STRUCTURAL FLOOR ANALYSIS

FINAL (100%) REPORT
FEDERAL BUILDING
517 Gold Avenue, SW

BPLW Project Number: 91062.009
November 5, 1992

BPLW Architects & Engineers, Inc.
American Financial Center No. 5, Suite 400
2400 Louisiana Blvd., NE
Albuquerque, New Mexico 87110
(505) 881-2759

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INTRODUCTION:

The purpose of this report is to explain the investigation, structural floor analysis, and the results of this analysis on the floor slabs of the Federal Building located at 517 Gold Avenue SW, Albuquerque, New Mexico.

This investigation was prompted by several previous studies by this office regarding the floor capacities of this building. The initial studies were performed to investigate the possibility of floor overloading conditions due to unusually heavy loads caused by map files in rooms 5031 and 6433, and by a new air handling unit in room 1019. A seismic analysis of the entire building was also performed.

The previous investigations revealed several discrepancies in the original construction documents dated 1956. The reinforcing steel was specified to comply with ASTM 305-49, an ASTM reference that has since changed to ASTM 615. However, ASTM 615 allows for two different grades of steel, Grade 40 with a yield strength of 40 ksi and Grade 60 with a yield strength of 60 ksi. It is not apparent from the construction documents which grade of reinforcing steel was actually used. For the purpose of that study, the conservative assumption of Grade 40 was used.

It was also unclear on the original construction documents what strength of concrete was used for the floor slabs. The drawings called for three different strengths of concrete to be used: 2500 psi, 3000 psi, and 3750 psi. The columns were specified to be of 3750 psi concrete and the walls were to be of 3000 psi concrete, but there was no indication which strength of concrete was used for the floor slabs. For the purposes of that study, an assumed concrete compressive strength of 3000 psi was used.

Based on these assumptions, the previous studies showed that the floors of the building were overstressed under the loads induced. In fact, the floors were overstressed when subjected to only the live loads prescribed by the Uniform Building Code plus the dead loads of the floors.

Therefore, this report was requested by the General Services Administration, Design and Construction Division, Fort Worth, Texas through delivery order number P-07-92-JU-0133 to find the actual capacity of the floor slabs based on the strengths of the concrete and reinforcing determined by the material testing procedures.

SCOPE:

The investigation of the floor load capacity of the two-way floor slab systems consisted of field sampling and testing the concrete and reinforcing in the slabs, a field survey of the deflections of a particular floor slab, a structural analysis based on the strength tests performed on the material samples, and general conclusions regarding the strength and serviceability of the structure based on the results of the tests and analysis.

The field sampling and testing consisted of obtaining several core samples from the floor slab and testing them for compressive strength. In addition to the core samples, Windsor Probe tests were required to supplement the data obtained from the compressive tests on the core samples. Also required was a sample of the reinforcing steel to be tested for tensile strength.

Measurement of the existing floor deflections was to be performed using state-of-the-art surveying equipment. These were to be performed on a typical frame in the east/west and north/south directions.

The structural analysis was requested by GSA to be a two-way slab analysis by the Equivalent Frame Method. The analysis was to include shear strength and moment capacity of the floor slabs. It was to comply with ACI 318-89 and with PCA'S "Notes on ACI 318-89, Building Code Requirements for Reinforced Concrete." Also requested was a comparison of the existing deflections versus calculated deflections.

Conclusions regarding strength and serviceability of the floor slabs based on the structural analysis are presented in this report as is the comparison of actual and theoretical deflections.

FIELD SAMPLING AND TESTING:

Concrete coring, windsor probe tests, floor surveying, asbestos fiber sampling and minor abatement for this project was performed on August 29, 1992 by Geo-Test, Inc., Community Sciences Corporation and R&H Associates under the supervision of BPLW. The work commenced at 9:00 a.m. and was completed by 4:00 p.m. Personnel present on site were:

Organization	Name
BPLW	Jonathan Sanchez
R&H Associates	Floyd Rubi Matthew Rubi
Geo-Test, Inc.	
Community Sciences Corporation	

Jeffrey R. Bergmann, P.E. - Project Manager was available by phone and was contacted at various times of the day.

Concrete cores and Windsor Probe tests were performed by Geo-Test, Inc. The sixth floor was determined to be a fairly representative floor and thus all samples were taken from this floor. The samples were taken from as unobtrusive areas as possible and all damage to existing finish materials was repaired immediately. Core samples and the rebar sample were obtained and Windsor Probe tests were performed. Locations of each of these are shown in Appendix A.

Tension cracking was observed in the areas exposed to perform core drilling. The cracks were approximately 4 inches to 6 inches apart and most appeared to be less than 1/64 of an inch in width. The cracks extended in both longitudinal and transverse directions, forming a 4- to 6-inch "grid". The full extent of the cracking was not apparent from the limited portion of slab that was exposed.

Due to the number of the cracks in the areas identified for core samples, core extraction was extremely difficult. A number of cores were drilled, for which complete extraction of a solid core suitable for testing was not possible. The third sample suitable for testing was not obtained until late in the day. In order to minimize disruption to GSA staff or tenants, a decision was made by Jeffrey R. Bergmann, to omit one core in lieu of returning for a single core extraction or further damaging any other areas in the building.

The three core samples were cured for 48 hours and then tested for compressive strength in accordance with ASTM C42 and ACI 437-R-67. Results from the eleven Windsor Probe tests were correlated and an explanation of the correlation procedure is provided in Appendix A. The one rebar sample was cut from the floor slab and was tested for yield strength and ultimate strength in accordance with ASTM A370 and ACI 437. Results of these tests are listed in Appendix "A".

Floor deflections were also measured on August 29, 1992. The measured deflections are shown in Appendix "A" and are shown in decimals of a foot, not decimals of an inch.

The survey was performed by Community Sciences Corporation with a ZIESS NI-22 automatic level, fiberglass level rod, and a chrome clad chain. Elevations were taken by setting the level rod on top of an icepick pushed thru the carpet tile to solid strata vinyl tiles. The levels were closed thru the corridors and open shots in the rooms off the corridor were taken. The benchmark was located at the doorway of the southern stairway because of the continuous concrete walls which extend from the basement to the eighth floor roof. This was established as 100.00'.

STRUCTURAL ANALYSIS:

LOADS:

The dead loads generated and listed in Appendix B include the weight of the structure and building materials present. The live load used for the analysis was 80 psf in accordance with the scope of work requested by GSA. This was the design live load specified on the original construction documents dated 1956. A live load of 50 psf in office spaces and 100 psf in corridors as prescribed by the Uniform Building Code was also investigated.

STRUCTURE PROPERTIES:

The geometric configuration of the structure and the floor slab was taken from drawings supplied by GSA. Site investigations from previous studies mentioned earlier yielded no major contradictions to those plans. The floor slab is shown on those plans to be an 8" thick two-way reinforced concrete slab system with 4" dropped panels (total thickness 12") at the columns. The columns are cast-in-place concrete columns on a 25' grid.

The compressive strength tests of the core samples yielded compressive strengths of 2100 psi, 2300 psi, and 2450 psi. Results of the Windsor Probe tests ranged from 2300 psi to 3500 psi. An average of the compressive test results would indicate a compressive strength of 2283 psi. However, an average of the Windsor Probe results would indicate a compressive strength of 2810 psi. The results of compressive strength tests of core samples are generally more reliable than the Windsor Probe tests because many variables can greatly affect the results of the Windsor Probe tests. Several obvious variables include aggregate rebound, angle of penetration and variations in surface hardness. ACI 318R-89 Section R5.6.4 states that "Such tests are of value primarily for comparisons within the same job rather than as quantitative measures of strength." The Windsor Probe tests were used primarily to determine the consistency of the concrete strength, whereas the compressive strength tests were used to determine actual concrete strength. Therefore, a design compressive strength of 2300 psi was used for the analysis. This is considerably lower than the compressive strength of 3000 psi assumed in previous studies.

The tensile strength test of the slab reinforcing indicated a yield strength of 77.3 ksi. This indicates that the reinforcing is actually Grade 60 reinforcing steel with an average yield strength of 60 ksi. Therefore, the yield strength of the rebar used in the analysis was 60 ksi. This differs from the 40 ksi steel assumed in previous studies.

METHOD OF ANALYSIS:

The method of analysis used was the Equivalent Frame method as per ACI 318-89 (see Appendix B for calculations). This was used to calculate the floor slab stiffness at

typical sections, dropped panels and at columns. The "equivalent frame" was then modeled on the computer to calculate the stresses in the slab and the columns. The stresses in the members were factored with appropriate ACI load factors in the load combination #1 for negative moment and load combination #2 for positive moment. These load combinations are shown graphically in Appendix B. The other load combinations were for computational conveniences only. The factored stresses calculated by the computer program were then compared to the ultimate moment capacity of the member.

The calculated moments were distributed to the column strips and middle strips per ACI 318-89 Section 13.7.7.5 and then compared to the capacities of those sections. This was done for additional information only. The comparison of the calculated moment to the capacity of the entire slab beam should be the criterion for determining structural adequacy.

To model the deflections of the slab, a three-dimensional finite element analysis was utilized (see Appendix C for a summary of the results). One structural bay supported at the four corners was modeled using 1152 flat plate finite elements. Deflections were calculated for the both the gross moment of inertia and the effective moment of inertia.

The shear loads were calculated by hand and compared to the shear capacities of the slabs.

All of the structural calculations used in the analysis are given in Appendix "B".

CONCLUSIONS:

The floor slabs for this building have dropped panels (8'-4" x 8'-4" x 12" thick) at the columns. These shear panels increase the shear capacity of the slab by increasing the area stressed in shear. The shear panels also contain a rebar "shearhead", originally designed to increase the shear capacity of the panels. The shearheads, however, do not have adequate development length for the rebar and thus would simply pull out of the slabs when subjected to shear loads. Therefore, the shearheads were not considered to add to the shear capacity. The actual shear capacities of the floor slabs are less than the ones calculated in the previous study because 2300 psi compressive strength found was less than the assumed 3000 psi. The lower floor slabs (1st through 5th floors) have adequate shear capacity. ~~The sixth, seventh, and eighth floors have service live load~~ capacities of 53 psf, 66 psf, and 79 psf respectively ~~(see Appendix B)~~.

The calculated deflections were much less than the actual ones. Even considering long term deformations and a totally cracked section, as long as the sides of the slab were prevented from rotating (i.e., as close to real world conditions as possible) due to adjacent slabs, the actual deflections were much greater than the calculated ones. The only way to approach actual deflection was by manipulating the computer model to allow free rotation at all four sides of the slab, assume a totally cracked section, include long-term deformations and increase the load on the slab. The measured and maximum deflection at mid panel of 2.88 inches, which is twice of that allowed by ACI 318 serviceability limits.

There are several possibilities for the apparent discrepancies. Since the actual 36 year compressive strength is less than the 28 day compressive strength indicated on the construction documents, the compressive strength of the slabs at the time of shore removal, or when the next floor was poured, would have been much less than anticipated. This in turn would have reduced the modulus of elasticity and caused greater deflections than expected. The floor slabs could have experienced a plastic deformation during construction. Another possibility is that the floor slabs at one time or another had been considerably overloaded. This could have resulted in plastic deformation of the reinforcing steel, which cannot be accounted for in a typical deflection analysis. In either case, the large deflections measured are a matter of grave concern and could render the results of an equivalent frame analysis inaccurate. During concrete core recovery, the testing subconsultant had to pick the areas from which cores were taken very carefully because of the quantity of cracks in the slab.

The problems with core recovery and the large deflections measured leads us to conclude that cracking in the tension zones of the slab has occurred.

The tension zone cracking may have also led to partial yielding of the reinforcing, bond failure or a number of partial failure modes whose investigation is not within the scope of this study.

Four frames were analyzed using the equivalent frame method, one frame for each direction of each of the 5th and 6th floors. The slab on the 6th floor is typical for the 7th and 8th floors and the slab on the 5th floor is typical for the 2nd, 3rd, and 4th floors. The increase in tensile strength of the reinforcing, compared to previous studies, increased the moment capacities of the slabs a great deal. Actual moment capacities based on uncracked sections are listed in tabular form in Appendix C. The maximum load is 85 psf for the 2nd through 5th floors and 90 psf for the 6th through 8th floors. These do not meet the requirements for corridors per the Uniform Building Code, but do meet the minimum requirements for standard office spaces.

The calculated service live load capacities for both moment and shear are tabulated in Appendix B.

The loads of the map files in room 6433 (previous study for rooms 6433 and 5031) equal approximately 55 psf. These loads combined with 50 psf for people, desks, chairs, etc. exceeds the maximum live load capacity of the slab. This could have caused the large deflections observed in this room and could cause an equivalent frame analysis method for adjacent areas of the 6th floor to show an inaccurately high load capacity.

Site visits from previous studies and from the investigation of rooms 4015, 7437, and 8017 being performed in accordance with Modification #1 to this contract have revealed that noticeably excessive deflections exist on the 4th, 5th, 6th, 7th, and 8th floors. The deflections seem to be consistent throughout each of these floors.

RECOMMENDATIONS:

The primary issue "is the floor adequate to safely support the loads imposed". Although analysis based on uncracked sections indicates that there exists nominal capacity in the slab, engineering judgement on the issue leads one to be rather suspect of the slabs integrity. Therefore, one of several different options should be pursued.

1. Perform further studies. Several different options for additional studies have been discussed. The first option is to perform a finite element analysis of the entire structure, instead of analyzing only one frame in each direction by the equivalent frame method. While this would give more information on the behavior of the entire structure, especially with regard to deflections, the results would probably be very similar to the results of this study. The finite element analysis of the slab in one bay in this study would theoretically provide upper and lower bounds for the slab deflections. Deflections given by a finite element analysis would be somewhere between these bounds, because the criteria for the analysis would be the same as that used for this analysis. The calculated moments and shears would be very close to those already calculated because the loads would be the same, and the equivalent frame method already performed has been proven to be quite accurate with regard to moments and shears. The equivalent frame method, however, is not an accurate approximation of the deflections, that is the reason a finite element was performed in this study to calculate deflections.

   Another investigation that could be performed is a load test. This would entail evacuating all tenants and valuables, placing a load equal to the anticipated load due to people, furniture, and equipment on the floor slabs in most critical configuration possible, leaving the load in place for 24 hours, measuring the deflections, removing the load, and then remeasuring the deflections after a 24 hour waiting period. This test would determine if the structure can withstand the specified load. It would, however, be quite expensive and very disruptive to the tenants. In addition, given the deflections measured in the slabs and the possibility of partial failure, this test could be very dangerous. It could cause a catastrophic failure. In fact, ACI 318R Section R20.4.7 states that:

   > "A general acceptance criterion for the behavior of a structure under the test load is that it shall not show 'visible evidence of failure.' 'Visible evidence of failure' will include cracking, spalling, or deflection of such magnitude and extent that it is obviously excessive and incompatible with the safety requirements for the structure. No simple rules can be developed, for application to all types of structures and

conditions. If sufficient damage has occurred that the structure is considered to have failed that test, retesting is not permitted since it is considered that damaged members should not be put into service even at a lower load rating."

The floor slabs have, in effect, been subject to a "load test" just due to the actual live and dead loads and the extreme deflections measured constitute "visible evidence of failure". This test should not be performed unless it is done under the direct supervision of an engineer who is very experienced in performing load tests on existing buildings, and it is approved by the appropriate governing agencies.

A third option for study would be to remove the floor coverings and perform a study of the existing cracks in the slabs. To provide the most information, both the floor coverings and the ceilings should be removed so the slab can be observed from both the top and the bottom. This might give some indication as to whether a partial failure has actually occurred. It may or may not provide insight as to what type of partial failure has occurred. However, it will not provide enough information about the failure, if one exists, to determine the actual capacity of the floor slabs.

2. Consult with an expert in the area of forensic structural investigation. It is possible that an expert in this area of engineering could determine whether a partial failure has occurred. However, in order to make such a determination, the expert would have to perform one or more of the studies previously mentioned.

3. Design a structural reinforcement for the floor slabs and construct it. Several different options for this rehabilitation could be investigated and the most feasible and economic could be utilized to ensure that the building would withstand all probable gravity loads.

4. Abandon the existing building and construct a new facility. In addition to the concerns regarding the gravity load capacity of the floor slabs, the existing building would be severely overstressed in the event of an earthquake, as determined by the seismic analysis previously mentioned. It is possible that it would be more economical in the long run to construct a new building that would serve GSA's needs for the next 30 years than to rehabilitate the existing structure.

It would be most prudent to pursue either Option #3 or Option #4. None of the studies mentioned would reveal the extent of either partial bond failure or partial plastic deformations. No testing method would. In order to determine the capacities of the floor slabs, an expert would have to determine the extent of the partial failure, or perform a load test, which is expensive and could cause a catastrophic failure. Therefore, performing Option #1 or Option #2 would, in all likelihood, reveal that either Option #3 or Option #4 should be performed.

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RECEIVED
SEP 23 1992
BPLW
Architects & Engineers, Inc.

September 18, 1992

BPLW Architects and Engineers
American Financial Center, No. 5
2400 Louisiana Boulevard N.E.
Albuquerque, New Mexico 87110

Job No. 1-20810

ATTENTION: Jeff Bergman

IN RE: United States Federal Building
517 Gold Avenue S.W
Albuquerque, New Mexico

Dear Mr. Bergman:

Transmitted herein are the results of physical tests performed at the above referenced site and additional testing performed on samples of concrete and reinforcing steel obtained from the site. Testing was performed on the sixth floor of the structure located at 517 Gold Southwest in Albuquerque. Testing performed included the following.

1) Three concrete core samples were obtained from the floor slab at the location indicated on the attached site plan. The cores were cured for 48 hours and tested for compressive strength. Results are as follows:

Location	Compressive Strength
A	2300 PSI
B	2100 PSI
C	2450 PSI

2) Eleven locations on the floor slab were tested for indicated compressive strength utilizing a Windsor Probe device. To accomplish the tests, floor tiles were removed, tests performed and floor tiles were replaced at the locations indicated on the attached site plan. Tests No.'s 10 and 11 were performed adjacent to core samples to allow correlation with compressive strength tests. Results are as follows:

O-TEST

Location	Indicated Compressive Strength
1	2450 PSI
2	3270 PSI
3	2625 PSI
4	2625 PSI
5	3000 PSI
6	2900 PSI
7	2825 PSI
8	3500 PSI
9	3070 PSI
10	2350 PSI
11	2300 PSI

3) A sample of floor slab rebar was obtained from the location indicated on the site plan. The reinforcing bar consisted of a No. 6 bar. Test results are as follows:

Test	Result
Yield Strength	77.3 KSI
Ultimate Strength	87.0 KSI

Should you have any questions concerning this report please contact me.

Respectfully Submitted:

GEO-TEST, INC.

Patrick J. Byres, P.E.

