

**ADDENDUM NO. 2**  
**to the**  
**LA MIRADA HIGH SCHOOL NEW FOOTBALL STADIUM PROJECT**  
**for the**  
**NORWALK-LA MIRADA UNIFIED SCHOOL DISTRICT**  
**BID NO. 202122-4 (Formal, DSA #03-120551/03-120869)**

This addendum forms a part of the contract and modifies the original bid documents. It is intended that all work affected by the following modifications shall conform to related provisions and general conditions of the contract, of the original bid package. **Modify the following items wherever appearing in any portion of the bid package.** Acknowledge receipt of Addendum No. 2 in the space provided on this form as well as on the bid form. Failure to do so may subject bidder to disqualification.

\*\*\*\*\*

Project Modifications/Changes/Additions/Deletions and/or RFI Responses are hereby made:

**Document(s):**

- **NLMUSD'S Addendum No. 2 consists of this document along with one (1) attachment file as summarized herewith:** and foremost, the attachment file (along with this doc) can be found at: [www.crplanwell.com](http://www.crplanwell.com)

**Attachment Files:**

- ADDM 2

**ALL OTHER PROVISIONS** of the Contract Documents shall remain unchanged. This Addendum is hereby made a part of the Contract Documents to the same extent as those provisions contained in the original documents and all itemized listings thereof.

**NOTE:** The failure or omission of any bidder to receive or examine any contract document, form, instrument, addendum, plans or other document, or to visit the site and acquaint himself with the conditions there existing shall by no means relieve any bidder from any obligation with respect to his bid or to the contract.

**PLEASE SIGN AND RETURN ONE COPY OF THIS ADDENDUM WITH YOUR BID FORM.**

\_\_\_\_\_  
Company Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

## **ADDENDUM #2- DSA Submittal - NARRATIVE OF CHANGES**

**DSA A#:** 03-120551

**PROJECT:** La Mirada High School, New Football Stadium  
13520 Adelfa Dr, La Mirada, CA 90638

**OWNER:** Norwalk La Mirada Unified School District (NLMUSD)  
12820 Pioneer Boulevard, Norwalk, CA 90650  
Bomee Yoon Facilities Coordinator, Facilities Planning & Construction  
Email: [byoon@nlmusd.k12.ca.us](mailto:byoon@nlmusd.k12.ca.us)

**ARCHITECT:** NAC Architecture  
837 North Spring Street, Third Floor  
Los Angeles, CA 90012

**DATE:** March 3, 2022

**NAC PROJECT #:** 161-19015  
Changes included in this addendum are itemized below:

### **ARCHITECTURAL**

#### SHEET REVISIONS

A3.00

- Updated roof assembly details to add underlayment

A9.01

- Updated metal roof notes and components on details 8 & 9
- Updated singly ply roof detail notes and components on details 1, 3, 5 & 6

A9.02

- Updated metal roof notes and components on details 1, 2 & 3

### **FIELD LIGHTING**

#### SHEET REVISIONS

MT1

- Updated Cs values in general notes. Add reference to document containing

site-specific seismic parameters. Update seismic moments and shears in pole forces table. See next page for further information including updated calculations.

End narrative



9931 MUIRLANDS BOULEVARD, IRVINE, CALIFORNIA 92618  
TEL (949)462-3200 FAX (949)462-3201 WWW.KNASTRUCTURAL.COM

**DATE:** February 28, 2022

**TO:** Division of the State Architect

**RE:** La Mirada HS Football Field Lighting  
Musco Sports Lighting Poles  
Request for Addendum Approval  
DSA Application No. 03-120551

**FROM:** Josh Randall, SE 4506

$C_s$  values and seismic moment and shear reactions have been updated to reflect the use of site-specific seismic parameters provided by the geotechnical engineer.

The increase on pole demands is minimal and all poles and their foundations are still adequate for their current designs.

The revisions required to the approved drawings are as follows:

- Sheet MS1: Update  $C_s$  values in general notes. Add reference to document containing site-specific seismic parameters. Update seismic moments and shears in pole forces table.

All revisions from the approved drawings have been “clouded”.

Thank you for your assistance in facilitating this revision. If you have any questions, we are available to respond.

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## **ADDENDUM #2- DSA Submittal**

### **Response to pre-construction Requests for Information from Bidders:**

**DSA A#:** 03-120551

**PROJECT:** La Mirada High School, New Football Stadium  
13520 Adelfa Dr, La Mirada, CA 90638

**OWNER:** Norwalk La Mirada Unified School District (NLMUSD)  
12820 Pioneer Boulevard, Norwalk, CA 90650  
Bomee Yoon Facilities Coordinator, Facilities Planning & Construction  
Email: [byoon@nlmusd.k12.ca.us](mailto:byoon@nlmusd.k12.ca.us)

**ARCHITECT:** NAC Architecture  
837 North Spring Street, Third Floor  
Los Angeles, CA 90012

**DATE:** March 3, 2022

**NAC PROJECT #:** 161-19015

#### **GENERAL**

RFI No. 1 QUESTION

What is the engineer's estimate?

#### RESPONSE

\$13M

RFI No. 2 QUESTION

Will the District consider the following experience acceptable to suffice the requirements outlined in Additional Special Conditions – Specific Experience Requirements of Prime Contractor and its Field Superintendent:

1. Construction of a 30-acre joint use community and high school sports park with over 80,000 sf synthetic turf football field with stadium seating and press box as well as 4 ball fields and 3 concessions buildings. Project was constructed by Prime Contractor and Executive Project Manager who will be spending at least 8 hrs a week on the LMHS Project.

2. Construction of a \$15 million-plus public works project constructed with synthetic turf components on an occupied and secure site. Project was constructed by Prime Contractor, Project Superintendent, and Executive Project Manager.

#### RESPONSE



1. Completed two (2) projects during the last seven (7) years in California that required the construction and installation of a synthetic turf athletic field consisting of at least 57,600 square feet of synthetic field surface would be acceptable experience. Both the prime contractor **and** the field superintendent assigned to this Project must have above required experience.
2. It is unclear whether the referenced \$15 million-plus public works project constructed with a synthetic turf athletic field consisted of at least 57,600 square feet of synthetic field surface. As required in Addendum No. 1 Additional Special Conditions and/or Information provided, Section 1, the prime contractor prime contractor must submit documents and other evidence confirming the prime contractor **and** its field superintendent meet these experience requirements as determined by the Architect in his or her discretion.

End



**MUSCO LIGHTING, INC.**  
**Light Structure Pole and Foundation Standard**

This confidential report is provided exclusively for the use of engineering approval. The technical information provided herein is the confidential property of Musco Lighting, Inc., and reproduction of this report or use of this information for anything other than its limited, intended purpose as to this project, without the written permission of Musco Lighting, Inc., is prohibited.

**ITEM : Structural Calculations  
Pole Foundation Standard**

**PROJECT : La Mirada High School  
La Mirada, CA  
Addendum #02**

**PROJECT NO : 200279  
363.589**

**DATE : 2/28/2022**

The only change from original DSA approved calcs is the use of site-specific seismic design parameters and revision of the Cs formulas due to the ASCE 7 Chapter 11 exemptions no longer being applicable. Changes are clouded.



**ENGINEER :**  **KNA  
STRUCTURAL  
ENGINEERS**  
**JOSH RANDALL, SE No. 4506**  
**9931 Muirlands Blvd**  
**Irvine, CA 92618**

DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE TO REVIEW THE STRUCTURAL CALCULATIONS AND MUSCO LIGHTING DRAWINGS AND PROVIDE STATEMENT OF GENERAL CONFORMANCE PRIOR TO SUBMITTAL TO DSA
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**MUSCO LIGHTING, INC.**  
**Light Structure Pole and Foundation Standard**

Calculation Index

**CONTENTS:**

<u>Page</u>	<u>Item</u>	
1-3	LSS100-B (w/ 7 Fixtures)	-Wind Analysis
4-5	LSS100-B (w/ 7 Fixtures)	-Seismic Analysis
6-8	LSS100-B (w/ 10 Fixtures)	-Wind Analysis
9-10	LSS100-B (w/ 10 Fixtures)	-Seismic Analysis
11-12	Precast Base by Cretex	
13-15	LSS110-C (w/ 10 Fixtures)	-Wind Analysis
16-17	LSS110-C (w/ 10 Fixtures)	-Seismic Analysis
18-19	Precast Base by Cretex	
20	Foundation Check	
21-22	Pier Reinforcing Strain Calcs	
Appendix "A"	ATC Hazards by location-Wind	
Appendix "B"	Site-Specific Seismic Design Parameters	

**CODE REFERENCE:**

**State of California Code of Regulations Title 24, Part 1, 2: 2019 Edition**

**2018 IBC**

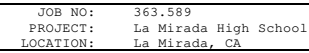
**ACI 318-14**

Building Code Requirements for Structural Concrete

**AISC 360-16**

Specifications for Structural Steel Buildings





POLE ID: F1, F3, F4, F6

ATTACHMENT	NUMBER	DIST. FROM	PA	Cf	EPA	Kz	qz	WIND,F	WEIGHT,P
TYPE		TOP POLE,FT	SQ FT		SQ FT		PSF	LBS	LBS
LED1500	7.0	0.5		1.0	3.71	1.268	29.29	186	721
	0.0	3.0		1.0	3.71	1.261	29.14	0	0
	0.0	8.5		1.0	3.71	1.254	28.98	0	0
	0.0	8.0		1.0	3.71	1.247	28.82	0	0
	0.0	10.5		1.0	3.71	1.240	28.66	0	0
SPEAKER	1.0	86.4	1.65	1.3	2.14	0.849	19.61	51	41
LED400	2.0	11.4	2.33	1.3	3.03	1.238	28.60	208	121
LED575	3.0	81.4	1.73	1.3	2.25	0.902	20.84	169	143
ANTENNA	1.0	86.4	2.68	1.3	3.49	0.849	19.61	82	37
CAMERA	1.0	86.4	0.98	1.3	1.27	0.849	19.61	30	36
ECE	12.0	86.9	10.00	1.3	13.00	0.849	19.61	307	240
TOTALS =							1763	1338	

LOADING DIAGRAM

```

-> L = 101.36 ft. (max.ht. from grade)
-> l = 101.36 ft. (ht. from grade at base of pole) 99.38 ft.(nom. ht from grade)
->tA = 0.125 in. (pole thk. @ top)
->dA = 8.00 in. (pole diam. @ top)
->dB = 20.70 in. (pole diam. @ btm)
->tB = 0.239 in. (pole thk. @ btm)
->Fy = 38.0 ksi (fixt mount sect. = 5.25 ft)
->Fy = 55.0 ksi (other pole sect.)
-> E = 29,000 ksi
->Kzt = 1 (Figure 26.8-1)
->Kd = 1 (Table 26.6-1)
->Kz = 1.269 MAX-EXP C @ 101.4 FT. (Table 26.10-1)
->Ke = 1.00 (Table 26.9-1)
->Cf = 1.00 LIGHT FIXTURE (INCLUDED IN EPA)
->Cf = 0.700 MAX (VARIES 0.5-1.2 FOR RND POLE) (Figure 29.5-1)
POLE DAMPING, beta= 0.03 Per Musco test

```

→ POLE NATURAL FREQUENCY = 0.348 Hz  $1/(2\pi \cdot (\Delta/386)^{0.5})$  where  $\Delta$  is due to self weight  
→  $G_f = 1.20$  (Section 26.11.5) (Reference Vibration Problems in Engineering by Timoshenko, 4th ED. pg.34)

```

Pole Properties:
Ia = 23.98 in4          taper = 0.140 in/ft
Ib = 804 in4           db/da = 2.588
ra = 2.785 in          rb = 7.235 in.
Aa = 3.093 in2         Ab = 15.36 in2
Sa = 5.99 in3          Sb = 77.69 in3

From Critical Buckling Loads of Tapered Columns, ASCE 2/62:
n = Log (Ib/Ia) / Log (db/da) = 3.69
P* = (Ib/Ia) / (Ib/Ia)^.333 = 10.4
kl/req* (1/(P*)^*.5) [kl/ra] = 284 (where k= 2.1)
AISC 360-16 Specification Table B4.1, Case 15

```

Section 26.11.5 Gust-Effect Factor			
constant epsilon,e	=	0.2	Lz = 565.0
constant 1	=	500	N1 = 1.976
	=	99.50	Rn = 0.090
Vz	=	1.631	
4.6n1h/Vz	=	1.631	
4.6n1B/Vz	=	0.019	R = 1.119
15.4n1L/Vz	=	0.064	gR = 3.930
			C = 0.200
Rh	=	0.432	lz = 0.181
RB	=	0.987	Q = 0.907
RL	=	0.958	G = 0.881
		GF =	1.204

[illegible]

