Final Structural Evaluation of Phoenix Rio Salado Bridges - Phase II

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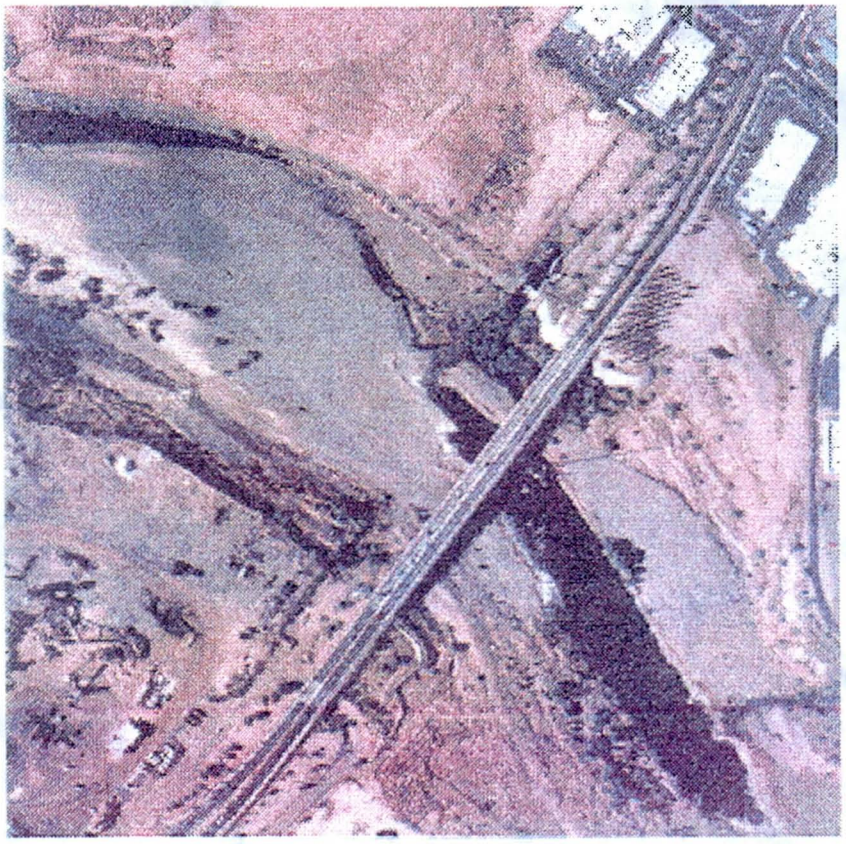
7th Street and 16th Street Bridges



City of Phoenix

U.S. Army Corps Of Engineers
Los Angeles District

WEST CONSULTANTS, INC

Submitted by: T·Y·LIN INTERNATIONAL

April 5, 2000

Final Structural Evaluation of Phoenix Rio Salado Bridges - Phase II 7th Street and 16th Street

Prepared for
U.S. Army Corps of Engineers
Los Angeles District

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Contract:
DACW09-97-D-0022

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T·Y·LIN INTERNATIONAL

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1.0 EXECUTIVE SUMMARY

This structural evaluation of Phoenix Rio Salado Bridges is a summary of the final engineering evaluation performed to determine whether the Seventh Street Bridge and the Sixteenth Street Bridge are compromised by the proposed low flow channel condition on a 100-year event.

The foundation for the ***Seventh Street Bridge*** as well as the ***Sixteenth Street Bridge*** is adequate for both the vertical loads and the lateral bending.

2.0 INTRODUCTION

West Consultants, Inc. recently conducted a bridge scour analysis for seven bridge structures over the Salt River. These structures are the 24th Street Bridge, the Upstream Conveyor Bridge, the 16th Street Bridge, the 7th Street Bridge, 7th Avenue, the South Central Avenue Bridge, and the Downstream Conveyor Bridge. The bridge scour analysis was performed as a result of a hydraulic and sediment transport analysis for three low flow channel design alternatives for the Phoenix Reach of the Rio Salado Project. A brief description of the three alternatives investigated by West Consultants, Inc. are listed below:

- Alternative 1 is the Corps of Engineers feasibility design concept. This is a trapezoidal channel with a 2H:1V soil cement bank protected side slopes, earth bottom and soil cement grade control structures located within the low flow channel. This concept included a 200-foot bottom width throughout the project with five grade control structures. West Consultants, Inc. made some modifications to this concept after their hydraulic and channel stability analysis showed that the bottom width of the low flow channel was less than the proposed in the feasibility study. Also, three grade control structures were recommended instead of five.

- Alternative 2 is the Value Engineering (VE) M-26 concept. This VE concept was modified to have a 3H:1V vegetated side slopes and soil cement at locations requiring additional protection. For this concept the grade control structures are extended across the full width of the flood control channel and include a notch for the low flood channel.

- Alternative 3 is the same as alternative 2 except for overbank guide dikes added to maintain the alignment of the low channel flow.

West Consultants, Inc. modeled the low flow channel alignment by locating the channel thalweg from 1-foot contour mapping. In the model, the alignment of the low flow

channel was adjusted to avoid major features that were identified by the Corps of Engineers, the City of Phoenix and the County Flood Control District. The low flow channel location and alignment considered the number of bridge piers within the low flow channel and their orientation with respect to the channel flow. The same low flow channel geometry was used for the three alternatives with a 3H:1V side slopes.

Consequently, West Consultants, Inc. performed a bridge scour analysis in the project reach based on the 100-year discharge of 166,000 cfs. Contraction and abutment scours were estimated to be negligible at the seven bridge structures based on the low flow channel results. There is no flow contraction between the bridge approach section and the bridge opening since the flow is confined within the channel banks, and the abutments do not project abruptly into the flow area. West Consultants, Inc. estimated the bridge scour for the seven structures over the Salt River by using the Corps of Engineering, HEC-RAS computer program (Version 2.2, September 1998) per Federal Highway Administration (FHWA) guidelines. The scour computations are based on the data in the HEC-RAS model.

To determine the local pier scour, West Consultants, Inc. used the Colorado State University (CSU) equation. In order to comply with the Arizona Department of Transportation guidelines, West Consultants, Inc. added two feet increase in pier width per side for the top 12 feet to account for debris loading. An angle of attack of 0 degrees was assumed in the computations of the pier scour since the low flow channel alignment was lined up parallel to the piers of all bridges.

All HEC-RAS output and scour computations including flows, scour elevations and water surface elevations included in this report are referenced from a memo provided by West Consultants, Inc. dated on September 16th, 1999. Their values are based on the results of the analysis between 90% to 100% of the Final Report "Low-Flow Channel Design Analysis for Rio Salado (Salt River), Arizona dated on January 11th, 2000. The anticipated scour elevation for the Salt River through downtown Phoenix based on the scour analysis will be lowered as much as twelve feet for a 100-year event. The seven

bridge structures over the Salt River are impacted by the lowered scour elevation. Therefore, there is a need for a detailed and thorough scour investigation of these seven bridge structures over the Salt River in order to avoid catastrophic effects due to excessive scour.

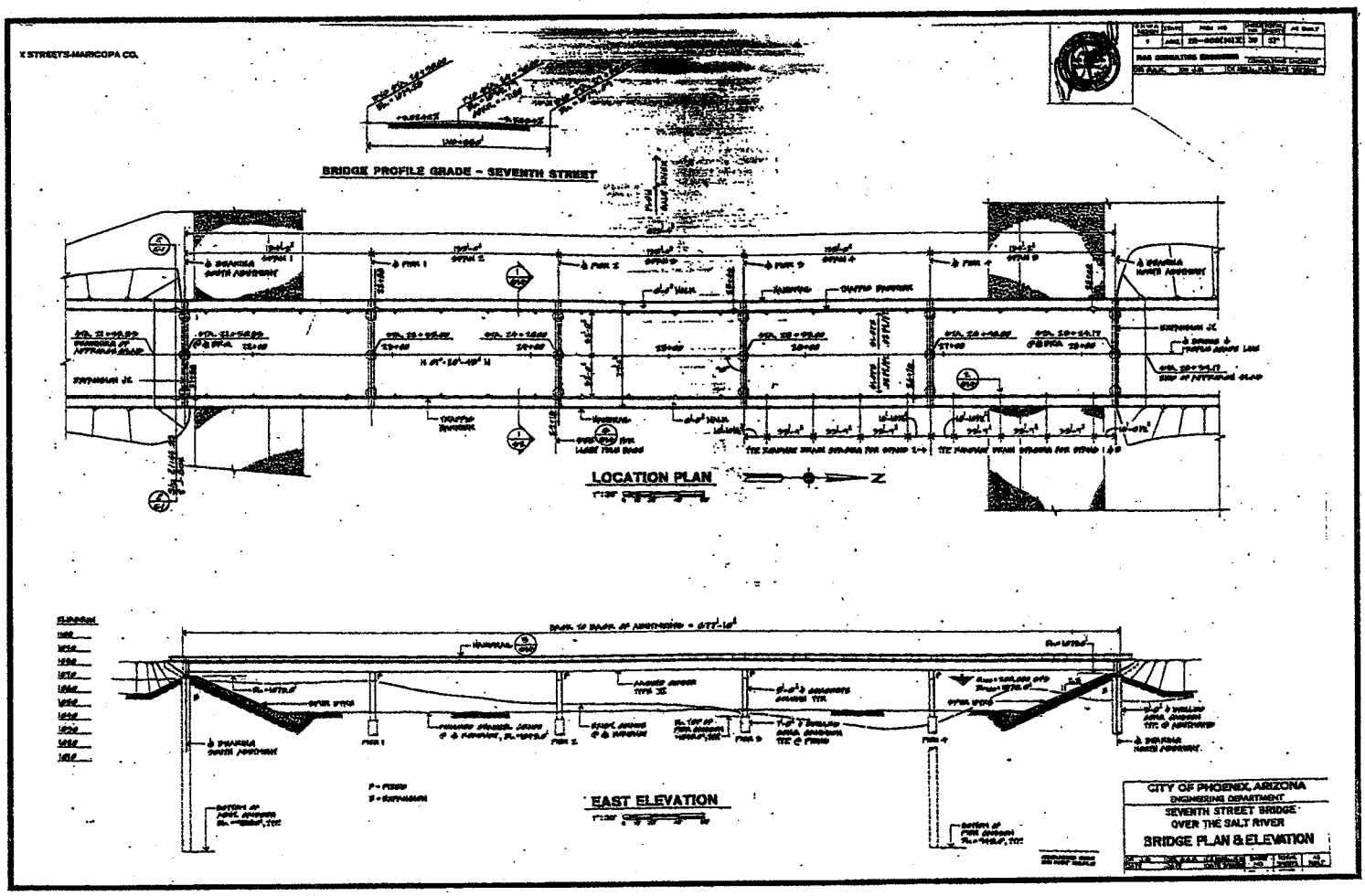
The following report summarizes the impact of the lowered scour elevation on two of the seven structures due to low-flow channel conditions – ***Seventh Street and Sixteenth Street***. This report does not examine the existing conditions. Results of the bridge scour analysis with the low-flow channel geometry conducted by West Consultants, Inc. anticipates that the elevation of maximum pier scour for the ***Seventh Street and Sixteenth Street*** is estimated to be 1005.25 feet and 1018.38 feet respectively. Preliminary recommendations will be proposed for retrofit measurement where the increase in scour depth reduces the bridge capacity below Arizona Department of Transportation (ADOT) standards.

3.0 BRIDGE DESCRIPTION

As-built plans for the two bridges were obtained and computer models generated based upon the information contained in these documents. Below is a brief description of the two structures.

3.1 Seventh Street

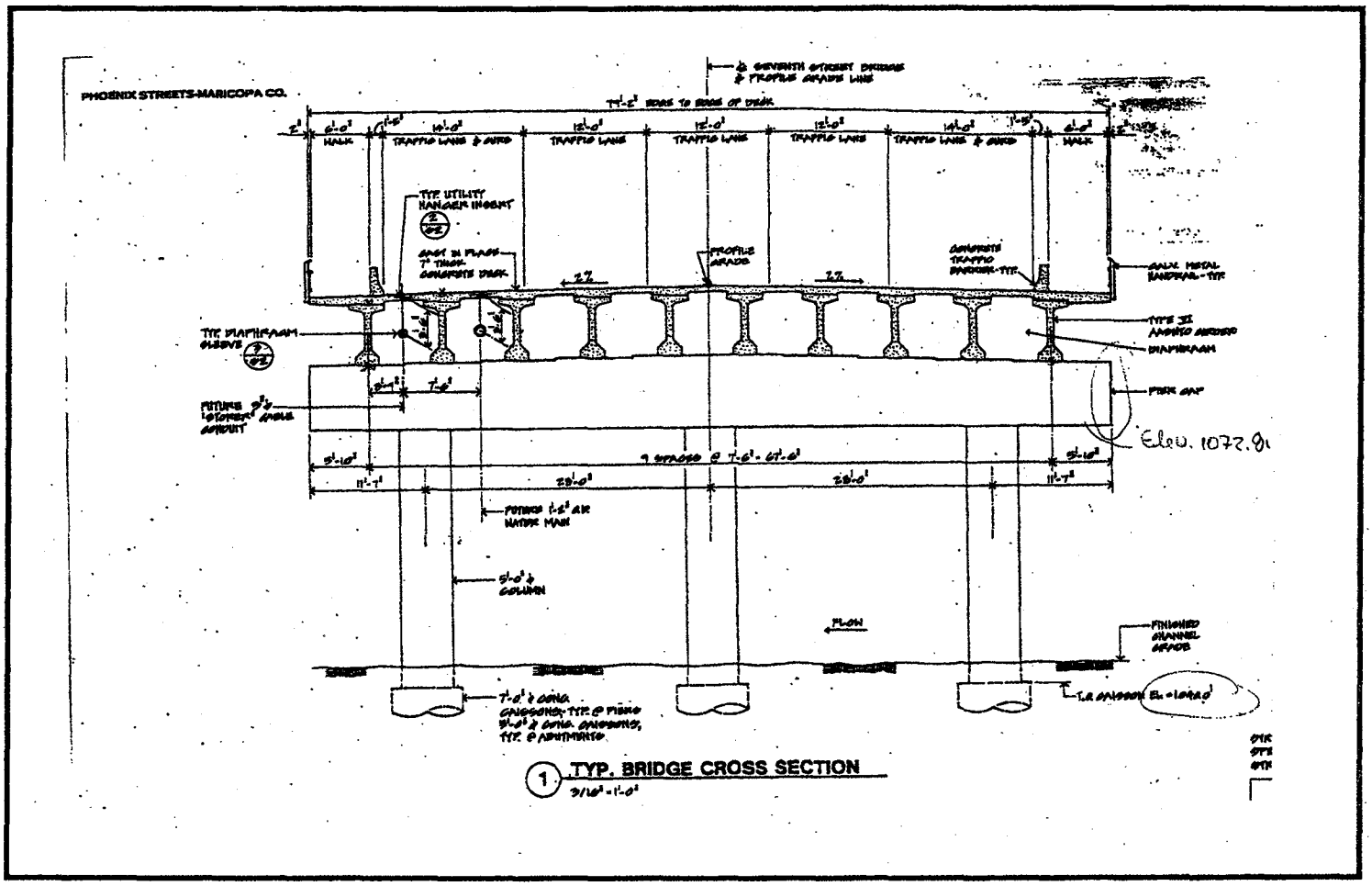
The ***Seventh Street Bridge*** is a five-span structure 677-feet 10 inches long (back to back of abutments) and 79-feet 2-inches wide.



Plan and Elevation – Seventh Street Bridge

The AASHTO Girder Bridge – per as-built plans dated 1982 – is supported on three-column bents and spill-through type abutments. The five-foot diameter shafts at the

abutments are founded 100-feet beneath the channel bottom (Elevation 945), while the seven-foot diameter shafts at the piers are extended nearly 100-feet into the riverbed (Elevation 945). At both abutments, riprap was placed along the slopes and is extended five to ten feet into the riverbed.



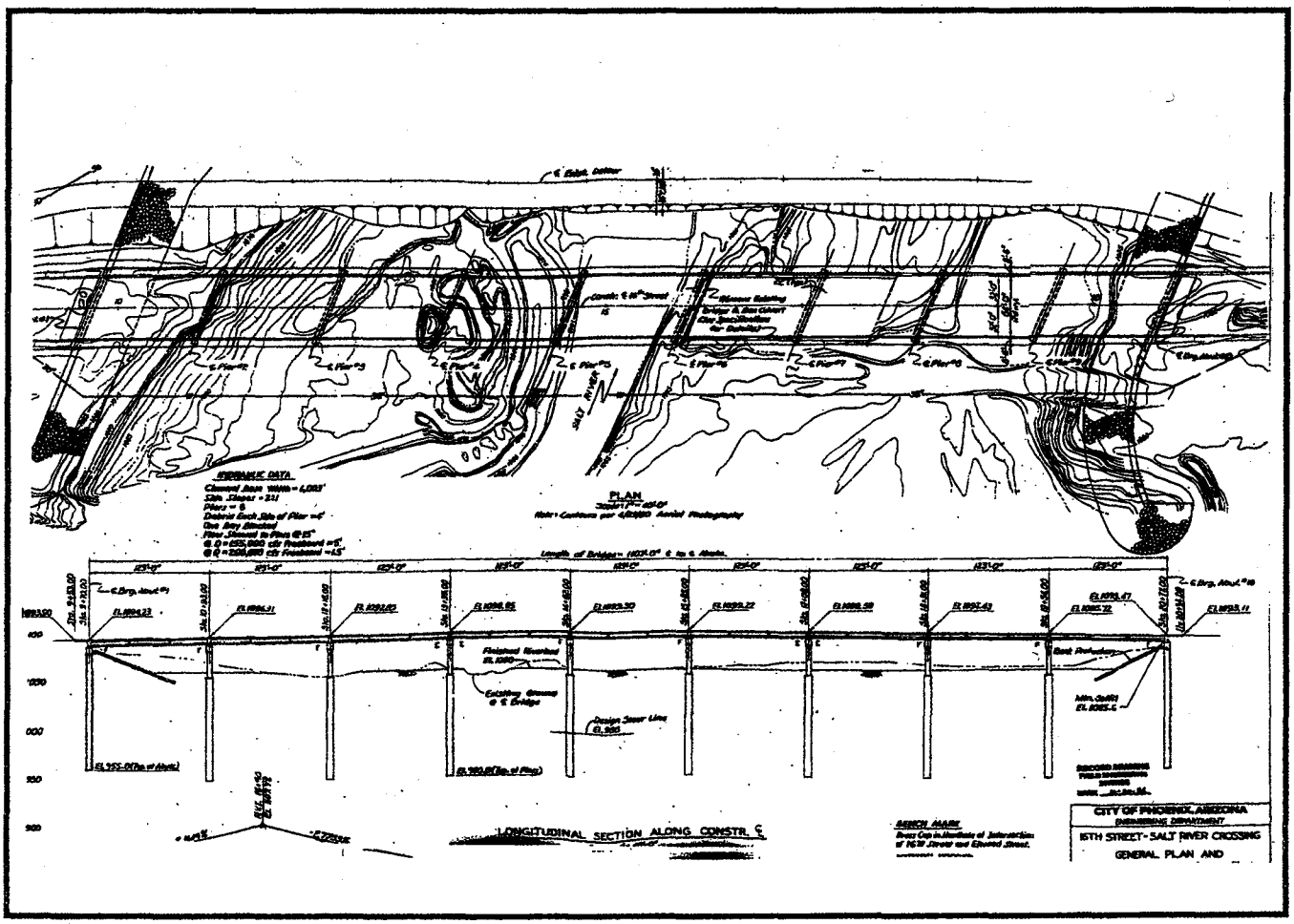
Typical Section – Seventh Street Bridge

For the purposes of comparison, the following table summarizes the hydraulic data shown on the as-built plans in 1982 and the proposed data supplied by West Consultants, Inc. from the bridge scour results.

	Invert Elevation (ft)	Design Flow (cfs)	Water Surface Elevation (ft)
As-Builts	1045.00	200,000	1070.90
Proposed	1028.83	166,000	1066.76

3.2 Sixteenth Street

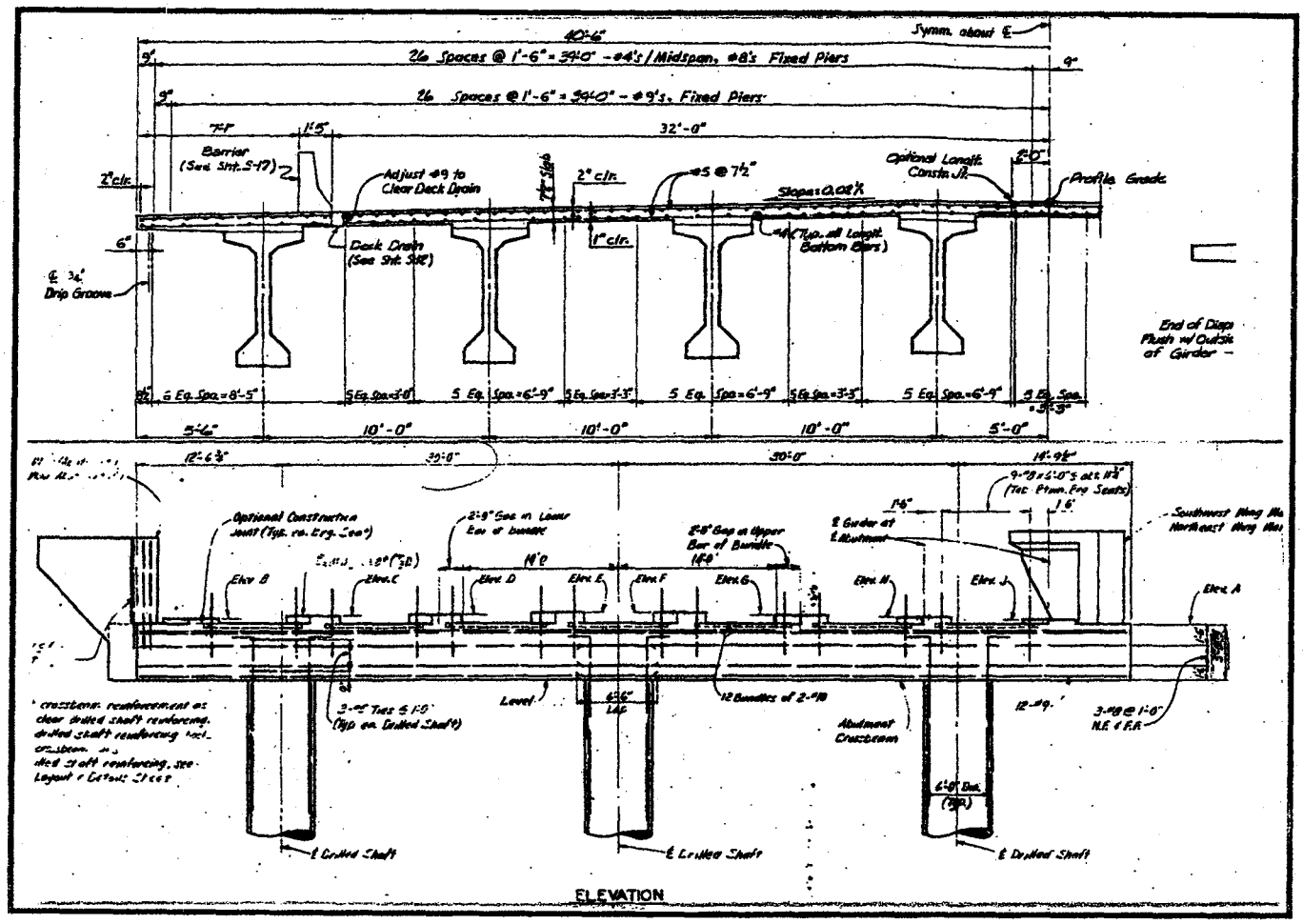
Per as-built plans of 1981, the ***Sixteenth Street Bridge*** is a nine-span structure of approximately 1107-feet long and 82-feet 6- inches wide.



Elevation and Typical Section – Sixteenth Street Bridge

The AASHTO Girder Bridge – per as-built plans dated 1981 – is supported on three-column bents and spill-through type abutments. The five-foot diameter shafts at the

abutments are founded 105-feet beneath the channel bottom (Elevation 955), while the seven-foot diameter shafts at the piers are extended nearly 110-feet into the riverbed (Elevation 950). At both abutments, riprap was placed along the slopes and is extended five to ten feet into the riverbed.



Pier Elevation and Section – Sixteenth Street Bridge

For the purposes of comparison, the following table summarizes the hydraulic data shown on the as-built plans in 1981 and the proposed data supplied by West Consultants, Inc: from the bridge scour results.

	Invert Elevation (ft)	Design Flow (cfs)	Water Surface Elevation (ft)
As-Built	1060.00	200,000	1090.10
Proposed	1040.46	166,000	1073.64

4.0 SUMMARY OF ANALYSIS

The basis for the analysis of the bridge foundations is set by the "Standard Specifications for Highway Bridges," American Association of State Highway and Transportation Officials (AASHTO), 1996 Edition, and approved revisions through 1998. AASHTO has developed standard loading conditions which the bridge components or elements must withstand in order to be considered safe. In general, the bridge structure is analyzed to carry the following loads and forces:

- Dead Load (DL) – AASHTO Art. 3.3

  The dead load on a bridge structure is the aggregate weight of all the elements in the structure. This will include but is not limited to the deck, wearing surface, stay-in-place-forms, sidewalks and railings, parapets, signing and utilities. The first step in any design or analysis of a bridge structure is to compile a list of all the elements, which contribute to dead load. Dead loads are the principal permanent loading condition. AASHTO provides a list of some dead load unit weights that are used in computing the overall weight of the structure (ASSHTO 3.3.6).

- Live Load (LL) – AASHTO Art. 3.7

  The term live load means a load that moves along the length of a bridge span. In most cases, live load represents the major temporary loading condition. The live load force consists of the applied moving load of vehicles, cars and pedestrians. A person

walking along the bridge is considered live load. Obviously, a highway bridge needs to be designed to resist more than pedestrian loading.

AASHTO has developed a hypothetical design vehicle based on a truck loading to give the designers the ability to accurately model the live load on a bridge. AASHTO has issued a loading scheme based on two loading systems, the H loadings and the HS loadings. To meet the demands of heavier trucks, five truck classes were introduced in 1944.

These classes have the following designations and gross weights:

1. H10-44 (20,000 pounds)
2. H15-44 (30,000 pounds)
3. H20-44 (40,000 pounds)
4. HS15-44 (54,000 pounds)
5. HS20-44 (72,000 pounds)

Today, all but the H10-44 vehicle are still incorporated in the AASHTO Specifications.

AASHTO Figures 3.7.6A & 3.7.7A illustrate these design trucks and their associated geometry. The H loading and HS loading trucks were developed with two and three axles, respectively. These design trucks represent the core standard in use today in the United States. The trains of trucks in the 1935 circa design code are replaced by lane loading configuration, which consists of a uniform distributed load combined with a concentrated load (AASHTO Figure 3.7.6B). The AASHTO design trucks and lane loading are meant to cover 10 feet in width (AASHTO 3.6.1). These loads are then placed in a 12 feet lane, which are spaced across the bridge from curb to curb (AASHTO 3.6.2).

Another form of live loading is known as alternative military loading which was developed by the Federal Highway Administration in 1956. This live loading consists of two axles separated by 4 feet and each weights 24,000 lbs. This loading is used to represent heavy military vehicles (AASHTO 3.7.4).

A reduction in the live load intensity is permitted for bridges with three or more lanes that have maximum force caused by fully loading each lane. A 90 percent reduction of three lane structures and 75 percent reduction for bridges with four or more lanes are permitted given the rarity of the situation where simultaneously loading in multiple lanes occur (AASHTO 3.12).

- Impact (I) – AASHTO Art. 3.8

An impact factor is used as a multiplier for certain structural components in order to account for the dynamic effects of the sudden loading of a vehicle onto a structure. A load that moves across a member introduces larger stresses than one statically placed on it. AASHTO defines the impact factor in a conservative idealization as follows:

$$I = \frac{50}{L + 125}$$

Where,

I = Impact Factor (not to exceed 30 percent)

L = Length of Span Loaded to Create Maximum Stress, ft

The live load intensity is then multiplied by this factor which increases the live load values. The impact factor is designed to take into account the effects of a vehicle vibrating and striking imperfections in the deck as well as the dynamic effects of impact.

- Longitudinal Forces (LF) – AASHTO Art. 3.9

Longitudinal forces are developed from vehicles braking or accelerating while on a bridge. AASHTO specifies that 5 percent of the appropriate lane load, without impact, along with the concentrated force from moment for all travel lanes going in the same direction be used as the resulting longitudinal force. This longitudinal force is applied 6 feet above the top of deck surface. The longitudinal force affects the substructure elements more significantly than the superstructure elements.

- Wind Loads (W) – AASHTO Art. 3.15

Wind loading offers a complicated set of loading conditions, which must be idealized in order to provide a workable design. AASHTO specifies an assumed wind velocity of 100 miles per hour for the loading on a bridge. Wind forces are applied in the transverse and longitudinal direction at the center of gravity of the exposed region of the superstructure. AASHTO offers a set of wind loading values for different types of superstructure configurations based on the angle of attack (skew angle) of wind forces. Conventional slab-on-girder bridges with spans less than or equal to 125 feet can use the following basic loading (AASHTO 3.15.2.1.3):

1. Wind Load on Superstructure:
   Transverse Loading = 50 lbs/ft^2
   Longitudinal Loading = 12 lbs/ft^2

2. Wind Load on Live Load:
   Transverse Loading = 100 lbs/ft^2
   Longitudinal Loading = 40 lbs/ft^2

3. Wind Load on Substructure - (AASHTO 3.15.2.2):
   Transverse Loading = 40 lbs/ft^2
   Longitudinal Loading = 40 lbs/ft^2

The transverse and longitudinal loads are to be placed simultaneously for all wind loads (AASHTO 3.15.2.1.3).

Another loading consideration is the effect of overturning. AASHTO specifies an upward force of 20 pounds per square foot of the superstructure applied at the quarter point of the transverse superstructure width to account for the effect of overturning (AASHTO 3.15.3).

- Thermal Forces (T) – AASHTO Art. 3.16)

The effects of thermal forces on a structure are caused by fluctuations in temperature. This change in temperature is greatly dependent on the location of the bridge site. As a reference point, the estimated temperature at the time of construction is determined using temperature rise and fall values which are computed from extreme hot and cold temperatures. AASHTO provides recommended temperature ranges for the design of different bridge structures (AASHTO 3.16).

- Channel Forces – (AASHTO Art. 3.18)

Channel forces are those loads imposed on the bridge structure due to water course-related features. These forces include, but are not limited to stream flow, floating ice, and buoyancy. Channel forces principally affect substructure elements.

1. Stream Flow (SF) – AASHTO 3.18.1:

Structures with supports in watercourses are at risk for having those supports slide or overturn due to stream flow forces. An excessive stream flow velocity can lead to adverse scour conditions, which can undermine footings and threaten the integrity of the bridge structure. AASHTO defines the average pressure acting on a bridge pier due to flowing water as:

$$P_{avg} = K * (V_{avg})^2$$

Where,

P_{avg} = Average Stream Pressure (lb/ft)

K = Constant based on Shape of Pier

V_{avg} = Average Velocity of Water (ft/s)

The equation for the pressure due to stream flows uses a constant to describe the geometry of the pier in a water channel. K has three possible values, 1.4 for piers subjected to drift build-up and square ended piers, 0.7 for circular piers and 0.5 for angled ends. The average velocity is computed by dividing the flow rate by the flow area. The flow values are obtained from a hydrologic or hydraulic study for conditions producing maximum velocities. The maximum stream flow pressure P_{max} is equal to twice the average stream pressure P_{avg}. A triangular distribution is assumed with P_{max} located at the top of the water surface and a pressure of zero at the flow line.

2. Buoyancy (B) – AASHTO 3.19:

Bridge structures with elements, which are submerged underwater such as pier footings and piles, can sometimes be impacted from the effects of buoyancy.

$$B = g_{water} * \text{Area}$$

Where,

g_{water} = Density of water (62.40 lb/ft^3)

Area = Area of the cross section subjected to the Stream Flow

The "Bridge Design and Detailing Manual (BD&D)," Arizona Department of Transportation (ADOT), 1994 Edition provides guidelines for the analysis of bridges over waterways for four different streambed ground lines in part 1 – Section 1.2.1.

Case 1 is the as-constructed stream cross section. For this case, the bridge is analyzed to withstand the forces from AASHTO Group I to VII load combinations Table 3.22.1A.

Case 2 corresponds to the long-term dry streambed cross section i.e. the as constructed stream cross section minus the depth of the general scour. The bridge is analyzed to resist the same forces as Case 1 but the analysis for Seismic Forces is based solely on general scour.

Case 3 corresponds to the streambed cross section condition for the most critical design flow. Abutment protection is provided to withstand this event and abutments are protected from scour for this condition. On the other hand, the piers are subjected to the full general and critical flow local scour. For this condition, the bridge is analyzed to withstand the forces from the AASHTO Group I to VI load combinations.

Case 4 corresponds to the streambed cross section conditions for the superflood condition. All bank protection and approach embankments are assumed to have failed for this case. The abutments and piers are analyzed for the superflood scour, which means that all the substructure elements have experienced the maximum scour simultaneously.

The bridge is analyzed to make sure that it can withstand the following force:

$$DL + SF + B + 0.5\,W$$

Where, DL = Dead Load

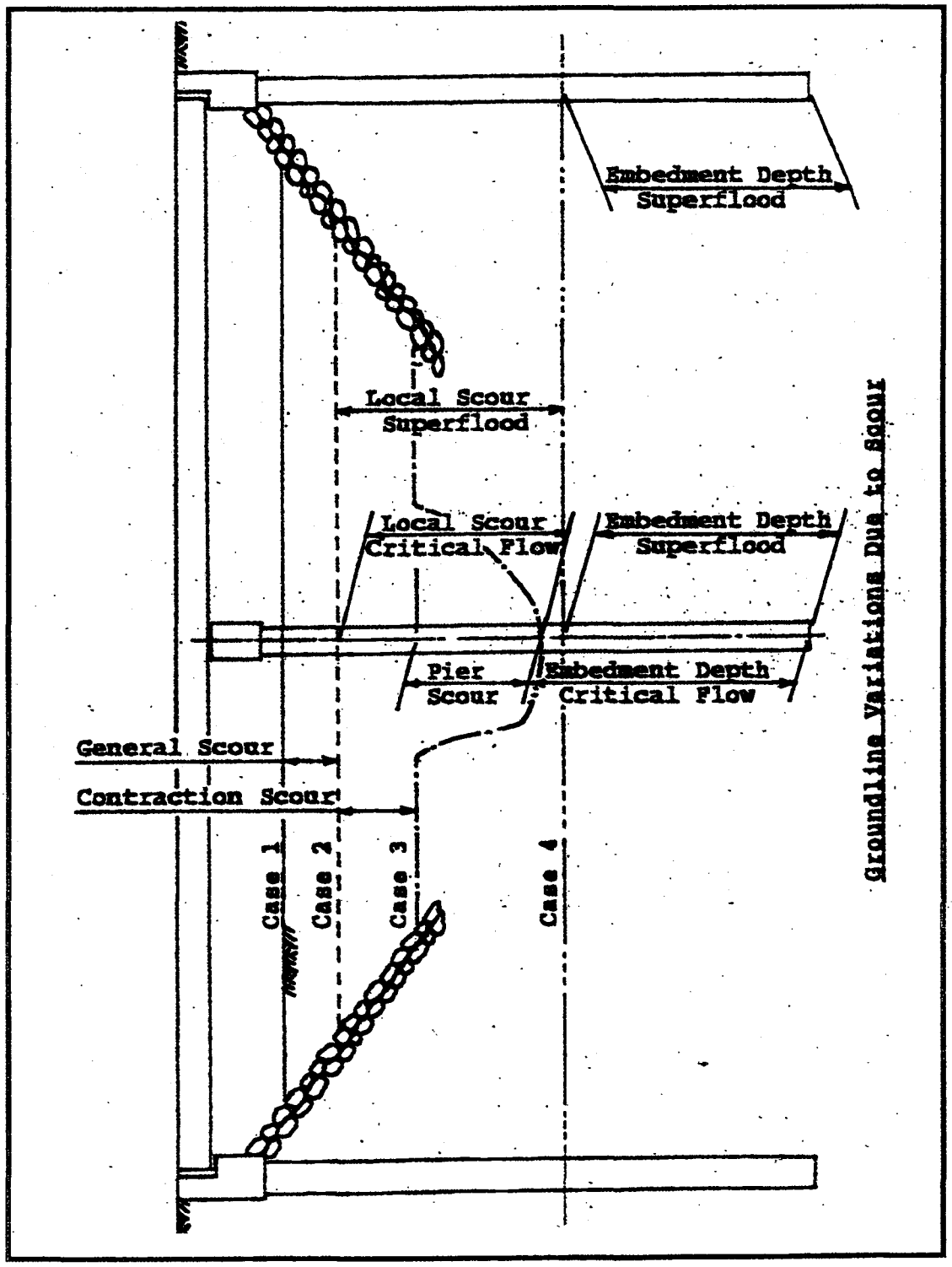
SF = Stream Force

B = Buoyancy

W = Wind on Structure

As previously stated, the bridge scour analysis for the low-flow channel performed by West Consultants, Inc. is based on the 100-year discharge of 166,000 cfs. This discharge

is considered the most critical flow; as a result, the piers are subjected to the critical flow local scour. Based on the results of the low-flow channel, the abutment scour was estimated to be insignificant at the bridge structures. For these conditions, the structural analysis only needs to be executed for Case 3 of the "Bridge Design and Detailing Manual (BD&D)". The bridge structures are verified to withstand the forces from the AASHTO load group combinations I to VI. The following figure provides a detailed illustration of the four different streambed ground lines for bridges over natural waterways.


Embedment Depth
Superflood
Local Scour
Superflood
Local Scour
Critical Flow
Embedment Depth
Superflood
Pier
Scour
Embedment Depth
Critical Flow
General Scour
Contraction Scour
Case 1
Case 2
Case 3
Case 4
Groundline Variations Due to Scour

A three-dimensional, finite-element analysis of the existing bridges were performed using the structural program SAP. The program has acquired the status of being the most reputable and widely used computer program in the field of structural analysis. Idealized models are used in structural analysis that represent pinned and fixed supports as well as pin-connected and fixed-connected joints. In reality, however, all connections exhibit some stiffness toward joint rotations, owing to friction and material behavior. When selecting a particular model for each support or joint, it is vital to be aware of how the assumptions will affect the actual performance of the member and whether the assumptions are reasonable for the structural design.

The assumptions made on the structural model for the analysis of the ***Seventh Street Bridge and the Sixteenth Street Bridge*** is as follows:

- The support at the abutment / expansion pier is represented as roller even though the existing abutment is a monolithic diaphragm abutment. The monolithic diaphragm abutment is connected directly to the drilled shafts. Some of the major benefits of using a monolithic diaphragm abutment are its effectiveness in absorbing higher loads and its ability to accommodate relatively large thermal movements. However, a more conservative assumption for this pier scour analysis is to model the support at the abutment as a roller, consequently, conveying most of the loads to the pier elements.

- Given that long embedded drilled shafts support the piers, a point of fixity of four times the diameter of the drilled shaft was assumed to ideally model the support conditions at the piers. In addition, soil springs were generated to model the stiffness and support provided at the bridge foundations. The soil springs where included in the structural model in order to approximate the existing conditions in the piers.
  The soil parameters used to model the soil springs at the piers are based on a preliminary geotechnical report performed by AGRA Earth & Environmental, Inc. on October 14, 1999. A copy of their findings is included in Appendix A. The geotechnical review was based on existing soil borings at ***Seventh Avenue Bridge***.

AGRA Earth & Environmental, Inc. has provided us with an Effective Unit Weight (g_{soil}) of 140 pcf and a Submerged Unit Weight (g_{sub}) of 77.6 pcf.

- The stream forces for the 100-year peak event were applied to the piers/shafts along with other loads for the appropriate load groups as per AASHTO specifications.

Finally, the demand forces generated by SAP2000 were compared to the pier/shaft capacities; where the demand exceeds the capacity, retrofit measures must be taken. Where the demand placed upon the pier/shaft is equal to or less than its capacity, retrofit measures need not be taken.

AGRA Earth & Environmental, Inc. estimated the downward and upward capacities of the existing foundations for the ***Seventh Avenue Bridge*** (see Appendix A). The estimate was for two conditions of flood flow and resulting scour around the foundations. The two conditions of maximum scour elevations for the 7-foot diameter drilled shafts were 1002.8 ft and 1012.0 ft. For these conditions the embedded depths of the 7-foot diameter shafts were about 55 and 64 feet, respectively. The calculated ultimate downward capacities were 3914 kips and 4446 kips for the scour elevations 1002.8 ft and 1012.0 ft, respectively.

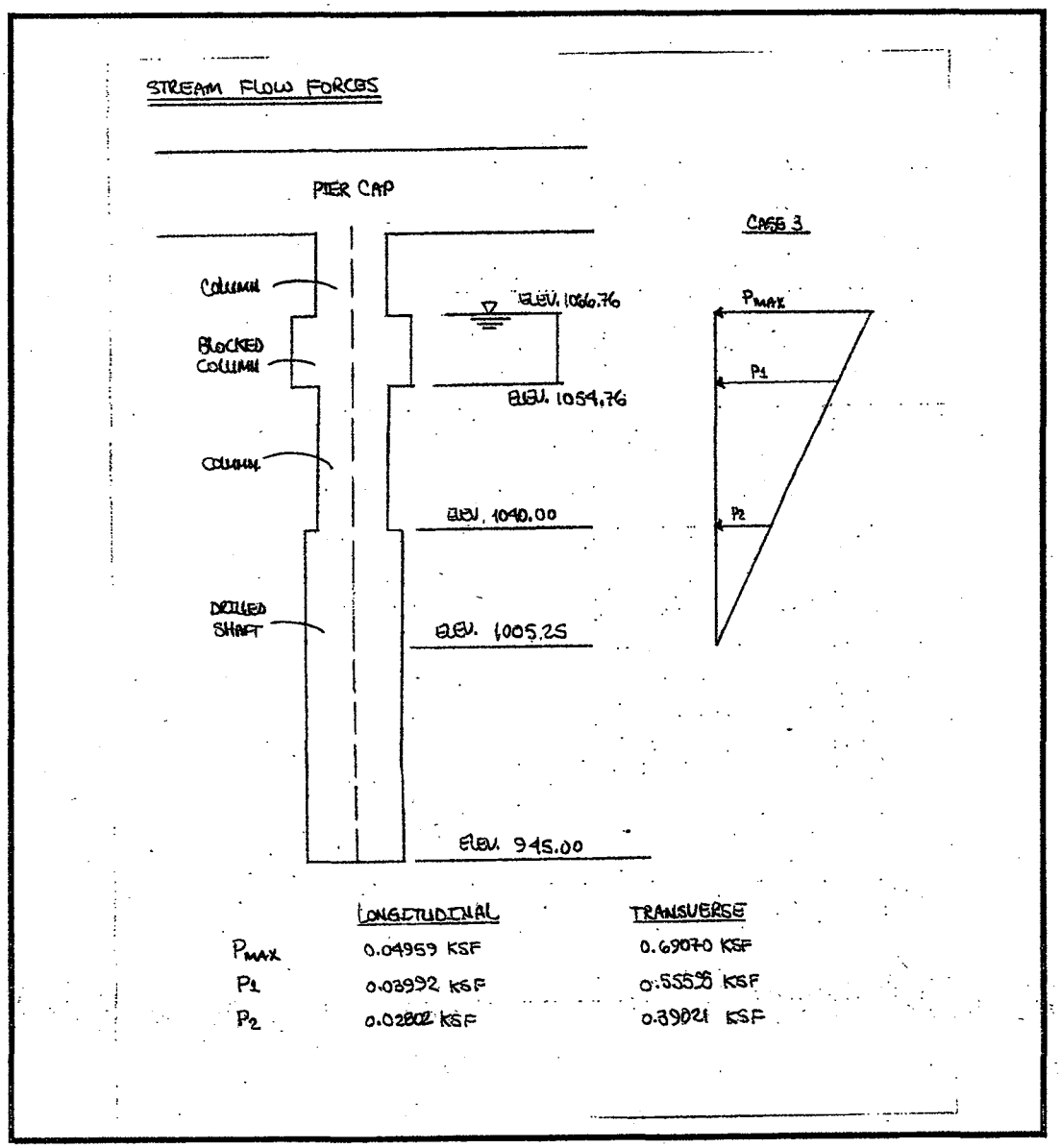
These values will be used for the ***Seventh Street and Sixteenth Street Bridges*** because of the similarities in drilled shaft sizes and length and continuity of soil material in this reach of the river.

4.1 Seventh Street

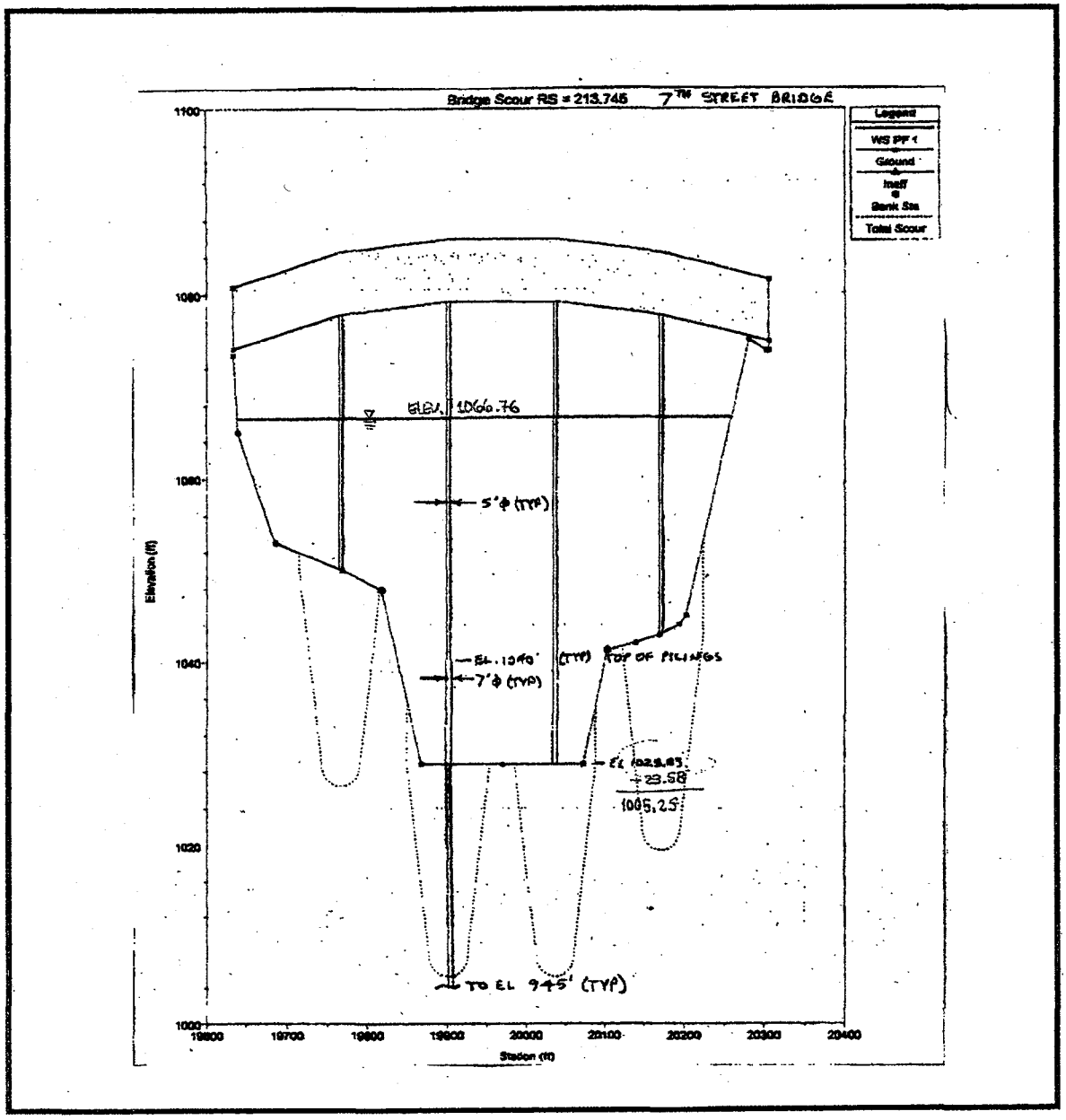
The ***Seventh Street Bridge*** foundation consists of column/drilled shafts similar to those found on the Seventh Avenue Bridge. The columns have a diameter of 5.0 feet from the bottom of the pier cap (about elevation 1072.8 feet) to elevation 1040.00 feet. Below this elevation to the tip of the shafts (elevation 945 feet) the drilled shaft diameter is 7.0 feet.

The Seventh Street Bridge maximum scour is at elevation 1005.25 resulting in a embedded length of 7-foot diameter drilled shafts of 60 feet. The maximum load resisted by a 7- foot drilled shaft based on the structural analysis is 1657 kips. Based on the AGRA values the 7-foot diameter drilled shafts hold a safety factor of 2.4 for the scour elevation of 1002.8 ft and 2.7 for the scour elevation of 1012.0 ft. **For axial capacity the *Seventh Street Bridge* is adequate for the proposed scour**.

For lateral bending, the structural analysis revealed that the 5-foot diameter and the 7-foot diameter drilled shafts are **adequate** to resist the stream flow and scour associated with the 100-year peak event. The flexural demand forces from SAP were compared to the drilled shaft flexural capacities. The structural program PCYIELD was used to determine the flexural capacity of the column/shaft based upon the area of concrete, tie spacing and amount of longitudinal reinforcment. The flexural capacity/demand ratio for the ***Seventh Street Bridge*** is approximately **2.11** (1.0 being the threshold for acceptance).



Stream Flow Diagram – Seventh Street Bridge



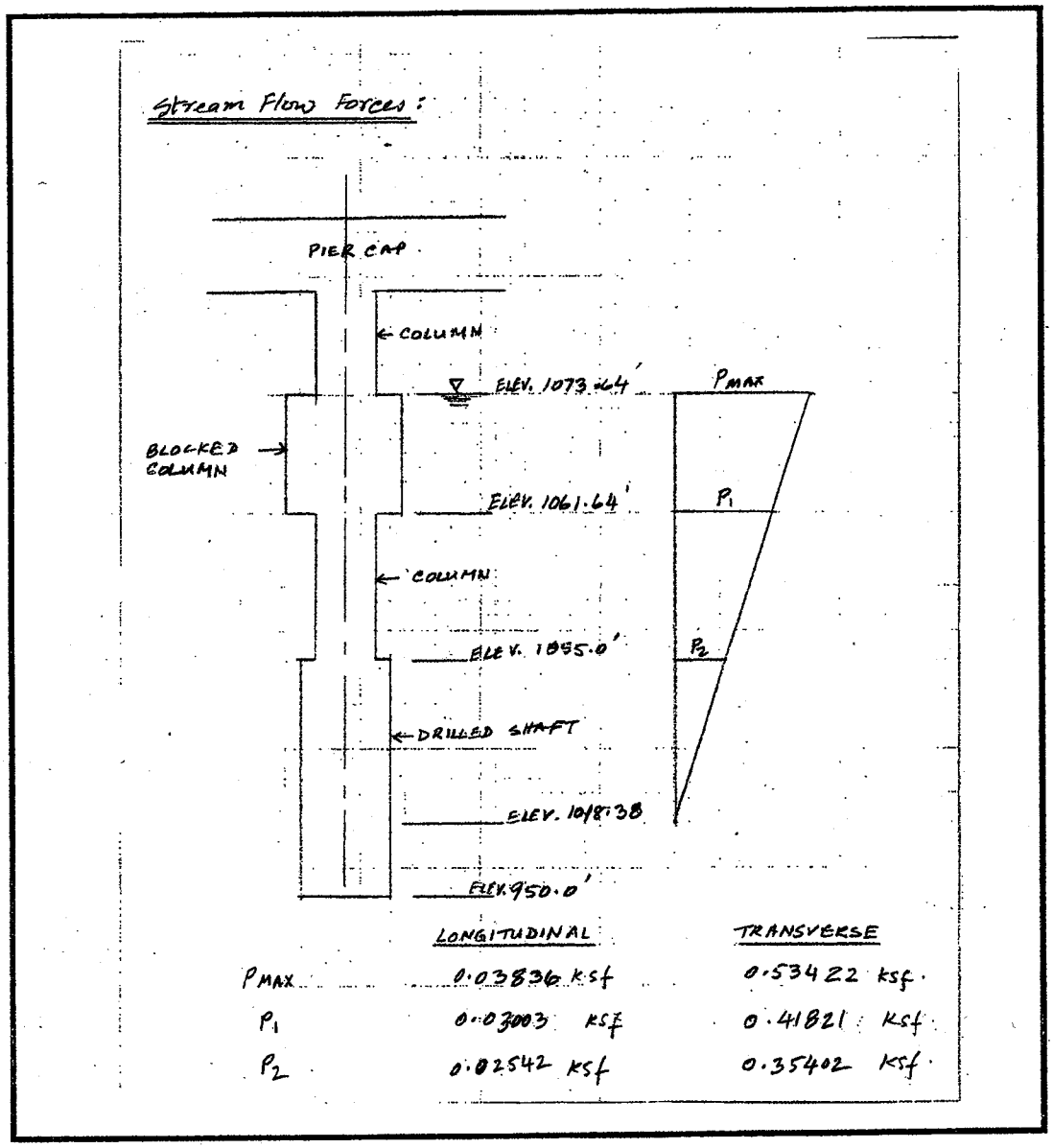
Proposed Scour – Seventh Street Bridge

4.2 Sixteenth Street

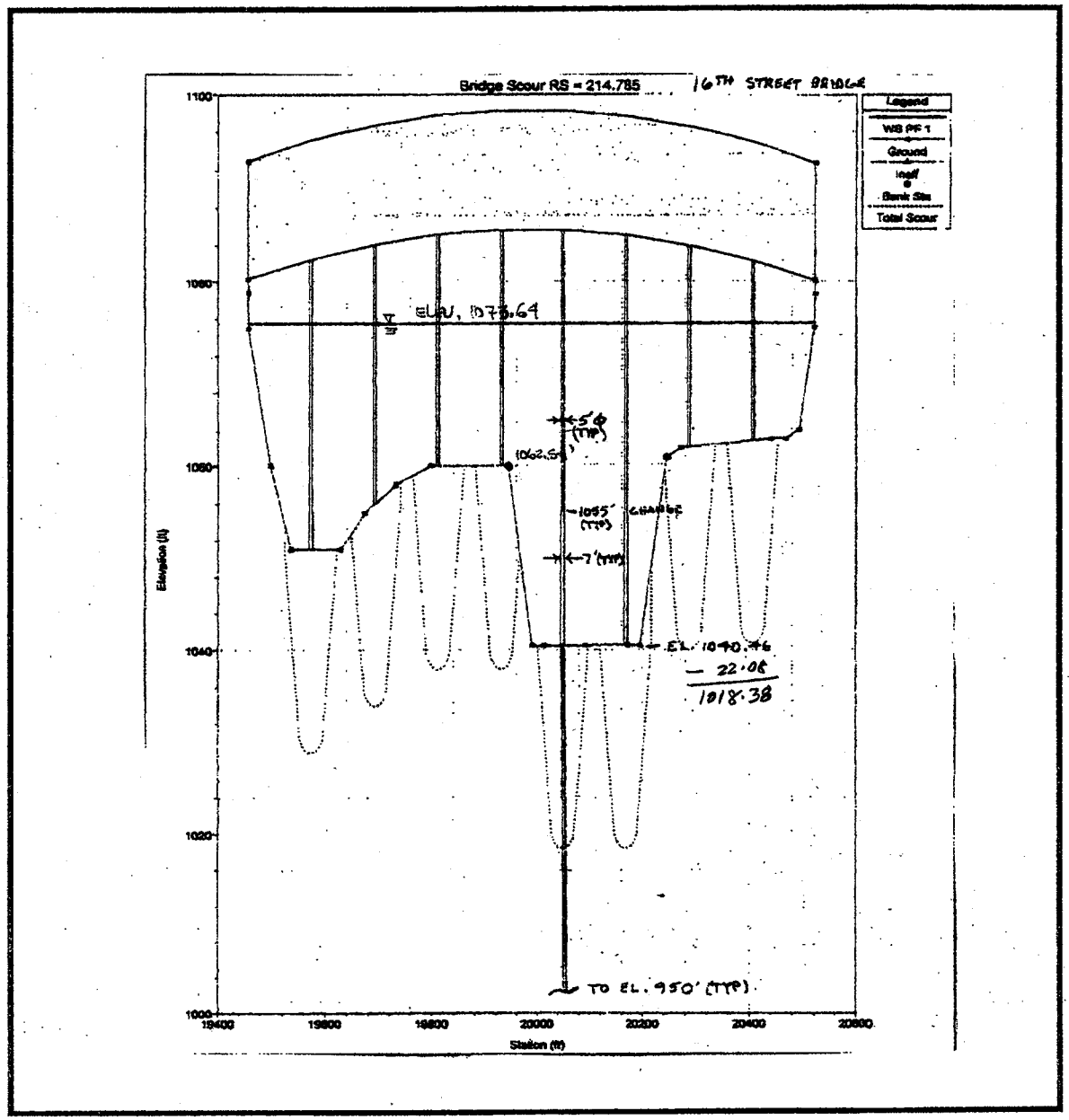
The ***Sixteenth Street Bridge*** foundation consists of column/drilled shafts similar to those found on the Seventh Avenue Bridge. The columns have a diameter of 5.0 feet from the bottom of the pier cap (about elevation 1085.41 feet) to elevation 1055.00 feet. Below this elevation to the tip of the shafts (elevation 950 feet) the drilled shaft diameter is 7.0 feet.

The ***Sixteenth Street Bridge*** maximum scour is at elevation 1018.38 resulting in an embedded length of 7-foot diameter drilled shafts of 68 feet. The maximum load resisted by a 7- foot drilled shaft based on the structural analysis is 1266 kips. Based on the AGRA values, the 7-foot diameter drilled shafts hold a safety factor of 3.1 for the scour elevation of 1002.8 ft and 3.5 for the scour elevation of 1012.0 ft. **For axial capacity the *Sixteenth Street Bridge* is adequate for the proposed scour.**

For lateral bending the structural analysis revealed that the 5-foot diameter and the 7-foot diameter drilled shafts are **adequate** to resist the stream flow and scour associated with the 100-year peak event. The flexural demand forces from SAP were compared to the drilled shaft flexural capacities. The structural program PCYIELD was used to determine the flexural capacity of the column/shaft based upon the area of concrete, tie spacing and amount of longitudinal reinforcment. The flexural capacity/demand ratio for the ***Sixteenth Street Bridge*** is approximately **1.23** (1.0 being the threshold for acceptance.)



Stream Flow Diagram – Sixteenth Street Bridge



Proposed Scour – Sixteenth Street

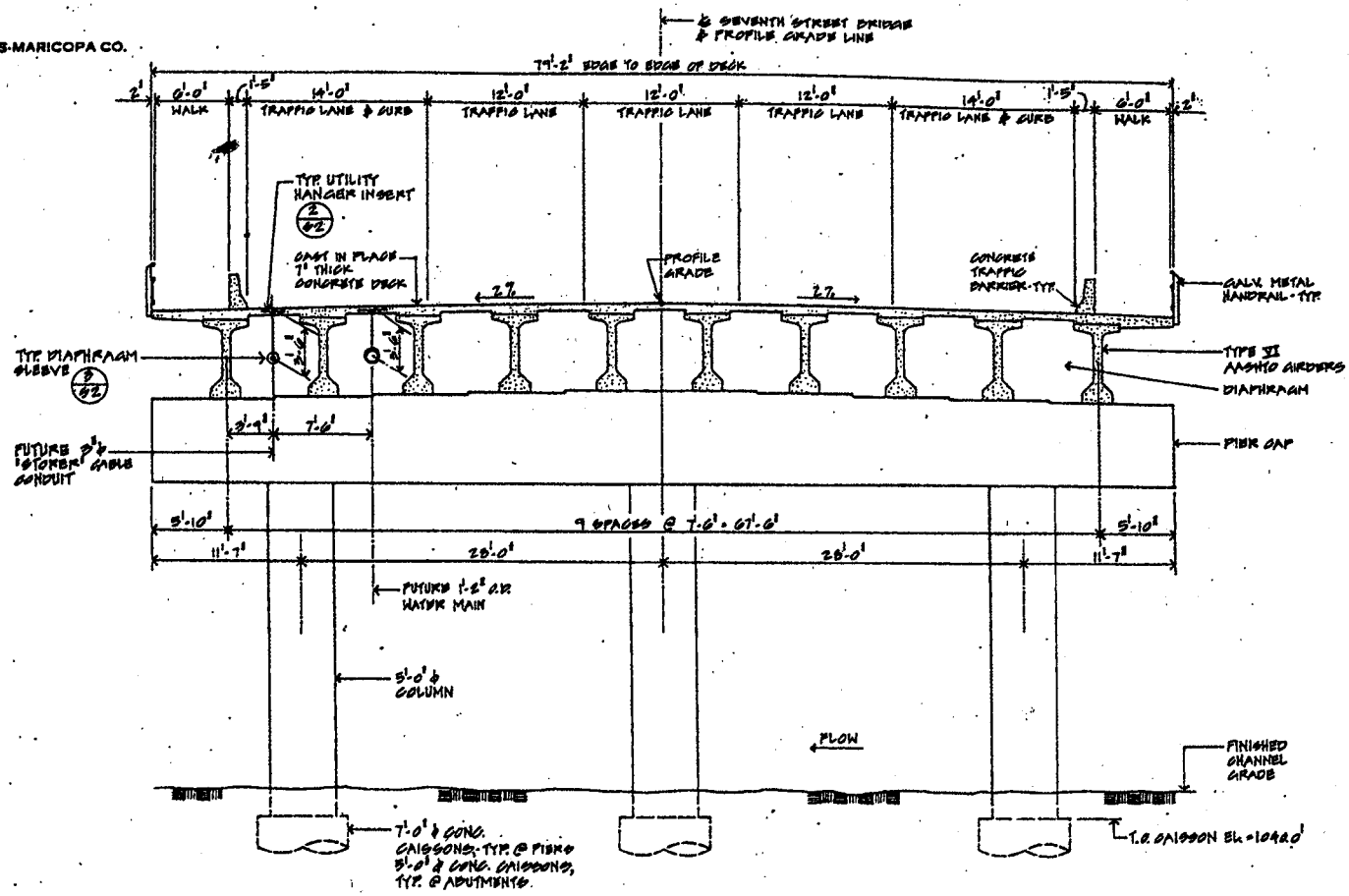
5.0 RETROFIT MEASURES

Based on the structural analysis findings, the ***Seventh Street*** and the ***Sixteenth Street Bridges*** are adequate to resist the forces due to the proposed low flow channel condition during a 100 year event. Therefore, no retrofit measures are required for any of these two bridges.

APPENDIX A

SEVENTH STREET BRIDGE CALCULATIONS

PHOENIX STREETS-MARICOPA CO.



1 TYP. BRIDGE CROSS SECTION
3/16" = 1'-0"

PRELIMINARY

INTERNATIONAL

Project: Salt River Bridges - Scour

Item: Seventh Street Bridge

Job No. 1317.00

Designer: VPD

Date: 9/21/99

Sheet: of

Checker:

Date:

Grid: 1/8"

SUPERELEVATION DATA

SUPERELEVATION TO LEFT OF CONST CL		
starting superelevation=	-0.02	'/ft to left
final superelevation=	-0.02	'/ft to left

SUPERELEVATION TO RIGHT OF CONST CL		
starting superelevation=	-0.02	'/ft to right
final superelevation=	-0.02	'/ft to right

VERTICAL CURVE DATA

VERTICAL CURVE 1

Location	station	elevation
BVC	20+50.00	1079.280
PVI	24+90.00	1094.786
EVC	29+30.00	1079.086

g1 =	3.5242	%
g2 =	-3.5684	%
dg/dx=r=	-0.80598	

SKEW ANGLE=	0.000	degrees
STARTING STATION=	21+50.83	
STATIONING INCREMENT=	13.50	ft

	c.l. brg abut 1				c.l. brg Pier 1				c.l. brg Pier 2			
	STA.	OFF	SUPER	ELEV	STA.	OFF	SUPER	ELEV	STA.	OFF	SUPER	ELEV
Lt Edge	21+50.83	-39.5833	-0.0200	1081.63	22+85.00	-39.5833	-0.0200	1084.54	24+20.00	-39.5833	-0.0200	1086.01
Girder 1	21+50.83	-33.7500	-0.0200	1081.75	22+85.00	-33.7500	-0.0200	1084.66	24+20.00	-33.7500	-0.0200	1086.13
Girder 2	21+50.83	-26.2500	-0.0200	1081.90	22+85.00	-26.2500	-0.0200	1084.81	24+20.00	-26.2500	-0.0200	1086.28
Girder 3	21+50.83	-18.7500	-0.0200	1082.05	22+85.00	-18.7500	-0.0200	1084.96	24+20.00	-18.7500	-0.0200	1086.43
Girder 4	21+50.83	-11.2500	-0.0200	1082.20	22+85.00	-11.2500	-0.0200	1085.11	24+20.00	-11.2500	-0.0200	1086.58
Girder 5	21+50.83	-3.7500	-0.0200	1082.35	22+85.00	-3.7500	-0.0200	1085.26	24+20.00	-3.7500	-0.0200	1086.73
PGL	21+50.83	0.0000	-0.0200	1082.42	22+85.00	0.0000	-0.0200	1085.34	24+20.00	0.0000	-0.0200	1086.80
Girder 6	21+50.83	3.7500	-0.0200	1082.35	22+85.00	3.7500	-0.0200	1085.26	24+20.00	3.7500	-0.0200	1086.73
Girder 7	21+50.83	11.2500	-0.0200	1082.20	22+85.00	11.2500	-0.0200	1085.11	24+20.00	11.2500	-0.0200	1086.58
Girder 8	21+50.83	18.7500	-0.0200	1082.05	22+85.00	18.7500	-0.0200	1084.96	24+20.00	18.7500	-0.0200	1086.43
Girder 9	21+50.83	26.2500	-0.0200	1081.90	22+85.00	26.2500	-0.0200	1084.81	24+20.00	26.2500	-0.0200	1086.28
Girder 10	21+50.83	33.7500	-0.0200	1081.75	22+85.00	33.7500	-0.0200	1084.66	24+20.00	33.7500	-0.0200	1086.13
Rt Edge	21+50.83	39.5833	-0.0200	1081.63	22+85.00	39.5833	-0.0200	1084.54	24+20.00	39.5833	-0.0200	1086.01

	c.l. brg Pier 3				c.l. brg Pier 4				c.l. brg abut 2			
	STA.	OFF	SUPER	ELEV	STA.	OFF	SUPER	ELEV	STA	OFF	SUPER	ELEV
Lt Edge	25+55.00	-39.5833	-0.0200	1086.01	26+90.00	-39.5833	-0.0200	1084.54	28+24.17	-39.5833	-0.0200	1081.62
Girder 1	25+55.00	-33.7500	-0.0200	1086.12	26+90.00	-33.7500	-0.0200	1084.65	28+24.17	-33.7500	-0.0200	1081.74
Girder 2	25+55.00	-26.2500	-0.0200	1086.27	26+90.00	-26.2500	-0.0200	1084.80	28+24.17	-26.2500	-0.0200	1081.89
Girder 3	25+55.00	-18.7500	-0.0200	1086.42	26+90.00	-18.7500	-0.0200	1084.95	28+24.17	-18.7500	-0.0200	1082.04
Girder 4	25+55.00	-11.2500	-0.0200	1086.57	26+90.00	-11.2500	-0.0200	1085.10	28+24.17	-11.2500	-0.0200	1082.19
Girder 5	25+55.00	-3.7500	-0.0200	1086.72	26+90.00	-3.7500	-0.0200	1085.25	28+24.17	-3.7500	-0.0200	1082.34
PGL	25+55.00	0.0000	-0.0200	1086.80	26+90.00	0.0000	-0.0200	1085.33	28+24.17	0.0000	-0.0200	1082.41
Girder 6	25+55.00	3.7500	-0.0200	1086.72	26+90.00	3.7500	-0.0200	1085.25	28+24.17	3.7500	-0.0200	1082.34
Girder 7	25+55.00	11.2500	-0.0200	1086.57	26+90.00	11.2500	-0.0200	1085.10	28+24.17	11.2500	-0.0200	1082.19
Girder 8	25+55.00	18.7500	-0.0200	1086.42	26+90.00	18.7500	-0.0200	1084.95	28+24.17	18.7500	-0.0200	1082.04
Girder 9	25+55.00	26.2500	-0.0200	1086.27	26+90.00	26.2500	-0.0200	1084.80	28+24.17	26.2500	-0.0200	1081.89
Girder 10	25+55.00	33.7500	-0.0200	1086.12	26+90.00	33.7500	-0.0200	1084.65	28+24.17	33.7500	-0.0200	1081.74
Rt Edge	25+55.00	39.5833	-0.0200	1086.01	26+90.00	39.5833	-0.0200	1084.54	28+24.17	39.5833	-0.0200	1081.62

TAYLIN INTERNATIONAL

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- DESIGN CONDITIONS
  - 1 - FIVE SPAN UNIT OF 135 Ft X 79'-2" WIDTH
  - HS20 LIVE LOAD - 4 LANES
  - 10 AASHTO TYPE VI GIRDERS. COMPOSITE CONSTRUCTION WITH 7 INCH DECK SLAB.
  - ALLOWANCE FOR 25 PSF FUTURE WEARING SURFACE
- MATERIALS
  - CONCRETE : NORMAL WEIGHT

    CLASS S, $f'c = 3000$ PSI - BARRIES & APPROACH SLAB

    CLASS S, $f'c = 4500$ PSI - DECK SLAB & DIAPHRAGMS

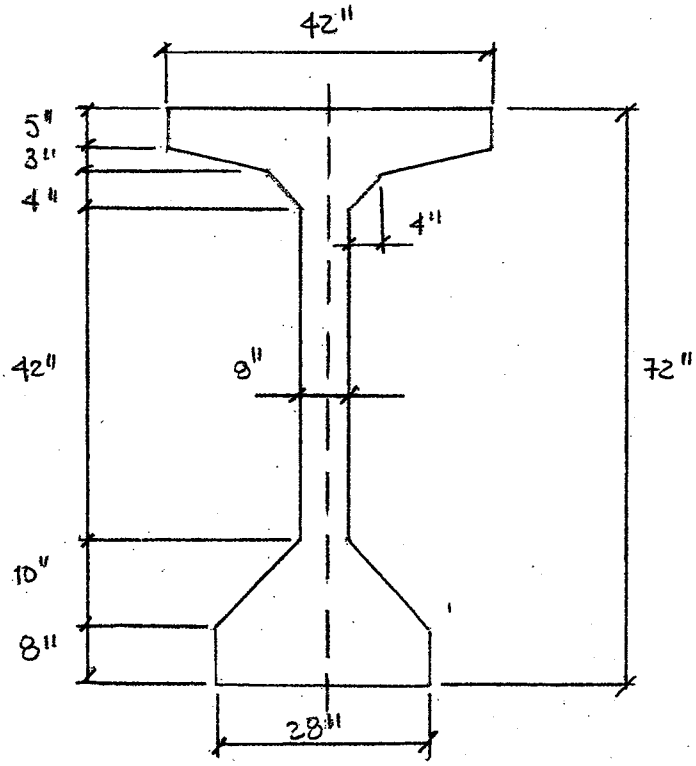
    CLASS S, $f'c = 4000$ PSI - CAISSONS, PIER CAPS AND WINGWALLS.
  - REINFORCEMENT

    ALL REINFORCING BARS ARE A615 DEFORMED BILLET STEEL - GRADE 60

    F_y MIN $= 60{,}000$ PSI

    $f_s = 24{,}000$ PSI

    $f_s = 20{,}000$ PSI - DECK & DIAPHRAGMS ONLY
- GIRDER SELECTION



SECTION PROPERTIES

$A_c = 1085\ in^2$

$I = 733{,}320\ in^4$

$y_b = 36.38\ in$

$S_b = 20157\ in^3$

$S_t = 20587\ in^3$

$w_D = 1.130\ K/Ft$

TY·LIN INTERNATIONAL

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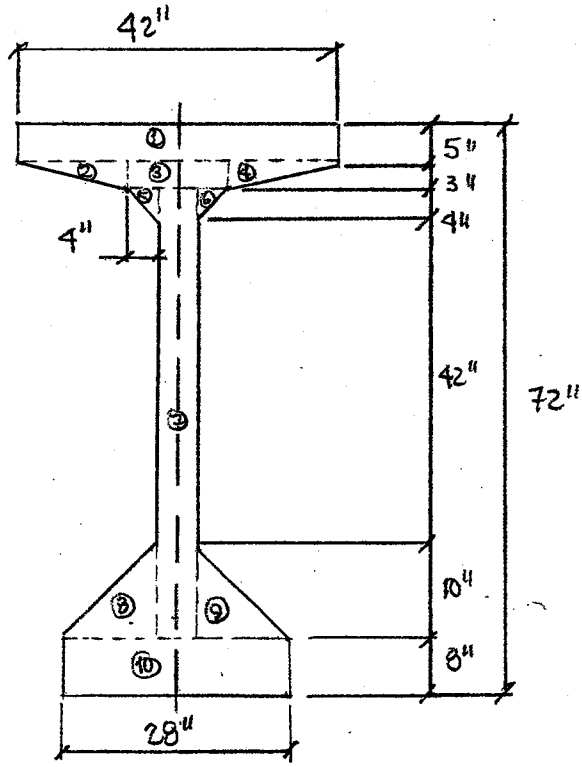
Checked: Date:
Client Ref.:

Iyy



SECTION	AREA (FT²)	X bot (Ft)	AREA * X bot (Ft³)	AREA (X - X bot)²	Io (Ft⁴)
1	1.45833	1.750	2.55208	0.000	1.48372
2	0.13542	0.7222	0.0978	0.14305	0.00883
3	0.3333	1.7500	0.58333	0.000	0.04938
4	0.13542	2.7778	0.37616	0.14305	0.00883
5	0.05556	1.30556	0.07254	0.01097	0.00034
6	0.05556	2.19444	0.12191	0.01097	0.00034
7	3.1111	1.750	5.4444	0.000	0.11523
8	0.34722	1.13889	0.39545	0.12967	0.0134
9	0.34722	2.36111	0.81983	0.12967	0.0134
10	1.55556	1.750	2.72222	0.000	0.70576
	Σ 7.5347 Ft²		Σ 13.1857	Σ 0.5674	+ Σ 2.40423

$$\bar{y} = \frac{\Sigma \text{AREA} * X_{bot}}{\Sigma \text{AREA}} = \frac{13.1857}{7.5347} = 1.750 \text{ Ft}$$

$$I_{yy} = 2.97163 \text{ Ft}^4$$

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Concrete Properties

F'c (slab):	4500	PSI
F'c (girder):	6000	PSI
No.Girders:	10	

Left Outside distance:	5.833	ft
Girder Spacing:	7.500	ft
Right outside distance:	5.833	ft

Girder Properties:

Area:	7.535	ft^2
Yb:	3.032	ft^2
Yt:	2.968	ft^2
H:	6.000	ft^2
Ix:	35.365	ft^4
St:	11.914	ft^3
Sb:	11.665	ft^3

Section Properties for Superstructure:

Area:	127.361	ft^2
Ycb:	4.414	ft^2
Yct:	2.336	ft^2
Hc:	6.750	ft^2
Izz:	680	ft^4
Iyy:	58228	ft^4
Ixx:	44.191	ft^4

Izz

	Location	X ft	Width ft	Thickness ft	E ksf	Area ft^2	y ft	Area*y ft^3	A(y-ycb)^2 ft^4	I ft^4	E(I+Ay^2) ksf-ft^4
0.0 L	SLAB	0.000	79.167	0.583	550609	46.18	6.46	298.25	193.02	1.31	106997074
	HAUNCH		3.500	0.167	550609	5.83	6.08	35.49	16.26	0.01	8958656
	G1				635789	7.53	3.03	22.84	14.40	35.36	31637393
	G2				635789	7.53	3.03	22.84	14.40	35.36	31637393
	G3				635789	7.53	3.03	22.84	14.40	35.36	31637393
Girders	G4				635789	7.53	3.03	22.84	14.40	35.36	31637393
	G5				635789	7.53	3.03	22.84	14.40	35.36	31637393
	G6				635789	7.53	3.03	22.84	14.40	35.36	31637393
	G7				635789	7.53	3.03	22.84	14.40	35.36	31637393
	G8				635789	7.53	3.03	22.84	14.40	35.36	31637393
	G9				635789	7.53	3.03	22.84	14.40	35.36	31637393
	G10				635789	7.53	3.03	22.84	14.40	35.36	31637393
					Sum:	127.36		562.16			432329662
							ycb=	4.41 ft			

Iyy

	Location	X ft	Width ft	Thickness ft	E ksf	Area ft^2	y ft	Area*y ft^3	A(y-ycb)^2 ft^4	I ft^4	E(I+Ay^2) ksf-ft^4
0.0 L	SLAB	0.000	0.583	79.167	550609	46.18	39.58	1827.98	0.00	24119.18	13280249377
	HAUNCH		0.167	3.500	550609	5.83	0.00	230.90	2707.03	0.01	1490524230
	G1	33.750			635789	7.53	5.83	43.95	8582.52	2.97	5458560377
	G2	26.250			635789	7.53	13.33	100.46	5191.89	2.97	3302838482
	G3	18.750			635789	7.53	20.83	156.97	2648.93	2.97	1686047060
Girders	G4	11.250			635789	7.53	28.33	213.48	953.61	2.97	608186113
	G5	3.750			635789	7.53	35.83	269.99	105.96	2.97	69255639
	G6	3.750			635789	7.53	43.33	326.50	105.96	2.97	69255639
	G7	11.250			635789	7.53	50.83	383.02	953.61	2.97	608186113
	G8	18.750			635789	7.53	58.33	439.53	2648.93	2.97	1686047060
	G9	26.250			635789	7.53	65.83	496.04	5191.89	2.97	3302838482
	G10	33.750			635789	7.53	73.33	552.55	8582.52	2.97	5458560377
					Sum:	127.36		5041.38			37020548948
							ycb=	39.58 ft			

Ixx

	Location	Width ft	Thickness ft	E ksf	E*W*T^3 ksf-ft^4
0.0 L	SLAB	79.167	0.583	550609	8652395
	HAUNCH	3.500	0.167	550609	89219
Girders	G1 to G10	6.000	1.256	635789	75546128
				Sum:	84287742
					3