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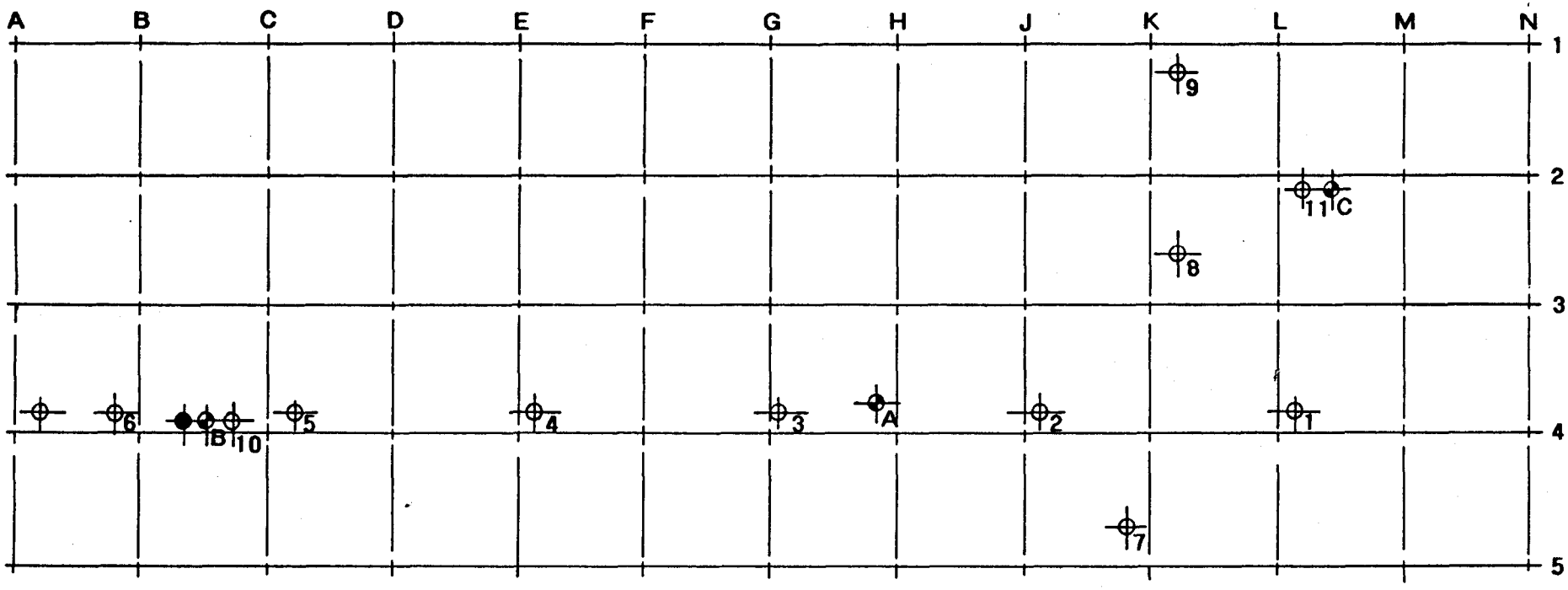


LEGEND

WINDSOR PROBE

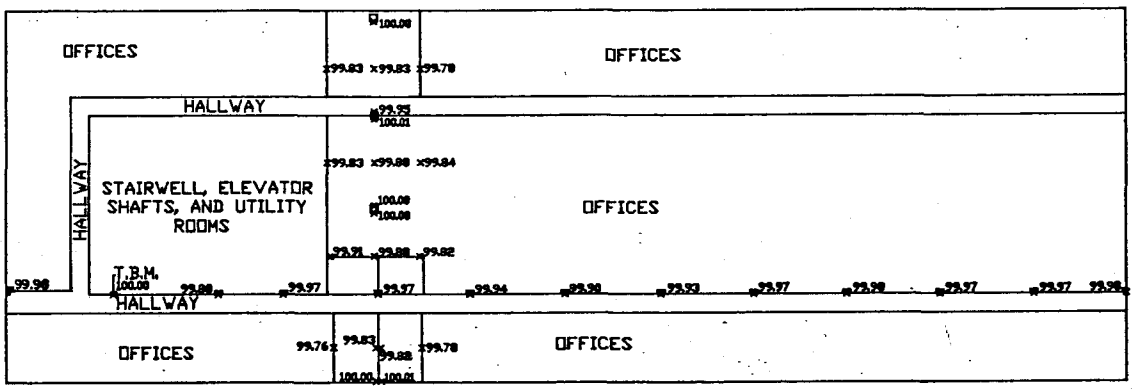
CORE SAMPLE

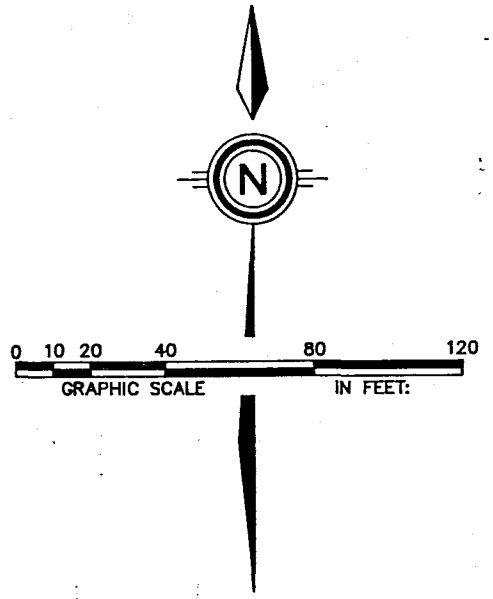
REBAR SAMPLE

ELEVATIONS FOR
STRUCTURAL INVESTIGATION
OF

517 GOLD AVENUE, N.W.

(6TH FLOOR "OLD FEDERAL BUILDING")
GENERAL SERVICES ADMINISTRATION CONTRACT
NO. GS-07P-91-JUD-0012
SEPTEMBER, 1992





NOTE: 1) ELEVATIONS WERE TAKEN FROM THE TOP OF AN ICE PICK PUSHED THROUGH THE CARPET AND INTO TILE BENEATH. (TYP.)
2) T.B.M. ELEVATION WAS ASSUMED AT 100.00'.

DATE: 9-1-92	[redacted]
SCALE: 1"=40'	
DESIGNED: D.K.S.	
DRAWN: D.K.S.	
JOB NO.: 234-01-675	

8/1/92 C.S.

R & H ASSOCIATES, INC.

September 1, 1992

RECEIVED

SEP 09 1992

BPLW
Architects & Engineers, Inc.

Mr. Jeff Bergmann
BPLW Architects & Engineers
2400 Louisiana NE, Suite 400
Albuquerque, NM 87110

Re: Analysis of Air Monitoring
Federal Court House
517 Gold SW, Albuquerque

Dear Jeff:

As you know, on August 29, 1992, R & H Associates, Inc., removed asbestos-containing tile in the areas of the concrete coring and window probe areas. During that work, we conducted air monitoring, and attached are the analyses of those air samples. Sample number FED-1 was a personal sample taken from the breathing zone of the asbestos technician. Sample number FED-2 was located in the south corridor by the elevators, and sample number FED-2 was located in the north corridor (north corner).

The entire project ran smoothly, and we wish to thank the poeple from GSA for their assistance.

Sincerely,

Floyd Rubi
President

FR/kb

Enclosure

P.O. Box 8948 • Albuquerque, New Mexico 87198 • Phone (505) 255-5543

R & H ASSOCIATES, INC.

September 1, 1992

Mr. Jeff Bergmann
BPLW Architects & Engineers
2400 Louisiana NE, Suite 400
Albuquerque, NM 87110

PROJECT NUMBER: 216

Project: Federal Building
Manager: Jeff Bergmann

Date Received: 8-29-92
Sample Date: 8-29-92

Air samples are analyzed for fibers using NIOSH 7400 Method.

Control#	Sample Number	Sample Code*	Volume (liters)	Fibers/cc
92-980	FED-1	PS	279.6	.00236
92-981	FED-2	GE	1543.36	.002
92-982	FED-3	GE	1553.39	.0033

EPA AHERA Clearance level is 0.01 fibers/cc. OSHA Permissible Exposure Limit is 0.2 fibers/cc.

OL = Overloaded/obscured

*Sample Codes: BK = Field Blank; EL = Excursion Limit; CL = Clearance; PS = Personal Sample; GE = General Environment

Floyd Rubi
Microscopist

R & H Associates, Inc., participates in the National Institute of Occupational Safety and Health Proficiency Analytical Testing Program (NIOSH/PAT), #87198001.

P.O. Box 8948 • Albuquerque, New Mexico 87198 • Phone (505) 255-5543

GEO-TEST

November 2, 1992

BPLW Architects and Engineers
American Financial Center, No. 5
2400 Louisiana Boulevard, N.E.
Albuquerque, New Mexico 87110

Job No. 1-20810

RECEIVED
NOV 4 1992
BPLW
Architects & Engineers, Inc.

ATTENTION: Jeff Bergman, P.E.

PROJECT: United States Federal Building
517 Gold Avenue, S.W.
Albuquerque, New Mexico

Mr. Bergman:

As requested, we have reviewed results of our windsor probe and concrete core tests at the referenced project. The review was conducted for the purpose of clarifying methods used in correlation between core strength results and windsor probe results. As cores were obtained in the field a degree of difficulty was encountered obtaining adequate samples, this was due to both the density of reinforcing bars and the apparent strength of concrete. A decision was made in the field to perform windsor probe tests at the location of two core samples. This decision was made to allow correlation between the actual core strength results and the estimated value derived from penetration resistance. Comparison of results, indicated that windsor probe tests varied from actual core compressive strength results by 73 to 78 percent. Therefore, 80 percent of indicated windsor probe strengths were reported. We feel that these values are reasonable for methods used. A tabulation of results is as follows:

Location	Core Result	Indicated Windsor Probe	80% of Wind. Corrected Probe
A	2300	2940	2350
B	2100	2875	2300
1		3060	2450
2		4090	3270
3		3280	2625
4		3280	2625
5		3750	3000
6		3625	2900

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Location	Core Result	Indicated Windsor Probe	80% of Wind. Corrected Probe
7		3530	2825
8		4375	3500
9		3840	3070

Respectfully Submitted:

GEO-TEST, INC.

Patrick J. Byres, P.E.

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FRAME	MAX. NEG MOMENT @ DROPPED PANEL		MAX. NEG. MOMENT @ 8" SLAB		MAX. POS. MOMENT		TOTAL LIVE LOAD CAPACITY
	EXISTING	CAPACITY	EXISTING	CAPACITY	EXISTING	CAPACITY	
6TH FLOOR N-S	461 l-k	487 l-k	159 l-k	331 l-k	210 l-k	316 l-k	90 psf
6TH FLOOR E-W	447 l-k	543 l-k	151 l-k	383 l-k	202 l-k	323 l-k	120 psf
5TH FLOOR N-S	455 l-k	469 l-k	156 l-k	317 l-k	201 l-k	357 l-k	85 psf
5TH FLOOR E-W	431 l-k	484 l-k	142 l-k	336 l-k	189 l-k	307 l-k	103 psf

MOMENT COMPARISON

		TOTAL MOMENT	COLUMN STRIP			MIDDLE STRIP		
			MOMENT	As	CAPACITY	MOMENT	As	CAPACITY
6TH FLOOR N-S FRAME	NEG.	461^{1-k}	346^{1-k}	8.68	351^{1-k}	58^{1-k}	4.34	106^{1-k}
	POS.	210^{1-k}	126^{1-k}	8.06	199^{1-k}	42^{1-k}	4.96	118^{1-k}
6TH FLOOR E-W FRAME	NEG.	447^{1-k}	335^{1-k}	9.30	372^{1-k}	56^{1-k}	4.34	106^{1-k}
	POS.	202^{1-k}	121^{1-k}	6.82	172^{1-k}	40^{1-k}	4.96	118^{1-k}
5TH FLOOR N-S FRAME	NEG.	455^{1-k}	341^{1-k}	8.06	329^{1-k}	57^{1-k}	4.34	106^{1-k}
	POS.	201^{1-k}	121^{1-k}	6.82	172^{1-k}	40^{1-k}	4.96	118^{1-k}
5TH FLOOR E-W FRAME	NEG.	431^{1-k}	323^{1-k}	8.06	329^{1-k}	54^{1-k}	3.72	93^{1-k}
	POS.	189^{1-k}	113^{1-k}	6.20	158^{1-k}	38^{1-k}	4.96	118^{1-k}

DISTRIBUTION OF TOTAL MOMENT TO COLUMN STRIPS & MIDDLE STRIPS

SHEARS @ INTERIOR COLUMNS		
FLOOR	REQUIRED[2]	CAPACITY[3]
1	115^k	173
2	115^k	165^k
3	115^k	157^k
4	115^k	150^k
5	116^k	141
6	116^k	134
7	116^k	125^k
8	116^k	119^k

1) SERVICE LOAD SHEAR REQUIRED TO RESIST DEAD LOADS & CODE PRESCRIBED LIVE LOADS.

2) SERVICE SHEAR CAPACITY OF SLAB.

CALCULATED SERVICE LIVE LOAD CAPACITIES (psf)		
FLOOR	SHEAR	MOMENT
1	145	85
2	132	85
3	118	85
4	105	85
5	92	85
6	79	90
7	66	90
8	53	90

BPLW
Architects & Engineers, Inc.
2400 Louisiana Blvd. NE
AFC #5 Suite 400
Albuquerque, NM 87110
(505) 881-2759
63 East Main Street
Suite 602
Mesa, AZ 85201
(602) 827-2759

Project _____
Subject _____
Project No. _____ Date _____ By _____

- ☐ Memorandum
- ☐ Telephone record
- ☐ Note to the file
- ☐ Minutes of meeting
- ☐ To be typed
- ☐ _____

GRAVITY LOADS

DEAD:	SLAB	=	100 psf
	FLOORING	=	2 psf
	CEILING (SUSP. SYS., PLASTER, ACC. TILE)	=	14 psf
	MECH	=	4 psf
	ELEC.	=	2 psf
	PARTITIONS	=	15 psf
			137 psf

LIVE: 80 psf

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- ☐ _____

6th FLOOR

NORTH - SOUTH FRAME "F"

(TYP. FOR 6th, 7th, & 8th FLRS.)

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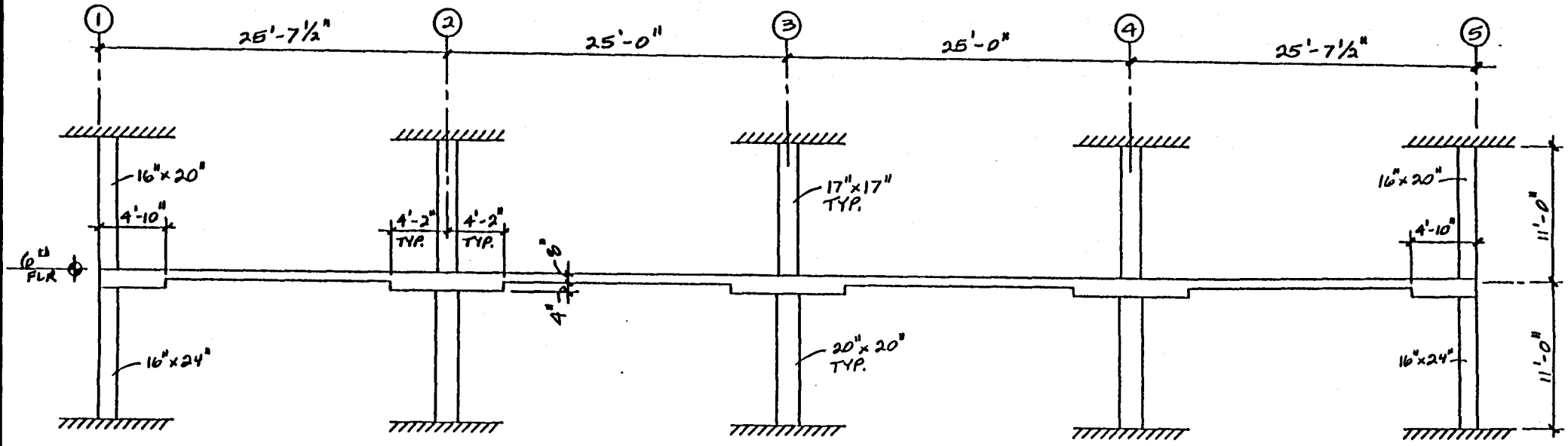

TYPICAL SLAB-BEAM CONFIGURATION

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Project _____
Subject _____
Project No. _____ Date _____ By _____

- ☐ Memorandum
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- ☐ Note to the file
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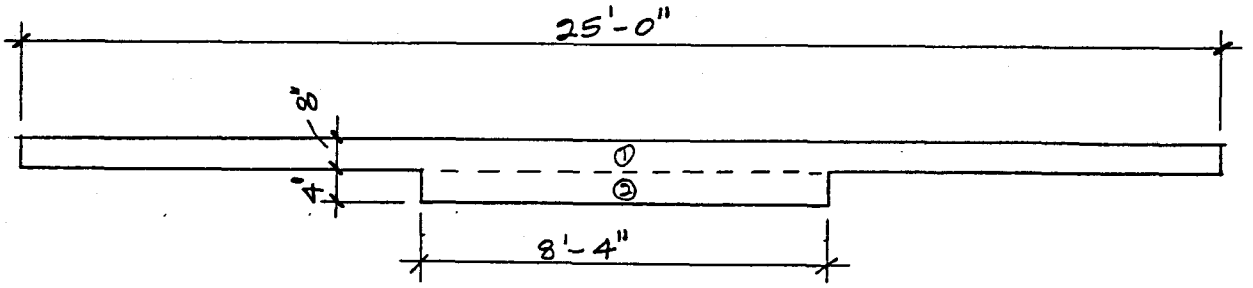
- ☐ _____



SECTION	AREA	y	Ay
1	2400	8	19,200
2	400	2	800
	2800		20,000

$\bar{y} = 7.14''$

$I_1 = 12,800 \quad A_1 = 2400 \quad d_1 = .86''$

$I_2 = 533 \quad A_2 = 400 \quad d_2 = 5.14''$

$$I_g = 12800 + 2400(.86)^2 + 533 + 400(5.14)^2$$
$$= 25,676$$

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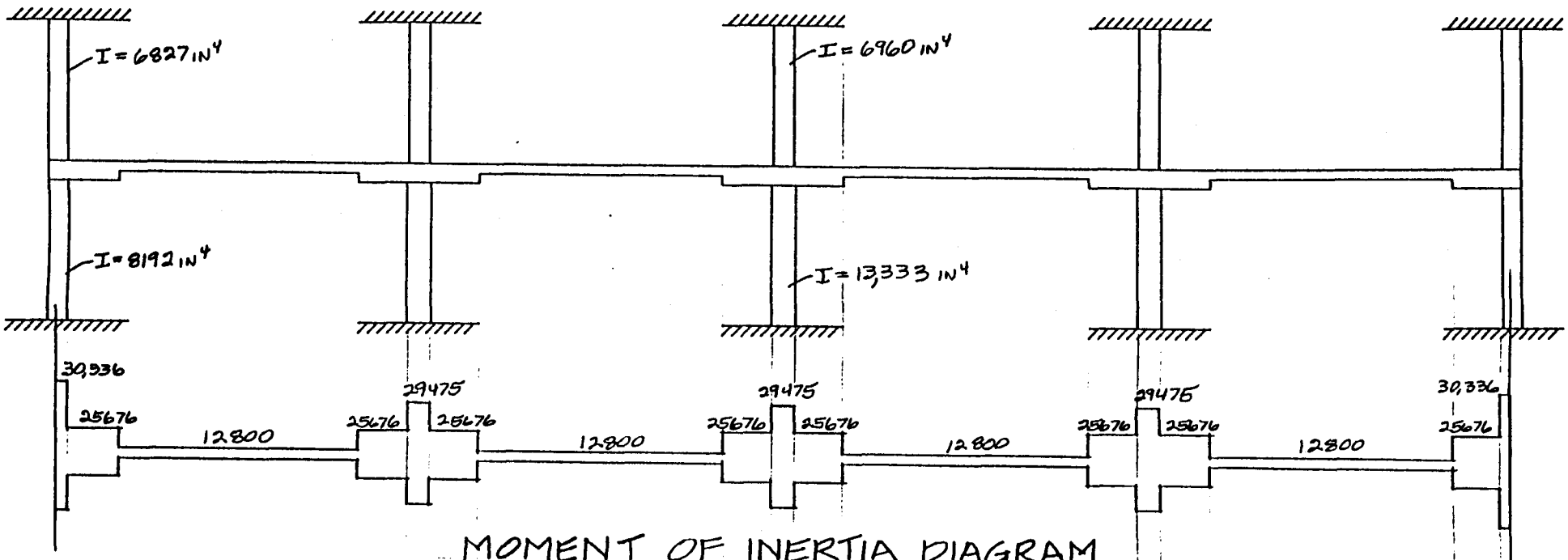
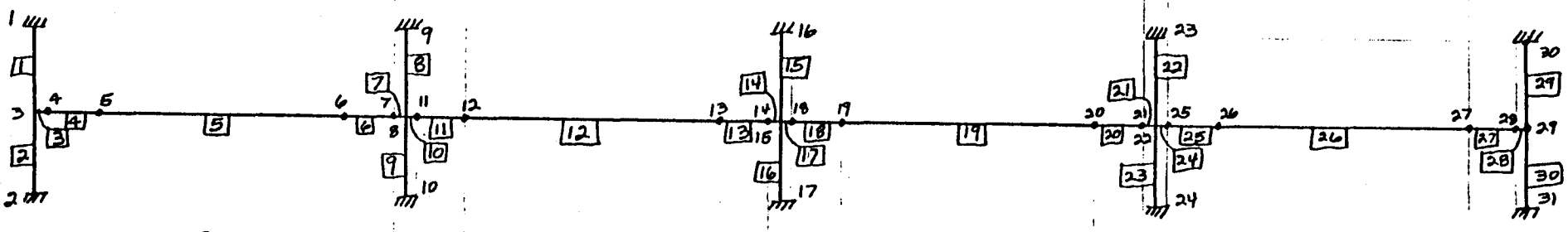
ℓ_1 = 25

