NORTHEAST UTILITIES
THE CONNECTICUT LIGHT AND POWER COMPANY
THE HARTFORD ELECTRIC LIGHT COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

P.O. BOX 270
HARTFORD, CONNECTICUT 06101
(203) 666-6911

September 25, 1980

Docket No. 50-245
B10082

Director of Nuclear Reactor Regulation
Attn: Mr. Dennis M. Crutchfield, Chief
Operating Reactors Branch #5
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

References: (1) Letter, W. G. Counsil to D. L. Ziemann dated January 24, 1980.
(2) Letter, D. M. Crutchfield to W. G. Counsil dated May 9, 1980.

Gentlemen:

Millstone Nuclear Power Station, Unit No. 1
Fire Protection Commitment - Blast Wall

Enclosed please find justification for deviating from a fire protection commitment documented in NRC's Safety Evaluation Report for Millstone Unit No. 1.

NRC Commitment - SER Item 3.1.14

A blast wall will be erected between the boiler room and the diesel generator room.

NNECO Response

Technical justification for not constructing the reference wall was provided to NRC on January 24, 1980 (Reference (1)). This package concluded that:

> "Based on the manufacturer's experience, type of failure expected from a cylindrical type vessel (end failure), orientation of the boilers, and the nature of the potential explosion, NNECO concludes that the existing wall provides sufficient protection to the emergency diesel generator."

By letter dated May 19, 1980 (Reference (2)), the Staff stated that insufficient technical justification was provided to assure that the existing 12-inch block wall could withstand an explosion involving the auxiliary boiler.

An evaluation was conducted by Ebasco Services, Incorporated, entitled "Turbine Building Seismic Review". Enclosed as Attachment (A) is a copy of Paragraph F (Concrete Block Wall). This evaluation reveals that the wall in question (north wall of auxiliary boiler room) is a reinforced 12-inch block wall designed to withstand a tornado wind of 300 mph (185 PSF). The wall is reinforced with 8-#6 verticals, clustered every 3 feet-4 inches, and provided with prefabricated truss bars every second course for horizontal reinforcing.

In comparison, the south and west walls of the auxiliary boiler room have been constructed as enclosure walls and consist of standard 8-inch, non-reinforced concrete block. Also, the south wall has three (3) fixed open vents totaling 48 square feet of pressure relief venting.

It should be emphasized that:

a) The wall in question is a 12-inch block wall designed and reinforced to withstand tornado affects.

b) The south and west walls are 8-inch, non-reinforced block walls.

c) The south wall has pressure relief venting.

Based on this, it is concluded that should an explosion occur, the south and west walls of the auxiliary boiler room would provide the required relief venting, either through open venting (fixed open louvers), or through failure of the 8-inch, non-reinforced block walls (collapse of the south or west walls).

Technical justification provided previously (Reference (1)) and supplemented by the information documented above, support the conclusion that the existing north wall of the Auxiliary Boiler Room provides sufficient protection to the emergency diesel generator.

Northeast Nuclear Energy Company (NNECO), therefore, requests that the Staff concur with this evaluation, that the existing wall has sufficient capability such that another wall (blast wall) need not be erected. NNECO also requests the Staff to either concur that the existing wall meets "blast wall" requirements, or that the existing wall negates the need for this item to remain as a Fire Protection SER Commitment Item. An expedited review and response is needed, since this is a license condition, requiring resolution prior to startup from the refueling outage which starts October 4, 1980.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

W. G. Counsil
Senior Vice President

Attachment

DOCKET NO. 50-245

MILLSTONE NUCLEAR POWER STATION, UNIT NO. 1

ATTACHMENT A

# TURBINE BUILDING SEISMIC REVIEW

SEPTEMBER, 1980

# EBASCO SERVICES
INCORPORATED

UTILITY CONSULTANTS - ENGINEERS - CONSTRUCTORS

TWO RECTOR STREET
NEW YORK, N.Y. 10006

CABLE ADDRESS "EBASCO"


October 30, 1979
L-MISC-79-16

Mr L A Chatfield
SEP Task Force Chairman
Northeast Utilities
P O Box 270
Hartford, Connecticut 06101

Dear Mr Chatfield:

Subject: Millstone Unit No 1
Systematic Evaluation Program (SEP)
Seismic Re-evaluation
NUSCO P O #462926

Ref (a) NUSCO Letter GCE-79-387 dated August 9, 1979,
J F Bibby to A Vern .

(b) NUSCO Letter NEE-79-L-252 dated August 15, 1979,
B Ilberman to E O'Donnell.