2/28/2022																				LS100-B wind				
Distance From top of Pole FT	Outside Diameter of Pole, D IN	Pole thick, t IN	D/t	Kz	qz PSF	Cf Pole	kl/r equiv.	E3-4 Fe	E3-2 or E3-3 Design comp strength, Pr KIPS	Acting unfactored, Pr KIPS	F8.1-F8.4 Design flex strength, M K-FT	Req'd flex. length, M K-FT	Pr/Pc	H1-1b for Pr/Pc < 0.2	H1-1a for Pr/Pc ≥ 0.2	2nd Order /1st Order Moment FT-K	Req'd shea length,, KIPS	1st Order Delta IN	C2.2a P-Delta Moment FT-K	Total 2nd Order Moment FT-K	E7-19 Q	ACTING MOM DUE TO DL	M/I	DEFL DUE TO DL IN
0	8.00	0.125	64.0	1.269	29.32	0.7	284	3.54	8.64	0.000	21.36	0.0	0.000	0.000	N.A.	1.000	Y	0.000	95.5	0.0	1.1198	0.00	0.00011	80.75
1	8.00	0.125	64.0	1.267	29.26	0.7	284	3.54	8.64	0.732	21.36	0.5	0.102	0.079	N.A.	1.284	Y	0.932	93.7	0.1	1.1198	0.01	0.01558	79.27
2	8.00	0.125	64.0	1.264	29.20	0.7	284	3.54	8.64	0.742	21.36	1.4	0.103	0.130	N.A.	1.189	Y	0.948	91.9	0.3	1.1198	0.74	0.04653	77.79
3	8.00	0.125	64.0	1.261	29.14	0.7	284	3.54	8.64	0.753	21.36	2.4	0.105	0.182	N.A.	1.170	Y	0.965	90.1	0.4	1.1198	1.49	0.07791	76.32
4	8.00	0.125	64.0	1.259	29.08	0.7	284	3.54	8.64	0.763	21.36	3.3	0.106	0.234	N.A.	1.162	Y	0.981	88.3	0.5	1.1198	2.25	0.10974	74.84
5	8.00	0.125	64.0	1.256	29.01	0.7	284	3.54	8.64	0.779	21.36	4.3	0.108	0.288	N.A.	1.157	Y	0.997	86.5	0.7	1.1198	3.02	0.10736	73.37
6	8.65	0.179	48.3	1.253	28.95	0.7	284	3.54	13.30	0.796	50.11	5.3	0.072	0.159	N.A.	1.154	Y	1.014	84.8	0.8	1.0813	3.80	0.09578	71.91
7	8.79	0.179	49.1	1.250	28.89	0.7	284	3.54	13.52	0.813	51.65	6.4	0.072	0.178	N.A.	1.152	Y	1.032	83.0	1.0	1.0747	4.61	0.10889	70.46
8	8.93	0.179	49.9	1.247	28.82	0.7	284	3.54	13.74	0.830	53.20	7.4	0.072	0.196	N.A.	1.150	Y	1.050	81.2	1.1	1.0683	5.43	0.12098	69.01
9	9.07	0.179	50.7	1.245	28.76	0.7	284	3.54	13.96	0.847	54.78	8.5	0.073	0.214	N.A.	1.149	Y	1.068	79.5	1.3	1.0621	6.27	0.13214	67.56
10	9.21	0.179	51.5	1.242	28.69	0.7	284	3.54	14.18	0.864	56.38	9.5	0.073	0.231	N.A.	1.148	Y	1.087	77.7	1.4	1.0561	7.12	0.14244	66.13
11	9.35	0.179	52.2	1.239	28.62	0.7	284	3.54	14.40	0.882	58.00	10.6	0.074	0.247	N.A.	1.147	Y	1.105	76.0	1.6	1.0503	7.99	0.15197	64.70
12	9.49	0.179	53.0	1.236	28.56	0.7	284	3.54	14.62	1.021	59.65	11.8	0.084	0.270	N.A.	1.147	Y	1.332	74.3	1.7	1.0446	8.89	0.16179	63.28
13	9.63	0.179	53.8	1.233	28.49	0.7	284	3.54	14.84	1.040	61.32	13.2	0.084	0.288	N.A.	1.145	Y	1.351	72.6	1.9	1.0391	9.92	0.17189	61.88
14	9.77	0.179	54.6	1.230	28.42	0.7	284	3.54	15.06	1.058	63.01	14.5	0.084	0.306	N.A.	1.144	Y	1.371	70.9	2.1	1.0338	10.96	0.18122	60.48
15	9.91	0.179	55.4	1.227	28.35	0.7	284	3.54	15.28	1.077	64.73	15.9	0.085	0.324	N.A.	1.143	Y	1.390	69.2	2.3	1.0286	12.03	0.18984	59.09
16	10.05	0.179	56.1	1.224	28.28	0.7	284	3.54	15.50	1.096	66.47	17.3	0.085	0.340	N.A.	1.142	Y	1.410	67.5	2.5	1.0235	13.12	0.19781	57.71
17	10.19	0.179	56.9	1.221	28.21	0.7	284	3.54	15.72	1.116	68.23	18.8	0.085	0.356	N.A.	1.141	Y	1.430	65.9	2.6	1.0186	14.22	0.20517	56.34
18	10.33	0.179	57.7	1.218	28.14	0.7	284	3.54	15.94	1.135	70.01	20.2	0.085	0.372	N.A.	1.140	Y	1.451	64.2	2.8	1.0139	15.35	0.21198	54.99
19	10.47	0.179	58.5	1.215	28.07	0.7	284	3.54	16.16	1.155	71.81	21.7	0.086	0.386	N.A.	1.139	Y	1.471	62.6	3.0	1.0092	16.50	0.21828	53.65
20	10.61	0.179	59.3	1.212	28.00	0.7	284	3.54	16.38	1.176	73.64	23.1	0.086	0.401	N.A.	1.139	Y	1.492	61.0	3.2	1.0047	17.66	0.22411	52.32
21	10.75	0.179	60.1	1.209	27.93	0.7	284	3.54	16.60	1.195	75.49	24.6	0.086	0.414	N.A.	1.138	Y	1.513	59.4	3.4	1.0003	18.85	0.24202	51.01
22	10.53	0.179	58.8	1.205	27.85	0.7	284	3.54	16.25	1.215	72.60	26.2	0.090	0.455	N.A.	1.137	Y	1.534	57.9	3.6	1.0073	20.05	0.25961	49.70
23	10.67	0.179	59.6	1.202	27.78	0.7	284	3.54	16.47	1.236	74.43	27.7	0.090	0.468	N.A.	1.136	Y	1.554	56.3	3.8	1.0028	21.28	0.26434	48.42
24	10.81	0.179	60.4	1.199	27.70	0.7	284	3.54	16.69	1.256	76.30	29.3	0.090	0.481	N.A.	1.136	Y	1.575	54.8	4.0	0.9984	22.52	0.26869	47.15
25	10.95	0.179	61.2	1.196	27.63	0.7	284	3.54	16.91	1.277	78.18	30.9	0.091	0.493	N.A.	1.135	Y	1.596	53.3	4.2	0.9942	23.79	0.27267	45.89
26	11.09	0.179	62.0	1.192	27.55	0.7	284	3.54	17.13	1.298	80.09	32.5	0.091	0.505	N.A.	1.134	Y	1.617	51.8	4.4	0.9901	25.08	0.27633	44.65
27	11.23	0.179	62.7	1.189	27.47	0.7	284	3.54	17.35	1.320	82.01	34.1	0.091	0.517	N.A.	1.133	Y	1.639	50.3	4.5	0.986	26.39	0.27967	43.43
28	11.37	0.179	63.5	1.186	27.39	0.7	284	3.54	17.57	1.342	83.97	35.7	0.092	0.528	N.A.	1.133	Y	1.661	48.9	4.7	0.9821	27.72	0.28273	42.22
29	11.51	0.179	64.3	1.182	27.32	0.7	284	3.54	17.79	1.364	85.94	37.4	0.092	0.539	N.A.	1.132	Y	1.683	47.5	4.9	0.9783	29.07	0.28553	41.04
30	11.65	0.179	65.1	1.179	27.24	0.7	284	3.54	18.01	1.386	87.94	39.1	0.092	0.549	N.A.	1.131	Y	1.705	46.1	5.1	0.9745	30.44	0.28809	39.86
31	11.79	0.179	65.9	1.175	27.15	0.7	284	3.54	18.23	1.408	89.96	40.8	0.093	0.559	N.A.	1.130	Y	1.727	44.7	5.3	0.9709	31.84	0.29042	38.71
32	11.93	0.179	66.6	1.172	27.07	0.7	284	3.54	18.45	1.431	92.00	42.6	0.093	0.569	N.A.	1.130	Y	1.750	43.3	5.5	0.9673	33.26	0.29255	37.57
33	12.07	0.179	67.4	1.168	26.99	0.7	284	3.54	18.67	1.454	94.07	44.3	0.093	0.579	N.A.	1.129	Y	1.772	42.0	5.7	0.9638	34.70	0.29448	36.45
34	12.21	0.179	68.2	1.165	26.91	0.7	284	3.54	18.89	1.477	96.16	46.1	0.094	0.588	N.A.	1.128	Y	1.795	40.7	5.9	0.9604	36.17	0.29624	35.35
35	12.35	0.179	69.0	1.161	26.82	0.7	284	3.54	19.11	1.501	98.27	47.9	0.094	0.597	N.A.	1.127	Y	1.819	39.4	6.1	0.9571	37.66	0.29783	34.26
36	12.49	0.179	69.8	1.157	26.74	0.7	284	3.54	19.33	1.525	100.40	49.7	0.095	0.605	N.A.	1.126	Y	1.842	38.1	6.3	0.9538	39.17	0.29927	33.19
37	12.63	0.179	70.6	1.153	26.65	0.7	284	3.54	19.55	1.549	102.56	51.6	0.095	0.614	N.A.	1.126	Y	1.865	36.9	6.5	0.9506	40.71	0.30057	32.14
38	12.77	0.179	71.3	1.150	26.56	0.7	284	3.54	19.77	1.573	104.74	53.5	0.095	0.622	N.A.	1.125	Y	1.889	35.7	6.7	0.9475	42.27	0.30173	31.11
39	12.91	0.179	72.1	1.146	26.47	0.7	284	3.54	19.99	1.598	106.94	55.4	0.096	0.630	N.A.	1.124	Y	1.913	34.5	6.9	0.9445	43.85	0.30277	30.10
40	13.05	0.179	72.9	1.142	26.38	0.7	284	3.54	20.21	1.623	109.16	57.3	0.096	0.638	N.A.	1.123	Y	1.937	33.3	7.1	0.9415	45.46	0.3037	29.10
41	13.19	0.179	73.7	1.138	26.29	0.7	284	3.54	20.43	1.648	111.41	59.2	0.097	0.645	N.A.	1.122	Y	1.961	32.2	7.2	0.9386	47.10	0.30453	28.12
42	13.33	0.179	74.5	1.134	26.20	0.7	284	3.54	20.65	1.673	113.68	61.2	0.097	0.653	N.A.	1.121	Y	1.986	31.0	7.4	0.9357	48.76	0.30526	27.16
43	13.47	0.179	75.3	1.130	26.11	0.7	284	3.54	20.87	1.699	115.98	63.2	0.098	0.660	N.A.	1.121	Y	2.010	29.9	7.6	0.9329	50.44	0.30589	26.22
44	13.61	0.179	76.0	1.126	26.01	0.7	284	3.54	21.09	1.725	118.29	65.2	0.098	0.667	N.A.	1.120	Y	2.035	28.8	7.8	0.9302	52.16	0.30645	25.30
45	13.75	0.179	76.8	1.122	25.92	0.7	284	3.54	21.31	1.751	120.63	67.3	0.099	0.673	N.A.	1.119	Y	2.060	27.8	8.0	0.9275	53.89	0.30692	24.39
46	13.89	0.179	77.6	1.117	25.82	0.7	284	3.54	21.53	1.778	122.99	69.4	0.099	0.680	N.A.	1.118	Y	2.085	26.7	8.2	0.9249	55.66	0.30732	23.50
47	14.03	0.179	78.4	1.113	25.72	0.7	284	3.54	21.75	1.804	125.37	71.5	0.100	0.686	N.A.	1.117	Y	2.110	25.7	8.4	0.9223	57.45	0.30766	22.64
48	14.17	0.179	79.2	1.109	25.62	0.7	284	3.54	21.97	1.831	127.78	73.6	0.100	0.693	N.A.	1.116	Y	2.135	24.7	8.5	0.9198	59.27	0.30793	21.79
49	14.31	0.179	79.9	1.104	25.52	0.7	284	3.54	22.19	1.859	130.21	75.7	0.101	0.699	N.A.	1.115</								

51	14.28/2022	0.179	81.5	1.095	25.31	0.7	284	3.54	22.63	1.914	135.14	80.1	0.102	0.711	N.A.	1.113	Y	2.212	21.9	9.1	89.2	0.9125	64.88	1.9108	9.34
52	14.73	0.179	82.3	1.091	25.20	0.7	284	3.54	22.85	1.942	137.64	82.3	0.102	0.716	N.A.	1.112	Y	2.238	21.0	9.3	91.6	0.9101	66.81	0.30848	18.57
53	14.87	0.179	83.1	1.086	25.09	0.7	284	3.54	23.07	1.971	140.16	84.6	0.103	0.722	N.A.	1.111	Y	2.264	20.1	9.4	94.0	0.9079	68.77	0.30851	17.81
54	15.01	0.179	83.9	1.081	24.98	0.7	284	3.54	23.29	1.999	142.70	86.9	0.103	0.727	N.A.	1.111	Y	2.291	19.2	9.6	96.5	0.9056	70.75	0.30849	17.07
55	15.15	0.179	84.6	1.077	24.87	0.7	284	3.54	23.51	2.028	145.27	89.2	0.104	0.733	N.A.	1.110	Y	2.317	18.4	9.8	98.9	0.9034	72.77	0.30843	16.35
56	15.29	0.179	85.4	1.072	24.76	0.7	284	3.54	23.73	2.057	147.85	91.5	0.104	0.738	N.A.	1.109	Y	2.343	17.6	9.9	101.4	0.9012	74.81	0.30834	15.64
57	15.43	0.179	86.2	1.067	24.64	0.7	284	3.54	23.95	2.087	150.47	93.8	0.105	0.743	N.A.	1.108	Y	2.370	16.8	10.1	103.9	0.8991	76.88	0.30822	14.96
58	15.57	0.179	87.0	1.061	24.52	0.7	284	3.54	24.17	2.117	153.10	96.2	0.105	0.748	N.A.	1.107	Y	2.397	16.0	10.3	106.5	0.897	78.98	0.30807	14.29
59	15.71	0.179	87.8	1.056	24.40	0.7	284	3.54	24.39	2.147	155.76	98.6	0.106	0.753	N.A.	1.106	Y	2.423	15.3	10.4	109.1	0.895	81.11	0.30789	13.64
60	15.85	0.179	88.5	1.051	24.28	0.7	284	3.54	24.61	2.186	158.44	101.1	0.107	0.758	N.A.	1.105	Y	2.450	14.6	10.6	111.7	0.8929	83.28	0.27878	13.01
61	15.63	0.239	65.4	1.046	24.16	0.7	284	3.54	32.27	2.226	211.24	103.5	0.083	0.582	N.A.	1.104	Y	2.477	13.9	10.7	114.3	0.973	85.48	0.2496	12.40
62	15.77	0.239	66.0	1.040	24.03	0.7	284	3.54	32.56	2.266	214.86	106.0	0.083	0.586	N.A.	1.103	Y	2.503	13.2	10.9	116.9	0.9703	87.73	0.2493	11.80
63	15.91	0.239	66.6	1.034	23.90	0.7	284	3.54	32.86	2.306	218.50	108.5	0.084	0.589	N.A.	1.102	Y	2.530	12.5	11.0	119.6	0.9677	90.01	0.249	11.22
64	16.05	0.239	67.2	1.029	23.77	0.7	284	3.54	33.15	2.347	222.17	111.1	0.085	0.593	N.A.	1.101	Y	2.557	11.9	11.2	122.3	0.965	92.34	0.24872	10.65
65	16.19	0.239	67.7	1.023	23.63	0.7	284	3.54	33.44	2.388	225.88	113.7	0.086	0.596	N.A.	1.100	Y	2.583	11.3	11.3	125.0	0.9624	94.71	0.24844	10.10
66	16.33	0.239	68.3	1.017	23.49	0.7	284	3.54	33.74	2.429	229.61	116.3	0.086	0.600	N.A.	1.099	Y	2.610	10.6	11.5	127.7	0.9599	97.11	0.24817	9.56
67	16.47	0.239	68.9	1.011	23.35	0.7	284	3.54	34.03	2.471	233.38	118.9	0.087	0.603	N.A.	1.098	Y	2.637	10.1	11.6	130.5	0.9574	99.56	0.24791	9.04
68	16.61	0.239	69.5	1.004	23.21	0.7	284	3.54	34.32	2.513	237.17	121.5	0.088	0.606	N.A.	1.097	Y	2.664	9.5	11.8	133.3	0.955	102.06	0.24766	8.53
69	16.75	0.239	70.1	0.998	23.06	0.7	284	3.54	34.62	2.556	241.00	124.2	0.089	0.609	N.A.	1.096	Y	2.691	8.9	11.9	136.1	0.9526	104.59	0.24741	8.04
70	16.89	0.239	70.7	0.991	22.91	0.7	284	3.54	34.91	2.599	244.85	126.9	0.089	0.612	N.A.	1.095	Y	2.718	8.4	12.1	139.0	0.9502	107.17	0.24717	7.56
71	17.03	0.239	71.3	0.985	22.75	0.7	284	3.54	35.20	2.642	248.74	129.6	0.090	0.615	N.A.	1.094	Y	2.745	7.9	12.2	141.8	0.9479	109.79	0.24694	7.10
72	17.17	0.239	71.8	0.978	22.59	0.7	284	3.54	35.50	2.686	252.65	132.4	0.091	0.618	N.A.	1.093	Y	2.772	7.4	12.3	144.7	0.9456	112.45	0.24671	6.65
73	17.31	0.239	72.4	0.971	22.43	0.7	284	3.54	35.79	2.730	256.60	135.2	0.092	0.621	N.A.	1.092	Y	2.799	6.9	12.5	147.7	0.9433	115.16	0.24649	6.21
74	17.45	0.239	73.0	0.963	22.26	0.7	284	3.54	36.08	2.774	260.58	138.0	0.092	0.624	N.A.	1.091	Y	2.827	6.4	12.6	150.6	0.9411	117.91	0.24627	5.80
75	17.59	0.239	73.6	0.956	22.08	0.7	284	3.54	36.38	2.819	264.59	140.8	0.093	0.627	N.A.	1.090	Y	2.854	5.9	12.7	153.6	0.9389	120.71	0.24606	5.39
76	17.73	0.239	74.2	0.948	21.91	0.7	284	3.54	36.67	2.864	268.62	143.7	0.094	0.630	N.A.	1.089	Y	2.881	5.5	12.9	156.6	0.9368	123.55	0.24586	5.00
77	17.87	0.239	74.8	0.940	21.72	0.7	284	3.54	36.96	2.909	272.69	146.6	0.094	0.632	N.A.	1.089	Y	2.908	5.1	13.0	159.6	0.9346	126.44	0.24566	4.62
78	18.01	0.239	75.4	0.932	21.53	0.7	284	3.54	37.26	2.955	276.79	149.5	0.095	0.635	N.A.	1.088	Y	2.935	4.7	13.1	162.6	0.9326	129.37	0.24546	4.26
79	18.15	0.239	75.9	0.923	21.33	0.7	284	3.54	37.55	3.001	280.92	152.5	0.096	0.638	N.A.	1.087	Y	2.962	4.3	13.2	165.7	0.9305	132.34	0.24527	3.92
80	18.29	0.239	76.5	0.914	21.13	0.7	284	3.54	37.84	3.047	285.08	155.4	0.097	0.640	N.A.	1.086	Y	2.989	3.9	13.3	168.8	0.9285	135.37	0.24509	3.59
81	18.43	0.239	77.1	0.905	20.92	0.7	284	3.54	38.14	3.094	289.27	158.5	0.097	0.643	N.A.	1.085	Y	3.016	3.6	13.4	171.9	0.9265	138.44	0.24491	3.27
82	18.57	0.239	77.7	0.896	20.69	0.7	284	3.54	38.43	3.285	293.49	161.6	0.103	0.648	N.A.	1.084	Y	3.213	3.2	13.5	175.1	0.9245	141.56	0.24485	2.97
83	18.71	0.239	78.3	0.886	20.47	0.7	284	3.54	38.73	3.332	297.74	164.8	0.103	0.651	N.A.	1.083	Y	3.239	2.9	13.7	178.4	0.9226	144.87	0.24492	2.68
84	18.85	0.239	78.9	0.875	20.23	0.7	284	3.54	39.02	3.380	302.02	168.0	0.104	0.654	N.A.	1.082	Y	3.266	2.6	13.8	181.8	0.9207	148.22	0.24498	2.41
85	18.99	0.239	79.5	0.865	19.97	0.7	284	3.54	39.31	3.428	306.33	171.3	0.105	0.657	N.A.	1.081	Y	3.293	2.3	13.9	185.2	0.9188	151.63	0.24503	2.15
86	19.13	0.239	80.0	0.853	19.71	0.7	284	3.54	39.61	3.477	310.67	174.6	0.105	0.660	N.A.	1.080	Y	3.319	2.1	13.9	188.6	0.917	155.08	0.24507	1.90
87	19.27	0.239	80.6	0.849	19.61	0.7	284	3.54	39.90	3.879	315.04	178.2	0.117	0.669	N.A.	1.079	Y	3.815	1.8	14.0	192.2	0.9152	158.58	0.24538	1.67
88	19.41	0.239	81.2	0.849	19.61	0.7	284	3.54	40.19	3.928	319.44	182.0	0.117	0.673	N.A.	1.078	Y	3.842	1.6	14.1	196.2	0.9134	162.48	0.24594	1.46
89	19.55	0.239	81.8	0.849	19.61	0.7	284	3.54	40.49	3.978	323.88	185.9	0.118	0.677	N.A.	1.077	Y	3.869	1.4	14.2	200.1	0.9116	166.43	0.24647	1.26
90	19.69	0.239	82.4	0.849	19.61	0.7	284	3.54	40.78	4.028	328.34	189.8	0.119	0.681	N.A.	1.075	Y	3.896	1.2	14.3	204.1	0.9099	170.44	0.24697	1.07
91	19.83	0.239	83.0	0.849	19.61	0.7	284	3.54	41.07	4.078	332.83	193.7	0.119	0.685	N.A.	1.074	Y	3.923	1.0	14.4	208.1	0.9082	174.49	0.24745	0.90
92	19.97	0.239	83.6	0.849	19.61	0.7	284	3.54	41.37	4.129	337.35	197.6	0.120	0.688	N.A.	1.073	Y	3.950	0.8	14.5	212.1	0.9065	178.59	0.24791	0.75
93	20.11	0.239	84.1	0.849	19.61	0.7	284	3.54	41.66	4.180	341.91	201.6	0.120	0.692	N.A.	1.072	Y	3.978	0.7	14.5	216.1	0.9048	182.75	0.24834	0.60
94	20.25	0.239	84.7	0.849	19.61	0.7	284	3.54	41.95	4.232	346.49	205.6	0.121	0.696	N.A.	1.071	Y	4.006	0.5	14.6	220.1	0.9031	186.95	0.24875	0.48
95	20.39	0.239	85.3	0.849	19.61	0.7	284	3.54	42.25	4.284	351.11	209.6	0.122	0.699	N.A.	1.070	Y	4.034	0.4	14.6	224.2	0.9015	191.21	0.24914	0.37
96	20.53	0.239	85.9	0.849	19.61	0.7	284	3.54	42.54	4.336	355.75	213.6	0.122	0.703	N.A.	1.069	Y	4.062	0.3	14.7	228.3	0.8999	195.52	0.24951	0.27
97	20.67	0.239	86.5	0.849	19.61	0.7	284	3.54	42.83	4.388	360.43	217.7	0.123	0.706	N.A.	1.068	Y	4.090	0.2	14.7	232.4	0.8983	199.88	0.24986	0.19
98	20.81	0.239	87.1	0.849	19.61	0.7	284	3.54	43.13	4.441	365.13	221.8	0.124	0.710	N.A.	1.066	Y	4.119	0.1	14.7	236.6	0.8968	204.30	0.25019	0.12
99	20.95	0.239	87.7	0.849	19.61	0.7	284	3.54	43.42	4.495	369.87	225.9	0.124	0.713	N.A.	1.065	Y	4.147	0.1	14.8	240.7	0.8952	208.77	0.2505	0.07
100	21.09	0.239	88.2	0.849	19.61	0.7	284	3.54	43.72	4.548	374.63	230.1	0.125	0.716	N.A.	1.064	Y								

