# Transverse Joint Sealing With Improved Sealants



## Final Report
## Highway Research Advisory Board
## Project HR-276



September 1991
Highway Division

Iowa Department of Transportation

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# TRANSVERSE JOINT SEALING WITH IMPROVED SEALERS

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## DISCLAIMER

The opinions, findings, and conclusions expressed in this report are those of the authors and not necessarily those of Jasper County or the Iowa Department of Transportation. This paper does not constitute a standard, specification, or regulation. The inclusion of manufacturer names and trade names are for identification purposes and are not to be considered as endorsements.

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# METRIC CONVERSION

1 INCH = 2.54 CENTIMETERS (cm)

1 FOOT = 0.3048 METERS (m)

1 CUBIC FOOT = 0.028 3168 CUBIC METERS ($m^3$)

1 CUBIC YARD = 0.764 555 CUBIC METERS ($m^3$)

1 MILE = 1.609 34 KILOMETERS (km)

1 POUND (MASS) = 0.453 592 KILOGRAMS (kg)

1 POUND (FORCE) = 4.448 218 NEWTONS (N)

1 PSI = 6.894 733 $KN/m^2$ (kPa)

1 GALLON = 0.003 785 CUBIC METERS ($m^3$)

1 SQ. YARD = 0.836 127 SQ. METERS ($m^2$)

1 POUND/CUBIC FOOT = 16.018 477 KILOGRAMS/CUBIC METERS ($kg/m^3$)

1 ACRE = 0.404 686 HECTARES (ha)

ABSTRACT

Concern about premature joint sealant failures occurring in portland cement concrete (PCC) pavements gave impetus to initiating this research project. Eight sealants, including three silicone sealants, were evaluated and tested in the lab as well as incorporated in approximately 700 joints in the field and evaluated over a six-year period.

The preliminary data show that among the silicone sealants, Dow Corning 888 rated the highest. However, this was rated third overall behind the W. R. Meadows cold-applied Sof Seal and Crafco #231 hot pour sealants. The W. R. Meadows and Crafco sealants cost approximately 30 percent and 50 percent less to furnish and place than the Dow Corning product. All joint sealants will continue to be evaluated.

ACKNOWLEDGEMENT

This research project was sponsored by Jasper County and the Iowa Department of Transportation through the Highway Research Advisory Board. Partial funding for this project was from the Secondary Road Research Fund in the amount of $32,000.

The authors wish to extend appreciation to Charles Cabalka, the Jasper County Engineer; the Jasper County Board of Supervisors; and the Iowa DOT for their support in developing and conducting this project. We also wish to thank Central Paving Corporation and Contractors Steel Corporation for their cooperation in the project. The Jasper County inspection personnel also deserve recognition for the extra effort put forth on the project. Finally, many thanks go to Kathy Davis, Vern Marks and Bob Steffes of the Iowa DOT Materials Office for their assistance in writing this report.

The following companies provided materials or assistance free of charge:

| | |
|---|---|
| CRAFCO Inc. | -Sealant, 600 lbs. (272 kg) |
| Allied Materials Corp. | -Sealant, 600 lbs. (272 kg) |
| SWS Silicones Corp. | -Sealant, 55 gal. drum (208L) |
| Superior Products Co. | -Sealant, 55 gal. drum (208L) |
| W. J. Ruscoe Co. & Magnum Diamond & Machinery Inc. | -Sealant, 55 gal. drum (208L) |
| Pyles Div. Sealed Power Corp. and Contractors Steel Corp. | -Pyles Pump with representative |
| W. R. Meadows Inc. and Contractor Steel Corp. | -$CO_2$ pump with operator |

## INTRODUCTION

Deterioration of joints in PCC pavements continues to be a major maintenance problem. Contraction joints are used to control cracking and provide for movement of the pavement due to temperature variation. The joint sealant must adhere to the concrete and withstand the constant movement of the joint. Unfortunately, sealants have too often failed after only a few years of service. When the sealant fails, water and incompressibles are free to enter the joint. Moisture in the joint contributes to the concrete deterioration. Water is allowed to enter the base, reducing its stability and causing pumping to occur. During winter months the concentration of water freezes resulting in joint heave and a reduced ride quality.

There has been substantial progress achieved in the quality of joint sealant material over the years. However, premature sealant failure is still occurring, sometimes because of improper installation and oftentimes because of the properties of the sealant.

## OBJECTIVE

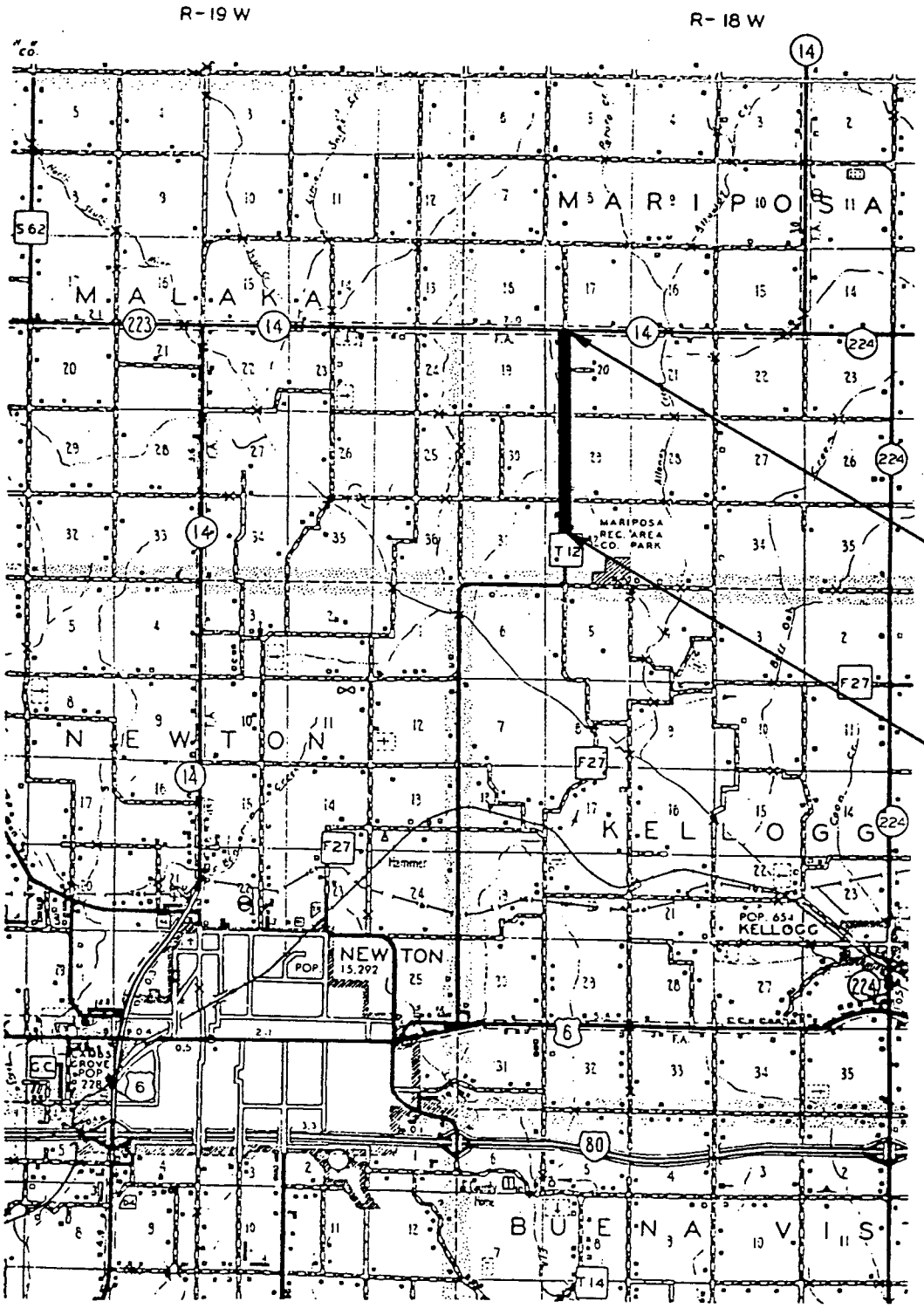
The objective of the research was to evaluate several types of contraction-joint sealants.

## PROJECT LOCATION AND DESCRIPTION

A 2.56-mile (4.12 km) segment of a 9-mile (14.5 km) PCC paving project FM-50(8)--55-50 on Jasper County Road T12 was selected for the project (Figure 1). The new pavement is 8 inches (20.3 cm) thick, 22 feet (6.7 m) wide, and has contraction joints skewed 6:1 (right side ahead) spaced at 15 feet (4.6 m). The contraction joints are not doweled.

Figure 1 Project Location

# JASPER COUNTY
## IOWA



## RESEARCH VARIABLES

The major objective of the research was to evaluate joint sealants in transverse joints. However, two widths of saw cut were used for each sealant and water cleaning was performed on one section. The research section layout is in Figure 2.

### Sealant Requirement

Poured joint sealants (Sealants 1 through 4) meet Iowa DOT specifications which require the sealant to conform to ASTM D3405 with the following modifications:

Penetration at 77°F (25°C) 90-150
Bond at-20°F (-29°C), standard specimen, 3 cycles, 200% extension

Silicone joint sealants (Sealants 5 through 7) meet Iowa DOT specifications which require the sealant to cure to a tack-free-to-touch condition at 77°F (25°C) in less than 90 minutes. When cured for 14 days at a temperature of 74°F (23°C) to 80°F (27°C) and 45% to 55% relative humidity, the sealant shall meet the following test requirements:

| | |
|---|---|
| Durometer hardness, shore A | 10-30 |
| Tensile stress, 150% elongation, maximum | 90 psi (621 kPa) |
| Bond at -20°F (-29°C), 3 cycles, 200% extension | |
| Accelerated weathering, 3000 hours | |

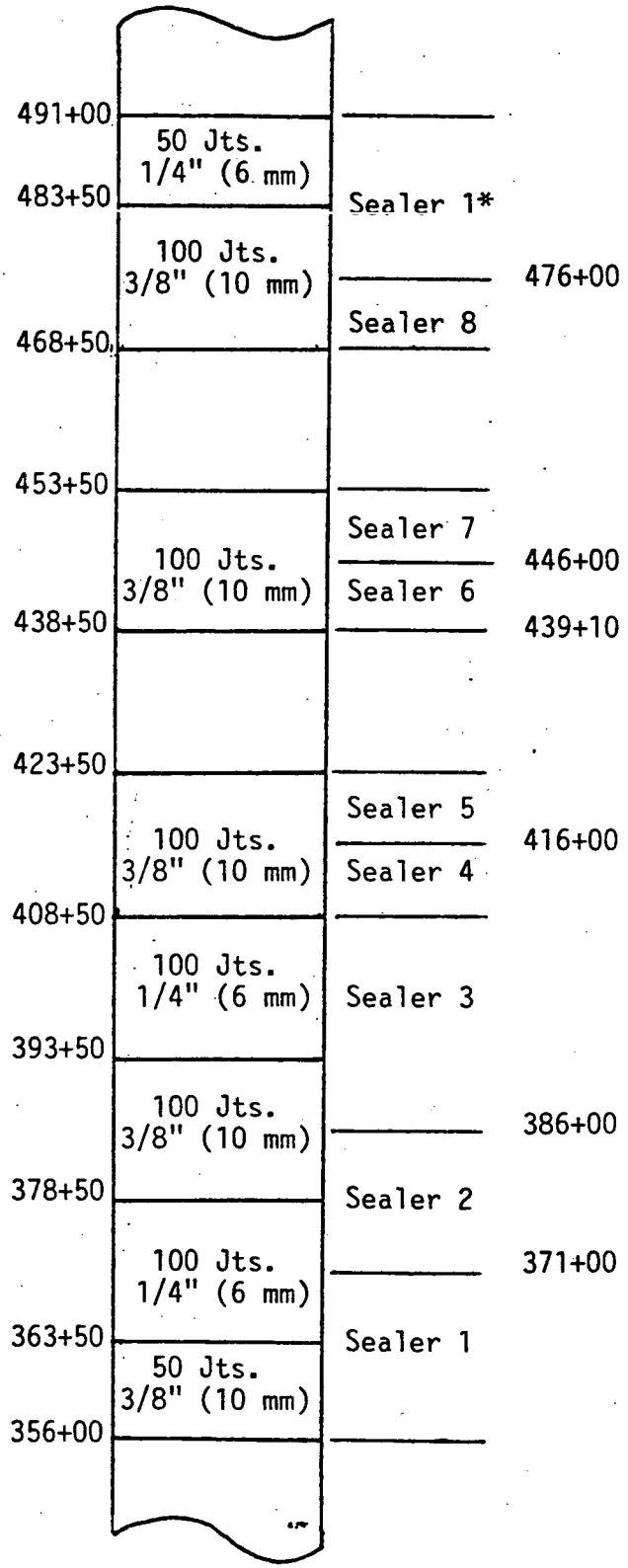



Figure 2 Research Layout

*Waterblast cleaning

1. W. R. Meadows Inc. - Sof Seal (hot)
2. CRAFCO Inc. - Hot Pour #231
3. Allied Materials Corp. - 9030 Jt. Sealer
4. W. R. Meadows Inc. - Sof Seal (cold)
5. SWS Silicones Corp. - HW-5 Silicone
6. Dow Corning Co. - DC 888 Silicone
7. Superior Product Co. - Superseal 888 Silicone
8. W. J. Ruscoe Co. - Perm. Sealer Hwy. Jt. Sealer

Acceptance of silicone joint sealants for use on state projects is on the basis of manufacturer and brand name approval. The three silicone sealants used were state approved at the time of the project.

Nitrile rubber sealant (Sealant 8) did not meet Iowa DOT specifications for poured joint sealants. Testing indicated penetration was above 150 and resilience was only 11 percent recovery. However, to determine the field performance, the sealant was included in the research.

Joint Configuration

The 1/4-inch (6 mm) transverse joint configuration shown in Figure 3 was specified for the project. The 1/4-inch (6 mm) wide joint had been used on Iowa projects from 1982 to 1985. In early 1985, the transverse joint width was changed to 3/8-inch (10 mm). Figure 4 shows the 3/8-inch (10 mm) joint configuration used in the research project. Placement difficulties with the backer rod forced the elimination of the 1/4-inch (6 mm) joints from the cold applied sealant sections (Sealants 4 through 8).

Joint Cleaning

Sand cleaning and air blasting prior to sealing was specified as the standard cleaning for the project. One section received special cleaning with high pressure water (minimum pressure 1000 psi (6890 kPa)).

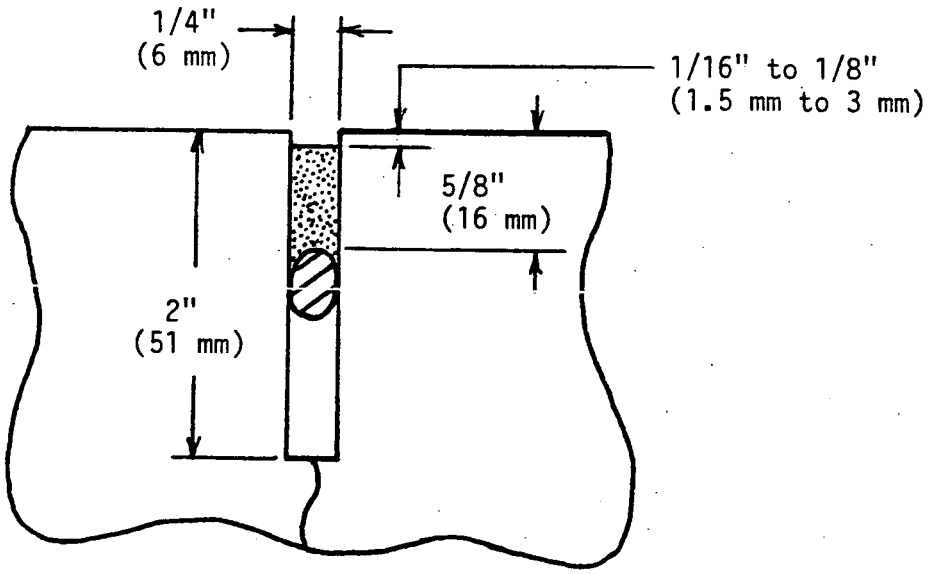



Figure 3 1/4-Inch (6 mm) Longitudinal Joint and Skewed Contraction Joint Detail

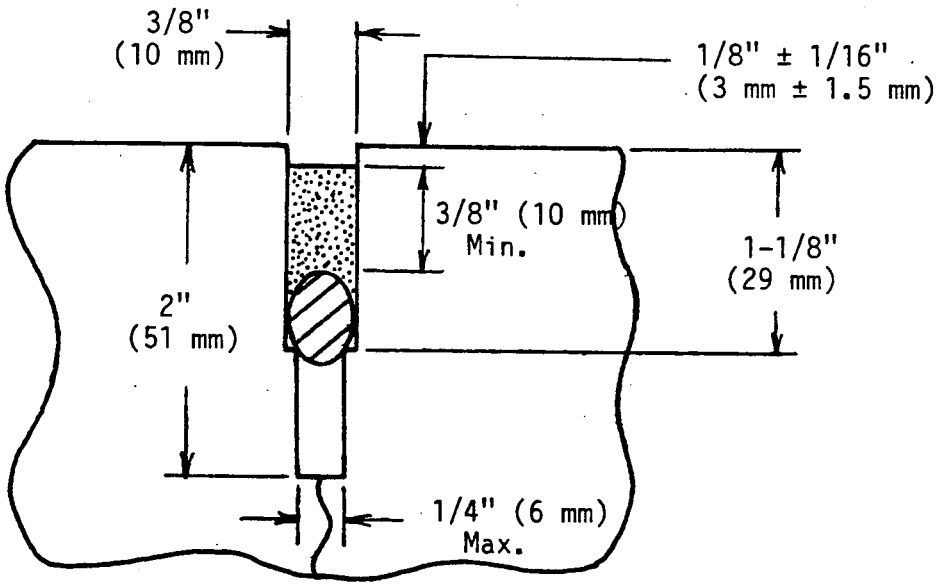



Figure 4 3/8-Inch (10 mm) Skewed Contraction Joint Detail

## CONSTRUCTION

Central Paving Corporation of Indianola, Iowa, was the successful bidder for the paving project. Jasper County added the research sections as an extra work order to the contract. The general requirements for the installation of the sealants are in Appendix A.

### Joint Sawing

The contractor sawed the 2-inch (5.1 cm) deep cut at every fifth transverse joint location as soon as the concrete attained an age at which extensive raveling did not occur. The remaining transverse joints and the longitudinal centerline joint were cut the day following placement of the concrete. All joints were sawed dry using Carborundum blades. Cutting the 3/8-inch (10 mm) step was tried both before and after the 1/4-inch (6 mm) cut. The 1/4-inch (6 mm) blade tended to wander, widening out the joint when sawing in the 3/8-inch (10 mm) cut. The contractor decided to cut the 3/8-inch (10 mm) step after the 1/4-inch (6 mm) cut had been made. A 3/8-inch (10 mm) blade lasted 40 to 50 joints before necking-down of the sides of the blade forced replacement.

### Joint Cleaning

A specially built sand cleaner/air blaster unit was used to clean the joints (Figures 5 and 6). The joints received two cleanings; once behind the saws to remove the cutting dust before it recemented and again just prior to the sealing operation. When the sand cleaning unit was adjusted properly, it appeared to effectively clean both faces with a single pass.

