Private Fuel Storage, L.L.C.

7677 East Berry Ave., Englewood, CO 80111-2137
Phone 303-741-7009 Fax: 303-741-7806
John L. Donnell, P.E., Project Director

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

July 18, 2000

CALCULATION PACKAGE SUBMITTAL
DOCKET NO. 72-22 / TAC NO. L22462
PRIVATE FUEL STORAGE FACILITY
PRIVATE FUEL STORAGE L.L.C.

Per the request of Marissa Bailey of the Spent Fuel Project Office, enclosed for your use please find the Private Fuel Storage (PFS) calculation for the cask storage pad analysis and design, calculation number 0599602 – G(PO17) –2, revision 2, dated February 4, 2000. This calculation was prepared for PFS by International Civil Engineering Consultants, Inc.

If you have any questions regarding this submittal, please contact me at 303-741-7009.

Sincerely

John L. Donnell

John L. Donnell
Project Director
Private Fuel Storage L.L.C.

Enclosure

NMSS01 Public

cc:
Mark Delligatti-1/1
John Parkyn-1/0
Jay Silberg-1/0
Sherwin Turk-1/0
Asadul Chowdhury-1/1
Murray Wade-1/0
Scott Northard-1/0
Denise Chancellor-1/1
Richard E. Condit-1/0
John Paul Kennedy-1/0
Joro Walker-1/0
Utah Document File (D. Bird)-1/1

CALCULATION COVER SHEET

CEC

PROJECT	Private Fuel Storage Facility (PFSF)
SUBJECT	Storage Pad Analysis and Design
JOB NO.	1101-000
FILE NO.	
CALC NO.	G(PO17)-2
NO. OF SHEETS	324

RECORD OF ISSUES

NO.	DESCRIPTION	BY	DATE	CHKD	DATE	APPRD	DATE
0	Initial Issue	my DH aum kl	10/18/99	my DH aum kl	10/18/99	WT	10/18/99
1	Revision 1 (see notes below)	DH kl	12/6/99	DH kl	12/6/99	WT	12/6/99
2	Revision 2 (see notes below)	DH	2/4/00	my	2/4/00	WT	2/4/00

[X] Nuclear Quality Assurance Category [ ] Non-Nuclear Quality Assurance Category

This set of calculations documents the engineering analyses and detailed calculations required for structural design of the reinforced-concrete spent-fuel cask storage pads to be constructed at the Private Fuel Storage Facility (PFSF) project site.

This set of calculations has been prepared in accordance with CEC's quality assurance procedure for nuclear projects.

Revision 1 was made to correct (1) typographical errors on Pages 5, 29, and A-3 and (2) insert computer output file names and explanation notes on Pages 43 and 51.

Revision 2 was made to correct typographical errors and to include additional clarifications on Pages 17, 21, 28, 236, 298, and 312.

NAME		INITIAL	SIGNATURE
Anwar Mirza	(Preparer/Checker)	aum	Anwar Mirza
Donald Hamasaki	(Preparer/Checker)	DH	Donald Hamasaki
Ming S. Yang	(Preparer/Checker)	my	[signature]
Kiat Lilhanand	(Preparer/Checker)	kl	K. Lilhanand
Wen S. Tseng	(Independent Reviewer)	WT	W. S. Tseng

International Civil Engineering Consultants, Inc.

STONE & WEBSTER ENGINEERING CORPORATION

CALCULATION SHEET

CALCULATION IDENTIFICATION NUMBER				Sheet i
J.O. OR W.O. NO. 05996.02	DIVISION & GROUP Civil	CALCULATION NO. G(PO17)-2	OPTIONAL TASK CODE NA	

Summary of Revisions

PAGE NO.	DESCRIPTION	REVISION NO.	REVISION DATE	REMARKS
NA	Calculation Title Page	1	12-6-99	
i	Summary of Revisions	1	12-6-99	Added Summary of Revisions Page
5	Section 3, References	1	12-6-99	Corrected Typo in Ref. 1 (05996.02 was 05596.01)
29	Section 5.1.3	1	12-6-99	Corrected Typo in last sentence (sheet 13 was sheet 11)
43	Section 5.1.5	1	12-6-99	Added output file name X8LB.OUT and Note
51	Summary of Forces-Dynamic Load Cases	1	12-6-99	Added output file name X8LB.OUT and Note
A-3	Appendix A	1	12-6-99	Corrected Typo in last sentence (Attachment A-2 was A-3)
NA	Calculation Title Page	2	2-4-00	
i	Summary of Revisions	2	2-4-00	Revised Summary of Revisions Page
17	Section 4.4.2	2	2-4-00	Clarified statement in last bullet
21	Section 5.1.1, Elements Used	2	2-4-00	Corrected the number of elements used in the plate
28	Application of Live Loads	2	2-4-00	Clarified note
236	Table S-2	2	2-4-00	Corrected Note 4
298	Punching shear diagram	2	2-4-00	Added static analysis
312	Table 5	2	2-4-00	Corrected various values

Section | Page

1. OBJECTIVE 1
2. ANALYSIS AND DESIGN SUMMARY 2
3. REFERENCES 5
4. DESIGN INPUT PARAMETERS AND CRITERIA 8
   - 4.1 Codes and Standard 8
   - 4.2 Site Soil Condition 8
   - 4.3 Geometry and Material Specifications 14
     - 4.3.1 Geometry 14
     - 4.3.2 Material Specifications 14
   - 4.4 Design Loads 17
     - 4.4.1 Dead Load (D) 17
     - 4.4.2 Live Load (L) 17
     - 4.4.3 Lateral Soil Pressure (H) 18
     - 4.4.4 Operating and Accidental Thermal Loads (T and T_a) 18
     - 4.4.5 Wind Load (W) and Tornado Wind and Missile Load (W_t) 18
     - 4.4.6 Earthquake Load (E) 18
   - 4.5 Load Combinations 19
   - 4.6 Acceptance Criteria 19
5. DESIGN ANALYSIS 21
   - 5.1 Static and Dynamic Analyses Using CECSAP
     - 5.1.1 Mathematical Model 21
     - 5.1.2 Static Analyses 26
     - 5.1.3 Dynamic Analyses 29
     - 5.1.4 Dynamic Analysis Output Selection 38
     - 5.1.5 Static and Dynamic Analysis Inputs and Outputs 43
     - 5.1.6 Static and Dynamic Analysis Results 44
   - 5.2 Dynamic Analysis Using SASSI 150

5.2.1 SASSI Model 151
5.2.2 Dynamic Loading 167
5.2.3 Analysis Procedure 169
5.2.4 SASSI Analysis Results 173
5.2.5 Comparison of SASSI and CECSAP Results 213
5.3 Soil Pressures 234
5.3.1 Static Soil Pressure 234
5.3.2 Dynamic Horizontal and Vertical Soil Pressure 237
6. DESIGN CALCULATIONS 242
6.1 Design of Reinforced Concrete Pad 242
6.2 Vertical Soil Bearing Pressures and Horizontal Soil Shear Stresses 311

APPENDIX A CACULATION OF DYNAMIC INCREASE FACTORS (DIF) FOR CONCRETE AND STEEL A-1

ATTACHMENT A CECSAP ANALYSIS INPUT AND OUTPUT
ATTACHMENT B SASSI ANALYSIS INPUT AND OUTPUT

1. OBJECTIVE

The objective of this set of calculations is to present the analyses and detailed calculations required for the design of the reinforced-concrete spent-fuel cask storage pads to be constructed at the PFSF project site.

2. ANALYSIS AND DESIGN SUMMARY

A. Pad Geometry and Support Condition

(a) Pad Dimensions: Length - 64'-0"
Width - 30'-0"
Thickness - 3'-0"

(b) Support Condition: Pad directly supported on soil with soil fills on its sidewalls

(c) Pad Top Surface Elevation: 3.5" above finished grade elevation

(d) Pad Bottom Surface Elevation: 2'-8-1/2" below finished grade elevation

B. Pad Structural Design (Option 1)

(a) Concrete: Normal weight concrete: $f_c' = 3{,}000$ psi at 28 days

(b) Reinforcing: ASTM A615 Grade 60 deformed bar:
$F_y = 60$ ksi

(c) Horizontal (Flexural) Reinforcement:

Top Face - Two-way reinforcement with #10 @ 12" o.c. each way; longitudinal bars at the top at 3.0" below the top surface of the pad

Bottom Face - Two-way reinforcement with #10 @ 6" o.c. each way; longitudinal bars at the bottom at 4.0" above the bottom surface of the pad

(d) Vertical (Shear) Reinforcement: One #8 @ 12" o.c. each way in two ways distributed uniformly over the entire pad; each vertical bar with a 135° hook anchored to the top longitudinal bars and a 90° bend anchored to the bottom longitudinal bars.

Pad Structural Design (Option 2)

(a) Concrete: Normal weight concrete: $f_c' = 3{,}000$ psi at 28 days

(b) Reinforcing: ASTM A615 Grade 60 deformed bar: $F_y = 60$ ksi

(c) Horizontal (Flexural) Reinforcement:

Top Face — Two-way reinforcement with #8 @ 6" o.c. each way; longitudinal bars at the top at 2.75" below the top surface of the pad

Bottom Face - Two-way reinforcement with #10 @ 6" o.c. each way; longitudinal bars at the bottom at 3.75" above the bottom surface of the pad

(d) Vertical (Shear) Reinforcement: One #6 @ 6" o.c. each way in two ways distributed uniformly over the entire pad; each vertical bar with a 135° hook anchored to the top longitudinal bars and a 90° bend anchored to the bottom longitudinal bars.

C. Structural Strengths

(a) Ultimate static moment capacity (ϕM_n) = 332 k-ft/ft

(b) Ultimate dynamic moment capacity including DIF $(\phi M'_n)$ = 367 k-ft/ft

(c) Ultimate static out-of-plane shear capacity (ϕV_n) = 134 k/ft

(d) Ultimate dynamic out-of-plane shear capacity $(\text{DIF} \times \phi V_n)$ = 148 k/ft

D. Structural Demand Loads

(a) Normal Loading Condition (1.4D + 1.7L + 1.7H) - Envelope of 3 Soil Cases:

Maximum moment	=	124 k-ft/ft
Maximum (flexural) shear force	=	19 k/ft

(b) Accident-Level Loading Condition (D + L + H + E) - Envelope of 3 Soil Cases:

Maximum moment	=	348 k-ft/ft
Maximum (flexural) shear force	=	80 k/ft
Maximum punching shear force	=	147 k/ft

E. Soil Bearing Pressure

(a) Maximum soil bearing pressure under the static (dead plus live (snow plus 7 casks plus one loaded transporter)) loading condition: 4.0 ksf

(b) Maximum soil bearing pressure under dynamic (dead plus live plus the design earthquake) loading condition: 6.53 ksf

3. REFERENCES

1. Stone & Webster Engineering Corporation (SWEC) Calculation No. 05996.02 G(PO18)-2, "Soil and Foundation Parameters for Dynamic Soil-Structure Interaction Analyses, 2000-Year Return Period Design Ground Motions," Rev. 0, by Geomatrix Consultants, Inc., August 10, 1999.

2. E-Mail Transmittal from Alan Solar of Holtec to Wen S. Tseng of International Civil Engineering Consultants, Inc. (ICEC) on "Pfs Force Files - 2000-Year Return Event Letter Numbers 1, 2, and 3," with attached files 2 casks.zip, 4 Casks.zip, and 18 casks.zip, dated August 26, 1999.

3. Appendix B of Holtec Report HI-992277, Rev. 0, "2000-Year Seismic Event - Bounds on Soil Spring," Transmittal from Stan Macie of SWEC to Wen S. Tseng of ICEC, dated August 31, 1999.

4. Fax transmittal from Stan Macie of SWEC to Wen S. Tseng of ICEC on "Holtec Tech Specs," dated August 13, 1999.

5. Fax transmittal from Stan Macie of SWEC to Wen S. Tseng of ICEC on "PFSF Pad Analysis," dated August 31, 1999.

6. Fax transmittal from Stan Macie of SWEC to Wen S. Tseng of ICEC on "Sketches of J&R Engineering Cask Transporter," dated May 22, 1997.

7. Fax transmittal of SWEC Calculation G(B)-05-1 from Paul J. Trudeau of SWEC to Wen S. Tseng of ICEC on "Revised Soil Properties and Coefficients of Subgrade Modulus," dated September 3, 1999.

8. Fax transmittal from Stan Macie of SWEC to Wen S. Tseng of ICEC on "Private Fuel Storage Facility Safety Analysis Report," Chapter 3, Revision 0, dated May 9, 1997.

9. Stone & Webster Engineering Corporation (SWEC) Document, "Geotechnical Design Criteria for the PFSF Storage Facility," Rev. 1, June 9, 1997.

10. Transmittal from Stan Macie of SWEC to Wen S. Tseng of ICEC on "Drawing 0599601-EC-1-B (Rev. B), dated June 4, 1997.

11. Transmittal from Stan Macie of SWEC to Wen S. Tseng of ICEC on "Latest Drawing (0599601-EC-1-C)," dated June 30, 1997.

12. International Civil Engineering Consultants, Inc., "Computer Program SASSI for IMB/RS-6000 Workstation, Version 1.2 - User's Manual," March 1997.

13. International Civil Engineering Consultants, Inc., "Computer Program CECSAP, Version 1.0 - User's Manual," October 1996.

14. ACI 349-85 (1990), "Code Requirements for Nuclear Safety Related Concrete Structures," American Concrete Institute, March 1990.

15. ASCE Standard 4-86, "Seismic Analysis of Safety Related Nuclear Structures and Commentary," American Society of Civil Engineers, September 1986.

16. Stone & Webster Engineering Corporation (SWEC) Calculation G(B)-04, Rev. 4, September 3, 1999.

17. Winter, G., Urquhart, L.C., O'Rourke, C.E., Nilson, A.H., Design of Concrete Structures, Seventh Edition, McGraw-Hill Book Company, 1964.

4. DESIGN INPUT PARAMETERS AND CRITERIA

4.1 Codes and Standards

The codes and standards used in the analysis and design of the storage pad are as follows:

1. ACI 349-85 (1990), "Code Requirements for Nuclear Safety Related Concrete Structures," American Concrete Institute, March 1990.
2. ASCE Standard 4-86, "Seismic Analysis of Safety Related Nuclear Structures and Commentary," American Society of Civil Engineers, September 1986.

4.2 Site Soil Condition

The local site soil profile at the cask storage area consists basically of three layers: an uppermost layer of silt, silty clay and clayey silt with layered thickness of 25 to 35 ft; followed by a layer of 25 to 30 ft thick of very dense fine sand overlying a silty layer, as shown in Fig. 1 (Ref. 9). Results of geophysical survey program indicate that the ground water table is at about 100 to 130 ft and the bedrock is between 520 ft and 880 ft below the ground surface.

The properties of the top soil layer based on the results of geotechnical investigations documented in Ref. 16 are as follows:

(a) Effective-stress strength parameters for drained analyses (e.g. static loadings):

Angle of internal friction $\phi = 40^\circ$ and $c = 0$ ksf .

(b) Total-stress strength parameters for undrained analyses (e.g., dynamic loadings):

$$\phi = 24.9^\circ \text{ and } c = 1.22 \text{ ksf}$$

(c) Coefficients of earth pressure, K:

- At-rest, $K_0 = 0.5$
- Active, $K_a = 0.22$

(d) Coefficients of vertical subgrade reaction of in-situ soil, k (Ref. 7):

k = 2.75 kips/ft^3, for clay

k = 26.2 kips/ft^3, for cohesionless silt

The strain-compatible dynamic soil properties given in Ref. 1 used in the pad dynamic response analyses using SASSI computer program (Ref. 12) are shown in Table 1.

Table 1

Dynamic Soil Properties for SASSI Model

(Source: Reference 1)

Upper-Bound Properties

SHAKE Layers	Depth Top (ft)	Depth Bottom (ft)	Density (pcf)	Wave Velocity Vs (fps)	Wave Velocity Vp (fps)	Damping Ratio Shear (%)	Damping Ratio Compression (%)
1-2	0	4	85	621	1390	3.2	3.2
3-5	4	10	85	524	1390	7.4	7.4
6-7	10	14	92.5	817	1646	5.9	5.9
8-10	14	20	92.5	876	1770	6.4	6.4
11-12	20	25	92.5	834	1770	7.5	7.5
13-14	25	33	115	1067	2088	4.6	4.6
15-17	33	45	115	1013	2088	5.6	5.6
18-25	45	85	120	2723	4808	2.3	2.3
26-33	85	125	135	5741	9945	2.0	2.0
34-38	125	175	145	5741	9945	2.0	2.0
39-47	175	625	145	5741	9945	2.0	2.0
	625		170	6400	11155	1.8	1

Best-Estimate Properties

SHAKE Layers	Depth Top (ft)	Depth Bottom (ft)	Density (pcf)	Wave Velocity V_s (fps)	Wave Velocity V_p (fps)	Damping Ratio Shear (%)	Damping Ratio Compression (%)
1-2	0	4	85	488	1135	4.2	4.2
3-5	4	10	85	378	1135	9.9	9.9
6-7	10	14	92.5	626	1344	7.4	7.4
8-10	14	20	92.5	667	1445	8.0	8.0
11-12	20	25	92.5	611	1445	9.7	9.7
13-14	25	33	115	824	1705	5.7	5.7
15-17	33	45	115	758	1705	7.5	7.5
18-25	45	85	120	1861	3400	3.3	3.3
26-33	85	125	135	4511	7814	2.3	2.3
34-38	125	175	145	4511	7814	2.3	2.3
39-47	175	625	145	4511	7814	2.3	2.3
	625		170	6400	11155	1.6	1

CALCULATION SHEET

				CALC. NO.	G(PO17)-2	REV. NO.	0
ORIGINATOR	W	DATE	10/15/99	CHECKED	DH	DATE	10/15/99
PROJECT	Private Fuel Storage Facility					JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design					SHEET	11

Table 1 (Cont'd)

Lower-Bound Properties

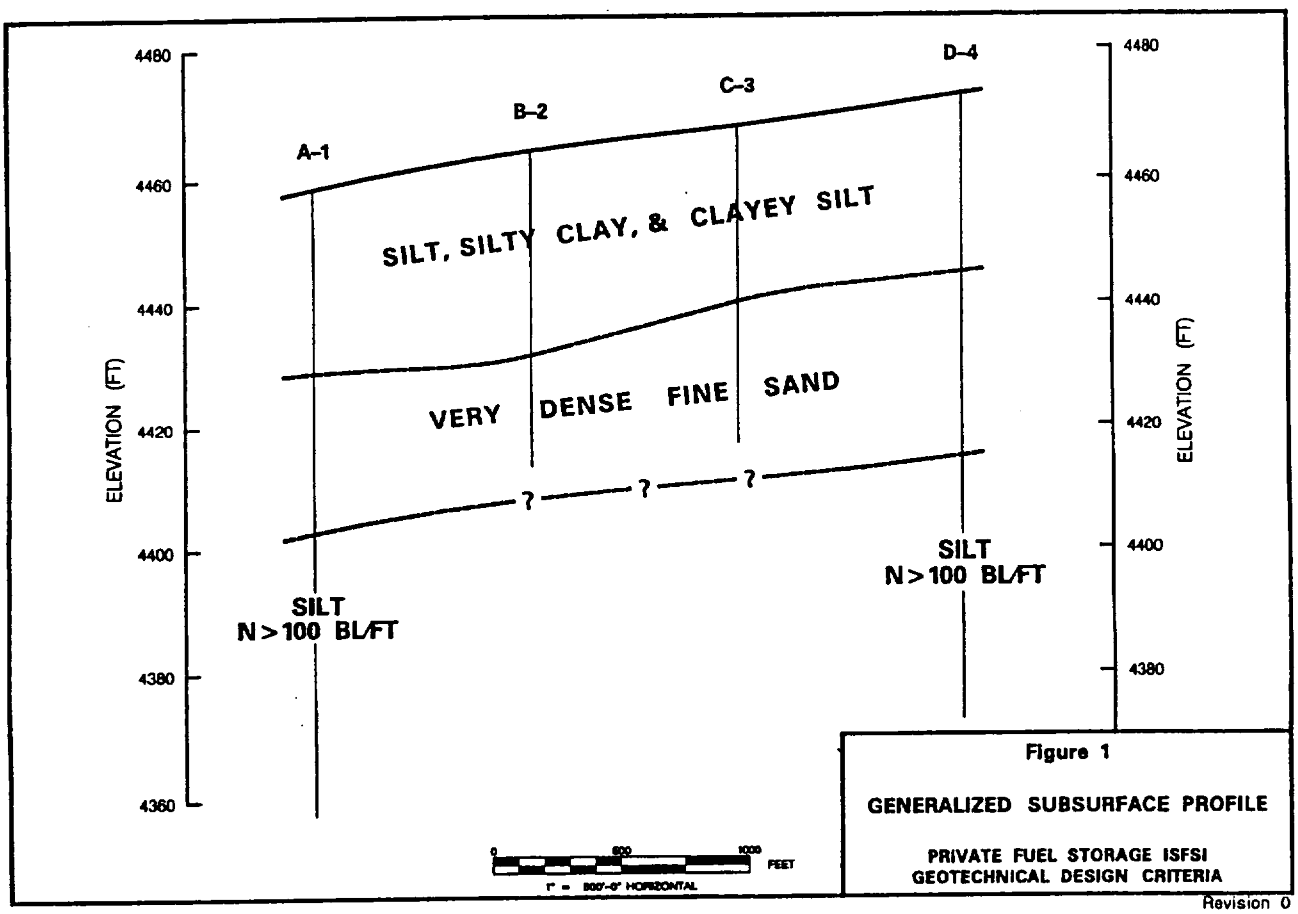
SHAKE Layers	Depth Top (ft)	Depth Bottom (ft)	Density (pcf)	Wave Velocity		Damping Ratio	
				V_s (fps)	V_p (fps)	Shear (%)	Compression (%)
1-2	0	4	85	379	927	5.5	5.5
3-5	4	10	85	245	927	13.5	10.0
6-7	10	14	92.5	467	1097	9.2	9.2
8-10	14	20	92.5	477	1180	10.6	10.0
11-12	20	25	92.5	407	1180	13.2	10.0
13-14	25	33	115	615	1392	7.6	7.6
15-17	33	45	115	535	1392	10.3	10.0
18-25	45	85	120	1232	2404	4.9	4.9
26-33	85	125	135	1913	3460	4.6	4.6
34-38	125	175	145	2419	5600	4.3	4.3
39-47	175	625	145	3281	5683	2.6	2.6
	625		170	6400	11155	1.4	1

Note: V_S = shear wave velocity, V_P = compression wave velocity

CALCULATION SHEET

ORIGINATOR	DH	DATE	9/23/99	CALC. NO. G(PO17)-2	REV. NO. 0
				CHECKED KV	DATE 9/23/99
PROJECT	Private Fuel Storage Facility				JOB NO. 1101-000
SUBJECT	Storage Pad Analysis and Design				SHEET NO. 12

Figure 1
Site Soil Profile (Ref. 9)



The soil spring stiffnesses, damping coefficient, and mass value used to represent the soil foundation for dynamic analyses of the pad using CECSAP program (Ref. 13) are, as developed by Holtec (Ref. 3), shown in Table 2 below:

Table 2

Vertical and Horizontal Soil Mass, Spring and Damping Constants

Storage Pad Analyses

Private Fuel Storage Facility

Soil Property(1) Cases	Direction of Excitation(2)	Soil Virtual Mass $M_s^{(3)}$ (lb-sec²/in)	Soil Spring Constant $K_s^{(3)}$ (lb/in)	Soil Damping Constant $C_s^{(3)}$ (lb-sec/in)
Best Estimate	V	5.224×10^3	1.124×10^7	4.271×10^5
	H_L	9.67×10^2	8.098×10^6	2.085×10^5
	H_S	9.67×10^2	8.524×10^6	2.195×10^5
Lower Bound	V	5.224×10^3	6.232×10^6	3.258×10^5
	H_L	9.67×10^2	4.369×10^6	1.548×10^5
	H_S	9.67×10^2	4.599×10^6	1.629×10^5
Upper Bound	V	5.224×10^3	1.878×10^7	5.425 x 105
	H_L	9.67×10^2	1.380×10^7	2.699 x 105
	H_S	9.67×10^2	1.452×10^7	2.842 x 105

Notes: (1) Soil properties for each case are defined in Table 2 of Geomatrix Calc. No. 05996.02-G(PO18)-2 (Rev.0) dated 8/10/99.

(2) V = Vertical direction, H_L = Horizontal long direction of the pad, and H_S = Horizontal short direction of the pad.

(3) Obtained from Appendix B of Holtec Report No. HI-992277, Rev. 0.

4.3 Geometry and Material Specifications

4.3.1 Geometry

The configuration of the storage pad having dimensions of 64' x 30' x 3' supporting 8 dry storage casks considered in the analysis and design of the pad is as specified in Ref. 11 and shown on the following two pages.

4.3.2 Material Specifications

The properties of concrete and reinforcing bars used for the design of the pad are as specified in Ref. 4 as follows:

Concrete: Normal Weight Concrete

f'_c = Compressive strength = 3,000 psi

E_c = Modules of elasticity = 57,000 $\sqrt{f'_c}$ = 3.12 x 10^6 psi

γ_c = Unit weight = 150 lb/ft^3

ν_c = Poisson's ratio = 0.17

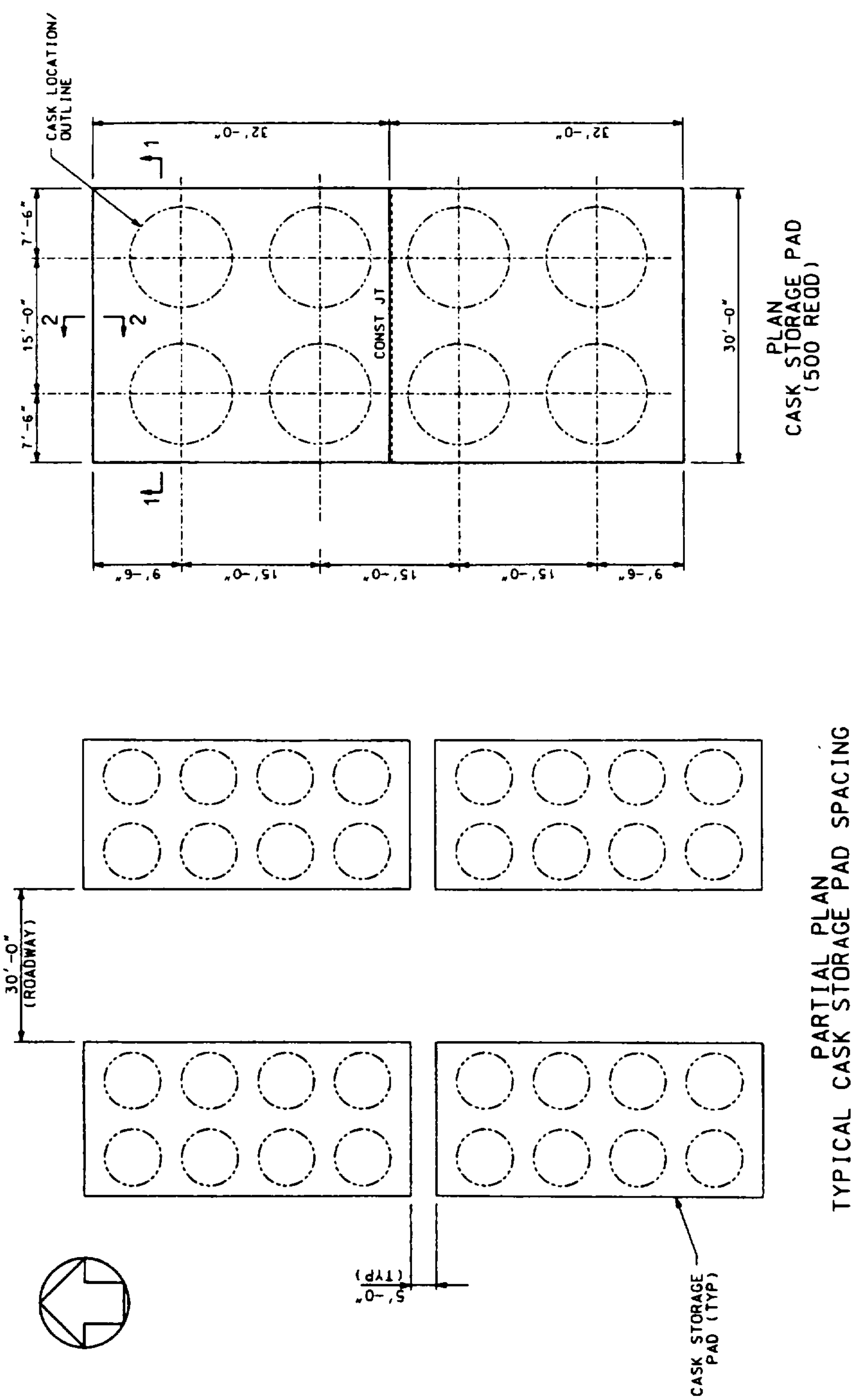
Reinforcing Bar: ATSM A615 Grade 60 Billet Steel

F_y = Specified minimum yield strength = 60 ksi

E_s = Modulus of elasticity = 29,000 ksi

CALCULATION SHEET

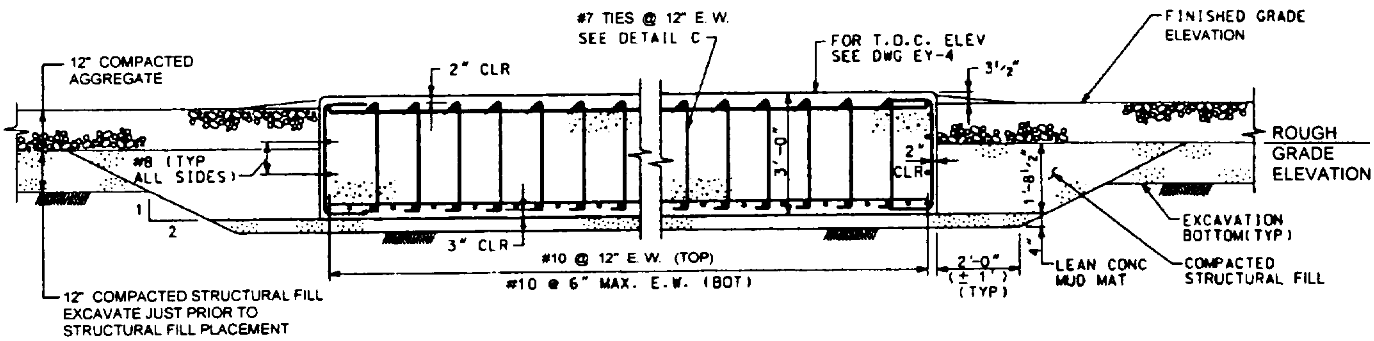
ORIGINATOR DH DATE 9/23/99 CALC. NO. G(PO17)-2 REV. NO. 0
CHECKED [illegible] DATE [illegible]
PROJECT Private Fuel Storage Facility JOB NO. 1101-000
SUBJECT Storage Pad Analysis and Design SHEET NO. 15



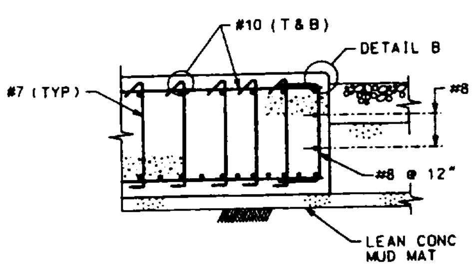
Source: Drawing 0599601-C (Ref. 11)

CALCULATION SHEET

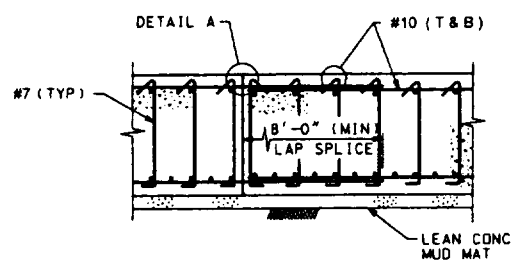
ORIGINATOR	DH	DATE	9/23/99	CALC. NO.	G(PO17)-2
				REV. NO.	0
				CHECKED	[illegible]
				DATE	9/23/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	16



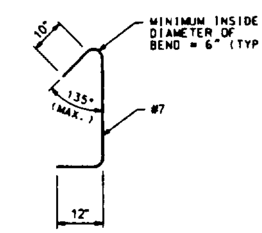
1-1



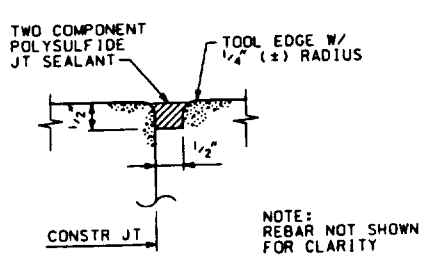
2-2



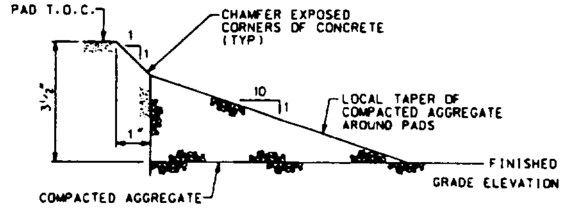
TYP CONSTRUCTION JT
CASK STORAGE PAD



DETAIL C
TYPICAL TIE DETAIL
(OPTION 1)



DETAIL A
SCALE: NTS



DETAIL B
SCALE: NTS

Source: Drawing 0599601-C (Ref. 11)

4.4 Design Loads

Design loads considered in the analysis and design of the pad consists of the following:

4.4.1 Dead Load (D)

The dead load (D) considered is the gravitational dead weight of the reinforced concrete pad based on:

- Gross unit weight of the concrete pad = 150 pcf

4.4.2 Live Load (L)

The live load (L) considered is the gravitational dead weight of the fully loaded dry cask and the snow load.

- Weight of each fully-loaded dry cask = 360 kips (Ref. 4)
- Snow load = 45 psf (Ref. 5)

Four dry cask storage configurations are considered:

- 2, 4, and 8 casks
- 7 casks with one cask being transported on the pad by cask transporter
- Weight of transporter = 135 kips (Ref. 6)
- An impact (amplification) factor of 2.0 is conservatively assumed and applied to the weight of transporter plus one fully-loaded cask to account for the dynamic effect associated with cask transporting

4.4.3 Lateral Soil Pressure (H)

The lateral soil pressure (H) acting on the pad's perimeter wall considered is based on the properties of structural backfill soil as follows:

Unit weight of soil = 125 pcf (Ref. 9)

Active earth pressure coefficient (Ka) = 0.22 (Ref. 16)

4.4.4 Operating and Accident Thermal Loads (T and T_a)

Since the storage pad is supported freely on the ground surface, the loads due to T and Ta are assumed to produce negligible effect for the design of the pad.

4.4.5 Wind Load (W) and Tornado Wind and Missile Load (W_t)

For the design of the pad, the wind load (W) and tornado wind and missile load (W_t) is assumed to affect only the storage casks but not the pad. Thus, its effects are not considered in the design of the pad.

4.4.6 Earthquake Load (E)

The earthquake load (E) considered for the design of the pad is based on the horizontal and vertical design ground motion response spectra (Ref. 1) developed for the site.

For design of the pad, the maximum horizontal (a_h) and vertical (a_v) pad response accelerations based on the Holtec's seismic response analysis results (Ref. 2) coupled with the dry cask seismic response reaction force time histories acting on the pad (Ref. 2) with 2, 4, and 8 cask storage configurations are considered. Values of $a_h = 0.528g$ and $a_v = 0.533g$ are used in the design.

4.5 Load Combinations

Load combinations in accordance with ACI 349-85 (1990) are considered in the pad design as follows:

Loading Condition		Load Combinations
Normal Condition	(1)	1.4D + 1.7L
	(2)	1.4D + 1.7L + 1.7H
Off-Normal Condition	(1)	0.75 (1.4D + 1.7L + 1.7H + 1.7T)
	(2)	0.75 (1.4D + 1.7L + 1.7H + 1.7T + 1.7W)
Accident-Level Condition	(1)	D + L + H + T + E
	(2)	D + L + H + T_a

Since T, T_a, W, and Wt are assumed negligible for the design of the pad, the governing load combinations considered in design become:

Loading Condition	Loading Combination
Normal condition	1.4D + 1.7L + 1.7H
Accident-level condition	D + L + H + E

4.6 Acceptance Criteria

The acceptance criteria for design are in accordance with the strength design (U_c) provisions of ACI-349-85 (1990) as follows:

Loading Condition	Acceptance Criteria
Normal condition	$U_C > 1.4D + 1.7L + 1.7H$
Accident-level condition	$U_C > D + L + H + E$

5. DESIGN ANALYSIS

5.1 Static and Dynamic Analyses Using CECSAP

5.1.1 Mathematical Model

A mathematical model was developed for the analyses using program CECSAP (Ref. 13).

Total number of nodes: 299

Elements used:

- 264 plate (flat shell) elements with thickness of 3 ft to model the pad
- 299 vertical boundary elements
- 299 horizontal boundary elements in X-direction (short direction of the pad)
- 299 horizontal boundary elements in Y-direction (long direction of the pad)

These boundary elements are used to model soil stiffnesses associated with the motion directions. In other words, each node has three soil springs attached for the three directions of motion.

- Likewise, there are three damper elements assigned to every node to model the soil damping effect. There are a total of 897 damper elements.

The finite element mesh is shown in Fig. 1 with node number plotted. The 299 nodes are arranged in 23 rows of 13 nodes. The distances between two consecutive nodes in each row are from left to right, 1.98', 2.76', 2.76', 2.76', 2.76', 2.76', 1.98', 1.98', 2.76', 2.76', 2.76', 2.76', 3.96, 2.76', 2.76', 2.76', 2.76', 3.98'. *The mesh is symmetrical with respect to both centerlines. Node No. 150 is at the center of the pad. A node is assigned to every loading point for each cask. The loading nodes for all casks are:

Cask No.	Quadrant 1	Quadrant 2	Quadrant 3	Quadrant 4
1	277	249	225	253
2	283	255	231	259
3	212	184	160	188
4	218	190	166	194
5	134	106	82	110
6	140	112	88	116
7	69	41	17	45
8	75	47	23	51

*Figure 2 shows the mathematical model with plate element numbers (total = 264).

CALCULATION SHEET

CEC

ORIGINATOR mss DATE 9-23-99 CALC. NO. G(PO17)-2 REV. NO. 0

CHECKED DH DATE 9/23/99

PROJECT Private Fuel Storage Facility JOB NO. 1101-000

SUBJECT Storage Pad Analysis and Design SHEET NO. 23

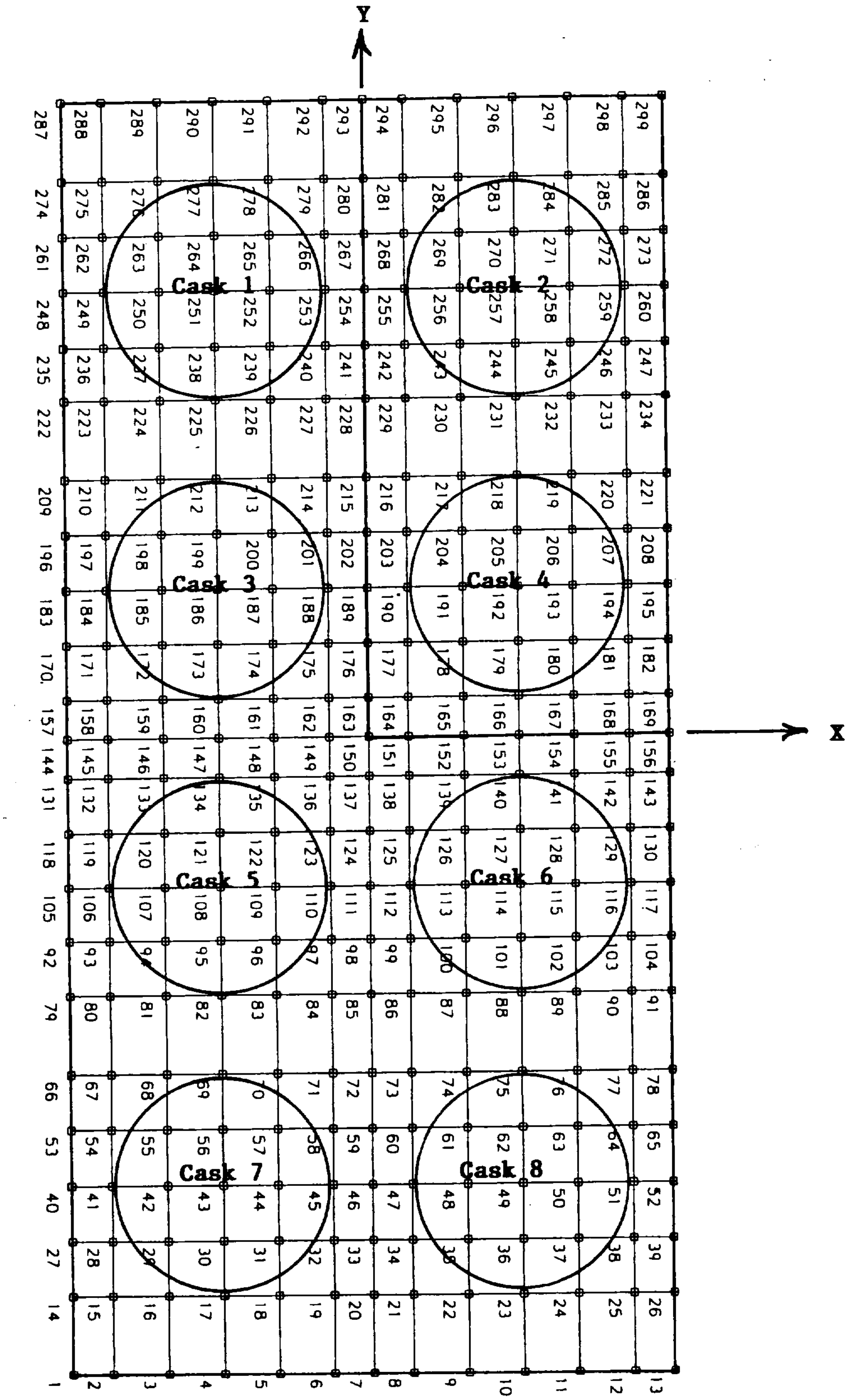


Figure 1 CECSAP Finite-Element Model with Node Numbers

International Civil Engineering Consultants, Inc.

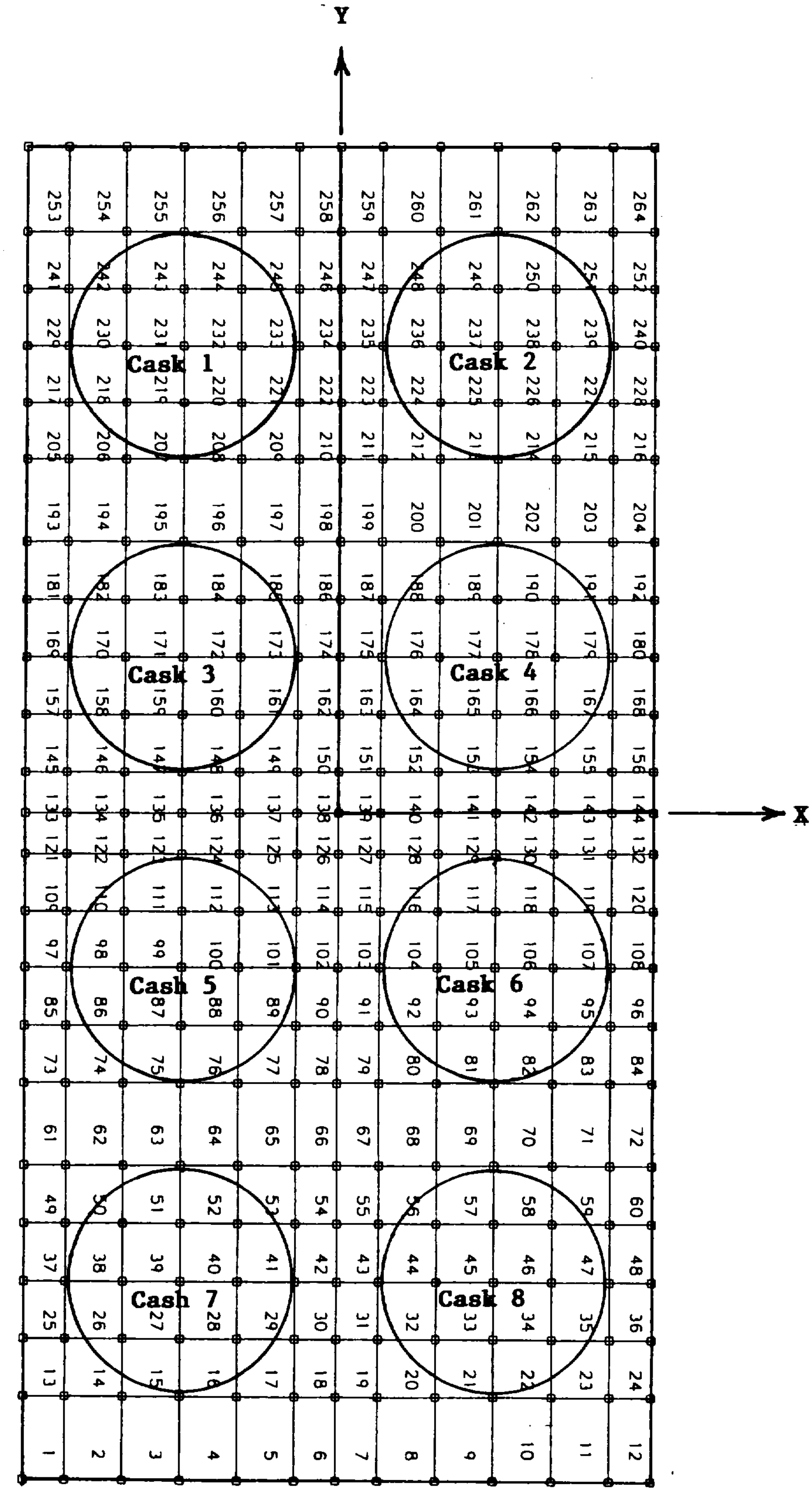


Figure 2 CECSAP Finite-Element Model with Plate Element Numbers

Local Axes of Plate Elements

In the CECSAP model, the local plate coordinate system coincides with the global system. Thus, the moment M_{XX} of a plate element is for bending about the global Y-axis and M_{yy} for bending about global X-axis.

Material Properties of Concrete Pad (Flat Shell Elements)

Concrete Young's modulus, E

$$E = 57000\sqrt{f_c'} \qquad f_c' = 3000 \text{ psi}$$

$$= 3{,}122 \text{ ksi}$$

$$= 449{,}568 \text{ ksf}$$

Poisson's Ratio $\nu = 0.17$

Thus, the material matrix for isotropic membrane stiffness of the plate required for input to CECSAP is as follows:

$$\begin{Bmatrix} \sigma_{xx} \\ \sigma_{yy} \\ \tau_{xy} \end{Bmatrix} = \frac{E}{1-\nu^2}\begin{bmatrix} 1 & \nu & 0 \\ \nu & 1 & 0 \\ 0 & 0 & (1-\nu)/2 \end{bmatrix}\begin{Bmatrix} \varepsilon_{xx} \\ \varepsilon_{yy} \\ \varepsilon_{xy} \end{Bmatrix} = \begin{bmatrix} 462{,}947 & 78{,}701 & 0 \\ 78{,}701 & 462{,}947 & 0 \\ 0 & 0 & 192{,}123 \end{bmatrix}\begin{Bmatrix} \varepsilon_{xx} \\ \varepsilon_{yy} \\ \varepsilon_{xy} \end{Bmatrix}$$

where σ_{xx}, σ_{yy}, τ_{xy} are normal and shear stresses, and ε_{xx}, ε_{yy}, ε_{xy} are the corresponding strains.

The mass density of the pad is 0.15/32.2 = 0.0046584 $\dfrac{k-s^2}{f^4}$.

5.1.2 Static Analyses

There are two types of static analysis carried out by CECSAP:

- Dead Load Analysis (see Table 4)

  There are two dead load (D) analysis cases:

  Case S-1. Dead load of pad weight only with the lower-bound (LB) subgrade modulus of 2.75 kcf.

  Case S-2. Dead load of pad weight only with the upper-bound (UB) subgrade modulus of 26.2 kcf.

- Live Load Analyses

  There are two live load cases (S-3 and S-4).

  Case S-3 Live load only with the Lower-Bound (LB) subgrade modulus of 2.75 kcf.

  Case S-4 Live load only with the Upper-Bound (UB) subgrade modulus of 26.2 kcf.

For each of these two analysis cases, there are four types of cask loading on the pad as follows:

1. 2 Casks - Cask Nos. 1 and 2
2. 4 Casks - Cask Nos. 1, 2, 3, and 4
3. 8 Casks - Cask Nos. 1 through 8
4. 7 casks plus one loaded transporter carrying 1 cask (7+OLT)

The full-weight of a cask is 360 kips (Ref. 4). It is evenly distributed at four loading points of the four quadrants of the cask.

Table 4

Static and Dynamic Analysis Cases

Analysis Type	Case No.	No. of Cask	Static Loading				Dynamic Loading		
			D/LB	D/UB	L/LB	L/UB	LB	BE	UB
Static	S-1	-	O						
	S-2	-		O					
	S-3	2			O				
		4			O				
		8			O				
		7+OLT			O				
	S4	2				O			
		4				O			
		8				O			
		7+OLT				O			
Dynamic	D-1						O		
	D-2						O		
	D-3						O		
	D-4							O	
	D-5							O	
	D-6							O	
	D-7								O
	D-8								O
	D-9								O

Notes:

(1) D/LB and L/LB = Dead load (pad wt. only) and live load (cask weight) with a lower-bound (LB) soil subgrade modulus of 2.75 kcf.

(2) D/UB and L/LB = Dead load (pad wt. only) and live load (cask weight) with an upper-bound (UB) soil subgrade modulus of 26.2 kcf.

(3) LB, BE, UB = Lower-bound, Best-Estimate, Upper-Bound dynamic soils (see Table 2 for values of soil mass, spring, and damping constants

(4) OLT = One loaded transporter carried Cask 1 with 100% impact factor.

Application of Live Loads

For Cases S-3 and S-4, the weight of each cask was applied evenly at four loading points of the four quadrants.

1 Casks 1 and 2

2 Casks 1, 2, 3, and 4

3 Casks 1, 2, 3, 4, 5, 6, 7, and 8

4* Casks 2, 3, 4, 5, 6, 7, 8 and transporter carrying Cask 1

*Note: Only half of the transporter weight was used because only half of the transporter can be up on the pad during placement of Cask 1 due to its geometry. A dynamic impact (amplification) factor of 2 was used, i.e., (0.5 x 135 + 360) 2 = 855 Kips. This load of 855 kips is applied evenly to nodes 222 through 227 and nodes 274 through 279.

Mathematical Model for Static Analyses

The mathematical model used for static analyses is basically the same as the one used for dynamic analyses with the following changes:

1. The vertical soil spring stiffnesses used are calculated from the subgrade moduli of 2.75 and 26.2 kip/ft^3 for the lower-bound and upper-bound soils, respectively (Ref. 7).
2. No damper elements were used in static analyses.

5.1.3 Dynamic Analyses

Dynamic Loading

The dynamic loading on the pad is defined by force time histories of casks resulting from seismic input motions for 2000-year earthquake event (Ref. 1). For each cask, there are six force time histories: 4 vertical force time histories defining the vertical (Z) loading at four quadrants of the cask, and two force time histories defining horizontal loadings in the X and Y directions.

There are 9 dynamic analysis cases considered as shown in Table 3, consisting of 3 site conditions (lower-bound (LB), best-estimate (BE), and upper-bound (UB) soils) time 3 cask loading conditions as follows:

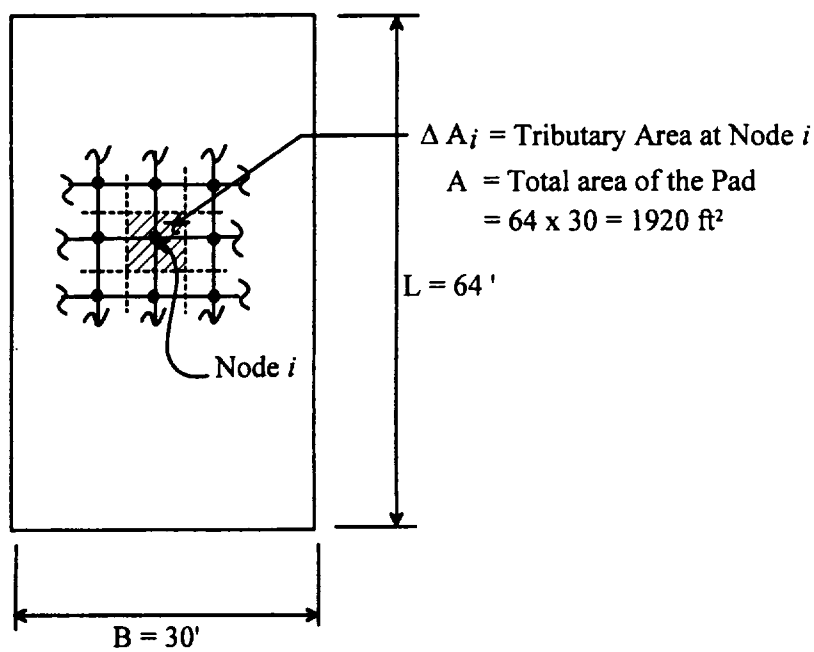
- 2 Casks: Casks 1 and 2
- 4 Casks: Casks 1, 2, 3, and 4
- 8 Casks: Casks 1, 2, 3, 4, 5, 6, 7, and 8

Therefore, the loadings for 2-cask cases were defined by 12 force time histories. Similarly, 24 and 48 time histories were used to define loadings for 4-cask and 8-cask cases, respectively.

Dynamic Soil Properties: Stiffness, Damping and Mass

Dynamic soil stiffness (K_d), damping (C_d), and mass (M_d) for the entire pad are distributed uniformly, according to the tributary area of each node, to all nodes on the pad. The values of K_d, C_d, and M_d for the vertical and horizontal directions were taken from HOLTEC Report No. 992277, Appendix B (Ref. 3), as shown in Table 2 (see sheet 13).

The soil parameters are distributed over the tributary area of each node on the concrete pad as shown below:



The horizontal and vertical soil spring stiffness, damping and mass constants attached to node "i" on the pad are each calculated using the following equations:

$$m_i = m_s \times \Delta A_i/A$$

$$K_i = K_s \times \Delta A_i/A$$

$$C_i = C_s \times \Delta A_i/A$$

In the above modelling of the dynamic vertical soil springs, it is assumed that the vertical response of the pad is mainly influenced by the vertical vibration mode and the influence of the rocking vibration mode is assumed to be relatively small. Thus, only the vertical soil springs given by Holtec were used for developing the vertical soil springs attached to each of the nodes on the pad model.

Proportional Damping for Pad

Stiffness proportional damping $\beta[K]$ was used, i.e.,

$$\underset{\text{pad}}{[C]} = \beta \underset{\text{pad}}{[K]}$$

where $[C]$ = damping matrix, $[K]$ = stiffness matrix, and β = constant. The constant β is determined by letting α = damping ratio = .07 at f = frequency = 25 Hz as follows:

$$\beta = \frac{\alpha T}{\pi} = \frac{\alpha}{f\pi} = \frac{0.07}{25.\pi} = 0.00089127$$

Note: $\beta[K]$ and the soil dampers constitute the damping matrix of the structure (pad)-soil system.

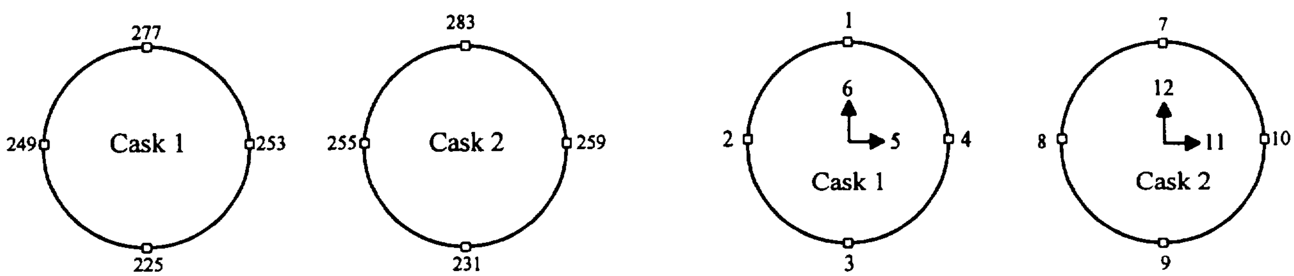
Force Time History Assignment

The force time history data resulting from 2, 4, and 8 casks on the pad have been provided by Holtec (Ref. 2). For each of these three cask conditions, there are three sets of data corresponding to the best estimate, lower and upper range soil properties. The friction between pad and casks used for generating these data is 0.8. The time history plots for these data are included in Attachment A-1. Note that the static gravity load was not included in the dynamic loads. In the following Figures, the loading time histories are assigned to proper loading nodes for 2-cask, 4-cask, and 8-cask. Note that the horizontal loads for a cask were distributed evenly to the four loading nodes for the four quadrants. This is achieved by assigning each horizontal component to four loading points of the four quadrants of the associated cask and then using a scale factor of 0.25 to return the total effect back to one.

CALCULATION SHEET

		CALC. NO. G(PO17)-2	REV. NO. 0
ORIGINATOR [illegible]	DATE 9-23-99	CHECKED DH	DATE 9/23/99
PROJECT Private Fuel Storage Facility			JOB NO. 1101-000
SUBJECT Storage Pad Analysis and Design			SHEET NO. 33

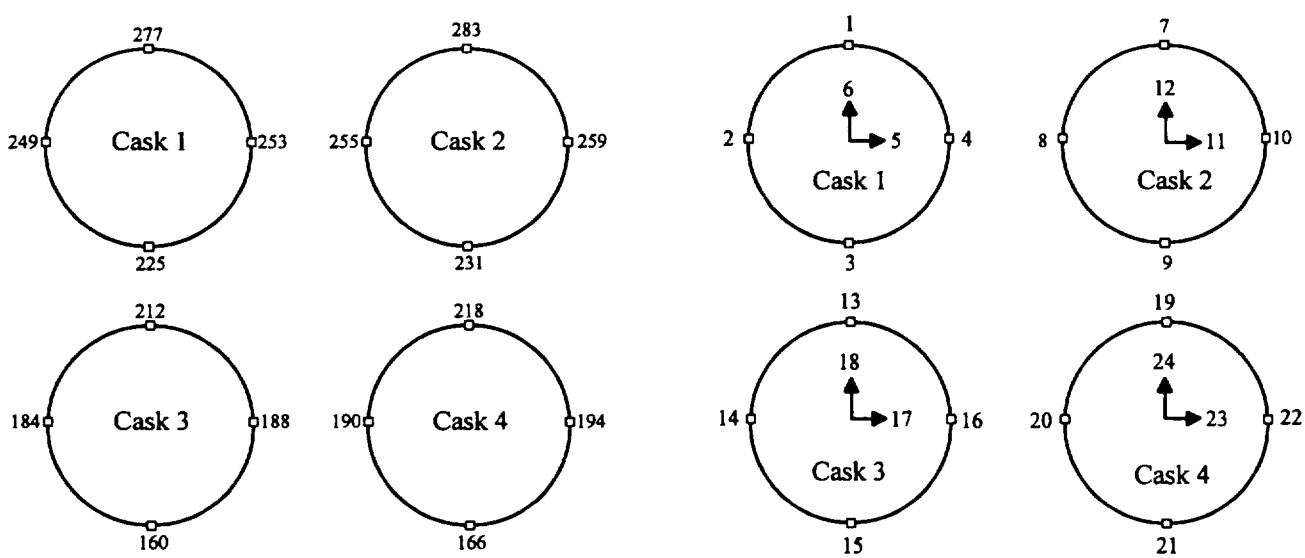
2-Cask Nodal Force Input Time History Numbers Assignment



Node Numbers Where Input Time Histories are Applied

Input Time Histories Numbers

4-Cask Nodal Force Input Time History Numbers Assignment



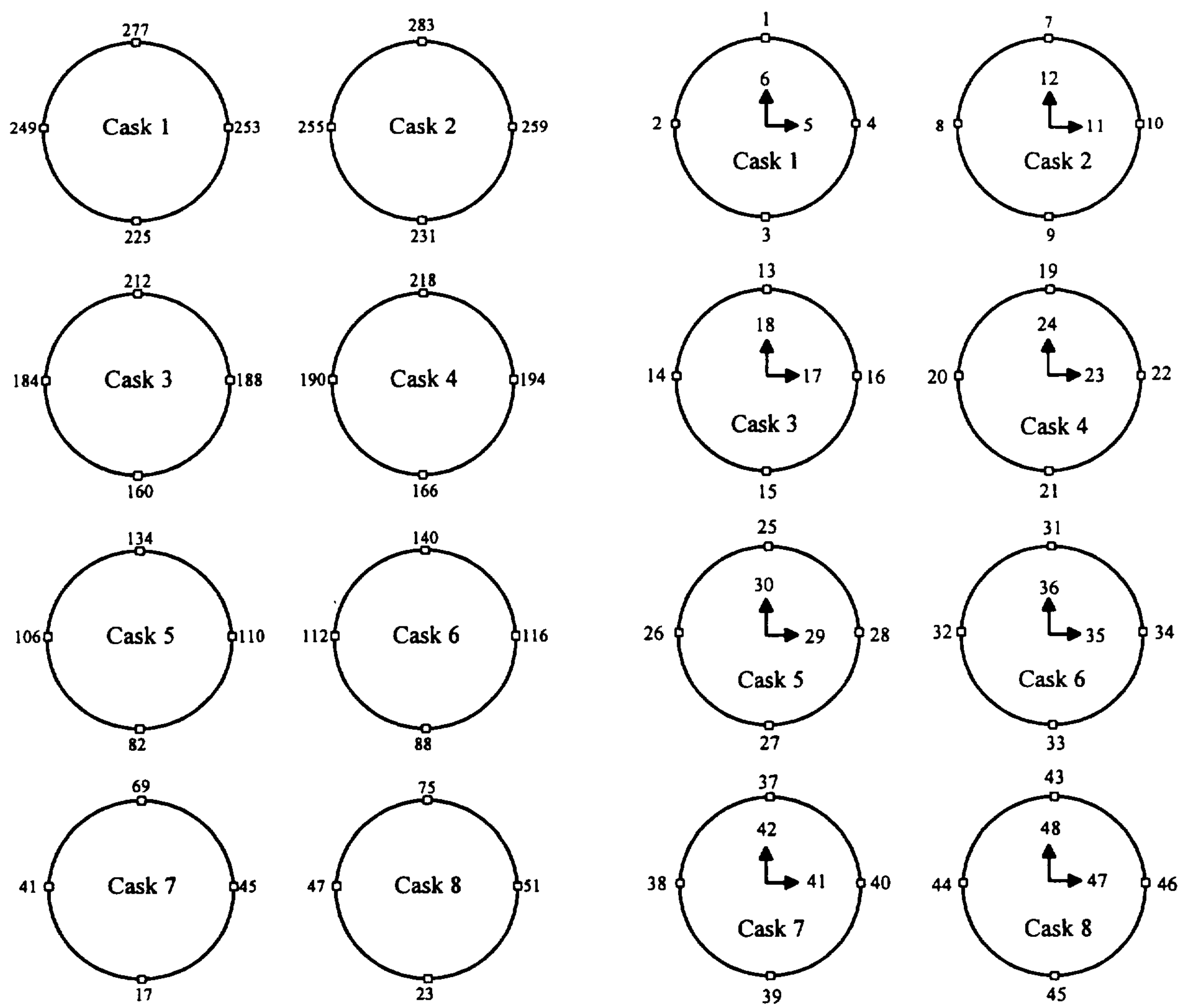
Node Numbers Where Input Time Histories are Applied

Input Time Histories Numbers

CALCULATION SHEET

		CALC. NO. G(PO17)-2	REV. NO. 0
ORIGINATOR mss	DATE 9-23-99	CHECKED DH	DATE 9/23/99
PROJECT Private Fuel Storage Facility			JOB NO. 1101-000
SUBJECT Storage Pad Analysis and Design			SHEET NO. 34

8-Cask Nodal Force Input Time History Numbers Assignment



Node Numbers Where Input Time Histories are Applied

Input Time Histories Numbers

2-Cask Nodal Force Load Time History Number Assignment

Cask No.	Node No.	Comp. No.	TH No.	Arrival Time	Scale Factor
1	277	1	5	0	-0.25
	277	2	6	0	-0.25
	277	3	1	0	-1
	249	1	5	0	-0.25
	249	2	6	0	-0.25
	249	3	2	0	-1
	225	1	5	0	-0.25
	225	2	6	0	-0.25
	225	3	3	0	-1
	253	1	5	0	-0.25
	253	2	6	0	-0.25
	253	3	4	0	-1
2	283	1	11	0	-0.25
	283	2	12	0	-0.25
	283	3	7	0	-1
	255	1	11	0	-0.25
	255	2	12	0	-0.25
	255	3	8	0	-1
	231	1	11	0	-0.25
	231	2	12	0	-0.25
	231	3	9	0	-1
	259	1	11	0	-0.25
	259	2	12	0	-0.25
	259	3	10	0	-1

Note: Factor of 0.25 was used to distribute horizontal loads evenly to four loading points. Negative signs indicate that the loads are acting downward on the pad.

4-Cask Nodal Force Load Time History Number Assignment

For Casks 1 & 2, use previous sheet.

For Casks 3 & 4, use the following assignment.

Cask No.	Node No.	Comp. No.	TH No.	Arrival Time	Scale Factor
3	160	1	17	0	-0.25
	160	2	18	0	-0.25
	160	3	15	0	-1
4	166	1	23	0	-0.25
	166	2	24	0	-0.25
	166	3	21	0	-1
3	184	1	17	0	-0.25
	184	2	18	0	-0.25
	184	3	14	0	-1
3	188	1	17	0	-0.25
	188	2	18	0	-0.25
	188	3	16	0	-1
4	190	1	23	0	-0.25
	190	2	24	0	-0.25
	190	3	20	0	-1
4	194	1	23	0	-0.25
	194	2	24	0	-0.25
	194	3	22	0	-1
3	212	1	17	0	-0.25
	212	2	18	0	-0.25
	212	3	13	0	-1
4	218	1	23	0	-0.25
	218	2	24	0	-0.25
	218	3	19	0	-1

Note: Factor of 0.25 was used to distribute horizontal loads evenly to four loading points. Negative signs indicate that the loads are acting downward on the pad.

CALCULATION SHEET

				CALC. NO.	G(PO17)-2	REV. NO.	0
ORIGINATOR	msg	DATE	9-23-99	CHECKED	DH	DATE	9/23/99
PROJECT	Private Fuel Storage Facility					JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design					SHEET	37

8-Cask Nodal Load Time History Assignment

For Casks 1, 2, 3, and 4, see previous two sheets.

For Casks 5 through 8, use the following assignment.

Cask No.	Node No.	Comp. No.	TH No.	Arrival No.	Scale Factor	Cask No.	Node No.	Comp. No.	TH No.	Arrival No.	Scale Factor
	17	1	41	0	-0.25		82	1	29	0	-0.25
7	17	2	42	0	-0.25	5	82	2	30	0	-0.25
	17	3	39	0	-1		82	3	27	0	-1
	23	1	47	0	-0.25		88	1	35	0	-0.25
8	23	2	48	0	-0.25	6	88	2	36	0	-0.25
	23	3	45	0	-1		88	3	33	0	-1
	41	1	41	0	-0.25		106	1	29	0	-0.25
7	41	2	42	0	-0.25	5	106	2	30	0	-0.25
	41	3	38	0	-1		106	3	26	0	-1
	45	1	41	0	-0.25		110	1	29	0	-0.25
7	45	2	42	0	-0.25	5	110	2	30	0	-0.25
	45	3	40	0	-1		110	3	28	0	-1
	47	1	47	0	-0.25		112	1	35	0	-0.25
8	47	2	48	0	-0.25	6	112	2	36	0	-0.25
	47	3	44	0	-1		112	3	32	0	-1
	51	1	47	0	-0.25		116	1	35	0	-0.25
8	51	2	48	0	-0.25	6	116	2	36	0	-0.25
	51	3	46	0	-1		116	3	34	0	-1
	69	1	41	0	-0.25		134	1	29	0	-0.25
7	69	2	42	0	-0.25	5	134	2	30	0	-0.25
	69	3	37	0	-1		134	3	25	0	-1
	75	1	47	0	-0.25		140	1	35	0	-0.25
8	75	2	48	0	-0.25	6	140	2	36	0	-0.25
	75	3	43	0	-1		140	3	31	0	-1

Note: Factor of 0.25 was used to distribute horizontal loads evenly to four loading points. Negative signs indicate that the loads are acting downward on the pad.

5.1.4 Dynamic Analysis Output Selection

The following response quantities were selected for output for all 9 [(3 cask cond.) x (3 soil cond.)] cases of dynamic analyses.

Displacements

Three components (U_X, U_y, U_Z) of displacement for all nodes in the two long side edges of pad, the long centerline, the short center line, the top short edge and one section in the short direction (X) between the top edge and short center line as indicated by the solid lines in the Fig. 5.1.4-1(a).

Soil Spring Force Output Selection

Forces in vertical soil springs attached to nodes numbered from 183 to 299 were selected for output. The vertical springs selected are located from the center line of Casks 3 and 4 to the upper edge of the pad. See shaded area in Fig. 5.1.4-1(b).

Shear force Output

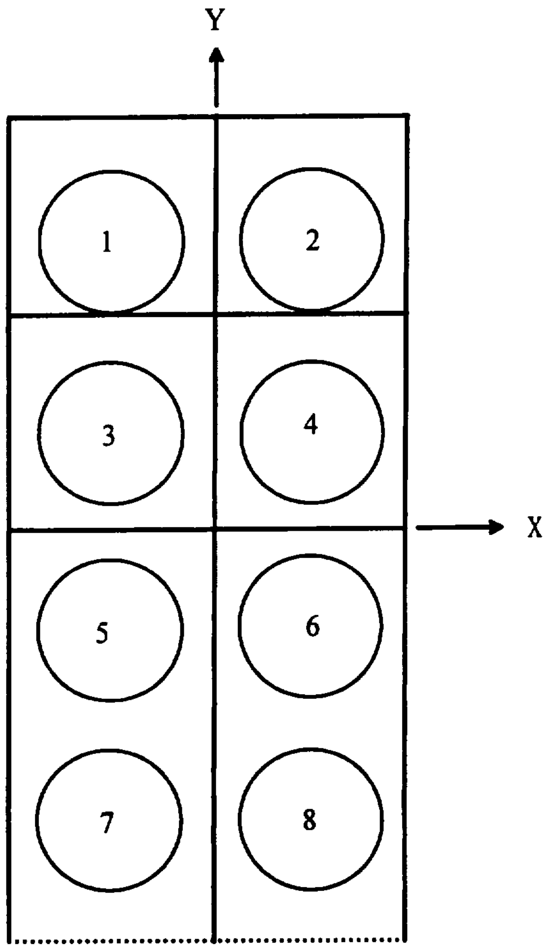
Since the plate element used in CECSAP does not output shear force values, the shear forces in the pad were calculated by moment gradient as described in Section 5.1.6.

Pad Moments and Forces Output Selection

After scanning input force time histories from Attachment A-1 and maximum moments from Attachment A-4, it was determined that the governing moments occur at casks 1 and 2 for all the load cases except for the 8-cask, lower-bound soil condition. For the 8-cask, lower-bound soil condition, the maximum forces occur at casks 7 and 8. Dynamic response in terms of displacements, stresses, moments, and spring forces were computed for all elements and documented in Attachment A-4. The dynamic response time histories at selected nodes and elements are given in Attachment A-5.

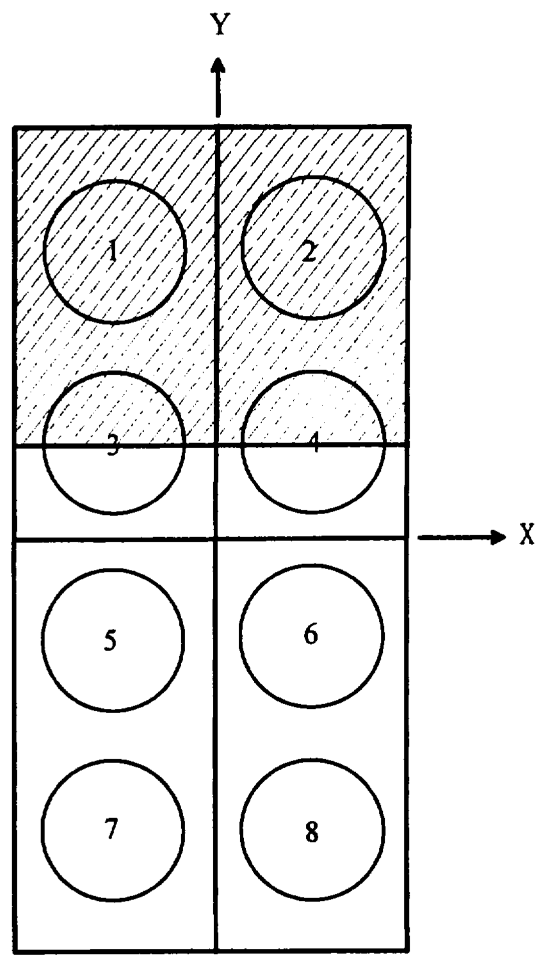
Plate bending moments (M_{XX}, M_{yy}) and shell membrane forces (S_{XX}, S_{yy}) were selected for output. Plate element numbers 193 to 264 were selected as shown by the shaded area in Fig. 5.1.4-2(a). These elements represent the pad from the edge of casks 3 and 4 to the upper edge of the pad. Since the maximum forces for the 8 cask, lower bound soil condition case occur at cask 7 and 8, an additional analysis was performed with the casks flipped about the X axis, as shown in Fig 5.1.4-2(b). Thus, the same elements as listed above could be selected for output for the 8-cask, lower-bound soil condition. The node number-time history correspondence for this additional case is shown in Fig. 5.1.4-3.

Output Selection for Dynamic Analysis



Node Numbers Selected for Displacements (Solid Lines)

(a)

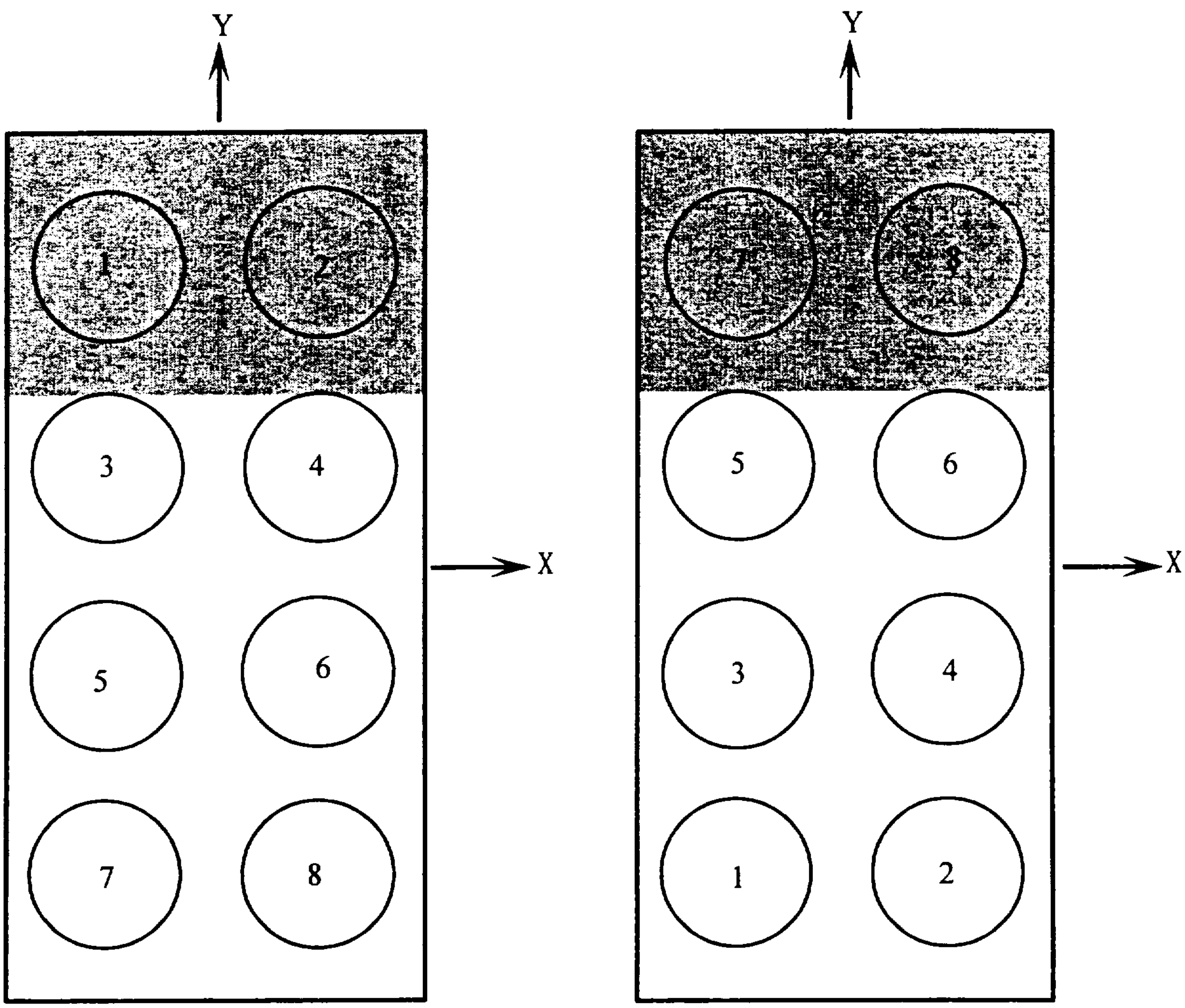


Node Numbers Selected for Soil Spring Forces (Shaded Area)

(b)

Fig. 5.1.4-1

Output Selection for Dynamic Analysis



Elements Selected for Pad Stresses
(Shaded Area)

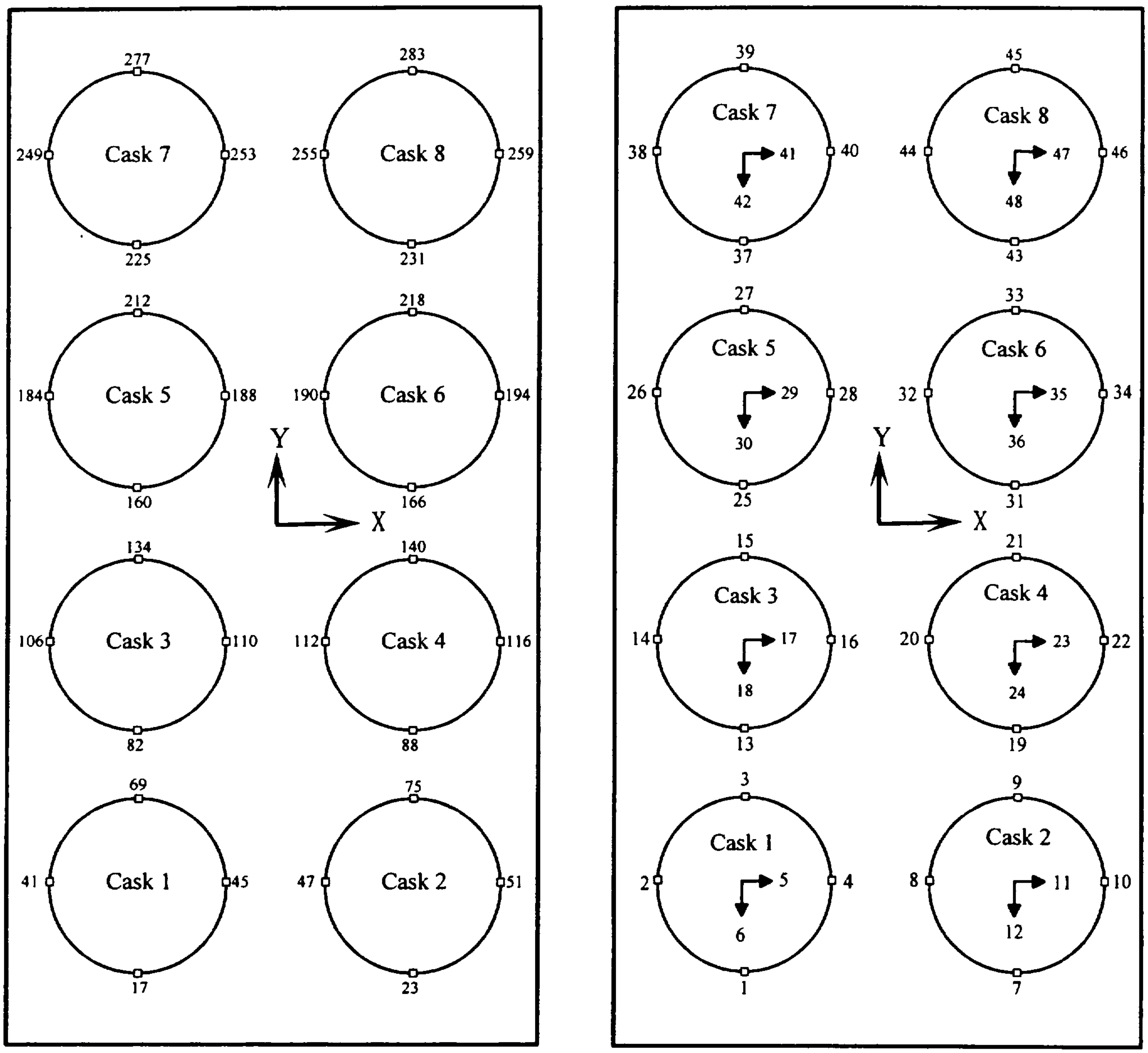
(a)

Elements Selected for Pad Stresses
8 Cask, Lower Bound Soil Condition Case
with Casks Flipped
(Shaded Area)

(b)

Fig. 5.1.4-2

Transformed Nodal Force Input Time History Numbers Assignment
for 8-Cask Lower-Bound Soil Condition



Node Numbers Where Input Time Histories are Applied

Transformed Input Time Histories Numbers

Fig. 5.1.4-3

5.1.5 INPUT AND OUTPUT LISTING OF CECSAP STATIC AND DYNAMIC ANALYSES

Complete input file listings of CECSAP are provided in Attachment A-2 for static as well as dynamic analysis. The CECSAP results are given in Attachment A-3. For analyses where the output is requested for each element, analysis results are documented in Attachments A-4. The dynamic response time histories (displacements, stresses, moments, spring forces) for all loads and soil conditions are given in Attachment A-5.

The file names used for the CECSAP analyses are as follows:

Analysis Type	Soil Type	Input File Name	Output File Name
Static (Dead Load)	Lower-Bound	DLLB.I	DLLB.OUT
	Upper-Bound	DLUB.I	DLUB.OUT
Static (Live Load)	Lower-Bound	LLLB.I	LLLB.OUT
	Upper-Bound	LLUB.I	LLUB.OUT
Dynamic (2-Cask)	Lower-Bound	2LB.I	2LB.OUT
(4-Cask)		4LB.I	4LB.OUT
(8-Cask)		8LB.I	8LB.OUT
			X8LB.OUT
Dynamic (2-Cask)	Best-Estimate	2BE.I	2BE.OUT
(4-Cask)		4BE.I	4BE.OUT
(8-Cask)		8BE.I	8BE.OUT
Dynamic (2-Cask)	Upper-Bound	2UB.I	2UB.OUT
(4-Cask)		4UB.I	4UB.OUT
(8-Cask)		8UB.I	8UB.OUT

Note: The output files provided in the Attachments are partial listings. The partial listings have a .OT extension on the output file name instead of a .OUT extension.

5.1.6 Static and Dynamic Analysis Results

Calculation of shear:

The shear force is calculated by dividing the change in moment between two adjacent plate elements by the distance between elements. That is,

Shear force, $V = (M_2 - M_1)/L$

Where M_2 = moment at centroid of element 2.

M_1 = moment at centroid of element 1.

L = distance between the centroids of elements 1 and 2.

Static Analysis Results

Results for the static analyses are shown on the following table. Note that the moments and shears for the dead load case are essentially zero since the pad is poured in place.

CALCULATION SHEET

ORIGINATOR	DH	DATE	9/23/99
CALC. NO.	G(PO17)-2	REV. NO.	0
CHECKED	Anm	DATE	9/23/99
PROJECT	Private Fuel Storage Facility	JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design	SHEET NO.	45

Summary of Forces - Static Load Cases

Case				Bending about X Vyz (k/ft)	Bending about X Myy (k-ft/ft)	Bending about Y Vxz (k/ft)	Bending about Y Mxx (k-ft/ft)	Reference
(D/LB)	S1	0	Max	0.0	0.0	0.0	0.0	
			Min	0.0	0.0	0.0	0.0	
(D/UB)	S2	0	Max	0.0	0.0	0.0	0.0	
			Min	0.0	0.0	0.0	0.0	
(L/LB)	S3	2 casks	Max	-7.9	73.2	-2.7	4.8	LLLB.MXS (Shear)
			Min		-18.8		-9.8	LLLB.MXM (Moment)
		4 casks	Max	-8.7	18.8	-3.8	5.5	
			Min		-66.8		-13.2	
		8 casks	Max	-6.4	-*	-3.9	4.7	
			Min		-53.0		-12.3	
		7+OLT	Max	11.3	26.6	5.0	28.6	
			Min		-50.3		-15.9	
(L/UB)	S4	2 casks	Max	-6.6	45.6	-2.5	3.4	LLUB.MXS (Shear)
			Min		-23.1		-8.5	LLUB.MXM (Moment)
		4 casks	Max	-8.3	23.4	-3.8	4.5	
			Min		-54.0		-12.8	
		8 casks	Max	-5.6	-*	3.1	3.3	
			Min		-32.3		-11.2	
		7+OLT	Max	11.2	28.4	-4.7	25.9	
			Min		-43.0		-14.2	
Envelope of all cases			Max	11.3	73.2	5.0	28.6	
			Min	-8.7	-66.8	-4.7	-15.9	

Notes:
*Values are all negative.
Negative moment means tension on bottom surface.
Positive moment means tension on top surface.
X = transverse axis.
Y = longitudinal axis.

STATIC LL CASE S3

```
CECSAP OUTPUT FILE NAME=lllb.out
**** MAXIMUM **** BENDING VALUES

 LOAD CASE NO.=     1
    ELEM.NO.       MXMAX    ELEM.NO.       MYMAX    (2 CASKS)
        150         4.76         133       73.24

 LOAD CASE NO.=     2
    ELEM.NO.       MXMAX    ELEM.NO.       MYMAX    (4 CASKS)
        258         5.50          73       18.81

 LOAD CASE NO.=     3
    ELEM.NO.       MXMAX    ELEM.NO.       MYMAX    (8 CASKS)
          6         4.67           0        0.00

 LOAD CASE NO.=     4
    ELEM.NO.       MXMAX    ELEM.NO.       MYMAX    (7 + OLT)
        260        28.60         121       26.59

**** MINIMUM **** BENDING VALUES

 LOAD CASE NO.=     1
    ELEM.NO.       MXMIN    ELEM.NO.       MYMIN    (2 CASKS)
        256        -9.79         229      -18.76

 LOAD CASE NO.=     2
    ELEM.NO.       MXMIN    ELEM.NO.       MYMIN    (4 CASKS)
        196       -13.24         169      -66.84

 LOAD CASE NO.=     3
    ELEM.NO.       MXMIN    ELEM.NO.       MYMIN    (8 CASKS)
        124       -12.25          97      -53.02

 LOAD CASE NO.=     4
    ELEM.NO.       MXMIN    ELEM.NO.       MYMIN    (7+OLT)
         70       -15.89         205      -50.30
```

CEC JOB NO. 1101-000
BY DH DATE 9/23/99
CHECK dm DATE 9/23/99
CALC. NO. E(P017)-2 REV. NO. 0
SHEET NO. 46

CECSAP OUTPUT FILE NAME=lllb.out
MAXMIMUM LIVE LOAD SHEAR..FOR MXX

LOAD CASE NO.= 1

ELEM1	ELEM2	MAX.SHEAR
255	254	-2.661

LOAD CASE NO.= 2

ELEM1	ELEM2	MAX.SHEAR
195	194	-3.836

LOAD CASE NO.= 3

ELEM1	ELEM2	MAX.SHEAR
123	122	-3.918

LOAD CASE NO.= 4

ELEM1	ELEM2	MAX.SHEAR
259	258	5.005

MAXMIMUM LIVE LOAD SHEAR..FOR MYY

LOAD CASE NO.= 1

ELEM1	ELEM2	MAX.SHEAR
217	205	-7.879

LOAD CASE NO.= 2

ELEM1	ELEM2	MAX.SHEAR
135	123	-8.727

LOAD CASE NO.= 3

ELEM1	ELEM2	MAX.SHEAR
25	13	-6.402

LOAD CASE NO.= 4

ELEM1	ELEM2	MAX.SHEAR
217	205	11.272

STATIC LL CASE S3

CEC JOB NO. 1101-000
BY DF DATE 9/23/99
CHECK Quin DATE 9/23/99
CALC. NO. S(PU17)-2 REV. NO. 0
SHEET NO. 47

CECSAP OUTPUT FILE NAME=llub.out

**** MAXIMUM **** BENDING VALUES

LOAD CASE NO.= 1

ELEM.NO.	MXMAX	ELEM.NO.	MYMAX
150	3.41	145	45.57

LOAD CASE NO.= 2

ELEM.NO.	MXMAX	ELEM.NO.	MYMAX
258	4.52	73	23.42

LOAD CASE NO.= 3

ELEM.NO.	MXMAX	ELEM.NO.	MYMAX
6	3.27	0	0.00

LOAD CASE NO.= 4

ELEM.NO.	MXMAX	ELEM.NO.	MYMAX
260	25.88	133	28.44

**** MINIMUM **** BENDING VALUES

LOAD CASE NO.= 1

ELEM.NO.	MXMIN	ELEM.NO.	MYMIN
222	-8.45	229	-23.14

LOAD CASE NO.= 2

ELEM.NO.	MXMIN	ELEM.NO.	MYMIN
196	-12.83	169	-54.01

LOAD CASE NO.= 3

ELEM.NO.	MXMIN	ELEM.NO.	MYMIN
123	-11.22	97	-32.33

LOAD CASE NO.= 4

ELEM.NO.	MXMIN	ELEM.NO.	MYMIN
70	-14.22	205	-43.01

STATIC LL CASE 54

CEC JOB NO. 1101-060

BY DF DATE 9/23/99

CHECK [illegible] DATE 9/23/99

CALC. NO. G(PU17)-2 REV. NO. 0

SHEET NO. 48

```
CECSAP OUTPUT FILE NAME=llub.out
MAXMIMUM LIVE LOAD SHEAR..FOR MXX

 LOAD CASE NO.= 1
 ELEM1 ELEM2 MAX.SHEAR
   255   254    -2.502

 LOAD CASE NO.= 2
 ELEM1 ELEM2 MAX.SHEAR
   195   194    -3.795

 LOAD CASE NO.= 3
 ELEM1 ELEM2 MAX.SHEAR
   125   124     3.908

 LOAD CASE NO.= 4
 ELEM1 ELEM2 MAX.SHEAR
   141   140    -4.697

MAXMIMUM LIVE LOAD SHEAR..FOR MYY

 LOAD CASE NO.= 1
 ELEM1 ELEM2 MAX.SHEAR
   217   205    -6.606

 LOAD CASE NO.= 2
 ELEM1 ELEM2 MAX.SHEAR
   135   123    -8.284

 LOAD CASE NO.= 3
 ELEM1 ELEM2 MAX.SHEAR
    25    13    -5.583

 LOAD CASE NO.= 4
 ELEM1 ELEM2 MAX.SHEAR
   217   205    11.199
```

STATIC LL CASE S4

CEC JOB NO. 1101-000
BY DH DATE 9/23/99
CHECK awm DATE 9/23/99
CALC. NO. G(PU17)-2 REV. NO. 0
SHEET NO. 49

5.1.6 Static and Dynamic Analysis Results (continued)

Dynamic Analysis Results

Results for the dynamic are summarized on the following table.

The procedures for calculating the dynamic analysis results are given on the following pages.

CALCULATION SHEET

CEC

ORIGINATOR	DH	DATE	12/6/99
CALC. NO.	G(PO17)-2	REV. NO.	1
CHECKED	kc	DATE	12/6/99
PROJECT	Private Fuel Storage Facility	JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design	SHEET NO.	51

Summary of Forces - Dynamic Load Cases

Case			Bending about X Vyz(1) (k)	Bending about X Myy(3) (k-ft/ft)	Bending about Y Vxz(2) (k)	Bending about Y Mxx(3) (k-ft/ft)	Reference
(2LB)	D1	Max	563.0	97.2	381.7	98.8	2LSHEARY.TOT, 2LSHEARX.TOT
		Min	-534.4	-113.5	-383.3	-98.9	2LMYY.TOT, 2LMXX.TOT
							2LB.OUT
(4LB)	D2	Max	628.1	111.7	424.6	119.6	4LSHEARY.TOT, 4LSHEARX.TOT
		Min	-581.6	-134.3	-560.0	-144.2	4LMYY.TOT, 4LMXX.TOT
							4LB.OUT
(8LB)	D3	Max	590.8	86.1	268.0	60.2	8LSHEARY.TOT, 8LSHEARX.TOT
		Min	-549.6	-113.3	-279.8	-76.0	8LMYY.TOT, 8LMXX.TOT
							8LB.OUT
(X8LB)	D3	Max	779.4	60.3	1147.2	148.6	X8LSHEAY.TOT, X8LSHEAX.TOT
	(transformed)	Min	-811.4	-278.9	-1304.2	-335.5	X8LMYY.TOT, X8LMXX.TOT
							X8LB.OUT
(2BE)	D4	Max	584.5	85.1	669.4	92.4	2BSHEARY.TOT, 2BSHEARX.TOT
		Min	-739.0	-141.2	-947.2	-224.9	2BMYY.TOT, 2BMXX.TOT
							2BE.OUT
(4BE)	D5	Max	600.1	72.4	393.3	104.2	4BSHEARY.TOT, 4BSHEARX.TOT
		Min	-489.4	-107.5	-381.1	-126.9	4BMYY.TOT, 4BMXX.TOT
							4BE.OUT
(8BE)	D6	Max	598.5	83.4	517.7	95.7	8BSHEARY.TOT, 8BSHEARX.TOT
		Min	-485.3	-125.6	-445.6	-150.3	8BMYY.TOT, 8BMXX.TOT
							8BE.OUT
(2UB)	D7	Max	579.2	80.5	297.6	117.2	2USHEARY.TOT, 2USHEARX.TOT
		Min	-506.4	-120.2	-384.8	-120.2	2UMYY.TOT, 2UMXX.TOT
							2UB.OUT
(4UB)	D8	Max	651.3	57.2	354.4	79.4	4USHEARY.TOT, 4USHEARX.TOT
		Min	-433.7	-111.7	-629.5	-136.8	4UMYY.TOT, 4UMXX.TOT
							4UB.OUT
(8UB)	D9	Max	411.5	63.8	412.4	105.0	8USHEARY.TOT, 8USHEARX.TOT
		Min	-439.5	-103.6	-475.6	-153.0	8UMYY.TOT, 8UMXX.TOT
							8UB.OUT
Envelope of all cases		Max	779.4	111.7	1147.2	148.6	
		Min	-811.4	-278.9	-1304.2	-335.5	

Notes:

(1) Shear across entire section of 30' Max Vyz=811.4/30= 27.0 k/ft

(2) Shear across entire section of 19' Max Vxz=1304.2/19= 68.6 k/ft

(3) Positive moments are calculated on a time-by-time step basis.

Negative moments are calculated from the largest absolute values of the moments.

Negative moment means tension on bottom surface.

Positive moment means tension on top surface.

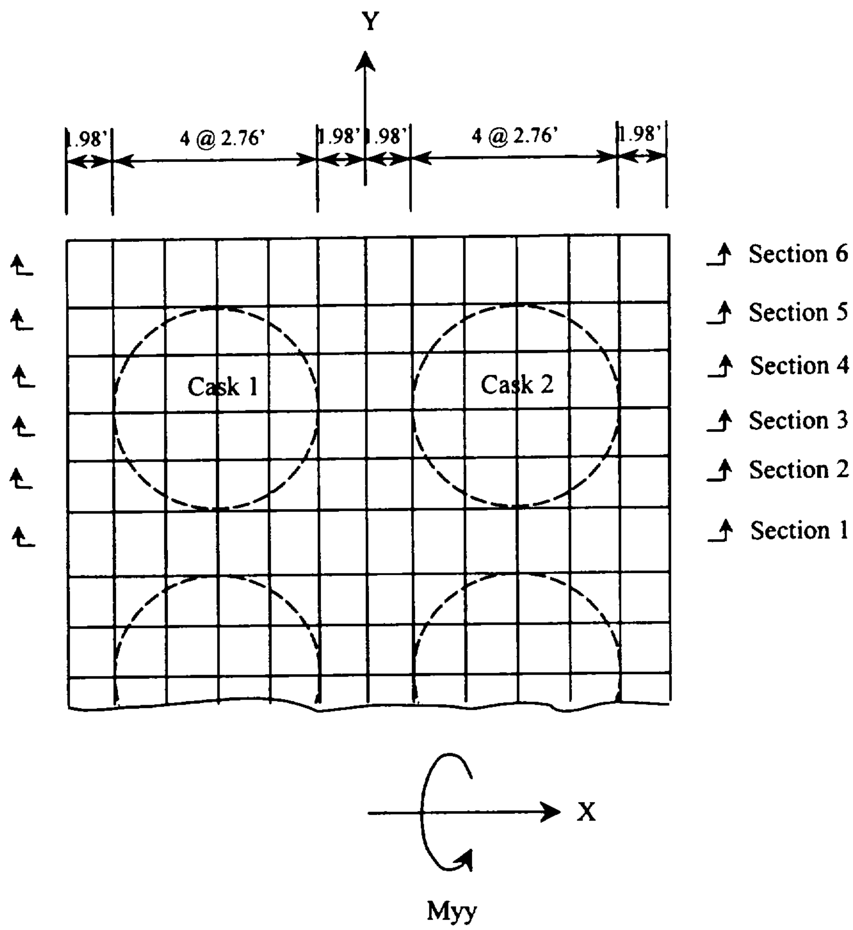
X = transverse axis.

Y = longitudinal axis.

Also see Note on page 43.

Moments about the X axis, Myy, and Shear, Vyz

The moments about the X axis, Myy, were obtained along the elements in the six sections shown in the figure below.



The maximum positive moment (tension on the top surface) about the X axis, Myy, was calculated as follows:

For each of the six sections:

Calculate the total moment across the section: $M_{yy}^{tot}(t) = \sum_{k=1}^{12}(M_{yyk}(t) \times L_k)$ (k-ft)

Calculate the maximum moment: $M_{yy}^{\max} = \max(M_{yy}^{tot}(t))$ (k-ft)

Calculate the maximum moment per unit width: $\overline{M}_{yy}^{\max} = M_{yy}^{\max} / \sum_{k=1}^{12} L_k$ (k-ft/ft)

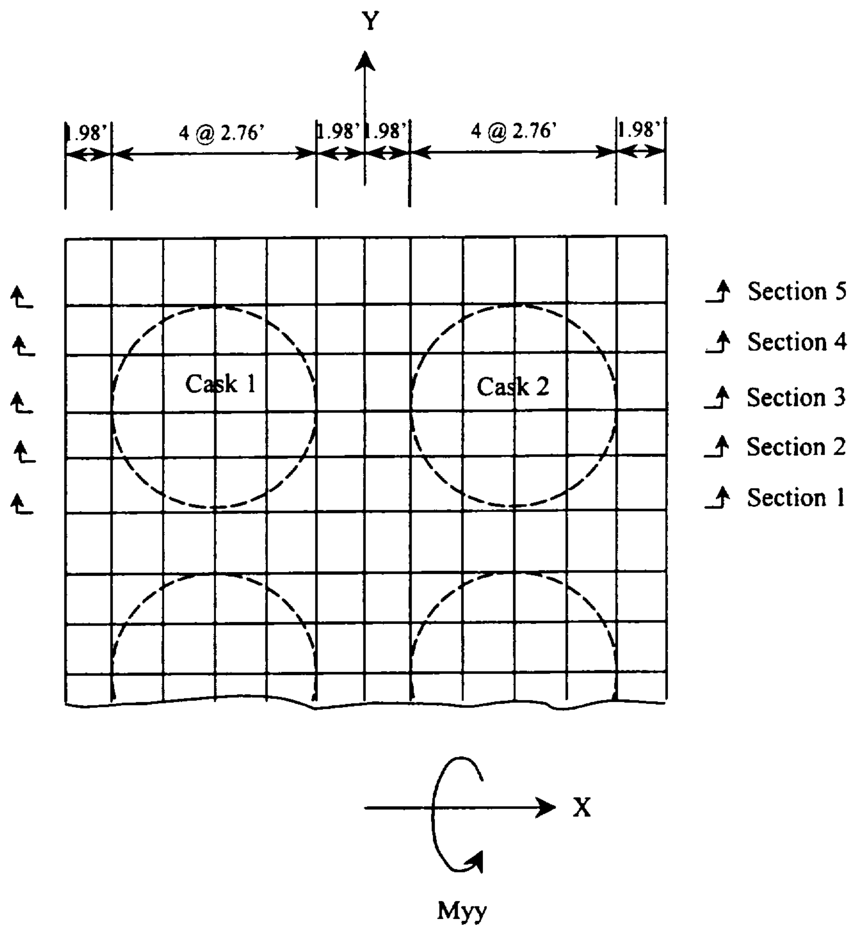
For conservatism, the maximum negative moment (tension on the bottom surface) about the X axis, -Myy, was calculated by using the absolute maxima of the moments from the CECSAP analyses. The procedure was as follows:

For each of the six sections:

Calculate the maximum moment across the section: $-M_{yy}^{\max} = -\sum_{k=1}^{12}\left[(\max|M_{yyk}(t)|) \times L_k\right]$ (k-ft)

Calculate the maximum moment per unit width: $-\overline{M}_{yy}^{\max} = -M_{yy}^{\max} / \sum_{k=1}^{12} L_k$ (k-ft/ft)

The shears, Vyz, were calculated along the elements in the five sections shown in the figure below.



CALCULATION SHEET

CALC. NO. G(PO17)-2 REV. NO. 0

ORIGINATOR DH DATE 9/23/99 CHECKED [signature] DATE 9-23-99

PROJECT Private Fuel Storage Facility JOB NO. 1101-000

SUBJECT Storage Pad Analysis and Design SHEET NO. 55

The maximum Vyz shear was calculated as follows:

For each of the five sections:

Calculate shear between elements i and j at time t: $V_{yzk}(t) = (M_{yyj}(t) - M_{yyi}(t)) / L_{ij}$ (k/ft)

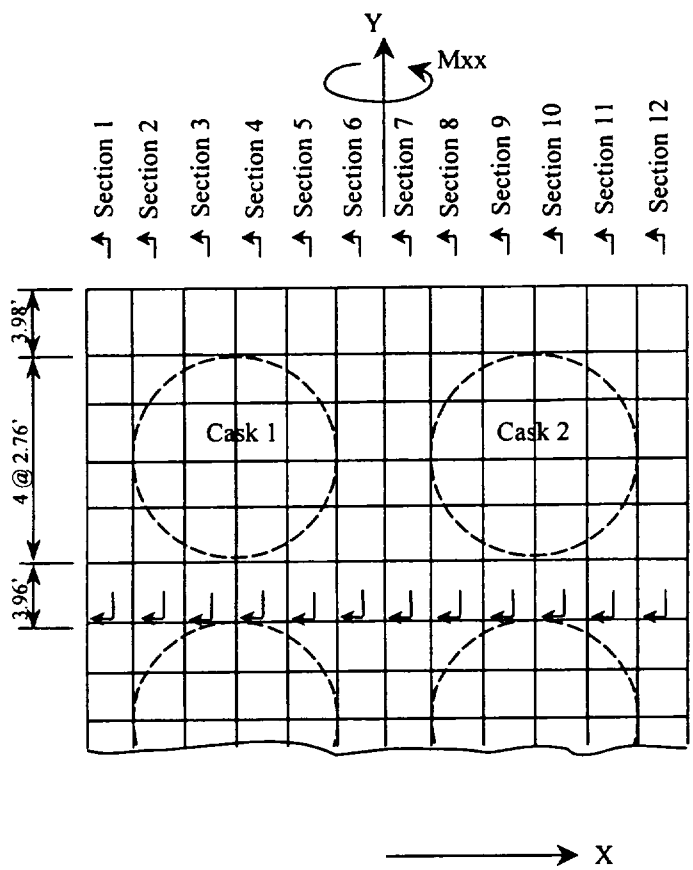
Calculate the total shear across the section: $V_{yz}^{tot}(t) = \sum_{k=1}^{12}(V_{yzk}(t) \times L_k)$ (k)

Calculate the maximum shear: $V_{yz}^{\max} = \max(V_{yz}^{tot}(t))$ (k)

Calculate the maximum shear per unit width: $\bar{V}_{yz}^{\max} = V_{yz}^{\max} / \sum_{k=1}^{12} L_k$ (k/ft)

Moments about the Y axis, Mxx, and Shear, Vxz

The moments about the Y axis, Mxx, were obtained along the elements in the twelve sections shown in the figure below.



