**Title**
BRIDGE SUPPORT STRUCTUAL CALCULATIONS



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# Lawrence Berkeley Laboratory
UNIVERSITY OF CALIFORNIA

## Engineering & Technical Services Division



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| AUTHOR<br>P. PURGALIS | DEPARTMENT<br>MECHANICAL | LOCATION<br>16T | DATE<br>6-8-81 |

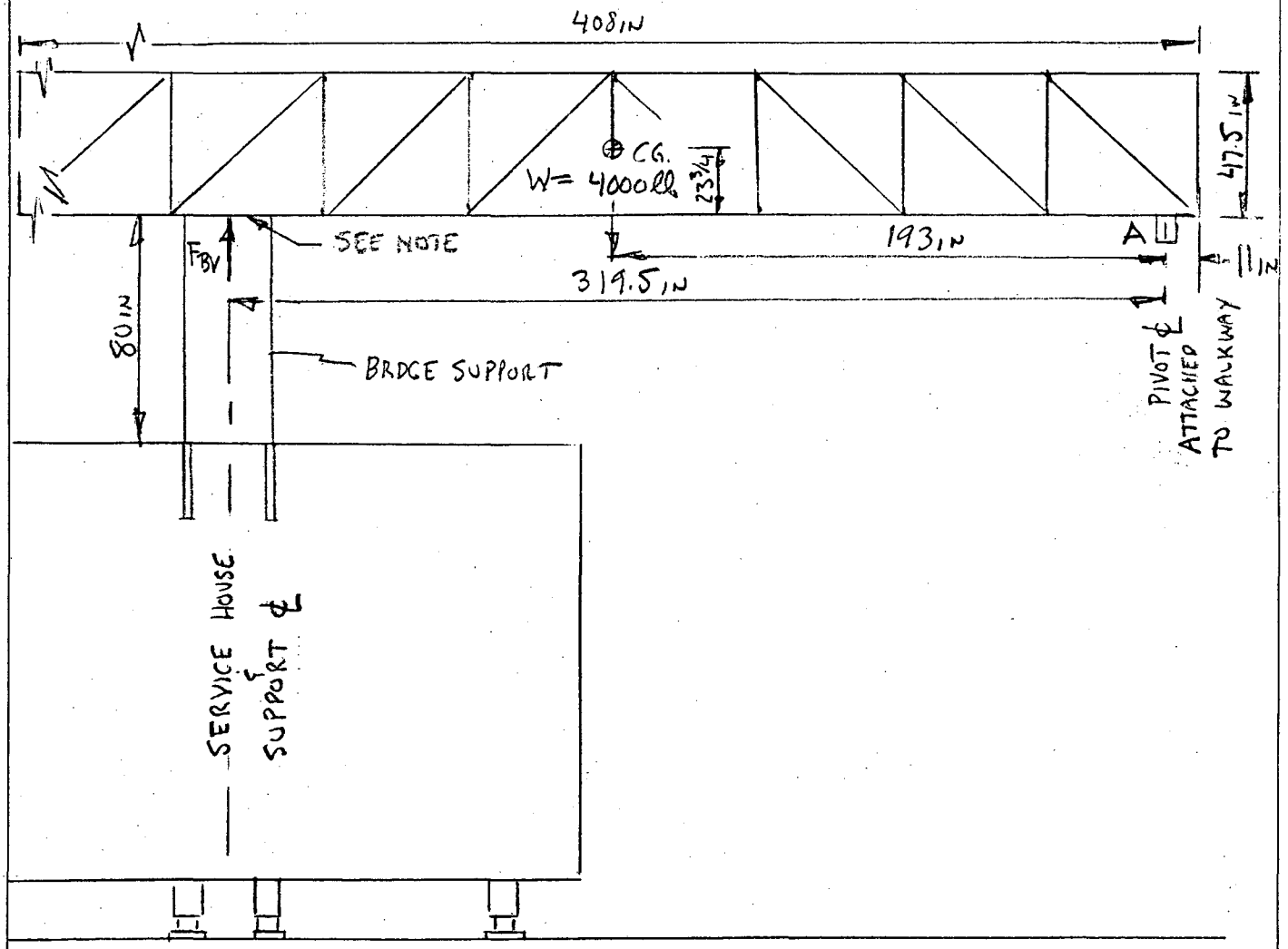
PROGRAM – PROJECT – JOB
PEP-4

SERVICE HOUSE

P. Purgalis
6-11-81

TITLE
BRIDGE SUPPORT STRUCTUAL CALCULATIONS

STRUCTUAL CALCULATIONS ARE SHOWN FOR THE SERVICE HOUSE BRIDGE SUPPORT. THE SUPPORT AND THE WELDS ATTACHING IT TO THE SERVICE HOUSE ARE STRESSED WITHIN ALLOWABLE LIMITS FOR DEAD WEIGHT AND .7g SEISMIC LOADS.




