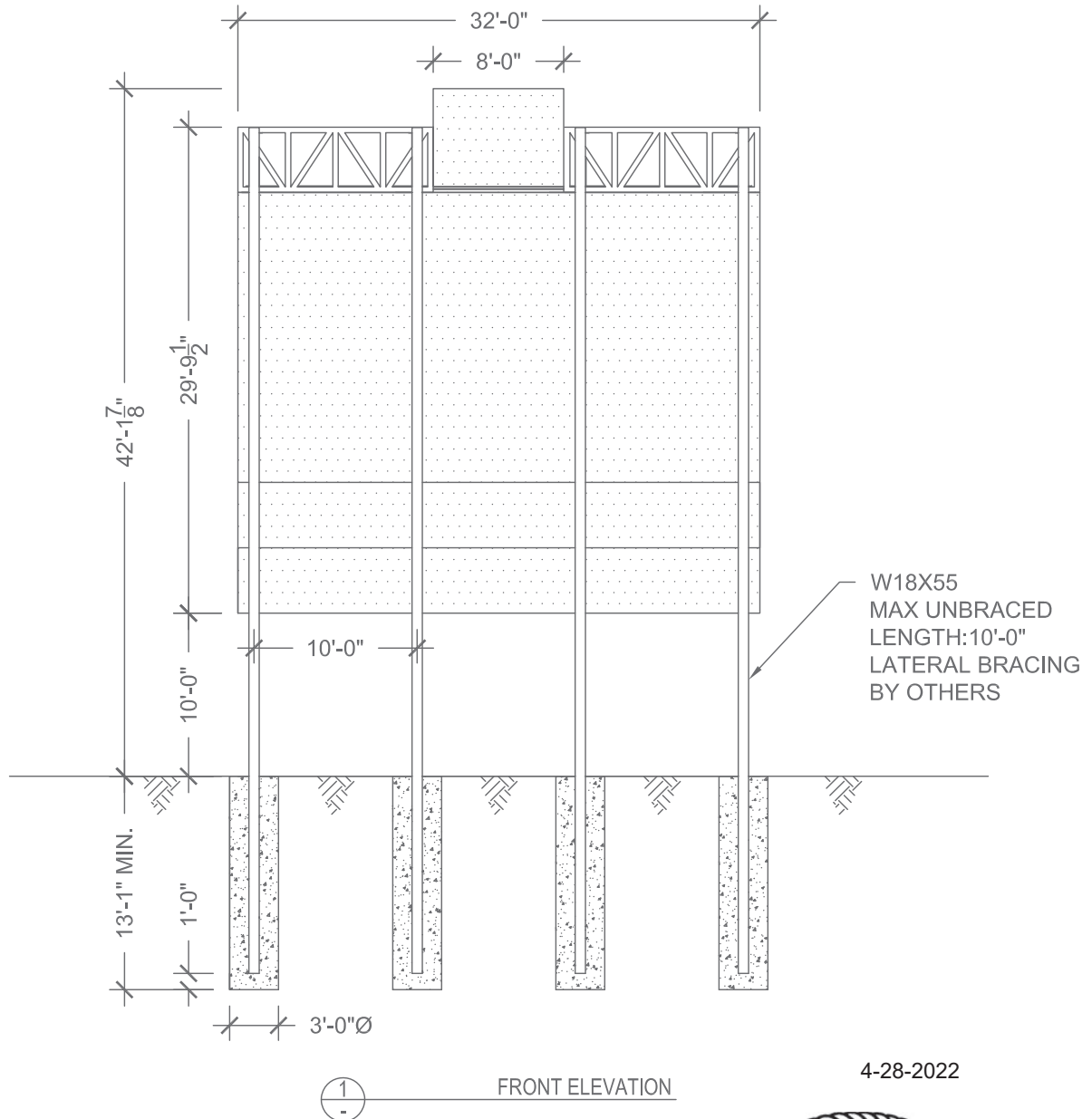




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PROJECT: LEE'S SUMMIT NORTH HIGH SCHOOL - 901 NE DOUGLAS STREET, LEE'S SUMMIT, MO  
PROJECT #: 34804  
CLIENT: NEVCO

DATE: 4/27/2022  
ENGINEER: AV  
LAST REVISED:



## GENERAL NOTES

1. DESIGN CODE: IBC 2018
2. DESIGN LOADS: ASCE 7-16
3. WIND VELOCITY: 110 MPH EXPOSURE C
4. CONCRETE 2500 PSI MIN.
5. WIDE FLANGE STEEL ASTM A992,  $F_y = 50$  KSI MIN.
6. PROVIDE 3" CONCRETE COVER MIN. ON ALL STEEL EMBEDDED IN CONCRETE WHEN CAST AGAINST SOIL
7. PROVIDE PROTECTION AGAINST DISSIMILAR METALS USING ANTI-CORROSIVE PAINT OR NEOPRENE GASKETS.
8. LATERAL SOIL BEARING PER IBC CLASS 4 (150 PSF/FT)
9. ALL DIMENSIONS TO BE VERIFIED PRIOR TO FABRICATION.





