CEC

CALCULATION COVER SHEET

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	my DH cw Ku	10/18/99	my DH aw Ku	10/18/99	HT	10/18/99
1	Revision 1 (see notes below)	DH KL	12/6/99	DH KL	12/6/99	HT	12/6/99
2	Revision 2 (see notes below)	DH	2/4/00	my	2/4/00	HT	2/4/00
3	Revision 3 (see notes on Sheet ii)	aum KL my DH	4/5/01	aum KL my DH	4/5/01	HT	4/5/01
4							
5							

☒ 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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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.

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CALCULATION SHEET

ORIGINATOR	KC
PROJECT	Private Fuel Storage Facility
SUBJECT	Storage Pad Analysis and Design

DATE 4/5/01

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REV.NO 3
DATE 4/5/01
JOB NO. 1101-000
SHEET iii

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CALCULATION SHEET

ORIGINATOR	_vv_	DATE _4/5/01_	CALC. NO. _____	REV.NO. _3_
PROJECT	Private Fuel Storage Facility		CHECKED _DH_	DATE _4/5/01_
SUBJECT	Storage Pad Analysis and Design			JOB NO. _1101-000_
				SHEET _iv_

CALCULATION SHEET

ORIGINATOR _V̌_ DATE _3/14/01_ CALC NO. G(PO17)-2 REV. NO. 3
PROJECT _Private Fuel Storage Facility_ CHECKED _MMn_ DATE _3/30/01_
SUBJECT _Storage Pad Analysis and Design_ JOB NO _1101-000_ SHEET NO. _2c_
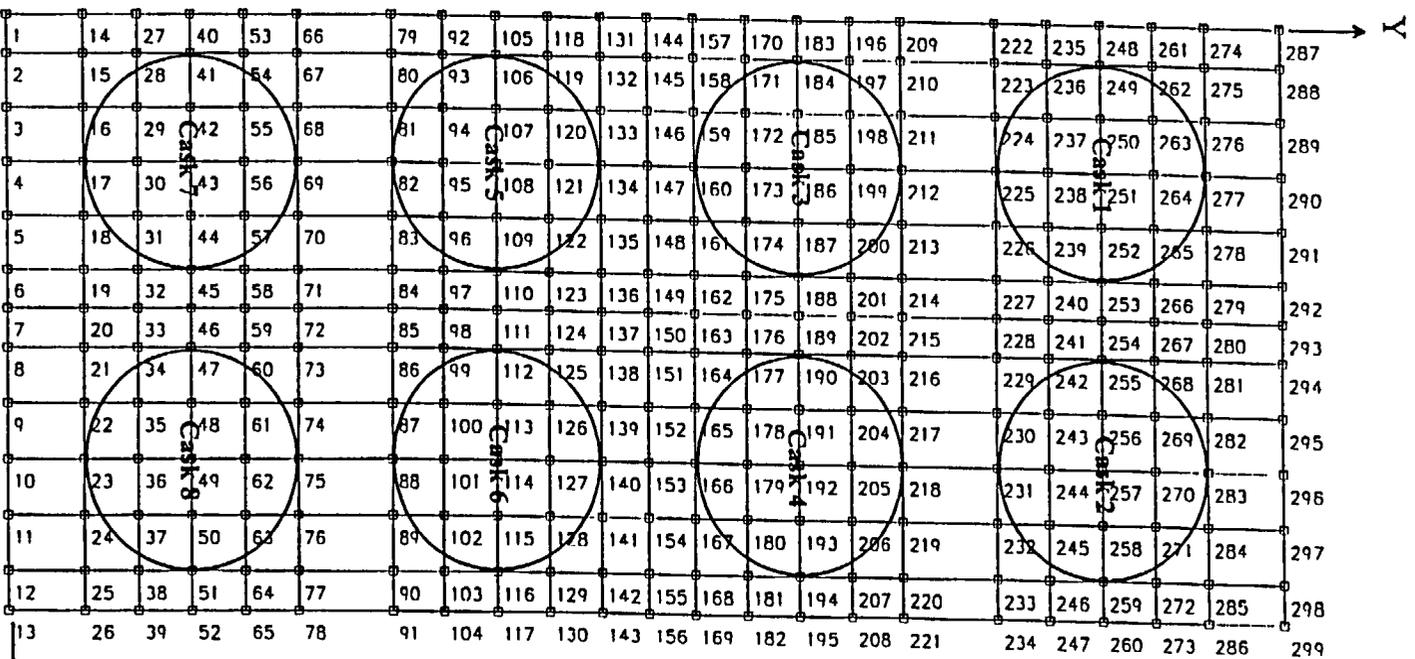
Figure 5.1-1 CECSAP Finite-Element Model with Node Numbers

fig5 1-1

CALCULATION SHEET

	CALC. NO. G(PO17)-2	REV. NO 3
ORIGINATOR W DATE 3/28/01	CHECKED	DATE 4-5-01
PROJECT Private Fuel Storage Facility		JOB NO. 1101-000
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Table D-1(d)
Maximum Vertical Soil Bearing Pressures
Dynamic Load

Node No	Maximum Displacement Zd (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	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:
1. q_{zd} = maximum soil bearing pressure = $(Kzd \times Z_d)/A$, where A = 67' x 30' = 2010 ft^2.
2. Kzd for LB, BE, and UB soils are vertical-z dynamic soil spring stiffnesses given below:

   (Kzd)LB = 1.20E+07 lb/in   (Kzd)BE = 2.37E+07 lb/in   (Kzd)UB = 5 41E+07 lb/in
             1.44.E+05 Kips/ft   2.84.E+05 Kips/ft   6.49.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 values of Zd shown 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 5.1-1.

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