

# Archt's Relationship

Eric Walker File

## TAC - Walker

Jan 22, 1969 Ltr - TAC to DeLew Cather  
indicating that they would enter  
agreement for consulting services  
for parking ramp

1/24/69 reply to above

1/24/69 Ltr TAC to DLC with planning info

1/24/69 DLC to <sup>Klover</sup> TAC outlining services

Dec 6, 1971 - Memo Licht to Maupin suggesting  
Walker instead of DLC because  
of poor performance of DLC

Feb 8, 1972 Memo - Licht to Peacock  
discuss design procedure to  
use with Walker

Mar 31, 1972 Memo Licht to files -  
re intg. discussing relationships  
of TAC with consultants.

## Peacock File

May 2, 1972 ltr HGSP to Kluver confirming  
U's intent to use TAC in  
collaboration with Carl Walker

## LeMay File

Apr 1, 1972 TAC to LeMay  
re arrangements with Walker  
(attached to Mar 2 HGSP ltr to  
TAC)

Mar 31, 1972 Dave Light memo to files re  
to meeting with Brown and  
Barnes & Kluver

3-12-73.

to: Clint Hewitt.

FROM: H. HAMANN

Per your request I am enclosing the  
CASH FLOW, OR CASH EXPENDITURES, ANTICIPATED  
FOR THE HEALTH SCIENCE PARKING RAMP.

During the usual construction procedure  
we should anticipate spending at least  
\$375,000 per month. During construction  
START-UP AND FINAL FINISHING, monthly expenditures  
will be less than \$375,000/mo.

Delays in the construction start date without  
an equal extension of the completion date  
will increase monthly expenditures.

I trust that this information is  
MEANINGFUL, PLEASE CALL, SHOULD YOU  
HAVE ANY QUESTIONS.

Sincerely,

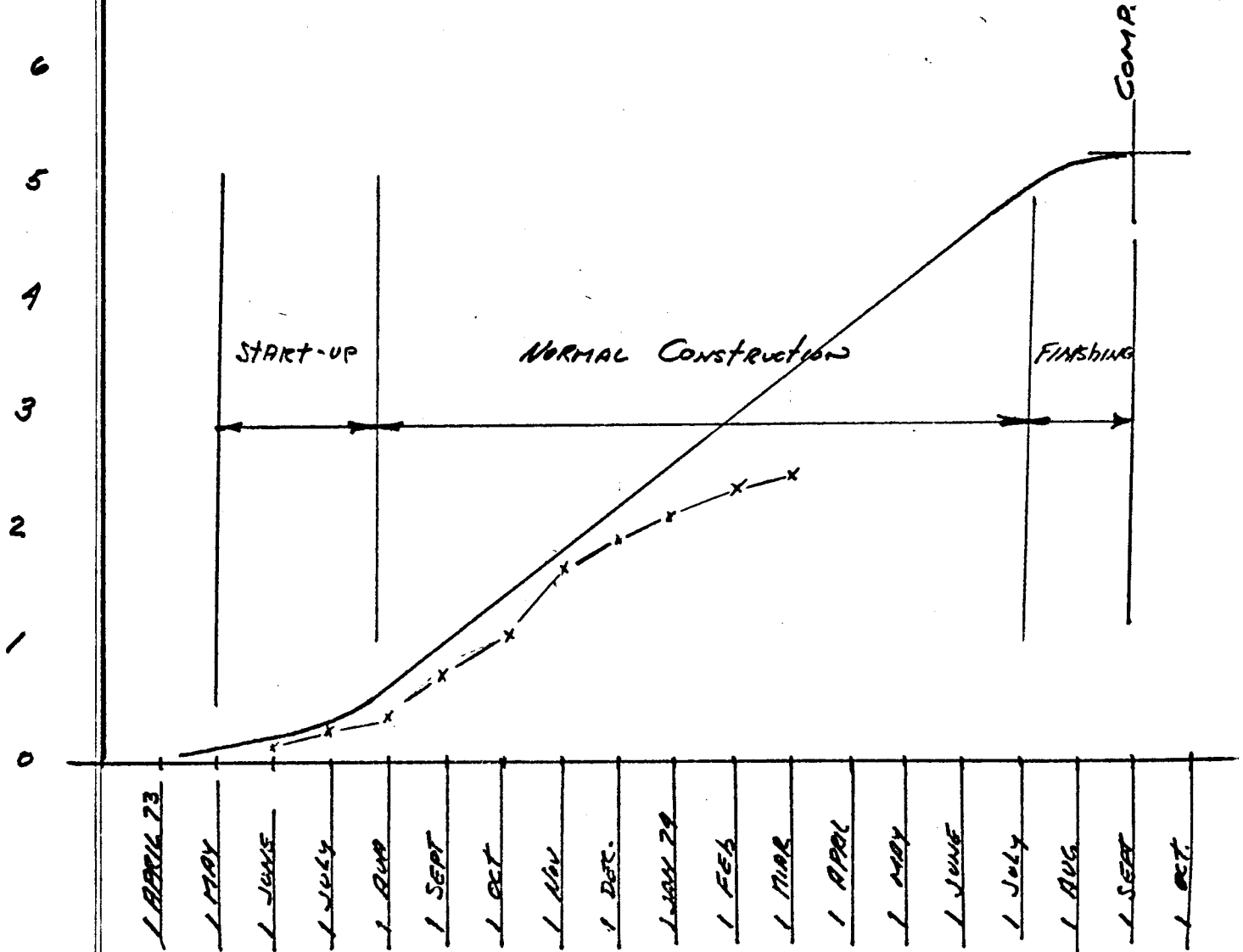
H. Hamann

# HEALTH SCIENCE PARKING RAMP.

CUMULATIVE CASH FLOW EST. MAR 73

SPENDING RATE \$375,000/MONTH.

DOLLARS IN MILLIONS.



MAR. 73.

HEALTH SCIENCE PARKING RAMP.

Estimated CASH FLOW DEMAND DURING CONSTRUCTION

Month.	MONTHLY EXPENDITURES. Actual	COM. MONTHLY EXP.	Actual
APRIL 73	\$	\$ 150,000	183. -
MAY	100,000 42,000	250,000	225,526
JUNE	150,000 30,638	400,000	256,164
JULY	300,000 206,425	700,000	462,589
AUG.	375,000 292,910	1,075,000	755,499
SEPT	375,000 359,594	1,450,000	1,115,093
OCT	375,000 608,309	1,825,000	1,723,402
NOV.	375,000 239,777	2,200,000	1,963,179
DEC.	375,000 248,000	2,575,000	2,211,179
JAN. 74	375,000 235,809	2,950,000	2,447,038
FEB	375,000 101,063	3,325,000	2,548,101
MARCH	375,000	3,700,000	
APRIL	375,000	4,075,000	
MAY	375,000	4,450,000	
JUNE	375,000	4,825,000	
JULY	328,000	5,153,000	
AUG.	225,000	5,388,000	EST COMP 1 SEPT 74
SEPT.	-	5,388,000	

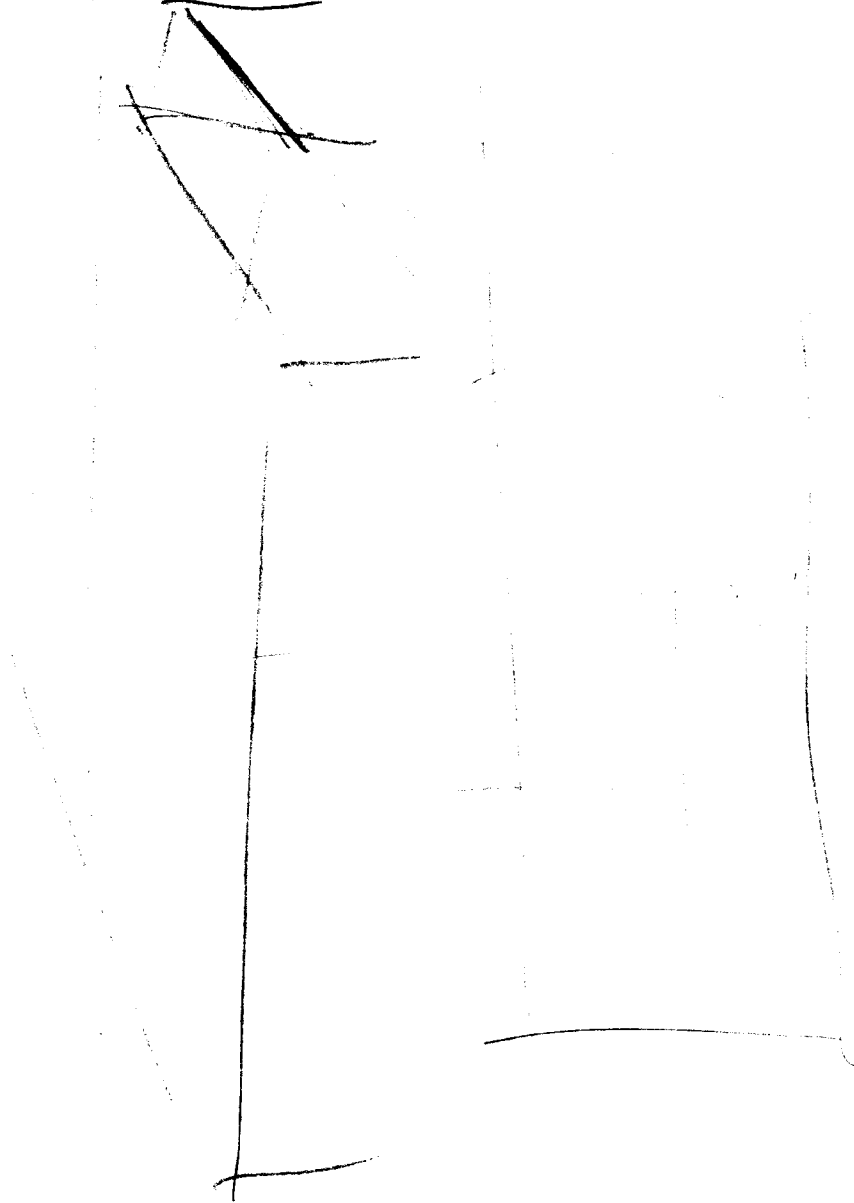
ASSUMPTIONS & DATA

START CONST.	1-MAY 73	Contract Est.	4,672,000
COMP "	1 SEPT 74	" RECEPTION	80,000
		Now Contract.	<u>616,000</u>
		TOTAL Project Cost.	\$ 5,368,000

TT's in production

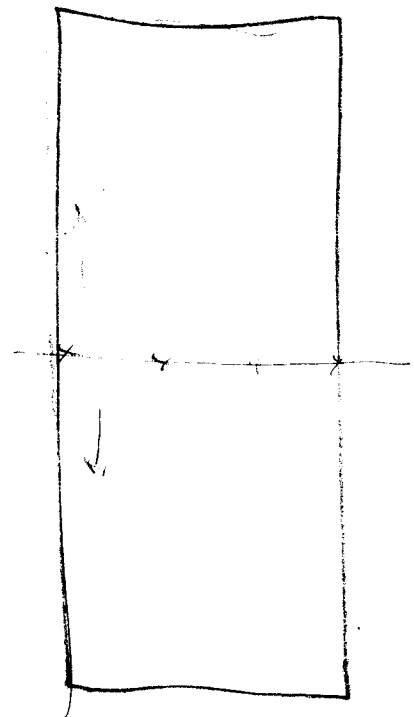
Curve is based assumption that  
TAC comes up with acceptable scheme  
at Inty. Fri Apr 18

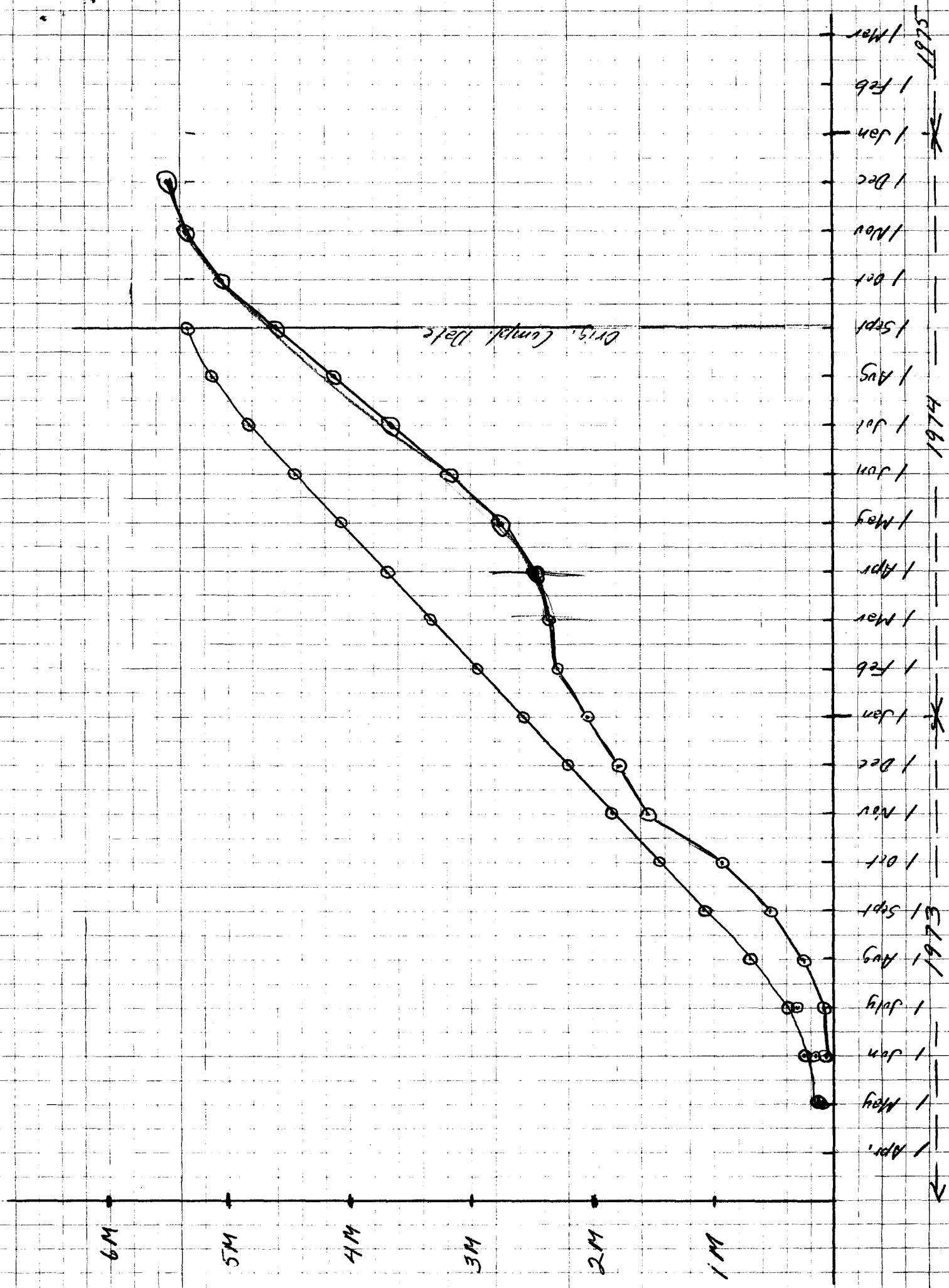
otherwise could be set back one  
month or more.



Mtg - Holland  
PM - PER  
1:30 Tues.

Is Wed PM open?





Assume \$75,000 for extra reinf. steel  
Incr.

May 1	2,750,000	450,000
June 1	3,200,000	450,000
July 1	3,650,000	450,000
Aug 1	4,100,000	450,000
Sept 1	4,550,000	450,000
Oct 1	5,000,000	350,000
Nov 1	5,350,000	
Dec 1	5,443,000	93,000

5368  
75  

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5443





UNIVERSITY OF MINNESOTA  
TWIN CITIES

Engineering and Construction Division  
Physical Planning Office  
26 Folwell Hall  
Minneapolis, Minnesota 55455

June 20, 1973

Adolphson & Peterson, Inc.  
6701 West 23rd Street  
Minneapolis, Minnesota 55426

Attention: Mr. Kenneth W. O'Brien

Re: Health Sciences Expansion Parking Facility  
University of Minnesota, Minneapolis

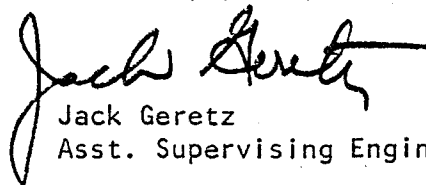
Gentlemen:

Periodic site meetings for the above referenced project will commence on June 27, 1973 at 1:30 P.M. The meetings will be held at the jobsite in the conference room of our Resident Superintendent's trailer. These meetings will be scheduled on alternate Wednesday afternoons. Please have your firm, as well as Prime Subcontractors, represented.

We would also remind you of the General Contractor's responsibility to record "minutes" for these meetings, as covered in the Special Conditions of the specification, Article 1A.03, Preconstruction Conference and Site Meetings, Paragraph B.

If you have any questions, please contact this office.

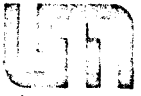
Sincerely yours,



Jack Geretz  
Asst. Supervising Engineer

JG:mj

cc: Paul Kopietz  
~~Gene Kogl~~  
Paul Maupin  
Lloyd Larson  
Erv Merkling  
Jim Hastert  
Emil Ranallo  
T.A.C., Attn: Kurt Rogness



UNIVERSITY OF MINNESOTA  
TWIN CITIES

Engineering and Construction Division  
Physical Planning Office  
26 Folwell Hall  
Minneapolis, Minnesota 55455

December 5, 1973

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Architects Collaborative, Inc.  
46 Brattle Street  
Cambridge, Massachusetts 02138

Attention: Mr. John Scott

Subject: Health Sciences Parking Ramp  
and Reception Center  
University of Minnesota

Gentlemen:

As you know, evidence of a serious structural failure in the parking ramp has been discovered involving failure of support for the precast double T concrete decks. Its cause and magnitude have not yet been fully determined.

To recap our previous meetings and conversations, the following is being done:

- A. We are presently conducting an investigation and having tests conducted on one of the structural members in question. You will be advised of the results of the tests and investigation as soon as they are available.
- B. It is our understanding you have hired your own structural consultants to undertake an investigation and that you will take the necessary steps to determine the cause of the problem and necessary corrective measures. We also request that you advise us of the results of your investigation as soon as they are available.
- C. Until the problem is better defined and ultimately resolved, we request that you take such steps and that you recommend such steps as you deem necessary to be taken in order to protect the work and to assure the safety of persons and property in the vicinity of the site and persons working at the site.

Very truly yours,

Paul E. Kopietz  
Asst. Director of Planning

PEK:mn

cc: Carl Walker & Assoc., Inc. (Mpls. Office)  
E. A. Kogl  
Clint Hewitt  
Paul Maupin  
Kurt Rogness (Mpls. TAC)

# U Ramp Delayed By Beam Cracks

12/8/73  
ST. PAUL  
PIONEER  
PRESS

By NANCY LIVINGSTON  
Staff Writer

Networks of small but threatening cracks have appeared in the concrete beams supporting the six floors of the new multi-million-dollar parking ramp the University of Minnesota is having built on Oak Street between Washington and Essex avenues in Southeast Minneapolis.

The ramp is called the Health Sciences Parking Ramp and it is located a short distance from the university's new \$33-million Health Sciences Complex.

According to James Brinkerhoff, vice president of finance, planning

and operations at the university, Twin Cities Testing Laboratory is now conducting tests to evaluate the seriousness of the cracked beams.

Brinkerhoff said the tests will determine how the beams can hold up under the kinds of loads they will be required to carry when the ramp is at its capacity of 1,000 cars.

The "phase I" section of the ramp that is nearly complete has six parking levels. Phase II of the ramp, which is not yet begun, will be about as large as Phase I, making the projected ramp capacity 2,149 cars. Total project cost is \$4,259,500. The original schedule called

for the ramp to be completed by next fall.

Brinkerhoff acknowledged that the section of ramp now up appears to be structurally unsound. Whether it is a "disaster," he said, will be determined by the tests being conducted.

He noted that the problem is crucial enough so everybody involved — the university, two or three architectural firms and one or more structural engineering firms — are all having their own attorneys and engineers evaluate the test results.

In the meantime, he said the opening of the ramp will be delayed indefinitely. The first section of the ramp was to open after the first of the year, but Brinkerhoff said he seriously doubted whether it would open before all the technical and legal issues are resolved.

How long this will take depends on the degree of hazard posed by the ramps. Brinkerhoff noted that some corrective action — such as simply increasing the number of exterior support columns — would take a couple of months. If the problem is more extensive, the remedies will take longer.

He said it would be "presumptuous" at this point to estimate when the ramp will eventually open.

Brinkerhoff said the cracks in the beams appeared about four weeks ago. Beams provide the horizontal support for a structure and span the distance between columns, which provide the structure's vertical support.)

The cracks are in the exterior beams between the columns that support the floors.

Design of the structure is to blame, said Brinkerhoff. The obligation for corrective action, he said, falls on the shoulders of the structural engineering firms and architectural firms involved.

He identified the two main firms as The Architects Collaborative, Inc., St. Paul and Cambridge, Mass.; and Carl Walker and Associates, Minneapolis and Kalamazoo, Mich. Other consultants with minor roles included another local architect and some structural engineering firms whose names he could not remember.

Brinkerhoff said the delayed opening of the ramp will have no direct economic impact on the university. The only disadvantage to the university, he said, would be in terms of inconvenience.

He said the ramp was built as large as it was because the Minneapolis Park Board may withdraw the river flats parking area from the university. Said Brinkerhoff, "We thought we'd get an advanced-planning 'leg-up' by planning alternate space for the 1,200 cars now being parked on the flats."

So far, he said, the Park Board has not withdrawn permission to use the flats. The real parking crunch will come when that area is no longer available and the new ramp is not ready for occupancy.

12/11/73  
MPLS MORN.  
TRIBUNE

## Cracks appear in 'U' parking ramp

Construction of a six-story University of Minnesota parking ramp, across SE. Oak St. from Territorial Hall, has been delayed. Engineers are trying to determine whether cracks in the support beams, discovered in November, are serious.

The fear is that the beams may not be strong enough to handle the 1,000 cars the ramp is designed to handle, Vice President James Brinkerhoff said. Adding extra support beams would probably delay the opening scheduled for next fall.



UNIVERSITY OF MINNESOTA  
TWIN CITIES

Office of the Assistant Vice President

Physical Planning  
340 Morrill Hall  
Minneapolis, Minnesota 55455

**December 11, 1973**

**TO:** Clint Hewitt  
~~Gene Kogl~~

**FROM:** L. A. LeMay

**SUBJECT:** Health Sciences Parking Ramp

Assistant Vice President Carlson has requested that you be advised that relative to the problems encountered with the Health Sciences Parking Ramp not only will there be a loss of income, but also additional costs will be accrued due to interest, etc. on borrowed funds. He indicated that Carolyn Anderson could provide figures of this aspect of the case.

LAL/sb

W. R. R. R. R.

December 13, 1973

The Architects Collaborative, Inc.  
46 Brattle Street  
Cambridge, Massachusetts 02138

Carl Walker and Associates, Inc.  
Shelard Plaza South  
Minneapolis, Minnesota 55402

Re: Health Sciences Parking Ramp  
and Reception Center --  
University of Minnesota

Gentlemen:

We have been asked by the University of Minnesota to represent their interests in the Health Science Center Parking Ramp.

You have been previously notified of the evidence of a serious structural failure in the Parking Ramp. The University has undertaken an investigation of the apparent failure, and we understand that you are conducting your own investigation.

The preliminary results of the University's investigation indicate that the cracking and "walking" of the horizontal beams supporting the pre-cast double-T slabs are the result of design errors or omissions or both.

Accordingly, you are hereby notified that you will be held responsible for any damages suffered by the University as a consequence of structural defects in the Parking Ramp arising out of your design errors or omissions or both including,

The Architects Collaborative, Inc.  
Carl Walker and Associates, Inc.

-2-

December 13, 1973

by way of example, all costs of corrective measures, lost revenues and all extended financing costs.

We urge you to take such steps as are necessary as soon as possible to determine the cause of the failure, prevent further damage to the structure, ascertain the soundest and most expedient corrective measures and implement such measures.

The University stands ready to cooperate and consult with you in order to achieve these ends.

Very truly yours,

BCH;ps



UNIVERSITY OF MINNESOTA  
TWIN CITIES

Engineering and Construction Division  
Physical Planning Office  
26 Folwell Hall  
Minneapolis, Minnesota 55455

December 14, 1973

TO: The Files  
FROM: Paul Kopietz **PK**  
SUBJECT: Health Sciences Parking Ramp  
Phone Conversation with John Scott (TAC)  
on Afternoon of December 12, 1973

Called John Scott to specifically ask him certain information and questions. The following covers the main points of the conversation. In addition, John kept me up-to-date as to where they are on the problem.

- A. I asked John if we could receive a copy of the original calculations that Carl Walker made on the design, and he said that this would be no problem and that he would see that we received a set.
- B. I reminded him that at the same time they are looking at the problem in Phase I, they should not forget that corrective action will have to be taken on Phase II and that they should pursue that equally as hard because if for some unknown reason we have an impasse on Phase I corrective action, a lot could be salvaged in terms of time by pushing the Phase II portion of the ramp and getting that in operation. He thought that was a good idea and indicated that he would do this.
- C. I asked John if there was any reason that we should withhold payment to the Prime Contractor, Adolphson & Peterson. He said off-hand he did not see why there should be any reason. He said from a legal sense there might be a couple of minor points that they could make in regard to the contractor's work but that the real problem was with Carl Walker's design and, therefore, he felt we should process the payment. The 10% that we normally withhold should cover any of these particular items. The things that he was referring to were some of the low strength tests and also the misplacement of some of the bearing pads.

This, generally, covers what I had called and asked John about, but he did fill me in on where they stand. He indicated that they have not had their meeting yet with Carl Walker and their structural consultants but that this was going to take place on Friday, December 14th, in Chicago. He told me that he asked Carl Walker to have his insurance carrier present at this meeting. John said enough to me to indicate that he is having problems with Carl Walker, and he has informed Carl Walker that they will not endorse any plan for correcting the problem that TAC cannot fully back themselves. He has told Carl Walker that if they cannot back his corrective plan, he will have to present it himself to the University.

Page 2.  
To the Files  
12/14/73

I indicated to John that my off-hand reaction to that would be that if TAC would not fully endorse the plan, I do not believe the University would be too interested in listening to Carl Walker's proposal. He has a tentative solution proposed from Carl Walker which seems insufficient. It's basically as follows:

They wish to put a large restraining angle along the back edge of the horizontal legs to stop the rotation and movement, and then they wish to grout in the bearing area and by some way improve the bearing. I indicated to John in an off-hand manner that speaking for myself it seemed to me that we would agree that the movement has to be stopped but that I felt Walker was not treating the bearing problem nearly seriously enough and that his proposed solution, if that's what it was, would not be acceptable. John indicated to me that their engineers and their office feel strongly about the bearing problem, and I believe they view it much like we do.

This basically was the conversation. One other minor point, they were not too happy with the article in the St. Paul paper. John indicated that TAC wouldn't make any comment on it but that he couldn't speak for Carl Walker who seemed to be very unhappy with it and said if we should get some response on that article, it would be strictly Carl Walker acting independently.

In closing, John indicated that he would probably be getting in touch with me next week to further post me on what has happened.

PEK:mj

cc: Briggs & Morgan, Marv Fabyanske  
✓ E. A. Kogl



UNIVERSITY OF MINNESOTA  
TWIN CITIES

Engineering and Construction Division  
Physical Planning Office  
26 Folwell Hall  
Minneapolis, Minnesota 55455

January 29, 1974

TO: The Files  
FROM: Paul E. Kopietz **PEK**  
SUBJECT: Health Sciences Parking Ramp

This memo is for the purpose of reviewing the week of January 21st regarding the progress on the Parking Ramp.

We were supposed to have received proposals for Phase I and Phase II corrections on January 16, 1974, as promised by Carl Walker. When we had heard nothing by Monday, January 21st, I called John Scott to see what was happening. He indicated to me that they had received a proposal from Carl Walker on Phase II changes but that it was so incomplete that they had returned it to them for resubmission. He indicated that they had just received it again that day (the 21st). He said they would review it and transmit it to us as quickly as possible.

I had heard nothing by Wednesday, and therefore started calling John and was unable to make contact with him until Friday. At that time, he indicated that the second proposal from Carl Walker had not been satisfactory and that they had spent several days reviewing and going over corrections and additions they wished them to make. It took until Wednesday evening to settle that matter. However, he indicated that he thought the drawings would be received shortly.

I reminded him that time was going by and that the University was getting increasingly concerned over the lack of appropriate action. He told me that he was aware of this and indicated that we would have the drawings no later than Monday, January 28th. This was later confirmed by him, and we expect the drawings for the Phase I correction at that time.

He indicated that they had just received a proposal from Raths/Raths & Johnson on the testing criteria value recommendation for Phase I that we were seeking and were in the process of reviewing that. He asked me if we wished to receive a copy of that letter prior to their review and recommendation. I indicated that we would like this. However, we would make no formal response until we had a review and recommendation from TAC on this proposal.

I further asked John what limits they carried on errors and omission insurance, and he indicated to me that Carl Walker carried \$1,000,000 with a \$6,000 deductible clause, and TAC carried \$1,000,000 with a \$10,000 deductible clause. John also told me that they had sent my letter of January 15th, in which we asked for certain assurances on the corrective action, on to Carl Walker asking them how they would respond to those requirements.

PEK:mj

cc: James Brinkerhoff  
Clint Hewitt  
✓ E. A. Kogl



UNIVERSITY OF MINNESOTA  
TWIN CITIES

Engineering and Construction Division  
Physical Planning Office  
26 Folwell Hall  
Minneapolis, Minnesota 55455

February 6, 1974

The Architects Collaborative, Inc.  
46 Brattle Street  
Cambridge, Massachusetts 02138

Attention: Mr. John Scott

Subject: Health Sciences Parking Ramp  
University of Minnesota

Dear John:

This letter is for the purpose of reviewing my comments on the modifications to the precast concrete components for the Phase II portion of the ramp that I made to you on Friday morning, February 1, 1974.

After reviewing the drawing that was delivered by Curt Rogness, we have the following recommendations or questions:

1. On all beams shown on the drawings, those being for grids A, B, C, D, E and F from grids 13 to 22, there needs to be additional No. 4 ties or tensile steel at each double T stem. They are still short of steel. We wish two more No. 4 bars at each T stem or four spaces at 6".
2. We would like to see the two No. 6 bottom bars of the A, F grid beams changed to two No. 7s. The bottom bars are presently stressed so close to the allowable that the University wishes this extra factor of safety.
3. B1 beams. These are not mentioned in the drawings, but our calculations indicate that they need supplemental tensile steel or ties for the live load. They are short.
4. We wish to know what the design concept is on Detail No. 2. Why the slotted hole in the channel? Is this configuration to move at each column, or is to be tied rigidly? If it is tied rigidly, then what happens when this is combined with the topping? It would seem this prevents the relief of the expansion stresses because you now have one large continuous mass of concrete, whereas previously each beam was free to come and go between the columns. We would like an analysis to indicate what happens here and which way do you wish this to operate.

Along this same line, if you do tie everything in solidly and prevent the movement from column to column, what then happens at the main expansion joint at Grid 13? We feel this should also be given consideration and expect an analysis and direction on the above.

Page 2.

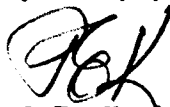
The Architects Collaborative, Inc.

2/6/74

5. All bolts and the angle shown at the bottom of the beam in Detail 7 should be of a permanent corrosion resistant material. There seems to be some confusion on this at the present time. We wish your direction on this.
6. We feel the anchor bolts shown in both Detail 2 and Detail 3 are too short at  $3\frac{1}{2}$ ". These should be longer.
7. We seriously question the need for the cover over the channel as shown in Detail 10. We really feel that we want these bolts and channels easily accessible so they can be observed and any maintenance work done on them freely. If you do insist on the covers, then they certainly should not be attached by a self-drilling screw just because of the cost implications and difficulty of doing this, and also it would make them difficult to move.
8. The teflon as shown at the expansion joint, Detail No. 3 for example, should be the reinforced type.

In addition to the above items, we wish a letter from you indicating that TAC and your consultants have reviewed this document and whether or not this is your proposal for the Phase II corrections.

Very truly yours,



Paul E. Kopietz  
Asst. Director of Planning

PEK:mj

cc: James Brinkerhoff  
Clint Hewitt  
✓ E. A. Kogl  
Curt Rogness

MADE BY

CHR

DATE

3/20/74

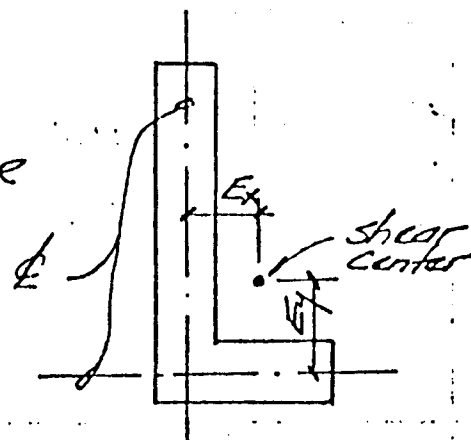
CHECKED BY

Find Beam Shear Centers

Use program "SCENTER" - P-2/R

revised 3/26/74

Beam Mark	$E_x$ (in.)	$E_y$ (in.)
B7 Floor A,F	0.35	2.78
B9 Floor F 12-13	0.09	10.49
B10 Floor B,C,D,E	0.02	19.79
B11 Roof C,D	0.01	28.04
B12 Floor F 12-13	0.07	7.41
B13 Roof A,F	0.04	11.13



see P-3/R & 4/R for  $E_x$  &  $E_y$

Find Controlling Reactions

(Use Load Factor = 1.5)

B7 (Floor)

working Reaction =  $44.9 K$  (see P-4/9A)  $5.89K = B7-DL$

B9 (Floor)

Working Reaction =  $3(12.99) + 0.404 \frac{(23.96)}{2} = 43.8 K$   $38.97$  P-2/9A  $4.14$  B9-DL

Area =  $\frac{(40.5 + 8)8}{144} = 2.694 ft^2$   
 $w = 0.404 k/ft$

B10 (Floor)

Working Reaction =  $3(12.99) + \frac{(23.96)}{2} 0.583 = 46.0 K$   $38.97$  P-2/9A  $6.98$  B10-DL

Area =  $\frac{8(62 + 8)}{144} = 3.89 ft^2$   
 $w = 0.583 k/ft$

B11 (Roof) (add 10 psf to LL)

Working Reaction =  $\frac{23.96}{2} (0.733) + 3(12.99) \frac{(122)}{112} = 51.2 K$   $42.4K$   $1.0893$   $1.76$  B11-DL  $P-2/9A$

