INFORMATIONAL PROPOSAL (For information only, not to be used for bidding)

NEBRASKA DEPARTMENT OF ROADS
LETTING DATE : November 13, 2003

CALL ORDER: N14 CONTRACT ID: 3700

CONTROL NO./SEQ. NO.: 31700 /000 PROJECT NO.: RD-81-3(1040)

TENTATIVE START DATE: 05/17/04 CONTRACT TIME: 100 WORKING DAYS

LOCATION: ON US-81 BETWEEN COLUMBUS AND MADISON.

IN COUNTY: PLATTE MADISON

BIDDER

GROUP 8 SPECIALTY

NOTES

THE TOTAL AMOUNT OF WORK WHICH WILL BE ACCEPTED IN THIS LETTING IS LIMITED TO $_____.

THE NUMBER OF _____ CONTRACTS WHICH WILL BE ACCEPTED IN THIS LETTING IS LIMITED TO ____.

THIS PROJECT (IS TIED)(IS NOT TIED) TO PROJECT NO. RD-80-6(1014).

STRIKE OUT WORDS IN PARENTHESIS THAT DO NOT APPLY.

NOTICE TO ALL BIDDERS

To report bid rigging activities, call: 1-800-424-9071

The U.S. Department of Transportation (DOT) operates the above toll-free “hotline” Monday through Friday, 8:00 a.m. to 5:00 p.m. eastern time. Anyone with knowledge of possible bid rigging, bidder collusion, or other fraudulent activities should use the “hotline” to report such activities.

The “hotline” is part of the DOT’s continuing effort to identify and investigate highway construction contract fraud and abuse and is operated under the direction of the DOT Inspector General. All information will be treated confidentially and caller anonymity will be respected.

LETTING QUESTIONS

Prior to the letting, any questions pertaining to the Special Provisions or the plans for this project should be directed to Construction Division personnel at (402) 479-4568 or (402) 479-4529.

STATE OF NEBRASKA
DEPARTMENT OF ROADS

Required Provisions Supplemental to the

Standard Specifications for Highway Construction

I. Application

These contract provisions shall apply to all work performed on the contract by the contractor with his own organization and with the assistance of workmen under his immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

The contractor shall insert in each of his subcontracts all of the stipulations contained in the Special Provisions and these Required Provisions.

A breach of any of the stipulations contained in these Required Provisions may be grounds for termination of the contract.

II. Equal Opportunity

1. **Selection of Labor**

   During the performance of this contract, the contractor shall not discriminate against labor from any other state.

2. **Nebraska Fair Employment Practices Act**

   The contractor shall not discriminate against any employee or applicant for employment, to be employed in the performance of this contract with respect to his hire, tenure, terms, conditions, or privileges of employment, because of his race, color, religion, sex or national origin. The contractor agrees to post in a conspicuous place or places a notice to be provided by the State Highway Department which sets forth excerpts of the Act.

3. **Nebraska Equal Pay Act**

   The contractor shall not discriminate on the basis of sex by paying wages to employees of one sex at a lesser rate than the rate paid to employees of the opposite sex for comparable work on jobs which have comparable requirements. An abstract of the Act is included on the notice which is provided by the State Highway Department.

April 4, 1995

III. Employment of Labor

1. **General**

No person under the age of sixteen (16) years, and no one whose age or physical condition is such as to make his employment dangerous to his health or safety, or to the health and safety of others shall be employed on any project. This paragraph shall not be construed to deny the employment of older people or physically handicapped persons, otherwise employable, where such persons may be safely assigned to work which they can ably perform.

No person currently serving sentence to a penal or correction institution shall be employed on any project.

Except as specifically provided under this section, workers who are qualified by training or experience to be assigned to projects of this character shall not be discriminated against on any grounds whatsoever.

2. **Payrolls**

Payrolls and basic records relating thereto will be maintained during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working on the site of the work.

The contractor's and subcontractor's payroll records shall be available for inspection by authorized representatives of the State Highway Department and authorized representatives of Federal Agencies.

The wages of labor shall be paid in legal tender of the United States, except that this condition will be considered satisfied if payment is made by a negotiable check, on a solvent bank, which may be cashed readily by the employee in the local community for the full amount, without discount or collection charges of any kind. Where checks are used for payment the contractor shall make all necessary arrangements for them to be cashed and shall give information regarding such arrangements.

No fee of any kind shall be asked or accepted by the contractor or any of his agents from any person as a condition of employment on the project.

No laborers shall be charged for any tools used in performing their respective duties except for reasonably avoidable loss or damage thereto.

Every employee on the work covered by this contract shall be permitted to lodge, board and trade where and with whom he elects and neither the contractor nor his agents, nor his employees shall directly or indirectly require as a condition of employment that an employee shall lodge, board or trade at a particular place or with a particular person.

No charge shall be made for any transportation furnished by the contractor or his agents to any person employed on the work.

No individual shall be employed as a laborer on this contract except on a wage basis, but this shall not be construed to prohibit the rental of teams, trucks or other equipment from individuals. No such rental agreement, or any charges for feed, gasoline, supplies, or repairs on account of such agreement, shall cause any deduction from the wages accruing to any employee except as authorized by the regulations hereinbefore cited.

IV. Safety and Accident Prevention

In the performance of this contract, the contractor shall comply with all applicable Federal, State and local laws governing safety, health and sanitation. The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions, on his own responsibility or as the contracting officer may determine, reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

V. Subletting or Assigning the Contract

The contractor shall perform with his own organization contract work amounting to not less than 30 percent of the total contract amount except that any items designated in the contract as "Specialty Items" may be performed by subcontract and the amount of any such "Specialty Items" so performed may be deducted from the total contract amount before computing the amount of work required to be performed by the contractor with his own organization.

Any items that have been selected as "Specialty Items" for the contract are listed as such in the Special Provisions found elsewhere in the contract.

No portion of the contract shall be sublet, assigned, or otherwise disposed of except with the written consent of the contracting officer or his authorized representative. Requests for permission to sublet assign or otherwise dispose of any portion of the contract shall be in writing and accompanied by a showing that the organization which will perform the work is particularly experienced and equipped for such work. The contractor shall give assurance that the minimum wage for labor as stated in his proposal shall apply to labor performed on all work sublet, assigned or otherwise disposed of in any way. Consent to sublet, assign or otherwise dispose of any portion of the contract shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract.

SPECIAL PROVISIONS
FOR
STATE
PROJECT NO. RD-81-3(1040)

GENERAL CONDITIONS

Sealed bids for the work contemplated in this proposal form will be received at the office of the Nebraska Department of Roads in Room 104 of the Central Office Building at 1500 Highway 2 at Lincoln, Nebraska, on November 13, 2003, until 1:30 P.M.

Bids submitted by mail should be addressed to the Nebraska Department of Roads, c/o Contract Lettings Section, P.O. Box 94759, Lincoln, NE 68509-4759.

The 1997 English Edition of the Standard Specifications for Highway Construction, including all amendments and additions thereto effective at the date of the contract, are made a part of these Special Provisions, through reference.

The Supplemental Specifications to the 1997 English Edition of the Standard Specifications for Highway Construction dated July 12, 2001, including all amendments and additions thereto effective at the date of the contract, are made part of these Special Provisions, through reference.

The Required Provisions dated April 4, 1995, are attached to and are a part of this proposal form.

The attention of bidders is directed to the Required Provisions covering subletting or assigning the contract.

The proposal contains a statement that the contractor is complying with, and will continue to comply with, fair labor standards in the pursuit of his business and in the execution of the work contemplated in this proposal.

Fair labor standards shall be construed to mean such a scale of wages and conditions of employment as are paid and maintained by at least fifty per cent of the contractors in the same business or field of endeavor as the contractor filing this proposal.

STATUS OF UTILITIES

No utilities have been or will be required to relocate within the limits of this project.

Underground utilities may exist within the limits of this project. The Contractor shall determine to his satisfaction the extent of occupancy of any underground utilities located within the respective construction areas and the extent of conflict with the proposed work under this contract.

Any utility adjustments or interruption of service for the convenience of the Contractor shall be the sole responsibility of the Contractor.

To arrange for utilities to locate and flag their underground facilities, contact The Diggers Hotline of Nebraska at 1-800-331-5666.

STATUS OF RIGHT-OF-WAY
(S1-16-0801)

According to the best information available, all necessary right-of-way has been acquired.

REQUIRED SUBCONTRACTOR/SUPPLIER QUOTATIONS LIST
(S1-43-0603)

At bid submittal, all bidders must provide to the NDOR the identity of all firms who provided quotations on all projects, including both DBEs and non-DBEs. This information must be on a form provided by the NDOR Contracts Office.

If no quotations were received, the bidder must indicate this in the space provided.

Each bidder will be required to submit one list per letting to cover all projects bid.

CONTROL OF WORK
(S1-43-0901)

Subsection 105.08 in the 1997 Standard Specifications is void and replaced by the following:

105.08 - Authority and Duty of the Inspector

Department inspectors are authorized to inspect all work performed and all materials furnished. Such inspection may extend to the preparation, fabrication, or manufacture of the materials. The inspector has the authority to reject work or materials until any issues can be decided, including the right to suspend work. The inspector is not authorized to alter or waive the provisions of the contract or act as a supervisor for the Contractor.

105.13 – Tentative Acceptance of Portions of the Project

Paragraph 3.a. of Subsection 105.13 is amended by deleting the word “normal”.

LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC
(S1-43-1001)

107.14 – Opening of Sections of the Project to Traffic

Subsection 107.14 Paragraphs 2.b.(1) and (2) are void and replaced by the following:

2.b. (1) Whenever the Department permits the public use of a highway undergoing construction, repair, or maintenance in lieu of a detour route, the Contractor shall not be held responsible for damages to those portions of the project upon which the Department permitted public use, when such damages are the result of no proximate act or failure to act on the part of the Contractor.

(2) If the traveling public should cause damage to the roadway, the Contractor shall assist the State in identifying the responsible party and the Contractor shall as a minimum if present at the time of the damage record pertinent information regarding the accident. (Who caused the damage; when the damage occurred; and how the damage occurred.)

107.15 – Contractor's Responsibility for Work

Subsection 107.15 is amended by adding Paragraph 1.b.(3) as follows:

(3) The Contractor shall not be held responsible for damage caused by the traveling public on those portions of the project where the Department has permitted public use of the road in lieu of using a detour route and the damage as not the result of any proximate act or failure to act on the part of the Contractor.

MEASUREMENT AND PAYMENT
(S1-43-0901)

109.08 – Acceptance, Final Payment, and Termination of Contractor's Responsibility

Subsection 109.08 Paragraph c. amended by deleting the word "normal".

Subsection 109.08 Paragraph d. is void and replaced by the following:

d. If the traveling public should cause damage to the roadway the Contractor shall assist the State in identifying the responsible party and the Contractor shall as a minimum if present at the time of the damage record pertinent information regarding the accident. (Who caused the damage; when the damage occurred; and how the damage occurred.)

LIABILITY INSURANCE
(S1-43-1103)

Paragraph 2.a. of Subsection 107.13 in the Standard Specifications is void and superseded by the following:

a. The General Liability coverage for bodily injury liability shall be not less than $1,000,000 for injuries, including accidental death, in any one occurrence, and subject to an aggregate limit of not less than $2,000,000.

Paragraph 2.b. of Subsection 107.13 is void and superseded by the following:

b. The amount of property damage liability insurance shall be not less than $1,000,000.

SPECIAL PROSECUTION AND PROGRESS

1. The Contractor will be required to complete the Granular Subdrain work before milling and placement of Asphaltic Concrete Type SPS in that area.

2. The Contractor will be required to complete the diamond grinding work before milling and placement of Asphaltic Concrete Type SPS in that area.

3. Due to the contract time for this project, the Contractor may be required to use multiple, work crews in order to complete the work in the allotted time.

4. The maximum length of any single lane closure shall not exceed 6.6± miles, excluding tapers. The minimum distance between the end of a single lane closure and the beginning of the taper section for the next single lane closure shall not be less than 2 miles.

SPECIAL PROSECUTION AND PROGRESS
(Dowel Bar Retrofit & Diamond Grinding)

The Contractor shall maintain a single lane closure in areas where (1) the dowel bar placement and/or grouting operation is in progress and (2) the dowel bar placement has been completed and the diamond grinding has not been completed. Providing that the minimum material strengths have been met, 24 hour compressive strength of 5000 psi, the Contractor will be required to begin the diamond grinding within 7 calendar days after completion of the dowel bar retrofit on any traffic lane segment of 5 miles or less in length. For segments greater than 5 miles, the Contractor will be required to begin the diamond grinding within 7 calendar days after completing 5 miles of the dowel bar retrofit. **Traffic will not be allowed on dowel bar retrofit sections until after completion of the diamond grinding.** The removal of the concrete in the kerf cuts and placement/grouting of the dowel bars will be completed for an entire lane segment in one direction prior to beginning concrete removal of the kerf cuts and dowel bar placement/grouting operation in another segment. Failure to begin the diamond grinding in any traffic lane segment within the calendar days allowed shall result in the assessment of liquidated damages of $1000.00 per day for each traffic lane segment in violation.

The Contractor shall schedule his work so as to minimize the number of lane closures; for example, constructing different items of work at the same time whenever possible.

In an attempt to prevent corner cracking, lanes shall remain closed after sawing the slots for the dowel bars until the grouting and diamond grinding operations are completed.

The maximum continuous length of lane closure, excluding length of taper, for dowel bar placement and diamond grinding operations shall be 6.6 ± miles. Based on the work operation, the Engineer may specify a lane closure shorter than the maximum permissible length. In the event that the Contractor elects to initiate simultaneous lane closures, the distance between the end of the first closure and the beginning of the taper for the next closure shall be a minimum of 2 miles. Lane closures will be allowed in northbound and southbound lanes concurrently.

The locations and lengths for Dowel Bar Retrofit and Diamond Grinding are as follows:

Location	Length	Direction
In Columbus	.95 mi.	NB & SB
Columbus, NW	5.16 mi.	NB
	6.59 mi	SB
Madison, So.	5.27 mi.	NB
	0.47 mi.	SB
	4.59 mi.	SB

SPECIAL PROSECUTION AND PROGRESS (Migratory Birds)

Paragraph 4.h. of Subsection 107.01 in the Standard Specifications for Highway Construction is void.

