

JUN 25 1985

Docket No.: 50-443
50-444

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APPLICANT: Public Service Company of New Hampshire
FACILITY: Seabrook Station, Unit 1 and 2
SUBJECT: MEETING SUMMARY

On May 24, 1985, NRC and applicant representatives met in Bethesda, Maryland to discuss the cable tray support re-evaluation program. Enclosure 1 provides the list of attendees to this meeting. Enclosure 2 provides the agenda and the applicant's presentation.

The applicant stated that the reason for undertaking the program was to evaluate existing cable tray problems and to apply current cable tray technology to resolve these problems.

As a result of the evaluation, the applicant decided to implement the Betchel Raceway Program to the Seabrook Project.

The applicant confirmed in this meeting that the cable trays used at Seabrook Station was of the same material and configuration as those used in the test program and that no fireproofing spray is used, which is consistent with the test conditions. The applicant stated that an evaluation of the Seabrook cable tray and support system had been performed and compared with existing test data, and the evaluation results showed that the use of up to 20% damping would be appropriate for Seabrook. We discussed the information presented by the applicant and found that the applicant's approach was acceptable. We indicated that we would approve the up to 20% damping for Seabrook if the applicant can provide and document the evaluation results.

The applicant has agreed to revise Sections 3.7 and 3.10 of the FSAR to provide the appropriate information which was presented in this meeting. The staff will review the revised FSAR to confirm the analysis presented in this meeting and the staff's review will be documented in an SER supplement.

151
Victor Nerses, Project Manager
Licensing Branch No. 3
Division of Licensing

Enclosures:
As stated

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*Previously concurred:
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06/17/85 06/24/85

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

LBB 3 Reading

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Victor Nerses

Victor Nerses, Project Manager
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Enclosures:
As stated

cc: See next page

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ENCLOSURE 1

MEETING MAY 24, 1985

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P. McMahon
R. Linderman
K. Lee
R. White
V. Nerses
J. Ma
S. Chan
G. Rigamonti
R. Tucker

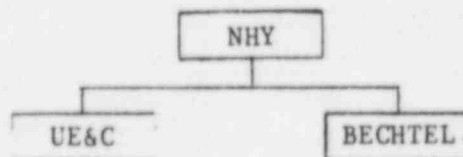
UEC
EBASCO
BECHTEL
BECHTEL
BECHTEL
YANKEE ATOMIC
NRC/NRR/DE/SGEB
NRC/NRR/DE/SGEB
NRC/NRR/DE/SGEB
UE&C
YAEC

SEABROOK CABLE TRAY DAMPING
MEETING AGENDA

- o INTRODUCTION (R. TUCKER / YAEC)
- o CABLE TRAY TEST PROGRAM (B. LINDERMAN / BECHTEL)
- o CABLE TRAY TEST MOVIE (OPTIONAL)
- o OVERVIEW OF TEST PROGRAM RESULTS (B. LINDERMAN / BECHTEL)
- o SEABROOK REVIEW (P. McMAHON / BECHTEL)
- o DESIGN IMPLEMENTATION (A. DUFAULT / UE&C)
- o CONCLUSIONS (R. TUCKER / YAEC)
- o DISCUSSION

INTRODUCTION

- o CURRENT CONSTRUCTION STATUS
 - OVERALL PLANT CONSTRUCTION IS 86% COMPLETE
 - 98% OF THE CABLE TRAY AND VERTICAL TRAY SUPPORT SYSTEM IS COMPLETE
 - LATERAL BRACING IS 75% COMPLETE
 - AXIAL BRACING IS 5% COMPLETE
- o PURPOSE OF THE CABLE TRAY STUDY
- o RESULTS OF THE STUDY
 - IMPLEMENTATION OF THE BECHTEL RACEWAY PROGRAM
- o BENEFITS OF ADOPTING THE PROGRAM
 - REDUCE CHANGEOUT OF CONNECTION HARDWARE
 - REDUCE INSTALLATION PROBLEMS
 - REDUCE COMPLEXITY OF ANTICIPATED MODIFICATIONS FROM 100% QA REINSPECTION
 - IMPROVE CONSTRUCTION SCHEDULE
- o ORGANIZATION



RACEWAY TEST PROGRAM

PURPOSE

- TO UNDERSTAND THE DYNAMIC BEHAVIOR OF RACEWAY SYSTEMS AND ESTABLISH REALISTIC DAMPING CHARACTERISTICS, FREQUENCY RESPONSES, AND THE ACTUAL ELASTIC AND INELASTIC BEHAVIOR OF THE SYSTEMS.
- FURNISH DATA FOR DEFINING BETTER METHODS OF ANALYSIS FOR BOTH PRESENT AND FUTURE FACILITIES.
- DEMONSTRATE CIRCUITS REMAIN FUNCTIONAL EVEN WITH PLASTIC DEFORMATION OF RACEWAY SYSTEMS.
- DETERMINE CAPABILITIES OF INSTALLED SYSTEMS IN EXISTING FACILITIES TO RESIST EARTHQUAKE MOTIONS.

RACEWAY TEST PROGRAM (CONT)

METHOD

- STARTING WITH THE SIMPLEST DESIGN SUCH AS ONE USED FOR A FOSSIL POWER PLANT, TO UPGRADE THE SYSTEMS BY TESTING, UNTIL AN ACCEPTABLE AND STABLE LEVEL OF BEHAVIOR OF THE SYSTEM IS ACHIEVED.
- TO EXTENSIVELY TEST THESE SELECTED SYSTEMS TO GENERATE STATISTICAL DATA BASES.
- USE DATA BASES TO ESTABLISH ADEQUATELY CONSERVATIVE DESIGN CRITERIA AND PROCEDURES.