$E_{cs} = 3.122 \times 10^6$ psi

$E_{cc} = 3.491 \times 10^6$ psi



MOMENT OF INERTIA DIAGRAM

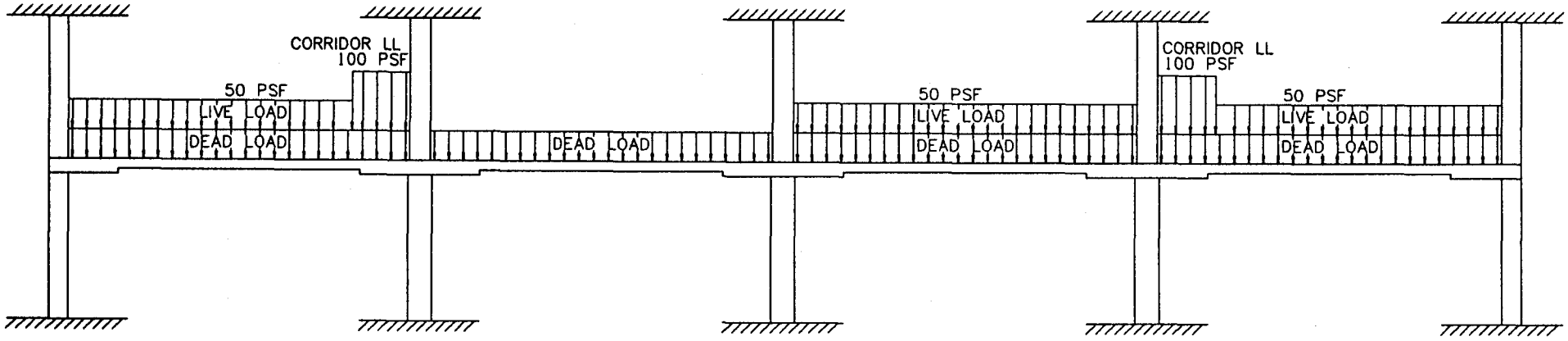


NODE: $\overset{3}{\circ}$ OR $+^{3}$

ELEMENT: $\boxed{3}$

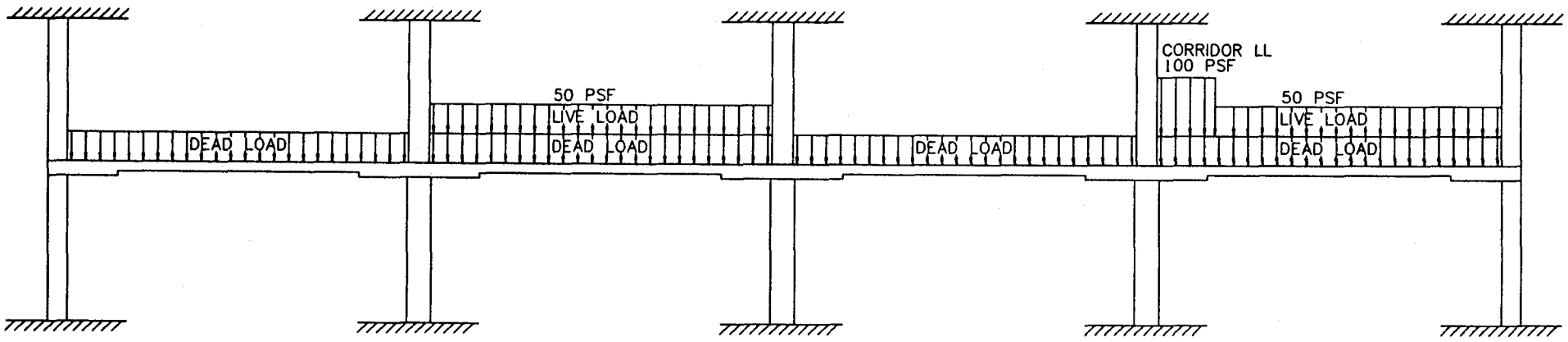
FIXED SUPPORT

COMPUTER MODEL



LOAD COMBINATION #1

NOT TO SCALE



LOAD COMBINATION #2

NOT TO SCALE

N O D A L I N F O R M A T I O N

NODE NO	NODAL COORDINATES X	Y	SUPPORT CONDITIONS CODE	PX STIFF	PY STIFF	M STIFF
Units :	Ft	Ft		K /In	K /In	K -In /Deg
1	0.000	22.000	F			
2	0.000	0.000	F			
3	0.000	11.000				
4	0.830	11.000				
5	4.830	11.000				
6	20.830	11.000				
7	24.170	11.000				
8	25.000	11.000				
9	25.000	22.000	F			
10	25.000	0.000	F			
11	25.830	11.000				
12	29.170	11.000				
13	45.840	11.000				
14	49.170	11.000				
15	50.000	11.000				
16	50.000	22.000	F			
17	50.000	0.000	F			
18	50.830	11.000				
19	54.160	11.000				
20	70.830	11.000				
21	74.170	11.000				
22	75.000	11.000				
23	75.000	22.000	F			
24	75.000	0.000	F			
25	75.830	11.000				
26	79.170	11.000				
27	95.170	11.000				
28	99.170	11.000				
29	100.000	11.000				
30	100.000	22.000	F			
31	100.000	0.000	F			

E L E M E N T I N F O R M A T I O N

ELEM ID	NE NODE	PE NODE	ELEM LENGTH	BETA ANGLE	PROP TYPE	ELEM TYPE	NE HINGE	PE HINGE
		Units :	Ft	Deg				
1	3	1	11.000	90.00	6	BEAM		
2	2	3	11.000	90.00	8	BEAM		
3	3	4	0.830	0.00	4	BEAM		
4	4	5	4.000	0.00	2	BEAM		
5	5	6	16.000	0.00	1	BEAM		
6	6	7	3.340	0.00	2	BEAM		
7	7	8	0.830	0.00	3	BEAM		

E L E M E N T I N F O R M A T I O N

ELEM NO	NE NODE	PE NODE	ELEM LENGTH	BETA ANGLE	PROP TYPE	ELEM TYPE	NE HINGE	PE HINGE
8	8	9	11.000	90.00	5	BEAM		
9	10	8	11.000	90.00	7	BEAM		
10	8	11	0.830	0.00	3	BEAM		
11	11	12	3.340	0.00	2	BEAM		
12	12	13	16.670	0.00	1	BEAM		
13	13	14	3.330	0.00	2	BEAM		
14	14	15	0.830	0.00	3	BEAM		
15	15	16	11.000	90.00	5	BEAM		
16	17	15	11.000	90.00	7	BEAM		
17	15	18	0.830	0.00	3	BEAM		
18	18	19	3.330	0.00	2	BEAM		
19	19	20	16.670	0.00	1	BEAM		
20	20	21	3.340	0.00	2	BEAM		
21	21	22	0.830	0.00	3	BEAM		
22	22	23	11.000	90.00	5	BEAM		
23	24	22	11.000	90.00	7	BEAM		
24	22	25	0.830	0.00	3	BEAM		
25	25	26	3.340	0.00	2	BEAM		
26	26	27	16.000	0.00	1	BEAM		
27	27	28	4.000	0.00	2	BEAM		
28	28	29	0.830	0.00	4	BEAM		
29	29	30	11.000	90.00	6	BEAM		
30	31	29	11.000	90.00	8	BEAM		

P R O P E R T Y I N F O R M A T I O N

PROP NO	SECTION NAME	MODULUS	AREA	I	DIST
	Units :	K /In 2	In2	In4	Ft
1	SLAB BEAM ONLY	2.7e+003	2.4e+003	1.28e+004	
2	SLAB BEAM @ DROP PAN	2.7e+003	2.8e+003	2.57e+004	
3	S.B. @ INT. COLUMNS	2.7e+003	2.8e+003	2.95e+004	
4	S.B. @ EXT. COLUMNS	2.7e+003	2.8e+003	3.03e+004	
5	6TH FLOOR INT. COLUM	3.5e+003	289	6.96e+003	
6	6TH FLOOR EXT. COLUM	3.5e+003	320	6.83e+003	
7	5TH FLOOR INT. COLUM	3.5e+003	400	1.33e+004	
8	5TH FLOOR INT. COLUM	3.5e+003	384	8.19e+003	

E L E M E N T L O A D I N F O R M A T I O N

REC NO	LOAD CASE	LOAD TYPE	LOAD SYS	DIST SPEC	DIST	PX	PY	M
				Units :	Ft	K /Ft	K /Ft	Ft-K /Ft

E L E M E N T L O A D I N F O R M A T I O N

REC NO	LOAD CASE	LOAD TYPE	LOAD SYS	DIST SPEC		DIST	PX	PY	M
Description : DL									
Element List : 3-7,10-14,17-21,24-28									
1	1	UNIF	GLO	FRAC	B	0.00	0.00	-3.43	0.00
					E	1.00	0.00	-3.43	0.00
Description : LL									
Element List : 3-7,17-21,24-28									
2	2	UNIF	GLO	FRAC	B	0.00	0.00	-2.00	0.00
					E	1.00	0.00	-2.00	0.00
Description : LL POS									
Element List : 3-7,17-21									
3	3	UNIF	GLO	FRAC	B	0.00	0.00	-2.00	0.00
					E	1.00	0.00	-2.00	0.00

N O D A L D I S P L A C E M E N T S

NODE NO	LOAD COMB	DX	DY	ROTATION
	Units :	In	In	Deg

LOAD COMBINATIONS:

COMB 1 : 1.40 X CASE 1
+ 1.70 X CASE 2

COMB 2 : 1.40 X CASE 1
+ 1.70 X CASE 3

COMB 3 : 1.00 X CASE 1
+ 1.00 X CASE 2

COMB 4 : 1.00 X CASE 1
+ 1.00 X CASE 3

COMB 5 : 1.40 X CASE 1

COMB 6 : 1.70 X CASE 2

COMB 7 : 1.70 X CASE 3

1	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
	6	0.0000	0.0000	0.0000
	7	0.0000	0.0000	0.0000
2	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
	6	0.0000	0.0000	0.0000
	7	0.0000	0.0000	0.0000
3	1	-0.0002	-0.0052	-0.1555
	2	-0.0024	-0.0052	-0.1556
	3	-0.0001	-0.0034	-0.1023
	4	-0.0014	-0.0034	-0.1024
	5	0.0002	-0.0030	-0.0863
	6	-0.0003	-0.0022	-0.0692
	7	-0.0025	-0.0022	-0.0692

N O D A L D I S P L A C E M E N T S

NODE NO	LOAD COMB	DX	DY	ROTATION
4	1	-0.0002	-0.0346	-0.1819
	2	-0.0024	-0.0346	-0.1820
	3	-0.0001	-0.0228	-0.1197
	4	-0.0014	-0.0228	-0.1198
	5	0.0002	-0.0193	-0.1010
	6	-0.0003	-0.0153	-0.0810
	7	-0.0025	-0.0153	-0.0811
5	1	-0.0002	-0.2211	-0.2403
	2	-0.0024	-0.2213	-0.2406
	3	-0.0001	-0.1455	-0.1580
	4	-0.0014	-0.1456	-0.1582
	5	0.0001	-0.1223	-0.1319
	6	-0.0003	-0.0988	-0.1085
	7	-0.0025	-0.0990	-0.1087
6	1	-0.0003	-0.1369	0.2045
	2	-0.0026	-0.1375	0.2050
	3	-0.0002	-0.0885	0.1333
	4	-0.0015	-0.0888	0.1336
	5	0.0001	-0.0630	0.1032
	6	-0.0004	-0.0739	0.1013
	7	-0.0026	-0.0745	0.1018
7	1	-0.0003	-0.0235	0.1007
	2	-0.0026	-0.0236	0.1015
	3	-0.0002	-0.0152	0.0636
	4	-0.0015	-0.0153	0.0641
	5	0.0001	-0.0108	0.0346
	6	-0.0004	-0.0127	0.0660
	7	-0.0026	-0.0128	0.0668
8	1	-0.0003	-0.0093	0.0615
	2	-0.0026	-0.0093	0.0623
	3	-0.0002	-0.0063	0.0374
	4	-0.0015	-0.0063	0.0379
	5	0.0000	-0.0069	0.0098
	6	-0.0004	-0.0024	0.0517
	7	-0.0026	-0.0024	0.0526
9	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000

N O D A L D I S P L A C E M E N T S

NODE NO	LOAD COMB	DX	DY	ROTATION
	5	0.0000	0.0000	0.0000
	6	0.0000	0.0000	0.0000
	7	0.0000	0.0000	0.0000
10	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
	6	0.0000	0.0000	0.0000
	7	0.0000	0.0000	0.0000
11	1	-0.0003	-0.0008	0.0369
	2	-0.0026	-0.0006	0.0379
	3	-0.0002	-0.0014	0.0201
	4	-0.0015	-0.0013	0.0207
	5	0.0000	-0.0072	-0.0127
	6	-0.0004	0.0064	0.0495
	7	-0.0026	0.0066	0.0506
12	1	-0.0003	-0.0033	-0.0333
	2	-0.0026	-0.0022	-0.0317
	3	-0.0002	-0.0071	-0.0288
	4	-0.0015	-0.0064	-0.0279
	5	0.0000	-0.0410	-0.0733
	6	-0.0004	0.0377	0.0400
	7	-0.0026	0.0388	0.0416
13	1	-0.0002	-0.0126	0.0395
	2	-0.0025	-0.0091	0.0363
	3	-0.0001	-0.0132	0.0329
	4	-0.0015	-0.0112	0.0310
	5	0.0000	-0.0462	0.0768
	6	-0.0002	0.0336	-0.0373
	7	-0.0025	0.0371	-0.0406
14	1	-0.0002	-0.0029	-0.0221
	2	-0.0025	-0.0022	-0.0269
	3	-0.0001	-0.0028	-0.0103
	4	-0.0015	-0.0024	-0.0131
	5	0.0000	-0.0084	0.0212
	6	-0.0002	0.0055	-0.0432
	7	-0.0025	0.0062	-0.0480

N O D A L D I S P L A C E M E N T S

NODE NO	LOAD COMB	DX	DY	ROTATION
15	1	-0.0002	-0.0087	-0.0444
	2	-0.0025	-0.0088	-0.0496
	3	-0.0001	-0.0059	-0.0261
	4	-0.0015	-0.0060	-0.0292
	5	-0.0000	-0.0065	-0.0000
	6	-0.0002	-0.0021	-0.0444
	7	-0.0025	-0.0023	-0.0496
16	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
	6	0.0000	0.0000	0.0000
	7	0.0000	0.0000	0.0000
17	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
	6	0.0000	0.0000	0.0000
	7	0.0000	0.0000	0.0000
18	1	-0.0002	-0.0193	-0.0772
	2	-0.0025	-0.0206	-0.0842
	3	-0.0001	-0.0124	-0.0481
	4	-0.0015	-0.0131	-0.0522
	5	-0.0000	-0.0084	-0.0212
	6	-0.0002	-0.0109	-0.0561
	7	-0.0025	-0.0121	-0.0630
19	1	-0.0002	-0.1076	-0.1588
	2	-0.0025	-0.1160	-0.1719
	3	-0.0001	-0.0691	-0.1031
	4	-0.0015	-0.0741	-0.1108
	5	-0.0000	-0.0462	-0.0768
	6	-0.0002	-0.0614	-0.0820
	7	-0.0025	-0.0698	-0.0951
20	1	-0.0003	-0.0781	0.1378
	2	-0.0027	-0.1089	0.1669
	3	-0.0002	-0.0511	0.0903
	4	-0.0016	-0.0692	0.1074

N O D A L D I S P L A C E M E N T S

NODE NO	LOAD COMB	DX	DY	ROTATION
	5	-0.0000	-0.0410	0.0733
	6	-0.0002	-0.0372	0.0644
	7	-0.0026	-0.0679	0.0936
21	1	-0.0003	-0.0135	0.0285
	2	-0.0027	-0.0189	0.0723
	3	-0.0002	-0.0088	0.0183
	4	-0.0016	-0.0120	0.0441
	5	-0.0000	-0.0072	0.0127
	6	-0.0002	-0.0063	0.0158
	7	-0.0027	-0.0117	0.0596
22	1	-0.0003	-0.0119	-0.0115
	2	-0.0027	-0.0094	0.0359
	3	-0.0002	-0.0079	-0.0080
	4	-0.0016	-0.0064	0.0199
	5	-0.0000	-0.0069	-0.0098
	6	-0.0002	-0.0050	-0.0018
	7	-0.0027	-0.0025	0.0456
23	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
	6	0.0000	0.0000	0.0000
	7	0.0000	0.0000	0.0000
24	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
	6	0.0000	0.0000	0.0000
	7	0.0000	0.0000	0.0000
25	1	-0.0003	-0.0177	-0.0545
	2	-0.0027	-0.0056	0.0076
	3	-0.0002	-0.0118	-0.0364
	4	-0.0016	-0.0047	0.0001
	5	-0.0001	-0.0108	-0.0346
	6	-0.0002	-0.0069	-0.0198
	7	-0.0027	0.0052	0.0423

N O D A L D I S P L A C E M E N T S

NODE NO	LOAD COMB	DX	DY	ROTATION
26	1	-0.0003	-0.1042	-0.1731
	2	-0.0027	-0.0332	-0.0745
	3	-0.0002	-0.0693	-0.1148
	4	-0.0016	-0.0275	-0.0568
	5	-0.0001	-0.0630	-0.1032
	6	-0.0003	-0.0412	-0.0699
	7	-0.0027	0.0298	0.0287
27	1	-0.0004	-0.2076	0.2237
	2	-0.0028	-0.1100	0.1167
	3	-0.0003	-0.1375	0.1482
	4	-0.0016	-0.0801	0.0853
	5	-0.0001	-0.1223	0.1319
	6	-0.0003	-0.0853	0.0918
	7	-0.0026	0.0123	-0.0152
28	1	-0.0005	-0.0328	0.1714
	2	-0.0028	-0.0176	0.0915
	3	-0.0003	-0.0217	0.1136
	4	-0.0017	-0.0128	0.0665
	5	-0.0002	-0.0193	0.1010
	6	-0.0003	-0.0135	0.0705
	7	-0.0026	0.0017	-0.0095
29	1	-0.0005	-0.0050	0.1466
	2	-0.0028	-0.0028	0.0783
	3	-0.0003	-0.0033	0.0971
	4	-0.0017	-0.0020	0.0569
	5	-0.0002	-0.0030	0.0863
	6	-0.0003	-0.0021	0.0603
	7	-0.0026	0.0001	-0.0080
30	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
	6	0.0000	0.0000	0.0000
	7	0.0000	0.0000	0.0000
31	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000

N O D A L D I S P L A C E M E N T S

NODE NO	LOAD COMB	DX	DY	ROTATION
	5	0.0000	0.0000	0.0000
	6	0.0000	0.0000	0.0000
	7	0.0000	0.0000	0.0000

E L E M E N T R E P O R T S

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
		Units :	K	K	K -Ft	K -Ft /In	Ft

LOAD COMBINATIONS:

COMB 1 : 1.40 X CASE 1
+ 1.70 X CASE 2

COMB 2 : 1.40 X CASE 1
+ 1.70 X CASE 3

COMB 3 : 1.00 X CASE 1
+ 1.00 X CASE 2

COMB 4 : 1.00 X CASE 1
+ 1.00 X CASE 3

COMB 5 : 1.40 X CASE 1

COMB 6 : 1.70 X CASE 2

COMB 7 : 1.70 X CASE 3

1	1	3	43.9008	-22.2526	163.2204		
		1	43.9008	-22.2526	-81.5585	-0.0531	3.67
	2	3	43.9245	-21.9873	161.7795		
		1	43.9245	-21.9873	-80.0814	-0.0529	3.68
	3	3	28.9839	-14.6509	107.4554		
		1	28.9839	-14.6509	-53.7039	-0.0349	3.67
	4	3	28.9978	-14.4948	106.6078		
		1	28.9978	-14.4948	-52.8350	-0.0348	3.68
	5	3	25.0683	-12.3845	90.7845		
		1	25.0683	-12.3845	-45.4448	-0.0295	3.67
	6	3	18.8326	-9.8681	72.4359		
		1	18.8326	-9.8681	-36.1137	-0.0236	3.67

