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16. ABSTRACT

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BRIDGE EXPANSION JOINT SEALS

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FINAL REPORT

STATE OF CALIFORNIA
BUSINESS AND TRANSPORTATION AGENCY
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

BRIDGE DEPARTMENT
BRUCE J. GUNDERSON

RESEARCH REPORT
CA-HY-BD-4105-3-72-06

Prepared in Cooperation with the U.S. Department of Transportation, Federal Highway Administration – July, 1972

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The objective of this research was to find a method of sealing bridge deck joints from intrusion of foreign debris. The research was carried out by laboratory testing of products, and placing the more promising ones in the field to check in-service performance. The findings of the field inspections are discussed. A "Movement Rating" system, which determines the movement capability for preformed elastomeric joint seals has been developed. A relationship between bridge deck joint movements and air temperature was developed from recording actual movements.

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The reference to trade names in this report does not in any way constitute endorsement of specific materials or equipment to the exclusion of equal products. Nor shall any part of this report be used for advertising or promotional purposes.

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HISTORICAL BACKGROUND

This is the final report on bridge expansion joint seals by the California Division of Highways. Two interim reports were previously published.[1,2] The research work was accomplished over a period of six years.

The evolution of sealing joints in California over the past fourteen years has progressed from asphalt latexes to polysulfides to polyurethanes to the present standard of preformed elastomeric seals. In that time just about everything under the sun has been tried. (See Appendix A)

Besides reporting on actual seal performance, a bridge joint movement study, a temperature study for California and a method of sizing preformed elastomeric seals are presented.

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CONCLUSIONS

1. Polyurethane seals are superior to most other poured in place seals.
2. The biggest problem in the use of preformed elastomeric seals is in making sure the joint movement and geometry will coincide with the movement rating of the selected seal.
3. Asphalt impregnated polyurethane foam is not satisfactory as a bridge joint seal.
4. Transflex performed well with solid bedding except for observed distress between units.

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RECOMMENDATIONS

1. If open joints can be used in the superstructure they should be.
2. Polyurethane cast-in-place seals should be restricted to movements of less than 1/2".
3. Preformed elastromeric seals should be limited to joints with movements less than 2" and preferably less than 1-1/2", unless modular units are used.
4. Movement marking scribes should be placed on joints to record movement.
5. Observed bridge joint movement in California based on air temperature (does not include shrinkage or prestress shortening):

	Concrete	Steel
Average or expected joint movement	0.43×10^{-5} Ft/Ft/F^0	0.48×10^{-5} Ft/Ft/F^0 + 0.02'
Recommended design joint movement	0.64×10^{-5} Ft/Ft/F^0	0.72×10^{-5} Ft/Ft/F^0 + 0.02'

IMPLEMENTATION

The California Division of Highways has implemented 1 thru 4 of the above recommendations. Item 5 is recommended for implementation.

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INTRODUCTION

Let's start at basics and ask "What are we trying to do when we seal a joint?" Usually the answer to this is one or more of the following:

1. Can't allow water to come through the joint because of traffic, erosion, corrosion, etc.
2. Can't allow deicing chemicals to infiltrate the joint.
3. Can't allow debris to fill joint.

If by some way the design can be changed so that the joint does not have to be sealed, a major maintenance problem for the bridge has been eliminated.

Drainage systems, especially at the abutments where there is room for adequate pipes to be used, can eliminate the need for sealed joints. Changes in design to allow debris to fall through the joints can also eliminate the sealed joint.

The problems associated with sealing joints have not been solved and a solution in the foreseeable future is not forseen. This is not to say that there haven't been improvements in sealing joints.

In California, for movements less than 2", a fairly decent joint sealing job can be obtained if a great amount of effort is put in:

1. Selecting the right seal.

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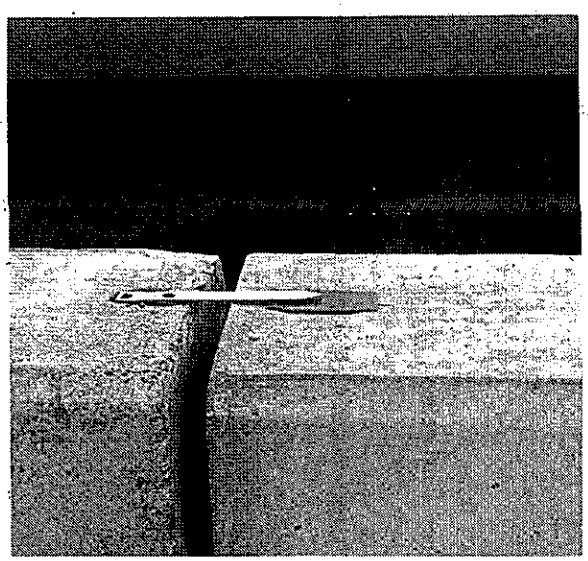
2. Constructing the joint to the proper width and depth for the selected seal.
3. Having clean sound concrete adjacent to the seal.
4. Proper installation.

The effort is not always put forth. Joint sealing takes a back seat to most other details. It is truly amazing to see compression joint seals installed with joint spalls not patched, seals above the deck level, joints full of debris below the seal, seal in an uncompressed condition and non-uniform joint dimensions. No matter how good a seal is installed in these situations, the joint sealing will not be effective.

California presently specifies a saw cut joint groove. If done properly this exposes unsound concrete which then may be replaced, gives a uniform width and allows the selection of the joint groove width after the major portion of the shrinkage, creep and shortening of the structure have taken place.



On all new construction, joint movement measuring scribes are now placed at joints to record the range of movement the joint has taken.

Movement Scribe
Figure 1

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For joints with movements greater than 2", finger or sliding plates have generally been used in the past. The present trend, however, is to use sealed joints such as transflex, modular units, etc.

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BRIDGE SEAL FIELD PERFORMANCE

The performance of seals placed in the field dating back to 1966 is documented. (See Appendix B). To compare seals and record their performance, a numerical rating scale was developed as follows:

NUMERICAL RATING SCALE FOR JOINT SEAL, JOINT & AMOUNT OF MOVEMENT

The numerical designation is a 5-digit number
The first two digits are the age of the seal in years

Rating	Condition of		Movement
	Seal (Third digit)	Joint Faces (Fourth digit)	(Fifth digit)
4	100% effective Water-tight No sand intrusion	100% sound No spalls No epoxy patches	Over 2"
3	Effective seal Very small tears Slight sand intrusion	100% sound No present spalls Epoxy patches OK	1-1/2" to 2"
2	Debris seal only 10% Max. tears Some sand intrusion	Fair condition No large spalls Edge spalls	1" to 1-1/2"
1	10% to 50% failure Will not retain Debris	Epoxy patches fail	1/2" to 1"
0	50% or more failure Will not retain debris	Large spalls	0" to 1/2"

Example:
Seal placed 1965; inspection 1970. Condition: 20% sand intrusion; joint with good epoxy patches; no spalls, movement 3/4". Numerical desgination is 05-131

Table 1

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After a seal failed (1 or 0 rating) it was not generally inspected further. In summary, the following is the average rating of the various seals.

IN-SERVICE SEAL RATING	
SEAL	Rating
Polyurethane Cast-In-Place (less than 1/2" expected movement*)	3.4
Polyurethane Cast-In-Place (1/2" or more expected movement*)	1.9
Preformed Elastomeric	3.3
Asphalt Impregnated Polyurethane Foam	2.0
Polyurethane Foam with extruded neoprene jacket	3.2
Transflex	3.9
*The expected movement is approximately 2/3 of the recommended design movement.	

Table 2

The individual type of seals are discussed in what follows.

Polyurethane Cast-In-Place Seals (Type A)

The performance of various polyurethane seals are shown in Table 3 and 4. The length of record of the seals varies up to five years, with the majority having three to four years in service.

Most seals of this type are two-component materials. A one component material was tested, but it had the worst performance.

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Polyurethane Sealant

Figure 2

From the records, U-Seal 3201 appeared to have the most successful performance. Using criteria developed from the joint movement study (See Page 24), the designed joint movement for this type seal should be less than 0.5" to expect reasonable performance of the seal. This almost eliminates the use of this seal in steel structures.

The failures of this type of seal are almost entirely in adhesion to the joint surface, indicating where the emphasis should be placed. A primer must be used and allowed to dry to the touch before placing the seal.

The two components must be mixed in the correct proportions. In the pourable grade, once the container is opened it should be completely used. Mixing should be done with power driven

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paddles for a minimum of ten minutes. In the machine grade, the machine must be checked after any stopping of the work to see if the proportions are correct at the mixing head.

Poor shape factor can also cause premature failure. At the present time a 3:1 width to depth ratio is used with a compressible material, that will not adhere to the seal, below it.

Being a tension-compression type seal, it will pull off incipient spalls that were not visible prior to placing the seal. The joint surfaces should be checked for spalls prior to placing the seal.

The polyurethane seal was found to be superior to polysulfide, epoxy or silicon seals previously tested.

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IN-SERVICE POLYURETHANE SEAL RATING																	
Rating	Number of Seals in Each Rating																
4	30	25	50	64	73	13	25	8	1	2	1						
3	4	6	16	22	15	8	3	2		2	5	1					
2	4	7	2	6	11	4	6	5		4	4	1	1		1	2	1
1	1	3	1	14	7	7	6	8	6	6	4	3	5			2	2
0		2		1		2	8	1	2		5	3	5	5	3	3	5
Average Rating-Overall	3.6	3.1	3.7	3.3	3.4	2.7	2.6	2.3	1.1	2.0	1.6	1.0	0.6	0	0.5	.6	.5
Average Rating-Individual																	
PRC3105	3.5	2.9	3.6	3.1	3.4	2.4	2.2	2.0	1.1	1.6	1.8	.6	.6	.0	.5	.5	1.3
U-3201	4.0	4.0	3.9	3.9	3.7	3.7	3.5	4.0		1.0			.0	.0	.0	.0	.0
T-68	3.6			3.1	4.0	2.8	4.0	4.0		3.2		1.0	.5				
Terraseal	1.0	2.1	4.0	2.2	2.4	4.0	3.5	1.0	1.0		.0	3.0	1.0	.0		1.5	
Ureseal		2.6	3.0	4.0													
8305				4.0	4.0												
Expected Movement Inches	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6+

Table 3

POLYURETHANE SEAL RATING BY MOVEMENT			
Seal	Number of Seals	Rating	
		Less than 1/2" Expected Movement	1/2" or More Expected Movement
PRC 3105	345	3.3	1.8
U-Seal 3201	112	3.9	2.3
Sika flex T-68	40	3.5	2.6
Terraseal 100	45	2.8	1.6
Ureseal 200	9	2.9	
Uralane 8305	6	4.0	
Total	557	3.4	1.9

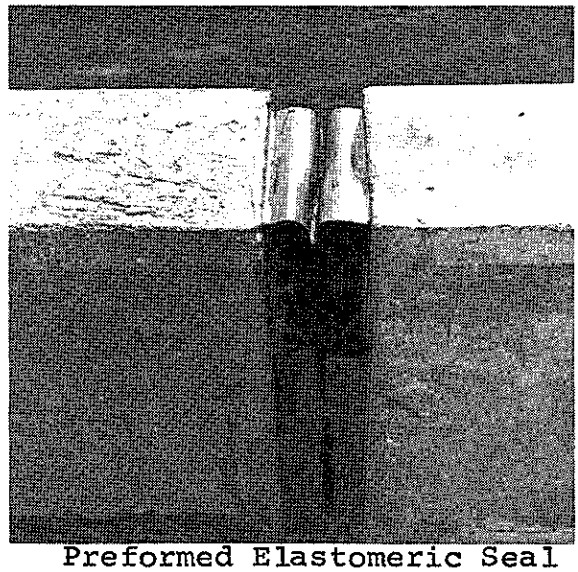
Table 4

Preformed Elastomeric Seals (Type B)

The performance of various types of preformed elastomeric seals is shown in Table 5. A major portion of the field testing for this type seal was to be on twin viaducts, each 8700 feet long

Preformed Elastomeric Seal

Figure 3



Preformed Elastomeric Seal

Figure 4

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with joints every 160 feet (Report #142). Many different seals were ordered for this test. The forming of these joints was so poor, however, that the joints had to be sawn to a greater width than the seals were designed to accommodate. Of the 50 seals noted out of compression because of excessive width of joint or too small of material used, 37 are from this test (See Appendix B).

At the present time we use this type of seal for up to 2" of design movement. This will probably be decreased in the future because of the undesirable excessive joint width needed to accommodate that large a seal.

The first of our installations of this type of seal date back to 1964. For the most part we have had very good performance with the seal except where the joint width and movement were not compatible with the size of seal selected. This seal cannot function in an imporperly designed or constructed joint. Ideally the joint movement should be recorded for at least a year prior to permanently sealing the joint. A temporary seal such as open celled polyurethane foam could be used in the joint until ready to seal permanently.

A few of the seal designs have been shown to be unstable, tending to rotate during installation. Much more care is needed to properly seat this type. Cracking of the neoprene has not been a major problem although we have had a few instances of cracking. Sand intrusion along the sides of the

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seal can be stopped by the use of high grade lubricant-adhesives now available.

Some other problems associated with this type seal are:

1. Leakage at changes in alignment, unless made with sufficient radius.
2. Wiping off of adhesive during installation.
3. Unsatisfactory splices.
4. Difficult installation during hot weather.
5. Placed too high in joint - hit by traffic.

IN-SERVICE PREFORMED ELASTOMERIC SEAL RATING

Rating		Number of Seals													
4		1	22	13	24	3	4	8	2	8		13	6	1	3
3			12	4		1			1	18	1	12			
2			10	3						3		1			
1		1		1											
0			4		5										
Seal		S-500	S-497	B-496	B-610	B-462	B-613	B-614	B-2000	B-2500	K-2000	K-3000	K-5000	D-3000	C-2500
Ave	(1)	2.5	3.0	3.4	3.3	3.8	4.0	4.0	3.7	3.2	3.0	3.5	4.0	4.0	4.0
Rating	(2)	4.0	3.8	3.8	4.0	3.8	4.0	4.0	3.7	3.3		3.6	4.0	4.0	4.0

(1) All Seals (2) Those out of compression, due to excessive joint width, subtracted.

Table 5

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The average overall rating for this type seal was 3.3. However, if the seals that were in joints that had opened up wider than the seal were left out of the results, the overall rating would be 3.7.

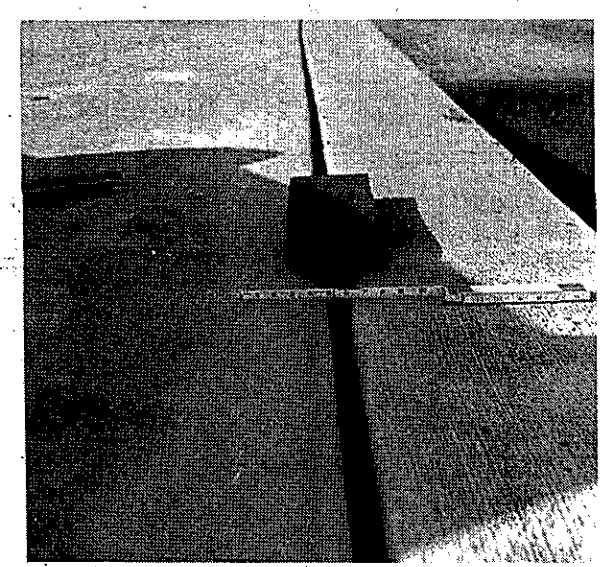
Asphalt Impregnated Polyurethane Foam (Type C)

The performance of this type seal is shown in Tables 6 and 7. The performance as a bridge seal is not very satisfactory especially in the valley environment. It performs better along the coastal areas away from the colder winter temperature in the valley. This is probably due to the fact that the asphalt in the material gets hard when cold.

Another problem with the material is that it comes in six foot lengths and there is leakage at most of the splices

Maintenance units, however, like to use this material as it takes a minimum of joint preparation before use.

A sandwich type was tried (closed cell foam in middle). It did not perform satisfactorily.



Asphalt Impregnated Polyurethane Foam

Figure 5

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IN-SERVICE IMPREGNATED POLYURETHANE FOAM SEAL RATING																	
Rating	Number of Seals in Each Rating																
4	4							1	1					4			
3		4	3	19	3	2		1	3			2	5	4	2		
2	1	3	1	4	2		2		4	5	3			1	1		
1			2	1	2	2			13	2	4	1	1		2		1
0				2		1		1	4	2	1		2			2	1
Ave Rating	3.6	2.6	2.2	2.5	2.1	1.6	2.0	2.3	1.4	1.3	1.3	2.3	2.0	3.3	2.0	0.0	0.5
Expected Movement (Inches)	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6+

Table 6

IMPREGNATED POLYURETHANE FOAM SEAL RATING BY LOCATION					
Rating	Number of Seals				
4		2	6	2	
3	11	33	1	3	
2	6	10	11		
1		3	28		
0		1	13	2	
Ave Rating	2.6	2.7	1.3	2.4	
	Ocean	Coastal	Valley	Desert	Mountain

Table 7

Polyurethane Foam With Extruded Neoprene Jacket

The forerunner to this seal was 1" wide pieces of polyurethane foam wrapped with neoprene sheets. The 1" units were then bonded together to make the desired width of seal. This seal failed in bond between units and cracking of the poor grade of neoprene. This type of seal, however, has inherent qualities that are desirable; large movement capability of the foam with impervious qualities of the neoprene.

This led to extruding the neoprene to the desired shape and filling the void with polyurethane foam. The performance of this extruded section is shown in Table 8.

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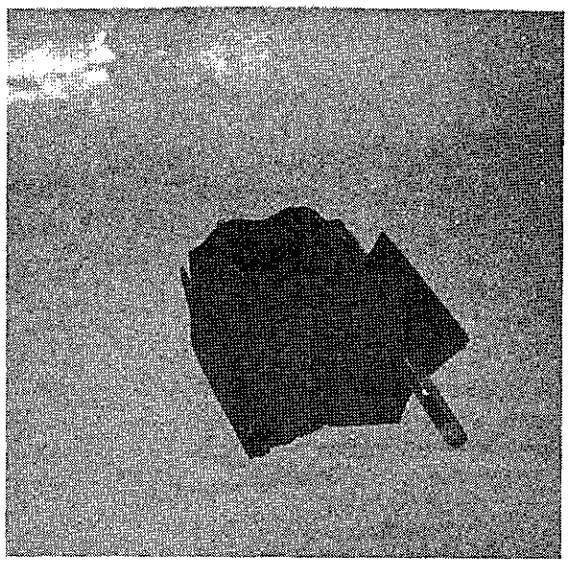
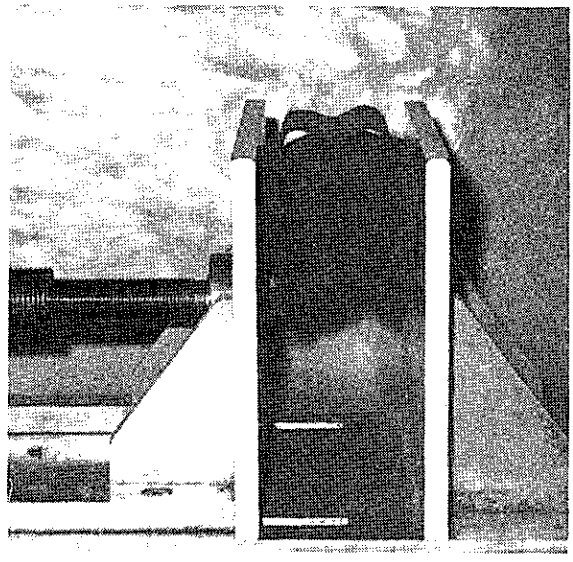


Polyurethane Foam With Extruded Neoprene Jacket

Figure 6



Polyurethane Foam With Extruded Neoprene Jacket

Figure 7

One local manufacturing firm who has developed this type of seal has also developed an adhesive to bond their seal to concrete. This adhesive is the best that has been observed in bonding neoprene to concrete.

IN-SERVICE EXTRUDED NEOPRENE JACKET SEAL RATING		
Rating	Number of Seals	
	All	Subtracting those out of Compression Due to Excessive Joint Width
4	8	8
3	10	8
2	2	
1	1	
0		
Ave Rating	3.2	3.5

Table 8

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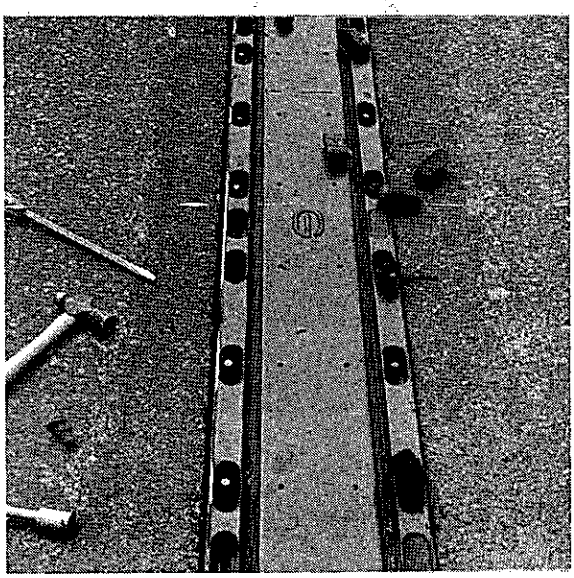
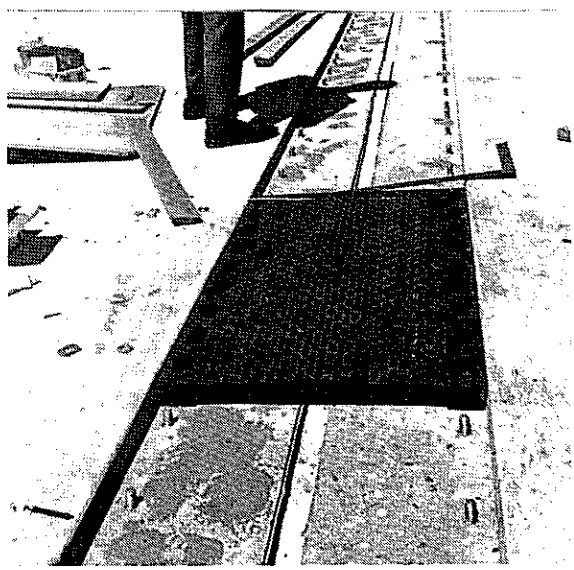
Transflex

Except for an installation made in 1967, use of transflex in California has all been within the last two years. The installation in 1967 was on an existing structure with a plant mix surfacing. One of the sections failed after four years due to loose hold down bolts. The top edges of the material took quite a beating from traffic due to settlement of the adjacent plant mix surfacing.



Transflex 200

Figure 8



Transflex 400

Figure 9

Other problems encountered with this type seal:

1. Distress between units (units normally 6 feet long).
2. Tendency to slap.
3. Reported damage caused by vehicle braking and turning movements.

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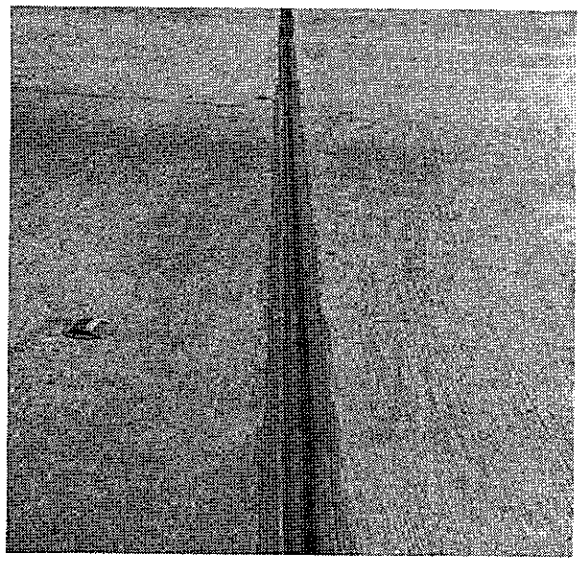
Miscellaneous Seals

One installation was made of superseal 444, a single component hot pour polymer. After two years it appeared equal in sealing capabilities to the liquid polyurethane.

For large movements, an aluminum extrusion modular type joint has been designed and is now being used on several projects. The State will be placing other types in the near future for evaluation.

Aluminum Extrusion

Figure 10



Neoprene Strip

Figure 11

1/16" thick elastomeric sheets bonded to the deck concrete with a loop formed down into the joint failed. The mode of failure was in bond to the concrete.

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MOVEMENT RATING FOR PREFORMED ELASTOMERIC JOINT SEALS

In the design of a joint seal system, there must be some correlation between the joint movement that is designed for and the actual movement capabilities of the joint seal. The Movement Rating System was developed to provide this for preformed elastomeric seals.

The designer calculates the theoretical movement for the joint and rounds this value up to the nearest 1/2". The joint seal then must have a Movement Rating of at least this much before being accepted.

This Movement Rating of the Seal is determined as follows:

1. The Width (W_1) and pressure (P_1) is taken at an arbitrary deflection -- say 15% deflection of the seal.
2. The pressure (P_1) is multiplied by a factor (say 4) to give a pressure (P_2). (4 is an arbitrary figure, it does, however, give a value close to where closure of the voids in the seal is starting.)
3. The width (W_2) of the seal is measured when the seal is compressed to the pressure (P_2).
4. The Movement Rating of the seal = W_1-W_2.

An example is shown in Figure 12.

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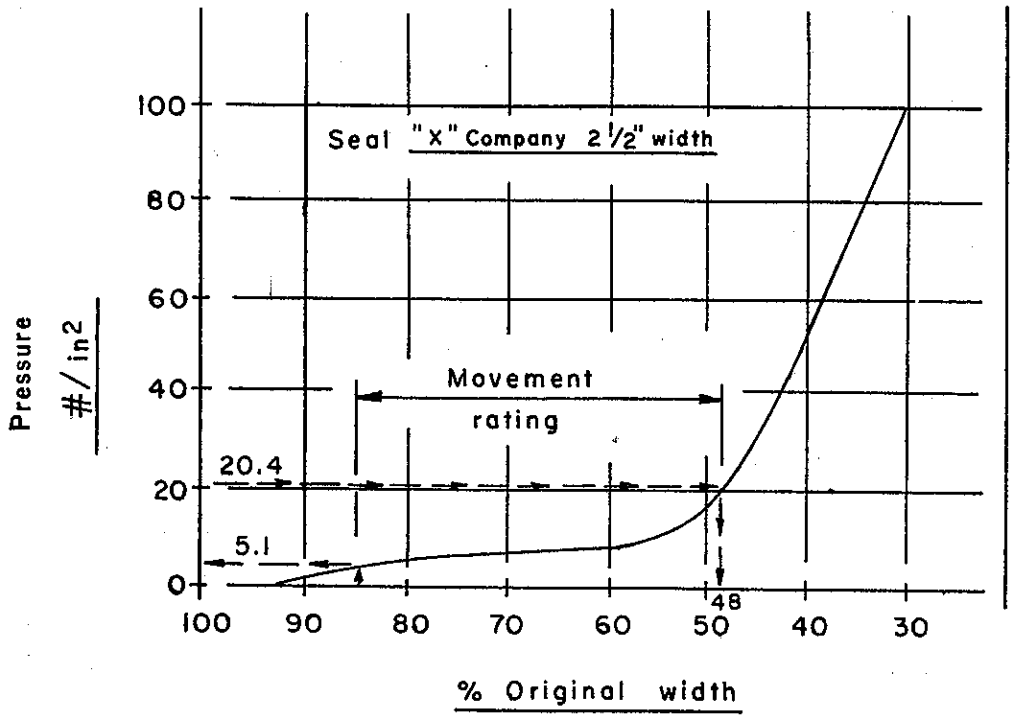
PRESSURE - DEFLECTION CURVE FOR
PREFORMED ELASTOMERIC SEAL



For example:

1 W_1 = .85W = .85 x 2.5 = 2.12"
P_1 = 5.1 psi

2 P_2 = 4 x P_1 = 4 x 5.1 = 20.4 psi

3 W_2 = .48W = .48 x 2.5 = 1.20"

4 Movement Rating = W_1-W_2 = 2.12"-1.20" = 0.92"

Figure 12

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BRIDGE EXPANSION JOINT MOVEMENT STUDY

Six structures (three concrete box girders and three steel plate girders) were selected for an expansion joint movement study. This study is an amplification of a previous joint movement study.[3] The previous study was based on annual movements of various types of structures.

One problem encountered in the previous study was that movements on quite a few of the structures were hindered due to debris filled joints. It was decided on this new study to select structures with joints that were either open or well sealed, so that the joints were free to move.