TEST PROGRAM TASKS

TASK A - FIXTURE DESIGN AND CONSTRUCTION

TASK B INITIAL - PRELIMINARY TESTING

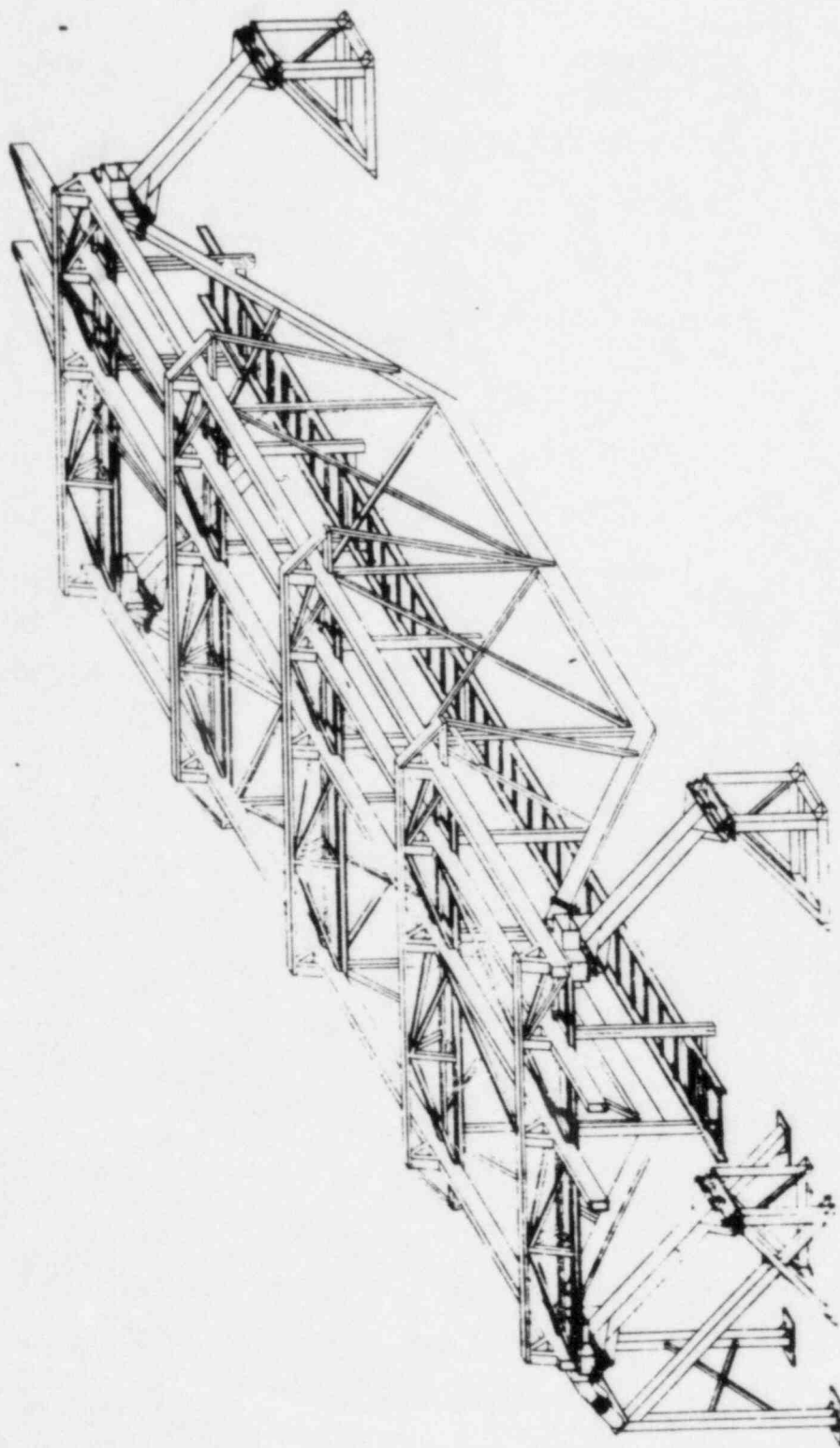
TASK B - CABLE TRAY RACEWAY SYSTEMS

TASK C - CONDUIT RACEWAY SYSTEMS

TASK D - COMBINED RACEWAY SYSTEMS

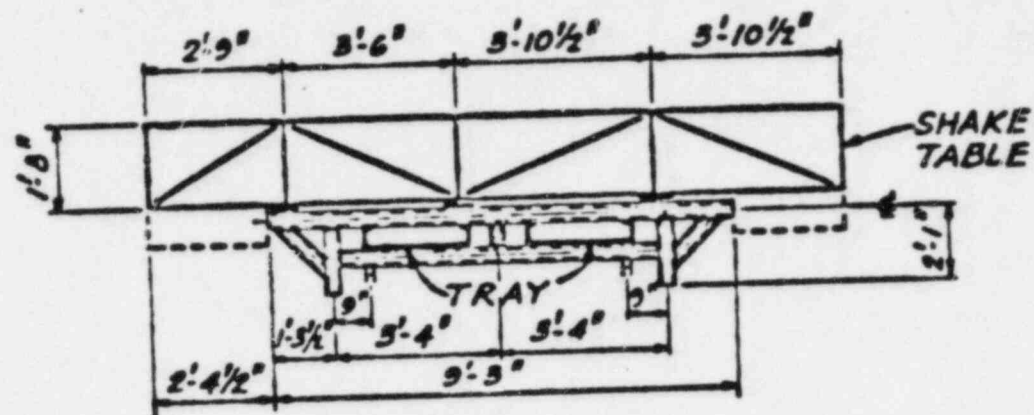
TASK E - FATIGUE LIFE OF CONNECTIONS

TASK F - CAPACITY OF CLAMPS

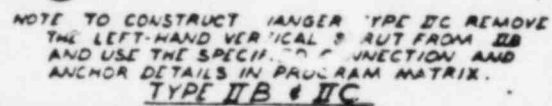
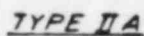
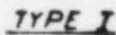


TASK B
CABLE TRAY RACEWAY SYSTEMS

- PHASE I - TEST VARIOUS TRAY TYPES ON RIGID SUPPORTS
- PHASE II - NON-DESTRUCTIVE TESTING OF VARIOUS UNBRACED TRAY SYSTEMS
- PHASE III - TEST EFFECTS OF TRAY TYPE AND MANUFACTURER ON A SELECTED UNBRACED TRAY SYSTEM
- PHASE IV - TEST EFFECTS OF STRUT CONNECTIONS ON A SELECTED UNBRACED TRAY SYSTEM
- PHASE V - DESTRUCTIVE TESTING ON SELECTED UNBRACED AND BRACED TRAY SYSTEMS
- PHASE VI - DESTRUCTIVE TESTING ON OPTIMIZED UNBRACED AND BRACED SYSTEMS



TEST SET-UP FOR RIGIDLY SUPPORTED TRAYS
(PHASE I)



TRAY SUPPORT TYPES TESTED

<p>NOTE: EITHER STRUT TYPE MAY BE USED</p> <p><u>ANCHOR A</u></p>	<p>NOTE: OVERHEAD STRUT IS PERMANENTLY ATTACHED TO THE TEST FIXTURE AS DETAILED ON SNT #108.</p> <p><u>ANCHOR B</u></p>	<p><u>ANCHOR C</u></p>	<p><u>ANCHOR D</u></p> <p><u>ANCHOR E</u> (SEE SNT #1)</p>
<p><u>CONNECTION E</u></p>	<p><u>CONNECTION F</u></p>	<p><u>CONNECTION G</u></p>	<p>NOTE: USE A 3/8\"/> <p><u>CONNECTION H</u></p> </p>

TRAY SUPPORT CONNECTIONS

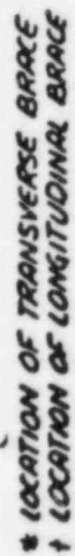
TASK C
CONDUIT RACEWAY SYSTEMS

- PHASE VII - TEST VARIOUS SIZED RIGID CONDUITS ON RIGID SUPPORTS
- PHASE VIII - NON-DESTRUCTIVE TESTING OF RIGID CONDUITS SUPPORTED ON
VARIOUS UNBRACED SUPPORT SYSTEMS
- PHASE IX - DELETED
- PHASE X - DESTRUCTIVE TESTS ON RIGID CONDUIT SUPPORT SYSTEMS WITH
VARIOUS TYPES OF STRUT CONNECTIONS
- PHASE XI - DELETED

