

Evaluating the Effectiveness of QC/QA Programs in Region 8 States

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ABSTRACT

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The main objective of this research was to quantify the differences and similarities among Quality Control/ Quality Assurance (QC/QA) programs for three state highway agencies. By measuring these differences, conclusions were drawn as to which state was achieving the best results with their QC/QA program. The states considered in this study included Colorado, Wyoming, and South Dakota.

When designing a QC/QA program, there are numerous factors that must be taken into account. Some of the processes common to at least two of the three states used in this study were, control of aggregate gradation, density, design air voids, and asphalt content. Specifications and processes used for incentive and disincentive pay adjustments differed among the states as did the processes controlled for.

The data for this research was collected, condensed, and filtered for use in a statistical software package. The projects were constructed during the first, second, and third years after the implementation of a pilot QC/QA program. ANOVA was used on the data and the variation between the test and target values for each factor. Conclusions were drawn from the ANOVA.

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1. INTRODUCTION

1.1 Background

There is a trend among state highway agencies to improve pavement performance by using Quality Control/Quality Assurance (QC/QA) programs. An increase in testing on pavement properties during construction results in pavements that may have a longer service life and decreased maintenance costs. Almost all state highway agencies have implemented some version of a Quality Control/Quality Assurance program which should improve pavement performance by increasing testing. The expected improvement produced by the implementation of a QC/QA program is a decrease in variability among factors that are tested and measured by the state highway agencies.

Increasing the amount of testing conducted on the hot bituminous pavement being placed in the field increases the contractor's awareness of differences between target values and those achieved during construction, and should result in the production of higher-quality pavements. Factors such as aggregate gradation, density, and design air voids affect the performance of pavement in service. Testing these factors in the field provides evidence that the pavement being constructed has characteristics which are as close as possible to the desired target values for each of those factors. Deviation from target values leads to a decrease in the life of the pavement, requiring increased maintenance and replacement costs for the state highway agency. QC/QA programs provide increased testing throughout the construction process, to lower the variability.

1.2 Problem Statement

Each state highway agency developed and implemented its own QC/QA program, resulting in programs that are different. It is important to determine which program is achieving a decrease in variability between the target values and those achieved by contractors in the field. Differences among state highway agencies who have implemented QC/QA programs were documented in a case study conducted by the University of Wyoming in 2002 (Butts, 2002). Some of the differences noted were the weight of certain processes for pay factor determination, the different pavement properties which were tested, and testing frequency. The processes determined by this previous study to be the most commonly tested for included, aggregate gradation, asphalt content, void properties, mat density, and smoothness. It is important to determine how subtle changes among the different QC/QA programs affect the variability within tested pavement properties.

1.3 Objective of Research

The main objective of this research was to determine which of the three states included in this study showed the lowest variation for processes tested in their respective QC/QA programs. This process begins by measuring similar processes tested for among the three states QC/QA programs. Once the similar processes have been determined and variation among those processes found, conclusions can be drawn as to which state is achieving the best results with their QC/QA program. Other objectives include:

- Evaluating differences and similarities among Colorado, Wyoming, and South Dakota QC/QA programs.
- Determining which processes within each state have the lowest variability.

- Finding which state has the lowest variability for each individual process.
- Concluding if there was a decrease in variability over time.
- Evaluating the state's QC/QA programs, to find which produced the lowest overall variability.

1.4 Report Organization

Chapter 2 of this study is a literature review of each of the processes controlled by the QC/QA programs included in this study. The specifications required by each state for these processes are discussed in Chapter 3. Chapter 4 details the manner in which the data was compiled, manipulated, and analyzed. Summaries of this data are given in Appendices A (Colorado), B (Wyoming), and C (South Dakota). Chapter 5 describes the statistical analysis that was performed to determine the variation of each of the processes included in the different QC/QA programs. Conclusions drawn from this analysis and some recommendations for future research are discussed in Chapter 6.

2. LITERATURE REVIEW

2.1 Introduction

When evaluating QC/QA programs, it is important to understand the different processes which are controlled by such programs. QC/QA programs in general, were implemented as cost effective controls over particular items involved in the construction of hot bituminous pavement (HBP). QC/QA programs decrease variability between target values or optimum mix design values and values for pavements constructed in the field, by increasing the amount of testing required of contractors. A decrease in this variability leads to pavements with longer service life and decreased maintenance costs. Each state highway agency was responsible for initiating its own QC/QA program to decrease this variability. Different agencies decided that different processes were more important to the overall quality of pavement within their jurisdiction than others. This chapter discusses the processes in the QC/QA programs of the states included in this study.

2.2 QC/QA Programs

Programs involving Quality Management generally modify specifications by replacing older material and method specifications with end-result specifications. This change allowed contractors to modify mix design properties and materials more easily during construction, rather than being forced to adhere to a specific mix design and method of production. By modifying mix designs when target and test values are not similar, contractors are able to directly lower variability in HBP.

2.2.1 Material and Method Specifications

Material and method specifications were common among state highway agencies prior to the introduction of QC/QA programs. Method specifications dictated what materials a contractor should use and the equipment with which they should be placed. These specifications minimized the contractor's control and left the responsibility for the overall final product in the hands of the state highway agency. Therefore, if a pavement was built using the materials and equipment specified and the final product failed to perform, it would be the responsibility of the highway agency, not the contractor.

There were several disadvantages to these types of specifications. The main disadvantage was the reduction of innovation allowed to the contractor. It is not uncommon for contractors to be aware of cost-saving materials or advanced equipment that may reduce the amount of labor needed for construction. By stipulating materials and equipment, state highway agencies may have increased overall construction costs. The second disadvantage is the non-statistical basis for such specifications. Since the specifications were not statistically based, it was next to impossible for contractors to reach 100 percent compliance. This led to disagreements about exactly what was meant by compliance. How far from the specified amount was considered to be in compliance? The final disadvantage included testing processes. Testing of materials was conducted on non-random samples, meaning that the test results may or may not have represented the overall quality of the pavement section. If samples were taken from a section where the pavement was of high-quality, there would be an overstatement that the entire project was of high quality. In reality the section being tested may have been the only high quality section within the entire project. Even

with the disadvantages of these types of specifications, material and method specifications are still in use by some state highway agencies. Often this is due to the familiarity among designers and contractors with such specifications. Agencies lacking personnel and resources to develop more statistically based specifications generally utilize material and method specifications.

2.2.2 End-Result Specifications

Upon realizing the disadvantages of material and method specifications, end-result specifications were created and became the introduction to QC/QA programs. End-result specifications dictate to contractors which attributes of the final product were desired. How the contractor achieved these attributes was up to him/her. These specifications give a minimum or maximum range of values for each governed process. For example, rather than dictating a single density value, a range of acceptable density values was given. Random lot testing is then applied to the pavement section and statistical analysis is used to determine the overall density value for the pavement.

End-result specifications have advantages over material and method specifications. Two advantages are:

1. They shift responsibility for final product performance from state highway agencies to contractors.
2. They rely on statistically based testing methods to determine quality of a section, rather than poorly defined compliance with quality measurements.

2.3 Process Control

Regardless of the type of specification used, it is important to determine which processes must be controlled. Process control begins by determining factors that affect the final product. When these factors are controlled by specifications, and contractors achieve those specifications, pavement performance is improved. Each state has the ability to determine which processes they will test and control for. States may also set the weight for each of these factors when determining the incentive or disincentive pay adjustments for a project. The processes discussed in this chapter are those determined to be necessary by the three states included in this study.

2.3.1 Aggregate Gradation

High-quality aggregate used in the proper proportions is very important to the overall quality of pavement. Aggregate is a general term used to describe materials including igneous, sedimentary, and metamorphic rock used to construct pavement. These rocks may be reduced from their larger form by impact, crushing, shear, and/or compression, and incorporated with a binder into the pavement. The suitability of aggregate for use in hot mix asphalt (HMA) is determined by evaluating the following material characteristics (Roberts et al, 1996):

1. Size and gradation
2. Cleanliness/deleterious materials
3. Toughness/hardness
4. Durability
5. Surface texture
6. Particle shape
7. Absorption
8. Affinity for asphalt

Using less than suitable aggregates in HMA production, will lead to a decrease in stiffness, stability, durability, permeability, workability, fatigue resistance, frictional resistance, and resistance to moisture damage (Roberts et al, 1996). Aggregate gradation must promote uniform coating of the aggregate to provide an adequately dense pavement, while ensuring adequate void spaces are present to decrease the probability of the occurrence of bleeding or rutting problems.

2.3.2 Air Voids

State highway agencies most commonly set the optimum range for air voids between 3 percent and 5 percent. The desired air voids should be created in the field using compaction, and not by increasing the asphalt content. Void spaces within asphalt are extremely important as they resist increased compaction over time. If there are insufficient void spaces in the pavement, bleeding and rutting will occur. Void spaces within the pavement should not allow air or water to enter the pavement surface. Large void spaces will lead to the penetration of water into the pavement structure, promoting stripping of the pavement.

2.3.3 Density

Density is also related to air voids. Since density is usually expressed as a percent of theoretical maximum density, it is easy to see that anything that decreases in-place air voids will increase the percent density (Roberts et al, 1996). Density is generally measured as a percent of the theoretical maximum, field values may lie anywhere from 90 percent to 99 percent of this maximum. Density may be increased by compacting asphalt pavement or by adding asphalt cement to fill void spaces. Compaction increases the shear strength of the pavement. Mix modification does not increase pavement strength, thus increasing the chance for rutting. Increased density due to increased compactive effort will increase shear resistance and improve performance assuming that there is adequate asphalt cement available to prevent durability problems and not too much asphalt cement to cause permanent deformation problems (Roberts et al, 1996). Compaction allows density to increase up to a certain point. After this point the increased thickness of asphalt around the aggregate particles causes them to move apart and density will decrease.

2.3.4 Asphalt Content

Having the correct asphalt content for a mixture is very important to insure the pavement performs satisfactorily. A mixture with low asphalt content is not durable and one with high asphalt content is not stable (Roberts et al, 1996). Asphalt content measurements are generally extracted from the pavement mixture. Incorrect asphalt amounts may result from cases where the aggregate weight, asphalt cement weight, and aggregate moisture content measurements are taken inaccurately. Aggregate provides structural stability for pavement and asphalt is merely employed to hold the aggregate together. Therefore, asphalt will not add structural capacity to the pavement. The addition of too much asphalt will lead to bleeding, rutting and decreased friction along a section of road. Adding too little asphalt will leave portions of the aggregate uncoated, and cause a low film thickness around the aggregate. Both will lead to raveling, stripping and difficulty when compacting the mixture.

It is important to note how one of the processes discussed is not entirely independent of any other process. Additional asphalt affects density and air void values. Additional aggregate determines the amount of asphalt needed. Therefore, each individual process must be taken into account when determining the overall quality of a pavement section. The interaction between the processes should be taken into account when determining the mix design or optimum combination of all factors.

2.4 Quality Management

2.4.1 Quality Control

Quality control is defined by the Federal Highway Administration (FHWA) as those quality assurance actions and considerations necessary to assess production and construction processes so as to control the level of quality being produced in the end product. This concept of quality control includes sampling and testing to monitor the processes, but, usually does not include acceptance sampling and testing. Quality control relies on two basic components, a target value and the variability of a process around that target. The target is the ideal value for a material characteristic. The variability shows how much a process differs from one location within a project to another. It is important to ensure that the quality control process is based on random test results and not on subjective judgments. Quality management programs have been introduced to eliminate subjectiveness from the testing process.

2.4.2 Quality Assurance

Quality assurance or independent assurance is conducted to insure that the test results from the quality control are valid. Quality assurance verifies that differences among samples are due to variation within samples, and not the testing techniques employed. As state highway agencies increase the amount of testing required by contractors and turn the responsibility for that testing over to the contractors, it is important to validate the contractors' test results. This can be accomplished by running assurance tests. Assurance testing is conducted on randomly chosen lots from the QC samples. This testing is generally conducted by the state highway agency and in many cases is used to determine incentive and disincentive payment adjustments.

2.5 Summary

When designing a QC/QA program there are numerous factors that must be taken into account. State highway agencies must decide which processes must be controlled. They must also determine how much of the testing should be turned over to the contractors. Quality management includes not only the quality control done by the contractor; it also includes the quality assurance testing conducted by the state highway agency or an impartial third party. There are some similarities among the QC/QA programs of the states included in this study. Some of the processes common to at least two of the three states are control of aggregate gradation, density, design air voids, and asphalt content. These factors are then used to determine quality among pavement sections. The proper combination of each of these properties will lead to increased pavement performance and a longer useful life from pavement sections.

3. QC/QA SPECIFICATIONS OF STATES INCLUDED IN THIS CASE STUDY

3.1 Introduction

Currently, the FHWA Region Eight states using a QC/QA program are Colorado, North Dakota, South Dakota, Utah, and Wyoming. These programs are the result of the need for a cost-effective program for increased testing of hot bituminous pavements, ensuring that the pavement placed in the field is as close as possible to the target value. Many of the state highway agencies have conducted internal studies to show the effectiveness of their programs in reducing variability between target and test values obtained from field samples. Most internal studies concluded that benefits were produced by the introduction of QC/QA programs (Butts, 2002 and Brakey, 1993, 1994, 1995). However, there have been no studies conducted to determine if the subtle changes among the different programs caused one state to achieve benefits exceeding that of another state. The first step in determining such information is to study and understand what differences are present among the programs.

This case study includes data from three different states: Colorado, Wyoming, and South Dakota. Colorado Department of Transportation was chosen because it had a well-developed long standing QC/QA program. South Dakota and Wyoming both had similar programs which were implemented in similar time frames. They were chosen because it was assumed the variation between the two would be quite similar. Each of these states had a QC/QA program in place with particular specifications written to govern the program. Each state had the ability to change and manipulate their particular program, so that the end result was a program that would give the greatest reduction in variability. This chapter describes the QC/QA specifications that were in place during the construction of the projects included in this study. Any modifications made during the study period were included and described in detail.

3.2 CDOT Introduction to QC/QA

Prior to the introduction of a QC/QA pilot program, the Colorado Department of Transportation (CDOT) used a statistically based acceptance specification program. This program allowed CDOT to specify testing procedures to test various construction materials in order to determine each materials' measurement, and determine its percentage within tolerance limits. This program included protocol for disincentive payments, or negative price adjustments, made to the overall bid price if materials did not conform to the set specifications. However, the program did not allow for incentive or positive price adjustments, for materials close to the target values. CDOT began researching WASHTO Model QA specifications and used the program as a guideline in constructing its own QC/QA program in October of 1991. The specifications for the pilot program in Colorado were composed using previous projects constructed under the standard specifications. These specifications were published in 1991 as *The Standard Specifications for Road and Bridge Construction* (Colorado, 1991).

3.2.1 CDOT'S Pilot Program

Colorado's pilot QC/QA program was initiated in 1992. There were seven projects completed under the program specifications in the first year followed by 18 projects completed in the second year. Approximately 764,000 tons of hot bituminous pavement (HBP) were constructed under

these new specifications in the first two years alone. The program was evaluated twice during this time. The first evaluation was published in June of 1993 and the second in May of 1994. It was at this time CDOT decided to extend the pilot program through the 1994 construction season. In 1994, 58 projects were completed under the new specifications, amounting to approximately 1,496,000 tons of HBP. After evaluation of the pilot program in 1994, a Standard Special Provision was written for 1995 projects.

3.2.2 CDOT'S Quality Control

The Colorado QC/QA program begins with the Quality Control Plan. This plan dictates the frequency of testing required by CDOT. Testing frequencies are summarized in Table 3.1. The Quality Control Plan gives direction for process control testing. The contractor is responsible for all process control testing, and the testing must be completed according to the Quality Control Plan (QCP) and submitted to the engineer for approval. The engineer, prior to construction of the project, must approve this plan. Upon completion and approval of the QCP, process control testing may begin.

Table 3.1 Minimum Testing Requirements for Colorado

ELEMENTS	PROCESS CONTROL	ACCEPTANCE	CHECK (CTP)
Asphalt Content	1/500T (1/500 metric tons)	1/1,000T (1/1,000metric tons)	1/10,000T (1/10,000 metric tons)
Gradation	1/DAY	1/2,000T (1/2,000metric tons)	1/20,000T (1/20,000 metric tons)
In-Place Density	1/500T (1/500 metric tons)	1/500T (1/500 metric tons)	1/5,000T (1/5,000 metric tons)

Quality control charts are prepared for each process control test. A process is considered to be the material produced between changes to the job mix formula (JMF). A process can consist of a large variety in the number of individual tests that must be completed. CDOT allows changes to the process including separation of a process without changes to the JMF to accommodate small quantities or unusual variations. However, if an individual test result for an element is greater than two standard deviations outside the tolerance limits, based on historical data for that element, the test must be designated as its own process. One standard deviation based on historical data is considered to be the V factor and can be viewed in Table 3.2 below.

Table 3.2 V Factors for Colorado

ELEMENT	V FACTOR
2.36 mm (No. 8) mesh and larger sieves	2.80
600 mm (No. 30) mesh sieve	1.80
75 mm (No. 200) mesh sieve	0.80
Asphalt Content	0.20
In-Place Density	1.10

3.2.3 CDOT'S Level of Control

Elements are considered to be the factors affecting the overall performance of pavement. Colorado considers the following three basic elements in QC/QA programs: asphalt content, aggregate gradation, and in-place density. Quality level charts are required for each one of these elements. Quality levels (QL) for each of the elements are calculated using the standard deviation and the distance from the average for each process. The QL will increase for each process given that the standard deviation decreases and the average test value is near the center of the tolerance limits for the given process.

The desired effect of using a QC/QA program is to give a greater amount of responsibility to contractors. Along with this responsibility comes an ability to initiate corrective action if process control shows a deviation from the desired test results. CDOT has taken this into account, and has recently implemented software to calculate a moving quality level (MQL). This MQL is not to be confused with the overall QL. MQL involves software used to combine the most recent process control tests only, while the QL includes every test result for a given process. The MQL can give a large quantity of information to the contractor and allow for corrective action. The MQL begins by testing at a 3:1 minimum ratio. After the second test at a 1:4 ratio, the MQL will begin running at a 1:5 ratio. There are three levels of control for the MQL beginning with a condition green, the highest level having a MQL value greater than 90 as calculated by the software. The second level is condition yellow. Each new process begins at this level, however, this level can also be reached when the MQL score is between 65 and 90. Condition yellow will also be introduced if a test result falls outside the given specification limits. The most undesirable condition is red. When condition red takes place, the MQL score has fallen below 65 and the contractor must resume testing at the minimum level. Production will only cease if condition red is calculated for the next five process control tests. With the introduction of quality level calculating software such as this, the contractor is able to see the test results and how far they are departing from the target values. A contractor is then able to take corrective action before reaching a condition red. This process gives the contractor more responsibility for the finished product and further assists the QC/QA programs intentions.

3.2.4 CDOT'S Quality Acceptance

Acceptance testing for CDOT is the sole responsibility of the Department of Transportation. Testing for acceptance of the final pavement product is conducted by state personnel and is based on the same random testing procedure as described to the contractor. However, when placing the first 500 tons of material, the testing is correlated to the process control testing. Testing will continue in this manner until the two test results are within acceptable tolerance limits. The check or CTP testing requirement are displayed in Table 3.1 as well. The minimum number of acceptance tests is at least 5 for asphalt content, 3 for gradation, and 10 for in-place density for all projects. The values of acceptable tolerances between QC and QA tests for correlation testing are summarized in Table 3.3.

Table 3.3 Tolerances for QC and QA Tests

ELEMENT	BASE DATA STANDARD DEVIATION	MAXIMUM DIFFERENCE SPLIT SAMPLE	MAXIMUM DIFFERENCE AVERAGE 5-TEST
Asphalt Content	0.11	0.32	0.14
HBP #4 Sieve	2.04	5.76	2.57
HBP #8 Sieve	1.92	5.44	2.43
HBP #200 Sieve	0.56	1.6	0.71
In-Place Density	0.77	2.17	0.97

3.2.5 CDOT'S Pay Factor Determination

Three elements are needed in Colorado, each having the proper proportions to ensure a high quality asphalt pavement is produced. Elements included are aggregate gradation, density, and asphalt content. These elements are used for determining quality levels as well as pay factors (PF). Evaluations of materials for the calculation of PF in Colorado are done using the Department's acceptance test results. Overall pay determination may include either an incentive or disincentive pay factor. CDOT has chosen to use a composite equation weighting each of the three elements to determine the overall incentive or disincentive payment to be made on each of the projects. The overall pay factor is 20 percent dependent on the QL scores for aggregate gradation. Specified sieves are tested individually and the lowest QL for each sieve size becomes the QL used to determine the pay factor for the aggregate element. Asphalt content accounts for 30 percent of the composite pay factor leaving 50 percent dependent on the density QL values.

The composite pay factor can have a range of values from 0.75 to 1.06 depending on the quality level of each of the individual elements. When an individual process earns a PF greater than 0.75 the work representative of this process will be accepted and the appropriate pay adjustment will be made. Conversely, if the PF for an individual process is less than 0.75, the engineer must designate either the removal of the placed materials or leave the materials in place if it can be determined that the final product can perform at the intended level.

3.2.6 Colorado Modifications

Colorado has made two major modifications to their QC/QA program since its induction. The first modifications were made in conjunction with the establishment of the pilot QC/QA program. These changes included a reduction of the tolerance limits on asphalt content and aggregate gradation. The second change was made in 1992 when CDOT began another pilot program to introduce acceptance of field mixtures based on the volumetric void properties. This program accepts pavement sections based on asphalt content and in-place density but does not require the field gradation acceptance testing. Acceptance based on void properties included two additional tests required of the contractors. These tests were percent air voids and voids in the mineral aggregate. Due to the contractors lack of experience with these two additional tests, CDOT did not allot disincentive pay factors on the void properties; however, the incentive payments on these properties were used to encourage compliance with specifications.

3.2.7 CDOT'S Specifications

For the purpose of this report, the specifications listed below are from the 1991 Standard Specifications as well as Standard Specification Revisions of Sections 105, Control of Work, and 106 Control of Materials. The projects analyzed in this report were completed beginning in 1994, after the introduction of the revision, and therefore are subject to its provisions. Revisions of sections 401 Plant Mix Pavements and 703 Aggregates (revised in November 1994 and March 1995) are included.

The following three basic elements were tested for all pilot projects: asphalt content, percent relative density and aggregate gradation. Each of these elements must conform to specifications for the final pavement product to perform properly. Specifications for each element are set forth in the State Department of Highway Division of Highways State of Colorado *Standard Specifications for Road and Bridge Construction*.

3.2.7.1 CDOT'S Aggregate Gradation

Aggregate gradation is of great importance to the overall performance of the final product. Colorado began with four different gradation types in the 1991 specification book. The same gradation classifications were used in 1994; however, the acceptable limits were changed slightly. Both the gradation specifications and the tolerance limits are summarized in tables 3.4 through 3.7. The majority of projects included in this study were Grading C or CX.

Table 3.4 CDOT 1992 Gradation Specifications

Sieve Size	Percent by Weight Passing Square Mesh Sieves			
	Grading G	Grading C	Grading CX	Grading F
1 1/2"	100			
1"				100
3/4"	63-85	100		
1/2"	46-78	70-95	100	
3/8"		60-88	74-95	
#4	22-54	44-72	50-78	
#8	13-43	30-58	32-60	45-85
#30	4-22	12-34	12-34	
#200	1-8	3-9	3-9	7-13

Table 3.5 CDOT 1994 Gradation Specifications

Sieve Size	Percent by Weight Passing Square Mesh Sieves			
	Grading G	Grading C	Grading CX	Grading F
1 1/2"	100			
1"	90-100	100		100
3/4"	63-85	90-100	100	
1/2"	46-78	70-89	90-100	
3/8"		60-88	74-89	
#4	22-54	44-72	50-78	
#8	13-47	30-62	32-64	45-85
#30	4-26	12-38	12-38	
#200	1-7	3-7	3-7	7-13

Table 3.6 CDOT 1992 Tolerance Limits

Tolerances	
Passing No. 8 and larger sieves	± 8%
Passing No. 30 sieve	± 6%
Passing No. 200 sieve	± 2%

Table 3.7 CDOT 1994 Tolerance Limits

Tolerances 1994 Revision	
Passing 3/8" (9.5 mm) and larger sieves	± 6%
Passing No. 4 and No. 8 sieves	± 5%
Passing No. 30 sieve	± 4%
Passing No. 200 sieve	± 2%

3.2.7.2 CDOT'S Density

Density is another element that must be tested for the QC/QA program as well as for PF determination. "Pavement other than Grading F shall be compacted to a density of 92 percent to 96 percent of the maximum theoretical density, determined according to AASHTO T 209. Grading F shall be compacted to a density of 90 percent to 95 percent of the maximum theoretical density. Field density determinations will be made in accordance with Colorado Procedure 44 or 81" (Colorado 234 or 401.17 Compaction).

3.2.7.3 CDOT'S Asphalt Content

Asphalt content is the final element tested for both QC/QA and PF determination. The target value for asphalt content is specified in the job mix formula (JMF). The tolerance limits for Asphalt content are 0.3 percent above or below the target value. Pay factors are figured separately depending on whether or not the asphalt is paid for as a portion of the Hot Bituminous Pavement price or is paid for separately. The following represent the two equations used.

When AC is not paid for separately:

$$I/DP = (PF - 1)(Ton_{HBP})(UP_{HBP}) \quad (3.1)$$

When AC is paid for separately:

$$I/DP = (PF - 1)(Ton_{HBP})(UP_{HBP}) + (PF - 1)(Ton_{AC})(UP_{AC}) \quad (3.2)$$

Where

I/DP = Incentive/Disincentive Payment

PF = Pay Factor

Ton_{HBP} = Tons of Asphalt Mix

UP_{HBP} = Unit Price of Asphalt Mix

Ton_{AC} = Tons of Asphalt Cement

UP_{AC} = Unit Price of Asphalt Cement

3.2.8 CDOT'S Personnel Requirements

Testing personnel in Colorado must conform to the following requirements as listed in the *Revision of Sections 105 and 106 Quality of Hot Bituminous Pavement*. The person responsible for the process control testing should be identified in the QCP. This person must possess one or more of the following qualifications (CDOT, 2002):

- A. Registration as a professional engineer.
- B. Certification by the National Institute for Certification in Engineering Technologies (NICET) at level II or higher in the subfield of Highway Materials or Asphalt, Concrete, and Soils.
- C. A minimum of five years testing experience with asphalt pavement.

Technicians performing tests, if other than the person responsible for process control testing, must possess one or more of the following qualifications:

1. A minimum of two years testing experience with asphalt pavement.
2. Certification by a nationally recognized organization such as NICET.

3.3 WYDOT'S QC/QA Program

The Wyoming Department of Transportation initiated a quality assurance program in 1997. The specifications for this program will be included in the Standard Specifications for Road and Bridge Construction for the Wyoming Department of Transportation (WYDOT) in the 2003 Edition. These specifications were published as this study was completed, and are currently available through WYDOT.

3.3.1 WYDOT'S Specifications

When contractors design the mix, they must follow the specifications given by WYDOT. The department uses both the Marshall and Superpave mix design procedures. However, the Marshall Mix design is generally weighted more heavily. Upon completion of the JMF and mix design, the materials branch at WYDOT must verify the mixes and assure that they are within the specifications. The specifications for the aggregate, depending on the gradation type, are summarized in Table 3.8. The tolerances for these limits are shown in Table 3.9.

Table 3.8 Aggregate Gradation for Wyoming

Sieve Size	Grading A	Grading C	Grading E	Grading G
1-1/4"			100	
1"	100		90-100	
3/4"	90-100	100	65-90	
1/2"	55-90	90-100	50-85	100
3/8"	45-85	55-90	40-75	90-100
No. 4	30-65	35-70	30-60	45-85
No. 8	20-50	20-55	20-45	30-65
No. 30	5-30	5-35	5-25	10-40
No. 200	2-7	2-7	2-7	2-7

Table 3.9 WYDOT Tolerance Limits

Sieve Size	Tolerance
1"	± 7%
3/4"	± 7%
1/2"	± 7%
3/8"	± 7%
No. 4	± 7%
No. 8	± 5%
No. 30	± 5%
No. 200	± 2%

3.3.2 WYDOT'S Level of Control

WYDOT has specifications based on the amount of traffic loading on the roadway as shown in Table 3.10.

Table 3.10 Specifications Based on Class

	CLASS I	CLASS II	CLASS III	CLASS IV
Los Angeles Abrasion	35 Max.	35 Max.	40 Max.	40 Max.
Number of Marshall Blows	75	75	50	50
Marshall Stability (min), N (lbs)	11000 (2500)	11000 (2500)	9000 (2000)	9000 (2000)
Marshall Flow, 0.25 mm (0.1 in)	8-16 (8-16)	8-16 (8-16)	8-16 (8-16)	8-16 (8-16)
% Voids in Laboratory Mix	4.0-6.0	3.0-5.0	3.0-5.0	2.5-4.5
% voids in Production Mix	3.0-5.0	2.5-4.5	2.5-4.5	2.0-4.0
Dust/ Effective Asphalt	0.8-1.4	0.8-1.4	0.8-1.4	0.8-1.4
Minimum % Asphalt	4.5	4.5	4.5	4.5
Minimum Tensile Strength Retained, %	75	75	75	75
Film Thickness, μm	6-12	6-12	6-12	6-12
% Voids in Mineral Aggregate				
Grading A	13.0- 16.0	12.0-15.0	12.0-15.0	11.0-14.0
Grading C	14.0- 17.0	13.0-16.0	13.0-16.0	12.0-15.0
Grading E	12.0- 15.0	11.0-14.0	11.0-14.0	
Grading G	14.0- 17.0	13.0-16.0	13.0-16.0	12.0-15.0

These specifications depend on the level of control needed in certain situations and are governed by the traffic present on the roadway, type of facility, type of funding, and quantity of material used in construction. For each of these levels of control, the requirements for the mix design, quality control, and quality assurance differ (Butts, 2002). Given the level of control, the different requirements can be viewed in Table 3.11. However, this table shows the requirements through the 2001 construction season. Updates to these specifications are shown in Table 3.12. These updates show the general trend of turning the responsibility of testing over to the contractor. By comparing the tables, it is apparent that WYDOT is using the contractors test results for pay determination, and is minimizing the amount of testing required of the state for verification.

Table 3.11 WYDOT Specification Based on Level of Control

	Level I	Level II	Level III	Level IV
Mix Design	New Design Required	Reference design allowed 5000 tons or less Voidless Unit Weight Required	Reference design allowed 5000 tons or less Voidless Unit Weight Required	Reference design allowed 5000 tons or less Reference of Voidless Unit Weight Allowed
Quality Control	Required	Required	Required	Required
Virgin Aggregate Production Gradation each stockpile	1/1000 t min.	1/1000 t min.	1/1000 t min.	2 tests min.
L.L. & P.I. on Virgin Material Mix Production	1/1000 t min.	1/1000 t min.	1/1000 t min.	2 tests min.
Virgin Aggregate Gradation	1/1000 t min.	1/1000 t min.	1/1000 t min.	Not Required
L.L. & P.I. on Virgin Material	1/1000 t min.	1/1000 t min.	1/1000 t min.	Not Required
Moisture Content of Virgin	1/day min.	1/day min.	1/day min.	Not Required
Aggregate/Hydrated Lime Mix Verification	** as per subsection 7.0107	Not Required	Not Required	Not Required
Moisture Content of Mixture	1/day min.	1/day min.	1/day min.	Not Required
Test Strip	Required	Required	Required	Not Required
In-Place Density	1/200 t	1/200 t	1/200 t	1/200 t 5 min.
Quality Assurance				
Virgin Gradation	1 lot/5000 t	1 lot/5000 t	* as per section 8.0	* as per section 8.0
In-Place Density	1 lot/1500 t	1 lot/1500 t	* as per section 8.0	* as per section 8.0
Asphalt Content	1/day	1/day	* as per section 8.0	* as per section 8.0
Quality Acceptance Field Lab	Required	Required	* as per section 8.0	* as per section 8.0

* References the WYDOT specification, which is not included in this paper

** The mix verification for the Recycled Bituminous Pavement shall be performed daily until no adjustments are required to the mix to ensure that all design criteria are within control limits. Once this is determined, then the mix verification frequency will become a minimum of 1 test per 6000 t.

Table 3.12 WYDOT Updates to Specification Based on Level of Control

	Level I	Level II	Level III	Level IV
Mix Design	New Design Required	Reference design allowed 5000 tons or less Voidless Unit Weight Required	Reference design allowed 5000 tons or less Voidless Unit Weight Required	Reference design allowed 5000 tons or less Reference of Voidless Unit Weight Allowed
Quality Control Virgin Aggregate Production				
Gradation each stockpile	1/1000 T min.	1/1000 T min.	1/1000 T min.	2 tests min.
L.L. & P.I. on Virgin Material	1/1000 T min.	1/1000 T min.	1/1000 T min.	Not Required
Quality Control Mix Production				
Virgin Aggregate Gradation	1/1000 T min.	1/1000 T min.	1/1000 T min.	Not Required
Asphalt Content	1/day	1/day	1/day	1/day
Test Strip	Required	Required if shown on plans	Required if shown on plans	Not Required
In-Place Density	1/200 T	1/200 T	1/200 T	1/200 T 5 min.
Quality Acceptance Mix Production				
Virgin Gradation	1 lot/5000 T	1 lot/5000 T	* as per section 8.0	* as per section 8.0
In-Place Density	1 lot/1500 T	1 lot/1500 T	* as per section 8.0	* as per section 8.0
Asphalt Content	1/day	1/day	* as per section 8.0	* as per section 8.0
Quality Acceptance Field Lab	Required	Required	* as per section 8.0	* as per section 8.0
L.L. & P.I. on Virgin Material	1/1000 T min.	1/1000 T min.	1/1000 T min.	Not Required
Moisture Content of Virgin Aggregate/Hydrated Lime, and Moisture Content of Mixture	1/day min.	1/day min.	1/day min.	Not Required
Mix Volumetrics	* Per Subsection 8.05 Acceptance-Mix volumetrics	Not Required	Not Required	Not Required
Verification Mix Production				
Virgin Gradation	1/lot	1/lot	Not Required	Not Required
In-Place Density	1/lot	1/lot	Not Required	Not Required
Asphalt Content	Not Required	Not Required	Not Required	Not Required
Mix Volumetrics	Split sample required, but no test Frequency specifically	Not Required	Not Required	Not Required
Virgin-L.L. & P.I. Virgin Material; Moisture Content Virgin Aggregate/Hydrated Lime; Moisture Content of Mix	Not Required	Not Required	Not Required	Not Required

**References the WYDOT specification, which is not included in this paper

3.3.3 WYDOT'S Pay Determination

Pay Determination is based on aggregate gradation, in-place density, and asphalt content. In-place density specifications for any average relative density must be equal to or greater than 92 percent value if they are to be accepted. The in place density should not exceed 96 percent. However, it will not be rejected if it does. Wyoming does not utilize a composite pay factor equation, instead each of the different properties are given their own pay factor. The aggregate gradation and asphalt content range from 0.75 to a maximum of 1.05. Material with a pay factor of less than 0.75 must be removed and replaced by the contractor. The pay factor range for in place density ranges from 0.50 to a maximum of 1.01. Any material receiving a pay factor less than 0.50 must be removed and replaced. Wyoming uses a multiplier when figuring each of the processes tested for. The density process has a multiplier of 1.33. Aggregate gradation and asphalt content utilize a 0.67 multiplier.

3.3.4 WYDOT'S Personnel Requirements

The contractor must provide a supervisor for the quality control testing. This supervisor is responsible for the quality control plan and testing performed by the technicians. The testing technicians must be certified through the Wyoming Certification Program. Each test performed must be signed by a certified testing technician. The Wyoming Certification Program consists of three seminars: aggregate, asphalt, and concrete field testing. Each seminar includes specifications, testing methods, material properties, and a written examination to ensure the technicians understand all testing procedures. The contractor must have a certified testing technician at the construction site during the production of aggregate and bituminous pavement.

3.4 South Dakota's QC/QA Program

South Dakota brought many influential members of the asphalt community together, thus beginning the necessary training and information gathering process essential to creating a QC/QA program. To insure quality improvement in South Dakota, a task force was formed to write the specifications that would be used in the QC/QA program. Once the program was written, personnel training began in October 1996. Training was achieved through seminars held statewide, as well as classes offered to testing technicians. The *South Dakota QC/QA Asphalt Concrete Manual October 2001* was produced to ensure that all projects completed in 2002 and beyond were within the specifications.

3.4.1 SDDOT'S Quality Control

The involvement of the state and the contractor is of great importance when dealing with QC/QA programs. All involved must know who is responsible and what they are responsible for. Quality control for the asphalt concrete pavement is the responsibility of the contractor. The contractor shall provide and maintain a quality control system. The system shall insure that all asphalt concrete materials and constructed pavement submitted for acceptance conforms to the contract requirements. The contractor shall be responsible for all asphalt concrete materials and constructed pavement, including aggregate process control and handling (SDDOT 2001).

This plan must be submitted to the engineer and must be approved prior to construction. The contractor must furnish the mix design for a particular project at least 15 days before the

production of any hot plant mix. This mix design must conform to the specifications shown in Table 3.13 and must be verified by the state laboratory.

Table 3.13 Mix Design Specifications for South Dakota

MIX DESIGN PARAMETERS	Class Q		
	Low Volume Traffic (LVT)	Medium Volume Traffic (MVT)	High Volume Traffic (HVT)
	SPECIFICATIONS		
% Air Voids	3.0 Min.	3.5 Min.	4.0 Min.
% VMA* 3/4" (19 mm) nominal maximum size	13.0 Min.	13.5 Min.	14.0 Min.
1/2" (12.5 mm) nominal maximum size	14.0 Min.	14.5 Min.	15.0 Min.
Marshall Blows	50	50	75
Marshall Stability	1000 Min.	1500 Min.	1800 Min.
Marshall Flow	8-18	8-16	8-16
Dust/Binder Ratio (based on effective binder)	NA	0.6-1.4	0.6-1.2
Moisture Sensitivity**	60 Min.	70 Min.	80 Min.
COMPOSITE MINERAL AGGREGATE REQUIREMENTS (without hydrated lime)			
Gradation	***	***	***
+ #4 (4.75 mm) Frac. Faces % Min.	50% 1-FF	70% 2-FF	95% 2-FF
- #4 (4.75 mm) Manufactured Fines	N/A	20% Min.****	70% Min.****
+ #4 (4.75 mm) Lt. Wt. Particles	4.5 % Max.	3.0 % Max.	1.0 % Max.
- #4 (4.75 mm) Lt. Wt. Particles	4.5 % Max.	3.0 % Max.	1.0 % Max.
Liquid Limit (LL)	25 Max.	25 Max	25 Max
Plasticity Index (PI)	3 Max.	N.P.	N.P.
L.A. Abrasion Loss	45 Max.	40 Max.	35 Max.
Sodium Soundness Loss (five cycles)			
+ #4 (4.75 mm)	15% Max.	15% Max.	12% Max.
- #4 (4.75 mm)	15% Max.	15% Max.	12% Max.

* Evaluated for compliance during the mix design verification. If the percent passing the 1/2-inch (12.5 mm) sieve is greater than or equal to 90 percent the mix shall be considered 1/2-inch (12.5 mm) nominal maximum size. If the percent passing the 1/2-inch (12.5 mm) sieve is less than 90 percent the mix shall be considered 3/4-inch (19 mm) nominal maximum size.

** Moisture sensitivity will be tested according to SD 309. Hydrated lime shall be used to meet the moisture sensitivity requirement of the mix. Hydrated lime will not be required if the moisture sensitivity requirements are met without the addition of hydrated lime. An item will be included in the contract for hydrated lime. Payment for hydrated lime will only be made when hydrated lime is actually used.

*** The target values for the gradation shall be within the limits shown in Table B. After the target value is established, the tolerances in Table F will be applied.

**** Manufactured fines shall be manufactured solely from material retained on the 3/4 inch (19 mm) sieve, unless the aggregate material is produced from a ledge rock source.

Although the contractor is responsible for the testing, the initial tests must be calibrated to ensure that all testing is being conducted properly. The calibration testing must be performed as follows (SDDOT 2001):

1. **COLD FEED:** Prior to production of asphalt concrete, the QC/QA certified technicians shall conduct comparison tests on a split companion cold feed calibration sample to assure that all associated equipment and procedures provided comparable results. Comparison test results shall conform to the tolerances shown in Table 3.14. The split companion calibration testing shall continue until the results are within the listed tolerances.
2. **MIXTURE TESTING:** The QC and the QA technicians shall perform correlation testing in the QC and QA field labs on a split companion sample supplied by the contractor prior to beginning production of asphalt concrete. The sample may be plant-produced material used for spot leveling or non-mainline paving. The correlation testing will be for bulk specific gravity (Marshall Method), maximum specific gravity (Rice Method), and an air void calculation. The results shall be within the tolerances shown in Table 3.14.
3. **BULK SPECIFIC GRAVITY REHEAT CORRELATION:** The QC and the QA technicians shall perform a reheat correlation test for the bulk specific gravity. The reheat test shall be performed on a split of the first subplot of the mix design and again on the first subplot of any new mix design.

Table 3.14 SDDOT Tolerance Limits

Attribute	Tolerance
Sieve 3/8" (9.5 mm) & larger	± 5.0%
Sieve #4 (4.75 mm) thru #50 (300 µm)	± 3.0%
Sieve #100 (150 µm) thru #200 (75 µm)	± 1.5%
Lightweight Particles	± 1.0%
Plasticity Index (PI)	± 1.0
Fractured Faces	± 10.0%
Air Voids	± 1.2%
Bulk Specific Gravity (Marshall)	± 0.020
Maximum Specific Gravity (Rice)	± 0.020

Once the correlation testing has been completed and are found to be within the tolerance limits found in Table 3.14, the mix can be produced. At this point the contractor shall begin testing at the frequency found in Table 3.15.

Table 3.15 SDDOT Minimum Testing Frequency

Test	Minimum Frequency	Test Method
Mineral Aggregate	1/1000 ton (M ton)	SD 202
Gradation*		
Plasticity Index (PI)*	1/1000 ton (M ton)	SD 207
Lightweight Particles*	1/1000 ton (M ton)	SD 208 & SD 214
Fractured Faces*	1/1000 ton (M ton)	SD 211
Max. Specific Gravity of Asphalt Concrete (Rice Method)**	1/1000 ton (M ton)	SD 312
Bulk Specific Gravity of Asphalt Concrete (Marshall Method)**	1/1000 ton (M ton)	SD 313
Asphalt Binder Content (sticking to the tank)	1 per day	SD 314
Hydrated Lime Content	1per day	
Moisture Content of Mix**	1/10,000 ton (M ton)	
Density, In Place***	2/1000 ton (M ton)	SD 315

* Samples shall be taken according to SD 201 Section 3.2.

** Samples shall be taken from behind laydown machine.

*** Two density cores per 1000 ton (M ton) subplot shall be taken for determination of in place density. The average of the two core density results will be the 1000 ton (M ton) subplot value used for density in the pay factor calculations. The engineer will determine and mark the core locations after the mix is placed and compacted. The cores will be taken the next working day after the asphalt pavement is placed. The contractor shall perform the coring under observation by the engineer. The engineer will take immediate possession of the core samples for density testing. The contractor shall patch all core holes with hot asphalt concrete to the satisfaction of the engineer

3.4.2 SDDOT'S Quality Assurance

The price adjustments are made using the contractor's quality control test results as long as the QC and QA test results are within the tolerance limits show in Table 3.14. To meet the requirements for independent sampling and testing for QC/QA projects, the following verification procedures (sampling and testing) shall be followed by the engineer and the contractor:

The engineer will randomly generate the subplot locations for hot mix and cold feed sampling and testing. The engineer will randomly sample (QA) and test one subplot for each lot. The contractor will randomly sample (QC) four sublots per lot and test all five subplot samples (a split of the one subplot randomly sampled by the Engineer and four sublots taken by the contractor).

The split sample test results (QA) of the sample taken by the engineer will be compared to the contractor test results (QC) for conformance with Table 3.14. Populations of the QC sample test results will be compared to the QA sample test results (SDDOT 2001).

3.4.3 SDDOT'S PAY FACTOR DETERMINATION

The two factors used for pay determination are air voids and in-place density. The tolerances for each of these attributes, as well as the non-pay factor attributes are show in Table 3.16. South Dakota uses a composite pay factor with air voids contributing 50 percent to the overall pay factor and in place density contributing 50 percent as well. Lots having a composite pay factor lower than 0.85 may be rejected. The composite pay factor may range anywhere from 0.85 to 1.05 depending on the individual quality index of each of the pay factor attributes.

Table 3.16 Tolerance Limits for Pay Factor Attributes

Pay Factor Attributes	
Attribute	Tolerance
% Air Voids	± 1.0%
In Place Density (% Compaction)	Minimum Specified & Maximum Specified
Non-pay Factor Attributes	
Attribute	Tolerance from Target Value
Sieve 5/8" (16 mm) thru 3/8" (9.5 mm)	± 7%
Sieve #4 (4.75 mm) thru #50 (300 µm)	± 5%
Sieve #100 (150 µm) thru #200 (75 µm)	± 2.0%
% Asphalt Binder	± 0.3%
Liquid Limit*	Maximum or less
% Lightweight Particles*	Maximum or less
Plasticity Index (PI)*	Maximum or less
% Fractured Faces*	Minimum or more
% Hydrated Lime	± 0.1%

* These properties are not listed on the job mix formula but will be tested for compliance with the mix design specifications.

3.4.4 SDDOT'S Specifications

The specifications for aggregate gradation are shown in Table 3.17. These specifications are from the 1998 South Dakota *Standard Specifications for Roads and Bridges*.

Table 3.17 Aggregate Gradation for South Dakota

REQUIREMENTS	CLASS D		CLASS E		CLASS G		CLASS S
	TYPE 1	TYPE 2	TYPE 1	TYPE 2	TYPE 1	TYPE 2	
SIEVE	PERCENT PASSING						
3/4" (19.0 mm)	100		100		100		
1/2" (12.5 mm)	75-59	100	75-95	100	75-95	100	100
3/8" (9.50 mm)							80-100
No. 4 (4.75 mm)	50-70	60-80	50-70	60-80	50-70	60-80	24-45
No. 8 (2.36 mm)	35-55	43-63	35-55	43-63	35-55	43-63	10-22
No. 16 (1.18 mm)	24-42	28-48	24-42	28-48	24-42	28-48	
No. 40 (425 µm)	14-28	14-30	14-28	14-30	14-28	14-30	
No. 200 (75 µm)	4.0-10.0	4.0-12.0	4.0-8.0	4.0-10.0	4.0-8.0	4.0-10.0	2.0-5.0
Processing Required	Crushed		Crushed		Crushed		Crushed
Liquid Limit (max)	25		25		25		25
Plasticity Index (max)	4		3		3		3
L. A. Abra. Loss (max)	40%		40%		40%		40%
Sodium Sulfate (Soundness) (max)							
+ #4 (4.75 mm) Sieve	15%		15%		12%		12%
- #4 (4.75 mm) Sieve	15%		15%		12%		12%
Shale Content (lightwt part) (max)							
+ #4 (4.75 mm) Sieve	4.0%		2.0%		2.0%		2.0%
- #4 (4.75 mm) Sieve	4.0%		2.0%		2.0%		2.0%
Crushed Particles (min)							
+ #4 (4.75 mm) Sieve	30% 1-FF		50% 2-FF		50% 2-FF		90% 2-FF

In-place density accounts for 50 percent of the composite pay factor and is therefore an extremely important parameter to measure. The lower specification limit (LSL) for in-place density is 92 percent of the lot average maximum specific gravity (Rice Method) test results for projects designated as high volume traffic. The LSL for in place density is 91 percent of the lot average maximum specific gravity (Rice Method) test results for projects designated as Low and Medium Volume Traffic. The upper specification limit (USL) for in-place density is 96 percent for all projects (SDDOT 2001). The other 50 percent of the pay factor is calculated using the percent of air voids as shown in equation 3.3.

$$\% \text{ Air Voids} = \frac{(E - F)}{E} * 100 \quad (3.3)$$

where:

E = Theoretical Maximum Specific Gravity from SD 312 (not included in this paper)

F = Marshall Bulk Specific Gravity average

3.4.5 SDDOT'S Personnel Requirements

There is a definite need to have trained technicians completing the testing for both the contractors and the Department of Transportation. To assure that the tests are being completed properly, the South Dakota Department of Transportation has four certification levels they are as follows:

Bituminous Technology I	Introduction to Asphalt (Basic Introduction)
Bituminous Technology II	Bituminous Laboratory Testing (Hands On Laboratory Training)
Bituminous Technology III	Roadway Inspection and Compaction (Field Inspection)
Bituminous Technology IV	Asphalt Concrete Production Control (Mix Design)

Testing technicians must be certified in the state of South Dakota. This certification may be obtained in the following ways (SDDOT, 2001):

1. Technicians currently certified in a surrounding state have the opportunity to test out of Bituminous Technology Levels I and III. The candidate may request to test out of these specific certification levels by requesting in writing to the Chief South Dakota Department of Transportation Materials and Surfacing Engineer their desire to test out. The candidate should be involved in the specific work area for the past four years that relates to the certification level and has a current applicable certification level from one of the surrounding states.
2. Candidates not currently certified in a surrounding state, or not eligible to test out, must attend the certified training course.

Once the certification process has been completed, the candidate must be recertified once every four years at the longest.

3.5 Summary

The differences and similarities among the three QC/QA programs used in this study have been described in detail. Some of the processes, such as aggregate gradation, are common to all three states. Other processes including density, asphalt content and air voids are common to two of the three states. Each state controls the weight placed on each of these factors when determining the overall pay factor. Colorado and Wyoming place higher weights on density and lesser weights on aggregate gradation and asphalt content. South Dakota places an equal weight on density and air voids. The subtle differences among the states QC/QA programs are the process they control for and the weights they give to each of these control factors. Understanding these subtle differences will allow for analysis of the QC data in this report.

4. DATA COLLECTION

4.1 Introduction

In this study the evaluation was done on data sets that were collected in the field, generally by the contractor, for fulfillment of the Quality Control Plan. The results of the Quality Control tests are then submitted to the state agency in compliance with that state's specifications. Since the QC/QA programs in the three states included in this evaluation were in place before electronic databases were in wide use, a majority of this data was entered into electronic format at a later date.

The data for this evaluation had to be collected from field tests and compiled into a useable format. In this case study, the software used by each of the state agencies differed. Conversion had to be made in order to combine them into a single useable format. This chapter discusses the various types of data which were necessary to complete the analysis, and how that data was extracted from each of the three state agencies.

4.2 Data Requirements

QC/QA programs increase the amount of testing required by state agencies. The rationale is that the increase in testing will allow contractors to monitor HBP mixes more closely. If the contractors are monitoring the placement process more closely, they are able to make changes more frequently, ensuring compliance with state specifications. Each state determines mix properties that will be used for QC and PF. These properties are then tested and the results recorded. From a record of the mix design, the target values can be established. The difference between this target and the actual values produced determines the degree to which each of the HBP produced adhere to the specification. A large difference between a target value and a test value is not desirable, as it will lead to pavements with poor performance characteristics.

As discussed earlier, Colorado, Wyoming, and South Dakota have different specifications in place for their respective QC/QA programs. However, there are certain common processes tested among the states. Table 4.1 shows the processes each of the states measure for their QC/QA programs. A measure of aggregate gradation is common to all three states. Density, voids in the total mix, and asphalt content are common among two of the three states. The target and test values were collected for each of these items.

Table 4.1 Measured Processes by State

Colorado	Wyoming	South Dakota
Aggregate Gradation	Aggregate Gradation	Aggregate Gradation
Density	Design Air Voids	Design Air Voids
Asphalt Content	Asphalt Content	Density

Target and test values are the most important factors when analyzing the three states QC/QA programs. However, they are not the only factors that must be taken into account. The year, location, and the particular mix design being used are also important. One of the major benefits of having a QC/QA program is that contractors have the ability to change mix designs. Mix designs within a project can be altered to ensure that the difference between test and target values remains

at a minimum. When the QC tests show that the target values are not being met, alterations are made. As the mix designs are altered within a project, the difference between the target values and test values should decrease as well.

The year in which the project was constructed is also important to this analysis. A fair and accurate analysis of the states' programs was necessary. Not all state highway agencies began their QC/QA programs in the same year. However, most state agencies began their programs in the same manner; a probationary or pilot program followed by a full implementation of the specifications. Therefore, analysis can be completed on the period of time following this probationary/pilot program. For Colorado, this analysis period was from 1994 through 1996. The first year of implementation was 1997 for both South Dakota and Wyoming. There were only three projects completed in 1997 in Wyoming and South Dakota. This did not yield enough data points for an accurate analysis, and was therefore considered a pilot year and not analyzed in this study. Therefore, the analysis for South Dakota and Wyoming consisted of data collected from 1998 through 2000. This limits the analysis period for all states to the first three years of full implementation beyond the probationary/pilot programs.

4.3 Data Collection

Colorado, Wyoming and South Dakota state highway agencies collected all of the required information for this study. However, the format of this data is different for each of the states. Colorado created its own software program for entering QC data into electronic format. This software was designed in 1994 and was not in Windows format; however, it could be opened using Microsoft Access Database. Upon receiving the raw data from Colorado, it had to be compiled. This proved to be a tedious task and often required the use and combination of numerous coded spreadsheets. The data from Wyoming was readily available as it was used at the University of Wyoming in a previous study. This data was in Excel spreadsheet format and required only minor filtration to remove projects that were not constructed under the QC/QA program. South Dakota and Wyoming certainly had the advantage of implementing their QC/QA programs after the use of electronic database programs. South Dakota requires contractors to submit their test results in Excel spreadsheet format. This greatly reduced the amount of work it took to extract the test and target values.

4.4 Compilation of Data

After obtaining all of the raw data for this study, it was necessary to create a format in which the data could be condensed to facilitate analysis. Minitab software version 13 was used to run the analysis, however, Excel spreadsheets were used for preliminary compilation of data. Spreadsheets containing data used in this study for Colorado, South Dakota, and Wyoming are located respectively in Appendices A, B, and C of this report. Once a spreadsheet was designed containing all the pertinent information, it had to be manipulated so that Minitab could be used for analysis. This meant giving codes to each of the non-numerical attributes, and equating the year of construction to the first, second, and third year of QC/QA implementation. Projects and mix designs within projects were coded to facilitate the analysis. The individual codes allowed for interactions and random effects between categories to be analyzed. The final data spreadsheet used for analysis included the following information:

- State in which the project was constructed
- Year in which the project was constructed

- Project designation
- Mix design within the project
- Absolute difference between the target and test values

4.5 Data Summary

The data collected for analysis in this study included numerous projects in the three states. The number of projects analyzed in each of the states is shown in Table 4.1. For a particular project, however, there were numerous different mix designs utilized. As mentioned before, the target values for each of the tests differed among mix designs and an analysis had to be done on each one. The number of individual test points that were analyzed in this study is shown by state, year and process in Tables 4.2 through 4.6.

Table 4.2 Number of Projects Analyzed by State

Year of Implementation	Colorado	Wyoming	South Dakota	Total
1st Year	22	12	10	44
2nd Year	16	41	12	69
3rd Year	9	42	25	76
Total	47	95	47	189

Table 4.3 Number of Tests Analyzed for Aggregate Gradation

Year of Implementation	Colorado	Wyoming	South Dakota	Total
1st Year	477	102	335	914
2nd Year	204	402	441	1047
3rd Year	88	358	847	1293
Total	769	862	1623	3254

Table 4.4 Number of CDOT Tests Analyzed for Density and Asphalt Content

Year of Implementation	Colorado		Total
	Density	Asphalt Content	
1st Year	1177	670	1847
2nd Year	623	332	955
3rd Year	305	171	476
Total	2105	1173	3278

Table 4.5 Number of WYDOT Tests Analyzed for Asphalt Content and Air Voids

Year of Implementation	Wyoming		Total
	Asphalt Content	Design Air Voids	
1st Year	101	101	202
2nd Year	412	391	803
3rd Year	366	363	729
Total	879	855	1734

Table 4.6 Number of SDDOT Tests Analyzed for Density and Air Voids

Year of Implementation	South Dakota		Total
	Density	Design Air Voids	
1 st Year	351	295	646
2 nd Year	396	475	871
3 rd Year	373	780	1153
Total	1120	1550	2670

4.6 Summary

The data for this report was collected from Colorado, Wyoming, and South Dakota quality management programs. Once the data was collected it was condensed and filtered for use in a statistical software package. This data was later used to analyze each of the three states QC/QA programs.

5. DATA ANALYSIS

5.1 Introduction

The analysis of the QC data obtained from Colorado, Wyoming, and South Dakota was performed to explore the differences and similarities among the three programs. Some reasonable assumptions had to be made to insure that a fair and valid analysis was performed on the data. After obtaining the necessary data in the appropriate format, the statistical analysis was done using Minitab version 13 software.

5.2 Analysis Tools

Analysis of variance (ANOVA) was conducted using a General Linear Model (GLM) module in Minitab. The GLM is used to test the hypothesis that the means of individual populations are different. The GLM describes the relationship between a response variable and several fixed or random factors. This model accounts for the random effect of a particular mix design within a project, as well as the fixed factors which were of primary interest.

ANOVA was used to determine if the means of the individual factors were equal. This equality can be assessed using a p-value. When determining the significance of the p-value, an α -value is chosen. A commonly chosen α -value is 0.05. For the data analyzed in this study, it was decided that this α -value was sufficient and would be utilized. The α -value is the probability that a type-I error will be made. A type-I error occurs when it is determined that there is a difference when in reality there is no difference.

If the p-value determined is less than the α -value selected for the study, the effect for the term is significant. The means for the factor are significantly different if the effect factor has been determined to be significant. Conversely, if the effect factor is not significant, or the p-value is greater than the α -value selected, the means are not significantly different. Therefore, if the selected α -value was 0.05 and the determined p-value from the data was 0.00, the means of the two factors being studied would be significantly different. In other words, there would be a difference between the two categories being tested. On the other hand, if the determined p-value was 0.086, then the difference would not be considered significant. In the case of this study, those two or three factors would be the difference between test and target values among the states.

Interactions must also be taken into account. Two factors are said to interact if the effect of one factor on the response variable depends on the condition at which the other factor is held constant. Interactions are usually represented as the product of two independent variables. Since it cannot be assumed that any of the interactions in this study are not useful, all interactions must be considered. There are three levels of factors for year **S** first, second, and third year of implementation. For state, the three levels of factors are Colorado, Wyoming and South Dakota. The levels of factors for mixes within projects vary depending on the number of different mix designs created. One example of the use of these factors would be, the third mix design used for a project constructed in Wyoming, in 1998. Factorial analysis is based on main effects and interactions. Main effects describe variability within levels of one single factor. Interactions describe the effects between combinations of levels of two different factors. Interactions in this case included state and year using the term Year*State. In this case the interaction is comparing the means of first year of implementation*Wyoming, first year of implementation*Colorado, ...,

third year of implementation*South Dakota. ANOVA will provide p-values for each of the main effects as well as the interactions.

ANOVA can be influenced by outliers. To insure the outliers were not swaying the results, analyses were run with and without the outliers. To show the difference between the analysis with the outliers and the analysis with out the outliers, the asphalt content means will be utilized. The mean of the difference between the target and test values for asphalt content in Wyoming, when analyzed with outliers, was 0.2810. When outliers were excluded, the mean was 0.2758, only about a 4 percent difference. Analysis excluding outliers for other factors produced similar results. Since the means did not differ drastically, the outliers were included in this study.

5.3 Preliminary Analysis

The preliminary calculations included determination of target values for each of the projects included in the study. In most cases, the target value was given as part of the mix design file. In such cases the mix design value was used as the target value. Mix design values for sieve sizes, density, and air voids were given as a range of values. The mid-points of these ranges were used as target values, since all three states reported them in the same manner. For example, if a #200 sieve had a lower limit of 2 percent and upper limit of 7 percent passing, then a mid-point value of 4.5 percent passing was used as the target value. This method was applied in all cases where the mix design was given as a range of values rather than a single target value.

The data analysis included all the QC test values that were available for each of the projects. QA tests in most cases are performed on samples drawn at random from the QC samples. Since the QA tests were duplicate tests, they were not included in this analysis.

Each project included in this analysis was constructed and is currently in use in one of the three states. It has been determined that some of the test values exceeded the upper or lower limits of the mix design and in some cases the specification limits. Since all of the projects were accepted by engineers, meaning they were not rejected and replaced by the contractor, they were included in this analysis. For example, Wyoming contained one particular project (ACIM-80-4(188)246) where the mix design and specification limits on the 1/2-inch sieve were 60 to 85 percent passing. Test results given for this project included values ranging from 57 percent passing to 78 percent passing. Three of the test values fell below 60 percent passing and were therefore outside of the specification limits. However, since the project was accepted and these test values were used to determine incentive and disincentive pay adjustments, they were included in this analysis. This was not the only case in which test values fell outside the mix design or specification ranges; it is merely one illustration of such a case.

When determining the difference between the test values and the target values, the absolute difference was used. It was determined that the magnitude of the difference was the important factor in each case. For example, the target value for a particular sieve is 40 percent passing. Therefore, test values of 38 percent passing and 42 percent passing would both have exactly a 2 percent difference between test and target values. Sign designation is not important as test values falling above or below the target value are equally undesirable. Differences between test and target values for Colorado, Wyoming, and South Dakota, can be found in Appendix A, B, and C respectively.

Target and test values were determined for each of the states by year, process, and mix design within projects. The absolute differences between the test and target values were then determined.

Figures 5.1 to 5.4 show box plots for the absolute difference between the test and target values for each of the processes tested. These box plots show the mean difference estimated from the raw data, before ANOVA was done on the data. Therefore, the mean values shown do not take into account effects of mixes and time.

The averages of the absolute differences between the target and test values were determined for each of the properties analyzed in this study. These properties included the 1/2-inch sieve, #4 sieve, #8 sieve, #200 sieve, air voids, density, and asphalt content. The line in the middle of each of the box plot represents the median. The upper and lower lines of the box plots represent the first and third quartiles of the data. Solid lines extending from the box plots represent the smallest and largest quarters of the data. Points beyond the solid lines represent possible outliers in the data. In cases where the box seems to be represented by a single horizontal line, the difference between the target and test values was relatively small and the majority of the data points fell on or close to the target value.

