<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;"> </div> <div> ENGINEERING DATA TRANSMITTAL </div> </div>	Page 1 of <u>1</u> 1. EDT 618806
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2. To: (Receiving Organization) Structural Engineering	3. From: (Originating Organization) Electrical Engineering	4. Related EDT No.: N/A
5. Proj./Prog./Dept./Div.: L-274 - HSEAS	6. Design Authority/ Design Agent/Cog. Engr.: Jeff Whattam	7. Purchase Order No.: MV5-SPD-83267
8. Originator Remarks: This transmittal transmits for approval the calculations and drawing for a monopole for the siren system. The calculations and drawing are vendor supplied and need reviewing and acceptance by structural engineering.		9. Equip./Component No.: N/A
11. Receiver Remarks: 11A. Design Baseline Document? ☐ Yes ☒ No		10. System/Bldg./Facility: Sitewide system
		12. Major Assm. Dwg. No.: N/A
		13. Permit/Permit Application No.: N/A
		14. Required Response Date: Nov 1, 1996

15. DATA TRANSMITTED					(F)	(G)	(H)	(I)
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	Approval Designator	Reason for Transmittal	Originator Disposition	Receiver Disposition
1	Vendor #96828-S1	1	0	40 foot monopole	N/A	1	1	1
1	Calculations 96828-HNF-SD-L274-CN-001 gm for JW 8/17/97	All	0	Calculations for monopole	N/A	1	1	1

16. KEY		
Approval Designator (F)	Reason for Transmittal (G)	Disposition (H) & (I)
E, S, Q, D or N/A (see WIC-CM-3-5, Sec.12.7)	1. Approval 4. Review 2. Release 5. Post-Review 3. Information6. Dist. (Receipt Acknow. Required)	1. Approved 4. Reviewed no/comment 2. Approved w/comment 5. Reviewed w/comment 3. Disapproved w/comment6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)									
(G) Reason	(H) Disp.	(J) Name	(K) Signature (M) MSIN	(L) Date	(G) Reason	(H) Disp.	(J) Name	(K) Signature (M) MSIN	(L) Date
2	1	Cog.Eng. JW Whattam		06-27					
2	1	Cog/Project Mgr. RR Nearing		03-06					
2	1	Structural Eng. KC Tu		06-46					
3	6	EP Rep - DL Lansing	N/A	02-58					
3	-	Project Files	G3-11						

18. JW Whattam Signature of EDT Originator	19. KC Tu Authorized Representative Date for Receiving Organization	20. RR Nearing Project Manager Date	21. DOE APPROVAL (if required) Ctrl. No. N/A ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments
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Calculations for the 40' Monopole for the Hanford Site Emergency Alerting System

JW Whattam

FDNW, Richland, WA 99352

U.S. Department of Energy Contract DE-AC06-96RL13200

EDT/ECN: 618806

UC: 600

Org Code: 57300

Charge Code: FE274

B&R Code: EW7070201

Total Pages: 15 *am for gw 8/7/97*

Key Words: Calculations, monopole, HSEAS, Hanford site emergency alerting system

Abstract: This document provides calculations for the 40' monopole used for the Hanford site emergency alerting system.

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JW Whattam 8/7/97
Release Approval Date

Release Stamp

Approved for Public Release

HNF-SD-L274-CN-001
Rev. 0

Prepared For:

S.E.S. USA
1600 Kentucky St. A3
Bellingham, WA 98226

CALCULATIONS

for the
40' Monopole
Hanford, Washington

October 17, 1996
Project No. 96828

Prepared By:

LA HATT ENGINEERING CORPORATION

P.O. BOX 5192
BELLINGHAM, WA 98227
(360) 676-8332

CLIENT SES USAPROJECT 40' MONOPOLE NO. 96328BY JAL CK _____ DATE 10/18/96 SHT. 1 OF _____**LA HATT ENGINEERING**

CORPORATION

P.O. Box 5192

Bellingham, WA 98227

676-8332

SCOPE OF WORK:

REVIEW CLIENT'S 40 FT. MONOPOLE DESIGN
FOR STRUCTURAL ADEQUACY ASSUMING
90 MPH, EXPOSURE "C" WIND LOADING &
AN IMPORTANCE FACTOR OF 1.15.

A53 PIPE

A36 SHAPES & PLATES

A-325 BOLTS

A-307 ANCHOR BOLTS

 $f_c = 25000 \text{ PSI}$ $f_y = 60 \text{ KSI}$

1500 PSF ALLOW SOIL PRESSURE

La Hatt Engineering Corporation has been retained to provide services for only those items listed in the scope of work for this project and will not be held accountable for items not listed. For details of construction not shown, the provisions of THE PROJECT SPECIFICATION shall form the minimum acceptable standards of construction. The design conclusions presented in this document are for use on this project only and are not intended for use on other projects without the written permission of La Hatt Engineering Corporation. Our interpretations and conclusions are based on data made available to us by the Client. Should actual conditions vary from those addressed in our analysis, we should be provided the opportunity to re-evaluate our findings in relation to the new data

Attach additional narrative sheets as required.

