

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

NEBRASKA DEPARTMENT OF ROADS
LETTING DATE: September 05, 2013

CALL ORDER: 110 CONTRACT ID: 1801Y

CONTROL NO./SEQ. NO.: 11801 /000 PROJECT NO.: S-77-2(1025)

TENTATIVE START DATE: 11/04/13 CONTRACT TIME: 200 WORKING DAYS

LOCATION: US-77, WAHOO BYPASS
IN COUNTY: SAUNDERS

BIDDER

GROUP 1 GRADING
GROUP 3 CONCRETE PAVEMENT
GROUP 4 CULVERTS
GROUP 4A CULVERT AT STA. 428+69.26
GROUP 5 SEEDING
GROUP 6 BRIDGE AT STA. 435+18.69
GROUP 7 GUARDRAIL
GROUP 8B ELECTRICAL
GROUP 10 GENERAL ITEMS

SEE SPECIAL PROVISIONS FOR GROUP TIES

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 _____.

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 submitted to NDOR in a written format through the Bid Express (BidX) website at <https://www.bidx.com/ne/lettings>. Likewise, NDOR will post answers exclusively to the BidX website. All official answers will be identified as “Authorized by NDOR.” **Questions will not be answered verbally.**

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.

April 4, 1995

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.

April 4, 1995

**SPECIAL PROVISIONS
FOR
STATE
PROJECT NO. S-77-2(1025)**

GENERAL CONDITIONS

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 September 5, 2013, until 1:30 P.M.

- a. 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.
- b. Bids submitted electronically over the internet, shall be submitted using www.bidx.com.

The 2007 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 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.

GROUPS 1, 3, 4, 4A, 5, 6, 7, 8B AND 10 ARE TIED TOGETHER AND BIDDING PROPOSAL FORMS FOR THIS WORK WILL BE ISSUED AND A CONTRACT AWARDED TO A CONTRACTOR WHO IS QUALIFIED FOR CONCRETE PAVEMENT.

STATUS OF UTILITIES

The following information is current as of July 19, 2013.

Aerial and/or underground utility facilities may exist within this project. The Contractor should request a utility status update at the preconstruction conference, and/or prior to starting work.

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 Diggers Hotline of Nebraska at 1-800-331-5666, or dial 811.

The following utilities have facilities within the project area, and have been provided project plans:

Butler Public Power District: Butler Public Power District has an existing 7.2kv aerial distribution line adjacent along the eastern right-of-way line of 17th Avenue Road from approximately Station 2005+00 to 2028+84 that will be relocated underground in the same area as the existing aerial line. The undergrounding will result in the removal of existing above ground electrical facilities within this area for highway project construction. Another existing 7.2kv aerial distribution line located approximately between Stations 475+00 and 482+00 will be relocated to move existing poles outside of the proposed project limits of construction. This rehabilitation work is anticipated to be completed prior to the beginning of project construction. During construction, near Station 504+00, Butler PPD in coordination with the City of Wahoo will install a new combination meter socket/main circuit breaker disconnect for the underpass tunnel lighting on a nearby utility pole along with a riser up the pole. The remaining portion of the electrical service from the disconnect will be provided and installed by the electrical contractor. For construction coordination or additional information regarding the District's existing facilities, contact Mr. Gary Westphal at (402) 367-3081.

City of Wahoo: The City of Wahoo has an existing power line running along the southern side of County Road "L" in conflict with this project. The City will remove three poles from the Limits of Construction and relocate the line underground prior to or concurrent with highway construction for this project. For construction coordination or additional information regarding the City's existing facilities, contact Mr. Jim Gibney at (402) 443-3222.

Lower Platte North NRD: The NRD has an existing 16" water line running alongside the eastern side of and approximately parallel to County Road 17 and crossing the proposed highway near Station 490+50. This recently constructed line was built in coordination with the Wahoo Bypass Intersection project associated with this project. Conflict with construction is not anticipated. For construction coordination or additional information regarding NRD's existing facilities, contact Mr. John Miyoshi at (402) 443-4675.

Nebraska Public Power District: NPPD has an existing 115kv transmission line near Station 437+45 in conflict with this project. Project construction will reduce the vertical clearance to levels in conflict with NESC Standards. The line will be rehabilitated by NPPD to provide acceptable clearance by NPPD and will be accomplished prior to the beginning of project construction. For construction coordination or additional information regarding NPPD's existing facilities, contact Mr. Dave Young at (402) 563-5893.

Omaha Public Power District: OPPD has a single phase overhead line at Highway 109 & Highway 77. No conflicts with this project are anticipated. For construction coordination or additional information regarding OPPD's existing facilities, contact Mr. Joe Ostblom at (402) 636-3513.

Windstream: Windstream has buried existing facilities located on the northern side of County Road "L"; the western side of Hackberry Lane (17th Avenue Road); and on County Road "M" that are in conflict with this highway construction project. Prior to the beginning of project construction, Windstream will relocate its facilities that are in conflict to accommodate the highway project. For construction coordination or additional information regarding Windstream's existing facilities, contact Mr. Todd Williams at (402) 432-7738, or Steve Stratton at (402) 981-3063.

All utility rehabilitation will be accomplished prior to or concurrent with construction.

STATUS OF RIGHT OF WAY

The right of way for this project has been acquired and physical possession is held by the State of Nebraska and ready for the Contractor's use, except tracts listed below:

Unacquired Right-of-Way Tracts as follows:

Tract Number	Status of Tract	Hearing Date
None	None	None

Right-of-Way Tracts with Pay Items:

Tract Number	Pay Items
None	None

- No encroachments on the old right of way.
- The right of way has been acquired in accordance with the current Federal Highway Administration directives covering the acquisition of real property.
- All right of way clearance has been completed.
- All necessary rights of way, including control of access rights when pertinent, have been acquired including legal and physical possession.
- No individual or families were required to be relocated.
- Steps relative to relocation advisory assistance and payments for business and moving personal property as required by the current Federal Highway Administration directives covering the administration of the Highway Relocation Assistance Program are not required.
- **This certificate covers Tract 14 supp. which was needed after the original certificate was processed.**

PROSECUTION AND PROGRESS (Winter Work)

Paragraph 3 of Subsection 108.02 in the Standard Specifications is amended to provide that the working day count on this project will be suspended from 12-1-2013 through 3-30-2014, and from 11-29-2014 through 3-29-2015. The Contractor will be permitted to work on this project during this time period without charging of working days against the contract time allowance. In the event that the project is not completed during this period, the working day count will resume on 3-31-2014 and on 3-30-2015, in accordance with the Standard Specifications, unless otherwise directed by the Engineer.

**SPECIAL PROSECUTION AND PROGRESS
(Phasing Requirements & Internal Liquidated Damage Assessment)**

1. The Contractor shall be required to construct the box culvert at Sta. 504+50 between November 4, 2013, and May 17, 2014, and have the roadway regraded to its original cross section, resurfaced with the existing rock surfacing and open to normal county road traffic, as directed by the Engineer. The work of removing, stockpiling and replacing the existing rock surfacing shall be subsidiary to other items of work for which direct payment is made. The City of Wahoo and the Lower Platte North NRD shall be responsible for providing access to the box at Sta. 504+50.
2. Closure of the County Road M from N-109 to County Road 17 will be allowed to perform grading, subgrade stabilization, placement of base material and paving operations. Once the Contractor begins these operations, they will have a maximum of 6 weeks (42 calendar days) to complete the work and have the roadway, including the County Road 17 intersection, open to traffic. The Contractor shall schedule this work to have this portion of County Road M open to two lane traffic on Holidays. See **SPECIAL PROSECUTION AND PROGRESS (Holidays)**.

Median surfacing and surfaced shoulder operations may be performed under traffic maintained conditions and lane closures, unless completed during the full closure time period.

The Contractor's failure to have the portion of County Road M, from N-109 to County Road 17, open to traffic as described in the previous paragraph shall result in the assessment of a \$950/calendar day internal liquidated damage. This assessment shall begin on the 43 calendar day following the closure of this portion of County Road M and it shall continue per calendar day until, and including, the day it is opened to traffic. This internal liquidated damage assessment shall in addition to other liquidated damages contain elsewhere in this contract. The following formula was used to determine this assessment:

$$\begin{aligned}
 \text{Cost} &= [(1-\%T)(\text{ADT})(\$ \text{ Pass}) + (\%T)(\text{ADT})(\$ \text{ Trucks})] \times D \\
 &= [(1-0.03)(400)(\$0.23) + (0.03)(400)(\$0.44)] \times 10 \\
 &= [\$89.24 + \$5.28] \times 10 \\
 &= \$945.20 \rightarrow \text{Rounded to } \$950 \text{ per calendar day}
 \end{aligned}$$

Where: %T = percent trucks

ADT = average daily

\$ Pass = passenger car factor = \$0.23

\$ Trucks = truck factor = \$0.44

D = delay (in minutes)

3. The Contractor shall be required to maintain school bus and emergency vehicle access at all times on either County Road 17, 17th Avenue or County Road L. County Road L and 17th Avenue shall not be closed at the same time
4. The Contractor is required to remove the existing rock surfacing on County Road M from N-109 to County Road 17 in its entirety before subgrade stabilization operations. Disposal of this material will be up to the Contractor. During excavation operations, it is anticipated that the existing rock surfacing will be removed in its entirety as indicated in the plan cross sections. In the event that some rock surfacing remains, the Contractor will be paid equipment rental to remove the remaining rock.

SPECIAL PROSECUTION AND PROGRESS (Holidays)

The Contractor will be required to schedule his operations in a manner to have two traffic lanes on County Road M from N-109 to County Road 17 open to traffic on the following holidays:

Memorial Day and Labor Day weekends – these holiday weekends shall begin at 3:00 p.m., Friday, and shall include the remainder of Friday and all day Saturday, Sunday and the Monday holiday.

- July 4th - If July 4th falls on a Monday or Friday, the Saturday and Sunday either preceding or following July 4th shall be included as part of the holiday.
- If July 4th falls on either Tuesday, Wednesday or Thursday, only that day will be considered as the holiday.
- If July 4th falls on a Saturday or Sunday, the day preceding and the day following July 4th shall be included as part of the holiday.
- The July 4th holiday shall begin at 3:00 p.m. on the day preceding the first day of the July 4th holiday, as defined above.

INFORMAL PARTNERING

The prime Contractor and Subcontractors will be required to participate in partnering meetings for this project.

The prime Contractor and applicable Subcontractors will be required to attend regularly scheduled meetings with the Project Manager to discuss the work schedule for the upcoming week and to resolve any problems encountered in the previous week, and to coordinate the work so as to present a minimum of disruptions to the public.

Informal Partnering will not be measured for payment and shall be considered subsidiary to other items of work for which direct payment is made, as per Section 113 of the NDOR Standard Specifications.

ENVIRONMENTAL COMMITMENT

Control No.: 11801

Project No.: S-77-2(1025)

Project Name: Wahoo Bypass

Below are the Conservation Conditions that will be required for this project. All conditions and regulations of any permit obtained for this project will be followed by the Contractor.

(Responsible Party for the measure is found in parentheses)

Regulated Wetlands and/or Water Resources for this project have been identified and delineated in the field by NDOR. The Contractor shall not drive through, stage, store, waste or stockpile materials and equipment within delineated wetland boundaries (Wetlands – Do Not

Disturb) and/or environmentally sensitive areas (Area of Environmental Concern – Do Not Disturb) as shown in the 2-W aerial plan sheets and/or the erosion control plan sheets included in the plan set. (Contractor, District Construction)

All listed 404 permit **Special Conditions** as included in the attached 404 permit document must be complied with including Section 401 Water Quality Certification conditions and/or all other conditions required for compliance state and federal regulations. (Contractor, District Construction)

All **Nationwide Permit General Conditions** and **Nebraska Regional Conditions** will be followed, as applicable. Based on the project scope (NDOR Control No. 11801), the items indicated with checkmarks in the attached document (*NDOR Contractor Requirements Sheet*) appear to be applicable and relevant to the Contractor and Project Manager. (Contractor, District Construction)

Concurrent with construction, silt curtains or other sediment control measures will be employed to reduce soil erosion and sedimentation into waters of the U.S. The amount of sediment entering waters of the U.S. and leaving the site shall be reduced to the maximum extent practicable. If the Contractor fails to institute all appropriate measures, the Corps reserves the option to halt all earthmoving operations until the erosion/sedimentation problems are corrected. (Contractor)

All riprap shall be covered, from the top of the structure down to the ordinary high water mark, with a minimum of six inches of soil compacted into the voids to the riprap. The riprap structures shall be vegetated with appropriate perennial, native grasses and forbs and maintained in this condition. *Phalaris arundinacea* (Reed Canary Grass), *Lythrum salicaria* (Purple Loosestrife), *Bromus inermis* (Smooth Brome), *Phragmites, sp.* (Common Reed, River Reed) and *Tamarix, sp.* (Salt Cedar), are NOT appropriate choices of vegetation. A cover crop may be planted to aid in the establishment of native vegetation. The disturbed areas shall be reseeded concurrent with the project or immediately upon completion. Revegetation shall be acceptable when ground cover of desirable species reaches 75%. (District Construction, Contractor)

All riprap placed within the drip line under the new or a modified bridge structure is not required to be covered and seeded. (District Construction, Contractor)

Upon placement of any temporary fills and at the completion of the project, clearly labeled color photos of permitted impacts to wetlands and waters of the U.S. (bridges, culverts, temporary crossings, riprap, covering and seeding, erosion control, etc.) must be submitted to the Nebraska Regulatory Office for inspection. (District Construction, Contractor)

All areas adjacent (contiguous, bordering, neighboring) to jurisdictional waters disturbed by construction shall be revegetated with appropriate perennial, native grasses and forbs and maintained in this condition. *Phalaris arundinacea* (Reed Canary Grass), *Lythrum salicaria* (Purple Loosestrife), *Bromus inermis* (Smooth Brome), *Phragmites, sp.* (Common Reed, River Reed) and *Tamarix, sp.* (Salt Cedar), are NOT appropriate choices of vegetation. A cover crop may be planted to aid in the establishment of native vegetation. The disturbed areas shall be reseeded concurrent with the project or immediately upon completion. Revegetation shall be acceptable when ground cover of desirable species reaches 75%. If this seeding cannot be accomplished by September 15 the year of project completion, then an erosion blanket shall be placed on the disturbed areas. The erosion blanket shall remain in place until ground cover of desirable species reaches 75%. If the seeding can be accomplished by September 15, all

seeded areas shall be properly mulched to prevent additional erosion. (District Construction, Contractor)

When vegetation has been established, all temporary erosion control materials shall be removed from the project site. Biodegradable or photodegradable materials need not be removed. (District Construction, Contractor)

- The intent of the above Special Condition is that all temporary erosion control measures installed such as silt fence and associated steel posts shall be removed upon completion of the project or upon vegetation establishment reaching the specified success criteria. Biodegradable and photodegradable erosion control measures detailed in the final erosion control plans are intended to remain in place upon completion of the project. Temporary biodegradable/photodegradable erosion control measures such as wood mulch berms and erosion checks may be left in place upon completion of the project.

Temporary Structures/Work/Fill

- The use of dredged material in the construction of temporary structures or used for temporary work or used as temporary fill shall not be allowed. The term “dredged material” means material that is excavated or dredged from waters of the U.S. All temporary fill material shall be obtained from an upland source.
- Plans for the temporary structure/work/fill shall be submitted to and approved by the Nebraska Regulatory Office prior to the commencement of construction.
- At the completion of the construction activity, all temporary fill material shall be removed in its entirety from the water of the U.S. to an upland area and the affected area shall be restored to its pre-construction condition.
- The Nebraska Regulatory Office shall be notified with documentation (i.e., photos) when the site has been restored to its pre-project condition.

NDOR and the Contractor are responsible for ensuring that the Corps is notified of the location of any borrow or waste site that will be used in conjunction with the construction of the authorized activity so the Corps may evaluate the site for potential impacts to aquatic resources, historic properties and endangered species. For a project where there is another lead Federal Agency (e.g., the Federal Highway Administration), the NDOR shall provide the Corps documentation indicating that lead Federal Agency has complied with the National Historic Preservation Act and the Endangered Species Act for the borrow site.

- Note: To comply with this permit condition, the Contractor must submit a Materials Source Site/Waste Site Request Form to the NDOR Construction Division at least 60 days prior to the date the Contractor expects to begin borrow or waste operations at the site.
- The NDOR Construction Division will route the Materials Source Site/Waste Site Request Form submitted by the Contractor to the U.S. Army Corps of Engineers (USACE), the Nebraska Game and Parks Commission (NGPC) including a courtesy copy to the U.S. Fish and Wildlife Service (USFWS), the Nebraska Department of Natural Resources (DNR), and the Nebraska State Historical Society (NSHS).
- If required, NDOR will complete the Platte River depletion calculation for borrow/waste sites that pond and/or exposed groundwater with the Platte River basin. The Contractor

shall be responsible for all offsets required by for compliance with the Platte River Recovery Implementation Plan (PRRIP).

- Upon receipt of the response from the resource agencies (FWS, NGPC, NSHS, DNR) and the USACE, NDOR will provide the Contractor notification of approval or denial of the requested site. The Contractor shall comply with all conditions established by the Resource Agencies.
- The Contractor is responsible for contacting the Nebraska Department of Environmental Quality (NDEQ) for authorizations under the National Pollutant Discharge Elimination System (NPDES) and/or any Local Government permits or authorizations required (e.g., local mining permits).

If field modifications are made to what is shown on the letting plans within the areas identified in the attached permit, the EPU Project Manager, Nick Burnham, must be notified prior to construction of the modification. Additional consultation and permitting may be required. Any construction activities are prohibited in all other areas shown as non-impacted wetlands or waters of the U.S.