E L E M E N T R E P O R T S

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	7	3	18.8563	-9.6029	70.9949		
		1	18.8563	-9.6029	-34.6366	-0.0234	3.70
2	1	2	-52.6810	-26.7470	98.1137		
		3	-52.6810	-26.7470	-196.1032	0.0531	7.33
	2	2	-52.7094	-27.0890	99.9729		
		3	-52.7094	-27.0890	-198.0059	0.0533	7.35
	3	2	-34.7807	-17.6009	64.5558		
		3	-34.7807	-17.6009	-129.0545	0.0349	7.33
	4	2	-34.7974	-17.8021	65.6495		
		3	-34.7974	-17.8021	-130.1737	0.0350	7.34
	5	2	-30.0819	-14.8148	54.2790		
		3	-30.0819	-14.8148	-108.6840	0.0295	7.33
	6	2	-22.5991	-11.9322	43.8347		
		3	-22.5991	-11.9322	-87.4193	0.0236	7.34
	7	2	-22.6275	-12.2742	45.6940		
		3	-22.6275	-12.2742	-89.3219	0.0238	7.36
3	1	3	-4.4944	96.5818	-359.3237		
		4	-4.4944	89.7800	-281.9835	0.0006	0.41
	2	3	-5.1016	96.6339	-359.7853		
		4	-5.1016	89.8321	-282.4019	0.0006	0.41
	3	3	-2.9501	63.7645	-236.5100		
		4	-2.9501	59.2618	-185.4540	0.0004	0.41
	4	3	-3.3073	63.7952	-236.7815		
		4	-3.3073	59.2924	-185.7001	0.0004	0.41
	5	3	-2.4303	55.1502	-199.4685		
		4	-2.4303	51.1703	-155.3455	0.0003	0.41
	6	3	-2.0640	41.4316	-159.8551		
		4	-2.0640	38.6096	-126.6380	0.0003	0.41
	7	3	-2.6713	41.4838	-160.3168		
		4	-2.6713	38.6618	-127.0564	0.0003	0.41

E L E M E N T R E P O R T S

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
4	1	4	-4.4944	89.7800	-281.9835		
		5	-4.4944	57.0000	11.5763	0.0062	1.63
	2	4	-5.1016	89.8321	-282.4019		
		5	-5.1016	57.0521	11.3664	0.0062	1.63
	3	4	-2.9501	59.2618	-185.4540		
		5	-2.9501	37.5618	8.1931	0.0041	1.63
	4	4	-3.3073	59.2924	-185.7001		
		5	-3.3073	37.5924	8.0696	0.0041	1.63
	5	4	-2.4303	51.1703	-155.3455		
		5	-2.4303	31.9903	10.9757	0.0033	1.61
	6	4	-2.0640	38.6096	-126.6380		
		5	-2.0640	25.0096	0.6006	0.0029	1.66
	7	4	-2.6713	38.6618	-127.0564		
		5	-2.6713	25.0618	0.3907	0.0029	1.66
5	1	5	-4.4944	57.0000	11.5763	209.8066	6.96
		6	-4.4944	-74.1200	-125.3844	-0.2564	7.56
	2	5	-5.1016	57.0521	11.3664	209.9594	6.96
		6	-5.1016	-74.0679	-124.7603	-0.2567	7.56
	3	5	-2.9501	37.5618	8.1931	138.2288	6.92
		6	-2.9501	-49.2382	-85.2185	-0.1684	7.54
	4	5	-3.3073	37.5924	8.0696	138.3177	6.93
		6	-3.3073	-49.2076	-84.8514	-0.1686	7.55
	5	5	-2.4303	31.9903	10.9757	117.6890	6.67
		6	-2.4303	-44.7297	-90.9393	-0.1399	7.41
	6	5	-2.0640	25.0096	0.6006	92.5833	7.36
		6	-2.0640	-29.3904	-34.4451	-0.1167	7.75
	7	5	-2.6713	25.0618	0.3907	92.7572	7.37
		6	-2.6713	-29.3382	-33.8211	-0.1170	7.75
6	1	6	-4.4944	-74.1200	-125.3844		
		7	-4.4944	-101.4913	-418.6554	0.0091	1.82
	2	6	-5.1016	-74.0679	-124.7603		
		7	-5.1016	-101.4392	-417.8573	0.0091	1.82

E L E M E N T R E P O R T S

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	3	6	-2.9501	-49.2382	-85.2185		
		7	-2.9501	-67.3577	-279.9337	0.0061	1.82
	4	6	-3.3073	-49.2076	-84.8514		
		7	-3.3073	-67.3271	-279.4642	0.0061	1.82
	5	6	-2.4303	-44.7297	-90.9393		
		7	-2.4303	-60.7450	-267.0820	0.0060	1.81
	6	6	-2.0640	-29.3904	-34.4451		
		7	-2.0640	-40.7464	-151.5734	0.0031	1.85
	7	6	-2.6713	-29.3382	-33.8211		
		7	-2.6713	-40.6942	-150.7753	0.0031	1.85
7	1	7	-4.4944	-101.4913	-418.6554		
		8	-4.4944	-108.2932	-505.7160	0.0009	0.42
	2	7	-5.1016	-101.4392	-417.8573		
		8	-5.1016	-108.2411	-504.8746	0.0009	0.42
	3	7	-2.9501	-67.3577	-279.9337		
		8	-2.9501	-71.8605	-337.7092	0.0006	0.42
	4	7	-3.3073	-67.3271	-279.4642		
		8	-3.3073	-71.8298	-337.2143	0.0006	0.42
	5	7	-2.4303	-60.7450	-267.0820		
		8	-2.4303	-64.7248	-319.1520	0.0005	0.42
	6	7	-2.0640	-40.7464	-151.5734		
		8	-2.0640	-43.5684	-186.5640	0.0003	0.42
	7	7	-2.6713	-40.6942	-150.7753		
		8	-2.6713	-43.5162	-185.7226	0.0003	0.42
8	1	8	71.0169	9.0177	-66.0497		
		9	71.0169	9.0177	33.1455	0.0210	3.66
	2	8	70.8813	9.4297	-68.5500		
		9	70.8813	9.4297	35.1763	0.0215	3.63
	3	8	48.3985	5.4835	-40.1662		
		9	48.3985	5.4835	20.1520	0.0128	3.66
	4	8	48.3188	5.7258	-41.6370		
		9	48.3188	5.7258	21.3465	0.0130	3.64

E L E M E N T R E P O R T S

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	5	8	52.5497	1.4194	-10.4202		
		9	52.5497	1.4194	5.1933	0.0033	3.67
	6	8	18.4672	7.5983	-55.6295		
		9	18.4672	7.5983	27.9522	0.0177	3.66
	7	8	18.3316	8.0103	-58.1299		
		9	18.3316	8.0103	29.9830	0.0181	3.63
9	1	10	-98.2932	17.1068	-62.5708		
		8	-98.2932	17.1068	125.6039	-0.0209	7.33
	2	10	-98.1056	16.8084	-60.4798		
		8	-98.1056	16.8084	124.4126	-0.0211	7.30
	3	10	-66.9876	10.4085	-38.0766		
		8	-66.9876	10.4085	76.4171	-0.0127	7.33
	4	10	-66.8772	10.2330	-36.8466		
		8	-66.8772	10.2330	75.7163	-0.0128	7.30
	5	10	-72.7331	2.7425	-10.0773		
		8	-72.7331	2.7425	20.0903	-0.0033	7.34
	6	10	-25.5601	14.3643	-52.4934		
		8	-25.5601	14.3643	105.5136	-0.0176	7.33
	7	10	-25.3724	14.0659	-50.4025		
		8	-25.3724	14.0659	104.3223	-0.0177	7.29
10	1	8	3.5947	61.0169	-314.0624		
		11	3.5947	57.0371	-265.0700	0.0005	0.41
	2	8	2.2771	60.7458	-311.9119		
		11	2.2771	56.7659	-263.1446	0.0005	0.41
	3	8	1.9750	43.5257	-221.1260		
		11	1.9750	40.6829	-186.1794	0.0004	0.41
	4	8	1.1999	43.3662	-219.8610		
		11	1.1999	40.5234	-185.0468	0.0004	0.41
	5	8	-1.1072	60.5580	-288.6415		
		11	-1.1072	56.5781	-240.0300	0.0005	0.41
	6	8	4.7019	0.4589	-25.4209		
		11	4.7019	0.4589	-25.0400		

E L E M E N T R E P O R T S

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	7	8	3.3843	0.1878	-23.2704		
		11	3.3843	0.1878	-23.1146		
11	1	11	3.5947	57.0371	-265.0700		
		12	3.5947	41.0218	-101.3117	0.0061	1.54
	2	11	2.2771	56.7659	-263.1446		
		12	2.2771	40.7506	-100.2919	0.0061	1.54
	3	11	1.9750	40.6829	-186.1794		
		12	1.9750	29.2434	-69.4024	0.0043	1.54
	4	11	1.1999	40.5234	-185.0468		
		12	1.1999	29.0839	-68.8025	0.0042	1.54
	5	11	-1.1072	56.5781	-240.0300		
		12	-1.1072	40.5628	-77.8046	0.0053	1.53
	6	11	4.7019	0.4589	-25.0400		
		12	4.7019	0.4589	-23.5071	0.0008	1.66
	7	11	3.3843	0.1878	-23.1146		
		12	3.3843	0.1878	-22.4873	0.0008	1.67
12	1	12	3.5947	41.0218	-101.3117	74.1613	8.56
		13	3.5947	-38.9109	-83.7174	-0.0794	8.50
	2	12	2.2771	40.7506	-100.2919	72.8691	8.50
		13	2.2771	-39.1820	-87.2174	-0.0773	8.46
	3	12	1.9750	29.2434	-69.4024	55.4410	8.54
		13	1.9750	-27.8513	-57.7994	-0.0610	8.48
	4	12	1.1999	29.0839	-68.8025	54.6828	8.49
		13	1.1999	-28.0108	-59.8582	-0.0597	8.45
	5	12	-1.1072	40.5628	-77.8046	93.7642	8.46
		13	-1.1072	-39.3698	-67.8606	-0.1132	8.41
	6	12	4.7019	0.4589	-23.5071		
		13	4.7019	0.4589	-15.8568	0.0338	8.07
	7	12	3.3843	0.1878	-22.4873		
		13	3.3843	0.1878	-19.3568	0.0359	8.23

E L E M E N T R E P O R T S

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	3	15	45.2023	-3.8036	27.9190		
		16	45.2023	-3.8036	-13.9206	-0.0089	3.67
	4	15	45.9211	-4.0770	30.2375		
		16	45.9211	-4.0770	-14.6089	-0.0099	3.71
	5	15	49.7609	-0.0000	0.0000		
		16	49.7609	-0.0000	-0.0000		
	6	15	16.4200	-6.4661	47.4624		
		16	16.4200	-6.4661	-23.6651	-0.0152	3.67
	7	15	17.6420	-6.9308	51.4038		
		16	17.6420	-6.9308	-24.8352	-0.0168	3.71
16	1	17	-91.5998	-12.4790	45.8409		
		15	-91.5998	-12.4790	-91.4284	0.0152	7.34
	2	17	-93.2912	-14.4846	54.2170		
		15	-93.2912	-14.4846	-105.1134	0.0171	7.37
	3	17	-62.5637	-7.3406	26.9652		
		15	-62.5637	-7.3406	-53.7814	0.0089	7.34
	4	17	-63.5587	-8.5203	31.8923		
		15	-63.5587	-8.5203	-61.8314	0.0101	7.37
	5	17	-68.8732	-0.0000	0.0000		
		15	-68.8732	-0.0000	-0.0000		
	6	17	-22.7266	-12.4790	45.8409		
		15	-22.7266	-12.4790	-91.4284	0.0152	7.34
	7	17	-24.4180	-14.4846	54.2170		
		15	-24.4180	-14.4846	-105.1134	0.0171	7.37
17	1	15	-2.4182	98.9225	-425.9676		
		18	-2.4182	92.1207	-346.6847	0.0007	0.41
	2	15	-5.2766	101.5648	-448.2219		
		18	-5.2766	94.7630	-366.7459	0.0008	0.41
	3	15	-1.5620	65.6666	-284.9973		
		18	-1.5620	61.1639	-232.3626	0.0005	0.41
	4	15	-3.2435	67.2210	-298.0880		
		18	-3.2435	62.7182	-244.1633	0.0005	0.41

E L E M E N T R E P O R T S

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	5	15	-1.1072	59.3170	-273.1292		
		18	-1.1072	55.3372	-225.5477	0.0005	0.41
	6	15	-1.3110	39.6055	-152.8384		
		18	-1.3110	36.7835	-121.1370	0.0003	0.41
	7	15	-4.1694	42.2478	-175.0927		
		18	-4.1694	39.4258	-141.1981	0.0003	0.41
8	1	18	-2.4182	92.1207	-346.6847		
		19	-2.4182	64.8313	-85.3597	0.0071	1.49
	2	18	-5.2766	94.7630	-366.7459		
		19	-5.2766	67.4736	-96.6219	0.0077	1.50
	3	18	-1.5620	61.1639	-232.3626		
		19	-1.5620	43.0986	-58.7654	0.0048	1.50
	4	18	-3.2435	62.7182	-244.1633		
		19	-3.2435	44.6530	-65.3903	0.0051	1.50
	5	18	-1.1072	55.3372	-225.5477		
		19	-1.1072	39.3698	-67.8606	0.0049	1.51
	6	18	-1.3110	36.7835	-121.1370		
		19	-1.3110	25.4615	-17.4990	0.0023	1.45
	7	18	-4.1694	39.4258	-141.1981		
		19	-4.1694	28.1038	-28.7613	0.0028	1.48
9	1	19	-2.4182	64.8313	-85.3597	171.0832	7.91
		20	-2.4182	-71.7793	-143.2715	-0.2110	8.10
	2	19	-5.2766	67.4736	-96.6219	181.1505	8.23
		20	-5.2766	-69.1370	-110.4863	-0.2293	8.28
	3	19	-1.5620	43.0986	-58.7654	112.4321	7.94
		20	-1.5620	-47.3361	-94.0846	-0.1384	8.12
	4	19	-3.2435	44.6530	-65.3903	118.3780	8.23
		20	-3.2435	-45.7818	-74.7992	-0.1491	8.28
	5	19	-1.1072	39.3698	-67.8606	93.7642	8.21
		20	-1.1072	-40.5628	-77.8046	-0.1132	8.26
	6	19	-1.3110	25.4615	-17.4990	77.8375	7.49
		20	-1.3110	-31.2165	-65.4669	-0.0980	7.90

E L E M E N T R E P O R T S

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
13	1	13	3.5947	-38.9109	-83.7174		
		14	3.5947	-54.8782	-239.8763	0.0054	1.80
	2	13	2.2771	-39.1820	-87.2174		
		14	2.2771	-55.1494	-244.2792	0.0055	1.80
	3	13	1.9750	-27.8513	-57.7994		
		14	1.9750	-39.2566	-169.5341	0.0038	1.80
	4	13	1.1999	-28.0108	-59.8582		
		14	1.1999	-39.4161	-172.1240	0.0038	1.80
	5	13	-1.1072	-39.3698	-67.8606		
		14	-1.1072	-55.3372	-225.5477	0.0049	1.82
	6	13	4.7019	0.4589	-15.8568		
		14	4.7019	0.4589	-14.3285	0.0005	1.65
	7	13	3.3843	0.1878	-19.3568		
		14	3.3843	0.1878	-18.7314	0.0006	1.66
14	1	14	3.5947	-54.8782	-239.8763		
		15	3.5947	-58.8581	-287.0768	0.0005	0.42
	2	14	2.2771	-55.1494	-244.2792		
		15	2.2771	-59.1292	-291.7048	0.0005	0.42
	3	14	1.9750	-39.2566	-169.5341		
		15	1.9750	-42.0993	-203.2968	0.0003	0.42
	4	14	1.1999	-39.4161	-172.1240		
		15	1.1999	-42.2588	-206.0191	0.0003	0.42
	5	14	-1.1072	-55.3372	-225.5477		
		15	-1.1072	-59.3170	-273.1292	0.0005	0.42
	6	14	4.7019	0.4589	-14.3285		
		15	4.7019	0.4589	-13.9476		
	7	14	3.3843	0.1878	-18.7314		
		15	3.3843	0.1878	-18.5756		
15	1	15	66.1808	-6.4661	47.4624		
		16	66.1808	-6.4661	-23.6651	-0.0152	3.67
	2	15	67.4029	-6.9308	51.4038		
		16	67.4029	-6.9308	-24.8352	-0.0168	3.71

E L E M E N T R E P O R T S

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	7	19	-4.1694	28.1038	-28.7613	87.3894	8.27
		20	-4.1694	-28.5742	-32.6817	-0.1161	8.30
20	1	20	-2.4182	-71.7793	-143.2715		
		21	-2.4182	-99.1506	-428.7245	0.0096	1.81
	2	20	-5.2766	-69.1370	-110.4863		
		21	-5.2766	-96.5083	-387.1140	0.0083	1.83
	3	20	-1.5620	-47.3361	-94.0846		
		21	-1.5620	-65.4556	-282.4468	0.0063	1.81
	4	20	-3.2435	-45.7818	-74.7992		
		21	-3.2435	-63.9013	-257.9700	0.0055	1.83
	5	20	-1.1072	-40.5628	-77.8046		
		21	-1.1072	-56.5781	-240.0300	0.0053	1.81
	6	20	-1.3110	-31.2165	-65.4669		
		21	-1.3110	-42.5725	-188.6945	0.0043	1.81
	7	20	-4.1694	-28.5742	-32.6817		
		21	-4.1694	-39.9302	-147.0840	0.0030	1.85
21	1	21	-2.4182	-99.1506	-428.7245		
		22	-2.4182	-105.9525	-513.8423	0.0009	0.42
	2	21	-5.2766	-96.5083	-387.1140		
		22	-5.2766	-103.3102	-470.0387	0.0008	0.42
	3	21	-1.5620	-65.4556	-282.4468		
		22	-1.5620	-69.9584	-338.6436	0.0006	0.42
	4	21	-3.2435	-63.9013	-257.9700		
		22	-3.2435	-68.4040	-312.8767	0.0005	0.42
	5	21	-1.1072	-56.5781	-240.0300		
		22	-1.1072	-60.5580	-288.6415	0.0005	0.42
	6	21	-1.3110	-42.5725	-188.6945		
		22	-1.3110	-45.3945	-225.2008	0.0004	0.42
	7	21	-4.1694	-39.9302	-147.0840		
		22	-4.1694	-42.7522	-181.3972	0.0003	0.42

E L E M E N T R E P O R T S

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
22	1	22	90.9541	-1.6476	12.1509		
		23	90.9541	-1.6476	-5.9726	-0.0039	3.69
	2	22	71.4796	5.5844	-40.3211		
		23	71.4796	5.5844	21.1073	0.0125	3.61
	3	22	60.1263	-1.1481	8.4611		
		23	60.1263	-1.1481	-4.1679	-0.0027	3.68
	4	22	48.6707	3.1060	-22.4048		
		23	48.6707	3.1060	11.7615	0.0069	3.61
	5	22	52.5497	-1.4194	10.4202		
		23	52.5497	-1.4194	-5.1933	-0.0033	3.67
	6	22	38.4044	-0.2282	1.7307		
		23	38.4044	-0.2282	-0.7793	-0.0006	3.79
	7	22	18.9299	7.0038	-50.7412		
		23	18.9299	7.0038	26.3006	0.0158	3.62
23	1	24	-125.8881	-3.2995	12.2295		
		22	-125.8881	-3.2995	-24.0650	0.0040	7.35
	2	24	-98.9337	9.3787	-33.1796		
		22	-98.9337	9.3787	69.9866	-0.0120	7.27
	3	24	-83.2198	-2.2866	8.4641		
		22	-83.2198	-2.2866	-16.6883	0.0027	7.35
	4	24	-67.3644	5.1712	-18.2471		
		22	-67.3644	5.1712	38.6362	-0.0067	7.27
	5	24	-72.7331	-2.7425	10.0773		
		22	-72.7331	-2.7425	-20.0903	0.0033	7.34
	6	24	-53.1549	-0.5570	2.1521		
		22	-53.1549	-0.5570	-3.9747	0.0006	7.44
	7	24	-26.2006	12.1213	-43.2569		
		22	-26.2006	12.1213	90.0769	-0.0154	7.29
24	1	22	-4.0701	110.8897	-550.0582		
		25	-4.0701	104.0878	-460.8425	0.0009	0.41
	2	22	-1.4823	67.1032	-359.7310		
		25	-1.4823	63.1233	-305.6870	0.0006	0.41

