# *Evaluating the Effectiveness of Pavement Smoothness Specifications*

by

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**July 1995**

**Acknowledgment**

This report has been prepared with funds provided by the United States Department of Transportation to the Mountain-Plains Consortium (MPC). The MPC member universities include North Dakota State University, Colorado State University, University of Wyoming, and Utah State University.

## Preface

This report describes a study jointly conducted by the University of Wyoming and the Wyoming Department of Transportation to examine if the initial roughness of a pavement section has any effects on its long-term performance. State Highway Agencies throughout the United States use smoothness specifications to insure they are providing the public with quality roads. Some State Highway Agencies go so far as to provide monetary incentives to contractors for building smoother roads. Very little work has been done to determine the effectiveness of such incentive policies. Statistical and graphical analysis were performed on asphalt and concrete test sections in Wyoming. The findings of this study indicate that the initial roughness of concrete pavements based on the Profilograph Index do not correlate with the long-term performance of these pavements. However, initial roughness measurements based on the International Roughness Index do correlate with future roughness measurements.

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# CHAPTER 1

# INTRODUCTION

by

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## BACKGROUND

It has long been known that pavement roughness highly influences the users' perception of ride quality. A pavement section that has a high level of roughness causes users discomfort and more wear and tear on vehicles. Therefore, State Highway Agencies (SHAs) have been trying to minimize pavement roughness through construction smoothness specifications and maintenance.

Over the years, pavement roughness measuring devices improved with new technological discoveries. The earliest form of roughness measuring devices was a straightedge which was used to measure pavement variations. Other devices were later developed, including rolling straightedges, profilographs, response-type road-roughness-measuring systems, and profilometers. Each new device incorporated some improvements over the earlier measuring devices. Such improvements included speed of operation, accuracy, repeatability, or a combination of these factors.

Although all roughness measuring devices can be used to determine the roughness of both new and old pavements, profilographs are currently the most widely used devices to accept new pavements. Profilographs measure the profile of a pavement section and give a Profilograph Index (PI). Most SHAs have implemented smoothness specifications based on the PI to insure good ride quality. The course of action for pavements that do not meet the required smoothness levels depends upon the SHA and its policies. Some SHAs require contractors to perform corrective work on rough sections. Other SHAs assess penalties (disincentive) to rough pavement sections. In addition, some SHAs pay incentives for those sections that are "significantly" smoother than certain limits.

## PROBLEM STATEMENT AND OBJECTIVE

A good number of SHAs have set a minimum acceptance level for pavement smoothness. In addition, many SHAs have incentive/disincentive policies encouraging contractors to build smoother pavements. Most incentive/disincentive policies were developed without in-depth studies to determine their effectiveness, which caused major differences in specifications followed by different SHAs. The main objective of this research was to determine the effect of initial pavement roughness on long-term pavement performance. Such determinations will help in evaluating the effectiveness of current pavement smoothness specifications. To accomplish the above objective, several pavement test sections were selected for inclusion in the study, extensive data were collected and analyzed, and then conclusions were drawn.

## REPORT ORGANIZATION

This research project was performed in two phases. The first phase concentrated on collecting information related to smoothness specifications. A comprehensive literature search was initially performed and a survey was later prepared and sent out to all SHAs. Chapter 2 summarizes the findings of the literature review. Chapter 3 outlines the design of experiment for the research project. The data from the nationwide survey and its analysis can be found in Chapter 4.

The second phase of this research project dealt with evaluating the effect of initial roughness on the long-term performance of pavements. In addition, this phase examined the effectiveness of pavement smoothness specifications. These findings are presented in Chapter 5. Finally, a summary of the entire research, conclusions, and recommendations for future research are presented in Chapter 6.

# CHAPTER 2

## LITERATURE REVIEW

Road roughness is an important factor in evaluating the condition of a pavement section because of its effects on ride quality and vehicle operating costs. In its broadest sense, road roughness has been defined as "the deviations of a surface from a true planar surface with characteristic dimensions that affect vehicle dynamics, ride quality, dynamics loads, and drainage" (Sayers, 1985). Despite this broad description, the practice today is to limit the measurement of roughness qualities to those related to the longitudinal profile of the road surface which cause vibrations in road-using vehicles. Road roughness can also be defined as "the distortion of the road surface that imparts undesirable vertical accelerations and forces to the vehicle or to the riders and thus contributes to an undesirable, uneconomical, unsafe, or uncomfortable ride" (Hudson).

In general, road roughness can be caused by any of the following factors (Yoder and Hampton):

a. Construction techniques which allow some variation from the design profile.

b. Repeated loads, particularly in channelized areas, that can cause pavement distortion by plastic deformation in one or more of the pavement components.

c. Frost heave and volume changes due to shrinkage and swell of the subgrade.

d. Non-uniform initial compaction.

In the last three decades, several studies pointed out the major penalties of roughness to the user. In 1960, Carey and Irick (1960) showed that the driver's opinion of the quality of serviceability provided by a pavement surface is primarily influenced by roughness. Between 1971 and 1982, the World Bank supported several research activities in Brazil, Kenya, the Caribbean, and India. The main purpose of these studies was to investigate the relationship between road roughness and user costs. In 1980, Rizenbergs (1980) pointed to the following penalties associated with roughness: rider non-acceptance and discomfort, less safety, increased energy consumption, road-tire loading and damage, and vehicle deterioration. Gillespie et al. (1981) examined the relationship between road roughness and vehicle ride to illustrate the mechanisms involved and to reveal those aspects of road roughness that play the major role in determining the public's perception of road serviceability. It has been widely suspected that the initial roughness of a pavement section will affect its long-term performance. Recently, a study conducted by Janoff (1990) suggested that initial pavement roughness measurements are highly correlated with roughness measurements made 8-10 years after construction. This study was limited to a small number of pavement sections in two states.

Due to the importance of pavement roughness, most State Highway Agencies have established smoothness specifications for new pavement construction. Smoothness specifications are normally written for the use of profilographs. About half of the states require that a specific limit of smoothness be met, whereas the remainder of the states are using a variable scale with pay adjustments, depending on the degree of the smoothness achieved (Woodstrom). These pay adjustment factors are made based on the assumption that lower initial pavement roughness will result in better pavement performance.

## PAVEMENT ROUGHNESS MEASURING DEVICES

The devices used to measure pavement roughness in the United States are generally divided into two types. Type 1 measures a vehicle's response to roughness, while type 2 measures the road profile (Pong and Wambold). In the sections below we discuss some of the devices that are in use today.

### Straightedge

The straightedge is the simplest of the measuring devices. It is normally used as a supplement to a more sophisticated method. The straightedge is usually 8 to 16 feet long and is made of wood or metal. It is placed on a pavement surface and the distance between the bottom of the straightedge and the pavement surface is measured. Tolerances in the form of specifications limits can then be used to interpret pavement smoothness. Using the straightedge is labor intensive and is usually limited to localized areas. Although the straightedge is a useful tool, accuracy diminishes as the wavelength of the bump increases beyond one-half the length of the straightedge (Woodstrom).

### Rolling Straightedge

A rolling straightedge is merely a straightedge with wheels. A wheel located at its midpoint is linked to an indicator that shows deviations from the plane of the rolling straightedge. Rolling straightedges are impractical for use on large projects because of their slow speed of operation and their inability to provide adequate definition of pavement roughness (Woodstrom).

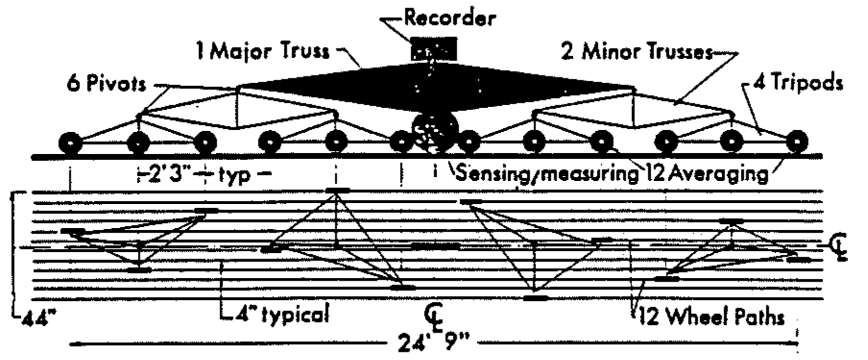
### Profilographs

A profilograph consists of a rigid beam or frame with a system of support wheels that establish a datum from which deviations can be evaluated. A profile wheel is located at the midpoint of the unit which creates a profile by recording vertical variations from the datum on a strip chart recorder. This analog trace usually has a true vertical scale and a horizontal scale of 1 inch = 25 feet. A blanking band is then used on the analog trace to "blank" out minor aberrations and provide a measurement called the Profilograph Index (PI).

Profilographs have a few definite advantages over other roughness measuring devices. They can be used on pavement surfaces a few hours after placement. They are also easily understood by field personnel and the strip chart provides the precise location of surface irregularities. The main disadvantages of this device are its slow operating speed (approximately 3 mph) and the time required to evaluate the charts and calculate the PI. In addition, certain cyclic features associated with some aspects of construction can be hidden by the blanking band. These features can have an adverse effect on the natural harmonics of some vehicles and set up a roller coaster effect in the vehicle (Asnani et al.).

Although numerous models of profilographs have been used since 1900, two models have evolved and are in wide use today. These are the Rainhart and the California-type profilographs. Figure 2.1 shows schematic diagrams of both profilograph types. The Rainhart profilograph was developed in 1967 by the Rainhart Company and the Texas Highway Department. Their studies yielded a device that was 24.75 feet long and was supported by twelve wheels. The twelve wheels are arranged in groups of three. Each wheel has its own longitudinal path which is spaced four inches from any other wheel's path. The California-type profilograph, which was developed in the 1940's, has changed several times over the years. The last change occurred in 1983 when a simplified wheel system was introduced. The current device is twenty five feet long and is supported by single axles, with only two wheels per axle, at both ends (Woodstrom).

In recent years the California-type profilograph has become the dominant profilograph used. The Rainhart is being phased out with only a handful of SHAs indicating the device's use for pavement acceptance. Some California-type profilographs are now computerized and do not require manual reduction of data. The software provides several filter settings so the profilograph can be used under different acceptance specifications. The PI results from these computerized profilographs are generally more repeatable than those PI values calculated through manual interpretation. The PI values from these computerized profilographs are also instantly attainable. The manual interpretations take much longer to compute and are subject to an individuals interpretation. However, the correct filter setting for the type of pavement being evaluated must be used in order to get an accurate PI rating (Bertrand).



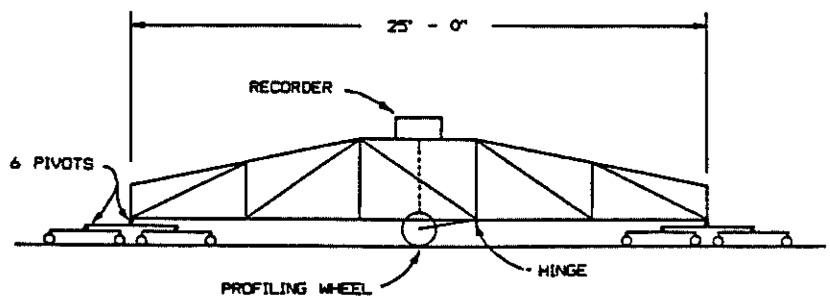




**Figure 2.1 The Rainhart Profilograph (top) and the California-type Profilograph (bottom).**

### Response-Type Road-Roughness-Measuring Systems(RTRRMS)

RTRRMS evaluate road roughness by measuring the dynamic response of a mechanical device traveling over a pavement surface at a given speed. Both automobiles and standardized trailers may be used with measurements taken of the vertical movements of the rear axles with respect to the vehicle frame (Woodstrom).

The main advantage of RTRRMS is the high operating speed (usually 50 mph). They also give accurate and reproducible data if the device is properly calibrated and maintained. However, the use of RTRRMS has declined over the last few years due to the following limitations (Woodstrom):

1. Speed of travel affects measurements.
2. Must frequently be calibrated.
3. The vehicle in which RTRRMS are installed contribute to many sources of potential variation, including rear suspension damping, tire non-uniformity, vehicle weight changes, and windage effects.
4. Comparability of data among different users is difficult.

Several response type devices were developed over the years, including the Mays Ride Meter, Bureau of Public Roads (BPR) Roughmeter, and the Portland Cement Association (PCA) Roadmeter.

### Profilometers

The underlying purpose in the development of profilometers was the need for a high-speed profiling system that would yield a "true" portrayal of pavement surface characteristics. This led to the development of the inertial profilometer in the early 1960's. The range and resolution of these systems are limited to a minor degree. However, within the wavelength and amplitude limitations of the system, a profile measurement may be called "absolute" because it does not require comparisons to any other systems. Modern profilometers require four basic subsystems, which are (Woodstrom):

1. Accelerometers for determination of the height of the vehicle to an inertial reference frame (the vehicle or trailer).

2. Height sensors for measurements of the instantaneous riding height of the vehicle relative to a location on the road below the sensor.

3. Distance or speed sensor for measurement of the position of the vehicle along the length of the road (odometer).

4. Computer hardware and software for computation of road profiles from the above sensor inputs.

Inertial systems are rarely used as an evaluation tool for new construction because of their high cost but are used extensively for Pavement Management Systems. They are able to duplicate roughness measurement output of several RTRRMS roughness indices, including IRI, Mays Meter, BPR Roughmeter, PCA Meter, and others. The main types of profilometers are the South Dakota Road Profilometer, GM Profilometer, K. J. Law 690 DNC, Automatic Road Analyzer (ARAN), Portable Universal Roughness Device (PURD), Swedish Laser Road Tester, Law Model 8300A Pavement Roughness Surveyor, PRORUT-FHWA System, Dynatest 5000 Roughness and Distress Meter (RDM), and the French Longitudinal Profile Analyzer (APL). Only the most widely used profilometers will be described in the following sections.

The South Dakota Road Profiler was developed in the early 1980's by the South Dakota Department of Transportation. This system is designed to collect profile and rut-depth data at highway speeds. It provides more reliable and accurate data than roughness meters. Measurements are taken using ultrasonic sensors located in the front bumper which sends the data to an onboard computer (Asnani et al.).

The GM profilometer was developed in the 1960's by the GM Corporation Research Laboratories. It uses two spring-loaded, road following wheels and linear potentiometers to measure relative displacements between the vehicle frame and the road surface. It travels at speeds up to 60 mph (NCHRP #275).

The first profilometer built by K. J. Law Engineers, Inc. was manufactured for the Texas Highway Department in 1966. New technology has led to the current K. J. Law 690 DNC (digital non-contact). It uses accelerometers placed on the body of the vehicle to measure and compute the longitudinal profile on the pavement. A non-contact light beam measuring system mounted with the accelerometers measures the relative displacement between the accelerometers and the pavement surface. The pavement profile is then computed for each wheel path as a function of the distance traveled (Woodstrom).

## ROUGHNESS INDICES

The measurement of pavement roughness is accomplished by using several different indices and devices. Some of these indices are the Profilograph Index (PI), International Roughness Index (IRI), root-mean-square vertical acceleration (RMSVA), quarter-car index (QI), average rectified velocity (ARV), and average rectified slope (ARS) (Carey and Irick). These indices require different algorithms to rate pavement roughness. Only the indices used in this research project will be discussed in the following sections.

### Profilograph Index (PI)

Most SHAs use the Profilograph Index to determine if the smoothness of a pavement section is acceptable. The Profilograph Index is calculated from the strip chart output of the profilograph based on a blanking band. This blanking band is usually 0.2 inches for the California-type profilograph and 0.1 inch for the Rainhart profilograph. The blanking band allows a tolerance for minor irregularities and the effect of surface texture of the pavement. However, any roughness features that range beyond the blanking band affect the pavement sections PI. Figure 2.2 shows a sample strip chart from a profilograph (Woodstrom).

A pavement with a high PI requires corrective work by the contractor. This corrective work is accomplished by grinding or milling the problem areas.

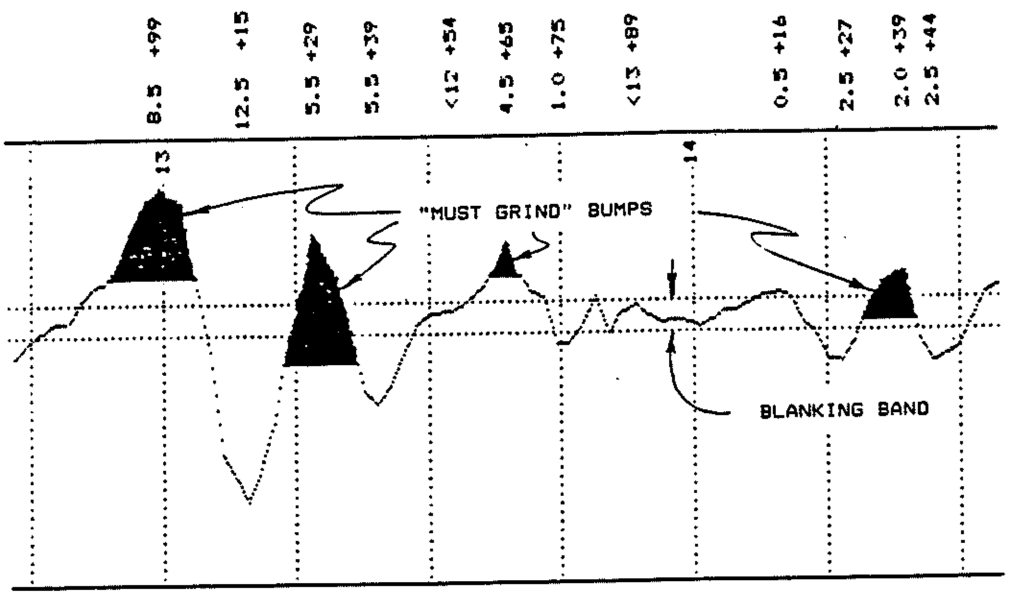



**Figure 2.2** **Sample Strip Chart from a Profilograph.**

## International Roughness Index (IRI)

The International Road Roughness Experiment (IRRE) occurred in Brazil in 1982 and was funded by the World Bank. Forty-nine test sites which included surfaces of asphaltic concrete, double-surface treatment, gravel, and earth roads were selected for testing (Sayers 1985). The experimenters developed the International Roughness Index (IRI) in order to compare the roughness data collected using different devices (Sayers et al.). The IRI is used to rate severity of roughness experienced by a vehicle traveling on the road and is normally reported in metric units of millimeters/meter or meters/kilometer (Sayers 1990). The computation of IRI is often done by simulating the response of a generic vehicle with standard mass, spring constants, and damping constraints. This numerical procedure is simplified by using only one corner of the vehicle in the computations, leading to the term "quarter-car simulation" (U.S. Department of Transportation). Figure 2.3 shows a quarter-car model for the computation of IRI. IRI is the only existing roughness index that has been demonstrated to be reproducible with a wide variety of equipment, which includes RTRRMS, rod and level, single- and two track profiling systems (Yoder and Witczak).

The use of IRI in the United States has grown rapidly because the Federal Highway Administration (FHWA) requires that all SHAs report pavement roughness measurements in these units. Also, most SHAs have working Pavement Management Systems (PMS) in place. These PMS utilize IRI measurements in prioritizing maintenance, rehabilitation, and reconstruction of pavement projects.

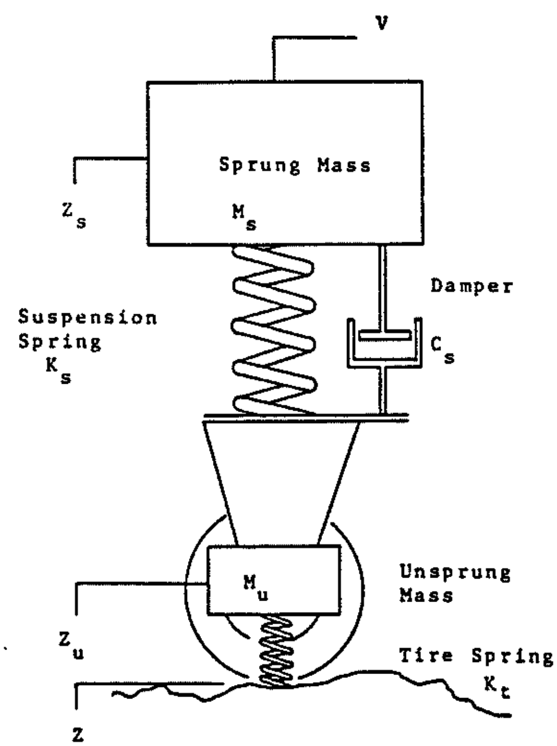



**Figure 2.3 Quarter Car Model for Computation of IRI.**

## PAVEMENT DISTRESSES

Pavement condition can be assessed by observing and measuring surface distresses. There are many types of distresses and each one reduces the serviceability of the pavement section to some degree. The Pavement Condition Index (PCI) is normally used to reflect the distress level in a pavement structure (Yoder and Witczak).

### Pavement Condition Index (PCI)

The Pavement Condition Index (PCI) measures the pavement's surface operational condition and structural integrity on a scale of 0 to 100. The main types of distresses in concrete pavements are faulting, linear cracking, corner breaks, patching, joint seal damage, and pumping. The main types of distresses in asphalt pavements are alligator cracking, reflection cracking, patching, potholes, rutting, and weathering and raveling. There are also other forms of distress that do not occur as frequently.

A survey form is normally used to evaluate individual sample sections. Sample survey forms for concrete and asphalt pavements can be found in Figures 2.4 and 2.5, respectively. After the survey forms are completed, the PCI can be calculated for the pavement sections. Figure 2.6 shows the PCI scale and condition rating.

## PAVEMENT SMOOTHNESS SPECIFICATIONS

It has long been believed that the roughness of a pavement section is dependent on its initial roughness, age, and other factors. In addition, a section that has a low initial roughness will last longer, require less maintenance, and remain smoother than a section that has a high initial roughness. Therefore, many SHAs have implemented pavement smoothness policies. These policies were developed to encourage the construction of smooth pavements. In some states, contractors may receive incentive payments if the initial PI is less than a preset limit. Contractors may also incur disincentives if the PI is

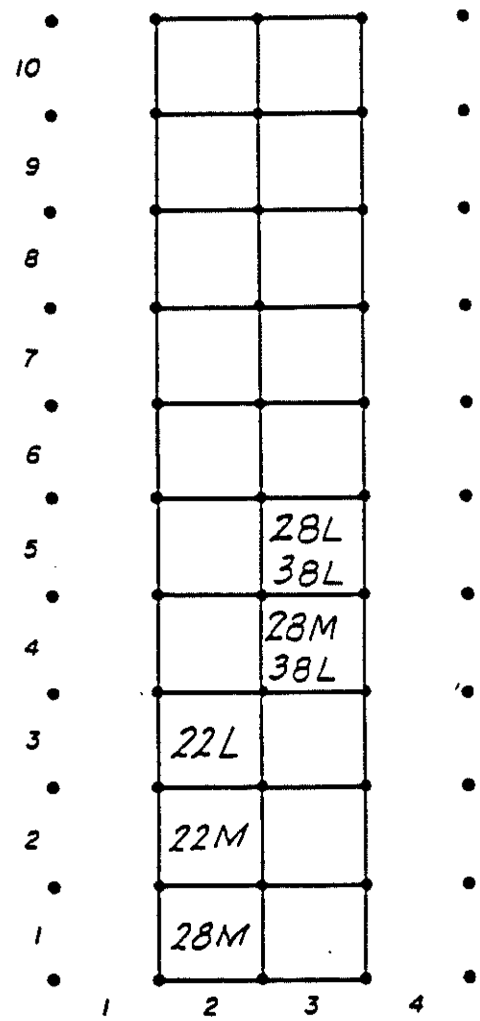
# FORM A

## CONCRETE PAVEMENT INSPECTION SHEET

BRANCH *MARSHALL AVE.* SECTION *1*

DATE *10/3/79* SAMPLE UNIT *1*

SURVEYED BY *SK* SLAB SIZE *15 x 20*




**Distress Types**

21. Blow-Up Buckling/Shattering
22. Corner Break
23. Divided Slab
24. Durability ("D") Cracking
25. Faulting
26. Joint Seal Damage
27. Lane/Shldr Drop Off
28. Linear Cracking
29. Patching, Large & Util Cuts
30. Patching, Small
31. Polished Aggregate
32. Popouts
33. Pumping
34. Punchout
35. Railroad Crossing
36. Scaling/Map Cracking/Crazing
37. Shrinkage Cracks
38. Spalling, Corner
39. Spalling, U Joint

| DIST. TYPE | SEV. | NO.** SLABS | % SLABS | DEDUCT VALUE |
|---|---|---|---|---|
| 26* | M | | | 4 |
| 22 | L | 1 | 5 | 4 |
| 22 | M | 1 | 5 | 8 |
| 28 | L | 1 | 5 | 3 |
| 28 | M | 2 | 10 | 9 |
| 38 | L | 2 | 10 | 1 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| DEDUCT TOTAL q = 2 | | | | 29 |
| CORRECTED DEDUCT VALUE (CDV) | | | | 24 |

PCI = 100 - CDV = 76

RATING = VERY GOOD

* All Distresses Are Counted On A Slab-By-Slab Basis Except Distress 26, Which Is Rated For the Entire Sample Unit.

** Total Number of Slabs Containing Each Distress of Same Severity

Figure 2.4 PCI Rating Form for Concrete Pavements (Shahin and Kohn).

FORM B

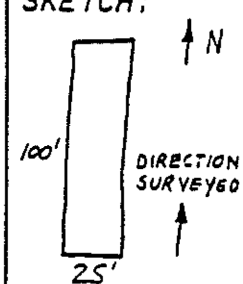
ASPHALT PAVEMENT INSPECTION SHEET

BRANCH MOTORPOOL RD. SECTION 1
DATE 10/2/79 SAMPLE UNIT 1
SURVEYED BY SK AREA OF SAMPLE 2500

**Distress Types**

1. Alligator Cracking
2. Bleeding
3. Block Cracking
*4. Bumps and Sags
5. Corrugation
6. Depression
*7. Edge Cracking
*8. Jt Reflection Cracking
*9. Lane/Shldr Drop Off
*10. Long & Trans Cracking
11. Patching & Util Cut Patching
12. Polished Aggregate
*13. Potholes
14. Railroad Crossing
15. Rutting
16. Shoving
17. Slippage Cracking
18. Swell
19. Weathering and Raveling

SKETCH:




EXISTING DISTRESS TYPES

| | (10) | (11) | (15) | (6) | | |
|---|---|---|---|---|---|---|
| | 10L | 1x6L | 2x25L | 6x4L | | |
| | 5L | 2x8M | | | | |
| | 15L | | | | | |
| | 5M | | | | | |
| | 10L | | | | | |
| | 5M | | | | | |
| TOTAL SEVERITY L | 40 | 6 | 50 | 24 | | |
| TOTAL SEVERITY M | 10 | 16 | | | | |
| TOTAL SEVERITY H | | | | | | |

PCI CALCULATION

| DISTRESS TYPE | DENSITY | SEVERITY | DEDUCT VALUE |
|---|---|---|---|
| 1 | 0.24 | L | 4 |
| 1 | 0.64 | M | 17 |
| 6 | 0.96 | L | 4 |
| 10 | 1.60 | L | 4 |
| 10 | 0.4 | M | 3 |
| 15 | 2.0 | L | 13 |
| | | | |
| DEDUCT TOTAL | q = 2 | | 45 |
| CORRECTED DEDUCT VALUE (CDV) | | | 33 |

PCI = 100 - CDV = 67

RATING = GOOD

* All Distresses Are Measured In Square Feet Except Distresses 4,7,8,9 and 10 Which Are Measured In Linear Ft; Distress 13 Is Measured In Number of Potholes.

**Figure 2.5 PCI Rating Form for Asphalt Pavements (Shahin and Kohn).**

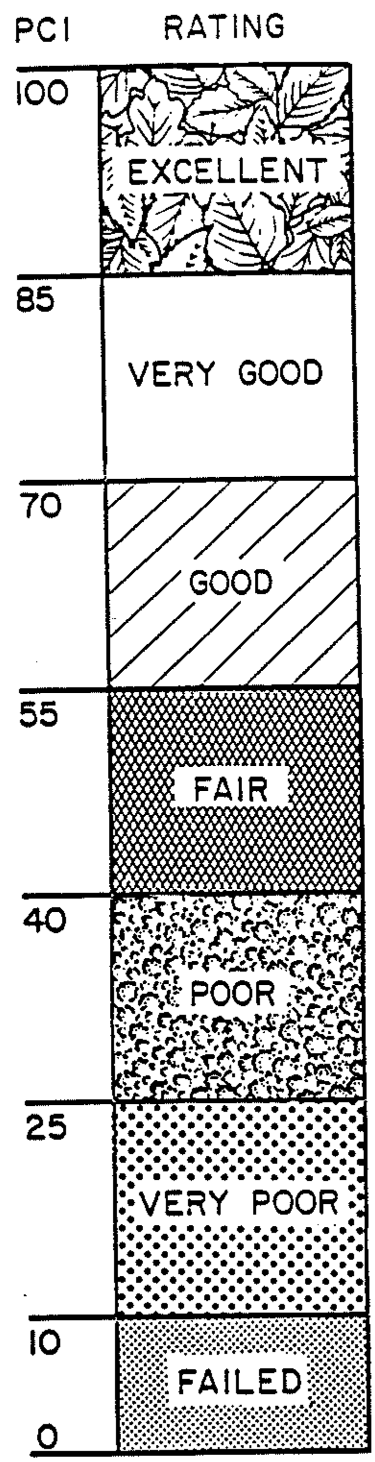



**Figure 2.6 PCI Scale and Condition Rating (Shahin and Kohn).**

above a certain level. Corrective grinding or milling is sometimes required on extremely rough sections of pavements.

## AASHTO Smoothness Specifications

AASHTO has three methods for smoothness specifications. Method 1 uses a 10-foot straightedge and is the simplest of the acceptance procedures. Methods 2 and 3 specify using a California-type profilograph. Tables 2.1 and 2.2 show the recommended payment plan for methods 2 and 3, respectively (AASHTO).

**Table 2.1 Method 2 of the AASHTO Smoothness Specifications.**

| Profilograph Index Inches per Mile | Price Adjustment % of Pavement Unit Bid Price |
|---|---|
| PI < 7 | 100 |
| 7 < PI < 8 | 98 |
| 8 < PI < 9 | 96 |
| 9 < PI < 10 | 94 |
| 10 < PI < 11 | 92 |
| 11 < PI < 12 | 90 |
| PI > 12 | Corrective work required |

**Table 2.2 Method 3 of the AASHTO Smoothness Specifications.**

| Profilograph Index Inches per Mile | Price Adjustment % of Pavement Unit Bid Price |
|---|---|
| PI < 3 | 105 |
| 3 < PI < 4 | 104 |
| 4 < PI < 5 | 102 |
| 5 < PI < 7 | 100 |
| 7 < PI < 8 | 98 |
| 8 < PI < 9 | 96 |
| 9 < PI < 10 | 94 |
| 10 < PI < 11 | 92 |
| 11 < PI < 12 | 90 |
| PI > 12 | Corrective work required |

## Wyoming DOT Smoothness Specifications

In the last few years, several SHAs have shown interest in developing construction incentive/disincentive polices. The Federal Highway Administration has encouraged more states to implement such polices. Table 2.3 summarizes the Wyoming DOT construction incentive policy for concrete pavements. For asphalt pavements, the Wyoming DOT uses a 10-foot straightedge with a tolerance of 3/16 of an inch.

