ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9209290134 DOC.DATE: 92/09/21 NOTARIZED: YES DOCKET #
FACIL:50-315 Donald C. Cook Nuclear Power Plant, Unit 1, Indiana M 05000315
50-316 Donald C. Cook Nuclear Power Plant, Unit 2, Indiana M 05000316
AUTH.NAME AUTHOR AFFILIATION
FITZPATRICK,E. Indiana Michigan Power Co. (formerly Indiana & Michigan Ele
RECIP.NAME RECIPIENT AFFILIATION
MURLEY Document Control Branch (Document Control Desk)

SUBJECT: Suppls 920821 response to Suppl 1 to GL 87-02, "Verification of Seismic Adequacy of Mechanical & Electrical Equipment in Operating Reactors,USI A-46." Submittal of SQUG walkdown rept expected by end of 1994 or early 1995.

DISTRIBUTION CODE: A025D COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 24
TITLE: Seismic Qualification of Equipment in Operating Plants - A-46

NOTES:

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	PD3-1 LA	2	2	PD3-1 PD	1	1
INTERNAL:	NRR/DET CHENG,P	1	1	NRR/DET/ESGB	1	1
	NRR/DST/SELB	1	1	NRR/DST/SICB	1	1
	NRR/DST/SPLB	1	1	NRR/DST/SRXB	1	1
	OGC/HDS1	1	1	REG FILE	1	1
EXTERNAL:	NRC PDR	1	1			

R I D S / A D D S

R I D S / A D D S

NOTE TO ALL "RIDS" RECIPIENTS:

PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK. ROOM P1-37 (EXT. 504-2065) TO ELIMINATE YOUR NAME FROM DISTRIBUTION LISTS FOR DOCUMENTS YOU DON'T NEED!

TOTAL NUMBER OF COPIES REQUIRED: LTTR 12 ENCL 12

MA-4 dlp

Indiana Michigan
Power Company
P.O. Box 16631
Columbus, OH 43216

INDIANA MICHIGAN POWER

AEP:NRC:1040A

Donald C. Cook Nuclear Plant, Units 1 & 2
Docket Nos. 50-315 AND 50-316
License Nos. DPR-58 AND DPR-74
RESPONSE TO SUPPLEMENT 1 TO GENERIC
LETTER 87-02 ON SQUG RESOLUTION OF USI A-46

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

September 21, 1992

Dear Dr. Murley:

On February 19, 1987, the NRC issued Generic Letter 87-02, "Verification of Seismic Adequacy of Mechanical and Electrical Equipment in Operating Reactors, Unresolved Safety Issue (USI) A-46". This Generic Letter encouraged utilities to participate in a generic program to resolve the seismic verification issues associated with USI A-46. As a result, the Seismic Qualification Utility Group ("SQUG") developed the "Generic Implementation Procedure (GIP) for Seismic Verification of Nuclear Plant Equipment". On May 22, 1992, the NRC Staff issued Generic Letter 87-02, Supplement 1, which constituted the NRC Staff's review of the GIP and which included Supplemental Safety Evaluation Report No. 2 ("SSER-2") on the GIP, Revision 2, corrected on February 14, 1992. The letter to SQUG enclosing SSER-2 requests that SQUG member utilities provide to the NRC, within 120 days, a schedule for implementing the GIP. By letter dated August 21, 1992, to James G. Partlow, NRR-NRC, SQUG clarified that the 120 days would expire on September 21, 1992. This letter responds to the Staff's request.

The responses to the three items noted in supplement No. 1 to GL 87-02 as applicable to Donald C. Cook Nuclear Plant are as follows:

1. COMMITMENT TO GIP

GIP Commitments

As a member of SQUG, Indiana Michigan Power Company commits to use the SQUG methodology as documented in the GIP, where "GIP" refers to GIP Revision 2, corrected February 14, 1992, to resolve USI A-46 at Donald C. Cook Nuclear Plant, Units 1 and 2. The GIP, as evaluated by the Staff, permits licensees to deviate from the SQUG

A025 1/1

commitments embodied in the commitment sections, provided the Staff is notified of substantial deviations prior to implementation. Indiana Michigan Power Company recognizes that the Staff's position in SSER-2 is that "if licensees use other methods that deviate from the criteria and procedures as described in SQUG commitments and in the implementation guidance of the GIP, Rev. 2, without prior NRC staff approval, the method may not be acceptable to the staff and, therefore, may result in a deviation from the provisions of" Generic Letter 87-02.

Specifically, Indiana Michigan Power Company hereby commits to the SQUG commitments set forth in the GIP in their entirety, including the clarifications, interpretations, and exceptions identified in SSER-2 as clarified by the August 21, 1992, SQUG letter responding to SSER-2.

GIP Implementation Guidance

Indiana Michigan Power Company generally will be guided by the remaining (non-commitment) sections of the GIP, i.e., GIP implementation guidance, which comprises suggested methods for implementing the applicable commitments. Indiana Michigan Power Company will notify the NRC as soon as practicable, but no later than the final USI A-46 summary report, of significant or programmatic deviations from the guidance portions of the GIP, if any. Justifications for such deviations, as well as for other, minor deviations, will be retained on site for NRC review.

Our current plans for executing certain aspects of the GIP guidance follow. It is our belief that these items are not deviations to the GIP Guidance.

1) As noted in the GIP, Section 8, we plan to inspect the cable and conduits on an area-by-area basis. Within a given area, typical representative supports will be evaluated. (It is not possible to inspect all supports in the area due to inaccessibility and/or obstruction.) The selection of a sample number of supports for the analytical evaluations will be performed per the GIP requirements. Further, it is noted that two different configurations of rod hanger supports for the cable trays have been tested to determine their failure threshold. These tests were performed to establish screening criteria for capacity versus demand for similar supports that are consistent with the margins of safety given in the GIP manual.

2) We are developing a unique seismic safe shutdown off-normal operating procedure, which uses the guidelines of the GIP, and the "two-column" format of the plant emergency operating procedures. The new procedure is unique in that it directs the operators to the use of the SQUG-verified components if

the normal or preferred action/expected response cannot be obtained. The procedure will be validated using our plant specific simulator. Operator training in the use of the procedure will be included in the licensed operator training programs.

2. SCHEDULES

Currently, we are finalizing the Safe Shutdown Equipment List (SSEL) for both units of Cook Nuclear Plant. In Unit 1, we have completed a limited walkdown of train outage-related electrical equipment and equipment inside the containment building. We are planning to perform the major walkdown in both units during late summer - early fall of 1993. The train outage- related equipment and inside containment equipment in Unit 2 will be walked during the next refueling outage. The next Unit 2 refueling outage is tentatively scheduled for Spring of 1994. Following this inspection, we currently anticipate a submittal of the SQUG walkdown report to the NRC by the end of 1994 or early 1995.

Please note that the three year requirement to complete the above submittal is approximately late 1995, based on the assumption that the three year period starts at the end of the 60 day period following the submittal date of AEP:NRC:1040A.

3. IN-STRUCTURE RESPONSE SPECTRA

The licensing-basis SSE(DBE) in-structure response spectra may be used as one of the options provided in the GIP for resolution of USI A-46. The development of the licensing-basis spectra is described in Chapters 2.0 and 5.0 of the FSAR which was developed consistent with standards and guidance applicable to the plant at the time of licensing and are considered to be of conservative design. The procedures and criteria which were used to generate the licensing-basis in-structure response spectra to be used for USIA-46 are described in Attachment 1.

This letter is submitted pursuant to 10CFR50.54(f) and, as such an oath of affirmation is enclosed.

Sincerely,

E. E. Fitzpatrick

E. E. Fitzpatrick
Vice President

tjw

cc: D. H. Williams, Jr.
A. A. Blind - Bridgman
J. R. Padgett
G. Charnoff
NFEM Section Chief
A. B. Davis - Region III
NRC Resident Inspector - Bridgman

STATE OF OHIO)
COUNTY OF FRANKLIN)

E. E. Fitzpatrick, being duly sworn, deposes and says that he is the Vice President of licensee, Indiana Michigan Power Company, that he has read the foregoing Response to Supplement 1 to Generic Letter 87-02, "Verification of Seismic Adequacy of Mechanical and Electrical Equipment in Operating Reactors, USI-A-46," and knows the contents thereof; and that said contents are true to the best of his knowledge and belief.

E E Fitzpatrick

Subscribed and sworn to before me this 21st

day of September, 1992.