RECORD OF REVISIONS TO SCOPE:

Rev.	Date	By	Description
0	10-18-96	JAL	ISSUED TO CLIENT

CLIENT SES LISA

PROJECT 40' MONOPOLE

NO. 96920

BY JAL CK

DATE

SHT. 2 OF

LA HATT ENGINEERING

CORPORATION

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Bellingham, WA 98227

676-8332

WIND LOADING
90 mph, Exp. C
 $I_w = 1.15$

LINE-SD-1274-CN-M1

LA HATT ENGINEERING
CORPORATION
P.O. Box 5192
Bellingham, WA 98227 676-8332

COMPUTER ANALYSIS

FROM MAC file: DETEK

Last modified at 8:09:56 AM on Wed, Apr 13, 1904

*All coord. and distances are in ft from the left (bot.) end of the element.

Support reactions: (pos. force is to right or up; pos. moment is cw.)

Mode No.	Reaction 1b (FX)	Reaction 1b (FY)	Reaction 1b-ft (NZ)
1	-8492.035	2502.000	9926.458

Node deformations: (positive is to right, up or counterclockwise.)

Node No.	Deflection inches (FX)	Deflection inches (FY)	Rotation radians (RZ)
1	3.280	+0.001	+0.023
3	10.716	+0.002	+0.036

Node 1	Elem 1/2	Node 2	Elem 2/3	Node 3
0.000	L=20.000	0.000	L=20.000	0.000
0.000	PIPE12/SCH40	20.000	PIPE10/SCH40	40.000
---	E=19000000.000	---	E=19000000.000	---

Dw10	Dw12	Dw14	Dw16	FNdw1	Dw18	Dw20	FNdw1	FNdw1	MMdw1
100.00	100.00	100.00	110.14	300.00	25.00	26.13	0.00	1152.000	---
1000	10000	10000	11000	300000	25000	26000	0000	1152000	---
									---6394.00

HNF-SD-L274-CN-001
Rev. 0

CLIENT SES USAPROJECT 40' MONOPOLE NO. 26828BY JAL CK DATE SHT. 4 OF **LA HATT ENGINEERING**

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676-8332

COMPUTER ANALYSIS CONTINUED

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CLIENT SES USAPROJECT 40' MONOPOLENO. 96820BY JAL

CK

DATE

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CHECK UPPER POLE10" SCH 40 PIPE ; $S_x = 29.91 \text{ in}^3$, $A_s = 11.91 \text{ in}^2$, $r = 3.67$

$$M_x = 34,417 \text{'}^{\#}$$

$$M_1 = 6,394 \text{'}^{\#}$$

$$P = 1410 \text{'}^{\#}$$

$$V = 1638 \text{'}^{\#}$$

$$f_a = \frac{1410 \text{'}^{\#}}{11.91} = 118.4 \text{ psi}$$

$$C_c = \sqrt{\frac{2\pi^2 (29 \times 10^6)}{35 \times 10^3}} = 127.9 < \frac{KL}{r} = \frac{2(40 \times 12)}{3.67} = 261.6$$

$$F_a = \frac{12\pi^2 (29 \times 10^6)}{23 (261.6)^2} = 2,182 \text{ psi}$$

$$\frac{f_a}{F_a} = 0.05 < 15\% \therefore \text{USE EQ H1-3 (AISC)}$$

By OBSERVATION $L_b > L_c \therefore F_b = 0.6F_y = 21 \text{ ksi}$

$$f_b = \frac{34,417 \text{'}^{\#}(12)}{29.91 \text{ in}^3} = 13,808 \text{ psi}$$

$$\frac{f_a}{F_a} + \frac{f_b}{F_b(1.33)} = \frac{118.4}{2182} + \frac{13,808}{21,000(1.33)} = 0.55 < 1 \text{ OK}$$

USE 10" SCH 40

CLIENT SES USAPROJECT 40' MONOPOLE NO. 26828BY JAL CK DATE SHT. 6 OF**LA HATT ENGINEERING**

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CHECK LOWER POLE12" SCH 40 PIPE ; $S_x = 43.8 \text{ in}^3$, $A_s = 14.7 \text{ in}^2$, $r = 4.33$

