



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 289

RECORD OF ISSUES

NO	DESCRIPTION	BY	DATE	CHKD	DATE	APPRD	DATE
0	Initial Issue	mm DH anw ml	10/18/99	mm DH anw ml	10/18/99	JHT	10/18/99
1	Revision 1 (see notes below)	DH ml	12/6/99	DH ml	12/6/99	JHT	12/6/99
2	Revision 2 (see notes below)	DH	2/4/00	mm	2/4/00	JHT	2/4/00
3	Revision 3 (see notes on Sheet ii)	anw ml mm DH	4/5/01	anw ml mm DH	4/5/01	JHT	4/5/01
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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.

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CALCULATION COVER SHEET

PROJECT Private Fuel Storage Facility (PFSF)
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SHEET ii

Revision 3 was made to incorporate the following: (1) PGA of 0.711g and 0.695g for horizontal and vertical components of the new design ground motions, (2) Revised dynamic soil properties for lower-bound, best-estimate, and upper-bound soils provided by Geomatrix, (3) Revised cask force time-histories provided by Holtec, (4) Revised pad size to 30 ft by 67 ft with cask spacing in the long axis of the pad changed to 16 ft and cask spacing in the short axis of the pad remained at 15 ft, (5) Pad founded in soil cement with about 3 ft under the pad and 2 ft thick on its side walls, and (6) Revised transporter weight to 145 kips.



CALCULATION SHEET

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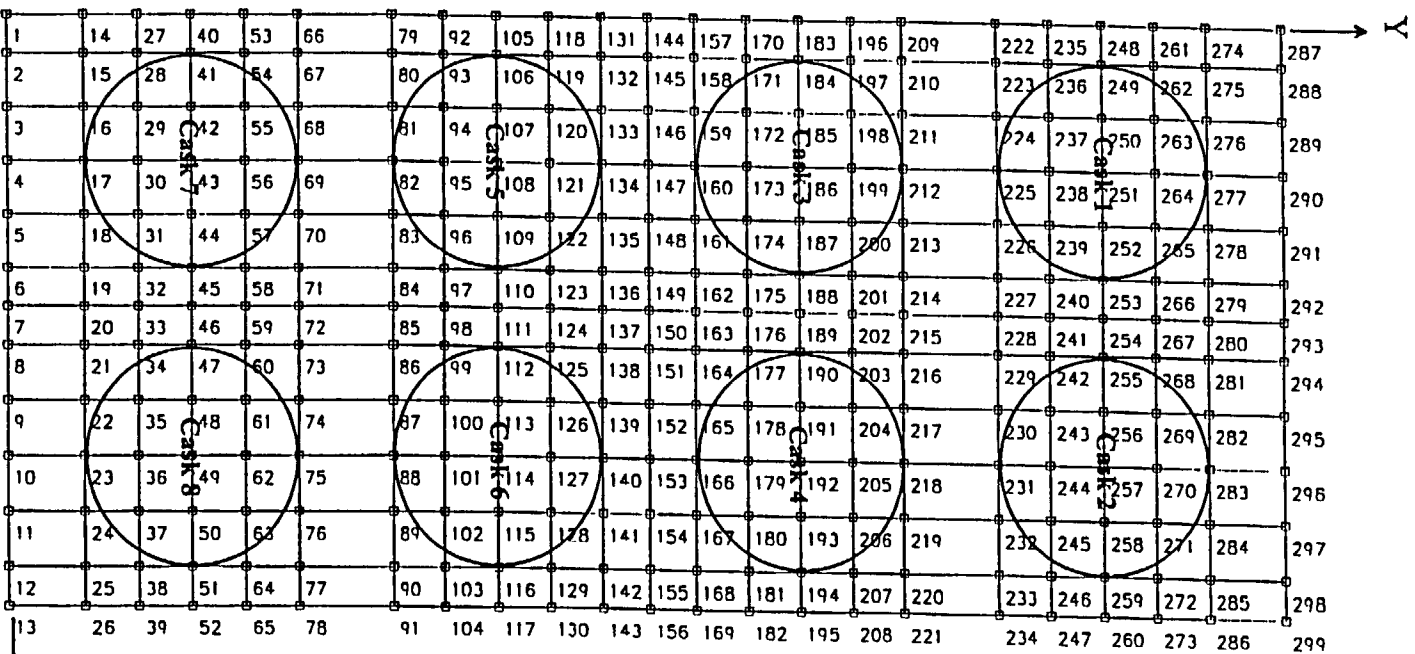


