

Job No. 21-2075

Sheet No. Cover

By TRM

Date 2/22

CARUSO  
TURLEY  
SCOTT  
structural  
engineers



**CLIENT:**

**Pearson Engineering Associates Inc**  
8825 N. 23rd Avenue, Suite 11  
Phoenix, AZ 85021

**PROJECT:**

**Palm Valley Elementary School**  
**Cooling Tower Replacement**  
2801 N. 135th Avenue  
Goodyear, AZ 85395

STRUCTURAL  
ENGINEERING  
EXPERTS

**PARTNERS**

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Troy Turley, SE, PE, LEED AP  
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PROFESSIONAL  
REGISTRATION

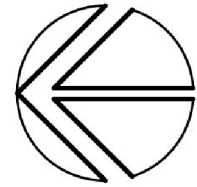
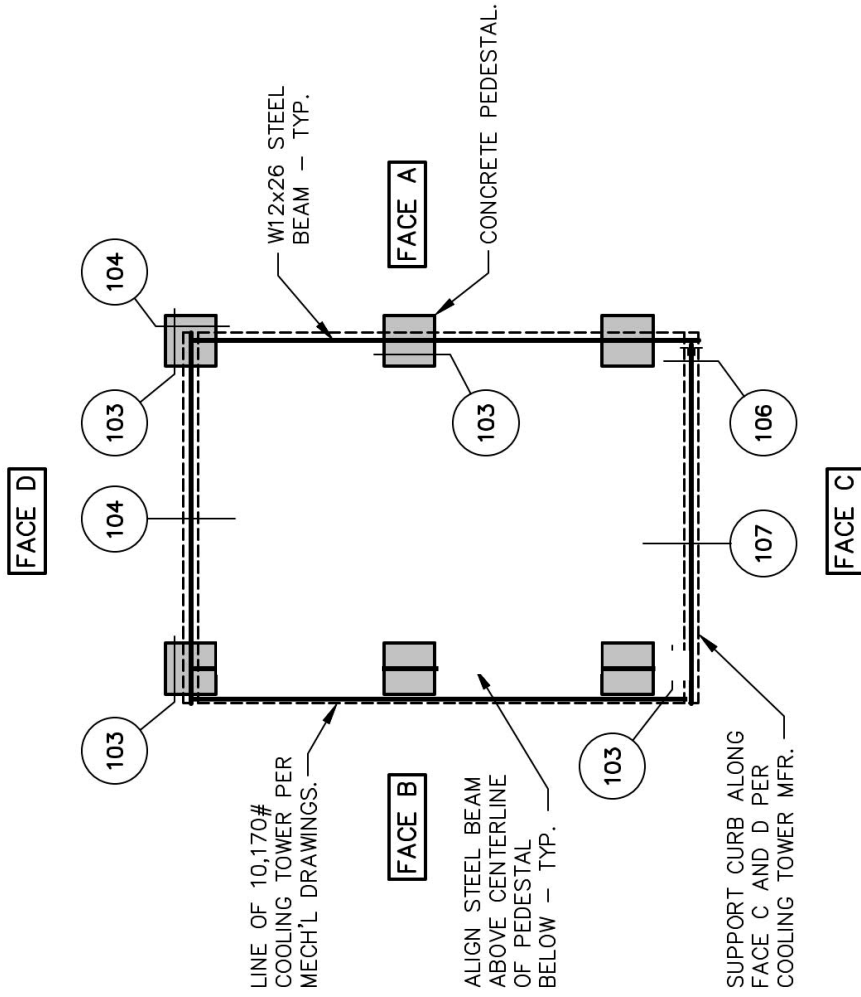
50 States  
Washington D.C.  
U.S. Virgin Islands  
Puerto Rico

**GENERAL INFORMATION:**

**BUILDING CODE: 2018 INTERNATIONAL BUILDING CODE**

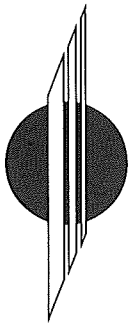
**Calculation Index:**

- Pg 1 - Cooling tower framing plan
- Pg 2 - Cooling tower loading
- Pg 3 - Steel beam design
- Pg 4 - Cooling tower spec sheet
- Pg 5 - Existing foundation plan (for reference)
- Pg 6 - Existing pedestal footing (for reference)



# COOLING TOWER FRAMING PLAN

SCALE: 1/4" = 1'-0"



