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SACRAMENTO MUNICIPAL UTILITY DISTRICT

RANCHO SECO NUCLEAR GENERATING STATION
UNIT NO. 1

ATTACHMENT C

SUPPLEMENTAL INFORMATION ON CONTAINMENT
DOCKET 50-312

MAY 1970

Liner Plate Analysis

In response to the commitment made in the answer to Question 5J7.4, the District wishes to reference proprietary report "Consume. Power Company Palisades Nuclear Power Plant Containment Building Liner Plate Design Report B-TOP-1". This report and Appendix 5L of Supplement 2 constitutes the basic design approach used on Rancho Seco.

There are minor differences in the Rancho Seco design from that present in the topical report:

1) The welding of the stiffeners is 3/16-6x12 rather than 3/16-4x12. This does not invalidate the analysis, because the spring constants are very similar.

2) The stiffeners on the thickened plates are not welded with a double fillet weld as stated in the topical report. The 3/16-6x12 welding is kept on all stiffeners. The topical report indicates the additional welding is not required to resist the loads.

3) In Supplement 2 of the PSAR it was noted that the 1/4-inch liner plate material is ASTM A285 Grade A. This plate has a specified yield strength of 24,000 psi which is lower than the values used in the topical B-TOP-1. This would only tend to decrease the loads on the anchors as stated in Section 3.4 of B-TOP-1.

4) A self supporting dome has been designed for Rancho Seco. It is stiffened in two directions instead of one as stated in Section 2.2.2 of B-TOP-1. Details of the dome will be submitted in September at the time the ring girder design is submitted.

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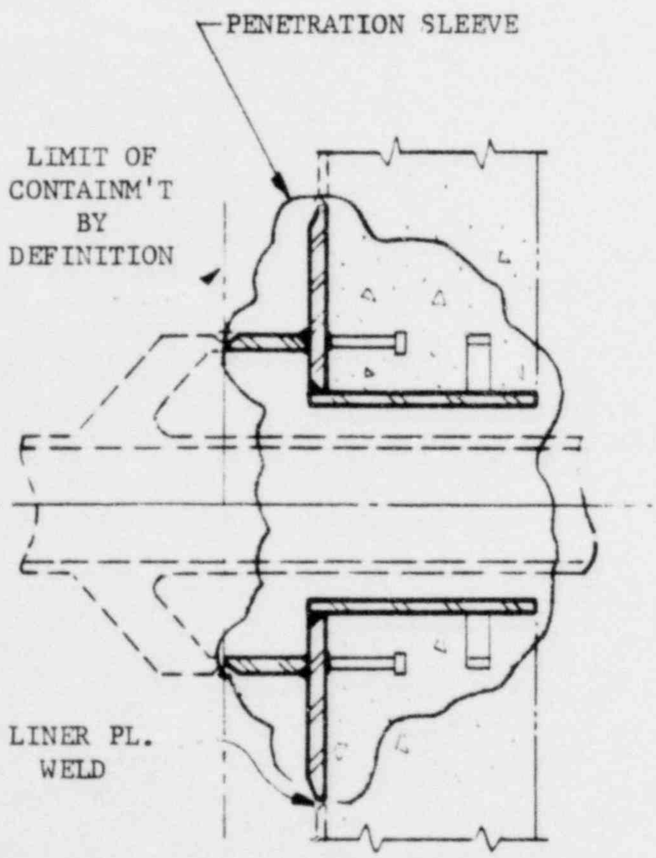
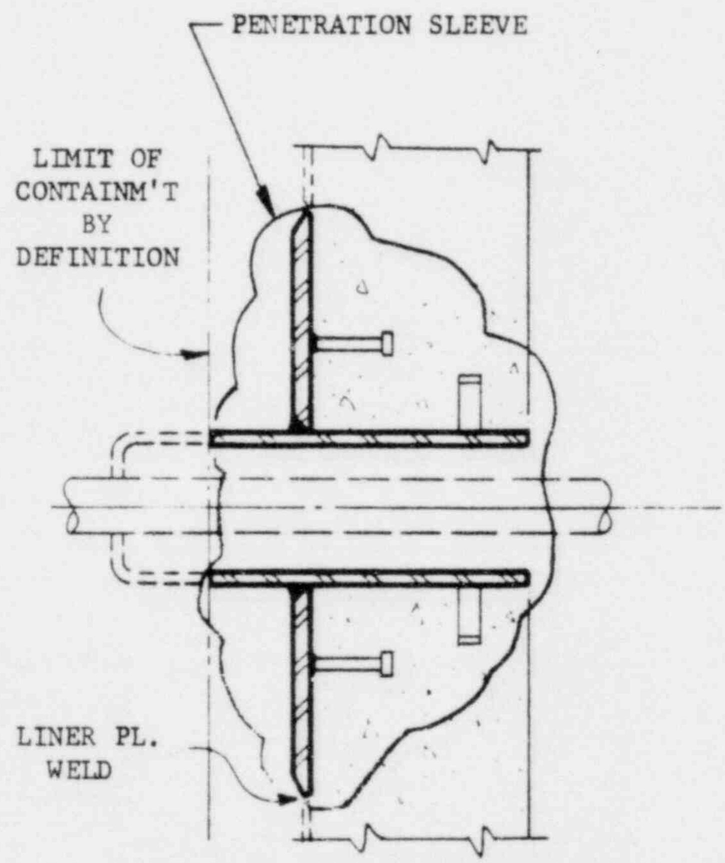
Penetration Sleeves