**Table 2.3 The Wyoming DOT Smoothness Specification Policy for Concrete Pavements.**

| Daily Average Profile Index | Percentage of Unit Price for Incentive Payment |
|---|---|
| 2.0 or less | 5.0 |
| 2.0 to 2.9 | 4.0 |
| 3.0 to 3.9 | 3.0 |
| 4.0 to 4.9 | 2.0 |
| 5.0 to 5.9 | 1.0 |
| 6.0 to 7.0 | 0.0 |
| Greater than 7.0 | Corrective grinding required |

There are a couple of important differences between the AASHTO and the Wyoming DOT specifications. The main difference is that the Wyoming DOT specification pays only incentives while requiring corrective work for sections with a PI greater than 7. Method 2 of the AASHTO specifications has only disincentives while method 3 offers both incentives and disincentives. The second difference is that the Wyoming DOT specification requires a PI of less than 2 for a 5 percent bonus while the AASHTO method 3 only requires a PI less than 3.

## CHAPTER SUMMARY

This chapter described in detail the instruments developed over the years to measure pavement roughness. It also described several roughness indices that are currently in use. Finally, the AASHTO and Wyoming DOT construction smoothness specifications were summarized.

# CHAPTER 3

# DESIGN OF EXPERIMENT

Figure 3.1 shows the overall data collection and analysis strategies followed in this research. In addition to performing a literature search, a nationwide survey was prepared and sent to all SHAs to collect the most up to date data possible. Next, two comprehensive databases were prepared, one for concrete and another for asphalt test sections. Only interstate sections in the state of Wyoming were included in this experiment.

For the concrete portion, a search in the Wyoming DOT files yielded eight projects with sufficient information for analysis. Next, data for each of these projects was collected, which included construction records, initial profilograph measurements, IRI, and PCI values. These data were compiled in a computerized database. Graphical and statistical analysis were performed and conclusions were drawn pertaining to concrete pavements. A similar approach was followed in the asphalt portion of this research project. A search yielded twenty-seven projects with adequate information for analysis. Pavement roughness data were collected on all of these projects. All data were compiled in a computerized database. Again, graphical and statistical analysis were performed and conclusions were drawn pertaining to the asphalt pavements.

## SELECTION OF TEST SECTIONS

In order to study the effect of initial smoothness on the long-term roughness of concrete pavements, all concrete sections built since 1986 in the state of Wyoming were identified for inclusion in the experiment. Older sections were not included simply because the Wyoming DOT does not keep pavement construction records for more than six years. These records are essential for obtaining profilograph measurements. This search resulted in eight relatively large concrete projects with all the necessary information to conduct a meaningful analysis.

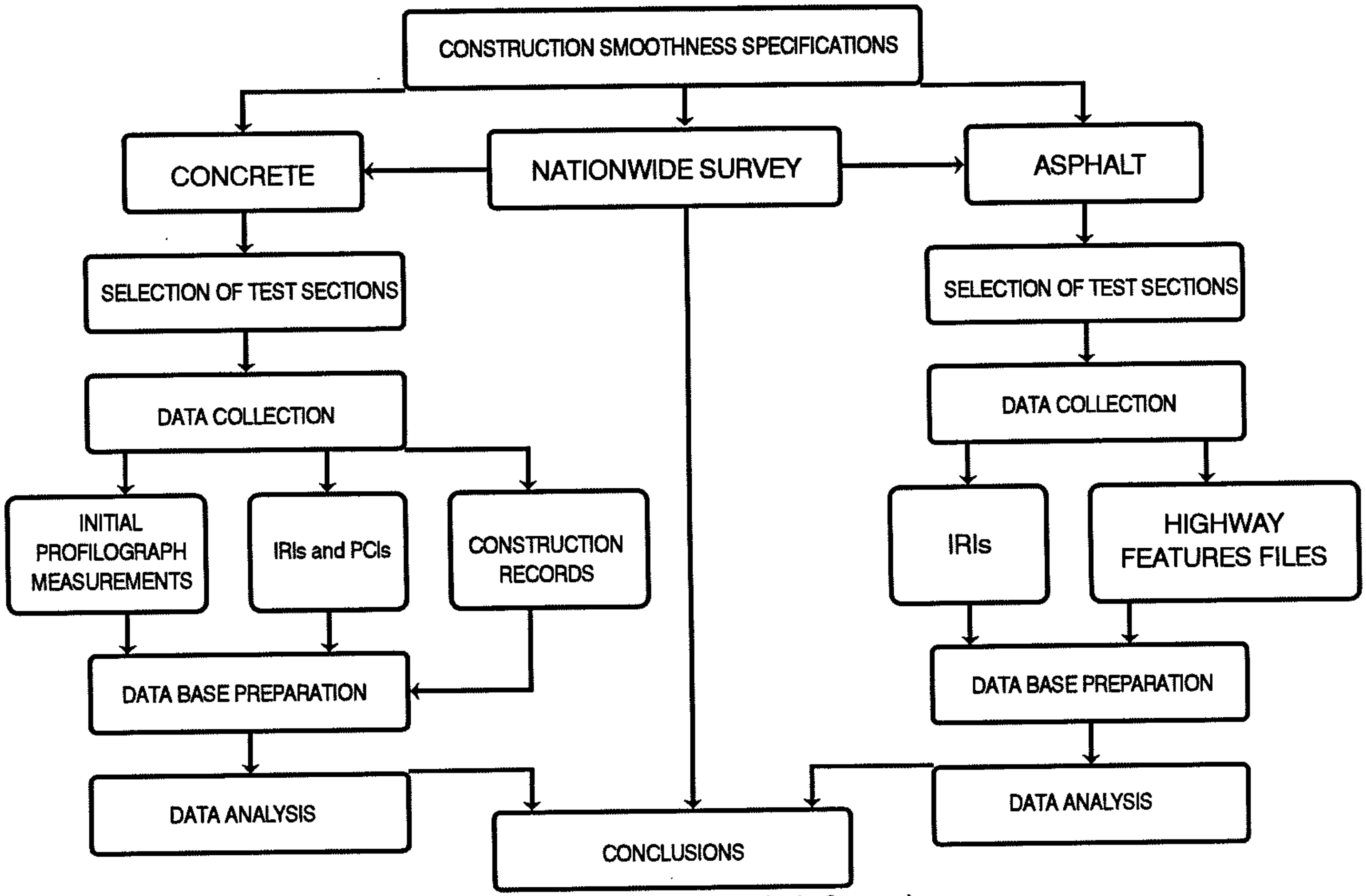



Figure 3.1 Data Collection and Analysis Strategies

For the evaluation of asphalt pavements, test sections were selected from projects that were rehabilitated between 1988 and 1992. Pavement sections built prior to 1988 were not included in the experiment because the Wyoming DOT did not collect appropriate roughness data prior to that date.

## DATA COLLECTION AND DATABASE PREPARATION

All data utilized in this research project were extracted from the Wyoming Department of Transportation's data files and records. The collected data were then summarized in a comprehensive and computerized database for analysis.

### Concrete Pavements

The first step in the data collection process was to examine the Wyoming Pavement Management System (PMS) to identify all concrete projects built in recent years. After projects were selected, most of the information needed for this research was found in the Wyoming DOT construction records. This information included the following on each concrete project: contract(proposal), profilograph reports, as-built drawings, completion reports, and maps of the project with corresponding stations and mileposts.

Each project was later broken down into test sections based on profilograph measurements obtained immediately after construction. It should be mentioned here that each test section included the length of highway poured in one day. The eight projects resulted in 175 test sections with variable PI values. Table 3.1 shows the location of each project and the number of test sections generated. The beginning and ending mileposts were later determined for each test section based on the station numbers used during construction. The completion reports were mainly used to determine the date each project was opened to traffic while the as-built drawings revealed the approximate thickness of the concrete layer.

**Table 3.1 General Information on Concrete Sections Included in the Experiment.**

| Road | Milepost | | ADT[1] | Truck Traffic per Day[1] | ESALs per Day[1] | Date Opened To Traffic | Pavement Thickness | Number of Test Sections |
|---|---|---|---|---|---|---|---|---|
| | From | To | | | | | | |
| I-80 | 92.4 | 101.7 | 6850 | 2310 | 3230 | 1986 | 12" | 42 |
| I-80W | 258.6 | 275.6 | 3820 | 1760 | 2460 | 1991 | 11" | 22 |
| I-80W | 212.4 | 216.2 | 4170 | 1800 | 2520 | 1990 | 11" | 11 |
| I-80E | 212.4 | 216.2 | 4170 | 1800 | 2520 | 1992 | 11" | 7 |
| I-80 | 382.3 | 393.4 | 3225 | 1240 | 1740 | 1987 | 10" | 39 |
| I-80 | 372.4 | 378.1 | 3440 | 1250 | 1750 | 1988 | 10" | 25 |
| I-80 | 378.1 | 382.3 | 3260 | 1240 | 1740 | 1990 | 10" | 17 |
| I-25 | 185.3 | 188.4 | 7300 | 850 | 1190 | 1987 | 10" | 12 |

[1]Based on 1993 data (one direction only)

After the test projects were selected the Average Daily Traffic (ADT), truck traffic, and Equivalent Single Axle Loads (ESALs) were obtained for the projects. ADT and truck traffic volumes were obtained from the Wyoming DOT traffic files (Wyoming DOT). For the concrete projects included in this report, the ADT ranged between 3260 and 7300 vehicle per day while the truck traffic ranged from 850 to 2310 trucks per day. Table 3.1 summarizes construction and traffic information for all concrete projects included in the experiment.

Once the above information was obtained, the test sections within each project were broken down into three groups based on their initial PI. Group 1 included all the sections with low PI while groups 2 and 3 included the sections with medium and high PI, respectively. Roughness data in the form of IRI was retrieved from the Wyoming DOT's computer files for the years 1989 through 1992 for each test section. Appendix A contains the PI information, while Appendix B summarizes the IRI data. This information was added to the computerized database for statistical analysis.

The PCI values for all test sections were also determined from the video logs and faulting data collected by the Wyoming DOT in the summer of 1993. The PCI data can be found in Appendix C.

## Asphalt Pavements

The Wyoming DOT's Highway Features file was used to select asphalt test sections. This file contains information on the construction and maintenance history of each project in the state of Wyoming. The information was used to identify 27 projects completed between 1988 and 1992. Each project was divided into half mile uniform test sections which resulted in a total of 884 test sections.

The Average Daily Traffic (ADT), truck traffic, and Equivalent Single Axle Loads (ESALs) were obtained for each test section. Again the ADT and truck traffic volumes were obtained from the Wyoming DOT traffic files (Wyoming DOT). For the asphalt projects, the ADT ranged between 1070 and 4915 vehicle per day while the truck traffic ranged from 270 to 2190 trucks per day. The wide variations are due to the fact that Interstate 80 receives much higher traffic volumes than Interstate 25 or Interstate 90.

Table 3.2 summarizes the construction and traffic information for all asphalt projects included in the experiment.

Roughness data in the form of IRI were then retrieved from the Wyoming DOT's computer files for the years 1989 through 1994 on each test section. These data can be found in Appendix D. Unlike concrete pavements, asphalt sections in Wyoming are not evaluated with profilographs. Therefore, the first IRI data available after construction were used to reflect the initial roughness of the test sections. All test sections completed in a particular year were grouped together to insure statistical independence of the samples. This procedure produced four data sets based on the construction date. Group 1 included all test sections built in 1989, while groups 2, 3, and 4 included the sections built in 1990, 1991, and 1992, respectively.

## CHAPTER SUMMARY

This chapter described the research project organization and the test sections selection process. In addition, the data utilized in the analysis, including beginning and ending mileposts for each test section, ADT, truck traffic per day, ESALs per day, date opened to traffic, and pavement thickness, were described.

**Table 3.2 General Information on Asphalt Test Sections Included in the Experiment.**

| Road | Milepost | | ADT[1] | Truck Traffic per Day[1] | ESALs per Day[1] | Date Opened To Traffic | Pavement Thickness | Number of Test Sections |
|---|---|---|---|---|---|---|---|---|
| | From | To | | | | | | |
| I-25 | 25.711 | 30.750 | 2175 | 520 | 730 | 1992 | 7" | 20 |
| I-25 | 39.557 | 47.835 | 2145 | 520 | 730 | 1991 | 5" | 32 |
| I-25 | 47.835 | 51.635 | 2130 | 520 | 730 | 1990 | 7" | 14 |
| I-25 | 58.473 | 68.965 | 2180 | 525 | 735 | 1989 | 7" | 40 |
| I-25 | 68.965 | 75.307 | 2220 | 520 | 730 | 1991 | 5" | 22 |
| I-25 | 94.837 | 100.125 | 2210 | 570 | 800 | 1989 | 4" | 22 |
| I-25 | 120.817 | 126.694 | 2200 | 575 | 805 | 1991 | 7" | 24 |
| I-25 | 141.417 | 152.818 | 2680 | 685 | 960 | 1989 | 7" | 44 |
| I-25 | 244.003 | 254.006 | 1070 | 275 | 385 | 1989 | 6" | 31 |
| I-25 | 254.006 | 263.781 | 1080 | 270 | 380 | 1991 | 5" | 36 |
| I-25 | 263.781 | 271.148 | 1080 | 270 | 380 | 1989 | 4" | 30 |
| I-25 | 271.148 | 279.400 | 1080 | 270 | 380 | 1991 | 5" | 29 |
| I-25 | 279.400 | 284.999 | 1080 | 270 | 380 | 1989 | 4" | 20 |
| I-80 | 39.000 | 49.053 | 4160 | 1940 | 2720 | 1991 | 4" | 36 |
| I-80 | 57.041 | 65.421 | 4260 | 1860 | 2600 | 1991 | 16" | 25 |
| I-80 | 120.327 | 130.026 | 4915 | 2190 | 3070 | 1992 | 7" | 17 |
| I-80 | 153.790 | 171.718 | 4005 | 1880 | 2630 | 1991 | 9" | 70 |
| I-80 | 171.756 | 186.621 | 3990 | 1880 | 2630 | 1991 | 10" | 55 |
| I-80 | 186.771 | 199.051 | 4020 | 1920 | 2690 | 1989 | 8" | 47 |
| I-80 | 199.100 | 210.962 | 4040 | 1945 | 2720 | 1989 | 10" | 43 |
| I-80 | 285.102 | 289.891 | 3840 | 1760 | 2460 | 1989 | 4" | 20 |

[1]Based on 1993 data (one direction only)

**Table 3.2 Continued . . .**

| Road | Milepost | | ADT[1] | Truck Traffic per Day[1] | ESALs per Day[1] | Date Opened To Traffic | Pavement Thickness | Number of Test Sections |
|---|---|---|---|---|---|---|---|---|
| | From | To | | | | | | |
| I-80 | 299.530 | 309.966 | 3890 | 1755 | 2460 | 1991 | 11" | 21 |
| I-90 | 14.609 | 33.043 | 2530 | 495 | 690 | 1991 | 4" | 74 |
| I-90 | 45.142 | 56.357 | 2450 | 500 | 700 | 1991 | 4" | 42 |
| I-90 | 69.801 | 85.494 | 1855 | 285 | 400 | 1991 | 9" | 30 |
| I-90 | 152.720 | 155.075 | 1900 | 370 | 520 | 1991 | 10" | 12 |
| I-90 | 194.932 | 202.008 | 1950 | 360 | 500 | 1989 | 4" | 28 |

[1]Based on 1993 data (one direction only)

# CHAPTER 4

# PAVEMENT SMOOTHNESS POLICIES ACROSS THE NATION

Due to the importance of pavement roughness, most State Highway Agencies (SHAs) have established smoothness specifications for new pavement construction. Some SHAs require that a specific limit of smoothness be met, whereas others use a variable scale with pay adjustment factors related to the degree of smoothness achieved. These pay adjustments are made based on the assumption that lower initial pavement roughness will result in better long term pavement performance. This chapter describes the nationwide survey that was performed to examine the variations in smoothness specifications across the nation.

## OBJECTIVES OF SURVEY

Copies of the smoothness specifications survey were mailed to all fifty state highway agencies in February, 1994. The objectives of the survey were to:

1. Identify the different roughness devices used by State Highway Agencies to accept pavement smoothness for new construction.
2. Determine the acceptance limits for the various roughness devices.
3. Identify SHAs that currently have incentive/disincentive policies for initial pavement smoothness.
4. Determine how the different SHAs developed their incentive/disincentive policies.
5. Estimate the percentage of pavement sections that qualified for incentives or incurred disincentives in recent years.
6. Evaluate the effectiveness of the various smoothness specifications.

## SAMPLE OF SURVEY

The construction smoothness survey included thirteen different questions aimed at satisfying the objectives stated above. Appendix E shows the survey that was sent out to all SHAs.

## RESULTS FROM SURVEY

Forty-five of the fifty states responded to the survey. The responses have been reduced and summarized in the sections below.

### State Highway Agencies with Smoothness Specifications

Out of the forty five SHAs that responded to the survey, only Massachusetts, Rhode Island, and Vermont indicated that they currently do not have any type of smoothness specifications. This implies that most highway agencies perceive initial pavement smoothness as being important.

### Roughness Devices Utilized in Accepting Pavements

There are a large number of roughness measuring devices in the market today. The accuracy and repeatability of measurements obtained with various devices vary from poor to excellent. A point of interest in this research project was to determine the devices that are currently used for accepting new pavements. As shown in Table 4.1, thirty out of forty-two SHAs with smoothness specifications indicated that they use the California-type profilograph in accepting concrete (PCC) pavements. Five SHAs use the Rainhart Profilograph, one uses the Mays Meter, and four SHAs indicated using other devices. The Michigan and Minnesota DOTs indicated that they use the GM Profilometer (Michigan also uses the California-type profilograph). The New Jersey and Florida DOTs use a rolling straightedge for accepting concrete pavements. Alaska, Maine, and New Hampshire indicated that they do not build PCC pavements. For the acceptance of new asphalt pavements, 15 SHAs indicated using the California-type profilograph while 16 SHAs use some form of a straightedge which varies in length between 3.05m (10 ft.) and 7.62m (25 ft.). As shown in Table 4.1, five states used the Mays Meter, and four states fell into the "others" category. Florida and New Jersey use rolling straightedges. Arizona uses the K. J. Law 690 DNC while Michigan indicated using the GM Profilometer and the California-type profilograph for accepting asphalt pavements. Minnesota, North Carolina, and Pennsylvania did not indicate the devices used for accepting asphalt sections. It should be mentioned here that all SHAs using straightedges to accept asphalt pavements do not have any incentive/disincentive policies.

## Acceptance Limits for Concrete Pavements

As shown in Table 4.2, most SHAs using the California-type profilograph specify a maximum smoothness limit of 11.05 or 15.79 cm/km (7 or 10 in/mile) for concrete pavement. An acceptance limit of 78.93 cm/km (50 in/mile) is used by Kansas DOT due to the elimination of the blanking band when reducing the pavement profile to reduce the possibility of a long and low amplitude wave being missed. Five states indicated using the Rainhart profilograph with various acceptance limits ranging from 6.31 to 18.94 cm/km (4 to 12 in/mile). Michigan and Minnesota indicated using the GM Profilometer with acceptance limits of 49.8 Ride Quality Index and 24 Root Mean Square Acceleration, respectively. Florida and New Jersey have an acceptance limit of 0.32 cm in 3.05m (1/8" in 10 ft.) Using a rolling straightedge. West Virginia uses the Mays Ride Meter with an acceptance limit of 157.86 cm/km (100 in/mile).

**Table 4.1 Roughness Devices used by State Highway Agencies in Accepting Pavements.**

| | | Device Type | | | | |
|---|---|---|---|---|---|---|
| | | California-type Profilograph | Rainhart Profilograph | Straightedge | Mays Meter | Others |
| Pavement Type | PCC[1] | AL, AZ, AR, CO, CT, HI, ID, IL, IN, IA, KS, LA, MD, MI, MS, MT, NE, NM, NY, ND, OH, OK, OR, PA, SD, TX, VA, WA, WI, WY | GA, KY, NC, SC, TN | 0 | WV | FL, MI, MN, NJ |
| | AC[2] | AL, ID, IL, IN, IA, KS, LA, MD, MI, NE, OH, OK, TX, VI, WI | 0 | AL, AR, CO, CT, HI, ME, MS, MT, NH, NM, NY, ND, OR, SD, WA, WY | GA, KY, SC, TN, WV | AZ, FL, MI, NJ |

[1]PCC: Portland Cement Concrete

[2]AC: Asphalt Cement

**Table 4.2 Acceptance Limits for PCC Pavements.**

| | Acceptance Limits | | | | | | |
|---|---|---|---|---|---|---|---|
| | 63 mm/km<br>4 in/mile | 79 mm/km<br>5 in/mile | 95 mm/km<br>6 in/mile | 110 mm/km<br>7 in/mile | 158 mm/km<br>10 in/mile | 189 mm/km<br>12 in/mile | 789 mm/km<br>50 in/mile |
| California - type Profilograph | 0 | ID, ND | AL, CO, LA | AZ, AR, IA, MD, MS, NM, OH, OK, OR, WA, WY | HI, IL, MI, NE, PA, SD, TX, VA, WI | CT, IN, MT, NY | KS |
| Rainhart Profilograph | NC | 0 | 0 | GA | TN | KY, SC | 0 |

## Acceptance Limits for Asphalt Pavements

Most SHAs using pavement incentives or disincentive on asphalt pavements use the California-type profilograph. As shown in Table 4.3, the consensus for an acceptance limit was 11.05 or 15.79 cm/km (7 or 10 in/mile). The rest of the SHAs indicated using a range of 4.74 to 18.94 cm/km (3 to 12 in/mile) except for Kansas where a value of 63.14 cm/km (40 in/mile) is used for accepting asphalt pavements with the same data reduction policy as described earlier for concrete pavements. Georgia, Tennessee, South Carolina, West Virginia, and Kentucky use the Mays Meter with varying acceptance values as shown in Table 4.4. Four SHAs indicated using non-profilograph devices for accepting asphalt pavements. Michigan uses both the California-type profilograph and the GM Profilometer with acceptance limits of 15.79 cm/km (10 in/mile) for the first and 49.8 Ride Quality Index for the latter device. Arizona has an acceptance limit of 0.32 cm in 3.05m (1/8" in 10 ft.) using the K. J. Law 690 DNC. The Rolling Straightedge is used with acceptance limits of 0.19 cm (3/16 in) for a 4.57m (15 ft) and 0.32 cm (1/8 in) for a 3.05m (10 ft) by the Florida DOT and New Jersey DOT, respectively. A straightedge was the device of choice for all states without incentive/disincentive policies.

## Incentive/Disincentive Policies

Incentive/disincentive policies used by different SHAs were of great interest to this research project. Table 4.5 shows the number of SHAs that have some sort of incentive/disincentive policies. Seventeen SHAs had incentive as well as disincentive policies for concrete pavements while only ten SHAs had both incentives and disincentives for asphalt pavements. Some SHAs had only incentive policies while others had only disincentive policies.

**Table 4.3 Acceptance Limits for AC Pavements where the California-type Profilograph is used.**

| | Acceptance Limits | | | | | |
|---|---|---|---|---|---|---|
| | 47 mm/km<br>3 in/mile | 95 mm/km<br>6 in/mile | 110 mm/km<br>7 in/mile | 158 mm/km<br>10 in/mile | 189 mm/km<br>12 in/mile | 631 mm/km<br>40 in/mile |
| California - type Profilograph | LA | AL, TX | ID, IA, MD, NE, OH, OK, | IL, MI, VA, WI | IN | KS |

**Table 4.4 Acceptance Limits for AC Pavements where Mays Meters are used.**

| Acceptance Limits | | | |
|---|---|---|---|
| Mays Meter Number | | | Rideability Index |
| 35 | 40 | 100 | 3.6 |
| GA, TN | SC | WV | KY |

**Table 4.5 Number of SHAs with Incentive and/or Disincentive Policies for Pavement Construction Smoothness.**

| | Incentives and Disincentive | Incentives Only | Disincentive Only | None |
|---|---|---|---|---|
| PCC | AL, AZ, CT, IL, IA, KS, KY, MN, MT, NE, ND, OH, PA, SD, TX, VI, WI | MI, NM, OR, OK, WY | IN, LA, MD, MS, NJ, NY, SC, WV | AK, AR, CO, FL, GA, HI, ID, ME, MA, NH, NC, RI, TN, VT, WA |
| AC | AL, AR, IL, IA, KS, KY, NE, TN, TX, VA | MI, OK | IN, LA, MD, NJ SC, WI | AK, AR, CO, CT, FL, GA, HI, ID, ME, MA, MN, MI, MT, NH, NM, NY, NC, ND, OH, OR, PA, RI, SD, VT, WA, WV, WY |

The information received on the actual incentive/disincentive policies varied greatly, with at most two SHAs having similar policies. However, most SHAs had a similar upper range adjustment pay factor of 105 percent for incentives and a lower range of 90 percent for disincentives. Several SHAs would reduce the incentive percentage by 1 percent and increase disincentive percentages by 2 percent for every increase of 1.58 cm/km (1 in/mile). Examples of two incentive/disincentive policies are shown in Table 4.6. The immense variance of incentive/disincentive policies among SHAs indicates the variability of opinion on what Profilograph Index (PI) values indicate smooth or rough roads.

## Development of Incentive/Disincentive Policies

As shown in Table 4.7, twenty two SHAs indicated using engineering judgment in the development of their current incentive/disincentive policies. Five SHAs based their specifications on research. However, the type of research, length of study, or number of projects analyzed were not identified by states. Only three states indicated following AASHTO guidelines in the development of their specifications.

Table 4.8 shows a majority of states indicated performing smoothness testing the same day or the day after the pavement was laid for both asphalt and concrete pavements. Some of the "others" responses were within 30 days or before the section is opened to traffic.

**Table 4.6 The Incentive/Disincentive Policies Adopted by the Texas and Alabama DOTs.**

Texas DOT

| PI mm/km (inches/mile) | Price Adjustment Factor[1] |
|---|---|
| <47 (<3) | 105% |
| 49 to 63 (3.1 to 4) | 104% |
| 65 to 79 (4.1 to 5) | 103% |
| 80 to 95 (5.1 to 6) | 102% |
| 96 to 110 (6.1 to 7) | 101% |
| 112 to 158 (7.1 to 10 | 100% |
| 159 to 174 (10.1 to 11) | 98% |
| 175 to 189 (11.1 to 12) | 96% |
| 191 to 205 (12.1 to 13) | 94% |
| 207 to 221 (13.1 to 14) | 92% |
| 223 to 237 (14.1 to 15) | 90% |
| >237 (>15) | Correct |

Alabama DOT

| PI mm/km (inches/mile) | Price Adjustment Factor[1] |
|---|---|
| <47 (<3) | 105% |
| 49 to 95 (3.1 to 6) | 100% |
| 96 to 126 (6.1 to 8) | 95% |
| 128 to 158 (8.1 to 10) | 90% |
| >158 (>10) | Correct |

[1]Percentage of Contract Unit Price

**Table 4.7 Sources Behind the Development of Incentive/Disincentive Policies.**

| Research | AASHTO Guidelines | From Other States | Engineering Judgment Combined With One Other Category | No Specifications |
|---|---|---|---|---|
| CT, IL, OK, PA, WV | MS, OH, TX | MD, NY | AZ, HI, IN, IA, KS, KY, LA, MI, MN, MT, NE, NJ, NM, ND, OR, SC, SD, TN, TX, VA, WI, WY | AK, AR, CO, FL, GA, ID, MA, ME, NH, NC, RI, VA, VT |

**Table 4.8 Timing of Pavement Smoothness Testing.**

| | | Time of Testing | | | |
|---|---|---|---|---|---|
| | | Same Day | Next Day | End of Construction | Others |
| Pavement Type | PCC | AR, CO, OR, PA | AL, AR, CT, GA, ID, IL, IN, IA, KS, LA, MS, NM, NY, NC, ND, OH, OK, SD, TX, VA, WA, WI, WY | FL, KY, MN, NJ | HI, MD, MI, MT, NE, SC, TN, WV |
| | AC | AK, CO, KS, ME, NH, OR, VA, WA, WI | AL, AR, CT, GA, ID, IN, IA, LA, MS, NM, NY, ND, OH, OK, SD, TX, WY | FL, IL, KY, NJ | AZ, HI, MD, MI, MT, NE, SC, TN, WV |

## Performance and Percentages of Sections Qualifying for Incentives or Disincentives

Most SHAs indicated that they do not keep track of the percentages of pavement sections receiving incentives or disincentives. Those SHAs with good records showed significant differences in the percentages of sections receiving incentives or disincentives. The range of concrete sections that received incentives was 10 percent to 98 percent while those incurring disincentives was 0 percent to 100 percent. New Jersey, the SHA reporting 100 percent disincentives on concrete pavements, requires less than five percent of the total lot to have surface variations greater than 0.32 cm in 3.05m (1/8" in 10 ft).

The variations among SHAs when considering asphalt pavements were as much as concrete pavements. The range of asphalt sections that received incentives was 15 percent to 95 percent while those incurring disincentives was 1 percent to 100 percent. Wisconsin, the SHA reporting 100 percent disincentives, assesses disincentives to any pavement that has a Profilograph Index higher than 15.79 cm/km (10 in/mile) using a California-type profilograph.

Fourteen SHAs indicated observing roughness related problems on sections that had received incentives. Some of these problems are due to the specifications which do not always eliminate "wheel chatter" or long wavelengths that create a roller coaster effect.

## Effectiveness of Acceptance Specifications

The satisfaction of different SHAs with their current smoothness specifications were determined in this survey. As shown in Table 4.9, most SHAs rate their smoothness specifications as good or very good. Only two states indicated poor satisfaction with their current smoothness specifications.

**Table 4.9 Effectiveness of Smoothness Specifications as Rated by SHAs.**

| | | Pavement Type | |
|---|---|---|---|
| | | PCC | AC |
| Rating | Excellent | AR, KS, PA, VA | KS |
| | Very Good | AL, GA, ID, IA, LA, MN, MS, MT, NE, NY, OH, SD, TN, WV, WI | AL, AK, GA, ID, IA, KY, LA, MS, MT, NE, NY, OH, SD, TN, VA, WV, |
| | Good | AR, CT, FL, HI, IL, IN, MD, MI, NC, ND, OK, OR, SC, WY | AR, CT, FL, HI, IL, IN, MD, ME, MI, ND, OK, OR, SC, WI, WY |
| | Fair | KY, NJ | NJ |
| | Poor | CO, TX | CO, TX |
| | No Answer | NM, WA | AZ, NH, NM, WA, |
| | No Specifications | AL, ME, MA, NH, RI, VT | MA, MN, NC, PA, RI, VT |

## CHAPTER SUMMARY

In this chapter, the responses to the smoothness specifications survey that was sent to all 50 SHAs were summarized. The responses indicated major variations in smoothness specifications among SHAs.