Area =  $\frac{(20 + 8)8}{144} = 4.89 ft^2$

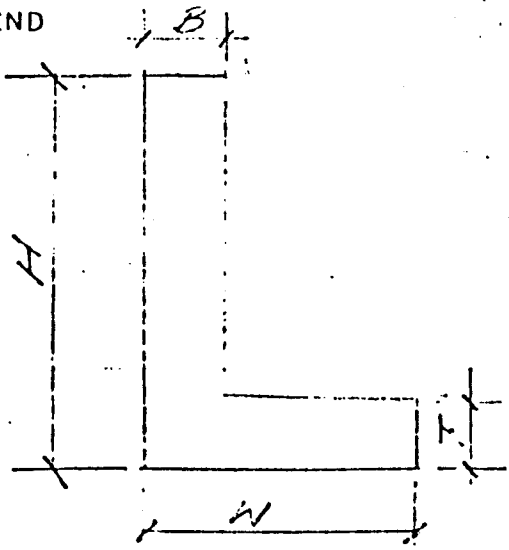
$w = 4.89(0.15) = 0.733 k/ft$

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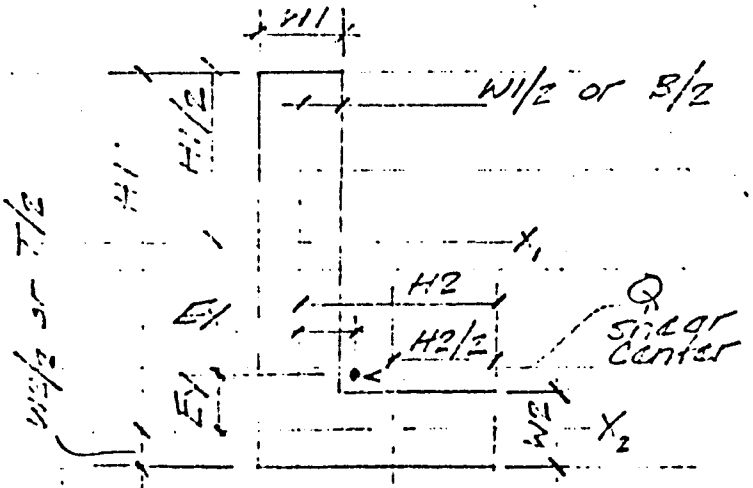
100 PRINT
120 PRINT
140 PRINT"*****"
160 PRINT
180 PRINT
200 PRINT"SHEAR CENTER - L BEAM"
220 PRINT
240 PRINT"INPUT: JOB NO., MARK"
260 INPUT A$,B$
280 PRINT"INPUT BEAM DIM'S (IN.): H, T, B, W"
300 INPUT H0,W2,W1,B1
320 H1=H0-W2/2
340 H2=B1-W1/2
360 I1=H1*W1*3/12
380 I2=W2*H2*3/12
400 I3=W1*H1*3/12
420 I4=H2*W2*3/12
440 X1=H2/2*I4/(I3+I4)
460 Y1=H1/2*I1/(I1+I2)
480 PRINT
500 PRINT
520 PRINT"SHEAR CENTER LOCATION (MARK="";B$;)"
540 PRINT"=====
560 PRINT
580 PRINT USING 760,X1
600 PRINT
620 PRINT USING 780,Y1
640 PRINT
660 PRINT"TYPE: 0 TO END OR 1 FOR NEXT CASE"
680 INPUT R0
700 IF R0=0 THEN 820
720 IF R0=1 THEN 100
740 IF R0<>0 THEN 820
760: EX=###.## IN. (TO RIGHT FROM B/2)
780: EY=###.## IN. (TO ABOVE FROM T/2)
800 REM REFERENCE-P.142,FORMULAS FOR STRESS AND STRAIN,R.J.ROARK
820 END

```

*Revised  
3/26/74  
Equation in  
Book incorrect,  
Revised per  
Prof. Warren Young  
U. of Wisc., author  
of to be published  
5th Edition, in  
Jan. 1975.*



INPUT



Y1, Y2  
CALC. & OUTPUT

\*\*\*\*\*

1-12

73681

Revised  
3/26/74

SHEAR CENTER - L BEAM

INPUT: JOB NO., MARK  
?R73681,B7

INPUT BEAM DIM'S (IN.): H, T, B, W  
?40.5,8,8,27.5

SHEAR CENTER LOCATION (MARK=B7)

=====

EX= 0.35 IN. (T0 RIGHT FROM B/2)

EY= 2.78 IN. (T0 ABOVE FROM T/2)

TYPE: 0 T0 END OR 1 FOR NEXT CASE ?1

\*\*\*\*\*

SHEAR CENTER - L BEAM

INPUT: JOB NO., MARK  
?R73681,B9

INPUT BEAM DIM'S (IN.): H, T, B, W  
?40.5,8,8,16

SHEAR CENTER LOCATION (MARK=B9)

=====

EX= 0.09 IN. (T0 RIGHT FROM B/2)

EY= 10.49 IN. (T0 ABOVE FROM T/2)

TYPE: 0 T0 END OR 1 FOR NEXT CASE ?1

\*\*\*\*\*

SHEAR CENTER - L BEAM

INPUT: JOB NO., MARK  
?R73681,B10

INPUT BEAM DIM'S (IN.): H, T, B, W  
?62,8,8,16

SHEAR CENTER LOCATION (MARK=B10)

=====

EX= 0.02 IN. (T0 RIGHT FROM B/2)

EY= 19.79 IN. (T0 ABOVE FROM T/2)

TYPE: 0 T0 END OR 1 FOR NEXT CASE ?1

\*\*\*\*\*

SHEAR CENTER - L BEAM

INPUT: JOB NO., MARK  
?R73681,B11

INPUT BEAM DIM'S (IN.): H, T, B, W  
?80,9-8,8,16

SHEAR CENTER LOCATION (MARK=B11)

=====

EX= 0.01 IN. (T0 RIGHT FROM B/2)

EY= 28.04 IN. (T0 ABOVE FROM T/2)

TYPE: 0 T0 END 0R 1 FOR NEXT CASE ?1

\*\*\*\*\*

SHEAR CENTER - L BEAM

INPUT: JOB NO., MARK  
?R73681,B12

INPUT BEAM DIM'S (IN.): H, T, B, W  
?66.75,8,8,27.5

SHEAR CENTER LOCATION (MARK=B12)

=====

EX= 0.07 IN. (T0 RIGHT FROM B/2)

EY= 7.41 IN. (T0 ABOVE FROM T/2)

TYPE: 0 T0 END 0R 1 FOR NEXT CASE ?1

\*\*\*\*\*

SHEAR CENTER - L BEAM

INPUT: JOB NO., MARK  
?R73681,B13

INPUT BEAM DIM'S (IN.): H, T, B, W  
?83.25,8,8,27.5

SHEAR CENTER LOCATION (MARK=B13)

=====

EX= 0.04 IN. (T0 RIGHT FROM B/2)

EY= 11.13 IN. (T0 ABOVE FROM T/2)

TYPE: 0 T0 END 0R 1 FOR NEXT CASE ?0

73681  
Revised  
3/26/74

B12 (Floor)

Working Reaction =  $\frac{23.96^{8.61}}{2} (0.719) + 3(12.99) = 47.6K$   $(P=2/9A)$

Area =  $\frac{(66.75 + 19.5)8}{144} = 4.791 ft^2$

$w = 4.791(0.15) = 0.719 klf$

B13 (Roof) (add 10 psf to LL)

Working Reaction =  $\frac{23.96^{10.3}}{2} (0.856) + 42.4 = 52.7K$   $(P=1/2R)$

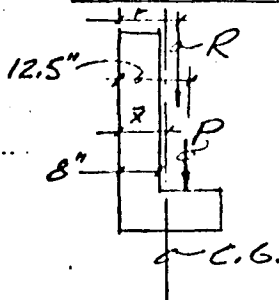
Area =  $\frac{(83.25 + 19.5)8}{144} = 5.708 ft^2$

$w = 5.708(0.15) = 0.856 klf$

Determine Location of  
 & Angle Seat Reaction

& of applied loads & seat angle reactions  
 to line up - hence no horizontal forces  
 req'd for equil.

Location Applied Loads - Centroid



$\bar{x}_{B1} = 8.35"$  see p. 2/9A

$\bar{x}_{B11} = \frac{4(8)80 + 8(8)12}{(80+8)8} = 4.73"$

$\bar{x}_{B9} = \frac{4(8)40.5 + 8(8)12}{(40.5+8)8} = 5.32"$

$\bar{x}_{B12} = \frac{4(8)66.75 + 8(19.5)17.75}{(66.75+19.5)8} = 7.11"$

$\bar{x}_{B10} = \frac{4(8)62 + 8(8)12}{(62+8)8} = 4.91"$

$\bar{x}_{B13} = \frac{4(8)83.25 + 8(19.5)17.75}{(83.25+19.5)8} = 6.6"$



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$$B7: \bar{r}_{B7} = \frac{38.97(12.5) + 5.89(8.35)}{44.9} = 11.94''$$

$$B9: \bar{r}_{B9} = \frac{38.97(12.5) + 4.84(5.32)}{43.8} = 11.71''$$

$$B10: \bar{r}_{B10} = \frac{38.97(12.5) + 6.98(4.91)}{46.0} = 11.33''$$

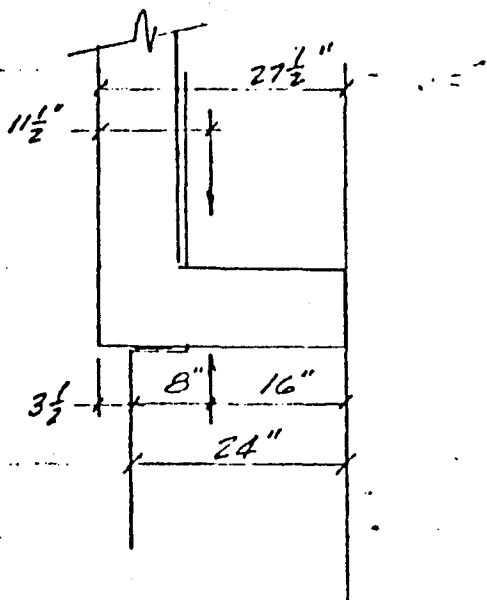
$$B11: \bar{r}_{B11} = \frac{42.4(12.5) + 8.78(4.73)}{51.2} = 11.16''$$

$$B12: \bar{r}_{B12} = \frac{38.97(12.5) + 8.61(7.11)}{47.6} = 11.52''$$

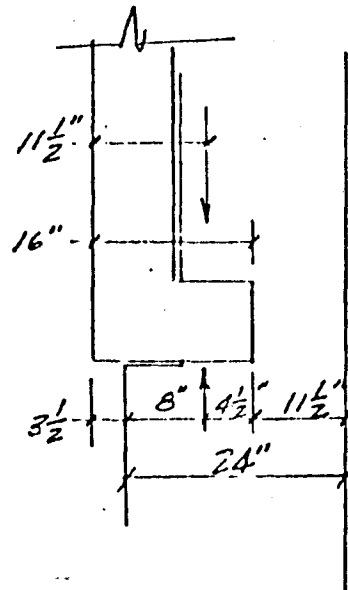
$$B13: \bar{r}_{B13} = \frac{42.4(12.5) + 10.3(6.61)}{52.7} = 11.35''$$

Avg = 11.50" ← Use  
for  
Angle  
Seat Location

COL TO BEAM DETAILS



B7, B12, B13  
Floor Floor Foot



B10  
Floor

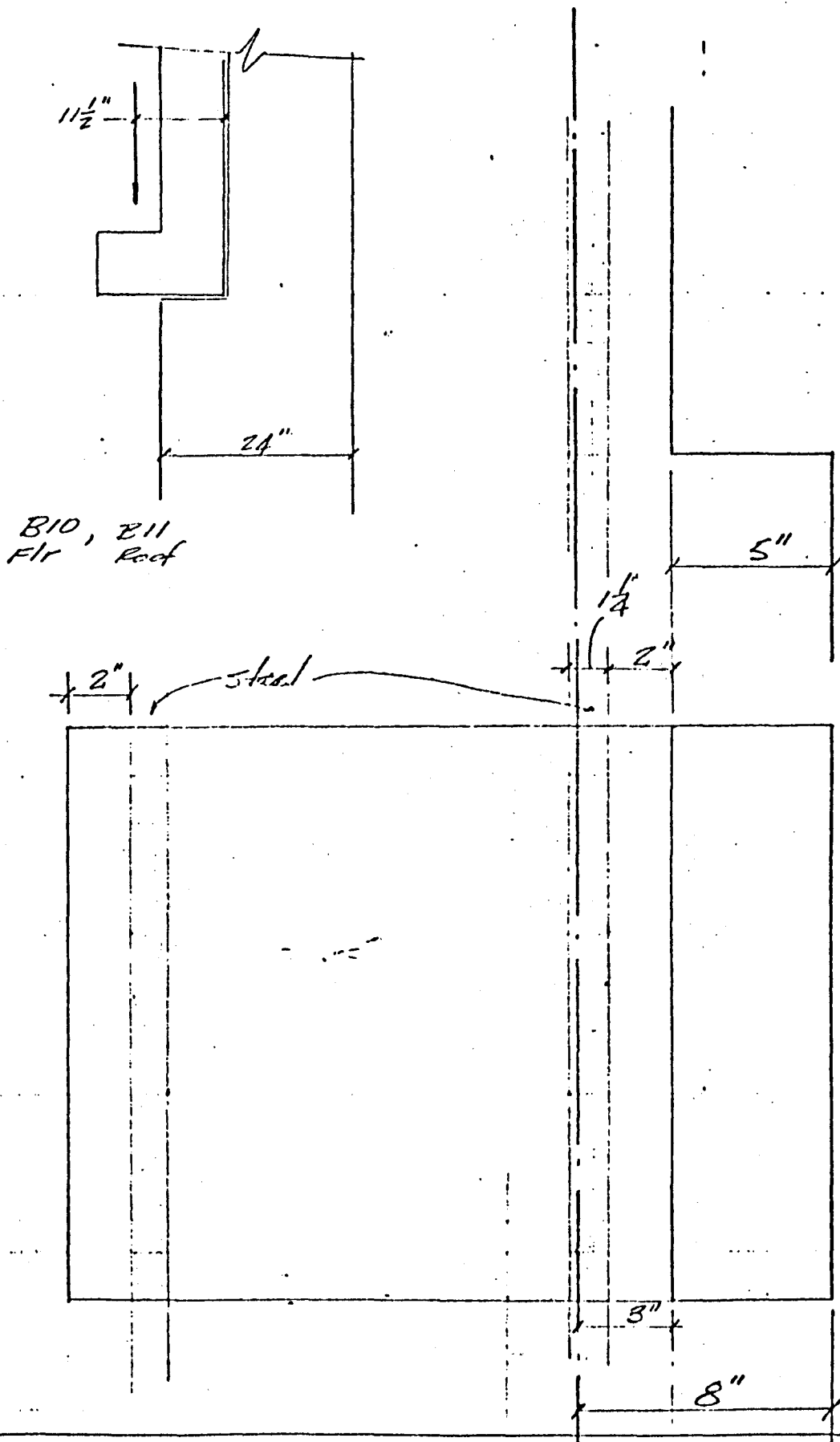
Phase I modification  
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7/25 F  
JOB NUMBER  
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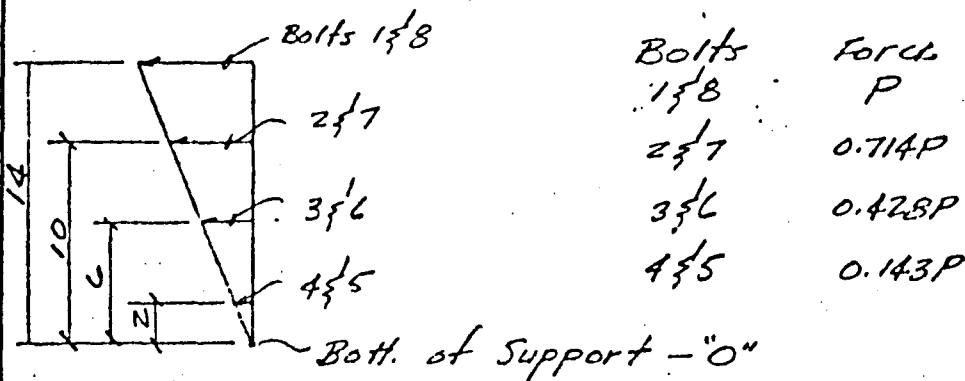
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**DESIGN SOFFIT SUPPORT**

Note: Various preliminary trial designs developed not shown in these calc's.

**Find  $P_u$  Forces To Exp. Bolts**

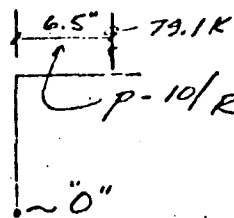
For dimensions & Arrangement - see p-9/R & 10/R



Max  $V_u$  To Support

B13 C Roof controls - see p. 5/R

$$V_u = 1.5(52.7) = 79.1K$$



Find  $P_u$

$$\sum M_o = 0 \quad ?$$

$$6.5(79.1) - 2[14P + 10(0.714P) + 6(0.428P) + 2(0.143P)] = 0$$

$$2(23.99P) = 514.15K$$

$P = 10.71K$  → MAX Ulf. Tension Force To Exp. Bolts

**Find  $S_u$  Forces To Exp. Bolts**

Consider support a rigid body - shear forces proportional to dist. from bolt c.g.

$$\text{Torque} = 79.1(3.75) = 296.62K$$

$$\sum M_o \text{ about Bolt C.G.} = 0 \quad ? \quad \text{--- see p-11/R$$

$$296.62 - 4[6.55F + 3.40(0.519F)] = 0$$

$$F_u = \frac{296.62}{33.26} = 8.92K \text{ per bolt} \quad \frac{1}{8} V_u = \frac{79.1}{8} = 9.89K \text{ per Bolt}$$

RATHS, RATHS & JOHNSON, inc.

STRUCTURAL ENGINEERS  
907 NORTH ELM STREET, HINSDALE, ILL. 60521

Phase I modification

SHEET NUMBER

9/25 R

JOB NUMBER

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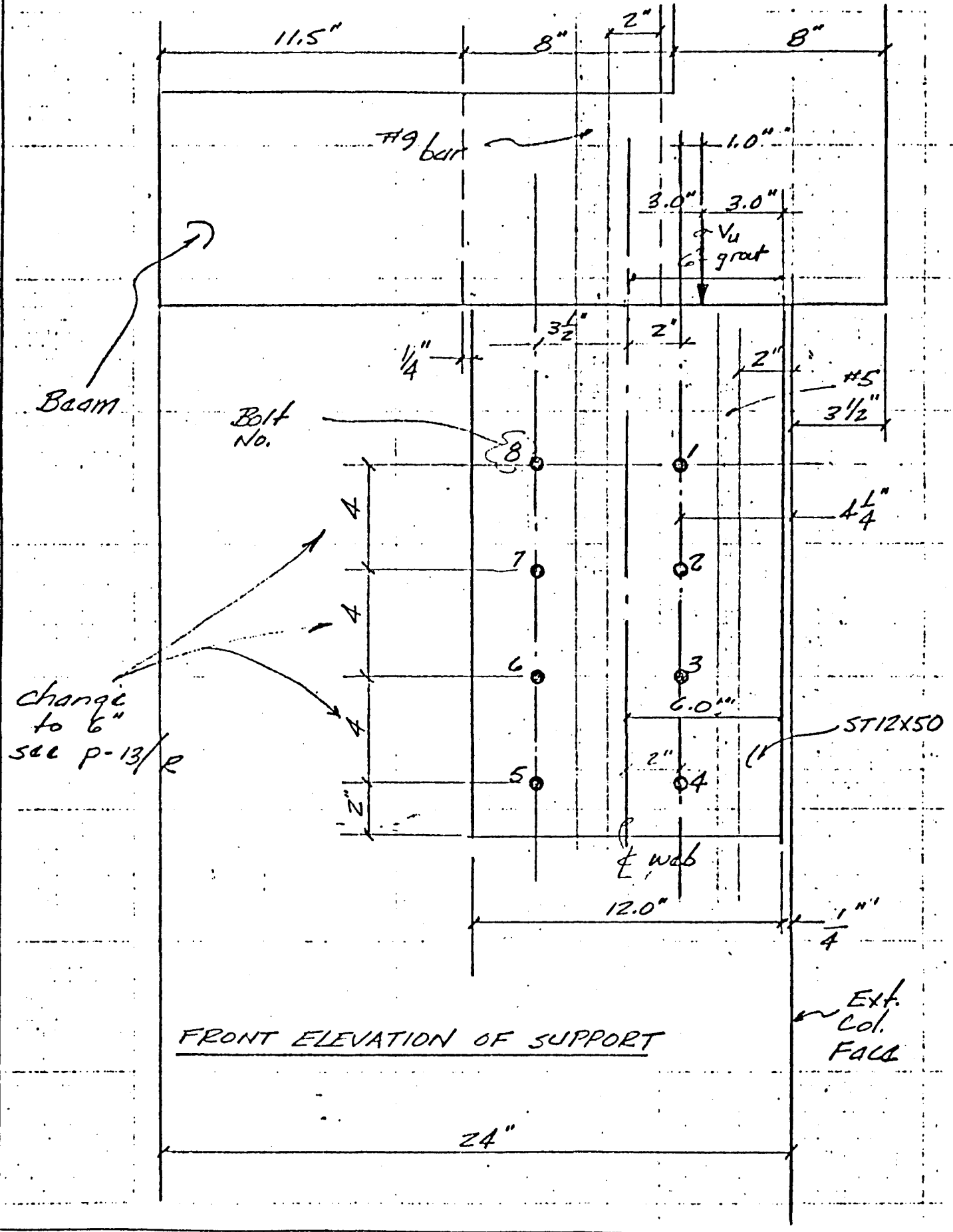
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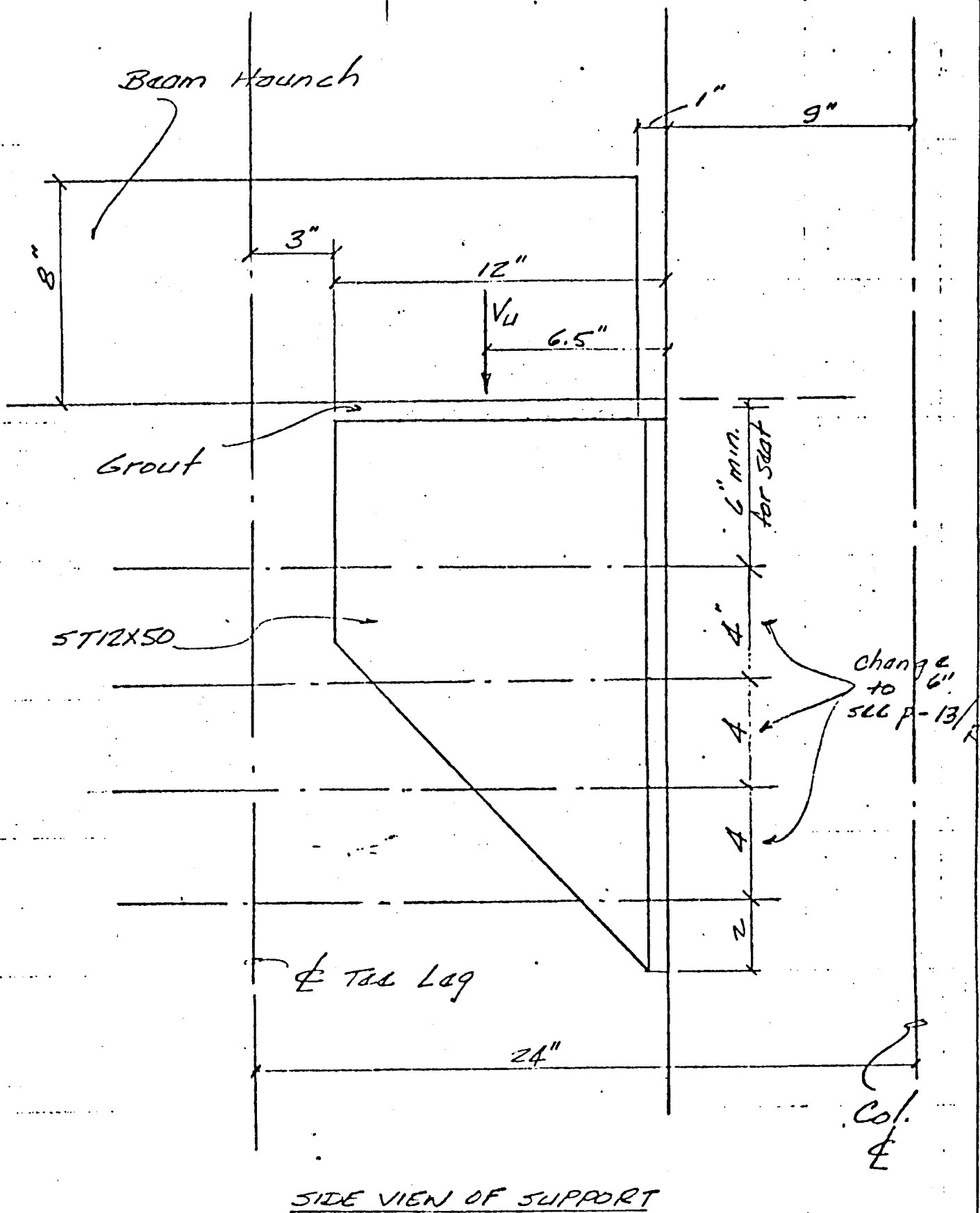
Bracket



FRONT ELEVATION OF SUPPORT

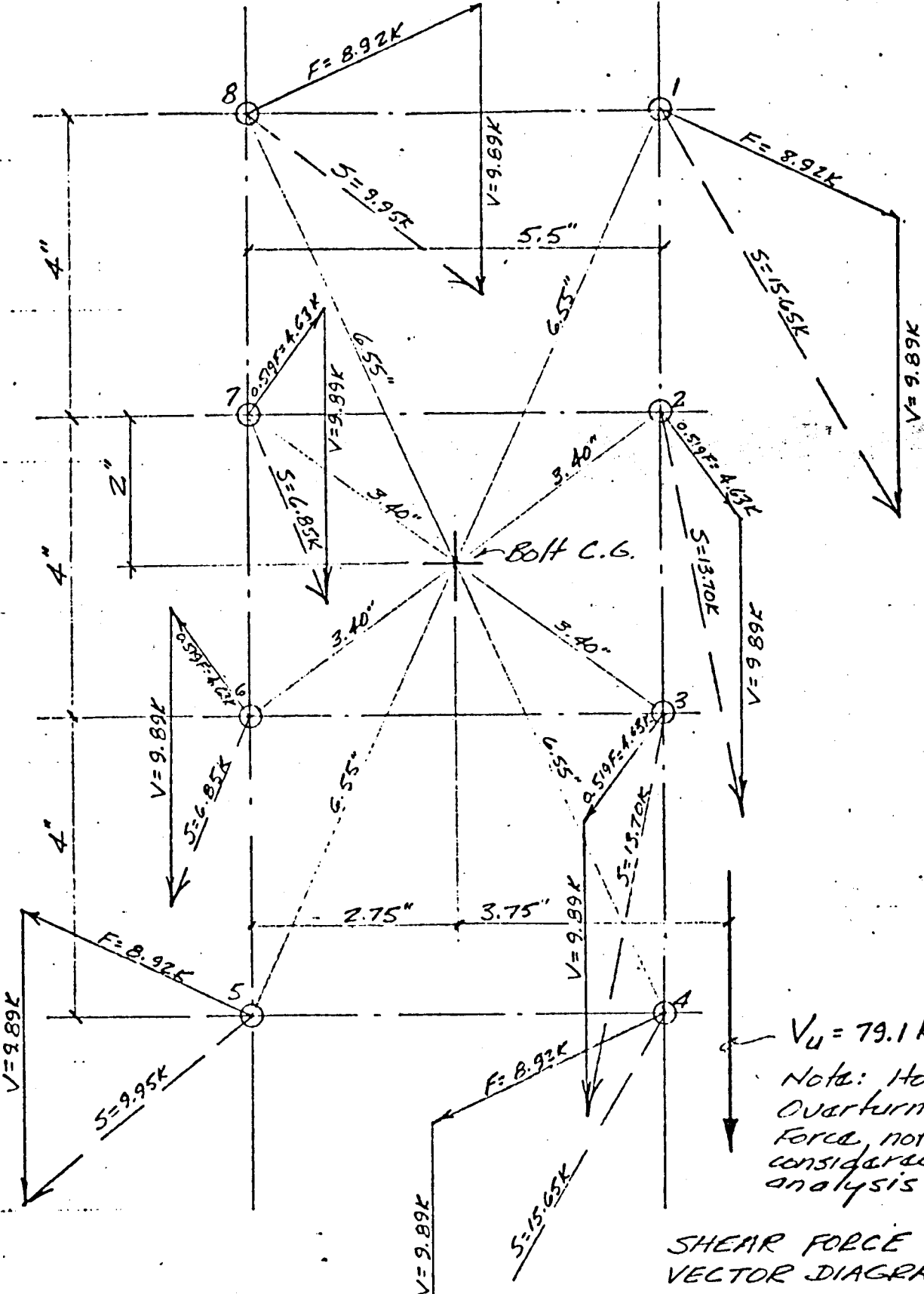
Ext. Col. Face

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SIDE VIEW OF SUPPORT

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$V_u = 79.1 K$   
 Note: Horiz  
 Overturning  
 Force not  
 considered this  
 analysis

SHEAR FORCE  
 VECTOR DIAGRAM

Select Expansion Bolt

$$\left. \begin{aligned} P_u \text{ max} &= 10.71K \sim p-8/R \\ S_u \text{ max} &= 15.65K \sim p-11/R \end{aligned} \right\} \text{ Bolt 1 controls}$$

Determine Reduced Shear Cone Capacity

Bolt 1 Pullout & shear capacity reduced by free edge of column if  $5\frac{1}{2}$ " embedment used - consider "n" case per PCI Conn. Manual (see p-13/R)

"n"  $\approx$  4"  $\frac{1}{2}$   $z_c = 5\frac{1}{2}$ "

Reduction Factor =  $0.89 + \frac{1}{4}(0.11) \approx 0.90$

Select Bolt.

Try 1" bolt -  $5\frac{1}{2}$ " Embedment

$$\left. \begin{aligned} P'_{uc} \text{ full cone for } f'_c &= 3500 \text{ psi: } 22.5K \\ S'_{uc} \text{ full cone for } f'_c &= 3500 \text{ psi: } 26.0K \end{aligned} \right\} \text{ see p-14/R}$$

$$\left. \begin{aligned} \text{Use } P'_{uc} &= 0.9(22.5) = 20.5K \\ S'_{uc} &= 0.9(26.0) = 23.4K \end{aligned} \right\} \text{ for conc. controlling}$$

$$\left( \frac{P_u}{P'_{uc}} \right)^{4/3} + \left( \frac{S_u}{S'_{uc}} \right)^{4/3} \leq 1 \quad (\text{PCI Eq 2-29})$$

$$\left( \frac{10.71}{20.5} \right)^{4/3} + \left( \frac{15.65}{23.4} \right)^{4/3} = (0.52)^{4/3} + (0.67)^{4/3} = 0.42 + 0.59 = 1.01 \text{ say ok}$$

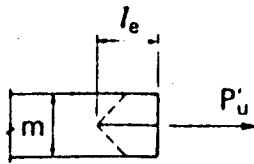
Does Not Consider Force

Use 1" x 8" Nut of WJ-1 Bolt

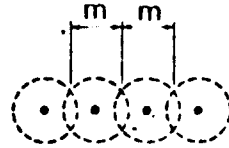
Actual Exp Bolt capacity is greater than calc. since  $f'_c = 6000 \text{ psi}$  neglected & friction between beam & support neglected which reduces  $P_u$ . Verify Bolt pull-out capacity by test in conc. made by precaster to check influence of aggregates.

Increase Vertical Spacing to 5"

Both Sides of Shear Cone Not Developed



Case 1

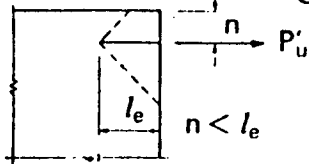


Case 2

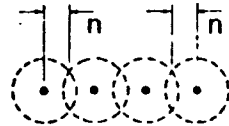
Interior studs or inserts in a group.  
 $m < 2 l_e$

m (in.)	$l_e = 2.5''$	$l_e = 4''$	$l_e = 6''$	$l_e = 8''$	$l_e = 9''$	$l_e = 12''$	$l_e = 15''$	$l_e = 18''$
3	0.72	0.47	0.31	0.24	0.21	0.16	0.13	0.11
4	0.90	0.61	0.42	0.31	0.28	0.21	0.17	0.14
5	1.0	0.74	0.51	0.39	0.35	0.26	0.21	0.18
6	1.0	0.86	0.61	0.47	0.42	0.31	0.25	0.21
7	1.0	0.95	0.70	0.54	0.48	0.37	0.29	0.25
8	1.0	1.0	0.78	0.61	0.55	0.42	0.34	0.28
9	1.0	1.0	0.86	0.68	0.61	0.47	0.38	0.31
10	1.0	1.0	0.92	0.74	0.67	0.51	0.42	0.35
11	1.0	1.0	0.97	0.80	0.73	0.56	0.46	0.38
12	1.0	1.0	1.0	0.86	0.78	0.61	0.50	0.42
13	1.0	1.0	1.0	0.91	0.83	0.65	0.53	0.45
14	1.0	1.0	1.0	0.95	0.88	0.70	0.57	0.48
15	1.0	1.0	1.0	0.98	0.92	0.74	0.61	0.51
16	1.0	1.0	1.0	1.0	0.96	0.78	0.65	0.55
17	1.0	1.0	1.0	1.0	0.98	0.82	0.68	0.58
18	1.0	1.0	1.0	1.0	1.0	0.86	0.72	0.61

One Side of Shear Cone Not Developed



Case 1



Case 2

Exterior studs or inserts in a group.  
 $n < l_e$

n (in.)	$l_e = 2.5''$	$l_e = 4''$	$l_e = 6''$	$l_e = 8''$	$l_e = 9''$	$l_e = 12''$	$l_e = 15''$	$l_e = 18''$
1.5	0.85	0.73	0.66	0.62	0.60	0.58	0.56	0.55
2	0.95	0.80	0.71	0.66	0.64	0.61	0.58	0.57
2.5	1.0	0.86	0.75	0.70	0.67	0.63	0.60	0.59
3	1.0	0.93	0.80	0.73	0.71	0.66	0.63	0.61
4	1.0	1.0	0.89	0.80	0.77	0.71	0.67	0.64
5	1.0	1.0	0.96	0.87	0.83	0.76	0.71	0.67
6	1.0	1.0	1.0	0.93	0.89	0.80	0.75	0.71
7	1.0	1.0	1.0	0.97	0.94	0.85	0.79	0.74
8	1.0	1.0	1.0	1.0	0.98	0.89	0.82	0.77
9	1.0	1.0	1.0	1.0	1.0	0.93	0.86	0.80
10	1.0	1.0	1.0	1.0	1.0	0.96	0.89	0.83
11	1.0	1.0	1.0	1.0	1.0	0.99	0.92	0.86
12	1.0	1.0	1.0	1.0	1.0	1.0	0.95	0.89
13	1.0	1.0	1.0	1.0	1.0	1.0	0.97	0.92
14	1.0	1.0	1.0	1.0	1.0	1.0	0.99	0.94
15	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.96
16	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.98
17	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.99
18	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0



# greater tensile and shear loads

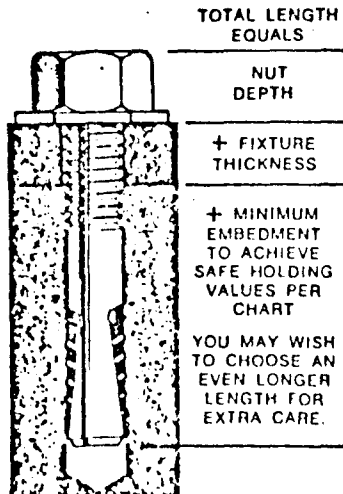
Applies to All WEJ-IT and Nose Cone Actions



As Tested in 3750 PSI Concrete at These Minimum Embedments

WEJ-IT Diameter and Hole Diameter	WEJ-IT Length	How Deep to Drill Hole	Tensile Strength	Shear Strength	
Inches	Inches	Inches	Lbs.	Lbs.	Inches
1/4	1 1/4	Drill Hole to a Depth Equal to the Full Shank Length of the WEJ-IT	1350	2000	1
	1 3/4		1450	2000	1 1/8
	2 1/4		1500	2000	1 1/4
	3		1650	2000	1 1/2
			1800	2200	1
3/8	1 1/2	"	1900	2200	1 1/4
	2		2180	2200	1 1/4
	3		3000	2500	1 3/8
			3200	2500	1 1/4
1/2	2 1/4	"	3689	2500	1 1/2
	3 1/2		3947	2500	2
	5		4126	2500	3 1/2
	6		4218	2500	4
			3700	6600	1 1/2
5/8	2 3/4	"	4200	6600	2
	3 1/2		5065	6600	2 1/4
	5		5281	6600	3 1/2
	6		5378	6600	4
	7		5492	6600	5
3/4	3 1/2	"	6940	11000	2
	4 1/2		9560	11000	3
	5		10192	11000	3 1/2
	5 1/2		10618	11000	3 3/4
	6		10726	11000	4
7/8	6	"	10902	11000	4 3/4
	4		16500	17000	3
	5		17194	17000	3 1/2
	6		17268	17000	4
	7		17324	17000	5
1	10	"	18100	17000	7
	8		19000	21500	4 1/2
	10		20000	21500	5 1/2
1 1/4	12	"	21000	21500	7
	8		22500	26000	5 1/2
	10		23186	26000	6
1 1/2	12	"	25720	26000	7
	8		32000	34000	5 1/2
	10		33400	34000	6 1/4
1 3/4	12	"	34800	34000	7
	8		35000	40000	5 1/2
	10		35500	40000	6
1 1/2	12	"	37000	40000	7
	8		49150	58000	5 1/2
	10		50500	58000	6 1/2
	12		52000	58000	8

SOURCE: Ketchum & Konkel; York Research Tests; U. S. Testing Company, Inc. Recommended safe working load is one-fourth of tensile and shear readings as listed. \*For 2500 psi concrete, take 60% of above Tensile figures. For 3000, take 80%; for 4500, add 20% to the above Tensile, for 5500, add 50%; for 6000, add 60%. \*To get a recommended safety factor of 4:1, divide the above figures by 4.



## choosing the size

Selection of any anchor is not absolutely scientific because much depends on these factors:

1. Diameter of the hole already in the fixture or equipment.
2. Depth, mix, strength and age of concrete.
3. Tensile or Shear Values desired.
4. Safety Factor required.

The diagram to the left can be helpful for choosing the minimum length desired.

The diameter may have to be one that fits the diameter of the hole already in the equipment... in which case you may choose from a variety of lengths offered in the above chart to give the desired holding power.

See page 5 for data on steel characteristics, stainless steel, aluminum and other metals.

WEJ-IT Diameter	Min. Edge Distance and WEJ-IT Spacing	Maximum Allowable Hole Diameter
1/4 3/8 1/2 5/8 3/4 7/8 1 1 1/8 1 1/4 1 1/2	↑ 4 WEJ-IT Diameters ↓	↑ 10% over the WEJ-IT diameter ↓
WEJ-IT and Hole Diameter	Concrete Block (Idealite)	Lt. Wt. Concrete (Idealite)
1/4	545 lbs.	868 lbs.
3/8	852 lbs.	1106 lbs.
1/2	1277 lbs.	2862 lbs.
5/8	2025 lbs.	3375 lbs.
3/4	—	3500 lbs.
7/8	—	6125 lbs.
1	—	8562 lbs.

Average ultimate tensile holding powers as tested by Testing Consultants, Inc., in 2000 psi concrete block and 4000 psi expanded shale lightweight concrete.

## typical specification

Contractors shall furnish and install \_\_\_\_\_ size WEJ-IT Concrete Anchors as manufactured by WEJ-IT Expansion Products, Inc., of Broomfield, Colorado, or equal. The anchor shall be the Double-Wedge Expansion Type, made of cold drawn steel having the accredited pullout and shear values as published by WEJ-IT.

## a guide of installation times for the estimator

These are average times to DRILL\* one hole, INSERT one WEJ-IT, and TIGHTEN the nut.

Allowance is not made for the additional savings gained through:

1. Not having to move fixtures or equipment back and forth to spot and line up holes.
2. Not having to chase around to get nuts, washers, bolts. WEJ-IT integrates these in a single integral-unit.

Such savings accrue by not having to use Shield-type anchors or not having to cast-in rods, channels or inserts at the time concrete is poured.

Size	Min. Sec.	Size	Min. Sec.
1/4 x 1 1/4	13	5/8 x 8	1 8
1/4 x 1 3/4	16	7/8 x 7	1 20
1/4 x 2 1/4	24	3/4 x 4	51
1/4 x 3	26	5/8 x 5	55
3/8 x 1 1/2	17	6/8 x 6	1 15
1/2 x 2	24	7/8 x 7	1 28
3/8 x 3	32	10 x 10	1 42
1/2 x 1 1/2	19	7/8 x 8	2 20
3/8 x 2	26	10 x 10	2 31
1/2 x 2 1/4	29	12 x 12	2 48
3/8 x 3 1/2	39	1 x 8	2 53
1/2 x 5	46	10 x 10	3 15
3/8 x 6	50	12 x 12	3 28
1/2 x 2	28	1 1/2 x 8	3
3/8 x 2 3/4	35	10 x 10	3 24
1/2 x 3 1/2	45	12 x 12	3 35
3/8 x 5	49	1 1/4 x 8	3 38
1/2 x 6	58	10 x 10	3 59
3/8 x 7	1 10	12 x 12	4 18
1/2 x 3 1/2	48	1 1/2 x 8	4 9
3/8 x 4 1/2	50	10 x 10	4 26
1/2 x 5	53	12 x 12	4 58
3/8 x 5 1/2	56		

\*Using Electric Roto-Hammers. In 3750 psi concrete, 28 day cure, 1:3:2 mix.

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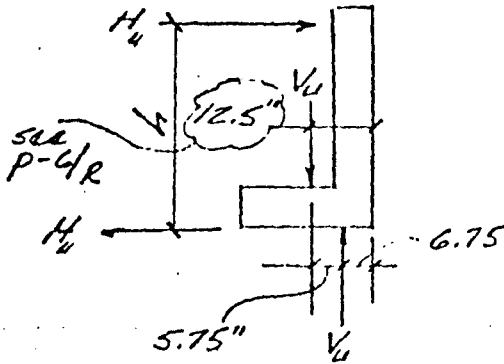
JOB NUMBER

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Determine Horizontal Force - Overturning

Overturning Couple

arm is between applied load & center of reaction



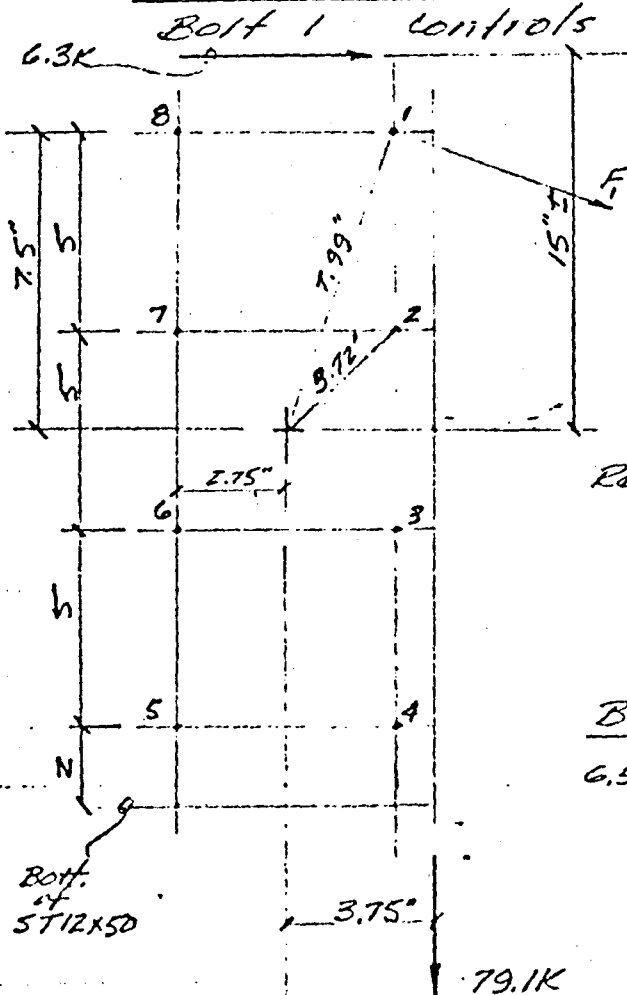
Horizontal Force

$$H_u(h) = V_u (5.75)$$

$$H_u = \frac{79.1(5.75)}{72} = 6.3K$$

$h \approx 72"$  for B13

Determine Final Bolt Forces w/ 5" Spacing



$$\Sigma \text{ Applied Torque} = 6.3(15) + 3.75(79.1) = 391.1 K''$$

Torque Force To Bolts 1, 4, 5 & 8 = F

Torque Force To Bolts 2, 3, 6 & 7 =  $\frac{3.72}{7.99} F = 0.466 F$

$$\text{Resist. Torque} = 4[7.99F + 3.72(0.466F)] = 38.89 F$$

$$F = \frac{391.1}{38.89} = 10.06 K$$

Bolt Torsion

$$6.5(79.1) = 2[17F + 12(0.706P)] + 7(0.412P) + 2(0.118P)$$

$$P = \frac{6.5(79.1)}{(28.59)2} = 8.99 K$$

By insp, change Bolt spacing to 6"

79.1K

Bolt of 5T12x50

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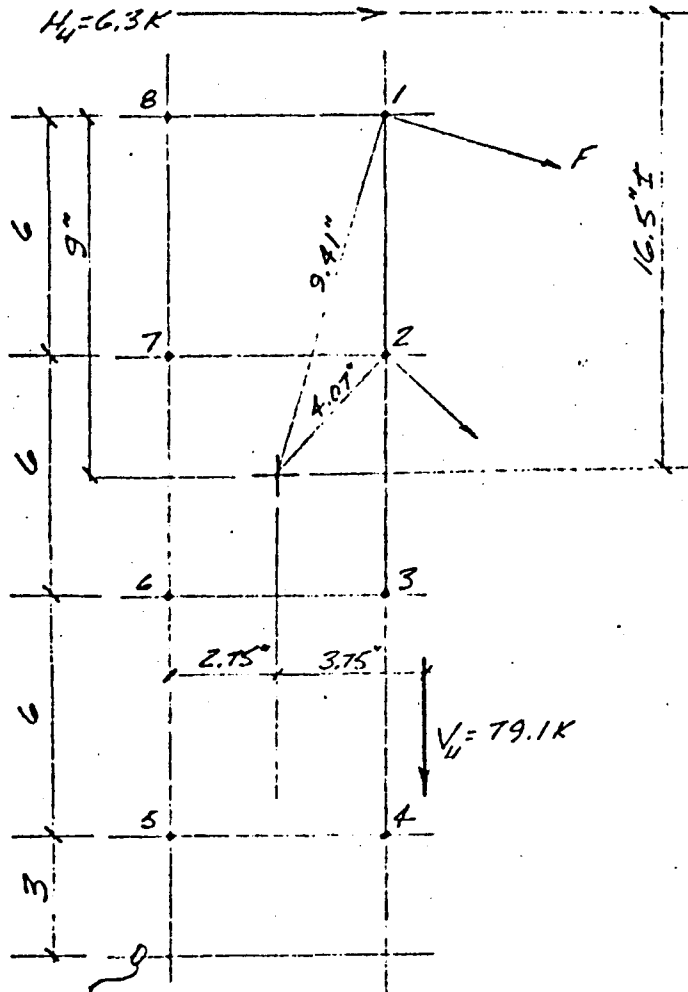
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Determine Final Bolt Forces w/6" Spacing



$\Sigma$  Applied Torque

$$16.5(6.3) + 3.75(79.1) = 400.6 \text{ K"}^2$$

Torque Force  
 Bolts 1, 4, 5, 8 = F

Torque Force =  $\frac{4.07}{9.41} = 0.432F$   
 Bolts 2, 3, 6, 7

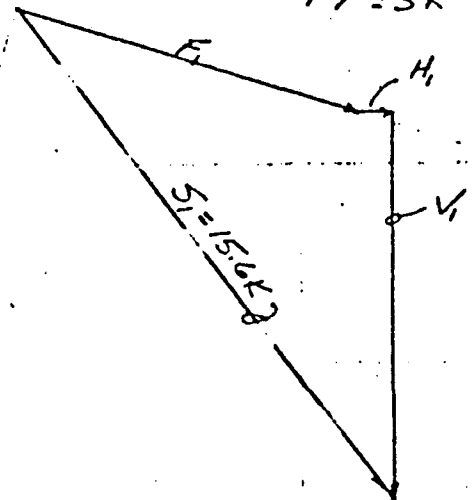
$$\text{Resist. Torque} = 4[9.41F + 4.07(0.432F)] = 44.67F$$

$$F_1 = \frac{400.6}{44.67} = 8.97 \text{ K @ Bolt 1}$$

$$V_1 = \frac{79.1}{8} = 9.89 \text{ K}$$

$$H_1 = \frac{6.3}{8} = 0.79 \text{ K}$$

Eng. Scale 50  
 1" = 5K



Bolt of ST12x50

Bolt Tension

$$6.5(79.1) = 2[21P + 15(0.714P) + 9(0.428P) + 3(0.143P)]$$

$$P = \frac{6.5(79.1)}{2(35.99)} = 7.14 \text{ K}$$

neglecting bolts off center of web

$$P = 3.5/5.5(7.14) = 9.09 \text{ K to Bolt 1}$$

Final Bolt Forces - Bolt 1

$$P_4 = 9.09 \text{ K}$$

$$S_4 = 15.6 \text{ K}$$

Phase 1 modifications  
Bracket

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Check 1" x 8" Exp. Bolt (see p-12/R)

$$\left(\frac{P_u}{\phi P_u}\right)^{4/3} + \left(\frac{S_u}{\phi S_u}\right)^{4/3} \leq 1$$

$$\left(\frac{9.09}{20.5}\right)^{4/3} + \left(\frac{15.6}{23.4}\right)^{4/3} = (0.44)^{4/3} + (0.67)^{4/3} = 0.39 + 0.59 = 0.98$$

OK less than 1.0

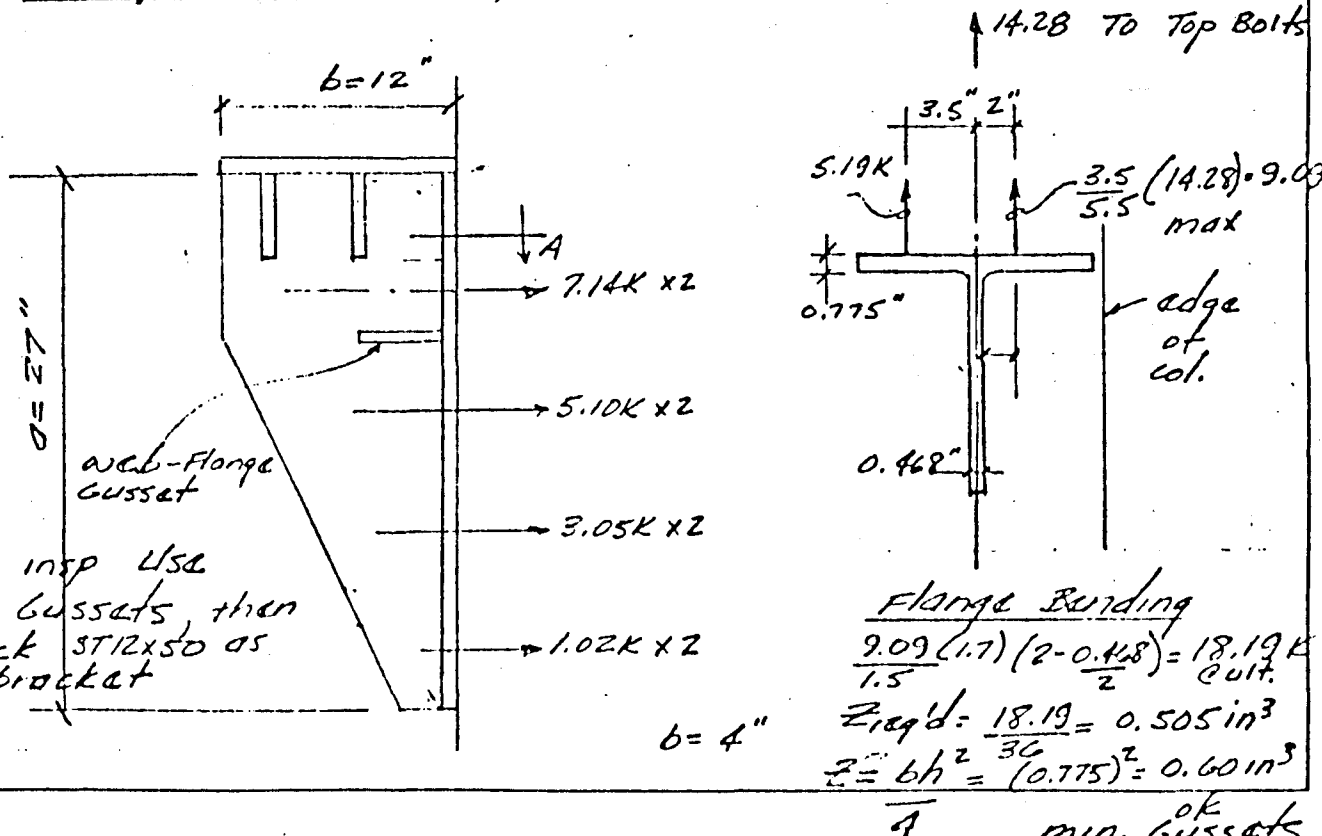
Select 1" x 8" Kwik or Waj-it Bolt - see comments p-12/R

Check Bolt Steel Bearing

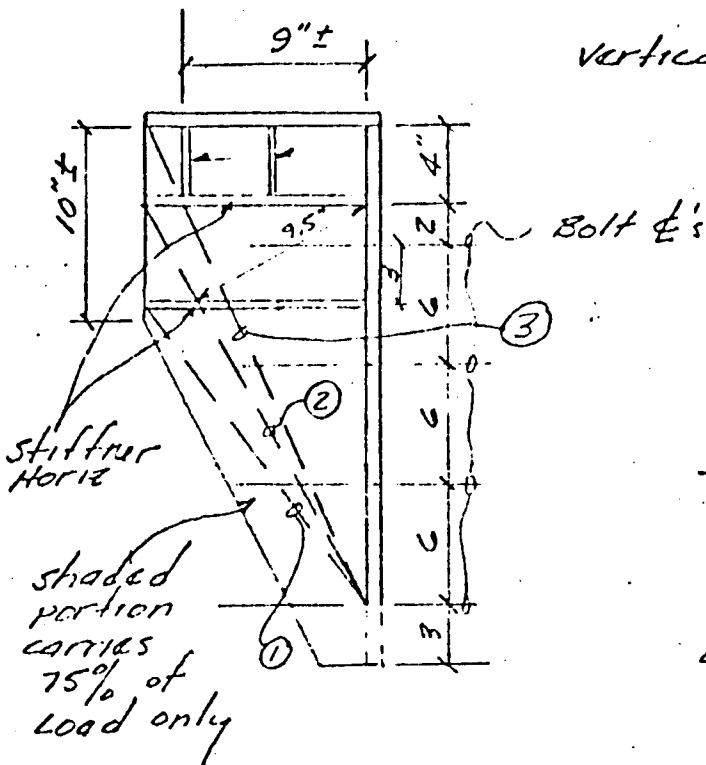
$$\frac{15.6}{1.5(0.775)} = 13.4 \text{ ksi working stress}$$

load factor  $\nearrow$   
Flange thk ST12x50  $\nearrow$   
OK

Design web-flange Gussats ST12x50



Check ST12X50 As a Bracket



Ref: Structural Steel Des.  
 Buedle et al, Polard  
 Press, 1964, p-550  
 to 554

shaded portion - dashed line

$$b = 11.2" \text{ \& } a = 15", \text{ } b/a = 0.75$$

between 0.5 & 1.0 for stability  
 use Eq 17.38

$$\frac{b}{t} \leq \frac{180}{\sqrt{F_y}} = \frac{180}{6} = 30 \text{ max}$$

$$\frac{b}{t} = \frac{11.2}{0.468} = 23.9 \text{ ok } < 30$$

Find Force R - Eq 17.37

$$\frac{R}{bt} = \frac{0.6 - 0.21(b/a)}{f_{max}}$$

$$R = f_{max} (0.6 - 0.21(b/a)) bt$$

$$R = \frac{36}{1.65} (0.6 - 0.21(0.75)) 11.2 (0.468)$$

R = 50.6 K allowed - working str

$$R_{applied} = 0.75(52.6) = 39.4 \text{ K ok } < 50.6 \text{ K}$$

Approx. Buckling - Dashed ②

Ref Fig. 17.21

Consider col width =  $\frac{BB'}{4}$

$$BB' \approx 9.5"$$

$$\frac{BB'}{4} = 2.38"$$

$$I = \frac{(0.468)^3 2.38}{12} = 0.0203 \text{ in}^4$$

$$r = \sqrt{\frac{I}{A}} = \sqrt{\frac{0.0203}{0.468(2.38)}} = \sqrt{0.0182}$$

$$r = 0.135"$$

k ≈ 0.8 (one end fixed & gusset)

l ≈ 23" (length of ②)

$$\frac{k l}{r} = \frac{0.8(23)}{0.135} = 136 \text{ \& } F_A = 8.07 \text{ K}$$

$$R_{max} = 8.07(9.5)0.468 = 55.9 \text{ K } < 52.6$$

thus additional horiz. gusset below top bolts req'd.

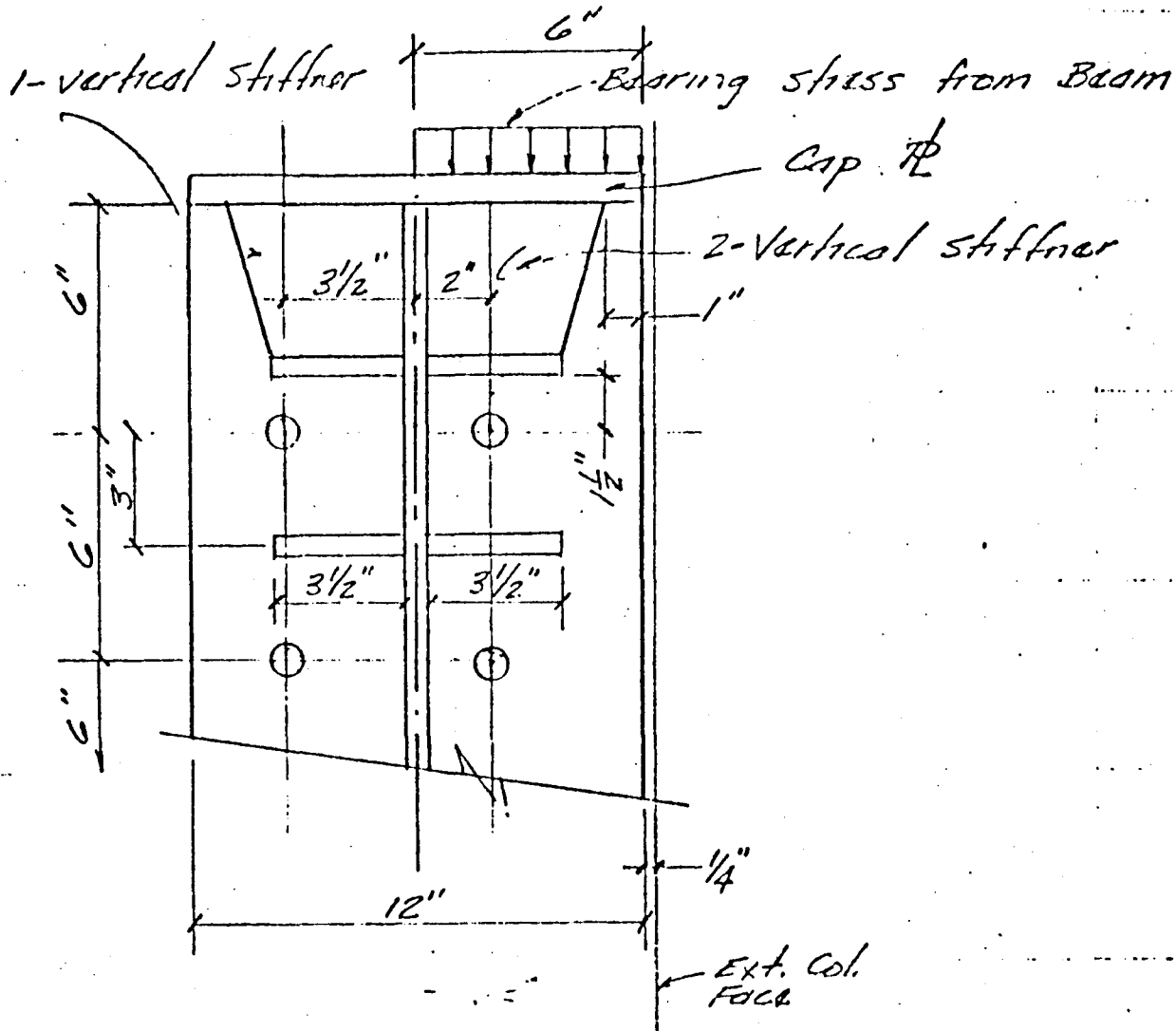
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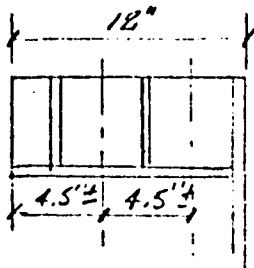
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Select Vertical stiffeners  
To Insure Uniform Load  
To Top ST12x50



Select Vert. Gusset Thick.

Load To Gusset =  $\frac{4.5}{12} (79.1) = 29.6K @ \text{ult. } (19.8K \text{ working})$



$$b/a = \frac{4.5}{4} = 1.125$$

$$b/t = \frac{60 + 120(b/a)}{\sqrt{F_y}} \quad (Eq 17.39) \quad 1 \leq b/a \leq 2$$

$$b/t = \frac{60 + 120(1.125)}{6} = 32.5$$

$$t_{min} = \frac{4.5}{32.5} = 0.14"$$

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Phase I modifications  
Bracket

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Try 1/2" Gussat  
 use Eq 17.37

$$R = (0.6 - 0.21(6/16)) f_{max} bt$$

$$R = (0.6 - 0.21(1.125)) 21(4.5)0.50 = 17.2K \approx 19.8K$$

say  
 ok since horiz  
 3/8 gussat present

Use 1/2" Gussats

Note: See RZ calc series for B Bolt  
 Design Summary  
 CWR  
 4/19/74

Select thickness cap PL

Bearing stress  $\approx \frac{52,600}{6(12)} = 730 \text{ psi}$   
 working

EM =  $\frac{WL^2}{12} = \frac{0.730(4.5)^2}{12} = 1.23K$  - between gussats

BM =  $\frac{WL^2}{2} = \frac{0.730(2)^2}{2} = 1.46K$  Beyond outer vert. gussat

$S_{req'd} = \frac{1.46}{24} = 0.061 \text{ in}^3/\text{in}$

1/2" PL  $S = \frac{bh^2}{6} = \frac{1(0.5)^2}{6} = 0.042 \text{ in}^3/\text{in}$

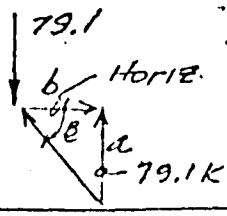
5/8" PL  $S = \frac{1(0.625)^2}{6} = 0.065 \text{ in}^3/\text{in}$

Use 5/8" PL for cap

Select cap PL weld

Determine Horiz. Force Component

Use dashed line (3) page 18/R



$\tan \theta = a/b \approx 24 = 2 \quad \theta = 68.5^\circ$

Horiz =  $79.1/2 = 39.6K$  @ ult or  $26.4K$  working

weld  $E70 @ 21KSI$ ; weld area =  $26.4 = 1.26 \text{ in}^2$  total

$1.26/\text{in} - 3/8 = 0.707(0.375) = 0.266 \text{ in}^2$  ( $1.26 \approx 5 \text{ in}$ )

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REDESIGN OF BRACKET - TAC SIZE

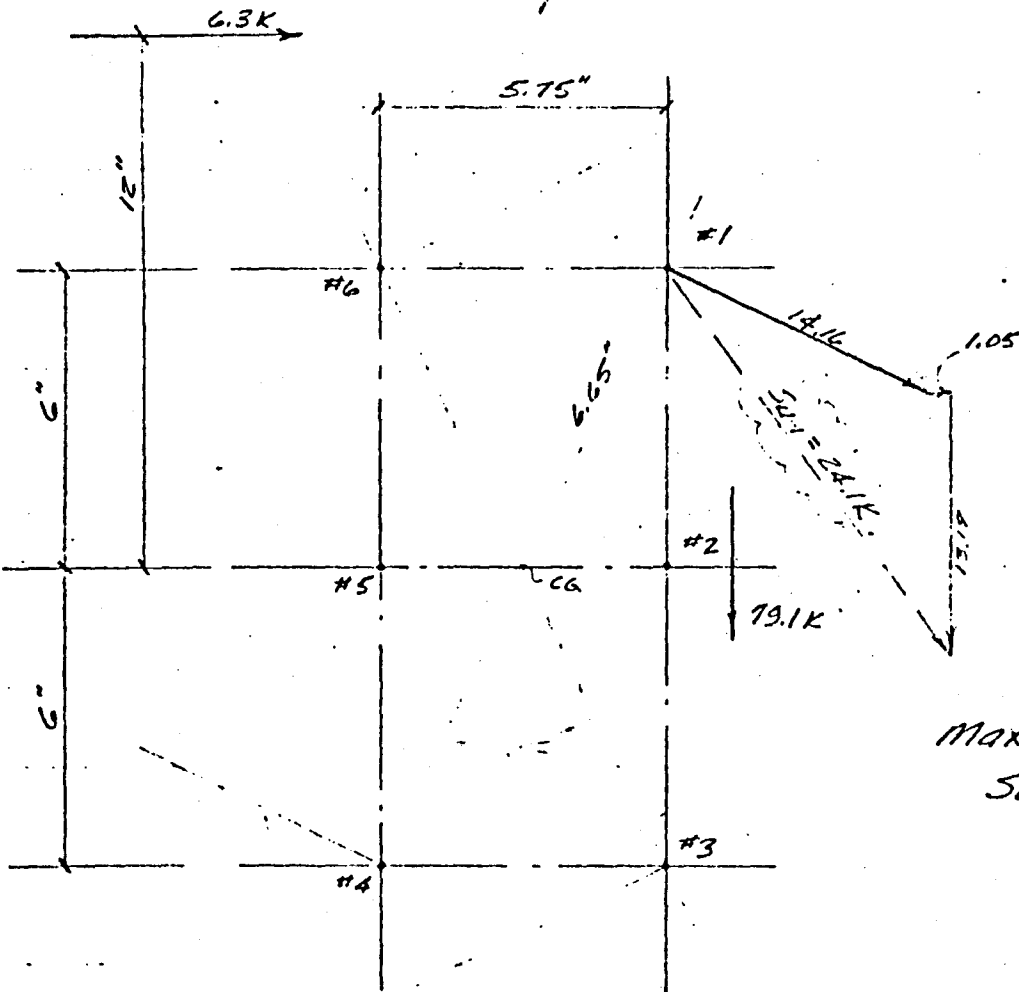
(Refer to p-22/R TAC sketch)

Find shears to 6-Bolt Pattern

Applied ult. Torque =  $12(6.3) + 4.25(79.1) = 411.8 \text{ K} \cdot \text{in.}$   
Refer to p-15/R

move bracket 1/2" from p-15/R

Use same analysis as before



Max  $S_u$  to Bolt #1  
 $S_u-1 = 24.1K @ \text{ult.}$

$$\sum M_{CG} = 0 \text{ } \uparrow$$

$$4(6.65F) + 2\left(\frac{5.75}{2}\right)\left(\frac{5.75}{2}(6.65)F\right) - 411.8 = 0$$

$$F = \frac{411.8}{29.08} = 14.16 \text{ K MAX}$$

Applied ult. shears

$$\text{HORIZ} = 6.3/6 = 1.05 \text{ K}$$

$$\text{VERT} = 79.1/6 = 13.18 \text{ K}$$



*Backet J-5197 Summary*

SHEET NUMBER

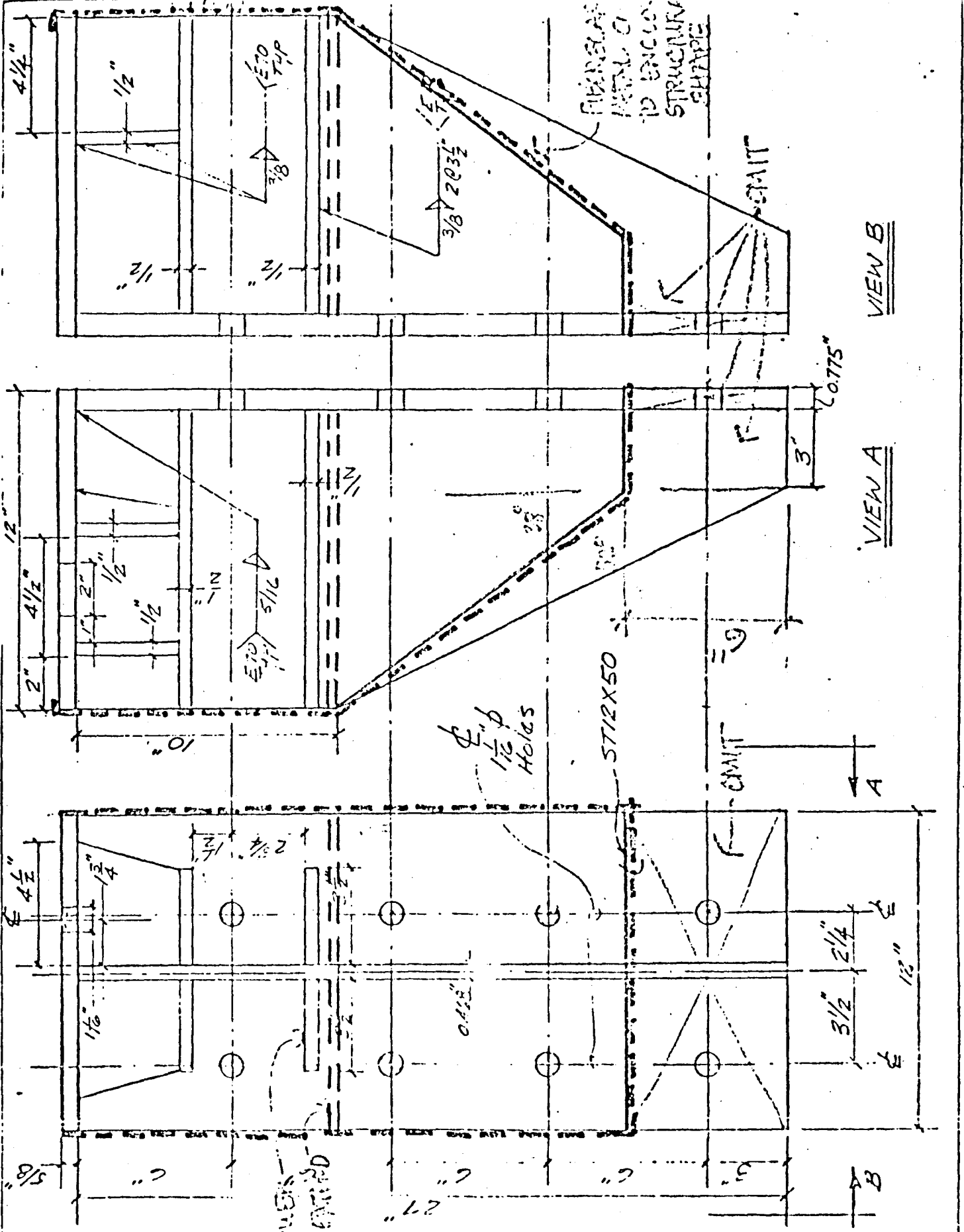
-2/22  
-R2

JOB NUMBER

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FINISHED CR.  
WALL CR.  
TO ENCLOSE  
STRUCTURAL  
SHAPE



VIEW B

VIEW A

B

LAUSE  
FINISHED

Phase I modifications

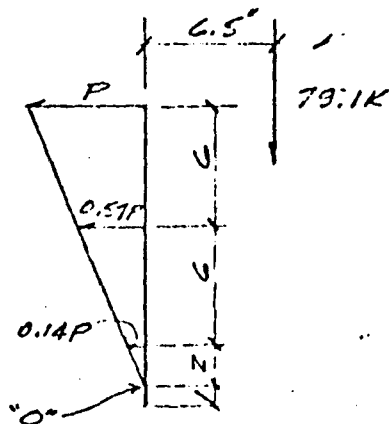
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Find Max. Bolt Tension

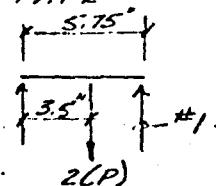


$\epsilon m_0 = 0.4$

$0 = 6.5(79.1) - 2[14P + 8(0.57P) + 2(0.14P)]$

$P = \frac{6.5(79.1)}{37.68} = 13.64K$

$P_{max} = \frac{3.5}{5.75} (2) 13.64 = 16.60K$   
 due to 79.1K



neglect reduction due to 6.3K horiz. force

Check ult. "a" distance

$\Sigma P = 2[13.64 + 0.57(13.64) + 0.14(13.64)] = 46.65K$

$a = \frac{46.65}{0.85(12)5} = 0.91"$  ok 1" select. in analysis above satisfactory

Select Expansion Bolts

Try 1 1/4" (see p-14/R)

Capacities (1" embed)

$P_{uc} = 0.9(35.5) = 31.9K$  for  $f_c' = 3500$  psi

$S_{uc} = 0.9(40) = 36K$  for  $f_c' = 3500$  psi

full cone reduction

Interaction  $P_{uc}$  &  $S_{uc}$

$\left(\frac{16.6}{31.9}\right)^{4/3} + \left(\frac{24.1}{36}\right)^{4/3} = 0.42 + 0.59 = 1.01$

6-1 1/4" x 10" w/w-jt or Kwik bolts ok

Capacities increase by 60% for  $f_c' = 6000$  psi  
 $1.5(1.6) = 2.4$  factor

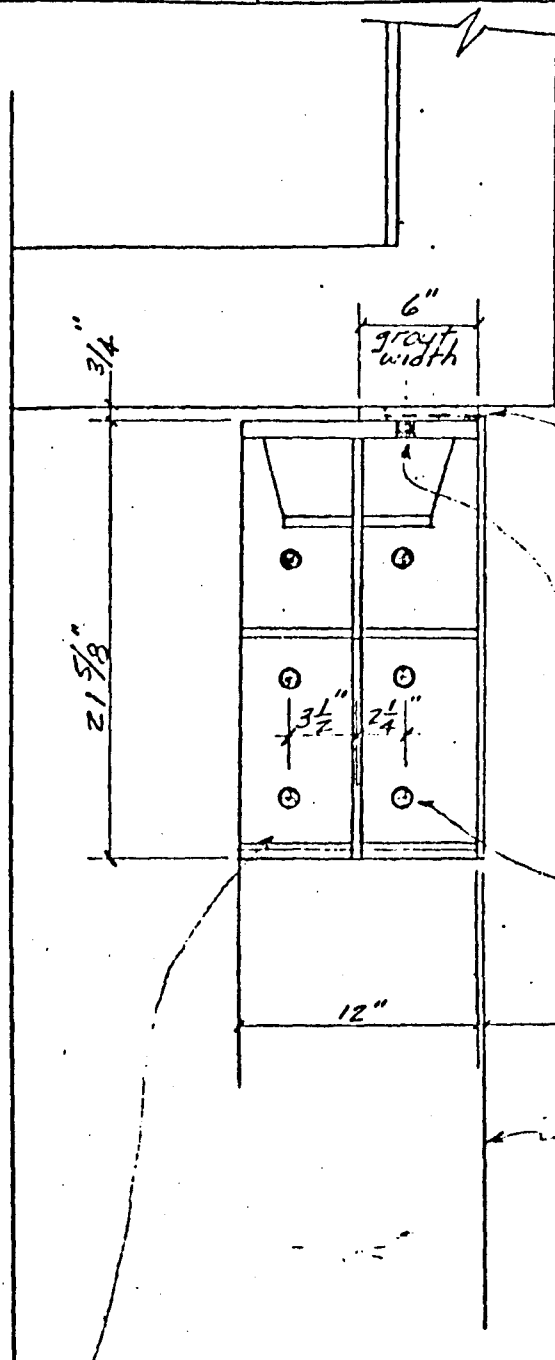
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4000 psi non-shrink  
 grout - full length  
 of ST12X50 (12")

Note: This Exp. Bolt  
 To be drilled 1"  
 before bracket  
 set in place

1 1/4 x 10" Kwik or Wej-it  
 Expansion bolt  
 w/ 6" Embedment min  
 (6 bolts per bracket)

Ext. Col. Face

ST12X50  
 see P-2/ R1

NOTE: 1 1/4 x 10" Exp. Bolts  
 To Be pull-out  
 tested in concrete  
 made by same  
 Precaster to verify  
 design values for  
 that precaster's  
 aggregates.

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25/25 R

Bracket Design Summary

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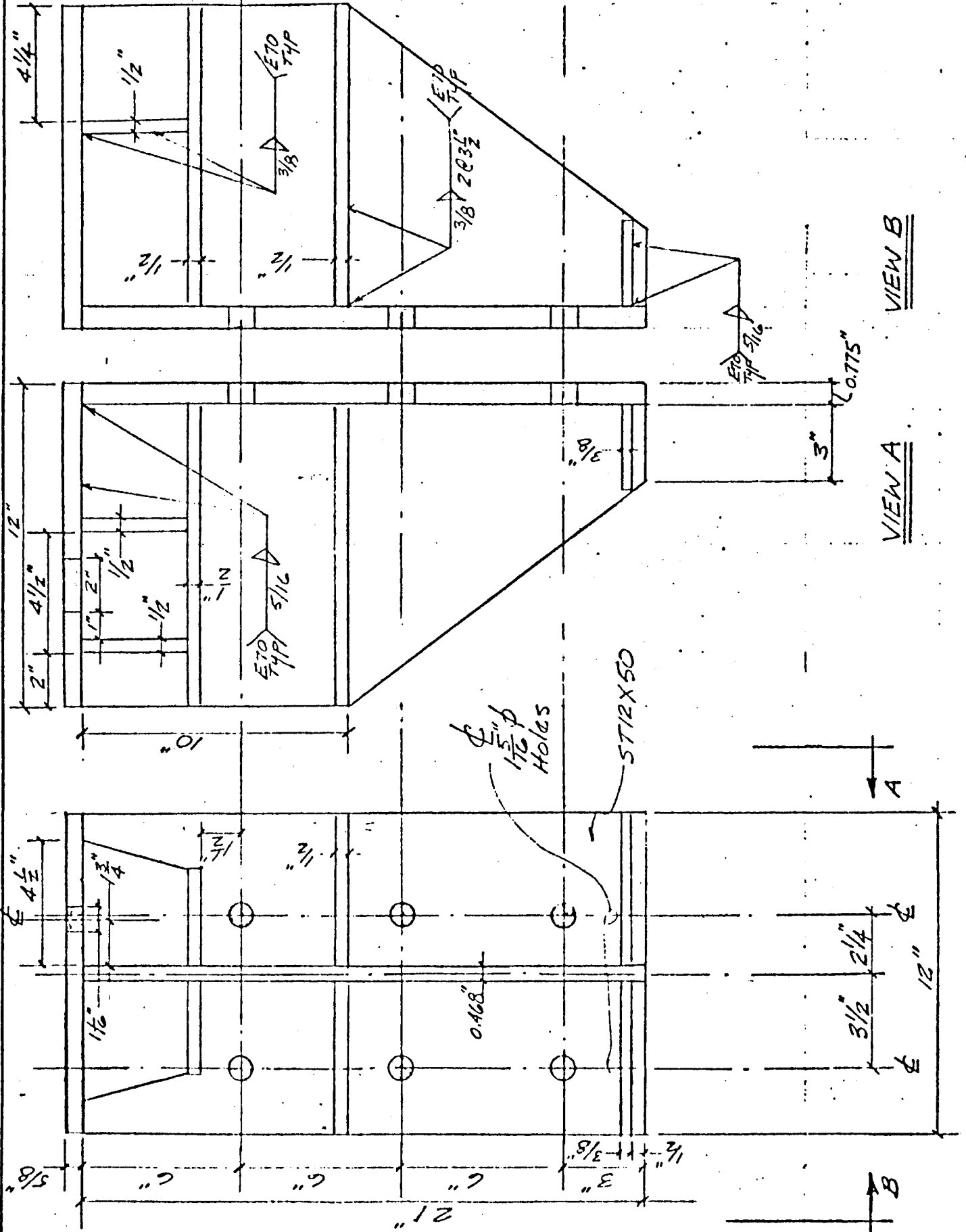
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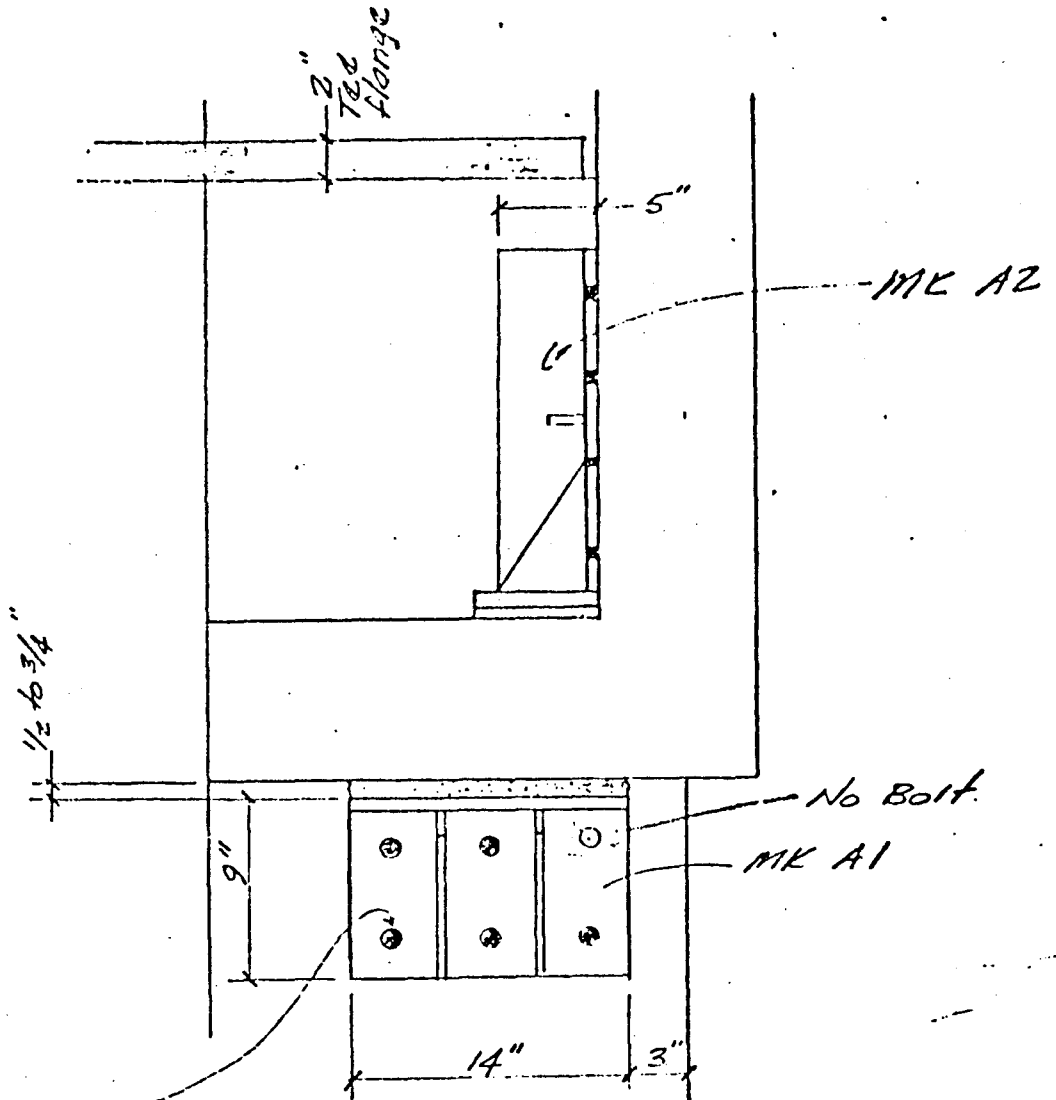


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solid  $\circ$   
indicates  
1/8" x 8" kwik  
or w/ep-it Bolt  
w/ 5/16" minimum  
Embedment

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2 / R1

Phase I modification  
Angle Design Summary

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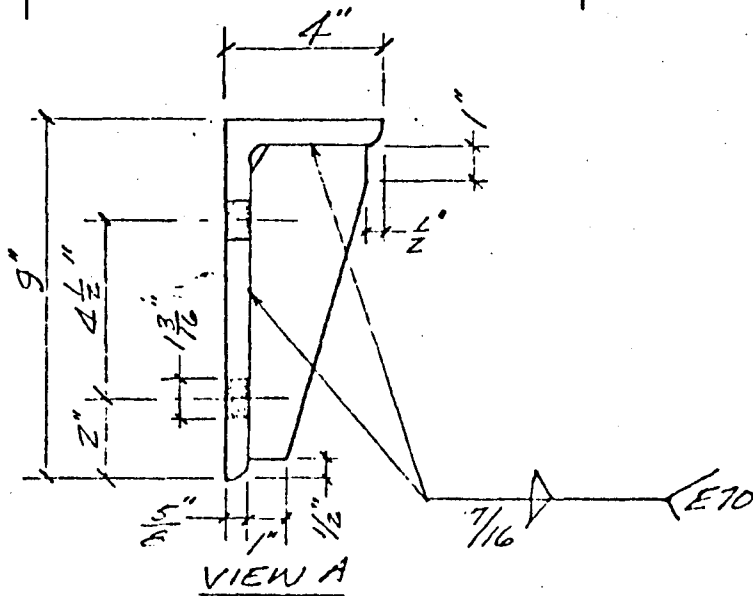
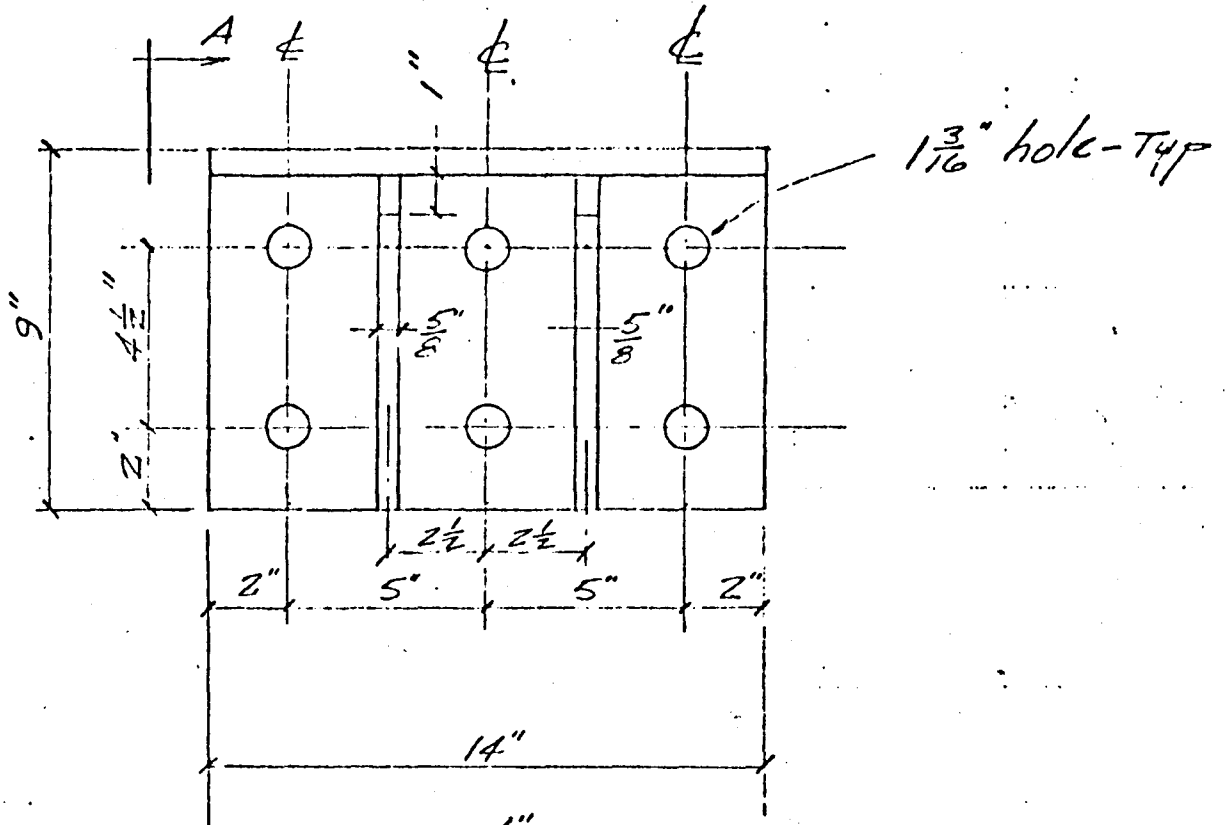
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MARK A1

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CHE

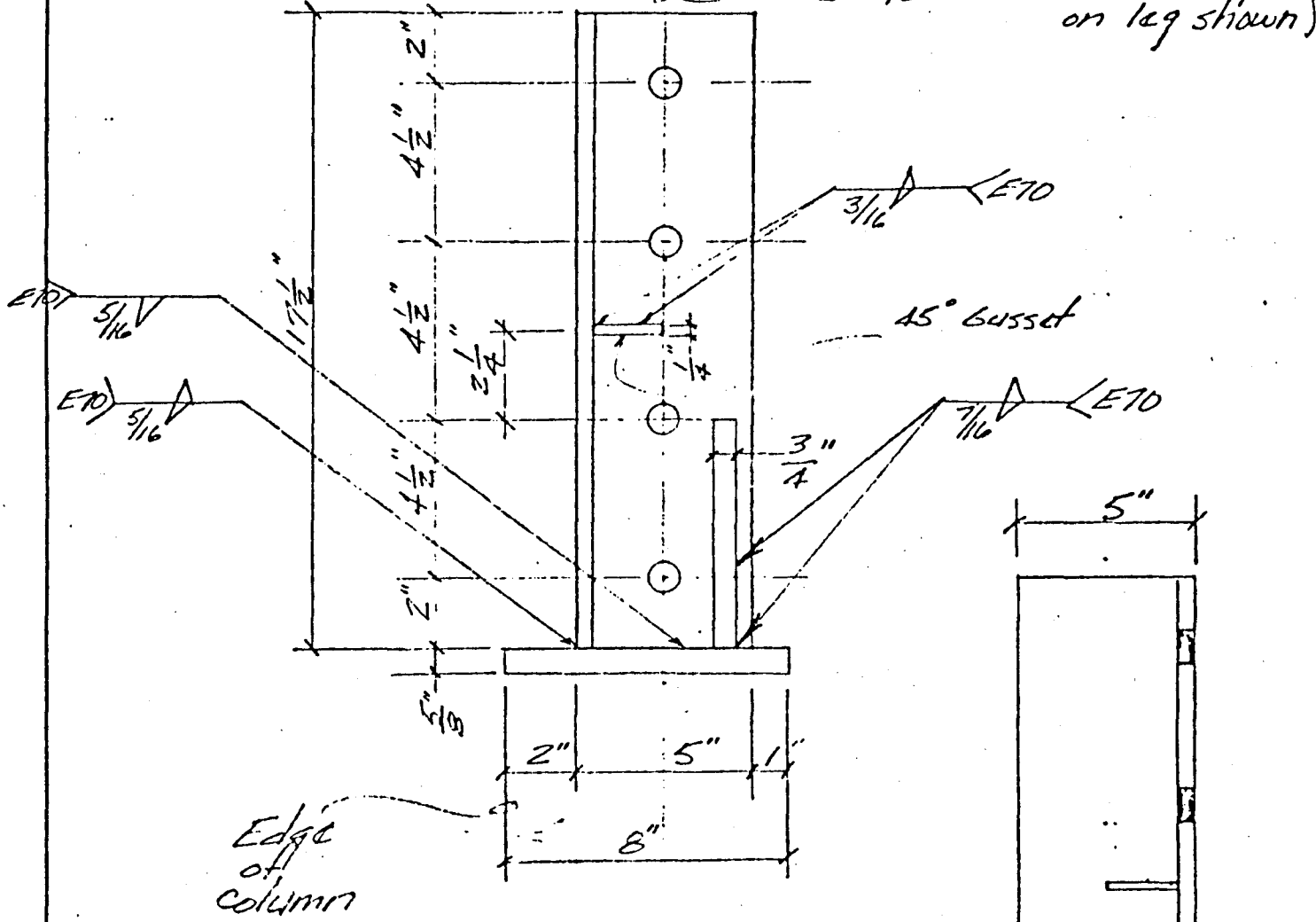
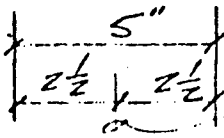
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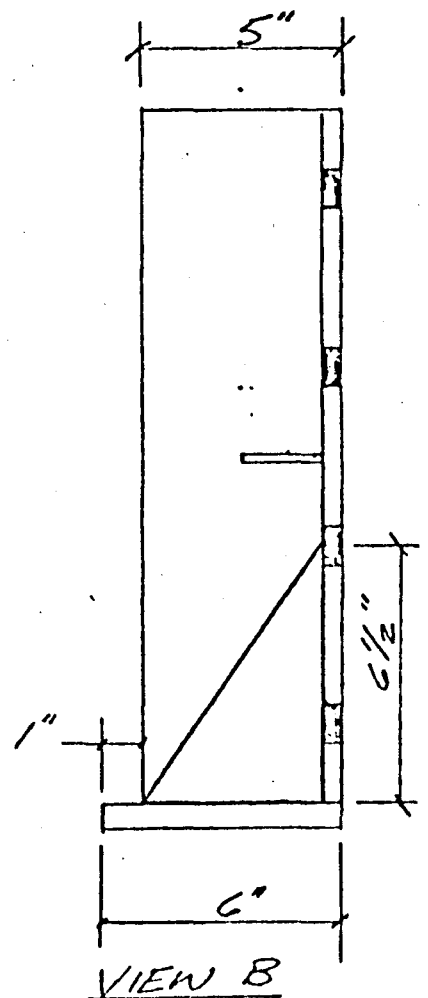
5x5x1/2 L

B



MARK AZ

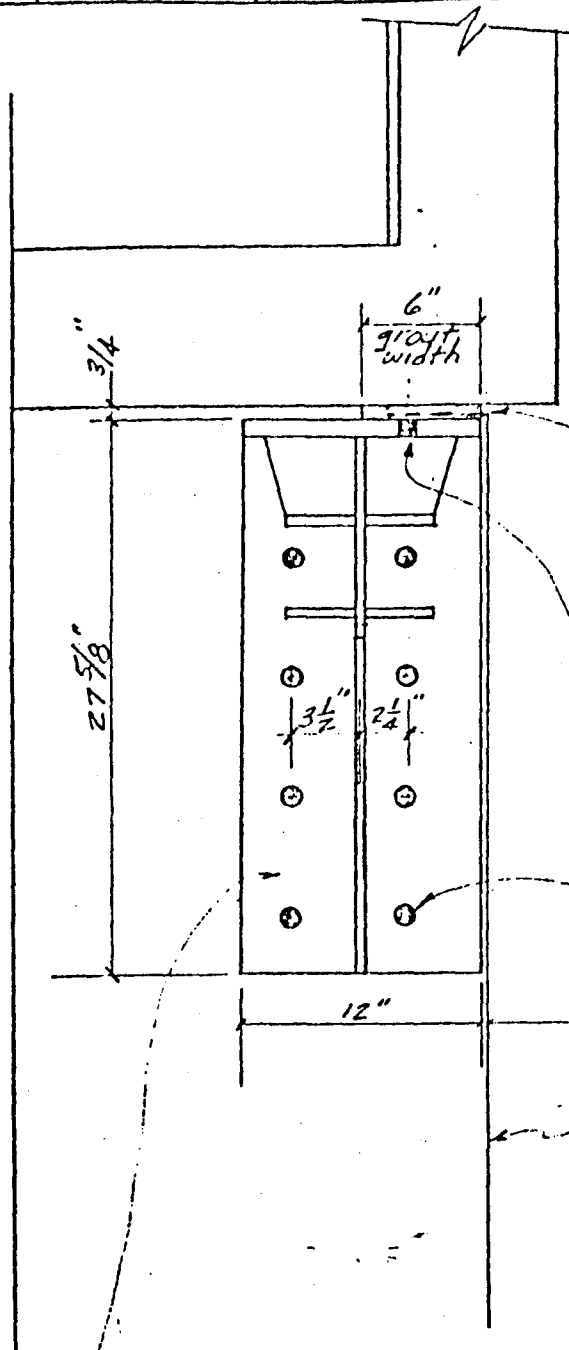
Note: mark AZ is not attached to column



U. of Minn.  
Phase I modifications  
Bracket Seat Design  
summary

DIRECT NUMBER  
1/ R2  
JOB NUMBER  
73681

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4000 psi non-shrink  
grout - full length  
of ST12X50 (12")

Note: This Exp. Bolt  
to be drilled in  
before bracket  
set in place

1"x8" Kwik or Wej-it  
Expansion bolt  
w/ 5/2" Embedment  
(9 bolts per bracket)

Ext. Col. Face

ST12X50  
see P-2/ R2

NOTE: 1"x8" Exp. Bolts  
To Be Pull-out  
Tested in concrete  
made by same  
Precaster to verify  
design values for  
that precaster's  
aggregates.



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2 / R2

Bracket Design Summary

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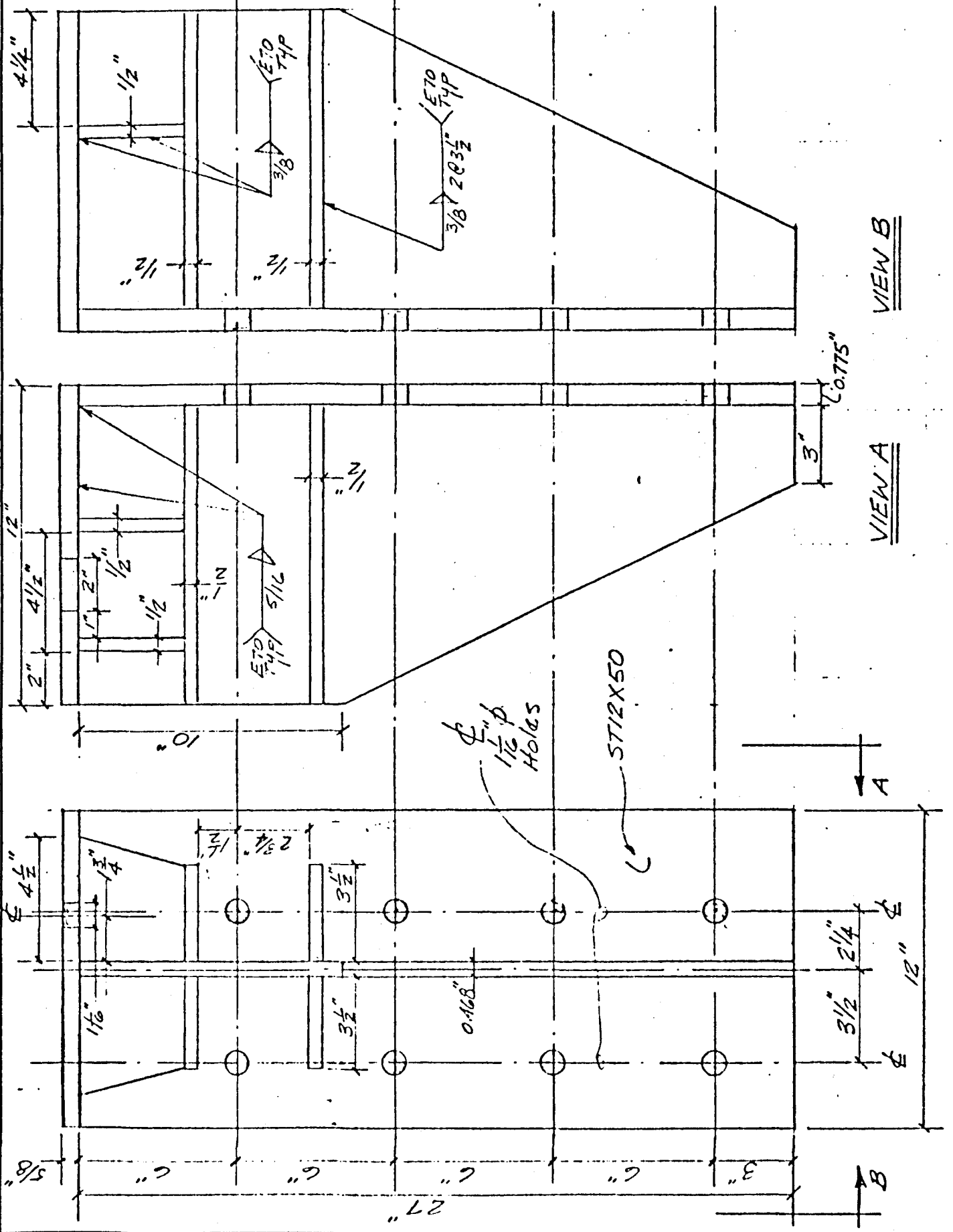
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Temperature Ranges

Estimate Avg. Temp at Topping  
 Placement to be 60°F

Estimate Avg. High Temp  
 to be 95°F

\* Estimate Avg. Low Temp  
 to be -15°F

\* Estimate Topping Differential  
 Shrinkage w/ precast to be 0.00025 in/in

"\*" causes shortening of system

Calculated Movements

11 Bays @ 24' (2) to (13) } movements are about  
 9 Bays @ 24' (13) to (22) } center of stiffness  
 which is midway  
 between expansion joints

shrinkage (shortening)

$$\Delta_{5 @ 13 to 2} = \frac{-11(24)}{2} (0.00025) 12 = -0.396'' \quad \text{Between (2) \& (13) @ each end}$$

$$\Delta_{5 @ 13 to 22} = \frac{-9(24)}{2} (0.00025) 12 = -0.324''$$

Temperature (shortening) (-25°F diff.)

$$\Delta_{\pm @ 13 to 2} = -75 (5.5 \times 10^{-6}) \frac{11(24)}{2} 12 = -0.653''$$

$$\Delta_{\pm @ 13 to 22} = -75 (5.5 \times 10^{-6}) \frac{9(24)}{2} 12 = -0.535''$$

Temperature (lengthening) (+25°F diff.)

$$\Delta_{\pm @ 13 to 2} = 25/75 (0.653) = 0.218''$$

$$\Delta_{\pm @ 13 to 22} = 25/75 (0.535) = 0.178''$$

} less shrinkage, need not consider

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JOB NUMBER  
73681Maximum Movements

If one side of column @ (13) is secured positively to column, then the sum of movements either side of (13) will develop on the other column side.

Expansion or Control joint on either the North or South side of (13) must accommodate temp & shrinkage.

$$\Delta_{max} = 0.653 + 0.535 + 0.324 \approx 1.51 \text{ in.}$$

shrinkage  
on one  
side only  
must be  
considered  
(from 13 to 22)

movement  
@ line (13)

- Place Expansion joint on south side of 13