**Reference:** 2019 CBC, ASCE 7-16

**INPUT:**

Job Location:	La Mirada, CA	
Site Class	D	Soil Report
0.2 Sec MCE, $S_s$	1.640 g	Soil Report
1.0 Sec MCE, $S_1$	0.583 g	Soil Report
$S_{MS} = F_a S_s$	2.073 g	Site Specific per Soil Report
$S_{M1} = F_v S_1$	1.504 g	Site Specific per Soil Report
$S_{DS} = 2/3 S_{MS}$	1.382 g	Site Specific per Soil Report
$S_{D1} = 2/3 S_{M1}$	1.003 g	Site Specific per Soil Report
$T_s = S_{D1}/S_{DS}$	0.726 sec	
Long Period transition period, $T_L$	8.0 sec	ASCE 7-16 -Figure 22-12
Risk Category	II	Table 1604A.5
Seismic Design Category	D	2019 CBC Section 1613A.3.5

**OUTPUT:**

<b>Light Pole Class</b>	LS100B	
Fundamental Period, T	2.87 sec	See structural calculations, pg 1
Seismic coeff., R	1.5	ASCE 7-16 Table 15.4-2
Overstrength Factor, $\Omega$	1.5	ASCE 7-16 Table 15.4-2
Importance Factor, I	1.00	ASCE 7-16 Section 15.4.1.1 & Table 1.5-2
Redundancy factor, $\rho$	1.0	ASCE 7-16 Section 15.6
<b>DESIGN SEISMIC FORCE</b>		
$V = C_s W$	ASCE 7-16 Eqn. 12.8-1	
$C_s = S_{DS}/(R/I)$ for $T \leq T_s$	0.921 g	ASCE 7-16 Eqn. 12.8-2
$C_s$ max. for $T \leq T_L$ , $C_s = S_{D1}/T(R/I)$	0.233 g	ASCE 7-16 Eqn. 12.8-3
$C_s$ min = $0.044 S_{DS} I \geq 0.03$	0.06 g	ASCE 7-16 Eqn. 15.4-1
if $S_1 \geq 0.6g$ , $C_s$ min = $0.8 S_1/(R/I)$	N.A. g	ASCE 7-16 Eqn. 15.4-2
Load Combination, 1.2D+ 1.0E	ASCE 7-16 Section 2.3.2 Load Comb 5	
where $E = E_h + E_v$	ASCE 7-16 Eqn. 12.4-1	
and $E_h = pQ_E$	0.233 W	ASCE 7-16 Eqn. 12.4-3
and $E_v = 0.2 S_{DS} D$	0.276 D	ASCE 7-16 Eqn. 12.4-4
Load Combination, 1.2D + ( $pQ_e + 0.2 S_{DS} D$ )		

Load Combination, 1.2D + ( $pQ_e + 0.2 S_{DS} D$ )	1.476 D	+	0.233 W
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Total Seismic Weight, W = 6.027 kips See following page

SEISMIC SHEAR, V =	1.691 kips	<	4.216 kips WIND SHEAR	WIND CONTROLS
SEISMIC SHEAR WITH O.F., $\Omega V$ =	2.537 kips	<	4.216 kips WIND SHEAR	WIND CONTROLS

Vertical Distribution of Seismic Force,  $F_x = \frac{C_{vx} V}{k}$  ASCE7-16 Eqn. 12.8-11 & Section 12.8.5  
 $k = 2.000$

Item	w	$h_x$	$w_x h_x^k$	$w_x h_x^k / \sum w_x h_x^k$	$C_{vx} V$	OTM
fixtures	0.721	100.86	7335	0.433	0.607	61.18
	0.000	98.36	0	0.000	0.000	0.00
SPEAKER	0.041	15	9	0.001	0.001	0.01
			0	0.000	0.000	0.00
Top Pole Section	0.061	98.7	594	0.035	0.049	4.85
3rd Pole Section	0.371	88.40	2899	0.171	0.240	21.19
2nd Pole Section	1.077	60.30	3916	0.231	0.324	19.53
1st Pole Section	1.937	22.88	1014	0.060	0.084	1.92
LED400	0.121	90.00	980	0.058	0.081	7.29
LED575	0.143	20.00	57	0.003	0.005	0.09
ANTENNA	0.037	15.00	8	0.000	0.001	0.01
CAMERA	0.036	15.00	8	0.000	0.001	0.01
ECE	0.240	15.00	54	0.003	0.004	0.07
1/2 Precast base above grade	1.243	8.08	81	0.005	0.007	0.05
Sum	6.0265		16956	1.000	1.402	116.21
Total Dead Load at grade	7.269					
SEISMIC OTM = 116.21 kip-ft < 250.61 kip-ft Wind OTM						
WIND CONTROLS						
SEISMIC OTM WITH O.F., $\Omega_M = 174.31$ kip-ft < 250.61 kip-ft Wind OTM						
WIND CONTROLS						



2/28/2022																				LS100-B wind F2					
Distance from top of Pole	Outside Diameter of Pole, D	Pole thick, t	D/t	Kz	qz PSF	Cf Pole	kl/r equiv.	E3-4 Fe	E3-2 or E3-3 Design comp strength, Pr	Acting Unfactored, Pr	F8.1-F8.4 Design flex strength, M	Req'd flex. strength, M	Pr/Pc	H1-1b for Pr/Pc < 0.2	H1-1a for Pr/Pc ≥ 0.2	2nd Order /1st Order Moment	Req'd shear length, CSR O.K.	1st Order Delta	C2.2a P-Delta Moment	Total 2nd Order Moment	E7-19 Q	ACTING MOM DUE TO DL	M/I	DEFL DUE TO DL	
FT	IN	IN							KIPS	KIPS	K-FT	K-FT				FT-K		IN	FT-K	FT-K				IN	
0	8.00	0.125	64.0	1.269	29.32	0.7	284	3.54	8.64	0.000	21.36	0.0	0.000	0.000	N.A.	1.000	Y	0.000	101.7	0.0	1.1198	0.00	0.00011	84.18	
1	8.00	0.125	64.0	1.267	29.26	0.7	284	3.54	8.64	0.483	21.36	0.3	0.067	0.053	N.A.	1.290	Y	0.643	99.8	0.1	1.1198	0.01	0.01039	82.63	
2	8.00	0.125	64.0	1.264	29.20	0.7	284	3.54	8.64	0.493	21.36	1.0	0.069	0.089	N.A.	1.194	Y	0.659	97.8	0.2	1.1198	0.49	0.03095	81.09	
3	8.00	0.125	64.0	1.261	29.14	0.7	284	3.54	8.64	0.875	21.36	1.9	0.122	0.166	N.A.	1.190	Y	1.167	95.9	0.4	1.1198	0.99	0.05969	79.54	
4	8.00	0.125	64.0	1.259	29.08	0.7	284	3.54	8.64	0.885	21.36	3.1	0.123	0.229	N.A.	1.172	Y	1.183	94.0	0.5	1.1198	1.87	0.0966	78.00	
5	8.00	0.125	64.0	1.256	29.01	0.7	284	3.54	8.64	0.901	21.36	4.3	0.125	0.294	N.A.	1.165	Y	1.200	92.1	0.7	1.1198	2.76	0.10052	76.46	
6	8.65	0.179	48.3	1.253	28.95	0.7	284	3.54	13.30	0.918	50.11	5.5	0.083	0.168	N.A.	1.160	Y	1.217	90.2	0.9	1.0813	3.67	0.09413	74.93	
7	8.79	0.179	49.1	1.250	28.89	0.7	284	3.54	13.52	0.935	51.65	6.7	0.083	0.191	N.A.	1.158	Y	1.235	88.3	1.1	1.0747	4.60	0.10997	73.41	
8	8.93	0.179	49.9	1.247	28.82	0.7	284	3.54	13.74	0.952	53.20	7.9	0.083	0.214	N.A.	1.155	Y	1.253	86.4	1.2	1.0683	5.54	0.12453	71.89	
9	9.07	0.179	50.7	1.245	28.76	0.7	284	3.54	13.96	0.969	54.78	9.2	0.083	0.235	N.A.	1.154	Y	1.271	84.5	1.4	1.0621	6.50	0.13794	70.37	
10	9.21	0.179	51.5	1.242	28.69	0.7	284	3.54	14.18	0.986	56.38	10.5	0.083	0.256	N.A.	1.153	Y	1.289	82.6	1.6	1.0561	7.48	0.15028	68.87	
11	9.35	0.179	52.2	1.239	28.62	0.7	284	3.54	14.40	1.004	58.00	11.8	0.084	0.276	N.A.	1.152	Y	1.308	80.8	1.8	1.0503	8.47	0.16166	67.37	
12	9.49	0.179	53.0	1.236	28.56	0.7	284	3.54	14.62	1.093	59.65	13.1	0.090	0.299	N.A.	1.151	Y	1.448	78.9	2.0	1.0446	9.49	0.17274	65.88	
13	9.63	0.179	53.8	1.233	28.49	0.7	284	3.54	14.84	1.112	61.32	14.6	0.090	0.319	N.A.	1.150	Y	1.467	77.1	2.2	1.0391	10.59	0.18355	64.41	
14	9.77	0.179	54.6	1.230	28.42	0.7	284	3.54	15.06	1.130	63.01	16.1	0.090	0.338	N.A.	1.149	Y	1.487	75.3	2.4	1.0338	11.71	0.19352	62.94	
15	9.91	0.179	55.4	1.227	28.35	0.7	284	3.54	15.28	1.149	64.73	17.6	0.090	0.357	N.A.	1.148	Y	1.506	73.5	2.6	1.0286	12.85	0.2027	61.48	
16	10.05	0.179	56.1	1.224	28.28	0.7	284	3.54	15.50	1.168	66.47	19.1	0.090	0.375	N.A.	1.147	Y	1.526	71.7	2.8	1.0235	14.01	0.21118	60.04	
17	10.19	0.179	56.9	1.221	28.21	0.7	284	3.54	15.72	1.188	68.23	20.6	0.091	0.392	N.A.	1.146	Y	1.547	69.9	3.0	1.0186	15.18	0.21899	58.61	
18	10.33	0.179	57.7	1.218	28.14	0.7	284	3.54	15.94	1.207	70.01	22.2	0.091	0.409	N.A.	1.146	Y	1.567	68.2	3.2	1.0139	16.38	0.2262	57.19	
19	10.47	0.179	58.5	1.215	28.07	0.7	284	3.54	16.16	1.227	71.81	23.8	0.091	0.425	N.A.	1.145	Y	1.588	66.4	3.4	1.0092	17.60	0.23285	55.79	
20	10.61	0.179	59.3	1.212	28.00	0.7	284	3.54	16.38	1.248	73.64	25.4	0.091	0.440	N.A.	1.144	Y	1.608	64.7	3.7	1.0047	18.84	0.23899	54.40	
21	10.75	0.179	60.1	1.209	27.93	0.7	284	3.54	16.60	1.267	75.49	27.0	0.092	0.455	N.A.	1.144	Y	1.629	63.0	3.9	1.0003	20.09	0.258	53.02	
22	10.53	0.179	58.8	1.205	27.85	0.7	284	3.54	16.25	1.287	72.60	28.6	0.095	0.498	N.A.	1.143	Y	1.650	61.3	4.1	1.0073	21.37	0.27664	51.66	
23	10.67	0.179	59.6	1.202	27.78	0.7	284	3.54	16.47	1.308	74.43	30.3	0.095	0.512	N.A.	1.142	Y	1.671	59.7	4.3	1.0028	22.67	0.28158	50.31	
24	10.81	0.179	60.4	1.199	27.70	0.7	284	3.54	16.69	1.328	76.30	32.0	0.095	0.526	N.A.	1.142	Y	1.692	58.1	4.5	0.9984	23.99	0.28609	48.98	
25	10.95	0.179	61.2	1.196	27.63	0.7	284	3.54	16.91	1.349	78.18	33.7	0.096	0.539	N.A.	1.141	Y	1.713	56.4	4.7	0.9942	25.33	0.29022	47.67	
26	11.09	0.179	62.0	1.192	27.55	0.7	284	3.54	17.13	1.370	80.09	35.4	0.096	0.552	N.A.	1.140	Y	1.735	54.9	5.0	0.9901	26.69	0.29398	46.37	
27	11.23	0.179	62.7	1.189	27.47	0.7	284	3.54	17.35	1.392	82.01	37.1	0.096	0.564	N.A.	1.139	Y	1.756	53.3	5.2	0.986	28.07	0.29741	45.09	
28	11.37	0.179	63.5	1.186	27.39	0.7	284	3.54	17.57	1.414	83.97	38.9	0.097	0.576	N.A.	1.139	Y	1.778	51.8	5.4	0.9821	29.47	0.30054	43.83	
29	11.51	0.179	64.3	1.182	27.32	0.7	284	3.54	17.79	1.436	85.94	40.7	0.097	0.587	N.A.	1.138	Y	1.800	50.2	5.6	0.9783	30.89	0.30338	42.59	
30	11.65	0.179	65.1	1.179	27.24	0.7	284	3.54	18.01	1.458	87.94	42.5	0.097	0.598	N.A.	1.137	Y	1.822	48.8	5.8	0.9745	32.34	0.30596	41.36	
31	11.79	0.179	65.9	1.175	27.15	0.7	284	3.54	18.23	1.480	89.96	44.3	0.097	0.609	N.A.	1.136	Y	1.845	47.3	6.0	0.9709	33.81	0.30831	40.15	
32	11.93	0.179	66.6	1.172	27.07	0.7	284	3.54	18.45	1.503	92.00	46.2	0.098	0.619	N.A.	1.136	Y	1.868	45.8	6.3	0.9673	35.30	0.31042	38.97	
33	12.07	0.179	67.4	1.168	26.99	0.7	284	3.54	18.67	1.526	94.07	48.1	0.098	0.629	N.A.	1.135	Y	1.890	44.4	6.5	0.9638	36.81	0.31234	37.80	
34	12.21	0.179	68.2	1.165	26.91	0.7	284	3.54	18.89	1.549	96.16	50.0	0.098	0.639	N.A.	1.134	Y	1.913	43.0	6.7	0.9604	38.35	0.31406	36.64	
35	12.35	0.179	69.0	1.161	26.82	0.7	284	3.54	19.11	1.573	98.27	51.9	0.099	0.648	N.A.	1.133	Y	1.937	41.6	6.9	0.9571	39.91	0.3156	35.51	
36	12.49	0.179	69.8	1.157	26.74	0.7	284	3.54	19.33	1.597	100.40	53.8	0.099	0.657	N.A.	1.132	Y	1.960	40.3	7.1	0.9538	41.50	0.31698	34.40	
37	12.63	0.179	70.6	1.153	26.65	0.7	284	3.54	19.55	1.621	102.56	55.8	0.099	0.666	N.A.	1.132	Y	1.984	39.0	7.3	0.9506	43.11	0.31822	33.30	
38	12.77	0.179	71.3	1.150	26.56	0.7	284	3.54	19.77	1.645	104.74	57.8	0.100	0.674	N.A.	1.131	Y	2.008	37.7	7.6	0.9475	44.74	0.31931	32.22	
39	12.91	0.179	72.1	1.146	26.47	0.7	284	3.54	19.99	1.670	106.94	59.8	0.100	0.682	N.A.	1.130	Y	2.032	36.4	7.8	0.9445	46.40	0.32027	31.17	
40	13.05	0.179	72.9	1.142	26.38	0.7	284	3.54	20.21	1.695	109.16	61.9	0.101	0.690	N.A.	1.129	Y	2.056	35.2	8.0	0.9415	48.08	0.32111	30.13	
41	13.19	0.179	73.7	1.138	26.29	0.7	284	3.54	20.43	1.720	111.41	63.9	0.101	0.698	N.A.	1.128	Y	2.080	33.9	8.2	0.9386	49.79	0.32184	29.11	
42	13.33	0.179	74.5	1.134	26.20	0.7	284	3.54	20.65	1.745	113.68	66.0	0.101	0.706	N.A.	1.127	Y	2.105	32.7	8.4	0.9357	51.52	0.32246	28.11	
43	13.47	0.179	75.3	1.130	26.11	0.7	284	3.54	20.87	1.771	115.98	68.2	0.102	0.713	N.A.	1.126	Y	2.129	31.6	8.6	0.9329	53.28	0.323	27.13	
44	13.61	0.179	76.0	1.126	26.01	0.7	284	3.54	21.09	1.797	118.29	70.3	0.102	0.720	N.A.	1.125	Y	2.154	30.4	8.8	0.9302	55.06	0.32344	26.17	
45	13.75	0.179	76.8	1.122	25.92	0.7	284	3.54	21.31	1.823	120.63	72.5	0.103	0.727	N.A.	1.124	Y	2.179	29.3	9.0	0.9275	56.87	0.3238	25.22	
46	13.89	0.179	77.6	1.117	25.82	0.7	284	3.54	21.53	1.850	122.99	74.7	0.103	0.734	N.A.	1.124	Y	2.204	28.2	9.2	0.9249	58.71	0.32408	24.30	
47	14.03	0.179	78.4	1.113	25.72	0.7	284	3.54	21.75	1.876	125.37	76.9	0.104	0.740	N.A.	1.123	Y	2.230	27.1	9.4	0.9223	60.57	0.3243	23.40	
48	14.17	0.179	79.2	1.109	25.62	0.7	284	3.54	21.97	1.903	127.78	79.1	0.104	0.746	N.A.	1.122	Y	2.255	26.0	9.6	0.9198	62.46	0.32445	22.51	
49	14.31	0.179	79.9	1.104	25.52	0.7	284	3.54	22.19	1.931	130.21	81.4	0.104</												