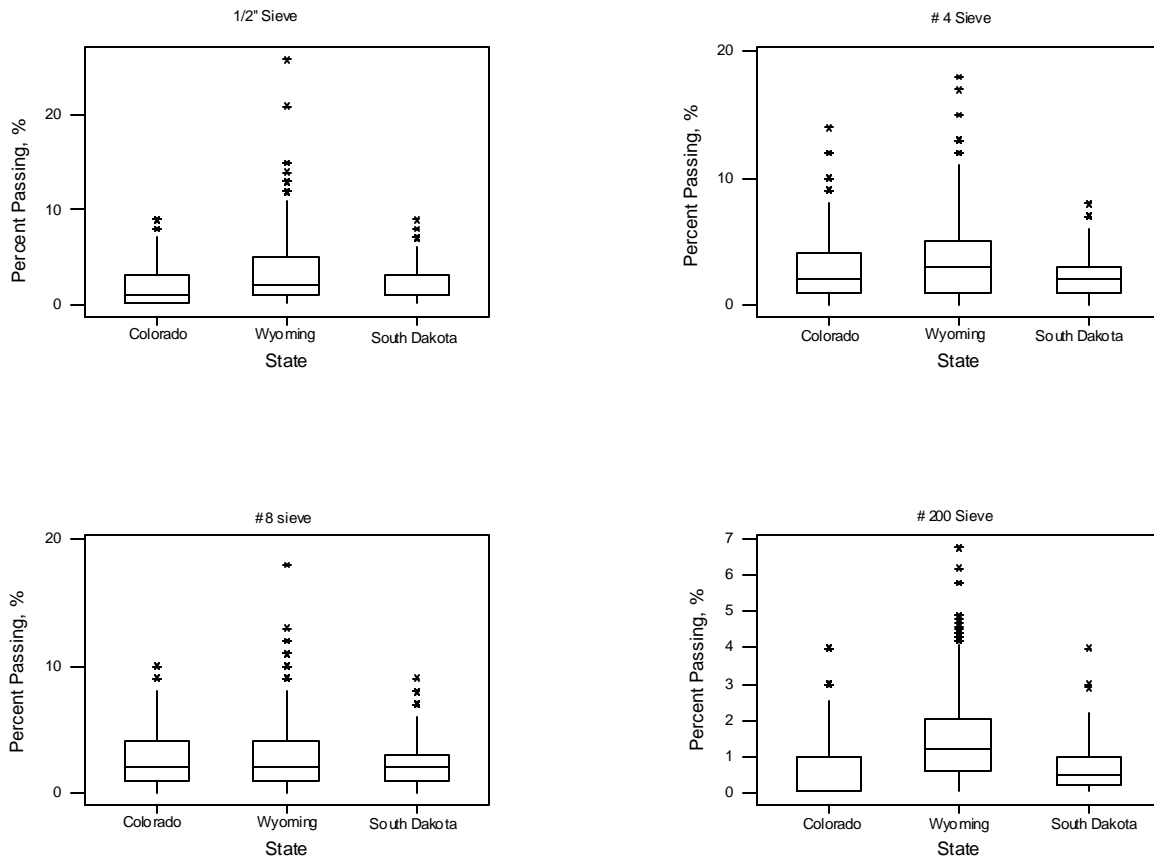


Figure 5.1 Box Plots for Absolute Difference of Target and Test Values for Aggregate Gradation

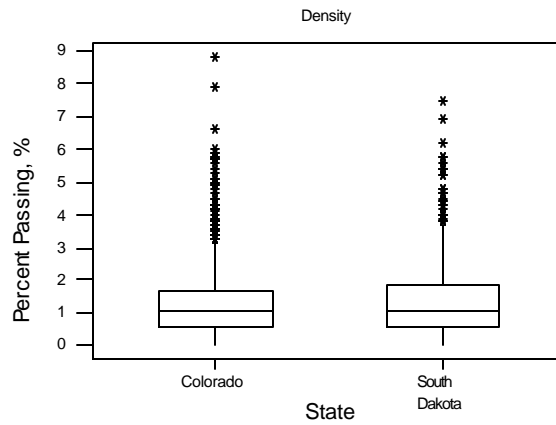


Figure 5.2 Box Plots for Absolute Difference of Target and Test Values for Density

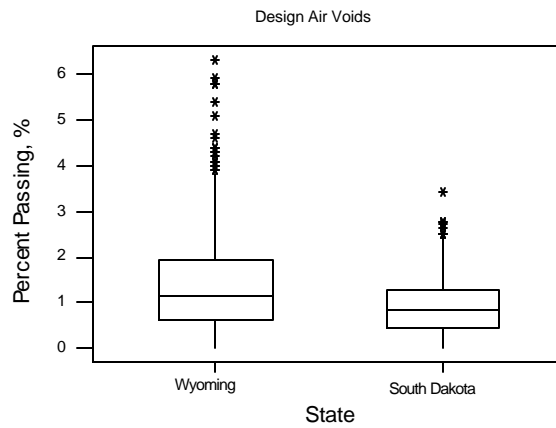


Figure 5.3 Box Plots for Absolute Difference of Target and Test Values for Air Voids

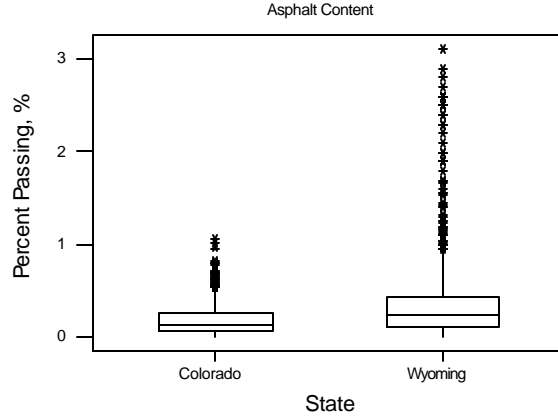


Figure 5.4 Box Plots for Absolute Difference of Target and Test Values for Asphalt Content

5.4 Statistical Analysis

5.4.1 Aggregate Gradation

Aggregate gradation analysis included the 1/2-inch, #4, #8, and #200 sieves for Colorado, Wyoming, and South Dakota. These sieve sizes were used as they were common among the states. The results of the p-values from ANOVA can be found in Table 5.1. In general, it can be concluded that the state in which the project was constructed and the mix design used within a project were the most significant factors. Both of these outcomes were expected. The three states have their own QC programs with unique factors, so we would expect the state of construction to make a significant difference in variability. Variability should indeed decrease as mix designs within a project progress. The idea behind mix designs is such that if there is a problem and test results are not coming as close to target values as the contractor would like, the contractor or the engineer may make minor modifications to the mix design. These minor modifications should decrease the difference between the target and test values. Therefore, it is expected that as mix designs within projects are adjusted, the variation decreases. Each of these factors was significant given that all the p-values were well below 0.05, in most cases they were 0.000.

Table 5.1 p-values From ANOVA for Aggregate Gradation

Parameter	Year	State	Year*State	Project (Year*State)	Mix (Year*State*Project)
No. 200 sieve	0.490	0.000*	0.650	0.043	0.000*
No. 8 sieve	0.368	0.005*	0.349	0.142	0.000*
No. 4 sieve	0.121	0.000*	0.432	0.957	0.000*
1/2" sieve	0.836	0.000*	0.245	0.233	0.000*

* Denotes p-values that are less than the a-value of 0.05

The means of the difference between the target and test values, taking into account all random effects and interactions are shown in Table 5.2. These means show that in general Colorado and South Dakota had less variation than Wyoming. In some cases, two or even all three states had statistically similar means. In such cases it was necessary to do further evaluation to determine if the differences between two of the three states were significant. Normally this would be accomplished using Tukey multiple comparison; however, due to random effects in this study this was not possible. An alternate form of comparison had to be utilized. In the case of this study it was determined that the comparison should be done by removing one of the three states and conducting ANOVA on the two remaining states. For example, the means for Colorado and South Dakota on the #200 sieve were quite similar. Therefore, Wyoming data was re-classified as missing data and analysis was performed on the Colorado and South Dakota means. This analysis produced the p-values shown in Table 5.3. In cases where all three states had similar means, such as the #8 and #200 sieve sizes, analysis was run by first removing South Dakota and then removing Wyoming. From this analysis, it was determined that the two significant p-values were found in the #200 and #4 sieves. Overall, once Wyoming had been removed from the analysis, it was determined that the difference between the means of Colorado and South Dakota were not statistically significant. The only exception to this was the #4 sieve. Therefore, we can consider the variation between Colorado and South Dakota to be similar in that they both have low variation. Wyoming had the highest variation in most cases.

Table 5.2 Means from ANOVA by State for Aggregate Gradation

Parameter	Colorado	Wyoming	South Dakota
No. 200 sieve	0.676	1.286	0.594
No. 8 sieve	2.451	2.750	2.084
No. 4 sieve	2.203	4.116	1.904
1/2" sieve	1.975	3.738	1.720

Table 5.3 p-values When Particular States are Excluded for Aggregate Gradation

	No. 8 sieve	No. 200 Sieve	No. 4 sieve	1/2" sieve
Excluding SD	0.285	0.000*	N/A	N/A
Excluding WY	0.016	0.341	0.037*	0.237

* Denotes p-values that are less than the a-value of 0.05

It may be noted that the #200 sieve had the lowest overall variation among the three states. This may have been due to the specification limits placed on the sieve. The #200 sieve had a lower limit of 2 percent and an upper limit of 7 percent passing in most cases. With such a narrow band, it can be assumed that contractors and engineers pay close attention to the test values for this particular sieve. The #4 sieve had the highest overall variation. The #4 sieve is generally the breaking point between gravel and coarse sand, which may account for some of the variability within this factor. All three states had statistically significant differences for this factor. South Dakota had the least amount of variation on this sieve size followed by Colorado. Wyoming had the largest amount of variation on the #4 sieve. This can be seen graphically in Figure 5.5.

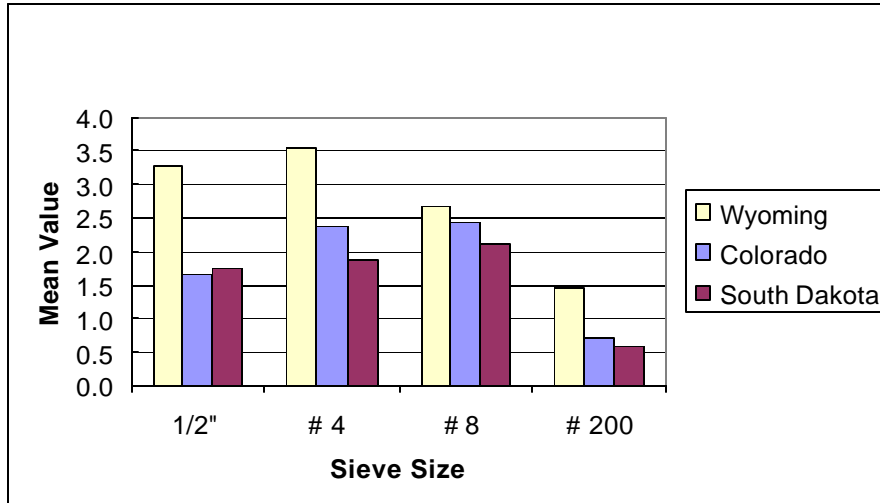


Figure 5.5 Histogram of Mean Difference between Target and Test Values for Aggregate Gradation by State

Figure 5.6 graphically displays the standard deviation of sieve sizes broken down by state. This figure shows that in general Wyoming had the highest overall standard deviation. South Dakota had the lowest overall standard deviation. The exception to this is the #200 sieve. For the #200 sieve South Dakota still had the lowest standard deviation; however, Colorado had the highest standard deviation.

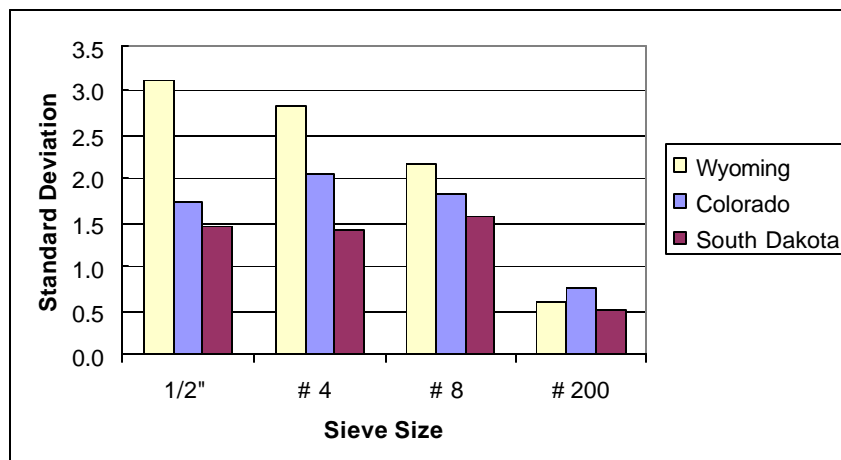


Figure 5.6 Standard Deviation of Difference between Target and Test values for Aggregate Gradation by State

Figure 5.7 displays the mean variation among the sieve sizes broken down by year. We would expect to see a decrease in the variation as the year of implementation increases. As states tighten control over the aggregate gradation process, we would expect the variation to decrease. Indeed this is the case with the #4 and #8 sieves. The 1/2-inch sieve follows this trend for the second and third years of implementation. The #200 sieve does not follow this general trend. This may be due to the narrow band specifications already in place for the #200 sieve. Since the specification band on the #200 sieve is only 2 percent passing to 7 percent passing for most of the projects there is little room for great reductions in variation within this sieve.

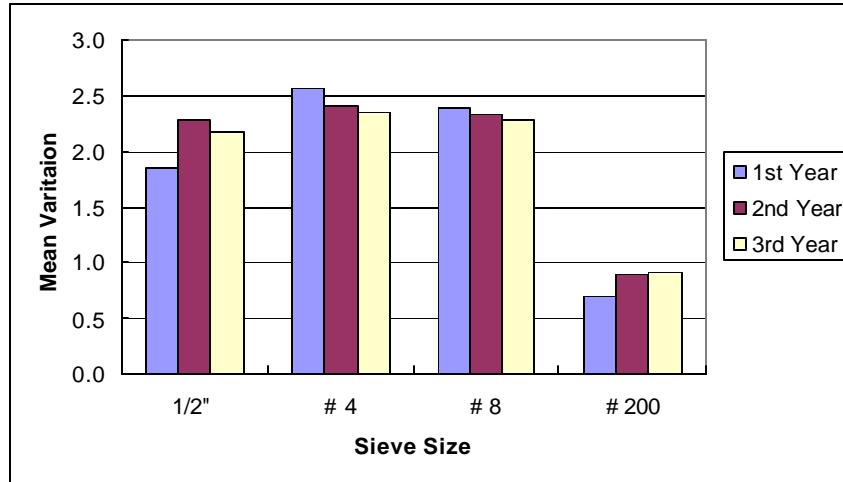


Figure 5.7 Mean Difference between Target and Test Values for Aggregate Gradation by Year

5.4.2 Density

Density analysis included data from Colorado and South Dakota. It was determined that the year, state and mix were statistically significant in the analysis. The mean and standard deviation values can be viewed by state in Figure 5.8 and by year in Figure 5.9. The mean is also listed in Table 5.5. The significance is shown in Table 5.4, as the p-values are well under 0.05. Indeed, density is the only case where the year of construction made a difference in the variation, as shown in Figure 5.9.

Table 5.4 p-values From ANOVA for Density

Parameter	Year	State	Year*State	Project (Year*State)	Mix (Year*State*Project)
Density	0.016*	0.008*	0.463	0.907	0.000*

* Denotes p-values that are less than the a-value of 0.05

Table 5.5 Means from ANOVA for Density by State

Parameter	Colorado	South Dakota
Density	0.005	1.315

This is attributed to the incentive and disincentive pay factors applied to the projects by the state agencies. Colorado and South Dakota both weigh the density pay factor at 50 percent of the overall pay factor. As contractors realized that the majority of their projects' pay factors depended on low variability between the target and test values for density, they were bound to provide better densities, decrease variation, or pay stiff disincentive payments. This large weight on the density factor would also provide large incentive payments if contractors obtained results close to the target values. Colorado achieved the least amount of variation for density, followed by South Dakota, as shown in Figure 5.8. Colorado had a slightly lower standard deviation than South Dakota.

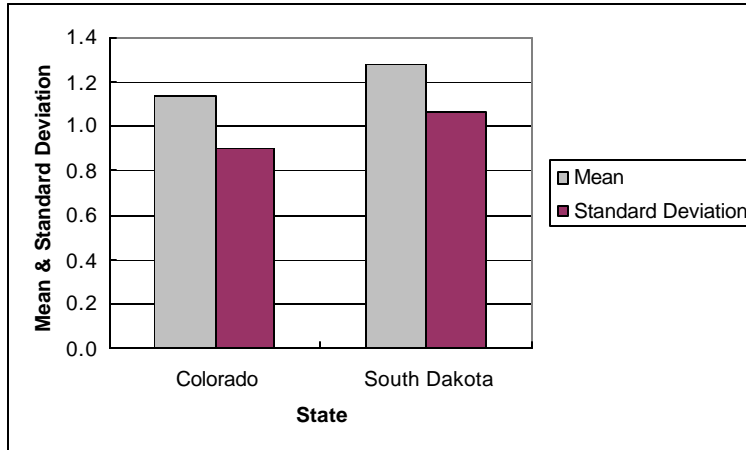


Figure 5.8 Mean and Standard Deviation Values for Difference between Target and Test Values by State for Density

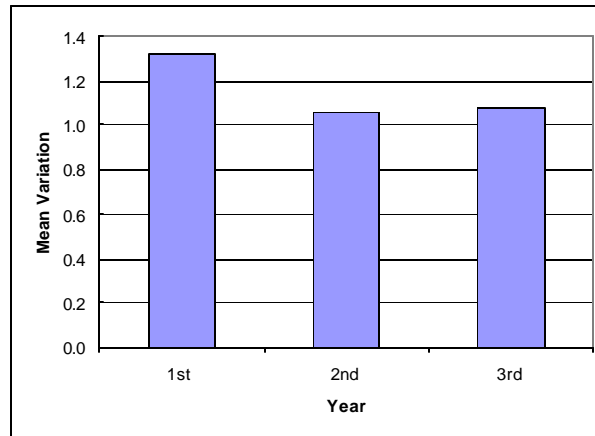


Figure 5.9 Mean Variation between Target and Test Values for Density by Year

5.4.3 Asphalt Content

Asphalt content was a factor measured by Colorado and Wyoming. Figure 5.10 shows the mean and standard deviation by state, while Figure 5.11 shows the mean by year. Overall asphalt content had the lowest average variability among the different factors as is shown in Table 5.6. Colorado had slightly lower variability for this factor than Wyoming, as can be viewed in Figure 5.10. State and mix were both statistically significant for this factor as shown in Figure 5.11. The p-values are both well below the α -value of 0.05, as shown in Table 5.7.

Table 5.6 Means from ANOVA by State for Asphalt Content

Parameter	Colorado	Wyoming
Asphalt Content	0.158	0.281

Table 5.7 p-values From ANOVA for Asphalt Content

Parameter	Year	State	Year*State	Project (Year*State)	Mix (Year*State*Project)
Asphalt Content	0.353	0.003*	0.440	0.644	0.000*

* Denotes p-values that are less than the a-value of 0.05

Colorado bases 30 percent of the overall pay factor on asphalt content. Wyoming has an individual pay factor for asphalt content that ranges from 0.75 on the low end to 1.05 on the upper end. Knowing that Colorado bases a large portion of the overall pay factor determination on asphalt content, it is expected that the variation within this factor should be low. Wyoming should also produce low variation within this factor, as the disincentive pay may cost the contractor up to 25 percent for this category, and with low variability they may achieve up to a 5 percent incentive payment.

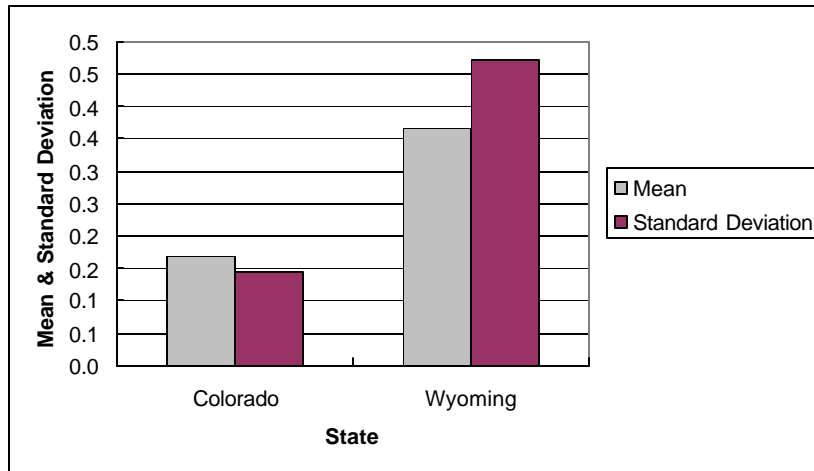


Figure 5.10 Mean and Standard Deviation between Target and Test Values by State for Asphalt Content

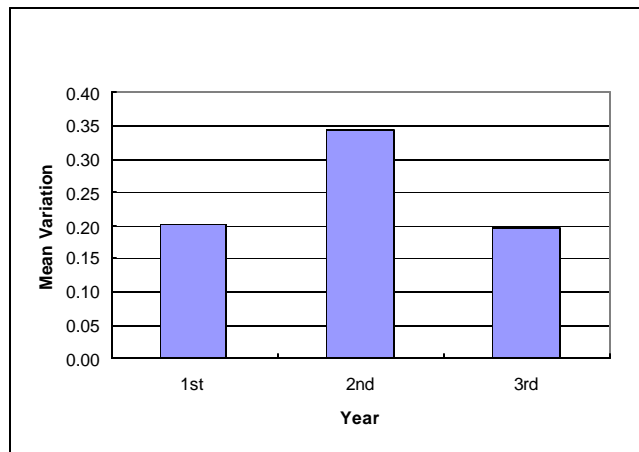


Figure 5.11 Mean for Difference between Target and Test Values of Asphalt Content by Year

5.4.4 Design Air Voids

The voids in the total mix were evaluated for Wyoming and South Dakota. Again state and mix were statistically significant. The p-values shown in Table 5.8 are both 0.000. South Dakota produced slightly less variability for this factor than Wyoming as shown in Figure 5.12. The means are also shown in Table 5.9. It was expected that South Dakota would have lower variability in this category as 50 percent of their overall pay factor is based on the design voids. It was also expected for the variability to be lower for this factor than for the aggregate gradation in South Dakota. Gradation is not included in the overall pay factor for South Dakota.

Table 5.8 p-values From ANOVA for Air Voids

Parameter	Year	State	Year*State	Project (Year*State)	Mix (Year*State*Project)
VTM	0.074	0.000*	0.110	0.087	0.000*

* Denotes p-values that are less than the a-value of 0.05

Table 5.9 Means from ANOVA by State for Air Voids

Parameter	Wyoming	South Dakota
VTM	1.364	0.893

With the pay factor being determined by density and design air voids, it is to be expected that those two factors would have the tightest control. Wyoming utilizes an individual pay factor for asphalt content, again ranging from 0.75 to 1.05. The overall trend in decreasing the mean over all three years of implementation is shown graphically in Figure 5.13. This figure shows that as each year of implementation increased the mean variation decreased.

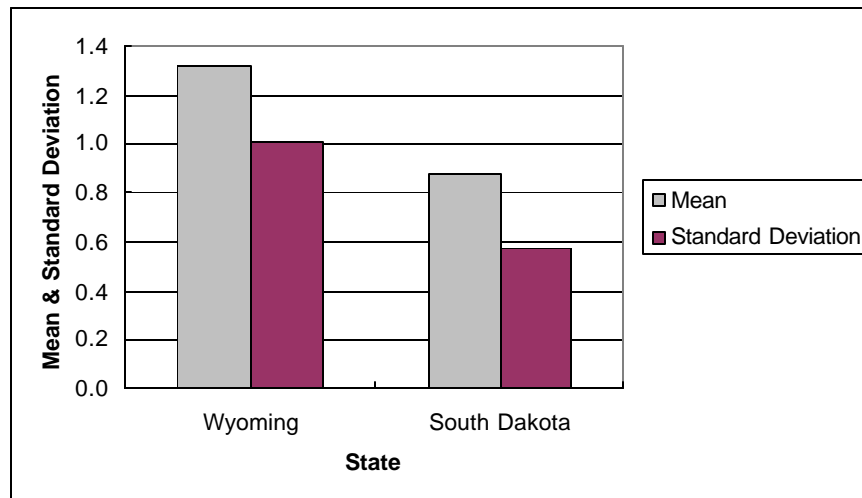


Figure 5.12 Mean and Standard Deviation for Difference between Target and Test Values for Air Voids by State

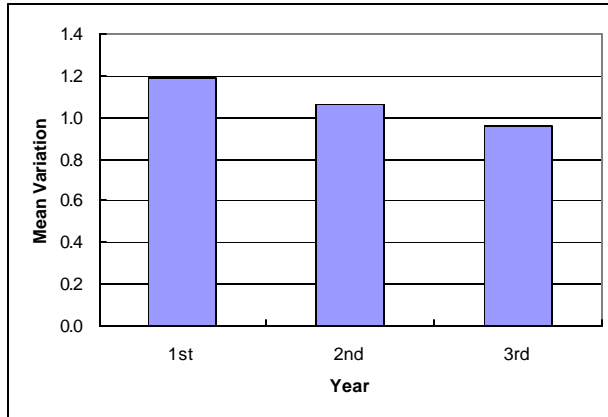


Figure 5.13 Mean for Difference between Target and Test Values of Air Voids by Year

5.5 Summary

Statistical analysis was performed on project data collected from Colorado, Wyoming, and South Dakota. The projects were constructed during the first, second and third years after the implementation of a pilot QC/QA program. ANOVA was used to analyze the data and the variation between the test and target values for each factor. Levels within factors were determined and included, mix design within the project, year of construction and the state in which the project was constructed. Aggregate gradation, density, voids in total mix, and asphalt content were all analyzed. Upon completion of the analysis a number of conclusions could be drawn.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

The main objective of this study was to determine which of the three case study states showed the lowest variation for processes tested in the QC/QA program. Colorado, Wyoming and South Dakota were all evaluated in this case study. These states were selected to represent FHWA Region 8. The conclusions that may be drawn from analysis on these three states are discussed in this chapter as well as recommendations for the continuation of this research.

Methodology used to evaluate the magnitude of variation among the three states began by collecting all relevant QC/QA project data and mix design values for each of the three states. Upon determining the differences and similarities among the states, analysis was completed on processes that at least two of the three states had in common. An analysis of the data was done using Minitab version 13 software. The model utilized by the software accounted for the random effects and interactions.

6.2 Conclusions

This study conducted an analysis of variance for each of the three states using QC/QA specifications. From this analysis, the following conclusions were drawn:

1. The similar process common to all three states included in this study was aggregate gradation; all three states had some common sieve sizes. In the case of density, air voids and asphalt content two of the three states were included in the analysis.
2. South Dakota had the lowest variability for aggregate gradation and design air voids. Colorado had the lowest variability for density and asphalt content.
3. Overall, Colorado and South Dakota produced the lowest average variation among the aggregate gradation factors. The #4 sieve was the only sieve where the difference between Colorado and South Dakota was statistically significant. Wyoming produced higher variation among the sieve sizes than the other two states.
4. Colorado produced the lowest variation for the density factor, while South Dakota produced slightly higher variation for this factor. Colorado produced the lowest variation for asphalt content, Wyoming was slightly higher.
5. South Dakota produced a lower variability for design air voids than Wyoming.
6. The decrease in variability by state was statistically significant for all processes. Overall, Colorado showed the lowest variation, however South Dakota had the lowest variation for aggregate gradation. Wyoming showed the largest variation for each of its processes.
7. The decrease in variability by mix within project was statistically significant for all of the processes tested.
8. The decrease in variability over the three year time period was shown in most cases. However, a majority of these decreases were statistically insignificant. Density was the only statistically significant process when evaluated by year of construction.
9. The processes carrying the largest weight for overall pay factor determination had the lowest variation. In Colorado the lowest variation was displayed by the density and asphalt content processes. These processes accounted for 50 percent and 30 percent of the weight for the overall pay factor determination respectively. In South Dakota the lowest variability was shown on the design air void process. This particular process accounted for 50 percent of South Dakota's overall pay factor determination.

6.3 Recommendations

As modifications are continuously made to QC/QA specifications a study similar to this one should be conducted in the future to determine the impact of changes to the specifications on the variability of mix designs. It is not uncommon for a state to reduce the allowable wide band specifications shortly after the implementation of a QC/QA program or with the introduction of incentive and disincentive payment adjustments. Analysis should be completed to determine if these tightened specification lead to a reduction of variance or more projects having test values outside specification limits.

The methodology introduced in this report should also be used to conduct a larger scale research project. This project should include QC/QA data from a number of states. The states should include additional region 8 states as well as surrounding states. This will allow for the study of variability utilizing a wide variety of different processes. Special attention should be paid to the weight of pay-factors and the reduction of variability within those weighted processes.

State highway agencies which desire to lower the variability on particular processes within their QC/QA program, may want to closely study the weight of those processes for incentive and disincentive pay adjustment. As shown in this study those processes carrying the greatest weight produced the lowest overall variability.

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APPENDIX A
COLORADO DATA

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
Specification Limits	90-100		50-78		32-64		3-7		5.6		94		10057	77608	1994	ANCH 0503-041	Colorado
Design/JMF	100		66		48		5.5		5.6		94						
JMF Limits	100		61-71		43-53		3.5-7.5		5.3-5.9		92-96						
1	100	0	64	-2	46	-2	5.8	0.3	5.6	0.0	92.7	-1.3					
2	100	0	64	-2	46	-2	5.1	-0.4	5.3	-0.3	93.9	-0.1					
3	100	0	68	2	48	0	5.1	-0.4	5.8	0.2	93	-1					
4	100	0	68	2	50	2	5.0	-0.5	5.4	-0.2	92.5	-1.5					
5	100	0	70	4	52	4	5.3	-0.2	5.3	-0.3	92.1	-1.9					
6									5.5	-0.1	92	-2					
7									5.6	0.0	92.7	-1.3					
8									5.6	0.0	92.7	-1.3					
9											93.1	-0.9					
10											91.9	-2.1					
11											92.4	-1.6					
Specification Limits	90-100		50-78		32-64		3-7		5.3		94		10057	77608A	1994	ANCH 0503-041	Colorado
Design/JMF	100		66		48		5.5		5.3		94						
JMF Limits	100		61-71		43-53		3.5-7.5		5.0-5.6		92-96						
1	100	0	66	0	48	0	5.6	0.1	5.3	0.0	93.2	-0.8					
2	100	0	69	3	50	2	5.5	0.0	5.4	0.0	91.9	-2.1					
3	100	0	68	2	51	3	5.5	0.0	5.3	0.0	92.4	-1.6					
4	100	0	66	0	49	1	5.1	-0.4	5.1	-0.2	93.3	-0.7					
5	100	0	64	-2	45	-3	4.6	-0.9	5.5	0.2	91.9	-2.1					
6	100	0	65	-1	49	1	5.1	-0.4	5.4	0.0	92.6	-1.4					
7	100	0	64	-2	48	0	5.2	-0.3	5.3	0.0	93.9	-0.1					
8	100	0	62	-4	47	-1	5.8	0.3	5.1	-0.2	92.6	-1.4					
9	100	0	62	-4	47	-1	5.6	0.1	5.3	0.0	92.6	-1.4					
10	100	0	64	-2	48	0	5.4	-0.1	5.2	-0.1	93.2	-0.8					
11	100	0	65	-1	50	2	6.0	0.5	5.5	0.2	91.9	-2.1					
12									5.6	0.3	92.1	-1.9					
13											93.2	-0.8					
14											91.2	-2.8					
15											92.4	-1.6					
16											92.1	-1.9					
17											92.4	-1.6					
18											92.7	-1.3					
19											92.3	-1.7					
20											92.8	-1.2					
21											92.6	-1.4					
22											91.9	-2.1					
23											93.6	-0.4					
24											92.3	-1.7					
25											93.3	-0.7					
26											93.5	-0.5					
27											93.2	-0.8					
28											93.5	-0.5					
29											94.8	0.8					
30											94	0					
31											92.3	-1.7					
32											93.8	-0.2					
33											94.1	0.1					
34											92.8	-1.2					
35											92.5	-1.5					
36											94.5	0.5					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
37											95.2	1.2					
38											92.8	-1.2					
39											92.3	-1.7					
40											92.5	-1.5					
41											95.3	1.3					
42											93.5	-0.5					
43											92.9	-1.1					
44											92.3	-1.7					
45											93.4	-0.6					
Specification Limits	70-89		44-72		30-62		3-7										
Design/JMF	86		60		46		4.3		5.2		94		10126	77078	1994	NH 1191-005	Colorado
JMF Limits	80-92		55-65		41-51		2.3-6.3		4.9-5.5		92-96						
1	87	1	58	-2	45	-1	6.2	1.9	5.18	0.0	92.2	-1.8					
2	88	2	64	4	51	5	6.7	2.4	5.48	0.3	88.7	-5.3					
3	91	5	62	2	50	4	6.3	2.0	5.44	0.2	91	-3					
4	89	3	61	1	48	2	5.7	1.4	5.27	0.1	90.6	-3.4					
5									5.55	0.4	89.8	-4.2					
6									5.53	0.3	90.6	-3.4					
7									5.05	-0.2	90.1	-3.9					
8									5.22	0.0	90.7	-3.3					
9									5.2	0.02	92.7	-1.3					
Specification Limits	70-89		44-72		30-62		3-7										
Design/JMF	89		60		48		6		5.2		94		10126	77078A	1994	NH 1191-005	Colorado
JMF Limits	83-95		55-65		43-53		4-8		4.9-5.5		92-96	-1.3					
1	89	0	60	0	45	-3	6.1	0.1	5.31	0.1	92.7	-2.6					
2	90	1	62	2	47	-1	6.7	0.7	5.38	0.2	91.4	-0.4					
3	89	0	62	2	52	4	6.6	0.6	5.29	0.1	93.6	-0.8					
4	91	2	64	4	48	0	6.8	0.8	5.28	0.1	93.2	-0.4					
5	87	-2	55	-5	43	-5	6.3	0.3	5.43	0.2	93.6	-4.1					
6	89	0	63	3	48	0	7.1	1.1	5.26	0.1	89.9	0.2					
7	89	0	61	1	46	-2	6.9	0.9	5.37	0.2	94.2	-1.9					
8	88	-1	60	0	45	-3	6.7	0.7	5.25	0.0	92.1	-1.7					
9	92	3	61	1	46	-2	6.6	0.6	5.18	0.0	92.3	-4.8					
10	88	-1	62	2	47	-1	6.1	0.1	5.31	0.1	89.2	-1.2					
11	89	0	62	2	45	-3	5.7	-0.3	4.99	-0.2	92.8	-2.3					
12									5.18	0.0	91.7	-1.6					
13									5.32	0.1	92.4	-1.8					
14									5.15	0.0	92.2	-0.7					
15									5.02	-0.2	93.3	-1.7					
16									5.41	0.2	92.3	-1.4					
17									5.28	0.1	92.6	-1.7					
18									5.16	0.0	92.3	-0.6					
19									5.36	0.2	93.4	-0.8					
20											93.2	-2.1					
21											91.9	0.7					
22											94.7	-1.6					
23											92.4	-5.1					
24											88.9	-1.8					
25											92.2	-2.9					
26											91.1	-1.7					
27											92.3	-9.4					
Specification Limits	70-89		44-72		30-62		3-7										
Design/JMF	86		57		44		6.6		4.9		94		10126	64223	1994	NH 1191-005	Colorado
JMF Limits	80-92		52-62		39-49		4.6-8.6		4.6-5.2		92-96						

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
1	88	2	58	1	46	2	7.1	0.5	4.8	-0.1	92	-2					
2									4.7	-0.22	95.7	1.7					
Specification Limits	70-89		44-72		30-62		3-7				94		10126	82101	1994	NH 1191-005	Colorado
Design/JMF	88		57		43		6.6		5.2		92-96						
JMF Limits	82-94		52-62		38-48		4.6-8.6		4.9-5.5								
1	88	0	59	2	44	1	6.6	0.0	5.2	0.0	93	-1					
2	91	3	56	-1	41	-2	6.1	-0.5	5.3	0.1	92.6	-1.4					
3	91	3	55	-2	42	-1	6.5	-0.1	5.3	0.1	93.4	-0.6					
4	90	2	57	0	44	1	6.9	0.3	5.3	0.1	93.4	-0.6					
5	89	1	59	2	45	2	7.7	1.1	5.3	0.1	92.7	-1.3					
6	90	2	60	3	47	4	7.5	0.9	5.5	0.3	93.1	-0.9					
7	84	-4	54	-3	42	-1	6.8	0.2	5.3	0.1	95.1	1.1					
8	88	0	55	-2	42	-1	6.4	-0.2	5.4	0.2	95.1	1.1					
9	91	3	57	0	44	1	7.4	0.8	5.3	0.1	90.9	-3.1					
10	88	0	57	0	43	0	6.9	0.3	5.4	0.2	92.1	-1.9					
11	91	3	61	4	47	4	7.5	0.9	5.3	0.1	93.2	-0.8					
12	92	4	55	-2	41	-2	6.5	-0.1	5.2	0.0	94.8	0.8					
13									5.1	-0.2	93.1	-0.9					
14									5.4	0.2	94	0					
15									5.2	0.0	90.5	-3.5					
16									5.1	-0.1	92.6	-1.4					
17									5.2	0.0	92.2	-1.8					
18									5.2	0.0	93.3	-0.7					
19									5.0	-0.2	93.6	-0.4					
20											96	2					
21											93.1	-0.9					
22											92.9	-1.1					
23											93.9	-0.1					
24											91.6	-2.4					
25											93	-1					
26											92.1	-1.9					
27											92.7	-1.3					
28											93.5	-0.5					
29											93.6	-0.4					
30											92.5	-1.5					
31											89.7	-4.3					
32											95.6	1.6					
33											94.8	0.8					
34											91.8	-2.2					
35											93.6	-0.4					
36											96.7	2.7					
37											93.6	-0.4					
38											92	-2					
39											91.8	-2.2					
40											93.1	-0.9					
41											92.9	-1.1					
42											93.7	-0.3					
43											93.2	-0.8					
44											92.7	-1.3					
45											90.7	-3.3					
46											92.3	-1.7					
Specification Limits	70-89		44-72		30-62		3-7						10155	77004	1994	C 2873-067	Colorado
Design/JMF	81		52		43		6.3		5.2		94						
JMF Limits	79-91		47-57		38-48		4.3-8.3		4.9-5.5		92-96						

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
1	84	3	53	1	41	-2	5.6	-0.7	4.7	-0.5	95	1					
2	85	4	54	2	43	0	3.8	-2.5	4.8	-0.4	96.2	2.2					
3	85	4	51	-1	38	-5	4.9	-1.4	4.9	-0.4	93.6	-0.4					
4	86	5	49	-3	35	-8	5.0	-1.3	4.9	-0.3	94.1	0.1					
5	86	5	51	-1	39	-4	4.7	-1.6	4.6	-0.7	93.2	-0.8					
6	86	5	51	-1	39	-4	4.7	-1.6	5.1	-0.1	93.6	-0.4					
7	84	3	49	-3	41	-2	6.1	-0.2	5.5	0.3	94.4	0.4					
8	86	5	52	0	39	-4	3.8	-2.5	5.3	0.1	95	1					
9	85	4	48	-4	35	-8	4.9	-1.4	5.1	-0.1	93.5	-0.5					
10	84	3	53	1	48	5	4.1	-2.2	5.3	0.1	94	0					
11	81	0	48	-4	38	-5	4.9	-1.4	5.1	-0.1	93.4	-0.6					
12	82	1	50	-2	38	-5	4.3	-2.0	5.2	0.0	94.5	0.5					
13	79	-2	55	3	41	-2	5.0	-1.3	5.2	0.0	93.3	-0.7					
14											92.6	-1.4					
15											93.3	-0.7					
16											94.9	0.9					
17											95.3	1.3					
18											94	0					
19											95.8	1.8					
20											92.9	-1.1					
21											94.8	0.8					
22											94.6	0.6					
23											94.9	0.9					
24											95.6	1.6					
25											93.8	-0.2					
26											95.4	1.4					
Specification Limits Design/JMF	70-89		44-72		30-62		3-7				94		10155	642331	1994	C 2873-067	Colorado
JMF Limits	82		60		47		6.1		5.4		92-96						
JMF Limits	76-88		55-65		42-52		4.1-8.1		5.1-5.7								
1	87	5	58	-2	46	-1	7.0	0.9	5.5	0.1	93.7	-0.3					
2	89	7	60	0	48	1	6.2	0.1	5.3	-0.1	93.9	-0.1					
3	87	5	57	-3	45	-2	6.1	0.0	5.6	0.2	94	0					
4	88	6	57	-3	43	-4	6.9	0.8	5.2	-0.3	94.5	0.5					
5									5.3	-0.1	94.1	0.1					
6									5.5	0.1	94.5	0.5					
7											95.5	1.5					
8											92.9	-1.1					
Specification Limits Design/JMF	90-100		50-78		32-64		3-7				94		10222	84862	1994	PFH 0149A-015	Colorado
JMF Limits	96		54		36		6.2		7.5		92-96						
JMF Limits	91-100		49-59		31-41		4.2-8.2		7.2-7.8								
1	96	1	52	-2	36	0	6.4	0.2	8.6	1.1	92.5	-1.5					
2	97	2	52	-2	35	-1	5.8	-0.4	7.2	-0.3	93	-1					
3	97	2	55	1	38	2	6.5	0.3	7.4	-0.2	93.6	-0.4					
4	96	1	51	-3	35	-1	6.2	0.0	7.3	-0.2	89.7	-4.3					
5	96	1	56	2	38	2	6.6	0.4	7.1	-0.4	94.2	0.2					
6	96	1	56	2	38	2	6.6	0.4	7.2	-0.4	92	-2					
7	98	3	53	-1	35	-1	4.9	-1.3	7.0	-0.5	92.6	-1.4					
8	98	3	55	1	37	1	5.1	-1.1	7.5	0.0	95.6	1.6					
9	96	1	52	-2	35	-1	5.5	-0.7	7.3	-0.2	92.5	-1.5					
10	98	3	54	0	35	-1	5.6	-0.6	7.5	0.0	93	-1					
11									7.7	0.2	92.3	-1.7					
12									7.4	-0.1	92	-2					
13									7.4	-0.1	92.5	-1.5					
14									7.6	0.1	92.5	-1.5					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
15									7.5	0.0	94.5	0.5					
16									7.3	-0.2	92.9	-1.1					
17											92.4	-1.6					
18											93.1	-0.9					
19											92.8	-1.2					
20											93.6	-0.4					
21											93	-1					
22											93.3	-0.7					
23											93.5	-0.5					
24											93.7	-0.3					
25											92.6	-1.4					
26											93.3	-0.7					
27											93.9	-0.1					
28											92.7	-1.3					
29											92.3	-1.7					
30											92	-2					
31											93	-1					
32											93.4	-0.6					
33											92.1	-1.9					
34											92.7	-1.3					
35											93.1	-0.9					
Specification Limits Design/JMF JMF Limits	90-100 95 90-100		50-78 54 49-59		32-64 36 31-41		3-7 6.2 4.2-8.2		7.5 7.2-7.8		94 92-96		10222	84862C	1994	PFH 0149A-015	Colorado
1	97	2	56	2	39	3	7.2	1.0	8.0	0.5	91.3	-2.7					
2	96	1	53	-1	35	-1	6.3	0.1	8.5	1.0	92.6	-1.4					
3									7.7	0.2	91.9	-2.1					
4									7.3	-0.21	90.2	-3.8					
Specification Limits Design/JMF JMF Limits	70-89 86 80-92		44-72 57 52-62		30-62 46 41-51		3-7 6.3 4.3-8.3		5.5 5.1-5.9		94 92-96		10230	73251	1994	STR 1192-004	Colorado
1	82	-4	55	-2	47	1	5.5	-0.8	5.7	0.2	93.9	-0.1					
2	84	-2	57	0	48	2	6.5	0.2	5.9	0.4	92.2	-1.8					
3	82	-4	52	-5	41	-5	5.3	-1.0	5.6	0.1	93.1	-0.9					
4	82	-4	57	0	46	0	6.2	-0.1	5.8	0.3	93.6	-0.4					
5	83	-3	57	0	45	-1	5.0	-1.3	5.6	0.1	95	1					
6	83	-3	56	-1	43	-3	5.3	-1.0	5.5	0.0	94.3	0.3					
7	82	-4	54	-3	42	-4	4.6	-1.7	5.8	0.3	95.3	1.3					
8	82	-4	54	-3	42	-4	5.5	-0.8	5.7	0.2	94.8	0.8					
9	88	2	58	1	45	-1	5.8	-0.5	5.8	0.3	92.9	-1.1					
10	80	-6	53	-4	41	-5	5.3	-1.0	5.3	-0.2	93.4	-0.6					
11									5.5	0.0	92.4	-1.6					
12											93.6	-0.4					
13											93.9	-0.1					
14											91.8	-2.2					
15											93	-1					
16											92.6	-1.4					
17											92.6	-1.4					
18											93	-1					
19											93.3	-0.7					
20											93.5	-0.5					
21											94.1	0.1					
22											92.2	-1.8					
23											94.4	0.4					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State	
24											93.8	-0.2						
25											91	-3						
26											92.1	-1.9						
27											93.2	-0.8						
28											93.6	-0.4						
29											90.6	-3.4						
30											94.3	0.3						
31											93.8	-0.2						
32											92.8	-1.2						
33											93.6	-0.4						
34											92.6	-1.4						
35											94.1	0.1						
36											96	2						
Specification Limits	90-100		50-78		32-64		3-7							10230	73252	1994	STR 1192-004	Colorado
Design/JMF	100		61		51		6.4		5.7		94							
JMF Limits	100		56-66		46-56		4.4-8.4		5.3-6.1		92-96							
1	100	0	59	-2	48	-3	6.4	0.0	6.0	0.3	93.8	-0.2						
2	100	0	63	2	50	-1	6.4	0.0	5.5	-0.2	93.6	-0.4						
3									5.5	-0.18	94	0						
Specification Limits	70-89		44-72		30-62		3-7							10455	72755	1994	NHS 0243-044	Colorado
Design/JMF	86		60		46		5.7		5.4		94							
JMF Limits	80-92		55-65		41-51		3.7-7.7		5.1-5.7		92-96							
1	86	0	61	1	46	0	5.5	-0.2	5.2	-0.2	95.6	1.6						
2	89	3	62	2	46	0	5.4	-0.3	5.2	-0.3	95.5	1.5						
3	90	4	63	3	47	1	4.7	-1.0	5.2	-0.2	94.4	0.4						
4	87	1	56	-4	41	-5	4.6	-1.1	5.4	0.0	94.2	0.2						
5	84	-2	55	-5	39	-7	4.8	-0.9	5.3	-0.1	93.2	-0.8						
6	84	-2	56	-4	42	-4	5.0	-0.7	5.5	0.1	91.2	-2.8						
7	86	0	60	0	45	-1	5.0	-0.7	5.3	-0.1	94.1	0.1						
8	84	-2	57	-3	43	-3	5.2	-0.5	5.3	-0.1	92.8	-1.2						
9	86	0	60	0	45	-1	5.4	-0.3	5.1	-0.3	93.1	-0.9						
10	85	-1	59	-1	43	-3	5.0	-0.7			93.7	-0.3						
11	87	1	60	0	45	-1	6.0	0.3			93.9	-0.1						
12	84	-2	56	-4	42	-4	4.6	-1.1			93.8	-0.2						
13	87	1	60	0	45	-1	5.5	-0.2			92	-2						
14	88	2	62	2	47	1	5.7	0.0			92.4	-1.6						
15											92.5	-1.5						
16											92.8	-1.2						
17											92.3	-1.7						
18											93	-1						
19											94.4	0.4						
20											91.8	-2.2						
21											93.3	-0.7						
22											92.3	-1.7						
23											93.3	-0.7						
24											93.6	-0.4						
25											95.1	1.1						
26											95	1						
27											93.7	-0.3						
28											94	0						
29											95.4	1.4						
Specification Limits	70-89		44-72		30-62		3-7							10455	72755B	1994	NHS 0243-044	Colorado
Design/JMF	86		60		46		5.7		5.4		94							
JMF Limits	80-92		55-65		41-51		3.7-7.7		5.1-5.7		92-96							

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
1	87	1	59	-1	44	-2	5.1	-0.6	5.1	-0.3	92	-2					
2	87	1	63	3	47	1	5.6	-0.1	5.2	-0.3	93.9	-0.1					
3	86	0	59	-1	44	-2	4.8	-0.9	5.3	-0.1	92.8	-1.2					
4	90	4	62	2	47	1	5.8	0.1	5.1	-0.3	93.8	-0.2					
5	89	3	63	3	47	1	5.7	0.0	5.2	-0.3	92.8	-1.2					
6	87	1	60	0	45	-1	5.9	0.2	5.4	0.0	93.9	-0.1					
7	85	-1	58	-2	43	-3	5.1	-0.6	5.4	-0.1	95.5	1.5					
8	86	0	58	-2	43	-3	5.0	-0.7	5.4	0.0	95.7	1.7					
9	85	-1	58	-2	44	-2	5.4	-0.3	5.3	-0.2	93.5	-0.5					
10	86	0	60	0	46	0	5.6	-0.1	5.2	-0.2	93.9	-0.1					
11	87	1	60	0	46	0	5.6	-0.1	5.3	-0.2	94.6	0.6					
12	89	3	63	3	50	4	5.6	-0.1	5.5	0.1	93.2	-0.8					
13	90	4	65	5	51	5	5.3	-0.4	5.1	-0.3	92.8	-1.2					
14									5.1	-0.3	94.8	0.8					
15									5.4	0.0	95.1	1.1					
16									5.3	-0.1	95.9	1.9					
17									5.2	-0.2	94.2	0.2					
18									5.7	0.3	92.9	-1.1					
19									5.5	0.1	93	-1					
20									5.3	-0.1	93.8	-0.2					
21									5.2	-0.2	95.1	1.1					
22									5.4	0.0	94.7	0.7					
23											94.3	0.3					
24											92.3	-1.7					
25											93.2	-0.8					
26											94.3	0.3					
27											95	1					
28											92.3	-1.7					
29											95.8	1.8					
30											93	-1					
31											93.7	-0.3					
32											94	0					
33											93	-1					
34											92.7	-1.3					
35											94.5	0.5					
36											94.8	0.8					
37											93.6	-0.4					
38											93.2	-0.8					
39											95.5	1.5					
40											93	-1					
41											93.5	-0.5					
42											94.3	0.3					
43											93.2	-0.8					
44											95.7	1.7					
45											93.3	-0.7					
46											92.6	-1.4					
47											96	2					
48											93.8	-0.2					
49											94.3	0.3					
50											95	1					
51											94.5	0.5					
52											96.5	2.5					
53											94.6	0.6					
54											94.4	0.4					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
55											95.8	1.8					
56											94.4	0.4					
57											94.6	0.6					
58											93.3	-0.7					
Specification Limits	70-89		44-72		30-62		3-7						10460	74418	1994	C 0703-210	Colorado
Design/JMF	84		54		41		4.8		5.5		94						
JMF Limits	78-90		49-59		36-46		2.8-6.8		5.2-5.8		92-96						
1	84	0	54	0	38	-3	4.6	-0.2	5.3	-0.2	95.1	1.1					
2	84	0	48	-6	36	-5	4.7	-0.1	5.6	0.1	94.6	0.6					
3	87	3	55	1	41	0	5.1	0.3	5.7	0.2	93	-1					
4	85	1	49	-5	35	-6	4.9	0.1	5.6	0.0	94.3	0.3					
5	88	4	59	5	45	4	5.4	0.6	5.0	-0.5	92.4	-1.6					
6	88	4	59	5	45	4	5.2	0.4	5.7	0.2	95.2	1.2					
7	84	0	53	-1	38	-3	5.3	0.5	5.9	0.4	94.4	0.4					
8	86	2	54	0	39	-2	5.1	0.3	5.5	0.0	93.2	-0.8					
9	88	4	54	0	39	-2	4.7	-0.1	5.4	-0.1	93	-1					
10	87	3	60	6	44	3	6.2	1.4	5.6	0.1	92.6	-1.4					
11	86	2	59	5	45	4	5.7	0.9	5.3	-0.2	92.5	-1.5					
12	88	4	59	5	45	4	5.8	1.0	5.6	0.1	93.3	-0.7					
13	87	3	59	5	45	4	6.0	1.2	5.5	0.0	91.9	-2.1					
14	87	3	60	6	44	3	5.7	0.9	5.5	0.0	92.6	-1.4					
15									5.6	0.1	93	-1					
16											94.7	0.7					
17											93	-1					
18											92.6	-1.4					
19											92.6	-1.4					
20											93.2	-0.8					
21											92.8	-1.2					
22											93.6	-0.4					
23											91.7	-2.3					
24											91.1	-2.9					
25											94	0					
26											92.1	-1.9					
27											92.5	-1.5					
Specification Limits	90-100		50-78		32-64		3-7						10492	96920	1994	MC R200-010	Colorado
Design/JMF	100		62		49		6.7		6.0		94						
JMF Limits	100		57-67		44-54		4.7-8.7		5.6-6.4		92-96						
1	100	0	58	-4	44	-5	6.7	0.0	6.1	0.1	92.8	-1.2					
2	100	0	62	0	48	-1	7.5	0.8	6.0	0.0	93.7	-0.3					
3	100	0	64	2	51	2	7.4	0.7	6.1	0.1	94.1	0.1					
4									6.1	0.1	94.6	0.6					
5									5.8	-0.16	93.7	-0.3					
Specification Limits	90-100		50-78		32-64		3-7						10492	96920A	1994	MC R200-010	Colorado
Design/JMF	100		62		49		6.7		5.8		94						
JMF Limits	100		57-67		44-54		4.7-8.7		5.4-6.1		92-96						
1	100	0	59	-3	46	-3	7.2	0.5	5.7	0.0	95.3	1.3					
2	100	0	63	1	50	1	7.4	0.7	5.6	-0.1	92.7	-1.3					
3	100	0	62	0	45	-4	6.5	-0.2	5.6	-0.1	93.3	-0.7					
4									5.9	0.1	95.5	1.5					
5									5.6	-0.2	93.1	-0.9					
6									5.6	-0.2	93.1	-0.9					
7											92.9	-1.1					
Specification Limits	90-100		50-78		32-64		3-7						10492	96919	1994	MC R200-010	Colorado
Design/JMF	100		59		46		5.8		6.0		94						

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
JMF Limits	100		54-64		41-51		3.8-7.8		5.6-6.4		92-96						
1	100	0	69	10	50	4	6.6	0.8	5.9	-0.1	93.5	-0.5					
2	100	0	68	9	49	3	6.6	0.8	5.8	-0.2	93	-1					
3	100	0	63	4	45	-1	5.9	0.1	5.6	-0.4	94.1	0.1					
4	100	0	62	3	50	4	6.8	1.0	6.1	0.1	93.7	-0.3					
5	100	0	60	1	47	1	6.4	0.6	5.9	-0.2	92.9	-1.1					
6	100	0	61	2	48	2	7.0	1.2	6.3	0.3	92	-2					
7	100	0	60	1	46	0	6.4	0.6	6.2	0.2	92.7	-1.3					
8	100	0	63	4	48	2	6.6	0.8	5.9	-0.1	93	-1					
9	100	0	62	3	48	2	6.8	1.0	5.6	-0.4	94.1	0.1					
10	100	0	60	1	47	1	6.6	0.8	5.9	-0.1	94.3	0.3					
11	100	0	58	-1	46	-1	6.1	0.3	5.9	-0.1	94	0					
12	100	0	58	-1	45	-1	6.1	0.3	6.1	0.1	92.8	-1.2					
13	100	0	62	3	42	-4	6.4	0.6	6.2	0.2	93.4	-0.6					
14									6.1	0.1	93.2	-0.8					
15									5.9	-0.1	92.9	-1.1					
16									5.7	-0.4	93	-1					
17											93.2	-0.8					
18											92.8	-1.2					
19											93.1	-0.9					
20											92.6	-1.4					
Specification Limits Design/JMF JMF Limits	90-100 100 100		50-78 59 54-64		32-64 46 41-51		3-7 5.8 3.8-7.8		6.0 6.0 5.6-6.4		94 94 92-96		10492	96919B	1994	MC R200-010	Colorado
1	100	0	61	2	42	-4	6.1	0.3	6.1	0.1	93.2	-0.8					
2	100	0	56	-4	40	-6	5.9	0.1	5.9	-0.1	93.3	-0.7					
3	100	0	53	-6	40	-7	6.0	0.2	5.2	-0.8	94.6	0.6					
4	100	0	63	4	46	0	6.7	0.9	5.8	-0.2	92.4	-1.6					
5	100	0	59	0	43	-3	6.1	0.3	5.8	-0.2	92.9	-1.1					
6	100	0	57	-2	44	-2	5.5	-0.3	6.0	0.0	93.3	-0.7					
7	100	0	63	4	47	1	6.3	0.5	5.6	-0.4	94.8	0.8					
8	100	0	61	2	48	2	6.4	0.6	5.7	-0.3	94	0					
9	100	0	66	7	50	4	6.3	0.5	5.6	-0.4	95.3	1.3					
10	100	0	61	2	48	2	6.3	0.5	5.6	-0.4	93.9	-0.1					
11									6.0	0.0	94	0					
12									6.0	0.0	92.8	-1.2					
13									6.5	0.5	93	-1					
14									5.9	-0.1	92.7	-1.3					
15									6.1	0.1	93.7	-0.3					
16									6.1	0.06	94.7	0.7					
Specification Limits Design/JMF JMF Limits	90-100 100 100		50-78 58 53-63		32-64 41 36-46		3-7 6.0 8-10		5.3 6.0 5-5.6		94 94 92-96		10507	80353	1994	C 1603-013	Colorado
1	100	0	59	1	42	1	6.0	0.0	5.5	0.2	94	0					
2	100	0	54	-4	39	-2	5.6	-0.4	5.4	0.1	93.2	-0.8					
3	100	0	57	-1	43	2	7.3	1.3	5.4	0.1	94.1	0.1					
4	100	0	60	2	46	5	6.8	0.8	5.4	0.1	92	-2					
5	100	0	62	4	47	6	8.6	2.6	5.4	0.1	91.9	-2.1					
6	100	0	56	-2	40	-1	6.2	0.2	5.1	-0.2	91.8	-2.2					
7	100	0	56	-2	38	-3	5.8	-0.2	5.2	-0.1	91.8	-2.2					
8	100	0	61	3	43	2	6.4	0.4	5.4	0.1	92.1	-1.9					
9	100	0	52	-6	36	-5	6.6	0.6	5.4	0.1	92.1	-1.9					
10	100	0	56	-2	39	-2	5.6	-0.4	5.6	0.3	93.4	-0.6					
11	100	0	57	-1	39	-2	5.6	-0.4	5.3	0.0	92	-2					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
12	100	0	57	-1	42	1	7.3	1.3	5.6	0.3	91.4	-2.6					
13	100	0	60	2	41	0	5.3	-0.7	5.5	0.2	91.1	-2.9					
14	100	0	58	0	42	1	6.1	0.1	5.5	0.2	93.6	-0.4					
15	100	0	57	-1	39	-2	5.7	-0.3	5.4	0.1	92.6	-1.4					
16	100	0	58	0	41	0	6.4	0.4	5.5	0.2	92.4	-1.6					
17	100	0	57	-1	40	-1	6.2	0.2	5.4	0.1	94.5	0.5					
18	100	0	59	1	45	4	7.7	1.7	6.1	0.8	93.8	-0.2					
19	100	0	58	0	42	1	8.5	2.5	5.5	0.2	92.3	-1.7					
20	100	0	62	4	47	6	8.6	2.6	5.4	0.1	92.1	-1.9					
21	100	0	59	1	43	2	8.2	2.2	5.4	0.0	92.9	-1.1					
22	100	0	56	-2	38	-3	5.0	-1.0	5.5	0.2	89	-5					
23	100	0	59	1	45	4	6.3	0.3	5.4	0.1	90.8	-3.2					
24	100	0	60	2	45	4	6.6	0.6	5.5	0.2	88.3	-5.7					
25	100	0	54	-4	39	-2	5.5	-0.5	5.2	-0.1	92.4	-1.6					
26	100	0	55	-3	38	-3	5.4	-0.6	5.7	0.4	92.4	-1.6					
27	100	0	56	-2	37	-4	5.3	-0.7	5.4	0.1	92.2	-1.8					
28	100	0	56	-2	42	1	5.7	-0.3	5.2	-0.1	88.1	-5.9					
29	100	0	60	2	45	4	6.5	0.5	5.2	-0.1	92.9	-1.1					
30	100	0	53	-5	35	-6	5.3	-0.7	5.3	0.0	90	-4					
31	100	0	53	-5	39	-2	5.8	-0.2	5.3	0.0	85.2	-8.8					
32	100	0	56	-2	39	-2	5.3	-0.7	5.4	0.1	92.3	-1.7					
33	100	0	56	-2	42	1	6.0	0.0	5.4	0.1	93.2	-0.8					
34	100	0	56	-2	43	2	6.2	0.2	5.6	0.3	89.3	-4.7					
35	100	0	55	-3	41	0	6.4	0.4	5.7	0.4	86.1	-7.9					
36	100	0	58	0	41	0	5.3	-0.7	5.6	0.3	88	-6					
37	100	0	57	-1	43	2	6.7	0.7	5.6	0.3	90.4	-3.6					
38	100	0	56	-2	41	0	6.4	0.4	5.4	0.1	87.4	-6.6					
39	100	0	54	-4	40	-1	6.4	0.4	5.7	0.4	88.1	-5.9					
40	100	0	54	-4	38	-3	5.9	-0.1	5.3	0.0	90.8	-3.2					
41	100	0	58	0	43	2	6.8	0.8	5.8	0.5	94.5	0.5					
42	100	0	57	-1	40	-1	6.4	0.4	5.3	0.0	92	-2					
43	100	0	56	-2	39	-2	6.4	0.4	5.7	0.4	90.8	-3.2					
44	100	0	55	-3	37	-4	6.1	0.1	5.4	0.12	90.4	-3.6					
45	100	0	54	-4	37	-4	6.2	0.2	4.9	-0.42							
46	100	0	51	-7	33	-8	5.6	-0.4	5.4	0.13							
47	100	0	57	-1	41	0	6.6	0.6	5.1	-0.19							
48	100	0	59	1	42	1	6.6	0.6	5.2	-0.06							
49	100	0	56	-2	39	-2	6.2	0.2	5.1	-0.16							
50	100	0	54	-4	40	-1	6.3	0.3	5.3	0.01							
51	100	0	57	-1	40	-1	6.5	0.5	5.4	0.14							
52	100	0	55	-3	39	-2	5.7	-0.3	5.0	-0.34							
53	100	0	53	-5	38	-3	5.1	-0.9	5.2	-0.09							
54									5.4	0.12							
55									5.4	0.1							
56									5.2	-0.12							
57									5.3	-0.02							
58									5.1	-0.16							
59									5.5	0.18							
60									5.4	0.08							
61									5.3	-0.02							
62									5.3	0							
63									5.3	0.03							
64									5.3	-0.01							
65									5.2	-0.06							

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
66									5.0	-0.3							
67									5.4	0.05							
68									5.2	-0.09							
69									5.2	-0.14							
70									5.3	-0.03							
71									5.5	0.21							
72									5.5	0.16							
73									5.4	0.1							
74									5.5	0.16							
75									5.5	0.23							
76									5.6	0.25							
77									5.3	0.04							
78									5.3	0.03							
79									5.3	-0.01							
80									5.2	-0.06							
81									5.5	0.23							
82									5.2	-0.07							
83									5.1	-0.25							
84									5.4	0.14							
85									5.3	0.02							
86									5.7	0.36							
87									5.3	0							
88									5.4	0.07							
89									5.2	-0.11							
90									5.4	0.12							
91									5.4	0.09							
92									5.4	0.05							
93									5.4	0.09							
94									5.1	-0.18							
95									5.2	-0.11							
96									5.6	0.25							
97									5.5	0.16							
98									5.4	0.13							
99									5.4	0.12							
100									5.1	-0.25							
101									5.3	-0.02							
102									5.1	-0.24							
103									5.6	0.25							
104									5.3	0.01							
105									5.2	-0.1							
Specification Limits	90-100		50-78		32-64		3-7		5.3		94		10507	80353T	1994	C 1603-013	Colorado
Design/JMF	100		58		41		6.0				92-96						
JMF Limits	100		53-63		36-46		4.0-8.0		5-5.6								
1	100	0	54	-4	37	-4	6.0	0.0	5.2	-0.1	91.9	-2.1					
2									5.6	0.3	89.5	-4.5					
3											90.3	-3.7					
4											89.7	-4.3					
5											92.1	-1.9					
6											90.9	-3.1					
7											91.6	-2.4					
8											89.1	-4.9					
9											90.1	-3.9					
10											88.2	-5.8					
11											89.1	-4.9					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State	
12											88.3	-5.7						
13											88.2	-5.8						
14											89.8	-4.2						
15											91.4	-2.6						
16											88.3	-5.7						
17											88.4	-5.6						
18											88.9	-5.1						
19											91.4	-2.6						
20											91.2	-2.8						
21											88.6	-5.4						
Specification Limits	90-100		50-78		32-64		3-7							10507	80264	1994	C 1603-013	Colorado
Design/JMF	100		58		43		6.0		5.5		94							
JMF Limits	100		53-63		38-48		4.0-8.0		5.2-5.8		92-96							
1	100	0	58	0	44	1	6.4	0.4	5.5	0.0	93.6	-0.4						
2	100	0	60	2	44	1	6.2	0.2	5.2	-0.3	95.7	1.7						
3	100	0	58	0	44	1	7.7	1.7	5.3	-0.2	93.6	-0.4						
4	100	0	57	-1	42	-1	5.8	-0.2	5.5	0.0	94.9	0.9						
5	100	0	58	0	42	-1	4.1	-1.9	5.3	-0.3	94.2	0.2						
6	100	0	56	-2	41	-2	5.9	-0.1	5.8	0.3	93.5	-0.5						
7	100	0	58	0	43	0	6.9	0.9	5.5	0.0	94.5	0.5						
8	100	0	59	1	46	3	6.7	0.7	5.2	-0.3	94	0						
9	100	0	58	0	45	2	7.1	1.1	5.1	-0.4	92.9	-1.1						
10	100	0	58	0	43	0	5.9	-0.1	5.3	-0.2	92.9	-1.1						
11	100	0	58	0	44	1	7.1	1.1	5.3	-0.3	91.6	-2.4						
12	100	0	57	-1	43	0	7.9	1.9	5.4	-0.1	95.7	1.7						
13	100	0	54	-4	41	-2	6.4	0.4	5.2	-0.3	95	1						
14									5.3	-0.2	92.4	-1.6						
15									5.7	0.2	93.1	-0.9						
16									5.2	-0.3	92.4	-1.6						
17									5.6	0.1	93.1	-0.9						
18									5.6	0.1	94.5	0.5						
19									5.3	-0.2	92.4	-1.6						
20									5.4	-0.1	94.2	0.2						
21									5.2	-0.3	94.2	0.2						
22									5.4	-0.1	94.5	0.5						
23									5.2	-0.3	93.5	-0.5						
24									5.5	0.0	94.1	0.1						
25									5.2	-0.3	94.8	0.8						
26									5.2	-0.29	92.3	-1.7						
Specification Limits	90-100		50-78		32-64		3-7							10556	73800	1994	NH 5502-027	Colorado
Design/JMF	95		63		45		6.3		5.9		94							
JMF Limits	89-100		58-68		40-50		4.3-8.3		5.6-6.2		92-96							
1	96	2	58	-5	41	-4	5.8	-0.5	5.9	0.0	94.1	0.1						
2	94	-1	57	-6	44	-1	6.4	0.1	6.1	0.2	95.6	1.6						
3	98	4	62	-1	45	0	7.2	0.9	5.8	-0.1	93.4	-0.6						
4	96	2	62	-1	43	-2	7.3	1.0	6.0	0.0	95.9	1.9						
5	95	1	64	1	47	2	7.9	1.6	6.1	0.1	92.2	-1.8						
6	97	3	64	1	48	3	8.3	2.0	6.2	0.3	93.2	-0.8						
7	94	-1	62	-1	45	0	6.8	0.5	5.9	0.0	92.7	-1.3						
8	96	2	62	-1	43	-2	6.2	-0.1	6.1	0.2	91.9	-2.1						
9	97	3	61	-2	46	1	7.3	1.0	6.1	0.2	92.2	-1.8						
10	98	4	63	0	47	2	6.7	0.4	5.9	0.0	93	-1						
11	96	2	64	1	47	2	7.1	0.8	6.1	0.2	92.9	-1.1						
12	97	3	61	-2	43	-2	6.9	0.6	6.1	0.1	93.2	-0.8						