Rita D. Hill
NOTARY PUBLIC

RITA D. HILL
NOTARY PUBLIC, STATE OF OHIO
MY COMMISSION EXPIRES 6-22-94

DONALD C. COOK NUCLEAR PLANT

IN-STRUCTURE RESPONSE SPECTRA

FOR USE IN USI A-46 RESOLUTION

(Response To NRC Request Per SSER No. 2 on SQUG GIP-2)

ATTACHMENT NO. 1 TO: AEP:NRC:1040A

Donald C. Cook Nuclear Plant
In-Structure Response Spectra For USI A-46

GENERAL

Licensing-Basis Ground Response Spectra

The Donald C. Cook Nuclear Plant is a Westinghouse PWR plant with ice condenser type containment. It is located on the southeast shore of Lake Michigan approximately 11 miles south-southwest of the city of Benton Harbor. The site is in a low seismicity area with no major earthquake epicenters located within about 400 miles of the site. The site is underlain by a simple sequence of formations consisting of a surface stratum of dune sand underlain by dense sand, a stiff clay stratum, and glacial till resting on shale-bedrock. The foundations bear on the dense sand.

The licensing-basis (LB) ground response spectra are of Housner type with maximum horizontal ground acceleration of 0.10 g for Operating Basis Earthquake (OBE) and 0.20 g for Design Basis Earthquake (DBE). See Figure 1 and Figure 2, attached.

In-Structure Response Spectra for USI A-46

The major structures in which USI A-46 equipment is housed are the Unit 1 and Unit 2 Containment Buildings and the Auxiliary Building, which is common to both units. The two Containment Buildings are mirror images of each other. One and only one set of in-structure response spectra was generated, and it has since been used as the licensing-basis response spectra for Unit 1 and Unit 2 applications.

The LB in-structure response spectra were generated using a time history analysis method in accordance with the procedures and criteria described in the FSAR. The procedures and criteria were reviewed by the NRC (AEC) at the time of licensing in the late sixties and the early seventies. Soil-structure interaction and dynamic characteristics of the structures were taken into consideration. The LB in-structure response spectra are considered to have met the requirements of "conservative, design" in-structure response spectra as defined in Ref. 1.

We intend to use the LB in-structure response spectra for DBE with 5% equipment damping for resolution of USI A-46.

CONTAINMENT BUILDING

Building Description

The Containment Building is of Westinghouse Ice Condenser type. It consists of the outer steel-lined reinforced concrete containment vessel and of the internal structure made up of crane wall, primary shield, operating deck, annular deck and ice condenser deck. The containment vessel and the internal structure are structurally separate except at the common foundation mat. Unit 1 and Unit 2 Containment Buildings are mirror images of each other. An elevation view of the Containment Building is attached as Figure 3.

ATTACHMENT NO. 1 TO: AEP:NRC:1040A

Donald C. Cook Nuclear Plant
In-Structure Response Spectra For USI A-46

Dynamic Model

The Containment Building was modeled as two vertical sticks with lumped masses, one representing the containment vessel, and the other the internal structure. The two sticks were coupled at the base by a rigid foundation mat. The effect of soil-structure interaction was considered by the inclusion of two soil springs attached to the foundation mat, one for translation and one for rotation. A sketch showing the model is attached as Figure 4.

Key Modeling Parameters

The soil spring constants (K_T=0.109x10^7 kip/ft, K_R=0.548x10^{10} ft-kip/rad for translational and rotational stiffness respectively) were based on the geometry of the foundation mat (142' in diameter) and a soil shear modulus of 20,000 psi. The 20,000 psi shear modulus for the soil, corresponding to a shear wave velocity of approximately 850 ft/sec, was recommended by Dr. Robert V. Whitman of Massachusetts Institute of Technology and Dr. A. Casagrande of Harvard University and was consistent with data obtained from the site investigation.

Analysis Procedure

The Containment Building was analyzed using the AEPSC computer code "Nuclear Containment Structure Program." A time history analysis approach was employed in the program.

The in-structure response spectra were obtained by scaling the LB ground response spectra by a set of frequency dependent magnification factors. The frequency dependent magnification factors were determined, for each elevation of interest, by a time history dynamic analysis using four real earthquake records as input. The detailed procedure used is as follows:

1. The four earthquakes records used in the analysis were:
   a) El Centro, May 18, 1940, N-S
   b) El Centro, May 18, 1940, W
   c) Taft, July 21, 1952, S-21-W
   d) Taft, July 21, 1952, N-69-W

2. For each of the four earthquakes a time history analysis was performed using the earthquake record as input ground motion. The response time history of the floor (or other mass point) was thus determined for each earthquake.

3. The acceleration time histories for each earthquake at the ground and at the floor were converted into their corresponding velocity response spectra for the desired equipment damping.

4. Magnification factors were determined for selected frequencies. The magnification factors are the ratios of velocity response spectral values at the floor to the corresponding values at the ground for each earthquake.

5. An envelope of maximum magnification factors was generated from the magnification factors calculated for each of the four earthquakes.

6. The in-structure response spectra for each elevation were then obtained by amplifying the LB ground response spectra by the envelope magnification factors determined in step 5.

7. To allow for soil and structure properties variations, the resonance response on the response spectra curve was used for frequencies in the interval of ±10% of the resonant frequency. This approach was submitted to the NRC (AEC) at the time of licensing in response to NRC (AEC) Question No. 5.77.

Analysis Results

As the Containment Building is essentially a cylindrical structure, only one horizontal analysis was performed. The vertical response was taken as two thirds of the horizontal response.

Frequencies, mass participation, and peak accelerations of interest are given below. The 5% damped DBE response spectrum for floor El. 651.3' (the operating deck) is included for reference as Figure 5. The El. 651.3' operating deck is the highest level for USI A-46 equipment in the Containment Buildings.

1. The frequencies of the first three modes, which were considered in the analysis, were listed below. The cumulative fraction of mass participating in the first three modes is over 90%.

   Frequency

   f_1 = 2.04 Hz
   f_2 = 4.63 Hz
   f_3 = 5.36 Hz

2. Peak acceleration values (zero-period acceleration) at various elevations of the Containment Building are as follows:

Elev.	Acc. (g)	Remarks
Free Field		
609.0'	0.20	max DBE ground acceleration (free field)
Containment Internal Structure		
597.5'	0.30	top of foundation mat
612.6'	0.40	primary shield near reactor support
651.3'	0.52	crane wall at operating deck
714.0'	0.90	top of crane wall

Note: The effective grade elevation for the Containment Building for USI A-46 purposes is established as El. 608'.

Donald C. Cook Nuclear Plant
In-Structure Response Spectra For USI A-46

AUXILIARY BUILDING

Building Description

The Auxiliary Building is a tee-shaped, reinforced concrete and steel structure with bottom of foundation slab at elevation 578'. A sub-basement extending down to elevation 562' is located at the intersection of the cross and the stem of the tee. The Diesel Generator Buildings are located at the ends of the cross of the tee and share the foundation slab with the Auxiliary Building proper. The Diesel Generator Buildings are structurally isolated from the Auxiliary Building at higher elevations and top out at elevation 637.5'. The main floor slabs in the concrete portion of the Auxiliary Building are at elevations 587', 609', 633' and 650'. Steel framing rises above the elevation 650' level along the stem of the tee to support the roof at elevation 705'. The stem of the tee extends between the two reactor containment vessels, and the fuel handling area is located in this part of the Auxiliary Building. See attached plan and elevation for more detail (Figure 6 and Figure 7).

Dynamic Model

With its overall height smaller than the plan dimensions and its slabs interconnected by numerous long and low integral concrete walls, the Auxiliary Building is essentially a shear wall type structure.

The dynamic model consisted of the floor slabs (and roofs), considered infinitely rigid and interconnected by weightless linear springs representing the stiffness of the shear walls (and the lateral stiffness of steel frames supporting the roof). All masses were lumped at the slabs and roofs. The motion of the lumped masses (slabs and roofs) was restricted to the horizontal plane, and each floor slab (mass point) was allowed three degrees of freedom, i.e., translation in the X-direction, translation in the Y-direction and rotation about the vertical Z-axis. See Figure 8 and Figure 9 for more detail.

The torsional effect due to eccentricity between the center of mass and center of shear wall stiffness was taken into account by entering the eccentricities at each end of each spring (relative to the respective center of mass) and also by assigning a mass moment of inertia to each mass point. Figure 8 and Figure 9 depict the X-Z and Y-Z views of the three-dimensional model.

The effect of soil structure interaction was considered by attaching a series of translational soil springs to the foundation in each of the X and Y directions. The rocking mode of vibration is not significant for the Auxiliary Building because its natural frequency of rocking is much higher than that of swaying, and therefore no rotational soil springs were used.

Key Modeling Parameters

The soil spring constants were calculated based on the dimensions of the portion of the foundation to which each spring was attached and a soil shear modulus of 20,000 psi. The location and stiffness of each soil spring are depicted in Figure 10 and Figure 11.

ATTACHMENT NO. 1 TO: AEP:NRC:1040A

Donald C. Cook Nuclear Plant
In-Structure Response Spectra For USI A-46

Analysis Procedure

The Auxiliary Building was analyzed by Sargent & Lundy Engineers using their computer program "Dynamic Seismic Analysis of Shear Structures." A time history method of analysis was utilized for generating in-structure response spectra.