51	14.28	0.179	81.5	1.095	25.31	0.7	284	3.54	22.63	1.986	135.14	86.0	0.105	0.765	N.A.	1.119	Y	2.332	23.0	10.2	96.2	0.9125	68.29	0.9097	19.97
52	14.73	0.179	82.3	1.091	25.20	0.7	284	3.54	22.85	2.014	137.64	88.3	0.106	0.770	N.A.	1.118	Y	2.358	22.1	10.4	98.8	0.9101	70.29	0.32448	19.17
53	14.87	0.179	83.1	1.086	25.09	0.7	284	3.54	23.07	2.043	140.16	90.7	0.106	0.776	N.A.	1.117	Y	2.385	21.1	10.6	101.3	0.9079	72.32	0.32437	18.38
54	15.01	0.179	83.9	1.081	24.98	0.7	284	3.54	23.29	2.071	142.70	93.1	0.107	0.781	N.A.	1.116	Y	2.411	20.2	10.8	103.9	0.9056	74.38	0.32422	17.61
55	15.15	0.179	84.6	1.077	24.87	0.7	284	3.54	23.51	2.100	145.27	95.5	0.107	0.787	N.A.	1.115	Y	2.437	19.4	11.0	106.5	0.9034	76.46	0.32403	16.86
56	15.29	0.179	85.4	1.072	24.76	0.7	284	3.54	23.73	2.129	147.85	98.0	0.108	0.792	N.A.	1.114	Y	2.464	18.5	11.2	109.1	0.9012	78.58	0.32381	16.13
57	15.43	0.179	86.2	1.067	24.64	0.7	284	3.54	23.95	2.159	150.47	100.5	0.108	0.797	N.A.	1.113	Y	2.491	17.7	11.3	111.8	0.8991	80.72	0.32355	15.42
58	15.57	0.179	87.0	1.061	24.52	0.7	284	3.54	24.17	2.189	153.10	103.0	0.109	0.802	N.A.	1.112	Y	2.518	16.9	11.5	114.5	0.897	82.90	0.32327	14.73
59	15.71	0.179	87.8	1.056	24.40	0.7	284	3.54	24.39	2.219	155.76	105.5	0.109	0.807	N.A.	1.111	Y	2.544	16.1	11.7	117.2	0.895	85.10	0.32295	14.06
60	15.85	0.179	88.5	1.051	24.28	0.7	284	3.54	24.61	2.258	158.44	108.1	0.110	0.812	N.A.	1.110	Y	2.572	15.3	11.9	119.9	0.8929	87.33	0.2923	13.41
61	15.63	0.239	65.4	1.046	24.16	0.7	284	3.54	32.27	2.298	211.24	110.6	0.085	0.623	N.A.	1.109	Y	2.598	14.6	12.0	122.7	0.973	89.61	0.2616	12.77
62	15.77	0.239	66.0	1.040	24.03	0.7	284	3.54	32.56	2.338	214.86	113.3	0.086	0.627	N.A.	1.108	Y	2.625	13.8	12.2	125.5	0.9703	91.93	0.26118	12.15
63	15.91	0.239	66.6	1.034	23.90	0.7	284	3.54	32.86	2.378	218.50	115.9	0.087	0.630	N.A.	1.107	Y	2.652	13.1	12.4	128.3	0.9677	94.29	0.26077	11.55
64	16.05	0.239	67.2	1.029	23.77	0.7	284	3.54	33.15	2.419	222.17	118.6	0.088	0.634	N.A.	1.106	Y	2.678	12.5	12.5	131.1	0.965	96.68	0.26037	10.96
65	16.19	0.239	67.7	1.023	23.63	0.7	284	3.54	33.44	2.460	225.88	121.2	0.088	0.637	N.A.	1.105	Y	2.705	11.8	12.7	133.9	0.9624	99.12	0.25997	10.39
66	16.33	0.239	68.3	1.017	23.49	0.7	284	3.54	33.74	2.501	229.61	124.0	0.089	0.640	N.A.	1.104	Y	2.732	11.2	12.9	136.8	0.9599	101.60	0.25959	9.84
67	16.47	0.239	68.9	1.011	23.35	0.7	284	3.54	34.03	2.543	233.38	126.7	0.090	0.644	N.A.	1.103	Y	2.759	10.5	13.0	139.7	0.9574	104.12	0.25921	9.30
68	16.61	0.239	69.5	1.004	23.21	0.7	284	3.54	34.32	2.585	237.17	129.5	0.090	0.647	N.A.	1.102	Y	2.786	9.9	13.2	142.7	0.955	106.69	0.25885	8.77
69	16.75	0.239	70.1	0.998	23.06	0.7	284	3.54	34.62	2.628	241.00	132.3	0.091	0.650	N.A.	1.101	Y	2.814	9.3	13.3	145.6	0.9526	109.30	0.25849	8.26
70	16.89	0.239	70.7	0.991	22.91	0.7	284	3.54	34.91	2.671	244.85	135.1	0.092	0.653	N.A.	1.100	Y	2.841	8.8	13.5	148.6	0.9502	111.94	0.25813	7.77
71	17.03	0.239	71.3	0.985	22.75	0.7	284	3.54	35.20	2.714	248.74	138.0	0.093	0.656	N.A.	1.099	Y	2.868	8.2	13.6	151.6	0.9479	114.64	0.25779	7.29
72	17.17	0.239	71.8	0.978	22.59	0.7	284	3.54	35.50	2.758	252.65	140.8	0.093	0.659	N.A.	1.098	Y	2.895	7.7	13.8	154.6	0.9456	117.37	0.25745	6.83
73	17.31	0.239	72.4	0.971	22.43	0.7	284	3.54	35.79	2.802	256.60	143.8	0.094	0.661	N.A.	1.097	Y	2.922	7.2	13.9	157.7	0.9433	120.15	0.25712	6.38
74	17.45	0.239	73.0	0.963	22.26	0.7	284	3.54	36.08	2.846	260.58	146.7	0.095	0.664	N.A.	1.096	Y	2.950	6.7	14.1	160.7	0.9411	122.98	0.2568	5.95
75	17.59	0.239	73.6	0.956	22.08	0.7	284	3.54	36.38	2.891	264.59	149.7	0.095	0.667	N.A.	1.095	Y	2.977	6.2	14.2	163.8	0.9389	125.84	0.25648	5.53
76	17.73	0.239	74.2	0.948	21.91	0.7	284	3.54	36.67	2.936	268.62	152.6	0.096	0.670	N.A.	1.094	Y	3.004	5.8	14.3	167.0	0.9368	128.76	0.25617	5.13
77	17.87	0.239	74.8	0.940	21.72	0.7	284	3.54	36.96	2.981	272.69	155.7	0.097	0.672	N.A.	1.093	Y	3.032	5.3	14.5	170.1	0.9346	131.72	0.25587	4.74
78	18.01	0.239	75.4	0.932	21.53	0.7	284	3.54	37.26	3.027	276.79	158.7	0.097	0.675	N.A.	1.092	Y	3.059	4.9	14.6	173.3	0.9326	134.72	0.25557	4.37
79	18.15	0.239	75.9	0.923	21.33	0.7	284	3.54	37.55	3.073	280.92	161.8	0.098	0.677	N.A.	1.091	Y	3.086	4.5	14.7	176.5	0.9305	137.77	0.25528	4.01
80	18.29	0.239	76.5	0.914	21.13	0.7	284	3.54	37.84	3.119	285.08	164.9	0.099	0.680	N.A.	1.090	Y	3.113	4.1	14.8	179.7	0.9285	140.86	0.25499	3.67
81	18.43	0.239	77.1	0.905	20.92	0.7	284	3.54	38.14	3.166	289.27	168.0	0.100	0.682	N.A.	1.089	Y	3.140	3.7	14.9	183.0	0.9265	144.01	0.25471	3.34
82	18.57	0.239	77.7	0.896	20.69	0.7	284	3.54	38.43	3.214	293.49	171.2	0.100	0.685	N.A.	1.088	Y	3.167	3.4	15.1	186.2	0.9245	147.20	0.25444	3.03
83	18.71	0.239	78.3	0.886	20.47	0.7	284	3.54	38.73	3.261	297.74	174.3	0.101	0.687	N.A.	1.087	Y	3.194	3.1	15.2	189.5	0.9226	150.43	0.25417	2.74
84	18.85	0.239	78.9	0.875	20.23	0.7	284	3.54	39.02	3.309	302.02	177.6	0.102	0.689	N.A.	1.086	Y	3.221	2.7	15.3	192.8	0.9207	153.72	0.2539	2.46
85	18.99	0.239	79.5	0.865	19.97	0.7	284	3.54	39.31	3.357	306.33	180.8	0.102	0.692	N.A.	1.085	Y	3.248	2.4	15.4	196.2	0.9188	157.05	0.25364	2.19
86	19.13	0.239	80.0	0.853	19.71	0.7	284	3.54	39.61	3.406	310.67	184.0	0.103	0.694	N.A.	1.084	Y	3.274	2.2	15.5	199.5	0.917	160.43	0.25339	1.94
87	19.27	0.239	80.6	0.849	19.61	0.7	284	3.54	39.90	3.568	315.04	187.4	0.107	0.698	N.A.	1.083	Y	3.465	1.9	15.6	203.0	0.9152	163.86	0.25323	1.71
88	19.41	0.239	81.2	0.849	19.61	0.7	284	3.54	40.19	3.837	319.44	191.1	0.115	0.704	N.A.	1.082	Y	3.800	1.6	15.7	206.7	0.9134	167.46	0.25331	1.49
89	19.55	0.239	81.8	0.849	19.61	0.7	284	3.54	40.49	3.887	323.88	194.9	0.115	0.708	N.A.	1.081	Y	3.827	1.4	15.7	210.6	0.9116	171.32	0.25355	1.28
90	19.69	0.239	82.4	0.849	19.61	0.7	284	3.54	40.78	3.937	328.34	198.7	0.116	0.711	N.A.	1.080	Y	3.854	1.2	15.8	214.5	0.9099	175.23	0.25377	1.09
91	19.83	0.239	83.0	0.849	19.61	0.7	284	3.54	41.07	3.987	332.83	202.6	0.116	0.715	N.A.	1.079	Y	3.881	1.0	15.9	218.5	0.9082	179.19	0.25398	0.92
92	19.97	0.239	83.6	0.849	19.61	0.7	284	3.54	41.37	4.038	337.35	206.5	0.117	0.718	N.A.	1.077	Y	3.909	0.8	16.0	222.4	0.9065	183.20	0.25417	0.76
93	20.11	0.239	84.1	0.849	19.61	0.7	284	3.54	41.66	4.089	341.91	210.4	0.118	0.721	N.A.	1.076	Y	3.936	0.7	16.0	226.4	0.9048	187.27	0.25435	0.62
94	20.25	0.239	84.7	0.849	19.61	0.7	284	3.54	41.95	4.141	346.49	214.3	0.118	0.724	N.A.	1.075	Y	3.964	0.5	16.1	230.4	0.9031	191.38	0.25452	0.49
95	20.39	0.239	85.3	0.849	19.61	0.7	284	3.54	42.25	4.193	351.11	218.3	0.119	0.727	N.A.	1.074	Y	3.992	0.4	16.2	234.5	0.9015	195.55	0.25467	0.37
96	20.53	0.239	85.9	0.849	19.61	0.7	284	3.54	42.54	4.245	355.75	222.3	0.120	0.730	N.A.	1.073	Y	4.021	0.3	16.2	238.5	0.8999	199.77	0.25481	0.27
97	20.67	0.239	86.5	0.849	19.61	0.7	284	3.54	42.83	4.297	360.43	226.4	0.120	0.733	N.A.	1.072	Y	4.049	0.2	16.2	242.6	0.8983	204.04	0.25494	0.19
98	20.81	0.239	87.1	0.849	19.61	0.7	284	3.54	43.13	4.350	365.13	230.4	0.121	0.736	N.A.	1.071	Y	4.078	0.1	16.3	246.7	0.8968	208.36	0.25506	0.12
99	20.95	0.239	87.7	0.849	19.61	0.7	284	3.54	43.42	4.404	369.87	234.5	0.122	0.739	N.A.	1.069	Y	4.107	0.1	16.3	250.8	0.8952	212.74	0.25516	0.07
100	21.09	0.239	88.2	0.849	19.61	0.7	284	3.54	43.72	4.457	374.63	238.6	0.122	0.742	N.A.	1.06									



**Reference:** 2019 CBC, ASCE 7-16

**INPUT:**

Job Location:	La Mirada, CA	
Site Class	D	Soil Report
0.2 Sec MCE, $S_s$	1.640 g	Soil Report
1.0 Sec MCE, $S_1$	0.583 g	Soil Report
Site Coeff., $F_a$		
Site Coeff., $F_v$		
$S_{MS} = F_a S_s$	2.073 g	Site Specific per Soil Report
$S_{M1} = F_v S_1$	1.504 g	Site Specific per Soil Report
$S_{DS} = 2/3 S_{MS}$	1.382 g	Site Specific per Soil Report
$S_{D1} = 2/3 S_{M1}$	1.003 g	Site Specific per Soil Report
$T_s = S_{D1}/S_{DS}$	0.726 sec	
Long Period transition period, $T_L$	8.0 sec	ASCE 7-16 -Figure 22-12
Risk Category	II	Table 1604A.5
Seismic Design Category	D	2019 CBC Section 1613A.3.5

**OUTPUT:**

<b>Light Pole Class</b>	LS100B	
Fundamental Period, $T$	2.93 sec	See structural calculations, pg 6
Seismic coeff., $R$	1.5	ASCE 7-16 Table 15.4-2
Overstrength Factor, $\Omega$	1.5	ASCE 7-16 Table 15.4-2
Importance Factor, $I$	1.00	ASCE 7-16 Section 15.4.1.1 & Table 1.5-2
Redundancy factor, $\rho$	1.0	ASCE 7-16 Section 15.6
<b>DESIGN SEISMIC FORCE</b>		
$V = C_s W$	ASCE 7-16 Eqn. 12.8-1	
$C_s = S_{DS}/(R/I)$ for $T \leq T_s$	0.921 g	ASCE 7-16 Eqn. 12.8-2
$C_s$ max. for $T \leq T_L$ , $C_s = S_{D1}/T(R/I)$	0.228 g	ASCE 7-16 Eqn. 12.8-3
$C_s$ min = $0.044 S_{DS} I \geq 0.03$	0.06 g	ASCE 7-16 Eqn. 15.4-1
if $S_1 \geq 0.6g$ , $C_s$ min = $0.8 S_1/(R/I)$	N.A. g	ASCE 7-16 Eqn. 15.4-2
Load Combination, 1.2D+ 1.0E	ASCE 7-16 Section 2.3.2 Load Comb 5	
where $E = E_h + E_v$	ASCE 7-16 Eqn. 12.4-1	
and $E_h = pQ_E$	0.228 W	ASCE 7-16 Eqn. 12.4-3
and $E_v = 0.2 S_{DS} D$	0.276 D	ASCE 7-16 Eqn. 12.4-4
Load Combination, 1.2D + ( $pQ_e + 0.2 S_{DS} D$ )		
Load Combination, 1.2D + ( $pQ_e + 0.2 S_{DS} D$ )	1.476 D	+ 0.228 W

Total Seismic Weight,  $W = 5.936$  kips See following page

SEISMIC SHEAR, $V =$	1.636 kips	<	4.176 kips WIND SHEAR	WIND CONTROLS
SEISMIC SHEAR WITH O.F., $\Omega V =$	2.454 kips	<	4.176 kips WIND SHEAR	WIND CONTROLS

Vertical Distribution of Seismic Force,  $F_x = \frac{C_{vx} V}{k}$  ASCE7-16 Eqn. 12.8-11 & Section 12.8.5  
 $k = 2.000$

Item	w	$h_x$	$w_x h_x^k$	$w_x h_x^k / \sum w_x h_x^k$	$C_{vx} V$	OTM
fixtures	0.371	100.86	3774	0.215	0.291	29.34
fixtures	0.371	98.36	3589	0.205	0.277	27.22
fixtures	0.101	100.9	1028	0.059	0.079	8.00
			0	0.000	0.000	0.00
Top Pole Section	0.061	98.7	594	0.034	0.046	4.52
3rd Pole Section	0.371	88.40	2899	0.165	0.223	19.76
2nd Pole Section	1.077	60.30	3916	0.223	0.302	18.20
1st Pole Section	1.937	22.88	1014	0.058	0.078	1.79
LED400	0.071	90.00	575	0.033	0.044	3.99
SPEAKER	0.041	15.00	9	0.001	0.001	0.01
ANTENNA	0.037	15.00	8	0.000	0.001	0.01
CAMERA	0.036	15.00	8	0.000	0.001	0.01
ECE	0.220	15.00	50	0.003	0.004	0.06
1/2 Precast base above grade	1.243	8.08	81	0.005	0.006	0.05
Sum	5.9355		17546	1.000	1.353	112.96
Total Dead Load at grade	7.178					

SEISMIC OTM =	112.96 kip-ft	<	260.62	kip-ft Wind OTM	WIND CONTROLS
SEISMIC OTM WITH O.F., $\Omega_M$ =	169.43 kip-ft	<	260.62	kip-ft Wind OTM	WIND CONTROLS

**SCOPE:** Analysis of an annular prestressed concrete pole member based on compatible strain procedure per ACI-318\* with an ultimate concrete strain of 0.003.

