11-2-78

MEETING SUMMARY DISTRIBUTION

Docket File 50-237
NRC PDR 50-237
Local PDR 50-237
SEP Reading
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E. G. Case
V. Stello
B. Grimes
T. Ippolito
R. Reid
G. Knighton
V. Noonan
D. Eisenhut
A. Schwencer
D. Ziemann
D. K. Davis
G. Lainas
P. Check
T. J. Carter
L. Scinto, OELD
OI&E (3)
H. Smith
R. Fraley, ACRS (16)
T. B. Abernathy
J. R. Buchanan
SEPB Members (11)
J. McEwen, KMC
P. O'Connor
N. M. Newmark
W. J. Hall
J. D. Stevenson, JDS-McKee
R. P. Kennedy, EDAC
F. J. Tokarz, LLL
R. Murray, LLL
G. Bagchi, NRC, RES
J. S. Graves, CECo
R. F. Janacek, CECo
K. B. Ramsden, CECo
D. Wozniak, CECo
N. P. Smith, CECo
H. Gustin, CECo
M. S. Turbak, CECo
R. Yungk, Dresden Tech. Staff
B. Shelton, Dresden
P. D. Baughman, YAECo
J. W. Stacey, YAEC
J. W. Wujcdga, Dresden
P. Hendrikson, GE, Licensing
D. Butcher, GE, I&SE
F. A. Hussain, GE
A. Fife, GE
R. E. Koppe, NSC
K. Kapur, NSC
G. R. Edwards, NUTECH
D. Strawson, MPR Associates
T. J. Victorine, Sargent & Lundy
W. R. Weaver, Sargent & Lundy
M. Askenazi, Sargent & Lundy
A. Walser, Sargent & Lundy
E. B. Branch, Sargent & Lundy
R. J. Mazza, Sargent & Lundy
M. Zar, Sargent & Lundy
G. A. Chauvin, Sargent & Lundy
G. T. Kitz, Sargent & Lundy

Memo
CCP

NOVEMBER 0 2 1978

Docket No. 50-237

MEMORANDUM FOR: D. K. Davis, Chief, Systematic Evaluation Program Branch, DOR

FROM: H. A. Levin, Systematic Evaluation Program Branch, DOR

SUBJECT: SUMMARY OF MEETING WITH COMMONWEALTH EDISON COMPANY - SENIOR SEISMIC REVIEW TEAM TOUR OF DRESDEN UNIT NO. 2

On October 23 and 24, 1978, the Senior Seismic Review Team (SSRT) met with representatives of Commonwealth Edison Company (CECo) (Members of SSRT and Attendees listed in Enclosure 1) to tour the Dresden 2 facility, to discuss technical questions relative to the seismic design of Dresden 2 and to identify and obtain seismic design information not available on the Dresden 2 docket. The meeting agenda is attached (Enclosure 2).

The October 23 morning session convened shortly after all attendees had completed a security and health physics indoctrination. Dr. Nathan M. Newmark, Chairman of the Senior Seismic Review Team, opened the meeting with a discussion of the purpose and scope of review of the SSRT seismic review of Dresden 2 (see Enclosure 3). After this discussion, Paul O'Connor, Dresden 2 Project Manager, and Howard Levin, Systematic Evaluation Program Branch, Seismic Coordinator, summarized details of the NRC staff and consultants review of the Dresden 2 docket and identified structures, components and systems which the SSRT desired to view on the tour. The following summarizes the discussion and identifies sources of docketed information that addresses items 1 through 12 of the SSRT request for information (letter dated October 1, 1978, from D. Ziemann to C. Reed).

1. Identification of specific reactor coolant system (RCS) components and any systems attached to the RCS which must retain their integrity during a seismic event to prevent a LOCA and ensure that safe shutdown equipment will function including minimum auxiliary systems and equipment that must function during and after a seismic event to safely shutdown and cooldown the reactor. This includes power supplies and instrumentation necessary for operation of safe shutdown equipment and necessary for the monitoring of core parameters.

   Reference: FSAR 12.1.2

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A. LOCA Prevention

1) Reactor Coolant system, including reactor vessel supports, recirculation pumps and supports, recirculation and riser piping.

2) All penetrations to reactor coolant system, including feedwater, steam, reactor water clean-up, HPCI, core spray, LPCI, etc. This is necessary only to the outermost containment isolation valve (except as noted below).

3) Main steam isolation valves, plus electromatic (4) and electropneumatic (1) relief valves.

4) Control rod drive hydraulic system, including piping to drives and electrical supplies.

5) Piping support systems (especially snubbers).

B. Assuming total loss of offsite power and no LOCA, the following safe-shutdown systems, in their entirety, should be reviewed. Some are also in Section A. above and some serve as backups in case "first line" systems are lost.

1) Isolation condenser

2) Isolation condenser fill systems

a. Clean demineralized H_2O

b. Contaminated demineralized H_2O

c. Fire water (actually service H_2O) - note Unit 2/3 tie-ins to Unit 1 screen wash pumps and diesel driven fire pump

3) Shutdown Cooling System

4) Reactor Building Closed Cooling Water System

5) Service Water System (crib house) (UMS)

6) 4 KV Emergency Buses - applicable cabling

7) 480 V Emergency Buses - applicable cabling

8) 125/250 VDC System (batteries) - applicable cabling

9) Diesel Generator Systems - applicable cabling - including fuel supplies and starting systems

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10) Necessary systems sensors, cables and power supplies

11) EMRV's target rock

Backups

12) HPCI

13) LPCI

14) Containment cooling service water

15) Standby Liquid Control System

16) Core Spray System

17) Reactor Water Cleanup System

2. A summary or abstract of the seismicity of the site, and the local foundation and soil conditions.

Reference: FSAR Section 2.7, PDAR Section I-2.5, I-2.8, III-2.0, III-4.0, Letter Report, "Geology and Hydrology of the Site of the Dresden No. 2 Unit, a Proposed Nuclear Power Plant, Grundy County, Illinois (AEC Docket No. 50-237)" - E. L. Meyer and Alfred Clebsch, Jr., U.S. Geological Survey.

3. The specific values of OBE and SSE or equivalent site ground motions used in design.

Reference: FSAR 12.1.1.3

OBE - 0.1 g vertical acc. = 2/3 horz. acc.
SSE - 0.2 g

4. The design spectra including ground and floor spectra for various damping levels actually used, for both OBE and SSE, for various structures and equipment.

Reference: FSAR Figure 12.1.2, 12.1.3, Amendment 13 - A.6, AM 13 Figure II.A.1, Amendment 19 - B.6 (FSAR 12.1.1.3, AM 13 - A.11 - Damping)

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Floor amplified response spectra were not found on the docket. CECo provided floor spectra computed by John A. Blume and Associates (see Enclosure 4).

In addition, the following document dated November 3, 1965, was submitted, "Dresden Unit 2 Nuclear Plant - Recommended Earthquake Criteria", for General Electric by John A. Blume and Associates (Enclosure 5).

The El Centro earthquake time history was used in the analysis of the reactor turbine building, ventilation stack and drywell.

5. The load combinations used in the design of the various safety-related or Category I structures and components of the facility.

   Reference: FSAR 12.1.1.3

6. The design allowable stresses, design codes, and/or other criteria used for the Category I structures and components.

   Reference: FSAR 12.1.1.3, Table 12.1.1

7. A tabulation of total combined stresses for key items, listing the individual contribution of dead load, live load, seismic, thermal and pressure, etc.

   Reference: Amendment 19 - Supplementary Seismic Design Information, Amendment 13 - Seismic

   CECo provided the following additional information (Enclosure 5).

   a) "Earthquake Analysis: Main Steam Lines", May 27, 1968.

   b) "Earthquake Analysis: Suppression Chamber Ring Header", August 29, 1968.

   c) "Report on the Earthquake Analysis of the Ventilation Stack", May 25, 1967.

   d) "Earthquake Analysis: Isolation Condenser", June 16, 1967.

   e) "Earthquake Analysis: Drywell", January 24, 1967.

   f) "Earthquake Analysis: Recirculation Loop Piping", December 6, 1968.

   g) "Earthquake Analysis: Reactor-Turbine Building", January 19, 1967.

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The above reports were written by John L. Blume and Associates for General Electric Company.

h) "Earthquake Analysis: Feedwater Lines", June 1, 1968, H. J. Sexton and Associates for General Electric Company.

i) "Economic Impact of Seismic Requirements on Nuclear Power Stations", E. B. Branch and R. J. Small, Paper GEC-P94, General Engineering Conference, Chicago, Illinois, March 11 - 12, 1971 (Enclosure 6).

8. List of equipment that have been seismically qualified, to what level and the method of qualification of each.

Reference: Amendment 19 - 6.B

9. A summary of changes to the facility as described in the FSAR which affect seismic Category I systems and structures.

Reference: Application for Full-Term Operating License, March 1973

10. A brief summary of tests and inspections of seismic Category I structures and systems identified in Question 1 which document the operating history of these items.

Reference: Application for Full-Term Operating License, March 1973, Section 2.1

11. Pressure test reports on the containment, or at least a summary of the results obtained in such tests.

Not located.

12. Any other pertinent information that would be helpful to the SSRT.

CECo provided photographs of various restraint installations in the plant.

The afternoon plant tour started directly after a break for lunch. The large group was broken down into several smaller groups of five or six individuals. The items viewed of particular interest included control room instrument panels and electrical panels, cable tray supports, piping and component supports, large valves, battery racks, the isolation condensor, core spray and LPCI pumps, diesel generators, torus supports CRD hydraulic

modules, and the Unit 2/3 crib house, circulation water and service water pumps. The tour was restricted to areas outside the drywell since the plant was operating. After the tour, the meeting reconvened to discuss items of interest and identify information required for the next days meeting.

On October 24, detailed engineering discussions were held in the Chicago offices of Sargent and Lundy, the original Architect - Engineer for Dresden 2. At the conclusion of the general technical discussion, the SSRT caucussed to summarize their findings, establish the need for additional information and identify assignments for members of the SSRT. The meeting reconvened after the caucus at which point Howard Levin summarized to CECo and their consultants the need for additional information in the following areas.

1. Clarification of the conservatism of using the El Centro time-history acceleration record with respect to frequency ranges where the El Centro response spectrum valleys fall below the design response spectrum; addressing whether the record was baseline corrected. The SSRT is specifically interested in determining whether this acceleation record was used to compute floor response spectra and if equipment falls in deficient frequency bands.

2. Clarification concerning the generation of floor response spectra addressing the method used to compute these spectra and for which facility they were computed.

3. Summary of analytical or qualitative methods of handling the effects of large eccentric masses (valves) on the piping system.

4. Brief summary addressing the seismic design of the reactor building crane including the actual input acceleration level used in design.

5. Design specifications including the seismic specifications or just the seismic specification if separate, for three examples of the following equipment.