The time limit for completing the work authorized ends on **March 18, 2017**. If more time is needed to complete the authorized activity, the Contractor shall submit a request for a time extension for consideration by the Omaha District, Corps of Engineers Regulatory Office before the above date is reached. (District Construction, NDOR Environmental)

In compliance with General Condition 26, the Compliance Certification form must be signed and returned to the Corps of Engineers, with a copy sent to the Environmental Permits Unit, upon completion of the authorized work and any required mitigation. (District Construction, NDOR Environmental)

Contact Person: Nick Burnham, Highway Environmental Biologist, (402) 479-3818

General Conservation Conditions

- A-1 Changes in Project Scope.** If there is a change in the project scope, the project limits, or environmental commitments, the NDOR Environmental Section must be contacted to evaluate potential impacts prior to implementation. Environmental commitments are not subject to change without prior written approval from the Federal Highway Administration. (District Construction, Contractor)
- A-2 Conservation Conditions.** Conservation conditions are to be fully implemented within the project boundaries as shown on the plans. (District Construction, Contractor)
- A-3 Early Construction Starts.** Request for early construction starts must be coordinated by the Project Construction Engineer with NDOR Environmental for approval of early start to ensure avoidance of listed species sensitive lifecycle timeframes. Work in these timeframes will require approval from the Federal Highway Administration and could require consultation with the USFWS and NGPC. (District Construction, Contractor)
- A-4 E&T Species.** If federal or state listed species are observed during construction, contact NDOR Environmental. Contact NDOR Environmental for a reference of federal and state listed species. (NDOR Environmental, District Construction, Contractor)

- A-5 Refueling.** Refueling will be conducted outside of those sensitive areas identified on the plans, in the contract, and/or marked in the field. (Contractor)
- A-6 Restricted Activities.** The following project activities shall, to the extent possible, be restricted to between the beginning and ending points (*stationing, reference posts, mile markers, and/or section-township-range references*) of the project, within the right-of-way designated on the project plans: borrow sites, burn sites, construction debris waste disposal areas, concrete and asphalt plants, haul roads, stockpiling areas, staging areas, and material storage sites. Any project related activities that occur outside of these areas must be environmentally cleared/permitted with the Nebraska Game and Parks Commission as well as any other appropriate agencies by the Contractor and those clearances/permits submitted to the District Construction Project Manager prior to the start of the above listed project activities. The Contractor shall submit information such as an aerial photo showing the proposed activity site, a soil survey map with the location of the site, a plan-sheet or drawing showing the location and dimensions of the activity site, a minimum of 4 different ground photos showing the existing conditions at the proposed activity site, depth to ground water and depth of pit, and the "Platte River depletion status" of the site. The District Construction Project Manager will notify NDOR Environmental which will coordinate with FHWA for acceptance if needed. The Contractor must receive Notice of Acceptance from NDOR, prior to starting the above listed project activities. These project activities cannot adversely affect state and/or federally listed species or designated critical habitat. (NDOR Environmental, District Construction, Contractor)
- A-7 Waste/Debris.** Construction waste/debris will be disposed of in areas or a manner which will not adversely affect state and/or federally listed species and/or designated critical habitat. (Contractor)

Contact Person: Melissa Marinovich, Highway Environmental Biologist, (402) 479-3546

WETLANDS 404 PERMIT



DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
NEBRASKA REGULATORY OFFICE - WEHRSPANN
8901 SOUTH 154 STREET
OMAHA, NEBRASKA 68138-3621

<http://www.nwo.usace.army.mil/missions/regulatoryprogram/nebraska.aspx>

May 31, 2013

RECEIVED

JUN 3 2013

ENVIRONMENTAL SECTION

DEPARTMENT OF THE ARMY NATIONWIDE PERMIT VERIFICATION

Permittee:

Thomas Goodbarn
District 1
Nebraska Department of Roads
302 Superior Street
Lincoln, Nebraska 68509

Permit No: 2008-01960-WEH

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions of Department of the Army Nationwide Permit No. 14 found in the February 21, 2012 Federal Register (77 FR 10184), Reissuance of Nationwide Permits. You must comply with all special, regional and general conditions attached herein.

Project Waterway and Location:

Tributaries to Big Sandy Creek and Cottonwood Creek
NW1/4 of SW1/4 in Section 33, Township 15 North, Range 7 East
41.226235°, -96.637055° WGS84
Saunders County, Nebraska

Project Description:

Project name: Wahoo Bypass, S-77-2(1025), CN 11801
Date of receipt: January 9, 2013 and supplemental information on April 19, 2013.

This project will construct approximately 3.3 miles of new four lane expressway, roadway embankment, a 200 foot triple span concrete girder bridge, and two culvert crossings on new alignment. Impacts to Waters of the U.S. (WOUS) will occur at the following locations:

Site 1, 435+50: Located at 41.226235°, -96.637055° WGS84. The project will construct a 200 foot triple span concrete girder bridge with roadway embankment. The new bridge and roadway grading will result in permanent impacts of 0.005 acre of PEMC riverine channel wetland and 0.042 acre of PEMA riverine floodplain wetland. The temporary culverted causeway structure will require the construction of a single 6-foot x 4.5-foot x 55-foot arch culvert to provide a channel crossing downstream of the new bridge within an un-named tributary to Cottonwood Creek. The causeway structure in WOUS will measure 6 feet wide x 55 feet long at the base and 6 feet wide x 30 feet long at the top. The temporary fill impact in WOUS, totaling 55 feet (0.004 acre) of riverine channel. There are no other diversions or temporary fills proposed.

Site 2, 473+54: Located at 41.233842°, -96.627884° WGS84. The project will construct a 42-inch x 154-foot culvert pipe within an un-named tributary to Sand Creek. The project will result in the discharge

of permanent fill material into WOUS, totaling 75 feet (0.003 acre) of riverine channel. There are no diversions or temporary fills proposed.

Site 3, Sta481+39: Located at 41.234608°, -96.625204° WGS84. The project will construct a 5-foot x 5-foot x 208-foot box culvert within an un-named tributary to Sand Creek. The project will result in the discharge of permanent fill material into WOUS, totaling 241 feet (0.006 acre) of riverine channel and 0.207 acre of PEMA floodplain depressional wetland. There are no diversions or temporary fills proposed. There are no proposed borrow areas identified for this project.

Special Conditions:

1. Concurrent with construction, silt curtains or other sediment control measures will be employed to reduce soil erosion and sedimentation into WOUS. The amount of sediment entering WOUS and leaving the site shall be reduced to the maximum extent practicable. If the permittee fails to institute all appropriate measures, the Corps reserves the option to halt all earthmoving operations until the erosion / sedimentation problems are corrected.
2. All riprap shall be covered, from the top of the structure down to the ordinary high water mark, with a minimum of six inches of soil compacted into the voids to the riprap. The riprap structures shall be vegetated with appropriate perennial, native grasses and forbs and maintained in this condition. *Phalaris arundinacea* (Reed Canary Grass), *Lythrum salicaria* (Purple Loosestrife), *Bromus inermis* (Smooth Brome), *Phragmites, sp.* (Common Reed, River Reed) and *Tamarix, sp.* (Salt Cedar), are *NOT* appropriate choices of vegetation. A cover crop may be planted to aid in the establishment of native vegetation. The disturbed areas shall be reseeded concurrent with the project or immediately upon completion. Revegetation shall be acceptable when ground cover of desirable species reaches 75%.
3. All riprap placed within the drip line under the new or a modified bridge structure is not required to be covered and seeded.
4. Upon placement of any temporary fills and at the completion of the project, clearly labeled color photos of permitted impacts to wetlands and waters of the U.S. (bridges, culverts, temporary crossings, riprap, covering and seeding, erosion control, etc.) must be submitted to the Nebraska Regulatory Office for inspection.
5. Permanent impacts associated with this project include 0.042 acre of PEMA riverine floodplain, 0.005 acre of PEMC riverine channel, and 0.207 acre of PEMA floodplain depressional wetlands, resulting in the total of 0.254 acre of wetland impacts. Impacted wetlands will be mitigated at the Waterloo Southeast Wetland Mitigation Bank (1998-50293, STPB 28(64) CN 21850). The bank is classified as a riverine floodplain (RF) and floodplain depressional (FD) according to the Nebraska wetland classification system. The mitigation of jurisdictional impacts is as follows:

To compensate for the lost wetland functions, 0.042 acre of unavoidable PEMA, riverine floodplain wetland impacts will be mitigated at the ratio of 1 (acres of mitigated wetland) : 1 (acre of impacts) requiring the debit of 0.042 acre of PEMA/C floodplain depressional or riverine floodplain wetlands. Impacts of 0.005 acre of PEMC, riverine channel wetland impacts will be mitigated at the ratio of 2 (acres of mitigated wetland) : 1 (acre of impacts) requiring the debit of 0.01 acre of PEMA/C floodplain depressional or riverine floodplain wetlands. Impacts of 0.207 acre of PEMA, floodplain depressional wetland impacts will be mitigated at the ratio of 1 (acres of mitigated wetland) : 1 (acre of impacts) requiring the debit of 0.207 acre of PEMA/C floodplain depressional or riverine floodplain wetlands. Therefore, the Waterloo Southeast Wetland Mitigation Bank will be debited 0.259 acre of PEMA / PEMC wetlands. An updated bank ledger must be received prior to the commencement of filling activities.

Regional Conditions:

1. All areas adjacent (contiguous, bordering, neighboring) to jurisdictional waters disturbed by construction shall be revegetated with appropriate perennial, native grasses and forbs and maintained in this condition. *Phalaris arundinacea* (Reed Canary Grass), *Lythrum salicaria* (Purple Loosestrife), *Bromus inermis* (Smooth Brome), *Phragmites, sp.* (Common Reed, River Reed) and *Tamarix, sp.* (Salt Cedar), are *NOT* appropriate choices of vegetation. A cover crop may be planted to aid in the establishment of native vegetation. The disturbed areas shall be reseeded concurrent with the project or immediately upon completion. Revegetation shall be acceptable when ground cover of desirable species reaches 75%. If this seeding cannot be accomplished by September 15 the year of project completion, then an erosion blanket shall be placed on the disturbed areas. The erosion blanket shall remain in place until ground cover of desirable species reaches 75%. If the seeding can be accomplished by September 15, all seeded areas shall be properly mulched to prevent additional erosion.
2. When the vegetation has become established, all temporary erosion control materials shall be removed from the project site. Biodegradable or photodegradable materials need not be removed.
3. The use of dredged material in the construction of temporary structures or used for temporary work or used as temporary fill shall not be allowed. The term "dredged material" means material that is excavated or dredged from waters of the U.S. All temporary fill material shall be obtained from an upland source.
4. Plans for the temporary structure / work / fill shall be submitted to and approved by the Nebraska Regulatory Office prior to the commencement of construction.
5. At the completion of the construction activity, all temporary fill material shall be removed in its entirety from the water of the U.S. to an upland area and the affected area shall be restored to its pre-construction condition.
6. The Nebraska Regulatory Office shall be notified with documentation (i.e. photos) when the site has been restored to its pre-project condition.
7. The permittee is responsible for ensuring that the Corps is notified of the location of any borrow site that will be used in conjunction with the construction of the authorized activity so that the Corps may evaluate the site for potential impacts to aquatic resources, historic properties, and endangered species. For projects where there is another lead Federal agency, the permittee shall provide the Corps documentation indicating that the lead Federal agency has complied with the National Historic Preservation Act and Endangered Species Act for the borrow site. The permittee shall not initiate work at the borrow site in conjunction with the authorized activity until approval is received from the Corps.

General Conditions:

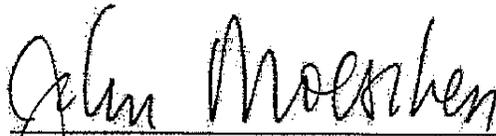
See attached NWP #14 Fact Sheet.

Further Information:

1. We have prepared a preliminary jurisdictional determination (JD) for the site which is a written indication that waterways within your project area may be a water of the U.S. Such waters have been treated as jurisdictional waters of the U.S. for purposes of computation of impacts and compensatory mitigation requirements. If you concur with the findings of the enclosed preliminary JD, please sign it and return it to the above address within two weeks.
2. If you believe the preliminary JD is inaccurate, you may request this office complete an approved JD prior to your commencement of any work in a water of the U.S. An approved JD is an official determination regarding the presence or absence of waters of the U.S. Completion of an approved JD may require coordination with the U.S. Environmental Protection Agency.

3. Upon completion of the authorized work and any required mitigation, please sign and return the attached Compliance Certification form to the address listed.
4. This verification will be valid until **March 18, 2017**.
5. Although an individual Department of the Army permit will not be required for the project, this does not eliminate the requirement that you obtain any other applicable Federal, state, tribal or local permits as required. Please note that deviations from the original plans and specifications of your project could require additional authorization from this office.
6. You are responsible for all work accomplished in accordance with the terms and conditions of the Nationwide Permit. If a contractor or other authorized representative will be accomplishing the work authorized by the Nationwide Permit in your behalf, it is strongly recommended that they be provided a copy of this letter and the attached conditions so that they are aware of the limitations of the applicable Nationwide Permit. Any activity that fails to comply with all of the terms and conditions of the Nationwide Permit will be considered unauthorized and subject to appropriate enforcement action.
7. The Omaha District, Regulatory Branch is committed to providing quality and timely service to our customers. In an effort to improve customer service, please take a moment to complete our Customer Service Survey found on our website at <http://per2.nwp.usace.army.mil/survey.html>. If you do not have Internet access, you may call and request a paper copy of the survey that you can complete and return to us by mail or fax.
8. If you have any questions concerning this verification or jurisdictional determination, please feel free to contact John Snowdon at the above address or call (402) 896-0896 and refer to file number **2008-01960**.

Signed



John L. Moeschen
Nebraska State Program Manager

Enclosure

Copy Furnished:

NDEQ (Garber)

**NDOR Contractor Requirements Sheet
Wetlands and Waters of the U.S.
Environmental Permitting Unit**

In accordance with Section 404 of the Clean Water Act (discharge of dredged or fill material into waters of the United States), NDOR has evaluated the project for necessary Contractor requirements. The requirements are based on nationwide permit general conditions and Nebraska regional conditions set forth by USACE, which can be viewed online at: <http://www.nwo.usace.army.mil/html/od-rne/nwp.html>. Note that not all of the USACE general and regional conditions appear below, because they are either not relevant to Contractor commitments or will be executed by NDOR. Contractor must also comply with special conditions in the 404 permit.

Based on the project scope (NDOR Control No. 11801), the Contactor requirements indicated with check marks below require action and/or compliance by the Contactor.

Navigation

No activity may cause more than a minimal adverse effect on navigation in navigable waters of the United States.

Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.

Aquatic Life Movements and Management of Water Flows

No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. Culverts placed in streams must be installed to maintain low flow conditions.

To the maximum extent practicable, the pre- construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization and storm water management activities, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

Adverse Effects From Impoundments

If the activity creates and impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

Spawning Areas

Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

Migratory Bird Breeding Areas

Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

Shellfish Beds

No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWP's 4 and 48.

Water Supply Intakes

No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

Equipment

Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

Removal of Temporary Fills

Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

Soil Erosion and Sediment Controls

SWPPP Required

Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow.

Borrow Site Identification

The Contractor shall notify NDOR of the location of any borrow site that will be used in conjunction with the construction of the authorized activity.

Revegetation of Disturbed Areas

All areas adjacent (contiguous, bordering, neighboring) to jurisdictional waters disturbed by construction shall be revegetated with appropriate perennial, native grasses and forbs and maintained in this condition. *Phalaris arundinacea* (Reed Canary Grass), *Lythrum salicaria* (Purple Loosestrife), *Bromus inermis* (Smooth Brome), *Phragmites, sp.* (Common Reed, River Reed) and *Tamarix, sp.* (Salt Cedar), are NOT appropriate choices of vegetation. A cover crop may be planted to avoid in the establishment of native vegetation. The disturbed areas shall be reseeded concurrent with the project or immediately upon completion. Revegetation shall be acceptable when ground cover of desirable species reaches 75%. If this seeding cannot be accomplished by September 15 the year of project completion, then an erosion blanket shall be

placed on the disturbed areas. The erosion blanket shall remain in place until ground cover of desirable species reaches 75%. If the seeding can be accomplished by September 15, all seeded areas shall be properly mulched to prevent additional erosion. When the vegetation has become established, all temporary erosion control materials shall be removed from the project site. Biodegradable or photodegradable materials need not be removed.

Discovery of Previously Unknown Remains and Artifacts

If you discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by this permit, you must immediately notify the District Engineer of what you have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The District Engineer will initiate the Federal, Tribal and State coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

Temporary Structures/Work/Fill

The use of dredged material in the construction of temporary structures or used for temporary work or used as temporary fill shall not be allowed. The term "dredged material" means material that is excavated or dredged from waters of the U.S. All temporary fill material shall be obtained from an upland source.

At the completion of the construction activity, all temporary fill material shall be removed in its entirety from the water of the U.S. to an upland area and the affected area shall be restored to its pre-construction condition.

The Nebraska Regulatory Office shall be notified with documentation (i.e., photos) when the site has been restored to its pre-project condition.

Stream Channelization Projects

Buffer strips shall be set aside along both sides of the channel no less than 50 feet from the top of each side slope landward. The buffer strips shall be planted to a mixture of perennial, native grasses, forbs and trees required for tree mitigation and maintained in this condition. Reed Canary Grass (*Phalaris arundinacea*), Purple Loosestrife (*Lythrum salicaria*) and Smooth Brome (*Bromus inermis*) are NOT appropriate choices of vegetation. Revegetation will be acceptable when ground cover of desirable species reaches 75%.

Suitable Material

No activity may use unsuitable fill material as defined in the list below. Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act).

OMAHA DISTRICT PROHIBITED/RESTRICTED MATERIALS:

1. Vehicle bodies, farm machinery and metal junk, including appliances and metal containers, are prohibited.
2. The use of old or used asphalt paving material as a fill material and the use of new or used asphalt for bank stabilization or erosion control is prohibited.

3. The use of organic debris as fill material is prohibited. (Properly anchored trees, treetops, root wads, logs, and hay bales may be allowed on a case-by-case basis.)
4. Any material subject to leaching when in an aquatic environment is prohibited (for example, but not limited to, chemically-treated building material, roofing material, and wood debris).
5. Individual or unanchored tires are prohibited. (Tires may be allowed on a case-by-case basis when placed in the form of a mat or grid with multiple anchoring points to reduce the risk of design failure.)
6. Small aggregate (i.e., less than 6 inches in diameter) may not be placed below the ordinary high water mark (OHWM) of a water body for the purpose of bank stabilization or erosion control when such aggregate will be unstable or subject to frequent failure. Small aggregate may, however, be placed below the OHWM if its purpose is to fill the interstices of a well graded rock riprap revetment or channel lining.
7. Slab material, regardless of source, must be broken before placement so that the dimension of the largest slab will not be more than 3.5 times the dimension of the smallest slab (unless justified by a qualified Engineer) and must be free of exposed rebar, wire and wire mesh.
8. The use of clean brick, broken concrete and cinder block for erosion control or bank stabilization will be considered on a case-by-case basis. If allowed, the broken concrete must be free of exposed rebar, wire, wire mesh, asphalt paving material, paint, and other erodible materials. Broken concrete must range in size from 6 to 36 inches (unless justified by a qualified Engineer).

FLOODPLAIN PERMIT

Nebraska Department of Roads
**Floodplain/Floodway Development
 Permit/Application**

RECEIVED

FEB 24 2010

ENVIRONMENTAL SECTION

Permit Application No.
Date: 2/17/10

This form is used for any man-made change to improved or unimproved transportation facility, including, but not limited to, buildings or other structures, mining, dredging, filling, grading, paving, excavation, drilling operations, or storage of equipment or materials.

Nebraska Department of Roads will obtain all other necessary federal, state, or local permits (e.g., Corps of Engineers 404 Permit, Local Levee District, etc.)