(c) NUSCO Letter dated October 16, 1979,
Larry A Chatfield to E O'Donnell.

As directed by References (a) and (b) and clarified by various telephone conversations between B. Ilberman, J. Bibby, C. Gladding, R. Kacich (NUSCO) and E. O'Donnell, T. Gould, M. Hsieh (Ebasco), Ebasco initiated an information search in support of the seismic re-evaluation for Millstone Unit No. 1.

On August 23, 1979 Ebasco transmitted the information tabulated on Attachment No. 1 to assist in answering Item 2E of Enclosure 2 to NRC letter dated July 16, 1979 Dennis L. Ziemann to Mr. W.G. Counsil. On August 24th, a copy of Ebasco's Emdrac listing for the Millstone Unit No. 1 was transmitted to aid in the information search process. M Hsieh (Ebasco) attended the August 28 and 29, 1979 NRC/Seismic Review Team site visit at Millstone Unit No. 1.

Attachment No. 2 "Turbine Building Seismic Review" contains Ebasco's input information which addresses items 2 and 3 of Reference (c). As indicated in my telephone conversation with you on October 24, 1979, the information gathering for the Reactor Building, Item 1 of Reference (c), is not yet completed. We aniticpate that an additional 10 mandays effort

will be necessary to complete the review on the Reactor Building. Subject to your approval we expect to transmit the "Reactor Building Seismic Review" during the week of November 5, 1979.

In response to your query on the Intake Structure, Gas Turbine Building and the Control Room seismic design review requested in Reference (c), we estimate that an effort of approximately 25 mandays will be necessary and would anticipate information transmittal on about December 12, 1979.

If you should have any questions concerning this task please contact me.

Sincerely,

T L Gould
SEP Project Licensing Engineer

TLG:kc
att.

Attachment No. 1

Information Submitted on 8/23/79 Selected Pages From:

| A. | Ebasco Specification | Equipment Item |
|---|---|---|
| | MPC-M1-E20 | Emergency Diesel Engine-Generator (with vendor exceptions) |
| | MPC-M1-M7 | Condensate Booster Pumps And Accessories |
| | MPC-M1-M4 | Reactor Feed Pumps And Accessories |
| | MPC-M1-M5 | Condensate And Circulating Water Pumps |
| | MPC-M1-M23 | Miscellaneous Small Horizontal Pumps |
| | MPC-M1-M19 | Miscellaneous Centrifugal And Rotary Pumps And Accessories |
| | MPC-M1-M33 | Fuel Pool Heat Exchangers |
| | MPC-M1-M49 | Secondary Cooling Water Heat Exchangers |
| | MPC-M1-M51 | Fuel Pool Pumps |

| B. | EMDRAC No. | Vendor | Item |
|---|---|---|---|
| | 5385-2911 R1 | CB&I | Condensate Tank, Anchorage Calculations |
| | 5385-2912 R0 | CB&I | Demineralized Water Tank, Anchorage Calculations |
| | 5385-2913 R1 | CB&I | Firewater Tanks, Anchorage Calculations |
| | 5385-2914 R0 | CB&I | Domestic Water Tank, Anchorage Calculations |

C. Ebasco Mechanical Equipment List For Millstone #1.

Attachment No. 2
(to L-MISC-79-16)

# TURBINE BUILDING SEISMIC REVIEW

## I. Summary

Review of the Turbine Building design calculations indicates that the overall Turbine Building was reviewed for the seismic conditions (see below) considering the fact that the structural members supporting or housing category I equipment are not isolated from the balance of the Turbine Building structure. Seismic review was also performed for the specific floor framing supporting Category I equipment.

Main structural members of the building are steel columns, beams, girders, bracing, and reinforced concrete shield walls surrounding the condenser room. With the exception of the rigid frames, all steel connections are of non-moment resistant type. As such, the horizontal seismic forces were distributed only to the rigid frames, diagonal bracing, and reinforced concrete shield wall. The results of the Turbine Building seismic review indicated that, with the exception of diagonal bracing designed to resist lateral loads in the North-South direction, all structural members as originally designed were adequate with respect to the postulated seismic conditions.