CONSTRUCTION DETAILS

TEMPORARY TRAFFIC CONTROL DEVICES (S4-9-1201)

Paragraphs 2.a. of Subsection 422.05 in the Standard Specifications is void and superseded by the following:

2.a. If signs are not returned or are returned damaged, and the damage is beyond reasonable “wear and tear” and the damage was caused by the Contractor, then the Contractor shall be charged the value of the missing or damaged items. These charges shall be deducted from monies due the Contractor upon final payment.

TYPE B HIGH INTENSITY WARNING LIGHTS (S4-9-1002)

All references in the plans to Type B High Intensity Warning Lights shall be considered void. The plans will not be revised to reflect this change.

TEMPORARY TRAFFIC CONTROL DEVICES (S4-10-0502)

Section 422 in the Standard Specifications is amended to include Mobile Traffic Control Operation. The Contractor shall furnish and operate the mobile traffic control operation as prescribed in the plans.

Subsection 422.04 is amended to provide that the mobile traffic control operation shall be measured on a daily basis for each day that the operation is in use. Operation for 4 hours or less will be considered as one-half day and operation for more than 4 hours shall be considered as a full day.

Subsection 422.05 is amended to include the following:

Pay Item	Pay Unit
Mobile Traffic Control Operation	Day (d)

CONTRACTOR FURNISHED SIGNS (S4-11-0303)

"Contractor Furnished Sign Day" shall consist of approved retroreflective fluorescent orange or white signs mounted on NCHRP-350 approved traffic control devices, i.e. Type III Barricades or Plastic Drums. The Contractor furnished sign, mounted on a traffic control device, shall together be NCHRP-350 Test Level 3 approved. The signs shall be of the size and shape required by the plans. The color and design of the signs shall be as required by the MUTCD and the NDR Traffic Engineering Division. Sign legends and symbols shall be of professional quality workmanship and in uniformity with the Standard Highway Signs design guide. Contractor furnished Signs shall meet the requirements of the American Traffic Safety Services Association (ATSSA), "Quality Standard for Work Zone Traffic Control Devices", hand printing or poor workmanship shall not be allowed.

Rigid sign substrates that have been approved to NCHRP 350 (TL-3) mounted on a traffic control device may be used.

Retroreflective orange fluorescent sheeting used for Contractor Furnished Signs shall be 3M diamond grade, Avery Dennison 6500 sheeting or other approved equal material.

Subsection 422.03 is amended by adding Paragraph 1.h.

Contractor Furnished Signs shall be installed as shown in the plans, or as directed by the Engineer. Contactor Furnished Signs shall be installed as prescribed in the MUTCD.

Paragraph 1.a. of Subsection 422.04 is void and superseded by the following:

1.a. Sign days of permanent, temporary and Contractor furnished signs installed in accordance with the plans, or as directed by the Engineer, will be measured and paid for by the each.

Paragraph 1. of Subsection 422.05 is amended to include the following:

Pay Item	Pay Unit
Contractor Furnished Sign Day	Each (ea)

RUMBLE STRIPS

This work consists of cutting rumble strips in pavements to the dimensions, spacing, and at the locations shown in the plans or directed by the Engineer. The cutting head shall have the cutting tips arranged in a pattern as to provide a smooth cut (approximately 1/16" between peaks and valleys).

Alignment of the edge of the pattern will be randomly checked by the Engineer. Any rumble strips misaligned 2 ± inches) shall be re-cut.

The Contractor shall demonstrate to the Engineer on an initial 500 foot test section that the equipment and method will provide the desired milled rumble strip and surface inside each depression without tearing, snagging, or chipping the pavement. If the desired results are not being provided, as determined by the Engineer, the Contractor shall provide new equipment or method, or make necessary adjustments to provide the desired results. If the initial 500 foot section results are unsatisfactory it will be repaired or replaced as determined by the Engineer, at no additional cost to the Department.

Excess waste material resulting from the operation shall be removed on a daily basis by use of a power broom or other method approved by the Engineer. Excess waste material shall be removed prior to opening the adjacent lane to traffic.

Any joint that had been previously sealed and then was damaged due to the installation of the rumble strip shall be resealed as directed by the Engineer.

The contractor shall not place rumble strips on bridge decks and bridge approach slabs.

Method of Measurement

Each shoulder or centerline receiving rumble strips shall be measured separately in stations of 100 feet. Stations shall be measured horizontally along the project centerline between the beginning and ending points. Deductions will be made for all areas where rumble strips are not required.

Basis of Payment

Pay Item	Pay Unit
Rumble Strips, Asphalt	Station (Sta)
Rumble Strips, Concrete	Station (Sta)

Payment is full compensation for all work required to install the rumble strips. No additional payment will be made for the test sections that were deemed unsatisfactory.

COLD MILLING CLASS 3

Under no circumstance shall the Contractor mill a greater depth from the roadway than is shown in the plans.

The Contractor shall mill the asphaltic concrete shoulders to a depth of 1-1/2 inches measured from the top of the outside edge of the driving lane adjacent to it.

Void Paragraph 9.a. of Subsection 510.04 in the 1997 English Edition Standard Specifications and replace it with the following:

Bituminous material produced from the cold milling operation shall become the property of the Contractor and removed from the project.

LOCAL MATERIAL SOURCES
(S5-1-0801)

Information regarding possible sources of local materials is available at the Materials and Research Division of the Department of Roads, Lincoln, Nebraska.

CONCRETE PAVEMENT REPAIR

Section 605 in the Standard Specifications and Supplemental Specifications is amended to include the following:

Paragraph 6. of Subsection 605.01 is amended to include the following:

When performing this operation on multi-lane highways, the Contractor will be permitted to have one lane closed at night. Where the pavement has been removed, the Contractor will be required to have the excavated area filled with either (1) the appropriate patching concrete material for curing overnight, or (2) a commercially available cold-mix bituminous mixture or other suitable temporary patch material with a durable surface, as directed by the Engineer. The next day, the Contractor will then be required to remove any “temporary patches”, thoroughly clean the repair area and complete the required permanent patch so that the lane can be opened to traffic by the end of the second day. The material, installation, removal and disposal of these temporary patches will not be measured and paid for directly, but shall be considered subsidiary to the concrete pavement repair work being performed.

Paragraph 1. of Subsection 605.02 is amended to include the following:

Repairs may be made with Class PR1-3500 (PR1-24 MPa) concrete after June 1 and before September 15, provided the minimum strength is met in the allotted time.

Paragraph 6.d. of Subsection 1002.02 is void and superseded by the following:

The Contractor may use liquid calcium chloride in Class PR1 concrete from June 1 through August 31. Flaked calcium chloride shall be used during the remainder of the year, as stated in Paragraph 6.c.

Repairing the concrete pavement shall be done prior to the dowel bar retrofitting and diamond grinding operations.

The last sentence of Paragraph 2. of Subsection 605.04 is void.

The existing 8" of concrete pavement in the "Columbus, Northwest" section, southbound, Sta. 161+00 to Sta. 280+20, has an unbonded 8" concrete overlay.

When sawing for removal of the top 8" of concrete, no encroachment of the cut shall occur in the bottom 8" layer.

After removing the 8" top layer of concrete and the bottom 8" is in good condition, a layer of clean sand approximately ½” in depth shall be placed to ensure an unbonded repair. The

furnishing and placement of the clean sand will not be paid for directly but shall be considered subsidiary to the concrete pavement repair work being performed.

Paragraph 10. of Subsection 605.04 is void.

Paragraph 16. of Subsection 605.04 is amended to include the following:

The minimum concrete placement shall be as shown in the plans or as directed by the engineer. Interior transverse joints shall be sawed to a minimum of one-third the actual thickness of the slab at the spacing designated in the plans.

The pavement elevation of repair areas shall be corrected in a manner that eliminates swales or bumps. Swales and bumps are defined as having a 1/8" or greater deviation using an approved 10 foot straightedge. Correction shall be diamond grinding or replacement. The condition of the adjacent pavement shall be considered when evaluating the 1/8" deviation requirement.

Paragraph 20. of Subsection 605.04 is amended to include the following subparagraphs.

f. From June 1 through August 31, if the daytime temperature is 85°F or greater, covering the repair concrete with polyethylene film and insulation board is optional, provided the maturity method is used to measure the strength of the concrete.

g. From June 1 through August 31, if the pavement is to remain closed to traffic for at least 24 hours, covering of the repair concrete with polyethylene film and insulation board is optional.

Paragraph 21. of Subsection 605.04 is amended to include the following:

b. Class PR1 Concrete may be used for concrete repair if the repaired area is to remain closed to traffic for at least 24 hours.

c. Class PR3 Concrete shall be used for all concrete repair if the repaired areas must be opened to traffic within 24 hours.

d. Strength measurements for the opening and the 24-hour pay strengths of the PR1 and PR3 Concrete may be performed using the maturity meter method.

Paragraphs 25. b. (1) and 25. b. (2) of Subsection 605.04 are void and superseded by the following:

A full depth diamond blade saw cut shall be made and dowel bars and/or tie bars anchored into the faces of the existing concrete as designated in the plans. A full depth cut approximately 4 inches (100 mm) wide may be made with a wheel cutter through the repair section if the repair will be overlaid. The wheel-type cutter shall be operated to produce minimum disturbance of the foundation course material, with no encroachment of the cut into the concrete of the adjoining lane.

Dowel bars shall be placed on the new transverse joint nearest the existing transverse joint. A minimum of 2 tie bars shall be placed on each side of a full depth pavement repair as designated in the plans.

Dowel bars or tie bars shall be anchored into the faces of the existing concrete as designated in the plans. To provide proper alignment, a drill approved by the Engineer shall be used to install the dowel bars. The drill shall be capable of drilling the holes parallel to the surface of the pavement and to the centerline of the highway ± 1/8 inch. The dowel bar holes shall be drilled in the same plane ± 1/8 inch and at the spacing shown in the plans. The tie bars can be drilled independently. The drilled holes shall be thoroughly cleaned with compressed air to remove all dust, dirt, loose material and moisture.

After cleaning and prior to dowel or tie bar insertion, an application of grout shall be made at the back of the hole. The grout shall be from the Approved Products List. Twist the dowel or tie bar one full turn during insertion to completely surround it with the grout. Grout retention disks shall be placed on the bars as designated in the plans. The furnishing and installation of dowel and tie bars will not be paid for directly but shall be considered subsidiary to the concrete pavement or joint repair work being performed.

Paragraph 25. c. of Subsection 605.04 is amended to include the following:

Any loosened foundation course material shall be removed and replaced with concrete.

Paragraph 25. d. of Subsection 605.04 is void.

Subsection 605.05 in the 1997 Standard Specifications is amended to provide that adjoining full depth repair areas of varying widths in the same traffic lane, which are situated such the removals of the areas may be accomplished concurrently, shall be considered as a single repair. The total area of the adjoining areas shall be combined to determine the repair type as shown in Table 605.01.

CONCRETE PAVEMENT REPAIR (PARTIAL DEPTH REPAIR)

Section 605 in the Standard Specifications and Supplemental Specifications is amended to include the following:

Paragraph 6. of Subsection 605.01 is amended to include the following:

When performing this operation on multi-lane highways, the Contractor will be permitted to have one lane closed at night. Where the pavement has been removed, the Contractor will be required to have the excavated area filled with either (1) the appropriate patching concrete material for curing overnight, or (2) a commercially available cold-mix bituminous mixture or other suitable temporary patch material with a durable surface, as directed by the Engineer. The next day, the Contractor will then be required to remove any “temporary patches”, thoroughly clean the repair area and complete the required permanent patch so that the lane can be opened to traffic by the end of the second day. The material, installation, removal and disposal of these temporary patches will not be measured and paid for directly, but shall be considered subsidiary to the concrete pavement repair work being performed.

Paragraph 1. of Subsection 605.02 is amended to include the following:

Repairs may be made with Class PR1-3500 (PR1-24 MPa) concrete after June 1 and before September 15, provided the minimum strength is met in the allotted time.

Paragraph 6.d. of Subsection 1002.02 is void and superseded by the following:

The Contractor may use liquid calcium chloride in Class PR1 concrete from June 1 through August 31. Flaked calcium chloride shall be used during the remainder of the year, as stated in Paragraph 6.c.

Repairing the concrete pavement shall be done prior to the dowel bar retrofitting and diamond grinding operations.

Paragraph 2. of Subsection 605.04 is void and superseded by the following:

All repairs shall be cut so the edges are parallel or perpendicular to the traveled way. For partial depth repairs, the Contractor shall cut and chip the pavement edges with a 15-pound maximum chipping hammer to form reasonably neat vertical surfaces.

Paragraph 9.c. of Subsection 605.04 is void and superseded by the following:

The vertical faces except for the transverse and longitudinal joints and cracks of the repair shall be brushed with the grout just prior to placement of the repair concrete.

Paragraph 16. of Subsection 605.04 is amended to include the following:

The minimum concrete placement shall be as shown in the plans or as directed by the engineer. Interior transverse joints shall be cut at the spacings designated in the plans.

Paragraph 20. of Subsection 605.04 is amended to include the following subparagraphs.

f. From June 1 through August 31, if the daytime temperature is 85°F or greater, covering the repair concrete with polyethylene film and insulation board is optional, provided the maturity method is used to measure the strength of the concrete.

g. From June 1 through August 31, if the pavement is to remain closed to traffic for at least 24 hours, covering of the repair concrete with polyethylene film and insulation board is optional.

Paragraph 21. of Subsection 605.04 is amended to include the following:

b. Class PR1 Concrete may be used for concrete repair if the repaired area is to remain closed to traffic for at least 24 hours.

c. Class PR3 Concrete shall be used for all concrete repair if the repaired areas must be opened to traffic within 24 hours.

d. Strength measurements for the opening and the 24-hour pay strengths of the PR1 and PR3 Concrete may be performed using the maturity meter method.

Paragraph 25. d. of Subsection 605.04 is void.

Subsection 605.05 in the 1997 Standard Specifications is amended to provide that adjoining partial depth repair areas of varying widths in the same traffic lane, which are situated such the removals of the areas may be accomplished concurrently, shall be considered as a single repair. The total area of the adjoining areas shall be combined to determine the repair type as shown in Table 605.01.

