

**Evaluation of Bonded Overlay  
and Dowel Bar Retrofit on I-40**

**Construction Report  
May, 1999**

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16. ABSTRACT <p>The Oklahoma Department of Transportation (ODOT) has completed a rehabilitation project on a 1,000 foot-long section of existing jointed PCC pavement. The section is located in the westbound traffic lanes of I-40, in Canadian County.</p> <p>As jointed PCC pavements age, many develop faults, resulting in poor ride quality (roughness). Faults can be removed, and ride quality restored, by grinding, but this often proves to be only a short-term solution. Longer lasting solutions generally require addressing structural factors, such as void formation in the subgrade and lack of load transfer between slabs. Another common problem associated with aging pavements is loss of surface friction characteristics. Surface friction may be restored by grinding or by placing an overlay.</p> <p>Traditional methods of improving load transfer between slabs generally require saw cutting a section of each slab, removing it, drilling holes into the adjacent slab and fastening dowel bars into the holes with epoxy. The joint then has to re-formed, and new concrete poured to replace the removed section. These methods are labor-intensive and expensive.</p> <p>Work done on the rehabilitated section consisted of retrofitting Load Transfer Units (dowel bars with expansion caps) between the slabs, and placing a thin, bonded, fiber-reinforced PCC overlay.</p> <p>The rehabilitation done on this project has the potential of restoring ride quality, improving load transfer between slabs, and improving surface friction characteristics using a faster, less labor-intensive process. ODOT has not used this method in the past. The construction operations will be evaluated from a constructability standpoint. The completed overlay will be evaluated with the goal of projecting the long-term performance of the rehabilitated section.</p>					
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# SI (METRIC) CONVERSION FACTORS

Approximate Conversions to SI Units					Approximate Conversions from SI Units				
Symbol	When you know	Multiply by	To Find	Symbol	Symbol	When you know	Multiply by	To Find	Symbol
<b>LENGTH</b>					<b>LENGTH</b>				
in	inches	25.40	millimeters	mm	mm	millimeters	0.0394	inches	in
ft	feet	0.3048	meters	m	m	meters	3.281	feet	ft
yd	yards	0.9144	meters	m	m	meters	1.094	yards	yds
mi	miles	1.609	kilometers	km	km	kilometers	0.6214	miles	mi
<b>AREA</b>					<b>AREA</b>				
in <sup>2</sup>	square inches	645.2	square millimeters	mm <sup>2</sup>	mm <sup>2</sup>	square millimeters	0.00155	square inches	in <sup>2</sup>
ft <sup>2</sup>	square feet	0.0929	square meters	m <sup>2</sup>	m <sup>2</sup>	square meters	10.764	square feet	ft <sup>2</sup>
yd <sup>2</sup>	square yards	0.8361	square meters	m <sup>2</sup>	m <sup>2</sup>	square meters	1.196	square yards	yd <sup>2</sup>
ac	acres	0.4047	hectares	ha	ha	hectares	2.471	acres	ac
mi <sup>2</sup>	square miles	2.590	square kilometers	km <sup>2</sup>	km <sup>2</sup>	square kilometers	0.3861	square miles	mi <sup>2</sup>
<b>VOLUME</b>					<b>VOLUME</b>				
fl oz	fluid ounces	29.57	milliliters	mL	mL	milliliters	0.0338	fluid ounces	fl oz
gal	gallon	3.785	liters	L	L	liters	0.2642	gallon	gal
ft <sup>3</sup>	cubic feet	0.0283	cubic meters	m <sup>3</sup>	m <sup>3</sup>	cubic meters	35.315	cubic feet	ft <sup>3</sup>
yd <sup>3</sup>	cubic yards	0.7645	cubic meters	m <sup>3</sup>	m <sup>3</sup>	cubic meters	1.308	cubic yards	yd <sup>3</sup>
<b>MASS</b>					<b>MASS</b>				
oz	ounces	28.35	grams	g	g	grams	0.0353	ounces	oz
lb	pounds	0.4536	kilograms	kg	kg	kilograms	2.205	pounds	lb
T	short tons (2000 lb)	0.907	megagrams	Mg	Mg	megagrams	1.1023	short tons (2000 lb)	T
<b>TEMPERATURE (exact)</b>					<b>TEMPERATURE (exact)</b>				
°F	degrees Fahrenheit	(°F-32)/1.8	degrees Celsius	°C	°C	degrees Fahrenheit	9/5(°C)+32	degrees Celsius	°F
<b>FORCE and PRESSURE or STRESS</b>					<b>FORCE and PRESSURE or STRESS</b>				
lbf	poundforce	4.448	Newtons	N	N	Newtons	0.2248	poundforce	lbf
lbf/in <sup>2</sup>	poundforce per square inch	6.895	kilopascals	kPa	kPa	kilopascals	0.1450	poundforce per square inch	lbf/in <sup>2</sup>



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## TABLE OF CONTENTS

INTRODUCTION .....	1
EXISTING PAVEMENT .....	2
REHABILITATION OPERATIONS.....	2
Milling Slots for Load .....	2
Transfer Units	
Installing Load .....	3
Transfer Units	
Placing the Overlay.....	8
TEST DATA .....	10
Falling Weight .....	10
Deflectometer	
Smoothness .....	10
APPENDIX A, ODOT SPECIAL PROVISIONS FOR FIBER REINFORCED, BONDED PORTLAND CEMENT CONCRETE OVERLAY	
APPENDIX B, CONCRETE MIX AND PLACEMENT INFORMATION	
APPENDIX C, FALLING WEIGHT DEFLECTOMETER AND SMOOTHNESS DATA	



## LIST OF FIGURES

Figure 1	Location of Project NHI-40-4(344)137IP .....	1
Figure 2	Rotomill Head Configured to Mill Slots for Load Transfer Units .....	3
Figure 3	Milled Slots .....	4
Figure 4	Roadway After Milling Slots .....	4
Figure 5	Complete Basket Assembly with LTU's .....	5
	and Expansion Caps Installed in Slot	
Figure 6	Securing Basket to Existing Pavement .....	6
Figure 7	Basket Secured to Existing Pavement .....	6
Figure 8	Reference Kerf Marking Joint Location .....	7
Figure 9	Concrete Delivered to Paver .....	8
Figure 10	Filling Slots in Front of Paver .....	9
Figure 11	Applying Curing Compound .....	9

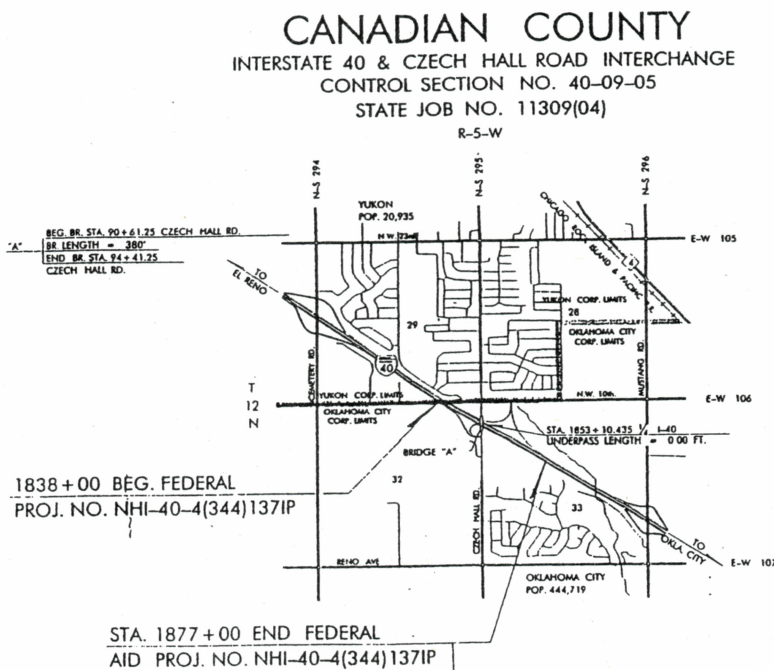
# INTRODUCTION

The Oklahoma Department of Transportation (ODOT) has completed a rehabilitation project on a 1,000 foot-long section of existing jointed PCC pavement. The test section was added to work done under Project NHI-40-4(344)137IP, Canadian County (Figure 1). The experimental section is located in the two westbound traffic lanes of I-40, from approximately 500 feet west to 500 feet east of Czech Hall Road (Station 1848 + 10 to 1858 + 10).

As jointed PCC pavements age, they often develop faults. Faults can be removed by grinding, but this often proves to be a short-term solution unless structural factors (formation of voids in the subgrade and lack of load transfer between slabs) are also addressed. Also, surface friction generally decreases as pavements age. Surface friction may be restored by grinding or placing an overlay.

Traditional methods of improving load transfer between slabs generally require saw cutting a section of each slab, removing it, drilling holes into the adjacent slab and fastening Load Transfer Units (dowel bars and expansion caps) into the holes with epoxy. The joint then has to be re-formed and new concrete poured to replace the removed section. This is an expensive, labor-intensive operation.

The rehabilitation done on this project has the potential of improving load transfer between slabs with a faster, less labor-intensive operation. Other benefits are improved ride quality, and improved surface friction characteristics. ODOT has not used this rehabilitation method in the past. The method will be evaluated from a constructability standpoint. The completed overlay will be evaluated with the goal of projecting the long-term performance of the rehabilitated section.



**Figure 1 Location of Project NHI-40-4(344)137IP**



## **EXISTING PAVEMENT**

The rehabilitation was done on a section of I-40 located roughly four miles west of the Oklahoma - Canadian County Line. ADT for this area is 74,500 with 11.28 percent trucks.

The existing roadway was built in 1969, under ODOT Construction Project I-40-4(52)134. Construction consisted of nine inches of PCC on a four inch layer of bituminous base, fine aggregate type. The PCC pavement had joints on 15 foot centers. After 30 years of service, ride quality had deteriorated in some areas due to fault formation. Some slabs had developed cracks which had required repair. Due to short notice prior to construction of the experimental feature, it was not possible to get condition data. ODOT Construction personnel agreed that moderate faulting was present before the overlay was placed, but no cracked slabs were found in the 1,000 foot long section before construction.

## **REHABILITATION OPERATIONS**

Work on the section to be rehabilitated consisted of retrofitting load transfer units (LTU) between the slabs and placing a thin (3 inch), bonded, fiber reinforced overlay. The work is described in additional detail in the following section.

The Contractor, (Duit Construction, Edmond Oklahoma) milled one hundred foot long transitional tie-ins on either end of the one thousand foot-long section to accommodate the overlay. Depth of this cold milling varied from zero to 2 ½ inches. A CMI PR500FL Rotomilling Machine was used to do the milling.

## **MILLING SLOTS FOR LOAD TRANSFER UNITS**

After the tie-ins were milled, the Contractor removed the milling arbor and reconfigured the cutting heads and spacers on the Rotomill (Figure 2). The reconfigured head was used to mill slots into the existing pavement (Figure 3). The milled slots were located spaced at two, three, four, nine, ten, and eleven feet from the centerline of the two westbound lanes (Figure 4). Individual slots were approximately four inches deep and three feet long.

Rotomilling slots into the existing pavement concerned both ODOT and Contractor's personnel. A significant amount of cracking and breakage occurred around the milled slots. Although all broken material was removed, the Construction personnel were concerned that the already fatigued existing PCC pavement may have been further damaged (hairline cracks, too small to be observed, etc.) by milling the slots. The cause of the breakage observed was thought, by the Construction personnel, to stem from either insufficient length of cutter teeth, cutter head oscillation or a combination of both.