The maximum positive moment (tension on the top surface) about the Y axis, Mxx, was calculated as follows:

For each of the twelve sections:

Calculate the total moment across the section: $M_{xx}^{tot}(t) = \sum_{k=1}^{6}(M_{xxk}(t) \times L_k)$ (k-ft)

Calculate the maximum moment: $M_{xx}^{\max} = \max(M_{xx}^{tot}(t))$ (k-ft)

Calculate the maximum moment per unit width: $\overline{M}_{xx}^{\max} = M_{xx}^{\max} / \sum_{k=1}^{6} L_k$ (k-ft/ft)

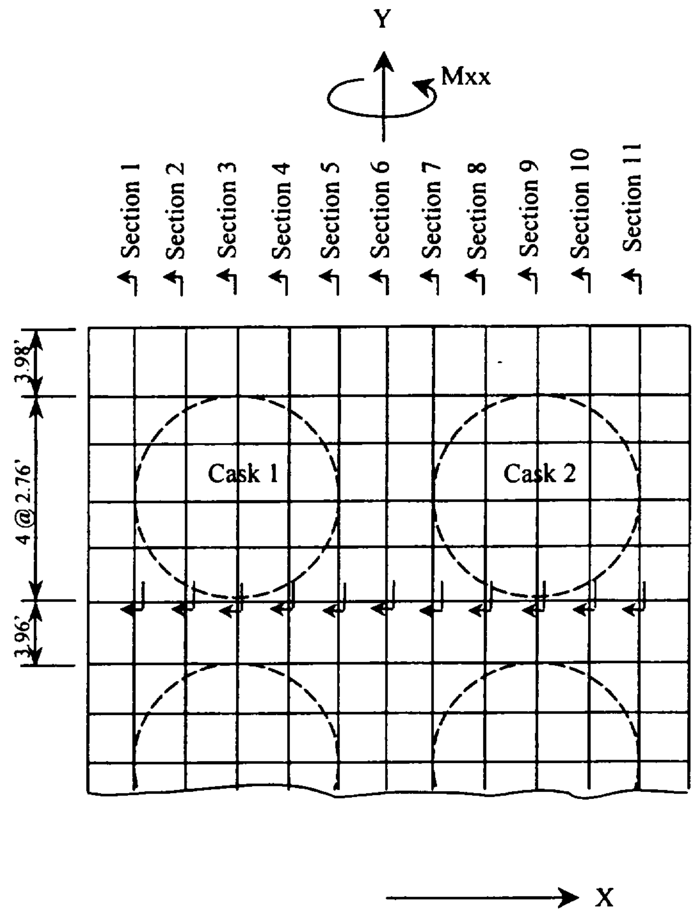
For conservatism, the maximum negative moment (tension on the bottom surface) about the Y axis, -Mxx, was calculated by using the absolute maxima of the moments from the CECSAP analyses. The procedure was as follows:

For each of the twelve sections:

Calculate the maximum moment across the section: $-M_{xx}^{\max} = -\sum_{k=1}^{6}\left[(\max|M_{xxk}(t)|) \times L_k\right]$ (k-ft)

Calculate the maximum moment per unit width: $-\overline{M}_{xx}^{\max} = -M_{xx}^{\max} / \sum_{k=1}^{6} L_k$ (k-ft/ft)

The shears, Vxz, were calculated along the elements in the eleven sections shown in the figure below.



The maximum Vxz shear was calculated as follows:

For each of the eleven sections:

Calculate shear between elements i and j at time t: $V_{xzk}(t) = (M_{xxj}(t) - M_{xxi}(t)) / L_{ij}$ (k/ft)

Calculate the total shear across the section: $V_{xz}^{tot}(t) = \sum_{k=1}^{6}(V_{xzk}(t) \times L_k)$ (k)

Calculate the maximum shear: $V_{xz}^{\max} = \max(V_{xz}^{tot}(t))$ (k)

Calculate the maximum shear per unit width: $\overline{V}_{xz}^{\max} = V_{xz}^{\max} / \sum_{k=1}^{12} L_k$ (k/ft)

FILENAME: 2LMXX.TOT
OUTPUT BY POST PROCESSOR "SHEARX2.FOR" VERSION:9/17/99

TOTAL MXX ALONG 12 COLS OF ELEMENTS IN Y-DIRECTION

TIME	COL- 1	COL- 2	COL- 3	COL- 4	COL- 5	COL- 6	COL- 7	COL- 8	COL- 9	COL-10	COL-11	COL-12
0.000	12.4	7.8	33.8	29.1	-5.9	-7.4	-7.5	-5.9	29.1	33.8	7.8	12.4
0.005	21.4	28.2	77.4	69.7	8.8	-2.2	-2.2	8.7	69.6	77.3	28.2	21.4
0.010	16.6	27.7	68.0	72.7	41.8	38.5	38.4	41.6	72.5	67.9	27.6	16.6
0.015	13.8	17.4	51.5	62.6	46.5	52.8	52.6	46.2	62.3	51.3	17.4	13.8
0.020	12.4	22.6	51.8	53.2	28.1	23.2	23.1	27.7	52.9	51.6	22.6	12.4
0.025	8.9	14.5	34.1	32.5	11.4	7.2	7.0	10.9	32.1	33.8	14.5	9.0
0.030	4.8	4.8	14.7	13.7	1.9	1.1	0.8	1.4	13.2	14.4	4.8	4.9
0.035	3.8	5.7	12.4	8.4	-4.4	-8.4	-8.7	-5.0	7.9	12.0	5.7	3.9
0.040	1.8	3.5	7.3	4.6	-3.4	-6.6	-6.9	-4.0	4.1	7.0	3.5	1.9
0.045	0.0	0.3	0.6	1.0	1.2	1.1	0.8	0.7	0.6	0.4	0.3	0.1
0.050	-0.9	0.8	0.4	1.5	4.1	3.7	3.4	3.6	1.2	0.2	0.9	-0.8
0.055	-1.9	0.3	-1.9	0.4	6.7	6.7	6.3	5.9	-0.3	-2.3	0.3	-1.7
19.930	-15.5	-4.2	36.6	57.9	66.8	30.6	-46.7	-78.0	-61.8	-37.3	2.6	13.7
19.935	-16.3	-5.4	36.3	58.4	67.9	31.3	-47.1	-78.5	-61.2	-35.9	4.2	14.6
19.940	-16.8	-6.5	35.5	57.9	67.8	31.6	-46.5	-77.4	-59.0	-33.5	6.0	15.4
19.945	-17.1	-7.8	33.6	56.0	66.5	31.7	-44.6	-74.5	-55.5	-30.3	7.9	16.1
19.950	-17.0	-9.0	31.2	53.4	64.0	31.1	-42.0	-70.1	-50.6	-26.1	9.8	16.6
19.955	-16.7	-9.9	28.6	49.9	60.3	29.8	-38.8	-64.5	-44.4	-20.9	11.8	16.9
19.960	-16.1	-10.7	25.3	45.5	55.5	28.1	-34.9	-57.8	-37.3	-15.2	13.8	17.0
19.965	-15.3	-11.6	21.4	40.2	50.0	26.0	-30.4	-50.2	-29.9	-9.6	15.5	16.8
19.970	-9.1	-11.5	3.4	16.0	20.1	10.4	-8.6	-16.5	-8.8	3.4	14.1	9.7
MAXIMUM	84.3	362.7	1025.9	1526.2	1859.7	1876.8	1614.4	1516.0	1253.6	823.9	347.5	95.5
@TIME	10.970	10.995	10.995	11.000	11.000	11.000	11.000	11.005	12.610	12.610	11.010	5.320
MINIMUM	-175.7	-391.9	-859.9	-1121.5	-1106.4	-1294.0	-1635.3	-1559.2	-1001.7	-766.1	-271.6	-126.5
@TIME	5.300	10.985	5.315	10.980	10.980	10.975	12.525	12.525	11.025	5.300	10.980	12.405

$\frac{1876.8}{19} = 98.8$ K-FT/FT

CEC JOB NO. 1101-000
BY DH DATE 9/23/99
CHECK QWM DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 60

FILENAME: 2LMYY.TOT
OUTPUT BY POST PROCESSOR "SHEARY2.FOR" VERSION:9/17/99

TOTAL MYY ALONG 6 ROWS OF ELEMENT IN X-DIRECTION

TIME	ROW-1	ROW-2	ROW-3	ROW-4	ROW-5	ROW-6	ROW-
0.000	-8.3	41.7	129.1	133.9	62.4	42.6	
0.005	-5.8	210.0	419.7	436.2	273.0	128.8	
0.010	71.9	395.2	616.9	621.4	429.7	179.2	
0.015	160.0	422.4	579.8	546.7	361.9	151.7	
0.020	134.9	295.1	391.3	357.8	232.9	99.7	
0.025	11.7	100.5	185.3	192.6	140.3	69.1	
0.030	-130.8	-61.7	30.5	72.1	70.9	42.9	
0.035	-236.9	-173.8	-81.7	-19.3	17.0	22.3	
0.040	-305.7	-252.5	-164.9	-88.3	-24.4	5.6	
0.045	-344.2	-301.3	-223.4	-140.7	-57.8	-9.0	
0.050	-353.0	-325.3	-261.7	-178.9	-84.2	-21.2	
0.055	-334.9	-325.5	-281.2	-204.2	-104.2	-31.6	
19.930	-192.5	-218.4	-164.3	-99.7	-20.5	10.8	
19.935	-226.4	-248.1	-186.2	-113.3	-26.1	10.0	
19.940	-252.1	-268.5	-200.4	-122.0	-30.2	9.3	
19.945	-269.6	-280.0	-206.9	-125.0	-31.8	8.9	
19.950	-279.3	-282.9	-206.1	-122.9	-30.9	9.2	
19.955	-281.4	-277.9	-198.7	-116.2	-28.1	9.9	
19.960	-277.2	-266.6	-186.4	-106.2	-23.6	10.9	
19.965	-268.2	-251.4	-171.0	-94.1	-18.2	12.1	
19.970	-236.2	-210.1	-152.1	-89.9	-34.1	-3.9	
MAXIMUM	2759.4	2914.7	2690.5	1941.3	639.4	307.6	
@TIME	5.090	5.085	5.090	5.090	5.090	11.540	
MINIMUM	-3088.1	-2895.8	-1826.3	-1719.9	-1057.3	-492.6	
@TIME	4.865	5.315	12.530	5.290	5.525	13.620	

$\frac{2914.7}{30} = 97.2$ K-FT/FT

CEC JOB NO. 1101-000
BY DH DATE 9/23/99
CHECK [illegible] DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 61

FILENAME: 2LSHEARX.TOT
OUTPUT BY POST PROCESSOR "SHEARX2.FOR" VERSION:9/17/99

TOTAL SHEAR FORCES (SUM OF MXX GRADIENTS) OF LONGITUDINAL(Y) SECTIONS

TIME	1	2	3	4	5	6	7	8	9	10	11
0.000	-1.89	9.42	-1.69	-12.68	-0.64	0.00	0.64	12.68	1.72	-9.42	1.92
0.005	2.92	17.80	-2.79	-22.00	-4.64	0.00	4.64	22.02	2.79	-17.80	-2.92
0.010	4.68	14.61	1.74	-11.17	-1.39	-0.06	1.36	11.17	-1.67	-14.56	-4.64
0.015	1.51	12.34	4.00	-5.84	2.69	-0.06	-2.72	5.86	-3.97	-12.34	-1.48
0.020	4.30	10.56	0.53	-9.13	-2.07	-0.06	1.96	9.13	-0.50	-10.53	-4.30
0.025	2.35	7.06	-0.54	-7.67	-1.74	-0.11	1.66	7.66	0.63	-7.00	-2.33
0.030	0.01	3.58	-0.36	-4.28	-0.37	-0.11	0.22	4.28	0.39	-3.49	0.02
0.035	0.83	2.40	-1.45	-4.62	-1.67	-0.17	1.59	4.68	1.54	-2.32	-0.79
0.040	0.69	1.42	-1.06	-2.92	-1.41	-0.17	1.22	2.95	1.06	-1.26	-0.69
0.045	0.05	0.13	0.14	0.07	0.01	-0.11	-0.04	-0.01	-0.08	-0.03	-0.05
0.050	0.74	-0.13	0.42	0.93	-0.15	-0.17	0.07	-0.90	-0.36	0.18	-0.74
0.055	0.90	-0.74	0.79	2.28	0.02	-0.17	-0.17	-2.23	-0.73	0.98	-0.88
0.060	0.62	-1.55	1.19	3.62	0.59	-0.25	-0.78	-3.61	-1.07	1.73	-0.62
19.930	4.76	14.78	7.70	3.26	-15.27	-39.02	-13.21	5.86	8.91	14.46	4.62
19.935	4.57	15.18	7.97	3.43	-15.39	-39.63	-13.26	6.29	9.18	14.59	4.39
19.940	4.28	15.24	8.16	3.59	-15.24	-39.46	-13.02	6.66	9.21	14.28	3.97
19.945	3.94	15.01	8.16	3.75	-14.72	-38.51	-12.55	6.90	9.18	13.86	3.47
19.950	3.41	14.54	8.08	3.85	-13.87	-36.91	-11.88	7.05	8.88	13.05	2.86
19.955	2.90	13.95	7.72	3.71	-12.85	-34.65	-10.87	7.29	8.52	11.88	2.17
19.960	2.25	13.08	7.30	3.63	-11.60	-31.79	-9.64	7.43	7.99	10.49	1.38
19.965	1.59	11.93	6.83	3.54	-10.12	-28.51	-8.37	7.33	7.36	9.09	0.60
19.970	-1.03	5.40	4.54	1.49	-4.07	-9.64	-3.35	2.80	4.43	3.87	-1.83
MAXIMUM	156.03	244.53	210.25	381.67	280.41	300.89	211.77	292.06	191.74	196.81	102.17
@TIME	10.995	11.000	11.000	5.315	5.315	5.640	5.640	12.525	12.525	5.300	5.530
MINIMUM	-131.00	-209.64	-139.43	-246.74	-279.78	-383.26	-196.50	-225.06	-180.65	-197.48	-114.83
@TIME	5.315	10.980	12.530	10.975	5.290	5.290	11.000	5.305	11.005	12.405	11.010

CEC JOB NO. 1101-000
BY PH DATE 9/23/99
CHECK QLM DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 62

FILENAME: 2LSHEARY.TOT
OUTPUT BY POST PROCESSOR "SHEARY2.FOR" VERSION:9/17/99

TOTAL SHEAR FORCES (SUM OF MYY GRADIENTS) OF TRANSVERSE(X) SECTIONS

TIME	1	2	3	4	5
0.000	14.81	31.68	1.77	-25.90	-5.87
0.005	64.18	75.94	6.04	-59.11	-42.80
0.010	96.20	80.33	1.63	-69.44	-74.30
0.015	78.04	57.03	-12.04	-66.96	-62.38
0.020	47.63	34.87	-12.11	-45.23	-39.52
0.025	26.40	30.75	2.67	-18.94	-21.09
0.030	20.55	33.41	14.98	-0.46	-8.30
0.035	18.75	33.40	22.59	13.16	1.53
0.040	15.83	31.76	27.73	23.15	8.88
0.045	12.80	28.23	29.99	30.04	14.52
0.050	8.24	23.05	29.95	34.34	18.72
0.055	2.76	16.06	27.88	36.27	21.53
0.060	-1.55	8.21	23.53	35.43	22.76
19.930	-7.69	19.59	23.37	28.68	9.30
19.935	-6.47	22.44	26.37	31.56	10.75
19.940	-4.90	24.61	28.40	33.27	11.71
19.945	-3.10	26.47	29.65	33.75	12.10
19.950	-1.09	27.85	30.16	33.32	11.92
19.955	1.03	28.72	29.88	31.88	11.28
19.960	3.19	29.08	29.07	29.95	10.23
19.965	5.01	29.10	27.82	27.44	8.99
19.970	7.79	21.00	22.58	20.20	8.92
MAXIMUM	207.63	562.99	352.10	373.14	203.76
@TIME	10.345	5.315	5.315	5.290	5.525
MINIMUM	-284.88	-468.76	-295.68	-534.45	-193.89
@TIME	5.295	5.290	5.080	5.080	5.090

CEC JOB NO. 1101-000
BY DT DATE 9/23/99
CHECK aum DATE 9/27/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 63

FILENAME: 4LMXX.TOT
OUTPUT BY POST PROCESSOR "SHEARX2.FOR" VERSION:9/17/99

TOTAL MXX ALONG 12 COLS OF ELEMENTS IN Y-DIRECTION

TIME	COL- 1	COL- 2	COL- 3	COL- 4	COL- 5	COL- 6	COL- 7	COL- 8	COL- 9	COL-10	COL-11	COL-12
0.000	11.6	8.5	49.1	41.3	-14.5	-22.8	-22.8	-14.6	41.3	49.1	8.5	11.6
0.005	20.5	33.2	108.5	92.8	-8.3	-35.7	-35.8	-8.4	92.7	108.4	33.2	20.5
0.010	15.5	31.0	92.9	93.9	34.7	20.3	20.2	34.5	93.7	92.8	31.0	15.5
0.015	12.6	20.1	80.1	96.5	61.8	63.4	63.3	61.5	96.2	79.8	20.0	12.6
0.020	13.9	34.6	95.7	106.7	65.6	55.7	55.5	65.2	106.3	95.4	34.5	13.9
0.025	11.7	28.2	79.3	89.9	57.7	51.7	51.5	57.3	89.5	79.0	28.1	11.7
0.030	7.5	15.6	50.7	59.0	37.1	34.7	34.5	36.6	58.5	50.3	15.4	7.5
0.035	6.5	14.2	38.0	34.8	6.5	-2.2	-2.5	6.0	34.2	37.5	14.0	6.6
0.040	3.8	7.4	20.3	11.8	-14.8	-24.9	-25.2	-15.5	11.2	19.8	7.3	3.8
0.045	1.2	0.2	2.9	-5.4	-22.4	-28.9	-29.2	-23.1	-6.1	2.4	0.0	1.2
0.050	0.1	-0.1	-0.4	-8.3	-21.2	-27.6	-27.9	-22.0	-9.1	-0.9	-0.2	0.2
0.055	-0.8	-0.2	-2.8	-7.4	-12.5	-16.8	-17.3	-13.4	-8.3	-3.5	-0.4	-0.8
19.930	-6.6	11.9	52.9	68.4	63.8	23.0	-47.4	-78.9	-66.0	-45.1	-11.6	4.5
19.935	-7.3	13.4	59.7	77.4	70.7	25.4	-50.3	-84.8	-70.9	-47.5	-11.3	5.7
19.940	-8.2	13.1	63.1	82.9	76.2	28.9	-50.0	-86.5	-72.0	-47.6	-10.3	6.7
19.945	-9.1	11.0	61.1	81.1	75.4	29.9	-47.4	-81.6	-64.3	-40.5	-6.3	8.1
19.950	-9.7	9.3	59.1	79.1	74.2	30.8	-44.5	-76.2	-56.4	-33.4	-2.5	9.4
19.955	-9.7	9.1	59.8	80.4	75.2	32.2	-42.1	-73.2	-52.4	-29.6	-0.5	10.3
19.960	-9.6	9.0	60.2	80.6	74.4	32.2	-40.0	-69.8	-47.9	-25.5	1.5	11.0
19.965	-9.7	7.3	56.8	76.4	70.3	30.8	-37.3	-64.3	-40.9	-19.3	4.4	11.8
19.970	-4.7	2.9	28.1	42.0	37.8	17.6	-10.5	-25.6	-20.0	-7.5	5.2	6.2
MAXIMUM	143.3	584.2	1339.0	1877.5	2241.8	2272.5	1956.0	1670.1	1253.0	914.7	493.1	126.0
@TIME	12.550	12.565	12.565	12.565	12.570	12.570	12.570	12.575	4.665	4.665	5.315	5.315
MINIMUM	-346.9	-505.0	-1253.9	-1431.8	-1530.1	-2142.7	-2458.1	-2518.2	-1796.3	-1238.1	-521.3	-124.3
@TIME	12.555	5.570	5.570	5.570	12.550	12.550	12.545	12.545	12.550	5.305	12.550	12.410

$$\frac{2272.5}{19} = 119.6$$

CEC JOB NO. 1101-000
BY DF DATE 9/23/99
CHECK [signature] DATE 9/27/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 64

FILENAME: 4LMYY.TOT
OUTPUT BY POST PROCESSOR "SHEARY2.FOR" VERSION:9/17/99

TOTAL MYY ALONG 6 ROWS OF ELEMENT IN X-DIRECTION

TIME	ROW-1	ROW-2	ROW-3	ROW-4	ROW-5	ROW-6	ROW-
0.000	-9.7	-27.8	72.8	102.3	49.4	40.5	
0.005	27.8	18.9	215.5	285.8	190.1	105.9	
0.010	253.4	225.2	340.2	356.4	247.5	118.0	
0.015	543.3	461.7	465.4	375.0	213.3	96.0	
0.020	693.6	607.9	581.8	461.3	273.9	112.4	
0.025	745.2	664.8	638.3	520.9	331.4	135.0	
0.030	738.2	659.3	608.7	475.7	292.8	115.2	
0.035	664.0	565.7	498.5	375.8	229.7	90.9	
0.040	528.7	421.5	360.8	270.9	172.2	70.3	
0.045	372.1	282.2	234.4	171.9	112.9	47.5	
0.050	215.1	153.6	122.3	87.6	64.1	28.9	
0.055	56.9	29.1	19.6	14.7	24.1	13.6	
19.930	64.9	-12.6	-24.5	-19.2	7.6	11.9	
19.935	15.0	-53.9	-50.9	-33.1	4.5	13.1	
19.940	-24.1	-90.2	-77.0	-48.3	-0.7	13.1	
19.945	-51.6	-119.1	-99.8	-63.9	-7.8	12.1	
19.950	-70.3	-135.5	-111.7	-71.6	-11.7	11.5	
19.955	-87.3	-143.2	-111.6	-67.9	-7.7	13.8	
19.960	-102.8	-148.8	-108.6	-60.3	-0.8	17.0	
19.965	-112.1	-154.2	-109.6	-59.0	0.5	18.0	
19.970	-115.2	-124.0	-97.6	-61.1	-21.7	-0.8	
MAXIMUM	3349.5	3323.8	3098.8	2247.9	976.9	327.3	
@TIME	5.595	5.600	5.600	5.600	5.605	5.525	
MINIMUM	-3610.5	-3328.7	-2225.0	-1938.6	-1192.9	-665.3	
@TIME	5.540	5.540	5.535	12.545	12.565	5.565	

$$\frac{3349.5}{30} = 111.65$$

CEC JOB NO. 1101-000
BY DH DATE 9/23/99
CHECK ALM DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 65

FILENAME: 4LSHEARX.TOT
OUTPUT BY POST PROCESSOR "SHEARX2.FOR" VERSION:9/17/99

TOTAL SHEAR FORCES (SUM OF MXX GRADIENTS) OF LONGITUDINAL(Y) SECTIONS

TIME	1	2	3	4	5	6	7	8	9	10	11
0.000	-1.28	14.75	-2.88	-20.25	-3.49	0.00	3.49	20.25	2.88	-14.75	1.28
0.005	5.37	27.22	-5.71	-36.62	-11.56	0.00	11.53	36.64	5.71	-27.22	-5.37
0.010	6.57	22.44	0.39	-21.48	-6.12	0.00	6.05	21.48	-0.36	-22.38	-6.54
0.015	3.15	21.74	5.92	-12.57	0.65	-0.06	-0.74	12.56	-5.89	-21.68	-3.12
0.020	8.75	22.10	3.99	-14.91	-4.17	-0.06	4.09	14.94	-3.95	-22.08	-8.75
0.025	6.97	18.48	3.87	-11.61	-2.54	-0.11	2.48	11.63	-3.77	-18.45	-6.90
0.030	3.41	12.72	3.04	-7.91	-1.03	-0.11	0.90	7.94	-2.99	-12.61	-3.35
0.035	3.24	8.66	-1.10	-10.26	-3.65	-0.15	3.57	10.22	1.25	-8.51	-3.11
0.040	1.52	4.68	-3.08	-9.68	-4.28	-0.15	4.12	9.64	3.11	-4.53	-1.47
0.045	-0.46	1.03	-2.98	-6.16	-2.70	-0.21	2.58	6.18	3.11	-0.87	0.53
0.050	-0.11	-0.09	-2.88	-4.67	-2.69	-0.25	2.53	4.70	2.94	0.28	0.14
0.055	0.27	-0.95	-1.65	-1.81	-1.82	-0.25	1.63	1.83	1.80	1.13	-0.18
0.060	0.00	-1.74	0.00	1.63	-0.17	-0.25	-0.10	-1.62	0.12	1.85	0.17
19.930	7.76	14.83	5.62	-1.65	-17.20	-35.53	-13.24	4.67	7.57	12.14	6.79
19.935	8.74	16.81	6.40	-2.47	-19.16	-38.22	-14.56	5.02	8.47	13.13	7.12
19.940	9.03	18.07	7.23	-2.45	-19.99	-39.84	-15.42	5.26	8.84	13.48	7.17
19.945	8.48	18.14	7.28	-2.08	-19.20	-39.05	-14.42	6.22	8.61	12.35	6.09
19.950	7.98	18.07	7.31	-1.79	-18.33	-37.97	-13.39	7.14	8.32	11.19	5.02
19.955	7.91	18.35	7.49	-1.88	-18.14	-37.54	-13.17	7.51	8.33	10.54	4.53
19.960	7.87	18.55	7.43	-2.27	-17.77	-36.45	-12.59	7.93	8.15	9.80	3.98
19.965	7.17	17.93	7.08	-2.19	-16.67	-34.37	-11.40	8.47	7.81	8.63	3.11
19.970	3.20	9.15	5.06	-1.53	-8.50	-14.25	-6.36	2.06	4.53	4.61	0.37
MAXIMUM	195.76	298.52	262.51	424.60	259.12	285.20	210.76	381.49	282.76	272.91	187.21
@TIME	12.565	12.570	12.570	5.310	5.315	12.420	5.340	5.295	12.545	5.305	12.550
MINIMUM	-179.37	-271.28	-237.08	-346.51	-417.32	-559.95	-257.41	-342.14	-193.69	-247.75	-154.87
@TIME	5.570	5.570	12.550	12.550	12.545	5.295	5.305	5.305	12.575	12.415	5.315

CEC JOB NO. 1101-000
BY DF DATE 9/23/99
CHECK [illegible] DATE 9/23/99
CALC. NO. G(PU3)-2 REV. NO. 0
SHEET NO. 66

FILENAME: 4LSHEARY.TOT
OUTPUT BY POST PROCESSOR "SHEARY2.FOR" VERSION:9/17/99

TOTAL SHEAR FORCES (SUM OF MYY GRADIENTS) OF TRANSVERSE(X) SECTIONS

TIME	1	2	3	4	5
0.000	-5.34	36.39	10.67	-19.12	-2.69
0.005	-2.67	71.27	25.44	-34.67	-24.98
0.010	-8.42	41.67	5.88	-39.47	-38.47
0.015	-24.24	1.35	-32.75	-58.62	-34.80
0.020	-25.47	-9.50	-43.63	-67.86	-47.91
0.025	-23.90	-9.63	-42.50	-68.66	-58.24
0.030	-23.51	-18.39	-48.17	-66.26	-52.79
0.035	-29.21	-24.38	-44.43	-52.89	-41.17
0.040	-31.89	-21.98	-32.57	-35.82	-30.24
0.045	-26.72	-17.33	-22.60	-21.37	-19.41
0.050	-18.30	-11.35	-12.55	-8.53	-10.47
0.055	-8.30	-3.43	-1.76	3.38	-3.11
0.060	-0.34	3.08	8.14	14.83	4.84
19.930	-23.05	-4.37	1.95	9.71	1.33
19.935	-20.54	1.08	6.46	13.65	2.53
19.940	-19.69	4.79	10.38	17.25	4.13
19.945	-20.10	7.02	13.07	20.26	5.93
19.950	-19.41	8.64	14.55	21.70	6.90
19.955	-16.65	11.45	15.85	21.78	6.37
19.960	-13.70	14.63	17.50	21.53	5.32
19.965	-12.50	16.13	18.30	21.59	5.22
19.970	-2.59	9.55	13.21	14.24	6.20
MAXIMUM	460.62	628.07	410.51	401.29	231.74
@TIME	5.525	5.310	5.310	12.555	12.545
MINIMUM	-341.11	-581.61	-328.21	-497.05	-243.41
@TIME	5.305	5.295	5.595	5.600	5.605

CEC JOB NO. 1101-000
BY DH DATE 9/23/99
CHECK awm DATE 9/23/99
CALC. NO. 4(P017)-2 REV. NO. 0
SHEET NO. 67

FILENAME: 8LMXX.TOT
OUTPUT BY POST PROCESSOR "SHEARX2.FOR" VERSION:9/17/99

TOTAL MXX ALONG 12 COLS OF ELEMENTS IN Y-DIRECTION

TIME	COL- 1	COL- 2	COL- 3	COL- 4	COL- 5	COL- 6	COL- 7	COL- 8	COL- 9	COL-10	COL-11	COL-12
0.000	0.2	-0.2	-2.4	-5.6	-8.3	-8.5	-6.7	-0.2	17.5	17.8	1.8	-0.8
0.005	0.8	-2.9	-13.2	-24.1	-28.4	-23.1	-11.4	10.6	45.7	44.6	11.5	-0.3
0.010	1.4	-5.4	-22.1	-35.1	-34.1	-20.9	-2.6	22.4	50.6	45.1	13.0	-0.5
0.015	3.4	2.7	-5.9	-12.9	-12.1	-5.3	3.2	15.0	31.7	24.4	0.1	-4.0
0.020	6.1	16.5	21.7	19.8	13.6	7.8	4.3	4.0	11.0	5.9	-7.7	-5.4
0.025	5.9	17.1	25.3	26.4	21.7	15.6	10.4	6.8	9.5	3.5	-8.0	-5.0
0.030	3.4	7.7	9.2	10.2	12.4	14.9	16.5	17.8	19.9	10.4	-4.5	-4.5
0.035	1.7	2.1	-0.5	-1.4	1.9	7.3	12.2	16.6	19.5	10.9	-3.1	-4.0
0.040	0.6	0.7	-0.4	-1.6	-1.7	-1.2	-0.3	1.3	3.8	0.2	-6.2	-4.0
0.045	-1.0	-2.2	-2.9	-3.7	-5.4	-7.6	-9.6	-11.0	-10.3	-9.5	-8.1	-3.3
0.050	-2.7	-7.6	-11.5	-13.4	-13.9	-14.0	-13.7	-12.4	-9.6	-6.7	-4.1	-1.4
0.055	-4.0	-12.3	-19.6	-22.7	-21.4	-18.1	-14.1	-8.8	-4.0	-0.4	1.3	0.6
19.930	-1.8	-21.6	-84.1	-67.9	26.6	72.6	83.5	61.8	-9.7	-30.5	4.0	4.8
19.935	-1.9	-19.4	-78.9	-62.1	30.6	75.2	85.6	64.3	-7.1	-28.8	4.2	4.1
19.940	-1.9	-16.9	-73.0	-55.8	34.1	76.7	86.7	66.2	-4.3	-26.6	4.5	3.4
19.945	-1.8	-14.3	-66.6	-49.4	36.7	77.0	86.6	67.0	-1.6	-24.2	4.7	2.7
19.950	-1.7	-11.7	-59.6	-42.7	38.6	76.0	85.0	66.7	1.0	-21.5	4.8	1.9
19.955	-1.6	-8.9	-51.8	-35.5	39.8	73.8	82.0	65.2	3.3	-18.7	4.7	1.1
19.960	-1.4	-6.0	-43.6	-28.0	40.3	70.4	77.7	62.6	5.3	-15.9	4.5	0.3
19.965	-1.9	-3.9	-34.4	-19.2	44.3	72.3	79.1	63.1	5.3	-15.7	2.8	-1.1
19.970	1.5	5.0	3.0	17.7	48.4	64.7	67.7	56.1	25.8	7.2	4.7	0.4
MAXIMUM	100.4	374.7	702.6	924.4	870.5	1130.1	1143.8	1133.1	1028.1	752.7	315.6	212.5
@TIME	5.515	5.295	5.295	5.295	5.360	4.690	4.690	5.585	5.370	5.370	12.540	5.295
MINIMUM	-153.4	-348.4	-723.0	-859.2	-1277.1	-1362.7	-1395.0	-1187.5	-1277.6	-998.8	-464.5	-127.9
@TIME	5.285	5.285	5.280	5.305	5.305	5.310	5.310	5.310	5.315	5.315	5.315	5.425

$$\frac{1143.8}{19} = 60.2$$

CEC JOB NO. 1101-000
BY DH DATE 9/23/99
CHECK [illegible] DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 68

FILENAME: 8LMYY.TOT
OUTPUT BY POST PROCESSOR "SHEARY2.FOR" VERSION:9/17/99

TOTAL MYY ALONG 6 ROWS OF ELEMENT IN X-DIRECTION

TIME	ROW-1	ROW-2	ROW-3	ROW-4	ROW-5	ROW-6	ROW-
0.000	-3.4	-33.1	-27.3	-15.8	-6.4	-1.4	
0.005	-22.6	-99.5	-99.0	-71.9	-38.6	-11.3	
0.010	-70.3	-149.4	-158.6	-131.1	-82.3	-27.5	
0.015	-140.1	-192.2	-179.7	-139.7	-86.0	-28.7	
0.020	-183.1	-222.2	-190.0	-130.8	-69.0	-20.1	
0.025	-195.6	-215.1	-185.6	-133.8	-75.6	-23.5	
0.030	-214.5	-216.3	-179.1	-128.1	-74.5	-24.1	
0.035	-206.3	-227.2	-188.3	-127.3	-66.4	-19.2	
0.040	-149.2	-193.6	-179.1	-135.2	-79.3	-25.4	
0.045	-70.9	-122.5	-128.1	-108.5	-71.6	-25.0	
0.050	12.1	-36.3	-47.8	-42.0	-27.1	-9.2	
0.055	102.0	60.3	38.8	23.6	12.1	3.5	
19.930	-174.5	-137.6	-59.3	-30.5	-54.9	-43.1	
19.935	-196.3	-163.2	-91.6	-58.7	-68.7	-47.2	
19.940	-214.0	-184.8	-120.5	-84.3	-80.9	-50.5	
19.945	-227.5	-202.7	-146.1	-107.2	-91.2	-52.9	
19.950	-236.4	-216.7	-168.6	-127.7	-99.8	-54.5	
19.955	-241.0	-226.8	-188.0	-146.1	-106.9	-55.3	
19.960	-241.9	-233.5	-204.5	-162.0	-112.4	-55.4	
19.965	-243.1	-237.8	-212.8	-169.8	-114.9	-54.5	
19.970	-221.0	-228.9	-201.7	-154.1	-96.3	-36.1	
MAXIMUM	2161.3	2229.7	2581.7	2389.1	1764.0	667.1	
@TIME	5.565	5.310	5.315	5.315	5.315	5.315	
MINIMUM	-1984.9	-2172.9	-2446.9	-2755.0	-2017.4	-732.3	
@TIME	5.605	5.380	5.330	5.330	5.330	5.330	

$$\frac{2581.7}{30} = 86.1$$

CEC JOB NO. 1101-000
BY bl DATE 9/23/99
CHECK aum DATE 9/23/99
CALC. NO. E(P017)-2 REV. NO. 0
SHEET NO. 69

FILENAME: 8LSHEARX.TOT
OUTPUT BY POST PROCESSOR "SHEARX2.FOR" VERSION:9/17/99

TOTAL SHEAR FORCES (SUM OF MXX GRADIENTS) OF LONGITUDINAL(Y) SECTIONS

TIME	1	2	3	4	5	6	7	8	9	10	11
0.000	-0.25	-0.75	-1.13	-0.99	-0.07	0.90	2.77	6.43	0.11	-5.79	-1.08
0.005	-1.46	-3.76	-3.93	-1.54	2.19	5.99	9.30	12.69	-0.42	-12.05	-4.95
0.010	-2.86	-6.03	-4.69	0.34	5.60	9.25	10.58	10.14	-1.94	-11.66	-5.73
0.015	-0.33	-3.14	-2.56	0.34	2.81	4.29	4.96	6.02	-2.65	-8.75	-1.71
0.020	4.35	1.88	-0.75	-2.20	-2.43	-1.77	-0.09	2.50	-1.87	-4.92	1.02
0.025	4.71	2.95	0.36	-1.63	-2.56	-2.63	-1.48	0.96	-2.17	-4.16	1.28
0.030	1.77	0.55	0.36	0.80	1.04	0.80	0.55	0.74	-3.44	-5.40	0.03
0.035	0.15	-0.95	-0.30	1.17	2.35	2.45	1.84	1.07	-3.14	-5.03	-0.44
0.040	0.06	-0.39	-0.42	-0.04	0.25	0.46	0.70	0.90	-1.31	-2.31	0.93
0.045	-0.50	-0.25	-0.31	-0.59	-1.01	-1.04	-0.64	0.32	0.29	0.52	2.02
0.050	-2.06	-1.41	-0.72	-0.21	-0.07	0.19	0.54	1.04	1.07	0.96	1.12
0.055	-3.47	-2.66	-1.10	0.43	1.41	2.07	2.22	1.76	1.26	0.66	-0.38
0.060	-3.76	-2.67	-0.87	0.81	1.61	2.08	2.09	1.44	1.53	1.10	-0.66
19.930	-8.33	-22.58	5.87	34.21	19.42	5.54	-9.15	-25.90	-7.54	12.50	0.33
19.935	-7.38	-21.58	6.13	33.58	18.77	5.28	-8.97	-25.84	-7.86	11.97	-0.09
19.940	-6.37	-20.34	6.20	32.58	17.98	5.09	-8.68	-25.55	-8.06	11.27	-0.49
19.945	-5.31	-18.92	6.24	31.22	16.94	4.90	-8.22	-24.84	-8.18	10.43	-0.87
19.950	-4.23	-17.37	6.14	29.45	15.75	4.53	-7.73	-23.78	-8.16	9.49	-1.21
19.955	-3.10	-15.58	5.93	27.25	14.34	4.12	-7.06	-22.45	-7.94	8.51	-1.55
19.960	-1.93	-13.59	5.64	24.78	12.68	3.66	-6.34	-20.72	-7.68	7.41	-1.73
19.965	-0.80	-11.08	5.51	23.01	11.78	3.44	-6.74	-20.99	-7.63	6.71	-1.66
19.970	1.45	-0.72	5.32	11.07	6.93	1.55	-4.89	-11.00	-6.72	-0.86	-1.79
MAXIMUM	120.87	155.16	109.13	267.96	191.08	134.86	122.34	217.88	154.87	240.49	153.05
@TIME	5.295	12.535	4.690	4.725	5.585	5.790	5.790	12.425	5.310	5.300	5.315
MINIMUM	-93.37	-180.63	-171.48	-279.83	-186.72	-235.41	-159.87	-218.62	-107.82	-173.11	-125.97
@TIME	5.305	4.660	5.310	5.310	5.295	5.295	5.315	5.285	5.585	5.370	5.370

CEC JOB NO. 1101-000
BY DH DATE 9/23/99
CHECK QUM DATE 9/23/99
CALC. NO. G(PJ/7)-2 REV. NO. 0
SHEET NO. 70

FILENAME: 8LSHEARY.TOT
OUTPUT BY POST PROCESSOR "SHEARY2.FOR" VERSION:9/17/99

TOTAL SHEAR FORCES (SUM OF MYY GRADIENTS) OF TRANSVERSE(X) SECTIONS

TIME	1	2	3	4	5
0.000	-8.88	2.14	4.15	3.34	1.50
0.005	-22.91	0.20	9.77	12.09	8.12
0.010	-23.55	-3.33	9.95	17.66	16.27
0.015	-15.48	4.52	14.46	19.44	17.01
0.020	-11.64	11.70	21.51	22.42	14.51
0.025	-5.77	10.67	18.77	21.13	15.45
0.030	-0.53	13.45	18.45	19.44	14.97
0.035	-6.24	14.14	22.10	22.07	14.01
0.040	-13.20	5.27	15.86	20.25	15.99
0.045	-15.37	-2.03	7.14	13.42	13.83
0.050	-14.39	-4.19	2.13	5.42	5.28
0.055	-12.40	-7.78	-5.48	-4.21	-2.54
0.060	-12.30	-13.90	-14.14	-12.50	-7.39
19.930	10.96	28.44	10.43	-8.85	3.53
19.935	9.90	25.96	11.92	-3.66	6.38
19.940	8.69	23.31	13.14	1.25	9.05
19.945	7.39	20.47	14.09	5.79	11.37
19.950	5.87	17.42	14.86	10.14	13.43
19.955	4.21	14.05	15.19	14.15	15.31
19.960	2.49	10.51	15.37	17.99	16.89
19.965	1.62	9.08	15.64	19.88	17.94
19.970	-2.31	9.86	17.26	20.97	17.88
MAXIMUM	590.78	359.22	235.34	391.57	381.34
@TIME	5.315	5.605	5.320	10.285	5.330
MINIMUM	-549.60	-427.10	-265.33	-378.24	-325.42
@TIME	5.330	5.330	5.310	5.280	5.315

CEC JOB NO. 1101-000
BY DF DATE 9/23/99
CHECK awm DATE 9/27/99
CALC. NO. G(2017)-2 REV. NO. 0
SHEET NO. 71

FILENAME: X8LMXX.TOT
OUTPUT BY POST PROCESSOR "SHEARX2.FOR" VERSION:9/17/99

TOTAL MXX ALONG 12 COLS OF ELEMENTS IN Y-DIRECTION

TIME	COL- 1	COL- 2	COL- 3	COL- 4	COL- 5	COL- 6	COL- 7	COL- 8	COL- 9	COL-10	COL-11	COL-12
0.000	11.6	8.4	48.9	41.1	-14.6	-22.6	-22.6	-14.5	41.4	49.4	8.9	11.9
0.005	20.6	32.9	107.2	91.5	-8.7	-35.1	-34.8	-7.7	93.1	109.3	34.7	21.6
0.010	16.5	31.8	91.1	91.0	33.4	20.9	21.5	35.2	92.8	91.5	30.8	16.2
0.015	15.9	25.5	82.3	95.9	61.5	63.5	62.4	57.2	86.6	68.3	11.6	10.1
0.020	19.7	47.1	107.4	115.0	70.5	55.8	49.7	50.3	81.7	68.6	15.3	7.4
0.025	18.6	44.8	98.0	105.9	68.4	54.1	44.4	37.3	56.6	43.7	2.9	3.0
0.030	14.3	31.7	69.1	76.1	51.3	42.8	34.2	23.5	30.9	17.5	-9.6	-1.5
0.035	13.4	30.3	56.4	53.3	24.6	12.5	5.5	1.7	14.6	9.9	-9.0	-2.1
0.040	11.2	25.4	42.6	35.1	7.5	-7.2	-15.5	-19.2	-8.7	-8.1	-15.7	-4.7
0.045	8.4	17.7	25.3	17.7	-1.9	-14.7	-24.3	-32.5	-30.6	-27.8	-23.1	-6.8
0.050	5.7	12.4	14.1	4.9	-11.5	-23.3	-30.9	-35.6	-33.4	-28.3	-20.4	-6.7
0.055	2.4	5.3	1.0	-7.1	-15.4	-22.6	-26.5	-28.2	-28.3	-24.0	-15.4	-5.7
19.930	-1.6	34.5	111.1	190.8	275.0	320.1	325.8	287.5	207.8	124.2	37.8	-1.2
19.935	-1.9	34.6	112.7	196.1	285.3	333.2	339.6	300.9	219.2	132.1	41.2	-0.7
19.940	-2.2	34.6	113.9	199.9	293.0	343.0	349.8	310.8	228.1	138.4	43.9	-0.3
19.945	-2.3	34.4	114.0	201.6	297.1	348.3	355.2	316.6	234.0	143.0	46.1	0.2
19.950	-2.3	33.9	113.0	200.8	297.1	348.9	355.8	317.8	236.4	145.3	47.5	0.8
19.955	-2.2	33.0	110.7	197.5	293.0	344.4	350.9	314.0	235.1	145.3	48.0	1.2
19.960	-2.0	31.8	107.1	191.6	284.7	335.0	341.1	305.8	230.7	143.6	47.8	1.6
19.965	-1.9	30.0	101.1	182.3	273.1	322.3	328.3	295.1	223.8	140.1	46.9	1.7
19.970	2.8	32.0	94.2	168.7	240.2	279.9	286.2	260.6	200.7	123.3	46.5	6.0
MAXIMUM	217.3	1142.6	2327.0	2752.6	2568.6	2791.3	2824.0	2644.7	2245.3	1502.1	577.8	205.6
@TIME	5.310	5.310	5.310	5.310	4.710	4.705	4.705	4.705	4.705	4.705	5.325	5.305
MINIMUM	-228.2	-1169.3	-2785.9	-4089.6	-4400.9	-3795.1	-3319.5	-4881.1	-5959.1	-4634.5	-1857.0	-385.1
@TIME	5.300	5.300	5.320	5.320	5.320	5.320	5.315	5.310	5.310	5.310	5.315	5.315

X8LMXX

$$\frac{2824.0}{19} = 148.6$$

CEC JOB NO. 1101-000
BY DL DATE 9/23/99
CHECK [illegible] DATE 9/27/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 72

FILENAME: X8LMYY.TOT
OUTPUT BY POST PROCESSOR "SHEARY2.FOR" VERSION:9/17/99

TOTAL MYY ALONG 6 ROWS OF ELEMENT IN X-DIRECTION

TIME	ROW-1	ROW-2	ROW-3	ROW-4	ROW-5	ROW-6	ROW-
0.000	-10.4	-23.7	75.6	103.6	47.5	38.6	
0.005	10.2	30.7	228.3	293.7	186.3	100.7	
0.010	175.2	219.2	353.9	372.2	246.9	112.1	
0.015	381.5	387.1	434.1	369.2	203.8	87.4	
0.020	492.4	454.9	465.5	384.8	218.6	87.6	
0.025	567.1	487.6	466.8	379.8	223.7	89.5	
0.030	617.7	525.4	465.2	347.8	187.5	69.0	
0.035	624.4	525.5	448.2	327.1	177.1	63.4	
0.040	586.0	492.2	415.3	304.8	170.7	60.1	
0.045	523.6	439.5	360.2	255.7	139.6	46.6	
0.050	446.6	362.0	280.7	189.8	101.0	31.9	
0.055	354.3	273.6	196.6	123.6	63.4	17.8	
19.930	123.1	102.1	79.4	53.5	27.1	8.1	
19.935	135.3	110.8	85.2	56.7	28.6	8.5	
19.940	145.8	118.5	90.5	60.2	30.7	9.2	
19.945	154.8	124.8	95.0	63.0	32.5	9.9	
19.950	161.3	129.2	98.8	65.8	34.0	10.5	
19.955	164.9	131.8	101.8	68.6	36.1	11.6	
19.960	166.5	132.9	104.0	71.1	38.0	12.6	
19.965	167.0	133.7	105.7	72.8	38.4	12.5	
19.970	165.4	131.5	100.4	67.0	35.1	10.6	
MAXIMUM	1493.2	1674.3	1810.3	1757.9	1309.2	676.0	
@TIME	11.690	5.400	12.575	12.575	5.330	5.305	
MINIMUM	-3588.1	-6267.4	-5898.6	-5130.4	-3783.2	-1380.4	
@TIME	5.315	5.310	5.315	5.315	5.315	5.315	

X8LMYY

$$\frac{1810.3}{30} = 60.3$$

CEC JOB NO. 1101-000
BY DF DATE 9/23/99
CHECK [illegible] DATE 9/27/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 73

FILENAME: X8LSHEAX.TOT
OUTPUT BY POST PROCESSOR "SHEARX2.FOR" VERSION:9/17/99

TOTAL SHEAR FORCES (SUM OF MXX GRADIENTS) OF LONGITUDINAL(Y) SECTIONS

TIME	1	2	3	4	5	6	7	8	9	10	11
0.000	-1.38	14.64	-2.79	-20.18	-3.35	0.00	3.38	20.23	2.88	-14.64	1.31
0.005	5.18	26.92	-5.71	-36.29	-11.14	0.13	11.43	36.56	5.81	-27.00	-5.49
0.010	6.41	21.56	-0.07	-20.87	-5.29	0.39	5.77	20.86	-0.48	-22.00	-6.18
0.015	4.08	20.57	4.92	-12.47	0.79	-0.53	-2.21	10.69	-6.67	-20.55	-0.64
0.020	11.58	21.88	2.80	-16.18	-6.18	-3.10	0.30	11.38	-4.77	-19.30	-3.32
0.025	11.06	19.31	2.89	-13.57	-6.05	-4.95	-3.00	7.01	-4.68	-14.78	0.03
0.030	7.35	13.55	2.57	-9.00	-3.58	-4.38	-4.54	2.69	-4.84	-9.77	3.43
0.035	7.09	9.48	-1.15	-10.40	-5.15	-3.50	-1.64	4.63	-1.69	-6.84	2.93
0.040	6.02	6.26	-2.71	-10.00	-6.15	-4.16	-1.59	3.79	0.24	-2.72	4.69
0.045	3.94	2.76	-2.75	-7.11	-5.43	-4.86	-3.43	0.66	0.95	1.71	6.86
0.050	2.87	0.67	-3.36	-5.93	-5.00	-3.83	-2.02	0.79	1.90	2.86	5.81
0.055	1.19	-1.50	-2.94	-2.99	-3.02	-1.94	-0.70	-0.05	1.52	3.12	4.04
0.060	-0.30	-2.86	-1.45	0.57	-0.79	-1.00	-1.16	-2.20	0.55	3.54	3.25
19.930	15.19	27.73	28.88	30.53	19.01	2.91	-16.19	-28.87	-30.34	-31.29	-16.49
19.935	15.46	28.28	30.17	32.33	20.16	3.24	-16.32	-29.60	-31.56	-32.96	-17.64
19.940	15.51	28.70	31.19	33.75	21.12	3.41	-16.42	-29.97	-32.47	-34.21	-18.63
19.945	15.49	28.86	31.72	34.58	21.62	3.55	-16.27	-29.92	-32.99	-35.11	-19.36
19.950	15.26	28.68	31.81	34.88	21.86	3.50	-16.04	-29.52	-33.01	-35.45	-19.78
19.955	14.87	28.12	31.50	34.58	21.72	3.34	-15.62	-28.59	-32.49	-35.30	-19.71
19.960	14.26	27.21	30.59	33.70	21.18	3.07	-14.87	-27.20	-31.58	-34.69	-19.56
19.965	13.41	25.81	29.42	32.93	20.74	3.08	-14.07	-25.81	-30.33	-33.79	-19.11
19.970	12.34	22.52	26.98	25.93	16.77	3.24	-10.78	-21.69	-28.02	-27.87	-17.07
MAXIMUM	390.48	429.13	264.77	719.99	647.81	563.78	646.81	444.43	479.93	1147.15	621.07
@TIME	5.310	5.310	4.705	5.295	5.300	5.325	5.320	5.320	5.310	5.310	5.315
MINIMUM	-405.34	-604.01	-472.35	-421.10	-917.00	-1304.19	-773.43	-390.59	-289.90	-360.95	-205.32
@TIME	5.325	5.320	5.320	5.315	5.310	5.310	5.310	5.310	4.655	4.705	4.705

X8LSHEAX

CEC JOB NO. 1101-000
BY DH DATE 9/23/99
CHECK QUM DATE 9/23/99
CALC. NO. G(1017)-2 REV. NO. 0
SHEET NO. 74

FILENAME: X8LSHEAY.TOT
OUTPUT BY POST PROCESSOR "SHEARY2.FOR" VERSION:9/17/99

TOTAL SHEAR FORCES (SUM OF MYY GRADIENTS) OF TRANSVERSE(X) SECTIONS

TIME	1	2	3	4	5
0.000	-3.91	35.98	10.16	-20.30	-2.69
0.005	6.08	71.62	23.64	-38.92	-25.41
0.010	13.03	48.85	6.63	-45.42	-40.00
0.015	1.69	17.05	-23.51	-59.97	-34.58
0.020	-11.16	3.82	-29.22	-60.24	-38.86
0.025	-23.65	-7.48	-31.49	-56.60	-39.79
0.030	-27.45	-21.82	-42.53	-58.07	-35.13
0.035	-29.48	-28.03	-43.82	-54.31	-33.82
0.040	-27.89	-27.88	-40.06	-48.60	-32.83
0.045	-25.06	-28.71	-37.87	-42.04	-27.61
0.050	-25.22	-29.48	-32.93	-32.20	-20.53
0.055	-24.02	-27.90	-26.45	-21.81	-13.54
0.060	-20.76	-24.98	-20.07	-12.54	-7.21
19.930	-6.30	-8.19	-9.34	-9.56	-5.60
19.935	-7.24	-9.32	-10.31	-10.22	-5.95
19.940	-8.14	-10.13	-11.01	-10.68	-6.41
19.945	-8.93	-10.78	-11.63	-11.10	-6.71
19.950	-9.53	-11.04	-11.93	-11.54	-6.99
19.955	-9.91	-10.87	-12.01	-11.78	-7.29
19.960	-10.00	-10.44	-11.96	-11.93	-7.52
19.965	-9.92	-10.13	-11.91	-12.45	-7.67
19.970	-10.07	-11.33	-12.11	-11.55	-7.28
MAXIMUM	532.56	554.96	756.03	779.35	712.99
@TIME	5.330	5.325	5.310	5.310	5.315
MINIMUM	-811.39	-489.03	-220.45	-441.26	-236.67
@TIME	5.310	4.645	5.300	5.300	12.575

X8LSHEAY

CEC JOB NO. 1101-000
BY DT DATE 9/23/99
CHECK awn DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 75

FILENAME: 2BMXX.TOT
OUTPUT BY POST PROCESSOR "SHEARX2.FOR" VERSION:9/17/99

TOTAL MXX ALONG 12 COLS OF ELEMENTS IN Y-DIRECTION

TIME	COL- 1	COL- 2	COL- 3	COL- 4	COL- 5	COL- 6	COL- 7	COL- 8	COL- 9	COL-10	COL-11	COL-12
0.000	11.8	7.3	31.9	27.4	-5.8	-7.2	-7.3	-5.8	27.4	31.9	7.3	11.8
0.005	19.5	26.1	71.2	63.8	7.5	-3.0	-3.1	7.4	63.7	71.1	26.1	19.6
0.010	13.9	24.1	58.3	62.5	36.8	33.6	33.5	36.6	62.3	58.1	24.1	13.9
0.015	10.3	12.8	39.0	48.8	38.5	44.5	44.3	38.1	48.5	38.7	12.7	10.4
0.020	8.2	16.6	36.5	37.2	19.9	15.4	15.1	19.4	36.7	36.2	16.5	8.3
0.025	4.5	8.3	18.3	16.5	4.3	0.9	0.6	3.8	16.1	18.0	8.3	4.6
0.030	0.4	-0.9	-0.4	-1.2	-3.6	-3.7	-4.0	-4.2	-1.7	-0.7	-1.0	0.5
0.035	-0.7	-0.3	-2.9	-6.1	-8.5	-11.3	-11.7	-9.3	-6.8	-3.3	-0.3	-0.6
0.040	-2.5	-2.5	-8.0	-9.8	-7.3	-9.1	-9.6	-8.2	-10.7	-8.5	-2.5	-2.4
0.045	-4.1	-5.5	-14.3	-13.5	-3.5	-2.4	-2.9	-4.4	-14.2	-14.8	-5.5	-4.0
0.050	-4.8	-5.1	-14.6	-13.4	-1.9	-1.1	-1.3	-2.4	-13.9	-14.9	-5.0	-4.7
0.055	-5.4	-5.6	-16.8	-15.0	-0.6	0.8	0.6	-0.9	-15.1	-16.9	-5.5	-5.3
19.930	-18.9	-1.4	54.3	82.3	92.8	43.7	-59.2	-102.3	-81.6	-50.3	1.7	17.9
19.935	-19.6	-3.0	52.8	81.3	92.8	44.4	-58.3	-100.9	-79.3	-47.8	3.8	18.9
19.940	-20.0	-4.8	49.8	78.3	90.6	44.1	-55.9	-97.0	-75.0	-43.9	6.0	19.5
19.945	-19.8	-6.4	45.7	73.5	86.0	42.6	-52.1	-90.6	-68.5	-38.6	8.2	19.8
19.950	-19.1	-8.0	40.3	66.5	79.1	40.0	-46.8	-81.6	-59.6	-31.6	10.6	19.8
19.955	-17.9	-9.6	33.5	57.5	69.8	36.1	-40.4	-70.3	-48.6	-23.2	12.9	19.3
19.960	-16.4	-11.0	26.1	47.3	58.5	31.1	-33.4	-57.4	-36.2	-13.9	15.2	18.4
19.965	-14.4	-11.8	18.8	36.6	46.3	25.3	-25.9	-43.7	-23.5	-4.8	16.9	17.0
19.970	-8.4	-11.7	0.4	11.3	16.1	9.5	-5.1	-10.3	-2.2	8.1	15.5	9.7
MAXIMUM	179.8	695.1	1343.4	1401.8	1454.4	1502.8	1561.2	1736.2	1756.4	1272.9	423.5	90.6
@TIME	5.815	5.815	5.815	5.815	5.285	5.290	5.290	5.690	5.690	5.690	5.690	5.875
MINIMUM	-193.5	-527.4	-1498.7	-2466.4	-3085.4	-3016.6	-3211.9	-4042.9	-3873.2	-2751.5	-993.5	-173.8
@TIME	5.280	5.825	5.825	5.825	5.825	5.825	5.820	5.815	5.815	5.815	5.820	5.820

$$\frac{1756.4}{19} = 92,4$$

CEC JOB NO. 1101-005
BY DF DATE 9/23/99
CHECK awm DATE 9/23/99
CALC. NO. 5(D017)-2 REV. NO. 0
SHEET NO. 76

FILENAME: 2BMYY.TOT
OUTPUT BY POST PROCESSOR "SHEARY2.FOR" VERSION:9/17/99

TOTAL MYY ALONG 6 ROWS OF ELEMENT IN X-DIRECTION

TIME	ROW-1	ROW-2	ROW-3	ROW-4	ROW-5	ROW-6	ROW-
0.000	-8.8	36.9	119.9	124.8	58.3	40.5	
0.005	-11.5	183.5	378.4	396.5	251.3	119.8	
0.010	50.8	331.1	528.6	538.9	381.1	160.2	
0.015	117.9	324.6	453.9	432.4	294.2	125.3	
0.020	82.1	184.5	251.1	231.8	158.1	70.0	
0.025	-32.1	-0.1	50.6	68.4	64.5	37.6	
0.030	-148.6	-137.6	-87.9	-43.5	-2.9	10.4	
0.035	-220.4	-218.4	-177.6	-121.4	-52.5	-10.3	
0.040	-252.3	-262.3	-233.8	-172.8	-87.0	-26.1	
0.045	-254.6	-275.3	-262.8	-204.8	-111.4	-38.7	
0.050	-230.9	-264.8	-271.2	-221.5	-127.9	-48.4	
0.055	-187.0	-235.0	-262.2	-225.1	-137.3	-55.8	
19.930	-286.3	-302.2	-220.1	-129.8	-26.2	14.7	
19.935	-301.6	-312.1	-227.3	-134.7	-30.1	12.9	
19.940	-306.3	-311.0	-225.8	-133.9	-31.9	11.3	
19.945	-301.1	-299.6	-215.9	-127.3	-31.5	10.1	
19.950	-287.4	-279.3	-198.1	-115.1	-28.2	9.6	
19.955	-266.7	-251.9	-174.2	-98.2	-22.4	9.8	
19.960	-240.5	-219.5	-146.4	-78.8	-15.1	10.6	
19.965	-211.1	-185.1	-117.6	-59.0	-7.4	11.6	
19.970	-169.0	-138.9	-93.1	-49.8	-15.3	0.4	
MAXIMUM	2301.1	2552.9	2429.2	1761.0	707.9	342.9	
@TIME	5.070	5.065	5.070	5.070	5.825	5.825	
MINIMUM	-2698.1	-2665.9	-2379.6	-3138.3	-2525.4	-1156.5	
@TIME	4.840	5.295	5.815	5.815	5.815	5.815	

$$\frac{2552.9}{30} = 85.1$$

CEC JOB NO. 1101-000
BY DH DATE 9/23/99
CHECK qum DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 77

FILENAME: 2BSHEARX.TOT
OUTPUT BY POST PROCESSOR "SHEARX2.FOR" VERSION:9/17/99

TOTAL SHEAR FORCES (SUM OF MXX GRADIENTS) OF LONGITUDINAL(Y) SECTIONS

TIME	1	2	3	4	5	6	7	8	9	10	11
0.000	-1.86	8.91	-1.66	-12.03	-0.59	0.00	0.59	12.05	1.66	-8.91	1.86
0.005	2.78	16.36	-2.68	-20.40	-4.45	0.00	4.43	20.45	2.68	-16.36	-2.78
0.010	4.32	12.39	1.53	-9.29	-1.34	-0.06	1.32	9.31	-1.49	-12.34	-4.32
0.015	1.06	9.44	3.58	-3.69	2.54	-0.11	-2.60	3.72	-3.58	-9.39	-0.98
0.020	3.55	7.23	0.27	-6.29	-1.88	-0.11	1.79	6.29	-0.21	-7.11	-3.45
0.025	1.59	3.62	-0.61	-4.37	-1.42	-0.11	1.39	4.42	0.72	-3.54	-1.57
0.030	-0.58	0.21	-0.28	-0.83	0.01	-0.17	-0.06	0.89	0.39	-0.12	0.61
0.035	0.18	-0.97	-1.19	-0.87	-1.17	-0.21	1.02	0.93	1.22	1.08	-0.15
0.040	-0.02	-1.99	-0.71	0.88	-0.74	-0.25	0.55	-0.86	0.80	2.23	0.02
0.045	-0.56	-3.24	0.30	3.60	0.44	-0.21	-0.60	-3.59	-0.20	3.38	0.61
0.050	-0.12	-3.49	0.44	4.18	0.35	-0.11	-0.50	-4.15	-0.32	3.51	0.12
0.055	-0.04	-4.06	0.66	5.17	0.64	-0.06	-0.64	-5.15	-0.63	4.12	0.07
0.060	-0.38	-4.50	0.96	6.16	1.07	-0.36	-1.22	-5.99	-0.84	4.71	0.47
19.930	7.36	20.20	10.12	3.81	-20.69	-51.94	-18.19	7.45	11.39	18.86	6.78
19.935	6.98	20.18	10.33	4.22	-20.43	-51.92	-17.97	7.82	11.45	18.70	6.36
19.940	6.41	19.79	10.35	4.46	-19.56	-50.46	-17.33	7.95	11.30	18.05	5.73
19.945	5.64	18.86	10.06	4.54	-18.32	-47.84	-16.25	8.08	10.88	16.95	4.88
19.950	4.70	17.51	9.55	4.55	-16.53	-43.88	-14.67	8.01	10.16	15.25	3.84
19.955	3.53	15.65	8.75	4.42	-14.24	-38.70	-12.62	7.86	9.18	13.08	2.67
19.960	2.28	13.43	7.64	4.09	-11.58	-32.56	-10.13	7.69	8.10	10.54	1.36
19.965	1.12	11.06	6.44	3.47	-8.88	-25.84	-7.51	7.35	6.78	7.85	0.04
19.970	-1.45	4.42	3.94	1.71	-2.76	-7.41	-2.17	2.95	3.73	2.70	-2.46
MAXIMUM	217.40	271.24	164.07	332.70	316.28	290.00	420.93	407.79	406.43	669.42	347.36
@TIME	5.815	5.280	5.285	5.685	5.690	5.690	5.825	5.825	5.815	5.815	5.815
MINIMUM	-211.77	-351.90	-350.61	-530.46	-695.09	-947.23	-365.45	-276.57	-175.21	-307.71	-182.03
@TIME	5.825	5.825	5.825	5.820	5.815	5.815	5.815	5.490	5.690	5.690	5.690

CEC JOB NO. 1101-000
BY DH DATE 9/23/99
CHECK [illegible] DATE 9/23/99
CALC. NO. 4(2013)-2 REV. NO. 0
SHEET NO. 78

FILENAME: 2BSHEARY.TOT
OUTPUT BY POST PROCESSOR "SHEARY2.FOR" VERSION:9/17/99

TOTAL SHEAR FORCES (SUM OF MYY GRADIENTS) OF TRANSVERSE(X) SECTIONS

TIME	1	2	3	4	5
0.000	13.54	30.05	1.77	-24.13	-5.22
0.005	57.98	70.58	6.56	-52.61	-39.09
0.010	83.42	71.50	3.71	-57.19	-65.53
0.015	61.58	46.83	-7.79	-50.05	-50.14
0.020	30.53	24.14	-7.02	-26.68	-26.15
0.025	9.55	18.38	6.45	-1.42	-8.01
0.030	3.27	18.07	16.17	14.66	3.97
0.035	0.57	14.81	20.38	24.96	12.50
0.040	-2.94	10.33	22.04	31.10	18.09
0.045	-6.14	4.54	21.02	33.86	21.60
0.050	-10.10	-2.33	17.94	33.90	23.60
0.055	-14.27	-9.80	13.41	31.83	24.18
0.060	-17.38	-17.11	7.63	27.63	23.37
19.930	-4.73	29.74	32.69	37.52	12.15
19.935	-3.12	30.77	33.57	37.89	12.76
19.940	-1.37	30.86	33.28	36.95	12.80
19.945	0.45	30.36	32.04	34.73	12.33
19.950	2.38	29.37	30.10	31.47	11.20
19.955	4.42	28.18	27.55	27.45	9.60
19.960	6.23	26.46	24.56	23.08	7.62
19.965	7.73	24.44	21.22	18.72	5.61
19.970	9.02	16.56	15.69	12.51	4.71
MAXIMUM	186.48	584.54	340.25	412.24	406.21
@TIME	10.335	5.490	5.295	5.265	5.815
MINIMUM	-386.49	-739.01	-274.89	-493.92	-172.38
@TIME	5.815	5.815	5.815	5.055	5.070

CEC JOB NO. 1101-000
BY DF DATE 9/23/99
CHECK [illegible] DATE 9/23/99
CALC. NO. 9(PJ17)-2 REV. NO. 0
SHEET NO. 79

FILENAME: 4BMXX.TOT
OUTPUT BY POST PROCESSOR "SHEARX2.FOR" VERSION:9/17/99

TOTAL MXX ALONG 12 COLS OF ELEMENTS IN Y-DIRECTION

TIME	COL- 1	COL- 2	COL- 3	COL- 4	COL- 5	COL- 6	COL- 7	COL- 8	COL- 9	COL-10	COL-11	COL-12
0.000	11.1	8.0	47.0	39.5	-14.1	-21.9	-22.0	-14.1	39.5	47.0	8.0	11.1
0.005	19.1	31.3	101.9	86.9	-8.5	-34.7	-34.7	-8.6	86.8	101.8	31.3	19.1
0.010	13.5	28.1	82.7	83.4	31.0	17.5	17.4	30.8	83.2	82.6	28.0	13.5
0.015	10.0	16.0	65.6	80.4	53.4	55.5	55.3	53.1	80.0	65.3	15.9	10.0
0.020	10.4	28.2	75.6	84.5	53.4	44.8	44.6	53.0	84.1	75.3	28.0	10.4
0.025	7.7	20.8	56.3	64.5	43.9	39.3	39.0	43.3	64.0	55.9	20.6	7.7
0.030	3.3	8.2	27.0	33.5	24.8	24.1	23.8	24.1	32.9	26.6	8.0	3.3
0.035	2.0	6.4	13.9	10.7	-1.2	-6.8	-7.2	-2.1	9.9	13.2	6.2	2.1
0.040	-0.7	0.0	-3.1	-9.9	-17.9	-23.7	-24.1	-18.8	-10.8	-3.8	-0.2	-0.7
0.045	-3.1	-6.6	-19.3	-25.3	-22.8	-24.5	-24.9	-23.6	-26.1	-20.0	-6.8	-3.1
0.050	-4.1	-7.0	-22.9	-28.3	-21.2	-22.5	-23.0	-22.2	-29.2	-23.6	-7.1	-4.0
0.055	-4.9	-7.5	-26.0	-28.7	-14.4	-13.7	-14.3	-15.7	-29.9	-26.9	-7.7	-4.8
19.930	-9.6	23.1	95.5	122.5	111.3	45.6	-64.2	-113.8	-91.0	-59.6	-12.6	10.1
19.935	-10.5	22.6	97.2	125.3	114.7	47.8	-64.9	-115.5	-91.3	-58.9	-11.1	11.2
19.940	-11.2	21.5	96.8	125.6	115.8	49.0	-64.3	-115.0	-89.6	-56.9	-9.3	12.3
19.945	-11.7	19.7	94.2	123.1	114.2	49.0	-62.4	-111.8	-85.7	-53.2	-7.1	13.3
19.950	-12.0	17.4	89.6	118.0	110.1	48.0	-59.1	-106.1	-79.3	-47.8	-4.3	14.0
19.955	-12.0	14.7	83.2	110.5	103.7	45.9	-54.6	-97.9	-70.7	-40.7	-1.2	14.6
19.960	-11.8	11.7	75.3	100.9	95.0	42.9	-48.7	-87.5	-60.2	-32.4	2.1	14.9
19.965	-11.3	8.5	66.1	89.5	84.7	39.1	-41.9	-75.2	-48.3	-23.3	5.4	14.9
19.970	-5.1	3.6	32.0	48.1	44.3	22.1	-9.8	-27.4	-21.7	-8.0	6.4	7.4
MAXIMUM	144.2	413.2	1153.1	1614.3	1771.0	1918.4	1980.1	1798.0	1235.7	872.2	405.8	94.2
@TIME	10.980	12.530	4.640	5.290	5.295	5.295	5.300	5.300	11.005	4.525	11.010	11.010
MINIMUM	-151.0	-393.5	-788.9	-1164.2	-1344.5	-1819.5	-1901.6	-1776.4	-1370.9	-1167.0	-426.4	-114.0
@TIME	12.520	5.305	5.305	4.625	10.980	10.980	10.980	10.980	10.980	4.610	4.610	10.960

$$\frac{1980.1}{19} = 104.2 \text{ K-FT/FT}$$

CEC JOB NO. 1101-000
BY DH DATE 9/23/99
CHECK [signature] DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 80

FILENAME: 4BMYY.TOT
OUTPUT BY POST PROCESSOR "SHEARY2.FOR" VERSION:9/17/99

TOTAL MYY ALONG 6 ROWS OF ELEMENT IN X-DIRECTION

TIME	ROW-1	ROW-2	ROW-3	ROW-4	ROW-5	ROW-6	ROW-
0.000	-9.6	-28.0	68.5	96.8	47.1	39.1	
0.005	21.8	10.8	196.6	264.6	179.1	100.8	
0.010	219.5	190.6	295.0	314.0	225.3	108.6	
0.015	458.0	382.1	381.7	305.5	178.0	82.0	
0.020	549.3	474.6	449.4	354.1	216.2	90.0	
0.025	544.3	479.3	456.7	374.0	248.1	102.6	
0.030	489.1	432.1	390.4	301.3	192.9	76.3	
0.035	383.1	316.4	262.6	189.3	121.7	48.2	
0.040	237.3	170.5	124.1	83.1	61.1	25.2	
0.045	89.8	44.2	7.6	-9.7	2.7	1.4	
0.050	-41.5	-60.0	-85.9	-82.2	-42.4	-17.2	
0.055	-158.6	-148.9	-161.1	-137.2	-75.4	-31.2	
19.930	-74.3	-153.3	-118.4	-68.6	3.5	22.9	
19.935	-101.6	-175.7	-133.9	-77.7	-0.3	22.3	
19.940	-123.9	-191.4	-144.3	-83.7	-3.5	21.5	
19.945	-140.5	-200.6	-149.1	-86.0	-5.9	20.3	
19.950	-150.6	-202.9	-148.5	-84.7	-6.8	19.4	
19.955	-153.9	-198.5	-142.6	-79.7	-6.5	18.6	
19.960	-150.2	-187.5	-131.7	-71.7	-4.9	17.9	
19.965	-140.3	-170.9	-116.7	-61.1	-2.0	17.5	
19.970	-124.8	-121.8	-89.3	-51.8	-16.1	1.1	
MAXIMUM	1693.9	2138.0	2171.3	1603.3	761.2	293.4	
@TIME	5.540	5.535	5.535	5.065	5.530	12.510	
MINIMUM	-2672.7	-2912.4	-2450.2	-2157.2	-1174.0	-609.5	
@TIME	5.300	5.300	12.530	12.530	12.530	5.520	

$$\frac{2171.3}{30} = 72.37 \text{ K-FT/FT}$$

CEC JOB NO. 1101-000
BY DJ? DATE 9/23/99
CHECK ... DATE 9/23/99
CALC. NO. G(PJ17)-2 REV. NO. 0
SHEET NO. 81

FILENAME: 4BSHEARX.TOT
OUTPUT BY POST PROCESSOR "SHEARX2.FOR" VERSION:9/17/99

TOTAL SHEAR FORCES (SUM OF MXX GRADIENTS) OF LONGITUDINAL(Y) SECTIONS

TIME	1	2	3	4	5	6	7	8	9	10	11
0.000	-1.33	14.15	-2.69	-19.42	-3.37	0.00	3.37	19.45	2.69	-14.11	1.33
0.005	5.15	25.61	-5.45	-34.51	-11.06	0.00	11.02	34.51	5.45	-25.54	-5.15
0.010	6.18	19.78	0.29	-18.96	-5.73	-0.03	5.66	18.96	-0.17	-19.75	-6.15
0.015	2.55	17.97	5.36	-9.74	0.84	-0.06	-0.98	9.74	-5.32	-17.90	-2.53
0.020	7.50	17.14	3.27	-11.29	-3.62	-0.11	3.56	11.29	-3.22	-17.11	-7.43
0.025	5.53	12.90	2.98	-7.50	-1.93	-0.15	1.83	7.50	-2.96	-12.74	-5.46
0.030	2.06	6.82	2.34	-3.15	-0.25	-0.15	0.10	3.18	-2.27	-6.74	-1.99
0.035	1.89	2.67	-1.14	-4.31	-2.37	-0.25	2.15	4.34	1.21	-2.52	-1.70
0.040	0.32	-1.16	-2.46	-2.86	-2.47	-0.25	2.25	2.86	2.52	1.30	-0.20
0.045	-1.54	-4.65	-2.17	0.89	-0.75	-0.25	0.53	-0.89	2.17	4.76	1.57
0.050	-1.22	-5.73	-1.91	2.55	-0.57	-0.30	0.32	-2.48	2.04	5.98	1.34
0.055	-1.11	-6.71	-0.94	5.18	0.31	-0.33	-0.57	-5.13	1.13	6.94	1.23
0.060	-1.53	-7.61	0.31	8.09	1.82	-0.25	-2.11	-8.06	-0.18	7.84	1.70
19.930	13.83	26.24	9.72	-4.07	-27.68	-55.44	-20.96	8.27	11.35	17.03	9.53
19.935	13.98	27.00	10.14	-3.87	-28.22	-56.88	-21.35	8.73	11.69	17.33	9.39
19.940	13.79	27.29	10.43	-3.55	-28.16	-57.21	-21.39	9.18	11.84	17.23	9.11
19.945	13.24	26.98	10.46	-3.25	-27.50	-56.24	-20.81	9.46	11.74	16.74	8.58
19.950	12.39	26.17	10.24	-2.82	-26.21	-54.10	-19.80	9.72	11.40	15.73	7.77
19.955	11.24	24.83	9.90	-2.48	-24.36	-50.77	-18.34	9.85	10.85	14.31	6.68
19.960	9.91	23.03	9.27	-2.11	-22.04	-46.24	-16.32	9.86	10.03	12.54	5.42
19.965	8.36	20.89	8.44	-1.76	-19.23	-40.86	-14.05	9.77	9.02	10.39	4.04
19.970	3.67	10.28	5.85	-1.32	-9.38	-16.13	-7.41	2.02	4.99	5.22	0.47
MAXIMUM	174.37	305.79	204.95	393.33	282.55	246.34	194.23	323.13	193.07	268.36	157.22
@TIME	4.640	5.285	5.295	5.300	5.300	4.525	4.525	4.620	10.980	4.610	4.610
MINIMUM	-128.41	-182.87	-203.01	-307.15	-286.28	-381.14	-255.46	-286.93	-207.07	-217.58	-131.46
@TIME	5.305	4.625	10.980	10.975	10.975	5.275	5.290	5.285	5.300	4.525	11.010

CEC JOB NO. 1101-000
BY DF DATE 9/23/99
CHECK aum DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 82

FILENAME: 4BSHEARY.TOT
OUTPUT BY POST PROCESSOR "SHEARY2.FOR" VERSION:9/17/99

TOTAL SHEAR FORCES (SUM OF MYY GRADIENTS) OF TRANSVERSE(X) SECTIONS

TIME	1	2	3	4	5
0.000	-5.46	34.98	10.27	-18.06	-2.43
0.005	-3.35	67.34	24.60	-31.01	-23.28
0.010	-8.62	37.81	6.88	-32.13	-34.61
0.015	-22.61	-0.14	-27.58	-46.25	-28.52
0.020	-22.26	-9.13	-34.51	-49.96	-37.41
0.025	-19.35	-8.17	-30.01	-45.64	-43.16
0.030	-16.98	-15.11	-32.30	-39.26	-34.53
0.035	-19.80	-19.49	-26.58	-24.46	-21.81
0.040	-19.94	-16.80	-14.85	-7.97	-10.69
0.045	-13.52	-13.29	-6.24	4.49	-0.39
0.050	-5.50	-9.38	1.32	14.45	7.44
0.055	2.92	-4.43	8.68	22.38	13.16
0.060	9.20	-1.21	14.23	28.55	18.43
19.930	-23.53	12.67	18.02	26.15	5.74
19.935	-22.04	15.12	20.33	28.11	6.69
19.940	-20.11	17.07	21.94	29.03	7.41
19.945	-17.82	18.66	22.89	29.00	7.74
19.950	-15.57	19.67	23.10	28.22	7.78
19.955	-13.22	20.21	22.77	26.56	7.47
19.960	-11.15	20.23	21.76	24.19	6.78
19.965	-9.10	19.67	20.14	21.42	5.77
19.970	0.90	11.78	13.56	12.95	5.09
MAXIMUM	331.72	600.10	361.72	357.98	256.87
@TIME	5.065	5.300	5.300	5.275	12.530
MINIMUM	-268.61	-399.62	-209.97	-489.42	-181.35
@TIME	12.530	5.270	5.535	5.065	5.530

CEC JOB NO. 1101-000
BY DH DATE 9/23/99
CHECK auw DATE 9/25/99
CALC. NO. E(P017)-2 REV. NO. 0
SHEET NO. 83

FILENAME: 8BMXX.TOT
OUTPUT BY POST PROCESSOR "SHEARX2.FOR" VERSION:9/17/99

TOTAL MXX ALONG 12 COLS OF ELEMENTS IN Y-DIRECTION

TIME	COL- 1	COL- 2	COL- 3	COL- 4	COL- 5	COL- 6	COL- 7	COL- 8	COL- 9	COL-10	COL-11	COL-12
0.000	11.4	8.4	47.2	39.5	-14.1	-21.7	-21.7	-14.1	39.5	47.2	8.4	11.4
0.005	20.3	32.8	102.3	86.5	-8.4	-33.9	-33.9	-8.4	86.5	102.3	32.8	20.3
0.010	15.2	29.8	82.0	81.6	30.6	18.5	18.4	30.6	81.5	81.9	29.8	15.2
0.015	11.3	15.9	61.6	75.4	51.2	55.4	55.2	50.9	75.1	61.4	15.8	11.3
0.020	11.3	27.0	69.8	77.5	49.4	43.0	42.8	48.9	77.0	69.4	26.9	11.3
0.025	8.3	19.5	51.3	59.0	41.6	39.2	38.9	41.0	58.4	50.8	19.3	8.3
0.030	3.2	5.8	22.7	31.4	28.1	30.9	30.6	27.5	30.7	22.2	5.7	3.3
0.035	1.6	3.6	10.7	11.7	6.4	5.1	4.8	5.8	11.0	10.2	3.5	1.6
0.040	-1.2	-2.3	-4.5	-7.2	-9.8	-12.2	-12.9	-11.2	-8.5	-5.4	-2.6	-1.1
0.045	-3.5	-8.8	-20.4	-23.2	-17.3	-16.6	-17.2	-18.9	-25.1	-21.8	-9.4	-3.6
0.050	-4.3	-9.1	-24.2	-28.3	-20.5	-20.2	-20.3	-20.9	-29.0	-24.9	-9.6	-4.4
0.055	-5.0	-9.3	-27.1	-30.4	-18.1	-17.1	-17.5	-18.4	-30.1	-26.8	-9.0	-4.7
19.930	-3.5	28.0	85.8	105.4	93.0	37.5	-51.4	-94.8	-83.0	-60.1	-20.2	3.4
19.935	-3.7	29.6	90.7	111.0	97.4	39.1	-53.6	-98.4	-84.1	-60.4	-20.5	3.9
19.940	-3.8	30.8	94.3	115.0	100.4	40.2	-54.9	-100.5	-84.2	-59.9	-20.4	4.4
19.945	-3.8	31.5	96.4	117.2	101.8	40.8	-55.4	-101.0	-82.9	-58.5	-20.1	4.8
19.950	-3.6	31.8	97.2	117.7	101.6	40.6	-55.0	-100.0	-80.0	-55.8	-19.3	5.2
19.955	-3.4	31.7	96.9	116.6	99.7	39.6	-53.8	-97.3	-75.5	-51.8	-18.1	5.6
19.960	-3.1	31.1	95.1	113.9	96.3	38.1	-51.6	-92.8	-69.5	-46.8	-16.5	5.9
19.965	-2.7	30.1	91.8	109.5	91.8	36.4	-48.2	-86.6	-62.5	-41.3	-14.7	6.1
19.970	3.2	26.1	60.9	73.0	58.0	24.1	-16.8	-43.5	-44.4	-33.8	-16.0	-1.4
MAXIMUM	155.4	584.8	1314.7	1690.7	1818.5	1731.9	1577.4	1493.0	1322.9	1073.4	398.5	90.6
@TIME	5.355	5.890	5.275	12.575	12.575	12.575	12.570	5.035	5.030	12.415	12.415	4.655
MINIMUM	-186.9	-534.4	-1440.1	-1645.1	-1831.6	-2125.0	-2182.6	-2079.5	-2819.7	-2397.3	-968.3	-157.1
@TIME	4.635	5.360	5.360	12.540	5.315	12.535	12.530	5.305	5.305	5.305	5.305	5.305

$$\frac{1818.5}{19} = 95.71 \quad K\text{-}FT/FT$$

CEC JOB NO. 1101-000
BY DF DATE 9/23/99
CHECK QWM DATE 9/23/99
CALC. NO. E(P017)-2 REV. NO. 0
SHEET NO. 84

FILENAME: 8BMYY.TOT
OUTPUT BY POST PROCESSOR "SHEARY2.FOR" VERSION:9/17/99

TOTAL MYY ALONG 6 ROWS OF ELEMENT IN X-DIRECTION

TIME	ROW-1	ROW-2	ROW-3	ROW-4	ROW-5	ROW-6	ROW-
0.000	-10.7	-22.1	72.8	98.9	44.9	36.8	
0.005	-6.0	28.1	216.5	277.6	175.8	94.6	
0.010	100.3	181.6	318.0	340.9	229.6	103.0	
0.015	222.4	278.9	344.9	305.8	173.9	74.7	
0.020	253.1	273.5	307.7	266.8	155.9	63.3	
0.025	225.2	232.1	249.5	216.1	132.0	54.4	
0.030	157.5	170.7	180.2	148.7	84.2	31.9	
0.035	98.4	82.5	81.2	68.7	42.5	16.9	
0.040	66.7	22.3	-1.8	-10.9	-9.2	-3.9	
0.045	49.4	1.5	-38.7	-53.9	-41.2	-18.8	
0.050	40.1	-2.2	-44.2	-55.7	-36.3	-17.6	
0.055	39.0	7.2	-38.3	-52.1	-32.3	-17.9	
19.930	-95.9	-155.2	-123.5	-76.7	-10.7	12.9	
19.935	-114.7	-178.0	-139.6	-85.6	-11.8	14.7	
19.940	-129.9	-195.6	-151.5	-91.8	-12.5	16.2	
19.945	-140.8	-208.2	-158.7	-94.6	-11.9	17.8	
19.950	-147.1	-214.8	-161.0	-94.0	-10.2	19.5	
19.955	-148.6	-215.4	-158.4	-90.2	-7.2	21.3	
19.960	-145.8	-211.0	-151.6	-83.4	-3.1	23.1	
19.965	-139.5	-202.4	-141.7	-74.9	1.3	24.7	
19.970	-128.2	-147.9	-114.6	-68.7	-21.1	1.9	
MAXIMUM	2014.9	2501.9	2428.4	2124.8	1181.0	598.7	
@TIME	5.900	5.900	5.545	5.545	5.545	5.365	
MINIMUM	-2669.2	-3072.9	-2276.6	-2096.3	-1359.4	-600.3	
@TIME	5.305	5.305	5.580	5.580	5.580	5.885	

$$\frac{2501.9}{30} = 83.40 \text{ K-FT/FT}$$

CEC JOB NO. 1101-000
BY DH DATE 9/23/99
CHECK QWM DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 85

FILENAME: 8BSHEARX.TOT
OUTPUT BY POST PROCESSOR "SHEARX2.FOR" VERSION:9/17/99

TOTAL SHEAR FORCES (SUM OF MXX GRADIENTS) OF LONGITUDINAL(Y) SECTIONS

TIME	1	2	3	4	5	6	7	8	9	10	11
0.000	-1.24	14.07	-2.80	-19.38	-3.22	0.00	3.22	19.38	2.80	-14.07	1.24
0.005	5.28	25.14	-5.70	-34.39	-10.70	0.00	10.70	34.39	5.70	-25.14	-5.28
0.010	6.16	18.91	-0.10	-18.47	-5.17	0.00	5.15	18.50	0.10	-18.88	-6.16
0.015	1.93	16.53	4.98	-8.79	1.74	-0.06	-1.79	8.75	-4.98	-16.50	-1.93
0.020	6.62	15.47	2.77	-10.22	-2.68	-0.11	2.63	10.18	-2.77	-15.44	-6.53
0.025	4.71	11.54	2.81	-6.35	-1.02	-0.15	0.87	6.35	-2.74	-11.44	-4.61
0.030	1.12	6.13	3.13	-1.19	1.25	-0.15	-1.31	1.15	-3.08	-6.00	-0.99
0.035	0.88	2.61	0.31	-1.91	-0.52	-0.15	0.36	1.94	-0.28	-2.45	-0.78
0.040	-0.45	-0.74	-1.00	-0.94	-1.02	-0.36	0.73	0.94	1.10	1.08	0.64
0.045	-2.25	-4.19	-1.07	2.21	0.32	-0.37	-0.74	-2.25	1.18	4.53	2.46
0.050	-2.01	-5.46	-1.49	2.81	0.10	-0.04	-0.29	-2.94	1.49	5.60	2.17
0.055	-1.80	-6.43	-1.18	4.43	0.43	-0.17	-0.43	-4.22	1.18	6.41	1.80
0.060	-1.99	-7.16	-0.33	6.50	1.36	-0.41	-1.56	-6.44	0.48	7.39	2.11
19.930	13.33	20.96	7.09	-4.46	-23.43	-44.92	-18.32	4.31	8.27	14.45	9.96
19.935	14.06	22.17	7.33	-4.96	-24.59	-46.85	-18.89	5.18	8.64	14.48	10.26
19.940	14.60	23.05	7.48	-5.32	-25.36	-48.05	-19.20	5.90	8.79	14.31	10.44
19.945	14.87	23.51	7.53	-5.57	-25.78	-48.52	-19.23	6.56	8.86	13.90	10.48
19.950	14.91	23.69	7.40	-5.89	-25.76	-48.24	-18.99	7.21	8.79	13.21	10.35
19.955	14.76	23.58	7.15	-6.14	-25.35	-47.17	-18.35	7.93	8.57	12.18	9.98
19.960	14.42	23.18	6.81	-6.33	-24.59	-45.29	-17.38	8.41	8.21	11.03	9.45
19.965	13.83	22.38	6.42	-6.44	-23.35	-42.73	-16.22	8.72	7.68	9.62	8.74
19.970	9.70	12.60	4.37	-5.45	-14.32	-20.69	-11.28	-0.34	3.81	6.44	6.14
MAXIMUM	202.78	344.83	172.35	294.17	283.94	374.86	235.51	393.75	238.01	517.72	342.26
@TIME	5.280	5.275	12.575	5.360	5.360	5.390	5.395	12.530	12.530	5.305	5.305
MINIMUM	-204.50	-328.17	-232.68	-330.01	-309.73	-310.06	-344.82	-445.60	-167.32	-250.49	-162.83
@TIME	5.360	5.360	5.395	5.395	12.530	5.280	5.885	5.885	6.260	12.410	12.415

CEC JOB NO. 1101-000
BY DH DATE 9/23/99
CHECK aim DATE 9/23/99
CALC. NO. G(DD17)-2 REV. NO. 0
SHEET NO. 86

FILENAME: 8BSHEARY.TOT
OUTPUT BY POST PROCESSOR "SHEARY2.FOR" VERSION:9/17/99

TOTAL SHEAR FORCES (SUM OF MYY GRADIENTS) OF TRANSVERSE(X) SECTIONS

TIME	1	2	3	4	5
0.000	-3.37	34.39	9.45	-19.53	-2.36
0.005	10.17	68.29	22.08	-36.87	-24.15
0.010	24.23	49.43	8.28	-40.34	-37.59
0.015	16.82	23.90	-14.16	-47.81	-29.50
0.020	6.08	12.35	-14.83	-40.19	-27.49
0.025	2.11	6.25	-12.10	-30.47	-23.01
0.030	3.99	3.43	-11.44	-23.32	-15.51
0.035	-4.67	-0.51	-4.59	-9.52	-7.64
0.040	-13.16	-8.76	-3.28	0.63	1.61
0.045	-14.26	-14.57	-5.49	4.60	6.62
0.050	-12.54	-15.17	-4.15	7.04	5.57
0.055	-9.54	-16.46	-4.99	7.15	4.26
0.060	-8.19	-19.71	-7.35	7.35	5.21
19.930	-17.67	11.47	16.96	23.92	7.00
19.935	-18.81	13.91	19.55	26.72	7.86
19.940	-19.57	15.95	21.62	28.76	8.56
19.945	-20.06	17.87	23.20	29.98	8.82
19.950	-20.18	19.48	24.27	30.40	8.79
19.955	-19.90	20.70	24.75	30.03	8.43
19.960	-19.41	21.53	24.66	29.12	7.80
19.965	-18.70	21.95	24.19	27.59	6.90
19.970	-5.87	12.09	16.57	17.23	6.83
MAXIMUM	322.67	598.53	372.25	407.55	257.71
@TIME	5.360	5.305	5.310	5.295	5.580
MINIMUM	-353.02	-350.66	-247.79	-485.29	-245.94
@TIME	5.395	5.280	5.900	5.355	5.545

CEC JOB NO. 1101-000
BY DT DATE 9/23/99
CHECK awn DATE 9/27/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 87

FILENAME: 2UMXX.TOT
OUTPUT BY POST PROCESSOR "SHEARX2.FOR" VERSION:9/17/99

TOTAL MXX ALONG 12 COLS OF ELEMENTS IN Y-DIRECTION

TIME	COL- 1	COL- 2	COL- 3	COL- 4	COL- 5	COL- 6	COL- 7	COL- 8	COL- 9	COL-10	COL-11	COL-12
0.000	11.0	6.7	29.8	25.5	-5.7	-7.0	-7.0	-5.7	25.5	29.8	6.7	11.0
0.005	17.6	23.7	64.5	57.5	6.2	-3.8	-3.8	6.0	57.4	64.4	23.7	17.6
0.010	11.0	20.3	48.0	51.7	31.8	28.7	28.5	31.4	51.5	47.8	20.3	11.0
0.015	6.8	8.1	26.1	34.8	30.7	36.4	36.2	30.2	34.4	25.8	8.0	6.8
0.020	4.2	10.7	21.4	21.5	12.2	8.3	8.0	11.6	21.0	21.1	10.6	4.2
0.025	0.4	2.5	3.4	1.6	-1.6	-4.1	-4.4	-2.2	1.2	3.1	2.5	0.5
0.030	-3.4	-5.9	-13.7	-14.1	-7.6	-6.7	-7.1	-8.3	-14.7	-14.1	-6.0	-3.3
0.035	-4.2	-5.1	-15.4	-17.7	-11.0	-12.2	-12.7	-11.8	-18.5	-16.0	-5.1	-4.1
0.040	-5.6	-6.8	-19.2	-20.1	-9.2	-9.4	-9.9	-10.2	-21.0	-19.8	-6.9	-5.4
0.045	-6.6	-9.0	-23.5	-22.2	-5.7	-3.4	-3.9	-6.7	-23.1	-24.1	-9.0	-6.4
0.050	-6.6	-8.1	-22.3	-20.8	-4.2	-2.3	-2.8	-5.1	-21.6	-22.8	-8.1	-6.5
0.055	-6.5	-7.9	-22.4	-20.6	-3.1	-0.9	-1.3	-3.9	-21.2	-22.7	-7.9	-6.4
19.930	-24.2	3.7	81.4	118.6	129.6	59.2	-79.6	-157.6	-158.5	-113.2	-24.3	14.9
19.935	-24.3	-14.3	39.1	77.0	110.0	78.4	-15.2	-58.7	-46.5	-27.4	8.5	17.4
19.940	-21.0	-14.3	32.3	66.7	96.9	78.7	10.8	-8.5	14.5	22.9	35.8	24.2
19.945	-17.2	-5.4	43.8	79.3	105.3	81.4	9.2	-21.9	-10.3	-0.9	21.2	20.0
19.950	-14.0	-0.8	47.7	80.0	93.3	59.8	-14.0	-50.8	-42.8	-25.2	8.8	16.6
19.955	-11.3	-3.7	28.3	44.1	46.6	18.8	-35.2	-56.1	-39.2	-17.6	10.6	14.8
19.960	-10.2	-15.1	-5.0	-1.2	1.2	-10.3	-37.5	-41.2	-19.5	-1.3	14.1	12.5
19.965	-7.3	-17.4	-18.8	-20.9	-20.3	-21.3	-27.9	-22.7	-4.7	7.9	13.3	8.9
19.970	-4.3	-12.0	-16.7	-19.7	-20.3	-18.0	-14.4	-7.1	3.6	10.3	10.3	4.7
MAXIMUM	103.6	446.8	1027.1	1310.8	1848.4	2155.2	2227.0	2011.3	1489.5	1008.8	398.0	89.0
@TIME	5.510	5.530	5.530	10.995	10.995	10.995	10.995	10.995	10.990	6.480	6.480	5.545
MINIMUM	-218.2	-725.2	-1449.4	-1771.4	-1380.4	-1293.9	-1579.6	-1587.8	-1197.1	-1022.7	-540.2	-223.2
@TIME	5.520	5.520	5.520	5.520	5.520	10.970	5.510	5.510	6.785	6.785	6.470	10.985

$$\frac{2227.0}{19} = 117.2 \text{ K-FT/FT}$$

CEC JOB NO. 1101-000
BY DH DATE 9/23/99
CHECK [illegible] DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 88

FILENAME: 2UMYY.TOT
OUTPUT BY POST PROCESSOR "SHEARY2.FOR" VERSION:9/17/99

TOTAL MYY ALONG 6 ROWS OF ELEMENT IN X-DIRECTION

TIME	ROW-1	ROW-2	ROW-3	ROW-4	ROW-5	ROW-6	ROW-
0.000	-9.5	31.6	109.8	114.9	54.0	38.3	
0.005	-17.1	155.6	334.4	354.1	228.1	110.1	
0.010	30.7	266.4	437.4	452.9	329.7	139.7	
0.015	79.6	230.9	329.5	317.9	224.8	97.5	
0.020	38.3	86.4	121.1	112.6	84.9	39.7	
0.025	-60.2	-77.7	-63.1	-40.3	-5.7	6.6	
0.030	-145.4	-181.3	-174.5	-134.5	-66.6	-20.0	
0.035	-180.4	-223.5	-231.9	-190.1	-106.8	-38.9	
0.040	-176.9	-228.7	-253.4	-215.9	-129.2	-51.3	
0.045	-148.3	-206.0	-248.1	-221.2	-139.6	-59.3	
0.050	-102.3	-166.1	-224.6	-211.2	-141.1	-63.4	
0.055	-47.3	-116.4	-189.3	-190.3	-134.6	-63.9	
19.930	-292.1	-309.1	-221.6	-131.7	-36.8	7.2	
19.935	-279.4	-278.9	-199.1	-114.4	-23.7	11.6	
19.940	-249.1	-247.0	-177.9	-104.4	-23.1	10.1	
19.945	-223.4	-220.2	-158.1	-94.3	-26.6	5.1	
19.950	-196.6	-190.4	-136.5	-80.4	-20.9	6.0	
19.955	-169.1	-156.7	-106.0	-58.6	-14.2	5.6	
19.960	-137.9	-118.5	-74.0	-36.5	-5.0	7.2	
19.965	-105.7	-82.3	-42.5	-13.6	5.3	9.3	
19.970	-70.9	-46.3	-21.0	-3.1	5.7	4.8	

MAXIMUM	2144.5	2415.7	2322.2	1638.3	651.9	447.6
@TIME	5.930	5.925	5.925	5.920	6.475	6.475
MINIMUM	-2933.4	-2960.8	-2168.8	-2115.5	-1140.4	-510.9
@TIME	5.285	5.280	5.250	5.245	12.480	6.465

$$\frac{2415.7}{30} = 80.52$$

CEC JOB NO. 1101-000
BY DK DATE 9/23/99
CHECK QWM DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 89

FILENAME: 2USHEARX.TOT
OUTPUT BY POST PROCESSOR "SHEARX2.FOR" VERSION:9/17/99

TOTAL SHEAR FORCES (SUM OF MXX GRADIENTS) OF LONGITUDINAL(Y) SECTIONS

TIME	1	2	3	4	5	6	7	8	9	10	11
0.000	-1.79	8.38	-1.53	-11.32	-0.49	0.00	0.49	11.28	1.53	-8.38	1.79
0.005	2.59	14.79	-2.51	-18.59	-4.23	0.00	4.23	18.61	2.51	-14.75	-2.59
0.010	3.92	10.03	1.37	-7.20	-1.29	-0.06	1.26	7.20	-1.34	-9.97	-3.92
0.015	0.58	6.54	3.19	-1.53	2.40	-0.11	-2.49	1.53	-3.17	-6.42	-0.48
0.020	2.74	3.90	0.07	-3.39	-1.68	-0.11	1.49	3.35	0.01	-3.81	-2.68
0.025	0.87	0.31	-0.65	-1.17	-1.04	-0.11	0.95	1.22	0.71	-0.23	-0.87
0.030	-1.08	-2.83	-0.15	2.35	0.38	-0.17	-0.50	-2.33	0.22	2.97	1.14
0.035	-0.38	-3.76	-0.83	2.47	-0.56	-0.21	0.37	-2.41	0.91	3.94	0.42
0.040	-0.51	-4.51	-0.34	3.92	-0.09	-0.30	-0.15	-3.90	0.43	4.69	0.61
0.045	-0.94	-5.30	0.47	5.91	0.94	-0.25	-1.20	-5.96	-0.42	5.48	1.11
0.050	-0.56	-5.13	0.55	5.99	0.79	-0.21	-0.98	-5.97	-0.40	5.34	0.66
0.055	-0.59	-5.24	0.63	6.35	0.90	-0.21	-1.09	-6.27	-0.55	5.35	0.65
0.060	-0.78	-5.15	0.74	6.39	1.25	-0.26	-1.44	-6.30	-0.65	5.30	0.90
19.930	11.75	28.18	13.45	4.02	-29.71	-70.12	-32.91	-0.30	16.41	32.23	16.51
19.935	4.21	19.31	13.78	11.99	-13.39	-47.23	-18.38	4.42	6.91	13.01	3.74
19.940	2.86	16.89	12.46	10.93	-7.72	-34.33	-8.13	8.34	3.07	4.67	-4.89
19.945	4.98	17.78	12.86	9.42	-10.13	-36.51	-13.10	4.19	3.42	8.01	-0.53
19.950	5.55	17.50	11.69	4.83	-14.12	-37.25	-15.58	2.94	6.34	12.31	3.31
19.955	3.27	11.56	5.72	0.90	-11.74	-27.28	-8.84	6.15	7.82	10.23	1.80
19.960	-2.05	3.66	1.36	0.90	-4.85	-13.76	-1.52	7.84	6.63	5.58	-0.64
19.965	-4.22	-0.57	-0.74	0.24	-0.41	-3.32	2.14	6.59	4.58	1.94	-1.86
19.970	-3.29	-1.68	-1.11	-0.21	1.00	1.82	3.14	3.84	2.46	-0.02	-2.36
MAXIMUM	174.04	264.41	201.28	297.58	183.60	281.87	177.04	277.95	187.33	243.34	146.76
@TIME	5.530	5.255	10.995	5.270	5.275	6.245	6.070	5.510	5.510	6.785	6.470
MINIMUM	-213.90	-294.29	-141.85	-230.61	-308.56	-384.82	-298.12	-362.64	-225.00	-252.55	-159.92
@TIME	5.520	5.515	10.970	10.965	5.510	5.245	6.280	6.275	10.995	10.990	6.480

CEC JOB NO. 1101-003
BY JT DATE 9/23/99
CHECK [illegible] DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 90

FILENAME: 2USHEARY.TOT
OUTPUT BY POST PROCESSOR "SHEARY2.FOR" VERSION:9/17/99

TOTAL SHEAR FORCES (SUM OF MYY GRADIENTS) OF TRANSVERSE(X) SECTIONS

TIME	1	2	3	4	5
0.000	12.27	28.42	1.88	-22.04	-4.60
0.005	51.31	64.76	7.16	-45.66	-35.01
0.010	70.13	62.00	5.62	-44.64	-56.35
0.015	45.03	35.75	-4.21	-33.74	-37.85
0.020	14.33	12.57	-3.12	-10.04	-13.40
0.025	-5.21	5.31	8.21	12.54	3.63
0.030	-10.68	2.46	14.43	24.61	13.86
0.035	-12.89	-3.05	15.15	30.22	20.17
0.040	-15.40	-8.97	13.58	31.41	23.09
0.045	-17.18	-15.29	9.80	29.57	23.78
0.050	-19.00	-21.18	4.89	25.40	23.05
0.055	-20.58	-26.42	-0.45	20.20	20.98
0.060	-21.12	-30.21	-5.59	14.15	17.94
19.930	-5.01	31.77	32.58	34.35	13.04
19.935	0.14	28.91	30.66	32.85	10.46
19.940	0.62	25.06	26.64	29.49	9.89
19.945	0.93	22.50	23.07	24.55	9.42
19.950	1.89	19.57	20.34	21.60	7.98
19.955	3.70	18.30	17.20	16.06	5.82
19.960	5.77	16.10	13.57	11.43	3.59
19.965	6.93	14.40	10.49	6.85	1.22
19.970	7.33	9.16	6.50	3.24	-0.30
MAXIMUM	157.88	579.23	342.42	456.29	218.20
@TIME	10.325	5.270	5.275	5.245	5.250
MINIMUM	-278.16	-479.15	-258.60	-506.38	-154.09
@TIME	5.250	5.245	5.925	5.925	5.915

CEC JOB NO. 1101-006
BY DJ DATE 9/23/99
CHECK AWM DATE 9/23/99
CALC. NO. S(P017)-2 REV. NO. 0
SHEET NO. 91

FILENAME: 4UMXX.TOT
OUTPUT BY POST PROCESSOR "SHEARX2.FOR" VERSION:9/17/99

TOTAL MXX ALONG 12 COLS OF ELEMENTS IN Y-DIRECTION

TIME	COL- 1	COL- 2	COL- 3	COL- 4	COL- 5	COL- 6	COL- 7	COL- 8	COL- 9	COL-10	COL-11	COL-12
0.000	10.6	7.5	44.6	37.4	-13.6	-21.0	-21.0	-13.7	37.4	44.6	7.5	10.6
0.005	17.6	29.2	94.5	80.3	-8.6	-33.4	-33.5	-8.7	80.1	94.4	29.2	17.6
0.010	11.3	24.9	71.5	72.0	27.4	14.9	14.8	27.1	71.7	71.3	24.8	11.3
0.015	7.1	11.6	50.1	63.3	45.1	47.9	47.7	44.7	62.9	49.7	11.5	7.1
0.020	6.7	21.4	54.5	61.7	41.7	34.7	34.5	41.2	61.1	54.1	21.3	6.8
0.025	3.6	13.2	32.7	39.0	30.9	28.2	28.0	30.3	38.4	32.3	13.0	3.7
0.030	-0.8	0.8	3.5	8.5	13.6	15.4	15.2	13.1	8.0	3.1	0.6	-0.8
0.035	-2.0	-1.1	-9.4	-12.1	-7.7	-9.4	-9.7	-8.4	-12.8	-9.9	-1.2	-1.9
0.040	-4.4	-6.7	-24.2	-29.1	-19.6	-20.9	-21.5	-20.8	-30.2	-25.0	-6.9	-4.3
0.045	-6.3	-12.2	-37.6	-41.2	-21.8	-19.0	-19.6	-23.2	-42.5	-38.7	-12.5	-6.2
0.050	-6.8	-12.3	-39.9	-42.8	-19.9	-16.4	-17.0	-21.1	-44.0	-40.8	-12.6	-6.7
0.055	-7.1	-12.5	-41.5	-42.4	-14.4	-9.2	-9.9	-15.7	-43.5	-42.3	-12.6	-6.9
19.930	-13.4	34.4	135.4	175.3	164.2	71.6	-84.6	-160.7	-136.3	-92.8	-20.8	15.0
19.935	-14.6	19.1	100.9	135.7	133.8	62.4	-67.5	-126.3	-98.1	-63.0	-9.1	15.3
19.940	-13.5	18.5	95.3	126.0	121.9	54.5	-65.3	-116.0	-84.4	-50.5	-3.7	15.6
19.945	-12.5	20.7	98.3	130.2	125.1	56.2	-63.9	-119.0	-93.1	-58.6	-7.4	14.8
19.950	-12.3	18.3	92.5	124.6	120.5	54.9	-59.7	-114.6	-92.4	-59.2	-8.6	14.1
19.955	-11.9	13.3	77.4	104.5	101.5	45.9	-52.8	-97.4	-73.5	-43.8	-2.1	14.6
19.960	-11.2	6.3	57.9	80.3	79.7	37.1	-41.6	-75.0	-51.4	-27.0	3.7	14.1
19.965	-9.5	2.2	42.6	60.7	60.4	29.2	-29.7	-53.9	-33.6	-14.9	6.4	12.4
19.970	-4.5	-1.0	16.5	27.3	26.4	13.8	-5.4	-15.1	-9.8	-0.5	7.7	6.3
MAXIMUM	67.3	422.7	1150.8	1417.5	1508.1	1312.1	1242.7	1032.7	1052.9	841.2	268.2	89.2
@TIME	5.965	10.980	5.265	5.815	5.815	5.815	5.280	5.280	5.335	5.335	5.335	5.825
MINIMUM	-121.2	-282.8	-681.1	-738.1	-958.0	-1205.9	-1948.7	-2408.1	-2147.0	-1591.4	-734.6	-134.3
@TIME	5.265	5.285	5.050	5.305	5.675	10.980	10.975	10.975	10.980	10.980	10.980	10.980

$$\frac{1508.1}{19} = 79.4 \text{ K-FT/FT}$$

CEC JOB NO. 1101-000
BY DH DATE 9/23/99
CHECK [illegible] DATE 9/23/99
CALC. NO. 61P0172 REV. NO. 0
SHEET NO. 92

FILENAME: 4UMYY.TOT
OUTPUT BY POST PROCESSOR "SHEARY2.FOR" VERSION:9/17/99

TOTAL MYY ALONG 6 ROWS OF ELEMENT IN X-DIRECTION

TIME	ROW-1	ROW-2	ROW-3	ROW-4	ROW-5	ROW-6	ROW-
0.000	-9.5	-28.3	63.7	90.8	44.5	37.5	
0.005	15.8	2.4	176.0	241.3	167.0	95.0	
0.010	185.5	155.8	247.4	268.4	200.8	97.9	
0.015	374.3	304.2	297.1	234.0	140.3	66.2	
0.020	413.0	349.7	321.3	248.3	157.1	65.8	
0.025	364.0	314.8	289.8	235.4	166.0	68.9	
0.030	278.3	242.8	201.7	146.2	99.1	37.4	
0.035	161.7	125.3	74.5	35.5	26.8	7.8	
0.040	28.0	-1.2	-45.8	-57.2	-29.3	-15.0	
0.045	-89.3	-95.9	-134.0	-129.1	-78.3	-36.4	
0.050	-177.5	-160.8	-193.0	-176.1	-110.9	-51.0	
0.055	-242.4	-203.5	-227.5	-201.0	-129.0	-60.0	
19.930	-109.6	-191.2	-143.1	-82.4	-1.5	23.3	
19.935	-127.1	-194.8	-143.9	-81.6	-1.8	22.4	
19.940	-132.8	-190.0	-140.2	-79.2	-1.7	21.6	
19.945	-134.6	-180.7	-131.0	-74.1	-5.5	17.4	
19.950	-130.6	-166.7	-120.1	-67.3	-5.6	15.6	
19.955	-120.9	-148.4	-104.1	-56.8	-5.1	13.2	
19.960	-105.2	-124.6	-84.7	-44.6	-3.6	11.3	
19.965	-84.7	-98.2	-63.4	-30.4	0.0	10.5	
19.970	-60.7	-57.3	-39.0	-20.1	-4.5	1.9	
MAXIMUM	1398.1	1419.9	1717.2	1318.6	545.0	294.2	
@TIME	6.055	6.060	5.050	5.055	5.280	5.280	
MINIMUM	-2392.4	-2471.6	-2263.0	-2035.6	-1098.3	-389.1	
@TIME	5.280	5.280	10.975	5.265	10.980	12.500	

$$\frac{1717.2}{30} = 57.2 \text{ K-FT/FT}$$

CEC JOB NO. 1101-000
BY DF DATE 9/23/99
CHECK Qum DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 93