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
13	92	-3	61	-2	42	-3	6.4	0.1	5.7	-0.2	91.2	-2.8					
14	94	-1	62	-1	43	-2	6.5	0.2	6.0	0.1	93.4	-0.6					
15	97	3	62	-1	43	-2	6.9	0.6	6.0	0.1	91.5	-2.5					
16	95	1	58	-5	43	-2	7.2	0.9	5.9	0.0	89.8	-4.2					
17	95	1	61	-2	44	-1	6.9	0.6	6.0	0.1	92.2	-1.8					
18	97	3	58	-5	43	-2	6.1	-0.2	6.0	0.1	91.7	-2.3					
19	97	3	60	-3	43	-2	6.4	0.1			92.3	-1.7					
20											92.3	-1.7					
21											92.2	-1.8					
22											94.2	0.2					
23											92.9	-1.1					
24											93.1	-0.9					
25											93.1	-0.9					
26											93.8	-0.2					
27											93.5	-0.5					
28											93.4	-0.6					
29											93.1	-0.9					
30											94.3	0.3					
31											92.4	-1.6					
32											92.4	-1.6					
33											93.3	-0.7					
34											92.3	-1.7					
35											93.2	-0.8					
36											93.1	-0.9					
37											93.5	-0.5					
38											92.3	-1.7					
39											93	-1					
40											92.8	-1.2					
41											93.7	-0.3					
42											94.4	0.4					
43											93.8	-0.2					
44											94.4	0.4					
45											92.3	-1.7					
46											91.9	-2.1					
47											93.5	-0.5					
48											92.2	-1.8					
49											94	0					
50											92.9	-1.1					
51											91.9	-2.1					
52											93.9	-0.1					
53											92.3	-1.7					
54											92.3	-1.7					
55											92.5	-1.5					
56											92.3	-1.7					
57											91.7	-2.3					
58											92.3	-1.7					
59											91.6	-2.4					
60											92.9	-1.1					
61											93	-1					
62											93	-1					
63											93.7	-0.3					
64											93.8	-0.2					
65											91.9	-2.1					
66											92.3	-1.7					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State	
67											94.1	0.1						
68											94.3	0.3						
69											93.1	-0.9						
70											94.6	0.6						
71											93.3	-0.7						
72											93.5	-0.5						
73											92.7	-1.3						
74											94	0						
75											92.3	-1.7						
76											94.5	0.5						
77											93.5	-0.5						
78											94.2	0.2						
79											93.1	-0.9						
80											92.6	-1.4						
81											94.9	0.9						
82											94.8	0.8						
Specification Limits	90-100		50-78		32-64		3-7							10556	73797	1994	NH 5502-027	Colorado
Design/JMF	96		50		35		7.0		6.1		94							
JMF Limits	91-100		45-55		30-40		5-9		5.8-6.4		92-96							
1	93	-3	46	-4	31	-4	6.9	-0.1	5.7	-0.4	92.5	-1.5						
2	93	-3	50	0	34	-1	7.4	0.4	5.8	-0.3	93.3	-0.7						
3	95	-1	49	-1	33	-2	7.1	0.1	6.4	0.3	92.4	-1.6						
4	95	-1	53	3	35	0	7.6	0.6	6.4	0.3	92.7	-1.3						
5	94	-2	50	0	34	-1	8.1	1.1	6.4	0.3	93	-1						
6	96	1	54	4	36	1	7.6	0.6	6.0	-0.1	93.1	-0.9						
7	93	-3	46	-4	32	-3	7.4	0.4	6.2	0.1	91.4	-2.6						
8									5.7	-0.4	94.7	0.7						
9									6.2	0.1	94	0						
10									6.2	0.1	93.7	-0.3						
11									6.0	-0.1	94.4	0.4						
12									6.2	0.1	92.6	-1.4						
13									6.3	0.2	91.5	-2.5						
14									6.5	0.36	95.5	1.5						
Specification Limits	90-100		50-78		32-64		3-7							10556	73800A	1994	NH 5502-027	Colorado
Design/JMF	96		50		35		7.0		5.8		94							
JMF Limits	91-100		45-55		30-40		5-9		5.5-6.1		92-96							
1	91	-5	45	-5	28	-7	6.5	-0.5	5.7	-0.1	93.1	-0.9						
2	95	-1	46	-4	30	-5	6.9	-0.1	5.8	0.0	90.9	-3.1						
3	94	-2	51	1	34	-1	7.1	0.1	5.6	-0.2	92.9	-1.1						
4	93	-3	53	3	35	0	6.6	-0.4	5.7	-0.1	92.8	-1.2						
5	95	-1	50	0	32	-3	6.8	-0.2	5.8	0.0	91.1	-2.9						
6	96	0	49	-1	33	-2	7.3	0.3	5.9	0.1	92.8	-1.2						
7									5.8	0.0	90.6	-3.4						
8									5.8	0.0	91.2	-2.8						
9											96	2						
10											95	1						
11											92.9	-1.1						
12											92.2	-1.8						
13											92.2	-1.8						
14											93.6	-0.4						
15											93.4	-0.6						
Specification Limits	90-100		50-78		32-64		3-7							10643	47524B	1994	ACMI 0251-137	Colorado
Design/JMF	100		51		35		2.4		5.3		94							
JMF Limits	100		46-56		30-40		2.1-6.1		5-5.6		92-96							

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
1	100	0	48	-3	36	1	5.9	3.6	5.3	0.0	93.6	-0.4					
2	100	0	49	-2	37	2	4.3	2.0	5.4	0.1	92.8	-1.2					
3	100	0	47	-4	33	-2	5.1	2.8	5.5	0.2	95.2	1.2					
4	100	0	48	-3	32	-3	4.9	2.6	5.5	0.2	96	2					
5	100	0	50	-1	35	0	5.0	2.7	5.3	0.0	94.3	0.3					
6	100	0	50	-1	33	-2	4.1	1.8	5.4	0.1	93.5	-0.5					
7	100	0	49	-2	34	-1	4.8	2.5	5.1	-0.2	94.2	0.2					
8	100	0	46	-5	31	-4	6.0	3.7	5.2	-0.1	92.1	-1.9					
9	100	0	48	-3	34	-1	4.4	2.1	5.2	-0.1	94.3	0.3					
10	100	0	48	-3	34	-1	5.3	3.0	5.1	-0.2	94	0					
11	100	0	49	-2	34	-1	5.0	2.7	5.3	0.0	92.1	-1.9					
12	100	0	47	-4	31	-4	4.9	2.6	5.0	-0.3	93.8	-0.2					
13	100	0	50	-1	36	1	5.9	3.6	5.2	-0.1	91.7	-2.3					
14	100	0	51	0	37	2	5.4	3.1	5.4	0.1	93.4	-0.6					
15	100	0	49	-2	38	3	4.9	2.6	5.4	0.1	94.2	0.2					
16	100	0	52	1	39	4	5.8	3.5	5.2	-0.1	90.9	-3.1					
17	100	0	52	1	36	1	5.5	3.2	5.5	0.2	92.7	-1.3					
18	100	0	52	1	36	1	5.8	3.5	5.4	0.0	92.4	-1.6					
19	100	0	51	0	38	3	5.6	3.3	5.4	0.1	94.5	0.5					
20											91.8	-2.2					
21											94.3	0.3					
22											92.8	-1.2					
23											92.1	-1.9					
24											96	2					
25											91.5	-2.5					
26											93.9	-0.1					
27											92.8	-1.2					
28											95.3	1.3					
29											93.3	-0.7					
30											92.9	-1.1					
31											93.5	-0.5					
32											96	2					
33											93.7	-0.3					
34											94.2	0.2					
35											94.2	0.2					
36											92.7	-1.3					
37											93.6	-0.4					
38											91.5	-2.5					
39											93.2	-0.8					
40											92.2	-1.8					
41											92.1	-1.9					
42											94.3	0.3					
43											94.2	0.2					
44											92.2	-1.8					
45											92.2	-1.8					
46											92.6	-1.4					
47											92.2	-1.8					
48											92.4	-1.6					
49											93.5	-0.5					
50											93.4	-0.6					
51											94	0					
52											92.1	-1.9					
53											93.8	-0.2					
54											94.2	0.2					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
55											92.7	-1.3					
56											92.9	-1.1					
57											94.3	0.3					
58											92.5	-1.5					
59											94.8	0.8					
60											93.1	-0.9					
61											91.9	-2.1					
62											92.2	-1.8					
63											92.1	-1.9					
64											92.2	-1.8					
65											92.6	-1.4					
66											94.2	0.2					
67											93.3	-0.7					
68											93.9	-0.1					
69											92	-2					
70											92.9	-1.1					
71											92.7	-1.3					
72											91.9	-2.1					
73											91.5	-2.5					
74											93.4	-0.6					
75											94.3	0.3					
76											94.9	0.9					
77											92.7	-1.3					
78											92.3	-1.7					
79											93.8	-0.2					
80											93.8	-0.2					
81											92.5	-1.5					
82											95.6	1.6					
83											92.3	-1.7					
84											93	-1					
85											92.2	-1.8					
86											92.6	-1.4					
87											92.9	-1.1					
Specification Limits	70-89		44-72		30-62		3-7						10671	84055	1994	C 0631-005	Colorado
Design/JMF	87		59		44		4.9		5.2		94						
JMF Limits	81-93		54-64		39-49		2.9-6.9		4.9-5.5		92-96						
1	90	3	62	3	44	0	5.6	0.7	5.6	0.4	93.8	-0.2					
2	92	5	64	5	46	2	6.6	1.7	5.3	0.1	94.5	0.5					
3	92	5	64	5	46	2	6.4	1.5	5.1	-0.1	92.3	-1.7					
4	89	2	59	0	40	-4	4.8	-0.1	4.9	-0.3	94.1	0.1					
5									5.4	0.2	93.8	-0.2					
6									5.1	-0.1	92.8	-1.2					
7									5.1	-0.1	93.6	-0.4					
8											92.9	-1.1					
Specification Limits	70-89		44-72		30-62		3-7						10671	84055A	1994	C 0631-005	Colorado
Design/JMF	87		59		44		4.9		5.2		94						
JMF Limits	81-93		54-64		39-49		2.9-6.9		4.9-5.5		92-96						
1	90	3	64	5	46	2	7.0	2.1	5.1	-0.1	94	0					
2	90	3	58	-1	41	-3	5.6	0.7	5.7	0.5	92.4	-1.6					
3	89	2	59	0	43	-1	5.5	0.6	5.7	0.5	91.8	-2.2					
4	86	-1	57	-2	42	-2	5.8	0.9	5.6	0.4	92	-2					
5	89	2	61	2	44	0	6.9	2.0	5.1	-0.1	92.9	-1.1					
6	90	3	61	2	45	1	6.1	1.2	5.6	0.4	92.7	-1.3					
7	85	-2	54	-5	39	-5	4.6	-0.3	5.7	0.5	93	-1					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
8	90	3	61	2	45	1	5.7	0.8	5.3	0.1	92.3	-1.7					
9	90	3	59	0	43	-1	5.9	1.0	5.3	0.1	92.1	-1.9					
10	86	-1	56	-3	39	-5	4.9	0.0	5.5	0.3	92.9	-1.1					
11	87	0	56	-3	40	-4	4.7	-0.2	5.6	0.4	92.7	-1.3					
12	85	-2	56	-3	40	-4	5.3	0.4	5.3	0.1	92.3	-1.7					
13	86	-1	56	-3	40	-4	5.1	0.2	5.3	0.1	92.1	-1.9					
14	88	1	57	-2	41	-3	5.3	0.4	5.0	-0.2	93.2	-0.8					
15	87	0	56	-3	41	-3	5.1	0.2	5.2	0.0	92.8	-1.2					
16	87	0	59	0	42	-2	5.2	0.3	5.5	0.3	92.9	-1.1					
17	90	3	58	-1	41	-3	5.7	0.8	5.3	0.1	93.7	-0.3					
18	84	-3	56	-3	40	-4	5.4	0.5	5.0	-0.2	92	-2					
19	90	3	58	-1	41	-3	5.2	0.3	5.5	0.3	93.5	-0.5					
20	91	4	60	1	44	0	5.7	0.8	5.2	0.0	92.8	-1.2					
21	90	3	61	2	44	0	5.8	0.9	5.2	0.0	93.3	-0.7					
22	91	4	62	3	47	3	6.3	1.4	5.2	0.0	92.5	-1.5					
23	86	-1	58	-1	44	0	5.9	1.0	5.3	0.1	93.2	-0.8					
24	86	-1	59	0	44	0	6.2	1.3	5.3	0.0	92.2	-1.8					
25	85	-2	57	-2	42	-2	5.4	0.5	5.3	0.1	92.8	-1.2					
26	87	0	54	-5	39	-5	6.9	2.0	5.3	0.1	95.6	1.6					
27	85	-2	57	-2	42	-2	6.0	1.1	5.0	-0.3	92.2	-1.8					
28	87	0	59	0	44	0	5.7	0.8	5.3	0.1	92.5	-1.5					
29	84	-3	55	-4	40	-4	4.9	0.0	5.1	-0.1	92.7	-1.3					
30	89	2	58	-1	43	-1	5.6	0.7	5.1	-0.1	94	0					
31	88	1	59	0	43	-1	6.0	1.1	5.2	0.0	92.6	-1.4					
32	87	0	58	-1	42	-2	5.4	0.5	5.2	0.0	93.5	-0.5					
33	86	-1	56	-3	40	-4	5.0	0.1	5.2	0.0	94.8	0.8					
34	86	-1	57	-2	41	-3	4.7	-0.2	5.1	-0.1	92.8	-1.2					
35	86	-1	57	-2	41	-3	5.4	0.5	5.1	-0.1	93	-1					
36	87	0	55	-4	42	-2	5.3	0.4	5.4	0.2	94	0					
37	88	1	55	-4	40	-4	5.2	0.3	5.3	0.1	92.9	-1.1					
38	89	2	59	0	42	-2	5.5	0.6	5.3	0.1	94.3	0.3					
39	85	-2	55	-4	39	-5	5.7	0.8	5.2	0.0	93.4	-0.6					
40	87	0	57	-2	42	-2	6.0	1.1	5.1	-0.1	95.4	1.4					
41	85	-2	56	-3	40	-4	5.5	0.6	5.1	-0.1	93.8	-0.2					
42	88	1	56	-3	40	-4	5.2	0.3	5.3	0.1	93.2	-0.8					
43	87	0	55	-4	43	-1	5.3	0.4	5.0	-0.2	92.7	-1.3					
44	87	0	52	-7	37	-7	5.0	0.1	5.2	0.0	94.2	0.2					
45	86	-1	56	-3	41	-3	5.6	0.7	5.2	0.0	92.8	-1.2					
46											93.7	-0.3					
47											93.2	-0.8					
48											95.2	1.2					
49											94.4	0.4					
50											94	0					
51											92	-2					
52											92.7	-1.3					
53											92.1	-1.9					
54											93.9	-0.1					
55											92.1	-1.9					
56											93.7	-0.3					
57											93.4	-0.6					
58											94.9	0.9					
59											93.7	-0.3					
60											93.2	-0.8					
61											91.4	-2.6					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
62											94.4	0.4					
63											93	-1					
64											92.1	-1.9					
65											92.7	-1.3					
66											93.8	-0.2					
67											93.5	-0.5					
68											94.8	0.8					
69											94.4	0.4					
70											93.9	-0.1					
71											92.8	-1.2					
72											93.3	-0.7					
73											94.8	0.8					
74											92.2	-1.8					
75											92.5	-1.5					
76											91.8	-2.2					
77											94.4	0.4					
78											91.8	-2.2					
79											92.4	-1.6					
80											94.2	0.2					
81											92.6	-1.4					
82											92.1	-1.9					
83											92	-2					
84											92.9	-1.1					
85											94	0					
86											92.4	-1.6					
87											94.7	0.7					
88											94.2	0.2					
89											92.1	-1.9					
90											94.4	0.4					
91											92	-2					
Specification Limits Design/JMF JMF Limits	70-89 76 70-82		44-72 43 38-48		30-62 33 27-37		3-7 6.2 4.2-8.2		5.1 4.7-5.5		94 92-96		91433	64213	1994	H-AQCM-CX-CC 0	Colorado
1	76	0	43	0	31	-2	5.8	-0.4	5.4	0.3	96.5	2.5					
2	75	-1	43	0	33	1	5.8	-0.4	5.2	0.1	95.6	1.6					
3	81	5	47	4	34	2	4.5	-1.7	5.2	0.1	96.7	2.7					
4	82	6	43	0	36	4	3.3	-2.9	4.9	-0.2	96.3	2.3					
5	77	1	45	2	32	-1	4.0	-2.2	5.2	0.1	95.9	1.9					
6									5.0	-0.1	93.2	-0.8					
7									5.1	0.0	95.6	1.6					
8									4.9	-0.2	94.6	0.6					
9									5.1	-0.01	93.4	-0.6					
10									4.9	-0.17							
Specification Limits Design/JMF JMF Limits	70-89 85 79-91		44-72 61 56-66		30-62 47 42-52		3-7 5.1 3.1-7.1		5.3 4.9-5.7		94 92-96		91433	64203	1994	H-AQCM-CX-CC 0	Colorado
1	87	2	58	-3	47	0	5.7	0.6	5.4	0.1	95.2	1.2					
2	88	3	60	-1	48	1	6.2	1.1	5.4	0.1	94.5	0.5					
3	87	2	60	-1	50	3	6.1	1.0	5.4	0.1	94.2	0.2					
4	83	-2	56	-5	45	-2	4.9	-0.2	5.4	0.1	94.2	0.2					
5	84	-1	59	-2	46	-1	6.7	1.6	5.3	0.0	93.2	-0.8					
6	87	2	60	-1	48	1	4.6	-0.5	5.7	0.4	95.3	1.3					
7	84	-1	58	-3	47	0	4.5	-0.6	5.3	0.0	94.6	0.6					
8	89	4	65	4	51	4	5.0	-0.1	5.7	0.4	94.3	0.3					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
9	85	0	57	-4	45	-2	4.8	-0.3	5.3	0.0	95.9	1.9					
10	86	1	60	-1	47	0	4.5	-0.6	5.5	0.2	93.8	-0.2					
11									5.2	-0.1	93.7	-0.3					
12									5.2	-0.1	94.9	0.9					
13									5.2	-0.1	94.6	0.6					
14									5.4	0.06	94.5	0.5					
Specification Limits	70-89		44-72		30-62		3-7						91457	67840	1994	H-AQCM-CX-CC 0	Colorado
Design/JMF	86		65		45		5.7		5.7		94						
JMF Limits	80-92		60-70		40-50		3.7-7.7		5.4-6		92-96						
1	88	2	64	-1	50	5	6.2	0.5	5.2	-0.5	93.4	-0.6					
2	89	3	59	-6	39	-6	5.4	-0.3	5.2	-0.5	95.2	1.2					
3	86	0	60	-5	45	0	7.3	1.6	5.8	0.1	89.7	-4.3					
4	88	2	63	-2	48	3	7.4	1.7	5.0	-0.7	93	-1					
5	87	1	65	0	46	1	6.3	0.6	5.6	-0.2	94.8	0.8					
6									5.5	-0.2	94.1	0.1					
7									5.1	-0.6	91.3	-2.7					
8									5.5	-0.2	92.2	-1.8					
9									5.5	-0.21	91.5	-2.5					
10									5.4	-0.29							
Specification Limits	90-100		50-78		32-64		3-7						93120	79880R	1994	NH(CX) 040-2(34)	Colorado
Design/JMF	100		56		36		6.2		5.5		94						
JMF Limits	100		51-61		31-41		4.2-8.2		5.2-5.8		92-96						
1	100	0	54	-2	37	1	5.4	-0.8	5.6	0.0	90.4	-3.6					
2	100	0	59	3	41	5	5.5	-0.7	5.5	0.0	92.4	-1.6					
3	100	0	55	-1	37	1	5.3	-0.9	5.5	0.0	91.3	-2.7					
4	100	0	56	0	38	2	5.5	-0.7	5.7	0.2	92.1	-1.9					
5	100	0	57	1	38	2	5.0	-1.2	5.6	0.1	91.6	-2.4					
6	100	0	59	3	40	4	4.8	-1.4	5.6	0.1	91.9	-2.1					
7	100	0	55	-1	37	1	5.4	-0.8	5.5	0.0	95	1					
8	100	0	58	2	39	3	4.0	-2.2	5.3	-0.2	91.7	-2.3					
9									5.5	0.0	93.1	-0.9					
10											93.1	-0.9					
11											92.4	-1.6					
12											93.7	-0.3					
13											92.1	-1.9					
14											92.9	-1.1					
15											93.8	-0.2					
16											92	-2					
17											92.3	-1.7					
18											92.6	-1.4					
19											92.6	-1.4					
20											92.2	-1.8					
21											92.1	-1.9					
22											92.2	-1.8					
23											92.4	-1.6					
Specification Limits	90-100		50-78		32-64		3-7						93120	79880	1994	NH(CX) 040-2(34)	Colorado
Design/JMF	100		56		36		6.2		5.3		94						
JMF Limits	100		51-61		31-41		4.2-8.2		5-5.6		92-96						
1	100	0	58	2	40	4	5.7	-0.5	5.0	-0.3	92.5	-1.5					
2	100	0	57	1	39	3	5.8	-0.4	5.2	-0.1	92.5	-1.5					
3	100	0	55	-1	38	2	5.8	-0.4	5.4	0.0	90.8	-3.2					
4	100	0	56	0	38	2	5.7	-0.5	5.2	-0.1	92.7	-1.3					
5	100	0	56	0	38	2	5.1	-1.1	5.1	-0.2	93.5	-0.5					
6	100	0	55	-1	38	2	5.8	-0.4	5.0	-0.4	92	-2					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
7	100	0	59	3	41	5	5.7	-0.5	4.9	-0.4	92.1	-1.9					
8	100	0	57	1	39	3	5.8	-0.4	5.2	-0.1	93	-1					
9	100	0	57	1	40	4	5.9	-0.3	5.2	-0.1	92.5	-1.5					
10									5.1	-0.2	94.2	0.2					
11									5.2	-0.1	92.8	-1.2					
12									5.1	-0.2	92.9	-1.1					
13									5.5	0.2	93.9	-0.1					
14									5.3	0.0	92.9	-1.1					
15									5.2	-0.1	92	-2					
16									5.4	0.1	92.8	-1.2					
17									5.4	0.1	93.2	-0.8					
18											93.8	-0.2					
19											95.5	1.5					
20											92.3	-1.7					
21											92.5	-1.5					
22											92.4	-1.6					
23											92.1	-1.9					
24											93.1	-0.9					
25											94	0					
26											92.9	-1.1					
27											93.3	-0.7					
28											94.7	0.7					
29											92.5	-1.5					
30											93.1	-0.9					
Specification Limits Design/JMF JMF Limits	70-89 91 85-97		44-72 62 57-67		30-62 44 39-49		3-7 5.9 3.9-7.9		5.2 4.9-5.5		94 92-96		92043	68243	1994	BRF 0385-1(004)	Colorado
1	92	1	68	6	50	6	7.8	1.9	5.3	0.0	92.2	-1.8					
2	88	-3	60	-2	44	0	6.4	0.5	5.4	0.2	92	-2					
3	90	-1	62	0	43	-1	6.1	0.2	5.1	-0.1	92.2	-1.8					
4	91	0	66	4	49	5	7.0	1.1	5.1	-0.1	92.5	-1.5					
5	93	2	66	4	47	3	6.8	0.9	5.0	-0.2	92.2	-1.8					
6	89	-2	61	-1	42	-2	5.5	-0.4	5.2	0.0	92.4	-1.6					
7	90	-1	62	0	43	-1	6.2	0.3	5.4	0.2	92.3	-1.7					
8											92.7	-1.3					
9											93.6	-0.4					
10											92.5	-1.5					
11											92.8	-1.2					
12											93.7	-0.3					
13											93.6	-0.4					
14											93.6	-0.4					
Specification Limits Design/JMF JMF Limits	70-89 85 79-91		44-72 58 53-63		30-62 47 42-52		3-7 6.0 4.4-8.4		5.0 4.6-5.4		94 92-96		92914	642053	1994	IM 0704-160	Colorado
1	81	-4	56	-2	46	-1	6.1	0.1	5.0	0.0	95.3	1.3					
2	87	2	57	-1	47	0	5.8	-0.2	5.0	0.0	95.6	1.6					
3	85	0	55	-3	46	-1	5.6	-0.4	4.9	-0.1	93.3	-0.7					
4	90	5	58	0	48	1	6.5	0.5	4.8	-0.2	92.8	-1.2					
5									4.9	-0.1	93.2	-0.8					
6									4.9	-0.2	93.9	-0.1					
7											95.4	1.4					
8											93.3	-0.7					
9											93.9	-0.1					
Specification Limits	70-89		44-72		30-62		3-7						92313	642051	1994	BR 2854-055	Colorado

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
Design/JMF	85		58		47		6.4		5.0		94						
JMF Limits	79-91		53-63		42-52		4.4-8.4		4.6-5.4		92-96						
1	89	4	57	-1	45	-2	5.4	-1.0	4.9	-0.1	93.3	-0.7					
2	86	1	56	-2	45	-2	4.6	-1.8	4.7	-0.3	94.5	0.5					
3	85	0	60	2	49	2	6.6	0.2	5.0	0.0	93.2	-0.8					
4	91	6	61	3	47	0	4.8	-1.6	5.1	0.0	93.2	-0.8					
5	89	4	58	0	45	-2	5.8	-0.6	5.1	0.0	92.4	-1.6					
6	86	1	60	2	48	1	6.5	0.1	4.8	-0.2	93.6	-0.4					
7	90	5	62	4	48	1	6.7	0.3	5.1	0.1	92.1	-1.9					
8	92	7	62	4	47	0	6.4	0.0	5.0	0.0	93.5	-0.5					
9	91	6	64	6	52	5	7.3	0.9	4.9	-0.1	92.2	-1.8					
10	88	3	60	2	49	2	6.5	0.1	5.2	0.2	93.5	-0.5					
11	90	5	61	3	47	0	6.4	0.0	5.0	0.0	92.4	-1.6					
12	90	5	58	0	45	-2	6.0	-0.4			92.5	-1.5					
13	88	3	62	4	49	2	4.8	-1.6			92.3	-1.7					
14	87	2	58	0	47	0	6.0	-0.4			92.8	-1.2					
15	87	2	57	-1	46	-1	6.0	-0.4			93.3	-0.7					
16	88	3	53	-5	46	-1	6.2	-0.2			92.7	-1.3					
17											92	-2					
18											93.4	-0.6					
19											93.1	-0.9					
20											92.5	-1.5					
21											93.7	-0.3					
22											94.3	0.3					
23											92.3	-1.7					
24											93.6	-0.4					
25											94.8	0.8					
26											92.7	-1.3					
27											93.1	-0.9					
28											95.1	1.1					
29											95.3	1.3					
30											95.4	1.4					
31											95.4	1.4					
32											94.4	0.4					
33											94.8	0.8					
34											93.8	-0.2					
35											93.8	-0.2					
36											93.6	-0.4					
Specification Limits	100		74-89		50-78		12-38		3-7		94		10491A	75271	1994		Colorado
Design/JMF	100		62		48		6.0		5.7		94						
JMF Limits	100		57-67		43-53		4-8		5.4-6.0		92-96						
1	100	0	68	6	49	1	7.1	1.1	5.3	-0.4	94.2	0.2					
2	100	0	65	3	46	-2	6.7	0.7	5.3	-0.4	95.6	1.6					
3	100	0	66	4	46	-2	6.5	0.5	5.6	-0.1	94.2	0.2					
4	100	0	64	2	45	-3	6.4	0.4	5.5	-0.2	93.6	-0.4					
5	100	0	66	4	47	-1	6.5	0.5	5.3	-0.4	92.5	-1.5					
6									5.5	-0.2	92.2	-1.8					
7									5.6	-0.1	92.7	-1.3					
8									5.4	-0.3	95.2	1.2					
9									5.5	-0.2	94.1	0.1					
Specification Limits	100		74-89		50-78		12-38		3-7		94		10491	75720	1994	MC R200-009	Colorado
Design/JMF	100		62		48		6.0		5.7		94						
JMF Limits	100		57-67		43-53		4-8		5.4-6		92-96						
1	100	0	64	2	50	2	7.2	1.2	6.3	0.6	94.3	0.3					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
2	100	0	62	0	48	0	6.9	0.9	5.5	-0.2	94.1	0.1					
3	100	0	61	-1	47	-1	4.2	-1.8	5.5	-0.2	96	2					
4	100	0	62	0	51	3	5.1	-0.9	5.4	-0.3	94.1	0.1					
5	100	0	63	1	52	4	4.6	-1.4	5.3	-0.4	93.9	-0.1					
6	100	0	66	4	53	5	4.5	-1.5	5.5	-0.2	93.6	-0.4					
7	100	0	57	-5	45	-3	5.5	-0.5	6.3	0.6	93.5	-0.5					
8	100	0	64	2	52	4	4.8	-1.2	5.5	-0.2	93.4	-0.6					
9	100	0	69	7	55	7	8.0	2.0	5.5	-0.2	93.5	-0.5					
10	100	0	63	1	48	0	4.3	-1.7	5.4	-0.3	93.2	-0.8					
11	100	0	63	1	49	1	7.6	1.6	5.4	-0.3	95.3	1.3					
12									5.6	-0.2	92.7	-1.3					
13									5.5	-0.2	93.4	-0.6					
14									5.4	-0.3	94.1	0.1					
15									5.5	-0.2	89.5	-4.5					
16									5.6	-0.1	94.7	0.7					
17									5.4	-0.3	92.8	-1.2					
18											92.5	-1.5					
19											93.5	-0.5					
20											92	-2					
21											93.5	-0.5					
22											92.3	-1.7					
23											93.7	-0.3					
24											91.3	-2.7					
25											92	-2					
26											92.8	-1.2					
27											93.4	-0.6					
28											92.9	-1.1					
29											93.7	-0.3					
30											94.3	0.3					
31											92.2	-1.8					
32											92.7	-1.3					
33											92.4	-1.6					
34											92.2	-1.8					
35											92.1	-1.9					
36											92.5	-1.5					
37											92.9	-1.1					
38											92.5	-1.5					
39											92.1	-1.9					
40											93.4	-0.6					
41											94.3	0.3					
42											92.3	-1.7					
43											94	0					
44											92.2	-1.8					
Specification Limits	100		74-89		50-78		12-38		3-7				10491	72664	1994	MC R200-009	Colorado
Design/JMF	100		62		48		6.0		5.9		94						
JMF Limits	100		57-67		43-53		4-8		5.6-6.2		92-96						
1	100	0	66	4	53	5	6.1	0.1	5.8	-0.1	96	2					
2	100	0	66	4	52	4	5.0	-1.0	5.4	-0.5	95.4	1.4					
3	100	0	65	3	51	3	7.3	1.3	5.6	-0.3	94.6	0.6					
4	100	0	64	2	50	2	5.8	-0.2	5.7	-0.2	95	1					
5	100	0	64	2	51	3	6.4	0.4	5.5	-0.5	95.8	1.8					
6	100	0	60	-2	48	0	6.5	0.5	5.5	-0.4	92.2	-1.8					
7	100	0	61	-1	47	-1	7.2	1.2	5.7	-0.2	93	-1					
8	100	0	66	4	53	5	6.3	0.3	5.4	-0.5	92.8	-1.2					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State	
9									5.4	-0.5	93.1	-0.9						
10									5.5	-0.4	93.3	-0.7						
11									5.4	-0.5	93.6	-0.4						
12									5.5	-0.4	93.2	-0.8						
13									5.4	-0.5	93.7	-0.3						
14									5.6	-0.3	93.1	-0.9						
15									5.4	-0.5	96.1	2.1						
16									5.8	-0.1	93.8	-0.2						
17									5.7	-0.3	93.4	-0.6						
18									5.7	-0.2	93.9	-0.1						
19									5.8	-0.1	93.5	-0.5						
20									6.0	0.0	93	-1						
21									5.9	0.0	94.1	0.1						
22											92.8	-1.2						
23											93.3	-0.7						
24											93.4	-0.6						
Specification Limits Design/JMF	70-89		44-72		30-62		3-7							10153	64212	1994	C 0881-006	Colorado
JMF Limits	86		62		53		5.8		5.2		94							
	80-92		57-67		48-58		3.8-7.8		4.9-5.5		92-96							
1	88	2	61	-1	49	-4	5.0	-0.8	5.4	0.2	92.6	-1.4						
2	87	1	61	-1	51	-2	5.5	-0.3	5.3	0.1	92.4	-1.6						
3	89	3	66	4	53	0	5.2	-0.6	5.3	0.1	93.2	-0.8						
4	88	2	60	-2	48	-5	5.2	-0.6	5.3	0.1	92.8	-1.2						
5	87	1	61	-1	48	-5	4.6	-1.2	5.5	0.3	93.5	-0.5						
6	88	2	65	3	54	1	5.8	0.0	5.4	0.1	93.2	-0.8						
7	87	1	64	2	52	-1	6.2	0.4	5.4	0.2	93	-1						
8	86	0	61	-1	50	-3	5.3	-0.5	5.2	0.0	91.6	-2.4						
9	86	0	64	2	52	-1	5.6	-0.2	5.2	0.0	92.6	-1.4						
10	88	2	62	0	50	-3	5.4	-0.4			92.4	-1.6						
11											92.2	-1.8						
12											92.7	-1.3						
13											94.5	0.5						
14											92.6	-1.4						
15											93.5	-0.5						
16											92.3	-1.7						
17											93.2	-0.8						
18											92.5	-1.5						
19											93.2	-0.8						
20											92.7	-1.3						
21											93.3	-0.7						
22											93.7	-0.3						
Specification Limits Design/JMF	70-89		44-72		30-62		3-7							10125	77004	1994	IM 0253-116	Colorado
JMF Limits	85		52		43		6.3		5.0		94							
	79-91		47-57		38-48		4.3-8.3		4.7-5.3		92-96							
1	91	6	61	9	49	6	6.9	0.6	5.5	0.5	97.8	3.8						
2	82	-3	49	-3	40	-3	8.1	1.8	5.3	0.3	94.3	0.3						
3	89	4	55	3	38	-5	6.6	0.3	4.6	-0.4	92	-2						
4	87	2	57	5	46	3	6.1	-0.2	4.4	-0.6	90.2	-3.8						
5	85	0	57	5	45	2	6.8	0.5	4.8	-0.2	91.5	-2.5						
6	84	-1	59	7	47	4	5.9	-0.4	4.4	-0.6	93.3	-0.7						
7	79	-6	52	0	41	-2	6.4	0.1	4.8	-0.2	95.2	1.2						
8	86	1	53	1	41	-2	6.8	0.5	4.7	-0.3	91.4	-2.6						
9	84	-1	58	6	50	7	7.6	1.3	4.5	-0.5	95.9	1.9						

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
10	85	0	57	5	44	1	5.9	-0.4	5.0	0.0	92.4	-1.6					
11	82	-3	54	2	45	2	5.4	-0.9	4.9	-0.1	91.8	-2.2					
12	85	0	62	10	52	9	6.5	0.2	5.1	0.0	93.3	-0.7					
13	86	1	56	4	46	3	4.5	-1.8	4.8	-0.2	93	-1					
14	84	-1	59	7	49	6	7.3	1.0	4.9	-0.1	93	-1					
15	84	-1	55	3	42	-1	5.3	-1.0	5.0	0.0	94.5	0.5					
16	84	-1	59	7	48	5	5.5	-0.8	5.0	0.0	92.5	-1.5					
17	82	-3	57	5	46	3	5.2	-1.1	4.8	-0.2	92.7	-1.3					
18	88	3	61	9	47	4	5.3	-1.0	5.3	0.3	93.9	-0.1					
19	83	-2	60	8	48	5	6.2	-0.1	5.0	0.0	92.6	-1.4					
20	90	5	64	12	50	7	6.9	0.6	5.0	0.0	92.4	-1.6					
21	84	-1	58	6	48	5	6.5	0.2	5.1	0.1	95.1	1.1					
22	83	-2	56	4	45	2	5.4	-0.9	4.7	-0.4	90.7	-3.3					
23	89	4	59	7	47	4	5.9	-0.4	4.5	-0.5	94.7	0.7					
24	85	0	57	5	48	5	6.0	-0.3	5.1	0.1	92.4	-1.6					
25	90	5	64	12	53	10	7.3	1.0	5.1	0.1	92.8	-1.2					
26	89	4	59	7	48	5	6.3	0.0	4.9	-0.1	94.7	0.7					
27	86	1	64	12	49	6	7.5	1.2	4.8	-0.2	91.7	-2.3					
28	86	1	62	10	48	5	7.3	1.0	4.9	-0.1	92.1	-1.9					
29	79	-6	56	4	42	-1	5.6	-0.7			91.8	-2.2					
30	87	2	66	14	51	8	7.3	1.0			94.14	0.14					
31											94.1	0.1					
32											91.4	-2.6					
33											93.4	-0.6					
34											93.9	-0.1					
35											93.2	-0.8					
36											92.3	-1.7					
37											92.8	-1.2					
38											94.3	0.3					
39											92.6	-1.4					
40											92.8	-1.2					
41											93.6	-0.4					
42											92.6	-1.4					
43											92.1	-1.9					
44											93.4	-0.6					
45											90.7	-3.3					
46											92.3	-1.7					
47											93.6	-0.4					
48											91.8	-2.2					
49											95.7	1.7					
50											92.1	-1.9					
51											94.1	0.1					
52											92.8	-1.2					
53											94.1	0.1					
54											92.2	-1.8					
55											91.2	-2.8					
56											93	-1					
57											92.8	-1.2					
58											92.6	-1.4					
59											93.1	-0.9					
60											93.4	-0.6					
Specification Limits	70-89		44-72		30-62		3-7										
Design/JMF	86		59		48		6.5		4.9		94		10125	91594	1994	IM 0253-116	Colorado
JMF Limits	80-92		54-64		43-53		4.5-8.5		4.6-5.2		92-96						

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State	
1	82	-4	58	-1	44	-4	7.3	0.8	5.1	0.2	93.6	-0.4						
2	80	-6	52	-7	39	-9	6.5	0.0	5.1	0.2	93.8	-0.2						
3	82	-4	54	-5	40	-8	6.2	-0.3	5.1	0.2	93.1	-0.9						
4	77	-9	58	-1	45	-3	5.9	-0.6	4.7	-0.2	92.6	-1.4						
5									4.7	-0.3	93.2	-0.8						
6									4.1	-0.8	95.9	1.9						
7									4.6	-0.33	93.3	-0.7						
Specification Limits	70-89		44-72		30-62		3-7							10125	64223	1994	IM 0253-116	Colorado
Design/JMF	86		57		44		6.6		4.9		94							
JMF Limits	80-92		52-62		39-49		4.6-8.6		4.6-5.2		92-96							
1	89	3	60	3	46	2	7.5	0.9	5.2	0.3	94.7	0.7						
2	85	-1	56	-1	43	-1	6.7	0.1	5.1	0.2	93	-1						
3	86	0	60	3	46	2	7.5	0.9	5.2	0.3	95.2	1.2						
4									5.0	0.1	92	-2						
5									5.1	0.2	89	-5						
Specification Limits	90-100		50-78		32-64		3-7				94		10088	65731	1995	NH 0502-031	Colorado	
Design/JMF	96		52		35		6.5		5.6		94							
JMF Limits	92-100		47-57		30-40		4.5-8.5		5.3-5.9		92-96							
1	99	3	52	-1	37	2	7.2	0.7	5.6	0.0	93.4	-0.6						
2	99	3	52	0	38	3	7.9	1.4	5.3	-0.4	93.5	-0.5						
3									5.6	0.0	93.3	-0.7						
4									5.6	0.0	92.3	-1.7						
Specification Limits	90-100		50-78		32-64		3-7						10088	65731A	1995	NH 0502-031	Colorado	
Design/JMF	96		52		35		6.5		6.0		94							
JMF Limits	92-100		47-57		30-40		4.5-8.5		5.7-6.3		92-96							
1	97	1	49	-3	36	1	7.6	1.1	5.9	-0.1	90.8	-3.2						
2	97	1	51	-1	36	1	7.5	1.0	6.0	0.0	93.8	-0.2						
3	97	1	50	-3	36	1	7.3	0.8	6.6	0.6	90.7	-3.3						
4	97	1	48	-4	34	-2	6.8	0.3	6.1	0.1	93.3	-0.7						
5	97	1	49	-3	35	0	6.6	0.1	6.5	0.5	92	-2						
6	95	-1	48	-4	36	1	6.9	0.4	6.2	0.2	92	-2						
7	97	1	53	1	39	4	7.6	1.1	5.9	-0.1	93.7	-0.3						
8	99	3	54	2	38	3	7.1	0.6	6.3	0.3	92.9	-1.1						
9	99	3	49	-3	35	0	7.3	0.8	6.2	0.2	90.2	-3.8						
10	99	3	52	0	38	3	7.9	1.4	5.8	-0.2	93.9	-0.1						
11	99	3	48	-4	34	-1	7.3	0.8	5.9	-0.1	93.1	-0.9						
12	97	1	48	-4	34	-2	6.1	-0.4	6.1	0.0	94.5	0.5						
13	98	2	48	-4	32	-3	5.4	-1.1	5.9	-0.1	93.3	-0.7						
14									5.9	-0.1	93.2	-0.8						
15											93.3	-0.7						
16											93.7	-0.3						
17											92.6	-1.4						
18											92.1	-1.9						
19											92.8	-1.2						
20											95.4	1.4						
21											92.7	-1.3						
22											95.2	1.2						
23											93.7	-0.3						
24											93.6	-0.4						
25											94.2	0.2						
26											95.5	1.5						
27											92	-2						
28											93.2	-0.8						
Specification Limits	90-100		50-78		32-64		3-7						10088	65731B	1995	NH 0502-031	Colorado	

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
Design/JMF	96		52		35		6.5		6.1		94						
JMF Limits	92-100		47-57		30-40		4.5-8.5		5.8-6.4		92-96						
1	96	0	49	-3	36	1	7.4	0.9	6.5	0.4	92.8	-1.2					
2	96	0	48	-4	33	-2	6.1	-0.4	5.9	-0.2	92	-2					
3	98	2	54	2	38	3	6.8	0.3	6.1	0.0	90.8	-3.2					
4	96	0	49	-3	34	-1	6.3	-0.2	6.0	-0.1	92	-2					
5	97	1	51	-1	37	2	6.7	0.2	6.1	0.0	91.3	-2.7					
6	97	1	51	-1	36	1	7.0	0.5	6.1	0.0	92.3	-1.7					
7	98	2	52	0	38	3	7.6	1.1	5.9	-0.2	93.5	-0.5					
8	98	2	52	-1	37	2	6.9	0.4	6.1	0.0	92.1	-1.9					
9	97	1	52	0	38	3	7.4	0.9	5.9	-0.2	92.7	-1.3					
10	98	2	49	-3	35	0	7.1	0.6	5.8	-0.3	91.7	-2.3					
11									6.2	0.1	94.2	0.2					
12									6.5	0.4	89.8	-4.2					
13									6.5	0.4	89.8	-4.2					
14									6.2	0.1	91.5	-2.5					
15									5.8	-0.3	93	-1					
16									6.0	-0.1	93.4	-0.6					
17									5.9	-0.2	93	-1					
18									5.8	-0.3	94.3	0.3					
19									5.8	-0.3	92.6	-1.4					
20									6.0	-0.1	93.8	-0.2					
21											93	-1					
22											92.8	-1.2					
23											93	-1					
24											93.4	-0.6					
25											91.6	-2.4					
26											93.3	-0.7					
27											91.6	-2.4					
28											94.2	0.2					
29											93.4	-0.6					
30											91.5	-2.5					
31											92.4	-1.6					
32											93.7	-0.3					
33											93.2	-0.8					
34											92.5	-1.5					
35											92.3	-1.7					
36											91.5	-2.5					
37											93.8	-0.2					
Specification Limits													10105	64248	1995	STU C100-003	Colorado
Design/JMF	84		63		50		6.5		5.4		94						
JMF Limits	78-90		58-68		45-55		4.5-8.5		5-5.8		92-96						
1	83	-1	56	-7	43	-7	5.7	-0.8	5.6	0.2	94.5	0.5					
2	93	9	68	5	53	3	6.3	-0.2	5.6	0.2	94	0					
3	87	3	61	-2	46	-4	5.6	-0.9	5.5	0.0	92.2	-1.8					
4	89	5	65	2	51	1	6.1	-0.4	5.7	0.3	94.4	0.4					
5									6.2	0.8	95.2	1.2					
6									5.6	0.2	93.8	-0.2					
7									5.4	0.0	94.2	0.2					
8									5.5	0.1	91.2	-2.8					
9											94.2	0.2					
10											91.5	-2.5					
Specification Limits													10105	164248	1995	STU C100-003	Colorado
Design/JMF	84		63		50		6.5		5.2		94						

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
JMF Limits	78-90		58-68		45-55		4.5-8.5		4.8-5.6		92-96						
1	93	9	68	5	53	3	6.3	-0.2	4.7	-0.5	92.2	-1.8					
2	87	3	61	-2	46	-4	5.6	-0.9	5.0	-0.2	94.4	0.4					
3	89	5	65	2	51	1	6.1	-0.4	5.3	0.1	95.2	1.2					
4	87	3	61	-2	42	-8	5.6	-0.9	5.8	0.6	93.8	-0.2					
5	88	4	63	0	49	-1	6.3	-0.2	5.2	0.0	91.2	-2.8					
6									5.0	-0.2	94.2	0.2					
7									5.1	-0.1	91.5	-2.5					
8									4.9	-0.3	94.2	0.2					
9									5.1	-0.1	94.4	0.4					
10									5.2	0.0	94.1	0.1					
Specification Limits Design/JMF JMF Limits	95 89-100		54 49-59		39 34-44		6.9 4.9-8.9		5.1 4.8-5.4		94 92-96		10370	7659T	1995	PLH 139A-022	Colorado
1	97	3	51	-3	36	-3	6.3	-0.6	5.2	0.1	94.28	0.28					
2	95	1	53	-1	38	-1	6.6	-0.3	5.3	0.2	92.36	-1.64					
3	96	2	50	-4	37	-2	6.8	-0.1	5.2	0.1	94	0					
4	95	1	54	0	40	1	6.9	0.0	5.1	0.0	92.44	-1.56					
5	95	1	52	-2	39	0	7.2	0.3	5.1	0.0	93.67	-0.33					
6	93	-2	52	-2	39	0	7.1	0.2	5.2	0.1	93.59	-0.41					
7									5.1	0.0	93.95	-0.05					
8											93.75	-0.25					
9											94.08	0.08					
10											93.22	-0.78					
11											93.42	-0.58					
12											93.14	-0.86					
13											92.44	-1.56					
14											93.87	-0.13					
15											92.36	-1.64					
Specification Limits Design/JMF JMF Limits	95 89-100		54 49-59		39 34-44		6.9 4.9-8.9		5.0 4.7-5.3		94 92-96		10370	76591X	1995	PLH 139A-022	Colorado
1	96	2	58	4	41	2	7.6	0.7	5.4	0.4	94.1	0.1					
2	96	2	57	3	42	3	7.3	0.4	5.4	0.4	95.1	1.1					
3	96	2	53	-1	39	0	7.6	0.7	5.2	0.2	95	1					
4	97	3	56	2	42	3	7.6	0.7	5.6	0.6	92.3	-1.7					
5	96	2	55	1	41	2	7.3	0.4	5.0	0.0	91.5	-2.5					
6	95	1	52	-2	39	0	7.3	0.4	5.2	0.2	92.5	-1.5					
7	98	4	54	0	37	-2	7.1	0.2	5.1	0.1	92.8	-1.2					
8	97	3	58	4	43	4	7.5	0.6	4.9	-0.1	92.8	-1.2					
9									5.0	0.0	92.1	-1.9					
10									4.8	-0.2	92.4	-1.6					
11									5.2	0.2	93	-1					
12									5.2	0.2	92.8	-1.2					
13											93.49	-0.51					
14											92.9	-1.1					
15											93.6	-0.4					
16											92.6	-1.4					
17											92.96	-1.04					
18											92.6	-1.4					
19											93.25	-0.75					
20											95	1					
Specification Limits Design/JMF	95		50		37		7.0		5.5		94		10555		1995	C 0641-009	Colorado

