43.21 | 1.00 | 193.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 6.28 | 37.50 | -14.58 | 14.58 | 45.79 | 0.99 | 193.16 | Vu < PhiVc/2 | lot Reqd 9.6. | 193.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 6.46 | 37.50 | -14.99 | 14.99 | 48.44 | 0.97 | 192.83 | Vu < PhiVc/2 | lot Reqd 9.6. | 192.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 6.64 | 37.50 | -15.41 | 15.41 | 51.17 | 0.94 | 192.52 | Vu < PhiVc/2 | lot Reqd 9.6. | 192.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 6.82 | 37.50 | -15.83 | 15.83 | 53.98 | 0.92 | 192.23 | Vu < PhiVc/2 | lot Reqd 9.6. | 192.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 7.00 | 37.50 | -16.24 | 16.24 | 56.85 | 0.89 | 191.95 | Vu < PhiVc/2 | lot Reqd 9.6. | 192.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 1 | 7.18 | 37.50 | -16.66 | 16.66 | 59.81 | 0.87 | 191.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 191.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 7.44 | 37.50 | 251.87 | 251.87 | 34.71 | 1.00 | 193.22 | PhiVc < Vu | 58.649 | 268.2 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 8.10 | 37.50 | 250.35 | 250.35 | 130.41 | 1.00 | 205.07 | PhiVc < Vu | 45.273 | 280.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 8.75 | 37.50 | 248.82 | 248.82 | 294.52 | 1.00 | 205.07 | PhiVc < Vu | 43.748 | 280.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 9.41 | 37.50 | 247.29 | 247.29 | 457.63 | 1.00 | 205.07 | PhiVc < Vu | 42.222 | 280.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 10.07 | 37.50 | 245.77 | 245.77 | 619.74 | 1.00 | 205.07 | PhiVc < Vu | 40.697 | 280.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 10.73 | 37.50 | 244.24 | 244.24 | 780.84 | 0.98 | 204.54 | PhiVc < Vu | 39.705 | 279.5 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 11.38 | 37.50 | 242.72 | 242.72 | 940.95 | 0.81 | 200.48 | PhiVc < Vu | 42.241 | 275.5 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 12.04 | 37.50 | 241.19 | 241.19 | 1,100.04 | 0.69 | 197.61 | PhiVc < Vu | 43.581 | 272.6 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 12.70 | 37.50 | 239.67 | 239.67 | 1,258.14 | 0.60 | 195.48 | PhiVc < Vu | 44.186 | 270.5 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 13.36 | 37.50 | 238.14 | 238.14 | 1,415.23 | 0.53 | 193.84 | PhiVc < Vu | 44.306 | 268.8 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 14.02 | 37.50 | 236.62 | 236.62 | 1,571.32 | 0.47 | 192.53 | PhiVc < Vu | 44.091 | 267.5 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 14.67 | 37.50 | 235.09 | 235.09 | 1,726.41 | 0.43 | 191.46 | PhiVc < Vu | 43.633 | 266.5 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 15.33 | 37.50 | 233.57 | 233.57 | 1,880.49 | 0.39 | 190.57 | PhiVc < Vu | 42.993 | 265.6 | 18.8 | 18.0 |

# Concrete Beam

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DESCRIPTION: Grid B30

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 15.99 | 37.50 | 232.04 | 232.04 | 2,033.57 | 0.36 | 189.82 | PhiVc < Vu | 42.216 | 264.8 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 16.65 | 37.50 | 230.51 | 230.51 | 2,185.64 | 0.33 | 189.18 | PhiVc < Vu | 41.330 | 264.2 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 17.30 | 37.50 | 228.99 | 228.99 | 2,336.72 | 0.31 | 188.63 | PhiVc < Vu | 40.358 | 263.6 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 17.96 | 37.50 | 227.46 | 227.46 | 2,486.79 | 0.29 | 188.15 | PhiVc < Vu | 39.316 | 263.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 18.62 | 37.50 | 225.94 | 225.94 | 2,635.85 | 0.27 | 187.72 | PhiVc < Vu | 38.216 | 262.7 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 19.28 | 37.50 | -79.59 | 79.59 | 2,596.80 | 0.10 | 183.64 | Vu < PhiVc/2 | lot Reqd 9.6. | 183.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 19.93 | 37.50 | -81.11 | 81.11 | 2,543.97 | 0.10 | 183.73 | Vu < PhiVc/2 | lot Reqd 9.6. | 183.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 20.59 | 37.50 | -82.64 | 82.64 | 2,490.13 | 0.10 | 183.83 | Vu < PhiVc/2 | lot Reqd 9.6. | 183.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 21.25 | 37.50 | -84.16 | 84.16 | 2,435.29 | 0.11 | 183.93 | Vu < PhiVc/2 | lot Reqd 9.6. | 183.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 21.91 | 37.50 | -85.69 | 85.69 | 2,379.45 | 0.11 | 184.04 | Vu < PhiVc/2 | lot Reqd 9.6. | 184.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 22.56 | 37.50 | -87.22 | 87.22 | 2,322.60 | 0.12 | 184.15 | Vu < PhiVc/2 | lot Reqd 9.6. | 184.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 23.22 | 37.50 | -88.74 | 88.74 | 2,264.75 | 0.12 | 184.27 | Vu < PhiVc/2 | lot Reqd 9.6. | 184.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 23.88 | 37.50 | -90.27 | 90.27 | 2,205.90 | 0.13 | 184.40 | Vu < PhiVc/2 | lot Reqd 9.6. | 184.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 24.54 | 37.50 | -91.79 | 91.79 | 2,146.04 | 0.13 | 184.54 | Vu < PhiVc/2 | lot Reqd 9.6. | 184.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 25.19 | 37.50 | -93.32 | 93.32 | 2,085.18 | 0.14 | 184.69 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 259.7 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 25.85 | 37.50 | -94.84 | 94.84 | 2,023.32 | 0.15 | 184.84 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 259.8 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 26.51 | 37.50 | -96.37 | 96.37 | 1,960.45 | 0.15 | 185.01 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 260.0 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 27.17 | 37.50 | -97.89 | 97.89 | 1,896.58 | 0.16 | 185.20 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 260.2 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 27.82 | 37.50 | -99.42 | 99.42 | 1,831.71 | 0.17 | 185.39 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 260.4 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 28.48 | 37.50 | -100.95 | 100.95 | 1,765.84 | 0.18 | 185.61 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 260.6 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 29.14 | 37.50 | -102.47 | 102.47 | 1,698.96 | 0.19 | 185.84 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 260.8 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 29.80 | 37.50 | -104.00 | 104.00 | 1,631.08 | 0.20 | 186.10 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 261.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 30.45 | 37.50 | -375.52 | 375.52 | 1,415.35 | 0.83 | 201.02 | PhiVc < Vu | 174.498 | 393.9 | 7.7 | 7.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 31.11 | 37.50 | -377.05 | 377.05 | 1,167.92 | 1.00 | 205.07 | PhiVc < Vu | 171.974 | 397.9 | 7.9 | 7.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 31.77 | 37.50 | -378.57 | 378.57 | 919.49 | 1.00 | 205.07 | PhiVc < Vu | 173.50 | 397.9 | 7.8 | 7.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 32.43 | 37.50 | -380.10 | 380.10 | 670.06 | 1.00 | 205.07 | PhiVc < Vu | 175.025 | 397.9 | 7.7 | 7.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 33.08 | 37.50 | -381.62 | 381.62 | 419.62 | 1.00 | 205.07 | PhiVc < Vu | 176.551 | 397.9 | 7.6 | 7.0 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb | 2 | 33.74 | 37.50 | -383.15 | 383.15 | 168.18 | 1.00 | 205.07 | PhiVc < Vu | 178.076 | 397.9 | 7.6 | 7.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 7.330 | -61.82 | 1,040.74 | 0.06 |
| Span # 2 | 2 | 26.850 | 2,640.07 | 3,106.26 | 0.85 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (*L) | | | | | |
| Span # 1 | 1 | 7.330 | -61.82 | 1,040.74 | 0.06 |
| Span # 2 | 2 | 26.850 | 2,640.07 | 3,106.26 | 0.85 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (L*) | | | | | |
| Span # 1 | 1 | 7.330 | -61.82 | 1,040.74 | 0.06 |
| Span # 2 | 2 | 26.850 | 1,735.76 | 3,106.26 | 0.56 |
| +1.20D+1.60L+0.50S+1.60H, LL Comb Run (LL) | | | | | |
| Span # 1 | 1 | 7.330 | -61.82 | 1,040.74 | 0.06 |
| Span # 2 | 2 | 26.850 | 2,640.07 | 3,106.26 | 0.85 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H, LL Comb Run (LL) | 1 | 0.0203 | 7.714 | +D+L+H, LL Comb Run (LL) | -0.3862 | 0.000 |
| +D+L+H, LL Comb Run (LL) | 2 | 0.4909 | 13.425 | | 0.0000 | 0.000 |

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 28 JUN 2022, 1:02PM
File: FWI2101 - Paragon Star.ec6