Another refinement from the previous study was that the scribes measuring the movements were epoxied directly to the concrete parapet of the railing instead of the aluminum rail section. This eliminated the correction factor due to different coefficients of expansion and the faster thermal reaction time of the slim aluminum rail.

Marking scribes were placed at the joints to record the movements. The setting was 0 at installation. The scribes were read at monthly intervals for a year. The maximum opening and maximum closing of the joint since the last reading were recorded. The instantaneous position of the scribe as well as the air temperature were also recorded.

The air temperature range for the period was obtained from the nearest Weather Bureau recording station. The point of

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no movement between joints was calculated for the continuous spans, taking into consideration the column and abutment restraints. The contributory length to the joint movement was calculated. The data for each joint was then plotted as shown in Appendix C.

The term "Coefficient of Movement" is used instead of "Coefficient of Expansion" because air temperatures were used, not structure temperatures.

The temperature-movement data points for each study were input to a computer program that calculates a first degree regression equation of the form $M = a+bT$ (b being the average coefficient of movement), by the standard least-squares technique.

It is of interest to note that a 6-span, single column bent, 650' concrete box girder (not a part of this study) on a 370' radius curve with only one joint near the middle moved 0.2". It was expected to move 1.1". It appears that the structure was accomplishing its thermal movement by transverse bowing rather than by longitudinal displacement.

The temperature-movement data was plotted using the seasons as a variable, but no definite pattern could be established. For example, the joint opening for a 75° air temperature in summer was not found significantly different from a 75° air temperature in winter.

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Results:

Concrete Box Girder

The three concrete box girders had average coefficients of movements of: 0.0000042, 0.0000041 and 0.0000044. Plotting all three together the average coefficient was 0.0000043 Ft/Ft.F^{o}. Maximum and minimum lines were then drawn parallel to the average coefficient line. It was found that a 50% safety factor would encompass almost all the points. (See joint movement Study 1, 2, 3 in Appendix.)

Steel Plate Girders

In Study #4 the live load impact movements could be isolated by recording the movement at a fixed joint. This bridge's movements would be affected more than the other two steel structures because of its short simple spans. (See joint movement Study 4A, 5, 6 in Appendix.)

The normal opening and closing of the fixed joint was in the range of $\pm$ 1/16". By comparing the average coefficients of movements with and without live load included, a live load correction factor was calculated:

(0.0000061 Ft/Ft/F^{o} = 0.0000047 Ft/Ft/F^{o}) x 100° x 136' = 0.019'

Use 0.02' per joint for steel.

The three steel plate girders had average coefficients of movements of: 0.0000047, 0.0000044, 0.0000049 (live load subtracted from Study #4). Plotting all three together the average coefficient was 0.0000048 Ft/Ft/F^{o}. Maximum and

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minimum lines were then drawn parallel to the average coefficient line. It was again found that a 50% safety factor would encompass almost all the points.

In Study #6, the 45° skewed joints moved up to 1/4" laterally. Also, in Study #6 the movements of the two joints in each suspended span were added together for calculating.

Conclusions:

On the basis of the foregoing the following equations may be used to calculate joint movement in California:

Concrete structure

Average or Expected Joint Movement = 0.0000043 Ft/Ft/F°

Recommended Design Joint Movement = 1.50 x 0.0000043 =

0.0000064 Ft/Ft/F°

Steel Plate Structures

Average or Expected Joint Movement = 0.0000048 Ft/Ft/F° + 0.02 Ft.

Recommended Design Joint Movement = 1.50 x 0.0000048 + .02' =

0.0000072 Ft/Ft/F° + 0.02 Ft

Note: Shrinkage and prestress shortening have to be taken into consideration also, if applicable.

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CALIFORNIA TEMPERATURE EXTREMES

A comprehensive temperature study was made of approximately 300 stations maintained by the Weather Bureau in California.

The temperatures studied were from a twenty-year period (1931-1952).

The purpose of this study was to assist in the selection of the mean temperature and temperature range for a given location for the design and installation of joint seals.

The results of this study are shown in Figures 13 and 14.

AIR TEMPERATURE RANGE IN CALIFORNIA

Ocean Frontage	70°
Coastal	85°
Valleys	100°
Desert	110°
Mountain (above 2000'):	
Northern California (Districts 1 & 2) and east slope of Sierras	125°
Other mountain areas	110°

Figure 13

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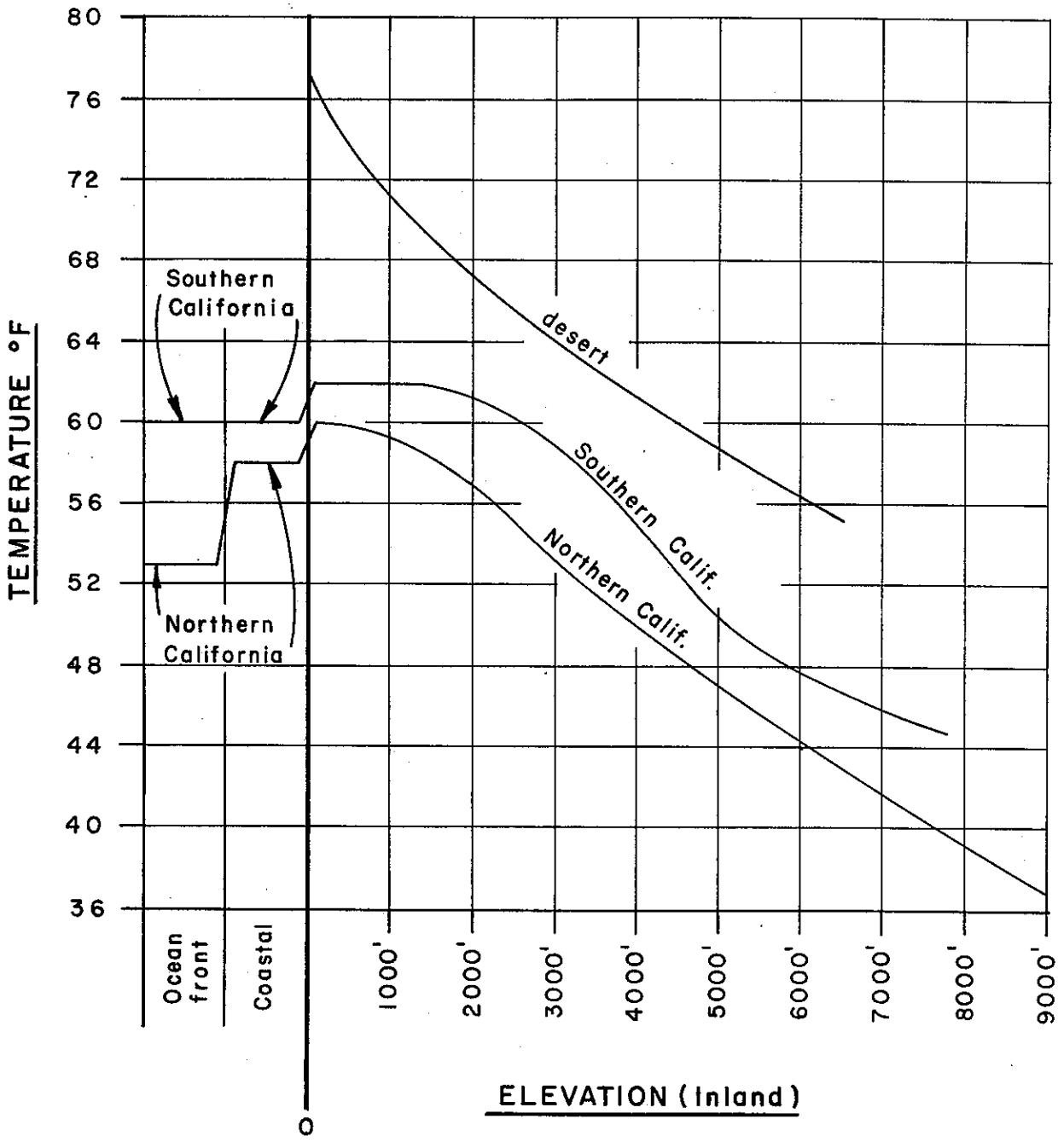
MEAN AIR TEMPERATURES



Note:

For use if no better information available.

Figure 14

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REFERENCES

1. Stewart, Carl F., "Bridge Expansion Joint Sealants, Interim Report #1", State of California, Business and Transportation Agency, Department of Public Works, Division of Highways, Bridge Department, June 1966.

2. Gunderson, Bruce J., "Bridge Expansion Joint Sealants, Interim Report #2", State of California, Business and Transportation Agency, Department of Public Works, Division of Highways, Bridge Department, R&D Report #3-69, July 1969.

3. Stewart, Carl F., "Annual Movement Study of Bridge Deck Expansion Joints", State of California, Business and Transportation Agency, Department of Public Works, Division of Highways, Bridge Department, R&D Report #2-69, June 1969.

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APPENDIX

A. Catalog of Seals Field Tested

B. Inspection of Seals Placed Since 1966

C. Joint Movement Study

D. 1972 Joint Seal Standard Plan

E. 1971 Joint Seal Specifications

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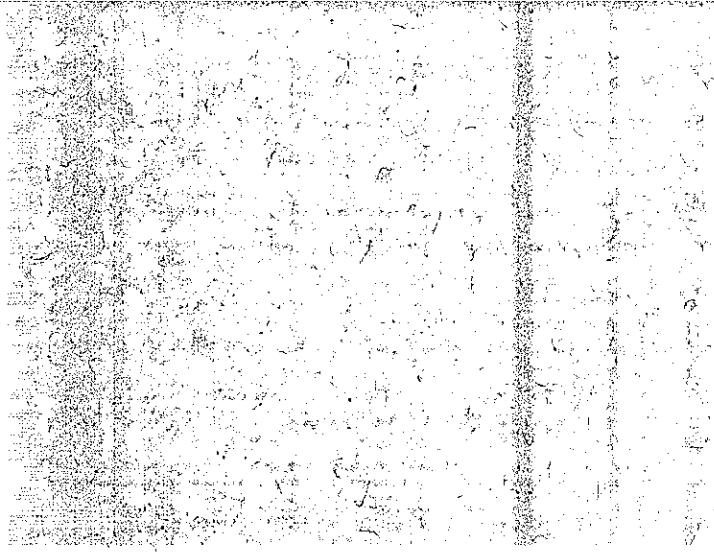

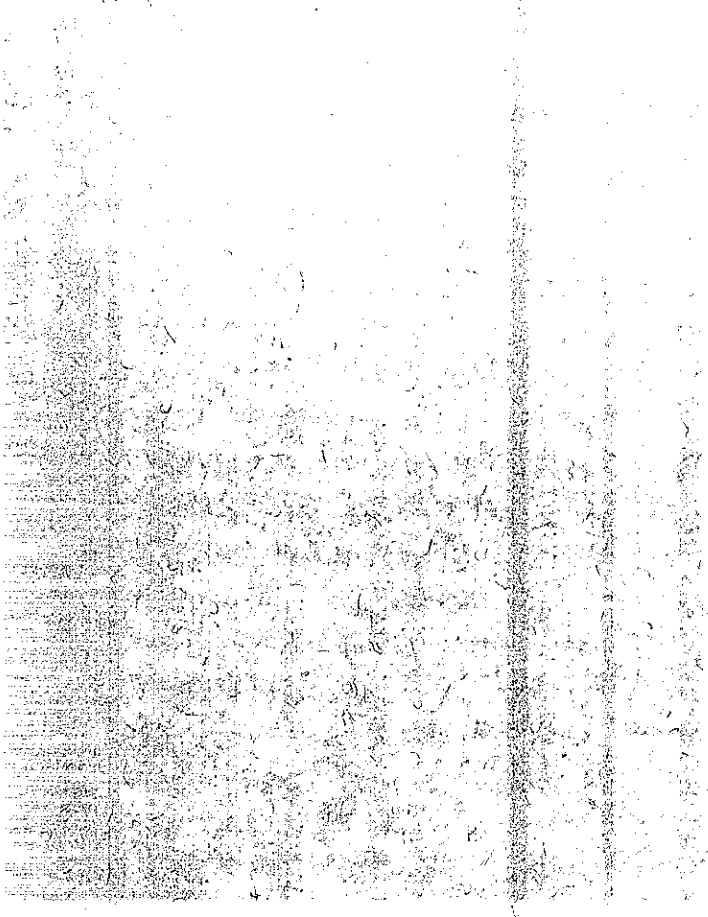

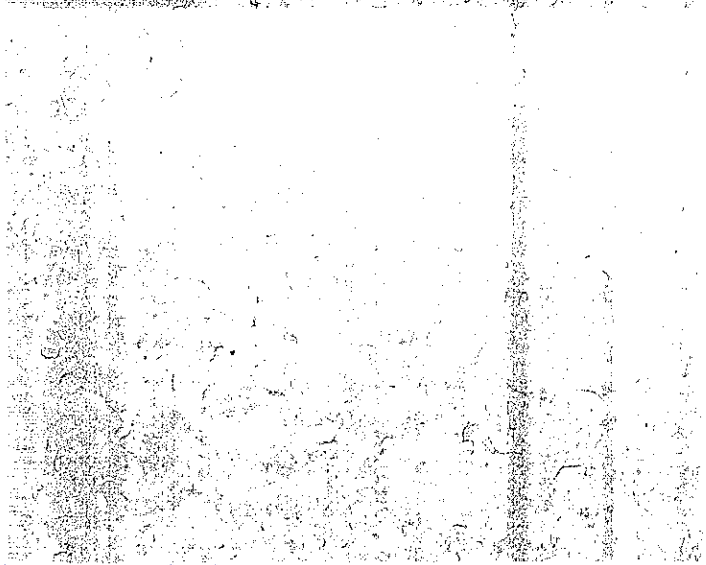

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APPENDIX A

Catalog of Seals Field Tested

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I. Compression Seals

A. Preformed elastomeric joint seals

1. Acme S-500
2. Acme S-497
3. Acme B-496
4. Acme B-610
5. Acme B-462
6. Acme B-613
7. Acme B-614
8. Brown B-2000
9. Brown B-2500
10. Brown C-2500
11. Brown D-3000
12. Brown K-2000
13. Brown K-3000
14. Brown K-5000

B. Polyurethane Foams

1. Asphalt Impregnated
   a. compriband
   b. ureseal
2. Neoprene sheet shielded
3. Extruded neoprene shielded
4. Untreated

C. Butyl Rubber

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II. Mechanical Seals

A. Transflex

B. Aluminum Extrusion

C. Elastomeric sheets bonded to deck surface

1. Neoprene

2. Urethane

III. Poured in Place Seals

A. Two Component Polyurethane

1. PRC 3105

2. U-Seal 3201

3. Ureseal 200

4. PRC 3000

5. PRC 220

6. PRC 210

7. Coast Pro Seal 962

8. Allied

9. Tabo

10. Sikaflex T-68

11. Uralane 8305

B. One Component Polyurethane

1. Terraseal 100

2. PRC RW-370-01

C. Polysulfide

1. Pressite 54, 55, 404, 1175.55

2. Coast Pro Seal F-37

3. Edoco 170281, 170282

4. Fuller 400

5. Churchhill 3C-51

6. Chem-Seal

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D. Silicon-G. E.

E. Polyvinyl Chloride

F. Two Component Neoprene

1. Polymeric N-25-4-36

2. Polymeric N-25-4-19

G. Epoxy

1. Epothak 2100

2. Ceelride

3. Coast Pro Seal 805

4. Epocast H 1356

H. Asphalt Latex

I. Hotpour Polymer - Superseal 444

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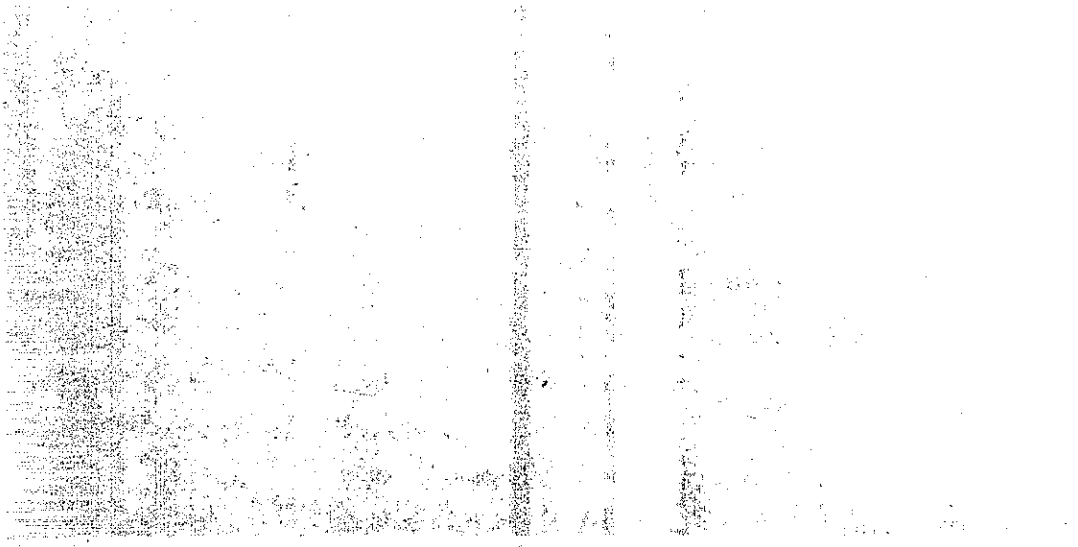

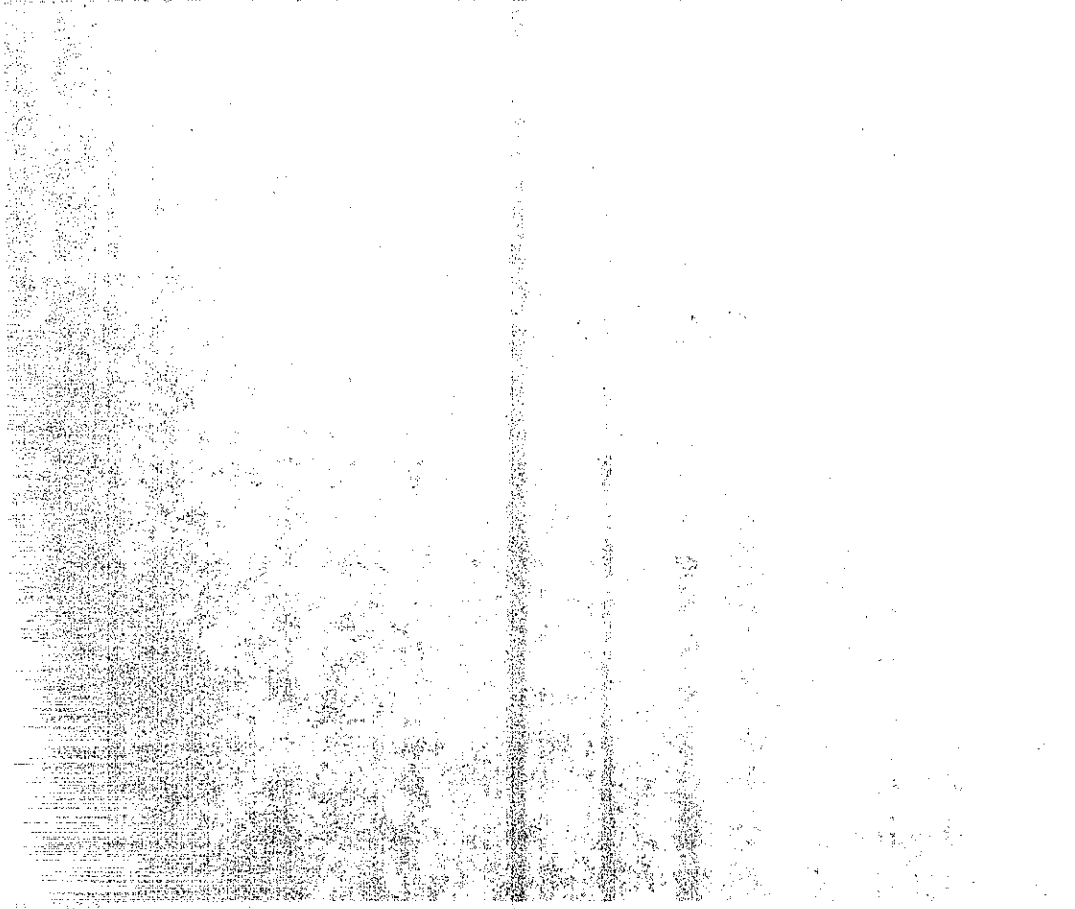

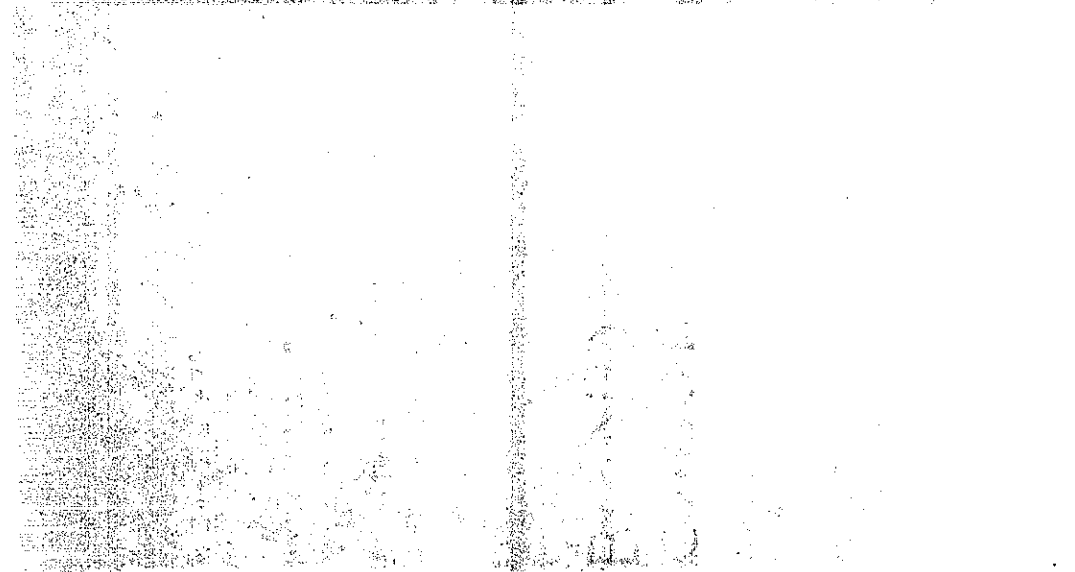

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APPENDIX B

Inspections of Seals Placed Since 1966

Seal	Page
Polyurethane	1
Preformed Elastomeric	26
Asphalt Impregnated Polyurethane Foam	39
Polyurethane Form With Extruded Neoprene Jacket	45
Transflex	46
Hot Pour Polymer	46

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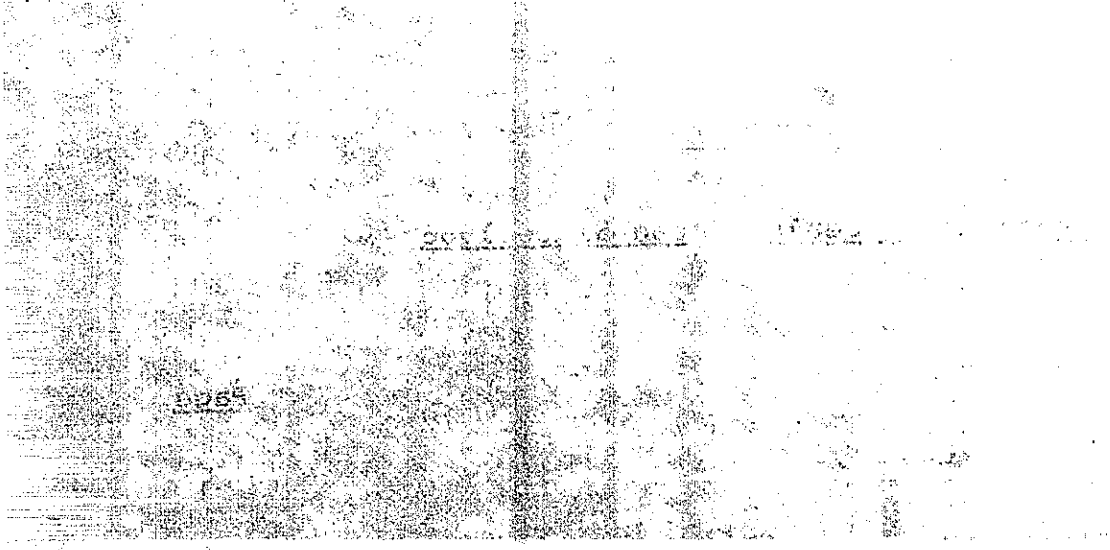

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NOTES

① PN - paving notch

② Joint width measured at approximately mean temperature unless otherwise noted. Max & Ave show erratic width.

③ Actual movements to date

④ Expected movements based on expansion joint movement study

⑤ Joint width opened wider than seal

⑥ End starting to extrude from joint

⑦ High in joint

⑧ Joint width measured at this years minimum temperature

⑨ Original seal too small, so replaced

⑩ Some cracking on top

⑪ Extremely poor constructed joints

⑫ Damaged during installation

⑬ Metal armoured joint

⑭ Hold down bolts came loose

⑮ Distress between units - no appreciable wear

Notes pertain to various items on following inspection sheets.