# CHAPTER 5

# DATA ANALYSIS

## GENERAL STATISTICAL TERMINOLOGY

A variety of statistical tests were utilized in this research project. This chapter describes some of these statistical tests and then summarizes the results from the data analysis.

### Coefficient of Determination

The coefficient of determination, usually denoted as $R^2$, is interpreted as the proportion of variability within a data set explained by a model fit to the data. $R^2$ varies between zero and one. If the $R^2$ is close to zero, the regression relationship obtained is weak. The closer $R^2$ is to one, the stronger the relationship.

### Kruskal-Wallis Test

The Kruskal-Wallis Rank Test (Owen) is normally performed to test for differences among three data sets. This test is on-parametric and is based on the ranks of the observations. The following alternatives are used:

$H_0$: all populations are identical

$H_a$: all populations are not identical

The only assumption that is made about the populations is that the samples are independent and random. The test statistic can be expressed as:

$$H=\left[\frac{12}{N(N+1)}\Sigma\frac{R_i^2}{n_i}\right]-3(N+1)$$

where:

$R_i$ = the sum of the ranks of the *i*th sample.

N = the total number of observations.

$n_i$ = the number of observations in the $i^{th}$ group.

Large values of H lead to the rejection of the null hypothesis that there is no difference among the three groups. If the samples come from identical populations and $n_i$ are not small($n_i$>5), then H is approximately distributed as chi-square with two degrees of freedom and $\alpha$=0.05. When $n_i$ is small, the tables given in the "Handbook of Statistical Tables" by Owen are used.

**Mann-Whitney Test**

At times, when only two groups are analyzed, the Kruskal-Wallis reduces to the Mann-Whitney (Wilcoxon) Two-Sample Rank Test (Owen). The Mann-Whitney test uses the ranks of the numbers as the Kruskal-Wallis test. Once the samples have been ranked, the rank sums ($R_x$ and $R_y$) for each category are found. This is then used to calculate $U_x$ and $U_y$,

where:

$$U_x = R_x - m(m + 1)/2$$

$$U_y = R_y - n(n + 1)/2$$

where:

$U_x$=number of times an x value is larger than a y value

$U_y$= number of times a y value is larger than an x value

m = number of x values

n = number of y values

Of these two values, the lower of $U_x$ or $U_y$ is the critical value. Using this critical value and the values of m and n, a standard U can be obtained in tables given in Owen's "Handbook of Statistical Tables." This is done by selecting the table using the larger of m or n and the appropriate confidence level ($\alpha$=0.05). If the critical value of $U_x$ or $U_y$ is larger than U from the table in Owen, then the null hypothesis that the populations are identical is selected (Owen).

The tables for the Mann-Whitney test do not contain U values for large numbers of data points ($n_i$ > 20). When $n_i$ gets large, the test statistic changes slightly and uses the formula shown below.

$$Z=\frac{U-[(N_1*N_2)/2]}{\sqrt{[N_1*N_2*(N_1+N_2+1)]/12}}$$

where:

U = the lower of $U_x$ and $U_y$

$N_1$ = the number of test sections in group one

$N_2$ = the number of test sections in group two.

Then, if the test statistic Z is less than the critical value from the standard normal tables, the null hypothesis that the populations are identical is rejected[20].

**Standard t-test**

The t-test can also be performed to compare two groups with the following alternatives:

$H_o$ = populations are identical

$H_a$ = population are not identical

The t-statistic is normally used when the two independent groups being compared are relatively small ($n_i$<20). For a t-statistic, it is assumed the underlying distributions are normal and the variances $s_x^2$ and $s_y^2$ are about equal. Then the sample variances can be pooled by proportioning $S_x^2$ and $S_y^2$ to $N_1$-1 and $N_2$-1, respectively. This brings about the formula shown below.

$$T = \frac{[\overline{X} - \overline{Y}]}{\sqrt{\frac{[N_1 - 1]S_X^2 + [N_2 - 1]S_Y^2}{N_1 + N_2 - 2}[\frac{1}{N_1} + \frac{1}{N_2}]}}$$

where:

$\overline{X}$ = the mean of group one

$\overline{Y}$ = the mean of group two

$N_1$ = the number of test sections in group one

$N_2$ = the number of test sections in group two

$S_x^2$ = the sample variance of group one

$S_y^2$ = the sample variance of group two

Then if $T<t(\alpha/2;N_1+N_2-2)$, $H_o$ is rejected and it is concluded that the populations are not identical (Hogg and Ledolter).

## ANALYSIS OF CONCRETE TEST SECTIONS

The statistical tests described above were used to perform a comprehensive data analysis on the concrete test sections data. This analysis included the following. First, a large number of charts were prepared to examine the rate of increase in roughness for test sections with variable initial PI values. Second, additional charts were prepared to determine the relationships between initial PI and IRI measurements collected for the same sections on later dates. Finally, a comprehensive statistical analysis was performed on the data to provide reliable and conclusive results.

### Effect of Initial PI on the Rate of Increase in IRI

In order to evaluate the effect of initial PI on the rate of increase in roughness, test sections from each construction project were examined separately. The test sections from each construction project were grouped into the following six categories depending on their initial PI: $0<PI<2$, $2<PI<3$, $3<PI<4$, $4<PI<5$, $5<PI<6$, $PI>6$. These categories correspond to the categories used by the Wyoming DOT for construction incentives. After grouping the sections, six charts were prepared for each project (one graph per category). Figure 5.1 shows a typical graph for one of the projects. The graphs showed a general upward trend as time passed. No differences were readily observed among the categories, indicating that initial PI values do not significantly influence the rate of increase in roughness over the years.

### Results from Kruskal-Wallis and Mann-Whitney Tests

In this analysis, the test sections were split into three groups (rather than six) in order to have an adequate number of data points in each group. These groups are shown below:

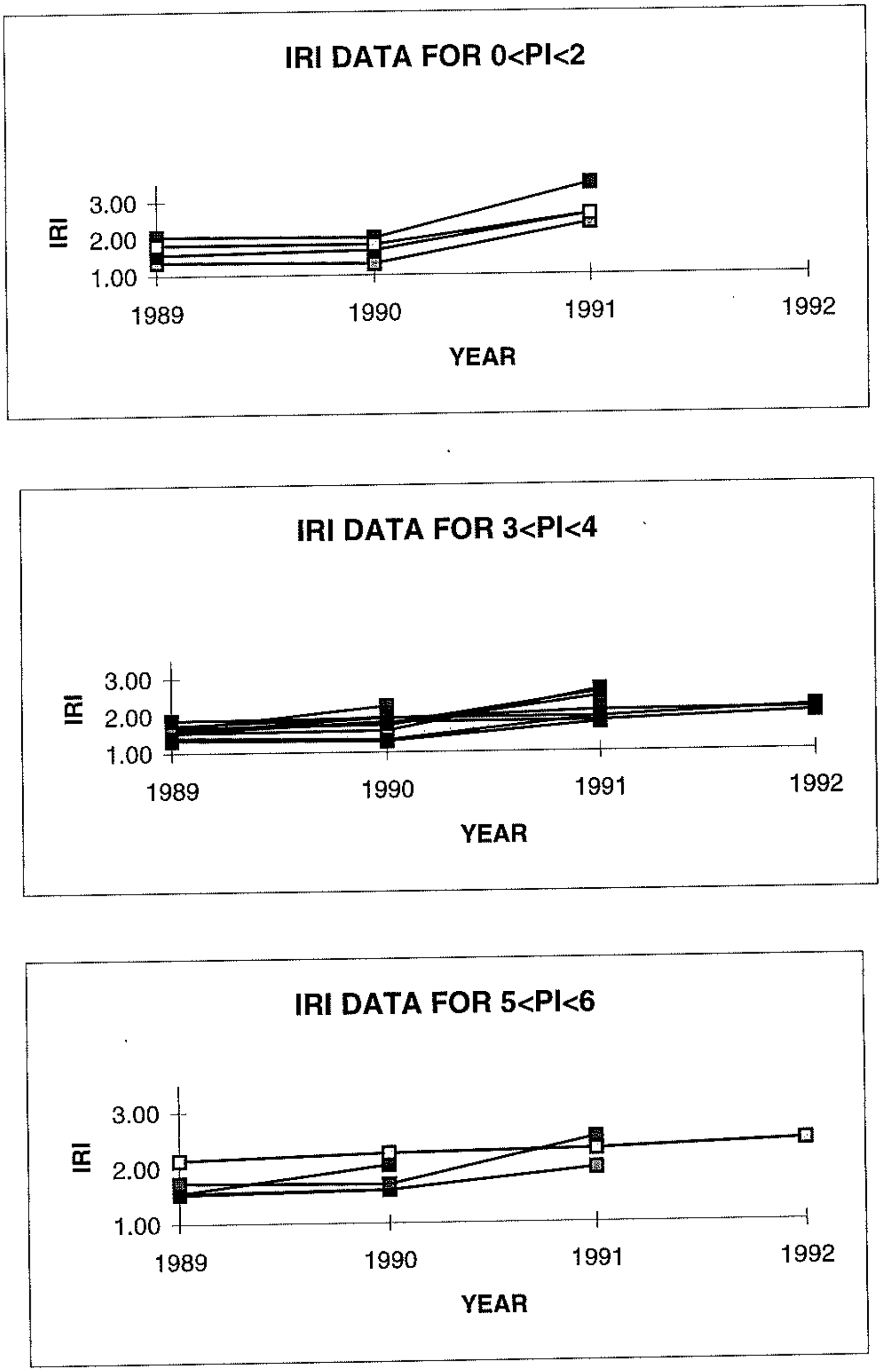



**Figure 5.1 The Increase in Roughness for Pavement Sections with Variable Initial PI [I-80, MP 92].**

Group 1: $0 < PI < 3.0$

Group 2: $3.01 < PI < 5.0$

Group 3: $PI > 5.01$

Either the Kruskal-Wallis test or the Mann-Whitney test were run on the concrete test sections, depending on the number of categories available. If data points were available in all three categories, the Kruskal-Wallis test was run. If the data points fell in only two of the groups, the Mann-Whitney test was used.

As can be seen in Table 5.1, the Kruskal-Wallis test was run on all the 1989 IRI roughness data. This test showed that all categories were identical. In other words, there is no statistical difference in the 1989 roughness among the groups even though the initial PI of the sections were different. This same trend can also be seen in Tables 5.2 through 5.4 for the 1990 through 1992 data. For all projects included in the experiment, the results were the same except for one. The 1991 data for the I-80 project at milepost 372.4 showed that the populations were barely different. It should also be noted that no statistical analysis was performed on project I-80 milepost 382.3 because the entire project was exceptionally smooth when it was built. Of the thirty-nine test sections in this project, only three PI values were greater than three, with the highest being 3.8. This placed all data points from the project in the same smooth category.

## Regression Relationship between PI and IRI

In this analysis, efforts were made to examine the relationship between initial PI and IRI measurements collected in 1989 through 1992. Again, test sections from each construction project were analyzed separately. Figure 5.2 shows a typical graph for a project on I-80 MP92. When linear

**Table 5.1 Results from Statistical Analysis Conducted on the 1989 Roughness Data.**



| Road | Milepost | | Test Performed | Statistical Analysis Value | Standard Value | Conclusion |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| I-80 | 92.4 | 101.7 | K-W[1] | 2.11 | 5.99 | Identical |
| I-80 | 372.1 | 378.1 | K-W | 0.63 | 5.99 | Identical |
| I-80 | 378.1 | 382.3 | K-W | 0.86 | 5.10 | Identical |
| I-80[a] | 382.3 | 393.4 | None | | | |
| I-25 | 185.3 | 188.4 | K-W | 0.66 | 5.11 | Identical |

[1]Kruskal-Wallis test

[a]All sections had low Profilograph Index (very smooth).

**Table 5.2 Results from Statistical Analysis Conducted on the 1990 Roughness Data.**

| Road | Milepost | | Test Performed | Statistical Analysis Value | Standard Value | Conclusion |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| I-80 | 92.4 | 101.7 | K-W[1] | 0.33 | 5.99 | Identical |
| I-80 | 372.4 | 378.1 | K-W | 1.61 | 5.99 | Identical |
| I-80 | 378.1 | 382.3 | K-W | 1.23 | 5.99 | Identical |
| I-80[a] | 382.3 | 393.4 | None | | | |
| I-25 | 185.3 | 188.4 | K-W | 2.47 | 4.87 | Identical |

[1]Kruskal-Wallis test

[a]All sections had low Profilograph Index (very smooth).

**Table 5.3 Results from Statistical Analysis Conducted on the 1991 Roughness Data.**

| Road | Milepost | | Test Performed | Statistical Analysis Value | Standard Value | Conclusion |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| I-80 | 92.4 | 101.7 | K-W[1] | 4.35 | 5.99 | Identical |
| I-80W | 212.4 | 216.2 | K-W | 2.60 | 4.86 | Identical |
| I-80W | 258.6 | 275.6 | K-W | 2.35 | 4.90 | Identical |
| I-80 | 372.4 | 378.1 | K-W | 5.71 | 5.24 | Different |
| I-80 | 378.1 | 382.3 | K-W | 4.99 | 5.30 | Identical |
| I-80[a] | 382.3 | 393.4 | None | | | |
| I-25 | 185.3 | 188.4 | M-W[2] | 4.00 | 0.00 | Identical |

[1]Kruskal-Wallis test

[2]Mann-Whitney test

[a]All sections had low Profilograph Index (very smooth)

**Table 5.4 Results from Statistical Analysis Conducted on the 1992 Roughness Data.**

| Road | Milepost | | Test Performed | Statistical Analysis Value | Standard Value | Conclusion |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| I-80 | 92.4 | 101.7 | K-W[1] | 0.13 | 5.25 | Identical |
| I-80E | 212.4 | 216.2 | K-W | 4.69 | 5.10 | Identical |
| I-80W | 212.4 | 216.2 | K-W | 1.20 | 4.86 | Identical |
| I-80W | 258.6 | 275.6 | K-W | 0.97 | 4.90 | Identical |
| I-80 | 372.4 | 378.1 | M-W[2] | 6.5 | 2.00 | Identical |
| I-80 | 378.1 | 382.3 | M-W | 2.50 | 0.00 | Identical |
| I-80[a] | 382.3 | 393.4 | None | | | |
| I-25 | 185.3 | 188.4 | M-W | 5.50 | 0.00 | Identical |

[a]All sections had low Profilograph Index (very smooth)
[1]Kruskal-Wallis test
[2]Mann Whitney test

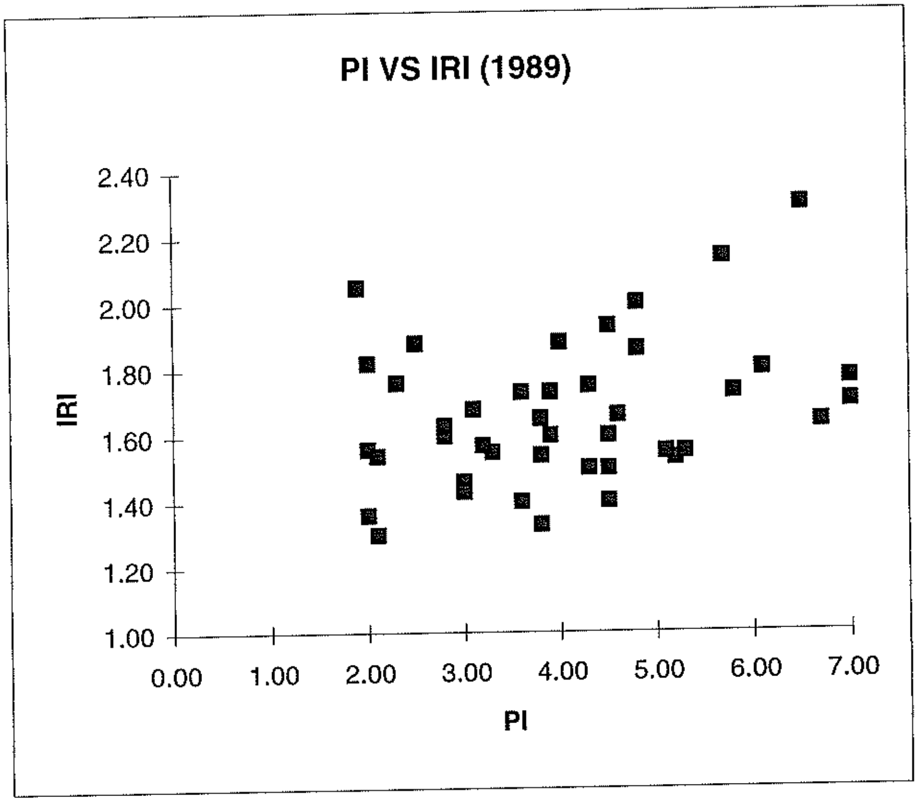



**Figure 5.2 The Relationship between 1989 IRI and initial PI for I-80, MP 92.**

regression was performed on the data, the $R^2$ values ranged from O percent to 75 percent and were below 50 percent for six out of the eight projects. Also, the equations of the lines showed the effect of the initial PI on future IRI to be almost zero. These low $R^2$ values indicate that there was very little correlation between the initial PI values and IRI measurements after the sections have been in service for a few years.

## Effect of Initial IRI on Concrete Pavement Roughness

It is clear from the analysis performed in previous sections that initial PI values do not correlate well with later IRI measurements. Therefore, another analysis was performed to determine the effect of initial roughness on later roughness measurements. This analysis compared the first IRI measurements after construction with later IRI measurements. This was done to eliminate the effect of variations in roughness indexes on the statistical tests. The test sections with initial roughness measurements in 1989 were combined in one group while sections with initial roughness in 1990, 1991, 1992 were combined in three other groups. The test sections within each group were then separated into two subgroups based on initial IRI measurements. Those test sections with initial IRI measurements less than 1.65 were classified as smooth while the sections with higher IRI were classified as rough. The 1.65 value was selected to insure an adequate number of test sections in each subgroup. Next, the Mann-Whitney test was performed on the subgroups to determine if the smooth sections remained smoother than the rougher sections after a few years of being in service. These results can be found in Table 5.5. The statistical tests indicate that smooth test sections did remain smoother than the rougher sections. Overall, these results indicate that initial IRI values correlate with future IRI measurements.

**Table 5.5 Results of Mann-Whitney Tests Based on Initial IRI Measurements for Concrete Pavements.**

| Years | Statistic Analysis Value | Standard Value | Conclusion |
|---|---|---|---|
| 1989 versus 1990 | -2.99 | -1.645 | Different |
| 1989 versus 1991 | -2.53 | -1.645 | Different |
| 1989 versus 1992 | -3.64 | -1.645 | Different |
| 1989 versus 1993 | -3.36 | -1.645 | Different |
| 1989 versus 1994 | -1.84 | -1.645 | Different |
| 1990 versus 1991 | No Test[1] | | |
| 1990 versus 1992 | No Test[1] | | |
| 1990 versus 1993 | No Test[1] | | |
| 1990 versus 1994 | No Test[1] | | |
| 1991 versus 1992 | -2.82 | -1.645 | Different |
| 1991 versus 1993 | -3.40 | -1.645 | Different |
| 1991 versus 1994 | -2.91 | -1.645 | Different |
| 1992 versus 1993 | -2.31 | -1.645 | Different |
| 1992 versus 1994 | -2.17 | -1.645 | Different |

[1]All test sections were smooth

## Effect of Initial PI on PCI

This analysis was performed to examine the relationship between the initial PI value and the Pavement Condition Index of a section. Since incentives are paid based on initial PI values, sections with low PI should retain higher PCI values than sections with high initial PI values. Otherwise, paying incentives may not be cost effective.

The PCI for all sections were calculated by using the Wyoming DOT video logs and faulting data collected in the summer of 1993. Once all PCI for all sections were calculated, they were stored in a computerized database and prepared for analysis. The t-test was performed on the same three groups that were used in the Kruskal-Wallis test described earlier. An alpha level of 0.05 was selected in the t-test. The analysis resulted in the conclusion that for all projects analyzed there were no statistical differences among the three groups. These results are summarized in Table 5.6. Two of the projects had only one observation in group 1, so a t-test could not be performed using that group due to having no degrees of freedom. The sections at milepost 382 all fell into two categories, so the t-test was performed on group 1 and group 2 only. Also, groups 1 and 2 at milepost 212 east had identical means and variance. This was probably due to the small number of sections and the fact that the project was opened to traffic in 1992. Overall, the results from the PCI and IRI analysis support the fact that there is no statistical difference among the three groups.

**Table 5.6 Results of t-tests on PCI Values**

| Road | Milepost | Group | t | $t_{Critical}$ | Decision |
|---|---|---|---|---|---|
| I-80 | 92.4 | 1 vs 2 | 0.993 | 2.179 | Identical |
| | | 2 vs 3 | -0.224 | 2.201 | Identical |
| | | 1 vs 3 | 0.897 | 2.201 | Identical |
| I-80W | 258.6[1] | 2 vs 3 | 0.913 | 2.093 | Identical |
| I-80W | 212.4[1] | 2 vs 3 | -0.695 | 2.365 | Identical |
| I-80E | 212.4[2] | 1 vs 3 | 1.342 | 3.182 | Identical |
| | | 2 vs 3 | 0.668 | 2.093 | Identical |
| I-80 | 382.3[3] | 1 vs 2 | 1.748 | 2.026 | Identical |
| I-80 | 372.4 | 1 vs 2 | 1.634 | 2.12 | Identical |
| | | 2 vs 3 | 0.133 | 2.109 | Identical |
| | | 1 vs 3 | 1.788 | 2.262 | Identical |
| I-80 | 378.1 | 1 vs 2 | 1.739 | 2.365 | Identical |
| | | 2 vs 3 | 0.965 | 2.228 | Identical |
| | | 1 vs 3 | 0.595 | 2.201 | Identical |
| I-25 | 185.3 | 1 vs 2 | -0.782 | 2.365 | Identical |
| | | 2 vs 3 | 1.341 | 3.182 | Identical |
| | | 1 vs 3 | -1.789 | 2.306 | Identical |

[1]Only one observation in Group 1
[2]No variance between Group 1 and Group 2
[3]Only two groups

## ANALYSIS ON ASPHALT TEST SECTIONS

A comprehensive data analysis was performed on the asphalt test sections included in the experiment. This analysis consisted of the following steps. First, several charts were prepared to examine the relationship between initial and future IRI measurements. Second, a regression relationship was developed for each chart. Finally, a comprehensive statistical analysis was performed on the data to provide reliable and conclusive results.

### Effect of Initial IRI on Future Roughness

As was described in Chapter 3, the asphalt test sections were grouped based on the year of their initial roughness. Those test sections with initial roughness measurements in 1989 were combined in one group while sections with initial roughness in 1990, 1991, 1992 were combined in three other groups. Next, scatter graphs were developed to determine if there were any obvious trends. These graphs had the initial IRI measurements on the X-axis and the IRI from the comparative year on the Y-axis. Figure 5.3 shows a sample of one of these graphs. Table 5.7 shows the fourteen different combinations of IRI data that were used in preparing the graphs.

Next, a linear regression relationship was developed for each one of the scatter graphs. Although the $R^2$ values of these developed relationships were relatively low, thirteen out of the fourteen graphs showed an upward (positive) trend. The only graph that did not show this upward trend was the 1990 versus 1993 graph which had a negative slope. Upon closer inspection of this data set, a peculiarity was found in the IRI data of one of the projects where the 1993 IRI values were much lower than the values in 1992. The IRI values in 1994 were once again similar to the 1992 level. Therefore, the 1993 data for this project were eliminated from the data set. The scatter graph and regression relationship were redeveloped which resulted in an upward trend similar to all the other graphs. The upward trend on all asphalt test sections support the idea that initial IRI measurements affect future roughness values.

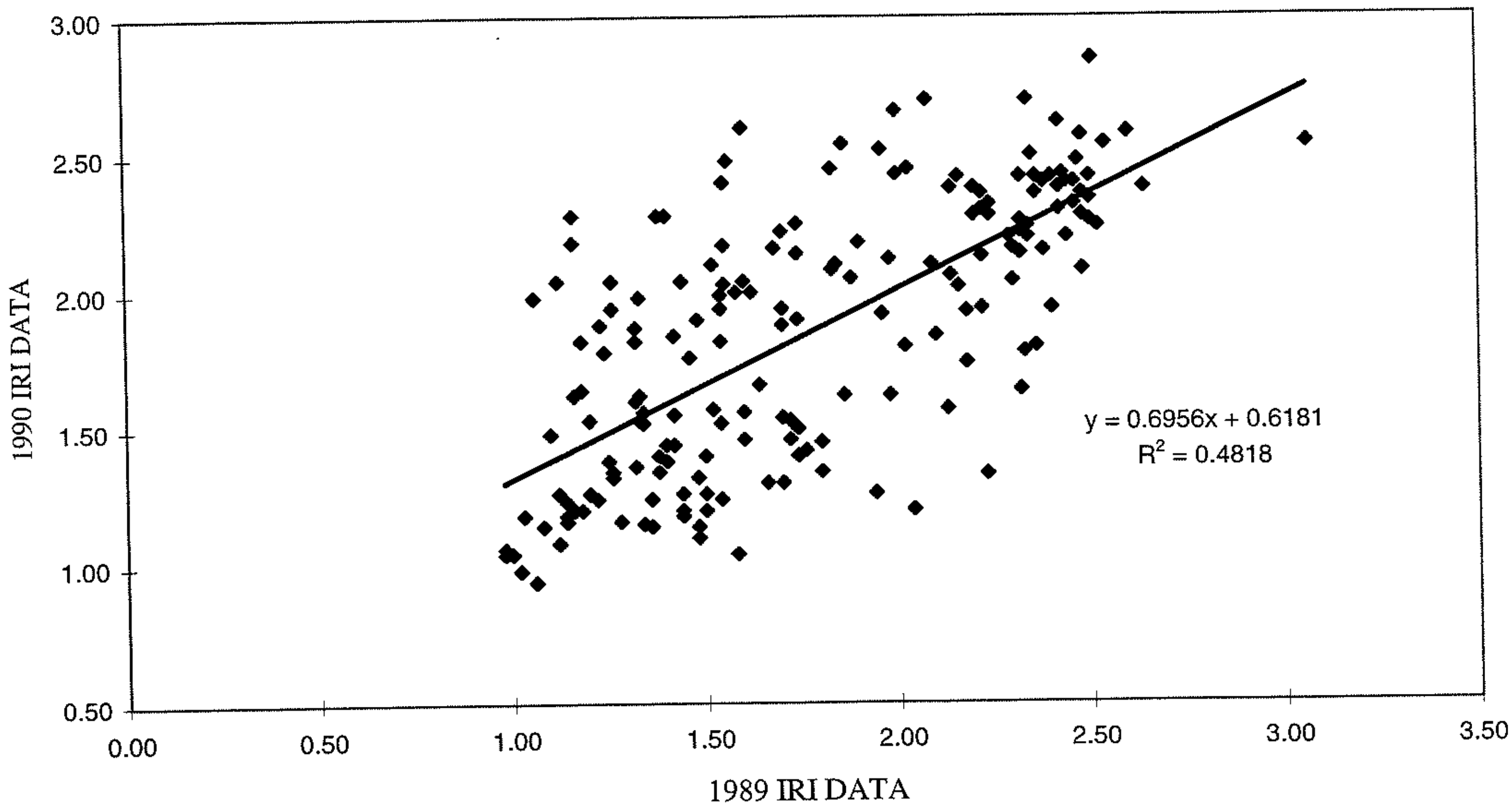



Figure 5.3 Regression Relationship for IRI Meausurements collected in 1989 and 1990

**Table 5.7 IRI Data Used in Preparation of Scatter Graphs.**

| Group # | Date of IRI Measurement | |
|---|---|---|
| | Initial | Later |
| 1 | 1989 | 1990 |
| | 1989 | 1991 |
| | 1989 | 1992 |
| | 1989 | 1993 |
| | 1989 | 1994 |
| 2 | 1990 | 1991 |
| | 1990 | 1992 |
| | 1990 | 1993 |
| | 1990 | 1994 |
| 3 | 1991 | 1992 |
| | 1991 | 1993 |
| | 1991 | 1994 |
| 4 | 1992 | 1993 |
| | 1992 | 1994 |

**Results from Mann-Whitney Tests**

The Mann-Whitney test was performed on the four project groups that were combined based upon the year of their initial IRI measurements. Initially, the test sections within each group were split around the median to obtain approximately the same number of data points in each roughness category. These four medians were later averaged to obtain a single split point for all four project groups. The two roughness categories are shown below:

Smooth: IRI < 1.65

Rough: IRI > 1.65

The Mann-Whitney test was then run using the new split point of 1.65. Thirteen out of the fourteen tests showed the two groups were different. The same problem that was explained in the previous section was found in the 1990 vs 1993 data. The data points for the problem project were removed and the Mann-Whitney test was performed again which resulted in all fourteen tests showing that the two groups were statistically different. This supports the findings from the regression relationships and demonstrates that initial IRI values do affect future roughness values for asphalt pavements. Table 5.8 contains the results from these statistical tests.

**Table 5.8 Results of Mann-Whitney Tests Based on Initial IRI Measurements for Asphalt Pavements.**

| Years | Statistic Analysis Value | Standard Value | Conclusion |
|---|---|---|---|
| 1989 versus 1990 | -7.87 | -1.645 | Different |
| 1989 versus 1991 | -4.90 | -1.645 | Different |
| 1989 versus 1992 | -6.19 | -1.645 | Different |
| 1989 versus 1993 | -6.30 | -1.645 | Different |
| 1989 versus 1994 | -7.02 | -1.645 | Different |
| 1990 versus 1991 | -3.75 | -1.645 | Different |
| 1990 versus 1992 | -2.88 | -1.645 | Different |
| 1990 versus 1993 | -1.66 | -1.645 | Different |
| 1990 versus 1994 | -3.39 | -1.645 | Different |
| 1991 versus 1992 | -4.70 | -1.645 | Different |
| 1991 versus 1993 | -5.49 | -1.645 | Different |
| 1991 versus 1994 | -8.34 | -1.645 | Different |
| 1992 versus 1993 | -2.16 | -1.645 | Different |
| 1992 versus 1994 | -3.21 | -1.645 | Different |

## CHAPTER SUMMARY

In this chapter, the methods utilized in the analysis of the data collected in this research project were presented. These methods included plotting the data, performing Kruskal-Wallis tests or Mann-Whitney tests, performing t-tests, and developing regression models.

Plots of the data were initially developed to determine if any trends could be readily observed. The Mann-Whitney and Kruskal-Wallis tests were performed to determine if there were any statistical differences among the groups. The t-test was performed on the concrete sections to ascertain the effect initial PI had on PCI values. The regression relationships were developed to examine the relationship between initial and later roughness of test sections.