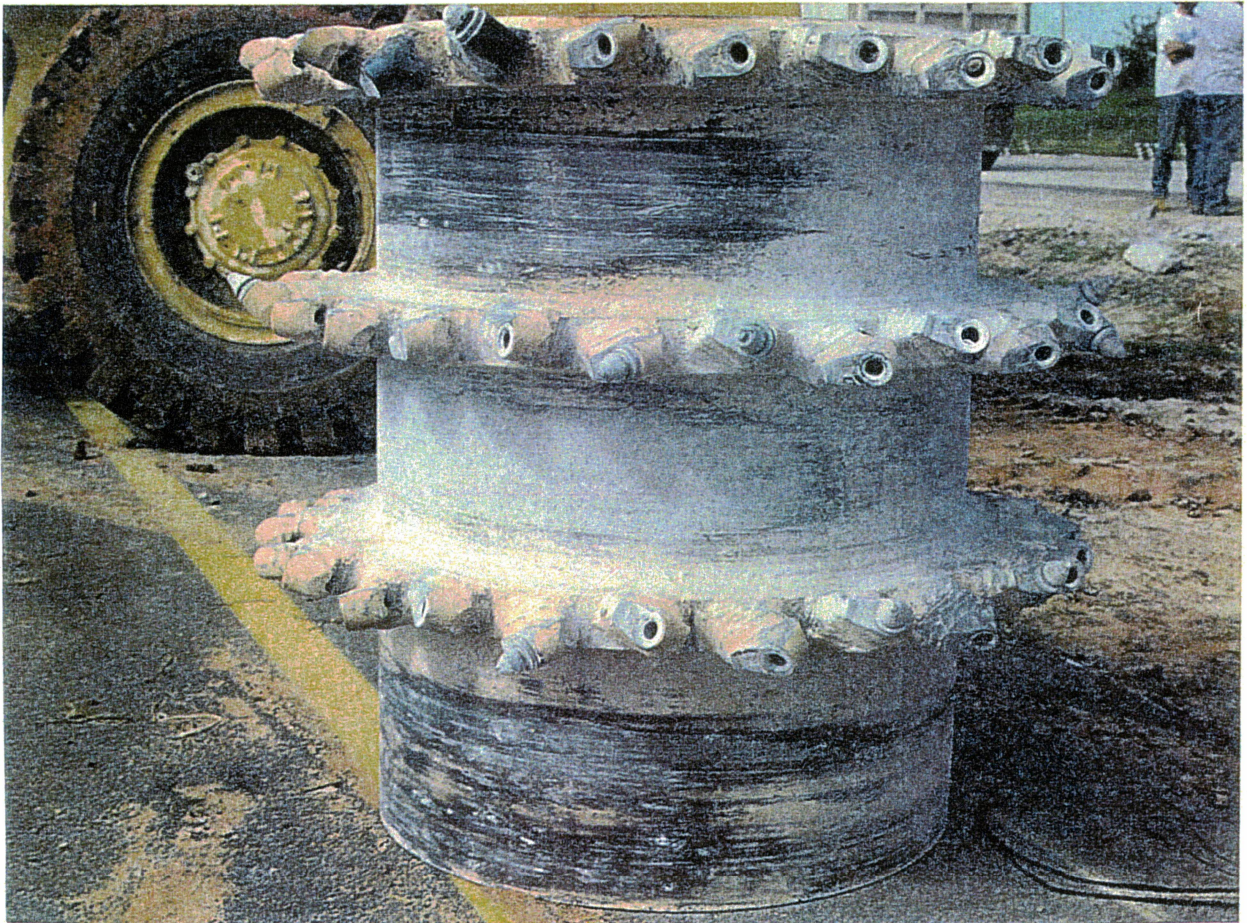
Following slot milling, the Contractor sand blasted the surface, removed pavement markers, removed any remaining loose material from the surface with hand tools, cleaned the surface twice by shot blasting, and water blasted the pavement surface.



## INSTALLING LOAD TRANSFER UNITS (LTU's)

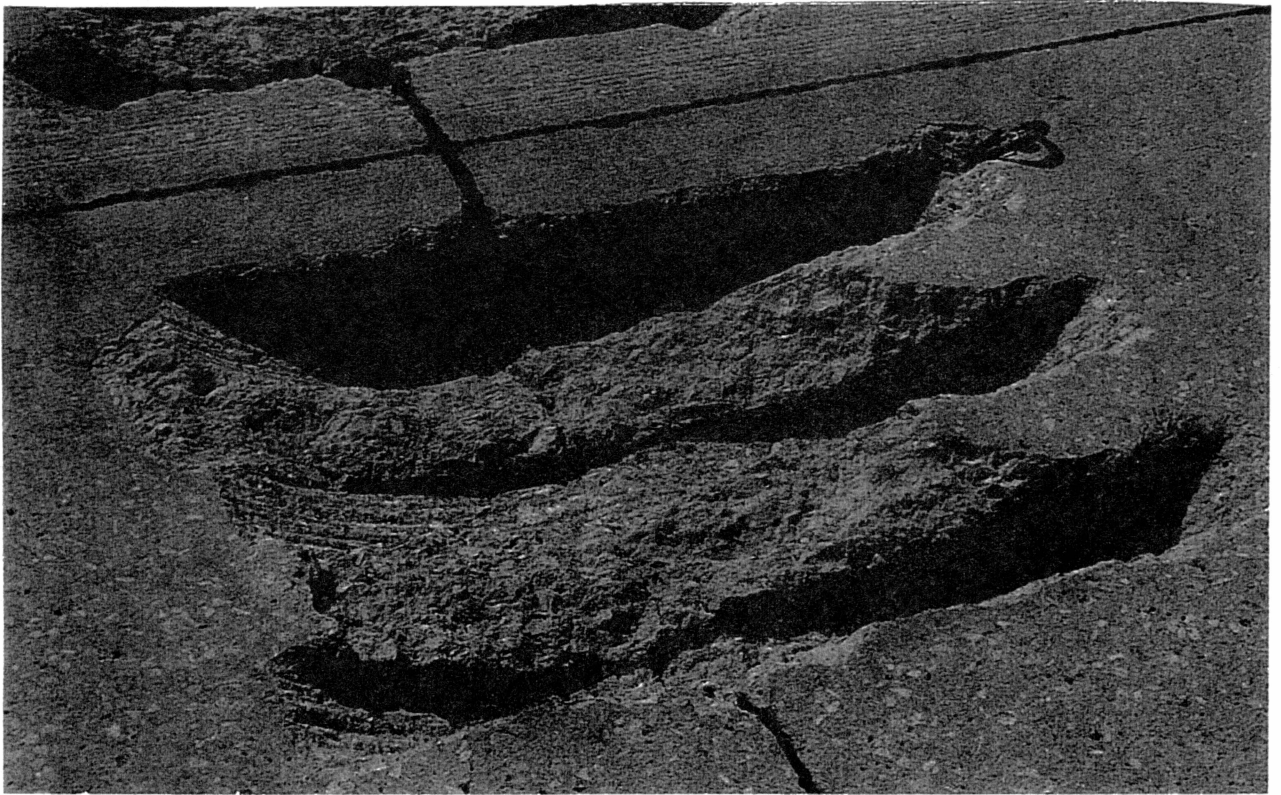
Load Transfer Units (LTU's) consisted of 1 1/4 inch diameter, epoxy-coated dowel bars with expansion caps. The Contractor used three foot sections of LTU Support Baskets to secure the LTU's in place (Figure 5). Basket sections were cut in half along their length. This was done to ensure that the assembly (baskets and LTU's) were fully isolated on each side of the transverse joint, allowing for free movement during expansion and contraction. The dowel bars were next placed into the baskets and expansion caps were installed on the non-supported side of the LTU. The completed assemblies (Baskets and LTU's) were then placed in the milled slots and the baskets were secured to the pavement (Figure 6).

The Contractor's employees then set grade rails and line for the electronic paver controls. These were carefully checked to insure that overlay smoothness would compare favorably with ODOT requirements. Following this, reference kerfs were sawed (Figure 10) into the shoulders to ensure that joints sawed into the overlay would match exactly with those in the existing pavement.