Figure 5.1-1 CECSAP Finite-Element Model with Node Numbers



CALCULATION SHEET

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

Node No	Maximum Displacement Z_d ($\times 10^{-3}$ ft.)								
	LB			BE			UB		
	2 Casks	4 Casks	8 Casks	2 Casks	4 Casks	8 Casks	2 Casks	4 Casks	8 Casks
1	4.051	9.396	-31.02	1.806	4.158	-23.66	0.406	1.654	-15.92
7	3.900	7.973	-24.23	1.964	3.648	-21.18	0.439	1.024	-13.36
13	4.788	11.470	-31.22	2.115	4.636	-17.88	0.528	1.560	-15.31
144	-9.195	-22.58	-34.05	-5.939	-16.84	-22.66	-1.861	-8.34	-13.66
150	-5.063	-15.2	-12.71	-3.683	-11.13	-12.39	-1.332	-6.698	-8.016
156	-6.565	-15.9	-32.24	-2.988	-9.447	-18.42	-1.734	-5.773	-14.53
287	-29.18	-24.39	-17.51	-14.54	-15.67	-18.88	-12.72	-8.52	-8.38
293	-15.57	-16.97	-19.21	-9.019	-12.42	-12.22	-12.08	-10.68	-6.446
299	-21.85	-26.09	-28.04	-12.87	-16.35	-17.02	-9.835	-11.63	-13.12
	Maximum Soil Bearing Pressure q_{zd} (Kips/ft ²)								
1	0	0	-2.22	0	0	-3.35	0	0	-5.14
7	0	0	-1.74	0	0	-3.00	0	0	-4.32
13	0	0	-2.24	0	0	-2.53	0	0	-4.94
144	-0.66	-1.62	-2.44	-0.84	-2.38	-3.21	-0.60	-2.69	-4.41
150	-0.36	-1.09	-0.91	-0.52	-1.57	-1.75	-0.43	-2.16	-2.59
156	-0.47	-1.14	-2.31	-0.42	-1.34	-2.61	-0.56	-1.86	-4.69
287	-2.09	-1.75	-1.25	-2.06	-2.22	-2.67	-4.11	-2.75	-2.71
293	-1.12	-1.22	-1.38	-1.28	-1.76	-1.73	-3.90	-3.45	-2.08
299	-1.57	-1.87	-2.01	-1.82	-2.31	-2.41	-3.18	-3.76	-4.24

Notes:

- q_{zd} = maximum soil bearing pressure = $(Kzd \times Z_d)/A$, where $A = 67' \times 30' = 2010 \text{ ft}^2$.
- Kzd for LB, BE, and UB soils are vertical-z dynamic soil spring stiffnesses given below:

$$\begin{array}{lll}
 (Kzd)_{LB} = 1.20E+07 \text{ lb/in} & (Kzd)_{BE} = 2.37E+07 \text{ lb/in} & (Kzd)_{UB} = 5.41E+07 \text{ lb/in} \\
 1.44.E+05 \text{ Kips/ft} & 2.84.E+05 \text{ Kips/ft} & 6.49.E+05 \text{ Kips/ft}
 \end{array}$$

- LB = lower-bound soil, BE = best-estimate soil, UB = upper-bound soil.
- Z_d are obtained from CECSAP analysis results given in Att. A
- Negative displacements imply downward movements.
- The maximum values of Z_d shown may not be concurrent. However, they are assumed to be concurrent values and concurrent signs are assigned to them.
- Node numbers are shown in Figure 5.1-1.

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