Seismic review was based on the building accelerations and load combinations postulated as follows:

| Turbine Building | Design Earthquake Horizontal | Acceleration Vertical |
|---|---|---|
| Roof (El. 104.75') | 0.25g | 0.05g |
| Operating Floor (El. 54.5') | 0.14g | 0.05g |
| Mezzanine Floor (El. 34.5') | 0.11g | 0.05g |
| Ground Floor (El. 14.5') | 0.07g | 0.05g |

| Load Combination | Allowable Stress |
|---|---|
| DL + Design Earthquake | Normal Code Allowables |
| DL + 2.4 (Design Earthquake) | Yield Stresses |

## II. Overall Seismic Review

A. Rigid Frames (Ref. Drawings: G-187985, 187989)
As shown in Figure 1 , the rigid frames were provided along Column lines 4 through 14 spanning between column lines A & E. Each frame, consisting of a steel girder and columns of the built-up type, provides support for the Turbine Building crane runway along column lines A and E at El. 86.42' and the roof deck at El. 104.75'. It was also designed to withstand any lateral loads in the East-West direction, wind or the crane thrust, that could be generated within th. 25-ft. bay.

A typical frame (Column line 6) was checked for the postulated seismic conditions in the East-West direction assuming the ertire crane dead load and associated seismic force to be resisted by the single frame under consideration. It was concluded that the original design was satisfactory under the postulated seismic conditions and no modification was required.

B. Diagonal Bracing (Ref. Drawings: G-187989, 197991, 187992)
The diagonal bracing was originally designed for the wind load of 50 psf and was placed at the following locations:

North-South Direction:

| | |
|---|---|
| On Column line A: | Between Column lines 6 and 7, and between Column lines 11 and 12. |
| On Column line E: | Between Column lines 6 and 7, and between Column lines 11 and 12. |
| On Column line G: | Between Column lines 4 and 5, and between Column lines 11 and 12. |

East-West Direction:

| | |
|---|---|
| On Column line 3: | Between Column lines F and G. |
| On Column line 15: | Between Column lines D and E. |

The lateral loads in the East-West direction are to be resisted primarily by the rigid frames erected on Column line 4 through 14. The diagonal bracing on Column lines 3 and 15 provide the lateral resistance for the non-rigid type wall framing.

The lateral loads in the North-South direction are resisted entirely by the diagonal bracing within the wall framing on Column lines A, E, and G. Again, none of the connections were considered moment-resistant.

Each set of bracing was reviewed for strength and stability under the postulated seismic conditions and was found satisfactory except that located on Column lines A and B.

Instead of strengthening the originally designed bracing, a new set of bracing was installed between Column lines 7 and 8 on Column lines A and E as shown in Figures 1 and 2.

C. Reinforced Concrete Shield Wall (Ref. Drawings: G-187857 through 187862)
A 3-ft thick reinforced concrete wall was erected along column lines 6, 13, A and Fz as shown in Figure 1 , enclosing the condensers, heaters, and condensate demineralizers. The concrete

wall extended from the ground floor up to the operating floor and provided support for the steel columns as well as the operating and mezzanine floor framing.

Seismic review was performed by first determining the total horizontal seismic shear to be transmitted to the wall including those from the column base, floor systems and the inertia force of the wall itself. The total shear was then distributed among wall elements by the method contained in the publication entitled "Seismic Analysis of Reinforced Concrete Building" by K Muto. The distributed shears were inversely proportional to the deflection of the wall elements.

The results of the review indicated that, under the postulated seismic conditions, the concrete shear stresses at all levels were well within the stipulated allowables.

III. Specific Seismic Review

Seismic review was previously performed on the equipment support or anchorage for the Category I equipment housed within Turbine Building as identified herein.

The horizontal seismic coefficients for the equipment were determined based on the following formula:

$$\text{Equipment Acceleration (in g-unit)} = \text{Peak Accel.} \quad \frac{\text{Bldg Accel.}}{\text{Ground Accel.}}$$

in which the peak acceleration was set to be o.22g, building accelerations were as shown in Section I, and ground acceleration was 0.07g.

The equipment support or anchorage was checked for both the Design Earthquake condition with the code allowables, and 2.4 times the Design Earthquake with allowables not exceeding the yield stresses.

A. Station Battery (Mezzanine Floor)

The battery rack and supporting floor beams were found adequate as designed.

B. Diesel Generator Unit (Ground Floor)

The 1-1/8" diameter anchor bolts spaced 6 ft 2 in. on centers were found adequate as designed.

C. Diesel Fuel Day Tank (Mezzanine Floor)

The supporting floor beams were found adequate as designed.

D. Diesel Generator Air Intake and Exhaust Silensers (Operating and Mezzanine Floors)

The supporting columns, beams and bracing were found adequate as originally designed.