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Type Polyurethane PRC 3105

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
C.R.	PN 79	CIP/PS	Coast	02-430		0.3			
148	160	CIP/PS	Coast	02-231		0.7		1.5	
148	118	CIP/PS	Coast	02-231		0.5		1.5	
147	PN 58	CIP/PS	Valley	03-230		0.3		1.3	
147	PN 58	CIP/PS	Valley	03-130		0.3		1.3	
147	75	Steel	Valley	03-321		0.7		1.3	
147	75	Steel	Valley	03-421		0.7		1.3	
147	152	Steel	Valley	03-122		1.1		1.3	
147	PN 70	CIP	Valley	03-430		0.3		1.3	
147	PN 70	CIP	Valley	03-430		0.3		1.3	
147	PN 70	CIP	Valley	03-430		0.3		1.3	
147	PN 70	CIP	Valley	03-320		0.3		1.3	
147	PN 135	CIP	Valley	03-431		0.7		1.3	
147	PN 135	CIP	Valley	03-431		0.7		1.3	
147	PN 47	CIP/PS	Valley	03-430		0.2		1.3	
147	PN 47	CIP/PS	Valley	03-430		0.2		1.3	
147	PN 78	CIP	Valley	03-410		0.4		1.3	
147	PN 78	CIP	Valley	03-410		0.4		1.3	
147	PN 72	CIP	Valley	03-430		0.4		1.3	
147	PN 72	CIP	Valley	03-410		0.4		1.3	
143	75	Steel	Valley	02-241		0.7		1.5	
143	75	Steel	Valley	02-141		0.7		1.5	
143	75	Steel	Valley	02-141		0.7		1.5	
143	75	Steel	Valley	02-141		0.7		1.5	

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Type Polyurethane PRC 3105

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
128	PN 80	CIP	Valley	03-430		0.4		1.5	
128	PN 80	CIP	Valley	03-430		0.4		1.5	
128	PN 80	CIP	Valley	03-430		0.4		1.5	
128	PN 80	CIP	Valley	03-430		0.4		1.5	
128	PN 57	CIP	Valley	03-430		0.3		1.5	
128	PN 57	CIP	Valley	03-420		0.3		1.5	
128	PN 57	CIP	Valley	03-430		0.3		1.5	
128	PN 57	CIP	Valley	03-430		0.3		1.5	
128	PN 70	CIP	Valley	03-430		0.4		1.5	
128	PN 70	CIP	Valley	03-430		0.4		1.5	
128	PN 70	CIP	Valley	03-400		0.4		1.5	
128	PN 70	CIP	Valley	03-430		0.4		1.5	
128	PN 70	CIP	Valley	03-430		0.4		1.5	
128	PN 70	CIP	Valley	03-430		0.4		1.5	
128	PN 70	CIP	Valley	03-430		0.4		1.5	
128	PN 70	CIP	Valley	03-430		0.4		1.5	
128	PN 74	CIP	Valley	03-430		0.4		1.5	
128	PN 74	CIP	Valley	03-430		0.4		1.5	
128	PN 74	CIP	Valley	03-430		0.4		1.5	
127	75	CIP	LA	03-140		0.3		2.0	
127	145	CIP/PS	LA	03-441		0.6		1.5	
127	150	CIP/PS	LA	03-441		0.6		1.5	
127	50	CIP	LA	03-140		0.2		2.0	
124	181	PC/PS	Coast	03-121		0.8		1.5	

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Type Polyurethane PRC 3105

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
124	100	CIP	Coast	03-140		0.4		1.5	
122	PN 40	CIP	Desert	03-320		0.2			
122	PN 40	CIP	Desert	03-320		0.2			
122	PN 32	CIP	Desert	03-320		0.2			
122	PN 32	CIP	Desert	03-320		0.2			
122	PN 30	CIP	Desert	03-320		0.2			
122	PN 30	CIP	Desert	03-320		0.2			
114	190	CIP	Valley	03-021		1.0		2.5	
114	365	CIP	Valley	03-243		1.9		2.5	
114	390	CIP	Valley	03-143		2.0		2.5	
114	280	CIP	Valley	03-043		1.4		2.5	
114	140	Steel	Valley	03-141		1.0		2.5	
114	140	Steel	Valley	03-141		1.0		2.5	
114	140	Steel	Valley	03-331		1.0		2.5	
114	140	Steel	Valley	03-221		1.0		2.5	
114	140	Steel	Valley	03-331		1.0		2.5	
114	140	Steel	Valley	03-221		1.0		2.5	
114	140	Steel	Valley	03-131		1.0		2.5	
114	140	Steel	Valley	01-041		1.0		2.5	
114	140	Steel	Valley	03-141		1.0		2.5	
114	140	Steel	Valley	03-241		1.0		2.5	
114	109	Steel	Valley	03-221		0.9		2.5	
114	140	Steel	Valley	03-431		1.0		2.5	
114	140	Steel	Valley	01-241		1.0		2.5	

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Type Polyurethane PRC 3105

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
114	140	Steel	Valley	03-321		1.0		2.5	
114	140	Steel	Valley	03-331		1.0		2.5	
114	PN 68	CIP/PS	Valley	03-340		0.3		2.5	
114	PN 68	CIP/PS	Valley	03-440		0.3		2.5	
112	PN 33	CIP	Coast	03-220		0.2		1.8	
112	PN 33	CIP	Coast	03-220		0.2		1.8	
112	PN 0	CIP	Coast	03-230		0		1.8	
112	PN 0	CIP	Coast	03-230		0		1.8	
112	PN 25	CIP	Coast	03-330		0.1		1.8	
112	PN 25	CIP	Coast	03-330		0.1		1.8	
112	PN 0	CIP	Coast	03-320		0		1.8	
112	PN 0	CIP	Coast	03-320		0		1.8	
109	108	PC/PS	Desert	01-131		0.6		2.2	
108	PN 73	CIP	LA	04-340		0.3		1.0	
108	PN 73	CIP	LA	04-330		0.3		1.0	
107	PN 68	CIP	Valley	03-440		0.3		1.3	
107	PN 68	CIP	Valley	03-340		0.3		1.3	
107	PN 68	CIP	Valley	03-440		0.3		1.3	
107	PN 68	CIP	Valley	03-340		0.3		1.3	
107	PN 58	CIP/PS	Valley	03-440		0.3		1.3	
107	PN 58	CIP/PS	Valley	03-440		0.3		1.3	
107	PN 58	CIP/PS	Valley	03-440		0.3		1.3	
107	PN 58	CIP/PS	Valley	03-440		0.3		1.3	
107	PN 73	CIP	Valley	03-440		0.4		1.3	

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Type: Polyurethane PRC 3105

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
107	PN 73	CIP	Valley	03-440		0.4		1.3	
107	PN 73	CIP	Valley	03-440		0.4		1.3	
107	PN 73	CIP	Valley	03-440		0.4		1.3	
107	PN 90	CIP	Valley	03-440		0.5		1.3	
105	PN 55	PC/PS	Valley	03-430		0.3		2.2	
105	PN 55	PC/PS	Valley	03-440		0.3		2.2	
105	PN 55	PC/PS	Valley	03-440		0.3		2.2	
105	PN 44	CIP	Valley	03-430		0.2		2.2	
105	PN 44	CIP	Valley	03-440		0.2		2.2	
105	195	CIP	Valley	03-341		1.0		2.2	
105	88	CIP	Valley	03-340		0.4		2.2	
104	110	CIP/PS	Coast	03-320		0.5		1.5	
104	92	CIP/PS	Coast	03-420		0.4		1.5	
103	78	Slab	Coast	03-420		0.3		1.2	
98	PN 80	CIP	Valley	03-340		0.4		2	
98	PN 80	CIP	Valley	03-440		0.4		2	
98	PN 80	CIP	Valley	03-320		0.4		2	
98	PN 80	CIP	Valley	03-340		0.4		2	
98	PN 80	CIP	Valley	03-430		0.4		2	
98	230	CIP	Valley	03-032		1.2		2	
98	230	CIP	Valley	03-032		1.2		2	
98	PN 80	CIP	Valley	03-430		0.4		2	
98	PN 75	CIP	Valley	03-400		0.4		2	
98	PN 75	CIP	Valley	03-440		0.4		2	

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Type Polyurethane PRC 3105

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
98	PN 75	CIP	Valley	03-430		0.4		2	
98	PN 75	CIP	Valley	03-430		0.4		2	
98	PN 90	CIP	Valley	03-430		0.4		2	
98	PN 90	CIP	Valley	03-430		0.4		2	
98	PN 90	CIP	Valley	03-400		0.4		2	
98	PN 90	CIP	Valley	03-430		0.4		2	
97	PN 68	PS	LA	02-130		0.3		1.2	
97	PN 68	PS	LA	02-130		0.3		1.2	
97	PN 65	PS	LA	02-130		0.3		1.2	
97	PN 65	PS	LA	02-130		0.3		1.2	
94	PN 122	CIP	LA	03-440		0.5		1.2	
94	PN 90	CIP	LA	03-440		0.4		1.2	
91	PN 113	CIP	Valley	03-141		0.6		1.2	
91	PN 42	CIP	Valley	03-340		0.2		1.2	
91	PN 55	CIP	Valley	03-240		0.3		1.2	
91	PN 115	CIP	Valley	03-241		0.6		1.2	
91	PN 94	CIP	Valley	03-340		0.5		1.2	
91	PN 85	CIP	Valley	03-430		0.4		1.2	
91	PN 85	CIP	Valley	03-430		0.4		1.2	
91	PN 95	CIP	Valley	03-440		0.5		1.2	
89	56	Steel	Valley	02-041		0.6		1.5	
89	96	Steel	Valley	02-041		0.8		1.5	
89	83	Steel	Valley	02-141		0.7		1.5	
89	43	Steel	Valley	02-140		0.5		1.5	

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Type Polyurethane PRC 3105

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
89	PN 0	CIP	Valley	02-210		0		1.5	
89	125	CIP	Valley	02-011		0.6		1.5	
89	125	CIP	Valley	02-011		0.6		1.5	
89	PN 0	CIP	Valley	02-410		0		1.5	
89	PN 0	CIP	Valley	02-440		0		1.5	
89	125	CIP	Valley	02-221		0.6		1.5	
89	125	CIP	Valley	02-421		0.6		1.5	
89	PN 0	CIP	Valley	02-440		0		1.5	
89	53	Steel	Valley	02-041		0.6		1.5	
89	107	Steel	Valley	02-241		0.9		1.5	
89	53	Steel	Valley	02-041		0.6		1.5	
89	PN 90	CIP	Valley	02-440		0.4		1.5	
89	PN 90	CIP	Valley	02-420		0.4		1.5	
89	PN 90	CIP	Valley	02-410		0.4		1.5	
89	PN 90	CIP	Valley	02-410		0.4		1.5	
88	209	Steel	Valley	03-122		1.5		1.5	
86	125	CIP	Valley	04-431		0.6		1.5	
86	125	CIP	Valley	04-431		0.6		1.5	
74	60	CIP	Ocean	04-440		0.2		1.1	
74	60	CIP	Ocean	04-420		0.2		1.2	
74	60	CIP	Ocean	04-340		0.2		1.0	
74	60	CIP	Ocean	04-440		0.2		1.0	
74	80	CIP	Ocean	04-440		0.3		0.8	
74	80	CIP	Ocean	04-420		0.3		0.9	

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Type Polyurethane PRC 3105

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
74	80	CIP	Ocean	04-440		0.3		0.8	
74	80	CIP	Ocean	04-340		0.3		0.9	
74	160	CIP	Ocean	04-421		0.6		1.8	
74	205	CIP	Ocean	04-221		0.7		1.8	
74	160	CIP	Ocean	04-241		0.6		1.3	
74	205	CIP	Ocean	04-221		0.7		1.3	
74	115	CIP	Ocean	04-420		0.4		1.9	
74	110	CIP	Ocean	02-120		0.4		1.5	
74	170	CIP	Ocean	04-321		0.6		1.5	
74	60	CIP	Ocean	04-321		0.2		1.5	
74	PN 46	CIP	Ocean	03-420		0.2		1.0	
74	PN 46	CIP	Ocean	03-420		0.2		1.0	
74	PN 46	CIP	Ocean	03-420		0.2		1.0	
74	PN 46	CIP	Ocean	03-420		0.2		1.0	
74	113	CIP	Ocean	04-120		0.4		1.2	
74	113	CIP	Ocean	04-220		0.4		1.0	
74	113	CIP	Ocean	04-220		0.4		1.2	
74	113	CIP	Ocean	04-120		0.4		1.0	
74	PN 0	CIP	Ocean	03-420		0		0.8	
74	PN 0	CIP	Ocean	03-420		0		0.9	
74	133	PIC	Ocean	04-420		0.5		1.2	
74	243	CIP	Ocean	04-321		0.9		1.3	
74	110	CIP	Ocean	04-120		0.4		1.2	
74	PN 80	CIP	Ocean	03-440		0.3		0.9	

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Type Polyurethane PRC 3105

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
74	PN 80	CIP	Ocean	03-420		0.3		1.1	
74	PN 45	CIP	Ocean	03-420		0.2		1.1	
74	PN 45	CIP	Ocean	03-420		0.2		1.0	
74	PN 45	CIP	Ocean	03-420		0.2		1.0	
74	PN 45	CIP	Ocean	03-420		0.2		1.0	
74	170	CIP	Ocean	03-421		0.6		1.5	
74	170	CIP	Ocean	03-421		0.6		1.6	
74	170	CIP	Ocean	03-421		0.6		1.4	
74	170	CIP	Ocean	03-421		0.6		1.6	
74	PN 0	CIP	Ocean	03-420		0		0.8	
74	PN 0	CIP	Ocean	03-420		0		1.0	
74	PN 0	CIP	Ocean	03-420		0		1.0	
74	PN 0	CIP	Ocean	03-440		0		1.0	
66	155	CIP	Coast	04-141		0.7		1.8	
65	PN 125	CIP	Valley	04-141		0.6		1.5	
65	PN 109	CIP	Valley	04-140		0.5		1.5	
65	PN 109	CIP	Valley	04-040		0.5		1.5	
65	PN 100	CIP	Valley	04-140		0.5		1.5	
65	PN 100	CIP	Valley	04-140		0.5		1.5	
65	PN 75	CIP	Valley	04-240		0.4		1.5	
65	PN 75	CIP	Valley	04-240		0.4		1.5	
65	PN 75	CIP	Valley	04-130		0.4		1.5	
65	PN 75	CIP	Valley	04-140		0.4		1.5	
65	PN 47	CIP	Valley	04-340		0.2		1.5	

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Type Polyurethane PRC 3105

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
65	PN 47	CIP	Valley	04-340		0.2		1.5	
65	PN 50	CIP	Valley	04-420		0.2		1.5	
65	PN 50	CIP	Valley	04-330		0.2		1.5	
65	PN 80	CIP	Valley	04-430		0.4		1.5	
65	PN 80	CIP	Valley	04-440		0.4		1.5	
61	PN 95	CIP	Mountain	05-430		0.5		1.3	
61	PN 95	CIP	Mountain	05-430		0.5		1.3	
61	PN 100	CIP	Mountain	03-420		0.5		1.5	
61	PN 100	CIP	Mountain	03-300		0.5		1.3	
59	95	CIP	Mountain	04-430		0.5		1.7	
57	17	CIP	Ocean	04-120		0.1		1.5	
57	37	CIP	Ocean	02-230		0.1		1.5	
57	34	CIP	Ocean	04-220		0.1		1.5	
57	14	CIP	Ocean	04-320		0.1		1.5	
57	39	PC/PS	Ocean	02-130		0.1		1.8	
57	78	PC/PS	Ocean	04-330		0.3		1.8	
57	78	PC/PS	Ocean	04-210		0.3		1.8	
57	78	PC/PS	Ocean	04-320		0.3		1.8	
57	78	PC/PS	Ocean	04-440		0.3		1.3	
57	78	PC/PS	Ocean	04-320		0.3		1.3	
57	39	PC/PS	Ocean	04-320		0.1		2.0	
55	288	CIP	Valley	01-043		1.5		3.0	
55	288	CIP	Valley	01-043		1.5		2.2	
48	PN 0	CIP	Valley	04-430		0		1.3	

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Type Polyurethane PRC 3105

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
48	PN 0	CIP	Valley	04-430		0		1.3	
44	295	CIP	Valley	01-043		1.5			
44	130	CIP	Valley	03-041		0.7			
43	121	Steel	Valley	00-141		0.9		1.2	
43	121	Steel	Valley	02-241		0.9		1.2	
43	150	Steel	Valley	02-142		1.1		1.2	
43	150	Steel	Valley	02-142		1.1		1.2	
42	98	Steel	Valley	04-121		0.8		1.4	
42	95	Steel	Valley	04-121		0.8		1.4	
42	160	Steel	Valley	04-122		1.2		1.3	
42	81	Steel	Valley	04-121		0.7		1.3	
41	135	Steel	Valley	05-341		0.7		1.3	
41	135	Steel	Valley	05-241		0.7		1.3	
40	215	CIP	Coast	02-141		0.9		1.3	
40	215	CIP	Coast	02-141		0.9		1.3	
40	180	CIP	Coast	02-441		0.8		1.3	
40	180	CIP	Coast	02-041		0.8		1.3	
38	70	PC/PS	Coast	05-320		0.3		1.3	
38	70	PC/PS	Coast	05-420		0.3		1.3	
38	70	PC/PS	Coast	05-420		0.3		1.3	
38	70	PC/PS	Coast	05-320		0.3		1.3	
38	70	PC/PS	Coast	05-420		0.3		1.3	
38	70	PC/PS	Coast	05-220		0.3		1.3	
38	70	PC/PS	Coast	05-420		0.3		1.3	

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Type Polyurethane PRC 3105

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
38	70	PC/PS	Coast	05-420		0.3		1.3	
36	172	Steel	Valley	01-032	0.7	1.3		2.0	
36	172	Steel	Valley	01-032	0.7	1.3		1.9	
34	83	CIP	Coast	05-430		0.4			
30	114	PC/PS	Coast	05-420	0.4	0.5			
30	149	PC/PS	Coast	05-221		0.6			
29	PN 75	CIP	Valley	03-320		0.4			
29	PN 75	CIP	Valley	03-230		0.4			
29	PN 50	CIP	Valley	03-430		0.2			
29	PN 50	CIP	Valley	03-430		0.2			
29	PN 50	CIP	Valley	03-330		0.2			
29	PN 50	CIP	Valley	03-430		0.2			
29	PN 110	CIP	Valley	03-131		0.5			
29	PN 110	CIP	Valley	03-131		0.5			
29	PN 110	CIP	Valley	03-031		0.5			
29	PN 110	CIP	Valley	03-131		0.5			
29	PN 60	CIP	Valley	03-330		0.3			
29	PN 60	CIP	Valley	03-430		0.3			
29	PN 60	CIP	Valley	03-130		0.3			
29	PN 60	CIP	Valley	03-130		0.3			
29	PN 70	CIP	Valley	03-230		0.3			
29	PN 70	CIP	Valley	03-130		0.3			
29	PN 70	CIP	Valley	03-030		0.3			
29	PN 70	CIP	Valley	03-130		0.3			

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Type Polyurethane PRC 3105

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
29	PN 70	CIP	Valley	03-230		0.3			
29	PN 70	CIP	Valley	03-130		0.3			
29	PN 70	CIP	Valley	03-430		0.3			
29	PN 70	CIP	Valley	03-330		0.3			
29	PN 30	CIP	Valley	03-430		0.1			
29	PN 30	CIP	Valley	03-430		0.1			
29	PN 30	CIP	Valley	03-430		0.1			
29	PN 30	CIP	Valley	03-430		0.1			
22	PN 86	CIP	Valley	05-430		0.4		1.3	
22	PN 86	CIP	Valley	05-430		0.4		1.3	
22	PN 76	CIP	Valley	05-430		0.4		1.3	
22	PN 76	CIP	Valley	05-430		0.4		1.3	
22	PN 63	CIP	Valley	05-430		0.3		1.3	
22	PN 63	CIP	Valley	05-430		0.3		1.3	
22	PN 93	CIP	Valley	05-210		0.5		1.3	
22	PN 93	CIP	Valley	05-230		0.5		1.3	
22	PN 74	CIP	Valley	05-230		0.4		1.3	
22	PN 74	CIP	Valley	05-230		0.4		1.3	
22	PN 66	CIP	Valley	05-330		0.3		1.3	
22	PN 66	CIP	Valley	05-430		0.3		1.3	
17	35	CIP	Coast	05-440		0.2		1.5	
15	234	PC/PS	Coast	02-042	1.3	1.0		2.1	
15	PN 70	CIP	Coast	05-440		0.3			
15	PN 70	CIP	Coast	05-440		0.3			

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Type Polyurethane PRC 3105

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
15	PN 71	CIP	Coast	05-440		0.3			
15	PN 71	CIP	Coast	05-440		0.3			
15	PN 130	CIP	Coast	05-440		0.6			
15	PN 130	CIP	Coast	05-440		0.6			
15	PN 100	PC	Coast	05-400		0.4			
15	PN 100	PC	Coast	05-440		0.4			
15	PN 81	CIP	Coast	05-440		0.3			
15	PN 81	CIP	Coast	05-440		0.3			
3	160	PC/PS	Valley	01-121	0.9	0.8			
63	270	CIP	Mountain	01-202		1.5		2.0	
46	148	CIP	Coast	00-041		0.6		1.5	
46	148	CIP	Coast	01-041		0.6		1.5	
46	95	CIP	Coast	01-340		0.4		1.5	
46	95	CIP	Coast	01-340		0.4		1.5	
46	95	CIP	Coast	01-340		0.4		1.5	
46	95	CIP	Coast	01-340		0.4		1.5	
46	95	CIP	Coast	01-340		0.4		1.5	
31	215	CIP	Valley	01-042		1.1			
31	215	CIP	Valley	01-042		1.1			
28	137	PS	Coast	02-341		0.6		1.5	
28	137	PS	Coast	02-241		0.6		1.5	
28	144	PS	Coast	02-041		0.6		2.2	
23	133	CIP	Coast	01-111		0.6		1.0	
21	201	CIP	Coast	01-141		0.9			

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Type Polyurethane PRC 3105

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
16	384	CIP	Coast	01-142	1.4	1.7		2.2	
16	316	CIP	Coast	01-242	1.3	1.4		2.1	
16	286	CIP	Coast	01-242	1.0	1.2		2.2	
16	316	CIP	Coast	01-042	1.3	1.4		2.5	
16	286	CIP	Coast	01-042	0.9	1.2		2.5	
8	132	CIP	Coast	03-240	0.2	0.6		1.8	

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Type Polyurethane U-Seal 3201

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
151	PN 73	CIP/PS	LA	00-430		0.3		1.5	
151	PN 73	CIP/PS	LA	00-430		0.3		1.5	
151	PN 73	CIP/PS	LA	00-430		0.3		1.5	
151	PN 75	CIP/PS	LA	00-430		0.3		1.5	
151	PN 75	CIP/PS	LA	00-430		0.3		1.5	
151	PN 67	CIP/PS	LA	00-430		0.3		1.5	
130	160	CIP/PS	Coast	03-441		0.7		1.25	(13)
130	PN 0	CIP/PS	Coast	03-440		0		1.25	
130	PN 0	CIP/PS	Coast	03-440		0		1.25	
130	PN 0	CIP/PS	Coast	03-440		0		1.25	
130	PN 0	CIP/PS	Coast	03-440		0		1.25	
130	143	CIP/PS	Coast	03-441		0.6		1.25	
130	143	CIP/PS	Coast	03-441		0.6		1.25	
130	143	CIP/PS	Coast	03-441		0.6		1.25	
130	143	CIP/PS	Coast	03-141		0.6		1.25	
130	PN 60	CIP	Coast	03-430		0.3		1.25	
130	PN 60	CIP	Coast	03-430		0.3		1.25	
130	PN 60	CIP	Coast	03-430		0.3		1.25	
130	PN 60	CIP	Coast	03-430		0.3		1.25	
130	PN 38	CIP/PS	Coast	03-440		0.2		1.25	
130	PN 38	CIP/PS	Coast	03-440		0.2		1.25	
130	PN 38	CIP/PS	Coast	03-440		0.2		1.25	
130	PN 38	CIP/PS	Coast	03-440		0.2		1.25	
130	PN 30	CIP/PS	Coast	03-440		0.1		1.25	

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Type Polyurethane U-Seal 3201

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
130	PN 30	CIP/PS	Coast	03-440		0.1		1.25	
130	PN 30	CIP/PS	Coast	03-440		0.1		1.25	
130	PN 30	CIP/PS	Coast	03-440		0.1		1.25	
130	PN 30	CIP/PS	Coast	03-430		0.1		1.25	
130	PN 30	CIP/PS	Coast	03-430		0.1		1.25	
130	PN 30	CIP	Coast	03-430		0.1		1.25	
130	PN 30	CIP	Coast	03-430		0.1		1.25	
130	PN 39	CIP/PS	Coast	03-430		0.2		1.25	
130	PN 39	CIP/PS	Coast	03-430		0.2		1.25	
130	PN 39	CIP/PS	Coast	04-430		0.2		1.25	
130	PN 39	CIP/PS	Coast	03-410		0.2		1.25	
130	PN 30	CIP/PS	Coast	03-430		0.1		1.25	
130	PN 30	CIP/PS	Coast	03-430		0.1		1.25	
130	PN 30	CIP	Coast	03-430		0.1		1.25	
130	PN 30	CIP	Coast	03-400		0.1		1.25	
130	PN 50	CIP	Coast	03-430		0.2		1.25	
130	PN 50	CIP/PS	Coast	03-310		0.2		1.25	
127	PN 140	CIP	LA	03-431		0.6		1.5	
127	PN 140	CIP	LA	03-431		0.6		1.5	
127	PN 103	CIP	LA	03-220		0.4		1.25	
127	PN 103	CIP	LA	03-320		0.4		1.25	
127	PN 103	CIP	LA	03-420		0.4		1.25	
127	PN 103	CIP	LA	03-420		0.4		1.25	
127	PN 0	CIP/PS	LA	03-440		0		1.5	

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Type Polyurethane U-Seal 3201

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
127	128	CIP/PS	LA	03-340		0.5		1.0	
127	128	CIP/PS	LA	03-440		0.5		1.0	
127	PN 0	CIP/PS	LA	03-430		0		1.5	
127	PN 83	CIP	LA	03-440		0.4		1.5	
127	PN 83	CIP	LA	03-430		0.4		1.5	
121	PN 94	PC/PS	LA	03-340		0.4		1.5	
121	PN 94	PC/PS	LA	03-340		0.4		1.5	
121	PN 65	CIP/PS	LA	03-340		0.3		1.5	
121	PN 65	CIP/PS	LA	03-440		0.3		1.5	
121	PN 74	PC/PS	LA	03-440		0.3		1.5	
121	PN 74	PC/PS	LA	03-430		0.3		1.5	
110	PN 88	CIP	LA	03-430		0.4		1.3	
110	PN 88	CIP	LA	03-430		0.4		1.3	
110	PN 131	CIP	LA	03-441		0.6		1.3	
110	PN 131	CIP	LA	03-441		0.6		1.3	
110	PN 140	CIP	LA	03-431		0.6		1.3	
110	PN 140	CIP	LA	03-431		0.6		1.3	
102	PN 55	CIP	Valley	03-430		0.3		1.5	
102	PN 55	CIP	Valley	03-430		0.3		1.5	
95	PN 0	CIP	Ocean	04-440		0		1.2	
95	PN 240	CIP	Ocean	02-141		0.9		1.2	
95	PN 240	CIP	Ocean	02-141		0.9		1.2	
95	PN 0	CIP	Ocean	04-440		0		1.2	
95	PN 0	CIP	Ocean	04-440		0		1.2	

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Type Polyurethane U-Seal 3201

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
95	160	CIP	Ocean	04-441		0.6		1.2	
95	160	CIP	Ocean	02-141		0.6		1.2	
95	PN 0	CIP	Ocean	04-440		0		1.2	
95	PN 0	CIP	Ocean	04-440		0		1.2	
95	110	CIP	Ocean	04-440		0.4		1.2	
95	110	CIP	Ocean	04-440		0.4		1.2	
95	PN 0	CIP	Ocean	04-440		0		1.2	
79	PN 110	CIP	Valley	03-430		0.5		1.5	
79	PN 86	CIP	Valley	03-430		0.4		1.5	
79	PN 86	CIP	Valley	03-440		0.4		1.5	
79	PN 74	CIP	Valley	03-430		0.4		1.5	
79	PN 74	CIP	Valley	03-440		0.4		1.5	
79	PN 30	CIP	Valley	03-430		0.1		1.5	
79	PN 30	CIP	Valley	03-430		0.1		1.5	
79	PN 44	CIP	Valley	03-440		0.2		1.5	
79	PN 44	CIP	Valley	03-430		0.2		1.5	
79	PN 40	CIP	Valley	03-430		0.2		1.5	
79	PN 40	CIP	Valley	03-440		0.2		1.5	
79	PN 41	CIP	Valley	03-430		0.2		1.5	
79	PN 41	CIP	Valley	03-430		0.2		1.5	
79	PN 45	CIP	Valley	03-440		0.2		1.5	
79	PN 45	CIP	Valley	03-440		0.2		1.5	
79	PN 44	CIP	Valley	03-430		0.2		1.5	
79	PN 44	CIP	Valley	03-430		0.2		1.5	

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Type Polyurethane U-Seal 3201

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
79	PN 32	CIP	Valley	03-440		0.1		1.5	
79	PN 32	CIP	Valley	03-440		0.1		1.5	
79	PN 42	CIP	Valley	03-440		0.2		1.5	
48	160	CIP	Coast	02-421		0.7			
48	160	CIP	Coast	02-421		0.7			
48	160	CIP	Coast	02-421	0.9	0.7		1.8	
42	254	CIP	Valley	01-042		1.3		1.5	
42	283	CIP	Valley	00-042		1.5		1.5	
42	282	CIP	Valley	00-042		1.5		2.0	
42	242	CIP	Valley	01-042		1.2		1.4	
42	318	CIP	Valley	00-043		1.6		1.8	
42	318	CIP	Valley	01-043		1.6		1.6	
42	333	CIP	Valley	01-043		1.7		1.7	
42	275	CIP	Valley	00-042		1.4		1.6	
42	335	CIP	Valley	00-043		1.7		1.7	
42	327	CIP	Valley	01-043		1.7		1.2	

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Type Polyurethane Sikaflex T-68

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
E	PN 0	Steel	Valley	02-440		0			
E	PN 0	Steel	Valley	02-240		0			
E	PN 0	Steel	Valley	02-340		0			
E	PN 0	Steel	Valley	02-440		0			
156	PN 80	CIP/PS	Valley	03-440		0.4			
156	139	CIP/PS	Valley	03-431		0.7			
156	PN 73	CIP/PS	Valley	03-440		0.4			
156	PN 73	CIP/PS	Valley	03-440		0.4			
145	92	CIP	Valley	03-240		0.5		1.1	
144	PN 78	CIP Slab	Valley	02-440		0.4		2.1	
144	PN 78	CIP Slab	Valley	02-440		0.4		2.2	
144	PN 60	CIP/PS	Valley	02-340		0.3		2.1	
144	PN 60	CIP/PS	Valley	02-340		0.3		2.5	
144	PN 60	CIP/PS	Valley	02-320		0.3		2.1	
144	PN 60	CIP/PS	Valley	02-340		0.3		2.1	
144	PN 100	CIP	Valley	03-340		0.5		2.0	
144	PN 100	CIP	Valley	03-340		0.5		2.1	
144	PN 70	Slab	Valley	03-320		0.3		2.0	
144	PN 70	Slab	Valley	03-430		0.3		2.0	
144	PN 100	Slab	Valley	03-320		0.5		2.1	
144	PN 100	Slab	Valley	03-320		0.5		2.1	
120	57	CIP/PS	Valley	00-140		0.3		1.8	
113	75	CIP/PS	Coast	02-430		0.3		1.5	
113	75	CIP/PS	Coast	02-430		0.3		1.5	