- Place NEW Expansion joint on south side of 2? (can't be adjacent to stair on neoprene handle mov.)
- Insure Expansion joint on North side of 22

Note: Control (expansion) joints should be teflon on bearing pads for Phase II construction & teflon on steel for Phase I construction

Expansion: Jt's & Lateral Load Frame Action

Design Considerations

- 1) Regardless of original lateral load design analysis, building stability is provided by partial framed action along column line 1, stairwells on east & west sides of building, partial frame action of col's double tees, partial helix action of ramps, etc. when structure loaded by E-W wind. Thus it is mandatory that diaphragm action of deck carry to lines (1) & (22)

- 2) Support modification at col. A2 & F2 must be insured that it is not loaded by temperature movements of col's A2 & F2 as these columns are not tied except for erection weld it's of wall panels north of A2 & F2, to the deck or structural system in an north-south direction. Thus a detail must be employed to tie col's A2 & F2 to the building in north-south direction.
- 3) To prevent temperature loadings inducing forces into beam support modifications, positively tie beams to columns on lines 2 and 13 at A & F. Phase I beams just south of A2 & F2 to be positively tied to col's, and Phase I beams just north of A13 & F13 to be positively tied to col's. Thus, Exp. joints south side at A13 & F13, and north side at B13, C13, D13 & E13.
- 4) Double tees supported upon wall panels north of 2 on lines A & F are tied securely to panels by coil rods embedded into topping. (See section 14/3 Gage Shop Drawings) - Exp. joint not possible
- 5) Modification of details or new details Phase II should be employed to insure that col's B13, C13, D13, & E13 are securely tied to system south of line 13 thereby forcing temperature & differential shrinkage move. (shrink. between 13 & 22) to take place on north side of 13.

Determine securing force south of 2 on A & F

Estimated movement =  $0.65 + 0.40 \approx 0.80$  in" for design  
 for temp & some shrink.

From p-6/13 D1. of 12/22/73 col's force  
 for 0.6" move considering  $E_t = 25.7K$

$$\frac{0.8}{0.6} (25.7) = 34.3K \text{ working or } 1.3(34.3) = 44.5K \text{ Ult.}$$

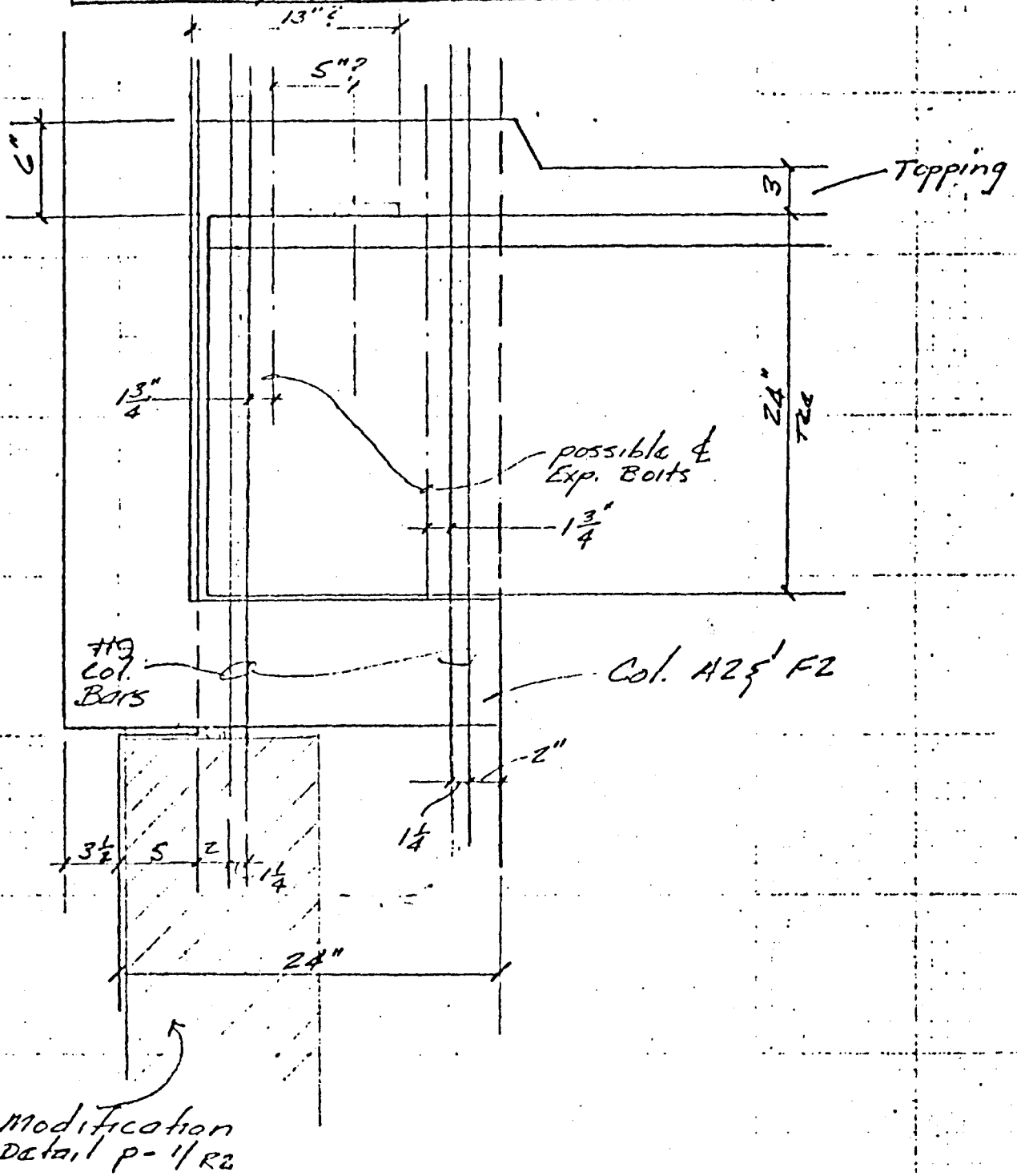
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Col's A25 F2 Tump Force Design

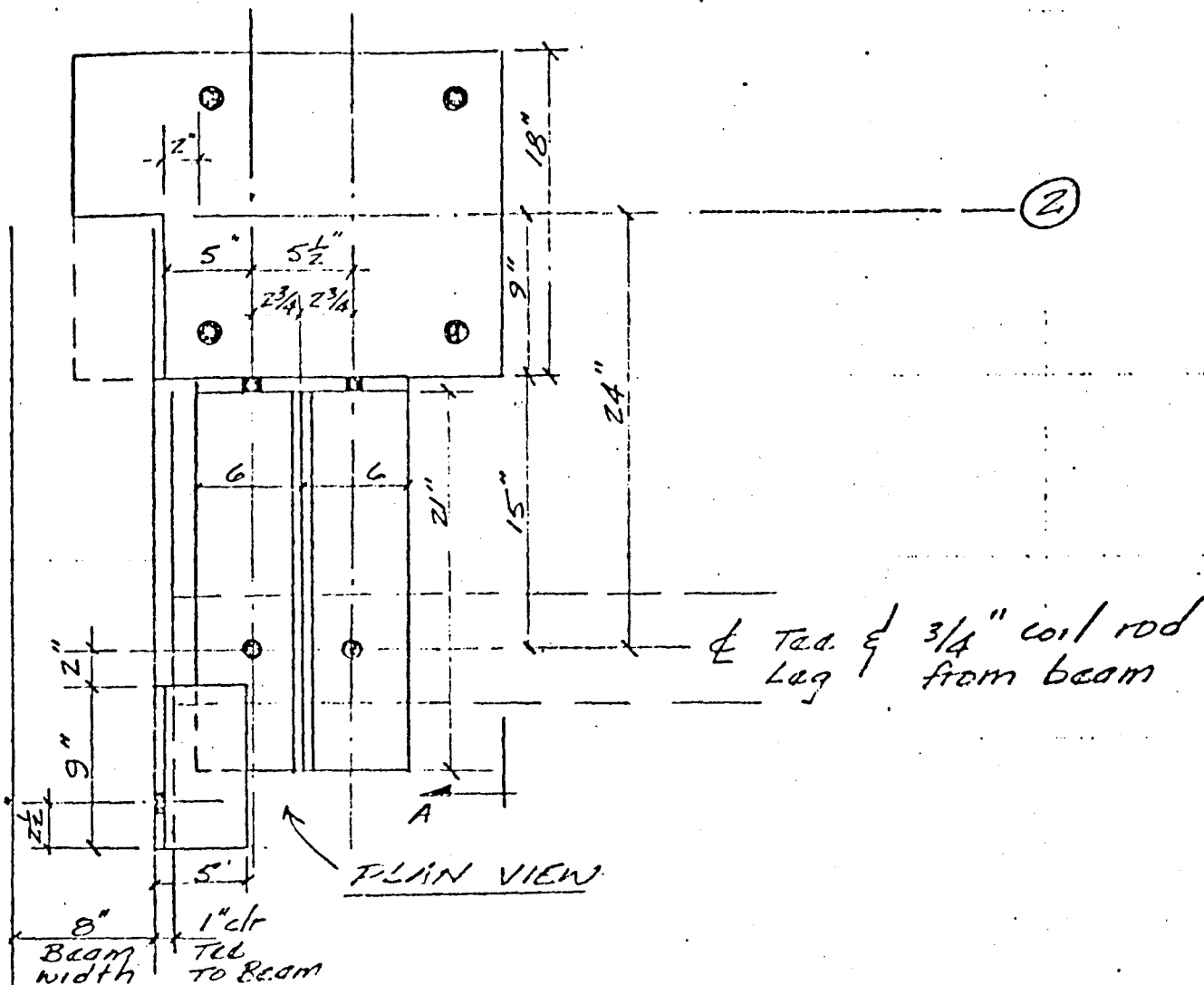


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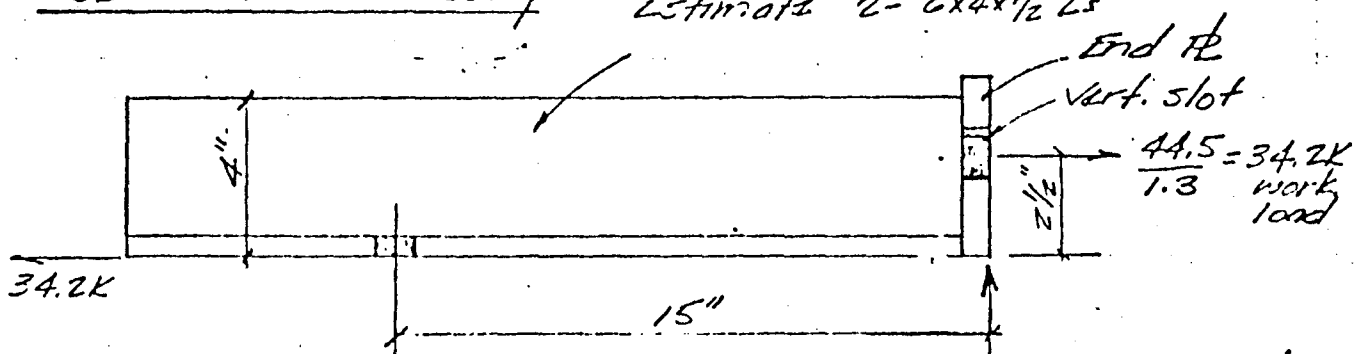
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Section A - Free Body Estimate 2- 6x4x1/2 L's



$F \approx \frac{34.2(2.5)}{15.0} = 5.7K$  - working (since working angles in AISC)

$B_{fl}/_{max} = 2.5(34.2) = 85.5 K"$

$S_{req'd} = \frac{85.5}{24} = 3.56 in^3$  (5 of 2- 6x4x1/2 L's = 4.16 in<sup>3</sup>)

ok  
3

F carried by exp. bolts, not tee flange

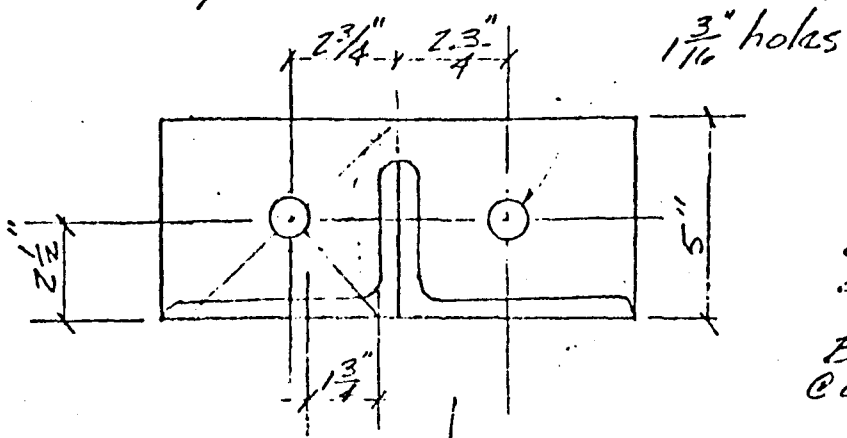
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Design End t



Use partial  
 2-way action  
 say 175% load  
 carried by shaded  
 area  
 $E_{eff} = \frac{44.5(1.75)}{2} \cdot 0.75$  <sup>actual moment arm less</sup>  
 $= 29.2K$

USE 3/4" dia  
 bolt bearing  
 by insp

$$Z_{req'd} = \frac{29.2}{36} = 0.81 \text{ in}^3$$

$$\frac{bt^2}{4} = \frac{5(t)^2}{4} = 0.81$$

$$t = \sqrt{0.81 \cdot \frac{4}{5}} = \sqrt{0.65}$$

$$t = 0.80$$

say 5/8" t

Select End of weld

Ult. Capacity  $\frac{3}{8}$  E70 =  $1.7(21)(0.707)(0.375) = 9.46 K/in$   
 Ult. Load =  $\frac{44.5}{2}(0.75) = 16.69K$

weld length =  $\frac{16.69}{9.46} = 1.76"$ , use full vertical  
 leg weld & neglect vertical  
 shear analysis due to P  
 on p-51 ✓

Select Expansion Bolts

$P_u/bolt = \frac{44.5}{2} = 22.25K$  @ full shear cone  
 capacity  $1\frac{1}{8} = 32.0K$   
 say ok - see p-14/R  
 of 3/20/74  
 calculations

Approx. ult SU  
 is  $\frac{44.5}{2.5} = 17.8K$   
 estimates  
 expansion  
 due to 2 bolts ok 226.5K  
 $\frac{5}{8}$  1" exp bolt - use  $1\frac{1}{8}$ "

Presence of tee flange  
 eliminates fl. consideration }  $P_u = \frac{5.7K}{2}$ , by insp  
 of tee leg & expansion bolt } neglect  
 interaction

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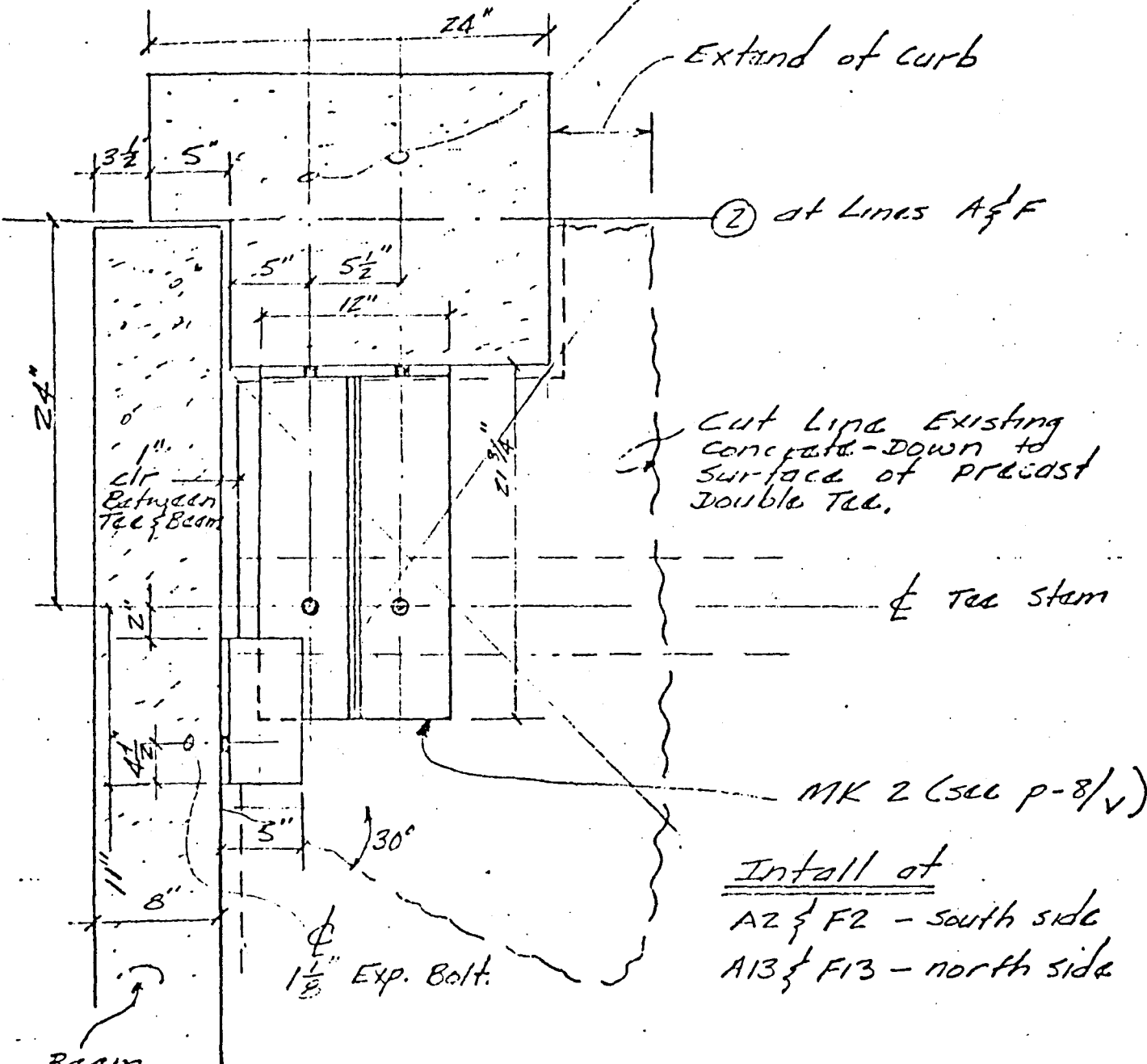
CHR

DATE

3/29/74

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Modification Details  
at Columns A2 & F2



PLAN VIEW OF MODIFICATION

Notes

- 1) All  $1\frac{1}{8}$ "  $\phi$  Expansion Bolt 8" long with  $5\frac{1}{2}$ " min. embedment - Kwik or Waj-it only (5-Total)
- 2) When removing topping & curb as indicate do not cut reinforcing bars or mesh
- 3) Replace removed concrete with non-shrink 5000 psi concrete after careful cleaning of exposed tee surface.



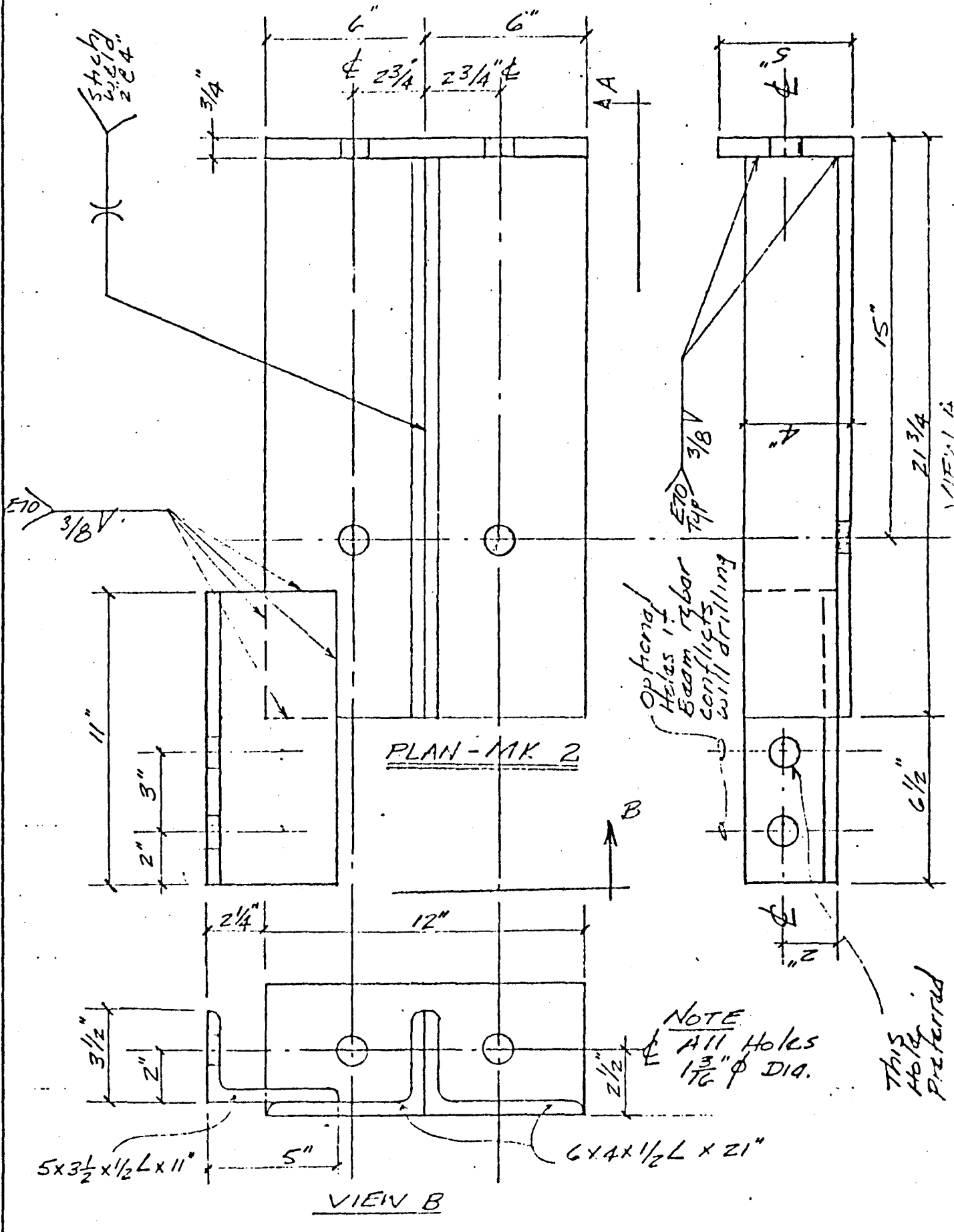
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CJR

DATE

3/30/74

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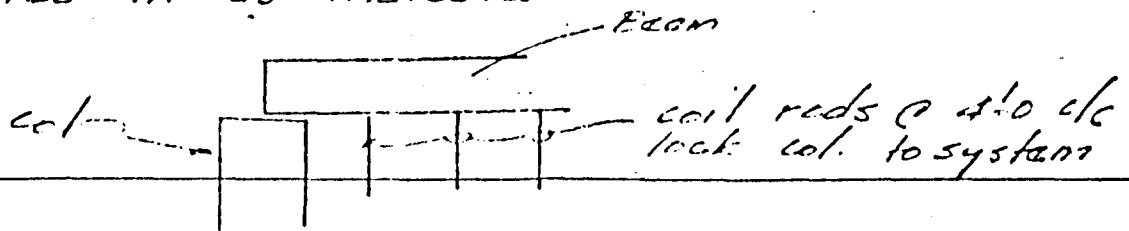
DATE  
4/1/74

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JOB NUMBER  
73681

Additional Modification Requirements

1. Install MK 2 at Col's <sup>south side</sup> A2, F2, <sup>north side</sup> A13 & F13 for Phase I.
2. Develop details for Phase II that insures that control joint on the south side of 13 can allow for 1 1/2" movement. Teflon pads on steel should be employed where beam is supported upon new support such as shown by 1/E1 or 1/E2. Likewise, where top beam bears against column, teflon surface must be employed. See Detail on p-10/ ✓
3. Details for Phase II must be developed to insure Col's A22 & F22 are tied to building by casting it's in beams & column at A22 & F22. Plate system should be designed to resist 44.5K tension at ultimate. welds between skewed panel and Col's A22 & F22 should not be made.
4. After Phase II topping placed, angles welded between Col B13, C13, D13 & E13 & beams on North side should be cut free to allow teflon pads (per March 18, 1974: Carl Walker memorandum) to act as control joints.
5. Phase II Beam to column details of B13, C13, D13 & E13 need to be developed to insure for south side that beams are tied to columns. Plates presently cast into columns, and the force for design, should be 44.5K tension at ultimate.
6. No modifications for tying columns E1, C1, D1 & E1 of Phase I need be employed as system presently is tied in as indicated!



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Beam  
Phase II  
south of  
(B)

~~Expansion joint or similar  
device on bearing area~~

Note: Beam ledge  
to be designed  
to resist 50%  
of reaction  
at column

SORBEX PADS  
~~PLATES~~ ON TOP  
1/4" THICK

grout full width  
to fill on  
steel fl's

slot 4" long by 1 3/16  
wide w/ expansion  
bolt so located to  
allow for 2" plus  
movements

SEE  
P-1/22

A-F

NOT NEEDED

South  
Col. Face

1/4  
2 - 3/32 steel  
fl's with  
bonded  
telfon

don't  
omit  
grout

Top fl.  
of modification

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APR 3 1974

Carl Walker & Assoc.

note: lower  
fl. must have  
slot 4" long  
to allow  
for movement.

# EXPANSION CONNECTION

GRID 13 { - GRID B/E ONLY  
 { - Levels 2, 3, 4, 5, 6

HOR FORCE  $T_u = 44.5^k$  (PER CHR CALL -  
 P. 5/10 V - 3/29/74)

Level 6 - All Force on One Side Only.

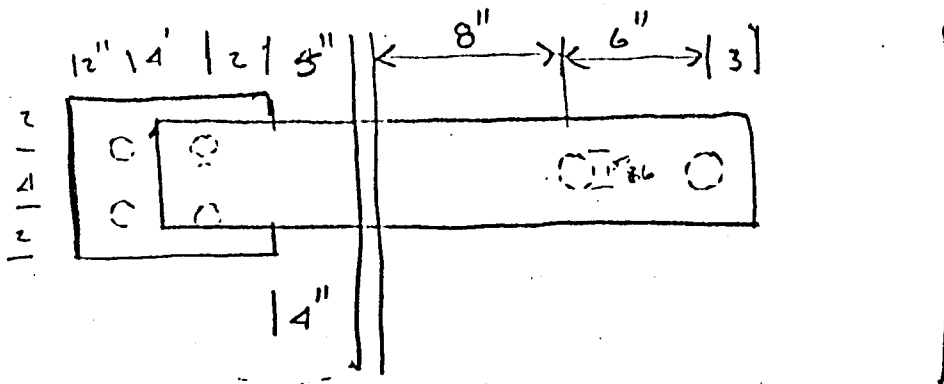
Use 1 1/4" x 9" KWIK BOLTS

$U_u$  - CAPACITY BY TEST - 6000 psi CONC.  
 = 45<sup>k</sup>

∴ Use 2 BOLTS IN COLUMN.

$$U_c = .85(115)(2) = 76.5^k$$

## PLATE IN BEAM



$$\begin{aligned} d_e &= 7'' \\ l_e &= 4'' \\ d_s &= 3/4'' \end{aligned}$$

$$V_c' = 11.9^k (4) = 47.6^k > 44.5^k$$

Use { 4- 3/4" x 4" STUDS  
 { 8 x 8 x 3/4" PL.

TIE STRAP  $T_u = \frac{44.5}{1.3} = 34.2^k$  WORKING.

$$F_t = .6(36) = 21.6$$

$$A = \frac{34.2}{21.6} = 1.58 \text{ in}^2$$

$$b = \frac{1.58}{.75} = 2.1$$

with hole use  $b = 4''$   
 $t = 3/4''$

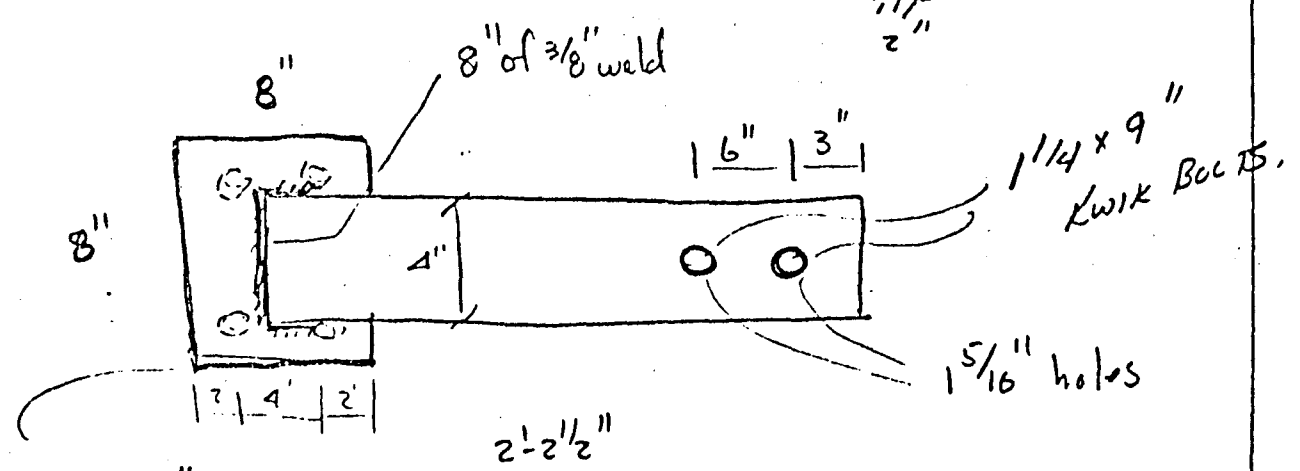
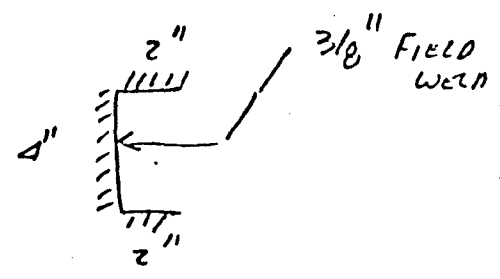
1 1/8  
 1 5/8  
 1 1/4  
 2

weld @ Beam.

(.7)(.8) = 5.6 <sup>12</sup>/<sub>IN</sub> of <sup>1</sup>/<sub>2</sub>" weld

<sup>1</sup>/<sub>2</sub>" l =  $\frac{34.2}{5.6}$  6.1"

<sup>3</sup>/<sub>8</sub>" l =  $\frac{34.2}{4.2}$  8.14"



8x8x3/4" IR.  
w 4- 3/4"x4" STUDS

ROOF CONN ONLY.

Level 2, 3, 4, 5 - Two Beams

$$\therefore T_u = \frac{411.5}{2} \cdot 22.25 \text{ k/beam}$$

- BOET IN COL. Use 1- 1<sup>1</sup>/<sub>4</sub>" x 9" (Kw) (Col)

- PL. IN BM.

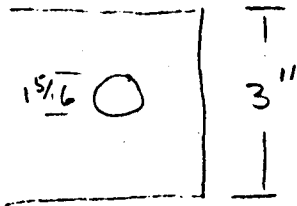
Use 8 x 8 x 1<sup>1</sup>/<sub>2</sub>"

w 4-1<sup>1</sup>/<sub>2</sub>" x 4" STADS

$$U_c' = 4(8.8) = 35.2 \text{ k} > 22.3 \text{ k}$$

- STRAP

$$A_b = \frac{22.25}{21.6} = 1.03 \text{ in}^2$$



$$b = 1.69 \times .75 = 1.27 \text{ in}^2$$

Use 3" x 3/4" STRAP

- WELD @ Beam.

3/8"

$$l = \frac{22.25}{4.2} = 5.29 \text{ in}$$

- Use 6" weld.



UNIVERSITY OF MINNESOTA  
TWIN CITIES

Engineering and Construction Division  
Physical Planning Office  
26 Folwell Hall  
Minneapolis, Minnesota 55455

April 15, 1974

TO: Mr. John Scott  
The Architects Collaborative  
Cambridge, Massachusetts

Carl Walker & Associates, Inc.  
C22, C222 Westmain Mall  
Kalamazoo, Michigan 49009

Carl Walker & Associates, Inc.  
400 Shelard Plaza South  
Minneapolis, Minnesota 55426

Raths, Raths and Johnson, Inc.  
907 North Elm Street  
Hinsdale, Illinois 60521

Johnston Sahlman Company  
640 Sexton Building  
Minneapolis, Minnesota 55415

FROM: Paul E. Kopietz, Assistant Director of Planning PEK

This is to confirm that a meeting will be held to discuss the corrective proposals for Phases I and II of the Health Sciences Parking Room in Room 300 Morrill Hall at 8:30 A.M. on April 19, 1974.

PEK:mm

cc: ✓ E. A. Kogl  
Clinton Hewitt  
James F. Brinkerhoff  
Paul J. Maupin

April 16, 1974

**TO:** Clint Hewitt  
**FROM:** E. A. Kogi  
**SUBJECT:** Health Sciences Parking Ramp - Cash Flow Requirements

A schedule of payments and cash flow requirements was developed for the Health Sciences Parking Ramp as you requested. This new schedule is essentially a revision of the anticipated expenditures developed by Kurt Hamann and changed as a result of observation of job conditions and discussion with those involved in recognition of design difficulties.

The double tee sections that form the floor slabs are being fabricated at present. A meeting will be held with the designers on Friday, April 19 to determine what revisions must be made in the structural members of the Phase II portion of the work as well as what corrections must be made in the Phase I portion of the job. Assuming that the architect's solution is responsive to the problem and that agreement is reached, the following schedule of expenditures should be approximately correct:

<u>Date</u>	<u>Expenditures</u>	<u>Total Payments</u>
May 1	<del>350,000</del>	\$ 2,750,000
June 1	450,000	2,200,000
July 1	450,000	1,750,000
Aug. 1	450,000	1,300,000
Sept. 1	450,000	850,000
Oct. 1	450,000	400,000
Nov. 1	350,000	50,000
Dec. 1	93,000	

Failure to reach agreement with the architect at that meeting would set the above dates back about one month.

EAK/sh

cc: Kurt Hamann, Paul Kopietz



RATHS, RATHS & JOHNSON, inc. : : Structural Engineers

CHARLES H. RATHS  
DONALD C. RATHS  
ROBERT W. JOHNSON

RECEIVED 907 NORTH ELM STREET  
HINSDALE, ILLINOIS 60521

MAY 8 - 1974

Carl Walker & Assoc.

312/325-6160

May 7, 1974

Mr. William C. Arons  
Carl Walker & Associates, Inc.  
400 Shelard Plaza South  
Suite 670  
Wayzata Blvd. & County Road 18  
Minneapolis, Minnesota 55426

Re: University of Minnesota Parking Facility  
RRJ 73681

Dear Mr. Arons:

This letter is to summarize our overall conclusions regarding the proposed structural modifications to Phase I and Phase II. The modifications are based upon using a steel bracket haunch attached to existing columns and the load test at Twin City Testing for Phase I. The Phase II modifications consider the addition of a concrete haunch cast with the columns and the addition of shear reinforcing steel to the beams even though tests indicate that it can be omitted.

The modifications designed and proposed by Raths, Raths & Johnson are appropriate and a proper resolution to the problem. Moreover, to the best of Raths, Raths & Johnson's knowledge, the proposed modifications to Phase I and II satisfy the ACI Building Code (ACI 318-71) relative to Section 1.4. Thus, it is our conclusion, upon review of both the ACI Code and the Uniform Building Code, 1970, (Sections 106 and 107) that the proposed modifications satisfy these code requirements in practice and intent.

Yours truly,

RATHS, RATHS & JOHNSON, INC.

*Charles H. Raths*

Charles H. Raths, S.E.

CHR:jd

cc: H. Carl Walker  
J. R. Janney

cc: DAN HOWARD - CNA  
CLYDE ANDERSON

# Wiss, Janney, Elstner and Associates, Inc.

CONSULTING AND RESEARCH ENGINEERS

(312) 272-7400

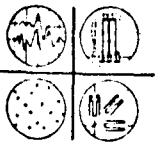
330 Pfingsten Road

Northbrook, Illinois 60062

May 8, 1974

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MAY 9 1974

RATHS, RATHS & JOHNSON



## PRINCIPALS

J. F. WISS  
J. R. JANNEY  
R. C. ELSTNER

## CONSULTING SPECIALISTS

H. W. MURRAY  
A. A. PURVIS  
E. W. THORSON  
E. E. ELLWOOD  
C. L. OLESON

## ENGINEERING DIRECTORS

J. A. HANSON  
J. M. HANSON  
E. L. PERRINE  
T. M. BROWN

## ASSOCIATES

M. E. BRANDER  
L. E. COPELAND  
O. E. CURTH  
O. C. GUEDELHOEFER  
R. J. KRAUSE  
M. K. PRESTON  
E. A. SALSE  
J. G. STOCKBRIDGE  
W. M. WADDINGTON

Mr. Charles Raths  
Raths, Raths & Johnson  
907 North Elm Street  
Hinsdale, Illinois 60521

Re: University of Minnesota  
WJE Job No. 73562

Dear Mr. Raths:

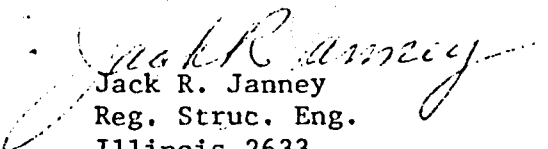
This letter is written at your request regarding my participation in the investigation into the problem which has been encountered in the parking structure designed by Carl Walker & Associates for the University of Minnesota. As I have indicated to you verbally on several occasions, I am in accord with your suggested remedial measures which had been developed to eliminate any possibility of a bearing problem between the spandrel beams of this structure and their supporting columns. I believe your solution to be as economical as any that we have been able to visualize; is an appropriate and a proper resolution to the problem; and will certainly overcome any question regarding the safety and serviceability of the structure throughout its intended life, with respect to the bearing problem.

Furthermore, permit me to state that the spandrel beams, as originally designed and constructed, do meet the provisions of the ACI Code with respect to Section 11.1(d). This statement is made on the basis of my study of the test report furnished by Carl Walker & Associates in which the test loading conditions and results were described. If these were indeed as indicated in that report, the member performed as I would have expected it to, and in accordance with experience we have gained in many similar situations and meets the intent of the ACI Building Code.

I further concur with the provisions you have suggested to incorporate the bearing device to enhance the support of the spandrel beams for that portion of the structure which is yet to be built. These devices consist of concrete haunches cast onto the columns supporting the spandrel beams. I further concur with your suggestion that additional web reinforcement be added, although in my judgement, it is not necessary for safety reasons but rather for esthetic reasons only. This statement is made because of the test results which are described above.

Respectfully submitted,

WISS, JANNEY, ELSTNER AND ASSOCIATES, INC,

  
Jack R. Janney  
Reg. Struc. Eng.  
Illinois 2633

JRJ/jc

cc: Dan Howard - CNA



31360

THE ARCHITECTS COLLABORATIVE INC.

JEAN B. FLETCHER 1945 1965  
WALTER GROPIUS 1945 1969  
NORMAN FLETCHER  
JOHN C. HARKNESS  
SARAH P. HARKNESS  
LOUIS A. McMILLEN

28 May 1974

RICHARD BROOKER  
ALEX CVIJANOVIĆ  
HERBERT GALLAGHER  
WILLIAM J. GEDDIS  
ROLAND KLUVER  
PETER W. MORTON  
H. MORSE PAYNE  
ERNEST L. BIRDSALL  
TREASURER

Mr. Paul Kopietz  
Assistant Director of Planning  
Physical Planning Office  
University of Minnesota  
26 Folwell Hall  
Minneapolis, Minnesota 55455

ROBERT F. CRANE  
HOWARD ELKUS  
ALLISON GOODWIN  
JOHN HAYES  
JOSEPH HOSKINS  
LEONARD NOTKIN

Re: University of Minnesota  
Parking Facility  
TAC Job No. 72023 - 702



QAZI B. AHMED  
KENDALL P. BATES  
SERGE CVIJANOVIĆ  
ROYSTON DALEY  
ROBERT DEWOLFE  
GREGORY DOWNES  
BASIL HASSAN  
THOMAS LARSON  
EDWARD MALICK  
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PERRY NEUBAUER  
MICHAEL PRODANOU  
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RICHARD SABIN  
JOHN J. SCOTT  
DAVID SHEFFIELD  
EDmund SUMMERSBY  
KENNETH TAYLOR  
MALCOLM TICKNOR  
ROBERT TURNER  
ROBERT WILSON  
LAURENCE ZUELKE

Dear Paul:

As requested in your letter of 1 May 1974 and your telephone conversation of 22 May with John Scott, we are submitting our formal written recommendation for the Phase II Modifications.

The drawing and modifications order was submitted to you and the general contractor on 16 May 1974. In addition to the scope and revisions outlined therein, we submit the following additional information.

TAC, together with Souza & True, have reviewed Drawing S6A and the associated calculations prepared by our structural consultant, Carl Walker and Associates. As mentioned in our phone conversation of 22 May 1974, we concur with the Phase II modifications prepared and submitted by Carl Walker and Associates and recommend your acceptance of their work.

In your letter of 23 May, you requested a further explanation of several items. A general explanation of each follows:

- Beam reinforcing pattern. As you note, this has been changed from previous submissions. We attach the calculations for the reinforcing as provided us by Carl Walker and Associates.
- Coil rod connections at Columns A22, F22, C22, D22 Levels 2 through 6 relate to expansion considerations. Their primary purpose is to tie the column and floor construction together. We do not have the expansion calculations to forward to you at present, but will do so as soon as we receive same from Carl Walker and Associates.

Mr. Paul Kopietz

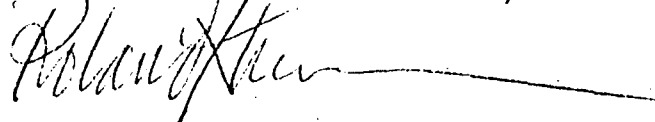
-2-

28 May 1974

We assure you that we are keeping in mind all the issues pertaining to Phase I that you raised in your 1 May letter. We will address these issues when we submit our final recommendations on Phase I.

Yours very truly,

THE ARCHITECTS COLLABORATIVE, Inc.

A handwritten signature in cursive script, appearing to read "Roland Klüber", with a long horizontal line extending to the right.

Roland Klüber

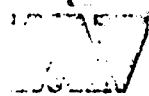
RK:MR

Enclosures

Concrete Haunch Design (4-18-74)

Shear and Torsion Reinforcement Design (3-20-74)

FILE 385



**CARL WALKER & ASSOCIATES, INC.**

400 Shelard Plaza South  
Suite 670  
MINNEAPOLIS, MINNESOTA 55426  
Telephone 612/546-4316

**LETTER OF TRANSMITTAL**

DATE	May 15, 1974	JOB NO.	1612
ATTENTION	John Scott		
RE.	RECEIVED		
	MAY 21 1974		
	C. WALKER & ASSOCIATES, INC.		

THE ARCHITECTS COLLABORATIVE

46 Brattle Street

Cambridge, Massachusetts

GENTLEMEN:

- WE ARE SENDING YOU  Attached  Under separate cover via air mail the following items:
- Shop drawings       Prints       Tracings       Sepias       Specifications
- Copy of letter       Change order       on May 15, 1974

COPIES	DATE	NO.	DESCRIPTION
1 (set)			1/26 T1 through 26/26 T1
1			copy of transmittal from Raths, Raths & Johnson
1 (set)			1/7 through 7/7 (ENCLOSED)

THESE ARE TRANSMITTED as checked below:

- For approval       No exceptions taken       Resubmit \_\_\_\_\_ copies for approval
- For your use       Make corrections noted       Submit \_\_\_\_\_ copies for distribution
- As requested       Revise and resubmit       Return \_\_\_\_\_ corrected prints
- For review and comment       Rejected       \_\_\_\_\_

REMARKS

These calculations agree with the drawings #S6A which we mailed to you on May 10, 1974 for your approval.

We will deliver these to Kurt Rogness as soon as you call with your approval.

COPY WITH \_\_\_\_\_ PRINTS TO:

SIGNED:

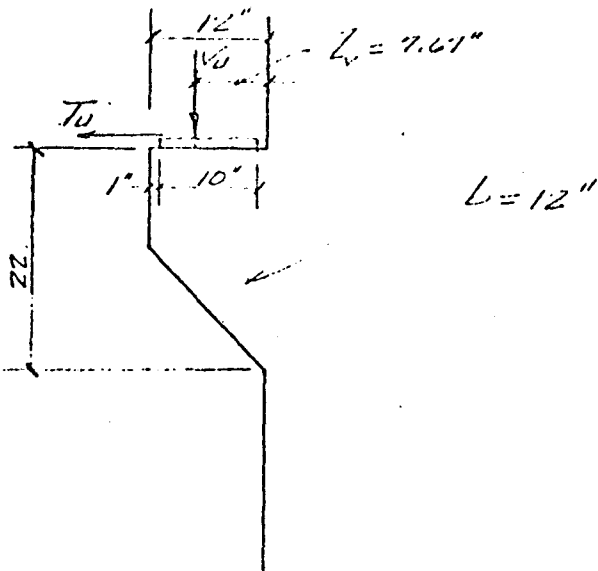
Design Criteria

- 1) Bracket shape to match Phase I Modification
- 2) Use concrete reinf haunch because of 1 above
- 3) Use full bearing area to eliminate torsion restraint
- 4) Insure beam ledge can resist reaction

Design Loads

$V_u$  controlling = 79.1 K (see E calc. series)  
 $T_u/V_u = 0.2$  for design minimum

Design Concrete Haunch



$$d = 22 - 0.75 - 0.5 = 20.75"$$

$$\frac{L_v}{d} = \frac{7.67}{20.75} = 0.37$$

Use B-1 PCI Connection Manual  
 (see p-2/E3)

for  $b = 12"$ ,  $T_u/V_u = 0.25$   $\left\{ \frac{L_v}{d} = 0.4 \right.$

$V_u = 113K$  2-#8 bars

OK

2/7 EB  
73681

B-7 Reinforced concrete bracket or haunch

$$V_u = \phi bd \sqrt{f'_c} (C_1 C_2)$$

See Sect. 2.4.2

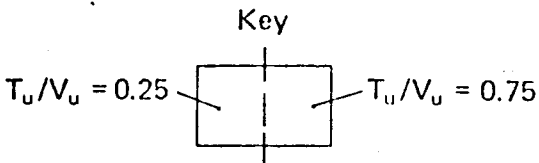
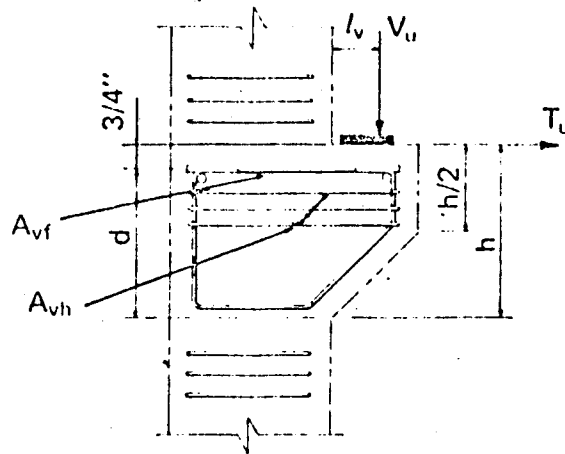
$V_u$  = Ultimate shear capacity

$f'_c$  = 5000 psi; for other concrete strengths multiply table values by  $\sqrt{f'_c/5000}$

$f_y$  = 40,000 psi

$h$  =  $d + 0.75'' + 1/2$  bar diameter

$b$  = Column width perpendicular to face shown



Note: See Fig. 2-3 for additional details

Values of  $V_u$ , kips

	$A_{vf}$	$A_{vh}$	$l_v/d = 0.2$								$l_v/d = 0.4$							
			h = 10"		h = 14"		h = 18"		h = 22"		h = 10"		h = 14"		h = 18"		h = 22"	
b = 12"	2-No. 5	2-No. 3	55	31	68	35					47	26	57	30				
	2-No. 6	2-No. 3	64	39	78	44	91	49			54	33	67	38	78	41		
	2-No. 7	2-No. 4	72	47	89	54	104	59	118	64	61	40	76	46	89	50	100	55
	2-No. 8	2-No. 4			100	64	117	71	132	76			85	54	100	60	113	65
	2-No. 9	3-No. 4			111	74	130	82	146	88			94	63	110	69	124	75
			h = 12"		h = 16"		h = 20"		h = 24"		h = 12"		h = 16"		h = 20"		h = 24"	
b = 14"	2-No. 5	2-No. 3	67	33							57	30						
	2-No. 6	2-No. 3	78	44	93	49					66	37	79	42				
	2-No. 7	2-No. 4	89	53	106	60	121	65			75	45	90	51	103	56		
	2-No. 8	2-No. 4	100	63	119	71	136	78	152	83	85	54	101	61	116	66	129	71
	2-No. 9	3-No. 4			132	83	151	90	168	97			112	70	128	77	143	82
	3-No. 5	2-No. 3	80	46	95	51					68	39	81	43				
	3-No. 6	2-No. 4	93	57	111	64	127	70	141	75	79	48	94	54	108	59	120	63
	3-No. 7	2-No. 4	106	69	126	78	145	85	161	91	90	59	107	66	123	72	137	77
	3-No. 8	3-No. 4			142	92	163	101	181	103			121	78	138	85	154	92
			h = 14"		h = 18"		h = 22"		h = 26"		h = 14"		h = 18"		h = 22"		h = 26"	
b = 16"	2-No. 6	2-No. 3	92	49							78	42						
	2-No. 7	2-No. 4	105	60	123	66					89	51	104	56				
	2-No. 8	2-No. 4	118	71	138	78	156	85	172	90	101	60	117	67	132	72	146	77
	2-No. 9	3-No. 4	131	82	153	91	172	93	190	105	111	70	130	77	146	84	162	89
	3-No. 5	2-No. 3	95	51							81	43						
	3-No. 6	2-No. 4	110	64	128	70	145	76			93	54	109	60	123	64		
	3-No. 7	2-No. 4	125	77	146	85	165	92	183	98	107	66	124	72	140	78	155	84
	3-No. 8	3-No. 4	141	92	165	101	186	110	205	117	120	78	140	86	158	93	174	99
	3-No. 9	4-No. 4			182	117	205	127	227	136			155	100	175	108	193	115
	4-No. 5	2-No. 4	107	61	125	67					91	52	106	57				
	4-No. 6	2-No. 4	125	76	145	84	164	91	181	97	106	65	123	72	139	77	154	82
	4-No. 7	3-No. 4	142	93	166	102	187	111	207	118	121	79	141	87	159	94	176	100
	4-No. 8	4-No. 4			186	122	210	131	233	140			158	103	179	112	198	119

RATHS, RATHS & JOHNSON, inc.  
 STRUCTURAL ENGINEERS  
 907 NORTH ELM STREET, MINGOALE, ILL. 60521

Phase II Bracket

SHEET NUMBER

3/7 12

MADE BY

CHR

DATE

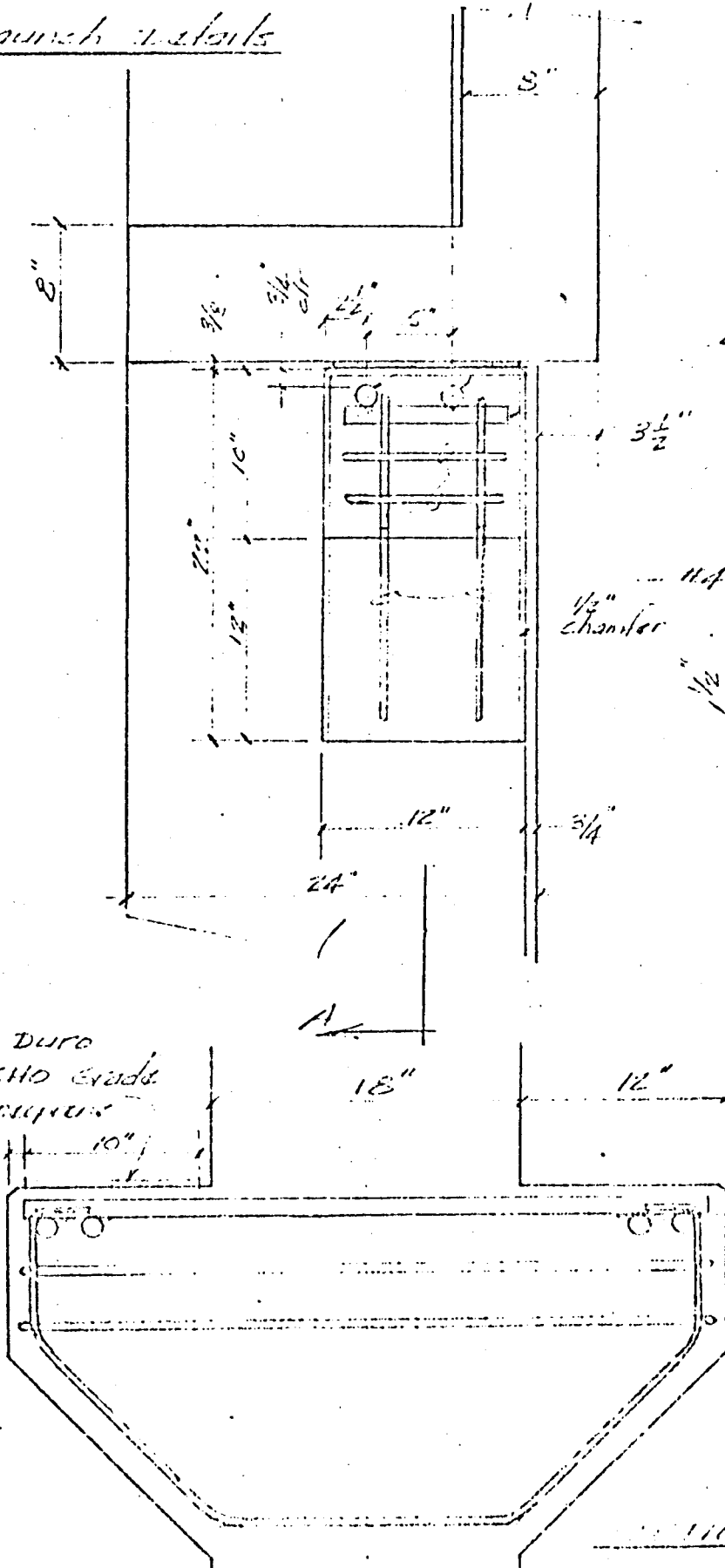
7/18/12

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JOB NUMBER

73681

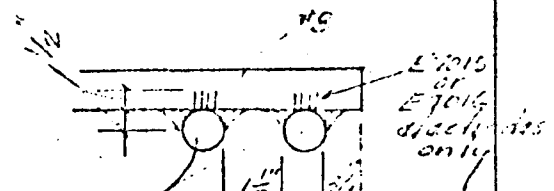
Haunch details



#8 x 40"  
 2-#8 x 10" }  $f_y = 40 \text{ ksi}$

#4  $f_y = 40 \text{ ksi}$   
 20" x 3"

#4 Keeper Bars  
 1/2" chamfer



weld detail - #8

50 Duro  
 AASHO Grade  
 3/8" mesh  
 1" x 10"

equal



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1155C II Bracket

SHEET NUMBER

4/7

JOB NUMBER

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MADE BY

CHK

DATE

4/13/14

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check bearing post

$$\frac{79.1}{1.5} = 52.7 \text{ K working}$$

$$f_b = \frac{52,100}{10(12)} = 434 \text{ psi} \text{ say } < 1000 \text{ psi ok}$$

check slabs

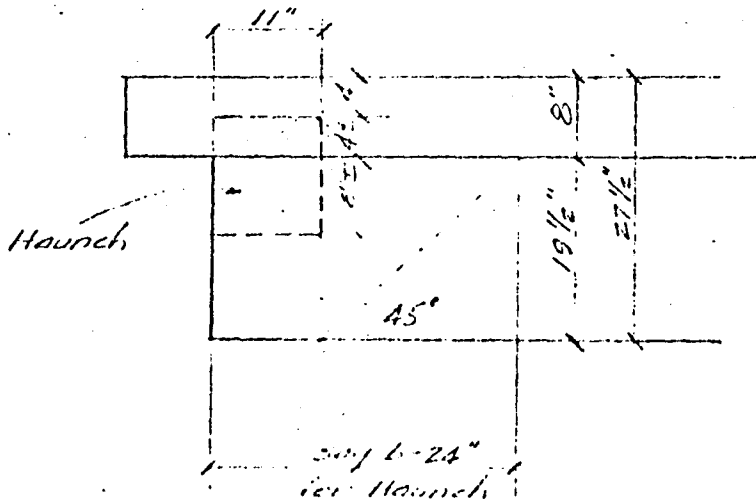
$$\text{slope factor} = \frac{10(12)}{2(10+12)0.375} = 7.27 \text{ PER PCI Fig 8-3}$$

comp. strain, less than 5% ok

Select beam Haunch Rein.

$$V_u = 79.1 \text{ K}$$

USE 90K @ 11K FOR DESIGN  
design as a serial-PCI section 2.4.2  
(see p-5/E3)



$$b = 24"$$

$$d = 6.5"$$

$$Z_v \approx \frac{2}{3}(8) = 5.3"$$

$$\frac{Z_v}{d} = \frac{5.3}{6.5} = 0.81 \text{ ok } < 1.0$$

$$f_b = \frac{90,000}{24(6.5)} = 577 \text{ psi} \text{ ok acceptable}$$

5/17 23  
73681

concrete bearing strength can be calculated by

$$f_{bu} = \phi 70 \sqrt{f'_c} \sqrt[3]{s/v} \quad (2-3)$$

where  $\phi = 0.70$

If a horizontal force  $T_u$  is present, the ultimate bearing strength should be reduced by multiplying Equation (2-3) by  $C_r$  as given in Equation (2-4), where the product  $s \times w$  shall not be taken greater than 9 sq. in.

$$C_r = \left[ \frac{sw}{200} \right]^{T_u/V_u} \quad (2-4)$$

For non-uniform bearing, the ultimate bearing stress at any point should not exceed that given by Equation (2-3) for  $s/v = 0.5$

The unconfined allowable bearing for lightweight structural concrete should be taken as 0.85 of the values for normal weight concrete.

### 2.3.4 Bearing on confined concrete

For heavily loaded members (usually when Sect. 2.3.3 cannot be satisfied), or those that resist large lateral forces, the shear-friction concept can be used to determine confinement reinforcement in the region of the connections. The following provisions apply to the design of the ends of these units:

The ultimate vertical bearing stress (load per unit of bearing area) should not exceed  $0.85 f'_c$ .

For vertical bearing cracks (see Fig. 2-2), reinforcement welded to confinement angles should be used, and can be determined by

$$A_{vf} = \frac{1}{\phi f_{yv}} \left[ \frac{V_u}{\mu} + T_u \right] \quad (2-5)$$

where  $\phi = 0.85$

$T_u$  is determined by analysis and it is recommended that a value not less than  $T_u = 0.2 V_u$  be used unless a lower value is justified by a refined analysis.

For horizontal cracks (see Fig. 2-2), reinforcement within the bearing area can be determined by

$$A_{sh} = \frac{A_{vf} f_{yv}}{\mu f_{ys}} \quad (2-6)$$