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
JMF Limits	90-100		45-55		32-42		5-9		5.2-5.8		92-96						
1	96	1	49	-1	34	-3	6.9	-0.1	6.1	0.6	93.8	-0.2					
2	96	1	49	-1	37	0	7.3	0.3	6.2	0.7	95.6	1.6					
3	98	3	52	2	39	2	8.7	1.7	6.0	0.5	92.6	-1.4					
4									5.9	0.4	92.3	-1.7					
5									5.6	0.1	93.2	-0.8					
6									5.2	-0.3	94.5	0.5					
7									5.3	-0.2	93.2	-0.8					
Specification Limits Design/JMF	95		49		38		6.8		5.0		94		10555	79185A	1995	C 0641-009	Colorado
JMF Limits	90-100		44-54		33-43		4.8-8.8		4.7-5.3		92-96						
1	97	2	50	1	35	-3	6.2	-0.6	5.1	0.1	92	-2					
2	95	0	47	-2	35	-3	7.9	1.1	5.0	0.0	94.8	0.8					
3									5.0	0.0	93.4	-0.6					
Specification Limits Design/JMF	95		50		37		7.0		5.2		94		10555	79185B	1995	C 0641-009	Colorado
JMF Limits	90-100		45-55		32-42		5-9		4.9-5.5		92-96						
2	92	-3	50	0	37	0	7.1	0.1	4.9	-0.3	91.7	-2.3					
3	93	-2	49	-1	36	-1	7.1	0.1	5.2	0.0	89.8	-4.2					
4	94	-1	52	2	38	1	7.8	0.8	5.2	0.0	92.8	-1.2					
5	95	0	49	-1	35	-2	7.6	0.6	5.2	0.0	93.9	-0.1					
6	93	-2	47	-3	36	-1	6.9	-0.1	4.9	-0.3	94.8	0.8					
7	95	0	48	-2	36	-1	7.3	0.3	5.4	0.2	90.5	-3.5					
8	97	2	47	-3	34	-3	8.2	1.2	5.2	0.0	93.6	-0.4					
9	94	-1	47	-3	35	-2	7.5	0.5	5.1	-0.1	92.4	-1.6					
10	94	-1	47	-3	33	-4	6.7	-0.3	5.0	-0.3	95.5	1.5					
11	97	2	51	1	37	0	7.9	0.9	5.3	0.1	91.1	-2.9					
12	93	-2	47	-3	33	-4	5.3	-1.7	5.1	-0.1	94	0					
13	96	1	49	-1	36	-1	7.4	0.4	5.2	0.0	94.1	0.1					
14	96	1	49	-1	36	-1	7.3	0.3	5.2	0.0	92.7	-1.3					
15									5.0	-0.2	94	0					
16											92.6	-1.4					
17											92.2	-1.8					
18											92.2	-1.8					
19											92	-2					
20											92	-2					
21											95.2	1.2					
22											92.9	-1.1					
23											92.3	-1.7					
24											93	-1					
25											93.5	-0.5					
26											94.2	0.2					
27											93.1	-0.9					
28											94.5	0.5					
29											93.3	-0.7					
30											93.6	-0.4					
31											91.3	-2.7					
32											93.2	-0.8					
33											93.2	-0.8					
34											92.6	-1.4					
35											92.1	-1.9					
36											92.2	-1.8					
37											92.4	-1.6					
38											95.9	1.9					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
39											92	-2					
40											92.5	-1.5					
41											92.1	-1.9					
42											92.7	-1.3					
43											92	-2					
44											93.6	-0.4					
45											93.7	-0.3					
46											93.2	-0.8					
47											91.9	-2.1					
48											95.1	1.1					
49											92.4	-1.6					
50											92.6	-1.4					
51											91.9	-2.1					
52											93.39	-0.61					
53											94.71	0.71					
54											92.4	-1.6					
Specification Limits Design/JMF	88		60		46		6.0		5.0		94		90025		1995	IR(CX) 25-1(120)	Colorado
JMF Limits	82-94		55-65		41-51		4-8		4.7-5.3		92-96						
1	87	-1	60	0	49	3	5.2	-0.8	4.7	-0.3	94.5	0.5					
2	89	1	63	3	47	1	7.2	1.2	4.7	-0.3	94.3	0.3					
3	89	1	60	0	43	-3	6.3	0.3	4.8	-0.2	94.1	0.1					
4	88	0	57	-3	40	-6	5.7	-0.3	5.3	0.3	94.7	0.7					
5	86	-2	60	0	43	-3	5.7	-0.3	5.2	0.2	94.9	0.9					
6	93	5	63	3	44	-2	5.9	-0.1	5.0	0.0	95.2	1.2					
7	86	-2	58	-2	45	-1	5.8	-0.2	5.1	0.1	95.2	1.2					
8	87	-1	59	-1	45	-1	5.7	-0.3	5.0	0.0	94.3	0.3					
9									5.1	0.1	94.1	0.1					
10									5.0	0.0	94.8	0.8					
11											94.2	0.2					
12											92.8	-1.2					
13											92.9	-1.1					
14											93.1	-0.9					
15											95.6	1.6					
16											92.7	-1.3					
Specification Limits Design/JMF	70-89		44-72		30-62		3-7		6.1		94		10984	WCT	1995	C 1121-004	Colorado
JMF Limits	94		64		45		5.0		5.8-6.4		92-96						
1	98	4	65	1	48	3	7.4	2.4	6.2	0.1	93.3	-0.7					
2											93.2	-0.8					
Specification Limits Design/JMF	70-89		44-72		30-62		3-7		6.6		94		10984	WCT 2	1995	C 1121-004	Colorado
JMF Limits	94		64		45		6.0		6.3-6.9		92-96						
1	98	4	65	1	46	1			6.6	0.0	93.7	-0.3					
2	99	5	63	-1	44	-1			6.8	0.2	95.7	1.7					
3	98	4	62	-2	40	-5			6.8	0.2	92.5	-1.5					
4	97	3	66	2	47	2			6.7	0.1	93.6	-0.4					
5	99	5	66	2	47	2			6.7	0.1	93.3	-0.7					
6	97	3	61	-3	41	-4			6.9	0.3	92.7	-1.3					
7	98	4	66	2	47	2			6.8	0.2	94.4	0.4					
8	98	4	62	-2	43	-2			6.5	-0.1	92.3	-1.7					
9	98	4	67	3	47	2			6.9	0.3	90.3	-3.7					
10	97	3	64	0	43	-2			6.3	-0.3	93	-1					
11	98	4	64	0	43	-2			6.7	0.1	94.9	0.9					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
12	97	3	65	1	43	-2			7.0	0.4	95.2	1.2					
13									6.8	0.2	94.7	0.7					
14									6.4	-0.2	94.7	0.7					
15									6.9	0.3	94.1	0.1					
16									6.6	0.0	92.8	-1.2					
17									6.9	0.3	94.4	0.4					
18									6.7	0.1	93.9	-0.1					
19									6.7	0.1	94.6	0.6					
20									6.7	0.1	93.3	-0.7					
21									6.6	0.0	94.7	0.7					
22									6.7	0.1	92.1	-1.9					
23											93.5	-0.5					
24											96.9	2.9					
25											92.9	-1.1					
26											96.1	2.1					
27											93.4	-0.6					
28											93.9	-0.1					
29											95.2	1.2					
30											93.8	-0.2					
31											93.1	-0.9					
32											93.2	-0.8					
33											95.3	1.3					
34											93.2	-0.8					
35											92.2	-1.8					
36											95.4	1.4					
37											94.7	0.7					
38											94.8	0.8					
39											95.8	1.8					
40											93.2	-0.8					
41											95	1					
42											94.9	0.9					
43											96.3	2.3					
44											95	1					
45											94.1	0.1					
Specification Limits Design/JMF	70-89		44-72		30-62		3-7						10959	83651	1995	MC R100-014	Colorado
JMF Limits	89		55		39		5.6		5.1		94						
	83-95		50-60		34-44		3.6-7.6		4.8-5.4		92-96						
1	88	-1	49	-6	35	-4	4.5	-1.1	4.7	-0.4	94.2	0.2					
2	87	-2	51	-4	38	-1	5.2	-0.4	4.9	-0.2	92.6	-1.4					
3	90	1	49	-6	35	-4	4.8	-0.8	5.0	-0.1	94.9	0.9					
4									4.9	-0.2	92.1	-1.9					
5									4.9	-0.2	92.5	-1.5					
6									5.0	-0.1	91.5	-2.5					
7											92.4	-1.6					
8											93.5	-0.5					
9											93.3	-0.7					
10											92.8	-1.2					
11											91.9	-2.1					
12											92.8	-1.2					
Specification Limits Design/JMF	70-89		44-72		30-62		3-7						10959	83651B	1995	MC R100-014	Colorado
JMF Limits	89		52		39		6.0		5.1		94						
	83-95		47-57		34-44		3.6-7.6		4.8-5.4		92-96						
1	88	-1	49	-3	35	-4	5.0	-1.0	5.2	0.1	92.9	-1.1					
2	89	0	50	-2	36	-3	4.6	-1.4	5.0	-0.1	94.9	0.9					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
3	91	2	51	-1	38	-1	5.7	-0.3	5.1	0.0	92.7	-1.3					
4	85	-4	50	-2	36	-3	5.6	-0.4	5.1	0.0	93.1	-0.9					
5	88	-1	50	-2	35	-4	5.2	-0.8	5.3	0.2	93.5	-0.5					
6	89	0	48	-4	35	-4	4.9	-1.1	4.9	-0.2	94.4	0.4					
7	89	0	50	-2	35	-4	5.0	-1.0	5.2	0.1	92.4	-1.6					
8									5.1	0.0	93.6	-0.4					
9									5.1	0.0	93.1	-0.9					
10									5.2	0.1	93.1	-0.9					
11									4.9	-0.2	93.9	-0.1					
12									5.0	-0.1	95.1	1.1					
13									5.1	0.0	94.7	0.7					
14											94.7	0.7					
15											92.2	-1.8					
16											91.7	-2.3					
17											95.8	1.8					
18											93.1	-0.9					
19											93.2	-0.8					
20											93.1	-0.9					
21											92.1	-1.9					
22											95.9	1.9					
23											94.4	0.4					
24											92.6	-1.4					
25											93.6	-0.4					
Specification Limits	70-89		44-72		30-62		3-7						10958	87151	1995	STR 069A-017	Colorado
Design/JMF	87		53		32		7.0		4.9		94						
JMF Limits	81-93		48-58		27-37		5-9		4.6-5.2		92-96						
1	92	5	53	0	33	1	7.2	0.2	5.2	0.3	92	-2					
2	89	2	50	-3	31	-1	6.9	-0.1	4.2	-0.7	94	0					
3	89	2	52	-1	33	1	6.9	-0.1	5.1	0.2	92.8	-1.2					
4	89	2	54	1	34	2	6.6	-0.4	5.2	0.3	93.3	-0.7					
5	86	-1	56	3	39	7	7.5	0.5	5.2	0.3	93.6	-0.4					
6	86	-1	49	-4	31	-1	6.3	-0.7	4.7	-0.2	92.1	-1.9					
7	88	1	51	-2	32	0	7.2	0.2	5.0	0.1	93.3	-0.7					
8	88	1	49	-4	34	2	8.3	1.3	4.3	-0.6	94	0					
9	84	-3	52	-1	35	3	8.2	1.2	4.7	-0.2	93.2	-0.8					
10	91	4	54	1	37	5	8.8	1.8	5.3	0.4	93.2	-0.8					
11	86	-1	47	-6	30	-2	7.5	0.5	4.9	0.0	92.2	-1.8					
12	88	1	52	-1	34	2	8.2	1.2	4.9	0.0	93.1	-0.9					
13	90	3	50	-3	32	0	6.8	-0.2	5.1	0.2	94.5	0.5					
14	91	4	58	5	39	7	8.6	1.6	5.2	0.3	92.5	-1.5					
15	89	2	56	3	38	6	8.9	1.9	5.0	0.1	92.6	-1.4					
16	90	3	55	2	37	5	8.8	1.8	4.8	-0.1	93.3	-0.7					
17									4.9	0.0	94.3	0.3					
18									5.0	0.1	93.7	-0.3					
19									4.7	-0.2	93.4	-0.6					
20									4.3	-0.6	92.7	-1.3					
21									4.9	0.0	93.1	-0.9					
22									5.1	0.2	93.7	-0.3					
23									4.9	0.0	94.6	0.6					
24									4.9	0.0	92.5	-1.5					
25									4.9	0.0	93.6	-0.4					
26									5.1	0.2	92.3	-1.7					
27									4.8	-0.1	94.6	0.6					
28									4.8	-0.1	93.1	-0.9					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
29									4.9	0.0	92.1	-1.9					
30									4.9	0.0	94.1	0.1					
31									4.9	0.0	92.7	-1.3					
32									5.2	0.3	92.1	-1.9					
33											92.7	-1.3					
34											92.2	-1.8					
35											92.1	-1.9					
36											91.8	-2.2					
37											92.3	-1.7					
38											92.9	-1.1					
39											93.6	-0.4					
40											93	-1					
41											92.6	-1.4					
42											93	-1					
43											93.7	-0.3					
44											93.1	-0.9					
45											93.2	-0.8					
46											93.5	-0.5					
47											93.2	-0.8					
48											92	-2					
49											92.6	-1.4					
50											93.1	-0.9					
51											92.5	-1.5					
52											92.5	-1.5					
53											92.3	-1.7					
54											93	-1					
55											92.5	-1.5					
56											92.4	-1.6					
57											92.8	-1.2					
58											92	-2					
59											93.8	-0.2					
60											93	-1					
61											92.6	-1.4					
62											92.9	-1.1					
63											92.4	-1.6					
64											92.2	-1.8					
Specification Limits	70-89		44-72		30-62		3-7				94		10773	65356	1995	NH 2854-059	Colorado
Design/JMF	84		50		36		6.7		5.3		94						
JMF Limits	78-90		45-55		31-41		4.7-8.7		5-5.6		92-96						
1	80	-4	49	-1	35	-1	6.4	-0.3	5.5	0.2	93.7	-0.3					
2	86	2	55	5	41	5	7.2	0.5	5.5	0.2	93.5	-0.5					
3	82	-2	54	4	40	4	6.8	0.1	5.0	-0.3	92.5	-1.5					
4	85	1	54	4	39	3	6.5	-0.2	5.2	-0.1	95.5	1.5					
5	87	3	54	4	40	4	7.1	0.4	4.9	-0.5	94.8	0.8					
6	83	-1	50	0	36	0	5.8	-0.9	5.5	0.2	95.2	1.2					
7	88	4	58	8	43	7	7.2	0.5	5.2	-0.1	94.3	0.3					
8	79	-5	48	-2	35	-1	7.1	0.4	5.4	0.0	95.4	1.4					
9	80	-4	44	-6	31	-5	5.5	-1.2	5.0	-0.3	96.1	2.1					
10	81	-3	50	0	37	1	6.6	-0.1	5.1	-0.2	96	2					
11	88	4	54	4	41	5	8.4	1.7	5.0	-0.3	93.8	-0.2					
12	84	0	51	1	38	2	6.2	-0.5	5.3	0.0	93.3	-0.7					
13	79	-5	45	-5	33	-3	5.8	-0.9	5.1	-0.2	93.9	-0.1					
14	79	-5	45	-5	33	-3	5.7	-1.0	5.2	-0.1	94.1	0.1					
15	82	-2	50	0	36	0	6.1	-0.6	5.2	-0.1	93	-1					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
16	81	-3	51	1	38	2	6.2	-0.5	4.8	-0.5	93.1	-0.9					
17	88	4	50	0	37	1	7.3	0.6	5.0	-0.3	94.7	0.7					
18	85	1	55	5	42	6	7.4	0.7	4.9	-0.4	94.6	0.6					
19	84	0	55	5	41	5	7.0	0.3	5.4	0.1	95.1	1.1					
20	81	-3	53	3	40	4	6.4	-0.3	5.3	0.0	94.6	0.6					
21	88	4	45	-5	32	-4	6.8	0.1	5.5	0.2	94.8	0.8					
22	83	-1	49	-1	37	1	6.3	-0.4	5.5	0.2	93.8	-0.2					
23									5.4	0.1	93.5	-0.5					
24									5.2	-0.1	95	1					
25									5.5	0.2	94.5	0.5					
26									5.5	0.2	93.4	-0.6					
27									5.4	0.1	94.2	0.2					
28									5.5	0.2	96.7	2.7					
29									5.6	0.3	92.4	-1.6					
30									5.4	0.1	93.9	-0.1					
31									5.5	0.2	94.2	0.2					
32									5.5	0.2	94.4	0.4					
33									5.3	0.0	95.6	1.6					
34									5.2	-0.1	95.4	1.4					
35									5.4	0.1	95.2	1.2					
36									5.4	0.0	93	-1					
37									5.7	0.4	95	1					
38									5.6	0.3	94.8	0.8					
39									5.5	0.2	94.5	0.5					
40									5.5	0.2	95.4	1.4					
41									5.3	0.0	93.3	-0.7					
42									5.2	-0.1	93.9	-0.1					
43									5.1	-0.2	94.1	0.1					
44									5.1	-0.2	92	-2					
45											92.1	-1.9					
46											93.6	-0.4					
47											93.8	-0.2					
48											92.3	-1.7					
49											93	-1					
50											93.3	-0.7					
51											93.6	-0.4					
52											92.9	-1.1					
53											93.3	-0.7					
54											94.5	0.5					
55											93.9	-0.1					
56											92.7	-1.3					
57											92.7	-1.3					
58											93.1	-0.9					
59											93.8	-0.2					
60											92.6	-1.4					
61											94.5	0.5					
62											93.1	-0.9					
63											93.9	-0.1					
64											92.9	-1.1					
65											94.8	0.8					
66											94.8	0.8					
67											93.2	-0.8					
68											93.4	-0.6					
69											93.7	-0.3					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
70											92.7	-1.3					
71											94.2	0.2					
72											94.1	0.1					
73											93.3	-0.7					
74											92.1	-1.9					
75											93.5	-0.5					
76											94.1	0.1					
77											92.2	-1.8					
78											93.2	-0.8					
79											94.8	0.8					
80											93.8	-0.2					
81											92.3	-1.7					
82											94.2	0.2					
83											93.3	-0.7					
84											92.7	-1.3					
85											94.8	0.8					
86											94.4	0.4					
87											93.5	-0.5					
88											93.3	-0.7					
Specification Limits Design/JMF	70-89 84		44-72 54		30-62 41		3-7 4.8		5.5		94		10772	74418e	1995	IM 0703-217	Colorado
JMF Limits	78-90		49-59		36-46		2.8-6.8		5.2-5.8		92-96						
1	85	1	54	0	40	-1	5.1	0.3	5.7	0.2	93.8	-0.2					
2	87	3	55	1	41	0	5.5	0.7	5.2	-0.3	94.3	0.3					
3	80	-4	49	-5	36	-5	4.8	0.0	5.7	0.2	94.5	0.5					
4	86	2	61	7	46	5	6.3	1.5	5.7	0.2	94.7	0.7					
5	87	3	51	-3	33	-8	4.1	-0.7	5.2	-0.3	93.7	-0.3					
6	84	0	51	-3	37	-4	5.1	0.3	5.9	0.4	92.9	-1.1					
7	86	2	52	-2	37	-4	5.4	0.6	5.8	0.3	91.8	-2.2					
8	85	1	56	2	41	0	5.1	0.3	5.7	0.2	93.6	-0.4					
9	89	5	55	1	40	-1	5.0	0.2	6.0	0.5	95.5	1.5					
10	88	4	55	1	42	1	5.2	0.4	5.6	0.1	91.1	-2.9					
11	90	6	62	8	47	6	6.2	1.4	5.6	0.1	93.6	-0.4					
12	83	-1	53	-1	39	-2	5.4	0.6	5.5	0.0	94.3	0.3					
13	85	1	58	4	41	0	5.2	0.4	5.8	0.3	94.3	0.3					
14									5.8	0.3	93.7	-0.3					
15									5.4	-0.1	93.7	-0.3					
16									5.7	0.2	93.2	-0.8					
17									5.8	0.3	93	-1					
18									5.2	-0.3	94.3	0.3					
19									5.7	0.2	93.3	-0.7					
20									5.6	0.1	95.8	1.8					
21									5.8	0.3	93.7	-0.3					
22									5.5	0.0	95.7	1.7					
23									5.6	0.1	93.9	-0.1					
24									5.5	0.0	94.3	0.3					
25									5.7	0.2	95	1					
26											94	0					
27											92	-2					
28											94.9	0.9					
29											92.5	-1.5					
30											94.8	0.8					
31											92.4	-1.6					
32											92.8	-1.2					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
33											95.2	1.2					
34											95.7	1.7					
35											92.4	-1.6					
36											94.8	0.8					
37											94.7	0.7					
38											92.1	-1.9					
39											92.1	-1.9					
40											92.6	-1.4					
41											92.3	-1.7					
42											92.9	-1.1					
43											94.7	0.7					
44											92.6	-1.4					
45											92.2	-1.8					
46											92.6	-1.4					
47											92.7	-1.3					
48											96.2	2.2					
49											93.8	-0.2					
50											93.1	-0.9					
Specification Limits Design/JMF	70-89 84		44-72 54		30-62 41		3-7 4.8		5.5		94		10772	74418	1995	IM 0703-217	Colorado
JMF Limits	78-90		49-59		36-46		2.8-6.8		5.2-5.8		92-96						
1	84	0	54	0	38	-3	4.6	-0.2	5.3	-0.2	95.1	1.1					
2	84	0	48	-6	36	-5	4.7	-0.1	5.6	0.1	94.6	0.6					
3	87	3	55	1	41	0	5.1	0.3	5.7	0.2	93	-1					
4	85	1	49	-5	35	-6	4.9	0.1	5.6	0.0	94.3	0.3					
5	88	4	59	5	45	4	5.4	0.6	5.0	-0.5	92.4	-1.6					
6	88	4	59	5	45	4	5.2	0.4	5.7	0.2	95.2	1.2					
7	84	0	53	-1	38	-3	5.3	0.5	5.9	0.4	94.4	0.4					
8	86	2	54	0	39	-2	5.1	0.3	5.5	0.0	93.2	-0.8					
9	88	4	54	0	39	-2	4.7	-0.1	5.4	-0.1	93	-1					
10	87	3	60	6	44	3	6.2	1.4	5.6	0.1	92.6	-1.4					
11	86	2	59	5	45	4	5.7	0.9	5.3	-0.2	92.5	-1.5					
12	88	4	59	5	45	4	5.8	1.0	5.6	0.1	93.3	-0.7					
13	87	3	59	5	45	4	6.0	1.2	5.5	0.0	91.9	-2.1					
14	87	3	60	6	44	3	5.7	0.9	5.5	0.0	92.6	-1.4					
15									5.6	0.1	93	-1					
16											94.7	0.7					
17											93	-1					
18											92.6	-1.4					
19											92.6	-1.4					
20											93.2	-0.8					
21											92.8	-1.2					
22											93.6	-0.4					
23											91.7	-2.3					
24											91.1	-2.9					
25											94	0					
26											92.1	-1.9					
27											92.5	-1.5					
Specification Limits Design/JMF	70-89 89		44-72 55		30-62 43		3-7 6.5		5.0		94		10687	64243	1995	C 0404-029	Colorado
JMF Limits	83-95		50-60		38-48		4.5-8.5		4.6-5.4		92-96						
1	86	-3	51	-4	39	-4	6.7	0.2	5.2	0.2	93.5	-0.5					
2	88	-1	52	-3	40	-3	6.3	-0.2	4.9	-0.1	95.3	1.3					
3	87	-2	51	-4	39	-4	6.6	0.1	5.0	0.0	94.6	0.6					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
4	89	0	52	-3	39	-4	6.6	0.1	4.9	-0.1	93.8	-0.2					
5	89	0	50	-5	38	-5	6.9	0.4	4.9	-0.1	93.7	-0.3					
6	85	-4	53	-2	42	-1	6.4	-0.1	5.1	0.1	92.2	-1.8					
7	88	-1	53	-2	40	-3	6.0	-0.5	4.7	-0.3	93.9	-0.1					
8	86	-3	54	-1	42	-1	6.5	0.0	5.0	0.0	93.3	-0.7					
9	82	-7	50	-5	38	-5	6.5	0.0	5.1	0.1	92.6	-1.4					
10	90	1	56	1	42	-1	5.4	-1.1	5.0	0.0	93.6	-0.4					
11	90	1	59	4	45	2	7.7	1.2	5.0	0.0	92.2	-1.8					
12	85	-4	56	1	42	-1	6.3	-0.2	5.1	0.1	92.9	-1.1					
13	86	-3	56	1	45	2	6.0	-0.5	5.1	0.0	93.8	-0.2					
14	89	0	56	1	44	1	7.8	1.3	4.9	-0.1	92.8	-1.2					
15									4.9	-0.1	91.9	-2.1					
16									5.1	0.1	93.1	-0.9					
17									5.2	0.2	91.4	-2.6					
18									5.1	0.1	93.5	-0.5					
19									4.9	-0.1	94.1	0.1					
20									5.0	0.0	93.9	-0.1					
21											93	-1					
22											92.6	-1.4					
23											94.9	0.9					
24											95.5	1.5					
25											95.9	1.9					
26											94.7	0.7					
27											93.4	-0.6					
28											92.4	-1.6					
29											94.6	0.6					
30											95.9	1.9					
31											94.3	0.3					
32											94.3	0.3					
33											92.2	-1.8					
34											94.8	0.8					
35											94.1	0.1					
36											93	-1					
37											93.3	-0.7					
38											92.5	-1.5					
39											92.8	-1.2					
40											92.7	-1.3					
41											93.3	-0.7					
42											93.5	-0.5					
Specification Limits	70-89		44-72		30-62		3-7						10682	642314	1995	C 0831-063	Colorado
Design/JMF	85		54		41		7.0		4.9		94						
JMF Limits	79-91		49-59		36-46		5-9		4.6-5.2		92-96						
1	85	0	54	0	41	0	7.4	0.4	5.0	0.1	93.7	-0.3					
2	85	0	54	0	43	2	8.5	1.5	4.8	-0.1	92.6	-1.4					
3	87	2	55	1	43	2	6.0	-1.0	4.9	0.0	93.7	-0.3					
4	83	-2	52	-2	41	0	5.5	-1.5	4.7	-0.2	90.8	-3.2					
5	88	3	56	2	43	2	5.1	-1.9	4.7	-0.2	91.2	-2.8					
6	86	1	55	1	42	1	5.3	-1.7	4.7	-0.2	93.5	-0.5					
7	83	-2	55	1	45	4	5.3	-1.7	4.8	-0.1	93.6	-0.4					
8	82	-3	55	1	44	3	5.8	-1.2	4.8	-0.1	90.9	-3.1					
9									4.6	-0.3	92.9	-1.1					
10									4.9	0.0	92	-2					
11											92.1	-1.9					
12											92.2	-1.8					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
13											93.2	-0.8					
14											93.3	-0.7					
15											93.8	-0.2					
16											94.6	0.6					
17											94.3	0.3					
18											93.3	-0.7					
Specification Limits	90-100		50-78		32-64		3-7						10678	64249	1995	C 0361-046	Colorado
Design/JMF	100		50		43		5.4		5.1		94						
JMF Limits	100		45-55		38-48		3.4-7.4		4.7-5.5		92-96						
1	100	0	50	0	39	-4	5.4	0.0	5.3	0.2	94	0					
2	100	0	51	1	40	-3	6.0	0.6	5.0	-0.1							
3	100	0	49	-1	38	-5	4.6	-0.8	5.0	-0.1							
4	100	0	50	0	39	-4	5.7	0.3	4.7	-0.4							
5	100	0	52	2	40	-3	6.7	1.3	5.1	0.0							
6	100	0	51	1	39	-4	5.1	-0.3	4.7	-0.4							
7	100	0	49	-1	38	-5	5.7	0.3	4.8	-0.3							
8	100	0	50	0	39	-4	4.5	-0.9	4.9	-0.2							
9	100	0	50	0	39	-4	6.4	1.0	4.8	-0.3							
10									5.0	-0.1							
11									5.0	-0.1							
12									5.0	-0.1							
13									5.0	-0.1							
14									5.0	-0.1							
Specification Limits	90-100		50-78		32-64		3-7						10554	58550	1994	C 0502-033	Colorado
Design/JMF	95		55		39		6.5		5.4		94						
JMF Limits	90-100		50-60		34-44		4.5-8.5		5.1-5.7		92-96						
1	95	0	51	-4	36	-3	5.9	-0.6	5.4	0.0	94.4	0.4					
2	99	4	58	3	43	4	6.4	-0.1	5.7	0.3	96.5	2.5					
3	96	1	55	0	40	1	6.4	-0.1	5.5	0.1	93.9	-0.1					
4	94	-1	53	-2	38	-1	6.2	-0.3	5.1	-0.3	94.8	0.8					
5	96	1	55	0	41	2	6.6	0.1	5.5	0.0	95.7	1.7					
6	97	2	58	3	43	4	6.7	0.2	5.4	0.0	95.5	1.5					
7	95	0	54	-1	40	1	5.7	-0.8	5.3	-0.1	93.9	-0.1					
8	97	2	54	-1	40	1	5.8	-0.7	5.2	-0.2	94.9	0.9					
9	96	1	49	-6	35	-4	5.2	-1.3	5.4	0.0	95.5	1.5					
10	94	-1	52	-3	37	-2	5.3	-1.2	5.1	-0.3	93.1	-0.9					
11	96	1	55	0	41	2	6.6	0.1	5.4	0.0	94.9	0.9					
12	96	1	55	0	40	1	5.7	-0.8	5.4	0.0	96.7	2.7					
13	95	0	52	-3	38	-1	5.9	-0.6	5.4	0.0	95.9	1.9					
14	95	0	51	-4	37	-2	6.2	-0.3	5.1	-0.3	96.1	2.1					
15	96	1	55	0	39	0	6.3	-0.2	5.1	-0.3	94.8	0.8					
16									5.2	-0.2	95.5	1.5					
17									5.2	-0.2	95.8	1.8					
18									5.2	-0.2	95.2	1.2					
19									5.3	-0.1	93.9	-0.1					
20									5.5	0.1	96	2					
21									5.3	-0.1	93.6	-0.4					
22									5.3	-0.1	93.5	-0.5					
23									5.5	0.1	95.9	1.9					
24									5.3	-0.1	93.5	-0.5					
25									5.4	0.0	94.7	0.7					
26									5.3	-0.1	92	-2					
27									5.3	-0.1	94	0					
28									5.3	-0.1	93	-1					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
29									5.4	0.0	94.7	0.7					
30									5.4	0.0	95.4	1.4					
31											92.6	-1.4					
32											95	1					
33											95	1					
34											93.4	-0.6					
35											96.1	2.1					
36											94.3	0.3					
37											93.4	-0.6					
38											94.9	0.9					
39											93.2	-0.8					
40											92.9	-1.1					
41											93.1	-0.9					
42											96	2					
43											93.4	-0.6					
44											94.2	0.2					
45											93.6	-0.4					
46											92.1	-1.9					
47											94.4	0.4					
48											95	1					
49											93.5	-0.5					
50											94.4	0.4					
51											96.3	2.3					
52											94.6	0.6					
53											94.7	0.7					
54											92.8	-1.2					
55											93.8	-0.2					
56											93.6	-0.4					
57											93.3	-0.7					
58											93.5	-0.5					
59											93.2	-0.8					
Specification Limits	70-89		44-72		30-62		3-7				94		10306	64268	1995	CC 0931-018	Colorado
Design/JMF	81		54		42		5.0		4.7		92-96						
JMF Limits	75-87		49-59		37-47		3-7		4.4-5								
1	81	0	53	-1	45	3	5.0	0.0	4.7	0.0	93.8	-0.2					
2	83	2	54	0	43	1	5.1	0.1	4.8	0.1	93.1	-0.9					
3	81	0	53	-1	45	3	5.0	0.0	4.8	0.0	92.6	-1.4					
4	81	0	53	-1	45	3	5.1	0.1	4.9	0.2	93.1	-0.9					
5	81	0	53	-1	44	2	4.8	-0.2	5.0	0.3	93.3	-0.7					
6									5.0	0.3	95.1	1.1					
7									5.0	0.3	93.3	-0.7					
8									5.0	0.3	93.1	-0.9					
9									4.8	0.1	93.1	-0.9					
10									4.7	0.0	92.6	-1.4					
11											92.6	-1.4					
12											94	0					
13											92.6	-1.4					
14											91.8	-2.2					
15											93.1	-0.9					
16											93.9	-0.1					
17											93.4	-0.6					
18											92	-2					
19											92.9	-1.1					
20											93.1	-0.9					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State	
Specification Limits	70-89		44-72		30-62		3-7							10304	64268	1995	CC C110-002	Colorado
Design/JMF	81		54		42		5.0		4.7		94							
JMF Limits	75-87		49-59		37-47		3-7		4.3-5.1		92-96							
1	80	-1	52	-2	37	-5	5.4	0.4	4.8	0.1	95.1							
2	79	-2	58	4	41	-1	5.1	0.1	4.6	-0.1	93.8							
3	77	-4	58	4	41	-1	6.0	1.0	5.1	0.4	93.7							
4	78	-3	61	7	43	1	5.7	0.7	4.7	0.0	94.5							
5	75	-6	56	2	45	3	6.0	1.0	4.8	0.1	94							
6	73	-8	59	5	47	5	6.3	1.3	4.4	-0.3	93.3							
7									4.8	0.1	94.3							
8									4.6	-0.1	92.2							
9									4.7	0.0	92.9							
10									4.6	-0.1	94.2							
11									4.7	0.0	93.3							
12									4.8	0.1	92.8							
13											93.1							
14											92.3							
15											93.4							
16											93.7							
17											94.6							
18											94.8							
19											93.4							
20											94.4							
21											93.3							
22											93.7							
23											92.6							
24											93.6							
25											92.9							
Specification Limits	70-89		44-72		30-62		3-7						10934	109341	1996	PLH 0503-047	Colorado	
Design/JMF	79		56		41		5.2		6.0		94							
JMF Limits	71-87		48-64		33-49		3.2-7.2		5.7-6.3		92-96							
1	79	0	53	-3	37	-4	5.0	-0.2	6.1	0.1	95.3	1.3						
2	79	0	61	5	45	4	5.2	0.0	5.7	-0.3	94.8	0.8						
3									6.1	0.1	95	1						
4									5.9	-0.2	94.9	0.9						
5											92	-2						
6											95.2	1.2						
7											95	1						
8											94.1	0.1						
Specification Limits	70-89		44-72		30-62		3-7						10934	109342	1996	PLH 0503-047	Colorado	
Design/JMF	79		56		41		5.0		5.5		94							
JMF Limits	71-87		48-64		33-49		3.2-7.2		5.2-5.8		92-96							
1	79	0	60	4	45	4	5.1	0.1	5.6	0.1	94.3	0.3						
2	76	-3	57	1	43	2	5.2	0.2	5.4	-0.1	95	1						
3	83	4	62	6	46	5	6.9	1.9	5.5	0.0	94.1	0.1						
4	81	2	58	2	41	0	5.2	0.2	5.4	-0.1	94.6	0.6						
5	78	-1	57	1	43	2	5.6	0.6	5.6	0.0	93.8	-0.2						
6	82	3	61	5	44	3	6.0	1.0	5.5	0.0	92.7	-1.3						
7	82	3	61	5	46	5	6.0	1.0	5.7	0.2	94.9	0.9						
8	77	-2	55	-1	40	-1	5.7	0.7	5.7	0.2	93.1	-0.9						
9	78	-1	58	2	42	1	5.9	0.9	5.8	0.3	93.4	-0.6						
10	82	3	64	8	51	10	6.5	1.5	5.7	0.2	94.2	0.2						
11	82	3	61	5	45	4	3.3	-1.7	5.6	0.1	93.3	-0.7						
12									5.5	0.0	94.1	0.1						

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
13									5.4	-0.1	94.3	0.3					
14									5.3	-0.2	94.9	0.9					
15									5.2	-0.3	95.2	1.2					
16									5.4	-0.1	93.5	-0.5					
17									5.3	-0.2	93.6	-0.4					
18									5.4	-0.1	94.1	0.1					
19									5.2	-0.4	94.5	0.5					
20									5.6	0.1	93.3	-0.7					
21									5.4	-0.1	93.2	-0.8					
22											94.7	0.7					
23											93.1	-0.9					
24											95	1					
25											94.7	0.7					
26											93.6	-0.4					
27											93.3	-0.7					
28											93.7	-0.3					
29											93.8	-0.2					
30											95.9	1.9					
31											93.8	-0.2					
32											95	1					
33											94.1	0.1					
34											93.3	-0.7					
35											91.4	-2.6					
36											95.2	1.2					
37											93.5	-0.5					
38											93.3	-0.7					
39											92.4	-1.6					
40											93.4	-0.6					
41											93.3	-0.7					
Specification Limits	90-100		50-78		32-64		3-7				94		11233	88550	1996	BR 3851-010	Colorado
Design/JMF	90		62		42		6.1		5.1		94						
JMF Limits	90		57-67		37-47		4.1-8.1		4.8-5.4		92-96						
1	94	4	62	0	43	1	6.0	-0.1	5.0	-0.1	92.6	-1.4					
2	95	5	66	4	47	5	6.4	0.3	5.0	-0.1	92.2	-1.8					
3											93.8	-0.2					
4											93.9	-0.1					
5											93.9	-0.1					
Specification Limits	70-89		44-72		30-62		3-7				94		11318	89976	1996	C 0142-028	Colorado
Design/JMF	89		60		43		5.6		4.7		94						
JMF Limits	83-95		55-65		38-48		3.6-7.6		4.4-5.0		92-96						
1	88	-1	63	3	46	3	6.8	1.2	4.7	0.0							
2	87	-2	59	-1	43	0	6.9	1.3	4.9	0.2							
3	86	-3	60	0	43	0	6.4	0.8	4.6	-0.1							
4	88	-1	58	-2	38	-5	5.6	0.0	4.9	0.2							
5	92	3	58	-2	38	-5	5.8	0.2	4.8	0.1							
6									4.8	0.1							
7									4.9	0.1							
8									4.9	0.2							
9									4.7	0.0							
10									4.7	0.0							
Specification Limits	70-89		44-72		30-62		3-7				94		11318	89976R	1996	C 0142-028	Colorado
Design/JMF	89		60		43		6.0		5.0		94						
JMF Limits	83-95		55-65		38-48		3.6-7.6		4.7-5.3		92-96						
1	87	-2	61	1	43	0	6.1	0.1	5.0	0.0	94.7	0.7					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
2	87	-2	59	-1	42	-1	6.8	0.8	4.8	-0.2	93.9	-0.1					
3	85	-4	59	-1	42	-1	6.5	0.5	5.0	0.0	94.6	0.6					
4	87	-2	60	0	43	0	6.9	0.9	5.2	0.2	94.4	0.4					
5	87	-2	59	-1	41	-2	5.4	-0.6	5.2	0.2	94.3	0.3					
6	88	-1	60	0	44	1	6.2	0.2	5.2	0.2	93.5	-0.5					
7	90	1	62	2	43	0	7.0	1.0	5.0	0.0	93.6	-0.4					
8	90	1	61	1	44	1	6.6	0.6	5.2	0.2	93.1	-0.9					
9	92	3	66	6	51	8	7.7	1.7	5.0	0.0	94.6	0.6					
10	90	1	60	0	43	0	6.0	0.0	5.1	0.1	94.6	0.6					
11	90	1	59	-1	42	-1	5.9	-0.1	4.9	-0.1	92.8	-1.2					
12	88	-1	58	-2	41	-2	5.7	-0.3	5.1	0.0	94	0					
13									5.0	0.0	94.1	0.1					
14									5.1	0.1	92.5	-1.5					
15									5.0	0.0	92.9	-1.1					
16									5.0	0.0	92.9	-1.1					
17									5.1	0.1	93	-1					
18									5.0	0.0	93.1	-0.9					
19									5.0	0.0	93.1	-0.9					
20									5.0	0.0	93.9	-0.1					
21									4.8	-0.2	92.9	-1.1					
22									4.7	-0.3	92.8	-1.2					
23									4.7	-0.3	93.5	-0.5					
24											93.9	-0.1					
25											92.9	-1.1					
26											93	-1					
27											93.2	-0.8					
28											93.2	-0.8					
29											92.8	-1.2					
30											92.8	-1.2					
31											92.8	-1.2					
32											92.9	-1.1					
33											92.2	-1.8					
34											93.4	-0.6					
35											93	-1					
36											92.5	-1.5					
37											93.1	-0.9					
38											94.4	0.4					
39											95.7	1.7					
40											94.1	0.1					
41											93	-1					
42											93	-1					
43											93.7	-0.3					
44											95.5	1.5					
45											92.2	-1.8					
46											93.9	-0.1					
Specification Limits																	
Design/JMF	86		64		48		6.1		5.8		94		11359	82459	1996	C R200-041	Colorado
JMF Limits	80-92		59-69		43-53		4.1-8.1		5.5-6.1		92-96						
1	83	-3	62	-2	49	1	5.3	-0.8	5.8	0.0	93.2	-0.8					
2	81	-5	62	-2	49	1	5.4	-0.7	5.6	-0.2	94.2	0.2					
3	84	-2	64	0	50	2	4.9	-1.2	5.5	-0.3	93	-1					
4	86	0	66	2	52	4	5.8	-0.3	5.5	-0.3	93	-1					
5	83	-3	61	-3	48	0	4.8	-1.3	5.6	-0.2	93.7	-0.3					
6	85	-1	65	1	50	2	4.7	-1.4	5.6	-0.2	91.6	-2.4					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
7	83	-3	63	-1	49	1	5.7	-0.4	5.7	-0.1	94.1	0.1					
8									5.7	-0.1	92.7	-1.3					
9									5.7	-0.1	92.7	-1.3					
10									5.6	-0.2	93	-1					
11									5.6	-0.2	93.2	-0.8					
12									5.5	-0.3	93.9	-0.1					
13									5.7	-0.1	94.3	0.3					
14									5.9	0.1	94.4	0.4					
15											94.1	0.1					
16											94.7	0.7					
17											94.1	0.1					
18											93.7	-0.3					
19											94.2	0.2					
20											94.5	0.5					
21											94.7	0.7					
22											94.5	0.5					
23											93.7	-0.3					
24											94.9	0.9					
25											94.2	0.2					
26											94.3	0.3					
27											93.9	-0.1					
Specification Limits Design/JMF JMF Limits	70-89 84		44-72 60		30-62 47		3-7 6.0		4.9		94		11365	R6016	1996	IM 0252-292	Colorado
	78-90		55-65		42-52		4.0-8.0		4.6-5.2		92-96						
1	80	-4	59	-1	47	0	6.6	0.6	4.7	-0.2	92.6	-1.4					
2	83	-1	60	0	48	1	6.6	0.6	4.8	-0.1	95.6	1.6					
3	89	5	61	1	47	0	6.3	0.3	5.0	0.1	95.7	1.7					
4	88	4	59	-1	45	-2	5.9	-0.1	4.9	0.0	91.4	-2.6					
5	87	3	61	1	47	0	6.1	0.1	4.6	-0.3	93.2	-0.8					
6	76	-8	54	-6	46	-1	6.3	0.3	4.9	0.0	93.4	-0.6					
7	83	-1	58	-2	47	0	6.8	0.8	5.0	0.1	93.3	-0.7					
8	87	3	61	1	48	1	6.3	0.3	5.0	0.1	92.9	-1.1					
9	86	2	65	5	51	4	6.8	0.8	4.9	0.0	93.3	-0.7					
10	84	0	60	0	47	0	5.8	-0.2	4.9	0.0	92.5	-1.5					
11	85	1	59	-1	46	-1	5.9	-0.1	4.9	-0.1	92.9	-1.1					
12	86	2	57	-3	44	-3	6.0	0.0	4.9	0.0	93.1	-0.9					
13	84	0	56	-4	43	-4	6.3	0.3	4.6	-0.3	92.9	-1.1					
14	83	-1	59	-1	47	0	6.8	0.8	4.9	0.0	91.4	-2.6					
15	81	-3	59	-1	46	-1	4.0	-2.0	4.7	-0.2	93.3	-0.7					
16									5.2	0.3	92.3	-1.7					
17									5.2	0.3	93.3	-0.7					
18									4.9	0.0	92.3	-1.7					
19									4.8	-0.1	93.7	-0.3					
20									4.9	0.0	92.2	-1.8					
21									4.8	-0.1	92.6	-1.4					
22									4.9	0.0	93.2	-0.8					
23									5.2	0.3	92.6	-1.4					
24									5.0	0.1	93.9	-0.1					
25									4.7	-0.2	92.1	-1.9					
26									5.1	0.1	92.6	-1.4					
27									4.6	-0.3	92.1	-1.9					
28									4.8	-0.1	93.3	-0.7					
29									4.9	0.0	96.4	2.4					
30											96.1	2.1					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
31											94	0					
32											95	1					
33											92.6	-1.4					
34											92.1	-1.9					
35											93.2	-0.8					
36											95.1	1.1					
37											94.7	0.7					
38											94.4	0.4					
39											92.8	-1.2					
40											91.9	-2.1					
41											94.4	0.4					
42											93.1	-0.9					
43											94.4	0.4					
44											93.7	-0.3					
45											92.1	-1.9					
46											94	0					
47											92.6	-1.4					
48											91.9	-2.1					
49											92.8	-1.2					
50											94.7	0.7					
51											92.8	-1.2					
52											92.6	-1.4					
53											93	-1					
54											93.4	-0.6					
55											95.8	1.8					
56											92.8	-1.2					
57											94.1	0.1					
Specification Limits	70-89		44-72		30-62		3-7				94		11369	83560	1996	STA 0852-072	Colorado
Design/JMF	0		0		26		4.2		5.0		94						
JMF Limits	0		0		21-31		2.2-6.2		4.7-5.3		92-96						
1	0	0	0	0	24		3.6	-0.6	5.4	0.4	93.5	-0.5					
2	0	0	0	0	25		4.7	0.5	5.2	0.2	94.6	0.6					
3	0	0	0	0	31		5.7	1.5	5.1	0.1	92.6	-1.4					
4	0	0	0	0	27		4.8	0.6	5.5	0.5	93.8	-0.2					
5	0	0	0	0	34		6.5	2.3	4.9	-0.1	93	-1					
6	0	0	0	0	36		6.9	2.7	5.2	0.2	92.5	-1.5					
7	0	0	0	0	25		4.8	0.6	5.1	0.0	93.6	-0.4					
8	0	0	0	0	32		5.9	1.7	4.9	-0.1	93.1	-0.9					
9	0	0	0	0	28		4.9	0.7	4.7	-0.3	94.2	0.2					
10	0	0	0	0	29		4.6	0.4	5.3	0.3	94.6	0.6					
11	0	0	0	0	25		4.0	-0.2	4.4	-0.6	93.8	-0.2					
12	0	0	0	0	27		4.7	0.5	5.4	0.4	93.8	-0.2					
13	0	0	0	0	32		5.7	1.5	5.5	0.5	95	1					
14									5.2	0.2	92.4	-1.6					
15									5.6	0.6	93.5	-0.5					
16									5.7	0.7	94.4	0.4					
17									6.0	1.0	93.5	-0.5					
18									5.3	0.3	94.4	0.4					
19									4.3	-0.7	95.1	1.1					
20									5.1	0.1	94.5	0.5					
21									5.1	0.1	94.4	0.4					
22									5.1	0.1	93.7	-0.3					
23									4.7	-0.3	93.8	-0.2					
24									4.6	-0.4	92.4	-1.6					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
25									5.4	0.4	93	-1					
26									5.5	0.5	93.8	-0.2					
27											93.8	-0.2					
28											93.5	-0.5					
29											94.3	0.3					
30											94.7	0.7					
31											92.8	-1.2					
32											93	-1					
33											94.9	0.9					
34											94.7	0.7					
35											93	-1					
36											92.6	-1.4					
37											92.7	-1.3					
38											93.8	-0.2					
39											93.3	-0.7					
Specification Limits Design/JMF	70-89		44-72		30-62		3-7				94		88041	84100	1996	FR(CX) 009-2(009)	Colorado
JMF Limits	73		36		26		5.1		5.4		94						
JMF Limits	67-79		31-41		21-31		3.1-7.1		5.1-5.7		92-96						
1	76	3	36	0	26	0	5.7	0.6	5.4	-0.1	94	0					
2	76	3	35	-1	23	-3	5.5	0.4	5.5	0.1	95.6	1.6					
3	73	0	33	-3	24	-2	4.9	-0.2	5.3	-0.1	94.5	0.5					
4	72	-1	35	-1	24	-2	4.8	-0.3	5.5	0.0	93.3	-0.7					
5	75	2	35	-1	26	0	5.0	-0.1	5.3	-0.1	94.3	0.3					
6	75	2	36	0	23	-3	4.4	-0.7	5.4	0.0	94.8	0.8					
7	73	0	36	0	26	0	5.1	0.0	5.4	0.0	95.5	1.5					
8	72	-1	35	-1	26	0	5.3	0.2	5.5	0.1	94.2	0.2					
9									5.1	-0.4	94.5	0.5					
10									5.3	-0.1	93.8	-0.2					
11									5.4	0.0	94	0					
12									5.2	-0.2	94.1	0.1					
13									5.4	0.0	94.1	0.1					
14									5.4	0.0	93.8	-0.2					
15									5.5	0.0	93.7	-0.3					
16									5.4	0.0	93.1	-0.9					
17											94.7	0.7					
18											95.3	1.3					
19											94.4	0.4					
20											93.9	-0.1					
21											94.1	0.1					
22											93.2	-0.8					
23											93.9	-0.1					
24											93.6	-0.4					
25											93	-1					
26											94.3	0.3					
27											94	0					
28											92.9	-1.1					
29											95	1					
30											94.1	0.1					
31											93.9	-0.1					
Specification Limits Design/JMF	70-89		44-72		30-62		3-7				94		88041	841001	1996	FR(CX) 009-2(009)	Colorado
JMF Limits	69		36		26		5.1		5.5		94						
JMF Limits	63-75		31-41		21-31		3.1-7.1		5.2-5.8		92-96						
1	74	5	31	-5	22	-4	5.1	0.0	5.6	0.1	94.2	0.2					
2									5.5	0.0	93.1	-0.9					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
3											94	0					
4											92.3	-1.7					
Specification Limits	70-89		44-72		30-62		3-7				94		91067	93408	1996	BRF 050-4(017)	Colorado
Design/JMF	77		54		40		5.7		4.8		94						
JMF Limits	71-83		49-59		35-45		3.7-7.7		4.5-5.1		92-96						
1	75	-2	57	3	43	3	5.5	-0.2	4.9	0.1	92.1	-1.9					
2	75	-2	56	2	44	4	7.0	1.3	5.5	0.7	92.1	-1.9					
3	81	4	59	5	42	2	5.5	-0.2	4.9	0.1	93.3	-0.7					
4	81	4	59	5	45	5	4.1	-1.6	4.9	0.1	92	-2					
5	74	-3	54	0	39	-1	4.2	-1.5	4.6	-0.2	92.1	-1.9					
6	72	-5	55	1	39	-1	5.1	-0.6	4.8	0.0	92.6	-1.4					
7	77	0	59	5	42	2	5.1	-0.6	4.7	-0.1	93.3	-0.7					
8									4.9	0.1	92.6	-1.4					
9									4.8	0.0	92.9	-1.1					
10									4.7	-0.1	92.8	-1.2					
11									4.9	0.1	93.1	-0.9					
12									4.9	0.1	93.4	-0.6					
13									5.0	0.2	93.6	-0.4					
14									4.7	-0.1	93.3	-0.7					
15											93.4	-0.6					
16											93.5	-0.5					
17											91	-3					
18											92.8	-1.2					
19											92.8	-1.2					
20											92.1	-1.9					
21											93.3	-0.7					
22											92.6	-1.4					
23											92.1	-1.9					
24											93	-1					
25											92.9	-1.1					
26											92.8	-1.2					
27											92.5	-1.5					
28											92.8	-1.2					
Specification Limits	70-89		44-72		30-62		3-7				94		91052	66489	1996	TR-SR(CX) 0086(2)	Colorado
Design/JMF	87		59		47		6.0		5.3		94						
JMF Limits	81-93		54-64		42-52		4.0-8.0		5.0-5.6		92-96						
1	87	0	60	1	49	2	5.5	-0.5	5.1	-0.2	93.7	-0.3					
2	88	1	59	0	48	1	5.9	-0.1	5.2	-0.1	93	-1					
3	89	2	60	1	48	1	6.4	0.4	5.1	-0.2	92.8	-1.2					
4	90	3	63	4	50	3	7.3	1.3	5.4	0.1	91.3	-2.7					
5	83	-4	55	-4	44	-3	6.1	0.1	5.3	0.0	93	-1					
6									5.4	0.1	94.2	0.2					
7									5.2	-0.1	92.9	-1.1					
8									5.2	-0.1	92.7	-1.3					
9									5.2	-0.1	94.3	0.3					
10									5.4	0.1	95.2	1.2					
11											95.3	1.3					
12											95.2	1.2					
13											95.2	1.2					
14											94.5	0.5					
15											93.2	-0.8					
16											92.7	-1.3					
17											95.8	1.8					
18											92.8	-1.2					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	Density	Difference Density	PCEMS	Mix Design Number	Year	Project ID	State
19											93.7	-0.3					

APPENDIX B
WYOMING DATA

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	VTM	Difference VTM	Year	Project ID	State	RAP	Road Classification
Specification Limits Design/JMF JMF Limits	60-85 72		35-60 40		20-45 31		2-7 5.1		4.80		4.4		1998	ACIM-80-4(188)246	Wyoming	Yes	Interstate
1	67	-5	39	-1	30	-1	6.4	1.3	4.05	-0.75	4.9	0.5					
2	60	-12	31	-9	25	-6	6.4	1.3	3.79	-1.01	5.1	0.7					
3	67	-5	34	-6	28	-3	5.7	0.6	3.62	-1.18	4.7	0.3					
Specification Limits Design/JMF JMF Limits	60-85 72		35-60 40		20-45 31		2-7 5.1		4.80		4.4		1998	ACIM-80-4(188)246	Wyoming	Yes	Interstate
1	72	0	39	-1	30	-1	6	0.9	4.20	-0.60	4.9	0.5					
2	78	6	45	5	34	3	5.8	0.7	5.50	0.70	5.3	0.9					
Specification Limits Design/JMF JMF Limits	60-85 72 60-85		35-60 40 35-60		20-45 31 20-45		2-7 5.1 2-7		+/- 0.25 4.80 4.5 min.		+/- 1.5 4.4 3.0-5.0		1998	ACIM-80-4(188)246	Wyoming	Yes	Interstate
1	59	-13	31	-9	25	-6	4.8	-0.3	4.02	-0.78	3.6	-0.8					
2	62	-10	31	-9	24	-7	4.9	-0.2	3.88	-0.92	5.3	0.9					
3	75	3	40	0	31	0	5.8	0.7	4.15	-0.65	4.7	0.3					
4	60	-12	29	-11	22	-9	4.5	-0.6	3.25	-1.55	8.2	3.8					
5	67	-5	39	-1	30	-1	6.4	1.3	4.05	-0.75	4.9	0.5					
6	69	-3	39	-1	29	-2	4.9	-0.2	3.89	-0.91	4.5	0.1					
7	60	-12	31	-9	25	-6	6.4	1.3	3.79	-1.01	5.1	0.7					
8	75	3	43	3	34	3	6.1	1	4.80	0.00	2.7	-1.7					
9	65	-7	38	-2	29	-2	5.1	0	4.67	-0.13	3.5	-0.9					
10	66	-6	38	-2	30	-1	5.6	0.5	4.49	-0.31	4.2	-0.2					
11	77	5	46	6	36	5	6.2	1.1	5.21	0.41	2.2	-2.2					
12	74	2	42	2	32	1	6	0.9	4.74	-0.06	3.2	-1.2					
13	70	-2	37	-3	28	-3	5.2	0.1	4.52	-0.28	3.7	-0.7					
14	72	0	42	2	32	1	5.2	0.1	4.75	-0.05	3.1	-1.3					
15	70	-2	40	0	31	0	5.1	0	4.96	0.16	3.3	-1.1					
16	67	-5	38	-2	29	-2	5.2	0.1	4.45	-0.35	3.9	-0.5					
17	63	-9	37	-3	28	-3	5	-0.1	4.69	-0.11	3.6	-0.8					
18	62	-10	27	-13	21	-10	3.9	-1.2	3.60	-1.20	6.9	2.5					
19	70	-2	40	0	31	0	5.5	0.4	4.50	-0.30	6.2	1.8					
20	69	-3	36	-4	25	-6	4.8	-0.3	4.20	-0.60	6.3	1.9					
21	57	-15	27	-13	22	-9	4.1	-1	4.40	-0.40	6.2	1.8					
22	66	-6	34	-6	27	-4	5	-0.1	4.40	-0.40	4.6	0.2					
23	72	0	36	-4	27	-4	5	-0.1	5.46	0.66	4.9	0.5					
24	78	6	41	1	32	1	6	0.9	5.12	0.32	3.4	-1					
25	75	3	36	-4	27	-4	5.1	0	4.89	0.09	4	-0.4					
26	62	-10	33	-7	26	-5	4.4	-0.7	5.00	0.20	5.1	0.7					
27	59	-13	33	-7	25	-6	4.7	-0.4	4.10	-0.70	4	-0.4					
28	68	-4	36	-4	28	-3	5.8	0.7	4.70	-0.10	4.6	0.2					
29	66	-6	34	-6	27	-4	5.1	0	4.92	0.12	3.2	-1.2					
Specification Limits Design/JMF JMF Limits	60-85 72 60-74		35-60 40 32-46		20-45 31 21-31		2-7 5.1 2.4-6.4		+/- 0.25 4.90 4.5 min.		+/- 1.5 5 3.0-5.0		1998	ACIM-80-4(188)246	Wyoming	Yes	Interstate
1	70	-2	38	-2	29	-2	5.8	0.7	4.50	-0.40	3.4	-1.6					
2	69	-3	37	-3	29	-2	5.2	0.1	4.74	-0.16	3.6	-1.4					
3	72	0	39	-1	30	-1	4.5	-0.6	5.11	0.21	2.5	-2.5					
4	46	-26	23	-17	18	-13	3.8	-1.3	3.35	-1.55	6.6	1.6					
5	64	-8	36	-4	29	-2	5.5	0.4	4.50	-0.40	3.0	-2.0					
6	62	-10	38	-2	30	-1	5.8	0.7	4.29	-0.61	4.9	-0.1					
7	74	2	40	0	31	0	5.6	0.5	4.98	0.08	2.2	-2.8					
8	78	6	48	8	36	5	6.5	1.4	5.46	0.56	1.3	-3.7					
9	79	7	46	6	35	4	6.5	1.4	4.89	-0.01	2.1	-2.9					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	VTM	Difference VTM	Year	Project ID	State	RAP	Road Classification
10	85	13	50	10	38	7	8.2	3.1	5.16	0.26							
11	62	-10	32	-8	25	-6	3.5	-1.6	4.24	-0.66	4.5	-0.5					
12	73	1	36	-4	28	-3	2.3	-2.8	4.52	-0.38	3.7	-1.3					
13	64	-8	32	-8	25	-6	3.6	-1.5	5.10	0.20	4.7	-0.3					
14	70	-2	36	-4	28	-3	3.8	-1.3	5.10	0.20	3.7	-1.3					
15	60	-12	29	-11	22	-9	3.1	-2	4.53	-0.37	3.6	-1.4					
Specification Limits	60-85		35-60		20-45		2-7		+/- 0.25		+/- 1.5		1998	ACNHP-010-3(77)	Wyoming	No	Primary
Design/JMF	77		48		32		5.3		5.00		4.9						
JMF Limits	70-84		41-55		27-37		3-7		4.5 min.		2.5-4.5						
1	80	3	50	2	35	3	5.1	-0.2	5.63	0.63	2.7	-2.2					
2	74	-3	47	-1	33	1	5.2	-0.1	5.09	0.09	2.7	-2.2					
3	76	-1	46	-2	32	0	4.8	-0.5	5.30	0.30	2.5	-2.4					
4	76	-1	47	-1	32	0	5	-0.3	5.25	0.25	3.5	-1.4					
5	76	-1	51	3	35	3	5.5	0.2	5.41	0.41	3.2	-1.7					
6	69	-8	44	-4	31	-1	4.8	-0.5	4.85	-0.15	3.8	-1.1					
Specification Limits	90-100		35-55		20-40		2-6		5.20		4		1998	ACSTPS-2303(13)	Wyoming	No	Secondary
Design/JMF	96		45		28		4.7										
JMF Limits	90-100		38-52		23-33		2-6										
1	96	0	46	1	29	1	7.7	3	5.47	0.27	2.3	-1.7					
Specification Limits	90-100		35-55		20-40		2-6		5.20		4		1998	ACSTPS-2303(13)	Wyoming	No	Secondary
Design/JMF	96		45		28		4.7		4.95-5.45		2.5-4.5						
JMF Limits	90-100		38-52		23-33		2-6										
1	97	1	52	7	31	3	7.9	3.2	5.17	-0.03	2.6	-1.4					
2	97	1	48	3	30	2	7.2	2.5	5.24	0.04	1.4	-2.6					
3	96	0	46	1	28	0	7	2.3	5.23	0.03	1.9	-2.1					
4	97	1	48	3	30	2	7.1	2.4	4.75	-0.45	3	-1					
Specification Limits	60-85		35-60		20-45		2-7		5.60		2.9		1998	CMP-PO-024-2(13)	Wyoming	No	Primary
Design/JMF	78		55		40		3.8										
JMF Limits	71-85		46-60		35-45		2-6										
1	85	7	61	6	42	2	3	-0.8	5.58	-0.02	5	2.1					
Specification Limits	60-85		35-60		20-45		2-7		5.40		4		1998	CMP-PO-013-1(45)	Wyoming	No	Primary
Design/JMF	74		49		31		3.6										
JMF Limits	67-81		42-56		26-36		2-6										
1	70	-4	45	-4	29	-2	4.7	1.1	5.10	-0.30	3.9	-0.1					
Specification Limits	90-100		35-55		20-40		2-6		+/- 0.25		+/- 1.5		1998	CMP-PO-043-2(36)	Wyoming	No	Primary
Design/JMF	96		47		27		4		4.90		3.2						
JMF Limits	90-100		40-54		22-32		2-6		4.5 min.		2.5-4.5						
1	94	-2	43	-4	25	-2	6.5	2.5	4.93	0.03	3.1	-0.1					
2	94	-2	44	-3	25	-2	6	2	5.05	0.15	4.2	1.0					
Specification Limits	90-100		35-55		20-40		2-6		4.90		3.8		1998	CMP-PO-043-2(36)	Wyoming	No	Primary
Design/JMF	96		47		27		4										
JMF Limits	90-100		40-54		22-32		2-6										
1	96	0	45	-2	27	0	6.4	2.4	4.70	-0.20	4.8	1					
Specification Limits	60-85		35-60		20-45		2-7		5.50		4.3		1998	NHI-80-6(140)362 & NHI-80-6(165)364	Wyoming	No	Interstate
Design/JMF	70		42		26		5.0		5.25-5.75		2.5-4.5						
JMF Limits	63-77		35-49		21-31		3.0-7.0										
1	72	2	47	5	28	2	3.9	-1.1	5.63	0.13	4	-0.3					
2	69	-1	45	3	29	3	5.7	0.7	5.31	-0.19	4.4	0.1					
3	74	4	51	9	32	6	5.7	0.7	5.33	-0.17	3.3	-1					
4	61	-9	38	-4	25	-1	4.6	-0.4	4.81	-0.69	3.1	-1.2					
5	80	10	48	6	30	4	6.1	1.1	5.82	0.32	2.7	-1.6					
Specification Limits	60-85		35-60		20-45		2-7		5.20		4		1998	NHI-80-6(140)362	Wyoming	Yes	Interstate
Design/JMF	75		48		31		5.8										
JMF Limits																	
1	84	9	51	3	33	2	7.5	1.7	5.25	0.05	3	-1					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	VTM	Difference VTM	Year	Project ID	State	RAP	Road Classification
Specification Limits	55-80		35-55		20-40		2-7						1998	NHI-80-6(140)362	Wyoming	Yes	Interstate
Design/JMF	66		47		32		6.6		5.20		3.1						
JMF Limits									4.95-5.45		2.5-5.5						
1	57	-9	42	-5	29	-3	6.4	-0.2	4.73	-0.47	2.6	-0.5					
2	62	-4	46	-1	30	-2	6	-0.6	5.04	-0.16	3	-0.1					
3	65	-1	45	-2	32	0	6	-0.6	5.62	0.42	1.3	-1.8					
4	54	-12	38	-9	26	-6	5.7	-0.9	5.34	0.14	2.6	-0.5					
5	62	-4	44	-3	30	-2	6.8	0.2	5.80	0.60	1.4	-1.7					
6	57	-9	40	-7	29	-3	5.8	-0.8	8.10	2.90	1.8	-1.3					
Specification Limits	90-100		40-60		25-45		2-7						1998	NHI-80-6(140)362	Wyoming	Yes	Interstate
Design/JMF	95		50		32		5.7		6.00		4.3						
JMF Limits									5.75-6.25		2.5-4.5						
1	93	-2	54	4	35	3	6.5	0.8	6.44	0.44	2.6	-1.7					
2	94	-1	55	5	36	4	7.3	1.6	5.93	-0.07	3.6	-0.7					
3	94	-1	57	7	36	4	6.8	1.1	7.00	1.00	1.6	-2.7					
4	94	-1	53	3	30	-2	5.3	-0.4	6.15	0.15	4.4	0.1					
5	96	1	57	7	36	4	6.1	0.4	6.23	0.23	4.1	-0.2					
Specification Limits	60-85		35-60		20-45		2-7						1998	NHI-80-6(140)362	Wyoming	Yes	Interstate
Design/JMF	75		48		31		5.8		5.20		4						
JMF Limits									4.95-5.45		2.5-4.5						
1	80	5	55	7	34	3	6.3	0.5	5.55	0.35	4.5	0.5					
2	84	9	56	8	36	5	6.6	0.8	5.69	0.49	3	-1					
3	85	10	53	5	32	1	6.5	0.7	5.82	0.62	2.7	-1.3					
4	80	5	56	8	39	8	7.6	1.8	5.10	-0.10	2.2	-1.8					
5	73	-2	46	-2	31	0	5.6	-0.2	5.41	0.21	3.1	-0.9					
6	79	4	54	6	36	5	6.5	0.7	4.94	-0.26	3.4	-0.6					
7	82	7	52	4	32	1	5.6	-0.2	5.48	0.28	4.6	0.6					
8	82	7	55	7	35	4	5.6	-0.2	5.59	0.39	2.5	-1.5					
Specification Limits	60-85		35-60		20-45		2-7						1998	SCP-012-1(95)	Wyoming	No	Primary
Design/JMF	72		45		28		5		5.25		5.2						
JMF Limits	65-79		35-52		23-33		3-7										
1	67	-5	44	-1	30	2	5.3	0.3	5.19	-0.06	3.1	-2.1					
Specification Limits	60-85		35-60		20-45		2-7		+/- 0.25		+/- 1.5		1998	SCP-012-1(95)	Wyoming	No	Primary
Design/JMF	72		45		28		5		5.25		5.2						
JMF Limits	65-79		38-52		23-33		3-7		4.5 min.		3.0-5.0						
1	69	-3	44	-1	30	2	5.2	0.2	4.84	-0.41	4.3	-0.9					
2	80	8	55	10	36	8	5.8	0.8	5.89	0.64	1.8	-3.4					
3	70	-2	44	-1	28	0	4.9	-0.1	4.83	-0.42	4.0	-1.2					
4	76	4	48	3	30	2	4.9	-0.1	5.28	0.03	3.8	-1.4					
5	76	4	51	6	34	6	5.4	0.4	5.30	0.05	4.2	-1.0					
6	78	6	51	6	33	5	5.8	0.8	5.10	-0.15	3.8	-1.4					
7	74	2	49	4	33	5	5.6	0.6	5.04	-0.21	4.9	-0.3					
Specification Limits	90-100		40-60		25-45		2-7						1998	SCP-031-1(12)	Wyoming	No	Primary
Design/JMF	96		51		35		5.6		5.50		4.1						
JMF Limits	90-100		44-58		30-40		3-7										
1	93	-3	43	-8	30	-5	6	0.4	5.42	-0.08	6.2	2.1					
Specification Limits	60-85		35-60		20-45		2-7						1998	STPS-0505(9)	Wyoming	No	Secondary
Design/JMF	72		38		26		4.6		5.40		3.8						
JMF Limits	60-85		35-60		20-45		2-7										
1	80	8	46	8	30	4	6.1	1.5	5.72	0.32	4.6	0.8					
Specification Limits	60-85		35-60		20-45		2-7						1998	STPUNP-027-3(5)	Wyoming	No	Primary
Design/JMF	74		50		37		4.9		5.40		4						
JMF Limits	67-81		43-57		32-42		2.9-6.9										
1	82	8	56	6	40	3	5.3	0.4	5.56	0.16	3.7	-0.3					
Specification Limits	60-85		35-60		20-45		2-7						1999	ACNHP-010-3(77)	Wyoming	No	Primary