   In addition, a design (stress) report for each of these equipment categories to the degree possible. The SSRT would like to review a cross-section of equipment located in different buildings, different elevations in those buildings and different manufacturers.

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a) column supported tank

b) skirt supported tank

c) vertical heat exchanger or cooler

d) horizontal heat exchanger or cooler

e) vertical pump

f) horizontal pump

g) motor

h) transformer

i) control panel

j) switch gear

6. Summary of design criteria used for the design of cable trays and duct work including any generic evaluations made.

7. Summary of design criteria for the design of the battery racks and/or design drawings and mass data to permit a scoping evaluation by the SSRT. The SSRT is specifically interested in quantifying the torsional effects due to varying longitudinal deformation of the racks.

8. An example of the methods of calculating stresses in the concrete and steel at the base of the reactor building outside wall for given shears, tension/compression and moments; discussing which loads were actually used (statically of dynamically determined) and whether checks were made to verify later analytical results.

Original signed by
Howard A. Levin

Howard A. Levin
Systematic Evaluation Program Branch
Division of Operating Reactors

Enclosures:
1. List of Attendees
2. Meeting Agenda - NOT RECD FILES
3. Charter of SSRT
4. Dresden 2 Amplified Floor Response Spectra
5. Misc. Design Reports (as stated)
6. Technical paper (as stated)

ENCL 5 + 6 - SEE RPTS, P.W.O.

OFFICE ➔		DOR:SEPB/S&P	DOR:ORB #2	DOR:SEPB/C
SURNAME ➔		HALevin:rj	PO'Connor	DKDavis
DATE ➔		11/1/78	11/1/78	11/2/78

ENCLOSURE 1

LIST OF ATTENDEES
OCTOBER 23, 1978
DRESDEN SITE

Senior Seismic Review Team (SSRT)

Nathan M. Newmark, NRC Consultant
William J. Hall, NRC Consultant
John D. Stevenson, NRC Consultant
Robert P. Kennedy, NRC Consultant
Frank J. Tokarz, NRC Consultant
Robert Murray, NRC Consultant
Howard A. Levin, NRC/SEP
Thomas M. Cheng, NRC/SEP
Kahtan N. Jabbour, NRC/SEP
Goutam Bagchi, NRC/RES

J. S. Graves, CECo
R. Yungk, Dresden, Tech. Staff
P. O'Connor, NRC/ORB #2
T. J. Victorine, Sargent & Lundy
W. R. Weaver, Sargent & Lundy
M. Askenazi, Sargent & Lundy
R. E. Koppe, NSC
R. F. Janecek, CECo
K. B. Ramsden, CECo
G. R. Edwards, NUTECH
A. Walser, Sargent & Lundy
D. Wozniak, CECo
A. Fife, GE
J. McEwen, KMC, Inc.
D. Strawson, MPR Associates
J. W. Stacey, YAECo
N. P. Smith, CECo
F. A. Hussain, GE
K. Kapur, NSC
J. W. Wujcdga, Dresden
H. Gustin, CECo
D. Butcher, GE, I&SE
P. Henrikson, GE, Licensing
E. B. Branch, Sargent & Lundy
R. J. Mazza, Sargent & Lundy
B. Shelton, Dresden

LIST OF ATTENDEES
OCTOBER 24, 1978
SARGENT & LUNDY OFFICES

Senior Seismic Review Team (SSRT)

Nathan M. Newmark, NRC Consultant
William J. Hall, NRC Consultant
John D. Stevenson, NRC Consultant
Robert P. Kennedy, NRC Consultant
Frank J. Tokarz, NRC Consultant
Robert Murray, NRC Consultant
Howard A. Levin, NRC/SEP
Thomas M. Cheng, NRC/SEP
Kahtan N. Jabbour, NRC/SEP
Goutam Bagchi, NRC/RES

P. O'Connor, NRC/ORB #2
N. P. Smith, CECo
J. S. Graves, CECo
R. F. Janecek, CECo
R. J. Mazza, Sargent & Lundy
A. K. Singh, Sargent & Lundy
A. Walser, Sargent & Lundy
G. R. Edwards, NUTECH
D. Strawson, MPR Associates
J. McEwen, KMC, Inc.
J. W. Stacey, YAECo
M. Askenazi, Sargent & Lundy
P. D. Baughman, YAECo
E. R. Weaver, Sargent & Lundy
M. Zar, Sargent & Lundy
G. A. Chauvin, Sargent & Lundy
G. T. Kitz, Sargent & Lundy
C. B. Branch, Sargent & Lundy
K. B. Ramsden, CECo, SNED
T. J. Victorine, Sargent & Lundy
M. S. Turbak, CECo
K. Kapur, NSC
R. E. Koppe, NSC
D. Wozniak, CECo
A. Fife, GE
P. Hendrikson, GE
F. Hussain, GE

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SURNAME ➤						
DATE ➤						

ENCLOSURE 3

SEP SEISMIC REVIEW - EVALUATION OF SELECTED OPERATING PLANTS

SENIOR SEISMIC REVIEW TEAM

CHARTER

A. Purpose

To determine the margins of safety of existing nuclear plants relative to those designed under current standards, criteria, and procedures; and to define the nature and extent of retrofitting to bring these plants to acceptable levels of capability if they are not already at such levels.

B. Scope

To review seismicity and site conditions, structural and equipment capability to resist changed seismic hazards, and margins of safety in relation to current requirements, for all safety-related components elements, and systems. This may be done on the basis of either probability studies, deterministic evaluations, or a combination of these approaches.

C. Depth of Review

The review will consist of two parts, as follows:

1. A preliminary study of the plant considered based on: the data for geology, seismology and site conditions contained in the FSAR & PSAR; the design criteria, load combinations and methods of analysis used in the Operating License review; changes in seismicity evaluations for the region; changes in seismic design and/or design criteria since the OL review; and a site visit to make a spot check visually of selected parts or components of the structure, equipment and engineered safeguards.

2. A detailed review of any items identified in (1) as being possibly questionable, or deficient; a listing of items or criteria or procedures used in design or construction which deviate from current criteria; an engineering analysis of such items in sufficient depth to enable a judgment to be made by the review team as to the acceptability of such deviations; a final judgment of the acceptability of the actual safety margins of all important items in the facility.

ENCLOSURE 4

October 13, 1969

Telecon w/ R. Gill GE.

Subject: Blume Report - Dresden - Seismic Analysis Combined Reactor & Turbine Bldg.

Ralph says the Turbine Bldg N-S acceleration curve is incorrect. The 2.4g at 581 is more like .8g at 600' and .9g at 625'

Therefore the attached shows the Reactor Bldg coefficients can be used on the Turbine Bldg.

