ANGUIL ENVIRONMENTAL SYSTEMS, INC. September 4. 2012
Job # Kirkland AFB, Albuquerque, NM
Model 20 Catalytic Oxidizer Stack Calculations Job 16512

GUY STACK DESIGN CALCULATIONS

English Units

Design Parameters					
Stack Base length		13.00	ft		
Stack Base diameter		1.33	ft	16	in
Transition lengths		17.00	ft		
Transition diameters		1.33	ft	16	in
Stack material		A36 Carbon Steel			
Plate Thickness,	0-13 ft	3/16	in.		
Plate Thickness,	13-30 ft	3/16	in.	Transition	
Wind speed		100	mph	(3-second gust) Figure 6-1	
Importance Category		"III"		ASCE 7-05 Table 1-1	
Importance Factor		1.15		ASCE 7-05 Table 6-1	
Exposure Category		C open terrain		ASCE 7-05 Factor Table 6-2	
Seismic Site Soil Class		D		ASCE 7-05 Tables 11.4-1	
Seismic Design Category		A		ASCE 7-05 Tables 11.6-1 and 11.6-2	
Design Code		International Building Code 2009			
		ASCE 7-05 Minimum Design Loads			
		Lateral Forces due to Earthquakes have been evaluated			

Design Calculations			
Base Wind shear, ASCE 7-05	1,250	lbs	ASCE 7-05 eq. 6-28
Seismic shear at base, ASCE 7-05	66	lbs	
Wind moment, ASCE 7-05	37,495	ft-lbs	
Dead Load	6,556	lbs	
Base Section Modulus	36	in^3	
Base Section Area	9.31	in^2	
Transition Wind shear	621	lbs	
Transition Wind moment	5,281	ft-lbs	
Transition Section Modulus	36	in^3	
Transition Section Area	9.31	in^2	

Stack Design Calculations			
Allowable Base Moment	65,477	ft-lbs	
Calculated Max. Moment	37,495	ft-lbs	
Factor of Safety	1.75		A.O.K.
Allow Base Shear	134,058	lbs	
Calculated Base Shear	1,250	lbs	
Factor of Safety	107		A.O.K.
Allowable Transition Moments	65,477	ft-lbs	
Calculated Max. Transition Moment	5,281	ft-lbs	
Factors of Safety	12.40		A.O.K.
Allow Transition Shears	134,058	lbs	
Calculated Transition Shears	621	lbs	
Factors of Safety	216		A.O.K.

SEP - 6 2012

ANGUIL ENVIRONMENTAL SYSTEMS, INC. September 4, 2012
Job # Kirkland AFB, Albuquerque, NM
Model 20 Catalytic Oxidizer Stack Calculations

	English Units	
Anchor Bolt Design Calculations		
Anchor bolt number	8	
Material Type	ASTM N.C. A325	
Bolt Diameter	3/4 in	
Allowable Bolt Tension	26,500 psi	
Calculated Bolt Tension	5,667 psi	
Factor of Safety	4.68	A.O.K.
Allowable Bolt Shear	19,076 lbs	
Calculated Bolt Shear	1,250 lbs	
Factor of Safety	15.3	A.O.K.
Transition Bolt Design Calculations		
Anchor bolt number	12	
Material Type	ASTM N.C. A325	
Bolt Diameter	3/4 in	
Allowable Bolt Tension	13,500 psi	
Calculated Bolt Tension	798 psi	
Factor of Safety	16.91	A.O.K.
Allowable Bolt Shear	19,076 lbs	
Calculated Bolt Shear	621 lbs	
Factor of Safety	30.7	A.O.K.
Suggested Foundation Design		
Assumed Soil Bearing	2,000 psf	
Assumed Soil Lateral Resistance	150 psf	
Base Foundation		
Depth	6 feet	
Width	6 feet	
Length	6 feet	
Allowable Foundation Moment	71,100 ft-lbs	
Calculated Max. Moment	37,495 ft-lbs	
Factor of Safety	1.9	A.O.K.
Guy Wire Foundation		
Depth	5 feet	
Width	5 feet	
Length	5 feet	
Calculated Max. Guy Anchor Uplift	2,250 lbs	
Allowable Guy Anchor Uplift	11,250 lbs	
Factor of Safety	5.0	A.O.K.
Calculated Max. Guy Anchor Sliding	2,250 lbs	
Allowable Guy Anchor Sliding	3,750 lbs	
Factor of Safety	1.7	A.O.K.

ANGUIL ENVIRONMENTAL SYSTEMS, INC. September 4, 2012
Job # Kirkland AFB, Albuquerque, NM
Model 20 Catalytic Oxidizer Stack Calculations

DESIGN SUMMARY

		Units		
Stack Base length		13	ft	
Stack Base diameter		1.33	ft	16 in
Transition 1 height		17.00	ft	
Transition 1 diameter		1.33	ft	16 in
Plate Thickness	0-13 ft	3/16	ft	
Plate Thickness	13-30 ft	3/16	in.	
Total Stack Height		30.00	ft	See Note 4
Material		A36 Carbon Steel		
Base Plate Lower Ring		1	in.	
Base Plate Upper Ring		0	in.	
Base Gusset Plates		16		
thickness		3/4	in.	
Transition Flange, min.		1/4 x 1 1/2 x 1 1/2		equiv. 2x1/2 rolled bar
Stack Stiffeners, min.		rolled angles or equivalent		
		2 X 1/2	in.	rolled bar
Stack Stiffener Spacing, max.		5	ft	
Bolt type				
Anchor Bolt diameter		3/4	in.	ASTM N.C. A325
Anchor Bolt number		8		
Cast-in-Place Bolt Embedment		17	in.	See Note 3
Transition Bolt diameter		3/4	in.	ASTM N.C. A325
Transition Bolt number		12		

Notes:

1 All welds shall be 80% penetration.
2 Concrete shall be 4000 psi
3 Epoxy or chemically bonded concrete anchor bolts can be substituted for Cast-in-Place bolts. The epoxy anchor bolts shall be installed to a depth of at least 12" in 4000 psi concrete and have a design strength of at least 10,009 lbs The concrete foundation must be reinforced with a minimum of #4 rebar 12" O.C. each way, top and each side face if epoxy or chemically bonded bolts are use.
4 Guy wires and connections shall have a minimum rating of 7000 lbs.