FILENAME: 4USHEARX.TOT
OUTPUT BY POST PROCESSOR "SHEARX2.FOR" VERSION:9/17/99

TOTAL SHEAR FORCES (SUM OF MXX GRADIENTS) OF LONGITUDINAL(Y) SECTIONS

TIME	1	2	3	4	5	6	7	8	9	10	11
0.000	-1.29	13.47	-2.60	-18.48	-3.12	0.00	3.09	18.48	2.60	-13.47	1.29
0.005	4.90	23.63	-5.17	-32.18	-10.49	0.00	10.44	32.21	5.17	-23.63	-4.87
0.010	5.80	16.91	0.18	-16.18	-5.25	-0.06	5.22	16.21	-0.14	-16.84	-5.77
0.015	1.86	13.89	4.86	-6.62	1.20	-0.08	-1.26	6.58	-4.71	-13.86	-1.86
0.020	6.19	12.00	2.62	-7.26	-2.96	-0.15	2.81	7.25	-2.53	-11.88	-6.09
0.025	3.98	7.06	2.24	-2.94	-1.11	-0.15	0.99	2.94	-2.24	-6.98	-3.96
0.030	0.60	1.02	1.87	1.78	0.74	-0.15	-0.87	-1.82	-1.75	-0.88	-0.60
0.035	0.40	-2.97	-1.01	1.58	-0.71	-0.21	0.58	-1.57	1.06	3.16	-0.34
0.040	-0.95	-6.32	-1.85	3.46	-0.53	-0.30	0.27	-3.38	1.87	6.56	1.07
0.045	-2.46	-9.24	-1.30	7.01	1.14	-0.30	-1.52	-7.02	1.45	9.51	2.65
0.050	-2.31	-9.98	-1.03	8.30	1.46	-0.30	-1.76	-8.28	1.17	10.21	2.47
0.055	-2.23	-10.49	-0.33	10.11	2.20	-0.36	-2.48	-10.07	0.41	10.76	2.37
0.060	-2.64	-10.71	0.59	11.77	3.27	-0.36	-3.61	-11.72	-0.44	11.01	2.79
19.930	20.19	36.64	14.49	-4.06	-39.05	-78.90	-32.10	8.84	15.75	26.14	15.11
19.935	14.21	29.63	12.57	-0.67	-30.12	-65.63	-24.81	10.21	12.75	19.49	10.30
19.940	13.53	27.81	11.13	-1.44	-28.41	-60.51	-21.37	11.46	12.32	16.98	8.10
19.945	13.94	28.12	11.59	-1.84	-29.06	-60.67	-23.27	9.39	12.47	18.50	9.35
19.950	12.91	26.85	11.62	-1.53	-27.67	-57.90	-23.13	8.05	12.05	18.33	9.55
19.955	10.59	23.25	9.86	-1.05	-23.44	-49.87	-18.82	8.65	10.76	15.13	7.06
19.960	7.41	18.64	8.13	-0.26	-18.03	-39.79	-14.06	8.52	8.82	11.11	4.33
19.965	4.98	14.60	6.59	-0.09	-13.15	-29.75	-10.24	7.34	6.78	7.71	2.51
19.970	1.47	6.30	3.89	-0.28	-5.26	-9.73	-4.13	1.91	3.36	2.95	-0.63
MAXIMUM	178.09	307.91	167.32	315.93	198.92	288.78	233.11	319.09	252.78	354.42	253.26
@TIME	5.265	5.265	5.815	5.280	5.280	5.695	5.695	4.615	10.975	10.975	10.980
MINIMUM	-96.65	-168.38	-128.83	-339.00	-417.71	-629.53	-209.17	-283.44	-120.08	-216.07	-125.23
@TIME	5.285	5.050	10.980	10.980	10.975	10.975	5.275	5.275	5.280	5.695	5.695

CEC JOB NO. 1101-000
BY YK DATE 9/23/99
CHECK awm DATE 9/22/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 94

FILENAME: 4USHEARY.TOT
OUTPUT BY POST PROCESSOR "SHEARY2.FOR" VERSION:9/17/99

TOTAL SHEAR FORCES (SUM OF MYY GRADIENTS) OF TRANSVERSE(X) SECTIONS

TIME	1	2	3	4	5
0.000	-5.64	33.32	9.78	-16.76	-2.07
0.005	-4.05	62.91	23.64	-26.98	-21.38
0.010	-8.86	33.22	7.63	-24.49	-30.60
0.015	-20.79	-2.62	-22.86	-33.94	-22.02
0.020	-18.84	-10.32	-26.48	-33.01	-27.08
0.025	-14.63	-9.11	-19.71	-25.13	-28.85
0.030	-10.56	-14.86	-20.11	-17.11	-18.25
0.035	-10.79	-18.39	-14.10	-3.15	-5.64
0.040	-8.67	-16.21	-4.13	10.08	4.26
0.045	-1.98	-13.83	1.73	18.40	12.44
0.050	4.98	-11.66	6.12	23.61	17.73
0.055	11.62	-8.71	9.60	26.12	20.43
0.060	15.87	-7.04	11.29	26.78	22.14
19.930	-24.30	17.43	21.98	29.31	7.40
19.935	-20.15	18.45	22.57	28.93	7.17
19.940	-17.03	18.00	22.11	28.04	6.94
19.945	-13.74	18.04	20.56	24.86	6.77
19.950	-10.75	16.93	19.07	22.38	6.26
19.955	-8.14	16.03	17.19	18.73	5.43
19.960	-5.78	14.47	14.59	14.89	4.43
19.965	-4.06	12.66	11.91	11.01	3.13
19.970	0.98	6.66	6.83	5.70	1.91
MAXIMUM	357.89	651.25	365.32	438.48	224.00
@TIME	10.315	5.280	5.280	5.265	10.980
MINIMUM	-385.27	-433.70	-150.71	-424.83	-129.14
@TIME	10.975	5.260	5.050	5.050	5.055

CEC JOB NO. 1101-000
BY DH DATE 9/23/99
CHECK [illegible] DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 95

FILENAME: 8UMXX.TOT
OUTPUT BY POST PROCESSOR "SHEARX2.FOR" VERSION:9/17/99

TOTAL MXX ALONG 12 COLS OF ELEMENTS IN Y-DIRECTION

TIME	COL- 1	COL- 2	COL- 3	COL- 4	COL- 5	COL- 6	COL- 7	COL- 8	COL- 9	COL-10	COL-11	COL-12
0.000	10.9	7.8	44.6	37.3	-13.6	-20.7	-20.7	-13.6	37.3	44.6	7.8	10.9
0.005	18.7	30.3	94.2	79.4	-8.3	-32.1	-32.1	-8.4	79.3	94.1	30.3	18.7
0.010	12.8	25.9	69.6	69.5	27.4	16.8	16.7	27.1	69.2	69.4	25.8	12.8
0.015	8.2	10.9	45.4	58.1	43.6	49.0	48.8	43.2	57.7	45.0	10.8	8.2
0.020	7.5	19.9	48.7	55.2	38.9	34.4	34.2	38.3	54.6	48.3	19.8	7.5
0.025	4.2	11.8	28.5	34.7	29.7	29.3	29.0	29.1	34.1	28.0	11.7	4.2
0.030	-0.7	-1.0	1.0	8.1	17.4	22.0	21.4	16.3	7.1	0.3	-1.2	-0.6
0.035	-2.2	-2.7	-9.5	-8.8	-0.4	0.7	-0.3	-2.2	-10.6	-10.9	-3.1	-2.1
0.040	-4.4	-7.3	-21.7	-23.9	-13.4	-13.1	-13.6	-14.7	-25.5	-23.1	-7.9	-4.5
0.045	-6.2	-12.5	-34.4	-36.5	-18.6	-15.3	-15.5	-19.0	-36.9	-34.7	-12.5	-6.1
0.050	-6.6	-12.3	-36.0	-38.7	-19.7	-16.8	-17.0	-19.9	-38.7	-35.9	-12.2	-6.6
0.055	-6.6	-11.5	-36.0	-38.1	-17.2	-14.3	-14.2	-17.3	-38.3	-36.2	-11.6	-6.7
19.930	-4.9	37.3	114.8	139.7	122.6	49.3	-67.2	-122.4	-100.2	-70.5	-23.7	6.2
19.935	-5.0	38.8	119.1	145.0	127.4	51.6	-68.8	-126.0	-102.9	-72.5	-24.5	6.6
19.940	-4.9	39.5	120.9	147.2	129.3	52.7	-69.1	-127.1	-103.4	-72.8	-24.8	6.8
19.945	-4.7	39.4	120.2	146.2	128.5	52.6	-68.1	-125.6	-101.4	-71.3	-24.4	7.0
19.950	-4.4	38.4	117.2	142.2	124.6	51.1	-65.6	-121.4	-97.2	-68.1	-23.5	7.1
19.955	-3.9	36.7	111.7	135.1	117.8	48.4	-61.4	-113.9	-90.1	-62.9	-21.9	7.0
19.960	-3.3	34.2	103.9	125.3	108.5	44.7	-55.8	-103.6	-80.4	-55.6	-19.5	6.8
19.965	-2.5	31.2	94.1	113.1	97.0	40.2	-48.9	-91.0	-68.7	-46.9	-16.7	6.4
19.970	3.2	25.6	59.4	71.4	57.3	24.0	-16.7	-43.8	-45.7	-35.1	-16.3	-1.3
MAXIMUM	95.5	539.4	1461.8	1893.8	1822.3	1995.3	1957.8	1859.1	1665.3	1114.8	354.3	104.9
@TIME	5.270	4.650	4.650	4.650	5.465	5.465	5.465	5.470	5.470	5.470	12.335	5.625
MINIMUM	-186.8	-616.6	-1101.9	-1413.2	-1821.5	-2297.4	-2864.4	-2589.8	-1750.7	-1464.8	-533.1	-125.3
@TIME	12.515	12.515	12.515	12.515	5.300	5.295	5.295	5.295	12.510	5.755	12.510	5.465

$$\frac{1995.3}{19} = 105.0$$

CEC JOB NO. 1101-J00
BY UH DATE 9/23/99
CHECK DATE 9/23/99
CALC. NO. G(...)-2 REV. NO. 0
SHEET NO. 96

FILENAME: 8UMYY.TOT
OUTPUT BY POST PROCESSOR "SHEARY2.FOR" VERSION:9/17/99

TOTAL MYY ALONG 6 ROWS OF ELEMENT IN X-DIRECTION

TIME	ROW-1	ROW-2	ROW-3	ROW-4	ROW-5	ROW-6	ROW-
0.000	-10.3	-21.7	68.1	92.8	41.5	34.6	
0.005	-7.8	22.9	196.6	253.4	160.5	86.5	
0.010	85.9	158.6	274.5	294.5	200.3	89.1	
0.015	186.6	232.8	277.7	240.8	135.2	57.0	
0.020	198.2	210.1	222.9	187.0	108.4	42.1	
0.025	160.4	159.2	154.2	126.8	78.4	30.6	
0.030	92.1	97.8	83.9	58.2	29.9	7.6	
0.035	35.9	18.5	-4.7	-13.3	-7.2	-5.9	
0.040	5.8	-33.2	-74.5	-79.5	-49.2	-22.6	
0.045	-12.2	-50.9	-103.3	-112.8	-74.4	-34.5	
0.050	-24.1	-55.8	-107.1	-112.5	-69.3	-32.8	
0.055	-29.0	-51.8	-102.4	-107.8	-64.5	-31.7	
19.930	-119.7	-202.6	-152.8	-87.9	-1.2	24.7	
19.935	-131.8	-214.7	-160.9	-92.2	-2.3	25.3	
19.940	-139.5	-220.1	-163.3	-92.9	-2.7	25.4	
19.945	-142.2	-218.9	-160.5	-90.0	-2.0	25.4	
19.950	-140.2	-211.7	-152.7	-83.9	-0.7	25.1	
19.955	-133.6	-198.8	-140.3	-74.8	1.5	24.7	
19.960	-122.8	-180.9	-124.2	-63.5	4.5	24.2	
19.965	-108.9	-159.6	-105.9	-51.0	7.8	23.5	
19.970	-91.6	-105.3	-78.1	-43.7	-10.1	3.9	
MAXIMUM	1301.3	1573.2	1914.3	1515.4	533.5	231.3	
@TIME	5.950	5.055	5.055	5.060	12.515	12.515	
MINIMUM	-1600.5	-1836.9	-1901.9	-1891.3	-988.5	-477.6	
@TIME	4.845	5.755	5.295	12.505	12.505	4.645	

$$\frac{1914.3}{30} = 63.8 \text{ K-FT/FT}$$

CEC JOB NO. [illegible]-00[illegible]
BY DJ DATE 9/23/99
CHECK [illegible] DATE 9/[illegible]/99
CALC. NO. G(1017)-2 REV. NO. 0
SHEET NO. 97

FILENAME: 8USHEARX.TOT
OUTPUT BY POST PROCESSOR "SHEARX2.FOR" VERSION:9/17/99

TOTAL SHEAR FORCES (SUM OF MXX GRADIENTS) OF LONGITUDINAL(Y) SECTIONS

TIME	1	2	3	4	5	6	7	8	9	10	11
0.000	-1.36	13.39	-2.67	-18.45	-3.03	0.00	3.03	18.45	2.67	-13.39	1.36
0.005	4.89	23.09	-5.34	-31.79	-10.08	0.00	10.04	31.76	5.34	-23.09	-4.89
0.010	5.54	15.85	-0.03	-15.25	-4.43	-0.06	4.37	15.28	0.09	-15.79	-5.48
0.015	1.11	12.48	4.64	-5.26	2.31	-0.11	-2.34	5.26	-4.59	-12.39	-1.08
0.020	5.23	10.44	2.31	-5.95	-1.88	-0.11	1.73	5.91	-2.31	-10.34	-5.16
0.025	3.18	6.02	2.22	-1.83	-0.18	-0.15	-0.01	1.79	-2.18	-5.90	-3.14
0.030	-0.12	0.72	2.59	3.39	1.93	-0.30	-2.18	-3.31	-2.49	-0.47	0.26
0.035	-0.22	-2.49	0.24	3.05	0.44	-0.45	-0.81	-3.08	-0.08	2.85	0.41
0.040	-1.25	-5.27	-0.77	3.85	0.14	-0.25	-0.48	-3.88	0.92	5.46	1.44
0.045	-2.66	-7.97	-0.73	6.47	1.40	-0.08	-1.53	-6.44	0.73	8.02	2.72
0.050	-2.45	-8.58	-0.98	6.87	1.16	-0.06	-1.23	-6.82	1.01	8.61	2.45
0.055	-2.04	-8.93	-0.73	7.51	1.25	0.00	-1.28	-7.62	0.73	8.93	2.09
0.060	-2.13	-8.97	-0.15	8.67	1.90	-0.26	-2.01	-8.63	0.26	9.12	2.23
19.930	17.80	28.09	9.02	-6.20	-30.93	-58.84	-23.29	8.01	10.75	16.98	12.60
19.935	18.47	29.11	9.36	-6.39	-31.99	-60.84	-24.21	8.34	10.99	17.37	13.13
19.940	18.77	29.48	9.47	-6.45	-32.35	-61.48	-24.51	8.58	11.08	17.38	13.31
19.945	18.62	29.30	9.40	-6.42	-32.01	-60.95	-24.31	8.73	10.93	16.95	13.25
19.950	18.05	28.54	9.07	-6.38	-31.07	-58.97	-23.51	8.79	10.49	16.14	12.90
19.955	17.14	27.14	8.49	-6.26	-29.25	-55.48	-22.14	8.63	9.88	14.85	12.18
19.960	15.82	25.22	7.75	-6.05	-26.93	-50.80	-20.16	8.43	8.98	13.07	11.07
19.965	14.21	22.80	6.87	-5.83	-24.00	-44.97	-17.80	8.10	7.95	10.95	9.73
19.970	9.47	12.25	4.33	-5.09	-14.00	-20.55	-11.44	-0.66	3.81	6.75	6.30
MAXIMUM	218.39	334.16	206.89	248.16	201.53	246.36	192.16	412.25	311.33	364.27	195.22
@TIME	4.650	4.650	5.465	5.010	5.010	12.380	4.525	12.505	12.505	5.755	12.510
MINIMUM	-181.38	-229.10	-204.42	-257.77	-398.66	-475.61	-267.44	-350.61	-199.45	-308.15	-144.65
@TIME	12.515	5.055	6.260	6.255	12.505	12.505	4.645	4.645	5.470	5.470	5.470

CEC JOB NO. 1102-000
BY DH DATE 9/21/99
CHECK [signature] DATE 9/27/99
CALC. NO. 5(P017)-2 REV. NO. 0
SHEET NO. 98

FILENAME: 8USHEARY.TOT
OUTPUT BY POST PROCESSOR "SHEARY2.FOR" VERSION:9/17/99

TOTAL SHEAR FORCES (SUM OF MYY GRADIENTS) OF TRANSVERSE(X) SECTIONS

TIME	1	2	3	4	5
0.000	-3.49	32.54	8.96	-18.51	-2.00
0.005	9.13	62.94	20.56	-33.72	-21.98
0.010	21.64	42.01	7.21	-34.12	-33.06
0.015	13.71	16.26	-13.36	-38.24	-23.21
0.020	3.51	4.62	-12.97	-28.50	-19.67
0.025	-0.39	-1.85	-9.91	-17.50	-14.18
0.030	1.68	-5.01	-9.34	-10.24	-6.61
0.035	-5.17	-8.43	-3.12	2.17	0.36
0.040	-11.60	-14.97	-1.80	11.02	7.87
0.045	-11.49	-19.00	-3.51	13.89	11.87
0.050	-9.39	-18.59	-1.97	15.64	10.81
0.055	-6.83	-18.35	-1.97	15.64	9.75
0.060	-5.52	-19.31	-3.20	15.25	10.26
19.930	-24.69	18.05	23.53	31.40	7.66
19.935	-24.70	19.48	24.85	32.56	8.17
19.940	-23.93	20.60	25.51	32.63	8.34
19.945	-22.79	21.19	25.56	31.87	8.15
19.950	-21.28	21.38	24.93	30.16	7.64
19.955	-19.38	21.16	23.74	27.65	6.90
19.960	-17.30	20.55	22.02	24.60	5.83
19.965	-15.12	19.44	19.87	21.31	4.69
19.970	-4.10	9.81	12.47	12.21	4.13
MAXIMUM	337.67	411.51	239.68	359.20	215.61
@TIME	5.055	5.755	5.755	12.500	12.505
MINIMUM	-329.57	-388.29	-180.92	-439.49	-155.24
@TIME	12.505	6.255	5.950	5.070	5.060

CEC JOB NO. 1101-000
BY DJ DATE 9/23/99
CHECK aum DATE 9/23/99
CALC. NO. E(PU17)-2 REV. NO. 0
SHEET NO. 99

CALCULATION SHEET

CEC

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE 9/17/99	CHECKED cwm	DATE	9/23/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	100

2 Casks, Lower Bound Soil Properties
Maximum Absolute Moments (kip-ft/ft)
Ref. "2lb.out"

ELEM	XX-S/R	YY-S/R	XX-M/R	YY-M/R
193	8.22E-01	1.60E+01	4.92E+00	1.16E+02
194	2.63E+00	1.40E+01	2.44E+01	1.20E+02
195	5.21E+00	1.74E+01	7.87E+01	1.34E+02
196	7.49E+00	1.73E+01	7.45E+01	1.28E+02
197	6.70E+00	1.37E+01	6.56E+01	1.07E+02
198	6.54E+00	1.40E+01	6.82E+01	9.68E+01
199	6.63E+00	1.48E+01	6.77E+01	9.62E+01
200	7.02E+00	1.68E+01	6.42E+01	1.00E+02
201	8.77E+00	2.39E+01	7.22E+01	1.08E+02
202	5.57E+00	2.56E+01	7.24E+01	1.08E+02
203	2.64E+00	2.12E+01	1.92E+01	9.95E+01
204	8.85E-01	2.31E+01	3.96E+00	9.49E+01
205	1.16E+00	1.51E+01	1.03E+01	1.12E+02
206	2.08E+00	1.37E+01	2.87E+01	1.28E+02
207	5.05E+00	7.36E+00	9.13E+01	1.56E+02
208	9.10E+00	6.44E+00	8.44E+01	1.51E+02
209	9.18E+00	1.35E+01	8.20E+01	1.11E+02
210	8.82E+00	1.50E+01	8.55E+01	9.35E+01
211	9.07E+00	1.64E+01	8.20E+01	9.37E+01
212	9.65E+00	1.71E+01	7.91E+01	9.65E+01
213	1.04E+01	8.79E+00	8.13E+01	1.06E+02
214	3.91E+00	1.02E+01	8.14E+01	1.05E+02
215	1.86E+00	1.93E+01	1.79E+01	9.73E+01
216	1.60E+00	2.20E+01	4.68E+00	9.58E+01
217	2.07E+00	1.60E+01	3.18E+01	1.74E+02
218	1.04E+01	1.46E+01	3.35E+01	1.45E+02
219	6.88E+00	7.42E+00	5.88E+01	1.04E+02
220	6.66E+00	6.98E+00	7.56E+01	8.79E+01
221	9.94E+00	1.40E+01	9.84E+01	9.00E+01
222	1.53E+01	1.53E+01	1.02E+02	9.16E+01
223	1.55E+01	1.80E+01	1.24E+02	1.10E+02
224	7.45E+00	1.78E+01	1.13E+02	1.08E+02
225	6.80E+00	9.03E+00	6.28E+01	8.78E+01
226	7.85E+00	1.05E+01	5.18E+01	8.85E+01
227	1.23E+01	2.00E+01	2.00E+01	9.26E+01
228	2.54E+00	2.03E+01	2.35E+01	1.15E+02

CALCULATION SHEET

CEC

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE 7/7/99	CHECKED	DATE	9/23/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	101

2 Casks, Lower Bound Soil Properties
Maximum Absolute Moments (kip-ft/ft)
Ref. "2lb.out"

ELEM	XX-S/R	YY-S/R	XX-M/R	YY-M/R
229	2.15E+00	9.71E+00	3.13E+01	1.60E+02
230	1.03E+01	4.20E+00	2.77E+01	1.34E+02
231	7.44E+00	8.41E+00	5.67E+01	9.58E+01
232	6.62E+00	8.40E+00	8.90E+01	6.44E+01
233	1.01E+01	2.14E+00	1.10E+02	6.54E+01
234	1.56E+01	3.77E+00	1.11E+02	7.38E+01
235	1.57E+01	3.62E+00	1.28E+02	1.03E+02
236	7.82E+00	3.81E+00	1.17E+02	1.03E+02
237	6.93E+00	1.08E+01	6.88E+01	7.76E+01
238	7.80E+00	1.19E+01	4.28E+01	6.28E+01
239	1.23E+01	4.90E+00	2.24E+01	9.30E+01
240	2.60E+00	1.05E+01	2.36E+01	1.17E+02
241	1.16E+00	5.19E+00	5.49E+00	5.24E+01
242	2.56E+00	3.93E+00	2.13E+01	4.69E+01
243	5.34E+00	9.60E+00	6.43E+01	4.09E+01
244	1.03E+01	9.50E+00	1.00E+02	3.80E+01
245	1.06E+01	2.58E+00	1.15E+02	3.47E+01
246	1.03E+01	1.78E+00	1.14E+02	3.89E+01
247	1.01E+01	1.97E+00	9.75E+01	4.22E+01
248	1.06E+01	2.39E+00	9.14E+01	4.28E+01
249	1.08E+01	1.28E+01	7.71E+01	4.11E+01
250	4.51E+00	1.25E+01	5.94E+01	3.85E+01
251	1.92E+00	4.56E+00	2.21E+01	4.23E+01
252	1.23E+00	5.41E+00	4.67E+00	4.98E+01
253	1.11E+00	1.97E+00	1.14E+01	1.61E+01
254	3.18E+00	1.91E+00	3.12E+01	1.59E+01
255	5.75E+00	2.24E+00	6.86E+01	2.43E+01
256	8.94E+00	2.19E+00	1.06E+02	2.45E+01
257	9.05E+00	1.72E+00	1.20E+02	1.53E+01
258	9.09E+00	5.91E-01	1.18E+02	1.42E+01
259	9.02E+00	7.24E-01	1.02E+02	1.62E+01
260	8.82E+00	1.68E+00	9.14E+01	1.90E+01
261	8.99E+00	2.44E+00	8.52E+01	2.69E+01
262	5.06E+00	3.06E+00	6.41E+01	2.59E+01
263	2.94E+00	2.11E+00	2.72E+01	1.65E+01
264	1.14E+00	2.04E+00	8.16E+00	1.33E+01

CALCULATION SHEET

CEC

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE 10/15/99	CHECKED	DATE	10/15/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	02

2 Casks, Lower Bound Soil Properties
Average of Maximum Absolute Bending Moments

Elem	Myy (k-ft/ft)	Width (ft)	Myy*Width (k-ft)		Elem	Myy (k-ft/ft)	Width (ft)	Myy*Width (k-ft)	
193	1.16E+02	1.98	2.30E+02		205	1.12E+02	1.98	2.21E+02	
194	1.20E+02	2.76	3.32E+02		206	1.28E+02	2.76	3.52E+02	
195	1.34E+02	2.76	3.71E+02		207	1.56E+02	2.76	4.31E+02	
196	1.28E+02	2.76	3.54E+02		208	1.51E+02	2.76	4.16E+02	
197	1.07E+02	2.76	2.95E+02		209	1.11E+02	2.76	3.07E+02	
198	9.68E+01	1.98	1.92E+02		210	9.35E+01	1.98	1.85E+02	
199	9.62E+01	1.98	1.90E+02		211	9.37E+01	1.98	1.85E+02	
200	1.00E+02	2.76	2.77E+02		212	9.65E+01	2.76	2.66E+02	
201	1.08E+02	2.76	2.99E+02		213	1.06E+02	2.76	2.92E+02	
202	1.08E+02	2.76	2.98E+02		214	1.05E+02	2.76	2.91E+02	
203	9.95E+01	2.76	2.75E+02		215	9.73E+01	2.76	2.69E+02	
204	9.49E+01	1.98	1.88E+02		216	9.58E+01	1.98	1.90E+02	
	Total	30	3300.0552			Total	30	3404.1954	
	Total per unit width:		**110.00184**	k-ft/ft		Total per unit width:		**113.47318**	k-ft/ft
217	1.74E+02	1.98	3.45E+02		229	1.60E+02	1.98	3.16E+02	
218	1.45E+02	2.76	4.01E+02		230	1.34E+02	2.76	3.70E+02	
219	1.04E+02	2.76	2.87E+02		231	9.58E+01	2.76	2.64E+02	
220	8.79E+01	2.76	2.43E+02		232	6.44E+01	2.76	1.78E+02	
221	9.00E+01	2.76	2.48E+02		233	6.54E+01	2.76	1.81E+02	
222	9.16E+01	1.98	1.81E+02		234	7.38E+01	1.98	1.46E+02	
223	1.10E+02	1.98	2.19E+02		235	1.03E+02	1.98	2.03E+02	
224	1.08E+02	2.76	2.99E+02		236	1.03E+02	2.76	2.84E+02	
225	8.78E+01	2.76	2.42E+02		237	7.76E+01	2.76	2.14E+02	
226	8.85E+01	2.76	2.44E+02		238	6.28E+01	2.76	1.73E+02	
227	9.26E+01	2.76	2.55E+02		239	9.30E+01	2.76	2.57E+02	
228	1.15E+02	1.98	2.28E+02		240	1.17E+02	1.98	2.31E+02	
	Total	30	3193.2156			Total	30	2817.42	
	Total per unit width:		**106.44052**	k-ft/ft		Total per unit width:		**93.914**	k-ft/ft
241	5.24E+01	1.98	1.04E+02		253	1.61E+01	1.98	3.18E+01	
242	4.69E+01	2.76	1.29E+02		254	1.59E+01	2.76	4.39E+01	
243	4.09E+01	2.76	1.13E+02		255	2.43E+01	2.76	6.72E+01	
244	3.80E+01	2.76	1.05E+02		256	2.45E+01	2.76	6.76E+01	
245	3.47E+01	2.76	9.59E+01		257	1.53E+01	2.76	4.21E+01	
246	3.89E+01	1.98	7.70E+01		258	1.42E+01	1.98	2.82E+01	
247	4.22E+01	1.98	8.36E+01		259	1.62E+01	1.98	3.21E+01	
248	4.28E+01	2.76	1.18E+02		260	1.90E+01	2.76	5.25E+01	
249	4.11E+01	2.76	1.13E+02		261	2.69E+01	2.76	7.42E+01	
250	3.85E+01	2.76	1.06E+02		262	2.59E+01	2.76	7.14E+01	
251	4.23E+01	2.76	1.17E+02		263	1.65E+01	2.76	4.55E+01	
252	4.98E+01	1.98	9.86E+01		264	1.33E+01	1.98	2.63E+01	
	Total	30	1260.2136			Total	30	582.786	
	Total per unit width:		**42.00712**	k-ft/ft		Total per unit width:		**19.4262**	k-ft/ft

Note: Myy = moment about X-axis.

CALCULATION SHEET

CEC

ORIGINATOR	DH	DATE	10/15/99	CALC. NO.	G(PO17)-2	REV. NO.	0
				CHECKED	auw	DATE	10/15/99
PROJECT	Private Fuel Storage Facility					JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design					SHEET NO.	103

2 Casks, Lower Bound Soil Properties
Average of Maximum Absolute Bending Moments

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)		Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
193	4.92E+00	3.96	1.95E+01		194	2.44E+01	3.96	9.67E+01	
205	1.03E+01	2.76	2.83E+01		206	2.87E+01	2.76	7.91E+01	
217	3.18E+01	2.76	8.79E+01		218	3.35E+01	2.76	9.25E+01	
229	3.13E+01	2.76	8.63E+01		230	2.77E+01	2.76	7.65E+01	
241	5.49E+00	2.76	1.52E+01		242	2.13E+01	2.76	5.88E+01	
253	1.14E+01	3.98	4.55E+01		254	3.12E+01	3.98	1.24E+02	
	Total:	18.98	282.68384			Total:	18.98	527.8552	
	Total per unit width:		**14.89**	k-ft/ft		Total per unit width:		**27.81**	k-ft/ft
195	7.87E+01	3.96	3.12E+02		196	7.45E+01	3.96	2.95E+02	
207	9.13E+01	2.76	2.52E+02		208	8.44E+01	2.76	2.33E+02	
219	5.88E+01	2.76	1.62E+02		220	7.56E+01	2.76	2.09E+02	
231	5.67E+01	2.76	1.56E+02		232	8.90E+01	2.76	2.46E+02	
243	6.43E+01	2.76	1.77E+02		244	1.00E+02	2.76	2.76E+02	
255	6.86E+01	3.98	2.73E+02		256	1.06E+02	3.98	4.23E+02	
	Total:	18.98	1332.7628			Total:	18.98	1681.3428	
	Total per unit width:		**70.22**	k-ft/ft		Total per unit width:		**88.58**	k-ft/ft
197	6.56E+01	3.96	2.60E+02		198	6.82E+01	3.96	2.70E+02	
209	8.20E+01	2.76	2.26E+02		210	8.55E+01	2.76	2.36E+02	
221	9.84E+01	2.76	2.72E+02		222	1.02E+02	2.76	2.81E+02	
233	1.10E+02	2.76	3.04E+02		234	1.11E+02	2.76	3.07E+02	
245	1.15E+02	2.76	3.19E+02		246	1.14E+02	2.76	3.14E+02	
257	1.20E+02	3.98	4.79E+02		258	1.18E+02	3.98	4.68E+02	
	Total:	18.98	1859.6588			Total:	18.98	1876.754	
	Total per unit width:		**97.98**	k-ft/ft		Total per unit width:		**98.88**	k-ft/ft
199	6.77E+01	3.96	2.68E+02		200	6.42E+01	3.96	2.54E+02	
211	8.20E+01	2.76	2.26E+02		212	7.91E+01	2.76	2.18E+02	
223	1.24E+02	2.76	3.43E+02		224	1.13E+02	2.76	3.11E+02	
235	1.28E+02	2.76	3.54E+02		236	1.17E+02	2.76	3.23E+02	
247	9.75E+01	2.76	2.69E+02		248	9.14E+01	2.76	2.52E+02	
259	1.02E+02	3.98	4.06E+02		260	9.14E+01	3.98	3.64E+02	
	Total:	18.98	1866.5724			Total:	18.98	1722.608	
	Total per unit width:		**98.34**	k-ft/ft		Total per unit width:		**90.76**	k-ft/ft

Note: Mxx = moment about Y-axis.

2 Casks, Lower Bound Soil Properties
Average of Maximum Absolute Bending Moments

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
201	7.22E+01	3.96	2.86E+02	
213	8.13E+01	2.76	2.24E+02	
225	6.28E+01	2.76	1.73E+02	
237	6.88E+01	2.76	1.90E+02	
249	7.71E+01	2.76	2.13E+02	
261	8.52E+01	3.98	3.39E+02	
	Total:	18.98	1425.0994	
	Total per unit width:		**75.08**	k-ft/ft

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
202	7.24E+01	3.96	2.87E+02	
214	8.14E+01	2.76	2.25E+02	
226	5.18E+01	2.76	1.43E+02	
238	4.28E+01	2.76	1.18E+02	
250	5.94E+01	2.76	1.64E+02	
262	6.41E+01	3.98	2.55E+02	
	Total:	18.98	1191.291	
	Total per unit width:		**62.77**	k-ft/ft

203	1.92E+01	3.96	7.61E+01	
215	1.79E+01	2.76	4.94E+01	
227	2.00E+01	2.76	5.53E+01	
239	2.24E+01	2.76	6.17E+01	
251	2.21E+01	2.76	6.09E+01	
263	2.72E+01	3.98	1.08E+02	
	Total:	18.98	411.7638	
	Total per unit width:		**21.69**	k-ft/ft

204	3.96E+00	3.96	1.57E+01	
216	4.68E+00	2.76	1.29E+01	
228	2.35E+01	2.76	6.48E+01	
240	2.36E+01	2.76	6.51E+01	
252	4.67E+00	2.76	1.29E+01	
264	8.16E+00	3.98	3.25E+01	
	Total:	18.98	203.83138	
	Total per unit width:		**10.74**	k-ft/ft

Note: Mxx = moment about Y-axis.

4 Casks, Lower Bound Soil Properties
Maximum Absolute Moments (kip-ft/ft)
Ref. "4lb.out"

ELEM	XX-S/R	YY-S/R	XX-M/R	YY-M/R
193	1.60E+00	2.22E+01	7.08E+00	1.28E+02
194	4.92E+00	1.96E+01	3.63E+01	1.31E+02
195	1.04E+01	1.94E+01	1.10E+02	1.38E+02
196	1.67E+01	1.72E+01	9.77E+01	1.34E+02
197	1.19E+01	1.28E+01	8.78E+01	1.23E+02
198	8.95E+00	1.09E+01	8.65E+01	1.16E+02
199	8.76E+00	1.04E+01	8.25E+01	1.15E+02
200	1.05E+01	1.11E+01	7.92E+01	1.18E+02
201	1.52E+01	1.81E+01	7.90E+01	1.23E+02
202	8.89E+00	2.01E+01	8.68E+01	1.22E+02
203	4.04E+00	1.92E+01	2.86E+01	1.14E+02
204	1.38E+00	2.26E+01	5.04E+00	1.10E+02
205	1.38E+00	2.11E+01	1.40E+01	1.47E+02
206	2.79E+00	1.83E+01	3.82E+01	1.62E+02
207	4.81E+00	1.28E+01	1.27E+02	1.90E+02
208	1.20E+01	8.87E+00	1.08E+02	1.72E+02
209	1.10E+01	1.30E+01	9.52E+01	1.17E+02
210	1.06E+01	1.18E+01	9.69E+01	1.13E+02
211	1.13E+01	1.22E+01	1.31E+02	1.14E+02
212	1.32E+01	1.09E+01	1.28E+02	1.16E+02
213	1.35E+01	1.00E+01	9.91E+01	1.17E+02
214	5.11E+00	1.15E+01	1.06E+02	1.15E+02
215	2.80E+00	1.74E+01	3.06E+01	1.05E+02
216	1.66E+00	2.04E+01	7.93E+00	1.00E+02
217	2.70E+00	2.23E+01	6.62E+01	2.74E+02
218	1.31E+01	1.73E+01	5.67E+01	2.13E+02
219	9.04E+00	1.01E+01	8.06E+01	1.29E+02
220	8.23E+00	8.44E+00	9.16E+01	1.03E+02
221	1.03E+01	1.54E+01	1.10E+02	1.07E+02
222	1.75E+01	1.66E+01	1.26E+02	1.18E+02
223	2.01E+01	1.36E+01	1.88E+02	1.47E+02
224	1.12E+01	1.21E+01	1.75E+02	1.39E+02
225	7.84E+00	8.34E+00	9.88E+01	1.02E+02
226	1.03E+01	9.53E+00	7.95E+01	9.63E+01
227	1.40E+01	1.60E+01	3.05E+01	9.69E+01
228	2.95E+00	2.04E+01	2.58E+01	1.22E+02

4 Casks, Lower Bound Soil Properties
Maximum Absolute Moments (kip-ft/ft)
Ref. "4lb.out"

ELEM	XX-S/R	YY-S/R	XX-M/R	YY-M/R
229	2.77E+00	1.82E+01	6.40E+01	2.58E+02
230	1.27E+01	1.11E+01	5.17E+01	2.02E+02
231	9.14E+00	1.04E+01	7.16E+01	1.22E+02
232	8.77E+00	9.15E+00	1.00E+02	7.46E+01
233	1.12E+01	4.77E+00	1.24E+02	8.27E+01
234	1.83E+01	7.18E+00	1.40E+02	1.25E+02
235	2.06E+01	5.58E+00	1.90E+02	1.56E+02
236	1.11E+01	4.73E+00	1.82E+02	1.50E+02
237	8.88E+00	7.24E+00	1.10E+02	1.11E+02
238	1.12E+01	8.35E+00	7.33E+01	7.28E+01
239	1.40E+01	7.80E+00	3.00E+01	9.78E+01
240	3.04E+00	1.12E+01	2.56E+01	1.22E+02
241	1.69E+00	9.27E+00	7.59E+00	1.00E+02
242	3.01E+00	9.57E+00	3.53E+01	8.64E+01
243	6.73E+00	1.21E+01	9.61E+01	6.72E+01
244	1.22E+01	1.17E+01	1.12E+02	5.01E+01
245	1.24E+01	2.81E+00	1.37E+02	4.07E+01
246	1.30E+01	3.04E+00	1.41E+02	5.23E+01
247	1.21E+01	3.47E+00	1.42E+02	6.15E+01
248	1.37E+01	3.06E+00	1.48E+02	7.21E+01
249	1.51E+01	8.69E+00	1.19E+02	7.76E+01
250	5.65E+00	8.87E+00	7.29E+01	6.85E+01
251	3.03E+00	5.66E+00	3.33E+01	5.03E+01
252	1.20E+00	5.21E+00	6.60E+00	4.24E+01
253	1.71E+00	3.42E+00	2.31E+01	4.17E+01
254	4.75E+00	4.11E+00	5.07E+01	3.58E+01
255	7.98E+00	4.26E+00	1.08E+02	3.21E+01
256	1.05E+01	4.46E+00	1.44E+02	3.30E+01
257	1.11E+01	2.02E+00	1.53E+02	2.29E+01
258	1.16E+01	1.19E+00	1.66E+02	1.82E+01
259	1.17E+01	1.31E+00	1.54E+02	2.07E+01
260	1.17E+01	1.66E+00	1.46E+02	2.22E+01
261	1.11E+01	3.15E+00	1.14E+02	2.93E+01
262	6.50E+00	3.06E+00	8.05E+01	2.99E+01
263	4.17E+00	2.48E+00	3.33E+01	2.44E+01
264	1.55E+00	1.87E+00	1.12E+01	2.08E+01

4 Casks, Lower Bound Soil Properties
Average of Maximum Absolute Bending Moments

Elem	Myy (k-ft/ft)	Width (ft)	Myy*Width (k-ft)		Elem	Myy (k-ft/ft)	Width (ft)	Myy*Width (k-ft)	
193	1.28E+02	1.98	2.54E+02		205	1.47E+02	1.98	2.91E+02	
194	1.31E+02	2.76	3.62E+02		206	1.62E+02	2.76	4.47E+02	
195	1.38E+02	2.76	3.81E+02		207	1.90E+02	2.76	5.25E+02	
196	1.34E+02	2.76	3.71E+02		208	1.72E+02	2.76	4.74E+02	
197	1.23E+02	2.76	3.38E+02		209	1.17E+02	2.76	3.24E+02	
198	1.16E+02	1.98	2.29E+02		210	1.13E+02	1.98	2.23E+02	
199	1.15E+02	1.98	2.28E+02		211	1.14E+02	1.98	2.26E+02	
200	1.18E+02	2.76	3.24E+02		212	1.16E+02	2.76	3.20E+02	
201	1.23E+02	2.76	3.40E+02		213	1.17E+02	2.76	3.24E+02	
202	1.22E+02	2.76	3.37E+02		214	1.15E+02	2.76	3.16E+02	
203	1.14E+02	2.76	3.15E+02		215	1.05E+02	2.76	2.90E+02	
204	1.10E+02	1.98	2.18E+02		216	1.00E+02	1.98	1.98E+02	
	Total	30	3697.02			Total	30	3957.246	
	Total per unit width:		**123.234**	k-ft/ft		Total per unit width:		**131.9082**	k-ft/ft
217	2.74E+02	1.98	5.42E+02		229	2.58E+02	1.98	5.11E+02	
218	2.13E+02	2.76	5.89E+02		230	2.02E+02	2.76	5.58E+02	
219	1.29E+02	2.76	3.55E+02		231	1.22E+02	2.76	3.36E+02	
220	1.03E+02	2.76	2.84E+02		232	7.46E+01	2.76	2.06E+02	
221	1.07E+02	2.76	2.96E+02		233	8.27E+01	2.76	2.28E+02	
222	1.18E+02	1.98	2.34E+02		234	1.25E+02	1.98	2.47E+02	
223	1.47E+02	1.98	2.92E+02		235	1.56E+02	1.98	3.09E+02	
224	1.39E+02	2.76	3.83E+02		236	1.50E+02	2.76	4.14E+02	
225	1.02E+02	2.76	2.81E+02		237	1.11E+02	2.76	3.06E+02	
226	9.63E+01	2.76	2.66E+02		238	7.28E+01	2.76	2.01E+02	
227	9.69E+01	2.76	2.67E+02		239	9.78E+01	2.76	2.70E+02	
228	1.22E+02	1.98	2.41E+02		240	1.22E+02	1.98	2.42E+02	
	Total	30	4029.4404			Total	30	3827.3904	
	Total per unit width:		**134.31468**	k-ft/ft		Total per unit width:		**127.57968**	k-ft/ft
241	1.00E+02	1.98	1.98E+02		253	4.17E+01	1.98	8.26E+01	
242	8.64E+01	2.76	2.39E+02		254	3.58E+01	2.76	9.89E+01	
243	6.72E+01	2.76	1.86E+02		255	3.21E+01	2.76	8.87E+01	
244	5.01E+01	2.76	1.38E+02		256	3.30E+01	2.76	9.11E+01	
245	4.07E+01	2.76	1.12E+02		257	2.29E+01	2.76	6.31E+01	
246	5.23E+01	1.98	1.04E+02		258	1.82E+01	1.98	3.60E+01	
247	6.15E+01	1.98	1.22E+02		259	2.07E+01	1.98	4.10E+01	
248	7.21E+01	2.76	1.99E+02		260	2.22E+01	2.76	6.12E+01	
249	7.76E+01	2.76	2.14E+02		261	2.93E+01	2.76	8.09E+01	
250	6.85E+01	2.76	1.89E+02		262	2.99E+01	2.76	8.26E+01	
251	5.03E+01	2.76	1.39E+02		263	2.44E+01	2.76	6.74E+01	
252	4.24E+01	1.98	8.39E+01		264	2.08E+01	1.98	4.11E+01	
	Total	30	1922.8206			Total	30	834.6018	
	Total per unit width:		**64.09402**	k-ft/ft		Total per unit width:		**27.82006**	k-ft/ft

Note: Myy = moment about X-axis.

4 Casks, Lower Bound Soil Properties
Average of Maximum Absolute Bending Moments

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)		Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
193	7.08E+00	3.96	2.80E+01		194	3.63E+01	3.96	1.44E+02	
205	1.40E+01	2.76	3.87E+01		206	3.82E+01	2.76	1.06E+02	
217	6.62E+01	2.76	1.83E+02		218	5.67E+01	2.76	1.56E+02	
229	6.40E+01	2.76	1.77E+02		230	5.17E+01	2.76	1.43E+02	
241	7.59E+00	2.76	2.10E+01		242	3.53E+01	2.76	9.74E+01	
253	2.31E+01	3.98	9.19E+01		254	5.07E+01	3.98	2.02E+02	
	Total:	18.98	538.92744			Total:	18.98	847.5384	
	Total per unit width:		**28.39**	k-ft/ft		Total per unit width:		**44.65**	k-ft/ft
195	1.10E+02	3.96	4.37E+02		196	9.77E+01	3.96	3.87E+02	
207	1.27E+02	2.76	3.50E+02		208	1.08E+02	2.76	2.97E+02	
219	8.06E+01	2.76	2.22E+02		220	9.16E+01	2.76	2.53E+02	
231	7.16E+01	2.76	1.98E+02		232	1.00E+02	2.76	2.76E+02	
243	9.61E+01	2.76	2.65E+02		244	1.12E+02	2.76	3.10E+02	
255	1.08E+02	3.98	4.29E+02		256	1.44E+02	3.98	5.72E+02	
	Total:	18.98	1901.382			Total:	18.98	2094.6728	
	Total per unit width:		**100.18**	k-ft/ft		Total per unit width:		**110.36**	k-ft/ft
197	8.78E+01	3.96	3.48E+02		198	8.65E+01	3.96	3.43E+02	
209	9.52E+01	2.76	2.63E+02		210	9.69E+01	2.76	2.68E+02	
221	1.10E+02	2.76	3.03E+02		222	1.26E+02	2.76	3.49E+02	
233	1.24E+02	2.76	3.43E+02		234	1.40E+02	2.76	3.86E+02	
245	1.37E+02	2.76	3.77E+02		246	1.41E+02	2.76	3.90E+02	
257	1.53E+02	3.98	6.08E+02		258	1.66E+02	3.98	6.61E+02	
	Total:	18.98	2241.8468			Total:	18.98	2395.8096	
	Total per unit width:		**118.12**	k-ft/ft		Total per unit width:		**126.23**	k-ft/ft
199	8.25E+01	3.96	3.27E+02		200	7.92E+01	3.96	3.14E+02	
211	1.31E+02	2.76	3.61E+02		212	1.28E+02	2.76	3.52E+02	
223	1.88E+02	2.76	5.19E+02		224	1.75E+02	2.76	4.83E+02	
235	1.90E+02	2.76	5.23E+02		236	1.82E+02	2.76	5.03E+02	
247	1.42E+02	2.76	3.93E+02		248	1.48E+02	2.76	4.09E+02	
259	1.54E+02	3.98	6.13E+02		260	1.46E+02	3.98	5.79E+02	
	Total:	18.98	2735.95			Total:	18.98	2640.3584	
	Total per unit width:		**144.15**	k-ft/ft		Total per unit width:		**139.11**	k-ft/ft

Note: Mxx = moment about Y-axis.

CEC

CALCULATION SHEET

ORIGINATOR	DH	DATE	10/15/99	CALC. NO.	G(PO17)-2
				REV. NO.	0
				CHECKED	AWM
				DATE	10/15/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	109

4 Casks, Lower Bound Soil Properties
Average of Maximum Absolute Bending Moments

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)		Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
201	7.90E+01	3.96	3.13E+02		202	8.68E+01	3.96	3.44E+02	
213	9.91E+01	2.76	2.74E+02		214	1.06E+02	2.76	2.93E+02	
225	9.88E+01	2.76	2.73E+02		226	7.95E+01	2.76	2.20E+02	
237	1.10E+02	2.76	3.03E+02		238	7.33E+01	2.76	2.02E+02	
249	1.19E+02	2.76	3.29E+02		250	7.29E+01	2.76	2.01E+02	
261	1.14E+02	3.98	4.53E+02		262	8.05E+01	3.98	3.20E+02	
	Total:	18.98	1943.732			Total:	18.98	1579.9286	
	Total per unit width:		**102.41**	k-ft/ft		Total per unit width:		**83.24**	k-ft/ft

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)		Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
203	2.86E+01	3.96	1.13E+02		204	5.04E+00	3.96	1.99E+01	
215	3.06E+01	2.76	8.43E+01		216	7.93E+00	2.76	2.19E+01	
227	3.05E+01	2.76	8.40E+01		228	2.58E+01	2.76	7.13E+01	
239	3.00E+01	2.76	8.29E+01		240	2.56E+01	2.76	7.07E+01	
251	3.33E+01	2.76	9.19E+01		252	6.60E+00	2.76	1.82E+01	
263	3.33E+01	3.98	1.32E+02		264	1.12E+01	3.98	4.44E+01	
	Total:	18.98	588.9282			Total:	18.98	246.35968	
	Total per unit width:		**31.03**	k-ft/ft		Total per unit width:		**12.98**	k-ft/ft

Note: Mxx = moment about Y-axis.

8 Casks, Lower Bound Soil Properties
Maximum Absolute Moments (kip-ft/ft)
Ref. "8lb.out"

ELEM	XX-S/R	YY-S/R	XX-M/R	YY-M/R
193	1.61E+00	3.33E+01	1.38E+01	1.69E+02
194	4.67E+00	3.11E+01	4.59E+01	1.65E+02
195	1.03E+01	4.02E+01	9.94E+01	1.59E+02
196	2.03E+01	4.02E+01	7.98E+01	1.31E+02
197	2.27E+01	1.98E+01	5.27E+01	8.55E+01
198	2.43E+01	1.78E+01	7.29E+01	6.64E+01
199	2.67E+01	1.71E+01	7.60E+01	6.57E+01
200	3.01E+01	1.67E+01	7.53E+01	6.61E+01
201	3.54E+01	2.24E+01	7.22E+01	7.08E+01
202	7.29E+00	2.69E+01	7.27E+01	7.30E+01
203	3.14E+00	2.89E+01	3.70E+01	8.79E+01
204	1.27E+00	3.39E+01	1.03E+01	1.06E+02
205	1.58E+00	3.71E+01	1.67E+01	1.92E+02
206	4.39E+00	3.43E+01	4.13E+01	1.69E+02
207	9.66E+00	2.28E+01	5.44E+01	1.39E+02
208	1.87E+01	2.21E+01	4.98E+01	1.17E+02
209	2.05E+01	2.03E+01	5.83E+01	9.69E+01
210	2.17E+01	1.64E+01	6.94E+01	7.73E+01
211	2.25E+01	1.62E+01	7.27E+01	7.91E+01
212	2.37E+01	1.58E+01	6.61E+01	7.85E+01
213	2.09E+01	1.64E+01	7.71E+01	8.41E+01
214	6.41E+00	1.86E+01	6.87E+01	8.84E+01
215	2.29E+00	2.72E+01	3.36E+01	8.87E+01
216	1.06E+00	3.32E+01	8.27E+00	9.53E+01
217	2.25E+00	4.20E+01	1.96E+01	1.66E+02
218	1.47E+01	3.41E+01	2.85E+01	1.59E+02
219	1.32E+01	1.72E+01	4.45E+01	1.49E+02
220	1.53E+01	1.69E+01	5.78E+01	1.30E+02
221	1.69E+01	2.40E+01	6.82E+01	1.03E+02
222	2.68E+01	2.20E+01	6.89E+01	9.04E+01
223	2.90E+01	1.61E+01	7.04E+01	9.00E+01
224	1.15E+01	1.52E+01	6.65E+01	8.83E+01
225	1.24E+01	1.19E+01	7.43E+01	8.61E+01
226	1.31E+01	1.55E+01	5.84E+01	9.06E+01
227	1.42E+01	2.46E+01	2.81E+01	9.95E+01
228	2.38E+00	3.07E+01	3.91E+01	1.09E+02

8 Casks, Lower Bound Soil Properties
Maximum Absolute Moments (kip-ft/ft)
Ref. "8lb.out"

ELEM	XX-S/R	YY-S/R	XX-M/R	YY-M/R
229	2.26E+00	1.44E+01	2.03E+01	1.46E+02
230	1.48E+01	1.06E+01	2.83E+01	1.36E+02
231	1.16E+01	1.80E+01	5.23E+01	1.25E+02
232	1.21E+01	1.72E+01	7.23E+01	1.06E+02
233	1.50E+01	8.02E+00	7.37E+01	9.16E+01
234	2.41E+01	7.68E+00	7.50E+01	8.33E+01
235	2.58E+01	8.02E+00	7.05E+01	7.79E+01
236	1.10E+01	8.86E+00	6.88E+01	7.72E+01
237	9.12E+00	1.09E+01	6.67E+01	7.42E+01
238	1.06E+01	1.36E+01	4.60E+01	7.21E+01
239	1.42E+01	1.30E+01	2.35E+01	9.57E+01
240	2.34E+00	1.57E+01	4.10E+01	1.34E+02
241	2.70E+00	8.71E+00	6.94E+00	1.02E+02
242	4.87E+00	8.61E+00	2.35E+01	9.49E+01
243	6.53E+00	2.02E+01	6.06E+01	8.53E+01
244	1.62E+01	1.79E+01	8.06E+01	7.61E+01
245	1.62E+01	5.02E+00	7.78E+01	6.73E+01
246	1.59E+01	5.19E+00	8.03E+01	5.95E+01
247	1.43E+01	5.26E+00	7.25E+01	5.29E+01
248	1.50E+01	5.52E+00	7.37E+01	4.60E+01
249	1.47E+01	9.39E+00	6.19E+01	5.08E+01
250	4.88E+00	1.16E+01	5.60E+01	5.14E+01
251	2.10E+00	9.16E+00	2.00E+01	6.24E+01
252	1.59E+00	9.84E+00	9.31E+00	7.75E+01
253	1.29E+00	3.16E+00	8.23E+00	3.62E+01
254	4.15E+00	4.52E+00	3.05E+01	3.45E+01
255	7.69E+00	2.98E+00	6.60E+01	3.11E+01
256	1.51E+01	3.10E+00	8.65E+01	2.76E+01
257	1.41E+01	1.89E+00	8.71E+01	2.42E+01
258	1.26E+01	1.78E+00	8.64E+01	2.06E+01
259	1.09E+01	1.80E+00	7.71E+01	1.81E+01
260	1.16E+01	2.49E+00	7.49E+01	2.07E+01
261	1.30E+01	3.59E+00	6.45E+01	2.49E+01
262	5.39E+00	3.88E+00	6.72E+01	2.55E+01
263	3.43E+00	3.67E+00	2.39E+01	2.48E+01
264	1.23E+00	3.56E+00	1.04E+01	3.06E+01

CALCULATION SHEET

CEC

ORIGINATOR	DH	DATE	10/15/99	CALC. NO.	G(PO17)-2
				REV. NO.	0
				CHECKED	auM
				DATE	10/15/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	112

8 Casks, Lower Bound Soil Properties
Average of Maximum Absolute Bending Moments

Elem	Myy (k-ft/ft)	Width (ft)	Myy*Width (k-ft)		Elem	Myy (k-ft/ft)	Width (ft)	Myy*Width (k-ft)	
193	1.69E+02	1.98	3.34E+02		205	1.92E+02	1.98	3.80E+02	
194	1.65E+02	2.76	4.56E+02		206	1.69E+02	2.76	4.66E+02	
195	1.59E+02	2.76	4.38E+02		207	1.39E+02	2.76	3.82E+02	
196	1.31E+02	2.76	3.61E+02		208	1.17E+02	2.76	3.22E+02	
197	8.55E+01	2.76	2.36E+02		209	9.69E+01	2.76	2.67E+02	
198	6.64E+01	1.98	1.32E+02		210	7.73E+01	1.98	1.53E+02	
199	6.57E+01	1.98	1.30E+02		211	7.91E+01	1.98	1.57E+02	
200	6.61E+01	2.76	1.82E+02		212	7.85E+01	2.76	2.17E+02	
201	7.08E+01	2.76	1.95E+02		213	8.41E+01	2.76	2.32E+02	
202	7.30E+01	2.76	2.01E+02		214	8.84E+01	2.76	2.44E+02	
203	8.79E+01	2.76	2.43E+02		215	8.87E+01	2.76	2.45E+02	
204	1.06E+02	1.98	2.09E+02		216	9.53E+01	1.98	1.89E+02	
	Total	30	3117.6588			Total	30	3253.5456	
	Total per unit width:		**103.92196**	k-ft/ft		Total per unit width:		**108.45152**	k-ft/ft
217	1.66E+02	1.98	3.29E+02		229	1.46E+02	1.98	2.90E+02	
218	1.59E+02	2.76	4.39E+02		230	1.36E+02	2.76	3.76E+02	
219	1.49E+02	2.76	4.11E+02		231	1.25E+02	2.76	3.45E+02	
220	1.30E+02	2.76	3.59E+02		232	1.06E+02	2.76	2.93E+02	
221	1.03E+02	2.76	2.84E+02		233	9.16E+01	2.76	2.53E+02	
222	9.04E+01	1.98	1.79E+02		234	8.33E+01	1.98	1.65E+02	
223	9.00E+01	1.98	1.78E+02		235	7.79E+01	1.98	1.54E+02	
224	8.83E+01	2.76	2.44E+02		236	7.72E+01	2.76	2.13E+02	
225	8.61E+01	2.76	2.38E+02		237	7.42E+01	2.76	2.05E+02	
226	9.06E+01	2.76	2.50E+02		238	7.21E+01	2.76	1.99E+02	
227	9.95E+01	2.76	2.75E+02		239	9.57E+01	2.76	2.64E+02	
228	1.09E+02	1.98	2.15E+02		240	1.34E+02	1.98	2.65E+02	
	Total	30	3400.0098			Total	30	3022.0368	
	Total per unit width:		**113.33366**	k-ft/ft		Total per unit width:		**100.73456**	k-ft/ft
241	1.02E+02	1.98	2.02E+02		253	3.62E+01	1.98	7.17E+01	
242	9.49E+01	2.76	2.62E+02		254	3.45E+01	2.76	9.51E+01	
243	8.53E+01	2.76	2.35E+02		255	3.11E+01	2.76	8.58E+01	
244	7.61E+01	2.76	2.10E+02		256	2.76E+01	2.76	7.63E+01	
245	6.73E+01	2.76	1.86E+02		257	2.42E+01	2.76	6.67E+01	
246	5.95E+01	1.98	1.18E+02		258	2.06E+01	1.98	4.09E+01	
247	5.29E+01	1.98	1.05E+02		259	1.81E+01	1.98	3.58E+01	
248	4.60E+01	2.76	1.27E+02		260	2.07E+01	2.76	5.72E+01	
249	5.08E+01	2.76	1.40E+02		261	2.49E+01	2.76	6.88E+01	
250	5.14E+01	2.76	1.42E+02		262	2.55E+01	2.76	7.04E+01	
251	6.24E+01	2.76	1.72E+02		263	2.48E+01	2.76	6.85E+01	
252	7.75E+01	1.98	1.54E+02		264	3.06E+01	1.98	6.05E+01	
	Total	30	2052.702			Total	30	797.6808	
	Total per unit width:		**68.4234**	k-ft/ft		Total per unit width:		**26.58936**	k-ft/ft

Note: Myy = moment about X-axis.

CALCULATION SHEET

				CALC. NO.	G(PO17)-2 REV. NO. 0
ORIGINATOR	DH	DATE	10/15/99	CHECKED	AUM DATE 10/15/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	113

8 Casks, Lower Bound Soil Properties
Average of Maximum Absolute Bending Moments

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)		Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
193	1.38E+01	3.96	5.47E+01		194	4.59E+01	3.96	1.82E+02	
205	1.67E+01	2.76	4.61E+01		206	4.13E+01	2.76	1.14E+02	
217	1.96E+01	2.76	5.40E+01		218	2.85E+01	2.76	7.86E+01	
229	2.03E+01	2.76	5.60E+01		230	2.83E+01	2.76	7.81E+01	
241	6.94E+00	2.76	1.91E+01		242	2.35E+01	2.76	6.48E+01	
253	8.23E+00	3.98	3.27E+01		254	3.05E+01	3.98	1.22E+02	
	Total:	18.98	262.73002			Total:	18.98	638.5464	
	Total per unit width:		**13.84**	k-ft/ft		Total per unit width:		**33.64**	k-ft/ft
195	9.94E+01	3.96	3.94E+02		196	7.98E+01	3.96	3.16E+02	
207	5.44E+01	2.76	1.50E+02		208	4.98E+01	2.76	1.37E+02	
219	4.45E+01	2.76	1.23E+02		220	5.78E+01	2.76	1.60E+02	
231	5.23E+01	2.76	1.44E+02		232	7.23E+01	2.76	1.99E+02	
243	6.06E+01	2.76	1.67E+02		244	8.06E+01	2.76	2.22E+02	
255	6.60E+01	3.98	2.63E+02		256	8.65E+01	3.98	3.44E+02	
	Total:	18.98	1240.817			Total:	18.98	1379.1866	
	Total per unit width:		**65.37**	k-ft/ft		Total per unit width:		**72.67**	k-ft/ft
197	5.27E+01	3.96	2.09E+02		198	7.29E+01	3.96	2.89E+02	
209	5.83E+01	2.76	1.61E+02		210	6.94E+01	2.76	1.92E+02	
221	6.82E+01	2.76	1.88E+02		222	6.89E+01	2.76	1.90E+02	
233	7.37E+01	2.76	2.03E+02		234	7.50E+01	2.76	2.07E+02	
245	7.78E+01	2.76	2.15E+02		246	8.03E+01	2.76	2.22E+02	
257	8.71E+01	3.98	3.47E+02		258	8.64E+01	3.98	3.44E+02	
	Total:	18.98	1322.3142			Total:	18.98	1442.678	
	Total per unit width:		**69.67**	k-ft/ft		Total per unit width:		**76.01**	k-ft/ft
199	7.60E+01	3.96	3.01E+02		200	7.53E+01	3.96	2.98E+02	
211	7.27E+01	2.76	2.01E+02		212	6.61E+01	2.76	1.82E+02	
223	7.04E+01	2.76	1.94E+02		224	6.65E+01	2.76	1.84E+02	
235	7.05E+01	2.76	1.94E+02		236	6.88E+01	2.76	1.90E+02	
247	7.25E+01	2.76	2.00E+02		248	7.37E+01	2.76	2.03E+02	
259	7.71E+01	3.98	3.07E+02		260	7.49E+01	3.98	2.98E+02	
	Total:	18.98	1397.4714			Total:	18.98	1355.2416	
	Total per unit width:		**73.63**	k-ft/ft		Total per unit width:		**71.40**	k-ft/ft

Note: Mxx = moment about Y-axis.

CALCULATION SHEET

CEC

				CALC. NO.	G(PO17)-2
				REV. NO.	0
ORIGINATOR	DH	DATE	10/15/99	CHECKED	auM
				DATE	10/15/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	114

8 Casks, Lower Bound Soil Properties
Average of Maximum Absolute Bending Moments

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)		Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
201	7.22E+01	3.96	2.86E+02		202	7.27E+01	3.96	2.88E+02	
213	7.71E+01	2.76	2.13E+02		214	6.87E+01	2.76	1.89E+02	
225	7.43E+01	2.76	2.05E+02		226	5.84E+01	2.76	1.61E+02	
237	6.67E+01	2.76	1.84E+02		238	4.60E+01	2.76	1.27E+02	
249	6.19E+01	2.76	1.71E+02		250	5.60E+01	2.76	1.55E+02	
261	6.45E+01	3.98	2.57E+02		262	6.72E+01	3.98	2.68E+02	
	Total:	18.98	1315.2506			Total:	18.98	1187.9454	
	Total per unit width:		**69.30**	k-ft/ft		Total per unit width:		**62.59**	k-ft/ft

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)		Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
203	3.70E+01	3.96	1.47E+02		204	1.03E+01	3.96	4.09E+01	
215	3.36E+01	2.76	9.28E+01		216	8.27E+00	2.76	2.28E+01	
227	2.81E+01	2.76	7.74E+01		228	3.91E+01	2.76	1.08E+02	
239	2.35E+01	2.76	6.47E+01		240	4.10E+01	2.76	1.13E+02	
251	2.00E+01	2.76	5.53E+01		252	9.31E+00	2.76	2.57E+01	
263	2.39E+01	3.98	9.49E+01		264	1.04E+01	3.98	4.16E+01	
	Total:	18.98	531.7122			Total:	18.98	352.17348	
	Total per unit width:		**28.01**	k-ft/ft		Total per unit width:		**18.55**	k-ft/ft

Note: Mxx = moment about Y-axis.

CALCULATION SHEET

CEC

ORIGINATOR	DH	DATE	9/17/99	CALC. NO.	G(PO17)-2
				REV. NO.	0
				CHECKED	auw
				DATE	9/23/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	115

8 Casks, Lower Bound Soil Properties
Maximum Absolute Moments (kip-ft/ft)
Ref. "x8lb.out"

ELEM	XX-S/R	YY-S/R	XX-M/R	YY-M/R
1	2.48E+00	5.88E+00	2.55E+01	5.32E+01
2	8.26E+00	5.18E+00	9.22E+01	5.23E+01
3	1.51E+01	8.79E+00	2.55E+02	8.82E+01
4	2.55E+01	9.44E+00	2.70E+02	8.61E+01
5	2.99E+01	2.86E+00	2.80E+02	4.56E+01
6	3.28E+01	2.33E+00	2.38E+02	5.06E+01
7	3.51E+01	2.49E+00	1.73E+02	5.62E+01
8	3.66E+01	4.55E+00	2.04E+02	5.98E+01
9	3.83E+01	3.86E+00	2.15E+02	5.67E+01
10	1.52E+01	3.64E+00	1.42E+02	4.64E+01
11	9.73E+00	8.69E+00	8.25E+01	3.96E+01
12	4.04E+00	5.93E+00	3.39E+01	3.44E+01
13	3.68E+00	1.56E+01	1.69E+01	9.95E+01
14	8.84E+00	1.07E+01	8.03E+01	9.32E+01
15	1.58E+01	2.95E+01	2.36E+02	1.23E+02
16	2.83E+01	2.77E+01	2.49E+02	1.18E+02
17	3.52E+01	6.01E+00	2.58E+02	1.09E+02
18	3.85E+01	6.59E+00	2.19E+02	1.26E+02
19	3.81E+01	4.75E+00	1.96E+02	1.44E+02
20	4.32E+01	6.57E+00	2.57E+02	1.64E+02
21	4.78E+01	1.21E+01	2.52E+02	1.76E+02
22	1.07E+01	1.31E+01	1.96E+02	1.67E+02
23	5.96E+00	1.71E+01	8.21E+01	1.36E+02
24	4.71E+00	1.59E+01	1.61E+01	1.02E+02
25	2.08E+00	2.17E+01	3.23E+01	1.77E+02
26	1.29E+01	1.73E+01	7.68E+01	1.39E+02
27	1.96E+01	2.71E+01	1.64E+02	8.38E+01
28	2.73E+01	2.57E+01	2.32E+02	1.07E+02
29	3.65E+01	1.03E+01	2.44E+02	1.32E+02
30	5.13E+01	1.43E+01	2.09E+02	1.74E+02
31	6.50E+01	7.67E+00	2.70E+02	2.42E+02
32	2.06E+01	6.84E+00	3.42E+02 ←	2.41E+02
33	2.65E+01	1.00E+01	2.88E+02	2.68E+02
34	3.31E+01	1.01E+01	2.31E+02	2.94E+02 ←
35	5.11E+01	1.55E+01	1.14E+02	2.80E+02
36	1.02E+01	3.40E+01	2.96E+01	2.61E+02
Maximum:	6.50E+01	3.40E+01	3.42E+02	2.94E+02

CALCULATION SHEET

CEC

ORIGINATOR	DH	DATE	9/17/99	CALC. NO.	G(PO17)-2
				REV. NO.	0
				CHECKED	[illegible]
				DATE	9/27/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	116

8 Casks, Lower Bound Soil Properties
Maximum Absolute Moments (kip-ft/ft)
Ref. "x8lb.out"

ELEM	XX-S/R	YY-S/R	XX-M/R	YY-M/R
37	1.98E+00	5.62E+01	3.32E+01	1.62E+02
38	1.27E+01	4.75E+01	8.27E+01	1.25E+02
39	1.94E+01	2.42E+01	1.54E+02	7.96E+01
40	2.71E+01	2.23E+01	2.12E+02	1.01E+02
41	3.56E+01	3.86E+01	2.27E+02	1.42E+02
42	5.06E+01	4.03E+01	1.92E+02	2.16E+02
43	6.47E+01	2.40E+01	2.49E+02	3.17E+02
44	1.99E+01	1.95E+01	3.57E+02	3.60E+02
45	2.65E+01	1.22E+01	3.90E+02	3.36E+02
46	3.34E+01	1.01E+01	3.01E+02	3.72E+02
47	5.14E+01	2.04E+01	1.32E+02	3.81E+02
48	1.01E+01	4.16E+01	3.49E+01	3.85E+02
49	2.00E+00	5.25E+01	2.20E+01	9.73E+01
50	7.04E+00	4.61E+01	7.69E+01	9.76E+01
51	1.43E+01	2.29E+01	1.42E+02	1.05E+02
52	2.59E+01	1.99E+01	1.85E+02	9.49E+01
53	3.20E+01	3.58E+01	2.06E+02	1.34E+02
54	3.53E+01	3.50E+01	1.74E+02	2.12E+02
55	3.51E+01	2.93E+01	2.18E+02	2.67E+02
56	4.04E+01	2.27E+01	2.86E+02	3.70E+02
57	4.67E+01	1.47E+01	4.90E+02 ←	5.29E+02
58	1.16E+01	1.56E+01	4.28E+02	5.47E+02 ←
59	5.73E+00	2.49E+01	1.35E+02	4.36E+02
60	4.29E+00	2.51E+01	4.51E+01	4.25E+02
61	1.36E+00	4.51E+01	2.44E+01	1.47E+02
62	5.13E+00	4.27E+01	6.93E+01	1.21E+02
63	9.24E+00	5.29E+01	1.29E+02	1.24E+02
64	2.18E+01	5.09E+01	1.58E+02	1.08E+02
65	2.46E+01	3.57E+01	1.79E+02	8.56E+01
66	2.65E+01	3.31E+01	1.66E+02	1.44E+02
67	2.88E+01	2.99E+01	2.13E+02	1.92E+02
68	3.16E+01	2.56E+01	2.48E+02	2.28E+02
69	4.17E+01	2.63E+01	4.03E+02	3.42E+02
70	1.89E+01	2.27E+01	3.79E+02	3.94E+02
71	8.67E+00	2.20E+01	1.35E+02	3.59E+02
72	3.08E+00	2.56E+01	3.70E+01	3.35E+02
Maximum:	6.47E+01	5.62E+01	4.90E+02	5.47E+02

CALCULATION SHEET

CEC

				CALC. NO. G(PO17)-2	REV. NO. 0
ORIGINATOR	DH	DATE	10/15/99	CHECKED aum	DATE 10/15/99
PROJECT	Private Fuel Storage Facility				JOB NO. 1101-000
SUBJECT	Storage Pad Analysis and Design				SHEET NO. 117

8 Casks, Lower Bound Soil Properties
Average of Maximum Absolute Bending Moments

Elem	Myy (k-ft/ft)	Width (ft)	Myy*Width (k-ft)		Elem	Myy (k-ft/ft)	Width (ft)	Myy*Width (k-ft)	
1	5.32E+01	1.98	1.05E+02		13	9.95E+01	1.98	1.97E+02	
2	5.23E+01	2.76	1.44E+02		14	9.32E+01	2.76	2.57E+02	
3	8.82E+01	2.76	2.43E+02		15	1.23E+02	2.76	3.41E+02	
4	8.61E+01	2.76	2.38E+02		16	1.18E+02	2.76	3.25E+02	
5	4.56E+01	2.76	1.26E+02		17	1.09E+02	2.76	3.01E+02	
6	5.06E+01	1.98	1.00E+02		18	1.26E+02	1.98	2.48E+02	
7	5.62E+01	1.98	1.11E+02		19	1.44E+02	1.98	2.85E+02	
8	5.98E+01	2.76	1.65E+02		20	1.64E+02	2.76	4.54E+02	
9	5.67E+01	2.76	1.56E+02		21	1.76E+02	2.76	4.87E+02	
10	4.64E+01	2.76	1.28E+02		22	1.67E+02	2.76	4.60E+02	
11	3.96E+01	2.76	1.09E+02		23	1.36E+02	2.76	3.75E+02	
12	3.44E+01	1.98	6.80E+01		24	1.02E+02	1.98	2.02E+02	
	Total	30	1694.7366			Total	30	3931.5852	
	Total per unit width:		**56.49122**	k-ft/ft		Total per unit width:		**131.05284**	k-ft/ft
25	1.77E+02	1.98	3.49E+02		37	1.62E+02	1.98	3.20E+02	
26	1.39E+02	2.76	3.83E+02		38	1.25E+02	2.76	3.44E+02	
27	8.38E+01	2.76	2.31E+02		39	7.96E+01	2.76	2.20E+02	
28	1.07E+02	2.76	2.95E+02		40	1.01E+02	2.76	2.80E+02	
29	1.32E+02	2.76	3.65E+02		41	1.42E+02	2.76	3.91E+02	
30	1.74E+02	1.98	3.44E+02		42	2.16E+02	1.98	4.28E+02	
31	2.42E+02	1.98	4.79E+02		43	3.17E+02	1.98	6.27E+02	
32	2.41E+02	2.76	6.64E+02		44	3.60E+02	2.76	9.92E+02	
33	2.68E+02	2.76	7.40E+02		45	3.36E+02	2.76	9.28E+02	
34	2.94E+02	2.76	8.10E+02		46	3.72E+02	2.76	1.03E+03	
35	2.80E+02	2.76	7.73E+02		47	3.81E+02	2.76	1.05E+03	
36	2.61E+02	1.98	5.17E+02		48	3.85E+02	1.98	7.62E+02	
	Total	30	5951.0796			Total	30	7370.8764	
	Total per unit width:		**198.36932**	k-ft/ft		Total per unit width:		**245.69588**	k-ft/ft
49	9.73E+01	1.98	1.93E+02		61	1.47E+02	1.98	2.91E+02	
50	9.76E+01	2.76	2.69E+02		62	1.21E+02	2.76	3.34E+02	
51	1.05E+02	2.76	2.89E+02		63	1.24E+02	2.76	3.43E+02	
52	9.49E+01	2.76	2.62E+02		64	1.08E+02	2.76	2.98E+02	
53	1.34E+02	2.76	3.70E+02		65	8.56E+01	2.76	2.36E+02	
54	2.12E+02	1.98	4.20E+02		66	1.44E+02	1.98	2.86E+02	
55	2.67E+02	1.98	5.29E+02		67	1.92E+02	1.98	3.81E+02	
56	3.70E+02	2.76	1.02E+03		68	2.28E+02	2.76	6.30E+02	
57	5.29E+02	2.76	1.46E+03		69	3.42E+02	2.76	9.44E+02	
58	5.47E+02	2.76	1.51E+03		70	3.94E+02	2.76	1.09E+03	
59	4.36E+02	2.76	1.20E+03		71	3.59E+02	2.76	9.92E+02	
60	4.25E+02	1.98	8.42E+02		72	3.35E+02	1.98	6.62E+02	
	Total	30	8368.1856			Total	30	6483.0636	
	Total per unit width:		**278.93952**	k-ft/ft		Total per unit width:		**216.10212**	k-ft/ft

Note: Myy = moment about X-axis.

CEC

CALCULATION SHEET

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE 10/15/99	CHECKED	DATE	10/15/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	118

8 Casks, Lower Bound Soil Properties
Average of Maximum Absolute Bending Moments

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)		Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
1	2.55E+01	3.98	1.01E+02		2	9.22E+01	3.98	3.67E+02	
13	1.69E+01	2.76	4.66E+01		14	8.03E+01	2.76	2.22E+02	
25	3.23E+01	2.76	8.93E+01		26	7.68E+01	2.76	2.12E+02	
37	3.32E+01	2.76	9.17E+01		38	8.27E+01	2.76	2.28E+02	
49	2.20E+01	2.76	6.06E+01		50	7.69E+01	2.76	2.12E+02	
61	2.44E+01	3.96	9.68E+01		62	6.93E+01	3.96	2.74E+02	
	Total:	18.98	486.3612			Total:	18.98	1515.1998	
	Total per unit width:		**25.62**	k-ft/ft		Total per unit width:		**79.83**	k-ft/ft
3	2.55E+02	3.98	1.02E+03		4	2.70E+02	3.98	1.08E+03	
15	2.36E+02	2.76	6.52E+02		16	2.49E+02	2.76	6.86E+02	
27	1.64E+02	2.76	4.53E+02		28	2.32E+02	2.76	6.40E+02	
39	1.54E+02	2.76	4.25E+02		40	2.12E+02	2.76	5.85E+02	
51	1.42E+02	2.76	3.92E+02		52	1.85E+02	2.76	5.12E+02	
63	1.29E+02	3.96	5.10E+02		64	1.58E+02	3.96	6.27E+02	
	Total:	18.98	3448.358			Total:	18.98	4126.064	
	Total per unit width:		**181.68**	k-ft/ft		Total per unit width:		**217.39**	k-ft/ft
5	2.80E+02	3.98	1.11E+03		6	2.38E+02	3.98	9.46E+02	
17	2.58E+02	2.76	7.11E+02		18	2.19E+02	2.76	6.04E+02	
29	2.44E+02	2.76	6.74E+02		30	2.09E+02	2.76	5.75E+02	
41	2.27E+02	2.76	6.27E+02		42	1.92E+02	2.76	5.31E+02	
53	2.06E+02	2.76	5.69E+02		54	1.74E+02	2.76	4.81E+02	
65	1.79E+02	3.96	7.07E+02		66	1.66E+02	3.96	6.59E+02	
	Total:	18.98	4400.942			Total:	18.98	3795.084	
	Total per unit width:		**231.87**	k-ft/ft		Total per unit width:		**199.95**	k-ft/ft
7	1.73E+02	3.98	6.89E+02		8	2.04E+02	3.98	8.13E+02	
19	1.96E+02	2.76	5.40E+02		20	2.57E+02	2.76	7.10E+02	
31	2.70E+02	2.76	7.45E+02		32	3.42E+02	2.76	9.44E+02	
43	2.49E+02	2.76	6.87E+02		44	3.57E+02	2.76	9.85E+02	
55	2.18E+02	2.76	6.01E+02		56	2.86E+02	2.76	7.88E+02	
67	2.13E+02	3.96	8.45E+02		68	2.48E+02	3.96	9.83E+02	
	Total:	18.98	4106.72			Total:	18.98	5223.352	
	Total per unit width:		**216.37**	k-ft/ft		Total per unit width:		**275.20**	k-ft/ft

Note: Mxx = moment about Y-axis.

CALCULATION SHEET

CEC

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE 10/15/99	CHECKED DWM	DATE	10/15/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	119

8 Casks, Lower Bound Soil Properties
Average of Maximum Absolute Bending Moments

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)		Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
9	2.15E+02	3.98	8.54E+02		10	1.42E+02	3.98	5.66E+02	
21	2.52E+02	2.76	6.94E+02		22	1.96E+02	2.76	5.40E+02	
33	2.88E+02	2.76	7.96E+02		34	2.31E+02	2.76	6.37E+02	
45	3.90E+02	2.76	1.08E+03		46	3.01E+02	2.76	8.32E+02	
57	4.90E+02	2.76	1.35E+03		58	4.28E+02	2.76	1.18E+03	
69	4.03E+02	3.96	1.59E+03		70	3.79E+02	3.96	1.50E+03	
	Total:	18.98	6367.724			Total:	18.98	5254.786	
	Total per unit width:		**335.50**	k-ft/ft		Total per unit width:		**276.86**	k-ft/ft
11	8.25E+01	3.98	3.28E+02		12	3.39E+01	3.98	1.35E+02	
23	8.21E+01	2.76	2.27E+02		24	1.61E+01	2.76	4.45E+01	
35	1.14E+02	2.76	3.14E+02		36	2.96E+01	2.76	8.17E+01	
47	1.32E+02	2.76	3.64E+02		48	3.49E+01	2.76	9.64E+01	
59	1.35E+02	2.76	3.72E+02		60	4.51E+01	2.76	1.24E+02	
71	1.35E+02	3.96	5.35E+02		72	3.70E+01	3.96	1.47E+02	
	Total:	18.98	2141.2722			Total:	18.98	628.7224	
	Total per unit width:		**112.82**	k-ft/ft		Total per unit width:		**33.13**	k-ft/ft

Note: Mxx = moment about Y-axis.

2 Casks, Best Estimate Soil Properties
Maximum Absolute Moments (kip-ft/ft)
Ref. "2be.out"

ELEM	XX-S/R	YY-S/R	XX-M/R	YY-M/R
193	1.20E+00	2.25E+01	7.54E+00	1.04E+02
194	4.21E+00	2.09E+01	3.17E+01	1.12E+02
195	7.37E+00	2.14E+01	8.07E+01	1.23E+02
196	1.34E+01	1.95E+01	9.46E+01	1.16E+02
197	1.60E+01	1.49E+01	1.15E+02	9.43E+01
198	1.84E+01	1.91E+01	1.14E+02	8.47E+01
199	2.08E+01	2.55E+01	1.17E+02	8.33E+01
200	2.31E+01	3.24E+01	1.23E+02	8.81E+01
201	3.04E+01	4.45E+01	1.06E+02	9.68E+01
202	1.35E+01	5.01E+01	7.54E+01	9.99E+01
203	6.48E+00	4.52E+01	3.07E+01	8.78E+01
204	2.24E+00	5.19E+01	4.84E+00	8.27E+01
205	1.82E+00	2.44E+01	8.84E+00	9.95E+01
206	5.73E+00	2.14E+01	3.62E+01	1.14E+02
207	1.05E+01	1.20E+01	8.86E+01	1.37E+02
208	1.83E+01	9.47E+00	1.13E+02	1.31E+02
209	2.29E+01	1.47E+01	1.38E+02	9.78E+01
210	2.59E+01	1.94E+01	1.37E+02	8.12E+01
211	2.83E+01	2.79E+01	1.72E+02	8.09E+01
212	3.35E+01	3.45E+01	1.92E+02	8.35E+01
213	3.60E+01	2.31E+01	1.45E+02	1.14E+02
214	7.65E+00	2.40E+01	1.01E+02	1.17E+02
215	4.99E+00	3.55E+01	4.39E+01	8.62E+01
216	5.34E+00	4.06E+01	5.62E+00	8.23E+01
217	2.34E+00	2.63E+01	3.51E+01	1.57E+02
218	1.18E+01	2.01E+01	4.53E+01	1.23E+02
219	1.45E+01	1.09E+01	8.61E+01	9.20E+01
220	2.04E+01	1.02E+01	1.28E+02	7.87E+01
221	2.72E+01	1.51E+01	1.58E+02	1.14E+02
222	4.02E+01	1.84E+01	1.65E+02	1.75E+02
223	5.28E+01	3.10E+01	2.70E+02	2.24E+02
224	1.46E+01	3.32E+01	2.82E+02	2.03E+02
225	1.85E+01	2.14E+01	1.83E+02	1.24E+02
226	2.44E+01	2.63E+01	1.25E+02	7.83E+01
227	3.99E+01	3.51E+01	5.27E+01	9.93E+01
228	7.20E+00	2.45E+01	2.32E+01	1.21E+02

CALCULATION SHEET

CEC

				CALC. NO. G(PO17)-2	REV. NO. 0
ORIGINATOR	DH	DATE	9/17/99	CHECKED aum	DATE 9/23/99
PROJECT	Private Fuel Storage Facility				JOB NO. 1101-000
SUBJECT	Storage Pad Analysis and Design				SHEET NO. 121

2 Casks, Best Estimate Soil Properties
Maximum Absolute Moments (kip-ft/ft)
Ref. "2be.out"

ELEM	XX-S/R	YY-S/R	XX-M/R	YY-M/R
229	2.39E+00	1.07E+01	3.50E+01	1.56E+02
230	1.18E+01	7.52E+00	4.88E+01	1.22E+02
231	1.56E+01	1.08E+01	8.93E+01	9.07E+01
232	2.20E+01	1.04E+01	1.40E+02	7.27E+01
233	2.93E+01	1.05E+01	1.74E+02	1.25E+02
234	4.29E+01	1.31E+01	1.79E+02	1.93E+02
235	5.40E+01	1.46E+01	2.70E+02	2.50E+02
236	1.49E+01	8.48E+00	3.03E+02	2.41E+02
237	2.24E+01	2.24E+01	2.38E+02	1.73E+02
238	2.91E+01	2.60E+01	1.56E+02	1.07E+02
239	3.99E+01	1.48E+01	5.94E+01	9.34E+01
240	7.65E+00	3.39E+01	2.31E+01	1.14E+02
241	2.39E+00	5.37E+00	1.10E+01	7.00E+01
242	7.64E+00	7.00E+00	4.41E+01	5.48E+01
243	1.39E+01	1.19E+01	1.06E+02	5.18E+01
244	2.31E+01	1.08E+01	1.48E+02	5.49E+01
245	2.83E+01	5.55E+00	1.86E+02	5.89E+01
246	3.03E+01	4.83E+00	1.78E+02	8.60E+01
247	2.70E+01	5.44E+00	2.07E+02	1.10E+02
248	3.13E+01	1.05E+01	2.51E+02	1.46E+02
249	3.99E+01	2.46E+01	2.95E+02	1.84E+02
250	5.61E+00	2.16E+01	2.26E+02	1.67E+02
251	3.61E+00	1.26E+01	6.90E+01	1.06E+02
252	1.77E+00	1.55E+01	1.49E+01	6.79E+01
253	2.15E+00	1.96E+00	1.37E+01	2.82E+01
254	7.77E+00	3.29E+00	4.30E+01	2.43E+01
255	1.44E+01	3.21E+00	1.12E+02	4.38E+01
256	2.28E+01	3.55E+00	1.59E+02	4.40E+01
257	2.63E+01	1.64E+00	2.07E+02	2.38E+01
258	2.71E+01	1.79E+00	2.03E+02	2.60E+01
259	2.72E+01	2.61E+00	2.25E+02	3.57E+01
260	2.64E+01	6.36E+00	2.38E+02	6.11E+01
261	2.50E+01	7.49E+00	3.00E+02	9.18E+01
262	1.58E+01	9.77E+00	2.54E+02	9.27E+01
263	7.83E+00	5.01E+00	9.48E+01	6.51E+01
264	2.99E+00	5.85E+00	1.57E+01	4.74E+01

CALCULATION SHEET

CEC

			CALC. NO.	G(PO17)-2	REV. NO. 0
ORIGINATOR	DH	DATE 10/15/99	CHECKED	[illegible]	DATE 10/15/99
PROJECT	Private Fuel Storage Facility				JOB NO. 1101-000
SUBJECT	Storage Pad Analysis and Design				SHEET NO. 122

2 Casks, Best Estimate Soil Properties
Average of Maximum Absolute Bending Moments

Elem	Myy (k-ft/ft)	Width (ft)	Myy*Width (k-ft)		Elem	Myy (k-ft/ft)	Width (ft)	Myy*Width (k-ft)	
193	1.04E+02	1.98	2.07E+02		205	9.95E+01	1.98	1.97E+02	
194	1.12E+02	2.76	3.09E+02		206	1.14E+02	2.76	3.14E+02	
195	1.23E+02	2.76	3.41E+02		207	1.37E+02	2.76	3.77E+02	
196	1.16E+02	2.76	3.21E+02		208	1.31E+02	2.76	3.62E+02	
197	9.43E+01	2.76	2.60E+02		209	9.78E+01	2.76	2.70E+02	
198	8.47E+01	1.98	1.68E+02		210	8.12E+01	1.98	1.61E+02	
199	8.33E+01	1.98	1.65E+02		211	8.09E+01	1.98	1.60E+02	
200	8.81E+01	2.76	2.43E+02		212	8.35E+01	2.76	2.30E+02	
201	9.68E+01	2.76	2.67E+02		213	1.14E+02	2.76	3.14E+02	
202	9.99E+01	2.76	2.76E+02		214	1.17E+02	2.76	3.22E+02	
203	8.78E+01	2.76	2.42E+02		215	8.62E+01	2.76	2.38E+02	
204	8.27E+01	1.98	1.64E+02		216	8.23E+01	1.98	1.63E+02	
	Total	30	2961.684			Total	30	3109.116	
	Total per unit width:		98.7228	k-ft/ft		Total per unit width:		103.6372	k-ft/ft
217	1.57E+02	1.98	3.11E+02		229	1.56E+02	1.98	3.08E+02	
218	1.23E+02	2.76	3.40E+02		230	1.22E+02	2.76	3.35E+02	
219	9.20E+01	2.76	2.54E+02		231	9.07E+01	2.76	2.50E+02	
220	7.87E+01	2.76	2.17E+02		232	7.27E+01	2.76	2.01E+02	
221	1.14E+02	2.76	3.15E+02		233	1.25E+02	2.76	3.44E+02	
222	1.75E+02	1.98	3.47E+02		234	1.93E+02	1.98	3.82E+02	
223	2.24E+02	1.98	4.43E+02		235	2.50E+02	1.98	4.95E+02	
224	2.03E+02	2.76	5.61E+02		236	2.41E+02	2.76	6.66E+02	
225	1.24E+02	2.76	3.42E+02		237	1.73E+02	2.76	4.77E+02	
226	7.83E+01	2.76	2.16E+02		238	1.07E+02	2.76	2.94E+02	
227	9.93E+01	2.76	2.74E+02		239	9.34E+01	2.76	2.58E+02	
228	1.21E+02	1.98	2.39E+02		240	1.14E+02	1.98	2.25E+02	
	Total	30	3859.3188			Total	30	4234.8312	
	Total per unit width:		128.64396	k-ft/ft		Total per unit width:		141.16104	k-ft/ft
241	7.00E+01	1.98	1.39E+02		253	2.82E+01	1.98	5.59E+01	
242	5.48E+01	2.76	1.51E+02		254	2.43E+01	2.76	6.72E+01	
243	5.18E+01	2.76	1.43E+02		255	4.38E+01	2.76	1.21E+02	
244	5.49E+01	2.76	1.51E+02		256	4.40E+01	2.76	1.22E+02	
245	5.89E+01	2.76	1.63E+02		257	2.38E+01	2.76	6.56E+01	
246	8.60E+01	1.98	1.70E+02		258	2.60E+01	1.98	5.16E+01	
247	1.10E+02	1.98	2.19E+02		259	3.57E+01	1.98	7.07E+01	
248	1.46E+02	2.76	4.04E+02		260	6.11E+01	2.76	1.69E+02	
249	1.84E+02	2.76	5.06E+02		261	9.18E+01	2.76	2.53E+02	
250	1.67E+02	2.76	4.60E+02		262	9.27E+01	2.76	2.56E+02	
251	1.06E+02	2.76	2.91E+02		263	6.51E+01	2.76	1.80E+02	
252	6.79E+01	1.98	1.34E+02		264	4.74E+01	1.98	9.38E+01	
	Total	30	2931.6036			Total	30	1504.8372	
	Total per unit width:		97.72012	k-ft/ft		Total per unit width:		50.16124	k-ft/ft

Note: Myy = moment about X-axis.

CALCULATION SHEET

CEC

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE 10/15/99	CHECKED AUM	DATE	10/15/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	123

2 Casks, Best Estimate Soil Properties
Average of Maximum Absolute Bending Moments

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)		Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
193	7.54E+00	3.96	2.99E+01		194	3.17E+01	3.96	1.25E+02	
205	8.84E+00	2.76	2.44E+01		206	3.62E+01	2.76	9.99E+01	
217	3.51E+01	2.76	9.70E+01		218	4.53E+01	2.76	1.25E+02	
229	3.50E+01	2.76	9.65E+01		230	4.88E+01	2.76	1.35E+02	
241	1.10E+01	2.76	3.03E+01		242	4.41E+01	2.76	1.22E+02	
253	1.37E+01	3.98	5.46E+01		254	4.30E+01	3.98	1.71E+02	
	Total:	18.98	332.52336			Total:	18.98	778.0348	
	Total per unit width:		**17.52**	k-ft/ft		Total per unit width:		**40.99**	k-ft/ft
195	8.07E+01	3.96	3.19E+02		196	9.46E+01	3.96	3.75E+02	
207	8.86E+01	2.76	2.44E+02		208	1.13E+02	2.76	3.13E+02	
219	8.61E+01	2.76	2.38E+02		220	1.28E+02	2.76	3.54E+02	
231	8.93E+01	2.76	2.46E+02		232	1.40E+02	2.76	3.86E+02	
243	1.06E+02	2.76	2.92E+02		244	1.48E+02	2.76	4.08E+02	
255	1.12E+02	3.98	4.44E+02		256	1.59E+02	3.98	6.31E+02	
	Total:	18.98	1783.3624			Total:	18.98	2466.436	
	Total per unit width:		**93.96**	k-ft/ft		Total per unit width:		**129.95**	k-ft/ft
197	1.15E+02	3.96	4.54E+02		198	1.14E+02	3.96	4.50E+02	
209	1.38E+02	2.76	3.80E+02		210	1.37E+02	2.76	3.79E+02	
221	1.58E+02	2.76	4.35E+02		222	1.65E+02	2.76	4.56E+02	
233	1.74E+02	2.76	4.79E+02		234	1.79E+02	2.76	4.95E+02	
245	1.86E+02	2.76	5.13E+02		246	1.78E+02	2.76	4.92E+02	
257	2.07E+02	3.98	8.24E+02		258	2.03E+02	3.98	8.08E+02	
	Total:	18.98	3085.442			Total:	18.98	3078.966	
	Total per unit width:		**162.56**	k-ft/ft		Total per unit width:		**162.22**	k-ft/ft
199	1.17E+02	3.96	4.64E+02		200	1.23E+02	3.96	4.88E+02	
211	1.72E+02	2.76	4.75E+02		212	1.92E+02	2.76	5.29E+02	
223	2.70E+02	2.76	7.45E+02		224	2.82E+02	2.76	7.77E+02	
235	2.70E+02	2.76	7.46E+02		236	3.03E+02	2.76	8.36E+02	
247	2.07E+02	2.76	5.70E+02		248	2.51E+02	2.76	6.93E+02	
259	2.25E+02	3.98	8.95E+02		260	2.38E+02	3.98	9.46E+02	
	Total:	18.98	3894.428			Total:	18.98	4269.388	
	Total per unit width:		**205.19**	k-ft/ft		Total per unit width:		**224.94**	k-ft/ft

Note: Mxx = moment about Y-axis.

CALCULATION SHEET

CEC

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE 12/15/99	CHECKED auni	DATE	12/15/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	124

2 Casks, Best Estimate Soil Properties

Average of Maximum Absolute Bending Moments

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
201	1.06E+02	3.96	4.21E+02	
213	1.45E+02	2.76	3.99E+02	
225	1.83E+02	2.76	5.05E+02	
237	2.38E+02	2.76	6.57E+02	
249	2.95E+02	2.76	8.13E+02	
261	3.00E+02	3.98	1.19E+03	
	Total:	18.98	3990.568	
	Total per unit width:		**210.25**	k-ft/ft

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
202	7.54E+01	3.96	2.99E+02	
214	1.01E+02	2.76	2.78E+02	
226	1.25E+02	2.76	3.45E+02	
238	1.56E+02	2.76	4.32E+02	
250	2.26E+02	2.76	6.24E+02	
262	2.54E+02	3.98	1.01E+03	
	Total:	18.98	2989.4488	
	Total per unit width:		**157.51**	k-ft/ft

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
203	3.07E+01	3.96	1.21E+02	
215	4.39E+01	2.76	1.21E+02	
227	5.27E+01	2.76	1.45E+02	
239	5.94E+01	2.76	1.64E+02	
251	6.90E+01	2.76	1.91E+02	
263	9.48E+01	3.98	3.77E+02	
	Total:	18.98	1119.7516	
	Total per unit width:		**59.00**	k-ft/ft

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
204	4.84E+00	3.96	1.92E+01	
216	5.62E+00	2.76	1.55E+01	
228	2.32E+01	2.76	6.40E+01	
240	2.31E+01	2.76	6.37E+01	
252	1.49E+01	2.76	4.11E+01	
264	1.57E+01	3.98	6.24E+01	
	Total:	18.98	265.83716	
	Total per unit width:		**14.01**	k-ft/ft

Note: Mxx = moment about Y-axis.

CALCULATION SHEET

CEC

ORIGINATOR	DH	DATE 9/17/99	CALC. NO. G(PO17)-2	REV. NO.	0
			CHECKED	DATE	9/23/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	125

4 Casks, Best Estimate Soil Properties
Maximum Absolute Moments (kip-ft/ft)
Ref. "4be.out"

ELEM	XX-S/R	YY-S/R	XX-M/R	YY-M/R
193	1.49E+00	1.86E+01	6.75E+00	1.23E+02
194	4.53E+00	1.62E+01	2.69E+01	1.23E+02
195	9.64E+00	1.54E+01	7.13E+01	1.26E+02
196	1.92E+01	1.49E+01	9.01E+01	1.14E+02
197	1.39E+01	9.95E+00	1.03E+02	9.21E+01
198	1.07E+01	9.88E+00	1.11E+02	8.15E+01
199	1.10E+01	9.67E+00	1.06E+02	7.66E+01
200	1.29E+01	9.38E+00	9.29E+01	7.21E+01
201	1.62E+01	1.24E+01	6.65E+01	8.22E+01
202	8.97E+00	1.56E+01	7.10E+01	8.55E+01
203	4.18E+00	1.93E+01	2.09E+01	8.24E+01
204	1.39E+00	2.24E+01	4.14E+00	8.21E+01
205	1.25E+00	2.23E+01	1.06E+01	1.17E+02
206	2.63E+00	1.77E+01	2.63E+01	1.27E+02
207	4.80E+00	8.52E+00	7.57E+01	1.47E+02
208	1.34E+01	6.80E+00	8.61E+01	1.38E+02
209	1.21E+01	9.62E+00	1.05E+02	9.99E+01
210	1.05E+01	1.06E+01	1.15E+02	8.14E+01
211	1.00E+01	1.05E+01	1.11E+02	7.47E+01
212	1.14E+01	9.26E+00	9.63E+01	7.42E+01
213	1.31E+01	6.53E+00	8.11E+01	1.00E+02
214	5.90E+00	9.71E+00	8.14E+01	9.60E+01
215	3.55E+00	1.84E+01	2.12E+01	7.95E+01
216	1.17E+00	2.24E+01	5.88E+00	7.38E+01
217	2.49E+00	2.58E+01	3.40E+01	1.79E+02
218	1.43E+01	1.74E+01	3.02E+01	1.38E+02
219	9.06E+00	7.72E+00	6.04E+01	9.22E+01
220	8.55E+00	6.33E+00	9.03E+01	8.77E+01
221	9.18E+00	1.10E+01	1.05E+02	9.05E+01
222	2.14E+01	1.14E+01	1.14E+02	1.27E+02
223	2.19E+01	1.15E+01	1.47E+02	1.44E+02
224	1.27E+01	1.04E+01	1.31E+02	1.32E+02
225	9.46E+00	7.72E+00	7.67E+01	9.35E+01
226	1.12E+01	8.86E+00	5.20E+01	7.05E+01
227	1.23E+01	1.79E+01	2.47E+01	7.49E+01
228	2.50E+00	2.52E+01	1.77E+01	9.26E+01

4 Casks, Best Estimate Soil Properties
Maximum Absolute Moments (kip-ft/ft)
Ref. "4be.out"

ELEM	XX-S/R	YY-S/R	XX-M/R	YY-M/R
229	2.59E+00	1.58E+01	3.37E+01	1.70E+02
230	1.39E+01	8.39E+00	2.46E+01	1.38E+02
231	9.24E+00	8.27E+00	6.21E+01	9.13E+01
232	9.30E+00	7.01E+00	8.92E+01	7.93E+01
233	1.01E+01	4.49E+00	1.04E+02	8.93E+01
234	2.27E+01	5.58E+00	1.30E+02	1.22E+02
235	2.35E+01	4.83E+00	1.52E+02	1.34E+02
236	1.24E+01	4.09E+00	1.31E+02	1.17E+02
237	9.58E+00	7.89E+00	8.31E+01	7.61E+01
238	1.08E+01	8.60E+00	5.56E+01	5.20E+01
239	1.27E+01	7.13E+00	2.86E+01	7.16E+01
240	2.61E+00	1.13E+01	1.78E+01	8.87E+01
241	1.54E+00	7.62E+00	6.81E+00	7.77E+01
242	2.86E+00	7.53E+00	2.56E+01	6.74E+01
243	5.34E+00	9.13E+00	6.37E+01	6.50E+01
244	1.41E+01	7.80E+00	9.71E+01	5.93E+01
245	1.54E+01	3.09E+00	1.18E+02	4.33E+01
246	1.55E+01	3.41E+00	1.25E+02	4.51E+01
247	1.64E+01	3.17E+00	1.29E+02	4.88E+01
248	1.75E+01	2.56E+00	1.16E+02	4.60E+01
249	1.64E+01	8.23E+00	8.40E+01	3.49E+01
250	7.16E+00	1.02E+01	7.64E+01	4.46E+01
251	3.30E+00	6.17E+00	2.73E+01	4.87E+01
252	2.26E+00	5.36E+00	5.91E+00	5.26E+01
253	1.63E+00	2.77E+00	1.81E+01	2.83E+01
254	4.59E+00	3.51E+00	3.56E+01	2.33E+01
255	7.61E+00	2.98E+00	7.38E+01	3.50E+01
256	1.22E+01	2.82E+00	1.07E+02	3.47E+01
257	1.34E+01	1.20E+00	1.30E+02	2.28E+01
258	1.45E+01	1.15E+00	1.32E+02	1.52E+01
259	1.55E+01	1.07E+00	1.26E+02	1.46E+01
260	1.62E+01	1.14E+00	1.17E+02	1.75E+01
261	1.67E+01	2.53E+00	8.56E+01	2.76E+01
262	6.94E+00	2.62E+00	8.12E+01	2.75E+01
263	4.47E+00	2.94E+00	2.91E+01	2.13E+01
264	1.62E+00	2.06E+00	6.77E+00	2.09E+01

CALCULATION SHEET

CEC

				CALC. NO.	G(PO17)-2 REV. NO. 0
ORIGINATOR	DH	DATE	10/15/99	CHECKED	AUM DATE 10/15/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	127

4 Casks, Best Estimate Soil Properties
Average of Maximum Absolute Bending Moments

Elem	Myy (k-ft/ft)	Width (ft)	Myy*Width (k-ft)	
193	1.23E+02	1.98	2.43E+02	
194	1.23E+02	2.76	3.40E+02	
195	1.26E+02	2.76	3.48E+02	
196	1.14E+02	2.76	3.15E+02	
197	9.21E+01	2.76	2.54E+02	
198	8.15E+01	1.98	1.61E+02	
199	7.66E+01	1.98	1.52E+02	
200	7.21E+01	2.76	1.99E+02	
201	8.22E+01	2.76	2.27E+02	
202	8.55E+01	2.76	2.36E+02	
203	8.24E+01	2.76	2.27E+02	
204	8.21E+01	1.98	1.63E+02	
	Total	30	2866.0356	
	Total per unit width:		**95.53452**	k-ft/ft
217	1.79E+02	1.98	3.54E+02	
218	1.38E+02	2.76	3.82E+02	
219	9.22E+01	2.76	2.55E+02	
220	8.77E+01	2.76	2.42E+02	
221	9.05E+01	2.76	2.50E+02	
222	1.27E+02	1.98	2.52E+02	
223	1.44E+02	1.98	2.85E+02	
224	1.32E+02	2.76	3.63E+02	
225	9.35E+01	2.76	2.58E+02	
226	7.05E+01	2.76	1.95E+02	
227	7.49E+01	2.76	2.07E+02	
228	9.26E+01	1.98	1.83E+02	
	Total	30	3225.576	
	Total per unit width:		**107.5192**	k-ft/ft
241	7.77E+01	1.98	1.54E+02	
242	6.74E+01	2.76	1.86E+02	
243	6.50E+01	2.76	1.79E+02	
244	5.93E+01	2.76	1.64E+02	
245	4.33E+01	2.76	1.19E+02	
246	4.51E+01	1.98	8.94E+01	
247	4.88E+01	1.98	9.66E+01	
248	4.60E+01	2.76	1.27E+02	
249	3.49E+01	2.76	9.64E+01	
250	4.46E+01	2.76	1.23E+02	
251	4.87E+01	2.76	1.34E+02	
252	5.26E+01	1.98	1.04E+02	
	Total	30	1573.32	
	Total per unit width:		**52.444**	k-ft/ft

Elem	Myy (k-ft/ft)	Width (ft)	Myy*Width (k-ft)	
205	1.17E+02	1.98	2.32E+02	
206	1.27E+02	2.76	3.50E+02	
207	1.47E+02	2.76	4.05E+02	
208	1.38E+02	2.76	3.80E+02	
209	9.99E+01	2.76	2.76E+02	
210	8.14E+01	1.98	1.61E+02	
211	7.47E+01	1.98	1.48E+02	
212	7.42E+01	2.76	2.05E+02	
213	1.00E+02	2.76	2.76E+02	
214	9.60E+01	2.76	2.65E+02	
215	7.95E+01	2.76	2.19E+02	
216	7.38E+01	1.98	1.46E+02	
	Total	30	3063.456	
	Total per unit width:		**102.1152**	k-ft/ft
229	1.70E+02	1.98	3.36E+02	
230	1.38E+02	2.76	3.80E+02	
231	9.13E+01	2.76	2.52E+02	
232	7.93E+01	2.76	2.19E+02	
233	8.93E+01	2.76	2.46E+02	
234	1.22E+02	1.98	2.41E+02	
235	1.34E+02	1.98	2.66E+02	
236	1.17E+02	2.76	3.23E+02	
237	7.61E+01	2.76	2.10E+02	
238	5.20E+01	2.76	1.44E+02	
239	7.16E+01	2.76	1.97E+02	
240	8.87E+01	1.98	1.76E+02	
	Total	30	2990.4492	
	Total per unit width:		**99.68164**	k-ft/ft
253	2.83E+01	1.98	5.60E+01	
254	2.33E+01	2.76	6.42E+01	
255	3.50E+01	2.76	9.65E+01	
256	3.47E+01	2.76	9.59E+01	
257	2.28E+01	2.76	6.29E+01	
258	1.52E+01	1.98	3.01E+01	
259	1.46E+01	1.98	2.89E+01	
260	1.75E+01	2.76	4.84E+01	
261	2.76E+01	2.76	7.62E+01	
262	2.75E+01	2.76	7.59E+01	
263	2.13E+01	2.76	5.87E+01	
264	2.09E+01	1.98	4.14E+01	
	Total	30	735.0264	
	Total per unit width:		**24.50088**	k-ft/ft

Note: Myy = moment about X-axis.