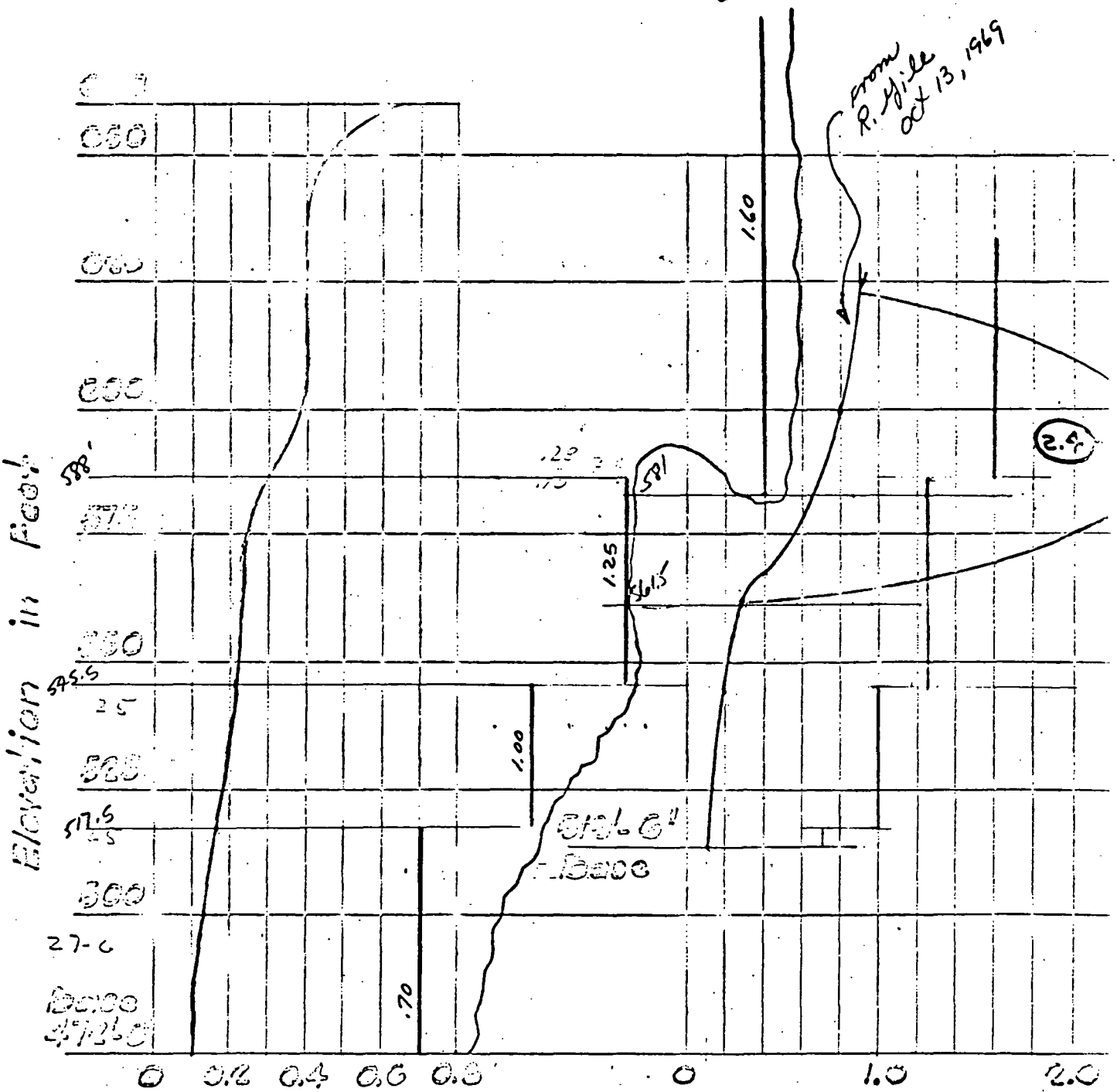
583

JOHN A. BLUME & ASSOCIATES, ENGINEERS

612 HOWARD STREET • SAN FRANCISCO 5, CALIFORNIA

JOB NO. | JOB – Dresden Unit 2 | BY | DATE

CLIENT | SUBJECT Reactor – Turbine Bldg. | CHK'D | DATE



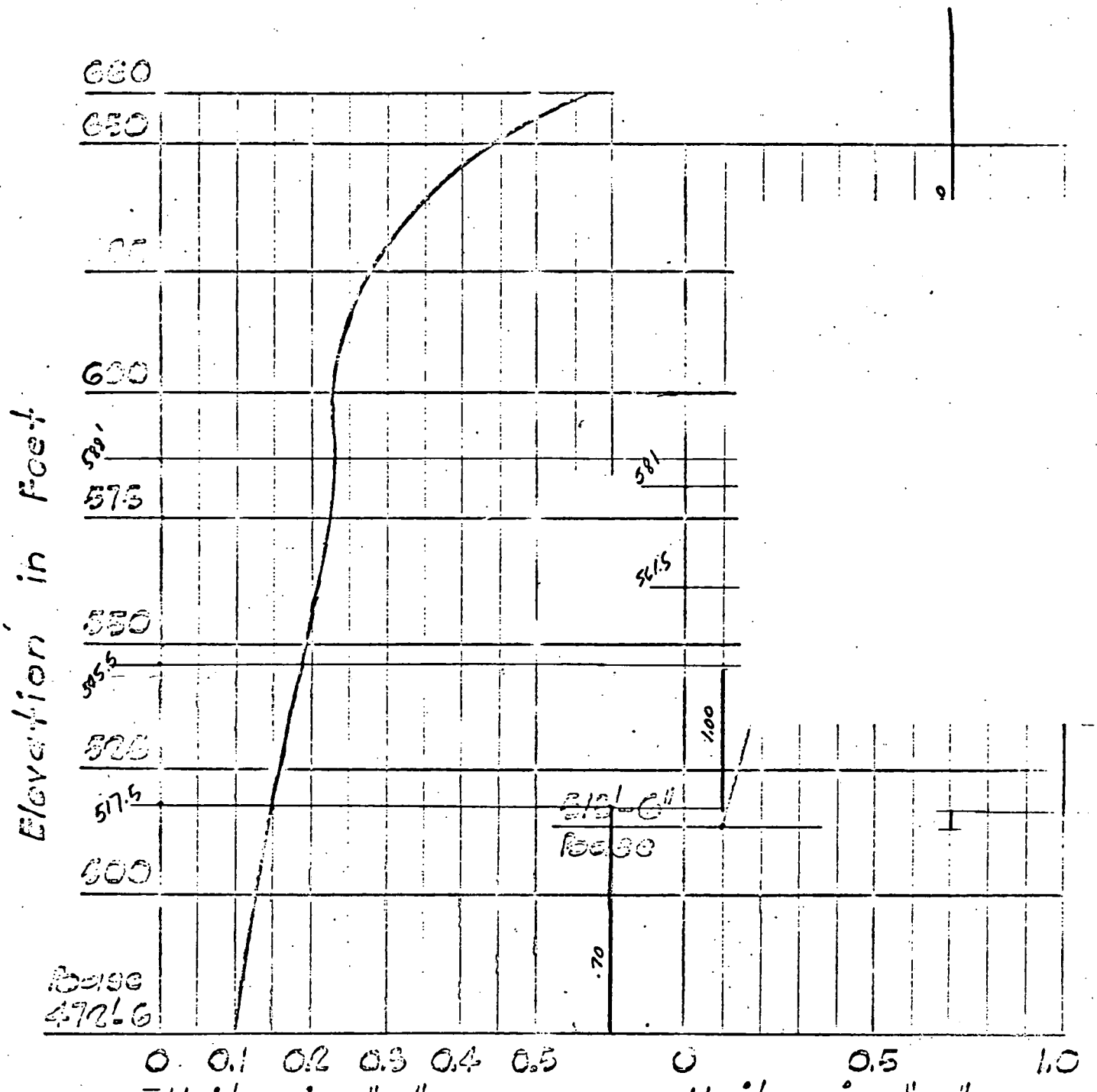
Acceleration Diagram
Under Seismic Loads
Near [illegible]

JOHN A. BLUME & ASSOCIATES, ENGINEERS

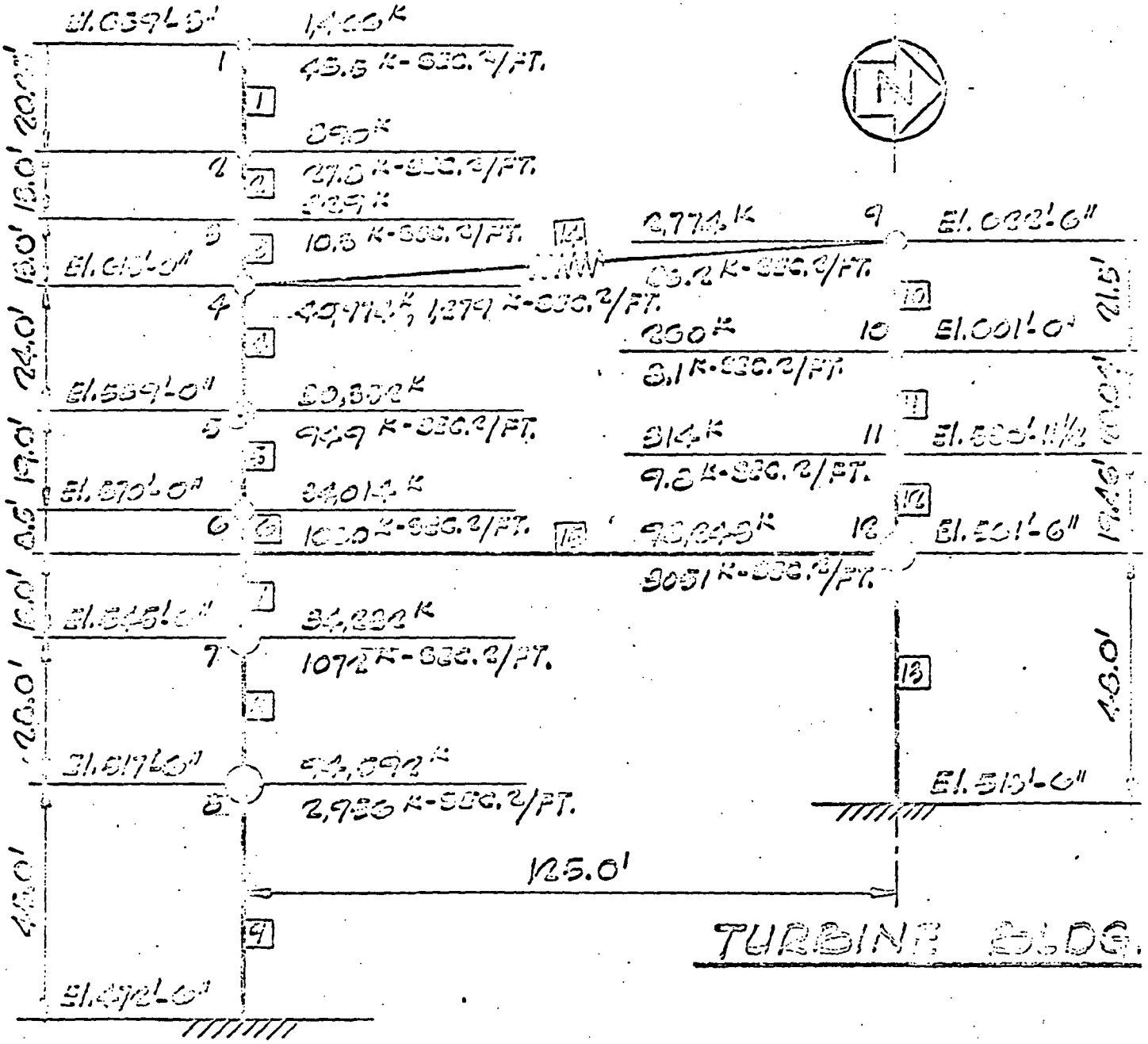
612 HOWARD STREET • SAN FRANCISCO 5, CALIFORNIA