Certain items relating to the design, fabrication, testing and inspection of the penetration sleeves require clarification. It was the intent when referring to the ASME code in the PSAR that penetration sleeves similar to those used in a steel vessel would be obtained by the District as far as materials and fabrication including welding and NDT procedures, but it was not intended to pressure test the sleeve to liner plate welds until the overall pressure test of the containment building. There is no plan to visually inspect these welds during this test, because the design leak rate is low enough to preclude a significant leak existing in any penetration. The design has followed applicable portions of the ASME Code and the criteria outlined in Section 5 and its appendices of the PSAR. Certain loading conditions stated in the PSAR and the interaction of the concrete and the penetration sleeve are not specifically considered by the ASME Code but are considered in the design. The sketches below will illustrate what we refer to as a penetration sleeve.



TYPICAL PIPING PENETRATION SLEEVE



TYPICAL ELECTRICAL PENETRATION SLEEVE

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Ring Girder Design

Bechtel is preparing a topical report which will cover this portion of the containment analysis. This topical report will be available for the District's review by mid-summer. The District will submit its ring girder reinforcement with appropriate comments in September, 1970. Construction of the ring girder is scheduled for early 1971.

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Buttress Design

In response to the commitment made in the answer to Question 5J.7.33, the details of the buttress reinforcement are shown in Figures 1, 2 & 3.

Analyses supporting the amount of reinforcement provided can be arrived at by several methods. Each method assumes a bursting force which is a function of the applied load. The District is participating in buttress tests currently being conducted under Bechtel's direction. Pending the results of these test we have used conservative assumptions for the methods of selecting the amount of reinforcement in the buttress.

In our judgment the maximum bursting force which could exist is 0.25 F, where F is the applied prestressing force. Using 55-1/2 strands of 270 KSI material, the ultimate tendon load is $2,272^K$.

To illustrate the conservatism of the amount of reinforcing provided, consider the hypothetical case where the tendon is stressed to ultimate and the entire bursting force is carried only by the reinforcement in the "bursting zone", the bursting force would be $0.25 \times 2,272^K = 568^K$. The least area of steel provided horizontally or vertically is 11.06 $in.^2$. The average stress in reinforcing under this hypothetical condition would be 51,000 psi which is less than 90 percent of yield of the reinforcing, which is consistent with our criteria. Hence, even under the extreme hypothetical condition the reinforcing remains within the predictable range.

If Leonhardt's formula for predicting the bursting force is used and $a_1 \doteq 1$ (the distance from the ℄ of the tendon to the edge of the bearing plate) and a = 5 (the approximate distance from the ℄ of tendon to the inside face of the containment wall; R = 0.3F (1 - 1/5) = 0.24F.

$$\text{At } 0.7\ f's,\ F = 1590^K \therefore R = 382^K$$

The average stress in the reinforcing steel is 34,000 psi which is 57 percent of minimum yield.