SEALING TRANSVERSE AND LONGITUDINAL CRACKS

Subsection 611.01 in the 2001 Supplemental Specifications is amended to include the following:

The transverse and longitudinal cracks shall be sealed after the dowel bar retrofitting and diamond grinding operations.

Subsection 611.02 is amended to include the following:

Material having a bond specification will be tested on concrete blocks that will be constructed by the Department's Concrete Laboratory. The concrete blocks will be constructed using 47B-3000 concrete meeting the requirements of Section 1002 in the Standard Specifications.

The design is amended so that no fly ash is used in the mixture. All other specifications for Portland cement concrete apply.

If a Department approved independent laboratory will used for testing purposes, the Department must be notified so that concrete blocks for bond testing can be set to the approved independent laboratory.

The first sentence of Paragraph 1. a. of Subsection 611.03 is void and superseded by the following:

Transverse and longitudinal cracks from 1/4 inch to 1/2 inch (6 mm to 12.5 mm) in width shall be prepared with a crack reservoir of a nominal 1/2 inch (12.5 mm) in width at the surface of the pavement and to a depth of at least 5/8 inch (16 mm).

The last sentence of Paragraph 1. b. of Subsection 611.03 is void and superseded by the following:

The backer rod shall be of such diameter to be seated properly that will allow for a depth of approximately 1/2 inch to 1 inch (12.5 mm to 25 mm) of crack sealing filler.

Paragraphs 2. d. and 2. e. of Subsection 611.03 are void and superseded by the following:

d. When proper pouring consistency is attained, the cracks shall be filled to 1/8 inch (3 mm) below the pavement surface through the use of a pressure type applicator approved by the Engineer, and equipped with a nozzle which will fit into the joints.

e. Material spilled on surfaces of the pavement adjacent to the crack shall be cleaned away by the Contractor at no additional cost to the Department.

Subsection 611.04 is void and superseded by the following:

Sealing transverse and longitudinal cracks will be measured for payment by the linear foot (meter) of transverse and longitudinal cracks sealed, measured to the nearest foot (meter) of sealed cracks, complete, in place and accepted by the Engineer.

DIAMOND GRINDING AND TEXTURING CONCRETE PAVEMENT

DESCRIPTION

This work shall consist of diamond grinding and texturing the driving lane of the mainline concrete pavement surface for profile improvement. The passing lane and outside concrete shoulder, if applicable, shall be day lighted as required to prevent any vertical projection in excess of ¼ inch. The grinding quantities are based on widths shown below. Grinding shall not extend across bridges unless specifically designated by the Engineer. The work shall be done according to the plans and these Special Provisions.

Sta. 104+06 to Sta. 150+00	Northbound & Southbound	Grind 14’ wide
Sta. 150+00 to Sta. 422+03	Northbound	Grind 13’ wide
Sta. 150+00 to Sta. 285+62	Southbound	Grind 13’ wide
Sta. 285+62 to Sta. 295+10	Southbound	Grind 14’ wide
Sta. 295+10 to Sta. 306+69	Southbound	Grind 13’ wide
Sta. 306+69 to Sta. 319+08	Southbound	Grind 14’ wide
Sta. 319+08 to Sta. 497+83	Southbound	Grind 13’ wide
Sta. 73+15 to Sta. 351+04	Northbound	Grind 13’ wide
Sta. 73+11 to Sta. 97+89	Southbound	Grind 13’ wide
Sta. 324+51 to Sta. 566+47	Southbound	Grind 13’ wide

PROJECT INFORMATION

The 10” non-reinforced portland cement concrete pavement to be ground was constructed in 1997. The surface is 25’ wide with skewed joint spacings of 16’-6” and has integral curb on the inside and 10’ outside concrete shoulders. The joints are not doweled. Pertinent data for the original construction project is shown below:

In Columbus
Northbound and Southbound
Highway US-81
Reference Post 112.87 to 113.82
Station 104+06 to 150+00
Class of Concrete: 47B (30% Coarse Aggregate)
Type of Coarse Aggregate: Limestone
Source of Coarse Aggregate: Martin Marietta
Weeping Water, NE
Los Angeles Abrasion (% Wear): B – 28%

The 10” non-reinforced portland cement concrete pavement to be ground was constructed in 1997. The surface is 24’ wide with straight joint spacings of 16’-6” and has 3’ inside and 8’ outside asphaltic concrete shoulders. The joints are not doweled. Pertinent data for the original construction project is shown below:

Columbus, Northwest
Northbound and Southbound
Highway US-81
Reference Post 113.82 to 121.0
Station 150+00 to 422+03 Northbound
150+00 to 497+83 Southbound
Class Of Concrete: 47B (30% Coarse Aggregate)
Type of Coarse Aggregate: Limestone
Source of Coarse Aggregate: Martin Marietta
Weeping Water, NE
Los Angeles Abrasion (% Wear): B – 28%

Bridge Exceptions: Sta. 411+23 to 413+52 (Bridge No. 119.38) Northbound
Sta. 411+03 to 413+24 (Bridge No. 119.38) Southbound
Sta. 433+03 to 434+64 (Bridge No. 119.78) Southbound
Sta. 452+42 to 454+93 (Bridge No. 120.16) Southbound
Sta. 471+27 to 473+19 (Bridge No. 120.51) Southbound

The 10” non-reinforced portland cement concrete pavement to be ground was constructed in 1999. The surface is 24’ wide with skewed joint spacings of 16’-6” and has 3’ inside and 8’ outside asphaltic concrete shoulders. The joints are not doweled. Pertinent data for the original construction project is shown below:

Madison, South
Northbound and Southbound
Highway US-81
Reference Post 133.04 to 142.39
Station 73+15 to 351+04 Northbound
73+11 to 97+89 Southbound
324+51 to 566+47 Southbound
Class Of Concrete: 47B (30% Coarse Aggregate)
Type of Coarse Aggregate: Limestone
Source of Coarse Aggregate: Martin Marietta
Weeping Water, NE
Los Angeles Abrasion (% Wear): B – 27%

Bridge Exception: Sta. 137+92 to 139+70 (Bridge No. 134.28) Northbound

The minimum, maximum and average joint faulting in each mile is shown in the following table:

JOINT FAULT MEASUREMENTS, INCHES

Location	Northbound			Southbound		
	Min.	Max.	Avg.	Min.	Max.	Avg.
US-81 (112.87 to 113.00) Station 104+06 to 107+17	0.13	0.27	0.20	0.03	0.20	0.13
US-81 (113.00 to 113.82) Station 107+17 to 150+00	0.00	0.80	0.28	0.03	0.63	0.24
US-81 (113.82 to 114.00) Station 150+00 to 159+34	0.20	0.74	0.48	0.04	0.42	0.24
US-81 (114.00 to 115.00) Station 159+34 to 212+26	0.10	0.88	0.33	0.15	0.42	0.26
US-81 (115.00 to 116.00) Station 212+26 to 264+80	0.16	0.52	0.29	0.15	0.33	0.20
US-81 (116.00 to 117.00) Station 264+80 to 317+52	0.21	0.60	0.37	0.19	0.29	0.23
US-81 (117.00 to 118.00) Station 317+52 to 370+37	0.00	0.84	0.40	0.14	0.70	0.36
US-81 (118.00 to 119.00) Station 370+37 to 391+85	0.30	0.81	0.48	0.05	0.18	0.12
US-81 (119.00 to 119.50) Station 391+85 to 423+03	0.14	0.48	0.27	--	--	--
US-81 (119.00 to 120.00) Station 391+85 to 445+28	--	--	--	0.12	0.73	0.36
US-81 (120.00 to 121.00) Station 445+28 to 498+13	--	--	--	0.18	0.62	0.39

JOINT FAULT MEASUREMENTS, INCHES

Location	Northbound Min.	Max.	Ave.	Southbound Min.	Max.	Avg.
US-81 (133.04 to 134.00) Station 73+15 to 123+46	0.14	0.53	0.34	--	--	--
US-81 (133.04 to 133.52) Station 73+11 to 97+89	--	--	--	0.10	0.60	0.32
US-81 (134.00 to 135.00) Station 123+46 to 176+02	0.22	0.48	0.33	--	--	--
US-81 (135.00 to 136.00) Station 176+02 to 228+34	0.10	0.40	0.29	--	--	--
US-81 (136.00 to 137.00) Station 228+34 to 280+31	0.14	0.53	0.32	--	--	--
US-81 (137.00 to 138.00) Station 280+31 to 333+44	0.15	0.44	0.31	--	--	--
US-81 (137.81 to 138.00) Station 324+49 to 333+44	--	--	--	0.13	0.42	0.23
US-81 (138.00 to 138.30) Station 333+44 to 350+98	0.13	0.40	0.24	--	--	--
US-81 (138.00 to 139.00) Station 333+44 to 387+04	--	--	--	0.18	0.57	0.33
US-81 (139.00 to 140.00) Station 387+04 to 440+23	--	--	--	0.10	0.29	0.19
US-81 (140.00 to 141.00) Station 440+23 to 493+52	--	--	--	0.15	0.50	0.30
US-81 (141.00 to 142.00) Station 493+52 to 545+55	--	--	--	0.20	0.48	0.25
US-81 (142.00 to 142.45) Station 545+55 to 569+54	--	--	--	0.20	0.31	0.25

Below are the proportions for 47B concrete pavement:

Class Of Concrete	Sacks of Cement per Cu.Yd. (Fixed)	Type of Concrete	Lbs. Total Agg. per Sack of Cement Min.	Max.	Ratio Coarse Agg. to Total Agg. (Percent)	Type of Coarse Aggregate
47B	6.0	Air-Entrained	480	520	30±3	Limestone

EQUIPMENT

Grinding and texturing shall be done utilizing diamond blades mounted on self-propelled machines designed for grinding and texturing pavements. The cutting head shall be at least 36 inches wide and consist of many diamond blades with spacers. The equipment shall be such that it will not cause strain or damage to the underlying surface of the pavement. Equipment that causes excessive raveling, aggregate fractures, spalls, or disturbance of transverse or longitudinal joints will not be permitted.

DIAMOND GRINDINGS

Grinding shall be done in the longitudinal direction so that grinding begins and ends at lines normal to the pavement centerline within one ground area, but not necessarily at the end of each shift or of a working day.

Grinding for profile improvement shall be continuous, within the area designated on the plans. All grinding shall be to full pavement width and shall include at least 90% of the pavement surface within any 100-foot length of pavement.

Grinding shall leave no vertical projection in excess of ¼ inch on any longitudinal line and at either edge of the portland cement concrete pavement.

This work shall be done only with one lane closed, as shown in the plans. The contractor will also be allowed to maintain a single lane closure overnight during the Diamond Grinding operation if he elects to continue grinding on a 24 hour basis. The lane closure shall be removed upon completion of grinding operation in that lane or when there is no grinding activity scheduled for the next day or the weekend. The contractor will be assessed $500 for each day the lane closure remains in place without grinding taking place.

Removal of all slurry or residue from the grinding operation shall be continuous. Pavement must be left in a clean condition. Residue from grinding operations shall not be permitted to flow into gutters or other drainage facilities. The residue shall be disposed of on the shoulder foreslopes.

Concrete pavement repair and dowel bar retrofitting shall be completed in an area before the grinding operation.

SMOOTHNESS

The ground and textured pavement will be considered acceptable provided the maximum profile index does not exceed 20 inches per mile in any individual 0.20 mile of each vehicle lane, when tested with the California Type Profilograph using a 0.1 inch blanking band.

METHOD OF MEASUREMENT

The quantity of grinding and texturing concrete pavement to be paid for shall be measured in square yards to the nearest 1.0 square yard, completed and accepted by the Engineer.

BASIS OF PAYMENT

The quantity of completed and accepted work, measured as provided herein, shall be paid for at the contract unit price per square yard for the item “Diamond Grinding and Texturing Concrete Pavement”. This price shall be full compensation for furnishing all materials, equipment, labor, supplies, tools and incidentals necessary to complete the work.

DOWEL BAR RETROFIT

DESCRIPTION

Install epoxy coated dowel bars in the driving lane, on the transverse joints and transverse cracks in the existing portland cement concrete pavement as shown in the plans. Existing construction joints will not be dowel bar retrofitted. The dowels shall be placed after the concrete repair and prior to the diamond grinding operation. Below are the locations for dowel bar retrofit:

US-81 (112.87 to 113.82) -- In Columbus
Sta. 104+06 to Sta. 150+00 Northbound (278 joints & 1 transverse crack)
Sta. 104+06 to Sta. 150+00 Southbound (278 joints & 1 transverse crack)

US-81 (113.82 to 121.00) -- Columbus, Northwest
Sta. 150+00 to Sta. 422+03 Northbound (1635 joints & 6 transverse cracks)
Sta. 150+00 to Sta. 497+83 Southbound (1942 joints & 7 transverse cracks)

Exceptions: Sta. 161+00 to Sta. 280+20 Southbound (Unbonded concrete overlay)
Sta. 411+23 to Sta. 413+52 Northbound (Bridge No. 119.38)
Sta. 411+03 to Sta. 413+24 Southbound (Bridge No. 119.38)
Sta. 433+03 to Sta. 434+64 Southbound (Bridge No. 119.78)
Sta. 452+42 to Sta. 454+93 Southbound (Bridge No. 120.16)
Sta. 471+27 to Sta. 473+19 Southbound (Bridge No. 120.51)

US-81 (133.04 to 142.39) -- Madison, South
Sta. 73+15 to Sta. 351+04 Northbound (1673 joints & 2 transverse cracks)
Sta. 73+11 to Sta. 97+89 Southbound (150 joints & 0 transverse cracks)
Sta. 324+51 to Sta. 566+47 Southbound (1466 joints & 0 transverse cracks)

Exception: Sta. 137+92 to Sta. 139+70 Northbound (Bridge No. 134.28)

MATERIALS

Furnish materials meeting the following requirements:

Epoxy coated dowel bars, 1-1/2 x 18 inches, shall conform to the requirements of Section 1022 in the Standard Specifications and Supplemental Specifications. Epoxy coating of the ends of the dowel bars is optional. The dowel bars shall be uniformly coated with an approved bond breaker in conformance with Paragraph 4 of Subsection 603.03.