# Concrete Beam

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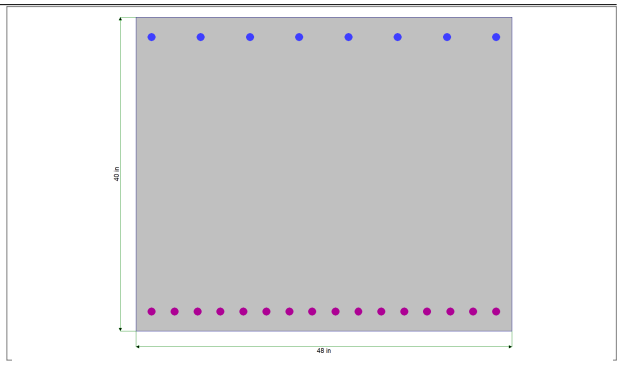
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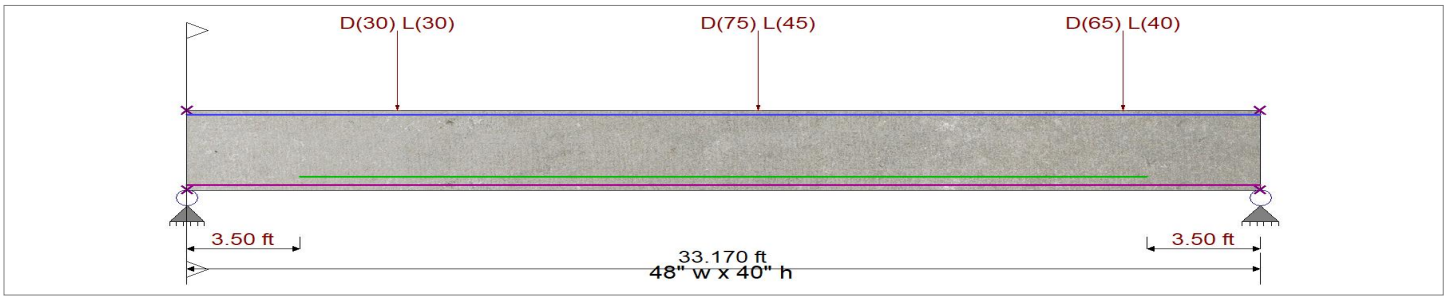
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | ϕ Phi Values | Flexure : | 0.90 |
| fr = f'c^1/2 * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| ψ Density | = | 145.0 pcf | β 1 | = | 0.80 |
| λ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 4.0 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 48.0 in, Height = 40.0 in
Span #1 Reinforcing....
8-#8 at 2.50 in from Top, from 0.0 to 33.170 ft in this span
16-#8 at 2.50 in from Bottom, from 0.0 to 33.170 ft in this span
10-#8 at 6.50 in from Bottom, from 3.50 to 29.670 ft in this span

Beam self weight calculated and added to loads
Point Load : D = 30.0, L = 30.0 k @ 6.50 ft, (B21 Reaction)
Point Load : D = 75.0, L = 45.0 k @ 17.670 ft, (B24/B25 Reaction)
Point Load : D = 65.0, L = 40.0 k @ 28.920 ft, (B24/B25 Reaction)

## DESIGN SUMMARY

**Design OK**

| | | | | | | |
|---|---|---|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.718** : 1 | Maximum Deflection | | | | |
| Section used for this span | **Typical Section** | Max Downward Transient Deflection | 0.096 in | Ratio = | 4132 | >=600. |
| Mu : Applied | 2,229.90 k-ft | Max Upward Transient Deflection | 0.000 in | Ratio = | 0 | <600.0 |
| Mn * Phi : Allowable | 3,106.26 k-ft | Max Downward Total Deflection | 0.612 in | Ratio = | 650 | >=420. |
| Location of maximum on span | 17.642 ft | Max Upward Total Deflection | 0.000 in | Ratio = | 0 | <420.0 |
| Span # where maximum occurs | Span # 1 | | | | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Overall MAXimum | 149.835 | 199.294 |
| Overall MINimum | 50.274 | 64.726 |
| +D+L+H | 149.835 | 199.294 |
| D Only | 99.561 | 134.568 |
| L Only | 50.274 | 64.726 |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.00 | 37.50 | 199.91 | 199.91 | 0.00 | 1.00 | 205.07 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 280.1 | 18.8 | 18.0 |

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# Concrete Beam



## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.36 | 37.50 | 199.07 | 199.07 | 72.32 | 1.00 | 205.07 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 280.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.73 | 37.50 | 198.23 | 198.23 | 144.33 | 1.00 | 205.07 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 280.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.09 | 37.50 | 197.39 | 197.39 | 216.04 | 1.00 | 205.07 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 280.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.45 | 37.50 | 196.55 | 196.55 | 287.44 | 1.00 | 205.07 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 280.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.81 | 37.50 | 195.71 | 195.71 | 358.54 | 1.00 | 205.07 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 280.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.18 | 37.50 | 194.87 | 194.87 | 429.34 | 1.00 | 205.07 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 280.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.54 | 37.50 | 194.02 | 194.02 | 499.83 | 1.00 | 205.07 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 280.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.90 | 37.50 | 193.18 | 193.18 | 570.01 | 1.00 | 205.07 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 280.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.26 | 37.50 | 192.34 | 192.34 | 639.89 | 0.94 | 203.64 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 278.6 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.63 | 37.50 | 191.50 | 191.50 | 709.46 | 0.84 | 201.36 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 276.4 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.99 | 37.50 | 190.66 | 190.66 | 778.73 | 0.77 | 199.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 274.5 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.35 | 37.50 | 189.82 | 189.82 | 847.70 | 0.70 | 197.96 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 273.0 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.71 | 37.50 | 188.98 | 188.98 | 916.36 | 0.64 | 196.65 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 271.6 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.08 | 37.50 | 188.14 | 188.14 | 984.71 | 0.60 | 195.52 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 270.5 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.44 | 37.50 | 187.30 | 187.30 | 1,052.76 | 0.56 | 194.55 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 269.5 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.80 | 37.50 | 186.46 | 186.46 | 1,120.51 | 0.52 | 193.70 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 268.7 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.16 | 37.50 | 185.61 | 185.61 | 1,187.95 | 0.49 | 192.95 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 267.9 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.53 | 37.50 | 100.77 | 100.77 | 1,252.96 | 0.25 | 187.33 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 262.3 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.89 | 37.50 | 99.93 | 99.93 | 1,289.34 | 0.24 | 187.11 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 262.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.25 | 37.50 | 99.09 | 99.09 | 1,325.41 | 0.23 | 186.91 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 261.9 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.61 | 37.50 | 98.25 | 98.25 | 1,361.18 | 0.23 | 186.72 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 261.7 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.98 | 37.50 | 97.41 | 97.41 | 1,396.65 | 0.22 | 186.54 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 261.5 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 8.34 | 37.50 | 96.57 | 96.57 | 1,431.81 | 0.21 | 186.37 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 261.4 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 8.70 | 37.50 | 95.73 | 95.73 | 1,466.66 | 0.20 | 186.21 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 261.2 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.06 | 37.50 | 94.89 | 94.89 | 1,501.21 | 0.20 | 186.05 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 261.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.43 | 37.50 | 94.04 | 94.04 | 1,535.46 | 0.19 | 185.91 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 260.9 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.79 | 37.50 | 93.20 | 93.20 | 1,569.40 | 0.19 | 185.77 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 260.8 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.15 | 37.50 | 92.36 | 92.36 | 1,603.03 | 0.18 | 185.64 | Vu < PhiVc/2 | lot Reqd 9.6. | 185.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.51 | 37.50 | 91.52 | 91.52 | 1,636.36 | 0.17 | 185.52 | Vu < PhiVc/2 | lot Reqd 9.6. | 185.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.88 | 37.50 | 90.68 | 90.68 | 1,669.39 | 0.17 | 185.40 | Vu < PhiVc/2 | lot Reqd 9.6. | 185.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.24 | 37.50 | 89.84 | 89.84 | 1,702.11 | 0.16 | 185.28 | Vu < PhiVc/2 | lot Reqd 9.6. | 185.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.60 | 37.50 | 89.00 | 89.00 | 1,734.52 | 0.16 | 185.17 | Vu < PhiVc/2 | lot Reqd 9.6. | 185.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.96 | 37.50 | 88.16 | 88.16 | 1,766.63 | 0.16 | 185.07 | Vu < PhiVc/2 | lot Reqd 9.6. | 185.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.33 | 37.50 | 87.32 | 87.32 | 1,798.44 | 0.15 | 184.97 | Vu < PhiVc/2 | lot Reqd 9.6. | 185.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.69 | 37.50 | 86.48 | 86.48 | 1,829.94 | 0.15 | 184.87 | Vu < PhiVc/2 | lot Reqd 9.6. | 184.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.05 | 37.50 | 85.63 | 85.63 | 1,861.14 | 0.14 | 184.78 | Vu < PhiVc/2 | lot Reqd 9.6. | 184.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.41 | 37.50 | 84.79 | 84.79 | 1,892.03 | 0.14 | 184.69 | Vu < PhiVc/2 | lot Reqd 9.6. | 184.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.78 | 37.50 | 83.95 | 83.95 | 1,922.62 | 0.14 | 184.61 | Vu < PhiVc/2 | lot Reqd 9.6. | 184.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.14 | 37.50 | 83.11 | 83.11 | 1,952.90 | 0.13 | 184.52 | Vu < PhiVc/2 | lot Reqd 9.6. | 184.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.50 | 37.50 | 82.27 | 82.27 | 1,982.87 | 0.13 | 184.45 | Vu < PhiVc/2 | lot Reqd 9.6. | 184.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.86 | 37.50 | 81.43 | 81.43 | 2,012.55 | 0.13 | 184.37 | Vu < PhiVc/2 | lot Reqd 9.6. | 184.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 15.23 | 37.50 | 80.59 | 80.59 | 2,041.91 | 0.12 | 184.30 | Vu < PhiVc/2 | lot Reqd 9.6. | 184.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 15.59 | 37.50 | 79.75 | 79.75 | 2,070.97 | 0.12 | 184.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 184.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 15.95 | 37.50 | 78.91 | 78.91 | 2,099.73 | 0.12 | 184.16 | Vu < PhiVc/2 | lot Reqd 9.6. | 184.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 16.31 | 37.50 | 78.07 | 78.07 | 2,128.18 | 0.11 | 184.09 | Vu < PhiVc/2 | lot Reqd 9.6. | 184.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 16.68 | 37.50 | 77.22 | 77.22 | 2,156.33 | 0.11 | 184.03 | Vu < PhiVc/2 | lot Reqd 9.6. | 184.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 17.04 | 37.50 | 76.38 | 76.38 | 2,184.17 | 0.11 | 183.96 | Vu < PhiVc/2 | lot Reqd 9.6. | 184.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 17.40 | 37.50 | 75.54 | 75.54 | 2,211.71 | 0.11 | 183.90 | Vu < PhiVc/2 | lot Reqd 9.6. | 183.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 17.76 | 37.50 | -87.30 | 87.30 | 2,223.85 | 0.12 | 184.28 | Vu < PhiVc/2 | lot Reqd 9.6. | 184.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 18.13 | 37.50 | -88.14 | 88.14 | 2,192.05 | 0.13 | 184.35 | Vu < PhiVc/2 | lot Reqd 9.6. | 184.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 18.49 | 37.50 | -88.98 | 88.98 | 2,159.95 | 0.13 | 184.42 | Vu < PhiVc/2 | lot Reqd 9.6. | 184.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 18.85 | 37.50 | -89.82 | 89.82 | 2,127.54 | 0.13 | 184.50 | Vu < PhiVc/2 | lot Reqd 9.6. | 184.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 19.21 | 37.50 | -90.66 | 90.66 | 2,094.82 | 0.14 | 184.58 | Vu < PhiVc/2 | lot Reqd 9.6. | 184.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 19.58 | 37.50 | -91.50 | 91.50 | 2,061.80 | 0.14 | 184.66 | Vu < PhiVc/2 | lot Reqd 9.6. | 184.7 | 0.0 | 0.0 |