1.	Name of Applicant: Nebraska Department of Roads PO Box 94759 Lincoln NE 68509-4759
2.	Type and Use of Development: Bypass City of Wahoo
3.	Specific Location of Development: South Terminus Roadway Embankment & Dry Run Creek (S077 09368)
4.	Complete this section if the proposed development involves the improvement of a structure (i.e., walled and roofed building). Pre-improvement Value of Structure: \$ _____ Cost of Improvement: \$ _____

The following section is to be completed by the community official:

5.	Is the development Substantial Improvement? (see #4)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
6.	Is the development in an identified floodplain?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
If Yes, complete the following:			
a.	Elevation of the Base (100-Year) Flood	Site #1 1213.4 Site #2 1188.0	Ft. MSL/NGVD 29 or NAVD 88
b.	Elevation/Floodproofing Requirement (if applicable)	_____	Ft. MSL/NGVD 29 or NAVD 88
c.	Is the development in a designed Floodway?	<input checked="" type="checkbox"/> Yes New structures for human habitation are prohibited. For any other Floodway development, the NDOR must provide certification by a registered professional engineer that the development would result in no increase along the floodway water surface profile.	
		<input type="checkbox"/> No If a floodway has not been designated, the NDOR may be required to submit hydraulic data demonstrating that the proposed development will not increase flood heights more than one foot at any location.	

If the development is in a floodplain, the following shall apply:

This permit is issued with the condition that the lowest floor (including basement) of a new or substantially improved nonresidential building will be elevated or floodproofed at least one foot above the base flood elevation. NDOR will provide certification by a registered Engineer, Architect, or Land Surveyor that these provisions are met.

All provisions of the Wahoo Floodplain Management Resolution/Ordinance (Number _____) shall be complied with.
 (County or City)

Jeremy Peterson Building Inspector 2/19/10
 Local Authorizing Official (Name & Title) Date

Jason Burgess For 2/17/10
 NDOR Environmental Permits Manager Date

Project Name: Wahoo Bypass	
Project No.: S-77-2(1025)	
Control No.: 11801	Structure No.: S077 09368

**NOTICE TO BIDDERS
(Storm Water Pollution Prevention Plan)
(A-20-0307)**

The Contractor shall understand the terms and conditions of the general National Pollutant Discharge Elimination System (NPDES) permit that authorizes the storm water discharges associated with industrial activity from the construction site. For reference, the general permit is posted on the Department's website.

Additionally, the Contractor, as evidenced by their signature on this proposal, agrees and understands that, if awarded the contract on this project, he/she:

- 1) becomes a co-permittee, along with the owner(s), to the Nebraska Department of Environmental Quality NPDES General Permit for Storm Water Discharges from construction sites on this project;
- 2) is legally bound to comply with the Clean Water Act to ensure compliance with the terms and conditions of the storm water pollution prevention plan developed under the NPDES permit and the terms of the NPDES permit; and
- 3) will hold the owners harmless for damages or fines arising as a result of noncompliance with the terms of the storm water permits and authorizations associated with the work on this project.

**SPECIAL PROSECUTION AND PROGRESS
(Migratory Birds)
(A-42-1112)**

The Department of Roads will, to the extent practicable, schedule the letting of projects such that clearing and grubbing can occur outside of the primary nesting season in Nebraska which has been determined to generally occur between April 1 and September 1. Work on structures, such as but not limited to bridges and culverts, should occur outside the primary swallow nesting season, April 15 to September 30, unless approved methods of avoiding nesting have been taken on the bridge and/or culvert structures. The nesting dates above are a guide only, nesting can occur outside of those dates. Work outside of those dates is not exempt from compliance with the Migratory Bird Treaty Act.

The Contractor shall, to the extent possible, schedule work on structures, such as but not limited to bridges and culverts, and clearing and grubbing activities to occur outside the primary nesting season in Nebraska. However, if circumstances dictate that project construction or demolition must be done when nesting migratory birds may be present, a survey of the number of active nests and species of birds shall be conducted by qualified personnel representing the Contractor, and assisted by the Project Manager (PM), NDOR Environmental Section staff, or the United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) - Wildlife Services Office. If the survey finds that nests will be impacted by the proposed construction, the Contractor may be responsible for delays.

The following guidance is provided for compliance with the Migratory Bird Treaty Act for construction of NDOR projects:

1. The Contractor shall submit a plan to the NDOR regarding how he intends to accomplish bridge demolition or clearing and grubbing of the project to avoid conflict with nesting migratory birds.
2. The Contractor must submit a temporary erosion control plan tailored to fit the plan for clearing and grubbing.
3. If construction operations result in unavoidable conflict with nesting migratory bird's eggs or young, which will result in "taking" nests and their contents, the Contractor should notify the NDOR Project Manager (PM). The PM shall notify the Environmental Section of Planning and Project Development by telephone at 402-479-4766.
4. The NDOR Environmental Section will then determine if assistance in conducting the survey will be provided by the NDOR Environmental Section (if available) or from the USDA APHIS - Wildlife Services Office and arrange for assistance with the survey of nest numbers, bird species, etc. Results of the survey shall be maintained by the NDOR until project completion.
5. If the nesting survey is required, and the project was awarded prior to the nesting season, and the Contractor did not accomplish clearing/grubbing and/or work on bridge/culvert structures outside the nesting season, the Contractor will reimburse the Department of Roads for each survey required at \$1,000 per survey. If the project was awarded during the nesting season, and construction activities are such that clearing/grubbing and/or work on bridge/culvert structures must be accomplished prior to any other activity on the project, then there will be no charge assessed for the initial survey. The Contractor is responsible for removing all trees surveyed, that do not contain active nests, and for taking appropriate measures on bridge/culvert structures, within 3 days of the survey. Reimbursement for additional surveys may be charged if the Contractor fails to remove the trees within 3 days of the survey, and requires an additional survey. Survey reimbursement will be determined on a project specific basis, considering the project timeline and associated activities.
6. If an active nest is found during the survey, the Contractor should do everything possible to restructure his activities and leave the nest undisturbed until the young fledge. Fledging could occur within a week, or up to a month, after the survey depending on the species of bird and whether the nest contained eggs or young. Also depending on the species of bird and their sensitivity to disturbance, a buffer of up to 30 feet surrounding the tree with the active nest could be required.
7. If construction cannot be rescheduled to allow the birds to fledge, and it is determined as an unavoidable "take" circumstance, the Contractor shall stop all work within 30 feet of the active nest and coordinate with the Construction Project Manager to determine how to proceed. The Construction Project Manager will then coordinate with the NDOR Environmental Section and they will facilitate coordination with the US Fish and Wildlife Service and the Federal Highway Administration (for projects using Federal-aid) to determine the appropriate way to address the active nest. No work shall occur within 30 feet of

the active nest until US Fish and Wildlife Service coordination is complete and the requirements of the Migratory Bird Treaty Act are satisfied.

8. It is the Contractor's responsibility to schedule his work to accommodate the process of conducting a survey(s) and submitting the necessary documentation if avoidance is not practicable. The Contractor shall be responsible for using any legal and practical method to prevent the nesting of birds in order to prevent the need for any survey and prevent the need for additional surveys. It is understood and agreed that the Contractor has considered in the bid all of the pertinent requirements concerning migratory birds (including endangered species) and that no additional compensation, other than time extensions if warranted, will be allowed for any delays or inconvenience resulting in these requirements.

STORM WATER DISCHARGES (A-43-0408)

In compliance with the Federal Water Pollution Control Act, authorization to discharge storm water on this project has been granted under National Pollutant Discharge Elimination System (NPDES) General NPDES Permit Number NER110000 for Storm Water Discharges from Construction Sites to Waters of the State of Nebraska. This permit became effective on January 1, 2008.

Contractors are advised that, under the Construction Storm Water General Permit, ***plant sites, camp sites, storage sites, and borrow or waste sites not shown on the plans may be subject to separate NPDES permit authorization requirements for stormwater discharges from those locations.*** Contractors shall be responsible for verifying the need for NPDES permit coverage with the Nebraska Department of Environmental Quality (NDEQ). When required for these locations, the filing of a "Notice of Intent" shall be made by the Contractor directly to the NDEQ.

Additionally, asphalt (SIC Code 2951) or concrete (SIC Code 3273) batch plants that are owned by a private contractor and are operated on a contract-for-service basis to perform work for the Contractor completing the project may be subject to NPDES General Permit Number NER000000 for Industrial Storm Water Discharges. While the plant may be required for completion of the project, it is not under the control of the Department (or other project owner); and the filing of a "Notice of Intent" shall be made by the Contractor directly to the NDEQ.

The NDEQ may be contacted at 402-471-4220 for additional information.

REQUIRED SUBCONTRACTOR/SUPPLIER QUOTATIONS LIST (A-43-0307)

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.

**PROPOSAL GUARANTY BID BOND
(A-43-0307)**

Paragraphs 1.a. and 1.b. of Subsection 102.15 in the *Standard Specifications* are void and superseded by the following:

- a. OPTION 1 - (Project Specific Paper Bid Bond). The Bid Bond shall be executed on an original Department Bid Bond Form, which may be obtained from the Department. The original Bid Bond shall be delivered to the Department with the bid. A reproduction or a copy of the original form will not be accepted and will cause the bid not to be opened and read.
- b. OPTION 2 - (Annual Bid Bond). The Department at its discretion may allow a bidder to place an "Annual Bid Bond" on file with the Department. This bond would cover all projects the bidder bids for a 12-month period shown in the bond. The bidder must indicate in the bid submittal to the Department that their "Annual Bid Bond" applies to the submitted bid. The original Annual Bid Bond shall be executed on the Department of Roads Bid Bond Form, which may be obtained from the Department. A reproduction or a copy of the original form will not be accepted.

**WORKER VISIBILITY
(A-43-0507)**

Pursuant to Part 634, Title 23, Code of Federal Regulations, the following modified rule is being implemented:

Effective on January 1, 2008, all workers within the right-of-way who are exposed either to traffic (vehicles using the highway for purposes of travel) or to construction equipment within the work area shall wear high-visibility safety apparel.

High-visibility safety apparel is defined to mean personal protective safety clothing that:

- 1 - is intended to provide conspicuity during both daytime and nighttime usage, and
- 2 - meets the Performance Class 2 or Class 3 requirements of the ANSI/ISEA 107-2004 publication titled "American National Standards for High-Visibility Safety Apparel and Headwear."

**VALUE ENGINEERING PROPOSALS (VEP)
(A-43-0807)**

Subsection 104.03 in the *Standard Specifications* is amended to include the following:

14. A VEP will not be accepted if the proposal is prepared by an Engineer or the Engineering Firm who designed the contract plans.

**SHOP PLANS
(A-43-1108)**

Paragraph 5. of Subsection 105.02 in the *Standard Specifications* is amended to provide that the Contractor may furnish shop plans on half-size plan sheets [11x17 inches (297x420 mm)], provided all information is legible.

**LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC
(A-43-0210)**

Paragraph 4.a. of Subsection 107.01 in the *Standard Specifications* is void and superseded by the following:

4. a. Whenever the Contractor violates any governing Federal, State or local environmental quality regulation and/or is in noncompliance with any environmental commitment, the violating activity must cease immediately until the appropriate remedy can be determined by: the Engineer, the NDOR Environmental Section, the Federal Highway Administration (for projects utilizing Federal-aid) and other agencies, as deemed appropriate. The Engineer, with assistance from the NDOR Environmental Section and the FHWA, will provide a written order confirming the appropriate corrective action to the Contractor. Work can resume to normal conditions once the Engineer determines that the violation or non-compliance has been addressed in accordance with the order for corrective action.

Subsection 107.01 in the *Standard Specifications* is amended to include the following two paragraphs:

5. Should the Contractor encounter any previously unidentified hazardous materials, the Engineer shall be promptly notified. The Contractor shall suspend operations in the area involved until such time that arrangements are made for their proper treatment or removal.
6. The Contractor shall prevent the transfer of invasive plant and animal species. The Contractor shall wash equipment at the Contractor's storage facility prior to entering the construction site. The Contractor shall inspect all construction equipment and remove all attached vegetation and animals prior to leaving the construction site.

**SPECIAL PROSECUTION AND PROGRESS
(Federal Immigration Verification System)
(A-43-1209)**

The Contractor shall register with and use a Federal Immigration Verification System to determine the work eligibility status of newly hired employees physically performing services within the State of Nebraska. The Prime Contractor shall contractually require every subcontractor to register with and use a Federal Immigration Verification System to determine the work eligibility status of newly hired employees physically performing services within the State of Nebraska.

The Federal Immigration Verification System shall be an electronic verification of the work authorization program of the Illegal Immigration Reform and Immigration Responsibility Act of 1996, 8 U.S.C. 1324a, known as the E-Verify Program. The Contractor may use an equivalent Federal program designated by the United States Department of Homeland Security or other Federal agency authorized to verify the work eligibility status of a newly hired employee. The equivalent program shall comply with the Immigration Reform and Control Act of 1986.

The Prime Contractor shall furnish a letter to the NDOR Construction Division in Lincoln on company letterhead and signed by an officer of the company stating that documentation is on file certifying that the Contractor and all subcontractors have registered with and used a Federal Immigration Verification System. The Contractor shall maintain all records of registration and use for a period of three years and make records available upon request. The Contractor shall contractually require subcontractors to maintain all records for a period of three years and make records available upon request.

Payment will not be made to the Contractor for using the Federal Immigration Verification System or the maintenance of the records. This work shall be subsidiary to the work being performed.

The Contractor's Certification shall become part of the final records of the Contract. The Department considers this document to have direct bearing to the beginning interest date and may affect the amount of interest earned.

CONTRACT TIME ALLOWANCE (A-43-0911)

Paragraph 5. of Subsection 108.02 of the *Standard Specifications* is void and superseded by the following:

5. Each week, the Engineer shall post on the Department's website a report of working days or calendar days charged. The Contractor then has 14 days from the day the Engineer's report is posted to provide a written explanation of why he/she does not concur with the working days or calendar days as assessed.

Paragraph 6.b. of Subsection 108.02 of the *Standard Specifications* is amended to include the following:

- (4) If the time allowance for the contract has been established on a calendar day basis, the Contractor is expected to schedule the work and assign whatever resources are necessary to complete the work in the time allowance provided regardless of the weather. Accordingly, regardless of anything to the contrary contained in these *Specifications*, the Department will not consider delays caused by inclement or unseasonable weather as justification for an extension of the contract time allowance unless:
 - i. the weather phenomena alleged to have contributed to or caused the delay is of such magnitude that it results in the Governor issuing a Disaster Declaration, **and**
 - ii. the weather phenomena alleged to have contributed to or caused the delay can clearly be shown to have directly impacted the work on the critical path identified on the Contractor's schedule.

Paragraphs 10.b. and 10.c. of Subsection 108.02 of the *Standard Specifications* are void and superseded by the following:

- b. (1) If the extra work is not in the original contract, time extensions will be granted by determining the actual time necessary to accomplish the extra work.
 - (2) If the extra work is the result of the addition of additional quantities of existing contract items, time extensions will be granted by either:
 - (i) determining the actual time necessary to accomplish the extra work; or
 - (ii) determining the additional time to be granted by comparing the value of the additional quantities of work to the total amount of the original contract when measurement of the actual additional time is not possible or practical.
 - (3) In either case, only the time necessary to perform the extra work of the additional quantities of existing contract items when the extra work or the additional quantities of existing contract items are deemed to be the current controlling operation will be granted as a time extension.
- c. Increases in quantities of work associated with traffic control items measured by the day will not be considered for extending the contract time allowance. Overruns of traffic control items that are measured by methods other than time may be considered for extending the contract time allowance, but they must be deemed to be a controlling operation when the overrun of quantities occurs.

**PARTIAL PAYMENT
(A-43-1110)**

Paragraph 2. of Subsection 109.07 of the *Standard Specifications* is void and superseded by the following:

- 2. When the value of the work completed during a semi-monthly period exceeds \$10,000, the Contractor will receive semi-monthly progress estimates from which the Department shall make such retentions as may be allowed by the contract, provided that the nature and quality of the completed work are satisfactory and provided further that the progress of the work conforms to the requirements of Subsection 108.07.

Paragraph 3.b. of Subsection 109.07 of the *Standard Specifications* is void and superseded by the following:

- b. Under normal circumstances, the Department shall not retain any earnings on a progress estimate. However, the Department reserves the right to retain such amounts as are necessary for material deficiencies, anticipated liquidated damages, unpaid borrow, and for other reasons to protect the Department's interests.

**PARTIAL PAYMENT
(A-43-0611)**

Paragraph 4. of Subsection 109.07 of the *Standard Specifications* is void and superseded by the following:

4. a. (1) Upon presentation by the Contractor of receipted bills, billing invoices, or such other documentation sufficient to satisfy the Engineer and verify the Contractor's or subcontractor's actual costs for the materials, payments may also be allowed for acceptable nonperishable materials purchased expressly to be incorporated into the work and delivered in the vicinity of the project or stored in acceptable storage places within Nebraska.
- (2) Materials not delivered and stored in the immediate vicinity of or on the actual project site must be clearly marked to identify the project on which they are to be used, must be segregated from similar materials at the storage site, and cannot be included in a supplier's inventory of material available for sale for other purposes.
- (3) All items eligible for partial payment as stored materials must be available for verification, sampling, and measurement.
- b. The amount to be included in the payment will be determined by the Engineer, but in no case shall it exceed 100 percent of the value of the materials documented. This value may not exceed the appropriate portion of the value of the contract item or items in which such materials are to be incorporated, nor shall the quantity in any case exceed the total estimated quantity required to complete the project.
- c. Payment will not be approved when the documented value of such materials amounts to less than \$1,000.00, when the progress of the work is not in accordance with the requirements set forth in Subsection 108.07, or when the material can reasonably be expected to be incorporated into the work and eligible for payment as completed work on a progress estimate within 15 days of being placed into storage.
- d. Deductions at rates and in amounts which are equal to the payments will be made from estimates as the materials are incorporated into the work.
- e. Payment for the materials shall not in itself constitute acceptance, and any materials which do not conform to the specifications shall be rejected in accordance with Subsection 106.05.
- f. The Contractor shall be responsible for all damages and material losses until the material is incorporated into the work and the work is accepted.
- g. Partial payment will not include payment for fuels, supplies, form lumber, falsework, other materials, or temporary structures of any kind which will not become an integral part of the finished construction.
- h. No partial payments will be made on living or perishable plant materials until planted.