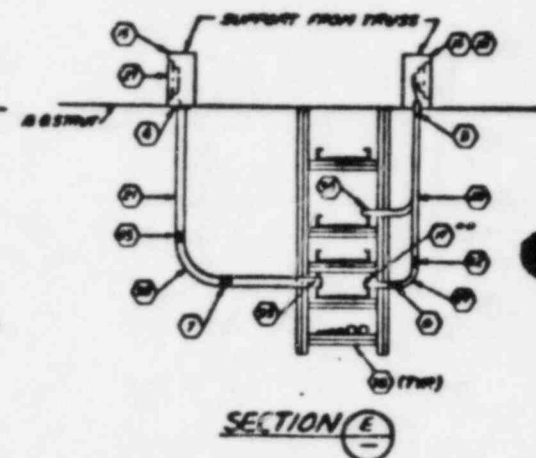
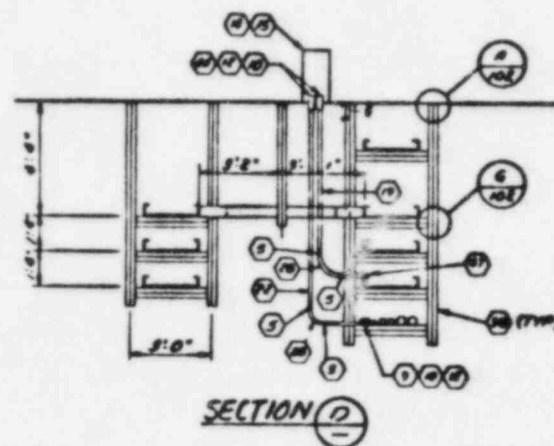
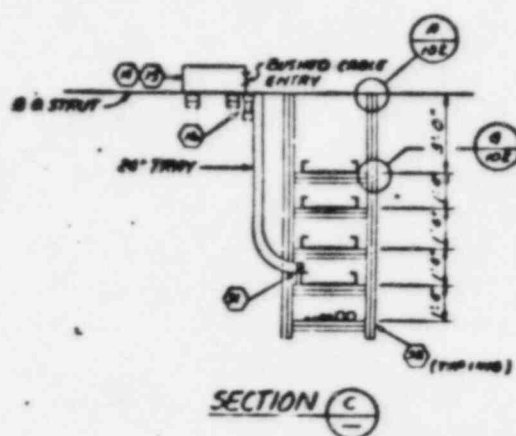
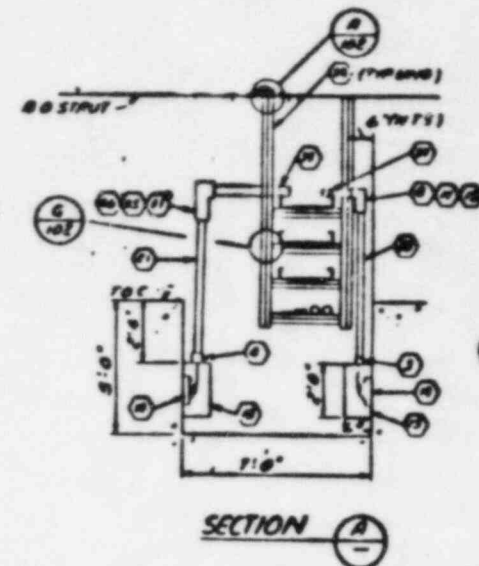
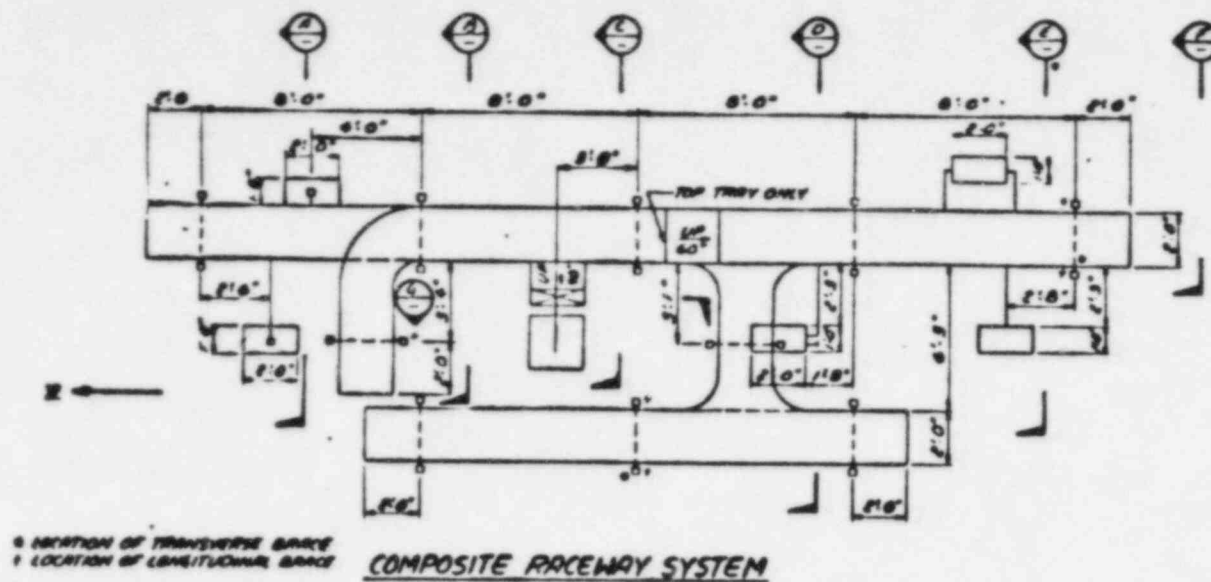
TASK D
COMBINED RACEWAY SYSTEMS

PHASE XII - COMBINED TRAY-CONDUIT RACEWAY SYSTEMS WITH STRUT-TYPE
HANGERS

PHASE XIII - DELETED



**TESTED COMPOSITE RACEWAY LAYOUT -- PLAN
(PHASE XII)**



** PART IS SHOWN IN UNBUILT TESTS

TESTED COMPOSITE RACEWAY LAYOUT — SECTIONS (PHASE XII)

TEST VARIABLES

- TRAY AND CONDUIT TYPES
- TRAY AND CONDUIT LOADING
- HANGER TYPES
- HANGER LENGTH
- HANGER CONNECTIONS
- NUMBER OF TRAYS
- NUMBER OF CONDUITS
- CONDUIT SIZES
- CONDUIT CLAMPS
- FITTINGS
- BRACING
- INPUT MOTION DIRECTION

CABLE TRAY

FIVE DIFFERENT TYPES OF CABLE TRAYS WERE SELECTED TO BE TESTED:

- LADDER TYPE MANUFACTURED BY B-LINE SYSTEMS INC.
- LADDER TYPE MANUFACTURED BY METAL PRODUCTS CORPORATION.
- PUNCH BOTTOM TYPE MANUFACTURED BY B-LINE SYSTEMS INC.
- TROUGH TYPE MANUFACTURED BY HUSKY-BURNDY
- ALUMINUM LADDER TYPE MANUFACTURED BY P-W INDUSTRIES

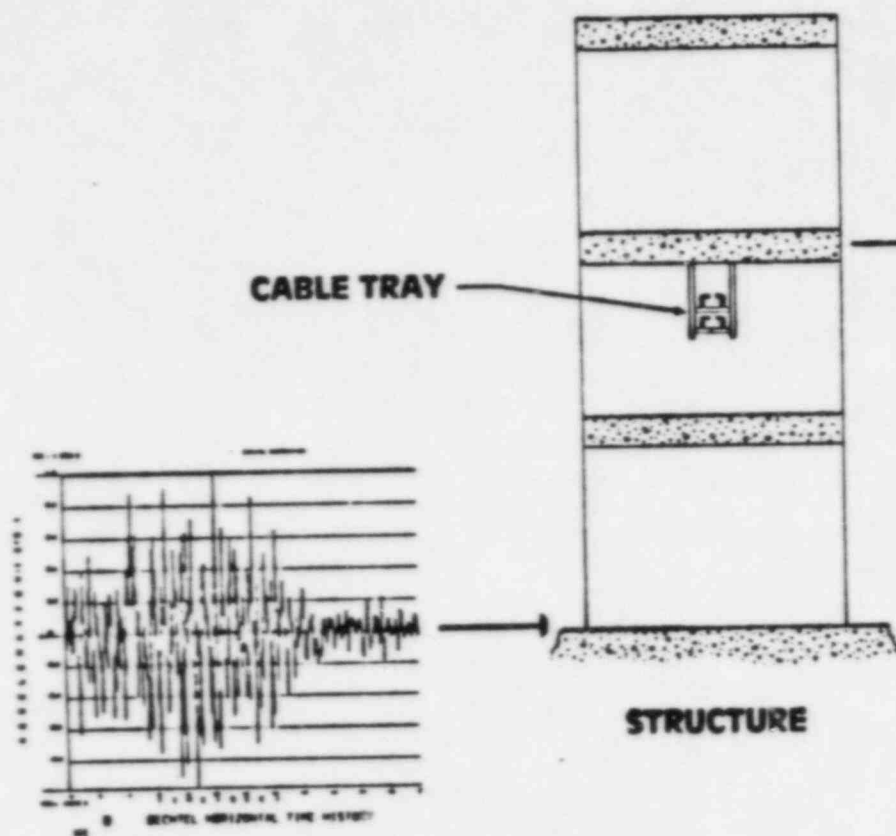
ALUMINUM GUTTER WIREWAY WITH COVER MANUFACTURED BY SUN METAL PRODUCT WAS ALSO TESTED.