E L E M E N T R E P O R T S

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	3	22	-2.7005	73.3878	-363.7929		
		25	-2.7005	68.8851	-304.7496	0.0006	0.41
	4	22	-1.1783	47.6310	-251.8357		
		25	-1.1783	44.7883	-213.4817	0.0004	0.41
	5	22	-2.4303	64.7248	-319.1520		
		25	-2.4303	60.7450	-267.0820	0.0005	0.41
	6	22	-1.6398	46.1649	-230.9062		
		25	-1.6398	43.3429	-193.7605	0.0004	0.41
	7	22	0.9480	2.3783	-40.5791		
		25	0.9480	2.3783	-38.6051		
5	1	25	-4.0701	104.0878	-460.8425		
		26	-4.0701	76.7165	-158.8992	0.0104	1.53
	2	25	-1.4823	63.1233	-305.6870		
		26	-1.4823	47.1080	-121.6007	0.0072	1.55
	3	25	-2.7005	68.8851	-304.7496		
		26	-2.7005	50.7656	-104.9330	0.0069	1.53
	4	25	-1.1783	44.7883	-213.4817		
		26	-1.1783	33.3488	-82.9928	0.0050	1.55
	5	25	-2.4303	60.7450	-267.0820		
		26	-2.4303	44.7297	-90.9393	0.0060	1.53
	6	25	-1.6398	43.3429	-193.7605		
		26	-1.6398	31.9869	-67.9599	0.0044	1.53
	7	25	0.9480	2.3783	-38.6051		
		26	0.9480	2.3783	-30.6614	0.0012	1.64
26	1	26	-4.0701	76.7165	-158.8992	200.1873	9.36
		27	-4.0701	-54.4035	19.6054	-0.2371	8.61
	2	26	-1.4823	47.1080	-121.6007	109.8034	9.82
		27	-1.4823	-29.6120	18.3676	-0.1225	8.89
	3	26	-2.7005	50.7656	-104.9330	132.5917	9.36
		27	-2.7005	-36.0344	12.9161	-0.1571	8.61
	4	26	-1.1783	33.3488	-82.9928	79.3638	9.74
		27	-1.1783	-21.4512	12.1880	-0.0897	8.83

E L E M E N T R E P O R T S

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	5	26	-2.4303	44.7297	-90.9393	117.6890	9.33
		27	-2.4303	-31.9903	10.9757	-0.1399	8.59
	6	26	-1.6398	31.9869	-67.9599	82.5046	9.41
		27	-1.6398	-22.4131	8.6297	-0.0972	8.63
	7	26	0.9480	2.3783	-30.6614		
		27	0.9480	2.3783	7.3919	0.0196	6.16
27	1	27	-4.0701	-54.4035	19.6054		
		28	-4.0701	-87.1835	-263.5684	0.0056	2.39
	2	27	-1.4823	-29.6120	18.3676		
		28	-1.4823	-48.7920	-138.4403	0.0027	2.44
	3	27	-2.7005	-36.0344	12.9161		
		28	-2.7005	-57.7344	-174.6216	0.0037	2.39
	4	27	-1.1783	-21.4512	12.1880		
		28	-1.1783	-35.1512	-101.0168	0.0020	2.43
	5	27	-2.4303	-31.9903	10.9757		
		28	-2.4303	-51.1703	-155.3455	0.0033	2.39
	6	27	-1.6398	-22.4131	8.6297		
		28	-1.6398	-36.0131	-108.2229	0.0023	2.40
	7	27	0.9480	2.3783	7.3919		
		28	0.9480	2.3783	16.9052	-0.0006	2.13
28	1	28	-4.0701	-87.1835	-263.5684		
		29	-4.0701	-93.9853	-338.7534	0.0005	0.42
	2	28	-1.4823	-48.7920	-138.4403		
		29	-1.4823	-52.7718	-180.5893	0.0003	0.42
	3	28	-2.7005	-57.7344	-174.6216		
		29	-2.7005	-62.2372	-224.4098	0.0004	0.42
	4	28	-1.1783	-35.1512	-101.0168		
		29	-1.1783	-37.9940	-131.3721	0.0002	0.42
	5	28	-2.4303	-51.1703	-155.3455		
		29	-2.4303	-55.1502	-199.4685	0.0003	0.42
	6	28	-1.6398	-36.0131	-108.2229		
		29	-1.6398	-38.8351	-139.2849	0.0002	0.42

E L E M E N T R E P O R T S

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	7	28	0.9480	2.3783	16.9052		
		29	0.9480	2.3783	18.8793		
29	1	29	42.7206	21.0603	-154.3347		
		30	42.7206	21.0603	77.3286	0.0501	3.66
	2	29	23.9872	11.5631	-84.1624		
		30	23.9872	11.5631	43.0319	0.0269	3.64
	3	29	28.2896	13.9495	-102.2285		
		30	28.2896	13.9495	51.2157	0.0332	3.66
	4	29	17.2700	8.3629	-60.9507		
		30	17.2700	8.3629	31.0412	0.0196	3.64
	5	29	25.0683	12.3845	-90.7845		
		30	25.0683	12.3845	45.4448	0.0295	3.67
	6	29	17.6523	8.6758	-63.5502		
		30	17.6523	8.6758	31.8838	0.0206	3.66
	7	29	-1.0811	-0.8214	6.6222		
		30	-1.0811	-0.8214	-2.4129	-0.0026	3.98
30	1	31	-51.2647	25.1304	-92.0159		
		29	-51.2647	25.1304	184.4187	-0.0500	7.33
	2	31	-28.7846	13.0454	-47.0727		
		29	-28.7846	13.0454	96.4269	-0.0265	7.30
	3	31	-33.9476	16.6500	-60.9689		
		29	-33.9476	16.6500	122.1813	-0.0331	7.33
	4	31	-20.7240	9.5412	-34.5317		
		29	-20.7240	9.5412	70.4214	-0.0193	7.31
	5	31	-30.0819	14.8148	-54.2790		
		29	-30.0819	14.8148	108.6840	-0.0295	7.33
	6	31	-21.1828	10.3156	-37.7369		
		29	-21.1828	10.3156	75.7348	-0.0206	7.33
	7	31	1.2973	-1.7694	7.2063		
		29	1.2973	-1.7694	-12.2571	0.0029	7.55

R E A C T I O N S

NODE NO	LOAD COMB	PX	PY	MOMENT
	Units :	K	K	K -Ft

LOAD COMBINATIONS:

COMB 1 : 1.40 X CASE 1
+ 1.70 X CASE 2

COMB 2 : 1.40 X CASE 1
+ 1.70 X CASE 3

COMB 3 : 1.00 X CASE 1
+ 1.00 X CASE 2

COMB 4 : 1.00 X CASE 1
+ 1.00 X CASE 3

COMB 5 : 1.40 X CASE 1

COMB 6 : 1.70 X CASE 2

COMB 7 : 1.70 X CASE 3

1	1	-22.2526	43.9008	-81.5585
	2	-21.9873	43.9245	-80.0814
	3	-14.6509	28.9839	-53.7039
	4	-14.4948	28.9978	-52.8350
	5	-12.3845	25.0683	-45.4448
	6	-9.8681	18.8326	-36.1137
	7	-9.6029	18.8563	-34.6366
2	1	26.7470	52.6810	-98.1137
	2	27.0890	52.7094	-99.9729
	3	17.6009	34.7807	-64.5558
	4	17.8021	34.7974	-65.6495
	5	14.8148	30.0819	-54.2790
	6	11.9322	22.5991	-43.8347
	7	12.2742	22.6275	-45.6940
9	1	9.0177	71.0169	33.1455
	2	9.4297	70.8813	35.1763
	3	5.4835	48.3985	20.1520
	4	5.7258	48.3188	21.3465
	5	1.4194	52.5497	5.1933
	6	7.5983	18.4672	27.9522
	7	8.0103	18.3316	29.9830

R E A C T I O N S

NODE NO	LOAD COMB	PX	PY	MOMENT
10	1	-17.1068	98.2932	62.5708
	2	-16.8084	98.1056	60.4798
	3	-10.4085	66.9876	38.0766
	4	-10.2330	66.8772	36.8466
	5	-2.7425	72.7331	10.0773
	6	-14.3643	25.5601	52.4934
	7	-14.0659	25.3724	50.4025
16	1	-6.4661	66.1808	-23.6651
	2	-6.9308	67.4029	-24.8352
	3	-3.8036	45.2023	-13.9206
	4	-4.0770	45.9211	-14.6089
	5	0.0000	49.7609	-0.0000
	6	-6.4661	16.4200	-23.6651
	7	-6.9308	17.6420	-24.8352
17	1	12.4790	91.5998	-45.8409
	2	14.4846	93.2912	-54.2170
	3	7.3406	62.5637	-26.9652
	4	8.5203	63.5587	-31.8923
	5	-0.0000	68.8732	-0.0000
	6	12.4790	22.7266	-45.8409
	7	14.4846	24.4180	-54.2170
23	1	-1.6476	90.9541	-5.9726
	2	5.5844	71.4796	21.1073
	3	-1.1481	60.1263	-4.1679
	4	3.1060	48.6707	11.7615
	5	-1.4194	52.5497	-5.1933
	6	-0.2282	38.4044	-0.7793
	7	7.0038	18.9299	26.3006
24	1	3.2995	125.8881	-12.2295
	2	-9.3787	98.9337	33.1796
	3	2.2866	83.2198	-8.4641
	4	-5.1712	67.3644	18.2471
	5	2.7425	72.7331	-10.0773
	6	0.5570	53.1549	-2.1521
	7	-12.1213	26.2006	43.2569
30	1	21.0603	42.7206	77.3286
	2	11.5631	23.9872	43.0319
	3	13.9495	28.2896	51.2157
	4	8.3629	17.2700	31.0412

R E A C T I O N S

NODE NO	LOAD COMB	PX	PY	MOMENT
	5	12.3845	25.0683	45.4448
	6	8.6758	17.6523	31.8838
	7	-0.8214	-1.0811	-2.4129
31	1	-25.1304	51.2647	92.0159
	2	-13.0454	28.7846	47.0727
	3	-16.6500	33.9476	60.9689
	4	-9.5412	20.7240	34.5317
	5	-14.8148	30.0819	54.2790
	6	-10.3156	21.1828	37.7369
	7	1.7694	-1.2973	-7.2063

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Subject _____
Project No. _____ Date _____ By _____

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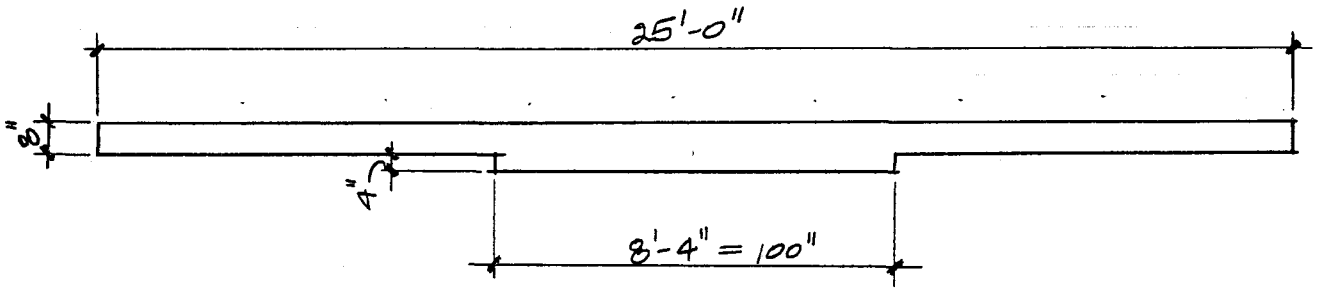
☐ _____

FIND TOTAL MOMENT CAPACITY OF SLAB. - 6th, 7th, & 8th FLRS

SLAB BEAM "F" - DROPPED PANEL SECTION

$f'_c = 2300 psi$
$f_y = 60 ksi$



$b = 100"$

TOP BARS = $28 \# 5 \Rightarrow A_s = 8.68 \text{ in}^2$
$14 \# 5 \Rightarrow A_s = 4.34 \text{ in}^2$
13.02 in^2

$d = 10.31"$

$$a = \frac{13.02(60)}{.85(2.3)(100)} = 4.00"$$

$$\phi M_n = \frac{1}{12}(.9)\left[13.02(60)\left(10.31 - \frac{4}{2}\right)\right]$$

$\phi M_n = 487'^{-k}$ $\quad M_u = -461'^{-k}$ ✓ OK

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CHECK NEG. MOMENT IN 8" SECTION @ EDGE OF DROPPED PANEL:

$A_s = 13.02''$
$d = 6.31''$

$$a = \frac{13.02(60)}{.85(2.3)(300)} = 1.332''$$

$$\phi M_n = 0.9\left(\frac{1}{12}\right)\left[13.02(60)\left(6.31 - \left(\frac{1.332}{2}\right)\right)\right]$$

$$\phi M_n = 330.68^{1-k}$$

MAX NEG. MOMENT $= 159^{1-k} < 331^{1-k}$ ✓ OK

CHECK POS. MOMENT

REINF. $= 26\#5 \Rightarrow 8.06\ IN^2$
$16\#5 \Rightarrow 4.96\ IN^2$
$13.02\ IN^2$

$d = 6.06''$

$$\phi M_n = 316^{1-k}$$

MAX CALC. POS. MOMENT $= 210^{1-k} < 316^{1-k}$ ✓ OK

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MAX NEG. MOMENT = 388^{1-k} (EL. 25 - NODE 25)

RESERVE CAPACITY = $487^{1-k} - 461^{1-k} = 26^{1-k}$

FACTORED MOMENT CAUSED BY 80 psf LL

$M_u = 193.8^{1-k}$ (EL. 25 - NODE 25 - L.C. #6)

FIND RESERVE CAPACITY IN PSF:

$$\frac{80}{193.8} = \frac{w}{26}$$

$$\underline{w = 10.73 \text{ psf}}$$

TOTAL LIVE LOAD CAPACITY = 80 + 10.73 = <u>90.73 psf</u>

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6th FLOOR

EAST-WEST FRAME "3"

(TYP. FOR 6th, 7th, & 8th FLRS.)

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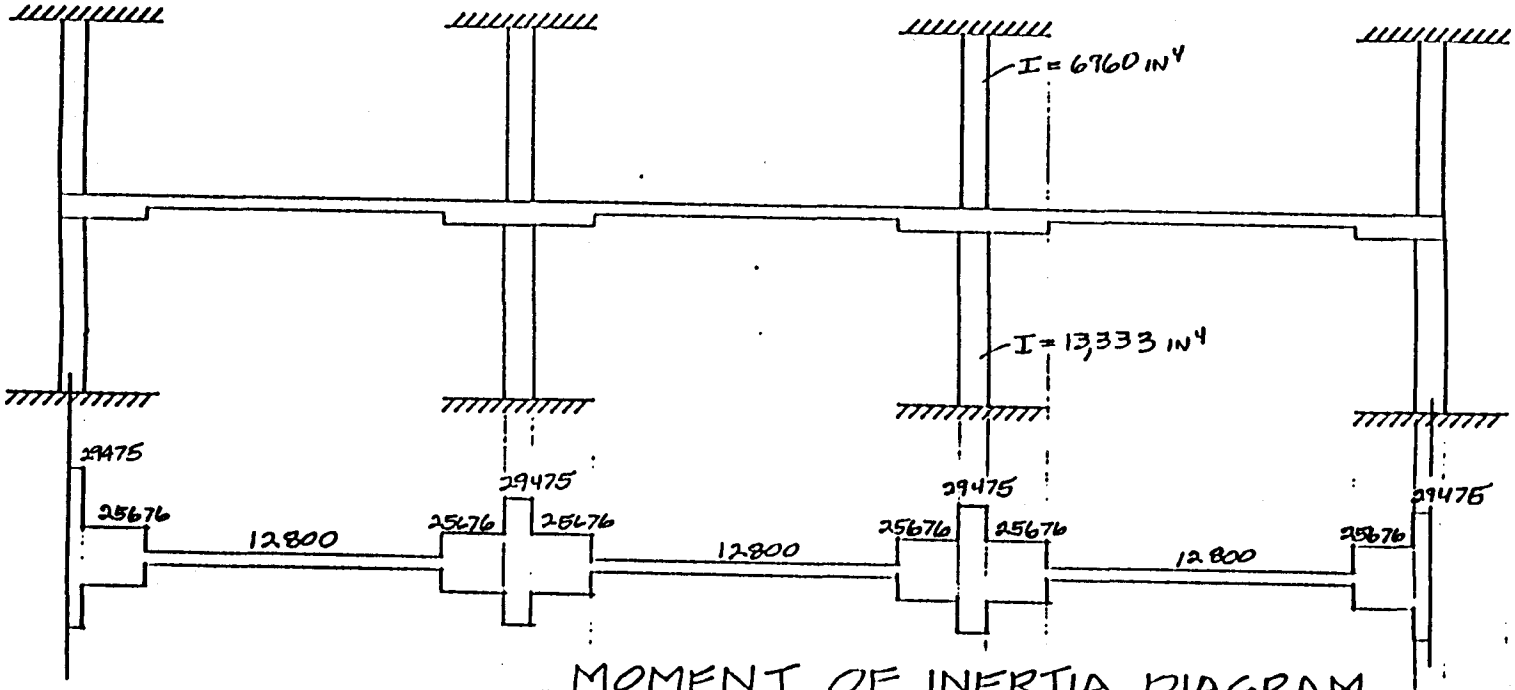
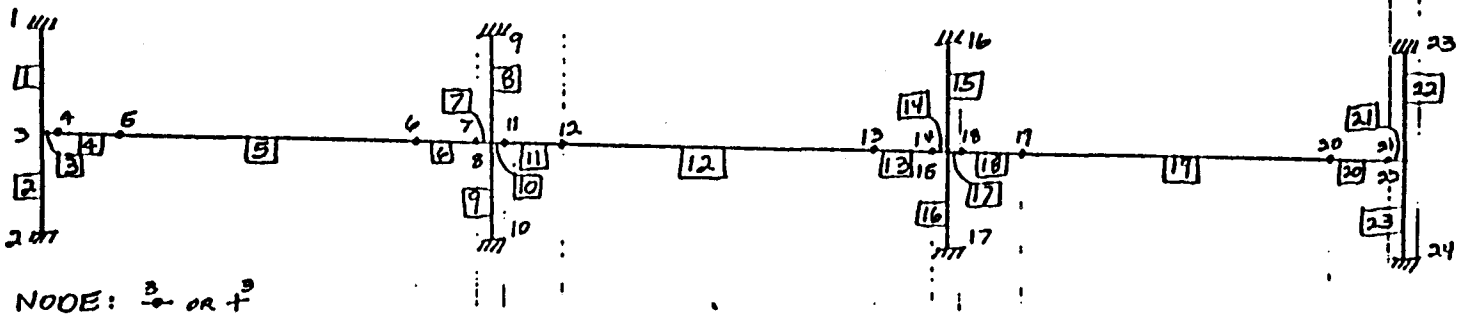
$l_2 = 28$

$E_{cs} = 2.734 \times 10^6$ psi

$E_{cc} = 3.491 \times 10^6$ psi



MOMENT OF INERTIA DIAGRAM



NODE: $\overset{3}{\circ}$ OR $\overset{3}{+}$

ELEMENT: $\boxed{3}$

FIXED SUPPORT

COMPUTER MODEL

N O D A L I N F O R M A T I O N

NODE NO	NODAL COORDINATES X	Y	SUPPORT CONDITIONS CODE	PX STIFF	PY STIFF	M STIFF
	Units : Ft	Ft		K /In	K /In	K -In /Deg
1	0.000	22.000	F			
2	0.000	0.000	F			
3	0.000	11.000				
4	0.830	11.000				
5	4.830	11.000				
6	20.830	11.000				
7	24.170	11.000				
8	25.000	11.000				
9	25.000	22.000	F			
10	25.000	0.000	F			
11	25.830	11.000				
12	29.170	11.000				
13	45.840	11.000				
14	49.170	11.000				
15	50.000	11.000				
16	50.000	22.000	F			
17	50.000	0.000	F			
18	50.830	11.000				
19	54.160	11.000				
20	70.830	11.000				
21	74.170	11.000				
22	75.000	11.000				
23	75.000	22.000	F			
24	75.000	0.000	F			

E L E M E N T I N F O R M A T I O N

ELEM NO	NE NODE	PE NODE	ELEM LENGTH	BETA ANGLE	PROP TYPE	ELEM TYPE	NE HINGE	PE HINGE
		Units : Ft		Deg				
1	3	1	11.000	90.00	5	BEAM		
2	2	3	11.000	90.00	7	BEAM		
3	3	4	0.830	0.00	3	BEAM		
4	4	5	4.000	0.00	2	BEAM		
5	5	6	16.000	0.00	1	BEAM		
6	6	7	3.340	0.00	2	BEAM		
7	7	8	0.830	0.00	3	BEAM		
8	8	9	11.000	90.00	5	BEAM		
9	10	8	11.000	90.00	7	BEAM		
10	8	11	0.830	0.00	3	BEAM		
11	11	12	3.340	0.00	2	BEAM		
12	12	13	16.670	0.00	1	BEAM		
13	13	14	3.330	0.00	2	BEAM		
14	14	15	0.830	0.00	3	BEAM		

E L E M E N T I N F O R M A T I O N

ELEM NO	NE NODE	PE NODE	ELEM LENGTH	BETA ANGLE	PROP TYPE	ELEM TYPE	NE HINGE	PE HINGE
15	15	16	11.000	90.00	5	BEAM		
16	17	15	11.000	90.00	7	BEAM		
17	15	18	0.830	0.00	3	BEAM		
18	18	19	3.330	0.00	2	BEAM		
19	19	20	16.670	0.00	1	BEAM		
20	20	21	3.340	0.00	2	BEAM		
21	21	22	0.830	0.00	3	BEAM		
22	22	23	11.000	90.00	5	BEAM		
23	24	22	11.000	90.00	7	BEAM		