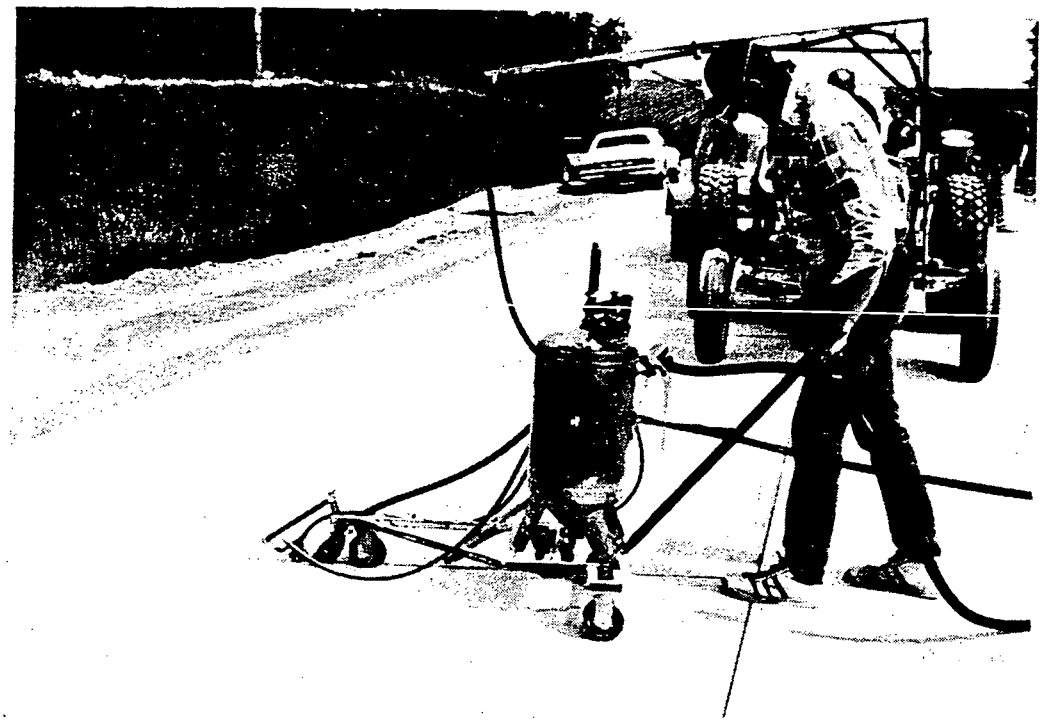


Figure 5 Contractor's Specially Built Sand Cleaner/ Air Blaster

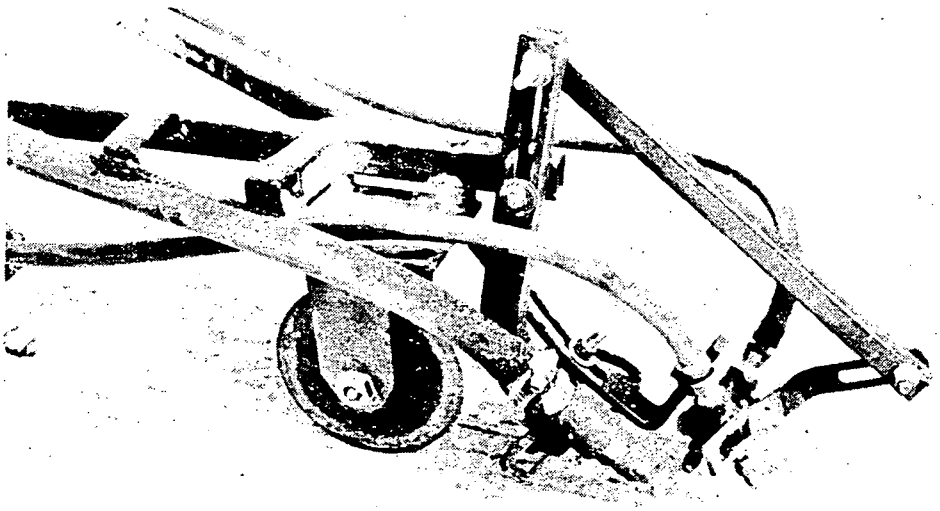


Figure 6 Nozzle Configuration of Sand Clean/Air Blaster Unit

One section was set aside to receive special cleaning. The Iowa DOT high-pressure water blaster was used to remove cuttings within one hour after final sawing (Figure 7). Initially a pressure of about 1700 psi (11.72 MPa) with an output of about 8 to 12 gallons (30 to 45 L) of water per minute was tried. The dust quickly turned to a paste when water contacted it and stuck to the joint faces. Waterblasting was discontinued until the cutting dust could be blown away by air blasting.

Figure 7 Special Joint Cleaning With High Pressure Water Blaster

The nozzle on the water blaster was changed to one which provided 1250 psi (86.20 MPa) with an output of about 14-16 gal./min (53-61 L/min.). Water blasting appeared effective for cleaning once the bulk of the dust was removed from the joint by air blasting.

Backer Material Placement

Backer rope and backer rod were placed after the second joint cleaning just prior to application of the sealants. For the hot applied sealants, 5/16-inch (8 mm) and 7/16-inch (11 mm) rope from Sackner Products, Inc. was used. The backer rope was placed without difficulty. For the cold applied sealants, 3/8-inch (10 mm) and 1/2-inch (13 mm) diameter closed-cell polyethylene rod from Hercules, Inc. was used. One-half inch (13 mm) diameter rod placed in the 3/8-inch (10 mm) joints occasionally tore as it was rolled in. Tearing occurred more often where the transverse tining intersected the skewed contraction joint. The rod diameter also measured larger than the 1/2-inch (13 mm) size indicated (Figure 8). Some minor tearing was experienced at the 1/4-inch (6 mm) centerline joint (Figure 9).

To prevent the tearing and facilitate sealant placement, nominal 3/8-inch (10 mm) rod was placed in the 3/8-inch (10 mm) joint. The rod was enough larger than 3/8-inch (10 mm), and the joint, due to blade necking, was enough smaller than 3/8-inch (10 mm) so that some degree of compression was

achieved at most joints with the exception of a few joints which had cracked and opened-up. The 3/8-inch (10 mm) rod was stretched to near the breaking point to reduce the diameter to allow it to be rolled into the 1/4-inch (6 mm) centerline joint. The 3/8-inch (10 mm) rod could not be placed in the 1/4-inch (6 mm) contraction joints.

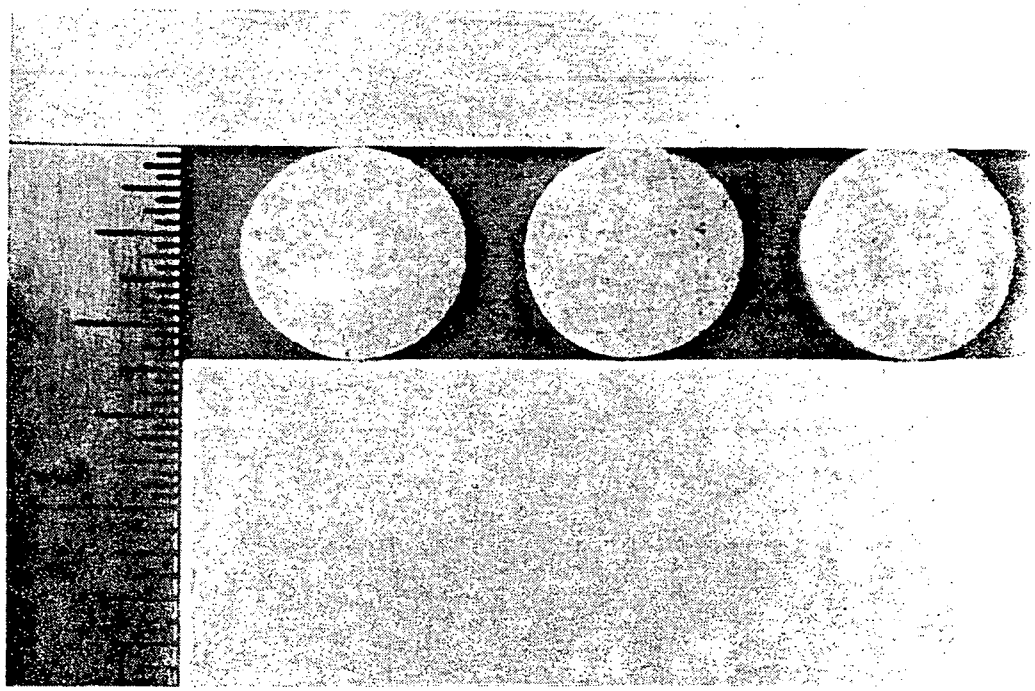


Figure 8 Actual Diameter of Nominal 1/2-Inch (13 mm) Backer Rod

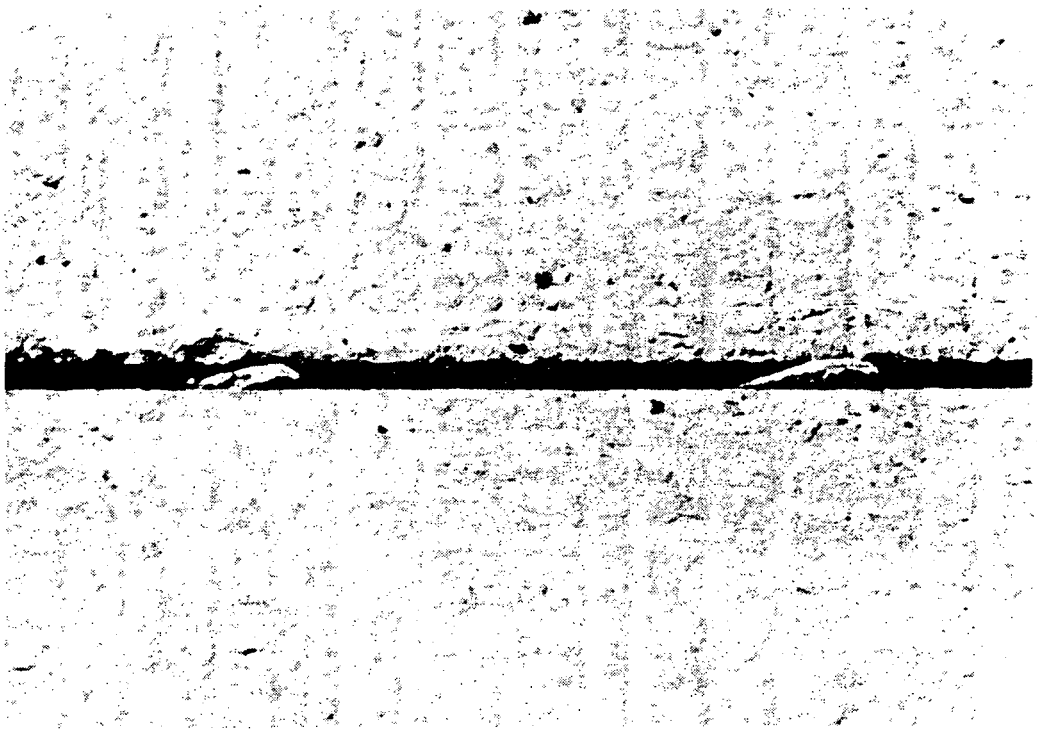


Figure 9 Tearing of Backer Rod at 1/4-Inch (6 mm) Centerline Joint

One-fourth inch (6 mm) rod was tried in the 1/4-inch (6 mm) joint, but the size of the rod actually measured 1/4-inch (6 mm) and did not fit tightly in the joint. Thus, placement of the cold applied sealants was eliminated for the 1/4-inch (6 mm) contraction joints.

## Joint Sealing

Specifications for the research required a minimum three day wait between concrete placement and the sealant application. The three silicone sealants and the nitrile rubber were placed with a Pyles brand joint sealant pump. The three hot pour sealants were placed with the contractor's standard double jacketed heater and pump. Representatives from W. R. Meadows

placed the cold applied Sof Seal with a special $CO_2$ powered pump (Figure 10).

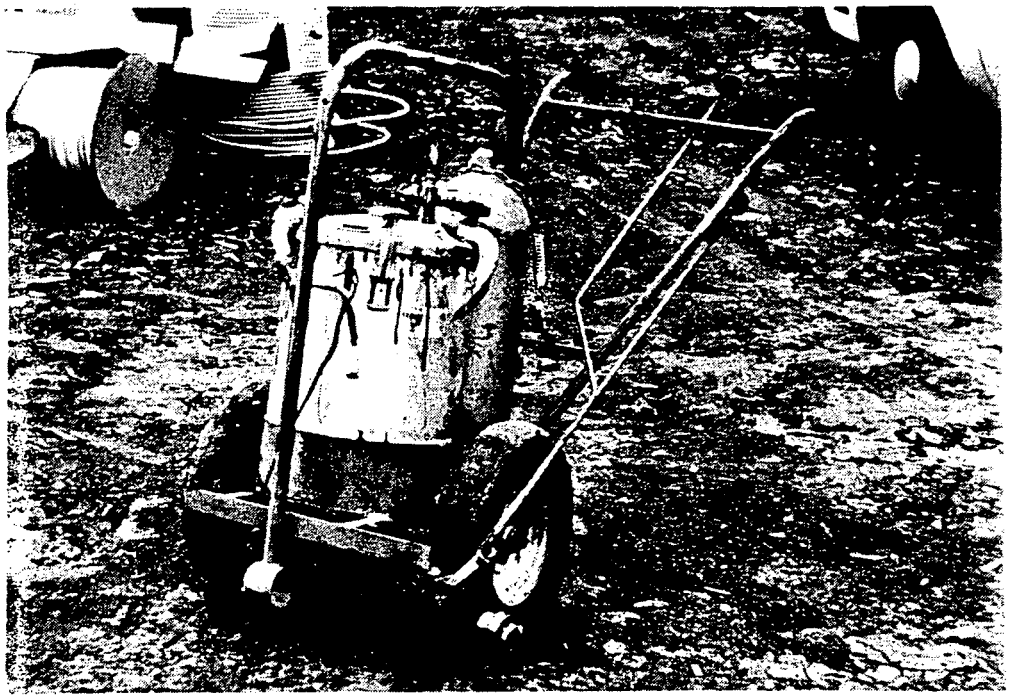


Figure 10 Special $CO_2$ Powered Pump for Application of Cold Applied Sof Seal

Application of the cold applied sealants began with the Ruscoe Nitrile Rubber. The troweling tip provided with the pump was too large for the joint opening. The tip was changed to a nozzle with a guide shoe (Figure 11). No troweling was necessary because of the nitrile rubber's self-leveling properties. The hot, windy weather caused the sealant to skin over quickly. On the recommendation from the Pyles representative, the pump and hoses were not cleaned with solvent between sealant applications. Instead, several gallons of the next sealant were pumped through the system to purge the system before any joints were sealed.

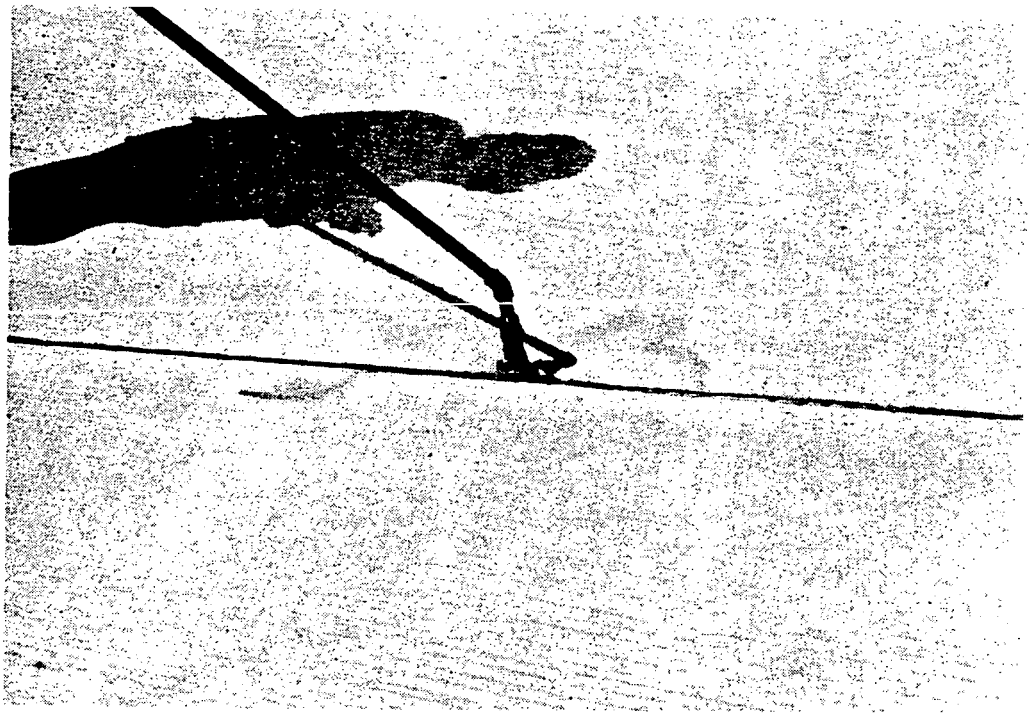


Figure 11 Sealant Application Nozzle Used With Pyles Pump

Figure 12 Nitrile Rubber Sealant "Bubbled" Out of the Joint

The following day the nitrile rubber sealant "bubbled" out of the joints (Figure 12). The sealant eventually subsided to surface level, but voids remained.

The three silicone sealants were placed May 30, 1985. Because the silicone sealants were not self leveling and no troweling tip was available, the bead had to be tooled by hand to the proper shape. The sealing of 1870 feet (570 m) of joint in each section was completed in approximately 1 hour. The silicones behaved similar to each other during placement. The Dow Corning material did seem to be slightly more viscous than the other two silicone sealants.

The cold applied, two component Sof Seal was placed May 31, 1985 by W. R. Meadows representatives. Cold applied Sof Seal is promoted generally for small volume sealing where hot application would not be practical.

Hot Sof Seal was placed in the water blasted section May 28, 1985 and in the other test section June 1, 1985. Allied sealant was placed May 31, 1985 and Crafco material was placed the following morning. After completion of each section, the kettle was emptied and cleaned out with diesel fuel. The hot pour sealants behaved similar to each other during placement. The 750-foot (229 m) long section of 1/4-inch (6 mm) joints required 28 minutes for placement and the 750-foot (229 m) long section of 3/8-inch (10 mm) joints required 24 minutes for placement.

COST COMPARISON

It would be difficult, if not impossible, and not entirely fair or realistic to try to determine the true cost of the total sealing operation for each sealant. The Pyles standard pump operated at maximum output delivered cold material at about one half the amount of what the contractor's normal equipment delivered hot material. A larger air driven motor could have increased the efficiency of the cold sealant placement.

Personnel required to perform the operations were two people for the hot applied (a driver and a sealer) and three people for the cold applied silicones (a driver, a sealer and a troweler). Even with a troweling tip, the silicones would require some shaping at the joint intersections and at the edges. Ruscoe nitrile rubber was self leveling and required no troweling. A heat up period was required for the kettle and the operator tended the kettle during that time.

The cost of the sealants and the backer material is in Table I. The 1/2-inch (13 mm) backer rod from Hercules, Inc. was $0.017 per foot ($0.056 per meter) and the 7/16-inch (11 mm) backer rope from Sackner Products Inc. was $0.023 per foot ($0.075 per meter).

TABLE I
MATERIAL PRICES

| Sealant | $/lb. ($/kg) | $/gal. ($/L) |
|---|---|---|
| Dow | | 35.00[1] (9.25) |
| Superior | | 35.00[2] (9.25) |
| SWS | | 35.00[2] (9.25) |
| Ruscoe | | 26.00[2] (6.87) |
| Sof Seal (C) | | 16.25[1] (4.29) |
| Allied | 0.60[2] (1.32) | |
| Sof Seal (H) | 0.60[2] (1.32) | 4.50 (1.19) |
| Crafco | 0.50[2] (1.10) | |

1. Actual cost paid to vendor
2. Price quoted by vendor; material provided at no charge.

## PERFORMANCE EVALUATION

Three evaluation criteria were proposed for the project:

1. Inspection of the joints
2. Measurement of wintertime joint heave
3. Testing of joint materials removed from the road

### Joint Inspection

The width of every other joint was measured after placement of the sealants in June, 1985. Winter and summer joint width measurements were conducted for several years as well as documentation of the overall performance of each joint sealant (Appendix B). To obtain joint width measurements, inside calipers were inserted into the transverse joint 6.1 inches (16 cm) east of the centerline joint parallel to the centerline at that point.

Performance rating of the sealants is based on the following:

1 = No broken seal
2 = Broken seal less than three feet (.9 m)
3 = Three feet (.9 m) or more of broken seal

This rating scale was used by Marks to evaluate several types of joint sealants placed on an Iowa roadway in 1978 (1).

Joint Heave Measurement

The profile of the research section was tested with a 25-foot (7.6 m) California profilograph to determine winter joint heave. The initial testing on February 26, 1986, showed no joint heave.

Joint Material Testing

Four-inch (10.2 cm) diameter cores were taken directly through the joints. The cores were brought into the laboratory and cut to yield 2 specimens with 2 inches (5.1 cm) of joint from each core. One specimen was tested at -20°F (-29°C) and the other was tested at 70°F (21°C). Cores were classified before testing as: 1) no visible failure (the bond was apparently tight on both faces for the entire 2-inch (5.1 cm) length); 2) partial seal failure (there was either some separation in the seal or partial bond failure at the faces); and 3) broken seal (the core was no longer held together by the sealant). Only the SWS and the Superseal 888 silicones rated lower than a "1" for cores obtained March 24, 1986. Of the 12 samples, 10 had

the bond broken at the concrete interface just below the surface of the sealant. The bond remained at the surface.

Tensile testing was conducted at both -20°F (-29°C) and 70°F± (21°C). The specimen was placed in a Tinius Olsen Universal testing machine and extended at the rate of 0.3 inches (7.6 mm) per minute. The tensile testing is a slight modification to that developed by Marks. Maximum load, elongation at maximum load, and elongation at failure were recorded (Appendix C). A summary of the testing is in Table II. Failure was assumed when 80% of the 2-inch (5.1 cm) seal had separated.

The depth of sealant was measured for each specimen (Appendix D). The shape factor is the depth of the sealant divided by the joint width. No strong correlation was observed between the test results and the shape factors.