JOB NO. | JOB Oroville 2.25 | BY | DATE

CLIENT | SUBJECT Reactor - Turbine Bldg. | CHK'D | DATE



Acceleration Diagram
Under Maximum Loads
E-W Direction

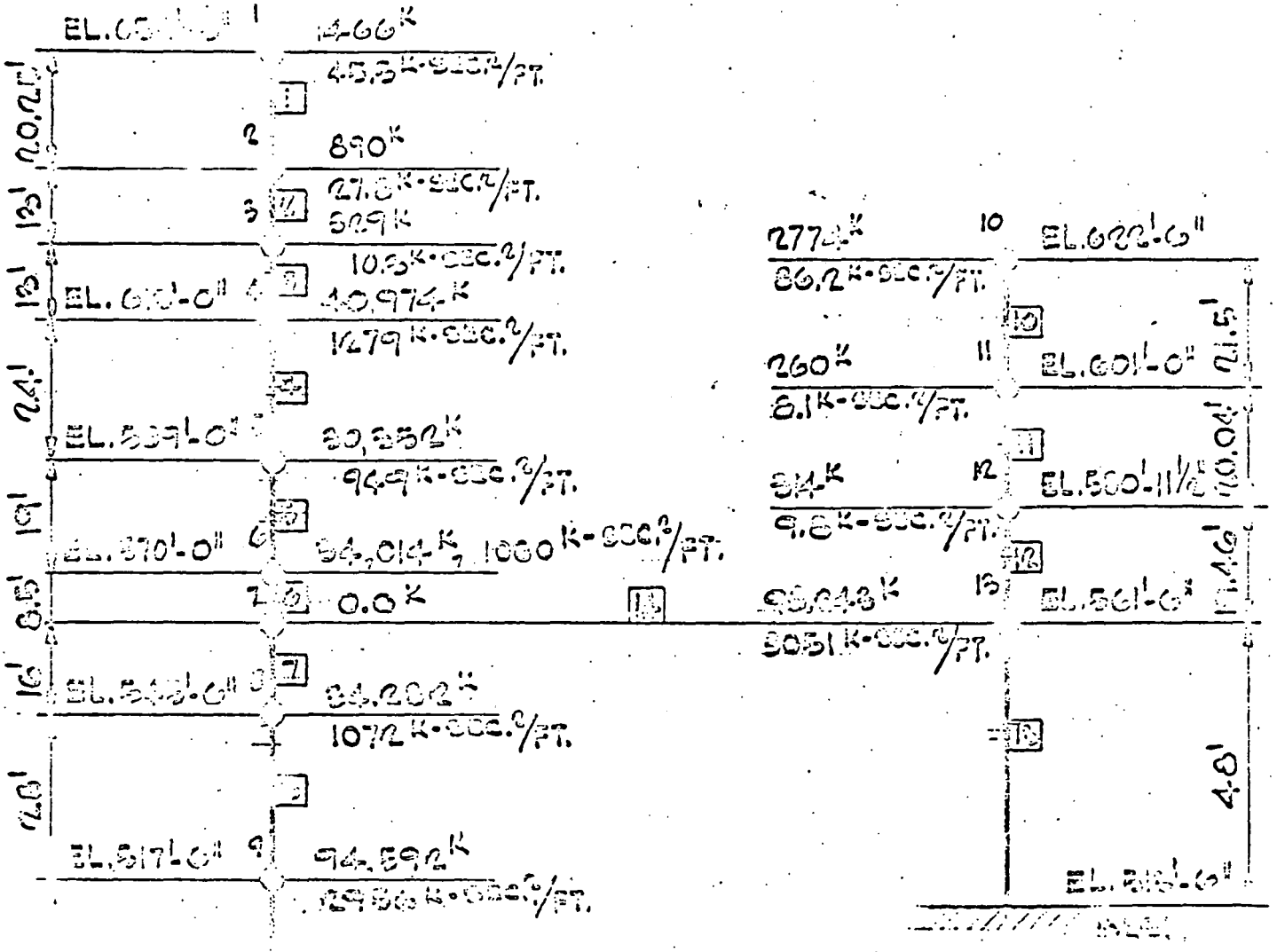


DRESDEN 2 & 3
MATHEMATICAL MODEL
EARTHQUAKE IN N-S DIRECTION

JOHN A. BLUME AND ASSOCIATES, ENGINEERS

512 HOWARD STREET SAN FRANCISCO

MATHEMATICAL MODEL
EARTHQUAKE IN
E-W DIRECTION



SARGENT LUNDY ENGINEERS

CLIENT
PROJECT JOB NO.
DESIGN BY DATE
CHECKED BY DATE SHEET OF

CALCS. FOR

PLATE 7

x	f	g	
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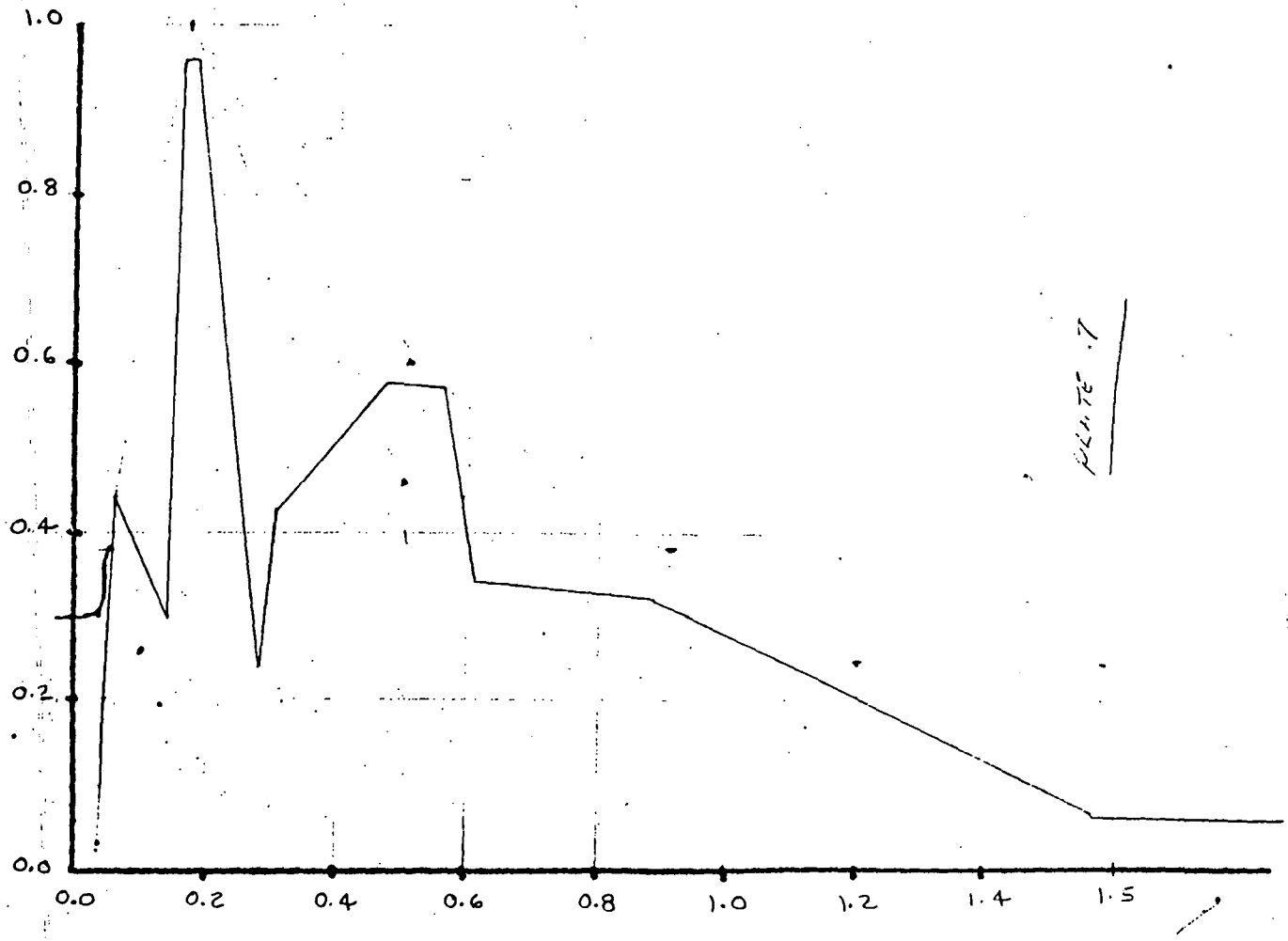
.04	25.00	.1	.3
.05	20.00	.2	.35
.06	16.67	.24	.38
.17	5.88	.96	1.00
.50	2.00	.58	.46 .6
.90	1.11	.33	.28
1.20	.83	.20	.25
1.50	.67	.06	.25
4		CONST	.09
4.5		↓	.06
5.0			.032
8.0			.02
16.0			.008
20.0			.001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0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.5