P R O P E R T Y I N F O R M A T I O N

PROP NO	SECTION NAME	MODULUS	AREA	I	DIST
	Units :	K /In 2	In2	In4	Ft
1	SLAB BEAM ONLY	2.7e+003	2.4e+003	1.28e+004	
2	SLAB BEAM @ DROP PAN	2.7e+003	2.8e+003	2.57e+004	
3	S.B. @ INT. COLUMNS	2.7e+003	2.8e+003	2.95e+004	
5	6TH FLOOR INT. COLUM	3.5e+003	289	6.96e+003	
7	5TH FLOOR INT. COLUM	3.5e+003	400	1.33e+004	

E L E M E N T L O A D I N F O R M A T I O N

REC NO	LOAD CASE	LOAD TYPE	LOAD SYS	DIST SPEC		DIST	PX	PY	M
					Units :	Ft	K /Ft	K /Ft	Ft-K /Ft
Description : DL									
Element List : 3-7,10-14,17-21,24-28									
1	1	UNIF	GLO	FRAC	B	0.00	0.00	-3.43	0.00
					E	1.00	0.00	-3.43	0.00
Description : LL									
Element List : 3-7,10-14									
2	2	UNIF	GLO	FRAC	B	0.00	0.00	-2.00	0.00
					E	1.00	0.00	-2.00	0.00
Description : LL POS									
Element List : 3-7,17-21									
3	3	UNIF	GLO	FRAC	B	0.00	0.00	-2.00	0.00
					E	1.00	0.00	-2.00	0.00

N O D A L D I S P L A C E M E N T S

NODE NO	LOAD COMB	DX	DY	ROTATION
	Units :	In	In	Deg

LOAD COMBINATIONS:

COMB 1 : 1.40 X CASE 1
+ 1.70 X CASE 2

COMB 2 : 1.40 X CASE 1
+ 1.70 X CASE 3

COMB 3 : 1.00 X CASE 1
+ 1.00 X CASE 2

COMB 4 : 1.00 X CASE 1
+ 1.00 X CASE 3

COMB 5 : 1.40 X CASE 1

COMB 6 : 1.70 X CASE 2

COMB 7 : 1.70 X CASE 3

1	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
	6	0.0000	0.0000	0.0000
	7	0.0000	0.0000	0.0000
2	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
	6	0.0000	0.0000	0.0000
	7	0.0000	0.0000	0.0000
3	1	0.0022	-0.0053	-0.1179
	2	0.0009	-0.0054	-0.1249
	3	0.0013	-0.0035	-0.0781
	4	0.0006	-0.0036	-0.0822
	5	0.0006	-0.0031	-0.0693
	6	0.0016	-0.0022	-0.0486
	7	0.0004	-0.0023	-0.0555

N O D A L D I S P L A C E M E N T S

NODE NO	LOAD COMB	DX	DY	ROTATION
4	1	0.0021	-0.0283	-0.1458
	2	0.0009	-0.0298	-0.1546
	3	0.0013	-0.0187	-0.0966
	4	0.0006	-0.0196	-0.1017
	5	0.0006	-0.0166	-0.0858
	6	0.0016	-0.0116	-0.0600
	7	0.0003	-0.0132	-0.0688
5	1	0.0020	-0.1864	-0.2089
	2	0.0008	-0.1985	-0.2246
	3	0.0013	-0.1235	-0.1384
	4	0.0005	-0.1306	-0.1477
	5	0.0005	-0.1097	-0.1232
	6	0.0015	-0.0766	-0.0857
	7	0.0003	-0.0888	-0.1015
6	1	0.0016	-0.0999	0.1657
	2	0.0003	-0.1323	0.1967
	3	0.0010	-0.0664	0.1099
	4	0.0002	-0.0855	0.1282
	5	0.0002	-0.0605	0.0989
	6	0.0014	-0.0393	0.0668
	7	0.0001	-0.0718	0.0978
7	1	0.0015	-0.0172	0.0513
	2	0.0002	-0.0229	0.0975
	3	0.0009	-0.0114	0.0343
	4	0.0002	-0.0148	0.0615
	5	0.0002	-0.0105	0.0329
	6	0.0013	-0.0067	0.0184
	7	0.0000	-0.0124	0.0646
8	1	0.0015	-0.0117	0.0097
	2	0.0002	-0.0091	0.0596
	3	0.0009	-0.0078	0.0068
	4	0.0002	-0.0062	0.0361
	5	0.0002	-0.0068	0.0088
	6	0.0013	-0.0050	0.0009
	7	0.0000	-0.0023	0.0508
9	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000

N O D A L D I S P L A C E M E N T S

NODE NO	LOAD COMB	DX	DY	ROTATION
	5	0.0000	0.0000	0.0000
	6	0.0000	0.0000	0.0000
	7	0.0000	0.0000	0.0000
10	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
	6	0.0000	0.0000	0.0000
	7	0.0000	0.0000	0.0000
11	1	0.0015	-0.0136	-0.0295
	2	0.0002	-0.0009	0.0359
	3	0.0009	-0.0089	-0.0190
	4	0.0001	-0.0014	0.0194
	5	0.0002	-0.0072	-0.0132
	6	0.0013	-0.0064	-0.0164
	7	0.0000	0.0063	0.0490
12	1	0.0014	-0.0779	-0.1358
	2	0.0002	-0.0029	-0.0311
	3	0.0009	-0.0509	-0.0890
	4	0.0001	-0.0068	-0.0274
	5	0.0001	-0.0407	-0.0720
	6	0.0013	-0.0372	-0.0638
	7	0.0000	0.0378	0.0409
13	1	0.0010	-0.0986	0.1509
	2	-0.0001	-0.0028	0.0309
	3	0.0006	-0.0631	0.0978
	4	-0.0001	-0.0067	0.0273
	5	-0.0001	-0.0405	0.0719
	6	0.0011	-0.0581	0.0791
	7	0.0000	0.0377	-0.0409
14	1	0.0010	-0.0174	0.0644
	2	-0.0001	-0.0009	-0.0360
	3	0.0005	-0.0112	0.0396
	4	-0.0001	-0.0014	-0.0195
	5	-0.0001	-0.0072	0.0131
	6	0.0011	-0.0102	0.0513
	7	0.0000	0.0063	-0.0491

N O D A L D I S P L A C E M E N T S

NODE NO	LOAD COMB	DX	DY	ROTATION
15	1	0.0009	-0.0091	0.0304
	2	-0.0001	-0.0091	-0.0597
	3	0.0005	-0.0062	0.0168
	4	-0.0001	-0.0062	-0.0362
	5	-0.0002	-0.0068	-0.0088
	6	0.0011	-0.0023	0.0392
	7	0.0000	-0.0023	-0.0508
16	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
	6	0.0000	0.0000	0.0000
	7	0.0000	0.0000	0.0000
17	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
	6	0.0000	0.0000	0.0000
	7	0.0000	0.0000	0.0000
18	1	0.0009	-0.0062	0.0033
	2	-0.0002	-0.0229	-0.0976
	3	0.0005	-0.0050	-0.0022
	4	-0.0001	-0.0148	-0.0616
	5	-0.0002	-0.0105	-0.0330
	6	0.0011	0.0043	0.0363
	7	0.0000	-0.0124	-0.0646
19	1	0.0009	-0.0351	-0.0743
	2	-0.0002	-0.1321	-0.1967
	3	0.0005	-0.0282	-0.0562
	4	-0.0002	-0.0853	-0.1282
	5	-0.0002	-0.0604	-0.0988
	6	0.0011	0.0253	0.0245
	7	-0.0000	-0.0717	-0.0979
20	1	0.0006	-0.0846	0.1103
	2	-0.0007	-0.1670	0.2215
	3	0.0003	-0.0614	0.0802
	4	-0.0005	-0.1099	0.1456

N O D A L D I S P L A C E M E N T S

NODE NO	LOAD COMB	DX	DY	ROTATION
	5	-0.0005	-0.0925	0.1219
	6	0.0011	0.0079	-0.0116
	7	-0.0003	-0.0745	0.0996
21	1	0.0006	-0.0154	0.0786
	2	-0.0008	-0.0297	0.1541
	3	0.0003	-0.0111	0.0570
	4	-0.0006	-0.0196	0.1014
	5	-0.0005	-0.0166	0.0856
	6	0.0011	0.0012	-0.0070
	7	-0.0003	-0.0131	0.0685
22	1	0.0006	-0.0030	0.0635
	2	-0.0008	-0.0054	0.1245
	3	0.0003	-0.0021	0.0461
	4	-0.0006	-0.0036	0.0820
	5	-0.0005	-0.0031	0.0692
	6	0.0011	0.0001	-0.0057
	7	-0.0003	-0.0023	0.0553
23	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
	6	0.0000	0.0000	0.0000
	7	0.0000	0.0000	0.0000
24	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
	6	0.0000	0.0000	0.0000
	7	0.0000	0.0000	0.0000

E L E M E N T R E P O R T S

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
		Units :	K	K	K -Ft	K -Ft /In	Ft

LOAD COMBINATIONS:

COMB 1 : 1.40 X CASE 1

E L E M E N T R E P O R T S

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	+ 1.70 X CASE 2						
COMB 2 :	1.40 X CASE 1						
	+ 1.70 X CASE 3						
COMB 3 :	1.00 X CASE 1						
	+ 1.00 X CASE 2						
COMB 4 :	1.00 X CASE 1						
	+ 1.00 X CASE 3						
COMB 5 :	1.40 X CASE 1						
COMB 6 :	1.70 X CASE 2						
COMB 7 :	1.70 X CASE 3						
1	1	3	40.1478	-17.4948	127.7926		
		1	40.1478	-17.4948	-64.6502	-0.0404	3.65
	2	3	41.2885	-18.3553	134.3880		
		1	41.2885	-18.3553	-67.5199	-0.0427	3.66
	3	3	26.5869	-11.5769	84.5842		
		1	26.5869	-11.5769	-42.7612	-0.0268	3.65
	4	3	27.2578	-12.0830	88.4639		
		1	27.2578	-12.0830	-44.4492	-0.0281	3.66
	5	3	23.5657	-10.2006	74.6696		
		1	23.5657	-10.2006	-37.5374	-0.0237	3.66
	6	3	16.5821	-7.2942	53.1229		
		1	16.5821	-7.2942	-27.1128	-0.0167	3.64
	7	3	17.7227	-8.1546	59.7184		
		1	17.7227	-8.1546	-29.9825	-0.0190	3.66
2	1	2	-55.5679	-32.4637	118.0707		
		3	-55.5679	-32.4637	-239.0299	0.0401	7.32
	2	2	-57.1467	-34.7084	126.8481		
		3	-57.1467	-34.7084	-254.9448	0.0426	7.33
	3	2	-36.7984	-21.5239	78.3218		
		3	-36.7984	-21.5239	-158.4406	0.0266	7.32

E L E M E N T R E P O R T S

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	4	2	-37.7271	-22.8443	83.4850		
		3	-37.7271	-22.8443	-167.8023	0.0280	7.33
	5	2	-32.6170	-19.2587	70.3565		
		3	-32.6170	-19.2587	-141.4892	0.0236	7.33
	6	2	-22.9510	-13.2050	47.7142		
		3	-22.9510	-13.2050	-97.5407	0.0165	7.31
	7	2	-24.5297	-15.4497	56.4916		
		3	-24.5297	-15.4497	-113.4555	0.0189	7.33
3	1	3	-14.9689	95.7158	-366.8225		
		4	-14.9689	88.9139	-290.2012	0.0006	0.41
	2	3	-16.3532	98.4352	-389.3328		
		4	-16.3532	91.6333	-310.4544	0.0006	0.41
	3	3	-9.9470	63.3853	-243.0249		
		4	-9.9470	58.8825	-192.2837	0.0004	0.41
	4	3	-10.7613	64.9849	-256.2662		
		4	-10.7613	60.4821	-204.1974	0.0004	0.41
	5	3	-9.0581	56.1827	-216.1589		
		4	-9.0581	52.2029	-171.1789	0.0004	0.41
	6	3	-5.9108	39.5331	-150.6636		
		4	-5.9108	36.7111	-119.0223	0.0002	0.41
	7	3	-7.2951	42.2524	-173.1739		
		4	-7.2951	39.4304	-139.2755	0.0003	0.41
4	1	4	-14.9689	88.9139	-290.2012		
		5	-14.9689	56.1339	-0.1054	0.0067	1.66
	2	4	-16.3532	91.6333	-310.4544		
		5	-16.3532	58.8533	-9.4812	0.0074	1.68
	3	4	-9.9470	58.8825	-192.2837		
		5	-9.9470	37.1825	-0.1537	0.0044	1.66
	4	4	-10.7613	60.4821	-204.1974		
		5	-10.7613	38.7821	-5.6689	0.0049	1.68
	5	4	-9.0581	52.2029	-171.1789		
		5	-9.0581	33.0229	-0.7275	0.0040	1.66

E L E M E N T R E P O R T S

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	6	4	-5.9108	36.7111	-119.0223		
		5	-5.9108	23.1111	0.6220	0.0027	1.65
	7	4	-7.2951	39.4304	-139.2755		
		5	-7.2951	25.8304	-8.7537	0.0034	1.70
5	1	5	-14.9689	56.1339	-0.1054	192.1471	6.85
		6	-14.9689	-74.9861	-150.9224	-0.2273	7.47
	2	5	-16.3532	58.8533	-9.4812	201.8496	7.18
		6	-16.3532	-72.2667	-116.7884	-0.2462	7.64
	3	5	-9.9470	37.1825	-0.1537	127.2692	6.85
		6	-9.9470	-49.6175	-99.6336	-0.1506	7.47
	4	5	-10.7613	38.7821	-5.6689	132.9536	7.15
		6	-10.7613	-48.0179	-79.5547	-0.1617	7.63
	5	5	-9.0581	33.0229	-0.7275	112.9857	6.89
		6	-9.0581	-43.6971	-86.1218	-0.1341	7.49
	6	5	-5.9108	23.1111	0.6220	79.1695	6.80
		6	-5.9108	-31.2889	-64.8005	-0.0932	7.44
	7	5	-7.2951	25.8304	-8.7537	89.3657	7.60
		6	-7.2951	-28.5696	-30.6665	-0.1122	7.84
6	1	6	-14.9689	-74.9861	-150.9224		
		7	-14.9689	-102.3574	-447.0859	0.0100	1.81
	2	6	-16.3532	-72.2667	-116.7884		
		7	-16.3532	-99.6380	-403.8692	0.0087	1.83
	3	6	-9.9470	-49.6175	-99.6336		
		7	-9.9470	-67.7370	-295.6155	0.0066	1.81
	4	6	-10.7613	-48.0179	-79.5547		
		7	-10.7613	-66.1374	-270.1940	0.0058	1.82
	5	6	-9.0581	-43.6971	-86.1218		
		7	-9.0581	-59.7124	-258.8159	0.0058	1.81
	6	6	-5.9108	-31.2889	-64.8005		
		7	-5.9108	-42.6449	-188.2700	0.0042	1.81
	7	6	-7.2951	-28.5696	-30.6665		
		7	-7.2951	-39.9256	-145.0533	0.0029	1.85

E L E M E N T R E P O R T S

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
7	1	7	-14.9689	-102.3574	-447.0859		
		8	-14.9689	-109.1592	-534.8652	0.0009	0.42
	2	7	-16.3532	-99.6380	-403.8692		
		8	-16.3532	-106.4398	-489.3915	0.0008	0.42
	3	7	-9.9470	-67.7370	-295.6155		
		8	-9.9470	-72.2397	-353.7059	0.0006	0.42
	4	7	-10.7613	-66.1374	-270.1940		
		8	-10.7613	-70.6401	-326.9566	0.0006	0.42
	5	7	-9.0581	-59.7124	-258.8159		
		8	-9.0581	-63.6923	-310.0283	0.0005	0.42
	6	7	-5.9108	-42.6449	-188.2700		
		8	-5.9108	-45.4669	-224.8364	0.0004	0.42
	7	7	-7.2951	-39.9256	-145.0533		
		8	-7.2951	-42.7476	-179.3627	0.0003	0.42
8	1	8	89.8065	1.2179	-9.2828		
		9	89.8065	1.2179	4.1138	0.0032	3.80
	2	8	69.7861	8.6691	-63.6257		
		9	69.7861	8.6691	31.7342	0.0203	3.67
	3	8	59.3639	0.8750	-6.6288		
		9	59.3639	0.8750	2.9957	0.0022	3.78
	4	8	47.5872	5.2580	-38.5952		
		9	47.5872	5.2580	19.2431	0.0123	3.67
	5	8	51.8568	1.2579	-9.2686		
		9	51.8568	1.2579	4.5686	0.0030	3.68
	6	8	37.9497	-0.0401	-0.0143		
		9	37.9497	-0.0401	-0.4549	0.0003	6.31
	7	8	17.9294	7.4112	-54.3572		
		9	17.9294	7.4112	27.1656	0.0173	3.67
9	1	10	-124.2996	3.0681	-11.9237		
		8	-124.2996	3.0681	21.8258	-0.0034	7.45

E L E M E N T R E P O R T S

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	2	10	-96.5898	16.7166	-61.3945		
		8	-96.5898	16.7166	122.4878	-0.0203	7.34
	3	10	-82.1646	2.1201	-8.1805		
		8	-82.1646	2.1201	15.1402	-0.0024	7.43
	4	10	-65.8647	10.1486	-37.2810		
		8	-65.8647	10.1486	74.3531	-0.0123	7.34
	5	10	-71.7741	2.5012	-9.2550		
		8	-71.7741	2.5012	18.2585	-0.0030	7.35
	6	10	-52.5255	0.5669	-2.6687		
		8	-52.5255	0.5669	3.5673	-0.0004	7.98
	7	10	-24.8157	14.2154	-52.1395		
		8	-24.8157	14.2154	104.2294	-0.0173	7.33
10	1	8	-13.1186	104.9469	-503.7566		
		11	-13.1186	98.1450	-419.4735	0.0009	0.41
	2	8	-8.3057	59.9361	-303.2780		
		11	-8.3057	55.9563	-255.1826	0.0005	0.41
	3	8	-8.7019	69.2887	-331.9369		
		11	-8.7019	64.7860	-276.2959	0.0006	0.41
	4	8	-5.8708	42.8118	-214.0083		
		11	-5.8708	39.9691	-179.6542	0.0004	0.41
	5	8	-7.8148	59.9386	-282.5018		
		11	-7.8148	55.9587	-234.4044	0.0005	0.41
	6	8	-5.3039	45.0083	-221.2548		
		11	-5.3039	42.1863	-185.0691	0.0004	0.41
	7	8	-0.4909	-0.0025	-20.7762		
		11	-0.4909	-0.0025	-20.7782		
11	1	11	-13.1186	98.1450	-419.4735		
		12	-13.1186	70.7737	-137.3792	0.0093	1.53
	2	11	-8.3057	55.9563	-255.1826		
		12	-8.3057	39.9410	-95.0343	0.0059	1.54
	3	11	-8.7019	64.7860	-276.2959		
		12	-8.7019	46.6665	-90.1703	0.0061	1.53

E L E M E N T R E P O R T S

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	4	11	-5.8708	39.9691	-179.6542		
		12	-5.8708	28.5296	-65.2615	0.0041	1.54
	5	11	-7.8148	55.9587	-234.4044		
		12	-7.8148	39.9434	-74.2479	0.0051	1.52
	6	11	-5.3039	42.1863	-185.0691		
		12	-5.3039	30.8303	-63.1313	0.0042	1.53
	7	11	-0.4909	-0.0025	-20.7782		
		12	-0.4909	-0.0025	-20.7864	0.0007	1.67
2	1	12	-13.1186	70.7737	-137.3792	168.2291	8.64
		13	-13.1186	-65.8369	-96.2309	-0.2067	8.51
	2	12	-8.3057	39.9410	-95.0343	71.3139	8.33
		13	-8.3057	-39.9917	-95.4573	-0.0747	8.33
	3	12	-8.7019	46.6665	-90.1703	110.5450	8.60
		13	-8.7019	-43.7683	-66.0135	-0.1355	8.49
	4	12	-5.8708	28.5296	-65.2615	53.5613	8.33
		13	-5.8708	-28.5652	-65.5584	-0.0579	8.33
	5	12	-7.8148	39.9434	-74.2479	92.1209	8.33
		13	-7.8148	-39.9892	-74.6298	-0.1104	8.33
	6	12	-5.3039	30.8303	-63.1313	76.6493	9.07
		13	-5.3039	-25.8477	-21.6011	-0.0964	8.71
	7	12	-0.4909	-0.0025	-20.7864		
		13	-0.4909	-0.0025	-20.8274	0.0357	8.34
13	1	13	-13.1186	-65.8369	-96.2309		
		14	-13.1186	-93.1263	-360.9046	0.0076	1.83
	2	13	-8.3057	-39.9917	-95.4573		
		14	-8.3057	-55.9590	-255.2152	0.0058	1.79
	3	13	-8.7019	-43.7683	-66.0135		
		14	-8.7019	-61.8335	-241.8405	0.0051	1.83
	4	13	-5.8708	-28.5652	-65.5584		
		14	-5.8708	-39.9704	-179.6703	0.0041	1.80
	5	13	-7.8148	-39.9892	-74.6298		
		14	-7.8148	-55.9566	-234.3796	0.0051	1.81