**PROJECT:** Musco Standard Pole Base

**DATE:** May-1-2014 9:49 AM

**POLE TYPE =** 6B

PROGRAM VERSION 2.3 DSA Design

## USER DEFINED INPUTS

CROSS-SECTION OUTER DIAMETER = $D_o$ =	20.5 INCHES
HOLLOW CORE INSIDE DIAMETER = $D_i$ =	10.25 INCHES
TENDON CIRCLE DIAMETER = $D_t$ =	17.25 INCHES
NUMBER OF TENDONS = N (56 or less and even)	22
TENDON DIAMETER = $d_t$ =	0.5 INCHES
NOMINAL TENDON AREA = $A_{ps}$ =	0.1531 IN <sup>2</sup>
ULTIMATE TENDON STRENGTH = $f_{pu}$ =	270 KSI
TENDON YIELD STRENGTH = $f_{py}$ =	230 KSI
CONCRETE COMPRESSIVE STRENGTH = $F'_c$ =	9500 PSI
MODULUS OF ELASTICITY - STEEL = $E_s$ =	28500 KSI
INITIAL PRESTRESS FACTOR = IPF =	0.64
PRESTRESS LOSS FACTOR = PLF =	0.82
*PHI FACTOR CALCULATED PER ACI 318	ACI 318

## OUTPUT

PHI FACTOR = $\phi$ =	0.81	
PRESTRESSING STRAIN IN TENDON = $\epsilon_{se}$ =	0.0050	
CONCRETE SERVICE STRESS DUE TO PRESTRESS =	1928 PSI	
CROSS SECTIONAL AREA =	248 IN <sup>2</sup>	
GROSS MOMENT OF INERTIA =	8127 IN <sup>4</sup>	
DISTANCE TO NEUTRAL AXIS FROM COMP. SIDE = $c$ =	8.18 INCHES	
CONCRETE COMPRESSIVE FORCE =	538 KIPS	
AREA OF BONDED REINFORCEMENT =	3.37 IN <sup>2</sup>	
MINIMUM BONDED REINFORCEMENT AREA =	0.50 IN <sup>2</sup>	<b>SATISFIED</b>

STRAND DEVELOPMENT LENGTH =  $L_d$  = 68 INCHES

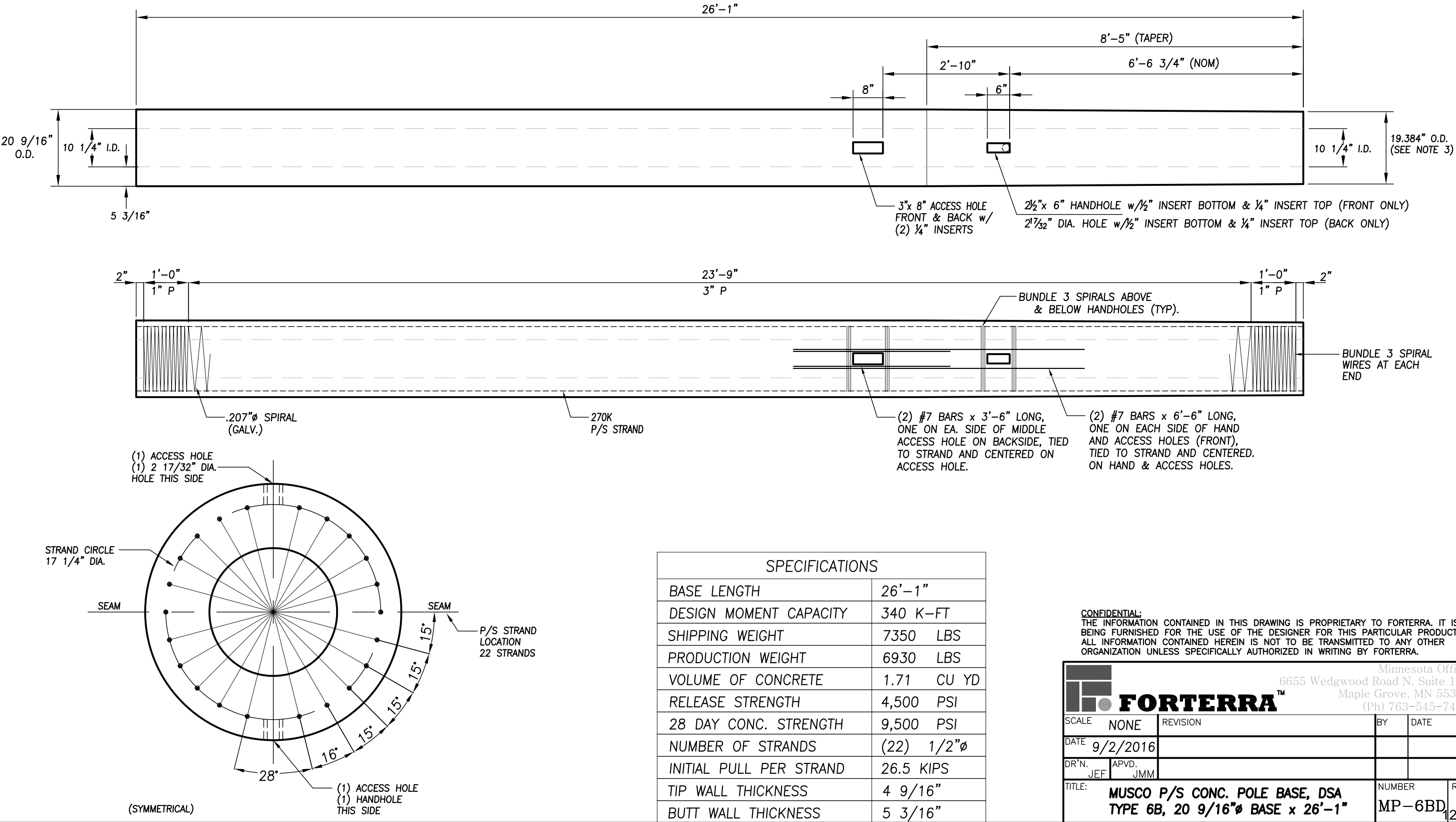
## RESULTS


NOMINAL MOMENT CAPACITY = $M_n$ =	420 FT-KIPS	
DESIGN MOMENT CAPACITY = $\phi M_n$ =	<b>340 FT-KIPS</b>	
CRACKING LOAD MOMENT =	176 FT-KIPS	<b>SATISFIED</b>

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NOTES:

- 1. MARK-DATE, TYPE AND "BOTTOM" NEAR BOTTOM OF BASE.
- 2. PROVIDE INSERTS FOR COVER PLATES AT EACH OPENING.
- 3. GROUNDING SYSTEM NOT SHOWN. REFERENCE MUSCO DOC. PS-1408-1.
- 4. COAT ENTIRE BASE END SURFACES (T AND B) WITH SIKAGARD 62, .015" MIN. THICKNESS. DO NOT COAT METAL INSERTS.
- 5. COAT INSIDE SURFACES AT EACH HOLE WITH SIKAGARD 62, .015 MIN. THICKNESS.
- 6. PROVIDE 3/4" STRAND COVER AT EACH HOLE WITH SPACER INSERT.



 <b>KNA STRUCTURAL ENGINEERS</b>	POLE DESIGNATION: LS110-C W/ 10 FIXTURES MANUFACTURER: MUSCO PROJECT NO: 200279	JOB NO: 363.589 PROJECT: La Mirada High School LOCATION: La Mirada, CA
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ASCE 7-16		
WIND CRITERIA	95 MPH, EXP C	
LOAD COMB	1.2 DEAD + 1.0 WIND	

POLE ID: F5

LED	1500	
EPA/FIXTURE*, Af	=	3.6 ft <sup>2</sup>
D.L./FIXTURE**	=	92.8 lbs
D.L./ECE***	=	20.0 lbs

\* EPA = EFFECTIVE PROJECTED AREA OF LIGHT FIXTURE  
 INCLUDING CROSSARM PER MUSCO

\*\* D.L. = DEAD LOAD OF FIXTURE &  
 CROSSARM PER MUSCO

\*\*\* D.L. = DEAD LOAD OF ECE,  
 PER MUSCO

P = SUPERIMPOSED WT + POLE WT

v				a	<--	---FIXTURES, F/Af= qz*Gf*Cf =		34.26	PSF MAX	(29.4-1)
						---where qz=.00256*Kz*Kzt*Kd*Ke(V) <sup>2</sup>		29.76	PSF MAX	(26.10-1)
						----				
1	v			b	<--					
v				b	<--					

ATTACHMENT	NUMBER	DIST. FROM	PA	Cf	EPA	Kz	qz	WIND, F	WEIGHT, F
TYPE		TOP POLE, FT	SQ FT		SQ FT		PSF	LBS	LBS
LED1500	4.0	0.5		1.0	3.59	1.287	29.73	491	371
LED1500	4.0	3.0		1.0	3.59	1.280	29.58	488	371
LED400	2.0	0.5	1.28	1.3	1.67	1.287	29.73	114	101
	0.0	8.0		1.0	3.59	1.267	29.28	0	0
	0.0	10.5		1.0	3.59	1.261	29.13	0	0
	0.0	13.0		1.0	3.59	1.254	28.97	0	0
LED600	1.0	18.7	2.59	1.3	3.37	1.238	28.60	111	71
SPEAKER	1.0	93.7	1.65	1.3	2.14	0.849	19.61	48	41
ANTENNA	1.0	93.7	2.68	1.3	3.49	0.849	19.61	79	37
CAMERA	1.0	93.7	0.98	1.3	1.27	0.849	19.61	29	36
ECE	11.0	94.7	10.00	1.3	13.00	0.849	19.61	294	220
TOTALS =								1654	1247

POLE, F/Af= qz\*Gf\*Cf = 23.99 PSF MAX (29.4-1)

where qz=.00256\*Kz\*Kzt\*Kd\*Ke(V)<sup>2</sup> = 29.76 PSF MAX (26.10-1)

LOADING DIAGRAM

## INPUT

-> l = 108.69 ft. (max. ht. from grade)  
 -> l = 108.69 ft. (ht. from grade at base of pole) 107.0 ft. (nom. ht from grade)  
 -> tA = 0.179 in. (pole thk. @ top)  
 -> dA = 10.15 in. (pole diam. @ top)  
 -> dB = 24.00 in. (pole diam. @ btm)  
 -> tB = 0.313 in. (pole thk. @ btm)  
 -> Fy = 55.0 ksi (fixt mount sect. = 41.0 ft)  
 -> Fy = 55.0 ksi (other pole sect.)  
 -> E = 29,000 ksi  
 -> Kzt = 1 (Figure 26.8-1)  
 -> Kd = 1 (Table 26.6-1)  
 -> Kz = 1.288 MAX-EXP C @ 108.7 FT. (Table 26.10-1)  
 -> Ke = 1.00 (Table 26.9-1)  
 -> Cf = 1.00 LIGHT FIXTURE (INCLUDED IN EPA)  
 -> Cf = 0.700 MAX (VARIES 0.5-1.2 FOR RND POLE) (Figure 29.5-1)  
 POLE DAMPING, beta = 0.03 Per Musco test

## OUTPUT

-> POLE NATURAL FREQUENCY = 0.401 Hz 1/(2PI\*(DELTA/386)^0.5) where DELTA is due to self weight  
 -> Gf = 1.15 (Section 26.11.5) (Reference Vibration Problems in Engineering by Timoshenko, 4th ED. pg.34)

Pole Properties:  
 Ia = 69.71 in<sup>4</sup> taper = 0.140 in/ft  
 Ib = 1634 in<sup>4</sup> db/da = 2.365  
 ra = 3.526 in rb = 8.375 in.  
 Aa = 5.607 in<sup>2</sup> Ab = 23.29 in<sup>2</sup>  
 Sa = 13.74 in<sup>3</sup> Sb = 136.15 in<sup>3</sup>

From Critical Buckling Loads of Tapered Columns, ASCE 2/62:

n = Log (Ib/Ia)/Log (dB/dA) = 3.67  
 P\* = (Ib/Ia)/(Ib/Ia)<sup>.333</sup> = 8.2  
 kl/req\* (1/(P\*)<sup>.5</sup>) [kl/ra] = 271 (where k = 2.1)

AISC 360-16 Specification Table B4.1, Case 15

for Fy = 55.0 KSI 55 KSI  
 D/t < .45E/Fy = 237 237 (MAX)  
 D/t < .31E/Fy = 163 163 Noncompact  
 D/t < .07E/Fy = 37 37 Compact  
 D/t < .11E/Fy = 58 58 Slender element Section for Uniform Compression

Section 26.11.5 Gust-Effect Factor			
constant epsilon, e	=	0.2	Lz = 573.0
constant l	=	500	N1 = 2.284
Vz	=	100.57	Rn = 0.082
4.6n1h/Vz	=	1.993	
4.6n1B/Vz	=	0.026	R = 0.997
15.4n1L/Vz	=	0.087	gR = 3.966
			c = 0.200
Rh	=	0.378	lz = 0.179
RB	=	0.983	Q = 0.904
RL	=	0.944	G = 0.880
GF = 1.151			

SHEAR, F=	2.838 KIPS	MOMENT, M=	182.53	K-FT	e= M/F =	64.32 FT	AXIAL, P=	6.311 KIPS	ASD Forces at groundline (for foundation design)
SHEAR, F=	4.730 KIPS	MOMENT, M=	304.22	K-FT	e= M/F =	64.32 FT	AXIAL, P=	7.573 KIPS	Nominal Forces at groundline

M < ΦMn = 523 K-FT Precast Ba  
 Pole Stress Check = 0.537 Max. < 1 Pole O.K.  
 Max. Deflection = 66.012 Inch < 0.15H = 196 Inch AASHTO 10.4.2