SLAB HAUNCH GIRDERS

$$EI=\frac{(E*W1*T1^3+E*No.\ Girders*W2*T2^3+E*No.\ Girders*W3*T3^3)}{3}$$

EI= 28095914

Ixx= 44.191 ft^4

TYLIN INTERNATIONAL

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SECTION PROPERTIES

HAUNCH PROPERTIES

Location	X ft	Width ft	Thickness ft	E ksf	Area ft^2	y ft	Area*y ft^3	A(y-ycb)^2 ft^4	I ft^4	E(I+Ay^2) ft^4
G1	33.750	3.500	0.167	550609	0.583	5.83	3.40	664	0.001	365854866
G2	26.250	3.500	0.167	550609	0.583	13.33	7.78	402	0.001	221319904
G3	18.750	3.500	0.167	550609	0.583	20.83	12.15	205	0.001	112918683
G4	11.250	3.500	0.167	550609	0.583	28.33	16.53	74	0.001	40651202
G5	3.750	3.500	0.167	550609	0.583	35.83	20.90	8	0.001	4517461
G6	3.750	3.500	0.167	550609	0.583	43.33	25.28	8	0.001	4517461
G7	11.250	3.500	0.167	550609	0.583	50.83	29.65	74	0.001	40651202
G8	18.750	3.500	0.167	550609	0.583	58.33	34.03	205	0.001	112918683
G9	26.250	3.500	0.167	550609	0.583	65.83	38.40	402	0.001	221319904
G10	33.750	3.500	0.167	550609	0.583	73.33	42.78	664	0.001	365854866
					5.833		230.90	2707	0.014	1490524230
						ycb=	39.583	ft		

ADDITIONAL DEAD LOAD ADDED

DIAPHRAGMS

Location	Total Load kips
ABUT 1	143.36
PIER 1	140.43
PIER 2	140.43
PIER 3	140.43
PIER 4	140.43
ABUT 2	143.36

PIER NOMENCLATURE

Location	Dist - x ft	Dist - y ft
C1	-39.583	0.000
G1	-33.750	0.000
C2	-30.500	0.000
C3	-28.000	0.000
G2	-26.250	0.000
G3	-18.750	0.000
C4	-14.000	0.000
G4	-11.250	0.000
G5	-3.750	0.000
C5	0.000	0.000
G6	3.750	0.000
G7	11.250	0.000
C6	14.000	0.000
G8	18.750	0.000
G9	26.250	0.000
C7	28.000	0.000
C8	30.500	0.000
G10	33.750	0.000
C9	39.583	0.000

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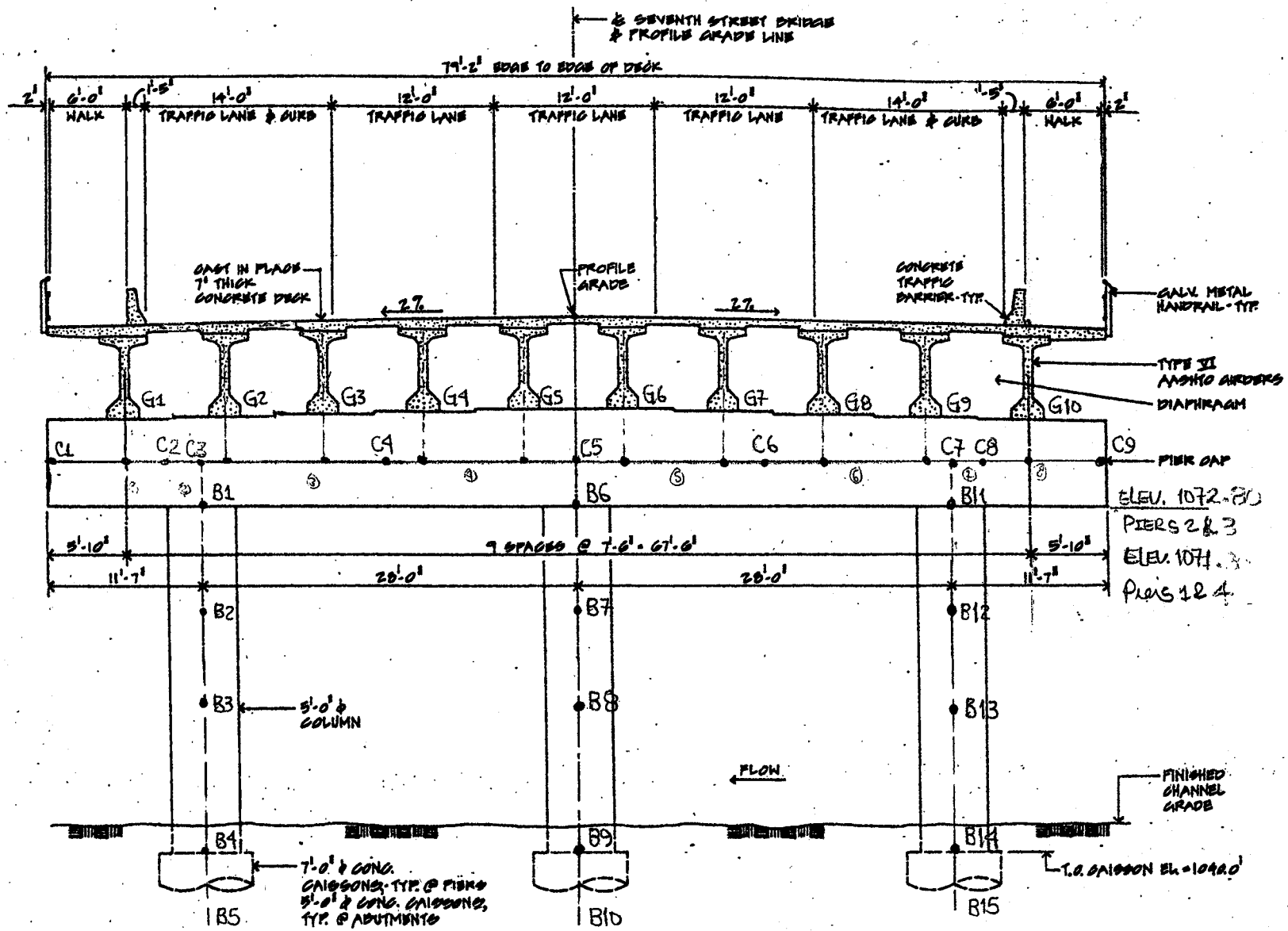
COORDINATES & SECTION PROPERTIES

	Location	Joint No.	X ft	Y ft	Z ft	Area ft^2	Iz ft^4	Iy ft^4	Ix ft^4
ABUT 1	0.00 L	101	0.00	0.00	1083.79	127.361	679.989	58228	44.191
	0.25 L	102	33.54	0.00	1083.79	127.361	679.989	58228	44.191
	0.50 L	103	67.08	0.00	1083.79	127.361	679.989	58228	44.191
	0.75 L	104	100.63	0.00	1083.79	127.361	679.989	58228	44.191
PIER 1	1.00 L	105	134.17	0.00	1083.79	127.361	679.989	58228	44.191
	1.25 L	106	167.92	0.00	1083.79	127.361	679.989	58228	44.191
	1.50 L	107	201.67	0.00	1083.79	127.361	679.989	58228	44.191
	1.75 L	108	235.42	0.00	1083.79	127.361	679.989	58228	44.191
PIER 2	2.00 L	109	269.17	0.00	1083.79	127.361	679.989	58228	44.191
	2.25 L	110	302.92	0.00	1083.79	127.361	679.989	58228	44.191
	2.50 L	111	336.67	0.00	1083.79	127.361	679.989	58228	44.191
	2.75 L	112	370.42	0.00	1083.79	127.361	679.989	58228	44.191
PIER 3	3.00 L	113	404.17	0.00	1083.79	127.361	679.989	58228	44.191
	3.25 L	114	437.92	0.00	1083.79	127.361	679.989	58228	44.191
	3.50 L	115	471.67	0.00	1083.79	127.361	679.989	58228	44.191
	3.75 L	116	505.42	0.00	1083.79	127.361	679.989	58228	44.191
PIER 4	4.00 L	117	539.17	0.00	1083.79	127.361	679.989	58228	44.191
	4.25 L	118	572.71	0.00	1083.79	127.361	679.989	58228	44.191
	4.50 L	119	606.25	0.00	1083.79	127.361	679.989	58228	44.191
	4.75 L	120	639.79	0.00	1083.79	127.361	679.989	58228	44.191
ABUT 2	5.00 L	121	673.33	0.00	1083.79	127.361	679.989	58228	44.191



Project: Salt River Bridges - Scour

Item: 7th Street Bridge

Job No. 1317.00

Drawn: VPD

Date: 1/27/00

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Projects: Salt River Bridges - Scour | Job No. 1317.00 | Sheet: of
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Checker: | Date:
Grid: 1/10"

Pier Cap $L = 28 * 2 + 11.6833 * 2 = 79.1667$ Ft

AREA $= 79.1667 * 4.50 = 356.25$ Ft^2

VOLUME $= 356.25\ Ft^2 * 6.50\ Ft = 2315.625\ Ft^3$

wt $= 2315.625\ Ft^3 * 0.150$ kcf $= 347.344$ kips $\div 7.74\ Ft = 44.876$ kips/Ft

length $= 1083.79 - 1076.05 = 7.74$ Ft

Inertias:

$I_x = \frac{1}{12} * 79.1667 * (4.50)^3 = 601.172\ Ft^4$

$I_y = \frac{1}{12} * 4.500 * (79.1667)^3 = 186062.518\ Ft^4$

$I_z = 0.333 * (79.1667) * (4.50)^3 = 2402.28\ Ft^4$

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COORDINATES & SECTION PROPERTIES

	Item	Location	Joint No.	X ft	Y ft	Z ft	Area ft^2	Iz ft^4	Iy ft^4	Ix ft^4
PIER 1	PIER CAP	C1	201	134.17	39.58	1076.05	29.250	102.984	49.359	112.800
		G1		134.17	33.75	1076.05	29.250	102.984	49.359	112.800
		C2	202	134.17	30.50	1076.05	29.250	102.984	49.359	112.800
		C3 - COL1	203	134.17	28.00	1076.05	29.250	102.984	49.359	112.800
		G2		134.17	26.25	1076.05	29.250	102.984	49.359	112.800
		G3		134.17	18.75	1076.05	29.250	102.984	49.359	112.800
		C4	204	134.17	14.00	1076.05	29.250	102.984	49.359	112.800
		G4		134.17	11.25	1076.05	29.250	102.984	49.359	112.800
		G5		134.17	3.75	1076.05	29.250	102.984	49.359	112.800
		C5 - COL 2	205	134.17	0.00	1076.05	29.250	102.984	49.359	112.800
		G6		134.17	-3.75	1076.05	29.250	102.984	49.359	112.800
		G7		134.17	-11.25	1076.05	29.250	102.984	49.359	112.800
		C6	206	134.17	-14.00	1076.05	29.250	102.984	49.359	112.800
		G8		134.17	-18.75	1076.05	29.250	102.984	49.359	112.800
		G9		134.17	-26.25	1076.05	29.250	102.984	49.359	112.800
		C7 - COL 3	207	134.17	-28.00	1076.05	29.250	102.984	49.359	112.800
		C8	208	134.17	-30.50	1076.05	29.250	102.984	49.359	112.800
		G10		134.17	-33.75	1076.05	29.250	102.984	49.359	112.800
		C9	209	134.17	-39.58	1076.05	29.250	102.984	49.359	112.800
	COL1	Top	601	134.17	28.00	1072.80	19.635	30.680	30.680	61.359
		HWL	602	134.17	28.00	1066.76	19.635	30.680	30.680	61.359
		12 ft below	603	134.17	28.00	1054.76	19.635	30.680	30.680	61.359
		Top of DS	604	134.17	28.00	1040.00	19.635	30.680	30.680	61.359
		Groundline	605	134.17	28.00	1005.25	38.485	117.859	117.859	235.718
		1 "Dia."	606	134.17	28.00	998.25	38.485	117.859	117.859	235.718
		2 "Dia."	607	134.17	28.00	991.25	38.485	117.859	117.859	235.718
		3 "Dia."	608	134.17	28.00	984.25	38.485	117.859	117.859	235.718
		4 "Dia."	609	134.17	28.00	977.25	38.485	117.859	117.859	235.718
	COL2	Top	610	134.17	0.00	1072.80	19.635	30.680	30.680	61.359
		HWL	611	134.17	0.00	1066.76	19.635	30.680	30.680	61.359
		12 ft below	612	134.17	0.00	1054.76	19.635	30.680	30.680	61.359
		Top of DS	613	134.17	0.00	1040.00	19.635	30.680	30.680	61.359
		Groundline	614	134.17	0.00	1005.25	38.485	117.859	117.859	235.718
		1 "Dia."	615	134.17	0.00	998.25	38.485	117.859	117.859	235.718
		2 "Dia."	616	134.17	0.00	991.25	38.485	117.859	117.859	235.718
		3 "Dia."	617	134.17	0.00	984.25	38.485	117.859	117.859	235.718
		4 "Dia."	618	134.17	0.00	977.25	38.485	117.859	117.859	235.718
	COL3	Top	619	134.17	-28.00	1072.80	19.635	30.680	30.680	61.359
		HWL	620	134.17	-28.00	1066.76	19.635	30.680	30.680	61.359
		12 ft below	621	134.17	-28.00	1054.76	19.635	30.680	30.680	61.359
		Top of DS	622	134.17	-28.00	1040.00	19.635	30.680	30.680	61.359
		Groundline	623	134.17	-28.00	1005.25	38.485	117.859	117.859	235.718
		1 "Dia."	624	134.17	-28.00	998.25	38.485	117.859	117.859	235.718
		2 "Dia."	625	134.17	-28.00	991.25	38.485	117.859	117.859	235.718
		3 "Dia."	626	134.17	-28.00	984.25	38.485	117.859	117.859	235.718
		4 "Dia."	627	134.17	-28.00	977.25	38.485	117.859	117.859	235.718

TYLIN INTERNATIONAL

Project:	Salt River Bridges Scour	Job No.	1317.00	Sheet:	
Item:	7th Street Bridge	Designer:	VPD	Date:	2/28/00
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COORDINATES & SECTION PROPERTIES

	Item	Location	Joint No.	X ft	Y ft	Z ft	Area ft^2	Iz ft^4	Iy ft^4	Ix ft^4
PIER 2	PIER CAP	C1	301	269.17	39.58	1076.05	29.250	102.984	49.359	112.800
		G1		269.17	33.75	1076.05	29.250	102.984	49.359	112.800
		C2	302	269.17	30.50	1076.05	29.250	102.984	49.359	112.800
		C3 - COL1	303	269.17	28.00	1076.05	29.250	102.984	49.359	112.800
		G2		269.17	26.25	1076.05	29.250	102.984	49.359	112.800
		G3		269.17	18.75	1076.05	29.250	102.984	49.359	112.800
		G4		269.17	14.00	1076.05	29.250	102.984	49.359	112.800
		C4	304	269.17	11.25	1076.05	29.250	102.984	49.359	112.800
		G5		269.17	3.75	1076.05	29.250	102.984	49.359	112.800
		C5 - COL 2	305	269.17	0.00	1076.05	29.250	102.984	49.359	112.800
		G6		269.17	-3.75	1076.05	29.250	102.984	49.359	112.800
		G7		269.17	-11.25	1076.05	29.250	102.984	49.359	112.800
		C6	306	269.17	-14.00	1076.05	29.250	102.984	49.359	112.800
		G8		269.17	-18.75	1076.05	29.250	102.984	49.359	112.800
		G9		269.17	-26.25	1076.05	29.250	102.984	49.359	112.800
		C5 - COL 3	307	269.17	-28.00	1076.05	29.250	102.984	49.359	112.800
		C7	308	269.17	-30.50	1076.05	29.250	102.984	49.359	112.800
		G10		269.17	-33.75	1076.05	29.250	102.984	49.359	112.800
		C8	309	269.17	-39.58	1076.05	29.250	102.984	49.359	112.800
	COL1	Top	701	269.17	28.00	1072.80	19.635	30.680	30.680	61.359
		HWL	702	269.17	28.00	1066.76	19.635	30.680	30.680	61.359
		12 ft below	703	269.17	28.00	1054.76	19.635	30.680	30.680	61.359
		Top of DS	704	269.17	28.00	1040.00	19.635	30.680	30.680	61.359
		Groundline	705	269.17	28.00	1005.25	38.485	117.859	117.859	235.718
		1 "Dia."	706	269.17	28.00	998.25	38.485	117.859	117.859	235.718
		2 "Dia."	707	269.17	28.00	991.25	38.485	117.859	117.859	235.718
		3 "Dia."	708	269.17	28.00	984.25	38.485	117.859	117.859	235.718
		4 "Dia."	709	269.17	28.00	977.25	38.485	117.859	117.859	235.718
	COL2	Top	710	269.17	0.00	1072.80	19.635	30.680	30.680	61.359
		HWL	711	269.17	0.00	1066.76	19.635	30.680	30.680	61.359
		12 ft below	712	269.17	0.00	1054.76	19.635	30.680	30.680	61.359
		Top of DS	713	269.17	0.00	1040.00	19.635	30.680	30.680	61.359
		Groundline	714	269.17	0.00	1005.25	38.485	117.859	117.859	235.718
		1 "Dia."	715	269.17	0.00	998.25	38.485	117.859	117.859	235.718
		2 "Dia."	716	269.17	0.00	991.25	38.485	117.859	117.859	235.718
		3 "Dia."	717	269.17	0.00	984.25	38.485	117.859	117.859	235.718
		4 "Dia."	718	269.17	0.00	977.25	38.485	117.859	117.859	235.718
	COL3	Top	719	269.17	-28.00	1072.80	19.635	30.680	30.680	61.359
		HWL	720	269.17	-28.00	1066.76	19.635	30.680	30.680	61.359
		12 ft below	721	269.17	-28.00	1054.76	19.635	30.680	30.680	61.359
		Top of DS	722	269.17	-28.00	1040.00	19.635	30.680	30.680	61.359
		Groundline	723	269.17	-28.00	1005.25	38.485	117.859	117.859	235.718
		1 "Dia."	724	269.17	-28.00	998.25	38.485	117.859	117.859	235.718
		2 "Dia."	725	269.17	-28.00	991.25	38.485	117.859	117.859	235.718
		3 "Dia."	726	269.17	-28.00	984.25	38.485	117.859	117.859	235.718
		4 "Dia."	727	269.17	-28.00	977.25	38.485	117.859	117.859	235.718

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Project:	Salt River Bridges Scour	Job No.	1317.00	Sheet:	
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COORDINATES & SECTION PROPERTIES

	Item	Location	Joint No.	X ft	Y ft	Z ft	Area ft^2	Iz ft^4	Iy ft^4	Ix ft^4
PIER 3	PIER CAP	C1	401	404.17	39.58	1076.05	29.250	102.984	49.359	112.800
		G1		404.17	33.75	1076.05	29.250	102.984	49.359	112.800
		C2	402	404.17	30.50	1076.05	29.250	102.984	49.359	112.800
		C3 - COL1	403	404.17	28.00	1076.05	29.250	102.984	49.359	112.800
		G2		404.17	26.25	1076.05	29.250	102.984	49.359	112.800
		G3		404.17	18.75	1076.05	29.250	102.984	49.359	112.800
		G4		404.17	14.00	1076.05	29.250	102.984	49.359	112.800
		C4	404	404.17	11.25	1076.05	29.250	102.984	49.359	112.800
		G5		404.17	3.75	1076.05	29.250	102.984	49.359	112.800
		C5 - COL 2	405	404.17	0.00	1076.05	29.250	102.984	49.359	112.800
		G6		404.17	-3.75	1076.05	29.250	102.984	49.359	112.800
		G7		404.17	-11.25	1076.05	29.250	102.984	49.359	112.800
		C6	406	404.17	-14.00	1076.05	29.250	102.984	49.359	112.800
		G8		404.17	-18.75	1076.05	29.250	102.984	49.359	112.800
		G9		404.17	-26.25	1076.05	29.250	102.984	49.359	112.800
		C5 - COL 3	407	404.17	-28.00	1076.05	29.250	102.984	49.359	112.800
		C7	408	404.17	-30.50	1076.05	29.250	102.984	49.359	112.800
		G10		404.17	-33.75	1076.05	29.250	102.984	49.359	112.800
		C8	409	404.17	-39.58	1076.05	29.250	102.984	49.359	112.800
	COL1	Top	801	404.17	28.00	1072.80	19.635	30.680	30.680	61.359
		HWL	802	404.17	28.00	1066.76	19.635	30.680	30.680	61.359
		12 ft below	803	404.17	28.00	1054.76	19.635	30.680	30.680	61.359
		Top of DS	804	404.17	28.00	1040.00	19.635	30.680	30.680	61.359
		Groundline	805	404.17	28.00	1005.25	38.485	117.859	117.859	235.718
		1 "Dia."	806	404.17	28.00	998.25	38.485	117.859	117.859	235.718
		2 "Dia."	807	404.17	28.00	991.25	38.485	117.859	117.859	235.718
		3 "Dia."	808	404.17	28.00	984.25	38.485	117.859	117.859	235.718
		4 "Dia."	809	404.17	28.00	977.25	38.485	117.859	117.859	235.718
	COL2	Top	810	404.17	0.00	1072.80	19.635	30.680	30.680	61.359
		HWL	811	404.17	0.00	1066.76	19.635	30.680	30.680	61.359
		12 ft below	812	404.17	0.00	1054.76	19.635	30.680	30.680	61.359
		Top of DS	813	404.17	0.00	1040.00	19.635	30.680	30.680	61.359
		Groundline	814	404.17	0.00	1005.25	38.485	117.859	117.859	235.718
		1 "Dia."	815	404.17	0.00	998.25	38.485	117.859	117.859	235.718
		2 "Dia."	816	404.17	0.00	991.25	38.485	117.859	117.859	235.718
		3 "Dia."	817	404.17	0.00	984.25	38.485	117.859	117.859	235.718
		4 "Dia."	818	404.17	0.00	977.25	38.485	117.859	117.859	235.718
	COL3	Top	819	404.17	-28.00	1072.80	19.635	30.680	30.680	61.359
		HWL	820	404.17	-28.00	1066.76	19.635	30.680	30.680	61.359
		12 ft below	821	404.17	-28.00	1054.76	19.635	30.680	30.680	61.359
		Top of DS	822	404.17	-28.00	1040.00	19.635	30.680	30.680	61.359
		Groundline	823	404.17	-28.00	1005.25	38.485	117.859	117.859	235.718
		1 "Dia."	824	404.17	-28.00	998.25	38.485	117.859	117.859	235.718
		2 "Dia."	825	404.17	-28.00	991.25	38.485	117.859	117.859	235.718
		3 "Dia."	826	404.17	-28.00	984.25	38.485	117.859	117.859	235.718
		4 "Dia."	827	404.17	-28.00	977.25	38.485	117.859	117.859	235.718

TYLIN INTERNATIONAL

Project:	Salt River Bridges Scour	Job No.	1317.00	Sheet:	
Item:	7th Street Bridge	Designer:	VPD	Date:	2/28/00
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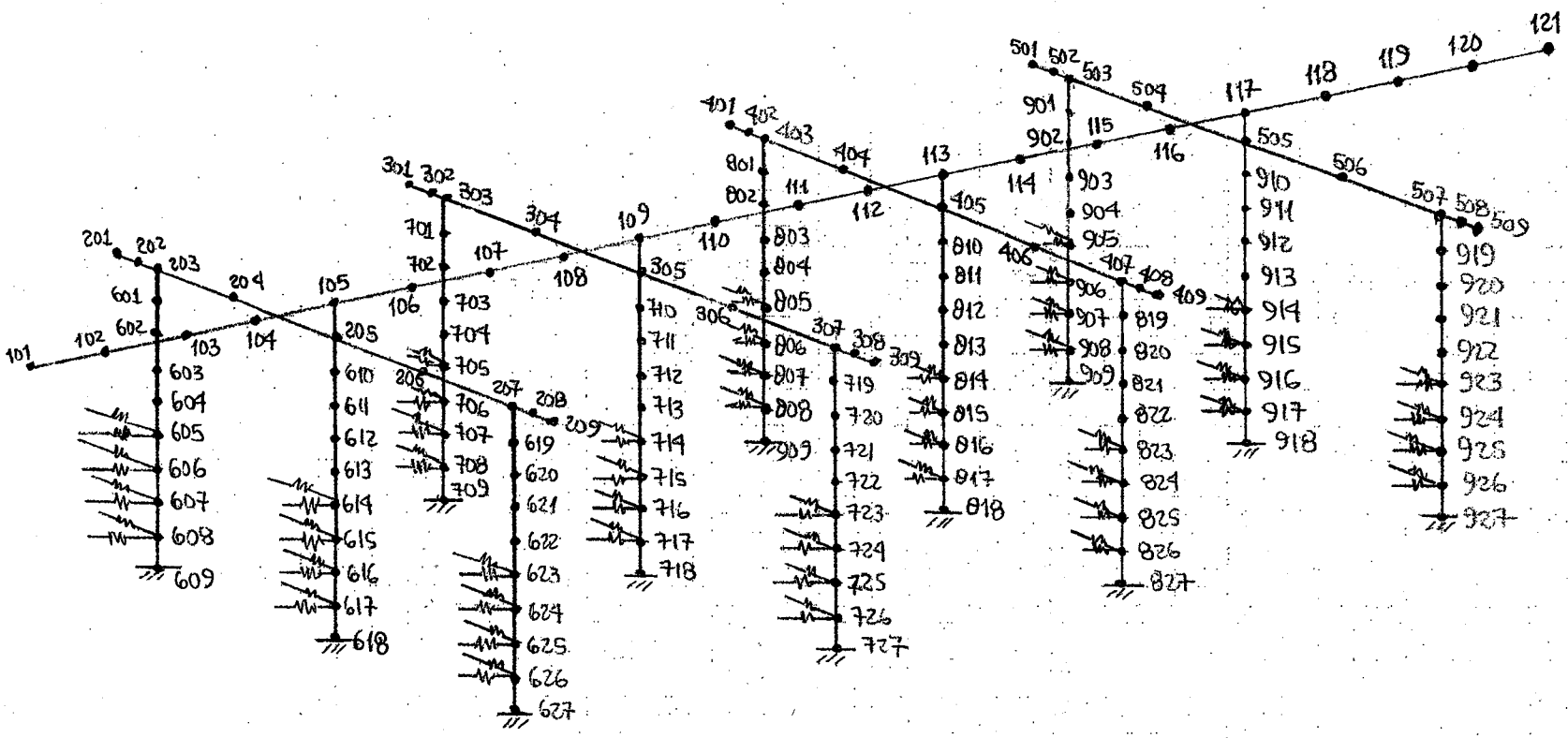
COORDINATES & SECTION PROPERTIES

	Item	Location	Joint No.	X ft	Y ft	Z ft	Area ft^2	Iz ft^4	Iy ft^4	Ix ft^4
PIER 4	PIER CAP	C1	501	539.17	213.33	1076.05	29.250	102.984	49.359	112.800
		G1		539.17	207.50	1076.05	29.250	102.984	49.359	112.800
		C2	502	539.17	204.25	1076.05	29.250	102.984	49.359	112.800
		C3 - COL1	503	539.17	201.75	1076.05	29.250	102.984	49.359	112.800
		G2		539.17	200.00	1076.05	29.250	102.984	49.359	112.800
		G3		539.17	192.50	1076.05	29.250	102.984	49.359	112.800
		G4		539.17	187.75	1076.05	29.250	102.984	49.359	112.800
		C4	504	539.17	185.00	1076.05	29.250	102.984	49.359	112.800
		G5		539.17	177.50	1076.05	29.250	102.984	49.359	112.800
		C5 - COL 2	505	539.17	173.75	1076.05	29.250	102.984	49.359	112.800
		G6		539.17	170.00	1076.05	29.250	102.984	49.359	112.800
		G7		539.17	162.50	1076.05	29.250	102.984	49.359	112.800
		C6	506	539.17	159.75	1076.05	29.250	102.984	49.359	112.800
		G8		539.17	155.00	1076.05	29.250	102.984	49.359	112.800
		G9		539.17	147.50	1076.05	29.250	102.984	49.359	112.800
		C5 - COL 3	507	539.17	145.75	1076.05	29.250	102.984	49.359	112.800
		C7	508	539.17	143.25	1076.05	29.250	102.984	49.359	112.800
		G10		539.17	140.00	1076.05	29.250	102.984	49.359	112.800
		C8	509	539.17	134.17	1076.05	29.250	102.984	49.359	112.800
	COL1	Top	901	539.17	201.75	1072.80	19.635	30.680	30.680	61.359
		HWL	902	539.17	201.75	1066.76	19.635	30.680	30.680	61.359
		12 ft below	903	539.17	201.75	1054.76	19.635	30.680	30.680	61.359
		Top of DS	904	539.17	201.75	1040.00	19.635	30.680	30.680	61.359
		Groundline	905	539.17	201.75	1005.25	38.485	117.859	117.859	235.718
		1 "Dia."	906	539.17	201.75	998.25	38.485	117.859	117.859	235.718
		2 "Dia."	907	539.17	201.75	991.25	38.485	117.859	117.859	235.718
		3 "Dia."	908	539.17	201.75	984.25	38.485	117.859	117.859	235.718
		4 "Dia."	909	539.17	201.75	977.25	38.485	117.859	117.859	235.718
	COL2	Top	910	539.17	173.75	1072.80	19.635	30.680	30.680	61.359
		HWL	911	539.17	173.75	1066.76	19.635	30.680	30.680	61.359
		12 ft below	912	539.17	173.75	1054.76	19.635	30.680	30.680	61.359
		Top of DS	913	539.17	173.75	1040.00	19.635	30.680	30.680	61.359
		Groundline	914	539.17	173.75	1005.25	38.485	117.859	117.859	235.718
		1 "Dia."	915	539.17	173.75	998.25	38.485	117.859	117.859	235.718
		2 "Dia."	916	539.17	173.75	991.25	38.485	117.859	117.859	235.718
		3 "Dia."	917	539.17	173.75	984.25	38.485	117.859	117.859	235.718
		4 "Dia."	918	539.17	173.75	977.25	38.485	117.859	117.859	235.718
	COL3	Top	919	539.17	145.75	1072.80	19.635	30.680	30.680	61.359
		HWL	920	539.17	145.75	1066.76	19.635	30.680	30.680	61.359
		12 ft below	921	539.17	145.75	1054.76	19.635	30.680	30.680	61.359
		Top of DS	922	539.17	145.75	1040.00	19.635	30.680	30.680	61.359
		Groundline	923	539.17	145.75	1005.25	38.485	117.859	117.859	235.718
		1 "Dia."	924	539.17	145.75	998.25	38.485	117.859	117.859	235.718
		2 "Dia."	925	539.17	145.75	991.25	38.485	117.859	117.859	235.718
		3 "Dia."	926	539.17	145.75	984.25	38.485	117.859	117.859	235.718
		4 "Dia."	927	539.17	145.75	977.25	38.485	117.859	117.859	235.718

CASE 3 -100 YR FLOOD (LONGITUDINAL)



NODAL NOMENCLATURE FOR SAP90

FERMINTERNATIONAL

Projects: Salt River Bridges - Scour
Item: Seventh Street Bridge
Job No. 1317.00
Sheet: of
Designer: VPD
Date: 1/29/00
Checker:
Date:
Grid: 1/10"

- DESIGN LOADS - PER GIRDER

- GALVANIZED METAL HANDRAIL = 50 lbs/Ft * 2 ÷ 1000 ÷ 10 girders = 0.010 Klf
- CONCRETE BARRIER = 0.372 K/Ft * 2 ÷ 10 girders = 0.0744 Klf
- SLAB = 79.1667 Ft * $\frac{7.0 \text{ in}}{12}$ * 0.150 Kcf ÷ 10 girders = 0.69271 Klf
- FWS = 25 psf * 64.0 Ft ÷ 1000 ÷ 10 girders = 0.160 Klf
- GIRDER = 1.300 Klf
- BUILD UP = $\frac{42}{12} * \frac{2}{12}$ * 0.150 Kcf = 0.0875 Klf

  ≅ 2.32461 Klf per girder

- WATER LINE:

  DIAMETER = 1'-2" AREA = $\frac{\pi}{4}(1.1667)^2$ = 1.06902 Ft^2

  WT. = 1.06902 Ft^2 * 62.4 pcf ÷ 1000 ÷ 10 girder = 0.00667 Klf per girder.

  ≅ 2.33128 Klf.

- ADDITIONAL DEAD LOADS

- PIER DIAPHRAGM:

  FIXED PIER = [(3.00 Ft * (9 * 7.50 Ft * 6.00 Ft)) + (7.535 Ft^2 * 3.00 Ft) - (10 * 2 * 7.535 Ft^2 * 2.00 Ft)] * 0.150 Kcf = 140.432 Kips

- ABUTMENT DIAPHRAGM:

  EXPANSION ABUTMENT = [2.25 Ft * 79.1667 Ft * 6.00 Ft] - [10 * 7.535 Ft^2 * 1.50 Ft]

  = 955.730 Ft^3 * 0.150 Kcf = 143.359 Kips.

  TOTAL DEAD LOAD = (140.432 K * 4 + 143.359 K * 2) ÷ 10 girders

  = 84.845 Kips/girder

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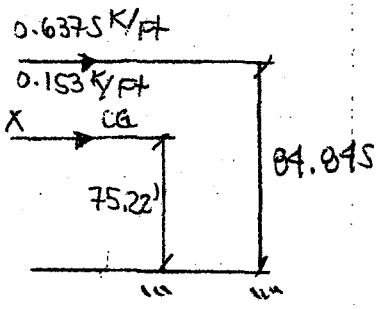
Project: Salt River Bridges - Scour | Job No: 1317.00 | Sheet: | No.:
Item: Seventh Street Bridge | Designer: VPD | Date: 1/27/00
Checker: | Date:

- **WIND LOADS**

  - ON SUPERSTRUCTURE - AASHTO Art. 3.15.2.1.3



WIND LOAD = WIND $_{\text{TRANS}}^{\text{LONG}}$ * h_{WIND}

$h_{WIND} = 6.00\,Ft + \frac{2''}{12} + \frac{7''}{12} + \sim 6.00\,Ft = 12.750\,Ft$ (METAL HANDRAIL)

POINT OF APPLICATION = $\frac{h_{WIND}}{2} = 6.375\,Ft$

$WIND_{TRANS} = 50\,Lbs/Ft^2$
$WIND_{LONG} = 12\,Lbs/Ft^2$
} BOTH FORCES SHALL BE APPLIED SIMULTANEOUSLY

$WIND\ LOAD_{TRANS} = 0.050\,KSF * 12.75\,Ft = 0.6375\,K/Ft * 1.12796 = 0.71907\,K/Ft$

$WIND\ LOAD_{LONG} = 0.012\,KSF * 12.75\,Ft = 0.153\,K/Ft * 1.12796 = 0.17258\,K/Ft$

  - OVERTURNING FORCES - AASHTO Art. 3.15.3

$F_{WIND} = W_{OVER} * WIDTH\_SUPERSTRUCTURE * LENGTH$

$W_{OVER} = 20\,Lbs/Ft^2$

POINT OF APPLICATION = 1/4 WIDTH_SUPERSTRUCTURE

$F_{WIND} = 0.020\,KSF * 79.1667\,Ft = 1.5833\,K/Ft$

$M_{WIND} = 0.020 * 79.1667 * \left(\frac{1}{4} * 79.1667\right) = 31.337\,K\text{-}Ft/Ft$ * TRIB. LENGTH

$M_{WIND}(P_1) = 31.337\,K\text{-}Ft/Ft * 135.0\,Ft = 4230.495\,K\text{-}Ft$

$M_{WIND}(P_2) = M_{WIND}(P_3) = M_{WIND}(P_4) = 4230.495\,K\text{-}Ft.$

  - ON SUBSTRUCTURE - AASHTO Art. 3.15.2.2.

WIND LOAD = WIND $_{\text{TRANS}}^{\text{LONG}}$ * WIDTH $_{\text{TRANS}}^{\text{LONG}}$

$WIND_{TRANS} = 40\,Lbs/Ft^2$
$WIND_{LONG} = 40\,Lbs/Ft^2$
} BOTH FORCES SHALL BE APPLIED SIMULTANEOUSLY

  - FIXED PIER CAP:

$WIND_{TRANS} = 0.040\,KSF * 6.50\,Ft * 4.50\,Ft \div 79.1667' = 0.01478\,K/Ft$

$WIND_{LONG} = 0.040\,KSF * 6.50\,Ft * 79.1667\,Ft = 20.58334\,Kips \div 7.74\,Ft$
$= 2.65935\,K/Ft$

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- WIND LOADS - (Cont.)
  - ON SUBSTRUCTURE - (cont)
    - COLUMN:

      $WIND_{TRANS} = 0.040\ KSF * 5.00\ Ft = 0.200\ K/Ft$

      $WIND_{LONG} = 0.040\ KSF * 5.00\ Ft = 0.200\ K/Ft * 3\ columns = 0.600\ K/Ft$

- THERMAL FORCES - AASHTO Art. 3.16 & BD&D Art. 1.2.1

  $T = -40°F$ (FALL)

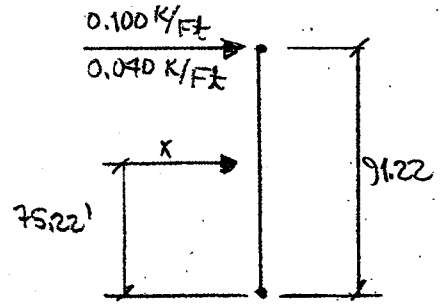
- WIND ON LIVE LOAD - AASHTO Art. 3.15.2.1.3

  WIND ON LIVE LOAD = $W_{LIVE\ LOAD}$ TRANS / LONG

  POINT OF APPLICATION = 6.00' FROM FLOOR SLAB

  $W_{LL\ TRANS} = 100\ Lbs/Ft$
  $W_{LL\ LONG} = 40\ Lbs/Ft$ } BOTH FORCES SHALL BE APPLIED SIMULTANEOUSLY

  DISTANCE TO LOAD = $6.00' + \frac{2''}{12} + \frac{7''}{12} + 6.00\ Ft = 12.750\ Ft$



EQUIVALENT FORCES:

$W_{LL\ TRANS} = -0.100 * 1.21271 = -0.12127\ K/Ft$

$W_{LL\ LONG} = 0.040 * 1.21271 = 0.0485\ K/Ft$

- LONGITUDINAL FORCES FROM LIVE LOAD - AASHTO Art. 3.9

  $L.F._{LIVE\ LOAD} = 5\%\ NO.\ LANES\ [R.F. * (0.640 * LENGTH + 18\ K)]$

  POINT OF APPLICATION = 6.00 Ft ABOVE THE FLOOR SLAB

  NO. LANES = $(79.1667' - 15.1667') \div 12 = 5.33$ LANES

  USE 3 LANES IN THE SAME DIRECTION

  $L.F. = 0.05 * 3\ LANES * 0.90 * 0.640\ K/Ft = 0.0864\ K/Ft * 1.21271 = 0.10478\ K/Ft$

  $L.F. = 0.05 * 3\ LANES * 0.90 * 18\ K * 0.25 = 0.6075\ K \quad * 1.21271 = 0.73672\ K$

  ↑ DISTRIBUTED @ THE 4 PIERS.

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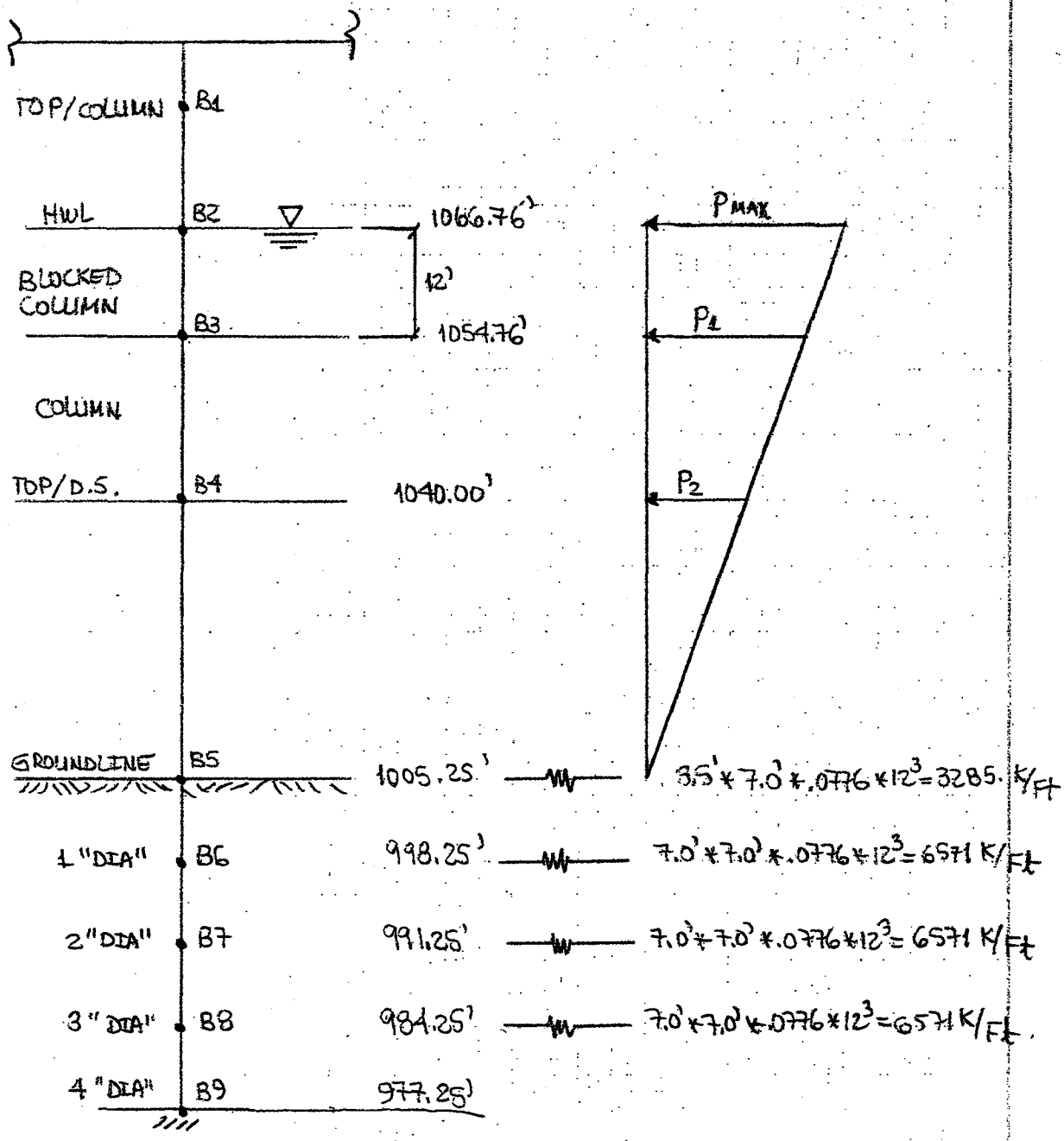
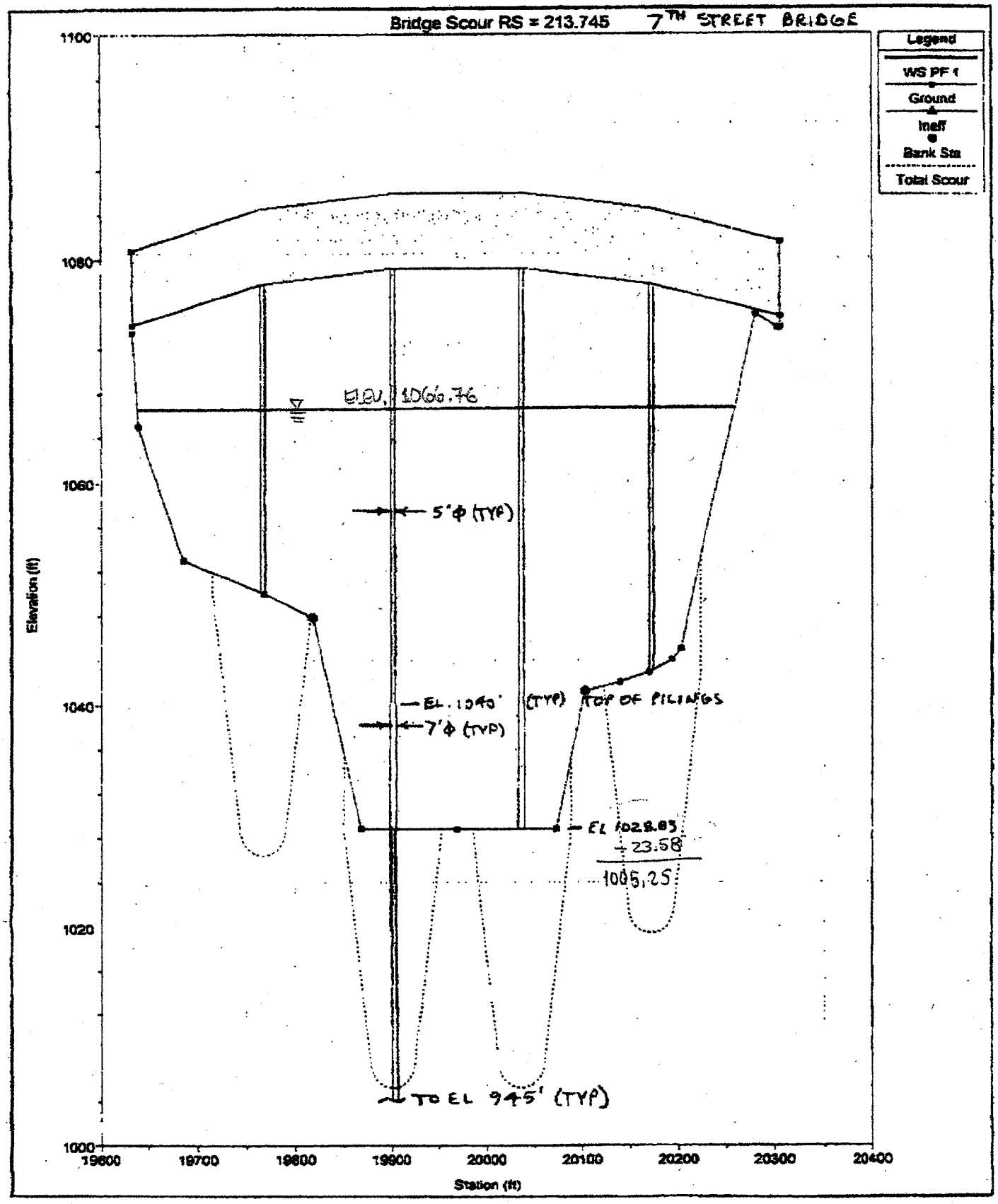
SOIL SPRINGS

CASE 3 – PIER SCOUR




Bridge Scour RS = 213.745
7TH STREET BRIDGE
Legend
WS PF 1
Ground
Ineff
Bank Sta
Total Scour
ELEV. 1066.76
5'Φ (TYP)
EL. 1040' (TYP) TOP OF PILINGS
7'Φ (TYP)
EL 1028.83
- 23.58
1005.25
TO EL 945' (TYP)
Elevation (ft)
Station (ft)
1100
1080
1060
1040
1020
1000
19600
19700
19800
19900
20000
20100
20200
20300
20400

Alternative 1 Bridge Scour With Long Term Degradation, River Station 213.745, 7th Street Bridge

Results Computed Using HEC-RAS Version 2.2 and HEC-18 Guidelines

Hydraulic Design Data

Pier Scour

All piers have the same scour depth

Input Data

Pier Shape:	Group of Cylinders
Pier Width (ft):	9
Grain Size D50 (ft):	0.0787
Depth Upstream (ft):	37.93 + 1028.83 = 1066.76
Velocity Upstream (ft/s):	16.26
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	115.36
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.5741
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	23.58
Froude #:	0.47
Equation:	CSU equation

Alternative case analysis:

Yf	Y1	Yf/Y >>	Vf/V1	V1	Vf
11.17	37.93	0.2945	0.74	16.26	12.03

Notes: Two feet of bulking is added to each side of piers less than 6' wide.

Exposed pile cap is 7" wide, which should not be bulked. The near bottom velocity on the unbulked pier will clearly produce less scour, so it is not computed herein.

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Project:	Salt River Bridges - Scour	Job No.	1317.00	Sheet:	
Item:	Seventh Street Bridge	Designer:	VPD	Date:	2/26/00
	Case 3 - Contraction Scour - (Pier Scour)	Checker:		Date:	

FORCE OF STREAM CURRENT ON PIERS: (AASHTO Art. 3.18.1 & ADOT BD&D Sec. 1.2.1)

MEAN VELOCITY, V =	16.26	FT/SEC
ANGLE OF ATTACK =	15	DEGREES
COLUMN DIAMETER =	5.00	FT
DRI'D SHFT DIAM =	7.00	FT

STREAM PRESSURE: (AASHTO Art. 3.18.1.1)

The effect of flowing water on piers and drift build-up, assuming a second-degree parabolic velocity distribution and thus a triangular pressure distribution, shall be calculated by the formula:

$$P_{avg} = K\,(V_{avg})^2 \qquad \text{(AASHTO Eqn. 3-4)}$$

where: P_{avg} = Average Stream Pressure, in pounds per square foot
V_{avg} = Average Velocity of water in feet per second
K = A Constant, 1.4 for all piers subjected to drift build-up

V_{avg} long = **4.21** ft/sec V_{avg} trans = **15.71** ft/sec

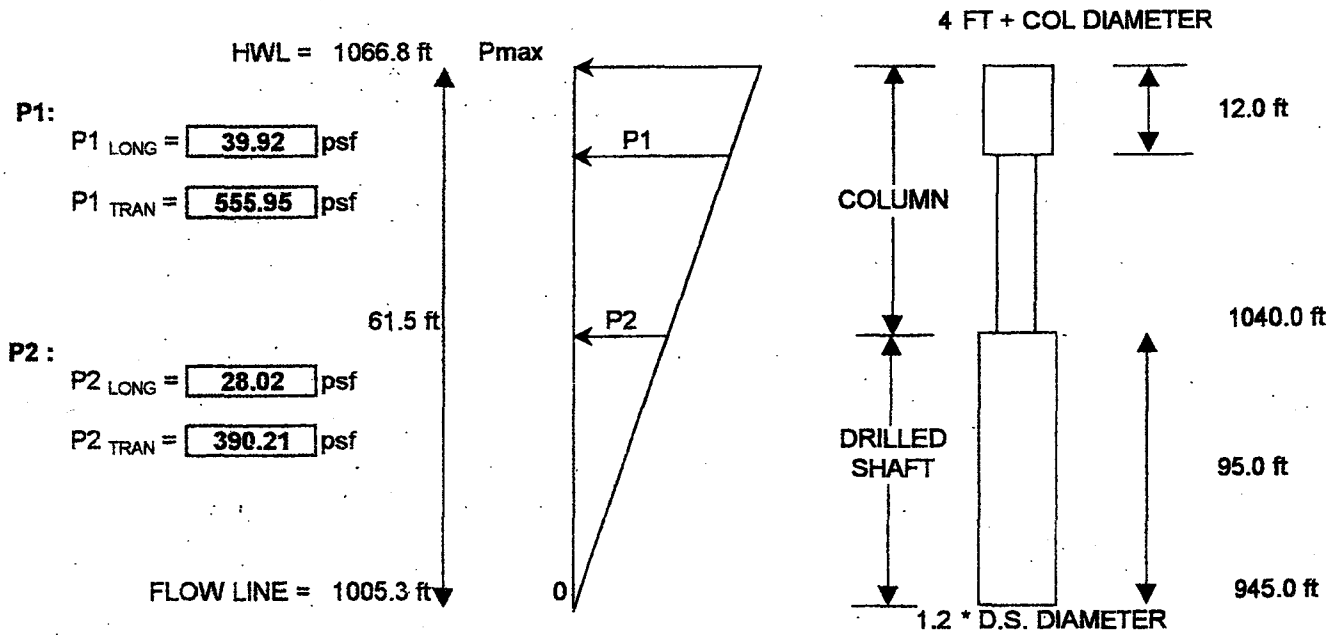
The maximum Stream Flow Pressure, P_{max}, shall be equal to twice the Average Stream Flow Pressure, P_{avg}, computed by Equation 3-4. Stream Flow Pressure shall be a triangular distribution with P_{max} located at the top of water elevation and a zero pressure located at the flow line.

$$P_{max} = 2 * K\,(V_{avg})^2 \qquad \text{where:} \qquad K = 1.4$$

P_{max} long = **49.59** psf P_{max} trans = **690.70** psf

BUOYANCY:

COLUMN =	62.40 kcf	* PI /4 *	(5.00 ft) ^{2}	=	1.23 k/ft	↑ upward force
DRI'D SHAFT =	62.40 kcf	* PI /4 *	(7.00 ft) ^{2}	=	2.40 k/ft	↑ upward force



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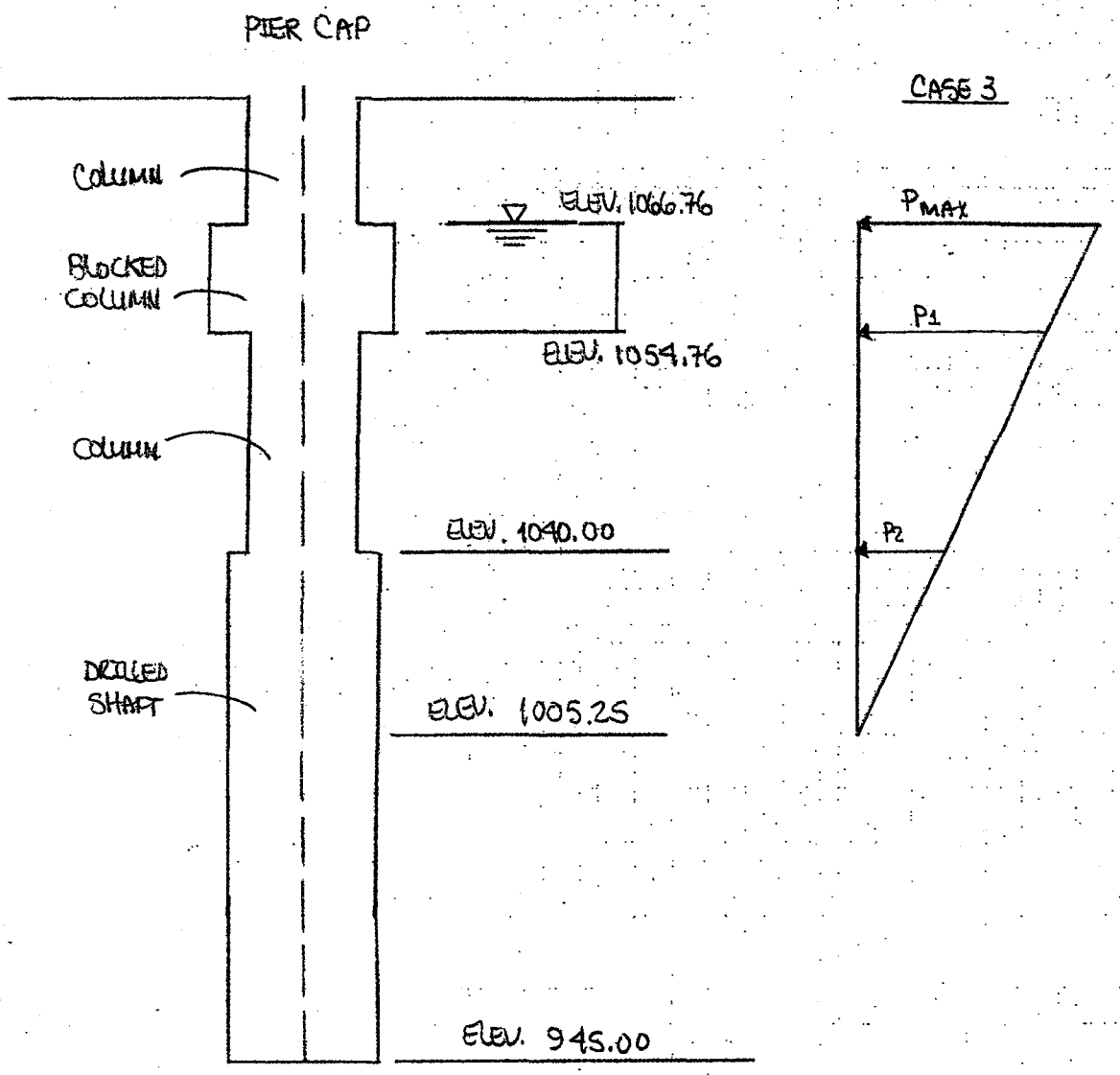
STREAM FLOW FORCES



	LONGITUDINAL	TRANSVERSE
P_{MAX}	0.04959 KSF	0.69070 KSF
P_1	0.03992 KSF	0.55556 KSF
P_2	0.02802 KSF	0.39021 KSF

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CASE 3: STREAM FLOW FORCES

LONGITUDINAL

BLOCKED COLUMN: @0.0' 0.04959 * (5.00+2*2) = 0.44631 K/Ft
@12.0' 0.03992 * (5.00+2*2) = 0.35928 K/Ft

COLUMN: @12.0' 0.03992 * 5.00 = 0.1996 K/Ft
@26.76' 0.02802 * 5.00 = 0.1401 K/Ft

DRILLED SHAFT: @26.76' 0.02802 * 7.00 = 0.19614 K/Ft
@61.51' 0.000 * 7.00 = 0.00 K/Ft

TRANSVERSE

BLOCKED COLUMN: @0.0' 0.69070 * (5.00+2*2) = 6.2163 K/Ft
@12.0' 0.55595 * (5.00+2*2) = 5.00355 K/Ft

COLUMN: @12.0' 0.55595 * 5.00 = 2.77975 K/Ft
@26.76' 0.39021 * 5.00 = 1.95105 K/Ft

DRILLED SHAFT: @26.76' 0.39021 * 7.00 = 2.73147 K/Ft
@61.51' 0.000 * 7.00 = 0.00 K/Ft

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Projects: Salt River Bridges - Scour | Job No. 1317.00 | Sheet: of

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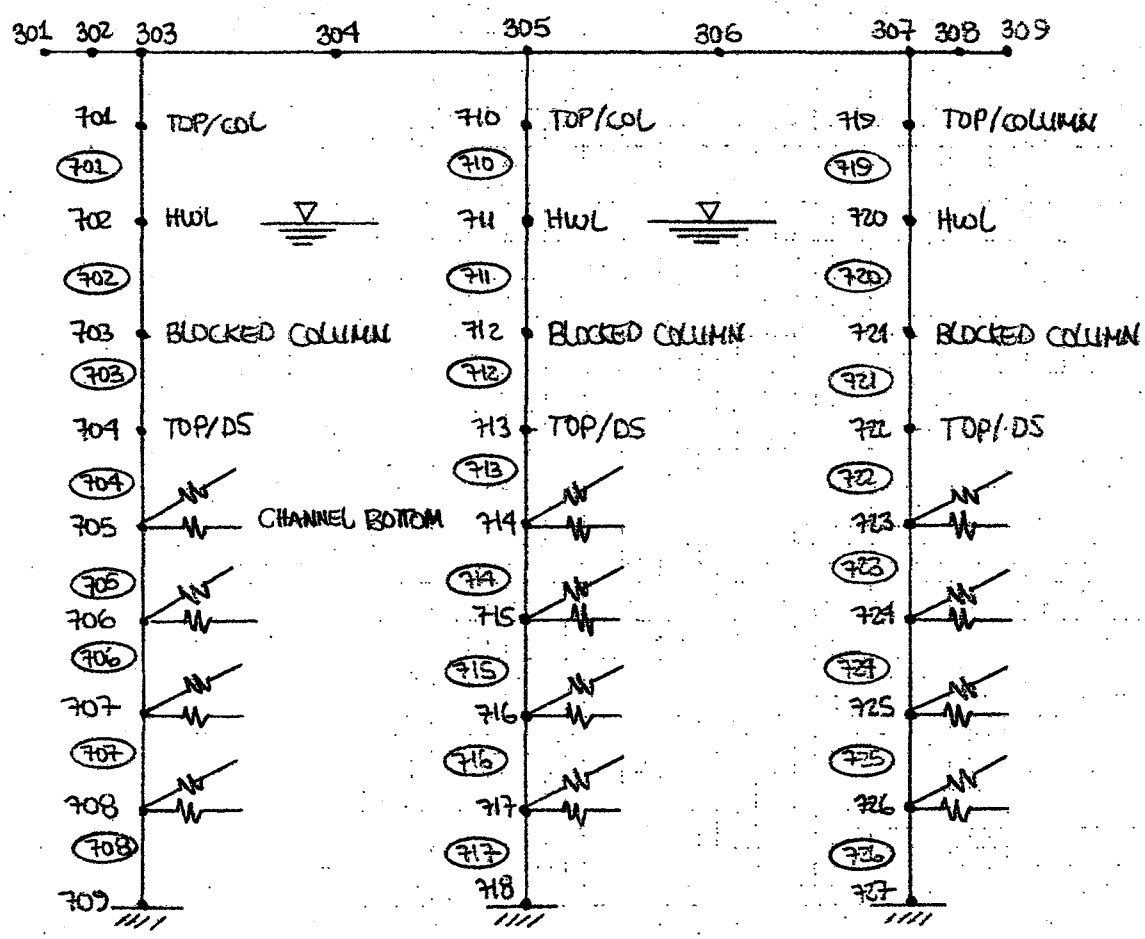
CASE 3 - 100-YR FLOOD (TRANSVERSE)



Reaction due to live load

- Live load distribution Factors for Front and Rear axles.

"As Per AASHTO 3.23.1, Lateral distribution of wheel loads at the end of the beam shall be that produced by assuming the floor to act as a simple span between beam. For wheels or axles in other positions in the span, the lateral distribution shall be as per Table 3.23.1"

Span length $l_{span} = 135.00$ Ft

Impact Factor $I = \frac{50}{l_{span}+125} = 0.19$

Beam spacing $S_{beam} = 7.500$ Ft

Spacing of axle $S_{axle} = 14.00$ Ft

Spacing of wheel $S_{wheel} = 6.00$ Ft

Reaction of front axle $R_{Front} = 8$ Kips

Reaction of Rear axle $R_{Rear} = 32$ Kips

Distribution Factor

For Front and Rear axle $DF_F = \frac{S_{beam}}{11} = 0.68182$

For middle axle $DF_M = \frac{S_{beam} - S_{wheel}}{S_{beam}} + 1.00 = 1.200$

MAXIMUM LIVE LOAD REACTION

$$R_{MAX} = \frac{R_{REAR}}{2} * DF_M + (R_{REAR} + R_{FONT}) * \frac{(l_{span} - S_{axle})}{l_{span}} * DF_F$$

$$R_{MAX} = \frac{32.0}{2} * 1.200 + (32+8) * \frac{(135-14)}{135} * 0.68182 = 43.644 \text{ Kips}$$

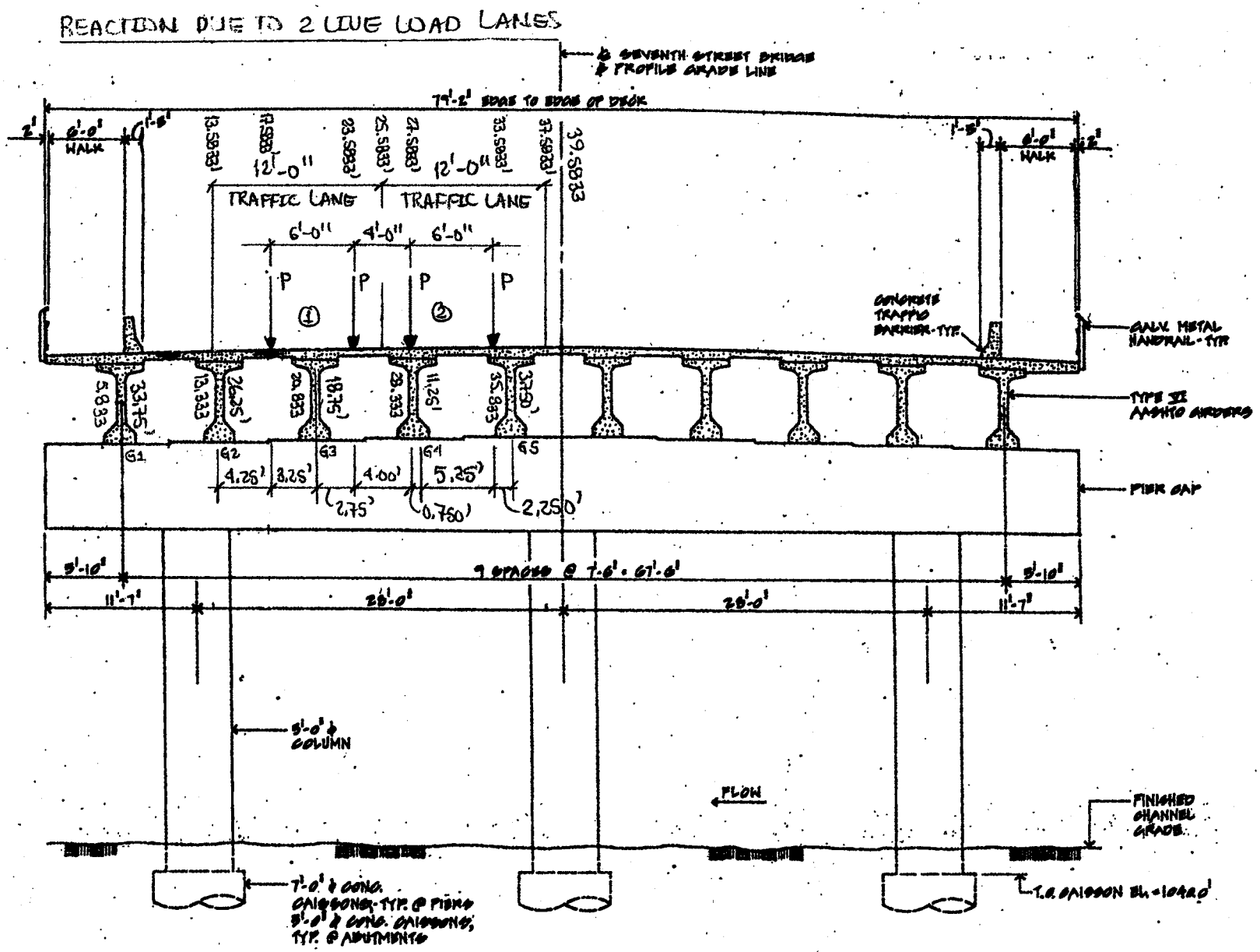
REACTION TO THE ADJACENT BEAMS
(THE REACTION TO THE ADJACENT BEAM WILL BE CONSERVATIVELY PLACED AS TO MAXIMIZE THE EFFECTS BEING INVESTIGATED)

$$R_{adj} = \frac{R_{REAR}}{2} * \left(\frac{S_{wheel}}{S_{beam}}\right) + (R_{REAR} + R_{FRONT}) * \frac{(l_{span} - S_{axle})}{l_{span}} (1 - DF_F)$$

$$R_{adj} = \frac{32.0}{2} * \left(\frac{6.00}{7.50}\right) + (32+8) * \frac{(135-14)}{135} (1 - 0.68182) = 24.207^K$$

$$R_{LIVELOAD} = 43.644^K + 24.207^K = 67.852^K \div 2 = 33.93^K * 1.19$$

$$R_{LIVELOAD} = 40.37^K/\text{wheel}$$



Project: Salt River Bridges - Scottsdale
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REACTION DUE TO 2 LIVE LOAD LANES

GIRDER 2

$$R_{G2} = \frac{R_{live}}{S_{beam}} (S_{beam} - 4.25')$$

$$R_{G2} = \frac{40.37^K}{7.50'} * (7.50 - 4.25) = 17.494 \text{ Kips}$$

GIRDER 3

$$R_{G3} = \frac{R_{live}}{S_{beam}} (S_{beam} - 3.25) + \frac{R_{live}}{S_{beam}} * (S_{beam} - 2.75 + 0.75)$$

$$R_{G3} = \frac{40.37^K}{7.50'} * (7.50 - 3.25) + \frac{40.37^K}{7.50'} * (7.50 - 2.75 + 0.75) = 52.481 \text{ Kips}$$

GIRDER 4

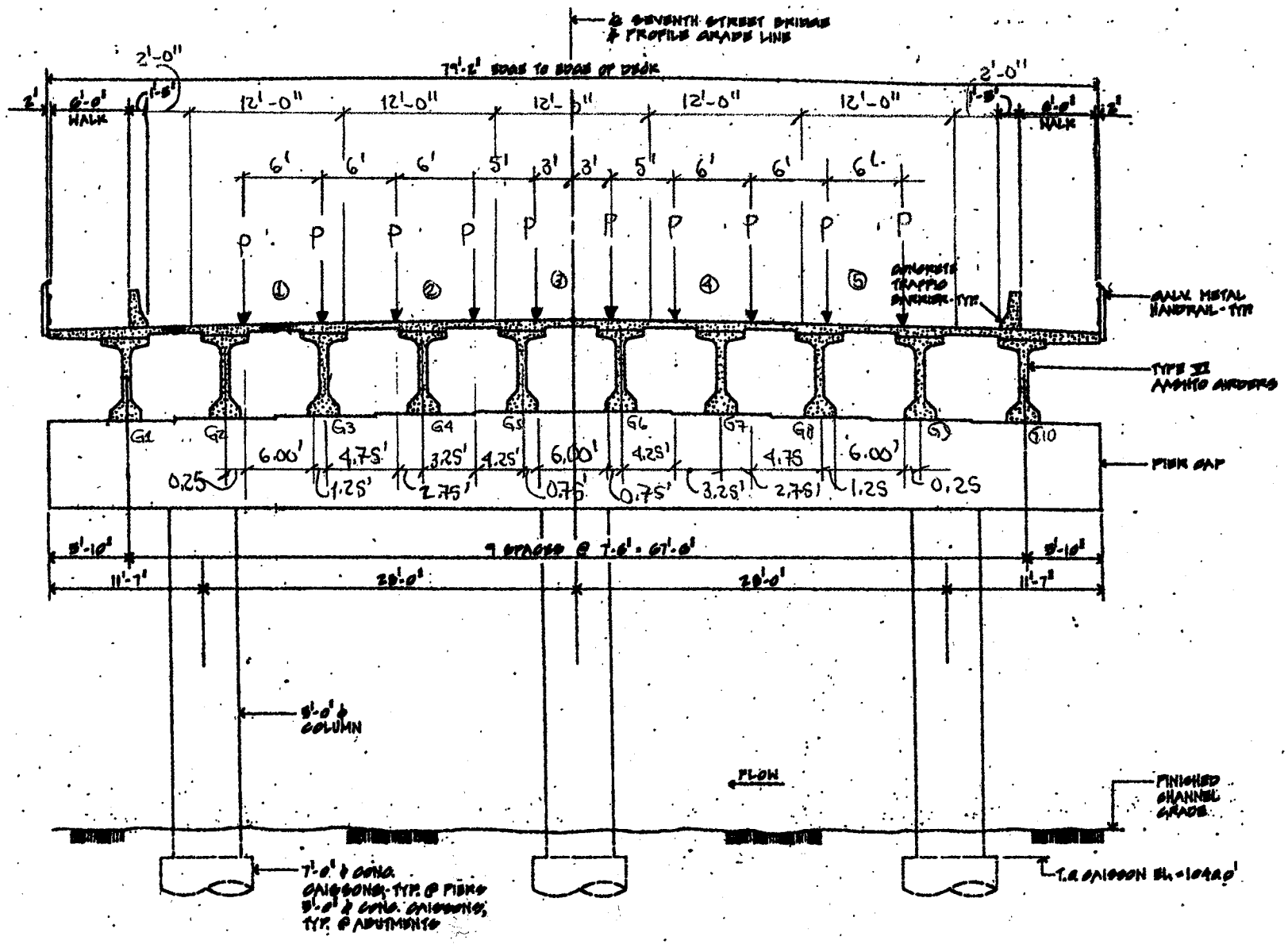
$$R_{G4} = \frac{R_{live}}{S_{beam}} * (S_{beam} - 0.75 + 2.75) + \frac{R_{live}}{S_{beam}} * (S_{beam} - 5.25)$$

$$R_{G4} = \frac{40.37^K}{7.50'} * (7.50 - 0.75 + 2.75) + \frac{40.37^K}{7.50'} * (7.50 - 5.25) = 63.246 \text{ Kips}$$

GIRDER 5

$$R_{G5} = \frac{R_{live}}{S_{beam}} * (S_{beam} - 2.25)$$

$$R_{G5} = \frac{40.37^K}{7.50'} * (7.50 - 2.25) = 28.259 \text{ Kips}$$



PYLMINTERNATIONAL

Project: Salt River Bridges - Scour

Item: Seventh Street Bridge

Job No. 1317.00

Designer: VPD

Date: 1/28/00

Checker

Date

T·Y·LIN INTERNATIONAL

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REACTION DUE TO 5 LIVE LOAD LANES

GIRDER 2

$$RG2 = \frac{R_{LIVE}}{S_{beam}} (S_{beam} - 0.25 + 1.25)$$

$$RG2 = \frac{40.37^K * 0.75}{7.50'} * (7.50 - 0.25 + 1.25) = 34.314^{Kips}$$

GIRDER 3

$$RG3 = \frac{R_{LIVE}}{S_{beam}} (S_{beam} - 1.25 + 0.25) + \frac{R_{live}}{S_{beam}} (S_{beam} - 4.75)$$

$$RG3 = \frac{40.37^K * 0.75}{7.50'} * (7.50 - 1.25 + 0.25) + \frac{40.37^K * 0.75}{7.50} * (7.50 - 4.75) = 37.342^{Kips}$$

GIRDER 4

$$RG4 = \frac{R_{live}}{S_{beam}} (S_{beam} - 2.75) + \frac{R_{live}}{S_{beam}} (S_{beam} - 3.25)$$

$$RG4 = \frac{40.37^K * 0.75}{7.50'} * (7.50 - 2.75) + \frac{40.37^K * 0.75}{7.50} * (7.50 - 3.25) = 36.333 \text{ Kips}$$

GIRDER 5

$$RG5 = \frac{R_{live}}{S_{beam}} * (S_{beam} - 4.25) + R_{live}$$

$$RG5 = \frac{40.37^K * 0.75}{7.50'} * (7.50 - 4.25) + 40.37^K * 0.75 = 43.398^{Kips}$$

GIRDER 6

RG6 = RG5 = 43.398 Kips

GIRDER 7

RG7 = RG4 = 36.333 Kips

GIRDER 8

RG8 = RG3 = 37.342 Kips

GIRDER 9

RG9 = RG2 = 34.314 Kips

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- WIND LOADS

-ON SUPERSTRUCTURE

WIND LOAD = WIND TRANS/LONG * h WIND

$h_{WIND} = 6.00\ Ft + \frac{2''}{12} + \frac{7''}{12} + \sim 6.00\ Ft = 12.750\ Ft$

METAL HANDRAIL

POINT OF APPLICATION = $\frac{h_{WIND}}{2} = 6.375\ Ft$

WIND TRANS = 50 Lbs/Ft²
WIND LONG = 12 Lbs/Ft²
} BOTH FORCES SHALL BE APPLIED SIMULTANEOUSLY

WIND LOAD TRANS = 50 Lbs/Ft² * 12.75 Ft * 135 Ft = 86.0625 Kips * 1.1279% = 97.075 K

WIND LOAD LONG = 12 Lbs/Ft² * 12.75 Ft * 135 Ft = 20.655 Kips * 1.12796 = 23.298 Kips

-ON SUBSTRUCTURE

WIND LOAD = WIND TRANS/LONG * WIDTH TRANS/LONG

WIND TRANS = 40 lbs/Ft²
WIND LONG = 40 lbs/Ft²
} BOTH FORCES SHALL BE APPLIED SIMULTANEOUSLY

- CAP

W TRANS = 0.040 * 4.50 Ft * 6.50 Ft = 1.170 Kips ÷ 79.1667 Ft = 0.01478 Kips/F

W LONG = 0.040 * 6.50 Ft = 0.260 Kips/Ft

- COLUMN

$W_{TRANS} = W_{LONG} = 0.040 * 5.00\ Ft = 0.200\ Kips/Ft$

- OVERTURNING FORCES

$F_{WIND} = W_{OVER} * WIDTH\_SUPER * L_{TRIB}$

$W_{OVER} = 20\ psf$

POINT OF APPLICATION = 1/4 WIDTH_SUPER

$F_{WIND} = 0.020 * 79.1667 * 135 = 213.75$ Kips @ 19.792' FROM ℄ CONST.