# Concrete Beam

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DESCRIPTION: Grid B31

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 1 | 19.94 | 37.50 | -92.35 | 92.35 | 2,028.48 | 0.14 | 184.74 | Vu < PhiVc/2 | lot Reqd 9.6. | 184.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 20.30 | 37.50 | -93.19 | 93.19 | 1,994.85 | 0.15 | 184.83 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 259.8 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 20.66 | 37.50 | -94.03 | 94.03 | 1,960.92 | 0.15 | 184.92 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 259.9 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 21.03 | 37.50 | -94.87 | 94.87 | 1,926.68 | 0.15 | 185.02 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 260.0 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 21.39 | 37.50 | -95.71 | 95.71 | 1,892.13 | 0.16 | 185.12 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 260.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 21.75 | 37.50 | -96.55 | 96.55 | 1,857.29 | 0.16 | 185.22 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 260.2 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 22.11 | 37.50 | -97.39 | 97.39 | 1,822.13 | 0.17 | 185.33 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 260.3 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 22.48 | 37.50 | -98.23 | 98.23 | 1,786.67 | 0.17 | 185.44 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 260.4 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 22.84 | 37.50 | -99.07 | 99.07 | 1,750.91 | 0.18 | 185.56 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 260.6 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 23.20 | 37.50 | -99.91 | 99.91 | 1,714.84 | 0.18 | 185.69 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 260.7 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 23.56 | 37.50 | -100.76 | 100.76 | 1,678.47 | 0.19 | 185.82 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 260.8 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 23.93 | 37.50 | -101.60 | 101.60 | 1,641.79 | 0.19 | 185.96 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 261.0 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 24.29 | 37.50 | -102.44 | 102.44 | 1,604.81 | 0.20 | 186.10 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 261.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 24.65 | 37.50 | -103.28 | 103.28 | 1,567.52 | 0.21 | 186.25 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 261.3 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 25.01 | 37.50 | -104.12 | 104.12 | 1,529.93 | 0.21 | 186.41 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 261.4 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 25.38 | 37.50 | -104.96 | 104.96 | 1,492.03 | 0.22 | 186.58 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 261.6 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 25.74 | 37.50 | -105.80 | 105.80 | 1,453.83 | 0.23 | 186.76 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 261.8 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 26.10 | 37.50 | -106.64 | 106.64 | 1,415.33 | 0.24 | 186.95 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 262.0 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 26.46 | 37.50 | -107.48 | 107.48 | 1,376.51 | 0.24 | 187.16 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 262.2 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 26.83 | 37.50 | -108.32 | 108.32 | 1,337.40 | 0.25 | 187.37 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 262.4 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 27.19 | 37.50 | -109.17 | 109.17 | 1,297.97 | 0.26 | 187.60 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 262.6 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 27.55 | 37.50 | -110.01 | 110.01 | 1,258.25 | 0.27 | 187.85 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 262.8 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 27.91 | 37.50 | -110.85 | 110.85 | 1,218.22 | 0.28 | 188.11 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 263.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 28.28 | 37.50 | -111.69 | 111.69 | 1,177.88 | 0.30 | 188.40 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 263.4 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 28.64 | 37.50 | -112.53 | 112.53 | 1,137.24 | 0.31 | 188.70 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 263.7 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 29.00 | 37.50 | -255.37 | 255.37 | 1,084.78 | 0.74 | 198.81 | PhiVc < Vu | 56.563 | 273.8 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 29.36 | 37.50 | -256.21 | 256.21 | 992.05 | 0.81 | 200.50 | PhiVc < Vu | 55.711 | 275.5 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 29.73 | 37.50 | -257.05 | 257.05 | 899.02 | 0.89 | 202.55 | PhiVc < Vu | 54.504 | 277.5 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 30.09 | 37.50 | -257.89 | 257.89 | 805.68 | 1.00 | 205.07 | PhiVc < Vu | 52.821 | 280.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 30.45 | 37.50 | -258.74 | 258.74 | 712.04 | 1.00 | 205.07 | PhiVc < Vu | 53.662 | 280.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 30.81 | 37.50 | -259.58 | 259.58 | 618.09 | 1.00 | 205.07 | PhiVc < Vu | 54.503 | 280.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 31.18 | 37.50 | -260.42 | 260.42 | 523.84 | 1.00 | 205.07 | PhiVc < Vu | 55.344 | 280.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 31.54 | 37.50 | -261.26 | 261.26 | 429.28 | 1.00 | 205.07 | PhiVc < Vu | 56.185 | 280.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 31.90 | 37.50 | -262.10 | 262.10 | 334.42 | 1.00 | 205.07 | PhiVc < Vu | 57.026 | 280.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 32.26 | 37.50 | -262.94 | 262.94 | 239.25 | 1.00 | 205.07 | PhiVc < Vu | 57.867 | 280.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 32.63 | 37.50 | -263.78 | 263.78 | 143.78 | 1.00 | 205.07 | PhiVc < Vu | 58.708 | 280.1 | 18.8 | 18.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 32.99 | 37.50 | -264.62 | 264.62 | 48.00 | 1.00 | 205.07 | PhiVc < Vu | 59.549 | 280.1 | 18.8 | 18.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 33.170 | 2,229.90 | 3,106.26 | 0.72 |
| +1.20D+1.60L+0.50S+1.60H | | | | | |
| Span # 1 | 1 | 33.170 | 2,229.90 | 3,106.26 | 0.72 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H | 1 | 0.6123 | 17.129 | | 0.0000 | 0.000 |

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

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File: FWI2101 - Paragon Star.ec6

# Concrete Beam

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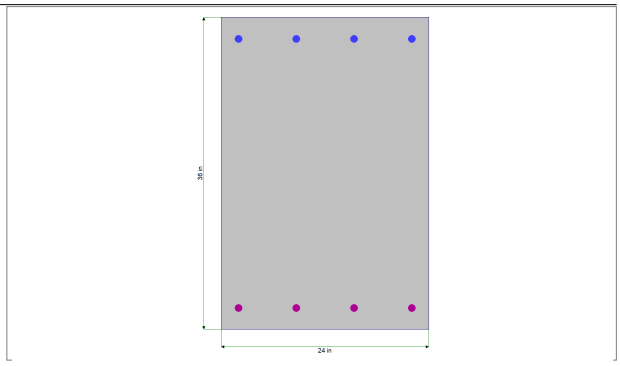
DESCRIPTION: Grid B32

