



SEMINARIO INTERNACIONAL DE PAVIMENTOS DE HORMIGÓN
24 y 25 DE OCTUBRE 2012 • CIUDAD DE CÓRDOBA - ARGENTINA



La Pregunta es Sellar o no Sellar?



Seal / No Seal
GROUP

Historia del Grupo SNS y sus Esfuerzos

Cuales son los temas

Actividades y Organizacion del Grupo SNS

Esfuerzo del Estudio de TTI (Texas Transportation Institute)

Desarrollo de nuevos metodos para ensayar; Limpio, Seco y Listo

Reportes y Documentos

Tecnicas Apropriadas para la instalacion correcta de sellos de juntas

Temas de Deterioro prematuro de Juntas y Esfuerzos en proceso

Uso de cordón de respaldo correctos

Oportunidades para el futuro

Preguntas y Respuestas



**SEMINARIO INTERNACIONAL
DE PAVIMENTOS DE HORMIGÓN**



Grupo SNS

Mision

- El Grupo **Seal/No Seal (SNS)** fue formado para responder a la pregunta que la industria realiza hace muchos años sobre el valor de sellar juntas en pavimentos de Concreto. Su mision es de establecer miembros que tomaran en forma responsable el estudiar y determinar la efectividad a largo plazo de sellantes en pavimentos de concreto.

Actividades Tipicas

- Desarrollar Miembros y Los Fondos Necesarios para Avanzar los Estudios
- Desenvolver y promover secciones de ensayo
- Preparar Tech Briefs y Updates periodicos sobre informaciones relevantes
- Promover y Conducir Estudios de Sellos



COSTE/D INDUSTRIES, INC.
- Where Safety Works -



Empresas Miembros



SEMINARIO INTERNACIONAL
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Como se Organiza el Grupo SNS

Gerencia

- ☐ Scott Eilken
- ☐ Charles Grady
- ☐ John Roberts
- ☐ Matt Ross

Comite Tecnico

- ☐ Mike Darter
- ☐ Dan Zollinger
- ☐ Katie Hall
- ☐ Wouter Gulden
- ☐ Imad Al Qadi
- ☐ Robert Rodden
- ☐ Larry Scofield

WEB www.sealnoseal.org

Seal / No Seal GROUP



Home

Key Objectives

News & Resources

Case Studies

Asphalt Surfaces

Members

Events

About Us



The **Seal/No Seal Group** was formed to respond to the age-old industry question about the value of sealing concrete pavement joints. Its mission is to develop a committed membership that takes responsibility for determining the long-term effectiveness of sealants in concrete pavements.

As cost pressures continue, there is increased interest in eliminating transverse joint sealants as a means of lowering the cost of concrete pavements. However, there is a lack of data in the industry to help guide owners about sealant effectiveness and the long-term impact of using or not using such sealants.

To learn more about the current research, click on the **News & Resources** tab. To join the effort, click on the **About Us** tab.

- Seal No Seal Progress [Update](#)

"Our role is to gather the necessary information to help owners make informed decisions that will ensure long-term effectiveness and best use of their concrete pavements."

Group Co-Chair Scott L. Eilken, owner of Quality Saw & Seal of Bridgeview, Ill.



Shown here is the hot pour sealing of the control joints on the test sections for a project in Joliet, Ill. The project involved sealing the transverse and longitudinal joints, including the curb joint, with hot pour sealant.



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CUALES SON LOS TEMAS

- Resultados en Conflicto Sobre la Efectividad y Performance del los Sellos
- El problema del Deterioro prematuro de Juntas esta tornandose mas relevante –Cual es la Causa?
- Inspeccion y Construcccion Apropiado
- Desarrollar Mejores Procedimientos de Ensayos
- Definindo cuando sellar
- Foco es Costo de la Construcción Inicial y no en el Valor al Largo Plazo del Sello.

Sellos Son Efectivos?

FHWA Sealant Effectiveness Study

TechBrief

The Concrete Pavement Technology Program (CPTP) is an integrated, national effort to improve the long-term performance and cost-effectiveness of concrete pavements. Managed by the Federal Highway Administration through partnerships with State highway agencies, industry, and academia, CPTP's primary goals are to reduce congestion, improve safety, lower costs, improve performance, and foster innovation. The program was designed to produce user-friendly software, procedures, methods, guidelines, and other tools for use in materials selection, mixture proportioning, and the design, construction, and rehabilitation of concrete pavements.

www.fhwa.dot.gov/pavement/concrete



U.S. Department of Transportation
Federal Highway Administration



Performance of Sealed and Unsealed Concrete Pavement Joints

This TechBrief presents the results of a nationwide study of the effects of transverse joint sealing on performance of jointed plain concrete pavement (JPCP). This study was conducted to assess whether JPCP designs with unsealed transverse joints performed differently from JPCP designs with sealed transverse joints. Distress and deflection data were collected from 117 test sections at 26 experimental joint sealing projects located in 11 states. Performance of the pavement test sections with unsealed joints was compared with the performance of pavement test sections with one or more types of sealed joints.

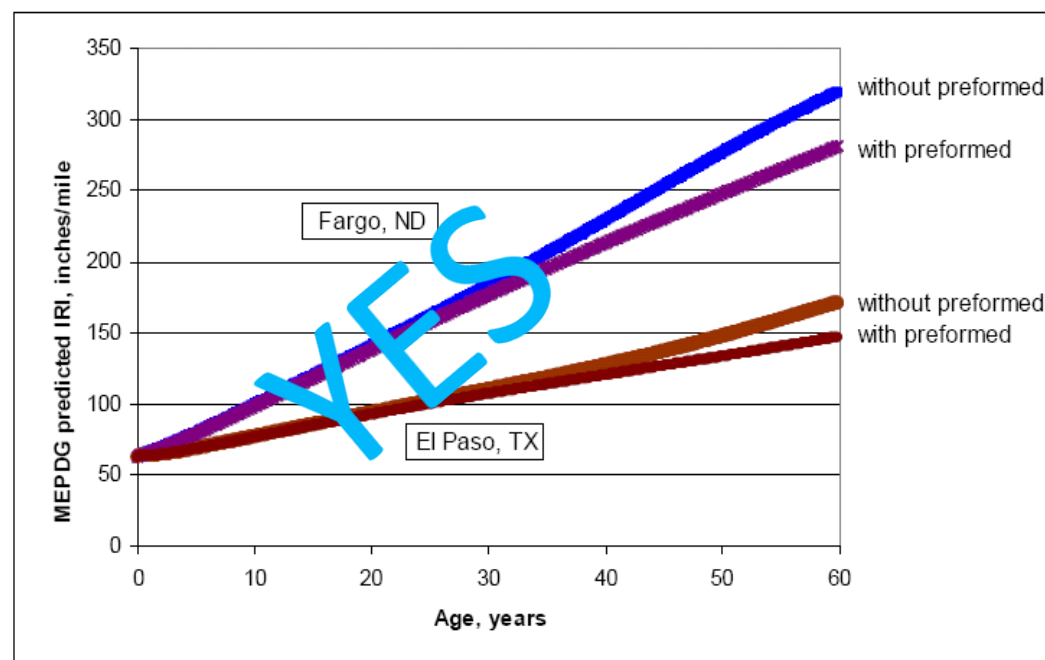
BACKGROUND

The sealing of transverse contraction joints in JPCP has been standard practice throughout much of the United States for many years. Its widespread use is due to the common belief that sealing joints improves concrete pavement performance in two ways: by reducing water infiltration into the pavement structure, thereby reducing the occurrence of moisture-related distresses such as pumping and faulting, and by preventing the infiltration of incompressibles (i.e., sand and small stones) into the joints, thereby reducing the likelihood of pressure-related joint distresses such as joint spalling and blowups. Transverse joints in jointed concrete pavement (JCP) are typically created by making an initial saw cut to force controlled cracking, followed by a second, wider saw cut to produce a reservoir for the joint sealant material. This traditional approach of sawing and sealing transverse contraction joints is estimated to account for between 2 and 7 percent of the initial construction cost of a JCP. Moreover, these sealed transverse joints require resealing one or more times over the service life of the pavement, leading to additional costs in terms of labor, materials, operations, and lane closures.

Recently, several State departments of transportation (DOTs) have been questioning conventional transverse joint sawing and sealing practices. These agencies contend that the benefits derived from sealing do not offset the costs associated with the placement and continued upkeep of the sealant over the life of the pavement. As a result, they have been experimenting with different sawing and sealing alternatives, for example:

- Narrow unsealed joints, consisting of single saw cuts that are left unsealed.
- Narrow filled joints, consisting of single saw cuts that are filled with sealant that adheres to the sides and bottom of the saw cut.
- Narrow sealed joints, consisting of single saw cuts that contain a narrow backer rod and sealant material.