Again using Leonhardt's formula if a_1 = 1' and a = 1'-8-1/2" (the distance from the ℄ of the tendon to the outside of the buttress.

$$R = 0.3F\ (1 - 1/1.71) = 0.124F \therefore R = 198^K$$

The average stress in the reinforcement is 18,900 which is 32 percent of yield.

In our view the latter analysis more closely approximates the mode in which bursting could occur, but in either case, the predicted stress in the rein- is within acceptable limits.

The average concrete bearing stress under this is 3,110, psi calculated from F/Ab where F is 0.7 f's. This is 70 percent of the allowable bearing stress f_{cp} = 4,420 psi as defined in ACI 318-63

$$(f_{cp} = 0.6\ f_{ci}\ \sqrt[3]{A_{b'}/A_b}).$$

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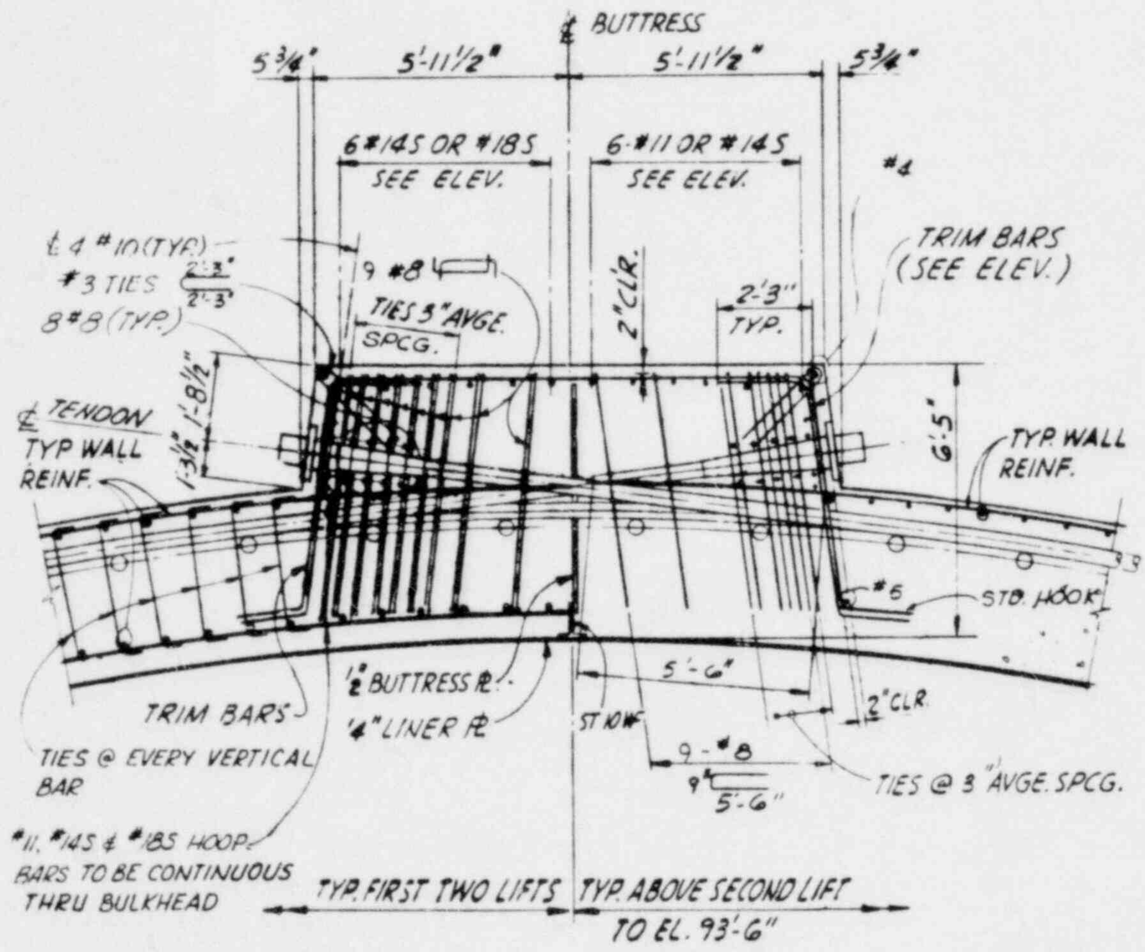