Confinement reinforcement in addition to  $A_{vf}$  and  $A_{sh}$  should be provided in both the vertical and horizontal directions, Fig. 2-2, and can be calculated by

$$A_{cv} = A_{ch} = \frac{V_u}{8 f_y} \quad (2-7)$$

## 2.4 SHEAR

### 2.4.1 General

In connection design the ratio of shear span to depth is generally less than unity. Shear at a connection can be transferred by the concrete of the connection, by embed-

ded structural shapes, or by a combination of both.

### 2.4.2 Concrete brackets or haunches (Fig. 2-3)

The ultimate shear strength of concrete can be calculated from

$$V_u = \phi b d \sqrt{f'_c} C_1 C_2 \quad (2-8)$$

where  $\phi = 0.85$

$$C_1 = 6.5 (1 - 0.5^{d/l_v})$$

$$C_2 = \frac{(1000 \rho_{vf})^{(1/3 + 0.4 T_u/V_u)}}{(10)^{0.8 T_u/V_u}}$$

Values for the parameters  $C_1$  and  $C_2$  can be taken from Design Aids B-8 and B-9.  $T_u$  is determined by analysis and it is recommended that a value not less than  $T_u = 0.2 V_u$  be used.

The main tensile reinforcement  $A_{vf}$  should be anchored positively near the extreme outer faces by welded cross bars or by welding to confinement angles. Horizontal ties  $A_{vh}$  approximately equal to  $A_{vf}/2$  should be placed in the upper 2/3 of the haunch. The position of the applied vertical load is assumed to be located at the outer third point of the bearing contact area. The ultimate bearing stress without confinement angles should not exceed  $0.5 f'_c$ .

### 2.4.3 Dapped-out end connections (Fig. 2-4)

The same general restrictions as given in Sect. 2.4.2 apply equally to this design condition. The horizontal reinforcement  $A_{vf}$  should be designed by Equation (2-5) and the vertical reinforcement  $A_{sh}$  by Equation (2-6). The ratio of  $l_v/d$  should not exceed 0.40;  $A_{vh}$  should equal  $A_{vf}/2$ .

### 2.4.4 Embedded structural steel shapes (Fig. 2-5)

Structural steel shapes embedded in columns or precast members usually consist of wide flange beams, channels or vertical plates. The behavior and design considerations are basic to all embedded structural steel shapes regardless of the structural shape employed.

For typical structural shapes embedded into a column or any other member from one side only, the ultimate concrete capacity is determined from

$$V_u = \frac{\phi f'_c b l_c}{3 + 4 (l_v/l_c)} \quad (2-9)$$

where  $\phi = 0.85$

The ultimate capacity of the connection can be increased by addition of angles, plates or other items to increase the effective width  $b$  of the embedded shape. The ultimate horizontal force  $T_u$ , if present, can be resisted by headed studs or welded reinforcement if the ultimate bond stress on the perimeter of the structural shape exceeds 250 psi.

For embedded structural steel shapes projecting equally from each side of a column or other precast member,

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Mass II Bracket

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$$f_c' = 5000 \text{ psi}$$

$$T_u = 0$$

$$V_u = 90$$

$$2.1/d = 0.81 \quad \therefore C_1 = 3.74 \text{ (table 8.8 PCI)}$$

Solve For  $C_2$

$$V_u = \phi b d / f_c' C_1 C_2 \text{ (PCI 4.8)}$$

$$90 = \frac{0.55(24)(6.5)}{1000} / 5000 (3.74) C_2$$

$$90 = 35.01 C_2$$

$$C_2 = 2.57 \text{ for } T_u = 0$$

$$C_2 = (1000 p_v f)'^{1/3}$$

$$(2.57)^3 = 1000 p_v f$$

$$16.97 = 1000 p_v f$$

$$p_v f = 0.01697 > 1.3\% \text{ say } \frac{1.3}{5} \text{ as } b > 24"$$

$$A_v f = 0.01697(24)(6.5) = 2.65 \text{ in}^2 \text{ total}$$

$$\frac{2.65}{0.2} = 13 \text{ bars - \#4}$$

$$\frac{2.65}{0.31} = 8.5 \text{ bars - \#5 say 9 - \#5}$$

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STRUCTURAL ENGINEERS  
907 NORTH ELM STREET, HINSDALE, ILL. 60521

*Steel II bracket*

SHEET NUMBER

*7/7 102*

MADE BY

*CHR*

DATE

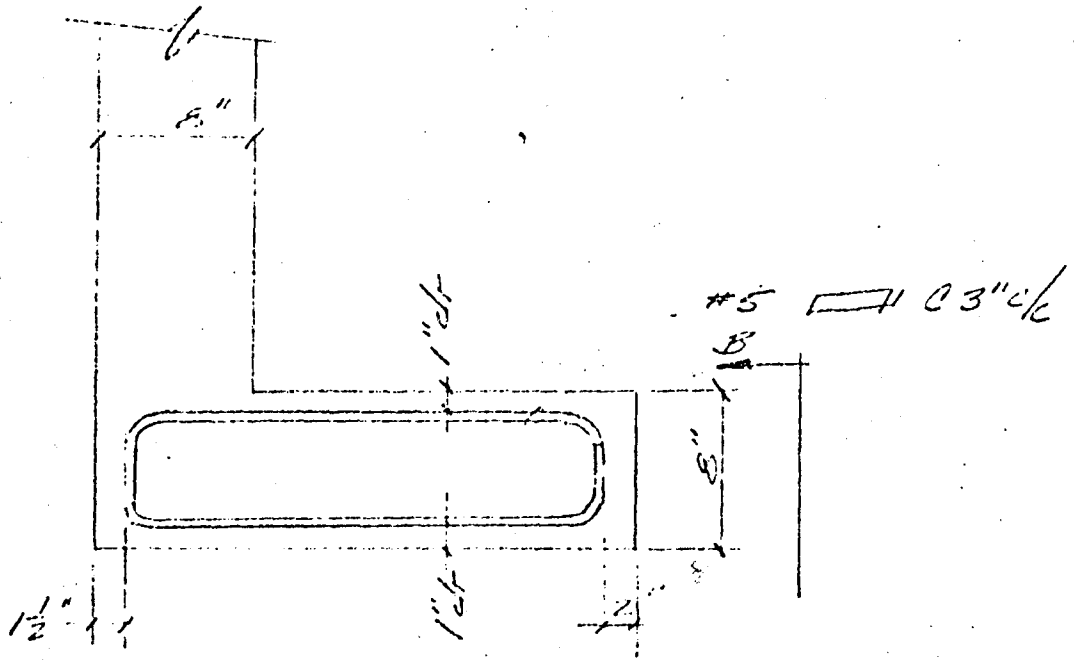
*4/15/11*

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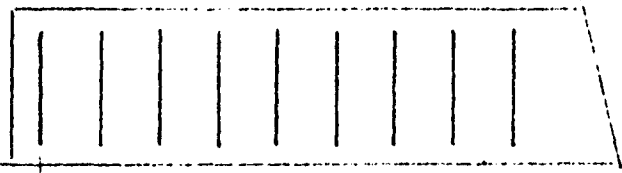
JOB NUMBER

*73031*

*Beam Reinforcement Details of Bracket*



*check that #5  
do not conflict  
with other beam  
reinf.*



*View B*

TO: Carl Walker & Associates, Inc.  
400 Shelard Plaza So. Suite 670  
Wayzata Blvd. & County Road 18  
Minneapolis, Minnesota 55426

LETTER OF TRANSMITTAL  
Raths, Raths & Johnson, inc.  
Structural Engineers  
907 North Elm Street, Hinsdale, Ill. 60521

Date May 10, 1974 Job No. 73681  
 Attention Mr. William Arons

Re: Minnesota Parking Garage

GENTLEMEN:

We are sending you  Attached XXXXXXXXXXXXXXXXXXXXXXXXXXXX First Class  
 Erection Drawings  Production Drawings  Prints  Sepias  Originals  
 Specifications  Calculations  Other: \_\_\_\_\_

Copies	Date	No	
1	5-10-74	1	Calculations for shear & torsion reinforcing ledger beams
			<i>To Agree With Drawing 56A</i>
			<i>As Sent On 5/10/74 To TMC</i>

THESE ARE TRANSMITTED AS CHECKED BELOW:

For approval  Approved as submitted  Resubmit \_\_\_\_\_ copies  
 For your use  Approved as noted  Submit \_\_\_\_\_ For approval  
 As requested  Returned for corrections \_\_\_\_\_ for distribution  
 For review & comment  Return \_\_\_\_\_ corrected prints

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REMARKS

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MAY 13 1974

Carl Walker & Assoc.

COPY TO \_\_\_\_\_

SIGNED Thomas F. McCluskey  
 Thomas F. McCluskey (73)

If enclosures are not as noted, kindly notify us at once.

73154

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MAY 13 1974

Carl Walker & Assoc.

DESIGN OF SHEAR & TORSION  
REINFORCEMENT - P/C BEAMS  
RRJ 73681

PREPARED FOR  
CARL WALKER & ASSOCIATES  
400 SHELARD PLAZA SOUTH, SUITE 670  
WAYZATA BLVD. & COUNTY ROAD 18.  
MINNEAPOLIS, MINNESOTA 55426

PREPARED BY  
RATHS, RATHS & JOHNSON, INC.  
STRUCTURAL ENGINEERS  
907 NORTH ELM STREET  
MUNSDALE, ILLINOIS 60521

Rec'd  
TRC  
5.17.74

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TFM

DATE

3.20.78

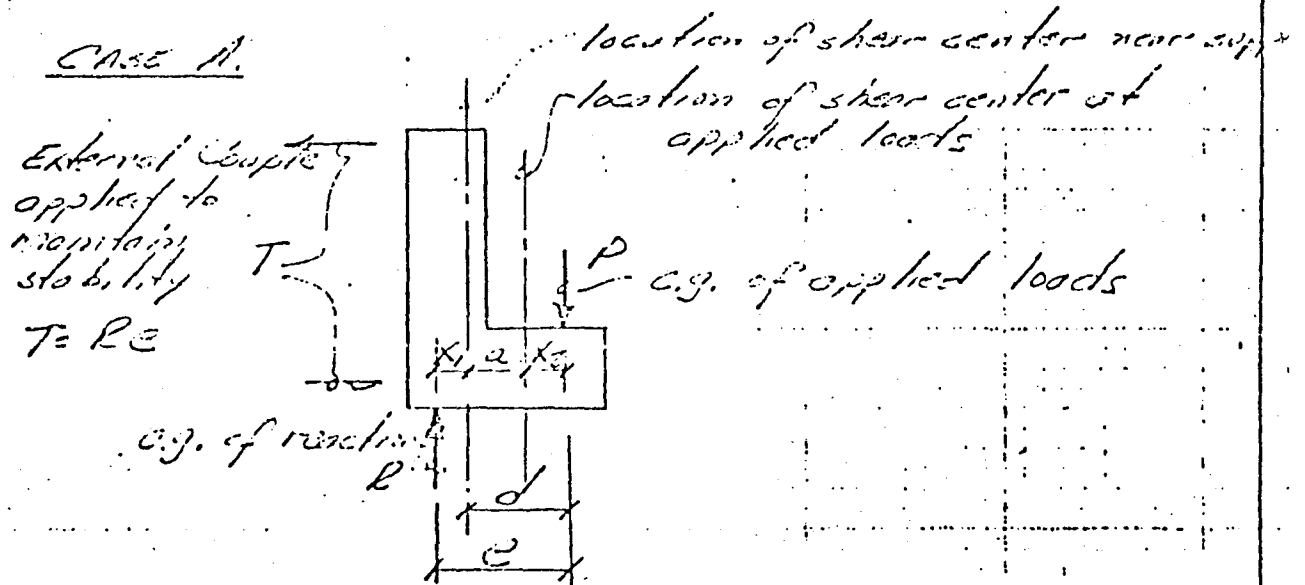
CHECKED BY

DESIGN OF TORSION STEEL FOR SPANDREL BEAM

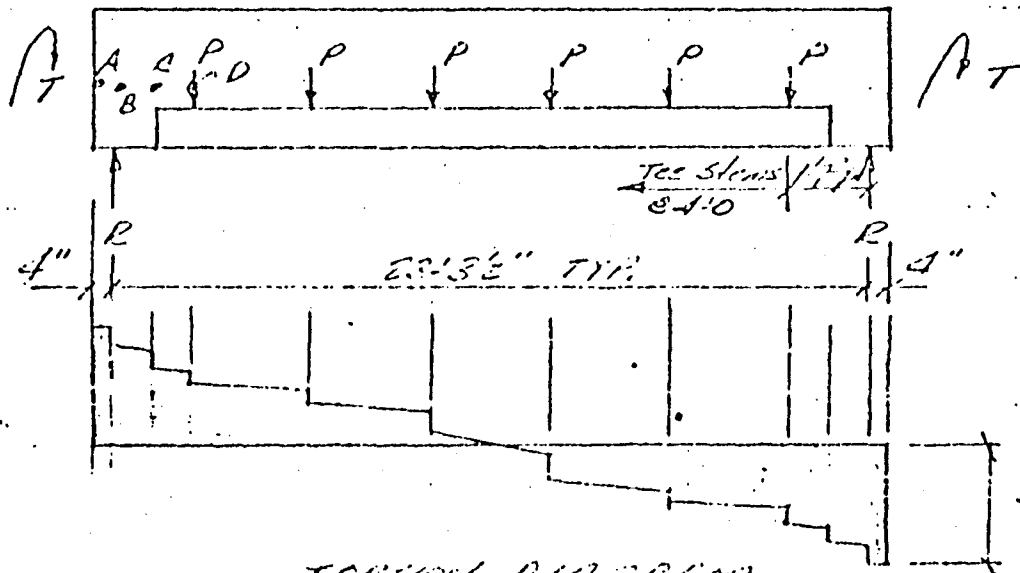
GENERAL DESIGN CONSIDERATIONS

For design of ledger beam where ledge does not extend to support - major concern is how change in location of shear centers affects torsion.

CASE A.



9" where ledge tube begins } for design say  
 to resist torsion? } of a dist. = beam depth.



$J_A = T = R_e$

$J_B = R_e - R_x = R_d$

$J_C = R_d - R_a$

$J_D = R_d - R_e - P_x$

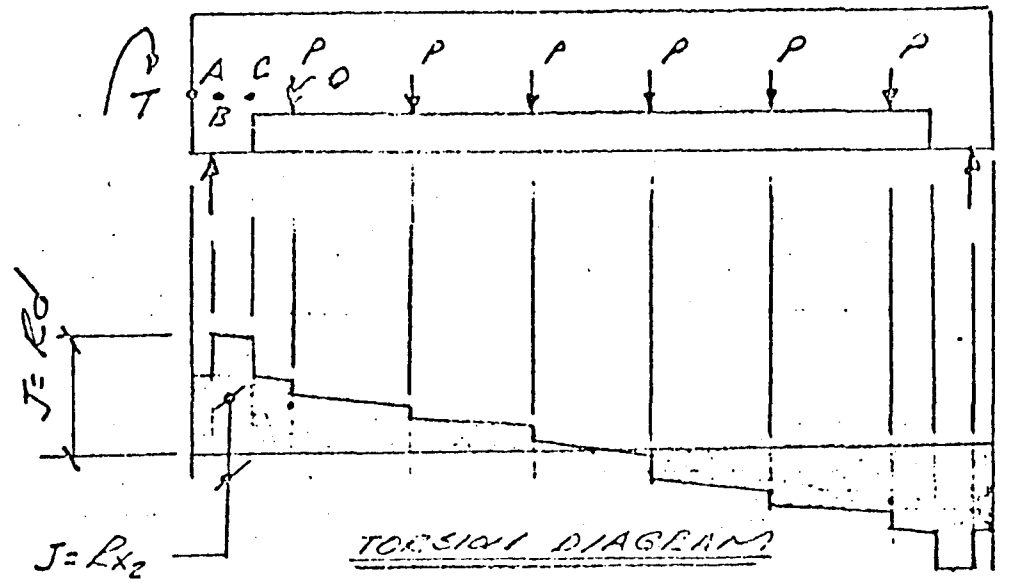
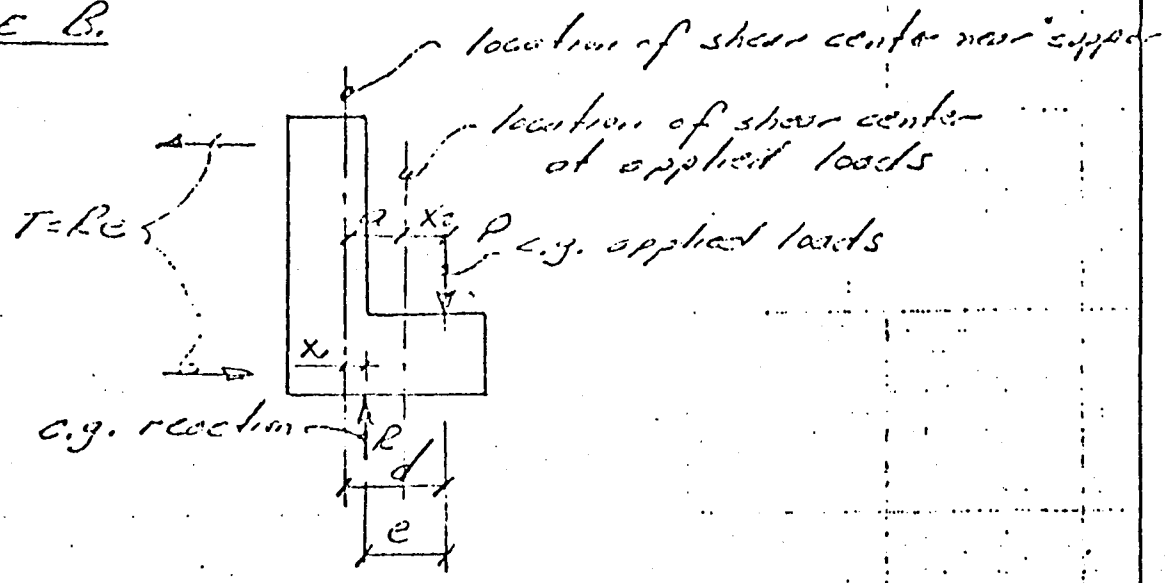
ENg loads DL

$J = R_e$

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BENTON DESIGN

CASE B.



$$J_A = Re$$

$$J_B = Re + Rx_1 = Rd$$

$$J_C = Re + Rx_1 - Ra = Rx_2$$

$$J_D = Rd - Ra - Px_2 = Rx_2 - Px_2$$

If applied loads  $P$  were located between shear centers of each section, torsion would decrease as dist. " $d$ " decreases.

DESIGN APPROACH

Design eccentricity equals distance from c.g. of applied loads to shear center - at support for a distance  $d$  (shear depth) from the support.

Design eccentricity equals distance from c.g. of applied loads to shear center of section considered - away from the support.



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BEAM DESIGN

DESIGN LOADINGS - TYPICAL FLOOR & ROOF

Superimposed Loads to Beams

Redwood CC = 30 psf + 10 psf @ roof  
 Tee CLUT = 44  
 Topping (NWT) = 35  
 112 psf 120 psf @ roof

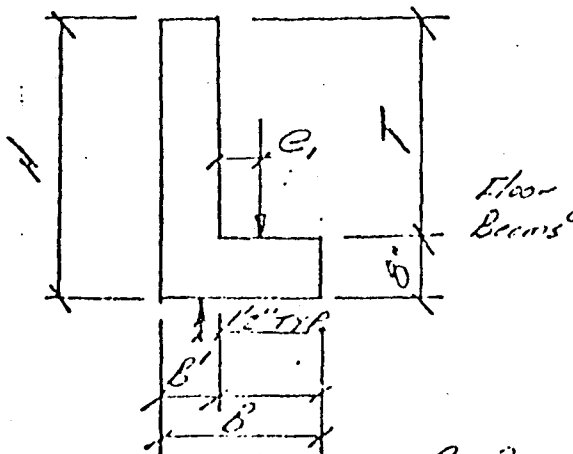
Conc. Tee Stem Load

$$P = \frac{58 \text{ in.}}{2} \left(\frac{8'}{2}\right) (0.112) = 12.99^k \text{ FLOOR}$$

$$14.38^k \text{ ROOF}$$

USE LOAD FACTOR = 1.5

BEAM DIMENSIONS - TYPICAL FLOORS & ROOF



MEMBER	B'	B	T	H
B7	8"	27.5"	32.5"	40.5"
B7	8"	16"	32.5"	40.5"
R10	8"	16"	54"	62"
BB	8"	27.5"	32.5"	40.5"
B15	8"	27.5"	32.5"	40.5"
B12	8"	27.5"	58.75"	66.75"
B11	8"	16"	72"	80"
B13	8"	27.5"	75.25"	83.25"
L17	8"	27.5"	75.25"	83.25"

e1 varies 15" to 55"  
 for B7, B8, B15, B12  
 e1 varies 15" to 45"  
 for other beams.

See Specs. 23 & 24 for  
 Dimensions.

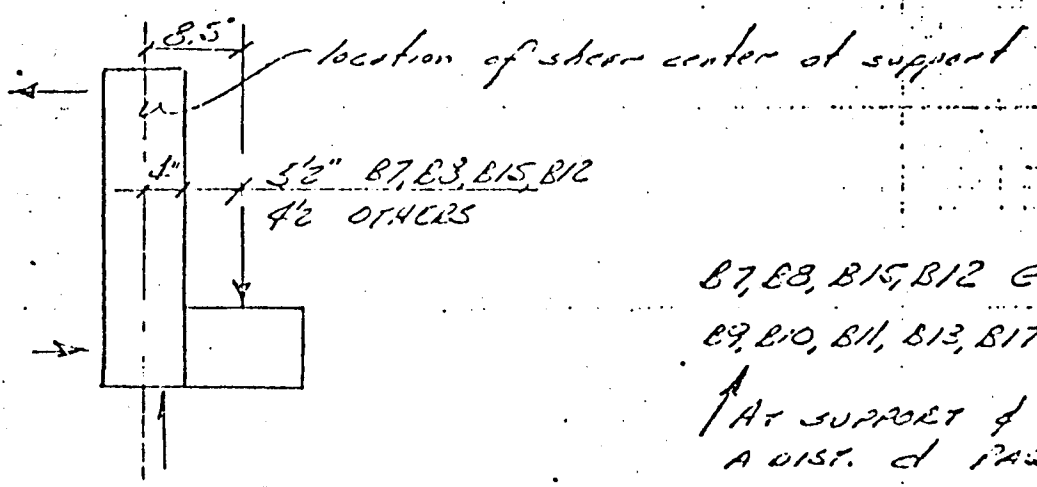
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BEAM DESIGN

DETERMINING UNIFORM BEAM LOADS

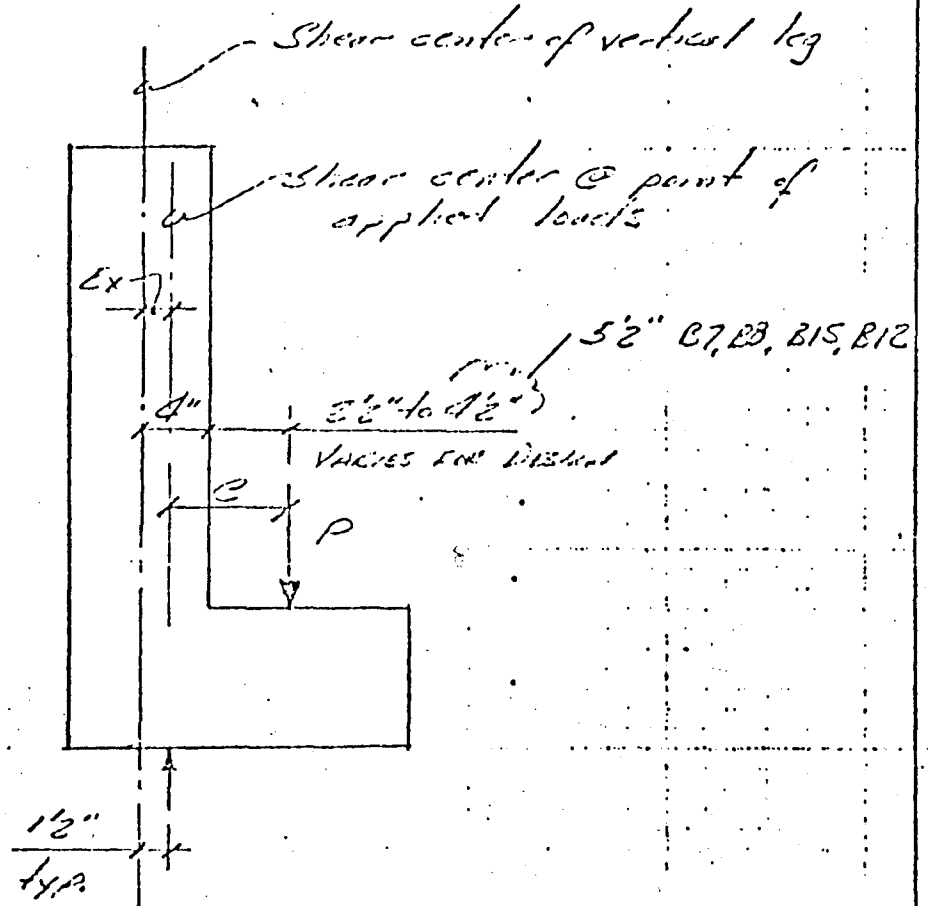
- B7  $W = [5.375 + 1.625] \times 0.667 \times 0.15 = 0.500 \text{ KLF}$
- B9  $W = [5.375 + 0.667] \times 0.667 \times 0.15 = 0.404 \text{ KLF}$
- B10  $W = [5.166 + 0.667] \times 0.667 \times 0.15 = 0.554 \text{ KLF}$
- B8  $W = [5.375 + 1.625] \times 0.667 \times 0.15 = 0.500 \text{ KLF}$
- B15  $0.500 \text{ KLF}$
- B12  $W = [5.562 + 1.625] \times 0.667 \times 0.15 = 0.712 \text{ KLF}$
- B11  $W = [6.666 + 0.667] \times 0.667 \times 0.15 = 0.734 \text{ KLF}$
- B13  $W = [6.25 + 1.625] \times 0.667 \times 0.15 = 0.856 \text{ KLF}$
- B17  $0.856 \text{ KLF}$

DETERMINE DESIGN ECCENTRICITY AT SUPPORT



B7, B8, B15, B12  $e = 7 \frac{1}{2}''$   
 B9, B10, B11, B13, B17  $e = 8 \frac{1}{2}''$   
 ↑ At support & for  
 a dist. of 12 ft

DETERMINE DESIGN ECCENTRICITY; AWAY FROM SURFACE



Location of shear centers computed by RRS program "SCENTER" - see sheet 6T1 & 7T1 for output.

EX VARIES FROM 0.01" TO 0.35"

for design use  $E = (4" + 1/2") = 8.5"$  B7, B9, B11, B13, B17

$E = (4" + 5/2") = 7.5"$  B7, B9, B15, B12

6/26 T1

\*\*\*\*\*

SHEAR CENTER - L BEAM

INPUT: JOB NO., MARK  
?R73681,B7  
INPUT BEAM DIM'S (IN.): H, T, B, W  
?40.5,8,8,27.5

SHEAR CENTER LOCATION (MARK=B7)

=====

EX= 0.35 IN. (TO RIGHT FROM B/2)

EY= 2.78 IN. (TO ABOVE FROM T/2)

TYPE: 0 TO END OR 1 FOR NEXT CASE ?1

\*\*\*\*\*

SHEAR CENTER - L BEAM

INPUT: JOB NO., MARK  
?R73681,B9  
INPUT BEAM DIM'S (IN.): H, T, B, W  
?40.5,8,8,16

SHEAR CENTER LOCATION (MARK=B9)

=====

EX= 0.09 IN. (TO RIGHT FROM B/2)

EY= 10.49 IN. (TO ABOVE FROM T/2)

TYPE: 0 TO END OR 1 FOR NEXT CASE ?1

\*\*\*\*\*

SHEAR CENTER - L BEAM

INPUT: JOB NO., MARK  
?R73681,B10  
INPUT BEAM DIM'S (IN.): H, T, B, W  
?62,8,8,16

SHEAR CENTER LOCATION (MARK=B10)

=====

EX= 0.02 IN. (TO RIGHT FROM B/2)

EY= 19.79 IN. (TO ABOVE FROM T/2)

TYPE: 0 TO END OR 1 FOR NEXT CASE ?1

20151

Feb 71

\*\*\*\*\*

SHEAR CENTER - L BEAM

INPUT: JOB NO., MARK  
?R73681,B11  
INPUT BEAM DIM'S (IN.): H, T, B, W  
?80,9,8,8,16

SHEAR CENTER LOCATION (MARK=B11)  
=====

EX= 0.01 IN. (TO RIGHT FROM B/2)  
EY= 28.04 IN. (TO ABOVE FROM T/2)  
TYPE: 0 TO END OR 1 FOR NEXT CASE ?1

\*\*\*\*\*

SHEAR CENTER - L BEAM

INPUT: JOB NO., MARK  
?R73681,B12  
INPUT BEAM DIM'S (IN.): H, T, B, W  
?66.75,8,8,27.5

SHEAR CENTER LOCATION (MARK=B12)  
=====

EX= 0.07 IN. (TO RIGHT FROM B/2)  
EY= 7.41 IN. (TO ABOVE FROM T/2)  
TYPE: 0 TO END OR 1 FOR NEXT CASE ?1

\*\*\*\*\*

SHEAR CENTER - L BEAM

INPUT: JOB NO., MARK  
?R73681,B13  
INPUT BEAM DIM'S (IN.): H, T, B, W  
?83.25,8,8,27.5

SHEAR CENTER LOCATION (MARK=B13)  
=====

EX= 0.04 IN. (TO RIGHT FROM B/2)  
EY= 11.13 IN. (TO ABOVE FROM T/2)  
TYPE: 0 TO END OR 1 FOR NEXT CASE ?0

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3-22-74

BEAM DESIGN

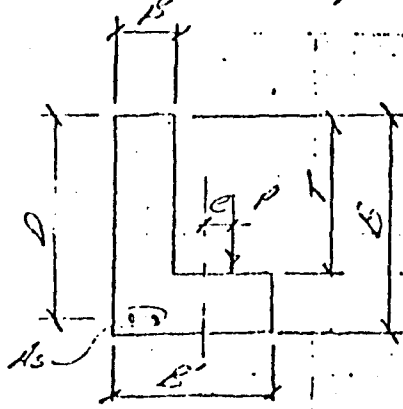
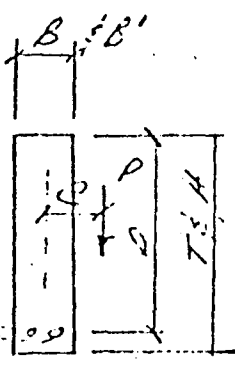
JOB NUMBER

73151

TORSION DESIGN CASES

Use RLS Program "RTORS" to determine shear & torsion steel reqd.

$f_y = 40,000$   
 $f_c = 6000$  psi  
 WT = 150 pcf  
 #3 stirrups



Near Support

MARK	D	B' x B	T x H	e	A <sub>s</sub>
B7, B8, B15	55	8"	45.5"	9.5"	2.37" <sup>2</sup>
B10	60	8"	62"	8.5"	1.58" <sup>2</sup>
B12	64.5	8"	66.75"	9.5"	2.37" <sup>2</sup>
* B11, B13, B17	72	8"	80"	8.5"	1.58" <sup>2</sup>
B9	38	8"	40.5	8.5"	2.37" <sup>2</sup>

Away From Support

MARK	D	B'	B	T	H	e	A <sub>s</sub>
B7, B8, B15	53"	8"	27.5"	32.5"	49.5"	9.5"	2.37"
B9	38"	8"	16"	32.5"	40.5"	8.5"	2.37
B10	60"	8"	16"	54"	62"	8.5"	1.58
B12	64.5"	8"	27.5"	38.75"	66.75"	9.5"	2.37
* B11	72"	8"	16"	72"	80"	8.5"	1.58
* B13, B17	50"	8"	27.5"	75.25"	83.25"	8.5"	2.37

\* Load Moments (P = 12.4 k)

Assume DL from side of same eccentricity as applied loads.

INPUT JOB NO., DESIGN MK.  
 ?73681, B7-B8-B15 (RECT)  
 INPUT N(W), L(FT), XL(FT), XR(FT), LF  
 ?7, 23.3, 0, 0, 1.5  
 INPUT W(KLF OR K), A(FT.), B(FT.)  
 W 1 : ?13, 1.65, 0  
 W 2 : ?13, 5.65, 0  
 W 3 : ?13, 9.65, 0  
 W 4 : ?13, 13.65, 0  
 W 5 : ?13, 17.65, 0  
 W 6 : ?13, 21.65, 0  
 W 7 : ?5, 0, 23.3  
 INPUT SHEAR D(IN)  
 ?38

INPUT DIMENSIONS (INCHES): B', B, T, H, CODE(1-SL OR 2-DL)  
 ?8, 8, 40.5, 40.5, 1  
 INPUT ECC.(IN), AS(IN2), FY(KSI), F'C(PST), WT.(PCF)  
 ?9.5, 2.37, 40, 6000, 150  
 INPUT: STIRRUP BAR #  
 ?3

\*\*\*\*\*  
 05/03/74 14:20

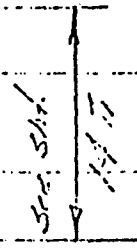
R/F TORSION ANALYSIS BY ACI(318-71)-SECTIONS 11.4, 11.6-11.8

JOB NO.=73681      DESIGN MK.=B7-B8-B15 (RECT)

*When Design the steel by amount of flexural steel provided. Try all beams*

MAX. CLOSED STIRRUP SPACING FOR TORSION= 10.62 IN. C/C

DIST FT.	VU PSI	TU PSI	AV IN2/FT	AT IN2/FT	AL IN2	AV+2(AT) IN2/FT
0.00	260	870	0.50	0.64	4.54	1.78
2.33	178	595	0.30	0.39	2.74	1.08
4.66	171	572	0.29	0.37	2.59	1.02
6.99	89	297	0.12	0.11	1.73	0.35
9.32	82	275	0.12	0.09	1.73	0.30
11.65	0	0	0.00	0.00	0.00	0.00
13.98	82	275	0.12	0.09	1.73	0.30
16.31	89	297	0.12	0.11	1.73	0.35
18.64	171	572	0.29	0.37	2.59	1.02
20.97	178	595	0.30	0.39	2.74	1.08
23.30	260	870	0.50	0.64	4.54	1.78



TYPE DIST. FOR OUTPUT THAT POINT, 0 TO BYPASS

?1.8						
1.86	179	599	0.30	0.39	2.77	1.09
?5.8						
5.82	92	309	0.12	0.12	1.73	0.37
?9.8						
9.79	5	18	0.00	0.00	0.00	0.00
?0						

\*\*\*\*\*

FOR NEXT CASE TYPE 1, 0 TO END ?1

INPUT JOB NO., DESIGN MK.  
 ?73681,B7-B8-B15 (RECT)  
 INPUT N(W), L(FT), XL(FT), XR(FT), LF  
 ?7,23.3,0,0,1.5  
 INPUT W(KL) OR K), A(FT.), B(FT.)  
 W 1 : ?13,1.65,0  
 W 2 : ?13,5.65,0  
 W 3 : ?13,9.65,0  
 W 4 : ?13,13.65,0  
 W 5 : ?13,17.65,0  
 W 6 : ?13,21.65,0  
 W 7 : ?5,0,23.3  
 INPUT SHEAR D(IN)  
 ?38

INPUT DIMENSIONS (INCHES): B', B, T, H, CODE(1-SL OR 2-DL)  
 ?8,8,40.5,40.5,1  
 INPUT ECC.(IN), AS(IN2), FY(KSI), F'C(PSI), WT.(PCF)  
 ?9.5,2.37,40,6000,150  
 INPUT: STIRRUP BAR #  
 ?3

\*\*\*\*\*  
 05/03/74 14:20

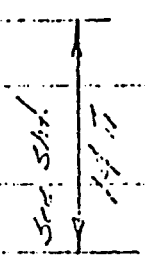
R/F TORSION ANALYSIS BY ACI(318-71)-SECTIONS 11.4,11.6-11.8

JOB NO.=73681      DESIGN MK.=B7-B8-B15 (RECT)

*Check Rebar de  
 steel by amount  
 of torsional steel  
 provided.  
 Typ. all beams*

MAX. CLOSED STIRRUP SPACING FOR TORSION= 10.62 IN. C/C

DIST FT.	VU PSI	TU PSI	AV IN2/FT	AT IN2/FT	AL IN2	AV+2(AT) IN2/FT
0.00	260	870	0.50	0.64	4.54	1.78
2.33	178	595	0.30	0.39	2.74	1.08
4.66	171	572	0.29	0.37	2.59	1.02
6.99	89	297	0.12	0.11	1.73	0.35
9.32	82	275	0.12	0.09	1.73	0.30
11.65	0	0	0.00	0.00	0.00	0.00
13.98	82	275	0.12	0.09	1.73	0.30
16.31	89	297	0.12	0.11	1.73	0.35
18.64	171	572	0.29	0.37	2.59	1.02
20.97	178	595	0.30	0.39	2.74	1.08
23.30	260	870	0.50	0.64	4.54	1.78



TYPE DIST. FOR OUTPUT THAT POINT, 0 TO BYPASS

?1.8						
1.86	179	599	0.30	0.39	2.77	1.09
?5.8						
5.82	92	309	0.12	0.12	1.73	0.37
?9.8						
9.79	5	18	0.00	0.00	0.00	0.00
?0						

\*\*\*\*\*

FOR NEXT CASE TYPE 1, 0 TO END ?1



INPUT JOB NO., DESIGN MK.

126 11

?73681,B12 (RECT)

INPUT N(W), L(FT), XL(FT), XR(FT), LF

?7,23.3,0,0,1.5

INPUT W(KLF OR K), A(FT.), B(FT.)

W 1 : ?13,1.65,0

W 2 : ?13,5.65,0

W 3 : ?13,9.65,0

W 4 : ?13,13.65,0

W 5 : ?13,17.65,0

W 6 : ?13,21.65,0

W 7 : ?.712,0,23.3

INPUT SHEAR D(IN)

?65

INPUT DIMENSIONS (INCHES): B', B, T, H, CODE(1-SL OR 2-DL)

?8,8,66.75,66.75,1

INPUT ECC.(IN), AS(IN2), FY(KSI), F'C(PST), WT.(PCF)

?9.5,2.37,40,6000,150

INPUT: STIRRUP BAR #

?3

\*\*\*\*\*

05/03/74 14:28

R/F TORSION ANALYSIS BY ACI(318-71)-SECTIONS 11.4,11.6-11.8

JOB NO.=73681

DESIGN MK.=B12 (RECT)

MAX. CLOSED STIRRUP SPACING FOR TORSION= 12.00 IN. C/C

DIST FT.	VU PSI	TU PSI	AV IN2/FT	AT IN2/FT	AL IN2	AV+2(AT) IN2/FT
0.00	161	557	0.26	0.34	3.90	0.94
2.33	111	384	0.14	0.19	2.13	0.52
4.66	105	365	0.13	0.17	2.33	0.47
6.99	55	192	0.12	0.01	3.00	0.15
9.32	50	173	0.12	0.00	0.00	0.12
11.65	0	0	0.00	0.00	0.00	0.00
13.98	50	173	0.12	0.00	0.00	0.12
16.31	55	192	0.12	0.01	3.00	0.15
18.64	105	365	0.13	0.17	2.33	0.47
20.97	111	384	0.14	0.19	2.13	0.52
23.30	161	557	0.26	0.34	3.90	0.94



TYPE DIST. FOR OUTPUT THAT POINT, 0 TO BYPASS

?1.8

1.86 112 388 0.15 0.19 2.17 0.53

?5.8

5.82 58 202 0.12 0.02 3.00 0.17

?9.8

9.79 5 16 0.00 0.00 0.00 0.00

?0

\*\*\*\*\*

FOR NEXT CASE TYPE 1, 0 TO END ?1

73154

INPUT JOB NO., DESIGN MK.

?73681, B12 (RECT)

INPUT N(W), L(FT), XL(FT), XR(FT), LF

?7, 23.3, 0, 0, 1.5

INPUT W(KLF OR K), A(FT.), B(FT.)

W 1 : ?13, 1.65, 0

W 2 : ?13, 5.65, 0

W 3 : ?13, 9.65, 0

W 4 : ?13, 13.65, 0

W 5 : ?13, 17.65, 0

W 6 : ?13, 21.65, 0

W 7 : ?.712, 0, 23.3

INPUT SHEAR D(IN)

?65

INPUT DIMENSIONS (INCHES): B', B, T, H, CODE(1-SL OR 2-DL)

?8, 8, 66.75, 66.75, 1

INPUT ECC.(IN), AS(IN2), FY(KSI), F'C(PHI), WT.(PCF)

?9.5, 2.37, 40, 6000, 150

INPUT: STIRRUP BAR #

?3

\*\*\*\*\*

05/03/74 14:28

R/F TORSION ANALYSIS BY ACI(318-71)-SECTIONS 11.4, 11.6-11.8

JOB NO.=73681

DESIGN MK.=B12 (RECT)

MAX. CLOSED STIRRUP SPACING FOR TORSION= 12.00 IN. C/C

DIST FT.	VU PSI	TU PSI	AV IN2/FT	AT IN2/FT	AL IN2	AV+2(AT) IN2/FT
0.00	161	557	0.26	0.34	3.90	0.94
2.33	111	384	0.14	0.19	2.13	0.52
4.66	105	365	0.13	0.17	2.33	0.47
6.99	55	192	0.12	0.01	3.00	0.15
9.32	50	173	0.12	0.00	0.00	0.12
11.65	0	0	0.00	0.00	0.00	0.00
13.98	50	173	0.12	0.00	0.00	0.12
16.31	55	192	0.12	0.01	3.00	0.15
18.64	105	365	0.13	0.17	2.33	0.47
20.97	111	384	0.14	0.19	2.13	0.52
23.30	161	557	0.26	0.34	3.90	0.94

See sketch  
1771

TYPE DIST. FOR OUTPUT THAT POINT, 0 TO BYPASS

?1.8

1.86 112 388 0.15 0.19 2.17 0.53

?5.8

5.82 58 202 0.12 0.02 3.00 0.17

?9.8

9.79 5 16 0.00 0.00 0.00 0.00

?0

\*\*\*\*\*

FOR NEXT CASE TYPE 1, 0 TO END ?1

73154

INPUT JOB NO., DESIGN MK.  
 ?73681, B11-B13-B17 (RECT)  
 INPUT N(W), L(FT), XL(FT), XR(FT), LF  
 ?7, 23.3, 0, 0, 1.5  
 INPUT W(KLF OR K), A(FT.), B(FT.)  
 W 1 : ?14.4, 1.65, 0  
 W 2 : ?14.4, 1.65, DELETED  
 14.4, 5.65, 0  
 W 3 : ?14.4, 9.65, 0  
 W 4 : ?14.4, 13.65, 0  
 W 5 : ?14.4, 17.65, 0  
 W 6 : ?14.4, 21.65, 0  
 W 7 : ?.856, 0, 23.3  
 INPUT SHEAR D(IN)  
 ?72  
 INPUT DIMENSIONS (INCHES): B', B, T, H, CODE(1-SL OR 2-DL)  
 ?8, 8, 80, 80, 1  
 INPUT ECC.(IN), AS(IN2), FY(KSI), F'C(Psi), WT.(PCF)  
 ?8.5, 1.58, 40, 6000, 150  
 INPUT: STIRRUP BAR #  
 ?3

\*\*\*\*\*  
 05/03/74 14:33

R/F TORSION ANALYSIS BY ACI(318-71)-SECTIONS 11.4, 11.6-11.8

JOB NO.=73681      DESIGN MK.=B11-B13-B17 (RECT)

MAX. CLOSED STIRRUP SPACING FOR TORSION= 12.00 IN. C/C

DIST FT.	VU PSI	TU PSI	AV IN2/FT	AT IN2/FT	AL IN2	AV+2(AT) IN2/FT
0.00	163	467	0.25	0.26	3.58	0.77
2.33	113	323	0.13	0.13	3.03	0.40
4.66	107	306	0.12	0.12	3.24	0.36
6.99	56	162	0.12	0.00	0.00	0.12
9.32	50	144	0.12	0.00	0.00	0.12
11.65	0	0	0.00	0.00	0.00	0.00
13.98	50	144	0.12	0.00	0.00	0.12
16.31	56	162	0.12	0.00	0.00	0.12
18.64	107	306	0.12	0.12	3.24	0.36
20.97	113	323	0.13	0.13	3.03	0.40
23.30	163	467	0.25	0.26	3.58	0.77

TYPE DIST. FOR OUTPUT THAT POINT, 0 TO BYPASS

?1.8						
1.86	114	327	0.13	0.14	2.98	0.41
?5.8						
5.82	59	170	0.12	0.00	0.00	0.12
?9.8						
9.79	5	14	0.00	0.00	0.00	0.00
?0						

\*\*\*\*\*

FOR NEXT CASE TYPE 1, 0 TO END ?1

126 11

INPUT JOB NO., DESIGN MK.

?73681,B9 (RECT)

INPUT N(W), L(FT), XL(FT), XR(FT), LF

?7,23.3,0,0,1.5

INPUT W(KLF OR K), A(FT.), B(FT.)

W 1 : ?13,1.65,0

W 2 : ?13,5.65,0

W 3 : ?13,9.65,0

W 4 : ?13,13.65,0

W 5 : ?13,17.65,0

W 6 : ?13,21.65,0

W 7 : ?.404,0,23.3

INPUT SHEAR D(IN)

?38

INPUT DIMENSIONS (INCHES): B', B, T, H, CODE(1-SL OR 2-DL)

?8,8,40.5,40.5,0-1

INPUT ECC.(IN), AS(IN<sup>2</sup>), FY(KSI), F'C(Psi), WT.(PCF)

?8.5,2.37,40,6000,150

INPUT: STIRRUP BAR #

?3

\*\*\*\*\*

05/03/74 14:37

R/F TORSION ANALYSIS BY ACI(318-71)-SECTIONS 11.4,11.6-11.8

JOB NO.=73681

DESIGN MK.=B9 (RECT)

MAX. CLOSED STIRRUP SPACING FOR TORSION= 10.62 IN. C/C

DIST FT.	VU PSI	TU PSI	AV IN2/FT	AT IN2/FT	AL IN2	AV+2(AT) IN2/FT
0.00	254	759	0.47	0.54	3.83	1.55
2.33	173	517	0.28	0.32	2.25	0.91
4.66	167	500	0.26	0.30	2.14	0.87
6.99	86	258	0.12	0.08	1.66	0.28
9.32	81	242	0.12	0.06	1.66	0.25
11.65	0	0	0.00	0.00	0.00	0.00
13.98	81	242	0.12	0.06	1.66	0.25
16.31	86	258	0.12	0.08	1.66	0.28
18.64	167	500	0.26	0.30	2.14	0.87
20.97	173	517	0.28	0.32	2.25	0.91
23.30	254	759	0.47	0.54	3.83	1.55



TYPE DIST. FOR OUTPUT THAT POINT, 0 TO BYPASS

?1.8

1.86 174 520 0.28 0.32 2.27 0.92

?5.8

5.82 89 267 0.12 0.09 1.66 0.29

?0

\*\*\*\*\*

FOR NEXT CASE TYPE 1. 0 TO END ?1

73154

INPUT JOB NO., DESIGN MK.  
 773681, B7-B8-B15 LEDGER  
 INPUT N(W), L(FT), XL(FT), XR(FT), LF  
 ?7, 23.3, 0, 0, 1.5  
 INPUT W(KLF OR K), A(FT.), B(FT.)  
 W 1 : ?13, 1.65, 0  
 W 2 : ?13, 5.65, 0  
 W 3 : ?13, 9.65, 0  
 W 4 : ?13, 13.65, 0  
 W 5 : ?13, 17.65, 0  
 W 6 : ?13, 21.65, 0  
 W 7 : ?5, 0, 23.3  
 INPUT SHEAR D(IN)  
 ?38

*Note: For all beams use  
 minimum reqd. for  
 rectangular section, use  
 min. of 4 stirrups  
 per support.*

INPUT DIMENSIONS (INCHES): B', B, T, H, CODE(1-SL OR 2-DL)  
 ?8, 27.5, 32.5, 40.5, 1  
 INPUT ECC.(IN), AS(IN2), FY(KSI), F'C(PSI), WT.(PCF)  
 ?9.5, 2.4, 40, 6000, 150  
 INPUT: STIRRUP BAR #  
 ?3

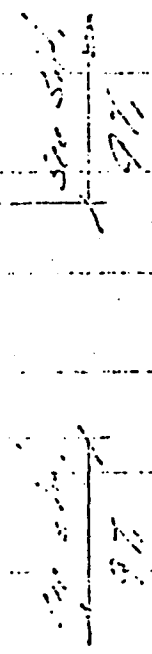
\*\*\*\*\*  
 05/03/74 14:41

R/F TORSION ANALYSIS BY ACI(318-71)-SECTIONS 11.4, 11.6-11.8

JOB NO.=73681      DESIGN MK.=B7-B8-B15 LEDGER

MAX. CLOSED STIRRUP SPACING FOR TORSION= 10.62 IN. C/C

DIST FT.	VU PSI	TU PSI	AV IN2/FT	AT IN2/FT	AL IN2	AV+2(AT) IN2/FT
0.00	192	587	0.33	0.57	4.00	1.46
2.33	132	402	0.18	0.31	2.21	0.80
4.66	127	386	0.17	0.29	2.06	0.75
6.99	66	201	0.12	0.04	1.68	0.20
9.32	61	186	0.12	0.02	1.68	0.15
11.65	0	0	0.00	0.00	0.00	0.00
13.98	61	186	0.12	0.02	1.68	0.15
16.31	66	201	0.12	0.04	1.68	0.20
18.64	127	386	0.17	0.29	2.06	0.75
20.97	132	402	0.18	0.31	2.21	0.80
23.30	192	587	0.33	0.57	4.00	1.46



TYPE DIST. FOR OUTPUT THAT POINT, 0 TO BYPASS  
 ?5.8  
 5.82      68      208      0.12      0.05      1.68      0.22  
 ?0

\*\*\*\*\*

FOR NEXT CASE TYPE 1, 0 TO END ?1

INPUT JOB NO., DESIGN MK.

?73681,B9 LEDGER

INPUT N(W), L(FT), XL(FT), XR(FT), LF

?7,23.3,0,0,1.5

INPUT W(KLF OR K), A(FT.), B(FT.)

W 1 : ?13,1.65,0

W 2 : ?13,5.65,0

W 3 : ?13,9.65,0

W 4 : ?13,13.65,0

W 5 : ?13,17.65,0

W 6 : ?13,21.65,0

W 7 : ?.404,0,23.3

INPUT SHEAR D(IN)

?38

INPUT DIMENSIONS (INCHES): B', B, T, H, CODE(1-SL OR 2-DL)

?8,16,32.5,40.5,1

INPUT ECC.(IN), AS(IN<sup>2</sup>), FY(KSI), F'C(PHI), WT.(PCF)

?8.5,2.37,40,6000,150

INPUT: STIRRUP BAR #

?3

\*\*\*\*\*  
05/03/74 14:44

R/F TORSION ANALYSIS BY ACI(318-71)-SECTIONS 11.4,11.6-11.8

JOB NO.=73681

DESIGN MK.=B9 LEDGER

MAX. CLOSED STIRRUP SPACING FOR TORSION= 10.62 IN. C/C

DIST FT.	VU PSI	TU PSI	AV IN <sup>2</sup> /FT	AT IN <sup>2</sup> /FT	AL IN <sup>2</sup>	AV+2(AT) IN <sup>2</sup> /FT
0.00	222	634	0.39	0.51	3.61	1.41
2.33	151	432	0.22	0.29	2.03	0.79
4.66	146	418	0.21	0.27	1.93	0.75
6.99	75	216	0.12	0.05	1.64	0.22
9.32	71	202	0.12	0.03	1.64	0.19
11.65	0	0	0.00	0.00	0.00	0.00
13.98	71	202	0.12	0.03	1.64	0.19
16.31	75	216	0.12	0.05	1.64	0.22
18.64	146	418	0.21	0.27	1.93	0.75
20.97	151	432	0.22	0.29	2.03	0.79
23.30	222	634	0.39	0.51	3.61	1.41

TYPE DIST. FOR OUTPUT THAT POINT, 0 TO BYPASS

?5.8

5.82 78 223 0.12 0.06 1.64 0.23

?9.8

9.79 4 11 0.00 0.00 0.00 0.00

?0

\*\*\*\*\*

FOR NEXT CASE TYPE 1, 0 TO END ?1

INPUT JOB NO., DESIGN MK.  
 ?73681,B10 LEDGER  
 INPUT N(W), L(FT), XL(FT), XR(FT), LF  
 ?7,23.3,0,0,1.5  
 INPUT W(KLF OR K), A(FT.), B(FT.)  
 W 1 : ?13,1.65,0  
 W 2 : ?13,5.65,0  
 W 3 : ?13,9.65,0  
 W 4 : ?13,13.65,0  
 W 5 : ?13,17.65,0  
 W 6 : ?13,21.65,0  
 W 7 : ?7,12,0,23.3  
 INPUT SHEAR D(IN)  
 ?60

INPUT DIMENSIONS (INCHES): B', B, T, H, CODE(1-SL OR 2-DL)  
 ?8,16,54,62,1

INPUT ECC.(IN), AS(IN2), FY(KSI), F'C(PHI), WT.(PCF)  
 ?8.5,2.37,40,6000,150

INPUT: STIRRUP BAR #  
 ?3

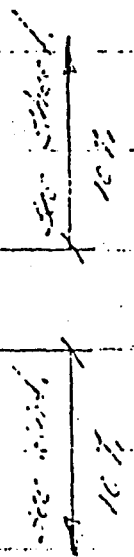
\*\*\*\*\*  
 05/03/74 14:49

R/F TORSION ANALYSIS BY ACI(318-71)-SECTIONS 11.4,11.6-11.8

JOB NO.=73681	DESIGN MK.=B10 LEDGER
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MAX. CLOSED STIRRUP SPACING FOR TORSION= 12.00 IN. C/C

DIST FT.	VU PSI	TU PSI	AV IN2/FT	AT IN2/FT	AL IN2	AV+2(AT) IN2/FT
0.00	158	475	0.24	0.31	3.27	0.85
2.33	109	328	0.12	0.16	2.17	0.44
4.66	104	311	0.12	0.14	2.35	0.40
6.99	55	164	0.12	0.00	0.00	0.12
9.32	49	147	0.12	0.00	0.00	0.12
11.65	0	0	0.00	0.00	0.00	0.00
13.98	49	147	0.12	0.00	0.00	0.12
16.31	55	164	0.12	0.00	0.00	0.12
18.64	104	311	0.12	0.14	2.35	0.40
20.97	109	328	0.12	0.16	2.17	0.44
23.30	158	475	0.24	0.31	3.27	0.85



TYPE DIST. FOR OUTPUT THAT POINT, 0 TO BYPASS

?5.8						
5.82	57	172	0.12	0.00	0.00	0.12
?9.8						
9.79	4	13	0.00	0.00	0.00	0.00
?0						

\*\*\*\*\*

FOR NEXT CASE TYPE 1, 0 TO END ?1

INPUT JOB NO., DESIGN MK.

773681, B11 LEDGER

INPUT N(W), L(FT), XL(FT), XR(FT), LF

?7, 23.3, 0, 0, 1.5

INPUT W(KLF OR K), A(FT.), B(FT.)

W 1 : ?14.4, 1.65, 0

W 2 : ?14.4, 5.65, 0

W 3 : ?14.4, 9.65, 0

W 4 : ?14.4, 13.65, 0

W 5 : ?14.4, 17.65, 0

W 6 : ?14.4, 21.65, 0

W 7 : ?.734, 0, 23.3

INPUT SHEAR D(IN)

?72

INPUT DIMENSIONS (INCHES): B', B, T, H, CODE(1-SL OR 2-DL)

?8, 16, 72, 80, 1

INPUT ECC.(IN), AS(IN2), FY(KSI), F'C(PSTI), WT.(PCF)

?8.5, 1.58, 40, 6000, 150

INPUT: STIRRUP BAR #

?3

\*\*\*\*\*

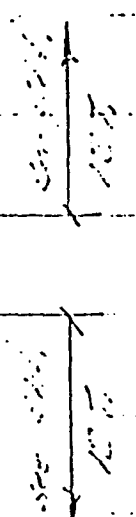
05/03/74 14:53

R/F TORSION ANALYSIS BY ACI(318-71)-SECTIONS 11.4, 11.6-11.8

JOB NO.=73681 DESIGN MK.=B11 LEDGER

MAX. CLOSED STIRRUP SPACING FOR TORSION= 12.00 IN. C/C

DIST FT.	VU PSI	TU PSI	AV IN2/FT	AT IN2/FT	AL IN2	AV+2(AT) IN2/FT
0.00	159	413	0.23	0.24	3.26	0.70
2.33	109	285	0.12	0.11	3.20	0.35
4.66	104	271	0.12	0.10	3.23	0.32
6.99	55	142	0.12	0.00	0.00	0.12
9.32	49	129	0.12	0.00	0.00	0.12
11.65	0	0	0.00	0.00	0.00	0.00
13.98	49	129	0.12	0.00	0.00	0.12
16.31	55	142	0.12	0.00	0.00	0.12
18.64	104	271	0.12	0.10	3.23	0.32
20.97	109	285	0.12	0.11	3.20	0.35
23.30	159	413	0.23	0.24	3.26	0.70



TYPE DIST. FOR OUTPUT THAT POINT, 0 TO BYPASS

?5.8

5.82 57 149 0.12 0.00 0.00 0.12

?9.8

9.79 4 11 0.00 0.00 0.00 0.00

?0

\*\*\*\*\*

FOR NEXT CASE TYPE 1, 0 TO END ?1



JOB NO., DESIGN MK.  
 B13-B17 LEDGER  
 N(W), L(FT), XL(FT), XR(FT), LF  
 3,0,0,1.5  
 (KLF OR K), A(FT.), B(FT.)  
 14.4,1.65,0  
 14.4,5.65,0  
 14.4,9.65,0  
 14.4,13.65,0  
 14.4,17.65,0  
 14.4,21.65,0  
 856,0,23.3  
 SHEAR D(IN)

DIMENSIONS (INCHES): B', B, T, H, CODE(1-SL OR 2-DL)  
 5,75,25,83.25,1  
 ECC.(IN), AS(IN<sup>2</sup>), FY(KSI), F'C(PSI), WT.(PCF)  
 2.37,40,6000,150  
 STIRRUP BAR #

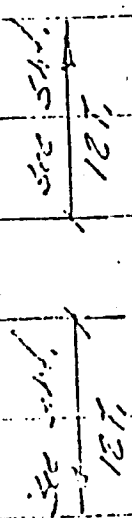
\*\*\*\*\*  
 '74 14:57

VERSION ANALYSIS BY ACI(318-71)-SECTIONS 11.4,11.6-11.8