CALCULATION SHEET

CEC

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR DH	DATE 10/15/99		CHECKED ALM	DATE	10/15/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	128

4 Casks, Best Estimate Soil Properties
Average of Maximum Absolute Bending Moments

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)		Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
193	6.75E+00	3.96	2.67E+01		194	2.69E+01	3.96	1.07E+02	
205	1.06E+01	2.76	2.91E+01		206	2.63E+01	2.76	7.27E+01	
217	3.40E+01	2.76	9.38E+01		218	3.02E+01	2.76	8.33E+01	
229	3.37E+01	2.76	9.30E+01		230	2.46E+01	2.76	6.78E+01	
241	6.81E+00	2.76	1.88E+01		242	2.56E+01	2.76	7.08E+01	
253	1.81E+01	3.98	7.20E+01		254	3.56E+01	3.98	1.42E+02	
	Total:	18.98	333.32704			Total:	18.98	542.7072	
	Total per unit width:		**17.56**	k-ft/ft		Total per unit width:		**28.59**	k-ft/ft
195	7.13E+01	3.96	2.82E+02		196	9.01E+01	3.96	3.57E+02	
207	7.57E+01	2.76	2.09E+02		208	8.61E+01	2.76	2.38E+02	
219	6.04E+01	2.76	1.67E+02		220	9.03E+01	2.76	2.49E+02	
231	6.21E+01	2.76	1.71E+02		232	8.92E+01	2.76	2.46E+02	
243	6.37E+01	2.76	1.76E+02		244	9.71E+01	2.76	2.68E+02	
255	7.38E+01	3.98	2.94E+02		256	1.07E+02	3.98	4.25E+02	
	Total:	18.98	1298.8248			Total:	18.98	1783.148	
	Total per unit width:		**68.43**	k-ft/ft		Total per unit width:		**93.95**	k-ft/ft
197	1.03E+02	3.96	4.06E+02		198	1.11E+02	3.96	4.38E+02	
209	1.05E+02	2.76	2.91E+02		210	1.15E+02	2.76	3.17E+02	
221	1.05E+02	2.76	2.90E+02		222	1.14E+02	2.76	3.15E+02	
233	1.04E+02	2.76	2.88E+02		234	1.30E+02	2.76	3.60E+02	
245	1.18E+02	2.76	3.25E+02		246	1.25E+02	2.76	3.44E+02	
257	1.30E+02	3.98	5.17E+02		258	1.32E+02	3.98	5.27E+02	
	Total:	18.98	2117.828			Total:	18.98	2301.992	
	Total per unit width:		**111.58**	k-ft/ft		Total per unit width:		**121.29**	k-ft/ft
199	1.06E+02	3.96	4.21E+02		200	9.29E+01	3.96	3.68E+02	
211	1.11E+02	2.76	3.06E+02		212	9.63E+01	2.76	2.66E+02	
223	1.47E+02	2.76	4.05E+02		224	1.31E+02	2.76	3.60E+02	
235	1.52E+02	2.76	4.19E+02		236	1.31E+02	2.76	3.63E+02	
247	1.29E+02	2.76	3.55E+02		248	1.16E+02	2.76	3.21E+02	
259	1.26E+02	3.98	5.01E+02		260	1.17E+02	3.98	4.66E+02	
	Total:	18.98	2407.736			Total:	18.98	2143.5152	
	Total per unit width:		**126.86**	k-ft/ft		Total per unit width:		**112.94**	k-ft/ft

Note: Mxx = moment about Y-axis.

CALCULATION SHEET

CEC

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE 10/15/99	CHECKED Qum	DATE	10/15/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	129

4 Casks, Best Estimate Soil Properties
Average of Maximum Absolute Bending Moments

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)		Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
201	6.65E+01	3.96	2.63E+02		202	7.10E+01	3.96	2.81E+02	
213	8.11E+01	2.76	2.24E+02		214	8.14E+01	2.76	2.25E+02	
225	7.67E+01	2.76	2.12E+02		226	5.20E+01	2.76	1.44E+02	
237	8.31E+01	2.76	2.29E+02		238	5.56E+01	2.76	1.53E+02	
249	8.40E+01	2.76	2.32E+02		250	7.64E+01	2.76	2.11E+02	
261	8.56E+01	3.98	3.41E+02		262	8.12E+01	3.98	3.23E+02	
	Total:	18.98	1500.5504			Total:	18.98	1337.1486	
	Total per unit width:		**79.06**	k-ft/ft		Total per unit width:		**70.45**	k-ft/ft

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)		Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
203	2.09E+01	3.96	8.29E+01		204	4.14E+00	3.96	1.64E+01	
215	2.12E+01	2.76	5.84E+01		216	5.88E+00	2.76	1.62E+01	
227	2.47E+01	2.76	6.83E+01		228	1.77E+01	2.76	4.89E+01	
239	2.86E+01	2.76	7.90E+01		240	1.78E+01	2.76	4.92E+01	
251	2.73E+01	2.76	7.54E+01		252	5.91E+00	2.76	1.63E+01	
263	2.91E+01	3.98	1.16E+02		264	6.77E+00	3.98	2.69E+01	
	Total:	18.98	480.0884			Total:	18.98	174.03474	
	Total per unit width:		**25.29**	k-ft/ft		Total per unit width:		**9.17**	k-ft/ft

Note: Mxx = moment about Y-axis.

CALCULATION SHEET

CEC

ORIGINATOR	DH	DATE	9/17/99	CALC. NO.	G(PO17)-2	REV. NO.	0
				CHECKED	AUM	DATE	9/23/99
PROJECT	Private Fuel Storage Facility					JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design					SHEET NO.	130

8 Casks, Best Estimate Soil Properties
Maximum Absolute Moments (kip-ft/ft)
Ref. "8be.out"

ELEM	XX-S/R	YY-S/R	XX-M/R	YY-M/R
193	1.86E+00	3.96E+01	8.04E+00	1.09E+02
194	5.64E+00	3.43E+01	2.88E+01	1.14E+02
195	1.14E+01	3.31E+01	7.29E+01	1.23E+02
196	1.15E+01	2.94E+01	9.70E+01	1.08E+02
197	1.08E+01	2.34E+01	9.48E+01	8.17E+01
198	1.12E+01	2.05E+01	1.12E+02	8.90E+01
199	1.19E+01	1.83E+01	1.13E+02	9.80E+01
200	1.31E+01	1.71E+01	1.17E+02	1.14E+02
201	1.51E+01	1.74E+01	1.87E+02	1.33E+02
202	1.08E+01	1.94E+01	1.64E+02	1.26E+02
203	5.29E+00	1.75E+01	5.63E+01	1.19E+02
204	1.78E+00	2.00E+01	9.33E+00	1.14E+02
205	1.15E+00	4.11E+01	1.08E+01	1.12E+02
206	2.64E+00	3.40E+01	2.70E+01	1.11E+02
207	5.39E+00	2.51E+01	8.44E+01	1.47E+02
208	1.32E+01	2.15E+01	1.04E+02	1.43E+02
209	1.09E+01	1.96E+01	9.82E+01	9.87E+01
210	1.14E+01	1.75E+01	1.18E+02	8.99E+01
211	1.18E+01	1.50E+01	1.21E+02	1.02E+02
212	1.27E+01	1.35E+01	1.12E+02	1.29E+02
213	1.24E+01	1.43E+01	2.03E+02	1.69E+02
214	5.43E+00	1.30E+01	1.82E+02	1.65E+02
215	2.69E+00	1.62E+01	5.74E+01	1.17E+02
216	1.16E+00	1.83E+01	7.55E+00	9.58E+01
217	2.88E+00	4.62E+01	3.08E+01	1.28E+02
218	1.36E+01	3.51E+01	3.25E+01	1.13E+02
219	1.06E+01	2.15E+01	6.89E+01	1.02E+02
220	7.64E+00	1.82E+01	9.24E+01	9.14E+01
221	8.58E+00	2.30E+01	1.27E+02	1.29E+02
222	1.72E+01	2.45E+01	1.48E+02	1.38E+02
223	1.72E+01	1.39E+01	1.50E+02	1.30E+02
224	1.11E+01	1.35E+01	1.25E+02	1.23E+02
225	7.73E+00	1.12E+01	1.61E+02	9.83E+01
226	8.86E+00	1.01E+01	1.42E+02	8.78E+01
227	1.12E+01	1.56E+01	5.53E+01	9.54E+01
228	2.55E+00	1.77E+01	2.13E+01	1.10E+02

8 Casks, Best Estimate Soil Properties
Maximum Absolute Moments (kip-ft/ft)
Ref. "8be.out"

ELEM	XX-S/R	YY-S/R	XX-M/R	YY-M/R
229	2.79E+00	1.93E+01	3.13E+01	1.32E+02
230	1.34E+01	1.79E+01	3.43E+01	1.00E+02
231	6.54E+00	1.75E+01	9.07E+01	6.98E+01
232	7.04E+00	1.58E+01	9.92E+01	8.79E+01
233	8.20E+00	1.24E+01	1.34E+02	1.26E+02
234	1.68E+01	1.72E+01	1.56E+02	1.35E+02
235	1.69E+01	1.18E+01	1.46E+02	1.20E+02
236	9.72E+00	1.06E+01	1.23E+02	1.15E+02
237	6.93E+00	8.41E+00	1.29E+02	8.95E+01
238	8.11E+00	9.19E+00	1.10E+02	7.20E+01
239	1.10E+01	9.03E+00	5.05E+01	8.26E+01
240	2.56E+00	1.27E+01	1.96E+01	1.02E+02
241	3.36E+00	1.28E+01	8.86E+00	6.15E+01
242	3.32E+00	1.17E+01	4.81E+01	5.11E+01
243	5.47E+00	2.09E+01	1.49E+02	5.70E+01
244	1.17E+01	1.84E+01	1.60E+02	5.90E+01
245	1.35E+01	8.09E+00	1.09E+02	5.88E+01
246	1.13E+01	9.02E+00	1.20E+02	5.77E+01
247	9.37E+00	6.87E+00	1.14E+02	5.54E+01
248	1.09E+01	6.19E+00	1.09E+02	5.14E+01
249	1.17E+01	1.02E+01	1.10E+02	7.75E+01
250	5.68E+00	1.03E+01	1.18E+02	8.11E+01
251	3.07E+00	6.15E+00	4.63E+01	5.22E+01
252	1.69E+00	8.44E+00	1.03E+01	5.47E+01
253	1.58E+00	4.65E+00	1.15E+01	2.48E+01
254	4.36E+00	4.49E+00	6.28E+01	2.95E+01
255	7.30E+00	8.08E+00	1.78E+02	5.34E+01
256	1.62E+01	9.04E+00	1.92E+02	5.51E+01
257	1.21E+01	3.30E+00	9.88E+01	2.79E+01
258	9.22E+00	3.05E+00	1.01E+02	2.17E+01
259	7.98E+00	2.51E+00	1.09E+02	2.05E+01
260	8.95E+00	2.01E+00	1.15E+02	3.22E+01
261	1.03E+01	3.77E+00	1.13E+02	5.61E+01
262	7.57E+00	3.68E+00	1.26E+02	5.82E+01
263	4.23E+00	2.44E+00	4.21E+01	3.93E+01
264	1.49E+00	3.03E+00	1.23E+01	2.77E+01

CALCULATION SHEET

CEC

ORIGINATOR	DH	DATE	10/15/99
CALC. NO.	G(PO17)-2	REV. NO.	0
CHECKED	aum	DATE	10/15/99
PROJECT	Private Fuel Storage Facility	JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design	SHEET NO.	132

8 Casks, Best Estimate Soil Properties
Average of Maximum Absolute Bending Moments

Elem	Myy (k-ft/ft)	Width (ft)	Myy*Width (k-ft)		Elem	Myy (k-ft/ft)	Width (ft)	Myy*Width (k-ft)	
193	1.09E+02	1.98	2.16E+02		205	1.12E+02	1.98	2.21E+02	
194	1.14E+02	2.76	3.15E+02		206	1.11E+02	2.76	3.07E+02	
195	1.23E+02	2.76	3.38E+02		207	1.47E+02	2.76	4.04E+02	
196	1.08E+02	2.76	2.99E+02		208	1.43E+02	2.76	3.95E+02	
197	8.17E+01	2.76	2.26E+02		209	9.87E+01	2.76	2.72E+02	
198	8.90E+01	1.98	1.76E+02		210	8.99E+01	1.98	1.78E+02	
199	9.80E+01	1.98	1.94E+02		211	1.02E+02	1.98	2.01E+02	
200	1.14E+02	2.76	3.13E+02		212	1.29E+02	2.76	3.55E+02	
201	1.33E+02	2.76	3.66E+02		213	1.69E+02	2.76	4.66E+02	
202	1.26E+02	2.76	3.48E+02		214	1.65E+02	2.76	4.54E+02	
203	1.19E+02	2.76	3.28E+02		215	1.17E+02	2.76	3.22E+02	
204	1.14E+02	1.98	2.26E+02		216	9.58E+01	1.98	1.90E+02	
	Total	30	3344.8776			Total	30	3767.2542	
	Total per unit width:		**111.49592**	k-ft/ft		Total per unit width:		**125.57514**	k-ft/ft
217	1.28E+02	1.98	2.54E+02		229	1.32E+02	1.98	2.62E+02	
218	1.13E+02	2.76	3.13E+02		230	1.00E+02	2.76	2.77E+02	
219	1.02E+02	2.76	2.82E+02		231	6.98E+01	2.76	1.93E+02	
220	9.14E+01	2.76	2.52E+02		232	8.79E+01	2.76	2.43E+02	
221	1.29E+02	2.76	3.56E+02		233	1.26E+02	2.76	3.47E+02	
222	1.38E+02	1.98	2.74E+02		234	1.35E+02	1.98	2.67E+02	
223	1.30E+02	1.98	2.58E+02		235	1.20E+02	1.98	2.38E+02	
224	1.23E+02	2.76	3.38E+02		236	1.15E+02	2.76	3.18E+02	
225	9.83E+01	2.76	2.71E+02		237	8.95E+01	2.76	2.47E+02	
226	8.78E+01	2.76	2.42E+02		238	7.20E+01	2.76	1.99E+02	
227	9.54E+01	2.76	2.63E+02		239	8.26E+01	2.76	2.28E+02	
228	1.10E+02	1.98	2.18E+02		240	1.02E+02	1.98	2.02E+02	
	Total	30	3321.3576			Total	30	3019.0752	
	Total per unit width:		**110.71192**	k-ft/ft		Total per unit width:		**100.63584**	k-ft/ft
241	6.15E+01	1.98	1.22E+02		253	2.48E+01	1.98	4.91E+01	
242	5.11E+01	2.76	1.41E+02		254	2.95E+01	2.76	8.14E+01	
243	5.70E+01	2.76	1.57E+02		255	5.34E+01	2.76	1.47E+02	
244	5.90E+01	2.76	1.63E+02		256	5.51E+01	2.76	1.52E+02	
245	5.88E+01	2.76	1.62E+02		257	2.79E+01	2.76	7.69E+01	
246	5.77E+01	1.98	1.14E+02		258	2.17E+01	1.98	4.30E+01	
247	5.54E+01	1.98	1.10E+02		259	2.05E+01	1.98	4.06E+01	
248	5.14E+01	2.76	1.42E+02		260	3.22E+01	2.76	8.90E+01	
249	7.75E+01	2.76	2.14E+02		261	5.61E+01	2.76	1.55E+02	
250	8.11E+01	2.76	2.24E+02		262	5.82E+01	2.76	1.61E+02	
251	5.22E+01	2.76	1.44E+02		263	3.93E+01	2.76	1.08E+02	
252	5.47E+01	1.98	1.08E+02		264	2.77E+01	1.98	5.49E+01	
	Total	30	1800.9018			Total	30	1158.183	
	Total per unit width:		**60.03006**	k-ft/ft		Total per unit width:		**38.6061**	k-ft/ft

Note: Myy = moment about X-axis.

CALCULATION SHEET

CEC

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE 10/15/99	CHECKED	DATE	10/15/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	133

8 Casks, Best Estimate Soil Properties
Average of Maximum Absolute Bending Moments

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)		Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
193	8.04E+00	3.96	3.18E+01		194	2.88E+01	3.96	1.14E+02	
205	1.08E+01	2.76	2.99E+01		206	2.70E+01	2.76	7.44E+01	
217	3.08E+01	2.76	8.51E+01		218	3.25E+01	2.76	8.96E+01	
229	3.13E+01	2.76	8.63E+01		230	3.43E+01	2.76	9.47E+01	
241	8.86E+00	2.76	2.45E+01		242	4.81E+01	2.76	1.33E+02	
253	1.15E+01	3.98	4.56E+01		254	6.28E+01	3.98	2.50E+02	
	Total:	18.98	303.08272			Total:	18.98	755.431	
	Total per unit width:		**15.97**	k-ft/ft		Total per unit width:		**39.80**	k-ft/ft
195	7.29E+01	3.96	2.89E+02		196	9.70E+01	3.96	3.84E+02	
207	8.44E+01	2.76	2.33E+02		208	1.04E+02	2.76	2.86E+02	
219	6.89E+01	2.76	1.90E+02		220	9.24E+01	2.76	2.55E+02	
231	9.07E+01	2.76	2.50E+02		232	9.92E+01	2.76	2.74E+02	
243	1.49E+02	2.76	4.11E+02		244	1.60E+02	2.76	4.41E+02	
255	1.78E+02	3.98	7.07E+02		256	1.92E+02	3.98	7.63E+02	
	Total:	18.98	2080.362			Total:	18.98	2402.7828	
	Total per unit width:		**109.61**	k-ft/ft		Total per unit width:		**126.60**	k-ft/ft
197	9.48E+01	3.96	3.75E+02		198	1.12E+02	3.96	4.44E+02	
209	9.82E+01	2.76	2.71E+02		210	1.18E+02	2.76	3.25E+02	
221	1.27E+02	2.76	3.49E+02		222	1.48E+02	2.76	4.07E+02	
233	1.34E+02	2.76	3.71E+02		234	1.56E+02	2.76	4.31E+02	
245	1.09E+02	2.76	2.99E+02		246	1.20E+02	2.76	3.30E+02	
257	9.88E+01	3.98	3.93E+02		258	1.01E+02	3.98	4.02E+02	
	Total:	18.98	2059.2916			Total:	18.98	2339.454	
	Total per unit width:		**108.50**	k-ft/ft		Total per unit width:		**123.26**	k-ft/ft
199	1.13E+02	3.96	4.47E+02		200	1.17E+02	3.96	4.62E+02	
211	1.21E+02	2.76	3.33E+02		212	1.12E+02	2.76	3.10E+02	
223	1.50E+02	2.76	4.13E+02		224	1.25E+02	2.76	3.46E+02	
235	1.46E+02	2.76	4.02E+02		236	1.23E+02	2.76	3.39E+02	
247	1.14E+02	2.76	3.15E+02		248	1.09E+02	2.76	3.01E+02	
259	1.09E+02	3.98	4.32E+02		260	1.15E+02	3.98	4.56E+02	
	Total:	18.98	2342.11			Total:	18.98	2214.336	
	Total per unit width:		**123.40**	k-ft/ft		Total per unit width:		**116.67**	k-ft/ft

Note: Mxx = moment about Y-axis.

CALCULATION SHEET

CEC

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE 10/15/99	CHECKED AMM	DATE	10/15/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	134

8 Casks, Best Estimate Soil Properties
Average of Maximum Absolute Bending Moments

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)		Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
201	1.87E+02	3.96	7.39E+02		202	1.64E+02	3.96	6.48E+02	
213	2.03E+02	2.76	5.59E+02		214	1.82E+02	2.76	5.01E+02	
225	1.61E+02	2.76	4.45E+02		226	1.42E+02	2.76	3.92E+02	
237	1.29E+02	2.76	3.56E+02		238	1.10E+02	2.76	3.02E+02	
249	1.10E+02	2.76	3.04E+02		250	1.18E+02	2.76	3.26E+02	
261	1.13E+02	3.98	4.51E+02		262	1.26E+02	3.98	5.01E+02	
	Total:	18.98	2852.372			Total:	18.98	2669.576	
	Total per unit width:		**150.28**	k-ft/ft		Total per unit width:		**140.65**	k-ft/ft
203	5.63E+01	3.96	2.23E+02		204	9.33E+00	3.96	3.69E+01	
215	5.74E+01	2.76	1.58E+02		216	7.55E+00	2.76	2.08E+01	
227	5.53E+01	2.76	1.53E+02		228	2.13E+01	2.76	5.88E+01	
239	5.05E+01	2.76	1.39E+02		240	1.96E+01	2.76	5.42E+01	
251	4.63E+01	2.76	1.28E+02		252	1.03E+01	2.76	2.83E+01	
263	4.21E+01	3.98	1.67E+02		264	1.23E+01	3.98	4.90E+01	
	Total:	18.98	968.346			Total:	18.98	248.11424	
	Total per unit width:		**51.02**	k-ft/ft		Total per unit width:		**13.07**	k-ft/ft

Note: Mxx = moment about Y-axis.

CALCULATION SHEET

CEC

ORIGINATOR	DH	DATE	9/17/97	CALC. NO.	G(PO17)-2
				REV. NO.	0
				CHECKED	[illegible]
				DATE	9/22/97
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	135

2 Casks, Upper Bound Soil Properties
Maximum Absolute Moments (kip-ft/ft)
Ref. "2ub.out"

ELEM	XX-S/R	YY-S/R	XX-M/R	YY-M/R
193	7.67E-01	2.07E+01	7.42E+00	1.04E+02
194	2.34E+00	1.73E+01	4.25E+01	1.08E+02
195	4.88E+00	1.92E+01	1.06E+02	1.17E+02
196	9.76E+00	1.88E+01	1.20E+02	1.14E+02
197	9.66E+00	1.45E+01	7.72E+01	1.00E+02
198	9.79E+00	1.49E+01	8.46E+01	9.15E+01
199	1.01E+01	1.76E+01	8.73E+01	8.92E+01
200	1.07E+01	2.08E+01	7.82E+01	9.14E+01
201	1.20E+01	3.12E+01	8.82E+01	1.21E+02
202	4.87E+00	3.44E+01	9.85E+01	1.33E+02
203	2.33E+00	3.16E+01	3.26E+01	1.17E+02
204	7.77E-01	3.44E+01	7.34E+00	1.05E+02
205	1.42E+00	1.80E+01	1.15E+01	1.01E+02
206	2.19E+00	1.45E+01	5.08E+01	1.10E+02
207	3.99E+00	8.54E+00	1.16E+02	1.34E+02
208	1.26E+01	7.28E+00	1.30E+02	1.31E+02
209	1.41E+01	1.42E+01	8.88E+01	1.01E+02
210	1.41E+01	1.59E+01	1.02E+02	8.78E+01
211	1.36E+01	1.88E+01	1.04E+02	8.43E+01
212	1.50E+01	2.08E+01	9.25E+01	1.01E+02
213	1.54E+01	1.32E+01	1.02E+02	1.55E+02
214	4.21E+00	1.65E+01	1.12E+02	1.65E+02
215	2.35E+00	3.15E+01	3.16E+01	1.34E+02
216	1.93E+00	3.62E+01	7.93E+00	1.12E+02
217	2.09E+00	1.64E+01	3.81E+01	1.87E+02
218	1.00E+01	1.48E+01	5.69E+01	1.51E+02
219	9.07E+00	9.63E+00	9.08E+01	1.00E+02
220	9.57E+00	7.43E+00	1.04E+02	7.54E+01
221	1.11E+01	1.47E+01	9.80E+01	7.65E+01
222	2.29E+01	1.64E+01	1.15E+02	1.01E+02
223	2.42E+01	2.20E+01	1.32E+02	1.30E+02
224	8.84E+00	2.29E+01	1.23E+02	1.27E+02
225	9.99E+00	1.46E+01	7.19E+01	9.44E+01
226	1.19E+01	1.64E+01	6.83E+01	8.18E+01
227	1.39E+01	3.09E+01	3.52E+01	1.37E+02
228	2.16E+00	3.68E+01	4.14E+01	1.77E+02

CALCULATION SHEET

CEC

			CALC. NO.	G(PO17)-2	REV. NO. 0
ORIGINATOR	DH	DATE 9/17/99	CHECKED	[illegible]	DATE 9/23/99
PROJECT	Private Fuel Storage Facility				JOB NO. 1101-000
SUBJECT	Storage Pad Analysis and Design				SHEET NO. 136

2 Casks, Upper Bound Soil Properties
Maximum Absolute Moments (kip-ft/ft)
Ref. "2ub.out"

ELEM	XX-S/R	YY-S/R	XX-M/R	YY-M/R
229	2.13E+00	8.08E+00	3.74E+01	1.84E+02
230	1.01E+01	3.85E+00	4.81E+01	1.49E+02
231	1.01E+01	9.77E+00	6.60E+01	9.85E+01
232	1.07E+01	8.42E+00	8.05E+01	7.13E+01
233	1.15E+01	3.01E+00	1.06E+02	7.02E+01
234	2.35E+01	4.44E+00	1.23E+02	9.56E+01
235	2.50E+01	8.49E+00	1.34E+02	1.24E+02
236	9.48E+00	4.84E+00	1.24E+02	1.20E+02
237	1.06E+01	1.61E+01	8.14E+01	8.64E+01
238	1.24E+01	1.73E+01	6.09E+01	8.45E+01
239	1.40E+01	7.83E+00	4.38E+01	1.42E+02
240	2.20E+00	1.10E+01	4.11E+01	1.82E+02
241	1.21E+00	4.60E+00	6.26E+00	6.08E+01
242	2.57E+00	3.93E+00	2.81E+01	5.45E+01
243	4.19E+00	9.34E+00	6.17E+01	5.39E+01
244	1.42E+01	9.77E+00	8.67E+01	5.07E+01
245	1.47E+01	2.88E+00	1.10E+02	4.34E+01
246	1.47E+01	2.14E+00	1.27E+02	3.93E+01
247	1.53E+01	3.42E+00	1.31E+02	4.21E+01
248	1.68E+01	2.80E+00	1.20E+02	4.60E+01
249	1.72E+01	1.66E+01	1.05E+02	6.77E+01
250	5.34E+00	1.81E+01	9.57E+01	6.53E+01
251	2.66E+00	7.26E+00	3.90E+01	6.43E+01
252	1.77E+00	6.27E+00	7.36E+00	7.84E+01
253	1.07E+00	1.59E+00	1.12E+01	2.33E+01
254	2.96E+00	2.00E+00	3.76E+01	2.41E+01
255	5.20E+00	2.58E+00	7.05E+01	2.55E+01
256	1.08E+01	2.45E+00	9.17E+01	2.39E+01
257	1.24E+01	1.99E+00	1.16E+02	1.91E+01
258	1.33E+01	8.27E-01	1.33E+02	1.57E+01
259	1.40E+01	1.11E+00	1.39E+02	1.52E+01
260	1.44E+01	1.61E+00	1.27E+02	2.98E+01
261	1.43E+01	5.22E+00	1.26E+02	5.32E+01
262	5.26E+00	5.35E+00	1.11E+02	5.33E+01
263	2.97E+00	3.53E+00	3.83E+01	3.08E+01
264	1.10E+00	2.44E+00	9.17E+00	2.61E+01

CALCULATION SHEET

CEC

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE 10/15/99	CHECKED aum	DATE	10/15/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	137

2 Casks, Upper Bound Soil Properties
Average of Maximum Absolute Bending Moments

Elem	Myy (k-ft/ft)	Width (ft)	Myy*Width (k-ft)		Elem	Myy (k-ft/ft)	Width (ft)	Myy*Width (k-ft)	
193	1.04E+02	1.98	2.05E+02		205	1.01E+02	1.98	2.01E+02	
194	1.08E+02	2.76	2.99E+02		206	1.10E+02	2.76	3.04E+02	
195	1.17E+02	2.76	3.23E+02		207	1.34E+02	2.76	3.69E+02	
196	1.14E+02	2.76	3.16E+02		208	1.31E+02	2.76	3.60E+02	
197	1.00E+02	2.76	2.76E+02		209	1.01E+02	2.76	2.78E+02	
198	9.15E+01	1.98	1.81E+02		210	8.78E+01	1.98	1.74E+02	
199	8.92E+01	1.98	1.77E+02		211	8.43E+01	1.98	1.67E+02	
200	9.14E+01	2.76	2.52E+02		212	1.01E+02	2.76	2.78E+02	
201	1.21E+02	2.76	3.34E+02		213	1.55E+02	2.76	4.26E+02	
202	1.33E+02	2.76	3.66E+02		214	1.65E+02	2.76	4.57E+02	
203	1.17E+02	2.76	3.22E+02		215	1.34E+02	2.76	3.68E+02	
204	1.05E+02	1.98	2.08E+02		216	1.12E+02	1.98	2.22E+02	
	Total	30	3258.9174			Total	30	3604.8696	
	Total per unit width:		**108.63058**	k-ft/ft		Total per unit width:		**120.16232**	k-ft/ft
217	1.87E+02	1.98	3.70E+02		229	1.84E+02	1.98	3.65E+02	
218	1.51E+02	2.76	4.17E+02		230	1.49E+02	2.76	4.12E+02	
219	1.00E+02	2.76	2.76E+02		231	9.85E+01	2.76	2.72E+02	
220	7.54E+01	2.76	2.08E+02		232	7.13E+01	2.76	1.97E+02	
221	7.65E+01	2.76	2.11E+02		233	7.02E+01	2.76	1.94E+02	
222	1.01E+02	1.98	2.00E+02		234	9.56E+01	1.98	1.89E+02	
223	1.30E+02	1.98	2.58E+02		235	1.24E+02	1.98	2.45E+02	
224	1.27E+02	2.76	3.50E+02		236	1.20E+02	2.76	3.30E+02	
225	9.44E+01	2.76	2.61E+02		237	8.64E+01	2.76	2.38E+02	
226	8.18E+01	2.76	2.26E+02		238	8.45E+01	2.76	2.33E+02	
227	1.37E+02	2.76	3.78E+02		239	1.42E+02	2.76	3.93E+02	
228	1.77E+02	1.98	3.51E+02		240	1.82E+02	1.98	3.61E+02	
	Total	30	3504.6516			Total	30	3429.468	
	Total per unit width:		**116.82172**	k-ft/ft		Total per unit width:		**114.3156**	k-ft/ft
241	6.08E+01	1.98	1.20E+02		253	2.33E+01	1.98	4.62E+01	
242	5.45E+01	2.76	1.50E+02		254	2.41E+01	2.76	6.64E+01	
243	5.39E+01	2.76	1.49E+02		255	2.55E+01	2.76	7.04E+01	
244	5.07E+01	2.76	1.40E+02		256	2.39E+01	2.76	6.59E+01	
245	4.34E+01	2.76	1.20E+02		257	1.91E+01	2.76	5.26E+01	
246	3.93E+01	1.98	7.77E+01		258	1.57E+01	1.98	3.10E+01	
247	4.21E+01	1.98	8.34E+01		259	1.52E+01	1.98	3.02E+01	
248	4.60E+01	2.76	1.27E+02		260	2.98E+01	2.76	8.22E+01	
249	6.77E+01	2.76	1.87E+02		261	5.32E+01	2.76	1.47E+02	
250	6.53E+01	2.76	1.80E+02		262	5.33E+01	2.76	1.47E+02	
251	6.43E+01	2.76	1.77E+02		263	3.08E+01	2.76	8.50E+01	
252	7.84E+01	1.98	1.55E+02		264	2.61E+01	1.98	5.16E+01	
	Total	30	1666.8726			Total	30	875.3598	
	Total per unit width:		**55.56242**	k-ft/ft		Total per unit width:		**29.17866**	k-ft/ft

Note: Myy = moment about X-axis.

CALCULATION SHEET

				CALC. NO. G(PO17)-2	REV. NO. 0
ORIGINATOR	DH	DATE	10/15/99	CHECKED DAM	DATE 10/15/99
PROJECT	Private Fuel Storage Facility				JOB NO. 1101-000
SUBJECT	Storage Pad Analysis and Design				SHEET NO. 138

2 Casks, Upper Bound Soil Properties
Average of Maximum Absolute Bending Moments

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)		Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
193	7.42E+00	3.96	2.94E+01		194	4.25E+01	3.96	1.68E+02	
205	1.15E+01	2.76	3.18E+01		206	5.08E+01	2.76	1.40E+02	
217	3.81E+01	2.76	1.05E+02		218	5.69E+01	2.76	1.57E+02	
229	3.74E+01	2.76	1.03E+02		230	4.81E+01	2.76	1.33E+02	
241	6.26E+00	2.76	1.73E+01		242	2.81E+01	2.76	7.76E+01	
253	1.12E+01	3.98	4.44E+01		254	3.76E+01	3.98	1.50E+02	
	Total:	18.98	331.22172			Total:	18.98	825.6586	
	Total per unit width:		**17.45**	k-ft/ft		Total per unit width:		**43.50**	k-ft/ft
195	1.06E+02	3.96	4.19E+02		196	1.20E+02	3.96	4.76E+02	
207	1.16E+02	2.76	3.21E+02		208	1.30E+02	2.76	3.57E+02	
219	9.08E+01	2.76	2.51E+02		220	1.04E+02	2.76	2.86E+02	
231	6.60E+01	2.76	1.82E+02		232	8.05E+01	2.76	2.22E+02	
243	6.17E+01	2.76	1.70E+02		244	8.67E+01	2.76	2.39E+02	
255	7.05E+01	3.98	2.81E+02		256	9.17E+01	3.98	3.65E+02	
	Total:	18.98	1623.864			Total:	18.98	1946.1422	
	Total per unit width:		**85.56**	k-ft/ft		Total per unit width:		**102.54**	k-ft/ft
197	7.72E+01	3.96	3.06E+02		198	8.46E+01	3.96	3.35E+02	
209	8.88E+01	2.76	2.45E+02		210	1.02E+02	2.76	2.82E+02	
221	9.80E+01	2.76	2.71E+02		222	1.15E+02	2.76	3.19E+02	
233	1.06E+02	2.76	2.92E+02		234	1.23E+02	2.76	3.40E+02	
245	1.10E+02	2.76	3.04E+02		246	1.27E+02	2.76	3.49E+02	
257	1.16E+02	3.98	4.61E+02		258	1.33E+02	3.98	5.31E+02	
	Total:	18.98	1878.7412			Total:	18.98	2155.1804	
	Total per unit width:		**98.99**	k-ft/ft		Total per unit width:		**113.55**	k-ft/ft
199	8.73E+01	3.96	3.46E+02		200	7.82E+01	3.96	3.10E+02	
211	1.04E+02	2.76	2.88E+02		212	9.25E+01	2.76	2.55E+02	
223	1.32E+02	2.76	3.65E+02		224	1.23E+02	2.76	3.40E+02	
235	1.34E+02	2.76	3.69E+02		236	1.24E+02	2.76	3.41E+02	
247	1.31E+02	2.76	3.62E+02		248	1.20E+02	2.76	3.32E+02	
259	1.39E+02	3.98	5.52E+02		260	1.27E+02	3.98	5.07E+02	
	Total:	18.98	2281.9488			Total:	18.98	2084.668	
	Total per unit width:		**120.23**	k-ft/ft		Total per unit width:		**109.83**	k-ft/ft

Note: Mxx = moment about Y-axis.

CALCULATION SHEET

CEC

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE 10/15/99	CHECKED [illegible]	DATE	10/15/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	139

2 Casks, Upper Bound Soil Properties
Average of Maximum Absolute Bending Moments

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
201	8.82E+01	3.96	3.49E+02	
213	1.02E+02	2.76	2.81E+02	
225	7.19E+01	2.76	1.98E+02	
237	8.14E+01	2.76	2.25E+02	
249	1.05E+02	2.76	2.89E+02	
261	1.26E+02	3.98	5.01E+02	
	Total:	18.98	1843.3504	
	Total per unit width:		**97.12**	k-ft/ft

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
202	9.85E+01	3.96	3.90E+02	
214	1.12E+02	2.76	3.08E+02	
226	6.83E+01	2.76	1.88E+02	
238	6.09E+01	2.76	1.68E+02	
250	9.57E+01	2.76	2.64E+02	
262	1.11E+02	3.98	4.42E+02	
	Total:	18.98	1760.2848	
	Total per unit width:		**92.74**	k-ft/ft

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
203	3.26E+01	3.96	1.29E+02	
215	3.16E+01	2.76	8.73E+01	
227	3.52E+01	2.76	9.71E+01	
239	4.38E+01	2.76	1.21E+02	
251	3.90E+01	2.76	1.08E+02	
263	3.83E+01	3.98	1.52E+02	
	Total:	18.98	694.053	
	Total per unit width:		**36.57**	k-ft/ft

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
204	7.34E+00	3.96	2.91E+01	
216	7.93E+00	2.76	2.19E+01	
228	4.14E+01	2.76	1.14E+02	
240	4.11E+01	2.76	1.13E+02	
252	7.36E+00	2.76	2.03E+01	
264	9.17E+00	3.98	3.65E+01	
	Total:	18.98	335.43092	
	Total per unit width:		**17.67**	k-ft/ft

Note: Mxx = moment about Y-axis.

CALCULATION SHEET

CEC

ORIGINATOR	DH	DATE	9/17/99	CALC. NO.	G(PO17)-2
				REV. NO.	0
				CHECKED	auM
				DATE	9/23/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	140

4 Casks, Upper Bound Soil Properties
Maximum Absolute Moments (kip-ft/ft)
Ref. "4ub.out"

ELEM	XX-S/R	YY-S/R	XX-M/R	YY-M/R
193	1.49E+00	1.83E+01	8.36E+00	1.21E+02
194	4.42E+00	1.58E+01	3.16E+01	1.21E+02
195	9.57E+00	1.55E+01	6.62E+01	1.23E+02
196	1.71E+01	1.58E+01	8.29E+01	1.08E+02
197	1.11E+01	1.16E+01	7.14E+01	8.01E+01
198	8.69E+00	1.22E+01	8.37E+01	6.88E+01
199	1.06E+01	1.26E+01	9.05E+01	7.21E+01
200	1.30E+01	1.28E+01	1.07E+02	7.83E+01
201	1.65E+01	1.88E+01	1.21E+02	7.90E+01
202	9.41E+00	1.99E+01	9.70E+01	8.39E+01
203	4.35E+00	1.99E+01	3.36E+01	8.05E+01
204	1.47E+00	2.02E+01	7.63E+00	7.94E+01
205	9.71E-01	1.75E+01	7.31E+00	1.02E+02
206	3.20E+00	1.41E+01	2.75E+01	1.12E+02
207	6.24E+00	9.79E+00	7.02E+01	1.32E+02
208	1.06E+01	8.02E+00	7.92E+01	1.22E+02
209	1.08E+01	1.09E+01	6.53E+01	8.34E+01
210	1.29E+01	1.29E+01	8.23E+01	7.59E+01
211	1.19E+01	1.27E+01	9.35E+01	9.10E+01
212	1.48E+01	1.19E+01	1.33E+02	1.04E+02
213	1.77E+01	7.38E+00	1.54E+02	1.39E+02
214	3.57E+00	1.01E+01	1.14E+02	1.37E+02
215	2.79E+00	2.20E+01	4.12E+01	1.00E+02
216	1.12E+00	2.52E+01	9.01E+00	8.96E+01
217	2.53E+00	2.07E+01	3.25E+01	1.48E+02
218	1.18E+01	1.56E+01	1.85E+01	1.20E+02
219	8.15E+00	6.84E+00	6.32E+01	8.07E+01
220	1.06E+01	5.77E+00	7.18E+01	6.47E+01
221	1.53E+01	1.34E+01	8.14E+01	8.36E+01
222	2.19E+01	1.49E+01	7.91E+01	1.14E+02
223	2.63E+01	1.43E+01	1.61E+02	1.61E+02
224	9.36E+00	1.41E+01	1.80E+02	1.66E+02
225	9.93E+00	9.10E+00	1.35E+02	1.32E+02
226	1.37E+01	8.96E+00	9.81E+01	9.45E+01
227	1.85E+01	2.11E+01	4.35E+01	9.15E+01
228	3.42E+00	3.11E+01	1.96E+01	1.09E+02

CEC

CALCULATION SHEET

ORIGINATOR	DH	DATE	9/17/99	CALC. NO.	G(PO17)-2
				REV. NO.	0
				CHECKED	aum
				DATE	9/?/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	141

4 Casks, Upper Bound Soil Properties
Maximum Absolute Moments (kip-ft/ft)
Ref. "4ub.out"

ELEM	XX-S/R	YY-S/R	XX-M/R	YY-M/R
229	2.56E+00	1.15E+01	3.26E+01	1.52E+02
230	1.16E+01	6.49E+00	1.64E+01	1.24E+02
231	7.46E+00	7.41E+00	6.32E+01	8.29E+01
232	1.03E+01	7.66E+00	7.98E+01	6.51E+01
233	1.54E+01	4.93E+00	9.20E+01	8.07E+01
234	2.22E+01	6.05E+00	8.63E+01	1.07E+02
235	2.68E+01	6.26E+00	1.68E+02	1.47E+02
236	9.69E+00	5.59E+00	1.78E+02	1.44E+02
237	8.51E+00	9.97E+00	1.22E+02	1.01E+02
238	1.21E+01	9.75E+00	9.49E+01	7.35E+01
239	1.85E+01	7.19E+00	4.29E+01	8.64E+01
240	3.33E+00	1.40E+01	1.85E+01	1.03E+02
241	1.81E+00	5.46E+00	4.54E+00	4.41E+01
242	3.87E+00	5.33E+00	2.29E+01	4.09E+01
243	6.92E+00	1.05E+01	6.14E+01	3.45E+01
244	1.11E+01	9.54E+00	8.76E+01	3.54E+01
245	1.35E+01	2.87E+00	9.56E+01	4.05E+01
246	1.45E+01	3.02E+00	8.25E+01	4.70E+01
247	1.51E+01	4.11E+00	1.15E+02	5.06E+01
248	1.76E+01	5.11E+00	1.31E+02	5.13E+01
249	1.87E+01	9.25E+00	1.12E+02	4.71E+01
250	5.48E+00	1.19E+01	8.30E+01	4.13E+01
251	2.69E+00	8.29E+00	4.03E+01	3.59E+01
252	2.54E+00	6.41E+00	7.54E+00	3.41E+01
253	1.40E+00	2.04E+00	1.09E+01	1.38E+01
254	3.91E+00	2.31E+00	3.46E+01	1.41E+01
255	6.78E+00	2.96E+00	6.22E+01	1.87E+01
256	9.97E+00	3.14E+00	9.31E+01	1.89E+01
257	1.08E+01	1.17E+00	1.02E+02	1.57E+01
258	1.18E+01	1.34E+00	9.21E+01	1.92E+01
259	1.36E+01	1.81E+00	9.82E+01	2.08E+01
260	1.51E+01	2.40E+00	1.14E+02	1.95E+01
261	1.71E+01	3.19E+00	1.05E+02	2.63E+01
262	6.05E+00	2.98E+00	8.17E+01	2.67E+01
263	3.86E+00	4.20E+00	3.47E+01	1.51E+01
264	1.42E+00	2.34E+00	7.62E+00	1.33E+01

CALCULATION SHEET

CEC

			CALC. NO.	G(PO17)-2	REV. NO. 0
ORIGINATOR	DH	DATE 10/15/99	CHECKED	auM	DATE 10/15/99
PROJECT	Private Fuel Storage Facility				JOB NO. 1101-000
SUBJECT	Storage Pad Analysis and Design				SHEET NO. 142

4 Casks, Upper Bound Soil Properties
Average of Maximum Absolute Bending Moments

Elem	Myy (k-ft/ft)	Width (ft)	Myy*Width (k-ft)		Elem	Myy (k-ft/ft)	Width (ft)	Myy*Width (k-ft)	
193	1.21E+02	1.98	2.39E+02		205	1.02E+02	1.98	2.01E+02	
194	1.21E+02	2.76	3.33E+02		206	1.12E+02	2.76	3.08E+02	
195	1.23E+02	2.76	3.38E+02		207	1.32E+02	2.76	3.64E+02	
196	1.08E+02	2.76	2.99E+02		208	1.22E+02	2.76	3.36E+02	
197	8.01E+01	2.76	2.21E+02		209	8.34E+01	2.76	2.30E+02	
198	6.88E+01	1.98	1.36E+02		210	7.59E+01	1.98	1.50E+02	
199	7.21E+01	1.98	1.43E+02		211	9.10E+01	1.98	1.80E+02	
200	7.83E+01	2.76	2.16E+02		212	1.04E+02	2.76	2.87E+02	
201	7.90E+01	2.76	2.18E+02		213	1.39E+02	2.76	3.84E+02	
202	8.39E+01	2.76	2.32E+02		214	1.37E+02	2.76	3.77E+02	
203	8.05E+01	2.76	2.22E+02		215	1.00E+02	2.76	2.77E+02	
204	7.94E+01	1.98	1.57E+02		216	8.96E+01	1.98	1.77E+02	
	Total	30	2753.9628			Total	30	3272.6688	
	Total per unit width:		**91.79876**	k-ft/ft		Total per unit width:		**109.08896**	k-ft/ft
217	1.48E+02	1.98	2.92E+02		229	1.52E+02	1.98	3.01E+02	
218	1.20E+02	2.76	3.32E+02		230	1.24E+02	2.76	3.41E+02	
219	8.07E+01	2.76	2.23E+02		231	8.29E+01	2.76	2.29E+02	
220	6.47E+01	2.76	1.79E+02		232	6.51E+01	2.76	1.80E+02	
221	8.36E+01	2.76	2.31E+02		233	8.07E+01	2.76	2.23E+02	
222	1.14E+02	1.98	2.26E+02		234	1.07E+02	1.98	2.12E+02	
223	1.61E+02	1.98	3.18E+02		235	1.47E+02	1.98	2.92E+02	
224	1.66E+02	2.76	4.59E+02		236	1.44E+02	2.76	3.97E+02	
225	1.32E+02	2.76	3.63E+02		237	1.01E+02	2.76	2.77E+02	
226	9.45E+01	2.76	2.61E+02		238	7.35E+01	2.76	2.03E+02	
227	9.15E+01	2.76	2.52E+02		239	8.64E+01	2.76	2.38E+02	
228	1.09E+02	1.98	2.15E+02		240	1.03E+02	1.98	2.05E+02	
	Total	30	3350.0316			Total	30	3096.87	
	Total per unit width:		**111.66772**	k-ft/ft		Total per unit width:		**103.229**	k-ft/ft
241	4.41E+01	1.98	8.74E+01		253	1.38E+01	1.98	2.72E+01	
242	4.09E+01	2.76	1.13E+02		254	1.41E+01	2.76	3.88E+01	
243	3.45E+01	2.76	9.53E+01		255	1.87E+01	2.76	5.17E+01	
244	3.54E+01	2.76	9.78E+01		256	1.89E+01	2.76	5.21E+01	
245	4.05E+01	2.76	1.12E+02		257	1.57E+01	2.76	4.32E+01	
246	4.70E+01	1.98	9.30E+01		258	1.92E+01	1.98	3.80E+01	
247	5.06E+01	1.98	1.00E+02		259	2.08E+01	1.98	4.12E+01	
248	5.13E+01	2.76	1.42E+02		260	1.95E+01	2.76	5.38E+01	
249	4.71E+01	2.76	1.30E+02		261	2.63E+01	2.76	7.25E+01	
250	4.13E+01	2.76	1.14E+02		262	2.67E+01	2.76	7.36E+01	
251	3.59E+01	2.76	9.91E+01		263	1.51E+01	2.76	4.16E+01	
252	3.41E+01	1.98	6.76E+01		264	1.33E+01	1.98	2.64E+01	
	Total	30	1250.829			Total	30	560.1648	
	Total per unit width:		**41.6943**	k-ft/ft		Total per unit width:		**18.67216**	k-ft/ft

Note: Myy = moment about X-axis.

4 Casks, Upper Bound Soil Properties
Average of Maximum Absolute Bending Moments

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)		Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
193	8.36E+00	3.96	3.31E+01		194	3.16E+01	3.96	1.25E+02	
205	7.31E+00	2.76	2.02E+01		206	2.75E+01	2.76	7.58E+01	
217	3.25E+01	2.76	8.97E+01		218	1.85E+01	2.76	5.09E+01	
229	3.26E+01	2.76	8.99E+01		230	1.64E+01	2.76	4.52E+01	
241	4.54E+00	2.76	1.25E+01		242	2.29E+01	2.76	6.33E+01	
253	1.09E+01	3.98	4.32E+01		254	3.46E+01	3.98	1.38E+02	
	Total:	18.98	288.5914			Total:	18.98	498.1976	
	Total per unit width:		**15.21**	k-ft/ft		Total per unit width:		**26.25**	k-ft/ft
195	6.62E+01	3.96	2.62E+02		196	8.29E+01	3.96	3.28E+02	
207	7.02E+01	2.76	1.94E+02		208	7.92E+01	2.76	2.18E+02	
219	6.32E+01	2.76	1.75E+02		220	7.18E+01	2.76	1.98E+02	
231	6.32E+01	2.76	1.74E+02		232	7.98E+01	2.76	2.20E+02	
243	6.14E+01	2.76	1.70E+02		244	8.76E+01	2.76	2.42E+02	
255	6.22E+01	3.98	2.48E+02		256	9.31E+01	3.98	3.71E+02	
	Total:	18.98	1222.0414			Total:	18.98	1577.7028	
	Total per unit width:		**64.39**	k-ft/ft		Total per unit width:		**83.12**	k-ft/ft
197	7.14E+01	3.96	2.83E+02		198	8.37E+01	3.96	3.32E+02	
209	6.53E+01	2.76	1.80E+02		210	8.23E+01	2.76	2.27E+02	
221	8.14E+01	2.76	2.25E+02		222	7.91E+01	2.76	2.18E+02	
233	9.20E+01	2.76	2.54E+02		234	8.63E+01	2.76	2.38E+02	
245	9.56E+01	2.76	2.64E+02		246	8.25E+01	2.76	2.28E+02	
257	1.02E+02	3.98	4.06E+02		258	9.21E+01	3.98	3.67E+02	
	Total:	18.98	1610.836			Total:	18.98	1609.4744	
	Total per unit width:		**84.87**	k-ft/ft		Total per unit width:		**84.80**	k-ft/ft
199	9.05E+01	3.96	3.58E+02		200	1.07E+02	3.96	4.25E+02	
211	9.35E+01	2.76	2.58E+02		212	1.33E+02	2.76	3.67E+02	
223	1.61E+02	2.76	4.43E+02		224	1.80E+02	2.76	4.97E+02	
235	1.68E+02	2.76	4.65E+02		236	1.78E+02	2.76	4.92E+02	
247	1.15E+02	2.76	3.18E+02		248	1.31E+02	2.76	3.61E+02	
259	9.82E+01	3.98	3.91E+02		260	1.14E+02	3.98	4.54E+02	
	Total:	18.98	2232.6918			Total:	18.98	2597.126	
	Total per unit width:		**117.63**	k-ft/ft		Total per unit width:		**136.83**	k-ft/ft

Note: Mxx = moment about Y-axis.

CALCULATION SHEET

CEC

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE 10/15/99	CHECKED aim	DATE	10/15/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	144

4 Casks, Upper Bound Soil Properties
Average of Maximum Absolute Bending Moments

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)
201	1.21E+02	3.96	4.78E+02
213	1.54E+02	2.76	4.24E+02
225	1.35E+02	2.76	3.72E+02
237	1.22E+02	2.76	3.37E+02
249	1.12E+02	2.76	3.09E+02
261	1.05E+02	3.98	4.16E+02
	Total:	18.98	2335.706
	Total per unit width:		**123.06** k-ft/ft

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)
202	9.70E+01	3.96	3.84E+02
214	1.14E+02	2.76	3.15E+02
226	9.81E+01	2.76	2.71E+02
238	9.49E+01	2.76	2.62E+02
250	8.30E+01	2.76	2.29E+02
262	8.17E+01	3.98	3.25E+02
	Total:	18.98	1786.2064
	Total per unit width:		**94.11** k-ft/ft

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)
203	3.36E+01	3.96	1.33E+02
215	4.12E+01	2.76	1.14E+02
227	4.35E+01	2.76	1.20E+02
239	4.29E+01	2.76	1.18E+02
251	4.03E+01	2.76	1.11E+02
263	3.47E+01	3.98	1.38E+02
	Total:	18.98	734.5784
	Total per unit width:		**38.70** k-ft/ft

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)
204	7.63E+00	3.96	3.02E+01
216	9.01E+00	2.76	2.49E+01
228	1.96E+01	2.76	5.41E+01
240	1.85E+01	2.76	5.11E+01
252	7.54E+00	2.76	2.08E+01
264	7.62E+00	3.98	3.03E+01
	Total:	18.98	211.38462
	Total per unit width:		**11.14** k-ft/ft

Note: Mxx = moment about Y-axis.

CALCULATION SHEET

CEC

ORIGINATOR	DH	DATE	9/17/99	CALC. NO.	G(PO17)-2
				REV. NO.	0
				CHECKED	AUM
				DATE	9/23/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	145

8 Casks, Upper Bound Soil Properties
Maximum Absolute Moments (kip-ft/ft)
Ref. "8ub.out"

ELEM	XX-S/R	YY-S/R	XX-M/R	YY-M/R
229	2.54E+00	9.75E+00	2.82E+01	1.27E+02
230	1.28E+01	9.02E+00	4.12E+01	1.05E+02
231	8.55E+00	6.78E+00	7.60E+01	7.12E+01
232	9.48E+00	6.14E+00	9.99E+01	4.87E+01
233	1.25E+01	1.01E+01	1.07E+02	7.56E+01
234	2.01E+01	1.19E+01	1.37E+02	1.16E+02
235	2.36E+01	8.57E+00	2.00E+02	1.51E+02
236	9.65E+00	7.67E+00	1.78E+02	1.45E+02
237	1.00E+01	1.18E+01	1.04E+02	1.02E+02
238	1.20E+01	1.35E+01	8.34E+01	6.57E+01
239	1.62E+01	1.01E+01	3.37E+01	8.87E+01
240	2.65E+00	1.23E+01	2.13E+01	1.11E+02
241	1.57E+00	6.68E+00	6.79E+00	5.93E+01
242	3.16E+00	5.37E+00	3.28E+01	5.16E+01
243	5.02E+00	7.98E+00	8.25E+01	3.88E+01
244	1.30E+01	7.43E+00	1.04E+02	3.08E+01
245	1.38E+01	5.88E+00	1.09E+02	3.80E+01
246	1.46E+01	6.87E+00	1.32E+02	5.02E+01
247	1.36E+01	5.45E+00	1.60E+02	5.55E+01
248	1.54E+01	4.56E+00	1.46E+02	5.73E+01
249	1.64E+01	1.44E+01	1.14E+02	6.62E+01
250	6.01E+00	1.54E+01	8.85E+01	6.92E+01
251	2.80E+00	7.10E+00	3.50E+01	4.47E+01
252	2.05E+00	7.68E+00	5.87E+00	4.81E+01
253	1.39E+00	2.47E+00	1.28E+01	1.90E+01
254	3.85E+00	1.98E+00	4.64E+01	1.82E+01
255	6.65E+00	4.90E+00	9.01E+01	2.10E+01
256	1.18E+01	5.30E+00	1.08E+02	2.00E+01
257	1.11E+01	1.79E+00	1.12E+02	1.54E+01
258	1.17E+01	2.33E+00	1.25E+02	1.99E+01
259	1.22E+01	1.95E+00	1.31E+02	2.40E+01
260	1.35E+01	2.23E+00	1.21E+02	2.72E+01
261	1.48E+01	3.60E+00	1.14E+02	4.59E+01
262	6.72E+00	3.40E+00	9.71E+01	4.70E+01
263	4.13E+00	2.73E+00	3.36E+01	3.09E+01
264	1.47E+00	2.83E+00	9.64E+00	2.06E+01

8 Casks, Upper Bound Soil Properties
Maximum Absolute Moments (kip-ft/ft)
Ref. "8ub.out"

ELEM	XX-S/R	YY-S/R	XX-M/R	YY-M/R
193	1.60E+00	2.24E+01	7.02E+00	7.00E+01
194	4.79E+00	1.85E+01	3.31E+01	7.34E+01
195	9.89E+00	1.49E+01	7.07E+01	7.95E+01
196	1.17E+01	1.29E+01	9.50E+01	7.61E+01
197	1.20E+01	1.08E+01	9.21E+01	5.82E+01
198	1.25E+01	1.11E+01	1.03E+02	4.86E+01
199	1.34E+01	1.22E+01	1.12E+02	5.50E+01
200	1.46E+01	1.45E+01	1.06E+02	7.69E+01
201	1.67E+01	2.47E+01	1.31E+02	1.09E+02
202	1.04E+01	2.79E+01	1.23E+02	1.12E+02
203	5.16E+00	2.52E+01	3.20E+01	9.38E+01
204	1.72E+00	2.86E+01	6.13E+00	8.54E+01
205	1.45E+00	1.85E+01	1.08E+01	6.53E+01
206	2.37E+00	1.48E+01	4.01E+01	6.93E+01
207	5.61E+00	1.15E+01	7.56E+01	8.53E+01
208	1.17E+01	1.06E+01	9.64E+01	8.77E+01
209	1.29E+01	9.67E+00	9.72E+01	7.91E+01
210	1.38E+01	1.14E+01	1.21E+02	7.31E+01
211	1.46E+01	1.38E+01	1.46E+02	6.67E+01
212	1.62E+01	1.59E+01	1.36E+02	9.74E+01
213	1.65E+01	1.26E+01	1.51E+02	1.52E+02
214	4.53E+00	1.42E+01	1.44E+02	1.53E+02
215	3.00E+00	2.45E+01	3.56E+01	1.10E+02
216	1.64E+00	2.97E+01	7.61E+00	9.81E+01
217	2.51E+00	1.54E+01	2.85E+01	1.41E+02
218	1.28E+01	1.27E+01	4.58E+01	1.14E+02
219	8.61E+00	7.99E+00	7.24E+01	7.67E+01
220	1.06E+01	7.50E+00	9.75E+01	6.48E+01
221	1.24E+01	1.11E+01	1.02E+02	8.43E+01
222	2.02E+01	1.27E+01	1.34E+02	1.14E+02
223	2.36E+01	1.76E+01	1.96E+02	1.48E+02
224	9.64E+00	1.84E+01	1.76E+02	1.41E+02
225	1.02E+01	9.50E+00	9.97E+01	9.65E+01
226	1.21E+01	1.11E+01	9.47E+01	7.59E+01
227	1.63E+01	2.55E+01	3.35E+01	9.97E+01
228	2.68E+00	2.93E+01	2.14E+01	1.17E+02

8 Casks, Upper Bound Soil Properties
Average of Maximum Absolute Bending Moments

Elem	Myy (k-ft/ft)	Width (ft)	Myy*Width (k-ft)		Elem	Myy (k-ft/ft)	Width (ft)	Myy*Width (k-ft)	
193	7.00E+01	1.98	1.39E+02		205	6.53E+01	1.98	1.29E+02	
194	7.34E+01	2.76	2.03E+02		206	6.93E+01	2.76	1.91E+02	
195	7.95E+01	2.76	2.20E+02		207	8.53E+01	2.76	2.35E+02	
196	7.61E+01	2.76	2.10E+02		208	8.77E+01	2.76	2.42E+02	
197	5.82E+01	2.76	1.61E+02		209	7.91E+01	2.76	2.18E+02	
198	4.86E+01	1.98	9.63E+01		210	7.31E+01	1.98	1.45E+02	
199	5.50E+01	1.98	1.09E+02		211	6.67E+01	1.98	1.32E+02	
200	7.69E+01	2.76	2.12E+02		212	9.74E+01	2.76	2.69E+02	
201	1.09E+02	2.76	3.01E+02		213	1.52E+02	2.76	4.20E+02	
202	1.12E+02	2.76	3.08E+02		214	1.53E+02	2.76	4.23E+02	
203	9.38E+01	2.76	2.59E+02		215	1.10E+02	2.76	3.02E+02	
204	8.54E+01	1.98	1.69E+02		216	9.81E+01	1.98	1.94E+02	
	Total	30	2385.9846			Total	30	2901.0906	
	Total per unit width:		**79.53282**	k-ft/ft		Total per unit width:		**96.70302**	k-ft/ft
217	1.41E+02	1.98	2.78E+02		229	1.27E+02	1.98	2.52E+02	
218	1.14E+02	2.76	3.16E+02		230	1.05E+02	2.76	2.90E+02	
219	7.67E+01	2.76	2.12E+02		231	7.12E+01	2.76	1.97E+02	
220	6.48E+01	2.76	1.79E+02		232	4.87E+01	2.76	1.34E+02	
221	8.43E+01	2.76	2.33E+02		233	7.56E+01	2.76	2.09E+02	
222	1.14E+02	1.98	2.26E+02		234	1.16E+02	1.98	2.29E+02	
223	1.48E+02	1.98	2.94E+02		235	1.51E+02	1.98	2.99E+02	
224	1.41E+02	2.76	3.89E+02		236	1.45E+02	2.76	4.00E+02	
225	9.65E+01	2.76	2.66E+02		237	1.02E+02	2.76	2.80E+02	
226	7.59E+01	2.76	2.09E+02		238	6.57E+01	2.76	1.81E+02	
227	9.97E+01	2.76	2.75E+02		239	8.87E+01	2.76	2.45E+02	
228	1.17E+02	1.98	2.31E+02		240	1.11E+02	1.98	2.20E+02	
	Total	30	3108.276			Total	30	2936.1228	
	Total per unit width:		**103.6092**	k-ft/ft		Total per unit width:		**97.87076**	k-ft/ft
241	5.93E+01	1.98	1.17E+02		253	1.90E+01	1.98	3.76E+01	
242	5.16E+01	2.76	1.42E+02		254	1.82E+01	2.76	5.01E+01	
243	3.88E+01	2.76	1.07E+02		255	2.10E+01	2.76	5.80E+01	
244	3.08E+01	2.76	8.50E+01		256	2.00E+01	2.76	5.52E+01	
245	3.80E+01	2.76	1.05E+02		257	1.54E+01	2.76	4.26E+01	
246	5.02E+01	1.98	9.93E+01		258	1.99E+01	1.98	3.94E+01	
247	5.55E+01	1.98	1.10E+02		259	2.40E+01	1.98	4.75E+01	
248	5.73E+01	2.76	1.58E+02		260	2.72E+01	2.76	7.51E+01	
249	6.62E+01	2.76	1.83E+02		261	4.59E+01	2.76	1.27E+02	
250	6.92E+01	2.76	1.91E+02		262	4.70E+01	2.76	1.30E+02	
251	4.47E+01	2.76	1.23E+02		263	3.09E+01	2.76	8.52E+01	
252	4.81E+01	1.98	9.52E+01		264	2.06E+01	1.98	4.08E+01	
	Total	30	1516.4706			Total	30	788.0334	
	Total per unit width:		**50.54902**	k-ft/ft		Total per unit width:		**26.26778**	k-ft/ft

Note: Myy = moment about X-axis.

CALCULATION SHEET

CEC

				CALC. NO. G(PO17)-2	REV. NO. 0
ORIGINATOR DH		DATE 10/15/99		CHECKED aum	DATE 10/15/99
PROJECT Private Fuel Storage Facility					JOB NO. 1101-000
SUBJECT Storage Pad Analysis and Design					SHEET NO. 148

8 Casks, Upper Bound Soil Properties
Average of Maximum Absolute Bending Moments

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)		Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
193	7.02E+00	3.96	2.78E+01		194	3.31E+01	3.96	1.31E+02	
205	1.08E+01	2.76	2.98E+01		206	4.01E+01	2.76	1.11E+02	
217	2.85E+01	2.76	7.87E+01		218	4.58E+01	2.76	1.26E+02	
229	2.82E+01	2.76	7.79E+01		230	4.12E+01	2.76	1.14E+02	
241	6.79E+00	2.76	1.87E+01		242	3.28E+01	2.76	9.06E+01	
253	1.28E+01	3.98	5.08E+01		254	4.64E+01	3.98	1.85E+02	
	Total:	18.98	283.66376			Total:	18.98	757.0962	
	Total per unit width:		**14.95**	k-ft/ft		Total per unit width:		**39.89**	k-ft/ft
195	7.07E+01	3.96	2.80E+02		196	9.50E+01	3.96	3.76E+02	
207	7.56E+01	2.76	2.09E+02		208	9.64E+01	2.76	2.66E+02	
219	7.24E+01	2.76	2.00E+02		220	9.75E+01	2.76	2.69E+02	
231	7.60E+01	2.76	2.10E+02		232	9.99E+01	2.76	2.76E+02	
243	8.25E+01	2.76	2.28E+02		244	1.04E+02	2.76	2.87E+02	
255	9.01E+01	3.98	3.59E+02		256	1.08E+02	3.98	4.31E+02	
	Total:	18.98	1484.357			Total:	18.98	1905.126	
	Total per unit width:		**78.21**	k-ft/ft		Total per unit width:		**100.38**	k-ft/ft
197	9.21E+01	3.96	3.65E+02		198	1.03E+02	3.96	4.08E+02	
209	9.72E+01	2.76	2.68E+02		210	1.21E+02	2.76	3.33E+02	
221	1.02E+02	2.76	2.82E+02		222	1.34E+02	2.76	3.69E+02	
233	1.07E+02	2.76	2.96E+02		234	1.37E+02	2.76	3.79E+02	
245	1.09E+02	2.76	3.00E+02		246	1.32E+02	2.76	3.65E+02	
257	1.12E+02	3.98	4.45E+02		258	1.25E+02	3.98	4.97E+02	
	Total:	18.98	1956.8148			Total:	18.98	2351.22	
	Total per unit width:		**103.10**	k-ft/ft		Total per unit width:		**123.88**	k-ft/ft
199	1.12E+02	3.96	4.45E+02		200	1.06E+02	3.96	4.19E+02	
211	1.46E+02	2.76	4.04E+02		212	1.36E+02	2.76	3.75E+02	
223	1.96E+02	2.76	5.40E+02		224	1.76E+02	2.76	4.86E+02	
235	2.00E+02	2.76	5.53E+02		236	1.78E+02	2.76	4.92E+02	
247	1.60E+02	2.76	4.41E+02		248	1.46E+02	2.76	4.02E+02	
259	1.31E+02	3.98	5.21E+02		260	1.21E+02	3.98	4.82E+02	
	Total:	18.98	2903.088			Total:	18.98	2656.186	
	Total per unit width:		**152.96**	k-ft/ft		Total per unit width:		**139.95**	k-ft/ft

Note: Mxx = moment about Y-axis.

CALCULATION SHEET

CEC

ORIGINATOR	DH	DATE	10/15/99	CALC. NO.	G(PO17)-2
				REV. NO.	0
				CHECKED	awn
				DATE	10/15/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	149

8 Casks, Upper Bound Soil Properties
Average of Maximum Absolute Bending Moments

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)		Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
201	1.31E+02	3.96	5.17E+02		202	1.23E+02	3.96	4.85E+02	
213	1.51E+02	2.76	4.15E+02		214	1.44E+02	2.76	3.97E+02	
225	9.97E+01	2.76	2.75E+02		226	9.47E+01	2.76	2.61E+02	
237	1.04E+02	2.76	2.88E+02		238	8.34E+01	2.76	2.30E+02	
249	1.14E+02	2.76	3.14E+02		250	8.85E+01	2.76	2.44E+02	
261	1.14E+02	3.98	4.53E+02		262	9.71E+01	3.98	3.87E+02	
	Total:	18.98	2262.2332			Total:	18.98	2005.357	
	Total per unit width:		**119.19**	k-ft/ft		Total per unit width:		**105.66**	k-ft/ft

Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)		Elem	Mxx (k-ft/ft)	Width (ft)	Mxx*Width (k-ft)	
203	3.20E+01	3.96	1.27E+02		204	6.13E+00	3.96	2.43E+01	
215	3.56E+01	2.76	9.82E+01		216	7.61E+00	2.76	2.10E+01	
227	3.35E+01	2.76	9.25E+01		228	2.14E+01	2.76	5.89E+01	
239	3.37E+01	2.76	9.30E+01		240	2.13E+01	2.76	5.88E+01	
251	3.50E+01	2.76	9.66E+01		252	5.87E+00	2.76	1.62E+01	
263	3.36E+01	3.98	1.34E+02		264	9.64E+00	3.98	3.84E+01	
	Total:	18.98	640.8396			Total:	18.98	217.57778	
	Total per unit width:		**33.76**	k-ft/ft		Total per unit width:		**11.46**	k-ft/ft

Note: Mxx = moment about Y-axis.

5.2 DYNAMIC ANALYSIS USING SASSI MODEL

This section documents SASSI dynamic analyses of the pad. The analyses were performed to check the CECSAP analyses. The following three analyses were performed:

- Lower Bound Soil Properties
- Best Estimate Soil Properties
- Upper Bound Soil Properties

For each analysis, the applied load consisted of a single vertical force applied to quadrant 2 of cask 1. Results in the form of vertical displacements and bending moments in the pad are compared to CECSAP results.

5.2.1 SASSI Model

The strain-compatible soil properties for the SASSI model were provided by Reference 1. They are listed on the following pages.

(FROM REF. 1)

CEC JOB NO. 1101-000 BY bH DATE 9/8/99 CHECK [illegible] DATE 9/23/99 CALC. NO. G(PO17)-2 REV. NO. 0 SHEET NO. 152

Table 1
Dynamic Soil Properties for SASSI Model

High Range Properties

Shake Layers	Depth Top (ft)	Depth Bottom (ft)	Density (pcf)	Wave Velocity Vs (fps)	Wave Velocity Vp (fps)	Damping Ratio Shear (%)	Damping Ratio Compression (%)
1-2	0	4	85	621	1390	3.2	3.2
3-5	4	10	85	524	1390	7.4	7.4
6-7	10	14	92.5	817	1646	5.9	5.9
8-10	14	20	92.5	876	1770	6.4	6.4
11-12	20	25	92.5	834	1770	7.5	7.5
13-14	25	33	115	1067	2088	4.6	4.6
15-17	33	45	115	1013	2088	5.6	5.6
18-25	45	85	120	2723	4808	2.3	2.3
26-33	85	125	135	5741	9945	2.0	2.0
34-38	125	175	145	5741	9945	2.0	2.0
39-47	175	625	145	5741	9945	2.0	2.0
	625		170	6400	11155	1.8	1

Best Estimate Properties

Shake Layers	Depth Top (ft)	Depth Bottom (ft)	Density (pcf)	Wave Velocity Vs (fps)	Wave Velocity Vp (fps)	Damping Ratio Shear (%)	Damping Ratio Compression (%)
1-2	0	4	85	488	1135	4.2	4.2
3-5	4	10	85	378	1135	9.9	9.9
6-7	10	14	92.5	626	1344	7.4	7.4
8-10	14	20	92.5	667	1445	8.0	8.0
11-12	20	25	92.5	611	1445	9.7	9.7
13-14	25	33	115	824	1705	5.7	5.7
15-17	33	45	115	758	1705	7.5	7.5
18-25	45	85	120	1861	3400	3.3	3.3
26-33	85	125	135	4511	7814	2.3	2.3
34-38	125	175	145	4511	7814	2.3	2.3
39-47	175	625	145	4511	7814	2.3	2.3
	625		170	6400	11155	1.6	1

Low Range Properties

Shake Layers	Depth Top (ft)	Depth Bottom (ft)	Density (pcf)	Wave Velocity Vs (fps)	Wave Velocity Vp (fps)	Damping Ratio Shear (%)	Damping Ratio Compression (%)
1-2	0	4	85	379	927	5.5	5.5
3-5	4	10	85	245	927	13.5	10.0
6-7	10	14	92.5	467	1097	9.2	9.2
8-10	14	20	92.5	477	1180	10.6	10.0
11-12	20	25	92.5	407	1180	13.2	10.0
13-14	25	33	115	615	1392	7.6	7.6
15-17	33	45	115	535	1392	10.3	10.0
18-25	45	85	120	1232	2404	4.9	4.9
26-33	85	125	135	1913	3460	4.6	4.6
34-38	125	175	145	2419	5600	4.3	4.3
39-47	175	625	145	3281	5683	2.6	2.6
	625		170	6400	11155	1.4	1

CALCULATION SHEET

CEC

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE 9/23/99	CHECKED KL	DATE	9/23/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	153

Dynamic Soil Properties for SASSI Model (from Ref. 1)
Lower Bound Properties

Layer	Thick (ft)	Density (kcf)	Vs (ft/sec)	Vp (ft/sec)	Damping Vs	Damping Vp	Top of Layer Elevation (ft)	Poisson's ratio	Approx. Cut-off Freq. (cps)
1	2	0.085	379	927	0.055	0.055	0	0.3996	37.9
2	2	0.085	379	927	0.055	0.055	-2	0.3996	37.9
3	1.5	0.085	245	927	0.135	0.1	-4	0.4625	32.7
4	1.5	0.085	245	927	0.135	0.1	-5.5	0.4625	32.7
5	1.5	0.085	245	927	0.135	0.1	-7	0.4625	32.7
6	1.5	0.085	245	927	0.135	0.1	-8.5	0.4625	32.7
7	2	0.0925	467	1097	0.092	0.092	-10	0.3893	46.7
8	2	0.0925	467	1097	0.092	0.092	-12	0.3893	46.7
9	2	0.0925	477	1180	0.106	0.1	-14	0.4023	47.7
10	2	0.0925	477	1180	0.106	0.1	-16	0.4023	47.7
11	2	0.0925	477	1180	0.106	0.1	-18	0.4023	47.7
12	2.5	0.0925	407	1180	0.132	0.1	-20	0.4325	32.6
13	2.5	0.0925	407	1180	0.132	0.1	-22.5	0.4325	32.6
14	2.666	0.115	615	1392	0.076	0.076	-25	0.3787	46.1
15	2.667	0.115	615	1392	0.076	0.076	-27.666	0.3787	46.1
16	2.667	0.115	615	1392	0.076	0.076	-30.333	0.3787	46.1
17	3	0.115	535	1392	0.103	0.1	-33	0.4133	35.7
18	3	0.115	535	1392	0.103	0.1	-36	0.4133	35.7
19	3	0.115	535	1392	0.103	0.1	-39	0.4133	35.7
20	3	0.115	535	1392	0.103	0.1	-42	0.4133	35.7
21	5	0.12	1232	2404	0.049	0.049	-45	0.3219	49.3
22	5	0.12	1232	2404	0.049	0.049	-50	0.3219	49.3
23	5	0.12	1232	2404	0.049	0.049	-55	0.3219	49.3
24	5	0.12	1232	2404	0.049	0.049	-60	0.3219	49.3
25	5	0.12	1232	2404	0.049	0.049	-65	0.3219	49.3
26	5	0.12	1232	2404	0.049	0.049	-70	0.3219	49.3
27	5	0.12	1232	2404	0.049	0.049	-75	0.3219	49.3
28	5	0.12	1232	2404	0.049	0.049	-80	0.3219	49.3
29	10	0.135	1913	3460	0.046	0.046	-85	0.2799	38.3
30	10	0.135	1913	3460	0.046	0.046	-95	0.2799	38.3
31	10	0.135	1913	3460	0.046	0.046	-105	0.2799	38.3
32	10	0.135	1913	3460	0.046	0.046	-115	0.2799	38.3
33	10	0.145	2419	5600	0.043	0.043	-125	0.3853	48.4
34	10	0.145	2419	5600	0.043	0.043	-135	0.3853	48.4
35	10	0.145	2419	5600	0.043	0.043	-145	0.3853	48.4
36	10	0.145	2419	5600	0.043	0.043	-155	0.3853	48.4
37	10	0.145	2419	5600	0.043	0.043	-165	0.3853	48.4

CALCULATION SHEET

CEC

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DP	DATE 9/23/99	CHECKED KL	DATE	9/23/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	154

Dynamic Soil Properties for SASSI Model (from Ref. 1)
Lower Bound Properties

Layer	Thick (ft)	Density (kcf)	Vs (ft/sec)	Vp (ft/sec)	Damping Vs	Damping Vp	Top of Layer Elevation (ft)	Poisson's ratio	Approx. Cut-off Freq. (cps)
38	15	0.145	3281	5683	0.026	0.026	-175	0.2500	43.7
39	15	0.145	3281	5683	0.026	0.026	-190	0.2500	43.7
40	15	0.145	3281	5683	0.026	0.026	-205	0.2500	43.7
41	15	0.145	3281	5683	0.026	0.026	-220	0.2500	43.7
42	15	0.145	3281	5683	0.026	0.026	-235	0.2500	43.7
43	15	0.145	3281	5683	0.026	0.026	-250	0.2500	43.7
44	15	0.145	3281	5683	0.026	0.026	-265	0.2500	43.7
45	15	0.145	3281	5683	0.026	0.026	-280	0.2500	43.7
46	15	0.145	3281	5683	0.026	0.026	-295	0.2500	43.7
47	15	0.145	3281	5683	0.026	0.026	-310	0.2500	43.7
48	15	0.145	3281	5683	0.026	0.026	-325	0.2500	43.7
49	15	0.145	3281	5683	0.026	0.026	-340	0.2500	43.7
50	15	0.145	3281	5683	0.026	0.026	-355	0.2500	43.7
51	15	0.145	3281	5683	0.026	0.026	-370	0.2500	43.7
52	15	0.145	3281	5683	0.026	0.026	-385	0.2500	43.7
53	15	0.145	3281	5683	0.026	0.026	-400	0.2500	43.7
54	15	0.145	3281	5683	0.026	0.026	-415	0.2500	43.7
55	15	0.145	3281	5683	0.026	0.026	-430	0.2500	43.7
56	15	0.145	3281	5683	0.026	0.026	-445	0.2500	43.7
57	15	0.145	3281	5683	0.026	0.026	-460	0.2500	43.7
58	15	0.145	3281	5683	0.026	0.026	-475	0.2500	43.7
59	15	0.145	3281	5683	0.026	0.026	-490	0.2500	43.7
60	15	0.145	3281	5683	0.026	0.026	-505	0.2500	43.7
61	15	0.145	3281	5683	0.026	0.026	-520	0.2500	43.7
62	15	0.145	3281	5683	0.026	0.026	-535	0.2500	43.7
63	15	0.145	3281	5683	0.026	0.026	-550	0.2500	43.7
64	15	0.145	3281	5683	0.026	0.026	-565	0.2500	43.7
65	15	0.145	3281	5683	0.026	0.026	-580	0.2500	43.7
66	15	0.145	3281	5683	0.026	0.026	-595	0.2500	43.7
67	15	0.145	3281	5683	0.026	0.026	-610	0.2500	43.7
HS	HS	0.17	6400	11155	0.014	0.01	-625	0.2547	
Total:	625							Minimum:	32.6

CALCULATION SHEET

CEC

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE 9/23/99	CHECKED	DATE	9/23/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	155

Dynamic Soil Properties for SASSI Model (from Ref. 1)
Best Estimate Properties

Layer	Thick (ft)	Density (kcf)	Vs (ft/sec)	Vp (ft/sec)	Damping Vs	Damping Vp	Top of Layer Elevation (ft)	Poisson's ratio	Approx. Cut-off Freq. (cps)
1	2	0.085	488	1135	0.042	0.042	0	0.3866	48.8
2	2	0.085	488	1135	0.042	0.042	-2	0.3866	48.8
3	1.5	0.085	378	1135	0.099	0.099	-4	0.4376	50.4
4	1.5	0.085	378	1135	0.099	0.099	-5.5	0.4376	50.4
5	1.5	0.085	378	1135	0.099	0.099	-7	0.4376	50.4
6	1.5	0.085	378	1135	0.099	0.099	-8.5	0.4376	50.4
7	2	0.0925	626	1344	0.074	0.074	-10	0.3615	62.6
8	2	0.0925	626	1344	0.074	0.074	-12	0.3615	62.6
9	2	0.0925	667	1445	0.08	0.08	-14	0.3646	66.7
10	2	0.0925	667	1445	0.08	0.08	-16	0.3646	66.7
11	2	0.0925	667	1445	0.08	0.08	-18	0.3646	66.7
12	2.5	0.0925	611	1445	0.097	0.097	-20	0.3911	48.9
13	2.5	0.0925	611	1445	0.097	0.097	-22.5	0.3911	48.9
14	2.666	0.115	824	1705	0.057	0.057	-25	0.3476	61.8
15	2.667	0.115	824	1705	0.057	0.057	-27.666	0.3476	61.8
16	2.667	0.115	824	1705	0.057	0.057	-30.333	0.3476	61.8
17	3	0.115	758	1705	0.075	0.075	-33	0.3768	50.5
18	3	0.115	758	1705	0.075	0.075	-36	0.3768	50.5
19	3	0.115	758	1705	0.075	0.075	-39	0.3768	50.5
20	3	0.115	758	1705	0.075	0.075	-42	0.3768	50.5
21	5	0.12	1861	3400	0.033	0.033	-45	0.2861	74.4
22	5	0.12	1861	3400	0.033	0.033	-50	0.2861	74.4
23	5	0.12	1861	3400	0.033	0.033	-55	0.2861	74.4
24	5	0.12	1861	3400	0.033	0.033	-60	0.2861	74.4
25	5	0.12	1861	3400	0.033	0.033	-65	0.2861	74.4
26	5	0.12	1861	3400	0.033	0.033	-70	0.2861	74.4
27	5	0.12	1861	3400	0.033	0.033	-75	0.2861	74.4
28	5	0.12	1861	3400	0.033	0.033	-80	0.2861	74.4
29	10	0.135	4511	7814	0.023	0.023	-85	0.2501	90.2
30	10	0.135	4511	7814	0.023	0.023	-95	0.2501	90.2
31	10	0.135	4511	7814	0.023	0.023	-105	0.2501	90.2
32	10	0.135	4511	7814	0.023	0.023	-115	0.2501	90.2
33	10	0.145	4511	7814	0.023	0.023	-125	0.2501	90.2
34	10	0.145	4511	7814	0.023	0.023	-135	0.2501	90.2
35	10	0.145	4511	7814	0.023	0.023	-145	0.2501	90.2
36	10	0.145	4511	7814	0.023	0.023	-155	0.2501	90.2
37	10	0.145	4511	7814	0.023	0.023	-165	0.2501	90.2

CALCULATION SHEET

CEC

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DL	DATE 9/23/99	CHECKED	DATE	9/23/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	156

Dynamic Soil Properties for SASSI Model (from Ref. 1)
Best Estimate Properties

Layer	Thick (ft)	Density (kcf)	Vs (ft/sec)	Vp (ft/sec)	Damping Vs	Damping Vp	Top of Layer Elevation (ft)	Poisson's ratio	Approx. Cut-off Freq. (cps)
38	15	0.145	4511	7814	0.023	0.023	-175	0.2501	60.1
39	15	0.145	4511	7814	0.023	0.023	-190	0.2501	60.1
40	15	0.145	4511	7814	0.023	0.023	-205	0.2501	60.1
41	15	0.145	4511	7814	0.023	0.023	-220	0.2501	60.1
42	15	0.145	4511	7814	0.023	0.023	-235	0.2501	60.1
43	15	0.145	4511	7814	0.023	0.023	-250	0.2501	60.1
44	15	0.145	4511	7814	0.023	0.023	-265	0.2501	60.1
45	15	0.145	4511	7814	0.023	0.023	-280	0.2501	60.1
46	15	0.145	4511	7814	0.023	0.023	-295	0.2501	60.1
47	15	0.145	4511	7814	0.023	0.023	-310	0.2501	60.1
48	15	0.145	4511	7814	0.023	0.023	-325	0.2501	60.1
49	15	0.145	4511	7814	0.023	0.023	-340	0.2501	60.1
50	15	0.145	4511	7814	0.023	0.023	-355	0.2501	60.1
51	15	0.145	4511	7814	0.023	0.023	-370	0.2501	60.1
52	15	0.145	4511	7814	0.023	0.023	-385	0.2501	60.1
53	15	0.145	4511	7814	0.023	0.023	-400	0.2501	60.1
54	15	0.145	4511	7814	0.023	0.023	-415	0.2501	60.1
55	15	0.145	4511	7814	0.023	0.023	-430	0.2501	60.1
56	15	0.145	4511	7814	0.023	0.023	-445	0.2501	60.1
57	15	0.145	4511	7814	0.023	0.023	-460	0.2501	60.1
58	15	0.145	4511	7814	0.023	0.023	-475	0.2501	60.1
59	15	0.145	4511	7814	0.023	0.023	-490	0.2501	60.1
60	15	0.145	4511	7814	0.023	0.023	-505	0.2501	60.1
61	15	0.145	4511	7814	0.023	0.023	-520	0.2501	60.1
62	15	0.145	4511	7814	0.023	0.023	-535	0.2501	60.1
63	15	0.145	4511	7814	0.023	0.023	-550	0.2501	60.1
64	15	0.145	4511	7814	0.023	0.023	-565	0.2501	60.1
65	15	0.145	4511	7814	0.023	0.023	-580	0.2501	60.1
66	15	0.145	4511	7814	0.023	0.023	-595	0.2501	60.1
67	15	0.145	4511	7814	0.023	0.023	-610	0.2501	60.1
HS	HS	0.17	6400	11155	0.016	0.01	-625	0.2547	
Total:	625							Minimum:	48.8

CALCULATION SHEET

CEC

ORIGINATOR	DL	DATE	9/23/99	CALC. NO.	G(PO17)-2
				REV. NO.	0
				CHECKED	kw
				DATE	9/23/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	157

Dynamic Soil Properties for SASSI Model (from Ref. 1)
Upper Bound Properties

Layer	Thick (ft)	Density (kcf)	Vs (ft/sec)	Vp (ft/sec)	Damping Vs	Damping Vp	Top of Layer Elevation (ft)	Poisson's ratio	Approx. Cut-off Freq. (cps)
1	2	0.085	621	1390	0.032	0.032	0	0.3753	62.1
2	2	0.085	621	1390	0.032	0.032	-2	0.3753	62.1
3	1.5	0.085	524	1390	0.074	0.074	-4	0.4172	69.9
4	1.5	0.085	524	1390	0.074	0.074	-5.5	0.4172	69.9
5	1.5	0.085	524	1390	0.074	0.074	-7	0.4172	69.9
6	1.5	0.085	524	1390	0.074	0.074	-8.5	0.4172	69.9
7	2	0.0925	817	1646	0.059	0.059	-10	0.3365	81.7
8	2	0.0925	817	1646	0.059	0.059	-12	0.3365	81.7
9	2	0.0925	876	1770	0.064	0.064	-14	0.3378	87.6
10	2	0.0925	876	1770	0.064	0.064	-16	0.3378	87.6
11	2	0.0925	876	1770	0.064	0.064	-18	0.3378	87.6
12	2.5	0.0925	834	1770	0.075	0.075	-20	0.3573	66.7
13	2.5	0.0925	834	1770	0.075	0.075	-22.5	0.3573	66.7
14	2.666	0.115	1067	2088	0.046	0.046	-25	0.3233	80.0
15	2.667	0.115	1067	2088	0.046	0.046	-27.666	0.3233	80.0
16	2.667	0.115	1067	2088	0.046	0.046	-30.333	0.3233	80.0
17	3	0.115	1013	2088	0.056	0.056	-33	0.3461	67.5
18	3	0.115	1013	2088	0.056	0.056	-36	0.3461	67.5
19	3	0.115	1013	2088	0.056	0.056	-39	0.3461	67.5
20	3	0.115	1013	2088	0.056	0.056	-42	0.3461	67.5
21	5	0.12	2723	4808	0.023	0.023	-45	0.2639	108.9
22	5	0.12	2723	4808	0.023	0.023	-50	0.2639	108.9
23	5	0.12	2723	4808	0.023	0.023	-55	0.2639	108.9
24	5	0.12	2723	4808	0.023	0.023	-60	0.2639	108.9
25	5	0.12	2723	4808	0.023	0.023	-65	0.2639	108.9
26	5	0.12	2723	4808	0.023	0.023	-70	0.2639	108.9
27	5	0.12	2723	4808	0.023	0.023	-75	0.2639	108.9
28	5	0.12	2723	4808	0.023	0.023	-80	0.2639	108.9
29	10	0.135	5741	9945	0.02	0.02	-85	0.2501	114.8
30	10	0.135	5741	9945	0.02	0.02	-95	0.2501	114.8
31	10	0.135	5741	9945	0.02	0.02	-105	0.2501	114.8
32	10	0.135	5741	9945	0.02	0.02	-115	0.2501	114.8
33	10	0.145	5741	9945	0.02	0.02	-125	0.2501	114.8
34	10	0.145	5741	9945	0.02	0.02	-135	0.2501	114.8
35	10	0.145	5741	9945	0.02	0.02	-145	0.2501	114.8
36	10	0.145	5741	9945	0.02	0.02	-155	0.2501	114.8
37	10	0.145	5741	9945	0.02	0.02	-165	0.2501	114.8

CALCULATION SHEET

CEC

ORIGINATOR	DH	DATE	9/23/99	CALC. NO.	G(PO17)-2
				REV. NO.	0
				CHECKED	[illegible]
				DATE	9/23/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	158

Dynamic Soil Properties for SASSI Model (from Ref. 1)
Upper Bound Properties

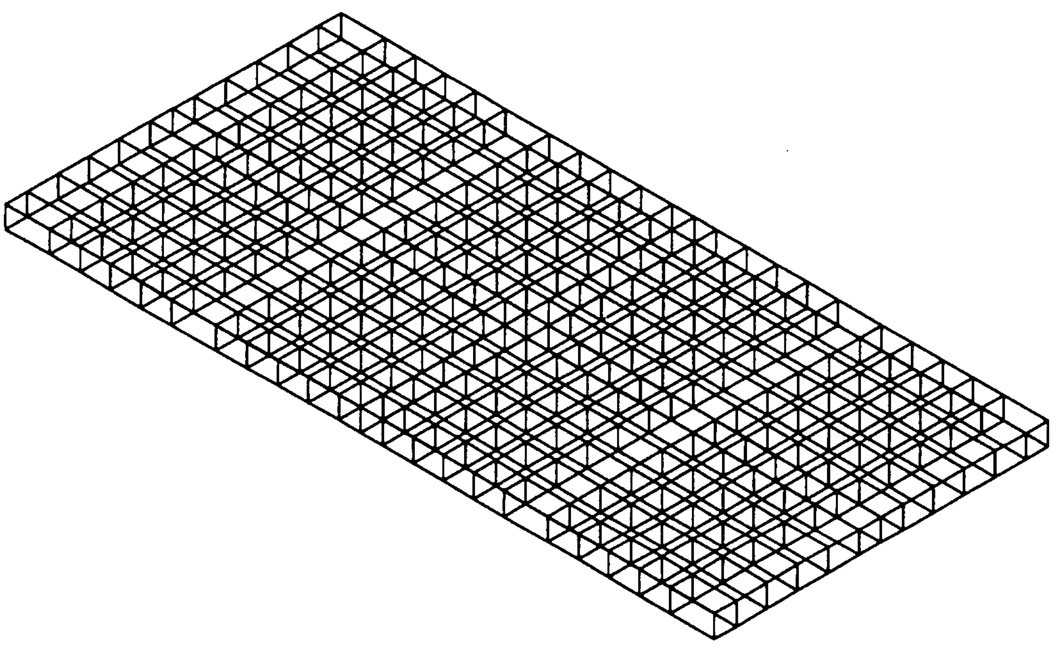
Layer	Thick (ft)	Density (kcf)	Vs (ft/sec)	Vp (ft/sec)	Damping Vs	Damping Vp	Top of Layer Elevation (ft)	Poisson's ratio	Approx. Cut-off Freq. (cps)
38	15	0.145	5741	9945	0.02	0.02	-175	0.2501	76.5
39	15	0.145	5741	9945	0.02	0.02	-190	0.2501	76.5
40	15	0.145	5741	9945	0.02	0.02	-205	0.2501	76.5
41	15	0.145	5741	9945	0.02	0.02	-220	0.2501	76.5
42	15	0.145	5741	9945	0.02	0.02	-235	0.2501	76.5
43	15	0.145	5741	9945	0.02	0.02	-250	0.2501	76.5
44	15	0.145	5741	9945	0.02	0.02	-265	0.2501	76.5
45	15	0.145	5741	9945	0.02	0.02	-280	0.2501	76.5
46	15	0.145	5741	9945	0.02	0.02	-295	0.2501	76.5
47	15	0.145	5741	9945	0.02	0.02	-310	0.2501	76.5
48	15	0.145	5741	9945	0.02	0.02	-325	0.2501	76.5
49	15	0.145	5741	9945	0.02	0.02	-340	0.2501	76.5
50	15	0.145	5741	9945	0.02	0.02	-355	0.2501	76.5
51	15	0.145	5741	9945	0.02	0.02	-370	0.2501	76.5
52	15	0.145	5741	9945	0.02	0.02	-385	0.2501	76.5
53	15	0.145	5741	9945	0.02	0.02	-400	0.2501	76.5
54	15	0.145	5741	9945	0.02	0.02	-415	0.2501	76.5
55	15	0.145	5741	9945	0.02	0.02	-430	0.2501	76.5
56	15	0.145	5741	9945	0.02	0.02	-445	0.2501	76.5
57	15	0.145	5741	9945	0.02	0.02	-460	0.2501	76.5
58	15	0.145	5741	9945	0.02	0.02	-475	0.2501	76.5
59	15	0.145	5741	9945	0.02	0.02	-490	0.2501	76.5
60	15	0.145	5741	9945	0.02	0.02	-505	0.2501	76.5
61	15	0.145	5741	9945	0.02	0.02	-520	0.2501	76.5
62	15	0.145	5741	9945	0.02	0.02	-535	0.2501	76.5
63	15	0.145	5741	9945	0.02	0.02	-550	0.2501	76.5
64	15	0.145	5741	9945	0.02	0.02	-565	0.2501	76.5
65	15	0.145	5741	9945	0.02	0.02	-580	0.2501	76.5
66	15	0.145	5741	9945	0.02	0.02	-595	0.2501	76.5
67	15	0.145	5741	9945	0.02	0.02	-610	0.2501	76.5
HS	HS	0.17	6400	11155	0.018	0.01	-625	0.2547	
Total:	625							Minimum:	62.1

CALCULATION SHEET

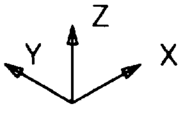
ORIGINATOR	DH	DATE	9/23/99	CALC. NO.	G(PO17)-2
				REV. NO.	0
				CHECKED	KL
				DATE	9/23/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	159

The following pages show the finite element mesh of the SASSI model.

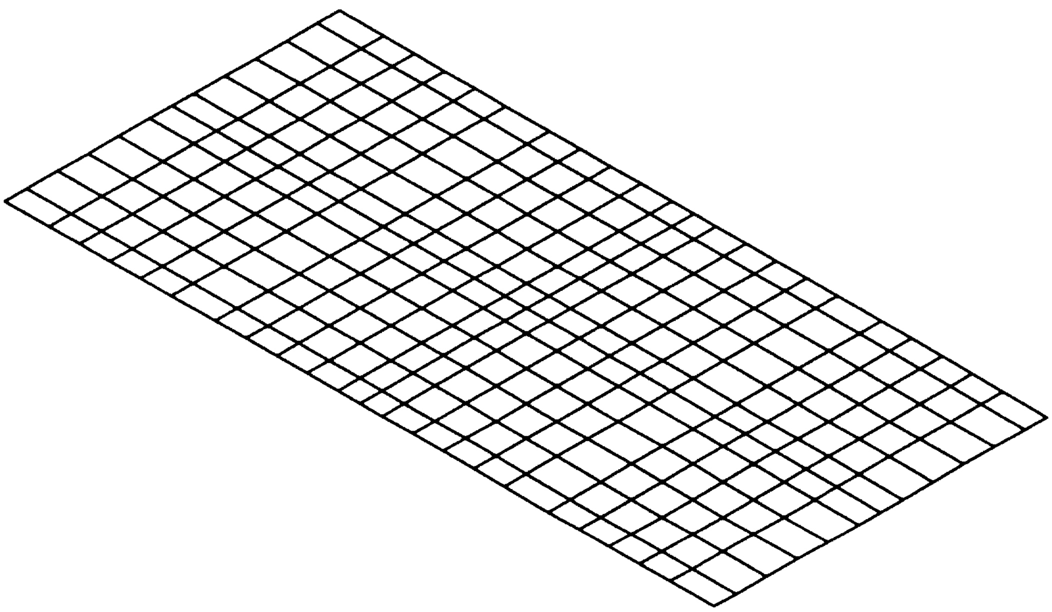
CEC JOB NO. 1101-000
BY DH DATE 9/23/99
CHECK KW DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 160



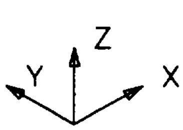
PFSF SASSI MODEL



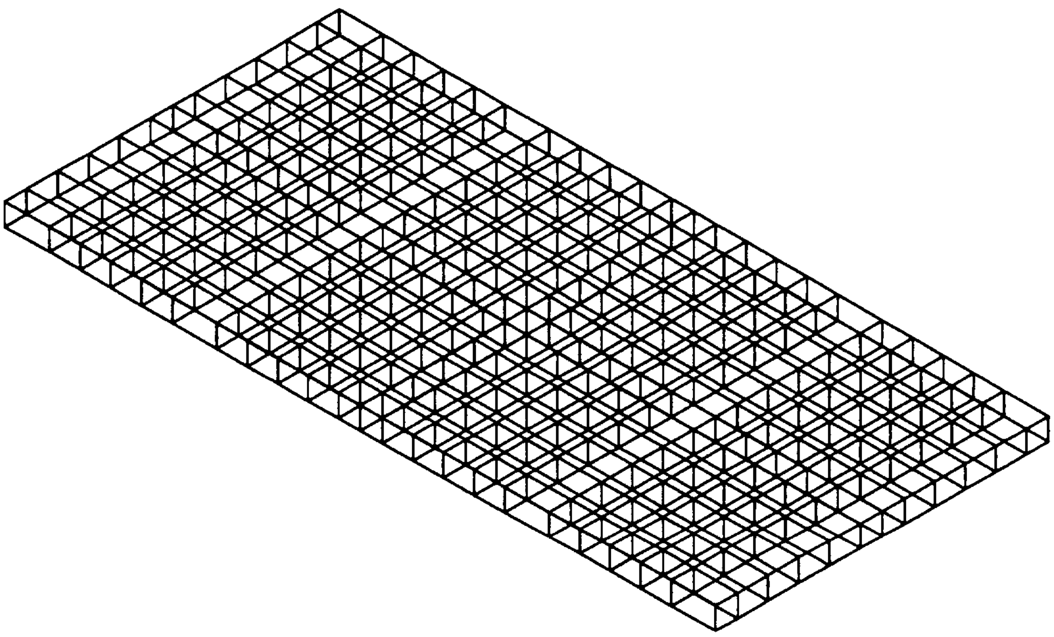
CEC JOB NO. 1101-000
BY DH DATE 9/23/99
CHECK KW DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 161



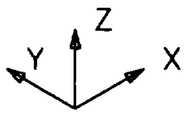
PFSF SASSI MODEL, GROUP 1 (PLATE ELEMENTS)



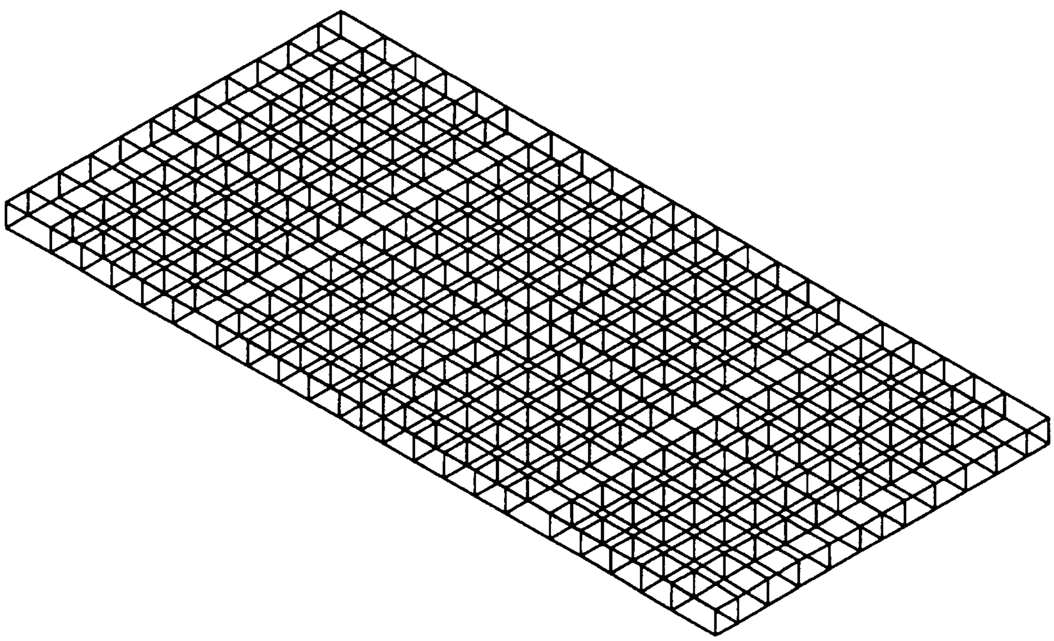
CEC JOB NO. 1101-000
BY DH DATE 9/23/99
CHECK KV DATE 9/23/99
CALC. NO. G(PO17)-2 REV. NO. 0
SHEET NO. 162



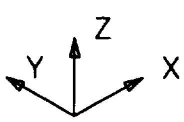
PFSF SASSI MODEL, GROUP 2 (EXCAVATED SOIL)

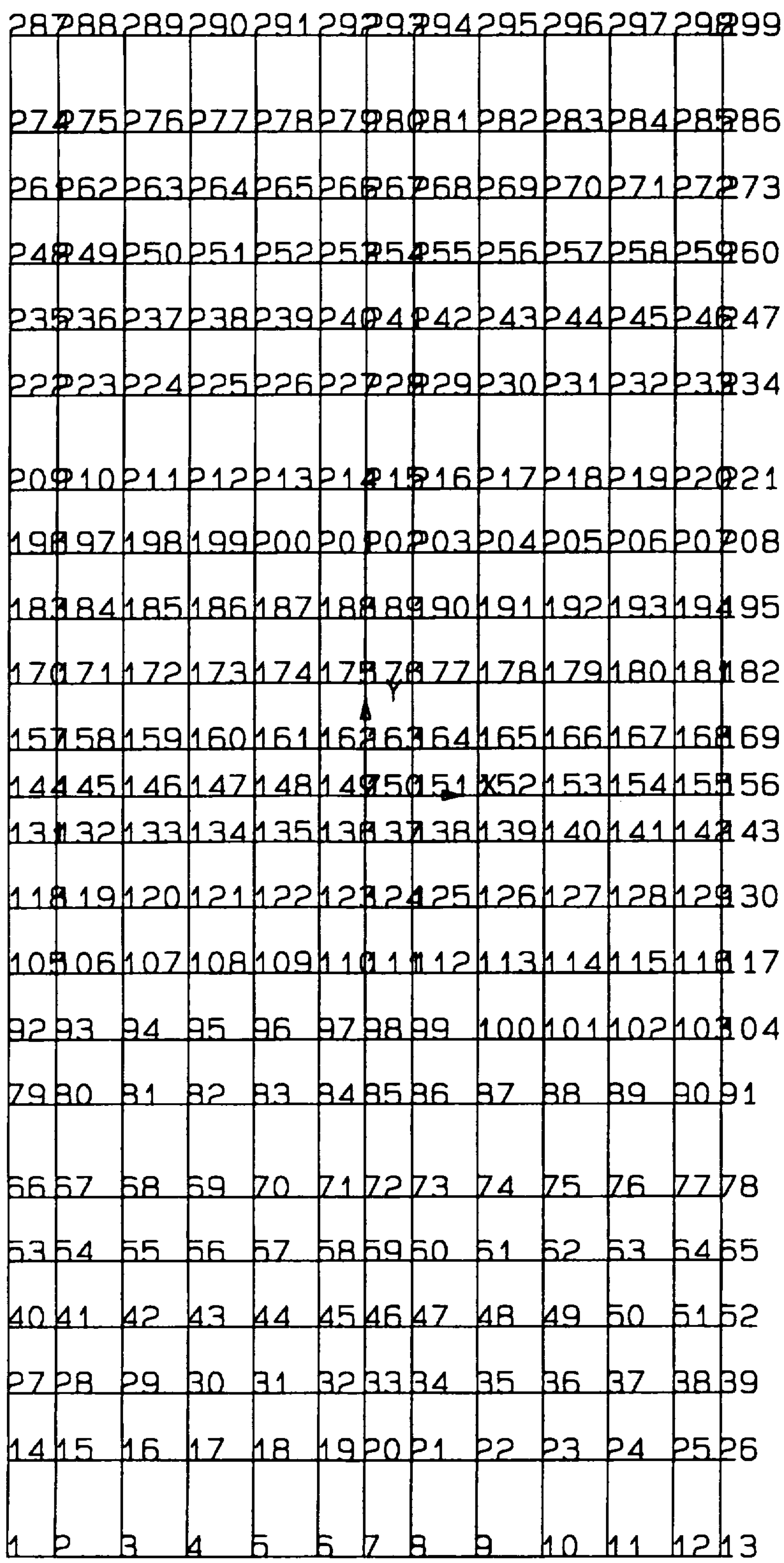


CEC JOB NO. 1101-000
BY DH DATE 9/23/99
CHECK kw DATE 9/23/99
CALC. NO. G(PO17)-2 REV. NO. 0
SHEET NO. 163



PFSF SASSI MODEL, GROUP 3 (SOIL ELEMENTS)

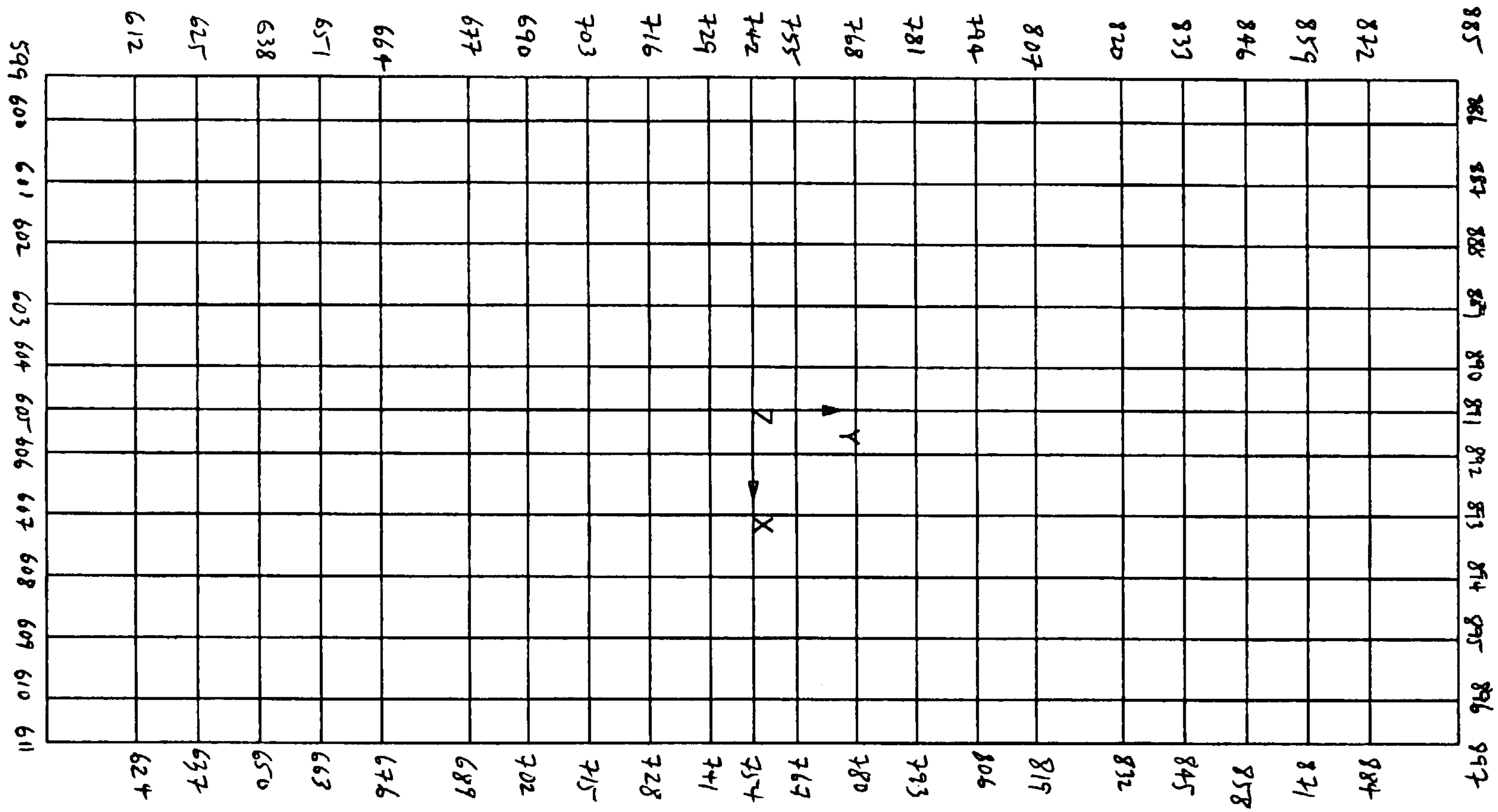




PFSF SASSI MODEL PLATE ELEMENT NODES

CEC JOB NO. 1101-000
BY OH DATE 9/23/97
CHECK KV DATE 9/23/97
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 164

PFSF SASSI MODEL BRICK ELEMENT NODES (EL. 0.0')



CEC JOB NO. 1101-000

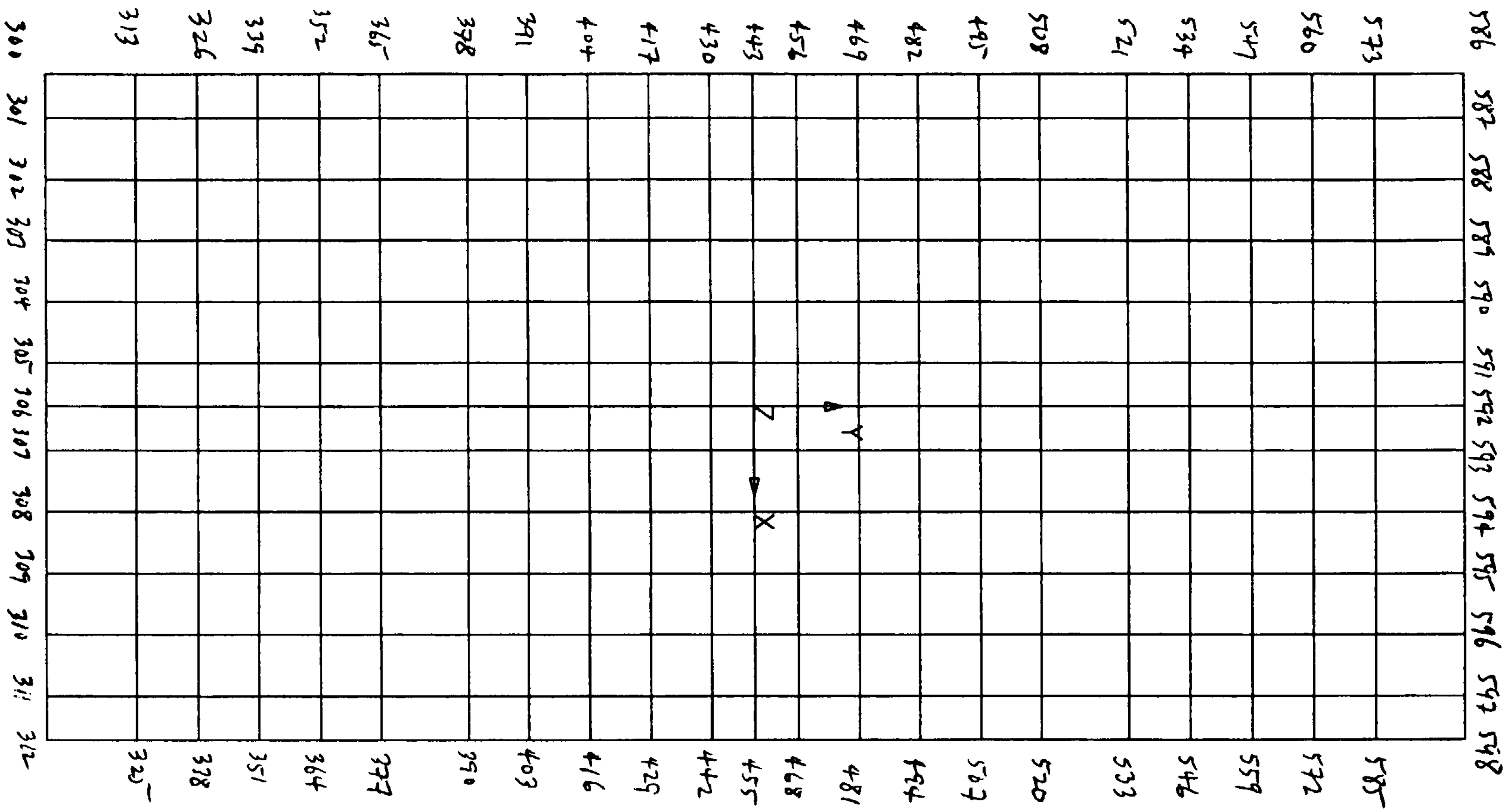
BY DH DATE 9/23/99

CHECK KL DATE 9/23/99

CALC. NO. G(PO17)-2 REV. NO. 0

SHEET NO. 165

PFSF SASSI MODEL BRICK ELEMENT NODES (EL. -2.0)



CEC JOB NO. 1101-000

BY DH DATE 9/23/99

CHECK kw DATE 9/23/99

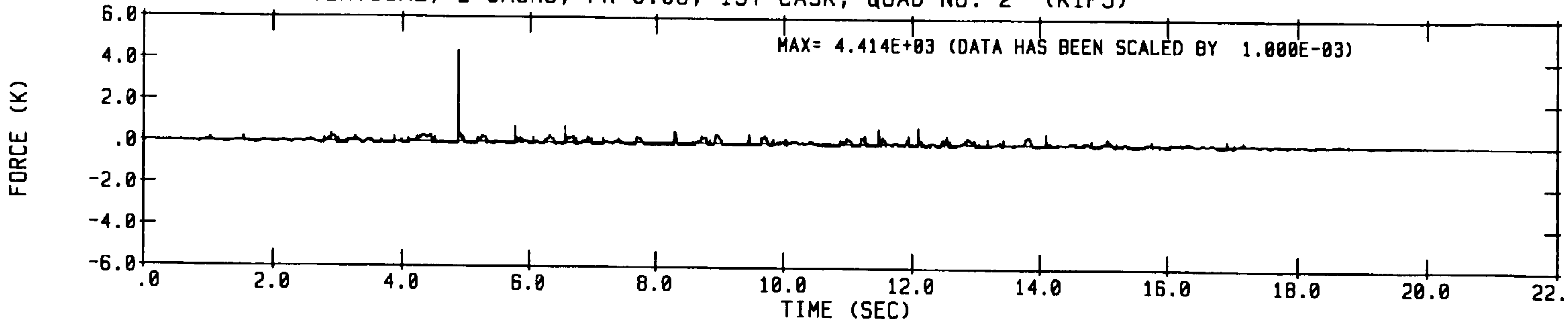
CALC. NO. G(PO17)-2 REV. NO. 0

SHEET NO. 166

5.2.2 Dynamic Loading

The following page shows the vertical load which was applied to node 249 of the SASSI model.