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- WIND ON LIVE LOAD

$W_{LIVE\_LOAD} = W_L * L_{span}$

POINT OF APPLICATION = 6.00 Ft FROM FLOOR SLAB

WL TRANS = 100 lbs/Ft
WL LONG = 40 lbs/Ft
} BOTH FORCES SHALL BE APPLIED SIMULTANEOUSLY

$W_{LIVE\_LOAD\ TRANS} = 0.100 * 135.0\ Ft = 13.50$ Kips

$W_{LIVE\_LOAD\ LONG} = 0.040 * 135.0\ Ft = 5.40$ Kips

EQUIVALENT FORCES:

$W_{LIVE\_LOAD\ TRANS} = 13.50\ Kips * 1.21271 = 16.372\ Kips \div 79.1667' = 0.2068\ Kip/Ft$

$W_{LIVE\_LOAD\ LONG} = 5.40\ Kips * 1.21271 = 6.549\ Kips \div 79.1667' = 0.08272\ K/Ft$

- LONGITUDINAL FORCES

L.F. = 5% * NO. LANES * [RED. FACTOR FOR MULTIPLE LANES * UNIF. LOAD * LENGTH + CONC. LOAD]

POINT OF APPLICATION = 6.00 Ft FROM FLOOR SLAB

3 LIVE LOAD LANES

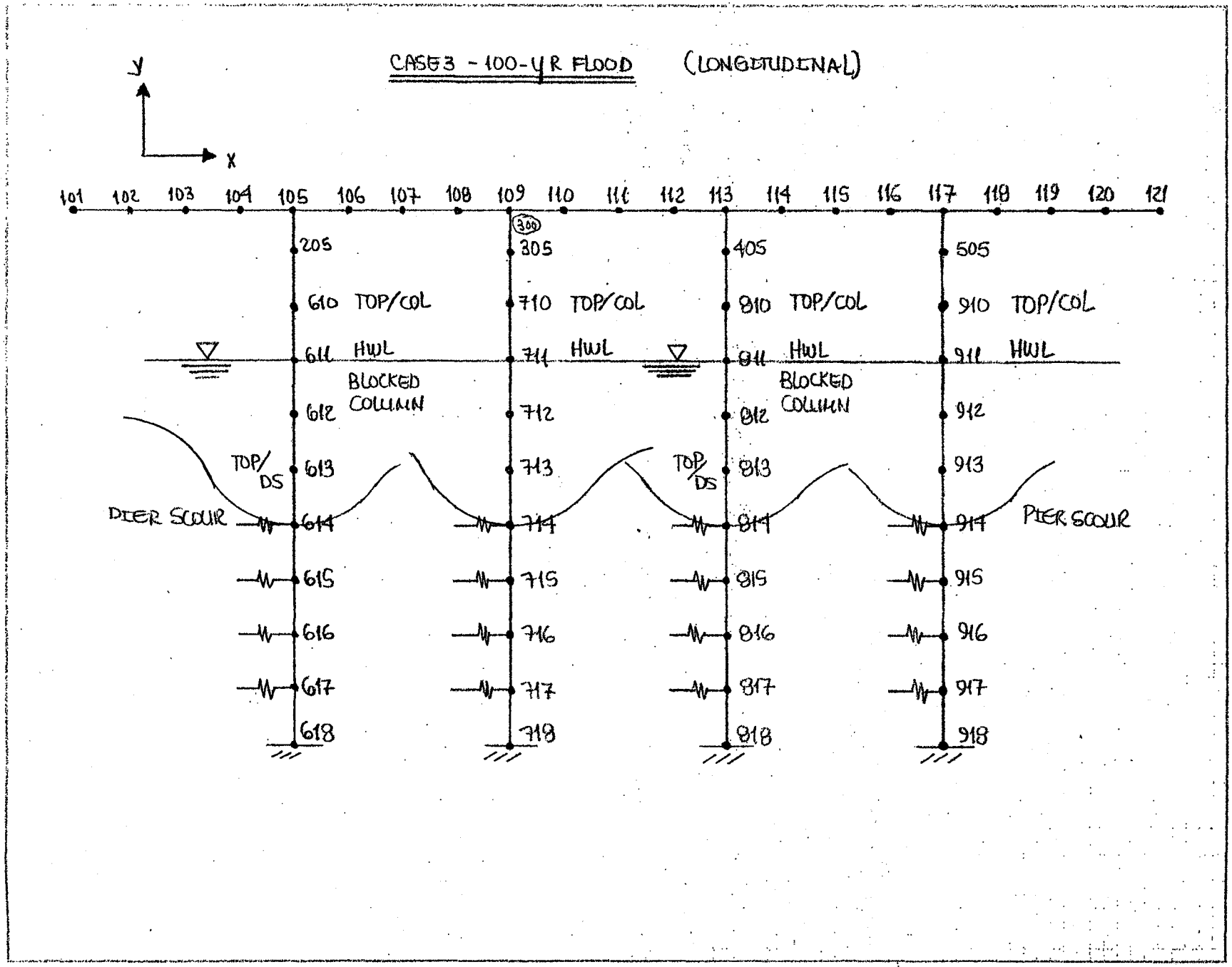
L.F. = 0.05 * 3 * [0.90 * ((0.640 * 135) + 18)] = 14.094 Kips

EQUIVALENT FORCES:

L.F = 14.094 Kips * 1.21271 = 17.09193 Kips ÷ 79.1667' = 0.2159 Kips/Ft.

- THERMAL FORCES

Δ TEMP = 40°F



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```
SALT RIVER BRIDGES - SCOUR  (7TH STREET BRIDGE)   "7THST_LO"
C
C UNITS: KIPS, FEET, SECONDS
C
SYSTEM
C LOAD CONDITION 1, DEAD LOAD
C LOAD CONDITION 2, WIND ON STRUCTURE (TRANSVERSE, LONGITUDINAL & OVERTURNING)
C LOAD CONDITION 3, WIND ON LIVE LOAD
C LOAD CONDITION 4, LONGITUDINAL FORCE DUE TO LIVE LOAD
C LOAD CONDITION 5, STREAM FORCE ON COLUMN
C LOAD CONDITION 6, TEMPERATURE
C
L=6
C
JOINTS
C   CL OF SUPERSTRUCTURE
101  X=  0.00  Y=1083.79  Z=0.00
102  X= 33.54  Y=1083.79  Z=0.00
103  X= 67.08  Y=1083.79  Z=0.00
104  X=100.63  Y=1083.79  Z=0.00
105  X=134.17  Y=1083.79  Z=0.00
106  X=167.92  Y=1083.79  Z=0.00
107  X=201.67  Y=1083.79  Z=0.00
108  X=235.42  Y=1083.79  Z=0.00
109  X=269.17  Y=1083.79  Z=0.00
110  X=302.92  Y=1083.79  Z=0.00
111  X=336.67  Y=1083.79  Z=0.00
112  X=370.42  Y=1083.79  Z=0.00
113  X=404.17  Y=1083.79  Z=0.00
114  X=437.92  Y=1083.79  Z=0.00
115  X=471.67  Y=1083.79  Z=0.00
116  X=505.42  Y=1083.79  Z=0.00
117  X=539.17  Y=1083.79  Z=0.00
118  X=572.71  Y=1083.79  Z=0.00
119  X=606.25  Y=1083.79  Z=0.00
120  X=639.79  Y=1083.79  Z=0.00
121  X=673.33  Y=1083.79  Z=0.00
C   PIER 1 - CAP
205  X=134.17  Y=1076.05  Z=0.00
C   PIER 2 - CAP
305  X=269.17  Y=1076.05  Z=0.00
C   PIER 3 - CAP
405  X=404.17  Y=1076.05  Z=0.00
C   PIER 4 - CAP
505  X=539.17  Y=1076.05  Z=0.00
C   PIER 1 - COLUMNS
610  X=134.17  Y=1072.80  Z=0.00
611  X=134.17  Y=1066.76  Z=0.00
612  X=134.17  Y=1054.76  Z=0.00
613  X=134.17  Y=1040.00  Z=0.00
614  X=134.17  Y=1028.83  Z=0.00
615  X=134.17  Y=1021.83  Z=0.00
616  X=134.17  Y=1014.83  Z=0.00
617  X=134.17  Y=1007.83  Z=0.00
618  X=134.17  Y=1000.83  Z=0.00
C   PIER 2 - COLUMNS
710  X=269.17  Y=1072.80  Z=0.00
711  X=269.17  Y=1066.76  Z=0.00
712  X=269.17  Y=1054.76  Z=0.00
713  X=269.17  Y=1040.00  Z=0.00
714  X=269.17  Y=1005.25  Z=0.00
715  X=269.17  Y= 998.25  Z=0.00
716  X=269.17  Y= 991.25  Z=0.00
717  X=269.17  Y= 984.25  Z=0.00
718  X=269.17  Y= 977.25  Z=0.00
C   PIER 3 - COLUMNS
```



```
810  X=404.17  Y=1072.80  Z=0.00
811  X=404.17  Y=1066.76  Z=0.00
812  X=404.17  Y=1054.76  Z=0.00
813  X=404.17  Y=1040.00  Z=0.00
814  X=404.17  Y=1005.25  Z=0.00
815  X=404.17  Y= 998.25  Z=0.00
816  X=404.17  Y= 991.25  Z=0.00
817  X=404.17  Y= 984.25  Z=0.00
818  X=404.17  Y= 977.25  Z=0.00
C   PIER 4 - COLUMNS
910  X=539.17  Y=1072.80  Z=0.00
911  X=539.17  Y=1066.76  Z=0.00
912  X=539.17  Y=1054.76  Z=0.00
913  X=539.17  Y=1040.00  Z=0.00
914  X=539.17  Y=1005.25  Z=0.00
915  X=539.17  Y= 998.25  Z=0.00
916  X=539.17  Y= 991.25  Z=0.00
917  X=539.17  Y= 984.25  Z=0.00
918  X=539.17  Y= 977.25  Z=0.00

RESTRAINTS
C   ABUT 1
101  R=0 1 1 1 1 0          :ROLLER
C   PIER 1
105  R=0 0 1 1 1 0
C 610  617 1 R=0 0 1 1 1 0
618  R=1 1 1 1 1 1
C   PIER 2
109  R=0 0 1 1 1 0
C 710  717 1 R=0 0 1 1 1 0
718  R=1 1 1 1 1 1
C   PIER 3
113  R=0 0 1 1 1 0
C 810  817 1 R=0 0 1 1 1 0
818  R=1 1 1 1 1 1
C   PIER 4
117  R=0 0 1 1 1 0
C 910  917 1 R=0 0 1 1 1 0
918  R=1 1 1 1 1 1
C   ABUT 2
121  R=0 1 1 1 1 0          :ROLLER

SPRINGS
C
614 K=3285,0,0,0,0,0
615 K=6571,0,0,0,0,0
616 K=6571,0,0,0,0,0
617 K=6571,0,0,0,0,0
714 K=3285,0,0,0,0,0
715 K=6571,0,0,0,0,0
716 K=6571,0,0,0,0,0
717 K=6571,0,0,0,0,0
814 K=3285,0,0,0,0,0
815 K=6571,0,0,0,0,0
816 K=6571,0,0,0,0,0
817 K=6571,0,0,0,0,0
914 K=3285,0,0,0,0,0
915 K=6571,0,0,0,0,0
916 K=6571,0,0,0,0,0
917 K=6571,0,0,0,0,0

FRAMES
C
NM=6   NL=12  Y=-1 0 0 0 0 0
C
C  ALL MATERIALS CONCRETE:
```

```
C  ROADWAY, 6'-0" DEEP BY 79'-2" WIDE TYPE VI AASHTO GIRDER,
C  ADDITIONAL WEIGHT/MASSS EQUIVALENT TO 10.42" BY 79'-2" CONCRETE INCLUDED TO
C  ACCOUNT FOR FUTURE WEARING SURFACE, WATER LINE AND BARRIERS.
C SUPERSTRUCTURE, 79'-2" BY 6'-0"
1  A=127.361 I=679.989,58228. J=44.191 AS=127.361,127.361 E=635789 TC=6E-6 W=23.3
13
C FIXED PIER CAP, 79'-2" BY 4'-6"
2  A=356.250 I=601.172,186063 J=2402.3 AS=356.250,356.250 E=519120 TC=6E-6 W=44.8
76
C COLUMN, 5' DIAMETER
3  A= 58.905 I= 92.040, 92.04 J=184.08 AS= 58.905, 58.905 E=519120 TC=6E-6 W= 8.8
36
C SHAFT, 7' DIAMETER
4  A=115.455 I=353.577,353.58 J=707.16 AS=115.455,115.455 E=519120 TC=6E-6 W=17.3
18
C SHAFT, 7' DIAMETER
5  A=115.455 I=353.577,353.58 J=707.16 AS=115.455,115.455 E=519120 TC=0E-6 W= 0.0
00
C RIGID MEMBER LINK, 39'2" BY 3'-6"
6  A=356.250 I=601.172,186063 J=2402.3 AS=356.250,356.250 E=519120 TC=6E-6 W= 0.0
00
C
C Load Case I SDL (Abut & Pier Diaph Load)
1  PLD= 0.000  -143.359  0
2  PLD= 0.000  -140.432  0
3  PLD=33.535  -143.359  0
C
C Load Case II WIND LOAD ON STRUCTURE
C
C wind on superstructure is load #4
C tran: 50 psf on 12.750' height (GLOBAL Y DIR)
C long: 12 psf on 12.750' height (GLOBAL X DIR)
C
4  WL=0.1726  0.000   0.000
C
C wind on substructure is load #5 & #6
C Fixed Pier Cap
C tran: 40 psf on  4.50' width (axis 3 - Y DIR)
C long: 40 psf on 79.17' width (axis 2 - X DIR)
C
5  WG=2.659   0.000   0.000
C
C Column
C tran: 40 psf on  5.00' width (axis 3 - Y DIR)
C long: 40 psf on  5.00' width (axis 2 - X DIR)
C
6  WG=0.600  0.000  0.000
C
C Load Case III WIND LOAD ON LIVE LOAD
C
C wind on live load is load #7
C tran: 100 plf at 6' above deck plus half girder depth (axis 3 - Y DIR)
C long:  40 plf at 6' above deck plus half girder depth (axis 1 - X DIR)
C
7  WL= 0.0485 0.000  0.000
C
C Load Case IV LONGITUDINAL FORCE ON LIVE LOAD
C
C longitudinal force on live load is load #8
C long: 0.05*no.lanes*(Red.Factor*0.640k/ft) at 6' above deck
C       plus half girder depth (X-DIR)
C       0.05*no.lanes*(Red.Factor*18.0kip)*0.5(distributed at the piers only)
C       at 6' above deck plus half girder depth (X-DIR)
C
8  WL= 0.105  0.000   0.000
C
```



```
C Load Case V STREAM FORCE
C
C Blocked Column - 9' Diameter
C
9  TRAP=0.0 0.446 6.216 -1.00 0.359 5.004
C
C Column - 5' Diameter
C
10 TRAP=0.0 0.200 2.780 -1.00 0.140 1.951
C
C Drilled Shaft - 7' Diameter
C
11 TRAP=0.0 0.196 2.731 -1.00 0.000 0.000
C
C Load Case VI TEMPERATURE
C
12 T=-40,0,0
C
C SPAN 1
101,101,102  LP=1,0          M=1  NSL=1  4  7  8  0  12
102,102,103                  M=1  NSL=0  4  7  8  0  12
103,103,104                  M=1  NSL=0  4  7  8  0  12
104,104,105                  M=1  NSL=0  4  7  8  0  12
C SPAN 2
105,105,106                  M=1  NSL=2  4  7  8  0  12
106,106,107                  M=1  NSL=0  4  7  8  0  12
107,107,108                  M=1  NSL=0  4  7  8  0  12
108,108,109                  M=1  NSL=0  4  7  8  0  12
C SPAN 3
109,109,110                  M=1  NSL=2  4  7  8  0  12
110,110,111                  M=1  NSL=0  4  7  8  0  12
111,111,112                  M=1  NSL=0  4  7  8  0  12
112,112,113                  M=1  NSL=0  4  7  8  0  12
C SPAN 2
113,113,114                  M=1  NSL=2  4  7  8  0  12
114,114,115                  M=1  NSL=0  4  7  8  0  12
115,115,116                  M=1  NSL=0  4  7  8  0  12
116,116,117                  M=1  NSL=0  4  7  8  0  12
C SPAN 3
117,117,118                  M=1  NSL=0  4  7  8  0  12
118,118,119                  M=1  NSL=0  4  7  8  0  12
119,119,120                  M=1  NSL=0  4  7  8  0  12
120,120,121                  M=1  NSL=3  4  7  8  0  12
C PIER 1 - CAP
200,105,205  LR=1 0 0 0 0 0  M=2  NSL=0  5  7  0  0  12
C PIER 1 - CAP TO COLUMN
201,205,610                  M=6
C PIER 2 - CAP
300,109,305  LR=1 0 0 0 0 0  M=2  NSL=0  5  7  0  0  12
C PIER 2 - CAP TO COLUMN
301,305,710                  M=6
C PIER 3 - CAP
400,113,405  LR=1 0 0 0 0 0  M=2  NSL=0  5  7  0  0  12
C PIER 3 - CAP TO COLUMN
401,405,810                  M=6
C PIER 4 - CAP
500,117,505  LR=1 0 0 0 0 0  M=2  NSL=0  5  7  0  0  12
C PIER 4 - CAP TO COLUMN
501,505,910                  M=6
C PIER 1 - COLUMN
610,610,611                  M=3  NSL=0  6  0  0  0  12
611,611,612                  M=3  NSL=0  0  0  0  9  12
612,612,613                  M=3  NSL=0  0  0  0  10 12
613,613,614                  M=4  NSL=0  0  0  0  11 12
614,614,615                  M=5  NSL=0  0  0  0  0  12  G=3,1,1,1
C PIER 2 - COLUMN
```

```
710,710,711                M=3  NSL=0  6  0  0   0  12
711,711,712                M=3  NSL=0  0  0  0   9  12
712,712,713                M=3  NSL=0  0  0  0  10  12
713,713,714                M=4  NSL=0  0  0  0  11  12
714,714,715                M=5  NSL=0  0  0  0   0  12  G=3,1,1,1
C PIER 3 - COLUMN
810,810,811                M=3  NSL=0  6  0  0   0  12
811,811,812                M=3  NSL=0  0  0  0   9  12
812,812,813                M=3  NSL=0  0  0  0  10  12
813,813,814                M=4  NSL=0  0  0  0  11  12
814,814,815                M=5  NSL=0  0  0  0   0  12  G=3,1,1,1
C PIER 4 - COLUMN
910,910,911                M=3  NSL=0  6  0  0   0  12
911,911,912                M=3  NSL=0  0  0  0   9  12
912,912,913                M=3  NSL=0  0  0  0  10  12
913,913,914                M=4  NSL=0  0  0  0  11  12
914,914,915                M=5  NSL=0  0  0  0   0  12  G=3,1,1,1
C
LOADS
C Load Case IV LONGITUDINAL FORCE ON LIVE LOAD
105  L=4  F=0.608, 0.000, 0.000, 0.000, 0.000, 0.000
109  L=4  F=0.608, 0.000, 0.000, 0.000, 0.000, 0.000
113  L=4  F=0.608, 0.000, 0.000, 0.000, 0.000, 0.000
117  L=4  F=0.608, 0.000, 0.000, 0.000, 0.000, 0.000
```

```
   $$$$$$$$     $$$$$$$$$$    $$$$$$$       $$$$$$$$       $$$$$$$
 $$$$$$$$$$    $$$$$$$$$$    $$$$$$$$$$    $$$$$$$$$$    $$$$$$$$$$
$$            $$      $$    $$       $$   $$       $$    $$       $$
$$            $$      $$    $$       $$   $$       $$    $$       $$
$$$$$$$$     $$$$$$$$$$    $$$$$$$$$$     $$$$$$$$$$    $$       $$
       $$    $$      $$    $$                      $$    $$       $$
      $$    $$      $$    $$                      $$    $$       $$
$$$$$$$$$$    $$      $$    $$            $$$$$$$$$$    $$$$$$$$$$
$$$$$$$$     $$      $$    $$             $$$$$$$$       $$$$$$$
```

STRUCTURAL ANALYSIS PROGRAMS

VERSION P5.31

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C S I / S A P 9 0 - - FINITE ELEMENT ANALYSIS OF STRUCTURES PAGE 13
PROGRAM:SAP90/FILE:7thst_lo.F3F
SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_LO"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	4	0.00			3.52			
		0.00	0.00	0.00				
		33.54	0.00	0.00				
		33.54			0.00			
	5	0.00			0.00			
		0.00	0.00	0.00				
		33.54	0.00	0.00				
		33.54			0.00			
	6	0.00			0.00			
		0.00	-5.22	175.08				
		33.54	-5.22	0.00				
		33.54			0.00			
200								
	1	0.00			-3683.50			
		0.00	0.00	-0.01				
		7.74	0.00	-0.01				
		7.74			-4030.84			
	2	0.00			0.00			
		0.00	54.86	-0.02				
		7.74	75.44	504.27				
		7.74			0.00			
	3	0.00			0.00			
		0.00	12.23	0.00				
		7.74	12.23	94.65				
		7.74			-0.38			
	4	0.00			0.00			
		0.00	27.39	-0.01				
		7.74	27.39	211.96				
		7.74			0.00			
	5	0.00			0.00			
		0.00	3.35	0.00		-88.23	1850.84	
		7.74	3.35	25.94		-88.23	1167.93	
		7.74			0.00			
	6	0.00			1.31			
		0.00	30.00	-0.01				
		7.74	30.00	232.16				
		7.74			1.31			
201								
	1	0.00			-4030.84			
		0.00	0.00	-0.01				
		3.25	0.00	-0.01				

C S I / S A P 9 0 - - FINITE ELEMENT ANALYSIS OF STRUCTURES PAGE 14
PROGRAM:SAP90/FILE:7thst_lo.F3F
SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_LO"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		3.25			-4030.84			
	2	0.00			0.00			
		0.00	75.44	504.27				
		3.25	75.44	749.47				
		3.25			0.00			
	3	0.00			-0.38			
		0.00	12.23	94.65				
		3.25	12.23	134.39				
		3.25			-0.38			
	4	0.00			0.00			
		0.00	27.39	211.96				
		3.25	27.39	300.96				
		3.25			0.00			
	5	0.00			0.00			
		0.00	3.35	25.94		-88.23	1167.93	
		3.25	3.35	36.83		-88.23	881.18	
		3.25			0.00			
	6	0.00			1.31			
		0.00	30.00	232.16				
		3.25	30.00	329.65				
		3.25			1.31			
300								
	1	0.00			-3209.52			
		0.00	0.00	0.00				
		7.74	0.00	0.00				
		7.74			-3556.86			
	2	0.00			0.00			
		0.00	20.44	-0.02				
		7.74	41.02	237.83				
		7.74			0.00			
	3	0.00			0.00			
		0.00	6.81	0.00				
		7.74	6.81	52.68				
		7.74			-0.38			
	4	0.00			0.00			
		0.00	15.24	-0.01				
		7.74	15.24	117.98				
		7.74			0.00			
	5	0.00			0.00			
		0.00	-1.12	0.00		-112.55	2568.31	
		7.74	-1.12	-8.66		-112.55	1697.20	

C S I / S A P 9 0 - - FINITE ELEMENT ANALYSIS OF STRUCTURES PAGE 15
PROGRAM:SAP90/FILE:7thst_lo.F3F
SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_LO"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		7.74			0.00			
	6	0.00			3.30			
		0.00	3.35	0.00				
		7.74	3.35	25.91				
		7.74			3.30			
301								
	1	0.00			-3556.86			
		0.00	0.00	0.00				
		3.25	0.00	0.00				
		3.25			-3556.86			
	2	0.00			0.00			
		0.00	41.02	237.83				
		3.25	41.02	371.15				
		3.25			0.00			
	3	0.00			-0.38			
		0.00	6.81	52.68				
		3.25	6.81	74.81				
		3.25			-0.38			
	4	0.00			0.00			
		0.00	15.24	117.98				
		3.25	15.24	167.53				
		3.25			0.00			
	5	0.00			0.00			
		0.00	-1.12	-8.66		-112.55	1697.20	
		3.25	-1.12	-12.29		-112.55	1331.43	
		3.25			0.00			
	6	0.00			3.30			
		0.00	3.35	25.91				
		3.25	3.35	36.78				
		3.25			3.30			
400								
	1	0.00			-3213.69			
		0.00	0.00	0.00				
		7.74	0.00	0.00				
		7.74			-3561.03			
	2	0.00			0.00			
		0.00	20.45	-0.02				
		7.74	41.03	237.92				
		7.74			0.00			
	3	0.00			0.00			
		0.00	6.81	0.00				

C S I / S A P 9 0 - - FINITE ELEMENT ANALYSIS OF STRUCTURES PAGE 16
PROGRAM:SAP90/FILE:7thst_lo.F3F
SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_LO"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		7.74	6.81	52.70				
		7.74			-0.38			
	4	0.00			0.00			
		0.00	15.25	-0.01				
		7.74	15.25	118.02				
		7.74			0.00			
	5	0.00			0.00			
		0.00	-1.12	0.00		-112.55	2568.31	
		7.74	-1.12	-8.65		-112.55	1697.20	
		7.74			0.00			
	6	0.00			-10.02			
		0.00	-10.00	0.00				
		7.74	-10.00	-77.37				
		7.74			-10.02			
401								
	1	0.00			-3561.03			
		0.00	0.00	0.00				
		3.25	0.00	0.00				
		3.25			-3561.03			
	2	0.00			0.00			
		0.00	41.03	237.92				
		3.25	41.03	371.28				
		3.25			0.00			
	3	0.00			-0.38			
		0.00	6.81	52.70				
		3.25	6.81	74.83				
		3.25			-0.38			
	4	0.00			0.00			
		0.00	15.25	118.02				
		3.25	15.25	167.57				
		3.25			0.00			
	5	0.00			0.00			
		0.00	-1.12	-8.65		-112.55	1697.20	
		3.25	-1.12	-12.28		-112.55	1331.43	
		3.25			0.00			
	6	0.00			-10.02			
		0.00	-10.00	-77.37				
		3.25	-10.00	-109.86				
		3.25			-10.02			
500								
	1	0.00			-3539.60			

C S I / S A P 9 0 - - FINITE ELEMENT ANALYSIS OF STRUCTURES PAGE 17
PROGRAM:SAP90/FILE:7thst_lo.F3F
SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_LO"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		0.00	0.00	0.01				
		7.74	0.00	0.01				
		7.74			-3886.94			
	2	0.00			0.00			
		0.00	20.46	-0.02				
		7.74	41.04	238.00				
		7.74			0.00			
	3	0.00			0.00			
		0.00	6.81	0.00				
		7.74	6.81	52.71				
		7.74			-0.37			
	4	0.00			0.00			
		0.00	15.25	-0.01				
		7.74	15.25	118.05				
		7.74			0.00			
	5	0.00			0.00			
		0.00	-1.12	0.00		-112.55	2568.31	
		7.74	-1.12	-8.64		-112.55	1697.20	
		7.74			0.00			
	6	0.00			12.06			
		0.00	-23.35	0.01				
		7.74	-23.35	-180.70				
		7.74			12.06			
501	----------							
	1	0.00			-3886.94			
		0.00	0.00	0.01				
		3.25	0.00	0.01				
		3.25			-3886.94			
	2	0.00			0.00			
		0.00	41.04	238.00				
		3.25	41.04	371.39				
		3.25			0.00			
	3	0.00			-0.37			
		0.00	6.81	52.71				
		3.25	6.81	74.85				
		3.25			-0.37			
	4	0.00			0.00			
		0.00	15.25	118.05				
		3.25	15.25	167.62				
		3.25			0.00			
	5	0.00			0.00			

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SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_LO"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		0.00	-1.12	-8.64		-112.55	1697.20	
		3.25	-1.12	-12.27		-112.55	1331.43	
		3.25			0.00			
	6	0.00			12.06			
		0.00	-23.35	-180.70				
		3.25	-23.35	-256.57				
		3.25			12.06			
610	----------							
	1	0.00			-4030.84			
		0.00	0.00	-0.01				
		6.04	0.00	-0.01				
		6.04			-4084.21			
	2	0.00			0.00			
		0.00	75.44	749.47				
		6.04	79.07	1216.10				
		6.04			0.00			
	3	0.00			-0.38			
		0.00	12.23	134.39				
		6.04	12.23	208.26				
		6.04			-0.38			
	4	0.00			0.00			
		0.00	27.39	300.96				
		6.04	27.39	466.38				
		6.04			0.00			
	5	0.00			0.00			
		0.00	3.35	36.83		-88.23	881.18	
		6.04	3.35	57.07		-88.23	348.26	
		6.04			0.00			
	6	0.00			1.31			
		0.00	30.00	329.65				
		6.04	30.00	510.83				
		6.04			1.31			
611	----------							
	1	0.00			-4084.21			
		0.00	0.00	-0.01				
		12.00	0.00	0.00				
		12.00			-4190.24			
	2	0.00			0.00			
		0.00	79.07	1216.10				
		12.00	79.07	2164.93				
		12.00			0.00			

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SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_LO"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	3	0.00			-0.38			
		0.00	12.23	208.26				
		12.00	12.23	355.01				
		12.00			-0.38			
	4	0.00			0.00			
		0.00	27.39	466.38				
		12.00	27.39	795.01				
		12.00			0.00			
	5	0.00			0.00			
		0.00	3.35	57.07		-88.23	348.26	
		12.00	8.18	127.31		-20.91	-292.06	
		12.00			0.00			
	6	0.00			1.31			
		0.00	30.00	510.83				
		12.00	30.00	870.78				
		12.00			1.31			
612								
	1	0.00			-4190.24			
		0.00	0.00	0.00				
		14.76	0.00	0.00				
		14.76			-4320.66			
	2	0.00			0.00			
		0.00	79.07	2164.93				
		14.76	79.07	3331.98				
		14.76			0.00			
	3	0.00			-0.38			
		0.00	12.23	355.01				
		14.76	12.23	535.51				
		14.76			-0.38			
	4	0.00			0.00			
		0.00	27.39	795.01				
		14.76	27.39	1199.23				
		14.76			0.00			
	5	0.00			0.00			
		0.00	8.18	127.31		-20.91	-292.06	
		8.20	9.68	200.77		0.00	-375.23	
		14.76	10.69	267.68		14.00	-327.99	
		14.76			0.00			
	6	0.00			1.31			
		0.00	30.00	870.78				
		14.76	30.00	1313.53				

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SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_LO"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		14.76			1.31			
613								
	1	0.00			-4320.66			
		0.00	0.00	0.00				
		11.17	0.00	0.00				
		11.17			-4514.11			
	2	0.00			0.00			
		0.00	79.07	3331.98				
		11.17	79.07	4215.18				
		11.17			0.00			
	3	0.00			-0.38			
		0.00	12.23	535.51				
		11.17	12.23	672.11				
		11.17			-0.38			
	4	0.00			0.00			
		0.00	27.39	1199.23				
		11.17	27.39	1505.13				
		11.17			0.00			
	5	0.00			0.00			
		0.00	10.69	267.68		14.00	-327.99	
		11.17	11.79	395.24		29.26	-58.00	
		11.17			0.00			
	6	0.00			1.31			
		0.00	30.00	1313.53				
		11.17	30.00	1648.58				
		11.17			1.31			
614								
	1	0.00			-4514.11			
		0.00	0.00	0.00				
		7.00	0.00	0.00				
		7.00			-4514.11			
	2	0.00			0.00			
		0.00	46.99	4215.18				
		7.00	46.99	4544.10				
		7.00			0.00			
	3	0.00			-0.38			
		0.00	7.15	672.11				
		7.00	7.15	722.19				
		7.00			-0.38			
	4	0.00			0.00			
		0.00	16.02	1505.13				

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SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_LO"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST END I	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		7.00	16.02	1617.28				
		7.00			0.00			
	5	0.00			0.00			
		0.00	8.31	395.24		29.26	-58.00	
		7.00	8.31	453.43		29.26	146.80	
		7.00			0.00			
	6	0.00			1.31			
		0.00	17.55	1648.58				
		7.00	17.55	1771.42				
		7.00			1.31			
615	----------							
	1	0.00			-4514.11			
		0.00	0.00	0.00				
		7.00	0.00	0.00				
		7.00			-4514.11			
	2	0.00			0.00			
		0.00	10.90	4544.10				
		7.00	10.90	4620.40				
		7.00			0.00			
	3	0.00			-0.38			
		0.00	1.45	722.19				
		7.00	1.45	732.34				
		7.00			-0.38			
	4	0.00			0.00			
		0.00	3.25	1617.28				
		7.00	3.25	1640.01				
		7.00			0.00			
	5	0.00			0.00			
		0.00	4.35	453.43		29.26	146.80	
		7.00	4.35	483.85		29.26	351.59	
		7.00			0.00			
	6	0.00			1.31			
		0.00	3.56	1771.42				
		7.00	3.56	1796.32				
		7.00			1.31			
616	----------							
	1	0.00			-4514.11			
		0.00	0.00	0.00				
		7.00	0.00	0.00				
		7.00			-4514.11			
	2	0.00			0.00			

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SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_LO"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST END I	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		0.00	-5.07	4620.40				
		7.00	-5.07	4584.88				
		7.00			0.00			
	3	0.00			-0.38			
		0.00	-1.07	732.34				
		7.00	-1.07	724.84				
		7.00			-0.38			
	4	0.00			0.00			
		0.00	-2.40	1640.01				
		7.00	-2.40	1623.21				
		7.00			0.00			
	5	0.00			0.00			
		0.00	2.56	483.85		29.26	351.59	
		7.00	2.56	501.77		29.26	556.38	
		7.00			0.00			
	6	0.00			1.31			
		0.00	-2.63	1796.32				
		7.00	-2.63	1777.92				
		7.00			1.31			
617	----------							
	1	0.00			-4514.11			
		0.00	0.00	0.00				
		7.00	0.00	0.00				
		7.00			-4514.11			
	2	0.00			0.00			
		0.00	-9.04	4584.88				
		7.00	-9.04	4521.59				
		7.00			0.00			
	3	0.00			-0.38			
		0.00	-1.70	724.84				
		7.00	-1.70	712.95				
		7.00			-0.38			
	4	0.00			0.00			
		0.00	-3.80	1623.21				
		7.00	-3.80	1596.60				
		7.00			0.00			
	5	0.00			0.00			
		0.00	2.11	501.77		29.26	556.38	
		7.00	2.11	516.52		29.26	761.17	
		7.00			0.00			
	6	0.00			1.31			

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SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_LO"

F R A M E E L E M E N T F O R C E S

	ELT ID	LOAD COND	DIST END I	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
			0.00	-4.16	1777.92				
			7.00	-4.16	1748.77				
			7.00			1.31			
	710								
		1	0.00			-3556.86			
DL			0.00	0.00	0.00				
			6.04	0.00	0.00				
			6.04			-3610.23			
		2	0.00			0.00			
W			0.00	41.02	371.15				
			6.04	44.64	629.85				
			6.04			0.00			
		3	0.00			-0.38			
WOUL			0.00	6.81	74.81				
			6.04	6.81	115.92				
			6.04			-0.38			
		4	0.00			0.00			
LF			0.00	15.24	167.53				
			6.04	15.24	259.60				
			6.04			0.00			
		5	0.00			0.00			
SF			0.00	-1.12	-12.29		-112.55	1331.43	
			6.04	-1.12	-19.05		-112.55	651.65	
			6.04			0.00			
		6	0.00			3.30			
T			0.00	3.35	36.78				
			6.04	3.35	57.00				
			6.04			3.30			
	711								
		1	0.00			-3610.23			
			0.00	0.00	0.00				
			12.00	0.00	0.00				
			12.00			-3716.27			
		2	0.00			0.00			
			0.00	44.64	629.85				
			12.00	44.64	1165.59				
			12.00			0.00			
		3	0.00			-0.38			
			0.00	6.81	115.92				
			12.00	6.81	197.61				
			12.00			-0.38			

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SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_LO"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST END I	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	4	0.00			0.00			
		0.00	15.24	259.60				
		12.00	15.24	442.53				
		12.00			0.00			
	5	0.00			0.00			
		0.00	-1.12	-19.05		-112.55	651.65	
		2.56	0.00	-20.47		-96.96	383.52	
		12.00	3.71	-2.44		-45.23	-280.45	
		12.00			0.00			
	6	0.00			3.30			
		0.00	3.35	57.00				
		12.00	3.35	97.16				
		12.00			3.30			
712								
	1	0.00			-3716.27			
		0.00	0.00	0.00				
		14.76	0.00	0.00				
		14.76			-3846.69			
	2	0.00			0.00			
		0.00	44.64	1165.59				
		14.76	44.64	1824.54				
		14.76			0.00			
	3	0.00			-0.38			
		0.00	6.81	197.61				
		14.76	6.81	298.08				
		14.76			-0.38			
	4	0.00			0.00			
		0.00	15.24	442.53				
		14.76	15.24	667.54				
		14.76			0.00			
	5	0.00			0.00			
		0.00	3.71	-2.44		-45.23	-280.45	
		14.76	6.22	71.95		-10.31	-675.27	
		14.76			0.00			
	6	0.00			3.30			
		0.00	3.35	97.16				
		14.76	3.35	146.57				
		14.76			3.30			
713								
	1	0.00			-3846.69			
		0.00	0.00	0.00				

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SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_LO"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		34.75	0.00	0.00				
		34.75			-4448.49			
	2	0.00			0.00			
		0.00	44.64	1824.54				
		34.75	44.64	3375.93				
		34.75			0.00			
	3	0.00			-0.38			
		0.00	6.81	298.08				
		34.75	6.81	534.63				
		34.75			-0.38			
	4	0.00			0.00			
		0.00	15.24	667.54				
		34.75	15.24	1197.28				
		34.75			0.00			
	5	0.00			0.00			
		0.00	6.22	71.95		-10.31	-675.27	
		4.01	6.96	98.39		0.00	-695.51	
		34.75	9.63	367.01		37.14	65.67	
		34.75			0.00			
	6	0.00			3.30			
		0.00	3.35	146.57				
		34.75	3.35	262.88				
		34.75			3.30			
714	----------							
	1	0.00			-4448.49			
		0.00	0.00	0.00				
		7.00	0.00	0.00				
		7.00			-4448.49			
	2	0.00			0.00			
		0.00	20.93	3375.93				
		7.00	20.93	3522.46				
		7.00			0.00			
	3	0.00			-0.38			
		0.00	3.08	534.63				
		7.00	3.08	556.20				
		7.00			-0.38			
	4	0.00			0.00			
		0.00	6.90	1197.28				
		7.00	6.90	1245.56				
		7.00			0.00			
	5	0.00			0.00			

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SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_LO"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		0.00	6.54	367.01		37.14	65.67	
		7.00	6.54	412.81		37.14	325.65	
		7.00			0.00			
	6	0.00			3.30			
		0.00	1.51	262.88				
		7.00	1.51	273.48				
		7.00			3.30			
715	----------							
	1	0.00			-4448.49			
		0.00	0.00	0.00				
		7.00	0.00	0.00				
		7.00			-4448.49			
	2	0.00			0.00			
		0.00	-5.47	3522.46				
		7.00	-5.47	3484.14				
		7.00			0.00			
	3	0.00			-0.38			
		0.00	-1.07	556.20				
		7.00	-1.07	548.73				
		7.00			-0.38			
	4	0.00			0.00			
		0.00	-2.39	1245.56				
		7.00	-2.39	1228.84				
		7.00			0.00			
	5	0.00			0.00			
		0.00	3.03	412.81		37.14	325.65	
		7.00	3.03	434.04		37.14	585.62	
		7.00			0.00			
	6	0.00			3.30			
		0.00	-0.52	273.48				
		7.00	-0.52	269.81				
		7.00			3.30			
716	----------							
	1	0.00			-4448.49			
		0.00	0.00	0.00				
		7.00	0.00	0.00				
		7.00			-4448.49			
	2	0.00			0.00			
		0.00	-17.04	3484.14				
		7.00	-17.04	3364.88				
		7.00			0.00			

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PROGRAM:SAP90/FILE:7thst_lo.F3F
SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_LO"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	3	0.00			-0.38			
		0.00	-2.88	548.73				
		7.00	-2.88	528.56				
		7.00			-0.38			
	4	0.00			0.00			
		0.00	-6.45	1228.84				
		7.00	-6.45	1183.68				
		7.00			0.00			
	5	0.00			0.00			
		0.00	1.46	434.04		37.14	585.62	
		7.00	1.46	444.28		37.14	845.60	
		7.00			0.00			
	6	0.00			3.30			
		0.00	-1.42	269.81				
		7.00	-1.42	259.89				
		7.00			3.30			
717								
	1	0.00			-4448.49			
		0.00	0.00	0.00				
		7.00	0.00	0.00				
		7.00			-4448.49			
	2	0.00			0.00			
		0.00	-19.87	3364.88				
		7.00	-19.87	3225.81				
		7.00			0.00			
	3	0.00			-0.38			
		0.00	-3.32	528.56				
		7.00	-3.32	505.29				
		7.00			-0.38			
	4	0.00			0.00			
		0.00	-7.44	1183.68				
		7.00	-7.44	1131.57				
		7.00			0.00			
	5	0.00			0.00			
		0.00	1.07	444.28		37.14	845.60	
		7.00	1.07	451.74		37.14	1105.57	
		7.00			0.00			
	6	0.00			3.30			
		0.00	-1.63	259.89				
		7.00	-1.63	248.45				
		7.00			3.30			

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PROGRAM:SAP90/FILE:7thst_lo.F3F
SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_LO"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
810								
	1	0.00			-3561.03			
		0.00	0.00	0.00				
		6.04	0.00	0.00				
		6.04			-3614.40			
	2	0.00			0.00			
		0.00	41.03	371.28				
		6.04	44.66	630.06				
		6.04			0.00			
	3	0.00			-0.38			
		0.00	6.81	74.83				
		6.04	6.81	115.96				
		6.04			-0.38			
	4	0.00			0.00			
		0.00	15.25	167.57				
		6.04	15.25	259.67				
		6.04			0.00			
	5	0.00			0.00			
		0.00	-1.12	-12.28		-112.55	1331.43	
		6.04	-1.12	-19.02		-112.55	651.65	
		6.04			0.00			
	6	0.00			-10.02			
		0.00	-10.00	-109.86				
		6.04	-10.00	-170.24				
		6.04			-10.02			
811								
	1	0.00			-3614.40			
		0.00	0.00	0.00				
		12.00	0.00	0.00				
		12.00			-3720.43			
	2	0.00			0.00			
		0.00	44.66	630.06				
		12.00	44.66	1165.93				
		12.00			0.00			
	3	0.00			-0.38			
		0.00	6.81	115.96				
		12.00	6.81	197.66				
		12.00			-0.38			
	4	0.00			0.00			
		0.00	15.25	259.67				
		12.00	15.25	442.65				

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PROGRAM:SAP90/FILE:7thst_lo.F3F
SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_LO"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST END I	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		12.00			0.00			
	5	0.00			0.00			
		0.00	-1.12	-19.02		-112.55	651.65	
		2.56	0.00	-20.44		-96.98	383.87	
		12.00	3.71	-2.40		-45.23	-280.45	
		12.00			0.00			
	6	0.00			-10.02			
		0.00	-10.00	-170.24				
		12.00	-10.00	-290.19				
		12.00			-10.02			
812	----------							
	1	0.00			-3720.43			
		0.00	0.00	0.00				
		14.76	0.00	0.00				
		14.76			-3850.85			
	2	0.00			0.00			
		0.00	44.66	1165.93				
		14.76	44.66	1825.05				
		14.76			0.00			
	3	0.00			-0.38			
		0.00	6.81	197.66				
		14.76	6.81	298.17				
		14.76			-0.38			
	4	0.00			0.00			
		0.00	15.25	442.65				
		14.76	15.25	667.72				
		14.76			0.00			
	5	0.00			0.00			
		0.00	3.71	-2.40		-45.23	-280.45	
		14.76	6.22	72.01		-10.31	-675.27	
		14.76			0.00			
	6	0.00			-10.02			
		0.00	-10.00	-290.19				
		14.76	-10.00	-437.74				
		14.76			-10.02			
813	----------							
	1	0.00			-3850.85			
		0.00	0.00	0.00				
		34.75	0.00	0.00				
		34.75			-4452.65			
	2	0.00			0.00			

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PROGRAM:SAP90/FILE:7thst_lo.F3F
SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_LO"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST END I	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		0.00	44.66	1825.05				
		34.75	44.66	3376.86				
		34.75			0.00			
	3	0.00			-0.38			
		0.00	6.81	298.17				
		34.75	6.81	534.78				
		34.75			-0.38			
	4	0.00			0.00			
		0.00	15.25	667.72				
		34.75	15.25	1197.60				
		34.75			0.00			
	5	0.00			0.00			
		0.00	6.22	72.01		-10.31	-675.27	
		4.01	6.96	98.46		0.00	-695.51	
		34.75	9.63	367.13		37.14	65.67	
		34.75			0.00			
	6	0.00			-10.02			
		0.00	-10.00	-437.74				
		34.75	-10.00	-785.12				
		34.75			-10.02			
814	----------							
	1	0.00			-4452.65			
		0.00	0.00	0.00				
		7.00	0.00	0.00				
		7.00			-4452.65			
	2	0.00			0.00			
		0.00	20.94	3376.86				
		7.00	20.94	3523.43				
		7.00			0.00			
	3	0.00			-0.38			
		0.00	3.08	534.78				
		7.00	3.08	556.35				
		7.00			-0.38			
	4	0.00			0.00			
		0.00	6.90	1197.60				
		7.00	6.90	1245.90				
		7.00			0.00			
	5	0.00			0.00			
		0.00	6.54	367.13		37.14	65.67	
		7.00	6.54	412.93		37.14	325.65	
		7.00			0.00			

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PROGRAM:SAP90/FILE:7thst_lo.F3F
SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_LO"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	6	0.00			-10.02			
		0.00	-4.52	-785.12				
		7.00	-4.52	-816.78				
		7.00			-10.02			
815								
	1	0.00			-4452.65			
		0.00	0.00	0.00				
		7.00	0.00	0.00				
		7.00			-4452.65			
	2	0.00			0.00			
		0.00	-5.48	3523.43				
		7.00	-5.48	3485.10				
		7.00			0.00			
	3	0.00			-0.38			
		0.00	-1.07	556.35				
		7.00	-1.07	548.88				
		7.00			-0.38			
	4	0.00			0.00			
		0.00	-2.39	1245.90				
		7.00	-2.39	1229.17				
		7.00			0.00			
	5	0.00			0.00			
		0.00	3.03	412.93		37.14	325.65	
		7.00	3.03	434.17		37.14	585.62	
		7.00			0.00			
	6	0.00			-10.02			
		0.00	1.57	-816.78				
		7.00	1.57	-805.81				
		7.00			-10.02			
816								
	1	0.00			-4452.65			
		0.00	0.00	0.00				
		7.00	0.00	0.00				
		7.00			-4452.65			
	2	0.00			0.00			
		0.00	-17.04	3485.10				
		7.00	-17.04	3365.80				
		7.00			0.00			
	3	0.00			-0.38			
		0.00	-2.88	548.88				
		7.00	-2.88	528.71				

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SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_LO"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		7.00			-0.38			
	4	0.00			0.00			
		0.00	-6.45	1229.17				
		7.00	-6.45	1184.00				
		7.00			0.00			
	5	0.00			0.00			
		0.00	1.46	434.17		37.14	585.62	
		7.00	1.46	444.40		37.14	845.60	
		7.00			0.00			
	6	0.00			-10.02			
		0.00	4.23	-805.81				
		7.00	4.23	-776.20				
		7.00			-10.02			
817								
	1	0.00			-4452.65			
		0.00	0.00	0.00				
		7.00	0.00	0.00				
		7.00			-4452.65			
	2	0.00			0.00			
		0.00	-19.87	3365.80				
		7.00	-19.87	3226.69				
		7.00			0.00			
	3	0.00			-0.38			
		0.00	-3.32	528.71				
		7.00	-3.32	505.43				
		7.00			-0.38			
	4	0.00			0.00			
		0.00	-7.45	1184.00				
		7.00	-7.45	1131.88				
		7.00			0.00			
	5	0.00			0.00			
		0.00	1.07	444.40		37.14	845.60	
		7.00	1.07	451.85		37.14	1105.57	
		7.00			0.00			
	6	0.00			-10.02			
		0.00	4.88	-776.20				
		7.00	4.88	-742.03				
		7.00			-10.02			
910								
	1	0.00			-3886.94			
		0.00	0.00	0.01				

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PROGRAM:SAP90/FILE:7thst_lo.F3F
SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_LO"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		6.04	0.00	0.01				
		6.04			-3940.31			
	2	0.00			0.00			
		0.00	41.04	371.39				
		6.04	44.67	630.22				
		6.04			0.00			
	3	0.00			-0.37			
		0.00	6.81	74.85				
		6.04	6.81	115.99				
		6.04			-0.37			
	4	0.00			0.00			
		0.00	15.25	167.62				
		6.04	15.25	259.75				
		6.04			0.00			
	5	0.00			0.00			
		0.00	-1.12	-12.27		-112.55	1331.43	
		6.04	-1.12	-19.01		-112.55	651.65	
		6.04			0.00			
	6	0.00			12.06			
		0.00	-23.35	-256.57				
		6.04	-23.35	-397.59				
		6.04			12.06			
911								
	1	0.00			-3940.31			
		0.00	0.00	0.01				
		12.00	0.00	0.00				
		12.00			-4046.34			
	2	0.00			0.00			
		0.00	44.67	630.22				
		12.00	44.67	1166.22				
		12.00			0.00			
	3	0.00			-0.37			
		0.00	6.81	115.99				
		12.00	6.81	197.72				
		12.00			-0.37			
	4	0.00			0.00			
		0.00	15.25	259.75				
		12.00	15.25	442.78				
		12.00			0.00			
	5	0.00			0.00			
		0.00	-1.12	-19.01		-112.55	651.65	

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SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_LO"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		2.56	0.00	-20.42		-96.99	384.04	
		12.00	3.71	-2.38		-45.23	-280.45	
		12.00			0.00			
	6	0.00			12.06			
		0.00	-23.35	-397.59				
		12.00	-23.35	-677.75				
		12.00			12.06			
912								
	1	0.00			-4046.34			
		0.00	0.00	0.00				
		14.76	0.00	0.00				
		14.76			-4176.76			
	2	0.00			0.00			
		0.00	44.67	1166.22				
		14.76	44.67	1825.49				
		14.76			0.00			
	3	0.00			-0.37			
		0.00	6.81	197.72				
		14.76	6.81	298.26				
		14.76			-0.37			
	4	0.00			0.00			
		0.00	15.25	442.78				
		14.76	15.25	667.92				
		14.76			0.00			
	5	0.00			0.00			
		0.00	3.71	-2.38		-45.23	-280.45	
		14.76	6.22	72.05		-10.31	-675.27	
		14.76			0.00			
	6	0.00			12.06			
		0.00	-23.35	-677.75				
		14.76	-23.35	-1022.35				
		14.76			12.06			
913								
	1	0.00			-4176.76			
		0.00	0.00	0.00				
		34.75	0.00	0.00				
		34.75			-4778.56			
	2	0.00			0.00			
		0.00	44.67	1825.49				
		34.75	44.67	3377.63				
		34.75			0.00			

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SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_LO"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	3	0.00			-0.37			
		0.00	6.81	298.26				
		34.75	6.81	534.94				
		34.75			-0.37			
	4	0.00			0.00			
		0.00	15.25	667.92				
		34.75	15.25	1197.96				
		34.75			0.00			
	5	0.00			0.00			
		0.00	6.22	72.05		-10.31	-675.27	
		4.01	6.96	98.50		0.00	-695.51	
		34.75	9.63	367.19		37.14	65.67	
		34.75			0.00			
	6	0.00			12.06			
		0.00	-23.35	-1022.35				
		34.75	-23.35	-1833.65				
		34.75			12.06			
914								
	1	0.00			-4778.56			
		0.00	0.00	0.00				
		7.00	0.00	0.00				
		7.00			-4778.56			
	2	0.00			0.00			
		0.00	20.94	3377.63				
		7.00	20.94	3524.23				
		7.00			0.00			
	3	0.00			-0.37			
		0.00	3.08	534.94				
		7.00	3.08	556.51				
		7.00			-0.37			
	4	0.00			0.00			
		0.00	6.90	1197.96				
		7.00	6.90	1246.27				
		7.00			0.00			
	5	0.00			0.00			
		0.00	6.54	367.19		37.14	65.67	
		7.00	6.54	413.00		37.14	325.65	
		7.00			0.00			
	6	0.00			12.06			
		0.00	-10.56	-1833.65				
		7.00	-10.56	-1907.60				

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PROGRAM:SAP90/FILE:7thst_lo.F3F
SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_LO"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		7.00			12.06			
915								
	1	0.00			-4778.56			
		0.00	0.00	0.00				
		7.00	0.00	-0.01				
		7.00			-4778.56			
	2	0.00			0.00			
		0.00	-5.48	3524.23				
		7.00	-5.48	3485.89				
		7.00			0.00			
	3	0.00			-0.37			
		0.00	-1.07	556.51				
		7.00	-1.07	549.04				
		7.00			-0.37			
	4	0.00			0.00			
		0.00	-2.39	1246.27				
		7.00	-2.39	1229.53				
		7.00			0.00			
	5	0.00			0.00			
		0.00	3.03	413.00		37.14	325.65	
		7.00	3.03	434.23		37.14	585.62	
		7.00			0.00			
	6	0.00			12.06			
		0.00	3.66	-1907.60				
		7.00	3.66	-1881.99				
		7.00			12.06			
916								
	1	0.00			-4778.56			
		0.00	0.00	-0.01				
		7.00	0.00	-0.01				
		7.00			-4778.56			
	2	0.00			0.00			
		0.00	-17.05	3485.89				
		7.00	-17.05	3366.57				
		7.00			0.00			
	3	0.00			-0.37			
		0.00	-2.88	549.04				
		7.00	-2.88	528.87				
		7.00			-0.37			
	4	0.00			0.00			
		0.00	-6.45	1229.53				

SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_LO"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		7.00	-6.45	1184.35				
		7.00			0.00			
	5	0.00			0.00			
		0.00	1.46	434.23		37.14	585.62	
		7.00	1.46	444.46		37.14	845.60	
		7.00			0.00			
	6	0.00			12.06			
		0.00	9.88	-1881.99				
		7.00	9.88	-1812.83				
		7.00			12.06			
917	----------							
	1	0.00			-4778.56			
		0.00	0.00	-0.01				
		7.00	0.00	-0.01				
		7.00			-4778.56			
	2	0.00			0.00			
		0.00	-19.88	3366.57				
		7.00	-19.88	3227.42				
		7.00			0.00			
	3	0.00			-0.37			
		0.00	-3.33	528.87				
		7.00	-3.33	505.58				
		7.00			-0.37			
	4	0.00			0.00			
		0.00	-7.45	1184.35				
		7.00	-7.45	1132.21				
		7.00			0.00			
	5	0.00			0.00			
		0.00	1.06	444.46		37.14	845.60	
		7.00	1.06	451.91		37.14	1105.57	
		7.00			0.00			
	6	0.00			12.06			
		0.00	11.40	-1812.83				
		7.00	11.40	-1733.02				
		7.00			12.06			

T·Y·LIN INTERNATIONAL

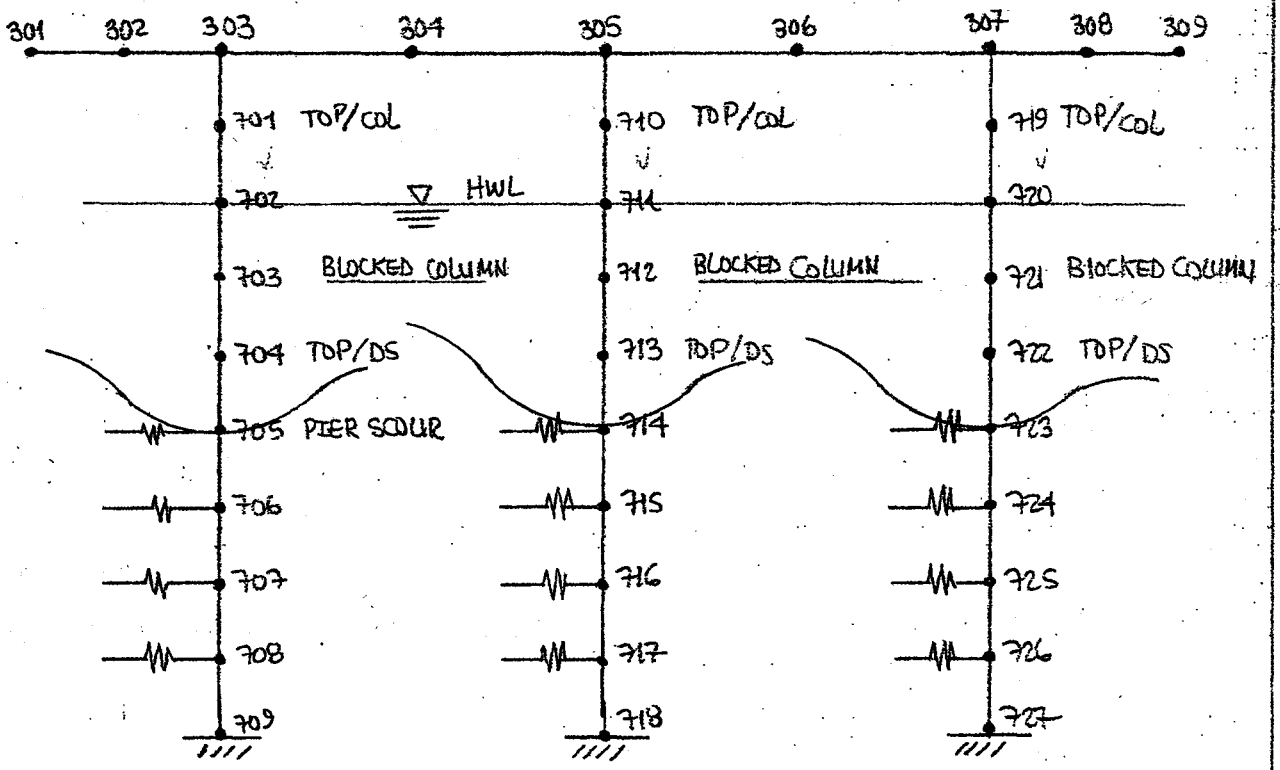
Projects: Salt River Bridges - Scour | Job No. 1317.00 | Sheet: of

Item: Seventh Street Bridge | Designer: VPD | Date: 1/31/00

Checker: | Date:

Grid: 1/10"

CASE 3 - 100 YR - FLOOD (TRANSVERSE)



```
SALT RIVER BRIDGES - SCOUR  (7TH STREET BRIDGE)   "7THST_TR"
C
C UNITS: KIPS, FEET, SECONDS
C
SYSTEM
C LOAD CONDITION 1, DEAD LOAD
C LOAD CONDITION 2, LIVE LOAD - 2 LANES
C LOAD CONDITION 3, LIVE LOAD - 5 LANES
C LOAD CONDITION 4, WIND ON STRUCTURE (TRANSVERSE, LONGITUDINAL & OVERTURNING)
C LOAD CONDITION 5, WIND ON LIVE LOAD
C LOAD CONDITION 6, STREAM FORCE ON COLUMN
C LOAD CONDITION 7, TEMPERATURE
C
L=8
C
JOINTS
C   PIER 1 - CAP
301  X=-39.58  Y=1076.05  Z=0.00
302  X=-30.50  Y=1076.05  Z=0.00
303  X=-28.00  Y=1076.05  Z=0.00
304  X=-11.25  Y=1076.05  Z=0.00
305  X=  0.00  Y=1076.05  Z=0.00
306  X= 11.25  Y=1076.05  Z=0.00
307  X= 28.00  Y=1076.05  Z=0.00
308  X= 30.50  Y=1076.05  Z=0.00
309  X= 39.58  Y=1076.05  Z=0.00
C   PIER 2 - COLUMNS
701  X=-28.00  Y=1072.80  Z=0.00
702  X=-28.00  Y=1066.76  Z=0.00
703  X=-28.00  Y=1054.76  Z=0.00
704  X=-28.00  Y=1040.00  Z=0.00
705  X=-28.00  Y=1005.25  Z=0.00
706  X=-28.00  Y= 998.25  Z=0.00
707  X=-28.00  Y= 991.25  Z=0.00
708  X=-28.00  Y= 984.25  Z=0.00
709  X=-28.00  Y= 977.25  Z=0.00
C   PIER 2 - COLUMNS
710  X=  0.00  Y=1072.80  Z=0.00
711  X=  0.00  Y=1066.76  Z=0.00
712  X=  0.00  Y=1054.76  Z=0.00
713  X=  0.00  Y=1040.00  Z=0.00
714  X=  0.00  Y=1005.25  Z=0.00
715  X=  0.00  Y= 998.25  Z=0.00
716  X=  0.00  Y= 991.25  Z=0.00
717  X=  0.00  Y= 984.25  Z=0.00
718  X=  0.00  Y= 977.25  Z=0.00
C   PIER 2 - COLUMNS
719  X= 28.00  Y=1072.80  Z=0.00
720  X= 28.00  Y=1066.76  Z=0.00
721  X= 28.00  Y=1054.76  Z=0.00
722  X= 28.00  Y=1040.00  Z=0.00
723  X= 28.00  Y=1005.25  Z=0.00
724  X= 28.00  Y= 998.25  Z=0.00
725  X= 28.00  Y= 991.25  Z=0.00
726  X= 28.00  Y= 984.25  Z=0.00
727  X= 28.00  Y= 977.25  Z=0.00

RESTRAINTS
C   PIER 1
301   R=0 0 1 0 0 0
302  308  1   R=0 0 1 1 1 0
309   R=0 0 1 0 0 0
C 701  708  1   R=0 0 1 1 1 0
709   R=1 1 1 1 1 1
C 710  717  1   R=0 0 1 1 1 0
718   R=1 1 1 1 1 1
```



```
C 719  726  1   R=0 0 1 1 1 0
727   R=1 1 1 1 1 1

SPRINGS
C
705 K=3285,0,0,0,0,0
706 K=6571,0,0,0,0,0
707 K=6571,0,0,0,0,0
708 K=6571,0,0,0,0,0
C
714 K=3285,0,0,0,0,0
715 K=6571,0,0,0,0,0
716 K=6571,0,0,0,0,0
717 K=6571,0,0,0,0,0
C
723 K=3285,0,0,0,0,0
724 K=6571,0,0,0,0,0
725 K=6571,0,0,0,0,0
726 K=6571,0,0,0,0,0

FRAMES
C
NM=5   NL=20  Y=-1 0 0 0 0 0 0
C
C  ALL MATERIALS CONCRETE:
C  ROADWAY, 6'-0" DEEP BY 79'-2" WIDE MODIFIED TYPE VI AASHTO GIRDER,
C  ADDITIONAL WEIGHT/MASSS EQUIVALENT TO 2.5" BY 79'-2" CONCRETE INCLUDED TO
C  ACCOUNT FOR FUTURE WEARING SURFACE AND BARRIERS.
C FIXED PIER CAP, 4'6" BY 6'-6"
1  A= 29.250 I=102.984, 49.36 J=112.80 AS= 29.250, 29.250 E=519120 TC=6E-6 W=4.38
8
C COLUMN, 5' DIAMETER
2  A= 19.635 I= 30.680, 30.68 J= 61.36 AS= 19.635, 19.635 E=519120 TC=6E-6 W=2.94
5
C SHAFT, 7' DIAMETER
3  A= 38.485 I=117.859,117.86 J=235.72 AS= 38.485, 38.485 E=519120 TC=6E-6 W=5.77
3
C SHAFT, 7' DIAMETER
4  A= 38.485 I=117.859,117.86 J=235.72 AS= 38.485, 38.485 E=519120 TC=0E-6 W=0.00
0
C RIGID MEMBER LINK
5  A= 19.635 I= 30.680, 30.68 J= 61.36 AS= 19.635, 19.635 E=519120 TC=6E-6 W=0.00
0
C
C Load Case I DL (Super, Abut & Pier Diaph Load, & SDL)
1  PLD= 5.833 -320.952  0
2  PLD= 1.750 -320.952  0  9.250 -320.952  0
3  PLD= 2.750 -320.952  0 10.250 -320.952  0
4  PLD= 3.750 -320.952  0 11.250 -320.952  0
5  PLD= 4.750 -320.952  0 12.250 -320.952  0
6  PLD= 3.250 -320.952  0
C
C Load Case II - LL+I (2 Lanes)
7  PLD= 1.750  -17.494  0  9.250  -52.481  0
8  PLD= 2.750  -63.246  0 10.250  -28.259  0
C
C Load Case III - LL+I (5 Lanes)
9  PLD= 1.750  -34.315  0  9.250  -37.342  0
10 PLD= 2.750  -36.333  0 10.250  -43.398  0
11 PLD= 3.750  -43.398  0 11.250  -36.333  0
12 PLD= 4.750  -37.342  0 12.250  -34.315  0
C
C Load Case IV WIND LOAD ON STRUCTURE
C
C wind on superstructure is load #13
C tran: 50 psf on 12.750' height (GLOBAL X DIR)
```

```
C long: 12 psf on 12.750' height (GLOBAL Z DIR)
C
13 WL=1.226  0.000  0.000
C
C wind on substructure is load #14 & #15
C Fixed Pier Cap
C tran: 40 psf on  4.50' width (axis 3 - X DIR)
C long: 40 psf on 79.17' width (axis 2 - Z DIR)
C
14 WL=0.015  0.000  0.000
C
C Column
C tran: 40 psf on  5.00' width (axis 3 - X DIR)
C long: 40 psf on  5.00' width (axis 2 - Z DIR)
C
15 WG=0.200  0.000  0.000
C
C Load Case V WIND LOAD ON LIVE LOAD
C
C wind on live load is load #16
C tran: 100 plf at 6' above deck plus half girder depth (axis 3 - X DIR)
C long:  40 plf at 6' above deck plus half girder depth (axis 1 - Z DIR)
C
16 WL=0.207  0.000  0.000
C
C Load Case VI STREAM FORCE
C
C Blocked Column - 9' Diameter
C
17 TRAP=0.0 6.216 0.446 -1.00 5.004 0.359
C
C Column - 5' Diameter
C
18 TRAP=0.0 2.780 0.200 -1.00 1.951 0.140
C
C Drilled Shaft - 7' Diameter
C
19 TRAP=0.0 2.731 0.196 -1.00 0.000 0.000
C
C Load Case VIII TEMPERATURE
C
20 T=-40,0,0
C
C PIER 2 - CAP
301,301,302  LP=1,0      M=1   NSL=1  0  0 13  14  16   0  20
302,302,303              M=1   NSL=0  0  0 13  14  16   0  20
303,303,304              M=1   NSL=2  7  9 13  14  16   0  20
304,304,305              M=1   NSL=3  8 10 13  14  16   0  20
305,305,306              M=1   NSL=4  0 11 13  14  16   0  20
306,306,307              M=1   NSL=5  0 12 13  14  16   0  20
307,307,308              M=1   NSL=0  0  0 13  14  16   0  20
308,308,309              M=1   NSL=6  0  0 13  14  16   0  20
C PIER 2 - CAP TO COLUMN
309,303,701              M=5
310,305,710              M=5
311,307,719              M=5
C PIER 2 - COLUMN
701,701,702              M=2   NSL=0  0  0  0  15   0   0  20
702,702,703              M=2   NSL=0  0  0  0   0   0  17  20
703,703,704              M=2   NSL=0  0  0  0   0   0  18  20
704,704,705              M=3   NSL=0  0  0  0   0   0  10  20
705,705,706              M=4   NSL=0  0  0  0   0   0   0  20  G=3,1,1,1
710,710,711              M=2   NSL=0  0  0  0  15   0   0  20
711,711,712              M=2   NSL=0  0  0  0   0   0  17  20
712,712,713              M=2   NSL=0  0  0  0   0   0  18  20
713,713,714              M=3   NSL=0  0  0  0   0   0  19  20
```



```
714,714,715              M=4   NSL=0  0  0  0   0   0   0  20  G=3,1,1,1
719,719,720              M=2   NSL=0  0  0  0  15   0   0  20
720,720,721              M=2   NSL=0  0  0  0   0   0  17  20
721,721,722              M=2   NSL=0  0  0  0   0   0  18  20
722,722,723              M=3   NSL=0  0  0  0   0   0  19  20
723,723,724              M=4   NSL=0  0  0  0   0   0   0  20  G=3,1,1,1
C
LOADS
C Load Case III STREAM FORCE - BUOYANCY
702  L=7  F=0.000, 14.76, 0.000, 0.000, 0.000, 0.000
703  L=7  F=0.000, 18.16, 0.000, 0.000, 0.000, 0.000
704  L=7  F=0.000, 83.40, 0.000, 0.000, 0.000, 0.000
711  L=7  F=0.000, 14.76, 0.000, 0.000, 0.000, 0.000
712  L=7  F=0.000, 18.16, 0.000, 0.000, 0.000, 0.000
713  L=7  F=0.000, 83.40, 0.000, 0.000, 0.000, 0.000
720  L=7  F=0.000, 14.76, 0.000, 0.000, 0.000, 0.000
721  L=7  F=0.000, 18.16, 0.000, 0.000, 0.000, 0.000
722  L=7  F=0.000, 83.40, 0.000, 0.000, 0.000, 0.000
C
C Load Case IV WIND LOADS - OVERTURNING FORCE
304  L=4  F=0.000, 213.8, 0.000, 0.000, 0.000, 0.000
```