The in-structure response spectra were obtained by averaging the results from time history analyses using four real earthquake records as input excitations. The detailed procedure used is as follows:

1. The four earthquakes records used in the analyses were:
   a) El Centro, May 18, 1940, N-S
   b) El Centro, Dec 30, 1934, N-S
   c) Olympia, April 13, 1949, S-80-W
   d) Taft, July 21, 1952, N-21-E

   Each time history record was scaled by an appropriate factor to make it compatible with the site LB ground response spectra for the OBE. The input motion for the DBE was taken as twice that of the OBE.

2. For each of the four earthquakes, two time history analyses were performed, one for excitation in the X-direction and the other for excitation in the Y-direction.

3. The time histories of the slab motions obtained from the time-history analysis of the structural model were used as the exciting functions to generate floor response spectra for the desired equipment damping.

4. For each floor the resulting response spectra from the four X-direction and the four Y-direction excitations were first averaged separately. Then, the resulting averaged spectra were enveloped to produce a combined set of response spectra for that floor. The resulting response spectra curves can be used for X-direction excitation and for Y-direction excitation.

5. To account for uncertainties in the soil stiffness, a second model was prepared with soil spring constants set at one third of the calculated values. The analysis was repeated for this new model.

6. As a final step, the response spectra obtained from the two models were superimposed and enveloped with a smooth curve. The OBE response spectra for each floor were obtained in this manner. Uncertainties in the soil stiffness was reflected by the flat peaks on the response spectra.

7. Since the forcing function for DBE was twice that of OBE and the damping values used for OBE and DBE were the same, the response spectra for DBE were obtained by multiplying the corresponding spectra for OBE by a factor of 2.0.

Donald C. Cook Nuclear Plant
In-Structure Response Spectra For USI A-46

Analysis Results

Only one set of in-structure response spectra was generated, and it is applicable for either horizontal direction. The vertical response was taken as two thirds of the horizontal response.

Frequencies, participation factors, and peak accelerations of interest are given below. The 5% damped DBE response spectrum for El. 650' is included for reference as Figure 12. In the Auxiliary Building, the floor at El. 650' is the highest level at which USI A-46 equipment is located.

1. The frequencies and participation factors of the first five modes were:

Frequency	X-Part. Factor	Y-Part. Factor
f_1 = 2.87 Hz	p_{1x} = 91.468	p_{1y} = 0.277
f_2 = 3.19 Hz	p_{2x} = 0.323	p_{2y} = -91.487
f_3 = 4.79 Hz	p_{3x} = 1.867	p_{3y} = 1.420
f_4 = 6.34 Hz	p_{4x} = 5.651	p_{4y} = 0.450
f_5 = 8.65 Hz	p_{5x} = 0.158	p_{5y} = -0.867

The first and second modes, which are essentially independent responses in the X and Y directions, are the dominant modes.

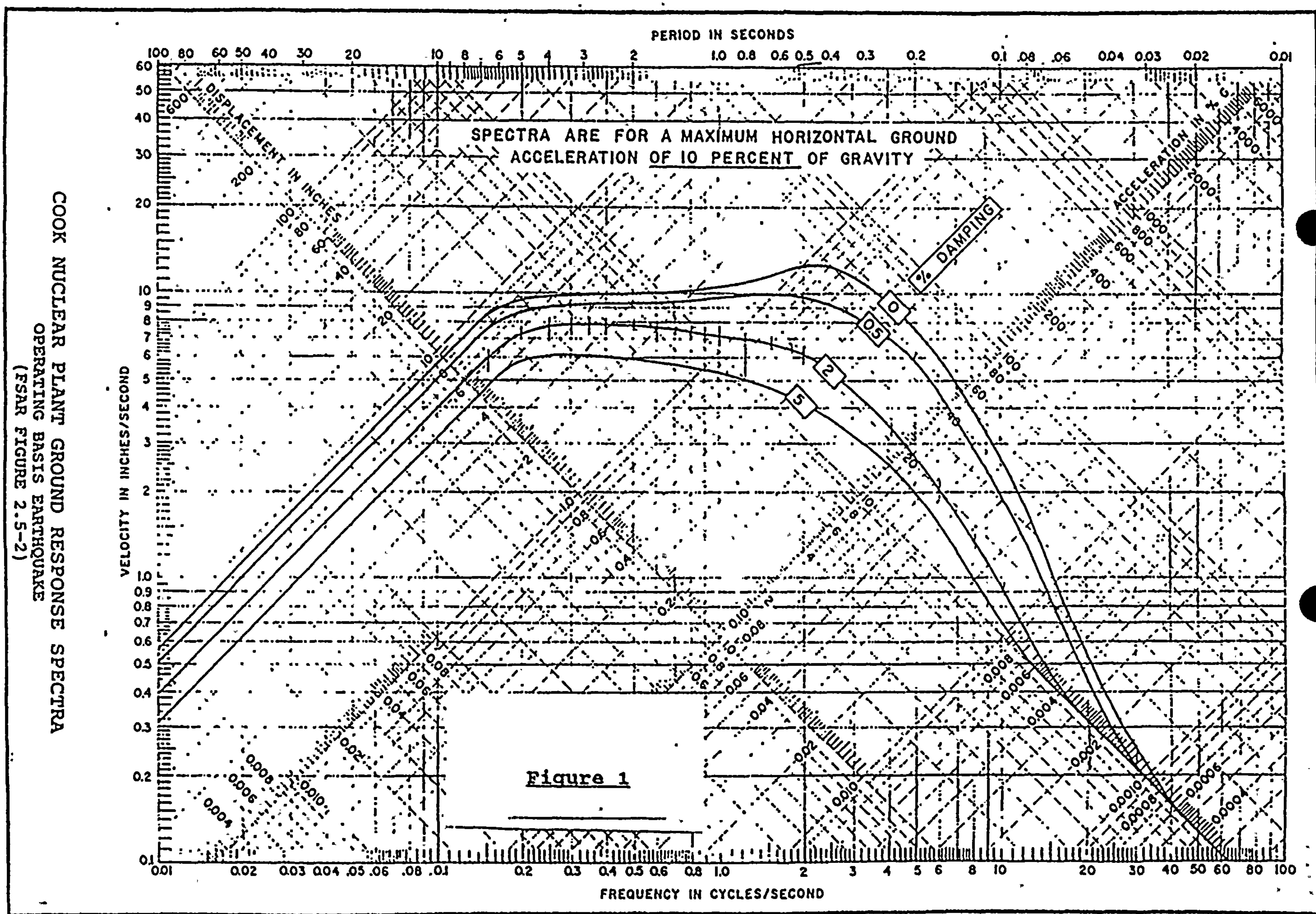
2. Peak acceleration values (zero-period acceleration) at various elevation of the Auxiliary Building are as follows:

Elev.	Acc. (g)	Remarks
Free Field		
609'	0.20	max DBE ground acceleration (free field)
Building		
587.0'	0.202	top of foundation mat
633.0'	0.224	control room
650.0'	0.226	main operating deck (top of spent fuel pool)

Note: The effective grade elevation for the Auxiliary Building for USI A-46 purposes is established as El. 608'.

References

1. Supplemental Safety Evaluation Report No. 2 (SSER No. 2) on SQUG Generic Implementation Procedure, Revision 2, As Corrected on February 14, 1992 (GIP-2)
2. Updated Final Safety Analysis Report (UFSAR) - Chapters 2 and 5.
3. Answers to NRC (AEC) Questions pertaining to Chapter 5 of the Original FSAR.