NOTE BRIDGE SHOULD BE ATTACHED TO BRIDGE SUPPORT SO IT DOES NOT SLIDE AROUND AND APPLY IMPACT LOAD TO BRIDGE SUPPORT DURING EARTHQUAKE

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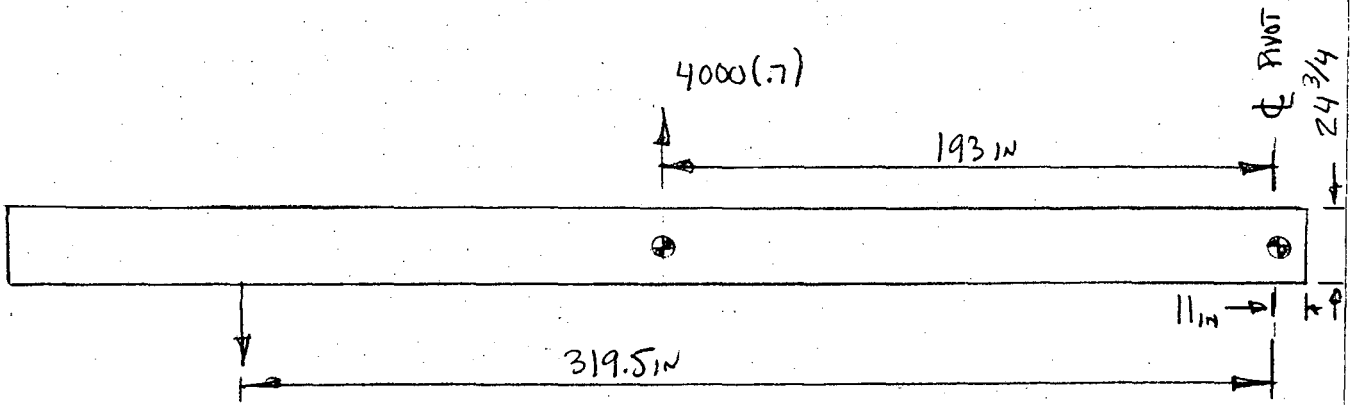
BRIDGE - SLAC DWG SA-205-024-58-R0 PIPING SUPPORT BRIDGE