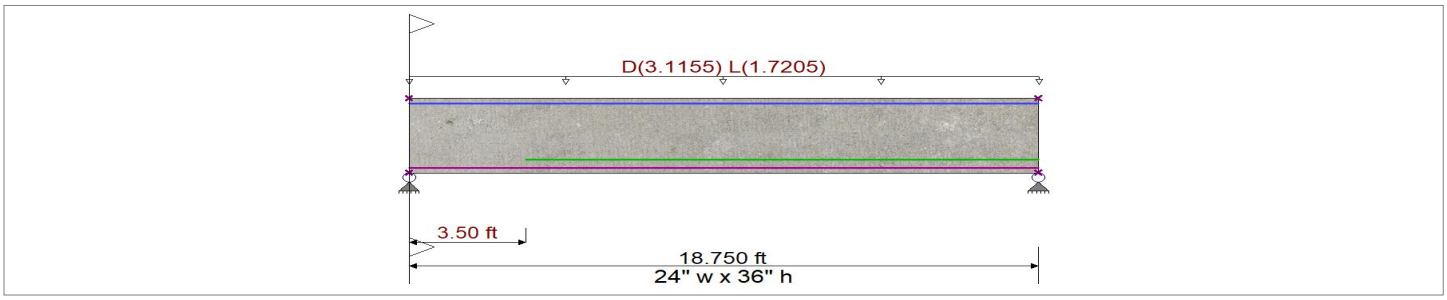
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | ϕ Phi Values | Flexure : | 0.90 |
| fr = f'c^1/2 * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| ψ Density | = | 145.0 pcf | β 1 | = | 0.80 |
| λ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 2.0 |






## Cross Section & Reinforcing Details

Rectangular Section, Width = 24.0 in, Height = 36.0 in
Span #1 Reinforcing....
4-#7 at 2.50 in from Top, from 0.0 to 18.750 ft in this span
4-#7 at 2.50 in from Bottom, from 0.0 to 18.750 ft in this span
2-#7 at 6.50 in from Bottom, from 3.50 to 18.750 ft in this span

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.3350, L = 0.1850 ksf, Tributary Width = 9.30 ft

## DESIGN SUMMARY

**Design OK**

| | | | | | | |
|---|---|---|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.657** : 1 | | Maximum Deflection | | | |
| Section used for this span | **Typical Section** | | Max Downward Transient Deflection | 0.013 in | Ratio = | 17884 >=600. |
| Mu : Applied | 331.144 k-ft | | Max Upward Transient Deflection | 0.000 in | Ratio = | 0 <600.0 |
| Mn * Phi : Allowable | 503.76 k-ft | | Max Downward Total Deflection | 0.047 in | Ratio = | 4779 >=420. |
| Location of maximum on span | 9.358 ft | | Max Upward Total Deflection | 0.000 in | Ratio = | 0 <420.0 |
| Span # where maximum occurs | Span # 1 | | | | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Overall MAXimum | 53.494 | 53.494 |
| Overall MINimum | 16.130 | 16.130 |
| +D+L+H | 53.494 | 53.494 |
| D Only | 37.364 | 37.364 |
| L Only | 16.130 | 16.130 |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.00 | 33.50 | 70.64 | 70.64 | 0.00 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 160.9 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.20 | 33.50 | 69.10 | 69.10 | 14.32 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 160.9 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.41 | 33.50 | 67.56 | 67.56 | 28.32 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 160.9 | 16.8 | 16.0 |

# Concrete Beam

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DESCRIPTION: Grid B32

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.61 | 33.50 | 66.01 | 66.01 | 42.01 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 160.9 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.82 | 33.50 | 64.47 | 64.47 | 55.37 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 160.9 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.02 | 33.50 | 62.92 | 62.92 | 68.43 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 160.9 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.23 | 33.50 | 61.38 | 61.38 | 81.16 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 160.9 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.43 | 33.50 | 59.84 | 59.84 | 93.58 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 160.9 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.64 | 33.50 | 58.29 | 58.29 | 105.68 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 160.9 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.84 | 33.50 | 56.75 | 56.75 | 117.47 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 160.9 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.05 | 33.50 | 55.20 | 55.20 | 128.94 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 160.9 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.25 | 33.50 | 53.66 | 53.66 | 140.10 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 160.9 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.46 | 33.50 | 52.11 | 52.11 | 150.93 | 0.96 | 85.35 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 160.7 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.66 | 33.50 | 50.57 | 50.57 | 161.45 | 0.87 | 84.95 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 160.3 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.87 | 33.50 | 49.03 | 49.03 | 171.66 | 0.80 | 84.60 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 160.0 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.07 | 33.50 | 47.48 | 47.48 | 181.55 | 0.73 | 84.30 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 159.7 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.28 | 33.50 | 45.94 | 45.94 | 191.12 | 0.67 | 84.03 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 159.4 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.48 | 33.50 | 44.39 | 44.39 | 200.37 | 0.62 | 83.80 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 159.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.69 | 33.50 | 42.85 | 42.85 | 209.31 | 0.57 | 83.58 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 159.0 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.89 | 33.50 | 41.31 | 41.31 | 217.94 | 0.53 | 83.39 | Vu < PhiVc/2 | lot Reqd 9.6. | 83.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.10 | 33.50 | 39.76 | 39.76 | 226.24 | 0.49 | 83.22 | Vu < PhiVc/2 | lot Reqd 9.6. | 83.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.30 | 33.50 | 38.22 | 38.22 | 234.23 | 0.46 | 83.06 | Vu < PhiVc/2 | lot Reqd 9.6. | 83.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.51 | 33.50 | 36.67 | 36.67 | 241.90 | 0.42 | 82.92 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.71 | 33.50 | 35.13 | 35.13 | 249.26 | 0.39 | 82.78 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.92 | 33.50 | 33.59 | 33.59 | 256.30 | 0.37 | 82.66 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.12 | 33.50 | 32.04 | 32.04 | 263.03 | 0.34 | 82.54 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.33 | 33.50 | 30.50 | 30.50 | 269.43 | 0.32 | 82.44 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.53 | 33.50 | 28.95 | 28.95 | 275.52 | 0.29 | 82.33 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.74 | 33.50 | 27.41 | 27.41 | 281.30 | 0.27 | 82.24 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.94 | 33.50 | 25.86 | 25.86 | 286.76 | 0.25 | 82.15 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.15 | 33.50 | 24.32 | 24.32 | 291.90 | 0.23 | 82.06 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.35 | 33.50 | 22.78 | 22.78 | 296.72 | 0.21 | 81.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.56 | 33.50 | 21.23 | 21.23 | 301.23 | 0.20 | 81.90 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.76 | 33.50 | 19.69 | 19.69 | 305.43 | 0.18 | 81.82 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.97 | 33.50 | 18.14 | 18.14 | 309.30 | 0.16 | 81.75 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.17 | 33.50 | 16.60 | 16.60 | 312.86 | 0.15 | 81.68 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.38 | 33.50 | 15.06 | 15.06 | 316.11 | 0.13 | 81.61 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.58 | 33.50 | 13.51 | 13.51 | 319.03 | 0.12 | 81.55 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.79 | 33.50 | 11.97 | 11.97 | 321.64 | 0.10 | 81.48 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.99 | 33.50 | 10.42 | 10.42 | 323.94 | 0.09 | 81.42 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 8.20 | 33.50 | 8.88 | 8.88 | 325.91 | 0.08 | 81.36 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 8.40 | 33.50 | 7.33 | 7.33 | 327.58 | 0.06 | 81.29 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 8.61 | 33.50 | 5.79 | 5.79 | 328.92 | 0.05 | 81.23 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 8.81 | 33.50 | 4.25 | 4.25 | 329.95 | 0.04 | 81.17 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.02 | 33.50 | 2.70 | 2.70 | 330.66 | 0.02 | 81.12 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.22 | 33.50 | 1.16 | 1.16 | 331.06 | 0.01 | 81.06 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.43 | 33.50 | -0.39 | 0.39 | 331.14 | 0.00 | 81.03 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.63 | 33.50 | -1.93 | 1.93 | 330.90 | 0.02 | 81.09 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.84 | 33.50 | -3.47 | 3.47 | 330.34 | 0.03 | 81.15 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.04 | 33.50 | -5.02 | 5.02 | 329.47 | 0.04 | 81.20 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.25 | 33.50 | -6.56 | 6.56 | 328.29 | 0.06 | 81.26 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.45 | 33.50 | -8.11 | 8.11 | 326.78 | 0.07 | 81.32 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.66 | 33.50 | -9.65 | 9.65 | 324.97 | 0.08 | 81.39 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.86 | 33.50 | -11.20 | 11.20 | 322.83 | 0.10 | 81.45 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.07 | 33.50 | -12.74 | 12.74 | 320.38 | 0.11 | 81.51 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.27 | 33.50 | -14.28 | 14.28 | 317.61 | 0.13 | 81.58 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.48 | 33.50 | -15.83 | 15.83 | 314.52 | 0.14 | 81.65 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.6 | 0.0 | 0.0 |