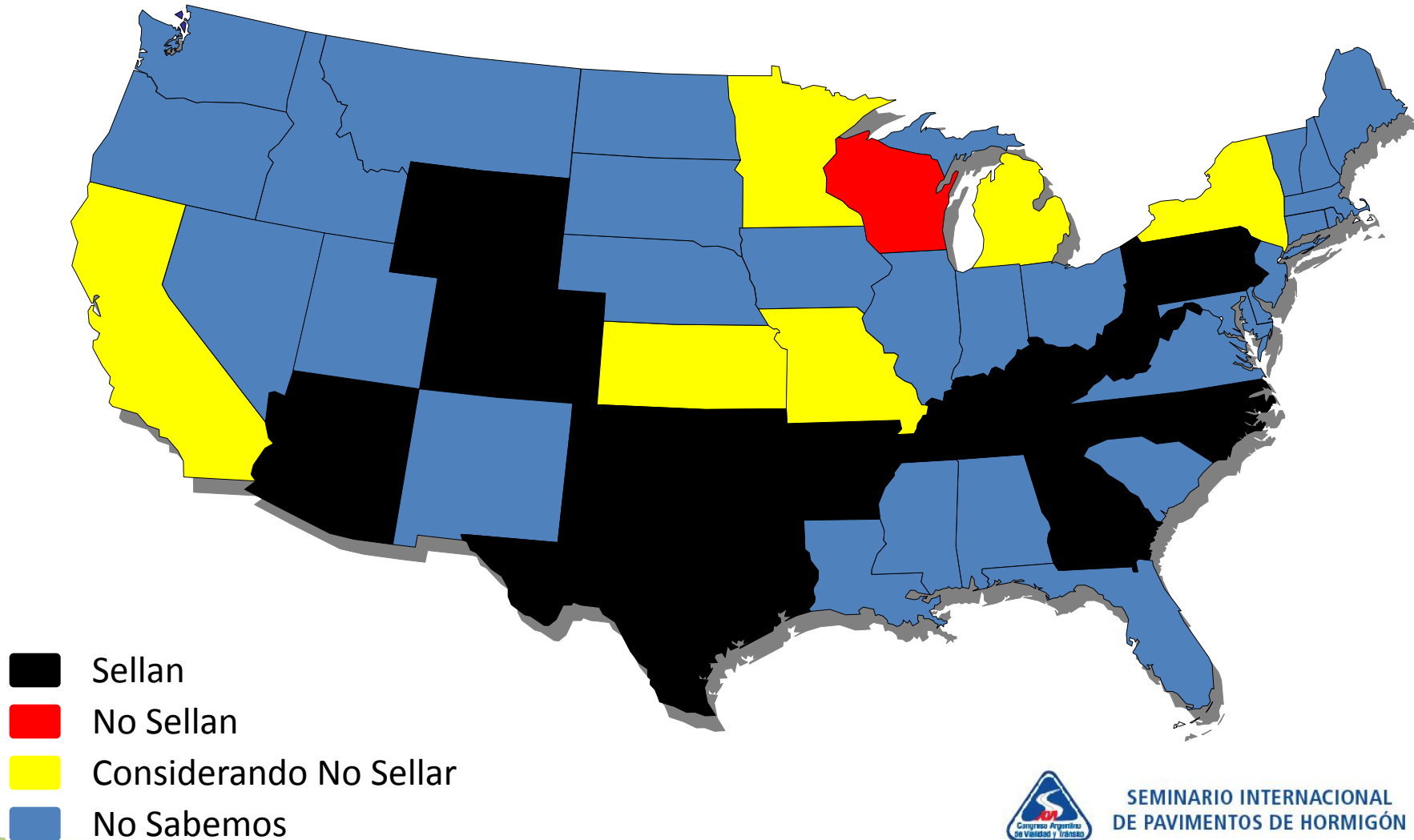
AASHTO New Design Guide



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Practicas en los Estados de E.E.U.U.



Definiendo La Vida Util del Sellante



MAINTENANCE TECHNICAL ADVISORY GUIDE (TAG)



State of California Department of Transportation
Office of Pavement Preservation
Division of Maintenance
1120 N Street, MS-5
Sacramento, CA 95814

October 2003

Table 2: Crack Sealer and Filler Specifications

Material	Specifications (CT/ AASHTO)	Application Type	Approx. Costs (\$/kg)	Approx. Life (Years)
Asphalt Emulsion	CT section 94/ M140, M208	Filling	0.15-0.30	2-4
Asphalt Cements	CT section 94/ M20, M226	Filling	0.03-0.15	2-4
Fiber Modified Asphalt	No Specification	Filling	0.35-0.60	6-8
Polymer Modified Emulsion (PME)	CT section 94/ M140, M208	Filling (minor sealing)	0.80-1.20	3-5
Asphalt Rubber (AR)	CT SSP 37-400	Sealing	0.45-0.60	6-8
Specialty AR Low Modulus	CT SSP 37-400	Sealing	0.75-1.40	5-9
Silicone	CT SSP 41-200, SSP 51-740	Sealing	5.75-6.75	4-6



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Definiendo la Vida Util del Sellante

LTPP Pavement Maintenance Materials: SHRP Joint Reseal Experiment, Final Report

PUBLICATION NO. FHWA-RD-99-142

SEPTEMBER 1999

232% to 348% Increase for
Silicone



U.S. Department of Transportation
Federal Highway Administration

Research, Development, and Technology
Turner-Fairbank Highway Research Center
6300 Georgetown Pike
McLean, VA 22101-2296



Sealant Material	Config-uration	Time at Which 75% Effectiveness Level Was Reached, months *					
		Arizona	Colorado	Iowa	Kentucky	South Carolina	Average
Koch 9005	1	116	66	94	156	63	99
	2	112	66	91	191	90	110
	3			148	182	49	126
	4	105	61				83
Crafco RS 231	1	52	80	76	86	92	77
	2	135	69	118	108	138	114
	3			103	155	80	113
	4	83	72				78
Meadows Sof-Seal	1		34	40	39	55	42
	2		40	51	64	46	50
	3			57	161	31	83
	4		43				43
Koch 9030	1		31	50	60	41	46
	2		32	63	50	58	51
	3			59	143	15	72
	4		37				37
Meadows Hi-Spec	1	43					43
	2	94					94
	4	76					76
Crafco RS 221	1	65					65
	2	105					105
	4	117					117
Dow 888	1	198	145	130	186	178	167
Dow 888-SL	1	183	110	125	164	186	154
Mobay 960-SL	1	194	93	65	115	168	127
Mobay 960	1			143			143
Crafco 903-SL	1	194					194
Koch 9050	1		19		136		78
Dow 888 w/ primer	1			151			151
Dow 888-SL w/ primer	1			143			143
Koch 9005 w/ primer	1				173		173

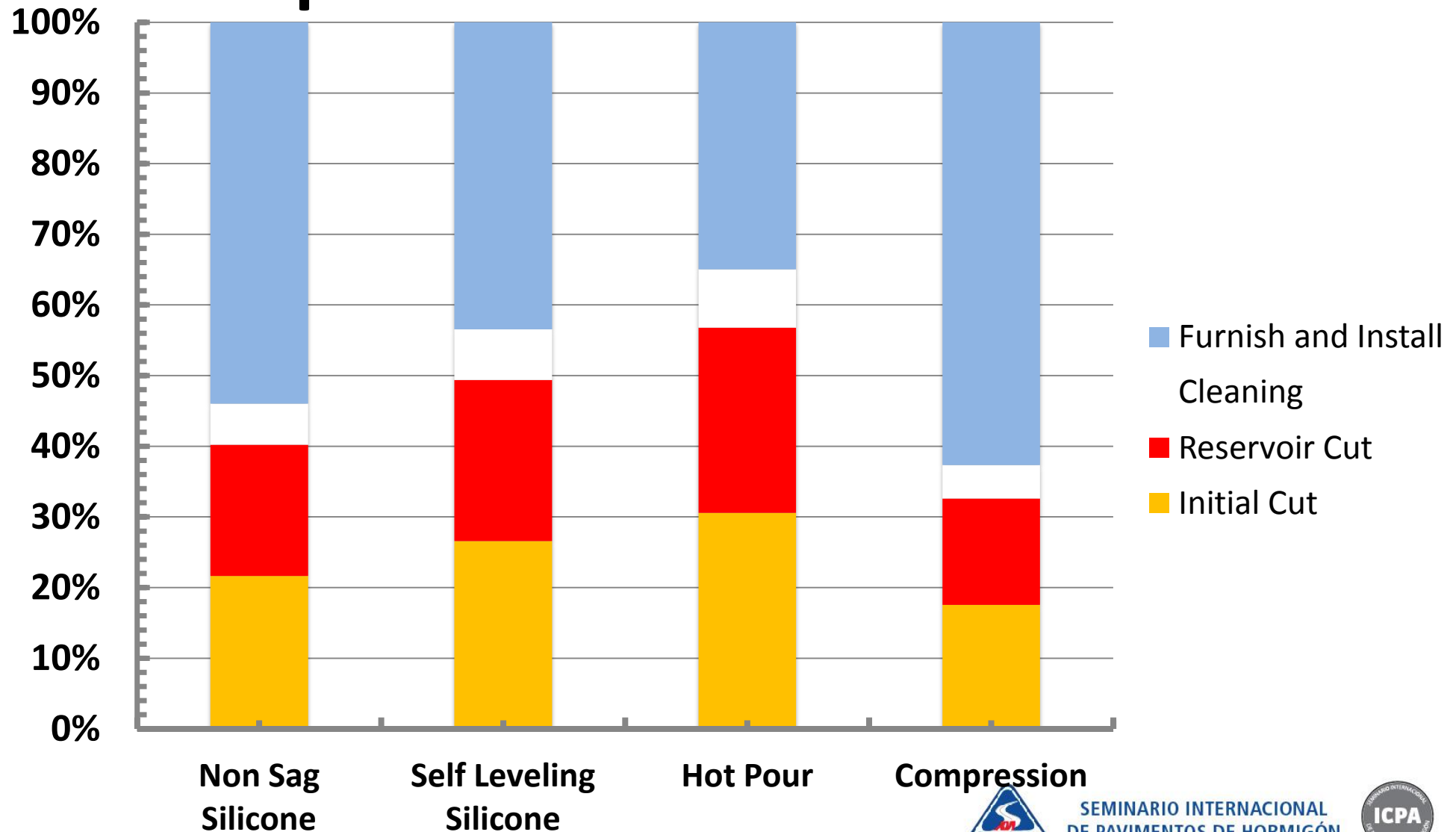
* Times greater than 82 months are extrapolated to a maximum of 200 months.