COOK NUCLEAR PLANT GROUND RESPONSE SPECTRA
OPERATING BASIS EARTHQUAKE
(FSAR FIGURE 2.5-2)

COOK NUCLEAR PLANT GROUND RESPONSE SPECTRA
DESIGN BASIS EARTHQUAKE
(FSAR FIGURE 2.5-3)

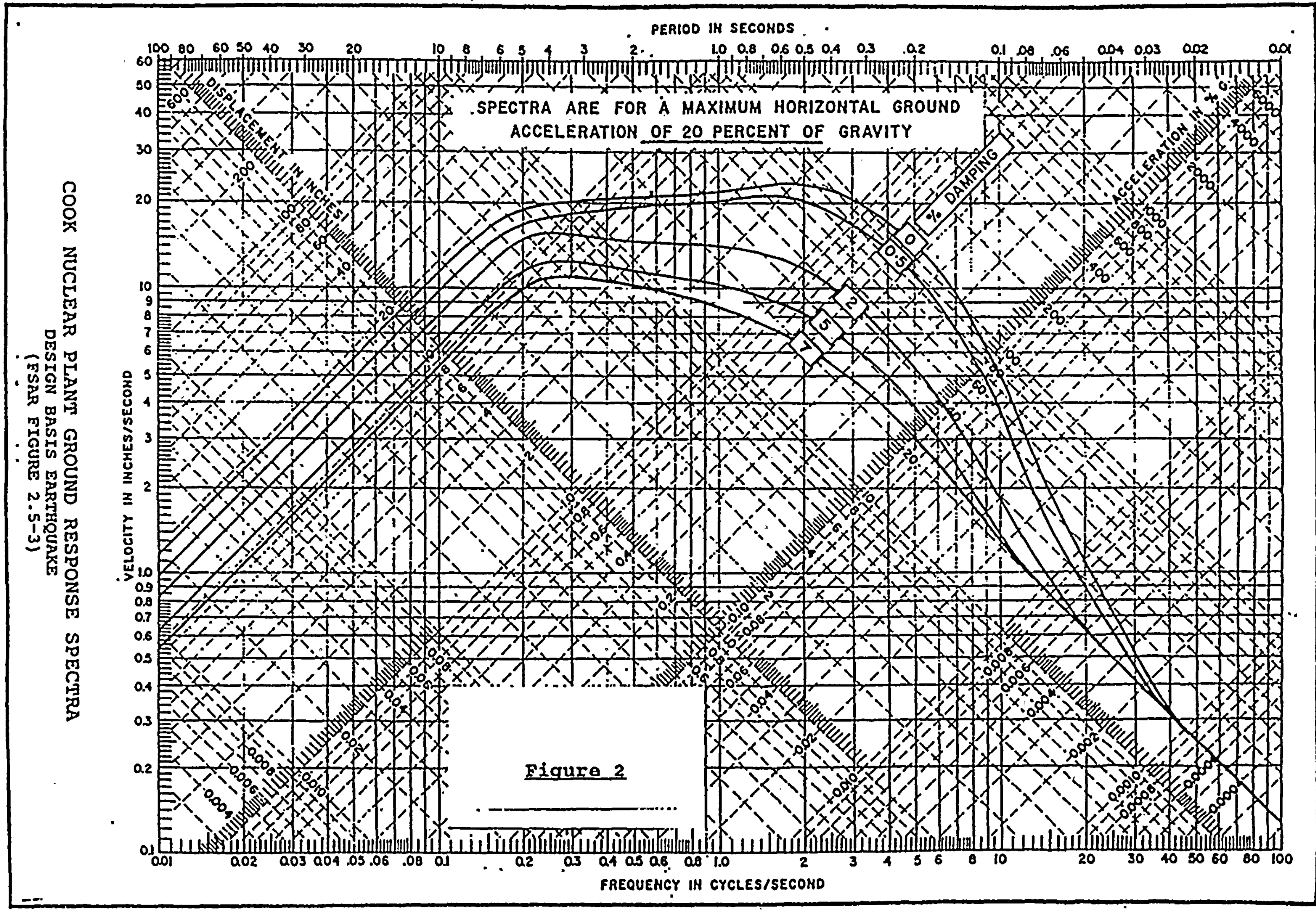


Figure 2

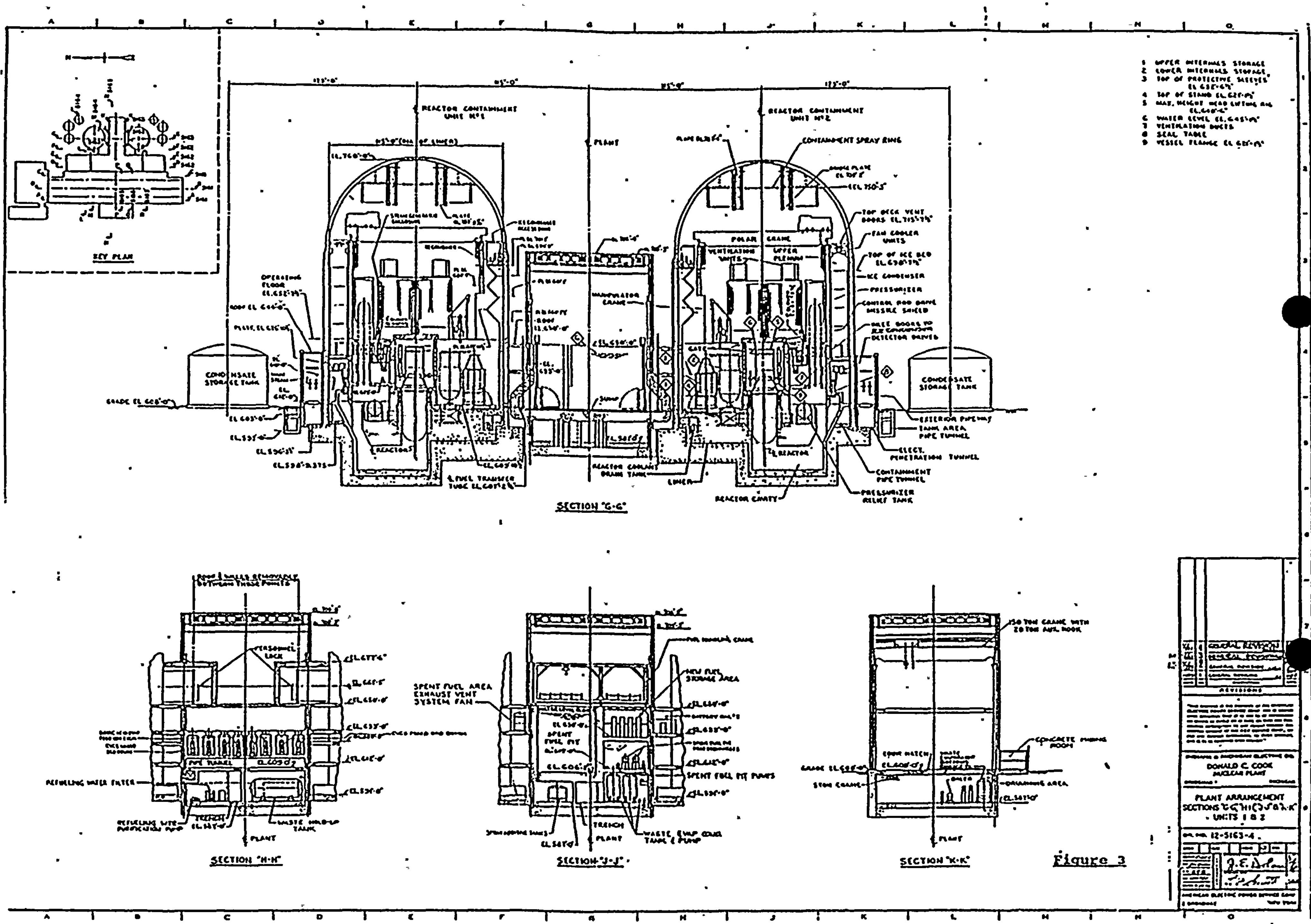
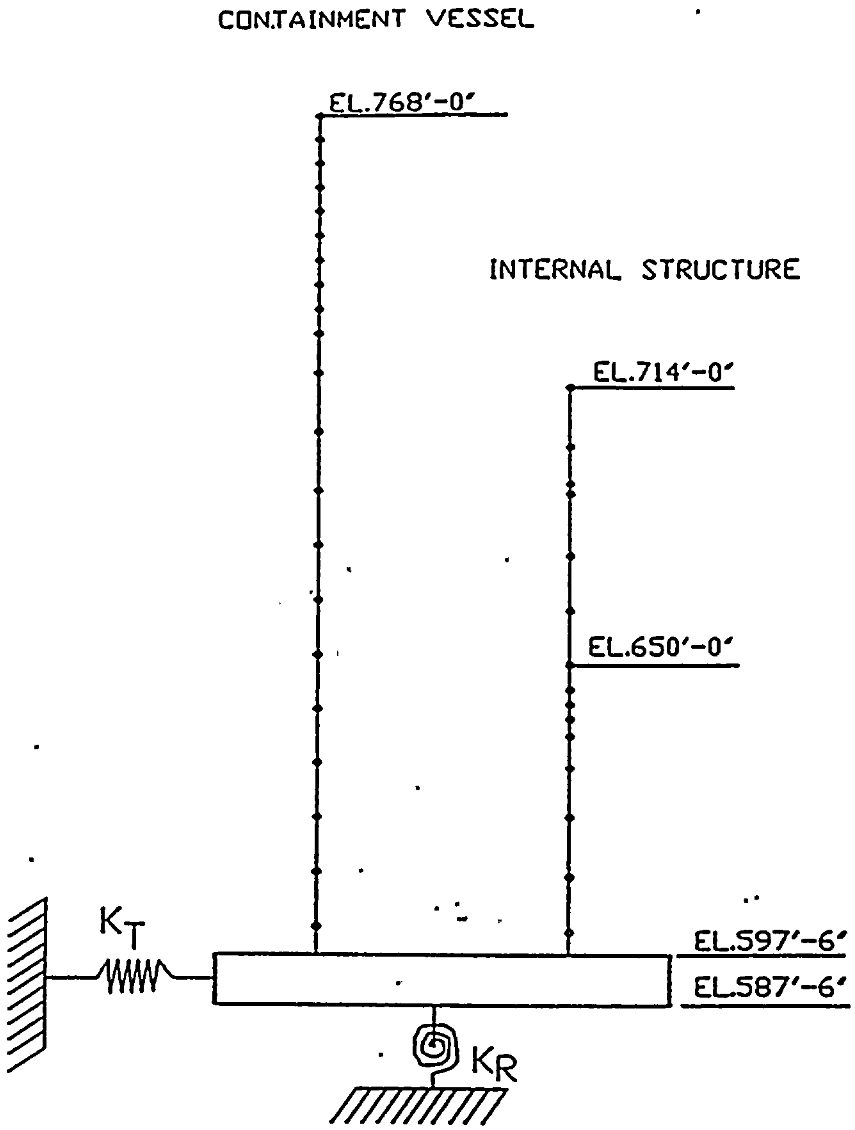