# Concrete Beam

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DESCRIPTION: Grid B32

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.68 | 33.50 | -17.37 | 17.37 | 311.12 | 0.16 | 81.71 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.89 | 33.50 | -18.92 | 18.92 | 307.40 | 0.17 | 81.79 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.09 | 33.50 | -20.46 | 20.46 | 303.37 | 0.19 | 81.86 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.30 | 33.50 | -22.00 | 22.00 | 299.02 | 0.21 | 81.94 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.50 | 33.50 | -23.55 | 23.55 | 294.35 | 0.22 | 82.02 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.70 | 33.50 | -25.09 | 25.09 | 289.37 | 0.24 | 82.10 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.91 | 33.50 | -26.64 | 26.64 | 284.07 | 0.26 | 82.19 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.11 | 33.50 | -28.18 | 28.18 | 278.45 | 0.28 | 82.28 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.32 | 33.50 | -29.72 | 29.72 | 272.52 | 0.30 | 82.38 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.52 | 33.50 | -31.27 | 31.27 | 266.27 | 0.33 | 82.49 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.73 | 33.50 | -32.81 | 32.81 | 259.70 | 0.35 | 82.60 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.93 | 33.50 | -34.36 | 34.36 | 252.82 | 0.38 | 82.72 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.14 | 33.50 | -35.90 | 35.90 | 245.62 | 0.41 | 82.85 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.34 | 33.50 | -37.45 | 37.45 | 238.11 | 0.44 | 82.99 | Vu < PhiVc/2 | lot Reqd 9.6. | 83.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.55 | 33.50 | -38.99 | 38.99 | 230.28 | 0.47 | 83.14 | Vu < PhiVc/2 | lot Reqd 9.6. | 83.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.75 | 33.50 | -40.53 | 40.53 | 222.13 | 0.51 | 83.31 | Vu < PhiVc/2 | lot Reqd 9.6. | 83.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.96 | 33.50 | -42.08 | 42.08 | 213.66 | 0.55 | 83.49 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 158.9 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 15.16 | 33.50 | -43.62 | 43.62 | 204.88 | 0.59 | 83.69 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 159.1 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 15.37 | 33.50 | -45.17 | 45.17 | 195.79 | 0.64 | 83.91 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 159.3 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 15.57 | 33.50 | -46.71 | 46.71 | 186.37 | 0.70 | 84.16 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 159.5 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 15.78 | 33.50 | -48.25 | 48.25 | 176.64 | 0.76 | 84.44 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 159.8 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 15.98 | 33.50 | -49.80 | 49.80 | 166.60 | 0.83 | 84.77 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 160.1 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 16.19 | 33.50 | -51.34 | 51.34 | 156.23 | 0.92 | 85.14 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 160.5 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 16.39 | 33.50 | -52.89 | 52.89 | 145.55 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 160.9 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 16.60 | 33.50 | -54.43 | 54.43 | 134.56 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 160.9 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 16.80 | 33.50 | -55.98 | 55.98 | 123.25 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 160.9 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 17.01 | 33.50 | -57.52 | 57.52 | 111.62 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 160.9 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 17.21 | 33.50 | -59.06 | 59.06 | 99.67 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 160.9 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 17.42 | 33.50 | -60.61 | 60.61 | 87.41 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 160.9 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 17.62 | 33.50 | -62.15 | 62.15 | 74.83 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 160.9 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 17.83 | 33.50 | -63.70 | 63.70 | 61.94 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 160.9 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 18.03 | 33.50 | -65.24 | 65.24 | 48.73 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 160.9 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 18.24 | 33.50 | -66.78 | 66.78 | 35.20 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 160.9 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 18.44 | 33.50 | -68.33 | 68.33 | 21.36 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 160.9 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 18.65 | 33.50 | -69.87 | 69.87 | 7.20 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 160.9 | 16.8 | 16.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 18.750 | 331.14 | 503.76 | 0.66 |
| +1.20D+1.60L+0.50S+1.60H | | | | | |
| Span # 1 | 1 | 18.750 | 331.14 | 503.76 | 0.66 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H | 1 | 0.0471 | 9.375 | | 0.0000 | 0.000 |

Title Block Line 1
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and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

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# Concrete Beam

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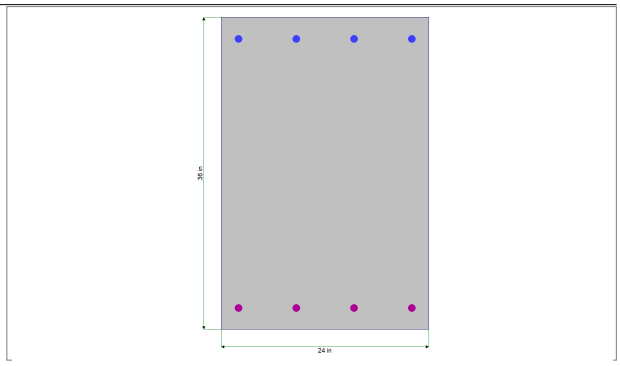
DESCRIPTION: Grid B33

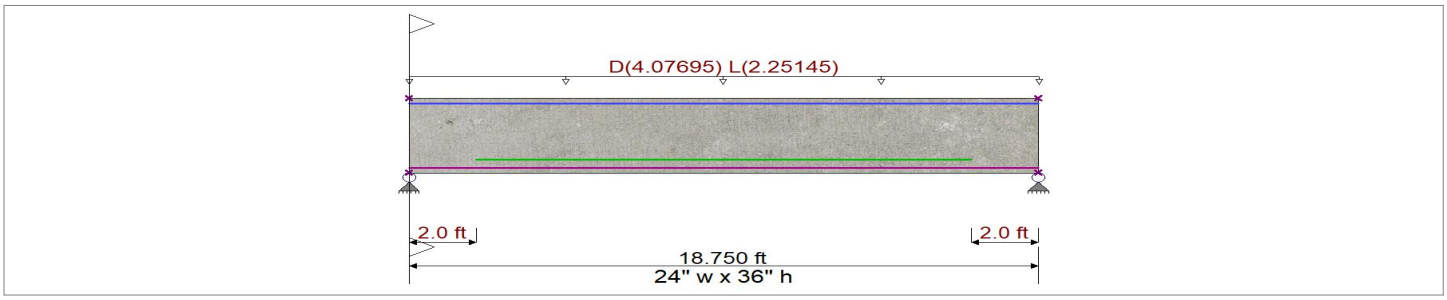
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | ϕ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| ψ Density | = | 145.0 pcf | $\beta_1$ | = | 0.80 |
| λ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup = | | 2.0 |






## Cross Section & Reinforcing Details

Rectangular Section, Width = 24.0 in, Height = 36.0 in
Span #1 Reinforcing....
4-#7 at 2.50 in from Top, from 0.0 to 18.750 ft in this span
4-#7 at 2.50 in from Bottom, from 0.0 to 18.750 ft in this span
4-#7 at 6.50 in from Bottom, from 2.0 to 16.750 ft in this span

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.3350, L = 0.1850 ksf, Tributary Width = 12.170 ft

## DESIGN SUMMARY

**Design OK**

| | | | | | | |
|---|---|---|---|---|---|---|
| Maximum Bending Stress Ratio = | **0.645** : 1 | | Maximum Deflection | | | |
| Section used for this span | **Typical Section** | | Max Downward Transient Deflection | 0.016 in | Ratio = | 13666 >=600. |
| Mu : Applied | 419.178 k-ft | | Max Upward Transient Deflection | 0.000 in | Ratio = | 0 <600.0 |
| Mn * Phi : Allowable | 650.30 k-ft | | Max Downward Total Deflection | 0.093 in | Ratio = | 2421 >=420. |
| Location of maximum on span | 9.358 ft | | Max Upward Total Deflection | 0.000 in | Ratio = | 0 <420.0 |
| Span # where maximum occurs | Span # 1 | | | | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Overall MAXimum | 67.485 | 67.485 |
| Overall MINimum | 21.107 | 21.107 |
| +D+L+H | 67.485 | 67.485 |
| D Only | 46.378 | 46.378 |
| L Only | 21.107 | 21.107 |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.00 | 33.50 | 89.42 | 89.42 | 0.00 | 1.00 | 85.51 | PhiVc < Vu | 3.912 | 123.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.20 | 33.50 | 87.47 | 87.47 | 18.12 | 1.00 | 85.51 | PhiVc < Vu | 1.957 | 123.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.41 | 33.50 | 85.52 | 85.52 | 35.85 | 1.00 | 85.51 | PhiVc < Vu | 0.002427 | 123.2 | 16.8 | 16.0 |