VERTICAL, 2 CASKS, FR=0.08, 1ST CASK, QUAD NO. 2 (KIPS)



CEC JOB NO. 1101-000
BY DH DATE 9/23/99
CHECK Aum DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 168

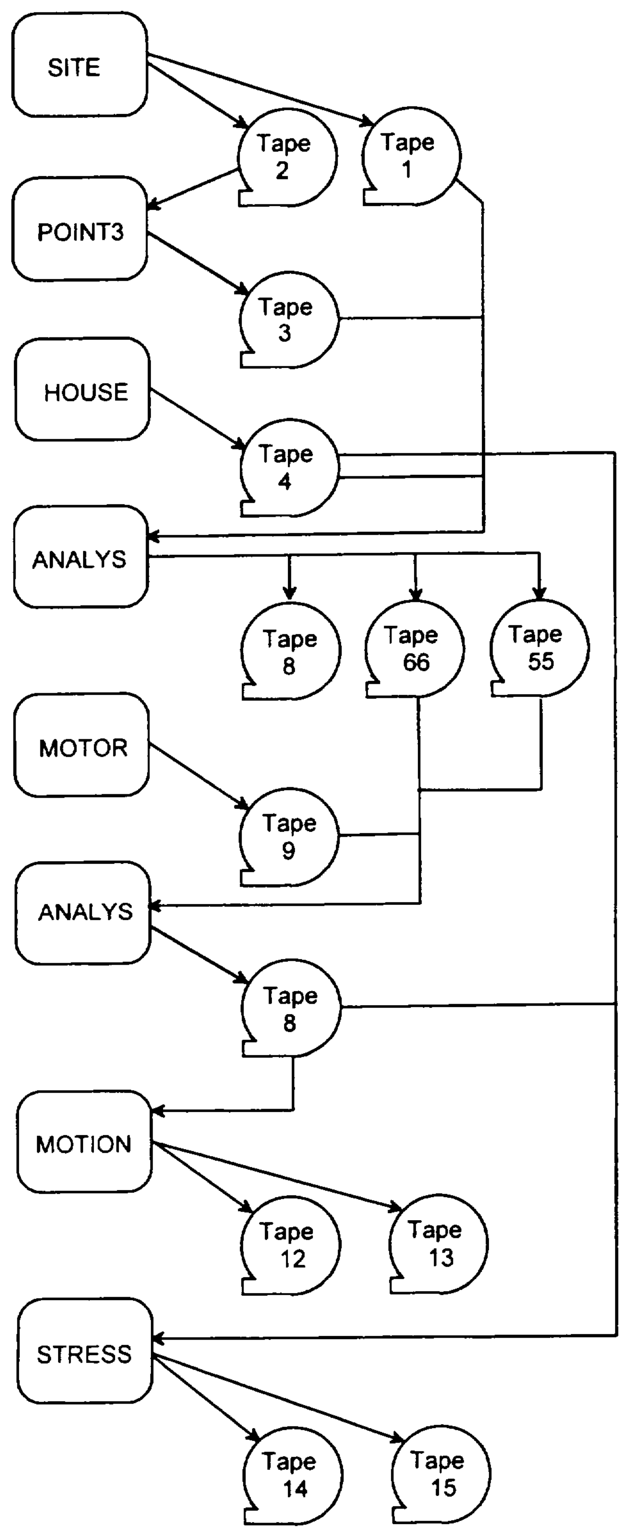
TIME HISTORY FILE = V20812.TH2

D:\PFSF\LB\VV1_____.INP 9/21/99

5.2.3 SASSI Analysis Procedure

The following pages show the SASSI analysis procedure.

SASSI Analysis Procedure - Lower Bound Soil



Step 1. Run the SITE module.
Input = lb1sd

Step 2. Run the POINT3 module.
Input = lb1pd

Step 3. Run the HOUSE module.
Input = lb1hd

Step 4. Run the ANALYS module.
Input = lb1ad

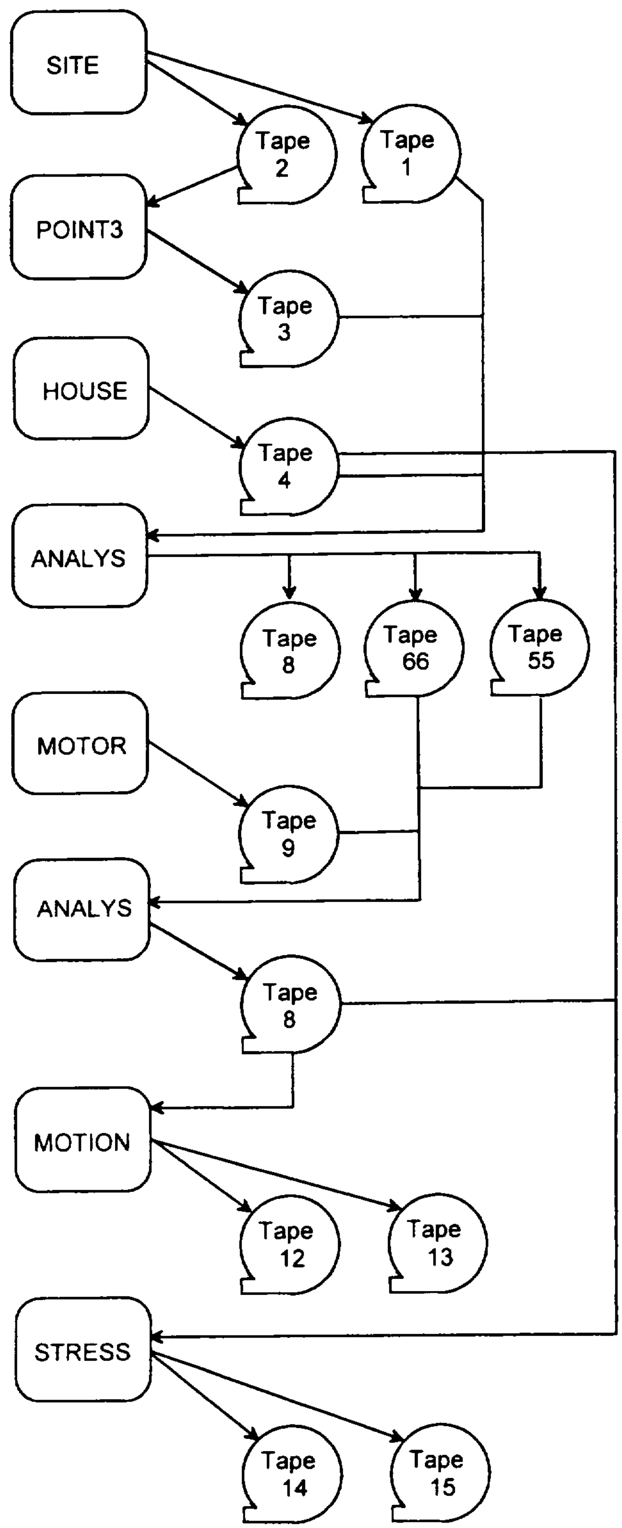
Step 5. Run the MOTOR module.
Input = lb249zmd

Step 6. Run the ANALYS module.
Input = lb249zad

Step 7. Run the MOTION module.
Input = l249zod

Step 8. Run the STRESS module.
Input = l249ztd

SASSI Analysis Procedure - Best Estimate Soil



Step 1. Run the SITE module.
Input = be1sd

Step 2. Run the POINT3 module.
Input = be1pd

Step 3. Run the HOUSE module.
Input = be1hd

Step 4. Run the ANALYS module.
Input = be1ad

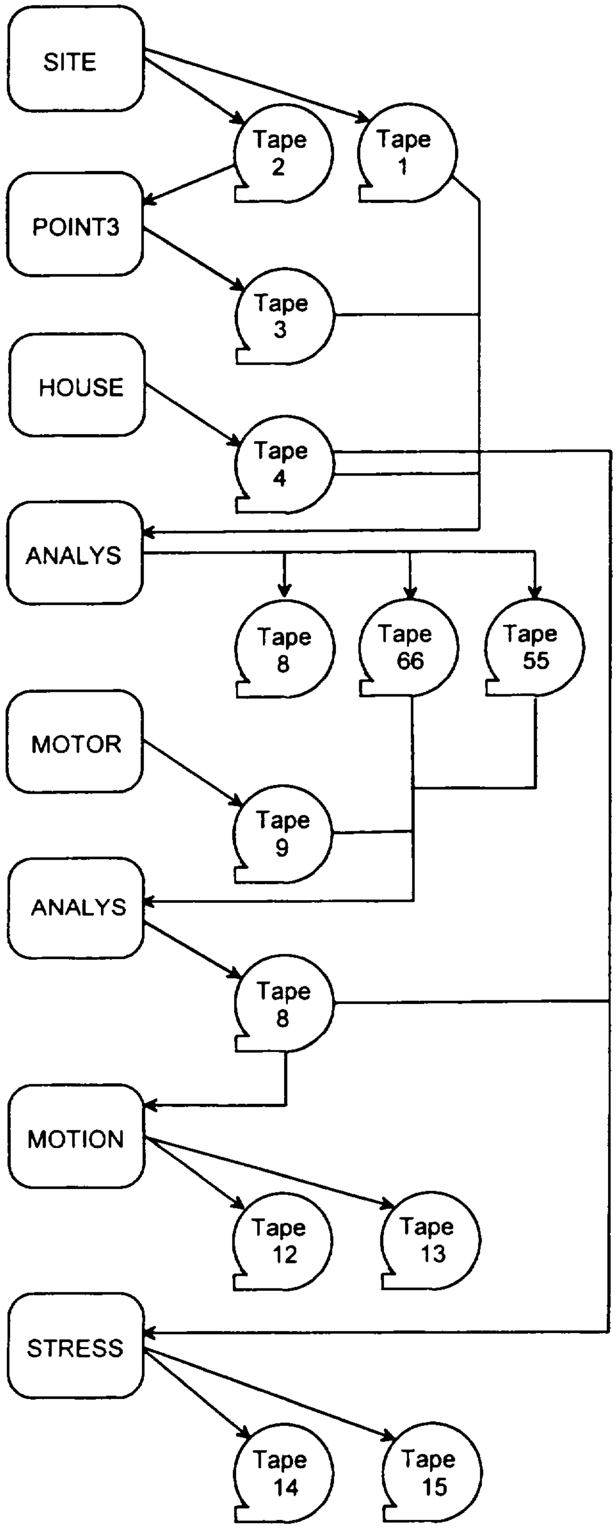
Step 5. Run the MOTOR module.
Input = be249zmd

Step 6. Run the ANALYS module.
Input = be249zad

Step 7. Run the MOTION module.
Input = b249zod

Step 8. Run the STRESS module.
Input = b249ztd

SASSI Analysis Procedure - Upper Bound Soil



Step 1. Run the SITE module.
Input = ub1sd

Step 2. Run the POINT3 module.
Input = ub1pd

Step 3. Run the HOUSE module.
Input = ub1hd

Step 4. Run the ANALYS module.
Input = ub1ad

Step 5. Run the MOTOR module.
Input = ub249zmd

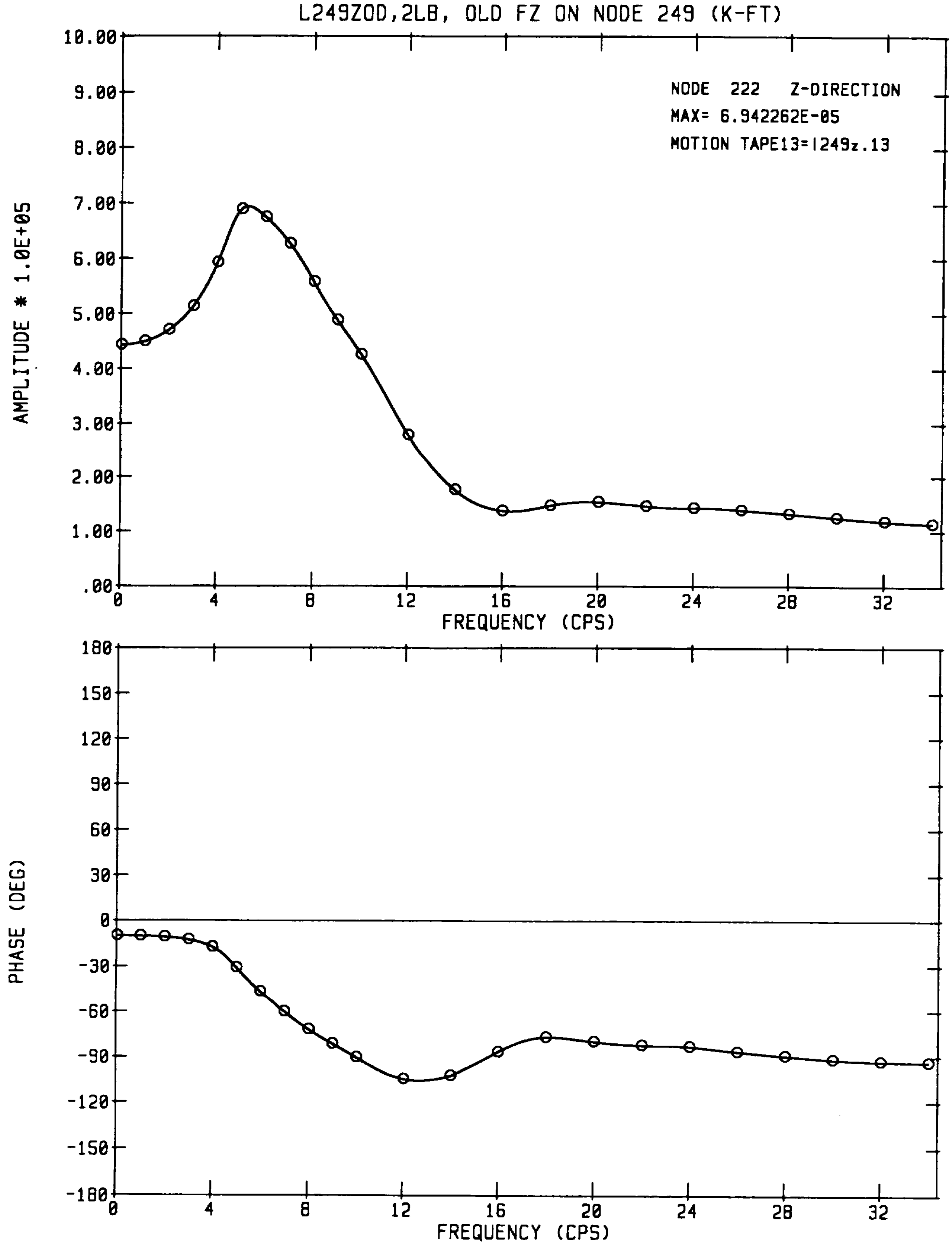
Step 6. Run the ANALYS module.
Input = ub249zad

Step 7. Run the MOTION module.
Input = u249zod

Step 8. Run the STRESS module.
Input = u249ztd

5.2.4 SASSI Analysis Results

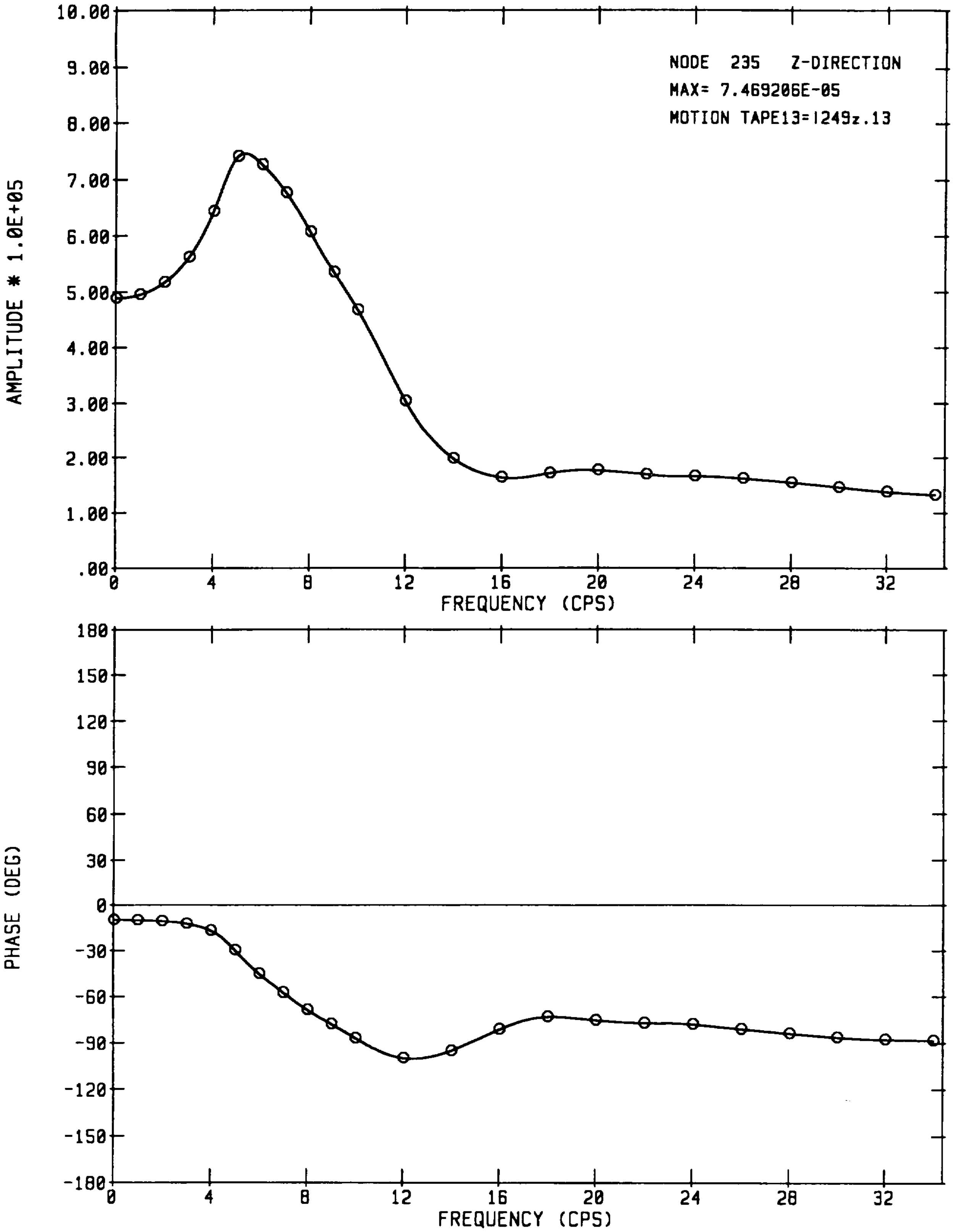
The following pages show the SASSI analysis results. Force-to-displacement transfer functions are shown for selected nodes. Force-to-moment transfer functions are shown for selected elements.



CEC JOB NO. 1101-000
BY DH DATE 9/22/99
CHECK AWM DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 174

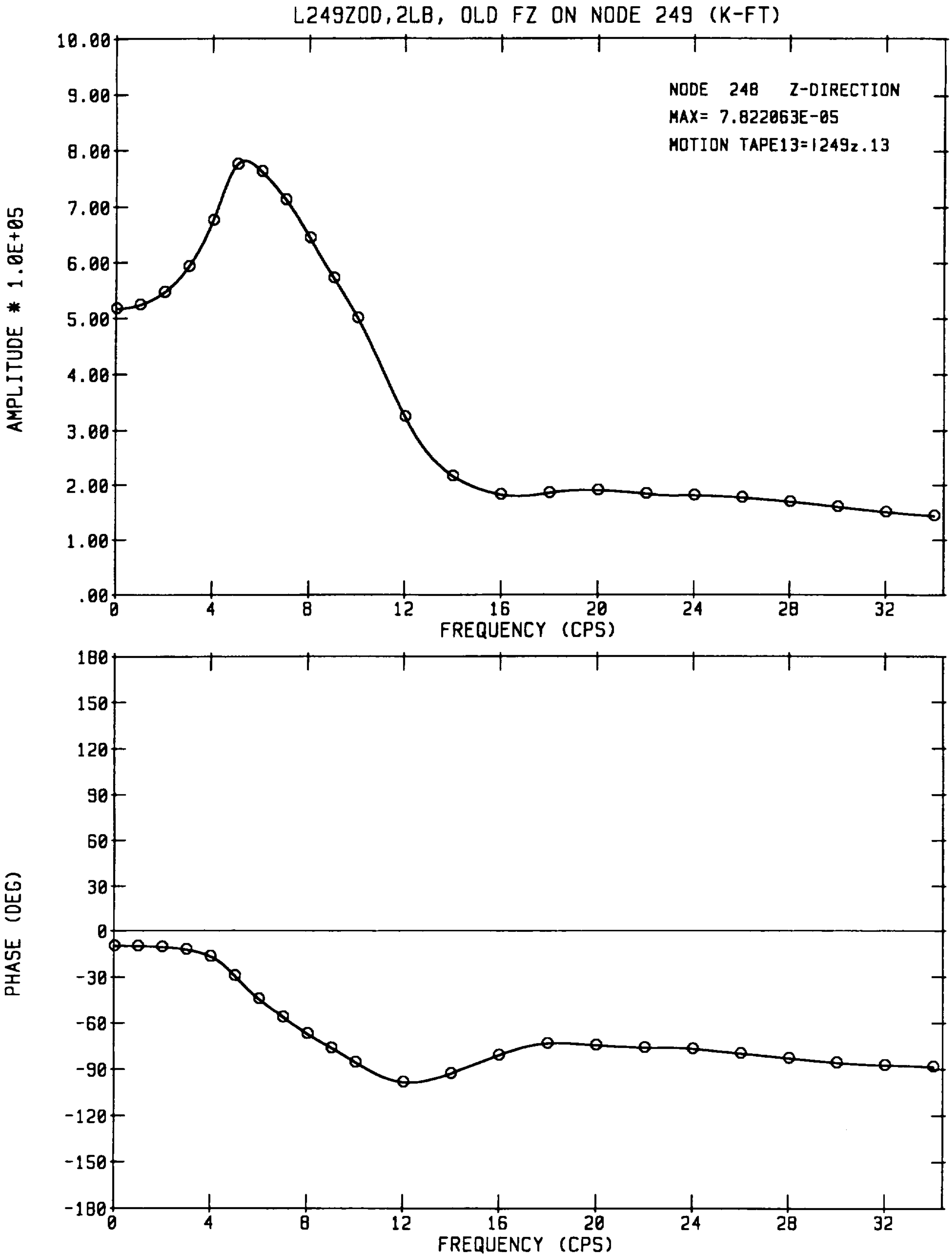
D:\PFSF\LB\PLOTTF\fz222Z.INP 9/22/99

L249ZOD,2LB, OLD FZ ON NODE 249 (K-FT)



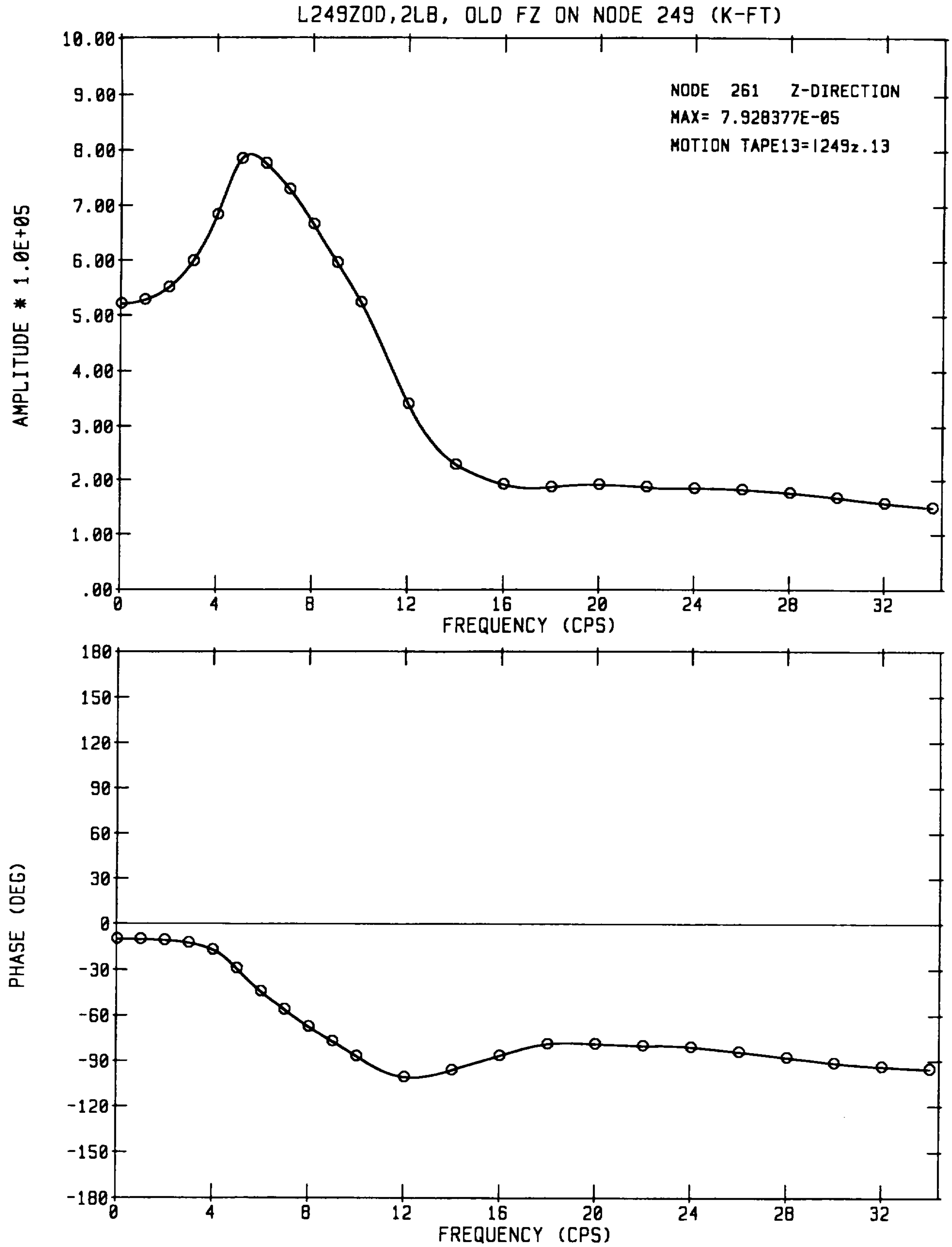
CEC JOB NO. 1101-000
BY DF DATE 9/22/99
CHECK RWM DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 175

D:\PFSF\LB\PLOTTF\fz235Z.INP 9/22/99



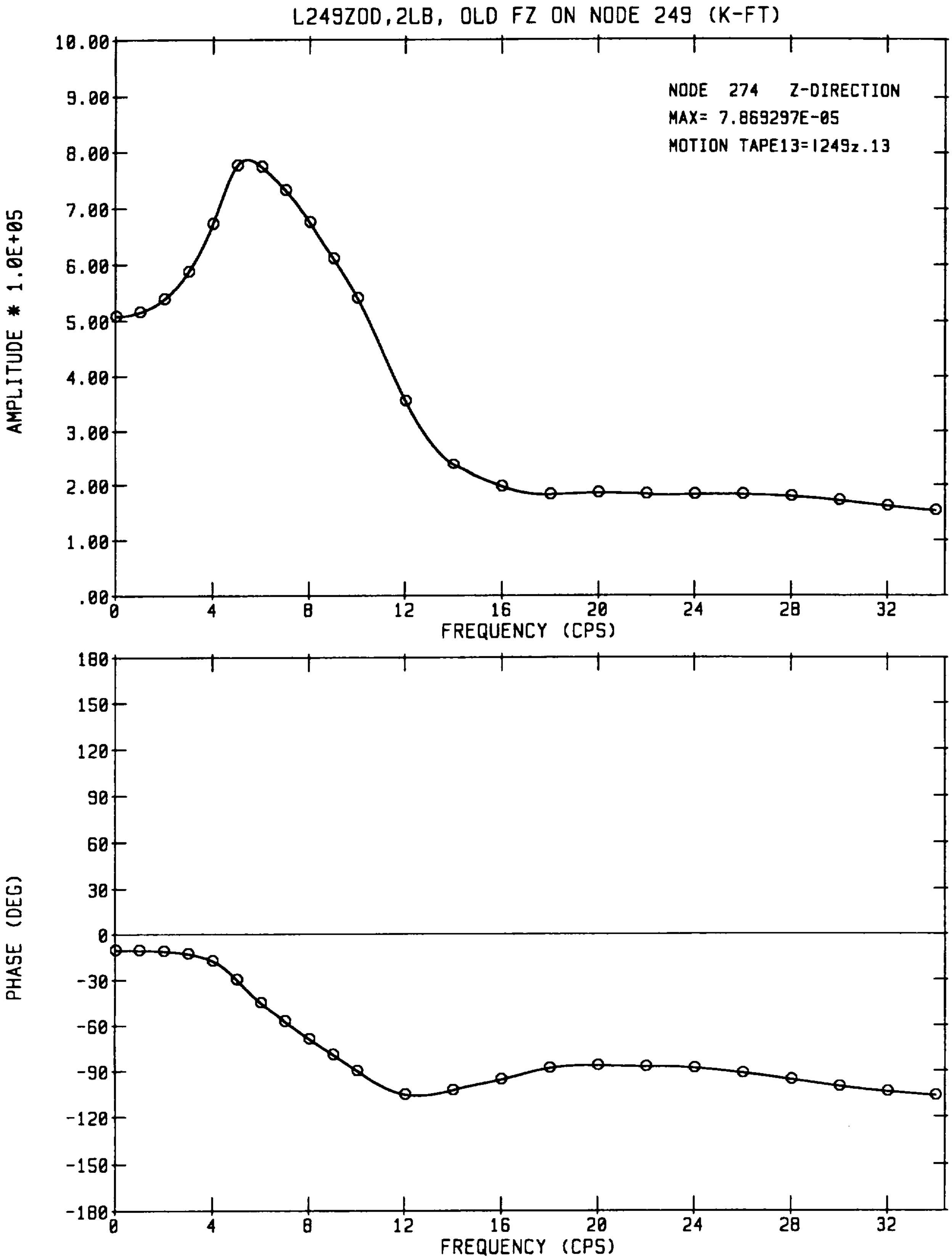
CEC JOB NO. 1101-000
BY DH DATE 9/22/99
CHECK aum DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 176

D:\PFSF\LB\PLOTTF\fz248Z.INP 9/22/99



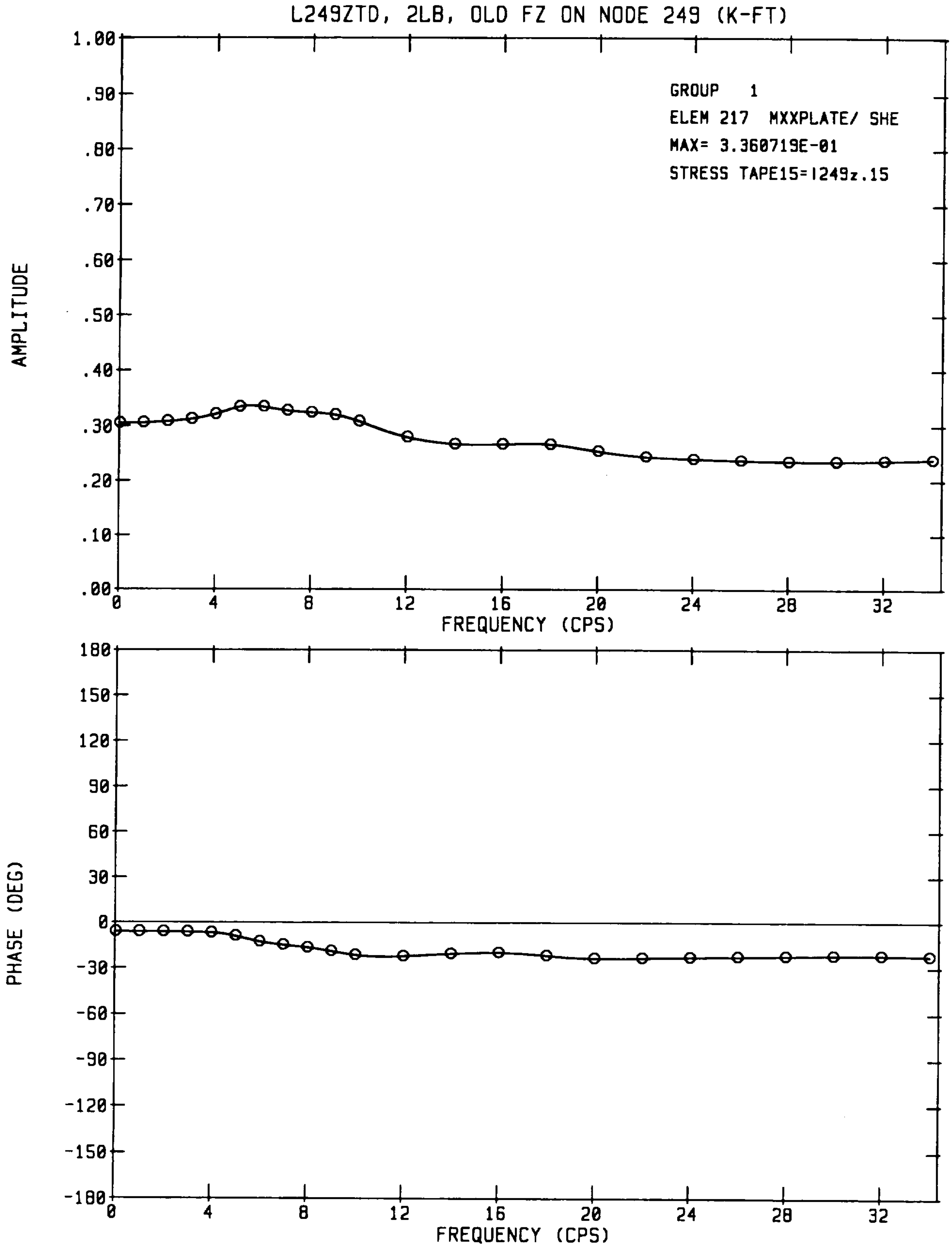
CEC JOB NO. 1101-000
BY DK DATE 9/22/99
CHECK gum DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 177

D:\PFSF\LB\PLOTTF\fz261Z.INP 9/22/99



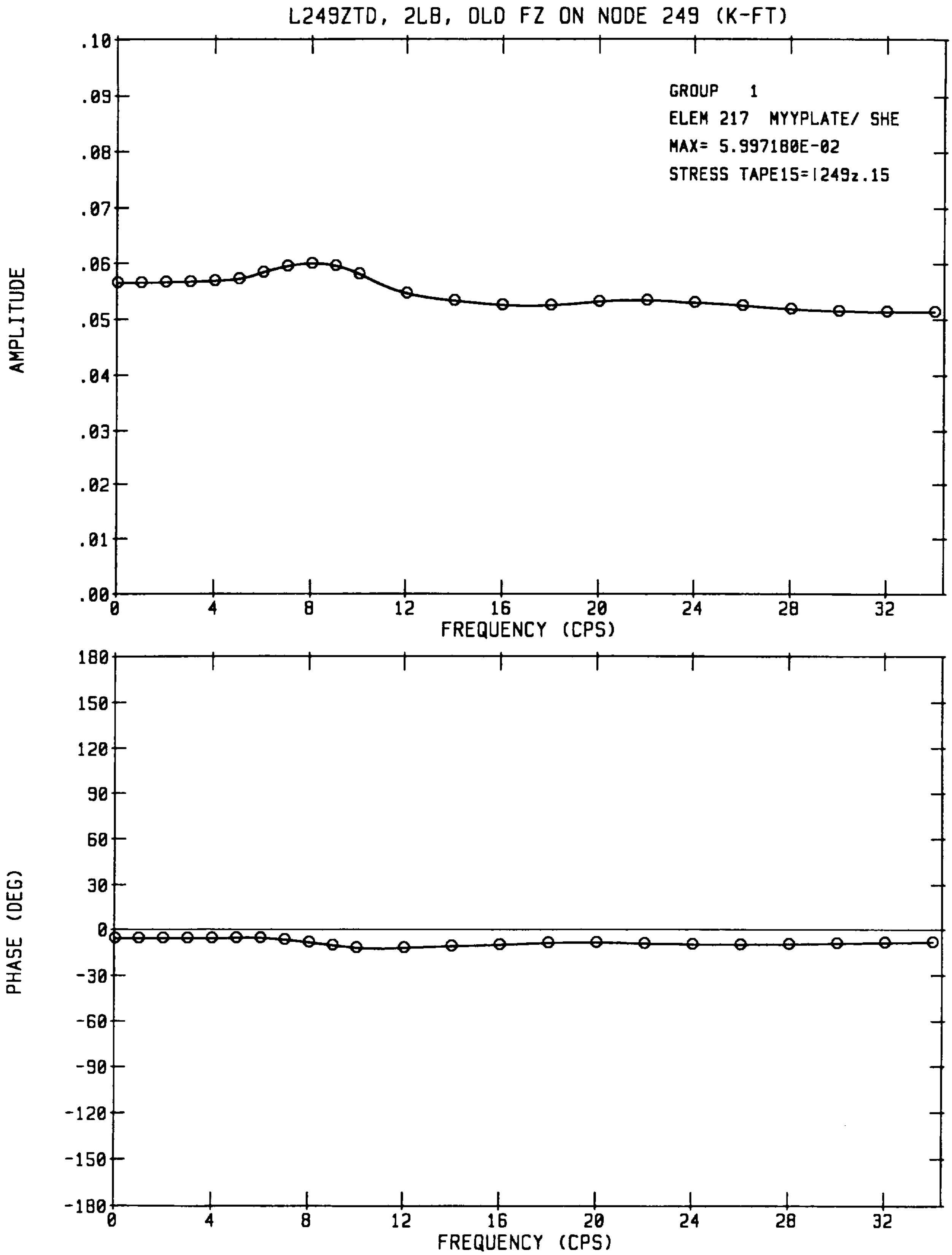
CEC JOB NO. 1101-000
BY DH DATE 9/22/99
CHECK aum DATE 9/23/99
CALC. NO. G(PO17)-2 REV. NO. 0
SHEET NO. 178

D:\PFSF\LB\PLOTTF\fz274Z.INP 9/22/99



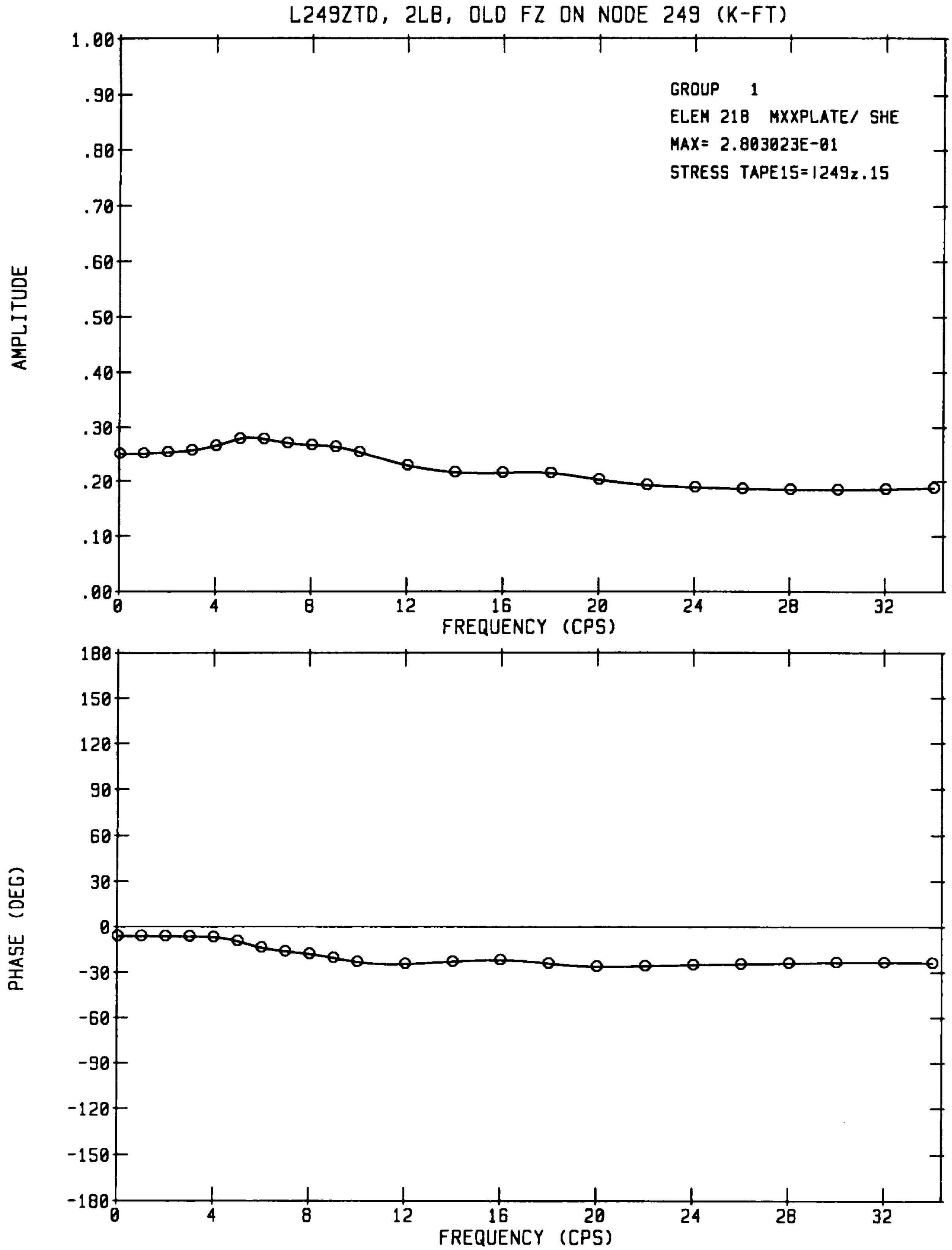
CEC JOB NO. 1101-000
BY DF DATE 9/22/99
CHECK AMM DATE 9/23/99
CALC. NO. G(Po:7)-2 REV. NO. 0
SHEET NO. 179

D:\PFSF\LB\PLOTTF\1217MXX.INP 9/22/99



CEC JOB NO. 1101-000
BY DF DATE 9/22/99
CHECK aum DATE 9/23/99
CALC. NO. G(PU17)-2 REV. NO. 0
SHEET NO. 180

D:\PFSF\LB\PLOTTF\1217MYY.INP 9/22/99



CEC JOB NO. 1101-000

BY DH DATE 9/22/99

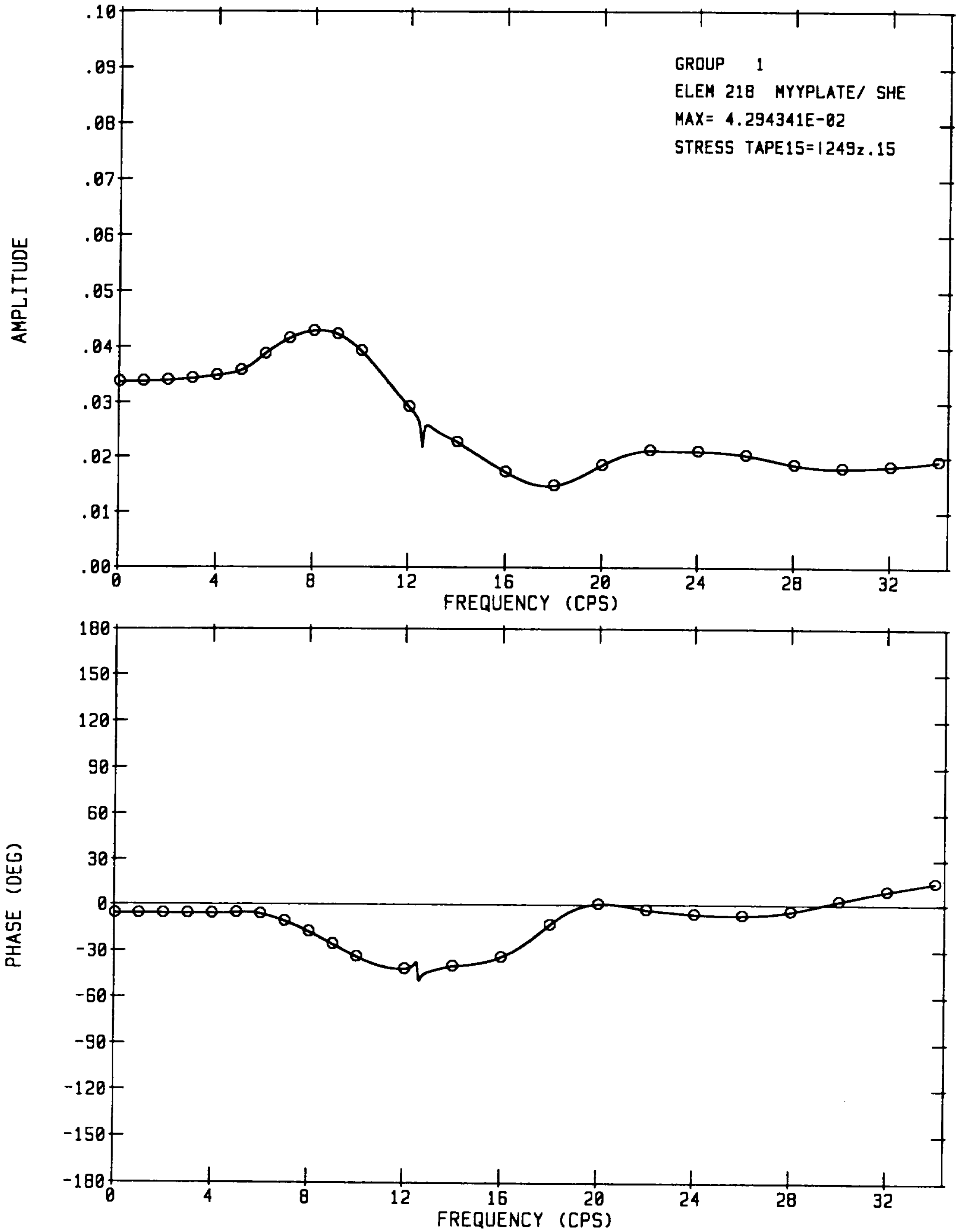
CHECK aum DATE 9/23/99

CALC. NO. G(P017)-2 REV. NO. 0

SHEET NO. 181

D:\PFSF\LB\PLOTTF\1218MXX.INP 9/22/99

L249ZTD, 2LB, OLD FZ ON NODE 249 (K-FT)



CEC JOB NO. 1101-000

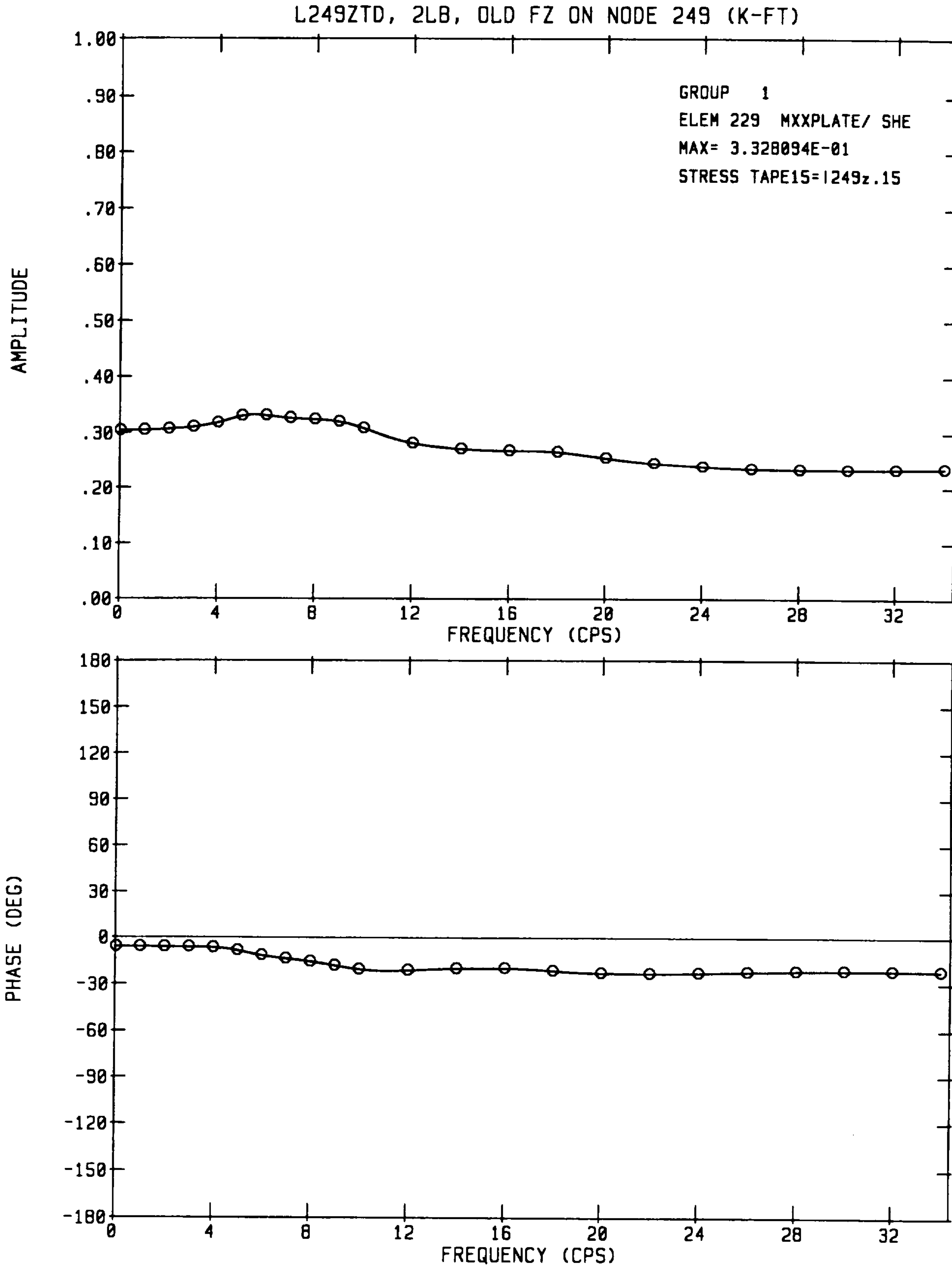
BY DH DATE 9/22/99

CHECK [illegible] DATE 9/23/99

CALC. NO. G(P017)-2 REV. NO. 0

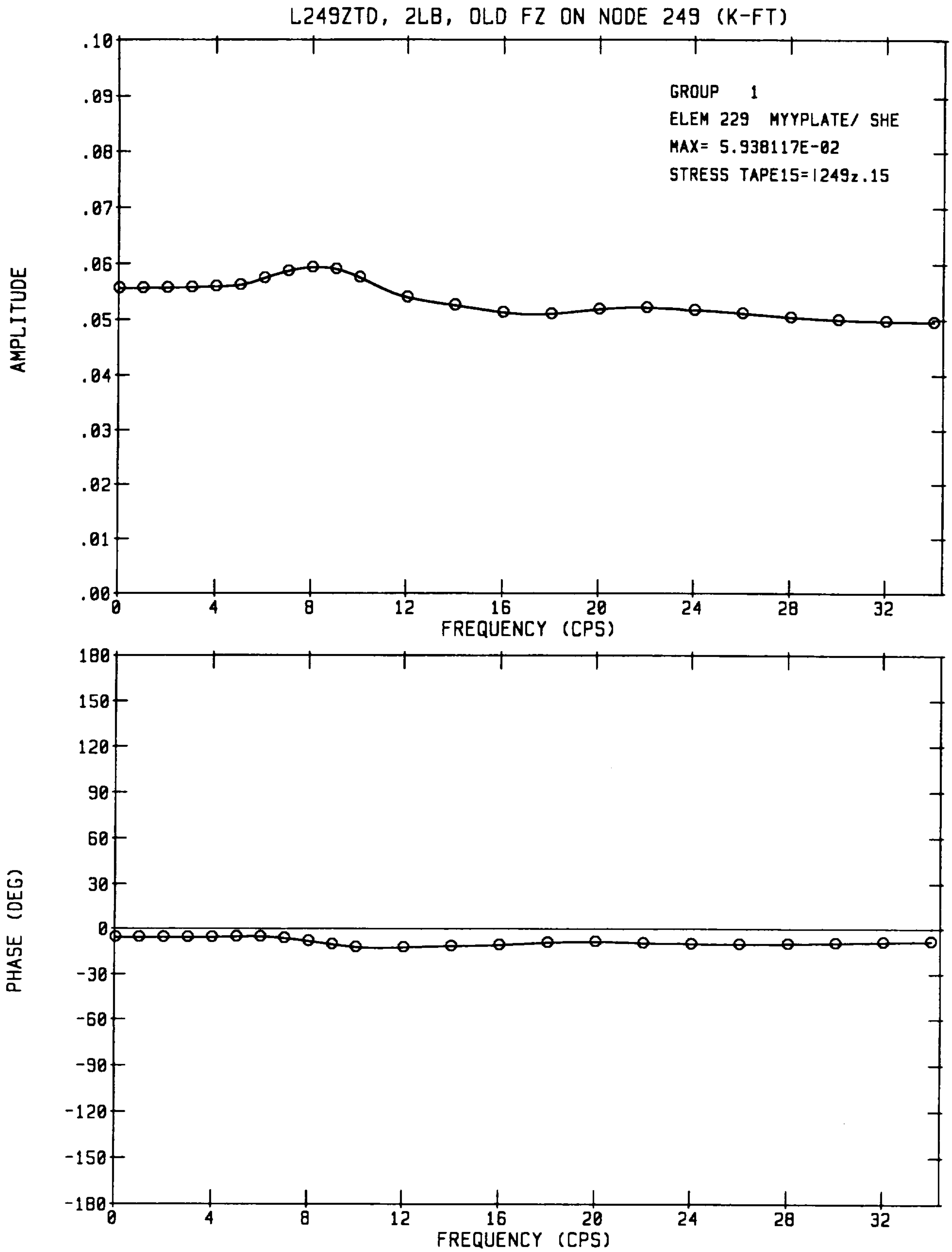
SHEET NO. 182

D:\PFSF\LB\PLOTTF\1218MYY.INP 9/22/99



CEC JOB NO. 1101-000
BY DH DATE 9/22/99
CHECK [illegible] DATE 9/23/99
CALC. NO. G(PU17)-2 REV. NO. 0
SHEET NO. 183

D:\PFSF\LB\PLOTTF\1229MXX.INP 9/22/99



CEC JOB NO. 1101-000

BY DH DATE 9/22/99

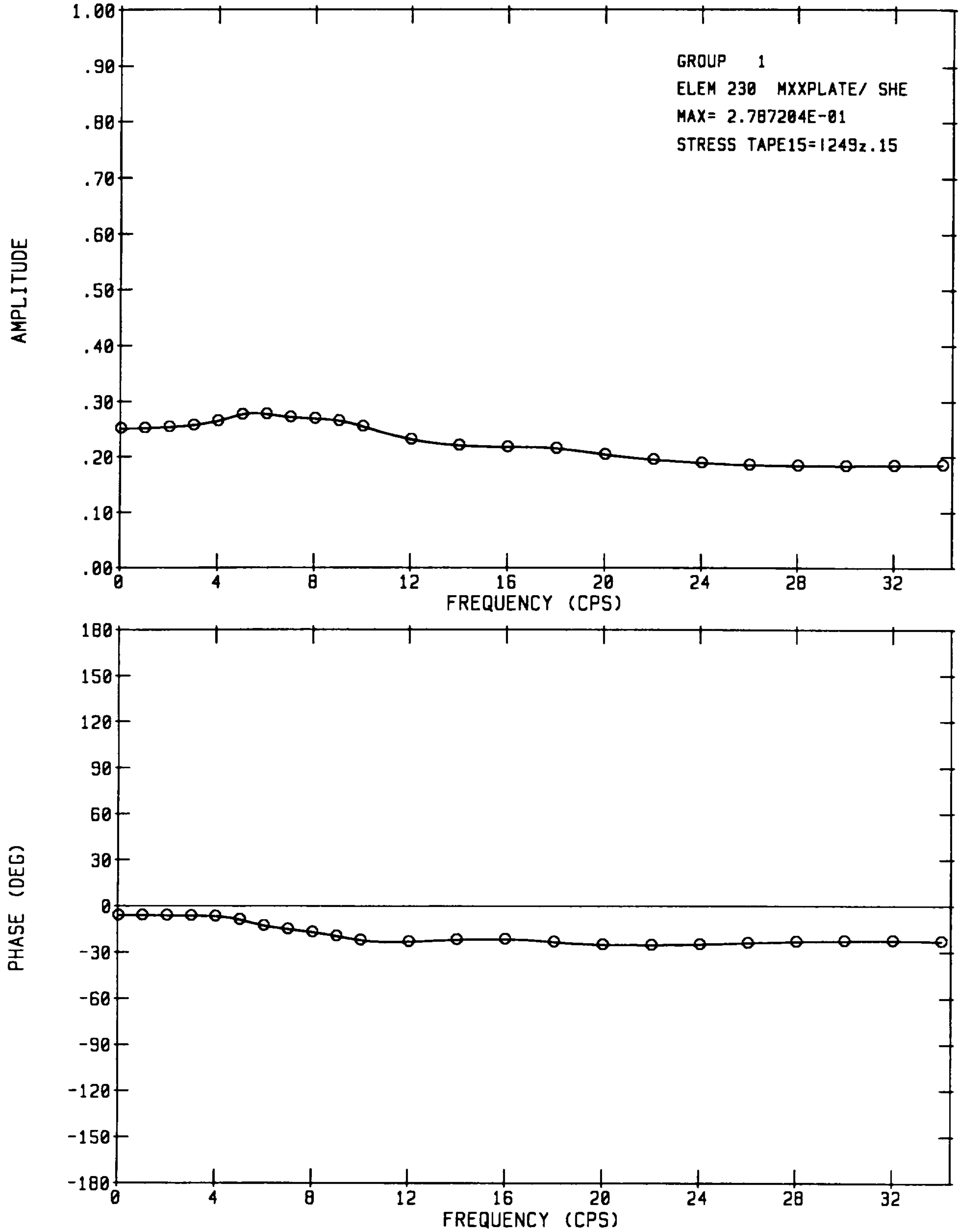
CHECK amm DATE 9/23/99

CALC. NO. G(PU17)-2 REV. NO. 0

SHEET NO. 184

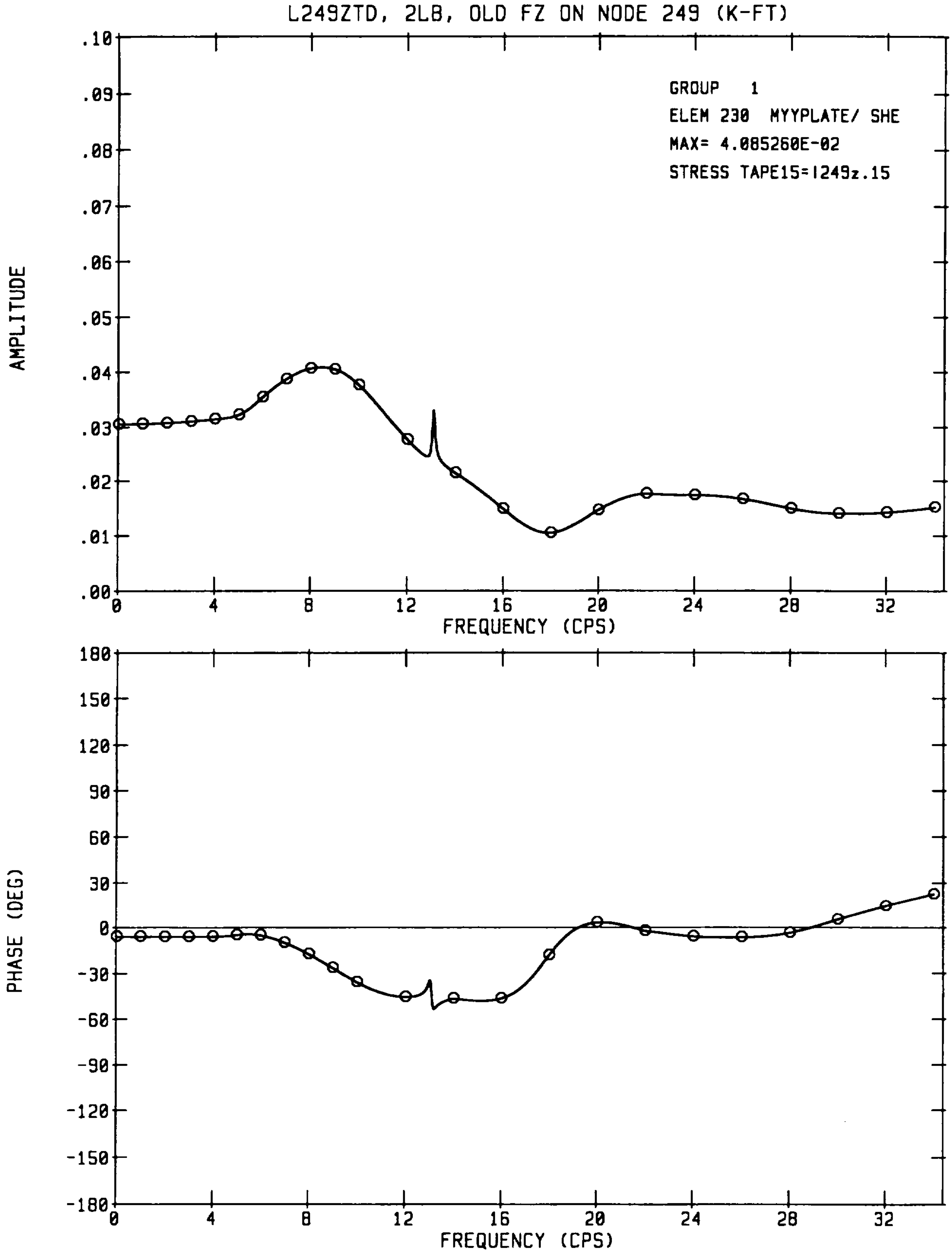
D:\PFSF\LB\PLOTTF\1229MYY.INP 9/22/99

L249ZTD, 2LB, OLD FZ ON NODE 249 (K-FT)



CEC JOB NO. 1101-000
BY DH DATE 9/22/99
CHECK [illegible] DATE 9/23/99
CALC. NO. G(PU17)-2 REV. NO. 0
SHEET NO. 185

D:\PFSF\LB\PLOTTF\1230MXX.INP 9/22/99



CEC JOB NO. 1101-000

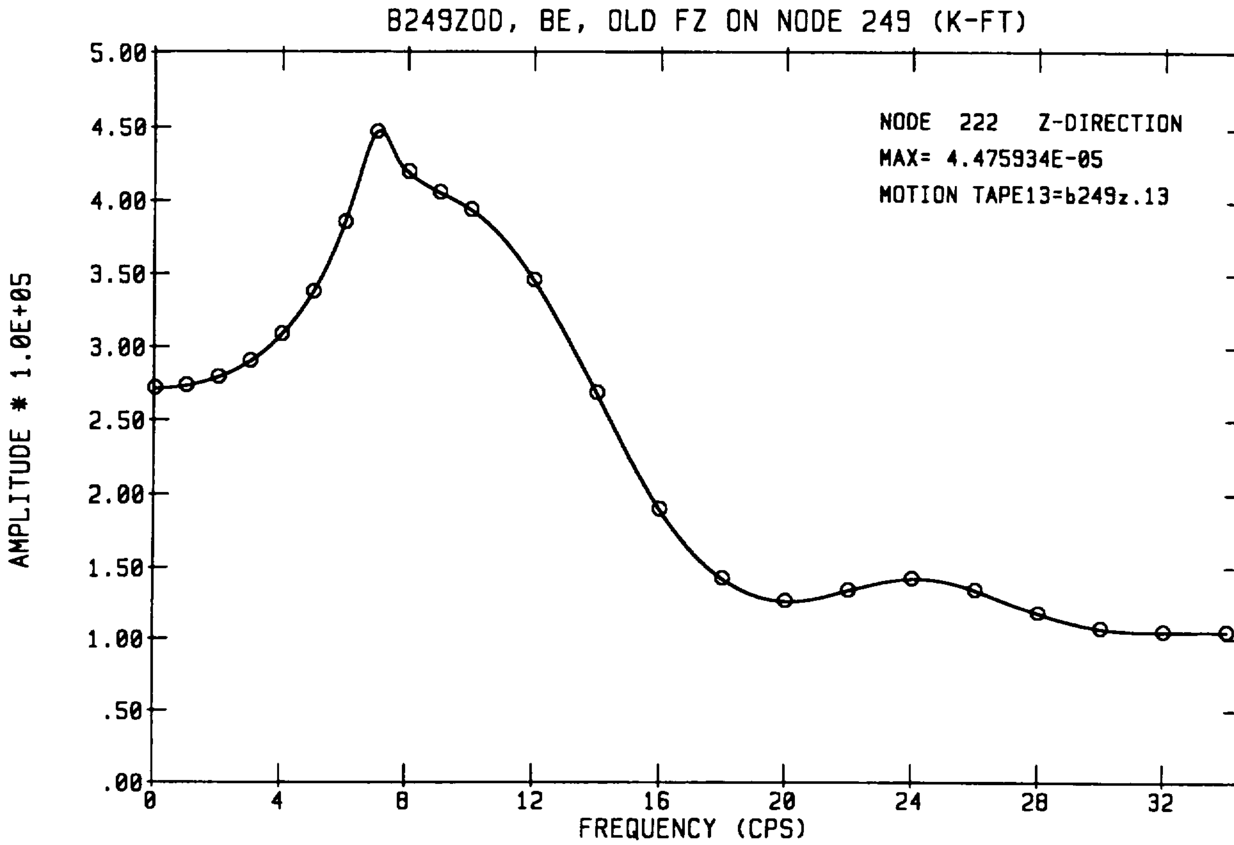
BY DH DATE 9/22/99

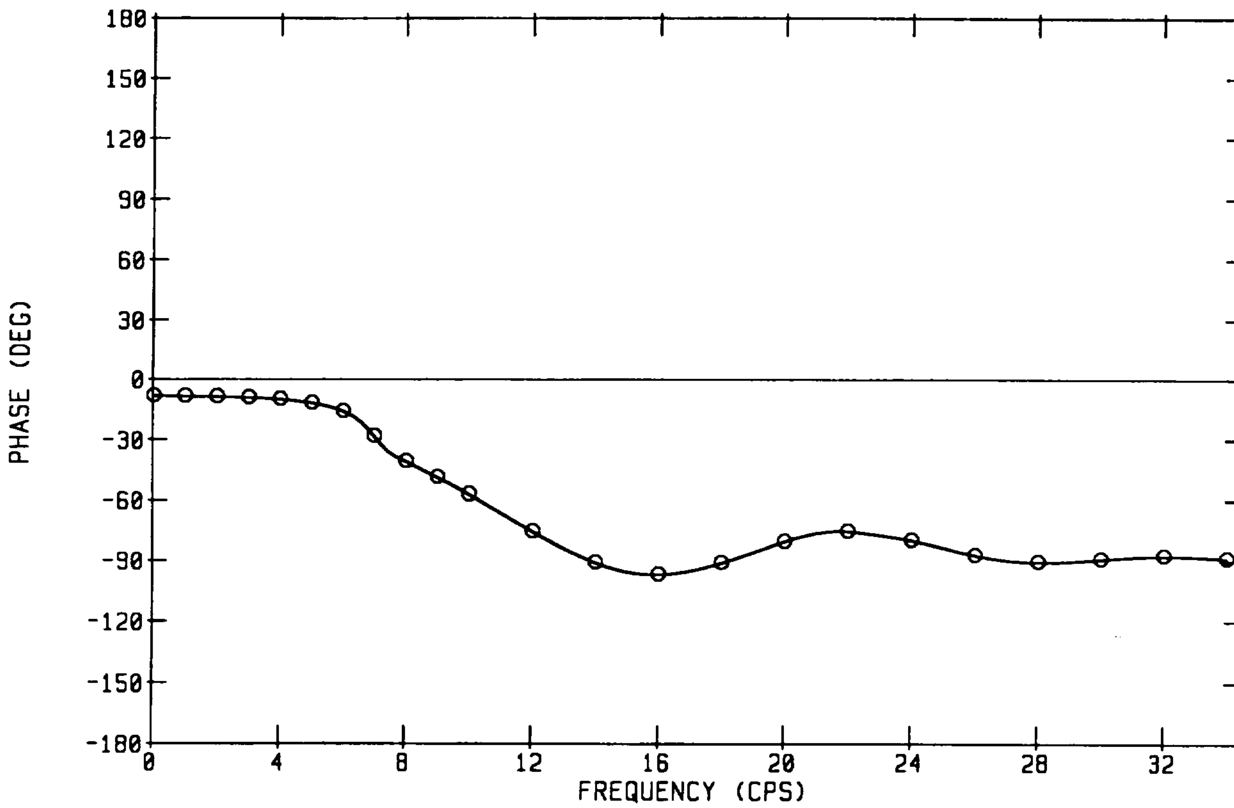
CHECK aum DATE 9/23/99

CALC. NO. 1101-000 REV. NO. 0

SHEET NO. 186

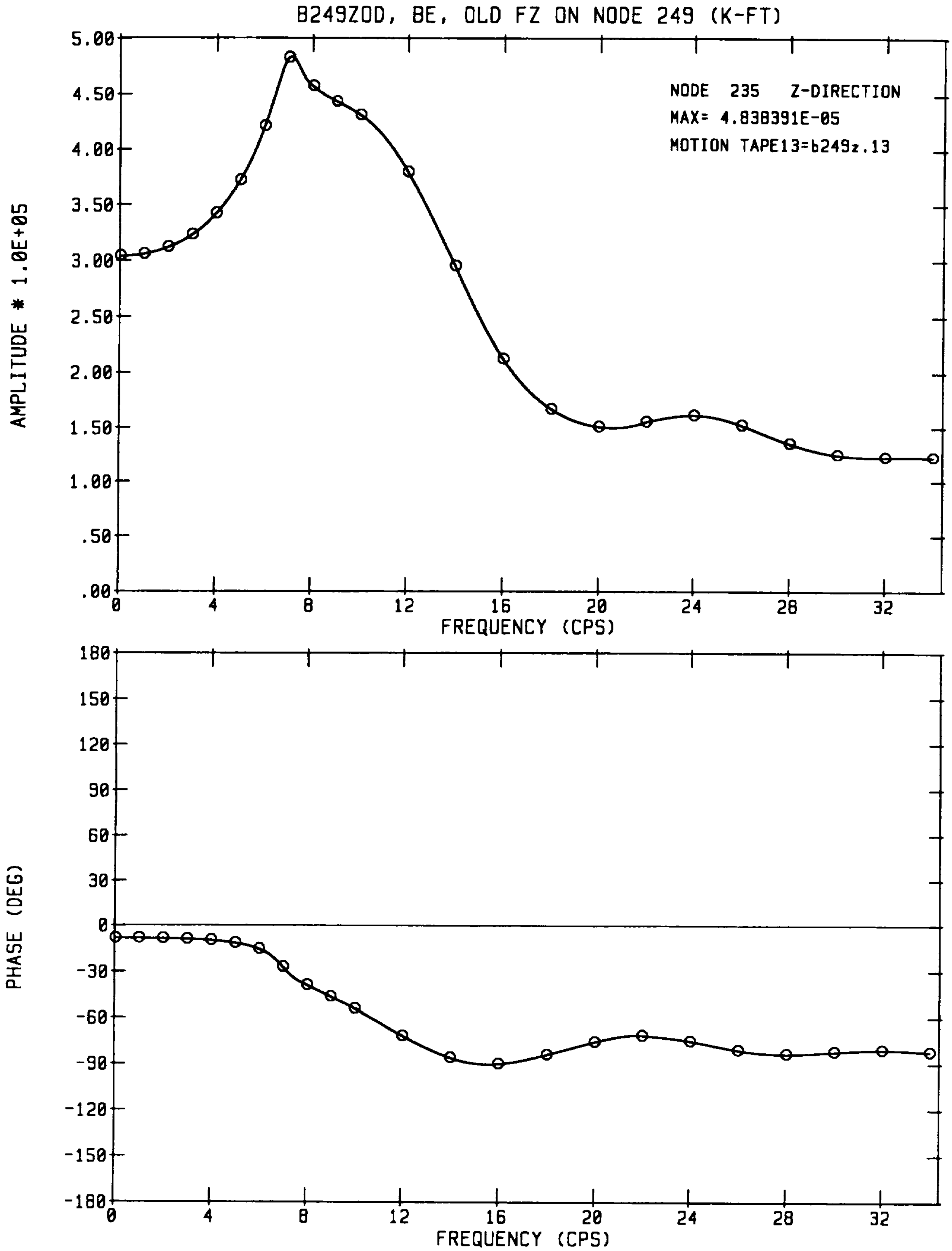
D:\PFSF\LB\PLOTTF\1230MYY.INP 9/22/99





CEC JOB NO. 1101-000
BY DF DATE 9/22/99
CHECK AWM DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 187

D:\PFSF\BE\PLOTTF\fz222Z.INP 9/22/99



CEC JOB NO. 1101-000

BY DH DATE 9/22/99

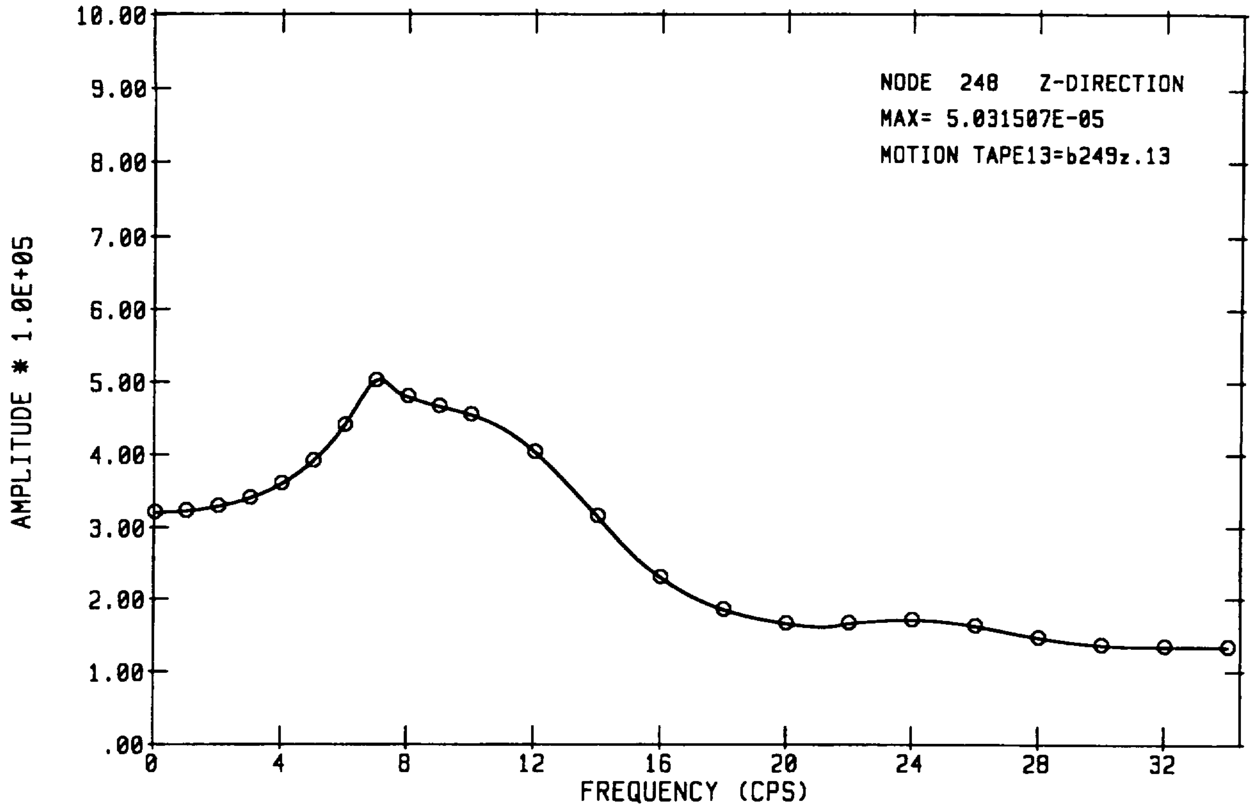
CHECK AUM DATE 9/23/99

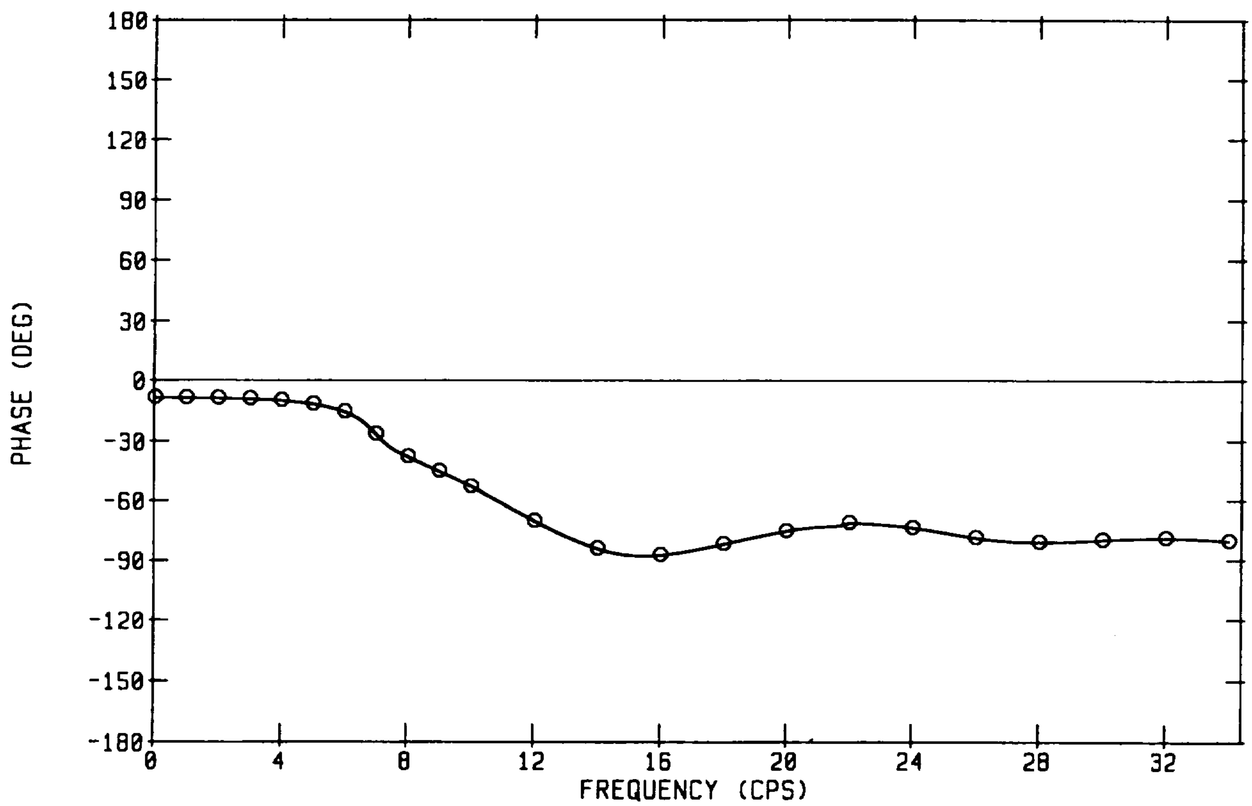
CALC. NO. G(P017)-2 REV. NO. 0

SHEET NO. 188

D:\PFSF\BE\PLOTTF\fz235Z.INP 9/22/99

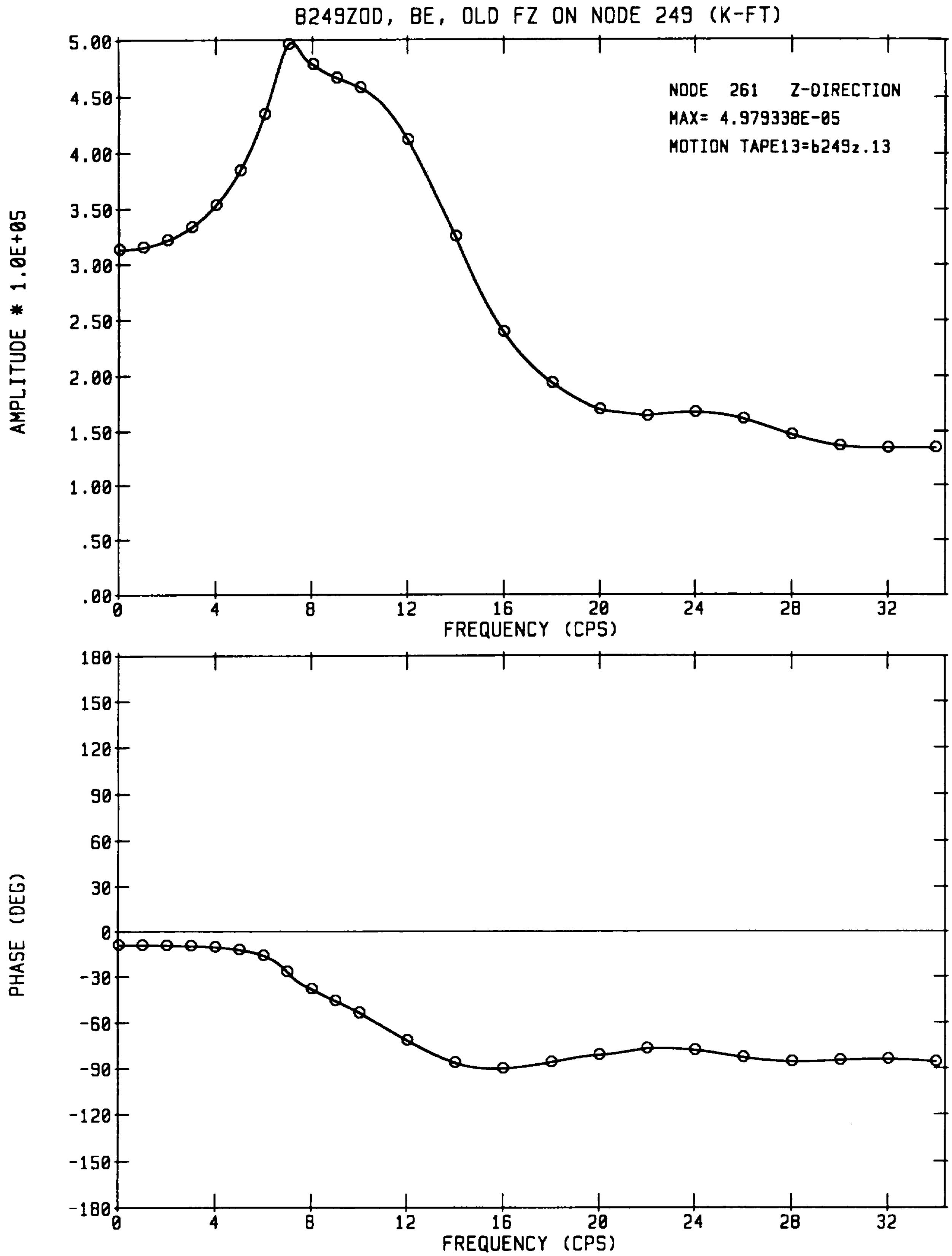
B249ZOD, BE, OLD FZ ON NODE 249 (K-FT)





CEC JOB NO. 1101-000
BY DH DATE 9/22/99
CHECK aum DATE 9/23/99
CALC. NO. G(PU17)-2 REV. NO. 0
SHEET NO. 189

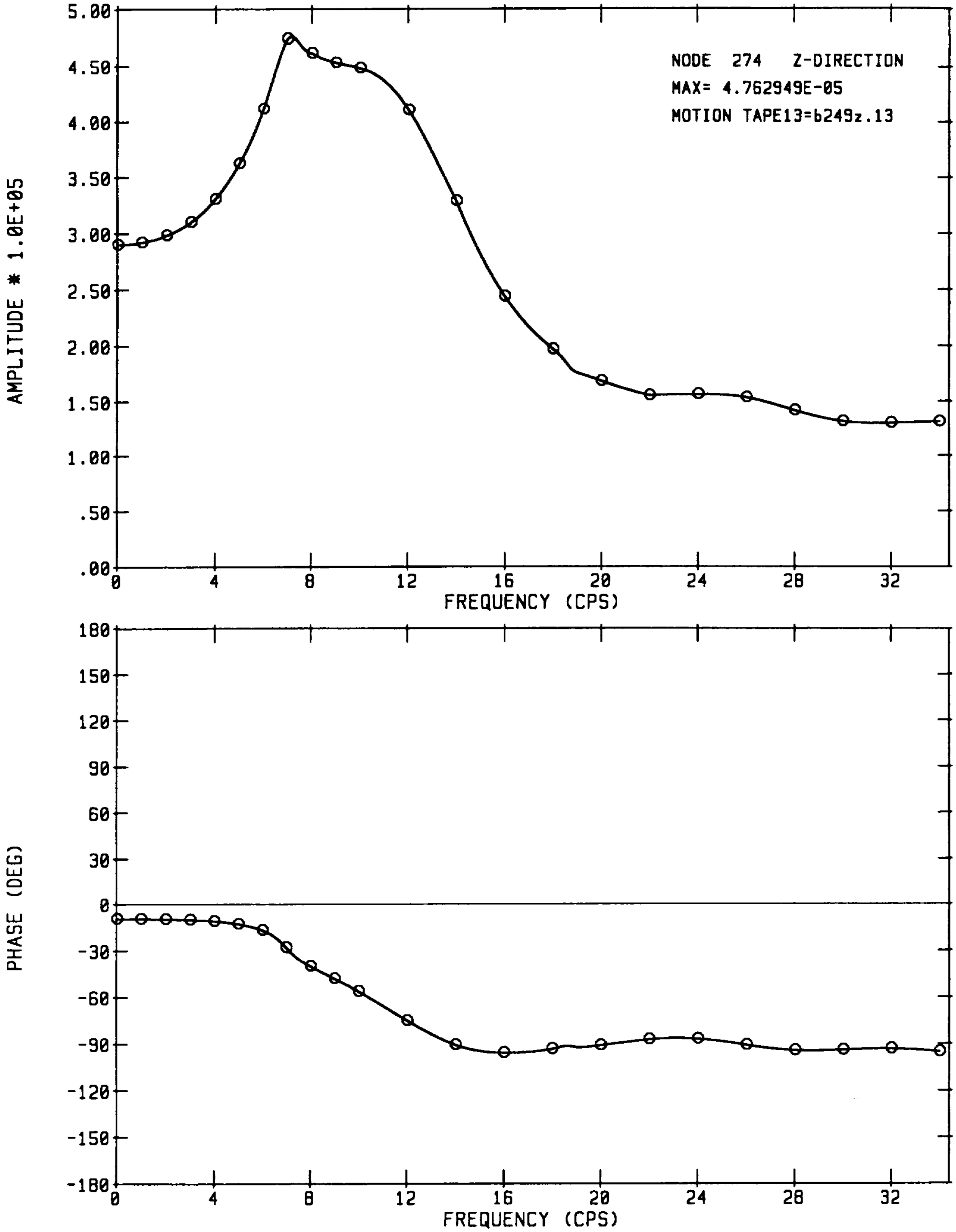
D:\PFSF\BE\PLOTTF\fz248Z.INP 9/22/99



CEC JOB NO. 1101-000
BY DH DATE 9/22/99
CHECK auM DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 190

D:\PFSF\BE\PLOTTF\fz261Z.INP 9/22/99

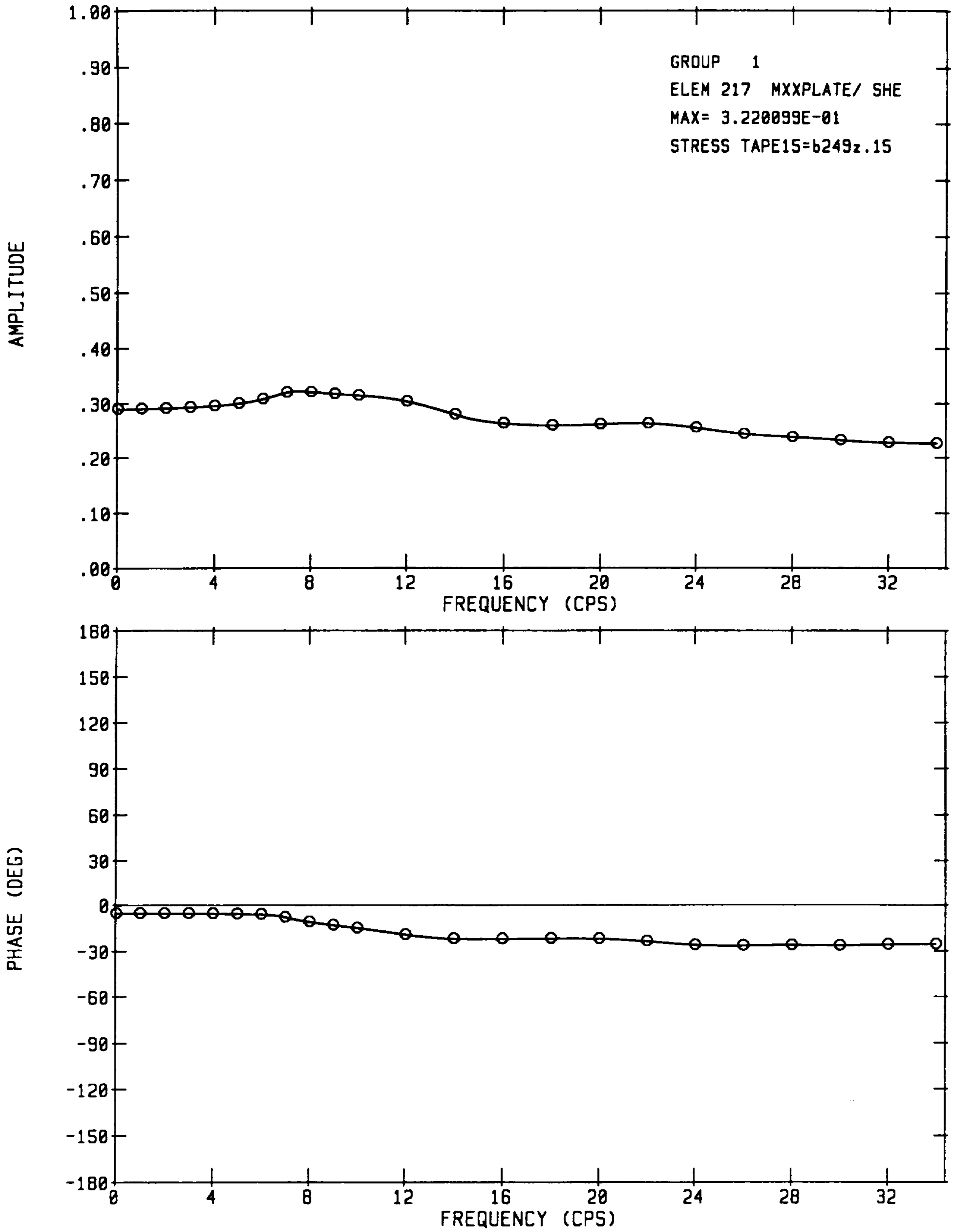
B249ZOD, BE, OLD FZ ON NODE 249 (K-FT)



CEC JOB NO. 1101-000
BY DH DATE 9/22/99
CHECK aum DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 191

D:\PFSF\BE\PLOTTF\fz274Z.INP 9/22/99

B249ZTD, BE, OLD FZ ON NODE 249 (K-FT)



CEC JOB NO. 1101-000

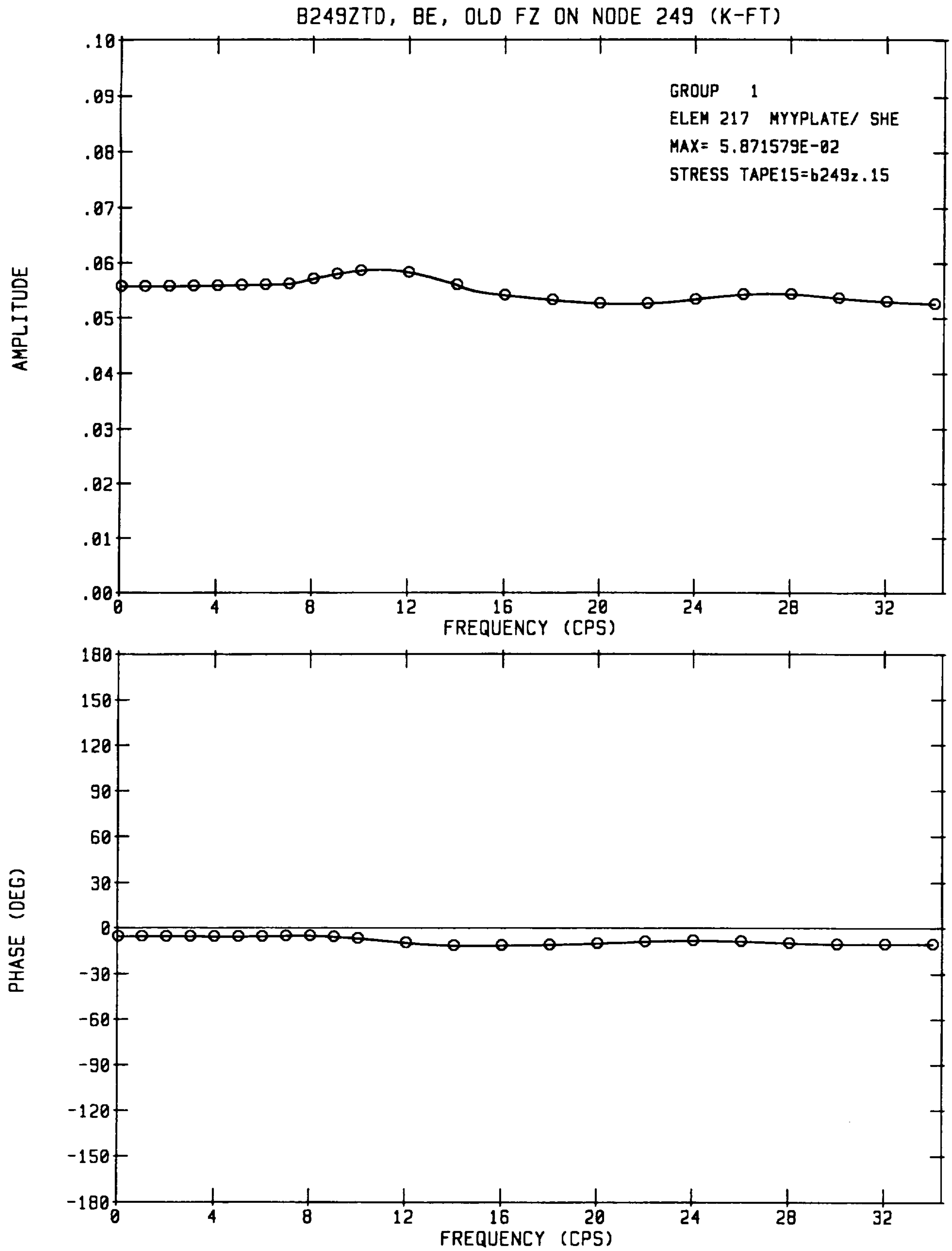
BY DH DATE 9/22/99

CHECK aum DATE 9/23/99

CALC. NO. G(P017)-2 REV. NO. 0

SHEET NO. 192

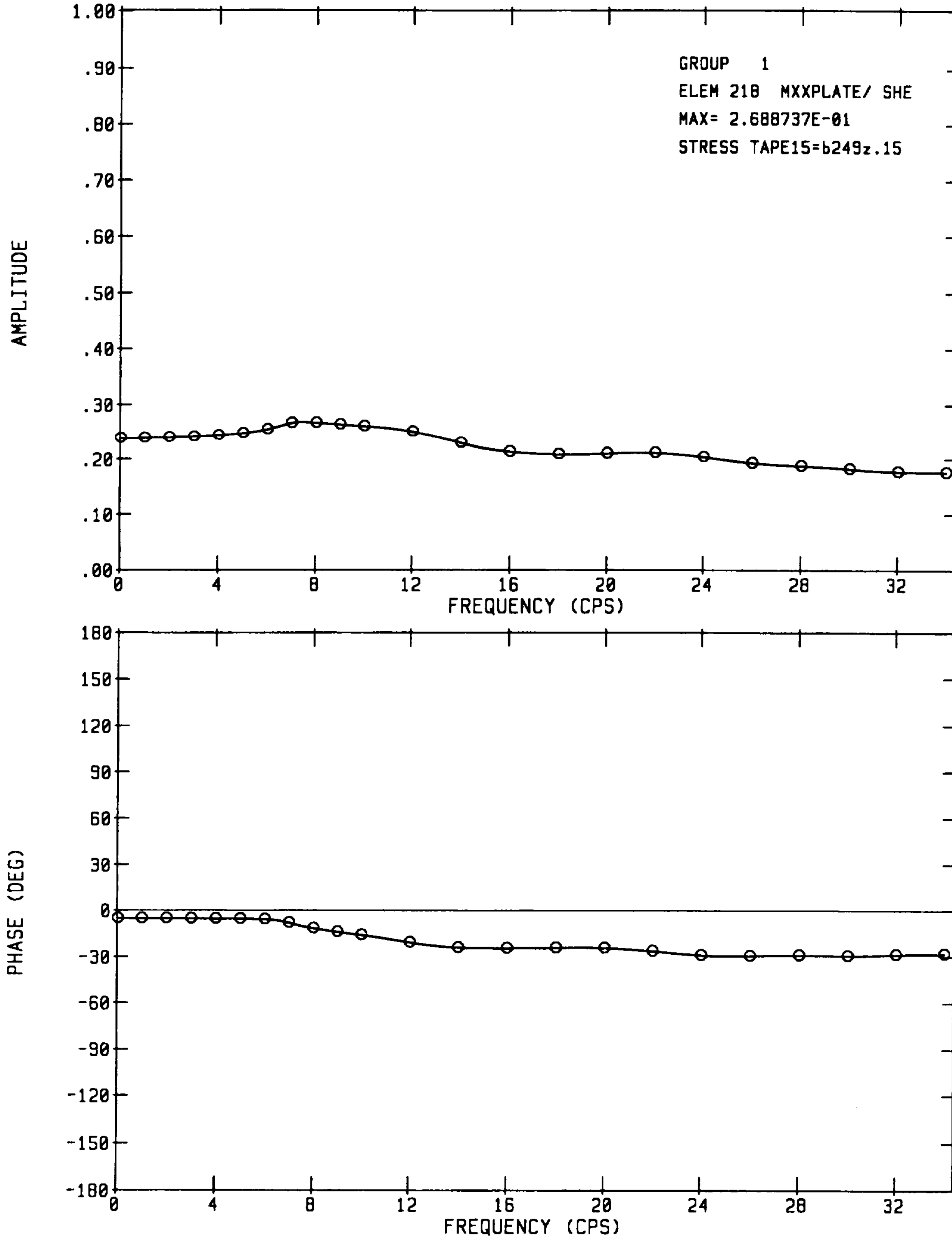
D:\PFSF\BE\PLOTTF\1217MXX.INP 9/22/99



CEC JOB NO. 1101-000
BY DH DATE 9/22/99
CHECK awm DATE 9/23/99
CALC. NO. G(PU17)-2 REV. NO. 0
SHEET NO. 193

D:\PFSF\BE\PLOTTF\1217MYY.INP 9/22/99

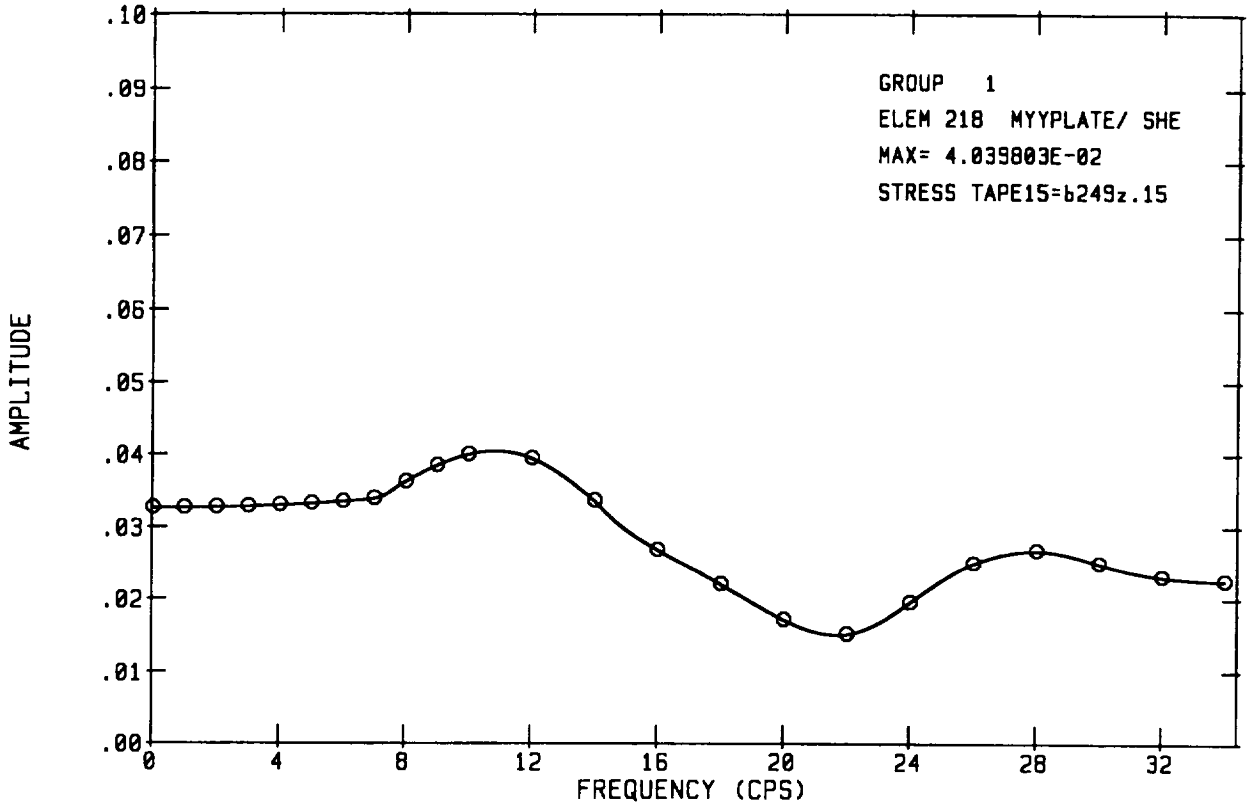
B249ZTD, BE, OLD FZ ON NODE 249 (K-FT)