E L E M E N T R E P O R T S

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	6	13	-5.3039	-25.8477	-21.6011		
		14	-5.3039	-37.1697	-126.5250	0.0024	1.87
	7	13	-0.4909	-0.0025	-20.8274		
		14	-0.4909	-0.0025	-20.8356	0.0007	1.67
14	1	14	-13.1186	-93.1263	-360.9046		
		15	-13.1186	-99.9281	-441.0222	0.0007	0.42
	2	14	-8.3057	-55.9590	-255.2152		
		15	-8.3057	-59.9389	-303.3129	0.0005	0.42
	3	14	-8.7019	-61.8335	-241.8405		
		15	-8.7019	-66.3363	-295.0310	0.0005	0.42
	4	14	-5.8708	-39.9704	-179.6703		
		15	-5.8708	-42.8132	-214.0255	0.0004	0.42
	5	14	-7.8148	-55.9566	-234.3796		
		15	-7.8148	-59.9364	-282.4752	0.0005	0.42
	6	14	-5.3039	-37.1697	-126.5250		
		15	-5.3039	-39.9917	-158.5470	0.0003	0.42
	7	14	-0.4909	-0.0025	-20.8356		
		15	-0.4909	-0.0025	-20.8377		
15	1	15	69.5171	4.3221	-31.9142		
		16	69.5171	4.3221	15.6286	0.0103	3.69
	2	15	69.8116	-8.6948	63.7932		
		16	69.8116	-8.6948	-31.8491	-0.0204	3.67
	3	15	47.4300	2.3825	-17.5958		
		16	47.4300	2.3825	8.6114	0.0057	3.69
	4	15	47.6033	-5.2745	38.7026		
		16	47.6033	-5.2745	-19.3167	-0.0123	3.67
	5	15	51.8650	-1.2687	9.3394		
		16	51.8650	-1.2687	-4.6167	-0.0030	3.68
	6	15	17.6521	5.5908	-41.2536		
		16	17.6521	5.5908	20.2453	0.0133	3.69
	7	15	17.9466	-7.4260	54.4538		
		16	17.9466	-7.4260	-27.2324	-0.0174	3.67

E L E M E N T R E P O R T S

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
16	1	17	-96.2174	8.7373	-32.4562		
		15	-96.2174	8.7373	63.6538	-0.0105	7.36
	2	17	-96.6251	-16.7223	61.3758		
		15	-96.6251	-16.7223	-122.5697	0.0204	7.34
	3	17	-65.6471	4.8239	-17.9259		
		15	-65.6471	4.8239	35.1371	-0.0058	7.36
	4	17	-65.8869	-10.1523	37.2694		
		15	-65.8869	-10.1523	-74.4062	0.0124	7.34
	5	17	-71.7855	-2.5043	9.2500		
		15	-71.7855	-2.5043	-18.2971	0.0030	7.35
	6	17	-24.4320	11.2416	-41.7062		
		15	-24.4320	11.2416	81.9509	-0.0135	7.36
	7	17	-24.8396	-14.2180	52.1257		
		15	-24.8396	-14.2180	-104.2726	0.0174	7.33
17	1	15	-8.7034	65.8064	-345.4542		
		18	-8.7034	61.8266	-292.4866	0.0006	0.41
	2	15	-16.3333	106.4978	-489.6758		
		18	-16.3333	99.6959	-404.1054	0.0008	0.41
	3	15	-6.2605	46.7408	-242.2981		
		18	-6.2605	43.8981	-204.6829	0.0004	0.41
	4	15	-10.7486	70.6769	-327.1343		
		18	-10.7486	66.1742	-270.3411	0.0006	0.41
	5	15	-9.0503	63.7141	-310.1117		
		18	-9.0503	59.7342	-258.8807	0.0005	0.41
	6	15	0.3469	2.0924	-35.3425		
		18	0.3469	2.0924	-33.6059		
	7	15	-7.2829	42.7837	-179.5641		
		18	-7.2829	39.9617	-145.2247	0.0003	0.41
18	1	18	-8.7034	61.8266	-292.4866		
		19	-8.7034	45.8592	-113.1897	0.0068	1.54

E L E M E N T R E P O R T S

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	2	18	-16.3333	99.6959	-404.1054		
		19	-16.3333	72.4066	-117.5547	0.0087	1.51
	3	18	-6.2605	43.8981	-204.6829		
		19	-6.2605	32.4928	-77.4920	0.0047	1.54
	4	18	-10.7486	66.1742	-270.3411		
		19	-10.7486	48.1089	-80.0597	0.0058	1.51
	5	18	-9.0503	59.7342	-258.8807		
		19	-9.0503	43.7669	-86.5514	0.0057	1.52
	6	18	0.3469	2.0924	-33.6059		
		19	0.3469	2.0924	-26.6383	0.0010	1.63
	7	18	-7.2829	39.9617	-145.2247		
		19	-7.2829	28.6397	-31.0034	0.0029	1.48
19	1	19	-8.7034	45.8592	-113.1897	106.1083	9.56
		20	-8.7034	-34.0734	-14.9552	-0.1293	8.99
	2	19	-16.3333	72.4066	-117.5547	202.3179	8.84
		20	-16.3333	-64.2041	-49.1868	-0.2642	8.57
	3	19	-6.2605	32.4928	-77.4920	76.6372	9.49
		20	-6.2605	-24.6019	-11.7211	-0.0942	8.94
	4	19	-10.7486	48.1089	-80.0597	133.2555	8.87
		20	-10.7486	-42.3258	-31.8573	-0.1736	8.59
	5	19	-9.0503	43.7669	-86.5514	113.1920	9.13
		20	-9.0503	-36.1658	-23.1963	-0.1444	8.73
	6	19	0.3469	2.0924	-26.6383		
		20	0.3469	2.0924	8.2412	0.0171	6.21
	7	19	-7.2829	28.6397	-31.0034	89.6192	8.42
		20	-7.2829	-28.0383	-25.9904	-0.1199	8.37
20	1	20	-8.7034	-34.0734	-14.9552		
		21	-8.7034	-50.0887	-155.5060	0.0028	1.90
	2	20	-16.3333	-64.2041	-49.1868		
		21	-16.3333	-91.5754	-309.3384	0.0059	1.88
	3	20	-6.2605	-24.6019	-11.7211		
		21	-6.2605	-36.0414	-112.9954	0.0020	1.90

E L E M E N T R E P O R T S

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	4	20	-10.7486	-42.3258	-31.8573		
		21	-10.7486	-60.4453	-203.4851	0.0039	1.88
	5	20	-9.0503	-36.1658	-23.1963		
		21	-9.0503	-52.1811	-170.7356	0.0032	1.89
	6	20	0.3469	2.0924	8.2412		
		21	0.3469	2.0924	15.2296	-0.0004	1.75
	7	20	-7.2829	-28.0383	-25.9904		
		21	-7.2829	-39.3943	-138.6028	0.0027	1.86
1	1	21	-8.7034	-50.0887	-155.5060		
		22	-8.7034	-54.0686	-198.7313	0.0003	0.42
	2	21	-16.3333	-91.5754	-309.3384		
		22	-16.3333	-98.3772	-388.1688	0.0006	0.42
	3	21	-6.2605	-36.0414	-112.9954		
		22	-6.2605	-38.8842	-144.0895	0.0002	0.42
	4	21	-10.7486	-60.4453	-203.4851		
		22	-10.7486	-64.9481	-255.5233	0.0004	0.42
	5	21	-9.0503	-52.1811	-170.7356		
		22	-9.0503	-56.1609	-215.6975	0.0004	0.42
	6	21	0.3469	2.0924	15.2296		
		22	0.3469	2.0924	16.9663		
	7	21	-7.2829	-39.3943	-138.6028		
		22	-7.2829	-42.2163	-172.4712	0.0003	0.42
22	1	22	22.6790	9.2063	-67.6439		
		23	22.6790	9.2063	33.6256	0.0216	3.67
	2	22	41.2642	18.2871	-133.9087		
		23	41.2642	18.2871	67.2497	0.0426	3.66
	3	22	16.3099	6.6979	-49.1787		
		23	16.3099	6.6979	24.4978	0.0157	3.67
	4	22	27.2424	12.0395	-88.1580		
		23	27.2424	12.0395	44.2767	0.0280	3.66
	5	22	23.5566	10.1736	-74.4793		
		23	23.5566	10.1736	37.4300	0.0237	3.66

E L E M E N T R E P O R T S

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	6	22	-0.8776	-0.9673	6.8354		
		23	-0.8776	-0.9673	-3.8044	-0.0020	3.53
	7	22	17.7076	8.1136	-59.4294		
		23	17.7076	8.1136	29.8197	0.0189	3.66
23	1	24	-31.3896	17.9097	-65.9199		
		22	-31.3896	17.9097	131.0874	-0.0217	7.34
	2	24	-57.1130	34.6204	-126.5642		
		22	-57.1130	34.6204	254.2601	-0.0424	7.33
	3	24	-22.5743	12.9583	-47.6307		
		22	-22.5743	12.9583	94.9108	-0.0158	7.34
	4	24	-37.7057	22.7881	-83.3038		
		22	-37.7057	22.7881	167.3654	-0.0279	7.33
	5	24	-32.6043	19.2239	-70.2445		
		22	-32.6043	19.2239	141.2183	-0.0236	7.33
	6	24	1.2147	-1.3141	4.3246		
		22	1.2147	-1.3141	-10.1309	0.0019	7.16
	7	24	-24.5087	15.3965	-56.3197		
		22	-24.5087	15.3965	113.0418	-0.0189	7.33

R E A C T I O N S

NODE NO	LOAD COMB	PX	PY	MOMENT
	Units :	K	K	K -Ft

LOAD COMBINATIONS:

COMB 1 : 1.40 X CASE 1
+ 1.70 X CASE 2

COMB 2 : 1.40 X CASE 1
+ 1.70 X CASE 3

COMB 3 : 1.00 X CASE 1
+ 1.00 X CASE 2

COMB 4 : 1.00 X CASE 1
+ 1.00 X CASE 3

R E A C T I O N S

NODE NO	LOAD COMB	PX	PY	MOMENT
COMB 5 :	1.40 X CASE 1			
COMB 6 :	1.70 X CASE 2			
COMB 7 :	1.70 X CASE 3			
1	1	-17.4948	40.1478	-64.6502
	2	-18.3553	41.2885	-67.5199
	3	-11.5769	26.5869	-42.7612
	4	-12.0830	27.2578	-44.4492
	5	-10.2006	23.5657	-37.5374
	6	-7.2942	16.5821	-27.1128
	7	-8.1546	17.7227	-29.9825
2	1	32.4637	55.5679	-118.0707
	2	34.7084	57.1467	-126.8481
	3	21.5239	36.7984	-78.3218
	4	22.8443	37.7271	-83.4850
	5	19.2587	32.6170	-70.3565
	6	13.2050	22.9510	-47.7142
	7	15.4497	24.5297	-56.4916
9	1	1.2179	89.8065	4.1138
	2	8.6691	69.7861	31.7342
	3	0.8750	59.3639	2.9957
	4	5.2580	47.5872	19.2431
	5	1.2579	51.8568	4.5686
	6	-0.0401	37.9497	-0.4549
	7	7.4112	17.9294	27.1656
10	1	-3.0681	124.2996	11.9237
	2	-16.7166	96.5898	61.3945
	3	-2.1201	82.1646	8.1805
	4	-10.1486	65.8647	37.2810
	5	-2.5012	71.7741	9.2550
	6	-0.5669	52.5255	2.6687
	7	-14.2154	24.8157	52.1395
16	1	4.3221	69.5171	15.6286
	2	-8.6948	69.8116	-31.8491
	3	2.3825	47.4300	8.6114
	4	-5.2745	47.6033	-19.3167
	5	-1.2687	51.8650	-4.6167
	6	5.5908	17.6521	20.2453
	7	-7.4260	17.9466	-27.2324

R E A C T I O N S

NODE NO	LOAD COMB	PX	PY	MOMENT
17	1	-8.7373	96.2174	32.4562
	2	16.7223	96.6251	-61.3758
	3	-4.8239	65.6471	17.9259
	4	10.1523	65.8869	-37.2694
	5	2.5043	71.7855	-9.2500
	6	-11.2416	24.4320	41.7062
	7	14.2180	24.8396	-52.1257
23	1	9.2063	22.6790	33.6256
	2	18.2871	41.2642	67.2497
	3	6.6979	16.3099	24.4978
	4	12.0395	27.2424	44.2767
	5	10.1736	23.5566	37.4300
	6	-0.9673	-0.8776	-3.8044
	7	8.1136	17.7076	29.8197
24	1	-17.9097	31.3896	65.9199
	2	-34.6204	57.1130	126.5642
	3	-12.9583	22.5743	47.6307
	4	-22.7881	37.7057	83.3038
	5	-19.2239	32.6043	70.2445
	6	1.3141	-1.2147	-4.3246
	7	-15.3965	24.5087	56.3197

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Project
Subject
Project No. Date By

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☐

FIND MOMENT CAPACITY OF SLAB – 6th, 7th, & 8th FLRS

SLAB BEAM "3" – DROPPED PANEL SECTION

TOP BARS ≐ 30 #5 ⇒ A_s = 9.30
14 #5 ⇒ A_s = 4.34
13.64 IN²

$$a = \frac{13.64(60)}{.85(2.3)(100)} = 4.19''$$

$$d = 12 - \left(.75 + \frac{.625}{2}\right) = 10.94''$$

$$\phi M_n = 0.9\left(\frac{1}{12}\right)\left[13.64(60)\left(10.94 - \left(\frac{4.19}{2}\right)\right)\right]$$

$\phi M_n = 543$ 1-k $M_u = -447$ 1-k ✓ OK

CHECK 8" SECTION:

$d = 6.94''$

$$a = \frac{13.64(60)}{.85(2.3)(300)} = 1.40''$$

$$\phi M_n = 0.9\left(\frac{1}{12}\right)\left[13.64(60)\left(6.94 - \frac{1.40}{2}\right)\right]$$

$\phi M_n = 383.2$ 1-k $M_u = -151$ 1-k ✓ OK

Copies to:

Designing to Shape the Future

BPLW
Architects & Engineers, Inc.
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CHECK POSITIVE MOMENT CAPACITY

BOTTOM BARS = 22 #5 ⇒ $A_s = 6.82$
16 #5 ⇒ $A_s = 4.96$
11.78 IN^2

$$d = 8 - \left(1 + \frac{.625}{2}\right) = 6.69''$$

$$a = \frac{11.78(60)}{.85(2.3)(300)} = 1.21$$

$$\phi M_n = 0.9\left(\frac{1}{12}\right)\left[11.78(60)\left(6.69 - \frac{1.21}{2}\right)\right]$$

$$\phi M_n = 323^{1-k} \qquad M_u = 202.3^{1-k} \quad \checkmark \text{ OK}$$

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June 1992
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MAX. NEG. MOMENT = 447^{1-k} (EL. #7 - NODE 7)

RESERVE CAPACITY = $543 - 447 = 96^{1-k}$

FACTORED MOMENT CAUSED BY 80 PSF LL

$M_u = 188.3^{1-k}$ (EL. #7 - NODE 7 - LC = 6)

FIND RESERVE CAPACITY IN PSF

$$\frac{w_R}{96} = \frac{80}{188.3}$$

$$w_R = 40.79^{1-k}$$

TOTAL LIVE LOAD CAPACITY = 80 + 40.79 = <u>120.79 psf</u>

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5th FLOOR

NORTH - SOUTH FRAME "D"

(TYP. FOR 2nd, 3rd, 4th & 5th FLRS.)

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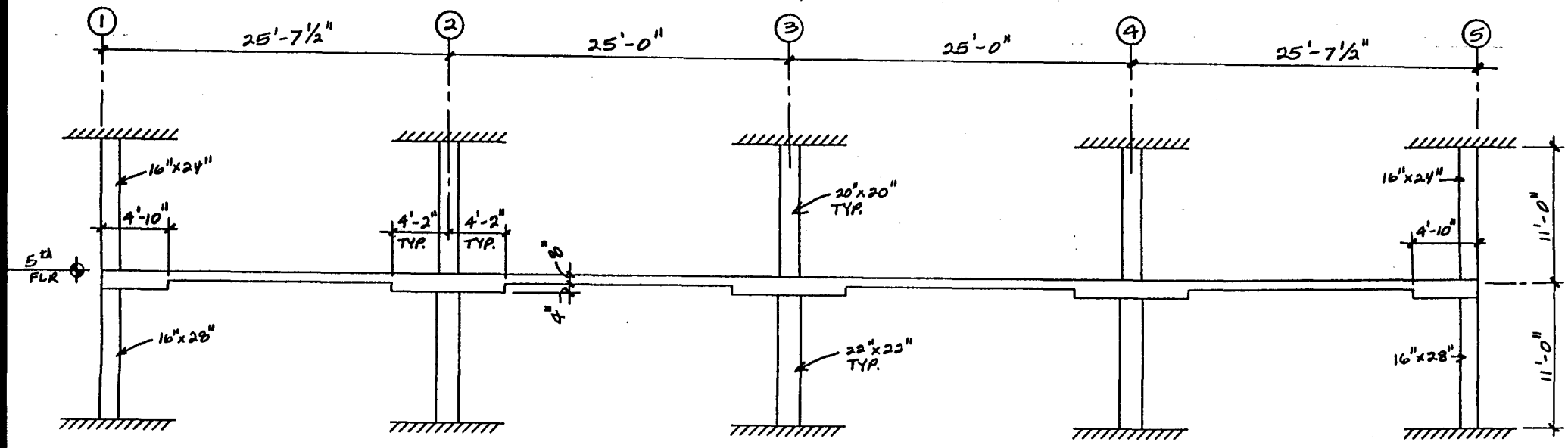
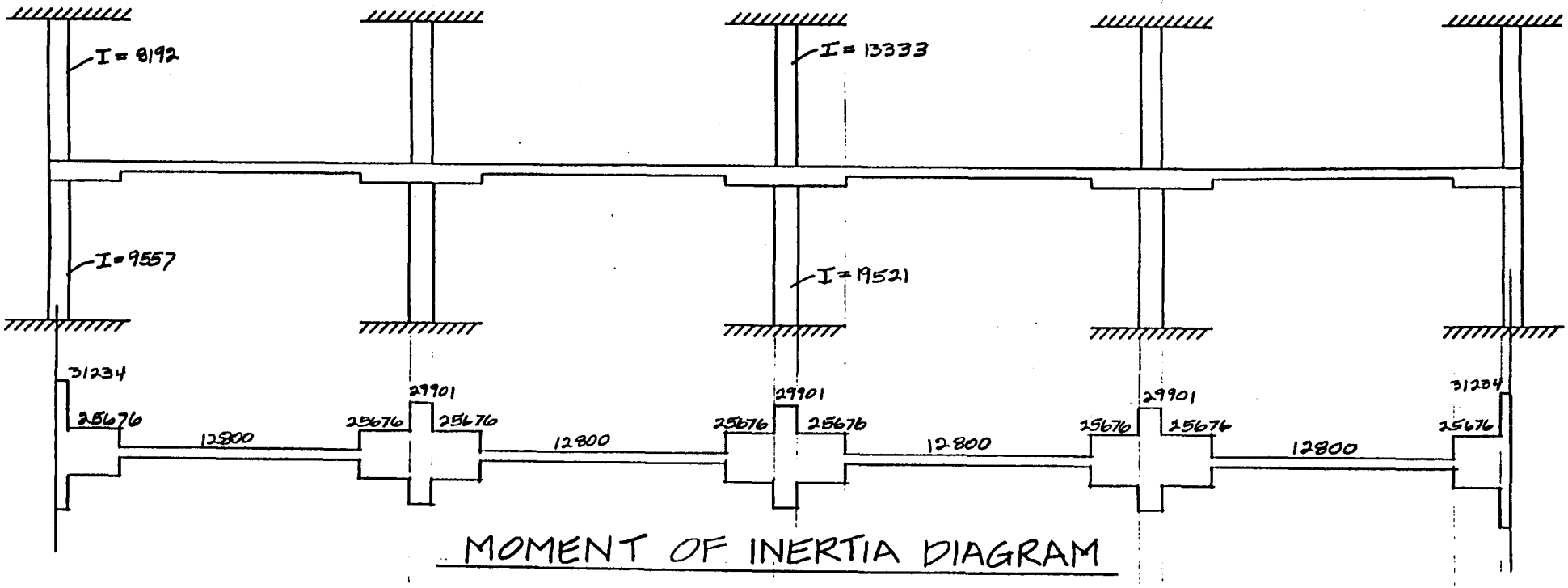