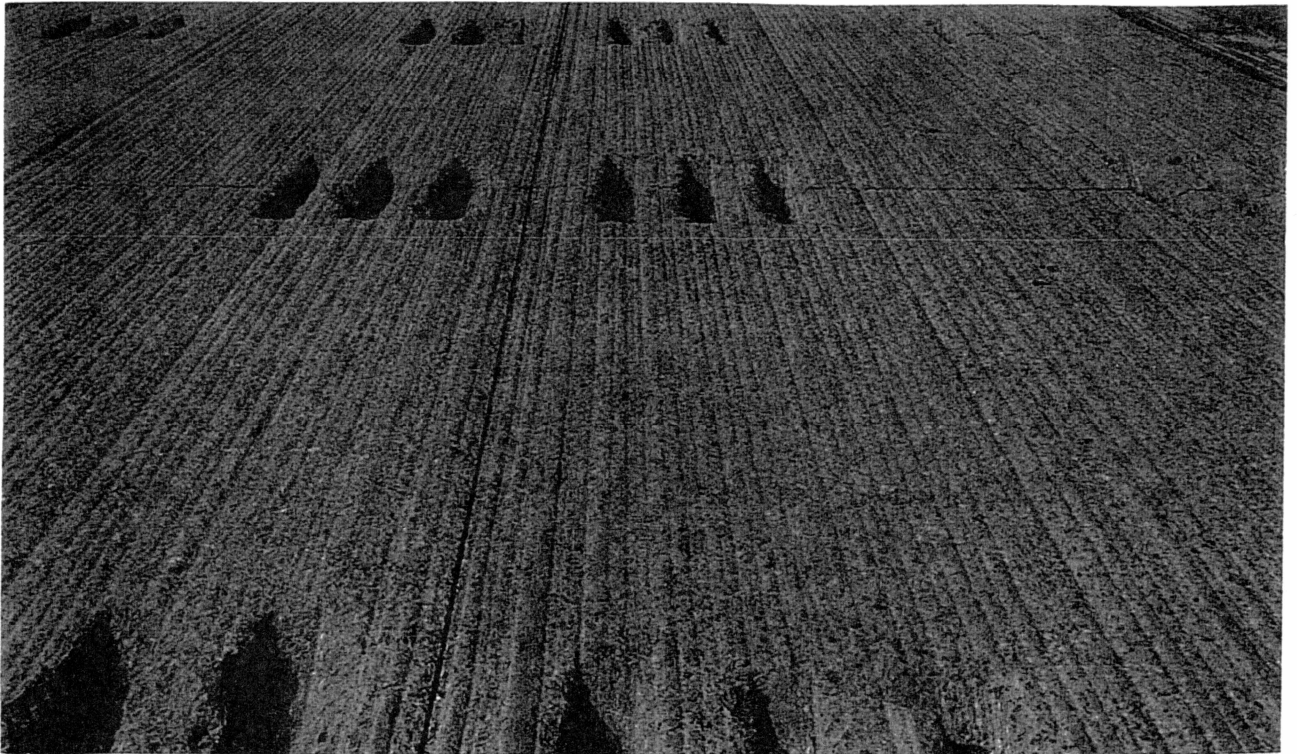


**Figure 2 Rotomill Head Configured to Mill Slots for Load Transfer Units**





**Figure 3 Milled Slots**

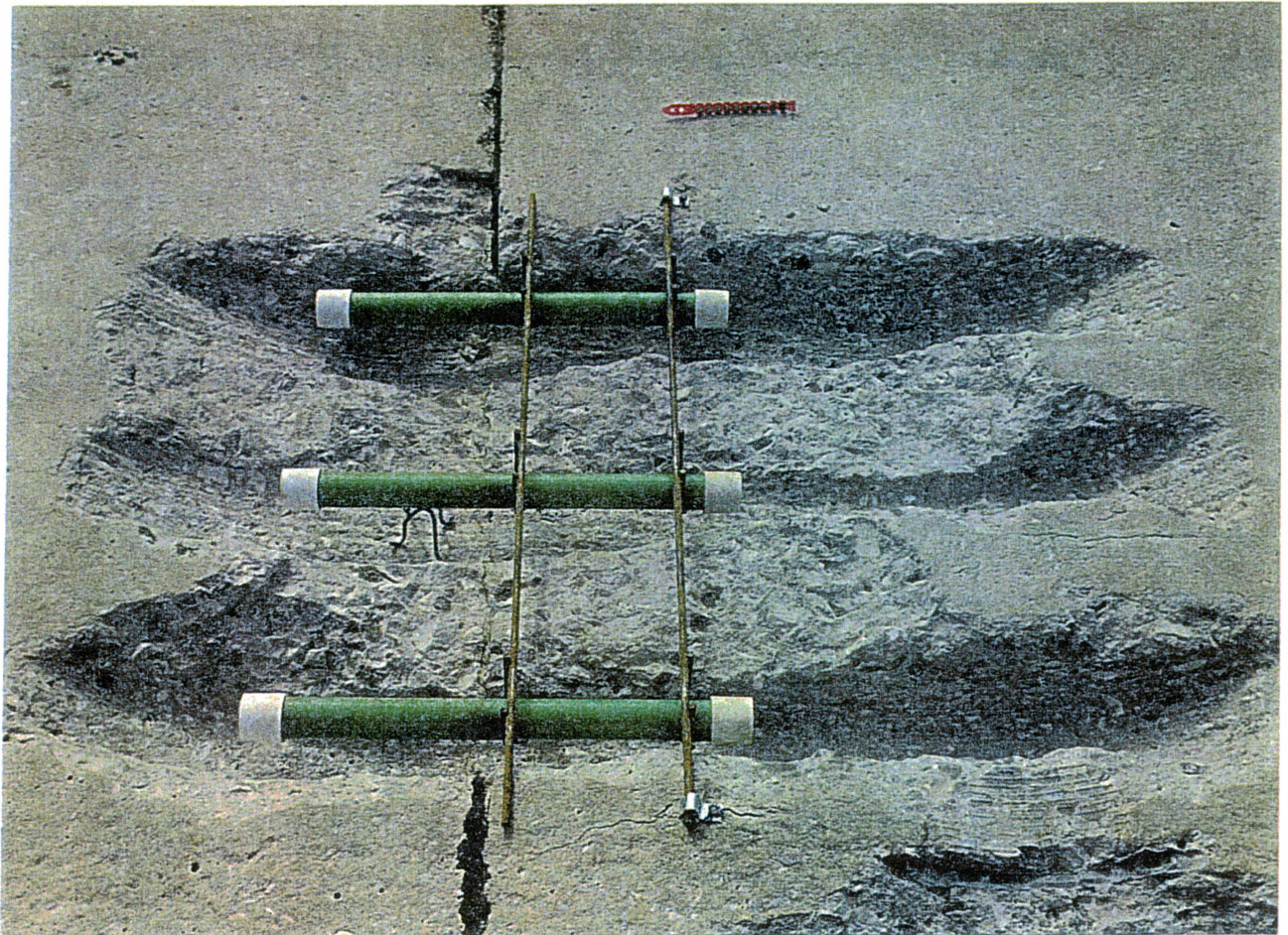


**Figure 4 Roadway after Milling Slots**



The Contractor used three foot sections of Load Transfer Unit Support Baskets to secure the LTU's in place (Figure 6). Basket sections were cut in half along their length. This was done to ensure that the assembly (baskets and LTU's) were fully isolated on each side of the transverse joint, allowing for free movement during expansion and contraction. The 1 1/4 inch diameter, epoxy-coated LTU's were then placed into the baskets (Figure 7) and expansion caps were installed on the non-supported side of the LTU (Figure 8). The completed assembly (Basket and LTU's) was then placed in the milled slots and the basket was secured to the pavement (Figure 9).

The Contractor's employees next set grade rails and line for the electronic paver controls. These were carefully checked to insure that smoothness of the overlay would compare favorably with ODOT smoothness requirements. Following this, reference kerfs were sawed (Figure 10) into the adjacent pavement to ensure that joints sawed into the overlay would match exactly with those below them in the existing pavement.

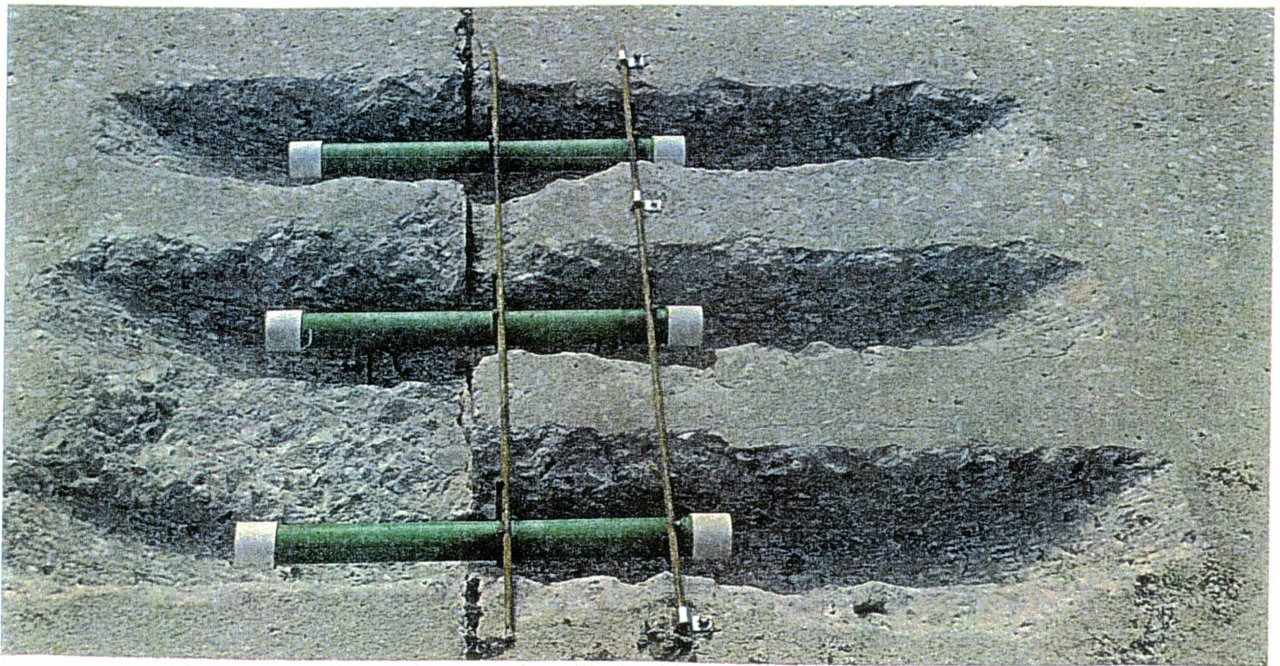


**Figure 5 Complete Basket Assembly with LTU's and Expansion Caps Installed in Slot**





**Figure 6 Securing Basket to Existing Pavement**



**Figure 7 Basket Secured to Existing Pavement**





**Figure 8 Reference Kerf Marking Joint Location**



## PLACING THE OVERLAY

A CMI SF450 Twenty-Four paving machine and a mechanical tining machine were set up to be used for the overlay operation. Concrete production began at 11:00 AM, October 23, 1998. The concrete was produced at a portable batch plant set up at I-40 and SH 92, approximately one mile from the jobsite. Concrete mix and placement information is listed in Appendix "B". The concrete was delivered to the site in end dump trucks and dumped immediately in front of the paver (Figure 8). Laborers placed concrete around the LTU's in the milled slots using shovels (Figure 9) just ahead of the paver. This was done to avoid the possibility of LTU's becoming misaligned as they could have been if filled by the larger amount of concrete moved by the paver. The paver placed the overlay and filled any remaining space in the slots monolithically. Tining followed placement, strike off, floating and finishing by approximately 45 minutes. Curing compound was applied (Figure 10), at twice the normal rate, roughly 30 minutes after tining. Joint sawing was done approximately 18 hours after placement had been completed. The reference kerfs sawn earlier were used to locate all joints before sawing the overlay. Joints were sawn to a depth equal to the overlay thickness, plus one-half inch. Normal joint sealing, with self-leveling silicone sealant, was the final step in this operation.

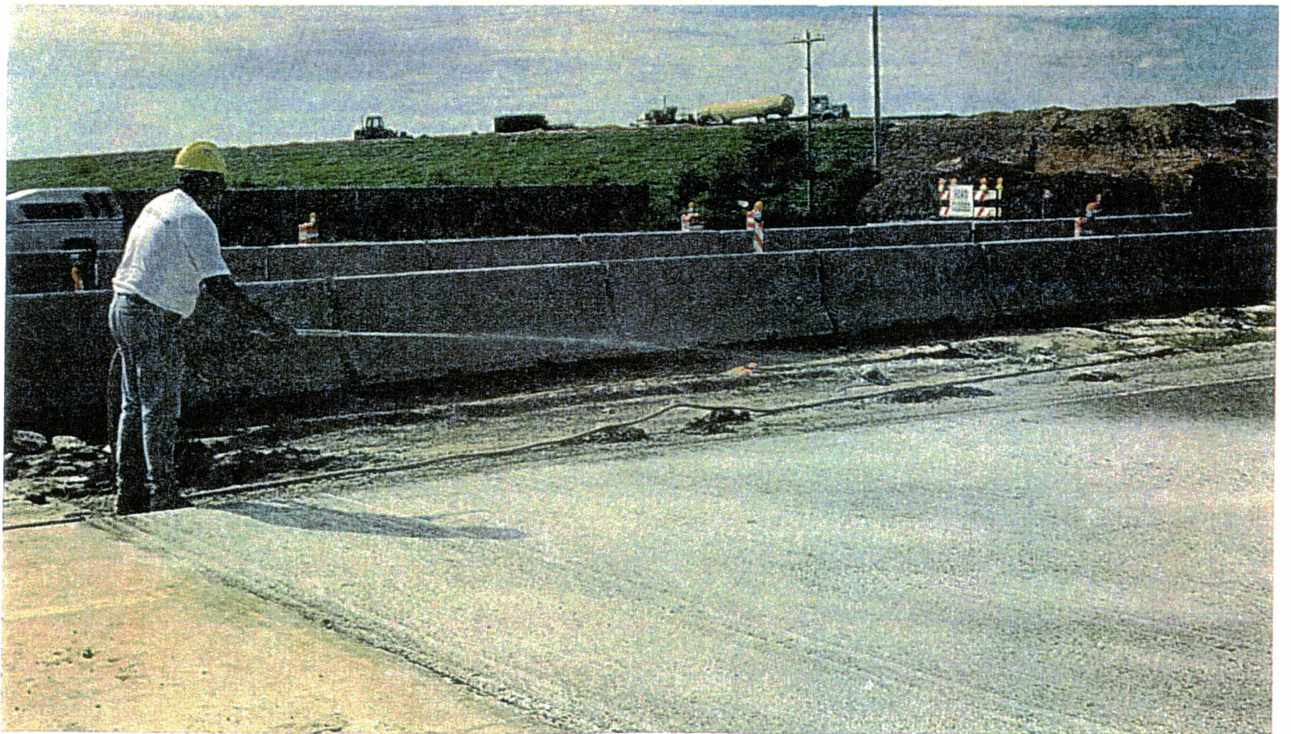


**Figure 9 Concrete Delivered to Paver**





**Figure 10 Filling Slots in Front of Paver**



**Figure 11 Applying Curing Compound**



## TEST DATA

### Falling Weight Deflectometer (FWD)

Falling Weight Deflectometer (FWD) testing was first done on the rehabilitated section on October 22, 1998, one day before the overlay was placed. At that time, tie-ins on each end of the experimental section had been milled. Also, slots had been milled for LTU's.

The second "round" of FWD tests was done March 3, 1999, roughly four months after completion of work on the overlay.

FWD test data are listed in Appendix "C". Data includes figures for deflections at the FWD plate (designated  $D_0$ ) and deflections 12 inches from the joint (on the opposite side of the joint from the plate) designated  $D_{-12}$ . Also listed are Load Transfer Efficiency (LTE) figures calculated from deflections before (October 22, 1998) and after (March 3, 1999) as shown below.

$$LTE(\%) = D_{-12} / D_0 \times 100$$

Briefly, LTE's calculated from the October 22, 1998 tests did not differ greatly from those calculated from tests done March 3, 1999. However, both deflections ( $D_0$  and  $D_{-12}$ ) measured during the March 3, 1999 tests were considerably lower than those measured October 22, 1998. Generally, deflections measured during the second round of FWD tests were more than 40 percent smaller than those measured October 22, 1998.

### Smoothness

Smoothness of the overlay was measured using the California Profilograph. Short notice made it impossible to get smoothness data for the existing roadway before the overlay was placed.

The overlay was tested on October 26, 1998, three days after placement. Test results on the overlay showed good smoothness, the outside (north) lane had a Profile Index (PI) of 0.977 Inches per mile of roughness while roughness measured on the inside (south) lane was 0.0 inches per mile. Both PI's would qualify for the maximum bonus under ODOT smoothness requirements.

Profilograph test data are included in Appendix "C".

**APPENDIX A  
ODOT SPECIAL PROVISION  
FOR FIBER REINFORCED, BONDED  
PORTLAND CEMENT CONCRETE OVERLAY**



OKLAHOMA DEPARTMENT OF TRANSPORTATION  
SPECIAL PROVISION  
FOR  
FIBER REINFORCED, BONDED PORTLAND CEMENT CONCRETE OVERLAY  
PROJECT NO. SAP-11(335), J/P 09244(04)  
CHEROKEE COUNTY

These Special Provisions revise, amend and where in conflict, supersede applicable sections of the Standard Specifications for Highway Construction, Edition of 1988, and the Supplement, thereto, Edition of 1991.