TEST MOTION

SNAP BACK - FIXED SUPPORTS

HARMONIC MOTION

EARTHQUAKE MOTION



INPUT MOTION

CABLE TRAY

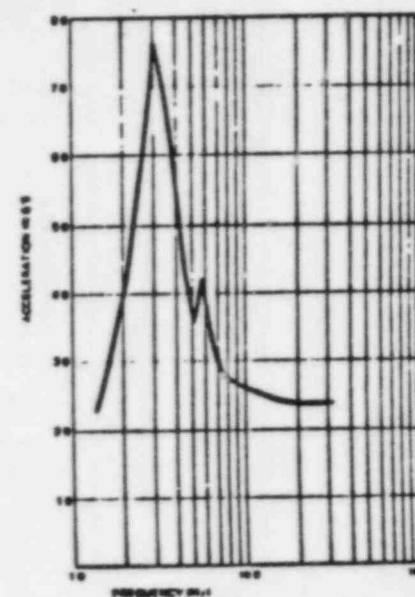
STRUCTURE



**STRUCTURAL
RESPONSE**

DYNAMIC PROPERTIES OF BUILDING

$f_1 = 3.0$	$H_1 = .80$	$\beta = .10$
$f_2 = 4.85$	$H_2 = .15$	$\beta = .10$
$f_3 = 8.0$	$H_3 = .05$	$\beta = .10$



**IN-STRUCTURE
RESPONSE
SPECTRUM**

CABLE TRAY
TEST PROGRAM
MOVIE

SUMMARY OF CABLE TRAY TEST RESULTS

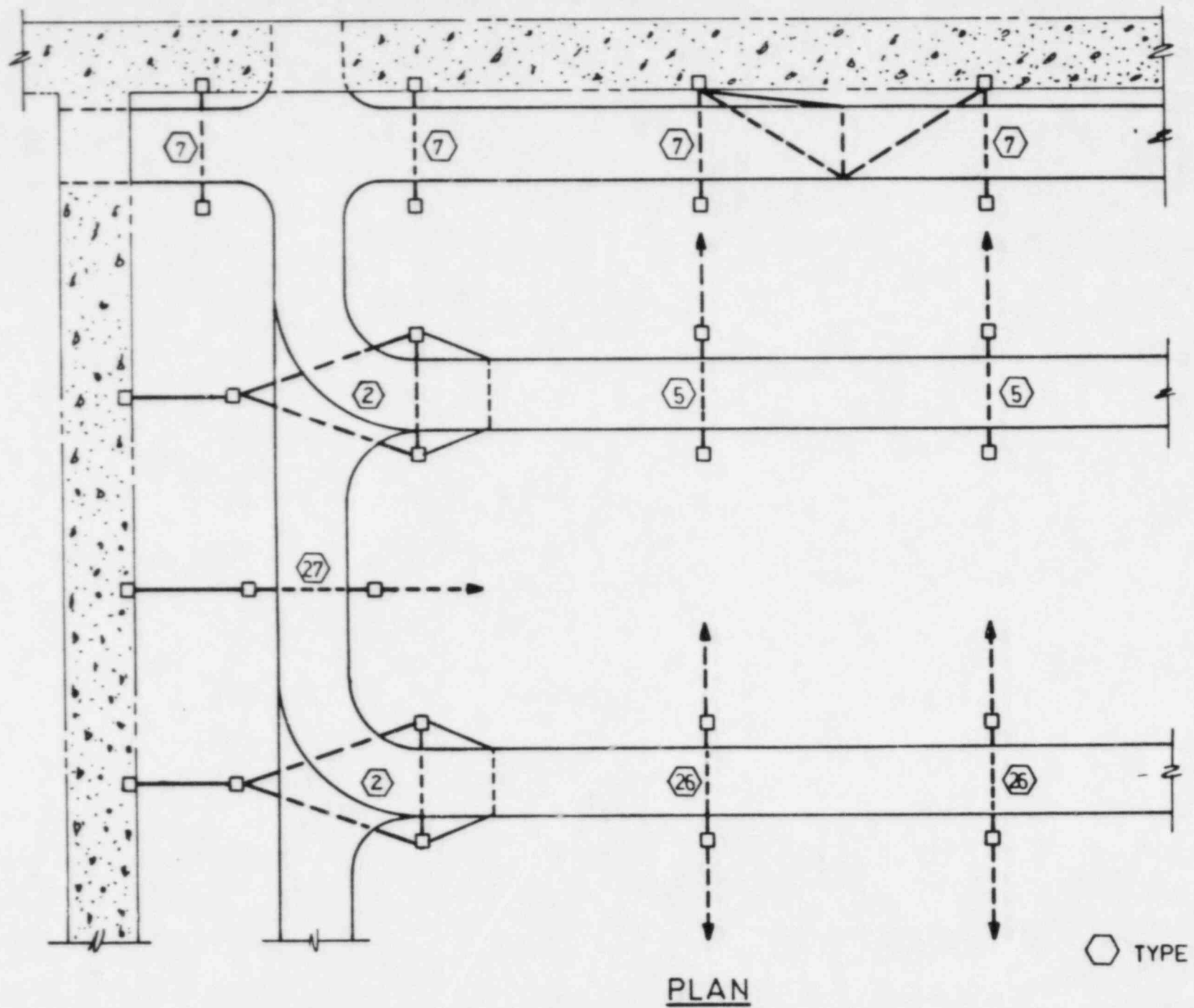
STRUT SUPPORTED TRAY SYSTEMS

- HIGH DAMPING WITH VALUES RANGING TO 50% OF CRITICAL FOR TRAYS WITH CABLE LOADING FROM 25 TO 50 LBS/FT. DAMPING REDUCES TO 7% OF CRITICAL WITH NO CABLE LOADING.
- DAMPING INCREASES WITH INCREASING FLOOR RESPONSE LEVEL.
- BRACING/RIGIDITY IS DESIRABLE BECAUSE IT INCREASES THE RESONANT FREQUENCY, DECREASES DEFLECTIONS AND INCREASES THE DAMPING IN THE SYSTEM.
- CABLES DO NOT APPEAR TO INFLUENCE OVERALL SYSTEM RESPONSE EXCEPT FOR DAMPING AND THEIR MASS.
- ALL STRUT SUPPORTED CABLE TRAYS TESTED SURVIVED WITHOUT DAMAGE. THESE SYSTEMS WERE TESTED AT INPUT LEVELS (ZPA VALUE) OF 1 TO 3 G'S TO THE SHAKE TABLE.

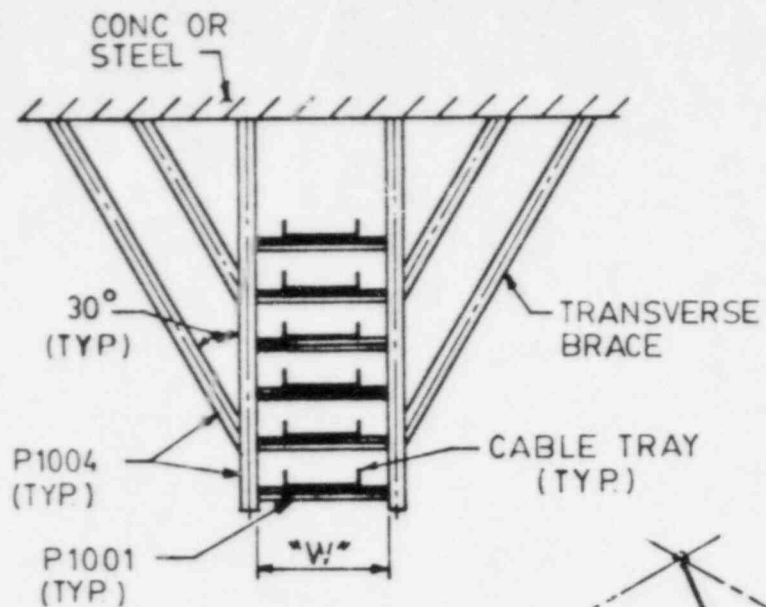
SEABROOK REVIEW:

- DOCUMENTATION REVIEW
- CRITERIA REVIEW
- STANDARD DETAILS REVIEW
- PLANT WALKDOWN
- SYSTEM COMPATIBILITY WITH THE TEST PROGRAM