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Type Polyurethane Sikaflex T-68

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
113	259	CIP/PS	Coast	02-042	1.5	1.1		3.1	
113	259	CIP/PS	Coast	02-241	0.8	1.1		2.5	
113	273	CIP/PS	Coast	03-142	1.5	1.2		2.8	
113	273	CIP/PS	Coast	03-043	1.8	1.2		3.0	
113	PN 0	Steel	Coast	02-330		0		1.5	
113	PN 0	Steel	Coast	02-430		0		1.5	
113	135	Steel	Coast	02-231		0.9		1.5	
113	135	Steel	Coast	02-331		0.9		1.5	
113	135	Steel	Coast	02-441		0.9		1.5	
113	135	Steel	Coast	02-441		0.9		1.5	
113	PN 0	Steel	Coast	02-430		0		1.5	
113	PN 0	Steel	Coast	02-430		0		1.5	
113	PN 0	CIP	Coast	02-430		0		1.3	
113	PN 0	CIP	Coast	02-430		0		1.3	
113	130	CIP	Coast	02-431		0.6		1.3	
113	130	CIP	Coast	02-431		0.6		2.0	

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Type Polyurethane Terraseal 100

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
117	68	Slab	Valley	03-420		0.3		1.5	
117	68	Slab	Valley	03-320		0.3		1.5	
117	68	Slab	Valley	01-120		0.3		1.5	
117	68	Slab	Valley	01-120		0.3		1.5	
116	100	CIP	Coast	03-340		0.4		1.25	
116	100	CIP	Coast	03-240		0.4		1.25	
116	100	CIP	Coast	03-240		0.4		1.25	
111	69	Steel	Coast	03-421		0.6		1.5	
111	58	Steel	Coast	03-420		0.5		1.5	
111	69	Steel	Coast	03-321		0.6		1.5	
100	PN 25	Slab	Valley	02-220		0.1		1.5	
100	PN 25	Slab	Valley	02-220		0.1		1.5	
100	PN 25	Slab	Valley	02-040		0.1		1.5	
100	PN 25	Slab	Valley	02-040		0.1		1.5	
98	PN 80	CIP	Valley	03-240		0.4		2	
98	230	CIP	Valley	03-142		1.2		2	
98	230	CIP	Valley	03-142		1.2		2	
98	PN 80	CIP	Valley	03-320		0.4		2	
92	164	Steel	Mount.	01-042		1.3		1.3	
92	164	Steel	Mount.	01-042		1.3		1.3	
81	longitudinal CIP		Valley	01-140		0		1.2	
78	145	CIP	Valley	01-101		0.7		1.3	
78	145	CIP	Valley	01-101		0.7		1.3	
77	160	CIP	Valley	01-121		0.8		1.5	

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Type Polyurethane Terraseal 100

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
77	160	CIP	Valley	01-121		0.8		1.5	
76	200	PC/PS	Valley	01-031		1.0		1.8	
76	200	PC/PS	Valley	01-041		1.0		1.8	
70	39	CIP	Valley	04-440		0.2		1.8	
70	41	CIP	Valley	04-440		0.2		1.8	
70	41	CIP	Valley	04-440		0.2		1.8	
70	39	CIP	Valley	04-440		0.2		1.8	
57	35	PC/PS	Ocean	04-240		0.1		1.3	
57	65	PC/PS	Ocean	04-420		0.2		2.0	
57	60	PC/PS	Ocean	04-440		0.2		1.8	
57	65	PC/PS	Ocean	04-440		0.2		1.5	
57	35	PC/PS	Ocean	04-320		0.1		1.5	
57	25	PC/PS	Ocean	04-420		0.1		1.5	
57	60	PC/PS	Ocean	04-420		0.2		1.5	
57	52	PC/PS	Ocean	04-420		0.2		1.5	
57	18	PC/PS	Ocean	04-420		0.1		1.5	
55	288	CIP	Valley	02-222	1.4	1.5		2.3	
55	288	CIP	Valley	02-143	1.6	1.5		2.7	
52	165	Steel	Valley	02-121	0.9	1.2		1.8	
52	50	Steel	Valley	04-420	0.4	0.5		1.0	
51	325	CIP	Ocean	04-320	0.2	1.1		1.2	

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Type Polyurethane Ureseal 200

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
57	18	PC/PS	Ocean	04-440		0.1		1.5	
57	52	PC/PS	Ocean	04-320		0.2		1.5	
57	60	PC/PS	Ocean	04-320		0.2		1.5	
57	25	PC/PS	Ocean	04-420		0.1		1.5	
57	17	CIP	Ocean	02-130		0.1		1.2	
57	37	CIP	Ocean	04-230		0.1		1.5	
57	34	CIP	Ocean	04-220		0.1		1.8	
57	14	CIP	Ocean	04-320		0.1		1.8	
34	83	CIP	Coast	05-440		0.3			

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Type Polyurethane Uralane 8305

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
115	PN 84	CIP	Ocean	03-420		0.3		1.9	
115	PN 83	CIP	Ocean	03-420		0.3		1.9	
115	PN 104	CIP	Ocean	03-420		0.4		1.9	
115	PN 104	CIP	Ocean	03-420		0.4		1.9	
115	PN 104	CIP	Ocean	01-420		0.4		1.9	
115	PN 104	CIP	Ocean	01-420		0.4		1.9	

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94	242	CIP	LA	03-442		1.1			
73	190	CIP	Coast	01-121		0.8		2	⑤

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Type Preformed Elastomeric S-497

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
154	110	Steel	South Mountain	02-441		0.9		1.8	
149	212	CIP	Coast	02-441		0.9			
142	161	PC/PS	Valley	02-331	0.4	0.8	2.5	2.2	⑤
142	161	PC/PS	Valley	02-431	0.4	0.8	2.3	2.2	
142	161	PC/PS	Valley	02-331	0.4	0.8	2.4	2.2	⑤
142	161	PC/PS	Valley	02-331	0.4	0.8	2.5	2.3	⑤
142	161	PC/PS	Valley	02-231	0.1	0.8	2.4	2.1	⑤
142	171	PC/PS	Valley	02-331	0.4	0.8	2.4	2.2	⑤
142	161	PC/PS	Valley	02-231	0.3	0.8	2.5	2.1	⑤
142	161	PC/PS	Valley	02-431	0.4	0.8	2.3	2.1	
142	161	PC/PS	Valley	02-331	0.4	0.8	2.3	2.3	⑤
142	161	PC/PS	Valley	02-231	0.1	0.8	3.0	2.3	⑤
142	161	PC/PS	Valley	02-331	0.7	0.8	2.7	2.5	⑤
142	161	PC/PS	Valley	02-231	0.4	0.8	2.5	2.4	⑤
142	161	PC/PS	Valley	02-441	0.4	0.8	2.1	2.0	
142	161	PC/PS	Valley	02-331	0.4	0.8	2.5	2.2	⑤
142	161	PC/PS	Valley	02-231	0.3	0.8	2.5	2.2	⑤
142	161	PC/PS	Valley	02-331	0.3	0.8	2.3	2.1	
142	161	PC/PS	Valley	02-231	0.1	0.8	2.1	2.0	
142	161	PC/PS	Valley	02-231	0.4	0.8	2.3	2.0	⑤
142	161	PC/PS	Valley	02-431	0.4	0.8	2.3	2.1	
142	118	CIP	Valley	02-421	0.5	0.6	2.5	2.2	⑤
106	300	CIP	North Mountain	03-413		1.9		2.2	
106	300	CIP	North Mountain	03-413		1.9		2.2	

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Type Preformed Elastomeric S-497

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
102	237	CIP/PS	Valley	02-032		1.2			⑤
102	232	CIP/PS	Valley	02-033		1.7			⑤
102	235	CIP/PS	Valley	02-032		1.2			⑤
102	390	CIP/PS	Valley	01-033		2.0			⑤
97	247	CIP	LA	04-322		1.1		1.6	⑥
96	195	PS	Coast	03-421		0.8		2.0	
96	195	PS	Coast	03-421		0.8		2.2	
94	352	CIP	LA	03-442		1.5			
94	256	CIP	LA	03-242		1.1			
94	223	CIP	LA	03-442		1.0			
94	224	CIP	LA	03-442		1.0			
94	185	CIP	LA	03-431		0.8			
94	213	CIP	LA	03-441		0.9		2.4	
94	248	CIP	LA	03-442		1.1			
91	165	CIP	Valley	03-431		0.8		1.5	
91	200	CIP	Valley	03-441		1.0		1.5	
91	200	CIP	Valley	03-441		1.0		1.5	
76	200	PC/PS	Valley	04-231		1.0		2.3	⑤
76	200	PC/PS	Valley	04-331		1.0		2.1	
72	115	PS	Valley	04-441		0.6		1.8	
72	115	PS	Valley	04-441		0.6		1.8	
3	160	PC/PS	Valley	07-311		0.8			
3	160	PC/PS	Valley	07-221		0.8			
3	160	PC/PS	Valley	07-321		0.8			

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Type Preformed Elastomeric B-496

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
144	200	CIP	Valley	03-421		1.0		2.1	⑦
142	198	CIP/PS	Valley	02-241	0.6	1.0	3.0	2.7	⑤
142	161	PC/PS	Valley	02-341	0.1	0.8	2.7	2.6	
142	161	PC/PS	Valley	02-231	0.4	0.8	3.0	2.7	⑤
142	161	PC/PS	Valley	02-131	0.6	0.8	3.0	2.9	⑤
142	161	PC/PS	Valley	02-441	0.3	0.8	2.9	2.6	⑤
142	201	PC/PS	Valley	02-431	0.3	1.0	2.6	2.5	
142	161	PC/PS	Valley	02-431	0.2	0.8	2.7	2.6	
142	161	PC/PS	Valley	02-331	0.4	0.8	2.9	2.7	⑤
142	161	PC/PS	Valley	02-331	0.1	0.8	2.8	2.5	
142	161	PC/PS	Valley	02-431	0.1	0.8	2.8	2.6	
142	161	PC/PS	Valley	02-331	0.2	0.8	3.0	2.6	⑤
142	161	PC/PS	Valley	02-431	0.2	0.8	2.8	2.6	
142	161	PC/PS	Valley	02-431	0.1	0.8	2.8	2.5	
142	161	PC/PS	Valley	02-241	0.1	0.8	3.0	2.5	⑤
142	161	PC/PS	Valley	02-441	0.4	0.8	3.0	2.6	⑤
142	161	PC/PS	Valley	02-431	0.8	0.8	2.5	2.4	
142	161	PC/PS	Valley	02-441	0.2	0.8	2.8	2.5	
106	350	CIP/PS	North Mountain	03-444		2.2		2.4	
82	90	Steel	Mountain	03-421		0.8		2.1	⑦
82	135	Steel	Mountain	03-422		1.1		2.6	⑦

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Type Preformed Elastomeric B-610

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
157	120	CIP/PS	Coast	02-440		0.5		2.7	
157	150	CIP/PS	Coast	02-441		0.6		3	
157	255	CIP/PS	Coast	02-441	0.8	1.1		2.6	
157	175	CIP/PS	Coast	02-441	0.7	0.8		2.5	
157	253	CIP/PS	Coast	02-441	0.8	1.1		2.7	
157	272	CIP/PS	Coast	02-442	0.9	1.2		2.7	
157	175	CIP/PS	Coast	02-401	0.7	0.8		2.7	
157	240	CIP/PS	Coast	02-441		1.0		2.7	
156	105	CIP	Valley	03-440		0.5		2.7	
146	130	CIP/PS	Valley	00-441		0.6			
142	199	CIP/PS	Valley	02-431	0.1	1.0	2.8	2.6	
142	205	PC/PS	Valley	02-431	0.4	1.0	3.1	3.0	
142	161	PC/PS	Valley	02-431	0.5	0.8	3.0	3.0	
142	161	PC/PS	Valley	02-441	0.1	0.8	3.3	2.8	
142	161	PC/PS	Valley	02-431	0.4	0.8	2.8	2.7	
139	240	PC/PS	Valley	03-442	<1.0	1.2		2.0	
123	345	PC/PS	North Mountain	02-004	2.0	2.2		3.6	⑧⑤
123	302	PC/PS	North Mountain	02-003	1.7	1.6		3.4	⑧⑤
123	345	PC/PS	North Mountain	02-003	1.7	2.2		3.5	⑧⑤
123	309	PC/PS	North Mountain	02-003	1.6	2.0		3.4	⑧⑤
123	234	PC/PS	North Mountain	02-003	1.8	1.5		3.3	⑧⑤
110	265	CIP	LA	03-442		1.1		2.2	
110	265	CIP	LA	03-442		1.1		2.2	
105	284	CIP	Valley	03-442		1.2		2.2	

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Type Preformed Elastomeric B-610

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
94	233	CIP	LA	03-442		1.0			
94	269	CIP	LA	03-442		1.2			
94	201	CIP	LA	03-441		0.9			
64	250	PS	Mountain	02-442	1.1	1.4		2.3	⑨
64	250	PS	Mountain	02-442	1.0	1.4		2.5	⑨

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Type Preformed Elastomeric B-462

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
157	360	CIP/PS	Coast	02-442		1.6		3	
142	211	PC/PS	Valley	02-431	0.6	1.1	3.3	3.1	
142	198	CIP/PS	Valley	02-331	0.4	1.0	3.3	3.0	
82	225	Steel	Mountain	03-443		1.6		3.3	⑦

Type Preformed Elastomeric B-613

156	246	CIP/PS	Valley	03-442		1.2		3.5	
156	245	CIP/PS	Valley	03-432		1.2		3.5	⑩
156	198	CIP/PS	Valley	03-442		1.0		3.5	
156	198	CIP/PS	Valley	03-442		1.0		4.2	

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Type Preformed Elastomeric B-614

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN) ③	EXPECTED (IN.) ④	MAX.	AVG.	
156	255	CIP/PS	Valley	03-442		1.3		4.4	
156	255	CIP/PS	Valley	03-442		1.3		4.5	
156	316	CIP/PS	Valley	03-443		1.6		5.0	
156	316	CIP/PS	Valley	03-443		1.6		4.8	
156	317	CIP/PS	Valley	03-443		1.6		4.5	
156	317	CIP/PS	Valley	03-443		1.6		4.7	
156	233	CIP/PS	Valley	03-442		1.2		4.0	
156	233	CIP/PS	Valley	03-442		1.2		4.5	

Type Preformed Elastomeric B-2000

142	161	PC/PS	Valley	02-331	0.4	0.8		1.5	
121	45	CIP	LA	03-440		0.2		1.1	
121	45	CIP	LA	03-440		0.2		1.1	

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Type Preformed Elastomeric B-2500

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
	228	CIP/PS	Valley	03-442		1.1		2	
	228	CIP/PS	Valley	03-322		1.1		2	
155	40	CIP	North Mountain	03-440		0.2		1.9	
155	57	CIP	North Mountain	03-310		0.3		1.8	
155	132	CIP	North Mountain	03-441		0.8		1.7	
155	163	CIP	North Mountain	03-341		1.0		2.0	
155	70	CIP	North Mountain	03-440		0.4		1.8	
142	118	CIP	Valley	02-321	0.4	0.5	2.5	2.2	⑤
142	161	PC/PS	Valley	02-431	0.4	0.8	2.2	2.0	
142	161	PC/PS	Valley	02-331	0.1	0.8	2.0	1.9	
142	161	PC/PS	Valley	02-331	0.1	0.8	1.8	1.6	
142	161	PC/PS	Valley	02-331	0.4	0.8	2.3	2.0	
142	161	PC/PS	Valley	02-331	0.6	0.8	2.3	2.0	
142	286	PC/PS	Valley	02-231	0.4	1.4	2.5	2.2	⑤
142	161	PC/PS	Valley	02-331	0.5	0.8	2.3	2.0	
142	161	PC/PS	Valley	02-431	0.4	0.8	2.1	1.9	
142	161	PC/PS	Valley	02-431	0.1	0.8	2.0	1.9	
142	161	PC/PS	Valley	02-331	0.2	0.8	2.3	2.1	
142	161	PC/PS	Valley	02-201	0.4	0.8	2.5	2.2	⑤
142	161	PC/PS	Valley	02-441	0.4	0.8	2.2	2.0	
142	161	PC/PS	Valley	02-331	0.1	0.8	2.5	1.9	⑤
90	60	CIP	Valley	03-320		0.3		1.8	⑪
90	60	CIP	Valley	03-320		0.3		1.8	⑪
90	50	CIP	Valley	03-320		0.2		1.7	⑪

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Type Preformed Elastomeric B-2500

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
90	50	CIP	Valley	03-320		0.2		1.6	(11)
90	65	CIP	Valley	03-320		0.3		1.5	(11)
90	65	CIP	Valley	03-320		0.3		1.4	(11)
76	200	PC/PS	Valley	04-341		1.0		2.0	(7)
76	200	PC/PS	Valley	02-241		1.0	3.0	2.3	(5)

Type Preformed Elastomeric K-2000

142	161	PC/PS	Valley	02-341	0.4	0.8	2.0	1.8	(5)

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Type Preformed Elastomeric K-3000

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
142	161	PC/PS	Valley	02-341	0.4	0.8	2.7	2.6	
142	161	PC/PS	Valley	02-331	0.1	0.8	3.0	2.3	⑤
142	161	PC/PS	Valley	02-431	0.2	0.8	2.5	2.2	
142	161	PC/PS	Valley	02-331	0.3	0.8	3.0	2.2	⑤
142	161	PC/PS	Valley	02-431	0.1	0.8	2.3	2.2	
142	161	PC/PS	Valley	02-231	0.1	0.8	2.5	2.4	
142	161	PC/PS	Valley	02-431	0.4	0.8	2.3	2.0	
142	161	PC/PS	Valley	02-431	0.4	0.8	2.3	2.0	
142	161	PC/PS	Valley	02-331	0.3	0.8	2.5	2.4	
142	161	PC/PS	Valley	02-331	0.5	0.8	2.5	2.5	
142	161	PC/PS	Valley	02-431	0.4	0.8	2.0	2.0	
142	161	PC/PS	Valley	02-331	0.3	0.8	2.3	2.2	
142	161	PC/PS	Valley	02-331	0.7	0.8	2.8	2.4	⑤
142	161	CIP	Valley	02-431	0.1	0.8	2.5	2.2	
142	240	PC/PS	Valley	02-431	0.2	1.2	2.6	2.4	
142	161	PC/PS	Valley	02-331	0.2	0.8	2.7	2.5	
142	161	PC/PS	Valley	02-431	0.3	0.8	3.0	2.6	⑤
142	161	PC/PS	Valley	02-441	0.1	0.8	2.8	2.2	
142	161	PC/PS	Valley	02-331	0.5	0.8	2.9	2.5	⑤
142	161	PC/PS	Valley	02-311	0.4	0.8	3.0	2.5	⑤
142	161	PC/PS	Valley	02-431	0.2	0.8	2.8	2.4	
142	161	PC/PS	Valley	02-331	0.4	0.8	2.5	2.2	
142	161	PC/PS	Valley	02-331	0.4	0.8	2.6	2.2	
142	161	PC/PS	Valley	02-431	0.2	0.8	2.3	2.1	

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Type Preformed Elastomeric K-3000

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
142	161	PC/PS	Valley	02-431	0.4	0.8	2.3	2.0	
142	161	PC/PS	Valley	02-441	0.5	0.8	2.5	2.2	

Type Preformed Elastomeric K-5000

158	320	CIP	Valley	01-442	0.8	1.6		3	
158	360	CIP	Valley	01-443	1.4	1.8		3	(10)
158	380	CIP	Valley	01-443		1.9		3	
158	400	CIP	Valley	01-443	1.9	2.0		3	
	300	PC/PS	Coast	02-442		1.3		3.7	
	432	PC/PS	Coast	01-443	1.3	1.9		3.5	

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Type Preformed Elastomeric C-2500

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
5	164	CIP	Coast	07-441		0.7		2.0	
1	285	CIP	Coast	08-441	0.8	1.2		1.8	(12)
1	285	CIP	Coast	08-441	0.8	1.2		2.0	(12)
3	160	PC/PS	Valley	07-421		0.8			

Type Preformed Elastomeric D-3000

5	217	CIP	Coast	07-441		0.9		2.3	

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Type Asphalt Impregnated Polyurethane Foam

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
P	200	Steel	Valley	01-242		1.4			
147	75	Steel	Valley	03-321		0.7		1.25	
136	130	Slab	Coast	03-340		0.5		2.0	
136	130	Slab	Coast	03-340		0.5		2.0	
134	250	CIP	Valley	02-442		1.3		1.5	
134	250	CIP	Valley	02-442		1.3		1.5	
134	250	CIP	Valley	02-442		1.3		1.5	
134	250	CIP	Valley	02-442		1.3		1.5	
125	PN 90	CIP	LA	03-330		0.4		2.0	
125	PN 90	CIP	LA	03-330		0.4		2.0	
125	PN 0	CIP	LA	03-430		0		2.0	(10)
125	105	CIP	LA	03-320		0.4		2.0	(10)
125	300	CIP	LA	03-342		1.3		2.0	(10)
125	300	CIP	LA	03-232		1.3		2.0	(10)
125	180	CIP	LA	03-331		0.8		2.0	(10)
125	PN 0	CIP	LA	03-430		0		2.0	(10)
119	PN 50	CIP	LA	03-330		0.2		2.5	
119	PN 50	CIP	LA	03-330		0.2		2.0	
119	PN 80	CIP	LA	03-330		0.3		2.0	
119	PN 80	CIP	LA	03-330		0.3		2.5	
119	PN 75	CIP/PS	LA	03-330		0.3		2.0	
119	PN 75	CIP/PS	LA	03-330		0.3		2.0	
119	PN 180	CIP	LA	03-331		0.8		2.0	
119	PN 180	CIP	LA	03-331		0.8		2.0	

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Type Asphalt Impregnated Polyurethane Foam

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
119	PN 75	CIP/PS	LA	03-330		0.3		2.0	
119	PN 75	CIP/PS	LA	03-330		0.3		2.0	
119	PN 75	CIP/PS	LA	03-330		0.3		2.0	
119	PN 75	CIP/PS	LA	03-330		0.3		2.0	
112	90	CIP	Coast	03-230		0.4		1.5	
112	90	CIP	Coast	03-230		0.4		1.5	
99	150	CIP	Desert	03-041		0.8		1.0	
99	150	CIP	Desert	03-041		0.8		1.0	
99	146	CIP/PS	Desert	03-441		0.8		2.2	
99	132	CIP/PS	Desert	03-441		0.7		1.5	
76	200	PC/PS	Valley	04-041		1.0		1.5	
76	200	PC/PS	Valley	04-141		1.0		1.5	
76	200	PC/PS	Valley	02-221		1.0		1.5	
76	200	PC/PS	Valley	02-231		1.0		1.3	
71	414	CIP	Coast	04-042	1.1	1.8		2.5	
71	316	CIP	Coast	04-342	1.0	1.4		2.5	
71	279	CIP	Coast	04-342	1.1	1.2		2.5	
71	309	CIP	Coast	04-342	1.1	1.3		3.0	
71	267	CIP	Coast	04-342	0.9	1.2		2.8	
71	277	CIP	Coast	04-342	1.0	1.2		2.2	
71	302	CIP	Coast	04-342	0.9	1.3		2.8	
71	262	CIP	Coast	04-342	1.2	1.2		2.5	
71	251	CIP	Coast	04-342	1.1	1.1		3.0	
67	95	Steel	Valley	04-231		0.8		1.6	

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Type Asphalt Impregnated Polyurethane Foam

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
67	95	Steel	Valley	04-241		0.8		1.6	
67	95	Steel	Valley	04-141		0.8		1.8	
67	95	Steel	Valley	04-241		0.8		1.8	
67	125	Steel	Valley	04-131		1.0		1.5	
67	125	Steel	Valley	04-231		1.0		1.5	
67	110	Steel	Valley	04-141		0.9		1.8	
67	110	Steel	Valley	04-231		0.9		1.5	
67	100	Steel	Valley	04-131		0.8		1.5	
67	100	Steel	Valley	04-031		0.8		1.6	
67	95	Steel	Valley	04-131		0.8		1.8	
67	95	Steel	Valley	04-131		0.8		1.5	
60	160	Steel	Valley	05-142		1.2		1.3	
60	160	Steel	Valley	05-022		1.2		1.3	
60	0	PC/PS	Valley	05-240		0		1.7	
60	46	PC/PS	Valley	05-240		0.2		1.7	
60	49	PC/PS	Valley	05-140		0.2		1.7	
60	89	PC/PS	Valley	05-130		0.4		1.7	
60	89	PC/PS	Valley	05-130		0.4		1.7	
60	47	PC/PS	Valley	05-130		0.2		1.7	
60	PN 0	CIP	Valley	05-440		0		1.7	
60	111	CIP	Valley	05-040		0.5		1.7	
60	215	CIP	Valley	05-142		1.1		1.7	
60	235	CIP	Valley	05-042		1.2		1.7	
60	275	CIP	Valley	05-141		1.4		1.7	

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Type Asphalt Impregnated Polyurethane Foam

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
60	145	CIP	Valley	05-041		0.7		1.7	
60	PN 0	CIP	Valley	05-440		0		1.7	
58	123	PS	Coast	05-140		0.5			
58	123	PS	Coast	05-140		0.5			
58	200	PS	Coast	05-241		0.9			
58	200	PS	Coast	05-241		0.9			
58	200	PS	Coast	05-241		0.9			
58	200	PS	Coast	05-241		0.9			
57	39	PC/PS	Ocean	04-230		0.1		1.8	
57	78	PC/PS	Ocean	04-230		0.3		1.8	
57	78	PC/PS	Ocean	04-330		0.3		2.0	
57	78	PC/PS	Ocean	04-330		0.3		1.8	
57	78	PC/PS	Ocean	04-330		0.3		1.8	
57	78	PC/PS	Ocean	04-320		0.3		1.8	
57	39	PC/PS	Ocean	04-320		0.1		2.0	
57	175	CIP	Ocean	01-221		0.6		1.5	
57	175	CIP	Ocean	01-221		0.6		1.5	
57	25	CIP	Ocean	04-340		0.1		1.5	
57	100	CIP	Ocean	04-340		0.3		1.5	
57	100	CIP	Ocean	04-340		0.3		1.5	
57	25	CIP	Ocean	04-320		0.1		1.5	
57	25	CIP	Ocean	04-340		0.1		1.5	
57	100	CIP	Ocean	04-330		0.3		1.5	
57	100	CIP	Ocean	04-240		0.3		1.5	

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Type Asphalt Impregnated Polyurethane Foam

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
57	25	CIP	Ocean	04-220		0.1		1.5	
50	80	PC/PS	Coast	05-340		0.3		1.5	
50	80	PC/PS	Coast	05-340		0.3		1.5	
50	80	PC/PS	Coast	05-340		0.3		1.5	
50	80	PC/PS	Coast	05-340		0.3		1.5	
50	80	PC/PS	Coast	05-240		0.3		1.5	
50	80	PC/PS	Coast	05-240		0.3		1.5	
48	320	CIP	Coast	04-342		1.4		2.5	
48	300	CIP	Coast	04-342		1.3		2.5	
42	300	CIP	Valley	04-022		1.5		1.5	
42	300	CIP	Valley	04-022		1.5		1.9	
42	339	CIP	Valley	04-123		1.7		1.6	
39	156	Steel	Desert	03-342		1.2			
39	142	Steel	Desert	03-342		1.1			
39	0	Steel	Desert	03-340		0.2			
35	180	CIP	Valley	03-001		0.9			
35	180	CIP	Valley	03-021		0.9			
35	180	CIP	Valley	03-121		0.9			
35	PN 62	CIP	Valley	03-020		0.3			
35	PN 62	CIP	Valley	03-000		0.3			
35	PN 62	CIP	Valley	03-110		0.3			
17	35	CIP	Coast	05-240		0.1		1.5	
3	160	PC/PS	Valley	01-121	0.9	0.8			
3	160	PC/PS	Valley	03-021	0.4	0.8			

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Type Asphalt Impregnated Polyurethane Foam