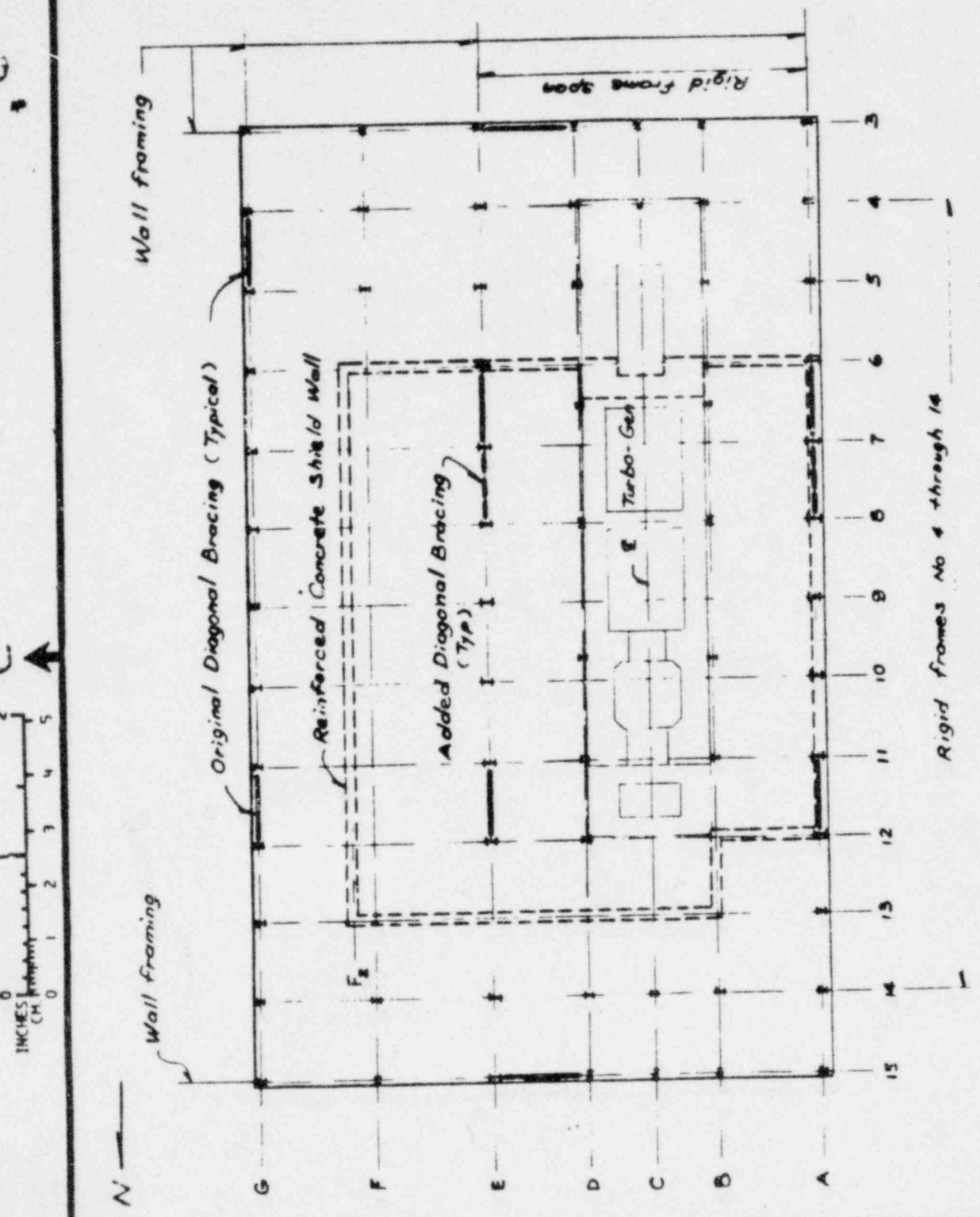
E. Switchgears (Mezzanine Floor)

The supporting floor beams for 4 kv Switchgears No. 1 through No. 7 and 480 v Switchgears No. 1, 1A, 2, and 2A were reviewed and found satisfactory as originally designed.

F. Concrete Block Wall (Operating and Mezzanine Floors)

The Battery Room and Diesel Generator Room are enclosed by 12 in. concrete block walls designed to withstand a tornado wind of 300 mph (185 psf). As shown in Figure 3, the block walls were reinforced with 8-#6 verticals clustered every 3 ft 4 in. Prefabricated truss bars (Dur-o-wall) were provided at every second course for horizontal reinforcing. The tornado design was considered similar to the Design Earthquake with a factor of 2.4 and with allowables up to the yield stresses.