BUTTRESS - HORIZONTAL SECTION
FIGURE 1

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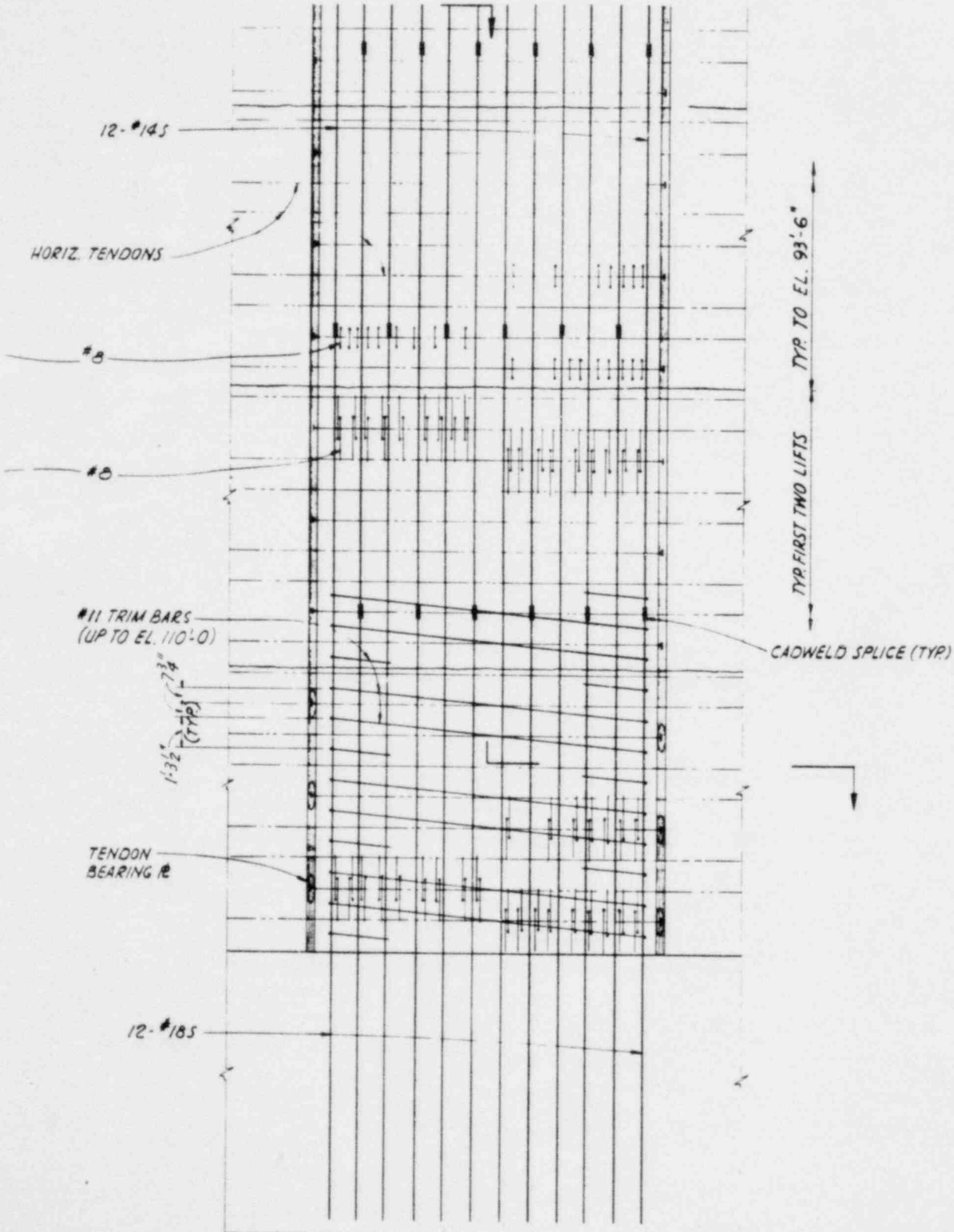