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
3	160	PC/PS	Valley	01-221	0.8	0.8			
3	160	PC/PS	Valley	01-121	0.8	0.8			
3	160	PC/PS	Valley	01-141	0.8	0.8			(13)
3	160	PC/PS	Valley	01-141	0.9	0.8			(13)
3	160	PC/PS	Valley	01-141	0.9	0.8			(13)
3	160	PC/PS	Valley	01-141	0.8	0.8			(13)
3	160	PC/PS	Valley	01-141	0.8	0.8			(13)
3	160	PC/PS	Valley	01-121		0.8			
13	330	CIP/PS	Coast	01-142	1.4	1.4		2.0	
2	210	CIP	Valley	04-142	1.0	1.0			(13)
2	210	CIP	Valley	04-141	0.9	1.0			
2	147	CIP	Valley	04-142	1.0	0.8			(13)

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Type Polyurethane Foam With Extruded Neoprene Jacket

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
142	161	PC/PS	Valley	02-231	0.4	0.8	3.0	2.7	⑤
142	161	PC/PS	Valley	02-421	0.1	0.8	2.6	2.4	
142	161	PC/PS	Valley	02-441	0.2	0.8	2.8	2.4	
142	161	PC/PS	Valley	02-231	0.5	0.8	3.0	2.7	⑤
142	161	PC/PS	Valley	02-331	0.4	0.8	3.1	2.6	⑤
142	161	PC/PS	Valley	02-331	0.3	0.8	2.0	1.8	
142	161	PC/PS	Valley	02-331	0.4	0.8	2.7	2.5	
142	161	PC/PS	Valley	02-331	0.5	0.8	3.0	2.5	⑤
142	188	CIP/PS	Valley	02-131	0.8	0.9	3.1	2.8	⑤
142	108	CIP/PS	Valley	02-431	0.1	0.5	2.5	2.0	
142	161	PC/PS	Valley	02-331	0.5	0.8	2.6	2.5	
142	161	PC/PS	Valley	02-441	0.5	0.8	2.8	2.3	
142	161	PC/PS	Valley	02-331	0.4	0.8	2.0	2.0	
142	161	PC/PS	Valley	02-331	0.2	0.8	2.8	2.2	
142	161	PC/PS	Valley	02-431	0.4	0.8	2.3	2.2	
142	161	PC/PS	Valley	02-331	0.3	0.8	2.4	2.2	
142	161	PC/PS	Valley	02-331	0.4	0.8	2.5	2.2	
142	161	PC/PS	Valley	02-341	0.4	0.8	2.0	1.9	
142	161	PC/PS	Valley	02-441	0.5	0.8	2.5	2.2	
142	161	PC/PS	Valley	02-431	0.4	0.8	2.1	2.0	
137	130	CIP	Desert	02-411		0.7		2.3	

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Type Transflex 200

REPORT NO.	CONTRIBUTARY LENGTH (FT.) ①	STRUCTURE TYPE	LOCATION	RATING	MOVEMENT		JOINT ② WIDTH (IN.)		NOTE
					ACTUAL (IN.) ③	EXPECTED (IN.) ④	MAX.	AVG.	
49	160	PC/PS	Valley	05-431	0.5	0.8		1.5	
49	160	PC/PS	Valley	04-031	0.6	0.8		1.5	(14)

Type Transflex 400

B.C.	295	CIP/PS	LA	01-442	1.0	1.3			(15)
B.C.	384	CIP/PS	LA	01-443	1.5	1.7			(15)
B.C.	387	CIP/PS	LA	01-444	2.1	1.7			(15)
S.R.	465	CIP	Coast	01-444	2.0	2.1			(15)
S.R.	515	CIP	Coast	01-444	1.8	2.3			(15)
S.R.	600	CIP	Coast	01-444	2.0	2.7			(15)

Type Hot Pour Polymer - Superseal 444

CR	PN 79	CIP/PS	Coast	02-430		0.3			

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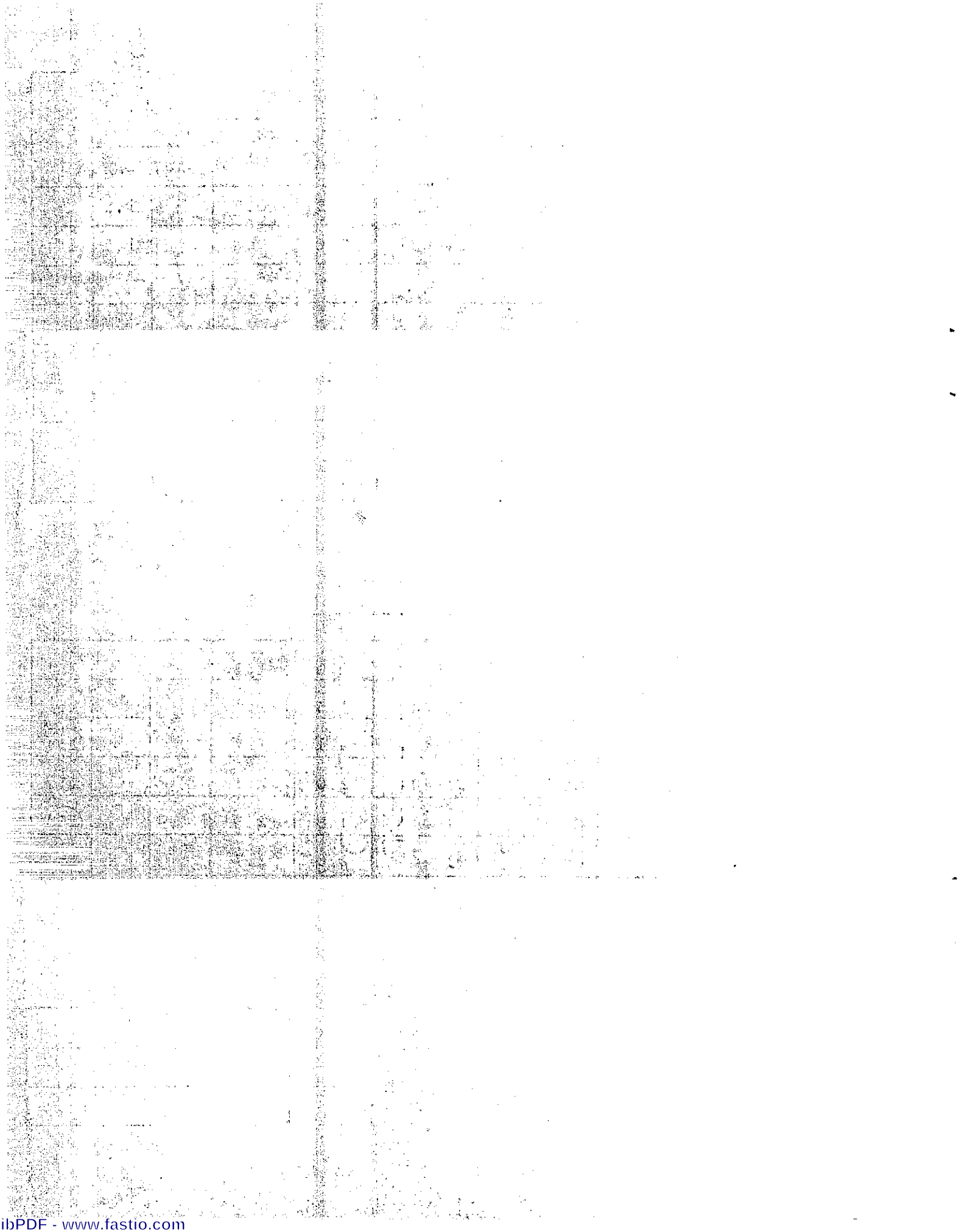

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APPENDIX C

Joint Movement Study

1) Air temperature vs. movement graphs.

2) Joint movement field data sheets.

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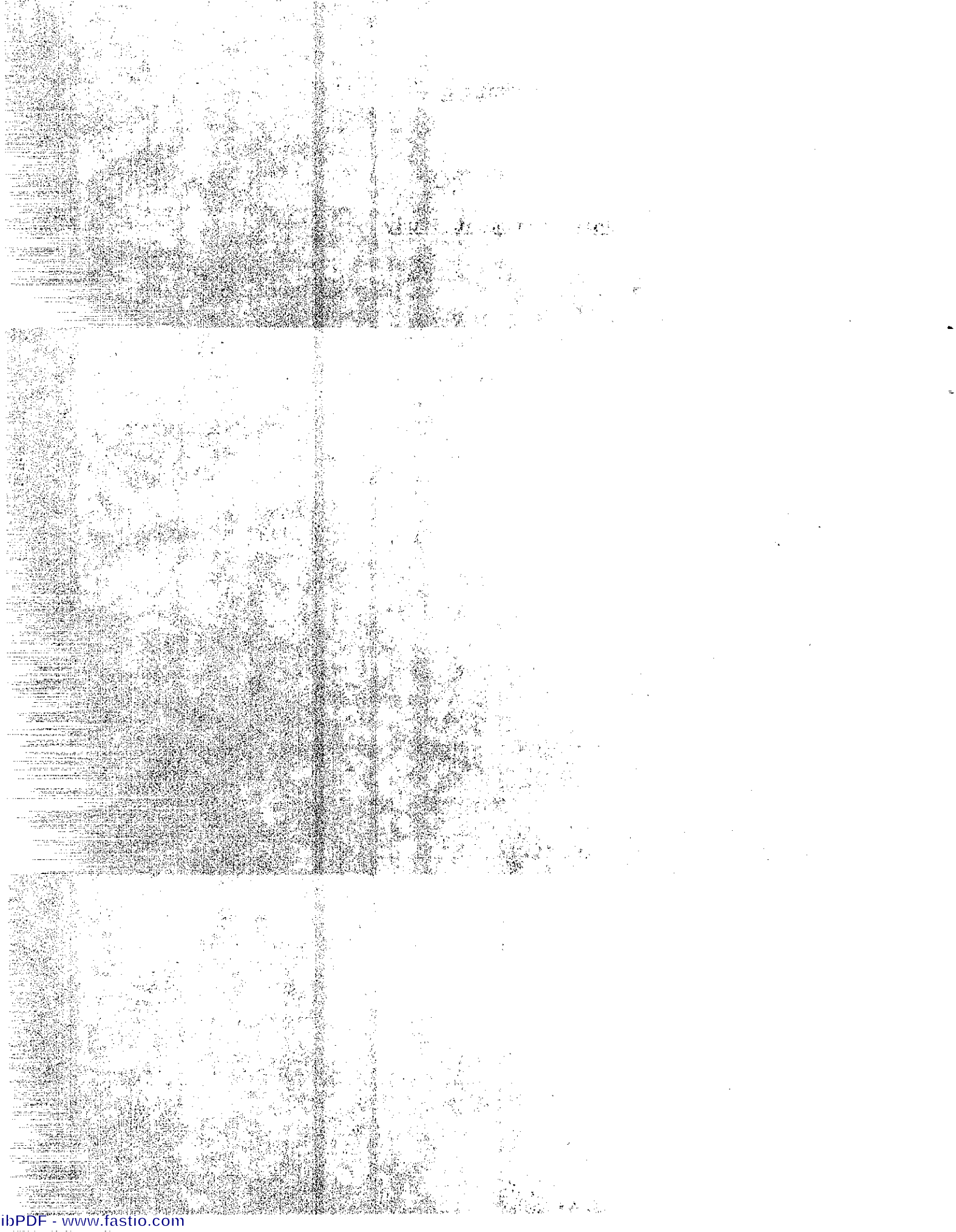

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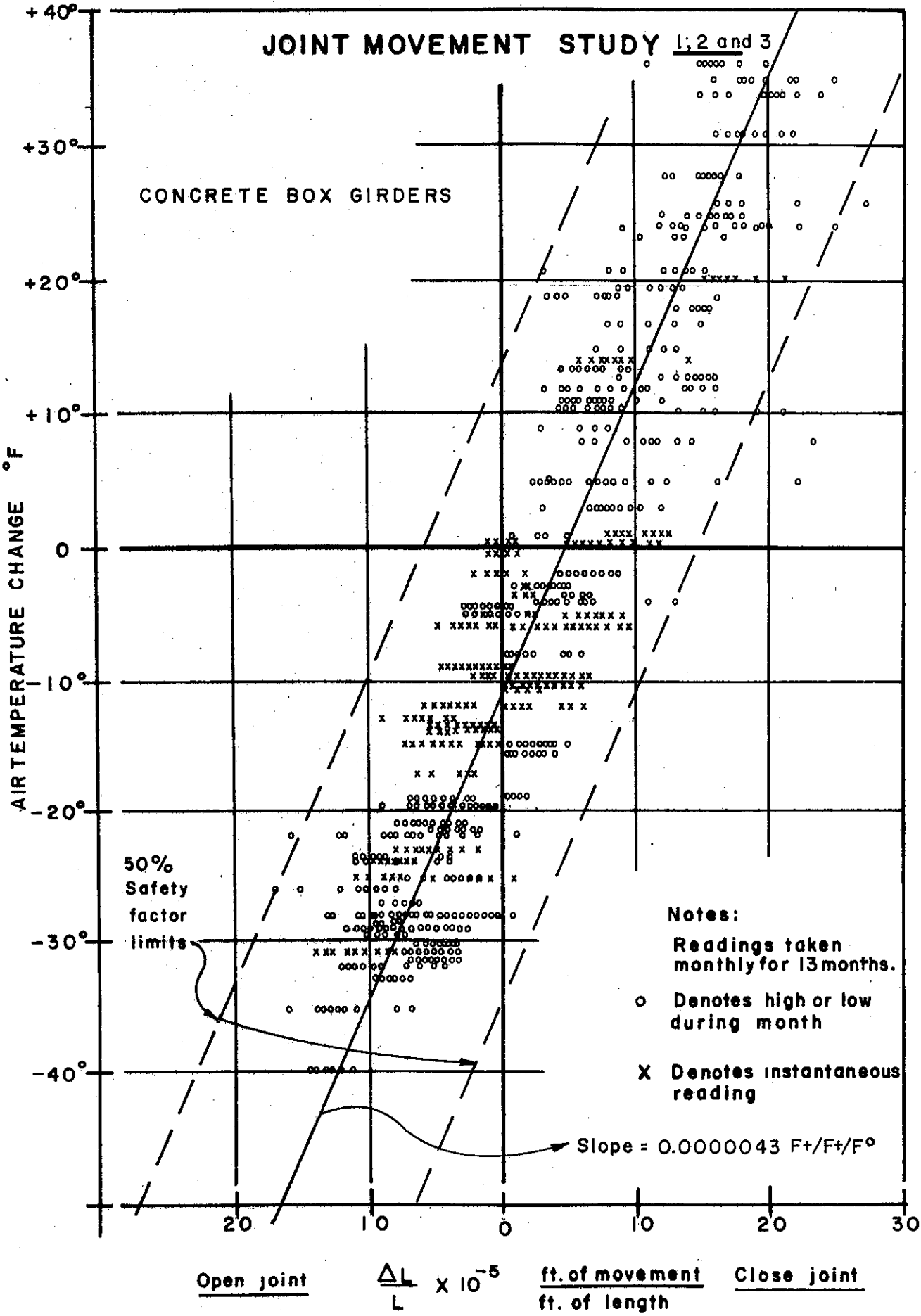

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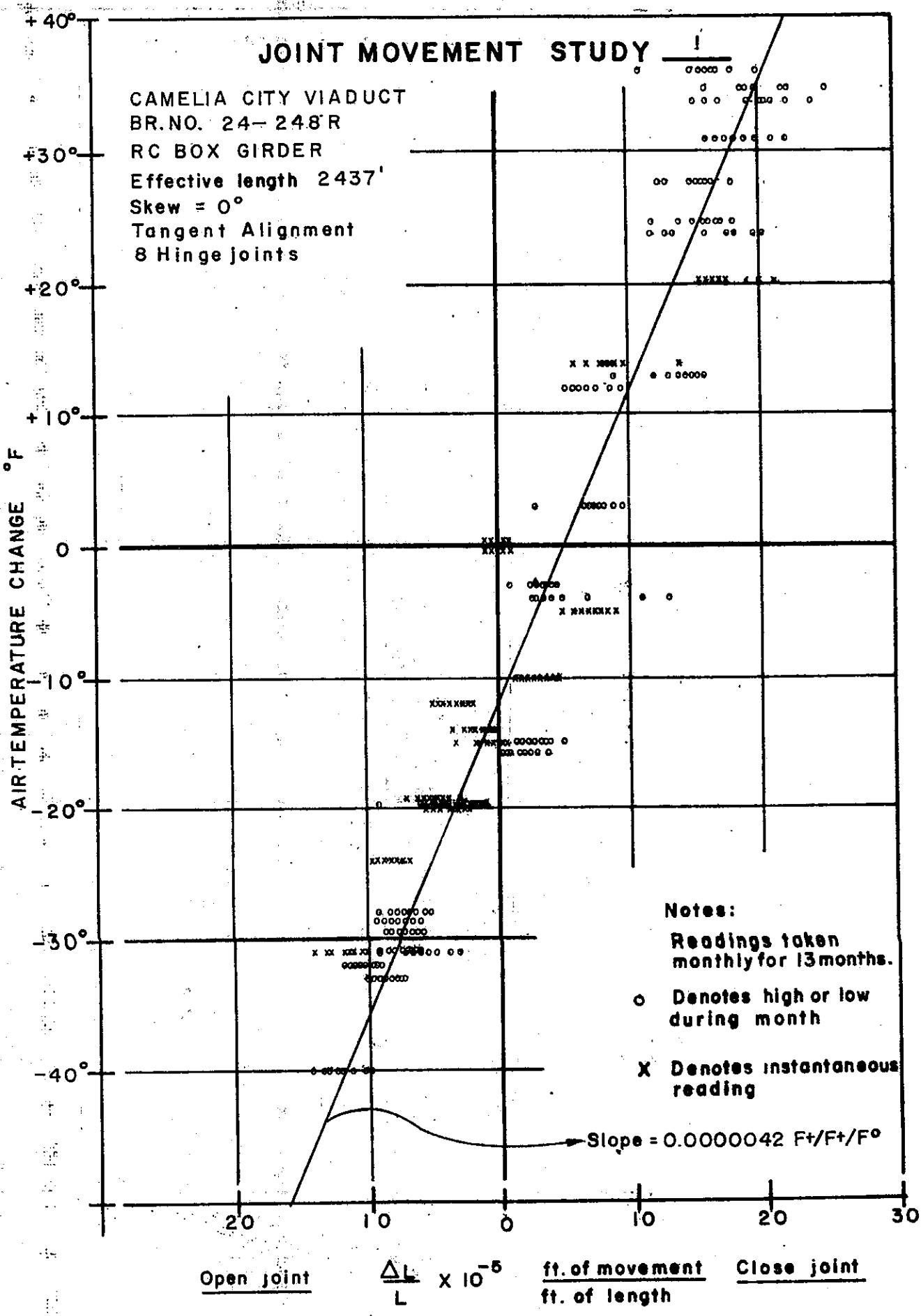

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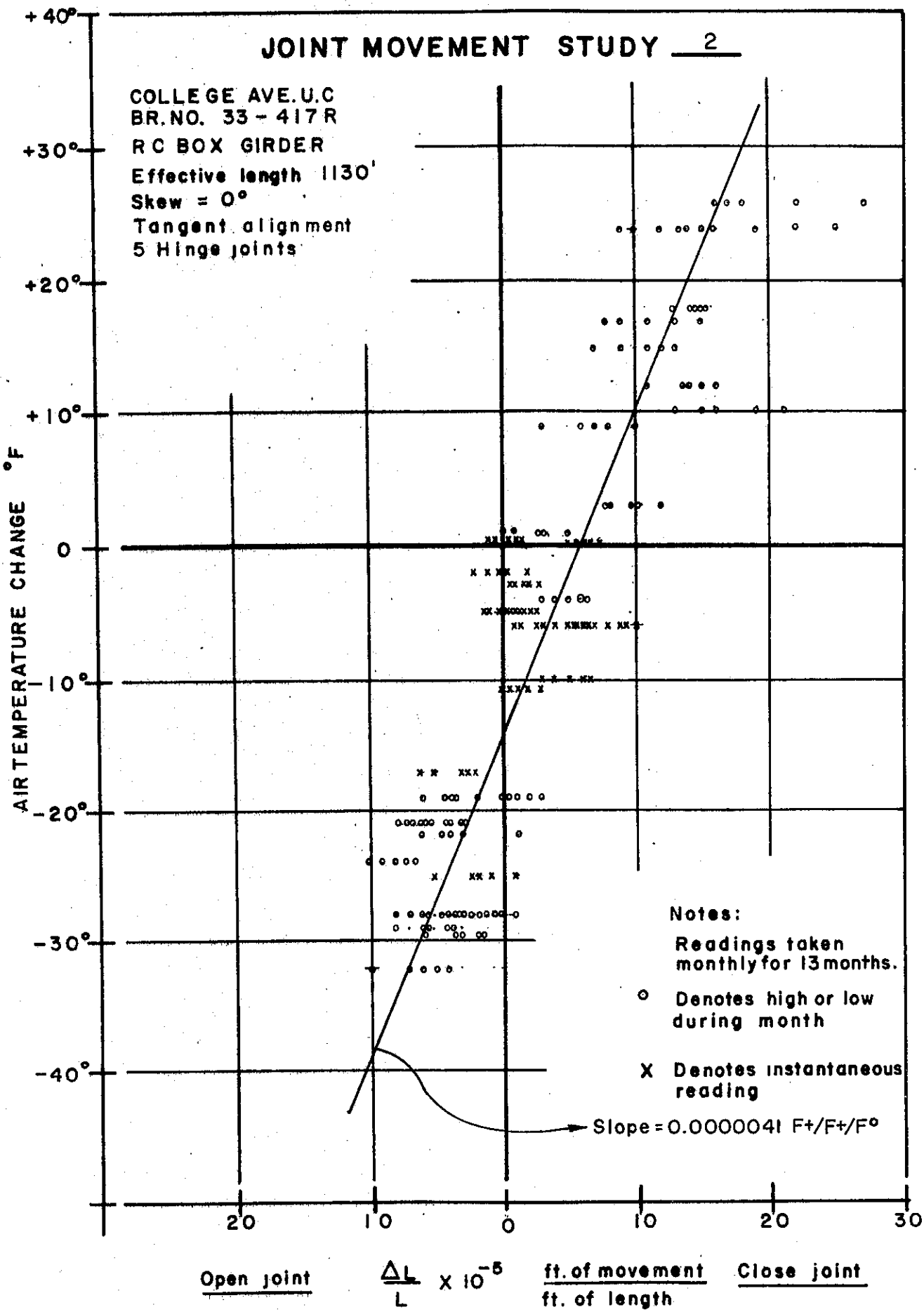

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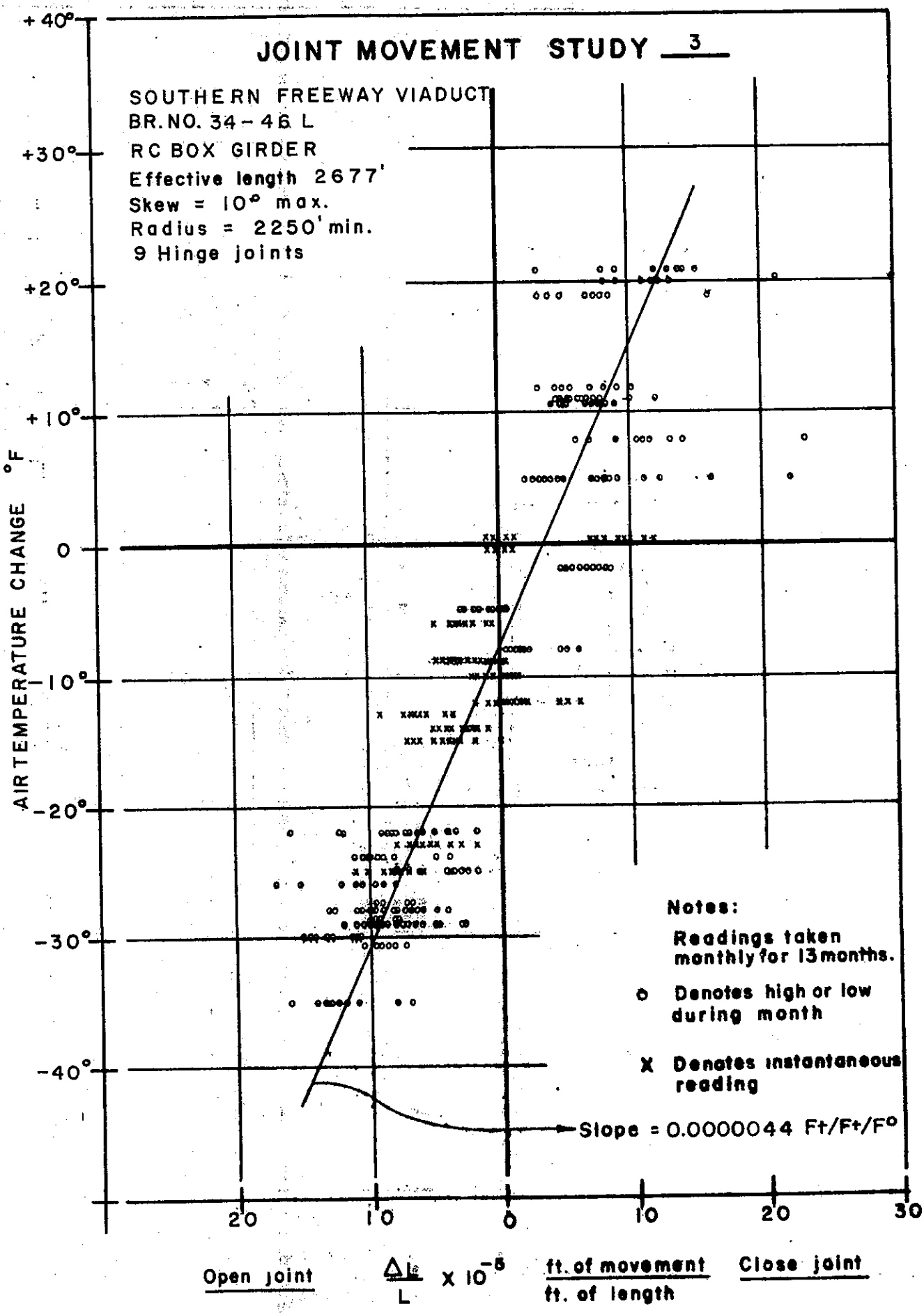