KEY PLAN
REACTOR CONTAINMENT UNIT No 1
REACTOR CONTAINMENT UNIT No 2
CONTAINMENT SPRAY RING
POLAR CRANE
VENTILATION UNITS
UPPER PLENUM
TOP DECK VENT DOORS
FAN COOLER UNITS
ICE CONDENSER
PRESSURIZER
CONTROL ROD DRIVE MISSILE SHIELD
DETECTOR DRIVES
CONDENSATE STORAGE TANK
OPERATING FLOOR
EXTERIOR PIPEWAY
TANK AREA PIPE TUNNEL
ELECT. PENETRATION TUNNEL
CONTAINMENT PIPE TUNNEL
PRESSURIZER RELIEF TANK
REACTOR CAVITY
REACTOR COOLANT DRAIN TANK
LINER
REACTOR
FUEL TRANSFER TUBE
PLANT
SECTION "G-G"
PERSONNEL LOCK
PIPE TUNNEL
REFUELING WATER FILTER
TRENCH
WASTE HOLD-UP TANK
SECTION "H-H"
SPENT FUEL AREA EXHAUST VENT SYSTEM FAN
NEW FUEL STORAGE AREA
SPENT FUEL PIT
SPENT FUEL PIT PUMPS
WASTE EVAP COND TANK & PUMP
SECTION "J-J"
150 TON CRANE WITH 20 TON AUX. HOOK
CONCRETE PIPING ROOM
GRADE
SECTION "K-K"
DONALD C. COOK NUCLEAR PLANT
PLANT ARRANGEMENT
UNITS 1 & 2
12-5163-4

Figure 3



DYNAMIC ANALYSIS MODEL
FOR CONTAINMENT BUILDING
DONALD C. COOK NUCLEAR PLANT.

NOTE: K_T = TRANSLATIONAL SOIL SPRING CONSTANT
K_R = ROTATIONAL SOIL SPRING CONSTANT

Figure 4

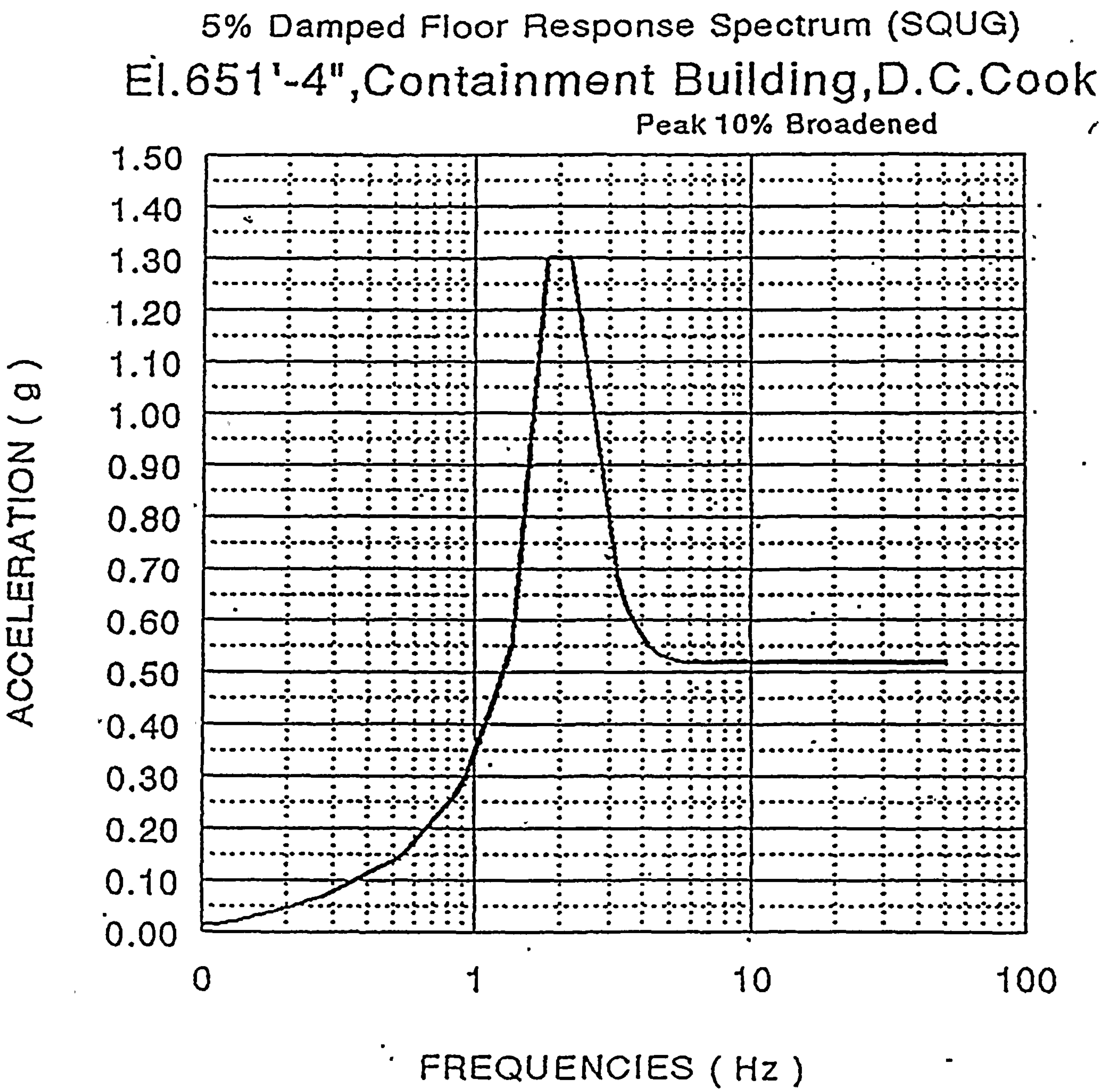

5% Damped Floor Response Spectrum (SQUG)
El.651'-4",Containment Building,D.C.Cook
Peak 10% Broadened
1.50
1.40
1.30
1.20
1.10
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
ACCELERATION (g)
0
1
10
100
FREQUENCIES (Hz)