JOHN A BLUME + ASSOC. ENGINEERS

RESPONSE ACCELERATION SPECTRUM

- MASS 4 -NS

DAMPING RATIO- 0.005, EC N-S

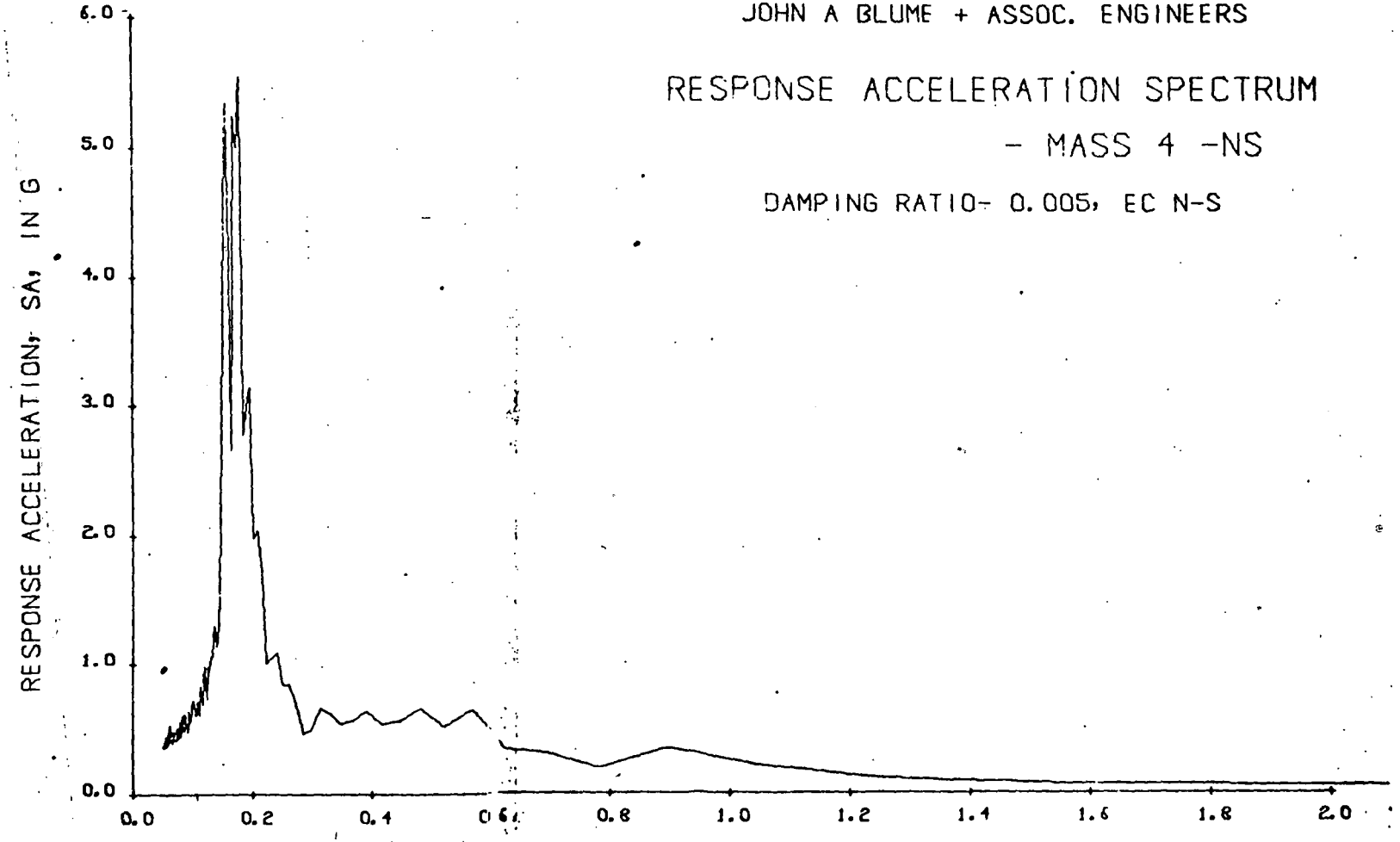


PLATE NO. 31

JOHN A BLUME + ASSOC. ENGINEERS

RESPONSE ACCELERATION SPECTRUM

- MASS 4 -EW

DAMPING RATIO- 0.005, EC N-S

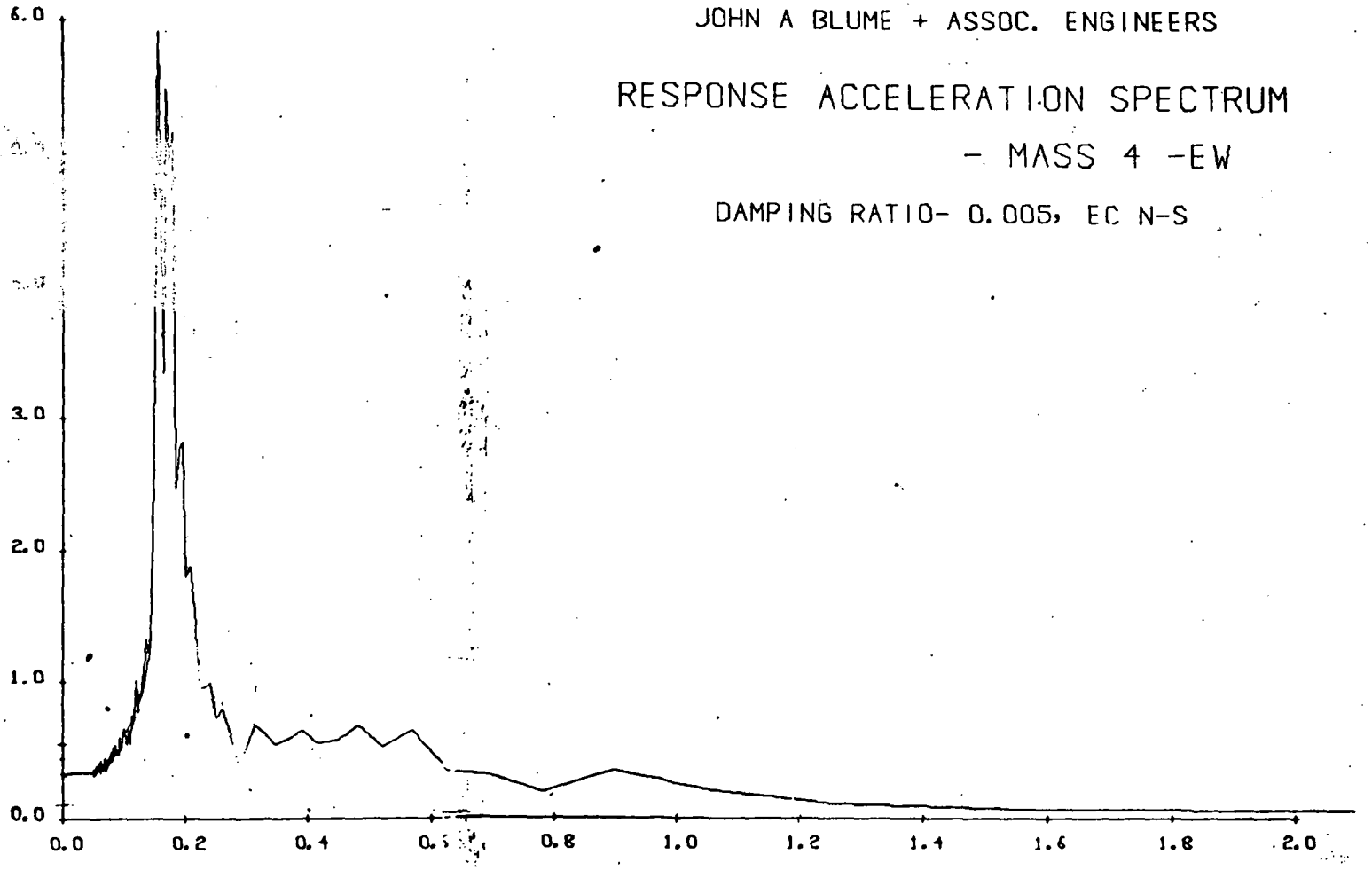


PLATE NO. 34

JOHN A BLUME + ASSOC. ENGINEERS

RESPONSE ACCELERATION SPECTRUM

- MASS 4 -EW

DAMPING RATIO- 0.005, EC N-S

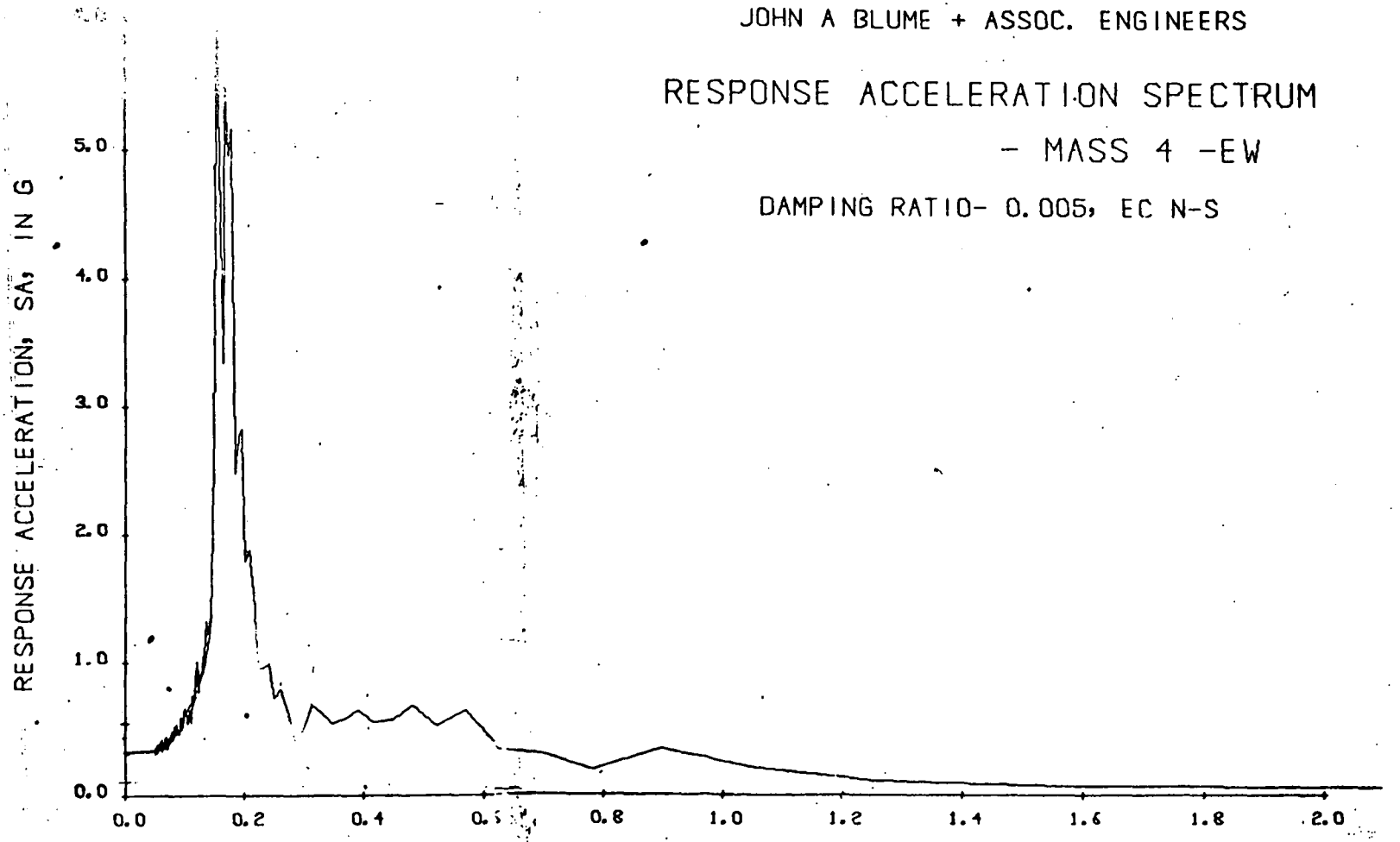