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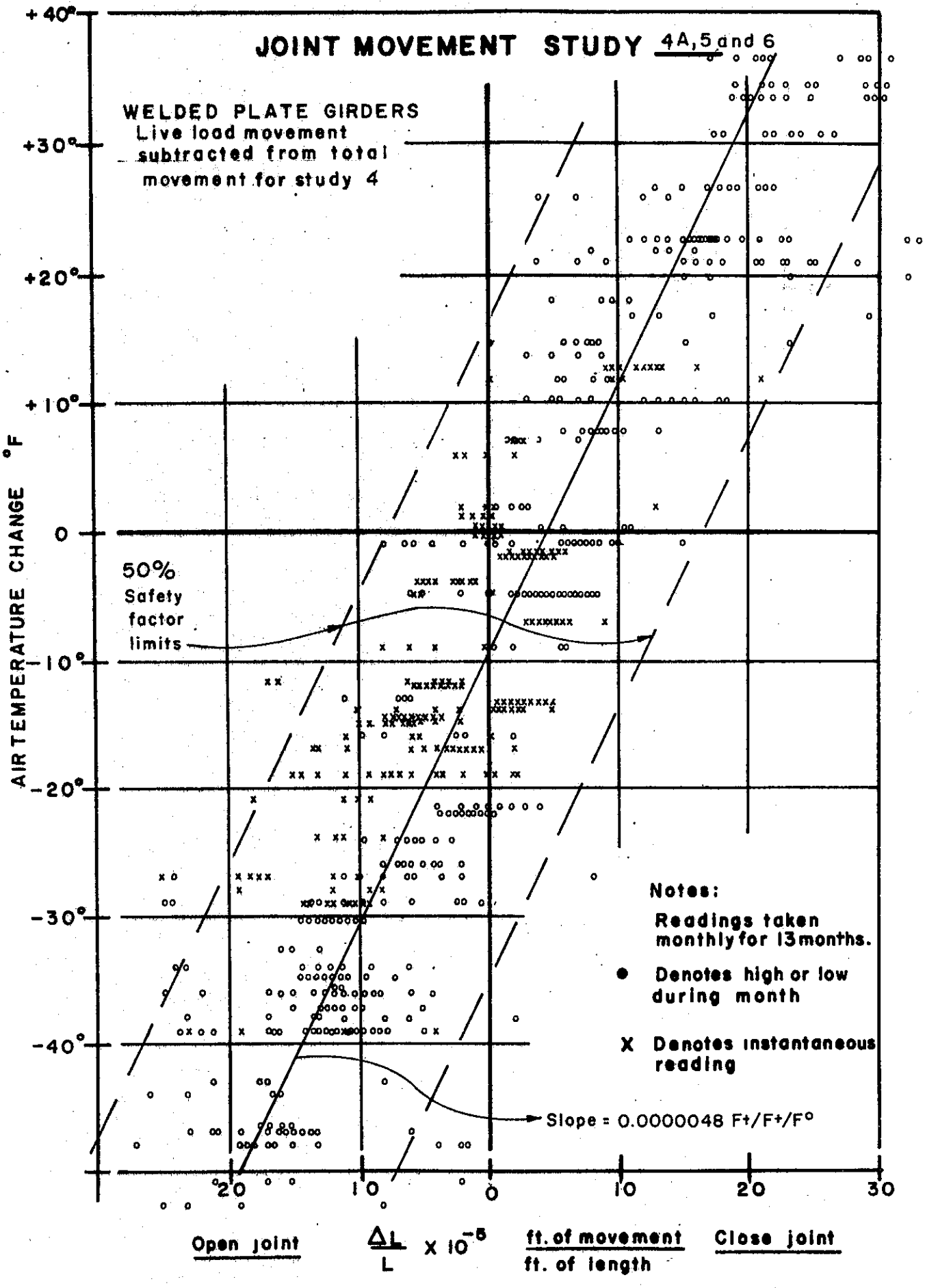
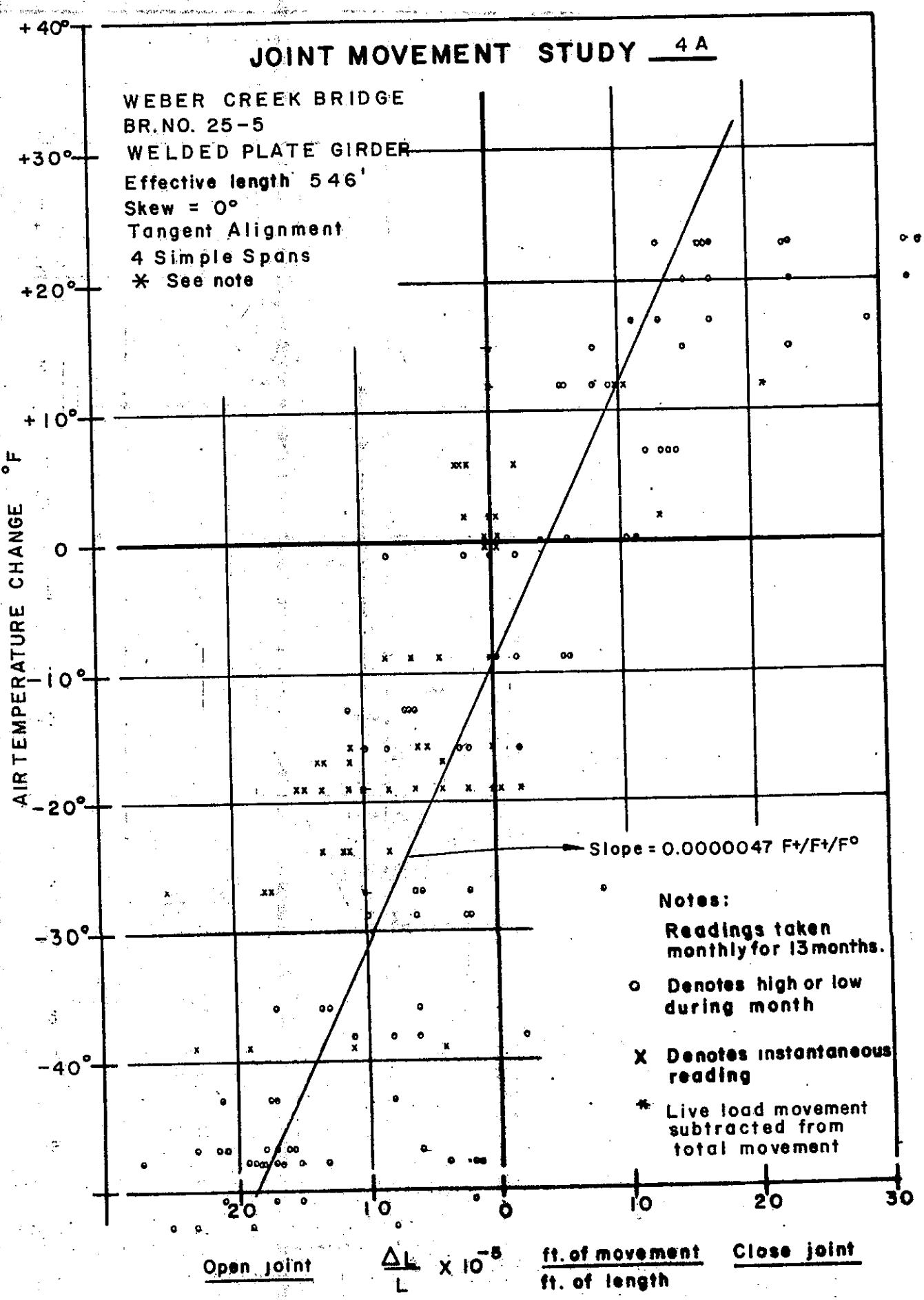
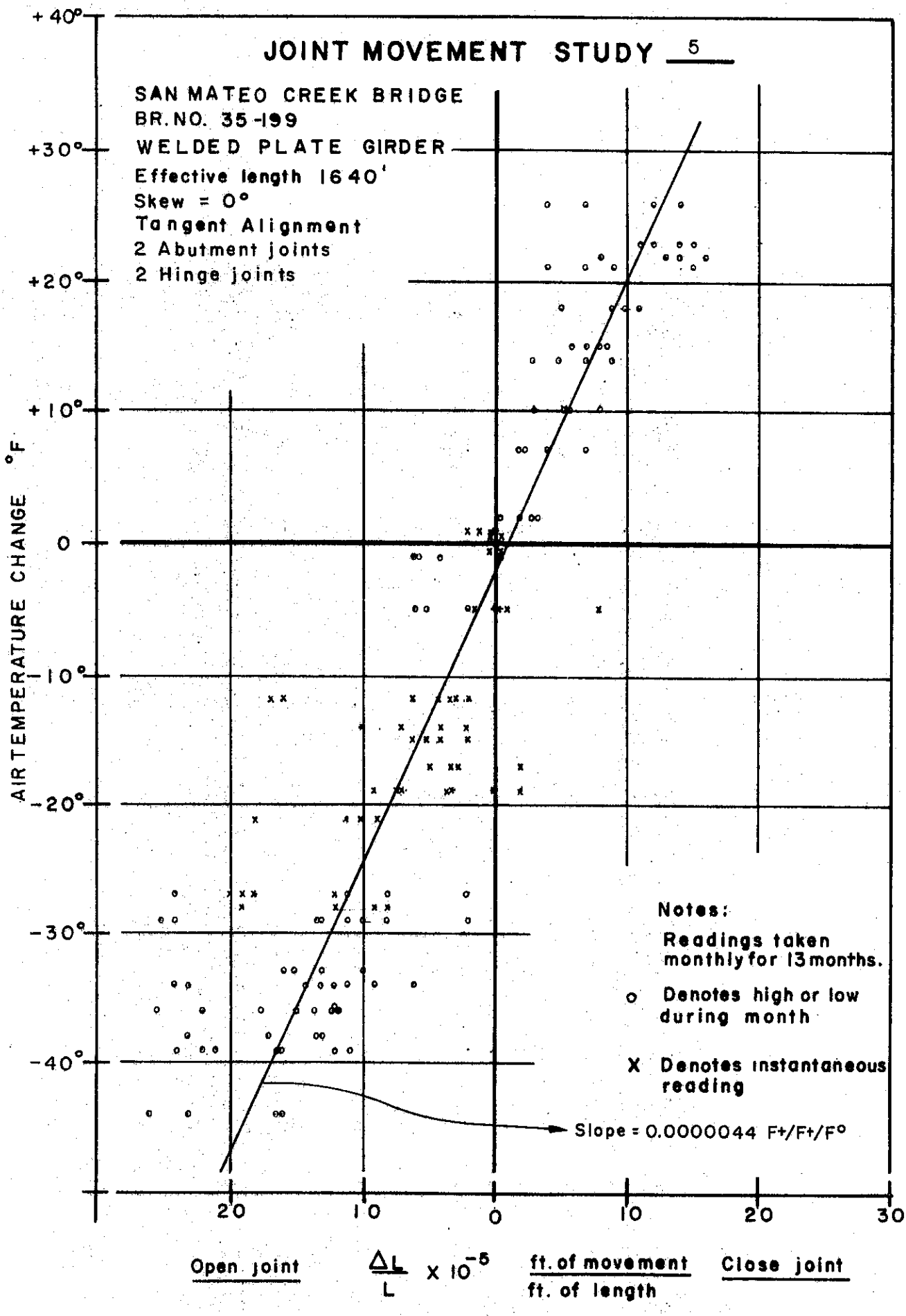


ClibPDF - www.fastio.com

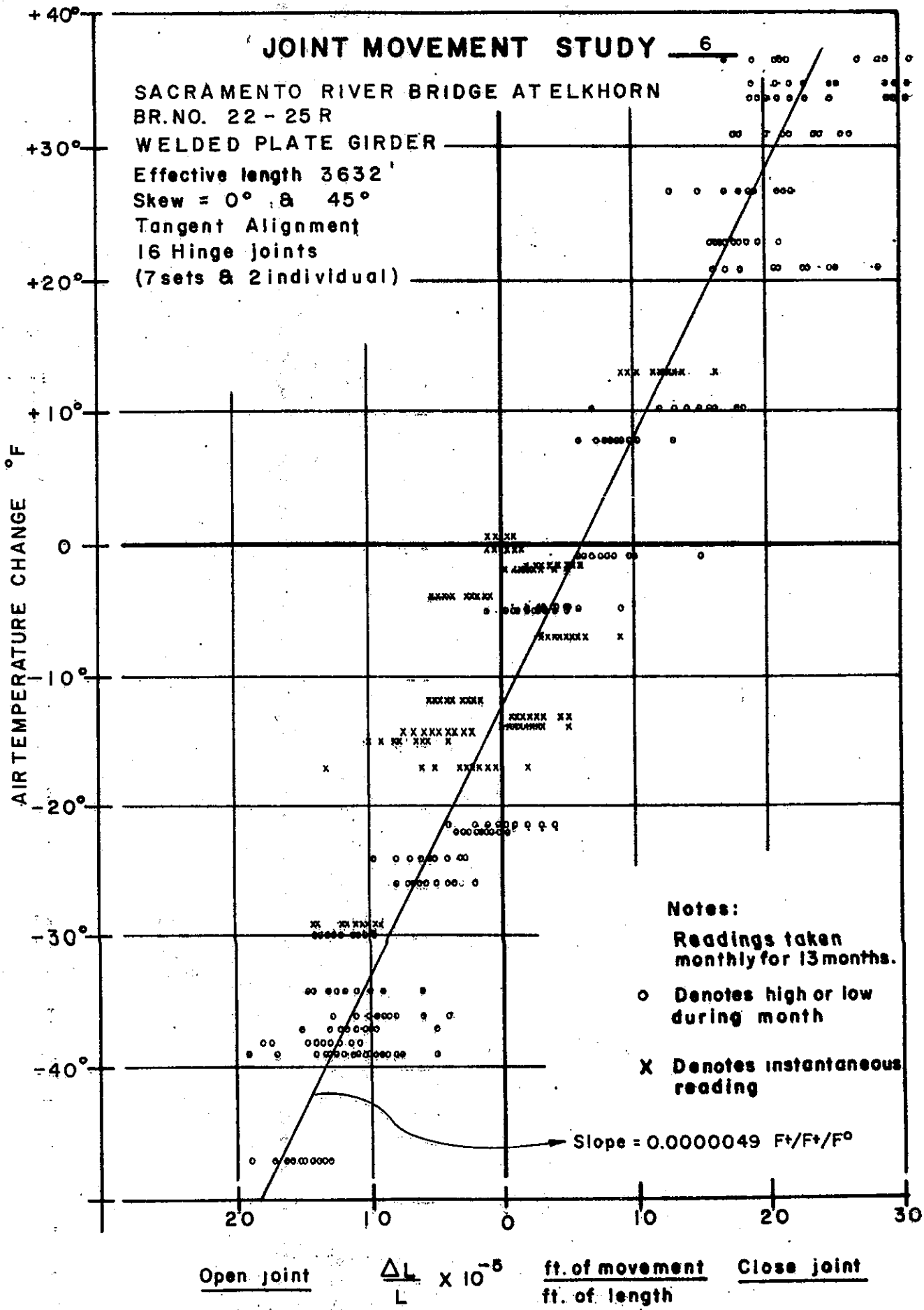
JOINT MOVEMENT STUDY 4A



ClibPDF - www.fastio.com



ClibPDF - www.fastio.com



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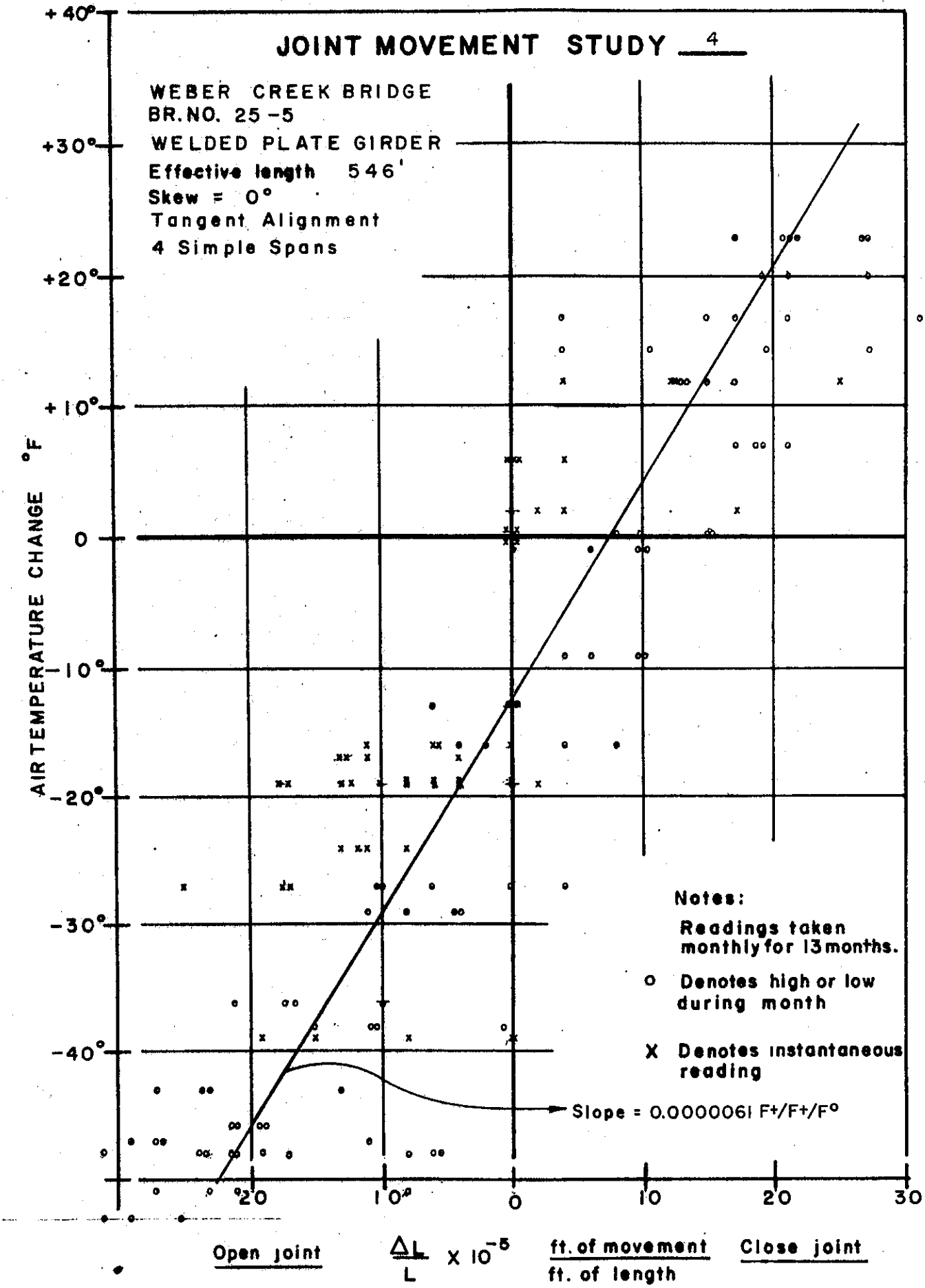

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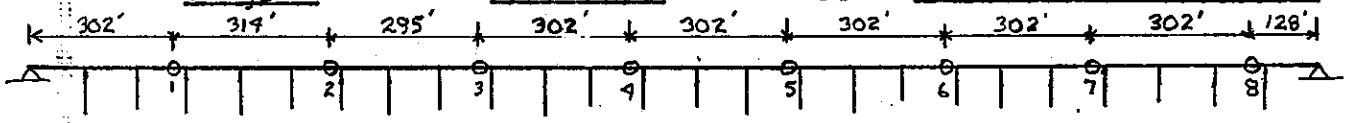
JOINT MOVEMENT STUDY # 1 sheet # 1-1

Br. # 24-248 R
Br. Camelia City Viaduct

03-Sac-80-1.7
Dist-Co-Rte-PM

Radius Tangent Skew 0° Str. type CIP-RC - Box Girder



Joint #	Contri. 'L' to Move. ft	Date	Temp today (F°)	Scribe (in 1/32") Range op	Range cl	Today op	Today cl	Movement Δl/L ftx10⁻⁵/ft Range op	Range cl	Today op	Today cl	Date	Temp today (F°)	Scribe (in 1/32") Range op	Range cl	Today op	Today cl	Movement Δl/L ftx10⁻⁵/ft Range op	Range cl	Today op	Today cl
		Temp range										Temp range									
1	350	9-17-69										10-27-69		10	21	5		7	16	4	
2	307													9	14	5		8	12	4	
3	302	70°										58°		8	17	5		7	15	4	
4	302											(-12)		8	20	4		7	17	3	
5	302	install										93°-95°		6	19	4		5	16	3	
6	302											(-29/+25)		6	20	3		5	17	3	
7	302													8	21	4		7	18	3	
8	270													9	15	5		9	14	5	
1		11-29-69		12	11	12		9	8	9		1-6-70		17	13	17		13	10	13	
2				10	7	9		9	6	8				16	5	16		14	4	14	
3		46°		9	10	9		8	9	8		39°		13	5	13		11	4	11	
4		(-24)		9	9	8		8	8	7		(-31)		14	3	13		12	3	11	
5		37°-83°		10	8	9		9	7	8		30°-67°		12	4	12		10	3	10	
6		(-33/+13)		8	10	8		7	9	7		(-40/-3)		12	5	12		10	4	10	
7				10	9	9		9	8	8				14	5	13		12	4	11	
8				10	8	9		10	8	9				13	1	13		13	1	13	
1		2-4-70		15	10	6		11	7	4		3-4-70		10	11	7		7	8	5	
2				13	13	6		11	11	5				11	4	7		9	3	6	
3		50°		12	5	4		10	4	3		50°		9	9	6		8	8	5	
4		(-20)		11	4	4		9	3	3		(-20)		8	9	6		7	8	5	
5		38°-66°		12	6	3		10	5	3		39°-73°		8	11	5		7	9	4	
6		(-32/-4)		13	15	4		11	13	3		(-31/+3)		8	8	5		7	7	4	
7				10	4	4		9	3	3				9	8	5		8	7	4	
8				11	4	5		11	4	5				7	9	5		7	9	5	
1		4-9-70		6	20	0		4	15	0		5-12-70		8	24	2		6	18	1	
2				10	10	3		9	9	3				10	14	4		9	12	3	
3		55°		9	15	1		6	13	1		56°		8	15	2		7	13	2	
4		(-15)		7	16	1		6	14	1		(-14)		9	23	3		8	20	3	
5		39°-83°		7	19	0		6	15	0		40°-94°		7	23	1		6	20	1	
6		(-31/+13)		4	16	0		3	14	0		(-30/+24)		7	15	1		6	13	1	

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JOINT MOVEMENT STUDY # 1 sheet # 1-2

Br. # 24-248R
Br. _____ Dist-Co-Rte-PM

Radius _____ Skew _____ Str. type _____

Joint #	Contri. 'L' to Move. ft	Date / Temp today (F°) / Temp range	Scribe (in 1/32") Range op	Range cl	Today op	Today cl	Movement $\frac{\Delta l}{L}$ ftx10^{-5} / ft Range op	Range cl	Today op	Today cl	Date / Temp today (F°) / Temp range	Scribe (in 1/32") Range op	Range cl	Today op	Today cl	Movement $\frac{\Delta l}{L}$ ftx10^{-5} / ft Range op	Range cl	Today op	Today cl
7		4-9-70	6	14	0		5	12	0		5-12-70	8	18	1		7	16	1	
8			7	16	0		7	15	0			6	19	1		6	18	1	
1		6-29-70	4	21		3	3	16		2	7-22-70		3/20		8		2/15		6
2			10	20		2	9	17		2			3/13		6		2/11		5
3		60°	5	17		3	4	15		3	65°		3/19		8		3/16		7
4		(-10)	5	28		3	4	24		3	(-5)		4/19		8		3/16		7
5		50°-109°	6	25		3	5	22		3	55°-107°		4/20		9		3/17		8
6		(-20/+39)	1	24		3	1	21		3	(-15/+37)		2/18		7		2/16		6
7			6	22		3	5	19		3			3/21		8		3/18		7
8			6	22		4	6	21		4			5/21		9		5/20		9
1		8-17-70		2/25		23		1/19		17	9-21-70	3	25		13	2	19		10
2				0/19		18		0/16		16		5	19		7	4	16		6
3		90°		2/25		23		2/22		20	84°	2	23		10	2	20		9
4		(+20)		2/29		22		2/25		19	(+14)	2	24		11	2	21		9
5		54°-105°		2/26		24		2/22		21	50°-101°	2	25		11	2	22		9
6		(-16/+35)		1/23		19		3/20		16	(-20/+31)	2	20		8	2	17		7
7				1/22		20		1/19		17		3	21		10	3	18		9
8				4/19		18		4/18		17		1	19		19	1	18		19
1		11-17-70	8	22	8		6	16	6										
2			10	15	8		9	13	7										
3		50°	9	21	6		8	18	5										
4		(-20)	9	19	6		8	16	5										
5		42°-98°	9	19	6		8	16	5										
6		(-28/+28)	9	15	5		8	13	4										
7			9	17	6		8	15	5										
8			7	17	4		7	16	4										

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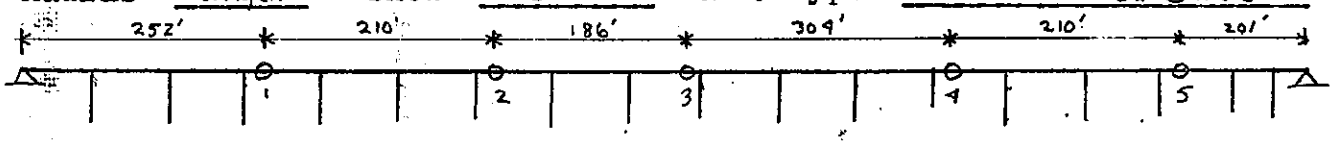
JOINT MOVEMENT STUDY # 2 sheet # 2-1

Br. # 33-417 R
Br. College Ave U.C.

04-Ala-24-3
Dist-Co-Rte-PM

Radius tangent Skew 0° Str. type CIP-RC-Box Girder



Joint #	Contri. 'L' to Move. ft	Date / Temp today (F°) / Temp range	Scribe (in 1/32") Range op	Range cl	Today op	Today cl	Movement Δl/L ftx10⁻⁵/ft Range op	Range cl	Today op	Today cl	Date / Temp today (F°) / Temp range	Scribe (in 1/32") Range op	Range cl	Today op	Today cl	Movement Δl/L ftx10⁻⁵/ft Range op	Range cl	Today op	Today cl
1	255'	9-23-69									10-27-69	4	9		1	4	9		1
2	175'											3	9		2	4	13		3
3	253'	70°									64°	3	12		4	3	12		4
4	272'										(-6)	6	11		1	6	11		1
5	175'	install									49°-85°	4	5		2	6	7		3
											(-21/+15)								
1		11-24-69	4	8	1		4	8	1		1-6-70	6	3	5		6	3	5	
2			4	7	0		6	10	0			3	2	2		4	3	3	
3		68°	0	6		2	0	6		2	53°	5	5	2		5	5	2	
4		(-2)	8	7	2		8	7	2		(-17)	10	1	6		10	1	6	
5		42°-79°	0	2	0		0	3	0		38°-71°	5	0	2		7	0	3	
		(-28/+9)									(-32/+1)								
1		2-4-70	6	5		5	6	5		5	3-4-70	2	10	2		2	10	2	
2			3	4		4	4	6		6			1/8		1		1/12		1
3		60°	4	6		6	4	6		6	45°	2	8	2		2	8	2	
4		(-10)	8	3		3	8	3		3	(-25)	6	8	5		6	8	5	
5		41°-65°	4	3		3	6	4		4	42°-73°	3	7	1		4	10	1	
		(-29/-5)									(-28/+3)								
1		4-9-70	5	13		8	5	13		8	5-12-70	4	11		6	4	11		6
2			1	14		7	1	21		10		2	11		4	3	16		6
3		64°	4	16		9	4	16		9	64°	4	14		6	4	14		6
4		(-6)	7	16		7	7	15		9	(-6)	7	15		5	7	14		5
5		42°-80°	3	13		6	4	19		9	40°-82°	2	10		4	3	15		6
		(-28/+10)									(-30/+12)								
1		6-30-70	3	16		7	3	16		7	7-21-70		2/16		2		2/16		2
2				1/17		5		1/25		7			2/18		2		3/27		3
3		70°	4	14		6	4	14		6	59°		0/18		0		0/18		0
4		(0)	6	16		5	6	15		5	(-11)		0/18		0		0/17		0
5		48°-94°	3	15		4	4	22		6	51°-96°		1/15		1		1/24		1

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JOINT MOVEMENT STUDY # 2 sheet # 2-2

Br. # 33-417 R
Br. _____ Dist-Co-Rte-PM

Radius _____ Skew _____ Str. type _____

Joint #	Contr. 'L' to Move. ft	Date / Temp today (F°) / Temp range	Scribe (in 1/32") Range op	Range cl	Today op	Today cl	Movement Δl/L ftx10⁻⁵/ft Range op	Range cl	Today op	Today cl	Date / Temp today (F°) / Temp range	Scribe (in 1/32") Range op	Range cl	Today op	Today cl	Movement Δl/L ftx10⁻⁵/ft Range op	Range cl	Today op	Today cl
1		8-17-70	2	15		2	2	15		2	9-18-70	7	13		0	7	13		0
2			3	10		2	4	15		3		3	6		1	4	9		1
3		67°	4	13		2	4	13		2	65°	6	8	1		6	8	1	
4		(-3)	6	16		1	6	15		1	(-5)	7	11	0		7	11	0	
5		51°-88°	3	10		1	4	15		1	49°-87°	4	10	1		6	15	1	
		(-19/+18)									(-21/+17)								
1		11-17-70	8	9		1	8	9		1									
2			5	13		1	7	19		1									
3		65°	7	19		1	7	14		1									
4		(-5)	10	13		0	10	12		0									
5		46°-94°	6	7		0	9	10		0									
		(-24/+29)																	

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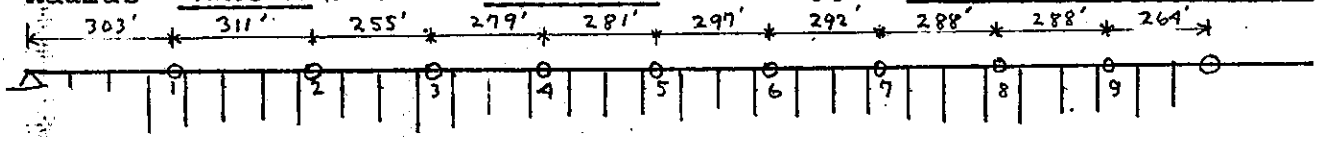
JOINT MOVEMENT STUDY # 3 sheet # 3-1