# CARUSO TURLEY SCOTT

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Job Name Palm Valley Elem school

Cooling tower Replacement

Tolleson, AZ

Job No. 21-2075 Sheet No. 2/6

By JTM Date 2/22

## COOLING TOWER REPLACEMENT

- PER EXISTING COOLING TOWER DRAWINGS (1996), EX COOLING TOWER IS SUPPORTED BY SIX CONC PEDESTALS ON 12" THICK x 3'0" SQ FOOTINGS.
- NEW 10,170 lb COOLING TOWER WILL BE SUPPORTED ON NEW STEEL BEAMS + CONC PEDESTALS BUT EX FOOTINGS WILL BE REUSED.

### STEEL BEAM:

$$\text{MAX SPAN} = 8'-6"$$

$$W = \frac{165 \times 10,170 \text{ lb}}{8.5 \text{ ft}} = 778 \text{ plf}$$

→ || USE W12 x 26  
(6" Flange)

### EXISTING FOOTINGS:

$$P = 778 \text{ plf} \times \frac{8.5 \text{ ft}}{2} = 3305 \text{ lb}$$

$$p = \frac{3305 \text{ lb}}{3' \times 3'} = 367 \text{ psf} < 1500 \text{ psf}$$

|| EXISTING FOOTINGS ARE OK



**Steel Beam**

Project File: CT.ec6

LIC# : KW-06016452, Build:20.22.1.27

CARUSO TURLEY SCOTT

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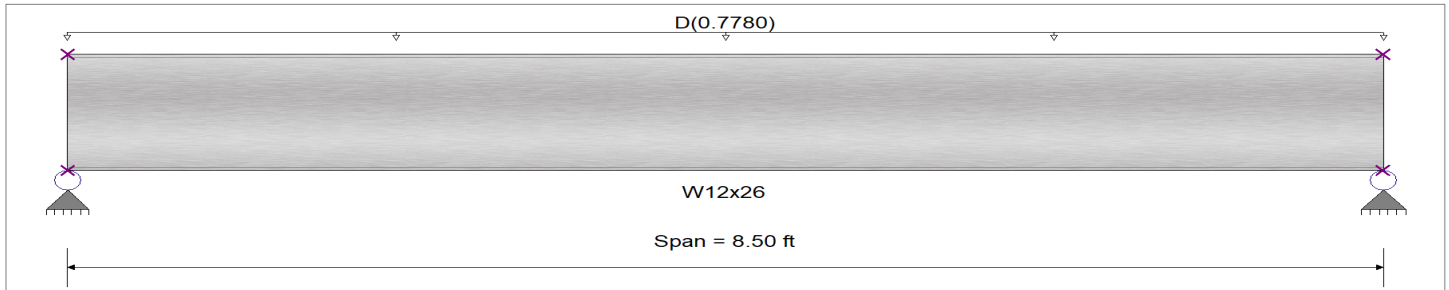
**DESCRIPTION:** Cooling Tower Support

**CODE REFERENCES**

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16  
 Load Combination Set : ASCE 7-16

**Material Properties**

Analysis Method : Allowable Strength Design  
 Beam Bracing : Completely Unbraced  
 Bending Axis : Major Axis Bending  
 Fy : Steel Yield : 50.0 ksi  
 E: Modulus : 29,000.0 ksi



**Applied Loads**

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added  
 Uniform Load : D = 0.7780 k/ft, Tributary Width = 1.0 ft

**DESIGN SUMMARY**

**Design OK**

Maximum Bending Stress Ratio =	<b>0.076 : 1</b>	Maximum Shear Stress Ratio =	<b>0.059 : 1</b>
Section used for this span	<b>W12x26</b>	Section used for this span	<b>W12x26</b>
Ma : Applied	7.026 k-ft	Va : Applied	3.307 k
Mn / Omega : Allowable	92.465 k-ft	Vn/Omega : Allowable	56.120 k
Load Combination	D Only	Load Combination	D Only
Span # where maximum occurs	Span # 1	Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
<b>Maximum Deflection</b>			
Max Downward Transient Deflection	0.000 in	Ratio =	0 <360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.016 in	Ratio =	6574 >=240. Span: 1 : D Only
Max Upward Total Deflection	0.000 in	Ratio =	0 <240.0