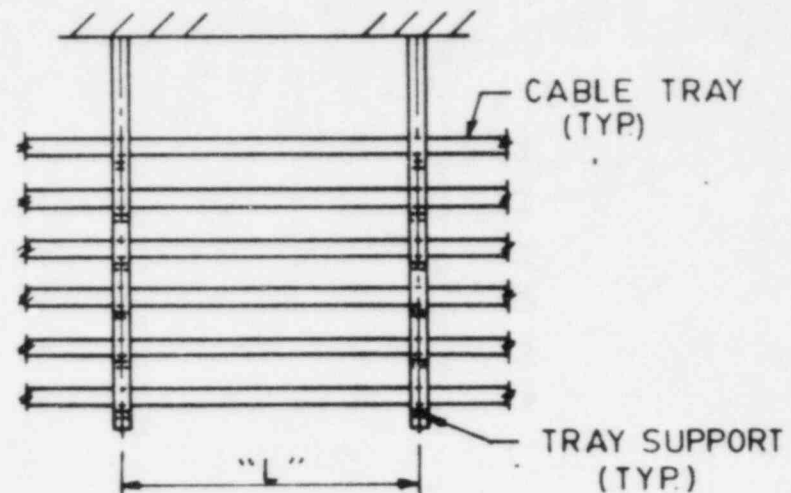
SEABROOK CABLE TRAY SUPPORT TYPES



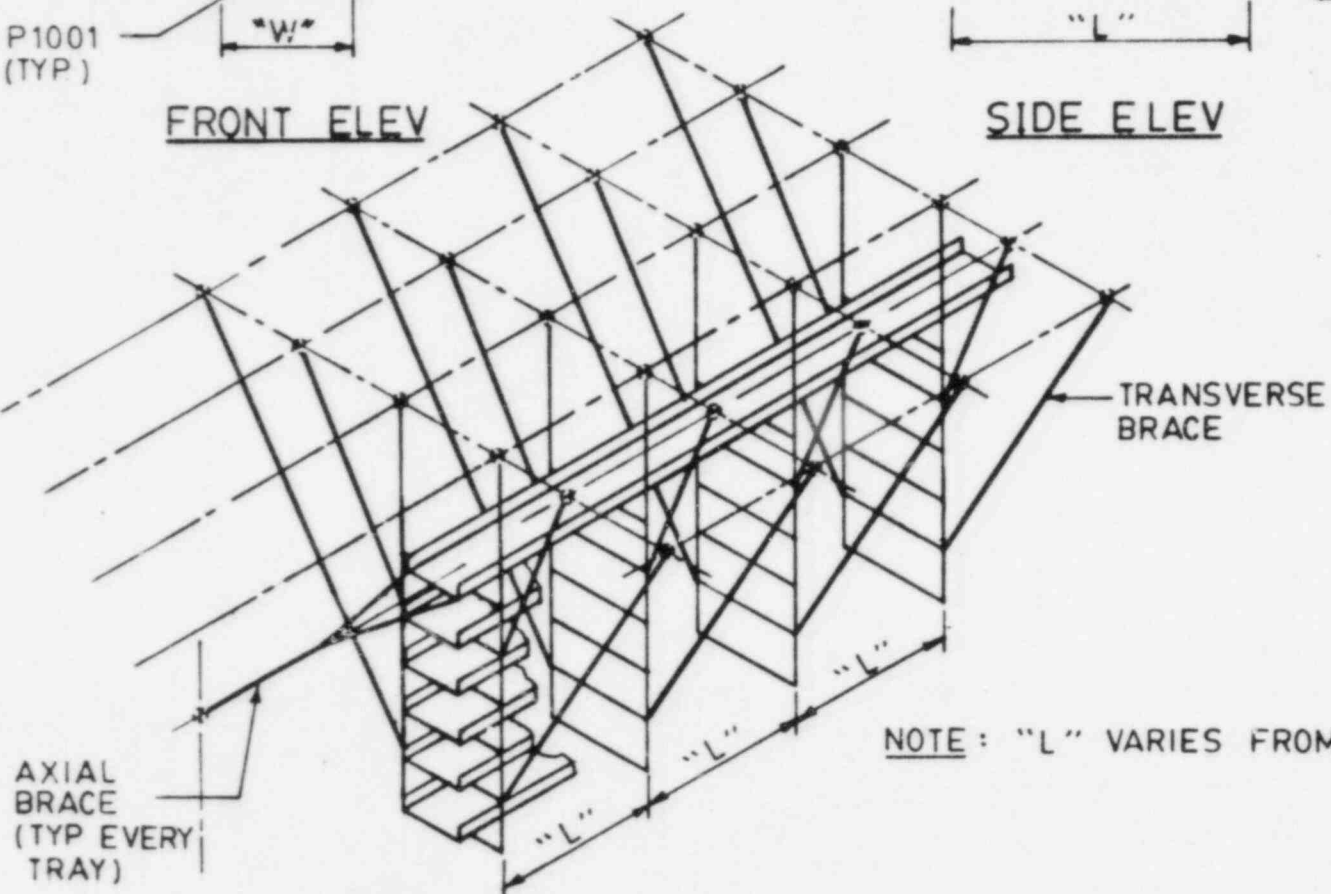
SEABROOK CABLE TRAY SUPPORT TYPES



FRONT ELEV

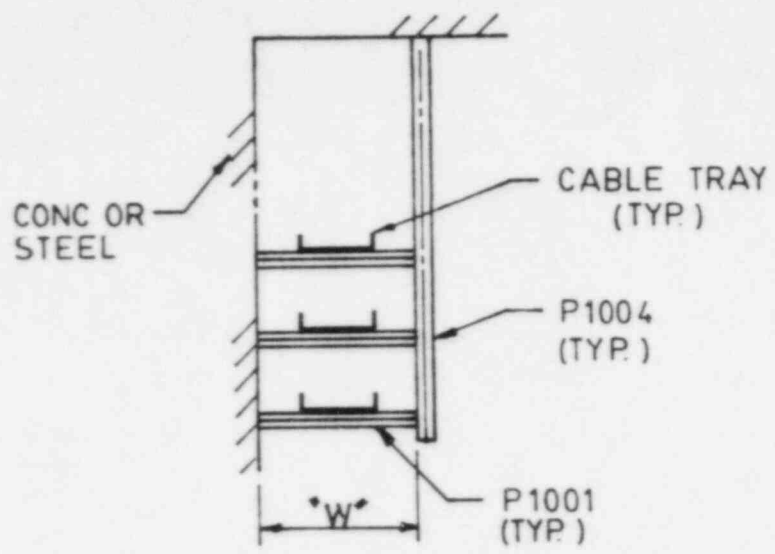


SIDE ELEV

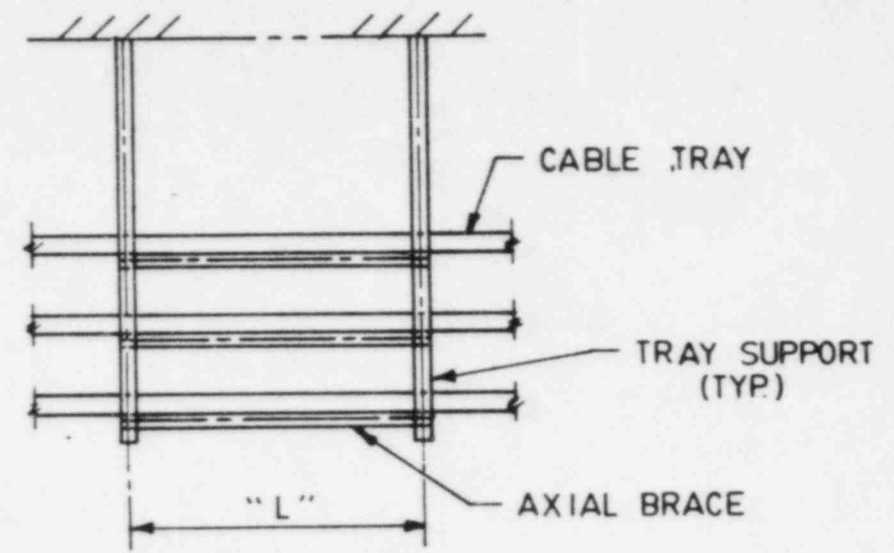


NOTE : "L" VARIES FROM 5'-0" TO 10'-0"