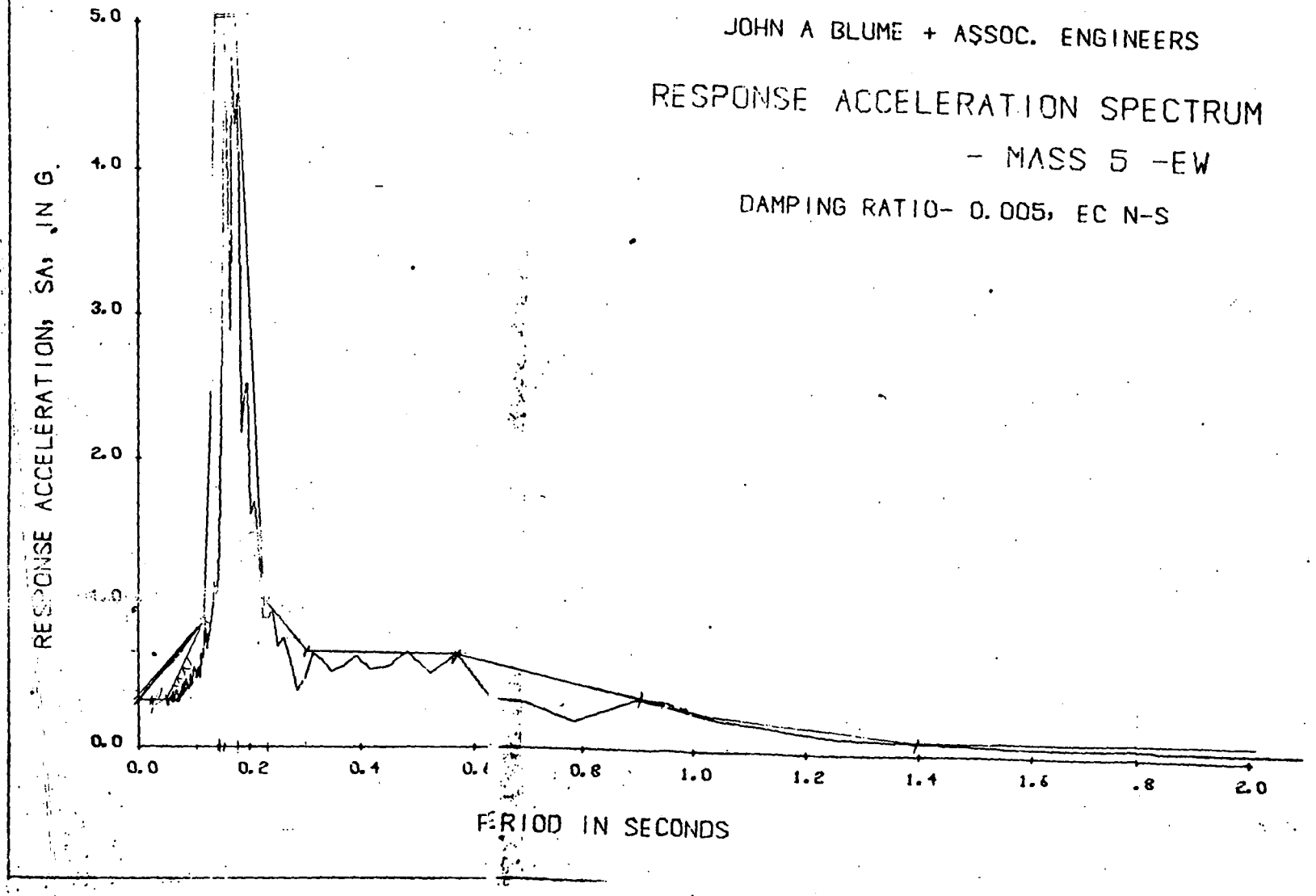
PLATE NO. 34

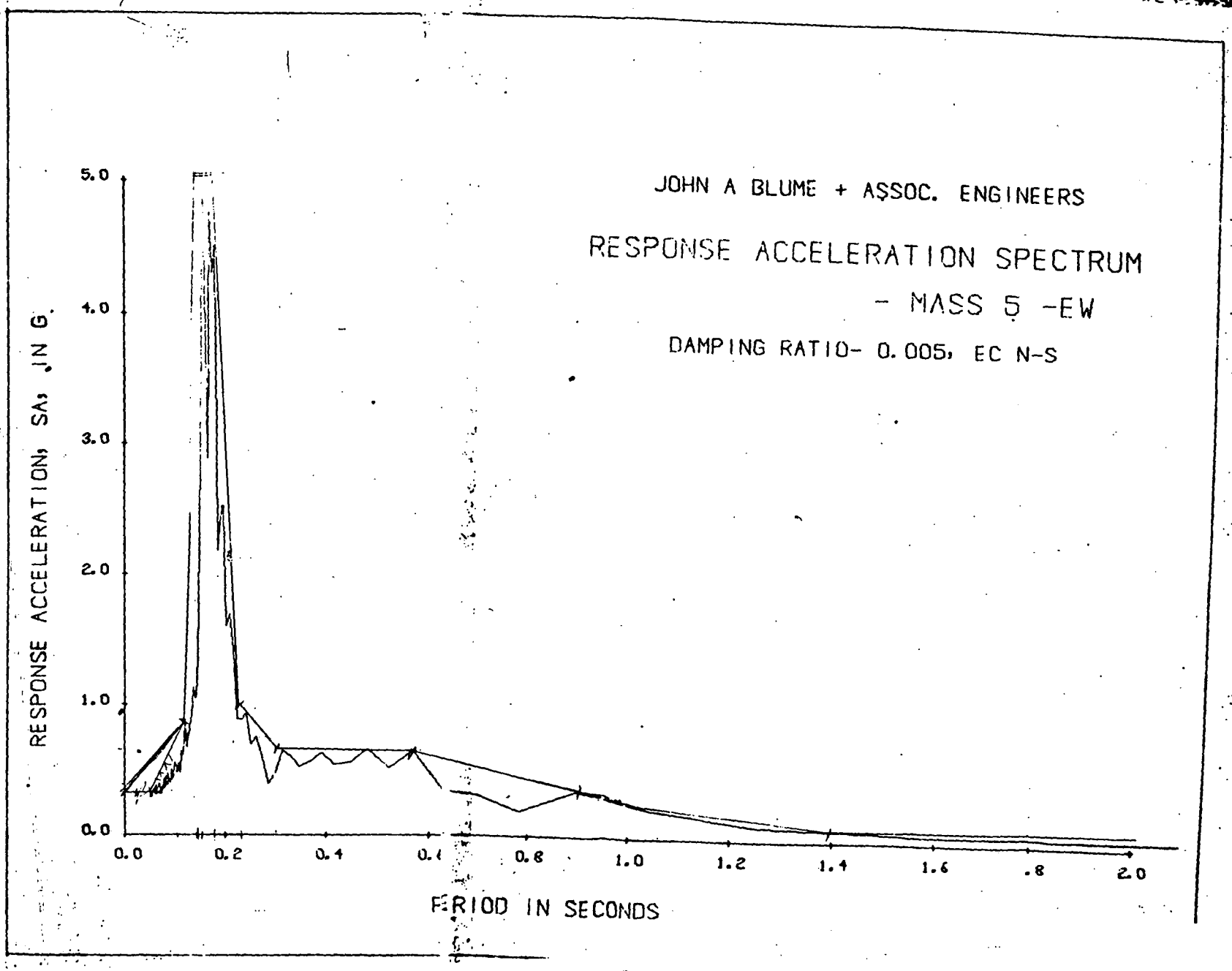
JOHN A BLUME + ASSOC. ENGINEERS

RESPONSE ACCELERATION SPECTRUM

- MASS 5 -EW

DAMPING RATIO- 0.005, EC N-S




JOHN A BLUME + ASSOC. ENGINEERS
RESPONSE ACCELERATION SPECTRUM
- MASS 5 -EW
DAMPING RATIO- 0.005, EC N-S
RESPONSE ACCELERATION, SA, IN G.
5.0
4.0
3.0
2.0
1.0
0.0
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
PERIOD IN SECONDS