ID.=73681 | DESIGN MK.=B13-B17 LEDGER

CLOSED STIRRUP SPACING FOR TORSION= 12.00 IN. C/C

T	VU PSI	TU PSI	AV IN2/FT	AT IN2/FT	AL IN2	AV+2(AT) IN2/FT
00	128	364	0.16	0.21	2.99	0.58
33	89	252	0.12	0.09	3.48	0.30
66	84	238	0.12	0.07	3.48	0.27
99	44	126	0.12	0.00	0.00	0.12
32	39	112	0.00	0.00	0.00	0.00
65	0	0	0.00	0.00	0.00	0.00
98	39	112	0.00	0.00	0.00	0.00
31	44	126	0.12	0.00	0.00	0.12
64	84	238	0.12	0.07	3.48	0.27
97	89	252	0.12	0.09	3.48	0.30
30	128	364	0.16	0.21	2.99	0.58



DIST. FOR OUTPUT THAT POINT, 0 TO BYPASS

82	47	133	0.12	0.00	0.00	0.12
79	4	11	0.00	0.00	0.00	0.00

\*\*\*\*\*

EXT CASE TYPE 1, 0 TO END ?1

UT JOB NO., DESIGN MK.  
 3681, B12 LEDGER  
 UT N(W), L(FT), XL(FT), XR(FT), LF  
 23.3, 0, 0, 1.5  
 UT W(KLF OR K), A(FT.), B(FT.)  
 : ?13, 1.65, 0  
 : ?13, 5.65, 0  
 : ?13, 9.65, 0  
 : ?13, 13.65, 0  
 : ?13, 17.65, 0  
 : ?13, 21.65, 0  
 : ? 712, 0, 23.3  
 UT SHEAR D(IN)  
 1.5

UT DIMENSIONS (INCHES): B', B, T, H, CODE(1-SL OR 2-DL)  
 27.5, 58.75, 66.75, 1  
 UT ECC.(IN), AS(IN<sup>2</sup>), FY(KSI), F'C(PSTI); WT.(PCF)  
 5, 2.37, 40, 6000, 150  
 UT: STIRRUP BAR #

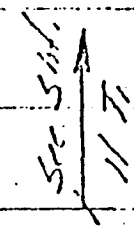
\*\*\*\*\*  
 3/74 15:08

TORSION ANALYSIS BY ACI(318-71)-SECTIONS 11.4, 11.6-11.8

NO.=73681 | DESIGN MK.=B12 LEDGER

CLOSED STIRRUP SPACING FOR TORSION= 12.00 IN. C/C

ST T.	VU PSI	TU PSI	AV IN2/FT	AT IN2/FT	AL IN2	AV+2(AT) IN2/FT
.00	133	431	0.19	0.30	3.39	0.78
.33	92	297	0.12	0.14	2.58	0.40
.66	87	282	0.12	0.12	2.78	0.37
.99	46	149	0.12	0.00	0.00	0.12
.32	41	134	0.12	0.00	0.00	0.12
.65	0	0	0.00	0.00	0.00	0.00
.98	41	134	0.12	0.00	0.00	0.12
.31	46	149	0.12	0.00	0.00	0.12
.64	87	282	0.12	0.12	2.78	0.37
.97	92	297	0.12	0.14	2.58	0.40
.30	133	431	0.19	0.30	3.39	0.78



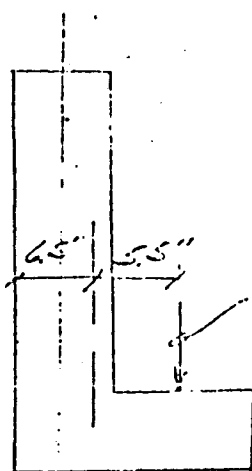
DIST. FOR OUTPUT THAT POINT, 0 TO BYPASS

.82	48	156	0.12	0.00	0.00	0.12
.79	4	12	0.00	0.00	0.00	0.00

\*\*\*\*\*  
 NEXT CASE TYPE 1, 0 TO END ?0

DETERMINE REINF. AT TEE LEGS

Provide additional reinforcing at location of tee stems for local bending of the vertical leg of beam due to concentrated loads.



$$P_0 = 13^k \times 1.5 = 19.5^k$$

$$M_0 = 19.5^k \times 5.5" = 107^k \cdot "$$

select  $\#4$  add'l. @ tee stems  $A = 0.366 = 0.4 \cdot "$

$$a = \frac{0.4(87)}{0.85(66)(18)} = 0.13" \quad d = 6.5"$$

$$M_u' = 0.4 \cdot " (40,000) (6.5 - 0.06) = 102^k \cdot "$$

say  $\frac{0.4}{2}$

use this add'l. reinf. only where min. spacing does not control.

DESIGNED BY

DATE

EXPIRES BY

TFT

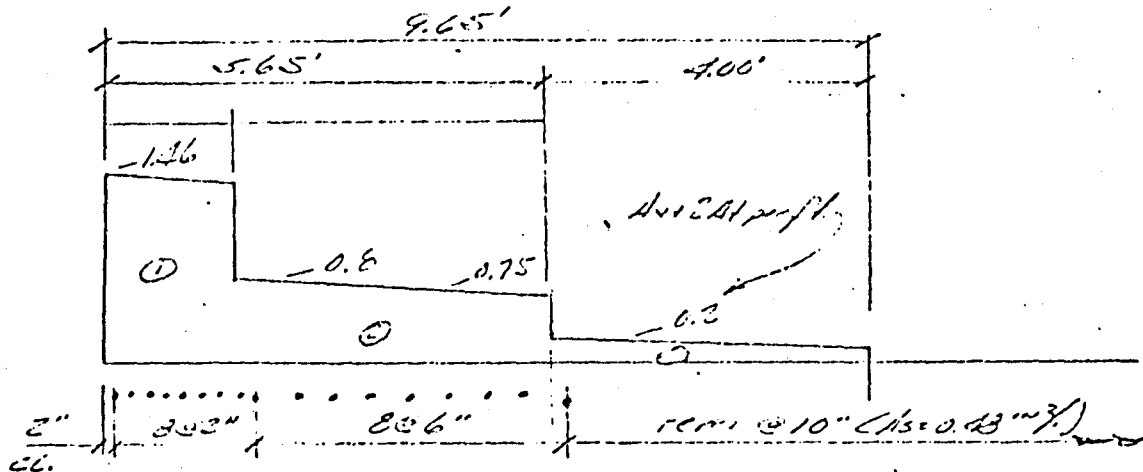
5-9-71

Beam Section

DETERMINE REQUIRED STIRRUP SPACING

BEAMS B7-B9-B7-B15

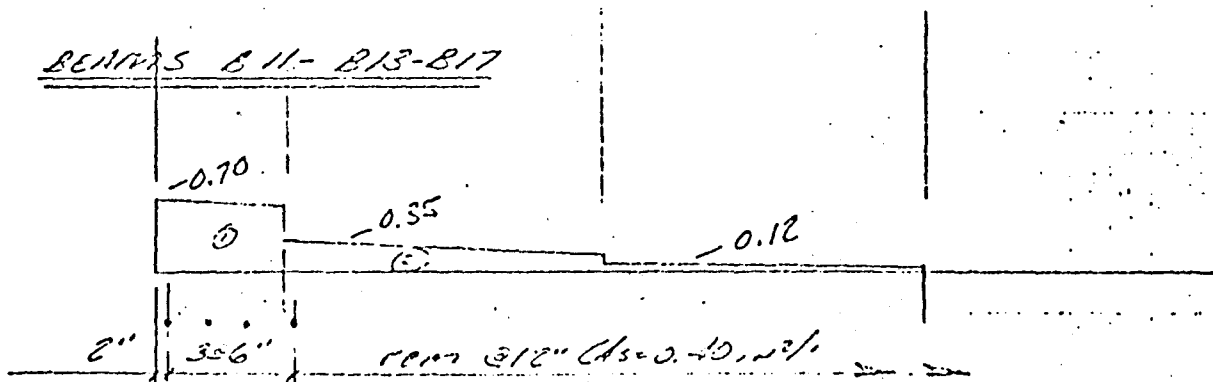
use #4 stirrups



1  $A_s = 1.26(1.65) = 2.07 \text{ in}^2$  use 6 #4 + 1 odd # = 7 min.

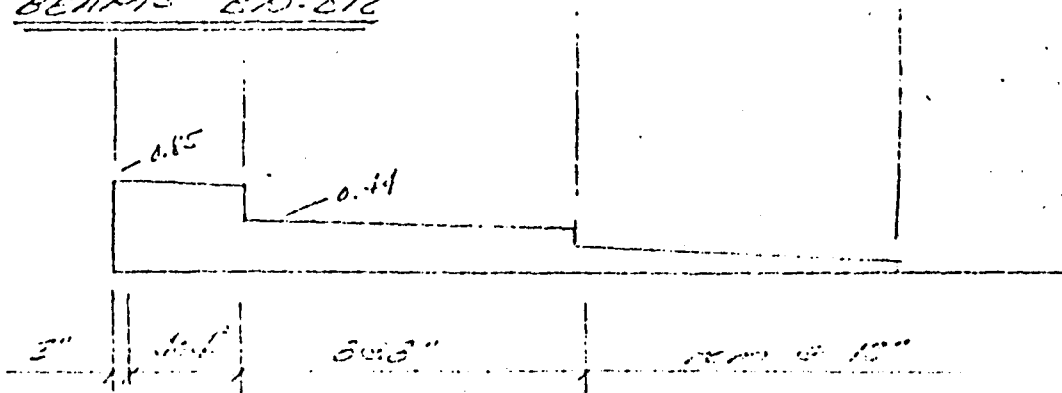
2  $A_s = 0.8(1.0) = 0.8 \text{ in}^2$  use 8 #4 + 2 odd # = 10 min.

BEAMS B11-B13-B17



1  $A_s = 0.7(1.65) = 1.15 \text{ in}^2$  use 3 #4 + 1 odd # = 4 min.

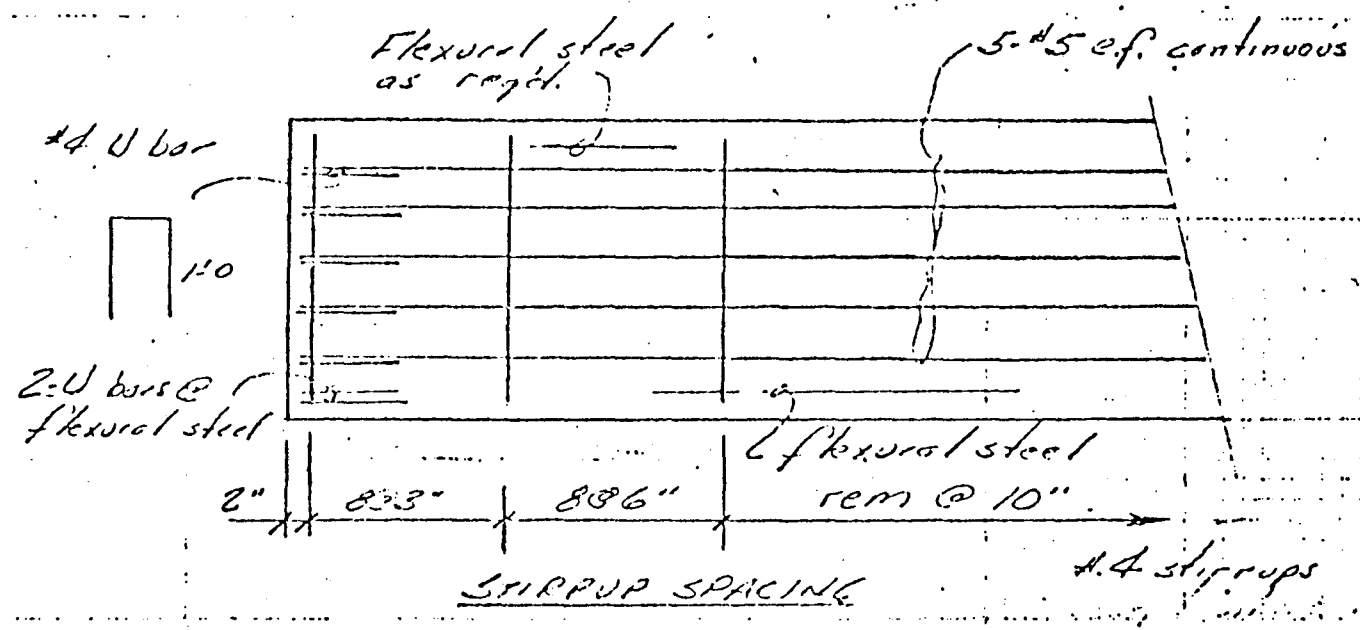
BEAMS B19-B22



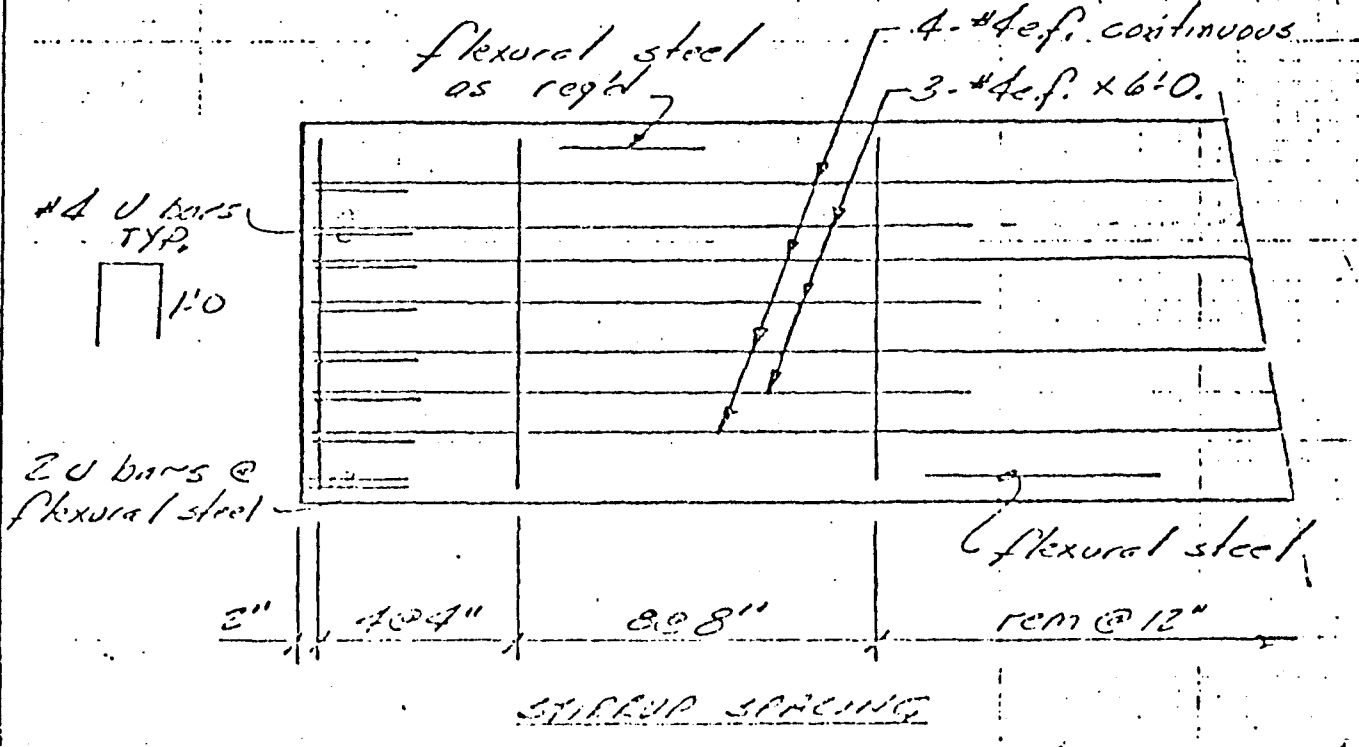
MADE BY TFM	DATE 3-22-74	CHECKED BY
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DESIGN SUMMARY - SHEAR & TORSION STEEL

BEAMS A7, B8, B15

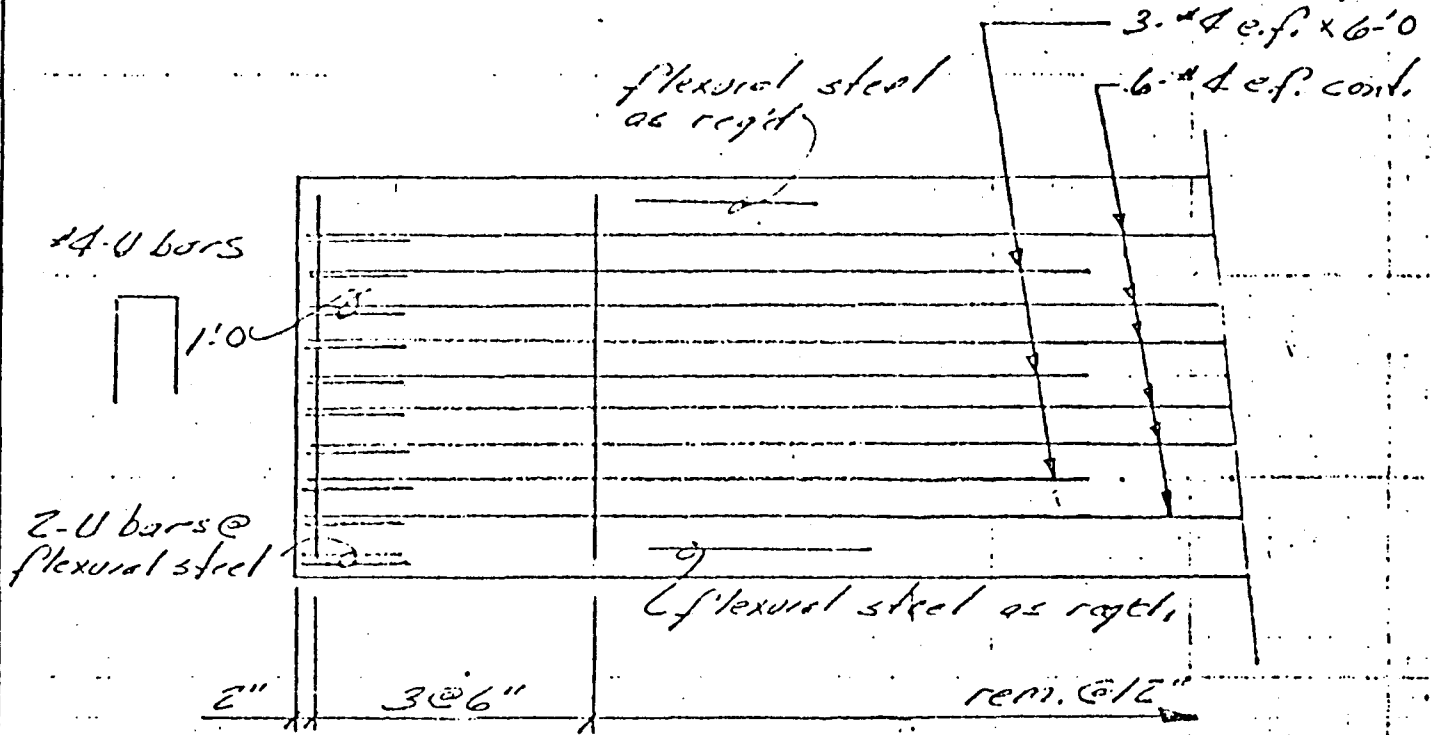


BEAMS B10 & B12



Note: If no top flexural steel req'd. - add additional #4 bar e.f. in corners of stirrup.  
 Stirrups are #4

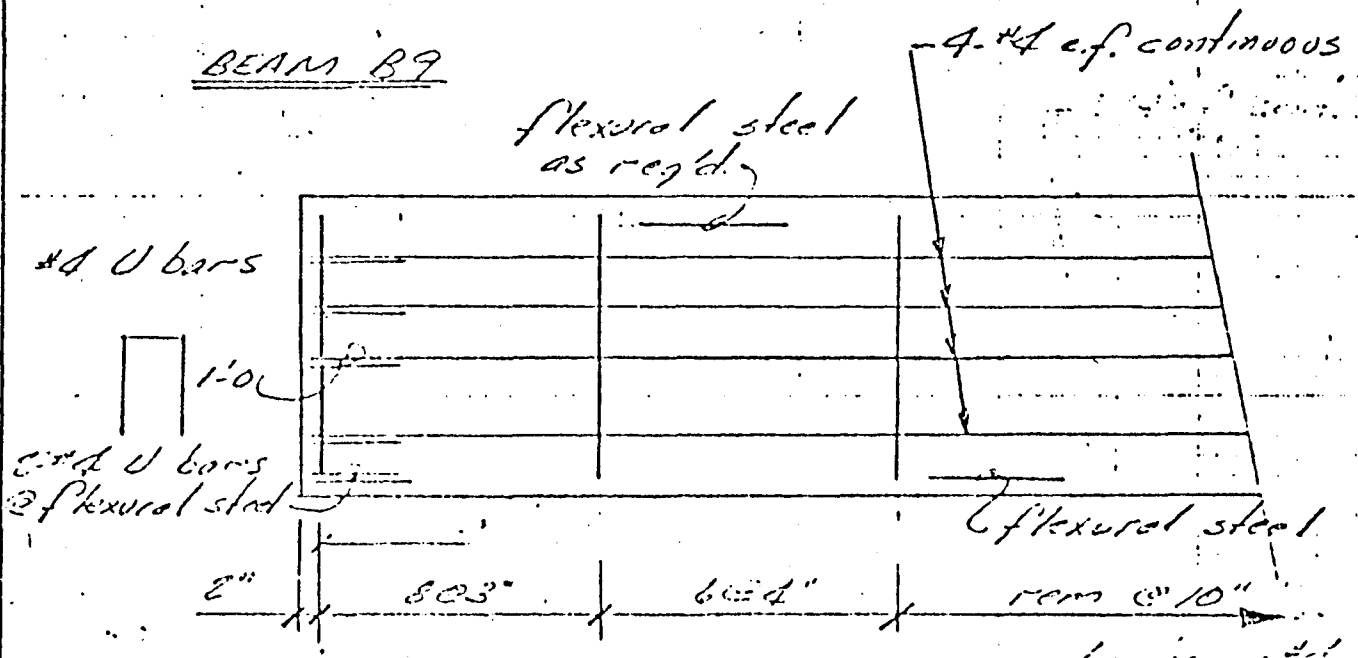
BEAMS B11, B13, B17



STIRRUP SPACING

stirrups are #4

BEAM B9



STIRRUP SPACING

stirrups are #4 except where noted.

Note: If no top flexural steel is required, add additional #4 longitudinal bar e.f. in corners of stirrup

MADE BY

DATE

CHECKED BY

JOB NUMBER

TENA

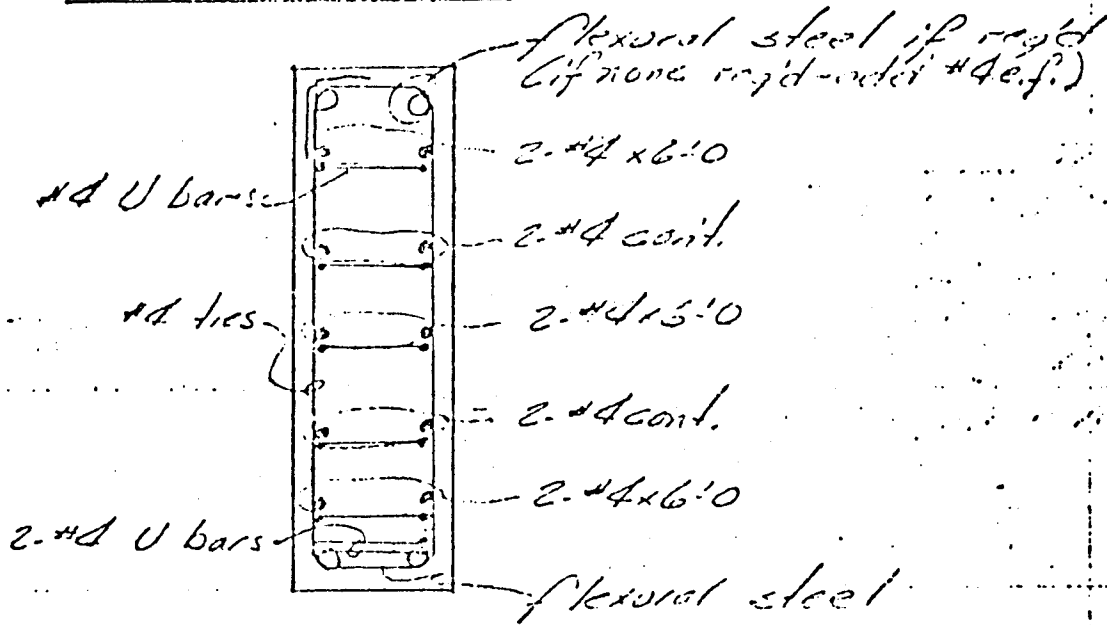
3-22-71

BEAM DESIGN

73681

DESIGN SUMMARY - SHEAR & TORSION STEEL

BEAMS B7, B8, B15 (SHOWN)



BEAM SECTION AT SUPPORT

{ section at support for other beams similar to above. }

THE ARCHITECTS COLLABORATIVE INC.



JUNE  
7 May 1974  
EJA

JEAN B. FLETCHER  
1945 ----- 1965  
WALTER GROPIUS  
1945 ----- 1969

NORMAN FLETCHER  
JOHN C. HARKNESS  
SARAH P. HARKNESS  
LOUIS A. McMILLEN

RICHARD BROOKER  
ALEX CVIJANOVIĆ  
HERBERT GALLAGHER  
WILLIAM J. GEDDIS  
ROLAND KLUVER  
PETER W. MORTON  
H. MORSE PAYNE, JR.

ERNEST L. BIRDSALL  
TREASURER

Mr. Paul Kopietz  
Assistant Director of Planning  
Physical Planning Office  
University of Minnesota  
26 Folwell Hall  
Minneapolis, Minnesota 55455

Re: University of Minnesota  
Health Sciences Expansion  
Parking Facility  
TAC Job No. 72023 - 702

Dear Paul:

As you requested in your letter of 1 May 1974 we submit at this time our formal written recommendations for Phase I Modifications.

TAC, together with Souza & True, have reviewed Drawing S-6B and the associated calculations prepared by our structural consultant, Carl Walker and Associates. We concur with the Phase I Modifications prepared and submitted by Carl Walker and Associates and recommend acceptance of their work.

In your letter of 1 May 1974 you requested clarification of a number of items. We will address each of these items in the order found in your letter.

1. Steel haunch assemblies have been added to support precast beams on Grids A, C, D and F at all levels.
2. We are equally concerned about the design compatibility between Phase I and Phase II. We believe this has been resolved by covering the steel haunch in Phase I with a molded fiberglass cover, the profile of which matches the Phase I concrete haunch. The fiberglass cover will have a smooth finish, and its color will match the precast concrete columns.



3. The expansion characteristics of the structure are generally outlined in the attached letter from Carl Walker and Associates. The calculations as prepared by Raths, Raths and Johnson are likewise attached for your information. Expansion details are outlined on Drawings S-6A and S-6B.
4. The behavior of the "L" shaped beam under load is complex but we believe that reference to knowledge gained in the testing is useful to our understanding.

Based on the test results of the spandrel beam conducted by Twin Cities Testing, we feel that the horizontal crack in the vertical leg of the beam will not develop in the field under actual or design working loads.

With the bracket modifications as outlined on Drawing S-6B, this means that the weakest part of the beam is now the middle portion, but the test shows that there is an adequate factor of safety against failure under any reasonable condition of loading that can be expected.

5. It is our understanding that all matters pertaining to settlement will be handled directly between Mr. Hart and Mr. Anderson, attorney for CNA. Therefore, it is inappropriate for us to comment on costs at this time.
6. Mr. Janney has not sent us the information relating to similar Parking Ramp solutions. When we receive such information, we will certainly forward it to you.

It is our position that this information on Phase I Modifications in conjunction with the material you already have on Phase II should permit the project to now proceed to completion.

Yours very truly,

THE ARCHITECTS COLLABORATIVE, Inc.



Roland Kluver

RK:MR

CC: Carl Sapers  
Carl Walker and Associates (Kalamazoo and Minneapolis)



**CARL WALKER & ASSOCIATES, inc.**

June 11, 1974

400 Shelard Plaza South, Suite 670 Minneapolis, Minnesota 55426  
612/546-4316

Mr. John Scott  
THE ARCHITECTS COLLABORATIVE  
46 Brattle Street  
Cambridge, Massachusetts 02138

*William C. Arons, P.E.  
Vice President  
Max Daubenger, P.E.  
Dennis E. Neu, P.E.  
John K. Arntson, Ph.D.*

Re: Explanation of Expansion Joint Characteristics  
HEALTH SCIENCE PARKING FACILITY  
University of Minnesota  
(CWA Commission #1612)

Dear John:

The purpose of this letter is to offer our conceptual and qualitative comments regarding the anticipated expansion and contraction in the structural system of this parking facility. Initial calculations had been prepared in making these determinations and are substantiated with those produced by Charles Raths and submitted along with the Phase I Modifications.

I. MAIN EXPANSION JOINT -- GRID 13

As per the original drawings and documents, the main building expansion joint is at Grid Line 13. Due to initial fabrication problems with the beams on Grids A and F, and other design factors, it is now wise to summarize the actual location of this expansion joint. The joint will be on the south side of the columns at grid A and F. The details for Phase II have been redesigned and allow for movement of the beams on the south side of these columns. At columns B, C, D, E the expansion joint is on the north side of the column. This is the original and best location for the expansion joint due to the inverted T beam resting on the haunch. We have now shown teflon coated bearing pads supporting these beams.

Let us now discuss the center stair tower and beam B-16 which supports the short connection to this tower. We feel that the best method to allow the south end of the structure to move free of this stair tower is to place two 1/4" teflon

# CARL WALKER & ASSOCIATES, inc.

Mr. John Scott  
June 11, 1974  
Page 2 of 4

coated bearing pads under each end of beam B-16. Thus, beam B-16 will be connected to the stair tower, which is a rigid element, and the columns on the south half will slide under B-16. B-16 will not be connected to the structural topping.

Let us now discuss Beam B-3 at the sixth level on Grid 13. This beam should be tied to the topping to provide lateral stability. Since we are tying this beam to the topping, we must allow it to slide on the columns in a manner similar to Beam B-16. We therefore will provide two 1/4" teflon coated bearing pads beneath each end of Beam B-3 (on Grid 13) at the top level.

On our drawing S6B, which notes the Phase 1 modifications, we have shown the exterior beam lines connected to columns 2 and 13 on grids A and F. This connection will allow the concrete deck to push or pull these columns with seasonal temperature changes.

The design force based upon a calculated horizontal deflection is transferred from the beam into the topping slab through the 3/4" coil rod inserts in the beams. Since the topping does surround all the columns, the entire system must then move together. The topping is also connected to the beam on Grid 1 with the coil rod inserts. These beams are on the north side of the column and therefore lock the exterior columns on grid B, C, D, E into the same mass system and will cause them to move in a similar manner.

## II. EXPANSION JOINT AT STAIRTOWERS B, C, D, F

The precast concrete stairtower walls form a very stiff box when compared to the lateral stiffness of the 18 by 24 concrete columns. For this reason we have attempted to isolate the stair towers from the main structural decks.

# CARL WALKER & ASSOCIATES, *inc.*

Mr. John Scott  
June 11, 1974  
Page 3 of 4

An expansion joint is shown on the north or south sides of the stair towers. This joint will continue along the skewed panel in Phase II. In Phase I, coil inserts were located in this panel and this panel is therefore tied into the topping. There are no signs of distress in the Phase I connections and we feel we should leave well enough alone. The expansion joint is also on the east or west side of the stair towers. However, these walls are bearing walls for the double T floor units. We have attempted to detail these floor units with thick neoprene bearing pads. The thicker bearing pads will allow for a lateral movement of the double T deck system in a shear deformation of the bearing pad. This detail is to apply to the double T's resting on the skewed wall panel as well as the east or west wall panel of the stair towers.

### III. EXPANSION JOINT AT ELEVATOR CORE

In a similar manner as described for the above mentioned stair towers, we have attempted to isolate the main elevator core. This has been done physically by moving the core approximately 10 feet from the building proper. We do have a connecting link to the elevator core and have shown an expansion joint at the east side of the elevator core to offer a separation. It should also be noted that the short beams No. B-21 are to rest on soft bearing pads to allow for any movement which could occur as the large structure moves.

The calculations which Mr. Rath has prepared have determined total shortening requirements based upon shrinkage and temperature changes. We feel these calculations are quite proper for a continuous concrete slab. However, we have a series of closely spaced control joints (8'-0" on center) which have been tooled in at the time of finishing the concrete so as to cause the initial shrinkage to occur at each double T. Once these cracks have opened they will react as cracks in the future. For this reason, all temperature changes will also occur over a series of units and not a total length of the building. We feel that the total dimension

CARL WALKER & ASSOCIATES, *inc.*

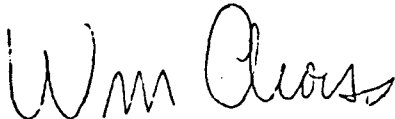
Mr. John Scott  
June 11, 1974  
Page 4 of 4

for anticipated shortening and elongation of the structure as calculated by Mr. Rath are on the conservative side. We do not feel the building will move as far as he has stated.

We refer you to the calculations we have submitted for a detailed and cursory review. The forces which the connections have been designed for are contained in these calculations. All of the required details are shown on sheets S6A and S6B.

Sincerely yours,

CARL WALKER & ASSOCIATES, INC.



William C. Arons, P.E.  
Vice-President

WCA/jme

cc: ✓ Clyde Anderson

Charles Rath

MEAGHER, GEER, MARKHAM, ANDERSON, ADAMSON, FLASKAMP & BRENNAN  
ATTORNEYS AT LAW

2250 IDS CENTER - 80 SOUTH EIGHTH STREET  
MINNEAPOLIS, MINNESOTA 55402  
PHONE (612) 338-0661

I. E. MEAGHER  
ARTHUR B. GEER  
B. B. MARKHAM  
CLYDE F. ANDERSON  
ORLAN C. ADAMSON II  
W. D. FLASKAMP  
MARK C. BRENNAN  
MARY JEANNE COYNE  
C. D. KNUDSON  
A. W. NELSON  
RODERICK D. BLANCHARD  
THOMAS L. ADAMS  
DAVID B. ORFIELD  
ROBERT M. FRISBIE  
RICHARD J. GROSETH  
GARY W. HOCH  
JAMES M. HILEY  
JAMES F. HOEGGE  
J. RICHARD BLAND  
JON K. HAMMARBERG  
H. GREGORY STEPHENS  
DONALD C. MARK, JR.

June 12, 1974

B. C. Hart, Esq.  
Briggs and Morgan  
W-2200 First National Bank Building  
St. Paul, Minnesota 55101

Re: Our File No. 31360

Dear Clarence:

In accordance with discussions that we have previously had in regard to working out a solution to the problems discovered at the University of Minnesota Health Sciences extension parking facility, we are delivering to you for the University's consideration and action the following:

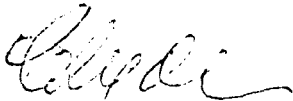
1. Letter dated May 7, 1974, to Mr. Kopietz from the Architects Collaborative being their written recommendation of Phase I modifications, attached to which are:
  - a. Two copies of drawing S-6B, dated June 10, 1974,
  - b. Two copies of drawings (two sheets) of "fiberglass covers for steel haunches" dated June 10, 1974,
  - c. Two copies of two-page Tremco spec sheets dated July, 1970,
  - d. Photocopy of calculations from Raths, Raths & Johnson, Inc.:
    - (1) "U of M Phase I Modification bracket seat design, March 20, 1974", 25 pages,
    - (2) "U of M Phase I Modifications angle seat design summary" dated March 20, 1974, three pages,
    - (3) "U of M Phase I Modifications bracket seat design summary" dated March 25, 1974, two pages,
    - (4) "U of M Parking Phase I Modifications expansion design" dated March 27, 1974, ten pages,

B. C. Hart, Esq.  
June 12, 1974  
Page 2

- (5) Three pages of miscellaneous calculations.
  - e. Photocopy of letter dated June 11, 1974, from Carl Walker Associates to Architects Collaborative re: explanation of expansion joint characteristics.
2. Opinion letters from consultants:
    - a. Wiss, Janney, Elstner and Associates, Inc. to Raths, Raths & Johnson dated May 8, 1974,
    - b. Raths, Raths & Johnson, Inc. to Carl Walker & Associates dated May 7, 1974.
3. Letter dated May 28, 1974 from the Architects Collaborative, Inc. to Paul Kopietz, this being TAC's formal written recommendation for Phase II modifications, attached to which is:
    - a. Photocopy of Carl Walker & Associates letter of transmittal dated May 15, 1974 to TAC, attached to which are:
      - (1) Raths, Raths & Johnson, Inc. calculations entitled "U of M Parking Facility Phase II bracket modification", seven sheets dated 4-18-74,
      - (2) Raths, Raths & Johnson, Inc. calculations entitled "Design of shear and reinforcement - P/C Beams" dated May 13, 1974, 26 pages.

We understand the Phase I modification drawings have been delivered to the contractor for pricing. When pricings have been obtained, we will be in a position to continue our discussions and negotiations toward resolution and disposition of these problems.

Very truly yours,



Clyde F. Anderson

CFA:jee  
enclosures

LAW OFFICE

BRIGGS AND MORGAN

PROFESSIONAL ASSOCIATION

2200 FIRST NATIONAL BANK BUILDING

SAINT PAUL, MINNESOTA 55101

291-1215

AREA CODE 612

June 17, 1974

CHARLES W. BRIGGS  
J. NEIL MORTON  
RICHARD E. KYLE  
SAMUEL H. MORGAN  
FRANK N. GRAHAM  
COLE OEHLE  
A. LAURENCE DAVIS  
FRANK HAMMOND  
LEONARD J. KEYES  
B. C. HART  
JOHN M. SULLIVAN  
BERNARD P. FRIEL  
BURT E. SWANSON  
M. J. GALVIN, JR.  
DAVID C. FORSBERG  
JOHN J. McNEELY  
McNEIL V. McNEELY, JR.  
EDWARD C. STRINGER  
TERENCE N. DOYLE  
RICHARD H. KYLE  
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R. L. SORENSON

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DOUGLAS L. SKOK  
DANIEL J. COLE, JR.  
MICHAEL H. JERONIMUS  
BRUCE C. ECKHOLM  
DOUGLAS R. HADDOCK  
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EDWIN P. LEE  
GERALD L. SVOBODA  
MARVIN T. FAHYANSKE  
THADDEUS S. FIGUS  
DAVID L. MITCHELL  
BONNIE L. BEREZOVSKY  
STEVE A. BRAND

COUNSEL  
ROBERT O. SULLIVAN  
HAROLD J. KINNEY

Mr. Clyde F. Anderson  
Meagher, Geer, Markham, Anderson,  
Adamson, Flaskamp & Brennan  
2250 IDS Center  
Minneapolis, Minnesota 55402

Re: University of Minnesota Health  
Science - Extension Parking Ramp

Dear Clyde:

Thank you for your letter dated June 12, 1974 which you delivered to me on June 13, 1974, along with the enclosures described therein. I called your attention to the following discrepancies in dating of documents which have been partially clarified in the manner indicated:

1. The letter from TAC to Mr. Paul Kopietz dated May 7, 1974 was apparently intended to be dated June 7, 1974, and was not mailed to Mr. Kopietz but was delivered to you.

2. The letter from TAC to Mr. Paul Kopietz dated May 28, 1974 was not mailed to Mr. Kopietz but was sent to you and received by you on June 5, 1974.

3. The seven-page enclosure (concrete haunch design by Raths, Raths and Johnson) to the TAC letter dated May 28 is dated April 18, 1974 and was received by Carl Walker on April 19, 1974, but was not forwarded to TAC until May 15, 1974.

4. The twenty-eight-page enclosure (Shear and torsion reinforcement design by Raths, Raths and Johnson) to the TAC letter dated May 28 bears dates ranging from March 20, 1974 to May 10, 1974, was transmitted to Carl Walker on



Mr. Clyde F. Anderson

-2-

June 17, 1974

May 10, 1974, received by Carl Walker on May 13, 1974 and received by TAC and the University of Minnesota on May 17, 1974.

5. It is not clear whether the two opinion letters from consultants (Wiss, Janney, Elstner and Associates, Inc. to Raths, Raths and Johnson dated May 8, 1974, and Raths, Raths and Johnson to Carl Walker & Associates, Inc. dated May 7, 1974) depend on each other or whether the May 7 letter depends on the May 8 letter, and neither letter clearly relates to TAC's Phase I and Phase II corrective design changes which were not formally recommended by TAC until June 7 and May 28, respectively.

As I mentioned in our meeting and you acknowledged, the materials you delivered to me on June 13 constitute the first Phase I and Phase II corrective measure proposals received by us which have TAC's written endorsement. It has been suggested on one previous occasion that the University had delayed the implementation of TAC's corrective measures by withholding its approval and acceptance of these measures. I stated emphatically on that previous occasion that TAC has the sole responsibility to solve this problem. There has been and will be no delay by the University if and when a positive proposal is made by TAC which TAC represents to be an unqualified corrective solution. Until your delivery to me of the above described materials, the University had received nothing susceptible of meaningful review. In the absence of a reasonably complete proposal for Phase I and Phase II corrective measures, delineated as such and endorsed by TAC and Walker, there has been nothing for the University to either accept or approve as a recommended design change.

It has been and continues to be the position of the University that it has been waiting for a firm and complete proposal for the corrective measures to be implemented, which proposal covers each aspect of the failure and is unqualifiedly endorsed by TAC, Walker and their consultants. Upon receipt of such a proposal, it will be reviewed by the University to determine if it is firm, complete and unqualifiedly endorsed. The University will not evaluate the proposal to determine adequacy or sufficiency of the recommended design changes.

Mr. Clyde F. Anderson

-3-

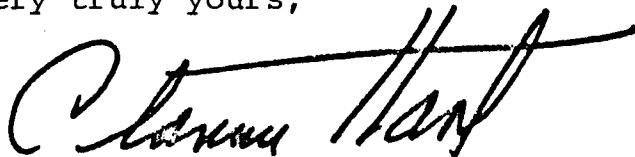
June 17, 1974

It will rely entirely on TAC and Walker in this regard. The proposal will be promptly returned to TAC along with requests for additional information and/or assurances if it appears that there may be one or more omissions or if the endorsements of TAC, Walker and its consultants appear qualified or ambiguous.

When the University is satisfied that the proposal accords with the standards set forth above, it will accept the proposal as a corrective design change and recommend to TAC that it be implemented. You have stated that the proposal has been submitted to the contractor for pricing and that you will want to discuss with us the matter of funding the additional costs involved as soon as you have obtained estimates of them.

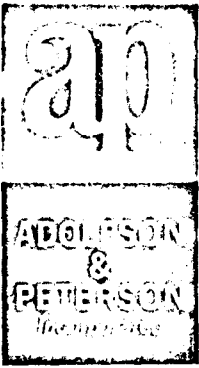
We will be in contact with you shortly.

Very truly yours,

A handwritten signature in black ink, appearing to read "Clarence Hart". The signature is written in a cursive style with a long horizontal stroke extending to the right.

BCH/jb

cc: Mr. Paul Kopietz



GENERAL CONTRACTORS / COMMERCIAL AND INDUSTRIAL

July 22, 1974

The Architect's Collaborative Inc.  
102 Hubbard Building  
2675 University Avenue  
St. Paul, Minnesota 53114

Attention: Kurt Rogness

Gentlemen:

RE: Health Science Parking Facility

Please refer to your transmittal letter dated June 12, 1974, requesting a quotation for Phase I Structural Modifications at the subject job. Attached please find a copy of our detailed estimate for a lump sum price covering the cost of this Modification in the amount of TWO HUNDRED SIXTY-SIX THOUSAND SIX HUNDRED FORTY-NINE AND NO/100-----DOLLARS (\$266,649.00).

If Kwik Bolts with the standard zinc plated finish are furnished in lieu of Kwik Bolts with galvanized finish DEDUCT \$17,505.00 from the above price.

Also attached please find a proposed schedule to cover the work. You will note that the start of the actual field work is based on the delivery of the steel and bolts for the haunches.

We are advised by the fabricator that as of this date enough material for about 1/3 of the haunches is available in a warehouse in Chicago and in the fabricator's plant. The present delivery on the galvanized Kwik Bolts is 8 to 10 weeks (possibly 6 to 8 weeks from another supplier). The delivery on the Kwik Bolts with the standard zinc plated finish is three to four weeks.

Please note on the attached progress schedule that the completion of the grouting at the top of the haunches and the caulking of the joints and, therefore, the final completion of the modification work will depend on warm weather so the grout and caulking will set up and not freeze. No allowance is included in the proposal for any kind of temporary heat.

In view of the above, an early approval to purchase the steel and bolts would be helpful. The prices on steel materials and also on the pads are only firm for a short time, therefore, we are obliged to advise that this proposal is good for two weeks or until August 2, 1974.



This proposal includes:

- 1) That the work be done concurrently with the Phase II modifications on which we have previously given you a proposal.  
See note A on the attached detailed estimate
- 2) No heat or maintenance of heating facilities is included for reception area, the elevator lobby, or stairways, and no costs are included for snow removal from the ramp floors or any maintenance or protection of the rain leaders. See Note B on attached detail estimate.

No temporary heat of any kind is included in this proposal.

- 3) We will require a hold harmless agreement from the Owner to protect us from damage claims which may be caused by our personal jacking up the floors that are already finished with concrete topping.
- 4) With reference to Note 10 on Drawing S6B as per the recommendation of the manufacturer's representative, we have figured Sorbtex Bearing Pads in lieu of the Neoprene pads called for. This of course will have to be reviewed and approved by the structural engineer.
- 5) A. J. Spanjers the caulking subcontractor proposes to use Harry S. Peterson 2000 caulking material for all work covered by this modification. It is recommended that the material not be applied when the temperature is below 40 degrees F.

Note: no caulking is included around the perimeter of the fibre glass covers as none is shown.

- 6) Painting the eight (8) guardrails at column A12 only is included - no other areas of painting are included.
- 7) Drilling through steel stirrups rather than changing the hole location in the haunches and that all the holes in the columns for the haunch supports will fall on the inside of the vertical reinforcing steel so that neither the vertical steel will have to be cut nor the hole location changed.