```
     $$$$$$$$     $$$$$$$$$$    $$$$$$$       $$$$$$$$      $$$$$$$
   $$$$$$$$$$    $$$$$$$$$$    $$$$$$$$$$    $$$$$$$$$$    $$$$$$$$$$
  $$            $$      $$    $$       $$   $$       $$    $$       $$
 $$            $$      $$    $$       $$   $$       $$    $$       $$
 $$$$$$$$     $$$$$$$$$$    $$$$$$$$$$     $$$$$$$$$$    $$       $$
        $$    $$       $$    $$                      $$    $$       $$
       $$    $$       $$    $$                      $$    $$       $$
$$$$$$$$$$    $$       $$    $$             $$$$$$$$$$    $$$$$$$$$$
$$$$$$$$     $$       $$    $$              $$$$$$$$       $$$$$$$
```

STRUCTURAL ANALYSIS PROGRAMS

VERSION P5.31

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C S I / S A P 9 0 - - FINITE ELEMENT ANALYSIS OF STRUCTURES PAGE 9
PROGRAM:SAP90/FILE:\7thst.F3F
SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_TR"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		0.00	31.76	-945.44				
		3.25	31.76	-842.21				
		3.25			150.00			
	5	0.00			0.00			
		0.00	0.45	-43.95				
		3.25	0.45	-42.49				
		3.25			0.00			
	6	0.00			0.00			
		0.00	5.67	-174.44				
		3.25	5.67	-156.01				
		3.25			0.00			
	7	0.00			-40.50			
		0.00	-16.15	-1356.41		-7.77	104.91	
		3.25	-16.15	-1408.90		-7.77	79.64	
		3.25			-40.50			
	8	0.00			-8.73			
		0.00	0.00	0.00				
		3.25	0.00	0.00				
		3.25			-8.73			
311								
	1	0.00			-1039.87			
		0.00	5.56	-288.83				
		3.25	5.56	-270.74				
		3.25			-1039.87			
	2	0.00			4.89			
		0.00	0.26	-11.44				
		3.25	0.26	-10.60				
		3.25			4.89			
	3	0.00			-62.36			
		0.00	1.44	-73.02				
		3.25	1.44	-68.36				
		3.25			-62.36			
	4	0.00			-63.27			
		0.00	31.40	-927.34				
		3.25	31.40	-825.29				
		3.25			-63.27			
	5	0.00			-2.21			
		0.00	0.37	-40.02				
		3.25	0.37	-38.82				
		3.25			-2.21			
	6	0.00			-8.79			

C S I / S A P 9 0 - - FINITE ELEMENT ANALYSIS OF STRUCTURES PAGE 10
PROGRAM:SAP90/FILE:\7thst.F3F
SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_TR"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		0.00	5.36	-158.82				
		3.25	5.36	-141.41				
		3.25			-8.79			
	7	0.00			-63.28			
		0.00	-18.99	-1213.93		-7.77	104.91	
		3.25	-18.99	-1275.64		-7.77	79.64	
		3.25			-63.28			
	8	0.00			4.37			
		0.00	-3.29	96.28				
		3.25	-3.29	85.59				
		3.25			4.37			
701								
	1	0.00			-1038.76			
		0.00	-3.18	139.17				
DL		6.04	-3.18	119.94				
		6.04			-1056.55			
	2	0.00			-67.03			
		0.00	-1.21	58.41				
LL+I/2-span		6.04	-1.21	51.08				
		6.04			-67.03			
	3	0.00			-61.45			
		0.00	-1.15	52.80				
LL+I/5-span		6.04	-1.15	45.86				
		6.04			-61.45			
	4	0.00			127.08			
		0.00	33.89	-941.68				
w/sup.		6.04	33.89	-737.01				
		6.04			127.08			
	5	0.00			2.21			
		0.00	0.37	-38.82				
w/sub		6.04	1.58	-32.93				
		6.04			2.21			
	6	0.00			8.79			
		0.00	5.36	-141.41				
w/LL		6.04	5.36	-109.05				
		6.04			8.79			
	7	0.00			103.77			
		0.00	35.14	-1992.82		-6.23	55.92	
SF		6.04	35.14	-1780.59		-6.23	18.26	
		6.04			103.77			
	8	0.00			4.37			
T								

C S I / S A P 9 0 - - FINITE ELEMENT ANALYSIS OF STRUCTURES PAGE 11
PROGRAM:SAP90/FILE:\7thst.F3F
SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_TR"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		0.00	3.29	-85.59				
		6.04	3.29	-65.72				
		6.04			4.37			
702								
	1	0.00			-1056.55			
		0.00	-3.18	119.94				
		12.00	-3.18	81.74				
		12.00			-1091.89			
	2	0.00			-67.03			
		0.00	-1.21	51.08				
		12.00	-1.21	36.51				
		12.00			-67.03			
	3	0.00			-61.45			
		0.00	-1.15	45.86				
		12.00	-1.15	32.06				
		12.00			-61.45			
	4	0.00			127.08			
		0.00	33.89	-737.01				
		12.00	33.89	-330.38				
		12.00			127.08			
	5	0.00			2.21			
		0.00	1.58	-32.93				
		12.00	1.58	-14.00				
		12.00			2.21			
	6	0.00			8.79			
		0.00	5.36	-109.05				
		12.00	5.36	-44.75				
		12.00			8.79			
	7	0.00			118.53			
		0.00	35.14	-1780.59		-6.23	18.26	
		12.00	102.46	-940.47		-1.40	-26.53	
		12.00			118.53			
	8	0.00			4.37			
		0.00	3.29	-65.72				
		12.00	3.29	-26.25				
		12.00			4.37			
703								
	1	0.00			-1091.89			
		0.00	-3.18	81.74				
		14.76	-3.18	34.75				
		14.76			-1135.36			

C S I / S A P 9 0 - - FINITE ELEMENT ANALYSIS OF STRUCTURES PAGE 12
PROGRAM:SAP90/FILE:\7thst.F3F
SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_TR"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	2	0.00			-67.03			
		0.00	-1.21	36.51				
		14.76	-1.21	18.60				
		14.76			-67.03			
	3	0.00			-61.45			
		0.00	-1.15	32.06				
		14.76	-1.15	15.08				
		14.76			-61.45			
	4	0.00			127.08			
		0.00	33.89	-330.38				
		14.76	33.89	169.77				
		14.76			127.08			
	5	0.00			2.21			
		0.00	1.58	-14.00				
		14.76	1.58	9.28				
		14.76			2.21			
	6	0.00			8.79			
		0.00	5.36	-44.75				
		14.76	5.36	34.34				
		14.76			8.79			
	7	0.00			136.69			
		0.00	102.46	-940.47		-1.40	-26.53	
		7.61	121.99	-84.05		0.00	-31.73	
		14.76	137.37	844.52		1.10	-27.66	
		14.76			136.69			
	8	0.00			4.37			
		0.00	3.29	-26.25				
		14.76	3.29	22.30				
		14.76			4.37			
704								
	1	0.00			-1135.36			
		0.00	-3.18	34.75				
		34.75	-3.18	-75.87				
		34.75			-1335.97			
	2	0.00			-67.03			
		0.00	-1.21	18.60				
		34.75	-1.21	-23.58				
		34.75			-67.03			
	3	0.00			-61.45			
		0.00	-1.15	15.08				
		34.75	-1.15	-24.88				

C S I / S A P 9 0 - - FINITE ELEMENT ANALYSIS OF STRUCTURES PAGE 13
PROGRAM:SAP90/FILE:\7thst.F3F
SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_TR"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		34.75			-61.45			
	4	0.00			127.08			
		0.00	33.89	169.77				
		34.75	33.89	1347.29				
		34.75			127.08			
	5	0.00			2.21			
		0.00	1.58	9.28				
		34.75	1.58	64.10				
		34.75			2.21			
	6	0.00			8.79			
		0.00	5.36	34.34				
		34.75	5.36	220.53				
		34.75			8.79			
	7	0.00			220.09			
		0.00	137.37	844.52		1.10	-27.66	
		2.75	101.04	1222.30		1.10	-24.62	
		10.25	57.64	1980.09		1.10	-16.34	
		34.75	57.64	3392.29		1.10	10.72	
		34.75			220.09			
	8	0.00			4.37			
		0.00	3.29	22.30				
		34.75	3.29	136.60				
		34.75			4.37			
705	----------							
	1	0.00			-1335.97			
		0.00	-1.54	-75.87				
		7.00	-1.54	-86.62				
		7.00			-1335.97			
	2	0.00			-67.03			
		0.00	-0.65	-23.58				
		7.00	-0.65	-28.14				
		7.00			-67.03			
	3	0.00			-61.45			
		0.00	-0.59	-24.88				
		7.00	-0.59	-28.98				
		7.00			-61.45			
	4	0.00			127.08			
		0.00	9.71	1347.29				
		7.00	9.71	1415.24				
		7.00			127.08			
	5	0.00			2.21			

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SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_TR"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		0.00	0.43	64.10				
		7.00	0.43	67.15				
		7.00			2.21			
	6	0.00			8.79			
		0.00	1.44	220.53				
		7.00	1.44	230.63				
		7.00			8.79			
	7	0.00			220.09			
		0.00	2.97	3392.29		1.10	10.72	
		7.00	2.97	3413.09		1.10	18.45	
		7.00			220.09			
	8	0.00			4.37			
		0.00	0.87	136.60				
		7.00	0.87	142.69				
		7.00			4.37			
706	----------							
	1	0.00			-1335.97			
		0.00	0.27	-86.62				
		7.00	0.27	-84.73				
		7.00			-1335.97			
	2	0.00			-67.03			
		0.00	-0.03	-28.14				
		7.00	-0.03	-28.34				
		7.00			-67.03			
	3	0.00			-61.45			
		0.00	0.04	-28.98				
		7.00	0.04	-28.74				
		7.00			-61.45			
	4	0.00			127.08			
		0.00	-16.09	1415.24				
		7.00	-16.09	1302.61				
		7.00			127.08			
	5	0.00			2.21			
		0.00	-0.78	67.15				
		7.00	-0.78	61.67				
		7.00			2.21			
	6	0.00			8.79			
		0.00	-2.73	230.63				
		7.00	-2.73	211.54				
		7.00			8.79			
	7	0.00			220.09			

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SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_TR"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		0.00	-54.33	3413.09		1.10	18.45	
		7.00	-54.33	3032.81		1.10	26.18	
		7.00			220.09			
	8	0.00			4.37			
		0.00	-1.70	142.69				
		7.00	-1.70	130.76				
		7.00			4.37			
707	----------							
	1	0.00			-1335.97			
		0.00	1.04	-84.73				
		7.00	1.04	-77.45				
		7.00			-1335.97			
	2	0.00			-67.03			
		0.00	0.24	-28.34				
		7.00	0.24	-26.65				
		7.00			-67.03			
	3	0.00			-61.45			
		0.00	0.30	-28.74				
		7.00	0.30	-26.62				
		7.00			-61.45			
	4	0.00			127.08			
		0.00	-26.76	1302.61				
		7.00	-26.76	1115.27				
		7.00			127.08			
	5	0.00			2.21			
		0.00	-1.29	61.67				
		7.00	-1.29	52.67				
		7.00			2.21			
	6	0.00			8.79			
		0.00	-4.45	211.54				
		7.00	-4.45	180.39				
		7.00			8.79			
	7	0.00			220.09			
		0.00	-77.52	3032.81		1.10	26.18	
		7.00	-77.52	2490.18		1.10	33.92	
		7.00			220.09			
	8	0.00			4.37			
		0.00	-2.77	130.76				
		7.00	-2.77	111.39				
		7.00			4.37			

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SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_TR"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
708	----------							
	1	0.00			-1335.97			
		0.00	1.22	-77.45				
		7.00	1.22	-68.90				
		7.00			-1335.97			
	2	0.00			-67.03			
		0.00	0.31	-26.65				
		7.00	0.31	-24.51				
		7.00			-67.03			
	3	0.00			-61.45			
		0.00	0.37	-26.62				
		7.00	0.37	-24.06				
		7.00			-61.45			
	4	0.00			127.08			
		0.00	-29.16	1115.27				
		7.00	-29.16	911.12				
		7.00			127.08			
	5	0.00			2.21			
		0.00	-1.40	52.67				
		7.00	-1.40	42.87				
		7.00			2.21			
	6	0.00			8.79			
		0.00	-4.84	180.39				
		7.00	-4.84	146.54				
		7.00			8.79			
	7	0.00			220.09			
		0.00	-82.56	2490.18		1.10	33.92	
		7.00	-82.56	1912.24		1.10	41.65	
		7.00			220.09			
	8	0.00			4.37			
		0.00	-3.01	111.39				
		7.00	-3.01	90.36				
		7.00			4.37			
710	----------							
	1	0.00			-1478.24			
		0.00	-2.38	101.55				
DL		6.04	-2.38	87.17				
		6.04			-1496.03			
	2	0.00			-99.34			
		0.00	0.95	-43.19				
LL+I/2-span		6.04	0.95	-37.42				

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SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_TR"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		6.04			-99.34			
	3	0.00			-178.97			
		0.00	-0.29	12.29				
LL +I/5-span		6.04	-0.29	10.57				
		6.04			-178.97			
	4	0.00			150.00			
		0.00	31.76	-842.21				
w/snp.		6.04	31.76	-650.36				
		6.04			150.00			
	5	0.00			0.00			
		0.00	0.45	-42.49				
w/sub.		6.04	1.66	-36.14				
		6.04			0.00			
	6	0.00			0.00			
		0.00	5.67	-156.01				
w/LL		6.04	5.67	-121.77				
		6.04			0.00			
	7	0.00			-40.50			
		0.00	-16.15	-1408.90		-7.77	79.64	
SF		6.04	-16.15	-1506.45		-7.77	32.69	
		6.04			-40.50			
	8	0.00			-8.73			
T		0.00	0.00	0.00				
		6.04	0.00	0.00				
		6.04			-8.73			
711	----------							
	1	0.00			-1496.03			
		0.00	-2.38	87.17				
		12.00	-2.38	58.59				
		12.00			-1531.37			
	2	0.00			-99.34			
		0.00	0.95	-37.42				
		12.00	0.95	-25.96				
		12.00			-99.34			
	3	0.00			-178.97			
		0.00	-0.29	10.57				
		12.00	-0.29	7.14				
		12.00			-178.97			
	4	0.00			150.00			
		0.00	31.76	-650.36				
		12.00	31.76	-269.21				

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SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_TR"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		12.00			150.00			
	5	0.00			0.00			
		0.00	1.66	-36.14				
		12.00	1.66	-16.26				
		12.00			0.00			
	6	0.00			0.00			
		0.00	5.67	-121.77				
		12.00	5.67	-53.73				
		12.00			0.00			
	7	0.00			-25.74			
		0.00	-16.15	-1506.45		-7.77	32.69	
		2.66	0.00	-1527.73		-6.61	13.60	
		12.00	51.17	-1281.78		-2.94	-30.57	
		12.00			-25.74			
	8	0.00			-8.73			
		0.00	0.00	0.00				
		12.00	0.00	0.00				
		12.00			-8.73			
712	----------							
	1	0.00			-1531.37			
		0.00	-2.38	58.59				
		14.76	-2.38	23.44				
		14.76			-1574.84			
	2	0.00			-99.34			
		0.00	0.95	-25.96				
		14.76	0.95	-11.87				
		14.76			-99.34			
	3	0.00			-178.97			
		0.00	-0.29	7.14				
		14.76	-0.29	2.93				
		14.76			-178.97			
	4	0.00			150.00			
		0.00	31.76	-269.21				
		14.76	31.76	199.61				
		14.76			150.00			
	5	0.00			0.00			
		0.00	1.66	-16.26				
		14.76	1.66	8.18				
		14.76			0.00			
	6	0.00			0.00			
		0.00	5.67	-53.73				

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SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_TR"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		14.76	5.67	29.96				
		14.76			0.00			
	7	0.00			-7.58			
		0.00	51.17	-1281.78		-2.94	-30.57	
		14.76	86.08	-253.79		-0.43	-54.41	
		14.76			-7.58			
	8	0.00			-8.73			
		0.00	0.00	0.00				
		14.76	0.00	0.00				
		14.76			-8.73			
713	----------							
	1	0.00			-1574.84			
		0.00	-2.38	23.44				
		34.75	-2.38	-59.32				
		34.75			-1775.45			
	2	0.00			-99.34			
		0.00	0.95	-11.87				
		34.75	0.95	21.31				
		34.75			-99.34			
	3	0.00			-178.97			
		0.00	-0.29	2.93				
		34.75	-0.29	-7.00				
		34.75			-178.97			
	4	0.00			150.00			
		0.00	31.76	199.61				
		34.75	31.76	1303.38				
		34.75			150.00			
	5	0.00			0.00			
		0.00	1.66	8.18				
		34.75	1.66	65.73				
		34.75			0.00			
	6	0.00			0.00			
		0.00	5.67	29.96				
		34.75	5.67	226.99				
		34.75			0.00			
	7	0.00			75.82			
		0.00	86.08	-253.79		-0.43	-54.41	
		2.29	92.14	-49.45		0.00	-54.90	
		34.75	133.54	3836.95		2.97	9.39	
		34.75			75.82			
	8	0.00			-8.73			

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SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_TR"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		0.00	0.00	0.00				
		34.75	0.00	0.00				
		34.75			-8.73			
714	----------							
	1	0.00			-1775.45			
		0.00	-1.12	-59.32				
		7.00	-1.12	-67.14				
		7.00			-1775.45			
	2	0.00			-99.34			
		0.00	0.48	21.31				
		7.00	0.48	24.66				
		7.00			-99.34			
	3	0.00			-178.97			
		0.00	-0.14	-7.00				
		7.00	-0.14	-7.95				
		7.00			-178.97			
	4	0.00			150.00			
		0.00	8.60	1303.38				
		7.00	8.60	1363.58				
		7.00			150.00			
	5	0.00			0.00			
		0.00	0.48	65.73				
		7.00	0.48	69.06				
		7.00			0.00			
	6	0.00			0.00			
		0.00	1.61	226.99				
		7.00	1.61	238.23				
		7.00			0.00			
	7	0.00			75.82			
		0.00	56.37	3836.95		2.97	9.39	
		7.00	56.37	4231.54		2.97	30.19	
		7.00			75.82			
	8	0.00			-8.73			
		0.00	0.00	0.00				
		7.00	0.00	0.00				
		7.00			-8.73			
715	----------							
	1	0.00			-1775.45			
		0.00	0.26	-67.14				
		7.00	0.26	-65.29				
		7.00			-1775.45			

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SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_TR"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	2	0.00			-99.34			
		0.00	-0.05	24.66				
		7.00	-0.05	24.34				
		7.00			-99.34			
	3	0.00			-178.97			
		0.00	0.03	-7.95				
		7.00	0.03	-7.75				
		7.00			-178.97			
	4	0.00			150.00			
		0.00	-16.07	1363.58				
		7.00	-16.07	1251.07				
		7.00			150.00			
	5	0.00			0.00			
		0.00	-0.78	69.06				
		7.00	-0.78	63.58				
		7.00			0.00			
	6	0.00			0.00			
		0.00	-2.73	238.23				
		7.00	-2.73	219.11				
		7.00			0.00			
	7	0.00			75.82			
		0.00	-27.34	4231.54		2.97	30.19	
		7.00	-27.34	4040.16		2.97	50.98	
		7.00			75.82			
	8	0.00			-8.73			
		0.00	0.00	0.00				
		7.00	0.00	0.00				
		7.00			-8.73			
716	----------							
	1	0.00			-1775.45			
		0.00	0.85	-65.29				
		7.00	0.85	-59.32				
		7.00			-1775.45			
	2	0.00			-99.34			
		0.00	-0.27	24.34				
		7.00	-0.27	22.45				
		7.00			-99.34			
	3	0.00			-178.97			
		0.00	0.10	-7.75				
		7.00	0.10	-7.05				
		7.00			-178.97			

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SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_TR"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
	4	0.00			150.00			
		0.00	-26.26	1251.07				
		7.00	-26.26	1067.23				
		7.00			150.00			
	5	0.00			0.00			
		0.00	-1.30	63.58				
		7.00	-1.30	54.45				
		7.00			0.00			
	6	0.00			0.00			
		0.00	-4.52	219.11				
		7.00	-4.52	187.45				
		7.00			0.00			
	7	0.00			75.82			
		0.00	-62.66	4040.16		2.97	50.98	
		7.00	-62.66	3601.56		2.97	71.78	
		7.00			75.82			
	8	0.00			-8.73			
		0.00	0.00	0.00				
		7.00	0.00	0.00				
		7.00			-8.73			
717	----------							
	1	0.00			-1775.45			
		0.00	0.99	-59.32				
		7.00	0.99	-52.39				
		7.00			-1775.45			
	2	0.00			-99.34			
		0.00	-0.32	22.45				
		7.00	-0.32	20.19				
		7.00			-99.34			
	3	0.00			-178.97			
		0.00	0.12	-7.05				
		7.00	0.12	-6.25				
		7.00			-178.97			
	4	0.00			150.00			
		0.00	-28.55	1067.23				
		7.00	-28.55	867.38				
		7.00			150.00			
	5	0.00			0.00			
		0.00	-1.42	54.45				
		7.00	-1.42	44.49				
		7.00			0.00			

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SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_TR"

F R A M E E L E M E N T F O R C E S

	ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		6	0.00			0.00			
			0.00	-4.93	187.45				
			7.00	-4.93	152.97				
			7.00			0.00			
		7	0.00			75.82			
			0.00	-70.84	3601.56		2.97	71.78	
			7.00	-70.84	3105.69		2.97	92.58	
			7.00			75.82			
		8	0.00			-8.73			
			0.00	0.00	0.00				
			7.00	0.00	0.00				
			7.00			-8.73			
	719								
		1	0.00			-1039.87			
			0.00	5.56	-270.74				
DL			6.04	5.56	-237.13				
			6.04			-1057.66			
		2	0.00			4.89			
			0.00	0.26	-10.60				
LL+I/2-span			6.04	0.26	-9.04				
			6.04			4.89			
		3	0.00			-62.36			
			0.00	1.44	-68.36				
LL+I/5-span			6.04	1.44	-59.68				
			6.04			-62.36			
		4	0.00			-63.27			
			0.00	31.40	-825.29				
w/sub			6.04	31.40	-635.62				
			6.04			-63.27			
		5	0.00			-2.21			
			0.00	0.37	-38.82				
w/sub.			6.04	1.58	-32.93				
			6.04			-2.21			
		6	0.00			-8.79			
			0.00	5.36	-141.41				
w/LL			6.04	5.36	-109.05				
			6.04			-8.79			
		7	0.00			-63.28			
			0.00	-18.99	-1275.64		-7.77	79.64	
SF			6.04	-18.99	-1390.32		-7.77	32.69	
			6.04			-63.28			

C S I / S A P 9 0 - - FINITE ELEMENT ANALYSIS OF STRUCTURES PAGE 24
PROGRAM:SAP90/FILE:\7thst.F3F
SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_TR"

F R A M E E L E M E N T F O R C E S

	ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
T		8	0.00			4.37			
			0.00	-3.29	85.59				
			6.04	-3.29	65.72				
			6.04			4.37			
	720								
		1	0.00			-1057.66			
			0.00	5.56	-237.13				
			12.00	5.56	-170.35				
			12.00			-1093.00			
		2	0.00			4.89			
			0.00	0.26	-9.04				
			12.00	0.26	-5.93				
			12.00			4.89			
		3	0.00			-62.36			
			0.00	1.44	-59.68				
			12.00	1.44	-42.46				
			12.00			-62.36			
		4	0.00			-63.27			
			0.00	31.40	-635.62				
			12.00	31.40	-258.80				
			12.00			-63.27			
		5	0.00			-2.21			
			0.00	1.58	-32.93				
			12.00	1.58	-14.00				
			12.00			-2.21			
		6	0.00			-8.79			
			0.00	5.36	-109.05				
			12.00	5.36	-44.75				
			12.00			-8.79			
		7	0.00			-48.52			
			0.00	-18.99	-1390.32		-7.77	32.69	
			3.13	0.00	-1419.82		-6.41	10.48	
			12.00	48.33	-1199.71		-2.94	-30.57	
			12.00			-48.52			
		8	0.00			4.37			
			0.00	-3.29	65.72				
			12.00	-3.29	26.25				
			12.00			4.37			
	721								
		1	0.00			-1093.00			
			0.00	5.56	-170.35				

C S I / S A P 9 0 - - FINITE ELEMENT ANALYSIS OF STRUCTURES PAGE 25
PROGRAM:SAP90/FILE:\7thst.F3F
SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_TR"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST END I	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		14.76	5.56	-88.21				
		14.76			-1136.47			
	2	0.00			4.89			
		0.00	0.26	-5.93				
		14.76	0.26	-2.11				
		14.76			4.89			
	3	0.00			-62.36			
		0.00	1.44	-42.46				
		14.76	1.44	-21.26				
		14.76			-62.36			
	4	0.00			-63.27			
		0.00	31.40	-258.80				
		14.76	31.40	204.68				
		14.76			-63.27			
	5	0.00			-2.21			
		0.00	1.58	-14.00				
		14.76	1.58	9.28				
		14.76			-2.21			
	6	0.00			-8.79			
		0.00	5.36	-44.75				
		14.76	5.36	34.34				
		14.76			-8.79			
	7	0.00			-30.36			
		0.00	48.33	-1199.71		-2.94	-30.57	
		14.76	83.25	-213.60		-0.43	-54.41	
		14.76			-30.36			
	8	0.00			4.37			
		0.00	-3.29	26.25				
		14.76	-3.29	-22.30				
		14.76			4.37			
722	----------							
	1	0.00			-1136.47			
		0.00	5.56	-88.21				
		34.75	5.56	105.16				
		34.75			-1337.08			
	2	0.00			4.89			
		0.00	0.26	-2.11				
		34.75	0.26	6.89				
		34.75			4.89			
	3	0.00			-62.36			
		0.00	1.44	-21.26				

C S I / S A P 9 0 - - FINITE ELEMENT ANALYSIS OF STRUCTURES PAGE 26
PROGRAM:SAP90/FILE:\7thst.F3F
SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_TR"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST END I	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		34.75	1.44	28.63				
		34.75			-62.36			
	4	0.00			-63.27			
		0.00	31.40	204.68				
		34.75	31.40	1295.89				
		34.75			-63.27			
	5	0.00			-2.21			
		0.00	1.58	9.28				
		34.75	1.58	64.10				
		34.75			-2.21			
	6	0.00			-8.79			
		0.00	5.36	34.34				
		34.75	5.36	220.53				
		34.75			-8.79			
	7	0.00			53.04			
		0.00	83.25	-213.60		-0.43	-54.41	
		2.29	89.30	-15.76		0.00	-54.90	
		34.75	130.70	3778.53		2.97	9.39	
		34.75			53.04			
	8	0.00			4.37			
		0.00	-3.29	-22.30				
		34.75	-3.29	-136.60				
		34.75			4.37			
723	----------							
	1	0.00			-1337.08			
		0.00	3.02	105.16				
		7.00	3.02	126.32				
		7.00			-1337.08			
	2	0.00			4.89			
		0.00	0.12	6.89				
		7.00	0.12	7.71				
		7.00			4.89			
	3	0.00			-62.36			
		0.00	0.76	28.63				
		7.00	0.76	33.96				
		7.00			-62.36			
	4	0.00			-63.27			
		0.00	8.41	1295.89				
		7.00	8.41	1354.78				
		7.00			-63.27			
	5	0.00			-2.21			

C S I / S A P 9 0 - - FINITE ELEMENT ANALYSIS OF STRUCTURES PAGE 27
PROGRAM:SAP90/FILE:\7thst.F3F
SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_TR"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		0.00	0.43	64.10				
		7.00	0.43	67.15				
		7.00			-2.21			
	6	0.00			-8.79			
		0.00	1.44	220.53				
		7.00	1.44	230.63				
		7.00			-8.79			
	7	0.00			53.04			
		0.00	54.89	3778.53		2.97	9.39	
		7.00	54.89	4162.74		2.97	30.19	
		7.00			53.04			
	8	0.00			4.37			
		0.00	-0.87	-136.60				
		7.00	-0.87	-142.69				
		7.00			4.37			
724	----------							
	1	0.00			-1337.08			
		0.00	0.20	126.32				
		7.00	0.20	127.73				
		7.00			-1337.08			
	2	0.00			4.89			
		0.00	-0.04	7.71				
		7.00	-0.04	7.43				
		7.00			4.89			
	3	0.00			-62.36			
		0.00	0.02	33.96				
		7.00	0.02	34.06				
		7.00			-62.36			
	4	0.00			-63.27			
		0.00	-16.07	1354.78				
		7.00	-16.07	1242.29				
		7.00			-63.27			
	5	0.00			-2.21			
		0.00	-0.78	67.15				
		7.00	-0.78	61.67				
		7.00			-2.21			
	6	0.00			-8.79			
		0.00	-2.73	230.63				
		7.00	-2.73	211.54				
		7.00			-8.79			
	7	0.00			53.04			

C S I / S A P 9 0 - - FINITE ELEMENT ANALYSIS OF STRUCTURES PAGE 28
PROGRAM:SAP90/FILE:\7thst.F3F
SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_TR"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST ENDI	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
		0.00	-27.32	4162.74		2.97	30.19	
		7.00	-27.32	3971.47		2.97	50.98	
		7.00			53.04			
	8	0.00			4.37			
		0.00	1.70	-142.69				
		7.00	1.70	-130.76				
		7.00			4.37			
725	----------							
	1	0.00			-1337.08			
		0.00	-1.02	127.73				
		7.00	-1.02	120.59				
		7.00			-1337.08			
	2	0.00			4.89			
		0.00	-0.11	7.43				
		7.00	-0.11	6.69				
		7.00			4.89			
	3	0.00			-62.36			
		0.00	-0.31	34.06				
		7.00	-0.31	31.92				
		7.00			-62.36			
	4	0.00			-63.27			
		0.00	-26.18	1242.29				
		7.00	-26.18	1059.04				
		7.00			-63.27			
	5	0.00			-2.21			
		0.00	-1.29	61.67				
		7.00	-1.29	52.67				
		7.00			-2.21			
	6	0.00			-8.79			
		0.00	-4.45	211.54				
		7.00	-4.45	180.39				
		7.00			-8.79			
	7	0.00			53.04			
		0.00	-62.00	3971.47		2.97	50.98	
		7.00	-62.00	3537.49		2.97	71.78	
		7.00			53.04			
	8	0.00			4.37			
		0.00	2.77	-130.76				
		7.00	2.77	-111.39				
		7.00			4.37			

C S I / S A P 9 0 - - FINITE ELEMENT ANALYSIS OF STRUCTURES PAGE 29
PROGRAM:SAP90/FILE:\7thst.F3F
SALT RIVER BRIDGES - SCOUR (7TH STREET BRIDGE) "7THST_TR"

F R A M E E L E M E N T F O R C E S

ELT ID	LOAD COND	DIST END I	1-2 PLANE SHEAR	1-2 PLANE MOMENT	AXIAL FORCE	1-3 PLANE SHEAR	1-3 PLANE MOMENT	AXIAL TORQ
726								
	1	0.00			-1337.08			
		0.00	-1.31	120.59				
		7.00	-1.31	111.40				
		7.00			-1337.08			
	2	0.00			4.89			
		0.00	-0.12	6.69				
		7.00	-0.12	5.84				
		7.00			4.89			
	3	0.00			-62.36			
		0.00	-0.38	31.92				
		7.00	-0.38	29.23				
		7.00			-62.36			
	4	0.00			-63.27			
		0.00	-28.44	1059.04				
		7.00	-28.44	859.93				
		7.00			-63.27			
	5	0.00			-2.21			
		0.00	-1.40	52.67				
		7.00	-1.40	42.87				
		7.00			-2.21			
	6	0.00			-8.79			
		0.00	-4.84	180.39				
		7.00	-4.84	146.54				
		7.00			-8.79			
	7	0.00			53.04			
		0.00	-70.03	3537.49		2.97	71.78	
		7.00	-70.03	3047.30		2.97	92.58	
		7.00			53.04			
	8	0.00			4.37			
		0.00	3.01	-111.39				
		7.00	3.01	-90.36				
		7.00			4.37			

TYLIN INTERNATIONAL

Project:	Salt River Bridges Scour	Job No.	1317.00	Sheet:	
Item:	7th Street Bridge	Designer:	VPD	Date:	3/27/00
D:\My Documents\Projects\1317 Salt River Bridges\7th Street\excel\[col_top.xls]Sheet1		Checker:		Date:	

LOADS AT TOP OF COLUMN - PIER 2

LOAD FACTOR DESIGN:

GROUP-I = 1.30 [.75 DL + 1.67 LL+I + 1.0 SF]
GROUP-II = 1.30 [.75 DL + 1.0 SF + 1.0 W]
GROUP-III = 1.30 [.75 DL + 1.0 LL+I + 1.0 SF + 0.3 W + 1.0 WL + 1.0 LF]
GROUP-IV = 1.30 [.75 DL + 1.0 LL+I + 1.0 SF + 1.0 RST]
GROUP-V = 1.25 [.75 DL + 1.0 SF + 1.0 W + 1.0 RST]
GROUP-VI = 1.25 [.75 DL + 1.0 LL+I + 1.0 SF + 0.3 W + 1.0 WL + 1.0 LF + 1.0 RST]

CASE - 3 VERTICAL LOAD

	DL (KIPS)	LL+I (KIPS)	WIND (KIPS)	WL (KIPS)	LF (KIPS)	SF (KIPS)	RST (KIPS)
Col 1	1,039	67	130	9	0	104	4
Col 2	1,478	179	150	0	0	41	9
Col 3	1,040	62	65	9	0	63	4

	GRP-I (KIPS)	GRP-II (KIPS)	GRP-III (KIPS)	GRP-IV (KIPS)	GRP-V (KIPS)	GRP-VI (KIPS)
Pu	1,293	1,317	1,297	1,241	1,272	1,253
	1,882	1,689	1,785	1,738	1,635	1,727
	1,232	1,181	1,214	1,183	1,141	1,173

CASE - 3 SHEAR

		DL (KIPS)	LL+I (KIPS)	WIND (KIPS)	WL (KIPS)	LF (KIPS)	SF (KIPS)	RST (KIPS)
long	Col 1 - Vy	0	0	14	2	5	0	1
trans	Col 1 - Vx	3	1	34	5	0	35	3
long	Col 2 - Vy	0	0	14	2	5	0	1
trans	Col 2 - Vx	2	1	32	6	0	16	0
long	Col 3 - Vy	0	0	14	2	5	0	1
trans	Col 3 - Vx	6	1	32	5	0	19	3

	GRP-I (KIPS)	GRP-II (KIPS)	GRP-III (KIPS)	GRP-IV (KIPS)	GRP-V (KIPS)	GRP-VI (KIPS)
Col 1 - Vy	0	18	15	1	18	16
Col 1 - Vx	51	93	71	55	94	72
Col 2 - Vy	0	18	15	1	18	16
Col 2 - Vx	25	65	44	25	63	43
Col 3 - Vy	0	18	15	1	18	16
Col 3 - Vx	33	71	51	36	73	53

TYLIN INTERNATIONAL

Project:	Salt River Bridges Scour	Job No.	1317.00	Sheet:	
Item:	7th Street Bridge	Designer:	VPD	Date:	3/27/00
D:\My Documents\Projects\1317 Salt River Bridges\7th Street\excel\[col_top.xls]Sheet1		Checker:		Date:	

LOADS AT TOP OF COLUMN - PIER 2 *(Cont.)*

CASE - 3 MOMENT

		DL (K-FT)	LL+I (K-FT)	WIND (K-FT)	WL (K-FT)	LF (K-FT)	SF (K-FT)	RST (K-FT)
trans	Col 1 - My	139	58	981	141	0	1,993	86
long	Col 1 - Mx	0	0	124	25	56	56	12
trans	Col 2 - My	102	43	885	156	0	1,409	0
long	Col 2 - Mx	0	0	124	25	56	80	12
trans	Col 3 - My	271	68	864	141	0	1,276	86
long	Col 3 - Mx	0	0	124	25	56	80	12

	GRP-I (K-FT)	GRP-II (K-FT)	GRP-III (K-FT)	GRP-IV (K-FT)	GRP-V (K-FT)	GRP-VI (K-FT)
Col 1 - My	2,853	4,001	3,369	2,914	3,954	3,346
Col 1 - Mx	73	234	226	89	240	233
Col 2 - My	2,024	3,081	2,535	1,987	2,962	2,437
Col 2 - Mx	104	264	257	119	270	262
Col 3 - My	2,071	3,046	2,532	2,122	3,035	2,542
Col 3 - Mx	104	264	257	119	270	262

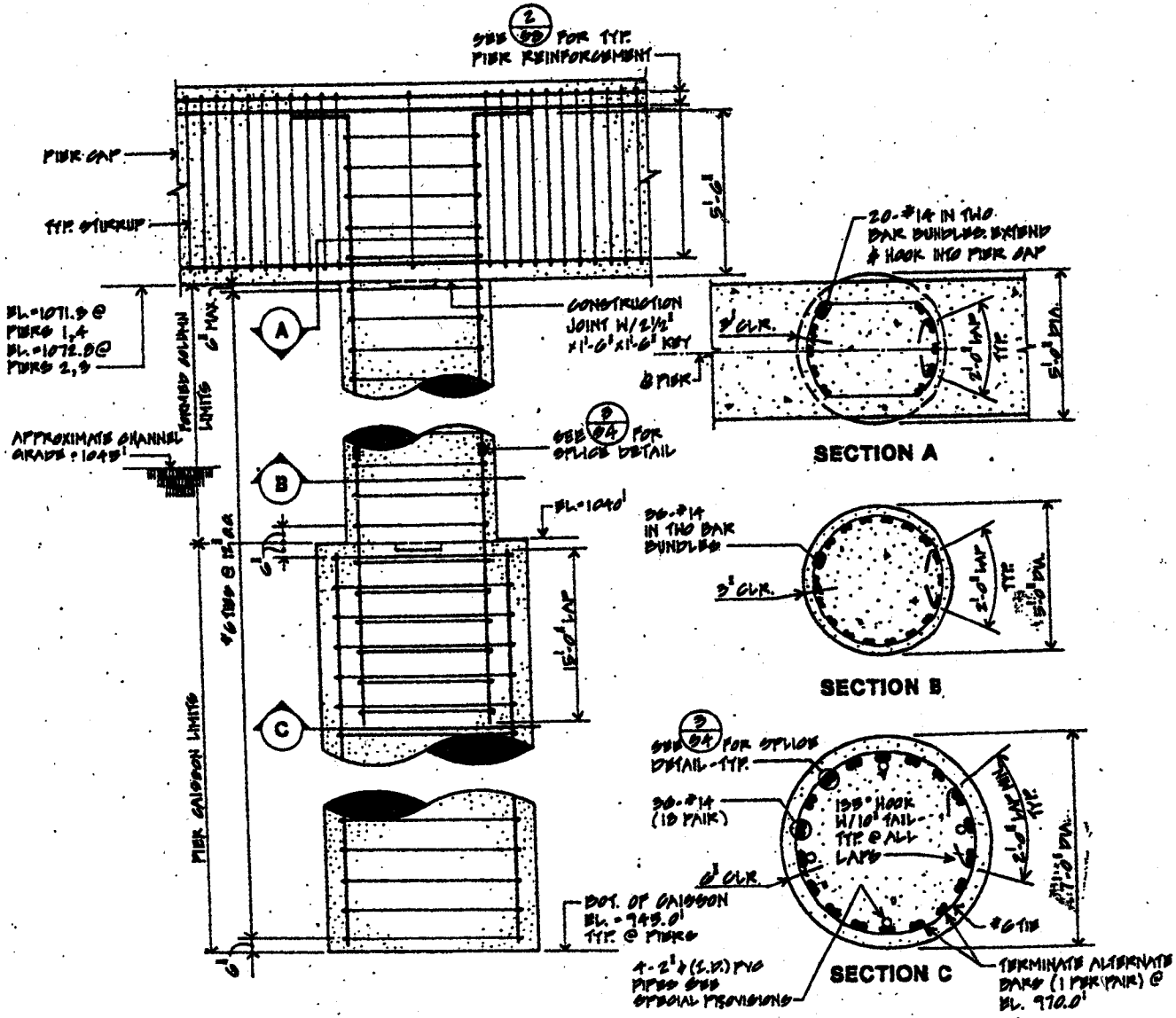
DRILLED SHAFT LOAD AT PIER 2

DRILLED SHAFT DIAMETER = 7 FT WT = 5.77 K/FT

LENGTH TO 100-YR FLOOD SCOUR = 61.51 FT WT = 355.1 KIPS

I = 0.19

	COL -1 (100-YR)	COL-2 (100-YR)	COL-3 (100-YR)
LL+I =	67.03	178.97	62.36
LL =	56	150	52
DL =	1,039	1,478	1,040
SF+B =	(104)	41	63
DL+LL-B =	991	1,669	1,155



1 TYP. PIER CAISSON

3/8" = 1'-0"

TYLIN INTERNATIONAL

Projects: Salt River Bridges - Scour

Item: Seventh Street Bridge

Job No. 1317.00

Designer: VPD

Sheet: of

Date: 2/2/00

Checker:

Date:

Grid: 1/10"

```
 SALT RIVER BRIDGES - 7TH STREET BRIDGE - PIER 2 COLUMN
        9
        4
        1       36
        0
        2      1.0      6.0        0    57.00      0.00      0.00
     3500 29000000   0.0030    60000
    60.00     0.00     0.00     0.00
    27.80                              2.25        36
LOAD AT TOP                       NO   PILE
 0.99 0.50 0.00 0.00    19.00    71.97    1    1     3.00  AGS    B
    139       0    68    68    58   981   141    0    0   86  1993
      0       0     0     0     0   124    25   56    0   12    56
   1039       0    62    62    67   130     9    0    0    4   104
                    0     0     0                        0
                    0     0     0                        0
                    0     0     0                        0
        0       0     0     0     0     0     0
        0       0     0     0     0     0     0
        0       0     0     0     0     0     0
```

```
TITLE   SALT RIVER BRIDGES - 7TH STREET BRIDGE                    PAGE  1

***************** Licensed to: T.Y. Lin International ****************
*                                                                    *
*              IAI RECOL-PC  - VERSION 2.1    06.26.89               *
*                                                                    *
**********************************************************************


COLUMN TYPE                    =  9  (CIRCULAR)
CONCRETE LOOPS                 =  1
TOTAL NO. OF CONCRETE COORD.   = 40
STEEL REBAR PATTERN            =  4  (CONCENTRIC LOOPS)
NUMBER OF STEEL REBAR LOOPS    =  1
TOTAL NO. OF STEEL REBARS      = 36
PLOT TYPE                      =  0  (NO PLOT)
DESIGN TYPE                    =  2  (CHECK)
PERCENT STEEL LIMITS           =     (1.00 % MIN.  6.00 % MAX.)


*************
* BENT DATA *
*************************************************************************

NUMBER OF COLUMNS IN BENT                  =     0
OUT TO OUT DISTANCE (DIAMETER) OF SPIRAL   = 57.00 (INCHES)
DISTANCE FROM TOP COLUMN PLASTIC HINGE TO
CENTER OF GRAVITY OF THE SUPERSTRUCTURE    =  0.00 (FEET)
CENTER TO CENTER SPACING OF COLUMNS        =  0.00 (FEET)


******************************
* MATERIAL PROPERTIES  (PSI) *
*************************************************************************

ULTIMATE CONCRETE COMPRESSIVE STRESS - FC =     3500.
YOUNG S MODULUS FOR CONCRETE         - EC =  3372165.
YOUNG S MODULUS FOR STEEL BARS       - ES = 29000000.
ULTIMATE CONCRETE COMPRESSIVE STRAIN - EO =      .003
YIELDING STRESS FOR STEEL BARS       - FY =    60000.
```

TITLE SALT RIVER BRIDGES - 7TH STREET BRIDGE PAGE 2

CIRCULAR CROSS-SECTION

HX
60.00

CONCRETE COORDINATES (INCHES)

COORD	X	Y
1	30.00	0.00
2	29.63	4.69
3	28.53	9.27
4	26.73	13.62
5	24.27	17.63
6	21.21	21.21
7	17.63	24.27
8	13.62	26.73
9	9.27	28.53
10	4.69	29.63
11	0.00	30.00
12	-4.69	29.63
13	-9.27	28.53
14	-13.62	26.73
15	-17.63	24.27
16	-21.21	21.21
17	-24.27	17.63
18	-26.73	13.62
19	-28.53	9.27
20	-29.63	4.69
21	-30.00	0.00
22	-29.63	-4.69
23	-28.53	-9.27
24	-26.73	-13.62
25	-24.27	-17.63
26	-21.21	-21.21
27	-17.63	-24.27
28	-13.62	-26.73
29	-9.27	-28.53
30	-4.69	-29.63
31	0.00	-30.00
32	4.69	-29.63
33	9.27	-28.53
34	13.62	-26.73
35	17.63	-24.27
36	21.21	-21.21
37	24.27	-17.63
38	26.73	-13.62
39	28.53	-9.27
40	29.63	-4.69

TITLE SALT RIVER BRIDGES - 7TH STREET BRIDGE PAGE 3

CONCENTRIC CIRCLE PATTERN

LOOP	RADIUS	AREA	BARS
1	27.80	2.25	36

STEEL REBAR COORDINATES (INCHES)

COORD	X	Y
1	27.80	0.00
2	27.38	4.83
3	26.12	9.51
4	24.08	13.90
5	21.30	17.87
6	17.87	21.30
7	13.90	24.08
8	9.51	26.12
9	4.83	27.38
10	0.00	27.80
11	-4.83	27.38
12	-9.51	26.12
13	-13.90	24.08
14	-17.87	21.30
15	-21.30	17.87
16	-24.08	13.90
17	-26.12	9.51
18	-27.38	4.83
19	-27.80	0.00
20	-27.38	-4.83
21	-26.12	-9.51
22	-24.08	-13.90
23	-21.30	-17.87
24	-17.87	-21.30
25	-13.90	-24.08
26	-9.51	-26.12
27	-4.83	-27.38
28	0.00	-27.80
29	4.83	-27.38
30	9.51	-26.12
31	13.90	-24.08
32	17.87	-21.30
33	21.30	-17.87
34	24.08	-13.90
35	26.12	-9.51
36	27.38	-4.83

THE MAIN LONGITUDINAL STEEL IS ASSUMED TO BE # 14 BARS.

TITLE SALT RIVER BRIDGES - 7TH STREET BRIDGE PAGE 4

```
**************************
* INITIAL REFERENCE DATA *
******************************************************************************

TOTAL AREA OF THE SECTION                AG =     19.55 FT**2
NOMINAL AXIAL LOAD STRENGTH              PO =  12996.09 KIPS
TOTAL REINFORCEMENT AREA                AST =     81.00 IN**2
PERCENT STEEL                             =      2.88 %

GROSS MOMENT OF INERTIA ABOUT Y-AXIS   IYC =     30.43 FT**4
GROSS MOMENT OF INERTIA ABOUT X-AXIS   IXC =     30.43 FT**4

STEEL MOMENT OF INERTIA ABOUT Y-AXIS   IYS =    1.5095 FT**4
STEEL MOMENT OF INERTIA ABOUT X-AXIS   IXS =    1.5095 FT**4
```


TITLE SALT RIVER BRIDGES - 7TH STREET BRIDGE PAGE 5

```
**************************
* COLUMN LOAD DATA (K-FT) *
******************************************************************************

LOAD NAME:          LOAD AT TOP
FOOTING DATA FILE:  NO
TYPE FOOTING:        PILE
```

SEISMIC DESIGN CRITERIA CATEGORY	MOMENT DISTRIBUTION FACT :---TOP---: DAY	SPC DAX	:---BOTTOM---: DBY	DBX	PERCENT IMPACT	COLUMN LENGTH (FEET)	STEEL TIE=1 SPIRAL=0	LOCATION TOP=1 BOTTOM=0	DUCTILITY FACTOR (Z)
AGS	0.99	0.50 B	0.00	0.00	19.00	71.97	1	1	3.00

COLUMN GROUP LOADS - SERVICE (K-FT)

BY		DEAD LOAD	PRE STRESS	:---- LL+IMPACT ---: CASE 1 TRANS MY-MAX	CASE 2 LONG MX-MAX	CASE 3 AXIAL N-MAX	WIND	WL	LF	CF-MY	TEMP	SF&
93	MY	139	0	68	68	58	981	141	0	0	86	19
56	MX	0	0	0	0	0	124	25	56	0	12	
04	P	1039	0	62	62	67	130	9	0	0	4	1
	PMY			0	0	0				0		
	PMX			0	0	0				0		
	P			0	0	0				0		

COLUMN SEISMIC AND ARBITRARY LOADS (K-FT)

	(ARS) UNREDUCED SEISMIC CASE 1 MAX TRAN	CASE 2 MAX LONG	ARBITRARY LOADS SERVICE AL1	SERVICE AL2	ARBITRARY LOADS FACTORED AL1	FACTORED AL2
MY TRAN	0.	0.	0.	0.	0.	0.
MX LONG	0.	0.	0.	0.	0.	0.
P AXIAL	0.	0.	0.	0.	0.	0.

TITLE SALT RIVER BRIDGES - 7TH STREET BRIDGE PAGE 6

****
* FACTORED LOADS FOR COLUMN DESIGN CHECK (KIP-FT) *
****

APPLIED FACTORED MOMENTS ARE MAGNIFIED FOR SLENDERNESS IN ACCORDANCE WITH CALTRANS BRIDGE DESIGN SPECIFICATIONS. (ART 8.16.5)

LENGTH = 71.97 FT FC = 3.50 KSI FY = 60.00 KSI
STEEL = 2.88 % AST = 81.00 SQ IN

GROUP	CASE	:------ APPLIED FACTORED ------: TRANS MY	LONG MX	COMB M	AXIAL P	CAPACITY (PHI*MN) MU	PHI	RATIO MU/M	
IH	1	3589.	273.	3599.	1283.	7380.	0.72	2.05	OK
IH	2	3589.	273.	3599.	1283.	7380.	0.72	2.05	OK
IH	3	3899.	354.	3915.	1631.	7365.	0.70	1.88	OK
IP	1	3320.	243.	3329.	1148.	7477.	0.74	2.25	OK
IP	2	3320.	243.	3329.	1148.	7477.	0.74	2.25	OK
IP	3	3622.	320.	3636.	1486.	7310.	0.70	2.01	OK
II		5014.	281.	5022.	1317.	7353.	0.71	1.46	OK
III	1	4222.	275.	4230.	1291.	7373.	0.72	1.74	OK
III	2	4222.	275.	4230.	1291.	7373.	0.72	1.74	OK
III	3	4583.	355.	4597.	1635.	7367.	0.70	1.60	OK
IV	1	3620.	262.	3629.	1234.	7415.	0.72	2.04	OK
IV	2	3620.	262.	3629.	1234.	7415.	0.72	2.04	OK
IV	3	3936.	341.	3951.	1578.	7345.	0.70	1.86	OK
V		4914.	271.	4921.	1272.	7386.	0.72	1.50	OK
VI	1	4158.	265.	4166.	1247.	7405.	0.72	1.78	OK
VI	2	4158.	265.	4166.	1247.	7405.	0.72	1.78	OK
VI	3	4497.	341.	4510.	1578.	7346.	0.70	1.63	OK
VII	1	2612.	242.	2624.	1143.	6838.	0.67	2.61	OK
VII	2	2612.	242.	2624.	1143.	6838.	0.67	2.61	OK

NOTE: FOR CALTRANS AND SPC-C AND SPC-D ONLY THE UNREDUCED SEISMIC MOMENTS ARE REDUCED BY THE Z OR R FACTOR. FOR SPC-B BOTH THE UNREDUCED SEISMIC AXIAL AND MOMENTS ARE REDUCED BY THE Z OR R FACTOR.

TITLE SALT RIVER BRIDGES - 7TH STREET BRIDGE PAGE 7

****
* MOMENT MAGNIFICATION AND BUCKLING CALCULATIONS *
****

REFERENCE: "CALTRANS BRIDGE DESIGN SPECIFICATIONS" (ART 8.16.5)
(COLUMN ASSUMED TO BE UNBRACED AGAINST SIDESWAY.)

MAGY = MOMENT MAGNIFACTION FACTOR ABOUT Y-AXIS
MAGX = MOMENT MAGNIFACTION FACTOR ABOUT X-AXIS

PCY = CRITICAL BUCKLING LOAD ABOUT Y-AXIS
PCX = CRITICAL BUCKLING LOAD ABOUT X-AXIS

KY = EFFECTIVE LENGTH FACTOR ABOUT Y-AXIS = 2.10
KX = EFFECTIVE LENGTH FACTOR ABOUT X-AXIS = 1.19

KY*L/R = SLENDERNESS RATIO ABOUT Y-AXIS =121.
KX*L/R = SLENDERNESS RATIO ABOUT X-AXIS = 69.

IYS = STEEL MOMENT OF INERTIA ABOUT Y-AXIS = 1.5095 FT**4
IXS = STEEL MOMENT OF INERTIA ABOUT X-AXIS = 1.5095 FT**4

GR	CA	:-MOMENT MAGNIFICATION-: TRAN MAGY	LONG MAGX	COMB MAG	:--CRACKED TRANSFORMED SECTION--: E*IY	E*IX	:-----CRITICAL BUCKLING----: TRAN PCY	LONG PCX	AXIAL LOAD P
IH	1	1.249	1.066	1.247	14902861.	15605690.	6439.	20854.	1283.
IH	2	1.249	1.066	1.247	14902861.	15605690.	6439.	20854.	1283.
IH	3	1.346	1.085	1.343	14689502.	15605690.	6347.	20854.	1631.
IP	1	1.218	1.058	1.217	14866681.	15605690.	6424.	20854.	1148.
IP	2	1.218	1.058	1.217	14866681.	15605690.	6424.	20854.	1148.
IP	3	1.307	1.077	1.304	14650504.	15605690.	6330.	20854.	1486.
II		1.253	1.067	1.252	15094474.	15605690.	6522.	20854.	1317.
III	1	1.249	1.066	1.248	15004190.	15605690.	6483.	20854.	1291.
III	2	1.249	1.066	1.248	15004190.	15605690.	6483.	20854.	1291.
III	3	1.343	1.085	1.341	14820958.	15605690.	6404.	20854.	1635.
IV	1	1.237	1.063	1.236	14914995.	15605690.	6444.	20854.	1234.
IV	2	1.237	1.063	1.236	14914995.	15605690.	6444.	20854.	1234.
IV	3	1.330	1.082	1.328	14707458.	15605690.	6355.	20854.	1578.
V		1.242	1.065	1.242	15088674.	15605690.	6519.	20854.	1272.
VI	1	1.238	1.064	1.237	15000312.	15605690.	6481.	20854.	1247.
VI	2	1.238	1.064	1.237	15000312.	15605690.	6481.	20854.	1247.
VI	3	1.327	1.082	1.325	14815734.	15605690.	6401.	20854.	1578.
VII	1	1.225	1.058	1.224	14386343.	15605690.	6216.	20854.	1143.
VII	2	1.225	1.058	1.224	14386343.	15605690.	6216.	20854.	1143.

*** WARNING KL/R = 121. ABOUT THE Y-AXIS IS GREATER THAN 100. REDESIGN THE COLUMN WITH A LARGER CROSS-SECTION OR PERFORM A SPECIAL SECOND ORDER ANALYSIS AS DEFINED IN ART 8.16.5.1.1 OF AASHTO.

TITLE SALT RIVER BRIDGES - 7TH STREET BRIDGE PAGE 8

COLUMN SERVICE LOADS (K-FT) AND MAXIMUM WORKING STRESSES (PSI)

YOUNG S MODULUS FOR CONCRETE - EC = 3372165. PSI
MODULAR RATIO (ES/EC) - N = 8.6

		:---- SERVICE LOADS (K-FT) ----:				:---- MAX STRESS (PSI) ----:		
GP	CASE	TRANS MY	LONG MX	COMB M	AXIAL P	CONC COMP	STEEL TEN	STEEL COMP
IH	1	2200.	56.	2201.	1205.	1419.	7401.	11454.
IH	2	2200.	56.	2201.	1205.	1419.	7401.	11454.
IH	3	2190.	56.	2191.	1210.	1413.	7286.	11412.
II		2490.	144.	2495.	1018.	1583.	11414.	12658.
III	1	2108.	139.	2113.	1002.	1349.	8372.	10838.
III	2	2108.	139.	2113.	1002.	1349.	8372.	10838.
III	3	2100.	139.	2105.	1006.	1344.	8272.	10804.
IV	1	1829.	54.	1830.	967.	1177.	6427.	9489.
IV	2	1829.	54.	1830.	967.	1177.	6427.	9489.
IV	3	1821.	54.	1822.	971.	1172.	6333.	9455.
V		2285.	137.	2289.	912.	1451.	10689.	11595.
VI	1	1944.	133.	1948.	898.	1242.	7954.	9969.
VI	2	1944.	133.	1948.	898.	1242.	7954.	9969.
VI	3	1937.	133.	1941.	901.	1238.	7863.	9939.
DL		139.	0.	139.	1039.	360.	0.	3063.

TITLE SALT RIVER BRIDGES - 7TH STREET BRIDGE PAGE 9

****
* PROBABLE PLASTIC MOMENT (1.3 X NOMINAL MOMENT) (KIP-FT) *
****

CODE (8.16.4.4) AND MEMO TO DESIGNERS 15-10

FC = 3.50 KSI FY = 60.00 KSI
EO = 0.0030 IN/IN AST = 81.00 SQ IN

ANGLE	TRANS MPY	LONG MPX	COMB MP	AXIAL P	P-BALANCE (APPROX)
90.0	0.1045E+05	-.1027E+01	0.1045E+05	0.7796E+04	3378
	0.1189E+05	-.6513E+00	0.1189E+05	0.6497E+04	
	0.1307E+05	-.2162E+00	0.1307E+05	0.5198E+04	
	0.1388E+05	0.3328E+00	0.1388E+05	0.3898E+04	
	0.1379E+05	0.9172E+00	0.1379E+05	0.2600E+04	
	0.1296E+05	0.1351E+01	0.1296E+05	0.1301E+04	
	0.1271E+05	0.1488E+01	0.1271E+05	0.1040E+04	
	0.1144E+05	0.1593E+01	0.1144E+05	0.8527E+00	
	0.1042E+05	0.1564E+01	0.1042E+05	-.6488E+03	
	0.9236E+04	0.1562E+01	0.9236E+04	-.1298E+04	

** NOTE: THE NUMBER OF COLUMNS EQUALS ZERO.
THEREFORE, NO PLASTIC HINGING ANALYSIS IS PERFORMED.

TITLE SALT RIVER BRIDGES - 7TH STREET BRIDGE PAGE 10

TYLIN INTERNATIONAL

Projects: Salt River Bridges - Scour | Job No. 1317.00 | Sheet: of

Item: Seventh Street Bridge | Designer: VPD | Date: 1/31/00

Checker: | Date:

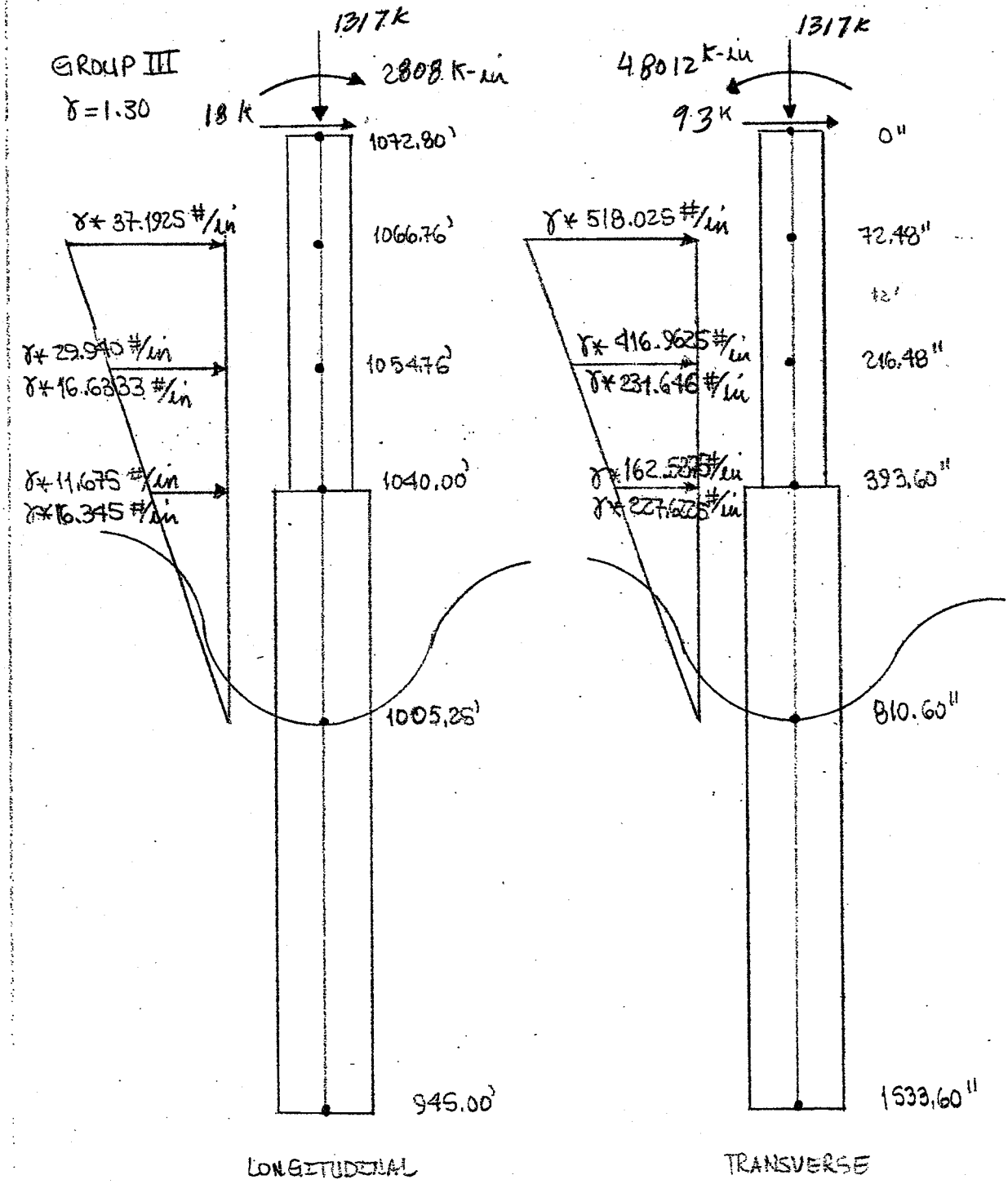
Grid: 1/10"

DESIGN LOAD = 1853 K

CAPACITY =

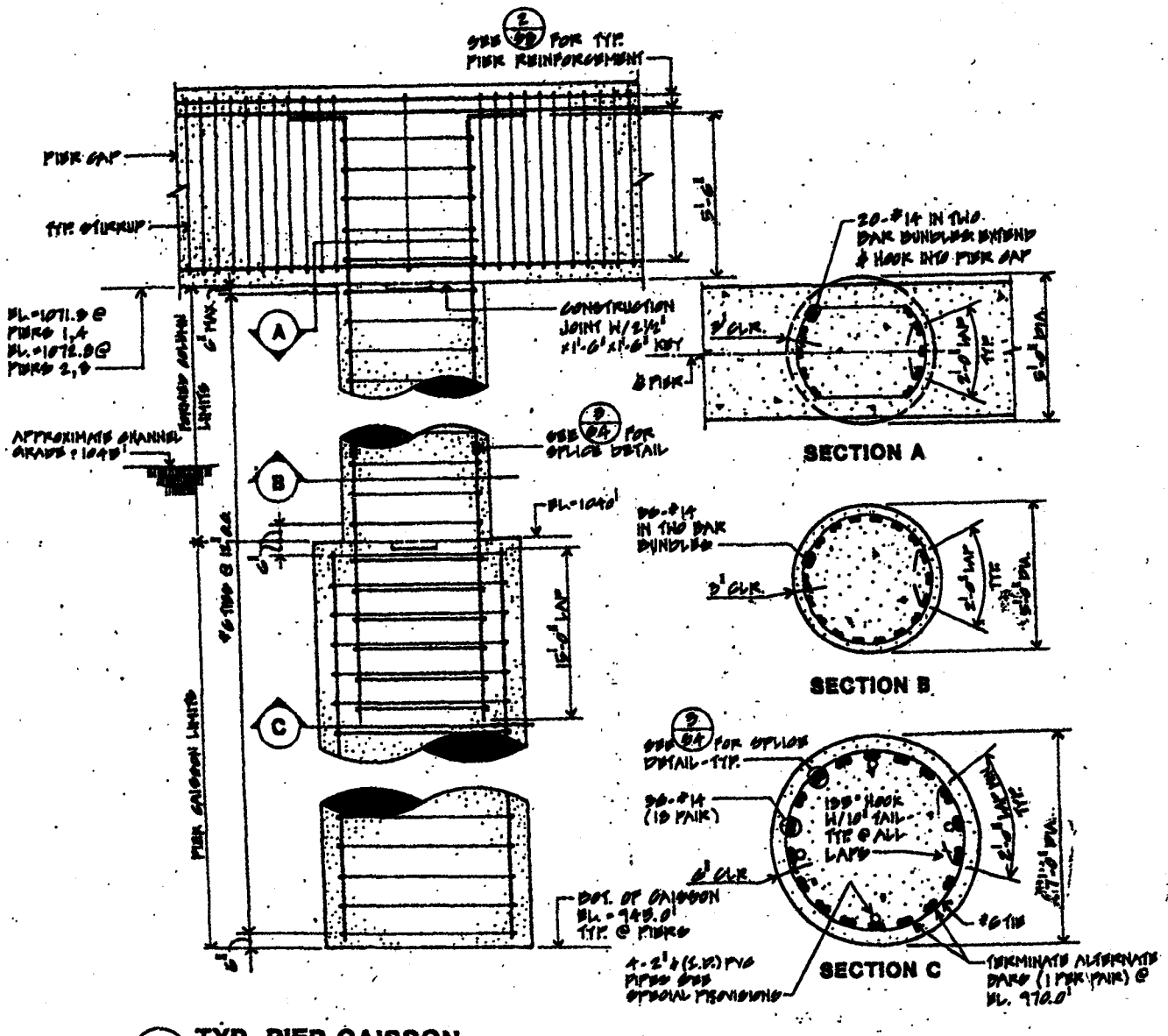
GROUP III

$\gamma = 1.30$



LONGITUDINAL

TRANSVERSE



1 TYP. PIER CAISSON
3/8"=1'-0"

FYLIN INTERNATIONAL

Projects: Salt River Bridges - Scour
Item: Seventh Street Bridge
Job No. 1317.00
Designer: VPD
Checker:
Date:
Sheet: 2 of 3
Date: 00
Grid: 1/10"

```
7th Street Bridge - Scour (Long Direction)
1 1 0 0 0
100     4       810.6   1533    0
0       60      636000  2830    3370000
393     60      636000  2830    3370000
393     84      2440000 5540    3370000
1533    84      2440000 5540    3370000
1       2       2       0       0
4       810.6   1533    500
810.6   0.045
1533    0.045
810.6   0       42      0
1533    0       42      0
6       1       1
72.48   48.4
216.48  38.9
216.48  21.6
393.6   15.2
393.6   21.2
810.6   0
1
1       18000   2808000 1317000
0
1       1       0
100     1E-5    100
```

Licensed to: Shagufta Jabeen

T.Y. Lin International

PROGRAM LPILE plus Version 3.0
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7th Street Bridge - Scour (Long Direction)

UNITS--ENGLISH UNITS

INPUT INFORMATION

THE LOADING IS STATIC

PILE GEOMETRY AND PROPERTIES

PILE LENGTH = 1533.00 IN
4 POINTS

X IN	DIAMETER IN	MOMENT OF INERTIA IN**4	AREA IN**2	MODULUS OF ELASTICITY LBS/IN**2
.00	60.000	.636E+06	.283E+04	.337E+07
393.00	60.000	.636E+06	.283E+04	.337E+07
393.00	84.000	.244E+07	.554E+04	.337E+07
1533.00	84.000	.244E+07	.554E+04	.337E+07

SOILS INFORMATION

X AT THE GROUND SURFACE = 810.60 IN

SLOPE ANGLE AT THE GROUND SURFACE = .00 DEG.

1 LAYER(S) OF SOIL

LAYER 1
THE SOIL IS A SAND - P-Y CRITERIA BY REESE ET AL, 1974
X AT THE TOP OF THE LAYER = 810.60 IN
X AT THE BOTTOM OF THE LAYER = 1533.00 IN
MODULUS OF SUBGRADE REACTION = .500E+03 LBS/IN**3

DISTRIBUTION OF EFFECTIVE UNIT WEIGHT WITH DEPTH
2 POINTS

X,IN	WEIGHT,LBS/IN**3
810.60	.45E-01
1533.00	.45E-01

DISTRIBUTION OF STRENGTH PARAMETERS WITH DEPTH
2 POINTS

X,IN	C,LBS/IN**2	PHI,DEGREES	E50
810.60	.000E+00	.420E+02	-----
1533.00	.000E+00	.420E+02	-----

BOUNDARY AND LOADING CONDITIONS

DISTRIBUTED LOAD CURVE 6 POINTS

X,IN	LOAD,LBS/IN
72.48	.484E+02
216.48	.389E+02
216.48	.216E+02
393.60	.152E+02
393.60	.212E+02
810.60	.000E+00

LOADING NUMBER 1

BOUNDARY-CONDITION CODE = 1
LATERAL LOAD AT THE PILE HEAD = .180E+05 LBS
MOMENT AT THE PILE HEAD = .281E+07 IN-LBS
AXIAL LOAD AT THE PILE HEAD = .132E+07 LBS

FINITE-DIFFERENCE PARAMETERS
NUMBER OF PILE INCREMENTS = 100
DEFLECTION TOLERANCE ON DETERMINATION OF CLOSURE = .100E-04 IN
MAXIMUM NUMBER OF ITERATIONS ALLOWED FOR PILE ANALYSIS = 100
MAXIMUM ALLOWABLE DEFLECTION = .10E+03 IN

OUTPUT CODES
KOUTPT = 1
KPYOP = 0
INC = 1

OUTPUT INFORMATION

```
*************************************************
* COMPUTE LOAD-DISTRIBUTION AND LOAD-DEFLECTION *
* CURVES FOR LATERAL LOADING                    *
*************************************************
```

DISTRIBUTED LOAD CURVE 6 POINTS

X,IN	LOAD,LBS/IN
72.48	.484E+02
216.48	.389E+02
216.48	.216E+02
393.60	.152E+02

393.60	.212E+02
810.60	.000E+00

LOADING NUMBER 1

BOUNDARY CONDITION CODE = 1
LATERAL LOAD AT THE PILE HEAD = .180E+05 LBS
MOMENT AT THE PILE HEAD = .281E+07 IN-LBS
AXIAL LOAD AT THE PILE HEAD = .132E+07 LBS

X IN	DEFLECTION IN	MOMENT LBS-IN	SHEAR LBS	SLOPE RAD.	TOTAL STRESS LBS/IN**2	FLEXURAL RIGIDITY LBS-IN**2	SOIL REACTION LBS/IN
*****	*********	********	*********	*********	*********	*********	*********
.0	.164E+01	.281E+07	.180E+05	-.313E-02	.598E+03	.214E+13	.000E+00
15.3	.159E+01	.315E+07	.180E+05	-.311E-02	.614E+03	.214E+13	.000E+00
30.7	.154E+01	.349E+07	.180E+05	-.309E-02	.630E+03	.214E+13	.000E+00
46.0	.150E+01	.382E+07	.180E+05	-.306E-02	.646E+03	.214E+13	.000E+00
61.3	.145E+01	.416E+07	.180E+05	-.303E-02	.662E+03	.214E+13	.000E+00
76.7	.140E+01	.450E+07	.184E+05	-.300E-02	.678E+03	.214E+13	.000E+00
92.0	.136E+01	.485E+07	.191E+05	-.297E-02	.694E+03	.214E+13	.000E+00
107.3	.131E+01	.520E+07	.198E+05	-.293E-02	.711E+03	.214E+13	.000E+00
122.6	.127E+01	.557E+07	.205E+05	-.289E-02	.728E+03	.214E+13	.000E+00
138.0	.122E+01	.595E+07	.212E+05	-.285E-02	.746E+03	.214E+13	.000E+00
153.3	.118E+01	.634E+07	.219E+05	-.281E-02	.764E+03	.214E+13	.000E+00
168.6	.114E+01	.673E+07	.225E+05	-.276E-02	.783E+03	.214E+13	.000E+00
184.0	.109E+01	.714E+07	.232E+05	-.271E-02	.802E+03	.214E+13	.000E+00
199.3	.105E+01	.755E+07	.238E+05	-.266E-02	.822E+03	.214E+13	.000E+00
214.6	.101E+01	.797E+07	.244E+05	-.260E-02	.842E+03	.214E+13	.000E+00
229.9	.974E+00	.840E+07	.248E+05	-.255E-02	.862E+03	.214E+13	.000E+00
245.3	.935E+00	.884E+07	.252E+05	-.248E-02	.882E+03	.214E+13	.000E+00
260.6	.897E+00	.928E+07	.255E+05	-.242E-02	.903E+03	.214E+13	.000E+00
275.9	.861E+00	.972E+07	.258E+05	-.235E-02	.924E+03	.214E+13	.000E+00
291.3	.825E+00	.102E+08	.261E+05	-.228E-02	.945E+03	.214E+13	.000E+00
306.6	.791E+00	.106E+08	.264E+05	-.221E-02	.966E+03	.214E+13	.000E+00
321.9	.758E+00	.111E+08	.266E+05	-.213E-02	.987E+03	.214E+13	.000E+00
337.3	.726E+00	.115E+08	.269E+05	-.205E-02	.101E+04	.214E+13	.000E+00
352.6	.695E+00	.120E+08	.272E+05	-.196E-02	.103E+04	.214E+13	.000E+00
367.9	.665E+00	.124E+08	.274E+05	-.188E-02	.105E+04	.214E+13	.000E+00
383.3	.637E+00	.129E+08	.277E+05	-.179E-02	.107E+04	.214E+13	.000E+00
398.6	.611E+00	.133E+08	.279E+05	-.173E-02	.467E+03	.822E+13	.000E+00
413.9	.584E+00	.138E+08	.282E+05	-.170E-02	.475E+03	.822E+13	.000E+00
429.2	.558E+00	.143E+08	.286E+05	-.168E-02	.483E+03	.822E+13	.000E+00
444.6	.533E+00	.148E+08	.288E+05	-.165E-02	.492E+03	.822E+13	.000E+00
459.9	.508E+00	.152E+08	.291E+05	-.162E-02	.500E+03	.822E+13	.000E+00
475.2	.483E+00	.157E+08	.294E+05	-.159E-02	.508E+03	.822E+13	.000E+00
490.6	.459E+00	.162E+08	.296E+05	-.156E-02	.516E+03	.822E+13	.000E+00
505.9	.435E+00	.167E+08	.299E+05	-.153E-02	.525E+03	.822E+13	.000E+00
521.2	.412E+00	.172E+08	.301E+05	-.150E-02	.533E+03	.822E+13	.000E+00
536.5	.389E+00	.177E+08	.303E+05	-.147E-02	.542E+03	.822E+13	.000E+00
551.9	.367E+00	.182E+08	.305E+05	-.143E-02	.550E+03	.822E+13	.000E+00
567.2	.345E+00	.187E+08	.307E+05	-.140E-02	.559E+03	.822E+13	.000E+00
582.5	.324E+00	.192E+08	.309E+05	-.136E-02	.568E+03	.822E+13	.000E+00
597.9	.303E+00	.197E+08	.311E+05	-.133E-02	.576E+03	.822E+13	.000E+00
613.2	.283E+00	.202E+08	.313E+05	-.129E-02	.585E+03	.822E+13	.000E+00
628.5	.264E+00	.207E+08	.314E+05	-.125E-02	.594E+03	.822E+13	.000E+00
643.9	.245E+00	.212E+08	.315E+05	-.121E-02	.602E+03	.822E+13	.000E+00
659.2	.227E+00	.217E+08	.317E+05	-.117E-02	.611E+03	.822E+13	.000E+00
674.5	.209E+00	.222E+08	.318E+05	-.113E-02	.620E+03	.822E+13	.000E+00
689.9	.192E+00	.227E+08	.319E+05	-.109E-02	.629E+03	.822E+13	.000E+00
705.2	.175E+00	.232E+08	.320E+05	-.105E-02	.637E+03	.822E+13	.000E+00

720.5	.160E+00	.237E+08	.320E+05	-.101E-02	.646E+03	.822E+13	.000E+00
735.8	.145E+00	.242E+08	.321E+05	-.960E-03	.655E+03	.822E+13	.000E+00
751.2	.130E+00	.248E+08	.322E+05	-.915E-03	.664E+03	.822E+13	.000E+00
766.5	.117E+00	.253E+08	.322E+05	-.868E-03	.673E+03	.822E+13	.000E+00
781.8	.104E+00	.258E+08	.322E+05	-.821E-03	.681E+03	.822E+13	.000E+00
797.2	.915E-01	.263E+08	.322E+05	-.772E-03	.690E+03	.822E+13	.000E+00
812.5	.800E-01	.268E+08	.320E+05	-.723E-03	.699E+03	.822E+13	-.360E+02
827.8	.693E-01	.273E+08	.290E+05	-.672E-03	.708E+03	.822E+13	-.350E+03
843.1	.594E-01	.277E+08	.211E+05	-.621E-03	.715E+03	.822E+13	-.680E+03
858.5	.503E-01	.280E+08	.822E+04	-.569E-03	.719E+03	.822E+13	-.100E+04
873.8	.420E-01	.280E+08	-.952E+04	-.517E-03	.720E+03	.822E+13	-.131E+04
889.1	.344E-01	.277E+08	-.299E+05	-.465E-03	.715E+03	.822E+13	-.135E+04
904.5	.277E-01	.271E+08	-.503E+05	-.414E-03	.704E+03	.822E+13	-.130E+04
919.8	.217E-01	.262E+08	-.693E+05	-.364E-03	.688E+03	.822E+13	-.119E+04
935.1	.165E-01	.250E+08	-.863E+05	-.316E-03	.668E+03	.822E+13	-.103E+04
950.5	.120E-01	.235E+08	-.101E+06	-.271E-03	.643E+03	.822E+13	-.842E+03
965.8	.822E-02	.219E+08	-.112E+06	-.229E-03	.615E+03	.822E+13	-.638E+03
981.1	.503E-02	.201E+08	-.120E+06	-.190E-03	.584E+03	.822E+13	-.429E+03
996.5	.241E-02	.182E+08	-.125E+06	-.154E-03	.551E+03	.822E+13	-.224E+03
1011.8	.309E-03	.163E+08	-.127E+06	-.122E-03	.518E+03	.822E+13	-.310E+02
1027.1	-.132E-02	.143E+08	-.126E+06	-.932E-04	.484E+03	.822E+13	.143E+03
1042.4	-.255E-02	.124E+08	-.123E+06	-.683E-04	.451E+03	.822E+13	.295E+03
1057.8	-.342E-02	.106E+08	-.117E+06	-.468E-04	.420E+03	.822E+13	.422E+03
1073.1	-.398E-02	.882E+07	-.110E+06	-.288E-04	.390E+03	.822E+13	.523E+03
1088.4	-.430E-02	.719E+07	-.102E+06	-.138E-04	.362E+03	.822E+13	.597E+03
1103.8	-.441E-02	.570E+07	-.921E+05	-.181E-05	.336E+03	.822E+13	.646E+03
1119.1	-.435E-02	.437E+07	-.820E+05	.758E-05	.313E+03	.822E+13	.672E+03
1134.4	-.418E-02	.319E+07	-.716E+05	.146E-04	.293E+03	.822E+13	.676E+03
1149.8	-.391E-02	.217E+07	-.614E+05	.196E-04	.275E+03	.822E+13	.662E+03
1165.1	-.357E-02	.131E+07	-.514E+05	.229E-04	.260E+03	.822E+13	.633E+03
1180.4	-.320E-02	.594E+06	-.420E+05	.246E-04	.248E+03	.822E+13	.593E+03
1195.7	-.282E-02	.187E+05	-.333E+05	.252E-04	.238E+03	.822E+13	.543E+03
1211.1	-.243E-02	-.429E+06	-.254E+05	.248E-04	.245E+03	.822E+13	.487E+03
1226.4	-.206E-02	-.762E+06	-.184E+05	.237E-04	.251E+03	.822E+13	.428E+03
1241.7	-.170E-02	-.995E+06	-.123E+05	.221E-04	.255E+03	.822E+13	.367E+03
1257.1	-.138E-02	-.114E+07	-.716E+04	.201E-04	.257E+03	.822E+13	.308E+03
1272.4	-.109E-02	-.122E+07	-.287E+04	.179E-04	.259E+03	.822E+13	.251E+03
1287.7	-.832E-03	-.123E+07	.578E+03	.156E-04	.259E+03	.822E+13	.198E+03
1303.1	-.610E-03	-.120E+07	.325E+04	.133E-04	.258E+03	.822E+13	.150E+03
1318.4	-.422E-03	-.113E+07	.522E+04	.112E-04	.257E+03	.822E+13	.107E+03
1333.7	-.267E-03	-.104E+07	.658E+04	.915E-05	.256E+03	.822E+13	.699E+02
1349.0	-.142E-03	-.930E+06	.741E+04	.732E-05	.254E+03	.822E+13	.382E+02
1364.4	-.428E-04	-.812E+06	.779E+04	.570E-05	.252E+03	.822E+13	.119E+02
1379.7	.329E-04	-.691E+06	.781E+04	.430E-05	.250E+03	.822E+13	-.936E+01
1395.0	.889E-04	-.572E+06	.754E+04	.312E-05	.248E+03	.822E+13	-.260E+02
1410.4	.129E-03	-.460E+06	.705E+04	.216E-05	.246E+03	.822E+13	-.385E+02
1425.7	.155E-03	-.356E+06	.639E+04	.139E-05	.244E+03	.822E+13	-.477E+02
1441.0	.171E-03	-.264E+06	.561E+04	.816E-06	.242E+03	.822E+13	-.540E+02
1456.3	.180E-03	-.185E+06	.475E+04	.398E-06	.241E+03	.822E+13	-.581E+02
1471.7	.183E-03	-.119E+06	.384E+04	.115E-06	.240E+03	.822E+13	-.606E+02
1487.0	.184E-03	-.669E+05	.290E+04	-.578E-07	.239E+03	.822E+13	-.621E+02
1502.3	.182E-03	-.298E+05	.194E+04	-.148E-06	.238E+03	.822E+13	-.628E+02
1517.7	.179E-03	-.748E+04	.973E+03	-.183E-06	.238E+03	.822E+13	-.633E+02
1533.0	.176E-03	.000E+00	.000E+00	-.190E-06	.238E+03	.822E+13	-.636E+02

OUTPUT VERIFICATION

THE MAXIMUM MOMENT IMBALANCE FOR ANY ELEMENT = .345E-04 IN-LBS
THE MAX. LATERAL FORCE IMBALANCE FOR ANY ELEMENT = .102E-05 LBS

OUTPUT SUMMARY

PILE-HEAD DEFLECTION = .164E+01 IN

```
COMPUTED SLOPE AT PILE HEAD    =  -.313E-02
MAXIMUM BENDING MOMENT         =   .280E+08 LBS-IN
MAXIMUM SHEAR FORCE            =  -.127E+06 LBS
NO. OF ITERATIONS              =          8
NO. OF ZERO DEFLECTION POINTS  =          2
```

S U M M A R Y T A B L E
****

BOUNDARY CONDITION BC1	BOUNDARY CONDITION BC2	AXIAL LOAD LBS	PILE HEAD DEFLECTION IN	MAX. MOMENT IN-LBS	MAX. SHEAR LBS
.1800E+05	.2808E+07	.1317E+07	.1638E+01	.2799E+08	-.1271E+06

$M_u = .2799 \times 10^8 / 12000 = 2332.5$ k-ft

$V_u = .1271 \times 10^6 / 1000 = 127$ k

```
7th Street Bridge - Scour (transverse)
1 1 0 0 0
100     4       810.6   1533    0
0       60      636000  2830    3370000
393     60      636000  2830    3370000
393     84      2440000 5540    3370000
1533    84      2440000 5540    3370000
1       2       2       0       0
4       810.6   1533    500
810.6   0.045
1533    0.045
810.6   0       42      0
1533    0       42      0
6       1       1
72.48   48.4
216.48  38.9
216.48  21.6
393.6   15.2
393.6   21.2
810.6   0
1
1       93000   -48012000       1317000
0
1       1       0
100     1E-5    100
```

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T.Y. Lin International

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7th Street Bridge - Scour (transverse)

UNITS--ENGLISH UNITS

INPUT INFORMATION

THE LOADING IS STATIC

PILE GEOMETRY AND PROPERTIES

PILE LENGTH = 1533.00 IN
4 POINTS

X	DIAMETER	MOMENT OF INERTIA	AREA	MODULUS OF ELASTICITY
IN	IN	IN**4	IN**2	LBS/IN**2
.00	60.000	.636E+06	.283E+04	.337E+07
393.00	60.000	.636E+06	.283E+04	.337E+07
393.00	84.000	.244E+07	.554E+04	.337E+07
1533.00	84.000	.244E+07	.554E+04	.337E+07

SOILS INFORMATION

X AT THE GROUND SURFACE = 810.60 IN

SLOPE ANGLE AT THE GROUND SURFACE = .00 DEG.

1 LAYER(S) OF SOIL

LAYER 1
THE SOIL IS A SAND - P-Y CRITERIA BY REESE ET AL, 1974
X AT THE TOP OF THE LAYER = 810.60 IN
X AT THE BOTTOM OF THE LAYER = 1533.00 IN
MODULUS OF SUBGRADE REACTION = .500E+03 LBS/IN**3

DISTRIBUTION OF EFFECTIVE UNIT WEIGHT WITH DEPTH
2 POINTS

X,IN	WEIGHT,LBS/IN**3
810.60	.45E-01
1533.00	.45E-01

DISTRIBUTION OF STRENGTH PARAMETERS WITH DEPTH
2 POINTS

X,IN	C,LBS/IN**2	PHI,DEGREES	E50
810.60	.000E+00	.420E+02	-----
1533.00	.000E+00	.420E+02	-----

BOUNDARY AND LOADING CONDITIONS

DISTRIBUTED LOAD CURVE 6 POINTS

X,IN	LOAD,LBS/IN
72.48	.484E+02
216.48	.389E+02
216.48	.216E+02
393.60	.152E+02
393.60	.212E+02
810.60	.000E+00

LOADING NUMBER 1

BOUNDARY-CONDITION CODE = 1
LATERAL LOAD AT THE PILE HEAD = .930E+05 LBS
MOMENT AT THE PILE HEAD = -.480E+08 IN-LBS
AXIAL LOAD AT THE PILE HEAD = .132E+07 LBS

FINITE-DIFFERENCE PARAMETERS
NUMBER OF PILE INCREMENTS = 100
DEFLECTION TOLERANCE ON DETERMINATION OF CLOSURE = .100E-04 IN
MAXIMUM NUMBER OF ITERATIONS ALLOWED FOR PILE ANALYSIS = 100
MAXIMUM ALLOWABLE DEFLECTION = .10E+03 IN

OUTPUT CODES
KOUTPT = 1
KPYOP = 0
INC = 1

OUTPUT INFORMATION