JOHN A BLUME + ASSOC. ENGINEERS

RESPONSE ACCELERATION SPECTRUM

- MASS 6 -NS

DAMPING RATIO- 0.005, EC N-S

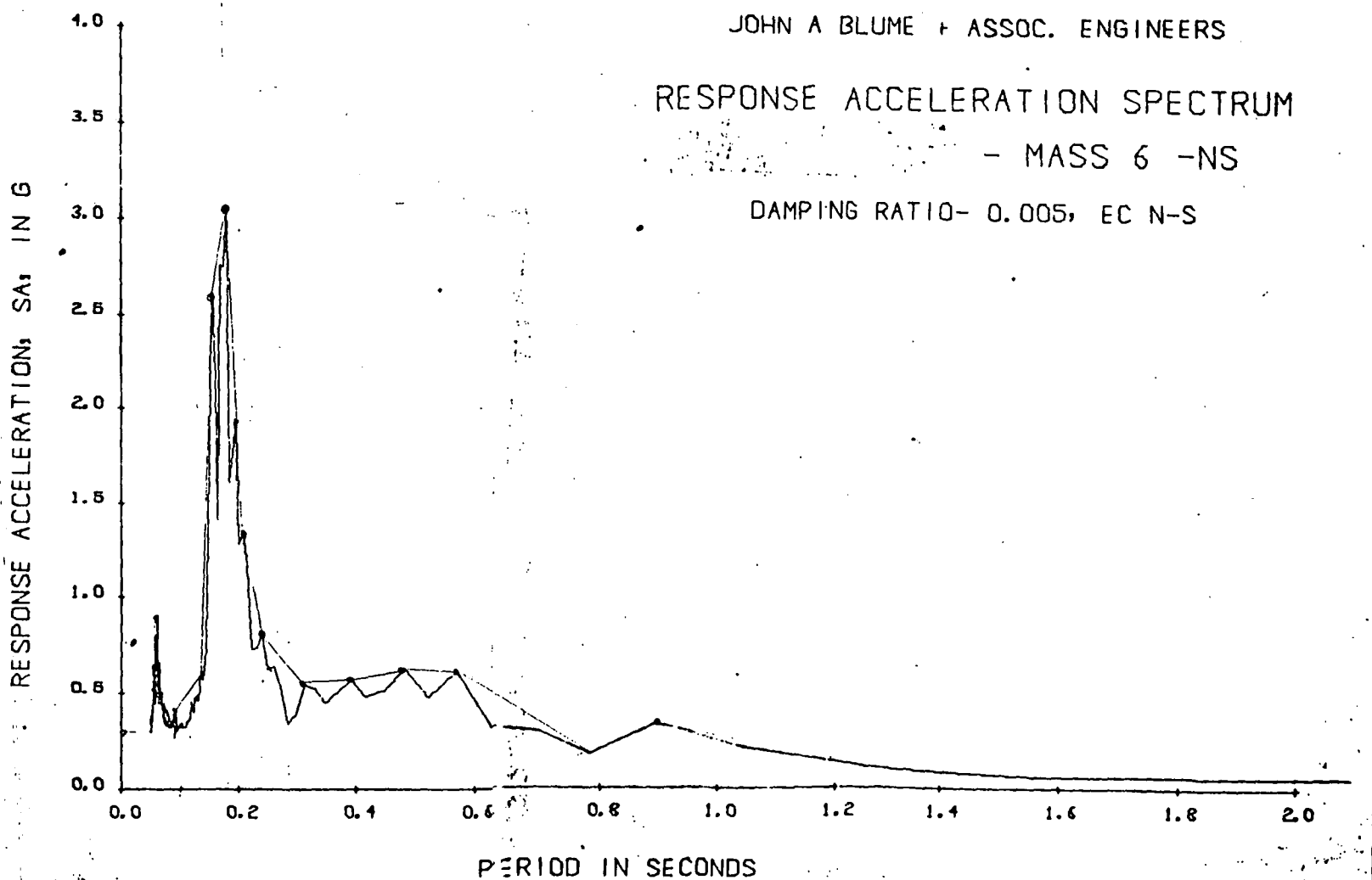


PLATE NO. 19

JOHN A BLUME + ASSOC. ENGINEERS

RESPONSE ACCELERATION SPECTRUM

- MASS 6 -EW

DAMPING RATIO- 0.005, EC N-S

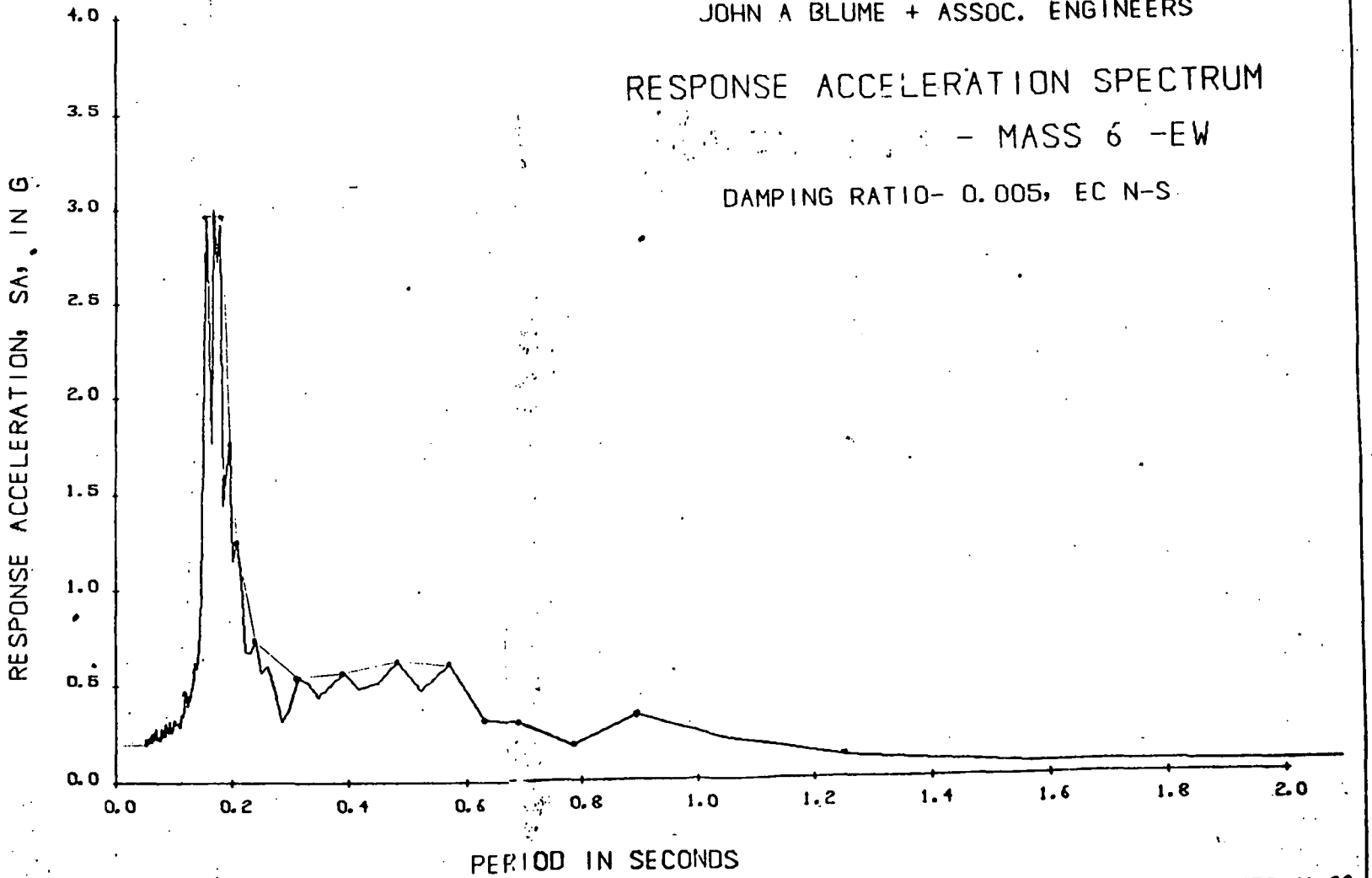


PLATE NO. 22

JOHN A BLUME + ASSOC. ENGINEERS

RESPONSE ACCELERATION SPECTRUM

- MASS 7 -NS

DAMPING RATIO- 0.005, EC N-S

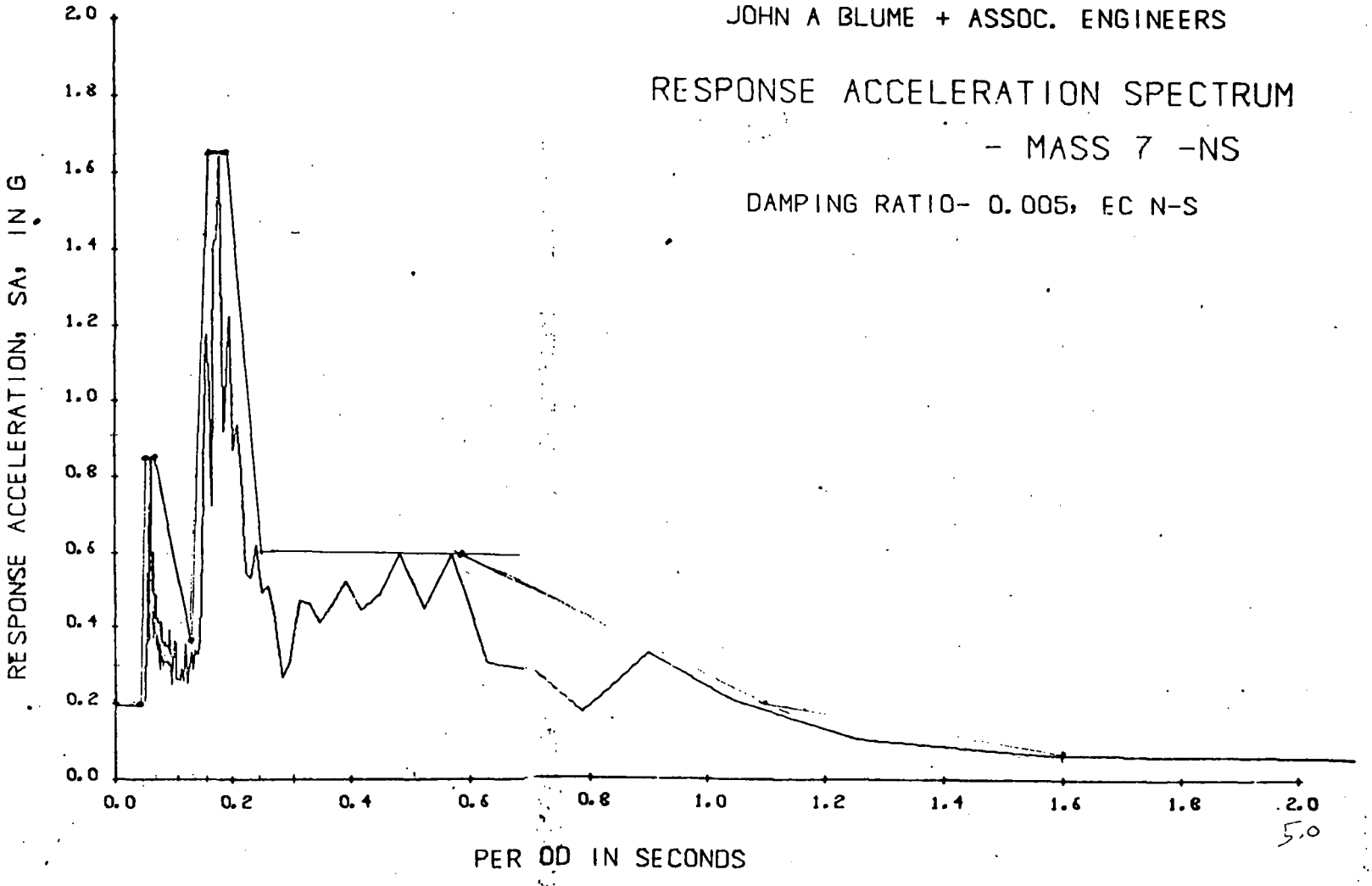


PLATE NO. 13

JOHN A BLUME + ASSOC. ENGINEERS

RESPONSE ACCELERATION SPECTRUM

- MASS 7 -EW

DAMPING RATIO- 0.005, EC N-S

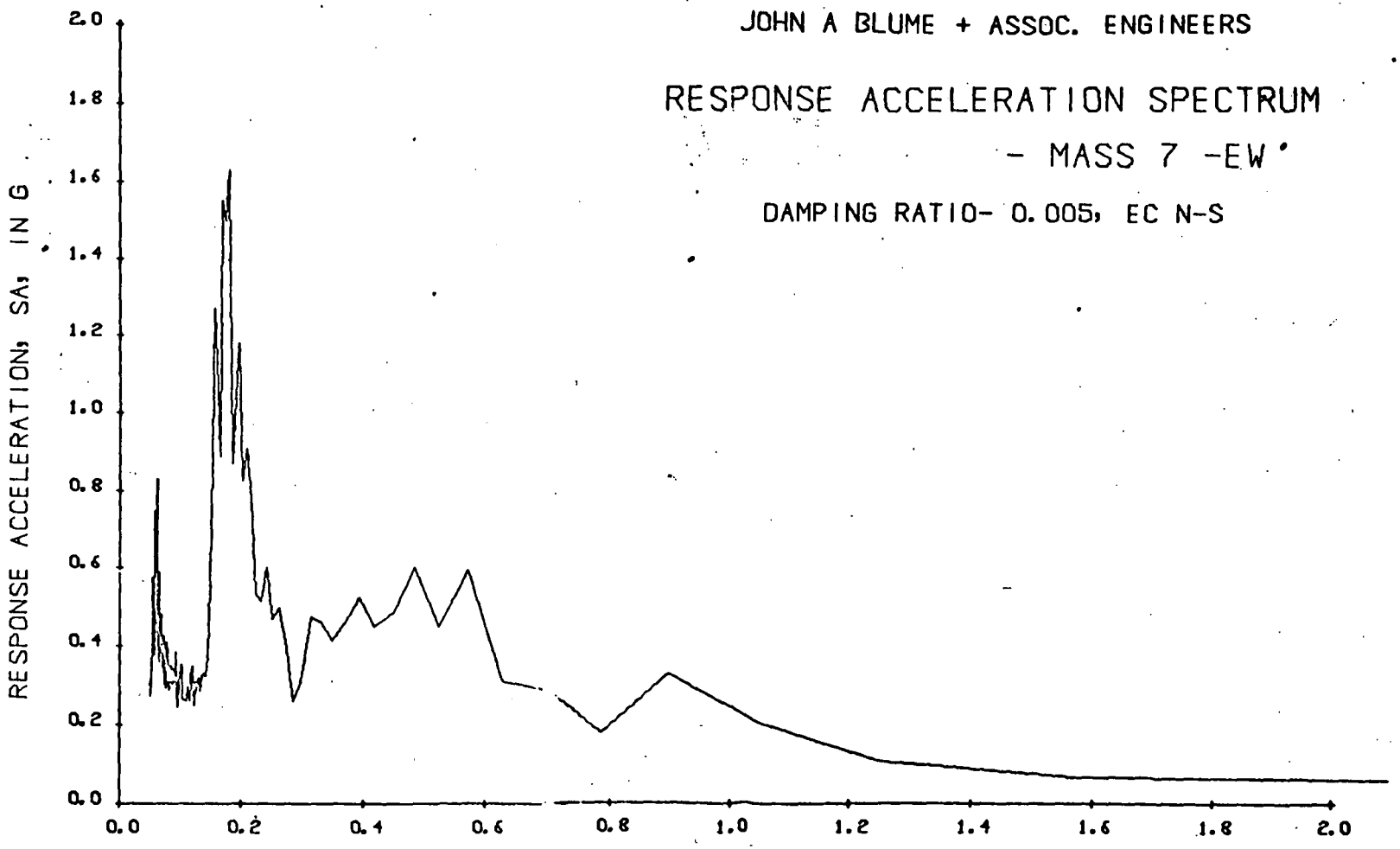


PLATE Nº 16

JOHN A BLUME + ASSOC. ENGINEERS

RESPONSE ACCELERATION SPECTRUM

- MASS 8 -NS.