**BUY AMERICA
(A-43-0212)**

Subsection 106.07 in the *Standard Specifications* is void and superseded by the following:

106.07 -- Buy America

1. The Buy America rule requires that steel or iron materials be produced domestically, and only those products which are brought to the construction site and permanently incorporated into the completed project are covered. Construction materials, forms, etc., which remain in place at the Contractor's convenience, but are not required by the contract, are not covered.
2. To further define the coverage, a domestic product is a manufactured steel construction material that was produced in one of the 50 States, the District of Columbia, Puerto Rico, or in the territories and possessions of the United States.
3. All manufacturing processes to produce steel or iron materials (i.e., smelting, and any subsequent process which alters the steel or iron material's physical form or shape, or changes its chemical composition) must occur within one of the 50 States, the District of Columbia, Puerto Rico, or in the territories and possessions of the United States, to be considered of domestic origin. This includes processes such as casting, rolling, extruding, machining, bending, grinding, drilling, and coating. Coating includes epoxy coating, galvanizing, painting, and any other coating that protects or enhances the value of the material. The manufacturer shall include a statement on the material test report or certification that all material described above except the coating material is a domestic product.
4. Raw materials used in the steel or iron materials may be imported. All manufacturing processes to produce steel or iron materials must occur domestically. Raw materials are materials such as iron ore, limestone, waste products, etc., which are used in the manufacturing process to produce the steel products. Waste products would include scrap; i.e., steel no longer useful in its present form from old automobiles, machinery, pipe, railroad tracks and the like. Also, steel trimmings from mills or product manufacturing are considered waste. Extracting, crushing, and handling the raw materials which is customary to prepare them for transporting are exempt from Buy America. The use of pig iron and processed, pelletized, and reduced iron ore manufactured outside of the United States may be used in the domestic manufacturing process for steel and/or iron materials.
5. Notwithstanding this requirement, a minimum of foreign steel or iron materials will be permitted if its value is less than one-tenth of one percent of the total contract cost or \$2,500, whichever is greater.
6. Upon completion of all work utilizing steel or iron products, the Prime Contractor shall furnish a letter to the State on company letterhead and signed by an officer of the company stating that documentation is on file certifying that all steel or iron materials brought to the construction site and permanently incorporated into the work complied in all respects with the Buy America requirements.

**BORROW, WASTE, STOCKPILE, AND PLANT SITE APPROVAL
(A-43-0512)**

Subsection 107.02 in the Standard Specifications is amended to include the following:

4. Site Approval:
 - a. When borrow is obtained from a borrow site or waste excavation is placed at sites which are not shown in the contract, or the Contractor plans to use a plant or stockpile site which is not shown in the contract, the Contractor shall be solely responsible for obtaining all necessary site approvals. The Department will provide the procedures necessary to obtain approvals from the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, Nebraska State Historical Society, Nebraska Game and Parks Commission, and Nebraska Department of Natural Resources on the NDOR website. The Contractor shall also be responsible for obtaining a Discharge Number from the Nebraska Department of Environmental Quality (NDEQ) that allows work under the current Construction Stormwater Permit. The Contractor shall also be responsible for obtaining any and all other permits required by local governments.
 - b. It is anticipated that it may require 60 calendar days or more for the Contractor to obtain the necessary approvals. The Contractor will not be allowed to begin work at borrow or waste sites until the necessary approvals are obtained. No extension of completion time will be granted due to any delays in securing approval of a borrow or disposal site unless a review of the time frames concludes that there were conditions beyond the Contractor's control.

Paragraph 7. of Subsection 205.02 in the Standard Specifications is void and superseded by the following:

7. Borrow and Waste Site Approval:
 - a. Borrow and waste site approvals shall be in accordance with Section 107.02.
 - b. Material shall not be removed from borrow sites until preliminary cross sections and representative soil samples have been taken by the Engineer. The Contractor shall notify the Engineer a sufficient time in advance of the opening of any borrow site so that cross sections may be taken.
 - c. Material shall be removed in a manner that will allow accurate final cross sections to be taken for determining the quantity of excavation. The surfaces of the borrow sites shall be bladed and shaped to drain as shown in the contract or as directed by the Engineer.

**SPECIAL PROSECUTION AND PROGRESS
(Subletting or Assigning of Contract)
(A-43-0813)**

Subsection 108.01 in the Standard Specifications is void and superseded by the following:

108.01 – Subletting or Assigning of Contract

1. a.(1) The Contractor will not be allowed to sublet, assign, sell, transfer, or otherwise dispose of any portion of the contract or any right, title, or interest therein; or to either legally or equitably assign any of the money payable under the contract or the claims without the prior written consent of the Engineer.
 - (2) With the Engineer's consent, the Contractor may sublet up to 70 percent of the work.
 - (3) Any items designated in the contract as "specialty items" may be performed by subcontract.
 - (4) The cost of any subcontracted "specialty items" may be deducted from the total contract cost before computing the percentage of work required to be performed by the Contractor.
 - (5) Subcontracts, or transfer of contract, will not release the Contractor of any liability under the contract and bonds.
- b. Certain items of work may be performed without a subcontract. A list of items not requiring a subcontract is available from the Engineer.
2. The performance of any work by a subcontractor before the date of authorization by the Department shall subject both the Contractor and subcontractor to the imposition of appropriate sanctions by the Department.
3. a. The Contractor's request to sublet work shall be made electronically to the NDR Construction Engineer using project management software identified by the Department. A signed subcontract agreement shall be on file in the Contractor's office when the request is made. The subcontract agreement must provide that the subcontracted work will be completed according to the terms of the contract. The required and Special Provisions contained in the proposal shall be physically included in any subcontract.
 - b. **On all Federal-aid projects, a scanned copy (.pdf format) of the signed subcontract agreement shall be included with the subcontracting request. (Federal-aid projects can be identified by inclusion in the Proposal of Form FHWA-1273 (REQUIRED CONTRACT PROVISIONS FEDERAL-AID CONSTRUCTION CONTRACTS)).**
 - c. Scanned copies (.pdf format) of all executed subcontracts, written agreements, and/or lease agreements used to meet DBE goals shall be submitted to the NDR Construction Engineer with the subcontracting request. These copies must show labor cost, material prices, overhead and profit.
4. a. Second tier subcontracts will be allowed.

- b. If a DBE firm subcontracts work to another firm, only work subcontracted to another DBE firm can be counted toward meeting a DBE goal.
- c. All requests for second tier subcontracting shall be submitted to and approved by the prime Contractor before they are forwarded to the NDR Construction Engineer for approval.
- 5. All subcontract documents relating to the contract shall be maintained during the course of the work and preserved for a period of three years thereafter. These documents shall be available for inspection by authorized representatives of State and Federal agencies. Scanned copies (.pdf format) of the signed subcontract agreements not specifically identified elsewhere in this Subsection shall be furnished to the Department upon request.
- 6. The Contractor may discuss a proposed subcontract with the Engineer before entering into a signed subcontract agreement, but final approval will not be granted until a formal request and proper certification has been received by the Department.
- 7. On projects requiring submittal of certified payrolls, all subcontractor payrolls shall be checked by the Contractor before submittal to the Engineer.
- 8. a. The prime Contractor, and subcontractors when subletting work to lower tier subcontractors, shall include language which can be identified as a "Prompt Payment Clause" as a part of every subcontract for work and materials.
 - b.(1) The language constituting the "Prompt Payment Clause" will require payment to all first tier subcontractors for all labor and materials --- for work completed to date --- within 20 calendar days of receipt of progress payments from the Department for said work. Similar language in a contract between a subcontractor and a lower-tier subcontractor will require payment to the lower tier subcontractor for all labor and materials --- for work completed to date --- within 10 calendar days of receipt of progress payments from the prime Contractor for said work.
 - (2) The language constituting the "Prompt Payment Clause" will also stipulate the return of retainage within 30 calendar days after the satisfactory completion of the work by the subcontractor as evidenced by inclusion of the work on a progress payment.
 - (3) Additionally, the language constituting the "Prompt Payment Clause" may stipulate the subcontractor's obligation to return to the Contractor or subcontractor, as the case may be, any overpayments which result from adjustments to measured and recorded quantities as part of the preparation of subsequent progress payments or the final records. Overpayments shall be returned to the prime Contractor or subcontractor, as the case may be, within 20 calendar days of receiving notice of the adjusted quantities and the amount of the overpayment.
- c. The prime Contractor of subcontractors, as the case may be, may withhold payment only for just cause and shall not withhold, delay, or postpone payment without first receiving written approval from the Department.

- d.(1) The failure by the prime Contractor to abide by the agreements identified in the “Prompt Payment Clause” without just cause, including the timely return of retainage, is a material breach of this contract which may result in the Department withholding the amount of payment from the prime Contractor that should have been paid to the subcontractor, termination of this contract, or other such remedy as the Department deems necessary.
- (2) Additionally, the failure of any subcontractor to abide by the agreements identified in the “Prompt Payment Clause” without just cause, including the timely return of retainage to lower tier subcontractors, or by failing to return overpayments in a timely manner when the language permitted in Paragraph 8.b.(3) above is included in the subcontract may result in the Department withholding subcontract approval for other work until the overpayments have been returned.

ELECTRONIC SHOP DRAWINGS (A-43-0813)

Subsection 105.02 of the Standard Specifications is amended to include the following:

- 8. a.(1) The Contractor may provide electronic working drawings in a Portable Document Format (PDF). The PDFs shall be sized to print on an 11 x 17 inch sheet of paper and have a minimum resolution of 300 dpi. Each sheet of the shop drawings shall have a space provided for an electronic stamp that measures 2.5 inches x 3.5 inches when printed.

- (2) Electronic working drawing files shall be named with the following file naming format:

Control Number_Brief Description_Date.pdf

For example: 12345_FloorDrains_12May2013.pdf

- (3) The project number, control number, and project location as it appears on the plans shall be shown on each sheet of the shop drawings. Structure numbers shall be included, if applicable.
- b. No electronic working drawings shall be submitted to the Engineer unless they have been checked by the Contractor. The electronic submittal shall be accompanied by a Contractor’s letter of approval in a PDF format. The letter of approval shall clearly indicate that the Contractor is responsible for any errors on the working drawings.
- c.(1) Electronic submittals shall be submitted by email to the following address:

DOR.ShopDrawings@nebraska.gov

- (2) Attachments shall be limited to 25 MB of data per email. Larger files shall be separated and sent in multiple emails.
- (3) Electronic working drawings will only be accepted from the Prime Contractor.

**LIABILITY INSURANCE
(A-55-0611)**

Subsection 107.13 in the Standard Specifications is void and superseded by the following:

107.13 – Liability Insurance

Prior to execution of the contract, the Contractor shall obtain insurance coverage to fully protect it from loss associated with the work, and have at a minimum the insurance described below:

1. General Liability:
Limits of at least:
 - \$ 1,000,000 per Occurrence
 - \$ 2,000,000 General Aggregate
 - \$ 2,000,000 Completed Operations Aggregate
 - \$ 1,000,000 Personal and Advertising Injury
- a. Contractor shall be responsible for the payment of any deductibles.
- b. Coverage shall be provided by a standard form Commercial General Liability Policy (CG0001 or equivalent) covering bodily injury, property damage including loss of use, and personal injury.
- c. The General Aggregate shall apply on a Per Project Basis.
- d. The State of Nebraska, Department of Roads, shall be named as an Additional Insured on a primary and non-contributory basis including completed operations for three (3) years after final acceptance and payment.
- e. Contractor agrees to waive its rights of recovery against the State of Nebraska, Department of Roads. Waiver of Subrogation in favor of the State of Nebraska, Department of Roads shall be added to the policy.
- f. Contractual liability coverage shall be on a broad form basis and shall not be amended by any limiting endorsements.
- g. If work is being performed near a railroad track, the 50' railroad right-of-way exclusion must be deleted.
- h. Products and completed operations coverage in the amount provided above shall be maintained for the duration of the work, and shall be further maintained for a minimum period of three years after final acceptance and payment.
- i. Coverage shall be included for demolition of any building or structure, collapse, explosion, blasting, excavation and damage to property below surface of ground (XCU coverage).

- j. Policy shall not contain a total or absolute pollution exclusion. Coverage shall be provided for pollution exposures arising from products and completed operations as per standard CG0001 Pollution Exclusion or equivalent. If the standard pollution exclusion as provided by CG0001 has been amended, coverage must be substituted with a separate Pollution Liability policy of \$1.0 million per occurrence and \$2.0 million aggregate. If coverage is provided by a “claims made” form, coverage will be maintained for three years after project completion. Any applicable deductible is the responsibility of the Contractor.
2. Automobile Liability:
Limits of at least:
\$ 1,000,000 CSL per Accident
- a. Coverage shall apply to all Owned, Hired, and Non-Owned Autos.
 - b. If work is being performed near a railroad track, the 50-foot railroad right-of-way exclusion must be deleted.
 - c. Contractor agrees to waive its rights of recovery against the State of Nebraska, Department of Roads. Waiver of Subrogation in favor of the State of Nebraska, Department of Roads, shall be added to the policy.
 - d. Automobile liability coverage shall be obtained from an insurance carrier who is licensed with the Nebraska Department of Insurance.
3. Workers' Compensation:
Limit: Statutory coverage for the State where the project is located.
Employer's Liability limits: \$500,000 Each Accident
\$500,000 Disease – Per Person
\$500,000 Disease – Policy Limit
- a. Contractor agrees to waive its rights of recovery against the State of Nebraska, Department of Roads. Waiver of Subrogation in favor of the State of Nebraska, Department of Roads shall be added to the policy.
 - b. Workers' compensation coverage shall be obtained from an insurance carrier who is licensed with the Nebraska Department of Insurance.
 - c. Where applicable, the Longshore and Harborworkers Compensation Act endorsement shall be attached to the policy.
4. Umbrella/Excess:
Limits of at least:
\$1,000,000 per Occurrence
- a. Policy shall provide liability coverage in excess of the specified Employers Liability, Commercial General Liability and Automobile Liability.
 - b. The State of Nebraska, Department of Roads, shall be an “Additional Insured.”
 - c. Contractor agrees to waive its rights of recovery against the State of Nebraska, Department of Roads. Waiver of subrogation in favor of the State of Nebraska, Department of Roads shall be provided.

5. Pollution Liability:
 - a. When “hazardous wastes” or contaminated or polluted materials must be handled and/or moved, the Contractor shall obtain Pollution Liability Coverage with minimum limits of \$1,000,000 per occurrence and \$2,000,000 aggregate.
 - b. If, during the course of construction, hazardous wastes, contaminated or polluted material are discovered on the project, the Contractor shall immediately cease any operation that may disturb these materials, and shall immediately notify the Engineer of all facts related to the discovery of these materials.
 - c. Unforeseen work related to the discovery of hazardous, contaminated or polluted materials on the project, and the extra cost, if any, of pollution liability coverage will be handled as “extra work.”
6. Additional Requirements:
 - a. The Contractor shall provide and carry any additional insurance required by the Special Provisions.
 - b. Except as otherwise provided herein, all insurance shall be kept in full force and effect until after the State releases the Contractor from all obligations under the contract.
 - c. If any of the work is sublet, equivalent insurance shall be provided by or on behalf of the subcontractor or subcontractors (at any tier) to cover all operations.
 - d. Any insurance policy shall be written by an insurance company with a Best’s Insurance Guide Rating of A – VII or better.
 - e. Prior to execution of the contract, Contractor shall provide the State of Nebraska, Department of Roads evidence of such insurance coverage in effect in the form of an Accord (or equivalent) certificate of insurance executed by a licensed representative of the participating insurer(s). Certificates of insurance shall show the Nebraska Department of Roads as the certificate holders.
 - f. For so long as insurance coverage is required under this agreement, the Contractor shall have a duty to notify the Department when the Contractor knows, or has reason to believe, that any insurance coverage required under this agreement will lapse, or may be cancelled or terminated. The Contractor must forward any pertinent notice of cancellation or termination to the Department at the address listed below by mail (return receipt requested), hand-delivery, or facsimile transmission within 2 business days of receipt by Contractor of any such notice from an insurance carrier. Notice shall be sent to:

Nebraska Department of Roads
Construction Division --- Insurance Section
1500 Highway 2, P.O. Box 94759
Lincoln, NE 68509-4759
Facsimile No. 402-479-4854
 - g. Failure of the owner or any other party to review, approve, and/or reject a certificate of insurance in whole or in part does not waive the requirements of this agreement.

- h. The limits of coverage set forth in this document are suggested minimum limits of coverage. The suggested limits of coverage shall not be construed to be a limitation of the liability on the part of the Contractor or any of its subcontractors/tier subcontractors. The carrying of insurance described shall in no way be interpreted as relieving the Contractor, subcontractor, or tier subcontractors of any responsibility or liability under the contract.
- i. If there is a discrepancy of coverage between this document and any other insurance specification for this project, the greater limit or coverage requirement shall prevail.

AWARD AND EXECUTION OF CONTRACT

The first sentence of Subsection 103.04 in the Standard Specifications is void and superseded by the following:

The bidder to whom the contract is awarded shall furnish within 10 days after the award, a contract bond, in a sum equal to the full amount of the contract.

The first sentence of Subsection 103.05 is void and superseded by the following:

The contract shall be signed by the successful bidder and returned, together with a satisfactory bond, within 10 days from the date of award.

Paragraph 1.a. of Subsection 103.06 is void and superseded by the following:

- a. Fails to file an acceptable performance bond within 10 days from the date of award.

CONSTRUCTION DETAILS

FUEL COST ADJUSTMENT PAYMENT (B-1-0708)

Paragraph 16.a. of Subsection 205.05 in the Standard Specifications is amended to provide that the references to fuel cost fluctuation will be 5% instead of the 10% shown.

The fuel use factor, "F", shown in Paragraph 16.c. of Subsection 205.05 is void and superseded by the following:

F = English

The fuel use factor for diesel fuel, in gallons per cubic yard. For the items of work "Excavation", "Excavation, Borrow", and "Excavation, Established Quantity", "F" shall be equal to 0.20. For the item of work "Earthwork Measured in Embankment", "F" shall be equal to 0.27.

Metric

The fuel use factor for diesel fuel, in liters per cubic meter. For the items of work "Excavation", "Excavation, Borrow", and "Excavation, Established Quantity", "F" shall be equal to 0.99. For the item of work "Earthwork Measured in Embankment", "F" shall be equal to 1.32.

Paragraph 16.d. of Subsection 205.05 is void and superseded by the following:

- d. The allowable price differential, "D", for the current estimate will be computed according to the following formula:

When the current price, P, is greater than the base price, P(b).

$D = P - 1.05P(b)$, but not less than zero.

When the current price, P, is less than the base price, P(b).

$D = P - 0.95P(b)$, but not greater than zero.

WATER (B-1-0307)

Paragraph 4.a. of Subsection 205.04 in the Standard Specifications is amended to include the following:

Payment shall be made at the established contract unit price.