TABLE II
JOINT TESTING SUMMARY
HR-276, Jasper County
April 1986

| Material | Test Temp °F | Max. Load lb. | (N) | ELONGATION @ Max. Load (in.) | (cm) | @Failure (in.) | (cm) | Failure Mode |
|---|---|---|---|---|---|---|---|---|
| Sof Seal 3/8" | -20 | 24.0 | 107 | 0.90 | 2.3 | 1.92 | 4.9 | adhesion |
| | 70 | 4.9 | 22 | 3.12 | 7.9 | 3.39 | 8.6 | cohesion |
| Sof Seal 1/4" | -20 | 28.5 | 127 | 1.05 | 2.7 | 1.60 | 4.1 | adhesion |
| | 70 | 5.0 | 22 | 2.68 | 6.8 | 2.82 | 7.2 | cohesion |
| Crafco 1/4" | -20 | 73.3 | 326 | 0.73 | 1.8 | 1.06 | 2.7 | adhesion |
| | 70 | 6.1 | 27 | 2.62 | 6.6 | 2.83 | 7.2 | adhesion |
| Crafco 3/8" | -20 | 56.7 | 252 | 0.49 | 1.2 | 1.07 | 2.7 | adhesion |
| | 70 | 4.5 | 20 | 3.30 | 8.4 | 3.45 | 8.8 | adhesion |
| Allied 3/8" | -20 | 31.6 | 141 | 0.92 | 2.3 | 1.27 | 3.2 | adhesion |
| | 70 | 3.4 | 15 | 2.62 | 6.6 | 2.95 | 7.5 | adhesion |
| Allied 1/4" | -20 | 29.7 | 132 | 0.85 | 2.2 | 1.35 | 3.4 | adhesion |
| | 70 | 3.6 | 16 | 1.72 | 4.4 | 1.88 | 4.8 | adhesion |
| Sof Seal (C) 3/8" | -20 | 109.9 | 489 | 1.15 | 2.9 | 1.35 | 3.4 | cohesion |
| | 70 | 18.6 | 82.7 | 1.42 | 3.6 | 1.43 | 3.6 | cohesion |
| SWS 3/8" | -20 | 10.5 | 46.7 | 0.50 | 1.3 | 0.82 | 2.1 | adhesion |
| | 70 | 9.3 | 41 | 0.44 | 1.1 | 0.75 | 1.9 | adhesion |
| Dow 3/8" | -20 | 31.0 | 138 | 1.75 | 4.4 | 2.19 | 5.6 | adhesion |
| | 70 | 18.4 | 81.8 | 1.19 | 3.0 | 1.62 | 4.1 | adhesion |
| SS888 3/8" | -20 | 15.5 | 68.9 | 0.52 | 1.3 | 0.57 | 1.4 | adhesion |
| | 70 | 13.9 | 61.8 | 0.39 | 1.0 | 0.45 | 1.1 | adhesion |
| Ruscoe 3/8" | -20 | 78.5 | 349 | 0.10 | 0.2 | 0.24 | 0.6 | adhesion |
| | 70 | 21.8 | 97.0 | 0.30 | 0.8 | 2.15 | 5.5 | cohesion |
| Sof Seal *3/8" | -20 | 35.6 | 158 | 0.89 | 2.3 | 1.44 | 3.6 | adhesion |
| | 70 | 5.5 | 24 | 2.38 | 6.0 | 2.83 | 7.2 | cohesion |

*Special waterblast cleaned section

-20°F = -29°C

70°F = 21°C

DISCUSSION AND SUMMARY

From all indications, installation of the sealants was satisfactory. The lack of bond below the surface on some of the silicone joints sampled did not appear to be construction related. The sections for the three silicone sealants were cleaned and sealed the same afternoon. Specimens sampled from the Dow Corning 888 section, which was placed after SWS Silicones Corp. HW-5 and before Superior Product Company SS888, did not experience the bond problem.

Painstaking measures were taken in cleaning the joints prior to sealing to minimize any failure that might be attributed to inadequate cleanliness of the concrete interface. Some sealants may actually require a higher level of cleanliness for proper adhesion to take place, but a determination of what constitutes a "clean" joint still does not exist.

Selection of an appropriate backer rod, especially in the case of hot poured sealants, is critical. In one instance, it is believed a hot pour sealant may have led to "gassing", a reaction between the hot pour material and the closed cell polyethylene backer rod.

A proper design depth of a sealant is of primary concern. When the top surface of the sealant is placed too low, compressibles become lodged in the joint channel and this can lead to horizontal compression failure. However, the air tur-

bulence caused by passing vehicles on a heavily trafficked roadway does aid in blowing some of these incompressibles out of the joint channel. Conversely, a sealant that overlaps the pavement surface may experience early failure also.

Another aspect of joint sealing to consider is tooling. To ensure adequate adhesion pressure to bond to the sidewalls, a sufficient down-pressure to mold the sealant into the joint channel and around the backer rod must be applied. As yet, this cannot be accurately measured.

Some might suggest that sealant failure could be moisture related. A permeable material like concrete does retain some moisture, but because of the hot and humid weather during the project, any moisture would apparently have had a negligible effect on the adhesion of the sealant.

The performance rating of the sealants is based on the following:

1 = No broken seal
2 = Broken seal less than three feet (0.9 m)
3 = Three feet (0.9 m) or more of broken seal.

| SEALANT | AVG. 1991 RATING |
|---|---|
| W. R. Meadows 3/8", cold applied Sof Seal | 1.4 |
| Crafco #231, 1/4" hot pour | 1.5 |
| Dow Corning 888, 3/8" Silicone | 1.6 |
| Crafco #231, 3/8" hot pour | 1.8 |

| SEALANT | AVG. 1991 RATING |
|---|---|
| W. R. Meadows 1/4", Sof Seal hot pour | 1.8 |
| Superior SS888, 3/8" Silicone | 1.9 |
| W. R. Meadows 3/8", Sof Seal hot pour | 2.1 |
| *W. R. Meadows 3/8", Sof Seal hot pour | 2.4 |
| *W. R. Meadows 1/4", Sof Seal hot pour | 2.5 |
| SWS HW-5 3/8", Silicone tooled | 2.5 |
| Allied #9030 3/8", hot pour | 3.0 |
| Allied #9030 1/4", hot pour | 3.0 |
| W. J. Ruscoe 3/8", Nitrile Rubber hot pour | 3.0 |

*Waterblast section

Placement of the silicone sealants was slower, more labor intensive and more expensive than the common hot pour sealants. A larger capacity pump system would increase production, but the need for someone to trowel the material into the joint to obtain joint wall contact appears necessary. Material cost for the silicone sealants would increase the project costs about $3000 per mile ($1864 per km) over the cost of current hot pour sealants.

The obvious disadvantage to the hot pour sealants is the need for heating the material. The time required to bring the material up to temperature, the danger to workers of burns, and the occasional clogged pump and hose are all drawbacks to hot pour sealants.

Observations from the project are:

1. The 3/8-inch (10 mm) joints were easier to clean and seal than the 1/4-inch (6 mm) joint.

2. The closed-cell polyethylene backer rod occasionally separated as it was rolled into the joint and sometimes broke during placement.

3. The average increase in joint width from summer to winter was only 0.04 inches (1.0 mm). Readings were as high as 0.19 inches (4.8 mm), but usually they did not exceed 0.11 inches (2.8 mm). Eight percent of the joints measured decreased in width.

## CONCLUSIONS

From this research it can be concluded that:

1. The width of the saw cuts used in this project had little bearing on the performance of the joint sealant material.

2. The sandblast/airblast method of cleaning did enhance the performance of the joint sealants. The section of joint channels that received the waterblast cleaning exhibited poorer performance in adhesion strength of even the higher rated sealants.

3. By the fourth winter after construction, the Allied #9030 and W. J. Ruscoe Nitrile Rubber sealants exhibited total adhesion failure.

## REFERENCES

1. Marks, Vernon J., Transverse Joint Sealing With Various Sealants, Final Report, Iowa Highway Research Board HR-203, September 1983.

2. Jones, Kevin, Transverse Joint Sealing With Improved Sealers, Construction Report, Iowa Highway Research Board HR-276, April 1986.

3. Belangie, M. C., Factors Affecting Joint System Performance, Belangie and Associates, 1989.

# APPENDIX A

## Requirements for Sealant Installation

## REQUIREMENTS FOR SEALANT INSTALLATION

A backer rope of the proper size and type shall be installed with a suitable tool in the dry, clean joint to the required depth, as designated on the plans. For transverse joints, it shall extend to near the edge of the pavement, as shown on the plans. It shall be dry when installed.

Joint sealer shall be prepared and installed in the joint and to the proper level as shown on the plans and as recommended by the manufacturer. Hot-poured sealers shall be heated in a thermostatically controlled heating kettle of a type approved by the Engineer; the material shall be heated to the temperature required for use, but not above that recommended by the manufacturer. When a silicone sealer is installed, the joint faces shall be primed if recommended by the sealer manufacturer, and the sealer shall be forced into the joint with a suitable tool. To ensure that the transverse joint is filled uniformly across the entire width of pavement, the joint opening at the pavement edge shall be sealed with tape to prevent flow of the sealer material from the joint opening during the sealing operation. After sealing, excess sealer shall be removed from the pavement surface.

Joint sealer shall be placed only when the pavement and ambient air temperatures are 40°F or higher. When near this minimum, additional air blasting or drying time or both may be

necessary to assure a satisfactory bond to the joint surfaces. Joints shall not be sealed until the concrete has an age of at least 3 days. However, joints for pavement repair and base repair may be sealed after the five-hour or the 36-hour curing period. When this sealer cannot be properly placed due to late fall work, only the T/4 sawcut shall be made; the shoulder sawcut of the joint and the cleaning and sealing shall be delayed until the following spring. This carryover shall be subject to approval of the Engineer. Joints shall be prepared, cleaned, and sealed after surface correction, if any, or seals damaged from the correction work shall be repaired. Joints shall be sealed the same day they are sand cleaned. Sealing shall be done only when the joint surfaces appear dry by visual examination.

# APPENDIX B

## Joint Inspection

JOINT INSPECTION

Sof Seal 3/8" Joint

| Joint Number | Station | Visual Evaluation 2-86 | 2-87 | 2-88 | 2-89 | 2-90 | 2-91 | Joint Width 6-85 | 2-86 | 6-86 | 6-87 | 2-88 | 6-88 | 2-89 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 356+00 | 1 | 1 | 1 | 1 | 1 | 3 | 0.51 | 0.52 | 0.48 | 0.48 | 0.51 | 0.48 | 0.54 |
| 2 | +15 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 3 | +29 | 1 | 1 | 1 | 1 | 1 | 3 | 0.39 | 0.42 | 0.38 | 0.39 | 0.45 | 0.39 | 0.43 |
| 4 | +45 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 5 | +59 | 1 | 1 | 1 | 1 | 1 | 2 | 0.44 | 0.46 | 0.45 | 0.45 | 0.50 | 0.45 | 0.52 |
| 6 | +75 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 7 | +89 | 1 | 1 | 1 | 1 | 1 | 2 | 0.39 | 0.43 | 0.41 | 0.41 | 0.42 | 0.38 | 0.45 |
| 8 | 7+05 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 9 | +21 | 1 | 1 | 1 | 1 | 1 | 2 | 0.46 | 0.49 | 0.41 | 0.41 | 0.44 | 0.42 | 0.43 |
| 10 | +35 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 11 | +51 | 1 | 1 | 1 | 1 | 1 | 2 | 0.39 | 0.50 | 0.38 | 0.39 | 0.47 | 0.40 | 0.46 |
| 12 | +65 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 13 | +80 | 1 | 1 | 1 | 1 | 1 | 2 | 0.37 | 0.45 | 0.37 | 0.38 | 0.40 | 0.38 | 0.40 |
| 14 | +95 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 15 | 8+11 | 1 | 1 | 1 | 1 | 1 | 2 | 0.38 | 0.45 | 0.38 | 0.39 | 0.44 | 0.40 | 0.41 |
| 16 | +25 | 1 | 1 | 1 | 2 | 2 | 3 | | | | | | | |
| 17 | +42 | 1 | 1 | 1 | 1 | 1 | 2 | 0.51 | 0.48 | 0.48 | 0.48 | 0.50 | 0.45 | 0.48 |
| 18 | +57 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 19 | +72 | 1 | 1 | 1 | 1 | 1 | 2 | 0.41 | 0.45 | 0.41 | 0.42 | 0.42 | 0.44 | 0.45 |
| 20 | +87 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 21 | 9+03 | 1 | 1 | 1 | 2 | 2 | 3 | 0.38 | 0.41 | 0.36 | 0.41 | 0.42 | 0.38 | 0.46 |
| 22 | +18 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 23 | +33 | 1 | 1 | 1 | 1 | 1 | 2 | 0.49 | 0.47 | 0.43 | 0.43 | 0.46 | 0.46 | 0.45 |
| 24 | +48 | 1 | 1 | 1 | 1 | 1 | 3 | | | | | | | |
| 25 | +64 | 1 | 1 | 1 | 1 | 1 | 2 | 0.36 | 0.41 | 0.36 | 0.39 | 0.41 | 0.37 | 0.41 |
| 26 | +79 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 27 | +93 | 1 | 1 | 1 | 1 | 1 | 2 | 0.36 | 0.42 | 0.35 | 0.38 | 0.39 | 0.37 | 0.40 |
| 28 | 360+10 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 29 | +27 | 1 | 1 | 1 | 1 | 1 | 2 | 0.57 | 0.54 | *0.51 | *0.52 | 0.56 | 0.53 | 0.51 |
| 30 | +42 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 31 | +57 | 1 | 1 | 1 | 1 | 1 | 2 | 0.37 | 0.40 | 0.35 | 0.37 | 0.42 | 0.38 | 0.43 |
| 32 | +72 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 33 | +88 | 1 | 1 | 1 | 1 | 1 | 2 | 0.36 | 0.39 | 0.36 | 0.38 | 0.41 | 0.38 | 0.42 |
| 34 | 1+03 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 35 | +18 | 1 | 1 | 1 | 1 | 1 | 2 | 0.44 | 0.45 | 0.42 | 0.42 | 0.45 | 0.41 | 0.47 |
| 36 | +33 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 37 | +48 | 1 | 1 | 1 | 1 | 1 | 2 | 0.38 | 0.42 | 0.36 | 0.38 | 0.40 | 0.39 | 0.40 |
| 38 | +63 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 39 | +77 | 1 | 1 | 1 | 1 | 1 | 2 | 0.36 | 0.41 | 0.36 | 0.39 | 0.39 | 0.39 | 0.42 |
| 40 | +92 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 41 | 2+08 | 1 | 1 | 1 | 1 | 1 | 2 | 0.39 | 0.45 | 0.37 | 0.39 | 0.42 | 0.39 | 0.34 |
| 42 | +23 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 43 | +37 | 1 | 1 | 1 | 1 | 1 | 2 | 0.39 | 0.47 | 0.38 | 0.43 | 0.43 | 0.42 | 0.44 |
| 44 | +52 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 45 | +67 | 1 | 1 | 1 | 1 | 1 | 2 | 0.39 | 0.50 | 0.39 | 0.40 | 0.46 | 0.40 | 0.47 |
| 46 | +82 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 47 | +97 | 1 | 1 | 1 | 1 | 1 | 2 | 0.44 | 0.45 | 0.41 | 0.43 | 0.45 | 0.42 | 0.43 |
| 48 | 3+12 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 49 | +27 | 1 | 1 | 1 | 1 | 1 | 2 | 0.47 | 0.53 | 0.45 | 0.51 | 0.50 | 0.47 | 0.50 |
| 50 | 363+42 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |

*Span saw created a double saw cut at measurement location

Sof Seal 1/4" Joint

| Joint Number | Station | Visual Evaluation 2-86 | 2-87 | 2-88 | 2-89 | 2-90 | 2-91 | Joint Width 6-85 | 2-86 | 6-86 | 6-87 | 2-88 | 6-88 | 2-89 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 51 | 363+57 | 1 | 1 | 2 | 1 | 1 | 2 | 0.29 | 0.36 | 0.31 | 0.31 | 0.34 | 0.32 | 0.33 |
| 52 | +72 | 1 | 1 | 1 | 1 | 1 | 3 | | | | | | | |
| 53 | +87 | 1 | 1 | 1 | 1 | 1 | 2 | 0.37 | 0.42 | 0.33 | 0.35 | 0.38 | 0.36 | 0.37 |
| 54 | 4+02 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 55 | +18 | 1 | 1 | 1 | 1 | 1 | 2 | 0.33 | 0.42 | 0.34 | 0.35 | 0.39 | 0.36 | 0.37 |
| 56 | +33 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 57 | +47 | 1 | 1 | 1 | 2 | 2 | 2 | 0.31 | 0.38 | 0.31 | 0.32 | 0.35 | 0.32 | 0.36 |
| 58 | +62 | 1 | 1 | 1 | 1 | 2 | 2 | | | | | | | |
| 59 | +76 | 1 | 1 | 1 | 1 | 1 | 2 | 0.41 | 0.52 | 0.38 | 0.42 | 0.44 | 0.42 | 0.45 |
| 60 | +92 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 61 | 365+07 | 1 | 1 | 1 | 1 | 1 | 1 | 0.36 | 0.37 | 0.29 | 0.32 | 0.35 | 0.36 | 0.36 |
| 62 | +22 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 63 | +37 | 1 | 1 | 2 | 2 | 2 | 2 | 0.29 | 0.48 | 0.29 | 0.30 | 0.38 | 0.31 | 0.38 |
| 64 | +52 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 65 | +67 | 1 | 1 | 1 | 1 | 1 | 2 | 0.42 | 0.41 | 0.36 | 0.38 | 0.43 | 0.37 | 0.42 |
| 66 | +82 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 67 | +98 | 1 | 1 | 1 | 1 | 1 | 2 | 0.31 | 0.37 | 0.27 | 0.28 | 0.33 | 0.30 | 0.33 |
| 68 | 6+13 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 69 | +28 | 1 | 1 | 1 | 1 | 1 | 1 | 0.28 | 0.32 | 0.28 | 0.28 | 0.34* | 0.28 | 0.31 |
| 70 | +43 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 71 | +60 | 1 | 1 | 1 | 1 | 1 | 1 | 0.42 | 0.42 | 0.33 | 0.39 | 0.38 | 0.36 | 0.37 |
| 72 | +75 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 73 | +90 | 1 | 1 | 1 | 1 | 1 | 1 | 0.32 | 0.38 | 0.31 | 0.32 | 0.37 | 0.36 | 0.35 |
| 74 | 7+05 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 75 | +20 | 1 | 1 | 1 | 1 | 1 | 2 | 0.41 | 0.42 | 0.37 | 0.39 | 0.40 | 0.41 | 0.41 |
| 76 | +35 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 77 | +50 | 1 | 1 | 1 | 1 | 1 | 2 | 0.29 | 0.33 | 0.28 | 0.33 | 0.34 | 0.30 | 0.35 |
| 78 | +65 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 79 | +82 | 1 | 1 | 1 | 2 | 2 | 3 | 0.31 | 0.34 | 0.31 | 0.31 | 0.31 | 0.29 | 0.38 |
| 80 | +97 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 81 | 8+11 | 1 | 1 | 2 | 1 | 1 | 2 | 0.47 | 0.51 | 0.41 | 0.47 | 0.44 | 0.41 | 0.43 |
| 82 | +26 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 83 | +42 | 1 | 1 | 1 | 1 | 2 | 2 | 0.35 | 0.41 | 0.33 | 0.40 | 0.40 | 0.38 | 0.41 |
| 84 | +57 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 85 | +73 | 1 | 1 | 1 | 1 | 1 | 1 | 0.34 | 0.44 | 0.26 | 0.35 | 0.31 | 0.32 | 0.31 |
| 86 | +88 | 1 | 1 | 1 | 1 | 2 | 2 | | | | | | | |
| 87 | 9+05 | 1 | 1 | 1 | 2 | 2 | 2 | 0.37 | 0.43 | 0.34 | 0.41 | 0.42 | 0.37 | 0.42 |
| 88 | +20 | 1 | 1 | 1 | 1 | 2 | 2 | | | | | | | |
| 89 | +34 | 1 | 1 | 1 | 2 | 2 | 2 | 0.27 | 0.27 | 0.26 | 0.29 | 0.31 | 0.29 | 0.32 |
| 90 | +49 | 1 | 1 | 2 | 2 | 2 | 2 | | | | | | | |
| 91 | +64 | 1 | 1 | 1 | 2 | 2 | 2 | 0.26 | 0.32 | 0.25 | 0.31 | 0.34 | 0.29 | 0.31 |
| 92 | +79 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 93 | +93 | 1 | 1 | 1 | 2 | 2 | 2 | 0.40 | 0.41 | 0.35 | 0.37 | 0.41 | 0.36 | 0.39 |
| 94 | 370+08 | 1 | 1 | 2 | 2 | 2 | 2 | | | | | | | |
| 95 | +23 | 1 | 1 | 1 | 1 | 1 | 2 | 0.26 | 0.34 | 0.26 | 0.27 | 0.31 | 0.28 | 0.30 |
| 96 | +38 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 97 | +51 | 1 | 1 | 1 | 2 | 2 | 2 | 0.26 | 0.31 | 0.25 | 0.28 | 0.31 | 0.28 | 0.32 |
| 98 | +66 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 99 | +80 | 1 | 1 | 1 | 1 | 1 | 1 | 0.52 | 0.47 | *0.42 | 0.45 | 0.40 | 0.45 | 0.45 |
| 100 | 370+95 | 1 | 1 | 2 | 2 | 2 | 2 | | | | | | | |