# Concrete Beam

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DESCRIPTION: Grid B33

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.61 | 33.50 | 83.56 | 83.56 | 53.17 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 123.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.82 | 33.50 | 81.61 | 81.61 | 70.09 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 123.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.02 | 33.50 | 79.65 | 79.65 | 86.62 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 123.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.23 | 33.50 | 77.70 | 77.70 | 102.74 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 123.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.43 | 33.50 | 75.74 | 75.74 | 118.46 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 123.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.64 | 33.50 | 73.79 | 73.79 | 133.78 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 123.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.84 | 33.50 | 71.83 | 71.83 | 148.70 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 123.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.05 | 33.50 | 69.88 | 69.88 | 163.22 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 123.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.25 | 33.50 | 67.92 | 67.92 | 177.34 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 123.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.46 | 33.50 | 65.97 | 65.97 | 191.06 | 0.96 | 85.35 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 123.0 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.66 | 33.50 | 64.01 | 64.01 | 204.38 | 0.87 | 84.95 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 122.6 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.87 | 33.50 | 62.06 | 62.06 | 217.29 | 0.80 | 84.60 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 122.3 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.07 | 33.50 | 60.11 | 60.11 | 229.81 | 0.73 | 84.30 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 122.0 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.28 | 33.50 | 58.15 | 58.15 | 241.93 | 0.67 | 84.03 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 121.7 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.48 | 33.50 | 56.20 | 56.20 | 253.64 | 0.62 | 83.80 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 121.5 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.69 | 33.50 | 54.24 | 54.24 | 264.96 | 0.57 | 83.58 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 121.3 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.89 | 33.50 | 52.29 | 52.29 | 275.87 | 0.53 | 83.39 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 121.1 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.10 | 33.50 | 50.33 | 50.33 | 286.39 | 0.49 | 83.22 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 120.9 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.30 | 33.50 | 48.38 | 48.38 | 296.50 | 0.46 | 83.06 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 120.8 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.51 | 33.50 | 46.42 | 46.42 | 306.21 | 0.42 | 82.92 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 120.6 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.71 | 33.50 | 44.47 | 44.47 | 315.53 | 0.39 | 82.78 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 120.5 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.92 | 33.50 | 42.51 | 42.51 | 324.44 | 0.37 | 82.66 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 120.3 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.12 | 33.50 | 40.56 | 40.56 | 332.95 | 0.34 | 82.54 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.33 | 33.50 | 38.60 | 38.60 | 341.06 | 0.32 | 82.44 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.53 | 33.50 | 36.65 | 36.65 | 348.77 | 0.29 | 82.33 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.74 | 33.50 | 34.69 | 34.69 | 356.08 | 0.27 | 82.24 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.94 | 33.50 | 32.74 | 32.74 | 362.99 | 0.25 | 82.15 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.15 | 33.50 | 30.79 | 30.79 | 369.50 | 0.23 | 82.06 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.35 | 33.50 | 28.83 | 28.83 | 375.61 | 0.21 | 81.98 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.56 | 33.50 | 26.88 | 26.88 | 381.32 | 0.20 | 81.90 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.76 | 33.50 | 24.92 | 24.92 | 386.62 | 0.18 | 81.82 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.97 | 33.50 | 22.97 | 22.97 | 391.53 | 0.16 | 81.75 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.17 | 33.50 | 21.01 | 21.01 | 396.04 | 0.15 | 81.68 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.38 | 33.50 | 19.06 | 19.06 | 400.14 | 0.13 | 81.61 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.58 | 33.50 | 17.10 | 17.10 | 403.85 | 0.12 | 81.55 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.79 | 33.50 | 15.15 | 15.15 | 407.15 | 0.10 | 81.48 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.99 | 33.50 | 13.19 | 13.19 | 410.05 | 0.09 | 81.42 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 8.20 | 33.50 | 11.24 | 11.24 | 412.56 | 0.08 | 81.36 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 8.40 | 33.50 | 9.28 | 9.28 | 414.66 | 0.06 | 81.29 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 8.61 | 33.50 | 7.33 | 7.33 | 416.36 | 0.05 | 81.23 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 8.81 | 33.50 | 5.38 | 5.38 | 417.66 | 0.04 | 81.17 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.02 | 33.50 | 3.42 | 3.42 | 418.57 | 0.02 | 81.12 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.22 | 33.50 | 1.47 | 1.47 | 419.07 | 0.01 | 81.06 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.43 | 33.50 | -0.49 | 0.49 | 419.17 | 0.00 | 81.03 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.63 | 33.50 | -2.44 | 2.44 | 418.87 | 0.02 | 81.09 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.84 | 33.50 | -4.40 | 4.40 | 418.17 | 0.03 | 81.15 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.04 | 33.50 | -6.35 | 6.35 | 417.06 | 0.04 | 81.20 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.25 | 33.50 | -8.31 | 8.31 | 415.56 | 0.06 | 81.26 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.45 | 33.50 | -10.26 | 10.26 | 413.66 | 0.07 | 81.32 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.66 | 33.50 | -12.22 | 12.22 | 411.36 | 0.08 | 81.39 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.86 | 33.50 | -14.17 | 14.17 | 408.65 | 0.10 | 81.45 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.07 | 33.50 | -16.13 | 16.13 | 405.55 | 0.11 | 81.51 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.27 | 33.50 | -18.08 | 18.08 | 402.04 | 0.13 | 81.58 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.48 | 33.50 | -20.04 | 20.04 | 398.14 | 0.14 | 81.65 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.6 | 0.0 | 0.0 |

# Concrete Beam

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DESCRIPTION: Grid B33

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.68 | 33.50 | -21.99 | 21.99 | 393.83 | 0.16 | 81.71 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.7 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.89 | 33.50 | -23.94 | 23.94 | 389.13 | 0.17 | 81.79 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.8 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.09 | 33.50 | -25.90 | 25.90 | 384.02 | 0.19 | 81.86 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.30 | 33.50 | -27.85 | 27.85 | 378.51 | 0.21 | 81.94 | Vu < PhiVc/2 | lot Reqd 9.6. | 81.9 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.50 | 33.50 | -29.81 | 29.81 | 372.60 | 0.22 | 82.02 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.0 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.70 | 33.50 | -31.76 | 31.76 | 366.30 | 0.24 | 82.10 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.1 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.91 | 33.50 | -33.72 | 33.72 | 359.59 | 0.26 | 82.19 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.2 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.11 | 33.50 | -35.67 | 35.67 | 352.48 | 0.28 | 82.28 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.3 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.32 | 33.50 | -37.63 | 37.63 | 344.97 | 0.30 | 82.38 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.52 | 33.50 | -39.58 | 39.58 | 337.06 | 0.33 | 82.49 | Vu < PhiVc/2 | lot Reqd 9.6. | 82.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.73 | 33.50 | -41.54 | 41.54 | 328.74 | 0.35 | 82.60 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 120.3 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.93 | 33.50 | -43.49 | 43.49 | 320.03 | 0.38 | 82.72 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 120.4 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.14 | 33.50 | -45.45 | 45.45 | 310.92 | 0.41 | 82.85 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 120.5 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.34 | 33.50 | -47.40 | 47.40 | 301.41 | 0.44 | 82.99 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 120.7 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.55 | 33.50 | -49.35 | 49.35 | 291.49 | 0.47 | 83.14 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 120.8 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.75 | 33.50 | -51.31 | 51.31 | 281.18 | 0.51 | 83.31 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 121.0 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.96 | 33.50 | -53.26 | 53.26 | 270.47 | 0.55 | 83.49 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 121.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 15.16 | 33.50 | -55.22 | 55.22 | 259.35 | 0.59 | 83.69 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 121.4 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 15.37 | 33.50 | -57.17 | 57.17 | 247.84 | 0.64 | 83.91 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 121.6 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 15.57 | 33.50 | -59.13 | 59.13 | 235.92 | 0.70 | 84.16 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 121.8 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 15.78 | 33.50 | -61.08 | 61.08 | 223.60 | 0.76 | 84.44 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 122.1 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 15.98 | 33.50 | -63.04 | 63.04 | 210.89 | 0.83 | 84.77 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 122.5 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 16.19 | 33.50 | -64.99 | 64.99 | 197.77 | 0.92 | 85.14 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 122.8 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 16.39 | 33.50 | -66.95 | 66.95 | 184.25 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 123.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 16.60 | 33.50 | -68.90 | 68.90 | 170.33 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 123.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 16.80 | 33.50 | -70.86 | 70.86 | 156.01 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 123.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 17.01 | 33.50 | -72.81 | 72.81 | 141.29 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 123.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 17.21 | 33.50 | -74.77 | 74.77 | 126.17 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 123.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 17.42 | 33.50 | -76.72 | 76.72 | 110.65 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 123.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 17.62 | 33.50 | -78.67 | 78.67 | 94.73 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 123.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 17.83 | 33.50 | -80.63 | 80.63 | 78.41 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 123.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 18.03 | 33.50 | -82.58 | 82.58 | 61.68 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 123.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 18.24 | 33.50 | -84.54 | 84.54 | 44.56 | 1.00 | 85.51 | PhiVc/2 < Vu <= | Min 9.6.3.1 | 123.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 18.44 | 33.50 | -86.49 | 86.49 | 27.04 | 1.00 | 85.51 | PhiVc < Vu | 0.9797 | 123.2 | 16.8 | 16.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 18.65 | 33.50 | -88.45 | 88.45 | 9.11 | 1.00 | 85.51 | PhiVc < Vu | 2.934 | 123.2 | 16.8 | 16.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 18.750 | 419.18 | 650.30 | 0.64 |
| +1.20D+1.60L+0.50S+1.60H | | | | | |
| Span # 1 | 1 | 18.750 | 419.18 | 650.30 | 0.64 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H | 1 | 0.0929 | 9.375 | | 0.0000 | 0.000 |