**Maximum Forces & Stresses for Load Combinations**

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values						Summary of Shear Values			
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx/Vnx/Omega	
D Only	Dsgn. L = 8.50 ft	1	0.076	0.059	7.03		7.03	154.42	92.46	1.14	1.00	3.31	84.18	56.12
+0.60D	Dsgn. L = 8.50 ft	1	0.046	0.035	4.22		4.22	154.42	92.46	1.14	1.00	1.98	84.18	56.12

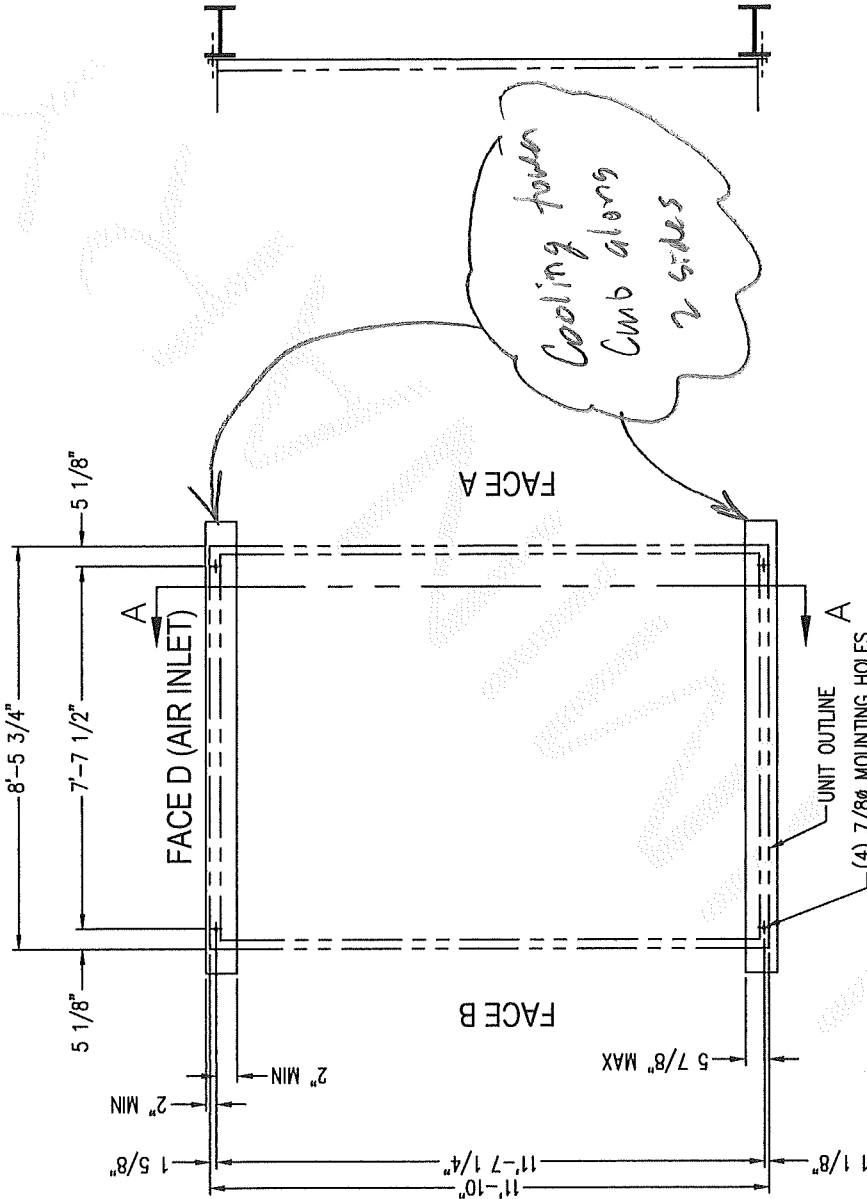
**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D Only	1	0.0155	4.274		0.0000	0.000

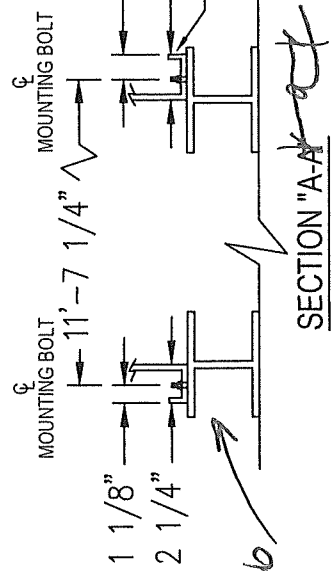
**Vertical Reactions**

Load Combination	Support notation : Far left is #		Values in KIPS
	Support 1	Support 2	
Overall MAXimum	3.307	3.307	
Overall MINimum	1.984	1.984	
D Only	3.307	3.307	
+0.60D	1.984	1.984	