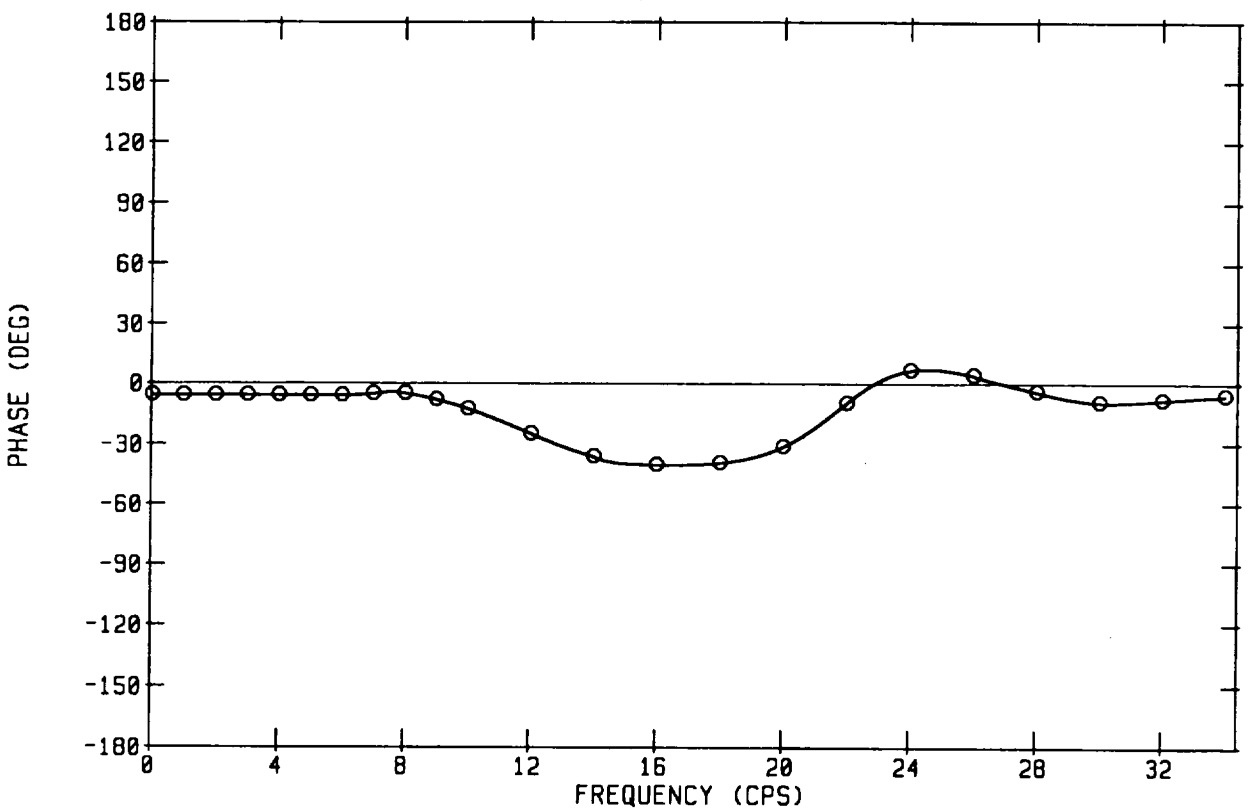


CEC JOB NO. 1101-005
BY DT DATE 9/22/99
CHECK aum DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 194

D:\PFSF\BE\PLOTTF\1218MXX.INP 9/22/99

B249ZTD, BE, OLD FZ ON NODE 249 (K-FT)





CEC JOB NO. 1101-000

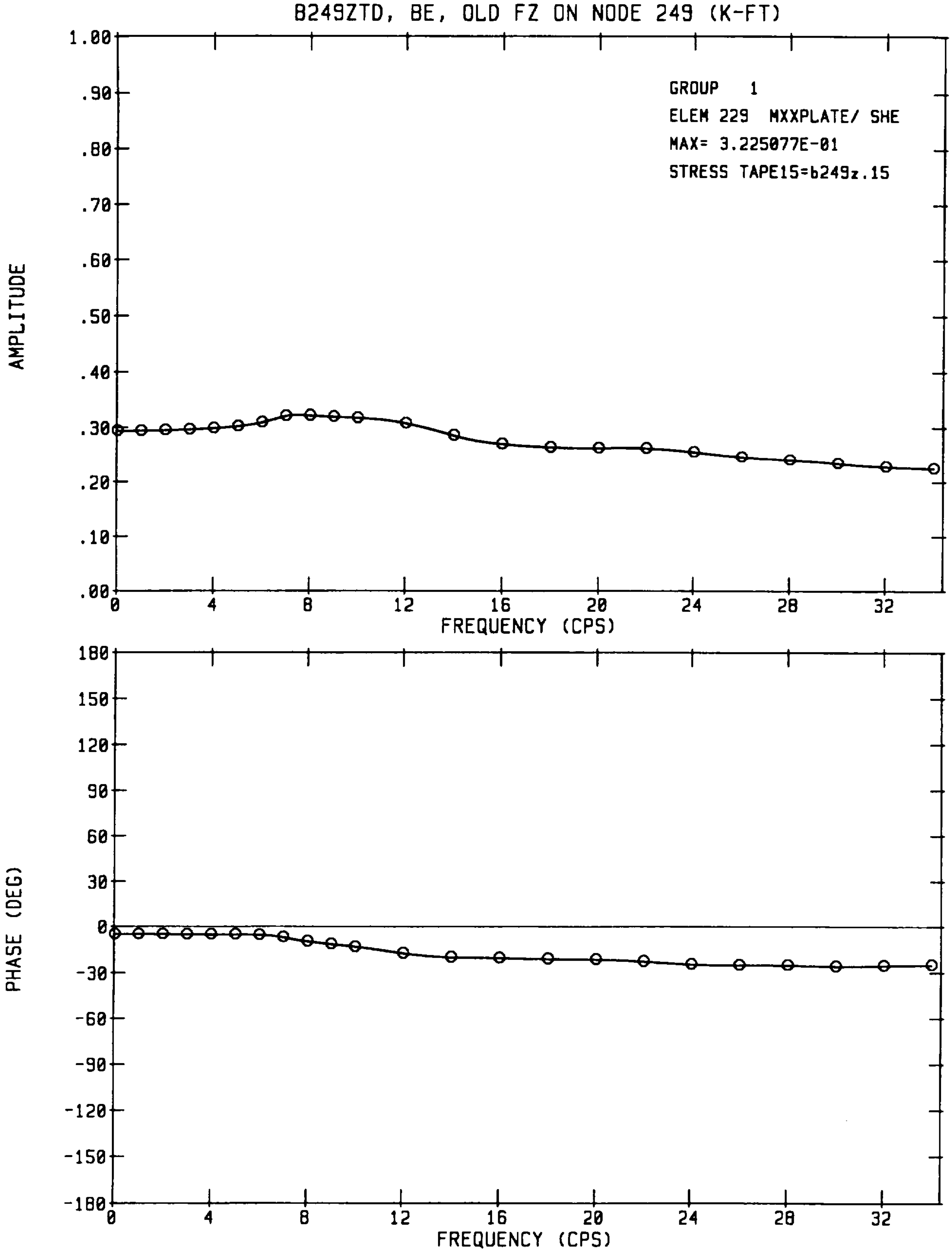
BY DH DATE 9/22/99

CHECK Qum DATE 9/23/99

CALC. NO. G(PU17)-2 REV. NO. 0

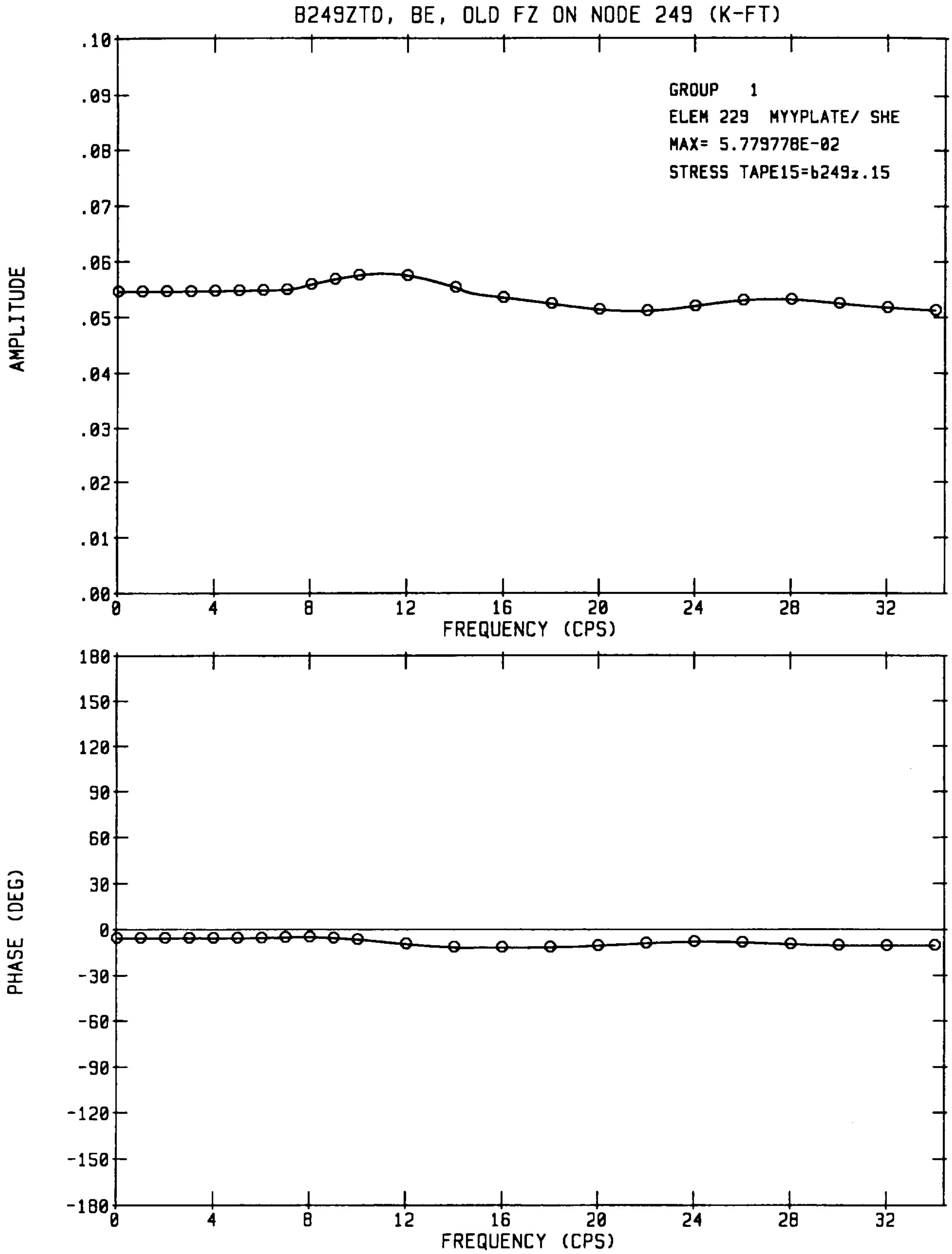
SHEET NO. 195

D:\PFSF\BE\PLOTTF\1218MYY.INP 9/22/99



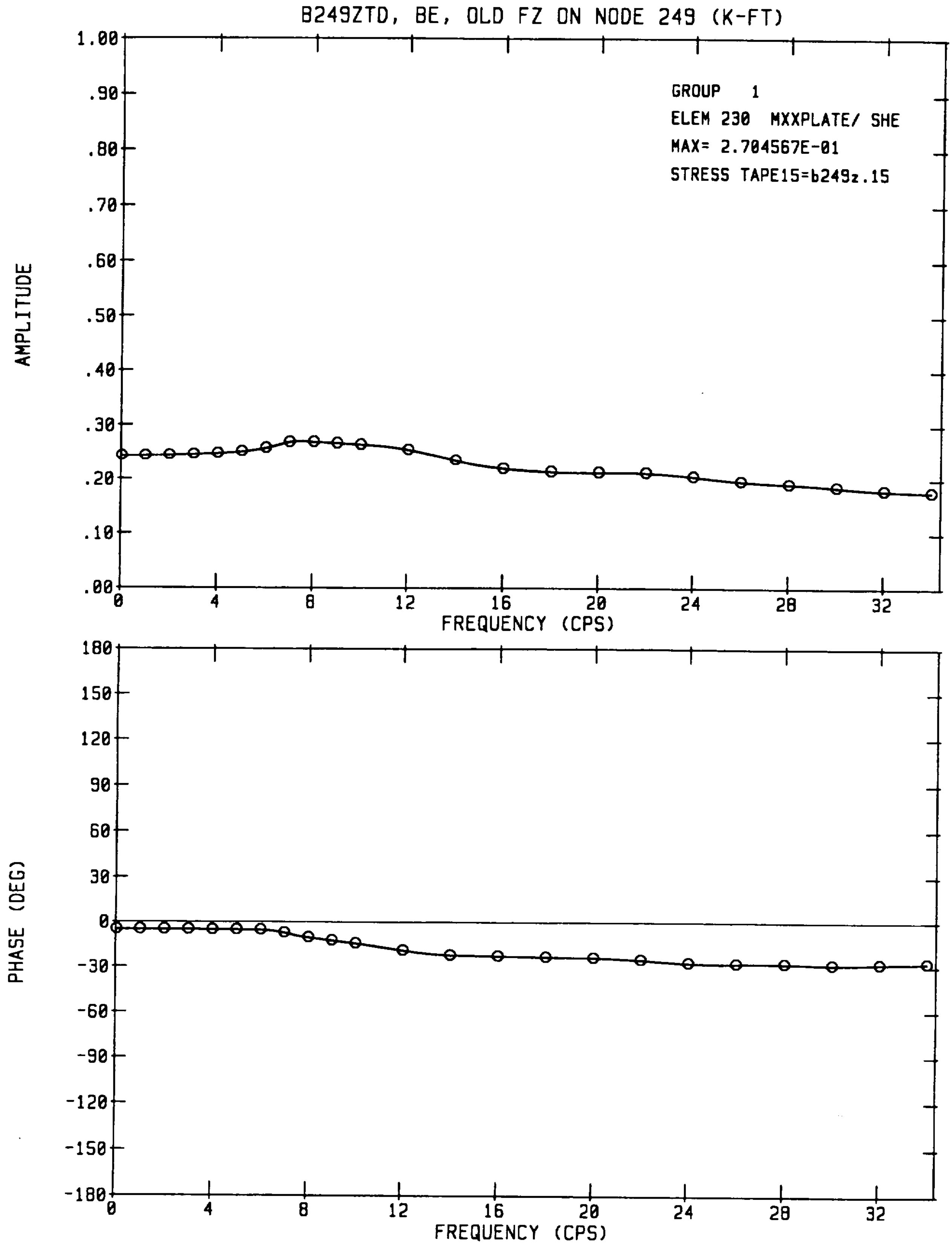
CEC JOB NO. 1101-000
BY DH DATE 9/22/99
CHECK aum DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 196

D:\PFSF\BE\PLOTTF\1229MXX.INP 9/22/99



CEC JOB NO. 1101-000
BY DH DATE 9/22/99
CHECK aum DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 197

D:\PFSF\BE\PLOTTF\1229MYY.INP 9/22/99



CEC JOB NO. 1101-000

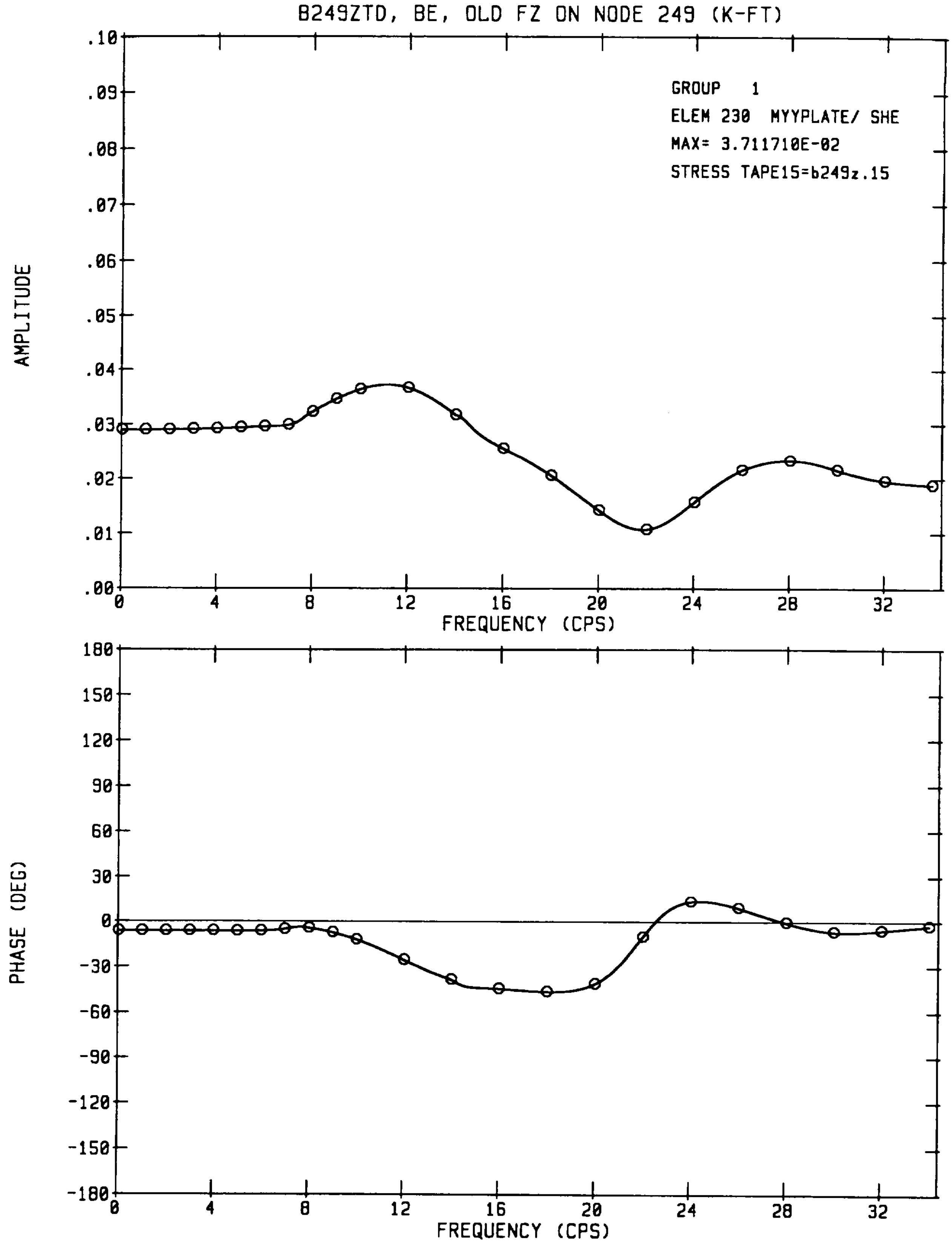
BY DH DATE 9/22/99

CHECK QWM DATE 9/23/99

CALC. NO. G(P017)-2 REV. NO. 0

SHEET NO. 198

D:\PFSF\BE\PLOTTF\1230MXX.INP 9/22/99



CEC JOB NO. 1101-000

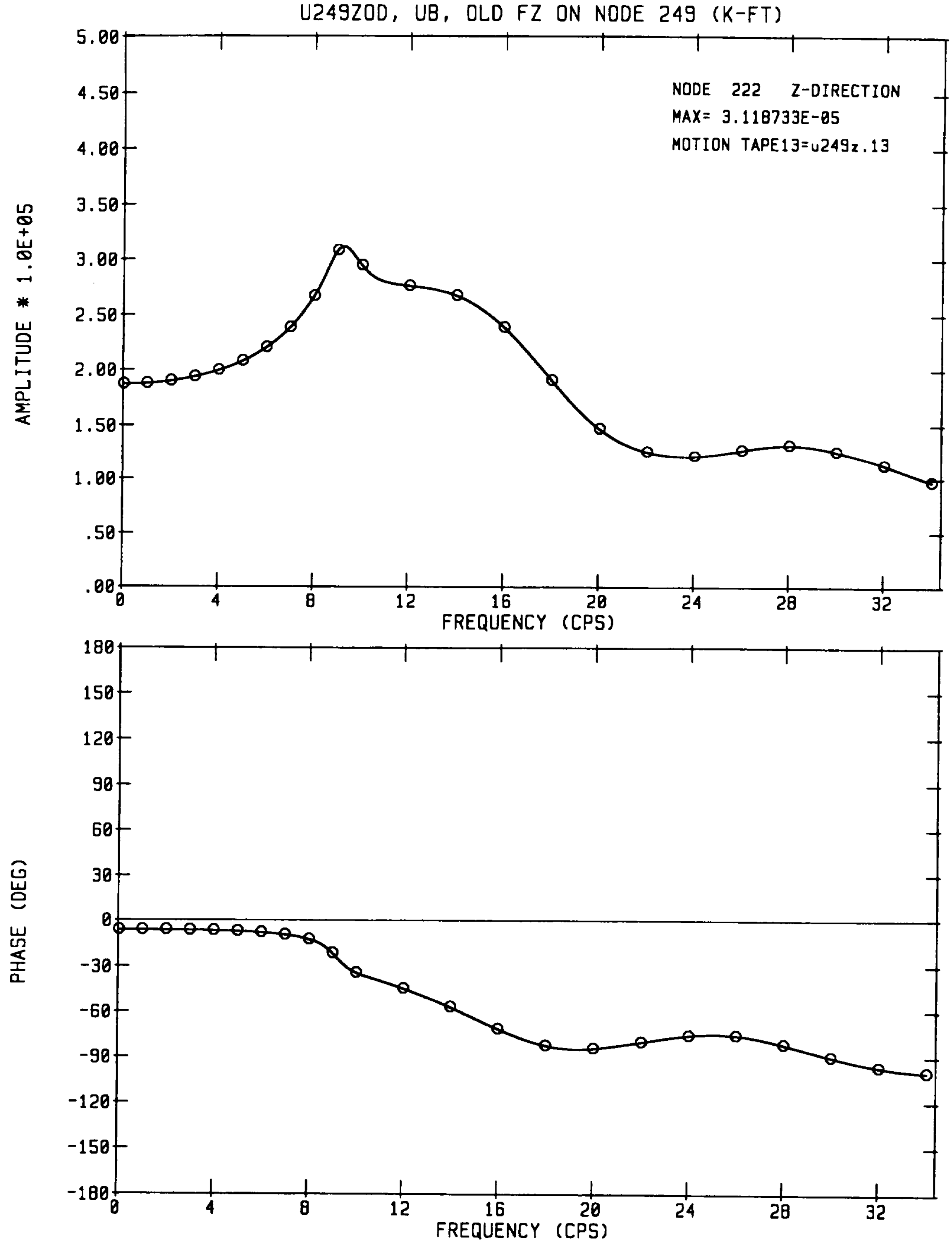
BY DH DATE 9/22/99

CHECK gum DATE 9/23/99

CALC. NO. G(P017)-2 REV. NO. 0

SHEET NO. 199

D:\PFSF\BE\PLOTTF\1230MYY.INP 9/22/99



CEC JOB NO. 1101-000

BY DH DATE 9/22/99

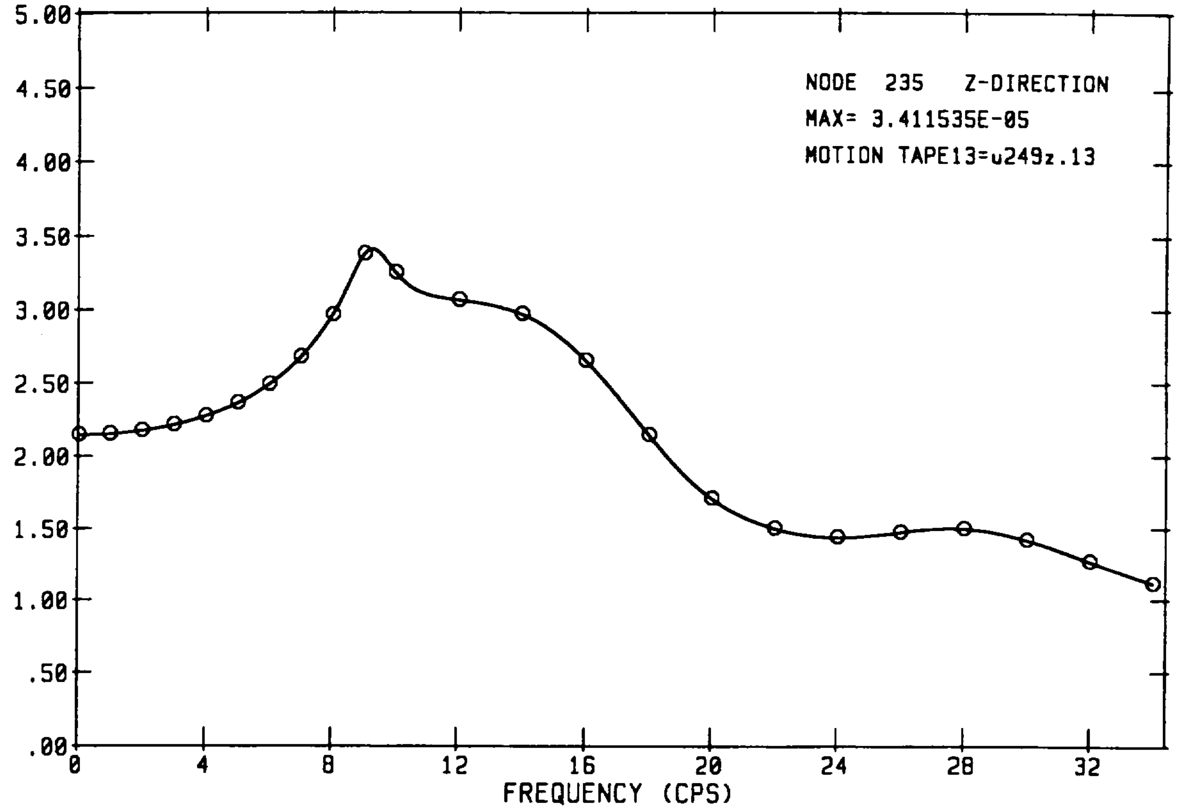
CHECK Allm DATE 9/23/99

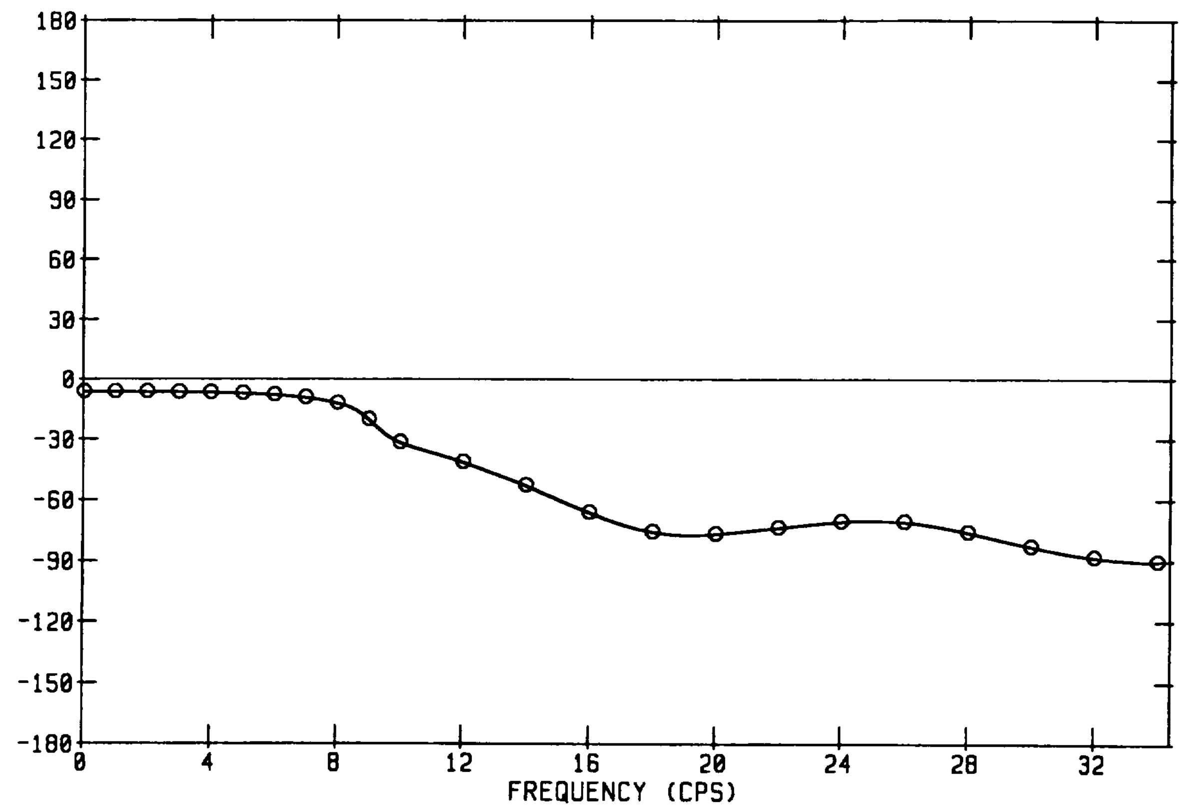
CALC. NO. G(P017)-2 REV. NO. 0

SHEET NO. 200

D:\PFSF\UB\PLOTTF\fz222Z.INP 9/22/99

U249ZOD, UB, OLD FZ ON NODE 249 (K-FT)

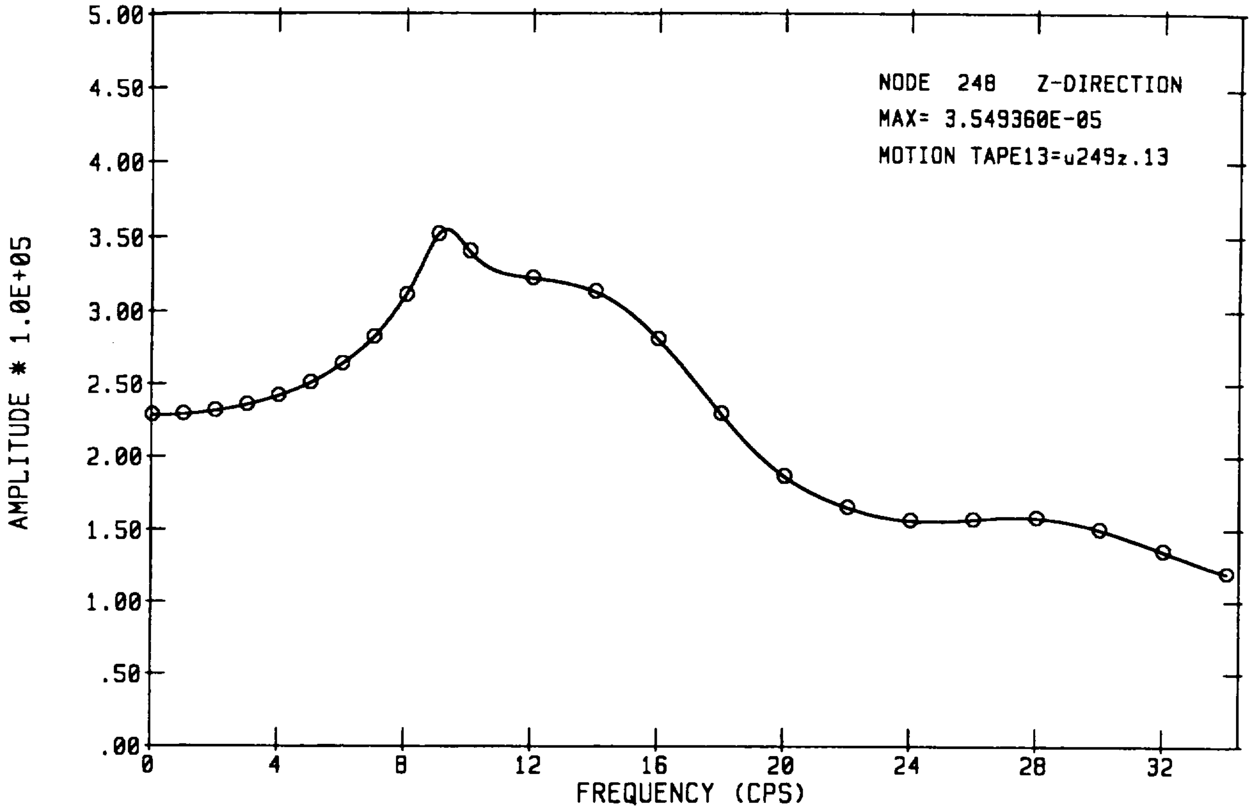


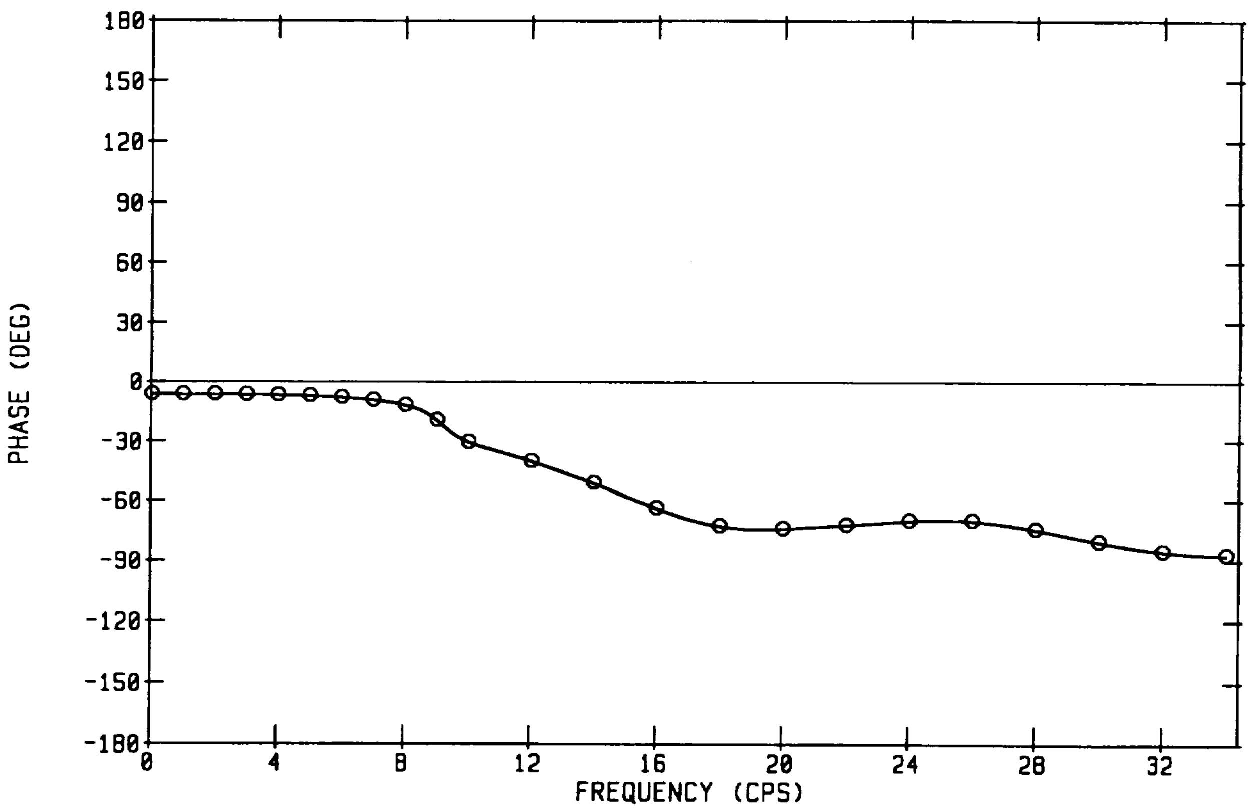


CEC JOB NO. 1101-000
BY DH DATE 9/22/99
CHECK aum DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 201

D:\PFSF\UB\PLOTTF\fz235Z.INP 9/22/99

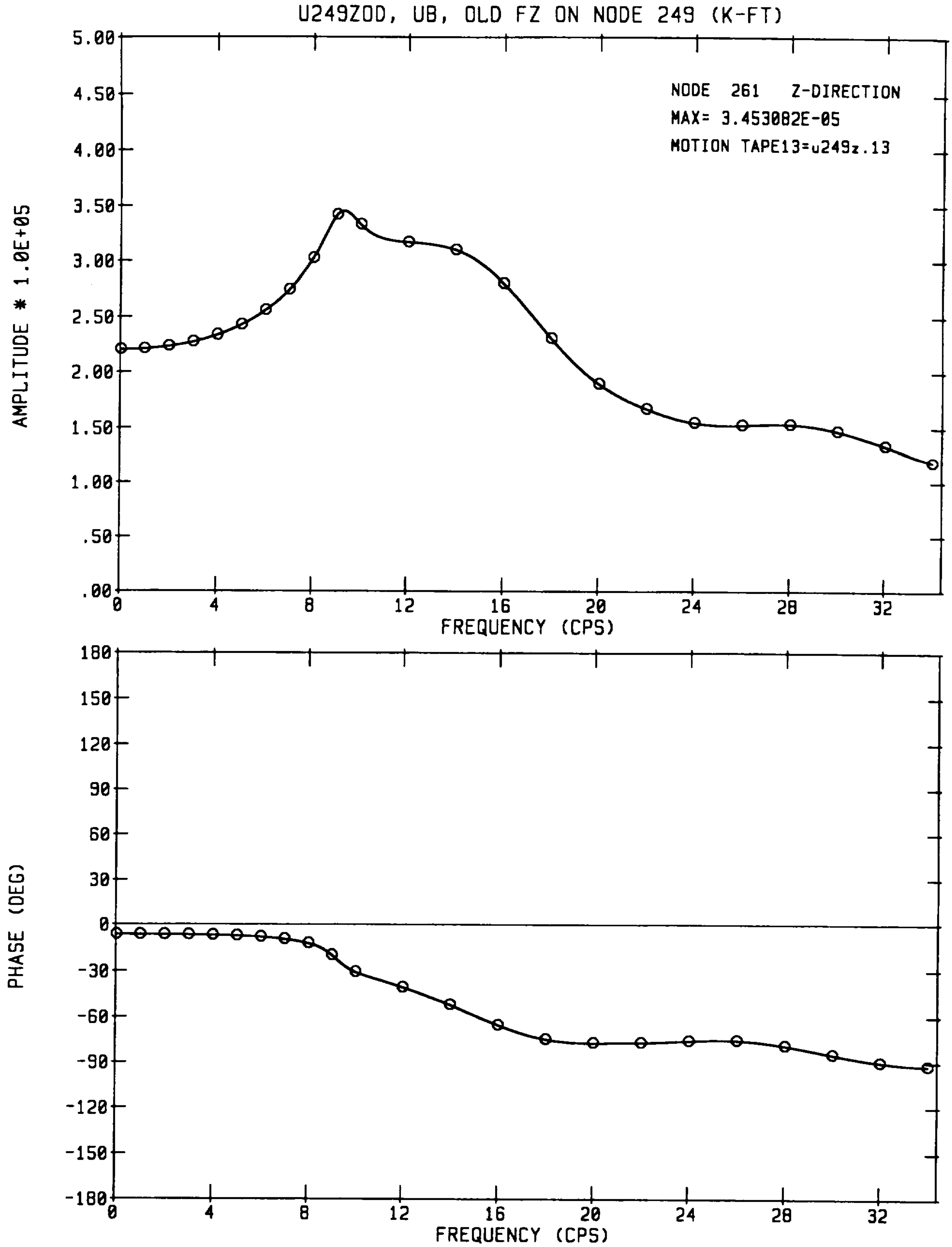
U249ZOD, UB, OLD FZ ON NODE 249 (K-FT)





CEC JOB NO. 1101-000
BY DH DATE 9/22/99
CHECK [illegible] DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 202

D:\PFSF\UB\PLOTTF\fz248Z.INP 9/22/99



CEC JOB NO. 1101-000

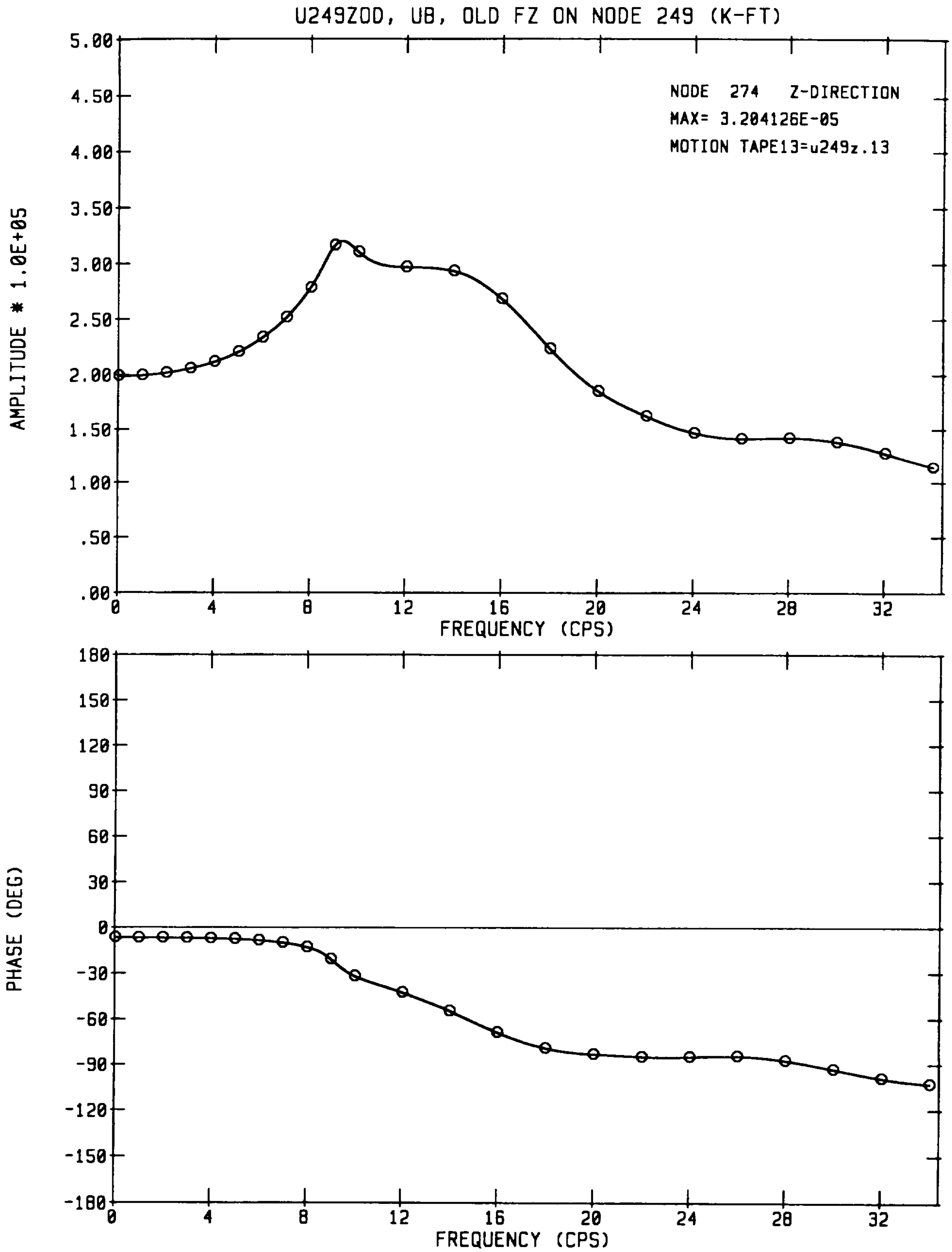
BY DH DATE 9/22/99

CHECK awm DATE 9/23/99

CALC. NO. G(PO17)-2 REV. NO. 0

SHEET NO. 203

D:\PFSF\UB\PLOTTF\fz261Z.INP 9/22/99



CEC JOB NO. 1101-000

BY DH DATE 9/22/99

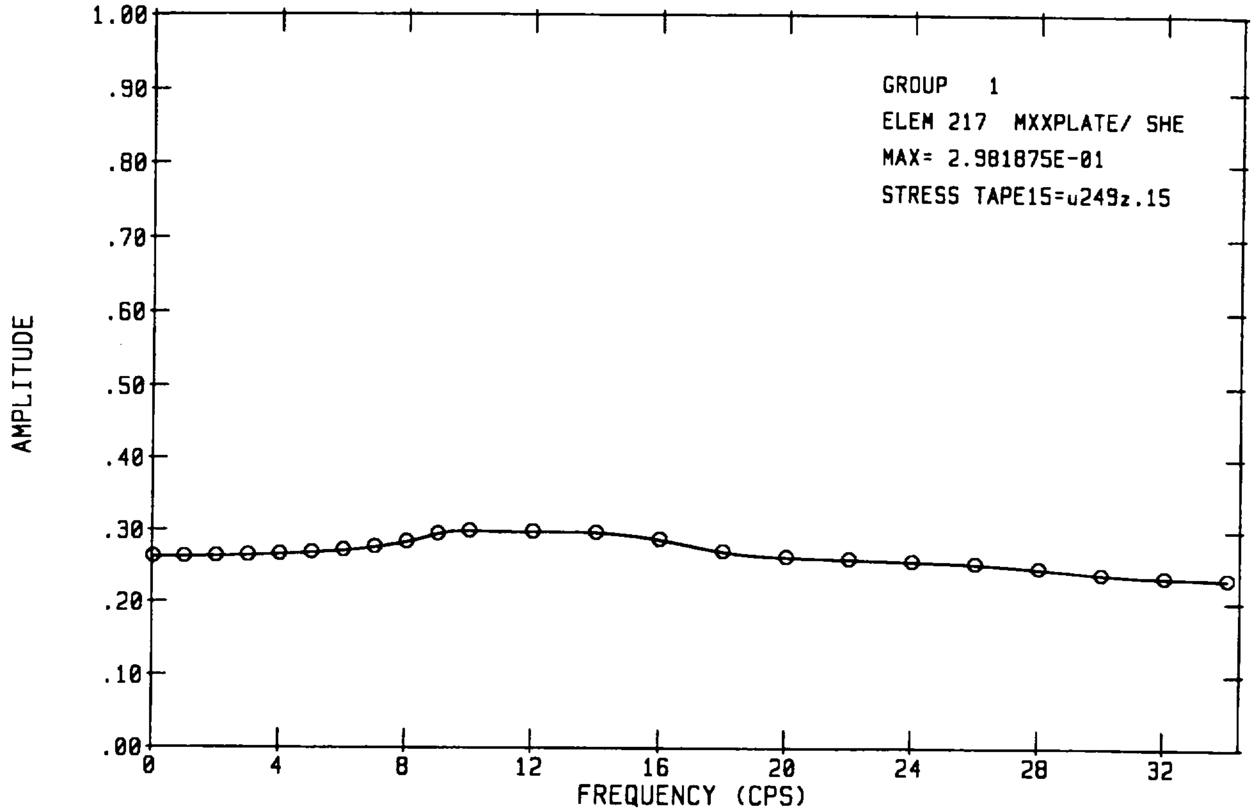
CHECK awm DATE 9/23/99

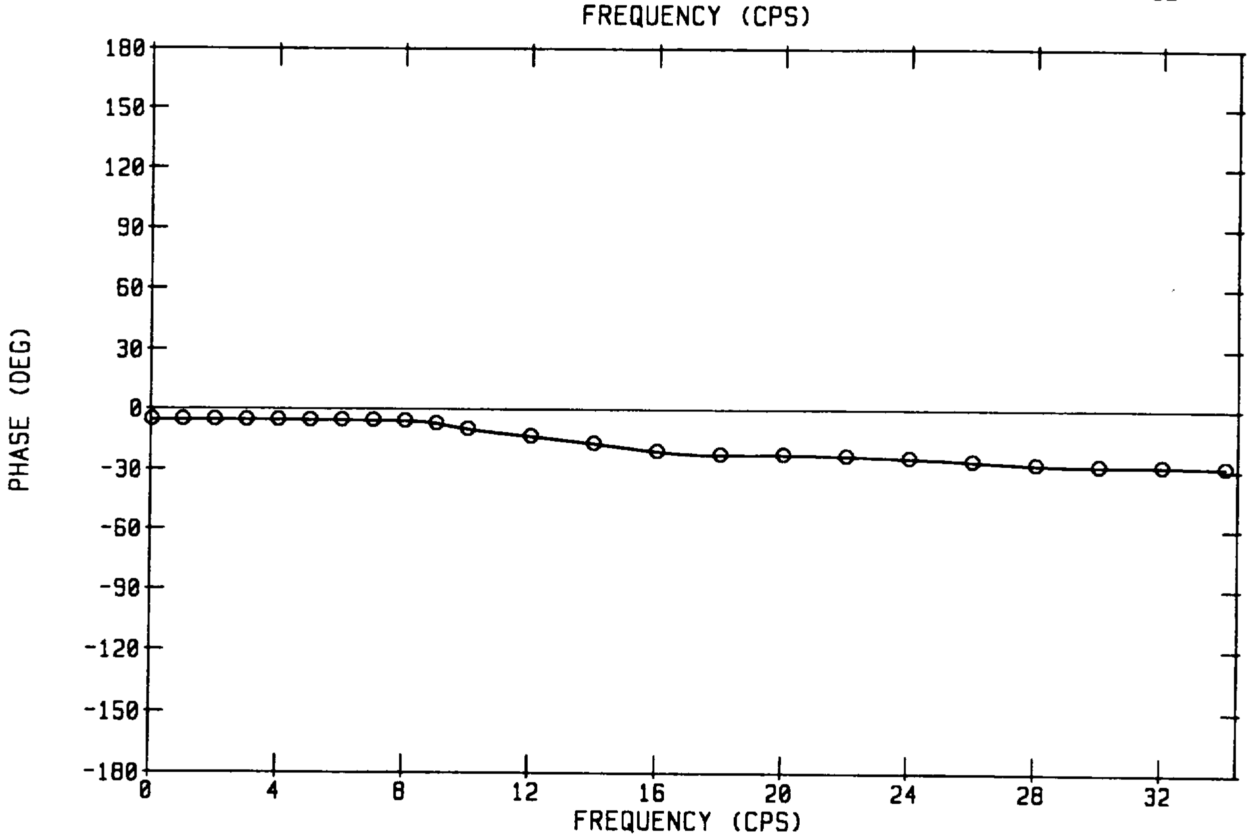
CALC. NO. G(P017)-2 REV. NO. 0

SHEET NO. 204

D:\PFSF\UB\PLOTTF\fz274Z.INP 9/22/99

U249ZTD, UB, OLD FZ ON NODE 249 (K-FT)





CEC JOB NO. 1101-000

BY DH DATE 9/22/99

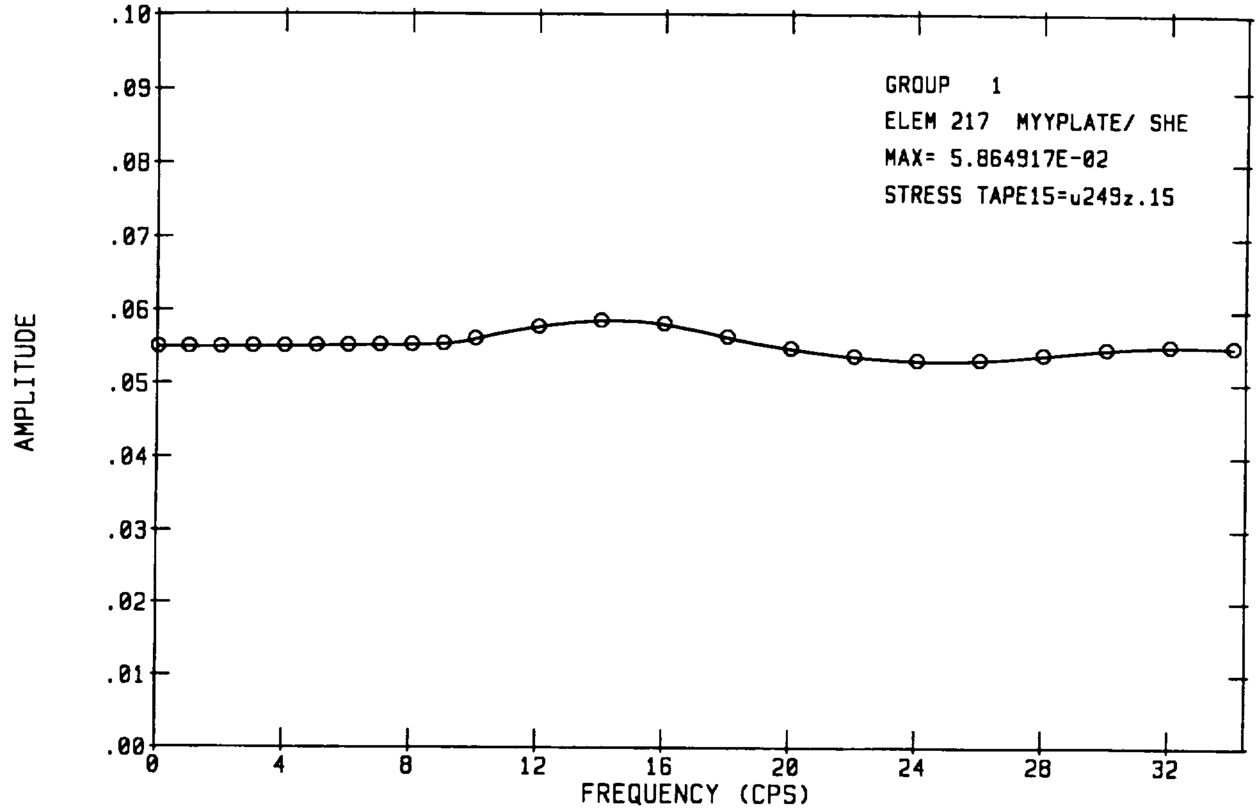
CHECK aum DATE 9/23/99

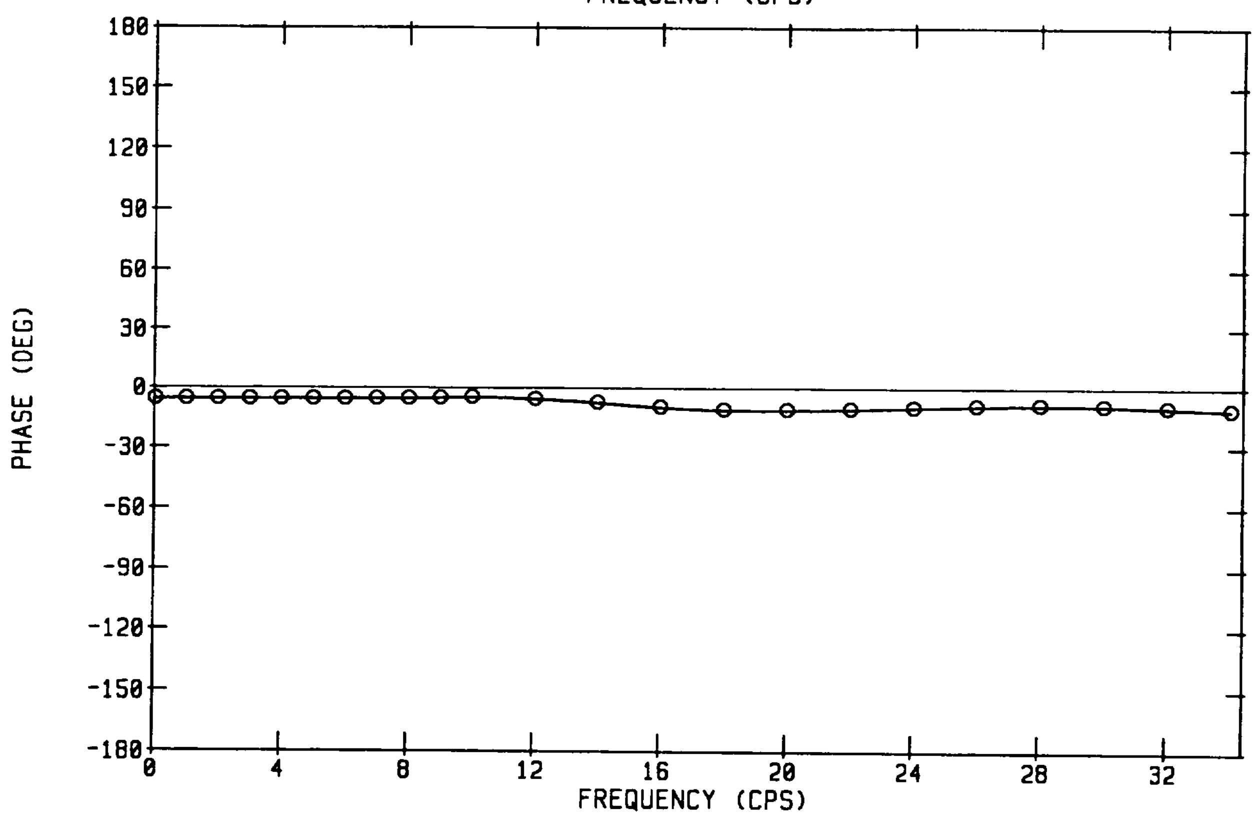
CALC. NO. G(P017)-2 REV. NO. 0

SHEET NO. 205

D:\PFSF\UB\PLOTTF\1217MXX.INP 9/22/99

U249ZTD, UB, OLD FZ ON NODE 249 (K-FT)

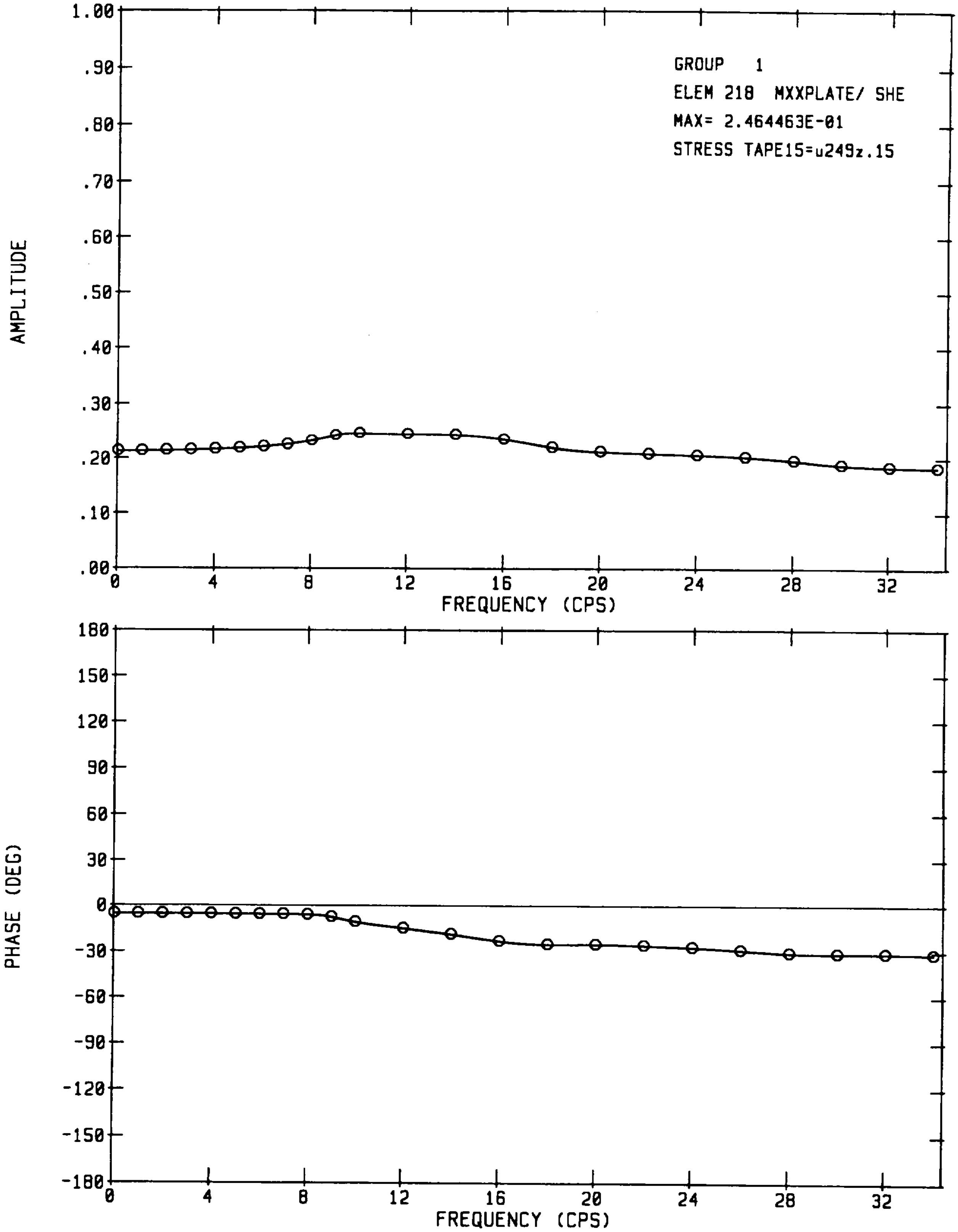




CEC JOB NO. 1101-000
BY DH DATE 9/22/99
CHECK aum DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 206

D:\PFSF\UB\PLOTTF\1217MYY.INP 9/22/99

U249ZTD, UB, OLD FZ ON NODE 249 (K-FT)



CEC JOB NO. 1101-000

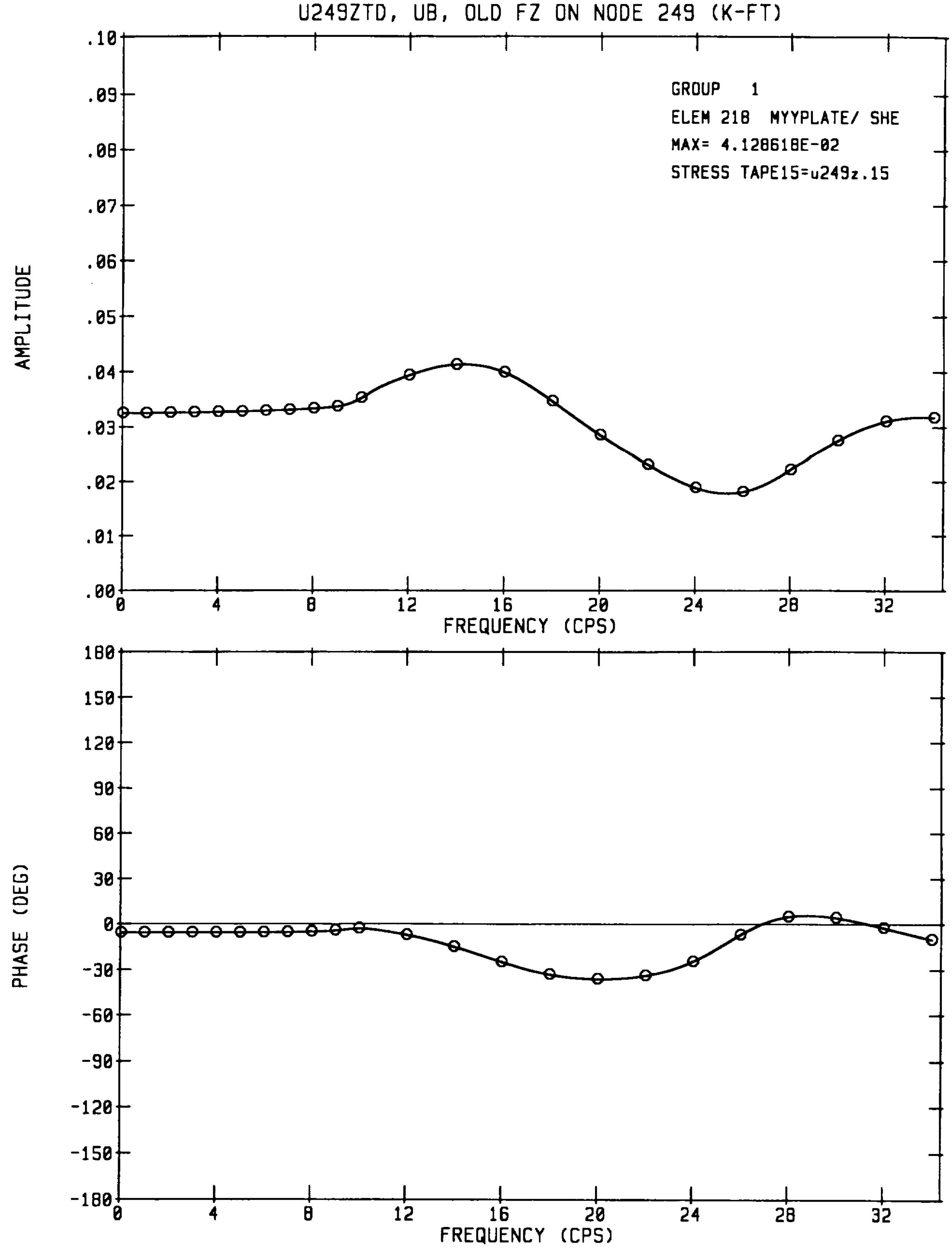
BY DH DATE 9/22/99

CHECK mm DATE 9/23/99

CALC. NO. G(P017)-2 REV. NO. 0

SHEET NO. 207

D:\PFSF\UB\PLOTTF\1218MXX.INP 9/22/99



CEC JOB NO. 1101-000

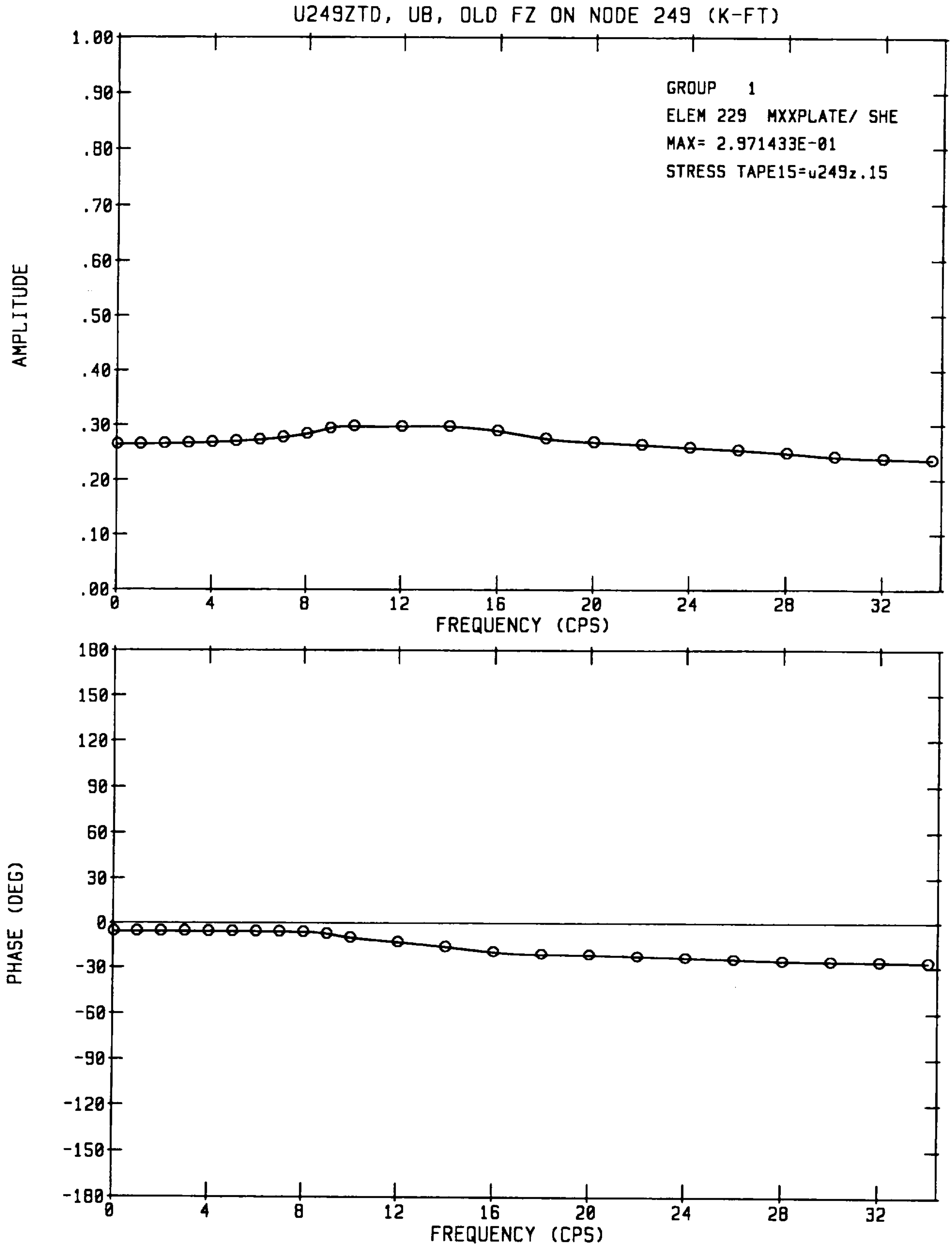
BY DH DATE 9/22/99

CHECK Aum DATE 9/23/99

CALC. NO. G(P017)-2 REV. NO. 0

SHEET NO. 208

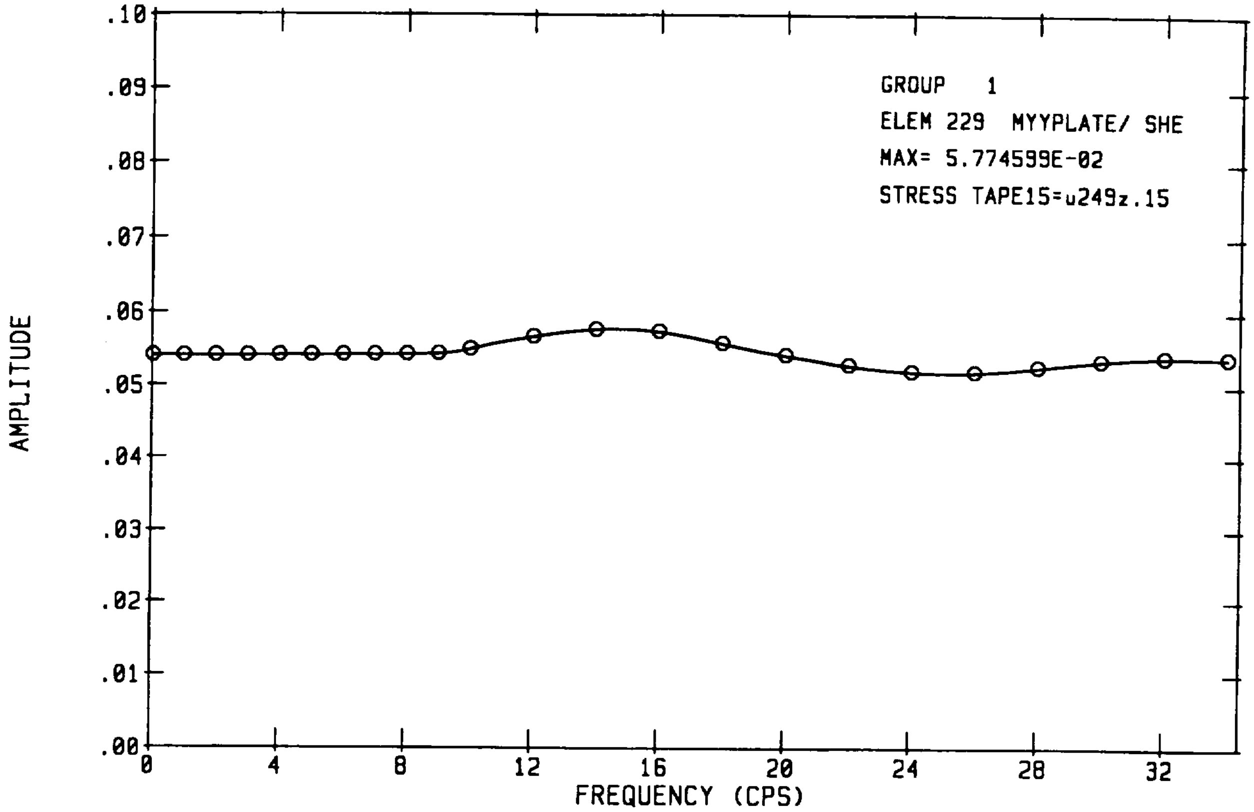
D:\PFSF\UB\PLOTTF\1218MYY.INP 9/22/99

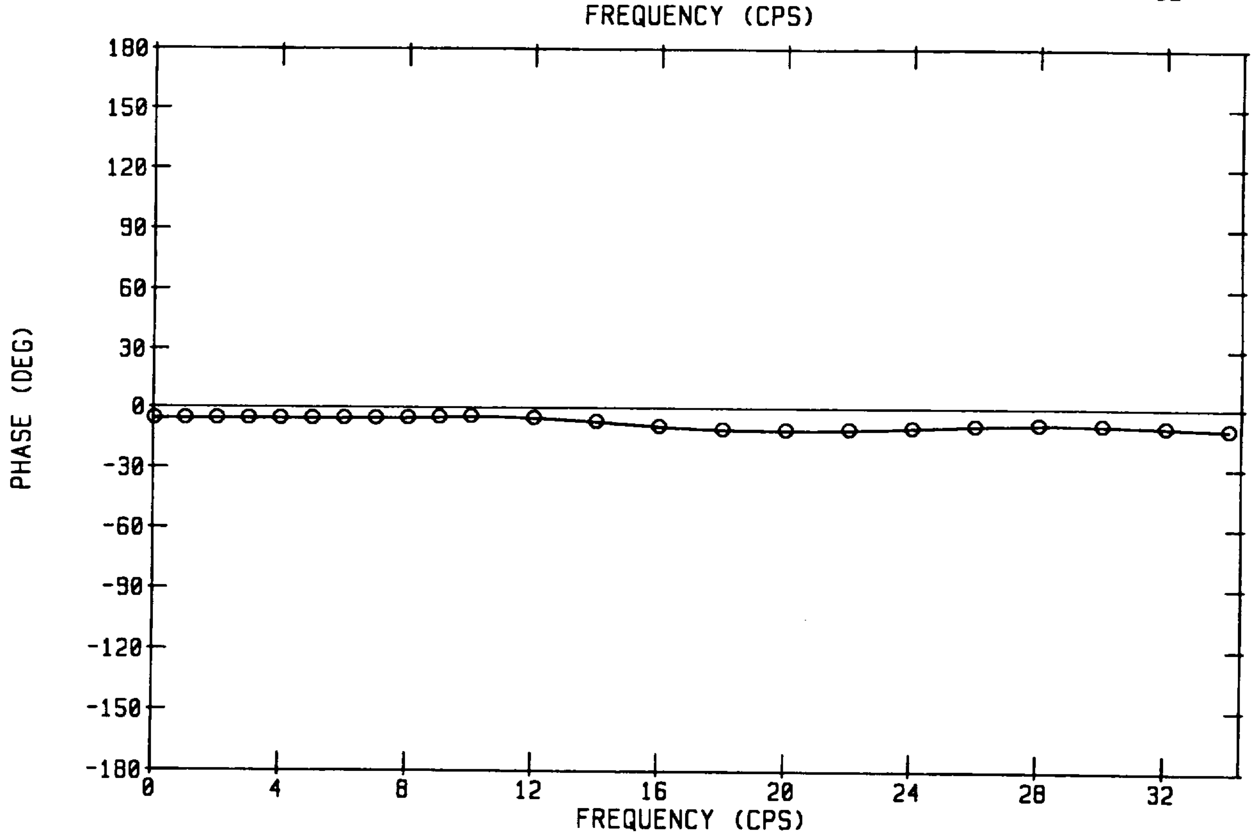


CEC JOB NO. 1101-000
BY DH DATE 9/22/99
CHECK aam DATE 9/23/99
CALC. NO. 6(P017)-2 REV. NO. 0
SHEET NO. 209

D:\PFSF\UB\PLOTTF\1229MXX.INP 9/22/99

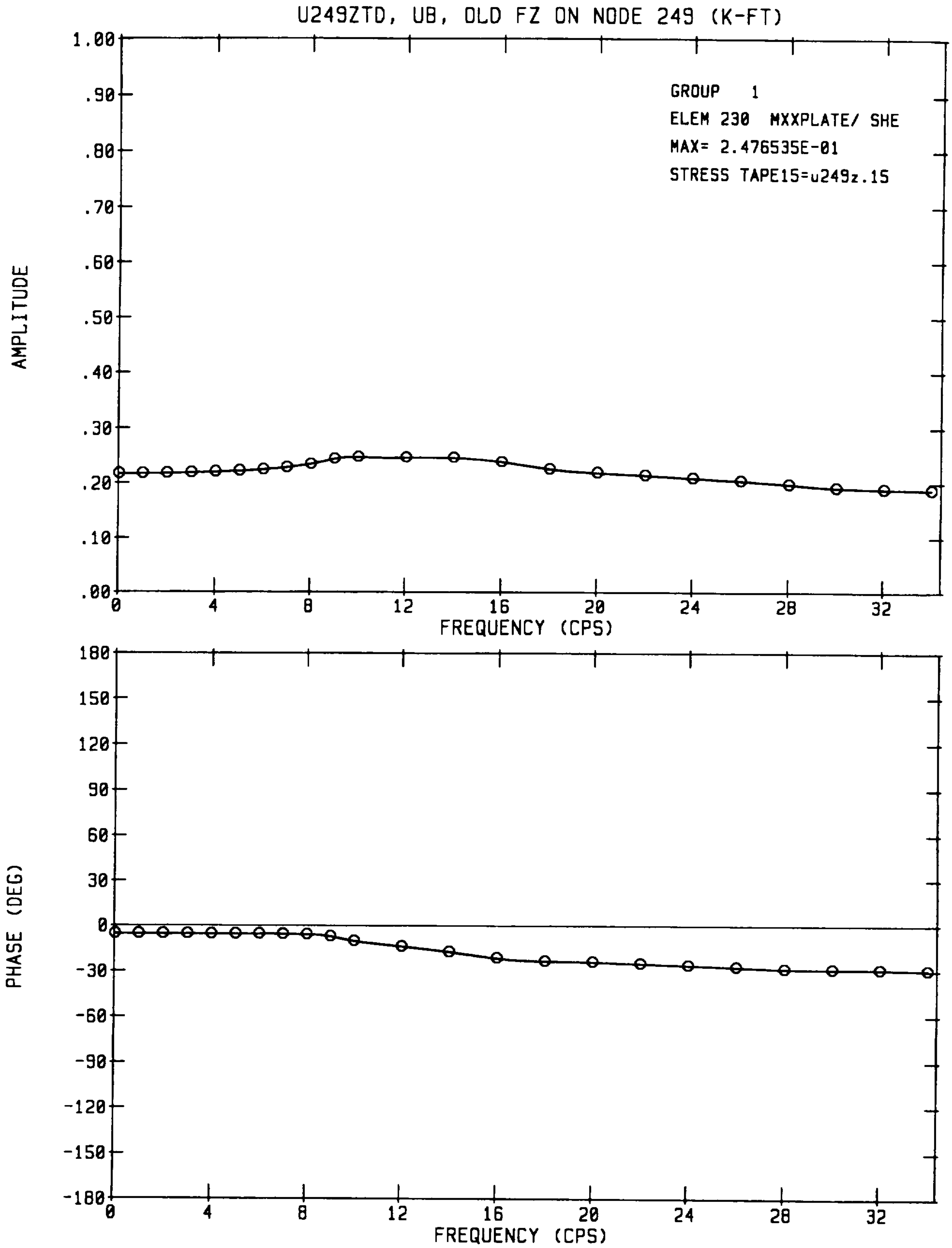
U249ZTD, UB, OLD FZ ON NODE 249 (K-FT)





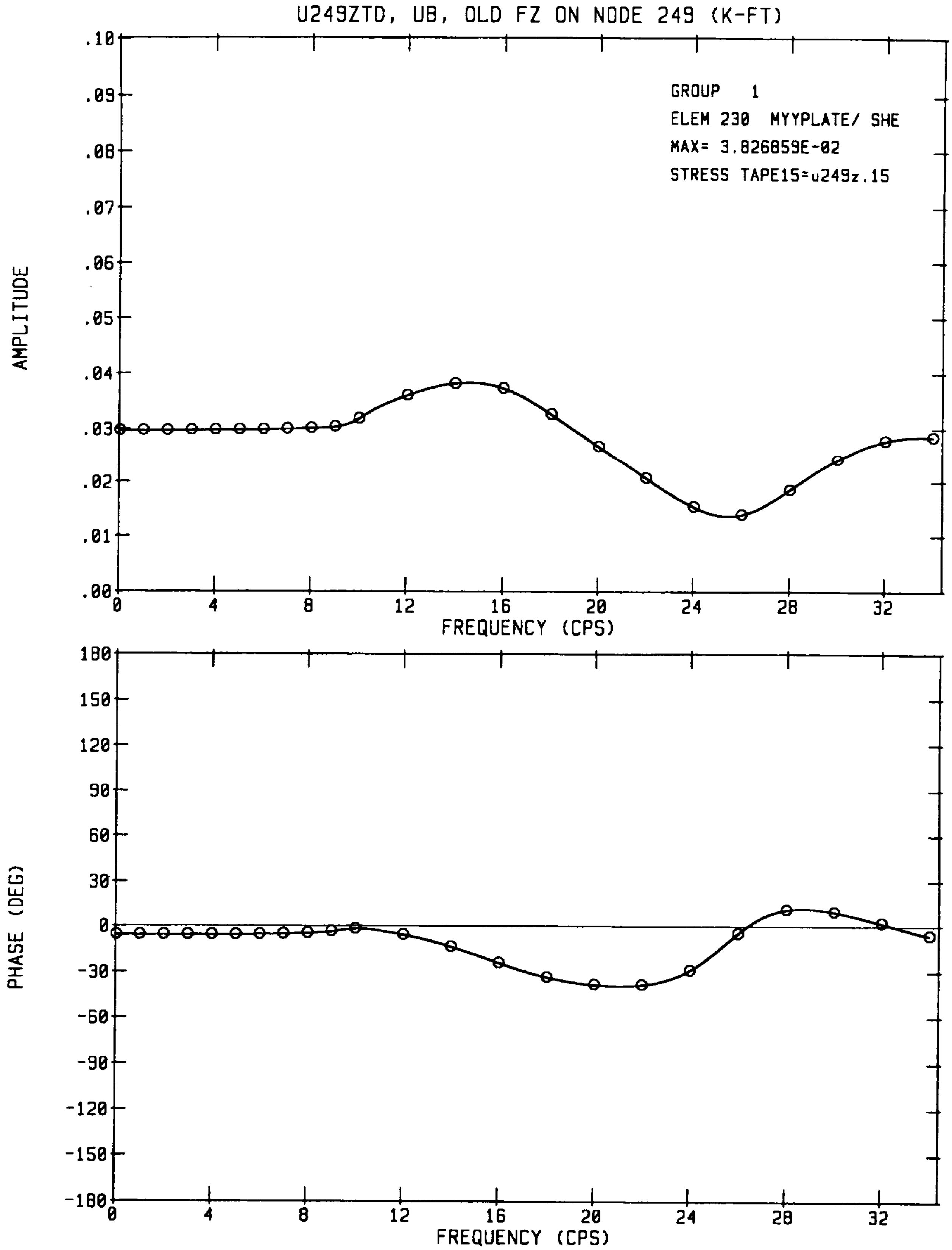
CEC JOB NO. 1101-000
BY DH DATE 9/22/99
CHECK aum DATE 9/23/99
CALC. NO. G(PU17)-2 REV. NO. 0
SHEET NO. 210

D:\PFSF\UB\PLOTTF\1229MYY.INP 9/22/99



CEC JOB NO. 1101-000
BY DF DATE 9/22/99
CHECK awm DATE 9/23/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 211

D:\PFSF\UB\PLOTTF\1230MXX.INP 9/22/99



CEC JOB NO. 1101-000

BY DH DATE 9/22/99

CHECK aum DATE 9/23/99

CALC. NO. G(P017)-2 REV. NO. 0

SHEET NO. 212

D:\PFSF\UB\PLOTTF\1230MYY.INP 9/22/99

5.2.5 COMPARISON OF CECSAP AND SASSI RESULTS

Results of the CECSAP and SASSI analyses, in terms of maximum displacements, maximum bending moments, and maximum shear force are compared in Tables 5.2.5-1, 5.2.5-2, and 5.2.5-3 respectively. This comparison is performed for lower-bound, best-estimate, and upper-bound soil conditions as shown in the tables. The displacement time histories at selected nodes for SASSI and CECSAP are compared in Figs. 5.2.5-1 through 5.2.5-9 for lower-bound, best-estimate, and upper-bound soil conditions. Similarly, moment time histories for plate element 217 from SASSI and CECSAP are compared in Figs. 5.2.5-10 through 5.2.5-18. The printed input and output files for SASSI and CECSAP analyses are given in Attachment B.

The maximum displacements from CECSAP are consistent with the displacements from the SASSI. Maximum bending moments and maximum shear forces from CECSAP are consistently higher than the results from SASSI. Thus, the maximum bending moments and shear forces from CECSAP will be used for the design of the pad.

Note:

The CECSAP dynamic models are the same as before (see Section 5), except a single vertical force time history is applied at the second quadrant of the first cask (Node No. 249). Analyses are performed for the lower-bound, best-estimate, and upper-bound soil conditions.

CALCULATION SHEET

CALC. NO. G(PO17)-2 REV. NO. 0

ORIGINATOR CWM DATE 9/22/99 CHECKED DH DATE 9/23/99

PROJECT Private Fuel Storage Facility JOB NO. 1101-000

SUBJECT Storage Pad Analysis and Design SHEET NO. 214

Table 5.2.5-1

Maximum Vertical Displacements (ft) at Selected Nodes

Selected Node No.	Lower-Bound Properties			Best-Est. Properties			Upper-Bound Properties		
	SASSI (A)	CECSAP (B)	% Diff. [(B)/(A)-1]100	SASSI (A)	CECSAP (B)	% Diff. [(B)/(A)-1]100	SASSI (A)	CECSAP (B)	% Diff. [(B)/(A)-1]100
144	0.0171	0.0165	-4	0.0096	0.0103	7	0.0066	0.0059	-10
157	0.0188	0.0183	-3	0.0113	0.0116	3	0.0082	0.0075	-9
170	0.0217	0.0209	-4	0.0142	0.0136	-4	0.0107	0.0096	-11
183	0.0248	0.0239	-4	0.0177	0.016	-10	0.0143	0.0124	-13
196	0.0279	0.0272	-3	0.0217	0.0186	-14	0.0181	0.0151	-17
209	0.0312	0.0305	-2	0.0263	0.0212	-19	0.0221	0.0188	-15
222	0.0372	0.0356	-4	0.0323	0.0255	-21	0.029	0.0236	-19
235	0.0414	0.039	-6	0.0362	0.0283	-22	0.0329	0.0274	-17
248	0.0443	0.0421	-5	0.0387	0.0312	-19	0.0349	0.0292	-16
261	0.0457	0.0447	-2	0.0384	0.0337	-12	0.0344	0.0294	-15
274	0.0458	0.047	3	0.0373	0.0356	-5	0.0321	0.0307	-4
287	0.0451	0.05	11	0.0355	0.0382	8	0.0276	0.0332	20
288	0.0397	0.0456	15	0.0308	0.0339	10	0.0241	0.0294	22
289	0.0335	0.0395	18	0.025	0.0287	15	0.0195	0.0243	25
290	0.0276	0.0335	21	0.0208	0.0248	19	0.0152	0.0190	25
291	0.0221	0.0278	26	0.0168	0.0209	24	0.013	0.0153	18
292	0.0176	0.0223	27	0.0139	0.0168	21	0.0106	0.0122	15
293	0.0147	0.0184	25	0.0116	0.0137	18	0.0092	0.0100	8
294	0.0123	0.0157	28	0.0092	0.0106	15	0.0079	0.0076	-4

Table 5.2.5-2

Maximum Bending Moment (k-ft/ft) for Selected Elements

Selected Element No.	Lower-Bound Prop.			Best-Est. Prop.			Upper-Bound Prop.		
	SASSI (A)	CECSAP (B)	% Diff. [(B)/(A)-1]100	SASSI (A)	CECSAP (B)	% Diff. [(B)/(A)-1]100	SASSI (A)	CECSAP (B)	% Diff. [(B)/(A)-1]100
Mxx (about Y-axis)									
217	80.2	151.3	89	81.1	151.1	86	82.1	150.8	84
218	35.9	79.6	122	40.3	79.8	98	44.7	80	79
229	78.5	150.4	92	79.5	150.2	89	80.7	150	86
230	31.4	78	148	35.0	78.3	124	39.9	78.6	97
Myy (about X-axis)									
217	411.4	626.3	52	416.1	614.8	48	407.8	601.6	48
218	332.8	485.8	46	339.3	475.9	40	332.3	464.7	40
229	411.3	642.3	56	420.5	631	50	409.6	618	51
230	334.1	504.2	51	344.6	494.4	43	336.4	483.3	44

Table 5.2.5-3

Shear Forces (k/ft) for Selected Elements (x-dir)

Selected Element No.	Lower-Bound Prop.			Best-Est. Prop.			Upper-Bound Prop.		
	SASSI (A)	CECSAP (B)	% Diff. [(B)/(A)-1]100	SASSI (A)	CECSAP (B)	% Diff. [(B)/(A)-1]100	SASSI (A)	CECSAP (B)	% Diff. [(B)/(A)-1]100
217-218	33.2	59.3	79	32.4	58.6	81	31.9	57.8	81
229-230	32.6	58.3	79	32.0	57.6	80	30.9	56.8	84

$S_{xx} = (M_{yy1} - M_{yy2}) / L$
$L = 2.37$ ft

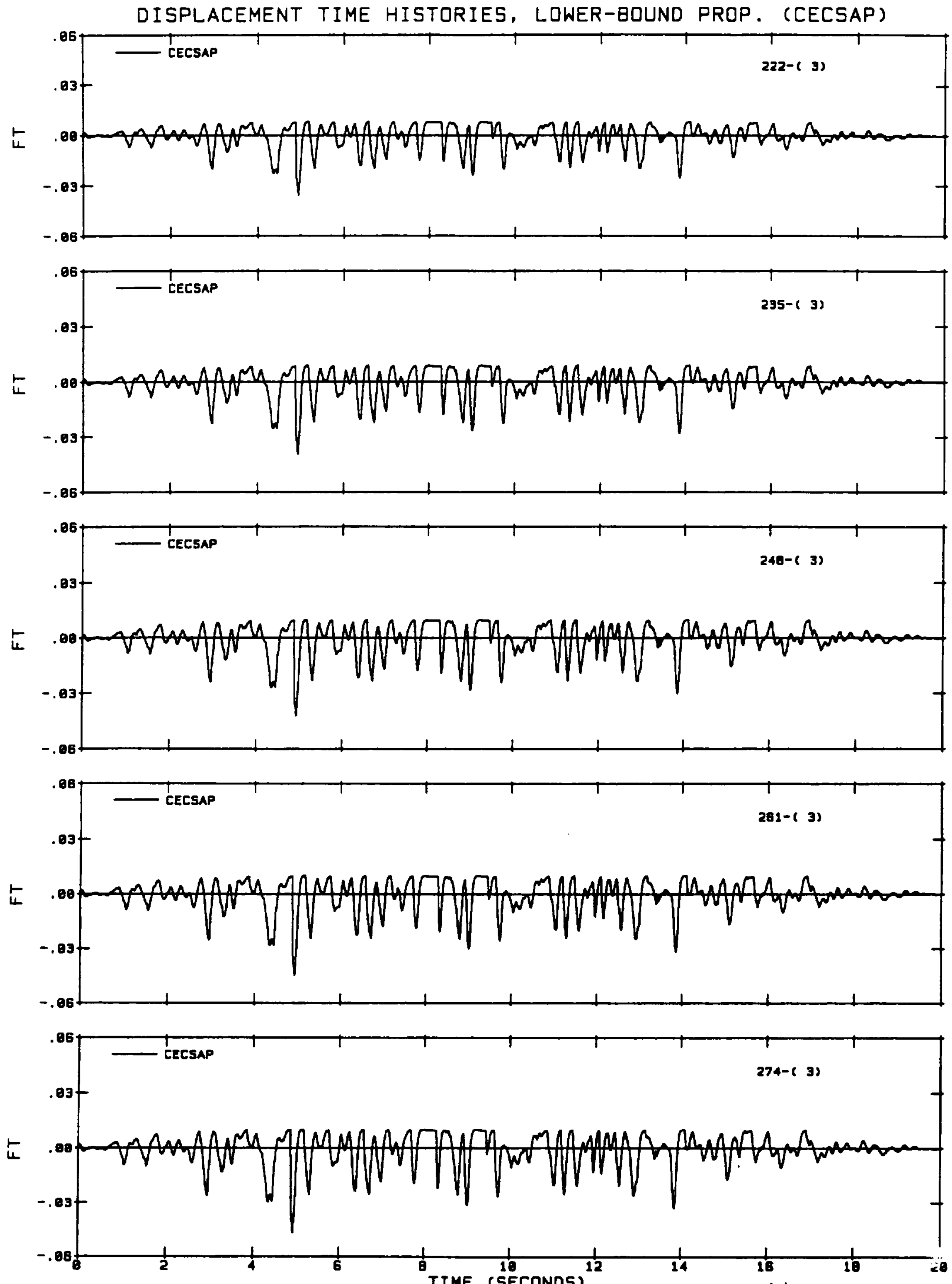


Fig. 5.2.5-1

CEC JOB NO. 1101-000

BY [illegible] DATE 9/22/99

CHECK DH DATE 9/22/99

CALC. NO. G(P017)-2 REV. NO. 0

SHEET NO. 216

DISPLACEMENT TIME HISTORIES, LOWER-BOUND PROP. (SASSI)

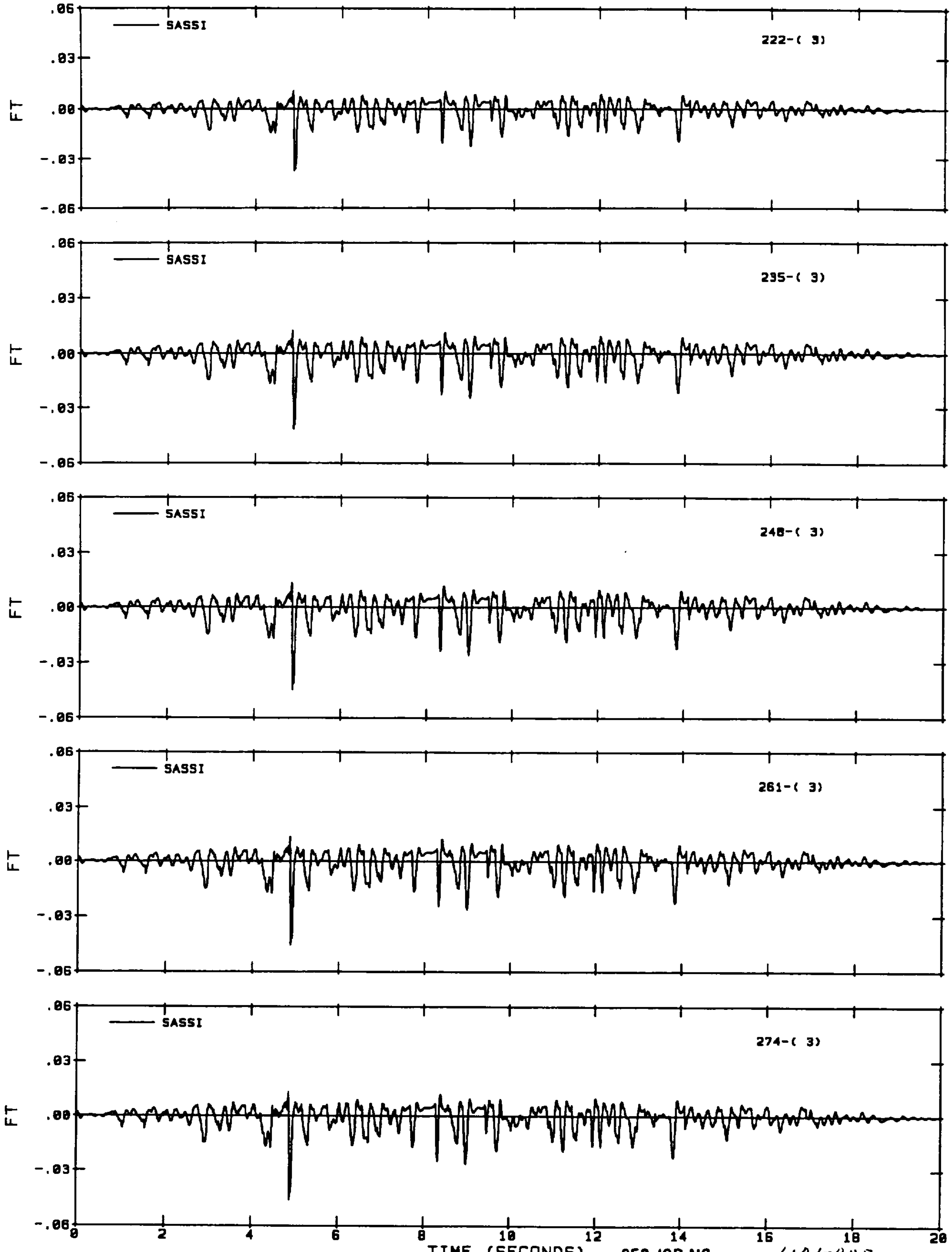


Fig. 5.2.5-2

CEC JOB NO. 1101-000

BY aum DATE 9/22/99

CHECK DH DATE 9/22/99

CALC. NO. G(P017)-2 REV. NO. 0

SHEET NO. 217

DISPLACEMENT TIME HISTORIES, LOWER-BOUND PROP. (CECSAP vs SASSI)

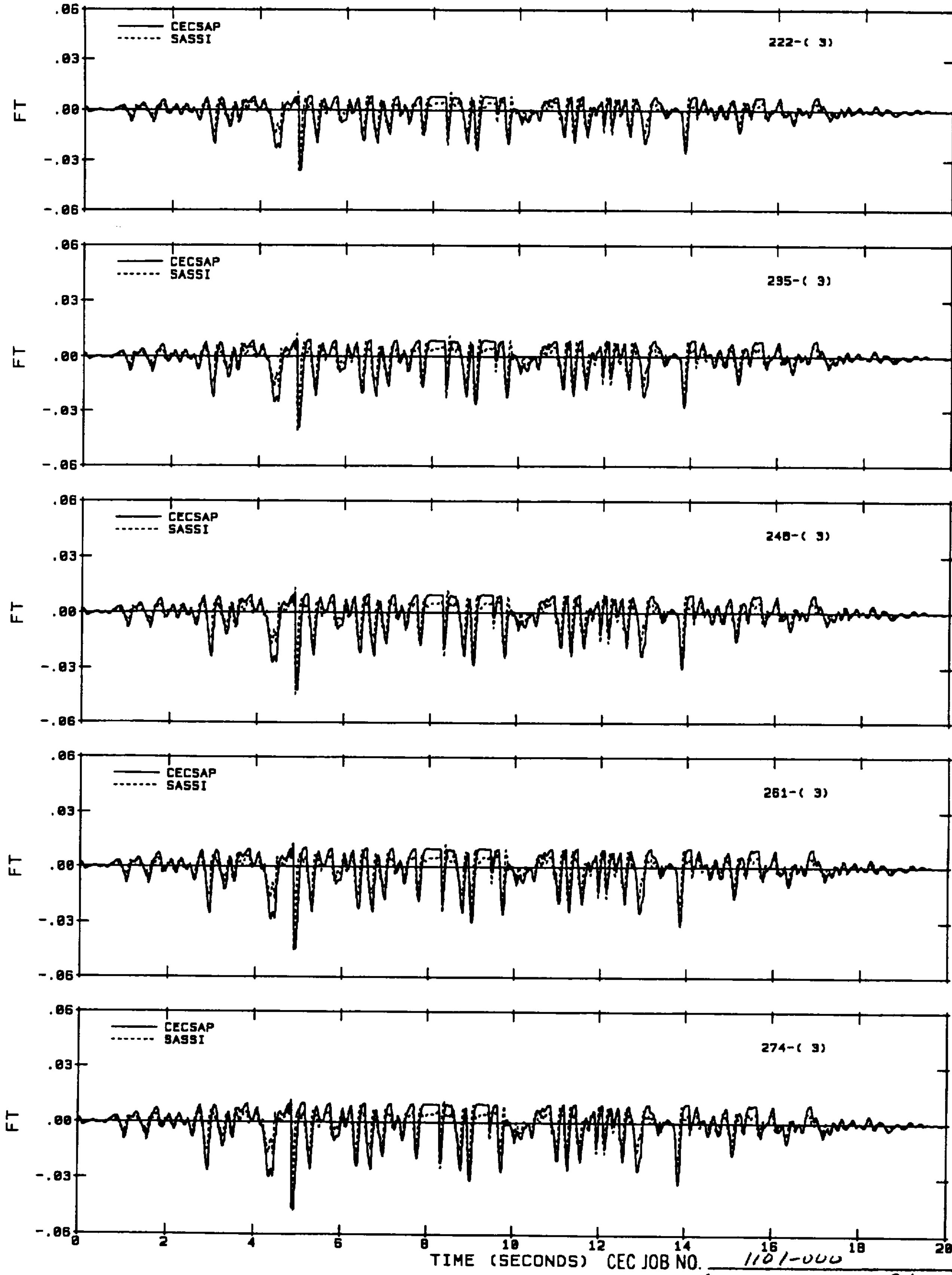


Fig. 5.2.5-3

CEC JOB NO. 1101-000

BY AWM DATE 9/22/99

CHECK DH DATE 9/22/99

CALC. NO. 6(PU17)-2 REV. NO. 0

SHEET NO. 218

DISPLACEMENT TIME HISTORIES, BEST-EST. PROP. (CECSAP)