The dowel bars shall have tight fitting end caps made of nonmetallic material that allow for at least 1/4 inch bar movement at each end of the bar. Chair devices for supporting the dowel bars shall be either epoxy coated or made of nonmetallic material. The chair devices shall

provide a minimum clearance of 1/2 inch between the bottom of the bar and the surface upon which the bar is placed, and between the bar and the walls of the slot. The chairs shall be designed to prevent movement of the bar during placement of the grout. Samples of the end caps and chairs shall be submitted to the Engineer for approval before installation.

The caulking shall be a non-sag sealant approved by the Engineer before use.

The foam core board filler material shall be a closed cell foam faced with plastic film, foil or poster board material on each side. The foam core board filler shall be 3/8 $\pm$ 1/8 inch thick. The foam core board filler shall be approved by the Engineer before installation.

NON-SHRINK GROUT

The non-shrink grout placed around the dowel bars shall be one of the materials listed in the Approved Products List.

The grout may be extended as the manufacturer recommends. The aggregate for extending the grout must be a sand/gravel approved by Materials and Research Division and meeting the following gradation.

Sieve Size	Percentage Passing
3/8 in.	100
No. 20	0/5

The grout, with maximum aggregate extension, must meet the following strength requirements.

4-hour minimum compressive strength of 3000 psi
24-hour minimum compressive strength of 4500 psi
24-hour bond to dry PCC, 400 psi (California Test 551)

The contractor will furnish materials to be used for making the grout, and the mix design, to Materials and Research Division 30 days prior to installation.

A minimum of one set of 3 cylinders will be made from each day's pour from the first grout produced. Additional sets can be made at anytime during grout production. When the lane will be opened to traffic at the end of the day's pour, cylinders shall also be made from the last grout produced and placed. These cylinders shall be tested at the age of 4 hours to verify that the minimum 4-hour compressive strength has been attained before opening to traffic. If minimum grout strengths are not being met, grouting operations shall be suspended until the contractor can demonstrate batch mixing and proportioning proficiency that meets the minimum strength required. Acceptance will be based on meeting the 24-hour minimum strength requirements.

CONSTRUCTION REQUIREMENTS

Slots shall be cut in the pavement with a gang saw capable of cutting at least three slots in each wheel path at a time. The slots shall be cut to the depth required to place the centers of the dowels at mid-depth in the concrete slab. Multiple saw cuts parallel to the centerline may be required to remove the material from the slot.

Jackhammers used to remove the concrete from the slots shall not be larger than the 30-pound class. Care shall be taken to prevent any damage to the pavement or to vehicles traveling in the adjoining lane.

All exposed surfaces and cracks in the slots shall be sandblasted and cleaned before bar installation. The transverse contraction joint on the bottom and sides shall be filled with non-sag caulking filler.

Chair devices shall be used to support the dowel bars at the depth shown on the plans but shall provide not less than 1/2 inch clearance around the sides and bottom of the bar. Place the dowel bars parallel to the centerline of the pavement and parallel to the pavement surface. The dowel bars shall be placed within ± 1/4 inch of the desired alignment. The dowel bars shall be centered over the transverse joint or crack so that a minimum of 7 inches of the dowel bar extends into the adjacent panel.

Cut a piece of foam core board material (angled if joints are skewed) to fit tightly around the dowel bar. The foam core board shall be placed at the center of the dowel bar flush with the surface of the concrete pavement, or slightly recessed. The foam board shall also cover the existing transverse joint or crack and shall be maintained in a vertical position, tight to all edges, during grout placement operations. The joint or crack above the foam board insert shall be re-established within 8 hours of grout placement by means of sawing when the grout has attained sufficient strength. If the foam board is flush with the pavement or visible, sawing of the slots will not be required.

The non-shrink grout shall be produced with a portable mixer approved by the Engineer. Mobile mixers that mix the grout in a chute will not be allowed. The mixer must be capable of proportioning the grout material and automatically recording and printing the material weights. All grout shall be placed immediately after mixing and before the grout has attained initial set. The grout shall not be re-tempered with water.

The contractor shall thoroughly moisten all surfaces of the sawed slot immediately prior to filling with grout. All excess water shall be removed with compressed air.

Immediately after placement, the grout shall be thoroughly coated with white pigmented curing compound.

The grout shall be placed according to the manufacturer’s recommendations. The grout shall be thoroughly consolidated with a hand held vibrator so the grout completely surrounds the dowel bars and support chairs. The grout shall be placed so that the material is at least 1/8 inch higher than the pavement if the pavement is to be diamond ground. If the pavement is not to be ground, the grout shall be finished flush with the surface. Dowel bars that must be removed due to poor workmanship and/or material failure, must be replaced with new bars. The repair work shall include diamond grinding. Any additional traffic control needed due to required retrofit repairs shall be performed at no additional cost.

TEST SECTION

The contractor shall construct a test section consisting of slot sawing, concrete removal, dowel bar placement, and grout mixing and placement at a location selected by the Engineer. The test section shall be at least one full lane width and consist of at least 10 but not more than 50 joints. The test section shall be placed in the presence of the Engineer and a representative from Materials and Research. Full depth cores will be taken from the test section to determine the quality of the placement operation.

METHOD OF MEASUREMENT

Dowel Bar Retrofit will be measured by the each bar placed.

BASIS OF PAYMENT

Payment for Dowel Bar Retrofit will be paid at the contract unit price per each for the item "Dowel Bar Retrofit." Payment will be full compensation for all work prescribed in this specification.

JOINT SEALING – ASPHALT TO CONCRETE

Subsection 508.02 in the 1997 Standard Specifications English Edition is void and superseded by the following:

519.02 – Material Requirements

1. The sealant shall be a mixture of paving grade asphalt, vulcanized recycled rubber and/or polymer modifier(s) that conform to the following requirements and specifications:

    a. The sealant shall contain a minimum of 18% vulcanized recycled rubber by weight of asphaltic components. The sealant shall be a pre-reacted blend of product. The material shall not require additional heating time after it has reached the manufacturer's recommended application temperature. New material may be added to the material that has already been heated to proper application temperature. When heated in accordance with ASTM D-5167 to the safe heating temperature, the sealant shall meet the following test parameters:

TEST	SPECIFICATION
Cone Penetration @ 77 F (25 C) (ASTM D-5329)	45 – 70
Flow, 140 F (60 C) (ASTM D-5329)	5.0 mm max.
Resilience, 77 F (25 C) (ASTM D-5329)	25 – 60%
Bond, -20 F (-29 C) 0% extension (1/2" specimen) (ASTM D-5329)	Pass 3 cycles
Flexibility, -29 F (-34 C), 1", 90 degrees, 10 sec. (ASTM D-3111, modified)	Pass
Asphalt Compatibility (ASTM D-5329)	Pass

    b. Sampling and heating shall be in accordance with ASTM D-5078 and ASTM D-5167.

    c. The vulcanized recycled ground rubber shall be free of wire, fabric, or other contaminating materials. The gradation shall be 95-100% passing the #10 sieve, 35-55% passing the #20 sieve, and 0-25% passing the #40 sieve.

    d. Acceptance of the manufactured material will be based on a certificate of compliance for each lot or batch furnished by the supplier. The certificate of compliance shall state the type of rubber used, the lot number and a copy of the test results for the lot. The date of manufacture must also be shown on the

certificate. This information must be submitted to the Department's Materials and Research Division, Bituminous Laboratory prior to the usage of material.

e. One sample per lot of material shall be sent to the Nebraska Department of Roads, Materials and Research Division for specification compliance testing. If the sealant sample test results do not conform to Specifications, the Contractor shall be assessed the costs for testing and shall be required to provide acceptable sealant for the project including additional samples for retesting.

f. The use of metal staples or fasteners of any kind is prohibited for closing the lids of the container. Tape or other like materials will be accepted.

g. Each container shall include information regarding lot number, type of product, safe heating temperature, and recommended pouring temperature of the crack sealing material.

SEALING TRANSVERSE AND LONGITUDINAL JOINT

Subsection 612.01 in the 2001 Supplemental Specifications is void and superseded by the following:

This work shall consist of the preparation and sealing of all joints in the concrete roadway, which includes the transverse joints, longitudinal centerline joint, and longitudinal outside shoulder joint on concrete shoulders, after the dowel bar retrofitting and diamond grinding operations. The transverse joints on the ramps at the Monroe, N-22 Intersection shall be sealed up to the gore areas, adjacent to the mainline.

Subsection 612.02 is amended to include the following:

Material having a bond specification will be tested on concrete blocks that will be constructed by the Department's Concrete Laboratory. The concrete blocks will be constructed using 47B-3000 concrete meeting the requirements of Section 1002 in the Standard Specifications.

The design is amended so that no fly ash is used in the mixture. All other specifications for Portland cement concrete apply.

If a Department approved independent laboratory will be used for testing purposes, the Department must be notified so that concrete blocks for bond testing can be sent to the approved independent laboratory.

GRANULAR SUBDRAINS

Subsection 915.02 of the 1997 Edition of the Standard Specifications is void and superseded by the following:

Aggregate that is used in granular subdrains shall conform to the quality requirements of subsection 1033.02 paragraphs 3.b.(3) and 3.b.(6) and the Class E Aggregate gradation requirements of Table 1033.03A.

Paragraph 2.b.of subsection 915.03 is void.

Paragraph 3.of subsection 915.03 is void and superseded by the following:

3. In areas of Granular Subdrains Type A (asphaltic concrete shoulder surfacing) Asphaltic Concrete for Patching Type SPS shall be used to replace the existing asphaltic shoulder material that is removed.

Paragraph 5.of subsection 915.03 is void and superseded by the following:

Excavated material shall become the property of the Contractor and removed from the project.

For Granular Subdrains Type A all trenched areas shall be filled with aggregate and asphalt concrete by the end of that days work. For Granular Subdrains Type B and Granular Subdrains Type C all trenched areas shall be filled with aggregate by the end of that days work. Traffic will not be permitted to travel next to these trenched areas until the trench has been filled to top of the existing surfacing.

Paragraph 2.of subsection 915.05 is void and superseded by the following:

Payment is full compensation for all work and materials required to do the work. Asphaltic Concrete for Patching required for the Granular Subdrains Type A will not be measured and paid for but shall be considered subsidiary to the item Granular Subdrains Type A.

FLY ASH
(S10-5-0801)

Subsection 1008.01 in the Standard Specifications is void and superseded by the following:

Fly ash shall be Class C or F meeting the requirements of ASTM C 618.

STRUCTURAL STEEL
(S10-5-0801)

Section 1045 of the Standard Specifications is amended to include the following:

1045.03 -- Steel Plate Substitution

The Contractor may use either English or Metric steel plates in accordance with Table 1045.01.

Table 1045.01

English-Metric Steel Plate Substitution Table

Metric (millimeters)	English (inches)	Metric (millimeters)	English (inches)
9	3/8	32	1 1/4
10	3/8	35	1 3/8
11	7/16	38	1 1/2
12	½	40	1 5/8
14	9/16	45	1 3/4
16	11/16	50	2
18	¾	55	2 1/4
20	13/16	60	2 3/8
22	7/8	70	2 3/4
25	1	80	3 1/4
28	1 1/8	90	3 1/2
30	1 ¼		

REPAIR OF DAMAGED METALLIC COATINGS
(S10-5-0801)

Paragraph 2. of Subsection 1061.01 in the Standard Specifications is void and superseded by the following:

2. The material used for repair shall provide a minimum coating thickness of at least 50 µm with one application.

CORRUGATED METAL PIPE
(S10-5-0801)

Table 1035.01 in Section 1035 of the Supplemental Specifications is amended by deleting the title “Steel and Aluminum Culvert Thickness”.

METAL FLARED-END SECTIONS
(S10-5-0801)

Table 1036.01 in Section 1036 of the Supplemental Specifications is amended by deleting the title “Steel and Aluminum Flared-End Thickness”.

REINFORCED CONCRETE PIPE, MANHOLE RISERS, AND FLARED-END SECTIONS
(S10-5-0801)

Paragraph 3.a. of Subsection 1037.02 in the Supplemental Specifications is void and superseded by the following:

3.a. Round reinforced concrete pipe shall conform to the requirements of AASHTO M 170-95 with the exception of the minimum circumferential reinforcing (in2/ft. (mm 2/m) of pipe wall) for 15, 21, and 24 inch (380, 460, 600 mm) Class III pipe, as shown below:

Paragraph 3.b. of Subsection 1037.02 is void and superseded by the following:

b. AASHTO M 170-95 Specifications are modified as follows:

Paragraph 4. of Subsection 1037.02 is void and superseded by the following:

4. Reinforced concrete arch pipe shall conform to the requirements of AASHTO M 206-95.

Paragraph 5. of Subsection 1037.02 is void and superseded by the following:

5. Reinforced concrete elliptical pipe shall conform to the requirements of AASHTO M 207-95.

Paragraph 7. of Subsection 1037.02 is void and superseded by the following:

7. Concrete flared-end sections shall be of the design shown in the plans and in conformance with the applicable requirements of AASHTO M 170-95, Class II pipe, AASHTO M 206-95, Class A-II pipe, or AASHTO M 207-95, Class HE-II pipe for the diameter of pipe which it is to be installed.

HIGH TENSILE BOLTS, NUTS, AND WASHERS (S10-5-1001)

Subsection 1058.02 in the Supplemental Specifications is void.

Paragraph 4.b.(5) in the Standard Specifications is void and superseded by the following:

(5) The bolt, nut, and washer assembly shall be assembled in a Skidmore-Wilhelm calibrator or an acceptable equivalent device. For bolts that are too short to be assembled in the calibrator, see Subsection 1058.03, Paragraph 4.b.(9).

ELASTOMERIC BEARINGS AND LAMINATED BEARING PADS (S10-5-0903)

Paragraph 2. of Subsection 1068.02 in the Standard Specifications is void and superseded by the following:

2. Samples and Certification shall be furnished in accordance with NDR's *Materials Sampling Guide*.

Paragraph 3. of Subsection 1068.02 is void.