435.01. DESCRIPTION. This work consists of placing a fiber reinforced, bonded PCC resurfacing overlay of an existing PCC pavement to the thickness as shown on the plans, and may include associated patching and widening work.

435.02 MATERIALS. All materials shall meet the requirements for the items in Section 700, Materials.

(a) Cement. Cement shall conform to Subsection 701.02. The use of Type III and Type IIIA cement will not be permitted. Fly ash may not be used as a cement replacement.

(b) Aggregate. Aggregate shall conform to Subsection 701.05 and 701.06. The gradation of the coarse aggregate in the PCC overlay shall have 100% passing the 1 inch sieve. The type of coarse aggregate in the overlay shall be of the same type as the original pavement to reduce stresses due to the coefficients of thermal expansion of different materials.

(c) Concrete. Concrete shall conform to Section 701.01 for Class 'AA' concrete. The bond shear strength between the original pavement and overlay shall be a minimum of 200 PSI, as tested with an Iowa Shear Strength test fixture or other similar device. A Type 'A' certification, as shown in Subsection 106.12, shall be submitted for each lane-mile (or major portion thereof) of the overlay.

(d) Grout. No grout or dampening of the slab shall be permitted prior to overlaying.

(e) Joint Filler and Sealer. Joint filler and sealer shall be a preformed elastomeric compression joint seal and conform to Subsection 701.08(c) or a low modulus silicone joint sealant and shall conform to Subsection 701.08(e).

(f) Admixtures. Admixtures shall conform to Subsection 701.03.

(g) Fiber Reinforcement. The fibers shall be engineered, synthetic fibers that are 100 percent polypropylene, collated, fibrillated fibers which have been specifically manufactured to an optimum gradation for use as a secondary reinforcement in Portland Cement concrete. The fibers shall not contain any reprocessed olefin materials. The following requirements shall also be met for the fibers:

Specific Gravity----- 0.90 to 0.95  
 Modulus of Elasticity-- 500 KSI, minimum  
 Tensile Strength----- 70 KSI, minimum  
 Length----- 1/4 to 1 inch  
 Absorption Rate----- nil

The fibers shall be added to the concrete overlay PCC at the rate of 3 pounds per cubic yard, or at the manufacturer's suggested rate, which ever is greater. The concrete will be mixed sufficiently to distribute the fiber uniformly. The fiber manufacturer or approved distributor shall provide the services of a qualified technical representative to prepare a trial batch of the modified PCC and assist in the initial placement/finishing.

435.03 EQUIPMENT. The equipment used shall be subject to approval of the Engineer and shall comply with the following:

(a) Shot Blasting Equipment. Equipment, such as the "SKIDABRADER" or its equivalent, shall be power-operated and capable of propelling steel shot against the pavement surface such that the entire concrete surface is uniformly textured at minimum width of six feet per pass. The shot blasting equipment shall include a means to collect used shot, which may be used again, and waste material. Materials removed in the cleaning operation shall be disposed of in a manner approved by the Engineer.

(b) Proportioning and Mixing Equipment. Proportioning and mixing equipment shall conform to Subsection 414.03(a). Sufficient mixing capacity of mixers shall be provided to permit the intended pour to be placed without interruption.

(c) Placing and Finishing Equipment. Placing and finishing equipment shall conform to Subsection 414.04. The contractor shall construct the pavement in a manner and with a system that will provide a smooth riding surface. The concrete placing equipment shall be either controlled to the proper elevation by string line or operated on a pad line that is constructed to a true grade line.

(d) Sand Patch Test Equipment and ACI Surface Soundness Test Equipment. Two sets of each test equipment will be purchased by the contractor and turned over to the ODOT Resident Engineer at the completion of the project.

#### 435.04 CONSTRUCTION METHODS.

(a) Full Depth PCC Patches. Full depth PCC patches shall be PCC patches constructed according to the plans with Class 'A' Concrete. Dowels will be required as shown on the plans. The patches will be full lane width, and the minimum length of patch, measured parallel to the centerline, will be 6 feet. Full depth patches shall be completed in an area before resurfacing work is done. Construction of full depth patches shall be according to Construction Standard PCPR-1-1 or



the most current Standard. However, joint sealing will not be required, calcium chloride shall not be used, traffic shall not be permitted on the patch for 36 hours, and smoothness will be subject to evaluation to 1/4 inch tolerance in 10 feet.

(b) Pavement Widening. Pavement widening will be required at locations and as detailed on the plans. The pavement widening shall be tied to the existing pavement as shown on the plans. Holes for tiebars shall be drilled 1/8 inch larger in diameter than the tiebar. The holes shall be clean and dry, with no particles of dust remaining in the holes. The tiebars shall be grouted in place with an epoxy material, which conforms to Subsection 701.13 and recommended for horizontal installation. A positive injection and retaining procedure for the epoxy will be required, as approved by the Engineer. Tiebars shall have a minimum cure time of 24 hours before being subjected to any stress. Tiebars shall be located at least 12 inches from existing transverse joints. The pavement widening may not be placed monolithically with the overlay in a single pass.

(c) Preparation of Surface. Preparation shall include the entire surface to be overlaid. The surface shall be thoroughly cleaned with a shotblasting machine or equivalent equipment. The preparation of the surface shall be of such an extent as to remove all dirt, oil, and other foreign materials, as well as any laitance or loose material from the surface and edges against which new concrete is to be placed. All old joint sealing material and incompressible materials shall likewise be removed. Materials removed in the preparation operation shall be disposed of in a manner approved by the Engineer.

(d) Placing and Finishing Resurfacing Concrete. Resurfacing concrete shall be placed in accordance with applicable requirements of Section 414 with the following modifications:

1. Surface Cleaning. Prior to applying the overlay to the surface, the entire surface shall be cleaned with a oil-free, compressed airblast. Acceptable cleaning will be determined by increasing the average surface macrotexture at least 0.030 from the unimproved value to an average minimum value of 0.060, as measured with ASTM E 965-87 standard volumetric method. This shall be followed by successful surface soundness tests in accordance with ACI 503R surface adhesion test method. The ACI 503R test results will be based on the average of 3 or more tests, exceeding 250 PSI at a minimum of 4 job locations. Tests that are less than 250 PSI, but fail at a depth of 1/4 inch or more, and over 50% or more of the test area, may be considered a passing test. If passing tests are not achieved, the surface macrotexture shall be increased until passing test results are achieved. After cleaning, no traffic shall be permitted on the cleaned surface except the paving machine. The Contractor shall take precautions to prevent contamination of the cleaned pavement surface prior to overlaying.

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2. Joint Identification. The exact location of each contraction and expansion joint in the existing pavement and joints to be sawed at each full depth patch shall be identified on both sides by a reliable method.

3. Placing and Finishing Resurfacing Concrete. The Contractor shall take every reasonable precaution to secure a smooth riding surface. Prior to the placement operation, he shall review his equipment, procedures, personnel, previous results and the inspection procedure with the Engineer to assure a coordinated effort. Precautions shall include the following:

- Assurance that the concrete can be produced and placed to the proper thickness and cross section within the specified limits, continuously and with uniformity,

- The thickness of all new concrete above the prepared surface shall be as specified on the plans,

- The use of a broom, burlap or astroturf drag or mechanical tining shall be as directed by the fiber manufacturer's field representative,

- At those times when the evaporation rate (see attached nomograph) exceeds 0.20 LBS/SF/HR for a period of time as specified by the Engineer, or greater than 20 minutes, or the difference in the ambient temperature at the time of placement verses the expected low temperature in a 24 hour period exceeds 25 degrees F, measures shall be taken to control the moisture content of the newly placed concrete overlay. Fogging, wet mat curing, or other measures as directed by the Engineer, shall be used to control the moisture content. The measures are in addition to the membrane curing required. When such conditions occur, the entire day's placement shall be protected. The protection shall remain in place for a minimum of 36 hours, or until such a time as directed by the Engineer. The removal of the protection shall be as directed by the Engineer,

- At those times when the difference in the ambient temperature at the time of placement verses the expected low temperature is expected to exceed 25 degrees F, the overlay shall be placed no later than 12 o'clock noon the preceding day or a minimum of 18 hours prior to the time the maximum temperature difference is expected,

- A white pigmented curing compound meeting the requirements of Subsection 701.07(d) shall be used and it shall be applied at the rate of one gallon to not more than 100 square feet.

4. Joints. Joints shall be sawed in the overlay directly over existing transverse and longitudinal joints. The joints shall be sawed to the full depth of the new overlay concrete plus one-half inch. Joints in the widened section shall be sawed  $\frac{1}{3}$  of thickness of the pavement in these areas. The joints shall be



435-1(e) 91S  
6-16-94

sawed as soon as possible without causing excessive raveling. All joints shall be cleaned and sealed in accordance with Subsection 701.08 or according to the manufacturer's recommendation.

(e) Limitations of Operations. Limitations of operations shall conform to Subsection 414.04(f), 414.04(p) and 414.04(q). No resurfacing concrete shall be placed when the air or pavement temperature is at or expected to be below 40 degrees F during placement. At the time of the overlay construction, the sum of the free air temperature and temperature of the plastic concrete delivered to the paver shall not exceed 180 degrees F. At no time shall the plastic PCC be delivered at a temperature exceeding 80 degrees F. If ice is substituted for the mix water in the concrete to lower the plastic concrete temperature, all the ice shall be melted and the water thoroughly mixed in the plastic PCC prior to placement.

435.05. METHOD OF MEASUREMENT. The quantity of the various items of work involved in the construction of Portland Cement concrete resurfacing will be measured in accordance with the following provisions:

(a) Portland Cement Concrete Resurfacing will be measured in cubic yards of Class 'AA' Concrete using a count of batches incorporated. This quantity will include concrete placed in the overlay only.

(b) Overlay Placement of Portland Cement Concrete Pavement, will be measured in square yards. This area will be measured in accordance to Section 414.05.

(c) Full Depth PCC Patches will be measured in square yards of the nominal surface area of the patches.

435.06. BASIS OF PAYMENT. Accepted quantities, measured as provided above, will be paid for in accordance with the following provisions:

(a) Portland Cement Concrete Resurfacing and Overlay Placement will be paid for at the contract unit price for:

(A) CLASS 'AA' CONCRETE C.Y.

(B) OVERLAY PLACEMENT S.Y.

which shall be full compensation for furnishing all material, equipment, labor and incidentals necessary for the proportioning, mixing, delivery and placement of the concrete. This includes the placement of bars for widening and sawing, cleaning and sealing the joints, in accordance with the plans and this Special Provision.

(b) Full Depth Patches will be paid for at the contract unit price for:

(C) PORTLAND CEMENT CONCRETE (PATCHING) S.Y.

435-1(f) 91S  
6-16-94

which shall be full compensation for furnishing all materials, equipment, labor and incidentals necessary for proportioning, mixing, delivery and placement of the concrete. This includes the cost of bars and bar assemblies used in accordance with the plans.



**APPENDIX B**  
**CONCRETE MIX AND PLACEMENT INFORMATION**

## CONCRETE DESIGN

Design: Class "AA" Fiber Reinforced Concrete (ODOT Special Provision 435-1(a-f) 91s, Appendix A).

Proportions: Holnam Type I Portland Cement (Ada)	SG = 3.15	658 lb.
Dolese Fine Aggregate (Dover)	SG = 2.64	1,181 lb.
Dolese # 67 Coarse Aggregate (Davis)	SG = 2.667	1,790 lb.
Batch Water		253 lb.
Masterbuilders Air Entraining Agent		59 fl. oz.
Fibermesh fiber reinforcement (polypropylene)		3 lb.

### Other Requirements;

Yield	143.41 lb./ cf
Twenty eight day Compressive Strength	3,500 psi
Slump	1 - 3 in
Water Cement Ratio	0.385
Air Entrainment	5 - 7 %
Aggregate Proportions	60 % Coarse: 40 % Fine

## BATCH PROPORTIONS

Holnam Type I Portland Cement (Ada)	5,250 lb.
Dolese Fine Aggregate (Dover)	9,620 lb.
M.P.I. # 67 Coarse Aggregate (Davis)	14,380 lb.
Batch Water	1,524 lb.
Masterbuilders Air Entraining Agent	175 fl. oz.
Fibermesh Fiber Reinforcement	24 lb.