*Span saw created a double saw cut at measurement location

CRAFCO 1/4" Joint

| Joint Number | Station | Visual Evaluation 2-86 | 2-87 | 2-88 | 2-89 | 2-90 | 2-91 | Joint Width 6-85 | 2-86 | 6-86 | 6-87 | 2-88 | 6-88 | 2-89 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 101 | 371+25 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 102 | +40 | 1 | 1 | 1 | 1 | 1 | 1 | 0.35 | 0.30 | 0.32 | 0.34 | 0.36 | 0.35 | 0.40 |
| 103 | +55 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 104 | +69 | 1 | 1 | 1 | 1 | 1 | 1 | 0.38 | 0.43 | 0.37 | 0.40 | 0.42 | 0.38 | 0.41 |
| 105 | +84 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 106 | +98 | 1 | 1 | 1 | 1 | 1 | 1 | 0.31 | 0.33 | 0.28 | 0.30 | 0.33 | 0.29 | 0.34 |
| 107 | 2+13 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 108 | +28 | 1 | 1 | 1 | 1 | 1 | 1 | 0.28 | 0.37 | 0.27 | 0.29 | 0.32 | 0.29 | 0.32 |
| 109 | +43 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 110 | +59 | 1 | 1 | 1 | 2 | 2 | 2 | 0.36 | 0.41 | 0.35 | 0.38 | 0.36 | 0.36 | 0.38 |
| 111 | +74 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 112 | +89 | 1 | 1 | 2 | 1 | 1 | 1 | 0.52 | 0.55 | *0.50 | 0.50 | 0.42 | 0.49 | 0.41 |
| 113 | 3+04 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 114 | +19 | 1 | 1 | 1 | 2 | 2 | 2 | 0.33 | 0.31 | 0.29 | 0.34 | 0.38 | 0.34 | 0.41 |
| 115 | +34 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 116 | +49 | 1 | 1 | 1 | 1 | 1 | 2 | 0.33 | 0.38 | 0.34 | 0.33 | 0.38 | 0.35 | 0.39 |
| 117 | +64 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 118 | +79 | 1 | 1 | 1 | 1 | 1 | 1 | 0.35 | 0.34 | 0.35 | 0.37 | 0.43 | 0.35 | 0.47 |
| 119 | +94 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 120 | 4+10 | 1 | 1 | 1 | 1 | 1 | 1 | 0.36 | 0.30 | 0.31 | 0.34 | 0.36 | 0.33 | 0.36 |
| 121 | +25 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 122 | +40 | 1 | 1 | 1 | 2 | 2 | 2 | 0.33 | 0.36 | 0.32 | 0.37 | 0.40 | 0.37 | 0.38 |
| 123 | +55 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 124 | +70 | 1 | 1 | 1 | 1 | 1 | 1 | 0.35 | 0.42 | 0.34 | 0.36 | 0.37 | 0.38 | 0.37 |
| 125 | +85 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 126 | +82 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 127 | 375+10 | 1 | 1 | 1 | 1 | 1 | 1 | 0.28 | 0.34 | 0.29 | 0.31 | 0.33 | 0.29 | 0.33 |
| 128 | +25 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 129 | +40 | 1 | 1 | 1 | 2 | 2 | 2 | 0.29 | 0.32 | 0.28 | 0.29 | 0.34 | 0.30 | 0.32 |
| 130 | +55 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 131 | +70 | 1 | 1 | 1 | 1 | 1 | 2 | 0.29 | 0.34 | 0.28 | 0.31 | 0.34 | 0.31 | 0.34 |
| 132 | +85 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 133 | 6+00 | 1 | 1 | 1 | 1 | 1 | 1 | 0.29 | 0.30 | 0.26 | 0.31 | 0.35 | 0.32 | 0.33 |
| 134 | +15 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 135 | +30 | 1 | 1 | 1 | 1 | 1 | 2 | 0.25 | 0.30 | 0.27 | 0.28 | 0.31 | 0.28 | 0.34 |
| 136 | +45 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 137 | +60 | 1 | 1 | 1 | 1 | 1 | 2 | 0.27 | 0.31 | 0.28 | 0.30 | 0.28 | 0.30 | 0.33 |
| 138 | +75 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 139 | +90 | 1 | 1 | 2 | 1 | 1 | 1 | 0.26 | 0.30 | 0.25 | 0.25 | 0.36 | 0.27 | 0.33 |
| 140 | 7+04 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 141 | +18 | 1 | 1 | 1 | 1 | 1 | 1 | 0.26 | 0.31 | 0.26 | 0.27 | 0.31 | 0.27 | 0.30 |
| 142 | +33 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 143 | +48 | 1 | 1 | 1 | 1 | 1 | 2 | 0.28 | 0.31 | 0.26 | 0.29 | 0.31 | 0.28 | 0.32 |
| 144 | +63 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 145 | +79 | 1 | 1 | 1 | 2 | 2 | 2 | 0.31 | 0.33 | 0.26 | 0.29 | 0.33 | 0.29 | 0.34 |
| 146 | +94 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 147 | 8+09 | 1 | 1 | 1 | 2 | 2 | 2 | 0.37 | 0.43 | 0.32 | 0.36 | 0.41 | 0.35 | 0.42 |
| 148 | +24 | 1 | 1 | 2 | 2 | 2 | 2 | | | | | | | |
| 149 | 378+39 | 1 | 1 | 1 | 2 | 2 | 2 | 0.34 | 0.40 | 0.31 | 0.36 | 0.36 | 0.35 | 0.36 |

*Span saw created a double saw cut at measurement location

CRAFCO 3/8" Joint

| Joint Number | Station | Visual Evaluation 2-86 | 2-87 | 2-88 | 2-89 | 2-90 | 2-91 | Joint Width 6-85 | 2-86 | 6-86 | 6-87 | 2-88 | 6-88 | 2-89 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 150 | 37+54 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 151 | +69 | 1 | 1 | 1 | 1 | 1 | 2 | 0.41 | 0.52 | 0.43 | 0.43 | 0.42 | 0.42 | 0.46 |
| 152 | +84 | 1 | 1 | 1 | 1 | 2 | 2 | | | | | | | |
| 153 | +99 | 1 | 1 | 1 | 1 | 1 | 2 | 0.48 | 0.46 | 0.45 | 0.49 | 0.47 | 0.45 | 0.49 |
| 154 | 9+15 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 155 | +30 | 1 | 1 | 1 | 2 | 2 | 2 | 0.45 | 0.54 | 0.45 | 0.48 | 0.51 | 0.44 | 0.51 |
| 156 | +45 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 157 | +60 | 1 | 1 | 1 | 2 | 2 | 2 | 0.46 | 0.51 | 0.47 | 0.47 | 0.37 | 0.46 | 0.50 |
| 158 | +75 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 159 | +90 | 1 | 1 | 1 | 1 | 1 | 2 | 0.48 | 0.51 | 0.43 | 0.47 | 0.50 | 0.46 | 0.51 |
| 160 | 380+01 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 161 | +13 | 1 | 1 | 1 | 1 | 1 | 1 | 0.42 | 0.48 | 0.42 | 0.44 | 0.48 | 0.43 | 0.47 |
| 162 | +28 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 163 | +43 | 1 | 1 | 1 | 1 | 2 | 2 | 0.41 | 0.49 | 0.37 | 0.45 | 0.44 | 0.42 | 0.44 |
| 164 | +58 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 165 | +73 | 1 | 1 | 1 | 1 | 1 | 2 | 0.42 | 0.48 | 0.42 | 0.46 | 0.48 | 0.43 | 0.47 |
| 166 | +88 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 167 | 1+03 | 1 | 1 | 1 | 1 | 1 | 1 | 0.42 | 0.49 | 0.42 | 0.44 | 0.47 | 0.42 | 0.48 |
| 168 | +18 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 169 | +33 | 1 | 1 | 1 | 1 | 1 | 1 | 0.46 | 0.56 | 0.43 | 0.47 | 0.53 | 0.45 | 0.52 |
| 170 | +48 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 171 | +63 | 1 | 1 | 1 | 2 | 2 | 2 | 0.41 | 0.50 | 0.40 | 0.43 | 0.46 | 0.42 | 0.49 |
| 172 | +78 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 173 | +93 | 1 | 1 | 1 | 1 | 1 | 2 | 0.44 | 0.50 | 0.43 | 0.45 | 0.50 | 0.45 | 0.49 |
| 174 | 2+08 | 1 | 1 | 1 | 1 | 1 | 2 | | | | | | | |
| 175 | +21 | 1 | 1 | 1 | 2 | 2 | 2 | 0.45 | 0.53 | 0.45 | 0.46 | 0.50 | 0.44 | 0.51 |
| 176 | +36 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 177 | +51 | 1 | 1 | 1 | 1 | 1 | 1 | 0.44 | 0.49 | 0.39 | 0.44 | 0.46 | 0.41 | 0.47 |
| 178 | +66 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 179 | +81 | 1 | 1 | 1 | 1 | 1 | 2 | 0.45 | 0.46 | 0.45 | 0.41 | 0.45 | 0.44 | 0.45 |
| 180 | +96 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 181 | 3+10 | 1 | 1 | 1 | 1 | 1 | 2 | 0.36 | 0.47 | 0.38 | 0.37 | 0.46 | 0.38 | 0.44 |
| 182 | +25 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 183 | +40 | 1 | 1 | 1 | 1 | 1 | 1 | 0.44 | 0.49 | 0.39 | 0.42 | 0.46 | 0.40 | 0.48 |
| 184 | +55 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 185 | +70 | 1 | 1 | 1 | 1 | 2 | 2 | 0.40 | 0.46 | 0.39 | 0.40 | 0.45 | 0.41 | 0.46 |
| 186 | +85 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 187 | 4+00 | 1 | 1 | 1 | 2 | 2 | 2 | 0.38 | 0.43 | 0.38 | 0.38 | 0.42 | 0.37 | 0.43 |
| 188 | +15 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 189 | +29 | 1 | 1 | 1 | 2 | 2 | 2 | 0.41 | 0.47 | 0.38 | 0.40 | 0.44 | 0.39 | 0.47 |
| 190 | +44 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 191 | +58 | 1 | 1 | 1 | 2 | 2 | 2 | 0.43 | 0.50 | 0.43 | 0.44 | 0.43 | 0.44 | 0.48 |
| 192 | +72 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 193 | +87 | 1 | 1 | 1 | 2 | 2 | 2 | 0.42 | 0.46 | 0.40 | 0.41 | 0.43 | 0.42 | 0.45 |
| 194 | 385+02 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 195 | +16 | 1 | 1 | 1 | 2 | 2 | 2 | 0.42 | 0.46 | 0.42 | 0.42 | 0.44 | 0.42 | 0.49 |
| 196 | +31 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 197 | +46 | 1 | 1 | 1 | 2 | 2 | 2 | 0.39 | 0.43 | 0.39 | 0.40 | 0.42 | 0.39 | 0.46 |
| 198 | +61 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 199 | +76 | 1 | 1 | 1 | 2 | 2 | 2 | 0.41 | 0.43 | 0.42 | 0.43 | 0.49 | 0.40 | 0.47 |
| 200 | 385+91 | 1 | 1 | 2 | 2 | 2 | 2 | | | | | | | |

Allied 3/8" Joint

| Joint | | Visual Evaluation | | | | | | Joint Width | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number | Station | 2-86 | 2-87 | 2-88 | 2-89 | 2-90 | 2-91 | 6-85 | 2-86 | 6-86 | 6-87 | 2-88 | 6-88 | 2-89 |
| 201 | 386+06 | 1 | 1 | 1 | 2 | 2 | | 0.75 | *0.82 | 0.75 | 0.76 | 0.73 | 0.77 | 0.79 |
| 202 | +21 | 1 | 1 | 1 | 1 | 1 | | | | | | | | |
| 203 | +35 | 1 | 1 | 1 | 3 | 3 | | 0.40 | 0.41 | 0.38 | 0.35 | 0.43 | 0.39 | 0.46 |
| 204 | +40 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 205 | +65 | 1 | 1 | 1 | 3 | 3 | | 0.40 | 0.42 | 0.39 | 0.38 | 0.43 | 0.40 | 0.41 |
| 206 | +80 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 207 | +95 | 1 | 1 | 1 | 3 | 3 | | 0.42 | 0.45 | 0.42 | 0.41 | 0.46 | 0.44 | 0.43 |
| 208 | 7+10 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 209 | +25 | 1 | 1 | 1 | 3 | 3 | | 0.40 | 0.41 | 0.39 | 0.41 | 0.43 | 0.37 | 0.45 |
| 210 | +40 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 211 | +55 | 1 | 1 | 1 | 3 | 3 | | 0.41 | 0.42 | 0.41 | 0.42 | 0.44 | 0.39 | 0.46 |
| 212 | +70 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 213 | +85 | 1 | 1 | 1 | 3 | 3 | | 0.39 | 0.41 | 0.38 | 0.36 | 0.42 | 0.39 | 0.43 |
| 214 | 8+00 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 215 | +15 | 1 | 1 | 1 | 3 | 3 | | 0.45 | 0.47 | 0.41 | 0.43 | 0.45 | 0.44 | 0.42 |
| 216 | +30 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 217 | +45 | 1 | 1 | 1 | 3 | 3 | | 0.42 | 0.45 | 0.39 | 0.43 | 0.43 | 0.40 | 0.46 |
| 218 | +60 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 219 | +75 | 1 | 1 | 1 | 3 | 3 | | 0.43 | 0.45 | 0.43 | 0.43 | 0.48 | 0.41 | 0.48 |
| 220 | +90 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 221 | 9+05 | 1 | 1 | 1 | 3 | 3 | | 0.45 | 0.46 | 0.42 | 0.42 | 0.43 | 0.42 | 0.46 |
| 222 | +20 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 223 | +35 | 1 | 1 | 1 | 3 | 3 | | 0.42 | 0.39 | 0.35 | 0.33 | 0.40 | 0.35 | 0.43 |
| 224 | +50 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 225 | +65 | 1 | 1 | 1 | 3 | 3 | | 0.39 | 0.50 | 0.39 | 0.37 | 0.46 | 0.36 | 0.42 |
| 226 | +80 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 227 | +95 | 1 | 1 | 1 | 3 | 3 | | 0.35 | 0.40 | 0.33 | 0.36 | 0.38 | 0.36 | 0.37 |
| 228 | 390+10 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 229 | +25 | 1 | 1 | 1 | 3 | 3 | | 0.41 | 0.48 | 0.39 | 0.36 | 0.51 | 0.37 | 0.47 |
| 230 | +40 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 231 | +55 | 1 | 1 | 1 | 3 | 3 | | 0.49 | 0.51 | 0.44 | 0.45 | 0.48 | 0.45 | 0.49 |
| 232 | +70 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 233 | +86 | 1 | 1 | 1 | 3 | 3 | | 0.51 | 0.41 | 0.36 | 0.38 | 0.41 | 0.38 | 0.41 |
| 234 | 1+01 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 235 | +16 | 1 | 1 | 1 | 3 | 3 | | 0.41 | 0.43 | 0.42 | 0.41 | 0.47 | 0.42 | 0.46 |
| 236 | +31 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 237 | +45 | 1 | 1 | 1 | 3 | 3 | | 0.43 | 0.47 | 0.42 | 0.43 | 0.47 | 0.44 | 0.49 |
| 238 | +60 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 239 | +75 | 1 | 1 | 1 | 3 | 3 | | 0.39 | 0.41 | 0.38 | 0.39 | 0.43 | 0.37 | 0.41 |
| 240 | +90 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 241 | 2+06 | 1 | 1 | 1 | 3 | 3 | | 0.45 | 0.45 | 0.43 | 0.41 | 0.46 | 0.36 | 0.47 |
| 242 | +21 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 243 | +36 | 1 | 1 | 1 | 3 | 3 | | 0.35 | 0.41 | 0.35 | 0.35 | 0.38 | 0.31 | 0.38 |
| 244 | +51 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 245 | +65 | 1 | 1 | 1 | 3 | 3 | | 0.35 | 0.42 | 0.32 | 0.36 | 0.39 | 0.35 | 0.39 |
| 246 | +80 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 247 | +95 | 1 | 1 | 1 | 3 | 3 | | 0.35 | 0.40 | 0.35 | 0.36 | 0.40 | 0.34 | 0.40 |
| 248 | 3+10 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 249 | +24 | 1 | 1 | 1 | 3 | 3 | | 0.38 | 0.40 | 0.37 | 0.39 | 0.43 | 0.35 | 0.40 |
| 250 | 393+39 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |

*Span saw created a double saw cut at measurement location

Allied 1/4" Joint

| Joint Number | Station | Visual Evaluation 2-86 | 2-87 | 2-88 | 2-89 | 2-90 | 2-91 | Joint Width 6-85 | 2-86 | 6-86 | 6-87 | 2-88 | 6-88 | 2-89 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 251 | 393+53 | 1 | 1 | 1 | 3 | 3 | | 0.46 | 0.49 | 0.44 | 0.44 | 0.45 | 0.41 | 0.43 |
| 252 | +68 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 253 | +83 | 1 | 1 | 1 | 2 | 2 | | 0.31 | 0.36 | 0.31 | 0.32 | 0.37 | 0.31 | 0.33 |
| 254 | +98 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 255 | 4+13 | 1 | 1 | 1 | 3 | 3 | | 0.33 | 0.36 | 0.33 | 0.32 | 0.38 | 0.30 | 0.35 |
| 256 | +27 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 257 | +40 | 1 | 1 | 1 | 3 | 3 | | 0.30 | 0.35 | 0.30 | 0.32 | 0.36 | 0.31 | 0.38 |
| 258 | +54 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 259 | +68 | 1 | 1 | 1 | 3 | 3 | | 0.30 | 0.34 | 0.31 | 0.32 | 0.36 | 0.31 | 0.34 |
| 260 | +84 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 261 | 395+01 | 1 | 1 | 1 | 3 | 3 | | 0.46 | 0.48 | 0.48 | 0.44 | 0.45 | 0.42 | 0.51 |
| 262 | +16 | 1 | 1 | 1 | 2 | 3 | | | | | | | | |
| 263 | +31 | 1 | 1 | 1 | 3 | 3 | | 0.32 | 0.40 | 0.32 | 0.32 | 0.38 | 0.32 | 0.38 |
| 264 | +46 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 265 | +61 | 1 | 1 | 1 | 3 | 3 | | 0.35 | 0.40 | 0.33 | 0.35 | 0.39 | 0.33 | 0.38 |
| 266 | +76 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 267 | +91 | 1 | 1 | 1 | 3 | 3 | | 0.27 | 0.30 | 0.28 | 0.25 | 0.31 | 0.29 | 0.30 |
| 268 | 6+06 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 269 | +21 | 1 | 1 | 1 | 3 | 3 | | 0.27 | 0.32 | 0.28 | 0.29 | 0.34 | 0.29 | 0.34 |
| 270 | +36 | 1 | 1 | 1 | 2 | 3 | | | | | | | | |
| 271 | +51 | 1 | 1 | 1 | 3 | 3 | | 0.42 | 0.45 | 0.39 | 0.38 | 0.43 | 0.40 | 0.40 |
| 272 | +66 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 273 | +80 | 1 | 1 | 1 | 3 | 3 | | 0.28 | 0.38 | 0.29 | 0.31 | 0.36 | 0.31 | 0.35 |
| 274 | +95 | 1 | 1 | 1 | 2 | 3 | | | | | | | | |
| 275 | 7+10 | 1 | 1 | 1 | 3 | 3 | | 0.27 | 0.32 | 0.28 | 0.29 | 0.32 | 0.29 | 0.37 |
| 276 | +25 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 277 | +40 | 1 | 1 | 1 | 3 | 3 | | 0.26 | 0.32 | 0.26 | 0.29 | 0.32 | 0.30 | 0.32 |
| 278 | +55 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 279 | +70 | 1 | 1 | 1 | 3 | 3 | | 0.32 | 0.39 | 0.33 | 0.30 | 0.38 | 0.34 | 0.40 |
| 280 | +85 | 1 | 1 | 1 | 2 | 3 | | | | | | | | |
| 281 | 8+00 | 1 | 1 | 1 | 3 | 3 | | 0.63 | *0.61 | 0.61 | 0.60 | 0.62 | 0.61 | 0.57 |
| 282 | +15 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 283 | +30 | 1 | 1 | 1 | 3 | 3 | | 0.36 | 0.40 | 0.35 | 0.36 | 0.50 | 0.37 | 0.44 |
| 284 | +44 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 285 | +58 | 1 | 1 | 1 | 3 | 3 | | 0.35 | 0.38 | 0.34 | 0.36 | 0.40 | 0.36 | 0.44 |
| 286 | +73 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 287 | +88 | 1 | 1 | 1 | 3 | 3 | | 0.30 | 0.33 | 0.28 | 0.37 | 0.32 | 0.28 | 0.33 |
| 288 | 9+03 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 289 | +17 | 1 | 1 | 1 | 3 | 3 | | 0.28 | 0.28 | 0.28 | 0.39 | 0.33 | 0.31 | 0.36 |
| 290 | +32 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 291 | +46 | 1 | 1 | 1 | 3 | 3 | | 0.38 | 0.43 | 0.39 | 0.39 | 0.45 | 0.40 | 0.45 |
| 292 | +61 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 293 | +75 | 1 | 1 | 1 | 3 | 3 | | 0.35 | 0.35 | 0.33 | 0.35 | 0.38 | 0.35 | 0.38 |
| 294 | +91 | 2 | 2 | 2 | 3 | 3 | | | | | | | | |
| 295 | 400+07 | 1 | 2 | 2 | 3 | 3 | | 0.30 | 0.33 | 0.28 | 0.31 | 0.33 | 0.31 | 0.35 |
| 296 | +22 | 1 | 2 | 2 | 3 | 3 | | | | | | | | |
| 297 | +38 | 1 | 1 | 1 | 3 | 3 | | 0.41 | 0.37 | 0.39 | 0.29 | 0.37 | 0.37 | 0.41 |
| 298 | +53 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 299 | +67 | 1 | 1 | 1 | 3 | 3 | | 0.28 | 0.33 | 0.28 | 0.27 | 0.35 | 0.28 | 0.37 |
| 300 | +82 | 1 | 1 | 1 | 3 | 3 | | | | | | | | |
| 301 | 400+97 | 1 | 1 | 1 | 3 | 3 | | 0.45 | 0.45 | 0.44 | 0.41 | 0.43 | 0.41 | 0.47 |