STEEL BARS FOR CONCRETE REINFORCEMENT (S10-5-1201)

Section 1020 in the Standard Specifications is void and superseded by the following:

1020.01 - Description

Steel tie bars for longitudinal joint reinforcement in concrete pavements shall be epoxy coated and deformed Grade 40 or 60 billet steel as shown in the plans, specifications or Special Provisions.

1020.02 - Material Characteristics

1. Billet-steel bars shall conform to the requirements of ASTM A 615/A 615M.
2. Epoxy coatings shall conform to the requirements in Section 1021 of the Standard Specifications and Supplemental Specifications.

1020.03 - Acceptance Requirements

Acceptance shall be based on sampling, testing, and certification requirements in accordance with the NDR *Materials Sampling Guide*.

EPOXY COATED REINFORCING STEEL (S10-5-0403)

Table 1021.01 in Section 1021 of the Standard Specifications is void and superseded by the following:

Table 1021.01			
Bend Test Requirements			
English		**Metric**	
Bar No.	**Mandrel Diameter (inches)**	**Bar**	**Mandrel Diameter (millimeters)**
3	3	10	75
4	4	13	100
5	5	16	125
6	6	19	150
7	7	22	175
8	8	25	200
9	9	29	230
10	10	32	250
11	11	36	280
14	17	43	430
18	23	57	580

PERFORMANCE GRADED BINDER

Section 503 in the Standard Specifications and Supplemental Specifications is amended to include Performance Graded Binders.

I. **Description**

The performance graded binder to be used on this project shall be PG Binder 58-28 supplied by a Certified Supplier.

Certified Supplier

A supplier must be certified by the Nebraska Department of Roads to be allowed to supply Performance Graded Binder in Nebraska. A certified supplier must be a participant in one or more of the following PG Binder groups.

1. AASHTO Materials Reference Laboratory (AMRL)
2. Western Cooperative Testing Group
3. Combined States Binder Group

The supplier must maintain and follow the requirements of the group or groups in which they participate in, to maintain certification by the Nebraska Department of Roads. In addition, active participation is required to maintain certification by the Department. Active participation

will include submitting of round robin sample results, along with meeting other requirements of the group or groups. Failure to do so will result in loss of certification by the Department.

A certified supplier may be asked to supply to the Department, past round robin results, laboratory inspection reports, reasons for and investigative reports on out lying results, quality control testing, and/or technician training and proficiency testing reports.

The binder supplier agrees to inspection of their plant or terminal without notice anytime during production or supplying of material to the Department. The inspection may also include the supplier's laboratory.

Supplier Certification

A supplier may request certification by contacting the Nebraska Department of Roads, Materials and Research Division, Flexible Pavement Engineer at (402) 479-4675. A temporary certification may be issued for a period of up to one year. Split sample testing will be required prior to receiving a temporary certification. Split sample testing will be done on all grades of binder that the supplier intends to supply during the temporary certification. The supplier will have up to one year to become certified by participating in and following the requirements of one or more of the approved binder groups.

A supplier may become certified through active participation in other binder certification/round robin groups that are approved by the Department. The Department may request from the supplier prior to approval, past or current round robin results, quality control testing, laboratory inspection reports, and/or technician training and proficiency testing reports.

II. Binder Sampling and Testing:

1. Lots. Each 3750 tons (3400 Mg) of HMA produced will be a binder lot.

2. A binder lot will include only one PG Binder grade or a blend as allowed in paragraph 6.e.

3. A binder lot will only include one supplier of the PG Binder or a blend as allowed in paragraph 6.e.

4. Blending of different binder grades and binders from different suppliers will be allowed with restrictions as noted in paragraph 6.e. The Engineer must be notified of the intent to blend prior to actual blending.

5. All binders shall be sampled at the rate of at least one sample per lot with a minimum of three samples per project.

    a. The sample shall consist of two one-quart (liter) cans and shall be taken by the Contractor's Certified Sampling Technician, with assistance from or under supervision of NDR personnel. The sample shall be taken at the plant from the line between the storage tank and the mixer or from the tank supplying material to the line, at a location at which material sampled is representative of the material in the line to the mixer. One can will be tested for compliance with AASHTO M320 specifications and the other can portion will be saved for dispute resolution, if needed. The sampling process shall follow procedures of the NDR Materials Sampling Guide and NDR T 40.

b. Testing. When the tested PG Binder is in compliance, the binder lot will be accepted and both cans of the sample can be discarded. If the tested PG Binder does not comply, then the price of the PG Binder lot represented by the sample shall be adjusted according to Tables 2, 3 and 4. Overall project average testing requirements and price adjustments will also apply, as stated in Table 5.

6. Material Requirements

a. Performance graded binder, as specified in the contract items shall be in accordance with the PG+ specifications as noted, and AASHTO M320 with the exception of Direct Tension.

b. Substitution of a PG Binder, which exceeds the upper and lower grade designations from the specified, requires advance notification of the Engineer, and be documented by a no cost change order. The bill of lading or delivery ticket shall state the binder grade and specific gravity.

c. Material Certification - A Material Certification shall be submitted prior to construction, stating the type of modifier being used, and the recommended mixing and compaction temperatures for the Hot Mix Asphalt. The Material Certification must state that acid has not been used. The Material Certification must also state that the material has not been air blown or oxidized.

d. The Contractor shall receive from the supplier, instructions on the proper storage and handling of each grade and shipment of PG Binder.

e. Blending of PG Binders at the hot mix plant site will be allowed only when transitioning to an asphalt mixture requiring a different grade of binder and with the following restrictions:

(1) The resultant blend will meet AASHTO M320 specifications when tested as ±3° C of the specified PG binder. The sample of the blended material will 1) be considered as a lot sample, 2) be taken during initial production following the blending of the binders, and 3) deductions when not meeting M320, will apply. On the blended sample's identification form will be a note explaining the blending conditions and a statement that the sample is a blend of materials. The next lot sample, following the sample representing the blend, will be tested as the specified binder grade for the asphalt mixture being produced and shall meet M320 specifications.

(2) Modified Binders - When a type of modification is used and stated in the Material Certification as required in paragraph 6.c., it will not be allowed to be blended with a binder containing a different type of modification. Blending of the same type of modifiers will be allowed.

f. If the Engineer determines that there is a need for an anti-stripping additive the Contractor shall be compensated for the cost of liquid anti-strip additive needed, as determined during mixture design verification, at

the invoice price of the additive. The PG Binder Supplier will add liquid anti-strip additives to the PG Binder when required by the Engineer.

g. When PG 64-28 and 70-28 are specified the following PG+ specifications (Table 1) and AASHTO M320 with the exception of Direct Tension) will apply:

(1) The performance graded binder shall be a binder, which incorporates a blend of base asphalt and elastomer modifiers of styrene-butadiene (SB), styrene-butadiene-styrene (SBS) or styrene-butadiene-rubber (SBR). Acid shall not be used. Air blown and/or oxidized asphalt will not be allowed. The supplier must certify that the binder is not acid modified, and that acid was not used. The binder supplier must also certify that air blowing or oxidization has not been done/used to modify the binder or used to change the properties of the binder. The composite material shall be thoroughly blended at the asphalt refinery or terminal prior to being loaded into the transport vehicle. The polymer modified binder shall be heat and storage stable and shall not separate when handled and stored per the suppliers storage and handling recommendations.

(2) Samples of binder proposed for use and production lot samples shall be submitted to the Materials and Research, Bituminous Laboratory for testing to insure the binder is of a modification system in which no acid is used. ARR-MAZ AD-here LOF65-00, amine anti strip will be added at the rate of 0.5% to sample(s) that have been heated to 300 degrees F or until viscous and stirred for a minimum of 5 minutes. The resultant blend will then be tested for PG grading and compared to PG grading prior to the blending. The resultant blend shall meet M320 specifications and shall not show a drop of G*/sin(delta) of more than 25% when compared to the result(s) of the sample prior to blending the anti strip. If the resultant blend does not meet M320 specification or shows a drop of greater than 25%, the material that is represented by the sample will be rejected.

(3) Approval for initial use will be based on the sample(s) meeting the PG+ specifications as stated in Table 1 and M320 specifications. Approval for use will also be based on PG grading when comparing results after blending anti strip to PG grading prior to the addition of anti strip.

(4) Lot samples of the binder shall meet or exceed the PG+ specifications as listed, in addition to M320 specifications. For PG+, Table 1 specification testing, material will be tested on original unaged binder for phase angle specification and RTFO aged material for elastic recovery. Anti strip will also be added to project lot samples as described in 6.g.(2).

(5) When it is determined that material does not meet Table 1 specifications, Table 2 and 3 will apply, depending on the grade of

binder. When it is determined that a single sample(s) does not meet M320 specifications, Table 4 will apply.

(6) All project samples will be tested for PG+ specification compliance.

Table 1

Additional Specifications for PG 64-28 and 70-28
Original Unaged Binder

	PG 64-28	PG 70-28
Elastic Recovery; AASHTO T301 tested at 77°F (RTFO Aged AASHTO T301)	Minimum 60%	Minimum 70%
Phase Angle; degrees (Max) (Original Binder)	77.0	75.0

Table 2

Single Sample Tolerance and Pay Factor Table
Pg 64-28

	(1) Pay Factor of 0.75	(2) Pay Factor of 0.50 or Removal
Elastic Recovery Percentage (RTFO Aged AASHTO T301)	54 to 57.5%	Less than 54%
Phase Angle (degrees) (Original Unaged)	78.5 – 79.0	Greater than 81.0°

Table 3

Single Sample Tolerance and Pay Factor Table
Pg 70-28

	(1) Pay Factor of 0.75	(2) Pay Factor of 0.50 or Removal
Elastic Recovery Percentage (RTFO Aged AASHTO T301)	64 to 67.5%	Less than 64%
Phase Angle (degrees) (Original Unaged)	76.5 – 79.0	Greater than 79.0°

Table 4

Single Sample Tolerance and Price Factor Table

	Pay Factor of 0.75[1]	Pay Factor of 0.50 or Removal[2]
Tests on Original Binder Dynamic Shear, G*/Sin δ, kPa	0.86-0.92	< 0.86
Tests on Rolling Thin Film Oven Residue Dynamic Shear, G*/Sin δ, kPa	1.76-1.97	< 1.76
Tests Pressure Aging Vessel Residue Dynamic Shear, G*Sin δ, kPa	5601-6200	> 6200
Creep Stiffness S, mPa	325-348	> 348
m-Value	0.270-0.284	< 0.270

NOTE: If more than one test fails to meet requirements, the largest individual price reduction (pay factor of 0.75 or 0.50) will be used to calculate price reduction for the asphalt binder.

[1] Price Reduction will be based on contract unit price of asphalt binder.

[2] The Engineer will determine if the non-compliant material will be removed. Removal and replacement will be at no additional cost to the Department. If the non-compliant material is accepted, a price factor of 0.50 will be applied. The price factor will be applied to the contract unit price of asphalt binder.

The pay factor will be applied to the quantity of material that the sample represents.

Overall Project Average - Price Reduction Based on Complete M320 Testing

Overall Project Averages does not apply to tested samples after the addition of anti strip. Samples not meeting PG+ specifications and the requirements after the addition of anti strip will be rejected.

PG+, Table 1 specifications do not apply to Overall Project Averages. PG+, Table 1 specification testing will be conducted on each Lot sample.

Out of specification material will be determined by the specifications outlined in AASHTO M320, excluding Direct Tension.

The Nebraska Department of Roads, Materials and Research, Bituminous Laboratory will do complete testing, per M320 specifications, on a minimum of three samples or 20% of the total samples from the project, whichever is the greatest. The Department will randomly select one sample for complete M320 testing out of every five samples received. When any test result shows sample not meeting M320 specifications, the previous and following sample received will be tested for complete M320 compliance. Testing will continue in this manner until tested samples meet all of M320 specifications, or there are no more lot samples to be tested.

Original Dynamic Shear Rheometer testing will be completed on all samples. When a sample being tested for only Original Dynamic Shear Rheometer compliance falls out of M320 specification, it will then be tested for complete M320 specification compliance. Adjacent samples will be tested when results, other than the Original Dynamic Shear Rheometer result, do not meet specification. This additional complete testing for M320 compliance is in addition to the minimum number of samples that will be tested for complete M320 compliance.

At the completion of testing, all complete M320 test results will be averaged. For averages that do not meet M320 specifications, the largest reduction shown in Table 5 will be applied to all the Performance Graded Binder used on the project.

Table 5

Overall Project Average – Pay Factor Table

	Range of Average	Pay Factor Applied
Tests on Original Binder Dynamic Shear, G*/Sin δ, kPa Min. 1.00 kPa	< 1.00 – 0.98 < 0.98 – 0.96 < 0.96 – 0.94 < 0.94	0.98 0.95 0.92 0.85
Tests on Rolling Thin Film Oven Residue Dynamic Shear, G*/Sin δ, kPa Min. 2.20 kPa	< 2.20 – 2.156 < 2.156 – 2.09 < 2.09 – 2.024 < 2.024	0.98 0.95 0.92 0.85
Tests Pressure Aging Vessel Residue Dynamic Shear, G*Sin δ, kPa Max. 5000 kPa	< 5000 – 5100 < 5100 – 5250 < 5250 – 5400 < 5400	0.98 0.95 0.92 0.85
m-Value Min. 0.300	< 0.300 – 0.298 < 0.298 – 0.293 < 0.293 – 0.290 < 0.290	0.98 0.95 0.92 0.85
Creep Stiffness S, mPa Max. 300 mPa	< 300 – 306 < 306 – 315 < 315 – 324 < 324	0.98 0.95 0.92 0.85

Single Sample Reduction and Overall Project Average Reduction

A sample representing a lot, not meeting M320 Specification, will have a reduction for the material that the sample represents. Only the largest reduction from Table 4, will apply when more than one result of a single sample does not meet M320 specifications. Only the largest overall project average reduction from Table 5, will apply when more than one test average falls out of M320 specifications. Pay Factors based on both Table 4 and Table 5 test results are separate from each other and both will be applied.

Investigation of Verification Lot Samples That Do Not Meet Specifications

When the lot sample shows test results out of specification limits, the process of resolving the sample failure will include the following actions as appropriate:

1. The Bituminous Lab may conduct retesting of the remaining portion of the original can sample as determined necessary to confirm or disaffirm the original test result(s).