## PLACEMENT CONDITIONS

(October 23, 1998, 11:30 AM)

Slump	2 - 2.5 in
Ambient Air Temperature	65 - 66 degrees F
Fresh Concrete Temperature	69 - 70 degrees F
Water Cement Ratio	0.29
Air Entrainment	5.9 - 6.0 %
Other Information	Thirty-three 8 cubic yard loads of Class "AA" Fiber Reinforced Concrete were batched, totaling 264 cubic yards.

**APPENDIX C**  
**FALLING WEIGHT DEFLECTOMETER**  
**AND**  
**SMOOTHNESS DATA**



PROJECT NO. NHI-40-4(344)137IP (Experimental Overlay Section) County Canadian

CONTRACTOR Duit Construction Pavement Type Thin bonded PCC Overlay (Jointed, with retrofitted dowel bars)

Station 1848 + 10 to station 1858 + 10 Traffic Direction Westbound

No. Of Lanes 2 (The two Westbound lanes of a divided four-lane highway)

Date Placed 10-23-98 Date Tested 10-26-98 Tested by Gary Williams, ODOT Research  
Outside (North) Lane, Westbound Expressway

<u>Track 1</u>				<u>Track 1 (excluding 1st and last 25')</u>			
Measured				Measured			
Segment	Length (Mi)	Roughness (In)	PRI (In/Mi)	Segment	Length (Mi)	Roughness (In)	PRI (In/Mi)
1	0.100	0.44	4.40	1	0.100	0.11	1.10
2	0.074	0.06	0.81	2	0.074	0.06	0.81
<hr/>							
Total	0.174	0.50	2.87	Total	0.174	0.17	0.977

Inside (South) Lane, Westbound Expressway

<u>Track 2</u>				<u>Track 2 (excluding 1st and last 25')</u>			
Measured				Measured			
Segment	Length (Mi)	Roughness (In)	PRI (In/Mi)	Segment	Length (Mi)	Roughness (In)	PRI (In/Mi)
1	0.100	0.20	2.00	1	0.100	0.00	0.00
2	0.077	0.38	4.94	2	0.077	0.00	0.00
<hr/>							
Total	0.177	0.58	6.94	Total	0.177	0.00	0.00

I 40 / Czech Hall Rd. FWD Joint Load Transfer Tests, **Left**

**D<sub>0</sub> = Deflection at plate, D<sub>12</sub> = Deflection 12 inches from joint, LTE = Load Transfer Efficiency**

October 22, 1998				March 3, 1999				Deflection Change October to March	
Distance	Drop D <sub>0</sub>	Drop D <sub>12</sub>	LTE(%) D <sub>12</sub> /D <sub>0</sub> x 100%	Distance	Drop D <sub>0</sub>	Drop D <sub>12</sub>	LTE(%) D <sub>12</sub> /D <sub>0</sub> x 100%	Drop D <sub>0</sub>	Drop D <sub>12</sub>
150	8.7	8.22	94.5	150	4.56	4.25	93.2	4.14	3.97
166	8.35	7.33	87.8	166	4.7	4.31	91.7	3.65	3.02
181	7.78	7.24	93.1	181	4.15	3.85	92.8	3.63	3.39
197	6.81	6.12	89.9	197	4.21	3.91	92.9	2.6	2.21
469	9.52	9.14	96.0	469	5.33	5.07	95.1	4.19	4.07
484	9.31	8.64	92.8	484	5.38	5.13	95.4	3.93	3.51
499	9.62	9.19	95.5	499	5.38	5.14	95.5	4.24	4.05
515	8.7	8.06	92.6	515	5.19	4.87	93.8	3.51	3.19
698	9.13	8.54	93.5	698	5.07	4.81	94.9	4.06	3.73
713	9.11	8.24	90.5	713	5.2	4.79	92.1	3.91	3.45
728	8.94	8.41	94.1	728	5.05	4.63	91.7	3.89	3.78
744	7.67	7.1	92.6	744	4.88	4.57	93.6	2.79	2.53
759	7.95	7.5	94.3	759	4.68	4.54	97.0	3.27	2.96

I 40 / Czech Hall Rd. FWD Joint Load Transfer Tests, **Right**

**D<sub>0</sub> = Deflection at plate, D<sub>12</sub> = Deflection 12 inches from joint, LTE = Load Transfer Efficiency**

October 22, 1998				March 3, 1999				Deflection Change October to March	
Distance	Drop D <sub>0</sub>	Drop D <sub>12</sub>	LTE(%) D <sub>12</sub> /D <sub>0</sub> x 100%	Distance	Drop D <sub>0</sub>	Drop D <sub>12</sub>	LTE(%) D <sub>12</sub> /D <sub>0</sub> x 100%	Drop D <sub>0</sub>	Drop D <sub>12</sub>
759	10.47	9.78	93.4	759	5.53	5.28	95.5	4.94	4.5
743	8.02	7.5	93.5	743	5.46	5.07	92.9	2.56	2.43
728	8.26	7.43	90.0	728	4.26	3.99	93.7	4	3.44
713	10.24	8.98	87.7	713	4.64	4.35	93.8	5.6	4.63
697	10.33	9.57	92.6	697	5.11	4.78	93.5	5.22	4.79
516	8.61	8.13	94.4	516	5.52	5.02	90.9	3.09	3.11
500	9.68	9.33	96.4	500	5.16	4.84	93.8	4.52	4.49
486	7.47	6.76	90.5	486	4.5	3.88	86.2	2.97	2.88
470	9.89	9.22	93.2	470	4.61	4.24	92.0	5.28	4.98
198	7.46	6.92	92.8	198	4.17	3.81	91.4	3.29	3.11
182	7.74	7.22	93.3	182	4.14	3.98	96.1	3.6	3.24
167	8.22	7.78	94.6	167	4.25	3.97	93.4	3.97	3.81
152	7.63	7	91.7	152	3.88	3.54	91.2	3.75	3.46

I 40 / Czech Hall Rd. FWD Load Tests, **Middle of Slab**

**D<sub>0</sub> = Deflection at plate**

Distance	Drop D <sub>0</sub>	Drop D <sub>0</sub>	Deflection Change October to March
160	7.18	4.11	3.07
193	7.09	4.52	2.57
482	8.58	4.46	4.12
511	9.08	5.52	3.56
724	8.7	5.13	3.57
753	7.11	4.9	2.21



3/3/99

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80      67990303CZECHMID36F20
7000    08002-057    759500
150     0 203 305 610 91412191829    5.9    0.0    8.0    12.0    24.0    36.0    48.0    72.0
DYNATEST\DATA\          .FWD
Czech hall middle of slab right
3      160sb    -0.0    74 53I51508    -0    74    53
3      160sb    -17.8    23 11I51508    -0    74    53
1306403827213650    160    753
1015.0 3.5 6.0 5.015.0 2.0 8.0
Ld      101 1.009    86.1
D1.     791 1.005    1.041
D2      792 1.003    1.106
D3      793 1.001    1.114
D4      794 1.007    1.078
D5      795 1.005    1.055
D6      796 1.005    1.116
D7      797 1.004    1.010
D*      798 1.000    1.000
D*      799 1.000    1.000
D* NO    1.000    1.000
Bryon Jones
0011150010002 1 1
0 0.0    0 0.0

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RoadNumrRoadway Name

RoadNumr

000+0.0 000+0.0 St

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300    0    0    0    0    0    0    11.8    0.0    0.0    0.0    0.0    0.0    0.0    0.0
6      24    8830    52493

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Dhhhh.....
Dhhhh.....

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MATLS15 STATIONS

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S      753sb    -17.8    27 12I51500    -0    80    54
1035 125 119 116 104    90    75    46 16451    4.93    4.69    4.55    4.09    3.53    2.94    1.81
1036 125 119 115 104    89    74    46 16462    4.90    4.67    4.54    4.08    3.52    2.93    1.81
1030 125 118 115 104    89    74    46 16367    4.90    4.66    4.52    4.08    3.50    2.93    1.81
1036 125 119 116 104    89    75    46 16459    4.92    4.68    4.55    4.09    3.52    2.94    1.81
S      724sb    -17.8    27 12I51502    -0    80    54
1036 130 125 122 110    96    81    53 16462    5.12    4.92    4.79    4.34    3.76    3.20    2.07
1028 129 124 121 109    96    81    52 16332    5.09    4.88    4.75    4.31    3.76    3.19    2.06
1037 130 125 122 110    96    82    53 16475    5.13    4.93    4.80    4.35    3.78    3.22    2.09
1034 130 125 121 110    96    81    53 16427    5.10    4.90    4.78    4.32    3.76    3.20    2.07
S      511sb    -17.8    27 14I51504    -0    80    57
1036 141 134 131 117 101    88    56 16467    5.53    5.28    5.17    4.63    3.99    3.45    2.19
1031 139 133 129 117 103    85    56 16387    5.49    5.24    5.06    4.60    4.05    3.33    2.20
1029 140 134 130 118 103    86    56 16356    5.52    5.28    5.11    4.63    4.05    3.39    2.22
1035 141 135 131 118 102    87    56 16451    5.53    5.30    5.16    4.65    4.03    3.44    2.19
S      482sb    -17.8    17 14I51505    -0    63    58
1026 113 107 104    94    83    71 16311    4.44    4.20    4.10    3.72    3.27    2.81    1.90
1022 113 107 104    95    84    72 16403    4.45    4.22    4.10    3.74    3.29    2.82    1.93
1032 113 108 105    95    84    72 16403    4.46    4.24    4.12    3.74    3.29    2.84    1.92
1032 113 108 105    95    84    72 16399    4.46    4.23    4.12    3.76    3.30    2.84    1.94
S      193sb    -17.8    25 12I51507    -0    76    54
1032 115 109 105    93    78    67 16396    4.51    4.29    4.14    3.65    3.09    2.63    1.52
1029 115 109 105    92    78    68 16343    4.52    4.28    4.13    3.64    3.05    2.66    1.52

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1041	115	109	105	93	79	66	39	16539	<u>4.52</u>	4.28	4.14	3.67	3.10	2.61	1.52
1028	114	108	105	94	80	64	39	16335	<u>4.50</u>	4.26	4.13	3.68	3.16	2.52	1.52
S	160sb	-17.8			23	12	151508	-0	74	53					
10	104	98	95	83	69	57	35	16383	<u>4.11</u>	3.85	3.72	3.26	2.72	2.24	1.37
1031	104	98	95	83	70	57	35	16391	<u>4.10</u>	3.84	3.74	3.26	2.75	2.24	1.37
1034	104	98	95	83	70	57	35	16430	<u>4.11</u>	3.84	3.74	3.27	2.75	2.24	1.39
1029	104	98	95	83	69	57	35	16351	<u>4.10</u>	3.86	3.73	3.26	2.72	2.26	1.38

EOF



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80      67981022I40MISL 36F20
0000    08002-057    759500    .
150    0 203 305 610 91412191829    5.9    0.0    8.0    12.0    24.0    36.0    48.0    72.0
2      DYNATEST\DATA\    .FWD
3      at chezh hall road middle of slab
3      160sb    -0.0    81 66I51610    -0 81 66
3      160sb    -17.8    27 19I51610    -0 81 66
1306403827213650    160    753
: 1015.0 3.5 6.0 5.015.0 2.0 8.0
d      101 1.009 86.1    .
01      791 1.005 1.041    .
02      792 1.003 1.106    .
03      793 1.001 1.114    .
04      794 1.007 1.078    .
05      795 1.005 1.055    .
06      796 1.005 1.116    .
D7      797 1.004 1.010    .
D*      798 1.000 1.000    .
D*      799 1.000 1.000    .
D* NO    1.000 1.000    .
Bryon Jones
0011150010002 1 1    .
0 0.0    0 0.0    .