" " GP-205-024-20-R6 EQ. & PIPING OVERALL LAYOUT




PLAN VIEW

Σ M AROUND A IN VERTICAL PLANE

$$4000\,(193) = F_{BV}\,(319.5)$$

$$F_{BV} = \frac{4000\,(193)}{319.5} = 2416\ \#$$

Σ M AROUND A IN HORIZONTAL PLANE

$$4000\,(.7)(193) = F_{BH}\,(319.5)$$

$$F_{BH} = \frac{4000\,(.7)(193)}{319.5} = 1692\ \#$$

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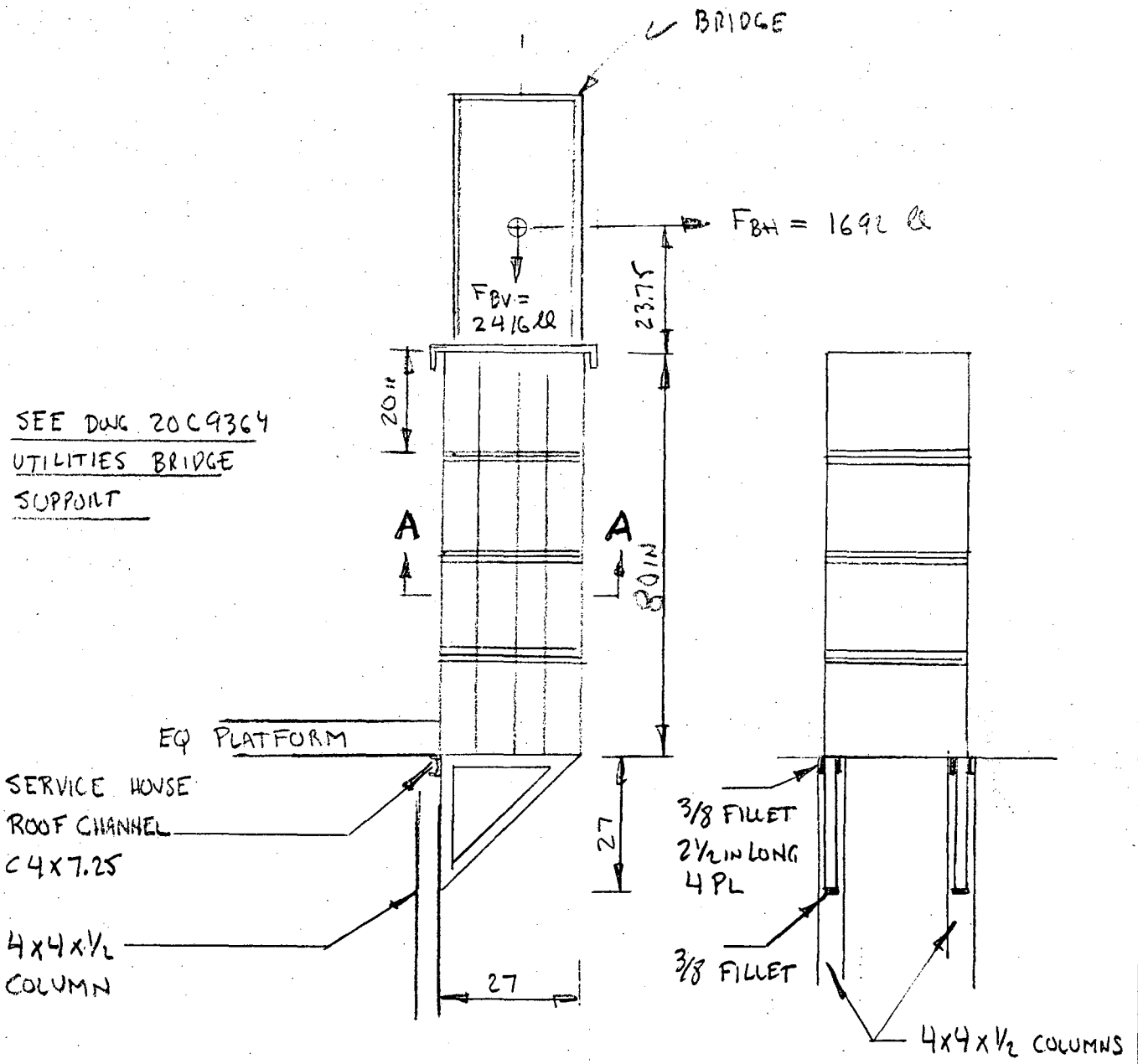


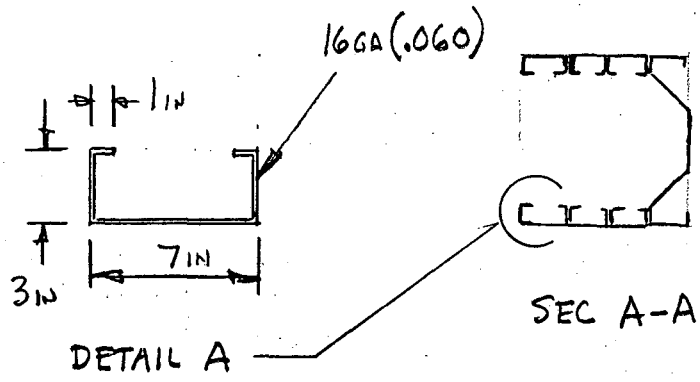

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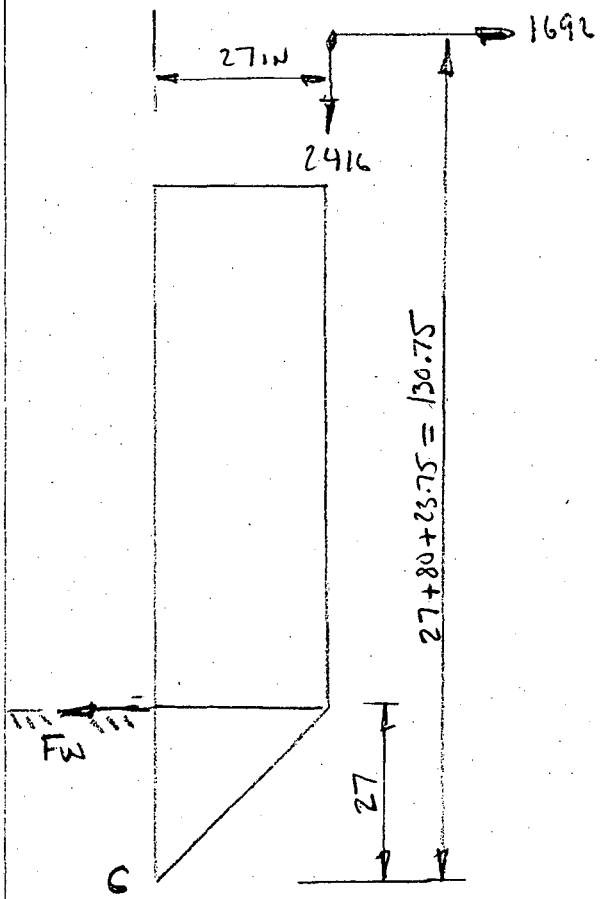