2. The Flexible Pavement Engineer will notify the Contractor who will arrange to investigate all aspects of the testing, loading, handling and delivery of the material in question. The Contractor shall report findings to the Central Laboratory, Flexible Pavement Engineer.

3. The Department will collect and compile all information and prepare a report. A copy of the report will be distributed to the District and the Contractor.

4. The Bituminous Laboratory will issue the standard report of tests for all samples tested, to include any resulting pay factor deductions. A copy of the report of tests will be distributed to the District, Construction Division, and Contractor.

Dispute Resolution

After testing and investigations have been completed on the one can of the sample and there is still a dispute, the Department will select an independent laboratory for referee testing to take place on the second can of the sample. If the independent lab's tests indicate failing results and pay deductions equal to or greater than the Department's, the Contractor will reimburse the Department for the cost of testing. If the independent lab's tests indicate that the material meets specification or is at a pay deduction less than the Department's, the Department will assume the cost of testing. When the independent lab's tests indicate a pay deduction, the lesser of the Department's and the independent lab's deductions will be applied.

Basis of Measurement

PG Binder shall be measured in accordance with Subsection 503.05 in the Standard Specifications and Supplemental Specifications.

Basis of Payment

Subsection 503.06 in the Standard Specifications and Supplemental Specifications is amended to provide that PG Binder, accepted by the Engineer for use in asphaltic concrete, will be paid for at the contract unit price per ton (Megagram) for the item "Performance Graded Binder _____", less any deductions as prescribed in the tolerance and price reduction tables.

SUPERPAVE ASPHALTIC CONCRETE

Section 1028 of the Standard Specifications and Supplemental Specifications is void.

Paragraph 2.b.(1) of Subsection 503.04 is void and superseded by the following:

The contractor shall take at least four (4) control strip mixture samples and record the test results for the mixture properties identified in Paragraph 4.h.(3) of Subsection 1028.03. The contractor will also record compaction density values and rolling pattern information. This data will be for information only and shared with the Engineer.

SECTION 1028 -- SUPERPAVE ASPHALTIC CONCRETE

1028.01 -- Description

1. a. Superpave Asphaltic Concrete is a Contractor-designed mix.

   b. The Contractor will be required to define properties using a gyratory compactor that has met the Superpave evaluation test procedures, during mix design and production.

2. a. Before production of asphaltic concrete, the Contractor shall submit, in writing, a tentative job mix formula on the NDOR Mix Design Submittal Form for verification to the NDR Flexible Pavement Engineer at the Lincoln, Nebraska Central Laboratory.

   b. The job mix formula shall identify the virgin mineral aggregates, RAP, if used, and mineral filler, if needed, with the value of the percent passing each specified sieve for the individual and blended materials.

   c. (1) The Contractor shall submit six – 95 mm and two – 75 mm gyratory pucks compacted to 7% ± 0.5% air voids for testing and 3 proportioned 22 lb. (10,000-gram) samples of the blended mineral aggregates and two one-quart (liter) sample of the proposed PG Binder to be used in the mixture to the NDR Materials and Research Central Laboratory at least 15 NDR working days before production of asphaltic concrete. These samples will be used to verify the Contractor's Superpave mix design test results and mix properties.

   (2) Submitted with these samples shall be a copy of the Contractor's results for all Superpave mix design tests.

   (3) This mix design shall include at a minimum:

   (i) The bulk specific gravity of the blended aggregate. Whenever RAP is used it shall be processed through an ignition oven and then combined proportionally with the virgin aggregate. The bulk specific gravity shall be determined for the blend from an unwashed sample of the - #4 and a washed sample of + #4 material in accordance with AASHTO T 84 and AASHTO T 85 respectively.

   (ii) The target binder content.

(iii) The supplier and grade of PG Binder.

(iv) The maximum specific gravity of the combined mixture (Rice).

(v) The bulk specific gravity and air voids at N initial (Nini), N design (Ndes) and N maximum (Nmax) of the compacted gyratory specimens.

(vi) Voids in the Mineral Aggregate (VMA) and Voids Filled with Asphalt (VFA) at Ndes.

(vii) Fine Aggregate Angularity (FAA), Coarse Aggregate Angularity (CAA), Flat and Elongated Particles and Clay Content of the aggregate blend.

(viii) Location description and/or legal descriptions and producers of materials used in the mix.

(ix) Dust to Binder Ratio

(x) PG Binder recommended mixing and compaction temperatures.

(xi) Type of PG Binder modification, if modified

d. Before the mix design is approved, the Materials and Research Laboratory shall test all properties. This approval is on the submitted laboratory materials, and allows the contractor to begin plant production test strip and verification testing with the QA/QC Program.

3. PG Binder in Recycled Asphalt Pavement:

a. The Contractor may approach the State with a proposal to supplement the virgin aggregates of the asphaltic concrete mix with a Contractor's specified percentage of recycled asphalt pavement (RAP). The State may accept or reject the proposal based on whether the mix design meets the specified criteria of the asphaltic concrete proposed. The RAP may come from the project or an existing stockpile. The Contractor is responsible for investigating the quality and quantity of the RAP material.

b. In recycled asphaltic concrete mixtures, the allowable maximum percent of Reclaimed Asphalt Pavement (RAP) will be as shown in Table 1028.01. If the Contractor elects to exceed these values, the Contractor will be required to lower the minimum pavement design temperature of the PG Binder, one grade, according to AASHTO MP1.

Table 1028.01

Asphaltic Concrete Type	Percent, Maximum RAP
SPS	50
SP1	35
SP2	25
SP3	25
SP4	15
SP4 Special	25
SP5	15

4. Quality Control Program:

   a. The Contractor shall establish, provide, and maintain an effective Quality Control(QC) Program. The QC Program shall detail the methods and procedures that will be taken to assure that all materials and completed construction conforms to all contract requirements.

   b. Although guidelines are established and certain minimum requirements are specified herein and elsewhere in the contract, the Contractor shall assume full responsibility for placing a pavement course that meets the target field values.

   c. The Contractor shall establish a necessary level of control that will:

      (1) Adequately provide for the production of acceptable quality materials.

      (2) Provide sufficient information to assure both the Contractor and the Engineer that the specification requirements can be met.

      (3) Allow the Contractor as much latitude as possible in developing control standards.

   d.(1) The Contractor shall develop and keep on file with the Materials and Research Flexible Pavements Engineer a copy of their QC Program.A copy of the QC Program shall be kept on file in the QC lab trailer. This Program shall be updated as needed and submitted annually for review.

      (2) The Contractor shall not begin any construction or production of materials without an approved QC Program.

   e. The QC Program shall address, as a minimum, the following items:

      (1) QC organization chart.

      (2) Submittals schedule.

      (3) Inspection requirements.

         (i) Equipment.

         (ii) Asphalt concrete production.

(iii) Asphalt concrete placement.

(4) QC testing plan.

(5) Documentation of QC activities.

(6) Requirements for corrective action when QC and/or acceptance criteria are not met.

(7) Any additional elements deemed necessary.

(8) A list, with the name and manufacturers model number, for all test equipment used during laboratory testing.

(9) A description of maintenance and calibration procedures, including the frequency that the procedures are performed.

f. The QC organization chart shall consist of the following personnel:

(1) A Program Administrator:

(i) The Program Administrator shall be a full-time employee of the Contractor or a Subcontractor (Consultant) hired by the Contractor.

(ii) The Program Administrator shall have a minimum of 5 years experience in highway construction.

(iii) The Program Administrator need not be on the job site at all times but shall have full authority to institute any and all actions necessary for the successful implementation of the QC Program.

(iv) The Program Administrator's qualifications and training shall be described in the QC Program.

(2) One or more Quality Control Technicians:

(i) The quality control technicians shall report directly to the Program Administrator and shall perform all sampling and quality control tests as required by the contract.

(ii) The QC technicians shall be certified by the NDR Materials and Research Division.

(iii) Certification at an equivalent level by a state or nationally recognized organization may be acceptable.

(iv) The QC technician's credentials and NDR training records shall be submitted to the NDR Materials and Research Division.

(v) The Contractor may have a non-certified technician working under the direct supervision of a certified technician for no more than one construction season.

g.(1) Inspections shall be performed daily to ensure continuing compliance with contract requirements until completion of the work.

(2) QC test results and periodic inspections shall be used to ensure the mix quality and to adjust and control mix proportioning.

h. QC Testing Plan:

(1) The testing plan shall include the NDR statistically based procedure of random sampling for acquiring test samples.

(2) The Contractor may add any tests necessary to adequately control production.

(3) All QC test results shall be reported on NDR software by the Contractor with a copy provided to the Engineer within 1 week after the tests are complete. Daily review by the Engineer will be allowed if requested.

i. Corrective Action Requirements:

(1) The Contractor shall establish and utilize QC charts for individual QC tests. The requirements for corrective action shall be linked to the control charts.

(2) The Contractor's QC Program shall detail how the results of QC inspections and tests will be used to determine the need for corrective action.

(3) (i) A clear set of rules to determine when a process is out of control and the type of correction to be taken to regain process control will be provided.

(ii) As a minimum, the plan shall address the corrective actions that will be taken when measurements of the following items or conditions approach the specification limits:

(I) Plant produced mix gradations at laydown.

(II) Binder content.

(III) Air voids.

(IV) VMA

(V) VFA (mix design only)

(VI) FAA AASHTO T 304
CAA ASTM D 5821

(VII) Dust to Binder Ratio

(iii) Corrective actions that will be taken when the following conditions occur:

(I) Rutting

(II) Segregation

(III) Surface voids

(IV) Tearing

(V) Irregular surface due to mix tenderness

1028.02 -- Material Characteristics

1. The type of PG Binder shall be shown in the plans or special provisions.

2. Aggregates:

   a. Aggregates for use in superpave asphaltic concrete shall be tested on an individual basis.

   b. With the exception of Asphaltic Concrete Type SPS the blended mineral aggregate shall not contain more than 60 percent limestone on the final surface lift of asphaltic concrete.

   c. Crushed rock material for use in asphaltic concrete, 1/4 inch (6.35 mm) down, screenings and manufactured sand shall have a Sodium Sulfate loss of not more than 12 percent by mass at the end of 5 cycles. One 20-lb. (10-kg) sample shall be taken by NDR personnel at the project for every 5,000 tons (4500 Mg) of aggregate used, with a minimum of one per project for quality testing.

   d. Quartzite, granite, and chat shall conform to the requirements of Subsection 1033.02, Paragraph 4, a. (8). One 60-lb. (30 kg) sample shall be taken by NDR personnel at the project every 3,000 tons (2700 Mg) of aggregate used, with a minimum of one per project for quality testing.

   e. Crushed rock (Limestone) and Dolomite shall conform to the requirements of Paragraph 4.a. (4), (5) and (6). of Subsection 1033.02 of the Standard Specifications, Sampling size and frequency shall adhere to the current NDR Materials Sampling Guide. (Some aggregate can be adversely affected by ignition ovens resulting in erroneous reading for asphalt content and gradation unless corrected for.)

   f. Amend Paragraph 4.a. (7) of Subsection 1033.02 to provide that soundness tests shall not be required for fine sand.

   g. Amend Subsection 1033.02 to provide that once the satisfactory quality of aggregates from a source has been established, sufficient additional soundness tests will be performed to insure the continued satisfactory quality of the material.

   h. The coarse aggregate angularity value of the blended aggregate material shall meet or exceed the minimum values for the appropriate asphaltic concrete type as shown in Table 1028.02

Table 1028.02
Coarse Aggregate Angularity
(ASTM D 5821)

Asphaltic Concrete Type	CAA (minimum)
SPS	35
SP1	55
SP2	65
SP3	75
SP4	85/80*
SP4 Special	85/80*
SP5	95/90*

* Denotes two faced crushed requirements

i. The fine aggregate angularity value of the blended aggregate material shall meet or exceed the minimum values for the appropriate asphaltic concrete type as shown in Table 1028.03.

Note: The specific gravity for calculation of the Fine Aggregate Angularity (FAA) shall be determined on a combined aggregate sample of the material passing the No. 8 (2.36 mm) sieve and retained on the No. 100 (150 µm) sieve. The Contractor will determine the specific gravity to be used in the calculation of FAA mixture design value(s) and, if verified by the NDOR Aggregate Laboratory, this same value can be used throughout production. The verification value determined by the NDOR Aggregate Laboratory will be on a combined aggregate sample supplied by the Contractor that is representative of the material proposed or being used during production. The specific gravity to be used throughout production to calculate FAA values will be the Contractor's verified value or the NDOR determined value (whenever verification is not made) and will be noted on the Mix Design. Changes in aggregate percentages during production may require determination of a revised specific gravity for FAA.

Table 1028.03
Fine Aggregate Angularity
(AASHTO T304 Method A)

Asphaltic Concrete Type	FAA (minimum)
SPS	--
SP1	40.0
SP2	43.0
SP3	43.0
SP4	45.0
SP4 Special	45.0
SP5	45.0

j. The coarse aggregate shall not contain flat and elongated particles exceeding the maximum value for the appropriate asphaltic concrete type category shown in these provisions according to Table 1028.04.

Table 1028.04
Flat and Elongated Particles*
(ASTM D 4791)

Asphaltic Concrete Type	Percent, Maximum
SPS	25
SP1	10
SP2	10
SP3	10
SP4	10
SP4 Special	10
SP5	10

*Criterion based on a 5:1 maximum to minimum ratio.

k. The sand equivalent of the blended aggregate material from the fine and coarse aggregates shall meet or exceed the minimum values for the appropriate asphaltic concrete type shown in these provisions according to Table 1028.05.

Table 1028.05
Clay Content Criteria
(AASHTO T 176)

Asphaltic Concrete Type	Sand Equivalent, Minimum
SPS	30
SP1	40
SP2	40
SP3	45
SP4	45
SP4 Special	45
SP5	45

l. The blended aggregate shall conform to the gradation requirements specified below for the appropriate nominal size.