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RoadNumrRoadway Name
RoadNumr
000+0.0 000+0.0 St
 300    0    0    0    0    0    0    0    11.8    0.0    0.0    0.0    0.0    0.0    0.0    0.0
    6      24    8528    50950
Dggg.....
Dgggg.....
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MATLS15 STATIONS																
★																
S	753sb	-17.8	27	19I51558	-0	80	66									
922	179 170	163 140	116 90	48 14648	7.05	6.70	6.43	5.53	4.56	3.55	1.87					
928	181 172	165 141	116 91	47 14743	7.11	6.76	6.48	5.56	4.56	3.58	1.84					
928	181 172	164 141	117 90	48 14743	<u>7.11</u>	6.76	6.47	5.57	4.59	3.56	1.88					
929	181 172	164 141	117 91	47 14770	<u>7.12</u>	6.75	6.47	5.56	4.59	3.57	1.87					
S	724sb	-17.8	27	19I51600	-0	81	66									
921	219 208	201 176	147 117	63 14640	8.61	8.20	7.91	6.92	5.78	4.63	2.48					
927	221 210	203 177	148 119	64 14738	8.69	8.29	8.00	6.98	5.83	4.68	2.52					
932	221 211	203 177	148 118	63 14810	<u>8.70</u>	8.30	8.00	6.99	5.84	4.67	2.48					
926	220 210	203 177	148 118	63 14722	<u>8.66</u>	8.26	7.98	6.96	5.82	4.66	2.49					
S	511sb	-17.8	28	20I51604	-0	83	67									
920	227 217	211 187	159 129	72 14611	8.95	8.56	8.32	7.38	6.24	5.09	2.82					
926	229 219	213 189	160 130	72 14711	9.02	8.63	8.39	7.43	6.29	5.13	2.83					
929	231 221	215 190	161 131	73 14770	9.08	8.70	8.45	7.50	6.35	5.17	2.87					
933	231 221	215 191	162 132	73 14830	9.08	8.71	8.47	7.51	6.37	5.18	2.87					
S	482sb	-17.8	26	20I51605	-0	79	68									
920	215 207	201 180	156 129	81 14611	8.48	8.16	7.92	7.09	6.13	5.08	3.19					
931	218 209	203 181	156 130	81 14794	8.57	8.22	7.99	7.13	6.16	5.13	3.20					
931	218 209	203 182	157 131	82 14790	<u>8.58</u>	8.22	8.00	7.15	6.19	5.14	3.22					
931	219 209	203 182	158 130	82 14786	<u>8.60</u>	8.24	8.01	7.16	6.20	5.13	3.23					
S	193sb	-17.8	28	19I51608	-0	83	67									
921	179 170	165 145	122 98	53 14632	7.05	6.71	6.50	5.70	4.78	3.84	2.11					
928	180 172	166 144	120 98	54 14751	7.07	6.77	6.55	5.68	4.72	3.86	2.11					

928	180	172	166	146	122	98	54	14746	<u>7.09</u>	6.77	6.55	5.74	4.80	3.86	2.12
927	180	172	166	145	122	98	54	14738	<u>7.10</u>	6.76	6.55	5.72	4.79	3.86	2.11
S		160sb	-17.8		27	19	151610	-0	81	66					
	182	173	167	144	119	93	46	14624	<u>7.15</u>	6.79	6.56	5.67	4.70	3.65	1.80
	183	172	166	145	122	92	48	14735	<u>7.20</u>	6.76	6.54	5.72	4.78	3.61	1.87
926	182	173	167	144	119	93	45	14714	<u>7.18</u>	6.82	6.58	5.69	4.70	3.65	1.78
929	183	172	166	146	122	91	48	14767	<u>7.21</u>	6.78	6.54	5.73	4.81	3.58	1.87

EOF



10/22/98

80 102981022I40JTR 36F20  
000 08002-057 759500  
150 0 203 305 610 914-3051829 5.9 0.0 8.0 12.0 24.0 36.0 -12.0 72.0  
YNATEST\DATA\ .FWD  
at chezh hall road outside lane left  
759sb -0.0 81 67I51508 -0 81 67  
759sb -17.8 27 21I51516 -0 81 70  
1306403827213650 150 759  
1015.0 3.5 6.0 5.015.0 2.0 8.0  
101 1.009 86.1  
791 1.005 1.041  
792 1.003 1.106  
793 1.001 1.114  
794 1.007 1.078  
795 1.005 1.055  
796 1.005 1.116  
797 1.004 1.010  
798 1.000 1.000  
799 1.000 1.000  
D\* NO 1.000 1.000  
Bryon Jones  
0011150010002 1 1  
0 0.0 0 0.0

RoadNumrRoadway Name  
RoadNumr  
000+0.0 000+0.0 St  
300 0 0 0 0 0 0 11.8 0.0 0.0 0.0 0.0 0.0 0.0 0.0  
13 52 8507 50854  
Cggg.....  
Cgggg.....  
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JOINTESTSTATIONS  
\*  
S 150sb -17.8 26 21I51437 -0 78 69  
1054 234 217 209 180 150 220 69 16745 9.22 8.55 8.23 7.08 5.89 8.67 2.71  
992 221 205 198 170 141 207 66 15755 8.69 8.06 7.78 6.68 5.57 8.16 2.58  
996 221 206 198 170 142 209 66 15823 8.70 8.09 7.80 6.68 5.57 8.22 2.59  
993 221 206 198 170 142 209 66 15771 8.71 8.09 7.80 6.70 5.60 8.22 2.61  
S 166sb -17.8 27 21I51440 -0 81 70  
981 208 190 180 152 125 182 54 15593 8.17 7.46 7.07 5.98 4.92 7.17 2.11  
994 211 192 182 154 126 185 54 15795 8.30 7.57 7.17 6.07 4.98 7.29 2.12  
1000 212 193 183 155 127 186 54 15887 8.35 7.61 7.20 6.10 5.02 7.33 2.15  
998 212 193 183 155 127 186 55 15855 8.35 7.61 7.20 6.10 5.02 7.34 2.15  
S 181sb -17.8 27 22I51441 -0 81 71  
1005 198 181 172 144 118 183 50 15966 7.78 7.13 6.76 5.67 4.65 7.19 1.96  
996 197 180 171 143 116 183 50 15834 7.75 7.10 6.73 5.64 4.58 7.19 1.95  
995 198 181 171 144 117 184 50 15807 7.78 7.12 6.74 5.65 4.59 7.24 1.96  
998 199 182 173 144 117 185 50 15858 7.84 7.17 6.81 5.69 4.61 7.30 1.96  
S 197sb -17.8 26 22I51446 -0 80 71  
994 172 159 153 132 110 155 52 15803 6.76 6.28 6.03 5.19 4.35 6.09 2.06  
995 172 160 154 133 111 155 53 15816 6.78 6.30 6.05 5.22 4.37 6.11 2.07  
1002 173 161 154 133 112 156 53 15922 6.81 6.32 6.07 5.24 4.42 6.12 2.09  
996 172 160 154 133 111 155 53 15823 6.77 6.30 6.05 5.22 4.37 6.11 2.09  
S 469sb -17.8 27 20I51452 -0 81 68  
1003 242 226 217 189 160 232 82 15943 9.53 8.88 8.55 7.43 6.30 9.13 3.22  
998 242 225 217 189 160 232 82 15855 9.52 8.87 8.54 7.43 6.31 9.12 3.22

999	242	226	217	189	161	232	82	15866	<u>9.52</u>	8.89	8.55	7.44	6.34	<u>9.14</u>	3.24
994	241	225	217	188	160	231	82	15800	<u>9.48</u>	8.86	8.52	7.41	6.31	<u>9.11</u>	3.22
S	484sb	-17.8	29	20I51454	-0	83	67								
	236	223	216	193	168	219	91	15819	<u>9.28</u>	8.77	8.50	7.60	6.61	<u>8.60</u>	3.59
994	235	221	215	194	170	219	92	15803	<u>9.26</u>	8.72	8.48	7.63	6.68	<u>8.64</u>	3.63
994	237	226	218	193	167	219	90	15792	<u>9.31</u>	8.88	8.58	7.59	6.56	<u>8.64</u>	3.55
997	237	226	218	193	167	220	90	15843	<u>9.34</u>	8.88	8.59	7.61	6.59	<u>8.65</u>	3.56
S	499sb	-17.8	28	21I51456	-0	83	69								
989	241	221	211	179	148	231	69	15707	<u>9.49</u>	8.71	8.31	7.05	5.83	<u>9.09</u>	2.72
993	243	222	213	181	148	232	70	15787	<u>9.56</u>	8.76	8.37	7.11	5.84	<u>9.15</u>	2.74
994	244	224	213	181	150	233	70	15800	<u>9.62</u>	8.80	8.39	7.14	5.89	<u>9.19</u>	2.76
994	244	224	214	182	150	234	70	15803	<u>9.59</u>	8.81	8.42	7.16	5.89	<u>9.20</u>	2.77
S	515sb	-17.8	27	21I51457	-0	81	69								
975	217	201	193	167	140	201	68	15490	<u>8.52</u>	7.90	7.60	6.57	5.53	<u>7.90</u>	2.68
994	221	205	197	170	143	205	70	15800	<u>8.70</u>	8.07	7.76	6.70	5.64	<u>8.06</u>	2.76
994	221	205	197	170	143	205	70	15803	<u>8.70</u>	8.07	7.75	6.70	5.63	<u>8.06</u>	2.74
993	221	205	197	171	143	205	70	15771	<u>8.70</u>	8.06	7.77	6.72	5.65	<u>8.06</u>	2.76
S	698sb	-17.8	29	21I51500	-0	83	70								
991	231	212	202	172	142	215	62	15747	<u>9.11</u>	8.34	7.94	6.76	5.59	<u>8.48</u>	2.44
993	232	212	202	172	143	217	62	15771	<u>9.12</u>	8.35	7.97	6.77	5.63	<u>8.55</u>	2.43
996	232	212	202	172	142	217	61	15823	<u>9.13</u>	8.36	7.96	6.76	5.60	<u>8.54</u>	2.42
993	232	213	203	173	144	218	61	15787	<u>9.15</u>	8.38	7.97	6.80	5.66	<u>8.57</u>	2.42
S	713sb	-17.8	28	21I51502	-0	82	69								
977	227	209	200	172	142	204	64	15533	<u>8.95</u>	8.21	7.87	6.75	5.59	<u>8.02</u>	2.52
984	230	211	202	173	144	207	65	15636	<u>9.04</u>	8.31	7.96	6.83	5.65	<u>8.13</u>	2.54
990	231	213	204	175	144	209	65	15736	<u>9.11</u>	8.39	8.04	6.88	5.67	<u>8.24</u>	2.56
995	233	214	205	175	144	210	65	15816	<u>9.16</u>	8.44	8.08	6.90	5.69	<u>8.29</u>	2.57
S	728sb	-17.8	27	21I51503	-0	81	70								
969	221	205	195	168	135	208	55	15402	<u>8.70</u>	8.08	7.68	6.62	5.32	<u>8.20</u>	2.18
	226	209	199	169	137	213	57	15684	<u>8.89</u>	8.24	7.85	6.67	5.38	<u>8.37</u>	2.24
991	227	210	201	171	138	214	58	15747	<u>8.94</u>	8.29	7.89	6.74	5.45	<u>8.41</u>	2.26
997	228	212	202	173	140	215	59	15847	<u>8.98</u>	8.33	7.94	6.81	5.50	<u>8.46</u>	2.33
S	744sb	-17.8	28	20I51506	-0	82	69								
969	190	175	165	138	112	176	47	15394	<u>7.49</u>	6.87	6.51	5.44	4.40	<u>6.92</u>	1.83
986	194	178	168	141	115	179	49	15665	<u>7.63</u>	6.99	6.63	5.57	4.51	<u>7.06</u>	1.94
988	195	178	169	142	115	180	50	15696	<u>7.67</u>	7.02	6.64	5.59	4.54	<u>7.10</u>	1.95
995	196	179	170	143	117	182	50	15816	<u>7.72</u>	7.04	6.68	5.65	4.61	<u>7.15</u>	1.98
S	759sb	-17.8	27	20I51508	-0	81	67								
992	202	180	172	140	113	190	48	15760	<u>7.95</u>	7.10	6.76	5.50	4.43	<u>7.49</u>	1.89
998	203	182	173	141	113	192	49	15863	<u>7.98</u>	7.15	6.79	5.55	4.44	<u>7.54</u>	1.92
999	202	181	172	141	112	191	49	15871	<u>7.95</u>	7.13	6.75	5.53	4.43	<u>7.50</u>	1.93
999	202	182	172	141	114	191	50	15879	<u>7.97</u>	7.15	6.78	5.54	4.50	<u>7.53</u>	1.96