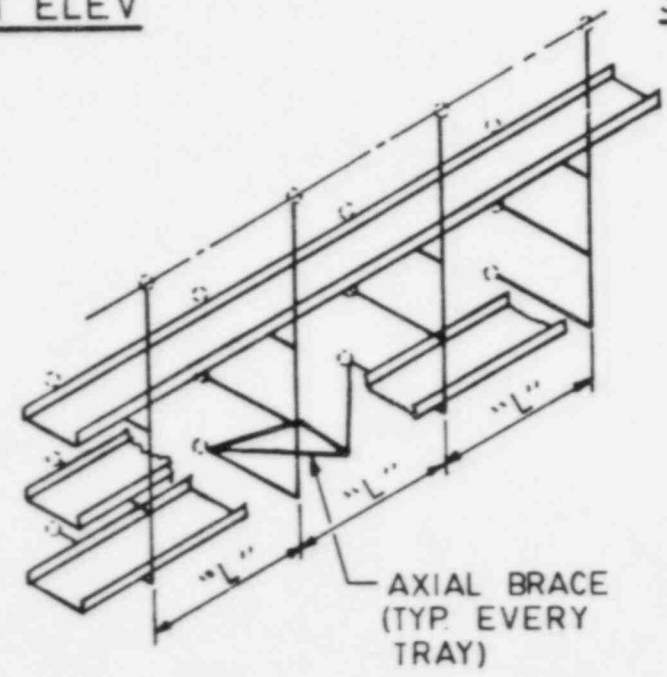
SEABROOK CABLE TRAY SUPPORT TYPES



FRONT ELEV



SIDE ELEV

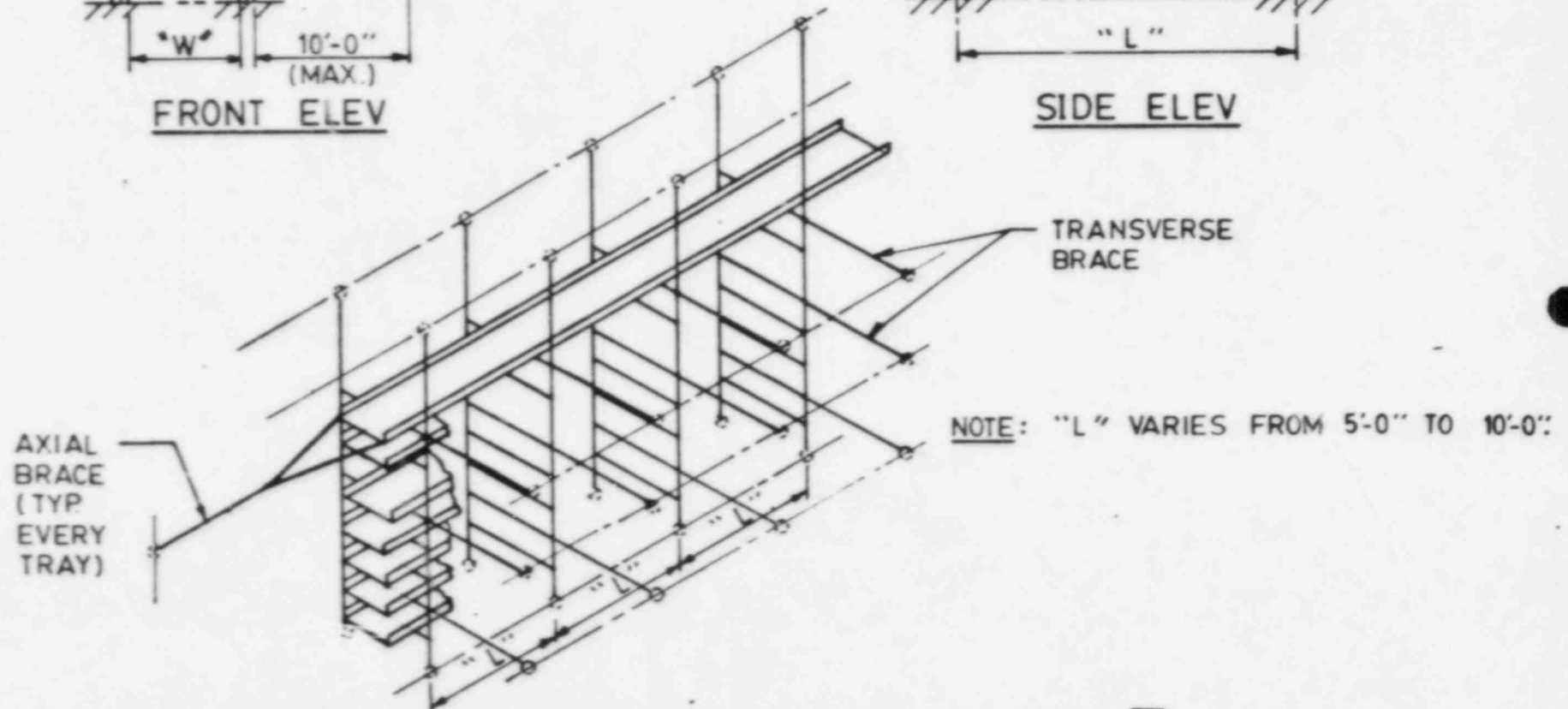
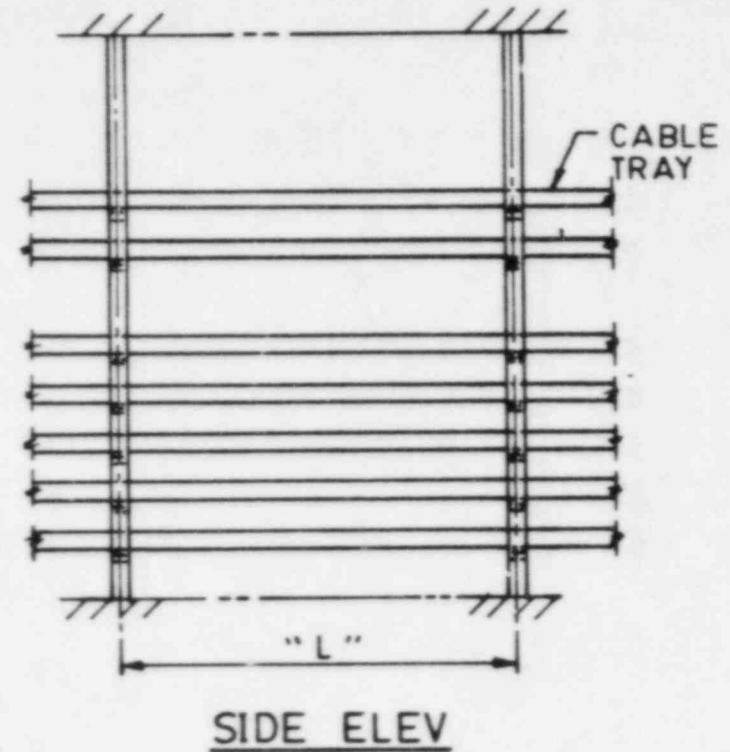
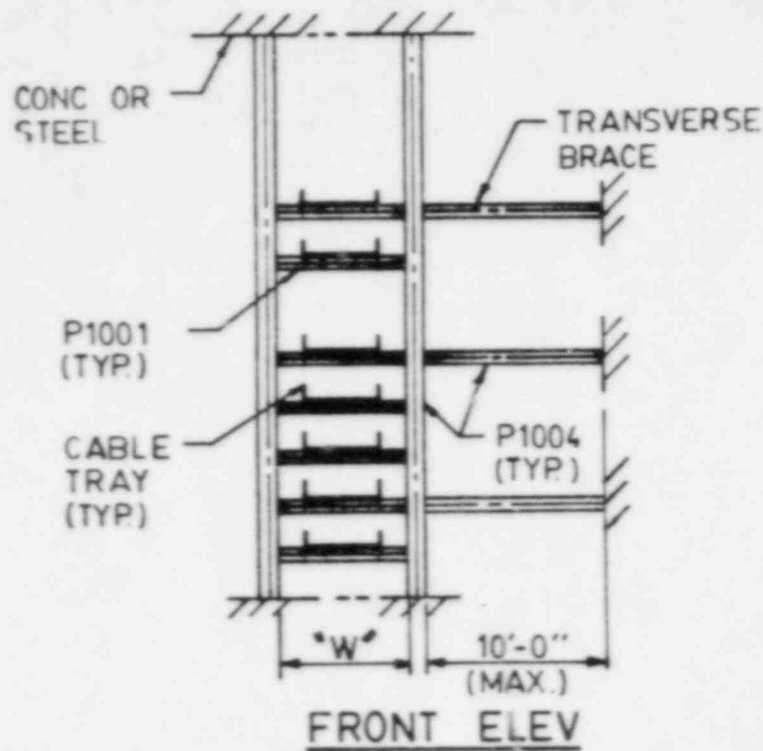