# CHAPTER 6

# CONCLUSIONS AND RECOMMENDATIONS

The main objective of this research project was to examine the effects of initial pavement roughness on future roughness values for both asphalt and concrete pavements. Such examination would help in evaluating current pavement smoothness specifications. As part of this study a nationwide survey dealing with smoothness specifications was performed. A large number of asphalt and concrete test sections in Wyoming were identified for inclusion in the study. For the concrete test sections, initial PI and IRI measurements were compared with later IRI and PCI measurements. The analysis on asphalt pavements compared initial IRI and later IRI measurements. This chapter summarizes the conclusions from the survey and the statistical analysis. Recommendations for future needed studies are also included in this chapter.

## CONCLUSIONS FROM SMOOTHNESS SPECIFICATIONS SURVEY

The nationwide survey contained questions dealing with current smoothness specifications in use by SHAs. In all, forty-five of the fifty SHAs surveyed responded. These responses lead to the following conclusions:

1. There is a great interest among SHAs in the subject of pavement smoothness specifications.
2. Most SHAs use the California-type profilograph to accept pavement smoothness.
3. A small number of SHAs are still using response type devices to accept pavement smoothness.
4. The acceptance limits for pavement smoothness vary greatly among SHAs. Two sections with the same smoothness level may incur a disincentive in one state and an incentive in another state.
5. Most SHAs established their specifications based on engineering judgment rather than research.
6. Most SHAs are highly satisfied with their current smoothness specifications.

## CONCLUSIONS FROM CONCRETE PAVEMENT ANALYSIS

Initial PI and IRI measurements were obtained for each test section to determine its roughness category. IRI and PCI data were also collected on all sections. Several types of analysis were performed on the collected data. Based on this extensive analysis, the following conclusions were drawn:

1. The charts developed indicate that the rate of increase in roughness for concrete sections over the years is not significantly affected by initial PI of concrete pavements.
2. The Kruskal-Wallis and Mann-Whitney tests strongly support the above conclusion at the 95 percent confidence level.
3. The t-test analysis using the PCI values indicate that low initial PI values do not necessarily lengthen the serviceability of road sections.
4. Initial IRI values do affect future roughness measurements for concrete pavements. The Mann-Whitney tests strongly supports this conclusion at the 95 percent confidence level.

It is clear from the above conclusions that SHAs paying incentives for smoother pavements based on initial PI are not receiving the extended pavement life that they expect.

## CONCLUSIONS FROM ASPHALT PAVEMENT ANALYSIS

Twenty-seven asphalt projects were included in this experiment which yielded 884 test sections. The projects were grouped based on the year of their initial IRI data. Initial and later IRI measurements were obtained for each asphalt test section. Graphical and statistical analyses were then performed and the following conclusions were drawn:

1. The charts and regression relationships developed indicate that initial IRI measurements affect future IRI values for asphalt pavements.
2. The Mann-Whitney tests strongly support the above conclusion at the 95 percent confidence interval.

While most SHAs have some sort of smoothness specifications for asphalt sections, most are based upon initial PI values or pavement deviations measured with a straightedge. The findings of this research project indicate that the use of initial IRI measurements may be a better method of acceptance.

## RECOMMENDATIONS.

Based on the results of this research project, the following recommendations are suggested:

1. SHAs should re-examine the policy of paying construction incentives for concrete pavements based on initial PI measurements. It is clear from this research project that initial PI values in the range that is normally accepted do not significantly affect future IRI or PCI values.

2. This study showed that there is a correlation between initial and future IRI measurements for both concrete and asphalt pavements. Since SHAs measure IRI on a yearly basis for use in Pavement Management Systems, it is more practical to use IRI rather than PI measurements for acceptance of pavement smoothness. Therefore, a more controlled study for using IRI instead of PI for accepting pavements should be performed. Such a study would require obtaining the initial IRI measurements of new pavements as soon as possible after construction. More useful conclusions with regard to the acceptance limits based on IRI rather than PI measurements can be then obtained.

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**APPENDIX A**

Profilograph Index Data for Concrete Pavement

| PROJECT NUMBER | ROAD NUMBER | MILEPOST | | PI BEFORE GRINDING | PI AFTER GRINDING |
|---|---|---|---|---|---|
| | | FROM | TO | | |
| MP 92 | I-80E | 92.80 | 92.38 | 4.80 | |
| | I-80E | 93.21 | 92.80 | 2.80 | |
| | I-80E | 93.67 | 93.21 | 2.00 | |
| | I-80E | 94.16 | 93.67 | 3.10 | |
| | I-80E | 94.60 | 94.16 | 1.90 | |
| | I-80E | 94.94 | 94.60 | 6.50 | |
| | I-80E | 95.35 | 94.94 | 9.30 | 7.00 |
| | I-80E | 95.77 | 95.35 | 3.00 | |
| | I-80E | 96.21 | 95.96 | 3.80 | |
| | I-80E | 96.55 | 96.21 | 3.90 | |
| | I-80E | 97.03 | 96.55 | 2.00 | |
| | I-80E | 97.55 | 97.09 | 2.10 | |
| | I-80E | 98.04 | 97.55 | 2.00 | |
| | I-80E | 98.47 | 98.04 | 3.80 | |
| | I-80E | 98.83 | 98.47 | 3.60 | |
| | I-80E | 99.48 | 99.20 | 5.80 | |
| | I-80E | 100.23 | 99.55 | 7.00 | |
| | I-80E | 100.63 | 100.23 | 4.30 | |
| | I-80E | 101.08 | 100.63 | 6.70 | |
| | I-80E | 101.53 | 101.08 | 5.20 | |
| | I-80W | 92.74 | 92.39 | 3.20 | |
| | I-80W | 93.22 | 92.74 | 2.10 | |
| | I-80W | 93.74 | 93.22 | 2.30 | |
| | I-80W | 94.28 | 93.74 | 2.50 | |
| | I-80W | 94.74 | 94.28 | 8.60 | 5.70 |
| | I-80W | 95.12 | 94.74 | 3.60 | |
| | I-80W | 95.57 | 95.12 | 4.60 | |
| | I-80W | 96.13 | 95.57 | 4.00 | |
| | I-80W | 96.74 | 96.13 | 3.30 | |
| | I-80W | 97.04 | 96.74 | 4.50 | |
| | I-80W | 97.62 | 97.09 | 4.80 | |
| | I-80W | 98.04 | 97.62 | 3.00 | |
| | I-80W | 98.36 | 98.04 | 4.50 | |
| | I-80W | 98.84 | 98.36 | 6.10 | |
| | I-80W | 99.34 | 98.93 | 2.80 | |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST | | PI BEFORE GRINDING | PI AFTER GRINDING |
|---|---|---|---|---|---|
| | | FROM | TO | | |
| MP 92 | I-80W | 99.78 | 99.47 | 4.50 | |
| | I-80W | 99.98 | 99.78 | 5.30 | |
| | I-80W | 100.37 | 99.98 | 4.30 | |
| | I-80W | 100.78 | 100.37 | 3.80 | |
| | I-80W | 101.09 | 100.78 | 4.50 | |
| | I-80W | 101.42 | 101.09 | 3.90 | |
| | I-80W | 101.69 | 101.42 | 5.10 | |
| MP 259 | I-80W | 260.76 | 258.99 | 4.79 | |
| | I-80W | 261.93 | 260.76 | 5.50 | |
| | I-80W | 262.32 | 261.93 | 8.67 | 6.70 |
| | I-80W | 263.12 | 262.32 | 4.61 | |
| | I-80W | 263.38 | 263.12 | 1.78 | |
| | I-80W | 263.61 | 263.38 | 9.64 | 6.20 |
| | I-80W | 264.44 | 263.65 | 14.28 | 6.40 |
| | I-80W | 265.46 | 264.44 | 4.10 | |
| | I-80W | 266.25 | 265.46 | 5.61 | |
| | I-80W | 267.15 | 266.25 | 7.75 | 6.25 |
| | I-80W | 267.94 | 267.22 | 5.08 | |
| | I-80W | 268.84 | 267.94 | 3.56 | |
| | I-80W | 269.27 | 268.84 | 6.00 | |
| | I-80W | 270.09 | 269.83 | 4.24 | |
| | I-80W | 271.11 | 270.09 | 6.68 | |
| | I-80W | 271.76 | 271.11 | 7.28 | 5.26 |
| | I-80W | 272.47 | 271.76 | 9.09 | 5.63 |
| | I-80W | 273.01 | 272.53 | 10.63 | 6.48 |
| | I-80W | 273.69 | 273.01 | 10.90 | 6.96 |
| | I-80W | 274.23 | 273.69 | 5.68 | |
| | I-80W | 275.11 | 274.23 | 5.37 | |
| | I-80W | 275.35 | 275.11 | 8.80 | 4.74 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST | | PI BEFORE GRINDING | PI AFTER GRINDING |
|---|---|---|---|---|---|
| | | FROM | TO | | |
| MP 212W | I-80W | 212.71 | 212.45 | 4.18 | |
| | I-80W | 213.07 | 212.77 | 3.58 | |
| | I-80W | 213.37 | 213.07 | 2.78 | |
| | I-80W | 213.69 | 213.37 | 3.47 | |
| | I-80W | 214.07 | 213.84 | 9.42 | 5.43 |
| | I-80W | 214.26 | 214.07 | 7.81 | 5.53 |
| | I-80W | 214.68 | 214.26 | 13.09 | 5.72 |
| | I-80W | 214.95 | 214.68 | 4.34 | |
| | I-80W | 215.17 | 214.95 | 7.94 | 5.50 |
| | I-80W | 216.18 | 215.89 | 12.90 | 5.54 |

| | | | | | |
|---|---|---|---|---|---|
| MP 212E | I-80E | 212.44 | 212.70 | 5.00 | |
| | I-80E | 212.76 | 213.10 | 2.13 | |
| | I-80E | 213.10 | 213.59 | 2.14 | |
| | I-80E | 213.59 | 213.85 | 5.68 | |
| | I-80E | 213.85 | 214.30 | 4.03 | |
| | I-80E | 214.35 | 214.76 | 4.75 | |
| | I-80E | 214.76 | 215.16 | 1.85 | |
| | I-80E | 215.22 | 216.02 | 8.03 | 6.27 |

| | | | | | |
|---|---|---|---|---|---|
| MP 382 | I-80W | 383.35 | 382.91 | 0.71 | |
| | I-80W | 383.75 | 383.38 | 2.23 | |
| | I-80W | 384.44 | 383.75 | 1.72 | |
| | I-80W | 384.95 | 384.44 | 1.05 | |
| | I-80W | 385.48 | 384.95 | 1.24 | |
| | I-80W | 386.00 | 385.48 | 2.05 | |
| | I-80W | 386.36 | 386.00 | 0.50 | |
| | I-80W | 386.90 | 386.42 | 1.11 | |
| | I-80W | 387.32 | 386.90 | 1.22 | |
| | I-80W | 387.78 | 387.32 | 0.81 | |
| | I-80W | 388.41 | 387.80 | 3.51 | |
| | I-80W | 388.97 | 388.41 | 2.92 | |
| | I-80W | 389.23 | 388.97 | 3.07 | |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST | | PI BEFORE GRINDING | PI AFTER GRINDING |
|---|---|---|---|---|---|
| | | FROM | TO | | |
| MP 382 | I-80W | 389.74 | 389.23 | 2.19 | |
| | I-80W | 390.45 | 389.74 | 2.00 | |
| | I-80W | 391.00 | 390.45 | 1.44 | |
| | I-80W | 391.35 | 391.00 | 2.64 | |
| | I-80W | 392.02 | 391.41 | 1.61 | |
| | I-80W | 392.54 | 392.02 | 1.26 | |
| | I-80W | 393.07 | 392.54 | 1.52 | |
| | I-80W | 393.37 | 393.07 | 1.59 | |
| | I-80E | 382.00 | 382.48 | 1.01 | |
| | I-80E | 382.91 | 382.29 | 4.27 | |
| | I-80E | 382.48 | 383.06 | 1.28 | |
| | I-80E | 383.06 | 384.10 | 0.90 | |
| | I-80E | 384.10 | 384.77 | 0.62 | |
| | I-80E | 384.77 | 385.46 | 1.33 | |
| | I-80E | 385.46 | 386.10 | 1.94 | |
| | I-80E | 386.10 | 386.80 | 1.36 | |
| | I-80E | 386.80 | 387.78 | 0.87 | |
| | I-80E | 387.79 | 388.18 | 3.80 | |
| | I-80E | 388.72 | 388.17 | 2.15 | |
| | I-80E | 388.74 | 389.86 | 2.06 | |
| | I-80E | 389.85 | 390.34 | 2.33 | |
| | I-80E | 390.34 | 390.55 | 1.93 | |
| | I-80E | 390.55 | 391.35 | 2.76 | |
| | I-80E | 391.41 | 391.90 | 2.68 | |
| | I-80E | 392.54 | 392.03 | 1.40 | |
| | I-80E | 392.54 | 393.37 | 1.86 | |

| | | | | | |
|---|---|---|---|---|---|
| MP 372 | I-80E | 373.05 | 372.42 | 3.76 | |
| | I-80E | 373.50 | 373.05 | 4.04 | |
| | I-80E | 373.94 | 373.50 | 3.47 | |
| | I-80E | 374.45 | 373.94 | 3.43 | |
| | I-80E | 374.96 | 374.45 | 6.17 | |
| | I-80E | 375.35 | 374.96 | 5.09 | |
| | I-80E | 376.03 | 375.40 | 3.72 | |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST FROM | MILEPOST TO | PI BEFORE GRINDING | PI AFTER GRINDING |
|---|---|---|---|---|---|
| MP 372 | I-80E | 376.59 | 376.03 | 6.06 | |
| | I-80E | 377.05 | 376.59 | 3.30 | |
| | I-80E | 377.33 | 377.14 | 3.30 | |
| | I-80E | 377.56 | 377.37 | 12.81 | 6.78 |
| | I-80E | 377.86 | 377.62 | 4.78 | |
| | I-80E | 378.07 | 377.86 | 7.96 | 6.80 |
| | I-80W | 373.00 | 372.42 | 1.98 | |
| | I-80W | 373.50 | 373.00 | 1.89 | |
| | I-80W | 373.97 | 373.50 | 2.44 | |
| | I-80W | 374.30 | 373.97 | 3.99 | |
| | I-80W | 374.88 | 374.30 | 3.79 | |
| | I-80W | 375.35 | 374.88 | 4.08 | |
| | I-80W | 375.80 | 375.40 | 5.85 | |
| | I-80W | 376.35 | 375.80 | 3.38 | |
| | I-80W | 376.91 | 376.34 | 3.01 | |
| | I-80W | 377.33 | 377.14 | 1.25 | |
| | I-80W | 377.37 | 377.57 | 5.30 | |
| | I-80W | 378.07 | 377.62 | 2.93 | |

| | | | | | |
|---|---|---|---|---|---|
| MP 378 | I-80E | 378.09 | 378.36 | 3.23 | |
| | I-80E | 378.36 | 379.00 | 5.62 | |
| | I-80E | 379.00 | 379.67 | 5.31 | |
| | I-80E | 379.67 | 380.34 | 3.85 | |
| | I-80E | 380.38 | 380.82 | 4.60 | |
| | I-80E | 380.82 | 381.55 | 5.07 | |
| | I-80E | 381.55 | 381.99 | 5.42 | |
| | I-80W | 378.09 | 378.36 | 9.15 | 4.20 |
| | I-80W | 378.36 | 378.65 | 7.73 | 5.16 |
| | I-80W | 378.65 | 378.94 | 5.56 | |
| | I-80W | 378.94 | 379.35 | 2.39 | |
| | I-80W | 379.35 | 379.91 | 2.48 | |
| | I-80W | 379.91 | 380.34 | 1.60 | |
| | I-80W | 380.38 | 380.85 | 2.34 | |
| | I-80W | 380.85 | 381.39 | 3.74 | |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST | | PI BEFORE GRINDING | PI AFTER GRINDING |
|---|---|---|---|---|---|
| | | FROM | TO | | |
| MP 378 | I-80W | 381.39 | 382.01 | 2.81 | |
| | I-80W | 382.01 | 382.27 | 7.06 | 4.13 |

| | | | | | |
|---|---|---|---|---|---|
| MP 185 | I-25S | 185.65 | 185.38 | 0.37 | |
| | I-25S | 186.42 | 185.95 | 1.35 | |
| | I-25S | 186.66 | 186.41 | 17.35 | 7.00 |
| | I-25S | 187.05 | 186.70 | 5.20 | |
| | I-25S | 187.48 | 187.05 | 1.45 | |
| | I-25S | 187.97 | 187.57 | 5.50 | |
| | I-25S | 188.14 | 187.80 | 4.37 | |
| | I-25N | 185.65 | 185.38 | 0.50 | |
| | I-25N | 186.40 | 186.03 | 3.29 | |
| | I-25N | 187.10 | 186.60 | 0.07 | |
| | I-25N | 187.45 | 187.10 | 0.85 | |
| | I-25N | 188.10 | 187.58 | 0.98 | |

## APPENDIX B

Roughness Data for Concrete Pavement

| PROJECT NUMBER | ROAD NUMBER | MILEPOST | | IRI | | | |
|---|---|---|---|---|---|---|---|
| | | FROM | TO | 1989 | 1990 | 1991 | 1992 |
| MP92 | I-80E | 92.80 | 92.38 | 2.00 | 1.96 | 2.70 | 1.82 |
| | I-80E | 93.21 | 92.80 | 1.60 | 1.70 | 2.23 | 1.60 |
| | I-80E | 93.67 | 93.21 | 1.82 | 1.82 | 2.64 | 1.72 |
| | I-80E | 94.16 | 93.67 | 1.68 | 1.73 | 2.48 | 1.75 |
| | I-80E | 94.60 | 94.16 | 2.05 | 2.00 | 3.48 | 2.05 |
| | I-80E | 94.94 | 94.60 | 2.30 | 2.27 | 3.10 | 2.47 |
| | I-80E | 95.35 | 94.94 | 1.70 | 1.63 | 2.03 | 1.73 |
| | I-80E | 95.77 | 95.35 | 1.46 | 1.50 | 2.78 | 1.42 |
| | I-80E | 96.21 | 95.96 | 1.33 | 1.30 | 1.77 | 1.40 |
| | I-80E | 96.55 | 96.21 | 1.60 | 1.77 | 2.60 | 1.90 |
| | I-80E | 97.03 | 96.55 | 1.56 | 1.66 | 2.64 | 1.74 |
| | I-80E | 97.55 | 97.09 | 1.30 | 1.45 | 1.92 | 1.33 |
| | I-80E | 98.04 | 97.55 | 1.36 | 1.30 | 2.40 | 1.34 |
| | I-80E | 98.47 | 98.04 | 1.54 | 1.58 | 2.66 | 1.58 |
| | I-80E | 98.83 | 98.47 | 1.40 | 1.33 | 1.93 | 1.50 |
| | I-80E | 99.48 | 99.20 | 1.73 | 1.70 | 2.53 | 2.13 |
| | I-80E | 100.23 | 99.55 | 1.77 | 1.89 | 2.71 | 2.20 |
| | I-80E | 100.63 | 100.23 | 1.50 | 1.48 | 2.13 | 1.90 |
| | I-80E | 101.08 | 100.63 | 1.64 | 1.64 | 2.14 | 1.90 |
| | I-80E | 101.53 | 101.08 | 1.53 | 1.60 | 1.98 | 1.93 |
| | I-80W | 92.74 | 92.39 | 1.57 | 1.93 | 1.93 | 2.18 |
| | I-80W | 93.22 | 92.74 | 1.54 | 1.95 | 1.73 | 1.95 |
| | I-80W | 93.74 | 93.22 | 1.76 | 2.12 | 2.22 | 2.30 |
| | I-80W | 94.28 | 93.74 | 1.88 | 1.80 | 1.90 | 1.80 |
| | I-80W | 94.74 | 94.28 | 2.14 | 2.26 | 2.32 | 2.46 |
| | I-80W | 95.12 | 94.74 | 1.73 | 1.93 | 1.77 | 1.97 |
| | I-80W | 95.57 | 95.12 | 1.66 | 1.76 | 1.82 | 1.74 |
| | I-80W | 96.13 | 95.57 | 1.88 | 1.92 | 2.10 | 2.12 |
| | I-80W | 96.74 | 96.13 | 1.55 | 1.82 | 1.82 | 2.03 |
| | I-80W | 97.04 | 96.74 | 1.60 | 2.17 | 2.03 | 1.87 |
| | I-80W | 97.62 | 97.09 | 1.86 | 2.28 | 2.16 | 2.12 |
| | I-80W | 98.04 | 97.62 | 1.43 | 2.30 | 1.68 | 1.70 |
| | I-80W | 98.36 | 98.04 | 1.40 | 1.65 | 1.70 | 1.63 |
| | I-80W | 98.84 | 98.36 | 1.80 | 1.88 | 2.06 | 2.04 |
| | I-80W | 99.34 | 98.93 | 1.63 | 1.75 | 1.85 | 1.85 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST FROM | MILEPOST TO | IRI 1989 | IRI 1990 | IRI 1991 | IRI 1992 |
|---|---|---|---|---|---|---|---|
| MP 92 | I-80W | 99.78 | 99.47 | 1.50 | 1.85 | 1.80 | 2.10 |
| | I-80W | 99.98 | 99.78 | 1.55 | 1.60 | 1.50 | 1.50 |
| | I-80W | 100.37 | 99.98 | 1.75 | 2.03 | 1.90 | 1.80 |
| | I-80W | 100.78 | 100.37 | 1.65 | 2.25 | 2.05 | 1.88 |
| | I-80W | 101.09 | 100.78 | 1.93 | 2.00 | 1.83 | 1.77 |
| | I-80W | 101.42 | 101.09 | 1.73 | 1.95 | 1.83 | 1.85 |
| | I-80W | 101.69 | 101.42 | 1.55 | 2.05 | 1.90 | 1.75 |
| MP259 | I-80W | 260.76 | 258.99 | | | 1.73 | 2.70 |
| | I-80W | 261.93 | 260.76 | | | 1.63 | 2.88 |
| | I-80W | 262.32 | 261.93 | | | 2.05 | 2.93 |
| | I-80W | 263.12 | 262.32 | | | 1.75 | 3.10 |
| | I-80W | 263.38 | 263.12 | | | 2.13 | 2.60 |
| | I-80W | 263.61 | 263.38 | | | 3.40 | 2.50 |
| | I-80W | 264.44 | 263.65 | | | 1.76 | 2.18 |
| | I-80W | 265.46 | 264.44 | | | 1.58 | 2.23 |
| | I-80W | 266.25 | 265.46 | | | 2.01 | 2.93 |
| | I-80W | 267.15 | 266.25 | | | 1.78 | 2.70 |
| | I-80W | 267.94 | 267.22 | | | 1.56 | 2.44 |
| | I-80W | 268.84 | 267.94 | | | 1.34 | 2.74 |
| | I-80W | 269.27 | 268.84 | | | 1.88 | 3.00 |
| | I-80W | 270.09 | 269.83 | | | 2.10 | 2.83 |
| | I-80W | 271.11 | 270.09 | | | 1.76 | 2.72 |
| | I-80W | 271.76 | 271.11 | | | 1.79 | 3.04 |
| | I-80W | 272.47 | 271.76 | | | 2.09 | 3.10 |
| | I-80W | 273.01 | 272.53 | | | 2.54 | 3.30 |
| | I-80W | 273.69 | 273.01 | | | 1.89 | 3.00 |
| | I-80W | 274.23 | 273.69 | | | 1.50 | 2.50 |
| | I-80W | 275.11 | 274.23 | | | 1.47 | 2.72 |
| | I-80W | 275.35 | 275.11 | | | 2.05 | 3.25 |

Blank Cell or N/A indicates data not available
or section not built yet.

| PROJECT NUMBER | ROAD NUMBER | MILEPOST | | IRI | | | |
|---|---|---|---|---|---|---|---|
| | | FROM | TO | 1989 | 1990 | 1991 | 1992 |
| MP212W | I-80W | 212.71 | 212.45 | | | 1.73 | 2.47 |
| | I-80W | 213.07 | 212.77 | | | 1.30 | 2.27 |
| | I-80W | 213.37 | 213.07 | | | 1.20 | 2.07 |
| | I-80W | 213.69 | 213.37 | | | 1.27 | 2.80 |
| | I-80W | 214.07 | 213.84 | | | 1.57 | 2.70 |
| | I-80W | 214.26 | 214.07 | | | 1.55 | 2.65 |
| | I-80W | 214.68 | 214.26 | | | 1.40 | 2.75 |
| | I-80W | 214.95 | 214.68 | | | 1.67 | 3.37 |
| | I-80W | 215.17 | 214.95 | | | 1.95 | 3.60 |
| | I-80W | 216.18 | 215.89 | | | 1.47 | 1.73 |
| MP212E | I-80E | 212.44 | 212.70 | | | | 1.77 |
| | I-80E | 212.76 | 213.10 | | | | 1.43 |
| | I-80E | 213.10 | 213.59 | | | | 1.08 |
| | I-80E | 213.59 | 213.85 | | | | 1.87 |
| | I-80E | 213.85 | 214.30 | | | | 1.58 |
| | I-80E | 214.35 | 214.76 | | | | 1.48 |
| | I-80E | 214.76 | 215.16 | | | | 1.68 |
| | I-80E | 215.22 | 216.02 | | | | 1.84 |
| MP382 | I-80W | 383.35 | 382.91 | 1.68 | 2.22 | 2.34 | 1.88 |
| | I-80W | 383.75 | 383.38 | 1.70 | 2.58 | 2.30 | 1.84 |
| | I-80W | 384.44 | 383.75 | 1.60 | 2.36 | 2.13 | 1.81 |
| | I-80W | 384.95 | 384.44 | 1.46 | 2.52 | 2.30 | 1.84 |
| | I-80W | 385.48 | 384.95 | 1.48 | 2.52 | 1.98 | 1.74 |
| | I-80W | 386.00 | 385.48 | 1.72 | 2.64 | 2.36 | 1.96 |
| | I-80W | 386.36 | 386.00 | 1.53 | 2.50 | 1.85 | 1.78 |
| | I-80W | 386.90 | 386.42 | 1.48 | 2.28 | 1.80 | 1.76 |
| | I-80W | 387.32 | 386.90 | 1.63 | 2.45 | 2.23 | 1.93 |
| | I-80W | 387.78 | 387.32 | 1.52 | 2.36 | 1.86 | 1.74 |
| | I-80W | 388.41 | 387.80 | 1.92 | 2.77 | 1.98 | 2.00 |
| | I-80W | 388.97 | 388.41 | 1.55 | 2.45 | 1.57 | 1.65 |
| | I-80W | 389.23 | 388.97 | 1.60 | 2.60 | 1.75 | 1.65 |
| | I-80W | 389.74 | 389.23 | 1.52 | 2.28 | 1.50 | 1.56 |
| | I-80W | 390.45 | 389.74 | 1.53 | 2.26 | 1.73 | 1.53 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST | | IRI | | | |
|---|---|---|---|---|---|---|---|
| | | FROM | TO | 1989 | 1990 | 1991 | 1992 |
| MP 382 | I-80W | 391.00 | 390.45 | 1.53 | 2.30 | 1.58 | 1.50 |
| | I-80W | 391.35 | 391.00 | 1.60 | 2.13 | 1.78 | 1.68 |
| | I-80W | 392.02 | 391.41 | 1.48 | 2.35 | 1.68 | 1.65 |
| | I-80W | 392.54 | 392.02 | 1.42 | 2.02 | 1.60 | 1.54 |
| | I-80W | 393.07 | 392.54 | 1.38 | 2.25 | 1.55 | 1.62 |
| | I-80W | 393.37 | 393.07 | 1.43 | 2.73 | 1.93 | 1.73 |
| | I-80E | 382.00 | 382.48 | N/A | 1.26 | 1.40 | 1.63 |
| | I-80E | 382.91 | 382.29 | N/A | 1.40 | 1.40 | 1.62 |
| | I-80E | 382.48 | 383.06 | N/A | 1.42 | 1.42 | 1.68 |
| | I-80E | 383.06 | 384.10 | 1.53 | 1.44 | 1.51 | 1.67 |
| | I-80E | 384.10 | 384.77 | 1.33 | 1.24 | 1.37 | 1.56 |
| | I-80E | 384.77 | 385.46 | 1.35 | 1.28 | 1.23 | 1.42 |
| | I-80E | 385.46 | 386.10 | 1.47 | 1.37 | 1.50 | 1.70 |
| | I-80E | 386.10 | 386.80 | 1.41 | 1.39 | 1.44 | 1.61 |
| | I-80E | 386.80 | 387.78 | 1.38 | 1.34 | 1.39 | 1.62 |
| | I-80E | 387.79 | 388.18 | 1.65 | 1.58 | 1.63 | 1.80 |
| | I-80E | 388.72 | 388.17 | 1.60 | 1.62 | 1.62 | 1.72 |
| | I-80E | 388.74 | 389.86 | 1.48 | 1.47 | 1.48 | 1.69 |
| | I-80E | 389.85 | 390.34 | 1.38 | 1.40 | 1.38 | 1.65 |
| | I-80E | 390.34 | 390.55 | 1.40 | 1.45 | 1.40 | 1.65 |
| | I-80E | 390.55 | 391.35 | 1.50 | 1.39 | 1.39 | 1.58 |
| | I-80E | 391.41 | 391.90 | 1.50 | 1.50 | 1.58 | 1.70 |
| | I-80E | 392.54 | 392.03 | 1.44 | 1.34 | 1.42 | 1.52 |
| | I-80E | 392.54 | 393.37 | 1.38 | 1.27 | 1.28 | 1.46 |
| MP372 | I-80E | 373.05 | 372.42 | 1.65 | 1.58 | 1.60 | 1.87 |
| | I-80E | 373.50 | 373.05 | 1.64 | 1.46 | 1.58 | 1.70 |
| | I-80E | 373.94 | 373.50 | 1.68 | 1.58 | 1.53 | 1.70 |
| | I-80E | 374.45 | 373.94 | 1.57 | 1.43 | 1.48 | 1.65 |
| | I-80E | 374.96 | 374.45 | 1.75 | 1.63 | 1.72 | 1.95 |
| | I-80E | 375.35 | 374.96 | 1.70 | 1.60 | 1.63 | 1.80 |
| | I-80E | 376.03 | 375.40 | 1.65 | 1.58 | 1.58 | 1.70 |
| | I-80E | 376.59 | 376.03 | 1.55 | 1.45 | 1.48 | 1.63 |
| | I-80E | 377.05 | 376.59 | N/A | 1.58 | 1.73 | 2.00 |
| | I-80E | 377.33 | 377.14 | N/A | 1.50 | 1.45 | 1.55 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST | | IRI | | | |
|---|---|---|---|---|---|---|---|
| | | FROM | TO | 1989 | 1990 | 1991 | 1992 |
| MP 372 | I-80E | 377.56 | 377.37 | N/A | 2.15 | 2.20 | 2.20 |
| | I-80E | 377.86 | 377.62 | N/A | 1.35 | 1.50 | 1.80 |
| | I-80E | 378.07 | 377.86 | N/A | 1.75 | 1.85 | 2.20 |
| | I-80W | 373.00 | 372.42 | 1.43 | 2.56 | 1.83 | 1.55 |
| | I-80W | 373.50 | 373.00 | 1.76 | 2.58 | 2.24 | 1.72 |
| | I-80W | 373.97 | 373.50 | 1.86 | 2.50 | 2.00 | 1.64 |
| | I-80W | 374.30 | 373.97 | 1.70 | 2.53 | 1.73 | 1.60 |
| | I-80W | 374.88 | 374.30 | 2.13 | 2.67 | 2.10 | 1.82 |
| | I-80W | 375.35 | 374.88 | 1.88 | 2.52 | 2.08 | 1.96 |
| | I-80W | 375.80 | 375.40 | 2.45 | 2.90 | 2.88 | 2.10 |
| | I-80W | 376.35 | 375.80 | 2.10 | 2.52 | 2.10 | 1.60 |
| | I-80W | 376.91 | 376.34 | 2.05 | 2.67 | 2.12 | 1.80 |
| | I-80W | 377.33 | 377.14 | 2.45 | 2.55 | 3.05 | 2.07 |
| | I-80W | 377.37 | 377.57 | 2.40 | 2.70 | 2.60 | 2.05 |
| | I-80W | 378.07 | 377.62 | 1.94 | 2.48 | 2.40 | 1.64 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MP378 | I-80E | 378.09 | 378.36 | N/A | 1.20 | 1.33 | 1.60 |
| | I-80E | 378.36 | 379.00 | N/A | 1.14 | 1.43 | 1.68 |
| | I-80E | 379.00 | 379.67 | N/A | 1.19 | 1.27 | 1.59 |
| | I-80E | 379.67 | 380.34 | N/A | 1.33 | 1.44 | 1.77 |
| | I-80E | 380.38 | 380.82 | N/A | 1.48 | 1.53 | 1.65 |
| | I-80E | 380.82 | 381.55 | N/A | 1.27 | 1.34 | 1.57 |
| | I-80E | 381.55 | 381.99 | N/A | 1.36 | 1.40 | 1.60 |
| | I-80W | 378.09 | 378.36 | 1.57 | 2.27 | 1.73 | 1.53 |
| | I-80W | 378.36 | 378.65 | 1.57 | 2.47 | 1.80 | 1.50 |
| | I-80W | 378.65 | 378.94 | 1.35 | 2.45 | 2.10 | 1.35 |
| | I-80W | 378.94 | 379.35 | 1.38 | 2.40 | 2.10 | 1.35 |
| | I-80W | 379.35 | 379.91 | 1.36 | 2.20 | 2.04 | 1.38 |
| | I-80W | 379.91 | 380.34 | 1.44 | 2.20 | 2.20 | 1.40 |
| | I-80W | 380.38 | 380.85 | 1.40 | 2.00 | 1.70 | 1.36 |
| | I-80W | 380.85 | 381.39 | 1.42 | 2.12 | 2.08 | 1.34 |
| | I-80W | 381.39 | 382.01 | 1.48 | 1.80 | 2.05 | 1.40 |
| | I-80W | 382.01 | 382.27 | 1.43 | 2.37 | 2.20 | 1.47 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST | | IRI | | | |
|---|---|---|---|---|---|---|---|
| | | FROM | TO | 1989 | 1990 | 1991 | 1992 |
| MP185 | I-25S | 185.65 | 185.38 | 1.90 | 1.87 | 1.97 | 1.90 |
| | I-25S | 186.42 | 185.95 | 1.98 | 2.04 | 2.02 | 2.14 |
| | I-25S | 186.66 | 186.41 | 1.80 | 1.95 | 1.90 | 2.15 |
| | I-25S | 187.05 | 186.70 | 1.60 | 1.63 | 1.60 | 1.73 |
| | I-25S | 187.48 | 187.05 | 1.40 | 1.35 | 1.40 | 1.73 |
| | I-25S | 187.97 | 187.57 | 1.55 | 1.72 | 1.55 | 1.60 |
| | I-25S | 188.14 | 187.80 | 1.87 | 2.65 | 1.97 | 1.70 |
| | I-25N | 185.65 | 185.38 | 1.76 | 1.80 | 1.80 | 2.03 |
| | I-25N | 186.40 | 186.03 | 1.73 | 1.60 | N/A | 2.03 |
| | I-25N | 187.10 | 186.60 | 1.66 | 1.72 | N/A | 1.76 |
| | I-25N | 187.45 | 187.10 | 1.47 | 1.50 | 1.77 | 1.95 |
| | I-25N | 188.10 | 187.58 | 1.78 | 1.62 | 1.88 | 1.90 |