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180      102990303CZECH2R 36F20
000      08002-057      759500
150      0 203 305 610 914-3051829      5.9      0.0      8.0      12.0      24.0      36.0 -12.0      72.0
YNATEST\DATA\      .FWD
zch hall joint check left
3      758sb      -0.0      83 52I51455      -0 83 52
3      759sb      -17.8      27 13I51456      -0 80 55
306403827213650      152      758
1015.0 3.5 6.0 5.015.0 2.0 8.0
d      101 1.009      86.1
01      791 1.005 1.041
02      792 1.003 1.106
03      793 1.001 1.114
04      794 1.007 1.078
05      795 1.005 1.055
06      796 1.005 1.116
07      797 1.004 1.010
0*      798 1.000 1.000
0*      799 1.000 1.000
0* NO      1.000 1.000
Bryon Jones
0011150010002 1 1
0 0.0      0 0.0

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RoadNumrRoadway Name

RoadNumr

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13      52      8824      52463

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# JOINTESTSTATIONS

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S      152sb      -17.8      26 13I51438      -0 80 55
1035 120 112 108 96 83 111 46 16454 4.73 4.40 4.23 3.76 3.26 4.39 1.81
990 115 107 103 92 79 106 44 15728 4.51 4.21 4.06 3.61 3.13 4.19 1.74
1003 116 108 105 93 80 108 45 15935 4.56 4.26 4.12 3.65 3.15 4.25 1.76
994 115 108 104 92 80 108 44 15792 4.54 4.24 4.08 3.63 3.15 4.26 1.75
S      168sb      -17.8      27 13I51439      -0 80 56
1005 121 112 108 95 82 111 44 15966 4.76 4.41 4.24 3.75 3.22 4.36 1.74
1003 119 111 107 94 81 110 44 15930 4.70 4.36 4.20 3.72 3.18 4.32 1.72
997 119 111 107 94 81 109 44 15839 4.70 4.37 4.19 3.72 3.20 4.31 1.72
1001 120 111 107 95 81 110 44 15898 4.72 4.37 4.21 3.72 3.20 4.33 1.73
S      182sb      -17.8      27 13I51440      -0 80 55
1024 109 100 97 86 74 101 40 16271 4.30 3.96 3.81 3.39 2.91 3.96 1.56
996 105 98 94 84 72 98 39 15834 4.15 3.85 3.71 3.30 2.83 3.84 1.52
997 106 98 95 84 72 98 39 15839 4.15 3.87 3.73 3.31 2.84 3.85 1.54
1003 106 99 95 85 73 98 39 15938 4.17 3.88 3.74 3.33 2.86 3.88 1.54
S      196sb      -17.8      27 14I51441      -0 80 56
1027 110 102 98 86 74 103 40 16316 4.34 4.01 3.85 3.39 2.93 4.05 1.57
8 107 99 95 84 72 100 39 15858 4.22 3.90 3.75 3.30 2.83 3.93 1.54
96 107 99 95 84 72 99 39 15823 4.21 3.89 3.74 3.29 2.82 3.91 1.54
996 108 100 97 84 70 100 38 15823 4.23 3.94 3.82 3.33 2.77 3.92 1.51
S      468sb      -17.8      17 14I51444      -0 63 56
1023 138 126 121 107 93 131 54 16260 5.42 4.97 4.76 4.20 3.67 5.15 2.13
987 134 123 118 105 91 128 53 15676 5.29 4.84 4.65 4.11 3.59 5.02 2.09

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1002	135	125	120	105	91	129	53	15922	<u>5.33</u>	4.91	4.73	4.15	3.60	<u>5.07</u>	2.10
1005	136	125	120	106	92	130	53	15966	<u>5.35</u>	4.93	4.73	4.15	3.62	<u>5.10</u>	2.11
S	484sb	-17.8			24	13I51445	-0	76	56						
1006	141	131	127	114	100	133	58	16152	<u>5.55</u>	5.14	4.98	4.48	3.93	<u>5.22</u>	2.30
997	137	128	124	111	98	130	58	15843	<u>5.41</u>	5.03	4.89	4.38	3.85	<u>5.11</u>	2.26
997	137	129	125	112	98	130	58	15843	<u>5.38</u>	5.07	4.92	4.40	3.85	<u>5.13</u>	2.28
1001	137	129	125	112	99	131	58	15903	<u>5.40</u>	5.07	4.91	4.41	3.89	<u>5.15</u>	2.30
S	499sb	-17.8			27	13I51446	-0	81	55						
1022	141	129	124	110	95	134	51	16237	<u>5.55</u>	5.07	4.89	4.31	3.72	<u>5.29</u>	2.02
995	135	126	121	106	91	129	49	15807	<u>5.32</u>	4.95	4.76	4.17	3.56	<u>5.08</u>	1.93
999	137	126	121	107	91	131	50	15879	<u>5.38</u>	4.95	4.78	4.20	3.60	<u>5.14</u>	1.96
994	136	126	121	106	91	130	49	15795	<u>5.37</u>	4.95	4.77	4.19	3.60	<u>5.12</u>	1.95
S	515sb	-17.8			28	13I51447	-0	82	56						
1012	134	124	120	106	91	126	49	16073	<u>5.27</u>	4.89	4.72	4.16	3.57	<u>4.95</u>	1.94
994	131	122	118	104	90	124	49	15795	<u>5.17</u>	4.81	4.64	4.09	3.52	<u>4.88</u>	1.93
999	132	123	118	104	90	124	49	15874	<u>5.19</u>	4.84	4.66	4.10	3.52	<u>4.87</u>	1.93
1001	132	123	118	104	89	124	49	15911	<u>5.19</u>	4.84	4.66	4.10	3.52	<u>4.88</u>	1.93
S	696sb	-17.8			28	14I51449	-0	83	56						
1026	133	125	120	107	92	126	49	16311	<u>5.25</u>	4.91	4.72	4.20	3.61	<u>4.96</u>	1.94
996	129	121	116	104	90	122	48	15823	<u>5.08</u>	4.76	4.57	4.08	3.53	<u>4.81</u>	1.89
996	129	121	116	103	89	122	48	15831	<u>5.07</u>	4.76	4.58	4.06	3.50	<u>4.81</u>	1.89
1001	130	122	117	104	90	123	48	15898	<u>5.10</u>	4.79	4.60	4.10	3.55	<u>4.83</u>	1.91
S	712sb	-17.8			28	13I51450	-0	82	55						
1001	133	124	120	107	92	122	49	15906	<u>5.25</u>	4.87	4.72	4.20	3.62	<u>4.81</u>	1.94
996	131	122	119	106	91	121	49	15823	<u>5.16</u>	4.81	4.67	4.16	3.59	<u>4.77</u>	1.94
1002	132	123	119	106	92	122	49	15927	<u>5.20</u>	4.84	4.69	4.19	3.61	<u>4.79</u>	1.95
996	133	123	119	106	91	121	49	15823	<u>5.22</u>	4.84	4.70	4.17	3.60	<u>4.78</u>	1.95
S	727sb	-17.8			27	14I51451	-0	81	56						
1011	130	120	116	101	86	118	45	16070	<u>5.11</u>	4.73	4.58	4.00	3.38	<u>4.66</u>	1.76
995	128	118	114	100	86	118	45	15819	<u>5.04</u>	4.67	4.49	3.96	3.37	<u>4.64</u>	1.77
999	128	119	115	100	86	118	45	15882	<u>5.05</u>	4.69	4.52	3.96	3.37	<u>4.63</u>	1.76
1005	128	119	115	101	86	119	46	15966	<u>5.06</u>	4.70	4.52	3.98	3.40	<u>4.69</u>	1.81
S	742sb	-17.8			28	12I51453	-0	83	54						
996	124	114	109	96	81	116	42	15827	<u>4.89</u>	4.48	4.30	3.76	3.18	<u>4.56</u>	1.65
1002	124	114	109	96	81	116	42	15914	<u>4.87</u>	4.49	4.30	3.78	3.20	<u>4.57</u>	1.65
996	124	114	109	96	82	116	43	15831	<u>4.88</u>	4.49	4.31	3.78	3.22	<u>4.57</u>	1.68
998	124	114	109	96	81	116	42	15855	<u>4.87</u>	4.48	4.30	3.78	3.20	<u>4.57</u>	1.66
S	758sb	-17.8			28	11I51455	-0	82	52						
1005	120	110	105	91	76	116	40	15974	<u>4.74</u>	4.32	4.14	3.58	3.01	<u>4.55</u>	1.58
999	119	109	104	91	76	115	40	15882	<u>4.69</u>	4.28	4.10	3.56	2.99	<u>4.51</u>	1.57
1002	119	109	105	90	76	115	40	15919	<u>4.68</u>	4.31	4.12	3.55	3.00	<u>4.54</u>	1.56
1003	119	108	104	90	76	114	40	15938	<u>4.68</u>	4.26	4.09	3.56	2.98	<u>4.49</u>	1.57

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10/22/98

R80 102981022I40JTR 36F20  
7000 08002-057 759500  
150 0 203 305 610 914-3051829 5.9 0.0 8.0 12.0 24.0 36.0 -12.0 72.0  
YNATEST\DATA\ .FWD  
I-10 at chezh hall road outside lane right  
3 152sb -0.0 82 67I51552 -0 82 67  
3 753sb -17.8 27 20I51553 -0 81 67  
1306403827213650 152 759  
1015.0 3.5 6.0 5.015.0 2.0 8.0  
Ld 101 1.009 86.1  
D1 791 1.005 1.041  
D2 792 1.003 1.106  
D3 793 1.001 1.114  
D4 794 1.007 1.078  
D5 795 1.005 1.055  
D6 796 1.005 1.116  
D7 797 1.004 1.010  
D\* 798 1.000 1.000  
D\* 799 1.000 1.000  
D\* NO 1.000 1.000  
Bryon Jones  
0011150010002 1 1  
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RoadNumrRoadway Name  
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13 52 8522 50920  
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JOINTESTSTATIONS

S 759sb -17.8 27 18I51520 -0 80 65  
1013 267 239 225 185 148 247 57 16097 10.49 9.41 8.87 7.28 5.81 9.73 2.24  
990 263 236 222 183 145 245 55 15739 10.35 9.30 8.76 7.19 5.72 9.63 2.15  
1003 266 238 226 184 147 249 56 15943 10.47 9.39 8.89 7.25 5.78 9.78 2.20  
996 265 238 224 184 146 247 56 15819 10.43 9.37 8.83 7.23 5.76 9.74 2.20  
S 743sb -17.8 27 19I51521 -0 81 66  
990 200 184 176 148 122 187 55 15731 7.89 7.26 6.93 5.84 4.79 7.37 2.17  
996 203 187 178 150 123 190 55 15819 7.98 7.35 7.01 5.91 4.84 7.46 2.17  
998 204 187 179 151 124 191 57 15855 8.02 7.38 7.05 5.95 4.89 7.50 2.24  
999 204 189 180 151 124 192 56 15871 8.05 7.42 7.08 5.96 4.88 7.56 2.22  
S 728sb -17.8 27 20I51523 -0 81 68  
991 209 192 184 155 125 187 56 15744 8.22 7.54 7.24 6.10 4.94 7.37 2.20  
999 210 193 185 157 127 189 57 15874 8.29 7.60 7.30 6.19 5.02 7.43 2.22  
994 210 192 184 154 125 189 56 15800 8.26 7.57 7.25 6.07 4.94 7.43 2.22  
998 211 193 185 155 126 190 57 15858 8.30 7.61 7.29 6.09 4.96 7.48 2.24  
S 713sb -17.8 27 20I51525 -0 80 67  
992 260 237 224 189 153 224 68 15760 10.22 9.32 8.81 7.45 6.02 8.83 2.67  
993 260 238 225 191 154 226 69 15771 10.22 9.38 8.87 7.52 6.06 8.92 2.70  
994 260 239 226 191 154 228 69 15792 10.24 9.40 8.90 7.51 6.07 8.98 2.71  
989 259 238 225 190 154 228 69 15707 10.19 9.35 8.86 7.48 6.05 8.96 2.71  
S 697sb -17.8 27 19I51527 -0 81 67  
985 260 239 228 192 156 243 70 15657 10.25 9.39 8.98 7.54 6.15 9.55 2.77  
993 262 241 231 193 159 244 73 15787 10.33 9.48 9.07 7.61 6.24 9.61 2.86