EXCAVATION AND EMBANKMENT (B-1-0212)

Paragraph 6. of Subsection 205.02 in the Standard Specifications is void and superseded by the following:

6. Frozen Layers:
 - a. Thin Frozen Layer. A thin soil layer that freezes during the construction of an embankment may remain provided that the layer:
 - (i) had proper density and moisture prior to freezing,
 - (ii) can be readily broke up by a single pass of a tamping (sheepsfoot) roller or track mounted excavator,
 - (iii) is thoroughly scarified into pieces having a single dimension of 3 inches or less, and a second dimension of ½ inch or less, and
 - (iv) is not within 10 inches (measured vertically) of any thin frozen layer that was previously scarified and left in place.
 - b. Thick Frozen Layer. A soil layer that freezes during the construction of an embankment, but does not meet the Thin Frozen Layer requirements:
 - (i) may remain in the embankment provided that the layer is thawed and has proper density and moisture after thawing, or
 - (ii) shall be completely removed from the embankment prior to placing any additional embankment material.

**TEMPORARY WATER POLLUTION CONTROL
(B-3-0509)**

Section 204 in the Standard Specifications is void.

**CONSTRUCTION STORMWATER MANAGEMENT CONTROL
(B-3-0509)**

General

1. This Section defines some best management practices (BMPs) for erosion and sediment control measures and construction practices the Contractor shall use to prevent soil erosion and avoid water pollution.
2. The Contractor shall exercise every reasonable precaution throughout the life of the contract to prevent silting of the waters of the state, the project site, and adjacent property. Construction of drainage facilities, as well as performance of other contract work which will contribute to the control of siltation, shall be carried out in conjunction with earthwork operations or as soon thereafter as is practicable.
3. a. The Contractor shall take sufficient precautions to prevent pollution of the waters of the state, the project site, and adjacent property with construction debris, petroleum products, chemicals, or other harmful materials.
b. The Contractor shall conduct and schedule the operations to avoid interference with any protected species.
c. The Contractor shall comply with all applicable statutes relating to pollution of the waters of the state and fish and game regulations.
4. All construction debris shall be disposed in a manner that it cannot enter any waterway. Excavation shall be deposited as to protect the waters of the state from siltation.
5. The erosion and sediment control measures shall continue until the permanent drainage facilities have been constructed and the slopes are sufficiently vegetated to be an effective erosion deterrent or until tentative acceptance of the work.
6. All erosion and sediment control measures shall be properly maintained by the Contractor.
7. All erosion and sedimentation resulting from the Contractor's operations and the weather conditions must be corrected by the Contractor.

LIMITATION OF OPERATIONS (B-3-0509)

General

1. The maximum exposed surface area for the Contractor's operations in excavation, borrow, and embankment is 18 acres (72,800 m²) plus an equal area of clearing and grubbing/large tree removal. A written request for an increase in the maximum exposed surface area may be approved by the Engineer unless an equal amount of finished grading and seeding has been completed in the previously opened area. This approval will be based on the soil, moisture, seasonal conditions, the Contractor's operation, or other conditions.
2. The Engineer shall have the authority to reduce the maximum exposed surface area when any of the following conditions warrant:
 - a. Soil and moisture conditions are such that erosion is probable.
 - b. Seasonal conditions may force extended delays.
 - c. Proximity to the waters of the state require more stringent controls.
 - d. Equipment and personnel available on the job is not sufficient to properly maintain erosion and dust control measures.
 - e. Any other environmental condition in the area that may exist which would be affected by erosion from the project.
3. Construction operations in rivers, streams, wetlands, and impoundments shall be restricted to those areas specifically shown in the contract. Rivers, streams, wetlands, and impoundments shall be promptly cleared of all false work, piling, debris, or other obstructions placed therein or caused by the construction operations.
4. Fording and operation of construction equipment within live streams and wetlands will not be allowed, unless explicitly allowed in the contract.

CONSTRUCTION METHODS (B-3-0509)

General

1. The Contractor shall conduct all construction activities to control sediment and avoid soil erosion.
2. The Contractor shall incorporate all permanent erosion control features into the project at the earliest practicable time.
3. Construction stormwater management control measures for Contractor obtained construction work areas located outside the right-of-way, such as borrow pit operations, haul roads, plant sites, staging areas, equipment storage sites, etc. are the sole responsibility of the Contractor. All construction stormwater management control

measures for these areas are at the Contractor's expense. The Contractor is responsible for securing all required permits for use of these areas.

4. The construction stormwater management procedures contained herein shall be coordinated with any permanent erosion control measures specified elsewhere in the contract to the extent practical to assure economical, effective, and continuous erosion and sediment control throughout the construction period.
5. The Contractor shall be responsible to limit erosion and prevent siltation into the waters of the state during the construction period, as well as during the times that work may be suspended.
6. a. The installation of all erosion and sediment control items shall be installed by qualified personnel who are knowledgeable in the principles and practice of various BMP installations.
- b. The installation of all erosion and sediment control items shall be done under the direct supervision of the Contractor's NDOR-Certified Erosion and Sediment Control Inspector. The Contractor's NDOR-Certified Erosion and Sediment Control Inspector shall be present at each site during installation to direct and inspect all erosion and sediment control BMP installations.
- c. The Contractor shall notify the Engineer of all Contractor NDOR-Certified Erosion and Sediment Control Inspectors who will be on the project to direct and inspect all erosion and sediment control BMP installations.
- d. No payment will be made for any erosion and sediment control item unless a Contractor NDOR Certified Erosion and Sediment Control Inspector was present to directly supervise and inspect the work.
- e. No payment will be made for any erosion and sediment control item that is not properly installed. All erosion and sediment control items shall be installed as per the NDOR Standard Plan or the manufacturer's instructions.

ENVIRONMENTAL COMMITMENT DOCUMENT (B-3-0509)

General

This specification establishes the required documentation included in the Environmental Commitment Document and Project Erosion and Sediment Control Inspection. The Department and the Contractor, as co-permittees, will comply with all conditions required by the current NPDES Construction Storm Water General Permit.

Environmental Commitment Document

1. An Environmental Commitment Document will be created by the Department to identify all project specific environmental commitments, when applicable.
 - a. (Pre-Bid) The Department will provide information related to commitments made for but not limited to:
 - i. Storm Water Pollution Prevention Plan.

- ii. U. S. Army Corps of Engineers 404 Permit.
 - iii. Nebraska Department of Environmental Quality 401 Water Quality Certification.
 - iv. State Title 117 Waters (COE Non-Jurisdictional).
 - v. Floodplain Permit.
 - vi. Historic Clearance.
 - vii. Threatened & Endangered Species Clearance.
 - viii. FHWA Environmental Clearance.
 - ix. NPDES Construction Stormwater Permit (within Right-of-Way limits, only).
 - x. Conservation Measures.
 - xi. Migratory Bird Treaty Act.
 - xii. Other pertinent issues.
- b. (Post-Bid) The Contractor shall provide the following information that will be included in the Environmental Commitment Document but not limited to:
- i. Temporary Erosion Control Plan.
 - ii. Spill Prevention and Control Plan.
 - iii. Name and telephone number of the Contractor's representative responsible for the Environmental Commitments.
 - iv. Name and telephone number of the employees that are NDOR-Certified Erosion and Sediment Control Inspectors.
 - v. Construction Schedule/Critical Path.

Temporary Erosion Control Plan

1. The Contractor shall prepare and submit the Temporary Erosion Control Plan prior to the start of any work. The Contractor shall not begin work until the Temporary Erosion Control Plan has been submitted to the Engineer and appropriate erosion control measures are in place. Payment for any work on the contract will be withheld if erosion control measures are not in place or properly maintained.
2. The submittal of the Temporary Erosion Control Plan, the approval to increase the maximum surface area, or any payment for or acceptance of any or all of the work shall not operate as a waiver of the Contractor's responsibility under this specification.
3. The Temporary Erosion Control Plan shall be amended as work progresses and site conditions change.
4. The Temporary Erosion Control Plan will be reviewed at the project progress meeting. All active Contractors will have their Inspectors present, and work as a team to determine Temporary Erosion Control BMP's as they are needed.
5. Payment for preparing the Temporary Erosion Control Plan is subsidiary to items that direct payment is made.

Spill Prevention and Control Plan

1. The Contractor shall prepare and submit the Spill Prevention and Control Plan prior to the start of any work. The Contractor shall not begin work until the Spill Prevention and Control Plan has been submitted to the Engineer and appropriate Spill Prevention and Control measures are in place.
 - a. Spill Prevention and Control Plan should clearly state measures to stop the source of the spill, contain the spill, clean up the spill, dispose of contaminated materials, and train personnel to prevent and control future spills.
 - b. Spill Prevention and Control Plans are applicable to construction sites where hazardous wastes are stored or used. Hazardous wastes include, but not limited to: pesticides, paints, cleaners, petroleum products, fertilizers, and solvents.
2. The Spill Prevention and Control Plan will be included in the Environmental Commitment Document.
3. Direct payment will not be made for the Spill Prevention and Control Plan.

Storm Water Pollution Prevention Plan (SWPPP)

1. The Contractor shall comply with all conditions required by the current NPDES Construction Storm Water General Permit.
2. The Department will prepare the NDOR Project SWPPP for construction activities causing a land disturbance within the Right-of-Way, temporary easements, and permanent easements of one (1) acre or more.
 - a. Areas of construction support activities located on private property, obtained by the Contractor, are not included in the NDOR Project SWPPP.
3. The Engineer and the Contractor will perform inspections as required by the current NPDES Construction Storm Water General Permit. Payment for project inspection is subsidiary to items that direct payment is made.
4. The SWPPP will be maintained and updated by the Engineer as work progresses and site conditions change, to accurately describe the BMPs that are currently in place.
5. The Contractor's participation in SWPPP inspections, maintenance and updates shall begin on the first day construction activities cause land disturbance and end on the date of project completion as evidenced as the completion date in the District Engineer's Letter of Tentative Acceptance.

Project Erosion and Sediment Control Inspection

1. Inspections must be conducted by a NDOR-Certified Erosion and Sediment Control Inspector. The Contractor and the Engineer shall conduct inspections in accordance with the NPDES Construction Storm Water General Permit.

2. The NDOR-Certified Erosion and Sediment Control Inspector certification is obtained by completing an erosion and sediment control inspector training course provided by the Nebraska Department of Roads and passing the examination that accompanies the training.
3. The Contractor's NDOR-Certified Erosion and Sediment Control Inspector shall be responsible for ensuring that all BMPs are installed in accordance with NDOR Specifications, Special Provisions, NDOR Standard Plans, or the manufacturers' recommended installation instructions. The Contractor's NDOR-Certified Erosion and Sediment Control Inspector shall be capable of reading and interpreting these documents. The Inspector shall be familiar with product and structural BMPs. The Contractor's NDOR-Certified Erosion and Sediment Control Inspector is required to inspect, assess, and supervise the maintenance of erosion and sediment control BMPs to ensure compliance with the NPDES Construction Storm Water General Permit while preserving BMP functionality.
4. Payment for project inspection is subsidiary to items that direct payment is made.

ENVIRONMENTAL COMMITMENT DOCUMENT ENFORCEMENT (B-3-0509)

General

1. This specification establishes a disincentive assessment for the Contractor's failure to comply with Environmental Commitments.
2. Deficiencies are described but not limited to:
 - a. Failure to install pollution prevention control BMPs as work progresses or as described in the SWPPP.
 - b. Failure to maintain existing pollution prevention control BMPs.
 - c. Failure to remove non-functioning pollution prevention control BMPs.
 - d. Failure to comply with U. S. Army Corps of Engineers 404 Permit requirements.
 - e. Failure to comply with NPDES Construction Storm Water General Permit requirements.
 - f. Failure to comply with all applicable statutes relating to pollution of the waters of the state.
 - g. Exceeding the maximum exposed surface area for excavation of 18 Acres without written request for permission and written approval.
 - h. Failure to comply with Plans, Specifications, and Contract requirements for the Environmental Commitment Document.

Conditions

1. a. The count of Working Days and Calendar Days shall continue during the time period that corrective work is being performed.
 - i. Delays to the project as a result of the Contractor conducting corrective actions for the Environmental Commitment Document shall not constitute a valid reason for an extension of the contract time allowance.
- b. The Contractor shall begin maintenance operations, provide adequate equipment and personnel, and diligently pursue the work without cessation until all deficiencies have been corrected.

Corrective Actions

1. a. Deficiencies shall be corrected within seven calendar days of notification. When deficiencies are not corrected within seven calendar days, the Engineer will make a disincentive assessment to the contract as stated herein.
2. If soil, weather, or other conditions prevent the Contractor from completing the corrective actions within seven calendar days, the Contractor shall notify the Engineer in writing. The Contractor's letter shall state the reasons preventing corrective action within the time allowed. The Contractor shall propose a Corrective Action Plan within 48 hours. Corrective work shall continue while the Plan is developed. The Contractor's Corrective Action Plan must contain a course of action and a time frame for completion. If the reasons and the Corrective Action Plan are acceptable to the Engineer, the Contractor will be allowed to proceed with the plan as proposed without incurring a disincentive assessment. If work described in the approved Corrective Action Plan does not commence as proposed, the Engineer may immediately invoke the NDOR Environmental Commitment Control Deficiency Notification Shut-Down Notice.
3. The Engineer may require the Contractor to provide a written Procedures Plan. The Procedures Plan shall detail the process to prevent reoccurrence of deficiencies. The written Procedures Plan shall be provided within seven calendar days of the request. Failure to correct all deficiencies and provide a Procedures Plan may result in payments being withheld until such time that procedures are outlined.

Notification

1. Deficiencies will be documented using the NDOR Environmental Commitment Deficiency Notification Form and the Corrective Action Log.
2. Initial Notice:
 - a. The Initial Notice will notify the Contractor of Environmental Commitment deficiencies and direct that they be corrected.
 - b. If all corrective work is completed within the time allowance shown in the initial notice or time shown in the Contractor's approved Corrective Action Plan, a disincentive assessment will not be imposed upon the Contractor.

3. Shut-Down Notice:
 - a. If all corrective work identified in the Corrective Action Log attached to the Initial Notice has not been completed at the end of the seventh calendar day after the Initial Notice Date, a Shut-Down Notice will become effective on the eighth calendar day after the Initial Notice Date.
 - b. All current operations shall cease as of the date and time cited by the Shut-Down Notice. The Contractor shall only work on Environmental Commitment deficiencies. After the Shut-Down Notice, the penalty day assessment will be counted as a Calendar Day.

Disincentive Assessments

1. If the corrective work is not complete within seven Calendar Days after the Initial Notice, a disincentive assessment of \$250.00 per Deficiency Location per Calendar Day for each Deficiency Location remaining uncorrected will begin on the eighth calendar day after the Initial Notice Date and continue through and count the day the last corrective work was completed for each Deficiency Location.

Corrective Action Incentive

1. The Contractor shall comply with the NPDES Construction Storm Water General Permit to correct all pollution prevention control deficiencies within 7 calendar days from when the Contractor was notified of the Environmental Commitment deficiencies and prior to the next storm event. The Contractor shall begin maintenance operations, provide adequate equipment and personnel, and diligently pursue the work --- without cessation --- until all deficiencies have been corrected.
2. The Department will pay an incentive as outlined in Table A when the Contractor is notified by the Environmental Commitment Deficiency Notification and Corrective Action Log and commences work to correct deficiencies resulting from a storm event that exceeded 0.50 inch of rain. One payment per notification will be made. Multiple deficiencies may be included in one notification.

Table A	
Corrective Action Incentive Payment Schedule	
Incentive to commence corrective work within:	
24 Hours of Notification	\$300.00
48 Hours of Notification	\$200.00

3. An incentive payment will not be paid if corrective work does not commence as outlined in Table A and completed within 7 days, or if an unscheduled visit coincides with a normally scheduled visit.
4. An incentive payment will not be paid for scheduled maintenance visits, expected to occur every 14 days, or pollution prevention BMP installations, maintenance, and removals required due to daily Contractor operations.

5. Immediate Action Deficiencies are not eligible for incentive payment.

Immediate Action Deficiencies

1. Deficiencies that pose an imminent threat to the environment are considered an emergency situation. These deficiencies will be identified in the Immediate Action Deficiencies section of the Environmental Commitment Notification Form. The corrective work for Immediate Action Deficiencies shall begin immediately and continue without cessation until completed.
2. The Contractor will be assessed a disincentive assessment of \$500.00 per Deficiency per Calendar Day for failure to begin corrective actions or failing to continue to completion.
3. Examples of Immediate Action Deficiencies include but not limited to:
 - a. Threatened & Endangered Species habitat protection deficiencies
 - b. U. S. Army Corps of Engineers 404 Permit Noncompliance
 - c. Petroleum Spills/Tank Leakage
 - d. Hazardous Material Spills

Rights Reserved

1. The Department reserves the right to initiate and perform corrective action on any deficiencies and then assess the costs to perform the work against the Contractor.
2. The Contractor shall be liable to the Department for any and all costs incurred by the Department as a result of the Contractor's actions, inactions, or for failure to comply with the NPDES Construction Storm Water General Permit, U. S. Army Corps of Engineers 404 Permit, or any other applicable permit.
3. It is expressly understood that the provisions of this specification will not relieve the Contractor of his/her responsibilities nor shall it relieve the surety of its obligation for and concerning any just claim.

REMOVE AND RESET MAILBOX

Section 921 in the Standard Specifications is amended to include the removal and resetting of mailboxes. This work will consist of removing the existing mailboxes and posts and reset them to original conditions at the locations shown in the plans, or directed by the Engineer. The Contractor will be required to replace any parts damaged during the removal and resetting process at no additional cost to the State.

Subsection 921.01 is void.

Paragraph 1. of Subsection 921.05 is amended to include the following:

Pay Item	Pay Unit
Remove and Reset Mailbox	Each (ea)

ESTABLISH PROPERTY CORNER

This work shall consist of establishing property corners as directed by the Engineer.

All work shall be performed under the direct supervision of a land surveyor registered to practice in the State of Nebraska. The surveyor shall prepare plats in accordance with Nebraska Survey Laws, and submit these plats with the survey. The survey and plats shall be filed with the County Surveyor, and/or the County Clerk, the City Engineer, the Department's District Office, and the Deputy State Surveyor at the Department of Roads Lincoln headquarters.

The work shall be measured and paid for on a one each basis for the item "Establish Property Corner". This price shall be considered full compensation for all research, materials, equipment, labor, tools and incidentals required to complete the work.

RE-ESTABLISH PROPERTY CORNER

This work shall consist of establishing ROW breaks and re-establishing existing property corners as directed by the Engineer.

All work shall be performed under the direct supervision of a land surveyor registered to practice in the State of Nebraska. The surveyor shall prepare plats in accordance with Nebraska Survey Laws, and submit these plats with the survey. The survey and plats shall be filed with the County Surveyor, and/or the County Clerk, the City Engineer, the Department's District Office, and the Deputy State Surveyor at the Department of Roads Lincoln headquarters.

The work shall be measured and paid for on a one each basis for the item "Re-Establish Property Corner". This price shall be considered full compensation for all research, materials, equipment, labor, tools and incidentals required to complete the work.