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V5.5

units; pounds, feet unless noted otherwise

### Applied Wind Loads; from ASCE 7-16

$F = q_z * G * C_f * A_f$  with  $q_z = 0.00256 K_z K_{zt} K_d V^2$  (29.3.2 & 29.4)  
 $C_f = 1.679$  (Fig. 29.3-1)  $1.00$   $0$  max. height= 41.79  
 $K_{zt} = 1.0$  (26.8.2) (=1.0 unless unusual landscape)  $s = 25.79$   
 $K_z =$  from table 28.3-1 Exposure= c  
 $K_d = 0.85$  for signs (table 26.6-1)  
 $V = 110$  mph  
 $G = 0.85$  (26.9) weight= 3.123 kips  
 $s/h = 0.617$   $M_{DL} = 0.00$  k-ft  
 $B/s = 1.24$

| Pole Loads | structure component | height at section c.g. | $K_z$ | $q_z$ | pressure $q_z * G * C_f$ | $A_f$ | shear                                                 | Wind Moment $M_w$                               |
|------------|---------------------|------------------------|-------|-------|--------------------------|-------|-------------------------------------------------------|-------------------------------------------------|
|            | 1                   | 5.0                    | 0.850 | 22.4  | 31.95                    | 6.4   | 204                                                   | 1018                                            |
|            | 2                   | 12.5                   | 0.850 | 22.4  | 31.95                    | 50.0  | 1597                                                  | 19967                                           |
|            | 3                   | 17.5                   | 0.876 | 23.1  | 32.92                    | 50.0  | 1646                                                  | 28809                                           |
|            | 4                   | 22.5                   | 0.921 | 24.2  | 34.61                    | 50.0  | 1730                                                  | 38934                                           |
|            | 5                   | 27.5                   | 0.961 | 25.3  | 36.11                    | 50.0  | 1806                                                  | 49654                                           |
|            | 6                   | 32.5                   | 0.996 | 26.2  | 37.42                    | 50.0  | 1871                                                  | 60807                                           |
|            | 7                   | 35.396                 | 1.012 | 26.7  | 38.05                    | 7.9   | 301                                                   | 10667                                           |
|            | 8                   | 37.792                 | 1.027 | 27.04 | 38.59                    | 40.0  | 1544                                                  | 58339                                           |
|            | 9                   | 39.896                 | 1.040 | 27.38 | 39.09                    | 0.8   | 33                                                    | 1297                                            |
|            | 10                  | 40.896                 | 1.045 | 27.51 | 39.28                    | 7.2   | 282                                                   | 11514                                           |
| sums:      |                     |                        |       |       |                          |       | 312.3                                                 | 11013                                           |
|            |                     |                        |       |       |                          |       | 281.01                                                | ( $M_w$ ) k-ft arm= 25.5                        |
|            |                     |                        |       |       |                          |       | $P_u = 3.75$ kip                                      | $M = 281.01$ k-ft $M = \sqrt{M_{DL}^2 + M_w^2}$ |
|            |                     |                        |       |       |                          |       | $M_u = \sqrt{(1.2M_{DL}^2 + 1.0M_w^2)} = 281.01$ k-ft |                                                 |

### Pole Design

section; W flange

$M_u \leq \phi M_n$  with  $M_n = f_y Z$   $f_y = 50$  ksi  $\phi = 0.9$

| H        | $M_u$ (k-ft) | Z req'd. (in) | USE                                                                              |
|----------|--------------|---------------|----------------------------------------------------------------------------------|
| at grade | 281.0        | 74.94         | W18X55 W-FLANGE, $\phi M_n = 362.96$ k-ft<br>(See page #3 for w-flange capacity) |

### Footing Design

footprint: round

$\omega = 1.3$  IBC 1605.3.2 IBC Table 1806.2, sections 1806.3.4, 1807.3.2  $S = (1.3x2x)$   
 $P = 8.59$  kip  $S1 = S \times d / 3$   $A = 2.34 \times P / (S1 \times b)$   $S = 400$   
 $S1 = 1600$   $d = 0.5xA (1 + (1 + 4.36x h/A)^{.5})$  IBC 1807.3.2.1  
 $A = 4.19$

footing: 3' - 0" dia.

13' - 1" deep



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Check W18X55 for flexure

(AISC 14 F2)

|          |                                                                                        |                          |            |                      |
|----------|----------------------------------------------------------------------------------------|--------------------------|------------|----------------------|
| Yielding | $M_u =$                                                                                | 3372 k-in (See Page #2)  | $F_y =$    | 50 ksi               |
|          | $Z_x =$                                                                                |                          |            | 112 in <sup>3</sup>  |
|          | $M_n = M_p = F_y Z =$                                                                  | 5600 k-in (eq'n. F2-1)   | $L_b =$    | 120 in               |
|          |                                                                                        |                          | $L_p =$    | 70.79 in             |
| LTB:     |                                                                                        |                          | $L_r =$    | 210.5 in             |
|          | $M_n = C_b [M_p - (M_p - 0.7 F_y S_x) ((L_b - L_p) / (L_r - L_p))] =$                  | 4839.4 k-in (eq'n. F2-2) | $E =$      | 29000 ksi            |
|          |                                                                                        |                          | $r_y =$    | 1.67 in              |
|          | $F_{cr} = C_b \pi^2 E / (L_b / r_t)^2 (1 + 0.078 J_c / S_x h_o (L_b / r_t)^2)^{1/2} =$ | 89.566 ksi (eq'n. F2-4)  | $S_x =$    | 98.3 in <sup>3</sup> |
|          |                                                                                        |                          | $J =$      | 1.66 in <sup>4</sup> |
|          | $\phi M_n =$                                                                           | 4355.5 k-in OK           | $h_o =$    | 17.5 in              |
|          |                                                                                        |                          | $c =$      | 1                    |
|          |                                                                                        |                          | $r_{ts} =$ | 1.999                |
|          | $P_u / 2 P_c + (M_u / M_c) =$                                                          | 0.7774 (eq'n. H1-1)      | $\phi =$   | 0.9                  |

**OK**