Cuales Son Los Problemas

❑ Mientras los costos aumentan, hay un interes en eliminar el sello de juntas como un método para bajar el costo de pavimentos rígido. Hay una falta de datos en la industria, para ayudar a los dueños sobre la efectividad de sellantes y su impacto al largo plazo en sus pavimentos de usar o no usar dichos sellantes **Proyectos de subastas alternativas (Asfalto versus Concreto)**

❖ Preocupaciones de costo bajo inicial dado los Presupuestos locales

Porcentaje Total del Costo de Cada Operación del Sello de Juntas



No Compresibles



**Crecimiento de Lozas
Movimiento de
Soportes**

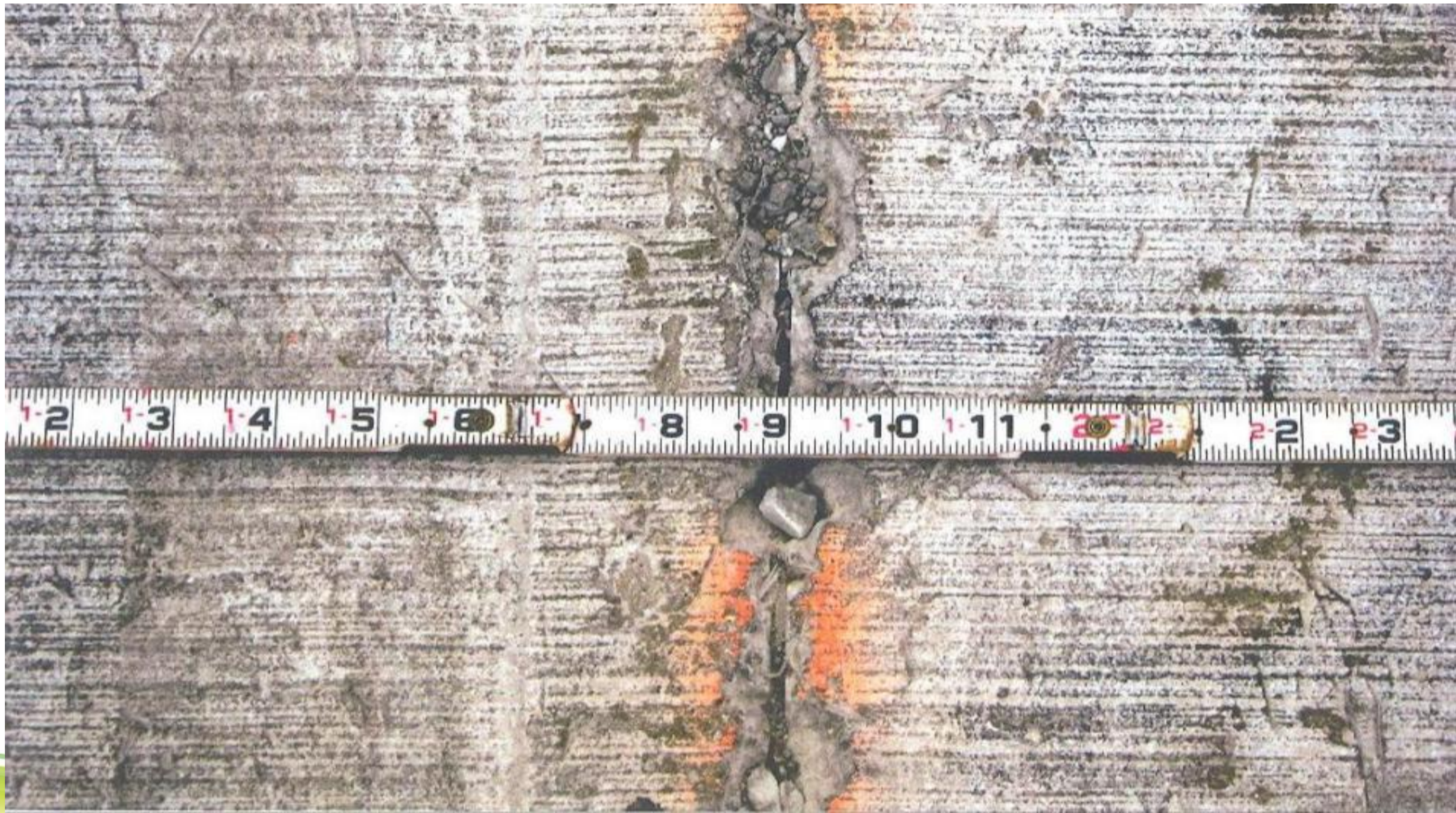


Inspección mas Cercana



Aumenta el Mantenimiento

Ni siempre es dramático





Joint Noise Estimator

Description

For passenger cars, 70% to 90% of the traffic generated noise is produced by the tire-pavement interaction. Thus, additional traffic generated noise due to such vehicles is well characterized through evaluation of just the tire-pavement interaction. In the U.S., this is accomplished with the use of On-Board Sound Intensity (OBSI; see image on the right in the header) per AASHTO TP-78.

As a vehicle travels over joints in a jointed concrete pavement, there is a joint slap noise that contributes to the overall tire-pavement noise. When evaluating pavements using OBSI techniques, it is generally only convenient to determine the overall pavement noise level. These levels are a function of both the joint slap effect and the pavement texture effect.

This tool, based on the work of Dr. Paul Dondos¹, was developed to allow designers to estimate the impact of various joint geometries and condition on the overall tire-pavement noise level and to provide guidance to maintenance efforts in terms of the noise levels obtained through sealing joints. Generally speaking, wider and deeper joint openings, and closer joint spacings, increase the overall traffic generated noise level.

¹ Dondos, P. "The Acoustic Prediction from Pavement Joint Slap as a Source of Noise." Concrete State-of-the-Art Report, Volume 1, No. 1, pp. 10-17, August 1998.

Terms of Use

The user accepts ALL responsibility for decisions made as a result of the use of this design tool. American Concrete Pavement Association, its Officers, Board of Directors and Staff are disavowed of any responsibility for any decisions made as a result of your use. Use of this design tool implies acceptance of the terms of use.

Concrete Pavement Details

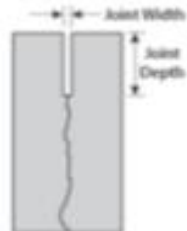
Joint Spacing (ft)

15

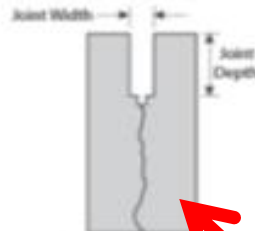
Joints Sealed:

☐ Yes

☒ No



Single Cut Joint



Reservoir Joint

Joint Width (in.)

0.625

Joint Depth (in.)