SUBGRADE PREPARATION (C-1-0307)

Paragraph 2.a. of Subsection 302.03 in the Standard Specifications is amended to include that trimming on narrow, irregular or roadway grading of 1/2 mile (0.8 km) or less may be accomplished using conventional methods.

BITUMINOUS FOUNDATION COURSE (C-2-0708)

Paragraph 2.b. of Subsection 307.02 in the Standard Specifications is void and superseded by the following:

2. b. All salvaged bituminous material must be less than 3 inches (75 mm) in maximum dimension and shall not contain more than 5 percent by weight of material retained on a 2-inch (50 mm) sieve just prior to its use.
 - (1) Contractor Production
 - (i) All salvaged bituminous material produced by the Contractor from pavement removal or by cold milling material from the existing pavement structure on the project, whether hauled directly to the

site of use or temporarily stockpiled, shall be screened to meet the requirements of Paragraph 2.b.

- (ii) If, after screening, there is insufficient material to produce the plan quantity, the Engineer may order the oversized salvaged bituminous material to be further processed at no cost to the State prior to delivery to the roadway. Processing shall mean crushing, pulverizing, re-screening, or a combination of these methods.
- (iii) On projects that allow multiple foundation course materials to be used, the Engineer may direct that the remaining salvaged bituminous material continue to be placed for bituminous foundation course to the extent this material is available and can be utilized on the project.
- (iv) Unless otherwise shown in the plans or special provisions, all Contractor produced salvaged bituminous material including oversized remaining at the end of the bituminous foundation course operation shall become the property of the Contractor and removed from the project.

(2) State Provided Stockpiles

- (i) If the salvaged bituminous material is to be obtained from existing stockpiles described in the special provisions or the plans, the salvaged bituminous material shall be screened to meet the requirements of Paragraph 2.b. prior to delivery to the roadway. Any oversized bituminous material remaining from the screening operation shall remain the property of the State.
- (ii) If, after screening, there is insufficient material to produce the plan quantity, the Engineer may order the oversized bituminous material to be further processed prior to the delivery to the roadway. Processing shall mean crushing, pulverizing, re-screening, or a combination of these methods.

Paragraph 2.b.(3) of Subsection 307.03 is void and superseded by the following:

- (3) The Department shall monitor the rolling pattern with a nuclear density gauge, testing and recording the density every ½ mile (0.8 km). Additional testing of separately placed irregular areas shall be performed as directed by the Engineer.

Paragraph 2.b.(5) of Subsection 307.03 is void.

Method of Measurement

Subsection 307.04 is amended to include the following:

- 4. a. Screening of salvaged bituminous material will not be measured for payment.
- b. Processing of Contractor produced salvaged bituminous material, ordered by the Engineer, which contains excessive oversized material due to the Contractor's production methods, will not be measured for payment.

Basis of Payment

Paragraph 6. of Subsection 307.05 is void and superseded by the following:

6. Screening of salvaged bituminous material shall be considered subsidiary to the bituminous foundation course item.
7. Processing of salvaged bituminous material, ordered by the Engineer, which contains excessive oversize material due to the Contractor's production methods, shall be considered subsidiary to the bituminous foundation course item.
8. If the Contractor is required to reprocess the oversized bituminous material from State stockpiles, the work of reprocessing will be paid for as "extra work".
9. Payment is full compensation for all work prescribed in this Section.

AGGREGATE FOUNDATION COURSE-D (C-3-1109)

Amend Section 307 of the Standard Specifications to include Aggregate Foundation Course-D.

1. Material Requirements
 - a. Foundation Course-D shall consist of mineral aggregate.
 - b. Aggregate shall conform to the quality requirements of Subsection 1033.02, Paragraphs 1., 2., and 9.
 - c. At least 14 days before beginning foundation course production, the Contractor shall submit a proposed mix design along with a 50 pound (23 kg) sample of each aggregate to the NDR Materials and Research laboratory for approval. The mix design will:
 - (1) Result in an aggregate mix that meets the gradation requirements of Table 1.
 - (2) Propose single defined values for the percentage passing each sieve on the gradations of Table 1.
 - (3) Include the average aggregate(s) gradations used to calculate the mix design.
 - (4) Create a fine aggregate angularity value of 43.0 or greater. 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 μ m) sieve as defined in AASHTO T 304 Method A, except the specific gravity material shall be washed over the No. 100 (150 μ m) sieve.
 - d. The NDR Materials and Research laboratory will determine the specific moisture-density values for the proposed foundation course design.

Table 1

Aggregate Foundation Course-D Gradation Requirements		
Sieve Size	Target Value (Percent Passing)	Tolerance
1/2 in (12.5 mm)	100	0
3/8 in (9.5 mm)	100	-4
No. 4 (4.75 mm)	93	±4
No. 10 (2.0 mm)	55	±10
No. 30 (600 µm)	25	±5
No. 40 (425 µm)	20	±4
No. 200 (75 µm)	3	±3

2. Construction Methods

- a. The Contractor shall place compact and profile the foundation course as shown in the plans.
- b. The foundation course shall be spread in a uniform layer and compacted to at least 100 percent of the maximum density as determined by AASHTO T 99.
- c. After compaction the foundation course shall be trimmed such that the thickness will not vary from the plan thickness by more than 1/2 inch (12.5 mm).

**CRUSHED CONCRETE FOUNDATION COURSE
(C-4-0212)**

Section 307 of the Standard Specifications is amended to include the following:

All samples, including field samples, will be washed sieve. All samples will be taken from the project grade prior to spreading and trimming. Material represented by samples with 15 percent or more passing the No. 200 (75 µm) sieve will be subject to removal.

Paragraphs 3.b. and 3.c. of Subsection 307.02 of the Standard Specifications are void.

Paragraph 3.d. of Subsection 307.02 of the Standard Specifications is void and superseded by the following:

The crushed concrete gradation shall be determined as prescribed in NDR T 27 (washed test). The target gradation requirement for the crushed concrete foundation course is shown below:

Material gradation will be accepted by the table below on a lot basis of 2500 cubic yards on the average of 5 consecutive tests, one for each 500 cubic yard subplot. If at the end of the project, the final lot consists of less than 2500 cubic yards, a minimum of 3 samples, or 1 sample for each 500 cubic yards or fraction thereof, whichever is greater shall be taken and tested and acceptance based on the average of those tests.

Crushed Concrete Foundation Course Gradation Requirements	
Sieve Size	(Percent Passing)
1½ inch (37.5 mm)	100 minimum
¾ inch (19.0 mm)	85 maximum
No. 4 (4.75 mm)	20 to 50
No. 200 (75 µm)	0 to 8

Paragraph 3.a. of Subsection 307.03 of the Standard Specifications is amended to include the following:

- a. (1) The Contractor shall roll the crushed concrete foundation course until no further compaction can be obtained and all roller marks are eliminated.
- (2) The Department will establish a rolling pattern for the project and set a density range.
- (3) The Department shall monitor the rolling pattern with a nuclear density gauge, testing and recording the density every 1/2 mile (0.8 km). Additional testing of separately placed irregular areas shall be performed as directed by the Engineer.
- (4) The Contractor shall take immediate action to correct the foundation course density if any density measurements are outside of the specified range.

GRAVEL EMBEDMENT

This work shall consist of spreading a two inch layer of gravel over the surface of the roadbed, as shown in the plans, scarifying to uniformly blend the gravel into the upper four inches of the subgrade soil and compacting the area with a sheepsfoot roller until firm and stable as determined by the Engineer.

Water shall be added as necessary to facilitate compaction.

Gravel for embedment shall conform to the requirements of Gravel Surfacing in Paragraph 7. of Subsection 1033.02 of the Standard Specifications.

After the Gravel Embedment is completed, the Contractor shall place and spread approximately one inch of gravel on the roadway. Additional gravel shall be placed and spread during the life of the project if requested by the Engineer.

Gravel Embedment shall be measured by the Station measured horizontally along the project centerline, of completed and accepted work.

The work of scarifying and compacting the roadbed, will be paid for at the contract unit price per station for the item "Gravel Embedment". This price shall be full compensation for scarifying, smoothing, and compacting the subgrade and for all labor, equipment, tools and incidentals necessary to complete the work.

Provide for the measurement of Gravel Embedment in equivalent stations, this being the actual number of square feet of embedment divided by 2400.

Water will not be measured and paid for but shall be considered subsidiary to the Gravel Embedment.

Gravel used in the work of gravel embedment will be measured and paid for in accordance with Section 310 of the Standard Specifications.

FOUNDATION COURSE 4”

The Contractor shall have the option of using either Aggregate Foundation Course-D, Crushed Concrete Foundation Course or Bituminous Foundation Course; and the Contractor shall bid the pay item “Foundation Course” accordingly.

These different foundation courses may be used interchangeably throughout the project, with the exception being that the same type of foundation course shall be used across the entire width of a pavement section to provide uniform drainage across that template. The Contractor shall make every attempt to use the same type of foundation course in long paving runs and any changes in foundation course type shall be approved by the Engineer.

Regardless of the type of material used it shall be obtained from Contractor sources.

Regardless of the type of material used it shall be measured and paid for as Foundation Course 4”.

Method of Measurement

Foundation Course shall be measured as prescribed in Paragraph 3. of Subsection 307.04.

Paragraph 3. of Subsection 307.04 is amended to include the following: Any increased depth Foundation Course of more than 4 inches will not be measured for payment. Payment for such increased depth shall be considered as included within payment for Foundation Course 4”.

Basis of Payment

Amend Subsection 307.05 of the Standard Specifications to include the following:

- | | | |
|----|------------------------|-----------------|
| 1. | Pay Item | Pay Unit |
| | Foundation Course ____ | Square Yard |

STABILIZED SUBGRADE TYPE LIME

Description

The work of constructing the stabilized subgrade shall consist of reshaping the subgrade and constructing and compacting a eight inch layer to the widths shown in the plans, of pulverized soil from the subgrade, hydrated lime and water to provide a firm, stable foundation for the subsequent construction. The stabilized subgrade shall be constructed in conformity with the lines, grades, quantity and material requirements, and typical cross section shown in the plans. The item “Stabilized Subgrade Type Lime” was established for this project assuming cohesive soils may be utilized for the subgrade material. Subgrade material shall be submitted to NDR Materials and Research Division, Pavement Design Engineer, for evaluation prior to construction. If the NDR Material and Research Division determines that the material is non-cohesive; then the items “Hydrated Lime”, “Stabilized Subgrade Type Lime” and “Water” may be under-run in certain areas dependent upon the soil samples submitted for use in those areas.

Material Requirement

1. Pebble Quicklime or Hydrated lime shall conform to the requirements of ASTM C977. Pebble Quicklime may be used in lieu of Hydrated Lime if the dry placing method of application is used. If the Contractor elects to use Pebble Quicklime it shall be measured and paid as Hydrated Lime.
2. Water shall conform to the requirements of Section 1005 of the Standard Specifications.

Equipment

1. a. All equipment used in the work shall be adequate for the purpose for which it is to be used and shall be kept in satisfactory working order.
 - b. The Contractor shall furnish the necessary accessories and personnel and shall perform the tests and calibrations on the equipment under the supervision of the Engineer. In the event problems are encountered during the tests and calibrations, the Contractor shall arrange for a trained technician or company representative of the company from which the equipment was obtained to make the necessary repairs and/or adjustments to the equipment. Calibration shall be made as often as is deemed necessary by the Engineer, to insure accuracy of the equipment.
2. If hydrated lime is hauled in bulk, the boxes of the vehicles hauling the hydrated lime shall be tight and provided with a suitable covering to prevent loss of the material.
3. Distributors used for applying water shall conform to the requirements of Subsection 301.02.
4. When hydrated lime slurry is used for the treatment, the Contractor shall furnish facilities for preparing the hydrated lime slurry and accurately determining the quantities of lime and water used in the mixer.
5. Equipment for use in trimming stabilized subgrade shall conform to the requirements of Section 302.

Prosecution and Progress

The subgrade soil shall contain no frost and the atmospheric temperature shall be at least 40° F and rising.

Application of Hydrated Lime

1. Lime placement on the subgrade may be accomplished by the methods hereinafter described as "Dry Placing", or "Slurry Placing" at the Contractor's option. Prior to the placement of the lime, the subgrade shall be adjusted to the typical cross section shown in the plans. The quantity of lime to be applied shall be approximately 5% as determined by the Materials and Research Division Laboratory.
2. Dry Placing

After the subgrade has been adjusted to the typical cross section shown in the plans, the hydrated lime shall be placed on the surface of the subgrade and distributed in a layer of uniform thickness over the entire width of the area being treated. A spreading device for

distribution of the lime shall be required if using a powdered lime. The spreading device shall be capable of spreading the additive both laterally and longitudinally in an even and accurate manner. Spreading with a motorgrader will not be allowed. The lime shall not be placed on the subgrade when the wind is blowing so that the loss of lime cannot be satisfactorily controlled. After the lime has been uniformly distributed, it shall be sprinkled with water.

3. Slurry Placing

- a. A slurry shall be prepared by combining hydrated lime and water in a ratio of approximately one ton of hydrated lime to 500 gallons of water, either in a central mixing tank or directly in the tanks used for distribution. The mixing tank shall be equipped with means of agitating the slurry to provide a uniform mixture and prevent the lime from settling after mixing. Water shall be measured with a calibrated meter and the hydrated lime shall be weighed on approved scales or the quantity determined by a count of bags used.
- b. After the subgrade has been adjusted to the typical cross section shown in the plans, the hydrated lime slurry shall be applied to the surface of the subgrade by means of distributors equipped with means of agitating the slurry during hauling and spreading. The number of applications and the rate of application shall be such that the total application of residual lime per square meter shall be uniformly deposited over the entire width of the area being treated and the quantity of slurry in any one application shall be such that run-off will not take place. The surface of the material being treated may be lightly scarified by use of a spike-tooth harrow or other comparable equipment closely following the distributor of facilitate absorption and prevent run-off.

Construction Methods

1. Materials and quantities used on the job shall be same used for the Mix Design. Any change in the quantities, quality or Suppliers shall be approved by the Materials and Research Pavement Design Engineer prior to its use on the project.
2. The Contractor shall provide adequate protection for the lime against moisture. Lime shall be hauled or stored in suitable moisture proof dry bulk trailers or containers. The use of tarpaulins for the protection of the lime will not be allowed. Lime which has become caked or lumpy shall not be used. Lime which has been spilled shall not be used.
3. The subgrade mixing procedure shall be the same for "Dry Placing" or "Slurry Placing" as hereinafter described.
4. The portion of the roadbed being treated shall be trimmed to within ½ inch of the finished elevation by use of conventional equipment, then scarified to loosen the subgrade soil to the full width and depth of the lime treated subgrade. This work may be performed prior to, during or after the application of the lime, however, if prior to the application of the lime, the material being treated shall be broken down to the extent necessary to prevent the lime, insofar as practicable, from sifting or draining through the material to be treated, into the underlying subgrade. If necessary the larger chunks or pieces of soil shall be broken down by the use of disc harrows, sheepsfoot rollers or other suitable equipment.

5. Preliminary mixing of lime and water shall be accomplished throughout the scarified material with a machine capable of pulverizing the existing subgrade to the depth required by these specifications and to a minimum width of not less than 8 feet in a single pass operation. The pulverizing machine shall be capable of blending and mixing, to a homogeneous material, the pulverized subgrade with the lime and water. The machine shall be equipped with standard automatic depth controls and be capable of maintaining a constant depth and width. Care shall also be taken to avoid mixing the lime with a greater quantity of the subgrade soil than is required to build the compacted thickness specified. During the preliminary mixing, water shall be added to provide a moisture content in a range from optimum moisture content of the mixture to plus 5 percentage points. The optimum moisture content shall be determined by NDR T 99. Preliminary mixing shall be continued until all chunks of soil have been reduced to a maximum of 2 inch in size.
6. The material shall than be bladed into approximately the final cross section and rolled with pneumatic-tired rollers to seal in the moisture and to insure against excessive wetting from rain. The material shall be cured in this condition for a period of 48 hours in order for the reaction of the lime and water soften the remaining chunks of soil. The surface shall be lightly sprinkled during this period to compensate for evaporation loss.
7. Following the curing period, final mixing shall be performed with the pulverizing machine until the mixture is uniform throughout and chunks of soil have been broken down to the extent that all will pass a 1-inch sieve and not more than 30 percent will be retained on the No. 4 sieve. The moisture content at the completion of the mixing shall be within plus or minus two percentage points of the optimum moisture percentage, determined by NDR T 99.
8. After mixing, the material shall again be shaped to the proper cross section and compacted with sheepsfoot rollers. Final shaping with a motor grader and final rolling with pneumatic-tired rollers will then be accomplished. The size and weight of the sheepsfoot and pneumatic-tired roller shall be such that the attained density throughout the entire width and depth of the layer shall be not less than the compaction requirements shown in the plans, determined by NDR T 99. Water may be added during the compaction and finishing operations to compensate for evaporation loss.
9. a. After the required compaction has been attained, the subgrade shall be trimmed in accordance with the requirements of Subsection 302.03,
 - b. After the trimming operation has been completed, the surface of the stabilized subgrade shall be lightly sprinkled with water at frequent intervals to offset the effects of evaporation, for a period of 3 days. No construction traffic, except for water trucks, will be allowed on the surface of the stabilized subgrade during the curing period.
10. Any damage to the stabilized subgrade shall be repaired at the Contractor's expense.

Maintenance of the Compacted Subgrade

Maintenance of the lime treated subgrade shall be the responsibility of the Contractor until the material for the subsequent construction has been placed. Water used to maintain the subgrade after the 3-day curing period and the work of maintaining the subgrade, prior to the subsequent construction will not be paid for directly but shall be considered to be subsidiary to any or all of the items for which the contract provides that direct payment is to be made.

Sampling and Testing

Sampling and testing shall be completed according to Section 10 of the Materials and Tests Division Material Sampling Guide.

A minimum of one 100 pound sample(s) of subgrade soil and one 5 pound sample of the hydrated lime shall be submitted for mix design a minimum of 10 days prior to beginning the Stabilized Subgrade work. Additional subgrade soil samples shall be submitted for each type of soil used on the project.

Method of Measurement

1. Hydrated lime shall be measured by the ton of acceptable material used in the work.
2. Water used in preparing the slurry or which is applied as directed by the Engineer, except that used for maintenance of the lime treated subgrade after the 3-day curing period, will be measured as provided in Paragraph 2. of Subsection 302.04/
3. Stabilized Subgrade Type Lime paid for by the square yard is not measured directly. The overlying pavement is measured, and the pavement quantity is used as the stabilized subgrade quantity.