BUTTRESS - EXTERIOR ELEVATION
FIGURE 2

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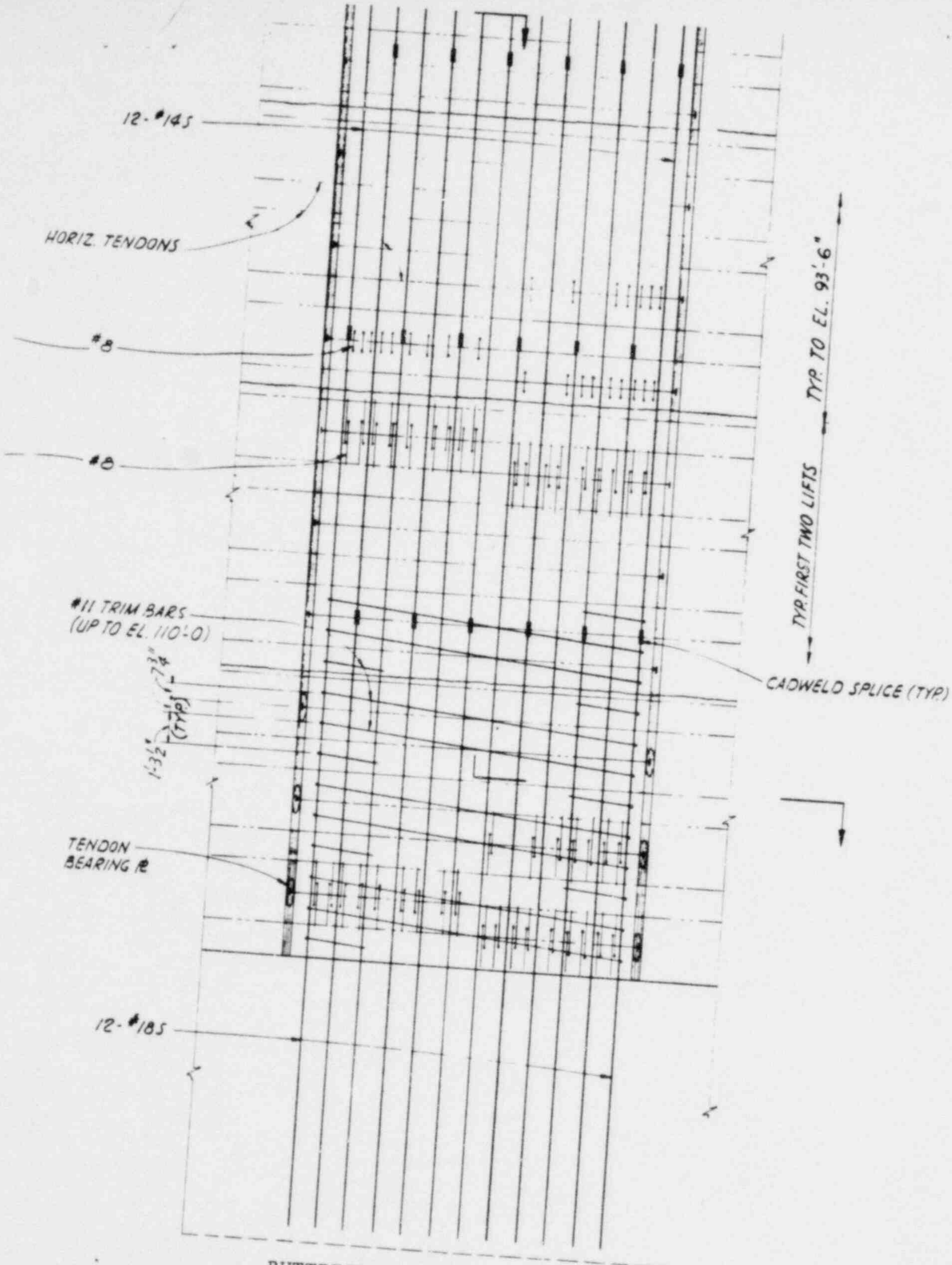