1.5

Traffic and Pavement Texture Details

Vehicle Speed (mph)

70

Existing Pavement Texture Noise Level:

☒ Use Average Noise Level Data:

Diamond Grinding (302 dBA)

☐ Input Noise Level (dBA):

Calculate

Noise Increase Details

Increase in Tire-Pavement Noise Level (OBSI) due to Joint Configuration¹:

5.28 dBA

Total Tire-Pavement Noise Level With Joint Affected Included¹:

107.28 dBA

Total Tire-Pavement Noise as Predicted 50 ft. Away:

76.91 dBA

Sellantes Afectan Ruido

Sin Sello vs Juntas Selladas es +- 5 dBA



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Factores Medio Ambientales

“El Contratista general requiriere un contractar con una compañía medio ambiental con un minimo de experiencia de cinco (5) en obras documentada de limpiezas ambientales de tanques bajo la superficie o que son precalificados para remediar la contaminacion del suelo y el monitoreo de la proteccion de sus empleados designado para tratar “Desechos Peligrosos” por el D.O.T.

Actividades del Grupo SNS

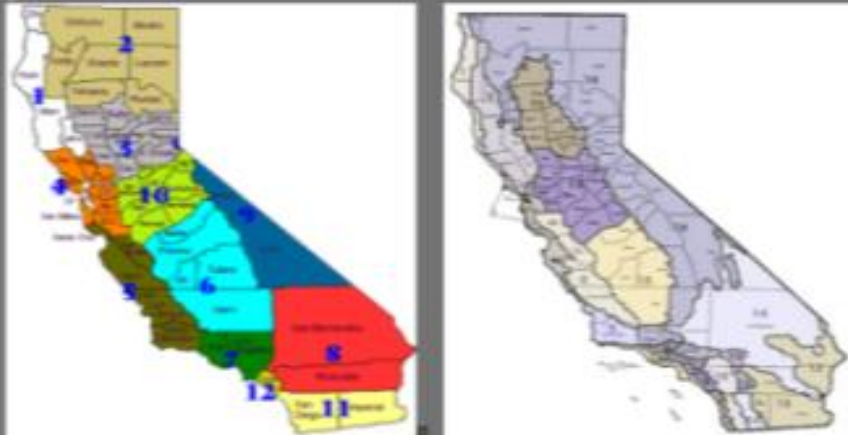
- ☐ Trabajando con Caltrans en su Estrategia de Sello
- ☐ Conduciendo Estudio con TTI
- ☐ Conduciendo estudio de limpio, seco y listo
- ☐ Especificaciones de aplicacion para uso General
- ☐ Contacto con Agencias para determinar su Experiencia en Blow Ups and Abutment Encroachments
- ☐ Documentacion de la absorcion del cordón de respaldo
- ☐ Papel Tecnologico de Sellantes superficiales para Concreto (Silanes)

2011

Joint-Sealant-Test- Section-Evaluation- Proposal

Prepared by the Seal-No-Seal-Group

This proposal discusses different approaches for determining sealant effectiveness and recommends procedures to evaluate field test sections for newly constructed PCCP and existing PCCP.



**California
DOT
(Caltrans)**



SEMINARIO INTERNACIONAL
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Estudio Texas Transportation Institute



Plan de Estudio TTI



1. Medir el flujo a través de juntas
2. Prueba de infiltración
3. Radar de Penetración Terrestre

Equipo de Laboratorio para estudiar la abertura de las Juntas





Movable Slab

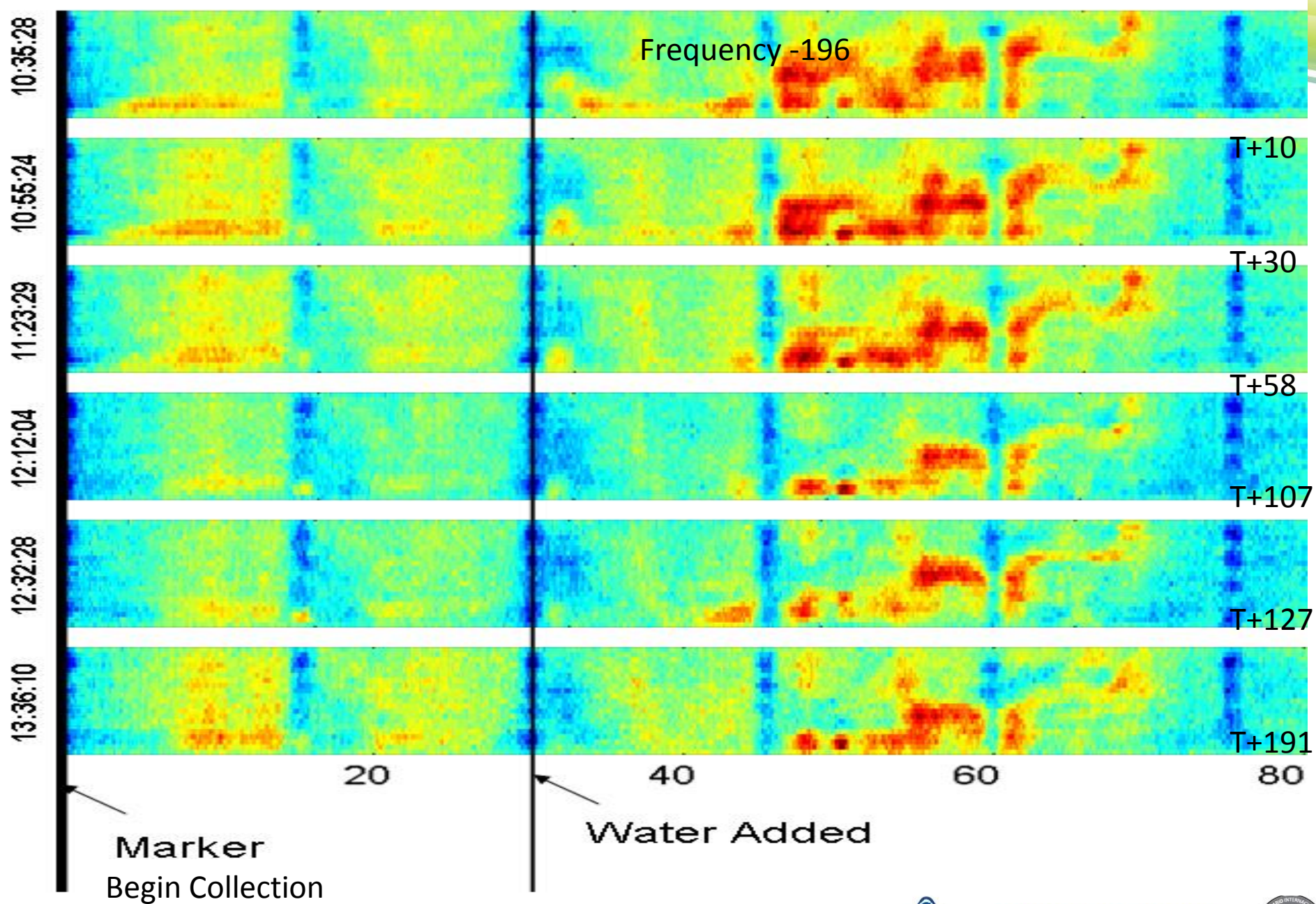
Equipo para Estudiar Movimiento de Juntas en Campo

Campo Móvil Ubicaciones Losa



Ensayos de Contaminación





T – Tiempo en que el agua fue agregada

Reportes y Documentación

- Papeles Tecnológicos
- Reportes de Evaluaciones de Sellantes en Campo
- Reporte sobre el Deterioro Prematuro de Juntas
- Miscelaneo

Papeles Tecnológicos

Seal No Seal .

Tech·Brief

Evaluation of Backer-Rod Absorption

Introduction

This study was conducted as a result of concerns that backer-rod absorption may be a contributing factor in premature joint deterioration. To evaluate this, a limited survey of contractors performing joint work was conducted to determine the types of backer rods used.

A limited backer-rod absorption study was then conducted to determine if they absorbed and retained water.

Although only closed-cell backer rods are intended for use with concrete and high pressure water, a small survey of open-cell backer rods used in concrete was also conducted. The most backer rods consisted of an



Figure 1: Backer rods in a joint, showing water level.

The experiment consisted of submerging a 10-inch long specimen of each backer rod in a glass of tap water in removing and weighing the backer rods at periodic intervals. The water used in weight samples was accurate to 0.005 lbs which is approximately the weight of a dime or a 1" 11" paper towel. Figure 1 is a photo of the backer rods submerged in water in each glass.

Initially, five backer rods were submerged in water to a depth of 10 inches and

Seal No Seal .

Tech·Brief

Joint-Movement-Estimator-for-Designing-Transverse-Joint-Seal-Installations

Introduction

Sealing of concrete pavements began in the early 1900s when full depth repair was used to allow for low width joint sealing. The gap commonly filled with asphalt, tar, pitch, or

Shortly after WWII, experience returned to the use of contraction joints at the bottom of slabs. Shortly after 1950, the contraction joint was moved to the top of the surface.

During the 1970s and 80s, agencies concerned with pumping joints and the need to consider the investigation of materials for sealing joints. By the 1990s, it was still common practice to prevent joints to ensure an

In the late 1990s, considerable research



Figure 2: Joint-Movement-Estimator for Designing Transverse Joint Seal Installations.