Basis of Payment

1. Hydrated lime that is used in the work, measured as provided herein, shall be paid for at the contract unit price per ton for the item, "Hydrated Lime". This price shall be full compensation for furnishing, delivering, and distributing the lime, for preparing the hydrated lime slurry, and for all equipment, labor, tools and incidentals necessary to complete the work.
2. Water used in preparing the slurry, or which is applied as directed by the Engineer, measured as provided herein, shall be paid for at contract unit price per Mgallon for the item "Water".
3. Stabilized Subgrade measured as provided herein, shall be paid for at the contract unit price per square yard for the item, "Stabilized Subgrade Type Lime". This price shall be full compensation for reshaping and trimming the subgrade, scarifying and pulverizing the subgrade soil, drying, mixing, shaping, and compacting the lime treated subgrade, for shaping and smoothing of surplus material on slopes or in waste areas, and for all material and services required.

TYPE B HIGH INTENSITY WARNING LIGHTS (D-6-0307)

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
(Type II Barricades, Reflectorized Drums, 42" (1070 mm) Reflective Cones, and
Vertical Panels)
(D-6-1112)**

Paragraph 2.d. of Subsection 422.03 in the Standard Specifications is void and superseded by the following:

- d. (1) Reflectorized drums used for traffic warning or channelization shall be constructed of lightweight, flexible, and deformable materials, be a minimum of 36 inches (900 mm) in height, and have a minimum width of 18 inches (450 mm), regardless of orientation. The predominant color of the drum shall be orange.
- (2) Steel drums shall not be used.
- (3) The markings on drums shall be horizontal, shall be circumferential, and shall display four 6-inch (150 mm) wide bands of retroreflective sheeting, alternating fluorescent orange - white – fluorescent orange - white. The fluorescent orange sheeting shall meet the luminance requirements of the following table.

FHWA Luminance Factor

Sheeting Type	Luminance Factor Y_T		
	Min	Max	Fluorescence Luminance Factor Limit, Y_F
Fluorescent Orange	25	None	15

- e. When approved by the Engineer or shown in the plans, 42" (1070 mm) reflective cones may be used in lieu of Type II Barricades or Reflectorized Drums. 42" (1070 mm) reflective cones shall include a 30-pound (14 kg) rubber base and display four 6-inch (150 mm) wide bands of retroreflective sheeting, alternating fluorescent orange - white - fluorescent orange - white. 42" (1070 mm) reflective cones shall not be used for lane-closure tapers or shifts.
- f. Rubber base-mounted 36-inch vertical panels shall not be used for channelization when the speed limit exceeds 40 miles per hour.

Paragraph 2.b. of Subsection 422.04 of the Standard Specifications is void and superseded by the following:

- b. (i) Type II Barricades, Reflectorized Drums, and 42" (1070 mm) Reflective Cones shall be counted as "Barricades, Type II" and measured for payment by the number of calendar days each is in place and positioned as shown in the plans or as directed by the Engineer.
- (ii) Vertical Panels shall be measured for payment as permanent "Sign Days" (by the each) by the number of calendar days each vertical panel unit is in place and positioned as shown in the plans or as directed by the Engineer.

Paragraph 2.c. of Subsection 422.04 of the Standard Specifications is amended to include Reflectorized Drums.

Paragraphs 3. and 4. of Subsection 422.05 of the Standard Specifications are void and superseded by the following:

3. a. The pay item "Barricade, Type II" is used to pay for three items ("Barricades, Type II", "42" (1070 mm) Reflectorized Cones", and "Reflectorized Drums").
- b. "Barricades, Type II", which includes "42" (1070 mm) Reflectorized Cones", and "Reflectorized Drums", is paid for as an "established" contract unit price item. The established unit price is identified on the "Schedule of Items" shown in the Proposal.
4. Payment for vertical panels includes all posts, brackets, or hardware necessary to install and maintain the vertical panel units.

WORK ZONE TRAFFIC CONTROL SIGNS (D-6-1212)

The Department has adopted the FHWA 2009 Manual of Uniform Traffic Control (MUTCD) and the 2011 Nebraska Supplement to the MUTCD as the official guidance for work zone traffic control signs. Many work zone traffic control signs have been revised, redesigned, or replaced in the 2009 MUTCD (and 2011 Nebraska Supplement). Accordingly, all work zone signs shall comply with the following:

- 1 - All signs, regardless of age, shall meet the design standards of the 2009 MUTCD (and 2011 Nebraska Supplement).

WET REFLECTIVE PREFORMED PAVEMENT MARKING TYPE 4- GROOVED (D-12-1208)

I. Description

This work shall consist of furnishing and installing retroreflective preformed patterned pavement markings in Contractor installed grooves in accordance with this provision and in reasonably close conformance to the dimensions and lines shown on the plans and/or required by the Engineer.

II. Materials - General

The preformed patterned markings shall consist of film with clear microcrystalline ceramic beads incorporated to provide immediate and continuing retroreflection during both wet and dry conditions. This film shall be manufactured without the use of lead chromate pigments or other similar, lead-containing chemicals.

Preformed words and symbols shall conform to the applicable shapes and sizes as outlined in the "Manual on Uniform Traffic Control Devices for Streets and Highways."

The preformed markings shall be capable of adhering to asphaltic cement concrete and Portland cement concrete by the use of a pre-coated pressure sensitive adhesive. A surface preparation adhesive may be used to precondition the pavement surface. The preformed markings shall conform to pavement contours by the action of traffic. The

pavement markings shall be capable of application on new, dense and open-graded asphalt concrete wearing courses during the paving operation in accordance with the manufacturer's instructions. After application, the markings shall be immediately ready for traffic. The bidder shall identify proper surface preparation adhesives (where necessary) to be applied at the time of application, all equipment necessary for proper application, and recommendations for application that will assure effective product performance. The preformed markings shall be suitable for use for one year after the date of receipt when stored in accordance with the manufacturer's recommendations.

III. **Surface Preparation**

The grooves for tape widths equal to or less than 8 inches shall preferably be made in a single, dry-cut pass. However, alternate (multiple pass) methods may be used, provided they produce the desired result --- a groove, the bottom of which has a fine corduroy or textured appearance, is of a uniform depth with no visible ridge(s), and does not significantly and obviously deviate from a plane. (If the tape manufacturer publishes any type of grooving and application guidelines, the Contractor shall provide the Engineer with the most current information available prior to commencing work and make reference to it.)

The equipment and method used shall be approved by the tape manufacturer and shall leave the cut groove ready for tape installation. If a course, tooth pattern is present, the Contractor shall increase the number of blades and decrease the number of spacers on the cutting head. If self-vacuuming equipment is not used, the groove shall be immediately vacuumed.

The pavement marking tape shall be placed in the grooves the same day the grooves are cut. Grooves shall be clean and dry prior to tape application. All conflicting pavement markings remaining after tape installation shall be removed; and this removal shall be subsidiary to the pavement marking.

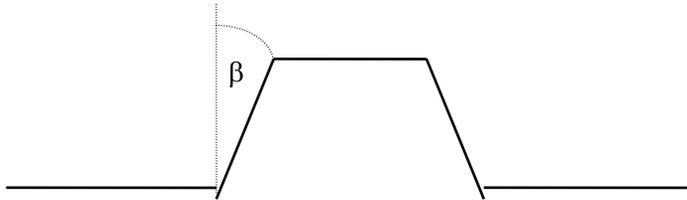
Groove width:	tape width + 1 inch to 2 inch max
Groove depth:	100 mils \pm 10 mils
Groove length:	full length of tape + required grooving transition
Groove position:	2 inches off of joint line (per plan)

IV. **Classification**

The markings shall be highly durable, retroreflective, pliant polymer materials designed for longitudinal and word/symbol markings subjected to high traffic volumes and severe wear conditions such as shear action from crossover or encroachment on typical longitudinal configurations such as edge lines and lane lines. The markings shall be capable of providing retroreflection during both wet and dry conditions.

V. **Composition and Retroreflectivity Requirements**

Composition: The retroreflective pliant polymer pavement markings shall consist of a mixture of high-quality polymeric materials, pigments and glass beads distributed throughout their base cross-sectional area, with a reflective layer of microcrystalline ceramic beads bonded to a durable polyurethane topcoat surface. The patterned surface shall have approximately 50% ± 15% of the surface area raised and presenting a near vertical face (β angle of 0° to 60°) to traffic from any direction. (See diagram below.) The channels between the raised areas shall be substantially free of exposed beads or particles.



Retroreflectance: The white markings shall have the initial expected retroreflectance values as shown in Table 1 under dry, wet, and rainy conditions. The photometric quantity to be measured shall be coefficient of retroreflected luminance (R_L) and shall be expressed as millicandelas per square foot per foot-candle $[(mcd \cdot ft^2) \cdot fc^{-1}]$. The metric equivalent shall be expressed as millicandelas per square meter per lux $[(mcd \cdot m^2) \cdot lx^{-1}]$.

Retroreflectance values shall be measured under dry conditions in accordance with the testing procedures of ASTM D4061.

Retroreflectance values shall be measured under wet conditions in accordance with ASTM E2176 or ASTM E2177. Wet retroreflectance values measured under a “condition of continuous wetting” (simulated rain) shall be in accordance with ASTM E2176. Wet retroreflectance values measured under a “condition of wetness” shall be in accordance with ASTM E2177.

Table 1
Expected Initial R_L under dry, wet, and rainy conditions

<u>Dry, Wet & Rainy</u>		
Entrance Angle	88.76°	88.76°
Observation Angle	1.05°	1.05°
Retroreflected Luminance	500	250
$R_L [(mcd \cdot m^2) \cdot lx^{-1}]$		

Note: The test instrument shall use an Entrance Angle of 88.76° and Observation Angle of 1.05° which represent a simulated driver viewing geometry at a 30 meter distance.

Beads: Index of Refraction: All “dry-performing” microcrystalline ceramic beads bonded to the polyurethane-coated, patterned surface of the material shall have a minimum index of refraction of 1.70 when tested using the liquid oil immersion method. All “wet-performing” microcrystalline ceramic beads bonded to the polyurethane-coated, patterned surface of the material shall have a minimum index of refraction of 2.30 when tested using the liquid oil immersion method. The glass beads mixed into the pliant

polymer shall have a minimum index of refraction of 1.5 when tested by the liquid oil immersion method.

Testing Procedure For Refractive Index of Beads By Liquid Immersion

Equipment Required:

1. Microscope (minimum 100X magnification)
2. Light source - preferably sodium light or other monochromatic source, but not absolutely essential
3. Refractive index liquids*
4. Microscope slide and slide cover
5. Mortar and pestle

*Available from R.P. Cargille Laboratories, Inc., Cedar Grove, NJ.

Procedure:

1. Using the mortar and pestle, crush a few representative beads and place a few of these crushed particles on a microscope slide.
2. Place a drop of a refractive index liquid, with an index as close to that of the glass as can be estimated, on the particles.
3. Cover the slide with a microscope slide cover and view the crushed particles by transmitted light normal to the slide surface (illuminated from the bottom).
4. Adjust the microscope mirror to allow a minimum light intensity for viewing. This is particularly important if sodium light is not used.
5. Bring a relatively flat and transparent particle into focus.
6. By slightly raising and lowering the objective (microscope tube), look for one or both of the following:
 - a. Becke Line - This light line will appear to move either into the particle or away from it. In general, if the objective is raised, the line will move toward the material of higher refractive index; if the objective is lowered, the line will move toward the material of lower index.
 - b. Variation in Particle Brightness - When raising the object from a sharp focus, the particle will appear to get brighter or darker than the surrounding field. If it becomes brighter, the glass has a higher refractive index than the liquid. If it becomes darker, the glass has a lower refractive index than the liquid. In both cases, the opposite will be true if the object is lowered.

7. This test can be used to confirm that the beads are above or below a specified index. It can also be used to give an accurate determination of the index (± 0.001). This is done by using several refractive index liquids until a match or near match of indices occurs. The index of the glass will equal that of the liquid when no Becke line and no variation in bead brightness can be observed.

The size and quality of the beads shall be such that the performance requirements for the retroreflective pliant polymer shall be met.

Acid Resistance: The beads shall show resistance to corrosion of their surface after exposure to a 1% solution (by weight) of sulfuric acid. The 1% acid solution shall be made by adding 5.7cc of concentrated acid into 1000cc of distilled water. **CAUTION:** Always add the concentrated acid into the water, not the reverse. The test shall be performed as follows:

Take a 1-inch x 2-inch sample, adhere it to the bottom of a glass tray and place just enough acid solution to completely immerse the sample. Cover the tray with a piece of glass to prevent evaporation and allow the sample to be exposed for 24 hours under these conditions. Then decant the acid solution (do not rinse, touch or otherwise disturb the bead surfaces) and dry the sample while adhered to the glass tray in a 150° F. (66° C.) oven for approximately 15 minutes.

Microscopic examination (20X) shall show no more than 15% of the beads having a formation of a very distinct opaque white (corroded) layer on their entire surface.

Color: The preformed markings shall consist of white film with pigments selected and blended to conform to standard highway colors.

Skid Resistance: The patterned surface of the retroreflective pliant polymer shall provide an initial average skid resistance value upon manufacturing of 45 BPN when tested according to ASTM E303 except values shall be taken in one direction and then at a 45° angle from that direction. These two values shall then be averaged to find the skid resistance of the patterned surface.

Patchability: The pavement marking material shall be capable of use for patching worn areas of the same type in accordance with manufacturer's instructions.

Thickness: The patterned material without adhesive shall have a minimum caliper of 0.065 inches (1.651mm) at the thickest portion of the patterned cross-section and a minimum caliper of 0.02 inches (.508mm) at the thinnest portion of the cross-section.



VI. Installation

The markings shall be applied in accordance with the manufacturer's installation instructions. Marking configurations shall be in accordance with the "Manual on Uniform Traffic Control Devices." Tape shall not be installed unless the surface and air temperatures are in compliance with the manufacturer's specifications.

The Contractor shall have on the project at all times during the application of the permanent pavement markings at least one employee with a valid American Traffic Safety Services Association (ATSSA) certification. The ATSSA certification may be for either a "Certified Pavement Marking Technician" or a "Certified Pavement Marking Specialist." The Contractor shall provide the Engineer a copy of the employee's certification prior to the beginning of work.

VII. Observation

Following initial completion of all pavement marking, there will be a 180 day observation period before final acceptance. During the observation period, the Contractor, at no expense to the Department of Roads, shall replace any markings that the Engineer determines are not performing satisfactorily due to defective materials and/or workmanship in manufacture and/or application. At the end of the observation period, the minimum required retention percentage for markings installed shall be 90%.

Determination of Percentage Retained - The percentage retained shall be calculated as the nominal area of the strip less the area of loss divided by the nominal area and expressed as a percentage of the nominal area. A claim, made by the State against the Contractor, shall be submitted to the Contractor in writing within 30 days after the 180-day observation period. When such a claim is made prior to August 1, the replacement material shall be installed during that same construction season. Replacement material for any claim after August 1, shall be installed prior to June 1, of the following year. Marking replacement shall be performed in accordance with requirement specified herein for the initial application, including but not limited to surface cleaning, sealer application, etc.

Final acceptance of all marking will include an inspection of the appearance of the markings during daylight and darkness. Any markings that fail to have a satisfactory appearance during either period, as determined by the Engineer, shall be reapplied at no expense to the Department of Roads.

Final acceptance of the pavement marking will be: (1) 180 days after the initial completion of all work, or (2) upon completion of all corrective work, whichever occurs last.

VIII. Contract Units and Basis for Payment

Subsection 423.04 of the 2007 Standard Specifications is amended to include the item: "_____ Wet Reflective Preformed Pavement Marking, Type 4, Grooved". The price shall be full compensation for grooving the pavement surface, furnishing and installing all markings, and for all materials (including adhesive), labor, tools, equipment and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
_____ Wet Reflective Preformed Pavement Marking, Type 4, Grooved	Linear Foot

**TEMPORARY TRAFFIC CONTROL FOR PERMANENT PAVEMENT MARKING
(D-13-1007)**

Paragraph 4. of Subsection 423.04 in the Standard Specifications is void.

**WET REFLECTIVE POLYUREA PAVEMENT MARKING, GROOVED
(D-17-0313)**

I. Description

This work shall consist of furnishing and installing wet night retroreflective polyurea pavement markings in accordance with this provision and in conformance to the dimensions and lines shown on the plans or established by the Engineer.

The wet reflective polyurea marking material shall be applied by spray method onto asphaltic cement concrete and Portland cement concrete surfaces. Following an application of glass beads or black aggregate, and upon curing, the resulting marking shall be an adherent reflectorized stripe of the specified thickness and width that is capable of resisting deformation by traffic.

The Contractor shall field verify the pavement marking quantities required for the project prior to purchasing materials. The Department will not be held responsible for the Contractor's shortage or surplus of material. The Contractor's verification of quantities and purchasing material shall not delay the project or the installation of pavement marking when required.

The polyurea pavement marking shall be applied in grooves cut into the surfacing. The grooves shall be made in a single pass dry cut; the equipment used shall be self-vacuuming and leave the cut groove ready for polyurea pavement marking application. The equipment and method used shall be approved by the polyurea pavement marking manufacturer. The polyurea pavement marking shall be applied in the grooves the same day as the cut. Grooves shall be clean and dry prior to polyurea pavement marking application. All conflicting pavement markings remaining after polyurea pavement marking application shall be removed; this removal shall be subsidiary to the pavement marking.

Groove width: pavement marking width + 1 inch to 2 inch maximum
Groove depth: per manufacturer's recommendations to a minimum of 60 mils
Groove length: full length of marking + required grooving transition
Groove position: 2 inches off of joint line (per plan)

Grooving of the surfacing shall be performed in accordance with the polyurea manufacturer's recommendations. Grooving the surfacing shall not be measured and paid for but shall be considered subsidiary to "_____ Wet Reflective Polyurea Pavement Marking, Grooved".

II. Materials

A. Polyurea

Composition Requirements:

Composition requirements are per manufacturer's specifications. The Wet Reflective Polyurea Pavement Markings approved for use are shown on the NDR Approved Products List. Markings which have not been previously approved by the Department will not be permitted on the project until approved by the Traffic Engineer.

Properties:

1. **Color and Weathering Resistance:** The mixed polyurea compound, white, yellow and black, when applied to a 3" x 6" aluminum panels at 15±1 mil in thickness with no glass beads or elements and exposed for 500 hours in a Q.U.V. Environmental Testing Chamber, as described in ASTM-G154, Cycle #1, shall conform to the following minimum requirements. The color of the white polyurea system shall not be darker than Federal Standard No. 595A-17778. The color of the yellow polyurea system shall conform to Federal Standard No. 595A-13538. The color of the black polyurea system shall conform to Federal Standard No. 595A-17038.
2. **Track-Free Time (Laboratory):** When tested in accordance with ASTM D 711, the polyurea marking material shall reach a track-free condition in 10 minutes or less for a 15 mil thickness. This test shall be performed with AASHTO Type 1 beads coated at a rate of 0.099 pounds per square foot. The track-free time shall not increase substantially with decreasing temperature.
3. **Adhesion to Concrete:** The polyurea coating, when tested according to ACI Method 503, shall have such a high degree of adhesion to the specified concrete surface that there shall be a 100% concrete failure in the performance of this test. The prepared specimens shall be conditioned at room temperature (75°± 2° F) for a minimum of 24 hours and maximum of 72 hours prior to the performance of the tests indicated.
4. **Adhesion to Asphalt:** The polyurea coating, when tested according to ACI Method 503, shall have such a high degree of adhesion to the specified asphalt surface that there shall be a 100% asphalt failure in the performance of this test. The prepared specimens shall be conditioned at room temperature (75°± 2° F) for a minimum of 24 hours and maximum of 72 hours prior to the performance of the tests indicated.