NOTE: "L" VARIES FROM 5'-0" TO 10'-0"

TYPICAL WALL BRACED TYPE TRAY SUPPORT TYPE

(7) (ALSO 20)

SEABROOK CABLE TRAY SUPPORT TYPES

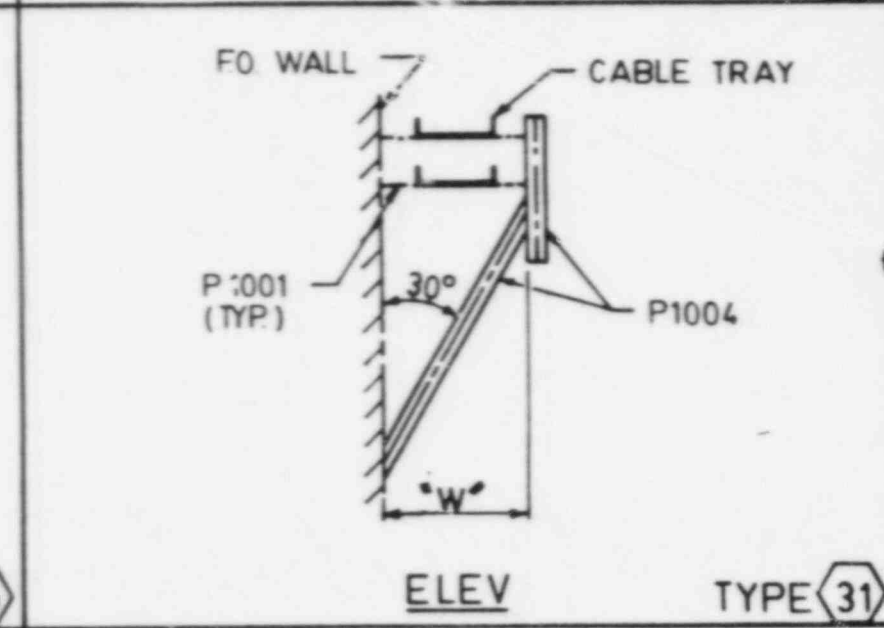
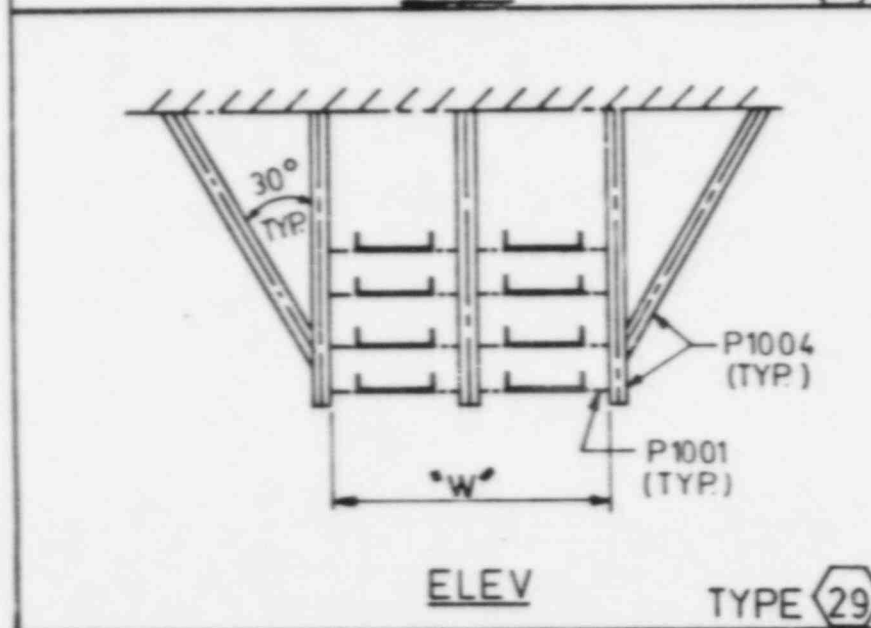
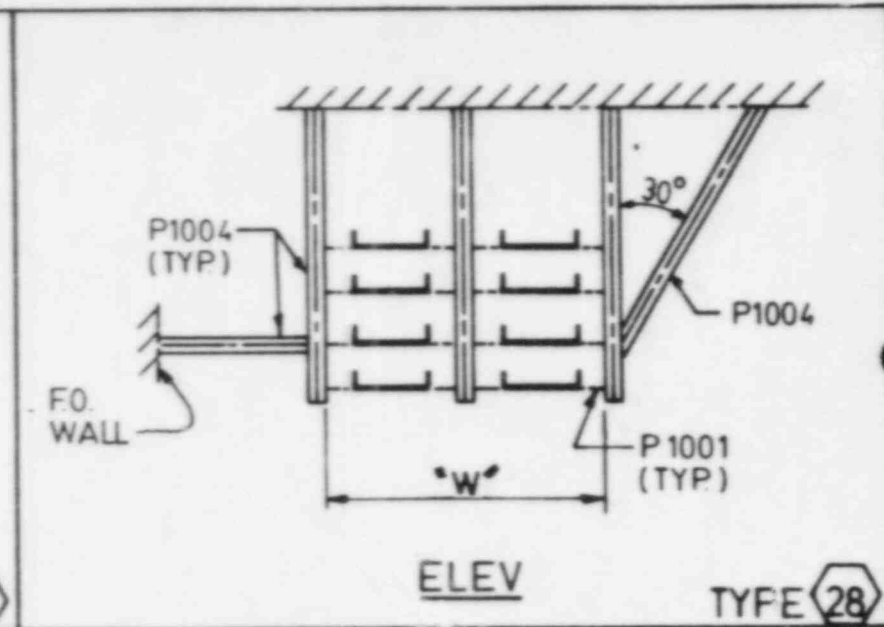
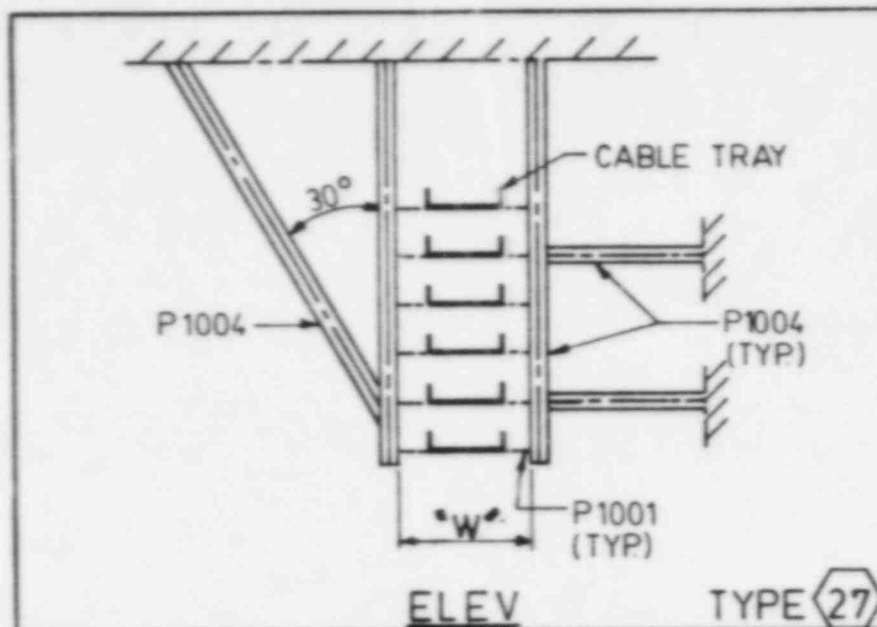