# APPENDIX C

Pavement Condition Data for Concrete Pavement

| PROJECT NUMBER | ROAD NUMBER | MILEPOST | | PCI |
|---|---|---|---|---|
| | | FROM | TO | 1993 |
| MP 92 | I-80E | 92.80 | 92.38 | 97 |
| | I-80E | 93.21 | 92.80 | 98 |
| | I-80E | 93.67 | 93.21 | 99 |
| | I-80E | 94.16 | 93.67 | 95 |
| | I-80E | 94.60 | 94.16 | 98 |
| | I-80E | 94.94 | 94.60 | 97 |
| | I-80E | 95.35 | 94.94 | 83 |
| | I-80E | 95.77 | 95.35 | 76 |
| | I-80E | 96.21 | 95.96 | 97 |
| | I-80E | 96.55 | 96.21 | 79 |
| | I-80E | 97.03 | 96.55 | 86 |
| | I-80E | 97.55 | 97.09 | 97 |
| | I-80E | 98.04 | 97.55 | 97 |
| | I-80E | 98.47 | 98.04 | 77 |
| | I-80E | 98.83 | 98.47 | 78 |
| | I-80E | 99.48 | 99.20 | 87 |
| | I-80E | 100.23 | 99.55 | 82 |
| | I-80E | 100.63 | 100.23 | 94 |
| | I-80E | 101.08 | 100.63 | 95 |
| | I-80E | 101.53 | 101.08 | 91 |
| | I-80W | 92.74 | 92.39 | N/A |
| | I-80W | 93.22 | 92.74 | N/A |
| | I-80W | 93.74 | 93.22 | N/A |
| | I-80W | 94.28 | 93.74 | N/A |
| | I-80W | 94.74 | 94.28 | N/A |
| | I-80W | 95.12 | 94.74 | N/A |
| | I-80W | 95.57 | 95.12 | N/A |
| | I-80W | 96.13 | 95.57 | N/A |
| | I-80W | 96.74 | 96.13 | N/A |
| | I-80W | 97.04 | 96.74 | N/A |
| | I-80W | 97.62 | 97.09 | N/A |
| | I-80W | 98.04 | 97.62 | N/A |
| | I-80W | 98.36 | 98.04 | N/A |
| | I-80W | 98.84 | 98.36 | N/A |
| | I-80W | 99.34 | 98.93 | N/A |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST | | PCI |
|---|---|---|---|---|
| | | FROM | TO | 1993 |
| MP 92 | I-80W | 99.78 | 99.47 | N/A |
| | I-80W | 99.98 | 99.78 | N/A |
| | I-80W | 100.37 | 99.98 | N/A |
| | I-80W | 100.78 | 100.37 | N/A |
| | I-80W | 101.09 | 100.78 | N/A |
| | I-80W | 101.42 | 101.09 | N/A |
| | I-80W | 101.69 | 101.42 | N/A |
| MP 259 | I-80W | 260.76 | 258.99 | 99 |
| | I-80W | 261.93 | 260.76 | 98 |
| | I-80W | 262.32 | 261.93 | 98 |
| | I-80W | 263.12 | 262.32 | 98 |
| | I-80W | 263.38 | 263.12 | 98 |
| | I-80W | 263.61 | 263.38 | 98 |
| | I-80W | 264.44 | 263.65 | 98 |
| | I-80W | 265.46 | 264.44 | 97 |
| | I-80W | 266.25 | 265.46 | 98 |
| | I-80W | 267.15 | 266.25 | 97 |
| | I-80W | 267.94 | 267.22 | 97 |
| | I-80W | 268.84 | 267.94 | 95 |
| | I-80W | 269.27 | 268.84 | 93 |
| | I-80W | 270.09 | 269.83 | 96 |
| | I-80W | 271.11 | 270.09 | 93 |
| | I-80W | 271.76 | 271.11 | 97 |
| | I-80W | 272.47 | 271.76 | 94 |
| | I-80W | 273.01 | 272.53 | 95 |
| | I-80W | 273.69 | 273.01 | 97 |
| | I-80W | 274.23 | 273.69 | 95 |
| | I-80W | 275.11 | 274.23 | 88 |
| | I-80W | 275.35 | 275.11 | 97 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST | | PCI |
|---|---|---|---|---|
| | | FROM | TO | 1993 |
| MP 212W | I-80W | 212.71 | 212.45 | 97 |
| | I-80W | 213.07 | 212.77 | 99 |
| | I-80W | 213.37 | 213.07 | 99 |
| | I-80W | 213.69 | 213.37 | 98 |
| | I-80W | 214.07 | 213.84 | 99 |
| | I-80W | 214.26 | 214.07 | 98 |
| | I-80W | 214.68 | 214.26 | 99 |
| | I-80W | 214.95 | 214.68 | 99 |
| | I-80W | 215.17 | 214.95 | 98 |
| | I-80W | 216.18 | 215.89 | 99 |

| | | | | |
|---|---|---|---|---|
| MP 212E | I-80E | 212.44 | 212.70 | 99 |
| | I-80E | 212.76 | 213.10 | 99 |
| | I-80E | 213.10 | 213.59 | 99 |
| | I-80E | 213.59 | 213.85 | 97 |
| | I-80E | 213.85 | 214.30 | 99 |
| | I-80E | 214.35 | 214.76 | 99 |
| | I-80E | 214.76 | 215.16 | 99 |
| | I-80E | 215.22 | 216.02 | 99 |

| | | | | |
|---|---|---|---|---|
| MP 382 | I-80W | 383.35 | 382.91 | 93 |
| | I-80W | 383.75 | 383.38 | 96 |
| | I-80W | 384.44 | 383.75 | 97 |
| | I-80W | 384.95 | 384.44 | 93 |
| | I-80W | 385.48 | 384.95 | 97 |
| | I-80W | 386.00 | 385.48 | 96 |
| | I-80W | 386.36 | 386.00 | 98 |
| | I-80W | 386.90 | 386.42 | 98 |
| | I-80W | 387.32 | 386.90 | 96 |
| | I-80W | 387.78 | 387.32 | 97 |
| | I-80W | 388.41 | 387.80 | 94 |
| | I-80W | 388.97 | 388.41 | 96 |
| | I-80W | 389.23 | 388.97 | 94 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST FROM | MILEPOST TO | PCI 1993 |
|---|---|---|---|---|
| MP 382 | I-80W | 389.74 | 389.23 | 87 |
| | I-80W | 390.45 | 389.74 | 97 |
| | I-80W | 391.00 | 390.45 | 92 |
| | I-80W | 391.35 | 391.00 | 98 |
| | I-80W | 392.02 | 391.41 | 98 |
| | I-80W | 392.54 | 392.02 | 96 |
| | I-80W | 393.07 | 392.54 | 95 |
| | I-80W | 393.37 | 393.07 | 92 |
| | I-80E | 382.00 | 382.48 | 97 |
| | I-80E | 382.91 | 382.29 | 92 |
| | I-80E | 382.48 | 383.06 | 96 |
| | I-80E | 383.06 | 384.10 | 96 |
| | I-80E | 384.10 | 384.77 | 97 |
| | I-80E | 384.77 | 385.46 | 97 |
| | I-80E | 385.46 | 386.10 | 96 |
| | I-80E | 386.10 | 386.80 | 96 |
| | I-80E | 386.80 | 387.78 | 96 |
| | I-80E | 387.79 | 388.18 | 96 |
| | I-80E | 388.72 | 388.17 | 98 |
| | I-80E | 388.74 | 389.86 | 98 |
| | I-80E | 389.85 | 390.34 | 98 |
| | I-80E | 390.34 | 390.55 | 97 |
| | I-80E | 390.55 | 391.35 | 98 |
| | I-80E | 391.41 | 391.90 | 96 |
| | I-80E | 392.54 | 392.03 | 96 |
| | I-80E | 392.54 | 393.37 | 98 |

| | | | | |
|---|---|---|---|---|
| MP 372 | I-80E | 373.05 | 372.42 | 97 |
| | I-80E | 373.50 | 373.05 | 98 |
| | I-80E | 373.94 | 373.50 | 97 |
| | I-80E | 374.45 | 373.94 | 97 |
| | I-80E | 374.96 | 374.45 | 93 |
| | I-80E | 375.35 | 374.96 | 98 |
| | I-80E | 376.03 | 375.40 | 95 |
| | I-80E | 376.59 | 376.03 | 96 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST | | PCI |
|---|---|---|---|---|
| | | FROM | TO | 1993 |
| MP 372 | I-80E | 377.05 | 376.59 | 92 |
| | I-80E | 377.33 | 377.14 | 96 |
| | I-80E | 377.56 | 377.37 | 96 |
| | I-80E | 377.86 | 377.62 | 94 |
| | I-80E | 378.07 | 377.86 | N/A |
| | I-80W | 373.00 | 372.42 | 99 |
| | I-80W | 373.50 | 373.00 | 97 |
| | I-80W | 373.97 | 373.50 | 97 |
| | I-80W | 374.30 | 373.97 | 98 |
| | I-80W | 374.88 | 374.30 | 99 |
| | I-80W | 375.35 | 374.88 | 98 |
| | I-80W | 375.80 | 375.40 | 98 |
| | I-80W | 376.35 | 375.80 | 98 |
| | I-80W | 376.91 | 376.34 | 95 |
| | I-80W | 377.33 | 377.14 | 98 |
| | I-80W | 377.37 | 377.57 | 97 |
| | I-80W | 378.07 | 377.62 | 99 |

| | | | | |
|---|---|---|---|---|
| MP 378 | I-80E | 378.09 | 378.36 | 92 |
| | I-80E | 378.36 | 379.00 | 92 |
| | I-80E | 379.00 | 379.67 | 94 |
| | I-80E | 379.67 | 380.34 | 95 |
| | I-80E | 380.38 | 380.82 | 96 |
| | I-80E | 380.82 | 381.55 | 96 |
| | I-80E | 381.55 | 381.99 | 98 |
| | I-80W | 378.09 | 378.36 | 94 |
| | I-80W | 378.36 | 378.65 | 96 |
| | I-80W | 378.65 | 378.94 | 99 |
| | I-80W | 378.94 | 379.35 | 95 |
| | I-80W | 379.35 | 379.91 | 97 |
| | I-80W | 379.91 | 380.34 | 97 |
| | I-80W | 380.38 | 380.85 | 98 |
| | I-80W | 380.85 | 381.39 | 94 |
| | I-80W | 381.39 | 382.01 | 94 |
| | I-80W | 382.01 | 382.27 | 95 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST FROM | MILEPOST TO | PCI 1993 |
|---|---|---|---|---|
| MP 185 | I-25S | 185.65 | 185.38 | 98 |
| | I-25S | 186.42 | 185.95 | 99 |
| | I-25S | 186.66 | 186.41 | 99 |
| | I-25S | 187.05 | 186.70 | 99 |
| | I-25S | 187.48 | 187.05 | 99 |
| | I-25S | 187.97 | 187.57 | 99 |
| | I-25S | 188.14 | 187.80 | 99 |
| | I-25N | 185.65 | 185.38 | 97 |
| | I-25N | 186.40 | 186.03 | 98 |
| | I-25N | 187.10 | 186.60 | 98 |
| | I-25N | 187.45 | 187.10 | 96 |
| | I-25N | 188.10 | 187.58 | 98 |

# APPENDIX D

Roughness Data for Asphalt Pavement

| PROJECT NUMBER | ROAD NUMBER | MILEPOST | | IRI | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | FROM | TO | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
| MP25-25 | I-25N | 25.71 | 26.21 | | | | 1.97 | 2.36 | 2.08 |
| | I-25N | 26.21 | 26.71 | | | | 2.42 | 2.30 | 2.32 |
| | I-25N | 26.71 | 27.21 | | | | 2.30 | 2.26 | 2.30 |
| | I-25N | 27.21 | 27.78 | | | | 2.24 | 2.34 | 2.34 |
| | I-25N | 27.78 | 28.21 | | | | 2.45 | 2.50 | 2.48 |
| | I-25N | 28.21 | 28.71 | | | | 2.30 | 2.10 | 2.44 |
| | I-25N | 28.71 | 29.21 | | | | 2.36 | 2.22 | 2.10 |
| | I-25N | 29.21 | 29.79 | | | | 2.28 | 1.98 | 1.87 |
| | I-25N | 29.79 | 30.29 | | | | 2.28 | 2.12 | 2.18 |
| | I-25N | 30.29 | 30.75 | | | | 2.48 | 1.85 | 1.68 |
| | I-25S | 26.21 | 26.71 | | | | 2.30 | 2.46 | 2.34 |
| | I-25S | 26.71 | 27.21 | | | | 2.10 | 2.46 | 2.22 |
| | I-25S | 27.21 | 27.78 | | | | 2.40 | 2.42 | 2.27 |
| | I-25S | 27.78 | 28.21 | | | | 2.35 | 2.28 | 2.35 |
| | I-25S | 28.21 | 28.71 | | | | 2.08 | 2.42 | 2.52 |
| | I-25S | 28.71 | 29.21 | | | | 2.40 | 1.74 | 2.34 |
| | I-25S | 29.21 | 29.79 | | | | 2.47 | 1.85 | 2.12 |
| | I-25S | 29.79 | 30.29 | | | | 2.42 | 1.96 | 2.44 |
| | I-25S | 30.29 | 30.75 | | | | 2.38 | 2.38 | 2.38 |
| MP120-25 | I-25N | 120.82 | 121.32 | | | 2.56 | 2.28 | 2.16 | 2.02 |
| | I-25N | 121.32 | 121.82 | | | 2.54 | 2.40 | 2.40 | 2.26 |
| | I-25N | 121.82 | 122.32 | | | 2.54 | 2.64 | 2.48 | 2.14 |
| | I-25N | 122.32 | 122.82 | | | 2.54 | 2.24 | 2.16 | 2.28 |
| | I-25N | 122.82 | 123.32 | | | 2.40 | 2.16 | 2.18 | 1.90 |
| | I-25N | 123.32 | 123.82 | | | 2.76 | 2.80 | 2.66 | 2.66 |
| | I-25N | 123.82 | 124.32 | | | 2.44 | 2.20 | 2.36 | 2.20 |
| | I-25N | 124.32 | 125.12 | | | 2.39 | 2.14 | 2.44 | 2.08 |
| | I-25N | 125.12 | 125.58 | | | 2.94 | 2.56 | 2.80 | 2.50 |
| | I-25N | 125.58 | 126.09 | | | 2.78 | 2.26 | 2.62 | 2.44 |
| | I-25N | 126.09 | 126.47 | | | 2.70 | 2.38 | 2.45 | 1.63 |
| | I-25N | 126.47 | 126.69 | | | 2.45 | 2.10 | 2.15 | 2.15 |
| | I-25S | 120.82 | 121.32 | | | 1.96 | 2.18 | 1.86 | 2.15 |
| | I-25S | 121.32 | 121.82 | | | 2.04 | 2.48 | 1.78 | 2.48 |
| | I-25S | 121.82 | 122.32 | | | 2.26 | 2.56 | 2.22 | 2.66 |
| | I-25S | 122.32 | 122.82 | | | 2.24 | 2.52 | 2.13 | 2.62 |

Blank Cell or N/A indicates data not available or section not built yet.