Figure 5

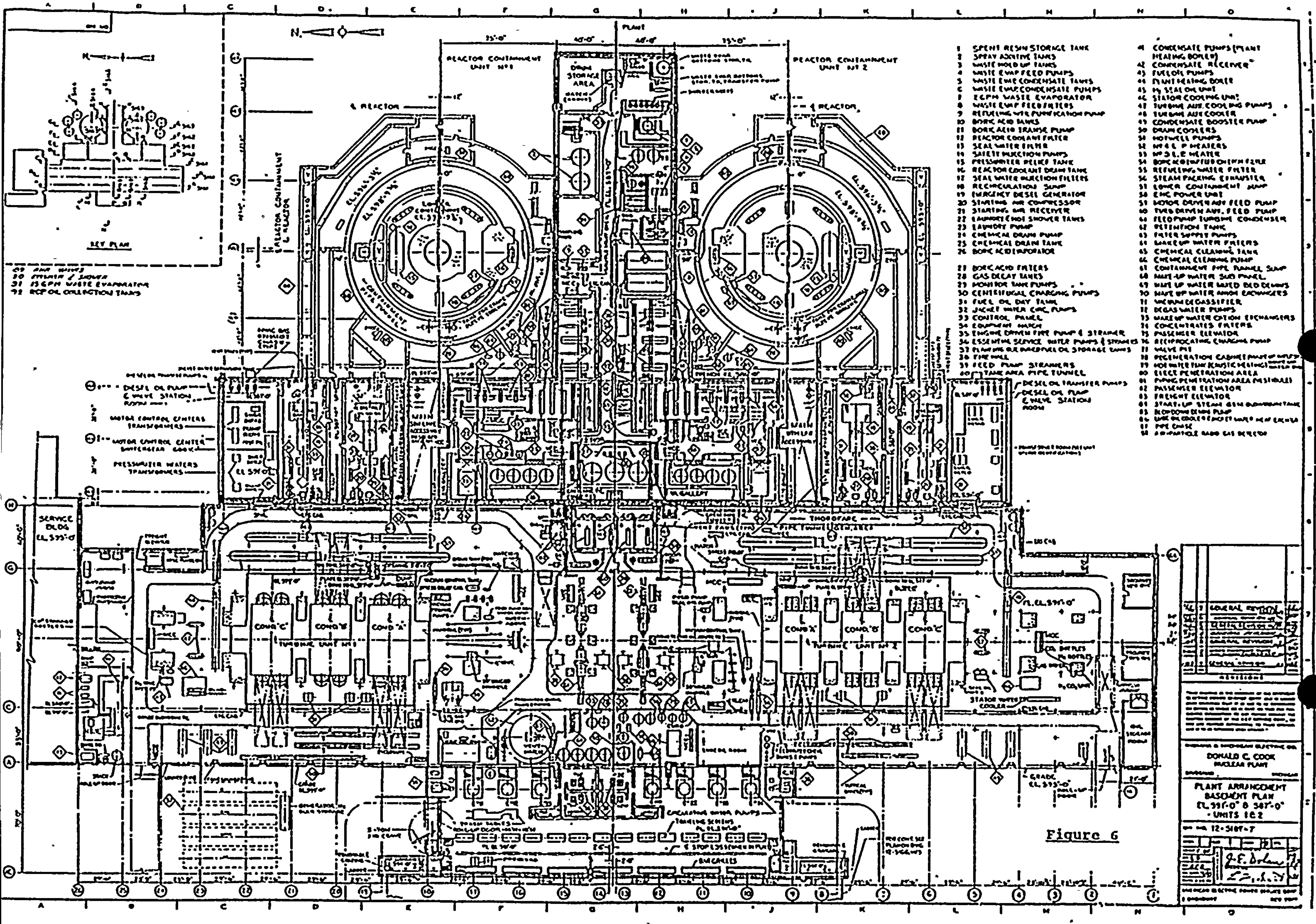

REACTOR CONTAINMENT UNIT No 1
REACTOR CONTAINMENT UNIT No 2
KEY PLAN
SERVICE BLDG
TURBINE UNIT No 1
TURBINE UNIT No 2
COND "C"
COND "B"
COND "A"
DONALD C. COOK NUCLEAR PLANT
PLANT ARRANGEMENT BASEMENT PLAN EL. 591'-0" & 587'-0" UNITS 1 & 2

Figure 6

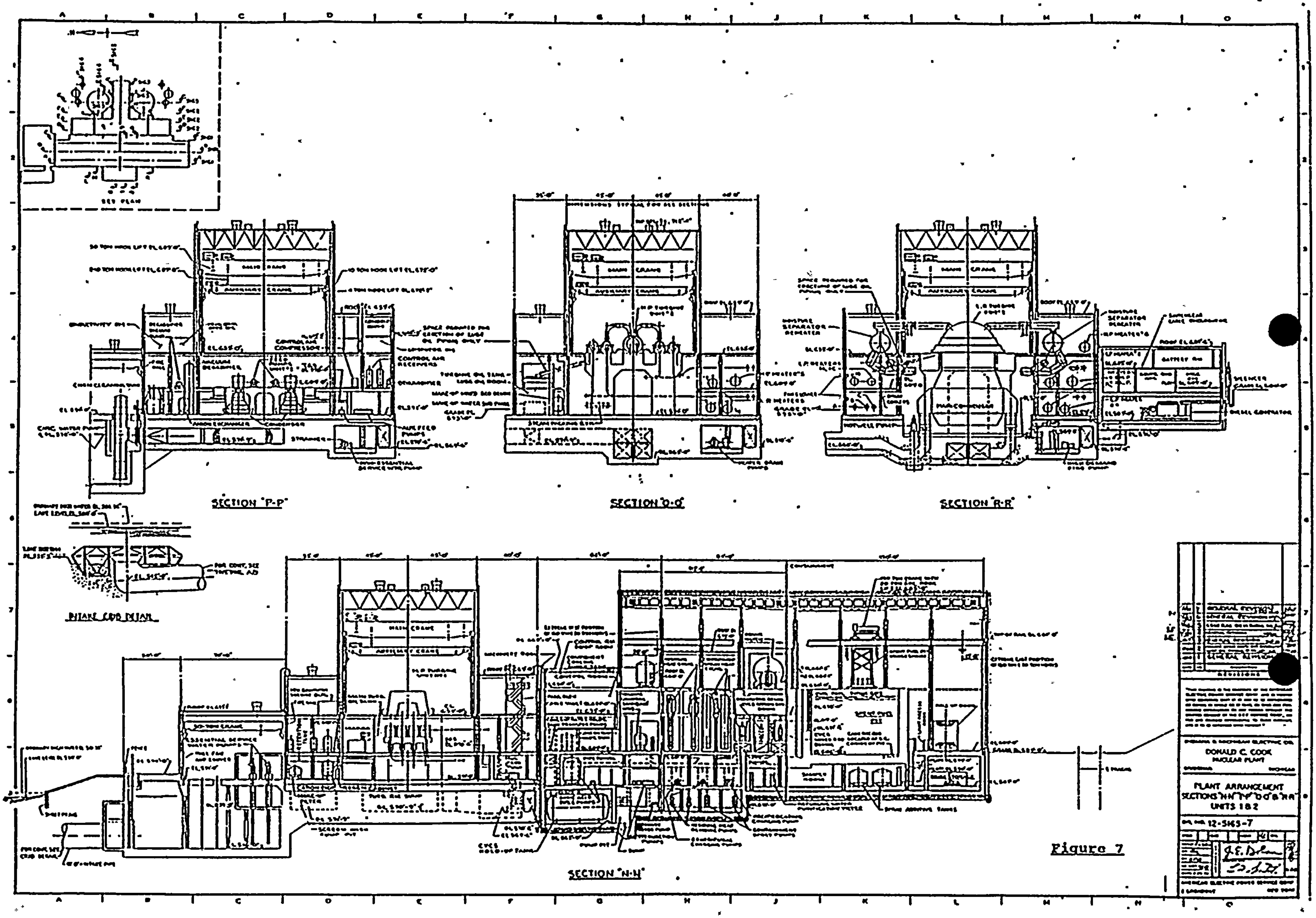

SECTION "P-P"
SECTION "O-O"
SECTION "R-R"
SECTION "N-N"
INTAKE CRIB DETAIL
DONALD C. COOK
NUCLEAR PLANT
PLANT ARRANGEMENT
UNITS 1 & 2