DAMPING RATIO- 0.005, EC N-S

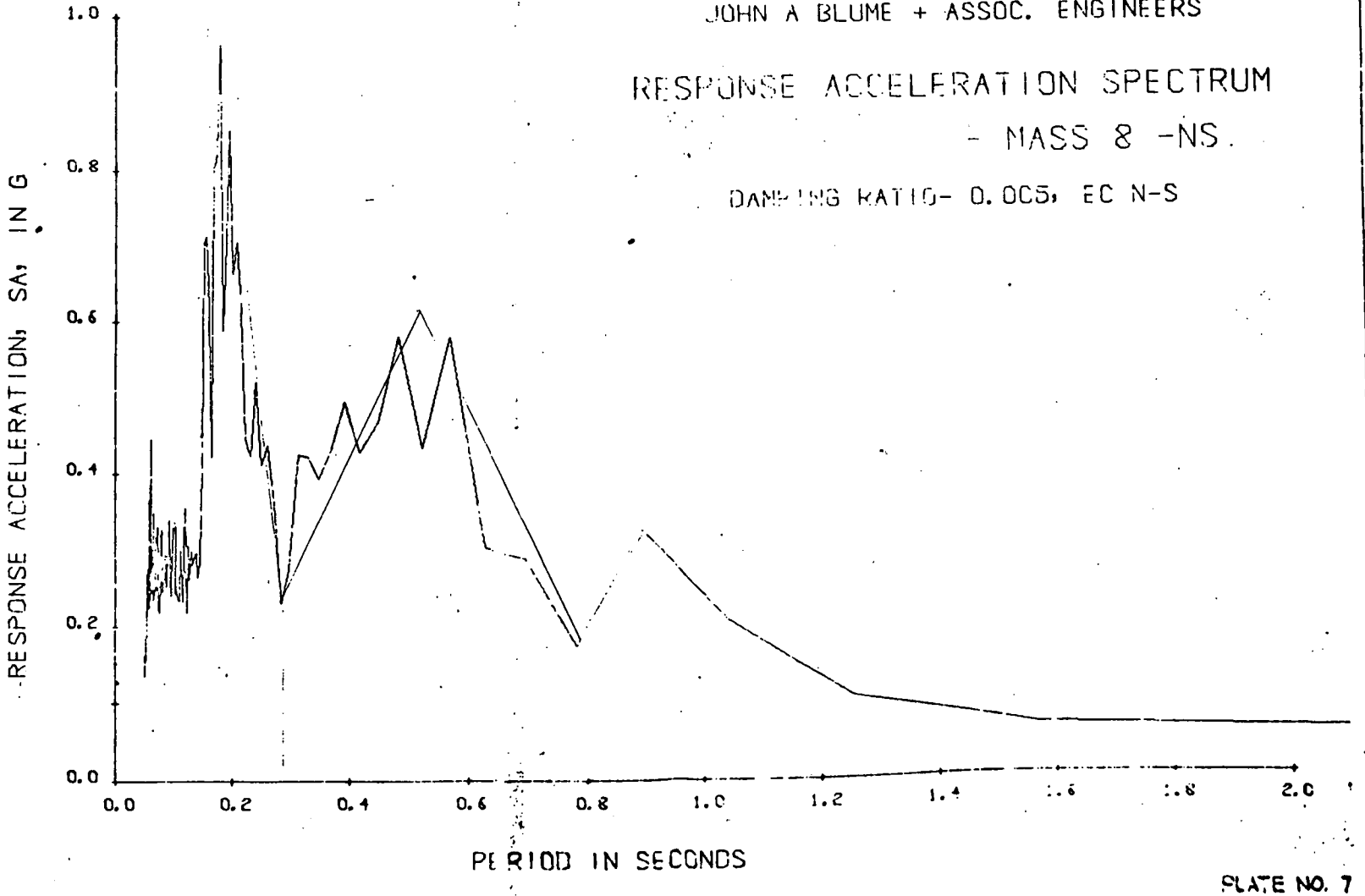


PLATE NO. 7

JOHN A BLUME + ASSOC. ENGINEERS

RESPONSE ACCELERATION SPECTRUM

- MASS 8 -EW

DAMPING RATIO- 0.005, EC N-S

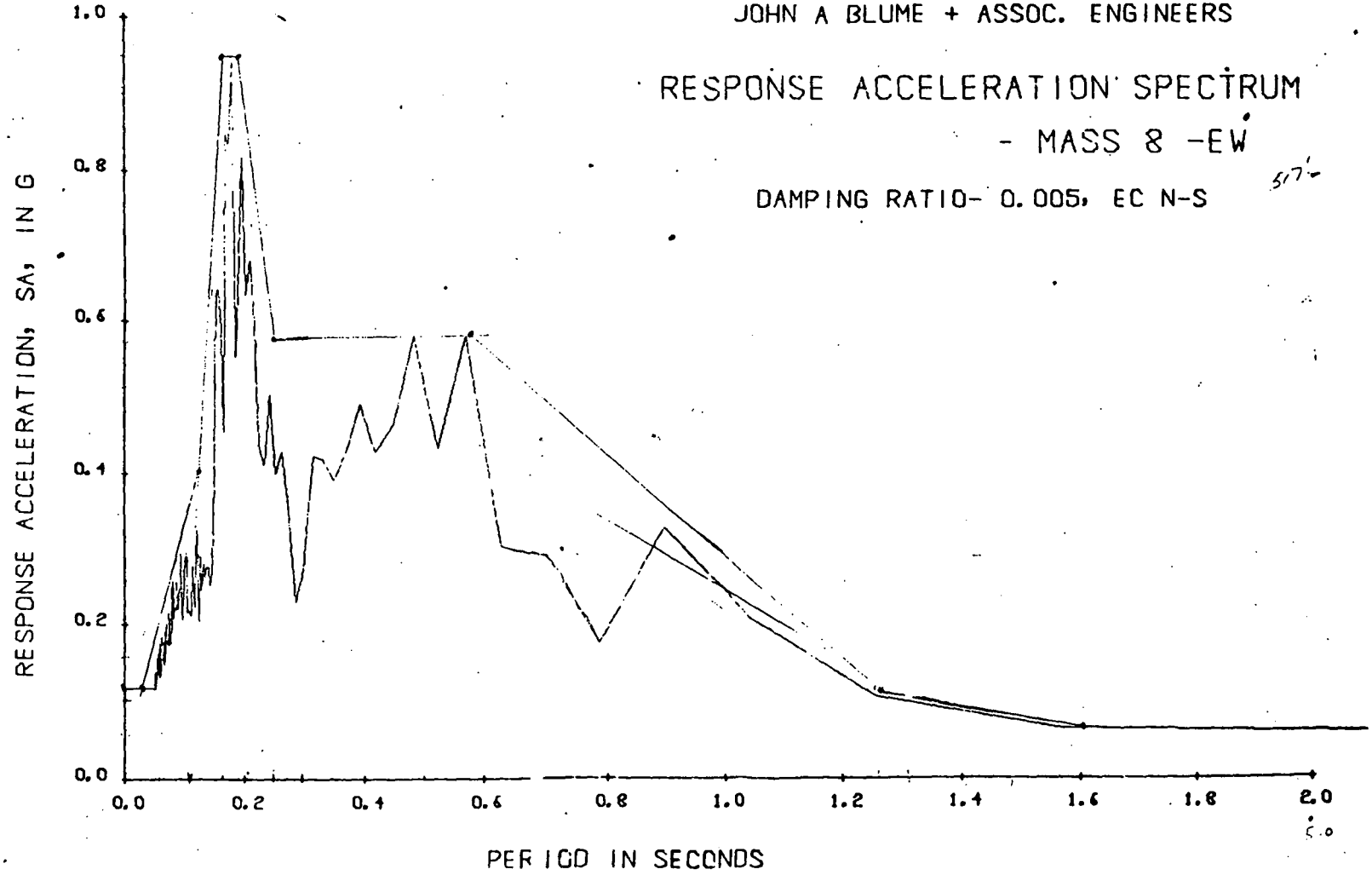


PLATE NO. 10

JOHN A BLUME + ASSOC. ENGINEERS

RESPONSE ACCELERATION SPECTRUM
EL-CENTRO 1940 N-S COMPONENT

GROUND MOTION NORMALIZED TO 0.1G

DAMPING RATIO 0.005

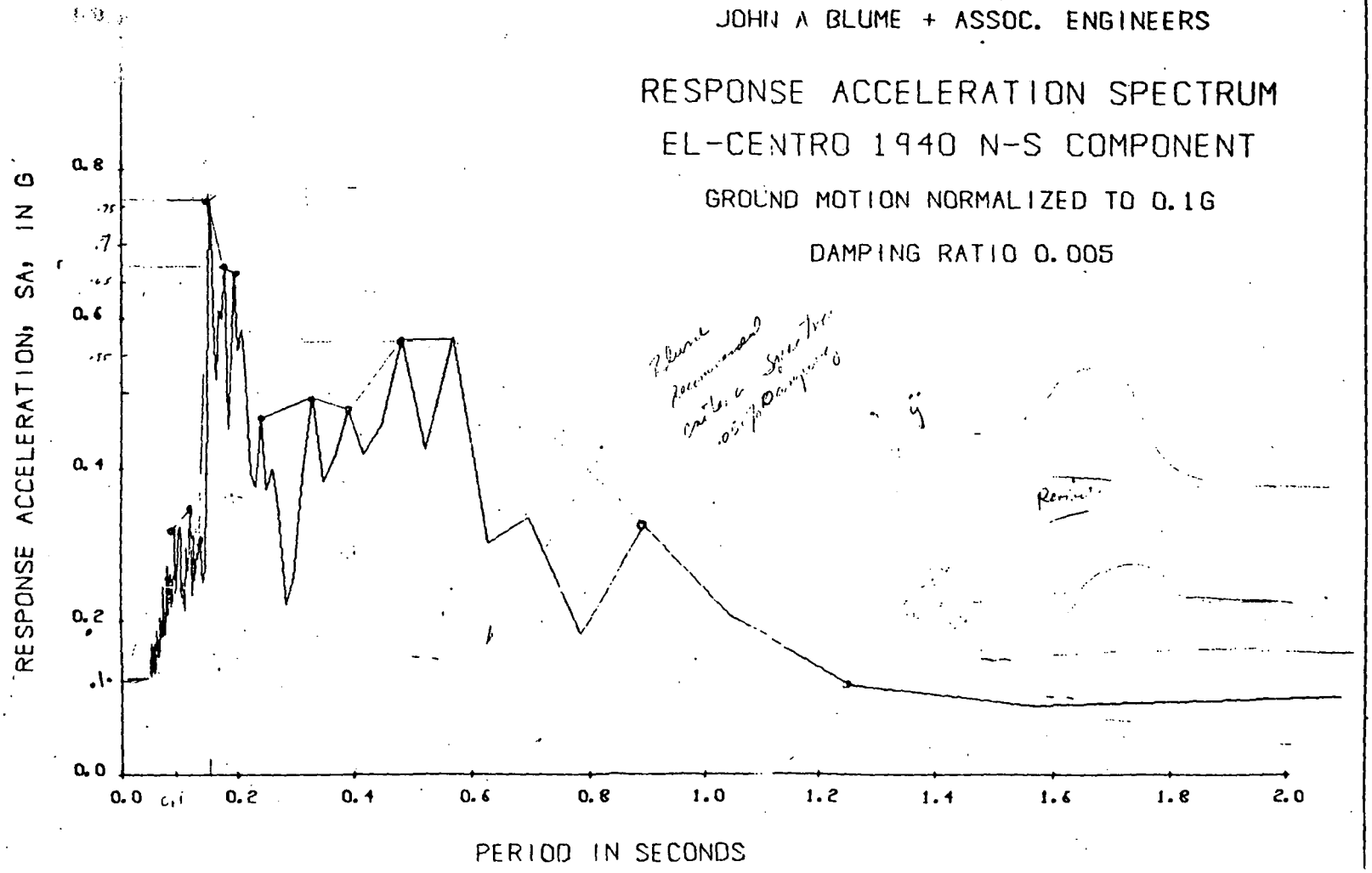


PLATE NO. 4