| PROJECT NUMBER | ROAD NUMBER | MILEPOST FROM | MILEPOST TO | IRI 1989 | IRI 1990 | IRI 1991 | IRI 1992 | IRI 1993 | IRI 1994 |
|---|---|---|---|---|---|---|---|---|---|
| MP120-25 | I-25S | 122.82 | 123.32 | | | 2.14 | 2.62 | 2.10 | 2.42 |
| | I-25S | 123.32 | 123.82 | | | 2.40 | 2.54 | 2.28 | 2.56 |
| | I-25S | 123.82 | 124.32 | | | 2.28 | 2.54 | 2.16 | 2.52 |
| | I-25S | 124.32 | 125.12 | | | 2.04 | 2.35 | 2.05 | 2.16 |
| | I-25S | 125.12 | 125.58 | | | 2.58 | 2.62 | 2.36 | 2.62 |
| | I-25S | 125.58 | 126.09 | | | 2.72 | 2.80 | 2.60 | 2.98 |
| | I-25S | 126.09 | 126.47 | | | 2.33 | 2.48 | 2.45 | 2.53 |
| | I-25S | 126.47 | 126.69 | | | 2.25 | 2.45 | 2.20 | 2.55 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MP39-25 | I-25N | 39.56 | 40.05 | | | 2.76 | 2.58 | 1.90 | 2.65 |
| | I-25N | 40.05 | 40.55 | | | 2.64 | 2.06 | 1.26 | 2.22 |
| | I-25N | 40.55 | 41.05 | | | 2.88 | 2.45 | 1.97 | 2.78 |
| | I-25N | 41.05 | 41.55 | | | 2.66 | 2.30 | 1.62 | 2.48 |
| | I-25N | 41.55 | 42.05 | | | 2.54 | 2.48 | 2.30 | 2.76 |
| | I-25N | 42.05 | 42.55 | | | 2.50 | 2.32 | 1.74 | 2.32 |
| | I-25N | 42.55 | 43.05 | | | 2.62 | 2.23 | 1.73 | 2.33 |
| | I-25N | 43.05 | 43.55 | | | 2.72 | 2.27 | 1.48 | 2.40 |
| | I-25N | 43.55 | 44.05 | | | 2.60 | 2.52 | 1.88 | 2.74 |
| | I-25N | 44.05 | 44.55 | | | 2.00 | 2.20 | 1.64 | 2.36 |
| | I-25N | 44.55 | 45.05 | | | 2.22 | 2.08 | 1.44 | 2.28 |
| | I-25N | 45.05 | 45.55 | | | 2.65 | 2.54 | 2.02 | 2.88 |
| | I-25N | 45.55 | 46.05 | | | 2.04 | 2.36 | 1.66 | 2.50 |
| | I-25N | 46.05 | 46.55 | | | 2.60 | 2.72 | 1.80 | 2.78 |
| | I-25N | 46.55 | 47.15 | | | 2.30 | 2.48 | 1.73 | 2.37 |
| | I-25N | 47.15 | 47.84 | | | 2.54 | 2.36 | 1.70 | 2.37 |
| | I-25S | 39.56 | 40.05 | | 2.02 | 2.48 | 2.60 | 2.50 | 2.63 |
| | I-25S | 40.05 | 40.55 | | 2.10 | 2.42 | 2.48 | 2.58 | 2.43 |
| | I-25S | 40.55 | 41.05 | | 2.20 | 2.56 | 2.36 | 2.64 | 2.83 |
| | I-25S | 41.05 | 41.55 | | 2.10 | 2.48 | 2.28 | 2.48 | 2.58 |
| | I-25S | 41.55 | 42.05 | | 2.10 | 2.54 | 2.40 | 2.66 | 2.74 |
| | I-25S | 42.05 | 42.55 | | 1.42 | 2.04 | 1.80 | 2.42 | 2.34 |
| | I-25S | 42.55 | 43.05 | | 1.63 | 2.50 | 2.18 | 2.38 | 2.45 |
| | I-25S | 43.05 | 43.55 | | 1.46 | 2.28 | 2.16 | 2.34 | 2.44 |
| | I-25S | 43.55 | 44.05 | | 2.20 | 2.58 | 2.22 | 2.56 | 2.60 |
| | I-25S | 44.05 | 44.55 | | 1.70 | 2.26 | 1.86 | 2.24 | 2.56 |
| | I-25S | 44.55 | 45.05 | | 1.98 | 2.50 | 2.04 | 2.32 | 2.58 |
| | I-25S | 45.05 | 45.55 | | 2.12 | 2.90 | 2.18 | 2.34 | 2.76 |
| | I-25S | 45.55 | 46.05 | | 1.80 | 2.44 | 2.22 | 2.54 | 2.30 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST FROM | MILEPOST TO | IRI 1989 | IRI 1990 | IRI 1991 | IRI 1992 | IRI 1993 | IRI 1994 |
|---|---|---|---|---|---|---|---|---|---|
| MP39-25 | I-25S | 46.05 | 46.55 | | 2.36 | 2.56 | 2.24 | 2.38 | 2.50 |
| | I-25S | 46.55 | 47.15 | | 1.72 | 2.62 | 2.33 | 2.52 | 2.37 |
| | I-25S | 47.15 | 47.84 | | 1.51 | 2.29 | 2.20 | 2.33 | 2.47 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MP47-25 | I-25N | 47.84 | 48.34 | | | 1.52 | 2.34 | 2.32 | 2.50 |
| | I-25N | 48.34 | 49.00 | | | 1.06 | 2.39 | 1.79 | 1.90 |
| | I-25N | 49.00 | 49.50 | | | 1.64 | 2.54 | 1.94 | 1.98 |
| | I-25N | 49.50 | 50.00 | | | 1.72 | 2.24 | 1.98 | 1.68 |
| | I-25N | 50.00 | 50.50 | | | 2.04 | 2.40 | 2.16 | 1.60 |
| | I-25N | 50.50 | 51.38 | | | 2.16 | 2.53 | 2.09 | 1.53 |
| | I-25N | 51.38 | 51.64 | | | 1.75 | 2.50 | 1.75 | 1.30 |
| | I-25S | 47.84 | 48.34 | | 1.80 | 2.40 | 2.56 | 2.66 | 2.62 |
| | I-25S | 48.34 | 49.00 | | 2.29 | 2.31 | 2.06 | 2.31 | 2.27 |
| | I-25S | 49.00 | 49.50 | | 2.18 | 2.36 | 2.08 | 2.20 | 2.66 |
| | I-25S | 49.50 | 50.00 | | 2.50 | 2.14 | 1.72 | 1.90 | 2.32 |
| | I-25S | 50.00 | 50.50 | | 2.46 | 2.42 | 2.24 | 2.40 | 2.64 |
| | I-25S | 50.50 | 51.38 | | 2.40 | 2.36 | 2.10 | 2.27 | 2.49 |
| | I-25S | 51.38 | 51.64 | | 2.30 | 2.35 | 2.20 | 2.35 | 2.45 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MP58-25 | I-25N | 58.47 | 58.97 | 1.88 | 2.05 | 1.46 | 2.34 | 2.30 | 1.72 |
| | I-25N | 58.97 | 59.47 | 2.34 | 2.20 | 1.88 | 2.48 | 2.44 | 2.46 |
| | I-25N | 59.47 | 59.97 | 2.36 | 1.80 | 1.88 | 2.38 | 2.40 | 1.96 |
| | I-25N | 59.97 | 60.47 | 1.96 | 1.92 | 1.86 | 2.50 | 2.30 | 2.08 |
| | I-25N | 60.47 | 60.97 | 2.52 | 2.24 | 2.18 | 2.48 | 2.44 | 2.16 |
| | I-25N | 60.97 | 61.47 | 2.48 | 2.08 | 2.74 | 2.46 | 2.24 | 2.30 |
| | I-25N | 61.47 | 61.97 | 2.20 | 2.38 | 2.58 | 2.26 | 2.42 | 2.28 |
| | I-25N | 61.97 | 62.47 | 2.20 | 2.28 | 2.46 | 2.34 | 2.34 | 2.38 |
| | I-25N | 62.47 | 62.97 | 2.32 | 2.26 | 2.28 | 2.50 | 2.30 | 2.40 |
| | I-25N | 62.97 | 63.60 | 2.50 | 2.42 | 2.42 | 2.58 | 2.42 | 2.58 |
| | I-25N | 63.60 | 64.10 | 2.48 | 2.28 | 2.02 | 2.32 | 2.28 | 2.44 |
| | I-25N | 64.10 | 64.60 | 2.36 | 2.42 | 1.84 | 2.44 | 2.38 | 2.48 |
| | I-25N | 64.60 | 65.25 | 2.09 | 2.10 | 1.23 | 2.19 | 1.96 | 1.64 |
| | I-25N | 65.25 | 65.75 | 2.32 | 2.14 | 1.28 | 2.06 | 2.20 | 2.22 |
| | I-25N | 65.75 | 66.25 | 2.16 | 2.02 | 1.46 | 2.23 | 2.43 | 2.28 |
| | I-25N | 66.25 | 66.75 | 2.35 | 2.50 | 3.13 | 2.55 | 2.23 | 2.48 |
| | I-25N | 66.75 | 67.25 | 2.43 | 2.43 | 2.33 | 2.38 | 2.43 | 2.45 |
| | I-25N | 67.25 | 67.75 | 2.14 | 2.06 | 1.90 | 2.44 | 2.26 | 2.38 |
| | I-25N | 67.75 | 68.25 | 2.22 | 2.36 | 1.93 | 2.65 | 2.50 | 2.48 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST FROM | MILEPOST TO | IRI 1989 | IRI 1990 | IRI 1991 | IRI 1992 | IRI 1993 | IRI 1994 |
|---|---|---|---|---|---|---|---|---|---|
| MP58-25 | I-25N | 68.25 | 68.97 | 2.33 | 1.78 | 2.40 | 2.53 | 2.27 | 2.45 |
| | I-25S | 58.47 | 58.97 | 2.34 | 2.24 | 2.28 | 2.38 | 2.26 | 2.42 |
| | I-25S | 58.97 | 59.47 | 2.48 | 2.36 | 2.20 | 2.48 | 2.34 | 2.06 |
| | I-25S | 59.47 | 59.97 | 2.46 | 2.40 | 2.32 | 2.38 | 2.20 | 2.46 |
| | I-25S | 59.97 | 60.47 | 2.54 | 2.54 | 2.48 | 2.40 | 2.40 | 2.42 |
| | I-25S | 60.47 | 60.97 | 2.24 | 2.32 | 2.32 | 2.14 | 2.30 | 2.32 |
| | I-25S | 60.97 | 61.47 | 2.36 | 2.36 | 2.26 | 1.72 | 2.46 | 2.32 |
| | I-25S | 61.47 | 61.97 | 2.40 | 1.94 | 2.36 | 1.88 | 2.30 | 1.78 |
| | I-25S | 61.97 | 62.47 | 2.22 | 2.30 | 2.22 | 2.00 | 2.34 | 1.86 |
| | I-25S | 62.47 | 62.97 | 2.46 | 2.32 | 2.00 | 2.42 | 2.66 | 2.18 |
| | I-25S | 62.97 | 63.60 | 2.48 | 2.57 | 2.40 | 2.52 | 2.57 | 2.28 |
| | I-25S | 63.60 | 64.10 | 2.40 | 2.42 | 2.58 | 2.18 | 2.34 | 2.22 |
| | I-25S | 64.10 | 64.60 | 2.64 | 2.38 | 2.60 | 2.76 | 2.52 | 2.68 |
| | I-25S | 64.60 | 65.25 | 2.44 | 2.40 | 2.33 | 2.44 | 2.23 | 2.27 |
| | I-25S | 65.25 | 65.75 | 2.32 | 2.42 | 2.42 | 2.24 | 2.22 | 2.44 |
| | I-25S | 65.75 | 66.25 | 2.32 | 2.22 | 2.44 | 2.44 | 2.60 | 2.44 |
| | I-25S | 66.25 | 66.75 | 3.06 | 2.54 | 2.66 | 2.80 | 2.25 | 2.80 |
| | I-25S | 66.75 | 67.25 | 1.56 | 2.48 | 2.54 | 2.40 | 2.35 | 2.42 |
| | I-25S | 67.25 | 67.75 | 1.96 | 2.52 | 2.30 | 2.56 | 2.38 | 2.38 |
| | I-25S | 67.75 | 68.25 | 2.30 | 2.16 | 2.22 | 2.50 | 2.34 | 2.32 |
| | I-25S | 68.25 | 68.97 | 2.29 | 2.20 | 2.44 | 2.64 | 2.16 | 2.73 |
| | I-25N | 68.97 | 69.47 | | | 2.50 | 2.20 | 2.28 | 1.72 |
| | I-25N | 69.47 | 69.97 | | | 2.24 | 2.20 | 2.06 | 1.92 |
| | I-25N | 69.97 | 70.47 | | | 2.52 | 2.24 | 2.28 | 1.58 |
| | I-25N | 70.47 | 71.34 | | | 2.56 | 2.42 | 2.29 | 1.54 |
| | I-25N | 71.34 | 71.84 | | | 1.88 | 2.48 | 2.24 | 1.72 |
| | I-25N | 71.84 | 72.36 | | | 1.80 | 2.48 | 2.20 | 1.52 |
| | I-25N | 72.36 | 73.03 | | | 1.39 | 2.40 | 1.90 | 1.30 |
| | I-25N | 73.03 | 73.53 | | | 1.93 | 2.53 | 1.80 | 1.44 |
| | I-25N | 73.53 | 74.03 | | | 1.10 | 2.26 | 1.80 | 1.08 |
| | I-25N | 74.03 | 74.53 | | | 1.26 | 2.44 | 1.58 | 1.16 |
| | I-25N | 74.53 | 75.01 | | | 1.30 | 2.42 | 1.72 | 1.20 |
| | I-25S | 68.97 | 69.47 | | | 2.32 | 2.40 | 1.74 | 2.34 |
| | I-25S | 69.47 | 69.97 | | | 2.38 | 2.58 | 2.06 | 2.46 |
| | I-25S | 69.97 | 70.47 | | | 2.22 | 2.42 | 1.76 | 2.46 |
| | I-25S | 70.47 | 71.34 | | | 1.98 | 2.38 | 1.61 | 1.98 |
| | I-25S | 71.34 | 71.84 | | | 1.52 | 2.46 | 1.34 | 1.70 |
| | I-25S | 71.84 | 72.36 | | | 1.74 | 2.26 | 1.64 | 2.04 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST | | IRI | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | FROM | TO | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
| MP68-25 | I-25S | 72.36 | 73.03 | | | 1.51 | 2.62 | 1.63 | 1.60 |
| | I-25S | 73.03 | 73.53 | | | 2.08 | 2.26 | 1.88 | 1.94 |
| | I-25S | 73.53 | 74.03 | | | 2.34 | 2.12 | 1.85 | 2.18 |
| | I-25S | 74.03 | 74.53 | | | 2.00 | 1.92 | 2.08 | 2.16 |
| | I-25S | 74.53 | 75.01 | | | 2.08 | 2.12 | 2.06 | 2.46 |
| MP94-25 | I-25N | 94.84 | 95.09 | 1.60 | 2.60 | 1.60 | 1.50 | 1.00 | 1.30 |
| | I-25N | 95.09 | 95.59 | 2.13 | 1.57 | 1.27 | 1.50 | 1.66 | 1.44 |
| | I-25N | 95.59 | 96.09 | 1.70 | 2.22 | 1.66 | 1.50 | 2.06 | 1.70 |
| | I-25N | 96.09 | 96.59 | 2.34 | 2.70 | 1.84 | 2.06 | 2.46 | 2.60 |
| | I-25N | 96.59 | 97.09 | 1.18 | 1.82 | 1.72 | 1.46 | 2.06 | 2.28 |
| | I-25N | 97.09 | 97.59 | 1.44 | 2.04 | 1.44 | 1.18 | 2.08 | 1.52 |
| | I-25N | 97.59 | 98.09 | 1.06 | 1.98 | 1.44 | 1.28 | 2.16 | 1.60 |
| | I-25N | 98.09 | 98.59 | 1.12 | 2.04 | 1.84 | 1.68 | 2.06 | 1.88 |
| | I-25N | 98.59 | 99.09 | 1.16 | 2.28 | 1.20 | 1.34 | 1.26 | 1.86 |
| | I-25N | 99.09 | 99.59 | 1.26 | 2.04 | 1.52 | 1.48 | 2.26 | 1.92 |
| | I-25N | 99.59 | 100.13 | 1.26 | 1.94 | 0.94 | 1.12 | 1.10 | 1.56 |
| | I-25S | 94.84 | 95.09 | 1.55 | 2.40 | 1.95 | 1.25 | 1.35 | 1.30 |
| | I-25S | 95.09 | 95.59 | 1.83 | 2.45 | 1.95 | 1.56 | 1.72 | 1.74 |
| | I-25S | 95.59 | 96.09 | 2.14 | 2.38 | 2.38 | 2.12 | 1.86 | 1.90 |
| | I-25S | 96.09 | 96.59 | 2.38 | 2.15 | 2.58 | 2.12 | 2.10 | 2.16 |
| | I-25S | 96.59 | 97.09 | 1.90 | 2.18 | 2.08 | 1.68 | 1.92 | 1.52 |
| | I-25S | 97.09 | 97.59 | 1.74 | 1.90 | 2.16 | 2.04 | 1.62 | 1.50 |
| | I-25S | 97.59 | 98.09 | 2.18 | 1.74 | 2.28 | 2.22 | 1.94 | 1.76 |
| | I-25S | 98.09 | 98.59 | 2.30 | 2.04 | 2.42 | 2.46 | 2.18 | 2.40 |
| | I-25S | 98.59 | 99.09 | 1.98 | 2.12 | 2.12 | 2.30 | 1.90 | 1.84 |
| | I-25S | 99.09 | 99.59 | 1.62 | 2.00 | 1.38 | 1.76 | 1.58 | 1.48 |
| | I-25S | 99.59 | 100.13 | 1.16 | 2.18 | 1.78 | 1.50 | 1.80 | 2.04 |
| MP141-25 | I-25N | 141.42 | 141.92 | | 2.60 | 2.17 | 2.04 | 2.42 | 2.04 |
| | I-25N | 141.92 | 142.42 | | 1.67 | 1.71 | 1.68 | 2.06 | 1.62 |
| | I-25N | 142.42 | 142.91 | | 1.78 | 1.68 | 1.86 | 2.30 | 1.96 |
| | I-25N | 142.91 | 143.41 | | 1.46 | 1.32 | 1.46 | 2.04 | 1.60 |
| | I-25N | 143.41 | 144.04 | | 1.48 | 1.25 | 1.55 | 2.02 | 1.45 |
| | I-25N | 144.04 | 144.54 | | 1.18 | 1.38 | 1.64 | 1.88 | 1.24 |
| | I-25N | 144.54 | 145.04 | | 1.24 | 1.52 | 1.48 | 1.96 | 1.38 |
| | I-25N | 145.04 | 145.78 | | 1.54 | 1.98 | 1.54 | 1.95 | 1.45 |
| | I-25N | 145.78 | 146.00 | | 2.05 | 2.35 | 1.90 | 2.40 | 2.10 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST | | IRI | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | FROM | TO | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
| MP141-25 | I-25N | 146.00 | 146.50 | | 2.28 | 2.38 | 2.28 | 2.60 | 2.10 |
| | I-25N | 146.50 | 147.00 | | 2.08 | 1.65 | 1.73 | 2.20 | 1.40 |
| | I-25N | 147.00 | 147.50 | | 1.88 | 2.16 | 1.88 | 2.22 | 1.62 |
| | I-25N | 147.50 | 148.00 | | 1.64 | 2.22 | 1.88 | 2.58 | 1.68 |
| | I-25N | 148.00 | 148.50 | | 2.18 | 2.28 | 1.94 | 2.50 | 1.92 |
| | I-25N | 148.50 | 149.00 | | 1.32 | 1.32 | 1.34 | 2.24 | 1.98 |
| | I-25N | 149.00 | 149.50 | | 1.18 | 1.30 | 1.46 | 2.16 | 1.48 |
| | I-25N | 149.50 | 150.00 | | 1.64 | 1.64 | 1.54 | 2.54 | 1.62 |
| | I-25N | 150.00 | 150.50 | | 1.52 | 1.74 | 1.52 | 2.26 | 1.64 |
| | I-25N | 150.50 | 151.00 | | 1.54 | 1.60 | 1.34 | 2.42 | 1.58 |
| | I-25N | 151.00 | 151.84 | | 1.63 | 1.73 | 1.65 | 1.79 | 1.75 |
| | I-25N | 151.84 | 152.34 | | 2.28 | 1.58 | 1.40 | 1.32 | 2.04 |
| | I-25N | 152.34 | 152.82 | | 1.62 | 1.52 | 1.66 | 2.24 | 2.20 |
| | I-25S | 141.42 | 141.97 | | 2.83 | 2.58 | 2.05 | 1.80 | 1.98 |
| | I-25S | 141.97 | 142.47 | | 2.30 | 1.74 | 1.71 | 1.50 | 1.46 |
| | I-25S | 142.47 | 142.97 | | 2.06 | 2.18 | 1.73 | 1.54 | 1.52 |
| | I-25S | 142.97 | 143.47 | | 2.28 | 1.64 | 1.44 | 1.52 | 1.24 |
| | I-25S | 143.47 | 144.06 | | 2.35 | 2.05 | 1.88 | 1.37 | 1.47 |
| | I-25S | 144.06 | 144.56 | | 1.54 | 1.56 | 1.40 | 1.20 | 1.16 |
| | I-25S | 144.56 | 145.06 | | 1.68 | 1.60 | 1.36 | 1.32 | 1.32 |
| | I-25S | 145.06 | 145.78 | | 2.07 | 1.84 | 1.49 | 1.30 | 1.37 |
| | I-25S | 145.78 | 146.00 | | 2.35 | 2.10 | 2.25 | 1.85 | 2.00 |
| | I-25S | 146.00 | 146.50 | | 2.54 | 2.14 | 1.74 | 1.46 | 1.74 |
| | I-25S | 146.50 | 147.00 | | 1.43 | 1.50 | 1.08 | 1.13 | 1.15 |
| | I-25S | 147.00 | 147.50 | | 2.42 | 5.12 | 1.66 | 1.84 | 2.00 |
| | I-25S | 147.50 | 148.00 | | 1.68 | 1.56 | 1.44 | 1.34 | 1.50 |
| | I-25S | 148.00 | 148.50 | | 2.42 | 2.06 | 1.84 | 1.52 | 1.60 |
| | I-25S | 148.50 | 149.00 | | 1.66 | 1.26 | 1.36 | 1.36 | 1.20 |
| | I-25S | 149.00 | 149.50 | | 1.76 | 1.42 | 1.36 | 1.32 | 1.18 |
| | I-25S | 149.50 | 150.00 | | 1.80 | 1.56 | 1.50 | 1.50 | 1.40 |
| | I-25S | 150.00 | 150.50 | | 1.64 | 1.52 | 1.62 | 1.44 | 1.38 |
| | I-25S | 150.50 | 151.00 | | 1.66 | 1.58 | 1.40 | 1.40 | 1.32 |
| | I-25S | 151.00 | 151.84 | | 2.00 | 1.69 | 1.61 | 1.53 | 1.49 |
| | I-25S | 151.84 | 152.34 | | 1.30 | 1.40 | 1.24 | 1.34 | 1.28 |
| | I-25S | 152.34 | 152.82 | | 1.64 | 1.54 | 1.40 | 1.60 | 1.46 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST | | IRI | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | FROM | TO | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
| MP244-25 | I-25N | 244.00 | 244.26 | 2.43 | 2.43 | 2.43 | 1.55 | 2.40 | 1.75 |
| | I-25N | 244.26 | 244.66 | 2.60 | 2.58 | 2.43 | 2.10 | 2.08 | 2.30 |
| | I-25N | 244.66 | 245.30 | 2.42 | 2.38 | 2.55 | 2.43 | 2.37 | 2.68 |
| | I-25N | 245.30 | 245.80 | 2.44 | 2.20 | 2.60 | 2.38 | 2.10 | 2.44 |
| | I-25N | 245.80 | 246.30 | 1.84 | 2.10 | 2.46 | 2.26 | 2.08 | 2.44 |
| | I-25N | 246.30 | 247.13 | 2.51 | 2.85 | 2.74 | 2.83 | 2.46 | 2.84 |
| | I-25N | 247.13 | 247.73 | 2.47 | 2.48 | 2.72 | 2.48 | 2.50 | 2.80 |
| | I-25N | 247.73 | 248.23 | 2.00 | 2.43 | 2.46 | 2.26 | 2.22 | 2.46 |
| | I-25N | 248.23 | 248.75 | 2.42 | 2.62 | 2.48 | 2.46 | 2.24 | 2.38 |
| | I-25N | 248.75 | 249.28 | 2.22 | 2.13 | 2.58 | 1.92 | 2.22 | 2.38 |
| | I-25N | 249.28 | 249.69 | 2.03 | 2.45 | 2.73 | 2.14 | 2.60 | 2.78 |
| | I-25N | 249.69 | 250.32 | 2.08 | 2.70 | 2.70 | 2.35 | 2.47 | 2.52 |
| | I-25N | 250.32 | 250.82 | 1.86 | 2.54 | 2.66 | 2.14 | 2.42 | 2.44 |
| | I-25N | 250.82 | 251.32 | 2.38 | 2.40 | 3.04 | 1.94 | 2.36 | 2.36 |
| | I-25N | 251.32 | 251.82 | 2.50 | 2.26 | 3.08 | 1.96 | 2.52 | 2.62 |
| | I-25N | 251.82 | 252.32 | 2.42 | 2.30 | 2.98 | 2.08 | 2.48 | 2.46 |
| | I-25N | 252.32 | 252.82 | 2.16 | 2.42 | 2.82 | 2.18 | 2.44 | 2.58 |
| | I-25N | 252.82 | 253.32 | 2.50 | 2.34 | 3.10 | 2.10 | 2.26 | 2.28 |
| | I-25N | 253.32 | 254.01 | 2.30 | N/A | 2.97 | 2.27 | 2.43 | 2.56 |
| | I-25S | 244.00 | 244.26 | | 1.57 | 2.30 | 2.17 | 1.90 | 2.50 |
| | I-25S | 244.26 | 244.66 | | 1.60 | 2.33 | 1.75 | 1.53 | 2.45 |
| | I-25S | 244.66 | 245.24 | | 1.87 | 1.87 | 2.28 | 1.98 | 2.52 |
| | I-25S | 245.24 | 245.74 | | 1.98 | 1.78 | 1.94 | 1.70 | 2.58 |
| | I-25S | 245.74 | 246.24 | | 2.13 | 1.80 | 2.20 | 1.65 | 2.45 |
| | I-25S | 246.24 | 246.74 | | 2.42 | 2.77 | 2.52 | 2.24 | 3.04 |
| | I-25S | 246.74 | 247.24 | | 1.84 | 2.00 | 2.05 | 1.60 | 2.34 |
| | I-25S | 247.24 | 247.73 | | 2.24 | 2.16 | 1.86 | 1.80 | 2.88 |
| | I-25S | 247.73 | 248.23 | | 1.73 | 1.95 | 1.76 | 1.40 | 2.34 |
| | I-25S | 248.23 | 248.81 | | 1.48 | 1.92 | 2.18 | 1.42 | 2.45 |
| | I-25S | 248.81 | 249.60 | | 1.78 | 1.75 | 2.11 | 1.49 | 2.46 |
| | I-25S | 249.60 | 250.42 | | 1.71 | 2.29 | 2.25 | 1.74 | 2.53 |
| MP254-25 | I-25N | 254.01 | 254.25 | | | | 2.30 | 2.15 | 2.23 |
| | I-25N | 254.25 | 254.75 | | | | 2.20 | 2.02 | 2.62 |
| | I-25N | 254.75 | 255.32 | | | | 1.63 | 1.78 | 2.08 |
| | I-25N | 255.32 | 255.82 | | | | 1.56 | 1.94 | 2.38 |
| | I-25N | 255.82 | 256.45 | | | | 1.68 | 2.11 | 2.31 |
| | I-25N | 256.45 | 256.95 | | | | 2.10 | 2.13 | 2.12 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST FROM | MILEPOST TO | IRI 1989 | IRI 1990 | IRI 1991 | IRI 1992 | IRI 1993 | IRI 1994 |
|---|---|---|---|---|---|---|---|---|---|
| MP254-25 | I-25N | 256.95 | 257.45 | | | | 2.18 | 1.80 | 2.00 |
| | I-25N | 257.45 | 257.95 | | | | 1.72 | 1.90 | 2.26 |
| | I-25N | 257.95 | 258.45 | | | | 1.64 | 2.42 | 2.10 |
| | I-25N | 258.45 | 258.95 | | | | 1.50 | 2.27 | 1.86 |
| | I-25N | 258.95 | 259.45 | | | | 1.70 | 2.30 | 1.90 |
| | I-25N | 259.45 | 259.95 | | | | 1.98 | 2.12 | 1.74 |
| | I-25N | 259.95 | 260.60 | | | | 1.51 | 2.31 | 1.80 |
| | I-25N | 260.60 | 261.38 | | | | 1.45 | 2.34 | 1.79 |
| | I-25N | 261.38 | 261.87 | | | | 1.38 | 2.56 | 1.60 |
| | I-25N | 261.87 | 262.37 | | | | 1.48 | 2.36 | 1.45 |
| | I-25N | 262.37 | 262.89 | | | | 1.40 | 1.90 | 1.48 |
| | I-25N | 262.89 | 263.78 | | | | 1.51 | 1.93 | 1.78 |
| | I-25S | 254.01 | 254.25 | | | 1.45 | 2.43 | 1.00 | 2.15 |
| | I-25S | 254.25 | 254.75 | | | 1.60 | 1.88 | 1.16 | 2.18 |
| | I-25S | 254.75 | 255.32 | | | 1.78 | 2.26 | 1.05 | 2.23 |
| | I-25S | 255.32 | 255.82 | | | 1.10 | 2.18 | 1.12 | 2.04 |
| | I-25S | 255.82 | 256.45 | | | 1.24 | 2.00 | 1.24 | 2.07 |
| | I-25S | 256.45 | 256.95 | | | 1.14 | 1.46 | 1.04 | 1.76 |
| | I-25S | 256.95 | 257.45 | | | 1.13 | 2.08 | 1.12 | 1.96 |
| | I-25S | 257.45 | 257.95 | | | 1.22 | 2.34 | 1.30 | 1.94 |
| | I-25S | 257.95 | 258.45 | | | 1.58 | 2.40 | 1.36 | 2.34 |
| | I-25S | 258.45 | 258.95 | | | 1.40 | 2.28 | 1.20 | 2.10 |
| | I-25S | 258.95 | 259.45 | | | 1.58 | 2.60 | 1.18 | 2.38 |
| | I-25S | 259.45 | 259.95 | | | 1.56 | 2.42 | 1.08 | 2.26 |
| | I-25S | 259.95 | 260.60 | | | 1.54 | 2.47 | 1.14 | 2.23 |
| | I-25S | 260.60 | 261.38 | | | 1.74 | 2.19 | 1.24 | 2.43 |
| | I-25S | 261.38 | 261.87 | | | 1.84 | 2.43 | 1.28 | 2.14 |
| | I-25S | 261.87 | 262.37 | | | 1.75 | 2.38 | 0.98 | 2.12 |
| | I-25S | 262.37 | 262.89 | | | 1.40 | 2.40 | 1.08 | 2.22 |
| | I-25S | 262.89 | 263.78 | | | 1.57 | 2.17 | 1.17 | 2.16 |
| | I-25N | 263.78 | 264.28 | | 2.43 | 2.72 | 1.84 | 1.48 | 2.22 |
| | I-25N | 264.28 | 264.78 | | 2.40 | 3.06 | 1.62 | 1.54 | 2.30 |
| | I-25N | 264.78 | 265.28 | | 2.54 | 3.30 | 1.82 | 1.76 | 2.36 |
| | I-25N | 265.28 | 265.78 | | 2.30 | 3.03 | 1.90 | 1.60 | 2.18 |
| | I-25N | 265.78 | 266.28 | | 2.37 | 2.88 | 1.74 | 1.52 | 2.02 |
| | I-25N | 266.28 | 266.78 | | 2.38 | 2.82 | 1.96 | 1.72 | 2.38 |
| | I-25N | 266.78 | 267.28 | | 2.22 | 3.00 | 1.58 | 1.52 | 2.40 |
| | I-25N | 267.28 | 267.78 | | 2.66 | 2.70 | 1.64 | 1.72 | 2.24 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST FROM | MILEPOST TO | IRI 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|---|---|---|---|
| MP263-25 | I-25N | 267.78 | 268.28 | | 2.30 | 2.78 | 2.12 | 1.66 | 2.36 |
| | I-25N | 268.28 | 268.78 | | 2.26 | 2.78 | 1.72 | 1.42 | 2.06 |
| | I-25N | 268.78 | 269.28 | | 2.36 | 2.76 | 1.92 | 1.36 | 1.68 |
| | I-25N | 269.28 | 269.78 | | 2.42 | 2.50 | 1.96 | 1.46 | 1.80 |
| | I-25N | 269.78 | 270.28 | | 2.42 | 3.42 | 2.18 | 1.74 | 1.98 |
| | I-25N | 270.28 | 270.78 | | 2.37 | 3.28 | 2.14 | 1.68 | 2.44 |
| | I-25S | 264.28 | 264.78 | | 2.08 | 1.94 | 2.32 | 1.02 | 2.14 |
| | I-25S | 264.78 | 265.28 | | 2.20 | 2.08 | 2.32 | 1.24 | 2.26 |
| | I-25S | 265.28 | 265.78 | | 2.32 | 2.24 | 2.24 | 1.62 | 2.76 |
| | I-25S | 265.78 | 266.28 | | 2.16 | 2.12 | 2.34 | 1.54 | 2.52 |
| | I-25S | 266.28 | 266.78 | | 2.26 | 2.06 | 2.70 | 1.88 | 2.76 |
| | I-25S | 266.78 | 267.28 | | 2.24 | 2.20 | 2.34 | 1.40 | 2.50 |
| | I-25S | 267.28 | 267.78 | | 2.20 | 2.02 | 2.06 | 1.44 | 2.52 |
| | I-25S | 267.78 | 268.28 | | 1.76 | 1.58 | 1.98 | 1.12 | 2.40 |
| | I-25S | 268.28 | 268.78 | | 1.84 | 1.30 | 1.94 | 1.02 | 2.38 |
| | I-25S | 268.78 | 269.28 | | 2.16 | 1.36 | 2.36 | 1.00 | 2.32 |
| | I-25S | 269.28 | 269.78 | | 2.20 | 1.56 | 2.24 | 1.20 | 1.96 |
| | I-25S | 269.78 | 270.28 | | 2.40 | 1.78 | 2.52 | 1.46 | 2.38 |
| | I-25S | 270.28 | 270.78 | | 1.24 | 1.76 | 2.38 | 1.08 | 1.80 |
| | I-25S | 270.78 | 271.15 | | 1.73 | 1.65 | 2.37 | 1.20 | 1.90 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MP271-25 | I-25N | 271.15 | 272.13 | | | | 1.75 | 1.99 | 1.88 |
| | I-25N | 272.13 | 272.63 | | | | 1.72 | 1.72 | 1.94 |
| | I-25N | 272.63 | 273.13 | | | | 1.92 | 1.66 | 1.86 |
| | I-25N | 273.13 | 273.63 | | | | 1.48 | 1.82 | 2.02 |
| | I-25N | 273.63 | 274.46 | | | | 2.08 | 1.99 | 2.26 |
| | I-25N | 274.46 | 274.96 | | | | 1.98 | 1.92 | 2.42 |
| | I-25N | 274.96 | 275.46 | | | | 1.76 | 1.80 | 2.20 |
| | I-25N | 275.46 | 275.96 | | | | 1.54 | 2.08 | 2.28 |
| | I-25N | 275.96 | 276.46 | | | | 1.38 | 2.34 | 2.48 |
| | I-25N | 276.46 | 276.96 | | | | 1.98 | 2.18 | 2.54 |
| | I-25N | 276.96 | 277.55 | | | | 1.76 | 2.06 | 2.54 |
| | I-25N | 277.55 | 278.05 | | | | 1.32 | 2.06 | 2.18 |
| | I-25N | 278.05 | 278.67 | | | | 1.47 | 2.27 | 2.64 |
| | I-25N | 278.67 | 279.40 | | | | 1.61 | 2.29 | 2.59 |
| | I-25S | 271.15 | 271.65 | | | 1.28 | 2.10 | 0.96 | 1.38 |
| | I-25S | 271.65 | 272.13 | | | 1.38 | 1.92 | 1.00 | 1.58 |
| | I-25S | 272.13 | 272.63 | | | 1.30 | 2.24 | 1.00 | 1.72 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST FROM | MILEPOST TO | IRI 1989 | IRI 1990 | IRI 1991 | IRI 1992 | IRI 1993 | IRI 1994 |
|---|---|---|---|---|---|---|---|---|---|
| MP271-25 | I-25S | 272.63 | 273.13 | | | 1.40 | 2.38 | 1.08 | 1.96 |
| | I-25S | 273.13 | 273.63 | | | 1.70 | 2.40 | 1.16 | 2.14 |
| | I-25S | 273.63 | 274.46 | | | 2.12 | 2.32 | 1.20 | 2.04 |
| | I-25S | 274.46 | 274.96 | | | 2.20 | 2.42 | 1.42 | 1.96 |
| | I-25S | 274.96 | 275.46 | | | 1.78 | 2.08 | 0.98 | 1.78 |
| | I-25S | 275.46 | 275.96 | | | 2.18 | 2.06 | 0.96 | 1.80 |
| | I-25S | 275.96 | 276.46 | | | 1.74 | 1.75 | 1.03 | 1.48 |
| | I-25S | 276.46 | 276.96 | | | 1.92 | 2.32 | 1.16 | 1.84 |
| | I-25S | 276.96 | 277.55 | | | 1.57 | 2.27 | 1.05 | 1.73 |
| | I-25S | 277.55 | 278.05 | | | 1.16 | 1.98 | 0.98 | 1.64 |
| | I-25S | 278.05 | 278.67 | | | 1.40 | 2.33 | 1.23 | 1.80 |
| | I-25S | 278.67 | 279.40 | | | 1.63 | 2.43 | 1.30 | 1.77 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MP279-25 | I-25N | 279.90 | 280.40 | | 2.36 | 2.94 | 2.22 | N/A | 2.76 |
| | I-25N | 280.40 | 280.90 | | 2.38 | 3.00 | 2.10 | 2.30 | 2.06 |
| | I-25N | 280.90 | 281.40 | | 2.02 | 3.02 | 1.64 | 2.20 | 2.16 |
| | I-25N | 281.40 | 281.90 | | 2.14 | 2.88 | 1.22 | 2.26 | 2.14 |
| | I-25N | 281.90 | 282.40 | | 2.42 | 2.86 | 1.44 | 2.26 | 2.08 |
| | I-25N | 282.40 | 283.24 | | 2.10 | 2.54 | 1.34 | 2.23 | 2.23 |
| | I-25N | 283.24 | 283.90 | | 2.16 | 2.66 | 1.66 | 2.29 | 2.21 |
| | I-25N | 283.90 | 284.40 | | 2.20 | 3.06 | 1.52 | 2.14 | 2.34 |
| | I-25N | 284.40 | 285.00 | | 2.12 | 3.13 | 1.62 | 2.27 | 2.42 |
| | I-25S | 279.40 | 279.90 | 2.16 | N/A | 2.00 | 2.46 | 1.50 | 2.02 |
| | I-25S | 279.90 | 280.40 | 1.74 | 2.25 | 1.84 | 2.28 | 1.34 | 1.72 |
| | I-25S | 280.40 | 280.90 | 1.54 | 1.94 | 1.84 | 2.12 | 1.00 | 1.48 |
| | I-25S | 280.90 | 281.40 | 1.38 | 2.28 | 1.82 | 2.02 | 0.94 | 1.22 |
| | I-25S | 281.40 | 281.90 | 1.48 | 1.90 | 1.98 | 2.02 | 0.90 | 1.32 |
| | I-25S | 281.90 | 282.40 | 1.70 | 1.94 | 2.08 | 2.20 | 1.02 | 1.42 |
| | I-25S | 282.40 | 283.24 | 1.68 | 2.16 | 1.95 | 2.58 | 1.31 | 1.93 |
| | I-25S | 283.24 | 283.90 | 1.46 | 1.76 | 2.26 | 2.37 | 1.24 | 2.09 |
| | I-25S | 283.90 | 284.40 | 1.74 | 2.14 | 2.18 | 2.32 | 1.36 | 1.92 |
| | I-25S | 284.40 | 285.00 | 1.70 | 1.88 | 2.33 | 2.37 | 1.38 | 1.87 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST | | IRI | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | FROM | TO | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
| MP39-80 | I-80E | 39.00 | 39.90 | | | 1.57 | 1.50 | 1.87 | 1.76 |
| | I-80E | 39.90 | 40.40 | | | 2.02 | 1.94 | 2.48 | 2.24 |
| | I-80E | 40.40 | 40.90 | | | 1.64 | 1.54 | 2.42 | 1.82 |
| | I-80E | 40.90 | 41.40 | | | 1.46 | 1.40 | 1.90 | 1.56 |
| | I-80E | 41.40 | 41.99 | | | 1.88 | 1.77 | 2.23 | 1.87 |
| | I-80E | 41.99 | 42.49 | | | 2.34 | 1.66 | 1.96 | 1.64 |
| | I-80E | 42.49 | 42.99 | | | 1.58 | 1.40 | 2.04 | 1.42 |
| | I-80E | 42.99 | 43.49 | | | 1.48 | 1.48 | 2.04 | 1.40 |
| | I-80E | 43.49 | 43.99 | | | 1.72 | 1.60 | 2.42 | 1.58 |
| | I-80E | 43.99 | 44.49 | | | 1.62 | 1.48 | 1.80 | 1.48 |
| | I-80E | 44.49 | 44.99 | | | 1.78 | 1.64 | 1.94 | 1.92 |
| | I-80E | 44.99 | 45.80 | | | 1.48 | 1.40 | 2.06 | 1.44 |
| | I-80E | 45.80 | 46.30 | | | 1.74 | 1.70 | 2.62 | 1.88 |
| | I-80E | 46.30 | 46.80 | | | 1.54 | 1.66 | 1.88 | 1.64 |
| | I-80E | 46.80 | 47.30 | | | 1.70 | 1.56 | 1.72 | 1.58 |
| | I-80E | 47.30 | 47.80 | | | 1.72 | 1.66 | 1.94 | 1.76 |
| | I-80E | 47.80 | 48.30 | | | 1.52 | 1.52 | 1.64 | 1.66 |
| | I-80E | 48.30 | 49.05 | | | 1.57 | 1.59 | 1.70 | 1.79 |
| | I-80W | 39.00 | 39.90 | | | 2.07 | 2.71 | 2.38 | 2.16 |
| | I-80W | 39.90 | 40.40 | | | 1.80 | 2.40 | 2.00 | 1.76 |
| | I-80W | 40.40 | 40.90 | | | 1.56 | 2.18 | 1.98 | 1.58 |
| | I-80W | 40.90 | 41.40 | | | 1.50 | 1.98 | 1.70 | 1.42 |
| | I-80W | 41.40 | 41.99 | | | 2.12 | 2.64 | 2.07 | 1.73 |
| | I-80W | 41.99 | 42.49 | | | 1.76 | 2.02 | 1.52 | 1.48 |
| | I-80W | 42.49 | 42.99 | | | 1.72 | 2.20 | 1.76 | 1.66 |
| | I-80W | 42.99 | 43.49 | | | 2.04 | 2.60 | 1.96 | 1.82 |
| | I-80W | 43.49 | 43.99 | | | 1.66 | 2.38 | 1.82 | 1.72 |
| | I-80W | 43.99 | 44.49 | | | 1.94 | 2.26 | 1.94 | 1.66 |
| | I-80W | 44.49 | 44.99 | | | 2.12 | 2.60 | 2.52 | 2.20 |
| | I-80W | 44.99 | 45.80 | | | 1.74 | 2.40 | 2.25 | 1.94 |
| | I-80W | 45.80 | 46.30 | | | 2.12 | 2.78 | 2.64 | 2.24 |
| | I-80W | 46.30 | 46.80 | | | 1.80 | 2.42 | 2.40 | 2.10 |
| | I-80W | 46.80 | 47.30 | | | 1.84 | 2.50 | 2.42 | 2.12 |
| | I-80W | 47.30 | 47.80 | | | 2.12 | 2.92 | 2.26 | 2.20 |
| | I-80W | 47.80 | 48.30 | | | 2.48 | 2.80 | 2.12 | 2.02 |
| | I-80W | 48.30 | 49.05 | | | 2.08 | 2.45 | 2.30 | 2.29 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST FROM | MILEPOST TO | IRI 1989 | IRI 1990 | IRI 1991 | IRI 1992 | IRI 1993 | IRI 1994 |
|---|---|---|---|---|---|---|---|---|---|
| MP57-80 | I-80E | 59.20 | 59.70 | | | | 0.96 | 1.96 | 1.88 |
| | I-80E | 59.70 | 60.20 | | | | 1.58 | 2.36 | 1.94 |
| | I-80E | 60.20 | 60.70 | | | | 0.98 | 2.68 | 1.66 |
| | I-80E | 60.70 | 61.20 | | | | 1.20 | 2.46 | 1.76 |
| | I-80E | 61.20 | 61.59 | | | | 1.30 | 2.05 | 2.23 |
| | I-80E | 61.59 | 62.09 | | | | 1.16 | 2.60 | 2.32 |
| | I-80E | 62.09 | 62.59 | | | | 0.98 | 1.82 | 2.34 |
| | I-80E | 62.59 | 63.09 | | | | 1.06 | 2.14 | 2.32 |
| | I-80E | 63.09 | 63.59 | | | | 1.02 | 2.56 | 1.82 |
| | I-80E | 63.59 | 64.09 | | | | 1.00 | 2.26 | 1.38 |
| | I-80E | 64.09 | 64.53 | | | | 1.18 | 2.35 | 1.50 |
| | I-80W | 57.04 | 57.54 | | | 1.94 | 2.54 | 2.40 | 2.42 |
| | I-80W | 57.54 | 58.04 | | | 1.74 | 2.43 | 2.35 | 2.48 |
| | I-80W | 58.04 | 58.54 | | | 1.68 | 2.62 | 2.06 | 2.32 |
| | I-80W | 58.54 | 59.04 | | | 1.93 | 2.66 | 2.18 | 2.54 |
| | I-80W | 59.04 | 59.54 | | | 2.08 | 2.50 | 2.26 | 2.46 |
| | I-80W | 59.54 | 60.04 | | | 1.80 | 2.52 | 2.20 | 2.02 |
| | I-80W | 60.04 | 60.54 | | | 1.40 | 2.26 | 2.24 | 1.90 |
| | I-80W | 60.54 | 61.04 | | | 1.34 | 2.22 | 2.18 | 2.10 |
| | I-80W | 61.04 | 61.59 | | | 1.70 | 2.55 | 2.15 | 2.10 |
| | I-80W | 61.59 | 62.09 | | | 1.54 | 2.66 | 1.64 | 2.42 |
| | I-80W | 62.09 | 62.71 | | | 1.73 | 2.63 | 1.38 | 2.28 |
| | I-80W | 62.71 | 63.21 | | | 1.66 | 2.84 | 1.58 | 2.32 |
| | I-80W | 63.21 | 63.71 | | | 1.56 | 2.78 | 1.34 | 2.30 |
| | I-80W | 63.71 | 64.53 | | | 1.67 | 2.60 | 1.08 | 1.93 |
| MP120-80 | I-80E | 121.58 | 122.27 | | | | 1.83 | 1.97 | 1.96 |
| | I-80E | 122.27 | 122.77 | | | | 1.60 | 2.06 | 1.96 |
| | I-80E | 122.77 | 123.27 | | | | 1.28 | 1.84 | 1.82 |
| | I-80E | 123.27 | 123.77 | | | | 1.64 | 2.12 | 2.42 |
| | I-80E | 123.77 | 124.27 | | | | 1.72 | 2.32 | 2.40 |
| | I-80E | 124.27 | 124.77 | | | | 1.98 | 1.74 | 1.90 |
| | I-80E | 124.77 | 125.27 | | | | 2.04 | 1.06 | 1.16 |
| | I-80E | 125.27 | 125.76 | | | | 1.68 | 1.06 | 1.34 |
| | I-80E | 125.76 | 126.64 | | | | 1.65 | 1.18 | 1.24 |
| | I-80E | 126.64 | 127.14 | | | | 1.70 | 1.38 | 1.38 |
| | I-80E | 127.14 | 127.77 | | | | 1.83 | 1.33 | 1.27 |
| | I-80E | 127.77 | 128.60 | | | | 1.45 | 1.21 | 1.29 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST FROM | MILEPOST TO | IRI 1989 | IRI 1990 | IRI 1991 | IRI 1992 | IRI 1993 | IRI 1994 |
|---|---|---|---|---|---|---|---|---|---|
| MP120-80 | I-80E | 128.60 | 129.32 | | | | 1.61 | 1.27 | 1.34 |
| | I-80E | 129.32 | 129.78 | | | | 1.48 | 1.08 | 1.18 |
| | I-80E | 129.78 | 130.03 | | | | 1.35 | 0.95 | 1.10 |
| MP153-80 | I-80E | 153.79 | 154.29 | | | | 1.22 | 1.80 | 1.30 |
| | I-80E | 154.29 | 154.79 | | | | 1.18 | 1.38 | 1.22 |
| | I-80E | 154.79 | 155.29 | | | | 1.32 | 1.62 | 1.32 |
| | I-80E | 155.29 | 155.79 | | | | 1.36 | 1.62 | 1.26 |
| | I-80E | 155.79 | 156.29 | | | | 1.54 | 1.66 | 1.38 |
| | I-80E | 156.29 | 156.79 | | | | 1.48 | 1.60 | 1.40 |
| | I-80E | 156.79 | 157.29 | | | | 1.72 | 1.60 | 1.28 |
| | I-80E | 157.29 | 157.79 | | | | 1.22 | 1.86 | 1.26 |
| | I-80E | 157.79 | 158.53 | | | | 1.19 | 1.26 | 1.29 |
| | I-80E | 158.53 | 159.03 | | | | 1.46 | 1.42 | 1.42 |
| | I-80E | 159.03 | 159.53 | | | | 1.28 | 1.46 | 1.26 |
| | I-80E | 159.53 | 160.23 | | | | 1.11 | 1.21 | 1.16 |