Seismic review calculations for the block have not been identified, however, the lateral loads that could be induced by the postulated seismic conditions would be less than the tornado load by observation.




| | | |
|---|---|---|
| EBASCO SERVICES INCORPORATED | MILLSTONE UNIT NO. 1 TURBINE BUILDING | Fig. 1 |
| DIV. Civil DR. MCH APPROVED | | |
| DATE ____ CH. ____ | | |
| SCALE ____ | | |

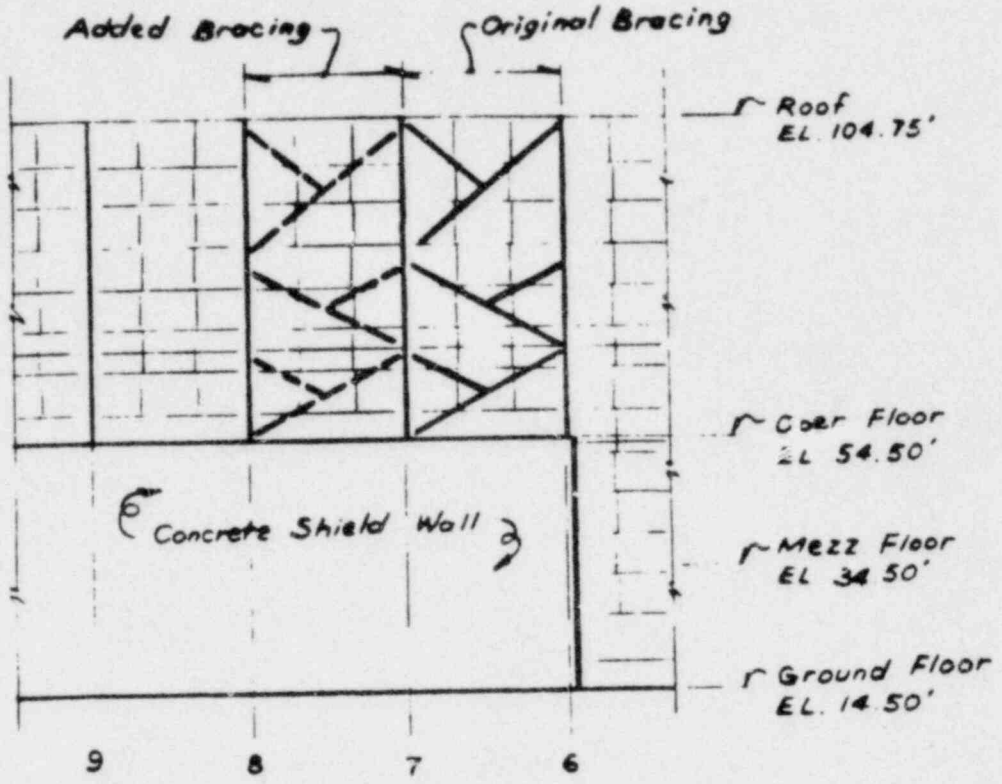
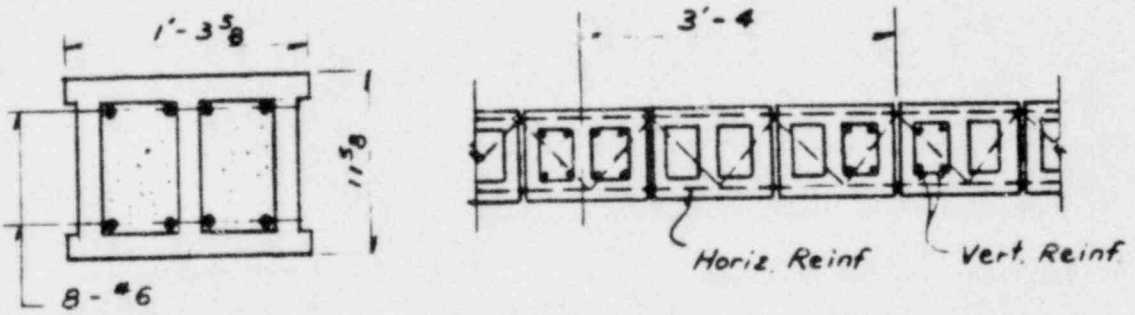



Figure 2. DIAGONAL BRACING




TYP. REINF. CONC BLOCK

TYP. BLOCK LAYOUT

Figure 3

| | | | |
|---|---|---|---|
| EBASCO SERVICES INCORPORATED | | MILLSTONE UNIT NO 1 TURBINE BUILDING | Fig. 2&3 |
| DIV. Civil DR. SACH<br>DATE ____ CH. ____<br>SCALE ____ | APPROVED | | |