Figure 2 is a diagram of the shape factor, which is the ratio of the shape factor to the shape factor.

The shape factor is based on the concept that there is a preferred sealant width to depth ratio which will provide the longest sealant performance for a given in-place sealant.

The desired shape factor is a function of both the material properties and the amount of expected joint opening and closing movement. The required shape factor then determines the actual joint sealant design for the expected environmental, pavement design, and traffic conditions.

When first implemented, it was necessary to calculate the expected joint opening movement for a particular design installation. This required knowledge regarding the (1) expected change in slab length, (2) address, (3) slab resistance, (4) concrete coefficient of

Seal No Seal .

Tech·Brief

Selecting-Backer-Rods-for-PCCP

Introduction

Backer rods are used in PCCP joints to provide the following features:

- Temporary support to allow placement of the sealant into the joint which facilitates mechanical bonding to the joint face.
- The stress control of the sealant and subsequent shape factor and recess depth.
- Platform for the sealant to cure on.



Figure 3: Photos of Backer Rods (Photo is for Change).

cellular rod. All four types are chemically inert and compatible with all cold applied sealants. The term open or closed cell refers to the structure of the void space within the cross section of the material. If the void spaces are interconnected and allow free flow of moisture

Seal No Seal .

Tech·Brief

Use-of-Silanes-for-Sealing-Joints-in-Concrete-Pavements

Introduction

Traditionally, sealing of transverse and longitudinal joints in concrete pavements has been accomplished through the use of low modulus or compression type sealants installed shortly after pavement construction or during rehabilitation efforts. The common sealant types are hot cur, silicone, and neoprene. Concrete sealants are placed in various geometric joint designs.

In recent times, concrete has developed a reputation for its resistance to water. The ability of concrete to resist water is a function of its density and the degree of its curing. The ability of concrete to resist water is a function of its density and the degree of its curing.

Concrete sealants are placed in various geometric joint designs. The common sealant types are hot cur, silicone, and neoprene. Concrete sealants are placed in various geometric joint designs.



Figure 1: Concrete sealant in a joint.

Concrete sealants are placed in various geometric joint designs. The common sealant types are hot cur, silicone, and neoprene. Concrete sealants are placed in various geometric joint designs.

1. When the sealant is placed in the joint, it should be placed in the joint.
2. When the sealant is placed in the joint, it should be placed in the joint.
3. When the sealant is placed in the joint, it should be placed in the joint.
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9. When the sealant is placed in the joint, it should be placed in the joint.
10. When the sealant is placed in the joint, it should be placed in the joint.

Concrete sealants are placed in various geometric joint designs. The common sealant types are hot cur, silicone, and neoprene. Concrete sealants are placed in various geometric joint designs.

Seal No Seal .

Tech·Brief

Joint-Slap-Evaluation-and-Prevention

Introduction

An often overlooked aspect of joint design is the impact of transverse joints on the overall pavement noise level. This is an important factor for the design of new pavements and the rehabilitation of existing pavements. This impact always increases the overall low frequency noise level experienced by the consumer.

As the years pass over a concrete joint in a concrete pavement, a "transient" noise is generated which is commonly referred to as joint slap. This noise is a result of the vibration in the road and surface created by the impact with the pavement joint.

The magnitude of this "transient" noise is a function of the amount of faulting of the joint, the joint opening width, the vehicle level in the joint, and the speed of the vehicle as it passes over the joint.

The increase in overall low frequency pavement noise level due to the "transient" noise is a function of the noise level of the existing pavement texture and the joint spacing in the roadway. The noise level of the existing pavement texture, the low impact joint slap has an overall low frequency noise. Therefore, so pavement texture becomes quieter, the impact



Figure 1: A diagram showing the impact of joint slap on pavement noise level.

Similarly, the more frequent the transverse joints are encountered either due to speed or joint spacing, the greater the effect on overall low frequency noise.

The American Concrete Pavement Association (ACPA) recently developed a web tool that can be used to estimate the increase in overall low frequency pavement noise level for a given joint geometry, existing pavement texture noise level, and vehicle speed. With this tool, it is now possible to determine the optimum joint configuration for a new pavement design, or the benefit of a sealed joint in an existing pavement.

The web tool is based on an analysis conducted by Paul Thompson of Thompson & Egberts, Inc. and the joint slap research conducted at Purdue University. The ACPA web tool is available at <http://www.acpa.org/apps/>.

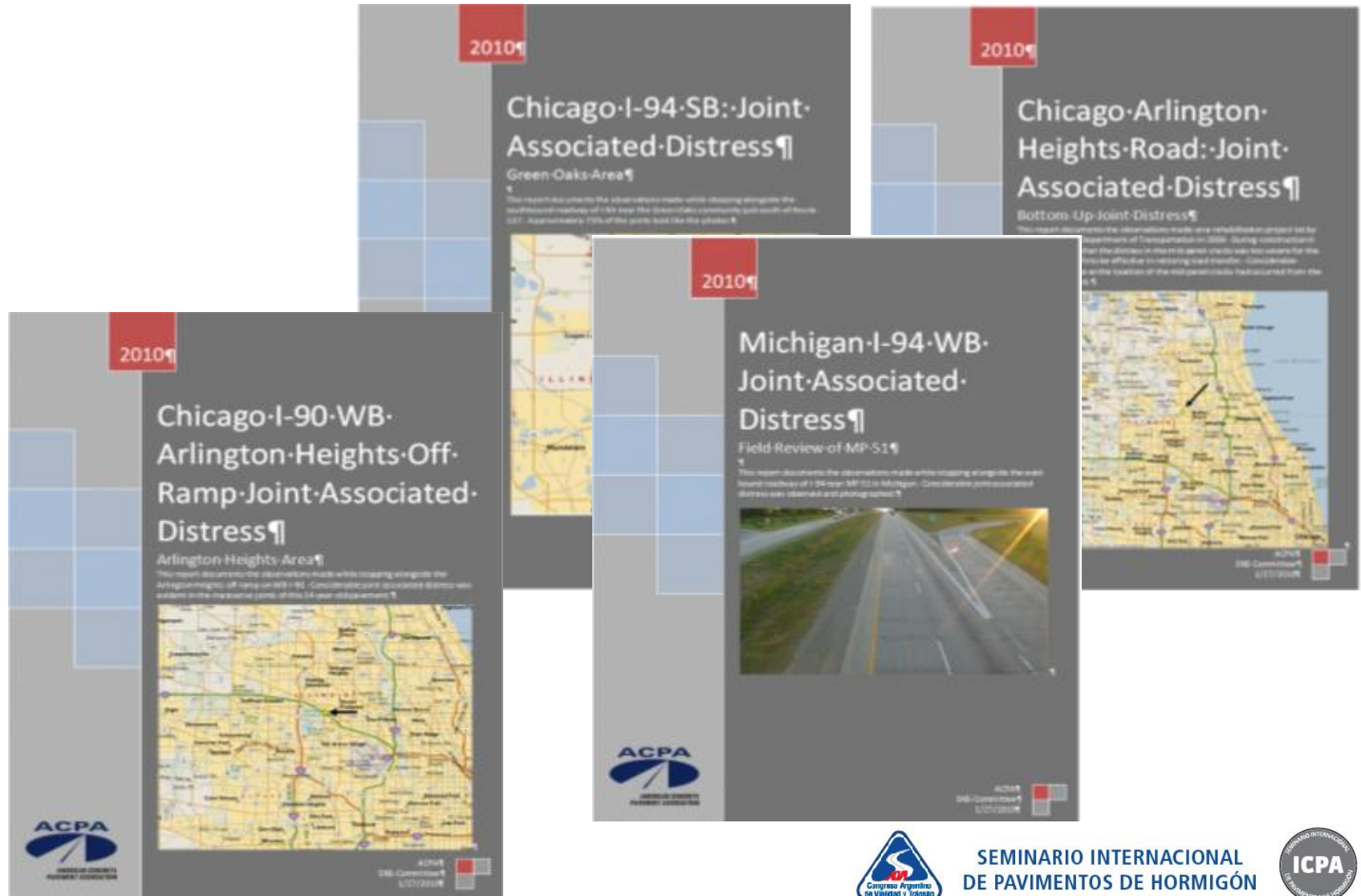
The ACPA web tool, see Figure 1, has two outputs. The first, is an estimate of a single design condition and the second (Fig. 2) is a plot which indicates the impact for various joint