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	VTM	Difference VTM	Year	Project ID	State	RAP	Road Classification
Design/JMF	77		48		32		5.3		5.00		3.7						
JMF Limits	70-84		41-55		27-37		3-7										
1	65	-12	36	-12	26	-6	4.6	-0.7	4.05	-0.95	6.9	3.2					
2	65	-12	36	-12	26	-6	5.3	0	4.26	-0.74	6.9	3.2					
Specification Limits	85-100		35-70		20-55		2-7						1999	ACNHP-031-1(64) & ACNHP-031-1(61)	Wyoming	No	Primary
Design/JMF	96		51		34		4.7		6.50		4.8						
JMF Limits	90-100		45-59		29-39		2.7-6.7										
1	94	-2	51	0	33	-1	5.2	0.5	5.90	-0.60	2.6	-2.2					
Specification Limits	85-100%		35-70%		20-55%		2-7%						1999	ACNHP-031-1(64)	Wyoming	No	Primary
Design/JMF	96		51		34		4.7		6.50		4.8						
JMF Limits	90-100		45-59		29-39		2.7-6.7		6.25-6.75		3.0-5.0						
1	94	-2	50	-1	35	1	4.4	-0.3	6.60	0.10	4.6	-0.2					
2	93	-3	48	-3	33	-1	4.9	0.2	6.40	-0.10	4.4	-0.4					
3	95	-1	48	-3	33	-1	4.3	-0.4	6.20	-0.30	4.3	-0.5					
4	94	-2	54	3	35	1	4.6	-0.1	6.70	0.20	5.2	0.4					
5	95	-1	56	5	38	4	6.5	1.8	6.20	-0.30	3.6	-1.2					
Specification Limits	55-95		30-65		20-50		2-7						1999	AM-0502(13)	Wyoming	No	Secondary
Design/JMF	72		43		31		5.4		4.80		4.1						
JMF Limits	65-79		36-50		26-36		3-7										
1	77	5	47	4	33	2	8	2.6	4.46	-0.34	3	-1.1					
Specification Limits	55-95		30-65		20-50		2-7						1999	AM-0502(13)	Wyoming	No	Secondary
Design/JMF	72		43		31		5.4		4.80		4.1						
JMF Limits	65-79		36-50		26-36		3.0-7.0		4.55-5.05		2.5-4.5						
1	77	5	48	5	34	3	8.4	3	4.96	0.16	1.8	-2.3					
2	73	1	45	2	32	1	7.7	2.3	4.81	0.01	1.8	-2.3					
3	76	4	47	4	33	2	7.9	2.5	4.93	0.13	1.7	-2.4					
4	72	0	42	-1	30	-1	7.3	1.9	4.47	-0.33	2.2	-1.9					
5	70	-2	42	-1	30	-1	7.2	1.8	4.71	-0.09	2.2	-1.9					
6	75	3	46	3	33	2	7.4	2	4.88	0.08	2.3	-1.8					
7	65	-7	36	-7	27	-4	6.9	1.5	4.08	-0.72	3.7	-0.4					
8	75	3	46	3	33	2	8	2.6	4.57	-0.23	3.6	-0.5					
Specification Limits	55-95		30-65		20-50		2-7						1999	AM-90-3(71)113	Wyoming	Yes	Interstate
Design/JMF	89		44		26		3.6		4.70		4.8						
JMF Limits									4.45-4.95		2.5-4.5						
1	91	2	46	2	29	3	5.1	1.5	4.76	0.06	2.6	-2.2					
2	88	-1	50	6	31	5	5	1.4	4.64	-0.06	2	-2.8					
3	93	4	49	5	30	4	5.3	1.7	4.82	0.12	2.2	-2.6					
4	88	-1	42	-2	26	0	5.1	1.5	4.62	-0.08	4	-0.8					
Specification Limits	55-95		30-65		20-50		2-7						1999	AM-90-3(71)113	Wyoming	Yes	Interstate
Design/JMF	89		44		26		3.6		4.70		4.1						
JMF Limits									4.45-4.95		2.5-4.5						
1	87	-2	42	-2	25	-1	6.1	2.5	4.46	-0.24	3.4	-0.7					
2	87	-2	41	-3	26	0	4.3	0.7	4.31	-0.39	3.3	-0.8					
3	92	3	44	0	27	1	5.9	2.3	4.48	-0.22	3.2	-0.9					
4	87	-2	41	-3	26	0	4.5	0.9	4.45	-0.25	4.1	0					
5	90	1	46	2	26	0	4.2	0.6	4.68	-0.02	3.7	-0.4					
6	89	0	46	2	26	0	4.3	0.7	4.38	-0.32	3.6	-0.5					
7	89	0	46	2	28	2	4.3	0.7	4.72	0.02	3	-1.1					
8	91	2	47	3	29	3	4.9	1.3	4.85	0.15	2.6	-1.5					
9	87	-2	48	4	29	3	5.5	1.9	4.91	0.21	2.4	-1.7					
10	89	0	47	3	28	2	5.1	1.5	4.93	0.23	2.2	-1.9					
11	86	-3	41	-3	25	-1	5	1.4	4.54	-0.16	2.9	-1.2					
12	90	1	49	5	30	4	5.9	2.3	4.75	0.05	2.2	-1.9					
13	89	0	44	0	28	2	5	1.4	4.67	-0.03	3.1	-1					
14	92	3	48	4	29	3	6.3	2.7	4.78	0.08	1.6	-2.5					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	VTM	Difference VTM	Year	Project ID	State	RAP	Road Classification
15	84	-5	41	-3	26	0	5.6	2	4.58	-0.12	1.6	-2.5					
Specification Limits	55-95		30-65		20-50		2-7		4.70		4.9		1999	AM-90-3(71)113	Wyoming	Yes	Interstate
Design/JMF	89		47		28		3.7		4.45-4.95		2.5-4.5						
JMF Limits																	
1	90	1	45	-2	26	-2	4.4	0.7	4.69	-0.01	3	-1.9					
2	93	4	46	-1	27	-1	4.2	0.5	4.70	0.00	3.1	-1.8					
3	91	2	46	-1	27	-1	4.3	0.6	4.54	-0.16	3.5	-1.4					
4	91	2	46	-1	28	0	5.6	1.9	4.69	-0.01	2.7	-2.2					
5	88	-1	44	-3	28	0	5.6	1.9	4.67	-0.03	3.1	-1.8					
6	88	-1	45	-2	28	0	5.2	1.5	4.64	-0.06	2.5	-2.4					
7	86	-3	45	-2	27	-1	6	2.3	4.76	0.06	2	-2.9					
Specification Limits	55-95		30-65		20-50		2-7		4.70		4.9		1999	AM-90-3(71)113	Wyoming	Yes	Interstate
Design/JMF	89		47		28		3.7										
JMF Limits																	
1	88	-1	48	1	28	0	6.7	3	4.52	-0.18	3.1	-1.8					
Specification Limits	85-100		35-70		20-55		2-7		4.70		3.9		1999	AM-90-3(71)113	Wyoming	No	Interstate
Design/JMF	89		46		26		5										
JMF Limits	85-99		39-53		21-31		3-7										
1	95	6	53	7	30	4	6.7	1.7	4.58	-0.12	2.1	-1.8					
Specification Limits	85-100		35-70		20-55		2-7		4.50		4.5		1999	AMS-2302(8)	Wyoming	No	Secondary
Design/JMF	91		44		26		3.9										
JMF Limits	86-100		37-51		21-31		3-7										
1	92	1	48	4	26	0	5.6	1.7	4.86	0.36	6.2	1.7					
2	93	2	49	5	27	1	5.3	1.4	4.64	0.14	6.2	1.7					
Specification Limits	55-95		30-65		20-50		2-7		5.40		4.2		1999	BROS-411(2)/ BROS-1900(5)	Wyoming	No	Secondary
Design/JMF	78		48		32		2.6										
JMF Limits	71-85		40-54		27-37		2-6										
1	75	-3	38	-10	21	-11	5.8	3.2	5.21	-0.19	2.5	-1.7					
2	73	-5	37	-11	20	-12	6	3.4	5.64	0.24	2.5	-1.7					
Specification Limits	90-100		40-60		25-45		2-7		5.30		4.9		1999	CMI-90-1(92)23	Wyoming	No	Interstate
Design/JMF	95		47		29		5										
JMF Limits	90-100		40-54		25-35		3-7										
1	93	-2	47	0	31	2	4.8	-0.2	5.07	-0.23	4.2	-0.7					
Specification Limits	55-95		30-65		20-50		2-7		6.00		4.4		1999	CMP-PO-1209(4)	Wyoming	No	Secondary
Design/JMF	88		40		26		5										
JMF Limits	81-95		33-47		21-31		3-7										
1	90	2	43	3	28	2	6.1	1.1	6.34	0.34	3.9	-0.5					
Specification Limits	55-95		30-65		20-50		2-7		6.00		4.5		1999	CMP-PO-025-3(73)	Wyoming	No	Primary
Design/JMF	74		49		34		4.1										
JMF Limits	73-87		41-55		29-39		2.9-6.9										
1	78	4	50	1	35	1	4	-0.1	5.82	-0.18	2.4	-2.1					
Specification Limits	85-100%		35-70%		20-30%		2-7%		5.75		4		1999	CMP-PO-025-3(73)	Wyoming	No	Primary
Design/JMF	94		48		34		4.3		5.50-6.00		2.5-4.5						
JMF Limits	87-100		41-55		29-39		2.3-6.3										
1	96	2	56	8	38	4	4.5	0.2	6.00	0.25	1.3	-2.7					
2	94	0	50	2	35	1	5.7	1.4	5.88	0.13	1.8	-2.2					
3	97	3	53	5	37	3	5.1	0.8	6.10	0.35	1.4	-2.6					
4	97	3	53	5	35	1	3.5	-0.8	6.08	0.33	2.9	-1.1					
5	96	2	56	8	37	3	5.1	0.8	6.67	0.92	2.1	-1.9					
Specification Limits	55-95%		30-65%		20-50%		2-7%		6.00		4.5		1999	CMP-PO-025-3(73)	Wyoming	No	Primary
Design/JMF	74		49		34		4.1		5.75-6.25		2.5-4.5						
JMF Limits	67-81		42-56		29-39		2.1-6.1										
1	69	-5	46	-3	32	-2	3.8	-0.3	6.26	0.26	1.7	-2.8					
2	75	1	49	0	34	0	4.3	0.2	6.35	0.35	1.6	-2.9					
3	76	2	52	3	35	1	3.6	-0.5	5.99	-0.01	1.8	-2.7					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	VTM	Difference VTM	Year	Project ID	State	RAP	Road Classification
4	79	5	53	4	35	1	4.3	0.2	5.61	-0.39	2.6	-1.9					
Specification Limits	55-95		30-65		20-50		2-7						1999	CMP-PO-034-2(28)	Wyoming	No	Primary
Design/JMF	79		53		38		4.4		5.00		5.3						
JMF Limits	72-86		46-60		33-43		2.4-6.4										
1	71	-8	46	-7	33	-5	4.9	0.5	5.07	0.07	3.6	-1.7					
Specification Limits	55-95		30-65		20-50		2-7						1999	CMP-PO-034-2(28)	Wyoming	No	Primary
Design/JMF	79		53		38		4.4		5.00		5.3						
JMF Limits	72-86		46-60		33-43		2.4-6.4		4.75-5.25		3.0-5.0						
1	80	1	56	3	39	1	5.3	0.9	5.60	0.60	3.1	-2.2					
2	75	-4	53	0	38	0	5	0.6	5.10	0.10	3.6	-1.7					
3	86	7	63	10	45	7	5.3	0.9	5.80	0.80	3.9	-1.4					
4	80	1	55	2	40	2	6.1	1.7	5.40	0.40	4.1	-1.2					
Specification Limits	55-95		30-65		20-50		2-7						1999	CMP-PO-043-2(38) & STPE-042-3(28)	Wyoming	No	Primary
Design/JMF	86		56		34		5.7		4.80		4						
JMF Limits	81-95		49-63		28-38		3.0-7.0		4.55-5.05		2.5-4.5						
1	86	0	54	-2	34	0	7	1.3	4.84	0.04	1.8	-2.2					
2	86	0	49	-7	30	-4	6.4	0.7	4.80	0.00	3.4	-0.6					
3	85	-1	50	-6	31	-3	6.3	0.6	4.88	0.08	3	-1					
4	85	-1	58	2	38	4	7.4	1.7	4.83	0.03	2.5	-1.5					
5	88	2	60	4	37	3	6.9	1.2	4.70	-0.10	3	-1					
6	84	-2	55	-1	35	1	7.2	1.5	4.70	-0.10	3.9	-0.1					
Specification Limits	55-95		30-65		20-50		2-7						1999	CMP-PO-043-2(38)	Wyoming	No	Primary
Design/JMF	86		56		34		5.7		4.80		4						
JMF Limits	81-95		49-63		28-38		3-7										
1	84	-2	55	-1	34	0	7.4	1.7	4.51	-0.29	4.5	0.5					
Specification Limits	85-100		35-70		20-55		2-7						1999	CMP-PO-1105(4)	Wyoming	No	Secondary
Design/JMF	93		52		39		5		5.40		4						
JMF Limits	86-100		45-59		34-44		3-7										
1	95	2	59	7	45	6	5.6	0.6	5.42	0.02	2.8	-1.2					
Specification Limits	55-95		30-65		20-50		2-7						1999	CMP-PO-1208(10)	Wyoming	No	Secondary
Design/JMF	79		45		31		5.8		5.20		4						
JMF Limits	72-86		39-53		26-36		3.0-7.0		4.95-5.45		2.5-4.5						
1	82	3	48	3	33	2	5.9	0.1	5.59	0.39							
2	84	5	48	3	31	0	5.4	-0.4	6.00	0.80							
3	82	3	45	0	30	-1	5.2	-0.6	5.70	0.50							
4	82	3	45	0	31	0	5.4	-0.4	5.70	0.50							
5									5.24	0.04							
6									5.10	-0.10							
Specification Limits	55-95		30-65		20-50		2-7						1999	CMP-PO-1208(10)	Wyoming	No	Secondary
Design/JMF	79		45		31		5.8		5.20		4						
JMF Limits	72-86		39-53		26-36		3-7										
1	76	-3	41	-4	28	-3	5.2	-0.6	5.20	0.00	2.1	-1.9					
2	85	6	49	4	33	2	6.1	0.3	5.53	0.33	2.1	-1.9					
3	79	0	43	-2	30	-1	6	0.2	5.06	-0.14	3.2	-0.8					
4	78	2	44	3	30	2	5.7	0.5	5.25	0.05	2.4	0.3					
Specification Limits	85-100		35-70		20-55		2-7						1999	CMP-PO-2303(15)	Wyoming	No	Secondary
Design/JMF	97		46		27		5.1		5.20		4						
JMF Limits	90-100		39-53		22-32		3-7										
1	96	-1	44	-2	28	1	7.9	2.8	5.01	-0.19	3.2	-0.8					
Specification Limits	55-95%		60-65%		20-50%		2-7%						1999	CMP-PO-FX-023-2(35)	Wyoming	No	Primary
Design/JMF	73		41		26		4.9		4.75		3.7						
JMF Limits	66-80		34-48		21-31		2.9-6.9		4.5-5.0		2.5-4.5						
1									5.00	0.25	3.1	-0.6					
2									4.85	0.10	3.4	-0.3					
3									4.80	0.05	4	0.3					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	VTM	Difference VTM	Year	Project ID	State	RAP	Road Classification
4									4.78	0.03	3.8	0.1					
5									4.81	0.06	3.9	0.2					
Specification Limits	55-95		30-65		20-50		2-7						1999	MP-PO-FX-023-2(35	Wyoming	No	Primary
Design/JMF	73		41		26		4.9		4.75		3.7						
JMF Limits	66-80		34-48		21-31		2.9-6.9										
1	64	-9	37	-4	26	0	7	2.1	4.52	-0.23	0.7	-3					
2	71	-2	41	0	28	2	7.9	3	4.37	-0.38	2.1	-1.6					
Specification Limits	55-95		30-65		20-50		2-7						1999	FH-0601(29)	Wyoming	No	Secondary
Design/JMF	79		49		27		5		5.75		4.8						
JMF Limits	72-86		42-56		22-32		3-7										
1	72	-7	46	-3	31	4	7.3	2.3	4.89	-0.86	1.2	-3.6					
2	67	-12	44	-5	30	3	7.3	2.3	5.17	-0.58	1.2	-3.6					
Specification Limits	55-95		30-65		20-50		2-7						1999	IM-25-4(135)219	Wyoming	No	Interstate
Design/JMF	76		47		29		5.4		5.20		4						
JMF Limits	69-83		40-54		24-34		3-7										
1	78	2	51	4	35	6	7	1.6	5.74	0.54	2.7	-1.3					
Specification Limits	85-100		35-70		20-50		2-7						1999	IM-25-4(135)219	Wyoming	No	Interstate
Design/JMF	95		48		29		5.8		5.60		4.4						
JMF Limits	88-100		41-55		24-34		3.0-7.0		5.35-5.85		2.5-4.5						
1	97	2	51	3	33	4	7.6	1.8	5.19	-0.41	5.2	0.8					
2	96	1	45	-3	29	0	6.3	0.5	5.70	0.10	4	-0.4					
3	95	0	44	-4	28	-1	6.2	0.4	5.60	0.00	3.7	-0.7					
4	96	1	54	6	33	4	7.3	1.5	5.80	0.20	5.3	0.9					
5	96	1	50	2	29	0	5.8	0	5.60	0.00	5.1	0.7					
Specification Limits	55-95		30-65		20-50		2-7						1999	IM-25-4(135)219	Wyoming	No	Interstate
Design/JMF	76		47		29		5.4		5.20		4.0						
JMF Limits	69-83		40-54		24-34		3.0-7.0		4.95-5.45		2.5-4.5						
1	74	-2	47	0	32	3	6.5	1.1	4.60	-0.60	4.3	0.3					
2	74	-2	49	2	32	3	5.9	0.5	5.60	0.40	4.3	0.3					
3	78	2	52	5	34	5	6.6	1.2	5.55	0.35	2.9	-1.1					
Specification Limits	55-95		30-65		20-50		2-7						1999	IM-25-4(135)219	Wyoming	No	Interstate
Design/JMF	76		47		29		5.4		5.60		4.7						
JMF Limits	69-83		40-54		24-34		3.0-7.0		5.35-5.85		2.5-4.5						
1	80	4	52	5	34	5	7	1.6	5.14	-0.46	3.7	-1					
2	76	0	50	3	33	4	6.8	1.4	5.49	-0.11	3.1	-1.6					
3	74	-2	46	-1	29	0	6.2	0.8	4.63	-0.97	3.8	-0.9					
4	77	1	49	2	32	3	6.4	1	5.60	0.00	3.9	-0.8					
5	71	-5	41	-6	26	-3	4.8	-0.6	4.67	-0.93	4.8	0.1					
Specification Limits	55-95		30-65		20-50		2-7						1999	IM-80-3(127)187	Wyoming	No	Interstate
Design/JMF	75		41		25		6.1		5.00		4.9						
JMF Limits	68-82		34-48		20-30		3.0-7.0		4.75-5.25		3.0-5.0						
1	81	0	41	-1	24	-3	5.3	-0.9	5.27	-0.97	3	-0.2					
2	78	-3	42	0	25	-2	5.6	-0.6	5.20	-1.04	3.9	0.7					
3	69	-12	37	-5	24	-3	5.5	-0.7	4.54	-1.70	3.2	0					
4	75	-6	39	-3	24	-3	5.1	-1.1	4.91	-1.33	2.7	-0.5					
5	72	-9	40	-2	26	-1	5.4	-0.8	4.81	-1.43	2.5	-0.7					
6	78	-3	38	-4	23	-4	5.4	-0.8	5.14	-1.10	3	-0.2					
7	77	-4	40	-2	24	-3	5.4	-0.8	5.10	-1.14	3.1	-0.1					
8	81	0	43	1	27	0	5.3	-0.9	5.20	-1.04	3.7	0.5					
9	81	0	44	2	27	0	5.4	-0.8	5.46	-0.78	3.2	0					
10	81	0	42	0	25	-2	5.5	-0.7	5.34	-0.90	3.2	0					
11	79	-2	42	0	25	-2	5.6	-0.6	5.06	-1.18	3.1	-0.1					
12	60	-21	27	-15	19	-8	4.6	-1.6	4.84	-1.40	4	0.8					
13	76	-5	44	2	28	1	6	-0.2	5.14	-1.10	3.2	0					
14	76	-5	44	2	28	1	5.3	-0.9	4.99	-1.25	3.5	0.3					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	VTM	Difference VTM	Year	Project ID	State	RAP	Road Classification
15	78	-3	44	2	28	1	5	-1.2	5.08	-1.16	3	-0.2					
16	67	-14	35	-7	22	-5	4.8	-1.4	4.33	-1.91	4.1	0.9					
17	75	-6	41	-1	25	-2	5.5	-0.7	4.99	-1.25	4.8	1.6					
18	75	-6	44	2	27	0	5.9	-0.3	5.01	-1.23	5.1	1.9					
Specification Limits Design/JMF JMF Limits	55-95 84 77-91		30-65 36 30-44		20-50 22 20-30		2-7 5 3-7		4.90		5		1999	IM-80-3(127)187	Wyoming	No	Interstate
1	87	3	42	6	25	3	5.6	0.6	4.68	-0.22	2.9	-2.1					
Specification Limits Design/JMF JMF Limits	90-MAX 82		42		23-49 27		2-7 3.5		5.00		4.2		1999	IM-80-3(129)143 & CMP SR-80-3(125)173	Wyoming	Yes	Interstate
1	82	0	46	4	30	3	4.6	1.1	4.20	-0.80	6.3	2.1					
2	82	0	46	4	29	2	4.3	0.8	4.27	-0.73	6.1	1.9					
3	85	3	49	7	32	5	5.4	1.9	5.23	0.23	2.6	-1.6					
4	80	-2	43	1	31	4	4.1	0.6	4.97	-0.03	3.6	-0.6					
5	84	2	46	4	30	3	5.2	1.7	4.67	-0.33	3.5	-0.7					
6	85	3	49	7	32	5	5.4	1.9	5.23	0.23	2.6	-1.6					
7	84	2	48	6	31	4	4.6	1.1	4.82	-0.18	4	-0.2					
8	83	1	44	2	29	2	4.4	0.9	4.66	-0.34	3.9	-0.3					
9	80	-2	47	5	32	5	4.9	1.4	4.67	-0.33	2.4	-1.8					
10	80	-2	44	2	29	2	4.3	0.8	4.91	-0.09	3.5	-0.7					
11	83	1	49	7	32	5	6.1	2.6	4.65	-0.35	2.4	-1.8					
12	82	0	47	5	31	4	4.4	0.9	4.98	-0.02	2.8	-1.4					
13	85	3	50	8	32	5	4.2	0.7	5.29	0.29	1.8	-2.4					
14	84	2	48	6	31	4	4.2	0.7	5.18	0.18	3.2	-1					
15	80	-2	45	3	30	3	4.8	1.3	4.85	-0.15	1.9	-2.3					
16	85	3	50	8	32	5	4.5	1	5.05	0.05	2.7	-1.5					
17	83	1	48	6	31	4	4.9	1.4	4.97	-0.03	2.3	-1.9					
18	80	-2	45	3	30	3	4.9	1.4	4.74	-0.26	2.1	-2.1					
19	78	-4	44	2	29	2	5.3	1.8	4.37	-0.63	3.9	-0.3					
20	88	6	53	11	33	6	5.4	1.9	4.75	-0.25	5.2	1					
21	86	4	45	3	29	2	4.9	1.4	4.40	-0.60	5.5	1.3					
22	86	4	46	4	29	2	4.8	1.3	4.50	-0.50	5.6	1.4					
23	88	6	49	7	31	4	5.2	1.7	4.63	-0.37	4.4	0.2					
24	83	1	47	5	30	3	5.2	1.7	5.20	0.20	2.7	-1.5					
25	84	2	51	9	33	6	5.7	2.2	5.21	0.21	1.4	-2.8					
26	77	-5	46	4	31	4	4.8	1.3	4.83	-0.17	2.5	-1.7					
27	84	2	51	9	32	5	5	1.5	5.18	0.18	2.7	-1.5					
28	81	-1	42	0	27	0	4.5	1	5.03	0.03	3.5	-0.7					
29	80	-2	45	3	29	2	5	1.5	5.12	0.12	3.5	-0.7					
30	82	0	44	2	29	2	4.8	1.3	4.64	-0.36	3.5	-0.7					
31	84	2	44	2	28	1	4.4	0.9	5.01	0.01	4.2	0					
32	77	-5	41	-1	27	0	5.2	1.7	4.74	-0.26	2.6	-1.6					
33	82	0	46	4	30	3	4.3	0.8	5.21	0.21	2.8	-1.4					
34	86	4	54	12	34	7	5.5	2	5.23	0.23	2.9	-1.3					
35	83	1	48	6	31	4	5.2	1.7	4.84	-0.16	3.4	-0.8					
36	77	-5	39	-3	27	0	5.5	2	4.25	-0.75	3.9	-0.3					
37	79	-3	45	3	30	3	5.8	2.3	4.65	-0.35	2.7	-1.5					
Specification Limits Design/JMF JMF Limits	90 max 82		42		23-49 27		2-7 3.5		5.00		4.1 3.0-5.0		1999	IM-80-3(129)143 & CMP SR-80-3(125)173	Wyoming	Yes	Interstate
1	83	1	47	5	31	4	3.4	-0.1	4.61	-0.39	3.1	-1					
2	86	4	48	6	32	5	4	0.5	4.45	-0.55	3.2	-0.9					
3	84	2	49	7	32	5	4.3	0.8	4.84	-0.16	3.4	-0.7					
4	81	-1	46	4	30	3	3.5	0	4.68	-0.32	3.9	-0.2					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	VTM	Difference VTM	Year	Project ID	State	RAP	Road Classification
5	79	-3	43	1	28	1	3.8	0.3	4.46	-0.54	3.2	-0.9					
6	82	0	43	1	28	1	4.1	0.6	4.65	-0.35	3.8	-0.3					
7	78	-4	41	-1	27	0	4.3	0.8	4.16	-0.84	4.5	0.4					
8	78	-4	44	2	30	3	5	1.5	4.37	-0.63	5	0.9					
9	83	1	48	6	31	4	4.8	1.3	4.65	-0.35	3.6	-0.5					
10	82	0	44	2	29	2	4.4	0.9	4.70	-0.30	4.1	0					
11	80	-2	44	2	29	2	3.8	0.3	4.19	-0.81	3.1	-1					
12	76	-6	39	-3	26	-1	4.2	0.7	4.16	-0.84	4.8	0.7					
13	83	1	47	5	31	4	4.6	1.1	4.70	-0.30	3.3	-0.8					
14	79	-3	41	-1	27	0	4.8	1.3	4.61	-0.39	4.7	0.6					
15	82	0	44	2	29	2	4.4	0.9	4.71	-0.29	4.1	0					
16	82	0	43	1	28	1	4.4	0.9	4.77	-0.23	3.5	-0.6					
17	86	4	50	8	31	4	5	1.5	5.14	0.14	4.2	0.1					
18	82	0	44	2	28	1	5.1	1.6	4.71	-0.29	3.6	-0.5					
19	84	2	47	5	31	4	5.3	1.8	4.66	-0.34	3.2	-0.9					
20	81	-1	41	-1	27	0	5.8	2.3	4.79	-0.21	4.4	0.3					
21	87	5	49	7	31	4	5.1	1.6	5.11	0.11	3.9	-0.2					
22	83	1	45	3	29	2	5.1	1.6	4.76	-0.24	4.2	0.1					
23	84	2	46	4	31	4	6.5	3	4.42	-0.58	3.5	-0.6					
24	81	-1	42	0	28	1	5	1.5	4.59	-0.41	4.1	0					
25	83	1	46	4	30	3	5.1	1.6	4.96	-0.04	4	-0.1					
26	86	4	50	8	30	3	5.1	1.6	4.58	-0.42	4.7	0.6					
27	83	1	46	4	29	2	5	1.5	4.91	-0.09	3.7	-0.4					
28	84	2	47	5	30	3	4.6	1.1	4.40	-0.60	4.7	0.6					
29	89	7	47	5	30	3	5.2	1.7	4.90	-0.10	4.2	0.1					
30	81	-1	42	0	27	0	5.1	1.6	4.76	-0.24	5.5	1.4					
31	81	-1	44	2	27	0	4.9	1.4	4.73	-0.27	2.9	-1.2					
32	83	1	45	3	30	3	5	1.5	4.98	-0.02							
33	81	-1	43	1	28	1	5.3	1.8	4.79	-0.21	3.2	-0.9					
34	82	0	44	2	29	2	4.8	1.3	4.86	-0.14	4	-0.1					
35	83	1	46	4	28	1	4.9	1.4	4.61	-0.39	4	-0.1					
36	75	-7	42	0	26	-1	4.4	0.9	4.83	-0.17	4.1	0					
37	86	4	48	6	30	3	5.1	1.6	5.21	0.21	4.2	0.1					
38	80	-2	43	1	28	1	5	1.5	4.62	-0.38	3.4	-0.7					
39	82	0	43	1	26	-1	5.5	2	4.59	-0.41	4.7	0.6					
40	83	1	45	3	30	3	4.9	1.4	4.74	-0.26	3.4	-0.7					
41	83	1	43	1	28	1	5	1.5	4.62	-0.38	3.8	-0.3					
42	83	1	45	3	30	3	5.5	2	4.71	-0.29	3	-1.1					
Specification Limits Design/JMF JMF Limits	90 max 82		42		23-49 27		2-7 3.5		5.00 4.75-5.25		4 3.0-5.0		1999	IM-80-3(129)143 & CMP SR-80-3(125)173	Wyoming	Yes	Interstate
1	79	-3	43	1	29	2	4.7	1.2	4.63	-0.37	4	0					
2	81	-1	45	3	31	4	5.1	1.6	4.76	-0.24	5.3	1.3					
3	83	1	49	7	32	5	4.9	1.4	4.99	-0.01	4.7	0.7					
4	83	1	46	4	31	4	5	1.5	4.62	-0.38	3.9	-0.1					
5	82	0	45	3	31	4	4.8	1.3	4.42	-0.58	3.7	-0.3					
6	82	0	55	13	37	10	4.9	1.4	4.70	-0.30	3.8	-0.2					
7	82	0	44	2	29	2	4.7	1.2	4.78	-0.22	3.7	-0.3					
8	77	-5	40	-2	26	-1	4.2	0.7	4.63	-0.37	4.5	0.5					
9	80	-2	44	2	29	2	4.4	0.9	4.83	-0.17	4.5	0.5					
10	80	-2	46	4	29	2	4.8	1.3	4.54	-0.46	3.3	-0.7					
Specification Limits Design/JMF JMF Limits	85-100 94		20-55 27		5-35 10		5 4.75-5.25		13.9 12.4-15.4		4.1 2.5-4.5		1999	IM-90-4(101)169	Wyoming	Yes	Interstate
1	94	0	27	0	12	2	4.87	-0.13	12	-1.90	2.8	2.8					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	VTM	Difference VTM	Year	Project ID	State	RAP	Road Classification
2	93	-1	27	0	12	2	5	0	11.90	-2.00	2.1	2.1					
3	97	3	27	0	12	2	5.17	0.17	12.10	-1.80	1.1	1.1					
4	94	0	25	-2	14	4	4.7	-0.3	11.40	-2.50	2.1	2.1					
5	95	1	30	3	14	4	4.77	-0.23	11.30	-2.60	2	2					
6	93	-1	26	-1	13	3	4.48	-0.52	12.00	-1.90	3.4	3.4					
7	93	-1	26	-1	12	2	4.61	-0.39	11.40	-2.50	2.1	2.1					
8	92	-2	26	-1	12	2	4.78	-0.22	11.30	-2.60	1.4	1.4					
9	95	1	29	2	14	4	4.54	-0.46	11.30	-2.60	2.2	2.2					
10	96	2	28	1	14	4	4.74	-0.26	11.50	-2.40	2.2	2.2					
11	94	0	29	2	14	4	4.26	-0.74	12.90	-1.00	4.4	4.4					
12	96	2	30	3	11	1	4.94	-0.06	12.20	-1.70	2.3	2.3					
13	97	3	28	1	12	2	4.2	-0.8	11.30	-2.60	2.8	2.8					
14	96	2	31	4	13	3	4.52	-0.48	11.70	-2.20	2.1	2.1					
15	96	2	29	2	13	3	4.61	-0.39	11.60	-2.30	2.1	2.1					
16	93	-1	29	2	12	2	5	0	11.50	-2.40	1.4	1.4					
17	96	2	29	2	13	3	4.2	-0.8	11.20	-2.70	2.9	2.9					
18	95	1	27	0	12	2	4.5	-0.5	11.30	-2.60	2.5	2.5					
19	95	1	28	1	12	2	4.3	-0.7	12.60	-1.30	4.3	4.3					
20	96	2	27	0	12	2	4.2	-0.8	11.40	-2.50	3.2	3.2					
21	93	-1	23	-4	9	-1	3.64	-1.36	11.30	-2.60	4.6	4.6					
22	94	0	26	-1	12	2	4.07	-0.93	10.80	-3.10	2.6	2.6					
23	89	-5	23	-4	10	0	4.02	-0.98	11.80	-2.10	4	4					
24	95	1	32	5	16	6	4.22	-0.78	12.00	-1.90	3.9	3.9					
25	95	1	27	0	11	1	4.3	-0.7	11.40	-2.50	3.3	3.3					
26	91	-3	25	-2	11	1	3.53	-1.47	11.60	-2.30	5.1	5.1					
27	93	-1	27	0	12	2	4.7	-0.3	11.10	-2.80	1.3	1.3					
28	94	0	25	-2	11	1	4.59	-0.41	11.40	-2.50	2.2	2.2					
29	94	0	25	-2	11	1	4.49	-0.51	12.30	-1.60	3.6	3.6					
30	93	-1	25	-2	11	1	4.36	-0.64	11.90	-2.00	2.8	2.8					
Specification Limits Design/JMF JMF Limits	85-100 94		35-70 49		20-55 27		2-7 3.6		5.00 4.75-5.25		4 2.5-4.5		1999	IM-90-4(101)169	Wyoming	Yes	Interstate
1	92	-2	38	-11	25	-2	7.2	3.6	4.66	-0.34	3.8	-0.2					
2	94	0	46	-3	29	2	6.6	3	5.16	0.16	1.1	-2.9					
3	97	3	50	1	30	3	7.9	4.3	4.66	-0.34	3.4	-0.6					
4	95	1	47	-2	29	2	7.8	4.2	4.74	-0.26	2.6	-1.4					
5	97	3	47	-2	28	1	6.1	2.5	4.45	-0.55	3.4	-0.6					
6	97	3	48	-1	28	1	7.3	3.7	4.47	-0.53	2.6	-1.4					
7	96	2	51	2	30	3	6.5	2.9	4.69	-0.31	3.2	-0.8					
8	96	2	42	-7	25	-2	4.9	1.3	4.53	-0.47	2.3	-1.7					
9	88	-6	46	-3	26	-1	5.2	1.6	4.28	-0.72	3.7	-0.3					
10	94	0	43	-6	25	-2	6.4	2.8	4.61	-0.39	3	-1					
Specification Limits Design/JMF JMF Limits	55-95 79 72-86		30-65 40 33-47		20-50 26 21-31		2-7 5.5 3-7		5.80		4		1999	MG-042-1(18)	Wyoming	No	Primary
1	82	3	44	4	28	2	5.8	0.3	6.61	0.81	4.4	0.4					
2	82	3	44	4	28	2	5.8	0.3	6.24	0.44	4.4	0.4					
3	78	-1	41	1	26	0	4.9	-0.6	6.45	0.65	3.2	-0.8					
4	80	1	42	2	28	2	5.2	-0.3	6.55	0.75	2.6	-1.4					
5	79	0	39	-1	24	-2	5.2	-0.3	6.33	0.53	3.5	-0.5					
6	74	-5	40	0	25	-1	5.5	0	6.06	0.26	4.7	0.7					
7	73	-6	39	-1	25	-1	4.7	-0.8	6.13	0.33	3.3	-0.7					
8	77	-2	41	1	25	-1	5.9	0.4	6.12	0.32	3.1	-0.9					
9	86	7	46	6	31	5	7.6	2.1	6.99	1.19	1.2	-2.8					
10	81	2	42	2	27	1	6.2	0.7	6.24	0.44	3.2	-0.8					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	VTM	Difference VTM	Year	Project ID	State	RAP	Road Classification
11	81	2	40	0	26	0	6.6	1.1	5.93	0.13	2.9	-1.1					
12	76	-3	38	-2	24	-2	6.6	1.1	5.55	-0.25	2.9	-1.1					
13	80	1	41	1	26	0	6.3	0.8	5.55	-0.25	4.7	0.7					
14	72	-7	36	-4	23	-3	5.6	0.1	5.80	0.00	5.2	1.2					
15	75	-4	40	0	25	-1	6.1	0.6	5.20	-0.60	4.2	0.2					
16	73	-6	31	-9	21	-5	4.7	-0.8	6.11	0.31	3.2	-0.8					
17	73	-6	37	-3	23	-3	5	-0.5	5.98	0.18	3.9	-0.1					
Specification Limits Design/JMF JMF Limits	55-95 77		30-65 44		20-50 28		2-7 5.4		4.50 4.25-4.75		4.3 3.0-5.0		1999	NHI-80-4(207)246 & CMP PO-0410(10)	Wyoming	Yes	Interstate
1	75	-2	43	-1	31	3	5.9	0.5	4.01	-0.49	5	0.7					
2	75	-2	47	3	33	5	5.9	0.5	4.28	-0.22	4.1	-0.2					
3	79	2	48	4	35	7	6.9	1.5	4.39	-0.11	2.6	-1.7					
4	71	-6	43	-1	31	3	5.7	0.3	4.19	-0.31	3.5	-0.8					
5	80	3	46	2	33	5	5.8	0.4	4.70	0.20	2.9	-1.4					
6	78	1	44	0	32	4	5.5	0.1	4.44	-0.06	3.1	-1.2					
7	82	5	51.7	7.7	35.5	7.5	6.9	1.5	4.84	0.34	3	-1.3					
8	77.9	0.9	48.4	4.4	33.4	5.4	6.4	1	4.60	0.10	3.5	-0.8					
9	74.2	-2.8	43.5	-0.5	29.9	1.9	5.7	0.3	4.39	-0.11	4.3	0					
10	78	1	47	3	34	6	6.1	0.7	4.60	0.10	4.6	0.3					
11	79	2	46	2	33	5	6.1	0.7	4.43	-0.07	3.3	-1					
12	78	1	48	4	35	7	7	1.6	4.74	0.24	3.7	-0.6					
13	75	-2	46	2	33	5	6.7	1.3	4.67	0.17	3.3	-1					
14	75	-2	43	-1	32	4	6.4	1	4.56	0.06	3	-1.3					
15	77	0	46	2	34	6	6.9	1.5	4.50	0.00	2.8	-1.5					
16	81	4	49	5	36	8	7	1.6	4.60	0.10	3.2	-1.1					
17	78	1	46	2	34	6	6.5	1.1	4.65	0.15	3.4	-0.9					
18	75	-2	40	-4	30	2	6.1	0.7	4.24	-0.26	2.7	-1.6					
19	77	0	45	1	34	6	6.6	1.2	4.48	-0.02	3.5	-0.8					
Specification Limits Design/JMF JMF Limits	55-95 76 69-83		30-65 46 39-53		20-50 28 23-33		2-7 5.8 3.0-7.0		5.00 4.75-5.25		4 3.0-5.0		1999	NHI-80-4(207)246 & CMP PO-0410(10)	Wyoming	No	Interstate
1	75	-1	44	-2	32	1	5.3	-2.8	4.17	-1.45	4.6	4.6					
2	71	-5	39	-7	27	-4	5.3	-2.8	3.95	-1.67	5.9	5.9					
3	78	2	49	3	35	4	6.6	-1.5	4.71	-0.91	2.1	2.1					
4	77	1	44	-2	29	-2	4.6	-3.5	4.98	-0.64	3.8	3.8					
5	83	7	54	8	37	6	6.2	-1.9	5.14	-0.48	3.9	3.9					
6	76	0	42	-4	29	-2	4.9	-3.2	4.85	-0.77	4.1	4.1					
7	69	-7	39	-7	27	-4	4.7	-3.4	5.21	-0.41	3	3					
Specification Limits Design/JMF JMF Limits	85-100 92 86-100		30-65 44 37-51		20-50 26 21-31		2-7 3.9 3-7		4.50		4.5		1999	NHI-90-4(112)186	Wyoming	No	Interstate
1	89	-3	43	-1	25	-1	6.9	3	4.59	0.09	4.3	-0.2					
2	86	-6	39	-5	23	-3	6.9	3	4.90	0.40	4.3	-0.2					
Specification Limits Design/JMF JMF Limits	55-95 70 63-77		30-65 47 40-54		20-50 34 29-39		2-7 4 2.0-6.0		5.90 5.65-6.15		4 2.5-4.5		1999	NH-ON034-02(031)	Wyoming	No	Primary
1	77	7	48	1	35	1	4.3	-0.9	6.40	1.41	2.2	-2.7					
2	69	-1	44	-3	33	-1	4	-1.2	6.00	1.01	3	-1.9					
3	76	6	50	3	39	5	5	-0.2	6.56	1.57	1.6	-3.3					
4	71	1	48	1	37	3	5.5	0.3	6.01	1.02	2.1	-2.8					
5	68	-2	46	-1	37	3	5.1	-0.1	5.77	0.78	2	-2.9					
6	64	-6	44	-3	34	0	4.2	-1	5.71	0.72	3.7	-1.2					
Specification Limits Design/JMF	55-95 79		30-65 46		20-50 30		2-7 5.7		5.40		3.1		1999	NHP-010-3(75)	Wyoming	No	Primary

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	VTM	Difference VTM	Year	Project ID	State	RAP	Road Classification
JMF Limits	72-86		39-53		25-35		3-7										
1	83	4	57	11	42	12	7.6	1.9	5.71	0.31	2.2	-0.9					
2	90	11	64	18	48	18	11.9	6.2	5.98	0.58	2.2	-0.9					
3	78	-1	48	2	36	6	8.4	2.7	5.3	-0.10	2.2	-0.9					
4									5.69	0.29	1.4	-1.7					
5									5.25	-0.15	2.7	-0.4					
6									5.82	0.42	3.6	0.5					
Specification Limits Design/JMF	55-95		30-65		20-50		2-7						1999	NHP-012-2(9)	Wyoming	No	Primary
JMF Limits	77		38		25		4.7		5.30		3.9						
JMF Limits	70-84		31-45		20-30		3-7										
1	76	-1	40	2	26	1	5.1	0.4	5.15	-0.15	2.7	2.7					
2	78	1	41	3	27	2	4.5	-0.2	5.40	0.10	2.2	2.2					
3	78	1	42	4	29	4	5.9	1.2	5.65	0.35	2.5	2.5					
4	84	7	47	9	30	5	6.2	1.5	5.75	0.45	4.1	4.1					
5	76	-1	40	2	27	2	5.5	0.8	5.23	-0.07	5.1	5.1					
Specification Limits Design/JMF	55-95		30-65		20-50		2-7						1999	§CP-ON040-02(018) & ARSCT-ON040-02(018)	Wyoming	No	Primary
JMF Limits	73		50		37		5.3		4.75		3.3						
JMF Limits	66-80		43-57		32-42		3.0-7.0		4.50-5.00		2.5-4.5						
1	80	7	56	6	42	5	8.9	3.6	4.85	0.10	1.7	1.7					
2	77	4	54	4	42	5	8.5	3.2	4.86	0.11	2.5	2.5					
Specification Limits Design/JMF	55-95		30-65		20-50		2-7						1999	§CP-ON040-02(018) & ARSCT-ON040-02(018)	Wyoming	No	Primary
JMF Limits	73		50		34		5.3		4.75		3.3						
JMF Limits	66-80		43-57		29-39		3.0-7.0		4.50-5.00		2.5-4.5						
1	72	-1	52	2	34	0	8.4	3.1	4.60	-0.15	2.9	-0.4					
2									4.76	0.01	2	-1.3					
3	75	2	49	-1	37	3	8	2.7	4.77	0.02	2.6	-0.7					
4	73	0	50	0	38	4	8.4	3.1	4.77	0.02	2.53	-0.77					
5	72	-1	50	0	35	1	8.5	3.2	4.80	0.05	3.5	0.2					
6	66	-7	42	-8	33	-1	7.5	2.2	5.00	0.25	2.5	-0.8					
7	67	-6	43	-7	33	-1	7	1.7	4.75	0.00	4.4	1.1					
8	70	-3	45	-5	33	-1	7.1	1.8	4.56	-0.19	4.4	1.1					
Specification Limits Design/JMF	85-100		35-70		20-55		2-7						1999	§CP-ON040-02(018) & ARSCT-ON040-02(018)	Wyoming	No	Primary
JMF Limits	93		47		34		5.7		5.00		4.1						
JMF Limits	86-100		40-54		29-39		3.0-7.0		4.75-5.25		2.5-4.5						
1	95	2	60	13	45	11	9.7	4	5.13	0.13	1.7	-2.4					
2	95	2	54	7	41	7	9	3.3	5.00	0.00	2.9	-1.2					
3	95	2	52	5	38	4	8.8	3.1	4.98	-0.02	2.7	-1.4					
4	93	0	46	-1	37	3	8	2.3	5.15	0.15	2.6	-1.5					
5	94	1	49	2	36	2	7.6	1.9	4.99	-0.01	2.6	-1.5					
Specification Limits Design/JMF	55-95		30-65		20-50		2-7						1999	SCP-010-4(39)	Wyoming	No	Primary
JMF Limits	73		48		33		5.6		5.10		4.9						
JMF Limits	66-80		41-55		28-38		3-7										
1	74	1	48	0	33	0	4.6	-1	5.31	0.21	2.9	-2					
Specification Limits Design/JMF	60-85		35-60		20-45		2-7						1999	SCP-010-4(39)	Wyoming	No	Primary
JMF Limits	73		48		33		5.6		5.10		4						
JMF Limits	66-80		41-55		28-38		3.0-7.0		4.85-5.35		2.5-4.5						
1	81	8	56	8	39	6	5.6	0	5.65	0.55	2.5	-1.5					
2	77	4	54	6	38	5	6	0.4	5.36	0.26	2.9	-1.1					
3	82	9	57	9	38	5	5.9	0.3	5.58	0.48	3.7	-0.3					
4	69	-4	45	-3	31	-2	5.5	-0.1	5.13	0.03	6.3	2.3					
5	73	0	49	1	34	1	5.9	0.3	5.07	-0.03	4.3	0.3					
6	77	4	52	4	36	3	6.3	0.7	6.00	0.90	3.5	-0.5					
7	68	-5	41	-7	28	-5	4.9	-0.7	5.50	0.40	4.5	0.5					
Specification Limits Design/JMF	55-95%		30-65%		20-50%		2-7%						1999	SCP-012-1(96)	Wyoming	No	Primary
JMF Limits	78		42		27		5		5.70		4.5						

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	VTM	Difference VTM	Year	Project ID	State	RAP	Road Classification
1	99	2	51	4	31	-1	3.2	-2.4	6.05	-0.15	8.9	4.4					
2	99	2	51	4	31	-1	3.2	-2.4	6.05	-0.15	8.1	3.6					
Specification Limits	85-100		35-70		20-55		2-7						1999	STPU-1110(2)	Wyoming	No	Secondary
Design/JMF	93		52		39		5		5.20		3.1						
JMF Limits	86-100		45-59		34-44		3-7										
1	93	0	62	10	49	10	5.2	0.2	4.99	-0.21	4.9	1.8					
Specification Limits	60-85		35-60		20-45		2-7						1999	IM-25-3(86)160	Wyoming	No	Interstate
Design/JMF	74		40		28		5.0		5.40		4						
JMF Limits	67-81		35-49		23-33		3.0-7.0		5.15-5.65		3.0-5.0						
1	84	10	42	2	27	-1	6.7	1.7	5.68	0.28	3.29	-0.71					
2	87	13	46	6	29	1	6.9	1.9	5.70	0.30	3.8	-0.2					
3	81	7	45	5	28	0	5	0	5.21	-0.19	5.27	1.27					
4	78	4	41	1	25	-3	5.7	0.7	5.15	-0.25	3.7	-0.3					
Specification Limits	55-95%		30-65%		20-50%		2-7%						2000	AM-ON25-04(057)	Wyoming	No	Primary
Design/JMF	84		41		31		5		5.00		2.6						
JMF Limits	77-91		34-48		26-36		3.0-7.0		4.75-5.25		2.5-4.5						
1	80	-4	35	-6	26	-5	5.6	0.6	4.64	-0.36	4	1.4					
2									4.74	-0.26	3.1	0.5					
Specification Limits	55-95		30-65		20-50		2-7						2000	AM-ON34-02(032)	Wyoming	No	Primary
Design/JMF	76		48		36		3.7		5.75		5.1						
JMF Limits	69-83		41-55		31-41		2-6										
1	78	2	52	4	38	2	4.6	0.9	6.01	0.26	3.4	-1.7					
Specification Limits	55-95		30-65		20-50		2-7						2000	AM-ON34-02(032)	Wyoming	No	Primary
Design/JMF	76		48		36		3.7		5.75		5.1						
JMF Limits	69-83		41-55		31-41		2.0-6.0		5.55-6.05		2.5-4.5						
1	83	7	53	5	39	3	4.6	0.9	6.40	0.65	3.6	-1.5					
2	81	5	52	4	39	3	4.7	1	5.90	0.15	4.1	-1					
Specification Limits	55-95		30-65		20-50		2-7						2000	CMP-042-1(16)	Wyoming	No	Primary
Design/JMF	77		46		27		5.8		5.40		4						
JMF Limits	70-84		39-53		22-32		3-7										
1	84	7	53	7	36	9	9.8	4	6.27	0.87	3.9	-0.1					
2	84	7	56	10	37	10	10.2	4.4	6.15	0.75	3.9	-0.1					
3	81	4	51	5	34	7	9.7	3.9	6.17	0.77	3.9	-0.1					
Specification Limits	55-95		30-65		20-50		2-7						2000	CMP-042-1(16)	Wyoming	No	Primary
Design/JMF	77		46		27		5.8		5.40		4						
JMF Limits	70-84		39-53		22-32		3.0-7.0		5.15-5.65		2.5-4.5						
1	75	-2	44	-2	30	3	7.6	1.8	6.00	0.60	6.3	2.3					
2	74	-3	43	-3	29	2	6.3	0.5	5.20	-0.20	5.7	1.7					
3	80	3	46	0	31	4	6.8	1	5.30	-0.10	5.3	1.3					
4	79	2	50	4	33	6	6	0.2	5.20	-0.20	5.8	1.8					
Specification Limits	55-95		30-65		20-50		2-7						2000	CMP-PM-IO80-05(136)	Wyoming	No	Interstate
Design/JMF	73		53		35		5		5.00		4.1						
JMF Limits	66-80		46-60		30-40		3.0-7.0		4.75-5.25		3.0-5.0						
1	65	-8	50	-3	37	2	5.6	0.6	4.99	-0.01	3.1	-1					
2	76	3	53	0	38	3	5.8	0.8	5.05	0.05	3.6	-0.5					
3	75	2	54	1	38	3	5.1	0.1	5.25	0.25	1.9	-2.2					
4	79	6	58	5	43	8	6.2	1.2	5.35	0.35	1.9	-2.2					
Specification Limits	55-95		30-65		20-50		2-7						2000	CMP-PM-IO80-05(136)	Wyoming	No	Interstate
Design/JMF	73		53		35		5		5.00		4.1						
JMF Limits	66-80		46-60		30-40		3-7										
1	79	6	55	2	40	5	5.6	0.6	4.41	-0.59	5.4	1.3					
Specification Limits	100		50-70		33-63		3-12						2000	CMP-PO-0107-00(022)	Wyoming	No	Secondary
Design/JMF	100		57		40		5.7		5.70		4.1						
JMF Limits	100		50-64		35-45		3.7-7.7										
1	100	0	65	8	42	2	5.8	0.1	5.61	-0.09	5.6	1.5					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	VTM	Difference VTM	Year	Project ID	State	RAP	Road Classification
Specification Limits Design/JMF JMF Limits	90-100 92 90-100		61 56-66		25-58 33 29-37		2-7 3.9 2-6		5.00		5.4		2000	CMP-PO-043-02(044)	Wyoming	No	Primary
1	92	0	54	-7	34	1	7.2	3.3	4.98	-0.02	2.8	-2.6					
2	93	1	64	3	37	4	6.2	2.3	5.18	0.18	3.1	-2.3					
3	93	1	64	3	37	4	6.2	2.3	5.18	0.18	2	-3.4					
4	94	2	64	3	37	4	5.9	2	5.05	0.05	4	-1.4					
5	94	2	64	3	37	4	5.9	2	5.05	0.05	2.4	-3					
6	92	0	61	0	35	2	6.4	2.5	4.89	-0.11	3.6	-1.8					
7	92	0	61	0	35	2	6.4	2.5	4.89	-0.11	2.4	-3					
8	93	1	61	0	35	2	6.6	2.7	5.35	0.35	2.9	-2.5					
9	93	1	61	0	35	2	6.6	2.7	5.35	0.35	1.4	-4					
10	91	-1	60	-1	33	0	6.3	2.4	4.90	-0.10	4.2	-1.2					
11	91	-1	60	-1	33	0	6.3	2.4	4.90	-0.10	2.8	-2.6					
12	95	3	61	0	33	0	5.7	1.8	5.09	0.09	3.9	-1.5					
13	95	3	61	0	33	0	5.7	1.8	5.09	0.09	2.2	-3.2					
14	93	1	64	3	36	3	6.6	2.7	4.90	-0.10	3.5	-1.9					
15	93	1	64	3	36	3	6.6	2.7	4.90	-0.10	2.2	-3.2					
16	96	4	67	6	38	5	6	2.1	5.20	0.20	2.6	-2.8					
17	94	2	66	5	37	4	6.1	2.2	5.00	0.00	2.9	-2.5					
18	91	-1	55	-6	32	-1	6.4	2.5	5.60	0.60	2.8	-2.6					
19											1.9	-3.5					
20											2.2	-3.2					
Specification Limits Design/JMF JMF Limits	85-100 91 85-99		35-70 49 42-56		20-55 32 27-37		2-7 5 3-7		5.64		4		2000	CMP-PO-FX-035-2(30)	Wyoming	No	Primary
1	89	-2	46	-3	29	-3	6.9	1.9	5.63	-0.01	3.2	-0.8					
Specification Limits Design/JMF JMF Limits	55-95 70 63-77		30-65 45 38-52		20-50 34 29-39		2-7 5.4 3-7		5.00		4.7		2000	MP-PO-ON20-02(05)	Wyoming	No	Primary
1	75	5	45	0	34	0	5.2	-0.2	5.18	0.18	4.4	-0.3					
Specification Limits Design/JMF JMF Limits	55-95 70 63-77		30-65 45 38-52		20-50 34 29-39		2-7 5.4 3.0-7.0		5.00 4.75-5.25		4.7 2.5-4.5		2000	MP-PO-ON20-02(05)	Wyoming	No	Primary
1	74	4	45	0	33	-1	3.8	-1.6	5.39	0.39	3.1	-1.6					
2	70	0	47	2	34	0	4.8	-0.6	5.09	0.09	2.7	-2					
3	77	7	51	6	37	3	4.9	-0.5	5.44	0.44	2.5	-2.2					
4	61	-9	40	-5	30	-4	4.9	-0.5	4.90	-0.10	2.8	-1.9					
5	74	4	48	3	35	1	6.9	1.5	5.10	0.10	2.6	-2.1					
6	59	-11	34	-11	25	-9	3.9	-1.5	4.54	-0.46	4.4	-0.3					
7	74	4	44	-1	32	-2	5.2	-0.2	5.01	0.01	3.5	-1.2					
8	71	1	42	-3	30	-4	5	-0.4	4.93	-0.07	3.7	-1					
Specification Limits Design/JMF JMF Limits	55-95 74 67-81		30-65 45 38-52		20-50 30 25-35		2-7 5.3 3-7		5.30		6.6		2000	MP-PO-ON21-01(05)	Wyoming	No	Primary
1	71	-3	47	2	33	3	5.4	0.1	5.55	0.25	3.7	-2.9					
2	59	-15	34	-11	24	-6	4.3	-1	5.41	0.11	3.3	-3.3					
3	75	1	50	5	34	4	5.2	-0.1	5.70	0.40	3.5	-3.1					
4	80	9	52	5	36	3	5.8	0.4	5.83	0.28	3.9	0.2					
Specification Limits Design/JMF JMF Limits	55-95 72 65-79		30-65 50 43-57		20-50 37 32-42		2-7 4.4 2.4-6.4		5.50		4.6		2000	MP-PO-ON27-02(01)	Wyoming	No	Primary
1	77	5	54	4	38	1	6	1.6	5.72	0.22	2.3	-2.3					
2	72	0	46	-4	32	-5	3.7	-0.7	5.20	-0.30	2.2	-2.4					
3	67	-5	46	-4	33	-4	3.7	-0.7	5.50	0.00	2.2	-2.4					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	VTM	Difference VTM	Year	Project ID	State	RAP	Road Classification
4	70	-7	45	-9	32	-6	3.5	-2.5	5.20	-0.52	2.5	0.2					
5	74	2	48	-2	34	-3	3.7	-0.7	5.70	0.20	1.9	-2.7					
6	73	1	49	-1	34	-3	4.1	-0.3	5.50	0.00	1.8	-2.8					
Specification Limits	85-100		35-70		20-50		2-7						2000	MP-PO-ON36-02(02)	Wyoming	No	Primary
Design/JMF	95		49		33		5.8		5.50		4.5						
JMF Limits	86-100		42-56		28-38		3-7										
1	97	2	54	5	37	4	5.9	0.1	5.57	0.07	3.8	-0.7					
Specification Limits	85-100		35-70		20-50		2-7						2000	MP-PO-ON36-02(02)	Wyoming	No	Primary
Design/JMF	95		49		33		5.8		5.50		4.5						
JMF Limits	86-100		42-56		28-38		3.0-7.0		5.25-5.75		2.5-4.5						
1	97	2	47	-2	30	-3	4.7	-1.1	5.30	-0.20	4.3	-0.2					
2	97	2	54	5	35	2	5	-0.8	5.90	0.40	4.7	0.2					
3	97	2	48	-1	32	-1	4.8	-1	5.80	0.30	4.1	-0.4					
4	96	1	47	-2	31	-2	4.5	-1.3	5.40	-0.10	4.4	-0.1					
Specification Limits	55-95		30-65		20-50		2-7						2000	MP-PO-OP17-01(02)	Wyoming	No	Primary
Design/JMF	75		39		27		4.2		5.50		3.3						
JMF Limits	68-82		32-46		22-32		2.2-6.2										
1	67	-8	33	-6	25	-2	4.4	0.2	4.87	-0.63	4.8	1.5					
Specification Limits	55-95		30-65		20-50		2-7						2000	MP-PO-W374-00(00)	Wyoming	No	Federal
Design/JMF	77		43		29		4.5		5.50		3.9						
JMF Limits	70-84		36-50		24-34		2.5-6.5										
1	75	-2	45	2	31	2	5.7	1.2	5.68	0.18	2.9	-1					
Specification Limits	85-100		35-70		20-55		2-7						2000	MP-PO-W374-00(00)	Wyoming	No	Federal
Design/JMF	93		41		28		5		5.50		4.2						
JMF Limits	86-100		34-48		23-33		3-7										
1	95	2	39	-2	28	0	5.8	0.8	5.55	0.05	3.8	-0.4					
Specification Limits	55-95		30-65		20-50		2-7						2000	MPS-PO-1906-00(01)	Wyoming	No	Secondary
Design/JMF	75		45		31		5.1		5.00		3.7						
JMF Limits	68-82		38-52		26-36		3-7										
1	76	1	43	-2	29	-2	6.3	1.2	4.94	-0.06	4.5	0.8					
Specification Limits	85-100		35-70		20-55		2-7						2000	CMS-0302(60)	Wyoming	No	Secondary
Design/JMF	95		51		34		6.3		6.00		4.8						
JMF Limits	86-100		44-58		29-39		3-7										
1	91	-4	54	3	38	4	7.9	1.6	6.15	0.15	2.2	-2.6					
Specification Limits	55-95		30-65		20-50		2-7						2000	FLH-6-54	Wyoming	No	County Rd.
Design/JMF	76		48		37		3.5		5.00		3.8						
JMF Limits	69-83		41-55		32-42		2.0-6.0										
1	79	3	48	0	37	0	4.4	0.9	5.12	0.12	3.4	-0.4					
Specification Limits	90-100				25-58		2-7						2000	IM-25-1(137)31	Wyoming	No	Interstate
Design/JMF	94		46		32		5.7		5.30		4						
JMF Limits	90-100		41-51		28-36		3-7										
1	92	-2	50	4	35	3	6.6	0.9	5.33	0.03	1.6	-2.4					
2									5.23	-0.07	2.5	-1.5					
3									5.30	0.00	4.4	0.4					
4	88	-6	42	-4	29	-3	5.8	0.1	5.21	-0.09	2.3	-1.7					
5	92	-2	46	0	30	-2	5.3	-0.4	5.49	0.19	3.5	-0.5					
6	92	-2	45	-1	31	-1	6.3	0.6	5.03	-0.27	2.6	-1.4					
7	95	1	54	8	39	7	6.9	1.2	5.64	0.34	2.3	-1.7					
8									5.52	0.22	3.1	-0.9					
9									5.41	0.11	3.2	-0.8					
Specification Limits	90-100				28-58		2-7						2000	IM-25-1(137)31	Wyoming	No	Interstate
Design/JMF	94		46		32		5.7		5.30		4						
JMF Limits	90-100		41-51		28-36		3.0-7.0		5.05-5.55		3.0-5.0						
1									5.52	0.22	3.1	-0.9					
2									5.41	0.11	3.2	-0.8					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	VTM	Difference VTM	Year	Project ID	State	RAP	Road Classification
3									5.45	0.15	3.4	-0.6					
4									5.35	0.05	3	-1					
5									5.23	-0.07	2.5	-1.5					
6									5.30	0.00	4.4	0.4					
Specification Limits	90 Max				23-49		2-7		5.00		4.2		2000	IM-80-3(129)143 & CMP SR-80-3(125)173	Wyoming	Yes	Interstate
Design/JMF	82		42		27		3.5		4.75-5.25		3.0-5.0						
JMF Limits																	
1	83	1	39	-3	24	-3	3.6	0.1	4.49	-0.51	6.1	1.9					
2	78	-4	39	-3	26	-1	4.8	1.3	4.48	-0.52	4.3	0.1					
3	78	-4	40	-2	26	-1	4.6	1.1	4.97	-0.03	4	-0.2					
4	83	1	51	9	35	8	5.9	2.4	5.43	0.43	1.6	-2.6					
5	79	-3	39	-3	26	-1	4.9	1.4	4.82	-0.18	3.2	-1					
6	86	4	47	5	31	4	5.2	1.7	5.23	0.23	3.2	-1					
7	85	3	46	4	30	3	6	2.5	4.95	-0.05	3.1	-1.1					
8	82	0	37	-5	24	-3	4.1	0.6	4.91	-0.09	5	0.8					
9	82	0	44	2	29	2	5	1.5	5.12	0.12	2.2	-2					
10	84	2	44	2	29	2	4.7	1.2	4.96	-0.04	2	-2.2					
11	83	1	41	-1	27	0	4.6	1.1	5.14	0.14	4.1	-0.1					
12	85	3	41	-1	26	-1	4.9	1.4	4.75	-0.25	4.3	0.1					
13	83	1	43	1	28	1	5	1.5	4.88	-0.12	3.6	-0.6					
14	85	3	45	3	30	3	5.1	1.6	5.13	0.13	3.4	-0.8					
15	80	-2	39	-3	26	-1	4.6	1.1	4.98	-0.02	3.6	-0.6					
16	86	4	48	6	32	5	5.1	1.6	4.98	-0.02	3.5	-0.7					
17	84	2	45	3	29	2	4	0.5	5.04	0.04	3.2	-1					
18	83	1	46	4	31	4	4.3	0.8	5.17	0.17	2.5	-1.7					
19	83	1	45	3	31	4	4.9	1.4	5.04	0.04	3.1	-1.1					
20	84	2	46	4	31	4	5.2	1.7	5.40	0.40	2.2	-2					
21	85	3	47	5	31	4	4.9	1.4	5.02	0.02	3.2	-1					
22	78	-4	36	-6	24	-3	4.8	1.3	4.81	-0.19	4.8	0.6					
23	80	-2	41	-1	27	0	4.9	1.4	4.91	-0.09	3.5	-0.7					
24	77	-5	37	-5	25	-2	4.3	0.8	4.91	-0.09	3.5	-0.7					
25	83	1	42	0	28	1	4.5	1	5.30	0.30	4.2	0					
26	86	4	46	4	30	3	5.1	1.6	5.29	0.29	2.9	-1.3					
27	82	0	42	0	30	3	4.8	1.3	5.05	0.05	4.2	0					
28	81	-1	41	-1	27	0	4.2	0.7	5.04	0.04	4.2	0					
29	84	2	43	1	28	1	4.7	1.2	5.00	0.00	3.1	-1.1					
Specification Limits	90 Max				23-49		2-7		5.00		4.2		2000	IM-80-3(129)143 & CMP SR-80-3(125)173	Wyoming	Yes	Interstate
Design/JMF	82		42		27		3.5		4.75-5.25		3.0-5.0						
JMF Limits																	
1	78	-4	39	-3	24	-3	2.5	-1	4.49	-0.51	4.3	0.1					
2	80	-2	39	-3	25	-2	3	-0.5	4.48	-0.52	3.6	-0.6					
3	79	-3	37	-5	24	-3	2.4	-1.1	4.97	-0.03	3.4	-0.8					
4	80	-2	39	-3	24	-3	2.6	-0.9	5.43	0.43	3.6	-0.6					
5	79	-3	36	-6	24	-3	2.2	-1.3	4.82	-0.18	3.4	-0.8					
6	75	-7	32	-10	19	-8	2.1	-1.4	5.23	0.23	3.2	-1					
7	80	-2	40	-2	26	-1	2.7	-0.8	4.95	-0.05							
8	78	-4	36	-6	22	-5	1.9	-1.6	4.91	-0.09							
9	78	-4	37	-5	24	-3	2.3	-1.2	5.12	0.12							
10	81	-1	39	-3	25	-2	2.1	-1.4	4.96	-0.04							
11	85	3	41	-1	26	-1	4.9	1.4	4.80	-0.20	4.3	0.1					
12	83	1	43	1	28	1	5	1.5	4.90	-0.10	3.6	-0.6					
13	85	3	45	3	30	3	5.1	1.6	5.10	0.10	3.4	-0.8					
14	80	-2	39	-3	26	-1	4.6	1.1	5.00	0.00	3.6	-0.6					
15	86	4	48	6	32	5	5.1	1.6	5.00	0.00	3.4	-0.8					
16	84	2	45	3	29	2	4	0.5	5.00	0.00	3.2	-1					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	VTM	Difference VTM	Year	Project ID	State	RAP	Road Classification
17	83	1	46	4	31	4	4.3	0.8	5.20	0.20	2.5	-1.7					
18	83	1	45	3	31	4	4.9	1.4	5.00	0.00	3.1	-1.1					
19	84	2	46	4	31	4	5.2	1.7	5.40	0.40	2.2	-2					
20	85	3	47	5	31	4	4.9	1.4	5.00	0.00	3.2	-1					
21	78	-4	36	-6	24	-3	4.8	1.3	4.81	-0.19	4.8	0.6					
22	80	-2	41	-1	27	0	4.9	1.4	4.91	-0.09	3.5	-0.7					
23	77	-5	37	-5	25	-2	4.3	0.8	4.91	-0.09	3.5	-0.7					
24	83	1	42	0	28	1	4.5	1	5.30	0.30	4.2	0					
25	86	4	46	4	30	3	5.1	1.6	5.29	0.29	2.9	-1.3					
26	82	0	42	0	30	3	4.8	1.3	5.05	0.05	4.2	0					
27	81	-1	41	-1	27	0	4.2	0.7	5.04	0.04	4.2	0					
28	84	2	43	1	28	1	4.7	1.2	5.00	0.00	3.1	-1.1					
29	85	3	44	2	28	1	4.7	1.2	5.30	0.30	3.2	-1					
30	85	3	44	2	29	2	5.2	1.7	5.71	0.71	2.3	-1.9					
31	81	-1	42	0	29	2	5.4	1.9	4.94	-0.06	2.1	-2.1					
32	80	-2	41	-1	27	0	4.5	1	5.10	0.10	3	-1.2					
33	80	-2	40	-2	27	0	4.9	1.4	4.80	-0.20	4.5	0.3					
34	81	-1	42	0	28	1	4.8	1.3	5.10	0.10	3.1	-1.1					
35	78	-4	39	-3	26	-1	4.2	0.7	4.95	-0.05	4.5	0.3					
Specification Limits Design/JMF JMF Limits	90 Max 82		42		23-49 27		2-7 3.5		5.00 4.75-5.25		4.2		2000	IM-80-3(129)143 & CMP SR-80-3(125)173	Wyoming	Yes	Interstate
1	83	1	40	-2	25	-2	4.1	0.6	4.97	-0.03	4.9	0.7					
2	83	1	42	0	27	0	4.5	1	5.05	0.05	3.2	-1					
3	84	2	45	3	29	2	5.1	1.6	5.12	0.12	3	-1.2					
Specification Limits Design/JMF JMF Limits	90-100 96 90-100		51 46-56		28-58 31 28-36		2-7 4.3 3.0-7.0		4.80 4.55-5.05		4.4		2000	IM-90-3(87)118	Wyoming	No	Interstate
1	97	1	60	9	32	1	8.5	4.2	4.70	-0.10	3	-1.4					
2	97	1	58	7	35	4	8.4	4.1	4.70	-0.10	4.2	-0.2					
3	97	1	60	9	36	5	8.3	4	4.70	-0.10	2.4	-2					
4	97	1	59	8	34	3	8.7	4.4	4.80	0.00	3.6	-0.8					
5	98	2	60	9	35	4	9.2	4.9	4.80	0.00	2.4	-2					
6	95	-1	48	-3	27	-4	7.3	3	4.70	-0.10	3.2	-1.2					
7	97	1	51	0	30	-1	8.7	4.4	4.70	-0.10	2.3	-2.1					
8	96	0	50	-1	28	-3	8.3	4	4.70	-0.10	2.9	-1.5					
Specification Limits Design/JMF JMF Limits	93 MAX 89 83-93		48 43-53		23-49 27 23-31		2-7 3.3 3-7		4.60		4.1		2000	IM-90-3(87)118	Wyoming	No	Interstate
1	90	1	51	3	29	2	7.8	4.5	4.78	0.18	3	-1.1					
Specification Limits Design/JMF JMF Limits	90 Max 84 79-89		57 52-62		23-49 35 31-39		2-7 3.6 3-7		4.80 4.35-4.85		4.1		2000	IM-90-3(87)118	Wyoming	No	Interstate
1	86	2	55	-2	31	-4	8.4	4.8	4.80	0.00	1.6	-2.5					
2	87	3	56	-1	31	-4	6.8	3.2	4.80	0.00	1.4	-2.7					
Specification Limits Design/JMF JMF Limits	93 Max 89 83-93		48 43-53		23-49 27 23-31		2-7 3.3 3-7		4.60 4.35-4.85		4.1		2000	IM-90-3(87)118	Wyoming	No	Interstate
1	87	-2	46	-2	28	1	7.2	3.9	4.50	-0.10	0.8	-3.3					
2	89	0	47	-1	28	1	7.4	4.1	4.70	0.10	2.7	-1.4					
3	88	-1	50	2	30	3	7.6	4.3	4.80	0.20	1.9	-2.2					
4	89	0	48	0	29	2	7.5	4.2	4.70	0.10	1.7	-2.4					
5	85	-4	42	-6	26	-1	7.2	3.9	4.50	-0.10	2.3	-1.8					
6	87	-2	44	-4	25	-2	6.5	3.2	4.70	0.10	3.3	-0.8					
7	89	0	43	-5	24	-3	7.1	3.8	4.50	-0.10	3.1	-1					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	VTM	Difference VTM	Year	Project ID	State	RAP	Road Classification
8	87	-2	42	-6	24	-3	6.7	3.4	4.50	-0.10	4	-0.1					
9	89	0	47	-1	27	0	7.2	3.9	4.50	-0.10	2.5	-1.6					
10	87	-2	44	-4	26	-1	7.3	4	4.50	-0.10	2.4	-1.7					
11	88	-1	44	-4	26	-1	7	3.7	4.50	-0.10	3	-1.1					
12	91	2	45	-3	26	-1	7.4	4.1	4.70	0.10	3.3	-0.8					
13	90	1	48	0	27	0	6.5	3.2	4.70	0.10	2.6	-1.5					
14	85	-4	43	-5	24	-3	5.5	2.2	4.90	0.30	3	-1.1					
15	92	3	47	-1	27	0	6.8	3.5	4.70	0.10	3	-1.1					
16	89	0	45	-3	25	-2	6.9	3.6	4.50	-0.10	3.4	-0.7					
17	86	-3	44	-4	25	-2	6.7	3.4	4.50	-0.10	3.4	-0.7					
Specification Limits Design/JMF JMF Limits	93 Max 89 83-93		47 42-52		23-49 27 23-31		2-7 3 2.0-6.0		4.60 4.35-4.85		3.9 3.0-5.0		2000	IM-90-3(87)118	Wyoming	No	Interstate
1	93	4	48	1	27	0	6.5	3.5	4.50	-0.10	4	0.1					
2	92	3	51	4	28	1	6.4	3.4	4.70	0.10	2.8	-1.1					
3	92	3	49	2	26	-1	6.3	3.3	4.70	0.10	3	-0.9					
4	88	-1	46	-1	26	-1	6.2	3.2	4.70	0.10	3	-0.9					
5	86	-3	48	1	27	0	6.3	3.3	4.70	0.10	2.6	-1.3					
6	87	-2	46	-1	26	-1	6.7	3.7	4.70	0.10	2.7	-1.2					
7	88	-1	47	0	27	0	6.6	3.6	4.70	0.10	2.6	-1.3					
8	90	1	47	0	27	0	6.3	3.3	4.60	0.00	2.8	-1.1					
9	90	1	48	1	28	1	6.7	3.7	4.90	0.30	2.2	-1.7					
10	88	-1	47	0	28	1	6.9	3.9	5.00	0.40	2.3	-1.6					
11	91	2	45	-2	24	-3	5.8	2.8	4.70	0.10	3	-0.9					
12	89	0	48	1	28	1	6.9	3.9	4.80	0.20	2.5	-1.4					
13	89	0	46	-1	27	0	6.8	3.8	4.90	0.30	2	-1.9					
14	87	-2	48	1	28	1	6.8	3.8	4.70	0.10	3	-0.9					
15	89	0	43	-4	25	-2	5.9	2.9	4.60	0.00	2.8	-1.1					
Specification Limits Design/JMF JMF Limits	90 Max 84 79-89		44 39-49		23-49 29 25-33		2-7 5 3.0-7.0		4.50 4.25-4.75		4 3.0-5.0		2000	IM-IO80-6(139)	Wyoming	No	Interstate
1	84	0	50	6	33	4	7	2	4.27	-0.23	4	0					
2	88	4	49	5	32	3	7	2	4.50	0.00	4.8	0.8					
3	84	0	45	1	29	0	6.2	1.2	4.28	-0.22	5.3	1.3					
4	83	-1	40	-4	26	-3	6.3	1.3	3.85	-0.65	5.4	1.4					
5	77	-7	42	-2	30	1	6.8	1.8	4.37	-0.13	4.9	0.9					
6	82	-2	44	0	30	1	6.5	1.5	4.72	0.22	3.4	-0.6					
Specification Limits Design/JMF JMF Limits	90 Max 84 79-89		44 39-49		23-49 29 25-33		2-7 5 3.0-7.0		4.70 4.45-4.95		3.2 3.0-5.0		2000	IM-IO80-6(139)	Wyoming	No	Interstate
1	77	-7	40	-4	29	0	8.3	3.3	4.87	0.17	2	-1.2					
2	82	-2	43	-1	30	1	7.1	2.1	4.84	0.14	3.4	0.2					
3	86	2	51	7	34	5	7.3	2.3	5.00	0.30	1.3	-1.9					
4	84	0	47	3	32	3	6.6	1.6	4.57	-0.13	3.2	0					
5	83	-1	39	-5	26	-3	5.3	0.3	4.30	-0.40	4.9	1.7					
6	89	5	51	7	35	6	6.9	1.9	5.09	0.39	1.7	-1.5					
7	83	-1	48	4	32	3	6.8	1.8	4.87	0.17	2	-1.2					
8	87	3	47	3	29	0	5.6	0.6	4.94	0.24	3.6	0.4					
9	84	0	51	7	34	5	7.4	2.4	5.16	0.46	2.1	-1.1					
10	81	-3	38	-6	25	-4	6.3	1.3	4.50	-0.20	5.1	1.9					
11	84	0	45	1	29	0	6.7	1.7	4.79	0.09	3.5	0.3					
12	87	3	52	8	33	4	7.3	2.3	5.09	0.39	2.7	-0.5					
13	82	-2	41	-3	27	-2	5.9	0.9	4.39	-0.31	4.4	1.2					
14	82	-2	48	4	32	3	6.7	1.7	4.73	0.03	3.7	0.5					
15	81	-3	46	2	30	1	6.3	1.3	4.58	-0.12	3.7	0.5					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	VTM	Difference VTM	Year	Project ID	State	RAP	Road Classification
16	85	1	46	2	29	0	6.4	1.4	4.47	-0.23	4.9	1.7					
17	79	-5	39	-5	25	-4	5.7	0.7	4.15	-0.55	5	1.8					
Specification Limits Design/JMF JMF Limits	85-100 93 86-100		35-70 43 36-50		20-55 25 20-30		2-7 3.7 3.0-7.0		5.00 4.75-5.25		4 2.5-4.5		2000	IM-IO90-3(89)145	Wyoming	No	Interstate
1	92	-1	46	3	26	1	7.4	3.7	4.80	-0.20	6.4	2.4					
2	91	-2	47	4	27	2	7.9	4.2	4.70	-0.30	4.9	0.9					
3	92	-1	44	1	25	0	7	3.3	4.70	-0.30	6.1	2.1					
4	93	0	52	9	29	4	7.8	4.1	5.20	0.20	3.4	-0.6					
5	92	-1	54	11	30	5	8.6	4.9	5.10	0.10	2.5	-1.5					
6	89	-4	46	3	27	2	7.1	3.4	5.00	0.00	2.8	-1.2					
7	88	-5	43	0	25	0	7	3.3	4.70	-0.30	4.5	0.5					
Specification Limits Design/JMF JMF Limits	55-95 83 76-90		35-65 51 44-58		20-50 29 24-34		2-7 4.2 3-7		4.60 4.35-4.85		4.1 2.5-4.5		2000	IM-IO90-3(89)145	Wyoming	No	Interstate
1	80	-3	51	0	28	-1	5.8	1.6	4.50	-0.10	3	-1.1					
2	84	1	55	4	32	3	7.1	2.9	4.80	0.20	2.4	-1.7					
3	85	2	54	3	31	2	8.3	4.1	4.30	-0.30	2.3	-1.8					
4	90	7	60	9	34	5	10	5.8	4.40	-0.20	2.3	-1.8					
5	87	4	54	3	31	2	8.5	4.3	4.40	-0.20	2.4	-1.7					
6	87	4	52	1	29	0	7.6	3.4	4.30	-0.30	3.1	-1					
7	91	8	64	13	38	9	11	6.8	4.10	-0.50	2.4	-1.7					
8	85	2	49	-2	28	-1	7.8	3.6	4.10	-0.50	3.6	-0.5					
9	86	3	51	0	30	1	8.1	3.9	4.20	-0.40	2.9	-1.2					
10	83	0	46	-5	27	-2	7.2	3	4.00	-0.60	3.7	-0.4					
11	83	0	53	2	30	1	7.4	3.2	4.40	-0.20	2.8	-1.3					
12	79	-4	45	-6	28	-1	7.6	3.4	5.00	0.40	2.6	-1.5					
13	92	9	39	-12	25	-4	10	5.8	4.30	-0.30	3.6	-0.5					
14	80	-3	46	-5	28	-1	11	6.8	4.60	0.00	3.6	-0.5					
15	89	6	55	4	31	2	7.9	3.7	4.90	0.30	2.6	-1.5					
16	84	1	49	-2	27	-2	7	2.8	4.00	-0.60	4.1	0					
17	81	-2	46	-5	26	-3	7.3	3.1	4.40	-0.20	3.4	-0.7					
18	89	6	55	4	31	2	8.6	4.4	4.90	0.30	2.7	-1.4					
19	84	1	47	-4	26	-3	7.3	3.1	4.60	0.00	3	-1.1					
20	77	-6	45	-6	25	-4	6.7	2.5	4.40	-0.20	3.5	-0.6					
21	79	-4	43	-8	25	-4	6.6	2.4	4.40	-0.20	4.1	0					
22	83	0	49	-2	28	-1	7.5	3.3	4.60	0.00	2.7	-1.4					
23	86	3	46	-5	27	-2	7.7	3.5	4.40	-0.20	2.5	-1.6					
24	87	4	53	2	31	2	7.9	3.7	4.50	-0.10	2.6	-1.5					
25	88	5	54	3	31	2	7.3	3.1	4.50	-0.10	3.6	-0.5					
26	87	4	53	2	30	1	7.8	3.6	4.90	0.30	2.5	-1.6					
27	86	3	52	1	30	1	8.5	4.3	4.60	0.00	2.8	-1.3					
28	82	-1	44	-7	27	-2	7.9	3.7	4.90	0.30	2.6	-1.5					
29	85	2	48	-3	28	-1	6.9	2.7	4.60	0.00	4.5	0.4					
Specification Limits Design/JMF JMF Limits	55-95 83 76-90		30-65 51 44-58		20-50 29 24-34		2-7 4.2 3-7		4.60		4.1		2000	IM-IO90-3(89)	Wyoming	No	Interstate
1	82	-1	47	-4	29	0	8.9	4.7	4.45	-0.15	3.5	-0.6					
2	82	-1	50	-1	29	0	7.4	3.2	4.78	0.18	3	-1.1					
Specification Limits Design/JMF JMF Limits	83 76-90		47 41-55		27 23-33		5.2 3.0-7.0		4.80 4.55-5.05		4 2.5-4.5		2000	IM-IO90-3(89)145	Wyoming	No	Interstate
1	84	1	50	3	28	1	7.5	2.3	4.60	-0.20	3.3	-0.7					
2	84	1	49	2	28	1	7.1	1.9	4.90	0.10	2.5	-1.5					
3	82	-1	51	4	31	4	8.7	3.5	4.70	-0.10	2.9	-1.1					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	VTM	Difference VTM	Year	Project ID	State	RAP	Road Classification
4	80	-3	48	1	28	1	7.2	2	4.80	0.00	2.7	-1.3					
5	84	1	51	4	29	2	7.9	2.7	4.50	-0.30	3.9	-0.1					
Specification Limits	85-100		35-70		20-55		2-7						2000	MG-ON-34-03(033)	Wyoming	No	Interstate
Design/JMF	93		54		37		4.9		5.80		5						
JMF Limits	86-100		47-61		32-42		3.0-7.0		5.55-6.05		2.5-4.5						
1	96	3	65	11	45	8	5.3	0.4	5.94	0.14	5.4	0.4					
2	93	0	60	6	41	4	5.1	0.2	5.78	-0.02	5.3	0.3					
3	94	1	61	7	43	6	5.1	0.2	5.74	-0.06	4.3	-0.7					
4	91	-2	59	5	40	3	5.8	0.9	5.55	-0.25	4.9	-0.1					
5	91	-2	54	0	37	0	5.4	0.5	5.24	-0.56	5	0					
6	95	2	66	12	48	11	4.8	-0.1	6.90	1.10	3.3	-1.7					
7	92	-1	58	4	41	4	3.7	-1.2	6.60	0.80	4.6	-0.4					
8	94	1	59	5	41	4	3.8	-1.1	6.60	0.80	5.4	0.4					
9	93	0	60	6	41	4	4.4	-0.5	6.20	0.40	5.6	0.6					
10	96	3	57	3	38	1	4.6	-0.3	6.00	0.20	4.3	-0.7					
11	94	1	58	4	41	4	4.9	0	5.70	-0.10	4.5	-0.5					
12	92	-1	54	0	37	0	4.3	-0.6	5.50	-0.30	4.9	-0.1					
Specification Limits	85-100		35-70		20-55		2-7						2000	MGS-0200-00(023)	Wyoming	No	Secondary
Design/JMF	92		56		37		5.5		6.50		4.6						
JMF Limits	85-98		49-63		32-42		3-7										
1	93	1	54	-2	35	-2	6.6	1.1	6.44	-0.06	2.9	1					
Specification Limits	85-100		35-70		20-55		2-7						2000	MGS-0208-00(008)	Wyoming	No	Secondary
Design/JMF	93		55		36		5.6		6.40		5						
JMF Limits	86-100		48-62		31-41		3-7										
1	96	3	57	2	36	0	5.4	-0.2	6.78	0.38	5.4	0.4					
Specification Limits	85-100		35-70		20-50		2-7						2000	MGS-2300(34)	Wyoming	No	Secondary
Design/JMF	93		50		30		4.9		5.25		5.2						
JMF Limits	86-100		43-57		25-35		3-7										
1	92	-1	52	2	31	1	8.8	3.9	5.35	0.10	3.1	-2.1					
Specification Limits	55-95		30-65		20-50		2-7						2000	NHI-010-04(032)	Wyoming	No	Primary
Design/JMF	85		42		28		5.2		5.30		4.2						
JMF Limits	78-92		35-49		23-33		3.0-7.0		5.05-5.55		2.5-4.5						
1	91	6	48	6	32	4	6.1	0.9	5.80	0.50	1.4	-2.8					
2	92	7	48	6	32	4	6.5	1.3	5.90	0.60	1.2	-3					
3	86	1	40	-2	27	-1	6.2	1	5.60	0.30	2.5	-1.7					
4	90	5	46	4	30	2	4.7	-0.5	5.80	0.50	2.8	-1.4					
5	87	2	40	-2	28	0	5.5	0.3	5.50	0.20	2.9	-1.3					
Specification Limits	55-95		30-65		20-50		2-7						2000	NHI-80-4(197)216 & BRI-80-4(206)220	Wyoming	Yes	Interstate
Design/JMF	74		42		29		6.4		5.25		4.4						
JMF Limits									5.00-5.50								
1	87	13	47	5	30	1	5.6	-0.8	5.64	0.39	3.3	-1.1					
2	87	13	46	4	28	-1	5.9	-0.5	5.71	0.46	5.6	1.2					
3	84	10	39	-3	25	-4	5.5	-0.9	5.39	0.14	2.9	-1.5					
4	67	-7	30	-12	21	-8	5.3	-1.1	4.80	-0.45	5.7	1.3					
5	63	-11	45	3	29	0	6.5	0.1	5.39	0.14	2.3	-2.1					
6	78	4	38	-4	24	-5	4.8	-1.6	5.25	0.00	2.4	-2					
7	83	9	42	0	26	-3	4.6	-1.8	5.76	0.51	1.8	-2.6					
8	86	12	42	0	26	-3	4.2	-2.2	5.31	0.06	3.1	-1.3					
Specification Limits	55-95		30-65		20-50		2-7						2000	NHI-80-4(197)216 & BRI-80-4(206)220	Wyoming	No	Interstate
Design/JMF	72		40		27		6		5.25		4.9						
JMF Limits	65-79		33-47		22-32		3.0-7.0		4.75-5.50								
1	83	11	44	4	26	-1	4.4	-1.6	5.24	-0.01	6.1	1.2					
2	70	-2	34	-6	22	-5	4	-2	5.03	-0.22	5.5	0.6					
3	74	2	34	-6	21	-6	4.3	-1.7	4.93	-0.32	5.9	1					
4	80	8	37	-3	24	-3	5.2	-0.8	5.01	-0.24	4.7	-0.2					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	VTM	Difference VTM	Year	Project ID	State	RAP	Road Classification
5	79	7	38	-2	24	-3	4.9	-1.1	5.39	0.14	5.7	0.8					
6	78	6	39	-1	23	-4	4.2	-1.8	5.11	-0.14	6.6	1.7					
7	69	-3	31	-9	20	-7	4.1	-1.9	4.57	-0.68	6.9	2					
8	84	12	44	4	27	0	4.1	-1.9	5.79	0.54	4.0	-0.9					
9	79	7	37	-3	23	-4	1.4	-4.6	5.47	0.22	3.8	-1.1					
10	79	7	39	-1	25	-2	5.1	-0.9	5.57	0.32	2.6	-2.3					
11	77	5	39	-1	24	-3	4.2	-1.8	5.52	0.27	2.6	-2.3					
12	84	12	42	2	26	-1	4	-2	5.40	0.15	3.1	-1.8					
13	73	1	33	-7	21	-6	3.7	-2.3	5.07	-0.18	4.3	-0.6					
Specification Limits Design/JMF	55-95		30-65		20-50		2-7						2000	NHI-80-4(197)216 & BRI-80-4(206)220	Wyoming	No	Interstate
JMF Limits	72		40		27		6		5.25		4.9						
1	83	11	44	4	26	-1	4.4	-1.6	5.24	-0.01	6.1	1.2					
Specification Limits Design/JMF	55-95		30-65		20-50		2-7						2000	NH-ON25-03(074)	Wyoming	No	Primary
JMF Limits	86		54		43		4.5		5.00		3.1						
1	79-93		47-61		38-48		2.5-6.5		4.75-5.25		2.5-4.5						
1									5.00	0.00	7.4	4.3					
2	91	5	63	9	48	5	4.2	-0.3	5.10	0.10	7.1	4					
3	88	2	62	8	47	4	4	-0.5	5.30	0.30	5.2	2.1					
4	86	0	57	3	45	2	5.5	1	5.50	0.50	3.2	0.1					
5	87	1	60	6	46	3	5.7	1.2	5.50	0.50	2.8	-0.3					
6	91	5	64	10	50	7	6.9	2.4	5.45	0.45	3.2	0.1					
7	93	7	64	10	48	5	4.6	0.1	5.43	0.43	3.4	0.3					
Specification Limits Design/JMF	55-95		30-65		20-50		2-7						2000	NHP-010-4(32)	Wyoming	No	Primary
JMF Limits	85		42		28		5.2		5.30		4.2						
1	91	6	47	5	30	2	7.1	1.9	5.70	0.40	4	-0.2					
Specification Limits Design/JMF	55-95		30-65		20-50		2.0-7.0						2000	NHP-021-1(49)	Wyoming	No	Primary
JMF Limits	74		45		30		5.3		5.30		6.6						
1	65	-9	39	-6	26	-4			5.37	0.07	3.3	-3.3					
2	66	-8	37	-8	24	-6			5.37	0.07	4.8	-1.8					
3	70	-4	42	-3	29	-1			5.37	0.07	2.7	-3.9					
4	74	0	43	-2	29	-1	3.9	-1.4	5.31	0.01	3.4	-3.2					
5	74	0	45	0	31	1					2.3	-4.3					
6	75	1	44	-1	29	-1	5.1	-0.2	5.79	0.49	3.8	-2.8					
7	69	-5	41	-4	28	-2	5.4	0.1	5.36	0.06	4.8	-1.8					
8	76	2	43	-2	30	0	5.8	0.5	5.47	0.17	4.1	-2.5					
Specification Limits Design/JMF	55-95%		30-65%		20-50%		2-7%						2000	SCP-012-1(96)	Wyoming	No	Primary
JMF Limits	78		42		27		5		5.30		4.3						
1	87	9	48	6	29	2	5.5	0.5	5.26	-0.04	3	-1.3					
2	85	7	46	4	28	1	5.8	0.8	5.12	-0.18	2.4	-1.9					
3	85	7	47	5	29	2	5.6	0.6	5.17	-0.13	2.7	-1.6					
4	78	0	44	2	28	1	5.9	0.9	5.15	-0.15	2.7	-1.6					
Specification Limits Design/JMF	55-95		30-65		20-50		2-7						2000	SCP-IO90-01(106)	Wyoming	Yes	Interstate
JMF Limits	83		46		34		4.8		4.90		3.6						
1	83	0	44	-2	31	-3	7.2	2.4	4.92	0.02	4.7	1.1					
Specification Limits Design/JMF	55-95		30-65		20-50		2.0-7.0						2000	SCP-IO90-01(106)	Wyoming	Yes	Interstate
JMF Limits	82		44		31		5.3		4.70		3.3						
1	83	1	43	-1					4.61	-0.09	3.5	0.2					
2	83	1	43	-1					4.89	0.19	2.7	-0.6					
Specification Limits	55-95		30-65		20-50		2-7						2000	SCP-ON13-01(047)	Wyoming	No	Primary