```
*************************************************
* COMPUTE LOAD-DISTRIBUTION AND LOAD-DEFLECTION *
* CURVES FOR LATERAL LOADING                    *
*************************************************
```

DISTRIBUTED LOAD CURVE 6 POINTS

X,IN	LOAD,LBS/IN
72.48	.484E+02
216.48	.389E+02
216.48	.216E+02
393.60	.152E+02

393.60	.212E+02
810.60	.000E+00

LOADING NUMBER 1

BOUNDARY CONDITION CODE = 1
LATERAL LOAD AT THE PILE HEAD = .930E+05 LBS
MOMENT AT THE PILE HEAD = -.480E+08 IN-LBS
AXIAL LOAD AT THE PILE HEAD = .132E+07 LBS

X IN	DEFLECTION IN	MOMENT LBS-IN	SHEAR LBS	SLOPE RAD.	TOTAL STRESS LBS/IN**2	FLEXURAL RIGIDITY LBS-IN**2	SOIL REACTION LBS/IN
*****	*********	*********	*********	*********	*********	*********	*********
.0	.782E+00	-.480E+08	.930E+05	.353E-02	.273E+04	.214E+13	.000E+00
15.3	.834E+00	-.467E+08	.930E+05	.319E-02	.267E+04	.214E+13	.000E+00
30.7	.880E+00	-.453E+08	.930E+05	.286E-02	.260E+04	.214E+13	.000E+00
46.0	.922E+00	-.439E+08	.930E+05	.254E-02	.254E+04	.214E+13	.000E+00
61.3	.958E+00	-.425E+08	.930E+05	.223E-02	.247E+04	.214E+13	.000E+00
76.7	.990E+00	-.412E+08	.934E+05	.193E-02	.241E+04	.214E+13	.000E+00
92.0	.102E+01	-.398E+08	.941E+05	.164E-02	.234E+04	.214E+13	.000E+00
107.3	.104E+01	-.383E+08	.948E+05	.136E-02	.227E+04	.214E+13	.000E+00
122.6	.106E+01	-.369E+08	.955E+05	.109E-02	.221E+04	.214E+13	.000E+00
138.0	.107E+01	-.355E+08	.962E+05	.836E-03	.214E+04	.214E+13	.000E+00
153.3	.108E+01	-.340E+08	.969E+05	.588E-03	.207E+04	.214E+13	.000E+00
168.6	.109E+01	-.325E+08	.975E+05	.350E-03	.200E+04	.214E+13	.000E+00
184.0	.110E+01	-.310E+08	.982E+05	.123E-03	.193E+04	.214E+13	.000E+00
199.3	.110E+01	-.295E+08	.988E+05	-.937E-04	.186E+04	.214E+13	.000E+00
214.6	.109E+01	-.280E+08	.994E+05	-.299E-03	.179E+04	.214E+13	.000E+00
229.9	.109E+01	-.264E+08	.998E+05	-.494E-03	.171E+04	.214E+13	.000E+00
245.3	.108E+01	-.249E+08	.100E+06	-.678E-03	.164E+04	.214E+13	.000E+00
260.6	.107E+01	-.233E+08	.100E+06	-.850E-03	.157E+04	.214E+13	.000E+00
275.9	.105E+01	-.218E+08	.101E+06	-.101E-02	.149E+04	.214E+13	.000E+00
291.3	.103E+01	-.202E+08	.101E+06	-.116E-02	.142E+04	.214E+13	.000E+00
306.6	.102E+01	-.186E+08	.101E+06	-.130E-02	.134E+04	.214E+13	.000E+00
321.9	.995E+00	-.171E+08	.102E+06	-.143E-02	.127E+04	.214E+13	.000E+00
337.3	.972E+00	-.155E+08	.102E+06	-.154E-02	.119E+04	.214E+13	.000E+00
352.6	.948E+00	-.139E+08	.102E+06	-.165E-02	.112E+04	.214E+13	.000E+00
367.9	.922E+00	-.123E+08	.102E+06	-.174E-02	.104E+04	.214E+13	.000E+00
383.3	.894E+00	-.107E+08	.103E+06	-.182E-02	.968E+03	.214E+13	.000E+00
398.6	.866E+00	-.905E+07	.103E+06	-.187E-02	.393E+03	.822E+13	.000E+00
413.9	.837E+00	-.743E+07	.103E+06	-.189E-02	.366E+03	.822E+13	.000E+00
429.2	.808E+00	-.580E+07	.104E+06	-.190E-02	.338E+03	.822E+13	.000E+00
444.6	.779E+00	-.418E+07	.104E+06	-.191E-02	.310E+03	.822E+13	.000E+00
459.9	.749E+00	-.254E+07	.104E+06	-.191E-02	.281E+03	.822E+13	.000E+00
475.2	.720E+00	-.906E+06	.104E+06	-.192E-02	.253E+03	.822E+13	.000E+00
490.6	.690E+00	.735E+06	.105E+06	-.192E-02	.250E+03	.822E+13	.000E+00
505.9	.661E+00	.238E+07	.105E+06	-.192E-02	.279E+03	.822E+13	.000E+00
521.2	.632E+00	.403E+07	.105E+06	-.191E-02	.307E+03	.822E+13	.000E+00
536.5	.602E+00	.568E+07	.105E+06	-.190E-02	.336E+03	.822E+13	.000E+00
551.9	.573E+00	.734E+07	.106E+06	-.189E-02	.364E+03	.822E+13	.000E+00
567.2	.545E+00	.899E+07	.106E+06	-.187E-02	.393E+03	.822E+13	.000E+00
582.5	.516E+00	.107E+08	.106E+06	-.185E-02	.421E+03	.822E+13	.000E+00
597.9	.488E+00	.123E+08	.106E+06	-.183E-02	.450E+03	.822E+13	.000E+00
613.2	.460E+00	.140E+08	.106E+06	-.181E-02	.478E+03	.822E+13	.000E+00
628.5	.432E+00	.156E+08	.106E+06	-.178E-02	.507E+03	.822E+13	.000E+00
643.9	.405E+00	.173E+08	.107E+06	-.175E-02	.536E+03	.822E+13	.000E+00
659.2	.379E+00	.190E+08	.107E+06	-.172E-02	.564E+03	.822E+13	.000E+00
674.5	.353E+00	.207E+08	.107E+06	-.168E-02	.593E+03	.822E+13	.000E+00
689.9	.327E+00	.223E+08	.107E+06	-.164E-02	.622E+03	.822E+13	.000E+00
705.2	.302E+00	.240E+08	.107E+06	-.160E-02	.651E+03	.822E+13	.000E+00

720.5	.278E+00	.257E+08	.107E+06	-.155E-02	.680E+03	.822E+13	.000E+00
735.8	.255E+00	.273E+08	.107E+06	-.150E-02	.708E+03	.822E+13	.000E+00
751.2	.232E+00	.290E+08	.107E+06	-.145E-02	.737E+03	.822E+13	.000E+00
766.5	.210E+00	.307E+08	.107E+06	-.139E-02	.766E+03	.822E+13	.000E+00
781.8	.189E+00	.324E+08	.107E+06	-.133E-02	.795E+03	.822E+13	.000E+00
797.2	.169E+00	.340E+08	.107E+06	-.127E-02	.823E+03	.822E+13	.000E+00
812.5	.150E+00	.357E+08	.107E+06	-.121E-02	.852E+03	.822E+13	-.424E+02
827.8	.132E+00	.374E+08	.103E+06	-.114E-02	.881E+03	.822E+13	-.417E+03
843.1	.116E+00	.389E+08	.939E+05	-.107E-02	.908E+03	.822E+13	-.818E+03
858.5	.998E-01	.403E+08	.783E+05	-.994E-03	.931E+03	.822E+13	-.122E+04
873.8	.851E-01	.414E+08	.566E+05	-.918E-03	.950E+03	.822E+13	-.161E+04
889.1	.716E-01	.421E+08	.293E+05	-.840E-03	.962E+03	.822E+13	-.196E+04
904.5	.593E-01	.423E+08	-.294E+04	-.761E-03	.966E+03	.822E+13	-.225E+04
919.8	.483E-01	.420E+08	-.391E+05	-.683E-03	.961E+03	.822E+13	-.247E+04
935.1	.384E-01	.411E+08	-.764E+05	-.605E-03	.945E+03	.822E+13	-.239E+04
950.5	.297E-01	.397E+08	-.111E+06	-.530E-03	.921E+03	.822E+13	-.208E+04
965.8	.222E-01	.377E+08	-.140E+06	-.458E-03	.887E+03	.822E+13	-.172E+04
981.1	.157E-01	.354E+08	-.163E+06	-.390E-03	.847E+03	.822E+13	-.134E+04
996.5	.102E-01	.328E+08	-.181E+06	-.326E-03	.802E+03	.822E+13	-.950E+03
1011.8	.569E-02	.299E+08	-.192E+06	-.268E-03	.752E+03	.822E+13	-.572E+03
1027.1	.201E-02	.269E+08	-.198E+06	-.215E-03	.700E+03	.822E+13	-.218E+03
1042.4	-.895E-03	.238E+08	-.199E+06	-.167E-03	.648E+03	.822E+13	.104E+03
1057.8	-.312E-02	.208E+08	-.196E+06	-.126E-03	.595E+03	.822E+13	.386E+03
1073.1	-.476E-02	.178E+08	-.188E+06	-.900E-04	.544E+03	.822E+13	.624E+03
1088.4	-.588E-02	.150E+08	-.177E+06	-.594E-04	.496E+03	.822E+13	.817E+03
1103.8	-.658E-02	.124E+08	-.163E+06	-.338E-04	.451E+03	.822E+13	.964E+03
1119.1	-.692E-02	.100E+08	-.148E+06	-.129E-04	.410E+03	.822E+13	.107E+04
1134.4	-.697E-02	.788E+07	-.131E+06	.377E-05	.373E+03	.822E+13	.108E+04
1149.8	-.680E-02	.600E+07	-.116E+06	.167E-04	.341E+03	.822E+13	.932E+03
1165.1	-.646E-02	.433E+07	-.101E+06	.263E-04	.312E+03	.822E+13	.928E+03
1180.4	-.599E-02	.289E+07	-.873E+05	.331E-04	.287E+03	.822E+13	.906E+03
1195.7	-.545E-02	.166E+07	-.737E+05	.373E-04	.266E+03	.822E+13	.869E+03
1211.1	-.485E-02	.627E+06	-.607E+05	.394E-04	.249E+03	.822E+13	.819E+03
1226.4	-.424E-02	-.208E+06	-.487E+05	.398E-04	.241E+03	.822E+13	.759E+03
1241.7	-.363E-02	-.866E+06	-.373E+05	.388E-04	.253E+03	.822E+13	.725E+03
1257.1	-.305E-02	-.135E+07	-.265E+05	.367E-04	.261E+03	.822E+13	.680E+03
1272.4	-.250E-02	-.168E+07	-.169E+05	.339E-04	.267E+03	.822E+13	.578E+03
1287.7	-.201E-02	-.187E+07	-.876E+04	.306E-04	.270E+03	.822E+13	.479E+03
1303.1	-.156E-02	-.195E+07	-.214E+04	.270E-04	.271E+03	.822E+13	.385E+03
1318.4	-.118E-02	-.194E+07	.311E+04	.234E-04	.271E+03	.822E+13	.299E+03
1333.7	-.846E-03	-.186E+07	.710E+04	.199E-04	.270E+03	.822E+13	.221E+03
1349.0	-.568E-03	-.172E+07	.996E+04	.166E-04	.267E+03	.822E+13	.153E+03
1364.4	-.339E-03	-.155E+07	.119E+05	.135E-04	.264E+03	.822E+13	.938E+02
1379.7	-.154E-03	-.136E+07	.129E+05	.108E-04	.261E+03	.822E+13	.437E+02
1395.0	-.767E-05	-.116E+07	.133E+05	.845E-05	.258E+03	.822E+13	.224E+01
1410.4	.105E-03	-.952E+06	.130E+05	.649E-05	.254E+03	.822E+13	-.316E+02
1425.7	.191E-03	-.756E+06	.123E+05	.490E-05	.251E+03	.822E+13	-.588E+02
1441.0	.256E-03	-.574E+06	.113E+05	.366E-05	.248E+03	.822E+13	-.805E+02
1456.3	.303E-03	-.410E+06	.991E+04	.274E-05	.245E+03	.822E+13	-.980E+02
1471.7	.340E-03	-.270E+06	.830E+04	.211E-05	.242E+03	.822E+13	-.112E+03
1487.0	.368E-03	-.156E+06	.648E+04	.171E-05	.240E+03	.822E+13	-.124E+03
1502.3	.392E-03	-.713E+05	.449E+04	.150E-05	.239E+03	.822E+13	-.136E+03
1517.7	.414E-03	-.184E+05	.233E+04	.141E-05	.238E+03	.822E+13	-.146E+03
1533.0	.435E-03	.000E+00	.000E+00	.140E-05	.238E+03	.822E+13	-.157E+03

OUTPUT VERIFICATION

THE MAXIMUM MOMENT IMBALANCE FOR ANY ELEMENT = -.128E-04 IN-LBS
THE MAX. LATERAL FORCE IMBALANCE FOR ANY ELEMENT = -.617E-06 LBS

OUTPUT SUMMARY

PILE-HEAD DEFLECTION = .782E+00 IN

```
COMPUTED SLOPE AT PILE HEAD    =   .353E-02
MAXIMUM BENDING MOMENT         =  -.480E+08 LBS-IN
MAXIMUM SHEAR FORCE            =  -.199E+06 LBS
NO. OF ITERATIONS              =         11
NO. OF ZERO DEFLECTION POINTS  =          2
```

S U M M A R Y T A B L E
****

BOUNDARY CONDITION BC1	BOUNDARY CONDITION BC2	AXIAL LOAD LBS	PILE HEAD DEFLECTION IN	MAX. MOMENT IN-LBS	MAX. SHEAR LBS
.9300E+05	-.4801E+08	.1317E+07	.7825E+00	-.4801E+08	-.1993E+06

$M_u = .4801 \times 10^8 / 12000 = 4001$ k-ft

$V_u = .1993 \times 10^6 / 1000 = 200$ k.

Resultant :

$M_u = \sqrt{[(4001)^2 + (2333)^2]}$

$= 4632$ k-ft

$V_u = \sqrt{(200^2 + 127^2)}$

$= 237$ k.

T.Y. LIN INTERNATIONAL

Project:	SALT RIVER BRIDGES-SCOUR	Job No.	1317.00	Sheet:	of
Item:	7TH STREET BRIDGE	Designer:	VPD	Date:	Mar-00
	DRILLED SHAFT	Checker:		Date:	

SHEAR REINFORCEMENT:

FOR Vu <= 0.5 phi Vc, NO SHEAR REINFORCEMENT IS REQ'D

FOR 0.5 phi Vc < Vu <= phi Vc, MIN. SHEAR REINFORCEMENT IS REQ'D
MIN. phi Vs = phi 50 b d, MAX SPACING, s <= d/2 <= 24 IN

FOR phi Vc < Vu <= (phi Vc + MIN phi Vs), MIN. SHEAR REINF. IS REQ'D
MIN. phi Vs = phi 50 b d, MAX SPACING, s = d/2 <= 24 IN

FOR (phi Vc + MIN phi Vs) < Vu <= (phi Vc + phi 4 SQRT(f'c) b d),
REQ'D phi Vs = Vu - phi Vc MAX SPAC'G, s = d/2 <= 24 IN
PROV'D phi Vs = phi Av fy d / s

FOR (phi Vc+ phi 4 SQRT(f'c) bd) < Vu <= (phi Vc+ phi 8 SQRT(f'c) b d)
REQ'D phi Vs = Vu - phi Vc MAX SPAC'G, s = d/4 <= 12 IN
PROV'D phi Vs = phi Av fy d / s

7' DRILLED SHAFT

Vu = 237 KIPS

f'c = 3,500 PSI

fy = 60,000 PSI

b = 84.00 IN

VERT BAR PATTERN RADIUS, R = 38.15 IN

phi = 0.85

d = b/2 + 2 * R / PI = 66.29 IN

d/2 = 33.14 IN d/4 = 16.57 IN

phi Vc = phi [2 SQRT(f'c) b d] = 560 KIPS

0.5 phi Vc = 280 KIPS

MIN phi Vs = phi (50 b d) = 237 KIPS

MAX phi Vs (FOR s=d/2) = phi [4 SQRT(f'c) b d]= 1,120 KIPS

MAX phi Vs (FOR s=d/4) = phi [8 SQRT(f'c) b d]= 2,240 KIPS

REQ'D phi Vs = Vu - phi Vc = 0 KIPS

NO SHEAR REINF REQ'D

TIE SIZE: NO. 6

NO. OF BARS = 1 Av = 0.44 IN^2

s = phi Av fy d / phi Vs = N/A

MAX s (FOR MIN Av) = Av fy /(50 b)= 6.29 IN

PROV'D SPACING, s = 12.00 IN

PROV'D phi Vs = phi Av fy d / s = 124 KIPS

```
7TH STREET BRIDGE PIER-1 DRILLED SHAFT  "P-7DS"
         9
         4
         1        36
         0
         2       1.0       6.0         1     78.00      0.00      0.00
      3500  29000000    0.0030     60000
     84.00      0.00      0.00      0.00
     38.15                                   2.25        36
                                     NO      PILE
 0.99 0.99 0.00 0.00      0.00     95.00    1    1      3.00  AGS    B
      0    4623      0      0      0      0    0    0      0      0
      0       0      0      0      0      0    0    0      0      0
      0    1317      0      0      0      0    0    0      0      0
                     0      0      0                      0
                     0      0      0                      0
                     0      0      0                      0
         0        0        0        0        0        0
         0        0        0        0        0        0
         0        0        0        0        0        0
```

```
*************************************************************************
*                                                                       *
*              PC YIELDED FACE COLUMN DESIGN PROGRAM                    *
*                                                                       *
*                  (C) Copyright, PCLINKS, Inc.                         *
*                       All Rights Reserved.                            *
*                                                                       *
*                 2330 Alhambra Blvd., Suite 140                        *
*                      Sacramento, CA 95817                             *
*                        (916) 456-4336                                 *
*                                                                       *
*    Licensed to : T.Y.Lin International (SF)  Serial No. : 1034985     *
*                                                                       *
*                     VER. : 2.04   03/12/91                            *
*                                                                       *
*************************************************************************
1 *******************************************
  YOUR PC YIELD FILE NAME IS : p-7ds
  *******************************************

  |...+....1....+....2....+....3....+....4....+....5....+....6....+....7....+...
.8
  7TH STREET BRIDGE PIER-1 DRILLED SHAFT  "P-7DS"
        9
        4
        1       36
        0
        2      1.0      6.0       1    78.00     0.00     0.00
     3500 29000000   0.0030   60000
    84.00     0.00     0.00    0.00
    38.15                             2.25       36
                                 NO    PILE
 0.99 0.99 0.00 0.00     0.00    95.00   1   1     3.00  AGS   B
     0   4623     0     0     0     0   0   0     0     0
     0      0     0     0     0     0   0   0     0     0
     0   1317     0     0     0     0   0   0     0     0
                  0     0     0                     0
                  0     0     0                     0
                  0     0     0                     0
       0        0        0        0        0        0
```



```
        0        0        0        0        0        0
        0        0        0        0        0        0
1       JOB : 7TH STREET BRIDGE PIER-1 DRILLED SHAFT
        PC CONCRETE COLUMN DESIGN PGM --- PCLINKS,Inc.  14:23:39  03/27/:0  PAGE 1

        T. Y. Lin  I n t e r n a t i o n a l ,  S a n  F r a n c i s c o ,  C
A

        COLUMN TYPE                    =  9  (CIRCULAR)
        CONCRETE LOOPS                 =  1
        TOTAL NO. OF CONCRETE COORD.   = 40
        STEEL REBAR PATTERN            =  4  (CONCENTRIC LOOPS)
        NUMBER OF STEEL REBAR LOOPS    =  1
        TOTAL NO. OF STEEL REBARS      = 36
        PLOT TYPE                      =  0  (NO PLOT)
        DESIGN TYPE                    =  2  (CHECK)
        PERCENT STEEL LIMITS           =     (1.00 % MIN.  6.00 % MAX.)

        *************
        * BENT DATA *
        *************************************************************************

        NUMBER OF COLUMNS IN BENT                    =     1
        OUT TO OUT DISTANCE (DIAMETER) OF SPIRAL     = 78.00 (INCHES)
        DISTANCE FROM TOP COLUMN PLASTIC HINGE TO
        CENTER OF GRAVITY OF THE SUPERSTRUCTURE      =  0.00 (FEET)
        CENTER TO CENTER SPACING OF COLUMNS          =  0.00 (FEET)

        ******************************
        * MATERIAL PROPERTIES  (PSI) *
        *************************************************************************

        ULTIMATE CONCRETE COMPRESSIVE STRESS - FC =     3500.
        YOUNG S MODULUS FOR CONCRETE         - EC =  3372165.
        YOUNG S MODULUS FOR STEEL BARS       - ES = 29000000.
        ULTIMATE CONCRETE COMPRESSIVE STRAIN - EO =      .003
        YIELDING STRESS FOR STEEL BARS       - FY =    60000.
1       PC CONCRETE COLUMN DESIGN PGM --- PCLINKS,Inc.  14:23:39  03/27/:0  PAGE 2

        T. Y. Lin  I n t e r n a t i o n a l ,  S a n  F r a n c i s c o ,  C
A

        CIRCULAR CROSS-SECTION

              HX
            84.00

        CONCRETE COORDINATES  (INCHES)

        COORD       X         Y
```

1	42.00	0.00
2	41.48	6.57
3	39.94	12.98
4	37.42	19.07
5	33.98	24.69
6	29.70	29.70
7	24.69	33.98
8	19.07	37.42
9	12.98	39.94
10	6.57	41.48
11	0.00	42.00
12	-6.57	41.48
13	-12.98	39.94
14	-19.07	37.42
15	-24.69	33.98
16	-29.70	29.70
17	-33.98	24.69
18	-37.42	19.07
19	-39.94	12.98
20	-41.48	6.57
21	-42.00	0.00
22	-41.48	-6.57
23	-39.94	-12.98
24	-37.42	-19.07
25	-33.98	-24.69
26	-29.70	-29.70
27	-24.69	-33.98
28	-19.07	-37.42
29	-12.98	-39.94
30	-6.57	-41.48
31	0.00	-42.00
32	6.57	-41.48
33	12.98	-39.94
34	19.07	-37.42
35	24.69	-33.98
36	29.70	-29.70
37	33.98	-24.69
38	37.42	-19.07
39	39.94	-12.98
40	41.48	-6.57

1 PC CONCRETE COLUMN DESIGN PGM --- PCLINKS,Inc. 14:23:39 03/27/:0 PAGE 3

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CONCENTRIC CIRCLE PATTERN

LOOP	RADIUS	AREA	BARS
1	38.15	2.25	36

STEEL REBAR COORDINATES (INCHES)

COORD	X	Y
1	38.15	0.00
2	37.57	6.62
3	35.85	13.05
4	33.04	19.07
5	29.22	24.52
6	24.52	29.22

7	19.08	33.04
8	13.05	35.85
9	6.62	37.57
10	0.00	38.15
11	-6.62	37.57
12	-13.05	35.85
13	-19.07	33.04
14	-24.52	29.22
15	-29.22	24.52
16	-33.04	19.08
17	-35.85	13.05
18	-37.57	6.62
19	-38.15	0.00
20	-37.57	-6.62
21	-35.85	-13.05
22	-33.04	-19.07
23	-29.22	-24.52
24	-24.52	-29.22
25	-19.08	-33.04
26	-13.05	-35.85
27	-6.62	-37.57
28	0.00	-38.15
29	6.62	-37.57
30	13.05	-35.85
31	19.07	-33.04
32	24.52	-29.22
33	29.22	-24.52
34	33.04	-19.08
35	35.85	-13.05
36	37.57	-6.62

THE MAIN LONGITUDINAL STEEL IS ASSUMED TO BE # 14 BARS.

***WARNING: THE CONCRETE COVER IS GREATER THAN 2 INCHES
IN THE X-DIRECTION

***WARNING: THE CONCRETE COVER IS GREATER THAN 2 INCHES
IN THE Y-DIRECTION

1 PC CONCRETE COLUMN DESIGN PGM --- PCLINKS,Inc. 14:23:39 03/27/:0 PAGE 4

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****
* INITIAL REFERENCE DATA *
****

TOTAL AREA OF THE SECTION	AG =	38.33	FT**2
NOMINAL AXIAL LOAD STRENGTH	PO =	21038.07	KIPS
TOTAL REINFORCEMENT AREA	AST =	81.00	IN**2
PERCENT STEEL	=	1.47	%
GROSS MOMENT OF INERTIA ABOUT Y-AXIS	IYC =	116.89	FT**4
GROSS MOMENT OF INERTIA ABOUT X-AXIS	IXC =	116.89	FT**4
STEEL MOMENT OF INERTIA ABOUT Y-AXIS	IYS =	2.8426	FT**4
STEEL MOMENT OF INERTIA ABOUT X-AXIS	IXS =	2.8426	FT**4

1 PC CONCRETE COLUMN DESIGN PGM --- PCLINKS,Inc. 14:23:39 03/27/:0 PAGE 5

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****
* COLUMN LOAD DATA (K-FT) *
****

LOAD NAME:
FOOTING DATA FILE: NO
TYPE FOOTING: PILE

MOMENT DISTRIBUTION FACT :---TOP---:---BOTTOM---: DAY	DAX	DBY	DBX	PERCENT IMPACT	COLUMN LENGTH (FEET)	STEEL TIE=1 SPIRAL=0	LOCATION TOP=1 BOTTOM=0	DUCTILITY FACTOR (Z)
0.99	0.99	0.00	0.00	0.00	95.00	1	1	3.00

COLUMN GROUP LOADS - SERVICE (K-FT)

	DEAD LOAD	PRE STRESS	:---- LL+IMPACT ---: CASE 1 TRANS MY-MAX	CASE 2 LONG MX-MAX	CASE 3 AXIAL N-MAX	WIND	WL	LF	CF-MY	TEMP
MY	0	4623	0	0	0	0	0	0	0	0
MX	0	0	0	0	0	0	0	0	0	0
P	0	1317	0	0	0	0	0	0	0	0
PMY			0	0	0				0	
PMX			0	0	0				0	
P			0	0	0				0	

COLUMN SEISMIC AND ARBITRARY LOADS (K-FT)

	(ARS) UNREDUCED SEISMIC CASE 1 MAX TRAN	CASE 2 MAX LONG	ARBITRARY LOADS SERVICE AL1	SERVICE AL2	ARBITRARY LOADS FACTORED AL1	FACTORED AL2
MY TRAN	0.	0.	0.	0.	0.	0.
MX LONG	0.	0.	0.	0.	0.	0.
P AXIAL	0.	0.	0.	0.	0.	0.

1 PC CONCRETE COLUMN DESIGN PGM --- PCLINKS,Inc. 14:23:39 03/27/:0 PAGE 6

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****
* FACTORED LOADS FOR COLUMN DESIGN CHECK (KIP-FT) *
****

APPLIED FACTORED MOMENTS ARE MAGNIFIED FOR SLENDERNESS IN ACCORDANCE WITH

CALTRANS BRIDGE DESIGN SPECIFICATIONS. (ART 8.16.5)

LENGTH = 95.00 FT FC = 3.50 KSI FY = 60.00 KSI
STEEL = 1.47 % AST = 81.00 SQ IN

GROUP	CASE	:------ APPLIED FACTORED ------: TRANS MY	LONG MX	COMB M	AXIAL P	CAPACITY (PHI*MN) MU	PHI	RATIO MU/M	
IH	1	6120.	391.	6132.	1317.	12952.	0.80	2.11	OK
IH	2	6120.	391.	6132.	1317.	12952.	0.80	2.11	OK
IH	3	6145.	391.	6158.	1317.	12952.	0.80	2.10	OK
IP	1	6120.	391.	6132.	1317.	12952.	0.80	2.11	OK
IP	2	6120.	391.	6132.	1317.	12952.	0.80	2.11	OK
IP	3	6145.	391.	6158.	1317.	12952.	0.80	2.10	OK
II		6120.	391.	6132.	1317.	12952.	0.80	2.11	OK
III	1	6120.	391.	6132.	1317.	12952.	0.80	2.11	OK
III	2	6120.	391.	6132.	1317.	12952.	0.80	2.11	OK
III	3	6145.	391.	6158.	1317.	12952.	0.80	2.10	OK
IV	1	6120.	391.	6132.	1317.	12952.	0.80	2.11	OK
IV	2	6120.	391.	6132.	1317.	12952.	0.80	2.11	OK
IV	3	6145.	391.	6158.	1317.	12952.	0.80	2.10	OK
V		6120.	391.	6132.	1317.	12952.	0.80	2.11	OK
VI	1	6120.	391.	6132.	1317.	12952.	0.80	2.11	OK
VI	2	6120.	391.	6132.	1317.	12952.	0.80	2.11	OK
VI	3	6145.	391.	6158.	1317.	12952.	0.80	2.10	OK
VII	1	4623.	342.	4636.	1317.	15803.	1.02	3.41	OK
VII	2	4623.	342.	4636.	1317.	15803.	1.02	3.41	OK

NOTE: THE AXIAL (ARS) UNREDUCED SEISMIC LOADS (P) ARE NOT DIVIDED BY THE DUCTILITY FACTOR Z

1 PC CONCRETE COLUMN DESIGN PGM --- PCLINKS,Inc. 14:23:39 03/27/:0 PAGE 7

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A

****
* MOMENT MAGNIFICATION AND BUCKLING CALCULATIONS *
****

REFERENCE: "CALTRANS BRIDGE DESIGN SPECIFICATIONS" (ART 8.16.5)
(COLUMN ASSUMED TO BE UNBRACED AGAINST SIDESWAY.)

MAGY = MOMENT MAGNIFACTION FACTOR ABOUT Y-AXIS
MAGX = MOMENT MAGNIFACTION FACTOR ABOUT X-AXIS

PCY = CRITICAL BUCKLING LOAD ABOUT Y-AXIS
PCX = CRITICAL BUCKLING LOAD ABOUT X-AXIS

KY = EFFECTIVE LENGTH FACTOR ABOUT Y-AXIS = 2.10
KX = EFFECTIVE LENGTH FACTOR ABOUT X-AXIS = 2.10

KY*L/R = SLENDERNESS RATIO ABOUT Y-AXIS =114.
KX*L/R = SLENDERNESS RATIO ABOUT X-AXIS =114.

IYS = STEEL MOMENT OF INERTIA ABOUT Y-AXIS =2.8426 FT**4
IXS = STEEL MOMENT OF INERTIA ABOUT X-AXIS =2.8426 FT**4

GR	CA	:-MAGNIFICATION-: TRAN	LONG	COMB	:--TRANSFORMED SECTION--: E*IY	E*IX	:-----BUCKLING----: TRAN	LONG	AXIAL LOAD

		MAGY	MAGX	MAG			PCY	PCX	P
IH	1	1.324	1.141	1.323	21712891.	42882995.	5384.	10634.	1317.
IH	2	1.324	1.141	1.323	21712891.	42882995.	5384.	10634.	1317.
IH	3	1.329	1.141	1.328	21441480.	42882995.	5317.	10634.	1317.
IP	1	1.324	1.141	1.323	21712891.	42882995.	5384.	10634.	1317.
IP	2	1.324	1.141	1.323	21712891.	42882995.	5384.	10634.	1317.
IP	3	1.329	1.141	1.328	21441480.	42882995.	5317.	10634.	1317.
II		1.324	1.141	1.323	21712891.	42882995.	5384.	10634.	1317.
III	1	1.324	1.141	1.323	21712891.	42882995.	5384.	10634.	1317.
III	2	1.324	1.141	1.323	21712891.	42882995.	5384.	10634.	1317.
III	3	1.329	1.141	1.328	21441480.	42882995.	5317.	10634.	1317.
IV	1	1.324	1.141	1.323	21712891.	42882995.	5384.	10634.	1317.
IV	2	1.324	1.141	1.323	21712891.	42882995.	5384.	10634.	1317.
IV	3	1.329	1.141	1.328	21441480.	42882995.	5317.	10634.	1317.
V		1.324	1.141	1.323	21712891.	42882995.	5384.	10634.	1317.
VI	1	1.324	1.141	1.323	21712891.	42882995.	5384.	10634.	1317.
VI	2	1.324	1.141	1.323	21712891.	42882995.	5384.	10634.	1317.
VI	3	1.329	1.141	1.328	21441480.	42882995.	5317.	10634.	1317.
VII	1	1.000	1.000	1.000	21441480.	42882995.	5317.	10634.	1317.
VII	2	1.000	1.000	1.000	21441480.	42882995.	5317.	10634.	1317.

*** WARNING KL/R = 114. ABOUT THE X-AXIS IS GREATER THAN 100.
REDESIGN THE COLUMN WITH A LARGER CROSS-SECTION OR
PERFORM A SPECIAL SECOND ORDER ANALYSIS AS DEFINED
IN ART 8.16.5.1.1 OF AASHTO.

*** WARNING KL/R = 114. ABOUT THE Y-AXIS IS GREATER THAN 100.
REDESIGN THE COLUMN WITH A LARGER CROSS-SECTION OR
PERFORM A SPECIAL SECOND ORDER ANALYSIS AS DEFINED
IN ART 8.16.5.1.1 OF AASHTO.

1 PC CONCRETE COLUMN DESIGN PGM --- PCLINKS,Inc. 14:23:39 03/27/:0 PAGE 8

T. Y. Lin International, San Francisco, C
A

COLUMN SERVICE LOADS (K-FT) AND MAXIMUM WORKING STRESSES (PSI)

YOUNG S MODULUS FOR CONCRETE - EC = 3372165. PSI
MODULAR RATIO (ES/EC) - N = 8.6

		:---- SERVICE LOADS (K-FT) ----:				----: MAX STRESS (PSI) ----:		
GP	CASE	TRANS MY	LONG MX	COMB M	AXIAL P	CONC COMP	STEEL TEN	STEEL COMP

IH	1	4623.	0.	4623.	1317.	1406.	13255.	10871.
IH	2	4623.	0.	4623.	1317.	1406.	13255.	10871.
IH	3	4623.	0.	4623.	1317.	1406.	13255.	10871.
II		3698.	0.	3698.	1054.	1125.	10604.	8697.
III	1	3698.	0.	3698.	1054.	1125.	10604.	8697.
III	2	3698.	0.	3698.	1054.	1125.	10604.	8697.
III	3	3698.	0.	3698.	1054.	1125.	10604.	8697.
IV	1	3698.	0.	3698.	1054.	1125.	10604.	8697.
IV	2	3698.	0.	3698.	1054.	1125.	10604.	8697.
IV	3	3698.	0.	3698.	1054.	1125.	10604.	8697.
V		3302.	0.	3302.	941.	1004.	9468.	7765.
VI	1	3302.	0.	3302.	941.	1004.	9468.	7765.
VI	2	3302.	0.	3302.	941.	1004.	9468.	7765.
VI	3	3302.	0.	3302.	941.	1004.	9468.	7765.
DL		4623.	0.	4623.	1317.	1406.	13255.	10871.

1 PC CONCRETE COLUMN DESIGN PGM --- PCLINKS,Inc. 14:23:39 03/27/:0 PAGE 9

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****
* PROBABLE PLASTIC MOMENT (1.3 X NOMINAL MOMENT) (KIP-FT) *
****

CODE (8.16.4.4) AND MEMO TO DESIGNERS 15-10

FC = 3.50 KSI FY = 60.00 KSI
EO = 0.0030 IN/IN AST = 81.00 SQ IN

ANGLE	TRANS MPY	LONG MPX	COMB MP	AXIAL P	P-BALANCE (APPROX)
90.0	22193.	-4.	22193.	12622.	7151
	24686.	-3.	24686.	10517.	
	26412.	0.	26412.	8414.	
	26613.	2.	26613.	6313.	
	25024.	4.	25024.	4209.	
	21842.	6.	21842.	2105.	
	17060.	7.	17061.	2.	
	17060.	7.	17061.	2.	
	14061.	9.	14061.	-1050.	
	10643.	6.	10643.	-2102.	

** NOTE: THE AXIAL DEAD LOAD EQUALS ZERO. THEREFORE,
NO PLASTIC HINGING ANALYSIS IS PERFORMED.

1 PC CONCRETE COLUMN DESIGN PGM --- PCLINKS,Inc. 14:23:39 03/27/:0 PAGE10

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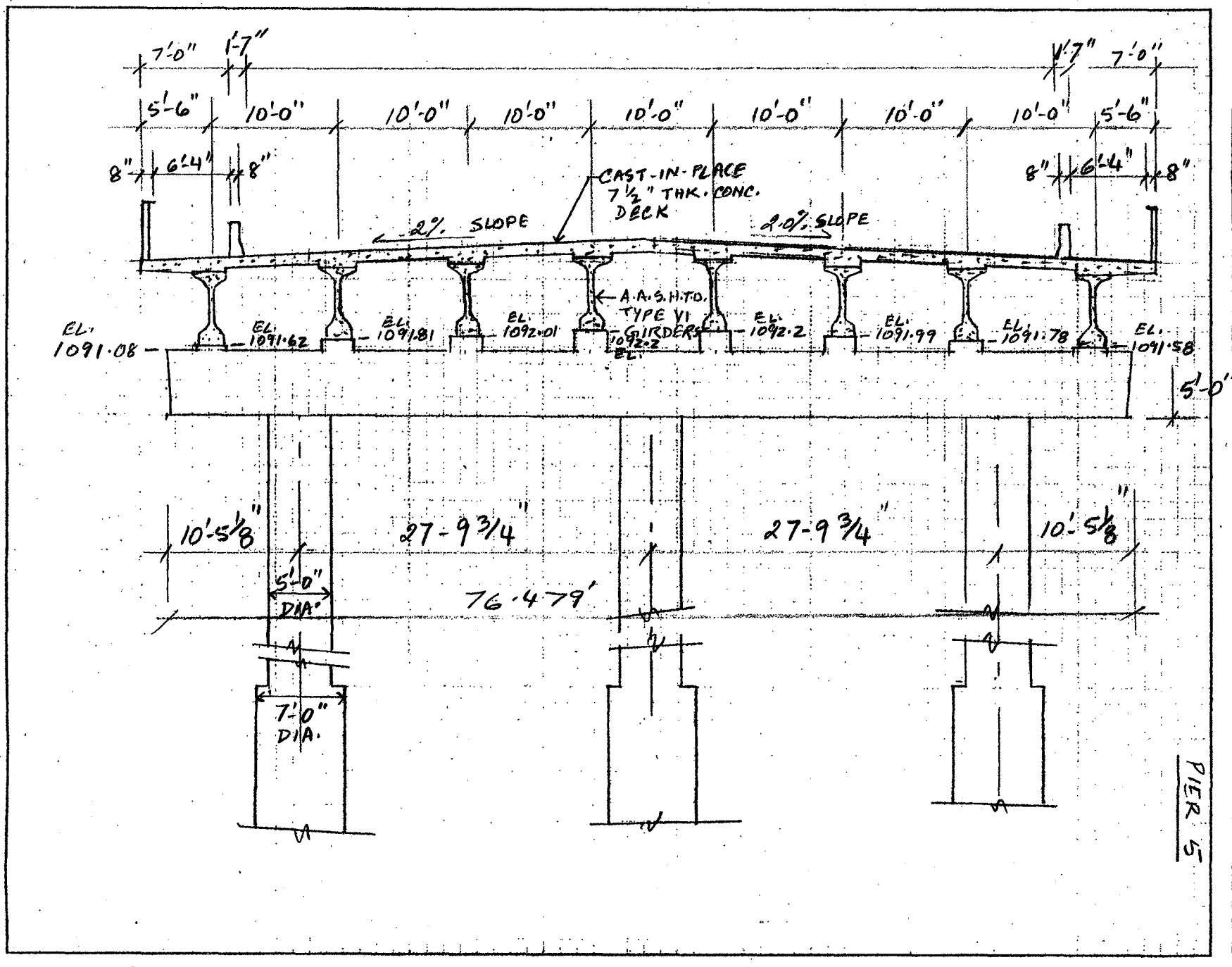
APPENDIX B

SIXTEENTH STREET BRIDGE CALCULATIONS



T·Y·LIN INTERNATIONAL

Projects: Salt River Bridges Scour Job No. Sheet: of

Item: 16th Street Bridge Designer: SJ Date:

Checker: Date:

Grid: 1/8"

TY·LIN INTERNATIONAL

Projects: 16TH ST. - SALT RIVER CROSSING. Job No. 1317.00 Sheet: of

Item: Designer: SJ Date:

Checker: Date:

Grid: 1/8"

• DESIGN CONDITIONS:

- 3 - Three span units of 123' x 81'-0" width
- HS 20 Live Load - 5 Lanes
- 8 AASHTO ~~MODIFIED~~ TYPE VI GIRDERS COMPOSITE CONSTRUCTION WITH 7" DECK SLAB.
- Allow FOR 25 PSF FUTURE WEARING SURFACE.
- Considered middle three span unit for scour check calculations

• MATERIAL:

- CONCRETE: NORMAL WT.

CLASS S, f'_c = 3000 PSI - BARRIERS AND APPROACH SLAB

CLASS S, f'_c = 4500 PSI - DECK SLABS & DIAPHRAGMS

f_c = 1400 PSI

CLASS S, f'_c = 4000 PSI - DRILLED SHAFTS, COLUMNS, PIER CAPS AND WING WALLS.

- REINFORCEMENT:

ALL REINFORCING BARS ARE A615 DEFORMED BILLET STEEL GRADE 60

f'_y Min = 60000 psi

f_s = 24000 psi

f_s = 20000 psi - DECK AND DIAPHRAGM ONLY

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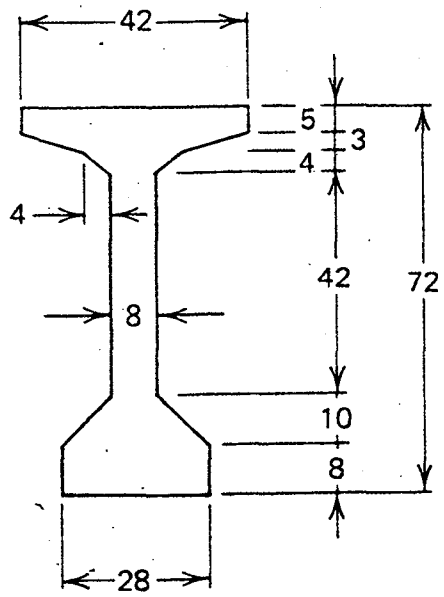
Projects: Salt River Bridges Scour	Job No.	Sheet:	of
Item: 16th Street Bridge	Designer: SJ	Date: 02-03-00	
	Checker:	Date:	
		Grid: 1/8"	



Type VI
110 to 140 ft

Section Properties:

$A_c = 1085 \text{ in}^2$

$I = 733320 \text{ in}^4$

$y_b = 36.38 \text{ in}$

$S_b = 20157 \text{ in}^3$

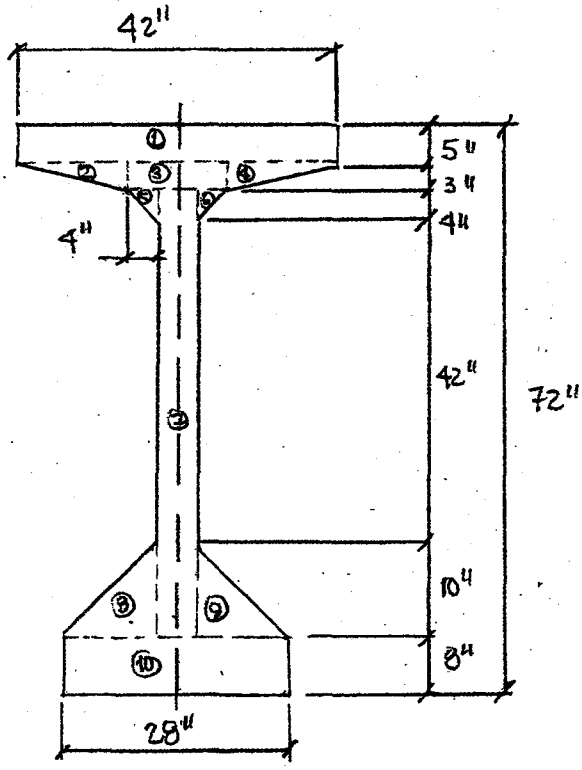
$S_t = 20587 \text{ in}^3$

$w_D = 1.130 \text{ k/'}$

TY·LIN INTERNATIONAL

Project: Salt River Bridges - Scour Job No. 1317.00
Item: Designed: VPD Sheet 1 of 100
16th Street Bridge Checked:

I_{yy}



SECTION	AREA (FT²)	X bot (Ft)	AREA * X bot (Ft³)	AREA (X-X bot)²	Io (Ft⁴)
1	1.45833	1.750	2.55208	0.000	1.48872
2	0.13542	0.7222	0.0978	0.14305	0.00883
3	0.3333	1.7500	0.58333	0.000	0.04938
4	0.13542	2.7778	0.37616	0.14305	0.00883
5	0.05556	1.30556	0.07254	0.01097	0.00034
6	0.05556	2.19444	0.12191	0.01097	0.00034
7	3.111	1.750	5.4444	0.000	0.11523
8	0.34722	1.13889	0.39545	0.12967	0.0134
9	0.34722	2.36111	0.81983	0.12967	0.0134
10	1.55556	1.750	2.72222	0.000	0.70576
	Σ 7.5347 Ft²		Σ 13.1857	Σ 0.5674	+ Σ 2.40423

$$\bar{y} = \frac{\Sigma \text{AREA} * X_{bot}}{\Sigma \text{AREA}} = \frac{13.1857}{7.5347} = 1.750 \text{ Ft}$$

$$I_{yy} = 2.97163 \text{ Ft}^4$$

FYLIN INTERNATIONAL

Projects:

Job No.

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Item:

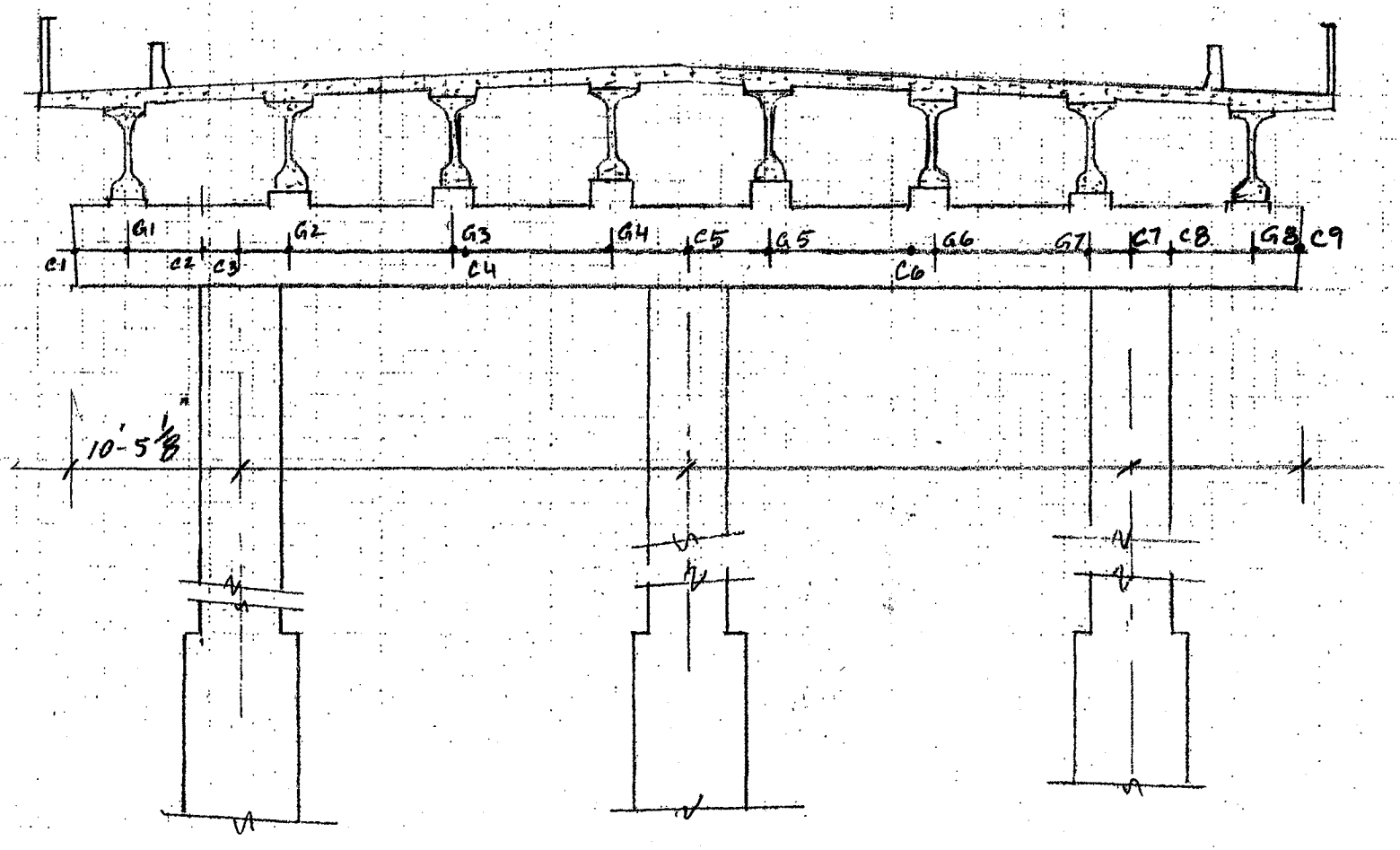
Designer:

Date:

Checker:

Date:

Grid: 1/8"



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Project:	Salt River Bridges Scour	Job No.	1317.00	Sheet:	
Item:	16th Street Bridge	Designer:	SJ	Date:	2/7/00
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Concrete Properties

F'c (slab):	4500 PSI
F'c (girder):	6000 PSI
No.Girders:	8

Left Outside distance:	5.500 ft
Girder Spacing:	10.000 ft
Right outside distance:	5.500 ft

Girder Properties:

Area:	7.535 ft^2
Yb:	3.032 ft
Yt:	2.968 ft
H:	6.000 ft^2
Ix:	35.365 ft^4
St:	11.914 ft^3
Sb:	11.665 ft^3

Section Properties for Superstructure:

Area:	112.194 ft^2
Ycb:	4.602 ft^2
Yct:	2.148 ft^2
Hc:	6.750 ft^2
Izz:	583 ft^4
Iyy:	56164 ft^4
Ixx:	36.365 ft^4

Izz

	Location	X ft	Width ft	Thickness ft	E ksf	Area ft^2	y ft	Area*y ft^3	A(y-ycb)^2 ft^4	I ft^4	E(I+Ay^2) ksf-ft^4
0.0 L	SLAB	0.000	81.000	0.583	550609	47.25	6.46	305.16	162.87	1.34	90416363
	HAUNCH		3.500	0.167	550609	4.67	6.08	28.39	10.24	0.01	5646491
	G1				635789	7.53	3.03	22.84	18.57	35.36	34293280
	G2				635789	7.53	3.03	22.84	18.57	35.36	34293280
	G3				635789	7.53	3.03	22.84	18.57	35.36	34293280
Girders	G4				635789	7.53	3.03	22.84	18.57	35.36	34293280
	G5				635789	7.53	3.03	22.84	18.57	35.36	34293280
	G6				635789	7.53	3.03	22.84	18.57	35.36	34293280
	G7				635789	7.53	3.03	22.84	18.57	35.36	34293280
	G8				635789	7.53	3.03	22.84	18.57	35.36	34293280
	-				0	0.00	0.00	0.00	0.00	0.00	0
	-				0	0.00	0.00	0.00	0.00	0.00	0
					Sum:	112.19		516.29			370409091
							ycb=	4.60 ft			

Iyy

	Location	X ft	Width ft	Thickness ft	E ksf	Area ft^2	y ft	Area*y ft^3	A(y-ycb)^2 ft^4	I ft^4	E(I+Ay^2) ksf-ft^4
0.0 L	SLAB	0.000	0.583	81.000	550609	47.25	40.50	1913.63	0.00	25833.94	14224408278
	HAUNCH		0.167	3.500	550609	4.67	40.50	189.00	2450.00	0.01	1348998926
	-	-			0	0.00	0.00	0.00	0.00	0.00	0
	G1	35.000			635789	7.53	5.50	41.44	9230.03	2.97	5870243378
	G2	25.000			635789	7.53	15.50	116.79	4709.20	2.97	2995947518
Girders	G3	15.000			635789	7.53	25.50	192.14	1695.31	2.97	1079750277
	G4	5.000			635789	7.53	35.50	267.48	188.37	2.97	121651657
	G5	5.000			635789	7.53	45.50	342.83	188.37	2.97	121651657
	G6	15.000			635789	7.53	55.50	418.18	1695.31	2.97	1079750277
	G7	25.000			635789	7.53	65.50	493.52	4709.20	2.97	2995947518
	G8	35.000			635789	7.53	75.50	568.87	9230.03	2.97	5870243378
	G10	-			0	0.00	0.00	0.00	0.00	0.00	0
					Sum:	112.19		4543.88			35708592864
							ycb=	40.50 ft			

Ixx

	Location	Width ft	Thickness ft	E ksf	E*W*T^3 ksf-ft^4
0.0 L	SLAB	81.000	0.583	550609	8852766
	HAUNCH	3.500	0.167	550609	71375
Girders	G1 to G8	6.000	1.256	635789	60436902
				Sum:	69361044
					3

SLAB HAUNCH GIRDERS

$$EI=\frac{(E*W1*T1^3+E*No.\ Girders*W2*T2^3+E*No.\ Girders*W3*T3^3)}{3}$$

EI= 23120348

Ixx= 36.365 ft^4

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Project:	Salt River Bridges Scour	Job No.	1317.00	Sheet:	
Item:	16th Street Bridge	Designer:	~~VRD~~ SJ	Date:	2/10/00
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SECTION PROPERTIES

HAUNCH PROPERTIES

Location	X ft	Width ft	Thickness ft	E ksf	Area ft^2	y ft	Area*y ft^3	A(y-ycb)^2 ft^4	I ft^4	E(I+Ay^2) ft^4
-	-	0.000	0.000	0	0.000	0.00	0.00	0	0.000	0
G1	35.000	3.500	0.167	550609	0.583	5.50	3.21	715	0.001	393457029
G2	25.000	3.500	0.167	550609	0.583	15.50	9.04	365	0.001	200743746
G3	15.000	3.500	0.167	550609	0.583	25.50	14.88	131	0.001	72268224
G4	5.000	3.500	0.167	550609	0.583	35.50	20.71	15	0.001	8030464
G5	5.000	3.500	0.167	550609	0.583	45.50	26.54	15	0.001	8030464
G6	15.000	3.500	0.167	550609	0.583	55.50	32.38	131	0.001	72268224
G7	25.000	3.500	0.167	550609	0.583	65.50	38.21	365	0.001	200743746
G8	35.000	3.500	0.167	550609	0.583	75.50	44.04	715	0.001	393457029
-	-	0.000	0.000	0	0.000	0.00	0.00	0	0.000	0
					4.667		189.00	2450	0.011	1348998926
						ycb=	40.500	ft		

ADDITIONAL DEAD LOAD ADDED

DIAPHRAGMS

Location	Total Load kips
-	-
PIER 3	541.20
PIER 4	541.20
PIER 5	541.20
PIER 6	541.20
-	-

PIER NOMENCLATURE

Location	Dist - x ft	Dist - y ft
C1	-38.240	-15.450
G1	-35.000	-14.141
C2	-30.313	-12.247
C3	-27.813	-11.237
G2	-25.000	-10.101
G3	-15.000	-6.060
C4	-13.906	-5.618
G4	-5.000	-2.020
C5	0.000	0.000
G5	5.000	2.020
C6	13.906	5.618
G6	15.000	6.060
G7	25.000	10.101
C7	27.813	11.237
C8	30.313	12.247
G8	35.000	14.141
C9	38.240	15.450
-	-	-
-	-	-

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COORDINATES & SECTION PROPERTIES (SUPER STRUCTURE)

	Location	Joint No.	X ft	Y ft	Z ft	Area ft^2	Iz ft^4	Iy ft^4	Ix ft^4
PIER 3	0.00 L	101	0.00	0.00	1098.91	112.194	582.598	56164	36.365
	0.25 L	102	30.75	0.00	1098.91	112.194	582.598	56164	36.365
	0.50 L	103	61.50	0.00	1098.91	112.194	582.598	56164	36.365
	0.75 L	104	92.25	0.00	1098.91	112.194	582.598	56164	36.365
PIER 4	1.00 L	105	123.00	0.00	1098.91	112.194	582.598	56164	36.365
	1.25 L	106	153.75	0.00	1098.91	112.194	582.598	56164	36.365
	1.50 L	107	184.50	0.00	1098.91	112.194	582.598	56164	36.365
	1.75 L	108	215.25	0.00	1098.91	112.194	582.598	56164	36.365
PIER 5	2.00 L	109	246.00	0.00	1098.91	112.194	582.598	56164	36.365
	2.25 L	110	276.75	0.00	1098.91	112.194	582.598	56164	36.365
	2.50 L	111	307.50	0.00	1098.91	112.194	582.598	56164	36.365
	2.75 L	112	338.25	0.00	1098.91	112.194	582.598	56164	36.365
PIER 6	3.00 L	113	369.00	0.00	1098.91	112.194	582.598	56164	36.365
	3.25 L	114	399.75	0.00	1098.91	112.194	582.598	56164	36.365
	3.50 L	115	430.50	0.00	1098.91	112.194	582.598	56164	36.365
	3.75 L	116	461.25	0.00	1098.91	112.194	582.598	56164	36.365

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Project:	Salt River Bridges Scour	Job No.	1317.00	Sheet:	
Item:	16th Street Bridge	Designer:	SJ	Date:	2/28/00
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COORDINATES & SECTION PROPERTIES

	Item	Location	Joint No.	X ft	Y ft	Z ft	Area ft^2	Iz ft^4	Iy ft^4	Ix ft^4
PIER 4	PIER CAP	C1	201	107.55	38.24	1088.66	30.000	62.500	90.000	247.500
		G1		108.86	35.00	1088.66	30.000	62.500	90.000	247.500
		C2	202	110.75	30.31	1088.66	30.000	62.500	90.000	247.500
		C3 - COL1	203	111.76	27.81	1088.66	30.000	62.500	90.000	247.500
		G2		112.90	25.00	1088.66	30.000	62.500	90.000	247.500
		G3		116.94	15.00	1088.66	30.000	62.500	90.000	247.500
		C4	204	117.38	13.91	1088.66	30.000	62.500	90.000	247.500
		G4		120.98	5.00	1088.66	30.000	62.500	90.000	247.500
		C5 - COL 2	205	123.00	0.00	1088.66	30.000	62.500	90.000	247.500
		G5		125.02	-5.00	1088.66	30.000	62.500	90.000	247.500
		C6	206	128.62	-13.91	1088.66	30.000	62.500	90.000	247.500
		G6		129.06	-15.00	1088.66	30.000	62.500	90.000	247.500
		G7		133.10	-25.00	1088.66	30.000	62.500	90.000	247.500
		C7 - COL 3	207	134.24	-27.81	1088.66	30.000	62.500	90.000	247.500
		C8	208	135.25	-30.31	1088.66	30.000	62.500	90.000	247.500
		G8		137.14	-35.00	1088.66	30.000	62.500	90.000	247.500
		C9	209	138.45	-38.24	1088.66	30.000	62.500	90.000	247.500
	COL1	Top	601	111.76	27.81	1086.16	19.635	30.680	30.680	61.359
		HWL	602	111.76	27.81	1073.64	19.635	30.680	30.680	61.359
		12 ft below	603	111.76	27.81	1061.64	19.635	30.680	30.680	61.359
		Top of DS	604	111.76	27.81	1055.00	19.635	30.680	30.680	61.359
		Groundline	605	111.76	27.81	1018.38	38.485	117.859	117.859	235.718
		1 "Dia."	606	111.76	27.81	1011.38	38.485	117.859	117.859	235.718
		2 "Dia."	607	111.76	27.81	1004.38	38.485	117.859	117.859	235.718
		3 "Dia."	608	111.76	27.81	997.38	38.485	117.859	117.859	235.718
		4 "Dia."	609	111.76	27.81	990.38	38.485	117.859	117.859	235.718
	COL2	Top	610	125.02	-5.00	1086.16	19.635	30.680	30.680	61.359
		HWL	611	125.02	-5.00	1073.64	19.635	30.680	30.680	61.359
		12 ft below	612	125.02	-5.00	1061.64	19.635	30.680	30.680	61.359
		Top of DS	613	125.02	-5.00	1055.00	19.635	30.680	30.680	61.359
		Groundline	614	125.02	-5.00	1018.38	38.485	117.859	117.859	235.718
		1 "Dia."	615	125.02	-5.00	1011.38	38.485	117.859	117.859	235.718
		2 "Dia."	616	125.02	-5.00	1004.38	38.485	117.859	117.859	235.718
		3 "Dia."	617	125.02	-5.00	997.38	38.485	117.859	117.859	235.718
		4 "Dia."	618	125.02	-5.00	990.38	38.485	117.859	117.859	235.718
	COL3	Top	619	137.14	-35.00	1086.16	19.635	30.680	30.680	61.359
		HWL	620	137.14	-35.00	1073.64	19.635	30.680	30.680	61.359
		12 ft below	621	137.14	-35.00	1061.64	19.635	30.680	30.680	61.359
		Top of DS	622	137.14	-35.00	1055.00	19.635	30.680	30.680	61.359
		Groundline	623	137.14	-35.00	1018.38	38.485	117.859	117.859	235.718
		1 "Dia."	624	137.14	-35.00	1011.38	38.485	117.859	117.859	235.718
		2 "Dia."	625	137.14	-35.00	1004.38	38.485	117.859	117.859	235.718
		3 "Dia."	626	137.14	-35.00	997.38	38.485	117.859	117.859	235.718
		4 "Dia."	627	137.14	-35.00	990.38	38.485	117.859	117.859	235.718

TYLIN INTERNATIONAL

Project:	Salt River Bridges Scour	Job No.	1317.00	Sheet:	
Item:	16th Street Bridge	Designer:	SJ	Date:	2/28/00
D:\My Documents\Projects\1317 Salt River Bridges\16th street\excel\[geom.xls]COOR		Checker:	VPD	Date:	3/2/00

COORDINATES & SECTION PROPERTIES

	Item	Location	Joint No.	X ft	Y ft	Z ft	Area ft^2	Iz ft^4	Iy ft^4	Ix ft^4
PIER 5	PIER CAP	C1	301	230.55	38.24	1088.66	30.000	62.500	90.000	247.500
		G1		231.86	35.00	1088.66	30.000	62.500	90.000	247.500
		C2	302	233.75	30.31	1088.66	30.000	62.500	90.000	247.500
		C3 - COL1	303	234.76	27.81	1088.66	30.000	62.500	90.000	247.500
		G2		235.90	25.00	1088.66	30.000	62.500	90.000	247.500
		G3		239.94	15.00	1088.66	30.000	62.500	90.000	247.500
		C4	304	240.38	13.91	1088.66	30.000	62.500	90.000	247.500
		G4		243.98	5.00	1088.66	30.000	62.500	90.000	247.500
		C5 - COL 2	305	246.00	0.00	1088.66	30.000	62.500	90.000	247.500
		G5		248.02	-5.00	1088.66	30.000	62.500	90.000	247.500
		C6	306	251.62	-13.91	1088.66	30.000	62.500	90.000	247.500
		G6		252.06	-15.00	1088.66	30.000	62.500	90.000	247.500
		G7		256.10	-25.00	1088.66	30.000	62.500	90.000	247.500
		C7 - COL 3	307	257.24	-27.81	1088.66	30.000	62.500	90.000	247.500
		C8	308	258.25	-30.31	1088.66	30.000	62.500	90.000	247.500
		G8		260.14	-35.00	1088.66	30.000	62.500	90.000	247.500
		C9	309	261.45	-38.24	1088.66	30.000	62.500	90.000	247.500
	COL1	Top	701	234.76	27.81	1085.41	19.635	30.680	30.680	61.359
		HWL	702	234.76	27.81	1073.64	19.635	30.680	30.680	61.359
		12 ft below	703	234.76	27.81	1061.64	19.635	30.680	30.680	61.359
		Top of DS	704	234.76	27.81	1055.00	19.635	30.680	30.680	61.359
		Groundline	705	234.76	27.81	1018.38	38.485	117.859	117.859	235.718
		1 "Dia."	706	234.76	27.81	1011.38	38.485	117.859	117.859	235.718
		2 "Dia."	707	234.76	27.81	1004.38	38.485	117.859	117.859	235.718
		3 "Dia."	708	234.76	27.81	997.38	38.485	117.859	117.859	235.718
		4 "Dia."	709	234.76	27.81	990.38	38.485	117.859	117.859	235.718
	COL2	Top	710	248.02	-5.00	1085.41	19.635	30.680	30.680	61.359
		HWL	711	248.02	-5.00	1073.64	19.635	30.680	30.680	61.359
		12 ft below	712	248.02	-5.00	1061.64	19.635	30.680	30.680	61.359
		Top of DS	713	248.02	-5.00	1055.00	19.635	30.680	30.680	61.359
		Groundline	714	248.02	-5.00	1018.38	38.485	117.859	117.859	235.718
		1 "Dia."	715	248.02	-5.00	1011.38	38.485	117.859	117.859	235.718
		2 "Dia."	716	248.02	-5.00	1004.38	38.485	117.859	117.859	235.718
		3 "Dia."	717	248.02	-5.00	997.38	38.485	117.859	117.859	235.718
		4 "Dia."	718	248.02	-5.00	990.38	38.485	117.859	117.859	235.718
	COL3	Top	719	260.14	-35.00	1085.41	19.635	30.680	30.680	61.359
		HWL	720	260.14	-35.00	1073.64	19.635	30.680	30.680	61.359
		12 ft below	721	260.14	-35.00	1061.64	19.635	30.680	30.680	61.359
		Top of DS	722	260.14	-35.00	1055.00	19.635	30.680	30.680	61.359
		Groundline	723	260.14	-35.00	1018.38	38.485	117.859	117.859	235.718
		1 "Dia."	724	260.14	-35.00	1011.38	38.485	117.859	117.859	235.718
		2 "Dia."	725	260.14	-35.00	1004.38	38.485	117.859	117.859	235.718
		3 "Dia."	726	260.14	-35.00	997.38	38.485	117.859	117.859	235.718
		4 "Dia."	727	260.14	-35.00	990.38	38.485	117.859	117.859	235.718

TY·LIN INTERNATIONAL

Projects: Salt River Bridges - Scour Job No. 1317.00 Sheet: of

Item: 16th Street Bridges Designer: ST Date: 02-07-00

Checker: VPD Date: 03/02/00

Grid: 1/8"

Pier Cap:

Length = 76.479'

Width = 6'

$A = 76.479 \times 6 = 458.874\ ft^2$

$I_{xx} = 79.479 \times \frac{6^3}{12} = 1430.622\ ft^4$

$I_{yy} = 6 \times 79.479^3/12 = 251030.9\ ft^4$

$I_{zz} = 0.333\ (79.479)\ 6^3 = 5722.488\ ft^4$

Volume $\simeq 458.874 \times 5 = 2294.37\ ft^3$

Wt $\simeq 2294.37 \times .15\ kcf = 344.15\ k$

Length $\simeq 1095.76 - 1088.66 = 7.1'$

$\therefore$ Wt $= 344.15/7.1 = 48.47\ k/'$

TY·LIN INTERNATIONAL

Projects: 16th St. - SALT RIVER CROSSING Job No. Sheet: of

Item: Designer: SJ Date: 02-03-00

Checker: VPD Date: 3/2/00

Grid: 1/8"

• Design Loads – PER GIRDER

– Galvanized Metal handrail $\simeq \frac{50 \times 2}{1000} / 8 = 0.0125$ k/'

– Concrete Barrier $= .372$ k/' $\times 2 / 8 = 0.093$ k/'

– Slab $= 81 \times \frac{7}{12} \times .15 / 8 = 0.886$ k/'

– Future wearing Surface $= 25$ psf $\times 63.834 / (1000 \times 8)$
$= 0.1995$ k/'

– Girder self wt $= 0.98$ k/'

– HAUNCH $= \frac{40}{12} \times \frac{2}{12} \times .15 = .0833$ k/'

Total $\simeq 2.254$ k/' per girder.

• Additional Dead Loads:

– Pier Diaphragm:

Fixed Pier: $[6' \times (7 \times 10.78' \times 7.0) - (6.53 ft^2 \times 2') \times 8 \times 2 + 6.53 \times 7 - .818' \times 1.5' \times 7] \times .15$ kcf

(7.535) (7.535)

↑ pedestal

$= 449.62$ K

Expansion Pier: Considered same as fixed pier $\simeq 449.62$K

– Int. Pier diaphragm: $[.75' \times (10.78' \times 6') - 6.53 ft^2 \times .75'] \times 7 \times .15$

(7.535)

$= 45.79$ kips (2-per span)

∴ Load on pier cap $\simeq 45.79 \times 2 = 91.58$K.

TY·LIN INTERNATIONAL

Projects: SALT RIVER BRIDGES - SCOUR | Job No. 1317.00 | Sheet: of
Item: 16th street bridge | Designer: SJ | Date: 2/7/00
Checker: VPD | Date: 3/2/00
Grid: 1/8"

• Wind Loads:

- ON SUPERSTRUCTURE: (AASHTO ART. 3.15.2.1.3)

Wind Load ≃ Wind TRANS LONG. * h wind

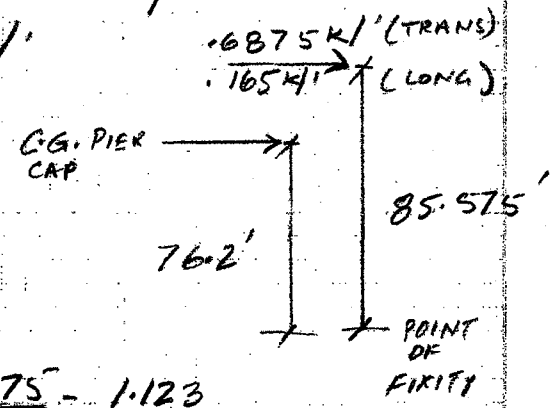
$h_{wind} = 6' + \frac{2''}{12} + \frac{7''}{12} + 6' + 1 = 13.75'$ (pedestal; metal Handrail)

Point of application ≃ $h_{wind}/2 = 6.375'$

$Wind_{TRANS} = 50\ \#/ft^2$
$Wind_{LONG} = 12\ \#/ft^2$ } APPLIED simultaneously.

$Wind_{TRANS} = 0.05\ KSF * 13.75' = 0.6875\ k/'$

$Wind_{LONG} = .012 \times 13.75 = .165\ k/'$



$\frac{85.575'}{76.2} = 1.123$

Transfer to Pier Cap C.G. $w_{Trans.} = .6875 \times 1.123 = 0.772\ k/'$ (along 85.575')
$w_{Long} = .165 \times 1.123 = .1853\ k/'$
$w_{long} = .165 \times$

$W_{Trans.} = .772 \times \frac{123}{76.479} \times \cos 22° = 1.1512\ k/'$ (along skewed Pier Cap)

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Projects: Salt River Bridges - Scour | Job No. 1317.00 | Sheet: of
Item: 16th Street Bridge | Designer: SJ | Date: 2-7-00
Checker: VPD | Date: 3/2/00
Grid: 1/8"

• Wind Loads (Cont'd)

- OVERTURNING FORCES: (AASHTO 3.15.3)

$F_{wind} = W_{over} * (\text{Width of superstructure}) * \text{Length}$

$W_{over} = 20 \#/ft^2$

Point of Application = 1/4 width - superstructure

$F_{wind} = .02 \text{ ksf} * 81 = 1.62 \text{ k/'} \times 123 = 199.26 \text{ k.}$

$M_{wind} = 1.62 * \frac{81}{4} = 32.805 \text{ k-ft/'} * \text{TRIB. Length}$

$M_{wind}(P_4) = M_{wind}(P_5) = 32.805 \text{ k-ft/'} * 123$
$= 4035.015 \text{ k-ft}$

- ON SUB STRUCTURE: (AASHTO 3.15.2.2)

WIND LOAD = $\text{WIND}_{\text{Trans Long}} * \text{WIDTH}_{\text{Trans Long}}$

$\text{Wind}_{TRANS} = 40 \#/ft^2$
$W_{LONG} = 40 \#/ft^2$
} BOTH FORCES SIMULTANEOUSLY

FIXED PIER CAP:

$\text{Wind}_{Trans} = .04 \text{ ksf} * 5' * 6' / 82.48 = .0145 \text{ k/'}$
(skewed length)

$\text{Wind}_{LONG} = .04 * 5 * 76.479 = 15.2958 \text{ k}/(7.71)$
$= 2.154 \text{ k/'}$

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Projects: Salt River Bridges - Scour | Job No. 1317.00 | Sheet: of
Item: 16th Street Bridge | Designer: SJ | Date: 02-7-00
Checker: VPD | Date: 3/2/00
Grid: 1/8"

• Wind (cont'd)

COLUMN:

$Wind_{TRANS} = .04\ ksf * 5' = .2\ k/'$

$Wind_{LONG} = .04\ ksf * 5' = .2\ k/'$

• THERMAL FORCES:

$T = -40°F$ (FALL)

• WIND ON LIVE LOAD:

Wind on Live Load = $(w_{LIVE\ LOAD})_{TRANS.\ LONG}$

POINT OF APPLICATION = 6' FROM FLOOR SLAB

$w_{LL\ TRANS.} = 100\ lb/'$
$w_{LL\ LONG.} = 40\ lb/ft$ } BOTH SIMULTANEOUSLY.

DISTANCE TO LOAD $= 6' + \frac{2}{12} + \frac{7}{12} + 6' + 1 = 13.75'$ (pedestal)

(from TOP OF PILE CAP)

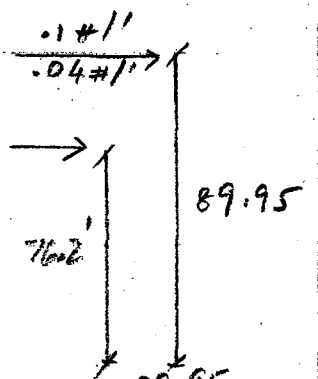
Equivalent forces at CG of Pile Cap:

$w_{LL\ TRANS.} = .100 * 1.18 = .118\ k/'$ (length of bridge)

$w_{LL\ LONG.} = .04 \times 1.18 = .0472\ k/'$

$w_{LL\ TRANS.}$ (along skew) $= .118 \times \frac{123}{76.479} \cos 22°$

$= .20468\ k/'$



Factor $= \frac{89.95}{76.2} = 1.18$

T·Y·LIN INTERNATIONAL

Projects: Salt River Bridges - Scour Job No. 1317.00 Sheet: of

Item: 16th Street Bridge Designer: SJ Date: 02-07-00

Checker: VPD Date: 3/2/00

Grid: 1/8"

• LONGITUDINAL FORCES FROM LIVE LOAD: (AASHTO 3.9)

$L.F._{Live\ load}$ = 5% OF No. of Lanes [R.F. * (.64 * Length + 18k)]

POINT of Application = 6' above Floor slab.

No. of Lanes = 5 (Assume all lanes in same direction)

$L.F._{Live\ load} = .05[5 * .75(.64)] = .12\ k/' \times 1.18$
$= .1416\ k/'$ [C.G. of Pile Cap]

$= .05 \times 5 \times .75 * 18^k \times \frac{1}{8} = .4218\ k \times 1.18$
$= .497\ k/pier$

↳ distributed to 8 piers

TY·LIN INTERNATIONAL

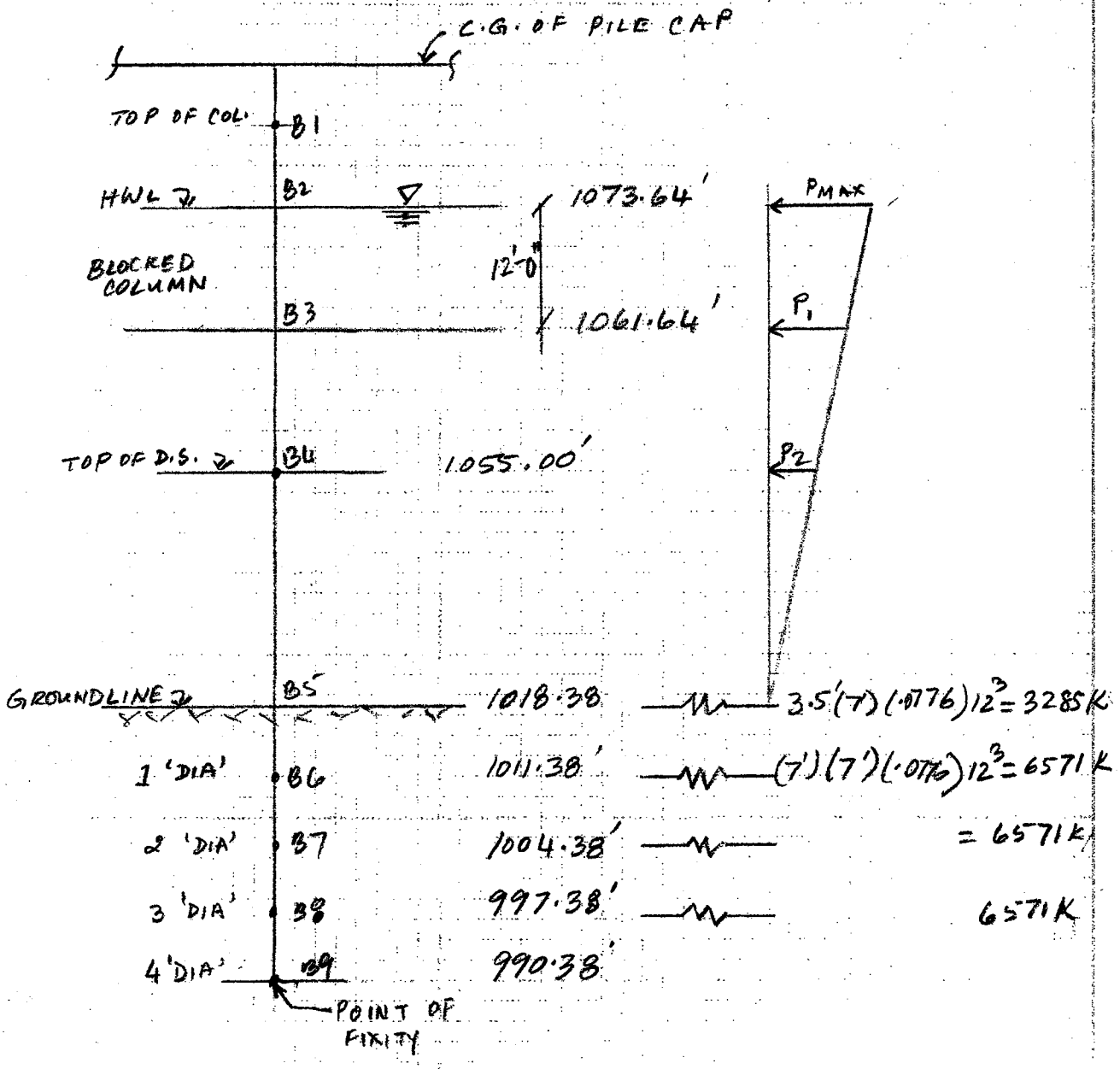
Projects: Salt River Bridges - Scour Job No. 1317.00 Sheet: of

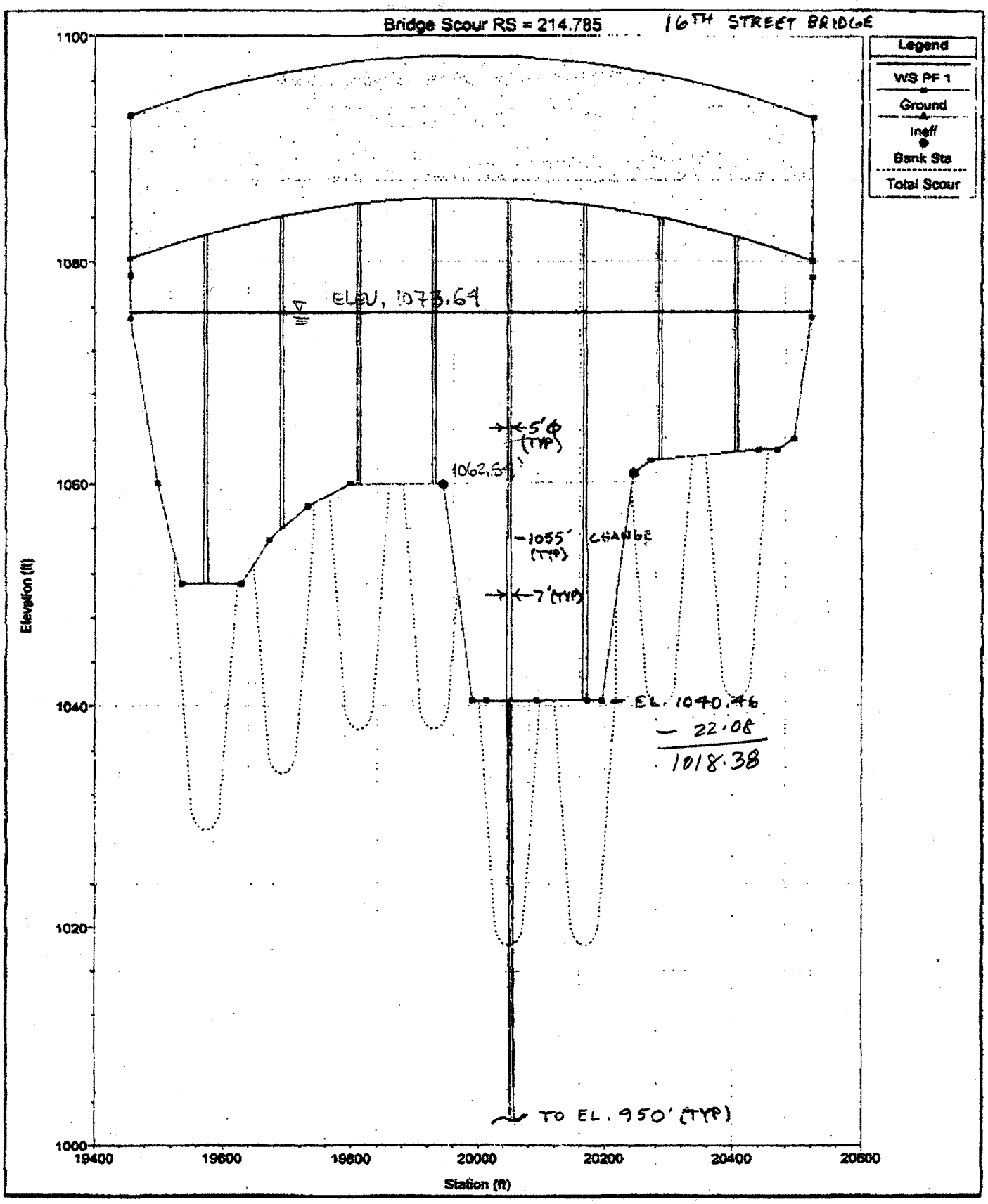
Item: 16th Street Bridge Designer: SJ Date: 02-07-00

Checker: VPD Date: 3/2/00

Grid: 1/8"

• SOIL SPRINGS :




Bridge Scour RS = 214.785
16TH STREET BRIDGE
Legend
WS PF 1
Ground
Ineff
Bank Sta
Total Scour
ELEV. 1073.64
5'ϕ (TYP)
1062.54
1055' (TYP)
CHANGE
7' (TYP)
EL. 1040.46
22.08
1018.38
TO EL. 950' (TYP)
Elevation (ft)
Station (ft)
1100
1080
1060
1040
1020
1000
19400
19600
19800
20000
20200
20400
20600

Alternative 1 Bridge Scour With Long Term Degradation, River Station 214.785, 16th Street Bridge

Results Computed Using HEC-RAS Version 2.2 and HEC-18 Guidelines

Hydraulic Design Data

Pier Scour

All piers have the same scour depth

Input Data

Pier Shape:	Group of Cylinders
Pier Width (ft):	9
Grain Size D50 (ft):	0.0328
Depth Upstream (ft):	35.18 + 1040.46 = 1073.64
Velocity Upstream (ft/s):	14.3
K1 Nose Shape:	1
Pier Angle:	0
Pier Length (ft):	64
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (ft):	0.2297
K4 Armouring Coef:	1

Results

Scour Depth Ys (ft):	22.08
Froude #:	0.42
Equation:	CSU equation

Alternative case analysis:

Yf	Y1	Yf/Y >>	Vf/V1	V1	Vf
14.54	35.18	0.4133	0.81	14.3	11.58

Notes: Two feet of bulking is added to each side of piers less than 6' wide.

Exposed pile cap is 7' wide, which should not be bulked. The near bottom velocity on the unbulked pier will clearly produce less scour, so it is not computed herein.

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Project:	Salt River Bridges - Scour	Job No.	1317.00	Sheet:	
Item:	16 th Street Bridge	Designer:	SJ	Date:	2/28/00
	Case 3 - Contraction Scour - (Pier Scour)	Checker:	VPD	Date:	3/2/00

FORCE OF STREAM CURRENT ON PIERS: (AASHTO Art. 3.18.1 & ADOT BD&D Sec. 1.2.1)

MEAN VELOCITY, V =	14.30	FT/SEC
ANGLE OF ATTACK =	15	DEGREES
COLUMN DIAMETER =	5.00	FT
DRI'D SHFT DIAM =	7.00	FT

STREAM PRESSURE: (AASHTO Art. 3.18.1.1)

The effect of flowing water on piers and drift build-up, assuming a second-degree parabolic velocity distribution and thus a triangular pressure distribution, shall be calculated by the formula:

$$P_{avg} = K\,(V_{avg})^2 \qquad \text{(AASHTO Eqn. 3-4)}$$

where: P_{avg} = Average Stream Pressure, in pounds per square foot
V_{avg} = Average Velocity of water in feet per second
K = A Constant, 1.4 for all piers subjected to drift build-up

V_{avg} long = **3.70** ft/sec V_{avg} trans = **13.81** ft/sec

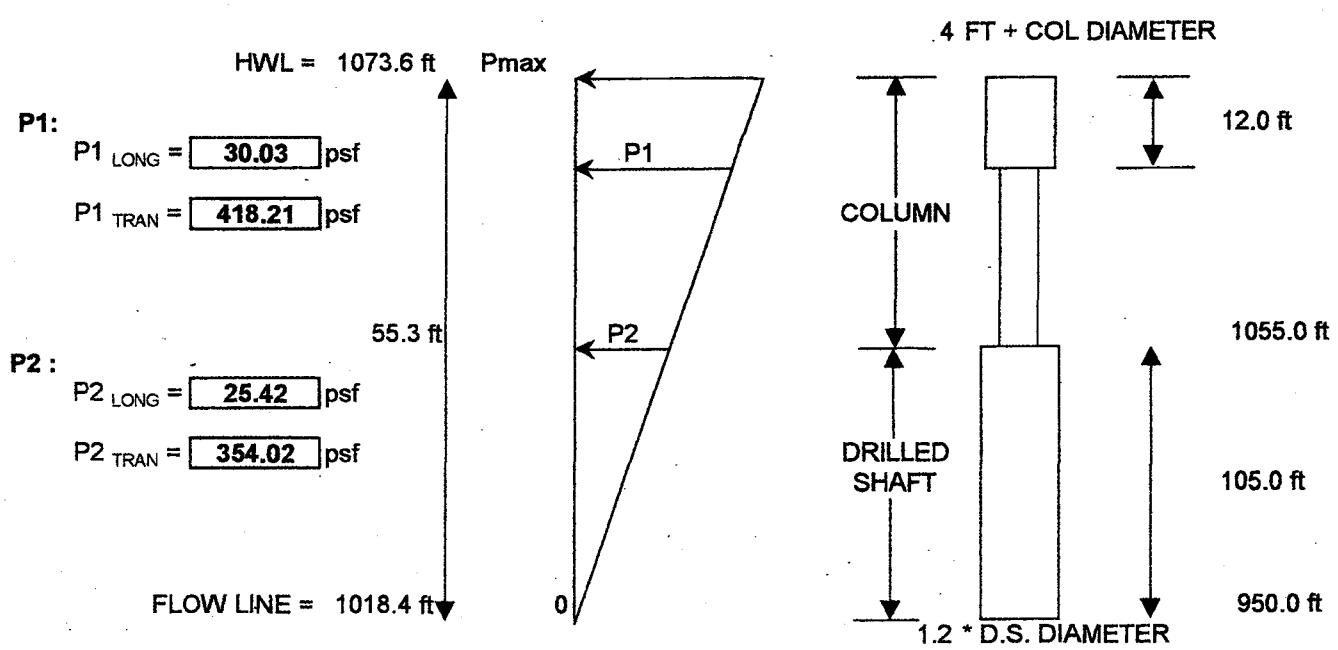
The maximum Stream Flow Pressure, P_{max}, shall be equal to twice the Average Stream Flow Pressure, P_{avg}, computed by Equation 3-4. Stream Flow Pressure shall be a triangular distribution with P_{max} located at the top of water elevation and a zero pressure located at the flow line.

$$P_{max} = 2 * K\,(V_{avg})^2 \qquad \text{where: } K = 1.4$$

P_{max} long = **38.36** psf P_{max} trans = **534.22** psf

BUOYANCY:

COLUMN =	62.40 kcf	* PI /4 *	(5.00 ft) ^{2}	=	1.23	k/ft	↑ upward force
DRI'D SHAFT =	62.40 kcf	* PI /4 *	(7.00 ft) ^{2}	=	2.40	k/ft	↑ upward force



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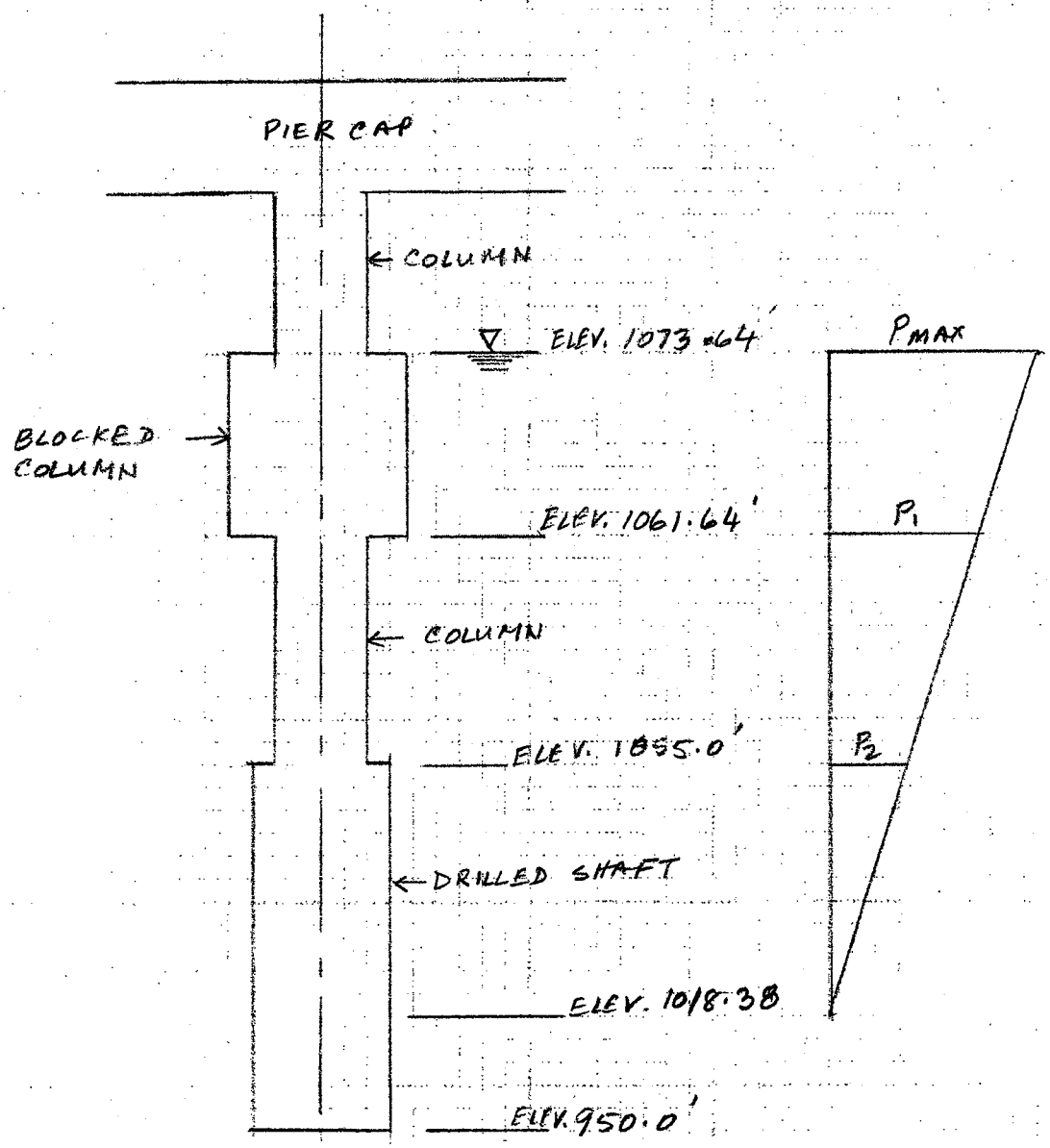
Projects: Salt River Bridges - Scour Job No. 1317.00 Sheet: of

Item: 16th Street Bridge Designer: SJ Date: 02-08-00

Checker: VPD Date: 3/2/00

Grid: 1/8"

Stream Flow Forces:



	LONGITUDINAL	TRANSVERSE
P_{MAX}	0.03836 ksf	0.53422 ksf
P_1	0.03003 ksf	0.41821 ksf
P_2	0.02542 ksf	0.35402 ksf

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Projects: Salt River Bridges – Scour | Job No. 1317.00 | Sheet: of
Item: 16th Street Bridge | Designer: SJ | Date: 02-08-00
Checker: VPD | Date: 3/2/00
Grid: 1/8"

Stream Flow Forces (cont'd)

LONGITUDINAL:

BLOCKED COLUMN:

@ 0': 0.03836 (5+2+2) = 0.345 k/'
@ 12': 0.03003 (5+2+2) = 0.27027 k/'

COLUMN:

@ 12': 0.03003 (5) = 0.15015 k/'
@ 18.64': 0.02542 (5) = 0.1271 k/'

Drilled Shaft:

@ 18.64': 0.02542 (7) = 0.178 k/'
@ 33.18': 0 (7) = 0 k/'

TRANSVERSE:

Blocked Column:

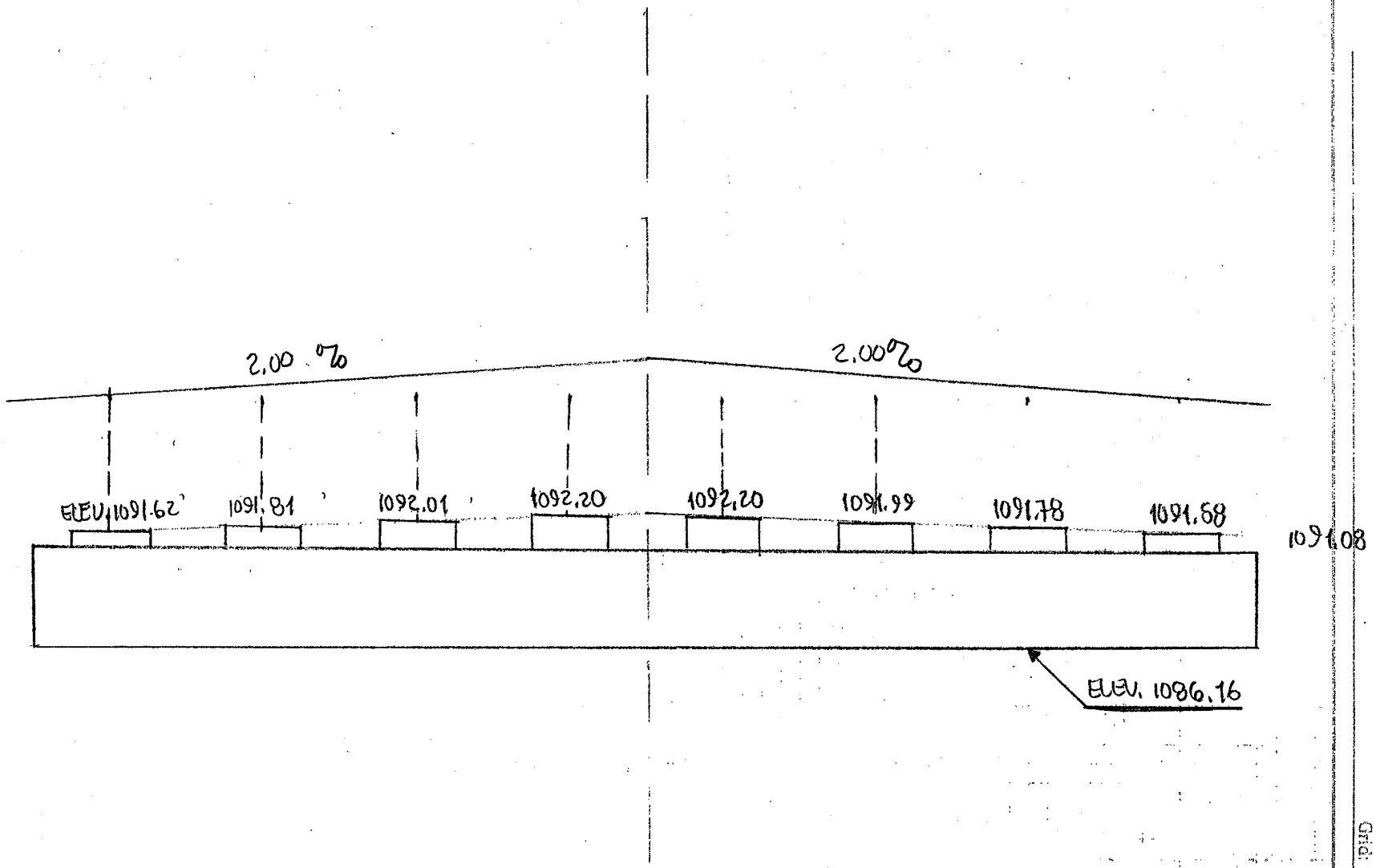
@ 0': 0.53422 (5+2+2) = 4.80798 k/'
@ 12': 0.41821 (5+2+2) = 3.764 k/'

COLUMN:

@ 12': 0.41821 (5) = 2.091 k/'
@ 18.64': 0.35402 (5) = 1.77 k/'

Drilled Shaft:

@ 18.64': 0.35402 (7) = 2.48 k/'
@ 33.18': 0 (7) = 0 k/'

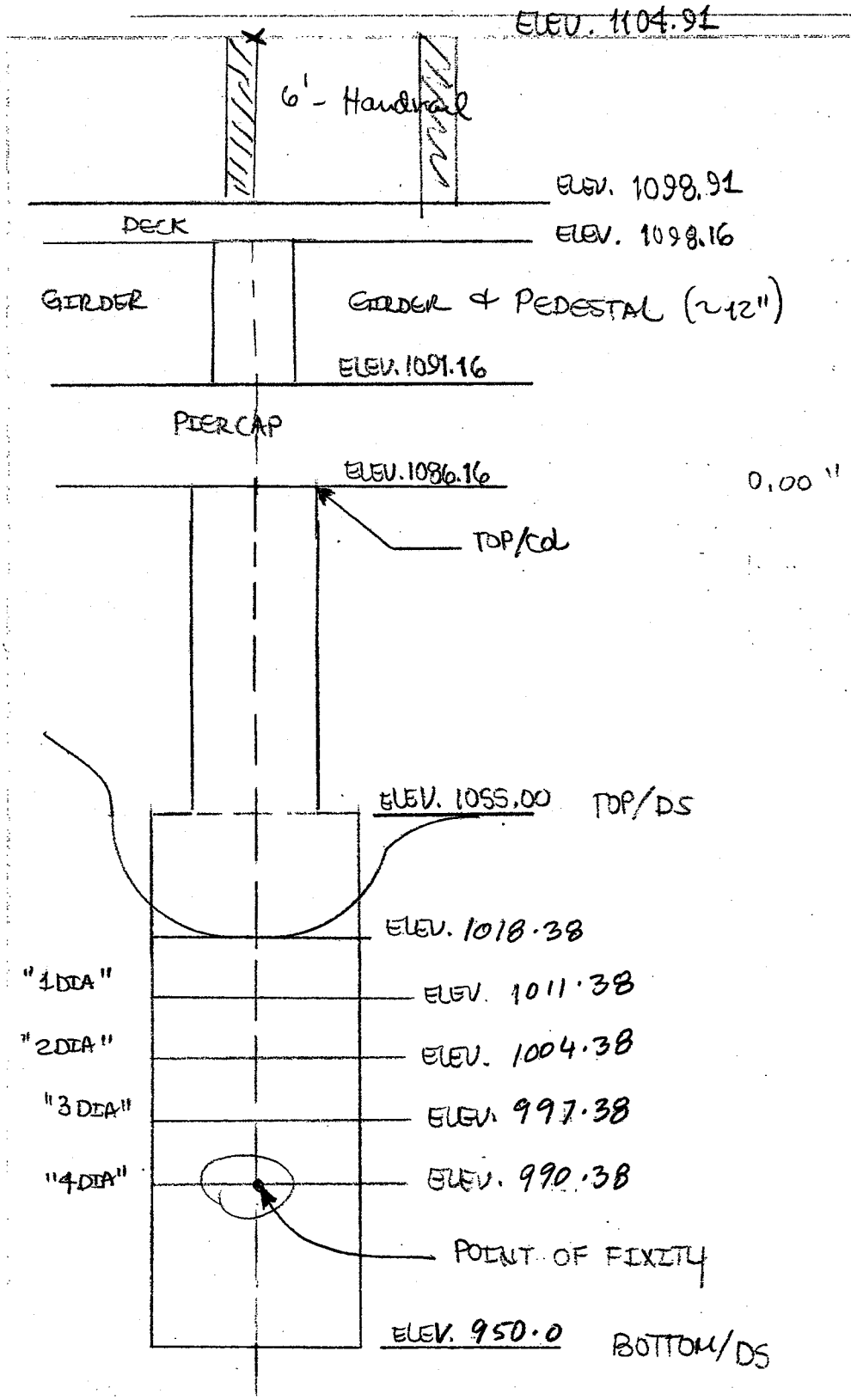


Pier 5

Project:
Item:
Job No.
Sheet: of
Designer:
Date:
Checker:
Date:
Grid: 1/8"

TRALINTERNATIONAL

Project:	Job No.	Sheet: of
Item:	Designer:	Date:
	Checker:	Date:
		Grid: 1/8"



Pier 5

Reaction Due to Live Load:

span Length $= l_{span} = 123.00'$

Impact factor $I = \dfrac{50}{l_{span} + 125} = 0.2016$

Beam Spacing $= S_{beam} = 10'\text{-}0''$

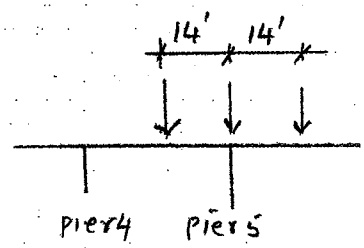
Spacing of axle $= S_{axle} = 14'\text{-}0''$

Spacing of wheels $= 6'\text{-}0''$

FRONT AXLE REACTION $= R_{FRONT} = 8$ kips

REAR AXLE REACTION $= R_{REAR} = 32$ kips

- DISTRIBUTION FACTOR:



PER AASHTO Lateral distribution of wheel loads at the end of the beam shall be that produced by assuming the floor to act as a simple span between beams. For wheels or axles in other positions in the span, the lateral distribution shall be as per table 3.23.1

- For Front and Rear axle $DF_F = \dfrac{S_{beam}}{11} = 0.909$

- For Middle axle $DF_M = \dfrac{S_{beam} - S_{wheel}}{S_{beam}} + 1$

$= 1.4$

TY·LIN INTERNATIONAL

Projects: Salt River Bridges Scour | Job No. | Sheet: of
Item: 16th Street Bridge | Designer: SJ | Date: 02-04-00
Checker: VPD | Date: 3/2/00
Grid: 1/8"

MAXIMUM LIVE LOAD REACTION:

$$R_{max} = \frac{R_{rear}}{2} \times DF_M + (32+8) \times \frac{(l_{span} - S_{axle})}{l_{span}} \times DF_F$$

$$= \frac{32}{2} \times 1.4 + (32+8) \times \left(\frac{123-14}{123}\right) \times 0.909$$

$$= 54.62 \text{ kips}$$

Reaction from adjacent span:
(the reaction from the adjacent span will be conservatively placed as to maximize the effect.)

$$R_{adj} \simeq \frac{R_{Rear}}{2}\left(\frac{S_{wheel}}{S_{beam}}\right) + (R_{rear} + R_{front}) \times \frac{(l_{span} - S_{axle})}{l_{span}} \times (1 - DF)$$

$$= \frac{32}{2} \times \frac{6}{10} + (32+8) \times \frac{(123-14)}{123}(1 - .909)$$

$$= 12.82 \text{ kips}$$

$$R_{Live\ Load} = 54.62 + 12.82 = 67.44 \text{ kips}$$

$$R_{Live\ Load} = 67.44/2 = 33.72 \text{/wheel} \times 1.2016$$

$$= 40.51 \text{ k/wheel}$$

FYLN INTERNATIONAL

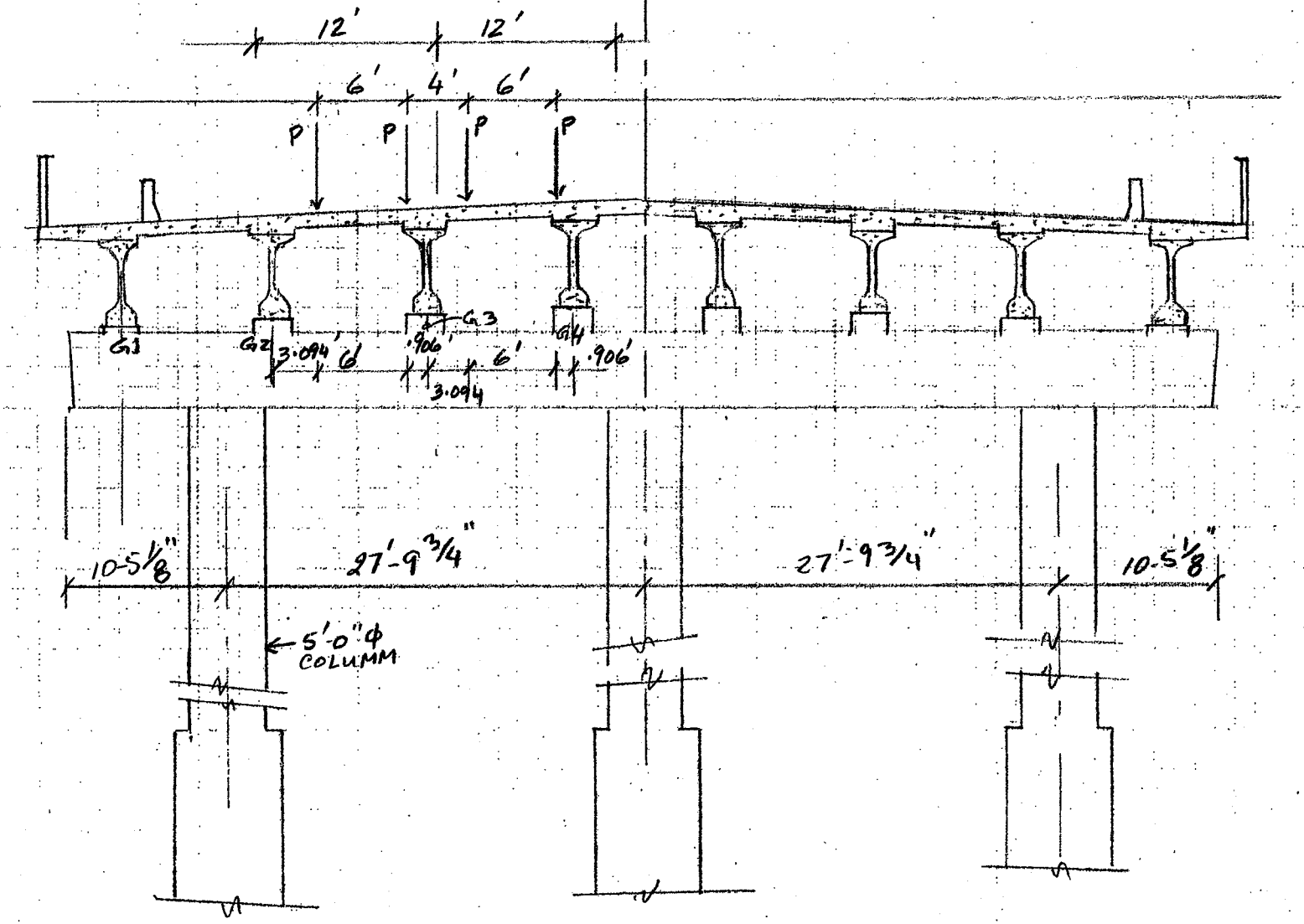
Projects: Salt River bridge Scour Job No. 1317.00 Sheet: of

Item: 16th street bridge. Designer: SJ Date: 2-4-00

Checker: Date:

Grid: 1/8"

REACTION DUE TO TWO LIVE LOAD LANES



T·Y·LIN INTERNATIONAL

Projects: Salt River Bridges - Scour	Job No.	Sheet:	of
Item: 16th Street Bridge.	Designer: SJ	Date: 02-04-00	
	Checker: VPD	Date: 3/2/00	
		Grid: 1/8"	

Reaction Due To 2 Lane Live Load:

GIRDER 2

$$R_{G2} = \frac{R_{Live}}{S_{beam}} \left(S_{beam} - 3.094 + .906 \right)$$

$$= \frac{40.51}{10} \left(10 - 6.4 + .906 \right) = 31.64 \text{ kips}$$

GIRDER 3

$$R_{G3} = \frac{R_{Live}}{S_{beam}} \times 3.094 + \frac{R_{Live}}{S_{beam}} (9.094) + \frac{R_{Live}}{S_{beam}} \times 6.906$$

$$+ \frac{R_{Live}}{S_{beam}} \times .906$$

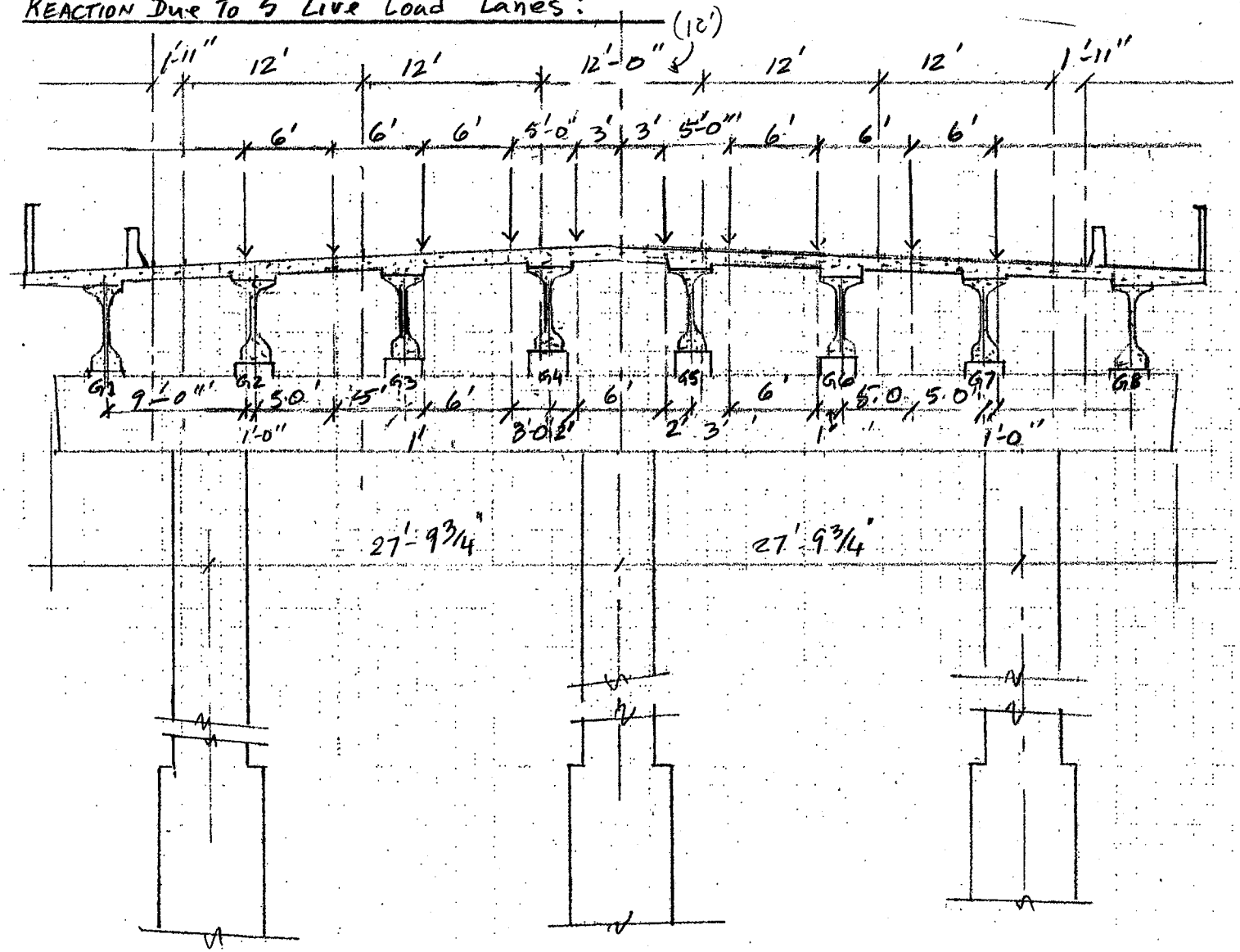
$$= 81.02 \text{ kips}$$

Girder 4

$$R_{G4} = \frac{R_{Live}}{S_{beam}} (3.094) + \frac{R_{Live}}{S_{beam}} (9.094)$$

$$= 49.37 \text{ kips}$$

REACTION DUE TO 5 LIVE LOAD LANES:



TYLIN INTERNATIONAL

Projects: Salt River Bridges - Scour

Job No.

Sheet: of

Item: 16th Street Bridge

Designer: SJ

Date: 02-04-00

Checker: VPD

Date: 3/2/00

Grid: 1/8"

TY·LIN INTERNATIONAL

Projects: Salt River Bridges Scour | Job No. 1317.00 | Sheet: of
Item: 16th Street | Designer: SJ | Date: 02-04-00
Checker: VPD | Date: 3/2/00
Grid: 1/8"

Reaction Due To 5 Live Load Lanes: 0.75 * 40.51 = 30.3825 kips

Girder 1 and 8:

$$R_{G1} = R_{G8} = \frac{R_{Live}}{S_{Beam}}(1) = \frac{40.51}{10}(1.0) \times 0.75$$

$$= 3.038 \text{ kips}$$

$$R_{G2} = R_{G7} = \frac{R_{Live}}{S_{beam}}(9.0) + \frac{R_{Live}}{S_{beam}}(5.0) = \frac{40.51}{10}(14)$$

$$= 56.71 \text{ kips} \times .75 = 42.53 \text{ K}$$

$$R_{G3} = R_{G6} = \frac{R_{Live}}{S_{beam}}(5.0 + 9.0 + 3.0) = \frac{40.51}{10} \times 16.9162 \times .75$$

$$= 51.4 \text{ K}$$

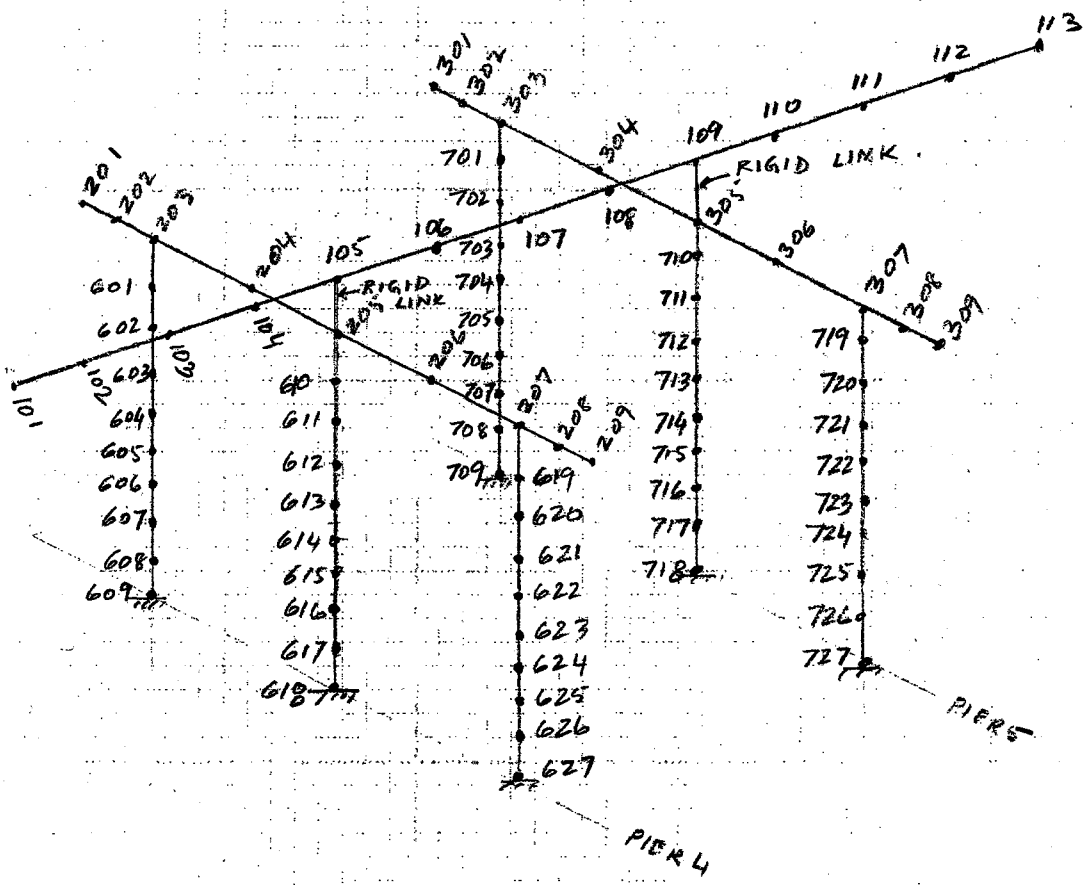
$$R_{G4} = R_{G5} = \frac{R_{Live}}{S_{beam}}(1.0 + 7.0 + 8 + 2) = \frac{40.51}{10} \times (18.168)$$

$$= 72.918 \text{ kips} \times .75$$

$$= 54.69 \text{ K}$$

TY·LIN INTERNATIONAL

Projects: Salt River Bridges - Scour	Job No. 1317.00	Sheet:	of
Item: 16th Street Bridge	Designer: SJ	Date: 02-07-00	
	Checker:	Date:	
		Grid: 1/8"	



NODAL NOMENCLATURE FOR SAP2000

T·Y·LIN INTERNATIONAL

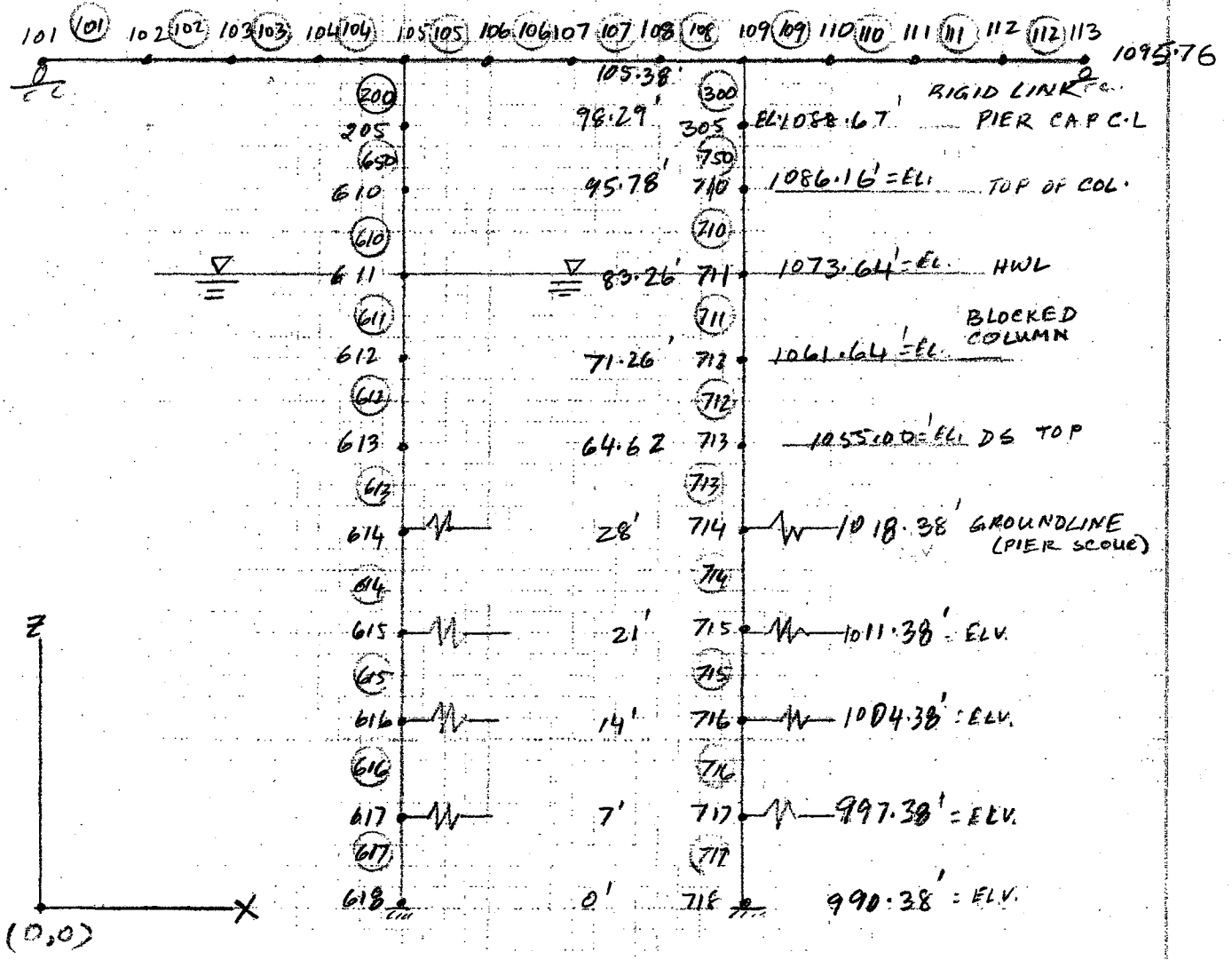
Projects: Salt River Bridges - Scour | Job No. 1317.00 | Sheet: of

Item: 16th Street Bridge | Designer: SJ | Date: 2-8-00

Checker: | Date:

Grid: 1/8"

LONGITUDINAL:



```
; File C:\Program Files\SAP2000N\Long.$2k saved 3/10/00 9:31:17 in Kip-in

SYSTEM
  DOF=UX,UY,UZ,RX,RY,RZ  LENGTH=IN  FORCE=Kip  PAGE=SECTIONS

JOINT
  101  X=0   Y=0   Z=1264.56
  102  X=369  Y=0   Z=1264.56
  103  X=738  Y=0   Z=1264.56
  104  X=1107  Y=0   Z=1264.56
  105  X=1476  Y=0   Z=1264.56
  106  X=1845  Y=0   Z=1264.56
  107  X=2214  Y=0   Z=1264.56
  108  X=2583  Y=0   Z=1264.56
  109  X=2952  Y=0   Z=1264.56
  110  X=3321  Y=0   Z=1264.56
  111  X=3690  Y=0   Z=1264.56
  112  X=4059  Y=0   Z=1264.56
  113  X=4428  Y=0   Z=1264.56
  205  X=1476  Y=0   Z=1179.48
  305  X=2952  Y=0   Z=1179.48
  610  X=1476  Y=0   Z=1149.36
  611  X=1476  Y=0   Z=999.12
  612  X=1476  Y=0   Z=855.12
  613  X=1476  Y=0   Z=775.44
  614  X=1476  Y=0   Z=336
  615  X=1476  Y=0   Z=252
  616  X=1476  Y=0   Z=168
  617  X=1476  Y=0   Z=84
  618  X=1476  Y=0   Z=0
  710  X=2952  Y=0   Z=1149.36
  711  X=2952  Y=0   Z=999.12
  712  X=2952  Y=0   Z=855.12
  713  X=2952  Y=0   Z=775.44
  714  X=2952  Y=0   Z=336
  715  X=2952  Y=0   Z=252
  716  X=2952  Y=0   Z=168
  717  X=2952  Y=0   Z=84
  718  X=2952  Y=0   Z=0

RESTRAINT
  ADD=618  DOF=U1,U2,U3,R1,R2,R3
  ADD=718  DOF=U1,U2,U3,R1,R2,R3
  ADD=101  DOF=U3
  ADD=113  DOF=U3

PATTERN
  NAME=DEFAULT

SPRING
  ADD=617  U1=547.5833
  ADD=616  U1=547.5833
  ADD=615  U1=547.5833
  ADD=614  U1=273.75
  ADD=717  U1=547.5833
  ADD=716  U1=547.5833
  ADD=715  U1=547.5833
  ADD=714  U1=273.75

MATERIAL
  NAME=STEEL  IDES=S  M=7.324016E-07  W=.000283
    T=0  E=29000  U=.3  A=.0000065  FY=36
  NAME=CONC  IDES=C  M=2.245853E-07  W=8.796297E-05
    T=0  E=4415  U=.2  A=.0000055
```



```
  NAME=OTHER  IDES=N  M=2.246377E-07  W=.0000868
    T=0  E=3600  U=.2  A=.0000055
  NAME=CONC2  IDES=C  M=2.246E-07  W=8.681E-05
    T=0  E=3605  U=.2  A=.0000055
  NAME=CONC3  IDES=C
    T=0  E=3602  U=.2  A=.0000055

FRAME SECTION
  NAME=FSEC1 MAT=STEEL SH=R T=18,10 A=180 J=3916.671 I=4860,1500 AS=150,150
  NAME=SEC1 MAT=CONC A=16155.36 J=754064.6 I=1.208075E+07,1.164617E+09 AS=16155.3
6,16155.36 S=218851.2,2396321 Z=.9999936,.9999936 R=.9996,.9996 T=18,9.9996
  NAME=SEC2 MAT=CONC2 A=66077.86 J=1.186615E+08 I=2.966538E+07,5.205377E+09 AS=66
077.86,66077.86 S=824038.3,1.13438E+07 Z=.9999936,.9999936 R=.9996,.9996 T=18,9.9
996
  NAME=SEC3 MAT=CONC2 A=8482.32 J=3817083 I=1908542,1908542 AS=8482.32,8482.32 S=
63618.05,63618.05 Z=.9999936,.9999936 R=.9996,.9996 T=18,9.9996
  NAME=SEC4 MAT=CONC2 A=16625.52 J=1.466367E+07 I=7331773,7331773 AS=16625.52,166
25.52 S=174566,174566 Z=.9999936,.9999936 R=.9996,.9996 T=18,9.9996
  NAME=SEC5 MAT=CONC3 A=16625.52 J=1.466367E+07 I=7331773,7331773 AS=16625.52,166
25.52 S=174566,174566 Z=.9999936,.9999936 R=.9996,.9996 T=18,9.9996
  NAME=SEC6 MAT=CONC3 A=66077.86 J=1.186615E+08 I=2.966538E+07,5.205377E+09 AS=66
077.86,66077.86 S=824038.3,1.071065E+07 Z=.9999936,.9999936 R=.9996,.9996 T=18,9.
9996

FRAME
  101  J=101,102  SEC=SEC1  NSEG=1  ANG=0
  102  J=102,103  SEC=SEC1  NSEG=1  ANG=0
  103  J=103,104  SEC=SEC1  NSEG=1  ANG=0
  104  J=104,105  SEC=SEC1  NSEG=1  ANG=0
  105  J=105,106  SEC=SEC1  NSEG=1  ANG=0
  106  J=106,107  SEC=SEC1  NSEG=1  ANG=0
  107  J=107,108  SEC=SEC1  NSEG=1  ANG=0
  108  J=108,109  SEC=SEC1  NSEG=1  ANG=0
  109  J=109,110  SEC=SEC1  NSEG=1  ANG=0
  110  J=110,111  SEC=SEC1  NSEG=1  ANG=0
  111  J=111,112  SEC=SEC1  NSEG=1  ANG=0
  112  J=112,113  SEC=SEC1  NSEG=1  ANG=0
  200  J=205,105  SEC=SEC2  NSEG=1  ANG=0  JREL=R3
  300  J=109,305  SEC=SEC2  NSEG=1  ANG=0  IREL=R3
  610  J=611,610  SEC=SEC3  NSEG=1  ANG=0
  611  J=612,611  SEC=SEC3  NSEG=1  ANG=0
  612  J=613,612  SEC=SEC3  NSEG=1  ANG=0
  613  J=614,613  SEC=SEC4  NSEG=1  ANG=0
  614  J=615,614  SEC=SEC5  NSEG=1  ANG=0
  615  J=616,615  SEC=SEC5  NSEG=1  ANG=0
  616  J=617,616  SEC=SEC5  NSEG=1  ANG=0
  617  J=618,617  SEC=SEC5  NSEG=1  ANG=0
  650  J=610,205  SEC=SEC6  NSEG=1  ANG=0
  710  J=711,710  SEC=SEC3  NSEG=1  ANG=0
  711  J=712,711  SEC=SEC3  NSEG=1  ANG=0
  712  J=713,712  SEC=SEC3  NSEG=1  ANG=0
  713  J=714,713  SEC=SEC4  NSEG=1  ANG=0
  714  J=715,714  SEC=SEC5  NSEG=1  ANG=0
  715  J=716,715  SEC=SEC5  NSEG=1  ANG=0
  716  J=717,716  SEC=SEC5  NSEG=1  ANG=0
  717  J=718,717  SEC=SEC5  NSEG=1  ANG=0
  750  J=710,305  SEC=SEC6  NSEG=1  ANG=0

LOAD
  NAME=DL
    TYPE=FORCE
      ADD=105  UZ=-541
      ADD=109  UZ=-541
      ADD=101  UZ=-541
      ADD=113  UZ=-541
    TYPE=GRAVITY  ELEM=FRAME
```

```
      ADD=101  UZ=-1
      ADD=102  UZ=-1
      ADD=103  UZ=-1
      ADD=104  UZ=-1
      ADD=105  UZ=-1
      ADD=106  UZ=-1
      ADD=107  UZ=-1
      ADD=108  UZ=-1
      ADD=109  UZ=-1
      ADD=110  UZ=-1
      ADD=111  UZ=-1
      ADD=112  UZ=-1
      ADD=617  UZ=-1
      ADD=616  UZ=-1
      ADD=615  UZ=-1
      ADD=614  UZ=-1
      ADD=613  UZ=-1
      ADD=612  UZ=-1
      ADD=611  UZ=-1
      ADD=610  UZ=-1
      ADD=650  UZ=-1
      ADD=200  UZ=-1
      ADD=717  UZ=-1
      ADD=716  UZ=-1
      ADD=715  UZ=-1
      ADD=714  UZ=-1
      ADD=713  UZ=-1
      ADD=712  UZ=-1
      ADD=711  UZ=-1
      ADD=710  UZ=-1
      ADD=750  UZ=-1
      ADD=300  UZ=-1
  NAME=WIND
    TYPE=DISTRIBUTED SPAN
      ADD=200  RD=0,1  U2=.1795,.1795
      ADD=300  RD=0,1  U2=.1795,.1795
      ADD=610  RD=0,1  U2=1.666667E-02,1.666667E-02
      ADD=710  RD=0,1  U2=1.666667E-02,1.666667E-02
      ADD=101  RD=0,1  U1=1.544167E-02,1.544167E-02
      ADD=102  RD=0,1  U1=1.544167E-02,1.544167E-02
      ADD=103  RD=0,1  U1=1.544167E-02,1.544167E-02
      ADD=104  RD=0,1  U1=1.544167E-02,1.544167E-02
      ADD=105  RD=0,1  U1=1.544167E-02,1.544167E-02
      ADD=106  RD=0,1  U1=1.544167E-02,1.544167E-02
      ADD=107  RD=0,1  U1=1.544167E-02,1.544167E-02
      ADD=108  RD=0,1  U1=1.544167E-02,1.544167E-02
      ADD=109  RD=0,1  U1=1.544167E-02,1.544167E-02
      ADD=110  RD=0,1  U1=1.544167E-02,1.544167E-02
      ADD=111  RD=0,1  U1=1.544167E-02,1.544167E-02
      ADD=112  RD=0,1  U1=1.544167E-02,1.544167E-02
  NAME=WINDLL
    TYPE=DISTRIBUTED SPAN
      ADD=101  RD=0,1  U1=3.933333E-03,3.933333E-03
      ADD=102  RD=0,1  U1=3.933333E-03,3.933333E-03
      ADD=103  RD=0,1  U1=3.933333E-03,3.933333E-03
      ADD=104  RD=0,1  U1=3.933333E-03,3.933333E-03
      ADD=105  RD=0,1  U1=3.933333E-03,3.933333E-03
      ADD=106  RD=0,1  U1=3.933333E-03,3.933333E-03
      ADD=107  RD=0,1  U1=3.933333E-03,3.933333E-03
      ADD=108  RD=0,1  U1=3.933333E-03,3.933333E-03
      ADD=109  RD=0,1  U1=3.933333E-03,3.933333E-03
      ADD=110  RD=0,1  U1=3.933333E-03,3.933333E-03
      ADD=111  RD=0,1  U1=3.933333E-03,3.933333E-03
      ADD=112  RD=0,1  U1=3.933333E-03,3.933333E-03
  NAME=LF
    TYPE=FORCE
```



```
      ADD=105  UX=.497
      ADD=109  UX=.497
    TYPE=DISTRIBUTED SPAN
      ADD=101  RD=0,1  U1=.0118,.0118
      ADD=102  RD=0,1  U1=.0118,.0118
      ADD=103  RD=0,1  U1=.0118,.0118
      ADD=104  RD=0,1  U1=.0118,.0118
      ADD=105  RD=0,1  U1=.0118,.0118
      ADD=106  RD=0,1  U1=.0118,.0118
      ADD=107  RD=0,1  U1=.0118,.0118
      ADD=108  RD=0,1  U1=.0118,.0118
      ADD=109  RD=0,1  U1=.0118,.0118
      ADD=110  RD=0,1  U1=.0118,.0118
      ADD=111  RD=0,1  U1=.0118,.0118
      ADD=112  RD=0,1  U1=.0118,.0118
  NAME=SF
    TYPE=DISTRIBUTED SPAN
      ADD=611  RD=0,1  U2=.022525,.02875
      ADD=612  RD=0,1  U2=1.059167E-02,.0125125
      ADD=613  RD=0,1  U2=0,1.483333E-02
      ADD=713  RD=0,1  U2=0,1.483333E-02
      ADD=711  RD=0,1  U2=.0225225,.02875
      ADD=712  RD=0,1  U2=1.059167E-02,.0125125
  NAME=TEMP
    TYPE=TEMPERATURE  ELEM=FRAME
      ADD=101  T=40
      ADD=102  T=40
      ADD=103  T=40
      ADD=104  T=40
      ADD=105  T=40
      ADD=106  T=40
      ADD=107  T=40
      ADD=108  T=40
      ADD=109  T=40
      ADD=110  T=40
      ADD=111  T=40
      ADD=112  T=40
      ADD=200  T=40
      ADD=300  T=40
      ADD=717  T=40
      ADD=716  T=40
      ADD=715  T=40
      ADD=714  T=40
      ADD=713  T=40
      ADD=712  T=40
      ADD=711  T=40
      ADD=710  T=40
      ADD=617  T=40
      ADD=616  T=40
      ADD=615  T=40
      ADD=614  T=40
      ADD=613  T=40
      ADD=612  T=40
      ADD=611  T=40
      ADD=610  T=40

OUTPUT
; No Output Requested

END

; The following data is used for graphics, design and pushover analysis.
; If changes are made to the analysis data above, then the following data
; should be checked for consistency.
SAP2000 V7.10 SUPPLEMENTAL DATA
  GRID GLOBAL  X "1"  0
```

```
  GRID GLOBAL  X "2"  369
  GRID GLOBAL  X "3"  738
  GRID GLOBAL  X "4"  1107
  GRID GLOBAL  X "5"  1476
  GRID GLOBAL  X "6"  1845
  GRID GLOBAL  X "7"  2214
  GRID GLOBAL  X "8"  2583
  GRID GLOBAL  X "9"  2952
  GRID GLOBAL  X "10"  3321
  GRID GLOBAL  X "11"  3690
  GRID GLOBAL  X "12"  4059
  GRID GLOBAL  X "13"  4428
  GRID GLOBAL  Y "14"  0
  GRID GLOBAL  Z "15"  0
  GRID GLOBAL  Z "16"  84
  GRID GLOBAL  Z "17"  168
  GRID GLOBAL  Z "18"  252
  GRID GLOBAL  Z "19"  336
  GRID GLOBAL  Z "20"  775.44
  GRID GLOBAL  Z "21"  855.12
  GRID GLOBAL  Z "22"  999.12
  GRID GLOBAL  Z "23"  1149.36
  GRID GLOBAL  Z "24"  1179.48
  GRID GLOBAL  Z "25"  1264.56
  MATERIAL STEEL FY 36
  MATERIAL CONC FYREBAR 60 FYSHEAR 40 FC 4 FCSHEAR 4
  MATERIAL CONC2 FYREBAR 60 FYSHEAR 40 FC 4 FCSHEAR 4
  MATERIAL CONC3 FYREBAR 60 FYSHEAR 40 FC 4 FCSHEAR 4
  STATICLOAD DL TYPE DEAD
  STATICLOAD WIND TYPE WIND
  STATICLOAD WINDLL TYPE WIND
  STATICLOAD LF TYPE OTHER
  STATICLOAD SF TYPE OTHER
  STATICLOAD TEMP TYPE OTHER
END SUPPLEMENTAL DATA
```

```
      200  LF
                0.00        0.00       26.62       0.00       0.00       0.0
0      188.75
                7.09        0.00       26.62       0.00       0.00       0.0
0        0.00
      200  SF
                0.00        0.00  -4.508E-05       0.00       0.00       0.0
0  -3.196E-04
                7.09        0.00  -4.508E-05       0.00       0.00       0.0
0        0.00
      200  TEMP
                0.00       -5.40       -5.94       0.00       0.00       0.0
0      -42.13
                7.09       -5.40       -5.94       0.00       0.00       0.0
0        0.00
                                   on 8 GIRDERS
      300  DL
                0.00    -2846.13        0.00       0.00       0.00       0.0
0        0.00
                7.09    -3334.16        0.00       0.00       0.00       0.0
0        0.00
      300  WIND
                0.00        0.00      -34.19       0.00       0.00       0.0
0        0.00
                7.09        0.00      -49.46       0.00       0.00       0.0
0      296.53
      300  WINDLL
                0.00        0.00       -8.71       0.00       0.00       0.0
0        0.00
                7.09        0.00       -8.71       0.00       0.00       0.0
0       61.74
      300  LF
                0.00        0.00      -26.62       0.00       0.00       0.0
0        0.00
                7.09        0.00      -26.62       0.00       0.00       0.0
0      188.75
      300  SF
                0.00        0.00  -4.508E-05       0.00       0.00       0.0
0        0.00
                7.09        0.00  -4.508E-05       0.00       0.00       0.0
0  3.196E-04
      300  TEMP
                0.00       -5.40       -5.94       0.00       0.00       0.0
0        0.00
                7.09       -5.40       -5.94       0.00       0.00       0.0
0       42.13

      610  DL
                0.00    -3444.79        0.00       0.00       0.00       0.0
0        0.00
               12.52    -3334.16        0.00       0.00       0.00       0.0
0        0.00
      610  WIND
                0.00        0.00       51.96       0.00       0.00       0.0
0     1055.59
               12.52        0.00       49.46       0.00       0.00       0.0
0      420.67
      610  WINDLL
                0.00        0.00        8.71       0.00       0.00       0.0
0      192.63
               12.52        0.00        8.71       0.00       0.00       0.0
0       83.60
      610  LF
                0.00        0.00       26.62       0.00       0.00       0.0
0      588.88
               12.52        0.00       26.62       0.00       0.00       0.0
```



```
0      255.57
      610  SF
                0.00        0.00  -4.508E-05       0.00       0.00       0.0
0  -9.971E-04
               12.52        0.00  -4.508E-05       0.00       0.00       0.0
0  -4.327E-04
      610  TEMP
                0.00       -5.40       -5.94       0.00       0.00       0.0
0      -131.43
               12.52       -5.40       -5.94       0.00       0.00       0.0
0      -57.04

      611  DL
                0.00    -3550.83        0.00       0.00       0.00       0.0
0        0.00
               12.00    -3444.79        0.00       0.00       0.00       0.0
0        0.00
      611  WIND
                0.00        0.00       51.96       0.00       0.00       0.0
0     1679.15
               12.00        0.00       51.96       0.00       0.00       0.0
0     1055.59
      611  WINDLL
                0.00        0.00        8.71       0.00       0.00       0.0
0      297.13
               12.00        0.00        8.71       0.00       0.00       0.0
0      192.63
      611  LF
                0.00        0.00       26.62       0.00       0.00       0.0
0      908.35
               12.00        0.00       26.62       0.00       0.00       0.0
0      588.88
      611  SF
                0.00        0.00        3.69       0.00       0.00       0.0
0       23.05
               12.00        0.00  -4.508E-05       0.00       0.00       0.0
0  -9.971E-04
      611  TEMP
                0.00       -5.40       -5.94       0.00       0.00       0.0
0      -202.73
               12.00       -5.40       -5.94       0.00       0.00       0.0
0      -131.43

      612  DL
                0.00    -3609.50        0.00       0.00       0.00       0.0
0        0.00
                6.64    -3550.83        0.00       0.00       0.00       0.0
0        0.00
      612  WIND
                0.00        0.00       51.96       0.00       0.00       0.0
0     2024.19
                6.64        0.00       51.96       0.00       0.00       0.0
0     1679.15
      612  WINDLL
                0.00        0.00        8.71       0.00       0.00       0.0
0      354.95
                6.64        0.00        8.71       0.00       0.00       0.0
0      297.13
      612  LF
                0.00        0.00       26.62       0.00       0.00       0.0
0     1085.12
                6.64        0.00       26.62       0.00       0.00       0.0
0      908.35
      612  SF
                0.00        0.00        4.61       0.00       0.00       0.0
0       50.70
```

```
                6.64       0.00       3.69       0.00       0.00       0.0
0      23.05
     612  TEMP
                0.00      -5.40      -5.94       0.00       0.00       0.0
0    -242.18
                6.64      -5.40      -5.94       0.00       0.00       0.0
0    -202.73
     613  DL
                0.00   -4243.73       0.00       0.00       0.00       0.0
0       0.00
               36.62   -3609.50       0.00       0.00       0.00       0.0
0       0.00
     613  WIND
                0.00       0.00      51.96       0.00       0.00       0.0
0    3927.10
               36.62       0.00      51.96       0.00       0.00       0.0
0    2024.19
     613  WINDLL
                0.00       0.00       8.71       0.00       0.00       0.0
0     673.86
               36.62       0.00       8.71       0.00       0.00       0.0
0     354.95
     613  LF
                0.00       0.00      26.62       0.00       0.00       0.0
0    2060.03
               36.62       0.00      26.62       0.00       0.00       0.0
0    1085.12
     613  SF
                0.00       0.00       7.87       0.00       0.00       0.0
0     299.17
               36.62       0.00       4.61       0.00       0.00       0.0
0      50.70
     613  TEMP
                0.00      -5.40      -5.94       0.00       0.00       0.0
0    -459.76
               36.62      -5.40      -5.94       0.00       0.00       0.0
0    -242.18
     614  DL
                0.00   -4243.73       0.00       0.00       0.00       0.0
0       0.00
                7.00   -4243.73       0.00       0.00       0.00       0.0
0       0.00
     614  WIND
                0.00       0.00      24.36       0.00       0.00       0.0
0    4097.61
                7.00       0.00      24.36       0.00       0.00       0.0
0    3927.10
     614  WINDLL
                0.00       0.00       3.99       0.00       0.00       0.0
0     701.81
                7.00       0.00       3.99       0.00       0.00       0.0
0     673.86
     614  LF
                0.00       0.00      12.21       0.00       0.00       0.0
0    2145.49
                7.00       0.00      12.21       0.00       0.00       0.0
0    2060.03
     614  SF
                0.00       0.00       5.35       0.00       0.00       0.0
0     336.64
                7.00       0.00       5.35       0.00       0.00       0.0
0     299.17
     614  TEMP
                0.00      -5.40      -2.72       0.00       0.00       0.0
```



```
0    -478.84
                7.00      -5.40      -2.72       0.00       0.00       0.0
0    -459.76
     615  DL
                0.00   -4243.73       0.00       0.00       0.00       0.0
0       0.00
                7.00   -4243.73       0.00       0.00       0.00       0.0
0       0.00
     615  WIND
                0.00       0.00      -6.39       0.00       0.00       0.0
0    4052.89
                7.00       0.00      -6.39       0.00       0.00       0.0
0    4097.61
     615  WINDLL
                0.00       0.00      -1.25       0.00       0.00       0.0
0     693.03
                7.00       0.00      -1.25       0.00       0.00       0.0
0     701.81
     615  LF
                0.00       0.00      -3.84       0.00       0.00       0.0
0    2118.64
                7.00       0.00      -3.84       0.00       0.00       0.0
0    2145.49
     615  SF
                0.00       0.00       2.49       0.00       0.00       0.0
0     354.07
                7.00       0.00       2.49       0.00       0.00       0.0
0     336.64
     615  TEMP
                0.00      -5.40  8.561E-01       0.00       0.00       0.0
0    -472.85
                7.00      -5.40  8.561E-01       0.00       0.00       0.0
0    -478.84
     616  DL
                0.00   -4243.73       0.00       0.00       0.00       0.0
0       0.00
                7.00   -4243.73       0.00       0.00       0.00       0.0
0       0.00
     616  WIND
                0.00       0.00     -19.86       0.00       0.00       0.0
0    3913.89
                7.00       0.00     -19.86       0.00       0.00       0.0
0    4052.89
     616  WINDLL
                0.00       0.00      -3.55       0.00       0.00       0.0
0     668.17
                7.00       0.00      -3.55       0.00       0.00       0.0
0     693.03
     616  LF
                0.00       0.00     -10.86       0.00       0.00       0.0
0    2042.63
                7.00       0.00     -10.86       0.00       0.00       0.0
0    2118.64
     616  SF
                0.00       0.00       1.21       0.00       0.00       0.0
0     362.51
                7.00       0.00       1.21       0.00       0.00       0.0
0     354.07
     616  TEMP
                0.00      -5.40       2.42       0.00       0.00       0.0
0    -455.88
                7.00      -5.40       2.42       0.00       0.00       0.0
0    -472.85
```

```
      617  DL
                    0.00     -4243.73        0.00        0.00        0.00        0.0
0        0.00
                    7.00     -4243.73        0.00        0.00        0.00        0.0
0        0.00
      617  WIND
                    0.00         0.00      -23.15        0.00        0.00        0.0
0     3751.80
                    7.00         0.00      -23.15        0.00        0.00        0.0
0     3913.89
      617  WINDLL
                    0.00         0.00       -4.11        0.00        0.00        0.0
0      639.37
                    7.00         0.00       -4.11        0.00        0.00        0.0
0      668.17
      617  LF
                    0.00         0.00      -12.58        0.00        0.00        0.0
0     1954.60
                    7.00         0.00      -12.58        0.00        0.00        0.0
0     2042.63
      617  SF
                    0.00         0.00   8.825E-01        0.00        0.00        0.0
0      368.69
                    7.00         0.00   8.825E-01        0.00        0.00        0.0
0      362.51
      617  TEMP
                    0.00        -5.40        2.81        0.00        0.00        0.0
0     -436.23
                    7.00        -5.40        2.81        0.00        0.00        0.0
0     -455.88

      650  DL
                    0.00     -3334.16        0.00        0.00        0.00        0.0
0        0.00
                    2.51     -3334.16        0.00        0.00        0.00        0.0
0        0.00
      650  WIND
                    0.00         0.00       49.46        0.00        0.00        0.0
0      420.67
                    2.51         0.00       49.46        0.00        0.00        0.0
0      296.53
      650  WINDLL
                    0.00         0.00        8.71        0.00        0.00        0.0
0       83.60
                    2.51         0.00        8.71        0.00        0.00        0.0
0       61.74
      650  LF
                    0.00         0.00       26.62        0.00        0.00        0.0
0      255.57
                    2.51         0.00       26.62        0.00        0.00        0.0
0      188.75
      650  SF
                    0.00         0.00   -4.508E-05        0.00        0.00        0.0
0  -4.327E-04
                    2.51         0.00   -4.508E-05        0.00        0.00        0.0
0  -3.196E-04
      650  TEMP
                    0.00        -5.40       -5.94        0.00        0.00        0.0
0      -57.04
                    2.51        -5.40       -5.94        0.00        0.00        0.0
0      -42.13

      710  DL
                    0.00     -3444.79        0.00        0.00        0.00        0.0
0        0.00
                   12.52     -3334.16        0.00        0.00        0.00        0.0
```



```
0        0.00
      710  WIND
                    0.00         0.00       51.96        0.00        0.00        0.0
0     1055.59
                   12.52         0.00       49.46        0.00        0.00        0.0
0      420.67
      710  WINDLL
                    0.00         0.00        8.71        0.00        0.00        0.0
0      192.63
                   12.52         0.00        8.71        0.00        0.00        0.0
0       83.60
      710  LF
                    0.00         0.00       26.62        0.00        0.00        0.0
0      588.88
                   12.52         0.00       26.62        0.00        0.00        0.0
0      255.57
      710  SF
                    0.00         0.00   4.508E-05        0.00        0.00        0.0
0  9.971E-04
                   12.52         0.00   4.508E-05        0.00        0.00        0.0
0  4.327E-04
      710  TEMP
                    0.00        -5.40        5.94        0.00        0.00        0.0
0      131.43
                   12.52        -5.40        5.94        0.00        0.00        0.0
0       57.04

      711  DL
                    0.00     -3550.83        0.00        0.00        0.00        0.0
0        0.00
                   12.00     -3444.79        0.00        0.00        0.00        0.0
0        0.00
      711  WIND
                    0.00         0.00       51.96        0.00        0.00        0.0
0     1679.15
                   12.00         0.00       51.96        0.00        0.00        0.0
0     1055.59
      711  WINDLL
                    0.00         0.00        8.71        0.00        0.00        0.0
0      297.13
                   12.00         0.00        8.71        0.00        0.00        0.0
0      192.63
      711  LF
                    0.00         0.00       26.62        0.00        0.00        0.0
0      908.35
                   12.00         0.00       26.62        0.00        0.00        0.0
0      588.88
      711  SF
                    0.00         0.00        3.69        0.00        0.00        0.0
0       23.05
                   12.00         0.00   4.508E-05        0.00        0.00        0.0
0  9.971E-04
      711  TEMP
                    0.00        -5.40        5.94        0.00        0.00        0.0
0      202.73
                   12.00        -5.40        5.94        0.00        0.00        0.0
0      131.43

      712  DL
                    0.00     -3609.50        0.00        0.00        0.00        0.0
0        0.00
                    6.64     -3550.83        0.00        0.00        0.00        0.0
0        0.00
      712  WIND
                    0.00         0.00       51.96        0.00        0.00        0.0
0     2024.19
```

```
                6.64       0.00      51.96       0.00       0.00       0.0
0     1679.15
      712  WINDLL
                0.00       0.00       8.71       0.00       0.00       0.0
0      354.95
                6.64       0.00       8.71       0.00       0.00       0.0
0      297.13
      712  LF
                0.00       0.00      26.62       0.00       0.00       0.0
0     1085.12
                6.64       0.00      26.62       0.00       0.00       0.0
0      908.35
      712  SF
                0.00       0.00       4.61       0.00       0.00       0.0
0       50.70
                6.64       0.00       3.69       0.00       0.00       0.0
0       23.05
      712  TEMP
                0.00      -5.40       5.94       0.00       0.00       0.0
0      242.18
                6.64      -5.40       5.94       0.00       0.00       0.0
0      202.73
      713  DL
                0.00   -4243.73       0.00       0.00       0.00       0.0
0        0.00
               36.62   -3609.50       0.00       0.00       0.00       0.0
0        0.00
      713  WIND
                0.00       0.00      51.96       0.00       0.00       0.0
0     3927.10
               36.62       0.00      51.96       0.00       0.00       0.0
0     2024.19
      713  WINDLL
                0.00       0.00       8.71       0.00       0.00       0.0
0      673.86
               36.62       0.00       8.71       0.00       0.00       0.0
0      354.95
      713  LF
                0.00       0.00      26.62       0.00       0.00       0.0
0     2060.03
               36.62       0.00      26.62       0.00       0.00       0.0
0     1085.12
      713  SF
                0.00       0.00       7.87       0.00       0.00       0.0
0      299.17
               36.62       0.00       4.61       0.00       0.00       0.0
0       50.70
      713  TEMP
                0.00      -5.40       5.94       0.00       0.00       0.0
0      459.76
               36.62      -5.40       5.94       0.00       0.00       0.0
0      242.18
      714  DL
                0.00   -4243.73       0.00       0.00       0.00       0.0
0        0.00
                7.00   -4243.73       0.00       0.00       0.00       0.0
0        0.00
      714  WIND
                0.00       0.00      24.36       0.00       0.00       0.0
0     4097.61
                7.00       0.00      24.36       0.00       0.00       0.0
0     3927.10
      714  WINDLL
                0.00       0.00       3.99       0.00       0.00       0.0
```



```
0      701.81
                7.00       0.00       3.99       0.00       0.00       0.0
0      673.86
      714  LF
                0.00       0.00      12.21       0.00       0.00       0.0
0     2145.49
                7.00       0.00      12.21       0.00       0.00       0.0
0     2060.03
      714  SF
                0.00       0.00       5.35       0.00       0.00       0.0
0      336.64
                7.00       0.00       5.35       0.00       0.00       0.0
0      299.17
      714  TEMP
                0.00      -5.40       2.72       0.00       0.00       0.0
0      478.84
                7.00      -5.40       2.72       0.00       0.00       0.0
0      459.76
      715  DL
                0.00   -4243.73       0.00       0.00       0.00       0.0
0        0.00
                7.00   -4243.73       0.00       0.00       0.00       0.0
0        0.00
      715  WIND
                0.00       0.00      -6.39       0.00       0.00       0.0
0     4052.89
                7.00       0.00      -6.39       0.00       0.00       0.0
0     4097.61
      715  WINDLL
                0.00       0.00      -1.25       0.00       0.00       0.0
0      693.03
                7.00       0.00      -1.25       0.00       0.00       0.0
0      701.81
      715  LF
                0.00       0.00      -3.84       0.00       0.00       0.0
0     2118.64
                7.00       0.00      -3.84       0.00       0.00       0.0
0     2145.49
      715  SF
                0.00       0.00       2.49       0.00       0.00       0.0
0      354.07
                7.00       0.00       2.49       0.00       0.00       0.0
0      336.64
      715  TEMP
                0.00      -5.40  -8.561E-01      0.00       0.00       0.0
0      472.85
                7.00      -5.40  -8.561E-01      0.00       0.00       0.0
0      478.84
      716  DL
                0.00   -4243.73       0.00       0.00       0.00       0.0
0        0.00
                7.00   -4243.73       0.00       0.00       0.00       0.0
0        0.00
      716  WIND
                0.00       0.00     -19.86       0.00       0.00       0.0
0     3913.89
                7.00       0.00     -19.86       0.00       0.00       0.0
0     4052.89
      716  WINDLL
                0.00       0.00      -3.55       0.00       0.00       0.0
0      668.17
                7.00       0.00      -3.55       0.00       0.00       0.0
0      693.03
      716  LF
```

```
                0.00        0.00      -10.86        0.00        0.00        0.0
0     2042.63
                7.00        0.00      -10.86        0.00        0.00        0.0
0     2118.64
      716  SF
                0.00        0.00        1.21        0.00        0.00        0.0
0      362.51
                7.00        0.00        1.21        0.00        0.00        0.0
0      354.07
      716  TEMP
                0.00       -5.40       -2.42        0.00        0.00        0.0
0      455.88
                7.00       -5.40       -2.42        0.00        0.00        0.0
0      472.85

      717  DL
                0.00    -4243.73        0.00        0.00        0.00        0.0
0        0.00
                7.00    -4243.73        0.00        0.00        0.00        0.0
0        0.00
      717  WIND
                0.00        0.00      -23.15        0.00        0.00        0.0
0     3751.80
                7.00        0.00      -23.15        0.00        0.00        0.0
0     3913.89
      717  WINDLL
                0.00        0.00       -4.11        0.00        0.00        0.0
0      639.37
                7.00        0.00       -4.11        0.00        0.00        0.0
0      668.17
      717  LF
                0.00        0.00      -12.58        0.00        0.00        0.0
0     1954.60
                7.00        0.00      -12.58        0.00        0.00        0.0
0     2042.63
      717  SF
                0.00        0.00   8.825E-01        0.00        0.00        0.0
0      368.68
                7.00        0.00   8.825E-01        0.00        0.00        0.0
0      362.51
      717  TEMP
                0.00       -5.40       -2.81        0.00        0.00        0.0
0      436.23
                7.00       -5.40       -2.81        0.00        0.00        0.0
0      455.88

      750  DL
                0.00    -3334.16        0.00        0.00        0.00        0.0
0        0.00
                2.51    -3334.16        0.00        0.00        0.00        0.0
0        0.00
      750  WIND
                0.00        0.00       49.46        0.00        0.00        0.0
0      420.67
                2.51        0.00       49.46        0.00        0.00        0.0
0      296.53
      750  WINDLL
                0.00        0.00        8.71        0.00        0.00        0.0
0       83.60
                2.51        0.00        8.71        0.00        0.00        0.0
0       61.74
      750  LF
                0.00        0.00       26.62        0.00        0.00        0.0
0      255.57
                2.51        0.00       26.62        0.00        0.00        0.0
0      188.75
```