Investigación en campo de los selladores



Joint Associated Revisión Distress



SEPTEMBER 2011

Interim Guide for Optimum **JOINT PERFORMANCE** of Concrete Pavements



Deterioro Prematuro De Juntas

Deterioro Prematuro de Juntas



La superficie no siempre nos dice todo



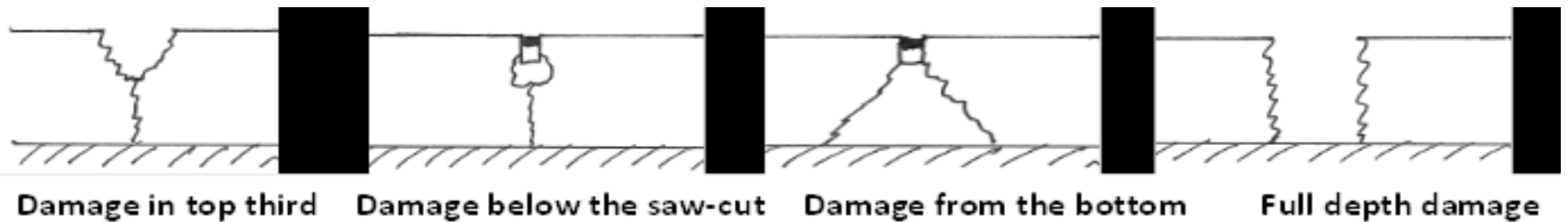
La superficie no siempre nos dice todo (Continuación)



Si quieren saber a que se parece en el fondo



Tipos de Deterioro Prematuro de Juntas



Joint Deterioration in PCC Slabs on Grade

Dr. Peter Taylor PE (IL)
Associate Director

National Concrete Pavement
Technology Center



IOWA STATE UNIVERSITY
Institute for Transportation



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Deterioro prematuro de Juntas