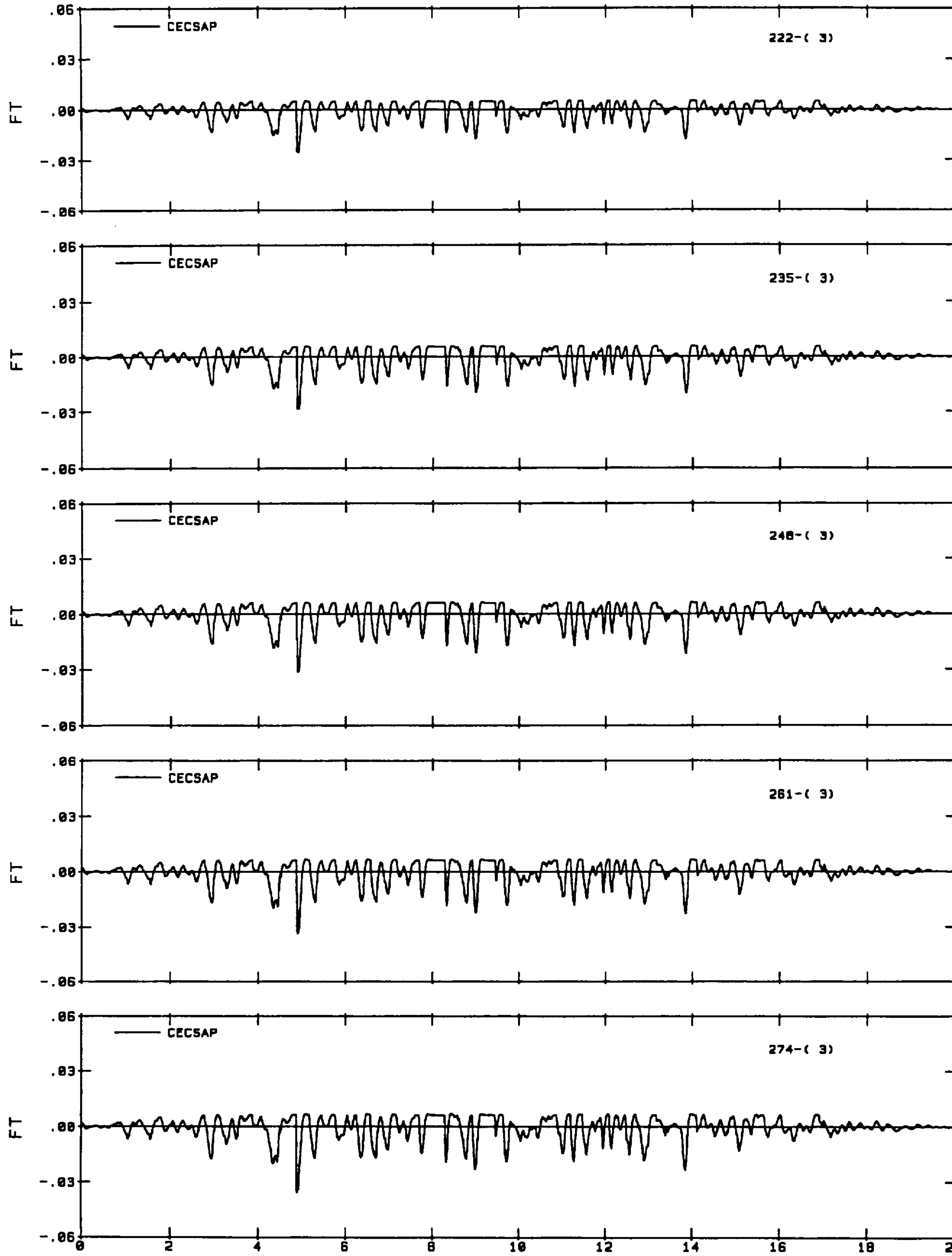


Fig. 5.2.5-4

CEC JOB NO. 1101-000
BY Aum DATE 9/22/99
CHECK DH DATE 9/22/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 219

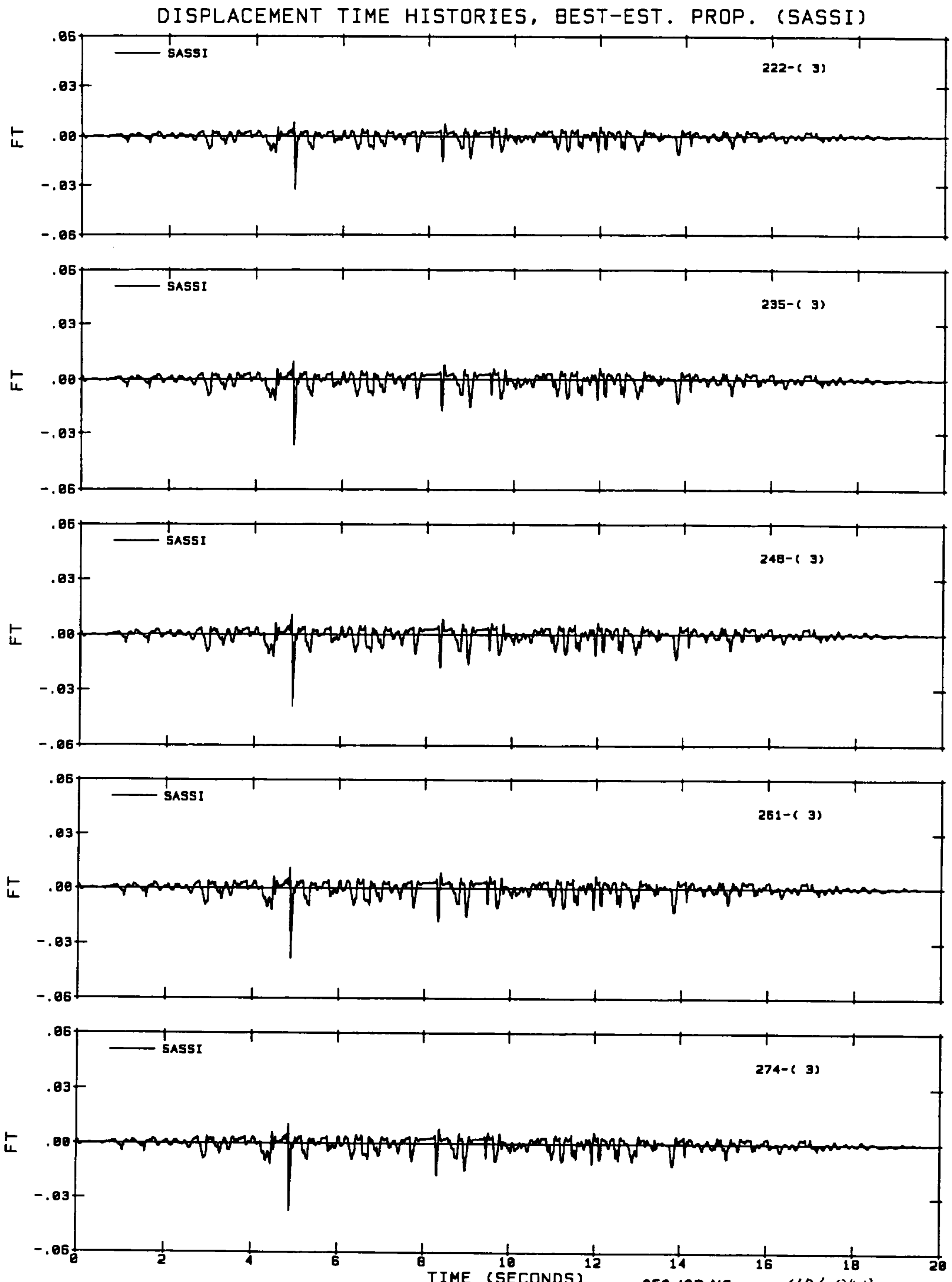


Fig. 5.2.5-5

CEC JOB NO. 1101-000

BY aum DATE 9/2?/99

CHECK DH DATE 9/22/99

CALC. NO. G(P017)-2 REV. NO. C

SHEET NO. 220

DISPLACEMENT TIME HISTORIES, BEST-EST. PROP. (CECSAP vs SASSI)

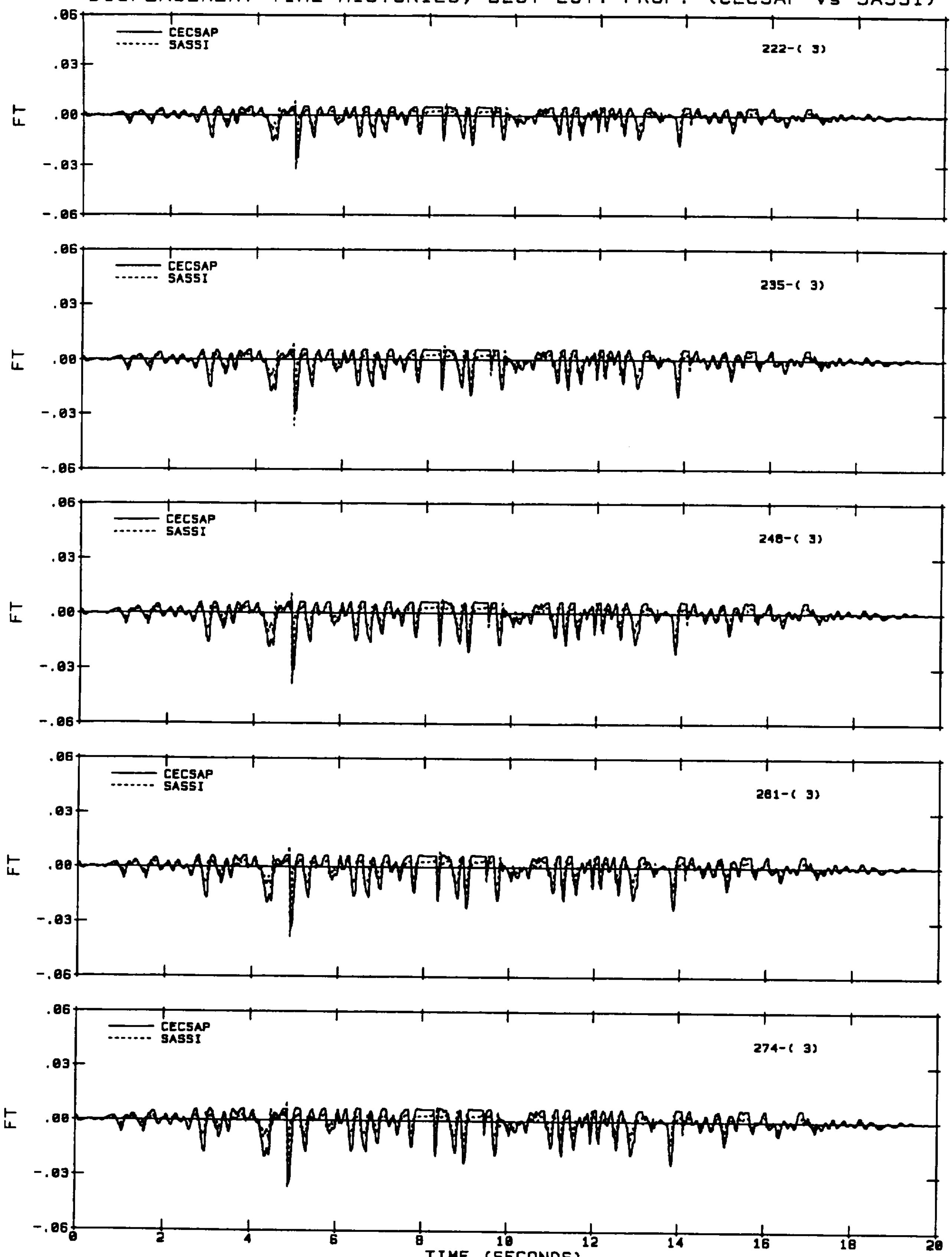


Fig. 5.2.5-6

CEC JOB NO. 1101-100
BY aum DATE 9/22/99
CHECK DH DATE 9/22/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 221

DISPLACEMENT TIME HISTORIES, UPPER-BOUND PROP. (CECSAP)

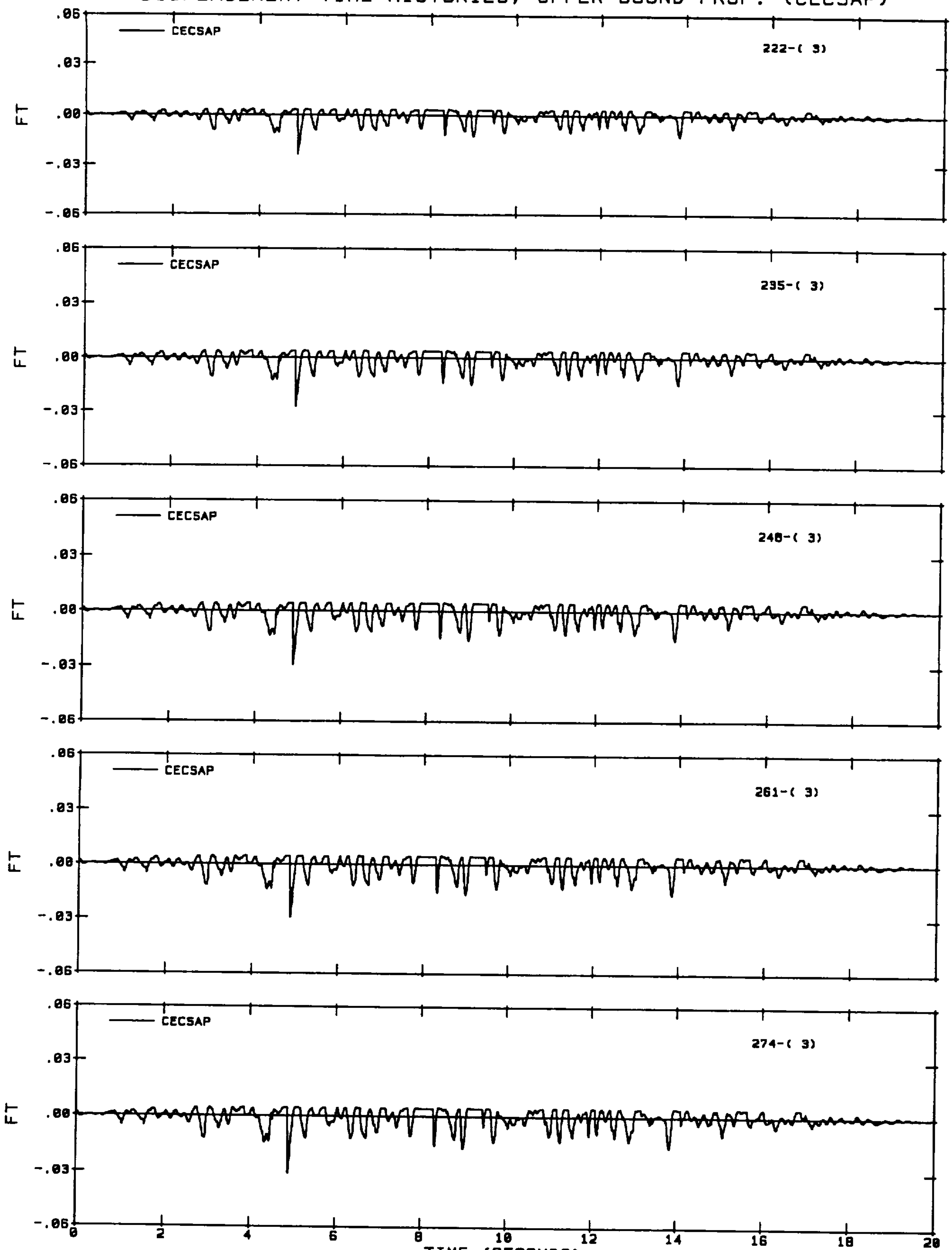


Fig. 5.2.5-7

CEC JOB NO. 1101-000

BY aum DATE 9/22/99

CHECK DH DATE 9/22/99

CALC. NO. G(P017)-2 REV. NO. 0

SHEET NO. 222

DISPLACEMENT TIME HISTORIES, UPPER-BOUND PROP. (CECSAP)

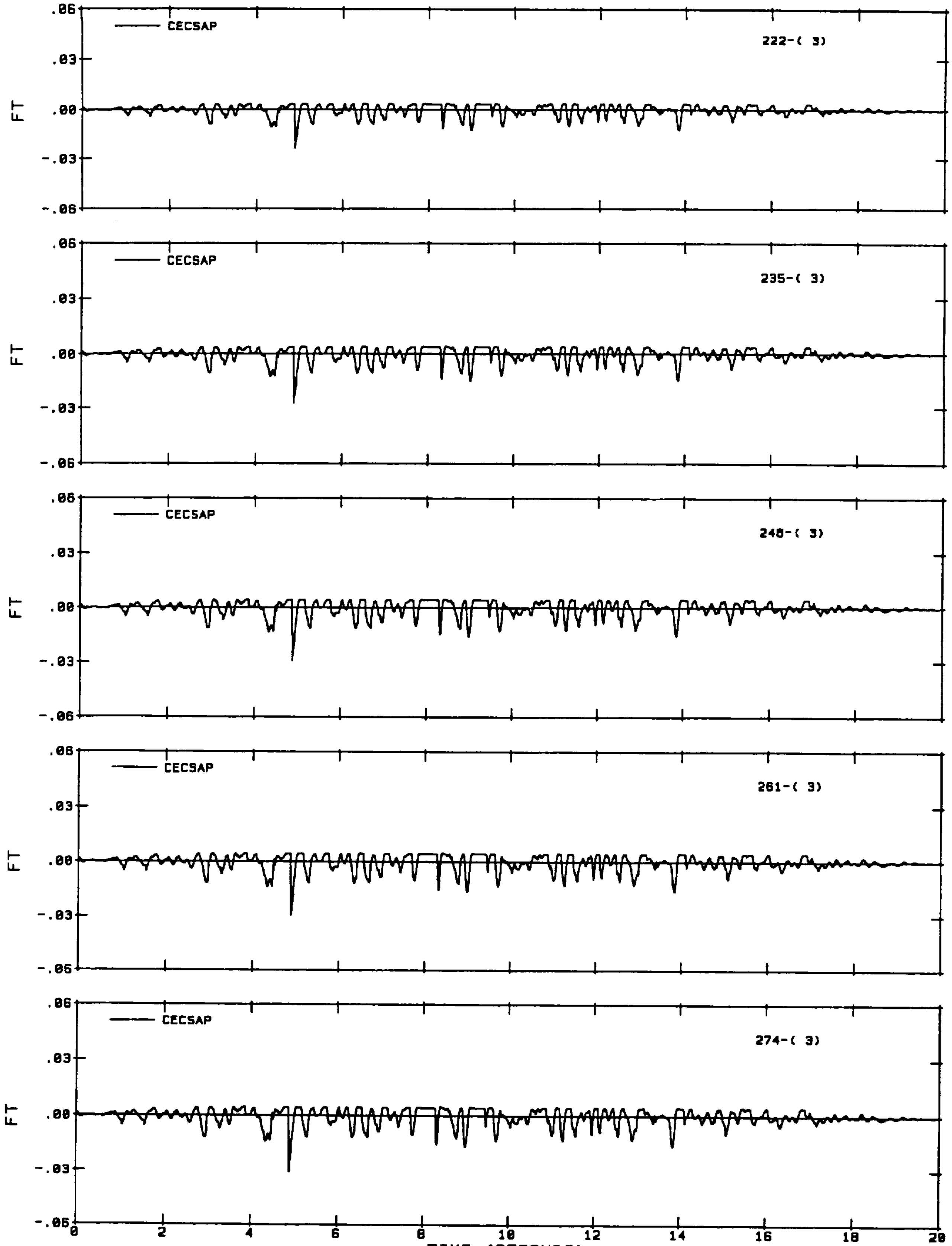


Fig. 5.2.5-8

CEC JOB NO. 1101-000

BY aum DATE 9/22/99

CHECK DH DATE 9/22/99

CALC. NO. G(P017)-2 REV. NO. 0

SHEET NO. 223

DISPLACEMENT TIME HISTORIES, UPPER-BOUND PROP. (CECSAP vs SASSI)

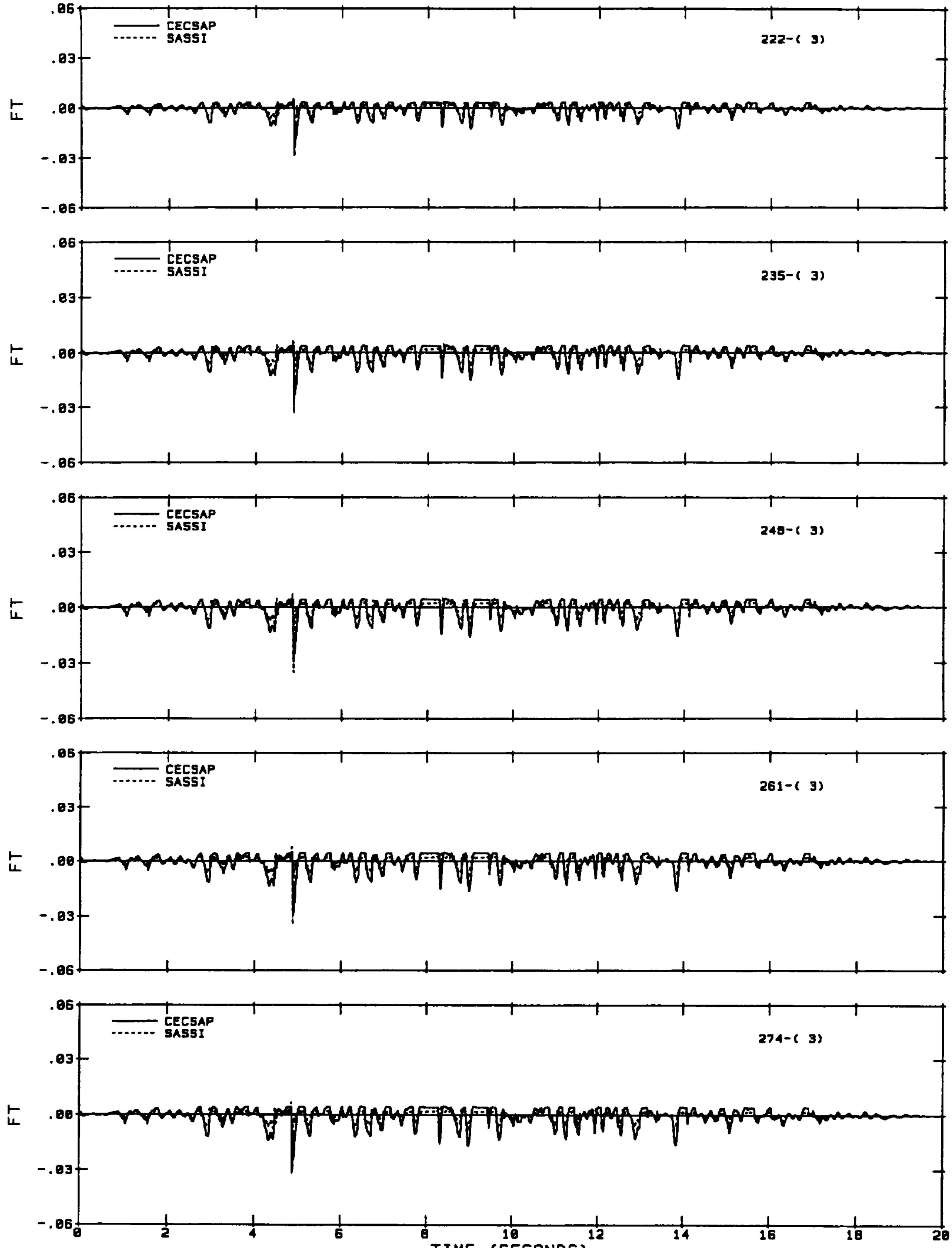


Fig. 5.2.5-9

CEC JOB NO. 1101-000
BY quM DATE 9/22/99
CHECK DH DATE 9/22/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 224

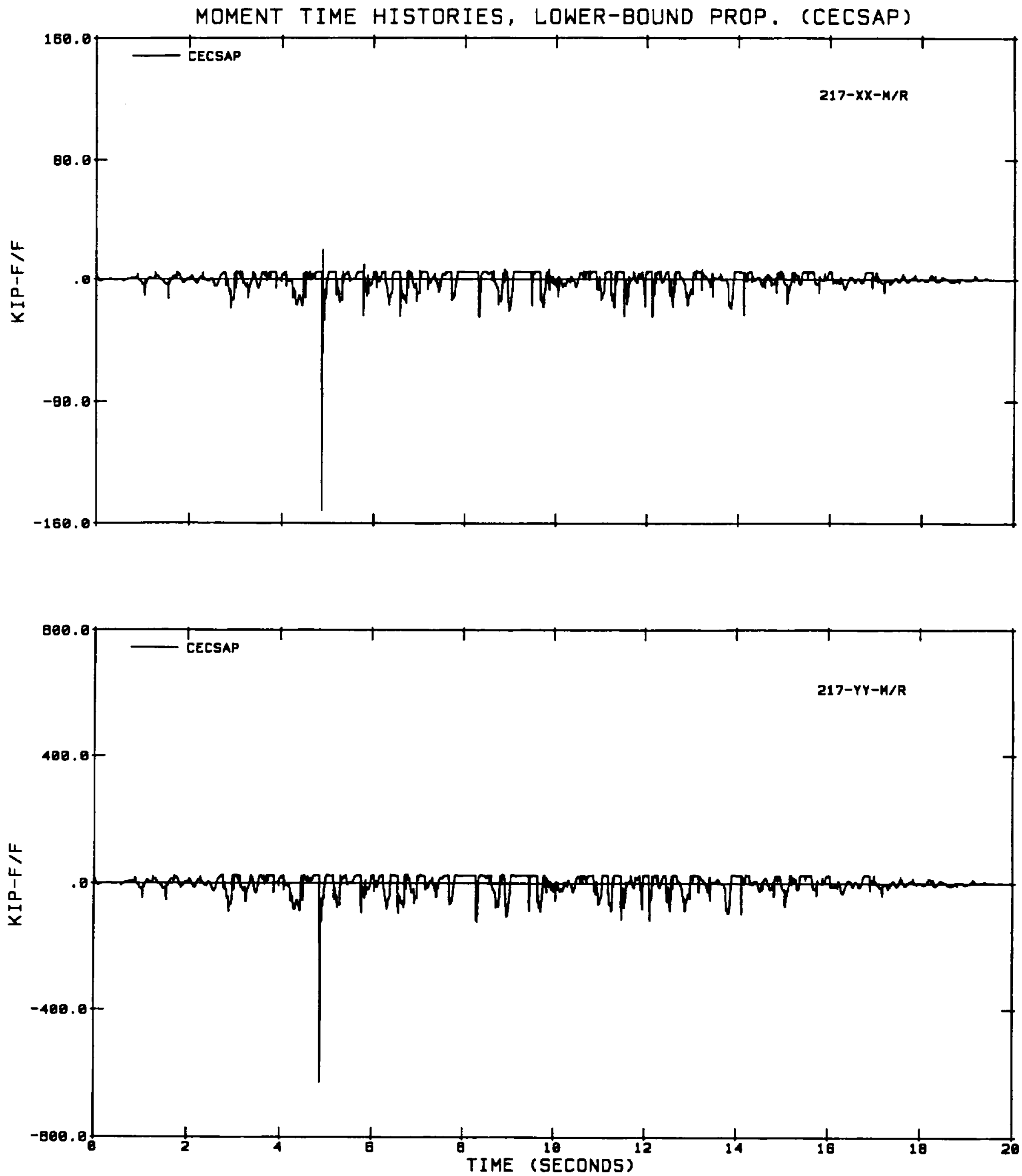
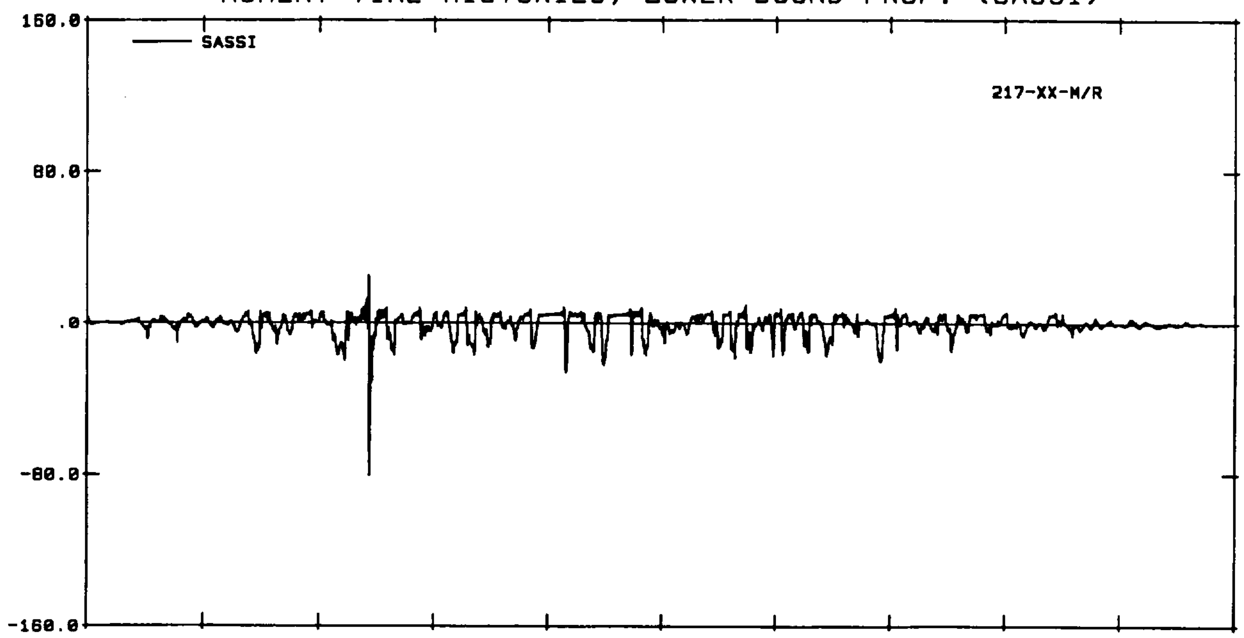


Fig. 5.2.5-10

CEC JOB NO. 11D1-000
BY aum DATE 9/22/99
CHECK DH DATE 9/22/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 225

MOMENT TIME HISTORIES, LOWER-BOUND PROP. (SASSI)



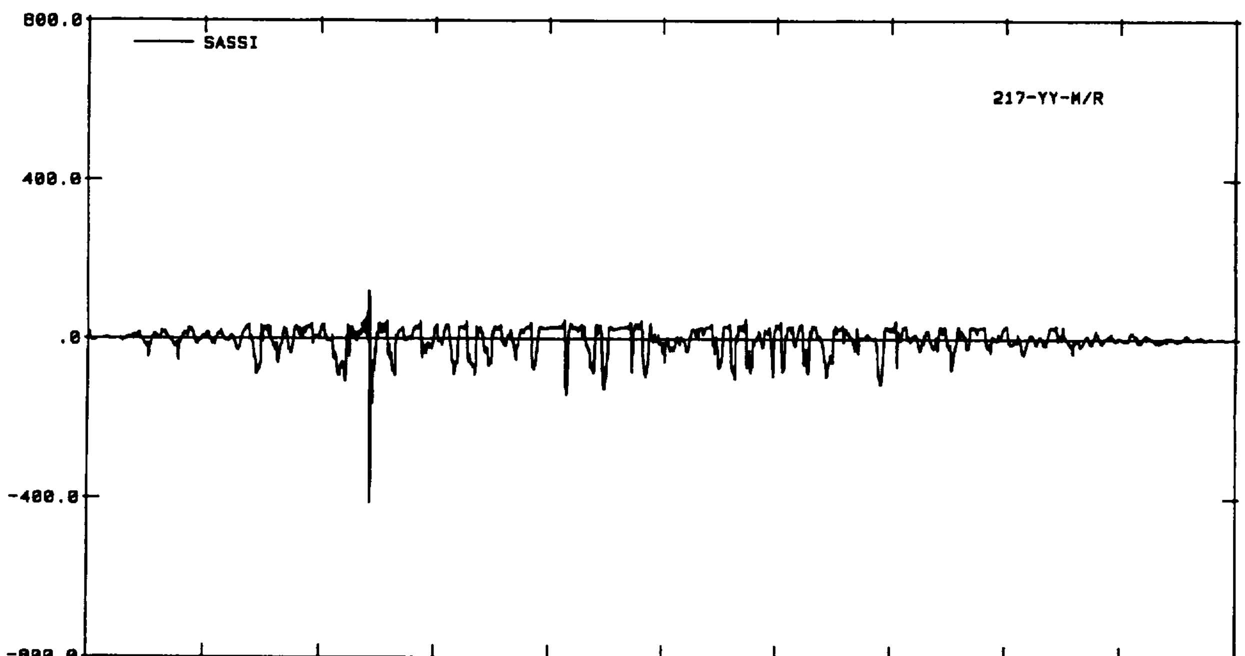


Fig. 5.2.5-11

CEC JOB NO. 1101-000
BY aura DATE 9/22/99
CHECK DF DATE 9/22/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 226

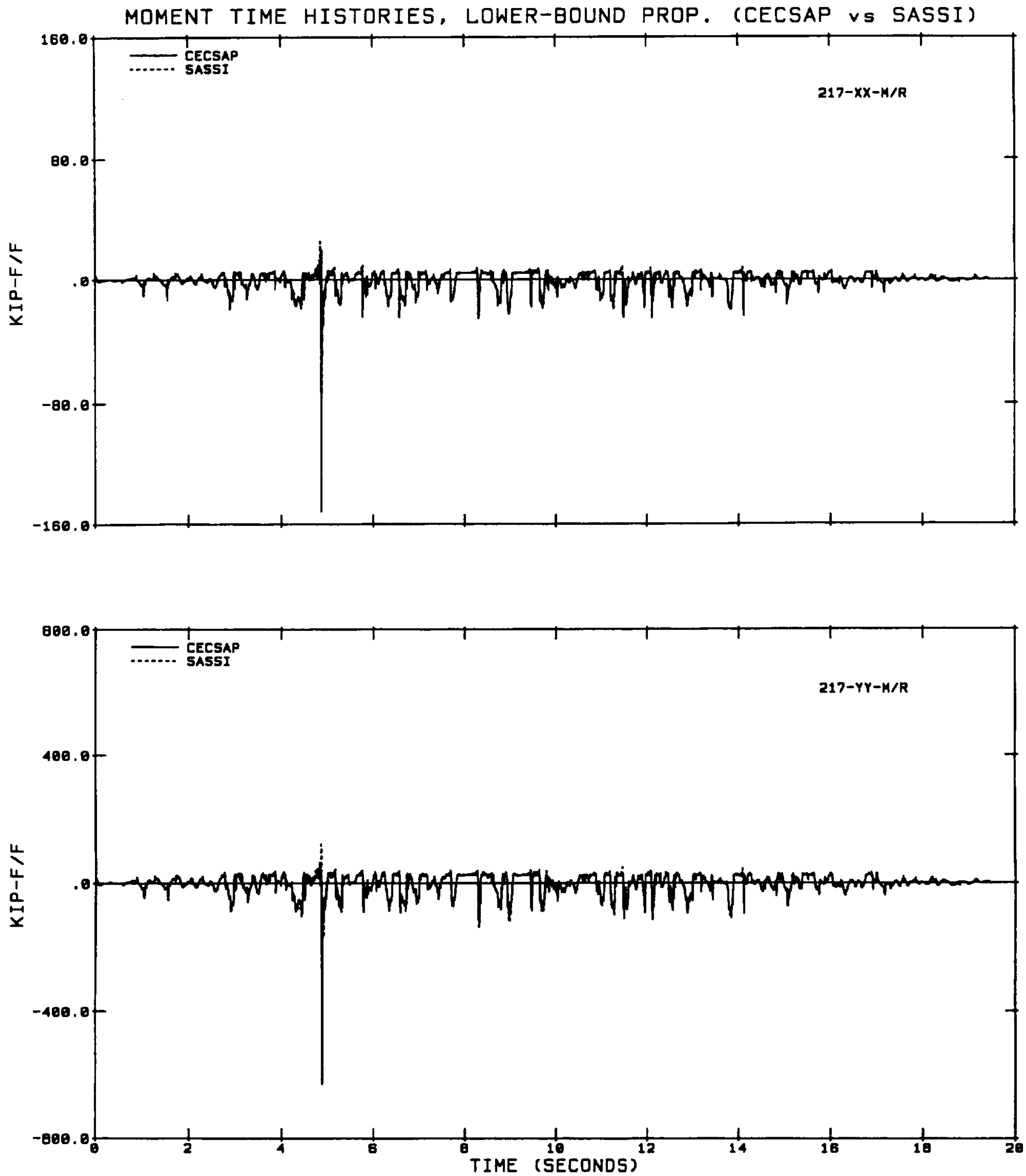


Fig. 5.2.5-12

CEC JOB NO. 1101-000
BY aum DATE 9/22/99
CHECK DH DATE 9/22/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 227

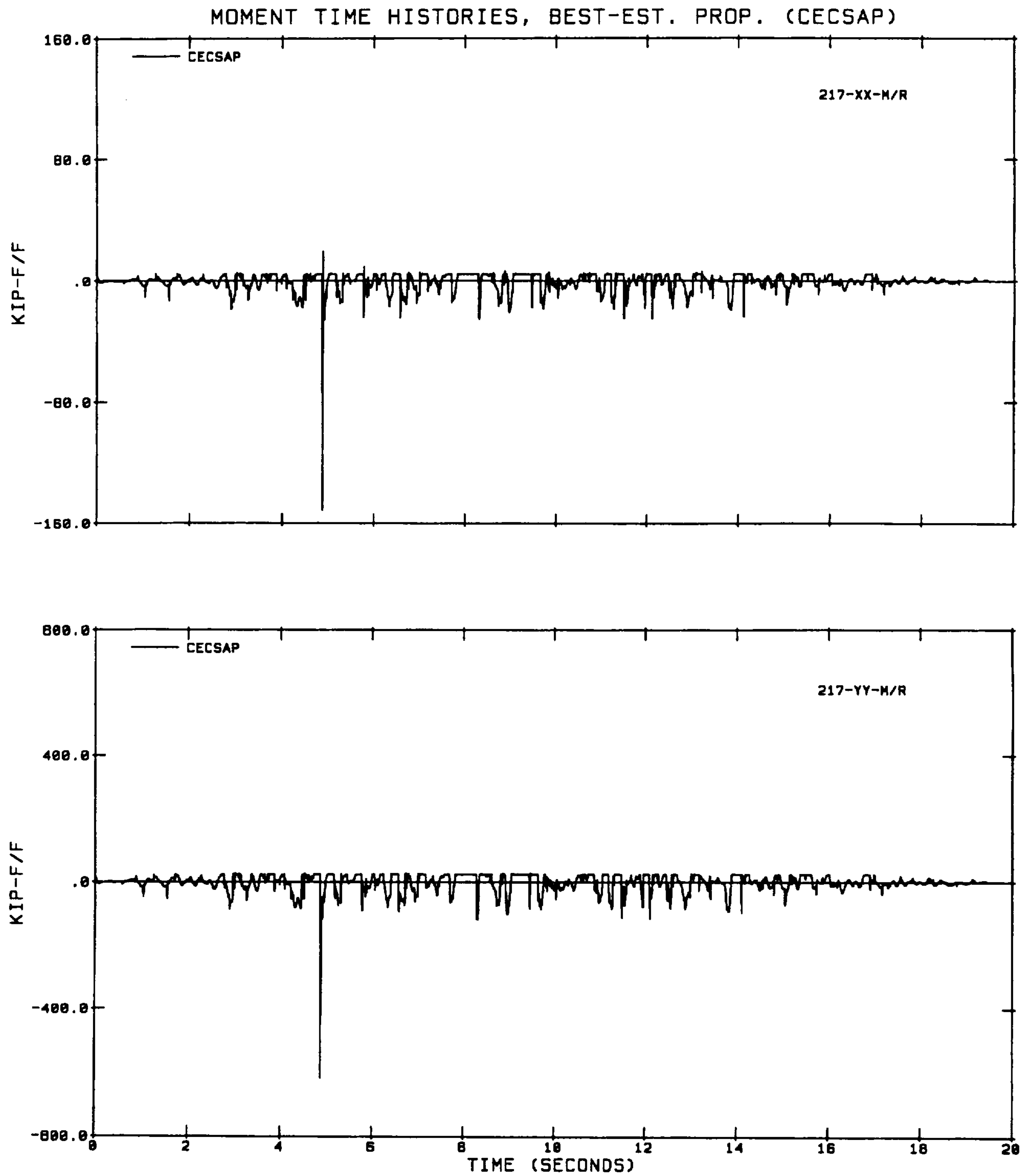
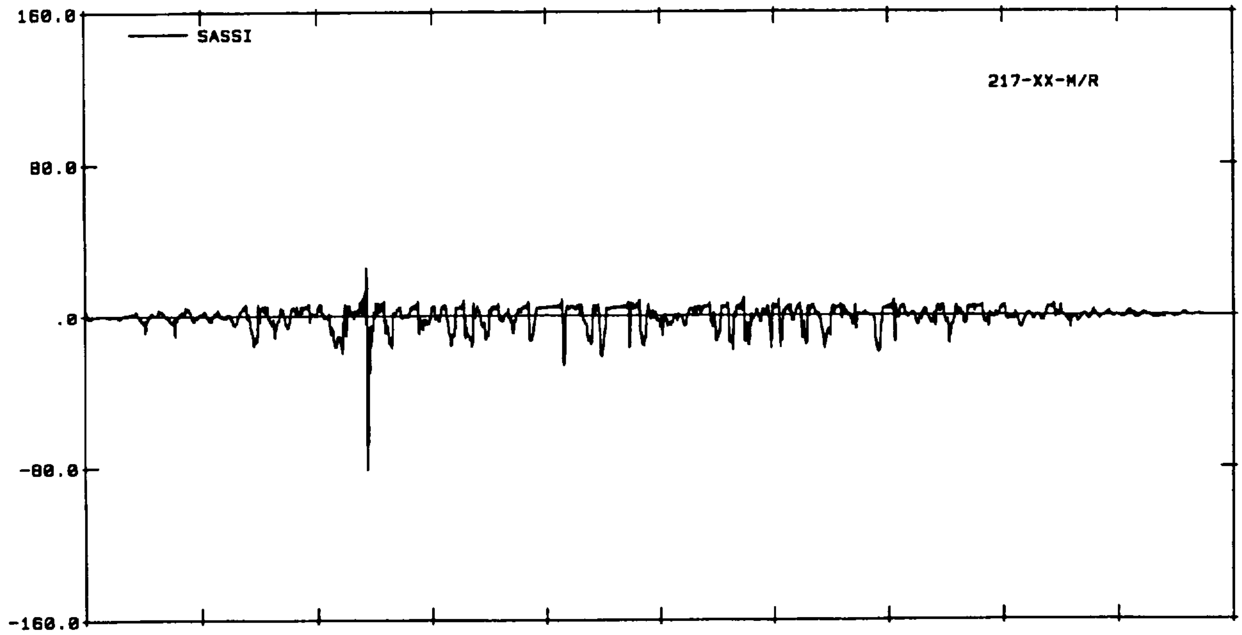


Fig. 5.2.5-13

CEC JOB NO. 1101-000
BY AUM DATE 9/22/99
CHECK DT DATE 9/22/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 228

MOMENT TIME HISTORIES, BEST-EST. PROP. (SASSI)



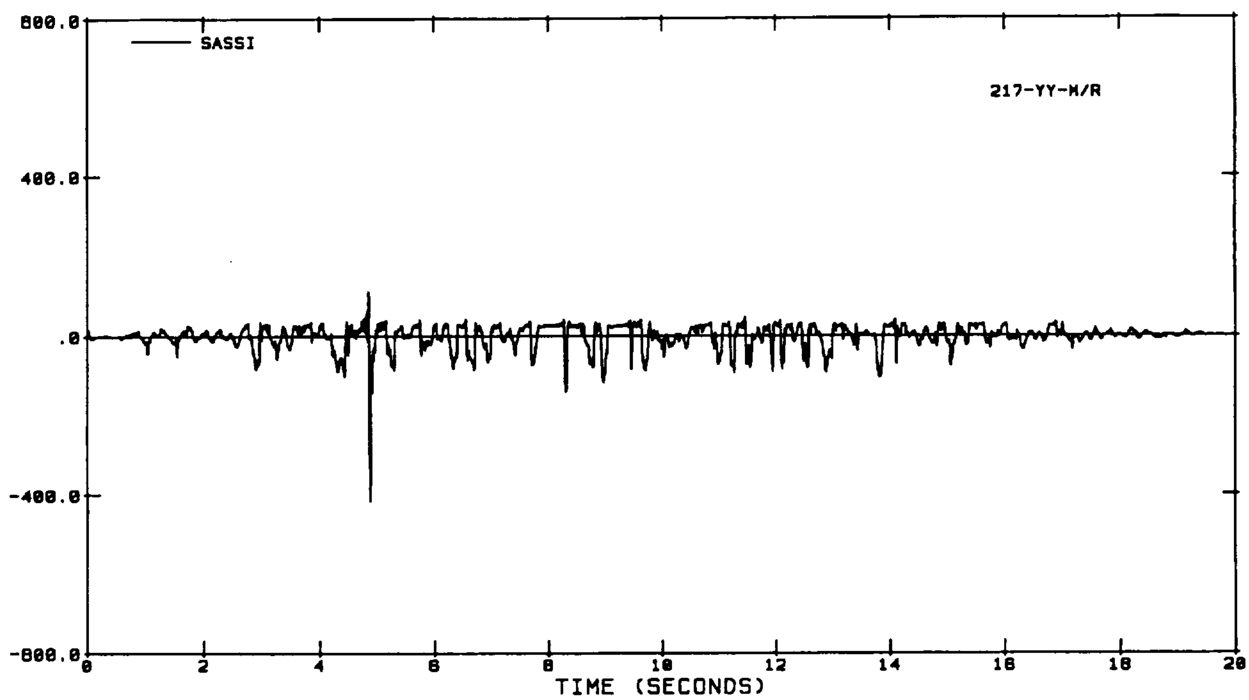


Fig. 5.2.5-14

CEC JOB NO. 1101-000
BY aum DATE 9/21/99
CHECK DF DATE 9/22/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 229

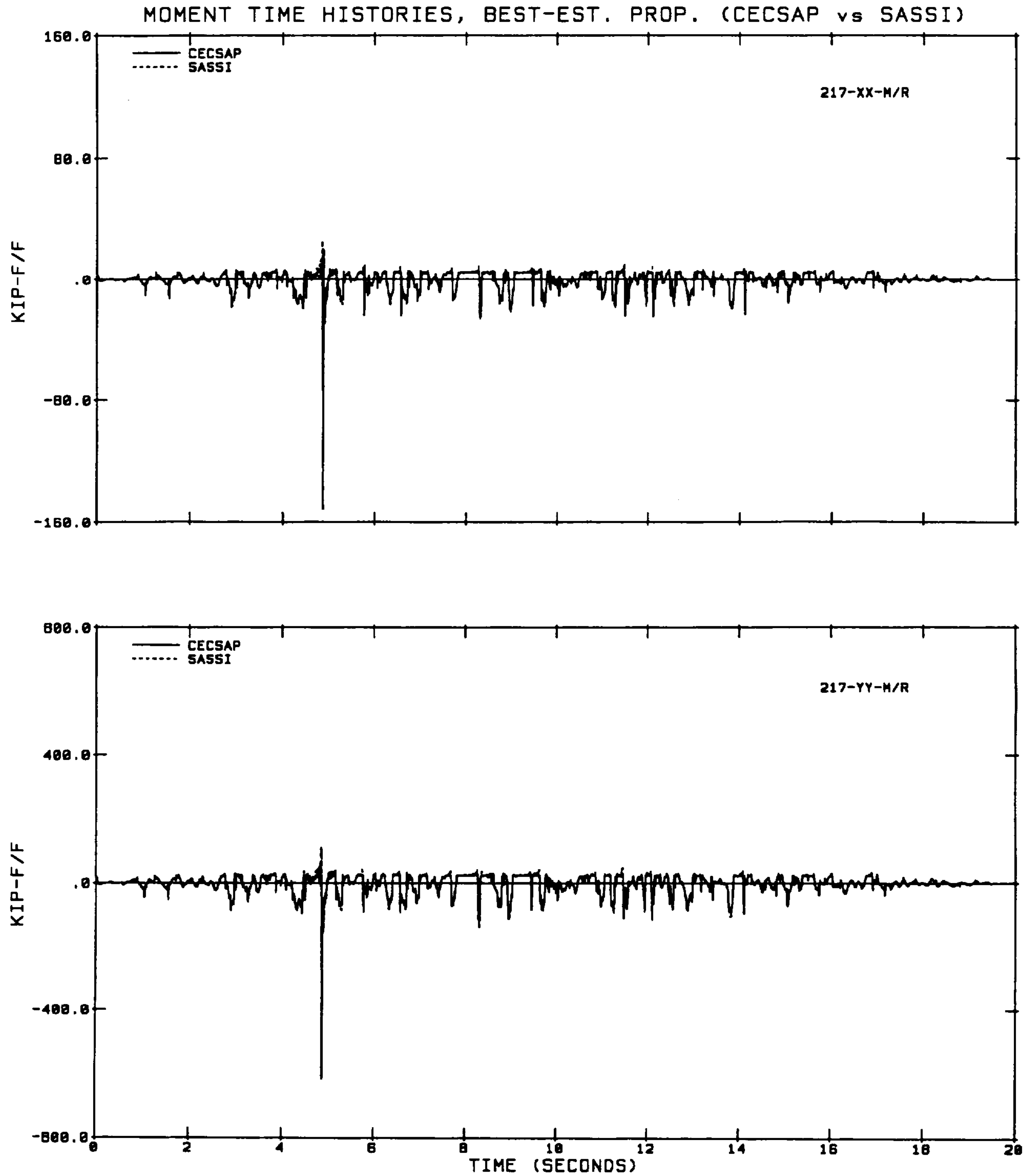


Fig. 5.2.5-15

CEC JOB NO. 1101-000
BY aum DATE 9/22/99
CHECK DH DATE 9/22/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 230

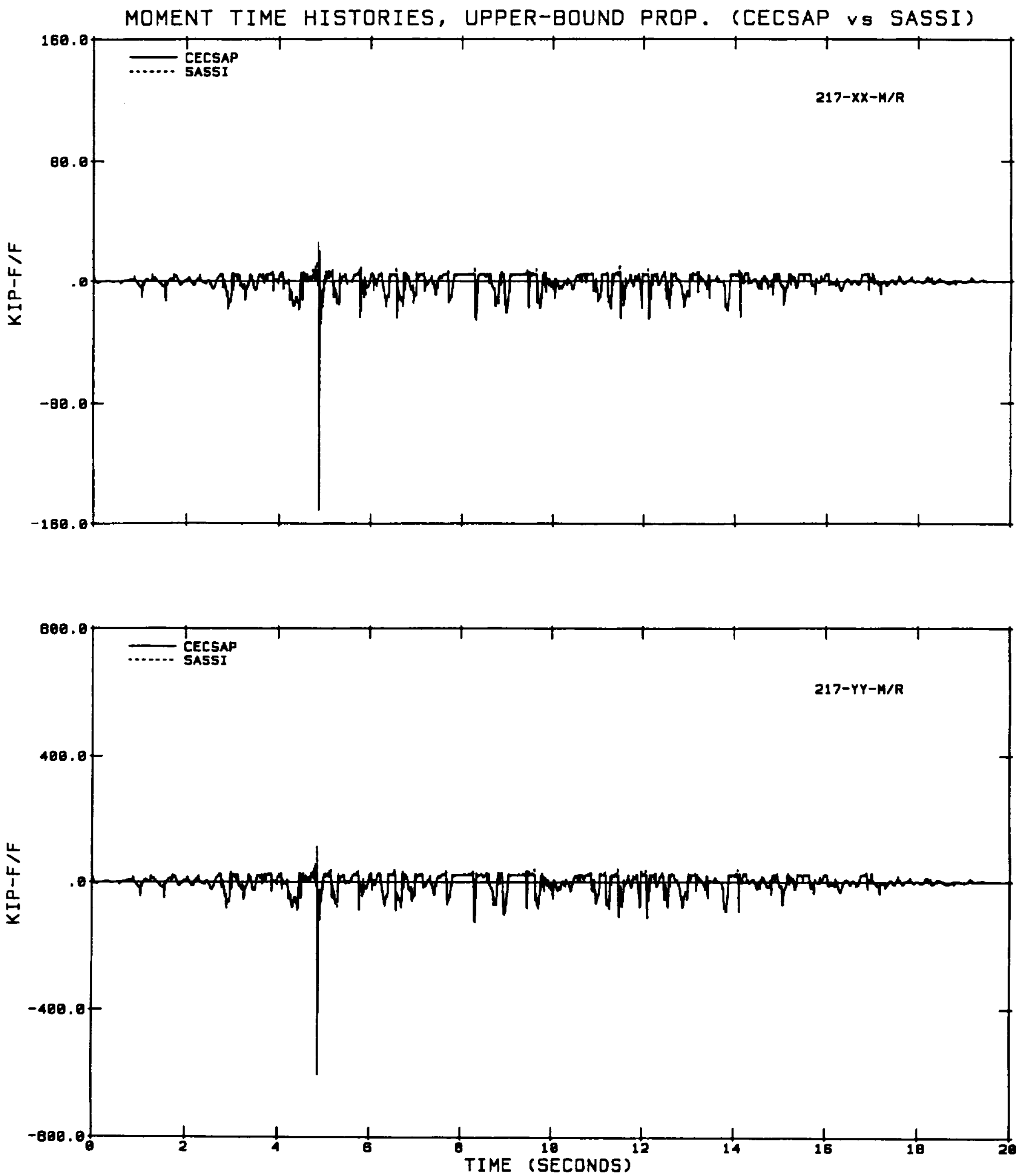


Fig. 5.2.5-16

CEC JOB NO. 1101-000
BY aum DATE 9/22/99
CHECK DF DATE 9/22/99
CALC. NO. G(PU17)-2 REV. NO. 0
SHEET NO. 231

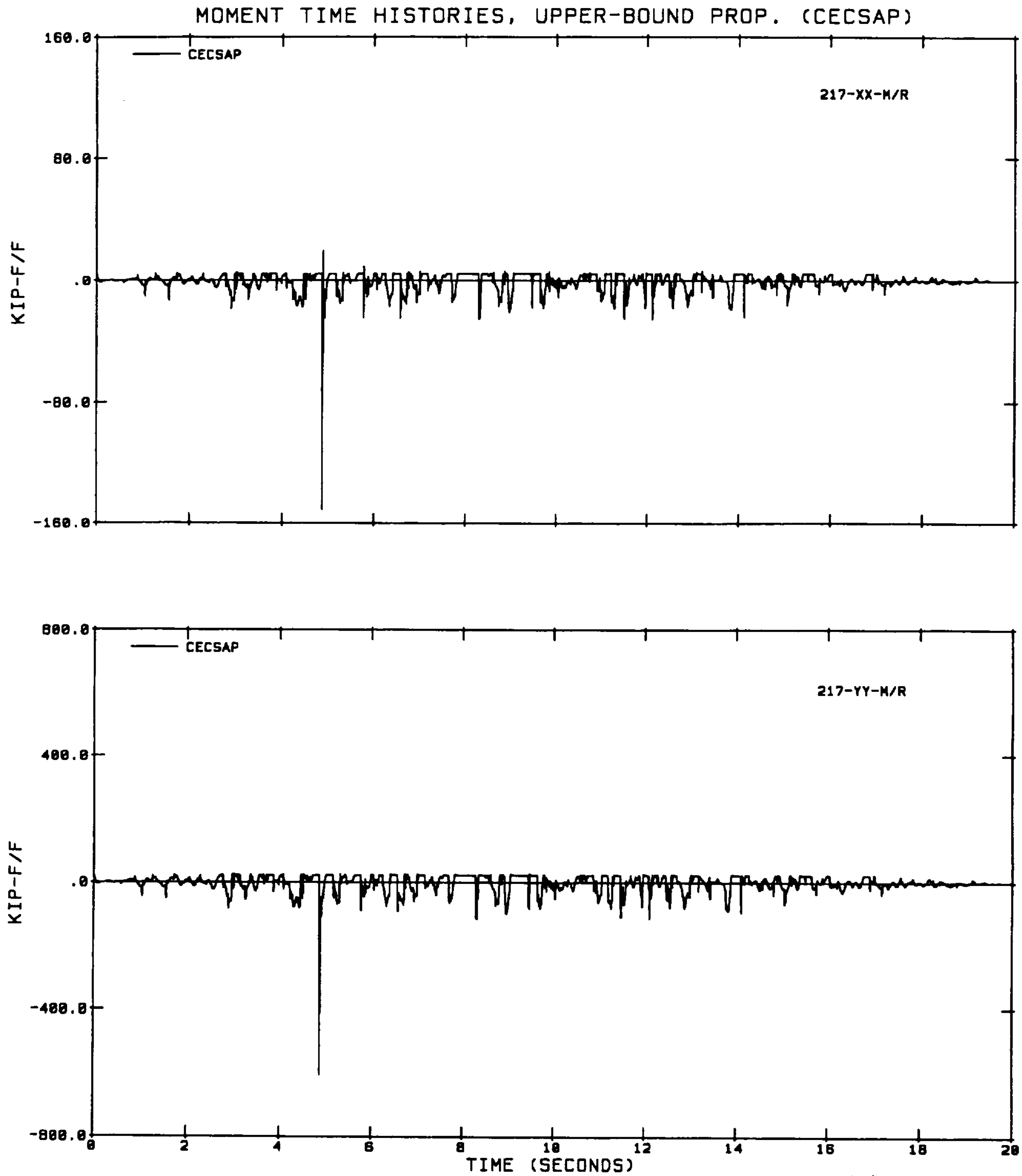


Fig. 5.2.5-17

CEC JOB NO. 1101-000
BY aum DATE 9/22/99
CHECK DH DATE 9/22/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 232

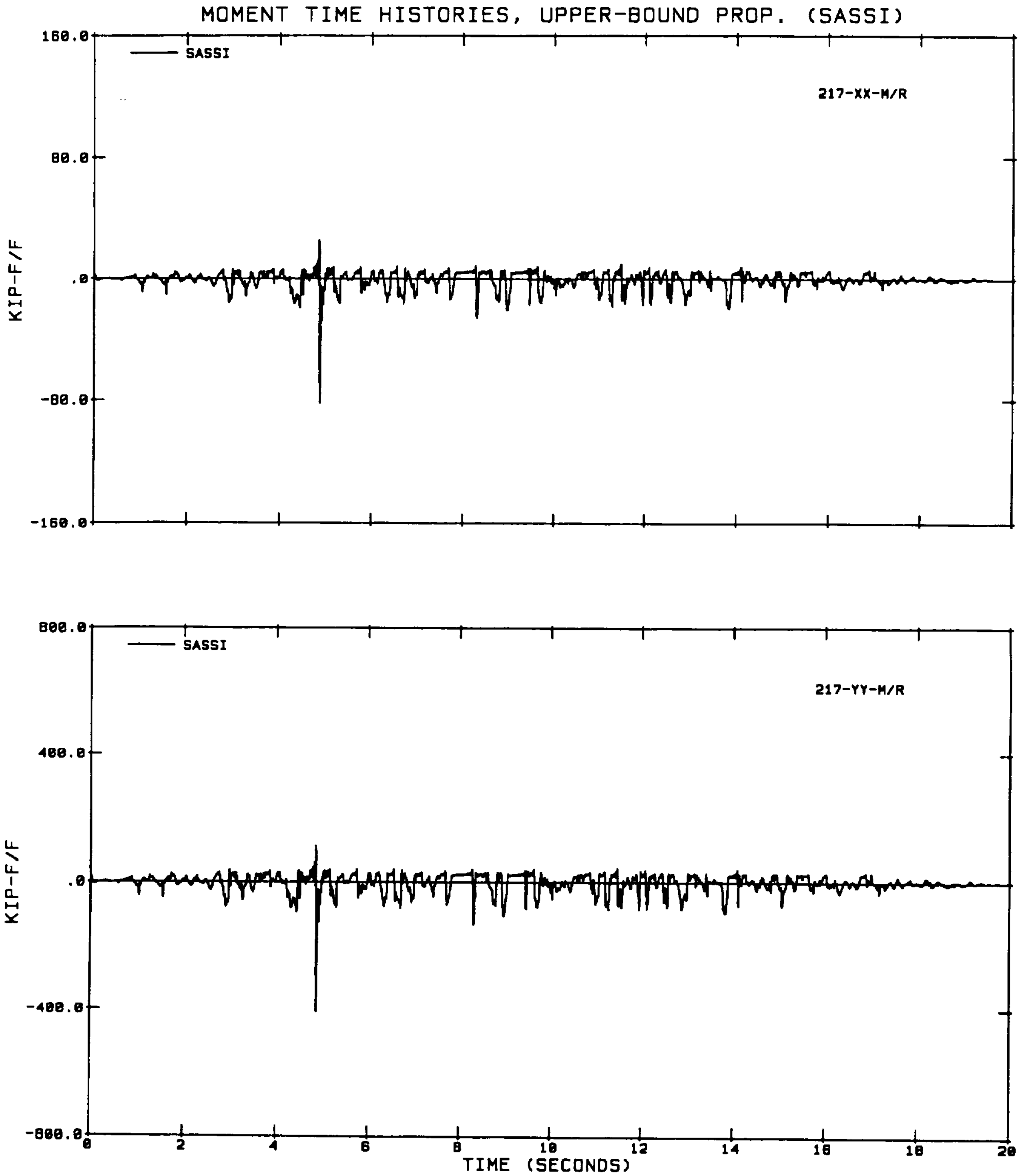


Fig. 5.2.5-18

CEC JOB NO. 1101-000
BY aum DATE 9/21/99
CHECK DH DATE 9/22/99
CALC. NO. G(P017)-2 REV. NO. 0
SHEET NO. 233

5.3 Soil Pressures

5.3.1 Static Soil Pressure

Calculations of static soil pressure due to dead load (DL) and cask live load (LL) are given in Table S-1 and S-2, respectively.

CALCULATION SHEET

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR		DATE 9/20/99	CHECKED	DATE	9-20-99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET	235

Table S - 1
Maximum Vertical Displacements and Soil Bearing Pressures
Dead Load

	k_s = 2.75 kcf	k_s = 26.2 kcf
Z_w(ft) =	0.164	0.0172
q_{zw}(ksf) =	0.45	0.45

Notes: 1. Z_w = maximum vertical displacement due to dead load (wt. of the pad only).

2. q_{zw} = vertical soil bearing pressure = k_s x Z_w, where k_s = subgrade moduli = 2.75 and 26.2 kcf for lower-bound and upper-bound soils, respectively, and Z_w are obtained from CECSAP analysis results (Att. A).

Table S - 2
Maximum Vertical Displacements and Soil Bearing Pressures
Live Load

Node No.	subgrade modulus = 2.75 kcf 2 Casks	4 Casks	8 Casks	7 Casks + OLT	subgrade modulus = 26.2 kcf 2 Casks	4 Casks	8 Casks	7 Casks + OLT
	(Z_l)max ($x10^{-2}$ ft.)							
1	13.54	11.2	-53.28	-60.55	0.7244	1.22	-4.959	-5.451
7	13.5	11.19	-53.27	-44	0.7026	1.206	-4.966	-4.481
13	13.54	11.2	-53.28	-27.42	0.7244	1.22	-4.959	-3.479
144	-12.65	-27.63	-55.27	-81.67	-0.8428	-3.061	-6.121	-8.451
150	-12.74	-27.62	-55.24	-63.97	-0.8975	-3.061	-6.119	-6.723
156	-12.65	-27.63	-55.27	-46.31	-0.8428	-3.061	-6.121	-5.01
287	-43.58	-64.48	-53.28	-103	-5.152	-6.179	-4.959	-11.85
293	-43.63	-64.46	-53.27	-83.3	-5.178	-6.172	-4.966	-8.549
299	-43.58	-64.48	-53.28	-63.94	-5.152	-6.179	-4.959	-5.58
	Maximum Soil Bearing Pressure $q_{zl}^{(1)}$ (ksf)							
1	0	0	-1.465	-1.665	0	0	-1.299	-1.428
7	0	0	-1.465	-1.210	0	0	-1.301	-1.174
13	0	0	-1.465	-0.754	0	0	-1.299	-0.911
144	0.348	-0.760	-1.520	-2.246	0.221	0.802	-1.604	-2.214
150	0.350	-0.760	-1.519	-1.759	0.235	-0.802	-1.603	-1.761
156	0.348	-0.760	-1.520	-1.274	0.221	-0.802	-1.604	-1.313
287	-1.198	-1.773	-1.465	-2.833	-1.350	-1.619	-1.299	-3.105
293	-1.200	-1.773	-1.465	-2.291	-1.357	-1.617	-1.301	-2.240
299	-1.198	-1.773	-1.465	-1.758	-1.350	-1.619	-1.299	-1.462

Note:

1. $q_{zl} = k_s \times Z_l$, where k_s = 2.75 and 26.2 kcf for lower-bound and upper-bound subgrade moduli, respectively, and Z_l are obtained from CECSAP analysis results (Att. A)
2. Negative displacements imply downward movements.
3. The displacement values listed are taken from the selected 9 nodes. They are Node 1, 7, 13, 144, 150, 156, 287, 293, and 299. The locations of these nodes are shown In Figure 1. Their maximum displacement values may not be the local maxima. By close examination, it is determined that the nine values taken for each loading case have encompassed the maximum value for that case.
4. For snow load, the soil bearing pressure is 0.045 ksf (Ref. 5).

5.3.2 Dynamic Horizontal and Vertical Soil Pressures

Calculations of horizontal and vertical soil pressures due to dynamic cask driving forces resulting from earthquake motions are given in the following tables:

Table D-1(a) shows calculation of total maximum horizontal dynamic soil reactions in the X-direction (short direction of pad).

Table D-1(b) shows calculation of total maximum horizontal dynamic soil reactions in the Y-direction (long direction of pad).

Table D-1(c) shows a summary of total maximum horizontal dynamic soil reactions.

Table D-1(d) shows calculation of maximum vertical dynamic soil bearing pressures.

CALCULATION SHEET

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	kv	DATE 9/20/99	CHECKED	DATE	9-20-99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET	238

Table D-1(a)
Total Maximum Horizontal Soil Reactions in the X Direction
Dynamic Load

Node Number	Maximum Displacement Xd (x10^{-3} ft.) LB 2 Casks	LB 4 Casks	LB 8 Casks	BE 2 Casks	BE 4 Casks	BE 8 Casks	UB 2 Casks	UB 4 Casks	UB 8 Casks
1	6.106	3.738	33.63	3.256	1.974	17.72	1.673	1.380	10.29
7	6.110	3.736	33.68	3.256	1.975	17.73	1.674	1.379	10.31
13	6.106	3.739	33.64	3.256	1.972	17.73	1.673	1.377	10.30
144	8.131	15.69	16.72	4.406	8.923	17.88	2.335	5.129	10.75
150	8.130	15.69	16.72	4.408	8.928	17.89	2.333	5.097	10.76
156	8.137	15.69	16.70	4.409	8.933	17.89	2.338	5.061	10.75
287	22.76	34.77	34.90	12.26	19.48	18.14	6.776	10.68	10.89
293	22.76	34.78	34.92	12.27	19.48	18.16	6.777	10.70	10.90
299	22.76	34.76	34.91	12.27	19.46	18.16	6.776	10.68	10.89
Average	12.333	18.066	28.424	6.643	10.125	17.922	3.595	5.720	10.65
Kxd (kips/ft)	55188	55188	55188	102288	102288	102288	174240	174240	174240
Qxd (kips)	681	997	1569	680	1036	1833	626	997	1855

Notes:

1. Average = {sum(Xd)$_i$}/N; Xd=max. x-displ.; i=nodes 1,7,13,144,150,156,287,293,299; and N=9.

2. Qxd = Kxd x Average = total maximum horizontal-x soil reaction in Kips due to dynamic loading.

3. Kxd for LB, BE, and UB soils are dynamic horizontal-x soil spring stiffnesses given below:

(Kxd)LB =	4.60E+06 lb/in	Kxd)BE =	8.52E+06 lb/in	Kxd)UB =	1.45E+07 lb/in
	5.52E+04 Kips/ft		1.02E+05 Kips/ft		1.74E+05 Kips/ft

4. LB = lower-bound soil, BE = best-estimate soil, UB = upper-bound soil.

5. Xd are obtained from CECSAP analysis results given in Att. A.

6. The maximum nodal displacements listed may not be concurrent. However, they are assumed to be concurrent for conservatism.

7. Node numbers are shown in Figure 1.

CALCULATION SHEET

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	[signature]	DATE 9/20/99	CHECKED [signature]	DATE	9-20-99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET	239

Table D-1(b)
Total Maximum Horizontal Soil Reactions in the Y Direction
Dynamic Load

Node Number	Max. Displacement Yd ($x10^{-3}$ ft.)								
	LB			BE			UB		
	2 Casks	4 Casks	8 Casks	2 Casks	4 Casks	8 Casks	2 Casks	4 Casks	8 Casks
1	9.362	17.42	29.04	5.446	10.100	17.04	3.550	5.444	10.67
7	7.698	14.54	17.42	4.581	8.865	17.23	2.829	5.085	10.80
13	9.788	14.65	20.90	5.119	9.150	17.41	3.116	5.711	10.92
144	9.472	17.51	29.08	5.563	10.240	17.07	3.588	5.602	10.71
150	7.746	14.66	17.40	4.660	8.984	17.24	2.889	5.226	10.83
156	9.856	14.76	20.72	5.225	9.310	17.42	3.245	5.874	10.95
287	9.570	17.54	29.13	5.671	10.380	17.06	3.767	5.734	10.71
293	7.833	14.72	17.39	4.803	9.120	17.23	3.001	5.348	10.81
299	10.000	14.89	20.54	5.346	9.366	17.41	3.370	5.890	10.93
Average	9.036	15.632	22.402	5.157	9.502	17.234	3.262	5.546	10.814
Kyd (kips/ft)	52428	52428	52428	97176	97176	97176	165600	165600	165600
Qyd (kips)	474	820	1175	501	923	1675	540	918	1791

Notes:

1. Average={sum(Yd)i}/N; Yd=max. y-displ.; i=nodes 1,7,13,144,150,156,287,293,299; and N=9.
2. Qyd = Kyd x Average = total maximum horizontal-y soil reaction in Kips due to dynamic loading.
3. Kyd for LB, BE, and UB soils are dynamic horizontal-y soil spring stiffnesses for entire pad given below:

(Kyd)LB =	4.37E+06 lb/in	(Kyd)BE	8.10E+06 lb/in	(Kyd)UB	1.38E+07 lb/in
	5.24.E+04 Kips/ft		9.72.E+04 Kips/ft		1.66.E+05 Kips/ft

4. LB = lower-bound soil, BE = best-estimate soil, UB = upper-bound soil.
5. Yd are obtained from CECSAP analysis results given in Att. A.
6. The maximum nodal displacement listed may not be concurrent. However, they are assumed to be concurrent for conservatism.
7. Node numbers are shown in Figure 1.

CALCULATION SHEET

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	KW	DATE 9/20/99	CHECKED	DATE	9-23-99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET	240

Table D-1(c)
Summary of Total Maximum Horizontal Soil Reactions
Dynamic Load

	Max. Soil Reaction (Kips)								
	LB			BE			UB		
	2 Casks	4 Casks	8 Casks	2 Casks	4 Casks	8 Casks	2 Casks	4 Casks	8 Casks
Qxd =	681	997	1569	680	1036	1833	626	997	1855
Qyd =	474	820	1175	501	923	1675	540	918	1791

Notes:

1. Qxd and Qyd in Kips are calculated in Tables D-1(a) and (b), respectively.

2. LB = lower-bound soil, BE = best-estimate soil, UB = upper-bound soil.

CALCULATION SHEET

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	kw	DATE 9/20/99	CHECKED	DATE	9-20-99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET	241

Table D-1(d)
Maximum Vertical Soil Bearing Pressures
Dynamic Load

Node Number	LB 2 Casks	LB 4 Casks	LB 8 Casks	BE 2 Casks	BE 4 Casks	BE 8 Casks	UB 2 Casks	UB 4 Casks	UB 8 Casks
	Maximum Displacement Zd ($x10^{-3}$ ft.)								
1	6.046	13.58	-30.77	4.002	7.599	-50.25	1.945	5.852	-33.37
7	6.421	9.074	-29.91	3.341	5.761	-24.61	1.955	3.728	-20.64
13	9.799	14.73	-47.10	4.855	10.53	-27.68	2.379	6.073	-21.03
144	-12.78	-24.37	-30.63	-9.079	-22.41	-29.56	-5.715	-15.900	-23.99
150	-6.301	-12.57	-16.70	-5.213	-12.41	-15.86	-4.055	-10.450	-12.29
156	-10.13	-25.14	-21.34	-5.896	-13.95	-29.82	-3.801	-11.180	-19.07
287	-26.50	-35.51	-69.21	-23.57	-27.08	-25.68	-18.900	-16.760	-14.97
293	-21.77	-32.04	-61.38	-17.39	-22.58	-21.37	-14.010	-14.500	-15.10
299	-26.01	-37.77	-54.79	-29.69	-22.41	-26.55	-15.430	-16.340	-16.84
	Maximum Soil Bearing Pressure q_{zd} (Kips/ft^2)								
1	0.00	0.00	-1.20	0.00	0.00	-3.53	0.00	0.00	-3.92
7	0.00	0.00	-1.16	0.00	0.00	-1.73	0.00	0.00	-2.42
13	0.00	0.00	-1.83	0.00	0.00	-1.94	0.00	0.00	-2.47
144	-0.50	-0.95	-1.19	-0.64	-1.57	-2.08	-0.67	1.87	-2.82
150	-0.25	-0.49	-0.65	-0.37	-0.87	-1.11	-0.48	-1.23	-1.44
156	-0.39	-0.98	-0.83	-0.41	-0.98	-2.09	-0.45	-1.31	-2.24
287	-1.03	-1.38	-2.70	-1.66	-1.90	-1.80	-2.22	-1.97	-1.76
293	-0.85	-1.25	-2.39	-1.22	-1.59	-1.50	-1.64	-1.70	-1.77
299	-1.01	-1.47	-2.13	-2.09	-1.57	-1.87	-1.81	-1.92	-1.98

Notes:

1. q_{zd} = maximum soil bearing pressure = (Kzd x Z_d)/A, where A = 64' x 30' = 1920 ft^2.
2. Kzd for LB, BE, and UB soils are vertical-z dynamic soil spring stiffnesses given below:

   (Kzd)LB = 6.23E+06 lb/in (Kzd)BE = 1.12E+07 lb/in (Kzd)UB = 1.88E+07 lb/in

   7.48.E+04 Kips/ft 1.35.E+05 Kips/ft 2.25.E+05 Kips/ft
3. LB = lower-bound soil, BE = best-estimate soil, UB = upper-bound soil.
4. Zd are obtained from CECSAP analysis results given in Att. A.
5. Negative displacements imply downward movements.
6. The maximum Zd values listed above may not be concurrent. However they are assumed to be concurrent values and concurrent signs are assigned to them.
7. Node numbers are shown in Figure 1.

CALCULATION SHEET

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE 10/16/99	CHECKED	DATE	10/16/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	242

6. DESIGN CALCULATIONS

6.1 Design of Reinforced Concrete Pad

Ultimate Static Moment Calculation

Concrete Properties: (Ref. 4)

f'c =	3000	psi
factor =	1.00	
factor*f'c =	3,000	psi

Poisson's Ratio, nu= 0.17

Young's Modulus,Ec= 3,122,019 psi (=57000*sqrt(f'c))

Reinforcing Steel Properties: (Ref. 4)

fy =	60000	psi
factor =	1	
factor*fy =	60,000	psi

Young's Modulus, Es= 29,000,000 psi

Since the in-plane forces induced in the pad, as plotted in Attachment A-5, are minimal, they will be neglected in the ultimate capacity calculations.

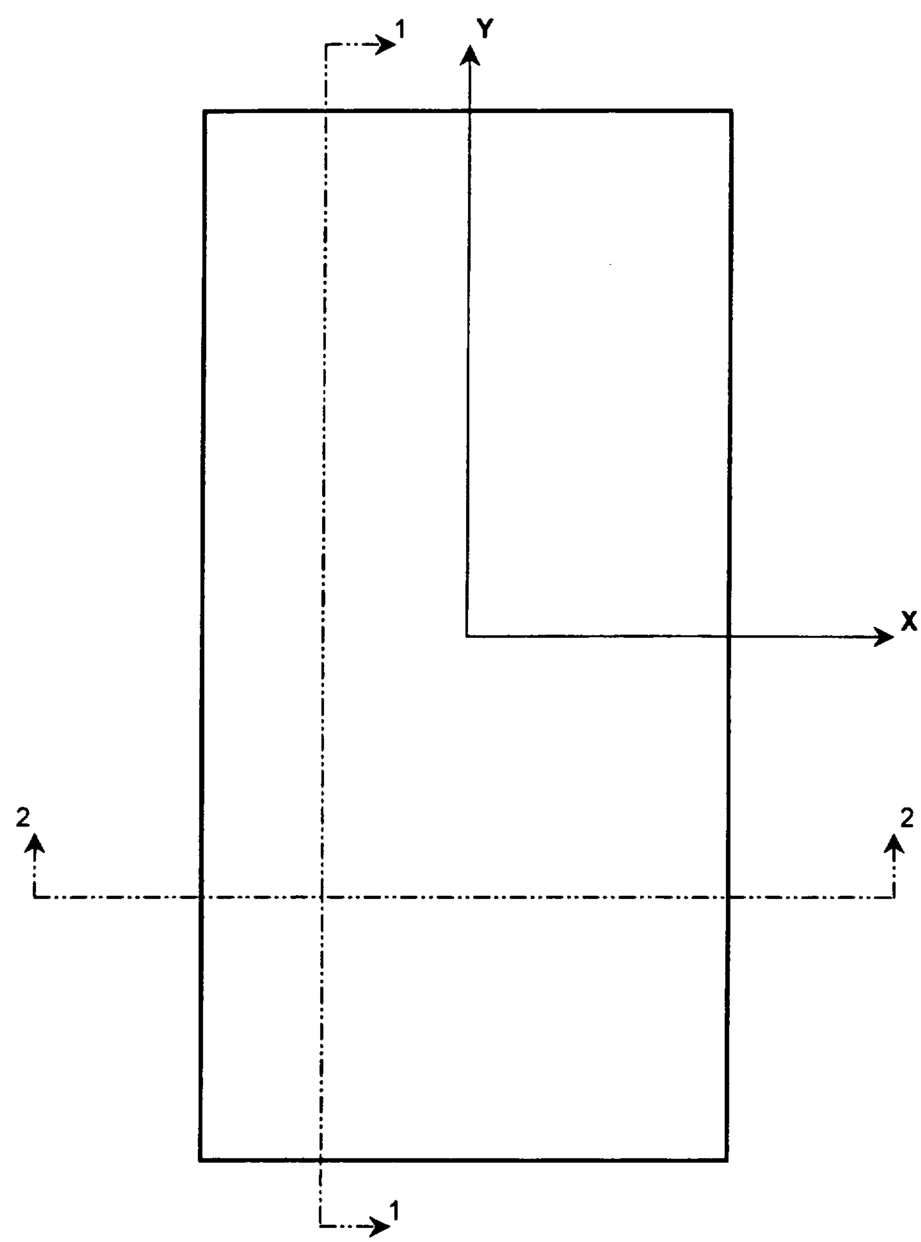
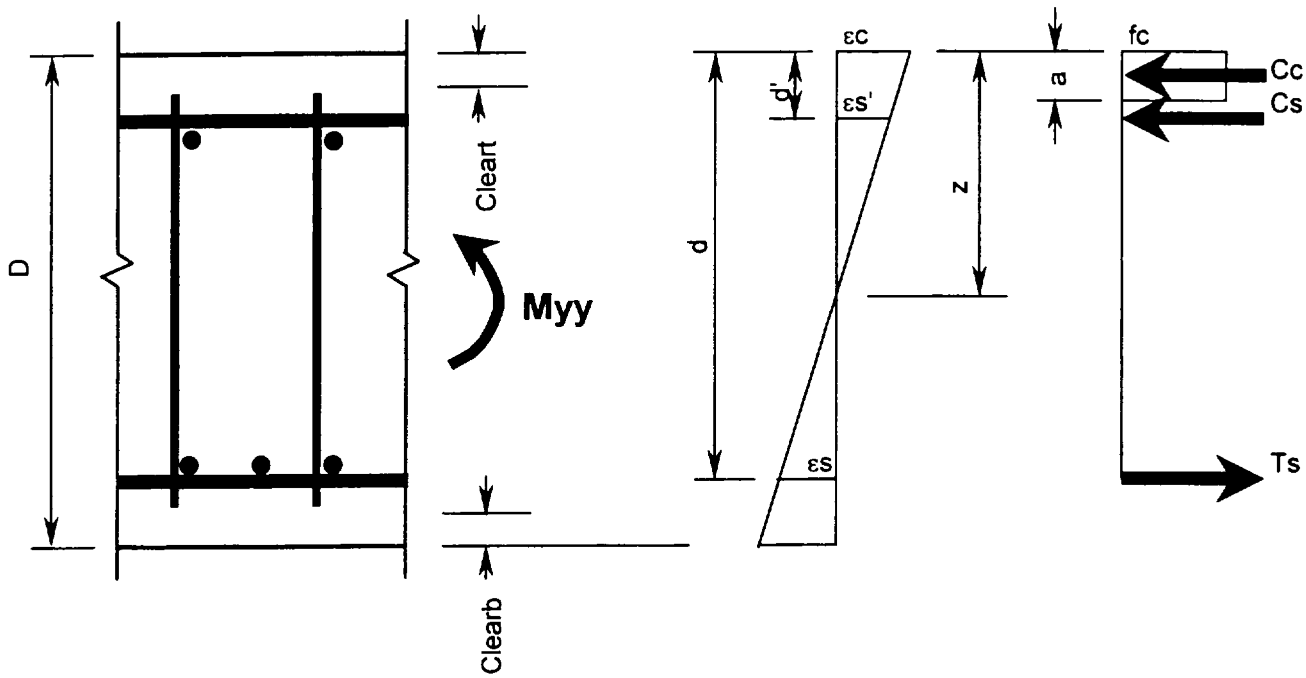


Figure 6-1 Plan View of Pad (not to scale)

Sections used for calculating moment capacities.

CALCULATION SHEET

Moment Capacity of the pad (per unit length) about the X-axis (about transverse) - Option 1
Tension on bottom



Section 1-1 Strain Forces

Reinforcement Location	Number Each way (per foot)	Size	Diameter (in)	Area of one bar (sq. in)	Total Area, As (sq. in)
Top	1	10	1.27	1.27	1.27
Bottom	2	10	1.27	1.27	2.54
Shear	1	8	1.00	0.79	0.79

CALCULATION SHEET

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE 10/16/99	CHECKED	DATE	10/16/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	245

Moment Capacity of the pad (per unit length) about the X-axis (about transverse) - Option 1
Tension on bottom
(Iterate on εs to obtain force balance)

Total Depth, D =	36 in
Top clearance, Cleart =	2 in
Bottom clearance, Clearb =	3 in
Comp face to CL of comp rebar, d' = Cleart + 1.27/2 + 1.00=	3.635 in
Comp face to CL of tensile rebar, d = D - Clearb - 1.27/2 - 1.00=	31.365 in
Assumed steel tensile strain at ultimate, εs =	**0.016535**
Concrete compressive strain at ultimate, εc =	0.003
Compression depth, z = εc * d / (εc + εs) =	4.8167 in
Steel compressive strain at ultimate, εs' = εc * (z-d') / z =	0.000736
Depth of concrete compression block, a = .85 * z =	4.0942283 in
Consider a unit width, b =	12 in
Concrete compressive stress at ultimate, fc = -.85 * f'c =	-2550 psi
Concrete compressive force, Cc = fc * a * b =	-125283.4 lb
Steel compressive stress, σs' = -εs' * Es =	-21344.59 psi
Steel compressive force, Cs = σs' * As' =	-27107.63 lb
Steel tensile stress , σs = εs * Es =	60000 psi
Steel tensile force, Ts = σs * As =	152400 lb
Total Force (should be approximately zero) =	9.0 lb

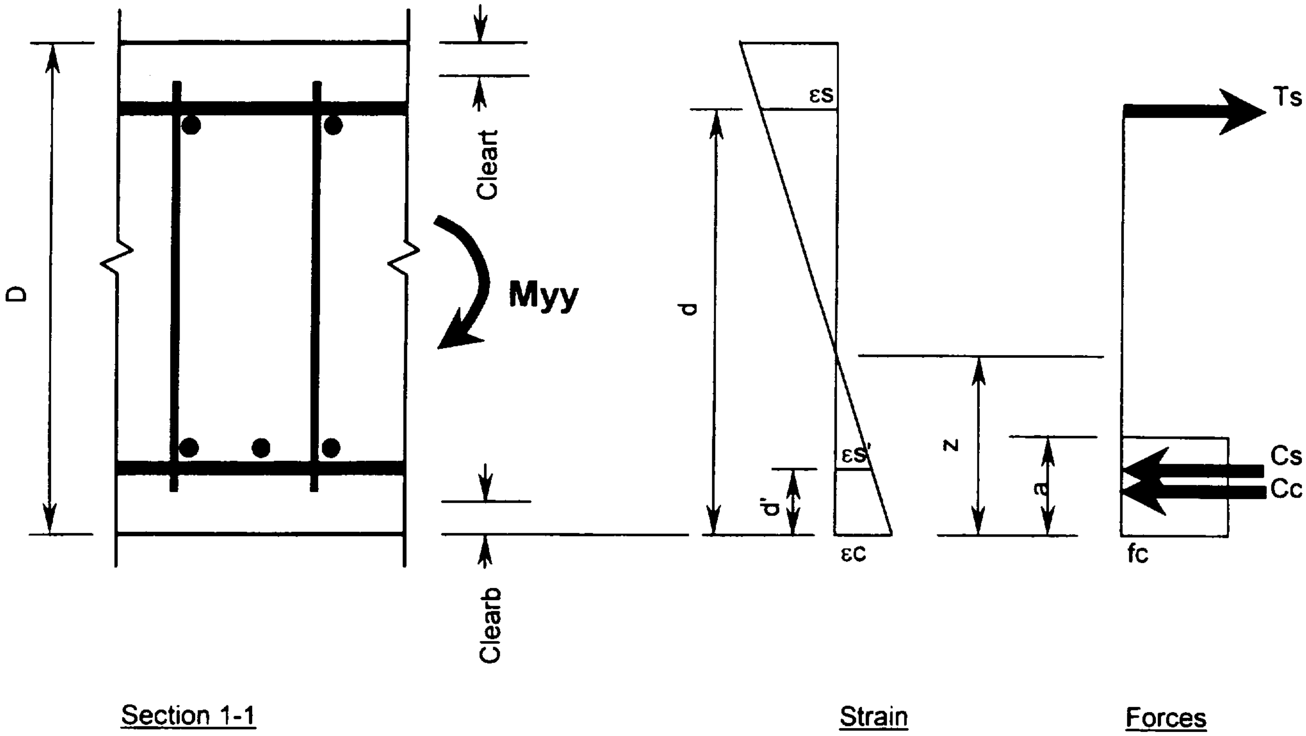
Moment Capacity of the pad (per unit length) about the X-axis (about transverse) - Option 1
Tension on bottom

y = Distance from CL of section to Force	y (in)	Moment (lb-in)
Concrete in compression, yc = D/2 - a/2 =	15.952886	1998632
Compression steel, ys' = D/2 - d' =	14.365	389401
Tensile steel, ys = d - D/2 =	13.365	2036826

Moment capacity (per unit foot width) = 4424859 lb-in/ft

= 368.7 k-ft/ft

Moment Capacity of the pad (per unit length) about the X-axis (about transverse) - Option 1
Tension on top



Moment Capacity of the pad (per unit length) about the X-axis (about transverse) - Option 1
Tension on top
(Iterate on εs to obtain force balance)

Total Depth, D =	36 in
Top clearance, Cleart =	2 in
Bottom clearance, Clearb =	3 in
Comp face to CL of comp rebar, d' = Clearb + 1.27/2 + 1.00=	4.635 in
Comp face to CL of tensile rebar, d = D - Cleart - 1.27/2 - 1.00=	32.365 in
Steel tensile strain at ultimate, εs =	**0.020788**
Concrete compressive strain at ultimate, εc =	0.003
Compression depth, z = εc * d / (εc + εs) =	4.08 in
Steel compressive strain at ultimate, εs' = εc * (z-d') / z =	-0.000407
Depth of concrete compression block, a = .85 * z =	3.4694279 in
Consider a unit width, b =	12 in
Concrete compressive stress at ultimate, fc = -.85 * f'c =	-2550 psi
Concrete compressive force, Cc = fc * a * b =	-106164.5 lb
Steel compressive stress, σs' = -εs' * Es =	11793.883 psi
Steel compressive force, Cs = σs' * As' =	29956.463 lb
Steel tensile stress , σs = εs * Es =	60000 psi
Steel tensile force, Ts = σs * As =	76200 lb
Total Force (should be approximately zero) =	-8.0 lb

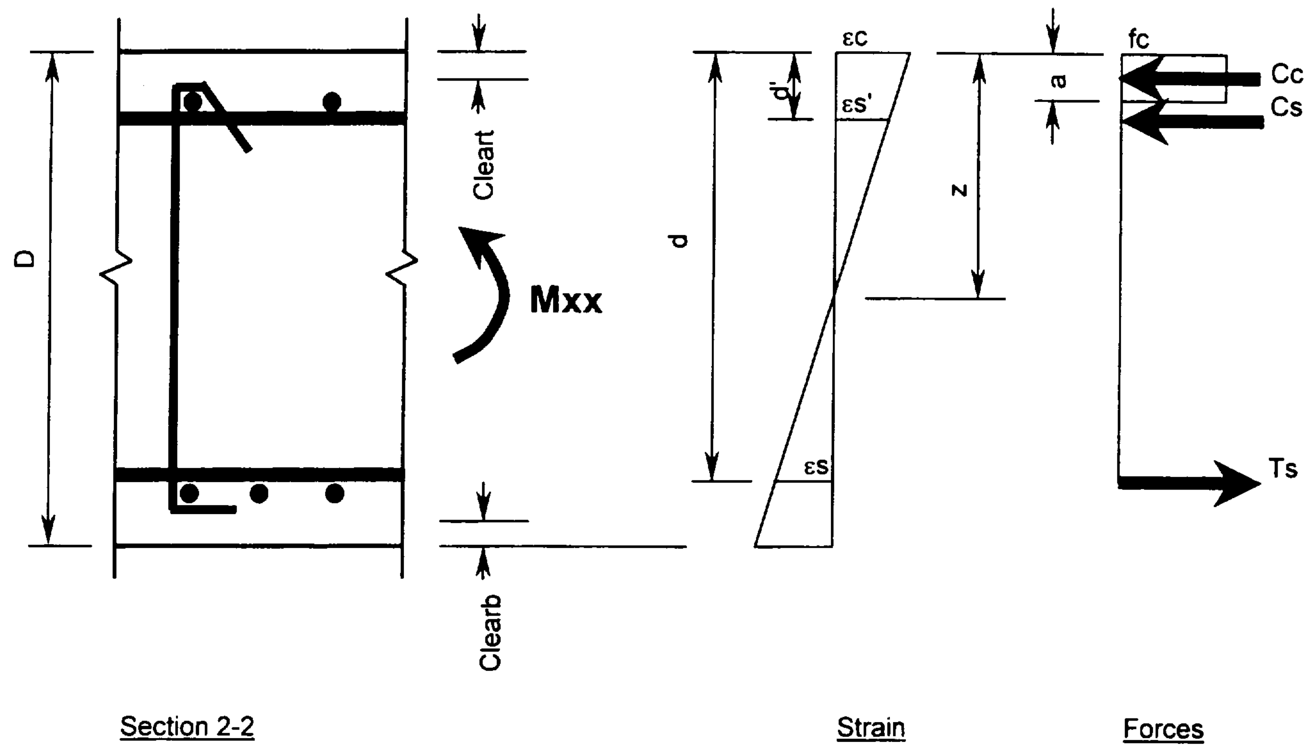
Moment Capacity of the pad (per unit length) about the X-axis (about transverse) - Option 1
Tension on top

y = Distance from CL of section to Force	y (in)	Moment (lb-in)
Concrete in compression, yc = D/2 - a/2 =	16.265286	1726796
Compression steel, ys' = D/2 - d' =	13.365	-400368
Tensile steel, ys = d - D/2 =	14.365	1094613

Moment capacity (per unit foot width) = 2421041 lb-in/ft

= 201.8 k-ft/ft

Moment Capacity of the pad (per unit length) about the Y-axis (about longitudinal) - Option 1
Tension on bottom



Reinforcement Location	Number Each way (per foot)	Size	Diameter (in)	Area of one bar (sq. in)	Total Area, As (sq. in)
Top	1	10	1.27	1.27	1.27
Bottom	2	10	1.27	1.27	2.54
Shear	1	8	1	0.79	0.79

Moment Capacity of the pad (per unit length) about the Y-axis (about longitudinal) - Option 1
Tension on bottom
(Iterate on εs to obtain force balance)

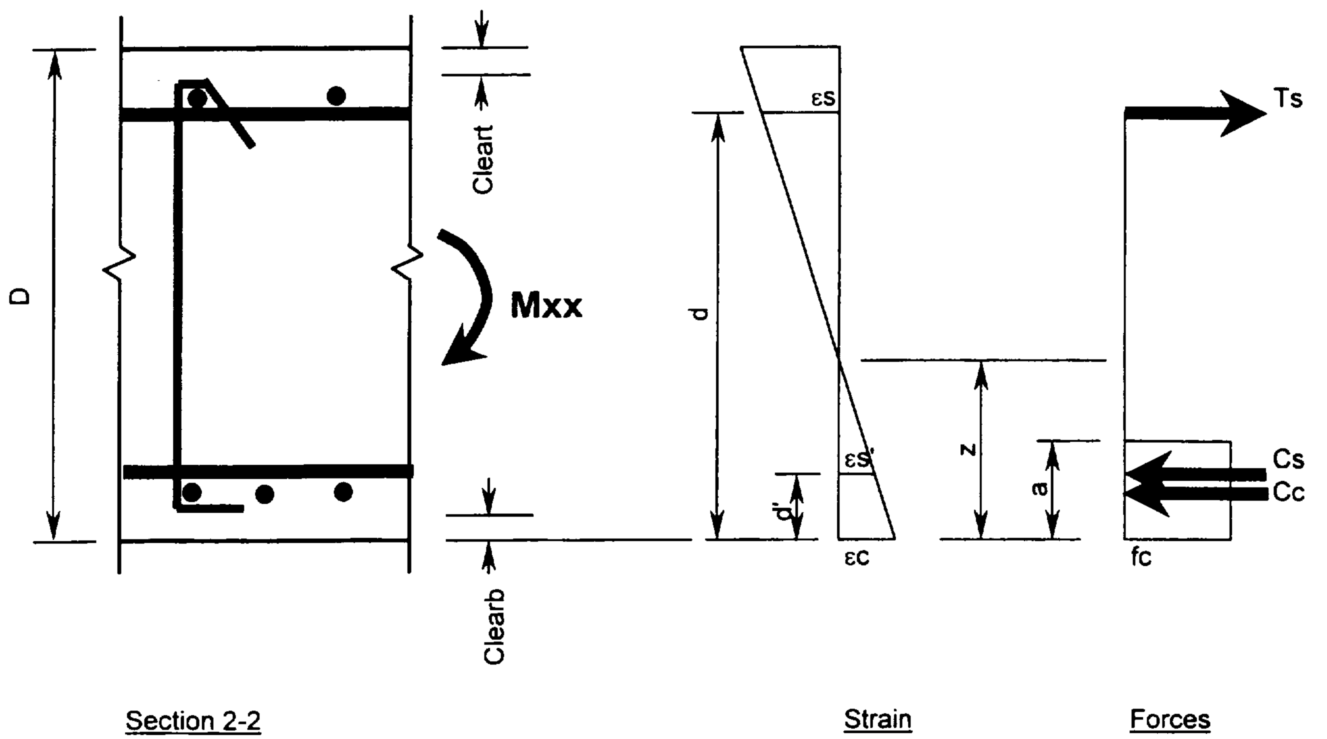
Total Depth, D =	36 in
Top clearance, Cleart =	2 in
Bottom clearance, Clearb =	3 in
Comp face to CL of comp rebar, d' = Cleart + 1.27*1.5 + 1.00=	4.905 in
Comp face to CL of tensile rebar, d = D - Clearb - 1.27*1.5 - 1.00=	30.095 in
Steel tensile strain at ultimate, εs =	**0.013594**
Concrete compressive strain at ultimate, εc =	0.003
Compression depth, z = εc * d / (εc + εs) =	5.44 in
Steel compressive strain at ultimate, εs' = εc * (z-d') / z =	0.0002954
Depth of concrete compression block, a = .85 * z =	4.6246987 in
Consider a unit width, b =	12 in
Concrete compressive stress at ultimate, fc = -.85 * f'c =	-2550 psi
Concrete compressive force, Cc = fc * a * b =	-141515.8 lb
Steel compressive stress, σs' = -εs' * Es =	-8567.917 psi
Steel compressive force, Cs = σs' * As' =	-10881.25 lb
Steel tensile stress , σs = εs * Es =	60000 psi
Steel tensile force, Ts = σs * As =	152400 lb
Total Force (should be approximately zero) =	3.0 lb

CALCULATION SHEET

Moment Capacity of the pad (per unit length) about the Y-axis (about longitudinal) - Option 1
Tension on bottom

y = Distance from CL of section to Force	y (in)	Moment (lb-in)
Concrete in compression, yc = D/2 - a/2 =	15.687651	2220050
Compression steel, ys' = D/2 - d' =	13.095	142490
Tensile steel, ys = d - D/2 =	12.095	1843278
Moment capacity (per unit foot width) =		4205818 lb-in/ft
=		350.5 k-ft/ft

Moment Capacity of the pad (per unit length) about the Y-axis (about longitudinal) - Option 1
Tension on top



Moment Capacity of the pad (per unit length) about the Y-axis (about longitudinal) - Option 1
Tension on top
(Iterate on εs to obtain force balance)

Total Depth, D =	36	in
Top clearance, Cleart =	2	in
Bottom clearance, Clearb =	3	in
Comp face to CL of comp rebar, d' = Clearb + 1.27*1.5 + 1.00 =	5.905	in
Comp face to CL of tensile rebar, d = D - Cleart - 1.27*1.5 - 1.00=	31.095	in
Steel tensile strain at ultimate, εs =	**0.016326**	
Concrete compressive strain at ultimate, εc =	0.003000	
Compression depth, z = εc * d / (εc + εs) =	4.83	in
Steel compressive strain at ultimate, εs' = εc * (z-d') / z =	-0.00067	
Depth of concrete compression block, a = .85 * z =	4.1028795	in
Consider a unit width, b =	12	in
Concrete compressive stress at ultimate, fc = -.85 * f'c =	-2550	psi
Concrete compressive force, Cc = fc * a * b =	-125548.1	lb
Steel compressive stress, σs' = -εs' * Es =	19431.287	psi
Steel compressive force, Cs = σs' * As' =	49355.469	lb
Steel tensile stress , σs = εs * Es =	60000	psi
Steel tensile force, Ts = σs * As =	76200	lb
Total Force (should be approximately zero) =	7.4	lb

CALCULATION SHEET

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE 10/15/99	CHECKED	DATE	10/15/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	255

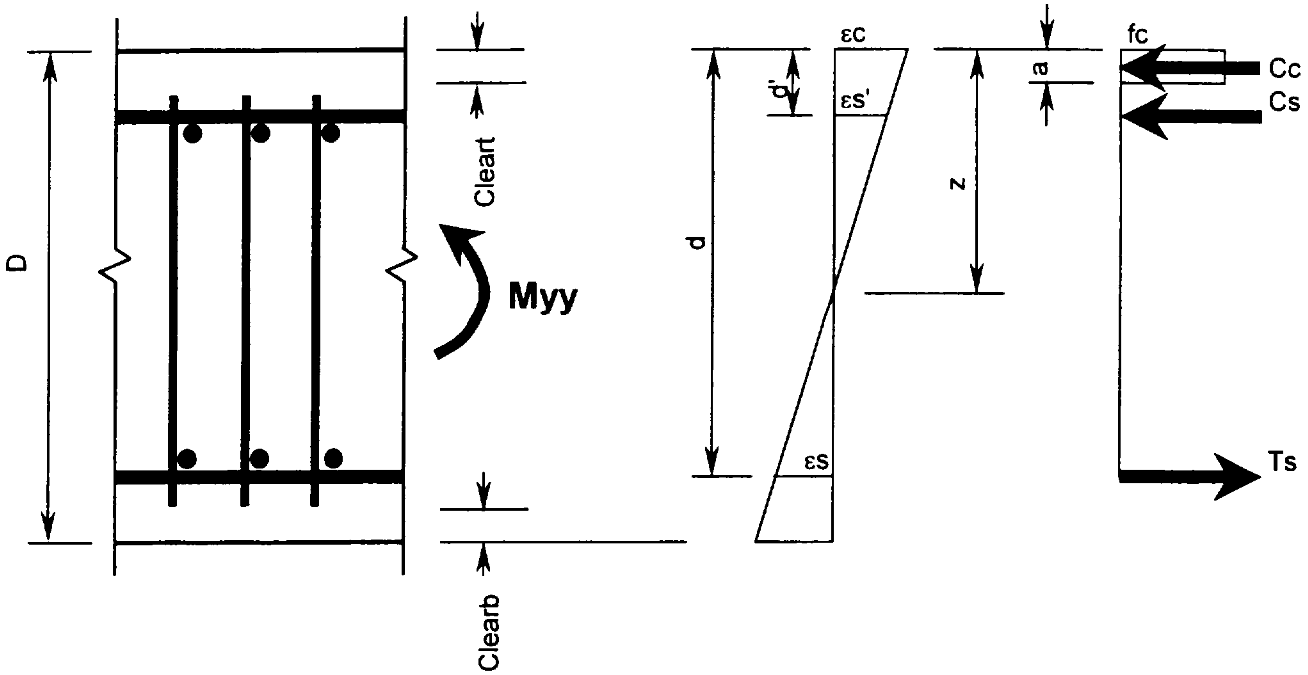
Moment Capacity of the pad (per unit length) about the Y-axis (about longitudinal) - Option 1
Tension on top

y = Distance from CL of section to Force	y (in)	Moment (lb-in)
Concrete in compression, yc = D/2 - a/2 =	15.94856	2002312
Compression steel, ys' = D/2 - d' =	12.095	-596954
Tensile steel, ys = d - D/2 =	13.095	997839

Moment capacity (per unit foot width) = 2403196 lb-in/ft

= 200.3 k-ft/ft

Moment Capacity of the pad (per unit length) about the X-axis (about transverse) - Option 2
Tension on bottom



Section 1-1

Strain

Forces

Reinforcement Location	Number Each way (per foot)	Size	Diameter (in)	Area of one bar (sq. in)	Total Area, As (sq. in)
Top	2	8	1	0.79	1.58
Bottom	2	10	1.27	1.27	2.54
Shear	2	6	0.75	0.44	0.88

CALCULATION SHEET

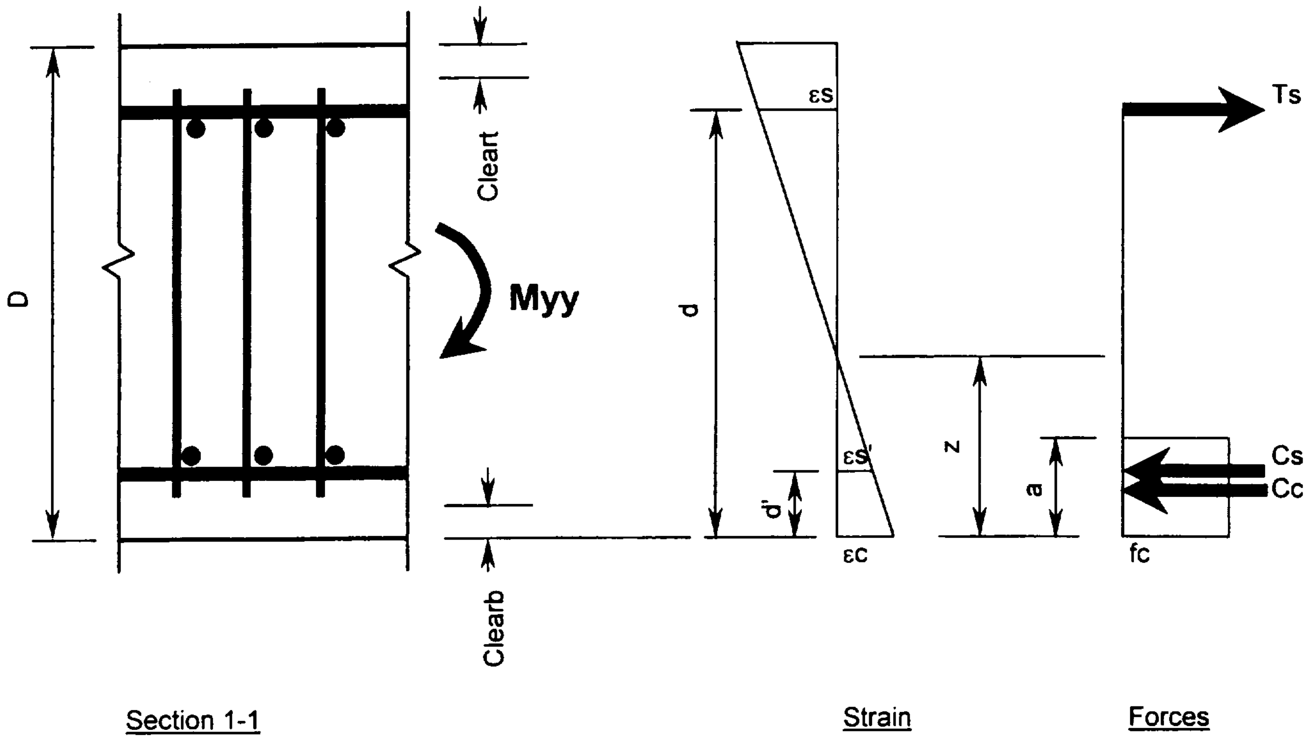
Moment Capacity of the pad (per unit length) about the X-axis (about transverse) - Option 2
Tension on bottom
(Iterate on εs to obtain force balance)

Total Depth, D =	36	in
Top clearance, Cleart =	2	in
Bottom clearance, Clearb =	3	in
Comp face to CL of comp rebar, d' = Cleart + 1.00/2 + 0.75=	3.25	in
Comp face to CL of tensile rebar, d = D - Clearb - 1.27/2 - 0.75=	31.615	in
Assumed steel tensile strain at ultimate, εs =	**0.018355**	
Concrete compressive strain at ultimate, εc =	0.003	
Compression depth, z = εc * d / (εc + εs) =	4.4413	in
Steel compressive strain at ultimate, εs' = εc * (z-d') / z =	0.0008047	
Depth of concrete compression block, a = .85 * z =	3.7751463	in
Consider a unit width, b =	12	in
Concrete compressive stress at ultimate, fc = -.85 * f'c =	-2550	psi
Concrete compressive force, Cc = fc * a * b =	-115519.5	lb
Steel compressive stress, σs' = -εs' * Es =	-23336.9	psi
Steel compressive force, Cs = σs' * As' =	-36872.31	lb
Steel tensile stress , σs = εs * Es =	60000	psi
Steel tensile force, Ts = σs * As =	152400	lb
Total Force (should be approximately zero) =	8.2	lb