TYPICAL SLAB-BEAM CONFIGURATION

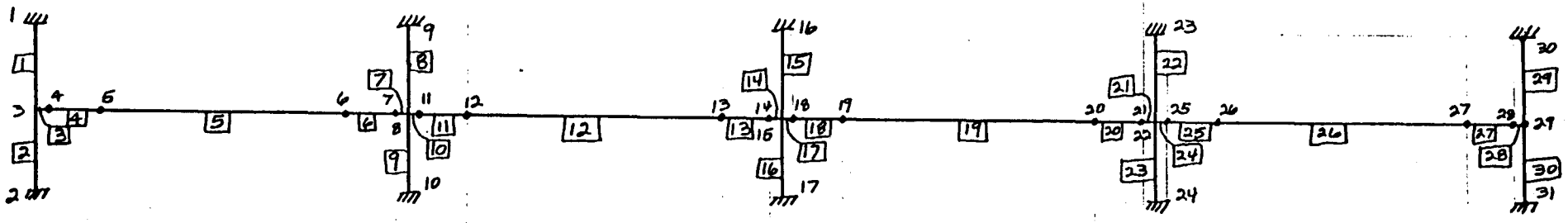
$l_2 = 25'$

$E_{cs} = 3.122 \times 10^6$ psi

$E_{cc} = 3.491 \times 10^6$ psi



MOMENT OF INERTIA DIAGRAM

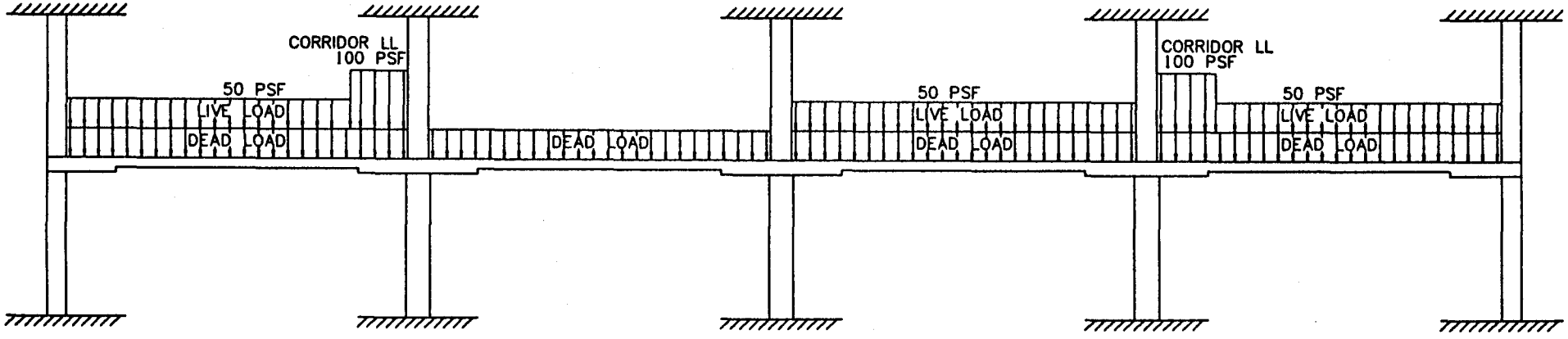


NODE: $\overset{3}{\bullet}$ OR $\overset{3}{+}$

ELEMENT: $\boxed{3}$

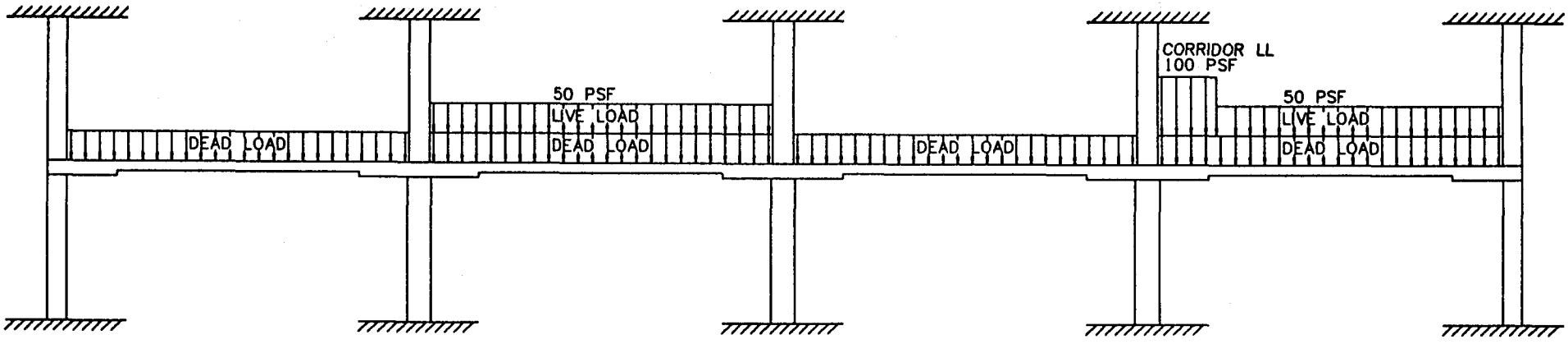
FIXED SUPPORT

COMPUTER MODEL



LOAD COMBINATION #1

NOT TO SCALE



LOAD COMBINATION #2

NOT TO SCALE

N O D A L I N F O R M A T I O N

NODE NO	NODAL COORDINATES X	Y	SUPPORT CONDITIONS CODE	PX STIFF	PY STIFF	M STIFF
Units :	Ft	Ft		K /In	K /In	K -In /Deg
1	0.000	22.000	F			
2	0.000	0.000	F			
3	0.000	11.000				
4	0.830	11.000				
5	4.830	11.000				
6	20.830	11.000				
7	24.170	11.000				
8	25.000	11.000				
9	25.000	22.000	F			
10	25.000	0.000	F			
11	25.830	11.000				
12	29.170	11.000				
13	45.840	11.000				
14	49.170	11.000				
15	50.000	11.000				
16	50.000	22.000	F			
17	50.000	0.000	F			
18	50.830	11.000				
19	54.160	11.000				
20	70.830	11.000				
21	74.170	11.000				
22	75.000	11.000				
23	75.000	22.000	F			
24	75.000	0.000	F			
25	75.830	11.000				
26	79.170	11.000				
27	95.170	11.000				
28	99.170	11.000				
29	100.000	11.000				
30	100.000	22.000	F			
31	100.000	0.000	F			

E L E M E N T I N F O R M A T I O N

ELEM N	NE NODE	FE NODE	ELEM LENGTH	BETA ANGLE	PROP TYPE	ELEM TYPE	NE HINGE	FE HINGE
		Units :	Ft	Deg				
1	3	1	11.000	90.00	6	BEAM		
2	2	3	11.000	90.00	8	BEAM		
3	3	4	0.830	0.00	4	BEAM		
4	4	5	4.000	0.00	2	BEAM		
5	5	6	16.000	0.00	1	BEAM		
6	6	7	3.340	0.00	2	BEAM		
7	7	8	0.830	0.00	3	BEAM		

L M E N T I N F O R M A T I O N

E DE	ELEM LENGTH	BETA ANGLE	PROP TYPE	ELEM TYPE	NE HINGE	PE HINGE	PY	M
[illegible]	11.000	90.00	5	BEAM				
8	11.000	90.00	7	BEAM				
11	0.830	0.00	3	BEAM				
12	3.340	0.00	2	BEAM			-3.43	0.00
13	16.670	0.00	1	BEAM			-3.43	0.00
14	3.330	0.00	2	BEAM				
15	0.830	0.00	3	BEAM				
16	11.000	90.00	5	BEAM				
15	11.000	90.00	7	BEAM			-2.00	0.00
18	0.830	0.00	3	BEAM			-2.00	0.00
19	3.330	0.00	2	BEAM				
20	16.670	0.00	1	BEAM				
21	3.340	0.00	2	BEAM				
22	0.830	0.00	3	BEAM			-2.00	0.00
23	11.000	90.00	5	BEAM			-2.00	0.00
22	11.000	90.00	7	BEAM				
25	0.830	0.00	3	BEAM				
26	3.340	0.00	2	BEAM				
27	16.000	0.00	1	BEAM				
28	4.000	0.00	2	BEAM				
29	0.830	0.00	4	BEAM				
30	11.000	90.00	6	BEAM				
29	11.000	90.00	8	BEAM				

O P E R T Y I N F O R M A T I O N

	MODULUS	AREA	I	DIST
Units :	K /In 2	In2	In4	Ft
	2.7e+003	2.4e+003	1.28e+004	
OP PAN	2.7e+003	2.8e+003	2.57e+004	
LUMNS	2.7e+003	2.8e+003	2.99e+004	
LUMNS	2.7e+003	2.8e+003	3.12e+004	
COLUM	3.5e+003	400	1.33e+004	
COLUM	3.5e+003	384	8.19e+003	
COLUM	3.5e+003	484	1.95e+004	
COLUM	3.5e+003	448	9.56e+003	

E N T L O A D I N F O R M A T I O N

OAD SY	DIST SPEC	DIST	PX	PY	M
	Units :	Ft	K /Ft	K /Ft	Ft-K /Ft

N O D A L D I S P L A C E M E N T S

NODE NO	LOAD COMB	DX	DY	ROTATION
	Units :	In	In	Deg

LOAD COMBINATIONS:

COMB 1 : 1.40 X CASE 1
+ 1.70 X CASE 2

COMB 2 : 1.40 X CASE 1
+ 1.70 X CASE 3

COMB 3 : 1.00 X CASE 1
+ 1.00 X CASE 2

COMB 4 : 1.00 X CASE 1
+ 1.00 X CASE 3

COMB 5 : 1.40 X CASE 1

COMB 6 : 1.70 X CASE 2

COMB 7 : 1.70 X CASE 3

1	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
	6	0.0000	0.0000	0.0000
	7	0.0000	0.0000	0.0000
2	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
	6	0.0000	0.0000	0.0000
	7	0.0000	0.0000	0.0000
3	1	0.0001	-0.0044	-0.1350
	2	-0.0008	-0.0044	-0.1350
	3	0.0001	-0.0029	-0.0890
	4	-0.0005	-0.0029	-0.0890
	5	0.0001	-0.0025	-0.0761
	6	-0.0001	-0.0019	-0.0589
	7	-0.0010	-0.0019	-0.0589

N O D A L D I S P L A C E M E N T S

NODE NO	LOAD COMB	DX	DY	ROTATION
4	1	0.0001	-0.0303	-0.1615
	2	-0.0008	-0.0303	-0.1615
	3	0.0001	-0.0200	-0.1064
	4	-0.0005	-0.0200	-0.1065
	5	0.0001	-0.0171	-0.0910
	6	-0.0001	-0.0131	-0.0705
	7	-0.0010	-0.0132	-0.0705
5	1	0.0001	-0.2015	-0.2242
	2	-0.0009	-0.2015	-0.2243
	3	0.0000	-0.1328	-0.1477
	4	-0.0005	-0.1328	-0.1477
	5	0.0001	-0.1132	-0.1253
	6	-0.0001	-0.0882	-0.0989
	7	-0.0010	-0.0883	-0.0990
6	1	-0.0001	-0.1189	0.1880
	2	-0.0010	-0.1191	0.1882
	3	-0.0000	-0.0772	0.1231
	4	-0.0006	-0.0773	0.1232
	5	0.0001	-0.0578	0.0986
	6	-0.0001	-0.0611	0.0894
	7	-0.0010	-0.0613	0.0896
7	1	-0.0001	-0.0180	0.0811
	2	-0.0010	-0.0181	0.0814
	3	-0.0000	-0.0117	0.0516
	4	-0.0006	-0.0117	0.0517
	5	0.0001	-0.0086	0.0306
	6	-0.0001	-0.0094	0.0505
	7	-0.0011	-0.0095	0.0508
8	1	-0.0001	-0.0072	0.0418
	2	-0.0010	-0.0072	0.0421
	3	-0.0000	-0.0049	0.0254
	4	-0.0006	-0.0049	0.0255
	5	0.0001	-0.0053	0.0062
	6	-0.0001	-0.0019	0.0355
	7	-0.0011	-0.0019	0.0358
9	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000

N O D A L D I S P L A C E M E N T S

NODE NO	LOAD COMB	DX	DY	ROTATION
	5	0.0000	0.0000	0.0000
	6	0.0000	0.0000	0.0000
	7	0.0000	0.0000	0.0000
10	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
	6	0.0000	0.0000	0.0000
	7	0.0000	0.0000	0.0000
11	1	-0.0001	-0.0020	0.0185
	2	-0.0010	-0.0020	0.0189
	3	-0.0000	-0.0020	0.0089
	4	-0.0006	-0.0019	0.0091
	5	0.0001	-0.0062	-0.0156
	6	-0.0001	0.0042	0.0341
	7	-0.0011	0.0042	0.0345
12	1	-0.0001	-0.0159	-0.0475
	2	-0.0010	-0.0154	-0.0468
	3	-0.0000	-0.0146	-0.0374
	4	-0.0006	-0.0143	-0.0370
	5	0.0000	-0.0416	-0.0751
	6	-0.0001	0.0257	0.0276
	7	-0.0010	0.0262	0.0283
13	1	-0.0000	-0.0218	0.0515
	2	-0.0010	-0.0200	0.0498
	3	-0.0000	-0.0185	0.0400
	4	-0.0006	-0.0174	0.0391
	5	0.0000	-0.0449	0.0774
	6	-0.0000	0.0231	-0.0259
	7	-0.0010	0.0249	-0.0275
14	1	-0.0000	-0.0034	-0.0090
	2	-0.0010	-0.0030	-0.0115
	3	-0.0000	-0.0029	-0.0027
	4	-0.0006	-0.0027	-0.0041
	5	0.0000	-0.0070	0.0210
	6	-0.0000	0.0036	-0.0301
	7	-0.0010	0.0039	-0.0325

N O D A L D I S P L A C E M E N T S

NODE NO	LOAD COMB	DX	DY	ROTATION
15	1	-0.0000	-0.0068	-0.0309
	2	-0.0010	-0.0069	-0.0336
	3	-0.0000	-0.0046	-0.0182
	4	-0.0006	-0.0047	-0.0198
	5	0.0000	-0.0051	-0.0000
	6	-0.0000	-0.0017	-0.0309
	7	-0.0010	-0.0018	-0.0336
16	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
	6	0.0000	0.0000	0.0000
	7	0.0000	0.0000	0.0000
17	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
	6	0.0000	0.0000	0.0000
	7	0.0000	0.0000	0.0000
18	1	-0.0000	-0.0152	-0.0645
	2	-0.0010	-0.0159	-0.0685
	3	-0.0000	-0.0098	-0.0406
	4	-0.0006	-0.0102	-0.0429
	5	-0.0000	-0.0070	-0.0210
	6	-0.0000	-0.0082	-0.0435
	7	-0.0010	-0.0089	-0.0475
19	1	-0.0000	-0.0964	-0.1511
	2	-0.0010	-0.1016	-0.1597
	3	-0.0000	-0.0624	-0.0987
	4	-0.0006	-0.0654	-0.1037
	5	-0.0000	-0.0449	-0.0774
	6	-0.0000	-0.0515	-0.0738
	7	-0.0010	-0.0567	-0.0824
20	1	-0.0001	-0.0761	0.1365
	2	-0.0011	-0.0973	0.1568
	3	-0.0001	-0.0500	0.0897
	4	-0.0007	-0.0625	0.1017

N O D A L D I S P L A C E M E N T S

NODE NO	LOAD COMB	DX	DY	ROTATION
	5	-0.0000	-0.0416	0.0751
	6	-0.0001	-0.0344	0.0613
	7	-0.0011	-0.0557	0.0816
21	1	-0.0001	-0.0112	0.0305
	2	-0.0012	-0.0148	0.0612
	3	-0.0001	-0.0074	0.0199
	4	-0.0007	-0.0095	0.0379
	5	-0.0001	-0.0062	0.0156
	6	-0.0001	-0.0050	0.0148
	7	-0.0011	-0.0086	0.0455
22	1	-0.0001	-0.0092	-0.0081
	2	-0.0012	-0.0072	0.0251
	3	-0.0001	-0.0061	-0.0056
	4	-0.0007	-0.0049	0.0140
	5	-0.0001	-0.0053	-0.0062
	6	-0.0001	-0.0039	-0.0019
	7	-0.0011	-0.0019	0.0314
23	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
	6	0.0000	0.0000	0.0000
	7	0.0000	0.0000	0.0000
24	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
	6	0.0000	0.0000	0.0000
	7	0.0000	0.0000	0.0000
25	1	-0.0001	-0.0143	-0.0499
	2	-0.0012	-0.0052	-0.0015
	3	-0.0001	-0.0095	-0.0332
	4	-0.0007	-0.0042	-0.0047
	5	-0.0001	-0.0086	-0.0306
	6	-0.0001	-0.0057	-0.0193
	7	-0.0011	0.0034	0.0291

N O D A L D I S P L A C E M E N T S

NODE NO	LOAD COMB	DX	DY	ROTATION
26	1	-0.0002	-0.0971	-0.1670
	2	-0.0012	-0.0375	-0.0790
	3	-0.0001	-0.0644	-0.1107
	4	-0.0007	-0.0294	-0.0589
	5	-0.0001	-0.0578	-0.0986
	6	-0.0001	-0.0393	-0.0684
	7	-0.0011	0.0203	0.0196
27	1	-0.0003	-0.1929	0.2134
	2	-0.0012	-0.1053	0.1152
	3	-0.0002	-0.1277	0.1413
	4	-0.0007	-0.0762	0.0836
	5	-0.0001	-0.1132	0.1253
	6	-0.0001	-0.0796	0.0880
	7	-0.0011	0.0080	-0.0101
28	1	-0.0003	-0.0291	0.1550
	2	-0.0012	-0.0161	0.0850
	3	-0.0002	-0.0193	0.1027
	4	-0.0007	-0.0116	0.0615
	5	-0.0001	-0.0171	0.0910
	6	-0.0001	-0.0120	0.0640
	7	-0.0011	0.0010	-0.0060
29	1	-0.0003	-0.0043	0.1297
	2	-0.0012	-0.0024	0.0712
	3	-0.0002	-0.0029	0.0859
	4	-0.0007	-0.0018	0.0515
	5	-0.0001	-0.0025	0.0761
	6	-0.0001	-0.0018	0.0536
	7	-0.0011	0.0001	-0.0049
30	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
	6	0.0000	0.0000	0.0000
	7	0.0000	0.0000	0.0000
31	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000

NODAL DISPLACEMENTS

NODE NO	LOAD COMB	DX	DY	ROTATION
	5	0.0000	0.0000	0.0000
	6	0.0000	0.0000	0.0000
	7	0.0000	0.0000	0.0000

ELEMENT REPORTS

SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
		Units :	K	K	K -Ft	K -Ft /In	Ft

LOAD COMBINATIONS:

COMB 1 : 1.40 X CASE 1
+ 1.70 X CASE 2

COMB 2 : 1.40 X CASE 1
+ 1.70 X CASE 3

COMB 3 : 1.00 X CASE 1
+ 1.00 X CASE 2

COMB 4 : 1.00 X CASE 1
+ 1.00 X CASE 3

COMB 5 : 1.40 X CASE 1

COMB 6 : 1.70 X CASE 2

COMB 7 : 1.70 X CASE 3

1	1	3	44.6047	-23.2209	170.2646		
		1	44.6047	-23.2209	-85.1656	-0.0461	3.67
	2	3	44.6133	-23.0885	169.5413		
		1	44.6133	-23.0885	-84.4321	-0.0460	3.67
	3	3	29.4715	-15.3117	112.2675		
		1	29.4715	-15.3117	-56.1610	-0.0304	3.67
	4	3	29.4765	-15.2338	111.8420		
		1	29.4765	-15.2338	-55.7295	-0.0304	3.67
	5	3	25.6516	-13.1083	96.0871		
		1	25.6516	-13.1083	-48.1045	-0.0260	3.67
	6	3	18.9531	-10.1126	74.1775		
		1	18.9531	-10.1126	-37.0611	-0.0201	3.67