| | I-80E | 160.23 | 160.77 | | | | 1.38 | 1.37 | 1.30 |
| | I-80E | 160.77 | 161.27 | | | | 1.60 | 2.18 | 2.26 |
| | I-80E | 161.27 | 161.77 | | | | 1.34 | 2.36 | 2.40 |
| | I-80E | 161.77 | 162.27 | | | | 1.44 | 2.52 | 2.38 |
| | I-80E | 162.27 | 162.77 | | | | 1.24 | 2.56 | 2.04 |
| | I-80E | 162.77 | 163.27 | | | | 1.62 | 2.62 | 2.58 |
| | I-80E | 163.27 | 163.77 | | | | 1.46 | 2.66 | 2.58 |
| | I-80E | 163.77 | 164.27 | | | | 1.22 | 2.28 | 1.84 |
| | I-80E | 164.27 | 164.77 | | | | 1.10 | 2.20 | 1.76 |
| | I-80E | 164.77 | 165.27 | | | | 1.22 | 2.32 | 1.56 |
| | I-80E | 165.27 | 165.77 | | | | 1.34 | 2.48 | 1.94 |
| | I-80E | 165.77 | 166.27 | | | | 1.26 | 2.46 | 2.34 |
| | I-80E | 166.27 | 166.77 | | | | 1.36 | 2.60 | 2.54 |
| | I-80E | 166.77 | 167.27 | | | | 1.32 | 2.08 | 2.10 |
| | I-80E | 167.27 | 167.77 | | | | 1.10 | 1.92 | 1.94 |
| | I-80E | 167.77 | 168.27 | | | | 1.16 | 1.74 | 1.74 |
| | I-80E | 168.27 | 168.77 | | | | 1.28 | 2.04 | 2.04 |
| | I-80E | 168.77 | 169.27 | | | | 1.30 | 2.16 | 2.30 |
| | I-80E | 169.27 | 169.77 | | | | 1.28 | 2.12 | 2.12 |
| | I-80E | 169.77 | 170.27 | | | | 1.42 | 2.30 | 1.86 |
| | I-80E | 170.27 | 170.77 | | | | 1.78 | 2.36 | 1.72 |
| | I-80E | 170.77 | 171.27 | | | | 1.96 | 2.44 | 1.92 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST FROM | MILEPOST TO | IRI 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|---|---|---|---|
| MP153-80 | I-80E | 171.27 | 171.72 | | | | 1.88 | 2.16 | 1.82 |
| | I-80W | 153.79 | 154.29 | | | 1.58 | 2.54 | 2.04 | 1.56 |
| | I-80W | 154.29 | 154.79 | | | 1.48 | 2.70 | 1.88 | 1.54 |
| | I-80W | 154.79 | 155.29 | | | 1.50 | 2.60 | 2.06 | 1.58 |
| | I-80W | 155.29 | 155.79 | | | 1.70 | 2.76 | 2.10 | 1.60 |
| | I-80W | 155.79 | 156.29 | | | 1.92 | 2.98 | 1.94 | 1.70 |
| | I-80W | 156.29 | 156.79 | | | 1.56 | 2.90 | 1.86 | 1.50 |
| | I-80W | 156.79 | 157.29 | | | 1.70 | 2.84 | 1.82 | 1.72 |
| | I-80W | 157.29 | 157.79 | | | 1.44 | 2.80 | 1.72 | 1.52 |
| | I-80W | 157.79 | 158.53 | | | 1.37 | 2.77 | 1.39 | 1.56 |
| | I-80W | 158.53 | 159.03 | | | 1.42 | 2.80 | 1.68 | 1.40 |
| | I-80W | 159.03 | 159.53 | | | 1.46 | 2.76 | 1.62 | 1.38 |
| | I-80W | 159.53 | 160.23 | | | 1.46 | 2.80 | 1.51 | 1.40 |
| | I-80W | 160.23 | 160.77 | | | 1.42 | 2.45 | 1.42 | 1.48 |
| | I-80W | 160.77 | 161.27 | | | 1.56 | 2.60 | 1.84 | 2.00 |
| | I-80W | 161.27 | 161.77 | | | 1.34 | 2.70 | 1.92 | 2.24 |
| | I-80W | 161.77 | 162.27 | | | 1.78 | 2.78 | 1.86 | 1.92 |
| | I-80W | 162.27 | 162.77 | | | 1.68 | 2.68 | 1.90 | 2.02 |
| | I-80W | 162.77 | 163.27 | | | 2.22 | 2.86 | 2.42 | 2.60 |
| | I-80W | 163.27 | 163.77 | | | 2.62 | 2.90 | 2.64 | 2.64 |
| | I-80W | 163.77 | 164.27 | | | 2.50 | 2.72 | 2.28 | 2.70 |
| | I-80W | 164.27 | 164.77 | | | 2.40 | 2.72 | 2.40 | 2.54 |
| | I-80W | 164.77 | 165.27 | | | 2.36 | 2.78 | 2.38 | 2.52 |
| | I-80W | 165.27 | 165.77 | | | 2.70 | 2.82 | 2.68 | 2.38 |
| | I-80W | 165.77 | 166.27 | | | 2.30 | 2.76 | 2.62 | 2.16 |
| | I-80W | 166.27 | 166.77 | | | 1.58 | 2.64 | 2.18 | 1.86 |
| | I-80W | 166.77 | 167.27 | | | 1.94 | 2.70 | 2.42 | 1.98 |
| | I-80W | 167.27 | 167.77 | | | 2.06 | 2.62 | 2.44 | 2.46 |
| | I-80W | 167.77 | 168.27 | | | 1.98 | 2.70 | 2.34 | 2.28 |
| | I-80W | 168.27 | 168.77 | | | 1.74 | 2.88 | 2.50 | 2.22 |
| | I-80W | 168.77 | 169.27 | | | 1.92 | 2.64 | 2.22 | 2.26 |
| | I-80W | 169.27 | 169.77 | | | 2.06 | 2.60 | 2.06 | 2.32 |
| | I-80W | 169.77 | 170.27 | | | 2.36 | 2.44 | 1.98 | 2.28 |
| | I-80W | 170.27 | 170.77 | | | 2.44 | 2.52 | 2.20 | 2.12 |
| | I-80W | 170.77 | 171.27 | | | 2.22 | 2.48 | 2.38 | 1.94 |
| | I-80W | 171.27 | 171.72 | | | 2.18 | 2.54 | 2.44 | 2.16 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST | | IRI | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | FROM | TO | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
| MP171-80 | I-80E | 171.76 | 172.63 | | | | 2.09 | 2.04 | 1.89 |
| | I-80E | 172.63 | 173.41 | | | | 1.80 | 1.88 | 1.69 |
| | I-80E | 173.41 | 174.06 | | | | 2.09 | 2.37 | 2.13 |
| | I-80E | 174.06 | 174.62 | | | | 1.58 | 1.78 | 1.48 |
| | I-80E | 174.62 | 175.01 | | | | 1.58 | 1.93 | 1.55 |
| | I-80E | 175.01 | 175.51 | | | | 1.58 | 1.98 | 1.52 |
| | I-80E | 175.51 | 176.22 | | | | 1.40 | 1.57 | 1.43 |
| | I-80E | 176.22 | 176.95 | | | | 1.53 | 1.56 | 1.55 |
| | I-80E | 176.95 | 177.52 | | | | 1.78 | 1.98 | 1.74 |
| | I-80E | 177.52 | 178.02 | | | | 1.46 | 1.82 | 1.60 |
| | I-80E | 178.02 | 178.52 | | | | 1.44 | 1.78 | 1.54 |
| | I-80E | 178.52 | 179.02 | | | | 1.48 | 2.14 | 1.34 |
| | I-80E | 179.02 | 179.56 | | | | 1.37 | 1.93 | 1.33 |
| | I-80E | 179.56 | 180.06 | | | | 1.40 | 1.88 | 1.46 |
| | I-80E | 180.06 | 180.56 | | | | 1.50 | 2.06 | 1.28 |
| | I-80E | 180.56 | 181.06 | | | | 1.60 | 2.12 | 1.38 |
| | I-80E | 181.06 | 181.50 | | | | 1.28 | 1.78 | 1.08 |
| | I-80E | 181.50 | 181.79 | | | | 1.53 | 1.73 | 1.47 |
| | I-80E | 181.79 | 182.67 | | | | 1.39 | 1.57 | 1.39 |
| | I-80E | 182.67 | 183.03 | | | | 1.47 | 1.73 | 1.90 |
| | I-80E | 183.03 | 183.33 | | | | 1.33 | 1.50 | 1.30 |
| | I-80E | 183.33 | 184.05 | | | | 1.33 | 1.55 | 1.63 |
| | I-80E | 184.05 | 184.55 | | | | 2.08 | 2.18 | 2.36 |
| | I-80E | 184.55 | 185.05 | | | | 1.40 | 1.66 | 1.76 |
| | I-80E | 185.05 | 185.55 | | | | 1.20 | 1.48 | 1.72 |
| | I-80E | 185.55 | 186.05 | | | | 1.10 | 1.30 | 1.22 |
| | I-80E | 186.05 | 186.62 | | | | 1.08 | 1.26 | 1.18 |
| | I-80W | 171.76 | 172.63 | | | 1.66 | 2.44 | 1.78 | 1.60 |
| | I-80W | 172.63 | 173.41 | | | 1.61 | 2.63 | 1.76 | 1.59 |
| | I-80W | 173.41 | 174.06 | | | 1.57 | 2.79 | 2.00 | 1.71 |
| | I-80W | 174.06 | 174.55 | | | 1.14 | 2.34 | 1.92 | 1.10 |
| | I-80W | 174.55 | 175.01 | | | 1.35 | 2.53 | 2.08 | 1.08 |
| | I-80W | 175.01 | 175.41 | | | 1.25 | 2.53 | 1.68 | 1.13 |
| | I-80W | 175.41 | 176.00 | | | 1.10 | 2.30 | 1.50 | 1.10 |
| | I-80W | 176.00 | 176.22 | | | 1.05 | 1.00 | 1.30 | 1.00 |
| | I-80W | 176.22 | 176.72 | | | 1.18 | 1.64 | 1.58 | 1.06 |
| | I-80W | 176.72 | 177.26 | | | 1.28 | 2.63 | 1.52 | 1.42 |
| | I-80W | 177.26 | 177.70 | | | 1.20 | 2.48 | 1.68 | 1.15 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST | | IRI | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | FROM | TO | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
| MP171-80 | I-80W | 177.70 | 178.20 | | | 1.06 | 2.52 | 1.46 | 1.02 |
| | I-80W | 178.20 | 178.70 | | | 1.24 | 2.52 | 1.44 | 1.24 |
| | I-80W | 178.70 | 179.20 | | | 1.24 | 2.06 | 1.56 | 1.14 |
| | I-80W | 179.20 | 179.70 | | | 1.22 | 2.02 | 1.46 | 1.14 |
| | I-80W | 179.70 | 180.10 | | | 1.63 | 2.10 | 1.68 | 1.33 |
| | I-80W | 180.10 | 180.94 | | | 1.41 | 2.31 | 1.56 | 1.43 |
| | I-80W | 180.94 | 181.61 | | | 1.20 | 2.13 | 1.53 | 1.05 |
| | I-80W | 181.61 | 182.27 | | | 1.07 | 2.34 | 1.80 | 0.93 |
| | I-80W | 182.27 | 182.82 | | | 1.22 | 2.40 | 2.08 | 1.28 |
| | I-80W | 182.82 | 183.19 | | | 1.13 | 2.35 | 2.23 | 0.98 |
| | I-80W | 183.19 | 183.41 | | | 1.40 | 2.70 | 2.05 | 1.50 |
| | I-80W | 183.41 | 183.91 | | | 1.30 | 2.78 | 2.04 | 1.28 |
| | I-80W | 184.10 | 184.41 | | | 1.78 | 2.82 | 2.20 | 1.70 |
| | I-80W | 184.60 | 184.91 | | | 1.18 | 2.62 | 1.66 | 1.08 |
| | I-80W | 185.10 | 185.41 | | | 1.08 | 2.42 | 1.24 | 0.90 |
| | I-80W | 185.60 | 185.91 | | | 1.28 | 2.28 | 1.40 | 1.08 |
| | I-80W | 185.91 | 186.59 | | | 1.31 | 2.27 | 1.51 | 1.27 |
| MP186-80 | I-80E | 186.77 | 187.20 | 1.48 | 1.32 | 1.46 | 1.30 | 1.37 | 1.40 |
| | I-80E | 187.20 | 187.70 | 1.70 | 1.54 | 2.40 | 1.60 | 1.66 | 1.84 |
| | I-80E | 187.70 | 188.20 | 1.48 | 1.14 | 2.34 | 1.28 | 1.46 | 1.68 |
| | I-80E | 188.20 | 188.70 | 1.48 | 1.10 | 1.44 | 1.12 | 1.28 | 1.64 |
| | I-80E | 188.70 | 189.20 | 1.50 | 1.26 | 1.76 | 1.16 | 1.18 | 1.36 |
| | I-80E | 189.20 | 189.70 | 1.44 | 1.20 | 1.72 | 1.18 | 1.16 | 1.36 |
| | I-80E | 189.70 | 190.20 | 1.44 | 1.18 | 1.68 | 1.28 | 1.26 | 1.64 |
| | I-80E | 190.20 | 190.70 | 1.54 | 1.52 | 1.52 | 1.38 | 1.42 | 1.52 |
| | I-80E | 190.70 | 191.20 | 1.60 | 1.46 | 1.62 | 1.46 | 1.50 | 1.50 |
| | I-80E | 191.20 | 191.70 | 1.80 | 1.34 | 1.66 | 1.42 | 1.32 | 1.44 |
| | I-80E | 191.70 | 192.20 | 1.72 | 1.46 | 1.64 | 1.64 | 1.36 | 1.48 |
| | I-80E | 192.20 | 192.70 | 1.44 | 1.18 | 1.60 | 1.22 | 1.16 | 1.34 |
| | I-80E | 192.70 | 193.20 | 1.74 | 1.40 | 1.86 | 1.54 | 1.44 | 1.68 |
| | I-80E | 193.20 | 193.70 | 1.66 | 1.30 | 1.86 | 1.34 | 1.38 | 1.58 |
| | I-80E | 193.70 | 194.20 | 1.70 | 1.30 | 1.74 | 1.44 | 1.28 | 1.44 |
| | I-80E | 194.20 | 194.70 | 1.54 | 1.24 | 1.64 | 1.28 | 1.18 | 1.30 |
| | I-80E | 194.70 | 195.31 | 1.50 | 1.40 | 1.83 | 1.60 | 1.42 | 1.42 |
| | I-80E | 195.31 | 195.81 | 1.12 | 1.26 | 1.74 | 1.40 | 1.26 | 1.25 |
| | I-80E | 195.81 | 196.31 | 1.33 | 1.62 | 2.07 | 1.72 | 1.68 | 1.63 |
| | I-80E | 196.31 | 196.81 | 1.03 | 1.18 | 2.88 | 1.30 | 1.18 | 1.86 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST FROM | MILEPOST TO | IRI 1989 | IRI 1990 | IRI 1991 | IRI 1992 | IRI 1993 | IRI 1994 |
|---|---|---|---|---|---|---|---|---|---|
| MP186-80 | I-80E | 196.81 | 197.31 | 1.00 | 1.04 | 2.46 | 1.40 | 1.12 | 1.70 |
| | I-80E | 197.31 | 197.81 | 0.98 | 1.04 | 2.12 | 1.16 | 1.20 | 1.50 |
| | I-80E | 197.81 | 198.31 | 1.20 | 1.53 | 2.05 | 1.42 | 1.26 | 1.42 |
| | I-80W | 186.77 | 187.20 | 1.33 | 1.53 | 1.28 | 2.48 | 1.68 | 1.33 |
| | I-80W | 187.20 | 187.70 | 1.26 | 1.32 | 1.22 | 2.18 | 1.62 | 1.38 |
| | I-80W | 187.70 | 188.20 | 1.08 | 1.14 | 1.08 | 2.64 | 1.80 | 1.02 |
| | I-80W | 188.20 | 188.70 | 0.98 | 1.06 | 0.98 | 2.10 | 1.48 | 1.08 |
| | I-80W | 188.70 | 189.20 | 1.12 | 1.08 | 1.10 | 2.60 | 1.82 | 1.04 |
| | I-80W | 189.20 | 189.70 | 1.18 | 1.20 | 1.18 | 2.14 | 1.42 | 1.06 |
| | I-80W | 189.70 | 190.20 | 1.16 | 1.20 | 1.36 | 2.44 | 1.62 | 1.28 |
| | I-80W | 190.20 | 190.70 | 1.44 | 1.26 | 1.22 | 2.04 | 1.58 | 1.40 |
| | I-80W | 190.70 | 191.20 | 1.34 | 1:52 | 1.58 | 2.04 | 1.94 | 1.60 |
| | I-80W | 191.20 | 191.70 | 1.40 | 1.44 | 1.48 | 2.20 | 1.80 | 1.46 |
| | I-80W | 191.70 | 192.20 | 1.14 | 1.18 | 1.22 | 2.02 | 1.76 | 1.30 |
| | I-80W | 192.20 | 192.70 | 1.06 | 0.94 | 1.06 | 1.90 | 1.18 | 1.12 |
| | I-80W | 192.70 | 193.20 | 1.28 | 1.16 | 1.24 | 1.86 | 1.50 | 1.42 |
| | I-80W | 193.20 | 193.70 | 1.26 | 1.34 | 1.16 | 1.60 | 1.30 | 1.34 |
| | I-80W | 193.70 | 194.20 | 1.32 | 1.36 | 1.34 | 1.96 | 1.46 | 1.34 |
| | I-80W | 194.20 | 194.70 | 1.20 | 1.26 | 1.28 | 1.84 | 1.34 | 1.20 |
| | I-80W | 194.70 | 195.31 | 1.25 | 1.38 | 1.32 | 1.87 | 1.53 | 1.23 |
| | I-80W | 195.31 | 195.81 | 1.38 | 1.34 | 1.32 | 2.42 | 1.66 | 1.34 |
| | I-80W | 195.81 | 196.31 | 1.52 | 1.57 | 1.58 | 2.42 | 1.86 | 1.80 |
| | I-80W | 196.31 | 196.81 | 1.42 | 1.55 | 1.38 | 1.98 | 1.66 | 1.58 |
| | I-80W | 196.81 | 197.31 | 1.22 | 1.24 | 1.30 | 2.38 | 1.38 | 1.36 |
| | I-80W | 197.31 | 197.81 | 1.14 | 1.16 | 1.34 | 1.98 | 1.30 | 1.26 |
| | I-80W | 197.81 | 198.31 | 1.40 | 1.38 | 1.40 | 2.30 | 1.54 | 1.48 |
| | I-80W | 198.31 | 199.05 | 1.14 | 1.23 | 1.13 | 1.99 | 1.36 | 1.13 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MP199-80 | I-80E | 199.10 | 199.60 | | 1.48 | 2.16 | 1.54 | 1.38 | 1.46 |
| | I-80E | 199.60 | 200.10 | | 1.34 | 1.72 | 1.52 | 1.30 | 1.38 |
| | I-80E | 200.10 | 200.60 | | 1.42 | 1.70 | 1.44 | 1.36 | 1.40 |
| | I-80E | 200.60 | 201.28 | | 1.71 | 1.89 | 1.73 | 1.53 | 1.49 |
| | I-80E | 201.28 | 202.04 | | 1.43 | 1.78 | 1.56 | 1.41 | 2.33 |
| | I-80E | 202.04 | 202.54 | | 1.38 | 1.56 | 1.52 | 1.32 | 2.26 |
| | I-80E | 202.54 | 203.04 | | 1.26 | 1.58 | 1.38 | 1.20 | 1.90 |
| | I-80E | 203.04 | 203.54 | | 1.28 | 2.18 | 1.34 | 1.18 | 1.94 |
| | I-80E | 203.54 | 203.87 | | 1.43 | 1.80 | 1.45 | 1.25 | 2.33 |
| | I-80E | 203.87 | 204.37 | | 1.78 | 2.73 | 1.82 | 1.68 | 2.72 |
| | I-80E | 204.37 | 204.87 | | 1.46 | 2.36 | 1.45 | 1.25 | 2.33 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST FROM | MILEPOST TO | IRI 1989 | IRI 1990 | IRI 1991 | IRI 1992 | IRI 1993 | IRI 1994 |
|---|---|---|---|---|---|---|---|---|---|
| MP199-80 | I-80E | 204.87 | 205.37 | | 1.28 | 2.50 | 1.25 | 1.18 | 1.88 |
| | I-80E | 205.37 | 205.87 | | 1.58 | 2.78 | 1.58 | 1.50 | 2.54 |
| | I-80E | 205.87 | 206.37 | | 1.98 | 2.96 | 2.12 | 1.56 | 2.62 |
| | I-80E | 206.37 | 206.87 | | 1.50 | 2.42 | 1.62 | 1.58 | 1.90 |
| | I-80E | 206.87 | 207.37 | | 1.68 | 1.92 | 1.64 | 1.26 | 1.94 |
| | I-80E | 207.37 | 207.87 | | 1.58 | 2.18 | 1.46 | 1.28 | 1.42 |
| | I-80E | 207.87 | 208.37 | | 1.53 | 2.20 | 1.46 | 1.36 | 2.08 |
| | I-80E | 208.37 | 208.87 | | 1.52 | 3.12 | 1.52 | 1.62 | 1.90 |
| | I-80E | 208.87 | 209.37 | | 1.28 | 2.82 | 1.34 | 1.34 | 1.48 |
| | I-80E | 209.37 | 209.87 | | 1.54 | 3.10 | 1.70 | 1.90 | 1.94 |
| | I-80E | 209.87 | 210.17 | | 1.30 | 2.77 | 1.40 | 1.53 | 1.63 |
| | I-80E | 210.17 | 210.96 | | 1.36 | 2.73 | 1.56 | 1.68 | 2.10 |
| | I-80W | 199.10 | 199.60 | 1.72 | 1.53 | 0.90 | 2.30 | 1.34 | 0.82 |
| | I-80W | 199.60 | 200.10 | 2.02 | 1.80 | 1.04 | 2.74 | 1.28 | 1.00 |
| | I-80W | 200.10 | 200.60 | 1.54 | 1.82 | 1.12 | 2.56 | 1.30 | 1.02 |
| | I-80W | 200.60 | 201.28 | 1.60 | 1.56 | 1.10 | 2.29 | 1.17 | 1.07 |
| | I-80W | 201.28 | 202.04 | 1.34 | 1.15 | 1.21 | 2.34 | 1.20 | 1.06 |
| | I-80W | 202.04 | 202.54 | 1.58 | 1.04 | 1.20 | 2.57 | 1.40 | 1.08 |
| | I-80W | 202.54 | 203.04 | 1.02 | 0.98 | 1.08 | 2.27 | 1.15 | 0.98 |
| | I-80W | 203.04 | 203.54 | 1.38 | 1.40 | 1.22 | 2.72 | 1.48 | 1.74 |
| | I-80W | 203.54 | 203.87 | 1.33 | 1.98 | 1.43 | 2.85 | 1.90 | 2.25 |
| | I-80W | 203.87 | 204.37 | 1.83 | 2.08 | 1.46 | 2.93 | 2.03 | 2.05 |
| | I-80W | 204.37 | 204.87 | 2.22 | 1.94 | 1.36 | 2.76 | 1.92 | 1.82 |
| | I-80W | 204.87 | 205.37 | 2.18 | 1.93 | 1.55 | 2.62 | 1.87 | 1.63 |
| | I-80W | 205.37 | 205.87 | 2.10 | 1.84 | 1.70 | 2.50 | 1.54 | 1.50 |
| | I-80W | 205.87 | 206.37 | 1.34 | 1.56 | 1.44 | 2.18 | 1.38 | 1.38 |
| | I-80W | 206.37 | 206.87 | 1.32 | 1.60 | 1.18 | 2.12 | 1.12 | 1.10 |
| | I-80W | 206.87 | 207.37 | 1.52 | 2.10 | 1.26 | 2.08 | 1.18 | 1.14 |
| | I-80W | 207.37 | 207.87 | 2.24 | 2.28 | 1.14 | 2.10 | 1.12 | 1.18 |
| | I-80W | 207.87 | 208.37 | 1.60 | 2.04 | 1.32 | 2.08 | 1.20 | 1.24 |
| | I-80W | 208.37 | 208.87 | 1.80 | 1.45 | 2.00 | 2.42 | 1.28 | 1.52 |
| | I-80W | 208.87 | 209.37 | 2.04 | 1.20 | 1.13 | 2.76 | 1.14 | 1.10 |
| | I-80W | 209.37 | 209.87 | 2.32 | 1.64 | 1.28 | 2.68 | 1.40 | 1.26 |
| | I-80W | 209.87 | 210.17 | 2.23 | 1.33 | 1.00 | 2.00 | 1.10 | 0.97 |
| | I-80W | 210.17 | 210.96 | 1.36 | 1.14 | 1.19 | 2.26 | 1.25 | 1.43 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST | | IRI | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | FROM | TO | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
| MP285-80 | I-80E | 285.10 | 285.58 | 1.42 | 1.84 | 2.62 | 2.38 | 2.34 | 2.44 |
| | I-80E | 285.58 | 286.08 | 1.32 | 1.36 | 2.52 | 1.86 | 2.24 | 2.44 |
| | I-80E | 286.08 | 286.58 | 1.36 | 1.24 | 2.38 | 1.66 | 1.98 | 2.36 |
| | I-80E | 286.58 | 287.08 | 1.98 | 1.62 | 2.66 | 1.92 | 2.24 | 2.26 |
| | I-80E | 287.08 | 287.58 | 1.76 | 1.42 | 2.18 | 1.88 | 2.02 | 2.36 |
| | I-80E | 287.58 | 288.08 | 1.86 | 1.62 | 2.06 | 2.00 | 2.04 | 2.34 |
| | I-80E | 288.08 | 288.58 | 1.64 | 1.66 | 1.94 | 2.10 | 1.96 | 2.46 |
| | I-80E | 288.58 | 289.08 | 1.74 | 1.50 | 1.58 | 1.92 | 2.24 | 2.68 |
| | I-80E | 289.08 | 289.58 | 1.94 | 1.26 | 1.40 | 1.58 | 2.46 | 2.54 |
| | I-80E | 289.58 | 289.89 | 1.50 | 1.20 | 1.17 | 1.53 | 2.20 | 2.57 |
| | I-80W | 285.10 | 285.58 | | 1.12 | 1.72 | 2.12 | 2.46 | 2.04 |
| | I-80W | 285.58 | 286.08 | | 1.14 | 1.74 | 2.36 | 2.44 | 2.16 |
| | I-80W | 286.08 | 286.58 | | 1.20 | 1.32 | 2.34 | 2.32 | 2.00 |
| | I-80W | 286.58 | 287.08 | | 1.48 | 2.16 | 2.64 | 2.26 | 2.18 |
| | I-80W | 287.08 | 287.58 | | 1.42 | 2.46 | 2.50 | 2.10 | 2.14 |
| | I-80W | 287.58 | 288.08 | | 1.20 | 2.30 | 2.60 | 2.42 | 2.18 |
| | I-80W | 288.08 | 288.58 | | 1.16 | 2.10 | 2.28 | 2.10 | 2.16 |
| | I-80W | 288.58 | 289.08 | | 1.42 | 2.26 | 2.30 | 2.30 | 2.04 |
| | I-80W | 289.08 | 289.58 | | 1.52 | 2.36 | 2.24 | 2.24 | 2.00 |
| | I-80W | 289.58 | 289.89 | | 1.60 | 2.17 | 2.53 | 2.17 | 2.40 |
| MP299-80 | I-80E | 299.53 | 300.03 | | | | 1.20 | 1.28 | 1.28 |
| | I-80E | 300.03 | 300.53 | | | | 1.58 | 1.40 | 1.38 |
| | I-80E | 300.53 | 301.03 | | | | 1.40 | 1.40 | 1.36 |
| | I-80E | 301.03 | 301.53 | | | | 1.22 | 1.12 | 1.34 |
| | I-80E | 301.53 | 302.03 | | | | 1.32 | 1.22 | 1.28 |
| | I-80E | 302.03 | 302.53 | | | | 1.38 | 1.26 | 1.58 |
| | I-80E | 302.53 | 303.03 | | | | 1.58 | 1.50 | 1.88 |
| | I-80E | 303.03 | 303.53 | | | | 1.42 | 1.18 | 1.70 |
| | I-80E | 303.53 | 304.03 | | | | 1.30 | 1.16 | 1.72 |
| | I-80E | 304.03 | 304.53 | | | | 1.48 | 1.22 | 1.42 |
| | I-80E | 304.53 | 305.03 | | | | 1.44 | 1.42 | 1.60 |
| | I-80E | 305.03 | 305.53 | | | | 1.30 | 1.20 | 1.48 |
| | I-80E | 305.53 | 306.03 | | | | 1.28 | 1.48 | 1.98 |
| | I-80E | 306.03 | 306.53 | | | | 1.30 | 1.10 | 2.00 |
| | I-80E | 306.53 | 307.03 | | | | 1.34 | 1.38 | 2.50 |
| | I-80E | 307.03 | 307.53 | | | | 1.34 | 1.16 | 2.36 |
| | I-80E | 307.53 | 308.03 | | | | 1.22 | 1.10 | 1.74 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST FROM | MILEPOST TO | IRI 1989 | IRI 1990 | IRI 1991 | IRI 1992 | IRI 1993 | IRI 1994 |
|---|---|---|---|---|---|---|---|---|---|
| MP299-80 | I-80E | 308.03 | 308.53 | | | | 1.13 | 1.08 | 2.07 |
| | I-80E | 308.53 | 309.03 | | | | 1.33 | 1.43 | 1.93 |
| | I-80E | 309.03 | 309.53 | | | | 1.24 | 1.24 | 1.46 |
| | I-80E | 309.53 | 309.97 | | | | 1.60 | 2.70 | 2.10 |
| MP14-90 | I-90E | 14.61 | 15.45 | | | 0.90 | 1.78 | 2.18 | 2.05 |
| | I-90E | 15.45 | 16.34 | | | 0.56 | 1.58 | 2.44 | 2.03 |
| | I-90E | 16.34 | 16.55 | | | 0.60 | 1.83 | 2.27 | 1.60 |
| | I-90E | 16.55 | 17.08 | | | 0.75 | 1.54 | 2.56 | 1.78 |
| | I-90E | 17.70 | 18.20 | | | 0.98 | 1.38 | 2.14 | 1.82 |
| | I-90E | 18.20 | 18.84 | | | 0.88 | 1.55 | 2.10 | 1.70 |
| | I-90E | 18.84 | 19.22 | | | 0.63 | 1.60 | 1.63 | 2.05 |
| | I-90E | 19.22 | 19.72 | | | 0.74 | 1.82 | 1.86 | 2.30 |
| | I-90E | 19.72 | 20.28 | | | 0.90 | 1.45 | 1.67 | 2.08 |
| | I-90E | 20.28 | 20.92 | | | 0.40 | 1.93 | 2.20 | 2.63 |
| | I-90E | 20.92 | 21.30 | | | 0.48 | 2.83 | 2.53 | 2.33 |
| | I-90E | 21.30 | 21.68 | | | 0.75 | 2.45 | 1.83 | 1.58 |
| | I-90E | 21.68 | 21.97 | | | 0.57 | 2.30 | 2.00 | 1.73 |
| | I-90E | 21.97 | 22.52 | | | 1.07 | 2.04 | 1.70 | 1.26 |
| | I-90E | 22.52 | 23.16 | | | 0.96 | 1.91 | 1.93 | 1.30 |
| | I-90E | 23.16 | 23.66 | | | 0.38 | 2.00 | 2.52 | 1.42 |
| | I-90E | 23.66 | 24.16 | | | 0.35 | 1.88 | 2.48 | 1.30 |
| | I-90E | 24.16 | 24.73 | | | 0.46 | 1.92 | 2.74 | 1.20 |
| | I-90E | 24.73 | 25.30 | | | 0.55 | 1.62 | 2.48 | 1.22 |
| | I-90E | 25.30 | 25.80 | | | 0.68 | 1.64 | 2.62 | N/A |
| | I-90E | 25.80 | 26.30 | | | 0.62 | 1.78 | 2.10 | N/A |
| | I-90E | 26.30 | 26.61 | | | 0.43 | 2.00 | 2.40 | N/A |
| | I-90E | 26.61 | 27.11 | | | 0.44 | 2.60 | 2.46 | N/A |
| | I-90E | 27.11 | 27.79 | | | 0.36 | 2.14 | 2.60 | N/A |
| | I-90E | 27.79 | 27.99 | | | 0.50 | 1.95 | 2.60 | N/A |
| | I-90E | 27.99 | 28.24 | | | 1.80 | 2.25 | 2.30 | N/A |
| | I-90E | 28.24 | 28.74 | | | 2.52 | 2.62 | 2.50 | N/A |
| | I-90E | 28.74 | 29.23 | | | 0.82 | 2.78 | 2.66 | N/A |
| | I-90E | 29.23 | 29.73 | | | 2.12 | 2.84 | 2.36 | N/A |
| | I-90E | 29.73 | 30.23 | | | 1.34 | 2.66 | 3.42 | N/A |
| | I-90E | 30.23 | 30.73 | | | 1.26 | 2.52 | 2.44 | N/A |
| | I-90E | 30.73 | 31.23 | | | 1.82 | 3.06 | 2.88 | N/A |
| | I-90E | 31.23 | 31.73 | | | 2.34 | 2.80 | 2.74 | 2.72 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST | | IRI | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | FROM | TO | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
| MP14-90 | I-90E | 31.73 | 32.23 | | | 2.00 | 3.26 | 4.00 | 2.96 |
| | I-90E | 32.23 | 32.73 | | | 2.04 | 2.90 | 2.66 | 2.60 |
| | I-90E | 32.73 | 33.04 | | | 2.25 | 2.75 | 2.35 | N/A |
| | I-90W | 14.61 | 15.45 | | | 1.94 | 1.71 | 2.20 | 2.86 |
| | I-90W | 15.45 | 16.34 | | | 1.94 | 1.48 | 1.55 | 2.25 |
| | I-90W | 16.34 | 16.55 | | | 1.85 | 1.20 | 2.00 | 1.90 |
| | I-90W | 16.55 | 17.08 | | | 1.53 | 1.30 | 1.37 | 1.90 |
| | I-90W | 17.08 | 17.70 | | | 1.55 | 1.32 | 1.58 | 1.48 |
| | I-90W | 17.70 | 18.20 | | | 1.48 | 1.42 | 1.34 | 1.48 |
| | I-90W | 18.20 | 18.84 | | | 1.60 | 1.52 | 1.92 | 1.73 |
| | I-90W | 18.84 | 19.22 | | | 1.50 | 1.40 | 1.98 | 1.68 |
| | I-90W | 19.22 | 19.72 | | | 1.74 | 1.78 | 2.30 | 1.92 |
| | I-90W | 19.72 | 20.28 | | | 1.47 | 1.33 | 1.87 | 1.82 |
| | I-90W | 20.28 | 20.92 | | | 2.10 | 2.10 | 2.40 | 2.43 |
| | I-90W | 20.92 | 21.30 | | | 2.33 | 2.18 | 2.60 | 2.25 |
| | I-90W | 21.30 | 21.68 | | | 1.45 | 1.63 | 1.90 | 1.78 |
| | I-90W | 21.68 | 21.97 | | | 1.60 | 1.63 | 2.23 | 1.93 |
| | I-90W | 21.97 | 22.52 | | | 1.54 | 1.52 | 2.12 | 1.82 |
| | I-90W | 22.52 | 23.16 | | | 1.67 | 1.49 | 2.07 | 1.89 |
| | I-90W | 23.16 | 23.66 | | | 1.68 | 1.44 | 2.12 | 2.02 |
| | I-90W | 23.66 | 24.16 | | | 1.50 | 1.54 | 1.56 | 1.62 |
| | I-90W | 24.16 | 24.73 | | | 1.50 | 1.48 | 1.74 | 1.82 |
| | I-90W | 24.73 | 25.30 | | | 1.67 | 1.57 | 1.65 | 1.85 |
| | I-90W | 25.30 | 25.80 | | | 1.94 | 1.68 | 1.96 | 1.38 |
| | I-90W | 25.80 | 26.30 | | | 1.78 | 1.64 | 1.70 | N/A |
| | I-90W | 26.30 | 26.61 | | | 1.37 | 1.73 | 1.60 | N/A |
| | I-90W | 26.61 | 27.11 | | | 1.66 | 1.68 | 1.68 | N/A |
| | I-90W | 27.11 | 27.79 | | | 1.74 | 1.56 | 1.90 | N/A |
| | I-90W | 27.79 | 27.99 | | | 2.35 | 2.05 | 1.85 | N/A |
| | I-90W | 27.99 | 28.24 | | | 2.45 | 2.40 | 2.15 | N/A |
| | I-90W | 28.24 | 28.74 | | | 2.08 | 2.32 | 2.56 | N/A |
| | I-90W | 28.74 | 29.23 | | | 2.32 | 2.52 | 2.76 | N/A |
| | I-90W | 29.23 | 29.73 | | | 2.58 | 2.88 | 2.70 | N/A |
| | I-90W | 29.73 | 30.23 | | | 2.16 | 2.68 | 2.58 | N/A |
| | I-90W | 30.23 | 30.73 | | | 2.50 | 2.86 | 2.44 | N/A |
| | I-90W | 30.73 | 31.23 | | | 2.64 | 3.04 | 3.08 | 3.00 |
| | I-90W | 31.23 | 31.73 | | | 2.62 | 2.90 | 2.96 | 2.78 |
| | I-90W | 31.73 | 32.23 | | | 2.84 | 2.90 | 2.54 | 2.74 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST | | IRI | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | FROM | TO | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
| MP14-90 | I-90W | 32.23 | 32.73 | | | 2.66 | 2.60 | 2.56 | 2.54 |
| | I-90W | 32.73 | 33.04 | | | 2.83 | 2.90 | 2.45 | 2.73 |
| MP45-90 | I-90E | 45.14 | 45.71 | | | | 1.56 | 2.34 | 1.64 |
| | I-90E | 45.71 | 46.21 | | | | 1.76 | 2.82 | 1.34 |
| | I-90E | 46.21 | 46.71 | | | | 1.44 | 2.52 | 1.46 |
| | I-90E | 46.71 | 47.21 | | | | 1.62 | 2.80 | 1.40 |
| | I-90E | 47.21 | 47.71 | | | | 1.78 | 2.32 | 1.30 |
| | I-90E | 47.71 | 48.21 | | | | 2.48 | 2.32 | 1.48 |
| | I-90E | 48.21 | 48.71 | | | | 2.44 | 1.74 | 1.70 |
| | I-90E | 48.71 | 49.21 | | | | 2.54 | 2.04 | 1.60 |
| | I-90E | 49.21 | 49.71 | | | | 1.80 | 1.78 | 1.82 |
| | I-90E | 49.71 | 50.21 | | | | 1.82 | 1.76 | 1.76 |
| | I-90E | 50.21 | 50.71 | | | | 2.04 | 1.88 | 2.18 |
| | I-90E | 50.71 | 51.21 | | | | 2.12 | 1.88 | 2.14 |
| | I-90E | 51.21 | 51.71 | | | | 2.38 | 1.70 | 1.74 |
| | I-90E | 51.71 | 52.04 | | | | 1.63 | 1.40 | 1.23 |
| | I-90E | 52.04 | 52.86 | | | | 1.93 | 2.04 | 1.16 |
| | I-90E | 52.86 | 53.71 | | | | 2.46 | 1.73 | 1.54 |
| | I-90E | 53.71 | 53.92 | | | | 2.90 | 2.55 | 2.30 |
| | I-90E | 53.92 | 54.66 | | | | 2.61 | 1.99 | 1.50 |
| | I-90E | 54.66 | 55.42 | | | | 2.39 | 1.89 | 1.17 |
| | I-90E | 55.42 | 55.92 | | | | 2.00 | 1.26 | 1.22 |
| | I-90E | 55.92 | 56.36 | | | | 2.40 | 1.60 | 1.88 |
| | I-90W | 45.14 | 45.71 | | | 1.88 | 1.88 | 2.12 | 2.20 |
| | I-90W | 45.71 | 46.21 | | | 1.60 | 2.06 | 2.64 | 2.72 |
| | I-90W | 46.21 | 46.71 | | | 1.40 | 1.84 | 2.08 | 2.22 |
| | I-90W | 46.71 | 47.21 | | | 1.45 | 1.82 | 1.98 | 2.14 |
| | I-90W | 47.21 | 47.71 | | | 1.40 | 1.34 | 2.20 | 2.24 |
| | I-90W | 47.71 | 48.21 | | | 1.30 | 1.48 | 2.58 | 2.46 |
| | I-90W | 48.21 | 48.71 | | | 1.24 | 2.14 | 2.56 | 2.42 |
| | I-90W | 48.71 | 49.21 | | | 1.42 | 1.86 | 2.86 | 2.42 |
| | I-90W | 49.21 | 49.71 | | | 1.38 | 1.82 | 2.84 | 2.32 |
| | I-90W | 49.71 | 50.21 | | | 1.90 | 2.00 | 2.76 | 2.42 |
| | I-90W | 50.21 | 50.71 | | | 2.10 | 1.92 | 2.64 | 2.70 |
| | I-90W | 50.71 | 51.21 | | | 2.22 | 2.38 | 2.40 | 2.72 |
| | I-90W | 51.21 | 51.71 | | | 1.90 | 2.06 | 2.62 | 2.36 |
| | I-90W | 51.71 | 52.04 | | | 1.43 | 1.77 | 2.43 | 2.10 |
| | I-90W | 52.04 | 52.86 | | | 1.89 | 1.70 | 2.74 | 2.17 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST FROM | MILEPOST TO | IRI 1989 | IRI 1990 | IRI 1991 | IRI 1992 | IRI 1993 | IRI 1994 |
|---|---|---|---|---|---|---|---|---|---|
| MP45-90 | I-90W | 52.86 | 53.71 | | | 2.08 | 1.61 | 2.65 | 2.09 |
| | I-90W | 53.71 | 53.92 | | | 2.85 | 1.95 | 2.95 | 2.65 |
| | I-90W | 53.92 | 54.66 | | | 2.16 | 1.54 | 2.40 | 1.93 |
| | I-90W | 54.66 | 55.42 | | | 2.27 | 1.68 | 1.93 | 1.41 |
| | I-90W | 55.42 | 55.92 | | | 1.68 | 1.88 | 1.98 | 1.04 |
| | I-90W | 55.92 | 56.36 | | | 2.73 | 1.88 | 2.23 | 1.45 |
| MP69-90 | I-90E | 69.80 | 70.54 | | | | 2.57 | 2.49 | N/A |
| | I-90E | 70.54 | 71.04 | | | | 2.68 | 2.32 | N/A |
| | I-90E | 71.04 | 71.54 | | | | 1.40 | 2.54 | 2.48 |
| | I-90E | 71.54 | 72.04 | | | | 1.44 | 2.48 | 2.56 |
| | I-90E | 72.04 | 72.82 | | | | 1.16 | 2.33 | 2.36 |
| | I-90E | 72.82 | 73.20 | | | | 1.78 | 2.58 | N/A |
| | I-90E | 73.20 | 73.77 | | | | 1.17 | 1.93 | 2.50 |
| | I-90E | 73.77 | 74.27 | | | | 1.10 | 2.40 | 2.30 |
| | I-90E | 74.27 | 74.77 | | | | 1.24 | 2.56 | 1.74 |
| | I-90E | 74.77 | 75.64 | | | | 1.50 | 2.51 | 2.16 |
| | I-90E | 75.64 | 76.06 | | | | 1.26 | 2.58 | 2.34 |
| | I-90E | 76.06 | 76.56 | | | | 1.18 | 2.46 | 2.14 |
| | I-90E | 76.56 | 77.06 | | | | 0.96 | 2.52 | 2.10 |
| | I-90E | 77.06 | 77.56 | | | | 0.96 | 2.30 | 2.02 |
| | I-90E | 77.56 | 78.06 | | | | 1.35 | 2.22 | 2.30 |
| | I-90E | 78.06 | 78.56 | | | | 2.06 | 2.50 | 2.30 |
| | I-90E | 78.56 | 79.06 | | | | 1.90 | 2.48 | 2.40 |
| | I-90E | 79.06 | 79.56 | | | | 1.88 | 2.72 | 2.36 |
| | I-90E | 79.56 | 80.10 | | | | 1.92 | 2.42 | 2.03 |
| | I-90E | 80.10 | 80.60 | | | | 1.24 | 2.56 | 2.30 |
| | I-90E | 80.60 | 81.10 | | | | 0.96 | 2.50 | 2.02 |
| | I-90E | 81.10 | 81.83 | | | | 1.47 | 2.51 | 1.84 |
| | I-90E | 81.83 | 82.33 | | | | 1.30 | 2.42 | 1.90 |
| | I-90E | 82.33 | 82.83 | | | | 1.36 | 2.24 | 1.78 |
| | I-90E | 82.83 | 83.15 | | | | 1.83 | 2.37 | 2.07 |
| | I-90E | 83.15 | 83.65 | | | | 2.02 | 2.26 | N/A |
| | I-90E | 83.65 | 84.15 | | | | 1.90 | 2.18 | N/A |
| | I-90E | 84.15 | 84.65 | | | | 2.47 | 2.62 | N/A |
| | I-90E | 84.65 | 85.15 | | | | 2.18 | 2.75 | N/A |
| | I-90E | 85.15 | 85.49 | | | | 3.15 | 2.78 | N/A |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST FROM | MILEPOST TO | IRI 1989 | IRI 1990 | IRI 1991 | IRI 1992 | IRI 1993 | IRI 1994 |
|---|---|---|---|---|---|---|---|---|---|
| MP152-90 | I-90E | 152.72 | 152.94 | | | | 2.40 | 2.40 | 2.30 |
| | I-90E | 152.94 | 153.41 | | | | 2.44 | 1.86 | 2.52 |
| | I-90E | 153.41 | 153.74 | | | | 2.53 | 2.03 | 2.50 |
| | I-90E | 153.74 | 154.37 | | | | 1.67 | 2.10 | 2.31 |
| | I-90E | 154.37 | 154.69 | | | | 1.96 | 2.13 | 2.27 |
| | I-90E | 154.69 | 155.08 | | | | 2.18 | N/A | 2.55 |
| | I-90W | 152.72 | 152.94 | | | | 2.60 | 1.80 | 1.73 |
| | I-90W | 152.94 | 153.41 | | | | 2.72 | 1.72 | 1.48 |
| | I-90W | 153.41 | 153.74 | | | | 2.37 | 2.33 | 1.73 |
| | I-90W | 153.74 | 154.37 | | | | 2.60 | 1.67 | 1.48 |
| | I-90W | 154.37 | 154.69 | | | | 2.80 | 2.20 | 1.60 |
| | I-90W | 154.69 | 155.08 | | | | 2.83 | 2.40 | 1.55 |
| MP194-90 | I-90E | 194.93 | 195.43 | 1.23 | 1.88 | 2.95 | 1.68 | 1.60 | 1.73 |
| | I-90E | 195.43 | 195.93 | 1.18 | 1.64 | 3.40 | 1.22 | 1.40 | 1.26 |
| | I-90E | 195.93 | 196.43 | 1.32 | 1.82 | 3.14 | 1.36 | 1.56 | 1.40 |
| | I-90E | 196.43 | 196.93 | 1.42 | 1.44 | 3.30 | 1.26 | 1.70 | 1.40 |
| | I-90E | 196.93 | 197.43 | 1.16 | 1.62 | 2.98 | 1.14 | 2.00 | 1.48 |
| | I-90E | 197.43 | 197.93 | 1.58 | 2.00 | 2.96 | 1.60 | 2.72 | 2.26 |
| | I-90E | 197.93 | 198.43 | 2.00 | 2.66 | 3.18 | 1.66 | 2.60 | 2.88 |
| | I-90E | 198.43 | 198.93 | 1.40 | 2.28 | 3.10 | 1.20 | 2.44 | 2.72 |
| | I-90E | 198.93 | 199.31 | 1.55 | 2.03 | 3.35 | 1.53 | 2.53 | 2.88 |
| | I-90E | 199.31 | 199.81 | 1.24 | 1.78 | 2.96 | 1.10 | 2.34 | 2.26 |
| | I-90E | 199.81 | 200.31 | 1.55 | 2.17 | 2.83 | 1.36 | 2.46 | 2.24 |
| | I-90E | 200.31 | 200.81 | 1.10 | 1.48 | 2.38 | 1.08 | 2.24 | 1.82 |
| | I-90E | 200.81 | 201.48 | 1.32 | 1.87 | 1.88 | 1.37 | 2.46 | 1.97 |
| | I-90E | 201.48 | 202.08 | 1.54 | 1.99 | 2.40 | 1.57 | 2.62 | 2.38 |
| | I-90W | 194.93 | 195.43 | | 1.63 | 1.50 | 2.10 | 2.48 | 1.83 |
| | I-90W | 195.43 | 195.93 | | 1.54 | 1.42 | 2.00 | 2.50 | 2.40 |
| | I-90W | 195.93 | 196.43 | | 1.42 | 1.36 | 2.02 | 2.64 | 2.24 |
| | I-90W | 196.43 | 196.93 | | 1.20 | 1.52 | 2.18 | 2.40 | 2.24 |
| | I-90W | 196.93 | 197.43 | | 1.24 | 1.52 | 1.98 | 1.92 | 1.76 |
| | I-90W | 197.43 | 197.93 | | 2.06 | 2.12 | 2.58 | 2.04 | 2.14 |
| | I-90W | 197.93 | 198.43 | | 1.76 | 1.92 | 2.34 | 1.86 | 1.90 |
| | I-90W | 198.43 | 198.93 | | 1.64 | 2.20 | 2.08 | 1.60 | 1.78 |
| | I-90W | 198.93 | 199.31 | | 1.90 | 1.73 | 2.80 | 2.13 | 2.40 |
| | I-90W | 199.31 | 199.81 | | 1.68 | 1.80 | 2.08 | 1.74 | 1.58 |
| | I-90W | 199.81 | 200.31 | | 1.45 | 1.57 | 2.02 | 1.34 | 1.74 |