994	263	241	231	193	159	243	73	15803	<u>10.33</u>	9.49	9.09	7.62	6.28	<u>9.57</u>	2.89
996	263	242	232	194	159	244	72	15819	<u>10.37</u>	9.53	9.13	7.64	6.26	<u>9.62</u>	2.81
S	516sb	-17.8			28	18I51530	-0	82	65						
997	215	197	187	156	128	203	58	15684	<u>8.45</u>	7.74	7.37	6.15	5.02	<u>7.99</u>	2.29
997	218	199	189	158	129	206	59	15843	<u>8.58</u>	7.85	7.46	6.23	5.09	<u>8.11</u>	2.31
996	219	200	190	159	130	206	59	15819	<u>8.61</u>	7.86	7.48	6.24	5.10	<u>8.13</u>	2.34
996	220	201	191	160	131	208	60	15819	<u>8.68</u>	7.91	7.52	6.30	5.14	<u>8.19</u>	2.35
S	500sb	-17.8			28	18I51531	-0	82	64						
978	240	216	204	169	137	231	61	15538	<u>9.45</u>	8.49	8.04	6.66	5.39	<u>9.11</u>	2.41
996	244	220	208	172	139	236	62	15819	<u>9.62</u>	8.67	8.20	6.78	5.48	<u>9.28</u>	2.43
1000	246	221	209	173	140	237	62	15895	<u>9.68</u>	8.68	8.22	6.80	5.51	<u>9.33</u>	2.44
996	246	220	208	172	140	236	62	15831	<u>9.67</u>	8.65	8.19	6.79	5.50	<u>9.31</u>	2.45
S	486sb	-17.8			27	18I51533	-0	81	65						
987	188	172	164	139	115	168	52	15688	<u>7.38</u>	6.78	6.47	5.47	4.53	<u>6.63</u>	2.06
997	190	175	166	141	117	171	53	15847	<u>7.48</u>	6.87	6.55	5.54	4.59	<u>6.74</u>	2.07
994	190	174	165	142	115	172	53	15795	<u>7.47</u>	6.83	6.49	5.61	4.54	<u>6.76</u>	2.09
997	191	175	167	141	117	172	52	15847	<u>7.51</u>	6.89	6.56	5.56	4.59	<u>6.78</u>	2.06
S	470sb	-17.8			27	19I51535	-0	81	67						
979	245	222	209	174	141	228	59	15556	<u>9.65</u>	8.75	8.24	6.85	5.56	<u>8.98</u>	2.31
996	249	226	213	176	143	233	60	15819	<u>9.81</u>	8.88	8.39	6.94	5.63	<u>9.16</u>	2.36
996	251	227	215	177	144	234	60	15827	<u>9.89</u>	8.93	8.45	6.99	5.66	<u>9.22</u>	2.36
996	252	228	215	178	144	235	61	15823	<u>9.92</u>	8.96	8.47	7.02	5.68	<u>9.26</u>	2.41
S	198sb	-17.8			27	20I51540	-0	81	69						
1002	190	173	164	136	110	177	47	15927	<u>7.50</u>	6.80	6.45	5.37	4.33	<u>6.96</u>	1.87
998	190	173	164	136	109	177	47	15858	<u>7.46</u>	6.80	6.47	5.34	4.28	<u>6.97</u>	1.85
998	190	172	163	136	109	176	47	15855	<u>7.46</u>	6.76	6.41	5.34	4.28	<u>6.92</u>	1.85
998	189	172	163	135	109	176	47	15855	<u>7.46</u>	6.76	6.43	5.33	4.28	<u>6.93</u>	1.85
S	182sb	-17.8			28	20I51541	-0	83	68						
991	194	175	166	136	109	182	44	15744	<u>7.65</u>	6.89	6.53	5.36	4.28	<u>7.17</u>	1.75
996	196	176	167	137	110	183	45	15823	<u>7.72</u>	6.93	6.56	5.39	4.33	<u>7.21</u>	1.76
999	197	176	167	137	110	183	45	15866	<u>7.74</u>	6.94	6.57	5.41	4.34	<u>7.22</u>	1.78
996	197	177	167	137	109	185	45	15823	<u>7.74</u>	6.97	6.59	5.40	4.30	<u>7.27</u>	1.76
S	167sb	-17.8			29	19I51543	-0	83	66						
980	205	183	173	141	111	194	45	15580	<u>8.06</u>	7.20	6.81	5.55	4.37	<u>7.64</u>	1.78
994	208	186	175	143	112	197	46	15800	<u>8.19</u>	7.31	6.90	5.61	4.42	<u>7.74</u>	1.81
998	209	187	176	143	113	198	46	15863	<u>8.22</u>	7.35	6.94	5.64	4.44	<u>7.78</u>	1.80
998	208	185	176	143	113	197	46	15850	<u>8.19</u>	7.30	6.92	5.63	4.45	<u>7.76</u>	1.80
S	152sb	-17.8			28	20I51552	-0	82	67						
974	189	171	162	133	105	174	44	15474	<u>7.43</u>	6.72	6.39	5.23	4.13	<u>6.84</u>	1.72
992	192	173	164	136	110	176	44	15760	<u>7.56</u>	6.81	6.46	5.34	4.32	<u>6.93</u>	1.75
996	194	174	166	137	110	178	45	15823	<u>7.63</u>	6.87	6.52	5.38	4.35	<u>7.00</u>	1.76
996	194	175	166	137	109	179	45	15827	<u>7.66</u>	6.90	6.55	5.38	4.29	<u>7.04</u>	1.76

EOF



Czech 2 RT, FWD

3/3/99

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80      102990303CZCH2  36F20
000    08002-057      759500
150    0 203 305 610 914-3051829  5.9  0.0  8.0 12.0 24.0 36.0 -12.0 72.0
DYNATEST\DATA\          .FWD
h hall joint check right
152sb   -0.0    76 55I51422  -0  76  55
152sb  -17.8    22 13I51430  -0  72  55
306403827213650      152      759
1015.0 3.5 6.0 5.015.0 2.0 8.0
101 1.009 86.1
791 1.005 1.041
792 1.003 1.106
793 1.001 1.114
794 1.007 1.078
795 1.005 1.055
796 1.005 1.116
797 1.004 1.010
798 1.000 1.000
799 1.000 1.000
* NO      1.000 1.000
Bryon Jones
0011150010002 1 1
0 0.0 0 0.0

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LoadNumrRoadway Name

RoadNumr

000+0.0 000+0.0 St

```

300 0 0 0 0 0 0 0 11.8 0.0 0.0 0.0 0.0 0.0 0.0 0.0
13 52 8811 52398

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g.....
999g.....

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JOINTTESTSTATIONS

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3      759sb -17.8  23 13I51403  -0  74  55
1011 142 128 123 105  87 137  42 16062  5.59  5.04  4.83  4.13  3.41  5.38  1.67
998 141 126 121 103  85 135  42 15855  5.54  4.97  4.76  4.06  3.36  5.30  1.64
997 140 125 120 103  85 134  42 15847  5.53  4.94  4.74  4.07  3.35  5.28  1.64
998 140 126 121 103  85 134  42 15855  5.53  4.98  4.76  4.05  3.34  5.30  1.64
744sb -17.8  25 13I51405  -0  78  55
995 139 127 122 105  88 129  46 15811  5.45  5.01  4.78  4.12  3.46  5.07  1.81
1001 139 127 122 105  88 129  46 15903  5.49  5.01  4.81  4.13  3.46  5.09  1.80
994 139 127 122 104  87 129  46 15795  5.46  5.01  4.81  4.09  3.43  5.07  1.81
1004 139 128 122 105  88 129  46 15959  5.48  5.03  4.81  4.14  3.47  5.09  1.82
728sb -17.8  26 11I51406  -0  79  51
997 110 101  97  83  70 102  39 15843  4.33  3.97  3.81  3.28  2.76  4.03  1.52
1004 109 101  97  84  71 102  38 15954  4.31  3.96  3.81  3.29  2.79  4.03  1.52
993 108 100  96  83  71 101  39 15784  4.26  3.93  3.77  3.28  2.79  3.99  1.52
999 109 100  96  83  70 102  39 15879  4.30  3.96  3.80  3.26  2.76  4.01  1.52
713sb -17.8  26 10I51408  -0  78  50
991 118 109 105  92  78 110  44 15752  4.65  4.30  4.13  3.62  3.08  4.35  1.74
993 119 110 105  92  79 111  44 15930  4.68  4.32  4.15  3.64  3.10  4.38  1.74
118 109 105  92  78 110  44 15792  4.64  4.30  4.13  3.61  3.08  4.35  1.74
997 118 109 105  92  78 111  44 15847  4.65  4.30  4.14  3.63  3.09  4.35  1.74
697sb -17.8  26 11I51409  -0  79  52
1002 130 119 115 100  85 121  48 15919  5.11  4.70  4.52  3.93  3.35  4.75  1.90
989 129 118 114  99  85 121  48 15720  5.07  4.65  4.47  3.91  3.34  4.76  1.89

```

	115	100	85	122	49	15895	5.11	4.69	4.51	3.93	3.35	4.78	1.91
	115	100	85	121	48	15863	5.10	4.69	4.52	3.94	3.35	4.78	1.90
sb	-17.8		25	11I51411		-0	76	53					
	128	123	106	89	128	46	15895	5.54	5.05	4.83	4.17	3.51	5.03
	10	127	122	105	88	127	46	15839	5.50	5.00	4.80	4.15	3.48
996	140	128	122	106	89	127	46	15831	5.52	5.02	4.82	4.16	3.49
1001	140	128	123	106	89	127	46	15906	5.52	5.03	4.82	4.17	3.50
S	500sb	-17.8		24	11I51412		-0	76	52				
1004	132	119	114	98	83	124	44	15950	5.18	4.68	4.49	3.85	3.26
995	130	118	113	97	82	122	43	15807	5.13	4.64	4.45	3.82	3.23
1000	131	118	114	98	83	123	44	15890	5.16	4.66	4.47	3.84	3.26
1002	131	118	114	98	83	123	44	15927	5.15	4.67	4.47	3.85	3.26
S	484sb	-17.8		25	12I51414		-0	78	53				
990	113	103	98	84	70	98	37	15723	4.44	4.06	3.86	3.31	2.77
998	114	104	99	85	71	98	37	15863	4.48	4.08	3.88	3.34	2.80
999	114	104	99	85	71	99	37	15879	4.50	4.08	3.89	3.35	2.80
998	114	103	99	85	71	98	37	15863	4.47	4.07	3.88	3.33	2.78
S	469sb	-17.8		16	11I51415		-0	62	53				
995	119	108	103	89	76	108	41	15816	4.67	4.25	4.05	3.49	2.98
1005	118	107	102	88	74	108	40	15974	4.66	4.22	4.04	3.48	2.93
999	117	107	102	88	74	108	41	15882	4.61	4.20	4.01	3.46	2.93
1003	118	106	102	88	72	108	39	15935	4.64	4.19	4.00	3.45	2.84
S	198sb	-17.8		24	13I51417		-0	75	56				
999	107	95	91	79	67	98	36	15871	4.19	3.76	3.60	3.11	2.65
999	106	95	91	79	67	97	36	15871	4.17	3.75	3.59	3.11	2.65
999	106	95	91	79	67	97	36	15874	4.17	3.74	3.59	3.11	2.65
1001	106	95	91	79	67	97	36	15903	4.18	3.76	3.59	3.11	2.63
S	182sb	-17.8		25	13I51418		-0	76	56				
1007	106	95	90	77	64	101	34	16006	4.17	3.75	3.56	3.02	2.52
997	104	94	89	76	63	99	33	15839	4.11	3.69	3.50	2.98	2.48
1002	105	95	89	77	64	101	33	15914	4.14	3.74	3.51	3.02	2.52
996	104	94	89	76	64	101	34	15831	4.11	3.72	3.48	2.99	2.51
S	168sb	-17.8		25	13I51419		-0	76	56				
998	108	96	91	77	64	101	33	15858	4.24	3.77	3.58	3.04	2.52
994	107	95	90	77	64	100	33	15803	4.22	3.75	3.56	3.03	2.52
999	108	96	91	77	64	101	33	15874	4.25	3.76	3.58	3.02	2.51
1004	108	95	91	77	64	101	33	15959	4.26	3.76	3.58	3.02	2.52
S	152sb	-17.8		24	13I51422		-0	76	55				
1019	101	92	88	77	65	92	35	16184	3.96	3.62	3.46	3.02	2.56
995	98	90	86	75	64	90	35	15807	3.87	3.53	3.38	2.95	2.51
1001	98	90	86	75	64	90	35	15903	3.88	3.54	3.37	2.96	2.52
999	98	90	86	75	64	90	35	15874	3.88	3.54	3.38	2.95	2.51

EOF