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 28 JUN 2022, 1:42PM

# Concrete Beam

File: FWI2101 - Paragon Star.ec6

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Lic. # : KW-06011403

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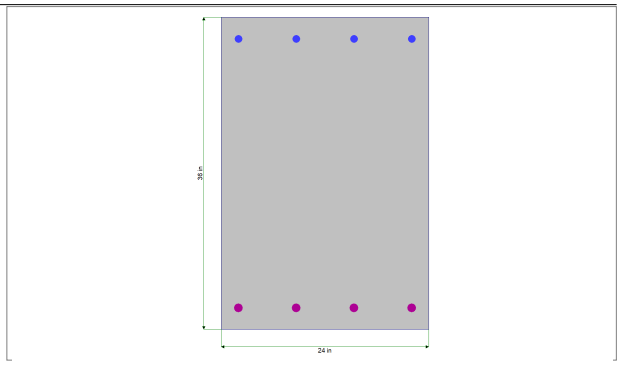
DESCRIPTION: Grid B34

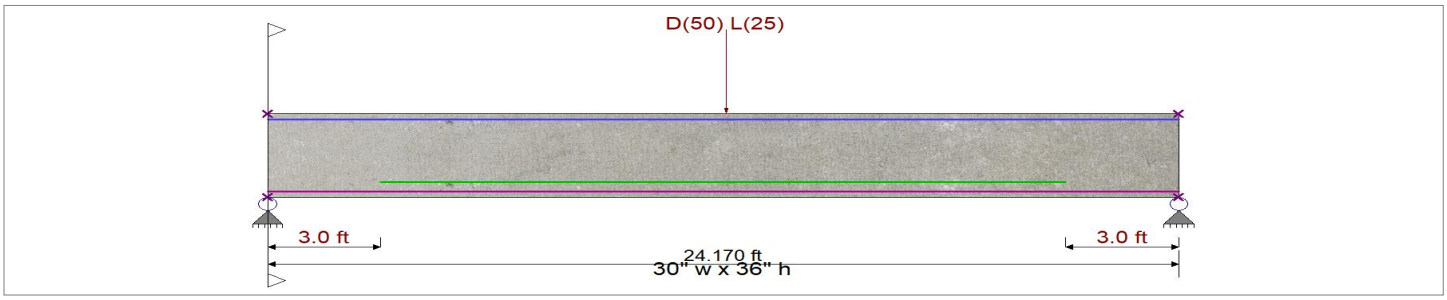
## CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

## Material Properties

| | | | | | |
|---|---|---|---|---|---|
| f'c | = | 5.0 ksi | ϕ Phi Values | Flexure : | 0.90 |
| fr = f'c$^{1/2}$ * 7.50 | = | 530.33 psi | | Shear : | 0.750 |
| ψ Density | = | 145.0 pcf | $\beta_1$ | = | 0.80 |
| λ LtWt Factor | = | 1.0 | | | |
| Elastic Modulus | = | 4,074.28 ksi | Fy - Stirrups | | 60.0 ksi |
| fy - Main Rebar | = | 60.0 ksi | E - Stirrups | = | 29,000.0 ksi |
| E - Main Rebar | = | 29,000.0 ksi | Stirrup Bar Size # | | 4 |
| | | | Number of Resisting Legs Per Stirrup | = | 2.0 |




## Cross Section & Reinforcing Details

Rectangular Section, Width = 30.0 in, Height = 36.0 in
Span #1 Reinforcing....
4-#7 at 2.50 in from Top, from 0.0 to 24.170 ft in this span
4-#8 at 2.50 in from Bottom, from 0.0 to 24.170 ft in this span
4-#8 at 6.50 in from Bottom, from 3.0 to 21.170 ft in this span

Beam self weight calculated and added to loads
Point Load : D = 50.0, L = 25.0 k @ 12.170 ft, (B33 Reaction)

## DESIGN SUMMARY

**Design OK**

| | | | | | | |
|---|---|---|---|---|---|---|
| Maximum Bending Stress Ratio | = | **0.817** : 1 | Maximum Deflection | | | |
| Section used for this span | | **Typical Section** | Max Downward Transient Deflection | 0.027 in | Ratio = | 10851 >=600. |
| Mu : Applied | | 698.57 k-ft | Max Upward Transient Deflection | 0.000 in | Ratio = | 0 <600.0 |
| Mn * Phi : Allowable | | 854.58 k-ft | Max Downward Total Deflection | 0.219 in | Ratio = | 1322 >=420. |
| Location of maximum on span | | 12.151 ft | Max Upward Total Deflection | 0.000 in | Ratio = | 0 <420.0 |
| Span # where maximum occurs | | Span # 1 | | | | |

## Vertical Reactions

Support notation : Far left is #1

| Load Combination | Support 1 | Support 2 |
|---|---|---|
| Overall MAXimum | 50.379 | 50.906 |
| Overall MINimum | 12.412 | 12.588 |
| +D+L+H | 50.379 | 50.906 |
| D Only | 37.967 | 38.318 |
| L Only | 12.412 | 12.588 |

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.00 | 33.50 | 65.42 | 65.42 | 0.00 | 1.00 | 107.19 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 147.4 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.26 | 33.50 | 65.07 | 65.07 | 17.24 | 1.00 | 107.19 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 147.4 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.53 | 33.50 | 64.73 | 64.73 | 34.38 | 1.00 | 107.19 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 147.4 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 0.79 | 33.50 | 64.39 | 64.39 | 51.43 | 1.00 | 107.19 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 147.4 | 15.1 | 15.0 |