| PROJECT NUMBER | ROAD NUMBER | MILEPOST | | IRI | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | FROM | TO | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
| MP194-90 | I-90W | 200.31 | 200.81 | | 1.28 | 1.64 | 2.04 | 1.62 | 2.08 |
| | I-90W | 200.81 | 201.48 | | 1.65 | 2.07 | 2.49 | 2.14 | 2.43 |
| | I-90W | 201.48 | 202.08 | | 1.86 | 1.94 | 2.27 | 2.17 | 2.45 |

## APPENDIX E

Smoothness Specification Survey

## CONSTRUCTION INCENTIVES SURVEY

## UNIVERSITY OF WYOMING
## DEPARTMENT OF CIVIL ENGINEERING

The purpose of this survey is to gather information concerning specifications and testing equipment used in accepting the initial smoothness of concrete and asphalt pavements. Please feel free to add any information that might be relevant to the end of the survey.

1. Please specify the name of your agency. ______________________________

2. Does your agency have pavement smoothness specifications? ( ) Yes ( ) No
   (If no, please return the survey in the envelope provided)
   (If yes, please continue)

3. Please indicate by placing an "x" in the blanks provided, the types of equipment that are utilized by your agency for the acceptance of "mainline" concrete (PCC) and asphalt (AC) pavements.

| | New Construction | | Overlays | |
|---|---|---|---|---|
| | AC | PCC | AC | PCC |
| A. Straight edge | ___ | ___ | ___ | ___ |
| B. Profilograph | ___ | ___ | ___ | ___ |
| California type | ___ | ___ | ___ | ___ |
| Rainhart | ___ | ___ | ___ | ___ |
| C. Other (specify) __________ | ___ | ___ | ___ | ___ |

4. Describe the smoothness acceptance limits that are typically used by your agency for PCC pavements (e.g. 7 inches per mile for profilograph measurements).

______________________________________________________________

______________________________________________________________

5. Describe the smoothness acceptance limits that are typically used by your agency for AC pavements (e.g. 0.1 inches from the lower edge of a 12 foot straightedge).

______________________________________________________________

______________________________________________________________

6. Does your agency have a monetary construction incentives/penalties policy for initial smoothness?

   Yes ( )        No ( )

   a. If yes, What are they for PCC? ____________________________________________

   ____________________________________________

   ____________________________________________

   b. What are they for AC?____________________________________________

   ____________________________________________

   ____________________________________________

7. How were the incentives/penalties levels arrived at? (Research study, engineering judgment, other)

   ____________________________________________

   ____________________________________________

8. Please provide comments on the following items with respect to the equipment you are currently using for initial smoothness testing.

   a. Equipment type____________________________________

   b. Manufactured by____________________________________

   c. Equipment calibration ____________________________________

   d. Durability of equipment/ruggedness____________________________________

   e. Repeatability of results____________________________________

   f. Operator training required____________________________________

9. At what point in time is the new pavement surface typically tested for smoothness?

   Same day______        Next day_______    End of construction______

   Other (please explain)____________________________________

10. Approximately, what is the percentage of concrete sections securing construction incentives for initial smoothness? __________    Penalties? ___________

11. What is the percentage of asphalt sections securing construction incentives for initial smoothness? _________    Penalties? ___________

12. Has your agency observed any failures or areas of high roughness on pavements that had been accepted under smoothness specifications? ( ) Yes ( ) No

13. How would you describe the effectiveness of your current smoothness specifications?

( ) Excellent
( ) Very Good
( ) Good
( ) Poor
( ) Very Poor

14. As part of this research study, we are gathering data from all states to determine the effectiveness of smoothness specifications. Please specify below the appropriate contact person in your agency who can best help us in obtaining such data.

Name ______________________________

Title ______________________________

Agency ______________________________

Address ______________________________

Phone ______________________________

Thank you for your time and effort. We appreciate your help with this survey.