Br. # 34-46 L
Br. Southern Freeway Viaduct

04-SF-87-9
Dist-Co-Rte-PM

Radius 2250 min. Skew 10° Max Str. type CIP-RC-Box Girder



Joint #	Contri. 'L' to Move. ft	Date	Scribe (in 1/32")				Movement $\frac{\Delta l}{L}$ ftx10^{-5}				Date	Scribe (in 1/32")				Movement $\frac{\Delta l}{L}$ ftx10^{-5}			
		Temp today (F°)	Range		Today		Range		Today		Temp today (F°)	Range		Today		Range		Today	
		Temp range	op	cl	op	cl	op	cl	op	cl	Temp range	op	cl	op	cl	op	cl	op	cl
1	414	9-23-69									10-27-69	14	8	0		9	5	0	
2	316											12	6	3		10	5	3	
3	279	73°									69°	4	5	0		4	5	0	
4	309										(-9)	10	8	2		8	7	2	
5	267	install									49°-89°	9	7	1		9	7	1	
6	277											10	8	0		9	7	0	
7	302										(-29/+11)	6	7	0		5	6	0	
8	262											11	12	0		11	12	0	
9	251											10	10	0		10	10	0	
1		11-24-69	14	8	4		9	5	3		1-6-70	18/2		12		11/1		8	
2			19	3	6		12	3	5			19/4		13		16/3		11	
3		64°	7	4	2		7	4	2		48°	9/1		6		8/1		6	
4		(-9)	11	4	4		9	3	3		(-25)	14	0	9		12	0	8	
5		44°-78°	10	3	4		10	3	4		38°-68°	13/2		10		13/2		10	
6			11	4	2		10	4	2			14	0	9		13	0	8	
7		(-29/+5)	6	5	2		5	4	2		(-35/-5)	8/2		5		7/2		4	
8			11	8	3		11	8	3			14/2		11		14/2		11	
9			10	8	1		10	8	1			12	0	7		12	0	7	
1		2-4-70	15	3		3	9	2		2	3-4-70	11	8	9		7	5	6	
2			16	1		1	13	1		1		12	6	9		10	5	8	
3		61°	9	1		1	8	1		1	50°	5	6	3		5	6	3	
4		(-12)	12	2		2	10	2		2	(-23)	9	8	7		8	7	6	
5		45°-65°	11	2		2	11	2		2	45°-71°	7	7	6		7	7	6	
6			11	5		5	10	5		5		9	8	6		8	7	6	
7		(-28/-8)	7	1		1	6	1		1	(-28/-2)	5	6	2		4	5	2	
8			11	6		6	11	6		6		6	8	4		6	8	4	
9			9	5		5	9	5		5		7	8	6		7	8	6	

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JOINT MOVEMENT STUDY # 3 sheet # 3-2

Br. # 34-46 L
Br. _____ Dist-Co-Rte-PM

Radius _____ Skew _____ Str. type _____

Joint #	Contri. 'L' to Move. ft	Date / Temp today (F°) / Temp range	Scribe (in 1/32") Range op	Range cl	Today op	Today cl	Movement $\frac{\Delta l}{L}$ ftx10^{-5} / ft Range op	Range cl	Today op	Today cl	Date / Temp today (F°) / Temp range	Scribe (in 1/32") Range op	Range cl	Today op	Today cl	Movement $\frac{\Delta l}{L}$ ftx10^{-5} / ft Range op	Range cl	Today op	Today cl
1		4-9-70	12	11	7		8	7	4		5-12-70	13	11	4		8	7	3	
2			12	10	2		10	8	2			12	11	1		10	9	1	
3		58°	5	7	4		5	7	4		59°	6	6	4		6	6	4	
4		(-15)	9	14	5		8	12	4		(-14)	9	16	4		8	13	3	
5		44°-78°	9	11	5		9	11	5		44°-81°	8	19	3		8	14	3	
6			9	10	6		8	9	6			8	12	4		7	11	4	
7		(-29/+5)	4	10	3		3	8	3		(-29/+8)	4	13	2		3	11	2	
8			8	22	7		8	22	7			7	23	5		7	23	5	
9			10	15	7		10	16	7			8	11	5		8	11	5	
1		6-29-70	10	14		14	6	9		9	7-21-70	9	15		2	6	9		1
2			5	9		9	4	8		8		5	10	1		4	8	1	
3		73°	2	12		8	2	11		7	61°	5	15	0		5	14	0	
4		(0)	5	19		12	4	12		10	(-12)	7	17		1	6	14		1
5		48°-93°	4	12		10	4	12		10	51°-94°	2	12		0	2	12		0
6			missing									missing							
7		(-25/+20)	4	16		8	3	13		7	(-22/+21)	5	15	3		4	13	3	
8			7	30		11	7	30		11		16	3		1	16	3		1
9			8	20		11	8	21		11		12	14		1	12	15		1
1		8-17-70	12	14	10		8	9	6		9-18-70	15	11	4		9	7	3	
2			10	4	8		8	3	7			17	11	2		11	9	2	
3		60°	7	9	4		7	8	4		67°	18	7	1		17	7	1	
4		(-13)	11	3	8		9	3	7		(-6)	13	6	3		11	5	3	
5		51°-85°	8	3	6		8	3	6		49°-84°	9	4	3		9	4	3	
6			missing									missing							
7		(-22/+12)	9	12	7		8	10	6		(-26/+11)	10	10	4		8	8	3	
8			7	5	4		7	5	4			12	8	1		12	8	1	
9			12	7	9		12	7	9			14	5	5		15	5	5	

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JOINT MOVEMENT STUDY # 3 sheet # 3-3

Br. # 34-46 L

Br. _____ Dist-Co-Rte-PM

Radius _____ Skew _____ Str. type _____

Joint #	Contri. 'L' to Move. ft	Date / Temp today (F°) / Temp range	Scribe (in 1/32") Range op	Range cl	Today op	Today cl	Movement $\frac{\Delta l}{L}$ ftx10^{-5}/ft Range op	Range cl	Today op	Today cl	Date / Temp today (F°) / Temp range	Scribe (in 1/32") Range op	Range cl	Today op	Today cl	Movement $\frac{\Delta l}{L}$ ftx10^{-5}/ft Range op	Range cl	Today op	Today cl
1		11-17-70	18	12		2	11	8		1									
2			17	4	2		14	3	2										
3		63°	12	4	0		11	4	0										
4		(-10)	16	6	0		13	5	0										
5		43°-42°	13	8		1	13	8		1									
6																			
7		(-30/+19)	13	8	2		11	7	2										
8			14	16		1	14	16		1									
9			14	8		1	15	8		1									

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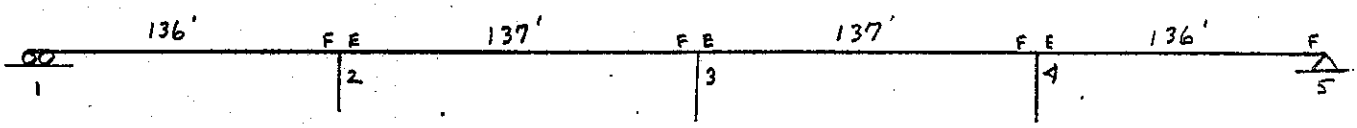
JOINT MOVEMENT STUDY # 4 sheet # 4-1

Br. # 25-5
Br. Weber Cr. Bridge

03-ED-50-15
Dist-Co-Rte-PM

Radius Tangent Skew 0° Str. type Welded Plate Girder



Joint #	Contri. 'L' to Move. ft	Date	Scribe (in 1/32")				Movement $\frac{\Delta l}{L}$ ftx10^{-5}				Date	Scribe (in 1/32")				Movement $\frac{\Delta l}{L}$ ftx10^{-5}			
		Temp today (F°)	Range		Today		Range		Today		Temp today (F°)	Range		Today		Range		Today	
		Temp range	op	cl	op	cl	op	cl	op	cl	Temp range	op	cl	op	cl	op	cl	op	cl
1	136	9-17-69									10-29-69	12	8	7		23	15	13	
2	137											7	7	2		13	13	4	
3	137	79°									62°	12	9	6		23	17	11	
4	136										(-17)	19	7	7		27	13	13	
5	0	install									36°-91°	3	4	0					
											(-43/+12)								
1		11-29-69	14	0	9		27	0	17		1-6-70	16/3		13		31/6		25	
2			6	5	2		11	10	4			damaged							
3		60°	19	3	7		27	6	13		52°	13	0	9		25	0	17	
4		(-19)	15	3	9		29	6	17		(-27)	15	0	9		29	0	17	
5		32°-78°	3	4	1						26°-66°	3	3	0					
		(-47/-1)									(-53/-13)								
1		2-4-70	19/2		7		27/4		13		3-4-70	16	3	10		31	6	19	
2			4	4	0		8	8	0			3	5	0		6	10	0	
3		60°	12	2	4		23	4	8		40°	10	5	4		19	10	8	
4		(-19)	11/1		5		21/2		10		(-39)	12	2	8		23	4	15	
5		28°-63°	3	3	0						31°-70°	2	2		2				
		(-51/-16)									(-48/-9)								
1		4-9-70	12	5	3		23	10	6		5-12-70	12	10	3		23	19	6	
2			4	8	0		8	15	0			3	10	0		6	19	0	
3		70°	9	8	2		17	15	4		63°	12	11	3		23	21	6	
4		(-9)	11	4	4		21	8	8		(-16)	11	9	6		21	17	11	
5		31°-79°	2	2	0						31°-86°	2	2	0					
		(-98/0)									(-48/+7)								
1		6-29-70	5	20		1	10	38		2	7-22-70	2	21		9	4	40		17
2			1	10		0	2	19		0		2	11		1	4	21		2
3		60°	8	14	2		15	27	4		81°	4	14		2	8	27		4
4		(-19)	6	11	3		11	21	6		(+2)	6	11		0	11	21		0
5		41°-99°	2	2	0						50°-102°	1	2		2				
		(-38/+20)									(-29/+23)								

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JOINT MOVEMENT STUDY # 1 sheet # 1-2

Br. # 25-5
Br. _____ Dist-Co-Rte-PM

Radius _____ Skew _____ Str. type _____

Joint #	Contri. 'L' to Move. ft	Date / Temp today (F°) / Temp range	Scribe (in 1/32") Range op	Range cl	Today op	Today cl	Movement $\frac{\Delta l}{L}$ ft x10^{-5} Range op	Range cl	Today op	Today cl	Date / Temp today (F°) / Temp range	Scribe (in 1/32") Range op	Range cl	Today op	Today cl	Movement $\frac{\Delta l}{L}$ ft x10^{-5} Range op	Range cl	Today op	Today cl
1		8-18-70		2/20		13		4/38		25	9-21-70	5	17		2	10	32		4
2			3	9		2	6	17		4		9	9		0	17	17		0
3		91°	5	19		7	10	27		13	85°	9	11		0	17	21		0
4		(+12)	5	11		7	10	21		13	(+6)	11	8		0	21	15		0
5		52°-102°	2	2		2					93°-96°	2	2		1				
		(-27/+23)									(-36/+17)								
1		11-17-70	11	19	6		21	27	11										
2			10	2	4		19	4	8										
3		55°	11	10	6		21	19	11										
4		(-29)	10	6	7		19	11	13										
5		33°-99°	2	2	0														
		(-46/+15)																	

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JOINT MOVEMENT STUDY # 4-A *

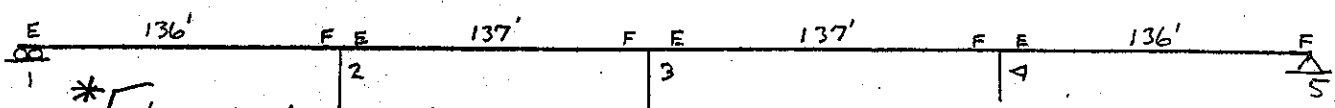
sheet # 4-1-a

Br. # 25-5

Br. Weber Cr. Bridge

03-ED-50-15
Dist-Co-Rte-PM

Radius Tangent Skew 0° Str. type Welded Plate Girder



* Live load movement as measured at '5' subtracted from movements

Joint #	Contri. 'L' to Move. ft	Date / Temp today (F°) / Temp range	Scribe (in 1/32") Range op	Range cl	Today op	Today cl	Movement Δl/L ftx10⁻⁵/ft Range op	Range cl	Today op	Today cl	Date / Temp today (F°) / Temp range	Scribe (in 1/32") Range op	Range cl	Today op	Today cl	Movement Δl/L ftx10⁻⁵/ft Range op	Range cl	Today op	Today cl
1	136	9-17-69									10-27-69	9	4	7		17	8	13	
2	137	79°									(-17)	4	3	2		8	6	4	
3	137	(0)									(-43/+12)	9	5	6		17	10	11	
4	136											11	3	7		21	6	13	
1		11-24-69	11/4		8		21/8		15		1-6-70	13/6		13		25/11		25	
2		(-19)	3	1	1		6	2	2		(-27)	damaged							
3		(-47/-1)	11/1		6		21/2		11		(-53/-13)	10/3		9		14/6		17	
4			12	0	8		23	0	15			12/3		9		23/6		17	
1		2-4-70	11/5		7		21/10		13		3-4-70	14	1	12		27	2	23	
2		(-19)	1	1	0		2	2	0		(-39)	1	3	2		2	6	4	
3		(-51/-16)	9/1		4		17/2		8		(-48/-9)	8	3	6		15	6	11	
4			8/4		5		15/8		10			10	0	10		19	0	19	
1		4-9-70	10	3	3		19	6	6		5-12-70	10	8	3		19	15	6	
2		(-9)	2	6	0		4	11	0		(-16)	1	8	0		2	15	0	
3		(-48/0)	7	6	2		13	11	4		(-48/+7)	10	9	3		19	17	6	
4			9	2	4		17	4	8			9	7	6		17	13	11	
1		6-29-70	3	18		1	6	34		2	7-22-70	1	19		7	2	36		13
2		(-19)		1/8		0		2/15		0	(+2)	1	9	1		2	17	2	
3		(-38/+20)	6	12	2		11	23	4		(-29/+23)	3	12		0	6	23		0
4			4	9	3		8	17	6			5	9		0	10	17		0
1		8-18-70		9/18		11		8/34		21	9-21-70	3	15		1	6	29		2
2		(+12)	1	7		0	2	13		0	(+6)	7	7	1		13	13	2	
3		(-27/+23)	3	12		5	6	23		10	(-36/+17)	7	9	1		13	17	2	
4			3	9		5	6	17		10		9	6	1		17	11	2	
1		11-17-70	9	12	6		17	23	11										
2		(-24)	8	0	4		15	0	8										
3		(-46/+15)	9	8	6		17	15	11										
4			8	4	7		15	8	13										

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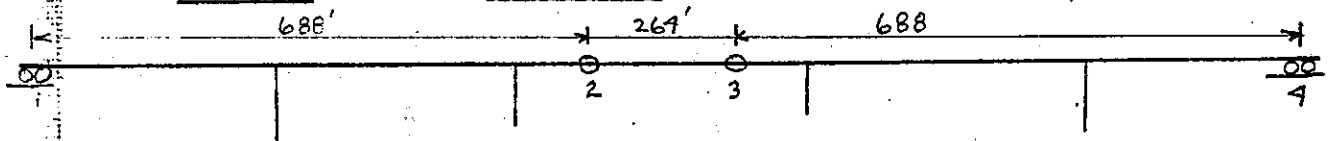
JOINT MOVEMENT STUDY # 5 Sheet # 5

Br. # 35-199
Br. San Mateo Cr. Br.

04-SM-280-14
Dist-Co-Rte-PM

Radius Tangent Skew _____ Str. type welded plate girder



Joint #	Contri. 'L' to Move. ft	Date / Temp today (F°) / Temp range	Scribe (in 1/32") Range op	Range cl	Today op	Today cl	Movement Δl/L ftx10⁻⁵/ft Range op	Range cl	Today op	Today cl
1	323	9-23-69								
2	497	75°								
3	479									
4	341	Install								
1		11-29-69	16	3	5		13	2	4	
2		61°	29	4	19		13	2	7	
3		(-14)	32	7	18		17	4	10	
4		37°-82° (-38/+7)	30	9	3		23	7	2	
1		2-4-70	19/2		4		11/2		3	
2		56°	30/12		19		16/6		7	
3		(-19)	38/10		13		21/5		7	
4		36°-70° (-39/-5)	29	0	0		22	0	0	
1		4-9-70	19	6		2	11	5		2
2		58°	22	10	6		12	5	3	
3		(-17)	30	6	10		16	3	5	
4		36°-85° (-39/+10)	32	10	4		24	8	3	
1		6-29-70	8	20		10	6	16		8
2		70°	18	27		2	9	14		1
3		(-5)	20	24		0	11	13		0
4		41°-97° (-34/+22)	32	11	2		24	8	2	
1		8-17-70	3	15	3		2	12	2	
2		63°	15	29	6		8	15	3	
3		(-12)	20	25	11		11	14	6	
4		48°-98° (-27/+23)	31	19	21		24	11	16	
1		11-18-70	16	5	12		13	4	10	
2		54°	22	13	18		12	7	9	
3		(-21)	26	16	21		14	9	11	
4		41°-96° (-34/+21)	30	20	24		23	15	18	

Date / Temp today (F°) / Temp range	Scribe (in 1/32") Range op	Range cl	Today op	Today cl	Movement Δl/L ftx10⁻⁵/ft Range op	Range cl	Today op	Today cl
10-27-69	12	8	3		10	6	2	
60°	28	16	11		15	8	6	
(-15)	30	13	8		16	7	4	
42°-90° (-33/+15)	17	11	7		13	8	5	
1-6-70	20/8		14		16/6		11	
48°	31/7		23		16/4		12	
(-27)	43/11		35		23/6		19	
31°-79° (-44/-1)	34	0	29		26	0	18	
3-4-70	15	0	11		12	0	9	
47°	22	6	16		12	3	8	
(-28)	27	5	22		15	3	12	
39°-77° (-36/+2)	29	3	25		22	2	19	
5-12-70	15	11		2	12	9		2
56°	24	6	6		13	3	3	
(-19)	32	12	12		17	7	7	
39°-89° (-36/+14)	33	7	12		25	5	9	
7-21-70	16	5	2		13	4	2	
63°	20	13	5		10	7	3	
(-12)	20	25	8		11	14	4	
46°-101° (-29/+26)	33	16	22		25	12	17	
9-18-70	2	6	0		2	5	0	
76°	16	19	2		8	10	1	
(+1)	24	16	1		13	9	1	
46°-93° (-29/+18)	31	19	3		24	11	2	

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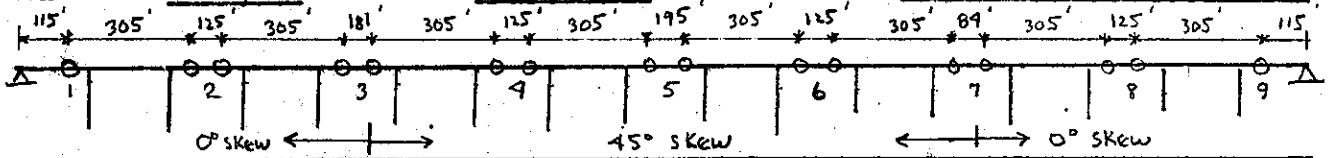
JOINT MOVEMENT STUDY # 6 sheet # 6-1

Br. # 22-25
Br. Sacramento River (Elkhorn)

03-Sac, Yol-5-39,1
Dist-Co-Rte-PM

Radius Tangent Skew 0° & 45° Str. type Welded Plate Girder



Joint #	Contri. 'L' to Move. ft	Date / Temp today (F°) / Temp range	Scribe (in 1/32") Range op	Range cl	Today op	Today cl	Movement Δl/L ftx10⁻⁵/ft Range op	Range cl	Today op	Today cl	Date / Temp today (F°) / Temp range	Scribe (in 1/32") Range op	Range cl	Today op	Today cl	Movement Δl/L ftx10⁻⁵/ft Range op	Range cl	Today op	Today cl
1	268	9-18-69									10-27-69	13	19	5		13	18	5	
2	430											11	15	4					
↓		72°									68°	12	16	4		14	19	5	
3	486											14	22	5					
↓		install									42°-95°	6	9	3		11	17	4	
4	430											12	26	7					
↓												7	9		5	12	21	1	
5	500										(-9)	11	18	4					
↓												8	12	3		10	16	4	
6	430										(-30/+23)	16	21	1					
↓												5	7	3		13	17	2	
7	390											10	29	2					
↓												6	2	0		11	18	1	
8	430											13	15	3					
↓												8	13	3		13	17	4	
9	268											10	18	2		10	17	2	
1		11-24-69	14	8	10		14	8	10		1-6-70	16	0	14		16	0	14	
2			13	2	7							16	0	11					
↓		57°	14	8	7		16	6	8		43°	16	2	12		19	1	14	
3			17	11	8							16	2	12					
↓		34°-80°	8	3	8		13	8	9		25°-67°	12	0	10		15	1	12	
4			16	9	13							18/4		18					
↓			5	13		6	13	13	4			4	12		2	13	5	10	
5		(-15)	13	10	6						(-29)	16	2	11					
↓			8	6	6		11	9	6			10	5	7		14	4	10	
6		(-38/+8)	19	14	5						(-47/-5)	21	5	13					
↓			8	2	8		16	10	8			6	0	4		16	3	10	
7			15	11	9							19	2	15					
↓			4	4	0		13	10	6			4	3	2		15	3	11	
8			13	8	5							16	3	10					
↓			10	6	6		14	8	7			12	0	9		17	2	12	
9			12	8	6		12	8	6			14	3	10		14	3	10	

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JOINT MOVEMENT STUDY # 6 sheet # 6-2

Br. # 22-25
Br. _____ Dist-Co-Rte-PM

Radius _____ Skew _____ Str. type _____

Joint #	Contri. 'L' to Move.ft	Date / Temp today (F°) / Temp range	Scribe (in 1/32") Range op	Range cl	Today op	Today cl	Movement Δl/L ftx10⁻⁵/ft Range op	Range cl	Today op	Today cl	Date / Temp today (F°) / Temp range	Scribe (in 1/32") Range op	Range cl	Today op	Today cl	Movement Δl/L ftx10⁻⁵/ft Range op	Range cl	Today op	Today cl
1		2-4-70	19	4	6		14	4	6		3-5-70	12	8		1	12	8		1
2			19	2	4							12	9		1				
3		55°	19	4	4		17	4	5		59°	12	7		2	15	10		2
3			13	6	2							12	12		7				
4		33°-67°	10	0	4		12	3	3		35°-71°	6	2	1		10	8		3
4			18/6		13							16	0	6					
4			19	4	8		19/1		13			1	19		11	10	8		3
5		(-17)	12	7		2					(-13)	8	9		5				
5			6	10		2	10	9		2		2	9		7	5	10		6
6		(-39/-5)	17	4	2						(-37/-1)	16	7		4				
6			4	0	1		13	2	2			2	3		0	11	6		2
7			16	3	5							14	6	1					
7			3	4		2	13	5	2			1	3		3	10	6		1
8			13	6	2							15	8		3				
8			9	2	2		13	5	2			7	3		0	13	7		2
9			11	6	1		11	6	1			12	15		5	12	15		5
1		4-9-70	10	15		0	10	15		0	5-12-70	11	24		1	11	23		1
2			11	19		0						8	20		0				
2		70°	10	16		2	13	18		1	58°	10	26		2	11	28		1
3			10	16		2						10	19		0				
2		36°-82°	5	8		2	8	13		2	33°-93°	5	10		1	8	16		1
4			10/2		4							15	21	6					
2			0	19		10	6	7		4		2	19		9	10	21		2
5		(-2)	8	19		0					(-14)	8	19	1					
2			0	9		5	4	12		3		2	17		5	5	17		2
6		(-36/+10)	19	19		4					(-39/+21)	19	24		1				
2			1	8		0	9	16		2		1	6		2	9	18		2
2			14	18		1						19	31		0				
2			1	3		2	10	14		2		1	4		3	10	23		2
8			12	15		2						10	22	1					
2			6	11		1	11	16		2		7	18		1	10	24		0
9			9	19		5	9	18		5		8	29		5	8	28		5

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JOINT MOVEMENT STUDY # 6 sheet # 6-3

Br. # 22-25
Br. _____ Dist-Co-Rte-PM

Radius _____ Skew _____ Str. type _____

Joint #	Contri. 'L' to Move. ft	Date / Temp today (F°) / Temp range	Scribe (in 1/32") Range op	Range cl	Today op	Today cl	Movement Δl/L ftx10⁻⁵/ft Range op	Range cl	Today op	Today cl	Date / Temp today (F°) / Temp range	Scribe (in 1/32") Range op	Range cl	Today op	Today cl	Movement Δl/L ftx10⁻⁵/ft Range op	Range cl	Today op	Today cl
1		6-29-70	5	21		4	5	20		4	7-22-70		4/22		12		4/21		12
2			6	22		2						2	29		7				
↓		65°	6	30		3	7	31		3	85°	2	23		8	2	29		9
3			7	27		2						4	29		10				
↓		48°-106°	4	12		5	6	21		4	50°-109°		3/11		9	1	19		10
4			8	21		0						1	21		9				
↓				2/16		10	4	22		6			6/18		10		3/29		12
5		(-7)	6	25		0					(+13)	3	14		5				
↓			0	13		7	3	20		4			5/18		13		1/17		10
6		(-29/+39)	13	25		4					(-22/+37)	2	30		15				
↓			0	7		5	8	19		5			2/19		6	0	27		13
7			7	32		6						1	26		18				
↓			1	3		2	5	23		5		1	5		2	1	21		13
8			12	20		4						5	29		10				
↓			4	21		3	10	25		4		1	29		9	4	29		12
9			3	31		9	3	30		9			2/32		16		2/31		16
1		8-18-70	0	26		3	0	25		3	9-21-70	4	21	3		4	20	3	
2			2	22		1						5	22	4					
↓		70°	3	26		3	3	29		2	60°	6	24	4		7	26	5	
3			4	31		3						8	28	5					
↓		50°-107°		3/12		6	1	23		5	46°-103°	0	12	0		4	21	3	
4			2	21		1						11	14	9					
↓				1/16		6	1	22		4			1/15		2	6	18	4	
5		(-2)	3	15		0					(-12)	5	11	5					
↓				4/21		8	0	19		4			1/22		2	2	18	2	
6		(-22/+35)	2	20		4					(-26/+31)	10	23	4					
↓				2/19		3	0	21		4		4	12	2		8	21	4	
7			3	33		6						5	32	3					
↓			1	4		1	3	25		5		4	4	2		6	24	3	
8			4	28		2						7	22	5					
↓			1	21		3	3	30		3		5	17	3		7	24	5	
9			2	32		6	2	31		6		5	27	2		5	26	2	

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JOINT MOVEMENT STUDY # 6 sheet # 6-9

Br. # 22-25
Br. _____ Dist-Co-Rte-PM

Radius _____ Skew _____ Str. type _____

Joint #	Contri. 'L' to Move. ft	Date / Temp today (F°) / Temp range	Scribe (in 1/32") Range op	Range cl	Today op	Today cl	Movement $\frac{\Delta l}{L}$ ftx10^{-5} / ft Range op	Range cl	Today op	Today cl	Date / Temp today (F°) / Temp range	Scribe (in 1/32") Range op	Range cl	Today op	Today cl	Movement $\frac{\Delta l}{L}$ ftx10^{-5} / ft Range op	Range cl	Today op	Today cl
1		11-17-70	12	15	8		12	15	8										
2			12	16	6														
↓		57°	11	19	6		14	18	7										
3			13	22	6														
↓		38°-99°	6	10	4		10	17	5										
4			15	20	10														
↓			0	17		6	9	22	2										
5		(-15)	5	4	5														
↓			6	20	4		6	13	5										
6		(-34/+27)	13	22	2														
↓			6	9	4		12	19	4										
7			14	28	7														
↓			6	3	0		13	21	5										
8			13	18	7														
↓			10	14	4		14	19	7										
9			11	22	4		11	21	4										

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APPENDIX D

1972 Joint Seal Standard Plan

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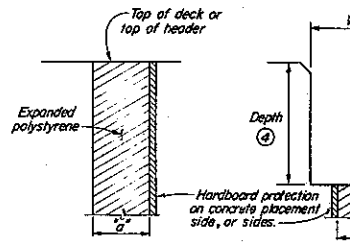
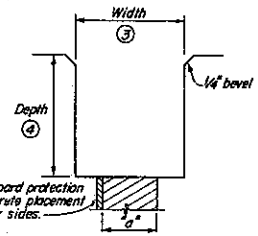
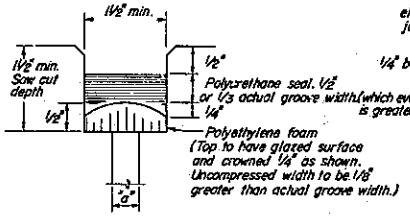


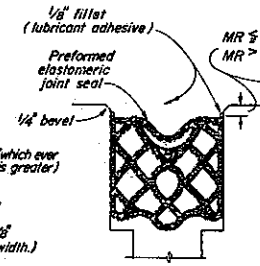
FORMING DETAIL



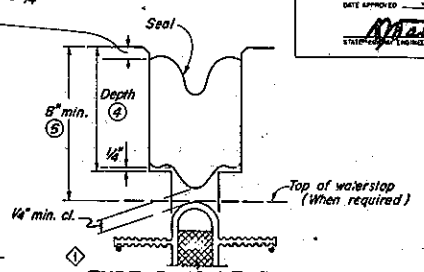
SAWCUT DETAIL



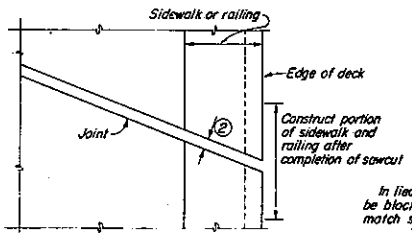
TYPE A SEAL



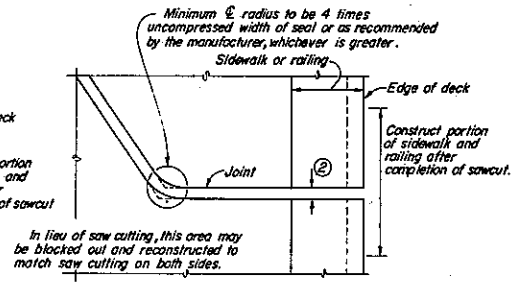
TYPE B SEAL



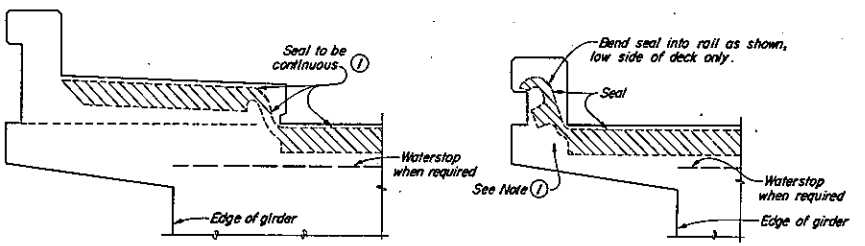
TYPE B JOINT SEAL IN MINIMUM WIDTH POSITION (W_2)



PLAN OF JOINT



PLAN OF ANGLED JOINT



Note: Type "B" Seal shown. Type "A" seals to conform to the general path of seal shown.