*Span saw created a double saw cut at measurement location

Sof Seal (C) 3/8" Joint

| Joint Number | Station | Visual Evaluation 2-86 | 2-87 | 2-88 | 2-89 | 2-90 | 2-91 | Joint Width 6-85 | 2-86 | 6-86 | 6-87 | 2-88 | 6-88 | 2-89 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 302 | 408+52 | 1 | 1 | 1 | 2 | 3 | 3 | | | | | | | |
| 303 | +67 | 1 | 1 | 1 | 1 | 1 | 1 | 0.45 | 0.48 | 0.44 | 0.45 | 0.48 | 0.44 | 0.47 |
| 304 | +82 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 305 | +96 | 1 | 1 | 1 | 2 | 2 | 2 | 0.41 | 0.46 | 0.38 | 0.41 | 0.40 | 0.40 | 0.43 |
| 306 | 9+10 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 307 | +24 | 1 | 1 | 1 | 2 | 2 | 2 | 0.36 | 0.44 | 0.36 | 0.36 | 0.40 | 0.37 | 0.42 |
| 308 | +39 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 309 | +55 | 1 | 1 | 1 | 2 | 2 | 2 | 0.36 | 0.43 | 0.35 | 0.38 | 0.42 | 0.37 | 0.44 |
| 310 | +70 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 311 | +85 | 1 | 1 | 1 | 1 | 1 | 1 | 0.37 | 0.44 | 0.37 | 0.37 | 0.40 | 0.36 | 0.40 |
| 312 | 410+00 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 313 | +15 | 1 | 1 | 1 | 1 | 1 | 1 | 0.38 | 0.40 | 0.37 | 0.38 | 0.41 | 0.40 | 0.43 |
| 314 | +30 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 315 | +45 | 1 | 1 | 1 | 1 | 1 | 1 | 0.40 | 0.47 | 0.40 | 0.41 | 0.47 | 0.40 | 0.46 |
| 316 | +60 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 317 | +75 | 1 | 1 | 1 | 1 | 1 | 1 | 0.39 | 0.48 | 0.38 | 0.40 | 0.40 | 0.38 | 0.46 |
| 318 | +90 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 319 | 1+04 | 1 | 1 | 1 | 1 | 1 | 1 | 0.37 | 0.46 | 0.37 | 0.38 | 0.42 | 0.38 | 0.42 |
| 320 | +19 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 321 | +34 | 1 | 1 | 1 | 1 | 1 | 1 | 0.42 | 0.41 | 0.39 | 0.38 | 0.44 | 0.37 | 0.41 |
| 322 | +49 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 323 | +64 | 1 | 1 | 1 | 1 | 1 | 1 | 0.39 | 0.42 | 0.38 | 0.39 | 0.47 | 0.38 | 0.42 |
| 324 | +79 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 325 | +94 | 1 | 1 | 1 | 2 | 2 | 2 | 0.40 | 0.41 | 0.36 | 0.38 | 0.43 | 0.35 | 0.38 |
| 326 | 2+09 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 327 | +24 | 1 | 1 | 1 | 2 | 2 | 2 | 0.40 | 0.43 | 0.40 | 0.39 | 0.39 | 0.37 | 0.45 |
| 328 | +39 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 329 | +54 | 1 | 1 | 1 | 2 | 2 | 2 | 0.47 | 0.46 | 0.44 | 0.47 | 0.41 | 0.47 | 0.55 |
| 330 | +69 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 331 | +84 | 1 | 1 | 1 | 2 | 2 | 2 | 0.35 | 0.41 | 0.35 | 0.37 | 0.44 | 0.35 | 0.43 |
| 332 | +99 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 333 | 3+15 | 1 | 1 | 1 | 1 | 1 | 1 | 0.35 | 0.45 | 0.42 | 0.37 | 0.44 | 0.37 | 0.41 |
| 334 | +30 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 335 | +46 | 1 | 1 | 1 | 1 | 1 | 1 | 0.39 | 0.43 | 0.35 | 0.34 | 0.37 | 0.37 | 0.42 |
| 336 | +61 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 337 | 3+76 | 1 | 1 | 1 | 1 | 1 | 1 | 0.40 | 0.47 | 0.42 | 0.39 | 0.44 | 0.41 | 0.46 |
| 338 | +91 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 339 | 4+06 | 1 | 1 | 1 | 2 | 2 | 2 | 0.46 | 0.52 | 0.49 | 0.46 | 0.48 | 0.47 | 0.53 |
| 340 | +21 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 341 | +37 | 1 | 1 | 1 | 2 | 2 | 2 | 0.39 | 0.50 | 0.41 | 0.39 | 0.50 | 0.42 | 0.47 |
| 342 | +52 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 343 | +67 | 1 | 1 | 1 | 1 | 1 | 1 | 0.42 | 0.47 | 0.40 | 0.43 | 0.47 | 0.41 | 0.45 |
| 344 | +83 | 1 | 1 | 1 | 1 | 2 | 2 | | | | | | | |
| 345 | 415+00 | 1 | 1 | 1 | 2 | 2 | 2 | 0.44 | 0.51 | 0.43 | 0.46 | 0.48 | 0.43 | 0.51 |
| 346 | +15 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 347 | +29 | 1 | 1 | 1 | 1 | 2 | 2 | 0.55 | 0.61 | *0.53 | 0.52 | 0.57 | 0.52 | 0.56 |
| 348 | +43 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 349 | +57 | 1 | 1 | 1 | 1 | 1 | 1 | 0.46 | 0.54 | 0.44 | 0.46 | 0.52 | 0.46 | 0.56 |
| 350 | 415+72 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |

*Span saw created a double saw cut at measurement location

SWS 3/8" Joint

| Joint Number | Station | Visual Evaluation 2-86 | 2-87 | 2-88 | 2-89 | 2-90 | 2-91 | Joint Width 6-85 | 2-86 | 6-86 | 6-87 | 2-88 | 6-88 | 2-89 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 351 | 415+87 | 1 | 1 | 1 | 3 | 3 | 3 | 0.42 | 0.44 | 0.41 | 0.41 | 0.43 | 0.42 | 0.48 |
| 352 | 6+02 | 1 | 1 | 1 | 2 | 3 | 3 | | | | | | | |
| 353 | +16 | 1 | 2 | 2 | 3 | 3 | 3 | 0.42 | 0.47 | 0.43 | 0.44 | 0.45 | 0.44 | 0.49 |
| 354 | +31 | 1 | 1 | 2 | 2 | 3 | 3 | | | | | | | |
| 355 | +47 | 1 | 1 | 1 | 2 | 2 | 2 | 0.39 | 0.43 | 0.38 | 0.40 | 0.43 | 0.38 | 0.42 |
| 356 | +62 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 357 | +77 | 1 | 2 | 2 | 2 | 2 | 2 | 0.36 | 0.44 | 0.60 | 0.37 | 0.43 | 0.38 | 0.45 |
| 358 | +92 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 359 | 7+07 | 1 | 2 | 2 | 3 | 3 | 3 | 0.42 | 0.52 | 0.45 | 0.42 | 0.51 | 0.44 | 0.54 |
| 360 | +37 | 1 | 1 | 2 | 2 | 3 | 3 | 0.37 | 0.41 | 0.35 | 0.34 | 0.42 | 0.37 | 0.45 |
| 361 | +52 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 362 | +66 | 1 | 1 | 1 | 2 | 2 | 2 | 0.41 | 0.43 | 0.41 | 0.42 | 0.45 | 0.42 | 0.47 |
| 363 | +81 | 1 | 1 | 2 | 2 | 2 | 2 | | | | | | | |
| 364 | +96 | 1 | 1 | 2 | 2 | 2 | 2 | 0.41 | 0.48 | 0.41 | 0.42 | 0.45 | 0.43 | 0.45 |
| 365 | 8+11 | 1 | 1 | 2 | 2 | 2 | 2 | | | | | | | |
| 366 | +26 | 1 | 1 | 1 | 2 | 2 | 2 | 0.36 | 0.41 | 0.37 | 0.37 | 0.40 | 0.38 | 0.40 |
| 367 | +41 | 1 | 1 | 2 | 2 | 3 | 3 | | | | | | | |
| 368 | +56 | 1 | 1 | 1 | 2 | 3 | 3 | 0.40 | 0.40 | 0.37 | 0.40 | 0.41 | 0.41 | 0.43 |
| 369 | +91 | 1 | 1 | 2 | 2 | 2 | 3 | | | | | | | |
| 370 | +86 | 1 | 1 | 2 | 2 | 2 | 2 | 0.40 | 0.44 | 0.38 | 0.40 | 0.42 | 0.39 | 0.44 |
| 371 | 9+01 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 372 | +16 | 1 | 1 | 1 | 2 | 2 | 2 | 0.36 | 0.43 | 0.36 | 0.38 | 0.41 | 0.38 | 0.43 |
| 373 | +31 | 1 | 1 | 2 | 2 | 2 | 2 | | | | | | | |
| 374 | +47 | 1 | 2 | 2 | 2 | 2 | 2 | 0.42 | 0.42 | 0.36 | 0.40 | 0.39 | 0.35 | 0.40 |
| 375 | +62 | 1 | 1 | 2 | 2 | 2 | 2 | | | | | | | |
| 376 | +76 | 1 | 2 | 2 | 2 | 3 | 3 | 0.38 | 0.42 | 0.38 | 0.35 | 0.38 | 0.37 | 0.42 |
| 377 | +91 | 1 | 1 | 2 | 2 | 2 | 2 | | | | | | | |
| 378 | 420+06 | 1 | 1 | 1 | 2 | 3 | 3 | 0.37 | 0.39 | 0.37 | 0.35 | 0.39 | 0.39 | 0.41 |
| 379 | +20 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 380 | +34 | 1 | 1 | 1 | 2 | 2 | 2 | 0.40 | 0.44 | 0.39 | 0.39 | 0.42 | 0.37 | 0.43 |
| 381 | +49 | 1 | 2 | 2 | 2 | 2 | 2 | | | | | | | |
| 382 | +63 | 1 | 1 | 1 | 2 | 2 | 2 | 0.35 | 0.39 | 0.36 | 0.37 | 0.37 | 0.37 | 0.39 |
| 383 | +78 | 1 | 1 | 2 | 3 | 3 | 3 | | | | | | | |
| 384 | 1+05 | 1 | 1 | 2 | 3 | 3 | 3 | | | | | | | |
| 385 | +20 | 1 | 1 | 2 | 2 | 3 | 3 | 0.36 | 0.42 | 0.38 | 0.37 | 0.41 | 0.39 | 0.40 |
| 386 | +35 | 1 | 1 | 2 | 3 | 3 | 3 | | | | | | | |
| 387 | +49 | 1 | 1 | 2 | 2 | 2 | 2 | 0.36 | 0.40 | 0.35 | 0.35 | 0.36 | 0.35 | 0.38 |
| 388 | +64 | 1 | 2 | 2 | 3 | 3 | 3 | | | | | | | |
| 389 | +79 | 1 | 1 | 2 | 3 | 3 | 3 | 0.40 | 0.41 | 0.35 | 0.32 | 0.37 | 0.35 | 0.40 |
| 390 | +94 | 1 | 1 | 1 | 2 | 3 | 3 | | | | | | | |
| 391 | 2+09 | 1 | 2 | 2 | 2 | 3 | 3 | 0.37 | 0.41 | 0.36 | 0.36 | 0.40 | 0.36 | 0.41 |
| 392 | +24 | 1 | 1 | 2 | 3 | 3 | 3 | | | | | | | |
| 393 | +40 | 1 | 1 | 1 | 2 | 2 | 3 | 0.37 | 0.41 | 0.36 | 0.35 | 0.37 | 0.36 | 0.39 |
| 394 | +55 | 1 | 1 | 2 | 2 | 3 | 3 | | | | | | | |
| 395 | +70 | 1 | 1 | 2 | 3 | 3 | 3 | 0.41 | 0.41 | 0.38 | 0.38 | 0.43 | 0.38 | 0.49 |
| 396 | +85 | 1 | 1 | 2 | 3 | 3 | 3 | | | | | | | |
| 397 | 3+00 | 1 | 2 | 2 | 3 | 3 | 3 | 0.37 | 0.41 | 0.32 | 0.34 | 0.41 | 0.36 | 0.40 |
| 398 | +15 | 1 | 1 | 2 | 2 | 3 | 3 | | | | | | | |
| 399 | 423+30 | 1 | 1 | 2 | 2 | 2 | 3 | 0.38 | 0.41 | 0.37 | 0.35 | 0.38 | 0.37 | 0.40 |
| | +45 | | | 2 | 2 | 2 | 2 | | | | | | | |

| Dow 3/8" Joint Number | Station | Visual Evaluation 2-86 | 2-87 | 2-88 | 2-89 | 2-90 | 2-91 | Joint Width 6-85 | 2-86 | 6-86 | 6-87 | 2-88 | 6-88 | 2-89 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 400 | 439+15 | 1 | 1 | 1 | 1 | 1 | 1 | 0.36 | 0.39 | 0.35 | 0.35 | 0.37 | 0.32 | 0.39 |
| 401 | +30 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 402 | +44 | 1 | 1 | 1 | 2 | 2 | 2 | 0.38 | 0.41 | 0.37 | 0.34 | 0.44 | 0.33 | 0.43 |
| 403 | +59 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 404 | +74 | 1 | 1 | 1 | 1 | 1 | 1 | 0.36 | 0.39 | 0.36 | 0.34 | 0.36 | 0.35 | 0.41 |
| 405 | +90 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 406 | 440+05 | 1 | 1 | 1 | 2 | 3 | 3 | 0.34 | 0.42 | 0.33 | 0.34 | 0.39 | 0.34 | 0.38 |
| 407 | +20 | 1 | 1 | 1 | 1 | 2 | 2 | | | | | | | |
| 408 | +36 | 1 | 1 | 1 | 1 | 2 | 2 | 0.42 | 0.44 | 0.38 | 0.34 | 0.41 | 0.35 | 0.41 |
| 409 | +51 | 1 | 1 | 1 | 1 | 2 | 2 | | | | | | | |
| 410 | +66 | 1 | 1 | 1 | 1 | 2 | 2 | 0.37 | 0.39 | 0.34 | 0.34 | 0.38 | 0.35 | 0.39 |
| 411 | +81 | 1 | 1 | 1 | 1 | 2 | 2 | | | | | | | |
| 412 | +97 | 1 | 1 | 1 | 1 | 2 | 2 | 0.43 | 0.45 | 0.41 | 0.41 | 0.47 | 0.42 | 0.46 |
| 413 | 1+12 | 1 | 1 | 1 | 1 | 2 | 2 | | | | | | | |
| 414 | +26 | 1 | 1 | 1 | 1 | 2 | 2 | 0.41 | 0.42 | 0.39 | 0.39 | 0.42 | 0.34 | 0.42 |
| 415 | +41 | 1 | 1 | 1 | 1 | 2 | 2 | | | | | | | |
| 416 | +57 | 1 | 1 | 1 | 1 | 2 | 2 | 0.43 | 0.44 | 0.42 | 0.41 | 0.43 | 0.40 | 0.45 |
| 417 | +72 | 1 | 1 | 1 | 1 | 2 | 2 | | | | | | | |
| 418 | +88 | 1 | 1 | 1 | 1 | 2 | 2 | 0.39 | 0.44 | 0.41 | 0.40 | 0.43 | 0.41 | 0.46 |
| 419 | 2+03 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 420 | +18 | 1 | 1 | 1 | 1 | 1 | 1 | 0.42 | 0.48 | 0.39 | 0.42 | 0.43 | 0.39 | 0.36 |
| 421 | +33 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 422 | +48 | 1 | 1 | 1 | 1 | 2 | 2 | 0.38 | 0.41 | 0.36 | 0.40 | 0.42 | 0.38 | 0.41 |
| 423 | +62 | 1 | 1 | 1 | 1 | 2 | 2 | | | | | | | |
| 424 | +79 | 1 | 1 | 1 | 1 | 1 | 1 | 0.43 | 0.45 | 0.41 | 0.38 | 0.46 | 0.37 | 0.39 |
| 425 | +94 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 426 | 3+09 | 1 | 1 | 1 | 2 | 2 | 2 | 0.45 | 0.49 | 0.45 | 0.43 | 0.47 | 0.46 | 0.45 |
| 427 | +24 | 1 | 1 | 1 | 1 | 2 | 2 | | | | | | | |
| 428 | +39 | 1 | 1 | 1 | 1 | 1 | 1 | 0.41 | 0.44 | 0.40 | 0.42 | 0.43 | 0.43 | 0.45 |
| 429 | +54 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 430 | +68 | 1 | 1 | 1 | 2 | 2 | 2 | 0.42 | 0.44 | 0.39 | 0.40 | 0.43 | 0.38 | 0.43 |
| 431 | +84 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 432 | 4+00 | 1 | 1 | 1 | 1 | 1 | 1 | 0.43 | 0.45 | 0.40 | 0.42 | 0.46 | 0.45 | 0.47 |
| 433 | +14 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 434 | +28 | 1 | 1 | 1 | 1 | 2 | 2 | 0.43 | 0.45 | 0.41 | 0.42 | 0.47 | 0.43 | 0.46 |
| 435 | +43 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 436 | +57 | 1 | 1 | 1 | 1 | 1 | 1 | 0.42 | 0.46 | 0.43 | 0.42 | 0.44 | 0.40 | 0.45 |
| 437 | +72 | 1 | 1 | 1 | 1 | 2 | 2 | | | | | | | |
| 438 | +87 | 1 | 1 | 1 | 2 | 2 | 2 | 0.45 | 0.48 | 0.44 | 0.44 | 0.47 | 0.43 | 0.46 |
| 439 | 445+02 | 1 | 1 | 1 | 1 | 2 | 2 | | | | | | | |
| 440 | +18 | 1 | 1 | 1 | 1 | 2 | 2 | 0.42 | 0.47 | 0.39 | 0.41 | 0.42 | 0.41 | 0.44 |
| 441 | +32 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 442 | +46 | 1 | 1 | 1 | 1 | 1 | 1 | 0.43 | 0.45 | 0.42 | 0.42 | 0.52 | 0.42 | 0.46 |
| 443 | +61 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 444 | +75 | 1 | 1 | 1 | 1 | 1 | 1 | 0.43 | 0.45 | 0.43 | 0.42 | 0.47 | 0.42 | 0.51 |
| 445 | 445+90 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |

S.S.888 3/8" Joint

| Joint Number | Station | Visual Evaluation 2-86 | 2-87 | 2-88 | 2-89 | 2-90 | 2-91 | Joint Width 6-85 | 2-86 | 6-86 | 6-87 | 2-88 | 6-88 | 2-89 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 446 | 446+04 | 1 | 1 | 1 | 2 | 2 | 2 | 0.43 | 0.46 | 0.43 | 0.42 | 0.42 | 0.44 | 0.48 |
| 447 | +19 | 1 | 1 | 1 | 1 | 2 | 2 | | | | | | | |
| 448 | +35 | 1 | 1 | 1 | 1 | 1 | 1 | 0.40 | 0.46 | 0.43 | 0.43 | 0.44 | 0.41 | 0.45 |
| 449 | +51 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| 450 | +67 | 1 | 1 | 1 | 2 | 2 | 2 | 0.43 | 0.46 | 0.44 | 0.43 | 0.48 | 0.43 | 0.49 |
| 451 | +82 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 452 | +97 | 1 | 1 | 1 | 2 | 2 | 2 | 0.40 | 0.46 | 0.42 | 0.42 | 0.44 | 0.42 | 0.44 |
| 453 | 7+12 | 1 | 1 | 1 | 2 | 3 | 3 | | | | | | | |
| 454 | +27 | 1 | 1 | 1 | 2 | 2 | 2 | 0.42 | 0.48 | 0.44 | 0.45 | 0.47 | 0.47 | 0.50 |
| 455 | +42 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 456 | +56 | 1 | 1 | 1 | 2 | 2 | 2 | 0.42 | 0.43 | 0.42 | 0.38 | 0.45 | 0.42 | 0.49 |
| 457 | +61 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 458 | +87 | 1 | 1 | 1 | 1 | 2 | 2 | 0.42 | 0.44 | 0.39 | 0.40 | 0.44 | 0.41 | 0.45 |
| 459 | 8+02 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 460 | +18 | 1 | 1 | 1 | 1 | 1 | 1 | 0.45 | 0.47 | 0.43 | 0.41 | 0.45 | 0.44 | 0.48 |
| 461 | +33 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 462 | +48 | 1 | 1 | 1 | 1 | 1 | 1 | 0.47 | 0.46 | 0.43 | 0.43 | 0.45 | 0.44 | 0.53 |
| 463 | +63 | 1 | 1 | 2 | 2 | 2 | 2 | | | | | | | |
| 464 | +79 | 1 | 1 | 2 | 2 | 2 | 2 | 0.41 | 0.41 | 0.38 | 0.40 | 0.44 | 0.42 | 0.43 |
| 465 | +94 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 466 | 9+10 | 1 | 1 | 1 | 2 | 2 | 2 | 0.45 | 0.43 | 0.46 | 0.38 | 0.51 | 0.44 | 0.50 |
| 467 | +25 | 1 | 1 | 1 | 1 | 2 | 2 | | | | | | | |
| 468 | +40 | 1 | 1 | 1 | 1 | 1 | 1 | 0.44 | 0.45 | 0.43 | 0.41 | 0.39 | 0.43 | 0.46 |
| 469 | +55 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 470 | +70 | 1 | 1 | 1 | 2 | 2 | 2 | 0.40 | 0.45 | 0.40 | 0.41 | 0.42 | 0.41 | 0.45 |
| 471 | +86 | 1 | 1 | 2 | 2 | 3 | 3 | | | | | | | |
| 472 | 450+03 | 1 | 1 | 1 | 1 | 1 | 1 | 0.42 | 0.42 | 0.40 | 0.38 | 0.43 | 0.41 | 0.46 |
| 473 | +17 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 474 | +31 | 1 | 1 | 1 | 1 | 2 | 2 | 0.40 | 0.47 | 0.40 | 0.39 | 0.42 | 0.41 | 0.44 |
| 475 | +46 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 476 | +60 | 1 | 1 | 1 | 2 | 2 | 2 | 0.45 | 0.45 | 0.46 | 0.43 | 0.43 | 0.43 | 0.46 |
| 477 | +74 | 1 | 2 | 2 | 2 | 2 | 2 | | | | | | | |
| 478 | +87 | 1 | 1 | 1 | 2 | 2 | 2 | 0.40 | 0.40 | 0.39 | 0.39 | 0.40 | 0.39 | 0.43 |
| 479 | 1+01 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 480 | +15 | 1 | 1 | 1 | 2 | 2 | 2 | 0.42 | 0.44 | 0.43 | 0.42 | 0.43 | 0.43 | 0.43 |
| 481 | +29 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 482 | +43 | 1 | 2 | 2 | 2 | 2 | 2 | 0.42 | 0.44 | 0.42 | 0.42 | 0.47 | 0.42 | 0.50 |
| 483 | +58 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 484 | +74 | 1 | 1 | 1 | 2 | 2 | 2 | 0.41 | 0.45 | 0.45 | 0.44 | 0.44 | 0.43 | 0.46 |
| 485 | +89 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 486 | 2+04 | 1 | 1 | 2 | 2 | 2 | 2 | 0.42 | 0.49 | 0.43 | 0.44 | 0.46 | 0.44 | 0.51 |
| 487 | +19 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 488 | +34 | 1 | 1 | 2 | 2 | 2 | 2 | 0.42 | 0.46 | 0.40 | 0.43 | 0.45 | 0.43 | 0.46 |
| 489 | +49 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 490 | +64 | 1 | 1 | 2 | 2 | 2 | 2 | 0.42 | 0.48 | 0.46 | 0.44 | 0.49 | 0.46 | 0.49 |
| 491 | +79 | 2 | 2 | 2 | 2 | 2 | 2 | | | | | | | |
| 492 | +93 | 1 | 2 | 2 | 2 | 2 | 3 | 0.48 | 0.61 | 0.51 | 0.48 | 0.47 | 0.50 | 0.60 |
| 493 | 3+08 | 1 | 1 | 2 | 2 | 2 | 2 | | | | | | | |
| 494 | 453+24 | 1 | 1 | 2 | 2 | 2 | 2 | 0.56 | 0.63 | 0.58 | 0.54 | 0.63 | 0.59 | 0.50 |
| | +39 | | | 2 | 2 | 2 | 2 | | | | | | | |

Ruscoe 3/8" Joint

| Joint Number | Station | Visual Evaluation 2-86 | 2-87 | 2-88 | 2-89 | 2-90 | 2-91 | Joint Width 6-85 | 2-86 | 6-86 | 6-87 | 2-88 | 6-88 | 2-89 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 495 | 468+47 | 2 | 2 | 2 | 3 | | | 0.27 | 0.37 | 0.25 | 0.27 | 0.24 | 0.27 | 0.31 |
| 496 | +62 | 1 | 2 | 2 | 3 | | | | | | | | | |
| 497 | +77 | 1 | 1 | 3 | 3 | | | 0.35 | 0.41 | 0.33 | 0.35 | 0.39 | 0.36 | 0.37 |
| 498 | +92 | 1 | 1 | 2 | 3 | | | | | | | | | |
| 499 | 9+08 | 1 | 1 | 2 | 3 | | | 0.36 | 0.37 | 0.35 | 0.36 | 0.43 | 0.37 | 0.39 |
| 500 | +23 | 1 | 1 | 2 | 3 | | | | | | | | | |
| 501 | +39 | 1 | 2 | 3 | 3 | | | 0.30 | 0.43 | 0.35 | 0.35 | 0.39 | 0.37 | 0.37 |
| 502 | +54 | 1 | 1 | 2 | 3 | | | | | | | | | |
| 503 | +68 | 1 | 1 | 2 | 3 | | | 0.36 | 0.43 | 0.36 | 0.38 | 0.44 | 0.38 | 0.42 |
| 504 | +83 | 2 | 2 | 2 | 3 | | | | | | | | | |
| 505 | +97 | 1 | 1 | 2 | 3 | | | 0.36 | 0.46 | 0.36 | 0.36 | 0.41 | 0.37 | 0.37 |
| 506 | 470+12 | 1 | 1 | 2 | 3 | | | | | | | | | |
| 507 | +27 | 1 | 1 | 2 | 3 | | | 0.35 | 0.42 | 0.36 | 0.36 | 0.39 | 0.37 | 0.38 |
| 508 | +42 | 1 | 1 | 1 | 3 | | | | | | | | | |
| 509 | +57 | 1 | 2 | 3 | 3 | | | 0.38 | 0.43 | 0.35 | 0.38 | 0.50 | 0.37 | 0.46 |
| 510 | +72 | 2 | 2 | 2 | 3 | | | | | | | | | |
| 511 | +88 | 1 | 1 | 1 | 3 | | | 0.35 | 0.37 | 0.33 | 0.36 | 0.40 | 0.35 | 0.38 |
| 512 | 1+03 | 1 | 1 | 2 | 3 | | | | | | | | | |
| 513 | +18 | 1 | 1 | 2 | 3 | | | 0.38 | 0.37 | 0.36 | 0.35 | 0.40 | 0.36 | 0.39 |
| 514 | +33 | 1 | 2 | 2 | 3 | | | | | | | | | |
| 515 | +47 | 1 | 1 | 2 | 3 | | | 0.36 | 0.42 | 0.35 | 0.36 | 0.40 | 0.36 | 0.42 |
| 516 | +62 | 1 | 1 | 1 | 3 | | | | | | | | | |
| 517 | +77 | 1 | 1 | 1 | 3 | | | 0.50 | 0.52 | 0.43 | 0.43 | 0.33 | 0.37 | 0.44 |
| 518 | +93 | 1 | 1 | 2 | 3 | | | | | | | | | |
| 519 | 2+09 | 1 | 2 | 2 | 3 | | | 0.36 | 0.36 | 0.35 | 0.38 | 0.40 | 0.37 | 0.40 |
| 520 | +23 | 1 | 1 | 2 | 3 | | | | | | | | | |
| 521 | +37 | 1 | 1 | 2 | 3 | | | 0.40 | 0.40 | 0.35 | 0.39 | 0.32 | 0.34 | 0.43 |
| 522 | +51 | 1 | 1 | 2 | 3 | | | | | | | | | |
| 523 | +65 | 1 | 1 | 3 | 3 | | | 0.36 | 0.41 | 0.33 | 0.37 | 0.30 | 0.34 | 0.34 |
| 524 | +79 | 1 | 1 | 3 | 3 | | | | | | | | | |
| 525 | +93 | 1 | 2 | 3 | 3 | | | 0.38 | 0.37 | 0.38 | 0.40 | 0.34 | 0.35 | 0.46 |
| 526 | 3+08 | 1 | 2 | 3 | 3 | | | | | | | | | |
| 527 | +23 | 1 | 1 | 2 | 3 | | | 0.43 | 0.40 | 0.38 | 0.40 | 0.44 | 0.41 | 0.44 |
| 528 | +38 | 1 | 1 | 1 | 3 | | | | | | | | | |
| 529 | +53 | 1 | 2 | 2 | 3 | | | 0.35 | 0.47 | 0.36 | 0.36 | 0.40 | 0.34 | 0.41 |
| 530 | +67 | 1 | 1 | 2 | 3 | | | | | | | | | |
| 531 | +81 | 1 | 1 | 1 | 3 | | | 0.35 | 0.46 | 0.36 | 0.37 | 0.42 | 0.38 | 0.41 |
| 532 | +96 | 1 | 1 | 1 | 3 | | | | | | | | | |
| 533 | 4+10 | 1 | 1 | 2 | 3 | | | 0.33 | 0.44 | 0.34 | 0.36 | 0.38 | 0.37 | 0.39 |
| 534 | +25 | 1 | 1 | 2 | 3 | | | | | | | | | |
| 535 | +40 | 1 | 1 | 1 | 3 | | | 0.36 | 0.39 | 0.36 | 0.36 | 0.41 | 0.37 | 0.40 |
| 536 | +55 | 1 | 1 | 1 | 3 | | | | | | | | | |
| 537 | +70 | 1 | 1 | 3 | 3 | | | 0.43 | 0.41 | 0.41 | 0.42 | 0.41 | 0.42 | 0.48 |
| 538 | +86 | 1 | 1 | 1 | 3 | | | | | | | | | |
| 539 | 475+03 | 1 | 1 | 2 | 3 | | | 0.36 | 0.41 | 0.36 | 0.37 | 0.40 | 0.38 | 0.42 |
| 540 | +18 | 1 | 2 | 2 | 3 | | | | | | | | | |
| 541 | +33 | 1 | 2 | 2 | 3 | | | 0.37 | 0.40 | 0.35 | 0.36 | 0.41 | 0.36 | 0.41 |
| 542 | +48 | 1 | 1 | 2 | 3 | | | | | | | | | |
| 543 | +63 | 1 | 2 | 3 | 3 | | | 0.38 | 0.41 | 0.36 | 0.40 | 0.46 | 0.41 | 0.45 |
| 544 | +79 | 1 | 2 | 3 | 3 | | | | | | | | | |
| 545 | 475+95 | 1 | 1 | 2 | 3 | | | 0.36 | 0.38 | 0.36 | 0.39 | 0.37 | 0.38 | 0.40 |

Sof Seal 3/8" Joint

| Joint Number | Station | Visual Evalation 2-86 | 2-87 | 2-88 | 2-89 | 2-90 | 2-91 | Joint Width 6-85 | 2-86 | 6-86 | 6-87 | 2-88 | 6-88 | 2-89 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 546 | 476+09 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 547 | +23 | 1 | 1 | 1 | 3 | 3 | 3 | 0.53 | 0.57 | 0.50 | 0.52 | 0.53 | 0.53 | 0.50 |
| 548 | +38 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 549 | +54 | 1 | 1 | 1 | 2 | 2 | 2 | 0.38 | 0.41 | 0.36 | 0.39 | 0.40 | 0.40 | 0.40 |
| 550 | +69 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 551 | +83 | 1 | 1 | 1 | 2 | 3 | 3 | 0.38 | 0.42 | 0.39 | 0.40 | 0.43 | 0.41 | 0.43 |
| 552 | +98 | 1 | 1 | 2 | 2 | 3 | 3 | | | | | | | |
| 553 | 7+13 | 1 | 1 | 1 | 2 | 2 | 2 | 0.39 | 0.44 | 0.38 | 0.37 | 0.40 | 0.40 | 0.42 |
| 554 | +28 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 555 | +43 | 1 | 1 | 2 | 2 | 2 | 2 | 0.35 | 0.40 | 0.38 | 0.37 | 0.40 | 0.38 | 0.40 |
| 556 | +58 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 557 | +73 | 1 | 1 | 1 | 2 | 3 | 3 | 0.53 | 0.57 | 0.51 | 0.52 | 0.52 | 0.53 | 0.55 |
| 558 | +88 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 559 | 8+03 | 1 | 1 | 1 | 2 | 2 | 2 | 0.39 | 0.44 | 0.42 | 0.42 | 0.44 | 0.44 | 0.44 |
| 560 | +18 | 1 | 1 | 2 | 2 | 3 | 3 | | | | | | | |
| 561 | +33 | 1 | 1 | 1 | 2 | 2 | 2 | 0.41 | 0.43 | 0.41 | 0.40 | 0.44 | 0.42 | 0.45 |
| 562 | +48 | 1 | 1 | 1 | 2 | 3 | 3 | | | | | | | |
| 563 | +62 | 1 | 1 | 1 | 2 | 3 | 3 | 0.39 | 0.42 | 0.38 | 0.38 | 0.40 | 0.39 | 0.40 |
| 564 | +77 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 565 | +92 | 1 | 1 | 1 | 1 | 2 | 2 | 0.40 | 0.41 | 0.38 | 0.39 | 0.43 | 0.41 | 0.42 |
| 566 | 9+06 | 1 | 1 | 1 | 2 | 3 | 3 | | | | | | | |
| 567 | +20 | 1 | 1 | 2 | 2 | 3 | 3 | 0.48 | 0.50 | 0.47 | 0.46 | 0.47 | 0.47 | 0.50 |
| 568 | +35 | 1 | 2 | 2 | 2 | 3 | 3 | | | | | | | |
| 569 | +50 | 1 | 1 | 1 | 2 | 3 | 3 | 0.38 | 0.43 | 0.37 | 0.39 | 0.42 | 0.37 | 0.42 |
| 570 | +65 | 1 | 1 | 1 | 2 | 3 | 3 | | | | | | | |
| 571 | +79 | 1 | 1 | 2 | 2 | 2 | 2 | 0.36 | 0.37 | 0.38 | 0.37 | 0.40 | 0.39 | 0.40 |
| 572 | +94 | 1 | 1 | 1 | 2 | 3 | 3 | | | | | | | |
| 573 | 480+09 | 1 | 1 | 1 | 2 | 3 | 3 | 0.39 | 0.42 | 0.39 | 0.40 | 0.43 | 0.40 | 0.44 |
| 574 | +24 | 1 | 1 | 1 | 1 | 2 | 2 | | | | | | | |
| 575 | +38 | 1 | 1 | 1 | 2 | 2 | 2 | 0.40 | 0.41 | 0.36 | 0.38 | 0.40 | 0.39 | 0.39 |
| 576 | +52 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 577 | +65 | 1 | 1 | 1 | 2 | 2 | 2 | 0.45 | 0.45 | 0.42 | 0.41 | 0.45 | 0.42 | 0.45 |
| 578 | +80 | 1 | 2 | 2 | 2 | 2 | 2 | | | | | | | |
| 579 | +95 | 1 | 1 | 1 | 2 | 2 | 3 | 0.43 | 0.47 | 0.41 | 0.42 | 0.45 | 0.42 | 0.45 |
| 580 | 1+09 | 1 | 1 | 1 | 1 | 2 | 2 | | | | | | | |
| 581 | +23 | 1 | 1 | 1 | 2 | 2 | 2 | 0.54 | 0.57 | 0.50 | 0.54 | 0.54 | 0.54 | 0.54 |
| 582 | +38 | 1 | 1 | 1 | 2 | 3 | 3 | | | | | | | |
| 583 | +53 | 1 | 1 | 1 | 2 | 3 | 3 | 0.45 | 0.46 | 0.41 | 0.44 | 0.46 | 0.42 | 0.48 |
| 584 | +68 | 1 | 1 | 2 | 2 | 3 | 3 | | | | | | | |
| 585 | +82 | 1 | 2 | 2 | 2 | 3 | 3 | 0.43 | 0.47 | 0.41 | 0.43 | 0.46 | 0.43 | 0.46 |
| 586 | +97 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 587 | 2+12 | 1 | 1 | 1 | 2 | 3 | 3 | 0.48 | 0.51 | 0.46 | 0.48 | 0.49 | 0.43 | 0.58 |
| 588 | +27 | 1 | 1 | 2 | 2 | 2 | 2 | | | | | | | |
| 589 | +42 | 1 | 1 | 1 | 2 | 3 | 3 | 0.38 | 0.39 | 0.35 | 0.36 | 0.37 | 0.36 | 0.36 |
| 590 | +58 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 591 | +74 | 1 | 1 | 2 | 2 | 2 | 2 | 0.45 | 0.43 | 0.42 | 0.38 | 0.45 | 0.41 | 0.38 |
| 592 | +89 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 593 | 3+03 | 1 | 1 | 1 | 2 | 2 | 2 | 0.43 | 0.49 | 0.41 | 0.43 | 0.45 | 0.43 | 0.44 |
| 594 | +18 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 595 | +34 | 1 | 1 | 1 | 2 | 2 | 3 | 0.42 | 0.45 | 0.40 | 0.41 | 0.43 | 0.42 | 0.45 |
| 596 | 483+49 | 1 | 1 | 1 | 3 | 3 | 3 | | | | | | | |