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	VTM	Difference VTM	Year	Project ID	State	RAP	Road Classification
Design/JMF	75		45		31		5.1		5.00		3.7						
JMF Limits	68-82		38-52		26-36		3-7										
1	72	-3	43	-2	30	-1	5.9	0.8	4.88	-0.12	4.8	1.1					
Specification Limits	85-100		35-70		20-55		2-7						2000	SCPS-0109(025)	Wyoming	No	Secondary
Design/JMF	91		44		30		6		5.25		3.7						
JMF Limits	85-98		37-51		25-35		3-7										
1	93	2	48	4	34	4	8.9	2.9	5.81	0.56	2.5	-1.2					
2	90	-1	48	4	34	4	9.1	3.1	5.81	0.56							
Specification Limits	55-95		30-65		20-50		2-7						2000	IB-ACIM-80-1(104)4	Wyoming	No	Interstate
Design/JMF	77		43		29		4.5		5.50		3.9						
JMF Limits	70-84		36-50		24-34		2.5-6.5										
1	81	4	52	9	36	7	7.2	2.7	5.62	0.12	2.5	-1.4					
2	73	-4	48	5	33	4	6.9	2.4	5.60	0.10	1.6	-2.3					
Specification Limits	55-95		30-65		20-50		2-7						2000	IB-ACIM-80-1(104)4	Wyoming	No	Interstate
Design/JMF	70		39		28		5.3		5.00		4.2						
JMF Limits	63-77		32-46		23-33		3-7										
1	78	8	40	1	27	-1	6.3	1	4.89	-0.11	3.7	-0.5					
Specification Limits	55-95		30-65		20-50		2-7						2000	IB-ACIM-80-1(104)4	Wyoming	No	Interstate
Design/JMF	77		43		31		5.9		5.50		3.9						
JMF Limits	70-84		36-50		26-36		3.0-7.0		5.25-5.75								
1	81	4	52	9	36	5	7.2	1.3	5.62	0.12	2.5	-1.4					
2	73	-4	48	5	33	2	6.9	1	5.60	0.10	1.6	-2.3					
Specification Limits	55-95		30-65		20-50		2-7						2000	IB-ACIM-80-1(104)4	Wyoming	No	Interstate
Design/JMF	70		39		28		5.3		5.00		4.2						
JMF Limits	63-77		32-46		23-33		3.0-7.0		4.75-5.25								
1	73	3	40	1	28	0	6.4	1.1	5.08	0.08	5.5	1.3					
2	76	6	41	2	28	0	6.3	1	5.01	0.01	3.1	-1.1					
3	66	-4	30	-9	22	-6	5.9	0.6	4.16	-0.84	3.3	-0.9					
4	78	8	40	1	27	-1	6.3	1	4.89	-0.11	3.7	-0.5					
5	72	2	37	-2	26	-2	4.9	-0.4	5.05	0.05	2	-2.2					
6	72	2	34	-5	24	-4	4.5	-0.8	4.65	-0.35	2.1	-2.1					
7	81	11	41	2	28	0	5.4	0.1	5.75	0.75	1.8	-2.4					
8	71	1	39	0	27	-1	4.5	-0.8	5.30	0.30	2	-2.2					
Specification Limits	55-95		30-65		20-50		2-7						2000	STPNP-034-3(27)	Wyoming	No	Primary
Design/JMF	75		45		31		4.5		6.25		5.5						
JMF Limits	68-82		38-52		26-36		2.5-6.5		6.00-6.50		2.5-4.5						
1	78	3	48	3	34	3	5.3	0.8	6.61	0.36	2.6	-2.9					
2	75	0	44	-1	31	0	4.9	0.4	6.57	0.32	2.6	-2.9					
3	74	-1	43	-2	31	0	4.3	-0.2	6.11	-0.14							
4	69	-6	40	-5	29	-2	4.1	-0.4	6.2	-0.05							
5	70	-5	42	-3	30	-1	4.1	-0.4	5.98	-0.27	4.1	-1.4					
6	74	-1	45	0	31	0	4.4	-0.1	6.62	0.37	4.1	-1.4					
7	81	6	49	4	34	3	3.5	-1	6.40	0.15	1.3	-4.2					
8	83	8	51	6	35	4	4	-0.5	5.90	-0.35	2.1	-3.4					
9	85	10	51	6	36	5	3.9	-0.6	7.20	0.95	3	-2.5					
10	79	4	46	1	30	-1	3.4	-1.1	6.70	0.45	3.1	-2.4					
11	78	3	47	2	33	2	3.6	-0.9	6.70	0.45	2.8	-2.7					
Specification Limits	85-100		35-70		20-50		2-7						2000	STPS, ARSCT & ARSCT-1900(30)	Wyoming	No	Secondary
Design/JMF	98		48		25		5.4		6.00		3.9						
JMF Limits	86-100		41-55		20-30		3.0-7.0		5.75-6.25		2.5-4.5						
1	99	1	42	-6	24	-1	5.6	0.2	5.27	-0.73	7	3.1					
2	98	0	41	-7	25	0	5.8	0.4	6.50	0.50	3.1	-0.8					
3	99	1	45	-3	29	4	6.6	1.2	6.19	0.19	2.5	-1.4					
4	99	1	46	-2	25	0	6.3	0.9	6.50	0.50	1.3	-2.6					
Specification Limits	85-100		35-70		20-50		2-7						2000	STPS, ARSCT &	Wyoming	No	Secondary

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Asphalt Content	Difference Asphalt Content	VTM	Difference VTM	Year	Project ID	State	RAP	Road Classification
Design/JMF	98		45		26		5.4		6.00		3.4			ARSCT-1900(30)			
JMF Limits	86-100		38-52		21-31		3.0-7.0		5.75-6.25		2.5-4.5						
1	99	1	46	1	23	-3	6.1	0.7	6.09	0.09	3	-0.4					
2	98	0	45	0	26	0	5.4	0	6.19	0.19	3.1	-0.3					
3	99	1	45	0	25	-1	6.3	0.9	5.96	-0.04	4.2	0.8					
4	98	0	48	3	25	-1	5.4	0	6.19	0.19	2.8	-0.6					
5	99	1	50	5	29	3	8.9	3.5	6.00	0.00	3.3	-0.1					
Specification Limits	85-100		35-70		20-55		2-7						2000	STPS-0202-00(013)	Wyoming	No	Secondary
Design/JMF	95		51		34		5.9		5.90		4.9						
JMF Limits	86-100		44-58		29-39		3-7										
1	98	3	57	6	37	3	6.3	0.4	6.09	0.19	6	1.1					
Specification Limits	85-100		35-70		20-55		2-7						2000	STPS-0703-00(012)	Wyoming	No	Secondary
Design/JMF	91		55		38		4.4		6.00		4.4						
JMF Limits	85-99		48-62		33-43		3-7										
1	92	1	58	3	42	4	6.4	2	6.34	0.34	2.8	-1.6					
Specification Limits	85-100		35-70		20-55		2-7						2000	STPS-E-0607(28)/ STPS-0607(13)	Wyoming	No	Secondary
Design/JMF	93		43		25		3.7		5.00		4						
JMF Limits	86-100		36-50		20-30		3-7										
1	88	-5	42	-1	25	0	7.7	4	5.01	0.01	4.4	0.4					
Specification Limits	55-95		30-65		20-50		2-7						2000	STPU-4200(10)	Wyoming	No	Urban
Design/JMF	81		44		30		5		5.00		3.4						
JMF Limits	74-88		37-51		25-35		3-7										
1	78	-3	43	-1	29	-1	6.5	1.5	4.70	-0.30	5.1	1.7					
Specification Limits	85-100		35-70		20-50		2-7						2000	STPUCO-4708(4)	Wyoming	No	Urban
Design/JMF	93		54		37		4.9		5.80		5						
JMF Limits	86-100		47-61		32-42		3-7										
1	85	-8	47	-7	33	-4	5.4	0.5	4.96	-0.84	4.1	-0.9					

APPENDIX C

SOUTH DAKOTA DATA

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
Specification Limits Design/JMF JMF Limits	75-95 87		45-75 59		30-55 46		3.0-7.0 6		3.5 min. 3.9		91.00 94.00		3751	1998	NH 0081(62)81	South Dakota	MVT
1	85	-2	54	-5	42	-4	5	-1	2.4	-1.5	94.00	0.00					
2	93	6	63	4	48	2	6	0	2.2	-1.7	93.70	-0.30					
3	88	1	60	1	47	1	6	0	3.2	-0.7	88.80	-5.20					
4	87	0	62	3	50	4	7	1	3.5	-0.4	91.40	-2.60					
5	89	2	62	3	49	3	7	1	3.2	-0.7	91.00	-3.00					
6	88	1	62	3	49	3	7	1	2.3	-1.6	95.60	1.60					
7	90	3	59	0	43	-3	6	0	2.2	-1.7	93.40	-0.60					
8	87	0	57	-2	44	-2	6	0	2.5	-1.4	94.70	0.70					
9	86	-1	55	-4	42	-4	6	0	2.0	-1.9	93.00	-1.00					
10	88	1	57	-2	44	-2	7	1	2.6	-1.3	92.80	-1.20					
11	86	-1	54	-5	41	-5	6	0	2.7	-1.2	91.80	-2.20					
12	84	-3	58	-1	43	-3	6	0	3.1	-0.8	92.80	-1.20					
13	84	-3	58	-1	43	-3	6	0	2.9	-1.0	90.20	-3.80					
14	85	-2	57	-2	47	1	6	0	2.9	-1.0	91.60	-2.40					
15	84	-3	58	-1	44	-2	7	1	2.3	-1.6	91.80	-2.20					
16	85	-2	60	1	46	0	6	0	2.8	-1.1	93.40	-0.60					
17	86	-1	58	-1	45	-1	6	0	2.2	-1.7	92.40	-1.60					
18	87	0	62	3	48	2	6	0	2.5	-1.4	92.20	-1.80					
19	85	-2	56	-3	43	-3	6	0	2.7	-1.2	91.80	-2.20					
20	84	-3	57	-2	44	-2	7	1	2.9	-1.0	93.20	-0.80					
21	86	-1	59	0	47	1	7	1	2.9	-1.0	91.60	-2.40					
22	87	0	61	2	48	2	7	1	2.7	-1.2	92.70	-1.30					
23	87	0	61	2	48	2	7	1	2.5	-1.4	93.60	-0.40					
24	87	0	61	2	48	2	7	1	2.5	-1.4	93.00	-1.00					
25	82	-5	56	-3	43	-3	6	0	2.4	-1.5	92.10	-1.90					
26	87	0	62	3	49	3	7	1	2.6	-1.3	92.40	-1.60					
27	86	-1	60	1	48	2	7	1	2.7	-1.2	91.20	-2.80					
28	84	-3	56	-3	46	0	7	1	2.8	-1.1	91.60	-2.40					
29	84	-3	56	-3	46	0	7	1	2.4	-1.5	90.50	-3.50					
30	86	-1	60	1	47	1	6	0	2.8	-1.1	91.10	-2.90					
31	87	0	60	1	46	0	7	1	2.5	-1.4	90.00	-4.00					
32	85	-2	58	-1	45	-1	6	0	3.1	-0.8	91.30	-2.70					
33	86	-1	58	-1	44	-2	6	0	2.6	-1.3	93.20	-0.80					
34	89	2	62	3	46	0	6	0	2.7	-1.2	91.20	-2.80					
35	85	-2	55	-4	42	-4	7	1	2.9	-1.0	91.50	-2.50					
36	86	-1	58	-1	49	3	7	1	3.0	-0.9	91.20	-2.80					
37	88	1	60	1	48	2	7	1	2.7	-1.2	92.10	-1.90					
38	88	1	60	1	47	1	7	1	2.7	-1.2	91.90	-2.10					
39	85	-2	57	-2	44	-2	7	1	2.6	-1.3	92.00	-2.00					
40	84	-3	56	-3	44	-2	7	1	2.5	-1.4	93.20	-0.80					
41	87	0	59	0	45	-1	7	1	2.8	-1.1	93.20	-0.80					
42	88	1	57	-2	45	-1	7	1	2.8	-1.1							
43	87	0	56	-3	46	0	7	1	2.7	-1.2							
44	86	-1	59	0	43	-3	7	1	2.6	-1.3							
Specification Limits Design/JMF JMF Limits	75-95 91		45-75 60		30-55 46		3.0-7.0 5		3.0 min. 2.7		91.00 94.00		4481 338R 358R	1998	P 0065(7)193 0653-372 0203-372	South Dakota	LVT
1	95	4	59	-1	46	0	6	1	2.2	-0.5	94.90	0.90					
2	94	3	56	-4	42	-4	5	0	1.8	-0.9	93.70	-0.30					
3	93	2	56	-4	43	-3	6	1	2.1	-0.6	94.10	0.10					
4	93	2	56	-4	43	-3	6	1	3.0	0.3	92.80	-1.20					
5	92	1	57	-3	44	-2	6	1	2.5	-0.2	94.10	0.10					
6	93	2	55	-5	41	-5	5	0	2.8	0.1	93.00	-1.00					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
7	94	3	55	-5	41	-5	5	0	2.7	0.0	93.00	-1.00					
8	92	1	59	-1	49	3	5	0	2.5	-0.2	92.30	-1.70					
9	94	3	63	3	47	1	7	2	2.2	-0.5	92.70	-1.30					
10	96	5	60	0	44	-2	6	1	2.2	-0.5	94.20	0.20					
11	94	3	59	-1	45	-1	6	1	2.1	-0.6	92.30	-1.70					
12	94	3	59	-1	46	0	6	1	2.6	-0.1	92.20	-1.80					
13	92	1	58	-2	45	-1	6	1	2.7	0.0	93.30	-0.70					
14	95	4	58	-2	43	-3	6	1	2.5	-0.2	94.00	0.00					
15	95	4	56	-4	41	-5	5	0	2.6	-0.1	93.50	-0.50					
16	93	2	61	1	49	3	7	2	2.4	-0.3	93.60	-0.40					
17	93	2	57	-3	44	-2	6	1	2.4	-0.3	93.10	-0.90					
18	94	3	59	-1	45	-1	6	1	2.1	-0.6	92.20	-1.80					
19	95	4	63	3	50	4	6	1	2.2	-0.5	93.70	-0.30					
20	94	3	62	2	48	2	6	1	2.3	-0.4	94.30	0.30					
21	94	3	59	-1	47	1	6	1	2.7	0.0	92.90	-1.10					
22	94	3	57	-3	44	-2	6	1	2.0	-0.7	93.20	-0.80					
23	94	3	63	3	48	2	6	1	2.5	-0.2	93.40	-0.60					
24	93	2	60	0	47	1	6	1	2.7	0.0	92.90	-1.10					
25	93	2	61	1	47	1	6	1	2.1	-0.6	93.70	-0.30					
Specification Limits	75-95		45-75		30-55		3.0-7.0		3.0 min.		91.00		4488	1998	P 3049(4)27	South Dakota	LVT
Design/JMF	90		62		50		4		3.6		94.00						
JMF Limits																	
1									2.1	-1.5	90.60	-3.40					
2									2.5	-1.1	93.10	-0.90					
3	90	0	64	2	53	3	5	1	2.5	-1.1	91.00	-3.00					
4	90	0	61	-1	49	-1	5	1	2.4	-1.2	91.60	-2.40					
5	89	-1	65	3	52	2	4	1	2.7	-0.9	93.10	-0.90					
6	90	0	63	1	52	2	4	1	2.7	-0.9	92.90	-1.10					
7	90	0	60	-2	46	-4	5	2	2.2	-1.4	92.00	-2.00					
8	90	0	58	-4	45	-5	5	1	2.7	-0.9	93.90	-0.10					
9	90	0	66	4	54	4	5	1	3.3	-0.3	94.20	0.20					
10	90	0	62	0	50	0	4	1	4.2	0.6	95.50	1.50					
11	87	-3	58	-4	47	-3	4	1	3.8	0.2	95.90	1.90					
12	89	-1	60	-2	50	0	4	0	3.1	-0.5	95.20	1.20					
13	89	-1	59	-3	48	-2	4	0	3.5	-0.1	93.30	-0.70					
14	90	0	62	0	50	0	4	1	3.9	0.3	92.40	-1.60					
15	91	1	60	-2	45	-5	5	2	2.2	-1.4	95.10	1.10					
16	91	1	60	-2	45	-5	5	2	1.6	-2.0	93.90	-0.10					
17	93	3	67	5	53	3	4	1	2.5	-1.1	93.90	-0.10					
18	92	2	67	5	53	3	5	1	2.2	-1.4	95.10	1.10					
19	89	-1	62	0	50	0	5	1	1.6	-2.0	93.80	-0.20					
20	91	1	65	3	51	1	5	1	1.8	-1.8	94.10	0.10					
21	92	2	65	3	53	3	5	1	2.0	-1.6	93.00	-1.00					
22	90	0	60	-2	46	-4	5	1	2.0	-1.6	95.30	1.30					
23	91	1	62	0	52	2	5	1	2.0	-1.6	95.80	1.80					
24	90	0	58	-4	45	-5	5	1	2.2	-1.4	94.90	0.90					
25	91	1	64	2	52	2	5	1	3.1	-0.5	95.20	1.20					
26	90	0	62	0	50	0	4	1	2.1	-1.5	95.40	1.40					
27	93	3	66	4	52	2	5	2	1.8	-1.8	95.00	1.00					
28	90	0	60	-2	48	-2	4	1	1.7	-1.9	93.70	-0.30					
29	92	2	61	-1	49	-1	5	1	2.1	-1.5	94.90	0.90					
30	93	3	65	3	52	2	5	2	3.0	-0.6	95.60	1.60					
31	93	3	67	5	54	4	5	1	2.2	-1.4	94.90	0.90					
32	89	-1	57	-5	43	-7	5	1	1.8	-1.8	94.60	0.60					
33	92	2	66	4	52	2	5	1	1.7	-1.9	96.00	2.00					
34	89	-1	60	-2	46	-4	5	1	1.7	-1.9	94.70	0.70					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
35	92	2	64	2	51	1	5	1	2.2	-1.4	94.60	0.60					
36	92	2	65	3	54	4	5	1	2.4	-1.2	95.10	1.10					
37	90	0	64	2	52	2	5	1	2.1	-1.5	95.70	1.70					
38	90	0	64	2	51	1	5	1	2.0	-1.6	96.10	2.10					
39	90	0	62	0	50	0	5	1	2.2	-1.4							
40	90	0	63	1	52	2	5	1	2.3	-1.3							
41	91	1	65	3	51	1	5	1	2.0	-1.6							
42	89	-1	62	0	51	1	5	1	2.0	-1.6							
43	89	-1	62	0	51	1	5	1	2.6	-1.0							
44	90	0	64	2	52	2	5	1	2.1	-1.5							
45	90	0	61	-1	50	0	4	1	2.5	-1.1							
46	90	0	61	-1	50	0	4	0	2.1	-1.5							
47	87	-3	59	-3	49	-1	4	0	2.3	-1.3							
48	91	1	64	2	53	3	4	0	2.4	-1.2							
49	88	-2	61	-1	49	-1	5	1	2.0	-1.6							
50	92	2	65	3	54	4	4	1	2.0	-1.6							
51	92	2	64	2	53	3	4	1	2.1	-1.5							
52	89	-1	61	-1	50	0	4	0	2.2	-1.4							
53	93	3	65	3	53	3	4	1	2.2	-1.4							
54	89	-1	63	1	53	3	4	0	2.2	-1.4							
55	91	1	66	4	55	5	4	0	1.6	-2.0							
56	91	1	63	1	52	2	4	0	2.2	-1.4							
57	88	-2	60	-2	50	0	4	0	2.3	-1.3							
Specification Limits	75-95		45-75		30-55		3.0-7.0		3.5 min.		91.00		3889	1998	P 0010(43)351	South Dakota	MVT
Design/JMF	89		66		55		5		4.1		94.00						
JMF Limits																	
1	90	1	65	-1	57	2	5	0	2.6	-1.5	93.70	-0.30					
2	91	2	65	-1	53	-2	6	1	2.6	-1.5	91.10	-2.90					
3	92	3	71	5	58	3	6	1	2.6	-1.5	92.00	-2.00					
4	91	2	66	0	54	-1	4	-1	3.1	-1.0	91.70	-2.30					
5	89	0	66	0	54	-1	5	1	2.8	-1.3	92.80	-1.20					
6	92	3	68	2	54	-1	4	-1	3.0	-1.1	91.30	-2.70					
7	91	2	67	1	55	0	5	0	3.2	-0.9	90.00	-4.00					
8	87	-2	64	-2	53	-2	6	1	2.6	-1.5	91.40	-2.60					
9	89	0	68	2	56	1	5	0	2.8	-1.3	90.90	-3.10					
10	91	2	67	1	55	0	5	0	2.5	-1.6	91.00	-3.00					
11	88	-1	65	-1	51	-4	5	0	2.6	-1.5	91.20	-2.80					
12	90	1	65	-1	52	-3	6	1	2.5	-1.6	93.90	-0.10					
13	89	0	66	0	53	-2	6	1	3.1	-1.0	92.30	-1.70					
14	90	1	66	0	54	-1	5	0	2.7	-1.4	92.90	-1.10					
15	91	2	69	3	56	1	6	1	3.5	-0.6	91.50	-2.50					
16	90	1	66	0	54	-1	5	0	2.8	-1.3	90.30	-3.70					
17	90	1	67	1	56	1	6	1	2.3	-1.8	91.60	-2.40					
18	92	3	69	3	55	0	5	0	3.7	-0.4	91.00	-3.00					
19	91	2	68	2	54	-1	4	-1	3.5	-0.6	91.70	-2.30					
20	89	0	66	0	53	-2	5	0	4.0	-0.1	91.70	-2.30					
21	90	1	67	1	53	-2	4	-1	3.5	-0.6	92.20	-1.80					
22	91	2	69	3	58	3	5	0	2.8	-1.3	90.60	-3.40					
23	89	0	68	2	56	1	5	0	3.2	-0.9	92.70	-1.30					
24	91	2	68	2	54	-1	5	0	3.0	-1.1	92.70	-1.30					
25	91	2	69	3	58	3	6	1	3.0	-1.1	91.30	-2.70					
26	92	3	69	3	57	2	5	0	3.0	-1.1	91.30	-2.70					
27	91	2	68	2	55	0	6	1	2.8	-1.3	92.50	-1.50					
28	90	1	68	2	56	1	6	1	2.6	-1.5	93.50	-0.50					
29	92	3	70	4	58	3	4	-1	3.3	-0.8	92.30	-1.70					
30	91	2	70	4	59	4	5	0	2.7	-1.4	93.10	-0.90					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
31	89	0	65	-1	53	-2	5	0	3.7	-0.4	92.20	-1.80					
32	88	-1	66	0	54	-1	5	0									
Specification Limits	75-95		45-75		30-55		3.0-7.0		3.0 min.		91.00		4478	1998	P 0010(37)230	South Dakota	LVT
Design/JMF	88		62		49		5		2.0		94.00						
JMF Limits																	
1	84	-4	58	-4	45	-4	5	-1			95.90	1.90					
2	85	-3	57	-5	46	-3	4	-1			96.00	2.00					
3	87	-1	59	-3	49	0	6	0			94.20	0.20					
4	88	0	62	0	51	2	5	-1			94.00	0.00					
5	85	-3	59	-3	48	-1	4	-1			91.40	-2.60					
6	83	-5	58	-4	47	-2	6	0			93.70	-0.30					
7	84	-4	58	-4	47	-2	6	0			91.00	-3.00					
8	85	-3	58	-4	48	-1	5	0			92.80	-1.20					
9	85	-3	59	-3	50	1	6	0			92.70	-1.30					
10	89	1	62	0	51	2	6	0			97.10	3.10					
11	87	-1	59	-3	51	2	6	0			94.70	0.70					
12	87	-1	60	-2	50	1	6	0			94.10	0.10					
13	88	0	65	3	52	3	6	1			96.20	2.20					
14	87	-1	62	0	50	1	6	0			93.90	-0.10					
15	89	1	64	2	49	0	6	0			94.90	0.90					
16	88	0	63	1	53	4	6	0			95.10	1.10					
17	88	0	66	4	53	4	6	1			94.40	0.40					
18	86	-2	61	-1	45	-4	5	0			94.60	0.60					
19	89	1	64	2	53	4	6	1			94.20	0.20					
20	88	0	63	1	52	3	6	0			93.50	-0.50					
21	86	-2	63	1	51	2	6	0			95.60	1.60					
22	85	-3	61	-1	52	3	6	0			94.50	0.50					
23	86	-2	61	-1	51	2	6	0			93.60	-0.40					
24	85	-3	59	-3	47	-2	5	-1			94.30	0.30					
25	86	-2	60	-2	47	-2	5	0			94.70	0.70					
26	83	-5	61	-1	52	3	6	1			95.40	1.40					
27											94.90	0.90					
28	89		62		49		5				93.90	-0.10					
29	88		61		49		5				93.00	-1.00					
30	87		63		49		5				93.00	-1.00					
31	88		58		43		6				93.60	-0.40					
32	86		57		45		5				91.70	-2.30					
33	86		57		45		5				92.30	-1.70					
34	89		62		46		5				92.50	-1.50					
35	88		62		50		5				93.20	-0.80					
36	90		64		47		6				91.70	-2.30					
37	90		62		44		6				94.10	0.10					
38	92		64		50		4				93.00	-1.00					
39	92		65		47		5				93.50	-0.50					
Specification Limits	75-95		45-75		30-55		3.0-7.0		3.0 min.		91.00		4826	1998	P 0027(2)221	South Dakota	LVT
Design/JMF	94		62		47		4		3.8		94.00						
JMF Limits																	
1	94	0	67	5	55	8	4	0	2.0	-1.8	93.80	-0.20					
2	93	-1	64	2	50	3	4	0	2.0	-1.8	95.30	1.30					
3	95	1	62	0	45	-2	5	1	2.1	-1.7	94.50	0.50					
4	93	-1	64	2	50	3	4	0	2.4	-1.4	94.40	0.40					
5	94	0	62	0	49	2	4	0	1.8	-2.0	93.80	-0.20					
6	95	1	65	3	50	3	4	0	1.9	-1.9	94.40	0.40					
7	95	1	65	3	50	3	4	0	1.9	-1.9	96.30	2.30					
8	94	0	62	0	48	1	4	0	2.6	-1.2	92.70	-1.30					
9	93	-1	64	2	54	7	4	0	2.8	-1.0	94.10	0.10					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
10	94	0	63	1	49	2	4	0	2.4	-1.4	95.60	1.60					
11	94	0	65	3	50	3	4	0	2.6	-1.2	88.80	-5.20					
12	94	0	63	1	48	1	4	0	2.4	-1.4	94.30	0.30					
13	95	1	64	2	50	3	4	0	2.2	-1.6	94.10	0.10					
14	95	1	63	1	49	2	4	0	2.1	-1.7	97.60	3.60					
15	95	1	64	2	50	3	4	0	1.8	-2.0	95.10	1.10					
16	93	-1	60	-2	48	1	5	0	2.9	-0.9	93.70	-0.30					
17	95	1	64	2	49	2	4	0	3.2	-0.6	94.80	0.80					
18	93	-1	60	-2	46	-1	5	1	2.2	-1.6	93.60	-0.40					
19	93	-1	64	2	50	3	4	0	2.0	-1.8	92.40	-1.60					
20	95	1	67	5	52	5	4	0	4.0	0.2	92.20	-1.80					
21	95	1	65	3	49	2	4	0	3.0	-0.8	91.70	-2.30					
22	95	1	64	2	50	3	4	0	2.7	-1.1	92.80	-1.20					
23	93	-1	63	1	48	1	4	0	2.7	-1.1	94.20	0.20					
24	93	-1	63	1	49	2	4	0	2.1	-1.7	92.50	-1.50					
25	93	-1	65	3	51	4	5	0	2.3	-1.5	94.50	0.50					
26	95	1	61	-1	47	0	5	1	2.9	-0.9	93.50	-0.50					
27	94	0	62	0	48	1	4	0	2.5	-1.3	93.80	-0.20					
28	94	0	60	-2	46	-1	5	0	2.5	-1.3	95.00	1.00					
Specification Limits	75-95		45-75		30-55		3.0-7.0		3.5 min.		91.00		4985	1998	NH 0018(13)74	South Dakota	MVT
Design/JMF	87		54		36		4		4.6		94.00						
JMF Limits																	
1	86	-1	53	-1	33	-3	5	1	1.8	-2.8	91.60	-2.40					
2	88	1	54	0	36	0	5	1	2.4	-2.2	92.80	-1.20					
3	85	-2	51	-3	31	-5	2	-2	3.7	-0.9	92.60	-1.40					
4	87	0	55	1	33	-3	4	0	3.4	-1.2	92.70	-1.30					
5	86	-1	51	-3	32	-4	4	0	3.6	-1.0	91.10	-2.90					
6	86	-1	56	2	32	-4	3	-2	3.8	-0.8	91.60	-2.40					
7	87	0	51	-3	31	-5	2	-2	3.4	-1.2	90.20	-3.80					
8	88	1	51	-3	33	-3	3	-1	3.5	-1.1	90.90	-3.10					
9	88	1	53	-1	34	-2	3	-1	3.6	-1.0	91.10	-2.90					
10	88	1	54	0	33	-3	4	0	3.6	-1.0	92.80	-1.20					
11	85	-2	52	-2	32	-4	4	0	3.0	-1.6	92.70	-1.30					
12	87	0	55	1	33	-3	4	-1	3.1	-1.5	90.60	-3.40					
13	87	0	52	-2	33	-3	3	-1	3.0	-1.6	92.20	-1.80					
14	85	-2	51	-3	33	-3	4	0	2.9	-1.7	91.20	-2.80					
15	89	2	57	3	35	-1	4	0	3.0	-1.6	92.10	-1.90					
16	84	-3	54	0	35	-1	3	-1	3.2	-1.4	94.50	0.50					
17	90	3	59	5	38	2	4	0	3.2	-1.4	91.80	-2.20					
18	85	-2	56	2	35	-1	4	0	2.7	-1.9	91.80	-2.20					
19	87	0	54	0	34	-2	4	0	2.8	-1.8	92.60	-1.40					
20	88	1	56	2	36	0	4	0	2.4	-2.2	92.20	-1.80					
21	84	-3	54	0	32	-4	4	-1	3.2	-1.4	93.30	-0.70					
22	89	2	56	2	33	-3	4	0	2.5	-2.1	91.40	-2.60					
23	87	0	55	1	36	0	4	0	3.2	-1.4	90.30	-3.70					
24	89	2	55	1	33	-3	4	0	2.8	-1.8	92.90	-1.10					
25	88	1	55	1	34	-2	4	0	2.7	-1.9	92.70	-1.30					
26	87	0	55	1	32	-4	3	-1	3.3	-1.3	92.50	-1.50					
27	86	-1	51	-3	31	-5	4	0	2.6	-2.0	92.50	-1.50					
28	87	0	57	3	37	1	4	0	2.2	-2.4	92.60	-1.40					
29	87	0	56	2	35	-1	4	0	2.5	-2.1	93.10	-0.90					
30	88	1	52	-2	31	-5	5	1	3.2	-1.4	90.20	-3.80					
31	85	-2	50	-4	31	-5	4	0	2.0	-2.6	93.40	-0.60					
32	88	1	56	2	34	-2	5	1	2.7	-1.9	92.50	-1.50					
33	85	-2	53	-1	34	-2	5	1	2.5	-2.1	91.30	-2.70					
34	90	3	58	4	34	-2	4	0	2.5	-2.1	91.80	-2.20					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
Specification Limits Design/JMF JMF Limits	75-95 92		45-75 67		30-55 55		3.0-7.0 6		3.0 min. 3.4		91.00 94.00		4825	1998	P 0028(3)342	South Dakota	LVT
1											92.10	-1.90					
2											92.30	-1.70					
3											93.20	-0.80					
4											93.00	-1.00					
5											92.80	-1.20					
6											92.30	-1.70					
7											90.40	-3.60					
8											91.40	-2.60					
9											91.00	-3.00					
10											89.20	-4.80					
11											88.20	-5.80					
12											88.60	-5.40					
13											89.60	-4.40					
14											91.30	-2.70					
15											91.20	-2.80					
16											91.30	-2.70					
17											93.00	-1.00					
18											93.60	-0.40					
19											92.40	-1.60					
20											94.60	0.60					
21											93.30	-0.70					
22											91.70	-2.30					
23											91.40	-2.60					
24											92.80	-1.20					
25											92.30	-1.70					
26											92.50	-1.50					
27											90.80	-3.20					
28											93.20	-0.80					
29											93.90	-0.10					
30											94.90	0.90					
31											90.40	-3.60					
32											93.20	-0.80					
33											93.30	-0.70					
34											93.10	-0.90					
35											92.20	-1.80					
36											91.30	-2.70					
37											93.30	-0.70					
38											94.30	0.30					
39											95.30	1.30					
Specification Limits Design/JMF JMF Limits	75-95 87		45-75 55		30-55 35		3.0-7.0 5		3.5 min. 3.8		91.00 94.00		4798	1998	NH 0085(56)112	South Dakota	MVT
1	91	4	58	3	32	-2	4	-1	4.1	0.3	86.50	-7.50					
2	92	5	60	5	33	-1	5	0	4.2	0.4	88.40	-5.60					
3	91	4	59	4	34	-3	5	0	3.5	-0.3	89.30	-4.70					
4	91	4	58	3	32	-1	5	0	3.7	-0.1	90.60	-3.40					
5	92	5	59	4	34	2	6	1	3.3	-0.5	88.60	-5.40					
6	92	5	63	8	37	-1	5	0	3.8	0.0	91.70	-2.30					
7	88	1	56	1	34	-2	5	0	3.0	-0.8	91.40	-2.60					
8	89	2	57	2	33	-3	5	0	3.0	-0.8	92.20	-1.80					
9	88	1	55	0	32	-2	4	-1	2.5	-1.3	94.10	0.10					
10	89	2	56	1	33	-1	4	-1	3.0	-0.8	92.50	-1.50					
11	88	1	57	2	34	-4	5	0	2.9	-0.9	93.30	-0.70					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
12	87	0	54	-1	31	-4	5	0	2.7	-1.1	93.40	-0.60					
13	89	2	54	-1	32	0	5	0	2.8	-1.0	92.80	-1.20					
14	89	2	60	5	35	0	6	1	2.8	-1.0	93.60	-0.40					
15	91	4	60	5	35	-1	6	1	2.5	-1.3	93.20	-0.80					
16	90	3	57	2	34	-2	5	0	3.0	-0.8	95.10	1.10					
17	89	2	58	3	33	-1	5	0	2.4	-1.4	94.80	0.80					
18	86	-1	58	3	34	2	5	0	2.5	-1.3	96.10	2.10					
19	90	3	62	7	37	-1	5	0	2.7	-1.1	93.40	-0.60					
20	89	2	55	0	34	-1	5	0	2.6	-1.2	94.50	0.50					
21	91	4	57	2	35	-3	6	1	2.4	-1.4	94.20	0.20					
22	90	3	56	1	33	-35	5	0	2.5	-1.3	94.40	0.40					
Specification Limits	75-95		45-75		30-55		3.0-7.0		3.5 min.		91.00		5356	1999	IM 90-2(101)59	South Dakota	MVT
Design/JMF	90		66		48		4.8		3.8		94.00		5591		NH 2016(8)71		
JMF Limits																	
1	93	3	70	4	49	1	3	-1.8	6.3	2.5	92.00	-2.00					
2	91	1	66	0	45	-3	3	-1.8	3.3	-0.5	94.00	0.00					
3	92	2	66	0	46	-2	2.9	-1.9	3.5	-0.3	93.90	-0.10					
4	92	2	68	2	47	-1	3	-1.8	4.8	1.0	92.80	-1.20					
5	91	1	65	-1	46	-2	3.4	-1.4	4.1	0.3	92.20	-1.80					
6	92	2	68	2	47	-1	3	-1.8	3.7	-0.1	94.50	0.50					
7	91	1	70	4	49	1	3.6	-1.2	3.3	-0.5	93.80	-0.20					
8	90	0	67	1	46	-2	3.1	-1.7	4.6	0.8	94.70	0.70					
9	91	1	69	3	49	1	4	-0.8	4.3	0.5	94.70	0.70					
10	93	3	70	4	49	1	3.6	-1.2	3.7	-0.1	94.80	0.80					
11	91	1	67	1	46	-2	3.5	-1.3	3.8	0.0	94.80	0.80					
12	93	3	66	0	45	-3	3.4	-1.4	3.3	-0.5	94.00	0.00					
13	89	-1	65	-1	45	-3	2.8	-2	4.0	0.2	94.40	0.40					
14	92	2	67	1	47	-1	2.9	-1.9	3.9	0.1	94.60	0.60					
15	92	2	66	0	45	-3	2.9	-1.9	3.5	-0.3	94.80	0.80					
16	93	3	67	1	46	-2	3.1	-1.7	4.4	0.6	94.60	0.60					
17	92	2	65	-1	45	-3	3.5	-1.3	3.2	-0.6	94.20	0.20					
18	93	3	67	1	46	-2	2.6	-2.2	3.3	-0.5	94.10	0.10					
19	92	2	66	0	45	-3	2.8	-2	4.6	0.8	93.80	-0.20					
20	92	2	70	4	49	1	3.4	-1.4	3.6	-0.2	93.80	-0.20					
21	92	2	67	1	49	1	3.7	-1.1	3.6	-0.2	94.10	0.10					
22	91	1	67	1	46	-2	3.8	-1	3.4	-0.4	93.80	-0.20					
23	90	0	64	-2	47	-1	4.5	-0.3	3.5	-0.3	94.30	0.30					
24	92	2	64	-2	46	-2	3.4	-1.4	3.7	-0.1	94.10	0.10					
25	92	2	67	1	45	-3	3.3	-1.5	4.1	0.3	92.90	-1.10					
26	92	2	67	1	48	0	3.7	-1.1	4.4	0.6	93.40	-0.60					
27	91	1	64	-2	47	-1	4.2	-0.6	4.6	0.8	93.10	-0.90					
28	90	0	70	4	51	3	4.6	-0.2	3.8	0.0	92.20	-1.80					
29	91	1	66	0	48	0	3.5	-1.3	3.5	-0.3	92.80	-1.20					
30	90	0	67	1	46	-2	3.1	-1.7	3.2	-0.6	92.40	-1.60					
31	91	1	66	0	47	-1	3.3	-1.5	4.4	0.6	93.50	-0.50					
32	93	3	67	1	49	1	3.4	-1.4	4.5	0.7	93.40	-0.60					
33	89	-1	66	0	47	-1	3.3	-1.5	3.8	0.0	93.30	-0.70					
34	90	0	65	-1	48	0	3.5	-1.3	4.5	0.7	93.70	-0.30					
35	91	1	68	2	49	1	3.5	-1.3	3.6	-0.2	94.70	0.70					
36	93	3	68	2	47	-1	3.2	-1.6	3.5	-0.3	94.20	0.20					
37	90	0	66	0	48	0	2.8	-2	4.7	0.9	94.10	0.10					
38	91	1	65	-1	44	-4	3.6	-1.2	4.4	0.6	93.20	-0.80					
39	92	2	68	2	49	1	2.6	-2.2	3.1	-0.7	93.80	-0.20					
40	92	2	65	-1	45	-3	3.8	-1	3.3	-0.5	93.70	-0.30					
41	94	4	69	3	42	-6	3.9	-0.9	4.1	0.3	93.10	-0.90					
42	90	0	64	-2	46	-2	3.7	-1.1	4.3	0.5	94.00	0.00					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
43	93	3	69	3	48	0	4.3	-0.5	3.4	-0.4	94.20	0.20					
44	90	0	67	1	47	-1	4	-0.8	3.4	-0.4	94.80	0.80					
45	89	-1	66	0	46	-2	4.2	-0.6	3.8	0.0	94.00	0.00					
46	92	2	67	1	48	0	4.8	0	3.4	-0.4	93.70	-0.30					
47	88	-2	65	-1	47	-1	4.3	-0.5	3.6	-0.2	95.20	1.20					
48	91	1	66	0	43	-5	4	-0.8	3.6	-0.2	94.40	0.40					
Specification Limits Design/JMF JMF Limits	75-95 87		45-75 64		30-55 51		3.0-7.0 5.4		3.5 min. 3.7		91.00 94.00		3752	1999	0281(47)48	South Dakota	MVT
1									2.8	-0.9	95.30	1.30					
2									2.9	-0.8	95.80	1.80					
3									3.1	-0.6	95.40	1.40					
4									3.0	-0.7	95.80	1.80					
5									2.9	-0.8	93.50	-0.50					
6									2.9	-0.8	91.70	-2.30					
7									3.2	-0.5	92.50	-1.50					
8									3.2	-0.5	93.50	-0.50					
9									3.1	-0.6	91.20	-2.80					
10									3.1	-0.6	93.50	-0.50					
11									2.9	-0.8	93.60	-0.40					
12									3.1	-0.6	93.30	-0.70					
13									2.9	-0.8	92.40	-1.60					
14									2.8	-0.9	92.80	-1.20					
15									2.9	-0.8	93.80	-0.20					
16									3.0	-0.7	92.20	-1.80					
17									2.9	-0.8	92.50	-1.50					
18									2.7	-1.0	92.50	-1.50					
19									2.7	-1.0							
20									3.2	-0.5	91.60	-2.40					
21									3.2	-0.5	91.60	-2.40					
22									2.9	-0.8	92.40	-1.60					
23									2.9	-0.8	92.00	-2.00					
24									2.8	-0.9	98.30	4.30					
25									2.8	-0.9	93.00	-1.00					
26									2.8	-0.9	93.90	-0.10					
27									2.9	-0.8	92.80	-1.20					
28									2.7	-1.0	93.80	-0.20					
29									2.7	-1.0	91.30	-2.70					
30									2.9	-0.8	92.90	-1.10					
31									2.7	-1.0	91.80	-2.20					
32									2.8	-0.9	93.90	-0.10					
33									2.4	-1.3	94.50	0.50					
34									2.7	-1.0	93.00	-1.00					
35									2.7	-1.0	92.80	-1.20					
36									2.7	-1.0	94.30	0.30					
37									2.7	-1.0	92.50	-1.50					
38									2.7	-1.0	92.30	-1.70					
39									2.8	-0.9	92.10	-1.90					
40									2.8	-0.9	89.60	-4.40					
41									2.9	-0.8	91.60	-2.40					
Specification Limits Design/JMF JMF Limits	75-95 86		45-75 58		30-55 37		3.0-7.0 4.8		3.5 min. 3.8		91.00 94.00		3529 549R	1999	NH 0212(92)87 2122-471	South Dakota	MVT
1	86.9	0.9	56.8	-1.2	36.1	-0.9	4.4	-0.4	3.6	-0.2	92.30	-1.70					
2	82.9	-3.1	55.6	-2.4	36.4	-0.6	4.4	-0.4	2.7	-1.1	92.50	-1.50					
3	88.2	2.2	58.2	0.2	37	0	3.6	-1.2	3.5	-0.3	90.90	-3.10					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
4	88.1	2.1	59.3	1.3	38.2	1.2	4.2	-0.6	3.6	-0.2	93.00	-1.00					
5	86.2	0.2	58.3	0.3	38.9	1.9	3.8	-1	2.8	-1.0	92.60	-1.40					
6	85.5	-0.5	56.9	-1.1	37.7	0.7	3.9	-0.9	3.9	0.1	93.30	-0.70					
7	85.1	-0.9	56.8	-1.2	34.3	-2.7	3.9	-0.9	3.8	0.0	92.70	-1.30					
8	89.3	3.3	59.1	1.1	37.2	0.2	4.6	-0.2	3.7	-0.1	93.30	-0.70					
9	85.7	-0.3	56.9	-1.1	37.1	0.1	3.7	-1.1	4.1	0.3	91.50	-2.50					
10	87.6	1.6	60.4	2.4	41	4	4.7	-0.1	3.4	-0.4	93.30	-0.70					
11	88.7	2.7	59	1	37.5	0.5	4.2	-0.6	3.0	-0.8	93.60	-0.40					
12	87.8	1.8	56.9	-1.1	34.9	-2.1	4.3	-0.5	3.4	-0.4	93.70	-0.30					
13	86.1	0.1	56.5	-1.5	36	-1	4.1	-0.7	3.5	-0.3	93.20	-0.80					
14	85.5	-0.5	55.9	-2.1	33.4	-3.6	3.8	-1	3.4	-0.4	93.00	-1.00					
15	86.8	0.8	60.5	2.5	40.9	3.9	4.7	-0.1	3.7	-0.1	93.20	-0.80					
16	84.8	-1.2	56.4	-1.6	36.8	-0.2	4.6	-0.2	2.9	-0.9	92.90	-1.10					
17	89.7	3.7	59.1	1.1	37.8	0.8	4.9	0.1	2.5	-1.3	93.20	-0.80					
18	83.7	-2.3	56.2	-1.8	36.5	-0.5	4.2	-0.6	2.8	-1.0	92.30	-1.70					
19	88.5	2.5	57.5	-0.5	35.7	-1.3	4	-0.8	3.3	-0.5	92.50	-1.50					
20	88	2	58.8	0.8	38.2	1.2	4.3	-0.5	3.3	-0.5	92.90	-1.10					
21	86	0	57.5	-0.5	36.8	-0.2	4	-0.8	3.2	-0.6	92.60	-1.40					
22	88.3	2.3	58.6	0.6	37.9	0.9	4.2	-0.6	3.0	-0.8	92.30	-1.70					
23	85.1	-0.9	57	-1	36.6	-0.4	4.2	-0.6	3.1	-0.7	93.10	-0.90					
24	84.6	-1.4	58.2	0.2	38.1	1.1	4.2	-0.6	3.8	0.0	91.50	-2.50					
25	87.1	1.1	58.6	0.6	37.2	0.2	4.5	-0.3	3.1	-0.7	92.50	-1.50					
26	88	2	60	2	39	2	5.1	0.3	2.9	-0.9	94.10	0.10					
27	86.8	0.8	59.9	1.9	39.1	2.1	4.9	0.1	2.8	-1.0	93.10	-0.90					
28	87.1	1.1	58.8	0.8	36.5	-0.5	4.3	-0.5	3.0	-0.8	92.10	-1.90					
29	88	2	57.4	-0.6	34.7	-2.3	4.1	-0.7	3.6	-0.2	92.60	-1.40					
30	85.7	-0.3	59.1	1.1	39.3	2.3	4.7	-0.1	3.4	-0.4	92.10	-1.90					
31	89.5	3.5	61.1	3.1	39.7	2.7	4.5	-0.3	3.0	-0.8	91.30	-2.70					
32	89.9	3.9	61.1	3.1	40.9	3.9	5.8	1	3.1	-0.7	92.50	-1.50					
33	86.2	0.2	57.8	-0.2	37.2	0.2	4.3	-0.5	3.4	-0.4	92.10	-1.90					
34	86.3	0.3	57.8	-0.2	37.8	0.8	4.5	-0.3	2.7	-1.1	92.40	-1.60					
35	86.8	0.8	56.3	-1.7	34.6	-2.4	4.4	-0.4	2.5	-1.3	93.00	-1.00					
36	85.7	-0.3	57.4	-0.6	38	1	4.7	-0.1	2.8	-1.0	93.20	-0.80					
37	88.3	2.3	58.8	0.8	38.8	1.8	4.7	-0.1	2.9	-0.9	92.00	-2.00					
38	87.9	1.9	59.2	1.2	37.8	0.8	4.2	-0.6	2.5	-1.3	93.00	-1.00					
39	87.6	1.6	57.8	-0.2	36.1	-0.9	4.7	-0.1	3.0	-0.8	92.20	-1.80					
40	87.4	1.4	57.7	-0.3	38.4	1.4	4.8	0	2.6	-1.2	92.80	-1.20					
41	88.2	2.2	59	1	37.1	0.1	4.5	-0.3	3.2	-0.6	93.20	-0.80					
42	88.3	2.3	59.2	1.2	37.3	0.3	4.7	-0.1	3.3	-0.5	91.10	-2.90					
43	87.3	1.3	57.4	-0.6	37	0	4.1	-0.7	3.2	-0.6	92.40	-1.60					
44	85.6	-0.4	54.9	-3.1	34.7	-2.3	4.5	-0.3	2.7	-1.1	92.60	-1.40					
45	88	2	59.3	1.3	38.5	1.5	4.2	-0.6	2.5	-1.3	92.40	-1.60					
46	87.7	1.7	59.1	1.1	38.5	1.5	4.6	-0.2	3.0	-0.8	94.50	0.50					
47	86.8	0.8	57.1	-0.9	37	0	4.4	-0.4	2.8	-1.0	93.20	-0.80					
48	87.9	1.9	59.1	1.1	37.5	0.5	4.7	-0.1	3.4	-0.4	93.10	-0.90					
49	84.2	-1.8	55.9	-2.1	37	0	4.3	-0.5	3.0	-0.8	93.00	-1.00					
50	86.6	0.6	58.1	0.1	37.1	0.1	4.3	-0.5	2.9	-0.9	94.00	0.00					
51	87.7	1.7	59.1	1.1	38.5	1.5	4.6	-0.2	3.0	-0.8	92.30	-1.70					
52	86.8	0.8	57.1	-0.9	37	0	4.4	-0.4	2.8	-1.0	94.00	0.00					
53	84.7	-1.3	57.3	-0.7	37.8	0.8	4.3	-0.5	3.3	-0.5	92.80	-1.20					
54	88	2	58	0	36	-1	4	-0.8	3.1	-0.7	92.50	-1.50					
55	87	1	57	-1	36	-1	4.1	-0.7	3.1	-0.7	91.50	-2.50					
Specification Limits	75-95		45-75		30-55		3.0-7.0		3.5 min.		91.00		5380	1999	P0281(00)105	South Dakota	MVT
Design/JMF	83		54		42		4.6		4.1		94.00						
JMF Limits																	
1	84	1	56	2	46	4	5.2	0.6	3.2	-0.9	92.70	-1.30					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
2	81	-2	52	-2	43	1	4.7	0.1	3.1	-1.0	93.30	-0.70					
3	84	1	55	1	46	4	4.8	0.2	3.6	-0.5	94.90	0.90					
4	80	-3	51	-3	44	2	4.6	0	2.0	-2.1	93.30	-0.70					
5	82	-1	50	-4	43	1	4	-0.6	3.9	-0.2	92.30	-1.70					
6	83	0	53	-1	42	0	4.5	-0.1	3.5	-0.6	93.40	-0.60					
7	84	1	53	-1	43	1	4.2	-0.4	3.5	-0.6	95.70	1.70					
8	85	2	55	1	45	3	5	0.4	3.5	-0.6	93.70	-0.30					
9	80	-3	53	-1	43	1	4.5	-0.1	3.4	-0.7	93.10	-0.90					
10	82	-1	52	-2	43	1	4.8	0.2	3.5	-0.6	92.40	-1.60					
11	82	-1	53	-1	43	1	4.5	-0.1	3.2	-0.9	95.10	1.10					
12	79	-4	57	3	47	5	5.5	0.9	3.1	-1.0	94.20	0.20					
13							4.9	0.3	3.2	-0.9	93.20	-0.80					
14	81	-2	52	-2	42	0	4.1	-0.5	3.4	-0.7	94.30	0.30					
15	82	-1	53	-1	44	2	4.9	0.3	3.3	-0.8	93.20	-0.80					
16	87	4	56	2	46	4	4.8	0.2			92.50	-1.50					
17	81	-2	51	-3	42	0	5	0.4			94.00	0.00					
18	80	-3	54	0	44	2	4.9	0.3			93.40	-0.60					
19	84	1	54	0	46	4	5.6	1			93.30	-0.70					
20	78	-5	50	-4	42	0	4.2	-0.4			94.30	0.30					
21	81	-2	52	-2	45	3	5.4	0.8			95.10	1.10					
22	82	-1	52	-2	44	2	5.1	0.5			95.10	1.10					
Specification Limits	75-95		45-75		30-55		3.0-7.0		3.5 min.		91.00		5381	1999	NH0012(16)275	South Dakota	MVT
Design/JMF	88		65		51		5.9		3.5		94.00						
JMF Limits																	
1	88	0	64	-1	50	-1	6.6	0.7	4.2	0.7	87.10	-6.90					
2	85	-3	60	-5	46	-5	5	-0.9	4.3	0.8	93.30	-0.70					
3	87	-1	63	-2	48	-3	5.8	-0.1	3.9	0.4	89.70	-4.30					
4	88	0	64	-1	49	-2	5.6	-0.3	3.7	0.2	94.00	0.00					
5	88	0	64	-1	49	-2	5.7	-0.2	3.8	0.3	93.30	-0.70					
6	90	2	66	1	51	0	5.9	0	0.1	-3.4	92.20	-1.80					
7	90	2	66	1	50	-1	5.7	-0.2	4.1	0.6	92.50	-1.50					
8	90	2	66	1	52	1	5.9	0	4.0	0.5	92.70	-1.30					
9	88	0	64	-1	48	-3	5.5	-0.4	3.6	0.1	94.00	0.00					
10	88	0	63	-2	49	-2	5.7	-0.2	3.4	-0.1	93.70	-0.30					
11	90	2	66	1	53	2	6.3	0.4	3.9	0.4	93.90	-0.10					
12	87	-1	64	-1	50	-1	5.6	-0.3	3.5	0.0	92.00	-2.00					
13	86	-2	61	-4	46	-5	5.9	0	4.2	0.7	92.30	-1.70					
14	81	-7	62	-3	48	-3	5.8	-0.1	2.9	-0.6	92.60	-1.40					
15	87	-1	63	-2	47	-4	5	-0.9	3.0	-0.5	92.80	-1.20					
16	88	0	64	-1	48	-3	5.3	-0.6	3.5	0.0	93.60	-0.40					
17	90	2	63	-2	49	-2	5.9	0	2.5	-1.0	95.20	1.20					
18	88	0	63	-2	48	-3	6.1	0.2	2.7	-0.8	93.70	-0.30					
19	87	-1	63	-2	47	-4	4.7	-1.2	3.3	-0.2	93.00	-1.00					
20	86	-2	61	-4	47	-4	5.5	-0.4	3.7	0.2	93.10	-0.90					
21	86	-2	63	-2	49	-2	5.7	-0.2	3.3	-0.2	92.70	-1.30					
22	90	2	65	0	47	-4	6	0.1	3.7	0.2	91.60	-2.40					
23	91	3	66	1	50	-1	4.9	-1	3.5	0.0	92.90	-1.10					
24	88	0	65	0	52	1	6.1	0.2	2.9	-0.6	93.00	-1.00					
25	86	-2	61	-4	47	-4	5.9	0	3.7	0.2	94.90	0.90					
26	86	-2	60	-5	46	-5	5.3	-0.6	3.7	0.2	93.70	-0.30					
27	88	0	64	-1	49	-2	6	0.1	3.6	0.1	94.10	0.10					
28	93	5	65	0	50	-1	5.8	-0.1	3.6	0.1	94.10	0.10					
29	88	0	62	-3	48	-3	6.4	0.5	3.2	-0.3	93.40	-0.60					
30	89	1	63	-2	48	-3	5.4	-0.5	3.2	-0.3	90.90	-3.10					
31											92.80	-1.20					
32											94.30	0.30					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
33											92.90	-1.10					
34											91.90	-2.10					
35											93.90	-0.10					
36											93.10	-0.90					
Specification Limits	75-95		45-75		30-55		3.0-7.0		3.5 min.		91.00		3015	1999	IM 90-2(110)94	South Dakota	MVT
Design/JMF	89		66		47		4.3		4.0		94.00						
JMF Limits																	
1	90	1	66	0	46	-1	4.1	-0.2	3.1	-0.9							
2									2.6	-1.4							
3	88	-1	63	-3	46	-1	3.7	-0.6	4.0	0.0							
4	91	2	64	-2	45	-2	3.6	-0.7	3.1	-0.9							
5	88	-1	64	-2	49	2	3.8	-0.5	3.2	-0.8							
6	89	0	65	-1	48	1	3.5	-0.8	3.2	-0.8							
7	94	5	68	2	52	5	3.9	-0.4	3.1	-0.9							
8	94	5	68	2	50	3	3.9	-0.4	3.2	-0.8							
9	89	0	66	0	47	0	3.8	-0.5	3.0	-1.0							
10	88	-1	62	-4	44	-3	3.8	-0.5	3.0	-1.0							
11	92	3	69	3	52	5	4.2	-0.1	3.5	-0.5							
12	93	4	68	2	49	2	4	-0.3	3.0	-1.0							
13	91	2	71	5	51	4	4.9	0.6	3.2	-0.8							
14	91	2	67	1	49	2	4.6	0.3	3.0	-1.0							
15	94	5	68	2	49	2	4.4	0.1	3.2	-0.8							
16	92	3	67	1	48	1	4.7	0.4	3.4	-0.6							
17	89	0	65	-1	47	0	4.9	0.6	3.2	-0.8							
18	91	2	65	-1	48	1	4.2	-0.1	3.8	-0.2							
19	91	2	66	0	49	2	4.2	-0.1	4.2	0.2							
20	92	3	67	1	48	1	4.7	0.4	3.4	-0.6							
21	94	5	67	1	46	-1	3.5	-0.8	2.2	-1.8							
22	90	1	67	1	46	-1	3.5	-0.8	3.0	-1.0							
23	90	1	63	-3	45	-2	3.7	-0.6	3.2	-0.8							
24	91	2	67	1	49	2	4.2	-0.1	2.8	-1.2							
25	92	3	65	-1	47	0	4	-0.3	2.7	-1.3							
26	93	4	63	-3	47	0	4.2	-0.1	3.1	-0.9							
27	91	2	68	2	49	2	4	-0.3	3.1	-0.9							
28	91	2	66	0	47	0	3.9	-0.4	2.9	-1.1							
29	91	2	65	-1	45	-2	3.6	-0.7	3.2	-0.8							
30	90	1	67	1	48	1	4.7	0.4	3.4	-0.6							
31	90	1	65	-1	48	1	3.7	-0.6	3.2	-0.8							
32	89	0	64	-2	45	-2	4	-0.3	3.1	-0.9							
33	85	-4	64	-2	46	-1	4.6	0.3	2.8	-1.2							
34	93	4	66	0	46	-1	3.6	-0.7	3.1	-0.9							
35	91	2	65	-1	45	-2	3.8	-0.5	2.7	-1.3							
36	91	2	67	1	47	0	4.7	0.4	2.7	-1.3							
37	90	1	70	4	44	-3	3.7	-0.6	3.0	-1.0							
38	88	-1	66	0	48	1	4.4	0.1	3.0	-1.0							
39	91	2	67	1	49	2	4.4	0.1	3.1	-0.9							
40	94	5	68	2	50	3	4	-0.3	3.3	-0.7							
41	92	3	65	-1	45	-2	3.5	-0.8	3.0	-1.0							
42	93	4	67	1	45	-2	4.1	-0.2	2.9	-1.1							
43	92	3	66	0	48	1	4.4	0.1	3.0	-1.0							
44	92	3	67	1	45	-2	4	-0.3	3.0	-1.0							
45	91	2	67	1	47	0	4.4	0.1	3.2	-0.8							
46	90	1	68	2	49	2	4	-0.3	3.0	-1.0							
47	91	2	68	2	52	5	4.4	0.1	3.2	-0.8							
48	90	1	66	0	47	0	4.2	-0.1	2.9	-1.1							
49	93	4	66	0	47	0	4.4	0.1	2.9	-1.1							