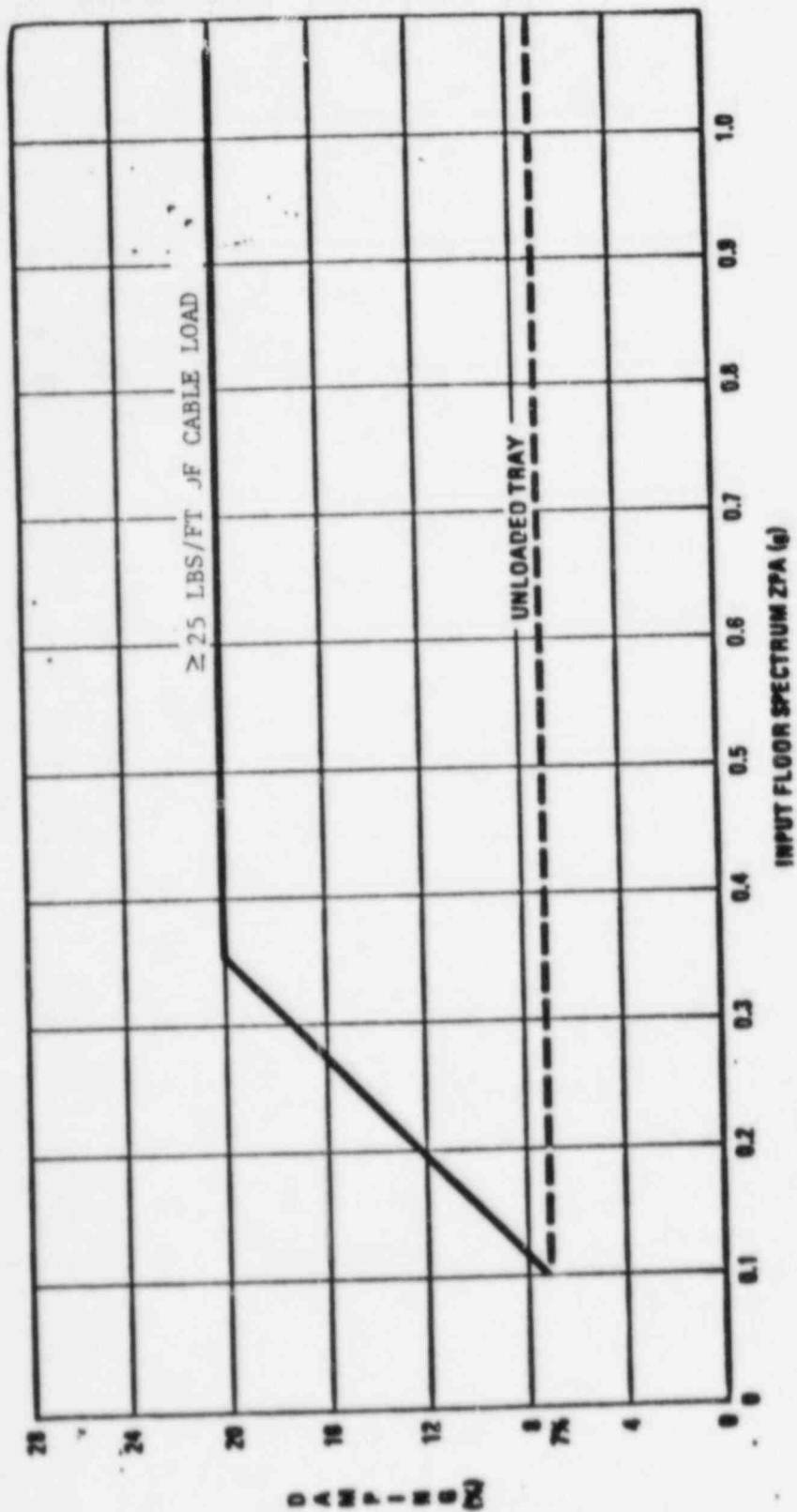
TYPICAL FLOOR TO CEILING TYPE TRAY SUPPORT TYPE (5)

SEABROOK CABLE TRAY SUPPORT TYPES

<p>Diagram of Type 4 cable tray support. A cable tray is mounted on a wall (F.O. WALL). It is supported by a bracket (P1004 (TYP)) and a hanger (P1001 (TYP)). The distance from the wall to the bracket is 10'-0" (MAX). The width of the tray is W. The diagram is labeled ELEV and TYPE 4.</p>	<p>Diagram of Type 6 cable tray support. A cable tray is mounted on a wall (F.O. WALL). It is supported by a bracket (P1001 (TYP)) and a hanger (P1004). The distance from the wall to the bracket is 10'-0" (MAX). The width of the tray is W. The diagram is labeled ELEV and TYPE 6.</p>
<p>Diagram of Type 8 cable tray support. A cable tray is mounted on a wall (F.O. WALL). It is supported by a bracket (P1004 (TYP)) and a hanger (P1001 (TYP)). The distance from the wall to the bracket is 10'-0" (MAX). The width of the tray is W. The diagram is labeled ELEV and TYPE 8.</p>	<p>Diagram of Type 15 cable tray support. A cable tray is mounted on a wall (F.O. WALL). It is supported by a bracket (P1001 (TYP)) and a hanger (P1004). The distance from the wall to the bracket is 10'-0" (MAX). The width of the tray is W. The diagram is labeled ELEV and TYPE 15.</p>

SEABROOK CABLE TRAY SUPPORT TYPES





DAMPING AS A FUNCTION OF INPUT ZPA

IMPLEMENTATION OF 20% DAMPING
AT THE SEABROOK STATION

DESIGN

- GUIDELINES HAVE BEEN DEVELOPED TO ESTABLISH THE SIGNIFICANT CONTROLLING PARAMETERS SUCH AS CONFIGURATION, TRAY MATERIALS, STRUT MATERIALS AND CONNECTION HARDWARE.

INSTALLATION

- DETAILED SUPPORT DRAWINGS FOR EACH SUPPORT WILL BE ISSUED TO CONSTRUCTION.
- ALL SUPPORTS WILL BE REINSPECTED TO THE DETAILED SUPPORT DRAWINGS.

APPLICATION

- USE OF THE 20% DAMPING WILL BE ON A CASE-BY-CASE BASIS.
- APPLICATION EXAMPLES:
 - RESOLUTION OF CONSTRUCTION FABRICATION PROBLEMS
 - SIMPLIFIED RESOLUTION OF INTERFERENCES WITH FIELD RUN COMPONENTS
 - OPTIMIZATION OF CONNECTION SIZES
 - OPTIMIZATION OF CONNECTION CHANGES

CONCLUSIONS

- DAMPING IS DEVELOPED BY CABLE MOTION.
- SEABROOK CABLE TRAY SUPPORTS ARE ESSENTIALLY RIGID.
- 20% DAMPING OPTIMIZES DESIGN.
- ENGINEERING/CONSTRUCTION SAVINGS CAN BE REALIZED WITHOUT DECREASING THE QUALITY AND SAFETY OF THE SYSTEM.
- IMMEDIATE IMPLEMENTATION IS REQUIRED TO REALIZE OPTIMAL BENEFIT.