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# Concrete Beam

DESCRIPTION: Grid B34

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.06 | 33.50 | 64.04 | 64.04 | 68.39 | 1.00 | 107.19 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 147.4 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.32 | 33.50 | 63.70 | 63.70 | 85.27 | 1.00 | 107.19 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 147.4 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.58 | 33.50 | 63.35 | 63.35 | 102.05 | 1.00 | 107.19 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 147.4 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 1.85 | 33.50 | 63.01 | 63.01 | 118.73 | 1.00 | 107.19 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 147.4 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.11 | 33.50 | 62.66 | 62.66 | 135.33 | 1.00 | 107.19 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 147.4 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.38 | 33.50 | 62.32 | 62.32 | 151.84 | 1.00 | 107.19 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 147.4 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.64 | 33.50 | 61.97 | 61.97 | 168.25 | 1.00 | 107.19 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 147.4 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 2.91 | 33.50 | 61.63 | 61.63 | 184.58 | 0.93 | 106.79 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 147.0 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.17 | 33.50 | 61.28 | 61.28 | 200.81 | 0.85 | 106.31 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 146.5 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.43 | 33.50 | 60.94 | 60.94 | 216.95 | 0.78 | 105.91 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 146.1 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.70 | 33.50 | 60.59 | 60.59 | 233.01 | 0.73 | 105.57 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 145.8 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 3.96 | 33.50 | 60.25 | 60.25 | 248.97 | 0.68 | 105.27 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 145.5 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.23 | 33.50 | 59.90 | 59.90 | 264.84 | 0.63 | 105.01 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 145.2 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.49 | 33.50 | 59.56 | 59.56 | 280.61 | 0.59 | 104.78 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 145.0 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 4.75 | 33.50 | 59.21 | 59.21 | 296.30 | 0.56 | 104.57 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 144.8 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.02 | 33.50 | 58.87 | 58.87 | 311.90 | 0.53 | 104.39 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 144.6 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.28 | 33.50 | 58.52 | 58.52 | 327.40 | 0.50 | 104.22 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 144.4 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.55 | 33.50 | 58.18 | 58.18 | 342.82 | 0.47 | 104.07 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 144.3 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 5.81 | 33.50 | 57.84 | 57.84 | 358.14 | 0.45 | 103.94 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 144.1 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.08 | 33.50 | 57.49 | 57.49 | 373.37 | 0.43 | 103.81 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 144.0 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.34 | 33.50 | 57.15 | 57.15 | 388.51 | 0.41 | 103.70 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 143.9 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.60 | 33.50 | 56.80 | 56.80 | 403.56 | 0.39 | 103.59 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 143.8 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 6.87 | 33.50 | 56.46 | 56.46 | 418.52 | 0.38 | 103.50 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 143.7 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.13 | 33.50 | 56.11 | 56.11 | 433.39 | 0.36 | 103.41 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 143.6 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.40 | 33.50 | 55.77 | 55.77 | 448.16 | 0.35 | 103.32 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 143.5 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.66 | 33.50 | 55.42 | 55.42 | 462.85 | 0.33 | 103.25 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 143.4 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 7.92 | 33.50 | 55.08 | 55.08 | 477.44 | 0.32 | 103.17 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 143.4 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 8.19 | 33.50 | 54.73 | 54.73 | 491.95 | 0.31 | 103.11 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 143.3 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 8.45 | 33.50 | 54.39 | 54.39 | 506.36 | 0.30 | 103.04 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 143.2 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 8.72 | 33.50 | 54.04 | 54.04 | 520.68 | 0.29 | 102.98 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 143.2 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 8.98 | 33.50 | 53.70 | 53.70 | 534.91 | 0.28 | 102.93 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 143.1 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.25 | 33.50 | 53.35 | 53.35 | 549.05 | 0.27 | 102.87 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 143.1 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.51 | 33.50 | 53.01 | 53.01 | 563.10 | 0.26 | 102.82 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 143.0 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 9.77 | 33.50 | 52.66 | 52.66 | 577.06 | 0.25 | 102.78 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 143.0 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.04 | 33.50 | 52.32 | 52.32 | 590.92 | 0.25 | 102.73 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 142.9 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.30 | 33.50 | 51.98 | 51.98 | 604.70 | 0.24 | 102.69 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 142.9 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.57 | 33.50 | 51.63 | 51.63 | 618.38 | 0.23 | 102.65 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 142.8 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 10.83 | 33.50 | 51.29 | 51.29 | 631.97 | 0.23 | 102.61 | Vu < PhiVc/2 | lot Reqd 9.6. | 102.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.09 | 33.50 | 50.94 | 50.94 | 645.48 | 0.22 | 102.57 | Vu < PhiVc/2 | lot Reqd 9.6. | 102.6 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.36 | 33.50 | 50.60 | 50.60 | 658.89 | 0.21 | 102.54 | Vu < PhiVc/2 | lot Reqd 9.6. | 102.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.62 | 33.50 | 50.25 | 50.25 | 672.21 | 0.21 | 102.50 | Vu < PhiVc/2 | lot Reqd 9.6. | 102.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 11.89 | 33.50 | 49.91 | 49.91 | 685.43 | 0.20 | 102.47 | Vu < PhiVc/2 | lot Reqd 9.6. | 102.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.15 | 33.50 | 49.56 | 49.56 | 698.57 | 0.20 | 102.44 | Vu < PhiVc/2 | lot Reqd 9.6. | 102.4 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.42 | 33.50 | -50.78 | 50.78 | 687.10 | 0.21 | 102.49 | Vu < PhiVc/2 | lot Reqd 9.6. | 102.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.68 | 33.50 | -51.13 | 51.13 | 673.64 | 0.21 | 102.52 | Vu < PhiVc/2 | lot Reqd 9.6. | 102.5 | 0.0 | 0.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 12.94 | 33.50 | -51.47 | 51.47 | 660.09 | 0.22 | 102.56 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 142.8 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.21 | 33.50 | -51.82 | 51.82 | 646.45 | 0.22 | 102.59 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 142.8 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.47 | 33.50 | -52.16 | 52.16 | 632.71 | 0.23 | 102.63 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 142.8 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 13.74 | 33.50 | -52.51 | 52.51 | 618.89 | 0.24 | 102.67 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 142.9 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.00 | 33.50 | -52.85 | 52.85 | 604.97 | 0.24 | 102.71 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 142.9 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.26 | 33.50 | -53.20 | 53.20 | 590.97 | 0.25 | 102.76 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 143.0 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.53 | 33.50 | -53.54 | 53.54 | 576.87 | 0.26 | 102.80 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 143.0 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 14.79 | 33.50 | -53.89 | 53.89 | 562.68 | 0.27 | 102.85 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 143.1 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 15.06 | 33.50 | -54.23 | 54.23 | 548.40 | 0.28 | 102.90 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 143.1 | 15.1 | 15.0 |

# Concrete Beam

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DESCRIPTION: Grid B34

## Detailed Shear Information

| Load Combination | Span Number | Distance (ft) | 'd' (in) | Vu (k) Actual | Vu (k) Design | Mu (k-ft) | d*Vu/Mu | Phi*Vc (k) | Comment | Phi*Vs (k) | Phi*Vn (k) | Spacing (in) Req'd | Spacing (in) Suggest |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +1.20D+1.60L+0.50S+1.60H | 1 | 15.32 | 33.50 | -54.57 | 54.57 | 534.03 | 0.29 | 102.96 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 143.2 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 15.59 | 33.50 | -54.92 | 54.92 | 519.57 | 0.30 | 103.01 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 143.2 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 15.85 | 33.50 | -55.26 | 55.26 | 505.02 | 0.31 | 103.08 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 143.3 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 16.11 | 33.50 | -55.61 | 55.61 | 490.37 | 0.32 | 103.14 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 143.3 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 16.38 | 33.50 | -55.95 | 55.95 | 475.64 | 0.33 | 103.21 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 143.4 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 16.64 | 33.50 | -56.30 | 56.30 | 460.81 | 0.34 | 103.29 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 143.5 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 16.91 | 33.50 | -56.64 | 56.64 | 445.90 | 0.35 | 103.37 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 143.6 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 17.17 | 33.50 | -56.99 | 56.99 | 430.89 | 0.37 | 103.45 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 143.7 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 17.43 | 33.50 | -57.33 | 57.33 | 415.79 | 0.38 | 103.55 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 143.7 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 17.70 | 33.50 | -57.68 | 57.68 | 400.60 | 0.40 | 103.65 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 143.8 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 17.96 | 33.50 | -58.02 | 58.02 | 385.32 | 0.42 | 103.76 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 144.0 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 18.23 | 33.50 | -58.37 | 58.37 | 369.95 | 0.44 | 103.88 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 144.1 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 18.49 | 33.50 | -58.71 | 58.71 | 354.48 | 0.46 | 104.01 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 144.2 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 18.75 | 33.50 | -59.06 | 59.06 | 338.93 | 0.49 | 104.15 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 144.3 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 19.02 | 33.50 | -59.40 | 59.40 | 323.28 | 0.51 | 104.31 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 144.5 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 19.28 | 33.50 | -59.75 | 59.75 | 307.55 | 0.54 | 104.48 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 144.7 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 19.55 | 33.50 | -60.09 | 60.09 | 291.72 | 0.58 | 104.67 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 144.9 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 19.81 | 33.50 | -60.43 | 60.43 | 275.80 | 0.61 | 104.89 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 145.1 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 20.08 | 33.50 | -60.78 | 60.78 | 259.79 | 0.65 | 105.14 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 145.3 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 20.34 | 33.50 | -61.12 | 61.12 | 243.69 | 0.70 | 105.42 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 145.6 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 20.60 | 33.50 | -61.47 | 61.47 | 227.50 | 0.75 | 105.74 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 145.9 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 20.87 | 33.50 | -61.81 | 61.81 | 211.22 | 0.82 | 106.11 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 146.3 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 21.13 | 33.50 | -62.16 | 62.16 | 194.84 | 0.89 | 106.54 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 146.7 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 21.40 | 33.50 | -62.50 | 62.50 | 178.38 | 0.98 | 107.06 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 147.3 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 21.66 | 33.50 | -62.85 | 62.85 | 161.82 | 1.00 | 107.19 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 147.4 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 21.92 | 33.50 | -63.19 | 63.19 | 145.18 | 1.00 | 107.19 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 147.4 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 22.19 | 33.50 | -63.54 | 63.54 | 128.44 | 1.00 | 107.19 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 147.4 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 22.45 | 33.50 | -63.88 | 63.88 | 111.61 | 1.00 | 107.19 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 147.4 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 22.72 | 33.50 | -64.23 | 64.23 | 94.69 | 1.00 | 107.19 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 147.4 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 22.98 | 33.50 | -64.57 | 64.57 | 77.68 | 1.00 | 107.19 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 147.4 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 23.25 | 33.50 | -64.92 | 64.92 | 60.57 | 1.00 | 107.19 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 147.4 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 23.51 | 33.50 | -65.26 | 65.26 | 43.38 | 1.00 | 107.19 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 147.4 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 23.77 | 33.50 | -65.61 | 65.61 | 26.10 | 1.00 | 107.19 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 147.4 | 15.1 | 15.0 |
| +1.20D+1.60L+0.50S+1.60H | 1 | 24.04 | 33.50 | -65.95 | 65.95 | 8.72 | 1.00 | 107.19 | PhiVc/2 < Vu <= | Min 11.5.6.3 | 147.4 | 15.1 | 15.0 |

## Maximum Forces & Stresses for Load Combinations

| Load Combination / Segment | Span # | Location (ft) along Beam | Bending Stress Results ( k-ft ) Mu : Max | Phi*Mnx | Stress Ratio |
|---|---|---|---|---|---|
| MAXimum BENDING Envelope | | | | | |
| Span # 1 | 1 | 24.170 | 698.57 | 854.58 | 0.82 |
| +1.20D+1.60L+0.50S+1.60H | | | | | |
| Span # 1 | 1 | 24.170 | 698.57 | 854.58 | 0.82 |

## Overall Maximum Deflections

| Load Combination | Span | Max. "-" Defl (in) | Location in Span (ft) | Load Combination | Max. "+" Defl (in) | Location in Span (ft) |
|---|---|---|---|---|---|---|
| +D+L+H | 1 | 0.2193 | 12.085 | | 0.0000 | 0.000 |