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
50	89	0	65	-1	46	-1	4.2	-0.1	3.1	-0.9							
51	91	2	67	1	47	0	4.2	-0.1	3.1	-0.9							
52	93	4	67	1	49	2	4.9	0.6	2.8	-1.2							
53	90	1	66	0	48	1	4.6	0.3	2.9	-1.1							
54	90	1	64	-2	48	1	4.7	0.4	3.2	-0.8							
55	93	4	68	2	54	7	4.8	0.5	2.9	-1.1							
56	92	3	67	1	46	-1	4.2	-0.1	2.9	-1.1							
57	91	2	63	-3	47	0	4.5	0.2	2.9	-1.1							
58	90	1	64	-2	50	3	4.6	0.3	2.9	-1.1							
59	92	3	65	-1	48	1	4.4	0.1	3.1	-0.9							
60	91	2	65	-1	48	1	4.4	0.1	3.0	-1.0							
61	93	4	67	1	47	0	4.9	0.6	2.8	-1.2							
62	93	4	66	0	50	3	4.6	0.3	3.0	-1.0							
63	93	4	66	0	49	2	4.1	-0.2	3.4	-0.6							
64	92	3	63	-3	48	1	3.8	-0.5	2.8	-1.2							
65	89	0	68	2	49	2	4.4	0.1	2.9	-1.1							
66	91	2	66	0	49	2	4	-0.3	2.9	-1.1							
67	93	4	68	2	50	3	3.1	-1.2	3.1	-0.9							
68	92	3	68	2	49	2	4.3	0	2.9	-1.1							
69	92	3	68	2	50	3	4.2	-0.1	3.3	-0.7							
70	91	2	69	3	51	4	5.1	0.8	3.0	-1.0							
71	91	2	67	1	49	2	4.3	0	2.9	-1.1							
72	93	4	68	2	48	1	4.4	0.1	2.9	-1.1							
73	90	1	67	1	50	3	4	-0.3	3.1	-0.9							
74	94	5	70	4	50	3	4.2	-0.1	3.0	-1.0							
75	93	4	68	2	50	3	4.4	0.1	3.1	-0.9							
76	93	4	66	0	48	1	4.5	0.2	3.1	-0.9							
77	90	1	64	-2	47	0	4.2	-0.1	3.5	-0.5							
78	94	5	70	4	51	4	4.5	0.2	3.3	-0.7							
79	94	5	67	1	48	1	4.7	0.4	3.3	-0.7							
80	93	4	67	1	48	1	4.5	0.2	3.1	-0.9							
81	93	4	68	2	48	1	4.6	0.3	2.9	-1.1							
82	92	3	66	0	46	-1	3.7	-0.6	3.0	-1.0							
83	90	1	64	-2	45	-2	3.5	-0.8	2.8	-1.2							
84	90	1	62	-4	43	-4	3.3	-1	2.9	-1.1							
85	92	3	70	4	50	3	3.7	-0.6	3.3	-0.7							
86	92	3	68	2	47	0	4.3	0	2.9	-1.1							
87	91	2	66	0	47	0	3.5	-0.8	3.0	-1.0							
88	91	2	67	1	47	0	3.7	-0.6	3.0	-1.0							
89	94	5	68	2	49	2	4.2	-0.1	3.3	-0.7							
90	88	-1	65	-1	48	1	3.9	-0.4	2.8	-1.2							
91	92	3	67	1	47	0	4.9	0.6	3.1	-0.9							
92	91	2	69	3	51	4	5.9	1.6	3.7	-0.3							
Specification Limits	75-95		45-75		30-55		3.0-7.0		3.0 min.		91.00		5124	1999	P3271(2)189	South Dakota	LVT
Design/JMF	87		59		47		5		3.0		94.00		526R		102		
JMF Limits													537R		103		
1	85	-2	56	-3	45	-2	4.1	-0.9	2.5	-0.5	93.80	-0.20	577R		473		
2	81	-6	57	-2	46	-1	4.3	-0.7	2.2	-0.8	94.60	0.60	576R		0832-371		
3	87	0	59	0	47	0	4	-1	2.7	-0.3	95.70	1.70					
4	84	-3	58	-1	46	-1	4.3	-0.7	2.9	-0.1	94.70	0.70					
5	87	0	59	0	47	0	4.1	-0.9	2.7	-0.3	95.50	1.50					
6	83	-4	52	-7	41	-6	3.8	-1.2	1.7	-1.3	94.40	0.40					
7	86	-1	59	0	47	0	3.9	-1.1	1.8	-1.2	94.50	0.50					
8	84	-3	59	0	47	0	3.9	-1.1	1.7	-1.3	94.40	0.40					
9	87	0	60	1	48	1	3.7	-1.3	1.6	-1.4	94.30	0.30					
10	85	-2	59	0	47	0	4.2	-0.8	1.5	-1.5	94.80	0.80					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
11	87	0	62	3	49	2	4.6	-0.4	1.7	-1.3	93.00	-1.00					
12	84	-3	62	3	50	3	4.3	-0.7	2.9	-0.1	93.50	-0.50					
13	85	-2	60	1	49	2	4.1	-0.9	2.7	-0.3	93.10	-0.90					
14	84	-3	60	1	49	2	4.5	-0.5	2.6	-0.4	93.40	-0.60					
15	86	-1	62	3	50	3	4.2	-0.8	1.8	-1.2	93.80	-0.20					
16	87	0	62	3	50	3	4.4	-0.6	2.1	-0.9	94.00	0.00					
17	85	-2	57	-2	46	-1	4.2	-0.8	2.4	-0.6	93.00	-1.00					
18	85	-2	61	2	49	2	4.6	-0.4	2.0	-1.0	93.10	-0.90					
19	88	1	62	3	50	3	4.2	-0.8	2.2	-0.8	93.40	-0.60					
20	88	1	64	5	52	5	4.4	-0.6	2.2	-0.8	93.60	-0.40					
21	87	0	61	2	49	2	4.2	-0.8	2.3	-0.7	93.20	-0.80					
22	85	-2	59	0	48	1	4.1	-0.9	2.4	-0.6	93.30	-0.70					
23	89	2	63	4	51	4	4.4	-0.6	2.4	-0.6	93.00	-1.00					
24	86	-1	61	2	49	2	4.5	-0.5	2.2	-0.8	91.80	-2.20					
25	86	-1	59	0	47	0	4.4	-0.6	2.4	-0.6	92.50	-1.50					
26	89	2	63	4	50	3	4.4	-0.6	2.1	-0.9	94.00	0.00					
27	86	-1	58	-1	46	-1	4.1	-0.9	2.2	-0.8	94.40	0.40					
28	84	-3	58	-1	44	-3	4.4	-0.6	2.0	-1.0	94.40	0.40					
29	83	-4	59	0	48	1	4.3	-0.7	2.1	-0.9	94.30	0.30					
30	86	-1	60	1	48	1	4	-1	2.1	-0.9	92.90	-1.10					
31	83	-4	58	-1	47	0	4.5	-0.5	2.0	-1.0	93.50	-0.50					
32	85	-2	56	-3	46	-1	4.2	-0.8	2.1	-0.9	94.40	0.40					
33	88	1	59	0	47	0	4.8	-0.2	1.9	-1.1	94.40	0.40					
34	89	2	62	3	50	3	4.4	-0.6	1.9	-1.1	94.40	0.40					
35	87	0	59	0	48	1	4.6	-0.4	1.7	-1.3	91.70	-2.30					
Specification Limits Design/JMF	75-95		45-75		30-55		3.0-7.0		3.0 min.		91.00		5125	1999	P 3079(9)150	South Dakota	LVT
JMF Limits	90		60		48		6.4		2.6		94.00						
1	86	-4	58	-2	47	-1	7.1	0.7	1.8	-0.8	95.10	1.10					
2	90	0	61	1	50	2	7	0.6	2.3	-0.3	94.30	0.30					
3	86	-4	59	-1	47	-1	7.3	0.9	1.6	-1.0	93.20	-0.80					
4	88	-2	62	2	51	3	6.8	0.4	1.7	-0.9	93.50	-0.50					
5	89	-1	63	3	52	4	7.7	1.3	1.5	-1.1	93.70	-0.30					
6	89	-1	60	0	50	2	7	0.6	1.7	-0.9	95.50	1.50					
7	87	-3	60	0	49	1	7.3	0.9	1.9	-0.7	96.10	2.10					
8	89	-1	59	-1	47	-1	7	0.6	1.8	-0.8	94.00	0.00					
9	89	-1	60	0	48	0	7.1	0.7	1.6	-1.0	93.60	-0.40					
10	88	-2	59	-1	46	-2	6.6	0.2	1.8	-0.8	95.80	1.80					
11	88	-2	55	-5	42	-6	6.5	0.1	1.5	-1.1	94.90	0.90					
12	87	-3	57	-3	46	-2	6.7	0.3	1.5	-1.1	95.50	1.50					
13	91	1	61	1	50	2	6.9	0.5	1.6	-1.0	94.10	0.10					
14	87	-3	57	-3	45	-3	6.3	-0.1	1.5	-1.1	94.40	0.40					
15	89	-1	57	-3	46	-2	6.7	0.3	1.6	-1.0	92.90	-1.10					
16	85	-5	58	-2	46	-2	6.9	0.5	1.9	-0.7	95.00	1.00					
17	88	-2	58	-2	48	0	7	0.6	2.1	-0.5	94.10	0.10					
Specification Limits Design/JMF	75-95		45-75		30-55		3.0-7.0		3.5 min.		91.00		5120	1999	P 0011(00)55	South Dakota	MVT
JMF Limits	88		58		43		5.5		4.2		94.00						
1	88	0	60	2	45	2	6.2	0.7	2.3	-1.9	91.00	-3.00					
2	85	-3	56	-2	42	-1	5.6	0.1	2.1	-2.1	90.80	-3.20					
3	88	0	61	3	47	4	6.3	0.8	3.0	-1.2	92.00	-2.00					
4	88	0	58	0	44	1	5.6	0.1	3.8	-0.4	90.70	-3.30					
5	89	1	56	-2	42	-1	6	0.5	3.4	-0.8	94.70	0.70					
6	85	-3	56	-2	41	-2	4.5	-1	3.6	-0.6	94.30	0.30					
7	89	1	58	0	47	4	4.9	-0.6	3.1	-1.1	91.40	-2.60					
8	88	0	60	2	45	2	5.3	-0.2	3.4	-0.8	95.50	1.50					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
9	87	-1	56	-2	41	-2	5.7	0.2	3.6	-0.6	92.70	-1.30					
10	89	1	58	0	46	3	6.7	1.2	3.3	-0.9	93.70	-0.30					
11	88	0	58	0	45	2	5.7	0.2	3.5	-0.7	92.00	-2.00					
12	89	1	59	1	45	2	6.1	0.6	3.6	-0.6	93.30	-0.70					
13	88	0	58	0	42	-1	6.4	0.9	3.4	-0.8	90.80	-3.20					
14	86	-2	59	1	47	4	6.7	1.2	3.6	-0.6	93.60	-0.40					
15	86	-2	55	-3	43	0	5.8	0.3	3.9	-0.3	93.20	-0.80					
16	88	0	56	-2	44	1	4.1	-1.4	3.9	-0.3	94.00	0.00					
17	85	-3	60	2	46	3	6.4	0.9	2.8	-1.4	93.80	-0.20					
18	88	0	57	-1	42	-1	5.5	0	3.4	-0.8	95.30	1.30					
19	88	0	59	1	45	2	6.5	1	2.8	-1.4	92.50	-1.50					
20	88	0	60	2	47	4	6.2	0.7	3.1	-1.1	93.60	-0.40					
21	86	-2	60	2	47	4	5.8	0.3	3.4	-0.8	92.80	-1.20					
22	90	2	60	2	46	3	6.5	1	3.4	-0.8	92.60	-1.40					
23	89	1	58	0	46	3	6.1	0.6	3.7	-0.5	91.40	-2.60					
24	88	0	59	1	44	1	5.5	0	3.7	-0.5	92.60	-1.40					
25	87	-1	58	0	46	3	6.8	1.3	3.6	-0.6	95.00	1.00					
26	88	0	59	1	45	2	5.1	-0.4	3.8	-0.4	93.10	-0.90					
27	88	0	60	2	44	1	6.7	1.2	3.5	-0.7	93.00	-1.00					
28	87	-1	60	2	44	1	5.8	0.3	3.1	-1.1	94.00	0.00					
29	88	0	61	3	46	3	6.4	0.9	3.5	-0.7	93.90	-0.10					
30	88	0	60	2	46	3	7.2	1.7	3.1	-1.1	92.30	-1.70					
Specification Limits	75-95		45-75		30-55		3.0-7.0		3.0 min.		91.00		4476	1999	P 0020(21)416	South Dakota	LVT
Design/JMF	88		65		55		5.7		4.5		94.00		5448		IM 29-7(18)185		
JMF Limits																	
1	90	2	68	3	57	2	6.1	0.4	2.9	-1.6	95.00	1.00					
2	87	-1	60	-5	50	-5	5.6	-0.1	3.0	-1.5	94.80	0.80					
3	95	7	69	4	55	0	7.1	1.4	3.0	-1.5	92.60	-1.40					
4	91	3	68	3	60	5	6.1	0.4	3.5	-1.0	94.20	0.20					
5	89	1	69	4	61	6	5.8	0.1	3.2	-1.3	90.70	-3.30					
6	82	-6	62	-3	55	0	5.5	-0.2	2.8	-1.7	90.70	-3.30					
7	86	-2	63	-2	56	1	5.9	0.2	2.7	-1.8	90.00	-4.00					
8	85	-3	65	0	55	0	5.4	-0.3	2.9	-1.6	92.30	-1.70					
9	84	-4	63	-2	56	1	5.1	-0.6	2.9	-1.6	90.50	-3.50					
10	88	0	64	-1	56	1	5.6	-0.1	2.6	-1.9	90.70	-3.30					
11	88	0	68	3	59	4	5.8	0.1	2.7	-1.8	94.00	0.00					
12	86	-2	66	1	60	5	5.8	0.1	3.0	-1.5	92.40	-1.60					
13	90	2	70	5	60	5	9.7	4	3.1	-1.4	94.90	0.90					
14	88	0	68	3	58	3	6.4	0.7	2.9	-1.6	92.00	-2.00					
15	87	-1	66	1	56	1	5.7	0	2.8	-1.7	90.00	-4.00					
16	88	0	69	4	59	4	5.8	0.1	3.3	-1.2	91.30	-2.70					
17	88	0	69	4	60	5	5.7	0	2.9	-1.6	89.50	-4.50					
18	88	0	68	3	59	4	5.6	-0.1	2.6	-1.9	92.00	-2.00					
19	87	-1	68	3	58	3	6.4	0.7	2.9	-1.6	93.30	-0.70					
20	90	2	69	4	59	4	6	0.3	2.4	-2.1	94.10	0.10					
21	90	2	67	2	59	4	5.9	0.2	2.9	-1.6	92.90	-1.10					
22	89	1	68	3	58	3	5.7	0	2.9	-1.6	93.20	-0.80					
23	90	2	68	3	59	4	6	0.3	2.9	-1.6	92.30	-1.70					
24	89	1	69	4	60	5	6	0.3	2.8	-1.7	93.30	-0.70					
25	90	2	68	3	58	3	7	1.3	3.0	-1.5	93.10	-0.90					
26	90	2	68	3	56	1	5.6	-0.1	2.6	-1.9	93.40	-0.60					
27	88	0	65	0	55	0	5.3	-0.4	2.6	-1.9	92.90	-1.10					
28	86	-2	67	2	57	2	5	-0.7	2.8	-1.7	93.00	-1.00					
29	88	0	69	4	60	5	5.3	-0.4	3.0	-1.5	93.60	-0.40					
30	90	2	67	2	59	4	6.2	0.5	2.6	-1.9	94.10	0.10					
31	89	1	67	2	56	1	6	0.3	2.8	-1.7	93.00	-1.00					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
32	86	-2	65	0	56	1	5.5	-0.2	2.9	-1.6	92.40	-1.60					
33	89	1	68	3	59	4	6	0.3	2.8	-1.7	96.00	2.00					
Specification Limits	75-95		45-75		30-55		3.0-7.0		3.5 min.		91.00		5356	1999	IM 90-2(101)59	South Dakota	MVT
Design/JMF	90		66		48		4.8		3.8		94.00		5591		NH 2016(8)71		
JMF Limits																	
1	93	3	70	4	49	1	3	-1.8	6.3	2.5	92.00	-2.00					
2	91	1	66	0	45	-3	3	-1.8	3.3	-0.5	94.00	0.00					
3	92	2	66	0	46	-2	2.9	-1.9	3.5	-0.3	93.90	-0.10					
4	92	2	68	2	47	-1	3	-1.8	4.8	1.0	92.80	-1.20					
5	91	1	65	-1	46	-2	3.4	-1.4	4.1	0.3	92.20	-1.80					
6	92	2	68	2	47	-1	3	-1.8	3.7	-0.1	94.50	0.50					
7	91	1	70	4	49	1	3.6	-1.2	3.3	-0.5	93.80	-0.20					
8	90	0	67	1	46	-2	3.1	-1.7	4.6	0.8	94.70	0.70					
9	91	1	69	3	49	1	4	-0.8	4.3	0.5	94.70	0.70					
10	93	3	70	4	49	1	3.6	-1.2	3.7	-0.1	94.80	0.80					
11	91	1	67	1	46	-2	3.5	-1.3	3.8	0.0	94.80	0.80					
12	93	3	66	0	45	-3	3.4	-1.4	3.3	-0.5	94.00	0.00					
13	89	-1	65	-1	45	-3	2.8	-2	4.0	0.2	94.40	0.40					
14	92	2	67	1	47	-1	2.9	-1.9	3.9	0.1	94.60	0.60					
15	92	2	66	0	45	-3	2.9	-1.9	3.5	-0.3	94.80	0.80					
16	93	3	67	1	46	-2	3.1	-1.7	4.4	0.6	94.60	0.60					
17	92	2	65	-1	45	-3	3.5	-1.3	3.2	-0.6	94.20	0.20					
18	93	3	67	1	46	-2	2.6	-2.2	3.3	-0.5	94.10	0.10					
19	92	2	66	0	45	-3	2.8	-2	4.6	0.8	93.80	-0.20					
20	92	2	70	4	49	1	3.4	-1.4	3.6	-0.2	93.80	-0.20					
21	92	2	67	1	49	1	3.7	-1.1	3.6	-0.2	94.10	0.10					
22	91	1	67	1	46	-2	3.8	-1	3.4	-0.4	93.80	-0.20					
23	90	0	64	-2	47	-1	4.5	-0.3	3.5	-0.3	94.30	0.30					
24	92	2	64	-2	46	-2	3.4	-1.4	3.7	-0.1	94.10	0.10					
25	92	2	67	1	45	-3	3.3	-1.5	4.1	0.3	92.90	-1.10					
26	92	2	67	1	48	0	3.7	-1.1	4.4	0.6	93.40	-0.60					
27	91	1	64	-2	47	-1	4.2	-0.6	4.6	0.8	93.10	-0.90					
28	90	0	70	4	51	3	4.6	-0.2	3.8	0.0	92.20	-1.80					
29	91	1	66	0	48	0	3.5	-1.3	3.5	-0.3	92.80	-1.20					
30	90	0	67	1	46	-2	3.1	-1.7	3.2	-0.6	92.40	-1.60					
31	91	1	66	0	47	-1	3.3	-1.5	4.4	0.6	93.50	-0.50					
32	93	3	67	1	49	1	3.4	-1.4	4.5	0.7	93.40	-0.60					
33	89	-1	66	0	47	-1	3.3	-1.5	3.8	0.0	93.30	-0.70					
34	90	0	65	-1	48	0	3.5	-1.3	4.5	0.7	93.70	-0.30					
35	91	1	68	2	49	1	3.5	-1.3	3.6	-0.2	94.70	0.70					
36	93	3	68	2	47	-1	3.2	-1.6	3.5	-0.3	94.20	0.20					
37	90	0	66	0	48	0	2.8	-2	4.7	0.9	94.10	0.10					
38	91	1	65	-1	44	-4	3.6	-1.2	4.4	0.6	93.20	-0.80					
39	92	2	68	2	49	1	2.6	-2.2	3.1	-0.7	93.80	-0.20					
40	92	2	65	-1	45	-3	3.8	-1	3.3	-0.5	93.70	-0.30					
41	94	4	69	3	42	-6	3.9	-0.9	4.1	0.3	93.10	-0.90					
42	90	0	64	-2	46	-2	3.7	-1.1	4.3	0.5	94.00	0.00					
43	93	3	69	3	48	0	4.3	-0.5	3.4	-0.4	94.20	0.20					
44	90	0	67	1	47	-1	4	-0.8	3.4	-0.4	94.80	0.80					
45	89	-1	66	0	46	-2	4.2	-0.6	3.8	0.0	94.00	0.00					
46	92	2	67	1	48	0	4.8	0	3.4	-0.4	93.70	-0.30					
47	88	-2	65	-1	47	-1	4.3	-0.5	3.6	-0.2	95.20	1.20					
48	91	1	66	0	43	-5	4	-0.8	3.6	-0.2	94.40	0.40					
Specification Limits	75-95		45-75		30-55		3.0-7.0		3.0 min.		91.00		5119	1999	P 0044(16)312	South Dakota	LVT
Design/JMF	94		62		45		3.5		4.4		94.00				0502-251		
JMF Limits															CA-097A		

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
1	92	-2	62	0	47	2	4.9	1.4	2.0	-2.4	95.90	1.90					
2	95	1	64	2	47	2	4.2	0.7	2.0	-2.4	95.50	1.50					
3	93	-1	63	1	46	1	4.2	0.7	2.1	-2.3	95.70	1.70					
4	94	0	61	-1	45	0	4	0.5	2.2	-2.2	95.70	1.70					
5	94	0	64	2	48	3	4.2	0.7	3.0	-1.4	95.70	1.70					
6	92	-2	62	0	47	2	4.1	0.6	3.3	-1.1	92.80	-1.20					
7	95	1	65	3	48	3	4.1	0.6	3.0	-1.4	91.50	-2.50					
8	96	2	65	3	47	2	3.9	0.4	3.3	-1.1	93.60	-0.40					
9	92	-2	61	-1	44	-1	3.9	0.4	2.9	-1.5	91.30	-2.70					
10	95	1	65	3	48	3	4.5	1	2.8	-1.6	93.30	-0.70					
11	94	0	64	2	47	2	4	0.5	3.3	-1.1	91.70	-2.30					
12	95	1	66	4	49	4	4.4	0.9	3.2	-1.2	92.20	-1.80					
13	94	0	65	3	48	3	4.4	0.9	3.0	-1.4	93.50	-0.50					
14	94	0	65	3	48	3	4.4	0.9	3.0	-1.4	94.10	0.10					
15	94	0	64	2	47	2	4.4	0.9	3.1	-1.3	92.70	-1.30					
16	95	1	64	2	46	1	4.8	1.3	2.8	-1.6	93.50	-0.50					
17	94	0	61	-1	44	-1	4.4	0.9	2.8	-1.6	93.30	-0.70					
18	94	0	63	1	47	2	2.9	-0.6	2.9	-1.5	94.60	0.60					
19	93	-1	62	0	46	1	4.2	0.7	3.1	-1.3	94.30	0.30					
20	94	0	65	3	49	4	4.2	0.7	3.1	-1.3	93.40	-0.60					
21	95	1	66	4	49	4	3.9	0.4	3.1	-1.3	94.70	0.70					
22	94	0	63	1	47	2	3.3	-0.2	3.2	-1.2	96.50	2.50					
23	94	0	64	2	50	5	4.5	1	3.0	-1.4	94.70	0.70					
24											94.70	0.70					
25	93	-1	64	2	47	2	3.5	0	3.0	-1.4	94.90	0.90					
26	95	1	65	3	46	1	3.1	-0.4	3.0	-1.4	94.00	0.00					
27	93	-1	63	1	45	0	4.3	0.8	3.1	-1.3	93.10	-0.90					
28	93	-1	64	2	47	2	3.5	0	3.0	-1.4	93.50	-0.50					
29	93	-1	64	2	46	1	3.5	0	2.9	-1.5	93.80	-0.20					
30	91	-3	64	2	47	2	4.3	0.8	2.8	-1.6	93.70	-0.30					
31	92	-2	65	3	47	2	4	0.5	2.8	-1.6	95.00	1.00					
Specification Limits	75-95		45-75		30-55		3.0-7.0		3.0 min.		91.00		3898	2000	P 0019(22)54	South Dakota	LVT
Design/JMF	87		64		52		6.7		3.3		94.00						
JMF Limits	80-94		59-69		47-57		4.7-8.7										
1	89	2	68	4	54	2	7.6	0.9	2.4	-0.9	93.00	-1.00					
2	92	5	67	3	53	1	7	0.3	2.7	-0.6	91.40	-2.60					
3	94	7	66	2	53	1	6.4	-0.3	2.3	-1.0	93.30	-0.70					
4	91	4	66	2	53	1	7.5	0.8	2.9	-0.4	93.10	-0.90					
5	92	5	67	3	53	1	6.8	0.1	2.6	-0.7	91.50	-2.50					
6	92	5	68	4	54	2	8.2	1.5	2.6	-0.7	92.00	-2.00					
7	92	5	67	3	55	3	8.2	1.5	3.0	-0.3	92.10	-1.90					
8	90	3	67	3	56	4	6.5	-0.2	2.7	-0.6	91.90	-2.10					
9	92	5	67	3	54	2	7.3	0.6	2.5	-0.8	92.90	-1.10					
10	92	5	69	5	54	2	6.6	-0.1	2.8	-0.5	93.40	-0.60					
11	92	5	69	5	56	4	6.6	-0.1	2.7	-0.6	93.00	-1.00					
12	87	0	64	0	53	1	7.3	0.6	2.7	-0.6	92.00	-2.00					
13	90	3	67	3	52	0	6.8	0.1	3.0	-0.3	91.30	-2.70					
14	89	2	65	1	52	0	6.1	-0.6	3.1	-0.2	92.70	-1.30					
15	91	4	66	2	53	1	5.7	-1	2.9	-0.4	92.90	-1.10					
16	91	4	65	1	53	1	8.4	1.7	3.3	0.0	90.60	-3.40					
17	90	3	64	0	51	-1	6.4	-0.3	3.2	-0.1	91.40	-2.60					
18	93	6	66	2	53	1	7.2	0.5	3.0	-0.3	91.50	-2.50					
19	90	3	64	0	52	0	6.3	-0.4	3.1	-0.2	89.80	-4.20					
20	90	3	65	1	54	2	6.1	-0.6	3.2	-0.1	92.30	-1.70					
21	92	5	67	3	55	3	6.7	0	2.8	-0.5	91.60	-2.40					
22	91	4	64	0	51	-1	6.7	0	2.8	-0.5	91.80	-2.20					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
23	90	3	63	-1	52	0	7.7	1	2.6	-0.7	92.60	-1.40					
24	86	-1	65	1	52	0	6.6	-0.1	2.8	-0.5	92.80	-1.20					
25	92	5	66	2	51	-1	6.4	-0.3	2.5	-0.8	90.90	-3.10					
26	89	2	64	0	52	0	7.1	0.4	2.6	-0.7	92.90	-1.10					
27	90	3	67	3	52	0	6.5	-0.2	2.8	-0.5	93.80	-0.20					
28	90	3	65	1	52	0	6.9	0.2	2.9	-0.4	91.90	-2.10					
29	87	0	65	1	52	0	5.7	-1	3.0	-0.3	94.00	0.00					
30	91	4	66	2	53	1	7.2	0.5	2.7	-0.6	91.40	-2.60					
31	86	-1	66	2	53	1	6.2	-0.5	3.0	-0.3	93.30	-0.70					
Specification Limits	75-95		45-75		30-55		3.0-7.0		4.0 min.		92.00		3464	2000	IM 90-2 (109)78	South Dakota	HVT
Design/JMF	92		67		43		4.2		4.4		94.00						
JMF Limits	85-99		62-72		38-48		2.2-6.2										
1	90	-2	63	-4	43	0	4	-0.2	3.1	-1.3	92.80	-1.20					
2	92	0	64	-3	41	-2	3.2	-1	3.6	-0.8	92.10	-1.90					
3	90	-2	63	-4	39	-4	3.2	-1	3.9	-0.5	93.20	-0.80					
4	92	0	64	-3	41	-2	2.8	-1.4	3.5	-0.9	92.10	-1.90					
5	91	-1	62	-5	40	-3	3.1	-1.1	3.6	-0.8	93.10	-0.90					
6	91	-1	67	0	47	4	4.5	0.3	3.5	-0.9	93.10	-0.90					
7	90	-2	66	-1	44	1	3.9	-0.3	3.4	-1.0	92.00	-2.00					
8	93	1	67	0	43	0	3.9	-0.3	4.1	-0.3	92.50	-1.50					
9	92	0	67	0	45	2	4.6	0.4	3.3	-1.1	94.20	0.20					
10	90	-2	65	-2	41	-2	3.8	-0.4	3.3	-1.1	92.70	-1.30					
11	91	-1	66	-1	48	5	4.4	0.2	3.5	-0.9	93.10	-0.90					
12	92	0	68	1	45	2	3.7	-0.5	3.3	-1.1	93.90	-0.10					
13	93	1	68	1	46	3	3.5	-0.7	3.3	-1.1	91.40	-2.60					
14	96	4	70	3	45	2	3.5	-0.7	3.1	-1.3	93.90	-0.10					
15	96	4	69	2	44	1	3.4	-0.8	3.2	-1.2	93.40	-0.60					
16	94	2	70	3	48	5	4.7	0.5	3.1	-1.3	91.60	-2.40					
17	94	2	70	3	48	5	4.7	0.5	3.5	-0.9	94.00	0.00					
18	92	0	71	4	48	5	4	-0.2	3.3	-1.1	92.20	-1.80					
19	95	3	71	4	47	4	4.4	0.2	3.6	-0.8	93.50	-0.50					
20	92	0	68	1	43	0	4	-0.2	3.3	-1.1	93.10	-0.90					
21	94	2	70	3	47	4	5	0.8	3.2	-1.2	95.00	1.00					
22	93	1	70	3	47	4	4.2	0	3.5	-0.9	95.20	1.20					
23	96	4	71	4	47	4	4.4	0.2	3.7	-0.7	94.10	0.10					
24	92	0	69	2	48	5	4.5	0.3	3.2	-1.2	95.20	1.20					
25	93	1	70	3	46	3	3.8	-0.4	3.3	-1.1	95.00	1.00					
26	92	0	69	2	46	3	4.1	-0.1	3.2	-1.2	93.20	-0.80					
27	95	3	69	2	46	3	3.8	-0.4	3.2	-1.2	95.10	1.10					
28	92	0	70	3	45	2	2.6	-1.6	3.3	-1.1	94.20	0.20					
29	91	-1	65	-2	39	-4	2.6	-1.6	3.6	-0.8	94.30	0.30					
30	92	0	68	1	45	2	3.8	-0.4	3.5	-0.9	95.30	1.30					
31	95	3	71	4	46	3	4.7	0.5	3.7	-0.7	94.60	0.60					
32	94	2	69	2	45	2	4.2	0	3.3	-1.1	93.70	-0.30					
33	94	2	68	1	43	0	3.7	-0.5	3.6	-0.8	93.80	-0.20					
34	91	-1	69	2	43	0	3.3	-0.9	3.4	-1.0	94.60	0.60					
35	94	2	68	1	45	2	3.5	-0.7	3.7	-0.7	93.40	-0.60					
36	91	-1	69	2	48	5	4	-0.2	3.7	-0.7	93.90	-0.10					
37	92	0	67	0	44	1	3.6	-0.6	3.5	-0.9	93.10	-0.90					
38	94	2	69	2	46	3	4.2	0	3.4	-1.0	93.60	-0.40					
39	91	-1	67	0	45	2	4.3	0.1	3.9	-0.5	94.30	0.30					
40	93	1	70	3	44	1	3.4	-0.8	3.6	-0.8	94.10	0.10					
41	96	4	69	2	44	1	4.1	-0.1	3.9	-0.5	91.60	-2.40					
42	95	3	71	4	48	5	4.5	0.3	2.8	-1.6	92.80	-1.20					
43	93	1	68	1	43	0	3.3	-0.9	3.8	-0.6	90.90	-3.10					
44	93	1	70	3	46	3	3.6	-0.6	4.0	-0.4	92.00	-2.00					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
45	97	5	71	4	47	4	4.2	0	3.9	-0.5	94.80	0.80					
46	94	2	72	5	46	3	3.6	-0.6	3.3	-1.1	93.70	-0.30					
47	95	3	72	5	48	5	4.1	-0.1	3.5	-0.9	94.50	0.50					
48	95	3	70	3	44	1	4.4	0.2	3.5	-0.9	94.00	0.00					
49	94	2	71	4	47	4	4.4	0.2	3.5	-0.9	95.30	1.30					
50	92	0	70	3	44	1	3.6	-0.6	3.5	-0.9	94.20	0.20					
51	90	-2	70	3	46	3	3.6	-0.6	3.5	-0.9	94.60	0.60					
52	91	-1	72	5	46	3	3.4	-0.8	3.6	-0.8	94.30	0.30					
53	95	3	72	5	48	5	4.1	-0.1	3.3	-1.1	94.90	0.90					
54	94	2	71	4	47	4	4.2	0	3.3	-1.1	95.10	1.10					
55	92	0	71	4	47	4	3.9	-0.3	3.2	-1.2	94.20	0.20					
56	95	3	71	4	48	5	4.7	0.5	3.7	-0.7	92.70	-1.30					
57	96	4	72	5	48	5	4.7	0.5	3.5	-0.9	94.80	0.80					
58	94	2	72	5	48	5	4.2	0	3.9	-0.5	93.10	-0.90					
59	91	-1	69	2	48	5	4.8	0.6	3.3	-1.1	94.90	0.90					
60	89	-3	70	3	45	2	4.2	0	3.6	-0.8	94.10	0.10					
61	92	0	68	1	48	5	3.7	-0.5	3.7	-0.7	93.70	-0.30					
62	89	-3	66	-1	47	4	4	-0.2	3.4	-1.0	93.00	-1.00					
63	90	-2	69	2	48	5	4.6	0.4	3.3	-1.1	93.10	-0.90					
64	91	-1	65	-2	46	3	4.4	0.2	3.5	-0.9	94.60	0.60					
65	90	-2	66	-1	47	4	4.6	0.4	3.8	-0.6	95.50	1.50					
66	91	-1	68	1	48	5	4.3	0.1	3.4	-1.0	95.60	1.60					
67	91	-1	69	2	47	4	4	-0.2	3.2	-1.2	94.20	0.20					
68	94	2	67	0	46	3	3.9	-0.3	3.3	-1.1	94.90	0.90					
69	94	2	71	4	47	4	4.3	0.1	3.2	-1.2	95.80	1.80					
70	92	0	67	0	44	1	4.1	-0.1	3.2	-1.2	94.00	0.00					
71	89	-3	68	1	44	1	3.7	-0.5	3.3	-1.1	94.20	0.20					
72	87	-5	67	0	45	2	3.9	-0.3	3.2	-1.2	93.20	-0.80					
73	94	2	64	-3	41	-2	3.2	-1	3.5	-0.9	92.70	-1.30					
74	92	0	70	3	46	3	4.3	0.1	3.5	-0.9	94.10	0.10					
75	96	4	71	4	47	4	4.9	0.7	3.1	-1.3	92.50	-1.50					
76	93	1	68	1	45	2	3.7	-0.5	3.4	-1.0	94.20	0.20					
77	91	-1	69	2	45	2	3.9	-0.3	3.6	-0.8	93.90	-0.10					
78	90	-2	69	2	47	4	4.9	0.7	3.5	-0.9	93.10	-0.90					
79	93	1	68	1	44	1	3.5	-0.7	3.4	-1.0	92.90	-1.10					
80	93	1	71	4	47	4	3.2	-1	3.9	-0.5	93.50	-0.50					
81	91	-1	68	1	45	2	3.8	-0.4	3.3	-1.1	93.40	-0.60					
82	94	2	66	-1	43	0	3.2	-1	3.3	-1.1	93.10	-0.90					
83	91	-1	68	1	42	-1	3.8	-0.4	3.4	-1.0	95.30	1.30					
84	93	1	69	2	45	2	3.6	-0.6	3.3	-1.1	94.50	0.50					
85	93	1	69	2	47	4	3.6	-0.6	3.3	-1.1	93.60	-0.40					
86	91	-1	66	-1	44	1	3.5	-0.7	3.9	-0.5	93.70	-0.30					
87	94	2	69	2	46	3	3.6	-0.6	3.7	-0.7	93.00	-1.00					
88	93	1	70	3	46	3	3.3	-0.9	3.6	-0.8	94.10	0.10					
89	94	2	67	0	46	3	3.9	-0.3	3.2	-1.2	94.60	0.60					
90	92	0	69	2	47	4	3.7	-0.5	3.2	-1.2	94.40	0.40					
91	93	1	69	2	43	0	3.5	-0.7	3.2	-1.2	93.50	-0.50					
92	93	1	71	4	45	2	3.9	-0.3	3.2	-1.2	94.90	0.90					
93	92	0	70	3	46	3	4	-0.2	3.3	-1.1	95.10	1.10					
94	91	-1	69	2	48	5	4.4	0.2	3.6	-0.8	95.10	1.10					
95	90	-2	69	2	48	5	3.8	-0.4	3.2	-1.2	94.10	0.10					
96	93	1	70	3	45	2	3.8	-0.4	3.2	-1.2	92.70	-1.30					
97	92	0	70	3	47	4	4	-0.2	3.5	-0.9	94.70	0.70					
98	94	2	69	2	42	-1	3.6	-0.6	3.3	-1.1	94.10	0.10					
99	92	0	63	-4	43	0	3.8	-0.4	3.2	-1.2	94.90	0.90					
100	94	2	66	-1	43	0	3.8	-0.4	3.2	-1.2	93.40	-0.60					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
25	89	5	62	4	50	0	4	0.3									
26	86	2	59	1	48	-2	3.7	0									
27	85	1	60	2	48	-2	4	0.3									
28	86	2	57	-1	45	-5	3.6	-0.1									
29	89	5	62	4	49	-1	3.7	0									
30	87	3	60	2	46	-4	3.8	0.1									
31	89	5	59	1	46	-4	3.4	-0.3									
32	89	5	58	0	47	-3	3.8	0.1									
33	90	6	62	4	50	0	3.7	0									
34	88	4	59	1	47	-3	4	0.3									
35	88	4	60	2	48	-2	4	0.3									
36	86	2	60	2	49	-1	4.2	0.5									
37	87	3	60	2	46	-4	3.7	0									
38	88	4	58	0	44	-6	3.4	-0.3									
39	87	3	59	1	44	-6	3.8	0.1									
40	88	4	60	2	45	-5	3.7	0									
41	86	2	58	0	45	-5	3.4	-0.3									
42	89	5	61	3	48	-2	4.1	0.4									
43	86	2	58	0	43	-7	3.6	-0.1									
44	86	2	56	-2	44	-6	3.8	0.1									
45	83	-1	57	-1	45	-5	3.6	-0.1									
Specification Limits	75-95		45-75		30-55		3.0-7.0		3.0 min.		91.00		3890	2000	P 0034(00)274	South Dakota	LVT
Design/JMF	93		69		55		3.2		3.7		94.00		6127		P 0047(00)87		
JMF Limits	86-100		64-74		50-60		1.2-5.2						6126		P 0249(00)73		
1	92	-1	69	0	53	-2	3.4	0.2	2.9	-0.8	93.20	-0.80	275M		ER-P 0050(21)220		
2	94	1	68	-1	53	-2	3.8	0.6	3.1	-0.6	94.70	0.70					
3	93	0	68	-1	51	-4	3.6	0.4	3.2	-0.5	93.40	-0.60					
4	94	1	69	0	52	-3	4	0.8	3.4	-0.3	93.20	-0.80					
5	94	1	67	-2	51	-4	3.6	0.4	3.2	-0.5	92.90	-1.10					
6	94	1	69	0	51	-4	3.2	0	3.1	-0.6	92.50	-1.50					
7	94	1	67	-2	53	-2	3.9	0.7	3.4	-0.3	92.30	-1.70					
8	93	0	67	-2	48	-7	3.2	0	3.6	-0.1	93.50	-0.50					
9	92	-1	66	-3	49	-6	2.6	-0.6	3.6	-0.1	92.70	-1.30					
10	92	-1	66	-3	49	-6	1.9	-1.3	3.6	-0.1	93.50	-0.50					
11	94	1	67	-2	53	-2	2.3	-0.9	3.8	0.1	92.80	-1.20					
12	94	1	66	-3	49	-6	1.6	-1.6	3.8	0.1	93.70	-0.30					
13	94	1	65	-4	48	-7	2.6	-0.6	3.5	-0.2	91.90	-2.10					
14	89	-4	64	-5	50	-5	2.6	-0.6	3.4	-0.3	92.20	-1.80					
15	92	-1	64	-5	47	-8	2.6	-0.6	3.4	-0.3	94.10	0.10					
16	90	-3	64	-5	48	-7	3.7	0.5	3.6	-0.1	92.70	-1.30					
17	91	-2	68	-1	50	-5	3.6	0.4	3.3	-0.4	94.70	0.70					
18	94	1	65	-4	48	-7	3.1	-0.1	3.2	-0.5	93.20	-0.80					
19	93	0	69	0	51	-4	3.6	0.4	2.9	-0.8	92.70	-1.30					
20	93	0	69	0	58	3	5	1.8	3.3	-0.4	92.80	-1.20					
21	95	2	72	3	54	-1	3.5	0.3	3.3	-0.4	91.80	-2.20					
22	94	1	72	3	54	-1	3	-0.2	4.1	0.4	93.10	-0.90					
23	92	-1	69	0	54	-1	3.2	0	3.6	-0.1	92.90	-1.10					
24	92	-1	70	1	53	-2	4.2	1	3.5	-0.2	93.90	-0.10					
25	94	1	72	3	58	3	3.7	0.5	3.6	-0.1	93.50	-0.50					
26	94	1	71	2	57	2	4.7	1.5	3.6	-0.1	95.00	1.00					
27	90	-3	68	-1	55	0	4.2	1	3.3	-0.4	92.80	-1.20					
28	92	-1	70	1	54	-1	4.3	1.1	3.8	0.1	92.50	-1.50					
29	92	-1	69	0	54	-1	3.9	0.7	3.8	0.1	93.80	-0.20					
30	95	2	71	2	54	-1	4.9	1.7	3.5	-0.2	93.10	-0.90					
31	94	1	71	2	54	-1	4.7	1.5	3.4	-0.3	92.30	-1.70					
32	94	1	72	3	55	0	4.2	1	3.3	-0.4	91.10	-2.90					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
33	93	0	70	1	53	-2	3.5	0.3	3.2	-0.5	91.30	-2.70					
34	93	0	72	3	57	2	3.9	0.7	3.1	-0.6	92.50	-1.50					
35	95	2	71	2	52	-3	3.4	0.2	3.3	-0.4	92.90	-1.10					
36	93	0	71	2	56	1	4.4	1.2	3.5	-0.2	92.90	-1.10					
37	95	2	74	5	55	0	3.2	0	3.9	0.2	92.00	-2.00					
38	93	0	71	2	55	0	3.9	0.7	3.8	0.1	93.60	-0.40					
39	95	2	74	5	57	2	4.7	1.5	3.8	0.1	90.80	-3.20					
40	95	2	73	4	56	1	4.4	1.2	3.8	0.1	92.10	-1.90					
41	94	1	73	4	57	2	4.2	1	3.9	0.2	92.13	-1.87					
42	90	-3	69	0	56	1	3.8	0.6	3.7	0.0	93.00	-1.00					
43	94	1	71	2	55	0	3.2	0	3.6	-0.1	94.30	0.30					
44	92	-1	73	4	55	0	3.9	0.7	3.8	0.1	91.10	-2.90					
Specification Limits	75-95		45-75		30-55		3.0-7.0		3.0 min.		91.00		4277	2000	P 0045(30)33	South Dakota	LVT
Design/JMF	88		67		51		5.9		4.9		94.00		253M		2751G		
JMF Limits	81-95		62-72		46-56		3.9-7.9										
1	82	-6	62	-5	47	-4	4.9	-1	4.0	-0.9							
2	87	-1	62	-5	48	-3	5.8	-0.1	2.8	-2.1							
3	87	-1	66	-1	52	1	6.6	0.7	2.7	-2.2							
4	87	-1	65	-2	48	-3	4.9	-1	3.8	-1.1							
5	90	2	64	-3	49	-2	5.6	-0.3	3.2	-1.7							
6	89	1	64	-3	47	-4	5.1	-0.8	2.7	-2.2							
7	92	4	68	1	51	0	6	0.1	2.8	-2.1							
8	91	3	66	-1	49	-2	5.3	-0.6	3.2	-1.7							
9	88	0	65	-2	50	-1	6.2	0.3	2.6	-2.3							
10	90	2	65	-2	50	-1	6.1	0.2	3.0	-1.9							
11	90	2	66	-1	50	-1	5.8	-0.1	2.8	-2.1							
12	89	1	69	2	54	3	6.7	0.8	3.5	-1.4							
13	88	0	67	0	52	1	5.7	-0.2	3.6	-1.3							
14	85	-3	64	-3	49	-2	5.3	-0.6	3.5	-1.4							
15	92	4	68	1	53	2	5.9	0	3.4	-1.5							
16	88	0	67	0	50	-1	5.4	-0.5	3.4	-1.5							
17	90	2	68	1	51	0	6.1	0.2	2.7	-2.2							
18	90	2	69	2	52	1	5.6	-0.3	2.9	-2.0							
19	92	4	72	5	56	5	6.5	0.6	3.4	-1.5							
20	87	-1	67	0	51	0	5.9	0	3.4	-1.5							
21	91	3	69	2	54	3	5.8	-0.1	2.8	-2.1							
22	91	3	69	2	54	3	5.7	-0.2	3.5	-1.4							
23	89	1	67	0	51	0	5.9	0	3.4	-1.5							
24	90	2	68	1	50	-1	5.9	0	2.6	-2.3							
25	89	1	67	0	51	0	5.7	-0.2	3.4	-1.5							
26	90	2	68	1	54	3	6.3	0.4	3.6	-1.3							
27	87	-1	67	0	52	1	5.1	-0.8	3.4	-1.5							
28	87	-1	66	-1	51	0	6	0.1	3.4	-1.5							
29	90	2	69	2	54	3	6.5	0.6	3.3	-1.6							
30	89	1	68	1	52	1	5.4	-0.5	2.9	-2.0							
31	87	-1	65	-2	49	-2	5.9	0	2.4	-2.5							
32	88	0	67	0	51	0	6.2	0.3	2.8	-2.1							
33	87	-1	64	-3	50	-1	5.5	-0.4	3.1	-1.8							
34	89	1	68	1	51	0	5.8	-0.1	2.6	-2.3							
35	91	3	69	2	52	1	5.9	0	2.4	-2.5							
36	87	-1	66	-1	51	0	6	0.1	2.6	-2.3							
37	91	3	68	1	50	-1	5.9	0	3.2	-1.7							
38	92	4	70	3	53	2	6.4	0.5	2.4	-2.5							
39	90	2	68	1	53	2	6.2	0.3	3.0	-1.9							
40	88	0	65	-2	50	-1	6	0.1	2.7	-2.2							
41	89	1	67	0	51	0	5.8	-0.1	2.8	-2.1							