(1) It is recommended that the selected blended aggregate gradation does not pass through the restricted zones as specified in the following control points for nominal size. The plot of the blended aggregate gradation of Superpave mix designs with FAA values of less than 43.0 will not enter the limits of the restricted zone. The plot of the blended aggregate gradation of Superpave mix designs with FAA values of 43.0 to less than 45.0 passing through the restricted zone must intersect both the upper and lower limits of the restricted zone between 1) any two consecutive sieves used to define the restricted zone limits, or 2) two vertical lines plotted between the #8 and #50 sieve a distance apart no greater than 1/3 the horizontal distance between the #8 (2.36-mm) and #50 (300-μm) sieves. Superpave mix designs with FAA values of 45.0 or greater will not be restricted from passing through the restricted zone.

Table 1028.06
Gradation Control Points for 0.375 Inch (9.5 mm) Nominal Size

	Control Points (percent passing)		**Restricted Zone Boundary (percent passing)**	
English Sieve (Metric)	**Minimum**	**Maximum**	**Minimum**	**Maximum**
1/2 inch (12.5 mm)	100.0			
3/8 inch (9.5 mm)	90.0	100.0		
No. 4 (4.75 mm)		90.0		
No. 8 (2.36 mm)	32.0	67.0	47.2	47.2
No. 16 (1.18 mm)			31.6	37.6
No. 30 (600 μm)			23.5	27.5
No. 50 (300 μm)			18.7	18.7
*No. 200 (75 μm)	2.0	10.0		

* see note following Table 1028.08

Table 1028.07
Gradation Control Points for 0.5 Inch (12.5 mm) Nominal Size

	Control Points (percent passing)		**Restricted Zone Boundary (percent passing)**	
English Sieve (Metric)	**Minimum**	**Maximum**	**Minimum**	**Maximum**
3/4 inch (19 mm)	100.0			
1/2 inch (12.5 mm)	90.00	100.00		
3/8 inch (9.5 mm)		90.00		
No. 8 (2.36 mm)	28.0	58.0	39.1	39.1
No. 16 (1.18 mm)			25.6	31.6
No. 30 (600 μm)			19.1	23.1
No. 50 (300 μm)			15.5	15.5
* No. 200 (75 μm)	2.0	10.0		

* see note following Table 1028.08

Table 1028.08
Gradation Control Points for 0.75 Inch (19 mm) Nominal Size

	Control Points (percent passing)		Restricted Zone Boundary (percent passing)	
English Sieve (Metric)	**Minimum**	**Maximum**	**Minimum**	**Maximum**
1 inch (25 mm)	100.0			
3/4 inch (19 mm)	90.0	100.0		
1/2 inch (12.5 mm)		90.0		
No. 8 (2.36 mm)	23.0	49.0	34.6	34.6
No. 16 (1.18 mm)			22.3	28.3`
No. 30 (600 μm)			16.7	20.7
No. 50 (300 μm)			13.7	13.7
* No. 200 (75 μm)	2.0	8.0		

* Dust to binder ratio is the ratio of the percentage by weight of aggregate finer than the No. 200 (75 μm) sieve to the asphalt content expressed as a percent by weight of total mix. The dust to binder ratio shall be between 0.60 and 1.60.

m. The combined mineral aggregate for Asphaltic Concrete, Type SPS, shall be an aggregate or a combination of aggregates, and mineral filler if needed.

Table 1028.09
Gradation Control Points for Type SPS

	Control Points (percent passing)	
English Sieve (Metric)	**Minimum**	**Maximum**
1 inch (25 mm)		
¾ inch (19 mm)	100	
½ inch (12.5 mm)	90	100
No. 8 (2.36 mm)	42	81
No. 16 (1.18 mm)	29	43
No. 30 (600 μm)	19	34
No. 50 (300 μm)	11	20
* No. 200 (75 μm)	2	8

* see note following Table 1028.08

n. Mineral filler shall consist of pulverized soil, pulverized crushed rock, broken stone, gravel, sand-gravel, sand or a mixture of these materials that conforms to the following requirements.

Table 1028.10
Mineral Filler for Type SPS

	Min.	Max.
Total Percent Passing the No. 50 (300 μm) Sieve	95	100
Total Percent Passing the No. 200 (75 μm) Sieve	80	100
Plasticity Index (material passing the No. 200 (75 μm) Sieve, except soil	0	3
Plasticity Index for Soil	0	6

3. Contractor's Lab Equipment:

   a. The Contractor shall calibrate and correlate the testing equipment according to the procedures prescribed for the individual tests and conduct tests in conformance with specified testing procedures.

   b. The Contractor shall have the following equipment (or approved equal) at or near the project location:

      (1) An AASHTO approved gyratory compactor and molds.

      (2) An AASHTO approved Asphalt Content Ignition Oven.

      (3) Rice equipment specified in AASHTO T 209, procedure 9.5.1, Weighing in Water. The thermometer being used to measure water temperature will be as specified in T 209.

      (4) FAA equipment

      (5) To test density of compacted asphaltic concrete, a minimum 6000 gm balance, 0.1 gm resolution, with under body connect and water container large enough to conveniently place specimen in the basket and completely submerge the basket and specimen without touching the sides or bottom is required.

      (6) QC Laboratory (suggested size 8 ft. x 45 ft.) (2.4 m x 13.7 m) which contain the following:

          Air conditioner.
          Dedicated phone (where available).
          FAX machine.
          Xerox type copy machine.
          Sample storage.
          Work table.
          Bulletin board.
          Running water.
          Desk and chair.
          Separate power supply.
          Incidental spoons, trowels, pans, pails.

      (7) Diamond saw for cutting cores.

      (8) Diamond core drill (6 inch (150 mm) and 4 inch (100 mm) diameter core.

      (9) Oven, 347°F (175°C) minimum, sensitive $\pm$5°F. ($\pm$2°C).

      (10) USA Standard Series Sieves for coarse and fine aggregate with appropriate shakers (12 inch (300 mm) recommended).

      (11) Personal Computer capable of running NDR software and Color Printer.

1028.03 -- Acceptance Requirements

1. Volumetric Mix Design

   a. The job mix formula shall be determined from a mix design for each mixture. A volumetric mixture design in accordance with AASHTO PP 28 as modified within this special provision will be required. However, the mixture for the Superpave specimens and maximum specific gravity mixture shall be short-term aged for two hours.

      (1) Practice for Short and Long-Term Aging of Hot Mix Asphalt (HMA), AASHTO R30

      (2) Method for Preparing and Determining the Density of Hot Mix Asphalt Specimens by Means of the SHRP Gyratory Compactor, AASHTO T312

   b. The optimum binder content shall be the binder content that produces 4.0 percent air voids at Ndes. The design shall have at least four binder content points, with a minimum of two points above and one point below the optimum. Submitted with the design will be plots showing the values of Air Voids, VMA, VFA and Density at the four binder contents. The amount of uncompacted mixture shall be determined in accordance with AASHTO T209. For Type SPS Asphaltic concrete the optimum binder content shall be that which produces air voids at Ndes of 1.5 percent to a maximum of 5.0 percent.

   c. The Contractor shall inform the Engineer when changes in mixture properties occur for any reason, such as, but not limited to, the result of changes in the types or sources of aggregates are made or when changes in grades, sources, properties or modification procedures (if modified) of PG Binders are made. These changes may require a new job mix formula, mix design and moisture sensitivity test. The new proposed job mix formula shall be in accordance with the requirements as stated above and submitted 5 working days prior to use for verification.

   d. Each Superpave mixture shall be tested for moisture sensitivity in accordance with AASHTO T 283. The loose mixture shall be short-term aged for two hours in accordance with AASHTO R30. The 6-inch (152-mm) specimens shall be compacted in accordance with AASHTO T 312 to seven percent air voids at 95-mm in height and evaluated to determine if the minimum Tensile Strength Ratio (TSR) of 80 percent has been met. If the mixture has not met the minimum TSR value, an anti-stripping additive shall be added at a dosage rate, such that the mix will meet the minimum TSR of 80 percent. All data shall be submitted with the mix design verification request. For mixtures containing an anti-stripping additive; during production of Lot #1, the Contractor shall provide to the NDR Central laboratory properly prepared gyratory samples for AASHTO T 283 testing. A TSR test result of less than 80 percent will require mixture modification(s) and a sample from subsequent lots will be tested until a TSR value of at least 80 percent is achieved. Moisture sensitivity testing is not required for Asphaltic Concrete Type SPS.

(1) When tests indicate the need for an anti-stripping additive the Contractor shall be compensated for the cost of liquid anti-strip additive needed, as determined during mixture design verification, at the invoice price of the additive. Liquid anti-strip additives will be added to the PG Binder by the PG Binder Supplier.

e. Design Criteria:

(1) The target value for the air voids of the asphaltic concrete design shall be 4 percent at the Ndes number of gyrations. For Type SPS Asphaltic concrete the air voids at Ndes shall be a minimum of 1.5 percent with a maximum of 5.0 percent.

Table 1028.11
Gyratory Compaction Effort
(Average Design High Air Temperature ≤39 degrees C)

Asphaltic Concrete Type	Nini	Ndes	Nmax
SPS	6	40	62
SP1	7	68	104
SP2	7	76	117
SP3	7	86	134
SP4	8	96	152
SP4 Special	7	76	117
SP5	8	109	174

(2) The design criteria for each mixture shall be determined from Tables 1028.12, 1028.13, and 1028.14.

Table 1028.12

Mix Criteria	SPS, SP1	SP2	SP3, SP4, SP4 Special, SP5
Voids In Mineral Aggregate	See Table 1028.13		
Voids Filled with Asphalt	See Table 1028.14		
%Gmm at Nini	91.5*	90.5	89.0
%Gmm at Nmax	98.0*	98.0	98.0

* No specification requirement for SPS, only %Gmm at Ndes = 95 to 98.5

Table 1028.13
Voids in Mineral Aggregate
Criteria at Ndes

Nominal Maximum Aggregate Size (Metric)	Minimum VMA, Percent*
3/8 inch (9.5 mm)	15.0
1/2 inch (12.5 mm)	14.0
3/4 inch (19 mm)	13.0

* No specification requirement for SPS

Table 1028.14
Voids Filled with Asphalt
Criteria at Ndes
(for mix design only)

Asphaltic Concrete Type	Design VFA, Percent
SPS	N/A
SP1	70 – 80
SP2	65 – 78
SP3	65 – 78
SP4	65 – 75
SP4 Special	65 - 75
SP5	65 – 75

2. The Contractor shall make Mix adjustments when:

   a. Air voids, VMA, FAA, CAA or Binder content do not meet the currently approved criteria.

   b. Surface voids create a surface and/or texture that does not meet the criteria of Sections 502 and 503 in the 1997 English and Metric Edition of the Standard Specifications.

   c. Pavement does not meet any other design criteria.

   d. Rutting occurs.

3. Mix adjustments at the plant are authorized within the limits shown in Table 1028.15 as follows:

   a. The adjustment must produce a mix with the percent air voids and all other properties as stated in these specifications.

   b. All adjustments must be reported to the Engineer.

   c. The adjustment values in Table 1028.15 will be the tolerances allowed for adjustments from the NDR verified mix design “Combined Gradation” target values which resulted from production or mix design adjustments, but cannot deviate from Superpave gradation criteria, or violate restricted zone criteria specified in paragraph 2. l. (1) of Subsection 1028.02. Mix adjustments for individual aggregates, including RAP, greater than 25% of the original verified mix design proportion or greater than 5% change in the original verified mix design percentage, whichever is greater, may require the Contractor to submit a new mix design, as determined by the Engineer. The contractor is responsible for requesting new mix design targets as they approach these tolerances, failure to do so may result in a suspension of operations until a new mix design is approved.

Table 1028.15

Aggregate Adjustments	
Sieve Size	**Adjustments**
1 inch (25 mm), 3/4 inch (19 mm), 1/2 inch (12.5 mm), 3/8 inch (9.5 mm)	± 6%
No. 8 (2.36 mm), No. 16 (1.18 mm), No. 30 (600 μm), No.50 (300 μm)	± 4%
No. 200 (75 μm)	± 2%

4. Sampling and Testing:

   a. The Contractor shall take samples at frequencies identified by the Engineer, according to the NDR statistically based procedure. The samples shall be approximately 75 pounds (34 kg) and split according to NDR T-248 either at: 1) the sampling location, with the NDR taking custody of their sample at that time or 2) after being transported to the test facility in an insulated container, as determined by the Engineer. The details of sampling, location, splitting etc. shall be determined at the pre-construction conference.

   b. All samples transported to the test facility and companion samples within the Lot shall be identified by attaching the lab calculation sheet from the superpave 2002 software, stored, and retained by the Contractor until the NDR has completed the verification testing process.

   c. (1) The sample shall be taken from the roadway, behind the paver before compaction or from the windrow.

   (2) At least one QC sample shall be tested for every 750 tons (680 Mg) of plant produced mix.

   (i) If, at the completion of the project, the final lot consists of less than 3,750 tons (3,400 Mg)of asphaltic concrete, 1 sample for each 750 tons (680 Mg) or fraction thereof, shall be taken and tested.

   (3) Additional sampling and testing for the Contractor's information may be performed at the Contractor's discretion. Any additional testing will not be used in pay factor determination.

   (4) At least 1 sample shall be taken between the first 110 tons (100 Mg) and 300 tons (270 Mg) at the following times: 1) at the project start-up, 2) when a test result, identified in Paragraph 4,h,(3) of Subsection 1028.03, is out of specification, and 3) when a substantial aggregate proportion or other major mix change has been made. This sample, when other than at start-up, will be in lieu of the next scheduled random sample location.

(5) The Contractor will be notified what sublot sample must be tested for FAA and CAA according to the NDR random sampling schedule. The FAA and CAA may be sampled from the blended cold feed material but in addition the Contractor will be required to test FAA and CAA from a roadway sample using an ignition oven sample for correlation. If the coarse portion of the blend is all ledge rock the CAA tests can be waived. If the samples tested with the ignition oven meet the CAA and FAA minimum requirement, then the cold feed sample does not have to be tested. When both ignition oven and cold feed samples are being tested the acquisition of the samples shall be timed such that each sample represents, as close as possible, the same aggregate being fed into the plant.