Figure 7

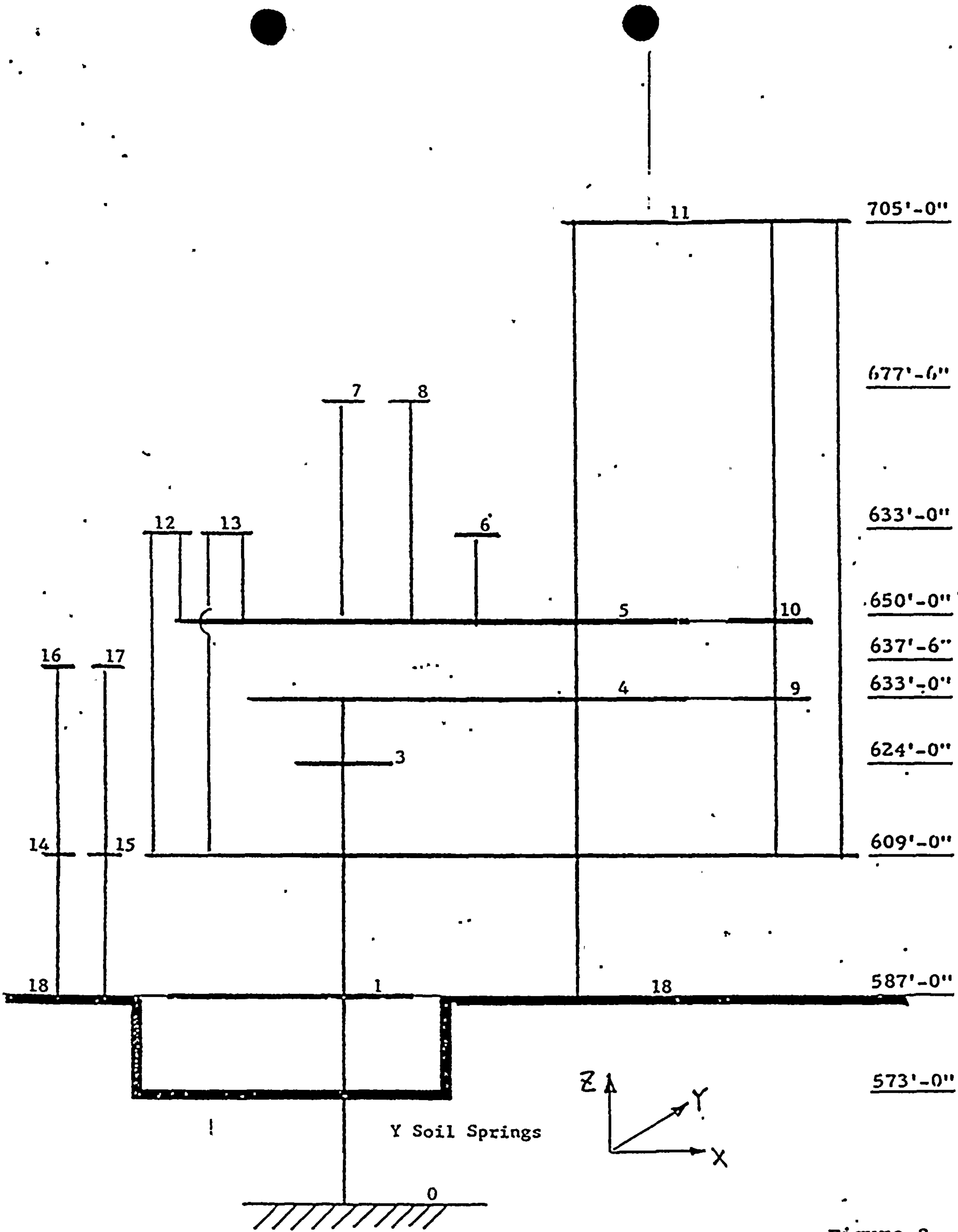


Figure 8

SCHEMATIC DIAGRAM OF MASSES AND Y SPRINGS

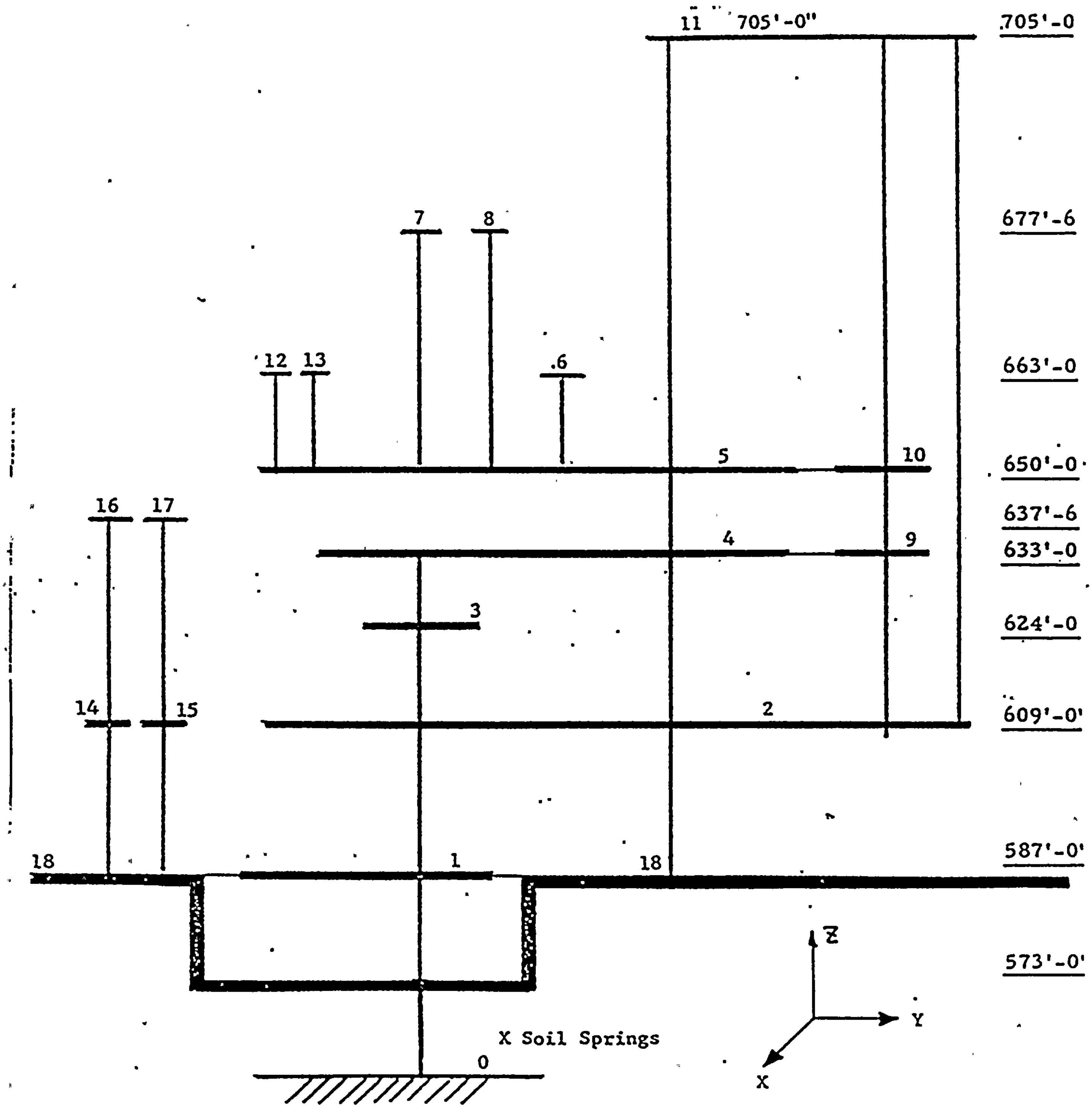
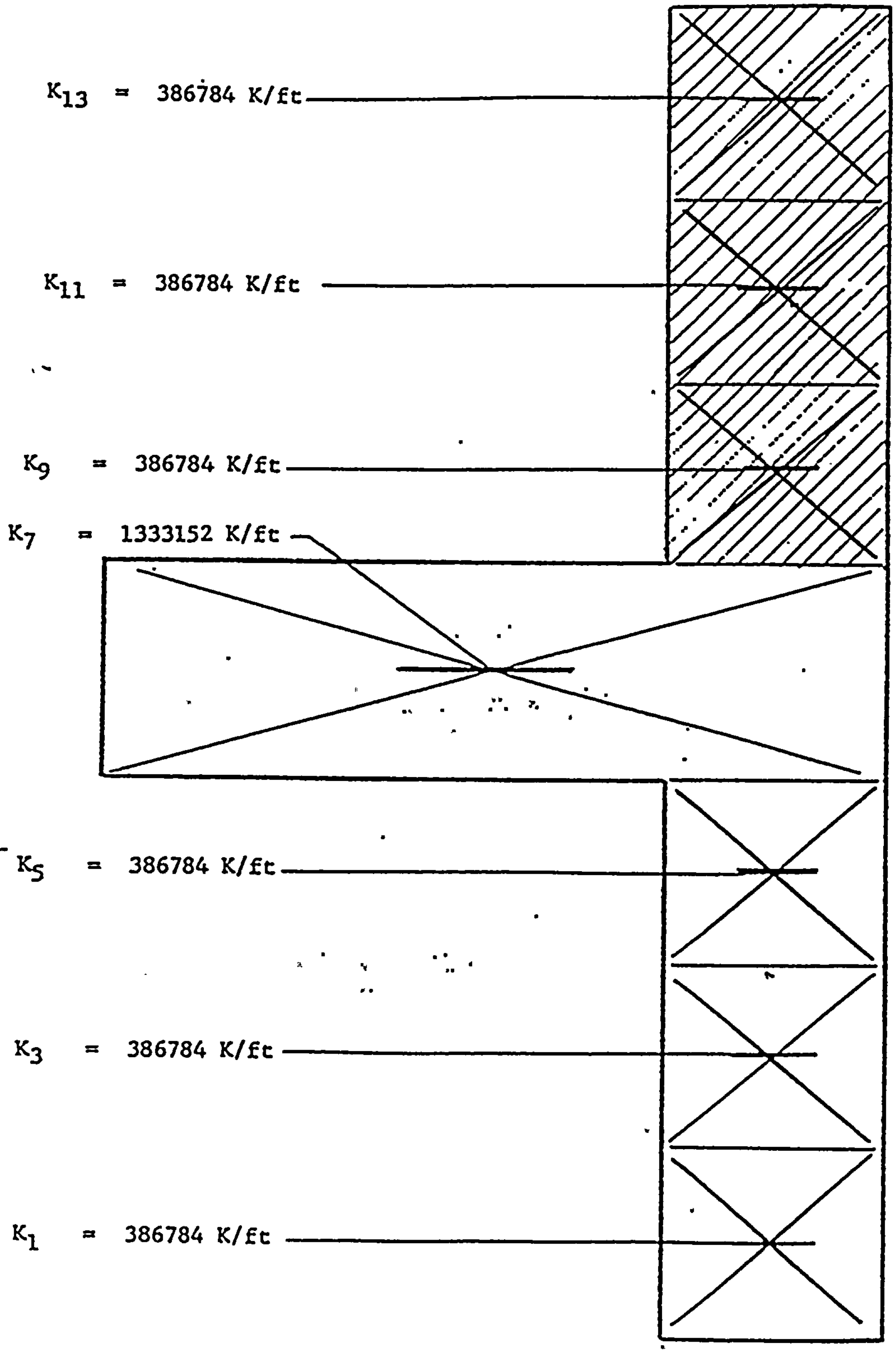