2/28/2022

LS110-C wind

Distance from top of Pole FT	Outside Diameter of Pole, D IN	Pole thick, t IN	D/t	Kz	qz PSF	Cf Pole	kl/r equiv.	E3-4 Fe	E3-2 or E3-3 Design comp strength, P KIPS	Acting manfactored, P KIPS	F8.1-F8.4 Design flex. strength, M K-FT	Req'd flex. strength, N K-FT	Pr/Pc	H1-1b for Pr/Pc < 0.2	H1-1a for Pr/Pc ≥ 0.2	2nd Order /1st Order Moment FT-K	Req'd shear O.K.	1st Order Delta IN	C2.2a P-Delta Moment FT-K	Total 2nd Order Moment FT-K	E7-19 Q	ACTING MOM DUE TO DL	M/I	DEFL DUE TO DL IN
0	10.15	0.179	56.7	1.288	29.76	0.7	271	3.88	17.19	0.000	67.72	0.0	0.000	0.000	N.A.	1.000	Y	0.000	66.0	0.0	1.02	0.00	7E-05	60.85
1	10.29	0.179	57.5	1.286	29.70	0.7	271	3.88	17.44	0.492	69.50	0.3	0.034	0.022	N.A.	1.179	Y	0.625	64.9	0.1	1.0152	0.01	0.0034	59.84
2	10.43	0.179	58.3	1.283	29.64	0.7	271	3.88	17.68	0.511	71.30	0.9	0.035	0.032	N.A.	1.121	Y	0.646	63.7	0.1	1.0105	0.01	0.0099	58.83
3	10.57	0.179	59.1	1.280	29.58	0.7	271	3.88	17.92	0.903	73.12	1.8	0.060	0.058	N.A.	1.118	Y	1.155	62.6	0.2	1.006	1.03	0.0184	57.83
4	10.71	0.179	59.8	1.278	29.52	0.7	271	3.88	18.16	0.923	74.96	3.0	0.061	0.075	N.A.	1.107	Y	1.177	61.4	0.3	1.0015	1.95	0.0287	56.82
5	10.85	0.179	60.6	1.275	29.46	0.7	271	3.88	18.40	0.944	76.83	4.2	0.062	0.091	N.A.	1.102	Y	1.198	60.3	0.4	0.9972	2.88	0.0384	55.82
6	10.99	0.179	61.4	1.273	29.40	0.7	271	3.88	18.64	0.965	78.72	5.4	0.062	0.107	N.A.	1.100	Y	1.219	59.2	0.5	0.993	3.83	0.0476	54.82
7	11.13	0.179	62.2	1.270	29.34	0.7	271	3.88	18.88	0.986	80.63	6.6	0.063	0.122	N.A.	1.098	Y	1.241	58.0	0.7	0.9889	4.81	0.0563	53.82
8	11.27	0.179	63.0	1.267	29.28	0.7	271	3.88	19.13	1.007	82.57	7.9	0.063	0.136	N.A.	1.097	Y	1.263	56.9	0.8	0.9849	5.80	0.0645	52.83
9	11.41	0.179	63.7	1.265	29.22	0.7	271	3.88	19.37	1.029	84.53	9.2	0.064	0.151	N.A.	1.096	Y	1.285	55.8	0.9	0.981	6.82	0.0723	51.83
10	11.55	0.179	64.5	1.262	29.16	0.7	271	3.88	19.61	1.051	86.51	10.5	0.064	0.165	N.A.	1.095	Y	1.308	54.7	1.0	0.9772	7.86	0.0796	50.85
11	11.69	0.179	65.3	1.259	29.10	0.7	271	3.88	19.85	1.074	88.51	11.8	0.065	0.178	N.A.	1.095	Y	1.331	53.6	1.1	0.9735	8.92	0.0866	49.86
12	11.83	0.179	66.1	1.257	29.03	0.7	271	3.88	20.09	1.096	90.54	13.1	0.065	0.191	N.A.	1.094	Y	1.354	52.5	1.2	0.9698	10.01	0.0932	48.88
13	11.97	0.179	66.9	1.254	28.97	0.7	271	3.88	20.33	1.119	92.59	14.5	0.066	0.204	N.A.	1.094	Y	1.377	51.4	1.4	0.9663	11.12	0.0995	47.91
14	12.11	0.179	67.7	1.251	28.91	0.7	271	3.88	20.57	1.142	94.66	15.9	0.067	0.217	N.A.	1.093	Y	1.400	50.3	1.5	0.9628	12.25	0.1055	46.94
15	12.25	0.179	68.4	1.248	28.84	0.7	271	3.88	20.81	1.165	96.76	17.3	0.067	0.229	N.A.	1.093	Y	1.424	49.2	1.6	0.9594	13.40	0.1111	45.98
16	12.39	0.179	69.2	1.246	28.78	0.7	271	3.88	21.06	1.189	98.87	18.7	0.068	0.241	N.A.	1.093	Y	1.448	48.1	1.7	0.9561	14.58	0.1165	45.03
17	12.53	0.179	70.0	1.243	28.71	0.7	271	3.88	21.30	1.213	101.02	20.2	0.068	0.252	N.A.	1.092	Y	1.472	47.1	1.9	0.9529	15.78	0.1216	44.08
18	12.67	0.179	70.8	1.240	28.65	0.7	271	3.88	21.54	1.237	103.18	21.7	0.069	0.264	N.A.	1.092	Y	1.496	46.0	2.0	0.9497	17.00	0.1265	43.14
19	12.81	0.179	71.6	1.237	28.58	0.7	271	3.88	21.78	1.333	105.36	23.2	0.073	0.277	N.A.	1.092	Y	1.631	45.0	2.1	0.9466	18.25	0.1313	42.21
20	12.95	0.179	72.3	1.234	28.51	0.7	271	3.88	22.02	1.357	107.57	24.9	0.074	0.289	N.A.	1.092	Y	1.656	43.9	2.3	0.9436	19.60	0.1362	41.28
21	13.09	0.179	73.1	1.231	28.44	0.7	271	3.88	22.26	1.382	109.80	26.5	0.074	0.301	N.A.	1.091	Y	1.681	42.9	2.4	0.9407	20.97	0.1408	40.36
22	13.23	0.179	73.9	1.228	28.37	0.7	271	3.88	22.50	1.407	112.06	28.2	0.075	0.312	N.A.	1.091	Y	1.706	41.9	2.6	0.9378	22.36	0.1452	39.45
23	13.37	0.179	74.7	1.225	28.31	0.7	271	3.88	22.75	1.433	114.34	30.0	0.076	0.323	N.A.	1.090	Y	1.731	40.9	2.7	0.9349	23.78	0.1494	38.55
24	13.51	0.179	75.5	1.222	28.24	0.7	271	3.88	22.99	1.459	116.63	31.7	0.076	0.334	N.A.	1.090	Y	1.757	39.9	2.9	0.9321	25.23	0.1534	37.66
25	13.65	0.179	76.3	1.219	28.17	0.7	271	3.88	23.23	1.485	118.96	33.5	0.077	0.345	N.A.	1.090	Y	1.782	38.9	3.0	0.9294	26.70	0.1572	36.78
26	13.79	0.179	77.0	1.216	28.09	0.7	271	3.88	23.47	1.511	121.30	35.3	0.077	0.355	N.A.	1.089	Y	1.808	37.9	3.1	0.9267	28.20	0.1608	35.90
27	13.93	0.179	77.8	1.213	28.02	0.7	271	3.88	23.71	1.538	123.67	37.1	0.078	0.365	N.A.	1.089	Y	1.834	37.0	3.3	0.9241	29.72	0.1643	35.04
28	14.07	0.179	78.6	1.210	27.95	0.7	271	3.88	23.95	1.565	126.06	38.9	0.078	0.375	N.A.	1.088	Y	1.861	36.0	3.4	0.9216	31.27	0.1676	34.18
29	14.21	0.179	79.4	1.207	27.88	0.7	271	3.88	24.19	1.592	128.47	40.8	0.079	0.385	N.A.	1.088	Y	1.887	35.1	3.6	0.9191	32.85	0.1707	33.34
30	14.35	0.179	80.2	1.203	27.80	0.7	271	3.88	24.44	1.619	130.91	42.7	0.080	0.395	N.A.	1.087	Y	1.914	34.2	3.7	0.9166	34.45	0.1737	32.50
31	14.49	0.179	80.9	1.200	27.73	0.7	271	3.88	24.68	1.647	133.37	44.6	0.080	0.404	N.A.	1.087	Y	1.941	33.3	3.9	0.9142	36.09	0.1765	31.68
32	14.63	0.179	81.7	1.197	27.65	0.7	271	3.88	24.92	1.675	135.85	46.6	0.081	0.413	N.A.	1.087	Y	1.968	32.4	4.0	0.9118	37.75	0.1793	30.86
33	14.77	0.179	82.5	1.194	27.58	0.7	271	3.88	25.16	1.703	138.35	48.6	0.081	0.422	N.A.	1.086	Y	1.995	31.5	4.2	0.9095	39.44	0.1819	30.06
34	14.91	0.179	83.3	1.190	27.50	0.7	271	3.88	25.40	1.731	140.88	50.6	0.082	0.431	N.A.	1.086	Y	2.022	30.6	4.3	0.9072	41.15	0.1843	29.27
35	15.05	0.179	84.1	1.187	27.42	0.7	271	3.88	25.64	1.760	143.43	52.6	0.082	0.439	N.A.	1.085	Y	2.050	29.8	4.5	0.905	42.90	0.1867	28.48
36	15.19	0.179	84.9	1.183	27.34	0.7	271	3.88	25.88	1.789	146.00	54.7	0.083	0.448	N.A.	1.085	Y	2.078	28.9	4.6	0.9028	44.67	0.189	27.71
37	15.33	0.179	85.6	1.180	27.26	0.7	271	3.88	26.13	1.818	148.60	56.8	0.084	0.456	N.A.	1.084	Y	2.106	28.1	4.8	0.9006	46.48	0.1911	26.95
38	15.47	0.179	86.4	1.176	27.18	0.7	271	3.88	26.37	1.848	151.22	58.9	0.084	0.464	N.A.	1.084	Y	2.134	27.3	4.9	0.8985	48.31	0.1932	26.21
39	15.61	0.179	87.2	1.173	27.10	0.7	271	3.88	26.61	1.878	153.86	61.0	0.085	0.472	N.A.	1.083	Y	2.162	26.5	5.1	0.8964	50.17	0.1952	25.47
40	15.75	0.179	88.0	1.169	27.02	0.7	271	3.88	26.85	1.917	156.52	63.2	0.086	0.480	N.A.	1.083	Y	2.190	25.7	5.2	0.8944	52.06	0.1785	24.74
41	15.89	0.239	65.0	1.166	26.93	0.7	271	3.88	35.21	1.956	208.68	65.4	0.067	0.373	N.A.	1.082	Y	2.219	24.9	5.4	0.975	54.00	0.1616	24.03
42	15.67	0.239	65.6	1.162	26.85	0.7	271	3.88	35.53	1.996	212.27	67.7	0.067	0.379	N.A.	1.082	Y	2.247	24.2	5.5	0.9723	55.98	0.163	23.32
43	15.81	0.239	66.2	1.158	26.77	0.7	271	3.88	35.85	2.036	215.90	69.9	0.068	0.384	N.A.	1.081	Y	2.275	23.4	5.7	0.9696	57.99	0.1643	22.63
44	15.95	0.239	66.7	1.155	26.68	0.7	271	3.88	36.17	2.076	219.55	72.2	0.069	0.390	N.A.	1.081	Y	2.304	22.7	5.8	0.9669	60.05	0.1656	21.95
45	16.09	0.239	67.3	1.151	26.59	0.7	271	3.88	36.50	2.117	223.23	74.5	0.070	0.396	N.A.	1.081	Y	2.332	21.9	6.0	0.9643	62.14	0.1668	21.27
46	16.23	0.239	67.9	1.147	26.50	0.7	271	3.88	36.82	2.159	226.94	76.9	0.070	0.401	N.A.	1.080	Y	2.361	21.2	6.2	0.9617	64.28	0.1681	20.61
47	16.37	0.239	68.5	1.143	26.41	0.7	271	3.88	37.14	2.200	230.68	79.2	0.071	0.406	N.A.	1.080	Y	2.390	20.5	6.3	0.9592	66.46	0.1693	19.95
48	16.51	0.239	69.1	1.139	26.32	0.7	271	3.88	37.46	2.242	234.46	81.6	0.072	0.412	N.A.	1.079	Y	2.419	19.8	6.5	0.9567	68.68	0.1704	19.31
49	16.65	0.239	69.7	1.135	26.23	0.7	271	3.88	37.78	2.284	238.26	84.1	0.073	0.417	N.A.	1.079	Y	2.448	19.2	6.6	0.9543	70.95	0.1715	18.67
50	16.79	0.239	70.3	1.131	26.14	0.7	271	3.88	38.11	2.327														

51	16.92/28/2022	0.239	70.8	1.127	26.04	0.7	271	3.88	38.43	2.370	245.96	89.0	0.074	0.427	N.A.	1.078	Y	2.507	17.8	6.9	96.0	0.9495	75.60	0.1737	17.43	LS110-C wind
52	17.07	0.239	71.4	1.123	25.95	0.7	271	3.88	38.75	2.413	249.85	91.6	0.075	0.432	N.A.	1.077	Y	2.537	17.2	7.1	98.6	0.9472	77.99	0.1748	16.83	
53	17.21	0.239	72.0	1.119	25.85	0.7	271	3.88	39.07	2.457	253.78	94.1	0.075	0.437	N.A.	1.077	Y	2.566	16.6	7.2	101.4	0.9449	80.43	0.1758	16.23	
54	17.35	0.239	72.6	1.115	25.75	0.7	271	3.88	39.40	2.501	257.73	96.7	0.076	0.442	N.A.	1.076	Y	2.596	16.0	7.4	104.1	0.9427	82.90	0.1768	15.65	
55	17.49	0.239	73.2	1.110	25.65	0.7	271	3.88	39.72	2.546	261.72	99.3	0.077	0.447	N.A.	1.076	Y	2.626	15.3	7.5	106.9	0.9405	85.43	0.1777	15.08	
56	17.63	0.239	73.8	1.106	25.55	0.7	271	3.88	40.04	2.590	265.74	101.9	0.078	0.451	N.A.	1.076	Y	2.656	14.8	7.7	109.6	0.9383	88.00	0.1787	14.52	
57	17.77	0.239	74.4	1.101	25.45	0.7	271	3.88	40.36	2.635	269.78	104.6	0.078	0.456	N.A.	1.075	Y	2.687	14.2	7.9	112.5	0.9361	90.61	0.1796	13.96	
58	17.91	0.239	74.9	1.097	25.34	0.7	271	3.88	40.69	2.681	273.86	107.3	0.079	0.461	N.A.	1.075	Y	2.717	13.6	8.0	115.3	0.934	93.27	0.1805	13.42	
59	18.05	0.239	75.5	1.092	25.24	0.7	271	3.88	41.01	2.727	277.97	110.1	0.080	0.465	N.A.	1.074	Y	2.748	13.0	8.2	118.2	0.932	95.97	0.1814	12.89	
60	18.19	0.239	76.1	1.088	25.13	0.7	271	3.88	41.33	2.773	282.10	112.8	0.081	0.470	N.A.	1.074	Y	2.778	12.5	8.3	121.1	0.9299	98.72	0.1822	12.37	
61	18.33	0.239	76.7	1.083	25.02	0.7	271	3.88	41.65	2.820	286.27	115.6	0.081	0.474	N.A.	1.073	Y	2.809	12.0	8.5	124.1	0.9279	101.52	0.1831	11.87	
62	18.47	0.239	77.3	1.078	24.91	0.7	271	3.88	41.97	2.867	290.47	118.4	0.082	0.478	N.A.	1.073	Y	2.840	11.5	8.6	127.0	0.9259	104.36	0.1839	11.37	
63	18.61	0.239	77.9	1.073	24.80	0.7	271	3.88	42.30	2.914	294.70	121.3	0.083	0.483	N.A.	1.072	Y	2.871	10.9	8.8	130.0	0.924	107.25	0.1847	10.88	
64	18.75	0.239	78.5	1.068	24.68	0.7	271	3.88	42.62	2.962	298.96	124.2	0.083	0.487	N.A.	1.072	Y	2.901	10.5	8.9	133.1	0.9221	110.19	0.1854	10.41	
65	18.89	0.239	79.0	1.063	24.56	0.7	271	3.88	42.94	3.010	303.25	127.1	0.084	0.491	N.A.	1.071	Y	2.933	10.0	9.0	136.1	0.9202	113.17	0.1862	9.94	
66	19.03	0.239	79.6	1.058	24.44	0.7	271	3.88	43.26	3.058	307.57	130.0	0.085	0.495	N.A.	1.071	Y	2.964	9.5	9.2	139.2	0.9183	116.21	0.1869	9.49	
67	19.17	0.239	80.2	1.053	24.32	0.7	271	3.88	43.59	3.107	311.92	133.0	0.086	0.499	N.A.	1.070	Y	2.995	9.0	9.3	142.4	0.9165	119.29	0.1877	9.05	
68	19.31	0.239	80.8	1.047	24.20	0.7	271	3.88	43.91	3.156	316.30	136.0	0.086	0.503	N.A.	1.070	Y	3.026	8.6	9.5	145.5	0.9147	122.42	0.1884	8.61	
69	19.45	0.239	81.4	1.042	24.07	0.7	271	3.88	44.23	3.205	320.71	139.1	0.087	0.507	N.A.	1.069	Y	3.057	8.2	9.6	148.7	0.9129	125.60	0.1891	8.19	
70	19.59	0.239	82.0	1.036	23.94	0.7	271	3.88	44.55	3.255	325.15	142.1	0.088	0.511	N.A.	1.069	Y	3.089	7.8	9.7	151.9	0.9111	128.83	0.1897	7.78	
71	19.73	0.239	82.6	1.031	23.81	0.7	271	3.88	44.88	3.305	329.62	145.2	0.088	0.515	N.A.	1.068	Y	3.120	7.3	9.9	155.1	0.9094	132.11	0.1904	7.39	
72	19.87	0.239	83.1	1.025	23.68	0.7	271	3.88	45.20	3.356	334.12	148.4	0.089	0.519	N.A.	1.067	Y	3.152	7.0	10.0	158.4	0.9077	135.44	0.191	7.00	
73	20.01	0.239	83.7	1.019	23.54	0.7	271	3.88	45.52	3.406	338.65	151.6	0.090	0.522	N.A.	1.067	Y	3.183	6.6	10.1	161.7	0.906	138.82	0.1917	6.63	
74	20.15	0.239	84.3	1.013	23.40	0.7	271	3.88	45.84	3.458	343.21	154.8	0.091	0.526	N.A.	1.066	Y	3.215	6.2	10.3	165.0	0.9043	142.25	0.1923	6.26	
75	20.29	0.239	84.9	1.007	23.26	0.7	271	3.88	46.17	3.509	347.81	158.0	0.091	0.530	N.A.	1.066	Y	3.246	5.8	10.4	168.4	0.9027	145.73	0.1929	5.91	
76	20.43	0.239	85.5	1.000	23.11	0.7	271	3.88	46.49	3.561	352.43	161.2	0.092	0.533	N.A.	1.065	Y	3.278	5.5	10.5	171.8	0.9011	149.27	0.1935	5.57	
77	20.57	0.239	86.1	0.994	22.96	0.7	271	3.88	46.81	3.628	357.08	164.5	0.093	0.537	N.A.	1.065	Y	3.310	5.2	10.6	175.2	0.8995	152.86	0.1779	5.24	
78	20.19	0.313	64.5	0.987	22.80	0.7	271	3.88	59.93	3.695	462.25	167.9	0.074	0.423	N.A.	1.064	Y	3.341	4.8	10.8	178.6	0.9773	156.52	0.1623	4.92	
79	20.33	0.313	65.0	0.980	22.64	0.7	271	3.88	60.36	3.762	468.36	171.2	0.075	0.426	N.A.	1.064	Y	3.372	4.5	10.9	182.1	0.9751	160.25	0.1627	4.61	
80	20.47	0.313	65.4	0.973	22.48	0.7	271	3.88	60.78	3.830	474.51	174.6	0.076	0.429	N.A.	1.063	Y	3.403	4.2	11.0	185.6	0.973	164.04	0.1631	4.32	
81	20.61	0.313	65.8	0.966	22.31	0.7	271	3.88	61.20	3.898	480.70	178.0	0.076	0.432	N.A.	1.062	Y	3.433	3.9	11.1	189.1	0.971	167.91	0.1635	4.03	
82	20.75	0.313	66.3	0.958	22.14	0.7	271	3.88	61.62	3.967	486.93	181.5	0.077	0.434	N.A.	1.062	Y	3.464	3.7	11.2	192.7	0.9689	171.84	0.164	3.75	
83	20.89	0.313	66.7	0.951	21.96	0.7	271	3.88	62.04	4.037	493.20	185.0	0.078	0.437	N.A.	1.061	Y	3.495	3.4	11.3	196.3	0.9669	175.84	0.1644	3.48	
84	21.03	0.313	67.2	0.943	21.78	0.7	271	3.88	62.47	4.106	499.51	188.5	0.079	0.440	N.A.	1.061	Y	3.525	3.1	11.4	199.9	0.9649	179.91	0.1648	3.22	
85	21.17	0.313	67.6	0.935	21.59	0.7	271	3.88	62.89	4.177	505.86	192.0	0.080	0.442	N.A.	1.060	Y	3.556	2.9	11.5	203.5	0.9629	184.05	0.1652	2.97	
86	21.31	0.313	68.1	0.926	21.40	0.7	271	3.88	63.31	4.247	512.25	195.6	0.081	0.445	N.A.	1.059	Y	3.587	2.7	11.6	207.2	0.961	188.26	0.1656	2.73	
87	21.45	0.313	68.5	0.917	21.20	0.7	271	3.88	63.73	4.319	518.68	199.2	0.081	0.447	N.A.	1.059	Y	3.617	2.4	11.7	210.9	0.959	192.55	0.1661	2.50	
88	21.59	0.313	69.0	0.908	20.99	0.7	271	3.88	64.16	4.390	525.15	202.8	0.082	0.450	N.A.	1.058	Y	3.647	2.2	11.8	214.6	0.9571	196.90	0.1665	2.28	
89	21.73	0.313	69.4	0.899	20.77	0.7	271	3.88	64.58	4.462	531.66	206.5	0.083	0.452	N.A.	1.058	Y	3.678	2.0	11.9	218.4	0.9553	201.33	0.1669	2.07	
90	21.87	0.313	69.9	0.889	20.54	0.7	271	3.88	65.00	4.535	538.20	210.2	0.084	0.455	N.A.	1.057	Y	3.708	1.8	12.0	222.2	0.9534	205.83	0.1673	1.87	
91	22.01	0.313	70.3	0.879	20.31	0.7	271	3.88	65.42	4.608	544.79	213.9	0.085	0.457	N.A.	1.057	Y	3.738	1.6	12.1	226.0	0.9516	210.40	0.1678	1.68	
92	22.15	0.313	70.8	0.868	20.06	0.7	271	3.88	65.84	4.682	551.42	217.6	0.085	0.459	N.A.	1.056	Y	3.767	1.5	12.2	229.8	0.9498	215.04	0.1682	1.50	
93	22.29	0.313	71.2	0.857	19.80	0.7	271	3.88	66.27	4.756	558.09	221.4	0.086	0.4												