#### ALTERNATE PROPOSAL

If metal lath, trim and stucco covers are applied over the steel haunches in lieu of the fibre glass covers, DEDUCT from the lump sum price the sum of \$7,000.00.

No caulking is figured around the perimeter of the stucco covers.

From the schedule it would appear that if this alternate would be accepted, that a great deal of the work would have to be done next spring when the weather would be warm, at which time if the ramp was being used for parking, the cars would have to be cleared away to allow the plasterers to work on the columns

July 22, 1974

-3-

If you would elect to do the work covered by this modification on a "Cost Plus basis, not to exceed a predetermined maximum amount" as provided for in paragraph L of Article 19.9 of the general conditions of the specifications, we would propose that the "Maximum" amount be TWO HUNDRED SEVENTY-FOUR THOUSAND AND NO/100-----DOLLARS (\$274,000.00).

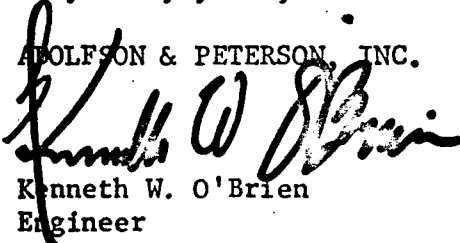
If the alternate for metal lath, trim and stucco covers is accepted and the work done a "Cost Plus Basis, not to exceed a predetermined maximum" we would propose that the "Maximum" amount be TWO HUNDRED EIGHTY-ONE THOUSAND AND NO/100-----DOLLARS (\$281,000.00).

If this method of doing the work is accepted, we would first like to go over this in detail with you to list the "costs" to be paid for and how the records are to be kept and approved for payment.

Will you kindly review this matter, and if you wish us to proceed with the work, please issue a change order to the contract to cover the additional costs.

Very truly yours,

ADOLFSON & PETERSON, INC.

  
Kenneth W. O'Brien  
Engineer

KWO/gcs

cc: Paul Kopietz  
Ralph Swanson

Enclosures



UNIVERSITY OF MINNESOTA  
TWIN CITIES

Engineering and Construction Division  
Physical Planning Office  
26 Folwell Hall  
Minneapolis, Minnesota 55455

July 23, 1974

Mr. Clyde F. Anderson, Attorney  
Meagher, Geer, Markham, Anderson,  
Adamson, Flaskamp and Brennan  
2250 IDS Center  
Minneapolis, MN 55402

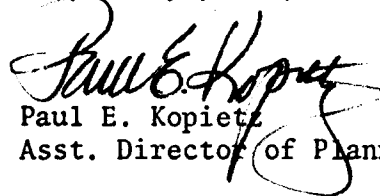
Subject: Health Sciences Parking Ramp  
University of Minnesota

Dear Mr. Anderson:

I am enclosing a copy of the modification document, as per your request, for those items of work that should be done immediately and in no way are involved with the delay and damage portion of the Phase II change. I am enclosing the backup data showing how the price was arrived at. I have circled Item 1 in the prestressed concrete letter of June 13th and then underlined the various dollar items in the backup information that combine to make up the figure of \$217,956.

If you have any questions on any of this, please call me.

Very truly yours,



Paul E. Kopietz  
Asst. Director of Planning

PEK:mj

Enclosure

cc: Clarence Hart, Briggs & Morgan  
✓ E. A. Kogl

MODIFICATION TO CONSTRUCTION DOCUMENTS

UNIVERSITY OF MINNESOTA

PROJECT Health Sciences Parking Facility  
CONTRACTOR Adolfson and Peterson

MOD. NO. \_\_\_\_\_

MOD. REJECTED \_\_\_\_\_

CHANGE ORDER NO. \_\_\_\_\_

CONTRACTS TO BE MODIFIED

When this Modification is signed, it shall become an order to proceed in accordance with the requirements of the Modification and the Contract Documents.

General Construction

Mechanical Work

Electrical Work

Vertical Transportation

Casework

\_\_\_\_\_

\_\_\_\_\_

Cost change (Add) (Deduct) \$ 239,751.00

No change in cost or time

A Change Order (will) (will not) be issued

Approved: \_\_\_\_\_ University Date \_\_\_\_\_

*Paul B. Smith*  
Planning Coordinator  
*V.W. Olson*  
Engineering & Construction

Approved: \_\_\_\_\_ University Date \_\_\_\_\_

Approved: \_\_\_\_\_ Contractor Date JULY 13, 1974

Recommended: K. Rogness Architect Date 15 July 1974

Person Requesting Change: Architects & Engineers

Reason for Change: Modify structural design in Precast Concrete Components for Phase II Construction.

Description of Change:

Changes shall be as detailed on attached Drawing S6A dated 16 May 1974 from Carl Walker and Associates, entitled "Beam Reinforcing and Column Haunch Phase II Modifications". Changes shall involve steel reinforcing, beam and column connections, and profiles. In addition a test shall be conducted to determine the pull-out capacity of expansion bolts which shall be used for Phase I structural modifications. All items and work not changed on Drawing S6A shall be supplied in accordance with the contract documents.

Work shall proceed in accordance with contractor's proposal for a lump sum as shown in Prestressed Concrete's letter dated June 13, 1974, Paragraph (i), "Summary of Cost Changes" plus 10% commission to the contractor.

LAW OFFICE  
**BRIGGS AND MORGAN**  
PROFESSIONAL ASSOCIATION

2200 FIRST NATIONAL BANK BUILDING  
SAINT PAUL, MINNESOTA 55101

291-1215  
AREA CODE 612

August 8, 1974

CHARLES W. BRIGGS  
J. NEIL MORTON  
RICHARD E. KYLE  
SAMUEL H. MORGAN  
FRANK N. GRAHAM  
COLE OEHLEH  
A. LAURENCE DAVIS  
FRANK HAMMOND  
LEONARD J. KEYES  
B. C. HART  
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STEVE A. BRAND

COUNSEL  
ROBERT O. SULLIVAN  
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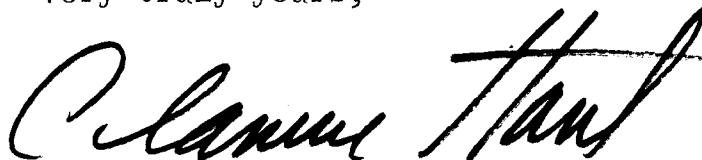
Mr. Clyde Anderson  
Meagher, Geer, Markham, Anderson,  
Adamson, Flaskamp & Brennan  
2250 IDS Center  
Minneapolis, Minnesota 55402

Re: University of Minnesota Health  
Sciences - Parking Ramp

Dear Clyde:

This will acknowledge your letter to me dated August 7, 1974. I agree with some of the statements in your letter, but I do not agree with all of them. I do not have time now to respond in detail, but I believe that the change order language we did agree upon, coupled with our conversation yesterday provides an adequate basis for allowing the corrective work to go forward. Meanwhile, it should be understood that we are preserving our respective claims and contentions concerning the nature and extent of the representations and assurances which have been given and which we have relied upon in going forward.

Very truly yours,



BCH:pa

cc: Mr. Paul Kopietz  
Mr. Gene Kogl



August 23, 1974

Mr. Herbert Meyers  
Director, Building Code Division  
Department of Administration  
Metcalf Square Building  
St. Paul, Minnesota 55101

Subject: Health Sciences Expansion - Parking Ramp

Dear Mr. Meyers:

A parking ramp is presently under construction on the campus of the University of Minnesota. The ramp is being erected using precast beams and columns, prestressed double tee floor slabs and poured-in-place topping.

After the structure was approximately one half erected a difference of opinion arose between the owner and the architect regarding the structural suitability of the design. Although I was not directly involved with the construction of this project for the last several months I have been involved in an advisory capacity. This involvement prevented my appointment as Building Official and was sufficient to cause doubts of my objectivity and lack of prejudice in enforcing the Building Code in this matter. For that reason I wish to disqualify myself as Building Official on this project and ask that your office review the problem to determine if the structure is in accordance with the appropriate Codes in the area of the controversy.

Following an affirmative reply from you a meeting will be set up in your office or wherever you prefer.

Very truly yours,

E.A. Kogi  
University of Minnesota Building Official

EAK/let

cc: Clifton Hewitt, Paul Kopietz, John Scott (TAC), Clarence Hart (Briggs & Morgan)

**August 23, 1974**

**TO: Paul Kopietz**  
**FROM: E. A. Kogi**  
**SUBJECT: Health Sciences Expansion - Parking Ramp**

Dave Kerkow has the information on the events that transpired up to Friday, August 23, 1974. This memo is to bring you up to date for that day.

The contractor had objected to signing a change order with the amendment that Clyde Anderson and Clarence Hart had agreed to. I suggested to Curt Rogness that they revise the amendment to say that our reservation applied to the "design of the work" instead of to the work. Curt called this morning and said that the contractor still would not sign it. I told him to get in touch with Clyde and we would contact Clarence to see if we could eliminate the amendment and cover that aspect by a separate letter agreement.

I so informed Clarence Hart, but I don't know what happened after that as Curt was on his way to St. John's and would not be back until afternoon.

EAK/sf



UNIVERSITY OF MINNESOTA  
TWIN CITIES

Office of the Assistant Vice President

*file copy*

Physical Planning  
340 Morrill Hall  
Minneapolis, Minnesota 55455

August 23, 1974

Mr. Herbert Meyers  
Director, Building Code Division  
Department of Administration  
Metro Square Building  
St. Paul, Minnesota 55101

Subject: Health Sciences Expansion - Parking Ramp

Dear Mr. Meyers:

A parking ramp is presently under construction on the campus of the University of Minnesota. The ramp is being erected using precast beams and columns, prestressed double tee floor slabs and poured-in-place topping.

After the structure was approximately one half erected a difference of opinion arose between the owner and the architect regarding the structural sufficiency of the design. Although I was not directly involved with the construction of this project, for the last several months I have been involved in an advisory capacity. This involvement preceded my appointment as Building Official and was sufficient to cause doubts of my objectivity and lack of prejudice in enforcing the Building Code in this matter. For that reason I wish to disqualify myself as Building Official on this project and ask that your office review the problem to determine if the structure is in accordance with the appropriate Codes in the area of the controversy.

Following an affirmative reply from you a meeting will be set up in your office or wherever you prefer.

Very truly yours,

E.A. Kogl  
University of Minnesota Building Official

EAK/lat

cc: Clinton Hewitt, Paul Kopietz, John Scott (TAC), Clarence Hart (Briggs & Morgan)



UNIVERSITY OF MINNESOTA  
TWIN CITIES

Engineering and Construction Division  
Physical Planning Office  
26 Folwell Hall  
Minneapolis, Minnesota 55455

August 30, 1974

TO: Clinton Hewitt  
FROM: Paul E. Kopietz PEK  
RE: Status Report  
Health Sciences Parking Ramp

PHASE II

The Phase II change order, as you know, has been signed and the work is on schedule. I checked with the General Contractor and he tells me that everything is moving quite satisfactorily and this would mean that their starting date for Phase II is approximately the 30th of September, 1974.

PHASE I

Since my last report, we have had no end of difficulty with this change order. The price was received approximately the 18th of July and up until now it has taken a great deal of negotiating between the attorneys, T.A.C., the Contractor and the University to get the change order into a shape that is satisfactory to all. As mentioned in my last report, we were not satisfied with the Phase I correction and still are not. One of the difficulties was that we tried to include our objection as a part of the change order documents and the General Contractor refused to sign this. In looking at his position, I can understand this. Hopefully, everything has been worked out now and the change order is in the process of being executed. The General Contractor informs me that they have already ordered a number of Phase I materials.

Our objections to Phase I corrections still stands; T.A.C. and their associates have been put on notice. I now plan to take steps to test a Phase I correction mock-up so we can see what the actual results will be.

Between now and the next report, two items that need our attention are: a review of the work schedule so that we may try and give you firm dates

Page 2  
Clinton Hewitt  
Health Science Parking Ramp  
August 30, 1974

and hopefully find out when a portion of the ramp will be available for use. In addition to this, we must sit down with the General Contractor and discuss all of those items which are damage and delay items and ascertain which are legitimate and what type of accounting and payment system we can set up so that they are properly reimbursed. As of this date, the responsibility for the majority of the costs has been recognized by the Architect and their insurance carrier.

PEK:nf  
CC: Vern Carlson  
Hugh Lampert  
E. A. Kogl  
Jack Geretz

LAW OFFICE

BRIGGS AND MORGAN

PROFESSIONAL ASSOCIATION

2200 FIRST NATIONAL BANK BUILDING

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THADDEUS S. FIGUS  
DAVID L. MITCHELL  
BONNIE L. BEREZOVSKY  
STEVE A. BRAND

September 4, 1974

COUNSEL  
ROBERT O. SULLIVAN  
HAROLD J. KINNEY

Mr. C. F. Anderson  
Meagher, Geer, Markham, Anderson  
Adamson, Flaskamp & Brennan  
IDS Tower  
Minneapolis, Minnesota 55402

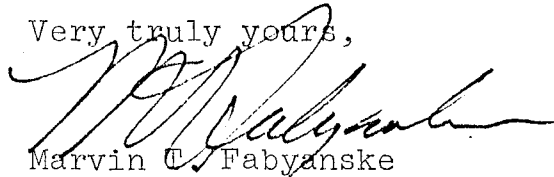
Re: U of M Parking Ramp

Dear Clyde:

In your letter dated August 5, 1974, you proposed that CWA would supply, at its expense, a full time representative to work with A & P on costs and also ways of expediting the repair program.

The University accepts your proposal. At your earliest convenience, please furnish me with the name of the representative and your best estimate of when your proposal will be implemented.

Very truly yours,



Marvin T. Fabyanske

MTF:ps

cc: Mr. Paul Kopietz  
Mr. Gene Koglu



UNIVERSITY OF MINNESOTA  
TWIN CITIES

Division of Space Programming and Management  
Office of Physical Planning  
N-363 Elliott Hall  
Minneapolis, Minnesota 55455  
(612) 373-2996

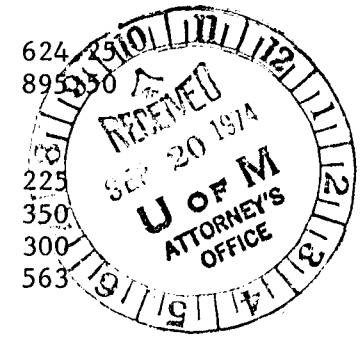
September 20, 1974

To: R. Joel Tierney  
From: Mary Barrett  
Subject: Cost of Acquiring Land for Health Sciences Parking Ramp.

*Mary Barrett*

As you requested, I am detailing below the costs incurred in acquiring the south half of Block 7 and all of Block 10, Baker's Addition to St. Anthony, for the Health Sciences Parking Ramp. There were probably a few expenses, such as for appraisals, for which I could not find documentation.

<u>Oak St. SE.</u>	<u>Purchase Price</u>	<u>Appraisals &amp; Reimbursement</u>	<u>Taxes, Etc.</u>	<u>Moving Expenses</u>
319-21,329	\$98,670			300
401	24,000		276.77	
405	16,675			300
409	25,000			
413	28,125	925		313.75
417	27,000	275		300
423	25,467	300		146.61
425	28,500	125		253.12
429	33,000	125		350.00
<u>Delaware St. SE</u>				
812	25,300	125		350
813	27,000	125		340
815	25,875	150		275
816	18,400		15.70	
819	25,000			231.75
820	34,000			
825	36,000	150		624
826	60,000	250		895.50
<u>Ontario St. SE</u>				
316	32,300	150		225
320	42,000	475	2.63	350
408	25,000	400		300
410-414	49,238.78	150	260.86	563
<u>Essex St. SE</u>				
809-11	38,000			
815-17	32,000	550		300
819-21	31,625			325
TOTAL	\$808,175.78	\$4,275	\$555.96	\$674,298
Commissioners' fees	\$4,300.00			
Attorneys' fees	<u>4,473.36</u>			
TOTAL				<u>8,773.36</u>
				\$1,496,078.10



LAW OFFICE

BRIGGS AND MORGAN

PROFESSIONAL ASSOCIATION

2200 FIRST NATIONAL BANK BUILDING

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September 23, 1974

CHARLES W. BRIGGS  
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STEVE A. BRAND

COUNSEL  
ROBERT O. SULLIVAN  
HAROLD J. KINNEY

Clinton Hewitt, Assistant Vice President  
340 Morrill Hall  
University of Minnesota  
Minneapolis, Minnesota 55455

Re: Health Sciences Expansion  
- Parking Ramp

Dear Mr. Hewitt:

I wish to give you the following report in response to your recent inquiry about the status of the design failure and related problems on "Phase I and Phase II" of the Health Sciences Parking Ramp project:

1. Description of design problems:

You will recall that these parking ramps have a structural design which consists of ~~cast in place~~ columns which support precast "L" beams between columns. The "L" beams support prestressed double-T concrete deck panels. *pre-cast*

In December of last year, a serious structural failure was discovered in the Phase I construction. In over-simplified terms, the failure is the result of inadequately reinforced column haunches or corbels and inadequately reinforced "L" beams. The design also permits rotation of the "L" beams on the supporting corbels which causes excessive and eccentric forces in bearing, in shear and in torsion. This design error is partially, though guardedly, acknowledged by TAC and by the responsible structural engineering consultant, Carl Walker & Associates. The design error has also been confirmed by analytical reports from engineering consultants, Dr. Paul Andersen and Mr. Milan Johnston, and by laboratory tests conducted at Twin City Testing Laboratories.



Clinton Hewitt  
September 23, 1974  
Page 2

2. Corrective Measures:

Early, urgent and continuous demands were made upon TAC by Mr. E. A. Kogl and Mr. Paul Kopietz of the Physical Planning Department to provide and implement required corrective design and repairs. There has been unnecessary delay by TAC and Walker in providing the requested corrective measures. Finally a proposed Phase I corrective design change order was given qualified approval by the University on August 30, 1974, and shortly thereafter another qualified change order was issued authorizing the contractor to proceed with construction of Phase II. Although Messrs. Kogl and Kopietz have advised TAC that they do not consider the corrective measures adequate in all respects,\* they have allowed the repair and construction work to resume in reliance on the written assurances of TAC, Walker and their consultants that the corrective measures will insure compliance with all applicable codes, and that the completed ramps will be structurally sound and safe.

3. Cost of Repairs and Changes:

By letter dated August 5, 1974, the attorney for Carl Walker & Associates has agreed that Walker and CNA, its errors and omissions insurance carrier, will reimburse the University for the payments made to A&P for Phase I "cost-plus" work, up to a maximum of \$274,000.

Similar assurances will be demanded, but have not yet been received, concerning the cost of Phase II changes. We anticipate, however, that Mr. Andersen will seek to obtain some contribution from the University for alleged betterment in the redesign.

4. Damages from Design Error:

It is too early to give you a reliable estimate of ultimate total damages which have been and will result from this design error.

As matters now stand, we anticipate the following categories of damage:

\* A letter from Milan Johnston to Paul Kopietz dated July 1, 1974, criticizes the corrective design.

Clinton Hewitt  
September 23, 1974  
Page 3

- a. Loss of Parking Revenues - gross rental values for Phase I alone could approximate \$16,500 per month at current rental value levels.
- b. Cost of Repairs - if not paid in full by TAC, Walker and CNA.
- c. Depreciated Building Value - due to unsatisfactory repairs and loss of aesthetic quality.
- d. Increased Life-Cycle Maintenance Costs.
- e. Engineering, Testing and Legal Fees.
- f. Delay Claims - by the contractor and its subcontractors and materialmen.

We anticipate that total damages could amount to several million dollars.

5. Litigation:

One lawsuit has already been commenced as a result of project delay. On September 13, 1974, Prestressed Concrete, Inc. served a summons and complaint on A&P and the University as co-defendants demanding damages of \$145,280.00 for delay in permitting fabrication of prestressed concrete beams and decks. Mr. John L. Devney of this office or I will report separately to the University attorney, Mr. Joel Tierney, concerning the status and handling of that litigation.

We anticipate that there may be further claims of this type by the general contractor and by subs and other materialmen on both Phase I and Phase II.

We also anticipate that it will become necessary either to join TAC as a third-party defendant in all cases of the type described above or to commence a separate action for damages against TAC. It is not likely that all these problems can be solved without litigation, and the resolution of these problems will not occur in the near future.

Clinton Hewitt  
September 23, 1974  
Page 4

This report is purposely abbreviated, so if you have additional questions, please feel free to contact any of the following lawyers in our Contracting Department:

B. C. Hart  
Jack Devney  
Phil Bruner  
Marv Fabyanske

Sincerely,

*Clarence Hart*  
pa.

BCH:pa

cc: ✓ Eugene Kogl  
Paul Kopietz  
Joel Tierney  
J. L. Devney  
P. L. Bruner  
M. T. Fabyanske



UNIVERSITY OF MINNESOTA  
TWIN CITIES

University Hospitals  
Minneapolis, Minnesota 55455

September 24, 1974

TO: Health Sciences Planning Committee

FROM: Robert Dickler, Assistant Director, University Hospitals

SUBJECT: Health Sciences Parking Ramp Reception Center and Shuttle Bus

In anticipation of the opening of the Oak Street Health Sciences Parking Ramp in November, 1974 the School of Dentistry and University Hospitals have been discussing for the past several months alternative approaches to the operation and organization of the reception center and shuttle bus services. The following attachments are the result of those investigations and discussions and constitute the basic structure which both units feel are necessary in relation to those services.

These proposals have been reviewed briefly with Dr. Russell V. Lucas as chairman of the Health Sciences Parking Committee and will be presented to the full committee at its next meeting. This is in accord with the committee's charge to provide a working plan for the reception center and shuttle bus as noted in the August 28, 1974 memo from Dr. Lucas (see attached).

It should be noted that even if these proposals are adopted in their present format a number of questions still must be addressed, particularly in relation to the shuttle bus. Briefly, these include sources of funding (reception center and bus), the unit responsible for supervision of the bus, and the types and number of contracts which will be sold to Health Sciences students and staff. In addition some tangential issues to both the reception center and shuttle bus include the development of an appropriate mechanism for referring handicapped patients to Mayo garage, appropriate signing of the campus, and the development of information materials and handouts for users of the parking facility.

## Oak Street Ramp Reception Center and Shuttle Bus

### -An Operational Proposal-

The following document is intended to briefly outline the School of Dentistry and University Hospitals proposals for the operation, funding, and administration of the Oak Street Ramp Reception Center and Shuttle Bus.

#### A. Reception Center

##### 1) Hours of Operation-

a) The Center should be open 24 hours, 7 days a week initially or whatever hours the ramp is in operation. Maps and information signs should be located in the reception center to help patrons reach their destination when the Center is not staffed.

It is recognized that the Reception Center being open 24 hours may present a security problem. However, it is hoped that University Police can provide adequate coverage of this location.

b) The Center should be staffed with one receptionist from 7:30 a.m. - 4:30 p.m.; Monday through Friday. These hours are selected as those during which the majority of patients, outpatients and visitors will enter the Health Sciences Complex. Since the center will service incoming rather than outgoing patrons, the majority of clientele should be serviced.

It is recognized, however, that Hospitals visitors and others enter the complex after 4:30 p.m. and on weekends. If at a later time it is determined that volume during other hours is sufficient to justify staffing, an attempt will be made to provide it.

##### 2) Organizational Control -

The Reception Center should be operated as a part of University Hospitals Communication Center. Such an arrangement will permit backup staffing during regular operating hours, vacation and sick leave.

##### 3) Staffing

It is proposed that initially the Reception Center be staffed by one person during normal operating hours.

#### 4) Scope of Knowledge and Training

While the School of Dentistry and University Hospitals view the reception center as essential for adequately serving our patients and visitors, it is recognized that patrons utilizing Oak Street Ramp facilities will be seeking destinations throughout the Health Sciences and University Campus. It is therefore proposed that each Health Sciences Unit designate an individual or group of individuals who can orient this individual to their facilities and offices as well as provide maps and other useful information. Contact will also be made with University Support Services concerning general campus information.

#### 5) Funding

a) Staffing - The University Hospitals and School of Dentistry will jointly fund the majority of personnel costs of the reception center (percentage allocation to be determined at a later date.)

b) Supplies - The Hospitals and School of Dentistry will jointly fund basic information handouts. All specific handouts relating to the various units will have to be provided by those units.

#### 6) Function

The reception center should function solely as a reception and information center. It should not be charged, at least initially, with controlling access to the shuttle bus ( a separate proposal ) or making determination of which patient patrons should park in Mayo Garage due to handicaps. (Note: Handicap parking will apply primarily to the Hospital Patients and should be controlled by both an internal Hospitals mechanism and development of policies with University Parking).

#### 7) Relationship with University Parking

It is proposed that while the reception center and parking attendants will be responsible to different organizations and fulfill different functions they should have a close working relationship. Such a relationship will be enhanced by adequate phone or intercom communications between the locations, jointly working on policy changes, etc.

## B. Shuttle Bus

### 1) Hours of Operation -

a) The shuttle bus, initially, should be in operation from 7:30 a.m. to 5:30 p.m., Monday-Friday. This time period should cover adequately outpatient patrons as well as the majority of the transient and contract parkers - other than the hospital.