Sof Seal 1/4" Joint

| Joint Number | Station | Visual Evaluation 2-86 | 2-87 | 2-88 | 2-89 | 2-90 | 2-91 | Joint Width 6-85 | 2-86 | 6-86 | 6-87 | 2-88 | 6-88 | 2-89 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 597 | 483+63 | 1 | 1 | 2 | 2 | 2 | 2 | 0.42 | 0.41 | 0.37 | 0.36 | 0.40 | 0.38 | 0.42 |
| 598 | +78 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 599 | +94 | 1 | 1 | 2 | 3 | 3 | 3 | 0.28 | 0.35 | 0.26 | 0.27 | 0.33 | 0.32 | 0.30 |
| 600 | 4+09 | 1 | 2 | 2 | 2 | 2 | 2 | | | | | | | |
| 601 | +24 | 1 | 1 | 2 | 2 | 2 | 3 | 0.28 | 0.32 | 0.28 | 0.27 | 0.34 | 0.32 | 0.30 |
| 602 | +39 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 603 | +54 | 1 | 1 | 2 | 2 | 2 | 2 | 0.40 | 0.45 | 0.38 | 0.39 | 0.42 | 0.43 | 0.42 |
| 604 | +69 | 1 | 1 | 1 | 3 | 3 | 3 | | | | | | | |
| 605 | +84 | 1 | 1 | 1 | 2 | 2 | 2 | 0.27 | 0.35 | 0.23 | 0.27 | 0.33 | 0.33 | 0.29 |
| 606 | +09 | 1 | 1 | 2 | 2 | 2 | 2 | | | | | | | |
| 607 | 485+16 | 1 | 1 | 1 | 2 | 2 | 2 | 0.45 | 0.44 | 0.38 | 0.38 | 0.40 | 0.42 | 0.43 |
| 608 | +31 | 1 | 1 | 2 | 2 | 2 | 2 | | | | | | | |
| 609 | +47 | 1 | 1 | 1 | 2 | 2 | 2 | 0.27 | 0.34 | 0.26 | 0.25 | 0.33 | 0.27 | 0.30 |
| 610 | +62 | 1 | 1 | 1 | 3 | 3 | 3 | | | | | | | |
| 611 | +77 | 1 | 1 | 2 | 2 | 2 | 2 | 0.28 | 0.29 | 0.23 | 0.25 | 0.31 | 0.27 | 0.30 |
| 612 | +91 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 613 | 6+05 | 1 | 1 | 1 | 2 | 2 | 2 | 0.38 | 0.41 | 0.37 | 0.37 | 0.40 | 0.38 | 0.40 |
| 614 | +20 | 1 | 1 | 1 | 2 | 3 | 3 | | | | | | | |
| 615 | +35 | 1 | 1 | 1 | 3 | 3 | 3 | 0.33 | 0.34 | 0.33 | 0.33 | 0.37 | 0.33 | 0.38 |
| 616 | +50 | 1 | 1 | 1 | 3 | 3 | 3 | | | | | | | |
| 617 | +64 | 1 | 1 | 1 | 3 | 3 | 3 | 0.56 | 0.52 | 0.47 | 0.46 | 0.40 | 0.51 | 0.51 |
| 618 | +80 | 1 | 1 | 1 | 3 | 3 | 3 | | | | | | | |
| 619 | +96 | 1 | 1 | 1 | 2 | 2 | 2 | 0.55 | 0.41 | 0.34 | 0.35 | 0.39 | 0.36 | 0.38 |
| 620 | 7+11 | 1 | 1 | 1 | 3 | 3 | 3 | | | | | | | |
| 621 | +25 | 1 | 1 | 2 | 2 | 2 | 2 | 0.33 | 0.33 | 0.31 | 0.33 | 0.36 | 0.33 | 0.36 |
| 622 | +39 | 1 | 1 | 1 | 3 | 3 | 3 | | | | | | | |
| 623 | +53 | 1 | 1 | 1 | 3 | 3 | 3 | 0.35 | 0.32 | 0.32 | 0.34 | 0.39 | 0.34 | 0.38 |
| 624 | +68 | 1 | 1 | 2 | 3 | 3 | 3 | | | | | | | |
| 625 | +83 | 1 | 1 | 1 | 3 | 3 | 3 | 0.35 | 0.37 | 0.30 | 0.34 | 0.36 | 0.33 | 0.36 |
| 626 | +98 | 1 | 1 | 1 | 3 | 3 | 3 | | | | | | | |
| 627 | 8+12 | 1 | 1 | 2 | 3 | 3 | 3 | 0.43 | 0.45 | 0.38 | 0.39 | 0.41 | 0.38 | 0.42 |
| 628 | +27 | 1 | 1 | 2 | 2 | 2 | 2 | | | | | | | |
| 629 | +43 | 1 | 1 | 1 | 2 | 2 | 2 | 0.33 | 0.38 | 0.28 | 0.32 | 0.39 | 0.33 | 0.38 |
| 630 | +58 | 1 | 1 | 2 | 2 | 2 | 2 | | | | | | | |
| 631 | +73 | 1 | 1 | 1 | 2 | 2 | 2 | 0.45 | 0.38 | 0.32 | 0.33 | 0.37 | 0.34 | 0.36 |
| 632 | +88 | 1 | 1 | 1 | 2 | 3 | 3 | | | | | | | |
| 633 | 9+03 | 1 | 1 | 1 | 2 | 2 | 2 | 0.35 | 0.36 | 0.32 | 0.33 | 0.33 | 0.35 | 0.40 |
| 634 | +18 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 635 | +32 | 1 | 1 | 1 | 2 | 3 | 3 | 0.40 | 0.40 | 0.38 | 0.41 | 0.46 | 0.41 | 0.44 |
| 636 | +47 | 1 | 1 | 2 | 2 | 2 | 2 | | | | | | | |
| 637 | +62 | 1 | 1 | 1 | 3 | 3 | 3 | 0.49 | 0.54 | 0.47 | 0.48 | 0.45 | 0.49 | 0.53 |
| 638 | +77 | 1 | 1 | 1 | 3 | 3 | 3 | | | | | | | |
| 639 | +92 | 1 | 1 | 1 | 3 | 3 | 3 | 0.26 | 0.31 | 0.23 | 0.25 | 0.31 | 0.27 | 0.29 |
| 640 | 490+07 | 1 | 1 | 1 | 2 | 2 | 2 | | | | | | | |
| 641 | +23 | 1 | 1 | 1 | 2 | 2 | 2 | 0.26 | 0.29 | 0.24 | 0.27 | 0.30 | 0.27 | 0.30 |
| 642 | +38 | 1 | 1 | 1 | 3 | 3 | 3 | | | | | | | |
| 643 | +53 | 1 | 1 | 1 | 2 | 3 | 3 | 0.28 | 0.30 | 0.27 | 0.27 | 0.31 | 0.29 | 0.31 |
| 644 | +68 | 1 | 1 | 1 | 2 | 3 | 3 | | | | | | | |
| 645 | +83 | 1 | 1 | 2 | 3 | 3 | 3 | 0.27 | 0.31 | 0.27 | 0.26 | 0.33 | 0.28 | 0.32 |
| 646 | 490+99 | 1 | 1 | 2 | 2 | 2 | 2 | 0.29 | 0.30 | 0.28 | 0.29 | 0.33 | 0.30 | 0.35 |

# APPENDIX C

## Sealant Tensile Testing

# Joint Tensile Testing
March 1986
70°F± Testing

| STATION | CORE No. | VISUAL RATING | MAX. LOAD (lbs.) | MAX. LOAD (N) | ELONGATION @MAX. LOAD (in.) | ELONGATION @MAX. LOAD (cm) | ELONGATION @FAILURE (in.) | ELONGATION @FAILURE (cm) | TYPE OF FAILURE |
|---|---|---|---|---|---|---|---|---|---|
| 357+05 | 1A | 1 | 6.6 | 29 | 3.42 | 8.69 | 3.62 | 9.19 | C |
| 357+95 | 2A | 1 | 4.4 | 20 | 3.02 | 7.67 | 3.32 | 8.43 | C |
| 359+03 | 3A | 1 | 3.8 | 17 | 2.92 | 7.42 | 3.22 | 8.18 | A/C |
| 367+05 | 4A | 1 | 5.9 | 26 | 2.65 | 6.73 | 2.75 | 6.98 | C |
| 367+97 | 5A | 1 | 4.2 | 19 | 2.45 | 6.22 | 2.55 | 6.48 | C |
| 369+05 | 6A | 1 | 4.9 | 22 | 2.95 | 7.49 | 3.15 | 8.00 | A/C |
| 373+04 | 7A | 1 | 5.9 | 26 | 2.65 | 6.73 | 2.75 | 6.98 | A |
| 373+94 | 8A | 1 | 6.8 | 30 | 2.65 | 6.73 | 2.80 | 7.11 | A |
| 375+98 | 9A | 1 | 5.5 | 24 | 2.55 | 6.48 | 2.95 | 7.49 | A |
| 380+01 | 10A | 1 | 5.0 | 22 | 3.42 | 8.69 | 3.67 | 9.32 | A |
| 381+03 | 11A | 1 | 4.2 | 19 | 3.22 | 8.18 | 3.32 | 8.43 | A |
| 382+08 | 12A | 1 | 4.2 | 19 | 3.27 | 8.31 | 3.37 | 8.56 | A |
| 388+00 | 13A | 1 | 3.9 | 17 | 3.12 | 7.92 | 3.37 | 8.56 | A |
| 389+05 | 14A | 1 | 3.8 | 17 | 2.62 | 6.65 | 3.17 | 8.05 | A |
| 390+10 | 15A | 1 | 2.6 | 12 | 2.12 | 5.38 | 2.32 | 5.89 | A |
| 396+06 | 16A | 1 | 3.8 | 17 | 2.05 | 5.21 | 2.25 | 5.72 | A/C |
| 397+10 | 17A | 1 | 3.1 | 14 | 1.15 | 2.92 | 1.35 | 3.43 | A |
| 398+00 | 18A | 1 | 4.0 | 18 | 1.95 | 4.95 | 2.05 | 5.21 | A |
| 412+09 | 19A | 1 | 23.7 | 105 | 1.32 | 3.35 | 1.32 | 3.35 | C |
| 412+99 | 20A | 1 | 20.0 | 89.0 | 1.42 | 3.61 | 1.42 | 3.61 | C |
| 414+06 | 21A | 1 | 12.0 | 53.4 | 1.52 | 3.86 | 1.57 | 3.99 | C |
| 416+02 | 22A | 2 | 10.9 | 48.5 | 0.37 | 0.94 | 0.72 | 1.83 | A |
| 417+07 | 23A | 2 | 7.0 | 31 | 0.57 | 1.45 | 0.82 | 2.08 | A |
| 417+96 | 24A | 2 | 10.0 | 44.5 | 0.37 | 0.94 | 0.72 | 1.83 | A |
| 442+03 | 25A | 1 | 14.4 | 64.1 | 1.12 | 2.84 | 1.82 | 4.62 | A/C |
| 443+09 | 26A | 1 | 14.6 | 64.9 | 0.82 | 2.08 | 1.32 | 3.35 | A |
| 444+14 | 27A | 1 | 26.1 | 116 | 1.62 | 4.11 | 1.72 | 4.37 | A |
| 446+04 | 28A | 2 | 12.3 | 54.7 | 0.37 | 0.94 | 0.42 | 1.07 | A/C |
| 446+97 | 29A | 2 | 14.7 | 65.4 | 0.47 | 1.19 | 0.52 | 1.32 | A |
| 448+02 | 30A | 2 | 14.6 | 64.9 | 0.32 | 0.81 | 0.42 | 1.07 | A |
| 469+97 | 31A | 1 | 19.3 | 85.9 | 0.42 | 1.07 | 2.02 | 5.13 | C |
| 471+03 | 32A | 1 | 21.0 | 93.4 | 0.12 | 0.30 | 2.22 | 5.64 | C |
| 472+09 | 33A | 1 | 25.1 | 112 | 0.37 | 0.94 | 2.22 | 5.64 | C |
| 478+03 | 34A | 1 | 4.8 | 21 | 2.82 | 7.16 | 3.07 | 7.80 | C |
| 479+06 | 35A | 1 | 4.5 | 20 | 1.92 | 4.88 | 2.52 | 6.40 | A |
| 480+09 | 36A | 1 | 7.1 | 32 | 2.42 | 6.15 | 2.92 | 7.42 | C |

70°F = 21°C
A = Adhesion Failure
C = Cohesion Failure
A/C = Adhesion and Cohesion Failure

# Joint Tensile Testing
March 1986
-20°F Testing

| STATION | CORE No. | VISUAL RATING | MAX. LOAD (lbs.) | MAX. LOAD (N) | ELONGATION @MAX. LOAD (in.) | ELONGATION @MAX. LOAD (cm) | ELONGATION @FAILURE (in.) | ELONGATION @FAILURE (cm) | TYPE OF FAILURE |
|---|---|---|---|---|---|---|---|---|---|
| 357+05 | 1 | 1 | 27.9 | 124 | 1.32 | 3.35 | 1.77 | 4.50 | A |
| 357+95 | 2 | 1 | 19.0 | 84.5 | 0.52 | 1.32 | 1.62 | 4.11 | A |
| 359+03 | 3 | 1 | 25.2 | 112 | 0.87 | 2.21 | 2.37 | 6.02 | A |
| 367+05 | 4 | 1 | 29.0 | 129 | 0.85 | 2.16 | 1.65 | 4.19 | A |
| 367+97 | 5 | 1 | 31.6 | 140 | 1.45 | 3.68 | 1.95 | 4.95 | A |
| 369+05 | 6 | 1 | 25.0 | 111 | 0.85 | 2.16 | 1.20 | 3.05 | A |
| 373+04 | 7 | 1 | 71.1 | 316 | 0.80 | 2.03 | 1.15 | 2.92 | A |
| 373+94 | 8 | 1 | 56.5 | 251 | 0.50 | 1.27 | 0.95 | 2.41 | A |
| 375+98 | 9 | 1 | 92.3 | 410 | 0.90 | 2.29 | 1.10 | 2.79 | A |
| 380+01 | 10 | 1 | 60.1 | 267 | 0.92 | 2.34 | 1.17 | 2.97 | A |
| 381+03 | 11 | 1 | 56.1 | 250 | 0.27 | 0.68 | 1.17 | 2.97 | A |
| 382+08 | 12 | 1 | 54.0 | 240 | 0.27 | 0.68 | 0.87 | 2.21 | A |
| 388+00 | 13 | 1 | 36.8 | 164 | 0.97 | 2.46 | 1.42 | 3.61 | A |
| 389+05 | 14 | 1 | 30.6 | 136 | 0.82 | 2.08 | 1.22 | 3.10 | A |
| 390+10 | 15 | 1 | 27.5 | 122 | 0.97 | 2.46 | 1.17 | 2.97 | A |
| 396+06 | 16 | 1 | 30.9 | 137 | 0.75 | 1.91 | 1.50 | 3.81 | A |
| 397+10 | 17 | 1 | 25.9 | 115 | 0.65 | 1.65 | 1.15 | 2.92 | A |
| 398+00 | 18 | 1 | 32.4 | 144 | 1.15 | 2.92 | 1.40 | 3.56 | A |
| 412+09 | 19 | 1 | 152.3 | 677 | 1.12 | 2.84 | 1.32 | 3.35 | C |
| 412+99 | 20 | 1 | 89.4 | 398 | 1.12 | 2.84 | 1.42 | 3.61 | C |
| 414+06 | 21 | 1 | 87.9 | 391 | 1.22 | 3.10 | 1.32 | 3.35 | C |
| 416+02 | 22 | 2 | 12.5 | 55.6 | 0.47 | 1.19 | 0.62 | 1.57 | A |
| 417+07 | 23 | 2 | 8.0 | 36 | 0.52 | 1.32 | 1.12 | 2.84 | A |
| 417+96 | 24 | 1 | 11.0 | 48.9 | 0.52 | 1.32 | 0.72 | 1.83 | A |
| 442+03 | 25 | 1 | 27.3 | 121 | 1.72 | 4.37 | 2.12 | 5.38 | A |
| 443+09 | 26 | 1 | 31.4 | 140 | 1.42 | 3.61 | 2.22 | 5.64 | A |
| 444+14 | 27 | 1 | 34.2 | 152 | 2.12 | 5.38 | 2.22 | 5.64 | A |
| 446+04 | 28 | 2 | 12.9 | 57.4 | 0.57 | 1.45 | 0.57 | 1.45 | A |
| 446+97 | 29 | 1 | 12.6 | 56.0 | 0.47 | 1.19 | 0.52 | 1.32 | A |
| 448+02 | 30 | 1 | 21.1 | 93.8 | 0.52 | 1.32 | 0.62 | 1.57 | A |
| 469+97 | 31 | 1 | 89.0 | 396 | 0.12 | 0.30 | 0.12 | 0.30 | A |
| 471+03 | 32 | 1 | 75.0 | 334 | 0.07 | 0.18 | 0.32 | 0.81 | A |
| 472+09 | 33 | 1 | 71.4 | 318 | 0.12 | 0.30 | 0.27 | 0.69 | A |
| 478+03 | 34 | 1 | 26.6 | 118 | 0.62 | 1.57 | 1.12 | 2.84 | A |
| 479+06 | 35 | 1 | 35.9 | 160 | 1.02 | 2.59 | 1.92 | 4.88 | A |
| 480+09 | 36 | 1 | 44.2 | 197 | 1.02 | 2.59 | 1.27 | 3.22 | A |

-20°F = -29°C
A = Adhesion Failure
C = Cohesion Failure

# Joint Tensile Testing
March 1988
70°F± Testing

| STATION | CORE No. | VISUAL RATING | MAX. LOAD (lbs.) | MAX. LOAD (N) | ELONGATION @MAX. LOAD (in.) | ELONGATION @MAX. LOAD (cm) | ELONGATION @FAILURE (in.) | ELONGATION @FAILURE (cm) | TYPE OF FAILURE |
|---|---|---|---|---|---|---|---|---|---|
| 357+20 | 1A | 1 | 4.0 | 18 | 0.53 | 1.35 | 1.93 | 4.90 | A |
| 358+10 | 2A | 1 | 3.7 | 16 | 0.83 | 2.11 | 1.73 | 4.39 | C |
| 358+88 | 3A | 1 | 5.2 | 23 | 1.83 | 4.65 | 2.33 | 5.92 | C |
| 367+35 | 4A | 1 | 3.7 | 16 | 1.55 | 3.94 | 1.95 | 4.95 | C |
| 367+82 | 5A | 1 | 4.0 | 18 | 0.55 | 1.40 | 0.85 | 2.16 | A |
| 369+20 | 6A | 1 | 5.2 | 23 | 1.35 | 3.43 | 1.65 | 4.19 | C |
| 372+89 | 7A | 1 | 9.2 | 41 | 2.65 | 6.73 | 2.85 | 7.24 | A |
| 374+10 | 8A | 1 | 9.1 | 40 | 2.85 | 7.24 | 3.05 | 7.75 | A |
| 375+83 | 9A | 1 | 7.3 | 32 | 2.55 | 6.48 | 2.85 | 7.24 | A |
| 380+16 | 10A | 1 | 4.4 | 20 | 3.53 | 8.97 | 4.03 | 10.2 | A |
| 380+88 | 11A | 1 | 7.1 | 32 | 3.63 | 9.22 | 4.23 | 10.7 | A |
| 382+23 | 12A | 1 | 3.7 | 16 | 2.33 | 5.92 | 3.03 | 7.70 | A |
| 387+85 | 13A | 1 | 1.8 | 8.0 | 1.93 | 4.90 | 2.43 | 6.17 | A |
| 389+20 | 14A | 1 | 2.6 | 12 | 2.33 | 5.92 | 3.63 | 9.22 | A/C |
| 389+95 | 15A | 1 | 2.1 | 9.3 | 0.43 | 1.09 | 1.33 | 3.38 | A |
| 396+21 | 16A | 2 | 2.2 | 9.8 | 0.95 | 2.41 | 1.65 | 4.19 | A/C |
| 396+95 | 17A | 1 | 2.6 | 12 | 1.05 | 2.67 | 1.35 | 3.43 | A |
| 398+15 | 18A | 1 | 3.7 | 16 | 0.55 | 1.40 | 1.05 | 2.67 | A |
| 411+94 | 19A | 1 | 36.9 | 164 | 1.33 | 3.38 | 1.53 | 3.89 | C |
| 413+14 | 20A | 1 | 23.4 | 104 | 0.83 | 2.11 | 1.13 | 2.87 | C |
| 413+91 | 21A | 1 | 21.0 | 93.4 | 1.13 | 2.87 | 1.63 | 4.14 | C |
| 416+17 | 22A | 2 | 7.1 | 32 | 0.33 | 0.84 | 0.73 | 1.85 | A |
| 416+92 | 23A | 1 | 19.4 | 86.3 | 0.73 | 1.85 | 1.13 | 2.87 | A |
| 418+11 | 24A | 1 | 9.5 | 42 | 0.33 | 0.84 | 0.73 | 1.85 | A |
| 441+88 | 25A | 1 | 9.2 | 41 | 1.13 | 2.87 | 1.33 | 3.38 | A/C |
| 443+24 | 26A | 1 | 15.2 | 67.6 | 0.33 | 0.84 | 1.53 | 3.89 | A/C |
| 443+99 | 27A | 1 | 15.5 | 68.9 | 0.93 | 2.36 | 1.23 | 3.12 | A |
| 446+19 | 28A | 1 | 15.6 | 69.4 | 0.23 | 0.58 | 0.43 | 1.09 | A/C |
| 446+82 | 29A | 1 | 12.4 | 55.2 | 0.13 | 0.33 | 0.33 | 0.84 | A/C |
| 448+17 | 30A | 1 | 13.2 | 58.7 | 0.33 | 0.84 | 0.43 | 1.09 | A/C |
| 469+82 | 31A | 2 | 7.0 | 31 | 0.13 | 0.33 | 0.23 | 0.58 | A |
| 471+18 | 32A | 3z | --- | --- | ---- | ---- | ---- | ---- | - |
| 471+94 | 33A | 3z | --- | --- | ---- | ---- | ---- | ---- | - |
| 478+18 | 34A | 1 | 4.2 | 19 | 1.03 | 2.62 | 2.03 | 5.16 | C |
| 478+91 | 35A | 1 | 4.7 | 21 | 1.03 | 2.62 | 1.93 | 4.90 | C |
| 480+24 | 36A | 1 | 5.0 | 22 | 1.93 | 4.90 | 2.53 | 6.43 | C |

70°F = 21°C
A = Adhesion Failure
C = Cohesion Failure
A/C = Adhesion and Cohesion Failure
x - Sample slipped through mold before failure was reached.
y - Loose concrete broke off making testing impossible.
z - Material failed during handling (no testing).