**Reference:** 2019 CBC, ASCE 7-16

**INPUT:**

Job Location:	La Mirada, CA	
Site Class	D	Soil Report
0.2 Sec MCE, $S_s$	1.640 g	Soil Report
1.0 Sec MCE, $S_1$	0.583 g	Soil Report
Site Coeff., $F_a$		
Site Coeff., $F_v$		
$S_{MS} = F_a S_s$	2.073 g	Site Specific per Soil Report
$S_{M1} = F_v S_1$	1.504 g	Site Specific per Soil Report
$S_{DS} = 2/3 S_{MS}$	1.382 g	Site Specific per Soil Report
$S_{D1} = 2/3 S_{M1}$	1.003 g	Site Specific per Soil Report
$T_s = S_{D1}/S_{DS}$	0.726 sec	
Long Period transition period, $T_L$	8.0 sec	ASCE 7-16 -Figure 22-12
Risk Category	II	Table 1604A.5
Seismic Design Category	D	2019 CBC Section 1613A.3.5

**OUTPUT:**

<b>Light Pole Class</b>	LS110-C	
Fundamental Period, $T$	2.49 sec	See structural calculations, pg 13
Seismic coeff., $R$	1.5	ASCE 7-16 Table 15.4-2
Overstrength Factor, $\Omega$	1.5	ASCE 7-16 Table 15.4-2
Importance Factor, $I$	1.00	ASCE 7-16 Section 15.4.1.1 & Table 1.5-2
Redundancy factor, $\rho$	1.0	ASCE 7-16 Section 15.6

**DESIGN SEISMIC FORCE**

$V = C_s W$		ASCE 7-16 Eqn. 12.8-1
$C_s = S_{DS}/(R/I)$ for $T \leq T_s$	0.921 g	ASCE 7-16 Eqn. 12.8-2
$C_s$ max. for $T \leq T_L$ , $C_s = S_{D1}/T(R/I)$	0.268 g	ASCE 7-16 Eqn. 12.8-3
$C_s$ min = $0.044 S_{DS} I \geq 0.03$	0.06 g	ASCE 7-16 Eqn. 15.4-1
if $S_1 \geq 0.6g$ , $C_s$ min = $0.8 S_1/(R/I)$	N.A. g	ASCE 7-16 Eqn. 15.4-2
Load Combination, 1.2D+ 1.0E		ASCE 7-16 Section 2.3.2 Load Comb 5
where $E = E_h + E_v$		ASCE 7-16 Eqn. 12.4-1
and $E_h = pQ_E$	0.268 W	ASCE 7-16 Eqn. 12.4-3
and $E_v = 0.2 S_{DS} D$	0.276 D	ASCE 7-16 Eqn. 12.4-4
Load Combination, 1.2D + ( $pQ_e + 0.2 S_{DS} D$ )		

Load Combination, 1.2D + ( $pQ_e + 0.2 S_{DS} D$ )	1.476 D	+	0.268 W
--	---------	---	---------

Total Seismic Weight,  $W = 8.026$  kips See following page

SEISMIC SHEAR, $V =$	2.592 kips	<	4.730 kips WIND SHEAR	WIND CONTROLS
SEISMIC SHEAR WITH O.F., $\Omega V =$	3.888 kips	<	4.730 kips WIND SHEAR	WIND CONTROLS



Vertical Distribution of Seismic Force,  $F_x = C_{vx} V$  ASCE7-16 Eqn. 12.8-11 & Section 12.8.5  
 $k = 2.000$

Item	w	$h_x$	$w_x h_x^k$	$w_x h_x^k / \sum w_x h_x^k$	$C_{vx} V$	OTM
fixtures	0.371	106.70	4224	0.182	0.392	41.84
fixtures	0.371	104.20	4028	0.174	0.374	38.96
fixtures	0.101	106.70	1150	0.050	0.107	11.39
	0.000	99.20	0	0.000	0.000	0.00
	0.000	96.70	0	0.000	0.000	0.00
Top Pole Section	1.026	86.50	7677	0.331	0.713	61.64
2nd Pole Section	1.889	49.40	4610	0.199	0.428	21.14
1st Pole Section	2.221	18.20	736	0.032	0.068	1.24
LED600	0.071	90.00	575	0.025	0.053	4.80
SPEAKER	0.041	15.00	9	0.000	0.001	0.01
ANTENNA	0.037	15.00	8	0.000	0.001	0.01
CAMERA	0.036	15.00	8	0.000	0.001	0.01
ECE	0.220	15.00	50	0.002	0.005	0.02
1/2 Precast base above grade	1.643	7.83	101	0.004	0.009	0.12
Sum	8.026		23175	1.000	2.151	181.19
Total Dead Load at grade	9.669					
SEISMIC OTM = 181.19 kip-ft < 304.22 kip-ft Wind OTM						
SEISMIC OTM WITH O.F. , QM = 271.79 kip-ft < 304.22 kip-ft Wind OTM						
					WIND CONTROLS	
					WIND CONTROLS	

**SCOPE:** Analysis of an annular prestressed concrete pole member based on compatible strain procedure per ACI-318\* with an ultimate concrete strain of 0.003.

**PROJECT:** Musco Standard Pole Base

**DATE:** May-1-2014 9:49 AM

**POLE TYPE =** 7B

PROGRAM VERSION 2.3 DSA Design

### USER DEFINED INPUTS

CROSS-SECTION OUTER DIAMETER = $D_o$ =	23.655 INCHES
HOLLOW CORE INSIDE DIAMETER = $D_i$ =	11.375 INCHES
TENDON CIRCLE DIAMETER = $D_t$ =	20.625 INCHES
NUMBER OF TENDONS = N (56 or less and even)	26
TENDON DIAMETER = $d_t$ =	0.5 INCHES
NOMINAL TENDON AREA = $A_{ps}$ =	0.1531 IN <sup>2</sup>
ULTIMATE TENDON STRENGTH = $f_{pu}$ =	270 KSI
TENDON YIELD STRENGTH = $f_{py}$ =	230 KSI
CONCRETE COMPRESSIVE STRENGTH = $F'_c$ =	9500 PSI
MODULUS OF ELASTICITY - STEEL = $E_s$ =	28500 KSI
INITIAL PRESTRESS FACTOR = IPF =	0.64
PRESTRESS LOSS FACTOR = PLF =	0.82
*PHI FACTOR CALCULATED PER ACI 318	ACI 318

### OUTPUT

PHI FACTOR = $\phi$ =	0.86	
PRESTRESSING STRAIN IN TENDON = $\epsilon_{se}$ =	0.0050	
CONCRETE SERVICE STRESS DUE TO PRESTRESS =	1669 PSI	
CROSS SECTIONAL AREA =	338 IN <sup>2</sup>	
GROSS MOMENT OF INERTIA =	14548 IN <sup>4</sup>	
DISTANCE TO NEUTRAL AXIS FROM COMP. SIDE = $c$ =	8.77 INCHES	
CONCRETE COMPRESSIVE FORCE =	650 KIPS	
AREA OF BONDED REINFORCEMENT =	3.98 IN <sup>2</sup>	
MINIMUM BONDED REINFORCEMENT AREA =	0.68 IN <sup>2</sup>	<b>SATISFIED</b>

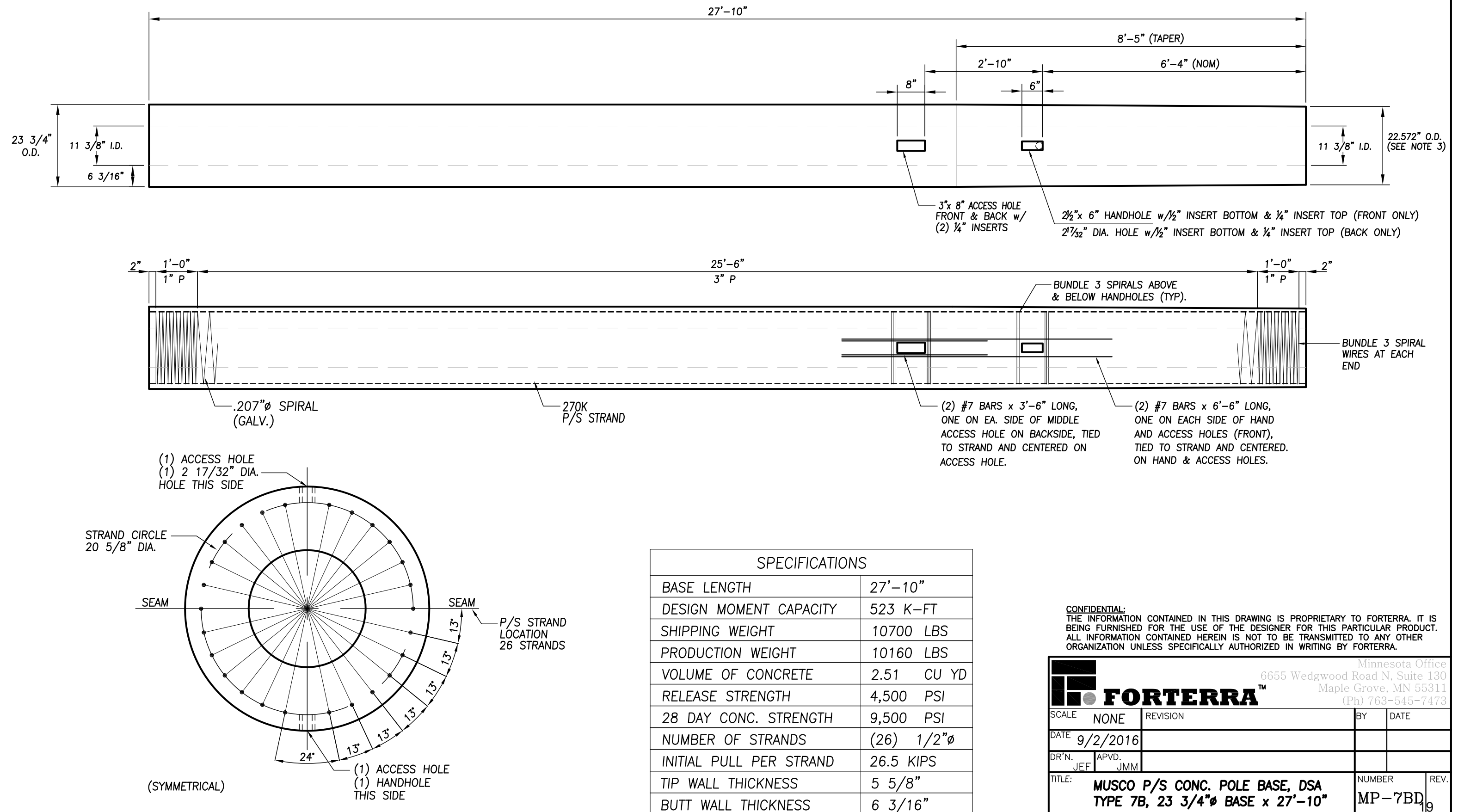
STRAND DEVELOPMENT LENGTH =  $L_d$  = 68 INCHES

### RESULTS

NOMINAL MOMENT CAPACITY = $M_n$ =	604 FT-KIPS
DESIGN MOMENT CAPACITY = $\phi M_n$ =	<b>523 FT-KIPS</b>
CRACKING LOAD MOMENT =	246 FT-KIPS <b>SATISFIED</b>


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1. MARK-DATE, TYPE AND "BOTTOM" NEAR BOTTOM OF BASE.
2. PROVIDE INSERTS FOR COVER PLATES AT EACH OPENING.
3. GROUNDING SYSTEM NOT SHOWN. REFERENCE MUSCO DOC. PS-1408-1.
4. COAT ENTIRE BASE END SURFACES (T AND B) WITH SIKAGARD 62, .015" MIN. THICKNESS. DO NOT COAT METAL INSERTS.
5. COAT INSIDE SURFACES AT EACH HOLE WITH SIKAGARD 62, .015 MIN. THICKNESS.
6. PROVIDE 3/4" STRAND COVER AT EACH HOLE WITH SPACER INSERT.