```
      750  SF
                0.00        0.00   4.508E-05        0.00        0.00        0.0
0   4.327E-04
                2.51        0.00   4.508E-05        0.00        0.00        0.0
0   3.196E-04
      750  TEMP
                0.00       -5.40        5.94        0.00        0.00        0.0
0       57.04
                2.51       -5.40        5.94        0.00        0.00        0.0
0       42.13
```

T·Y·LIN INTERNATIONAL

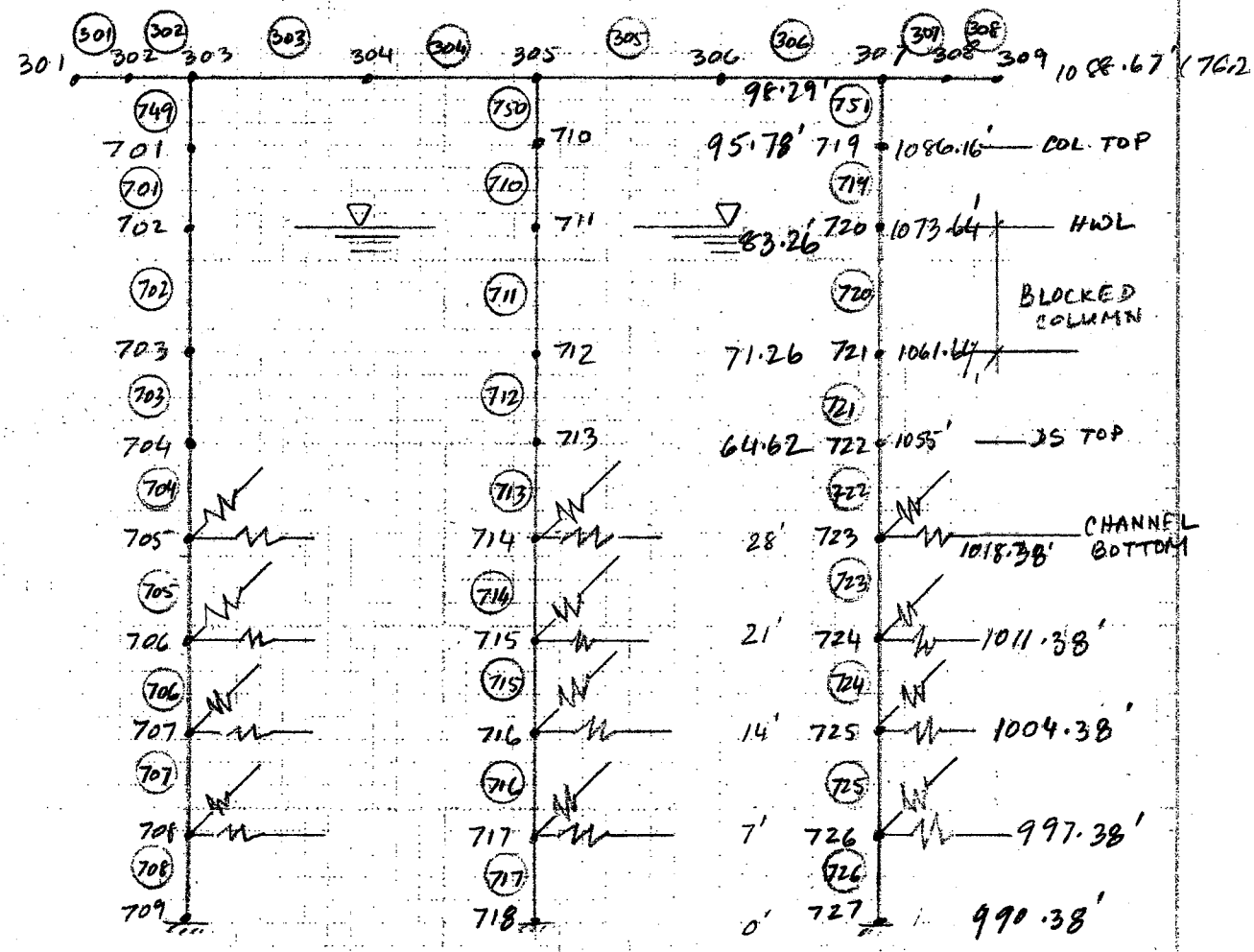
Projects: Salt River Bridges - Scour | Job No. 1317.00 | Sheet: of

Item: 16th Street Bridges | Designer: SJ | Date: 02-08-00

Checker: | Date:

Grid: 1/8"

TRANSVERSE:



```
; File C:\Program Files\SAP2000N\Trans.$2k saved 3/10/00 9:32:11 in Kip-ft

SYSTEM
  DOF=UX,UY,UZ,RX,RY,RZ  LENGTH=FT  FORCE=Kip  PAGE=SECTIONS

JOINT
  301  X=-38.24  Y=0  Z=98.29
  302  X=-30.313  Y=0  Z=98.29
  303  X=-27.813  Y=0  Z=98.29
  304  X=-13.906  Y=0  Z=98.29
  305  X=0  Y=0  Z=98.29
  306  X=13.906  Y=0  Z=98.29
  307  X=27.813  Y=0  Z=98.29
  308  X=30.313  Y=0  Z=98.29
  309  X=38.24  Y=0  Z=98.29
  701  X=-27.813  Y=0  Z=95.78
  702  X=-27.813  Y=0  Z=83.26
  703  X=-27.813  Y=0  Z=71.26
  704  X=-27.813  Y=0  Z=64.62
  705  X=-27.813  Y=0  Z=28
  706  X=-27.813  Y=0  Z=21
  707  X=-27.813  Y=0  Z=14
  708  X=-27.813  Y=0  Z=7
  709  X=-27.813  Y=0  Z=0
  710  X=0  Y=0  Z=95.78
  711  X=0  Y=0  Z=83.26
  712  X=0  Y=0  Z=71.26
  713  X=0  Y=0  Z=64.62
  714  X=0  Y=0  Z=28
  715  X=0  Y=0  Z=21
  716  X=0  Y=0  Z=14
  717  X=0  Y=0  Z=7
  718  X=0  Y=0  Z=0
  719  X=27.813  Y=0  Z=95.78
  720  X=27.813  Y=0  Z=83.26
  721  X=27.813  Y=0  Z=71.26
  722  X=27.813  Y=0  Z=64.62
  723  X=27.813  Y=0  Z=28
  724  X=27.813  Y=0  Z=21
  725  X=27.813  Y=0  Z=14
  726  X=27.813  Y=0  Z=7
  727  X=27.813  Y=0  Z=0

RESTRAINT
  ADD=709  DOF=U1,U2,U3,R1,R2,R3
  ADD=718  DOF=U1,U2,U3,R1,R2,R3
  ADD=727  DOF=U1,U2,U3,R1,R2,R3

PATTERN
  NAME=DEFAULT

SPRING
  ADD=708  U1=6571
  ADD=707  U1=6571
  ADD=706  U1=6571
  ADD=717  U1=6571
  ADD=716  U1=6571
  ADD=715  U1=6571
  ADD=726  U1=6571
  ADD=725  U1=6571
  ADD=724  U1=6571
  ADD=705  U1=3285
  ADD=714  U1=3285
  ADD=723  U1=3285
```



```
MATERIAL
  NAME=STEEL  IDES=S  M=1.518708E-02  W=.489024
    T=0  E=4176000  U=.3  A=.0000065  FY=5184
  NAME=CONC  IDES=C  M=4.657306E-03  W=.1500077
    T=0  E=635760  U=.2  A=.0000055
  NAME=OTHER  IDES=N  M=4.658087E-03  W=.1499904
    T=0  E=518400  U=.2  A=.0000055
  NAME=CONC2  IDES=C  M=4.657306E-03  W=.1500077
    T=0  E=519120  U=.2  A=.0000055
  NAME=CONC3  IDES=C
    T=0  E=518688  U=.2  A=.0000055

FRAME SECTION
  NAME=FSEC1 MAT=STEEL SH=R T=1.5,.8333333 A=1.25 J=.1888826 I=.234375,7.233796E-
02 AS=1.041667,1.041667
  NAME=SEC1 MAT=CONC2 A=30 J=247.5 I=62.5,90 AS=30,30 S=25,30 Z=.0005787,.0005787
 R=.0833,.0833 T=1.5,.8333
  NAME=SEC2 MAT=CONC2 A=19.635 J=61.36 I=30.68,30.68 AS=19.635,19.635 S=12.27,12.
27 Z=.0005787,.0005787 R=.0833,.0833 T=1.5,.8333
  NAME=SEC3 MAT=CONC2 A=38.485 J=235.72 I=117.859,117.859 AS=38.485,38.485 S=33.6
74,33.674 Z=.0005787,.0005787 R=.0833,.0833 T=1.5,.8333
  NAME=SEC4 MAT=CONC3 A=38.485 J=235.72 I=117.859,117.859 AS=38.485,38.485 S=33.6
74,33.674 Z=.0005787,.0005787 R=.0833,.0833 T=1.5,.8333
  NAME=SEC5 MAT=CONC3 A=19.635 J=61.36 I=30.68,30.68 AS=19.635,19.635 S=12.272,12
.272 Z=.0005787,.0005787 R=.0833,.0833 T=1.5,.8333

FRAME
  301  J=301,302  SEC=SEC1  NSEG=1  ANG=0
  302  J=302,303  SEC=SEC1  NSEG=1  ANG=0
  303  J=303,304  SEC=SEC1  NSEG=1  ANG=0
  304  J=304,305  SEC=SEC1  NSEG=1  ANG=0
  305  J=305,306  SEC=SEC1  NSEG=1  ANG=0
  306  J=306,307  SEC=SEC1  NSEG=1  ANG=0
  307  J=307,308  SEC=SEC1  NSEG=1  ANG=0
  308  J=308,309  SEC=SEC1  NSEG=1  ANG=0
  701  J=702,701  SEC=SEC2  NSEG=1  ANG=0
  702  J=703,702  SEC=SEC2  NSEG=1  ANG=0
  703  J=704,703  SEC=SEC2  NSEG=1  ANG=0
  704  J=705,704  SEC=SEC3  NSEG=1  ANG=0
  705  J=706,705  SEC=SEC4  NSEG=1  ANG=0
  706  J=707,706  SEC=SEC4  NSEG=1  ANG=0
  707  J=708,707  SEC=SEC4  NSEG=1  ANG=0
  708  J=709,708  SEC=SEC4  NSEG=1  ANG=0
  710  J=711,710  SEC=SEC2  NSEG=1  ANG=0
  711  J=712,711  SEC=SEC2  NSEG=1  ANG=0
  712  J=713,712  SEC=SEC2  NSEG=1  ANG=0
  713  J=714,713  SEC=SEC3  NSEG=1  ANG=0
  714  J=715,714  SEC=SEC4  NSEG=1  ANG=0
  715  J=716,715  SEC=SEC4  NSEG=1  ANG=0
  716  J=717,716  SEC=SEC4  NSEG=1  ANG=0
  717  J=718,717  SEC=SEC4  NSEG=1  ANG=0
  719  J=720,719  SEC=SEC2  NSEG=1  ANG=0
  720  J=721,720  SEC=SEC2  NSEG=1  ANG=0
  721  J=722,721  SEC=SEC2  NSEG=1  ANG=0
  722  J=723,722  SEC=SEC3  NSEG=1  ANG=0
  723  J=724,723  SEC=SEC4  NSEG=1  ANG=0
  724  J=725,724  SEC=SEC4  NSEG=1  ANG=0
  725  J=726,725  SEC=SEC4  NSEG=1  ANG=0
  726  J=727,726  SEC=SEC4  NSEG=1  ANG=0
  749  J=701,303  SEC=SEC5  NSEG=1  ANG=0
  750  J=710,305  SEC=SEC5  NSEG=1  ANG=0
  751  J=719,307  SEC=SEC5  NSEG=1  ANG=0

LOAD
  NAME=DL
```

```
    TYPE=GRAVITY  ELEM=FRAME
      ADD=301  UZ=-1
      ADD=302  UZ=-1
      ADD=303  UZ=-1
      ADD=304  UZ=-1
      ADD=305  UZ=-1
      ADD=306  UZ=-1
      ADD=307  UZ=-1
      ADD=308  UZ=-1
      ADD=708  UZ=-1
      ADD=707  UZ=-1
      ADD=706  UZ=-1
      ADD=705  UZ=-1
      ADD=704  UZ=-1
      ADD=703  UZ=-1
      ADD=702  UZ=-1
      ADD=701  UZ=-1
      ADD=749  UZ=-1
      ADD=717  UZ=-1
      ADD=716  UZ=-1
      ADD=715  UZ=-1
      ADD=714  UZ=-1
      ADD=713  UZ=-1
      ADD=712  UZ=-1
      ADD=711  UZ=-1
      ADD=710  UZ=-1
      ADD=750  UZ=-1
      ADD=726  UZ=-1
      ADD=725  UZ=-1
      ADD=724  UZ=-1
      ADD=723  UZ=-1
      ADD=722  UZ=-1
      ADD=721  UZ=-1
      ADD=720  UZ=-1
      ADD=719  UZ=-1
      ADD=751  UZ=-1
    TYPE=CONCENTRATED SPAN
      ADD=301  RD=.4087  U2=-356.945
      ADD=303  RD=.2023  U2=-356.945
      ADD=303  RD=.9213  U2=-356.945
      ADD=304  RD=.6404  U2=-356.945
      ADD=305  RD=.3595  U2=-356.945
      ADD=306  RD=.0787  U2=-356.945
      ADD=306  RD=.7977  U2=-356.945
      ADD=308  RD=.5913  U2=-356.945
  NAME=LLI2SPAN
    TYPE=CONCENTRATED SPAN
      ADD=304  RD=.640443  U2=-49.37
      ADD=303  RD=.2023  U2=-31.64
      ADD=303  RD=.9213  U2=-81.02
  NAME=LLI5SPAN
    TYPE=CONCENTRATED SPAN
      ADD=301  RD=.4087297  U2=-3.04
      ADD=303  RD=.2022722  U2=-43.54
      ADD=303  RD=.9213346  U2=-51.4
      ADD=304  RD=.640443  U2=-54.69
      ADD=305  RD=.359557  U2=-54.69
      ADD=306  RD=.0786654  U2=-51.4
      ADD=306  RD=.7977278  U2=-42.53
      ADD=308  RD=.5912703  U2=-3.04
  NAME=WINDSUP
    TYPE=FORCE
      ADD=304  UZ=199.26
      ADD=702  UZ=199.26
    TYPE=DISTRIBUTED SPAN
      ADD=301  RD=0,1  U1=1.1512,1.1512
```



```
      ADD=302  RD=0,1  U1=1.1512,1.1512
      ADD=303  RD=0,1  U1=1.1512,1.1512
      ADD=304  RD=0,1  U1=1.1512,1.1512
      ADD=305  RD=0,1  U1=1.1512,1.1512
      ADD=306  RD=0,1  U1=1.1512,1.1512
      ADD=307  RD=0,1  U1=1.1512,1.1512
      ADD=308  RD=0,1  U1=1.1512,1.1512
  NAME=WINDSUB
    TYPE=DISTRIBUTED SPAN
      ADD=301  RD=0,1  U1=.0145,.0145
      ADD=302  RD=0,1  U1=.0145,.0145
      ADD=303  RD=0,1  U1=.0145,.0145
      ADD=304  RD=0,1  U1=.0145,.0145
      ADD=305  RD=0,1  U1=.0145,.0145
      ADD=306  RD=0,1  U1=.0145,.0145
      ADD=307  RD=0,1  U1=.0145,.0145
      ADD=308  RD=0,1  U1=.0145,.0145
      ADD=701  RD=0,1  U2=.2,.2
      ADD=710  RD=0,1  U2=.2,.2
      ADD=719  RD=0,1  U2=.2,.2
  NAME=WLL
    TYPE=DISTRIBUTED SPAN
      ADD=301  RD=0,1  U1=.20468,.20468
      ADD=302  RD=0,1  U1=.20468,.20468
      ADD=303  RD=0,1  U1=.20468,.20468
      ADD=304  RD=0,1  U1=.20468,.20468
      ADD=305  RD=0,1  U1=.20468,.20468
      ADD=306  RD=0,1  U1=.20468,.20468
      ADD=307  RD=0,1  U1=.20468,.20468
      ADD=308  RD=0,1  U1=.20468,.20468
  NAME=SF
    TYPE=FORCE
      ADD=702  UZ=14.76
      ADD=703  UZ=8.167
      ADD=704  UZ=87.89
      ADD=711  UZ=14.76
      ADD=720  UZ=14.76
      ADD=712  UZ=8.17
      ADD=721  UZ=8.17
      ADD=713  UZ=87.89
      ADD=722  UZ=87.89
    TYPE=DISTRIBUTED SPAN
      ADD=702  RD=0,1  U2=3.764,4.808
      ADD=711  RD=0,1  U2=3.764,4.808
      ADD=720  RD=0,1  U2=3.764,4.808
      ADD=703  RD=0,1  U2=1.77,2.091
      ADD=712  RD=0,1  U2=1.77,2.091
      ADD=721  RD=0,1  U2=1.77,2.091
      ADD=704  RD=0,1  U2=0,2.48
      ADD=713  RD=0,1  U2=0,2.48
      ADD=722  RD=0,1  U2=0,2.48
  NAME=TEMP
    TYPE=TEMPERATURE  ELEM=FRAME
      ADD=301  T=-40
      ADD=302  T=-40
      ADD=303  T=-40
      ADD=304  T=-40
      ADD=305  T=-40
      ADD=306  T=-40
      ADD=307  T=-40
      ADD=308  T=-40
      ADD=708  T=-40
      ADD=707  T=-40
      ADD=706  T=-40
      ADD=705  T=-40
      ADD=704  T=-40
```

```
      ADD=703  T=-40
      ADD=702  T=-40
      ADD=701  T=-40
      ADD=749  T=-40
      ADD=717  T=-40
      ADD=716  T=-40
      ADD=715  T=-40
      ADD=714  T=-40
      ADD=713  T=-40
      ADD=712  T=-40
      ADD=711  T=-40
      ADD=710  T=-40
      ADD=750  T=-40
      ADD=726  T=-40
      ADD=725  T=-40
      ADD=724  T=-40
      ADD=723  T=-40
      ADD=722  T=-40
      ADD=721  T=-40
      ADD=720  T=-40
      ADD=719  T=-40
      ADD=751  T=-40

OUTPUT
; No Output Requested

END

; The following data is used for graphics, design and pushover analysis.
; If changes are made to the analysis data above, then the following data
; should be checked for consistency.
SAP2000 V7.10 SUPPLEMENTAL DATA
  GRID GLOBAL  X "1"  -38.24
  GRID GLOBAL  X "2"  -30.313
  GRID GLOBAL  X "3"  -27.813
  GRID GLOBAL  X "4"  -13.906
  GRID GLOBAL  X "5"  0
  GRID GLOBAL  X "6"  13.906
  GRID GLOBAL  X "7"  27.813
  GRID GLOBAL  X "8"  30.313
  GRID GLOBAL  X "9"  38.24
  GRID GLOBAL  Y "10"  0
  GRID GLOBAL  Z "11"  0
  GRID GLOBAL  Z "12"  7
  GRID GLOBAL  Z "13"  14
  GRID GLOBAL  Z "14"  21
  GRID GLOBAL  Z "15"  28
  GRID GLOBAL  Z "16"  64.62
  GRID GLOBAL  Z "17"  71.26
  GRID GLOBAL  Z "18"  83.26
  GRID GLOBAL  Z "19"  95.78
  GRID GLOBAL  Z "20"  98.29
  MATERIAL STEEL FY 5184
  MATERIAL CONC FYREBAR 8640 FYSHEAR 5760 FC 576 FCSHEAR 576
  MATERIAL CONC2 FYREBAR 8640 FYSHEAR 5760 FC 576 FCSHEAR 576
  MATERIAL CONC3 FYREBAR 8640 FYSHEAR 5760 FC 576 FCSHEAR 576
  STATICLOAD DL TYPE DEAD
  STATICLOAD LLI2SPAN TYPE LIVE
  STATICLOAD LLI5SPAN TYPE LIVE
  STATICLOAD WINDSUP TYPE WIND
  STATICLOAD WINDSUB TYPE WIND
  STATICLOAD WLL TYPE WIND
  STATICLOAD SF TYPE OTHER
  STATICLOAD TEMP TYPE OTHER
END SUPPLEMENTAL DATA
```

```
0       0.00
      307  LLI5SPAN
                0.00        0.00       -3.04        0.00        0.00        0.0
0     -21.85
                2.50        0.00       -3.04        0.00        0.00        0.0
0     -14.25
      307  WINDSUP
                0.00       12.00        0.00        0.00        0.00        0.0
0       0.00
                2.50        9.13        0.00        0.00        0.00        0.0
0       0.00
      307  WINDSUB
                0.00   1.512E-01        0.00        0.00        0.00        0.0
0       0.00
                2.50   1.149E-01        0.00        0.00        0.00        0.0
0       0.00
      307  WLL
                0.00        2.13        0.00        0.00        0.00        0.0
0       0.00
                2.50        1.62        0.00        0.00        0.00        0.0
0       0.00
      307  SF
                0.00        0.00        0.00        0.00        0.00        0.0
0       0.00
                2.50        0.00        0.00        0.00        0.00        0.0
0       0.00
      307  TEMP
                0.00        0.00        0.00        0.00        0.00        0.0
0       0.00
                2.50        0.00        0.00        0.00        0.00        0.0
0       0.00

      308  DL
                0.00        0.00     -392.62        0.00        0.00        0.0
0   -1814.48
                7.93        0.00        0.00        0.00        0.00        0.0
0       0.00
      308  LLI2SPAN
                0.00        0.00        0.00        0.00        0.00        0.0
0       0.00
                7.93        0.00        0.00        0.00        0.00        0.0
0       0.00
      308  LLI5SPAN
                0.00        0.00       -3.04        0.00        0.00        0.0
0     -14.25
                7.93        0.00        0.00        0.00        0.00        0.0
0       0.00
      308  WINDSUP
                0.00        9.13        0.00        0.00        0.00        0.0
0       0.00
                7.93        0.00        0.00        0.00        0.00        0.0
0       0.00
      308  WINDSUB
                0.00   1.149E-01        0.00        0.00        0.00        0.0
0       0.00
                7.93        0.00        0.00        0.00        0.00        0.0
0       0.00
      308  WLL
                0.00        1.62        0.00        0.00        0.00        0.0
0       0.00
                7.93        0.00        0.00        0.00        0.00        0.0
0       0.00
      308  SF
                0.00        0.00        0.00        0.00        0.00        0.0
0       0.00
                7.93        0.00        0.00        0.00        0.00        0.0
```



```
0       0.00
      308  TEMP
                0.00        0.00        0.00        0.00        0.00        0.0
0       0.00
                7.93        0.00        0.00        0.00        0.00        0.0
0       0.00

      701  DL
                0.00    -1087.20   1.265E-01        0.00        0.00        0.0
0 BOT.  -4.47
               12.52    -1050.32   1.265E-01        0.00        0.00        0.0
0 TOP   -6.06
      701  LLI2SPAN
                0.00      -74.33       -1.76        0.00        0.00        0.0
0      66.60
               12.52      -74.33       -1.76        0.00        0.00        0.0
0      88.63
      701  LLI5SPAN
                0.00      -69.17       -1.46        0.00        0.00        0.0
0      51.76
               12.52      -69.17       -1.46        0.00        0.00        0.0
0      70.08
      701  WINDSUP
                0.00      131.38       31.04        0.00        0.00        0.0
0    -479.69
               12.52      131.38       31.04        0.00        0.00        0.0
0    -868.28
      701  WINDSUB
                0.00        3.52        2.81        0.00        0.00        0.0
0     -41.88
               12.52        3.52   3.067E-01        0.00        0.00        0.0
0     -61.39
      701  WLL
                0.00        8.23        5.07        0.00        0.00        0.0
0     -68.91
               12.52        8.23        5.07        0.00        0.00        0.0
0    -132.40
      701  SF
                0.00       58.11       -1.04        0.00        0.00        0.0
0   -1040.67
               12.52       58.11       -1.04        0.00        0.00        0.0
0   -1027.66
      701  TEMP
                0.00        4.04        2.95        0.00        0.00        0.0
0     -38.74
               12.52        4.04        2.95        0.00        0.00        0.0
0     -75.63

      702  DL
                0.00    -1122.54   1.265E-01        0.00        0.00        0.0
0      -2.95
               12.00    -1087.20   1.265E-01        0.00        0.00        0.0
0      -4.47
      702  LLI2SPAN
                0.00      -74.33       -1.76        0.00        0.00        0.0
0      45.47
               12.00      -74.33       -1.76        0.00        0.00        0.0
0      66.60
      702  LLI5SPAN
                0.00      -69.17       -1.46        0.00        0.00        0.0
0      34.20
               12.00      -69.17       -1.46        0.00        0.00        0.0
0      51.76
      702  WINDSUP
                0.00      330.64       31.04        0.00        0.00        0.0
0    -107.25
```

```
                12.00      330.64      31.04       0.00       0.00       0.0
0     -479.69
      702  WINDSUB
                 0.00        3.52       2.81       0.00       0.00       0.0
0       -8.15
                12.00        3.52       2.81       0.00       0.00       0.0
0      -41.88
      702  WLL
                 0.00        8.23       5.07       0.00       0.00       0.0
0       -8.06
                12.00        8.23       5.07       0.00       0.00       0.0
0      -68.91
      702  SF
                 0.00       72.87      50.39       0.00       0.00       0.0
0     -732.01
                12.00       72.87      -1.04       0.00       0.00       0.0
0    -1040.67
      702  TEMP
                 0.00        4.04       2.95       0.00       0.00       0.0
0       -3.37
                12.00        4.04       2.95       0.00       0.00       0.0
0      -38.74

      703  DL
                 0.00    -1142.10   1.265E-01       0.00       0.00       0.0
0       -2.11
                 6.64    -1122.54   1.265E-01       0.00       0.00       0.0
0       -2.95
      703  LLI2SPAN
                 0.00      -74.33      -1.76       0.00       0.00       0.0
0       33.78
                 6.64      -74.33      -1.76       0.00       0.00       0.0
0       45.47
      703  LLI5SPAN
                 0.00      -69.17      -1.46       0.00       0.00       0.0
0       24.48
                 6.64      -69.17      -1.46       0.00       0.00       0.0
0       34.20
      703  WINDSUP
                 0.00      330.64      31.04       0.00       0.00       0.0
0       98.84
                 6.64      330.64      31.04       0.00       0.00       0.0
0     -107.25
      703  WINDSUB
                 0.00        3.52       2.81       0.00       0.00       0.0
0       10.51
                 6.64        3.52       2.81       0.00       0.00       0.0
0       -8.15
      703  WLL
                 0.00        8.23       5.07       0.00       0.00       0.0
0       25.61
                 6.64        8.23       5.07       0.00       0.00       0.0
0       -8.06
      703  SF
                 0.00       81.03      63.21       0.00       0.00       0.0
0     -353.66
                 6.64       81.03      50.39       0.00       0.00       0.0
0     -732.01
      703  TEMP
                 0.00        4.04       2.95       0.00       0.00       0.0
0       16.20
                 6.64        4.04       2.95       0.00       0.00       0.0
0       -3.37

      704  DL
                 0.00    -1353.51   1.265E-01       0.00       0.00       0.0
```



```
0        2.52
                36.62    -1142.10   1.265E-01       0.00       0.00       0.0
0       -2.11
      704  LLI2SPAN
                 0.00      -74.33      -1.76       0.00       0.00       0.0
0      -30.68
                36.62      -74.33      -1.76       0.00       0.00       0.0
0       33.78
      704  LLI5SPAN
                 0.00      -69.17      -1.46       0.00       0.00       0.0
0      -29.11
                36.62      -69.17      -1.46       0.00       0.00       0.0
0       24.48
      704  WINDSUP
                 0.00      330.64      31.04       0.00       0.00       0.0
0     1235.42
                36.62      330.64      31.04       0.00       0.00       0.0
0       98.84
      704  WINDSUB
                 0.00        3.52       2.81       0.00       0.00       0.0
0      113.44
                36.62        3.52       2.81       0.00       0.00       0.0
0       10.51
      704  WLL
                 0.00        8.23       5.07       0.00       0.00       0.0
0      211.30
                36.62        8.23       5.07       0.00       0.00       0.0
0       25.61
      704  SF
                 0.00      168.92     108.62       0.00       0.00       0.0
0     3069.73
                36.62      168.92      63.21       0.00       0.00       0.0
0     -353.66
      704  TEMP
                 0.00        4.04       2.95       0.00       0.00       0.0
0      124.11
                36.62        4.04       2.95       0.00       0.00       0.0
0       16.20

      705  DL
                 0.00    -1353.51   6.711E-02       0.00       0.00       0.0
0        2.99
                 7.00    -1353.51   6.711E-02       0.00       0.00       0.0
0        2.52
      705  LLI2SPAN
                 0.00      -74.33  -9.877E-01       0.00       0.00       0.0
0      -37.59
                 7.00      -74.33  -9.877E-01       0.00       0.00       0.0
0      -30.68
      705  LLI5SPAN
                 0.00      -69.17  -7.767E-01       0.00       0.00       0.0
0      -34.54
                 7.00      -69.17  -7.767E-01       0.00       0.00       0.0
0      -29.11
      705  WINDSUP
                 0.00      330.64       8.86       0.00       0.00       0.0
0     1297.44
                 7.00      330.64       8.86       0.00       0.00       0.0
0     1235.42
      705  WINDSUB
                 0.00        3.52   7.830E-01       0.00       0.00       0.0
0      118.92
                 7.00        3.52   7.830E-01       0.00       0.00       0.0
0      113.44
      705  WLL
                 0.00        8.23       1.33       0.00       0.00       0.0
```

```
0      220.62
                7.00        8.23        1.33        0.00        0.00        0.0
0      211.30
       705  SF
                0.00      168.92       46.45        0.00        0.00        0.0
0     3394.88
                7.00      168.92       46.45        0.00        0.00        0.0
0     3069.73
       705  TEMP
                0.00        4.04   7.572E-01        0.00        0.00        0.0
0      129.41
                7.00        4.04   7.572E-01        0.00        0.00        0.0
0      124.11

       706  DL
                0.00    -1353.51   1.371E-03        0.00        0.00        0.0
0        3.00
                7.00    -1353.51   1.371E-03        0.00        0.00        0.0
0        2.99
       706  LLI2SPAN
                0.00      -74.33  -1.263E-01        0.00        0.00        0.0
0      -38.47
                7.00      -74.33  -1.263E-01        0.00        0.00        0.0
0      -37.59
       706  LLI5SPAN
                0.00      -69.17  -1.660E-02        0.00        0.00        0.0
0      -34.66
                7.00      -69.17  -1.660E-02        0.00        0.00        0.0
0      -34.54
       706  WINDSUP
                0.00      330.64      -14.81        0.00        0.00        0.0
0     1193.73
                7.00      330.64      -14.81        0.00        0.00        0.0
0     1297.44
       706  WINDSUB
                0.00        3.52       -1.38        0.00        0.00        0.0
0      109.26
                7.00        3.52       -1.38        0.00        0.00        0.0
0      118.92
       706  WLL
                0.00        8.23       -2.65        0.00        0.00        0.0
0      202.05
                7.00        8.23       -2.65        0.00        0.00        0.0
0      220.62
       706  SF
                0.00      168.92      -21.08        0.00        0.00        0.0
0     3247.33
                7.00      168.92      -21.08        0.00        0.00        0.0
0     3394.88
       706  TEMP
                0.00        4.04       -1.57        0.00        0.00        0.0
0      118.40
                7.00        4.04       -1.57        0.00        0.00        0.0
0      129.41

       707  DL
                0.00    -1353.51  -2.701E-02        0.00        0.00        0.0
0        2.81
                7.00    -1353.51  -2.701E-02        0.00        0.00        0.0
0        3.00
       707  LLI2SPAN
                0.00      -74.33   2.485E-01        0.00        0.00        0.0
0      -36.74
                7.00      -74.33   2.485E-01        0.00        0.00        0.0
0      -38.47
       707  LLI5SPAN
```



```
                0.00      -69.17   3.116E-01        0.00        0.00        0.0
0      -32.48
                7.00      -69.17   3.116E-01        0.00        0.00        0.0
0      -34.66
       707  WINDSUP
                0.00      330.64      -24.62        0.00        0.00        0.0
0     1021.42
                7.00      330.64      -24.62        0.00        0.00        0.0
0     1193.73
       707  WINDSUB
                0.00        3.52       -2.27        0.00        0.00        0.0
0       93.34
                7.00        3.52       -2.27        0.00        0.00        0.0
0      109.26
       707  WLL
                0.00        8.23       -4.30        0.00        0.00        0.0
0      171.97
                7.00        8.23       -4.30        0.00        0.00        0.0
0      202.05
       707  SF
                0.00      168.92      -49.62        0.00        0.00        0.0
0     2899.99
                7.00      168.92      -49.62        0.00        0.00        0.0
0     3247.33
       707  TEMP
                0.00        4.04       -2.54        0.00        0.00        0.0
0      100.65
                7.00        4.04       -2.54        0.00        0.00        0.0
0      118.40

       708  DL
                0.00    -1353.51  -3.380E-02        0.00        0.00        0.0
0        2.57
                7.00    -1353.51  -3.380E-02        0.00        0.00        0.0
0        2.81
       708  LLI2SPAN
                0.00      -74.33   3.392E-01        0.00        0.00        0.0
0      -34.36
                7.00      -74.33   3.392E-01        0.00        0.00        0.0
0      -36.74
       708  LLI5SPAN
                0.00      -69.17   3.901E-01        0.00        0.00        0.0
0      -29.75
                7.00      -69.17   3.901E-01        0.00        0.00        0.0
0      -32.48
       708  WINDSUP
                0.00      330.64      -26.83        0.00        0.00        0.0
0      833.62
                7.00      330.64      -26.83        0.00        0.00        0.0
0     1021.42
       708  WINDSUB
                0.00        3.52       -2.48        0.00        0.00        0.0
0       76.00
                7.00        3.52       -2.48        0.00        0.00        0.0
0       93.34
       708  WLL
                0.00        8.23       -4.67        0.00        0.00        0.0
0      139.30
                7.00        8.23       -4.67        0.00        0.00        0.0
0      171.97
       708  SF
                0.00      168.92      -56.25        0.00        0.00        0.0
0     2506.22
                7.00      168.92      -56.25        0.00        0.00        0.0
0     2899.99
       708  TEMP
```

```
                0.00      4.04     -2.75      0.00      0.00      0.0
0      81.38
                7.00      4.04     -2.75      0.00      0.00      0.0
0     100.65

      710  DL
                0.00  -1135.99  6.100E-04      0.00      0.00      0.0
0  -2.000E-02
               12.52  -1099.11  6.100E-04      0.00      0.00      0.0
0  -2.763E-02
      710  LLI2SPAN
                0.00     -94.86      1.62      0.00      0.00      0.0
0     -52.76
               12.52     -94.86      1.62      0.00      0.00      0.0
0     -72.99
      710  LLI5SPAN
                0.00    -166.90  4.901E-03      0.00      0.00      0.0
0  -1.609E-01
               12.52    -166.90  4.901E-03      0.00      0.00      0.0
0  -2.222E-01
      710  WINDSUP
                0.00     129.00     28.34      0.00      0.00      0.0
0    -384.22
               12.52     129.00     28.34      0.00      0.00      0.0
0    -739.00
      710  WINDSUB
                0.00       0.00      3.00      0.00      0.00      0.0
0     -48.56
               12.52       0.00  4.957E-01      0.00      0.00      0.0
0     -70.44
      710  WLL
                0.00       0.00      5.51      0.00      0.00      0.0
0     -84.51
               12.52       0.00      5.51      0.00      0.00      0.0
0    -153.52
      710  SF
                0.00  -6.649E-05      2.08      0.00      0.00      0.0
0   -1150.82
               12.52  -6.649E-05      2.08      0.00      0.00      0.0
0   -1176.83
      710  TEMP
                0.00      -8.08      0.00      0.00      0.00      0.0
0      0.00
               12.52      -8.08      0.00      0.00      0.00      0.0
0      0.00

      711  DL
                0.00  -1171.33  6.100E-04      0.00      0.00      0.0
0  -1.268E-02
               12.00  -1135.99  6.100E-04      0.00      0.00      0.0
0  -2.000E-02
      711  LLI2SPAN
                0.00     -94.86      1.62      0.00      0.00      0.0
0     -33.37
               12.00     -94.86      1.62      0.00      0.00      0.0
0     -52.76
      711  LLI5SPAN
                0.00    -166.90  4.901E-03      0.00      0.00      0.0
0  -1.021E-01
               12.00    -166.90  4.901E-03      0.00      0.00      0.0
0  -1.609E-01
      711  WINDSUP
                0.00     129.00     28.34      0.00      0.00      0.0
0     -44.17
               12.00     129.00     28.34      0.00      0.00      0.0
0    -384.22
```



```
      711  WINDSUB
                0.00       0.00      3.00      0.00      0.00      0.0
0     -12.56
               12.00       0.00      3.00      0.00      0.00      0.0
0     -48.56
      711  WLL
                0.00       0.00      5.51      0.00      0.00      0.0
0     -18.36
               12.00       0.00      5.51      0.00      0.00      0.0
0     -84.51
      711  SF
                0.00      14.76     53.51      0.00      0.00      0.0
0    -804.77
               12.00      14.76      2.08      0.00      0.00      0.0
0   -1150.82
      711  TEMP
                0.00      -8.08      0.00      0.00      0.00      0.0
0      0.00
               12.00      -8.08      0.00      0.00      0.00      0.0
0      0.00

      712  DL
                0.00  -1190.89  6.100E-04      0.00      0.00      0.0
0  -8.626E-03
                6.64  -1171.33  6.100E-04      0.00      0.00      0.0
0  -1.268E-02
      712  LLI2SPAN
                0.00     -94.86      1.62      0.00      0.00      0.0
0     -22.64
                6.64     -94.86      1.62      0.00      0.00      0.0
0     -33.37
      712  LLI5SPAN
                0.00    -166.90  4.901E-03      0.00      0.00      0.0
0  -6.952E-02
                6.64    -166.90  4.901E-03      0.00      0.00      0.0
0  -1.021E-01
      712  WINDSUP
                0.00     129.00     28.34      0.00      0.00      0.0
0     143.99
                6.64     129.00     28.34      0.00      0.00      0.0
0     -44.17
      712  WINDSUB
                0.00       0.00      3.00      0.00      0.00      0.0
0       7.35
                6.64       0.00      3.00      0.00      0.00      0.0
0     -12.56
      712  WLL
                0.00       0.00      5.51      0.00      0.00      0.0
0      18.24
                6.64       0.00      5.51      0.00      0.00      0.0
0     -18.36
      712  SF
                0.00      22.93     66.33      0.00      0.00      0.0
0    -405.73
                6.64      22.93     53.51      0.00      0.00      0.0
0    -804.77
      712  TEMP
                0.00      -8.08      0.00      0.00      0.00      0.0
0      0.00
                6.64      -8.08      0.00      0.00      0.00      0.0
0      0.00

      713  DL
                0.00  -1402.30  6.100E-04      0.00      0.00      0.0
0   1.371E-02
               36.62  -1190.89  6.100E-04      0.00      0.00      0.0
```

```
0  -8.626E-03
     713  LLI2SPAN
                0.00      -94.86       1.62       0.00       0.00       0.0
0      36.53
               36.62      -94.86       1.62       0.00       0.00       0.0
0     -22.64
     713  LLI5SPAN
                0.00     -166.90   4.901E-03       0.00       0.00       0.0
0   1.099E-01
               36.62     -166.90   4.901E-03       0.00       0.00       0.0
0  -6.952E-02
     713  WINDSUP
                0.00      129.00      28.34       0.00       0.00       0.0
0    1181.71
               36.62      129.00      28.34       0.00       0.00       0.0
0     143.99
     713  WINDSUB
                0.00        0.00       3.00       0.00       0.00       0.0
0     117.20
               36.62        0.00       3.00       0.00       0.00       0.0
0       7.35
     713  WLL
                0.00        0.00       5.51       0.00       0.00       0.0
0     220.10
               36.62        0.00       5.51       0.00       0.00       0.0
0      18.24
     713  SF
                0.00      110.82     111.74       0.00       0.00       0.0
0    3131.78
               36.62      110.82      66.33       0.00       0.00       0.0
0    -405.73
     713  TEMP
                0.00       -8.08       0.00       0.00       0.00       0.0
0       0.00
               36.62       -8.08       0.00       0.00       0.00       0.0
0       0.00

     714  DL
                0.00    -1402.30   3.043E-04       0.00       0.00       0.0
0   1.584E-02
                7.00    -1402.30   3.043E-04       0.00       0.00       0.0
0   1.371E-02
     714  LLI2SPAN
                0.00      -94.86   8.035E-01       0.00       0.00       0.0
0      42.16
                7.00      -94.86   8.035E-01       0.00       0.00       0.0
0      36.53
     714  LLI5SPAN
                0.00     -166.90   2.447E-03       0.00       0.00       0.0
0   1.271E-01
                7.00     -166.90   2.447E-03       0.00       0.00       0.0
0   1.099E-01
     714  WINDSUP
                0.00      129.00       7.43       0.00       0.00       0.0
0    1233.69
                7.00      129.00       7.43       0.00       0.00       0.0
0    1181.71
     714  WINDSUB
                0.00        0.00   8.832E-01       0.00       0.00       0.0
0     123.38
                7.00        0.00   8.832E-01       0.00       0.00       0.0
0     117.20
     714  WLL
                0.00        0.00       1.56       0.00       0.00       0.0
0     231.05
                7.00        0.00       1.56       0.00       0.00       0.0
```



```
0     220.10
     714  SF
                0.00      110.82      48.10       0.00       0.00       0.0
0    3468.50
                7.00      110.82      48.10       0.00       0.00       0.0
0    3131.78
     714  TEMP
                0.00       -8.08       0.00       0.00       0.00       0.0
0       0.00
                7.00       -8.08       0.00       0.00       0.00       0.0
0       0.00

     715  DL
                0.00    -1402.30   -3.183E-05       0.00       0.00       0.0
0   1.562E-02
                7.00    -1402.30   -3.183E-05       0.00       0.00       0.0
0   1.584E-02
     715  LLI2SPAN
                0.00      -94.86   -8.950E-02       0.00       0.00       0.0
0      41.53
                7.00      -94.86   -8.950E-02       0.00       0.00       0.0
0      42.16
     715  LLI5SPAN
                0.00     -166.90   -2.504E-04       0.00       0.00       0.0
0   1.253E-01
                7.00     -166.90   -2.504E-04       0.00       0.00       0.0
0   1.271E-01
     715  WINDSUP
                0.00      129.00      -14.84       0.00       0.00       0.0
0    1129.77
                7.00      129.00      -14.84       0.00       0.00       0.0
0    1233.69
     715  WINDSUB
                0.00        0.00       -1.38       0.00       0.00       0.0
0     113.74
                7.00        0.00       -1.38       0.00       0.00       0.0
0     123.38
     715  WLL
                0.00        0.00       -2.65       0.00       0.00       0.0
0     212.52
                7.00        0.00       -2.65       0.00       0.00       0.0
0     231.05
     715  SF
                0.00      110.82      -21.05       0.00       0.00       0.0
0    3321.18
                7.00      110.82      -21.05       0.00       0.00       0.0
0    3468.50
     715  TEMP
                0.00       -8.08       0.00       0.00       0.00       0.0
0       0.00
                7.00       -8.08       0.00       0.00       0.00       0.0
0       0.00

     716  DL
                0.00    -1402.30   -1.759E-04       0.00       0.00       0.0
0   1.439E-02
                7.00    -1402.30   -1.759E-04       0.00       0.00       0.0
0   1.562E-02
     716  LLI2SPAN
                0.00      -94.86   -4.721E-01       0.00       0.00       0.0
0      38.23
                7.00      -94.86   -4.721E-01       0.00       0.00       0.0
0      41.53
     716  LLI5SPAN
                0.00     -166.90   -1.407E-03       0.00       0.00       0.0
0   1.155E-01
```

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                7.00     -166.90  -1.407E-03      0.00      0.00       0.0
0   1.253E-01
    716  WINDSUP
                0.00      129.00     -24.04      0.00      0.00       0.0
0     961.49
                7.00      129.00     -24.04      0.00      0.00       0.0
0    1129.77
    716  WINDSUB
                0.00        0.00      -2.32      0.00      0.00       0.0
0      97.53
                7.00        0.00      -2.32      0.00      0.00       0.0
0     113.74
    716  WLL
                0.00        0.00      -4.39      0.00      0.00       0.0
0     181.77
                7.00        0.00      -4.39      0.00      0.00       0.0
0     212.52
    716  SF
                0.00      110.82     -50.28      0.00      0.00       0.0
0    2969.19
                7.00      110.82     -50.28      0.00      0.00       0.0
0    3321.18
    716  TEMP
                0.00       -8.08       0.00      0.00      0.00       0.0
0       0.00
                7.00       -8.08       0.00      0.00      0.00       0.0
0       0.00

    717  DL
                0.00    -1402.30  -2.100E-04      0.00      0.00       0.0
0   1.292E-02
                7.00    -1402.30  -2.100E-04      0.00      0.00       0.0
0   1.439E-02
    717  LLI2SPAN
                0.00      -94.86  -5.627E-01      0.00      0.00       0.0
0      34.29
                7.00      -94.86  -5.627E-01      0.00      0.00       0.0
0      38.23
    717  LLI5SPAN
                0.00     -166.90  -1.681E-03      0.00      0.00       0.0
0   1.037E-01
                7.00     -166.90  -1.681E-03      0.00      0.00       0.0
0   1.155E-01
    717  WINDSUP
                0.00      129.00     -26.11      0.00      0.00       0.0
0     778.73
                7.00      129.00     -26.11      0.00      0.00       0.0
0     961.49
    717  WINDSUB
                0.00        0.00      -2.53      0.00      0.00       0.0
0      79.85
                7.00        0.00      -2.53      0.00      0.00       0.0
0      97.53
    717  WLL
                0.00        0.00      -4.79      0.00      0.00       0.0
0     148.28
                7.00        0.00      -4.79      0.00      0.00       0.0
0     181.77
    717  SF
                0.00      110.82     -57.09      0.00      0.00       0.0
0    2569.59
                7.00      110.82     -57.09      0.00      0.00       0.0
0    2969.19
    717  TEMP
                0.00       -8.08       0.00      0.00      0.00       0.0
0       0.00
```



```
                7.00       -8.08       0.00      0.00      0.00       0.0
0       0.00

    719  DL
                0.00    -1087.18  -1.271E-01      0.00      0.00       0.0
0       4.50
               12.52    -1050.30  -1.271E-01      0.00      0.00       0.0
0       6.09
    719  LLI2SPAN
                0.00        7.16   1.444E-01      0.00      0.00       0.0
0  -7.550E-01
               12.52        7.16   1.444E-01      0.00      0.00       0.0
0      -2.56
    719  LLI5SPAN
                0.00      -68.26       1.46      0.00      0.00       0.0
0     -51.56
               12.52      -68.26       1.46      0.00      0.00       0.0
0     -69.82
    719  WINDSUP
                0.00      -61.12      28.67      0.00      0.00       0.0
0    -395.95
               12.52      -61.12      28.67      0.00      0.00       0.0
0    -754.89
    719  WINDSUB
                0.00       -3.52       2.81      0.00      0.00       0.0
0     -41.88
               12.52       -3.52  3.067E-01      0.00      0.00       0.0
0     -61.39
    719  WLL
                0.00       -8.23       5.07      0.00      0.00       0.0
0     -68.91
               12.52       -8.23       5.07      0.00      0.00       0.0
0    -132.40
    719  SF
                0.00      -58.11      -1.04      0.00      0.00       0.0
0   -1040.67
               12.52      -58.11      -1.04      0.00      0.00       0.0
0   -1027.66
    719  TEMP
                0.00        4.04      -2.95      0.00      0.00       0.0
0      38.74
               12.52        4.04      -2.95      0.00      0.00       0.0
0      75.63

    720  DL
                0.00    -1122.53  -1.271E-01      0.00      0.00       0.0
0       2.97
               12.00    -1087.18  -1.271E-01      0.00      0.00       0.0
0       4.50
    720  LLI2SPAN
                0.00        7.16   1.444E-01      0.00      0.00       0.0
0   9.774E-01
               12.00        7.16   1.444E-01      0.00      0.00       0.0
0  -7.550E-01
    720  LLI5SPAN
                0.00      -68.26       1.46      0.00      0.00       0.0
0     -34.06
               12.00      -68.26       1.46      0.00      0.00       0.0
0     -51.56
    720  WINDSUP
                0.00      -61.12      28.67      0.00      0.00       0.0
0     -51.92
               12.00      -61.12      28.67      0.00      0.00       0.0
0    -395.95
    720  WINDSUB
                0.00       -3.52       2.81      0.00      0.00       0.0
```

```
0      -8.15
                12.00      -3.52       2.81       0.00       0.00       0.0
0     -41.88
      720  WLL
                 0.00      -8.23       5.07       0.00       0.00       0.0
0      -8.06
                12.00      -8.23       5.07       0.00       0.00       0.0
0     -68.91
      720  SF
                 0.00     -43.35      50.39       0.00       0.00       0.0
0    -732.01
                12.00     -43.35      -1.04       0.00       0.00       0.0
0   -1040.67
      720  TEMP
                 0.00       4.04      -2.95       0.00       0.00       0.0
0      3.37
                12.00       4.04      -2.95       0.00       0.00       0.0
0     38.74

      721  DL
                 0.00   -1142.08  -1.271E-01       0.00       0.00       0.0
0      2.13
                 6.64   -1122.53  -1.271E-01       0.00       0.00       0.0
0      2.97
      721  LLI2SPAN
                 0.00       7.16   1.444E-01       0.00       0.00       0.0
0      1.94
                 6.64       7.16   1.444E-01       0.00       0.00       0.0
0  9.774E-01
      721  LLI5SPAN
                 0.00     -68.26       1.46       0.00       0.00       0.0
0     -24.38
                 6.64     -68.26       1.46       0.00       0.00       0.0
0     -34.06
      721  WINDSUP
                 0.00     -61.12      28.67       0.00       0.00       0.0
0    138.44
                 6.64     -61.12      28.67       0.00       0.00       0.0
0     -51.92
      721  WINDSUB
                 0.00      -3.52       2.81       0.00       0.00       0.0
0     10.51
                 6.64      -3.52       2.81       0.00       0.00       0.0
0      -8.15
      721  WLL
                 0.00      -8.23       5.07       0.00       0.00       0.0
0     25.61
                 6.64      -8.23       5.07       0.00       0.00       0.0
0      -8.06
      721  SF
                 0.00     -35.18      63.21       0.00       0.00       0.0
0    -353.66
                 6.64     -35.18      50.39       0.00       0.00       0.0
0    -732.01
      721  TEMP
                 0.00       4.04      -2.95       0.00       0.00       0.0
0     -16.20
                 6.64       4.04      -2.95       0.00       0.00       0.0
0      3.37

      722  DL
                 0.00   -1353.49  -1.271E-01       0.00       0.00       0.0
0      -2.53
                36.62   -1142.08  -1.271E-01       0.00       0.00       0.0
0      2.13
      722  LLI2SPAN
```



```
                 0.00       7.16   1.444E-01       0.00       0.00       0.0
0      7.22
                36.62       7.16   1.444E-01       0.00       0.00       0.0
0      1.94
      722  LLI5SPAN
                 0.00     -68.26       1.46       0.00       0.00       0.0
0     29.03
                36.62     -68.26       1.46       0.00       0.00       0.0
0     -24.38
      722  WINDSUP
                 0.00     -61.12      28.67       0.00       0.00       0.0
0   1188.30
                36.62     -61.12      28.67       0.00       0.00       0.0
0    138.44
      722  WINDSUB
                 0.00      -3.52       2.81       0.00       0.00       0.0
0    113.44
                36.62      -3.52       2.81       0.00       0.00       0.0
0     10.51
      722  WLL
                 0.00      -8.23       5.07       0.00       0.00       0.0
0    211.30
                36.62      -8.23       5.07       0.00       0.00       0.0
0     25.61
      722  SF
                 0.00      52.71      108.62       0.00       0.00       0.0
0   3069.73
                36.62      52.71      63.21       0.00       0.00       0.0
0    -353.66
      722  TEMP
                 0.00       4.04      -2.95       0.00       0.00       0.0
0    -124.11
                36.62       4.04      -2.95       0.00       0.00       0.0
0     -16.20

      723  DL
                 0.00   -1353.49  -6.747E-02       0.00       0.00       0.0
0      -3.00
                 7.00   -1353.49  -6.747E-02       0.00       0.00       0.0
0      -2.53
      723  LLI2SPAN
                 0.00       7.16   2.302E-02       0.00       0.00       0.0
0      7.38
                 7.00       7.16   2.302E-02       0.00       0.00       0.0
0      7.22
      723  LLI5SPAN
                 0.00     -68.26   7.738E-01       0.00       0.00       0.0
0     34.45
                 7.00     -68.26   7.738E-01       0.00       0.00       0.0
0     29.03
      723  WINDSUP
                 0.00     -61.12       7.60       0.00       0.00       0.0
0   1241.52
                 7.00     -61.12       7.60       0.00       0.00       0.0
0   1188.30
      723  WINDSUB
                 0.00      -3.52   7.830E-01       0.00       0.00       0.0
0    118.92
                 7.00      -3.52   7.830E-01       0.00       0.00       0.0
0    113.44
      723  WLL
                 0.00      -8.23       1.33       0.00       0.00       0.0
0    220.62
                 7.00      -8.23       1.33       0.00       0.00       0.0
0    211.30
      723  SF
```

```
                0.00      52.71      46.45      0.00      0.00      0.0
0     3394.88
                7.00      52.71      46.45      0.00      0.00      0.0
0     3069.73
      723  TEMP
                0.00       4.04  -7.572E-01      0.00      0.00      0.0
0     -129.41
                7.00       4.04  -7.572E-01      0.00      0.00      0.0
0     -124.11

      724  DL
                0.00   -1353.49  -1.454E-03      0.00      0.00      0.0
0       -3.01
                7.00   -1353.49  -1.454E-03      0.00      0.00      0.0
0       -3.00
      724  LLI2SPAN
                0.00       7.16  -1.051E-01      0.00      0.00      0.0
0        6.65
                7.00       7.16  -1.051E-01      0.00      0.00      0.0
0        7.38
      724  LLI5SPAN
                0.00     -68.26   1.594E-02      0.00      0.00      0.0
0       34.56
                7.00     -68.26   1.594E-02      0.00      0.00      0.0
0       34.45
      724  WINDSUP
                0.00     -61.12     -14.84      0.00      0.00      0.0
0     1137.63
                7.00     -61.12     -14.84      0.00      0.00      0.0
0     1241.52
      724  WINDSUB
                0.00      -3.52      -1.38      0.00      0.00      0.0
0      109.26
                7.00      -3.52      -1.38      0.00      0.00      0.0
0      118.92
      724  WLL
                0.00      -8.23      -2.65      0.00      0.00      0.0
0      202.05
                7.00      -8.23      -2.65      0.00      0.00      0.0
0      220.62
      724  SF
                0.00      52.71     -21.08      0.00      0.00      0.0
0     3247.33
                7.00      52.71     -21.08      0.00      0.00      0.0
0     3394.88
      724  TEMP
                0.00       4.04       1.57      0.00      0.00      0.0
0     -118.40
                7.00       4.04       1.57      0.00      0.00      0.0
0     -129.41

      725  DL
                0.00   -1353.49   2.705E-02      0.00      0.00      0.0
0       -2.82
                7.00   -1353.49   2.705E-02      0.00      0.00      0.0
0       -3.01
      725  LLI2SPAN
                0.00       7.16  -1.575E-01      0.00      0.00      0.0
0        5.55
                7.00       7.16  -1.575E-01      0.00      0.00      0.0
0        6.65
      725  LLI5SPAN
                0.00     -68.26  -3.112E-01      0.00      0.00      0.0
0       32.38
                7.00     -68.26  -3.112E-01      0.00      0.00      0.0
0       34.56
```



```
      725  WINDSUP
                0.00     -61.12     -24.11      0.00      0.00      0.0
0      968.85
                7.00     -61.12     -24.11      0.00      0.00      0.0
0     1137.63
      725  WINDSUB
                0.00      -3.52      -2.27      0.00      0.00      0.0
0       93.34
                7.00      -3.52      -2.27      0.00      0.00      0.0
0      109.26
      725  WLL
                0.00      -8.23      -4.30      0.00      0.00      0.0
0      171.97
                7.00      -8.23      -4.30      0.00      0.00      0.0
0      202.05
      725  SF
                0.00      52.71     -49.62      0.00      0.00      0.0
0     2899.99
                7.00      52.71     -49.62      0.00      0.00      0.0
0     3247.33
      725  TEMP
                0.00       4.04       2.54      0.00      0.00      0.0
0     -100.65
                7.00       4.04       2.54      0.00      0.00      0.0
0     -118.40

      726  DL
                0.00   -1353.49   3.387E-02      0.00      0.00      0.0
0       -2.58
                7.00   -1353.49   3.387E-02      0.00      0.00      0.0
0       -2.82
      726  LLI2SPAN
                0.00       7.16  -1.691E-01      0.00      0.00      0.0
0        4.36
                7.00       7.16  -1.691E-01      0.00      0.00      0.0
0        5.55
      726  LLI5SPAN
                0.00     -68.26  -3.896E-01      0.00      0.00      0.0
0       29.66
                7.00     -68.26  -3.896E-01      0.00      0.00      0.0
0       32.38
      726  WINDSUP
                0.00     -61.12     -26.20      0.00      0.00      0.0
0      785.47
                7.00     -61.12     -26.20      0.00      0.00      0.0
0      968.85
      726  WINDSUB
                0.00      -3.52      -2.48      0.00      0.00      0.0
0       76.00
                7.00      -3.52      -2.48      0.00      0.00      0.0
0       93.34
      726  WLL
                0.00      -8.23      -4.67      0.00      0.00      0.0
0      139.30
                7.00      -8.23      -4.67      0.00      0.00      0.0
0      171.97
      726  SF
                0.00      52.71     -56.25      0.00      0.00      0.0
0     2506.22
                7.00      52.71     -56.25      0.00      0.00      0.0
0     2899.99
      726  TEMP
                0.00       4.04       2.75      0.00      0.00      0.0
0      -81.38
                7.00       4.04       2.75      0.00      0.00      0.0
0     -100.65
```

```
      749  DL
                0.00    -1050.32   1.265E-01     0.00      0.00      0.0
0       -6.06
                2.51    -1050.32   1.265E-01     0.00      0.00      0.0
0       -6.37
      749  LLI2SPAN
                0.00      -74.33      -1.76      0.00      0.00      0.0
0       88.63
                2.51      -74.33      -1.76      0.00      0.00      0.0
0       93.05
      749  LLI5SPAN
                0.00      -69.17      -1.46      0.00      0.00      0.0
0       70.08
                2.51      -69.17      -1.46      0.00      0.00      0.0
0       73.75
      749  WINDSUP
                0.00      131.38      31.04      0.00      0.00      0.0
0     -868.28
                2.51      131.38      31.04      0.00      0.00      0.0
0     -946.18
      749  WINDSUB
                0.00        3.52   3.067E-01     0.00      0.00      0.0
0      -61.39
                2.51        3.52   3.067E-01     0.00      0.00      0.0
0      -62.16
      749  WLL
                0.00        8.23       5.07      0.00      0.00      0.0
0     -132.40
                2.51        8.23       5.07      0.00      0.00      0.0
0     -145.12
      749  SF
                0.00       58.11      -1.04      0.00      0.00      0.0
0    -1027.66
                2.51       58.11      -1.04      0.00      0.00      0.0
0    -1025.05
      749  TEMP
                0.00        4.04       2.95      0.00      0.00      0.0
0      -75.63
                2.51        4.04       2.95      0.00      0.00      0.0
0      -83.03

      750  DL
                0.00    -1099.11   6.100E-04     0.00      0.00      0.0
0  -2.763E-02
                2.51    -1099.11   6.100E-04     0.00      0.00      0.0
0  -2.916E-02
      750  LLI2SPAN
                0.00      -94.86       1.62      0.00      0.00      0.0
0      -72.99
                2.51      -94.86       1.62      0.00      0.00      0.0
0      -77.05
      750  LLI5SPAN
                0.00     -166.90   4.901E-03     0.00      0.00      0.0
0  -2.222E-01
                2.51     -166.90   4.901E-03     0.00      0.00      0.0
0  -2.345E-01
      750  WINDSUP
                0.00      129.00      28.34      0.00      0.00      0.0
0     -739.00
                2.51      129.00      28.34      0.00      0.00      0.0
0     -810.13
      750  WINDSUB
                0.00        0.00   4.957E-01     0.00      0.00      0.0
0      -70.44
                2.51        0.00   4.957E-01     0.00      0.00      0.0
```



```
0      -71.68
      750  WLL
                0.00        0.00       5.51      0.00      0.00      0.0
0     -153.52
                2.51        0.00       5.51      0.00      0.00      0.0
0     -167.36
      750  SF
                0.00  -6.649E-05       2.08      0.00      0.00      0.0
0    -1176.83
                2.51  -6.649E-05       2.08      0.00      0.00      0.0
0    -1182.05
      750  TEMP
                0.00       -8.08       0.00      0.00      0.00      0.0
0       0.00
                2.51       -8.08       0.00      0.00      0.00      0.0
0       0.00

      751  DL
                0.00    -1050.30  -1.271E-01     0.00      0.00      0.0
0       6.09
                2.51    -1050.30  -1.271E-01     0.00      0.00      0.0
0       6.41
      751  LLI2SPAN
                0.00        7.16   1.444E-01     0.00      0.00      0.0
0      -2.56
                2.51        7.16   1.444E-01     0.00      0.00      0.0
0      -2.92
      751  LLI5SPAN
                0.00      -68.26       1.46      0.00      0.00      0.0
0      -69.82
                2.51      -68.26       1.46      0.00      0.00      0.0
0      -73.48
      751  WINDSUP
                0.00      -61.12      28.67      0.00      0.00      0.0
0     -754.89
                2.51      -61.12      28.67      0.00      0.00      0.0
0     -826.85
      751  WINDSUB
                0.00       -3.52   3.067E-01     0.00      0.00      0.0
0      -61.39
                2.51       -3.52   3.067E-01     0.00      0.00      0.0
0      -62.16
      751  WLL
                0.00       -8.23       5.07      0.00      0.00      0.0
0     -132.40
                2.51       -8.23       5.07      0.00      0.00      0.0
0     -145.12
      751  SF
                0.00      -58.11      -1.04      0.00      0.00      0.0
0    -1027.66
                2.51      -58.11      -1.04      0.00      0.00      0.0
0    -1025.05
      751  TEMP
                0.00        4.04      -2.95      0.00      0.00      0.0
0       75.63
                2.51        4.04      -2.95      0.00      0.00      0.0
0       83.03
```

TYLIN INTERNATIONAL

Project:	Salt River Bridges Scour	Job No.	1317.00	Sheet:	
Item:	16th Street Bridge	Designer:	SJ	Date:	3/7/00
D:\My Documents\Projects\1317 Salt River Bridges\16th street\excel\[col_top.xls]Sheet1		Checker:		Date:	

LOADS AT TOP OF COLUMN - PIER 5

LOAD FACTOR DESIGN:

GROUP-I = 1.30 [.75 DL + 1.67 LL+I + 1.0 SF]
GROUP-II = 1.30 [.75 DL + 1.0 SF + 1.0 W]
GROUP-III = 1.30 [.75 DL + 1.0 LL+I + 1.0 SF + 0.3 W + 1.0 WL + 1.0 LF]
GROUP-IV = 1.30 [.75 DL + 1.0 LL+I + 1.0 SF + 1.0 RST]
GROUP-V = 1.25 [.75 DL + 1.0 SF + 1.0 W + 1.0 RST]
GROUP-VI = 1.25 [.75 DL + 1.0 LL+I + 1.0 SF + 0.3 W + 1.0 WL + 1.0 LF + 1.0 RST]

CASE - 3 VERTICAL LOAD

	DL (KIPS)	LL+I (KIPS)	WIND (KIPS)	WL (KIPS)	LF (KIPS)	SF (KIPS)	RST (KIPS)
Col 1	1,050	74	135	8	0	(58)	4
→ Col 2	1,099	167	129	0	0	0	8
Col 3	1,050	68	65	8	0	58	4

	GRP-I (KIPS)	GRP-II (KIPS)	GRP-III (KIPS)	GRP-IV (KIPS)	GRP-V (KIPS)	GRP-VI (KIPS)
Pu	1,110	1,124	1,109	1,051	1,086	1,071
	1,434	1,239	1,339	1,299	1,202	1,297
	1,247	1,183	1,224	1,193	1,143	1,182

CASE - 3 SHEAR

		DL (KIPS)	LL+I (KIPS)	WIND (KIPS)	WL (KIPS)	LF (KIPS)	SF (KIPS)	RST (KIPS)
long	Col 1 - Vy	0	0	17	3	9	0	2
trans	Col 1 - Vx	0	2	34	5	0	1	3
→ long	Col 2 - Vy	0	0	17	3	9	0	2
→ trans	Col 2 - Vx	0	2	29	6	0	2	0
long	Col 3 - Vy	0	0	17	3	9	0	2
trans	Col 3 - Vx	0	1	29	5	0	1	3

	GRP-I (KIPS)	GRP-II (KIPS)	GRP-III (KIPS)	GRP-IV (KIPS)	GRP-V (KIPS)	GRP-VI (KIPS)
Col 1 - Vy	0	23	22	3	24	24
Col 1 - Vx	5	45	24	8	47	26
Col 2 - Vy	0	23	22	3	24	24
Col 2 - Vx	6	40	23	5	38	22
Col 3 - Vy	0	23	22	3	24	24
Col 3 - Vx	5	39	21	7	41	24

TYLIN INTERNATIONAL

Project:	Salt River Bridges Scour	Job No.	1317.00	Sheet:	
Item:	16th Street Bridge	Designer:	SJ	Date:	3/7/00
D:\My Documents\Projects\1317 Salt River Bridges\16th street\excel\[col_top.xls]Sheet1		Checker:		Date:	

LOADS AT TOP OF COLUMN - PIER 5 *(Cont.)*

CASE - 3 MOMENT

		DL (K-FT)	LL+I (K-FT)	WIND (K-FT)	WL (K-FT)	LF (K-FT)	SF (K-FT)	RST (K-FT)
trans	Col 1 - My	6	89	930 112.44	132 53	0	1,028	76
long	Col 1 - Mx	0	0	140	28	85	0	19
trans	Col 2 - My	0	73	809	153	0	1,177	0
long	Col 2 - Mx	0	0	140	28	85	0	19
trans	Col 3 - My	6	70	816	132	0	1,026	76
long	Col 3 - Mx	0	0	140	28	85	0	19

	GRP-I (K-FT)	GRP-II (K-FT)	GRP-III (K-FT)	GRP-IV (K-FT)	GRP-V (K-FT)	GRP-VI (K-FT)
Col 1 - My	1,534	2,550	1,992	1,555	2,547	2,010
Col 1 - Mx	0	182	202	25	199	218
Col 2 - My	1,688	2,582	2,140	1,625	2,483	2,058
Col 2 - Mx	0	182	202	25	199	218
Col 3 - My	1,491	2,400	1,920	1,529	2,403	1,941
Col 3 - Mx	0	182	202	25	199	218

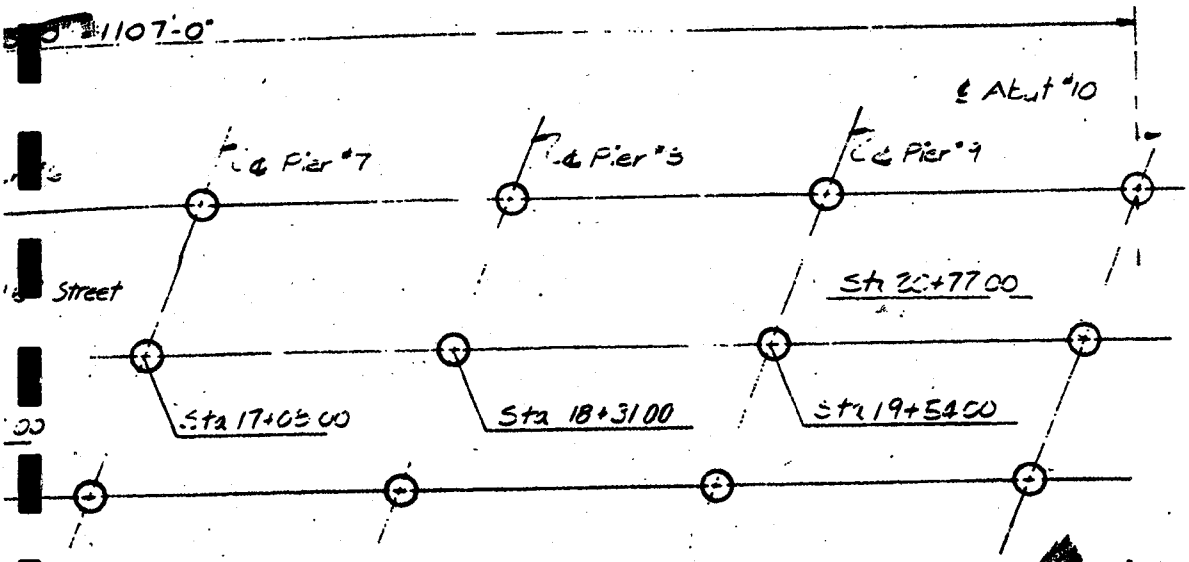
DRILLED SHAFT LOAD AT PIER 5

DRILLED SHAFT DIAMETER = 7 FT WT = 5.77 K/FT

LENGTH TO 100-YR FLOOD SCOUR = 61.18 FT WT = 353.2 KIPS

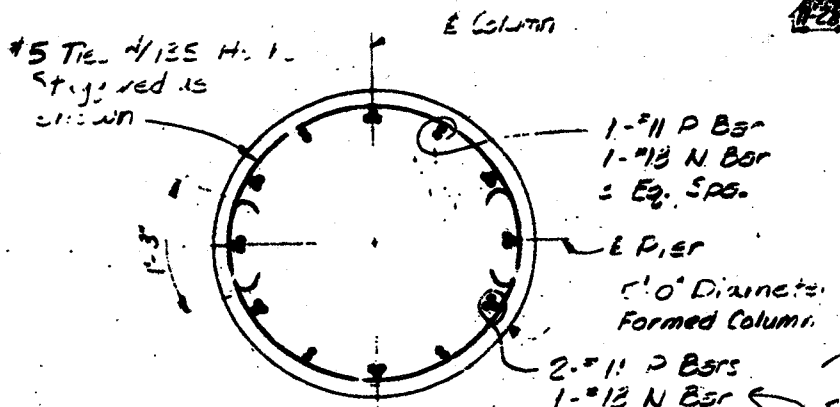
I = 0.20

	COL -1 (100-YR)	COL-2 (100-YR)	COL-3 (100-YR)
LL+I =	74	167	68
LL =	62	139	57
DL =	1,142	1,191	1,142
SF+B =	(169)	(111)	(53)
DL+LL-B =	1,035	1,219	1,146

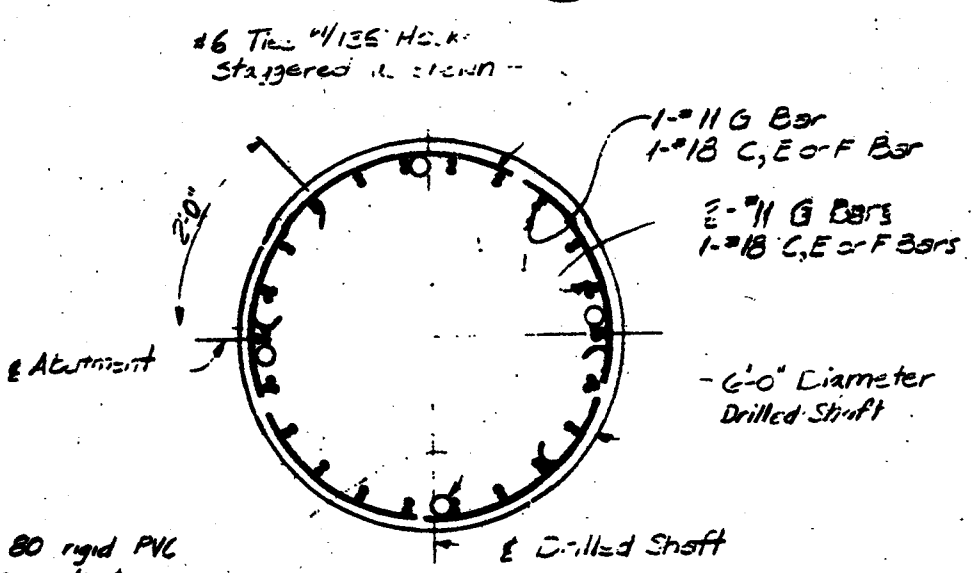


Location	TOP OF C[illegible]
*Abut #1	1030.75
Pier #2	1082.31
Pier #3	1084.[illegible]
Pier #4	1085.[illegible]
Pier #5	1086.16
Pier #6	1086.05
Pier #7	1085.00
Pier #8	1084.13
Pier #9	1082.[illegible]
*Abut #10	1080.00

*Top of Drilled Sh[illegible]

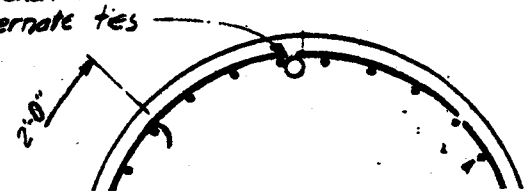


SECTION A
Scale 1/2"=1'-0"



SECTION B
Scale 1/2"=1'-0"

2" ϕ Schedule 80 rigid PVC Pipe (placed in quadrants as shown), from bottom of cage to 1'-0" above top of Drilled Shaft with glued cap bottom end, threaded cap top end. Securely attach to alternate ties



#18 Q Bars & #14 H Bars at Equal Spaces

FOUNDATION NOTES:

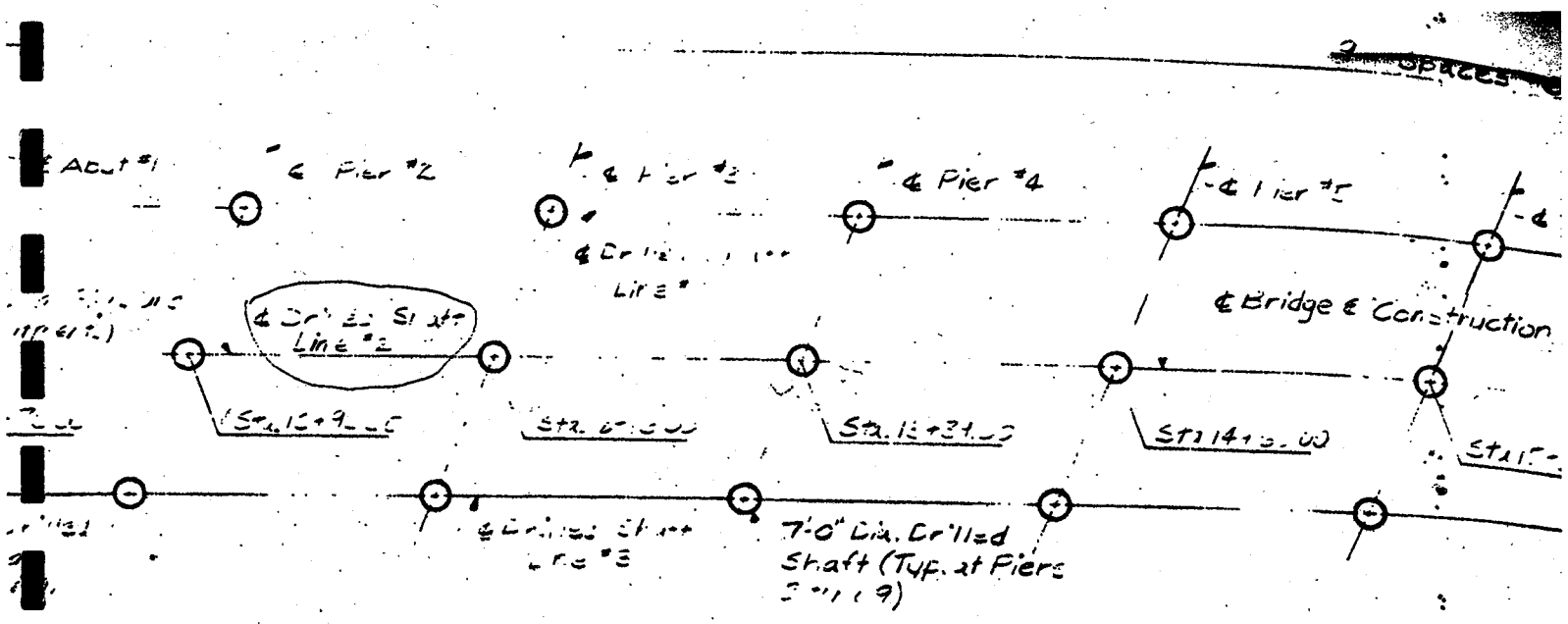
Drilled shafts shall be cast-[illegible]

Excavation of Drilled Shafts [illegible] be permitted until 48 hours [illegible] been concreted.