## CHECK ATTACHMENT WELD TO SEVICE HOUSE

$\Sigma M$ AROUND C

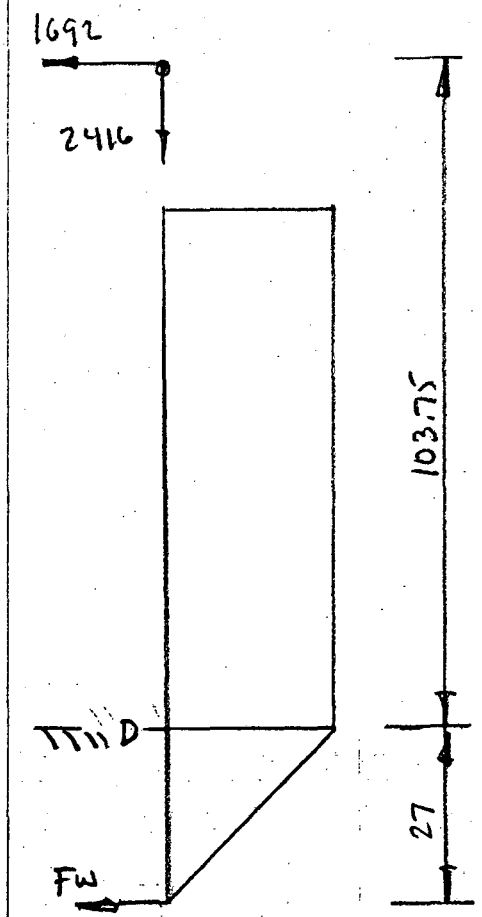
$F_w(27) = 2416(27) + 1692(130.75)$

$F_w = \dfrac{2416(27) + 1692(130.75)}{27}$

$= \boxed{10{,}610 \text{ lb}}$ — O.K.

ALLOWABLE WELD STRENGTH FOR 3/8 FILLET 3750 lb/IN

2.5 IN x 4 PLACES x 3750 lb/in = $\boxed{37{,}500 \text{ lb}}$




$\Sigma M$ AROUND D

$F_w(27) = 1692(103.75)$

$F_w = \dfrac{1692(103.75)}{27} = \boxed{6500 \text{ lb}}$ — O.K.

ALLOWABLE

4 IN x 2 PLACES x 3750 lb/in = $\boxed{30{,}000 \text{ lb}}$

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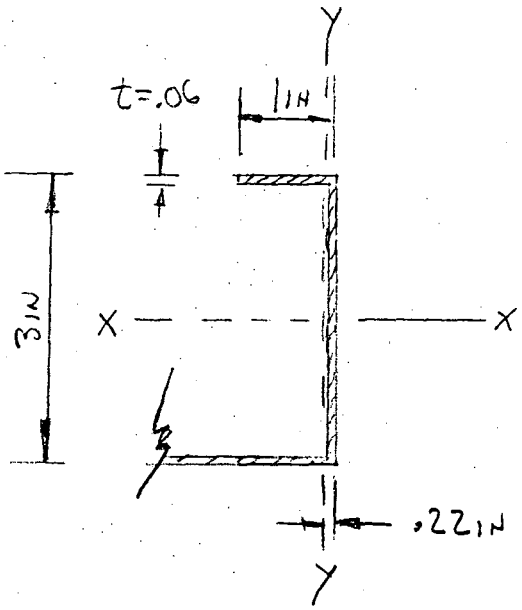
## CHECK BUCKLING STRENGTH OF BRIDGE SUPPORT




$A = (1IN + 1.IN + 2.IN) \times .06\,IN$

$= .3\,IN$

$I_{yy} = .026\,IN^4$

$r_{yy} = \sqrt{\frac{I}{A}} = \sqrt{\frac{.026}{.3}} = .29IN$

$I_{xx} = .4\,IN^4$

$r_{xx} = \sqrt{\frac{.4}{.3}} = 1.16\,IN$

$\frac{L}{r_{yy}} = \frac{20\,IN}{.29\,IN} = 69$ WEAKEST AXIS

FROM "AISC" ALLOWABLE COMPRESSIVE STRESS = 13KSI
SEE BLODGETT "DESIGN OF WELDMENTS" PAGE 2.5-9

ALLOWABLE LOAD = $.3IN^2 \times 13KSI =$ **3.9 K**

LOAD = **2.4K** ← O.K

SO WEAKEST PART OF ONE SECTION CAN CARRY THE ENTIRE LOAD

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