RAILING & SIDEWALK JOINT SEAL DETAILS

DIMENSIONS "a" OF JOINT REQUIRED

Movement Rating (M.R.) 5	Bridge Type	"a" Dimension Deck Concrete Placed: Winter	Fall-Spring	Summer
2"	All except CIP/PS	1 1/2"	1 1/4"	3/4"
	CIP/PS	1 1/4"	1"	1/2"
1 1/2"	All except CIP/PS	1 1/4"	1"	1/2"
	CIP/PS	1"	3/4"	1/2"
1"	All except CIP/PS	1"	3/4"	1/2"
	CIP/PS	3/4"	1/2"	1/2"
1/2"	All except CIP/PS	3/4"	3/4"	1/2"
	CIP/PS	1/2"	1/2"	1/2"

1

NOTES :

1. Make smooth cuts from the bottom of seal to 1 1/2" clear of top leaving at least one complete cell between the top of the cut and top of the seal. When necessary cut back of seal to clear conduit
2. Opening in rail and sidewalk to be constructed to the existing width of sawn deck joint.
3. Sawcut groove widths shall be as ordered by the Engineer.
4. Depth of sawcut : Type A - Depth to be shown above.
   Type B - Depth to be equal to or greater than the depth of seal measured along the contact surface, when compressed to minimum width position (W_2) plus dimensions shown above.
5. MR (movement rating) as shown on other detail plans.
6. Other depths must be approved by the Engineer.

BRIDGE ENGINEER — REGISTERED CIVIL ENGINEER No. 2395
DATE APPROVED JUNE 1, 1972
STATE BRIDGE ENGINEER — REGISTERED CIVIL ENGINEER No. 9073

6/72 — STATE OF CALIFORNIA BUSINESS AND TRANSPORTATION AGENCY DEPARTMENT OF PUBLIC WORKS DIVISION OF HIGHWAYS — XS-12-45

JOINT SEAL DETAILS

BRIDGE NO. | POST MILE | DRAWING NO. | SHEET | OF

REVISION DATES

1 Rev. 6/72 :

WO CU

Disregard prints bearing earlier revision dates

B6-21

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APPENDIX E

1971 Joint Seal Specifications

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(Revises Epoxy Mortar Requirements.)
(Paras. 15,16,17,18,19,20,21 and 25 are revised.)
(Use with Standard Plan B6-21.)
(Add SSP B 51.75.)
(Seal type to be selected by Bridge Design Section in accordance with Memo 21-3 to Bridge Designer.)

(ADVANCE COPY)

B 51.74
12-27-71

SEALING JOINTS.--Joints in concrete bridge decks and joints between concrete structures and concrete pavement shall be sealed in conformance with the details shown on the plans and the requirements in these special provisions.

The completed joint seal shall comply with the following requirements:

1. The seal shall be in planned position.

2. The seal shall maintain uniform and symmetrical folding.

3. The top edges of the seal shall remain in continuous contact with the sides of the groove over the entire range of joint movement and such contact shall not break when thumb pressure is applied vertically to the top of the seal at the centerline of the seal.

4. The seal shall satisfactorily resist the intrusion of foreign material and water.

If any of the requirements are not satisfied, the Contractor, at his expense shall remove the seal, repair or reconstruct the groove, and replace the seal or install new seal material.

The type of seal shall be as specified herein, or of the type specifically noted on the plans.

Either Type A or Type B seal shall be used, at the option of the Contractor, when the Movement Rating shown on the plans is one-half inch. Type A seal shall not be used when the slope along the joint is 6 percent or more, unless the Contractor demonstrates to the satisfaction of the Engineer that the seal can be satisfactorily placed.

Type B seal shall be used when the Movement Rating shown on the plans is more than one-half inch.

Pars. 3, 4, 5. Compare with plans.

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When ordered by the Engineer, a joint seal larger than called for by the Movement Rating shown on the plans shall be furnished and installed. Payment to the Contractor for furnishing the larger seal and for saw cutting the increment of additional depth of groove required will be determined as provided in Section 4-1.03, "Changes," of the Standard Specifications.

Prior to installing the seal, the Contractor shall keep the joint covered or otherwise protected to prevent debris and foreign material from entering the joint.

JOINT PREPARATION.--Except as provided herein, grooves for joint seals shall be saw cut to a uniform width and depth and to the alignment shown on the plans or as ordered by the Engineer. Both sides of the groove shall have saw cut surfaces for their full depth and shall expose sound concrete.

The depth of saw cut for Type B seals shall be equal to the depth of the seal, measured at the contact surface, plus 1 1/2 inches, instead of as shown on the plans.

Saw cutting of grooves shall not be started until seal material has been tested, approved, and delivered to the job site.

Saw cutting of grooves in deck at curb, sidewalk, or concrete railing locations shall be completed prior to constructing portions of said sidewalks and railings, as shown on the plans.

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Saw cutting of grooves will not be required at the following locations, provided that the grooves are formed to the required uniform dimensions:

1. Joints armored with steel or other metal.

2. Longitudinal joints in the bridge decks when Type A seal is used.

3. Joints where Type C seal is shown on the plans.

4. Joints constructed of epoxy headers.

5. Joints in curbs, sidewalks and railings.

The concrete saw for cutting the grooves shall be fitted with diamond blades having a core (disk) thickness not less than 3/16 inch. Double blades, cutting both sides of the groove simultaneously, shall be used for the initial cut. The completed groove measured at the top shall be within 1/8 inch of the width shown on the plans or ordered by the Engineer. The groove width measured at the bottom shall not vary from the top width by more than 1/16 inch for each 2 inches of depth.

Immediately following cutting, the lip of the groove shall be bevelled by grinding, as shown on the plans, and the groove shall then be thoroughly washed with water under pressure and blown out with high pressure air jets to remove all residue and foreign materials.

Epoxy mortar, for use in constructing the groove at curves as shown on the plans, or for repairing the groove, shall consist of a mixture of epoxy binder and aggregate. The epoxy binder shall conform to the provisions in Sections 95-1, "General," and 95-2.01, "Binder (Adhesive), Epoxy Resin Base (State Specification 681-80-28)," of the Standard Specifications, and to the requirements in this section. Aggregate shall conform to the requirements for fine aggregate for portland cement concrete in Section 90, "Portland Cement Concrete," of the Standard Specifications. Gradation shall conform to the provisions in Section 90-3.03, "Fine Aggregate Grading," of the Standard Specifications, except that submitting the gradation data will not be required. The amount of moisture in the aggregate when mixed with binder shall not exceed 0.50 percent, as determined by Test Method No. Calif. 226. The mortar shall consist of one part binder to 4 parts fine aggregate, by volume.

Para. 12. Edit.

Para. 15. State Specification 681-80-28 Epoxy shall not be used above elevation 3000, or in any freeze-thaw area. Use Section 95-2.07, "Binder (Adhesive) Epoxy Resin Base, Fast Setting (State Specification 701-80-47)" above elevation 3000 or in any freeze-thaw area, and reduce aggregate to 3 parts to one of binder.

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The minimum temperature of the epoxy mortar after mixing shall be 50° F., except that when the ambient temperature is below 50°F. the minimum temperature of the said mortar shall be 65° F. The temperature of the epoxy binder at the time of mixing shall be between 65° F. and 85° F.

The temperature of the epoxy mortar after mixing shall be between 65° F. and 80° F. The temperature of the epoxy binder at the time of mixing shall be between 65° F. and 80° F.

Heating of materials for epoxy mortar shall be done by indirect methods. Materials shall be cooled when required. The temperature of the aggregate at the time of mixing shall not be more than 90° F. The aggregate and the epoxy binder shall be mixed in equipment and by methods that result in a homogeneous mixture.

Prior to placing epoxy mortar, the entire areas to be filled or reconstructed, shall be prepared and cleaned free of all grease, asphalt, and loose and deleterious materials by abrasive blasting the concrete and exposed reinforcement. Clean aggregate shall be exposed. The areas shall be cleaned of residue by sweeping and pressure jetting with air or by other suitable means.

The areas to be filled shall be surface dry and the surface temperature shall be 50° F. or above when the epoxy mortar, or epoxy adhesive is applied. Concrete recently cured shall be air dried for not less than 2 days. Methods proposed to heat said surfaces are subject to approval by the Engineer.

Para. 16. Use below elevation 3000 and not in any freeze-thaw area, and delete paragraph 17.

Para. 17. Use above elevation 3000 or in a freeze-thaw area, and delete paragraph 16.

Para. 20. Change 50° F. to "40° F." when 701-80-47 epoxy is specified.

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Construction joints and reinforcement in existing concrete shall be coated with epoxy adhesive, conforming to the specifications herein for binder (adhesive), applied at the approximate rate of one gallon for each 25 square feet of area. The exact rate of applying epoxy adhesive shall be as ordered by the Engineer. The adhesive shall be worked onto the surface with stiff brushes, or equal. The epoxy mortar shall be placed before the adhesive begins to set. Epoxy mortar shall be placed in lifts not exceeding one inch above exposed reinforcing steel or 2 inches in total thickness. Successive lifts shall be placed before the adhesive in the lower lift begins to set. Immediately after placing each lift, the epoxy mortar shall be thoroughly tamped into place with sufficient energy to minimize air voids and bring an excess of binder to the surface. Surfaces shall be struck off to the required grade, and covered with sand bonded into the surface. Said sand shall conform to the specifications for aggregate, except that the sand shall all pass the No. 4 sieve and be retained on the No. 16 sieve.

At least 48 hours prior to installing the seal, the Contractor shall repair all spalls, fractures, breaks or voids in the concrete surfaces of the joint or groove by methods approved by the Engineer.

Prior to sealing joints, expanded polystyrene, hardboard, concrete spillage, and all foreign material shall be removed from the deck joint down to the depth of the waterstops, or the depth of the joint seal plus 3 inches, where waterstops are not used. All such material shall be removed from the entire depth of joints in curbs, sidewalks, railings, and the overhanging portion of deck slabs.

Immediately prior to placing the seal, the joints shall be cleaned by abrasive blast cleaning or by other methods approved by the Engineer and then cleaned with high pressure air jets to remove all residue and foreign material. Waterstops shall be protected from the abrasive blast.

Equipment shall be fitted with suitable traps, filters, drip pans or other devices to prevent oil or other deleterious matter from being deposited on the deck or construction joints.

Joint surfaces shall be surface dry at the time the seal is placed.

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TYPE A SEAL.--The sealant shall be a polyurethane sealant furnished and placed in accordance with the specification for "Two Component Machine Mixed Polyurethane Sealant (State Specification 701-56-39)" included in this section, "Sealing Joints."

Polyethylene foam shall be commercial quality, with a continuous, impervious, glazed top surface, suitable for retaining the liquid polyurethane sealant in the joint while hardening.

After cleaning, a primer, furnished by the manufacturer of the sealant, shall be applied to the sides of the groove and to all exposed vertical surfaces in the joint prior to placing the polyurethane sealant. The primer shall be dry prior to placing sealant. Contamination of the completed primer with foreign material will be cause for rejection of the primed surface.

A pourable 2-component polyurethane sealant which meets all of the test requirements of said State Specification 701-56-39 and, in addition, has a minimum pot life of 10 minutes at a temperature of 90° F. may be used, at the option of the Contractor. The 2 components shall be thoroughly mixed in the ratio recommended by the manufacturer with power driven agitators.

TYPE B SEAL.--The seal shall be a preformed elastomeric joint seal conforming to the specifications of ASTM Designation: D 2628, and the following requirements:

The seal shall consist of a multi-channel, nonporous, homogeneous material furnished in a finished extruded form.

The manufacturer shall designate the minimum uncompressed width of each size of seal to be furnished. Any seal which has a minimum uncompressed width, measured at any point in the height of the seal, less than that designated by the manufacturer shall not be used.

Seals delivered to the job site that have dimensional or shape tolerances of such magnitude that the seal will not function as specified in this section shall not be used.

At angles in the joint as shown in "Plan of Joint - Skew Greater than 20°" on the plan, the finished groove shall be constructed to a curve as shown for the optional curve.

Para. 30. Use when bridge is in remote construction area, and quantity of seal is less than 200 linear feet.

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The Type B seal to be furnished for this project is designated as a Type B1 Seal, and shall conform to the dimension and Movement Rating requirements, as follows:

The minimum depth of the seal, measured at the contact surface, shall be at least 95 percent of the minimum uncompressed width of the seal.

Elastomeric joint seals shall provide the Movement Ratings (M.R.) of not less than that shown on the plans. The Movement Rating equals (W_1-W_2). W_1 shall be the smaller of the values determined as follows:

1. 0.85 times the manufacturer's designated minimum uncompressed width of seal.

2. The width of seal on the third successive test cycle of the pressure-deflection test, when compressed to an average pressure of 3.0 pounds per square inch.

W_2 shall be the width of seal determined on the third successive test cycle of the pressure-deflection test, when compressed to an average pressure of 4 times the pressure measured at the seal width W_1.

Tests on elastomeric joint seals will be conducted in accordance with Test Method No. Calif. 673.

Para. 33. Use when Type B1 seal specified by Bridge Design Section.

Delete para. 34.

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The Type B seal to be furnished for this project is designated as a Type B2 seal, and shall conform to the dimension and Movement Rating requirements, as follows:

When the seal is compressed to 85 percent of minimum uncompressed width, the minimum depth of the seal, measured at the contact surface, shall be at least 60 percent of the minimum uncompressed width of the seal.

Elastomeric joint seals shall provide the Movement Ratings (M.R.) of not less than that shown on the plans. The Movement Rating equals (W_1-W_2). W_1 shall be the smaller of the values determined as follows:

1. 0.85 times the manufacturer's designated minimum uncompressed width of seal.

2. 1.15 times the minimum depth of the seal measured along the contact surface when compressed to 85 percent of the minimum uncompressed width of seal.

3. The width of seal on the third successive test cycle of the pressure-deflection test, when compressed to an average pressure of 2.0 pounds per square inch.

W_2 shall be the width of seal determined on the third successive test cycle of the pressure-deflection test, when compressed to an average pressure of 4 times the pressure measured at the seal width W_1.

Tests on elastomeric joint seals will be conducted in accordance with Test Method No. Calif. 673.

Para. 34. Use when Type B2 seal specified by Bridge Design Section.

Delete para. 33.

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The top and bottom edges of the seal, as furnished, shall maintain continuous contact with the sides of the testing device, when compressed between the limits of seal width of W_1 and W_2, and such contact shall not break when thumb pressure is applied vertically to the top of the seal at the center of the seal.

The seal shall be furnished full length for each joint with not more than one shop splice in any 60 foot length of seal. Field splices shall not be used.

The adhesive used to splice the seal shall be an effective bonding agent and shall be resistant to water and ozone. All abutting surfaces of shop splices shall be bonded together with adhesive. Shop splices shall have no visible offset of the exterior surfaces, and there shall be no visible evidence of bond failure.

After the seal has been installed in the joint, there shall be no visible evidence of bond failure at splices.

At all open ends of the seal, that would admit water or debris, each cell of the elastomeric joint seal shall be filled to a depth of about 3 inches with commercial quality open cell polyurethane foam, or closed by other methods subject to the approval of the Engineer.

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A combination lubricant and adhesive shall be liberally applied to the sides of the seal and to all vertical surfaces of the groove which will be in contact with the seal, immediately prior to installation. Just prior to applying the lubricant-adhesive, the contact surfaces of the seal shall be cleaned with normal butyl acetate, using clean rags or mops.

The lubricant-adhesive shall conform to the specification for "Lubricant-Adhesive (State Specification 701-80-30)" included in this section, "Sealing Joints." The components shall be thoroughly mixed as recommended by the manufacturer with power driven agitators.

The joint seal shall be installed with equipment suitable for the installation of elastomeric joint seals. The seal shall be positioned according to the dimensions from the top of deck shown on the plan.

The installation equipment shall not twist or distort the seal, elongate the seal longitudinally, cause other damage to the seal, nor cause structural damage to the concrete.

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CERTIFICATE OF COMPLIANCE AND TESTING.--Materials, certificates of compliance, and samples shall be furnished, and testing will be performed in accordance with the provisions in Section 6, "Control of Materials," of the Standard Specifications.

The certificate for the preformed elastomeric joint seal shall include the Movement Rating (M.R.) of the seal, the manufacturer's designated minimum uncompressed width, and the test results of the manufacturer or an independent testing agency.

Samples of the prefabricated joint seals, not less than 30 inches in length, will be taken by the Engineer from each lot of material. The samples will be selected at random from stock at the job site or at a location acceptable to the Engineer and the manufacturer. The samples shall be furnished for testing, with the certificate of compliance, 30 days in advance of proposed use.

MEASUREMENT.--All joint seals will be measured by the linear foot from end to end along the top of the completed seals.

Where individual seals are overlapped or are superimposed, each seal will be measured separately.

When the movement rating is one-half inch and the seal is either Type A or Type B, as provided for in this section, said seal will be paid for at the contract price per linear foot for joint seal (MR 1/2"). At other locations the seal will be paid for at the contract price per linear foot for the type and Movement Rating of joint seal listed in the contract items.

PAYMENT.--The contract prices paid per linear foot for joint seals of the types and Movement Ratings listed in the contract items shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in constructing the joint seals, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for constructing the curbs, sidewalks, and railings in stages as shown on the plans, forming, protecting, repairing, and cleaning joints, saw cutting and grinding bevels, and disposing of surplus material shall be considered as included in the prices paid for the contract items involved and no additional compensation will be allowed therefor.

Para. 49. Use when optional Type A - Type B seal is included.

Para. 50. Edit to suit job.

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(Add to SSP B 51.74.)

(ADVANCE COPY)

B 51.75
4-12-71

TWO COMPONENT MACHINE MIXED POLYURETHANE SEALANT (State Specification 701-56-39)

Classification:

This specification describes a 2 component, machine mixed, polyurethane joint sealant for use where movement of the joint occurs. This sealant, when properly applied against a clean sound surface, will reject foreign material, resist infiltration of water into the joint, and withstand up to ± 25 percent movement. The use of a primer against the joint faces is required.

When tested in accordance with Test Method No. Calif. 435, the sealant shall meet the following requirements:

Modulus at 150 percent elongation, pounds	8 - 75
Width of sealant after 7 days extension and one hour recovery, inches	21/32 max.
Condition 24 hours after notching	Sealant must not fail completely in adhesion or cohesion.
Condition of water immersed specimen at 7 days	Notched or loss of bond 1/4 inch, max.
Condition of specimen after 100 hours in Fadeometer	No more than slight checking or cracking.
Grease cone penetration	45 - 120

In addition to the above, sealant shall be self-levelling but cure rapidly enough to avoid flow after application on grades up to 15 percent.

Condition in Container:

There shall be no skinning in the containers of either component of the 2 component polyurethane sealant. Any settlement in the containers shall be thoroughly wetted, soft and mushy and shall be easily redispersed by hand stirring to form a smooth uniform product.

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Packaging and Labeling:

Each container shall be clearly labeled or each delivery of material in the tanks of 2-component equipment shall be accompanied with a ticket showing the State Specification number, designation (Component A or B), the manufacturer's name, lot or batch number, date of manufacture, date of packaging, date, if any, beyond which the polyurethane sealant shall not be used without additional testing and approval, and manufacturer's instructions for use.

Directions for Use:

All manufacturer's instructions shall be carefully followed.

Mixing of one or both components separately before using may be necessary.

Material which has been exposed to the atmosphere for more than 24 hours, shall not be used.

Equipment used shall be approved by the manufacturer of the sealant. Proportioning and mixing of the 2 components is critical.

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LUBRICANT - ADHESIVE
(State Specification 701-80-30)

Classification:

This specification describes a lubricant-adhesive intended for bonding preformed neoprene rubber joint seal to the concrete faces of joints. The material shall act as a lubricant for inserting the seal in the joint and as an adhesive for bonding to the joint faces.

Composition:

Composition of the lubricant-adhesive may be a one or 2-component material. In either case, the materials must meet the requirements in this specification. Two-component materials shall be mixed on a volume basis.

Physical Properties:

When tested in accordance with Test Method No. Calif. 436, the lubricant-adhesive shall have the following physical properties:

Total solids, minimum	60 percent
Lubricating life, at 77° F., minimum	30 minutes
Cure time, maximum	48 hours
Viscosity, Brookfield, at 77° F.	16,000-450,000 centipoises
Shear ratio, minimum	2.5
Peel strength test, maximum length peeled from concrete within 3 minutes	
500 gram load	None
1000 gram load	1/2 inch
Sag Test	No sagging

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Condition in Container:

There shall be no skinning in the containers of the lubricant-adhesive. Any settlement in the containers shall be thoroughly wetted, soft and mushy and shall be easily redispersed by hand stirring to form a smooth uniform product.

Packaging and Labeling:

The label of the containers shall show the State Specification number, designation if 2-component (Component A or B), the manufacturer's name, lot or batch number, date of manufacture, date of packaging and date, if any, beyond which the lubricant-adhesive shall not be used without additional testing and approval.

Directions for Use:

Lubricant-adhesive shall be mixed and applied in accordance with directions furnished by the manufacturer.

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(Add to SSP B 51.74, when Type C seal shown on plans.)

B 51.76
1-4-71

TYPE C SEAL.--The seal shall be a commercial quality polyester polyurethane foam impregnated with asphaltic bitumen, suitable for the purpose. The asphalt content shall be a minimum of 45 percent by weight of the seal.

A combination lubricant and adhesive shall be furnished and applied as recommended by the manufacturer of the seal, subject to the approval of the Engineer. The lubricant-adhesive shall be applied to the sides of the seal and to all vertical surfaces which will be in contact with the seal immediately prior to installation.

All joints in the foam seal shall be made as recommended by the manufacturer of the seal, and shall result in a continuous sealed joint.

The uncompressed width of the seal shall be at least 8 times the Movement Rating (M.R.) shown on the plans. The uncompressed width and depth of the seal shall conform to the dimensions listed in the following table:

Movement Rating, inches	Width, inches	Depth inches
1/2	4	2
1	8	4
1 1/2	12	5
2	16	6

The seal shall be delivered to the site precompressed and packaged, ready for installation. Precompression methods shall not result in an increase in the length of the uncompressed seal. An alternative procedure for compressing the seal may be proposed by the Contractor in accordance with the requirements in Section 5-1.11, "Alternative Equipment," of the Standard Specifications.

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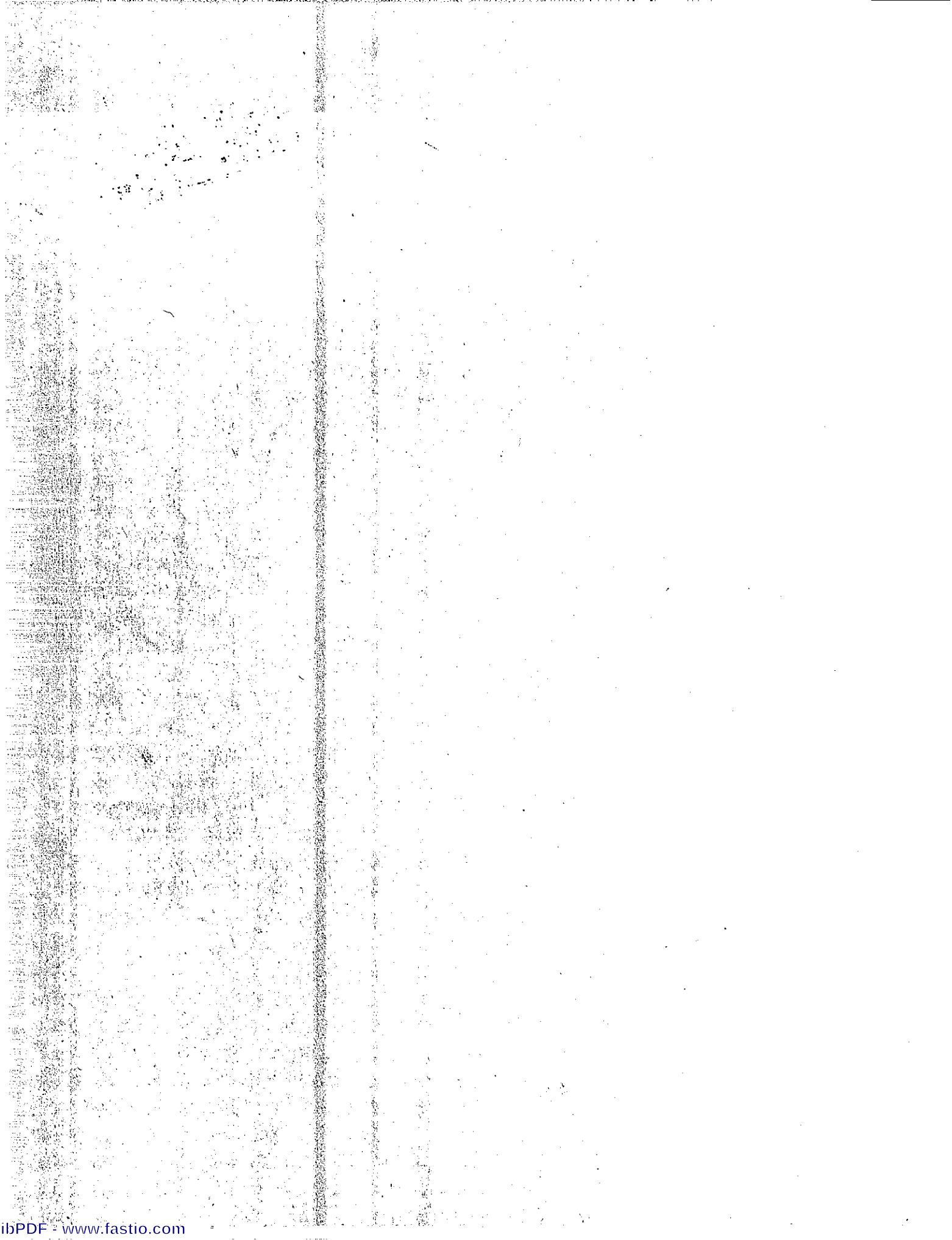
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