Any construction joint not sh[illegible] approval of the Engineer [illegible]

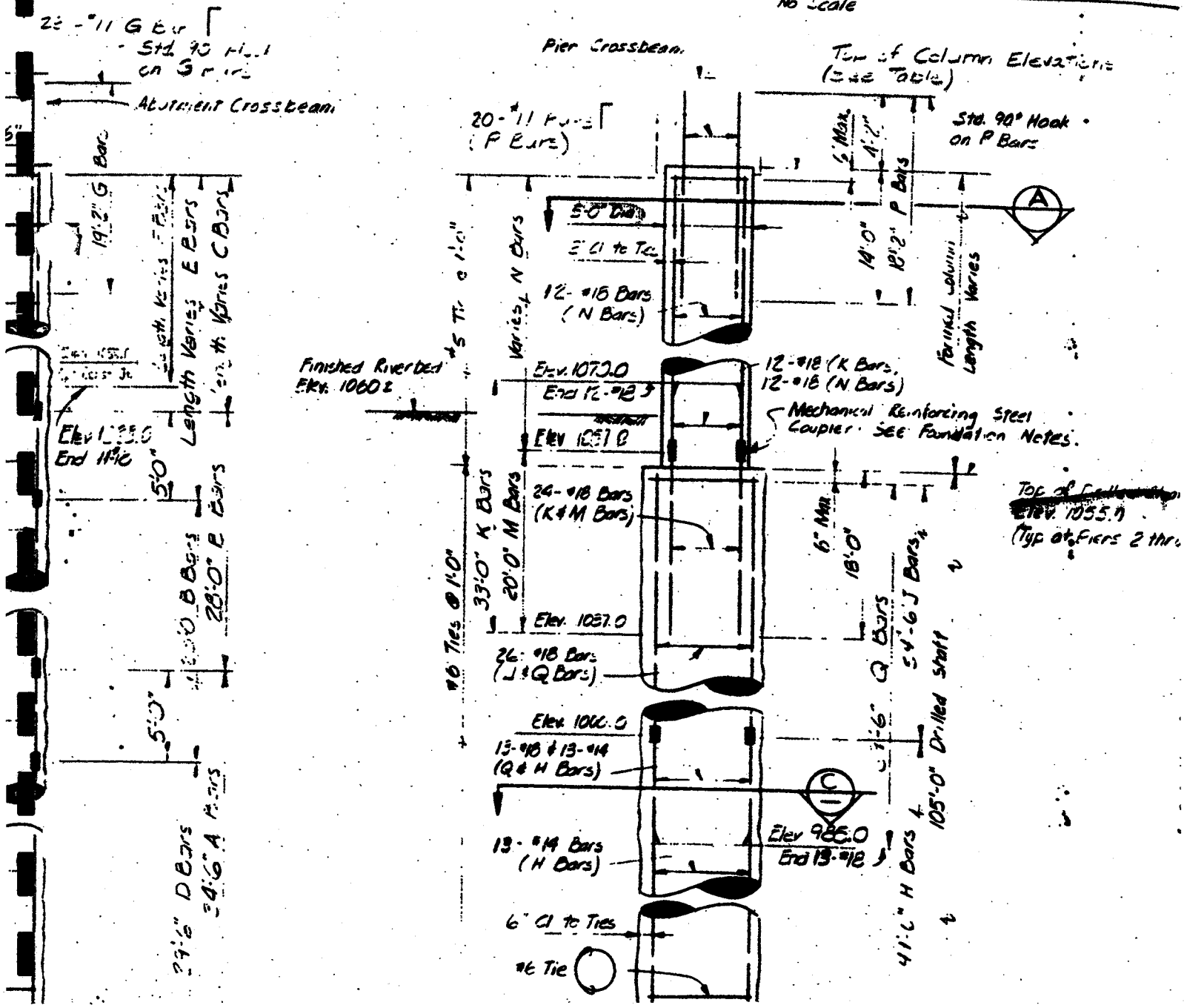
Tops of Drilled Shafts shall [illegible] shall not deviate more than [illegible] Reinforcing steel shall conform [illegible] drilled shaft reinforc[illegible]

Contractor shall be responsib[illegible] cages during fabrication [illegible] showing reinforcing cage [illegible] submitted to the Engineer [illegible] Mechanical Reinforcing Steel [illegible] of the specified yield [illegible]



DRILLED SHAFT LAYOUT

No Scale



```
 SALT RIVER BRIDGES - 16TH STREET BRIDGE - PIER 5 COLUMN
        9
        4
        1        36
        0
        2       1.0       6.0         0     57.00      0.00      0.00
     3500  29000000    0.0030     60000
    60.00      0.00      0.00      0.00
    27.8                                   2.25        36
LOAD AT TOP                            NO    PILE
 0.99 0.50 0.00 0.00     20.00     95.78   1    1     3.00    AGS    B
     0       0     73     73     73    809   153     0     0     0  1175
     0       0      0      0      0    140    28    85     0    19     0
  1099       0    167    167    167    129     0     0     0     8     0
                    0      0      0                          0
                    0      0      0                          0
                    0      0      0                          0
        0         0         0         0         0         0
        0         0         0         0         0         0
        0         0         0         0         0         0
```

```
TITLE   SALT RIVER BRIDGES - 16TH STREET BRIDG                    PAGE  1

*****************  Licensed to: T.Y. Lin International  ****************
*                                                                      *
*              IAI RECOL-PC  - VERSION 2.1    06.26.89                 *
*                                                                      *
************************************************************************


COLUMN TYPE                    =  9  (CIRCULAR)
CONCRETE LOOPS                 =  1
TOTAL NO. OF CONCRETE COORD.   = 40
STEEL REBAR PATTERN            =  4  (CONCENTRIC LOOPS)
NUMBER OF STEEL REBAR LOOPS    =  1
TOTAL NO. OF STEEL REBARS      = 36
PLOT TYPE                      =  0  (NO PLOT)
DESIGN TYPE                    =  2  (CHECK)
PERCENT STEEL LIMITS           =     (1.00 % MIN.  6.00 % MAX.)


*************
* BENT DATA *
*****************************************************************************

NUMBER OF COLUMNS IN BENT                    =     0
OUT TO OUT DISTANCE (DIAMETER) OF SPIRAL     = 57.00 (INCHES)
DISTANCE FROM TOP COLUMN PLASTIC HINGE TO
CENTER OF GRAVITY OF THE SUPERSTRUCTURE      =  0.00 (FEET)
CENTER TO CENTER SPACING OF COLUMNS          =  0.00 (FEET)


******************************
* MATERIAL PROPERTIES  (PSI) *
*****************************************************************************

ULTIMATE CONCRETE COMPRESSIVE STRESS - FC =     3500.
YOUNG S MODULUS FOR CONCRETE         - EC =  3372165.
YOUNG S MODULUS FOR STEEL BARS       - ES = 29000000.
ULTIMATE CONCRETE COMPRESSIVE STRAIN - EO =      .003
YIELDING STRESS FOR STEEL BARS       - FY =    60000.
```

TITLE SALT RIVER BRIDGES - 16TH STREET BRIDG PAGE 2

CIRCULAR CROSS-SECTION

HX
60.00

CONCRETE COORDINATES (INCHES)

COORD	X	Y
1	30.00	0.00
2	29.63	4.69
3	28.53	9.27
4	26.73	13.62
5	24.27	17.63
6	21.21	21.21
7	17.63	24.27
8	13.62	26.73
9	9.27	28.53
10	4.69	29.63
11	0.00	30.00
12	-4.69	29.63
13	-9.27	28.53
14	-13.62	26.73
15	-17.63	24.27
16	-21.21	21.21
17	-24.27	17.63
18	-26.73	13.62
19	-28.53	9.27
20	-29.63	4.69
21	-30.00	0.00
22	-29.63	-4.69
23	-28.53	-9.27
24	-26.73	-13.62
25	-24.27	-17.63
26	-21.21	-21.21
27	-17.63	-24.27
28	-13.62	-26.73
29	-9.27	-28.53
30	-4.69	-29.63
31	0.00	-30.00
32	4.69	-29.63
33	9.27	-28.53
34	13.62	-26.73
35	17.63	-24.27
36	21.21	-21.21
37	24.27	-17.63
38	26.73	-13.62
39	28.53	-9.27
40	29.63	-4.69

TITLE SALT RIVER BRIDGES - 16TH STREET BRIDG PAGE 3

CONCENTRIC CIRCLE PATTERN

LOOP	RADIUS	AREA	BARS
1	27.80	2.25	36

STEEL REBAR COORDINATES (INCHES)

COORD	X	Y
1	27.80	0.00
2	27.38	4.83
3	26.12	9.51
4	24.08	13.90
5	21.30	17.87
6	17.87	21.30
7	13.90	24.08
8	9.51	26.12
9	4.83	27.38
10	0.00	27.80
11	-4.83	27.38
12	-9.51	26.12
13	-13.90	24.08
14	-17.87	21.30
15	-21.30	17.87
16	-24.08	13.90
17	-26.12	9.51
18	-27.38	4.83
19	-27.80	0.00
20	-27.38	-4.83
21	-26.12	-9.51
22	-24.08	-13.90
23	-21.30	-17.87
24	-17.87	-21.30
25	-13.90	-24.08
26	-9.51	-26.12
27	-4.83	-27.38
28	0.00	-27.80
29	4.83	-27.38
30	9.51	-26.12
31	13.90	-24.08
32	17.87	-21.30
33	21.30	-17.87
34	24.08	-13.90
35	26.12	-9.51
36	27.38	-4.83

THE MAIN LONGITUDINAL STEEL IS ASSUMED TO BE # 14 BARS.

TITLE SALT RIVER BRIDGES - 16TH STREET BRIDG PAGE 4

```
*************************
* INITIAL REFERENCE DATA *
*************************************************************************

TOTAL AREA OF THE SECTION              AG =     19.55 FT**2
NOMINAL AXIAL LOAD STRENGTH            PO =  12996.09 KIPS
TOTAL REINFORCEMENT AREA              AST =     81.00 IN**2
PERCENT STEEL                           =      2.88 %

GROSS MOMENT OF INERTIA ABOUT Y-AXIS  IYC =     30.43 FT**4
GROSS MOMENT OF INERTIA ABOUT X-AXIS  IXC =     30.43 FT**4

STEEL MOMENT OF INERTIA ABOUT Y-AXIS  IYS =    1.5095 FT**4
STEEL MOMENT OF INERTIA ABOUT X-AXIS  IXS =    1.5095 FT**4
```


TITLE SALT RIVER BRIDGES - 16TH STREET BRIDG PAGE 5

```
*************************
* COLUMN LOAD DATA (K-FT) *
*************************************************************************

LOAD NAME:          LOAD AT TOP
FOOTING DATA FILE:  NO
TYPE FOOTING:        PILE


MOMENT DISTRIBUTION FACT            COLUMN     STEEL   LOCATION  DUCTILITY
SEISMIC
:---TOP---:---BOTTOM---:  PERCENT  LENGTH     TIE=1      TOP=1     FACTOR
DESIGN     SPC
DAY   DAX   DBY   DBX   IMPACT  (FEET)  SPIRAL=0   BOTTOM=0       (Z)
CRITERIA CATEGORY

0.99  0.50  0.00  0.00    20.00   95.78        1          1       3.00
AGS       B
```

COLUMN GROUP LOADS - SERVICE (K-FT)

	DEAD LOAD	PRE STRESS	:---- LL+IMPACT ---: CASE 1 TRANS MY-MAX	CASE 2 LONG MX-MAX	CASE 3 AXIAL N-MAX	WIND	WL	LF	CF-MY	TEMP	SF& BY
MY	0	0	73	73	73	809	153	0	0	0	11 75
MX	0	0	0	0	0	140	28	85	0	19	0
P	1099	0	167	167	167	129	0	0	0	8	0
PMY			0	0	0				0		
PMX			0	0	0				0		
P			0	0	0				0		

COLUMN SEISMIC AND ARBITRARY LOADS (K-FT)

(ARS)	UNREDUCED SEISMIC CASE 1 MAX TRAN	CASE 2 MAX LONG	ARBITRARY LOADS SERVICE AL1	SERVICE AL2	ARBITRARY LOADS FACTORED AL1	FACTORED AL2
MY TRAN	0.	0.	0.	0.	0.	0.
MX LONG	0.	0.	0.	0.	0.	0.
P AXIAL	0.	0.	0.	0.	0.	0.

TITLE SALT RIVER BRIDGES - 16TH STREET BRIDG PAGE 6

****
* FACTORED LOADS FOR COLUMN DESIGN CHECK (KIP-FT) *
****

APPLIED FACTORED MOMENTS ARE MAGNIFIED FOR SLENDERNESS IN ACCORDANCE WITH CALTRANS BRIDGE DESIGN SPECIFICATIONS. (ART 8.16.5)

LENGTH = 95.78 FT FC = 3.50 KSI FY = 60.00 KSI
STEEL = 2.88 % AST = 81.00 SQ IN

GROUP	CASE	:------ APPLIED FACTORED ------: TRANS MY	LONG MX	COMB M	AXIAL P	CAPACITY (PHI*MN) MU	PHI	RATIO MU/M	
IH	1	2704.	326.	2723.	1433.	7287.	0.70	2.68	OK
IH	2	2704.	326.	2723.	1433.	7287.	0.70	2.68	OK
IH	3	3182.	422.	3210.	1791.	7418.	0.70	2.31	OK
IP	1	2126.	236.	2139.	1072.	7528.	0.75	3.52	OK
IP	2	2126.	236.	2139.	1072.	7528.	0.75	3.52	OK
IP	3	2445.	325.	2467.	1429.	7282.	0.70	2.95	OK
II		3824.	277.	3834.	1239.	7411.	0.72	1.93	OK
III	1	3296.	302.	3310.	1339.	7336.	0.71	2.22	OK
III	2	3296.	302.	3310.	1339.	7336.	0.71	2.22	OK
III	3	3854.	396.	3874.	1696.	7388.	0.70	1.91	OK
IV	1	2463.	292.	2480.	1299.	7366.	0.72	2.97	OK
IV	2	2463.	292.	2480.	1299.	7366.	0.72	2.97	OK
IV	3	2872.	385.	2897.	1656.	7375.	0.70	2.55	OK
V		3624.	268.	3634.	1202.	7439.	0.73	2.05	OK
VI	1	3117.	292.	3130.	1297.	7368.	0.72	2.35	OK
VI	2	3117.	292.	3130.	1297.	7368.	0.72	2.35	OK
VI	3	3611.	381.	3631.	1641.	7368.	0.70	2.03	OK
VII	1	1652.	242.	1670.	1099.	6894.	0.68	4.13	OK
VII	2	1652.	242.	1670.	1099.	6894.	0.68	4.13	OK

NOTE: FOR CALTRANS AND SPC-C AND SPC-D ONLY THE UNREDUCED SEISMIC MOMENTS ARE REDUCED BY THE Z OR R FACTOR. FOR SPC-B BOTH THE UNREDUCED SEISMIC AXIAL AND MOMENTS ARE REDUCED BY THE Z OR R FACTOR.

TITLE SALT RIVER BRIDGES - 16TH STREET BRIDG PAGE 7

****
* MOMENT MAGNIFICATION AND BUCKLING CALCULATIONS *
****

REFERENCE: "CALTRANS BRIDGE DESIGN SPECIFICATIONS" (ART 8.16.5)
(COLUMN ASSUMED TO BE UNBRACED AGAINST SIDESWAY.)

MAGY = MOMENT MAGNIFACTION FACTOR ABOUT Y-AXIS
MAGX = MOMENT MAGNIFACTION FACTOR ABOUT X-AXIS

PCY = CRITICAL BUCKLING LOAD ABOUT Y-AXIS
PCX = CRITICAL BUCKLING LOAD ABOUT X-AXIS

KY = EFFECTIVE LENGTH FACTOR ABOUT Y-AXIS = 2.10
KX = EFFECTIVE LENGTH FACTOR ABOUT X-AXIS = 1.19

KY*L/R = SLENDERNESS RATIO ABOUT Y-AXIS =161.
KX*L/R = SLENDERNESS RATIO ABOUT X-AXIS = 92.

IYS = STEEL MOMENT OF INERTIA ABOUT Y-AXIS = 1.5095 FT**4
IXS = STEEL MOMENT OF INERTIA ABOUT X-AXIS = 1.5095 FT**4

GR	CA	:-MOMENT MAGNIFICATION-: TRAN MAGY	LONG MAGX	COMB MAG	CRACKED TRANSFORMED SECTION--: E*IY	E*IX	CRITICAL -----BUCKLING----: TRAN PCY	LONG PCX	AXIAL LOAD P
IH	1	1.604	1.139	1.593	15605673.	15605690.	3807.	11774.	1433.
IH	2	1.604	1.139	1.593	15605673.	15605690.	3807.	11774.	1433.
IH	3	1.888	1.179	1.863	15605673.	15605690.	3807.	11774.	1791.
IP	1	1.392	1.100	1.387	15605673.	15605690.	3807.	11774.	1072.
IP	2	1.392	1.100	1.387	15605673.	15605690.	3807.	11774.	1072.
IP	3	1.601	1.138	1.587	15605673.	15605690.	3807.	11774.	1429.
II		1.483	1.118	1.480	15605673.	15605690.	3807.	11774.	1239.
III	1	1.542	1.128	1.537	15605673.	15605690.	3807.	11774.	1339.
III	2	1.542	1.128	1.537	15605673.	15605690.	3807.	11774.	1339.
III	3	1.803	1.168	1.791	15605673.	15605690.	3807.	11774.	1696.
IV	1	1.518	1.124	1.509	15605673.	15605690.	3807.	11774.	1299.
IV	2	1.518	1.124	1.509	15605673.	15605690.	3807.	11774.	1299.
IV	3	1.770	1.164	1.750	15605673.	15605690.	3807.	11774.	1656.
V		1.461	1.114	1.458	15605673.	15605690.	3807.	11774.	1202.
VI	1	1.517	1.124	1.512	15605673.	15605690.	3807.	11774.	1297.
VI	2	1.517	1.124	1.512	15605673.	15605690.	3807.	11774.	1297.
VI	3	1.757	1.162	1.745	15605673.	15605690.	3807.	11774.	1641.
VII	1	1.406	1.103	1.397	15605673.	15605690.	3807.	11774.	1099.
VII	2	1.406	1.103	1.397	15605673.	15605690.	3807.	11774.	1099.

*** WARNING KL/R = 161. ABOUT THE Y-AXIS IS GREATER THAN 100. REDESIGN THE COLUMN WITH A LARGER CROSS-SECTION OR PERFORM A SPECIAL SECOND ORDER ANALYSIS AS DEFINED IN ART 8.16.5.1.1 OF AASHTO.

TITLE SALT RIVER BRIDGES - 16TH STREET BRIDG PAGE 8

COLUMN SERVICE LOADS (K-FT) AND MAXIMUM WORKING STRESSES (PSI)

YOUNG S MODULUS FOR CONCRETE - EC = 3372165. PSI
MODULAR RATIO (ES/EC) - N = 8.6

		:---- SERVICE LOADS (K-FT) ----:				:---- MAX STRESS (PSI) ----:		
GP	CASE	TRANS MY	LONG MX	COMB M	AXIAL P	CONC COMP	STEEL TEN	STEEL COMP
IH	1	1248.	0.	1248.	1266.	897.	1120.	7376.
IH	2	1248.	0.	1248.	1266.	897.	1120.	7376.
IH	3	1248.	0.	1248.	1266.	897.	1120.	7376.
II		1587.	112.	1591.	982.	1034.	4519.	8380.
III	1	1315.	124.	1321.	1044.	889.	2400.	7253.
III	2	1315.	124.	1321.	1044.	889.	2400.	7253.
III	3	1315.	124.	1321.	1044.	889.	2400.	7253.
IV	1	998.	15.	999.	1019.	719.	874.	5914.
IV	2	998.	15.	999.	1019.	719.	874.	5914.
IV	3	998.	15.	999.	1019.	719.	874.	5914.
V		1417.	114.	1422.	883.	924.	3998.	7489.
VI	1	1174.	124.	1181.	938.	795.	2126.	6494.
VI	2	1174.	124.	1181.	938.	795.	2126.	6494.
VI	3	1174.	124.	1181.	938.	795.	2126.	6494.
DL		0.	0.	0.	1099.	320.	0.	2754.

TITLE SALT RIVER BRIDGES - 16TH STREET BRIDG PAGE 9

```
*************************************************************
* PROBABLE PLASTIC MOMENT (1.3 X NOMINAL MOMENT) (KIP-FT) *
*************************************************************
```

CODE (8.16.4.4) AND MEMO TO DESIGNERS 15-10

FC = 3.50 KSI FY = 60.00 KSI
EO = 0.0030 IN/IN AST = 81.00 SQ IN

ANGLE	TRANS MPY	LONG MPX	COMB MP	AXIAL P	P-BALANCE (APPROX)
90.0	0.1045E+05	-.1027E+01	0.1045E+05	0.7796E+04	3378
	0.1189E+05	-.6513E+00	0.1189E+05	0.6497E+04	
	0.1307E+05	-.2162E+00	0.1307E+05	0.5198E+04	
	0.1388E+05	0.3328E+00	0.1388E+05	0.3898E+04	
	0.1379E+05	0.9172E+00	0.1379E+05	0.2600E+04	
	0.1296E+05	0.1351E+01	0.1296E+05	0.1301E+04	
	0.1277E+05	0.1456E+01	0.1277E+05	0.1100E+04	
	0.1144E+05	0.1593E+01	0.1144E+05	0.8527E+00	
	0.1042E+05	0.1564E+01	0.1042E+05	-.6488E+03	
	0.9236E+04	0.1562E+01	0.9236E+04	-.1298E+04	

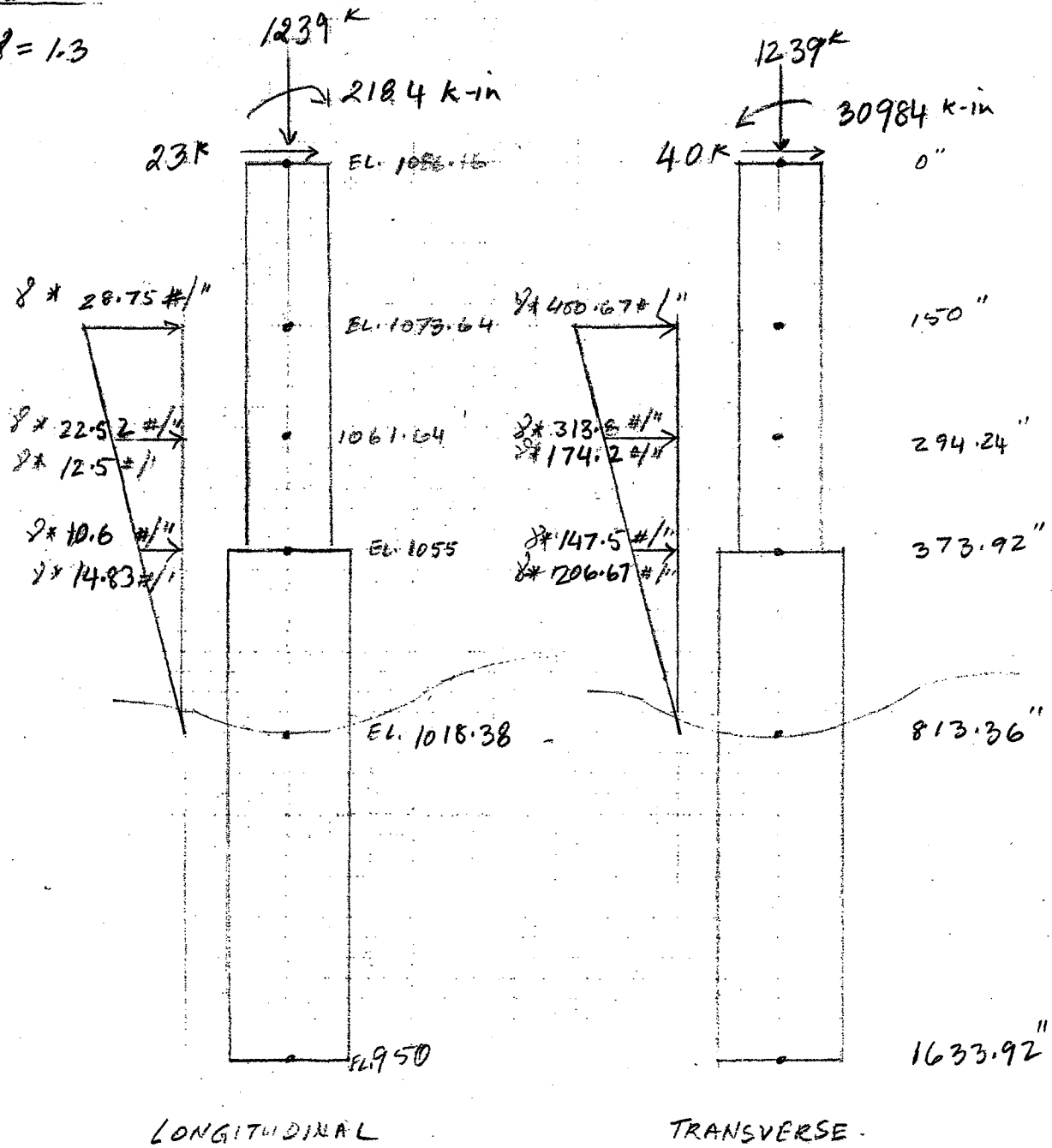
** NOTE: THE NUMBER OF COLUMNS EQUALS ZERO.
THEREFORE, NO PLASTIC HINGING ANALYSIS IS PERFORMED.

TYLIN INTERNATIONAL

Projects: Salt River Bridges - Scour	Job No. 1317.00	Sheet:	of
Item: 16th St. Bridge	Designer: SJ	Date: 2-11-00	
	Checker:	Date:	
		Grid: 1/8"	

GROUP II

$\gamma = 1.3$



LONGITUDINAL

TRANSVERSE

```
SALT RIVER BRIDGES-SCOUR 16TH ST BRIDGE  "LONG.LPD"
1 1 0 0 0
100      4        813.36  1633.92 0
0        60       636174  2827    3372165
373.92   60       636174  2827    3372165
373.92   84       2443920 5542    3372165
1633.92  84       2443920 5542    3372165
1        2        2       0       0
4        813.36   1633.92 500
813.36   0.046875
1633.92  0.046775
813.36   0        35      0
1633.92  0        35      0
6        1        1
150      37.375
294.24   29.25
294.24   16.25
373.92   13.78
373.92   19.28
813.36   0
1
1        23000    2184000 1239000
0
1        1        0
100      1E-5     480
```

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T.Y. Lin International

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SALT RIVER BRIDGES-SCOUR 16TH ST BRIDGE "LONG.LPD"

UNITS--ENGLISH UNITS

INPUT INFORMATION

THE LOADING IS STATIC

PILE GEOMETRY AND PROPERTIES

PILE LENGTH = 1633.92 IN
4 POINTS

X IN	DIAMETER IN	MOMENT OF INERTIA IN**4	AREA IN**2	MODULUS OF ELASTICITY LBS/IN**2
.00	60.000	.636E+06	.283E+04	.337E+07
373.92	60.000	.636E+06	.283E+04	.337E+07
373.92	84.000	.244E+07	.554E+04	.337E+07
1633.92	84.000	.244E+07	.554E+04	.337E+07

SOILS INFORMATION

X AT THE GROUND SURFACE = 813.36 IN

SLOPE ANGLE AT THE GROUND SURFACE = .00 DEG.

1 LAYER(S) OF SOIL

LAYER 1
THE SOIL IS A SAND - P-Y CRITERIA BY REESE ET AL, 1974
X AT THE TOP OF THE LAYER = 813.36 IN
X AT THE BOTTOM OF THE LAYER = 1633.92 IN
MODULUS OF SUBGRADE REACTION = .500E+03 LBS/IN**3

DISTRIBUTION OF EFFECTIVE UNIT WEIGHT WITH DEPTH
2 POINTS

X,IN	WEIGHT,LBS/IN**3
813.36	.47E-01
1633.92	.47E-01

DISTRIBUTION OF STRENGTH PARAMETERS WITH DEPTH
2 POINTS

X,IN	C,LBS/IN**2	PHI,DEGREES	E50
813.36	.000E+00	.350E+02	-----
1633.92	.000E+00	.350E+02	-----

BOUNDARY AND LOADING CONDITIONS

DISTRIBUTED LOAD CURVE 6 POINTS

X,IN	LOAD,LBS/IN
150.00	.374E+02
294.24	.293E+02
294.24	.163E+02
373.92	.138E+02
373.92	.193E+02
813.36	.000E+00

LOADING NUMBER 1

BOUNDARY-CONDITION CODE = 1
LATERAL LOAD AT THE PILE HEAD = .230E+05 LBS
MOMENT AT THE PILE HEAD = .218E+07 IN-LBS
AXIAL LOAD AT THE PILE HEAD = .124E+07 LBS

FINITE-DIFFERENCE PARAMETERS
NUMBER OF PILE INCREMENTS = 100
DEFLECTION TOLERANCE ON DETERMINATION OF CLOSURE = .100E-04 IN
MAXIMUM NUMBER OF ITERATIONS ALLOWED FOR PILE ANALYSIS = 100
MAXIMUM ALLOWABLE DEFLECTION = .48E+03 IN

OUTPUT CODES
KOUTPT = 1
KPYOP = 0
INC = 1

OUTPUT INFORMATION

```
*************************************************
* COMPUTE LOAD-DISTRIBUTION AND LOAD-DEFLECTION *
* CURVES FOR LATERAL LOADING                    *
*************************************************
```

DISTRIBUTED LOAD CURVE 6 POINTS

X,IN	LOAD,LBS/IN
150.00	.374E+02
294.24	.293E+02
294.24	.163E+02
373.92	.138E+02

373.92	.193E+02
813.36	.000E+00

LOADING NUMBER 1

BOUNDARY CONDITION CODE = 1
LATERAL LOAD AT THE PILE HEAD = .230E+05 LBS
MOMENT AT THE PILE HEAD = .218E+07 IN-LBS
AXIAL LOAD AT THE PILE HEAD = .124E+07 LBS

X IN *****	DEFLECTION IN *********	MOMENT LBS-IN *********	SHEAR LBS *********	SLOPE RAD. *********	TOTAL STRESS LBS/IN**2 *********	FLEXURAL RIGIDITY LBS-IN**2 *********	SOIL REACTION LBS/IN *********
.0	.170E+01	.218E+07	.230E+05	-.312E-02	.541E+03	.215E+13	.000E+00
16.3	.165E+01	.262E+07	.230E+05	-.311E-02	.562E+03	.215E+13	.000E+00
32.7	.160E+01	.306E+07	.230E+05	-.308E-02	.583E+03	.215E+13	.000E+00
49.0	.155E+01	.350E+07	.230E+05	-.306E-02	.603E+03	.215E+13	.000E+00
65.4	.150E+01	.394E+07	.230E+05	-.303E-02	.624E+03	.215E+13	.000E+00
81.7	.145E+01	.437E+07	.230E+05	-.300E-02	.645E+03	.215E+13	.000E+00
98.0	.140E+01	.481E+07	.230E+05	-.296E-02	.665E+03	.215E+13	.000E+00
114.4	.136E+01	.525E+07	.230E+05	-.293E-02	.686E+03	.215E+13	.000E+00
130.7	.131E+01	.568E+07	.230E+05	-.288E-02	.706E+03	.215E+13	.000E+00
147.1	.126E+01	.611E+07	.230E+05	-.284E-02	.727E+03	.215E+13	.000E+00
163.4	.122E+01	.655E+07	.233E+05	-.279E-02	.747E+03	.215E+13	.000E+00
179.7	.117E+01	.699E+07	.239E+05	-.274E-02	.768E+03	.215E+13	.000E+00
196.1	.113E+01	.744E+07	.245E+05	-.268E-02	.789E+03	.215E+13	.000E+00
212.4	.108E+01	.790E+07	.250E+05	-.263E-02	.811E+03	.215E+13	.000E+00
228.7	.104E+01	.836E+07	.256E+05	-.256E-02	.833E+03	.215E+13	.000E+00
245.1	.999E+00	.884E+07	.261E+05	-.250E-02	.855E+03	.215E+13	.000E+00
261.4	.959E+00	.932E+07	.266E+05	-.243E-02	.878E+03	.215E+13	.000E+00
277.8	.920E+00	.980E+07	.271E+05	-.236E-02	.901E+03	.215E+13	.000E+00
294.1	.882E+00	.103E+08	.276E+05	-.228E-02	.924E+03	.215E+13	.000E+00
310.4	.845E+00	.108E+08	.280E+05	-.220E-02	.947E+03	.215E+13	.000E+00
326.8	.810E+00	.113E+08	.282E+05	-.212E-02	.971E+03	.215E+13	.000E+00
343.1	.776E+00	.118E+08	.285E+05	-.203E-02	.995E+03	.215E+13	.000E+00
359.5	.744E+00	.123E+08	.287E+05	-.194E-02	.102E+04	.215E+13	.000E+00
375.8	.713E+00	.128E+08	.290E+05	-.188E-02	.444E+03	.824E+13	.000E+00
392.1	.683E+00	.133E+08	.293E+05	-.185E-02	.453E+03	.824E+13	.000E+00
408.5	.653E+00	.139E+08	.296E+05	-.182E-02	.462E+03	.824E+13	.000E+00
424.8	.623E+00	.144E+08	.299E+05	-.180E-02	.471E+03	.824E+13	.000E+00
441.2	.594E+00	.149E+08	.301E+05	-.177E-02	.480E+03	.824E+13	.000E+00
457.5	.565E+00	.154E+08	.304E+05	-.174E-02	.489E+03	.824E+13	.000E+00
473.8	.537E+00	.160E+08	.307E+05	-.170E-02	.498E+03	.824E+13	.000E+00
490.2	.510E+00	.165E+08	.309E+05	-.167E-02	.507E+03	.824E+13	.000E+00
506.5	.483E+00	.170E+08	.311E+05	-.164E-02	.516E+03	.824E+13	.000E+00
522.9	.456E+00	.176E+08	.313E+05	-.161E-02	.526E+03	.824E+13	.000E+00
539.2	.430E+00	.181E+08	.315E+05	-.157E-02	.535E+03	.824E+13	.000E+00
555.5	.405E+00	.187E+08	.317E+05	-.153E-02	.545E+03	.824E+13	.000E+00
571.9	.380E+00	.192E+08	.319E+05	-.150E-02	.554E+03	.824E+13	.000E+00
588.2	.356E+00	.198E+08	.321E+05	-.146E-02	.564E+03	.824E+13	.000E+00
604.6	.332E+00	.203E+08	.322E+05	-.142E-02	.573E+03	.824E+13	.000E+00
620.9	.310E+00	.209E+08	.324E+05	-.138E-02	.583E+03	.824E+13	.000E+00
637.2	.287E+00	.215E+08	.325E+05	-.133E-02	.592E+03	.824E+13	.000E+00
653.6	.266E+00	.220E+08	.326E+05	-.129E-02	.602E+03	.824E+13	.000E+00
669.9	.245E+00	.226E+08	.327E+05	-.125E-02	.611E+03	.824E+13	.000E+00
686.2	.225E+00	.231E+08	.328E+05	-.120E-02	.621E+03	.824E+13	.000E+00
702.6	.206E+00	.237E+08	.329E+05	-.116E-02	.631E+03	.824E+13	.000E+00
718.9	.187E+00	.243E+08	.330E+05	-.111E-02	.640E+03	.824E+13	.000E+00
735.3	.170E+00	.248E+08	.330E+05	-.106E-02	.650E+03	.824E+13	.000E+00
751.6	.153E+00	.254E+08	.331E+05	-.101E-02	.660E+03	.824E+13	.000E+00

767.9	.137E+00	.259E+08	.331E+05	-.959E-03	.669E+03	.824E+13	.000E+00
784.3	.122E+00	.265E+08	.332E+05	-.907E-03	.679E+03	.824E+13	.000E+00
800.6	.107E+00	.271E+08	.332E+05	-.853E-03	.689E+03	.824E+13	.000E+00
817.0	.937E-01	.276E+08	.328E+05	-.799E-03	.698E+03	.824E+13	-.526E+02
833.3	.810E-01	.282E+08	.299E+05	-.744E-03	.708E+03	.824E+13	-.300E+03
849.6	.693E-01	.286E+08	.230E+05	-.688E-03	.715E+03	.824E+13	-.542E+03
866.0	.586E-01	.289E+08	.123E+05	-.631E-03	.721E+03	.824E+13	-.773E+03
882.3	.487E-01	.290E+08	-.209E+04	-.573E-03	.723E+03	.824E+13	-.983E+03
898.7	.398E-01	.289E+08	-.195E+05	-.516E-03	.720E+03	.824E+13	-.115E+04
915.0	.319E-01	.284E+08	-.394E+05	-.459E-03	.712E+03	.824E+13	-.128E+04
931.3	.248E-01	.276E+08	-.610E+05	-.403E-03	.698E+03	.824E+13	-.136E+04
947.7	.187E-01	.265E+08	-.824E+05	-.350E-03	.678E+03	.824E+13	-.126E+04
964.0	.134E-01	.249E+08	-.101E+06	-.299E-03	.652E+03	.824E+13	-.101E+04
980.4	.894E-02	.232E+08	-.115E+06	-.251E-03	.622E+03	.824E+13	-.747E+03
996.7	.522E-02	.212E+08	-.125E+06	-.207E-03	.588E+03	.824E+13	-.478E+03
1013.0	.218E-02	.191E+08	-.131E+06	-.167E-03	.552E+03	.824E+13	-.217E+03
1029.4	-.246E-03	.169E+08	-.132E+06	-.131E-03	.514E+03	.824E+13	.265E+02
1045.7	-.212E-02	.148E+08	-.130E+06	-.100E-03	.477E+03	.824E+13	.246E+03
1062.0	-.351E-02	.127E+08	-.125E+06	-.729E-04	.441E+03	.824E+13	.437E+03
1078.4	-.450E-02	.107E+08	-.116E+06	-.497E-04	.407E+03	.824E+13	.596E+03
1094.7	-.514E-02	.887E+07	-.105E+06	-.303E-04	.376E+03	.824E+13	.723E+03
1111.1	-.549E-02	.724E+07	-.936E+05	-.143E-04	.348E+03	.824E+13	.733E+03
1127.4	-.561E-02	.581E+07	-.824E+05	-.140E-05	.323E+03	.824E+13	.635E+03
1143.7	-.554E-02	.455E+07	-.729E+05	.887E-05	.302E+03	.824E+13	.524E+03
1160.1	-.532E-02	.343E+07	-.647E+05	.168E-04	.283E+03	.824E+13	.484E+03
1176.4	-.499E-02	.244E+07	-.568E+05	.226E-04	.265E+03	.824E+13	.476E+03
1192.8	-.458E-02	.157E+07	-.492E+05	.266E-04	.251E+03	.824E+13	.459E+03
1209.1	-.412E-02	.828E+06	-.419E+05	.290E-04	.238E+03	.824E+13	.435E+03
1225.4	-.363E-02	.201E+06	-.350E+05	.300E-04	.227E+03	.824E+13	.405E+03
1241.8	-.314E-02	-.317E+06	-.286E+05	.299E-04	.229E+03	.824E+13	.384E+03
1258.1	-.266E-02	-.734E+06	-.224E+05	.288E-04	.236E+03	.824E+13	.371E+03
1274.5	-.220E-02	-.105E+07	-.165E+05	.270E-04	.242E+03	.824E+13	.353E+03
1290.8	-.177E-02	-.127E+07	-.109E+05	.247E-04	.245E+03	.824E+13	.330E+03
1307.1	-.139E-02	-.141E+07	-.575E+04	.221E-04	.248E+03	.824E+13	.303E+03
1323.5	-.105E-02	-.146E+07	-.108E+04	.192E-04	.249E+03	.824E+13	.268E+03
1339.8	-.762E-03	-.145E+07	.275E+04	.163E-04	.248E+03	.824E+13	.200E+03
1356.2	-.518E-03	-.137E+07	.553E+04	.136E-04	.247E+03	.824E+13	.141E+03
1372.5	-.319E-03	-.127E+07	.741E+04	.109E-04	.245E+03	.824E+13	.891E+02
1388.8	-.161E-03	-.113E+07	.851E+04	.856E-05	.243E+03	.824E+13	.462E+02
1405.2	-.390E-04	-.988E+06	.898E+04	.646E-05	.241E+03	.824E+13	.115E+02
1421.5	.505E-04	-.839E+06	.895E+04	.465E-05	.238E+03	.824E+13	-.154E+02
1437.8	.113E-03	-.695E+06	.854E+04	.313E-05	.236E+03	.824E+13	-.352E+02
1454.2	.153E-03	-.560E+06	.785E+04	.188E-05	.233E+03	.824E+13	-.489E+02
1470.5	.174E-03	-.439E+06	.699E+04	.890E-06	.231E+03	.824E+13	-.573E+02
1486.9	.182E-03	-.332E+06	.602E+04	.126E-06	.229E+03	.824E+13	-.612E+02
1503.2	.178E-03	-.242E+06	.502E+04	-.443E-06	.228E+03	.824E+13	-.615E+02
1519.5	.167E-03	-.168E+06	.403E+04	-.849E-06	.226E+03	.824E+13	-.590E+02
1535.9	.151E-03	-.110E+06	.310E+04	-.112E-05	.225E+03	.824E+13	-.544E+02
1552.2	.130E-03	-.666E+05	.227E+04	-.130E-05	.225E+03	.824E+13	-.482E+02
1568.6	.108E-03	-.360E+05	.154E+04	-.140E-05	.224E+03	.824E+13	-.408E+02
1584.9	.847E-04	-.163E+05	.938E+03	-.145E-05	.224E+03	.824E+13	-.327E+02
1601.2	.607E-04	-.532E+04	.476E+03	-.148E-05	.224E+03	.824E+13	-.239E+02
1617.6	.365E-04	-.701E+03	.161E+03	-.148E-05	.224E+03	.824E+13	-.147E+02
1633.9	.123E-04	.000E+00	.000E+00	-.148E-05	.224E+03	.824E+13	-.503E+01

OUTPUT VERIFICATION

THE MAXIMUM MOMENT IMBALANCE FOR ANY ELEMENT = .118E-04 IN-LBS
THE MAX. LATERAL FORCE IMBALANCE FOR ANY ELEMENT = .430E-06 LBS

OUTPUT SUMMARY

PILE-HEAD DEFLECTION = .170E+01 IN

```
COMPUTED SLOPE AT PILE HEAD    =  -.312E-02
MAXIMUM BENDING MOMENT         =   .290E+08 LBS-IN
MAXIMUM SHEAR FORCE            =  -.132E+06 LBS
NO. OF ITERATIONS              =         11
NO. OF ZERO DEFLECTION POINTS  =          3
```

S U M M A R Y T A B L E
****

BOUNDARY CONDITION BC1	BOUNDARY CONDITION BC2	AXIAL LOAD LBS	PILE HEAD DEFLECTION IN	MAX. MOMENT IN-LBS	MAX. SHEAR LBS
.2300E+05	.2184E+07	.1239E+07	.1704E+01	.2905E+08	-.1325E+06

$M_u = .2905 \times 10^8 / 120000 = 2420$ k-ft

$V_u = .1325 \times 10^6 / 1000 = 132k$

```
SALT RIVER BRIDGES-SCOUR 16TH ST BRIDGE  "TRANS.LPD"
1 1 0 0 0
100      4        813.36   1633.92 0
0        60       636174   2827    3372165
373.92   60       636174   2827    3372165
373.92   84       2443920  5542    3372165
1633.92  84       2443920  5542    3372165
1        2        2        0       0
4        813.36   1633.92  500
813.36   0.046875
1633.92  0.046875
813.36   0        35       0
1633.92  0        35       0
6        1        1
150      520.871
294.24   407.94
294.24   226.46
373.92   191.75
373.92   268.671
813.36   0
1
1        40000    -30984000        1239000
0
1        1        0
100      1E-5     480
```

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SALT RIVER BRIDGES-SCOUR 16TH ST BRIDGE "TRANS.LPD"

UNITS--ENGLISH UNITS

I N P U T   I N F O R M A T I O N

THE LOADING IS STATIC

PILE GEOMETRY AND PROPERTIES

PILE LENGTH = 1633.92 IN
4 POINTS

X IN	DIAMETER IN	MOMENT OF INERTIA IN**4	AREA IN**2	MODULUS OF ELASTICITY LBS/IN**2
.00	60.000	.636E+06	.283E+04	.337E+07
373.92	60.000	.636E+06	.283E+04	.337E+07
373.92	84.000	.244E+07	.554E+04	.337E+07
1633.92	84.000	.244E+07	.554E+04	.337E+07

SOILS INFORMATION

X AT THE GROUND SURFACE = 813.36 IN

SLOPE ANGLE AT THE GROUND SURFACE = .00 DEG.

1 LAYER(S) OF SOIL

LAYER 1
THE SOIL IS A SAND - P-Y CRITERIA BY REESE ET AL, 1974
X AT THE TOP OF THE LAYER = 813.36 IN
X AT THE BOTTOM OF THE LAYER = 1633.92 IN
MODULUS OF SUBGRADE REACTION = .500E+03 LBS/IN**3

DISTRIBUTION OF EFFECTIVE UNIT WEIGHT WITH DEPTH
2 POINTS

X,IN	WEIGHT,LBS/IN**3
813.36	.47E-01
1633.92	.47E-01

DISTRIBUTION OF STRENGTH PARAMETERS WITH DEPTH
2 POINTS

X,IN	C,LBS/IN**2	PHI,DEGREES	E50
813.36	.000E+00	.350E+02	-----
1633.92	.000E+00	.350E+02	-----

BOUNDARY AND LOADING CONDITIONS

DISTRIBUTED LOAD CURVE 6 POINTS

X,IN	LOAD,LBS/IN
150.00	.521E+03
294.24	.408E+03
294.24	.226E+03
373.92	.192E+03
373.92	.269E+03
813.36	.000E+00

LOADING NUMBER 1

BOUNDARY-CONDITION CODE = 1
LATERAL LOAD AT THE PILE HEAD = .400E+05 LBS
MOMENT AT THE PILE HEAD = -.310E+08 IN-LBS
AXIAL LOAD AT THE PILE HEAD = .124E+07 LBS

FINITE-DIFFERENCE PARAMETERS
NUMBER OF PILE INCREMENTS = 100
DEFLECTION TOLERANCE ON DETERMINATION OF CLOSURE = .100E-04 IN
MAXIMUM NUMBER OF ITERATIONS ALLOWED FOR PILE ANALYSIS = 100
MAXIMUM ALLOWABLE DEFLECTION = .48E+03 IN

OUTPUT CODES
KOUTPT = 1
KPYOP = 0
INC = 1

O U T P U T   I N F O R M A T I O N

****
* COMPUTE LOAD-DISTRIBUTION AND LOAD-DEFLECTION *
* CURVES FOR LATERAL LOADING *
****

DISTRIBUTED LOAD CURVE 6 POINTS

X,IN	LOAD,LBS/IN
150.00	.521E+03
294.24	.408E+03
294.24	.226E+03
373.92	.192E+03

373.92	.269E+03
813.36	.000E+00

LOADING NUMBER 1

BOUNDARY CONDITION CODE = 1
LATERAL LOAD AT THE PILE HEAD = .400E+05 LBS
MOMENT AT THE PILE HEAD = -.310E+08 IN-LBS
AXIAL LOAD AT THE PILE HEAD = .124E+07 LBS

X IN	DEFLECTION IN	MOMENT LBS-IN	SHEAR LBS	SLOPE RAD.	TOTAL STRESS LBS/IN**2	FLEXURAL RIGIDITY LBS-IN**2	SOIL REACTION LBS/IN
*****	*********	*********	*********	*********	*********	*********	*********
.0	.360E+01	-.310E+08	.400E+05	-.114E-02	.190E+04	.215E+13	.000E+00
16.3	.358E+01	-.303E+08	.400E+05	-.137E-02	.187E+04	.215E+13	.000E+00
32.7	.356E+01	-.296E+08	.400E+05	-.160E-02	.184E+04	.215E+13	.000E+00
49.0	.353E+01	-.289E+08	.400E+05	-.183E-02	.180E+04	.215E+13	.000E+00
65.4	.350E+01	-.282E+08	.400E+05	-.204E-02	.177E+04	.215E+13	.000E+00
81.7	.346E+01	-.275E+08	.400E+05	-.226E-02	.174E+04	.215E+13	.000E+00
98.0	.343E+01	-.268E+08	.400E+05	-.246E-02	.170E+04	.215E+13	.000E+00
114.4	.338E+01	-.261E+08	.400E+05	-.266E-02	.167E+04	.215E+13	.000E+00
130.7	.334E+01	-.254E+08	.400E+05	-.286E-02	.164E+04	.215E+13	.000E+00
147.1	.329E+01	-.247E+08	.400E+05	-.305E-02	.160E+04	.215E+13	.000E+00
163.4	.324E+01	-.240E+08	.442E+05	-.324E-02	.157E+04	.215E+13	.000E+00
179.7	.318E+01	-.231E+08	.524E+05	-.342E-02	.153E+04	.215E+13	.000E+00
196.1	.313E+01	-.221E+08	.604E+05	-.359E-02	.148E+04	.215E+13	.000E+00
212.4	.307E+01	-.210E+08	.682E+05	-.375E-02	.143E+04	.215E+13	.000E+00
228.7	.301E+01	-.198E+08	.759E+05	-.391E-02	.137E+04	.215E+13	.000E+00
245.1	.294E+01	-.184E+08	.833E+05	-.405E-02	.131E+04	.215E+13	.000E+00
261.4	.287E+01	-.169E+08	.904E+05	-.419E-02	.123E+04	.215E+13	.000E+00
277.8	.280E+01	-.153E+08	.974E+05	-.431E-02	.116E+04	.215E+13	.000E+00
294.1	.273E+01	-.135E+08	.104E+06	-.442E-02	.108E+04	.215E+13	.000E+00
310.4	.266E+01	-.117E+08	.109E+06	-.452E-02	.989E+03	.215E+13	.000E+00
326.8	.258E+01	-.976E+07	.113E+06	-.460E-02	.899E+03	.215E+13	.000E+00
343.1	.251E+01	-.780E+07	.116E+06	-.466E-02	.806E+03	.215E+13	.000E+00
359.5	.243E+01	-.578E+07	.120E+06	-.472E-02	.711E+03	.215E+13	.000E+00
375.8	.235E+01	-.370E+07	.123E+06	-.474E-02	.287E+03	.824E+13	.000E+00
392.1	.228E+01	-.155E+07	.128E+06	-.475E-02	.250E+03	.824E+13	.000E+00
408.5	.220E+01	.662E+06	.132E+06	-.475E-02	.235E+03	.824E+13	.000E+00
424.8	.212E+01	.294E+07	.136E+06	-.474E-02	.274E+03	.824E+13	.000E+00
441.2	.204E+01	.529E+07	.140E+06	-.474E-02	.314E+03	.824E+13	.000E+00
457.5	.197E+01	.770E+07	.143E+06	-.472E-02	.356E+03	.824E+13	.000E+00
473.8	.189E+01	.102E+08	.147E+06	-.471E-02	.398E+03	.824E+13	.000E+00
490.2	.181E+01	.127E+08	.150E+06	-.468E-02	.441E+03	.824E+13	.000E+00
506.5	.174E+01	.152E+08	.153E+06	-.466E-02	.486E+03	.824E+13	.000E+00
522.9	.166E+01	.179E+08	.156E+06	-.462E-02	.531E+03	.824E+13	.000E+00
539.2	.159E+01	.205E+08	.159E+06	-.458E-02	.577E+03	.824E+13	.000E+00
555.5	.151E+01	.232E+08	.162E+06	-.454E-02	.623E+03	.824E+13	.000E+00
571.9	.144E+01	.260E+08	.164E+06	-.449E-02	.670E+03	.824E+13	.000E+00
588.2	.136E+01	.288E+08	.166E+06	-.444E-02	.718E+03	.824E+13	.000E+00
604.6	.129E+01	.316E+08	.169E+06	-.438E-02	.767E+03	.824E+13	.000E+00
620.9	.122E+01	.345E+08	.171E+06	-.431E-02	.816E+03	.824E+13	.000E+00
637.2	.115E+01	.374E+08	.172E+06	-.424E-02	.866E+03	.824E+13	.000E+00
653.6	.108E+01	.403E+08	.174E+06	-.416E-02	.916E+03	.824E+13	.000E+00
669.9	.102E+01	.432E+08	.176E+06	-.408E-02	.966E+03	.824E+13	.000E+00
686.2	.949E+00	.462E+08	.177E+06	-.399E-02	.102E+04	.824E+13	.000E+00
702.6	.885E+00	.492E+08	.178E+06	-.390E-02	.107E+04	.824E+13	.000E+00
718.9	.822E+00	.522E+08	.179E+06	-.380E-02	.112E+04	.824E+13	.000E+00
735.3	.760E+00	.552E+08	.180E+06	-.369E-02	.117E+04	.824E+13	.000E+00
751.6	.701E+00	.582E+08	.181E+06	-.358E-02	.122E+04	.824E+13	.000E+00

767.9	.644E+00	.612E+08	.181E+06	-.346E-02	.128E+04	.824E+13	.000E+00
784.3	.588E+00	.643E+08	.182E+06	-.334E-02	.133E+04	.824E+13	.000E+00
800.6	.534E+00	.673E+08	.182E+06	-.321E-02	.138E+04	.824E+13	.000E+00
817.0	.483E+00	.703E+08	.181E+06	-.307E-02	.143E+04	.824E+13	-.806E+02
833.3	.434E+00	.733E+08	.177E+06	-.293E-02	.148E+04	.824E+13	-.471E+03
849.6	.388E+00	.762E+08	.166E+06	-.278E-02	.153E+04	.824E+13	-.878E+03
866.0	.343E+00	.789E+08	.148E+06	-.263E-02	.158E+04	.824E+13	-.128E+04
882.3	.302E+00	.812E+08	.124E+06	-.247E-02	.162E+04	.824E+13	-.167E+04
898.7	.263E+00	.830E+08	.938E+05	-.230E-02	.165E+04	.824E+13	-.202E+04
915.0	.226E+00	.843E+08	.584E+05	-.214E-02	.167E+04	.824E+13	-.231E+04
931.3	.193E+00	.850E+08	.187E+05	-.197E-02	.168E+04	.824E+13	-.254E+04
947.7	.162E+00	.850E+08	-.241E+05	-.180E-02	.168E+04	.824E+13	-.270E+04
964.0	.134E+00	.843E+08	-.691E+05	-.163E-02	.167E+04	.824E+13	-.280E+04
980.4	.109E+00	.828E+08	-.115E+06	-.147E-02	.165E+04	.824E+13	-.280E+04
996.7	.860E-01	.806E+08	-.160E+06	-.131E-02	.161E+04	.824E+13	-.277E+04
1013.0	.660E-01	.776E+08	-.205E+06	-.115E-02	.156E+04	.824E+13	-.265E+04
1029.4	.485E-01	.740E+08	-.246E+06	-.999E-03	.149E+04	.824E+13	-.243E+04
1045.7	.333E-01	.696E+08	-.283E+06	-.857E-03	.142E+04	.824E+13	-.210E+04
1062.0	.205E-01	.647E+08	-.314E+06	-.723E-03	.134E+04	.824E+13	-.166E+04
1078.4	.971E-02	.594E+08	-.337E+06	-.600E-03	.124E+04	.824E+13	-.116E+04
1094.7	.863E-03	.538E+08	-.347E+06	-.488E-03	.115E+04	.824E+13	-.121E+03
1111.1	-.624E-02	.481E+08	-.342E+06	-.387E-03	.105E+04	.824E+13	.779E+03
1127.4	-.118E-01	.426E+08	-.328E+06	-.297E-03	.956E+03	.824E+13	.926E+03
1143.7	-.160E-01	.374E+08	-.313E+06	-.218E-03	.866E+03	.824E+13	.933E+03
1160.1	-.189E-01	.324E+08	-.297E+06	-.149E-03	.780E+03	.824E+13	.992E+03
1176.4	-.208E-01	.277E+08	-.280E+06	-.894E-04	.699E+03	.824E+13	.108E+04
1192.8	-.218E-01	.232E+08	-.262E+06	-.390E-04	.623E+03	.824E+13	.114E+04
1209.1	-.221E-01	.191E+08	-.243E+06	.296E-05	.552E+03	.824E+13	.118E+04
1225.4	-.217E-01	.153E+08	-.224E+06	.370E-04	.486E+03	.824E+13	.119E+04
1241.8	-.209E-01	.118E+08	-.204E+06	.638E-04	.426E+03	.824E+13	.121E+04
1258.1	-.197E-01	.860E+07	-.184E+06	.840E-04	.371E+03	.824E+13	.125E+04
1274.5	-.181E-01	.576E+07	-.163E+06	.983E-04	.323E+03	.824E+13	.127E+04
1290.8	-.164E-01	.326E+07	-.142E+06	.107E-03	.280E+03	.824E+13	.128E+04
1307.1	-.146E-01	.110E+07	-.122E+06	.112E-03	.242E+03	.824E+13	.127E+04
1323.5	-.128E-01	-.721E+06	-.101E+06	.112E-03	.236E+03	.824E+13	.124E+04
1339.8	-.110E-01	-.221E+07	-.812E+05	.109E-03	.262E+03	.824E+13	.120E+04
1356.2	-.924E-02	-.338E+07	-.621E+05	.103E-03	.282E+03	.824E+13	.114E+04
1372.5	-.760E-02	-.424E+07	-.440E+05	.959E-04	.297E+03	.824E+13	.107E+04
1388.8	-.610E-02	-.482E+07	-.272E+05	.869E-04	.306E+03	.824E+13	.988E+03
1405.2	-.476E-02	-.514E+07	-.118E+05	.770E-04	.312E+03	.824E+13	.895E+03
1421.5	-.358E-02	-.521E+07	.195E+04	.668E-04	.313E+03	.824E+13	.792E+03
1437.8	-.258E-02	-.508E+07	.140E+05	.566E-04	.311E+03	.824E+13	.681E+03
1454.2	-.173E-02	-.476E+07	.241E+05	.468E-04	.305E+03	.824E+13	.556E+03
1470.5	-.105E-02	-.429E+07	.314E+05	.379E-04	.297E+03	.824E+13	.344E+03
1486.9	-.497E-03	-.373E+07	.356E+05	.299E-04	.288E+03	.824E+13	.167E+03
1503.2	-.684E-04	-.313E+07	.372E+05	.231E-04	.277E+03	.824E+13	.236E+02
1519.5	.259E-03	-.252E+07	.366E+05	.175E-04	.267E+03	.824E+13	-.913E+02
1535.9	.504E-03	-.193E+07	.344E+05	.131E-04	.257E+03	.824E+13	-.182E+03
1552.2	.687E-03	-.140E+07	.308E+05	.980E-05	.248E+03	.824E+13	-.254E+03
1568.6	.824E-03	-.925E+06	.262E+05	.750E-05	.239E+03	.824E+13	-.311E+03
1584.9	.932E-03	-.539E+06	.207E+05	.605E-05	.233E+03	.824E+13	-.359E+03
1601.2	.102E-02	-.248E+06	.145E+05	.527E-05	.228E+03	.824E+13	-.403E+03
1617.6	.110E-02	-.647E+05	.760E+04	.496E-05	.225E+03	.824E+13	-.444E+03
1633.9	.118E-02	.000E+00	.000E+00	.490E-05	.224E+03	.824E+13	-.486E+03

OUTPUT VERIFICATION

THE MAXIMUM MOMENT IMBALANCE FOR ANY ELEMENT = -.256E-04 IN-LBS
THE MAX. LATERAL FORCE IMBALANCE FOR ANY ELEMENT = .172E-05 LBS

OUTPUT SUMMARY

PILE-HEAD DEFLECTION = .360E+01 IN

```
COMPUTED SLOPE AT PILE HEAD    =  -.114E-02
MAXIMUM BENDING MOMENT         =   .850E+08 LBS-IN
MAXIMUM SHEAR FORCE            =  -.347E+06 LBS
NO. OF ITERATIONS              =         20
NO. OF ZERO DEFLECTION POINTS  =          2
```

S U M M A R Y T A B L E
****

BOUNDARY CONDITION BC1	BOUNDARY CONDITION BC2	AXIAL LOAD LBS	PILE HEAD DEFLECTION IN	MAX. MOMENT IN-LBS	MAX. SHEAR LBS
.4000E+05	-.3098E+08	.1239E+07	.3604E+01	.8502E+08	-.3474E+06

$M_u = .8502 \times 10^8 / 12000 = 7085$ k-ft

$V_u = 347$ k

Resultant:

$V_u = \sqrt{(347^2 + 132^2)}$

$= 371$ k

$M_u = \sqrt{(7085^2 + 2420^2)}$

$= 7487$ k

T.Y. LIN INTERNATIONAL

Project:	SALT RIVER BRIDGES-SCOUR	Job No.	1317.00	Sheet:	of
Item:	16TH STREET BRIDGE	Designer:	SJ	Date:	Mar-00
	DRILLED SHAFT	Checker:		Date:	

SHEAR REINFORCEMENT:

FOR Vu <= 0.5 phi Vc, NO SHEAR REINFORCEMENT IS REQ'D

FOR 0.5 phi Vc < Vu <= phi Vc, MIN. SHEAR REINFORCEMENT IS REQ'D
MIN. phi Vs = phi 50 b d, MAX SPACING, s <= d/2 <= 24 IN

FOR phi Vc < Vu <= (phi Vc + MIN phi Vs), MIN. SHEAR REINF. IS REQ'D
MIN. phi Vs = phi 50 b d, MAX SPACING, s = d/2 <= 24 IN

FOR (phi Vc + MIN phi Vs) < Vu <= (phi Vc + phi 4 SQRT(f'c) b d),
REQ'D phi Vs = Vu - phi Vc MAX SPAC'G, s = d/2 <= 24 IN
PROV'D phi Vs = phi Av fy d / s

FOR (phi Vc+ phi 4 SQRT(f'c) bd) < Vu <= (phi Vc+ phi 8 SQRT(f'c) b d)
REQ'D phi Vs = Vu - phi Vc MAX SPAC'G, s = d/4 <= 12 IN
PROV'D phi Vs = phi Av fy d / s

7' DRILLED SHAFT

Vu = 371 KIPS

f'c = 3,500 PSI

fy = 60,000 PSI

b = 84.00 IN

VERT BAR PATTERN RADIUS, R = 38.15 IN

phi = 0.85

d = b/2 + 2 * R / PI = 66.29 IN

d/2 = 33.14 IN

d/4 = 16.57 IN

phi Vc = phi [2 SQRT(f'c) b d] = 560 KIPS

0.5 phi Vc = 280 KIPS

MIN phi Vs = phi (50 b d) = 237 KIPS

MAX phi Vs (FOR s=d/2) = phi [4 SQRT(f'c) b d]= 1,120 KIPS

MAX phi Vs (FOR s=d/4) = phi [8 SQRT(f'c) b d]= 2,240 KIPS

REQ'D phi Vs = Vu - phi Vc = 0 KIPS

USE MIN. phi Vs

TIE SIZE: NO. 6

NO. OF BARS = 1 Av = 0.44 IN^2

s = phi Av fy d / phi Vs = N/A

MAX s (FOR MIN Av) = Av fy /(50 b)= 6.29 IN

PROV'D SPACING, s = 12.00 IN

PROV'D phi Vs = phi Av fy d / s = 124 KIPS

```
16TH STREET BRIDGE PIER-1 DRILLED SHAFT  "P-16DS"
        9
        4
        1        36
        0
        2       1.0       6.0         1     78.00      0.00      0.00
     3500  29000000    0.0030     60000
    84.00      0.00      0.00      0.00
    38.15                                   2.25        36
                                     NO      PILE
 0.99 0.99 0.00 0.00      0.00    105.00    1    1      3.00  AGS    B
     0    7487      0       0       0      0    0      0    0      0
     0       0      0       0       0      0    0      0    0      0
     0    1239      0       0       0      0    0      0    0      0
                    0       0       0                          0
                    0       0       0                          0
                    0       0       0                          0
        0         0         0         0         0         0
        0         0         0         0         0         0
        0         0         0         0         0         0
```

```
   ************************************************************************
   *                                                                      *
   *              PC YIELDED FACE COLUMN DESIGN PROGRAM                   *
   *                                                                      *
   *                 (C) Copyright, PCLINKS, Inc.                         *
   *                      All Rights Reserved.                            *
   *                                                                      *
   *                 2330 Alhambra Blvd., Suite 140                       *
   *                      Sacramento, CA 95817                            *
   *                        (916) 456-4336                                *
   *                                                                      *
   *    Licensed to : T.Y.Lin International (SF)  Serial No. : 1034985    *
   *                                                                      *
   *                    VER. : 2.04   03/12/91                            *
   *                                                                      *
   ************************************************************************
1  ******************************************
   YOUR PC YIELD FILE NAME IS : p-16ds
   ******************************************

   |...+....1....+....2....+....3....+....4....+....5....+....6....+....7....+...
.8
   16TH STREET BRIDGE PIER-1 DRILLED SHAFT  "P-16DS"
          9
          4
          1       36
          0
          2      1.0      6.0        1     78.00      0.00      0.00
       3500  29000000   0.0030    60000
      84.00      0.00      0.00     0.00
      38.15                                 2.25        36
                                     NO     PILE
    0.99 0.99 0.00 0.00      0.00   105.00   1   1      3.00  AGS    B
        0    7487     0     0     0     0     0     0     0     0
        0       0     0     0     0     0     0     0     0     0
        0    1239     0     0     0     0     0     0     0     0
                      0     0     0                       0
                      0     0     0                       0
                      0     0     0                       0
          0        0        0        0        0        0
```



```
          0        0        0        0        0        0
          0        0        0        0        0        0
1         JOB : 16TH STREET BRIDGE PIER-1 DRILLED SHAFT
          PC CONCRETE COLUMN DESIGN PGM --- PCLINKS,Inc.  14:50:24  03/27/:0  PAGE 1

          T. Y. Lin  I n t e r n a t i o n a l ,  S a n  F r a n c i s c o ,  C
A

          COLUMN TYPE                    =  9  (CIRCULAR)
          CONCRETE LOOPS                 =  1
          TOTAL NO. OF CONCRETE COORD.   = 40
          STEEL REBAR PATTERN            =  4  (CONCENTRIC LOOPS)
          NUMBER OF STEEL REBAR LOOPS    =  1
          TOTAL NO. OF STEEL REBARS      = 36
          PLOT TYPE                      =  0  (NO PLOT)
          DESIGN TYPE                    =  2  (CHECK)
          PERCENT STEEL LIMITS           =     (1.00 % MIN.  6.00 % MAX.)

          *************
          * BENT DATA *
          *****************************************************************

          NUMBER OF COLUMNS IN BENT                  =     1
          OUT TO OUT DISTANCE (DIAMETER) OF SPIRAL   = 78.00 (INCHES)
          DISTANCE FROM TOP COLUMN PLASTIC HINGE TO
          CENTER OF GRAVITY OF THE SUPERSTRUCTURE    =  0.00 (FEET)
          CENTER TO CENTER SPACING OF COLUMNS        =  0.00 (FEET)

          ******************************
          * MATERIAL PROPERTIES  (PSI) *
          *****************************************************************

          ULTIMATE CONCRETE COMPRESSIVE STRESS - FC =     3500.
          YOUNG S MODULUS FOR CONCRETE         - EC =  3372165.
          YOUNG S MODULUS FOR STEEL BARS       - ES = 29000000.
          ULTIMATE CONCRETE COMPRESSIVE STRAIN - EO =      .003
          YIELDING STRESS FOR STEEL BARS       - FY =    60000.
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          CIRCULAR CROSS-SECTION

              HX
            84.00

          CONCRETE COORDINATES  (INCHES)

          COORD       X         Y
```

1	42.00	0.00
2	41.48	6.57
3	39.94	12.98
4	37.42	19.07
5	33.98	24.69
6	29.70	29.70
7	24.69	33.98
8	19.07	37.42
9	12.98	39.94
10	6.57	41.48
11	0.00	42.00
12	-6.57	41.48
13	-12.98	39.94
14	-19.07	37.42
15	-24.69	33.98
16	-29.70	29.70
17	-33.98	24.69
18	-37.42	19.07
19	-39.94	12.98
20	-41.48	6.57
21	-42.00	0.00
22	-41.48	-6.57
23	-39.94	-12.98
24	-37.42	-19.07
25	-33.98	-24.69
26	-29.70	-29.70
27	-24.69	-33.98
28	-19.07	-37.42
29	-12.98	-39.94
30	-6.57	-41.48
31	0.00	-42.00
32	6.57	-41.48
33	12.98	-39.94
34	19.07	-37.42
35	24.69	-33.98
36	29.70	-29.70
37	33.98	-24.69
38	37.42	-19.07
39	39.94	-12.98
40	41.48	-6.57

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CONCENTRIC CIRCLE PATTERN

LOOP	RADIUS	AREA	BARS
1	38.15	2.25	36

STEEL REBAR COORDINATES (INCHES)

COORD	X	Y
1	38.15	0.00
2	37.57	6.62
3	35.85	13.05
4	33.04	19.07
5	29.22	24.52
6	24.52	29.22

7	19.08	33.04
8	13.05	35.85
9	6.62	37.57
10	0.00	38.15
11	-6.62	37.57
12	-13.05	35.85
13	-19.07	33.04
14	-24.52	29.22
15	-29.22	24.52
16	-33.04	19.08
17	-35.85	13.05
18	-37.57	6.62
19	-38.15	0.00
20	-37.57	-6.62
21	-35.85	-13.05
22	-33.04	-19.07
23	-29.22	-24.52
24	-24.52	-29.22
25	-19.08	-33.04
26	-13.05	-35.85
27	-6.62	-37.57
28	0.00	-38.15
29	6.62	-37.57
30	13.05	-35.85
31	19.07	-33.04
32	24.52	-29.22
33	29.22	-24.52
34	33.04	-19.08
35	35.85	-13.05
36	37.57	-6.62

THE MAIN LONGITUDINAL STEEL IS ASSUMED TO BE # 14 BARS.

***WARNING: THE CONCRETE COVER IS GREATER THAN 2 INCHES
IN THE X-DIRECTION

***WARNING: THE CONCRETE COVER IS GREATER THAN 2 INCHES
IN THE Y-DIRECTION

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****
* INITIAL REFERENCE DATA *
****

TOTAL AREA OF THE SECTION	AG =	38.33	FT**2
NOMINAL AXIAL LOAD STRENGTH	PO =	21038.07	KIPS
TOTAL REINFORCEMENT AREA	AST =	81.00	IN**2
PERCENT STEEL	=	1.47	%
GROSS MOMENT OF INERTIA ABOUT Y-AXIS	IYC =	116.89	FT**4
GROSS MOMENT OF INERTIA ABOUT X-AXIS	IXC =	116.89	FT**4
STEEL MOMENT OF INERTIA ABOUT Y-AXIS	IYS =	2.8426	FT**4
STEEL MOMENT OF INERTIA ABOUT X-AXIS	IXS =	2.8426	FT**4

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****
* COLUMN LOAD DATA (K-FT) *
****

LOAD NAME:
FOOTING DATA FILE: NO
TYPE FOOTING: PILE

MOMENT DISTRIBUTION FACT :---TOP---: DAY	DAX	:---BOTTOM---: DBY	DBX	PERCENT IMPACT	COLUMN LENGTH (FEET)	STEEL TIE=1 SPIRAL=0	LOCATION TOP=1 BOTTOM=0	DUCTILITY FACTOR (Z)
0.99	0.99	0.00	0.00	0.00	105.00	1	1	3.00

COLUMN GROUP LOADS - SERVICE (K-FT)

	DEAD LOAD	PRE STRESS	:---- LL+IMPACT ---: CASE 1 TRANS MY-MAX	CASE 2 LONG MX-MAX	CASE 3 AXIAL N-MAX	WIND	WL	LF	CF-MY	TEMP
MY	0	7487	0	0	0	0	0	0	0	0
MX	0	0	0	0	0	0	0	0	0	0
P	0	1239	0	0	0	0	0	0	0	0
PMY			0	0	0				0	
PMX			0	0	0				0	
P			0	0	0				0	

COLUMN SEISMIC AND ARBITRARY LOADS (K-FT)

	(ARS) UNREDUCED SEISMIC CASE 1 MAX TRAN	CASE 2 MAX LONG	ARBITRARY LOADS SERVICE AL1	SERVICE AL2	ARBITRARY LOADS FACTORED AL1	FACTORED AL2
MY TRAN	0.	0.	0.	0.	0.	0.
MX LONG	0.	0.	0.	0.	0.	0.
P AXIAL	0.	0.	0.	0.	0.	0.

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****
* FACTORED LOADS FOR COLUMN DESIGN CHECK (KIP-FT) *
****

APPLIED FACTORED MOMENTS ARE MAGNIFIED FOR SLENDERNESS IN ACCORDANCE WITH

CALTRANS BRIDGE DESIGN SPECIFICATIONS. (ART 8.16.5)

LENGTH = 105.00 FT FC = 3.50 KSI FY = 60.00 KSI
STEEL = 1.47 % AST = 81.00 SQ IN

GROUP	CASE	:------ APPLIED FACTORED ------: TRANS MY	LONG MX	COMB M	CAPACITY AXIAL P	(PHI*MN) MU	PHI	RATIO MU/M	
IH	1	10415.	376.	10421.	1239.	12906.	0.81	1.24	OK
IH	2	10415.	376.	10421.	1239.	12906.	0.81	1.24	OK
IH	3	10466.	376.	10473.	1239.	12906.	0.81	1.23	OK
IP	1	10415.	376.	10421.	1239.	12906.	0.81	1.24	OK
IP	2	10415.	376.	10421.	1239.	12906.	0.81	1.24	OK
IP	3	10466.	376.	10473.	1239.	12906.	0.81	1.23	OK
II		10415.	376.	10421.	1239.	12906.	0.81	1.24	OK
III	1	10415.	376.	10421.	1239.	12906.	0.81	1.24	OK
III	2	10415.	376.	10421.	1239.	12906.	0.81	1.24	OK
III	3	10466.	376.	10473.	1239.	12906.	0.81	1.23	OK
IV	1	10415.	376.	10421.	1239.	12906.	0.81	1.24	OK
IV	2	10415.	376.	10421.	1239.	12906.	0.81	1.24	OK
IV	3	10466.	376.	10473.	1239.	12906.	0.81	1.23	OK
V		10415.	376.	10421.	1239.	12906.	0.81	1.24	OK
VI	1	10415.	376.	10421.	1239.	12906.	0.81	1.24	OK
VI	2	10415.	376.	10421.	1239.	12906.	0.81	1.24	OK
VI	3	10466.	376.	10473.	1239.	12906.	0.81	1.23	OK
VII	1	7487.	322.	7494.	1239.	15803.	1.03	2.11	OK
VII	2	7487.	322.	7494.	1239.	15803.	1.03	2.11	OK

NOTE: THE AXIAL (ARS) UNREDUCED SEISMIC LOADS (P) ARE NOT DIVIDED BY THE DUCTILITY FACTOR Z

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****
* MOMENT MAGNIFICATION AND BUCKLING CALCULATIONS *
****

REFERENCE: "CALTRANS BRIDGE DESIGN SPECIFICATIONS" (ART 8.16.5)
(COLUMN ASSUMED TO BE UNBRACED AGAINST SIDESWAY.)

MAGY = MOMENT MAGNIFACTION FACTOR ABOUT Y-AXIS
MAGX = MOMENT MAGNIFACTION FACTOR ABOUT X-AXIS

PCY = CRITICAL BUCKLING LOAD ABOUT Y-AXIS
PCX = CRITICAL BUCKLING LOAD ABOUT X-AXIS

KY = EFFECTIVE LENGTH FACTOR ABOUT Y-AXIS = 2.10
KX = EFFECTIVE LENGTH FACTOR ABOUT X-AXIS = 2.10

KY*L/R = SLENDERNESS RATIO ABOUT Y-AXIS =126.
KX*L/R = SLENDERNESS RATIO ABOUT X-AXIS =126.

IYS = STEEL MOMENT OF INERTIA ABOUT Y-AXIS =2.8426 FT**4
IXS = STEEL MOMENT OF INERTIA ABOUT X-AXIS =2.8426 FT**4

GR	CA	:-MAGNIFICATION-: TRAN	LONG	COMB	:--TRANSFORMED SECTION--: E*IY	E*IX	:-----BUCKLING----: TRAN	LONG	AXIAL LOAD

		MAGY	MAGX	MAG			PCY	PCX	P
IH	1	1.391	1.166	1.391	21712891.	42882995.	4408.	8705.	1239.
IH	2	1.391	1.166	1.391	21712891.	42882995.	4408.	8705.	1239.
IH	3	1.398	1.166	1.398	21441480.	42882995.	4352.	8705.	1239.
IP	1	1.391	1.166	1.391	21712891.	42882995.	4408.	8705.	1239.
IP	2	1.391	1.166	1.391	21712891.	42882995.	4408.	8705.	1239.
IP	3	1.398	1.166	1.398	21441480.	42882995.	4352.	8705.	1239.
II		1.391	1.166	1.391	21712891.	42882995.	4408.	8705.	1239.
III	1	1.391	1.166	1.391	21712891.	42882995.	4408.	8705.	1239.
III	2	1.391	1.166	1.391	21712891.	42882995.	4408.	8705.	1239.
III	3	1.398	1.166	1.398	21441480.	42882995.	4352.	8705.	1239.
IV	1	1.391	1.166	1.391	21712891.	42882995.	4408.	8705.	1239.
IV	2	1.391	1.166	1.391	21712891.	42882995.	4408.	8705.	1239.
IV	3	1.398	1.166	1.398	21441480.	42882995.	4352.	8705.	1239.
V		1.391	1.166	1.391	21712891.	42882995.	4408.	8705.	1239.
VI	1	1.391	1.166	1.391	21712891.	42882995.	4408.	8705.	1239.
VI	2	1.391	1.166	1.391	21712891.	42882995.	4408.	8705.	1239.
VI	3	1.398	1.166	1.398	21441480.	42882995.	4352.	8705.	1239.
VII	1	1.000	1.000	1.000	21441480.	42882995.	4352.	8705.	1239.
VII	2	1.000	1.000	1.000	21441480.	42882995.	4352.	8705.	1239.

*** WARNING KL/R = 126. ABOUT THE X-AXIS IS GREATER THAN 100.
REDESIGN THE COLUMN WITH A LARGER CROSS-SECTION OR
PERFORM A SPECIAL SECOND ORDER ANALYSIS AS DEFINED
IN ART 8.16.5.1.1 OF AASHTO.

*** WARNING KL/R = 126. ABOUT THE Y-AXIS IS GREATER THAN 100.
REDESIGN THE COLUMN WITH A LARGER CROSS-SECTION OR
PERFORM A SPECIAL SECOND ORDER ANALYSIS AS DEFINED
IN ART 8.16.5.1.1 OF AASHTO.

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COLUMN SERVICE LOADS (K-FT) AND MAXIMUM WORKING STRESSES (PSI)

YOUNG S MODULUS FOR CONCRETE - EC = 3372165. PSI
MODULAR RATIO (ES/EC) - N = 8.6

		:---- SERVICE LOADS (K-FT) ----:				----:---- MAX STRESS (PSI) ----:		
GP	CASE	TRANS MY	LONG MX	COMB M	AXIAL P	CONC COMP	STEEL TEN	STEEL COMP

IH	1	7487.	0.	7487.	1239.	2359.	31548.	17801.
IH	2	7487.	0.	7487.	1239.	2359.	31548.	17801.
IH	3	7487.	0.	7487.	1239.	2359.	31548.	17801.
II		5990.	0.	5990.	991.	1888.	25238.	14241.
III	1	5990.	0.	5990.	991.	1888.	25238.	14241.
III	2	5990.	0.	5990.	991.	1888.	25238.	14241.
III	3	5990.	0.	5990.	991.	1888.	25238.	14241.
IV	1	5990.	0.	5990.	991.	1888.	25238.	14241.
IV	2	5990.	0.	5990.	991.	1888.	25238.	14241.
IV	3	5990.	0.	5990.	991.	1888.	25238.	14241.
V		5348.	0.	5348.	885.	1685.	22534.	12715.
VI	1	5348.	0.	5348.	885.	1685.	22534.	12715.
VI	2	5348.	0.	5348.	885.	1685.	22534.	12715.
VI	3	5348.	0.	5348.	885.	1685.	22534.	12715.
DL		7487.	0.	7487.	1239.	2359.	31548.	17801.

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****
* PROBABLE PLASTIC MOMENT (1.3 X NOMINAL MOMENT) (KIP-FT) *
****

CODE (8.16.4.4) AND MEMO TO DESIGNERS 15-10

FC = 3.50 KSI FY = 60.00 KSI
EO = 0.0030 IN/IN AST = 81.00 SQ IN

ANGLE	TRANS MPY	LONG MPX	COMB MP	AXIAL P	P-BALANCE (APPROX)
90.0	22193.	-4.	22193.	12622.	7151
	24686.	-3.	24686.	10517.	
	26412.	0.	26412.	8414.	
	26613.	2.	26613.	6313.	
	25024.	4.	25024.	4209.	
	21842.	6.	21842.	2105.	
	17060.	7.	17061.	2.	
	17060.	7.	17061.	2.	
	14061.	9.	14061.	-1050.	
	10643.	6.	10643.	-2102.	

** NOTE: THE AXIAL DEAD LOAD EQUALS ZERO. THEREFORE,
NO PLASTIC HINGING ANALYSIS IS PERFORMED.

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