Deterioro en adoquin hacia el Centro de la loza



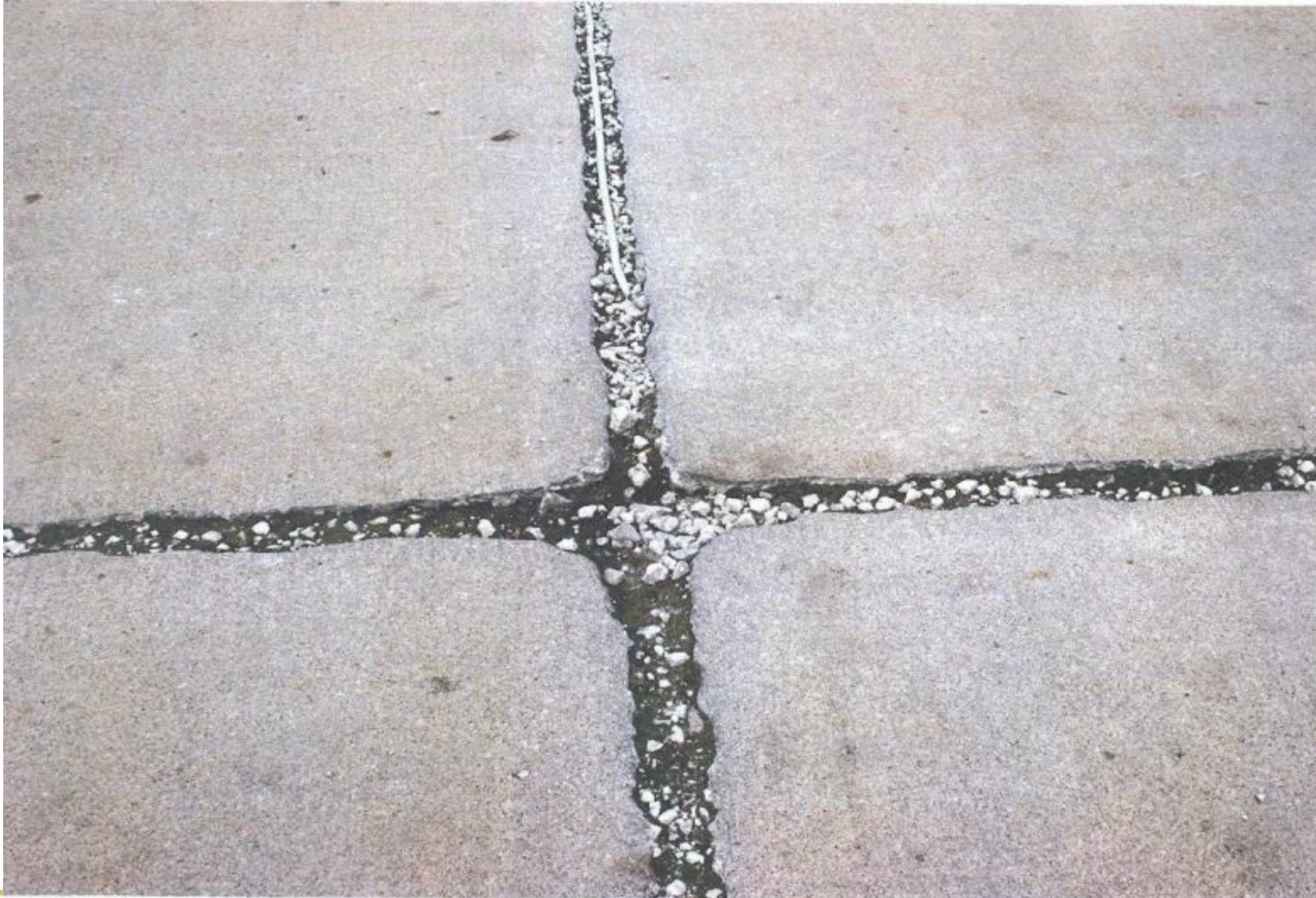
Agua en el Pavimento



Mas el Sellante esta en excelente condición



Areas de Estacionamiento



13th street, Ames, IA



September, 2009

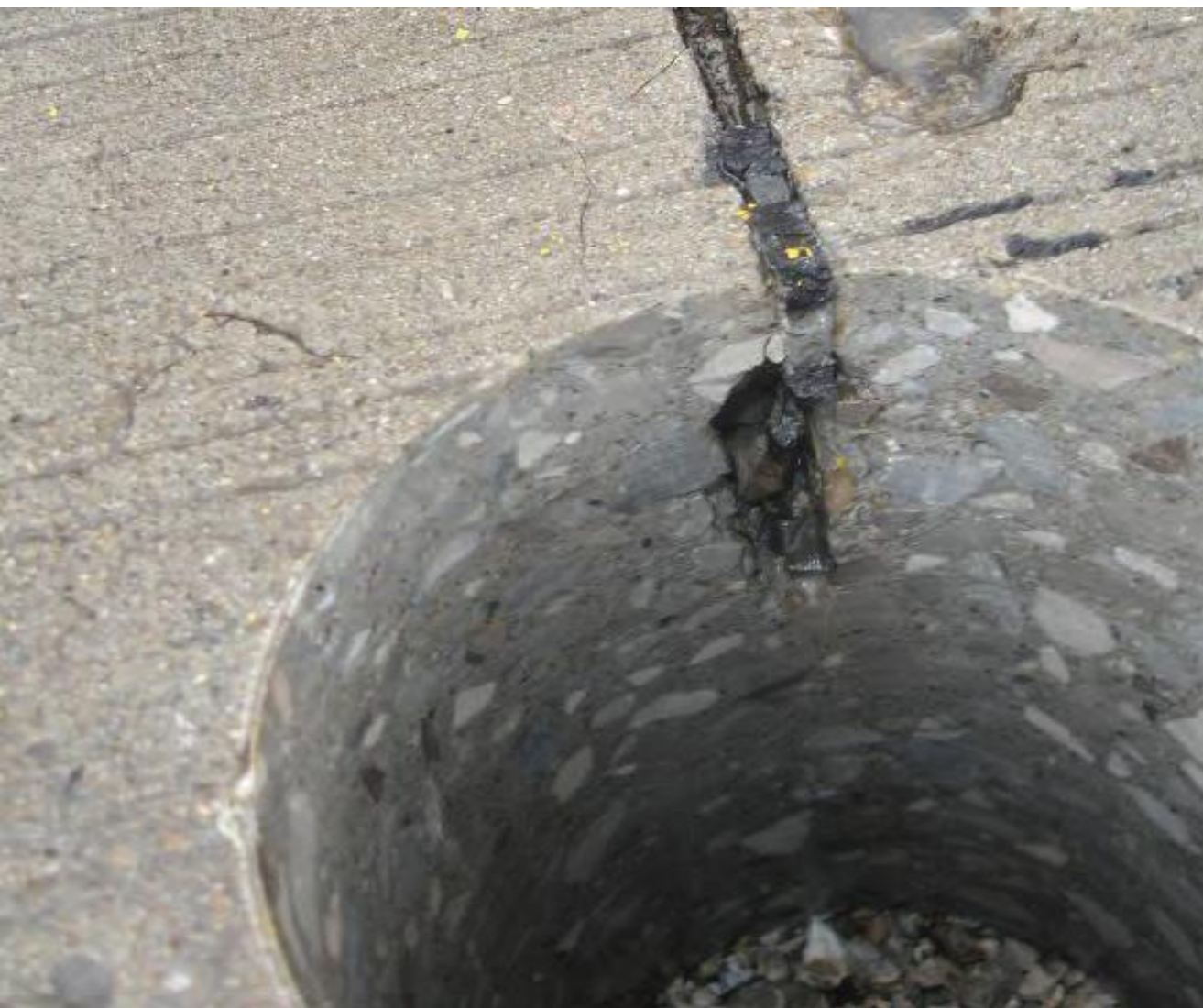


September, 2010



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Deterioro Debajo del Sello

Deterioro Debajo del Sello





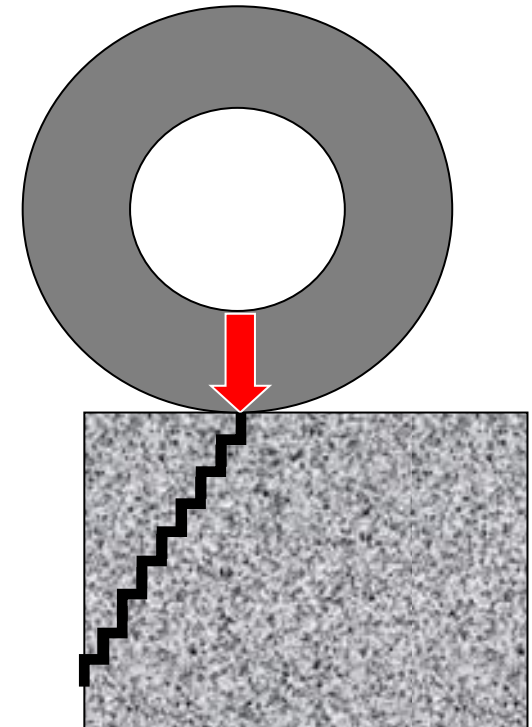
Deterioro del Mortero

Preguntas

- ☐ Aplicando Sal aumenta o disminuye el numero de ciclos de congelación descongelación?
- ☐ Cuales son las temperaturas en la loza?
- ☐ Cargas de construccion?
- ☐ Lo podemos reproducir en el laboratorio?
- ☐ Que podemos aprender en el campo?

Pesos de Cargas

- Cargas tempranas pueden estar causando el deterioro prematuro?



Max Prokudin

Resumen de Cuestionario

- ☐ Estados que proporcionaron respuesta detallada:
 - ☐ Iowa (transversal y longitudinal)
 - ☐ 15 años - un deterioro mayor

- ☐ Minnesota (transversal, 2 casos)
 - ☐ 13 años – un deterioro mayor

- ☐ Michigan (transversal y longitudinal, 4 casos)
 - ☐ 6 años - Mancha

- ☐ Indiana (principalmente longitudinal, 3 casos)
 - ☐ 9 años - poco de deterioro

Trabajo de la U de Purdue

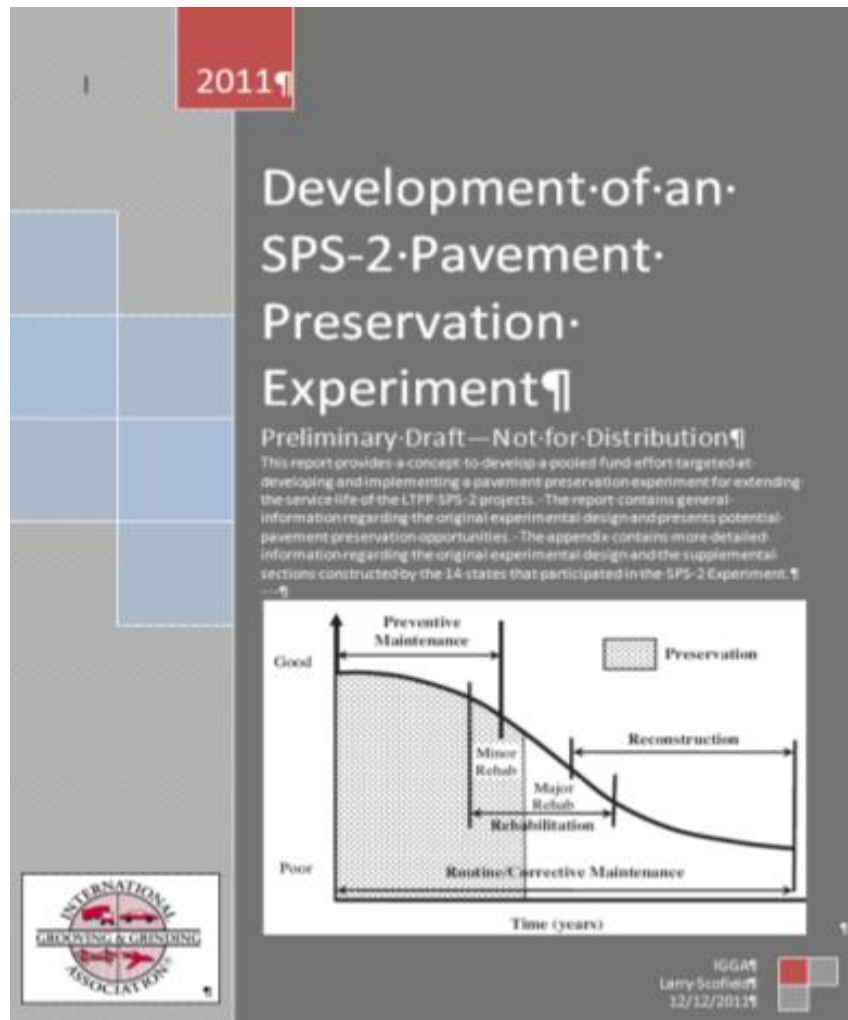
- ☐ Los daños depende de la saturación
- ☐ Saturación depende del contenido de vacíos de aire en el hormigón así como el contenido de agua / cemento del hormigón
- ☐ Algunos sales evitan que se sequen
- ☐ Some salts prevent drying

Qué consejo le damos ahora?

- ☐ Deje que el agua pueda salir
- ☐ Preste atención a los vacíos de aire y contenido de agua en la mezcla
- ☐ Trabajo de Aserrado
- ☐ Selle existente?



Sumario de Oportunidades



- SPS-2 P2 Experiment
- National P2 Test Bed
- GPR Activities
- Field Verification of WJE and TTI Studies
- Petrographer's Perspective of Joint Associated Distress

Tech·Brief

Selecting Backer Rods for PCCP

Introduction

Backer rods are used in PCCP joints to provide the following features:

- Temporary support to allow placement of the sealant into the joint reservoir and tooling of the joint which facilitates mechanical bond to the joint face.
- Thickness control of the sealant and subsequently the shape factor and recess depth.
- Platform for the sealant to cure or cool until its final properties are attained in several hours to several weeks while preventing third-side adhesion.

Although many backer rod suppliers furnish product to the highway industry, almost all backer rods used in the US highway market are produced by three manufacturers: Constructo-Pipe Products a subsidiary of **Namaco**, Backer Rod Manufacturing, Inc., and Industrial Thermo Polymers, Ltd. The specifications of these manufacturers' products are indicated in Table 1.

Four different types of backer rod are available: closed cell, cross-linked closed cell, open cell, and a product which uses a closed cell outer wrapper surrounding an inner core comprised of both closed cells and open cells. This product is sometimes referred to as bi-

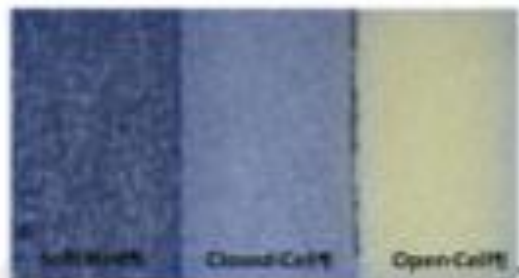


Figure 1 Photo of Backer Rods (Photo is for Change)

cellular rod. All four types are chemically inert and compatible with all cold applied sealants.

The term open or closed cell refers to the structure of the void space within the cross section of the material. If the void spaces are interconnected and allow free flow of moisture, they are open celled; if they are encapsulated and under pressure they are closed-cell structure.

Backer rods are produced by extruding plastic compounds such as polyethylene and polyurethane. Closed-cell rods are produced using polyethylene while open-cell rods are produced from polyurethane plastics. Polyethylene is the least expensive of the plastics.

Polyethylene is a thermoplastic with a low melting point (150°F) if not cross-linked. A thermoplastic can be re-melted over and over. Polyurethane is a thermo-setting plastic with a much higher melting point (400°F). Thermosetting plastics cannot be re-melted and used again.