(6) For projects using RAP material the FAA shall be established as follows:

A RAP sample will be processed through an ignition oven and then combined with the proportioned amount of virgin aggregate defined by the mix design and then proceeding with FAA and CAA testing.

d. The sample shall be compacted immediately while still hot (additional heating may be required to raise the temperature of the sample to compaction temperature).

e. Each production sample shall be tested as follows:

(1) (i) Bulk Specific Gravity (Gmb) shall be determined for each specimen in accordance with AASHTO T 166- Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface Dry Specimens. One specimen shall be compacted for each production sample.

(2) One Theoretical Maximum Specific Gravity (Gmm) test for each production sample of uncompacted mixture shall be determined in accordance with AASTHO T 209 procedure 9.5.1. Weight in water - Maximum Specific Gravity of Bituminous Paving Mixtures.

(3) (i) The Blended Aggregate Bulk Specific Gravity (Gsb) shall be determined from a combined aggregate blend, including any RAP following ignition burn-off, on the + #4 and - #4 material. This test and recalculation will be required if the mix design changes according to the tolerances in Paragraph 3.c. of subsection 1028.03 and/or table 1028.15.

(ii) AASHTO T 84 - Specific Gravity and Absorption of Fine Aggregate.

(iii) AASHTO T 85 - Specific Gravity and Absorption of Coarse Aggregate.

(4) The laboratory air voids shall be determined in accordance with the following:

Table 1028.16

Gmb(corr)@Nany = Gmb(meas)@Nmax x (height@Nmax ÷ height@Nany)
%Gmm(corr)@Nany = 100 x (Gmb(corr)@Nany ÷ Gmm(meas))
% Air Voids@Nany = 100 - %Gmm(corr)@Nany
VMA@Ndes = 100 – (Gmb(corr)@Ndes x Ps ÷ Gsb)
VFA@Ndes = 100 x ((VMA@Ndes - % Air Voids@Ndes) ÷ VMA@Ndes)
Measured = (meas)
Corrected = (corr)

5. (i) The percent of PG Binder shall be determined foreach QC test. The percent of PG Binder will be computed by ignition oven results.

(ii) The gradations shall be determined for each QC test using AASHTO T 30.

(6) Except as noted in this Subsection, all sampling and testing shall be done as prescribed in the *NDR Materials Sampling Guide and Standard Method of Tests.*

f. Testing Documentation:

(1) All test results and calculations shall be recorded and documented on data sheets using the 2002 version of NDOR provided "Superpave" software. A copy containing complete project documentation will be provided to the Materials and Research Division at the completion of the project.

g. QC Charts:

(1) QC charts shall be posted at the asphalt production site and kept current with both individual test results and moving average values for review by the Engineer.

(2) Control charts shall include a target value and specification limits.

(3) As a minimum, the following values shall be plotted or reported on NDR provided software:

(i) Laboratory Gyratory density

(ii) Ignition oven or cold feed aggregate gradations for all Superpave sieves will be reported.

(iii) PG Binder content shall be plotted to the nearest 0.1 percent by ignition oven results in accordance with AASHTO T 308.

(iv) The theoretical maximum specific gravity (Rice) to the nearest 0.001 percent will be reported.

(v) Laboratory Gyratory air voids at Ndes shall be plotted to nearest 0.1 percent. Laboratory Gyratory air voids, at Nini, Ndes and Nmax shall be reported to nearest 0.1 percent.

(vi) FAA and CAA of the asphaltic concrete for both cold feed and ignition oven samples will be reported to the nearest 0.1 percent.

(vii) VMA content shall be plotted to nearest 0.1 percent and VFA shall be reported to the nearest 0.1 percent.

(viii) Dust to Binder ratio to the nearest 0.01 will be reported.

h. Independent Assurance (IA) Review of Testing:

(1) The Contractor will allow NDR personnel access to their laboratory to conduct IA review of technician testing procedures and apparatus. Any deficiencies discovered in testing procedures will be noted and corrected.

(2) During IA review, NDR personnel and the Contractor will split a sample for the purpose of IA testing. The sample(s) selected will be tested in the NDR Branch Laboratory. Any IA test results found to be outside of defined testing tolerances will be noted. The Contractor must then verify the testing apparatus and make corrections if the apparatus is out of tolerance.

(3) Testing Tolerances

(i) Asphaltic Concrete and Asphaltic Concrete Aggregates.

Table 1028.17

Test	**Tolerance**
Asphalt Content by Ignition Oven	0.5%
Gyratory Density	0.020
Maximum Specific Gravity	0.015
Bulk Dry Specific Gravity (Gsb)	0.020
FAA	0.5%
CAA	10.0%
Field Core Density	0.020

(4) Aggregate Gradation (Blended Aggregate)

Table 1028.18

Size Fraction Between Consecutive Sieves, %	Tolerance
0.0 to 3.0	2%
3.1 to 10.0	3%
10.1 to 20.0	5%
20.1 to 30.0	6%
30.1 to 40.0	7%
40.1 to 50.0	9%

5. a. In response to tests results, the Contractor shall notify the Engineer whenever the process approaches the Specification limits.

b. When any single test result(s), on the same mix property, from two consecutive QC samples fall outside the allowable production tolerances in Table 1028.19, the material represented by these tests will be accepted with a 20% penalty or rejected, as determined by the Engineer.

Table 1028.19
Production Tolerances*

Test	Allowable Single Test Deviation from Specification
Voids in the Mineral Aggregate	- 0.75% to + 1.25% from Min.
Dust to Asphalt Ratio	None
Coarse Aggregate Angularity	- 5% below Min.
Fine Aggregate Angularity	- 0.50% below Min.

***** These tolerances are applied to the mix design specification values, not the submitted mix design targets.

c. The Contractor shall assume the responsibility to cease operations when specifications other than those stated in Table 1028.19 are not being met and production shall not be started again without approval of the Engineer.

6. Verification Sampling and Testing:

a. The NDR will select and test at random one of the sublot samples (750 tons, 680 Mg) within a Lot (3750 tons, 3400 Mg) for verification and report results in a timely manner.

b. The results of Contractor QC testing will be verified by NDR verification tests. On any given Lot, if the results of Air Void verification testing and its companion QC testing are within 1.4 percent air voids, the Air Void verification for the entire Lot is complete and the Contractor test results will be used to determine the pay factors. If the Air Void verification test results

and the companion QC test results are outside the above tolerance, the results from the verification test will be used to determine the pay factor for that sublot. Any or all of the remaining four NDR sublot samples may be tested and the NDR sublot test results may be applied to the respective sublots and the resulting pay factors will apply.

c. When verification test results show a consistent pattern of deviation from the QC results, the Engineer may cease production and request additional verification testing or initiate a complete IA review.

d. If the project personnel and the Contractor cannot reach agreement on the accuracy of the test results, the Materials and Research Laboratory will be asked to resolve the dispute, which will be final.

7. Acceptance and Pay Factors

a. Acceptance and pay factors for Asphaltic Concrete Type SPS will be based on compacted in place average density.

b. Acceptance and pay factors for Asphaltic Concrete Type SP1, SP2, SP3, SP4, SP4 Special and SP5 will be based on single test air voids, running average air voids, compacted in place average density, and production tolerances pay factor as stated in Paragraph 5.b. subsection 1028.03

(1) When there is a production tolerance pay factor penalty as stated in Paragraph 5.b. subsection 1028.03 this penalty percentage will be subtracted from the percent pay for single test air voids for each sublot affected. These three individual pay factors will then be multiplied by each other to determine a total pay factor for each sublot [(750 tons) (680 Mg)].

8. Asphaltic Concrete Air Voids

a. Normally, 1 sample for testing will be taken from each sublot [(750 tons) (680 Mg)] at locations determined by the Engineer.

b. The pay factors for the single test air voids and moving average of four air voids pay factors will be determined in accordance with table 1028.20.

c. If the average air voids pay factor is (50% or reject) the NDR will have the first option of accepting or rejecting the asphaltic concrete represented in this sublot. If the NDR accepts this sublot the Contractor will have the second option of replacing this asphaltic concrete for no pay on the removal and for whatever pay factor that applies to the replacement.

d. In the case of removal, the foremost limits of the removal will be defined as the tonnage (mass) at which the production and placement was halted and a design change was made. The rear limits will be at the tonnage (mass) where linear interpolation with the previous test return to an accepted range and out of rejection limits or at the limit(s) of the defective material as determined by additional core samples taken and tested by the Contractor which show result(s) in an acceptable range and out of rejection limits to the satisfaction of the Engineer.

Table 1028.20

Acceptance Schedule Air Voids - N_{des}		
Air voids test results	**Moving average of four**	**Single test**
Less than 1.5%	Reject	Reject
1.5% to less than 2.0%	Reject	50%
2.0% to less than 2.5%	50% or Reject	95%
2.5% to less than 3.0%	90%	95%
3.0% to less than 3.5%	100%	100%
3.5% to 4.5%	102%	104%
Over 4.5% to 5.0%	100%	100%
Over 5.0% to 5.5%	95%	95%
Over 5.5% to 6.0%	90%	95%
Over 6.0% to 6.5%	50% or Reject	90%
Over 6.5% to 7.0%	Reject	50%
Over 7.0%	Reject	Reject

9. Asphalt Concrete Density Samples:

   a. Density tests will be performed by the Contractor under direct observation of NDR personnel. The Contractor will establish the method of testing in the preconstruction conference and shall be tested in accordance with the AASHTO T 166 or NDR T 587. The Contractor will insure that the proper adjustment bias and/or correction factors are used and accessible to NDR personnel along with all other inputs when NDR T 587 is selected. All correlation factors and test results shall be generated and reported on the NDOR Density spreadsheet. All disputed values determined using NDR T 587 shall be resolved using AASHTO T 166.

b. Density of samples shall be determined by comparing the specific gravity of the core sample to the Maximum Specific Gravity (Rice) as follows:

$$\% \text{ Density} = \frac{\text{Specific Gravity of Core}}{\text{Maximum Mix Specific Gravity (Rice)}} \times 100$$

where:

$$\text{Sp. Gr. of Core} = \frac{\text{Wt. of Core in Air}}{\text{Wt. of SSD Core} - \text{Wt. of Core in Water}}$$

$$\text{Maximum Mix Specific Gravity (Rice)} = \frac{\text{Wt. of Mix in Air}}{\text{Wt. of Mix in Air} - \text{Wt. of Mix in Water}}$$

Note: The individual QC test value of the Maximum Mix Specific Gravity (Rice) will be used to calculate the density of each corresponding core.

c. Either 4 inch (100 mm) or 6 inch (150 mm) diameter core samples shall be cut by the Contractor the first day of work following placement of the mixture.

d. Normally, 1 sample for determination of density will be taken from each sublot (750 tons) (680 Mg) at locations determined by the Engineer.

e. The theoretical maximum density for each lot (3,750 tons) (3,400 Mg) shall be calculated using AASHTO T 209.

f. The average density of the lot shall be used to compute the pay factor for density. Exceptions to the sampling and testing of core samples for the determination of density are as follows:

(1) When the nominal layer thickness is 1 inch (25 mm) or less, the sampling and testing of density for this layer will be waived.

(2) When the average thickness of the 5 cores for a lot is 1 inch (25 mm) or less, the testing of density samples for this lot will be waived.

(3) When the nominal layer thickness and the average of the original 5 cores for a lot are both more than 1 inch (25 mm), but some of the cores are less than 1 inch (25 mm) thick, additional cores shall be cut at randomly selected locations to provide 5 samples of more than 1 inch (25 mm) thickness for the determination of the pay factor for density.

g. For the first lot (3,750 tons) (3,400 Mg) of asphaltic concrete produced on a project and for asphaltic concrete used for temporary surfacing, the pay factor for density shall be computed in accordance with Table 1028.21. After the completion of the first lot, the pay factor for density shall be computed in accordance with Table 1028.22.

h. (1) If, at the completion of the project, the final lot consists of less than 3,750 tons (3400 Mg) of asphaltic concrete, a minimum of 3 samples, or 1 sample for each 750 tons (680 Mg) or fraction thereof, whichever is greater, shall be taken and tested for density.

(2) The test results shall be averaged and the density pay factor based on the values shown in Table 1028.22.

(3) Should the average of less than 5 density tests indicate a pay factor less than 1.00, additional density samples to complete the set of five shall be taken at randomly selected locations and the density pay factor based on the average of the 5 tests.

Table 1028.21

Acceptance Schedule Density of Compacted Asphaltic Concrete (First Lot)	
Average Density (5 Samples, Percent of Voidless Density)	**Pay Factor**
Greater than 90.0	1.00
Greater than 89.5 to 90.0	0.95
Greater than 89.0 to 89.5	0.70
89.0 or Less	0.40 or Reject

Table 1028.22

Acceptance Schedule Density of Compacted Asphaltic Concrete (Subsequent Lots)	
Average Density (5 Samples, Percent of Voidless Density)	**Pay Factor**
Greater than 92.4	1.00
Greater than 91.9 to 92.4	0.95
Greater than 91.4 to 91.9	0.90
Greater than 90.9 to 91.4	0.85
Greater than 90.4 to 90.9	0.80
Greater than 89.9 to 90.4	0.70
89.9 or Less	0.40 or Reject

i. If requested by the Contractor, check tests for all density tests in the original set, taken no later than the working day following placement will be allowed in lots with a density pay factor of less than 1.00. No re-rolling will be allowed in these lots. Locations for checks tests will be determined by a new random sampling schedule provided by the Engineer. The average density obtained by the check tests shall be used to establish the density pay factor for the lot.

10. PG Binder Sampling

a. At least one sample (2-1 quart cans) (2-1 liter cans) of PG Binder will be sampled by the Contractor's QC Technician for every Lot (3750 tons) (3400 Mg) of asphalt concrete mixture produced.

b. Samples will be taken in accordance with NDR Standard Method T40.

c. The QC Technician will include on the Sample Identification form all information required by the contract.

PROPOSAL GUARANTY
(S1-38-0801)

As an evidence of good faith in submitting a proposal for this work or for any portion thereof as provided in the proposal form, the bidder must file with his proposal a bid bond, which must be executed on the Department of Roads' Bid Bond form, in the amount of 5 percent of the amount bid for any group of items or collection of groups for which the bid is submitted. Any alterations, conditions or limitations added to the Department of Roads' Bid Bond form will be unacceptable and cause the bid <u>not</u> to be opened and read.

* * * * *

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