- Notes
- 1) Each beam should be designed, as a minimum, for 65% of the total unit operation weight applied as a uniformly distributed load.
  - 2) All dimensions are in feet and inches. Weights are in pounds and include options and accessories.
  - 3) Operating weight and weight loading are for units with water level in basin at overflow.
  - 4) Unit support beams and anchor bolts to be designed and furnished by others.
  - 5) Support beams must be flush and level at top.



*Cooling tower  
Cmb along  
2 sides*



PLAN "A" STEEL

Model Number	Shipping Weight	Operating Weight	Heaviest Section
S15E-1285-07KN	5196	10170	4640



**BALTIMORE AIRCOIL COMPANY**

Single Cell Unit Support

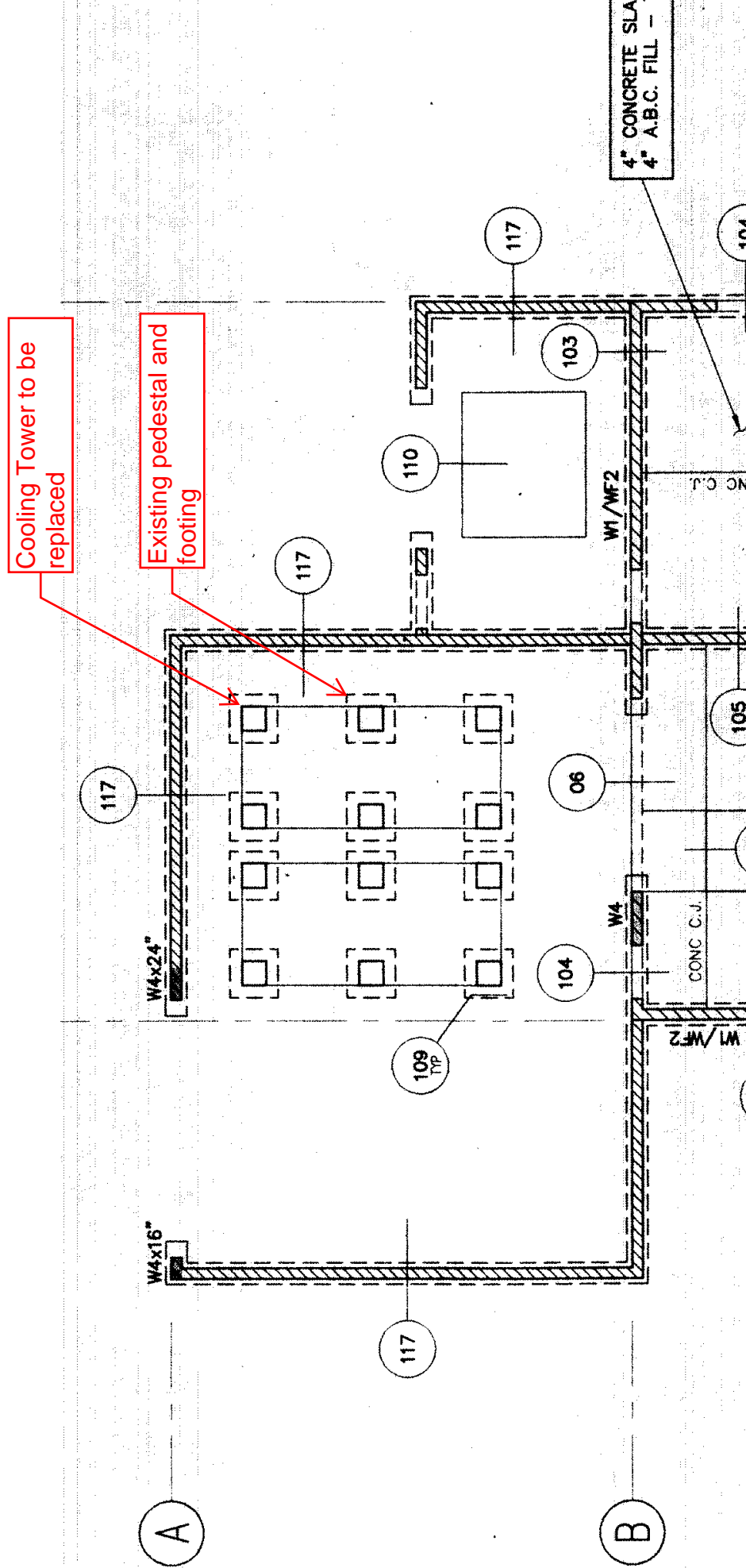
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ORDER NO: **Q22001242002**