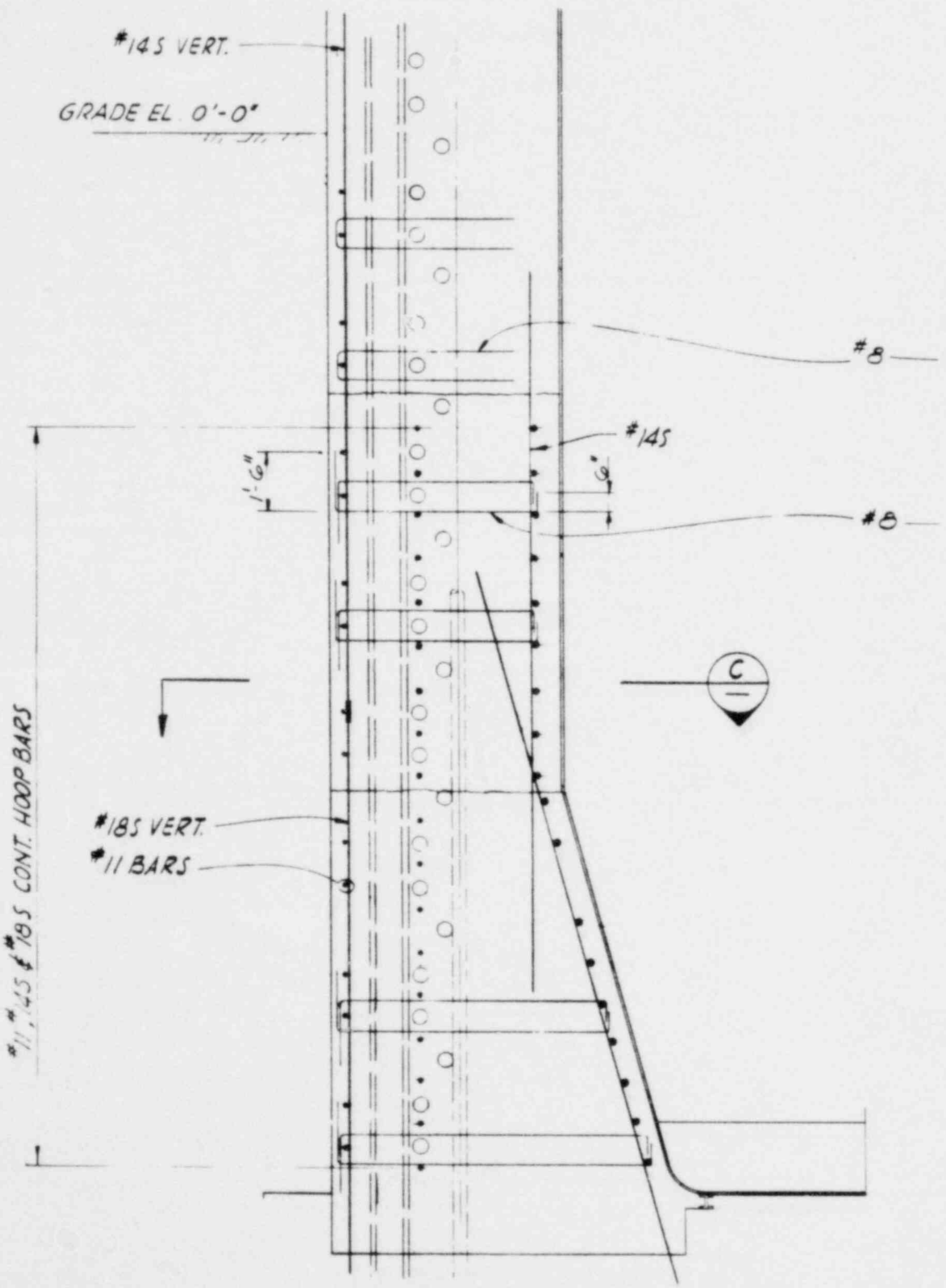


BUTTRESS - EXTERIOR ELEVATION
FIGURE 2



BUTTRESS - VERTICAL SECTION
FIGURE 3

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