b) Consideration should be given to extending the hours of operation in relation to hospital staff and visitor parking. This decision is primarily dependent on the potential volume resulting from final allocation of contract parking space.

### 2) Route -

a) Initially, the shuttle bus should proceed on one of two routes depending on the construction phase of Unit B-C., (See attached map.)

1. From the ramp west on Delaware St. S.E.; south on Harvard St.; west on Essex St.; north on Union St; west on the the horseshoe drive to the main hospital entrance; and return via the same route in reverse. Stops would be the parking ramp, Masonic Memorial Hospital; Unit A; University Hospitals; and Powell Hall.
2. From the ramp west on Delaware through the horseshoe drive and return via Delaware with stops at Unit A; University Hospitals; and the corner of Harvard and Delaware for Masonic Hospital.

b) Other routes have been considered but do not seem feasible either because of traffic (Church St.) or physical obstructions (Heart Hospital canopy).

### 3) Number of circuits per hour

It is estimated that a bus can complete the more extensive route ( 2 a 1 above) in approximately 12 minutes including stops. The direct route down Delaware (2a2 above) would be somewhat shorter (9-10 minutes).

### 4) Size of bus

Initially, a full size bus with a passenger capacity of approximately 50 individuals should be utilized.

### 5) Number of buses

Past surveys, relating to hospital outpatient parking indicate a peak load demand from 8:30-10:30 and 12:30 - 2:30. In addition, the majority of Dentistry clinic appointments are made for 10:00 a.m. and 2:00 p.m. resulting in additional peak demand. It is therefore recommended that a second bus initially be contracted for from 8:30-10:30 and 12:30-2:30. If, after a period of initial operation, the demand is inadequate to justify two vehicles during these hours it is proposed that the second bus be eliminated and the contract with M.T.C. be written accordingly.

6) Operation of bus -

a) It is recommended that initially the University contract with M.T.C. for the shuttle buses needed.

b) An evaluation should be made within the first year of the feasibility and economics of purchasing buses and operating this service internally within the University. Such consideration should include vehicle capacity needs, coverage of ill or tardy drivers, replacing inoperative vehicles and financing.

7) Access to the bus -

a) It is proposed that University Hospitals and School of Dentistry patients and associated individuals have first priority access to the bus. Student, staff, faculty, and others may use the shuttle bus if space permits.

b) No formal control mechanism such as tokens, appointment slips, etc. should be used initially due to the complexity of such systems. Rather, it is hoped that a dual mechanism of signs within the ramp or on the bus indicating patient priority, as well as the driver asking patients to board first, will be adequate controls.

8) Organizational Control -

It is unclear at this time which unit or units of the University should assume responsibility for contracting with and supervising M.T.C.

9) Funding -



a) Based on June, 1974 MTC bus rates the shuttle bus will cost approximately \$11.25/hour to operate. At 14 hours/day (7:30 - 5:30 and four hours for second bus) the service will cost approximately \$800/five day week or \$41,000 for an entire year.

b) While the School of Dentistry and Hospital patrons will be the primary users of the bus it is recognized that the shuttle bus will service all health science units, and possibly others, as well. It is therefore proposed that funding be primarily the responsibility of Dentistry and the Hospitals but that all units participate to some extent. How such costs should be apportioned at this time is unclear and will depend largely on the final space utilization configuration of the ramp.

Note: Much of the information relating to the shuttle bus costs and routes can be obtained from Roger O. Huss - Transit Coordinator for the University.



UNIVERSITY OF MINNESOTA  
TWIN CITIES

Pediatric Cardiology  
Box 94, Mayo Memorial Building  
Minneapolis, Minnesota 55455  
(612) 373-8938

TO: Parking Committee Members  
FROM: Russell V. Lucas, Jr., M.D., Chairman  
DATE: August 28, 1974

Stage I of the Oak Street Parking Ramp is scheduled for completion on about 1 November, 1974. As you know, a major thrust in the design of this Ramp was to provide a comprehensive parking facility and reception center for patients and visitors to the Health Sciences. The section scheduled for completion on 1 November, 1974 will have a 1,000 care capacity and will be for transient visitor parking.

Vice President French has asked our Committee to carefully evaluate the need of the Health Science Unit for patient and visitor parking and to provide a working plan for the utilization of the Oak Street Ramp and the Health Science Reception and Parking facility. He wishes us to provide him with a recommendation for his review.

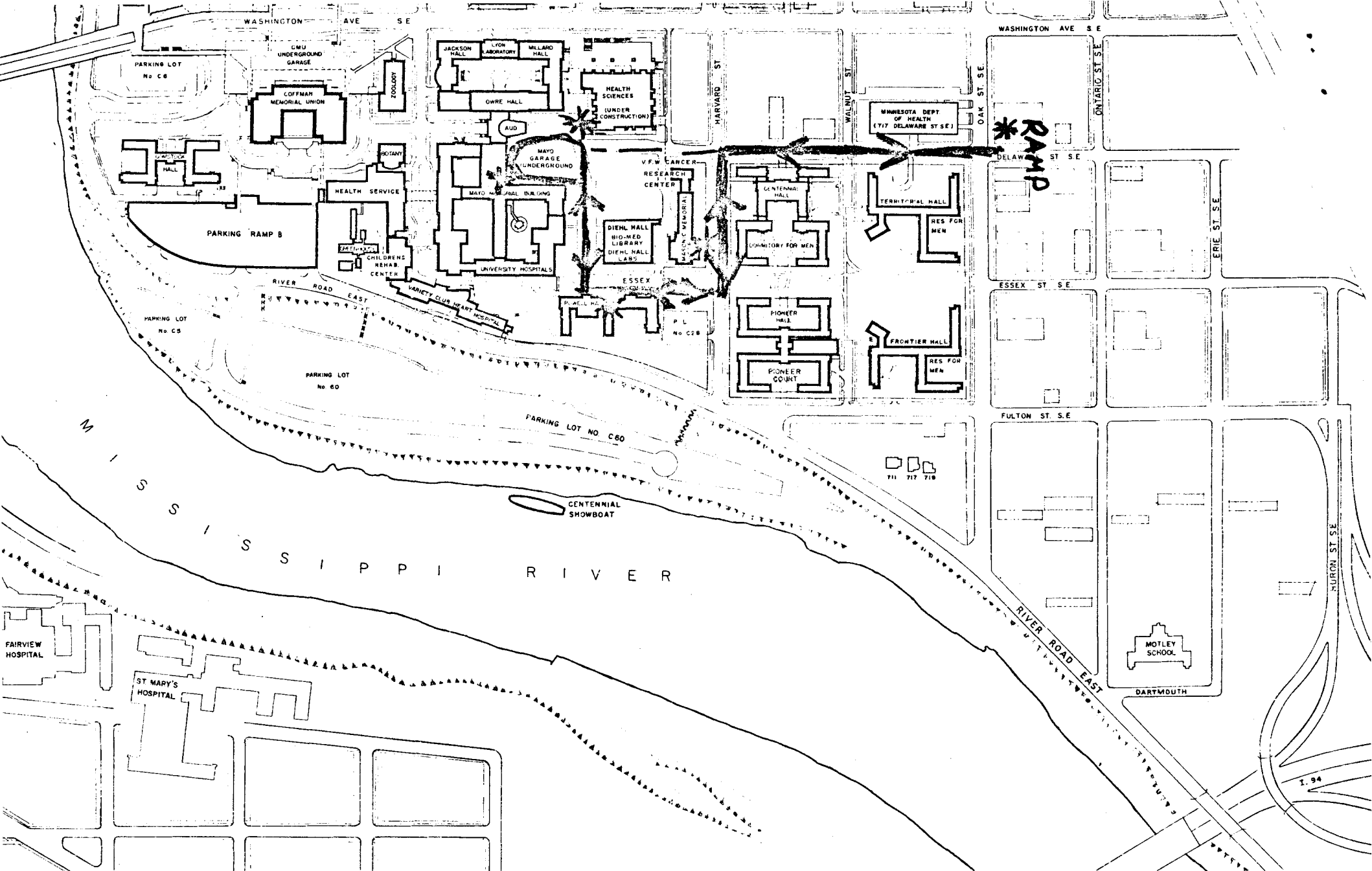
Among the areas we must consider in making our recommendations to Dr. French are: needs of the hospital clinics and other units, functioning of visitor reception center, patient transport flow between the parking ramp and the Health Sciences Units, the role of the Mayo Garage in patient parking, and consideration of costs and recovery of costs.

I would appreciate it if you would gain input from your specific constituencies in these areas so that we may proceed as expeditiously as possible. In addition, I would welcome letters or narratives for the Committee meeting, from anyone who wishes to provide input to the Committee.

Linda will be in touch with you in the near future regarding the time and place of the meeting.

RVL:lmb

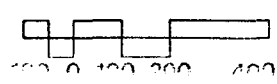
cc: Vice President French  
Mr. John Westerman  
Paul Winchell, M.D.  
Eugene Gedgaudas, M.D.  
Mr. David Preston



FEB. 1972

# MINNEAPOLIS CAMPUS

\* = BUS STOP





UNIVERSITY OF MINNESOTA  
TWIN CITIES

Office of the University Attorney  
330 Morrill Hall  
Minneapolis, Minnesota 55455  
(612) 373-3446

September 25, 1974

Mr. Clarence Hart  
BRIGGS AND MORGAN  
Professional Association  
2200 First National Bank  
Building  
St. Paul, Minnesota 55101

Re: Health Sciences Expansion - Parking Ramp

Dear Mr. Hart:

In accordance with our discussions in Mr. Hewitt's office, I enclose a copy of the acquisition costs of the land underlying the Health Sciences Parking Ramp.

Yours very truly,

R. Joel Tierney  
University Attorney

RJT/jkb

Enclosure

cc: Paul Kopietz  
Clinton N. Hewitt  
E. A. Kogl ✓



UNIVERSITY OF MINNESOTA  
TWIN CITIES

Health Sciences Planning Office  
Box 75 Powell Hall  
4103 Powell Hall  
Minneapolis, Minnesota 55455  
(612) 373-8981

September 30, 1974

Mr. Roland Kluver  
The Architects Collaborative  
46 Brattle Street  
Cambridge, Massachusetts 02138

SUBJECT: University of Minnesota Health Sciences  
Building K/E

Dear Roland:

This project is virtually completed, and in general a successful endeavor. The physical facility blends with the surrounding existing structures providing the necessary physical continuity. We have occupied the E portion for several weeks, and overall it is functional. But, we have three concerns regarding the design that must be corrected. The Shipping and Receiving Dock area presently has a 13' 4-3/4" high clearance at the dock bumper, and a 13' 6-1/4" clearance at the precast. This should be corrected to an overall clearance of 14' 0". The handicapped ramp on the north side of Powell Hall exceeds the code in percentage of slope. The handicapped ramp on the south of K/E is of an accepted slope, but is located so that a person in a wheel chair must enter and pass through the truck loading dock area, maneuvering around semi-trailer trucks, and is likely to be dangerous and in violation of the laws intent. The pedestrian bridgeway between Mayo and Heart Hospital lacks adequate clearance for our standard compactor truck to approach the Health Sciences central waste collection dock area.

We sincerely consider these design oversights the responsibility of the architect and engineers, and therefore request that the necessary corrective action be implemented.

Yours truly,

Paul J. Maupin  
Health Sciences Planning Coordinator  
Health Sciences Planning Office

PJM:rm

cc: Steve Whitney  
Clinton Hewitt



**STATE OF MINNESOTA**  
DEPARTMENT OF ADMINISTRATION  
SAINT PAUL

**BUILDING CODE  
DIVISION**

October 4, 1974

Mr. E.A. Kogl  
University of Minnesota Building Official  
Office of the Assistant Vice President  
340 Morrill Hall  
Mpls, Minn. 55455

Dear Mr. Kogl:

Subject: Health Sciences Expansion-Parking Ramp.

Your letter dated August 23, 1974 to Herbert Meyer relative to the problems encountered in the structural adequacy of the above building has been given to me for comment. Please be advised that this office will analyze and determine whether the above structure is in conformance with the Minnesota Building Code. We will review the changes and corrections suggested by the consultants to assure the structural integrity of the parking ramp.

Please contact me in the next few days to discuss the time and place of a meeting to discuss the above.

Yours very truly,

*Chester Ginniewicz P.E.*  
Chester Ginniewicz P.E.  
Administrative Engineer  
Building Code Division

CZ/jc

cc: Herbert W. Meyer

Oct 7, 1974

Brinckerhoff, Hart, Reaney, Tierney,  
Hewitt, Kopicz, Kogl -

Re: Health Sciences Parking Ramp

PEK - Status of job -

Ph. I C.O. under way, but not  
considered a full solution

Ph II <sup>Ch</sup> Order for manufacture of  
component parts has been written.

Contr. is not moving on install-  
ation until given C.O. to cover  
costs.

J.B. - Does not want any false claims  
for damages that will delay settlement.

BCH - Says we must ask for total  
damages to effectively collect the  
minimum we can collect.

J.B. - Says to cancel TAC contracts until  
they settle this.



UNIVERSITY OF MINNESOTA  
TWIN CITIES

Office of the Assistant Vice President

*Kogel*

Physical Planning  
340 Morrill Hall  
Minneapolis, Minnesota 55455

October 8, 1974

Mr. Roland Kluver  
The Architects Collaborative  
46 Brattle Street  
Cambridge, Massachusetts 02138

Dear Roland:

We are deeply concerned with the lack of resolution of the problems surrounding the Health Sciences Parking Ramp. The damages sustained by the University are escalating daily. One lawsuit has been commenced by a subcontractor, and it is not unreasonable to anticipate that other lawsuits will be initiated, the dollar dimensions of which are unknown except that they will be very substantial.

We respectfully request that TAC advise the University and our retained counsel of the names of their legal representatives by October 11, 1974, so that your interests may be considered at the discussions now being conducted.

Sincerely,

Clinton N. Hewitt  
Assistant Vice President  
Physical Planning

CNH/kh

cc: Briggs & Morgan  
Attn: B. C. Hart  
2200 1st National Bank Building  
St. Paul, Minnesota 55101

Vice President James Brinkerhoff  
Vice President Lyle French  
R. J. Tierney, University Attorney  
Mr. Paul Kopietz, Asst. Director  
Mr. L. A. LeMay, Physical Planning



UNIVERSITY OF MINNESOTA  
TWIN CITIES

Engineering and Construction Division  
Physical Planning Office  
26 Folwell Hall  
Minneapolis, Minnesota 55455

October 18, 1974

Adolfson and Peterson, Inc.  
6701 West 23rd Street  
Minneapolis, Minnesota 55426

Attention: Mr. Kenneth W. O'Brien

Reference: Health Sciences Parking Ramp  
University of Minnesota

Dear Mr. O'Brien:

We have received your letter of October 8, 1974 and your memorandum to Ralph Swanson and Dan Kramer. This letter is intended to correct any misapprehensions you may have concerning work on Phase II. Contrary to your assertions contained in the letter, no additional change order work will be necessary for Phase II. The change order which has been issued contains all necessary elements for you to proceed. Therefore, no approval has been given to you as to the furnishing of temporary heat on a cost plus basis. However you wish to heat and keep track of these costs is your decision.

We have instructed you that Adolfson and Peterson is to proceed with the completion of this work as promptly as possible in accordance with the contract documents and specifications. If this requires the furnishing of temporary heat, we will expect you to furnish it.

Finally, the University has not, at any time, indicated that it will provide you with a suggested method of accounting any of your claimed additional costs. You will recall that Mr. Rogness, on behalf of TAC, suggested that he might have some views on the subject. To the extent that you feel you need any direction in that regard, we suggest you contact Mr. Rogness.

We have been informed, through counsel, that Mr. Gordon Peterson of your firm, and Mr. Ron Olson, your Company's attorney, have indicated that you will proceed with the work, reserving all claims for additional costs until completion of the work. We agree that the contract documents require this approach and upon completion of the work, will be pleased to review any claims which you may feel you have.

Adolfson and Peterson, Inc.  
October 18, 1974  
Page Two

We trust, in light of the positions expressed by your superiors, we need have no further discussions at this time concerning your claims for alleged additional costs. We further trust that you will expediently proceed with the performance of your contract.

Very truly yours,



Paul E. Kopietz  
Assistant Director of Planning

PEK/iej

cc: Briggs & Morgan  
Jack Geretz  
R. J. Tierney  
E. A. Kogl

K.91

UNIVERSITY OF MINNESOTA  
TWIN CITIES

Engineering and Construction Division  
Physical Planning Office  
26 Folwell Hall  
Minneapolis, Minnesota 55455

DATE	OCT 28 1974
CH	
FILE	

October 25, 1974

TO: Clinton Hewitt

FROM: Paul E. Kopietz **PEK**

RE: Health Science Parking Ramp  
Progress Report

Since my last report, the following has taken place:

1. Construction is proceeding on both Phases I & II. The tentative completion dates, given by the General Contractor at a recent progress meeting, were completion of Phase I approximately March 1, 1975. and completion of Phase II approximately May 15, 1975. However, this should be qualified. As far as the contractor is concerned, he does not feel that the issue of winter heat has been resolved "who is to pay for this heat?" Therefore, his schedule is dependent upon this being resolved. Our position, as directed by the attorneys, is that the winter heat is a part of his delay and damage claim. He is to proceed as quickly as possible with completing the work and if it takes heat to do this, he then should proceed or he will be in default of his contract. However, it is still an unresolved question and I believe it should come to a head shortly so that, hopefully, T.A.C. and their people will pick up the ball on this so that we can proceed without further delay.
2. As you are aware, we are involved in several law suits, one from a subcontractor of Adolffson and Peterson and depositions have been started. In addition to this, the University has filed a third party dependant suit against T. A. C. and Carl Walker. This did bring a response from T.A.C. and their attorney was in the Twin Cities on October 17th and met with our counsel and it is my understanding he has made a preliminary proposal for our consideration. This is being reviewed by Briggs and Morgan and they will contact Mr. Tierney shortly to meet with us to discuss strategy.
3. I have made arrangements with Twin City Testing and Engineering Laboratory to run a Standard ACI load test on the "L" beam which will incorporate the modifications that are taking place on Phase I at the present time. The results of this will indicate to us what we can expect from these repairs.

Page 2  
Clinton Hewitt  
October 25, 1974  
Parking Ramp Progress Report

4. We should receive a report shortly from the Administrative Engineer for the Building Code Division of the State of Minnesota, reviewing the structural problems at the ramp and his analysis and findings on the modifications and repairs.

Therefore, in conclusion at this particular time, construction is moving ahead quite rapidly with this good weather but I still feel that the heat problem must be solved or we will again have unnecessary delays.

PEK:nf  
CC: James Brinkerhoff, Vice President  
Vern Carlsen, Ass't. Vice President  
Hugh Lampert  
R. J. Tierney  
✓ E. A. Kogl  
Jack Geretz



UNIVERSITY OF MINNESOTA  
TWIN CITIES

Engineering and Construction Division  
Physical Planning Office  
26 Folwell Hall  
Minneapolis, Minnesota 55455

October 23, 1974

COPY

Mr. Chester Zimmiewicz, P. E.  
Administrative Engineer  
Building Code Division  
State of Minnesota  
Department of Administration  
St. Paul, Minnesota

RE: Health Sciences Parking Ramp  
University of Minnesota  
Minneapolis Campus

Dear Mr. Zimmiewicz:

In reply to your letter to Mr. Kogl of October 4, 1974, I request the following:

1. Rather than have any additional meetings, we would like you to report your findings to the University on the subject project. It is assumed that you have all necessary information; if not, please contact me so we may provide any additional you may need.
2. We would ask that the report would address itself to three areas:
  - A. Review and comment as to the original structural design.
  - B. Review and comment as to the adequacy of the proposed corrections by the Architect to both Phases I and II. We are particularly interested as to their adequacy in meeting the required codes.
  - C. A reaction to the over-all expansion and contraction of such a large structure in view of the proposed corrections to the building.

Very truly yours,

Paul E. Kopietz  
Assistant Director of Planning

PEK:ng

CC: Gene Kogl ✓

THE ARCHITECTS COLLABORATIVE INC.

12 November 1974

JEAN B. FLETCHER  
1945 1966  
WALTER GROPIUS  
1945 1969  
NORMAN FLETCHER  
JOHN C. HARKNESS  
SARAH B. HARKNESS  
LOUIS A. McMILLEN

RICHARD BROOKER  
ALEX CVIJANOVIĆ  
HERBERT GALLAGHER  
WILLIAM J. GEDDIS  
ROLAND KLUVER  
PETER W. MORTON  
H. MORSE PAYNE  
ERNEST L. BIRDSALL  
TREASURER

ROBERT F. CRANE  
HOWARD ELKUS  
ALLISON GOODWIN  
JOHN HAYES  
JOSEPH HOSKINS  
LEONARD NOTKIN

QAZI B. AHMED  
KENDALL P. BATES  
SERGE CVIJANOVIĆ  
ROYSTON DALEY  
ROBERT DEWOLFE  
GREGORY DOWNES  
BASIL HASSAN  
THOMAS LARSON  
EDWARD MALICK  
RALPH MONTGOMERY  
PERRY NEUBAUER  
MICHAEL PRODANOU  
WALTER ROSENFELD  
RICHARD SABIN  
JOHN J. SCOTT  
DAVID SHEFFIELD  
EDMUND SUMMERSBY  
KENNETH TAYLOR  
MALCOLM TICKNOR  
ROBERT TURNER  
ROBERT WILSON  
LAURENCE ZUELKE

Mr. Paul Kopietz  
Assistant Director of Planning  
Engineering and Construction Division  
Physical Planning Office  
26 Folwell Hall  
Minneapolis, Minnesota 55455

Re: Health Sciences Parking Facility  
TAC Job No. 72023

Dear Paul:

In our telephone conversation of yesterday you relayed to us the content of a letter you received Friday, 8 November 1974, from the General Contractor, Adolfson and Peterson, Inc. In the letter the Contractor contends he requires a hold harmless agreement regarding the alignment of the structure or direction regarding the use of temporary heat if he is to proceed with the erection of the structure. Further, the Contractor is demanding that he receive direction from you today, 12 November 1974, or he will close down the project.

In light of the Contractor's contentions, which may have merit, it seems no other options exist except to:

- 1) postpone operations until spring and thereby further postpone substantial completion and occupancy, or
- 2) continue operations by authorizing temporary heating provisions.

Based on our conversation of yesterday, we assume the University is proceeding with the authorization of temporary heat.

Sincerely,

THE ARCHITECTS COLLABORATIVE Inc.



John J. Scott

JJS/mpw

cc: C. Sapers, K. Rogness

UNIVERSITY OF MINNESOTA  
TWIN CITIES

Engineering and Construction Division  
Physical Planning Office  
26 Folwell Hall  
Minneapolis, Minnesota 55455

November 13, 1974

The Architects Collaborative  
102 Hubbard Building  
2675 University Avenue  
St. Paul, Minnesota 55114

Attention: Mr. John Scott

Reference: Health Sciences Parking Ramp  
University of Minnesota

Dear Mr. Scott:

Enclosed find a copy of Change Order No. 3 together with a copy of my cover letter to A&P concerning winter heat.

This Change Order was issued pursuant to your advice and the University will look to your firm for reimbursement of all costs incurred as a result of its issuance.

Very truly yours,

Paul E. Kopietz  
Assistant Director of Planning

PEK/iej

Enclosures

cc: Clint Hewitt  
Joel Tierney  
E. A. Kogl ✓  
Jack Geretz  
Ervin Merklung  
Briggs & Morgan, Mr. Devney  
Hammel, Green and Abrahamson, Mr. Curt Rogness

UNIVERSITY OF MINNESOTA  
TWIN CITIES

Engineering and Construction Division  
Physical Planning Office  
26 Folwell Hall  
Minneapolis, Minnesota 55455

November 13, 1974

Adolfson and Peterson, Inc.  
General Contractors  
6701 West 23rd Street  
Minneapolis, Minnesota 55426

Attention: Mr. Gordon A. Peterson

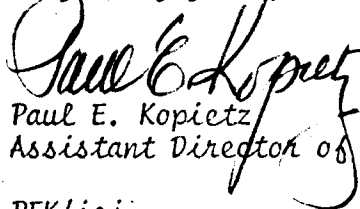
Reference: Health Sciences Parking Ramp  
University of Minnesota

Dear Mr. Peterson:

Enclosed find Change Order No. 3 issued under protest, providing for funding of winter heating costs. Issuance of the Change Order, together with Article 3D.04D of the Specifications, will obviate the need for any "hold harmless" agreements concerning erection. We demand that construction proceed.

The University wants to minimize all winter heating costs. To accomplish this we are prepared to review with you and Twin City Testing the specified requirements concerning minimum temperatures for curing, curing times and addition of admixtures to the concrete. Further, the University does not feel it is necessary to cover the top floor as indicated in your proposal and we are prepared to discuss alternative methods of proceeding on the top floor.

Very truly yours,



Paul E. Kopietz  
Assistant Director of Planning

PEK/iej

cc: Clint Hewitt  
Joel Tierney  
E. A. Kogl  
Jack Geretz  
Ervin Merkling  
Briggs & Morgan, Mr. Devney



**MODIFICATION TO CONSTRUCTION DOCUMENTS**

**UNIVERSITY OF MINNESOTA**

PROJECT Health Sciences Parking Facility  
CONTRACTOR Adolfson and Peterson

MOD. NO. \_\_\_\_\_  
MOD. REJECTED \_\_\_\_\_  
CHANGE ORDER NO. 3  
CONTRACTS TO BE MODIFIED  
 General Construction  
 Mechanical Work  
 Electrical Work  
 Vertical Transportation  
 Casework  
 \_\_\_\_\_  
 \_\_\_\_\_

When this Modification is signed, it shall become an order to proceed in accordance with the requirements of the Modification and the Contract Documents.

Cost change (Add) ~~(Deduct)~~ \$ See Below  
 No change in cost or time

A Change Order (will) (will not) be issued

Approved: \_\_\_\_\_ University Date \_\_\_\_\_  
*Planning Coordinator*  
Approved: \_\_\_\_\_ University Date 11-13-74  
*Engineering & Construction*  
Approved: \_\_\_\_\_ Contractor Date \_\_\_\_\_  
Recommended: John Scott Architect Date \_\_\_\_\_

Person Requesting Change: Adolfson and Peterson

Reason for Change: See below

Description of Change:

Circumstances Giving Rise to Change Order

1. Adolfson and Peterson Incorporated (A&P) general contractor on the above Project, has informed the University that unless a Change Order providing for the winter heating costs is issued immediately, A&P will terminate all construction operations.
2. A suspension of all construction operations at this time would result in substantial damage to the University.
3. The Public interest and considerations of safety require prompt completion of the Project.
4. The University deems the acts threatened by A&P to be in substantial breach of its contract with the University and in violation of the terms and conditions of said contract.
5. The University is compelled to secure completion of the Project without regard to the wrongful acts of A&P in order to reduce the losses and injury which would occur as a result of a termination of construction.

CHANGE ORDER

1. The University shall fund winter heating costs as part of the regular progress payments in an amount not to exceed One Hundred Sixty-Six Thousand Dollars and no/100 (\$166,040.00).

**MODIFICATION TO CONSTRUCTION DOCUMENTS**

**UNIVERSITY OF MINNESOTA**

PROJECT Health Sciences Parking Facility  
CONTRACTOR Adolfson and Peterson

MOD. NO. \_\_\_\_\_  
MOD. REJECTED \_\_\_\_\_  
CHANGE ORDER NO. 3  
CONTRACTS TO BE MODIFIED

When this Modification is signed, it shall become an order to proceed in accordance with the requirements of the Modification and the Contract Documents.

Cost change (Add) ~~(Deduct)~~ \$ See Below  
 No change in cost or time

- General Construction
- Mechanical Work
- Electrical Work
- Vertical Transportation
- Casework
- \_\_\_\_\_
- \_\_\_\_\_

A Change Order (will) (will not) be issued

Approved: \_\_\_\_\_ University Date \_\_\_\_\_  
Planning Coordinator

Approved: \_\_\_\_\_ University Date \_\_\_\_\_  
Engineering & Construction

Approved: \_\_\_\_\_ Contractor Date \_\_\_\_\_

Recommended: \_\_\_\_\_ Architect Date \_\_\_\_\_

Person Requesting Change: Adolfson and Peterson

Reason for Change: See Below

Description of Change:

CHANGE ORDER (Cont'd)

2. A&P shall provide all winter heat necessary for the performance of its work through the winter in a manner to be approved in advance in writing by the Supervising Engineer.
3. Winter heat costs shall be documented separately by A&P, and billed in the manner provided by Article 19.9 of the General Conditions of the Contract.
4. The University by issuing this Change Order does not acquiesce in or waive any rights which it has under the Contract or at law. The University reserves its rights to make any and all claims, or take any and all actions against A&P or its surety to recover amounts funded pursuant to this Change Order.