Closed-cell backer rods are produced by injecting gases into the material creating a

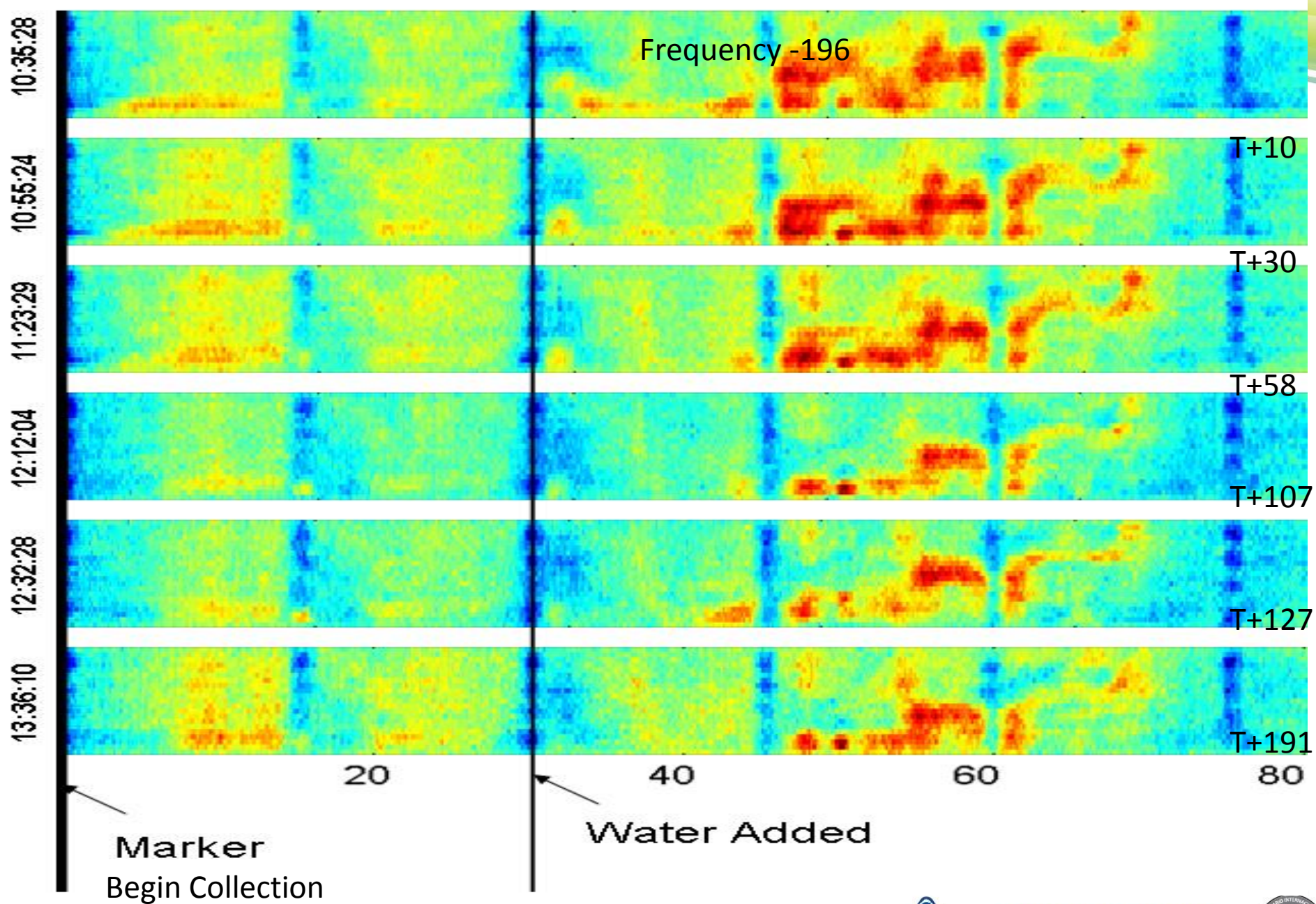
USO DEL CORDON DE RESPALDO

GPR Imagen de Agua Debajo del pavimento



SEMINARIO INTERNACIONAL
DE PAVIMENTOS DE HORMIGÓN





T – Tiempo en que el agua fue agregada

Estudio WJE (Limpio, seco y Listo)

- **Contaminación (Limpio & Listo)**
- Cinta Contaminada “prueba de limpieza”
- Adhesión de cinta de enlace resista la Prueba tracción
- Inspección de luz UV
- **Seco**
- la humedad del papel
- Medidor de Resistividad
- Medidor de Humedad Relativa
- Medidor de Humedad electromagnética

Ensayos de Contaminación



TEST METHOD: Tape Contamination Test (Cleanliness)

STANDARD REFERENCES: Section 5.4 and 6 of SSPC-SP 13/NACE No. 6

USAGE: Measure of the cleanliness of the prepared concrete joint prior to application of joint sealant.

EQUIPMENT / MATERIALS:

1. 3M Super 33+ or 3M Super 88 3/4-inch wide black electrical tape
2. Tongue depressor (3/4 in. wide)
3. Field scale and clamping device for direct tensile test. Scale should read between 0 and 30 lbs. or more, be accurate to 0.5 lbs., and have a peak hold.

PROCEDURE:

1. Cut a strip of black tape. The length of the strip should be at minimum two times the depth of the joint plus two (2) inches.
2. Wrap the tape around the depressor with the adhesive side of the tape facing away from the depressor.
3. Insert the tape and depressor into the joint, perpendicular to the surface of the concrete slab/pavement.
4. Firmly rub the tape against the surface of the joint with the tongue depressor. Rub both vertical surfaces and the bottom of the joint. Sufficient pressure should be applied so the level of contaminant removal is not affected by slight variations in pressure.
5. Attach the clamp and scale tightly onto both pieces of tape and tongue depressor and pull perpendicular to the joint. Record maximum load. For wider joints, it is acceptable to stack multiple depressors as a spacer as long as the depressors do not apply pressure to the vertical surface of the joint during the pullout test.
6. Examine the tape for contaminants. Grade level of contaminants per the visual standard.
7. Repeat the procedure at one additional location within 12 inches of the first test.
8. Report the contamination level of the two tests and determine if the level of contamination is below the predetermined acceptance threshold. (if applicable).

REPORT:

1. Sawcut width and preparation method
2. Time and date of the test
3. Test location
4. Length of sawcut joint represented by the test
5. Test result of the two tests by visual standard level (Trace, Light, Moderate, Heavy) and maximum pull out load.

TEST METHOD**EQUIPMENT****PROCEDURE**

Step: 2, 4

3, 4

5

VISUAL STANDARD

TRACE



LIGHT



MODERATE



HEAVY

Ensayo de Limpieza con Cinta

TEST METHOD: Wipe Test (Cleanliness)

STANDARD REFERENCES: Section 5.4 and 6 of SSPC-SP 13/NACE No. 6; ASTM D 5295

USAGE: Measure of the cleanliness of the prepared concrete joint prior to application of joint sealant.

EQUIPMENT / MATERIALS:

1. Black 100% cotton cloth
2. Tongue depressor or other flat tool made of wood, metal, or stiff plastic. Length of the depressor should be sufficiently long to extend to the bottom of the cut joint with room to hold it above the surface of the concrete.

PROCEDURE:

1. Cut the cloth into 2-inch wide strips. The length of the cloth strips should be at minimum two times the depth of the joint plus two inches.
2. Place the cloth strip around the tongue depressor and insert into the joint, perpendicular to the surface of the concrete slab/pavement.
3. Firmly rub the entire width of the cloth against the surface of the joint with the tongue depressor over a 2 in. length of the joint. Rub both vertical surfaces and the bottom of the joint. Sufficient pressure should be applied so the level of contaminant removal is not affected by slight variations in pressure.
4. Remove the depressor and cloth. Use caution when handling the cloth to avoid dislodging contaminants by shaking the cloth.
5. Examine the cloth for contaminants. Grade contamination per the visual standard.
6. Repeat the procedure at one additional location within 12 inches of the first test.
7. Report the contamination level of the two tests and determine if the level of contamination is below the predetermined acceptance threshold (if applicable).

REPORT:

1. Sawcut width and preparation method
2. Time and date of the test
3. Test location
4. Length of sawcut joint represented by the test
5. Test results of the two tests by visual standard level (None, Light, Moderate, Heavy).

TEST METHOD (VISUAL)**EQUIPMENT****PROCEDURE**

Step: 1



2, 3



4, 5

VISUAL STANDARD

None



LIGHT



MODERATE



HEAVY

Ensayo de Limpieza con Tela



Pre Moldeo y aserrado de las muestras

Prueba de humedad

Sonda de Humedad Relativa



Resistencia AC



Papel de Humedad

CONCLUSIONES

- Resultados en Conflicto Sobre la Efectividad y Performance del los Sellos
- El problema del Deterioro prematuro de Juntas esta tornandose mas relevante –Cual es la Causa?
- Inspeccion y Construcccion Apropiado
- Desarrollar Mejores Procedimientos de Ensayos
- Definindo cuando sellar
- Foco es Costo de la Construcción Inicial y no en el Valor al Largo Plazo del Sello.

GRACIAS

PREGUNTAS?