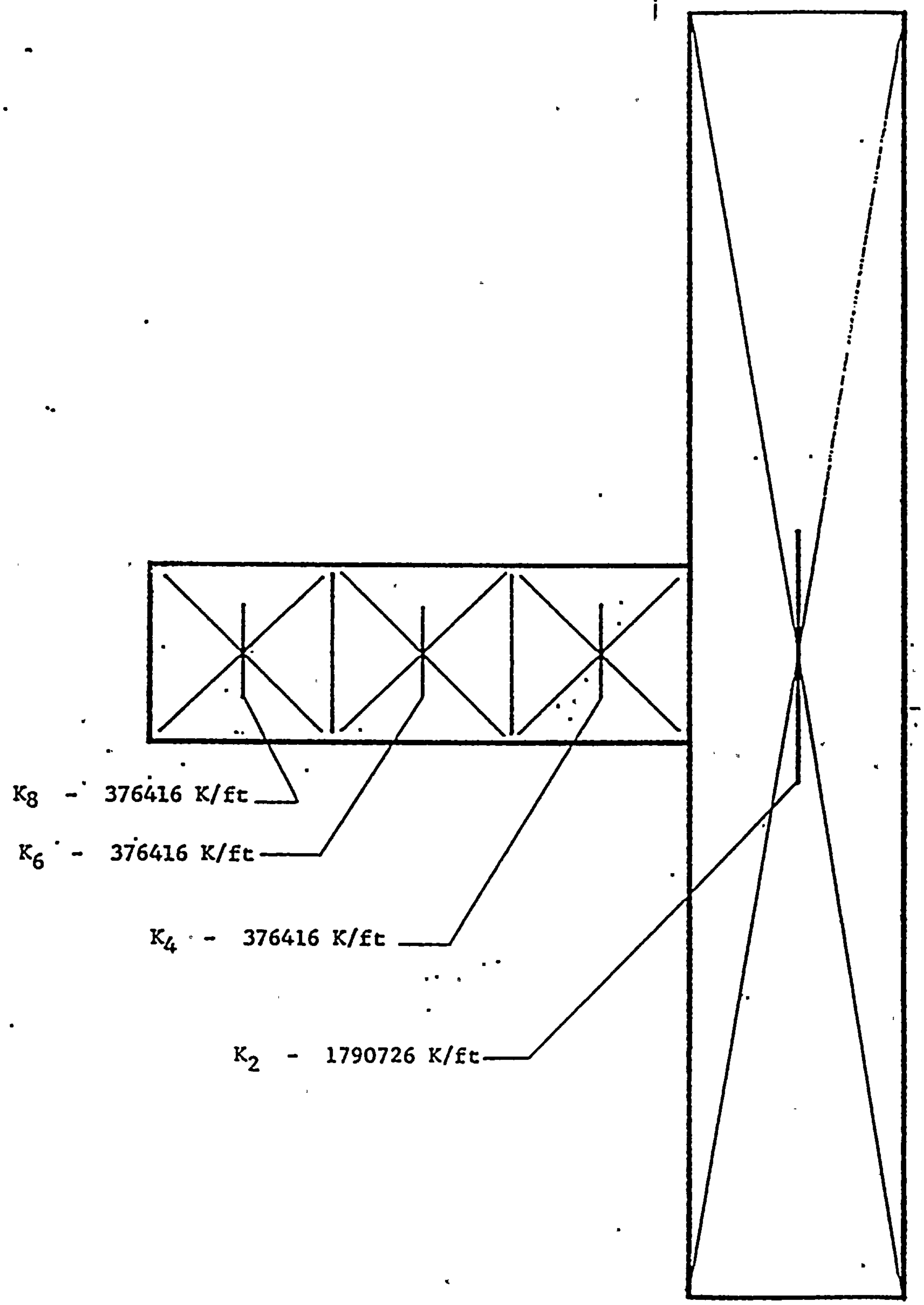
Figure 9

SCHEMATIC DIAGRAM OF MASSES AND X SPRINGS



Y SOIL SPRINGS

Figure 10



X SOIL SPRINGS

Figure 11

5% Damped Floor Response Spectrum (SQUG)

El.650'-0", Auxiliary Building, D.C.Cook

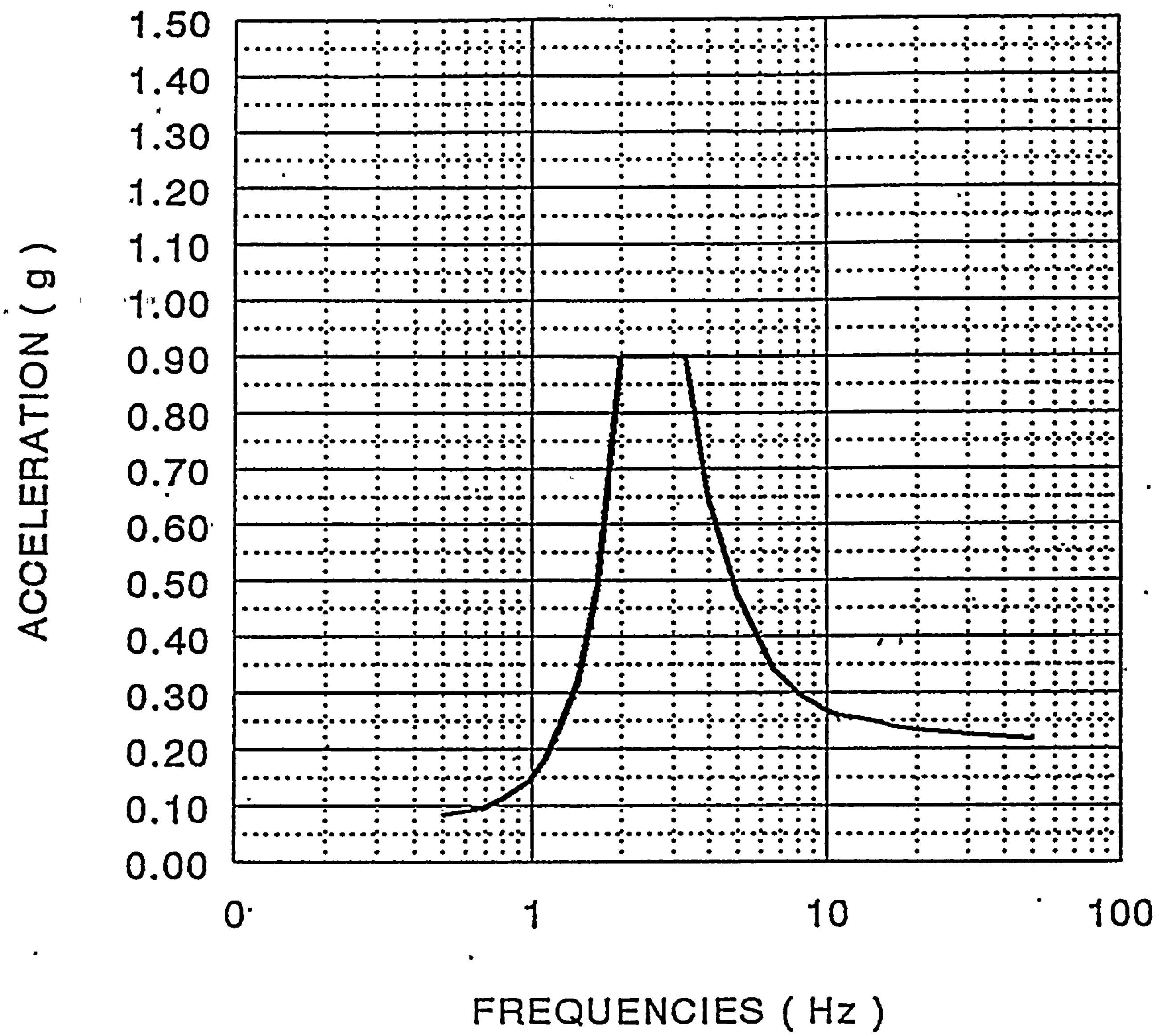


Figure 12