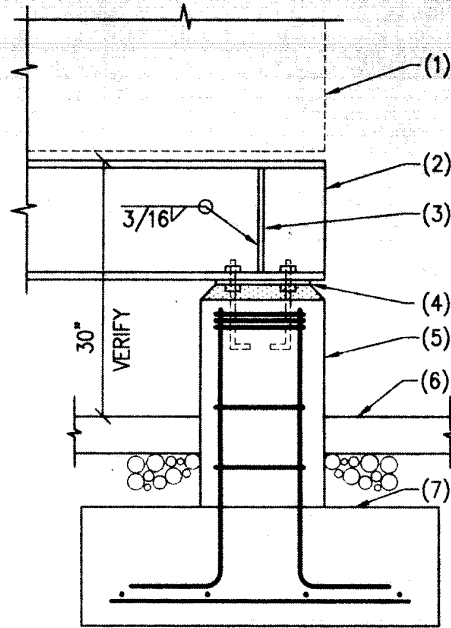
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DRAWING NUMBER: **SS-Q22001242002**



Existing Cooling Tower Foundation Plan



NOTES:

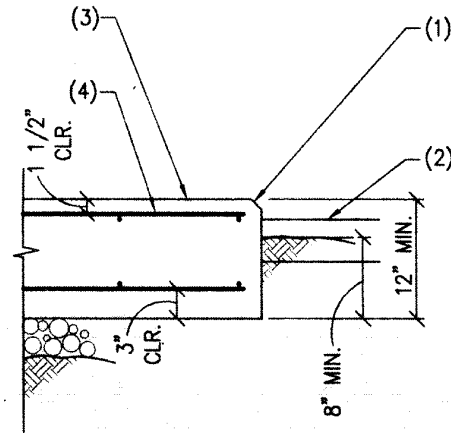
1. COOLING TOWER - SEE MECH'L.
2. W12X26 STEEL BEAM (4 PER COOLING TOWER). ← Verified in field
3. 3/8" STEEL STIFFENER PLATE.
4. STEEL BASE PLATE 1/2" X 10" X 10" WITH 4 - 3/4" DIA ANCHOR BOLTS AND 1 1/2" ± DRYPACK - PROVIDE DOUBLE NUTS FOR LEVELING. ← Verified in field
5. 12" SQ. CONCRETE PEDESTAL WITH 1 #5 VERT EACH CORNER AND #3 TIES AT 12" O.C. PROVIDE 3 TIES IN TOP 5". (6 PER COOLING TOWER.)
6. TOP OF PAVING.
7. 3'-0" SQ. X 12" DEEP CONCRETE FOOTING WITH 4 #5 EACH WAY. ← Footing Size

NOTE:  
SEE DETAIL 249 FOR BEAM TO BEAM CONNECTION INFORMATION.

**109** COOLING TOWER PEDESTAL FOOTING 95-164 NO SCALE

NOTES:

1. CHAMFER EDGES.
2. CONCRETE SLAB OR FINISHED GRADE WHERE OCCURS.
3. CONCRETE EQUIPMENT SLAB.
4. #4 AT 12" O.C. EACH WAY TOP AND BOTTOM.



NOTE: PLACE 1/2" EXPANSION MATERIAL BETWEEN PAD AND SLAB AS OCCURS.

**110** CONCRETE EQUIPMENT PAD ON GRADE 101-51 NO SCALE

NOTES:

1. STEEL COLUMN.
2. CONCRETE PEDESTAL - SEE ARCHITECTURAL DRAWINGS.
3. #4 AT 12" O.C. MAXIMUM VERTICAL REINFORCING.
4. FINISHED GRADE OR CONCRETE SLAB ON GRADE AS OCCURS.
5. STEEL BASE PLATE OVER 1 1/2" ± DRYPACK.
6. DOWELS TO MATCH AND LAP VERTICAL REINFORCING PER G.S.N.
7. #3 TIES AT 8" O.C.
8. CONCRETE FOOTING.