Moment Capacity of the pad (per unit length) about the X-axis (about transverse) - Option 2
Tension on bottom

y = Distance from CL of section to Force	y (in)	Moment (lb-in)	
Concrete in compression, yc = D/2 - a/2 =	16.112427	1861299	
Compression steel, ys' = D/2 - d' =	14.75	543867	
Tensile steel, ys = d - D/2 =	13.615	2074926	
Moment capacity (per unit foot width) =		4480092	lb-in/ft
=		373.3	k-ft/ft

Moment Capacity of the pad (per unit length) about the X-axis (about transverse) - Option 2
Tension on top



CALCULATION SHEET

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE 10/16/99	CHECKED	DATE	10/16/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	260

Moment Capacity of the pad (per unit length) about the X-axis (about transverse) - Option 2
Tension on top
(Iterate on εs to obtain force balance)

Total Depth, D =	36 in
Top clearance, Cleart =	2 in
Bottom clearance, Clearb =	3 in
Comp face to CL of comp rebar, d' = Clearb + 1.27/2 + 0.75=	4.385 in
Comp face to CL of tensile rebar, d = D - Cleart - 1.00/2 - 0.75=	32.75 in
Steel tensile strain at ultimate, εs =	**0.020718**
Concrete compressive strain at ultimate, εc =	0.003
Compression depth, z = εc * d / (εc + εs) =	4.14 in
Steel compressive strain at ultimate, εs' = εc * (z-d') / z =	-0.000176
Depth of concrete compression block, a = .85 * z =	3.52106 in
Consider a unit width, b =	12 in
Concrete compressive stress at ultimate, fc = -.85 * f'c =	-2550 psi
Concrete compressive force, Cc = fc * a * b =	-107744.4 lb
Steel compressive stress, σs' = -εs' * Es =	5094.6403 psi
Steel compressive force, Cs = σs' * As' =	12940.386 lb
Steel tensile stress , σs = εs * Es =	60000 psi
Steel tensile force, Ts = σs * As =	94800 lb
Total Force (should be approximately zero) =	-4.0 lb

CALCULATION SHEET

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE 11/15/99	CHECKED	DATE	10/15/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	261

Moment Capacity of the pad (per unit length) about the X-axis (about transverse) - Option 2
Tension on top

y = Distance from CL of section to Force	y (in)	Moment (lb-in)
Concrete in compression, yc = D/2 - a/2 =	16.23947	1749713
Compression steel, ys' = D/2 - d' =	13.615	-176183
Tensile steel, ys = d - D/2 =	14.75	1398300

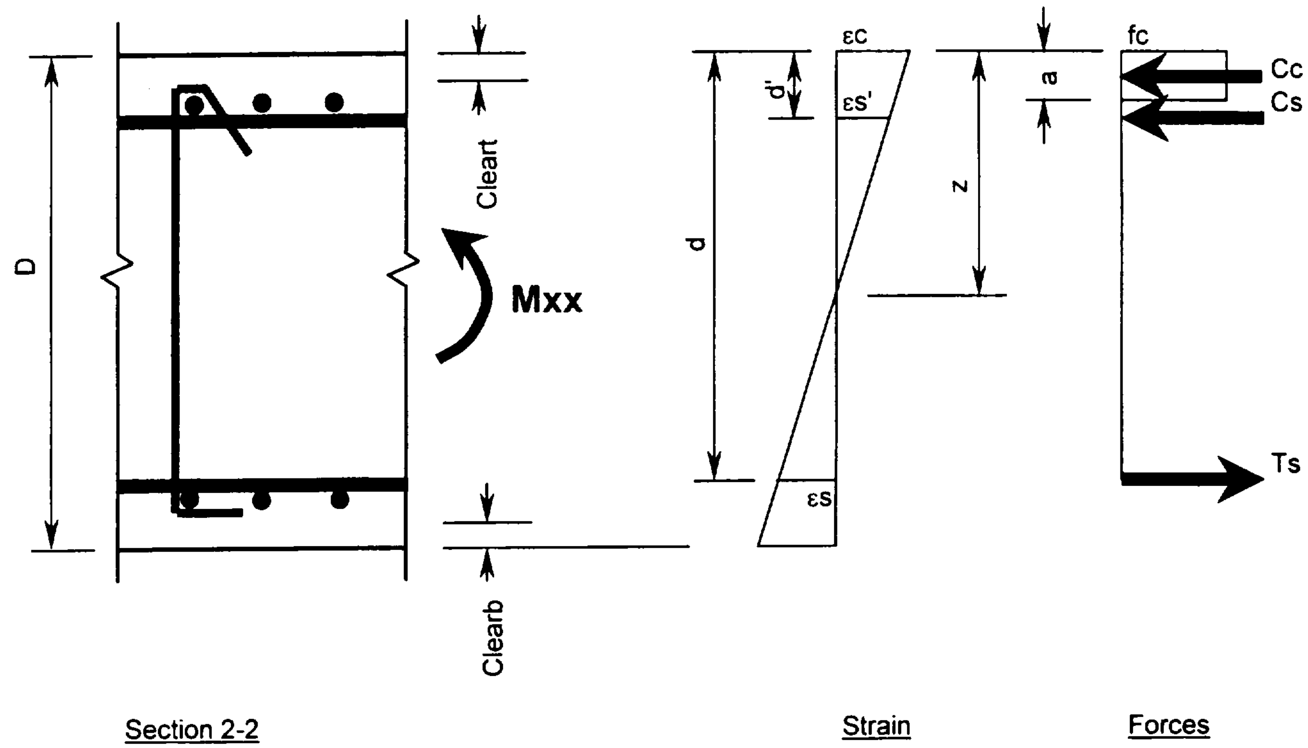
Moment capacity (per unit foot width) = 2971829 lb-in/ft

= 247.7 k-ft/ft

CALCULATION SHEET

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE 10/16/99	CHECKED [initials]	DATE	10/16/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	262

Moment Capacity of the pad (per unit length) about the Y-axis (about longitudinal) - Option 2
Tension on bottom



Reinforce-ment Location	Number Each way (per foot)	Size	Diameter (in)	Area of one bar (sq. in)	Total Area, As (sq. in)
Top	2	8	1	0.79	1.58
Bottom	2	10	1.27	1.27	2.54
Shear	2	6	0.75	0.44	0.88

CALCULATION SHEET

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE 10/16/99	CHECKED	DATE	10/16/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	263

Moment Capacity of the pad (per unit length) about the Y-axis (about longitudinal) - Option 2
Tension on bottom
(Iterate on εs to obtain force balance)

Total Depth, D =	36	in
Top clearance, Cleart =	2	in
Bottom clearance, Clearb =	3	in
Comp face to CL of comp rebar, d' = Cleart + 1.00*1.5 + 0.75=	4.25	in
Comp face to CL of tensile rebar, d = D - Clearb - 1.27*1.5 - 0.75=	30.345	in
Steel tensile strain at ultimate, εs =	**0.015080**	
Concrete compressive strain at ultimate, εc =	0.003	
Compression depth, z = εc * d / (εc + εs) =	5.04	in
Steel compressive strain at ultimate, εs' = εc * (z-d') / z =	0.0004678	
Depth of concrete compression block, a = .85 * z =	4.2798534	in
Consider a unit width, b =	12	in
Concrete compressive stress at ultimate, fc = -.85 * f'c =	-2550	psi
Concrete compressive force, Cc = fc * a * b =	-130963.5	lb
Steel compressive stress, σs' = -εs' * Es =	-13565.83	psi
Steel compressive force, Cs = σs' * As' =	-21434.01	lb
Steel tensile stress , σs = εs * Es =	60000	psi
Steel tensile force, Ts = σs * As =	152400	lb
Total Force (should be approximately zero) =	2.5	lb

CALCULATION SHEET

CEC

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE 10/15/99	CHECKED	DATE	10/15/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	264

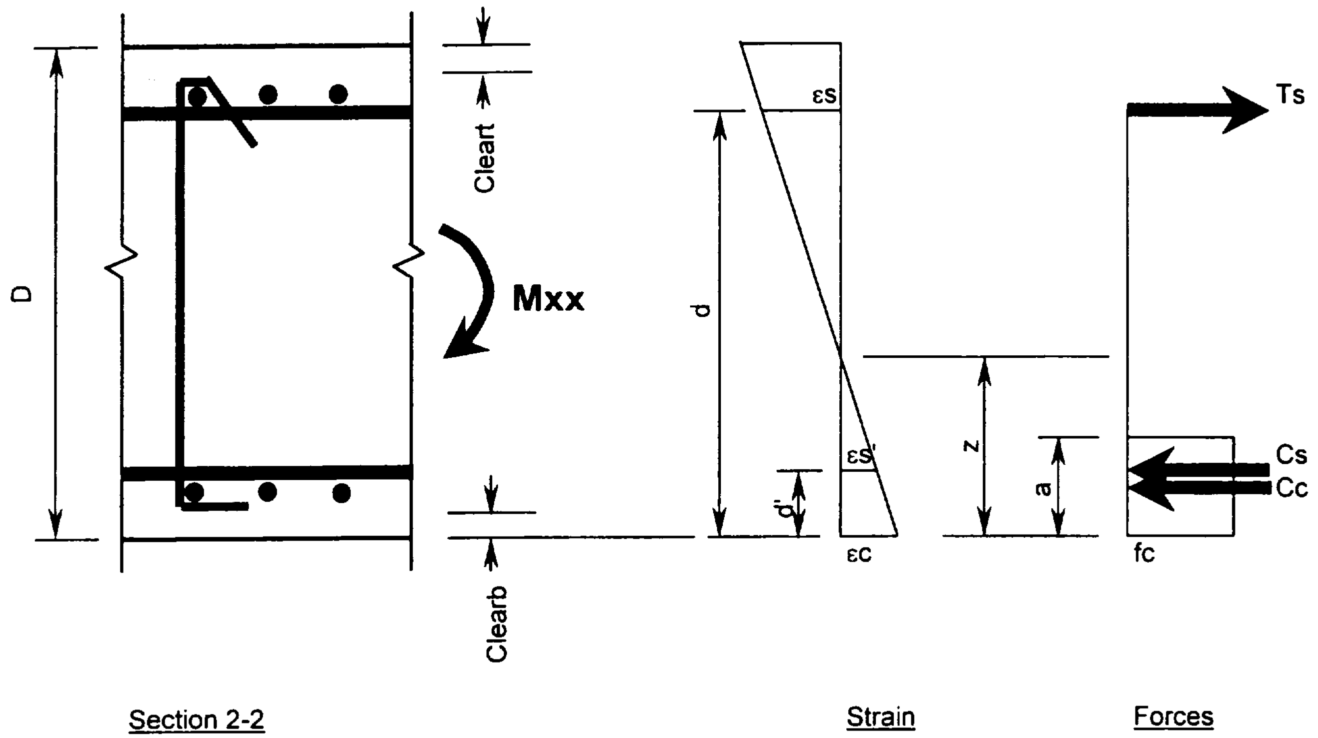
Moment Capacity of the pad (per unit length) about the Y-axis (about longitudinal) - Option 2
Tension on bottom

y = Distance from CL of section to Force	y (in)	Moment (lb-in)
Concrete in compression, yc = D/2 - a/2 =	15.860073	2077091
Compression steel, ys' = D/2 - d' =	13.75	294718
Tensile steel, ys = d - D/2 =	12.345	1881378

Moment capacity (per unit foot width) = 4253187 lb-in/ft

= 354.4 k-ft/ft

Moment Capacity of the pad (per unit length) about the Y-axis (about longitudinal) - Option 2
Tension on top



CALCULATION SHEET

CEC

			CALC. NO.	G(PO17)-2	REV. NO. 0
ORIGINATOR	DH	DATE 10/16/99	CHECKED	[illegible]	DATE 10/16/99
PROJECT	Private Fuel Storage Facility				JOB NO. 1101-000
SUBJECT	Storage Pad Analysis and Design				SHEET NO. 266

Moment Capacity of the pad (per unit length) about the Y-axis (about longitudinal) - Option 2
Tension on top
(Iterate on εs to obtain force balance)

Total Depth, D =	36	in
Top clearance, Cleart =	2	in
Bottom clearance, Clearb =	3	in
Comp face to CL of comp rebar, d' = Clearb + 1.27*1.5 + 0.75 =	5.655	in
Comp face to CL of tensile rebar, d = D - Cleart - 1.00*1.5 - 0.75=	31.75	in
Steel tensile strain at ultimate, εs =	**0.016368**	
Concrete compressive strain at ultimate, εc =	0.003000	
Compression depth, z = εc * d / (εc + εs) =	4.92	in
Steel compressive strain at ultimate, εs' = εc * (z-d') / z =	-0.00045	
Depth of concrete compression block, a = .85 * z =	4.18022	in
Consider a unit width, b =	12	in
Concrete compressive stress at ultimate, fc = -.85 * f'c =	-2550	psi
Concrete compressive force, Cc = fc * a * b =	-127914.7	lb
Steel compressive stress, σs' = -εs' * Es =	13039.533	psi
Steel compressive force, Cs = σs' * As' =	33120.413	lb
Steel tensile stress , σs = εs * Es =	60000	psi
Steel tensile force, Ts = σs * As =	94800	lb
Total Force (should be approximately zero) =	5.7	lb

Moment Capacity of the pad (per unit length) about the Y-axis (about longitudinal) - Option 2
Tension on top

y = Distance from CL of section to Force	y (in)	Moment (lb-in)
Concrete in compression, yc = D/2 - a/2 =	15.90989	2035109
Compression steel, ys' = D/2 - d' =	12.345	-408871
Tensile steel, ys = d - D/2 =	13.75	1303500

Moment capacity (per unit foot width) = 2929738 lb-in/ft

= 244.1 k-ft/ft

CALCULATION SHEET

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE 10/16/99	CHECKED	DATE	10/16/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	268

Check Moments for Normal Loading Condition (1.4D + 1.7L + 1.7H < ϕ * Mn)

1. -Myy (about X)

Demand:	1.4D + 1.7L + 1.7H =	1.7	x 67 =	113.9 k-ft/ft	(4LB)
Capacity:	ϕ * Mn =	0.9	x 369 =	332 k-ft/ft	

2. +Myy (about X)

Demand:	1.4D + 1.7L + 1.7H =	1.7	x 73 =	124.1 k-ft/ft	(2LB)
Capacity:	ϕ * Mn =	0.9	x 202 =	182 k-ft/ft	

3. -Mxx (about Y)

Demand:	1.4D + 1.7L + 1.7H =	1.7	x 16 =	27.2 k-ft/ft	(7+OLT)
Capacity:	ϕ * Mn =	0.9	x 350 =	315 k-ft/ft	

4. +Mxx (about Y)

Demand:	1.4D + 1.7L + 1.7H =	1.7	x 29 =	49.3 k-ft/ft	(7+OLT)
Capacity:	ϕ * Mn =	0.9	x 200 =	180 k-ft/ft	

Notes:
X = transverse axis
Y = longitudinal axis
+M = tension on top surface
-M = tension on bottom surface
Capacity = smaller of option 1 and option 2 values.
ϕ = Strength reduction factor as per ACI 349-85, 9.3.2.
Demand moments for D and H load cases are 0.0

Ultimate Dynamic Moment Calculation

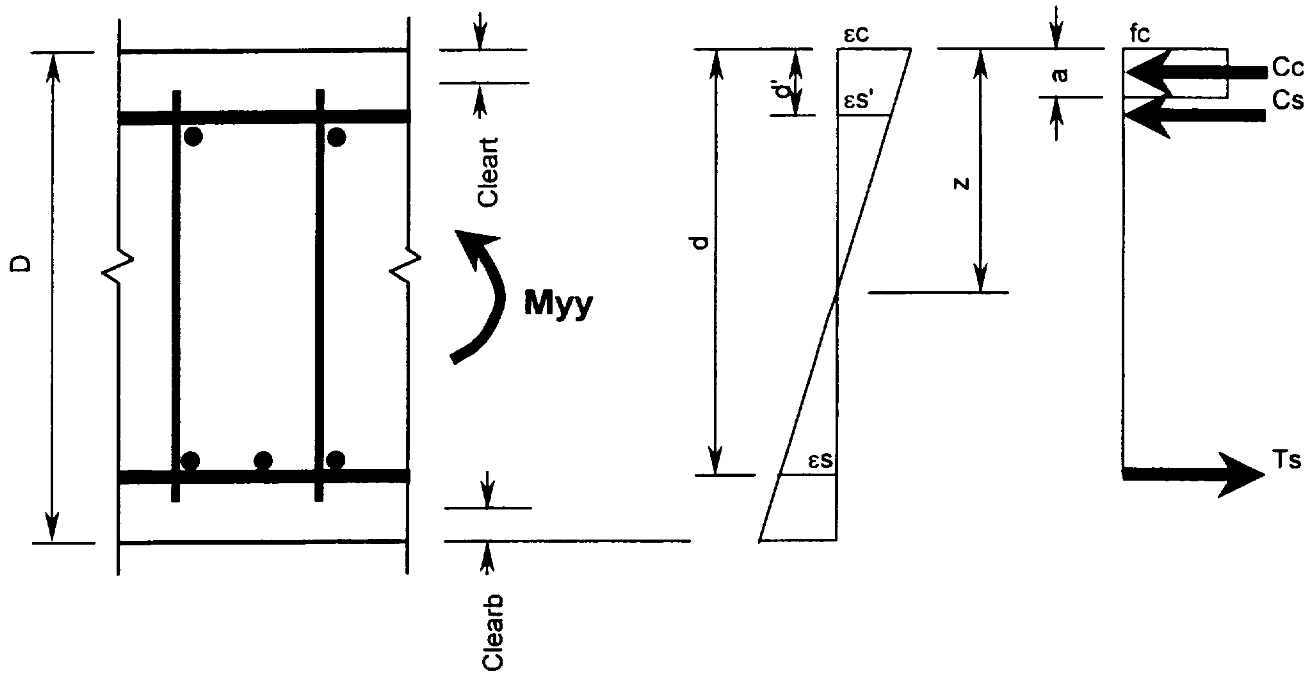
Concrete Properties: (Ref. 4)

f'c =	3000	psi	
DIF =	1.20		(See Appendix A for DIF calculation)
DIF * f'c =	3,600	psi	
Poisson's Ratio, nu=	0.17		
Young's Modulus,Ec=	3,420,000	psi	(=57000*sqrt(f'c))

Reinforcing Steel Properties: (Ref. 4)

fy =	60000	psi	
DIF =	1.1		(See Appendix A for DIF calculation)
DIF * fy =	66,000	psi	
Young's Modulus, Es=	29,000,000	psi	

Moment Capacity of the pad (per unit length) about the X-axis (about transverse) - Option 1
Tension on bottom



Section 1-1 Strain Forces

Reinforce-ment Location	Number Each way (per foot)	Size	Diameter (in)	Area of one bar (sq. in)	Total Area, As (sq. in)
Top	1	10	1.27	1.27	1.27
Bottom	2	10	1.27	1.27	2.54
Shear	1	8	1.00	0.79	0.79

CALCULATION SHEET

ORIGINATOR	DH	DATE	10/15/99	CALC. NO.	G(PO17)-2
				REV. NO.	0
				CHECKED	[illegible]
				DATE	10/15/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	271

Moment Capacity of the pad (per unit length) about the X-axis (about transverse) - Option 1
Tension on bottom
(Iterate on εs to obtain force balance)

Total Depth, D =	36 in
Top clearance, Cleart =	2 in
Bottom clearance, Clearb =	3 in
Comp face to CL of comp rebar, d' = Cleart + 1.27/2 + 1.00=	3.635 in
Comp face to CL of tensile rebar, d = D - Clearb - 1.27/2 - 1.00=	31.365 in
Assumed steel tensile strain at ultimate, εs =	**0.017377**
Concrete compressive strain at ultimate, εc =	0.003
Compression depth, z = εc * d / (εc + εs) =	4.6177 in
Steel compressive strain at ultimate, εs' = εc * (z-d') / z =	0.0006384
Depth of concrete compression block, a = .85 * z =	3.9250503 in
Consider a unit width, b =	12 in
Concrete compressive stress at ultimate, fc = -.85 * f'c =	-3060 psi
Concrete compressive force, Cc = fc * a * b =	-144127.8 lb
Steel compressive stress, σs' = -εs' * Es =	-18514.7 psi
Steel compressive force, Cs = σs' * As' =	-23513.67 lb
Steel tensile stress , σs = εs * Es =	66000 psi (max = DIF*fy)
Steel tensile force, Ts = σs * As =	167640 lb
Total Force (should be approximately zero) =	-1.5 lb

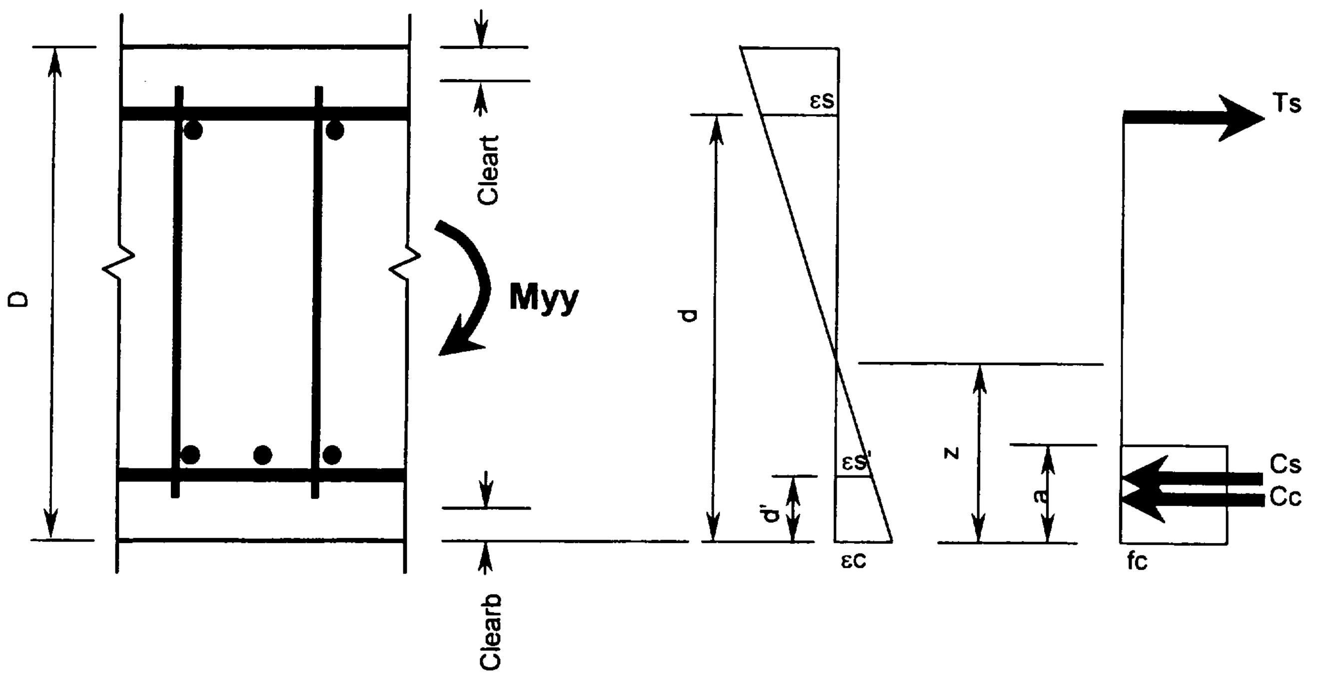
CALCULATION SHEET

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE 10/15/99	CHECKED	DATE	10/15/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	272

Moment Capacity of the pad (per unit length) about the X-axis (about transverse) - Option 1
Tension on bottom

y = Distance from CL of section to Force	y (in)	Moment (lb-in)	
Concrete in compression, yc = D/2 - a/2 =	16.037475	2311447	
Compression steel, ys' = D/2 - d' =	14.365	337774	
Tensile steel, ys = d - D/2 =	13.365	2240509	
	Moment capacity (per unit foot width) =	4889729	lb-in/ft
	=	407.5	k-ft/ft

Moment Capacity of the pad (per unit length) about the X-axis (about transverse) - Option 1
Tension on top



Section 1-1 Strain Forces

CALCULATION SHEET

ORIGINATOR	DH	DATE 10/15/99	CALC. NO. G(PO17)-2	REV. NO.	0
			CHECKED	DATE	10/15/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	274

Moment Capacity of the pad (per unit length) about the X-axis (about transverse) - Option 1
Tension on top
(Iterate on εs to obtain force balance)

Total Depth, D =	36 in
Top clearance, Cleart =	2 in
Bottom clearance, Clearb =	3 in
Comp face to CL of comp rebar, d' = Clearb + 1.27/2 + 1.00=	4.635 in
Comp face to CL of tensile rebar, d = D - Cleart - 1.27/2 - 1.00=	32.365 in
Steel tensile strain at ultimate, εs =	**0.021655**
Concrete compressive strain at ultimate, εc =	0.003
Compression depth, z = εc * d / (εc + εs) =	3.94 in
Steel compressive strain at ultimate, εs' = εc * (z-d') / z =	-0.000531
Depth of concrete compression block, a = .85 * z =	3.3474245 in
Consider a unit width, b =	12 in
Concrete compressive stress at ultimate, fc = -.85 * f'c =	-3060 psi
Concrete compressive force, Cc = fc * a * b =	-122917.4 lb
Steel compressive stress, σs' = -εs' * Es =	15394.618 psi
Steel compressive force, Cs = σs' * As' =	39102.331 lb
Steel tensile stress , σs = εs * Es =	66000 psi (max = DIF*fy)
Steel tensile force, Ts = σs * As =	83820 lb
Total Force (should be approximately zero) =	4.9 lb

Moment Capacity of the pad (per unit length) about the X-axis (about transverse) - Option 1
Tension on top

y = Distance from CL of section to Force	y (in)	Moment (lb-in)
Concrete in compression, yc = D/2 - a/2 =	16.326288	2006785
Compression steel, ys' = D/2 - d' =	13.365	-522603
Tensile steel, ys = d - D/2 =	14.365	1204074

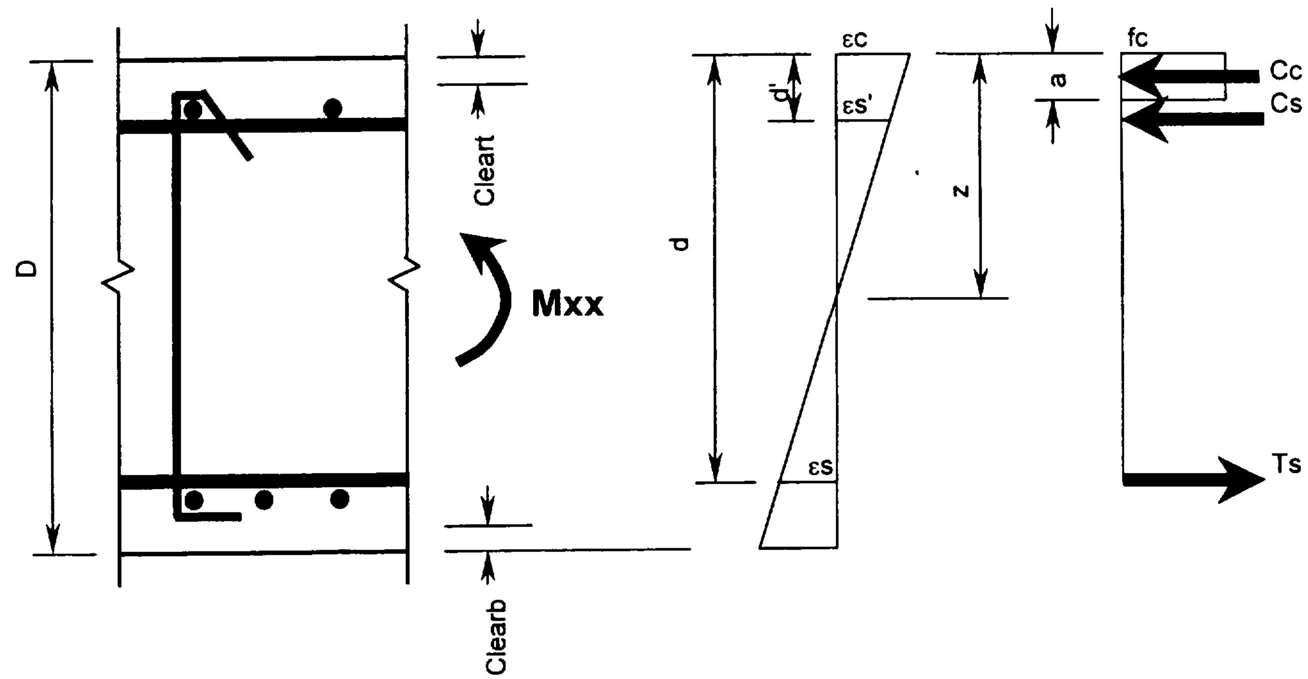
Moment capacity (per unit foot width) = 2688257 lb-in/ft

= 224.0 k-ft/ft

CALCULATION SHEET

ORIGINATOR	DH	DATE	10/11/99	CALC. NO.	G(PO17)-2
				CHECKED	[illegible]
REV. NO.	0	DATE	10/16/99		
PROJECT	Private Fuel Storage Facility	JOB NO.	1101-000		
SUBJECT	Storage Pad Analysis and Design	SHEET NO.	276		

Moment Capacity of the pad (per unit length) about the Y-axis (about longitudinal) - Option 1
Tension on bottom



Section 2-2 Strain Forces

Reinforce-ment Location	Number Each way (per foot)	Size	Diameter (in)	Area of one bar (sq. in)	Total Area, As (sq. in)
Top	1	10	1.27	1.27	1.27
Bottom	2	10	1.27	1.27	2.54
Shear	1	8	1	0.79	0.79

Moment Capacity of the pad (per unit length) about the Y-axis (about longitudinal) - Option 1
Tension on bottom
(Iterate on εs to obtain force balance)

Total Depth, D =	36 in
Top clearance, Cleart =	2 in
Bottom clearance, Clearb =	3 in
Comp face to CL of comp rebar, d' = Cleart + 1.27*1.5 + 1.00=	4.905 in
Comp face to CL of tensile rebar, d = D - Clearb - 1.27*1.5 - 1.00=	30.095 in
Steel tensile strain at ultimate, εs =	**0.014423**
Concrete compressive strain at ultimate, εc =	0.003
Compression depth, z = εc * d / (εc + εs) =	5.18 in
Steel compressive strain at ultimate, εs' = εc * (z-d') / z =	0.0001603
Depth of concrete compression block, a = .85 * z =	4.4046519 in
Consider a unit width, b =	12 in
Concrete compressive stress at ultimate, fc = -.85 * f'c =	-3060 psi
Concrete compressive force, Cc = fc * a * b =	-161738.8 lb
Steel compressive stress, σs' = -εs' * Es =	-4649.622 psi
Steel compressive force, Cs = σs' * As' =	-5905.02 lb
Steel tensile stress , σs = εs * Es =	66000 psi (max = DIF*fy)
Steel tensile force, Ts = σs * As =	167640 lb
Total Force (should be approximately zero) =	-3.8 lb

Moment Capacity of the pad (per unit length) about the Y-axis (about longitudinal) - Option 1
Tension on bottom

y = Distance from CL of section to Force	y (in)	Moment (lb-in)
Concrete in compression, yc = D/2 - a/2 =	15.797674	2555097
Compression steel, ys' = D/2 - d' =	13.095	77326
Tensile steel, ys = d - D/2 =	12.095	2027606

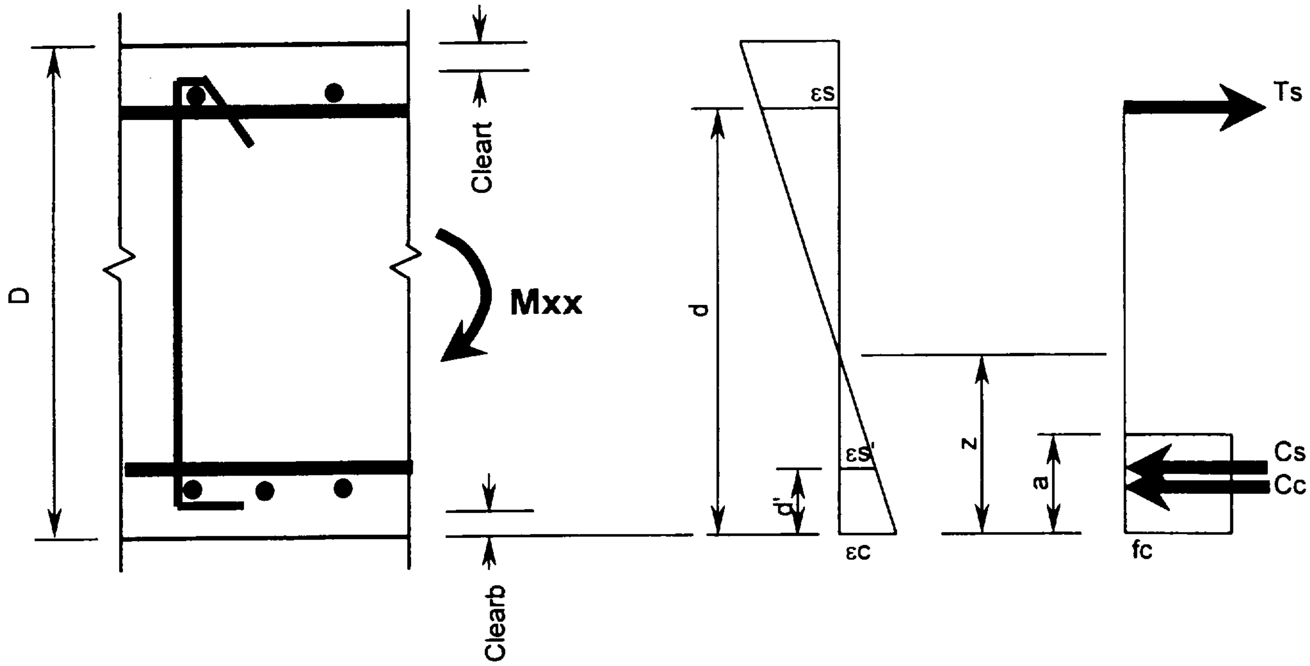
Moment capacity (per unit foot width) = 4660029 lb-in/ft

= 388.3 k-ft/ft

CALCULATION SHEET

ORIGINATOR	DH	DATE	10/16/99	CALC. NO.	G(PO17)-2
				REV. NO.	0
				CHECKED	[illegible]
				DATE	10/16/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	279

Moment Capacity of the pad (per unit length) about the Y-axis (about longitudinal) - Option 1
Tension on top



Section 2-2

Strain

Forces

Moment Capacity of the pad (per unit length) about the Y-axis (about longitudinal) - Option 1
Tension on top
(Iterate on εs to obtain force balance)

Total Depth, D =	36	in
Top clearance, Cleart =	2	in
Bottom clearance, Clearb =	3	in
Comp face to CL of comp rebar, d' = Clearb + 1.27*1.5 + 1.00 =	5.905	in
Comp face to CL of tensile rebar, d = D - Cleart - 1.27*1.5 - 1.00=	31.095	in
Steel tensile strain at ultimate, εs =	**0.017140**	
Concrete compressive strain at ultimate, εc =	0.003000	
Compression depth, z = εc * d / (εc + εs) =	4.63	in
Steel compressive strain at ultimate, εs' = εc * (z-d') / z =	-0.000825	
Depth of concrete compression block, a = .85 * z =	3.9370531	in
Consider a unit width, b =	12	in
Concrete compressive stress at ultimate, fc = -.85 * f'c =	-3060	psi
Concrete compressive force, Cc = fc * a * b =	-144568.6	lb
Steel compressive stress, σs' = -εs' * Es =	23914.112	psi
Steel compressive force, Cs = σs' * As' =	60741.843	lb
Steel tensile stress , σs = εs * Es =	66000	psi (max = DIF*fy)
Steel tensile force, Ts = σs * As =	83820	lb
Total Force (should be approximately zero) =	-6.7	lb

CALCULATION SHEET

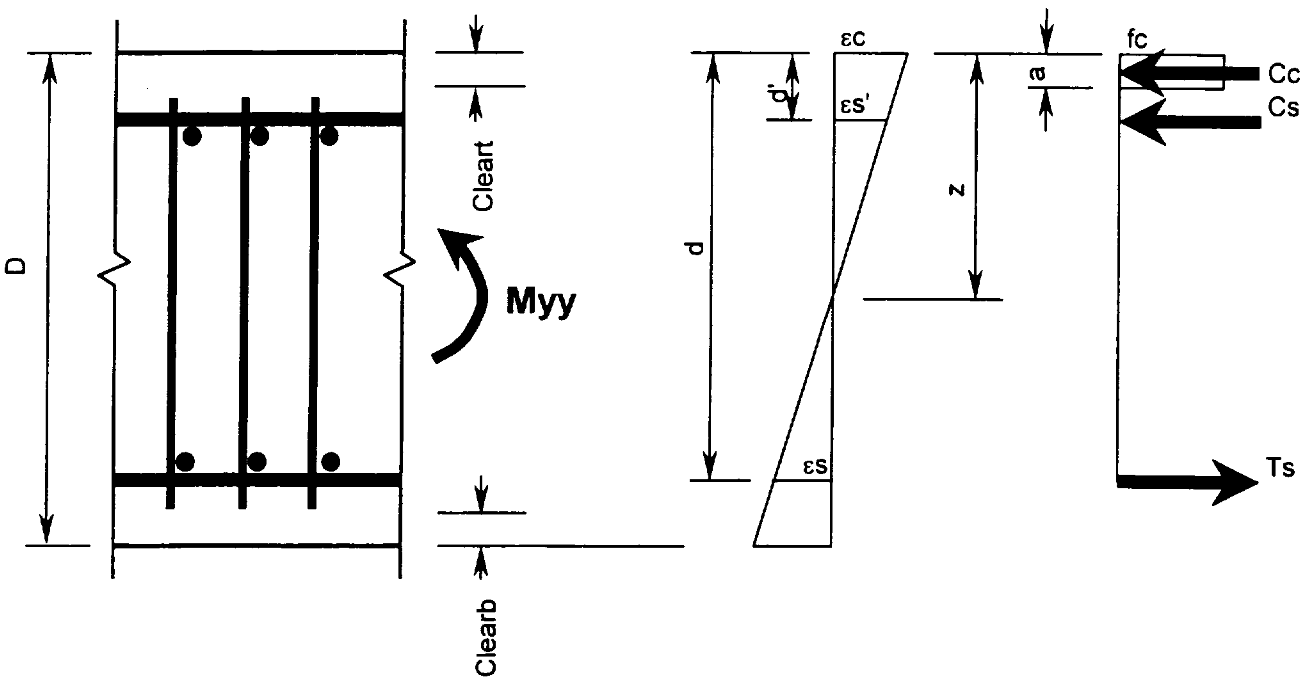
CEC

ORIGINATOR	DP	DATE	10/15/99	CALC. NO. G(PO17)-2	REV. NO. 0
				CHECKED	DATE 10/15/99
PROJECT	Private Fuel Storage Facility				JOB NO. 1101-000
SUBJECT	Storage Pad Analysis and Design				SHEET NO. 281

Moment Capacity of the pad (per unit length) about the Y-axis (about longitudinal) - Option 1
Tension on top

y = Distance from CL of section to Force	y (in)	Moment (lb-in)	
Concrete in compression, yc = D/2 - a/2 =	16.031473	2317648	
Compression steel, ys' = D/2 - d' =	12.095	-734673	
Tensile steel, ys = d - D/2 =	13.095	1097623	
Moment capacity (per unit foot width) =		2680598	lb-in/ft
=		223.4	k-ft/ft

Moment Capacity of the pad (per unit length) about the X-axis (about transverse) - Option 2
Tension on bottom



Section 1-1 Strain Forces

Reinforce-ment Location	Number Each way (per foot)	Size	Diameter (in)	Area of one bar (sq. in)	Total Area, As (sq. in)
Top	2	8	1	0.79	1.58
Bottom	2	10	1.27	1.27	2.54
Shear	2	6	0.75	0.44	0.88

Moment Capacity of the pad (per unit length) about the X-axis (about transverse) - Option 2
Tension on bottom
(Iterate on εs to obtain force balance)

Total Depth, D =	36	in
Top clearance, Cleart =	2	in
Bottom clearance, Clearb =	3	in
Comp face to CL of comp rebar, d' = Cleart + 1.00/2 + 0.75=	3.25	in
Comp face to CL of tensile rebar, d = D - Clearb - 1.27/2 - 0.75=	31.615	in
Assumed steel tensile strain at ultimate, εs =	**0.019070**	
Concrete compressive strain at ultimate, εc =	0.003	
Compression depth, z = εc * d / (εc + εs) =	4.2975	in
Steel compressive strain at ultimate, εs' = εc * (z-d') / z =	0.0007312	
Depth of concrete compression block, a = .85 * z =	3.6528432	in
Consider a unit width, b =	12	in
Concrete compressive stress at ultimate, fc = -.85 * f'c =	-3060	psi
Concrete compressive force, Cc = fc * a * b =	-134132.4	lb
Steel compressive stress, σs' = -εs' * Es =	-21205.36	psi
Steel compressive force, Cs = σs' * As' =	-33504.47	lb
Steel tensile stress , σs = εs * Es =	66000	psi (max = DIF*fy)
Steel tensile force, Ts = σs * As =	167640	lb
Total Force (should be approximately zero) =	3.1	lb

Moment Capacity of the pad (per unit length) about the X-axis (about transverse) - Option 2
Tension on bottom

y = Distance from CL of section to Force	y (in)	Moment (lb-in)
Concrete in compression, yc = D/2 - a/2 =	16.173578	2169401
Compression steel, ys' = D/2 - d' =	14.75	494191
Tensile steel, ys = d - D/2 =	13.615	2282419

Moment capacity (per unit foot width) = 4946010 lb-in/ft

= 412.2 k-ft/ft

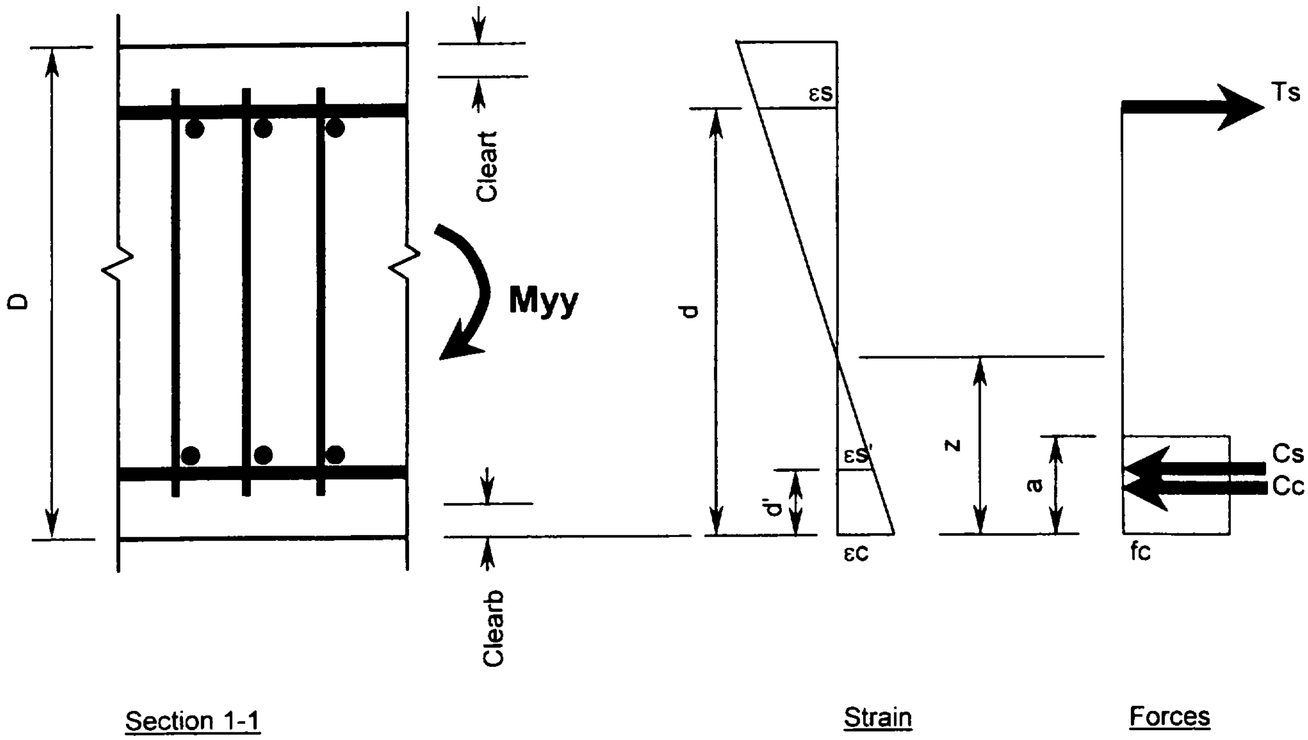
CALCULATION SHEET

CEC

ORIGINATOR	DH	DATE	10/16/99	CALC. NO.	G(PO17)-2
				CHECKED	[illegible]
				REV. NO.	0
				DATE	10/16/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	285

Moment Capacity of the pad (per unit length) about the X-axis (about transverse) - Option 2

Tension on top



Moment Capacity of the pad (per unit length) about the X-axis (about transverse) - Option 2
Tension on top
(Iterate on εs to obtain force balance)

Total Depth, D =	36 in
Top clearance, Cleart =	2 in
Bottom clearance, Clearb =	3 in
Comp face to CL of comp rebar, d' = Clearb + 1.27/2 + 0.75=	4.385 in
Comp face to CL of tensile rebar, d = D - Cleart - 1.00/2 - 0.75=	32.75 in
Steel tensile strain at ultimate, εs =	**0.021516**
Concrete compressive strain at ultimate, εc =	0.003
Compression depth, z = εc * d / (εc + εs) =	4.01 in
Steel compressive strain at ultimate, $\varepsilon s'$ = εc * (z-d') / z =	-0.000283
Depth of concrete compression block, a = .85 * z =	3.4064488 in
Consider a unit width, b =	12 in
Concrete compressive stress at ultimate, fc = -.85 * f'c =	-3060 psi
Concrete compressive force, Cc = fc * a * b =	-125084.8 lb
Steel compressive stress, $\sigma s'$ = -$\varepsilon s'$ * Es =	8193.1951 psi
Steel compressive force, Cs = $\sigma s'$ * As' =	20810.716 lb
Steel tensile stress , σs = εs * Es =	66000 psi (max = DIF*fy)
Steel tensile force, Ts = σs * As =	104280 lb
Total Force (should be approximately zero) =	5.9 lb

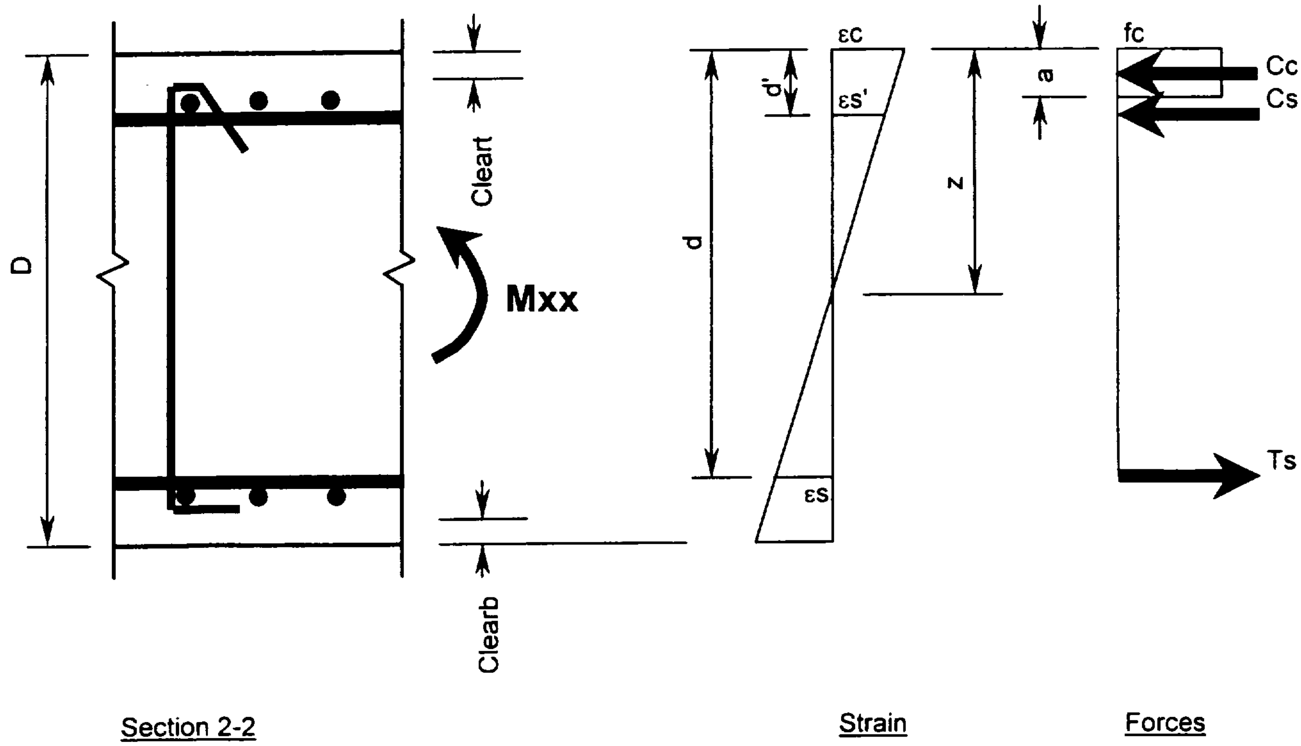
Moment Capacity of the pad (per unit length) about the X-axis (about transverse) - Option 2
Tension on top

y = Distance from CL of section to Force	y (in)	Moment (lb-in)
Concrete in compression, yc = D/2 - a/2 =	16.296776	2038479
Compression steel, ys' = D/2 - d' =	13.615	-283338
Tensile steel, ys = d - D/2 =	14.75	1538130

Moment capacity (per unit foot width) = 3293271 lb-in/ft

= 274.4 k-ft/ft

Moment Capacity of the pad (per unit length) about the Y-axis (about longitudinal) - Option 2
Tension on bottom



Reinforcement Location	Number Each way (per foot)	Size	Diameter (in)	Area of one bar (sq. in)	Total Area, As (sq. in)
Top	2	8	1	0.79	1.58
Bottom	2	10	1.27	1.27	2.54
Shear	2	6	0.75	0.44	0.88

CALCULATION SHEET

			CALC. NO.	G(PO17)-2	REV. NO. 0
ORIGINATOR	JH	DATE 10/15/99	CHECKED	[illegible]	DATE 10/15/99
PROJECT	Private Fuel Storage Facility				JOB NO. 1101-000
SUBJECT	Storage Pad Analysis and Design				SHEET NO. 289

Moment Capacity of the pad (per unit length) about the Y-axis (about longitudinal) - Option 2
Tension on bottom
(Iterate on εs to obtain force balance)

Total Depth, D =	36 in
Top clearance, Cleart =	2 in
Bottom clearance, Clearb =	3 in
Comp face to CL of comp rebar, d' = Cleart + 1.00*1.5 + 0.75=	4.25 in
Comp face to CL of tensile rebar, d = D - Clearb - 1.27*1.5 - 0.75=	30.345 in
Steel tensile strain at ultimate, εs =	**0.015821**
Concrete compressive strain at ultimate, εc =	0.003
Compression depth, z = εc * d / (εc + εs) =	4.84 in
Steel compressive strain at ultimate, εs' = εc * (z-d') / z =	0.000364
Depth of concrete compression block, a = .85 * z =	4.1113517 in
Consider a unit width, b =	12 in
Concrete compressive stress at ultimate, fc = -.85 * f'c =	-3060 psi
Concrete compressive force, Cc = fc * a * b =	-150968.8 lb
Steel compressive stress, σs' = -εs' * Es =	-10556.16 psi
Steel compressive force, Cs = σs' * As' =	-16678.74 lb
Steel tensile stress , σs = εs * Es =	66000 psi (max = DIF*fy)
Steel tensile force, Ts = σs * As =	167640 lb
Total Force (should be approximately zero) =	-7.6 lb

CALCULATION SHEET

CEC

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DP	DATE 10/15/99	CHECKED	DATE	10/15/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	290

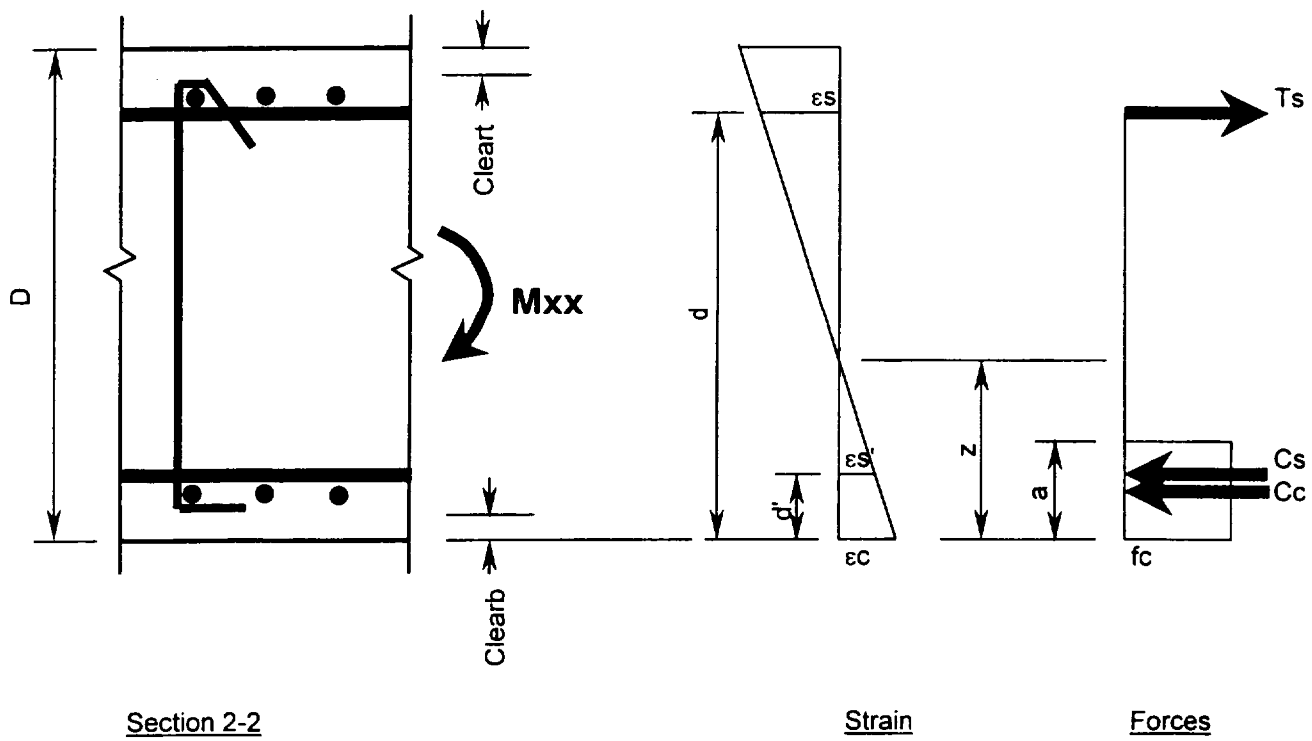
Moment Capacity of the pad (per unit length) about the Y-axis (about longitudinal) - Option 2
Tension on bottom

y = Distance from CL of section to Force	y (in)	Moment (lb-in)	
Concrete in compression, yc = D/2 - a/2 =	15.944324	2407096	
Compression steel, ys' = D/2 - d' =	13.75	229333	
Tensile steel, ys = d - D/2 =	12.345	2069516	
Moment capacity (per unit foot width) =		4705944	lb-in/ft
=		392.2	k-ft/ft

CALCULATION SHEET

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE 10/16/99	CHECKED	DATE	10/16/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	291

Moment Capacity of the pad (per unit length) about the Y-axis (about longitudinal) - Option 2
Tension on top



CALCULATION SHEET

ORIGINATOR	DH	DATE	10/15/99	CALC. NO. G(PO17)-2	REV. NO. 0
				CHECKED	DATE 10/15/99
PROJECT	Private Fuel Storage Facility				JOB NO. 1101-000
SUBJECT	Storage Pad Analysis and Design				SHEET NO. 292

Moment Capacity of the pad (per unit length) about the Y-axis (about longitudinal) - Option 2
Tension on top
(Iterate on εs to obtain force balance)

Total Depth, D =	36	in
Top clearance, Cleart =	2	in
Bottom clearance, Clearb =	3	in
Comp face to CL of comp rebar, d' = Clearb + 1.27*1.5 + 0.75 =	5.655	in
Comp face to CL of tensile rebar, d = D - Cleart - 1.00*1.5 - 0.75=	31.75	in
Steel tensile strain at ultimate, εs =	**0.017144**	
Concrete compressive strain at ultimate, εc =	0.003000	
Compression depth, z = εc * d / (εc + εs) =	4.73	in
Steel compressive strain at ultimate, εs' = εc * (z-d') / z =	-0.000588	
Depth of concrete compression block, a = .85 * z =	4.0191869	in
Consider a unit width, b =	12	in
Concrete compressive stress at ultimate, fc = -.85 * f'c =	-3060	psi
Concrete compressive force, Cc = fc * a * b =	-147584.5	lb
Steel compressive stress, σs' = -εs' * Es =	17047.725	psi
Steel compressive force, Cs = σs' * As' =	43301.222	lb
Steel tensile stress , σs = εs * Es =	66000	psi (max = DIF*fy)
Steel tensile force, Ts = σs * As =	104280	lb
Total Force (should be approximately zero) =	-3.3	lb

Moment Capacity of the pad (per unit length) about the Y-axis (about longitudinal) - Option 2
Tension on top

y = Distance from CL of section to Force	y (in)	Moment (lb-in)
Concrete in compression, yc = D/2 - a/2 =	15.990407	2359937
Compression steel, ys' = D/2 - d' =	12.345	-534554
Tensile steel, ys = d - D/2 =	13.75	1433850

Moment capacity (per unit foot width) = 3259233 lb-in/ft

= 271.6 k-ft/ft

CALCULATION SHEET

CEC

				CALC. NO.	G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE	10/16/99	CHECKED	KV	DATE	10/16/99
PROJECT	Private Fuel Storage Facility					JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design					SHEET NO.	294

Check Moments for Accident-Level Loading Condition (D + L + H + E < ϕ * Mn)

1. -Myy (about X)

Demand:	D + L + H +E =	53	+ 279 =	332 k-ft/ft	(8LB)
Capacity:	ϕ * Mn =	0.90	x 407 =	367 k-ft/ft	

2. +Myy (about X)

Demand:	D + L + H +E =	19	+ 112 =	131 k-ft/ft	(4LB)
Capacity:	ϕ * Mn =	0.90	x 224 =	202 k-ft/ft	

3. -Mxx (about Y)

Demand:	D + L + H +E =	12	+ 336 =	348 k-ft/ft	(8LB)
Capacity:	ϕ * Mn =	0.90	x 388 =	350 k-ft/ft	

4. +Mxx (about Y)

Demand:	D + L + H +E =	5	+ 149 =	154 k-ft/ft	(8LB)
Capacity:	ϕ * Mn =	0.90	x 223 =	201 k-ft/ft	

Notes:
X = transverse axis
Y = longitudinal axis
+M = tension on top surface
-M = tension on bottom surface
Capacity = smaller of option 1 and option 2 values.
Demand moments for D and H load cases are 0.0
ϕ = Strength reduction factor as per ACI 349-85, 9.3.2.

CALCULATION SHEET

CEC

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE 9/17/99	CHECKED	DATE	9/23/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	295

Calculate Shear Capacity of the Pad - Option 1

	Number Each Way (per foot)	Size	Diameter (in)	Area of one bar (sq. in)	Total Area, As (sq. in)
Shear Reinforcement:	1	8	1	0.79	0.79

fy = 60000 psi

Concrete: f'c= 3000 psi

For a one foot width:

s = 12 in

bw = 12 in

d = 30 in

Nominal Shear Strength provided by concrete, Vc = 2 * sqrt(f'c) * bw * d =	39436 lb/ft	11.3.1.1
Nominal Shear Strength provided by shear reinf, Vs = Av * fy * d / s =	118500 lb/ft	11.5.6.2
Nominal Shear Strength, Vn = Vc + Vs =	157936 lb/ft	11.1.1
	= 157.9 k/ft	

CALCULATION SHEET

ORIGINATOR	DH	DATE	9/17/99	CALC. NO.	G(PO17)-2
				CHECKED	kv
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	296

REV. NO. 0 — DATE 9/23/99

Calculate Shear Capacity of the Pad - Option 2

	Number Each Way (per foot)	Size	Diameter (in)	Area of one bar (sq. in)	Total Area, As (sq. in)
Shear Reinforcement:	2	6	0.75	0.44	0.88

fy = 60000 psi

Concrete: f'c= 3000 psi

For a one foot width:

s = 12 in

bw = 12 in

d = 30 in

Nominal Shear Strength provided by concrete, Vc = 2 * sqrt(f'c) * bw * d =	39436	lb/ft	11.3.1.1
Nominal Shear Strength provided by shear reinf, Vs = Av * fy * d / s =	132000	lb/ft	11.5.6.2
Nominal Shear Strength, Vn = Vc + Vs =	171436	lb/ft	11.1.1
=	171.4	k/ft	

CEC

CALCULATION SHEET

ORIGINATOR	DH	DATE	9/22/99	CALC. NO.	G(PO17)-2	REV. NO.	0
				CHECKED	kw	DATE	9/23/99
PROJECT	Private Fuel Storage Facility					JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design					SHEET NO.	297

Check Shear for Normal Loading Condition (1.4D + 1.7L + 1.7H < ϕ * Mn)

Demand:	1.4D + 1.7L + 1.7H =	1.7	x 11.3 =	19.21 k/ft
Capacity:	ϕ * Vn =	0.85	x 158 =	134 k/ft

Check Shear for Accident-Level Loading Condition (D + L + H + E < DIF * ϕ * Mn)

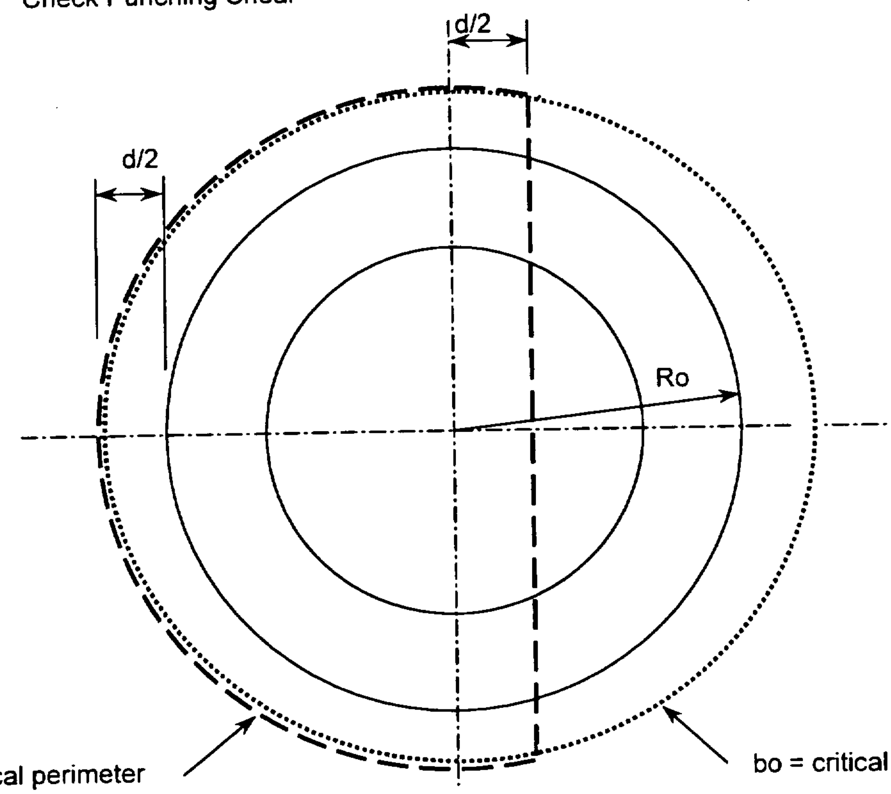
Demand:	D + L + H +E =		11.3	+ 69 =	80.3 k/ft
Capacity:	DIF * ϕ * Mn =	1.1	x 0.85	x 158 =	147.7 k/ft

Notes:
X = transverse axis
Y = longitudinal axis
Capacity = smaller of option 1 and option 2 values.
Demand moments for D and H load cases are 0.0
ϕ = Strength reduction factor as per ACI 349-85, 9.3.2.
DIF = Dynamic Increase Factor as per ACI 349-85, C.2.1.

CALCULATION SHEET

ORIGINATOR	DH	DATE	2/4/00	CALC. NO.	G(PO17)-2
				REV. NO.	2
				CHECKED	[signature]
				DATE	2/4/00
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	298

Check Punching Shear (Ref. ACI 349-85, Section 11.11.1.2)



Plan

d = 30 in
or d = 2.5 ft
Ro = 5.02 ft
bo = π *(Ro + d/2) + d + 2*(Ro + d/2 34.74 ft

Concrete: f'c = 3000 psi
Reinf: fy = 60000 psi

Dead Weight of one cask, W = 360 k

Static:

Punching shear demand (static) = W / [pi * (2 * Ro + d)] =
=360 / [pi * (2 * 5.02 + 2.50)] = 9.1 k/ft

Punching shear capacity (static) = ϕ * Vn / bo =
= 0.85 * 5486.3 / 34.74 = 134.2 k/ft(Option 1)Vn from page 300
= 0.85 * 5955.3 / 34.74 = 145.7 k/ft(Option 2)Vn from page 300

where Strength reduction factor, ϕ = 0.85 9.3.2(d)

CALCULATION SHEET

CEC			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	bH	DATE 9/20/99	CHECKED	DATE	9/23/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	299

Check Punching Shear

Punching shear will be checked for the cask with the largest vertical forces.
The cask with the largest vertical forces is cask #7 of the 8 cask, lower bound soil case

Dead Weight of one cask, W = 360 k

The forces on cask #7 are as follows:

Quadrant	Vertical Force, V (k)	V+W/4 (k)
q1	471.9	561.9
q2	1502.4	1592.4
q3	5084.0	5174.0
q4	3092.7	3182.7

Assume the cask tips so that the 3 largest forces are applied.

Demand, D = q2/2 + q3 + q4/2 = 7561.6 k

Reduced resistance requirement taking ductility into account

For shear carried by concrete and stirrups, μ = 1.6 * (C.3.7(b))

sqrt(2μ-1) = 1.4832397

Reduced Demand, Vu = D/sqrt(2μ-1) = 5098.0 k

* See following pages for derivation of μ.

Check Punching Shear

Calculate Punching Capacity - Option 1 (Ref. ACI 349-85, Section 11.11.3)

Concrete shear capacity, Vc = 2*sqrt(f'c)*bo*d = 1369920 lb 11.11.3.4

Steel Reinforcement = 1 - #8 @ 12 inch spacing Av = 0.79 sq. in/ft.

Steel shear capacity, Vs = Av* fy * d / s * bo = 4116428 lb 11.5.6.2

Total shear strength, Vn = Vc + Vs = 5486348 lb
= 5486.3 k (option 1)

Calculate Punching Capacity - Option 2

Concrete shear capacity, Vc = 2*sqrt(f'c)*bo*d = 1369920 lb 11.11.3.4

Steel Reinforcement = 2 - #6 @ 6 inch spacing Av =2*.44= 0.88 sq. in/ft

Steel shear capacity, Vs = Av* fy * d / s * bo = 4585388 lb 11.5.6.2

Total shear strength, Vn = Vc + Vs = 5955308 lb
= 5955.3 k (option 2)

Check Punching Shear

Vu < ϕ * DIF * Vn = ϕ * DIF * (Vc + Vs) 11.1.1

Strength reduction factor, ϕ = 0.85 9.3.2(d)

Dynamic Increase Factor, DIF = 1.1 C.2.1

Demand:

Vu = 5098.0 k

Vu/bo = 5098.0 / 34.74 = 146.8 k/ft

Capacity:

ϕ * DIF* (Vc + Vs) = 0.85 * 1.10 * (5486.3) = 5129.7 k (Option 1)

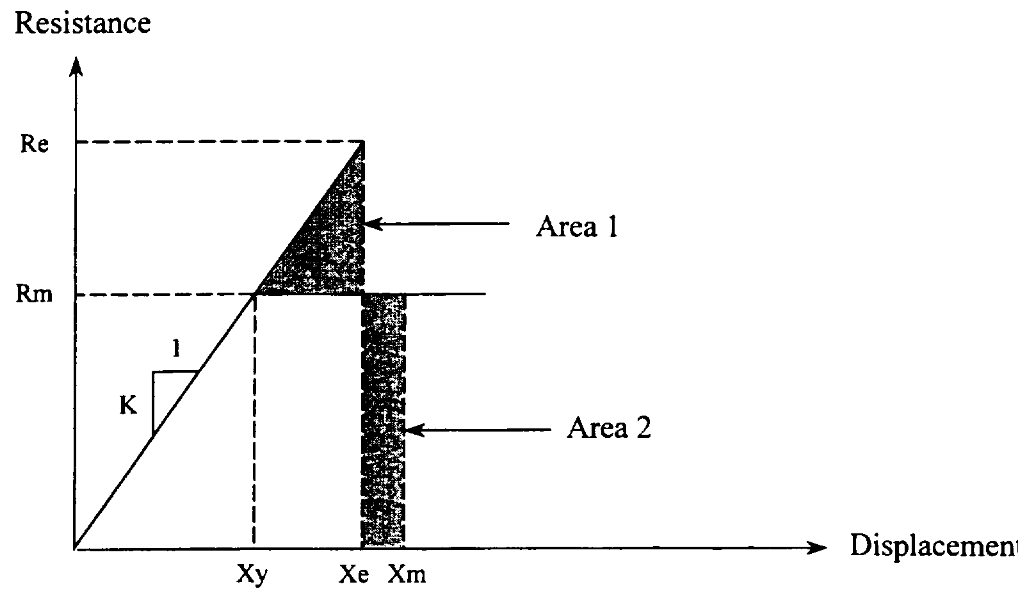
ϕ * DIF* (Vc + Vs) / bo = 5129.7 / 34.74 = 147.7 k/ft (Option 1)

ϕ * DIF* (Vc + Vs) = 0.85 * 1.10 * (5955.3) = 5568.2 k (Option 2)

ϕ * DIF* (Vc + Vs) / bo = 5568.2 / 34.74 = 160.3 k/ft (Option 2)

Derivation of reduced capacity taking credit of permissible ductility ratio (μ) as per ACI 349-85 (1990) Section C.3.7(b)

Definition:



$$\mu = \frac{X_m}{X_y} = \text{Ductility Ratio; } X_m = \mu X_y$$

Re = Elastic Resistance Capacity Required

Rm = Inelastic Resistance Capacity Required

K = Equivalent Stiffness

$$X_y = \frac{R_m}{K} \quad ; \quad X_e = \frac{R_e}{K}$$

Use "Energy Balance Principle" $\rightarrow$ Area (1) = Area (2)

$$\text{Area (1)} = \frac{1}{2}(R_e - R_m)(X_e - X_y)$$

$$= \frac{1}{2}(R_e - R_m)(R_e - R_m) / K$$

$$= \frac{1}{2K}(R_e - R_m)^2$$

$$\text{Area (2)} = R_m(X_m - X_e) = R_m\left(\mu\frac{R_m}{K} - \frac{R_e}{K}\right)$$

$$= \frac{1}{K}(\mu R_m^2 - R_e R_m)$$

Area (1) = Area (2) leads to:

$$\frac{1}{2K}(R_e - R_m)^2 = \frac{1}{K}(\mu R_m^2 - R_e R_m)$$

$$R_e^2 + R_m^2 - 2R_e R_m = 2\mu R_m^2 - 2R_e R_m$$

$$R_e^2 = (2\mu - 1)R_m^2$$

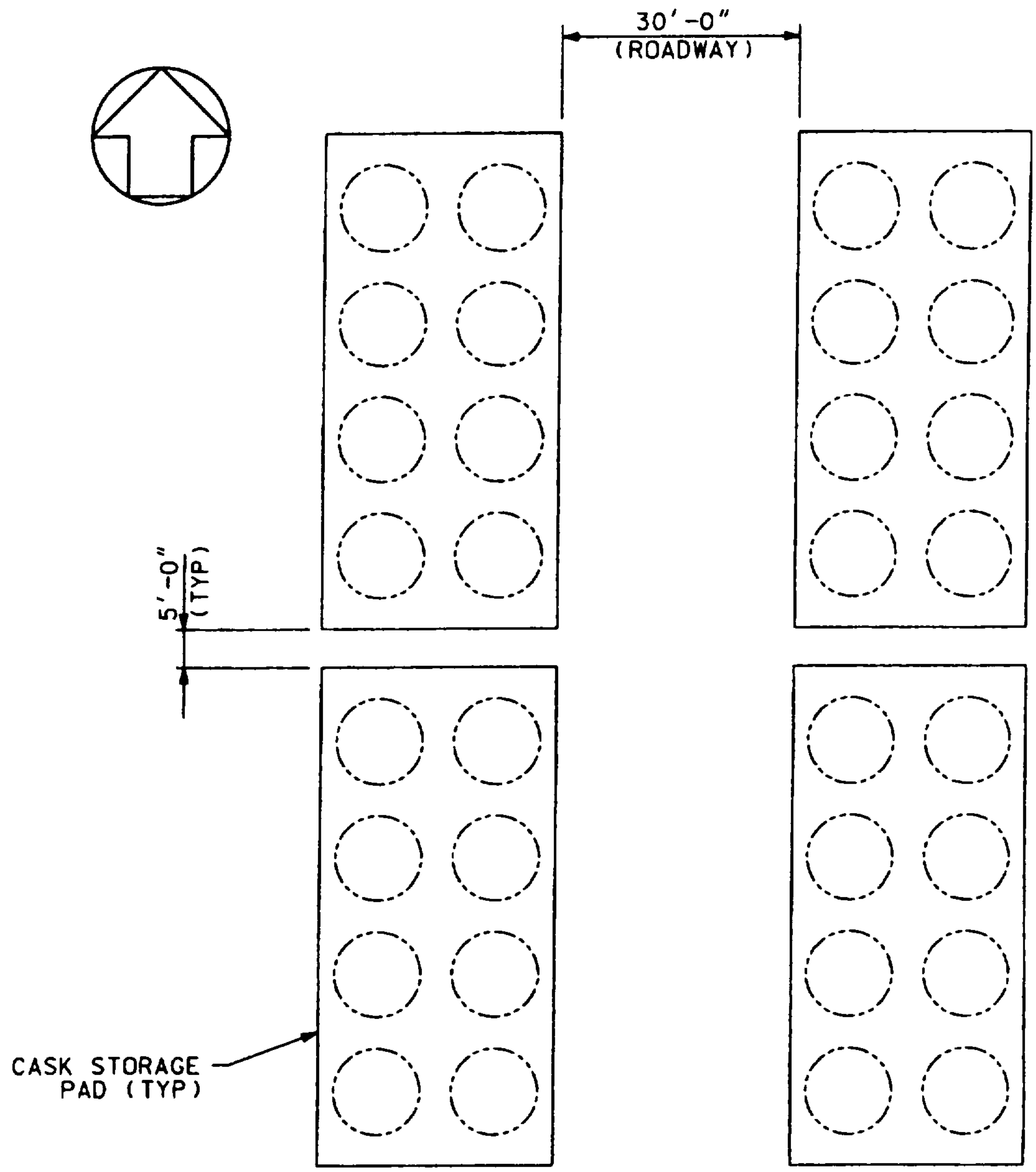
$$R_m = \frac{R_e}{\sqrt{2\mu - 1}}$$

As per ACI 349-85(1990), Section C.3.7(b): $\mu = 1.6$

$$R_m = \frac{R_e}{\sqrt{2 \times 1.6 - 1}} = \frac{R_e}{\sqrt{2.2}} = 0.674 R_e$$

$$R_m = 0.674 R_e \quad \text{for} \quad \mu = 1.6$$

CALCULATION SHEET

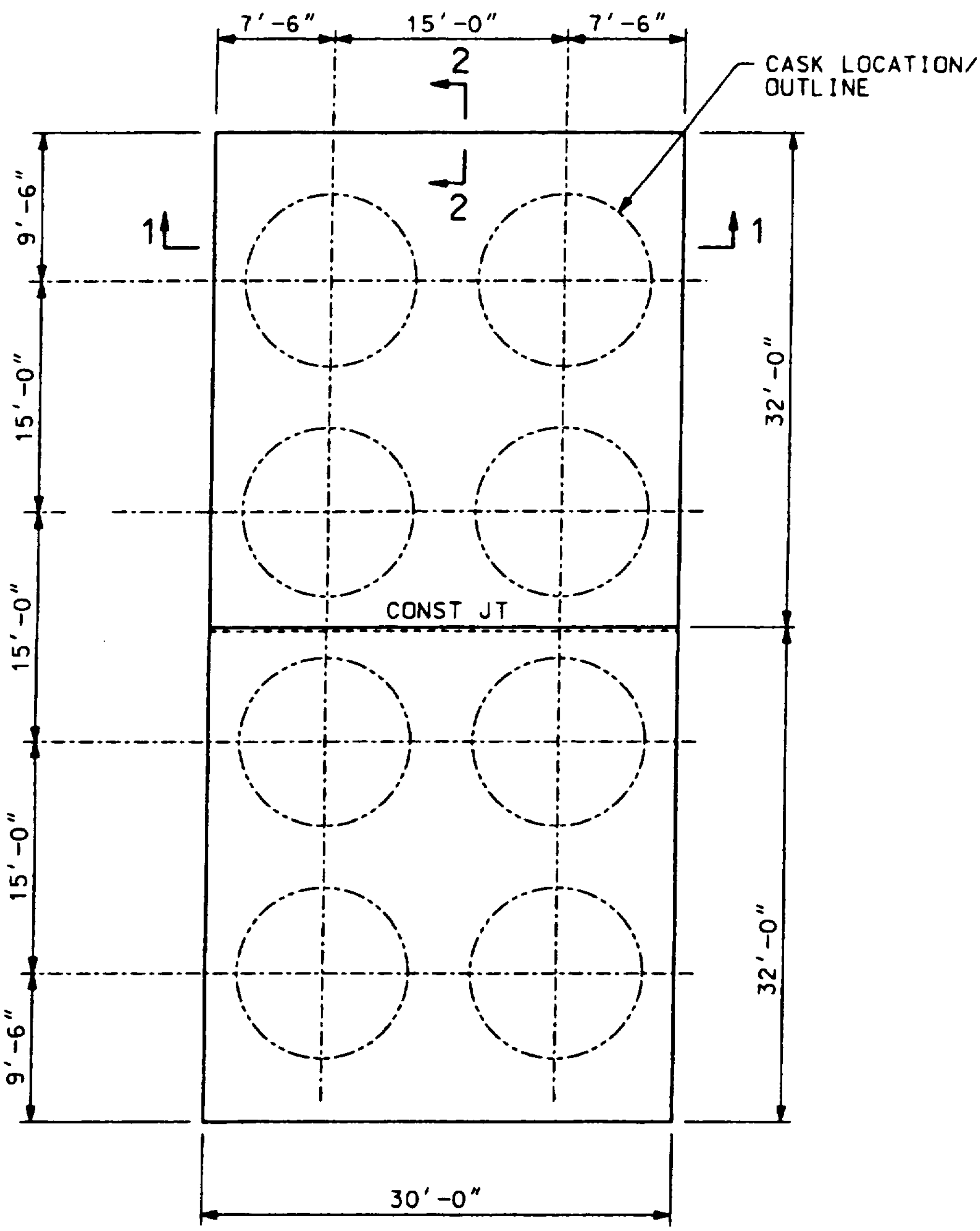


PARTIAL PLAN
TYPICAL CASK STORAGE PAD SPACING

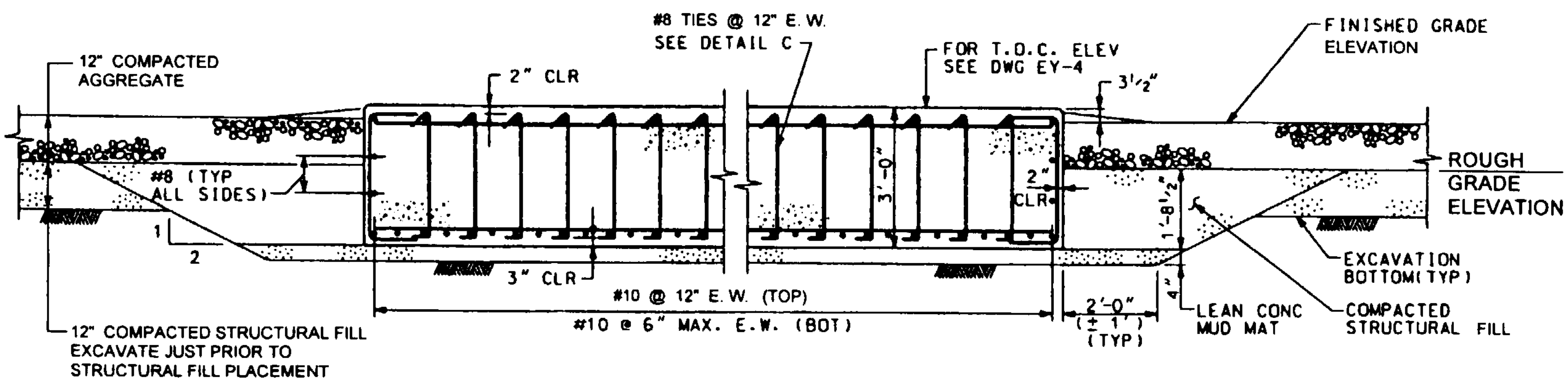
CALCULATION SHEET

CEC

ORIGINATOR	DH	DATE	9/17/99
CALC. NO.	G(PO17)-2	REV. NO.	0
CHECKED	KW	DATE	9/23/99
PROJECT	Private Fuel Storage Facility	JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design	SHEET NO.	306

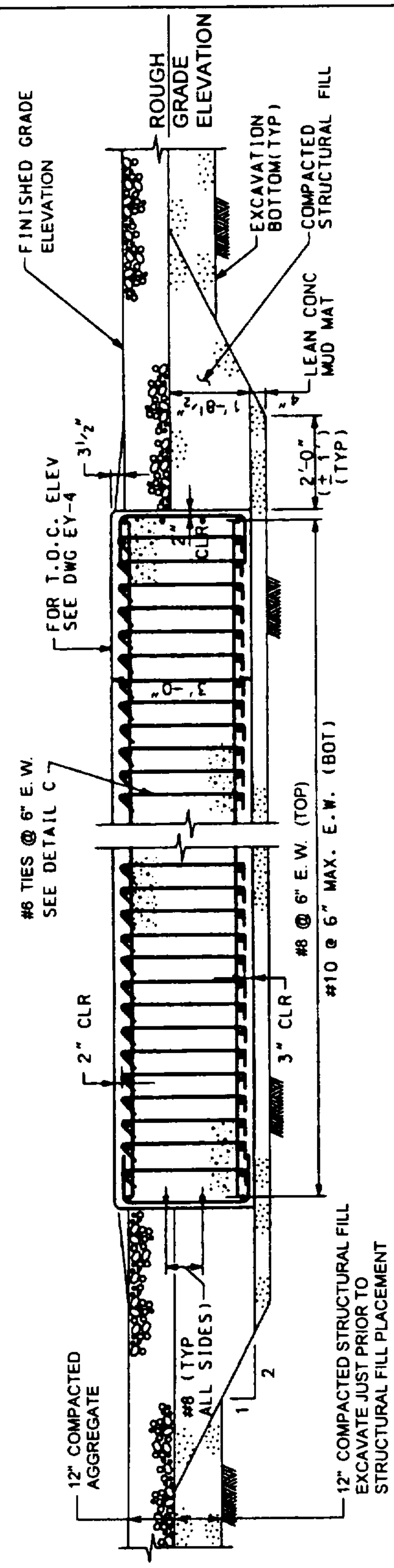


PLAN
CASK STORAGE PAD
(500 REQD)


#8 TIES @ 12" E.W.
SEE DETAIL C
12" COMPACTED
AGGREGATE
2" CLR
FOR T.O.C. ELEV
SEE DWG EY-4
3 1/2"
FINISHED GRADE
ELEVATION
ROUGH
GRADE
ELEVATION
#8 (TYP
ALL SIDES)
3'-0"
2"
CLR
1'-8 1/2"
1
2
3" CLR
4"
EXCAVATION
BOTTOM(TYP)
#10 @ 12" E.W. (TOP)
#10 @ 6" MAX. E.W. (BOT)
2'-0"
(± 1')
(TYP)
LEAN CONC
MUD MAT
COMPACTED
STRUCTURAL FILL
12" COMPACTED STRUCTURAL FILL
EXCAVATE JUST PRIOR TO
STRUCTURAL FILL PLACEMENT

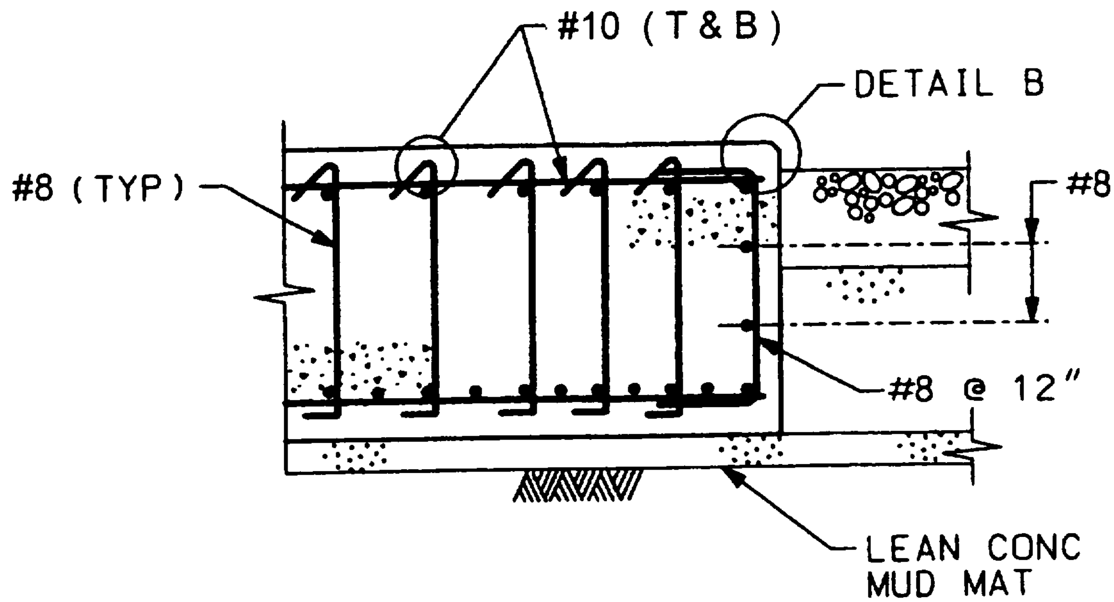
1-1

(OPTION 1)



FINISHED GRADE ELEVATION
ROUGH GRADE ELEVATION
EXCAVATION BOTTOM (TYP)
COMPACTED STRUCTURAL FILL
LEAN CONC MUD MAT
1'-8½"
4"
2'-0" (± 1') (TYP)
3½"
FOR T.O.C. ELEV SEE DWG EY-4
2" CLR
3'-0"
#6 TIES @ 6" E.W. SEE DETAIL C
#8 @ 6" E.W. (TOP)
#10 @ 6" MAX. E.W. (BOT)
2" CLR
3" CLR
#8 (TYP ALL SIDES)
1
2
12" COMPACTED AGGREGATE
12" COMPACTED STRUCTURAL FILL EXCAVATE JUST PRIOR TO STRUCTURAL FILL PLACEMENT

1–1
(OPTION 2)

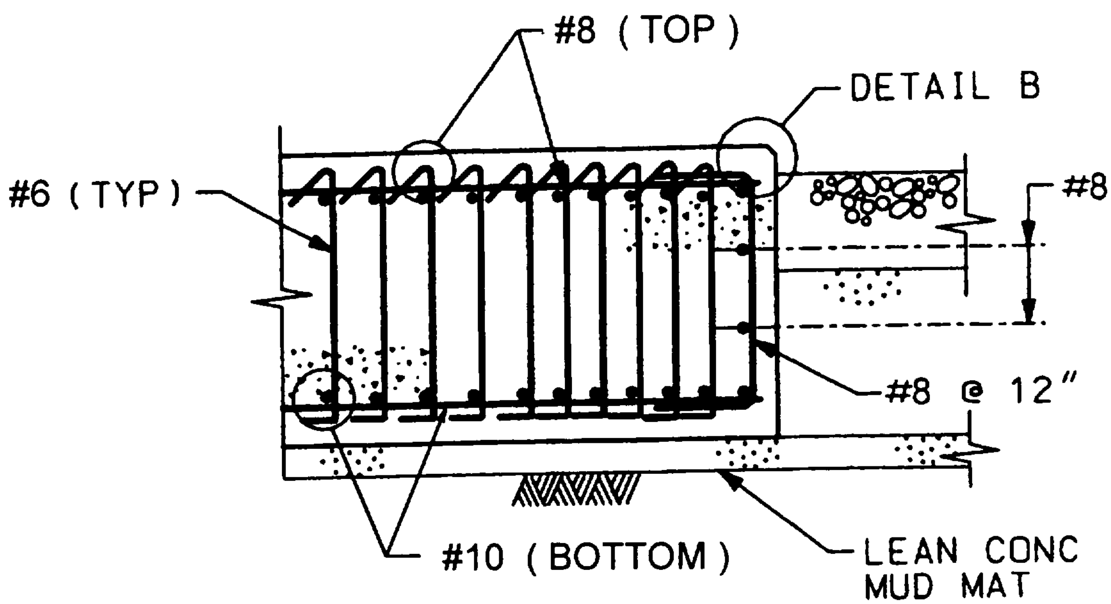


2-2

(OPTION 1)

CALCULATION SHEET

ORIGINATOR	DH	DATE	9/17/99	CALC. NO.	G(PO17)-2
				REV. NO.	0
				CHECKED	KW
				DATE	9/23/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	310



2-2

(OPTION 2)

6.2 Vertical Soil Bearing Pressures and Horizontal Soil Shear Stresses

Vertical soil bearing pressures for individual loadings and combined loadings are summarized as shown in Table 5.

Horizontal soil shear stresses are shown in Tables D-1(a) and (b), and the total horizontal soil reactions (shear forces) in both the short (x) and long (y) directions of the pad are summarized in Table D-1(c).

Table 5

Summary of Vertical Soil Bearing Pressures (ksf)

Node Number		287	293	299	144	150	156	1	7	13
2-Cask	Pad DL	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
	Snow LL	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045
	Cask LL	1.35	1.36	1.36	0.35	0.35	0.35	0	0	0
	Pad EQ	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
	Cask EQ	2.22	1.64	1.81	0.67	0.48	0.45	0	0	0
	100% Ve	4.305	3.735	3.905	1.755	1.565	1.535	0.735	0.735	0.735
4-Cask	Pad DL	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
	Snow LL	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045
	Cask LL	1.77	1.77	1.77	0.80	0.80	0.80	0	0	0
	Pad EQ	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
	Cask EQ	1.97	1.70	1.92	1.87	1.23	1.31	0	0	0
	100% Ve	4.475	4.205	4.425	3.405	2.765	2.845	0.735	0.735	0.735
8-Cask	Pad DL	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
	Snow LL	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045
	Cask LL	1.47	1.47	1.47	1.60	1.60	1.60	1.47	1.47	1.47
	Pad EQ	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
	Cask EQ	2.70	2.39	2.13	2.82	1.44	2.24	3.92	2.42	2.47
	100% Ve	4.905	4.595	4.335	5.155	3.775	4.575	6.125	4.625	4.675

Notes:
(1) Values for Pad DL are obtained from Table S-1 (page 235).
(2) Values for Snow LL are obtained from Table S-2 (page 236).
(3) Values for Cask LL are obtained from Table S-2 (page 236).
(4) Pad EQ pressure = (pad wt.) x a_v, where pad wt. = 864 kips, and a_v = 0.533g.
(5) Values for Cask EQ are obtained from Table D-1(d) (page 241).
(6) EQ pressures listed are the envelopes of results for all soil conditions.
(7) Node numbers are shown in Figure 1 (page 23).

CALCULATION SHEET

ORIGINATOR	DH	DATE	10/16/99	CALC. NO.	G(PO17)-2	REV. NO.	0
				CHECKED	KW	DATE	10/16/99
PROJECT	Private Fuel Storage Facility					JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design					SHEET NO.	A-1

APPENDIX A

CALCULATION OF DYNAMIC INCREASE FACTORS (DIFs)

FOR

CONCRETE AND STEEL

CALCULATION SHEET

CEC

			CALC. NO.	G(PO17)-2	REV. NO. 0
ORIGINATOR	DH	DATE 10/16/99	CHECKED	KL	DATE 10/16/99
PROJECT	Private Fuel Storage Facility				JOB NO. 1101-000
SUBJECT	Storage Pad Analysis and Design				SHEET NO. A-2

Procedure:

1. Obtain moment time history from CECSAP analysis.
2. From moment time history, determine strain time history.
3. From the strain time history, determine the strain rate.
4. From the strain rate, determine the dynamic increase factors (DIFs).

CALCULATION SHEET

CEC

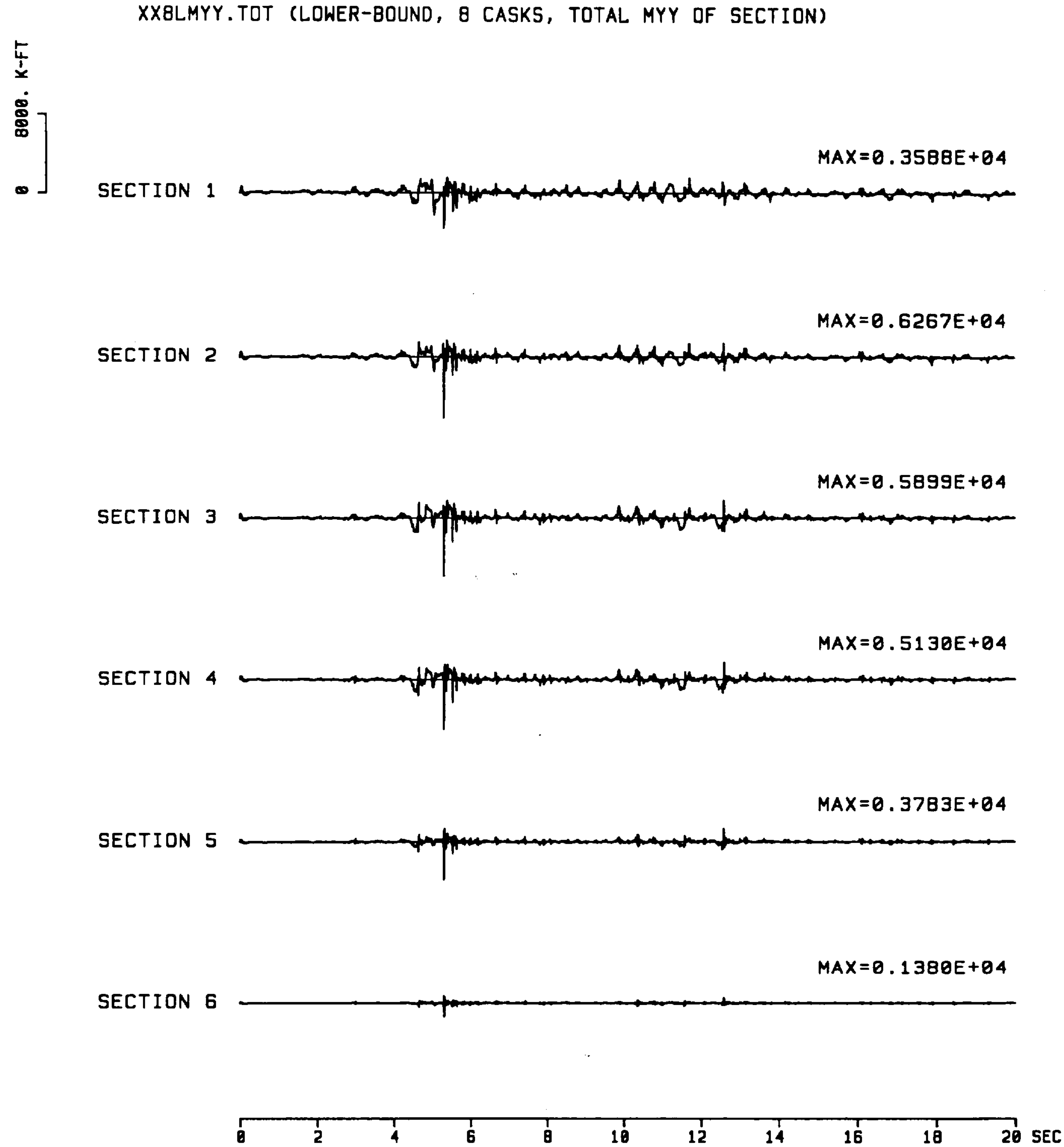
ORIGINATOR	DH	DATE	12/6/99	CALC. NO.	G(PO17)-2
				REV. NO.	1
				CHECKED	KL
				DATE	12/6/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	A-3

The case with the maximum bending moment is the 8 cask, lower bound case.

The moment time histories for the case with the maximum bending moment are shown on the following page. The maximum moment occurs at Section 2.

For the location of the sections, see the figure on page 52.

The data is given in Attachment A-2 (lower bound soil condition, 8 casks, with transformed input time histories). Also see page 73.

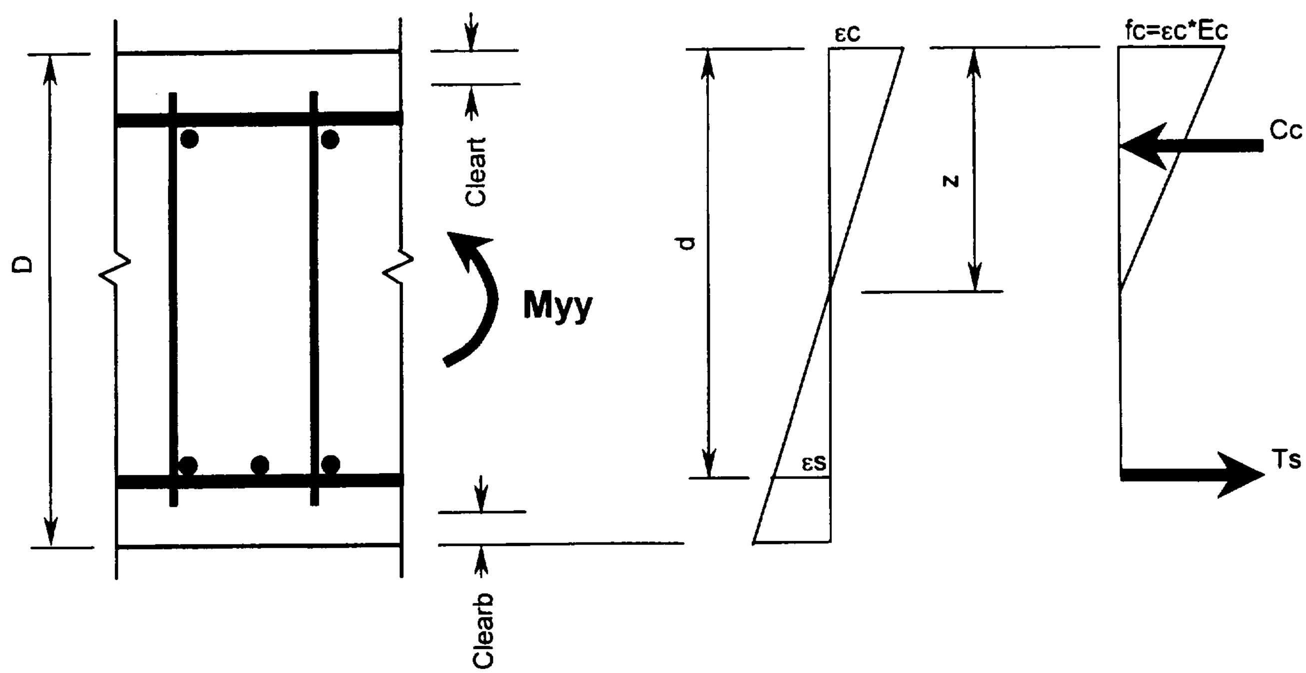


CEC JOB NO. 1101 - 000
BY DH DATE 10/15/99
CHECK KW DATE 10/15/99
CALC. NO. G(PO17)-2 REV. NO. 0
SHEET NO. A-4

D:\PFSF\CECSAP\PLOTBL.INP 10/ 7/99

CALCULATION SHEET

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE 10/16/99	CHECKED	DATE	10/16/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	A-5



Section 1-1
(Ref. Fig. 6-1)

Strain

Forces

Reinforce-ment Location	Number Each way (per foot)	Size	Diameter (in)	Area of one bar (sq. in)	Total Area, As (sq. in)
Top	1	10	1.27	1.27	1.27
Bottom	2	10	1.27	1.27	2.54
Shear	1	8	1.00	0.79	0.79

Total Depth, D = 36 in

Top clearance, Cleart = 2 in

Bottom clearance, Clearb = 3 in

Comp face to CL of tensile rebar, d = D - Clearb - 1.27/2 - 1.00= 31.365 in

Consider a unit width, b = 12 in

For a given moment, M, calculate the strain in the concrete and reinforcing steel:

Concrete:

f'c = 3000 psi

Ec = 3122019 psi (=57000*sqrt(f'c))

Steel:

fy = 60000 psi

Es = 29000000 psi

For balanced condition:

ρb = 0.85*0.85*f'c/fy*87000/(87000+fy) = 0.0214

0.75 * ρb = 0.0160

ρ = As/b/d = 0.0067

Since ρ < (0.75 * ρb), the strength of the reinforced concrete beam shown on the previous page can be approximately determined by disregarding the compression rebars (Ref. 17). This will be done on the following pages.

For a given moment, M, calculate the strain in the concrete and reinforcing steel:

Let strain, $\varepsilon < 0$ indicate compression.

Let strain, $\varepsilon > 0$ indicate tension.

Compressive force, C = εc * Ec * z * b / 2

Tensile force, T = εs * Es * As

Equilibrium of forces ==> C + T = 0 or

$$\varepsilon c * Ec * z * b / 2 + \varepsilon s * Es * As = 0 \quad (1)$$

Equilibrium of moments ==> -C * 2z/3 + T * (d - z) = M or

$$-\varepsilon c * Ec * c * c * b / 3 + \varepsilon s * Es * As * (d - c) = M \quad (2)$$

From the geometry of the strains ==> εs/(d-c) = -εc/c or

$$\varepsilon c = c * \varepsilon s / (c - d) \quad (3)$$

(1), (2), and (3) form three equations in three unknowns.

Solving for z, εc, and εs:

$$X*z*z + Y*z + Z = 0 \quad \text{where} \quad (4)$$

X = b
Y = 2 * Es / Ec * As
Z = - 2 * d * Es / Ec * As

Solve (4) for z, then:

$$\varepsilon c = -2 * Es * As * \varepsilon s / (z * b * Ec) \quad (5)$$

$$\varepsilon s = 3 * M / z / [Es * As * (2 + 3 * (d - z) / z)] \quad (6)$$

CALCULATION SHEET

ORIGINATOR	DH	DATE	10/15/99
CALC. NO.	G(PO17)-2	REV. NO.	0
CHECKED	KL	DATE	10/15/99
PROJECT	Private Fuel Storage Facility	JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design	SHEET NO.	A-8

Calculation of strain rate for determining Dynamic Impact Factor
(ref. ACI 394-85, Section C.2, and Commentary)

From the time history plot of the bending moment, the maximum moment occurs at 5.310 seconds.

The strain will be calculated at time steps before and after the time of the maximum.

Time =	5.305 sec	5.310 sec	5.315 sec
Myy=	1733.9 k-ft	6267.4 k-ft	5627.4 k-ft
Myy/width =	57.796667 k-ft/ft	208.91333 k-ft/ft	187.58 k-ft/ft
=	693560 lb-in/ft	2506960 lb-in/ft	2250960 lb-in/ft
2 - #10 ==> As=	2.54 sq. in	2.54 sq. in	2.54 sq. in
Using equation (4):			
X = b =	12 in	12 in	12 in
Y = 2*Es/Ec*As =	47.187419	47.187419	47.187419
Z = -2d*Es/Ec*As =	-1480.033	-1480.033	-1480.033
sqrt(Y*Y-4XZ) =	270.6811	270.6811	270.6811
Solve quadratic for z:			
z1 =	9.3122366 in	9.3122366 in	9.3122366 in
z2 =	-13.24452 in	-13.24452 in	-13.24452 in
Check:			
X*z1*z1+Y*z1+Z=	0	0	0
X*z2*z2+Y*z2+Z=	0	0	0
Using equation (6):			
εs =	0.0003332 in/in	0.0012043 in/in	0.0010813 in/in
Using equation (5):			
εc =	-0.000141 in/in	-0.000509 in/in	-0.000457 in/in
Check:			
Compression, C =	-24541.31 lb/ft	-88707.65 lb/ft	-79649.21 lb/ft
Tension, T =	24541.309 lb/ft	88707.653 lb/ft	79649.208 lb/ft
Moment, M =	693560 lb-in/ft	2506960 lb-in/ft	2250960 lb-in/ft

CALCULATION SHEET

			CALC. NO. G(PO17)-2	REV. NO.	0
ORIGINATOR	DH	DATE 10/16/99	CHECKED	DATE	10/16/99
PROJECT	Private Fuel Storage Facility			JOB NO.	1101-000
SUBJECT	Storage Pad Analysis and Design			SHEET NO.	A-9

Calculate DIF for concrete:

	Time 5.305 to 5.310 (Loading)	Time 5.310 to 5.315 Unloading	
Strain rate, SR = $\Delta(\varepsilon c)/\Delta t$ =	0.073569 in/in/sec	0.010386 in/in/sec	
log(SR) =	-1.133303	-1.983557	
0.90 + 0.10 (log SR + 5.0) =	1.29	1.20	(Ref. 14, Table C-1)
max. allowable DIF =	1.25	1.25	
DIF =	1.25	1.20	

Calculate DIF for Grade 60 reinforcing steel:

Strain rate, SR = $\Delta(\varepsilon c)/\Delta t$ =	0.174223 in/in/sec	0.024595 in/in/sec	
log(SR) =	-0.758894	-1.609148	
1.0 + 0.02625 (log SR + 5.9) =	1.13	1.11	(Ref. 14, Table C-1)
max. allowable DIF =	1.10	1.10	
DIF =	1.10	1.10	