# Joint Tensile Testing
March 1988
-20°F Testing

| STATION | CORE No. | VISUAL RATING | MAX. LOAD (lbs.) | MAX. LOAD (N) | ELONGATION @MAX. LOAD (in.) | ELONGATION @MAX. LOAD (cm) | ELONGATION @FAILURE (in.) | ELONGATION @FAILURE (cm) | TYPE OF FAILURE |
|---|---|---|---|---|---|---|---|---|---|
| 357+20 | 1 | 1 | 15.4 | 68.5 | 1.03 | 2.62 | 1.33 | 3.38 | A |
| 358+10 | 2 | 1 | 29.8 | 133 | 0.78 | 1.98 | 1.08 | 2.74 | A |
| 358+88 | 3 | 1 | 24.9 | 111 | 0.73 | 1.85 | 1.03 | 2.62 | A |
| 367+35 | 4 | 1 | 25.4 | 113 | 0.70 | 1.78 | 1.15 | 2.92 | A |
| 367+82 | 5 | 1 | 36.1 | 161 | 0.85 | 2.16 | 1.35 | 3.43 | A |
| 369+20 | 6 | 1 | 25.0 | 111 | 0.80 | 2.03 | 1.40 | 3.56 | A |
| 372+89 | 7 | 1 | 150.0 | 667 | 1.10 | 2.79 | 1.15 | 2.92 | A |
| 374+10 | 8 | 1 | 123.6 | 550 | 0.60 | 1.52 | 0.80 | 2.03 | A |
| 375+83 | 9 | 1 | 85.5 | 380 | 0.50 | 1.27 | 0.75 | 1.91 | A |
| 380+16 | 10 | 1 | 58.1 | 258 | 0.83 | 2.11 | 1.13 | 2.87 | A |
| 380+88 | 11 | 1 | 56.2 | 250 | 0.83 | 2.11 | 1.13 | 2.87 | A |
| 382+23 | 12 | 1 | 72.5 | 322 | 0.78 | 1.98 | 0.98 | 2.49 | A |
| 387+85 | 13 | 1 | 33.7 | 150 | 0.83 | 2.11 | 1.73 | 4.39 | A |
| 389+20 | 14 | 1 | 20.3 | 90.3 | 0.73 | 1.85 | 1.33 | 3.38 | A |
| 389+95 | 15 | 1 | 29.0 | 129 | 1.13 | 2.87 | 2.53 | 6.43 | A |
| 396+21 | 16 | 1 | 17.8 | 79.2 | 1.15 | 2.92 | 1.55 | 3.94 | A |
| 396+95 | 17 | 1 | 12.7 | 56.5 | 0.90 | 2.29 | 1.25 | 3.18 | A |
| 398+15 | 18 | 1 | 21.3 | 94.7 | 0.75 | 1.91 | 1.65 | 4.19 | C |
| 411+94 | 19x | 1 | 227+ | 1010+ | 0.10 | 0.25 | ---- | ---- | - |
| 413+14 | 20y | 1 | --- | --- | ---- | ---- | ---- | ---- | - |
| 413+91 | 21 | 1 | 250.0 | 1112 | 0.10 | 0.25 | 0.10 | 0.25 | A |
| 416+17 | 22 | 1 | 5.2 | 23 | 0.33 | 0.84 | 0.43 | 1.09 | A |
| 416+92 | 23 | 1 | 12.7 | 56.5 | 0.43 | 1.09 | 0.63 | 1.60 | A |
| 418+11 | 24 | 1 | 9.1 | 40 | 0.43 | 1.09 | 0.73 | 1.85 | A |
| 441+88 | 25 | 1 | 7.7 | 34 | 1.63 | 4.14 | 2.63 | 6.68 | A/C |
| 443+24 | 26 | 1 | 19.3 | 85.9 | 1.03 | 2.62 | 1.43 | 3.63 | A |
| 443+99 | 27 | 1 | 15.3 | 68.1 | 1.33 | 3.38 | 1.53 | 3.89 | A |
| 446+19 | 28 | 1 | 16.6 | 73.8 | 0.33 | 0.84 | 0.53 | 1.35 | A/C |
| 446+82 | 29 | 1 | 6.0 | 27 | 0.13 | 0.33 | 0.33 | 0.84 | A |
| 448+17 | 30 | 1 | 15.5 | 68.9 | 0.23 | 0.58 | 0.23 | 0.58 | A/C |
| 469+82 | 31z | 2 | ---- | --- | ---- | ---- | ---- | ---- | C |
| 471+18 | 32 | 1 | 51.7 | 230 | 0.0 | 0.0 | 0.0 | 0.0 | A |
| 471+94 | 33z | 3 | ---- | --- | ---- | ---- | ---- | ---- | A |
| 478+18 | 34 | 1 | 31.5 | 140 | 0.63 | 1.60 | 0.93 | 2.36 | A |
| 478+91 | 35 | 1 | 37.6 | 167 | 0.93 | 2.36 | 1.13 | 2.87 | A |
| 480+24 | 36 | 1 | 39.8 | 177 | 0.93 | 2.36 | 1.33 | 3.38 | A |

-20°F = -29°C
A = Adhesion Failure
C = Cohesion Failure
A/C = Adhesion and Cohesion Failure
x - Sample slipped through mold before failure was reached.
y - Loose concrete broke off making testing impossible.
z - Material failed during handling (no testing).

# APPENDIX D

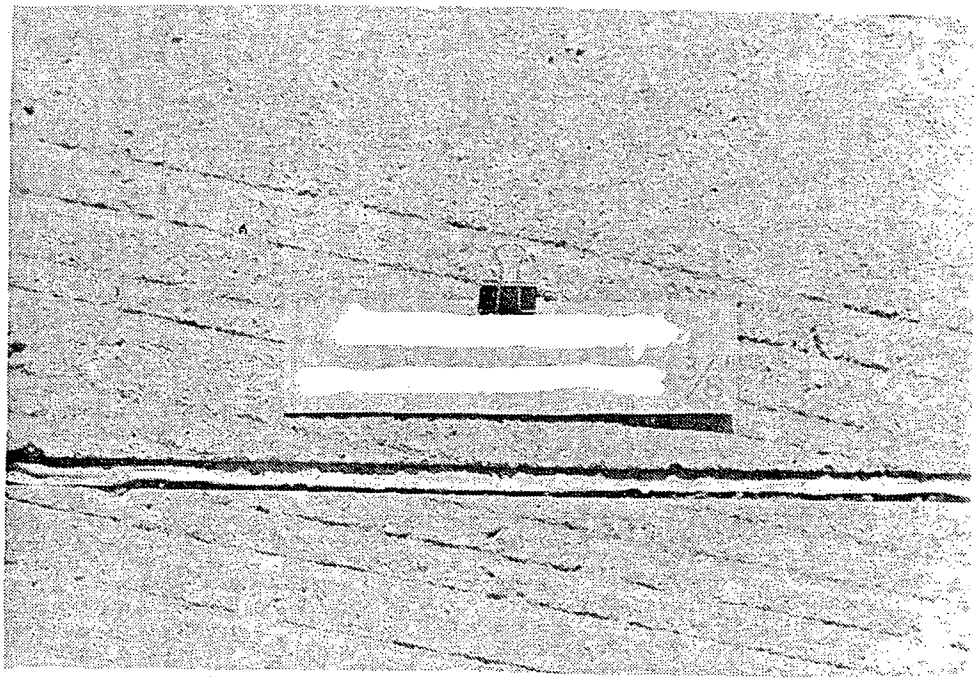
## Shape Factor Measurements

## SHAPE FACTOR MEASUREMENTS
Shape Factor = Depth/Width

| Core No. | Depth (In.) | (mm) | Shape Factor | Core No. | Depth (In.) | (mm) | Shape Factor |
|---|---|---|---|---|---|---|---|
| 1 | 0.50 | (12.7) | 1.3 | 1A | 0.40 | (10.2) | 1.0 |
| 2 | 0.40 | (10.2) | 1.0 | 2A | 0.45 | (11.4) | 1.2 |
| 3 | 0.40 | (10.2) | 1.0 | 3A | 0.40 | (10.2) | 1.0 |
| 4 | 0.40 | (10.2) | 1.6 | 4A | 0.40 | (10.2) | 1.6 |
| 5 | 0.50 | (12.7) | 2.0 | 5A | 0.50 | (12.7) | 2.0 |
| 6 | 0.45 | (11.4) | 1.8 | 6A | 0.40 | (10.2) | 1.6 |
| 7 | 0.40 | (10.2) | 1.6 | 7A | 0.40 | (10.2) | 1.6 |
| 8 | 0.40 | (10.2) | 1.6 | 8A | 0.40 | (10.2) | 1.6 |
| 9 | 0.40 | (10.2) | 1.6 | 9A | 0.40 | (10.2) | 1.6 |
| 10 | 0.45 | (11.4) | 1.2 | 10A | 0.45 | (11.4) | 1.2 |
| 11 | 0.30 | (7.62) | 0.8 | 11A | 0.30 | (7.62) | 0.8 |
| 12 | 0.40 | (10.2) | 1.0 | 12A | 0.35 | (8.89) | 0.9 |
| 13 | 0.45 | (11.4) | 1.2 | 13A | 0.40 | (10.2) | 1.0 |
| 14 | 0.40 | (10.2) | 1.0 | 14A | 0.40 | (10.2) | 1.0 |
| 15 | 0.35 | (8.89) | 0.9 | 15A | 0.40 | (10.2) | 1.0 |
| 16 | 0.45 | (11.4) | 1.8 | 16A | 0.40 | (10.2) | 1.6 |
| 17 | 0.40 | (10.2) | 1.6 | 17A | 0.45 | (11.4) | 1.8 |
| 18 | 0.50 | (12.7) | 2.0 | 18A | 0.50 | (12.7) | 2.0 |
| 19 | 0.55 | (14.0) | 1.4 | 19A | 0.50 | (12.7) | 1.3 |
| 20 | 0.50 | (12.7) | 1.3 | 20A | 0.50 | (12.7) | 1.3 |
| 21 | 0.40 | (10.2) | 1.0 | 21A | 0.35 | (8.89) | 0.9 |
| 22 | 0.30 | (7.62) | 0.8 | 22A | 0.35 | (8.89) | 0.9 |
| 23 | 0.55 | (14.0) | 1.4 | 23A | 0.45 | (11.4) | 1.2 |
| 24 | 0.35 | (8.89) | 0.9 | 24A | 0.30 | (7.62) | 0.8 |
| 25 | 0.30 | (7.62) | 0.8 | 25A | 0.30 | (7.62) | 0.8 |
| 26 | 0.40 | (10.2) | 1.0 | 26A | 0.45 | (11.4) | 1.2 |
| 27 | 0.30 | (7.62) | 0.8 | 27A | 0.35 | (8.89) | 0.9 |
| 28 | 0.40 | (10.2) | 1.0 | 28A | 0.35 | (8.89) | 0.9 |
| 29 | 0.70 | (17.8) | 1.8 | 29A | 0.75 | (19.1) | 2.0 |
| 30 | 0.70 | (17.8) | 1.8 | 30A | 0.65 | (16.5) | 1.7 |
| 31 | 0.40 | (10.2) | 1.0 | 31A | 0.45 | (11.4) | 1.2 |
| 32 | 0.55 | (14.0) | 1.4 | 32A | 0.45 | (11.4) | 1.2 |
| 33 | 0.55 | (14.0) | 1.4 | 33A | 0.50 | (12.7) | 1.3 |
| 34 | 0.30 | (7.62) | 0.8 | 34A | 0.30 | (7.62) | 1.3 |
| 35 | 0.40 | (10.2) | 1.0 | 35A | 0.40 | (10.2) | 1.0 |
| 36 | 0.40 | (10.2) | 1.0 | 36A | 0.35 | (8.89) | 0.9 |

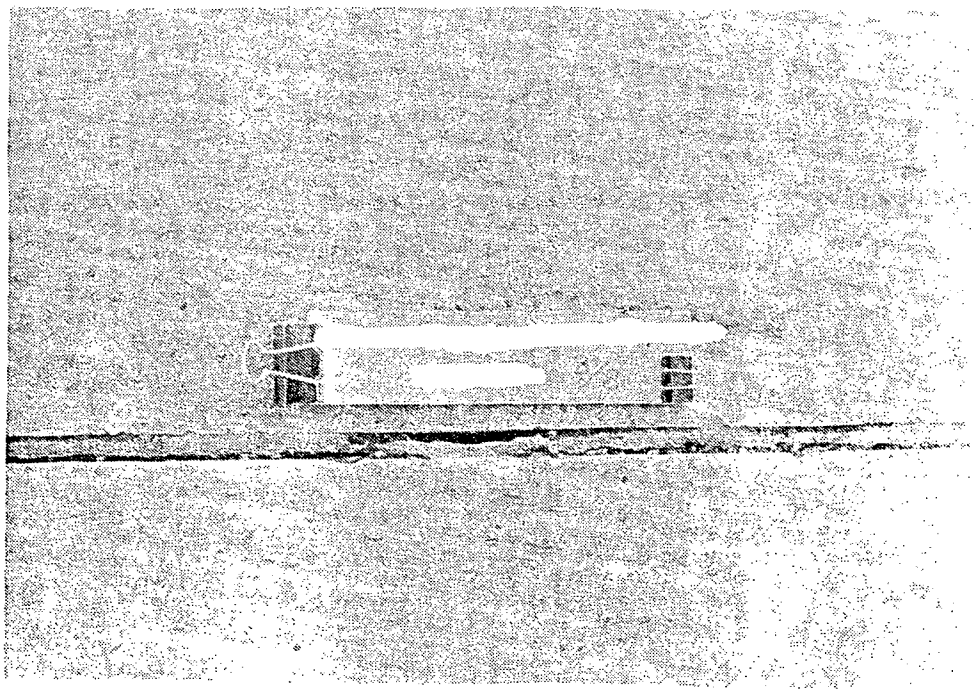
# Appendix E

## Photographs of Sealant Failures



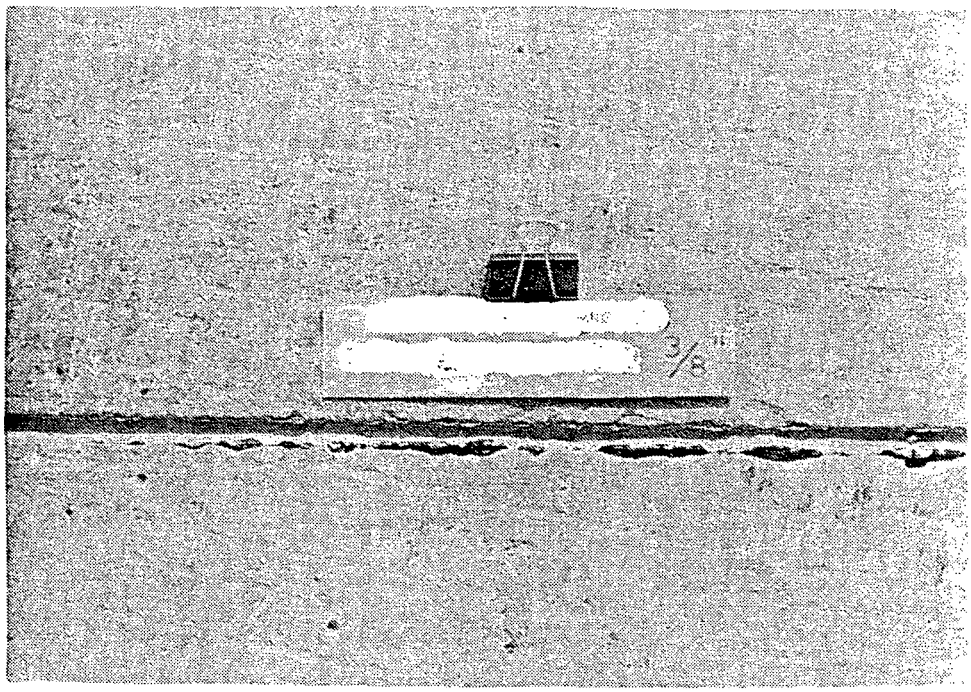
NITRILE RUBBER (cold applied)

Adhesion failure and sealant shrinkage



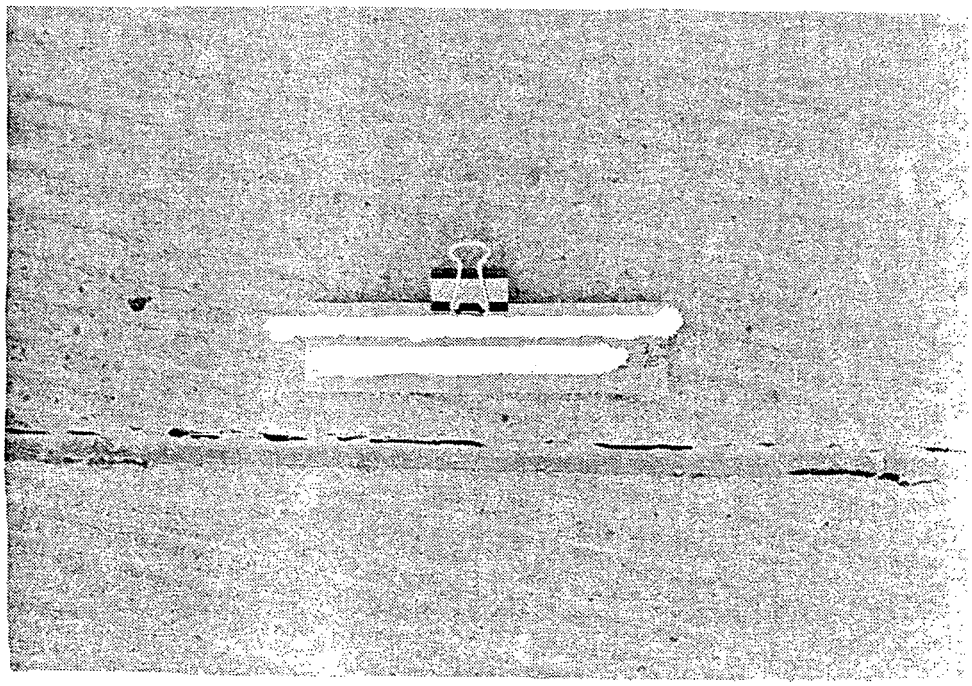
RUBBERIZED ASPHALT (hot pour)

Adhesion/cohesion failure, sealant
shrinkage and lodged incompressibles



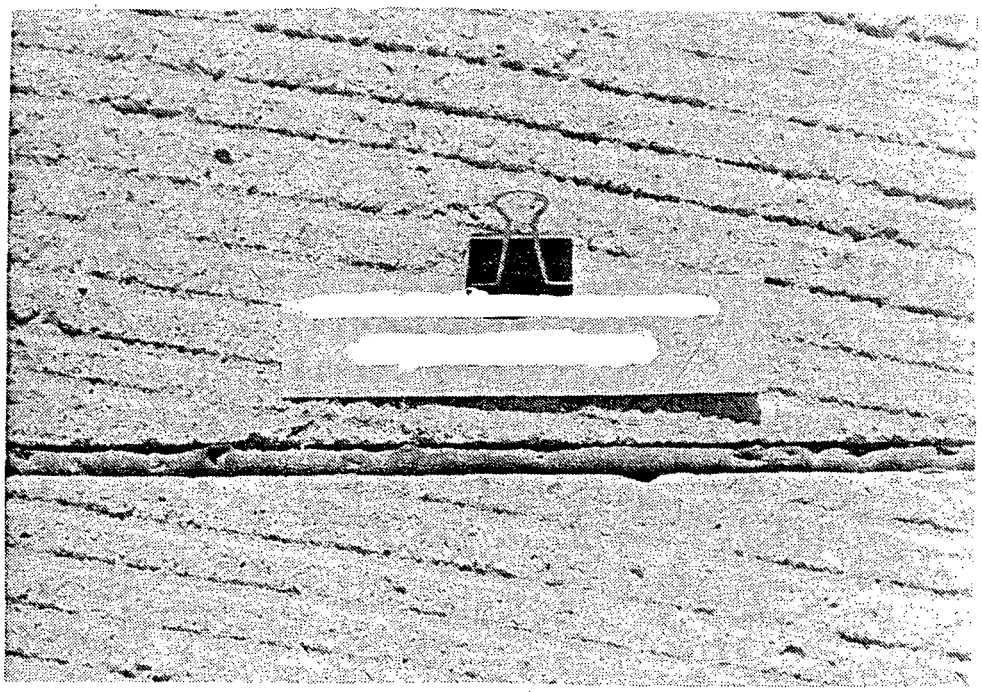
SILICONE (tooled)

Good adhesion with severe concrete spalling



SILICONE (tooled)

Adhesion failure



RUBBERIZED ASPHALT (hot pour)

Sealant bubbling and adhesion failure