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
42	90	2	66	-1	50	-1	5.7	-0.2	2.7	-2.2							
43	87	-1	66	-1	54	3	5.8	-0.1	2.8	-2.1							
44	89	1	67	0	52	1	5.8	-0.1	3.2	-1.7							
45	90	2	68	1	52	1	6.1	0.2	3.3	-1.6							
46	89	1	67	0	56	5	6.1	0.2	3.2	-1.7							
47	89	1	67	0	53	2	5.9	0	3.1	-1.8							
48	87	-1	65	-2	52	1	5.3	-0.6	2.4	-2.5							
49	90	2	67	0	51	0	4.1	-1.8	3.1	-1.8							
50	88	0	64	-3	51	0	6	0.1	3.0	-1.9							
51	90	2	67	0	53	2	5.9	0	3.3	-1.6							
52	87	-1	64	-3	49	-2	5.5	-0.4	2.5	-2.4							
53	83	-5	66	-1	52	1	5.7	-0.2	2.5	-2.4							
54	86	-2	64	-3	49	-2	5.1	-0.8	3.0	-1.9							
55	89	1	63	-4	47	-4	6.1	0.2	2.5	-2.4							
56	84	-4	67	0	53	2	6.5	0.6	2.1	-2.8							
57	85	-3	64	-3	51	0	5.9	0	2.2	-2.7							
Specification Limits	75-95		45-75		30-55		3.0-7.0		3.0 min.		91.00		5122	2000	P 0079(00)133	South Dakota	LVT
Design/JMF	88		56		45		6.3		3.2		94.00		052M		0793-471		
JMF Limits	81-95		51-61		40-50		4.3-8.3										
1	90	2	60	4	46	1	6.3	0	2.8	-0.4	93.30	-0.70					
2	92	4	61	5	48	3	6.8	0.5	2.7	-0.5	92.20	-1.80					
3	89	1	58	2	46	1	6.7	0.4	2.5	-0.7	93.00	-1.00					
4	90	2	58	2	45	0	6.8	0.5	2.2	-1.0	93.70	-0.30					
5	89	1	59	3	47	2	7.1	0.8	1.6	-1.6	92.80	-1.20					
6	90	2	58	2	45	0	6.6	0.3	3.1	-0.1	90.70	-3.30					
7	88	0	59	3	46	1	6.2	-0.1	3.0	-0.2	93.20	-0.80					
8	88	0	58	2	44	-1	6.3	0	2.7	-0.5	91.30	-2.70					
9	87	-1	57	1	45	0	6.1	-0.2	2.4	-0.8	90.00	-4.00					
10	87	-1	55	-1	43	-2	6.5	0.2	2.7	-0.5	91.00	-3.00					
11	89	1	53	-3	40	-5	5.4	-0.9	2.7	-0.5	91.40	-2.60					
12	89	1	55	-1	45	0	7	0.7	2.1	-1.1	92.10	-1.90					
13	89	1	56	0	46	1	6.7	0.4	2.1	-1.1	95.00	1.00					
14	87	-1	54	-2	44	-1	6.8	0.5	1.9	-1.3	95.60	1.60					
15	87	-1	54	-2	42	-3	6	-0.3	2.1	-1.1	95.20	1.20					
16	89	1	58	2	45	0	6.7	0.4	2.2	-1.0	95.00	1.00					
17	84	-4	53	-3	41	-4	6	-0.3	1.6	-1.6	94.00	0.00					
18	88	0	56	0	44	-1	6	-0.3	1.8	-1.4	92.50	-1.50					
19	86	-2	51	-5	40	-5	6	-0.3	1.7	-1.5	93.50	-0.50					
20	86	-2	51	-5	40	-5	5.7	-0.6	2.0	-1.2	94.10	0.10					
21	87	-1	53	-3	41	-4	6.2	-0.1	1.9	-1.3	92.30	-1.70					
22	88	0	55	-1	43	-2	6.4	0.1	2.3	-0.9	93.80	-0.20					
23	88	0	55	-1	43	-2	6.5	0.2	2.4	-0.8	92.90	-1.10					
24	86	-2	55	-1	42	-3	6.4	0.1	2.3	-0.9	93.00	-1.00					
25	88	0	56	0	43	-2	6.9	0.6	2.1	-1.1	94.70	0.70					
26	91	3	56	0	42	-3	7.3	1	2.6	-0.6	91.70	-2.30					
27	90	2	55	-1	44	-1	7.2	0.9	2.0	-1.2	94.40	0.40					
28	88	0	57	1	43	-2	6.7	0.4	2.1	-1.1	94.20	0.20					
29	89	1	51	-5	40	-5	6.4	0.1	2.1	-1.1	93.80	-0.20					
30	88	0	55	-1	42	-3	6.7	0.4	2.4	-0.8	92.30	-1.70					
31	89	1	56	0	44	-1	7.3	1	1.9	-1.3	94.70	0.70					
32	88	0	56	0	44	-1	6.8	0.5	2.2	-1.0	95.30	1.30					
33	89	1	55	-1	43	-2	6.4	0.1	2.2	-1.0	93.70	-0.30					
Specification Limits	75-95		45-75		30-55		3.0-7.0		3.0 min.		91.00		5391	2000	P 0045(00)66	South Dakota	LVT
Design/JMF	89		62		46		3.6		3.0		94.00		053M		0452-253		
JMF Limits	82-96		57-67		41-51		1.6-5.6										
1	90	1	64	2	48	2	3.8	0.2	3.3	0.3	92.50	-1.50					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
2	91	2	66	4	50	4	4.3	0.7	3.1	0.1	93.70	-0.30					
3	90	1	64	2	46	0	3.1	-0.5	3.1	0.1	93.70	-0.30					
4	92	3	67	5	51	5	4	0.4	2.9	-0.1	94.20	0.20					
5	89	0	67	5	50	4	3.7	0.1	2.7	-0.3	92.40	-1.60					
6	92	3	67	5	48	2	3.1	-0.5	3.2	0.2	93.30	-0.70					
7	90	1	64	2	46	0	2.7	-0.9	3.5	0.5	93.60	-0.40					
8	87	-2	66	4	51	5	3.4	-0.2	3.6	0.6	95.20	1.20					
9	91	2	66	4	50	4	3.8	0.2	2.8	-0.2	93.30	-0.70					
10	91	2	66	4	49	3	3.8	0.2	3.1	0.1	93.80	-0.20					
11	88	-1	66	4	49	3	3.4	-0.2	2.8	-0.2	94.50	0.50					
12	92	3	65	3	47	1	3.1	-0.5	2.9	-0.1	94.40	0.40					
13	92	3	64	2	47	1	3	-0.6	2.9	-0.1	94.70	0.70					
14	92	3	65	3	48	2	2.9	-0.7	2.7	-0.3	94.50	0.50					
15	89	0	61	-1	43	-3	3.1	-0.5	2.8	-0.2	93.30	-0.70					
16	90	1	65	3	49	3	3.7	0.1	3.3	0.3	93.70	-0.30					
17	90	1	63	1	49	3	3.5	-0.1	3.0	0.0	92.80	-1.20					
18	90	1	63	1	48	2	3.3	-0.3	3.0	0.0	93.20	-0.80					
19	90	1	63	1	49	3	3.7	0.1	3.2	0.2	93.70	-0.30					
Specification Limits Design/JMF JMF Limits	75-95 90 83-69		45-75 64 59-69		30-55 51 46-56		3.0-7.0 6.1 4.1-8.1		3.0 min. 2.5		91.00 94.00		5394 058M 059M	2000	P 0065(00)201 0653-372 0203-372	South Dakota	LVT
1	87	-3	60	-4	48	-3	5.9	-0.2	2.7	0.2							
2	88	-2	60	-4	49	-2	6	-0.1	2.1	-0.4							
3	89	-1	60	-4	48	-3	5	-1.1	2.3	-0.2							
4	89	-1	61	-3	48	-3	4.8	-1.3	2.3	-0.2							
5	92	2	64	0	55	4	6.7	0.6	2.3	-0.2							
6	90	0	64	0	51	0	6	-0.1	2.9	0.4							
7	89	-1	64	0	50	-1	5.7	-0.4	2.9	0.4							
8	90	0	61	-3	48	-3	6.4	0.3	2.7	0.2							
9	90	0	63	-1	48	-3	6.5	0.4	2.9	0.4							
10	92	2	64	0	50	-1	6.3	0.2	2.6	0.1							
11	91	1	64	0	50	-1	5.2	-0.9	2.5	0.0							
12	94	4	66	2	52	1	8.2	2.1	2.5	0.0							
13	91	1	65	1	52	1	6.8	0.7	2.3	-0.2							
14	89	-1	61	-3	49	-2	6.1	0	2.7	0.2							
15	90	0	62	-2	49	-2	7.3	1.2	3.1	0.6							
16	90	0	62	-2	49	-2	5.8	-0.3	2.8	0.3							
17	92	2	64	0	51	0	7.2	1.1	2.9	0.4							
18	91	1	64	0	50	-1	6.3	0.2	2.9	0.4							
19	91	1	63	-1	49	-2	6.5	0.4	3.0	0.5							
20	90	0	62	-2	48	-3	6.9	0.8	3.1	0.6							
21	90	0	64	0	51	0	7.4	1.3	2.7	0.2							
22	91	1	62	-2	51	0	6.3	0.2	2.5	0.0							
23	89	-1	60	-4	49	-2	6.5	0.4	2.7	0.2							
24	92	2	65	1	52	1	7	0.9	2.9	0.4							
25	90	0	64	0	50	-1	6.8	0.7	2.7	0.2							
26	91	1	65	1	52	1	7	0.9	3.3	0.8							
27	90	0	62	-2	49	-2	6.5	0.4	2.7	0.2							
28	91	1	62	-2	49	-2	7.1	1	2.5	0.0							
29	89	-1	62	-2	49	-2	6.2	0.1	2.4	-0.1							
30	90	0	62	-2	51	0	6.1	0	2.4	-0.1							
Specification Limits Design/JMF JMF Limits	75-95 89 82-96		45-75 63 58-68		30-55 54 49-59		3.0-7.0 6.7 4.7-8.7		3.0 min. 2.9		91.00 94.00		5415 169M	2000	P 3079(00)219 0203-472	South Dakota	LVT
1	88	-1	62	-1	51	-3	7.2	0.5	2.4	-0.5	92.20	-1.80					
2	87	-2	63	0	54	0	6.7	0	2.3	-0.6	93.40	-0.60					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
3	85	-4	59	-4	51	-3	7.3	0.6	2.3	-0.6	91.30	-2.70					
4	90	1	63	0	54	0	7.2	0.5	2.5	-0.4	92.90	-1.10					
5	89	0	61	-2	50	-4	6.8	0.1	2.3	-0.6	91.90	-2.10					
6	89	0	62	-1	53	-1	7.1	0.4	2.6	-0.3	93.40	-0.60					
7	88	-1	64	1	55	1	6.9	0.2	2.5	-0.4	91.10	-2.90					
8	90	1	61	-2	51	-3	6.9	0.2	2.4	-0.5	91.60	-2.40					
9	88	-1	61	-2	53	-1	6.5	-0.2	2.7	-0.2	92.80	-1.20					
10	86	-3	61	-2	52	-2	6.8	0.1	2.9	0.0	94.00	0.00					
11	87	-2	60	-3	51	-3	6.8	0.1	2.8	-0.1	93.20	-0.80					
12	85	-4	59	-4	49	-5	7	0.3	2.7	-0.2	93.50	-0.50					
13	89	0	63	0	53	-1	6.7	0	2.7	-0.2	89.20	-4.80					
14	88	-1	62	-1	53	-1	7.3	0.6	3.5	0.6	93.80	-0.20					
15	90	1	64	1	54	0	7.2	0.5	3.8	0.9	92.20	-1.80					
16	88	-1	63	0	54	0	7.3	0.6	3.6	0.7	90.90	-3.10					
17	88	-1	63	0	52	-2	6.5	-0.2	2.8	-0.1	91.20	-2.80					
18	88	-1	62	-1	53	-1	6.7	0	2.7	-0.2	93.40	-0.60					
19	90	1	62	-1	53	-1	7.1	0.4	2.9	0.0	91.60	-2.40					
20	90	1	64	1	55	1	7.9	1.2	3.0	0.1	90.80	-3.20					
21	89	0	62	-1	53	-1	7.5	0.8	3.8	0.9	92.00	-2.00					
22	86	-3	62	-1	54	0	7	0.3	2.9	0.0	91.90	-2.10					
23	86	-3	61	-2	54	0	6.9	0.2	2.7	-0.2	92.20	-1.80					
24	89	0	61	-2	52	-2	6.7	0	2.6	-0.3	91.20	-2.80					
25	89	0	63	0	55	1	7.5	0.8	2.8	-0.1	91.30	-2.70					
26	89	0	63	0	55	1	7	0.3	2.9	0.0	92.20	-1.80					
27	88	-1	62	-1	54	0	7.2	0.5	2.8	-0.1	91.10	-2.90					
28	87	-2	61	-2	52	-2	7.2	0.5	3.1	0.2	90.70	-3.30					
29	86	-3	62	-1	53	-1	7.2	0.5	3.5	0.6	91.30	-2.70					
30	88	-1	63	0	55	1	6.8	0.1	3.3	0.4	91.60	-2.40					
31	88	-1	62	-1	52	-2	6.8	0.1	2.6	-0.3	90.30	-3.70					
Specification Limits Design/JMF JMF Limits	75-95 89 28-96		45-75 63 58-68		30-55 54 49-59		3.0-7.0 6.7 4.7-8.7		3.0 min. 2.9		91.00 94.00		5650 170M	2000	P 3079(00)173 0793-471	South Dakota	LVT
1	88	-1	62	-1	54	0	7	0.3	3.0	0.1	92.30	-1.70					
2	88	-1	61	-2	53	-1	7.6	0.9	3.0	0.1	92.70	-1.30					
3	89	0	63	0	54	0	7.8	1.1	3.2	0.3	92.20	-1.80					
4	88	-1	62	-1	49	-5	6.6	-0.1	3.5	0.6	92.60	-1.40					
5	88	-1	61	-2	52	-2	6.7	0	2.3	-0.6	93.10	-0.90					
6	89	0	62	-1	51	-3	7.3	0.6	2.2	-0.7	92.90	-1.10					
7	89	0	61	-2	52	-2	8	1.3	2.1	-0.8	93.50	-0.50					
8	87	-2	62	-1	52	-2	6.3	-0.4	2.6	-0.3	92.60	-1.40					
9	89	0	63	0	54	0	6.5	-0.2	2.9	0.0	91.70	-2.30					
10	88	-1	61	-2	50	-4	6.2	-0.5	2.4	-0.5	94.20	0.20					
11	88	-1	62	-1	51	-3	7.2	0.5	2.4	-0.5	94.10	0.10					
12	86	-3	59	-4	49	-5	7	0.3	2.3	-0.6	92.00	-2.00					
13	89	0	62	-1	53	-1	6.3	-0.4	2.5	-0.4	90.30	-3.70					
14	86	-3	59	-4	50	-4	6	-0.7	2.5	-0.4	90.90	-3.10					
15	88	-1	59	-4	50	-4	7	0.3	2.5	-0.4	91.40	-2.60					
16	88	-1	61	-2	53	-1	6.5	-0.2	2.8	-0.1	91.20	-2.80					
17	88	-1	61	-2	53	-1	6.2	-0.5	2.3	-0.6	91.60	-2.40					
18	87	-2	60	-3	52	-2	5.9	-0.8	2.3	-0.6	93.80	-0.20					
19	89	0	63	0	55	1	6.5	-0.2	2.7	-0.2	92.20	-1.80					
20	88	-1	63	0	53	-1	6.7	0	2.7	-0.2	92.60	-1.40					
21	88	-1	61	-2	52	-2	5.6	-1.1	2.3	-0.6	91.20	-2.80					
22	89	0	63	0	54	0	6.9	0.2	2.5	-0.4	92.50	-1.50					
23	86	-3	60	-3	50	-4	6.9	0.2	2.6	-0.3	90.00	-4.00					
24	89	0	62	-1	52	-2	6.3	-0.4	2.9	0.0	92.70	-1.30					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
25	89	0	62	-1	52	-2	6.4	-0.3	2.8	-0.1	92.00	-2.00					
26	88	-1	62	-1	53	-1	6.7	0	3.1	0.2	90.60	-3.40					
27	89	0	63	0	54	0	6.9	0.2	3.2	0.3	90.10	-3.90					
Specification Limits	75-95		45-75		30-55		3.0-7.0		3.0 min.		91.00		5652	2000	3049(00)41	South Dakota	LVT
Design/JMF	85		57		51		6.1		3.5		94.00		160M		0473-391		
JMF Limits	78-92		52-62		46-56		4.1-6.1										
1	76	-9	53	-4	47	-4	3.2	-2.9	1.7	-1.8							
2	78	-7	57	0	51	0	5.6	-0.5	2.9	-0.6							
3	79	-6	59	2	52	1	5.3	-0.8	2.6	-0.9							
4	78	-7	56	-1	51	0	4.8	-1.3	2.5	-1.0							
5	78	-7	59	2	54	3	5.8	-0.3	3.5	0.0							
6	81	-4	60	3	55	4	5.9	-0.2	3.2	-0.3							
7	78	-7	58	1	53	2	6.1	0	2.7	-0.8							
8	82	-3	59	2	55	4	5.1	-1	2.7	-0.8							
9	80	-5	59	2	55	4	5.5	-0.6	2.7	-0.8							
10	78	-7	57	0	51	0	5.3	-0.8	3.2	-0.3							
11	78	-7	56	-1	51	0	5.4	-0.7	2.9	-0.6							
12	79	-6	57	0	52	1	5.5	-0.6	2.8	-0.7							
13	80	-5	58	1	52	1	5.7	-0.4	2.9	-0.6							
14	78	-7	55	-2	51	0	5.4	-0.7	2.8	-0.7							
15	77	-8	55	-2	50	-1	5.1	-1	2.7	-0.8							
16	81	-4	58	1	52	1	5.3	-0.8	2.4	-1.1							
17	79	-6	58	1	53	2	5.5	-0.6	2.6	-0.9							
18	79	-6	56	-1	51	0	5.3	-0.8	2.6	-0.9							
19	81	-4	60	3	55	4	5.7	-0.4	2.8	-0.7							
20	83	-2	64	7	59	8	6.4	0.3	3.2	-0.3							
Specification Limits	75-95		45-75		30-55		3.0-7.0		3.0 min.		91.00		5653	2000	P 3026(00)230	South Dakota	LVT
Design/JMF	88		63		48		4.1		4.1		94.00						
JMF Limits	81-95		58-68		43-53		2.1-6.1										
1	91	3	65	2	48	0	5	0.9	2.4	-1.7							
2	90	2	64	1	50	2	5	0.9	2.5	-1.6							
3	88	0	61	-2	47	-1	4	-0.1	2.3	-1.8							
4	88	0	60	-3	44	-4	4	-0.1	2.6	-1.5							
5	86	-2	58	-5	43	-5	3.1	-1	2.3	-1.8							
6	94	6	66	3	53	5	4.6	0.5	3.7	-0.4							
7	90	2	67	4	51	3	4.3	0.2	3.3	-0.8							
8	89	1	65	2	49	1	3.2	-0.9	3.2	-0.9							
9	92	4	67	4	52	4	3.4	-0.7	2.8	-1.3							
10	92	4	67	4	52	4	4	-0.1	2.3	-1.8							
11	92	4	66	3	50	2	4.7	0.6	3.2	-0.9							
12	92	4	67	4	50	2	3.4	-0.7	3.1	-1.0							
13	90	2	67	4	53	5	4.2	0.1	3.3	-0.8							
14	90	2	67	4	51	3	4.6	0.5	3.1	-1.0							
15	89	1	64	1	50	2	4.3	0.2	3.0	-1.1							
16	93	5	68	5	52	4	4.3	0.2	3.7	-0.4							
17	92	4	65	2	51	3	5	0.9	3.7	-0.4							
18	92	4	68	5	52	4	5	0.9	3.2	-0.9							
19	89	1	63	0	48	0	3.6	-0.5	2.4	-1.7							
20	93	5	68	5	51	3	4.8	0.7	3.4	-0.7							
21	93	5	65	2	48	0	4.3	0.2	2.3	-1.8							
22	90	2	65	2	50	2	4.7	0.6	2.3	-1.8							
23	90	2	68	5	53	5	3.9	-0.2	3.0	-1.1							
24	90	2	67	4	51	3	4.4	0.3	2.7	-1.4							
25	89	1	64	1	49	1	4.4	0.3	2.4	-1.7							
26	86	-2	63	0	47	-1	3.5	-0.6	2.3	-1.8							
27	90	2	63	0	48	0	4.2	0.1	2.9	-1.2							

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
28	90	2	65	2	48	0	4.4	0.3	2.7	-1.4							
29	89	1	59	-4	44	-4	3.5	-0.6	2.3	-1.8							
30	88	0	61	-2	46	-2	3.9	-0.2	2.4	-1.7							
31	88	0	63	0	47	-1	4	-0.1	2.2	-1.9							
32	88	0	61	-2	47	-1	4.3	0.2	2.3	-1.8							
33	89	1	64	1	48	0	4	-0.1	2.2	-1.9							
34	89	1	64	1	48	0	4	-0.1	2.1	-2.0							
35	91	3	66	3	50	2	4.1	0	2.1	-2.0							
36	87	-1	62	-1	47	-1	4.2	0.1	2.5	-1.6							
37	87	-1	61	-2	46	-2	3.9	-0.2	2.1	-2.0							
38	89	1	63	0	49	1	4.5	0.4	2.8	-1.3							
39	88	0	63	0	49	1	4.3	0.2	2.2	-1.9							
40	90	2	64	1	49	1	4.4	0.3	2.3	-1.8							
41	88	0	61	-2	45	-3	3.6	-0.5	2.5	-1.6							
42	87	-1	61	-2	46	-2	3.9	-0.2	2.3	-1.8							
43	89	1	62	-1	46	-2	4.7	0.6	2.2	-1.9							
44	88	0	60	-3	48	0	5.1	1	2.5	-1.6							
45	89	1	61	-2	45	-3	4.4	0.3	2.7	-1.4							
46	90	2	61	-2	45	-3	4.6	0.5	2.4	-1.7							
47	92	4	62	-1	47	-1	4.2	0.1	2.2	-1.9							
Specification Limits Design/JMF	75-95		45-75		30-55		3.0-7.0		3.5 min.		91.00		649R	2000	NH 0018(54)148	South Dakota	MVT
JMF Limits	90		59		48		5.9		3.9		94.00		307M		P 0073(6)12		
	83-97		54-64		43-53		3.9-7.9						161M		0732-392		
1	88	-2	51	-8	39	-9	4.7	-1.2	4.3	0.4							
2	89	-1	58	-1	44	-4	5.2	-0.7	6.1	2.2							
3	89	-1	57	-2	43	-5	5.3	-0.6	5.4	1.5							
4	91	1	61	2	46	-2	5.9	0	4.5	0.6							
5	91	1	60	1	44	-4	5.3	-0.6	5.3	1.4							
6	92	2	63	4	50	2	5.8	-0.1	3.5	-0.4							
7	91	1	62	3	49	1	6	0.1	4.0	0.1							
8	89	-1	58	-1	45	-3	5.1	-0.8	3.4	-0.5							
9	88	-2	59	0	45	-3	4.8	-1.1	6.1	2.2							
10	91	1	58	-1	43	-5	5.3	-0.6	2.5	-1.4							
11	91	1	57	-2	44	-4	5.1	-0.8	4.7	0.8							
12	90	0	58	-1	44	-4	5.8	-0.1	3.8	-0.1							
13	92	2	60	1	44	-4	5	-0.9	3.5	-0.4							
14	92	2	63	4	50	2	6	0.1	3.9	0.0							
15	90	0	59	0	45	-3	5	-0.9	2.9	-1.0							
16	91	1	59	0	46	-2	5.4	-0.5	2.2	-1.7							
17	88	-2	60	1	44	-4	5.2	-0.7	3.3	-0.6							
18	89	-1	59	0	44	-4	6.1	0.2	2.6	-1.3							
19	87	-3	60	1	46	-2	5.4	-0.5	3.0	-0.9							
20	87	-3	56	-3	43	-5	4.9	-1	2.6	-1.3							
21	89	-1	61	2	47	-1	5.5	-0.4	4.1	0.2							
22	89	-1	58	-1	45	-3	5	-0.9	3.9	0.0							
23	89	-1	58	-1	45	-3	5.2	-0.7	4.0	0.1							
24	91	1	57	-2	43	-5	5.1	-0.8	3.9	0.0							
25	90	0	57	-2	43	-5	5.3	-0.6	4.1	0.2							
26	87	-3	59	0	46	-2	5.6	-0.3	3.8	-0.1							
27	87	-3	59	0	47	-1	5.3	-0.6	4.3	0.4							
28	90	0	60	1	47	-1	5.7	-0.2	4.5	0.6							
29	88	-2	59	0	46	-2	5.7	-0.2	4.3	0.4							
30	90	0	58	-1	44	-4	5.5	-0.4	3.5	-0.4							
31	90	0	60	1	46	-2	5.4	-0.5	2.7	-1.2							
32	88	-2	60	1	47	-1	6.1	0.2	3.5	-0.4							
33	89	-1	60	1	45	-3	5.7	-0.2	3.8	-0.1							

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
34	90	0	63	4	47	-1	5.7	-0.2	2.7	-1.2							
35	91	1	63	4	49	1	5.6	-0.3	2.6	-1.3							
36	91	1	59	0	43	-5	5	-0.9	3.4	-0.5							
37	89	-1	60	1	46	-2	5.5	-0.4	2.8	-1.1							
38	92	2	61	2	44	-4	5.5	-0.4	3.4	-0.5							
39	88	-2	58	-1	44	-4	5.4	-0.5	3.6	-0.3							
40	89	-1	59	0	44	-4	5.5	-0.4	3.0	-0.9							
41	90	0	61	2	46	-2	5.5	-0.4	3.1	-0.8							
42	88	-2	55	-4	43	-5	4.6	-1.3	3.9	0.0							
43	89	-1	61	2	46	-2	5.7	-0.2	3.2	-0.7							
44	89	-1	58	-1	46	-2	5.8	-0.1	2.7	-1.2							
45	87	-3	59	0	46	-2	6.3	0.4	4.4	0.5							
46	90	0	59	0	46	-2	5.8	-0.1	4.5	0.6							
47	90	0	62	3	48	0	5.8	-0.1	3.1	-0.8							
48	91	1	63	4	48	0	7.2	1.3	1.8	-2.1							
Specification Limits Design/JMF	75-95		45-75		30-55		3.0-7.0		3.5 min.		91.00		655R	2000	NH 0012(00)121	South Dakota	MVT
JMF Limits	82-96		61-71		45-55		6.9 4.9-8.9		3.3		94.00						
1	88	-1	68	2	54	4	5	-1.9	3.4	0.1							
2	88	-1	65	-1	52	2	5.2	-1.7	3.3	0.0							
3	89	0	66	0	52	2	5.1	-1.8	3.4	0.1							
4	91	2	69	3	52	2	5.5	-1.4	3.3	0.0							
5	90	1	68	2	53	3	5.4	-1.5	2.9	-0.4							
6	89	0	68	2	52	2	5.1	-1.8	2.9	-0.4							
7	90	1	68	2	54	4	5.4	-1.5	3.0	-0.3							
8	90	1	66	0	52	2	5.5	-1.4	2.8	-0.5							
9	89	0	66	0	50	0	5.9	-1	2.9	-0.4							
10	91	2	69	3	54	4	6.1	-0.8	3.2	-0.1							
11	88	-1	67	1	51	1	6.1	-0.8	2.8	-0.5							
12	89	0	66	0	51	1	6.2	-0.7	3.2	-0.1							
13	91	2	65	-1	49	-1	5.7	-1.2	3.2	-0.1							
14	89	0	67	1	53	3	5.8	-1.1	3.4	0.1							
15	90	1	68	2	53	3	6.3	-0.6	3.0	-0.3							
16	88	-1	65	-1	50	0	6	-0.9	3.4	0.1							
17	89	0	66	0	53	3	5.4	-1.5	3.2	-0.1							
18	88	-1	66	0	51	1	5.5	-1.4	3.2	-0.1							
Specification Limits Design/JMF	75-95		45-75		30-55		3.0-7.0		3.5 min.		91.00		3236	2000	NH 0212(89)39	South Dakota	MVT
JMF Limits	81-95		58-68		44-54		5.5 3.5-7.5		4.2		94.00						
1	90	2	68	5	53	4	6.3	0.8	3.6	-0.6	92.90	-1.10					
2	90	2	62	-1	47	-2	5.7	0.2	3.5	-0.7	94.40	0.40					
3	88	0	58	-5	45	-4	5.2	-0.3	2.2	-2.0	92.00	-2.00					
4	89	1	62	-1	47	-2	5.7	0.2	2.9	-1.3	93.80	-0.20					
5	92	4	62	-1	47	-2	6.3	0.8	2.9	-1.3	91.70	-2.30					
6	92	4	61	-2	47	-2	6.2	0.7	3.0	-1.2	92.90	-1.10					
7	91	3	62	-1	46	-3	5.1	-0.4	2.6	-1.6	90.00	-4.00					
8	88	0	59	-4	46	-3	6.5	1	2.5	-1.7	88.60	-5.40					
9	92	4	62	-1	49	0	7	1.5	2.8	-1.4	91.40	-2.60					
10	90	2	61	-2	48	-1	5.3	-0.2	3.4	-0.8	93.70	-0.30					
11	92	4	63	0	48	-1	5.9	0.4	2.8	-1.4	93.70	-0.30					
12	92	4	63	0	49	0	6	0.5	2.9	-1.3	94.00	0.00					
13	91	3	63	0	49	0	5.7	0.2	3.1	-1.1	93.20	-0.80					
14	91	3	61	-2	48	-1	6.2	0.7	3.3	-0.9	96.00	2.00					
15	91	3	63	0	49	0	6.3	0.8	2.9	-1.3	93.80	-0.20					
16	93	5	64	1	50	1	6.6	1.1	2.8	-1.4	94.80	0.80					
17	93	5	61	-2	45	-4	5.1	-0.4	3.1	-1.1	93.70	-0.30					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
18	92	4	64	1	50	1	6.6	1.1	2.8	-1.4	93.20	-0.80					
19	88	0	62	-1	49	0	5.9	0.4	3.0	-1.2	91.70	-2.30					
20	90	2	62	-1	46	-3	5.7	0.2	2.9	-1.3	89.30	-4.70					
21	92	4	61	-2	45	-4	5.5	0	3.4	-0.8	93.70	-0.30					
22	90	2	61	-2	48	-1	5.6	0.1	2.6	-1.6	92.40	-1.60					
23	86	-2	61	-2	46	-3	5.1	-0.4	2.8	-1.4	95.30	1.30					
24	91	3	61	-2	47	-2	6.2	0.7	2.6	-1.6	93.90	-0.10					
25	90	2	62	-1	48	-1	6.5	1	2.7	-1.5	93.20	-0.80					
Specification Limits	75-95		45-75		30-55		3.0-7.0		3.5 min.		91.00		5383	2000	NH 0085(4)134	South Dakota	MVT
Design/JMF	90		64		47		6.8		4.5		94.00		1698M		0203-471		
JMF Limits	80-94		49-59		36-46		3.4-7.4										
1	87	-3	60	-4	45	-2	6.4	-0.4	4.1	-0.4							
2	87	-3	59	-5	45	-2	5.8	-1	3.7	-0.8							
3	90	0	63	-1	51	4	7.4	0.6	3.4	-1.1							
4	87	-3	59	-5	46	-1	6.5	-0.3	3.7	-0.8							
5	89	-1	64	0	50	3	6.9	0.1	4.1	-0.4							
6	84	-6	61	-3	47	0	6.3	-0.5	3.7	-0.8							
7	89	-1	63	-1	48	1	5.5	-1.3	4.2	-0.3							
8	92	2	61	-3	47	0	5.3	-1.5	4.6	0.1							
9	91	1	67	3	52	5	6.6	-0.2	4.3	-0.2							
10	90	0	66	2	52	5	6.7	-0.1	3.8	-0.7							
11	86	-4	63	-1	46	-1	5.9	-0.9	4.1	-0.4							
12	88	-2	68	4	51	4	6.1	-0.7	4.2	-0.3							
13	91	1	62	-2	45	-2	4.9	-1.9	3.6	-0.9							
14	88	-2	62	-2	47	0	5.7	-1.1	3.6	-0.9							
15	89	-1	67	3	50	3	5.1	-1.7	3.8	-0.7							
16	92	2	67	3	51	4	6.1	-0.7	3.8	-0.7							
17	89	-1	63	-1	46	-1	5.8	-1	4.2	-0.3							
18	92	2	65	1	49	2	5.9	-0.9	4.4	-0.1							
19	88	-2	63	-1	48	1	5.6	-1.2	4.1	-0.4							
20	83	-7	65	1	49	2	5.7	-1.1	4.2	-0.3							
21	83	-7	61	-3	46	-1	5.4	-1.4	4.3	-0.2							
22	85	-5	64	0	48	1	5.7	-1.1	4.1	-0.4							
23	89	-1	63	-1	47	0	5.7	-1.1	3.8	-0.7							
24	92	2	64	0	48	1	5.4	-1.4	4.0	-0.5							
25	91	1	65	1	49	2	5	-1.8	4.0	-0.5							
26	90	0	63	-1	47	0	5.5	-1.3	3.4	-1.1							
27	91	1	65	1	50	3	5.2	-1.6	4.3	-0.2							
28	90	0	66	2	49	2	5.1	-1.7	4.1	-0.4							
29	90	0	63	-1	47	0	4.9	-1.9	3.8	-0.7							
30	93	3	63	-1	47	0	5.1	-1.7	4.2	-0.3							
31	92	2	65	1	49	2	6.1	-0.7	3.6	-0.9							
32	93	3	65	1	50	3	5.8	-1	4.1	-0.4							
33	93	3	62	-2	47	0	5.3	-1.5	4.3	-0.2							
34	91	1	65	1	51	4	5.2	-1.6	3.2	-1.3							
35	93	3	64	0	50	3	6.5	-0.3	3.7	-0.8							
36	93	3	64	0	49	2	6.8	0	3.6	-0.9							
37	91	1	63	-1	47	0	5.7	-1.1	3.5	-1.0							
38	91	1	63	-1	50	3	6.2	-0.6	3.5	-1.0							
39	91	1	61	-3	46	-1	5.6	-1.2	3.3	-1.2							
40	94	4	61	-3	43	-4	6.6	-0.2	3.8	-0.7							
41	93	3	64	0	50	3	6.9	0.1	3.3	-1.2							
42	91	1	60	-4	43	-4	6.8	0	3.3	-1.2							
43	89	-1	62	-2	45	-2	6.4	-0.4	3.5	-1.0							
Specification Limits	75-95		45-75		30-55		3.0-7.0		3.5 min.		91.00		5392	2000	P 0022(23)348	South Dakota	MVT
Design/JMF	89		68		55		5.5		3.4		94.00						

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
JMF Limits	82-96		63-73		50-60		3.5-7.5										
1	90	1	67	-1	53	-2	6.1	0.6	3.3	-0.1							
2	93	4	73	5	59	4	7.1	1.6	3.0	-0.4							
3	92	3	71	3	56	1	6.7	1.2	3.0	-0.4							
4	92	3	71	3	59	4	7.4	1.9	3.1	-0.3							
5	91	2	69	1	58	3	6.5	1	3.3	-0.1							
6	93	4	70	2	58	3	6.4	0.9	3.5	0.1							
7	90	1	69	1	57	2	6.6	1.1	2.8	-0.6							
8	89	0	66	-2	53	-2	5.8	0.3	2.9	-0.5							
9	92	3	69	1	58	3	6.4	0.9	2.9	-0.5							
10	91	2	68	0	57	2	6.1	0.6	2.9	-0.5							
11	91	2	70	2	56	1	6.1	0.6	3.2	-0.2							
12	92	3	71	3	58	3	6.5	1	3.2	-0.2							
13	91	2	69	1	57	2	6.3	0.8	3.3	-0.1							
14	92	3	70	2	57	2	6.4	0.9	3.2	-0.2							
15	91	2	69	1	57	2	6.1	0.6	3.3	-0.1							
16	92	3	67	-1	55	0	6	0.5	3.1	-0.3							
17	91	2	69	1	56	1	6.4	0.9	3.1	-0.3							
18	89	0	67	-1	55	0	6.2	0.7	2.9	-0.5							
19	91	2	68	0	56	1	5.3	-0.2	3.0	-0.4							
20	91	2	68	0	56	1	5.9	0.4	3.1	-0.3							
21	90	1	69	1	55	0	5.9	0.4	3.1	-0.3							
22	90	1	69	1	55	0	5.8	0.3	3.0	-0.4							
23	91	2	72	4	57	2	6.3	0.8	3.2	-0.2							
Specification Limits	75-95		45-75		30-55		3.0-7.0		3.5 min.		91.00		5395	2000	P 0044(00)65	South Dakota	MVT
Design/JMF	87		61		45		3.4		3.2		94.00						
JMF Limits	80-94		56-66		40-50		2.0-6.0										
1	89	2	59	-2	44	-1	3	-0.4	2.9	-0.3							
2	85	-2	58	-3	44	-1	3.2	-0.2	3.0	-0.2							
3	87	0	58	-3	43	-2	2.8	-0.6	3.2	0.0							
4	84	-3	59	-2	44	-1	3.1	-0.3	3.1	-0.1							
5	85	-2	58	-3	44	-1	3.3	-0.1	3.0	-0.2							
6	85	-2	57	-4	43	-2	3.1	-0.3	3.0	-0.2							
7	85	-2	57	-4	42	-3	3.1	-0.3	2.9	-0.3							
8	84	-3	57	-4	42	-3	3.4	0	2.7	-0.5							
9	89	2	60	-1	46	1	3.5	0.1	2.8	-0.4							
10	90	3	61	0	47	2	3.6	0.2	3.0	-0.2							
11	89	2	59	-2	45	0	3.3	-0.1	3.1	-0.1							
12	91	4	60	-1	46	1	3.5	0.1	3.0	-0.2							
13	88	1	59	-2	45	0	3.4	0	2.8	-0.4							
14	89	2	61	0	47	2	3.7	0.3	2.9	-0.3							
15	88	1	60	-1	47	2	3.5	0.1	2.8	-0.4							
16	87	0	61	0	47	2	3.7	0.3	2.8	-0.4							
17	87	0	58	-3	43	-2	3.3	-0.1	2.9	-0.3							
18	88	1	61	0	47	2	3.8	0.4	2.8	-0.4							
Specification Limits	75-95		45-75		30-55		3.0-7.0		3.5 min.		91.00		5398	2000	P 0042(00)370	South Dakota	MVT
Design/JMF	88		61		47		5.3		4.4		94.00		5383		PH0042(8)373		
JMF Limits	84-98		59-69		48-53		4.0-8.0						5640		P0011(00)74		
1	89	1	58	-3	44	-3	4	-1.3	3.5	-0.9	93.00	-1.00					
2	86	-2	57	-4	42	-5	4.8	-0.5	2.7	-1.7	93.00	-1.00					
3	88	0	61	0	44	-3	4	-1.3	3.6	-0.8	90.60	-3.40					
4	85	-3	57	-4	43	-4	4.1	-1.2	2.8	-1.6	93.20	-0.80					
5	83	-5	56	-5	41	-6	4	-1.3	2.9	-1.5	92.30	-1.70					
6	86	-2	61	0	48	1	4.5	-0.8	3.1	-1.3	93.00	-1.00					
7	85	-3	58	-3	47	0	4.6	-0.7	3.1	-1.3	94.90	0.90					
8	85	-3	60	-1	47	0	4	-1.3	3.8	-0.6	94.00	0.00					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
9	85	-3	63	2	47	0	4.6	-0.7	3.7	-0.7	92.80	-1.20					
10	87	-1	64	3	48	1	5.1	-0.2	3.6	-0.8	93.20	-0.80					
11	88	0	62	1	49	2	4.4	-0.9	3.0	-1.4	93.00	-1.00					
12	88	0	63	2	48	1	4.7	-0.6	3.0	-1.4	93.40	-0.60					
13	91	3	67	6	51	4	4.4	-0.9	5.2	0.8	91.90	-2.10					
14	90	2	66	5	53	6	3.9	-1.4	4.8	0.4	95.30	1.30					
15	91	3	63	2	46	-1	4.5	-0.8	3.0	-1.4	93.30	-0.70					
16	86	-2	56	-5	42	-5	4.3	-1	4.3	-0.1	91.90	-2.10					
17	88	0	59	-2	44	-3	4.5	-0.8	3.3	-1.1	92.10	-1.90					
18	86	-2	59	-2	46	-1	4.9	-0.4	2.7	-1.7	95.30	1.30					
19	83	-5	57	-4	43	-4	3.7	-1.6	2.9	-1.5	92.40	-1.60					
20	88	0	62	1	45	-2	4.2	-1.1	4.1	-0.3	94.00	0.00					
21	86	-2	60	-1	46	-1	4.1	-1.2	2.8	-1.6	94.10	0.10					
22	87	-1	61	0	47	0	4.5	-0.8	3.1	-1.3	92.50	-1.50					
23	88	0	60	-1	45	-2	4.8	-0.5	2.7	-1.7	93.30	-0.70					
24	88	0	61	0	44	-3	5	-0.3	3.5	-0.9	93.70	-0.30					
25	88	0	58	-3	43	-4	4.5	-0.8	3.2	-1.2	93.70	-0.30					
26	88	0	63	2	48	1	4.8	-0.5	3.1	-1.3							
Specification Limits	75-95		45-75		30-55		3.0-7.0		3.5 min.		91.00		5599	2000	NH 0050(23)343	South Dakota	MVT
Design/JMF	85		61		53		4.3		4.2		94.00		212M		2941G		
JMF Limits	78-92		56-66		48-58		2.3-6.3										
1	85	0	59	-2	48	-5	3.8	-0.5	2.9	-1.3	93.30	-0.70					
2	88	3	63	2	53	0	4.3	0	2.6	-1.6	94.00	0.00					
3	85	0	62	1	52	-1	4.1	-0.2	3.2	-1.0	94.90	0.90					
4	85	0	60	-1	49	-4	4.5	0.2	3.0	-1.2	95.70	1.70					
5	85	0	60	-1	50	-3	4.7	0.4	2.6	-1.6	93.90	-0.10					
6	83	-2	61	0	52	-1	4.1	-0.2	2.8	-1.4	94.10	0.10					
7	85	0	59	-2	50	-3	4.1	-0.2	2.6	-1.6	93.90	-0.10					
8	86	1	62	1	53	0	3.7	-0.6	2.8	-1.4	95.10	1.10					
9	88	3	62	1	53	0	3.7	-0.6	3.1	-1.1	93.70	-0.30					
10	85	0	61	0	50	-3	3.9	-0.4	2.8	-1.4	93.50	-0.50					
11	83	-2	59	-2	51	-2	3.7	-0.6	2.8	-1.4	95.00	1.00					
12	83	-2	60	-1	52	-1	3.7	-0.6	3.1	-1.1	94.30	0.30					
13	85	0	59	-2	52	-1	4.1	-0.2	2.7	-1.5	94.10	0.10					
14	88	3	61	0	52	-1	4.3	0	3.3	-0.9	93.70	-0.30					
15	87	2	63	2	53	0	4.2	-0.1	3.1	-1.1	93.90	-0.10					
16	84	-1	61	0	53	0	3.9	-0.4	3.1	-1.1	93.20	-0.80					
17	85	0	59	-2	51	-2	4.2	-0.1	3.2	-1.0	95.40	1.40					
18	86	1	60	-1	50	-3	4.2	-0.1	3.4	-0.8	94.40	0.40					
19	85	0	59	-2	51	-2	3.3	-1	3.0	-1.2	94.60	0.60					
20	83	-2	60	-1	53	0	3.9	-0.4	3.1	-1.1	93.80	-0.20					
21	86	1	61	0	52	-1	4.3	0	3.0	-1.2	94.20	0.20					
22	86	1	60	-1	49	-4	4.1	-0.2	3.1	-1.1	94.90	0.90					
23	84	-1	61	0	53	0	3.6	-0.7	3.0	-1.2	94.20	0.20					
24	86	1	60	-1	52	-1	4.4	0.1	2.9	-1.3	94.90	0.90					
25	85	0	59	-2	50	-3	4.1	-0.2	3.2	-1.0	94.30	0.30					
26	85	0	59	-2	50	-3	4.1	-0.2	3.1	-1.1	94.90	0.90					
27	85	0	59	-2	50	-3	4.2	-0.1	3.0	-1.2	94.40	0.40					
28	87	2	61	0	51	-2	4.4	0.1	3.3	-0.9	92.70	-1.30					
29	86	1	62	1	50	-3	3.8	-0.5	3.0	-1.2	92.90	-1.10					
30	83	-2	58	-3	51	-2	4	-0.3	3.1	-1.1	92.30	-1.70					
Specification Limits	75-95		45-75		30-55		3.0-7.0		3.5 min.		91.00		5613	2000	NH 0050(15)368	South Dakota	MVT
Design/JMF	85		61		53		4.3		4.4		94.00		5985		P 3314(00)78		
JMF Limits	78-92		56-66		48-58		2.3-6.3						087M		0023-004		
1	87	2	58	-3	49	-4	3.7	-0.6	3.1	-1.3			279M		410-B107		
2	87	2	63	2	53	0	4.5	0.2	3.1	-1.3							

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
3	87	2	62	1	52	-1	3.9	-0.4	3.4	-1.0							
4	85	0	60	-1	51	-2	3.6	-0.7	3.6	-0.8							
5	85	0	60	-1	52	-1	4	-0.3	3.7	-0.7							
6	88	3	64	3	54	1	4	-0.3	3.6	-0.8							
7	88	3	63	2	52	-1	4.6	0.3	3.7	-0.7							
8	89	4	65	4	51	-2	3	-1.3	3.7	-0.7							
9	90	5	66	5	55	2	3.8	-0.5	3.5	-0.9							
10	88	3	65	4	52	-1	4.5	0.2	3.5	-0.9							
11	89	4	65	4	53	0	4.8	0.5	3.7	-0.7							
12	89	4	64	3	54	1	3.7	-0.6	3.9	-0.5							
13	87	2	58	-3	48	-5	4	-0.3	3.5	-0.9							
14	86	1	59	-2	49	-4	3.6	-0.7	3.1	-1.3							
15	89	4	61	0	50	-3	4.1	-0.2	3.5	-0.9							
16	88	3	62	1	51	-2	3.8	-0.5	3.0	-1.4							
17	87	2	60	-1	49	-4	3.8	-0.5	3.7	-0.7							
18	84	-1	59	-2	46	-7	4.1	-0.2	3.8	-0.6							
19	89	4	63	2	51	-2	5.4	1.1	3.9	-0.5							
20	90	5	66	5	53	0	4.4	0.1	3.8	-0.6							
21	88	3	63	2	50	-3	4.1	-0.2	3.9	-0.5							
22	90	5	65	4	53	0	4.9	0.6	3.7	-0.7							
23	89	4	65	4	53	0	5	0.7	4.1	-0.3							
24	87	2	65	4	55	2	3.4	-0.9	3.7	-0.7							
25	88	3	66	5	55	2	3.6	-0.7	3.8	-0.6							
26	88	3	66	5	56	3	4.8	0.5	3.4	-1.0							
27	87	2	63	2	52	-1	4.3	0	4.1	-0.3							
Specification Limits Design/JMF	75-95		45-75		30-55		3.0-7.0		3.5 min.		91.00		5614	2000	NH 0037(38)114	South Dakota	MVT
JMF Limits	84		60		50.2		7		3.6		94.00						
	77-91		55-65		45-55		5.0-9.0										
1	86	2	63	3	51	0.8	6.1	-0.9	3.3	-0.3	90.50	-3.50					
2	86	2	63	3	53	2.8	6.6	-0.4	3.9	0.3	91.70	-2.30					
3	85	1	62	2	52	1.8	6.7	-0.3	3.2	-0.4	91.50	-2.50					
4	85	1	64	4	53	2.8	6.8	-0.2	3.4	-0.2	92.70	-1.30					
5	83	-1	62	2	52	1.8	6.2	-0.8	4.0	0.4	93.30	-0.70					
6	86	2	65	5	54	3.8	6.8	-0.2	3.8	0.2	93.90	-0.10					
7	83	-1	62	2	53	2.8	7.3	0.3	3.5	-0.1	93.40	-0.60					
8	84	0	65	5	55	4.8	7	0	3.6	0.0	91.10	-2.90					
9	85	1	65	5	55	4.8	6.4	-0.6	3.5	-0.1	94.80	0.80					
10	83	-1	61	1	52	1.8	6.2	-0.8	3.5	-0.1	94.70	0.70					
11	84	0	63	3	53	2.8	6.5	-0.5	3.3	-0.3	94.80	0.80					
12	81	-3	59	-1	48	-2.2	5.6	-1.4	3.1	-0.5	91.60	-2.40					
13	84	0	61	1	52	1.8	6.3	-0.7	3.7	0.1	91.40	-2.60					
14	84	0	64	4	54	3.8	6.9	-0.1	3.8	0.2	93.60	-0.40					
15	85	1	62	2	51	0.8	6.2	-0.8	3.2	-0.4	94.90	0.90					
16	85	1	64	4	52	1.8	6.8	-0.2	3.3	-0.3	91.10	-2.90					
17	84	0	62	2	51	0.8	6.5	-0.5	2.9	-0.7	91.40	-2.60					
18	85	1	64	4	52	1.8	6.9	-0.1	3.6	0.0	89.30	-4.70					
19	85	1	62	2	52	1.8	6.7	-0.3	3.4	-0.2	91.40	-2.60					
20	87	3	63	3	50	-0.2	6.7	-0.3	3.1	-0.5	92.70	-1.30					
21	84	0	62	2	49	-1.2	6.1	-0.9	3.0	-0.6	93.90	-0.10					
22	85	1	62	2	52	1.8	7.4	0.4	2.7	-0.9	91.00	-3.00					
23	86	2	63	3	50	-0.2	8	1	3.1	-0.5	94.20	0.20					
24	83	-1	60	0	50	-0.2	6.6	-0.4	3.3	-0.3	92.90	-1.10					
25	86	2	63	3	53	2.8	6.8	-0.2	2.9	-0.7	91.40	-2.60					
26	82	-2	61	1	52	1.8	7.6	0.6	2.7	-0.9	95.50	1.50					
27	86	2	63	3	54	3.8	6.6	-0.4	2.8	-0.8	91.60	-2.40					
28	85	1	62	2	53	2.8	6.1	-0.9	3.1	-0.5	92.20	-1.80					

	1/2" Sieve	Difference 1/2"	#4 Sieve	Difference #4	#8 Sieve	Difference #8	#200 Sieve	Difference #200	Air Voids	Difference Air Voids	Density	Difference Density	PCEMS	Year	Project ID	State	Road Classification
29	86	2	63	3	52	1.8	6.3	-0.7	2.7	-0.9	93.30	-0.70					
Specification Limits	75-95		45-75		30-55		3.0-7.0		3.5 min.		91.00		5641	2000	P 0044(00)253	South Dakota	MVT
Design/JMF	87		63		53		4.7		4.1		94.00		159M		0033-001		
JMF Limits	80-94		58-68		48-58		2.7-6.7										
1	87	0	62	-1	50	-3	4.3	-0.4	4.1	0.0							
2	85	-2	63	0	51	-2	3.7	-1	5.0	0.9							
3	88	1	66	3	53	0	4.9	0.2	3.0	-1.1							
4	83	-4	62	-1	51	-2	4.9	0.2	3.6	-0.5							
5	88	1	66	3	56	3	4.7	0	3.9	-0.2							
6	84	-3	64	1	53	0	5.1	0.4	4.2	0.1							
7	85	-2	64	1	49	-4	4.8	0.1	3.8	-0.3							
8	84	-3	64	1	53	0	6.3	1.6	2.7	-1.4							
9	87	0	66	3	56	3	5.3	0.6	5.0	0.9							
10	90	3	67	4	55	2	5.5	0.8	3.8	-0.3							
11	87	0	65	2	49	-4	4.3	-0.4	3.6	-0.5							
12	84	-3	61	-2	49	-4	5.8	1.1	4.4	0.3							
13	84	-3	66	3	51	-2	5.3	0.6	5.2	1.1							
14	81	-6	58	-5	49	-4	4.4	-0.3	3.7	-0.4							
15	86	-1	66	3	58	5	5.7	1	2.9	-1.2							
16	83	-4	62	-1	51	-2	4.2	-0.5	3.1	-1.0							
17	83	-4	64	1	55	2	5.2	0.5	1.8	-2.3							
18	86	-1	63	0	52	-1	4.7	0	2.3	-1.8							
19	88	1	63	0	49	-4	5	0.3	3.1	-1.0							
20	88	1	64	1	51	-2	4.7	0	2.8	-1.3							
21	87	0	62	-1	51	-2	5.6	0.9	2.9	-1.2							
22	89	2	70	7	58	5	6.3	1.6	2.5	-1.6							
23	87	0	65	2	54	1	5	0.3	2.5	-1.6							
24	87	0	64	1	52	-1	5.3	0.6	2.8	-1.3							
Specification Limits	75-95		45-75		30-55		3.0-7.0		3.5 min.		91.00		5970	2000	P 0034(00)313	South Dakota	MVT
Design/JMF	92		66		53		4.4		3.4		94.00						
JMF Limits	85-99		61-71		48-58		2.4-6.4										
1	88	-4	66	0	53	0	4.1	-0.3	3.5	0.1	93.70	-0.30					
2	89	-3	63	-3	49	-4	3.8	-0.6	3.7	0.3	93.80	-0.20					
3	89	-3	65	-1	52	-1	3.7	-0.7	3.9	0.5	92.40	-1.60					
4	90	-2	63	-3	49	-4	3.1	-1.3	4.1	0.7	93.30	-0.70					
5	89	-3	67	1	57	4	5.7	1.3	3.3	-0.1	94.50	0.50					
6	89	-3	61	-5	49	-4	4	-0.4	3.2	-0.2	93.10	-0.90					
7	91	-1	64	-2	49	-4	3.7	-0.7	3.1	-0.3	94.00	0.00					
8	94	2	67	1	52	-1	4.4	0	3.2	-0.2	93.90	-0.10					
9	92	0	67	1	51	-2	4.2	-0.2	4.0	0.6	93.20	-0.80					
10	92	0	69	3	53	0	4	-0.4	3.9	0.5	93.80	-0.20					
11	91	-1	65	-1	51	-2	3.9	-0.5	2.9	-0.5	92.70	-1.30					
12	92	0	65	-1	49	-4	3.7	-0.7	3.0	-0.4	90.30	-3.70					
13	92	0	66	0	52	-1	4.3	-0.1	3.1	-0.3	95.30	1.30					
14	90	-2	64	-2	48	-5	3.6	-0.8	2.7	-0.7	93.20	-0.80					
15	90	-2	65	-1	50	-3	4.2	-0.2	3.1	-0.3	93.60	-0.40					
16	89	-3	64	-2	52	-1	4	-0.4	3.6	0.2	93.30	-0.70					
17	89	-3	62	-4	49	-4	3.6	-0.8	3.4	0.0	92.60	-1.40					
18	89	-3	63	-3	49	-4	3.8	-0.6	3.7	0.3	92.40	-1.60					
19	91	-1	66	0	52	-1	3.8	-0.6	2.8	-0.6	93.40	-0.60					
20	89	-3	63	-3	49	-4	4	-0.4	3.5	0.1	92.50	-1.50					
21	90	-2	66	0	50	-3	2.6	-1.8	3.6	0.2	93.50	-0.50					
22	92	0	68	2	53	0	2.9	-1.5	3.4	0.0	92.00	-2.00					
23	88	-4	63	-3	50	-3	3.9	-0.5	3.9	0.5	92.00	-2.00					
24	89	-3	65	-1	51	-2	3.9	-0.5	3.4	0.0	92.50	-1.50					
25	90	-2	67	1	50	-3	2.5	-1.9	3.3	-0.1	91.30	-2.70					

APPENDIX D

DATA ANALYSIS OUTPUT

General Linear Model: Asphalt Content versus Year, State, Project, Mix

Factor	Type	Levels	Values
Year	fixed	3	1 2 3
State	fixed	2	1 2

Analysis of Variance for AC, using Adjusted SS for Tests

Source	DF	Seq SS	Adj SS	Adj MS	F	P
Year	2	10.0998	0.3950	0.1975	1.05	0.353 x
State	1	19.2001	1.4732	1.4732	8.79	0.003 x
Year*State	2	4.9555	0.3114	0.1557	0.82	0.440 x
Project(Year State)	140	105.8628	45.1740	0.3227	0.93	0.644 x
Mix(Year State Project)	89	34.9195	34.9195	0.3924	11.32	0.000
Error	1810	62.7147	62.7147	0.0346		
Total	2044	237.7523				

x Not an exact F-test.

Least Squares Means for AC

Year	Mean
1	0.2175
2	0.2506
3	0.1897
State	
Colorado	0.1575
Wyoming	0.2810

General Linear Model: Air Voids versus Year, State, Project, Mix

Factor	Type	Levels	Values
Year	fixed	3	1 2 3
State	fixed	2	2 3

Analysis of Variance for void, using Adjusted SS for Tests

Source	DF	Seq SS	Adj SS	Adj MS	F	P
Year	2	16.7141	10.9232	5.4616	2.65	0.074 x
State	1	107.3002	24.2724	24.2724	13.32	0.000 x
Year*State	2	16.1192	9.2400	4.6200	2.24	0.110 x
Project(Year State)	132	696.9114	663.6899	5.0280	1.40	0.087 x
Mix(Year State Project)	59	96.0689	96.0689	1.6283	6.77	0.000
Error	2188	526.3081	526.3081	0.2405		
Total	2384	1459.4219				

x Not an exact F-test.

Least Squares Means for void

Year	Mean
1	1.1293
2	1.2609
3	0.9942
State	
Wyoming	1.3635
South Dakota	0.8927

General Linear Model: Density versus Year, State, Project, Mix

Factor	Type	Levels	Values
Year	fixed	3	1 2 3
State	fixed	2	1 3

Analysis of Variance for Density, using Adjusted SS for Tests

Source	DF	Seq SS	Adj SS	Adj MS	F	P
Year	2	53.9551	42.4085	21.2043	4.30	0.016 x
State	1	30.6149	35.5696	35.5696	7.36	0.008 x
Year*State	2	18.5272	7.6408	3.8204	0.78	0.463 x
Project(Year State)	72	470.7198	458.5378	6.3686	0.68	0.907 x
Mix(Year State Project)	32	187.9155	187.9155	5.8724	8.16	0.000
Error	3115	2241.4378	2241.4378	0.7196		
Total	3224	3003.1703				

x Not an exact F-test.

Least Squares Means for Density

Year	Mean
1	1.3677
2	0.9951
3	1.1166

State	Mean
Colorado	1.0051
South Dakota	1.3145

General Linear Model: # 200 Sieve versus Year, State, Project, Mix

Factor	Type	Levels	Values
Year	fixed	3	1 2 3
State	fixed	3	1 2 3

Analysis of Variance for No. 200, using Adjusted SS for Tests

Source	DF	Seq SS	Adj SS	Adj MS	F	P
Year	2	26.813	2.586	1.293	0.72	0.490 x
State	2	435.602	52.909	26.455	11.05	0.000 x
Year*State	4	95.041	6.485	1.621	0.62	0.650 x
Project(Year State)	176	928.584	738.805	4.198	1.41	0.043 x
Mix(Year State Project)	92	150.134	150.134	1.632	5.89	0.000
Error	2938	813.382	813.382	0.277		
Total	3214	2449.556				

x Not an exact F-test.

Least Squares Means for No. 200

Year	Mean
1	0.7671
2	0.9210
3	0.8679

State	Mean
Colorado	0.6763
Wyoming	1.2856
South Dakota	0.5941

General Linear Model: # 8 Sieve versus Year, State, Project, Mix

Factor	Type	Levels	Values
Year	fixed	3	1 2 3
State	fixed	3	1 2 3

Analysis of Variance for No. 8, using Adjusted SS for Tests

Source	DF	Seq SS	Adj SS	Adj MS	F	P
Year	2	5.785	10.943	5.471	1.00	0.368 x
State	2	180.695	68.707	34.353	5.33	0.005 x
Year*State	4	91.930	31.445	7.861	1.12	0.349 x
Project(Year State)	175	1974.762	1686.416	9.637	1.30	0.142 x
Mix(Year State Project)	93	470.739	470.739	5.062	1.87	0.000
Error	2940	7965.187	7965.187	2.709		
Total	3216	10689.097				

x Not an exact F-test.

Least Squares Means for No. 8

Year	Mean
1	2.391
2	2.573
3	2.321
State	
Colorado	2.451
Wyoming	2.750
South Dakota	2.084

General Linear Model: # 4 Sieve versus Year, State, Project, Mix

Factor	Type	Levels	Values
Year	fixed	3	1 2 3
State	fixed	3	1 2 3

Analysis of Variance for No. 4, using Adjusted SS for Tests

Source	DF	Seq SS	Adj SS	Adj MS	F	P
Year	2	25.105	26.016	13.008	2.12	0.121 x
State	2	1665.107	545.269	272.634	37.15	0.000 x
Year*State	4	120.095	30.120	7.530	0.96	0.432 x
Project(Year State)	176	2289.185	1780.638	10.117	0.71	0.957 x
Mix(Year State Project)	94	825.346	825.346	8.780	2.59	0.000
Error	2953	9997.647	9997.647	3.386		
Total	3231	14922.485				

x Not an exact F-test.

Least Squares Means for No. 4

Year	Mean
1	3.030
2	2.678
3	2.514
State	
Colorado	2.203
Wyoming	4.116
South Dakota	1.904

General Linear Model: 1/2" Sieve versus Year, State, Project, Mix

Factor	Type	Levels	Values
Year	fixed	3	1 2 3
State	fixed	3	1 2 3

Analysis of Variance for 1/2" Sie, using Adjusted SS for Tests

Source	DF	Seq SS	Adj SS	Adj MS	F	P
Year	2	94.064	3.394	1.697	0.18	0.836 x
State	2	1445.588	453.188	226.594	18.63	0.000 x
Year*State	4	576.487	73.329	18.332	1.37	0.245 x
Project(Year State)	176	4280.268	3377.706	19.192	1.17	0.233 x
Mix(Year State Project)	94	895.909	895.909	9.531	3.41	0.000
Error	2953	8258.433	8258.433	2.797		
Total	3231	15550.750				

x Not an exact F-test.

Variance Components, using Adjusted SS

Source	Estimated Value
Project(Year State)	0.1940
Mix(Year State Project)	1.1289
Error	2.7966

Least Squares Means for 1/2" Sie

Year	Mean
1	2.557
2	2.394
3	2.482
State	
Colorado	1.975
Wyoming	3.738
South Dakota	1.720

General Linear Model: 1/2" Sieve versus Year, SDCO Excluding Wyoming, Project, Mix

Factor	Type	Levels	Values
Year	fixed	3	1 2 3
SDCO	fixed	2	1 3

Analysis of Variance for 1/2" Sie, using Adjusted SS for Tests

Source	DF	Seq SS	Adj SS	Adj MS	F	P
Year	2	93.256	48.793	24.396	2.10	0.129 x
SDCO	1	2.997	14.903	14.903	1.42	0.237 x
Year*SDCO	2	31.253	29.486	14.743	1.27	0.286 x
Project(Year SDCO)	85	1882.937	1654.844	19.469	1.82	0.067 x
Mix(Year SDCO Project)	34	149.865	149.865	4.408	2.81	0.000
Error	2253	3535.372	3535.372	1.569		
Total	2377	5695.681				

x Not an exact F-test.

Least Squares Means for 1/2" Sie

Year	Mean
1	1.559
2	1.890
3	2.094
SDCO	
Colorado	1.975
South Dakota	1.720

General Linear Model: # 4 Sieve versus Year, SDCO Excluding Wyoming, Project, Mix

Factor	Type	Levels	Values
Year	fixed	3	1 2 3
SDCO	fixed	2	1 3

Analysis of Variance for No. 4, using Adjusted SS for Tests

Source	DF	Seq SS	Adj SS	Adj MS	F	P
Year	2	89.474	17.176	8.588	1.75	0.179 x
SDCO	1	72.068	20.477	20.477	4.43	0.037 x
Year*SDCO	2	38.333	4.838	2.419	0.49	0.613 x
Project(Year SDCO)	85	1015.026	609.986	7.176	0.59	0.938 x
Mix(Year SDCO Project)	34	182.078	182.078	5.355	2.33	0.000
Error	2253	5183.261	5183.261	2.301		
Total	2377	6580.241				

x Not an exact F-test.

Least Squares Means for No. 4

Year	Mean
1	2.214
2	1.954
3	1.991
SDCO	
Colorado	2.203
South Dakota	1.904

General Linear Model: # 8 Sieve versus Year, SDCO Excluding Wyoming, Project, Mix

Factor	Type	Levels	Values
Year	fixed	3	1 2 3
SDCO	fixed	2	1 3

Analysis of Variance for No. 8, using Adjusted SS for Tests

Source	DF	Seq SS	Adj SS	Adj MS	F	P
Year	2	12.229	2.132	1.066	0.21	0.811 x
SDCO	1	48.489	27.943	27.943	5.97	0.016 x
Year*SDCO	2	37.953	12.096	6.048	1.19	0.307 x
Project(Year SDCO)	84	798.493	614.261	7.313	1.31	0.355 x
Mix(Year SDCO Project)	34	116.378	116.378	3.423	1.40	0.063
Error	2241	5482.197	5482.197	2.446		
Total	2364	6495.740				

x Not an exact F-test.

Least Squares Means for No. 8

Year	Mean
1	2.228
2	2.324
3	2.250
SDCO	
Colorado	2.451
South Dakota	2.084

**General Linear Model: #200 Sieve versus Year, SDCO Excluding Wyoming,
Project, Mix**

Factor	Type	Levels	Values
Year	fixed	3	1 2 3
SDCO	fixed	2	1 3

Analysis of Variance for No. 200, using Adjusted SS for Tests

Source	DF	Seq SS	Adj SS	Adj MS	F	P
Year	2	6.4270	1.0838	0.5419	0.32	0.726 x
SDCO	1	3.8561	1.4325	1.4325	0.92	0.341 x
Year*SDCO	2	6.1477	3.3300	1.6650	0.99	0.376 x
Project(Year SDCO)	85	266.5754	262.9298	3.0933	1.65	0.101 x
Mix(Year SDCO Project)	33	25.1975	25.1975	0.7636	3.12	0.000
Error	2243	548.8883	548.8883	0.2447		
Total	2366	857.0921				

x Not an exact F-test.

Least Squares Means for No. 200

Year	Mean
1	0.6550
2	0.6719
3	0.5787
SDCO	
Colorado	0.6763
South Dakota	0.5941

**General Linear Model: # 200 Sieve versus Year, WYCO Excluding South Dakota,
Project, Mix**

Factor	Type	Levels	Values
Year	fixed	3	1 2 3
WYCO	fixed	2	1 2

Analysis of Variance for No. 200, using Adjusted SS for Tests

Source	DF	Seq SS	Adj SS	Adj MS	F	P
Year	2	176.825	1.486	0.743	0.30	0.740 x
WYCO	1	112.204	30.616	30.616	13.05	0.000 x
Year*WYCO	2	42.572	5.119	2.559	1.04	0.356 x
Project (Year WYCO)	134	802.722	612.942	4.574	3.35	0.000 x
Mix (Year WYCO Project)	92	150.134	150.134	1.632	4.25	0.000
Error	1368	525.414	525.414	0.384		
Total	1599	1809.871				

x Not an exact F-test.

Least Squares Means for No. 200

Year	Mean
1	0.8824
2	1.0514
3	1.0091
WYCO	
Colorado	0.6763
Wyoming	1.2856

**General Linear Model: # 8 Sieve versus Year, WYCO Excluding South Dakota,
Project, Mix**

Factor	Type	Levels	Values
Year	fixed	3	1 2 3
WYCO	fixed	2	1 2

Analysis of Variance for No. 8, using Adjusted SS for Tests

Source	DF	Seq SS	Adj SS	Adj MS	F	P
Year	2	14.886	18.173	9.086	1.39	0.251 x
WYCO	1	46.729	7.280	7.280	1.15	0.285 x
Year*WYCO	2	28.394	1.456	0.728	0.11	0.895 x
Project(Year WYCO)	133	1579.135	1290.789	9.705	2.07	0.000 x
Mix(Year WYCO Project)	93	470.739	470.739	5.062	1.56	0.001
Error	1371	4450.199	4450.199	3.246		
Total	1602	6590.082				

x Not an exact F-test.

Least Squares Means for No. 8

Year	Mean
1	2.538
2	2.866
3	2.397
WYCO	
Colorado	2.451
Wyoming	2.750