$$M_1 = 34,417 \text{ 'k}$$

$$M_2 = 99,236 \text{ 'k}$$

$$P = 2602 \text{ k}$$

$$V = 3472 \text{ k}$$

$$f_a = \frac{2602 \text{ k}}{14.58 \text{ in}^2} = 178.46 \text{ psi}$$

$$\frac{KL}{r} = \frac{2(40 \times 12)}{4.33} = 219.2 > C_c$$

$$F_a = \frac{12 \pi^2 (29 \times 10^6)}{23 (219.2)^2} = 3108 \text{ psi}$$

$$\frac{f_a}{F_a} = 0.06 \ll 15\%$$

Again, By OBSERVATION $L_b > L_c \Rightarrow F_b = 0.6 F_y$

$$f_b = \frac{99,236 \text{ 'k}(12)}{43.8 \text{ in}^3} = 27,188 \text{ psi}$$

$$\frac{178.46}{3108} + \frac{27,188}{35,000 (1.33)} = 0.64 < 1 \text{ OK}$$

Use 12" SCH 40

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TOP FLANGE PLATE CONNECTION

BOLT LOADS

$$T = \frac{6394(12) - 600(2\frac{3}{4})}{2\frac{3}{4}(11\frac{1}{4})} = 10,010^*$$

$$\text{BOLT TENSION} = \frac{10,010^*}{(2) \text{ BOLTS}} = 5,005^*$$

OK BY OBSERVATION

FLANGE

$$m = \frac{10,010^* \times 0.25^*}{13\frac{1}{2}^*} = 185^*$$

$$t = \sqrt{\frac{6(185^*)}{.75(36,000)}} = 0.2^* < \frac{1}{2}^* \text{ OK}$$

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REV. 0

CLIENT SES USA

PROJECT 40' MONOROLE

NO. 96828

BY JAL CK

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CENTER FLANGE PL CONNECTION

BOLT STRESS

$$\frac{34,417(12)}{30.6} = 13,497 \text{ PSI}$$

$\ll 44 \text{ ksi} (1.33)$ OK

FLANGE

$$T_1 = 8.12^c$$

$$T_2 = 14.06^k$$

$$T_3 = 8.12^k$$

$$x_1 = 3.5$$

$$x_2 = 7.36$$

$$x_3 = 4.25$$

$$t = \sqrt{\frac{6(3.74)}{.75(36)}} = 0.91" < 2" \text{ OK}$$

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CLIENT SES LISA

PROJECT 40' MONOPOLE

NO. 96928

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BOTTOM FLANGE PLATE CONNECTION

BOLT STRESS

$$\frac{99,236(12)}{44.33 \text{ in}^3} = 26,863 \text{ psi} < 44 \text{ ksi} (1.33) \text{ OK}$$

FLANGE

$$T_1 = 33 \text{ K}$$

$$T_2 = 46.7 \text{ K}$$

$$t = \sqrt{\frac{6(9.5)}{.75(36)}} = 1.45 < 2 \text{ in OK}$$

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BASE PLATE CONNECTION **BOLT STRESS**

$$T = \frac{99,234(12)}{92.23} = 12,911 \text{ PSI} < 1.33(20) \text{ KSI} \quad \text{OK}$$

PLATE

$2\frac{1}{2}''$ THICKNESS OK BY OBSERVATION

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FOUNDATIONCHECK 9' x 9' x 3.75' **STABILITY**

SLIDING

$$SF = \frac{.35[45.5 + 2.6]}{3.5} = 4.8 \gg 1.5 \text{ OK}$$

OVERTURNING

$$SF = \frac{[2.6 + 45.5]4.5}{99.2 + (3.5 \times 3.75)} = 1.93 > 1.5 \text{ OK}$$

CONTACT PRESSURE

$$e = \frac{99.2 + (3.5 \times 3.75)}{45.5 + 2.6} = 2.34' > \frac{B}{6}$$

$$\therefore \sigma = \frac{2(N)}{3\left(\frac{B}{2} - e\right)L} = \frac{2(48.1)}{3\left(\frac{9}{2} - 2.34\right)9'} = 1.65 \text{ KSF} < 1.33 (1.5 \text{ KSF}) \text{ OK}$$

FND. THICKNESS

TWO WAY SHEAR

OK BY OBSERVATION

FLEXURAL SHEAR

$$V_u = 1.7 \left(\frac{1.6 + 1.65}{2} \right) 0.75(9') = 17.94^k$$

$$d_{req'd} = \frac{17,940^*}{.35(2)\sqrt{2,500}108} = 1.9''$$

OK

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CLIENT SES USAPROJECT 40' MGN POLE NO. 96878BY JAL CK DATE SHT. 12 OF**LA HATT ENGINEERING**

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FOUNDATION CONTINUEDFLEXURAL REINF.

$$M_u = 1.7 (12.8^{KF}) 12,000 = 261,630 \text{ ''# / F}$$

REQ'D

$$a = \frac{.93(60)}{.85(2.5)12} = 1.25''$$

$$M_u = 0.9(.93)60,000 \left(42 - \frac{1.25}{2} \right) = 1,134,194 \text{ ''# / F}$$

AVAIL.

OK

ANCHOR BOLT EMBEDMENT

$$F_b = 0.04 f'_c (\pi d L)$$

$$L = \frac{F_b}{0.04 f'_c \pi d} = \frac{22,953^*}{.04(2,500) \pi 1.5''(1.33)} = 36.5'' \quad \text{OK}$$

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