SPECIFICATIONS	
BASE LENGTH	27'-10"
DESIGN MOMENT CAPACITY	523 K-FT
SHIPPING WEIGHT	10700 LBS
PRODUCTION WEIGHT	10160 LBS
VOLUME OF CONCRETE	2.51 CU YD
RELEASE STRENGTH	4,500 PSI
28 DAY CONC. STRENGTH	9,500 PSI
NUMBER OF STRANDS	(26) 1/2"Ø
INITIAL PULL PER STRAND	26.5 KIPS
TIP WALL THICKNESS	5 5/8"
BUTT WALL THICKNESS	6 3/16"

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 <b>FORTERRA™</b>		Minnesota Office		
		6655 Wedgwood Road N, Suite 130 Maple Grove, MN 55311 (Ph) 763-545-7473		
SCALE	NONE	REVISION	BY	DATE
DATE	9/2/2016			
DR'N.	JEF	APVD.	JMM	
TITLE:			NUMBER	REV.
MUSCO P/S CONC. POLE BASE, DSA TYPE 7B, 23 3/4"Ø BASE x 27'-10"			MP-7BD	19

Mark/Type	LS100-B WIND	LS100-B (EQ) SEISMIC	LS100-B WIND	LS100-B (EQ) SEISMIC	LS110-C WIND	LS110-C (EQ) SEISMIC
	F1, F3, F4, F6		F2		F5	
Precast Base, Design Moment capacity= $\phi M_n$ (K-Ft) =	340	340	340	340	523	523
Precast Base, Wind ASD Moment capacity= $\phi M_n(0.6)$ =	204		204		314	
Precast Base, Seismic ASD Moment capacity= $\phi M_n(0.7)$ =		238		238		366
INPUT						
ASD Shear, P lbs =	2,530	1,184	2,505	1,145	2,838	1,814
height of P above grade, h ft =	59.44	68.71	62.41	69.05	64.32	69.91
allow lateral brg pressure, s psf/ft =	150	150	150	150	150	150
max allow lateral brg pressure psf/ft =	1500	1500	1500	1500	1500	1500
P/C Base Diameter, b ft =	1.713	1.713	1.713	1.713	1.979	1.979
OUTPUT						
ASD Moment at grade, M ft-lbs =	150,368	81,346	156,371	79,069	182,534	126,833
Mallow, P/C Base ft-kips =	204	238	204	238	314	366
Mmax/Mallow - P/C Base =	0.737	0.342	0.767	0.332	0.582	0.346
IF Mallow>Mmax, P/C Base is O.K.	O.K.	O.K.	O.K.	O.K.	O.K.	O.K.
P/C Base below grade, Wind						
Depth to begin passive pressure, $d_p$ ft =	2.00	2.00	2.00	2.00	2.00	2.00
Eff. height of P above grade, $h + d_p$ ft =	61.44	70.71	64.41	71.05	66.32	71.91
Moment at begin passive pressure, M ft-lbs =	155,427	-	161,382	-	188,209	-
Mallow, P/C Base ft-kips =	204	-	204	-	314	-
Mmax/Mallow - P/C Base =	0.762	-	0.791	-	0.600	-
IF Mallow>Mmax, P/C Base is O.K.	O.K.	-	O.K.	-	O.K.	-
P/C Base below grade, Seismic						
ASD Shear, $\phi P$ (with Overstrength for Seismic) lbs =	-	1,776	-	1,718	-	2,721
height of P above grade, h (w/ EQ Overstrength) ft =	-	68.71	-	69.05	-	69.91
Moment at grade, M (w/ EQ Overstrength) ft-lbs =	-	122,020	-	118,603	-	190,250
Moment at begin passive pressure, M (w/ EQ Overstrength) ft-lbs =	-	125,571	-	122,038	-	195,693
Mallow, P/C Base ft-kips =	-	238	-	238	-	366
Mmax/Mallow =	-	0.528	-	0.513	-	0.535
IF Mallow>Mmax, Reinf. Base is O.K. for EQ Overstrength	-	O.K.	-	O.K.	-	O.K.
Reinf. Pier design						
Reinf Pier						
Effective Reinf Pier diameter	3.5	3.5	3.5	3.5	4.0	4.0
Mallow, Reinf Pier Base ft-kips =	229	267	229	267	345	402
Mmax/Mallow =	0.679	0.470	0.705	0.457	0.546	0.487
IF Mallow>Mmax, Reinf. Base is O.K. for EQ Overstrength	O.K.	O.K.	O.K.	O.K.	O.K.	O.K.
Check Embedment Length Req'd for Lateral Soil Bearing						
Precast Base -or- Reinforced Pier	REINFORCED PIER	REINFORCED PIER	REINFORCED PIER	REINFORCED PIER	REINFORCED PIER	REINFORCED PIER
Effective Base/Pier diameter	3.5	3.5	3.5	3.5	4.0	4.0
acting lateral brg pressure, $S_s$ psf =	700	559	707	553	711	622
allow lateral brg pressure, $S_s$ psf =	700	559	707	553	711	622
$A=2.34P/(S_s b)$ - ASD =	2.42	1.42	2.37	1.38	2.34	1.71
Min req'd embedment, d ft =	13.99	11.18	14.14	11.07	14.21	12.45
$=A/2\{1+[1+4.36(h+d_p)/A]^{1/2}\}$						
Depth to begin passive pressure ft =	2.00	2.00	2.00	2.00	2.00	2.00
Total embed req'd ft =	15.99	13.18	16.14	13.07	16.21	14.45
STANDARD EMBED DEPTH ft =	18	18	18	18	20	20
Total embed req'd/Standard embed =	0.888	0.732	0.897	0.726	0.811	0.722
IF Total embed req'd<Standard embed, O.K.	O.K.	O.K.	O.K.	O.K.	O.K.	O.K.
Base below grade, Wind						
Precast Base -or- Reinforced Pier	REINFORCED PIER	REINFORCED PIER	REINFORCED PIER	REINFORCED PIER	REINFORCED PIER	REINFORCED PIER
Shear= $0 @ d=(2P/sb)^{0.5}$ +depth neglected ft =	5.10	-	5.09	-	5.08	-
Mmax= $M+Pd-sbd/6$ ft-kips =	160.7	-	166.5	-	194.0	-
Mallow ft-kips =	229.0	-	229.0	-	345.0	-
Mmax/Mallow =	0.702	-	0.727	-	0.562	-
IF Mallow>Mmax, base is O.K.	O.K.	-	O.K.	-	O.K.	-
Base below grade, EQ						
Shear= $0 @ d=(2P/sb)^{0.5}$ +depth neglected ft =	-	4.60	-	4.56	-	5.01
Mmax= $M+Pd-sbd/6$ ft-kips =	-	128.7	-	125.0	-	201.2
Mallow ft-kips =	-	267.0	-	267.0	-	402.0
Mmax/Mallow =	-	0.482	-	0.468	-	0.500
IF Mallow>Mmax, base is O.K.	-	O.K.	-	O.K.	-	O.K.



POLE DESIGNATION: LSS100B  
 MANUFACTURER: MUSCO  
 CLIENT:

JOB NO: 363.589  
 PROJECT: La Mirada High School  
 LOCATION: La Mirada, CA

ULTIMATE STRENGTH CHECK OF FOOTING REINFORCEMENT  
 (BY STRAIN ANALYSIS FOR 8 BAR CAGE)

INPUT

OUTSIDE DIAMETER, d = 42.00 IN  
 CONCRETE COVER TO REINF = 3.38  
 REINF CIRCLE DIAMETER, r = 34.38 IN  
 NUMBER OF REBAR = 8  
 SIZE OF REINF, # = 7  
 AREA OF REINF = 0.60 IN 4.80 > 2.81 IN<sup>2</sup> (MIN As=.0025Ag)  
 REINF YIELD STRENGTH = 60.0 KSI  
 CONC COMP STRENGTH = 3.0 KSI  
 MOD OF ELASTICITY, STEEL = 29,000 KSI  
 MOD OF ELASTICITY, CONC = 3,122 KSI

ASSUME

CONCRETE STRAIN = 0.0030 IN/IN MAX  
 DISTANCE TO N.A., c = 5.77 IN

SOLUTION

n = Es/Ec = 9.29  
 BETA = 0.85 ACI 22.2.2.4.3  
 a = BETA\*c = 4.90  
 a/d = 0.1168  
 CURVE B FACTOR FOR AREA = 0.0484 FROM CHART PG 703 REINF CONC FUND, BY FERGUSON, 1965  
 COMPRESSION AREA = 85.38 IN<sup>2</sup>  
 CURVE A FOR ARM TO c.g. = 0.865 FROM CHART PG 703 REINF CONC FUND, BY FERGUSON, 1965  
 DIST. FROM c.g. TO cL. = 18.17 IN  
 YIELD STEEL STRAIN = 0.0021 IN/IN  
 SPACING OF REINF, THETA = 45 DEGREE:  
 DIST FOR THETA 1, d1 = 38.19 IN  
 DIST FOR THETA 2, d2 = 33.15 IN  
 DIST FOR THETA 3, d3 = 21.00 IN  
 DIST FOR THETA 4, d4 = 8.85 IN  
 DIST FOR THETA 5, d5 = 3.81 IN

BENDING STRAIN	STRAND STRESS	INTERNAL FORCES	ULTIMATE MOMENT CAPACITY
e1 = 0.0168549 IN/IN	fs = 60.0 KSI	F1 = 36.00 KIPS	97.3 KIP-FT
e2 = 0.014237 IN/IN	fs = 60.0 KSI	F2 = 72.00 KIPS	164.3 KIP-FT
e3 = 0.0079185 IN/IN	fs = 60.0 KSI	F3 = 72.00 KIPS	91.4 KIP-FT
e4 = 0.0015991 IN/IN	fs = 46.4 KSI	F4 = 55.65 KIPS	14.3 KIP-FT
e5 = -0.001018 IN/IN	fs = -29.5 KSI	F5 = -17.71 KIPS	2.9 KIP-FT

CONCRETE = -217.71 KIPS 53.2 KIP-FT

TOTAL = 0.23 KIPS

Mu =	423.3 KIP-FT (ULTIMATE STRENGTH)
Ms = 0.9Mu*.6 =	228.6 KIP-FT (ASD)
Ms = 0.9*Mu*.7 =	266.7 KIP-FT (ASD)



POLE DESIGNATION: LSS110C  
 MANUFACTURER: MUSCO  
 CLIENT:

JOB NO: 363.589  
 PROJECT: La Mirada High School  
 LOCATION: La Mirada, CA

ULTIMATE STRENGTH CHECK OF FOOTING REINFORCEMENT  
 (BY STRAIN ANALYSIS FOR 8 BAR CAGE)

INPUT

OUTSIDE DIAMETER, d = 48.00 IN  
 CONCRETE COVER TO REINF = 3.50  
 REINF CIRCLE DIAMETER, r = 40.00 IN  
 NUMBER OF REBAR = 8  
 SIZE OF REINF, # = 8  
 AREA OF REINF = 0.79 IN<sup>2</sup> 6.32 > 3.42 IN<sup>2</sup> (MIN As=.0025Ag)  
 REINF YIELD STRENGTH = 60.0 KSI O.K.  
 CONC COMP STRENGTH = 3.0 KSI (4.5 KSI ACTUAL)  
 MOD OF ELASTICITY, STEEL = 29,000 KSI  
 MOD OF ELASTICITY, CONC = 3,122 KSI

ASSUME

CONCRETE STRAIN = 0.0030 IN/IN MAX  
 DISTANCE TO N.A., c = 6.53 IN

SOLUTION

n = Es/Ec = 9.29  
 BETA = 0.85 ACI 22.2.2.4.3  
 a = BETA\*c = 5.55  
 a/d = 0.1155  
 CURVE B FACTOR FOR AREA = 0.0478 FROM CHART PG 703 REINF CONC FUND, BY FERGUSON, 1965  
 COMPRESSION AREA = 110.02 IN<sup>2</sup>  
 CURVE A FOR ARM TO c.g. = 0.867 FROM CHART PG 703 REINF CONC FUND, BY FERGUSON, 1965  
 DIST. FROM c.g. TO cL. = 20.81 IN  
 YIELD STEEL STRAIN = 0.0021 IN/IN  
 SPACING OF REINF, THETA = 45 DEGREE:

	BENDING STRAIN	STRAND STRESS	INTERNAL FORCES	ULTIMATE MOMENT CAPACITY
DIST FOR THETA 1, d1 = 44.00 IN	e1 = 0.0172299 IN/IN	fs = 60.0 KSI	F1 = 47.40 KIPS	148.0 KIP-FT
DIST FOR THETA 2, d2 = 38.14 IN	e2 = 0.0145361 IN/IN	fs = 60.0 KSI	F2 = 94.80 KIPS	249.8 KIP-FT
DIST FOR THETA 3, d3 = 24.00 IN	e3 = 0.0080345 IN/IN	fs = 60.0 KSI	F3 = 94.80 KIPS	138.1 KIP-FT
DIST FOR THETA 4, d4 = 9.86 IN	e4 = 0.0015318 IN/IN	fs = 44.4 KSI	F4 = 70.19 KIPS	19.5 KIP-FT
DIST FOR THETA 5, d5 = 4.00 IN	e5 = -0.001161 IN/IN	fs = -33.7 KSI	F5 = -26.60 KIPS	5.6 KIP-FT

CONCRETE = -280.54 KIPS 77.9 KIP-FT

TOTAL = 0.05 KIPS

Mu =	638.8 KIP-FT (ULTIMATE STRENGTH)
Ms = 0.9Mu*.6 =	345.0 KIP-FT (ASD)
Ms = 0.9Mu*.7 =	402.5 KIP-FT (ASD)

Search Information

Address: 13520 Adelfa Dr, La Mirada, CA 90638, USA

Coordinates: 33.9080758, -118.0038328

Elevation: 207 ft

Timestamp: 2020-03-02T17:43:10.470Z

Hazard Type: Wind



ASCE 7-16

MRI 10-Year ----- 66 mph

MRI 25-Year ----- 71 mph

MRI 50-Year ----- 76 mph

MRI 100-Year ----- 81 mph

Risk Category I ----- 89 mph

Risk Category II ----- 95 mph

Risk Category III ----- 102 mph

Risk Category IV ----- 106 mph

ASCE 7-10

MRI 10-Year ⚠️ Special Region mph

You are in a special wind region.  
Please contact the Authority Having Jurisdiction.

MRI 25-Year ⚠️ Special Region mph

You are in a special wind region.  
Please contact the Authority Having Jurisdiction.

MRI 50-Year ⚠️ Special Region mph

You are in a special wind region.  
Please contact the Authority Having Jurisdiction.

MRI 100-Year ⚠️ Special Region mph

You are in a special wind region.  
Please contact the Authority Having Jurisdiction.

Risk Category I ⚠️ Special Region mph

You are in a special wind region.  
Please contact the Authority Having Jurisdiction.

Risk Category II ⚠️ Special Region mph

You are in a special wind region.  
Please contact the Authority Having Jurisdiction.

ASCE 7-05

ASCE 7-05 Wind Speed ⚠️ Special Region mph

You are in a special wind region. Please contact the Authority Having Jurisdiction.

## APPENDIX B

### APPENDIX A: SEISMIC ANALYSIS

#### A.1 CBC Seismic Design Parameters

General seismic parameters based on the 2019 California Building Code and ASCE 7-16 with Supplement 1 are calculated using the ATC hazard, *Seismic Design by location* website application and the site coordinates (33.9082 degrees North Latitude, -118.00309 degrees West Longitude). The seismic parameters are presented below.

**Table No. A-1, CBC Seismic Design Parameters**

Seismic Parameter	Value
Site Class	D
Mapped Short period (0.2-sec) Spectral Response Acceleration, $S_s$	1.640 g
Mapped 1-second Spectral Response Acceleration, $S_1$	0.583 g
Site Coefficient, $F_a$	1.0
Site Coefficient, $F_v^*$	1.720
MCE 0.2-sec period Spectral Response Acceleration, $S_{MS}$	1.640 g
MCE 1-second period Spectral Response Acceleration, $S_{M1}^*$	1.002 g
Design Spectral Response Acceleration for short period, $S_{DS}$	1.093 g
Design Spectral Response Acceleration for 1-second period, $S_{D1}^*$	0.669 g

\*ASCE 7-16 section 21.3, for the site-specific ground motion these values are used:  $F_v=2.5$ ,  $S_{M1}=1.458$ , and  $S_{D1}=0.972$ , See Table A-2

#### A.2 Site-Specific Response Spectra

A site-specific response spectrum was developed for the project for a Maximum Considered Earthquake (MCE), defined as a horizontal peak ground acceleration that has a 2 percent probability of being exceeded in 50 years (return period of approximately 2,475 years).

In accordance with ASCE 7-16, Section 21.2 the site-specific response spectra can be taken as the lesser of the probabilistic maximum rotated component of MCE ground motion and the 84<sup>th</sup> percentile of deterministic maximum rotated component of MCE ground motion response spectra. The design response spectra can be taken as 2/3 of site-specific MCE response spectra but should not be lower than 80 percent of CBC general response spectra. The risk coefficient  $C_R$  has been incorporated at each spectral response period for which the acceleration was computed in accordance with ASCE 7-16, Section 21.2.1.1.

The 2019 CBC mapped acceleration parameters are provided in the following table. These parameters were determined using the *ATC hazard by location Seismic Design Maps* website application, and in accordance with ASCE 7-16 Sections 11.4, 11.6, 11.8, 21.2, and 21.3.





Period (sec)	84th Percentile Deterministic Response Spectrum, (g) Geometric Mean	Scale Factors for $MCE_R$	84th Percentile Deterministic MCE Response Spectrum, (g)	Site Specific $MCE_R$ Spectral Acceleration (g)	80% CBC Design Response Spectrum	Site Specific Design Spectral Acceleration (g)
0.30	2.758	1.125	3.103	2.266	0.875	1.51
0.40	2.904	1.150	3.340	2.303	0.875	1.54
0.50	2.803	1.175	3.294	2.234	0.875	1.49
0.75	2.249	1.238	2.783	1.811	0.875	1.21
1.00	1.753	1.300	2.279	1.474	0.777	0.98
2.00	1.055	1.350	1.424	0.748	0.389	0.50
3.00	0.893	1.400	1.250	0.501	0.259	0.33
4.00	0.784	1.450	1.137	0.369	0.194	0.25
5.00	0.594	1.500	0.891	0.276	0.155	0.18

The site-specific design response parameters are provided in the following table. These parameters were determined from Design Response Spectra presented in table above and following guidelines of ASCE Section 21.4.

**Table No. A-6, Site-Specific Seismic Design Parameters**

Parameter	Value (5% Damping)	Lower Limit, 80% of CBC Design Spectra
Site-Specific 0.2-second period Spectral Response Acceleration, $S_{MS}$	2.073	1.312
Site-Specific 1-second period Spectral Response Acceleration, $S_{M1}$	1.504	0.801
Site-Specific Design Spectral Response Acceleration for short period $S_{DS}$	1.382	0.875
Site-Specific Design Spectral Response Acceleration for 1-second period, $S_{D1}$	1.003	0.777