LAW OFFICE

BRIGGS AND MORGAN

PROFESSIONAL ASSOCIATION

2200 FIRST NATIONAL BANK BUILDING

SAINT PAUL, MINNESOTA 55101

291-1213

AREA CODE 612

November 13, 1974

CHARLES W. BRIGGS  
J. NEIL MORTON  
RICHARD E. KYLE  
SAMUEL H. MORGAN  
FRANK N. GRAHAM  
COLE GEHLER  
A. LAURENCE DAVIS  
FRANK HAMMOND  
LEONARD J. KEYES  
R. C. HART  
JOHN M. SULLIVAN  
BERNARD P. FRIEL  
BERT E. SWANSON  
M. J. GALVIN, JR.  
DAVID C. FORSBERG  
JOHN J. McNEELY  
McNEIL V. SEYMOUR, JR.  
EDWARD C. STRINGER  
TERENCE N. DOYLE  
RICHARD H. KYLE  
JONATHAN H. MORGAN  
JOHN L. DEVNEY  
R. L. SORENSON

PETER H. SEED  
PHILIP L. BRUNER  
SAMUEL L. HANSON  
RONALD E. ORCHARD  
JOHN R. KENEPICK  
JOHN R. FRIEDMAN  
JAMES W. BOWERS  
ANDRE J. ZDRAZIL  
DAVID J. SPENCER  
DOUGLAS L. SKEMA  
DANIEL J. COLE, JR.  
MICHAEL H. JERONIMUS  
BRUCE C. ECKHOLM  
DOUGLAS R. HADDUCK  
RICHARD D. HOLPER  
EDWIN P. LEE  
GERALD L. SVOHODA  
MARVIN T. FABYANSKE  
THADDEUS S. FIOUS  
DAVID L. MITCHELL  
BONNIE L. BEREZOVSKY  
STEVE A. BRAND  
MARK W. WESTRA  
LAUREL A. MARCH

COUNSEL  
ROBERT O. SULLIVAN  
HAROLD J. FINNEY

Mr. Carl M. Sapers  
Hill & Barlow  
225 Franklin Street  
Boston, Massachusetts 02110

Mr. Robert J. McGuire  
Cousineau, McGuire, Shaughnessy & Anderson  
904 First National Bank Building  
Minneapolis, Minnesota 55402

Mr. Clyde F. Anderson  
Meagher, Geer, Markham, Anderson,  
Adamson, Flaskamp & Brennan  
2250 IDS Center  
Minneapolis, Minnesota 55402

Re: Prestressed v.  
University of Minnesota et al.

Gentlemen:

On or about October 17, 1973 your respective clients, TAC and Walker, became aware of major structural design failures and errors in the first of two multi-story parking ramps designed by TAC and Walker as a part of the University new Health Sciences Center. Please refer also to letter from Mr. Paul Kopietz to TAC dated 12/5/73 and letter from Mr. Carl Sapers to B. C. Hart dated 12/21/73. Your clients and their expert consultants have acknowledged some of the most obvious design errors and have belatedly proposed and started to implement partial corrective measures. However, in spite of prompt, persistent and extraordinary efforts on our part to secure proposals, decisions and action by you, intolerable delays have continued. TAC and Walker have failed

Messrs. Sapers, McGuire  
and Anderson  
page two

November 13, 1974

to issue, negotiate and make arrangements to pay for and grant time extensions to the general contractor for extra work and expense due to changes and suspension of the work caused by your clients' design errors, and have utterly failed and refused to take effective action.

You have received copies of the following claim correspondence from A&P and Prestressed, Inc.:

Letter from A&P to TAC dated 7/22/74  
Letter from A&P to TAC dated 10/25/74  
Letter from A&P to University of Minnesota dated 11/8/74

You have been served with the Summons and Complaint herein.

You have received and failed to answer the following letters from this office:

Letter from John L. Devney to Carl M. Sapers dated 10/28/74  
Letter from Marvin T. Fabyanske to Anderson, Sapers and McGuire dated 11/8/74 with enclosures

This week on Monday and Tuesday we have reaffirmed our concerns and renewed our requests for action by you in telephone calls to Mr. Anderson and to Mr. McGuire. We have been told that Mr. Anderson has reported our requests to Mr. Sapers.

We did have one conference with Mr. Sapers in which he discussed and proposed to confirm an offer for resolution of the problems and claims on this project. When Mr. Sapers failed to confirm his offer, we wrote a letter to him dated 10/28/74 in which we asked him to confirm his offer. To date he has failed either to make a new offer or to confirm the offer previously discussed.

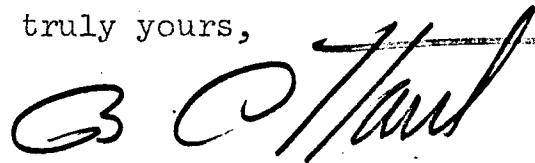
As of 5:30 p.m. Tuesday, November 12, 1974, we were advised by Mr. Anderson that he was not authorized by CNA to do anything. Mr. Anderson told us that Mr. Sapers told him that TAC would do nothing.

Messrs. Sapers, McGuire  
and Anderson  
page three

November 13, 1974

I told Mr. Anderson that the University has no alternative but to take action on behalf of TAC and Walker to see that the contract work is completed. The University will therefore be obliged to issue necessary change orders to the General Contractor to accomplish completion of the contract work. The University will hold your clients and their Errors and Omissions insurance carrier legally responsible for all costs, delay damages, legal expenses and disbursements caused by your inaction and will also seek punitive damages for willful, contumacious dilatory refusal to honor your contract commitments.

Very truly yours,

A handwritten signature in cursive script, appearing to read "B. C. Tard", written over a horizontal line.

BCH:ncr

cc: Mr. Paul E. Kopietz

UNIVERSITY OF MINNESOTA  
TWIN CITIES

Engineering and Construction Division  
Physical Planning Office  
26 Folwell Hall  
Minneapolis, Minnesota 55455

November 19, 1974

TO: Clint Hewitt  
FROM: Paul E. Kopietz **PEK**  
SUBJECT: Health Science Parking Ramp  
Progress Report

Since my last report, the following has taken place:

1. Phase I Construction: The Phase I modifications are proceeding as before. As a matter of fact, the General Contractor has been asked by Carl Walker and Associates to increase the size of the crew installing brackets, and they have agreed to do this.
2. Phase II Construction: Has been proceeding as rapidly as possible since my last report. However, it has not been without problems. We were notified on November 8, 1974 by the General Contractor that they would shut the project down on Tuesday, November 12 if the question of winter heat was not satisfactorily resolved. (The winter heat is needed to place the concrete topping). Therefore, after considerable consultation, it was decided that the University would proceed with a change order for winter heat only. This was done after it became apparent that we would not receive any favorable support or help from TAC, Carl Walker or CNA in resolving this problem. Therefore, the University took it upon themselves to issue this change order in order to keep the project moving ahead as quickly as possible.

At the writing of this report, the General Contractor still has not signed the change order and indicates he has some further questions before he will do this. A meeting is scheduled for Wednesday, November 20 to discuss his problems and hopefully, at that time it can be resolved. It is my hope that construction will continue to proceed.

3. At this time, the tentative completion dates for the work still remain as approximately March 1, 1975 for Phase I and May 15, 1975 for Phase II.
4. Twin City Testing will proceed shortly with the standard ACI load test on the "L" Beam as previously mentioned in my report of October 25, 1974.

PEK/iej

cc: James Brinkerhoff Hugh Lampert **LE** A. Kogl  
Vern Carlsen R. J. Tierney Jack Geretz

UNIVERSITY OF MINNESOTA  
TWIN CITIES

Engineering and Construction Division  
Physical Planning Office  
26 Folwell Hall  
Minneapolis, Minnesota 55455

December 4, 1974

TO: Clint Hewitt  
FROM: Paul E. Kopietz *PEK*  
SUBJECT: Health Science Parking Ramp  
Progress Report

Since my last report, the following has taken place:

- (1) Phase I Construction: The modifications are proceeding as before; the contractor has increased his crew size and it is the intention of Carl Walker to have at least two floors ready by the first of the year. Whether or not they will be usable and functional for parking is questionable at this time.
- (2) Phase II Construction: As you are aware, we have provided the contractor with a change order for winter heat and I am pleased to report that work is proceeding rapidly. At this time, the west half is fully enclosed for heat and the second level and 5th level as well as one half of the roof have been poured. If all goes well, the west half topping, with the exception of a small segment on the south end, will be completed by Tuesday evening, December 10th. Erection is proceeding on the east half. I am very optimistic if we get a break in the weather the rest of December, we can make very significant progress toward completion of this second phase.
- (3) A meeting was held on Tuesday, November 26th, with all of the various parties and their attorneys seeking ways to come to some kind of settlement. Briefly, what happened was that C. N. A. was trying to settle the total claim within the one million dollar coverage that Carl Walker has and in this way T.A.C. would not be exposed at all. However, when the known costs were added up, exclusive of the University's, this left only about sixty to seventy thousand dollars for the University out of the one million. Obviously, at this point, that is not acceptable and therefore there was really no agreement reached at this meeting.

Page 2  
Clint Hewitt  
Health Science Parking Ramp  
Progress Report

(4) Twin City Testing intends to proceed with their load test the week of December 9th.

PEK:nf  
CC: James Brinkerhoff  
Vern Carlson  
Hugh Lampert  
R. J. Tierney  
E. A. Kogl ✓  
Jack Geretz



**MODIFICATION TO CONSTRUCTION DOCUMENTS**

**UNIVERSITY OF MINNESOTA**

PROJECT Health Science Parking Facility  
CONTRACTOR Adolfson & Peterson

MOD. NO. \_\_\_\_\_  
MOD. REJECTED \_\_\_\_\_  
CHANGE ORDER NO. 3 (Amended)  
CONTRACTS TO BE MODIFIED

When this Modification is signed, it shall become an order to proceed in accordance with the requirements of the Modification and the Contract Documents.

- General Construction
- Mechanical Work
- Electrical Work
- Vertical Transportation
- Casework
- \_\_\_\_\_
- \_\_\_\_\_

Cost change (Add) ~~(Decrease)~~ \$ See Below  
 No change in cost or time

A Change Order (will) (will not) be issued

Approved: *Paul Kopetz* Planning Coordinator University Date \_\_\_\_\_  
 Approved: *Paul Kopetz* Engineering & Construction University Date 11/26/74  
 Approved: \_\_\_\_\_ Contractor Date \_\_\_\_\_  
 Recommended: John Scott Architect Date \_\_\_\_\_

Person Requesting Change: Adolfson & Peterson  
Reason for Change: See Below

Description of Change: (Refer to Modification to Construction Documents, Change Order No. 3, dated 11/13/74.)

CIRCUMSTANCES GIVING RISE TO CHANGE ORDER

Items 1 through 5 remain the same.

CHANGE ORDER

Delete Item 1 and substitute the following:

1. The University shall fund winter heating costs as part of the regular progress payments in an amount not to exceed TWO HUNDRED NINE THOUSAND FIVE HUNDRED FORTY EIGHT AND NO/100 DOLLARS (\$209,548.00).

Items 2 thru 4 remain the same.

PEK:nf  
CC: Paul Maupin  
Erv Merkling  
HSAE - Kurt Rogness  
Records



UNIVERSITY OF MINNESOTA  
TWIN CITIES

Engineering and Construction Division  
Physical Planning Office  
26 Folwell Hall  
Minneapolis, Minnesota 55455

December 11, 1974

Mr. Jack Devney  
Briggs & Morgan, Attorneys  
West First National Bank Bldg.  
332 Minnesota Street  
St. Paul, Mn. 55101

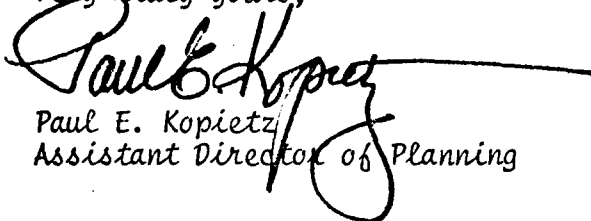
RE: Health Science Parking Ramp  
University of Minnesota  
Minneapolis Campus

Dear Mr. Devney:

I am enclosing two letters for your information, which were received in this office. They are as follows:

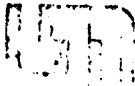
1. A letter from Mr. Zimmewicz, Administrative Engineer in the Building Code Division for the State of Minnesota, reviewing the Health Sciences Parking Ramp as previously requested by Mr. Kogl. As you can see, he has some questions on the Phase I modifications. The testing that we are presently carrying out with Twin City Testing, I believe would satisfy his recommendation for a test. I have talked with Mr. Zimmewicz and he has indicated that when we start the testing, he wishes to review it with us and be involved.
2. The second letter is from Dean Schaffer to Joel Tierney and is an outline of the costs or damages suffered by the School of Dentistry as a result of not being able to use the Health Sciences Parking Ramp. I will send a copy of this memo to Gene Blanski.

Very truly yours,

  
Paul E. Kopietz  
Assistant Director of Planning

PEK:nf  
Attachments

CC: Joel Tierney w/attachments



UNIVERSITY OF MINNESOTA  
TWIN CITIES

Office of the Dean

School of Dentistry  
136 Owre Hall  
Minneapolis, Minnesota 55455

December 6, 1974

Mr. Joel Tierney, Attorney  
University of Minnesota Attorney's Office  
330 Morrill Hall  
University of Minnesota

Re: Oak Street Parking Ramp

Dear Mr. Tierney:

The delayed opening of the Oak Street Parking Ramp to be used by patients of the School of Dentistry has created a tremendous hardship to these people, to our students and faculty, and has created tremendous difficulties for our teaching programs. In determining the impact of the delay, I requested all of the Directors of the Patient Care Programs to evaluate in dollars the amount which was lost. These losses were due to appointment failures by the patients who could not find a parking place and, secondly, because many others came so very late that we could not render the services that had been planned for the respective sessions. Therefore, with the above two criteria, I will enumerate the lost revenues by programs - assuming that the ramp will not open until February 15, 1975.

Fixed Prosthesis

Patient failures or late arrivals each day represents 20% of their potential income or a \$32,000 loss annually.

Operative Dentistry

In Operative Dentistry there is an average of 16 patient cancellations due to parking each day, and 20 additional people who complain vociferously about the parking problems. This represents an annual loss of \$30,720.

Pedodontics

Pedodontics is having an appointment failure rate of 5 patients per day. This represents income of \$50.00 per day. Therefore, the loss is \$12,000 yearly.



STATE OF MINNESOTA  
DEPARTMENT OF ADMINISTRATION  
SAINT PAUL

BUILDING CODE  
DIVISION

December 3, 1974

Mr. Paul Kopietz  
Assistant Director of Planning  
Engineering and Construction Division  
Physical Planning Office  
26 Folwell Hall  
Minneapolis, Minnesota 55455

Dear Mr. Kopietz:

Re: Health Sciences Parking Ramp  
University of Minnesota  
Minneapolis Campus

This letter is in answer to your letter on the above subject, dated October 23, 1974. We will review the structural components in the order presented in your letter of the above date as they relate to the State Code.

- A. Review and comment as to the original structural design. The following items are the result of our investigation:
1. In checking the original design, we find that the torsion stresses in the precast concrete spandrel beams exceeds the minimum requirements as outlined in Section 2611 of the Uniform Building Code in both the required number and spacing of stirrup steel and in the amount of longitudinal steel required for torsion reinforcement.
  2. While it does not appear that bearing stresses at the ends of the spandrel beams or on the bearing areas of the precast concrete columns supporting them are greater than those allowed by the Code, there are nevertheless diagonal bearing cracks and spalling which have developed on the bearing areas at many of the precast concrete columns.
- B. Review and comment as to the adequacy of the proposed corrections by the consultant to both phases I and II:

Page 2

December 3, 1974  
Mr. Paul Kopietz

1. In our judgement, the corrections made to Phase I addresses itself to increasing the amount of bearing area for the precast spandrel beams which, in our judgement and calculations, are not overstresses. There has been no attempt to correct for the torsion stresses, except possibly to reduce to overall span and consequent torsion load by the addition of the steel brackets.
  2. The added bearing supports, stirrups and longitudinal reinforcing steel added to the spandrel beams designed for the Phase II addition appear to satisfy the minimum requirements of both the A.C.I. 318-71 and the 1973 Edition of the Uniform Building Code.
- C. A reaction to the over-all expansion contraction of such a large structure in view of the proposed corrections to the building.

We did not evaluate the structure as to the expansion and contraction of the building, mainly because this is not an area generally covered by the Code. We do believe, however, that with the extensive use of the elastomeric pads under all major load carrying members, the problems inherent with the extreme range of temperature will be minimal.

RECOMMENDATIONS:

In light of the fact that in our opinion and others there does not appear to be any proposed or actual solution to the torsion stress cracks, we would advise that a full bay test be made of the reworked Phase I structure, as per Section 2620 of the 1973 Edition of the UBC and Chapter 20 of ACI-318-71.

We would also advise that if the cracks must be accepted, a statement to the effect that the long term effect on the reinforcing steel would not affect the over-all structural integrity of the parking ramp.

If you have any further questions, please do not hesitate to contact this office.

Yours truly,

*Chester J. Zimniewicz* P. E.  
Chester J. Zimniewicz, P.E.  
Administrative Engineer  
*by jh*

CJZ:jh



UNIVERSITY OF MINNESOTA  
TWIN CITIES

Engineering and Construction Division  
Physical Planning Office  
26 Folwell Hall  
Minneapolis, Minnesota 55455

February 6, 1975

TO: Clint Hewitt  
FROM: Paul E. Kopietz *PEK*  
RE: Health Science Parking Ramp  
Progress Report  
Minneapolis Campus

Since my last report, the following has taken place:

- (1) Phase I construction - the Phase I portion of the ramp has been put into operation as of February 3, 1975. The test of the beam, as previously mentioned, has been completed by Twin City Testing & Engineering Lab and the results showed that the ramp would be safe to use. However, there still are questions on the long term effects of the correction and what type of problems we may have due to expansion and contraction. Therefore, we are further re-viewing the full implications and no doubt will be in the process of setting up some type of monitoring program to observe what happens to the ramp under the loading conditions of cars and the various changes in seasons.
- (2) Phase II construction - we have had some small set backs in our progress due to the inclement weather that we had in January. The problem was that some of the precast elements that were essential to completion of the south end could not be hauled from Sioux Falls due to road restrictions imposed by the Minnesota Highway Dept. However, as of this date all but two of the sections have arrived and we are in the process of buttoning up the south end. We still have the south end stair towers to complete and, of course, all of the electronic parking control mechanism must be installed. The contractor, of course, still sticks with his previous estimate of May 15, 1975 for final completion but I am optimistic that by April 1st, the full ramp should be in pretty good shape and may be usable at that time.

The one element that may cause some delay is the pouring of the driveways and exits on the south end, which are of course on grade and outside of the building. But all in all, it has gone quite well.

Page 2  
Health Science Parking Ramp  
Progress Report  
Clint Hewitt  
2/6/75

- (3) A further meeting was held recently with Carl Walker and his attorney, Briggs and Morgan, Joel Tierney and myself. We explored how a settlement may be reached on the various suits in progress. It was, in my opinion, quite a constructive meeting. I believe that, if needed, Mr. Tierney could report more fully on it.

PEK:nf  
CC: James Brinkerhoff  
C. L. Carlsen  
Hugh Lampert  
R. J. Tierney  
✓ E. A. Kogl  
Jack Geretz

April 17, 1975

Briggs & Morgan  
332 Minnesota Street  
St. Paul, MN. 55101

Attn: Jack Devney

RE: Health Science Parking Ramp  
University of Minnesota  
Minneapolis Campus

Dear Mr. Devney:

This is in response to your recent request asking what monies we have expended on corrections on the ramp with the contractor to date and also funds expended with Twin City Testing, our consultants and in-house. The contract to date is up through Payment No. 20 that covering the period to February 28, 1975, we find the following:

<u>CHANGE ORDER</u>	<u>DESCRIPTION</u>	<u>AMOUNT OF CHANGE ORDER</u>	<u>PAID TO DATE</u>
C. O. #1		\$274,000.00	\$179,478.19
C. O. #2	Phase II - reinforcing and haunch beam design and column changes.	239,751.00	239,421.60
C. O. #3	Phase II - winter heat	209,548.00	111,918.09
Item 4	Temporary heat for Phase I. Authorized by Carl Walker and TAC on Dec. 6, 1974. (copy of letter enclosed).		
		NOT TO EXCEED 10,000.00	<u>2,190.17</u>
		TOTAL PAID TO DATE ON ITEMS ABOVE.....	\$533,008.59
		Less reimbursement from C.N.A. on C.O.1-162,807.19	
		AMOUNT ON CONTRACT NOT REIMBURSED	\$371,001.49

A. Amounts invoiced to date from Twin City Testing on beam tests 22,773.29

B. Amounts invoiced to date from Engineering Consultants, Johnston  
& Sahman (last invoice Nov. 7, 1974; this will undoubtedly  
increase \$3,000 to \$5,000.) 5,896.00

C. Time spent by office - Two & 1/2 days per month since Oct.  
1973. This would include myself and Gene Kogl. I am sure  
this is a conservative estimate - 47 days at \$100 per day 4,750.00

GRAND TOTAL ..... \$404,420.78





UNIVERSITY OF MINNESOTA  
TWIN CITIES

Engineering and Construction Division  
Physical Planning Office  
26 Folwell Hall  
Minneapolis, Minnesota 55455

July 30, 1975

Briggs & Morgan  
332 Minnesota Street  
St. Paul, MN. 55101

Attn: Jack Devney

RE: Health Science Parking Ramp  
University of Minnesota  
Minneapolis Campus

COPY

Dear Mr. Devney:

As per our recent phone conversation, this is the latest cost summation and update on the present job status. If you will refer to your letter of April 17, 1975, I will outline the items in a similar manner.

CHANGE ORDER	DESCRIPTION	AMOUNT OF CHANGE ORDER	INVOICED TO DATE
C.O.#1	Corrections	\$274,000.00	\$208,661.04
C.O.#2	Phase II - reinforcing and haunch beam design & column changes.	239,751.00	239,751.00
C.O.#3	Phase II - winter heat	209,548.00	117,221.75
Item #4	Temporary heat for Phase I authorized by Carl Walker and TAC on Dec. 6, 1974. NOT TO EXCEED	10,000.00	2,190.71
Item #5	Temporary restraining angles required because of beam problem.	3,000.00	3,000.00*
Item #6	Delay claim from Adolphson and Peterson.	-	101,961.62**
TOTALS OF ABOVE ITEMS INVOICED TO DATE			\$672,568.12
LESS REIMBURSEMENT FROM CMA ON C.O.#1			162,007.10
AMOUNT ON CONTRACT NOT REIMBURSED			\$510,569.12

The items as outlined above are the latest figures we have available and it would be my guess that they are final figures and I would not expect too much change from these.

Page 2  
Briggs & Morgan  
Health Science Parking Ramp  
July 30, 1975

Further explanation of Items #5 and #6:

\* Item #5 - a copy of this proposed change order modification is enclosed for your information. When the problem with the beams became apparent, Carl Walker ordered restraining clip angles be placed on the back side in order to prevent the possibility of their walking off the column. I do not believe that we should have to pay for this.

\*\* Item #6 is the delay claim that has been submitted monthly and, of course, we have always turned it down but this is the first time I have been able to include for you the detailed explanation of the claim as he sees it. Incidentally, we have copies of each one of these monthly delay claims that he has sent to us.

There was one other item that I did not include in the above but will mention for your consideration. By the time we discovered just how bad our ramp problem was, Gage Brothers, the ledger beam manufacturer was into production on the 2nd phase. We stopped him immediately. However, there were 14 beams that he did manufacture that had to be discarded and we had to pay for at a value of \$9,796.20. It seems to me that this should also be included and if you agree then the totals above will change by that amount.

I also wish to include for your information some other reports to review; they are as follows:

1. The test report on Phase II beams as requested by Prestressed Concrete dated May 20, 1975, and A. & P's transmittal letter to TAC and Carl Walker. As you can see by the report, it was very inconclusive and totally unsatisfactory; therefore, I called Twin City Testing and asked for some more definitive information and a report that was meaningful. They then went out to the project and did further checking with different instruments and different personnel and sent a report to me dated June 23, 1975. Based on this report, I am convinced that the required steel is present in the members.
2. I am enclosing a number of other memorandum by Carl Walker to TAC showing they have been intimately involved in the inspection of the structure and their concerns. Most all of these items, as outlined in Mr. Arons various memorandum, have been taken care of.

I indicated to you that A & P was essentially complete and that the amount of punch list work is rather minor. It is as follows:

1. Approximately four (4) sections of expansion joint need further repair.

Page 3  
Briggs & Morgan  
Health Science Parking Ramp  
July 30, 1975

2. The grade level parking and directional signs have not been installed.
3. Door in the storage room needs minor adjustment.
4. Several joints between beams need a little more work so we have the proper required distance between them.
5. There is one joint in the slab where caulking was missed.

A & P is asking if there is any chance that their retainer could be reduced to \$100,000.00. The present retainer is \$186,069.33.

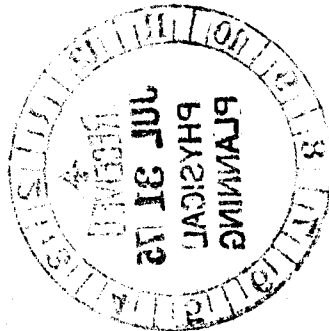
I am aware that there is a great deal of information in this letter and I trust that you can sort it out successfully. I will be on vacation for the next two weeks, so if you have any questions, call me yet this week.

Very truly yours,

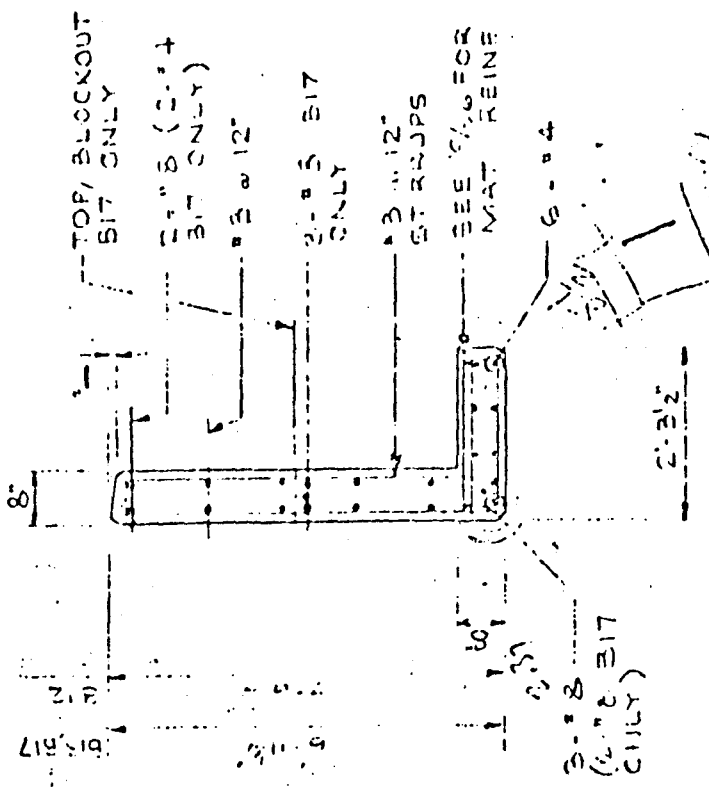


Paul E. Kopietz  
Director of Engineering & Construction

PEK:nf  
cc: R. J. Tierney  
Clint Hawitt  
Encl.



05/26. T1



SPANDREL BEAMS B12, B13, B17

FOR  
ONLY  
-4-