B. Reflective Media

The reflective media application shall incorporate a double drop technique to maximize wet night reflectivity and color. The reflective media used shall ensure the wet reflective polyurea pavement markings meet the reflectance performance requirements in Section II.D.3. The glass beads for drop-on application shall conform to the following requirements *or be an approved equivalent*.

1. Glass Beads

The required glass beads shall be a 60/40 blend (60% sinkers and 40% floaters) of AASHTO M 247-81 Type I gradation 1.5 index glass beads. The glass beads shall have a minimum of 70% Rounds as measured according to ASTM D1155. Crush Resistance shall be measured according to the procedures of ASTM D1213 and shall be a minimum of 30 pounds retained on US #40 Mesh.

Acid Resistance: A sample of glass beads supplied by the manufacturer shall show resistance to corrosion of their surface after exposure to a 1% solution (by weight) of sulfuric acid. The 1% acid solution shall be made by adding 5.7 cc of concentrated acid into 1000 cc of distilled water. CAUTION: Always add the concentrated acid into the water, not the reverse. The test shall be performed as follows:

Take a 1" x 2" sample, adhere it to the bottom of a glass tray and place just enough acid solution to completely immerse the sample. Cover the tray with a piece of glass to prevent evaporation and allow the sample to be exposed for 24 hours under these conditions. Then decant the acid solution (do not rinse, touch, or otherwise disturb the bead surfaces) and dry the sample while adhered to the glass tray in a 150° F (66° C) oven for approximately 15 minutes. Microscopic examination (20X) shall show not more than 15% of the beads having a formation of very distinct opaque white (corroded) layer on their entire surface.

2. Wet Reflective Media

Wet reflective media shall be approved for use by the polyurea manufacturer. The Wet Reflective Media approved for use are shown in the NDR Approved Products List.

C. Non-reflective Media

Black aggregate shall be broadcast to saturation on all black lines to provide a matte, non-reflective finish. The gradation of the black aggregate is as follows:

U.S. Sieve	Retained (%)
#20	17-37
#30	45-65
#40	14-25
Pan	0-1

D. Finished Markings

Because of normal variances in road surfaces, application processes and measurement, the properties of markings made from the materials specified herein will vary from one installation to the next. When the materials are applied according to the specifications in Section III, they shall be capable of forming markings with the following reproducibility of properties:

1. On-the-road Track-Free Time: When installed at 77° F and at a wet film thickness of 15±1 mils, the markings shall reach a no-track condition in less than 10 minutes. Track-free shall be considered as the condition where no visual deposition of the polyurea marking to the pavement surface is observed when viewed from a distance of 50 feet, after a free-rolling traveling vehicle's tires have passed over the line. The track-free time shall not increase substantially with decreasing temperature.
2. Skid Resistance: The average initial skid resistance shall be 45 BPN or greater when tested according to ASTM E303.
3. Retroreflectance – Initial retroreflectance are shown in the table below. Typical retroreflectivity averaged over many readings (mcd(ft-2)(fc-1)) metric equivalent (mcd(m-2)(lux-1)).

Average Minimum Initial Reflectance		
	White	Yellow
Dry (ASTM E1710)	500	350
Wet Recovery (ASTM 2177)	350	275
Wet Continuous (ASTM 2176)	100	75

- 3.1.1 Some reasonable variance should be expected (for example, application on very rough road surfaces or differences in glass beads).
- 3.1.2 The initial retroreflectance of a single installation shall be the average value determined to the measurement and sampling procedures outlined in ASTM D6359, using a 30-meter (98.4 feet) retroreflectometer. The 30-meter retroreflectometer shall measure the coefficient of retroreflected luminance, R_L at an observation angle of 1.05 degrees and an entrance angle of 88.76 degrees. R_L shall be expressed in units of millicandelas per square foot per foot-candle [mcd(ft²)(fc⁻¹)]. The metric equivalent shall be expressed in units of millicandelas per square meter per lux [mcd(m²)(lux⁻¹)].
- 3.1.3 Initial performance of pavement marking shall be measured within 14 days after application. The Traffic Engineer shall be notified prior to the placement of pavement markings.
- 3.1.4 Wet retroreflectance values measured under a “condition of continuous wetting” (simulated rain) shall be in accordance with ASTM E2176, and to reduce variability between measurements, the test method shall be performed in a controlled laboratory environment while the marking is positioned with a 3 to 5 degree lateral slope. Measurements shall be reported as the average of the minimum of three locations. Samples of the completed finished product shall be applied to flat panels during application and brought back to the lab for testing.

III. Application

The Contractor shall furnish equipment and apply the materials according to the following specifications:

A. Equipment

Application equipment shall be capable of producing markings that meet the specifications of the manufacturer's listed on the NDR Approved Products List for Wet Reflective Polyurea Pavement Marking.

At any time throughout the duration of the project, the Contractor shall provide free access to his application equipment for inspection by the Engineer, his authorized representative or a materials representative.

When black and white polyurea are applied together to create a contrast pattern, they shall be applied from one truck in a single pass operation.

B. Application Conditions:

1. **Moisture:** The markings shall only be applied during conditions of dry weather and when the pavement surface is dry and free of moisture.
2. **Air Temperature:** The markings shall only be applied when road and air temperatures are above 40 degrees F, unless manufacturer's guidelines state otherwise.
3. **Surface Preparation:** Marking operations shall not begin until applicable surface preparation work is completed and approved by the Engineer.
 - 3.1 Prior to applying the markings, the Contractor shall remove any remaining existing markings to expose a minimum of 80% of the pavement surface.
 - 3.2 Prior to applying the markings, the Contractor shall remove all curing compounds on new Portland cement concrete surfaces.
 - 3.3 Prior to applying the markings, the Contractor shall remove all dirt, sand, dust, oil, grease and any other contaminants from the road surface.
 - 3.4 Application over temporary paint is not acceptable.
4. **Dimensions:** The pavement markings shall be placed only on properly prepared surfaces and at the widths and patterns as designated on the contract plans. The markings shall be applied in accordance with the "Manual on Uniform Traffic Control Devices" and in accordance with the Engineer's plans.
5. **Other Restrictions:** The Engineer and/or Contractor shall determine further restrictions and requirements of weather and pavement conditions necessary to meet the all other application specifications and produce markings that perform to the satisfaction of the Engineer.

6. **Binder Thickness:** The polyurea binder (mixed Part A and Part B) coating shall be applied at rates to achieve minimum uniform wet thicknesses as follows:

Surface Type	Recommended Polyurea Pavement Marking Thickness (1 inch=1000 mils)
Existing Smooth Asphalt or Concrete Surface	20±2 mils
New Concrete Surface ¹	20±2 mils
New Asphalt Surface (Standard Asphalt Mix)	20±2 mils
Open Grade Friction Course (OGFC) or Stone Matrix Asphalt (SMA) ²	25±2 mils
Rough Concrete or Asphalt	22±2 mils
Concrete or Asphalt after Grinding Off Pavement Markings ³	22±2 mils

- ¹ Use thicker binder (20 mils) on new concrete surfaces with heavy tines.
² Very large aggregate sizes for open grade friction course or stone matrix asphalt mixes may require a thickness of 25 mils for proper coverage.
³ Pavement marking thickness determined by the type of surface and roughness/texture created from grinding operation.

7. **Reflective Media Application:** The Contractor shall ensure that the reflective media are properly set in the polyurea coating so that their exposed portions are free of polyurea coating material. The specified reflective media shall be dropped per the manufacturer's specified rates to achieve their recommended coating weights:
8. **Volumetric Proportioning:** The Contractor shall ensure proper proportioning as required by manufacturer's specifications and mixing of the polyurea components so that the markings are adequately hardened throughout and are free of soft or uncured material. Typically, such areas will darken over time from dirt and tire residue.
9. **Overspray:** The Contractor shall ensure the polyurea coating does not exhibit excessive overspray.
10. **Adhesion:** The Contractor shall ensure that the polyurea coating is well adhered to the road surface, and that the reflective media are well adhered to the binder.

IV. Observation Period

Following initial completion of all pavement marking, there will be a 180-day observation period before final acceptance. During the observation period, the Contractor, at no expense to the Department of Roads, shall replace any marking that the Engineer determines are not performing satisfactorily due to defective materials and/or workmanship in manufacture and/or application. At the end of the observation period the minimum required retention percentage for marking installed shall be 90%.

Determination of Percentage Retained - The percentage retained shall be calculated as the nominal area of the strip less the area of loss divided by the nominal area and expressed as a percentage of the nominal area. A claim, made by the State against the Contractor, shall be submitted to the Contractor in writing within 30 days after the 180-day observation period. When such a claim is made prior to August 1, the replacement material shall be installed during that same construction season. Replacement material for any claim after August 1, shall be installed prior to June 1, of the following year. Marking replacement shall be performed in accordance with requirement specified herein for the initial application, including but not limited to surface cleaning, sealer application, etc.

Final acceptance of all marking will include an inspection of the appearance of the markings during daylight and darkness. Any markings that fail to have a satisfactory appearance during either period, as determined by the Engineer, shall be reapplied at no expense to the Department of Roads.

Final acceptance of the pavement marking will be: (1) 180 days after the initial completion of all work, or (2) upon completion of all corrective work, whichever occurs last.

V. Contract Units and Basis for Payment

- A. Linear pavement markings will be measured in linear feet complete-in-place for the width specified.
- B. Arrows and Legends are measured by the each.

Subsection 423.05 of the Standard Specifications is amended to include the item: "___ Wet Reflective Polyurea Pavement Marking, Grooved". Payment shall be full compensation for grooving the pavement surface, furnishing and applying all markings, and for all materials, labor, tools, equipment and incidentals necessary to complete the work.

Payment will be made under:

Pay Item	Pay Unit
___ Wet Reflective Polyurea Pavement Marking, Grooved	Linear Feet
___ Wet Reflective Polyurea Pavement Marking, Grooved	Each

Payment is full compensation for all work prescribed in this Section.

WET REFLECTIVE POLYUREA PAVEMENT MARKING

I. Description

This work shall consist of furnishing and installing wet night retroreflective polyurea pavement markings in accordance with this provision and in conformance to the dimensions and lines shown on the plans or established by the Engineer.

The wet reflective polyurea marking material shall be applied by spray method onto asphaltic cement concrete and Portland cement concrete surfaces. Following an application of glass beads or black aggregate, and upon curing, the resulting marking shall be an adherent reflectorized stripe of the specified thickness and width that is capable of resisting deformation by traffic.

The Contractor shall field verify the pavement marking quantities required for the project prior to purchasing materials. The Department will not be held responsible for the Contractor's shortage or surplus of material. The Contractor's verification of quantities and purchasing material shall not delay the project or the installation of pavement marking when required.

All conflicting pavement markings remaining after polyurea pavement marking application shall be removed; this removal shall be subsidiary to the pavement marking.

II. Materials

A. Polyurea

Composition Requirements:

Composition requirements are per manufacturer's specifications. The Wet Reflective Polyurea Pavement Markings approved for use are shown on the NDR Approved Products List. Markings which have not been previously approved by the Department will not be permitted on the project until approved by the Traffic Engineer.

Properties:

1. **Color and Weathering Resistance:** The mixed polyurea compound, white, yellow and black, when applied to a 3" x 6" aluminum panels at 15±1 mil in thickness with no glass beads or elements and exposed for 500 hours in a Q.U.V. Environmental Testing Chamber, as described in ASTM-G154, Cycle #1, shall conform to the following minimum requirements. The color of the white polyurea system shall not be darker than Federal Standard No. 595A-17778. The color of the yellow polyurea system shall conform to Federal Standard No. 595A-13538. The color of the black polyurea system shall conform to Federal Standard No. 595A-17038.
2. **Track-Free Time (Laboratory):** When tested in accordance with ASTM D 711, the polyurea marking material shall reach a track-free condition in 10 minutes or less for a 15 mil thickness. This test shall be performed with AASHTO Type 1 beads coated at a rate of 0.099 pounds

per square foot. The track-free time shall not increase substantially with decreasing temperature.

3. Adhesion to Concrete: The polyurea coating, when tested according to ACI Method 503, shall have such a high degree of adhesion to the specified concrete surface that there shall be a 100% concrete failure in the performance of this test. The prepared specimens shall be conditioned at room temperature ($75^{\circ}\pm 2^{\circ}$ F) for a minimum of 24 hours and maximum of 72 hours prior to the performance of the tests indicated.
4. Adhesion to Asphalt: The polyurea coating, when tested according to ACI Method 503, shall have such a high degree of adhesion to the specified asphalt surface that there shall be a 100% asphalt failure in the performance of this test. The prepared specimens shall be conditioned at room temperature ($75^{\circ}\pm 2^{\circ}$ F) for a minimum of 24 hours and maximum of 72 hours prior to the performance of the tests indicated.

B. Reflective Media

The reflective media application shall incorporate a double drop technique to maximize wet night reflectivity and color. The reflective media used shall ensure the wet reflective polyurea pavement markings meet the reflectance performance requirements in Section II.D.3. The glass beads for drop-on application shall conform to the following requirements *or be an approved equivalent*.

1. Glass Beads

The required glass beads shall be a 60/40 blend (60% sinkers and 40% floaters) of AASHTO M 247-81 Type I gradation 1.5 index glass beads. The glass beads shall have a minimum of 70% Rounds as measured according to ASTM D1155. Crush Resistance shall be measured according to the procedures of ASTM D1213 and shall be a minimum of 30 pounds retained on US #40 Mesh.

Acid Resistance: A sample of glass beads supplied by the manufacturer shall show resistance to corrosion of their surface after exposure to a 1% solution (by weight) of sulfuric acid. The 1% acid solution shall be made by adding 5.7 cc of concentrated acid into 1000 cc of distilled water. CAUTION: Always add the concentrated acid into the water, not the reverse. The test shall be performed as follows:

Take a 1" x 2" sample, adhere it to the bottom of a glass tray and place just enough acid solution to completely immerse the sample. Cover the tray with a piece of glass to prevent evaporation and allow the sample to be exposed for 24 hours under these conditions. Then decant the acid solution (do not rinse, touch, or otherwise disturb the bead surfaces) and dry the sample while adhered to the glass tray in a 150° F (66° C) oven for approximately 15 minutes. Microscopic examination (20X) shall show not more than 15% of the beads having a formation of very distinct opaque white (corroded) layer on their entire surface.

2. Wet Reflective Media

Wet reflective media shall be approved for use by the polyurea manufacturer. The Wet Reflective Media approved for use are shown in the NDR Approved Products List.

C. Non-reflective Media

Black aggregate shall be broadcast to saturation on all black lines to provide a matte, non-reflective finish. The gradation of the black aggregate is as follows:

U.S. Sieve	Retained (%)
#20	17-37
#30	45-65
#40	14-25
Pan	0-1

D. Finished Markings

Because of normal variances in road surfaces, application processes and measurement, the properties of markings made from the materials specified herein will vary from one installation to the next. When the materials are applied according to the specifications in Section III, they shall be capable of forming markings with the following reproducibility of properties:

1. On-the-road Track-Free Time: When installed at 77° F and at a wet film thickness of 15±1 mils, the markings shall reach a no-track condition in less than 10 minutes. Track-free shall be considered as the condition where no visual deposition of the polyurea marking to the pavement surface is observed when viewed from a distance of 50 feet, after a free-rolling traveling vehicle's tires have passed over the line. The track-free time shall not increase substantially with decreasing temperature.
2. Skid Resistance: The average initial skid resistance shall be 45 BPN or greater when tested according to ASTM E303.
3. Retroreflectance – Initial retroreflectance are shown in the table below. Typical retroreflectivity averaged over many readings (mcd(ft-2)(fc-1)) metric equivalent (mcd(m-2)(lux-1)).

Average Minimum Initial Reflectance		
	White	Yellow
Dry (ASTM E1710)	500	350
Wet Recovery (ASTM 2177)	350	275
Wet Continuous (ASTM 2176)	100	75

- 3.1.1 Some reasonable variance should be expected (for example, application on very rough road surfaces or differences in glass beads).
- 3.1.2 The initial retroreflectance of a single installation shall be the average value determined to the measurement and sampling procedures outlined in ASTM D6359, using a 30-meter (98.4 feet)

retroreflectometer. The 30-meter retroreflectometer shall measure the coefficient of retroreflected luminance, R_L at an observation angle of 1.05 degrees and an entrance angle of 88.76 degrees. R_L shall be expressed in units of millicandelas per square foot per foot-candle [$\text{mcd}(\text{ft}^{-2})(\text{fc}^{-1})$]. The metric equivalent shall be expressed in units of millicandelas per square meter per lux [$\text{mcd}(\text{m}^{-2})(\text{lux}^{-1})$].

- 3.1.3 Initial performance of pavement marking shall be measured within 14 days after application. The Traffic Engineer shall be notified prior to the placement of pavement markings.
- 3.1.4 Wet retroreflectance values measured under a “condition of continuous wetting” (simulated rain) shall be in accordance with ASTM E2176, and to reduce variability between measurements, the test method shall be performed in a controlled laboratory environment while the marking is positioned with a 3 to 5 degree lateral slope. Measurements shall be reported as the average of the minimum of three locations. Samples of the completed finished product shall be applied to flat panels during application and brought back to the lab for testing.

III. Application

The Contractor shall furnish equipment and apply the materials according to the following specifications:

A. Equipment

Application equipment shall be capable of producing markings that meet the specifications of the manufacturer’s listed on the NDR Approved Products List for Wet Reflective Polyurea Pavement Marking.

At any time throughout the duration of the project, the Contractor shall provide free access to his application equipment for inspection by the Engineer, his authorized representative or a materials representative.

When black and white polyurea are applied together to create a contrast pattern, they shall be applied from one truck in a single pass operation.

B. Application Conditions:

1. **Moisture:** The markings shall only be applied during conditions of dry weather and when the pavement surface is dry and free of moisture.
2. **Air Temperature:** The markings shall only be applied when road and air temperatures are above 40 degrees F, unless manufacturer’s guidelines state otherwise.

3. **Surface Preparation:** Marking operations shall not begin until applicable surface preparation work is completed and approved by the Engineer.
 - 3.1 Prior to applying the markings, the Contractor shall remove any remaining existing markings to expose a minimum of 80% of the pavement surface.
 - 3.2 Prior to applying the markings, the Contractor shall remove all curing compounds on new Portland cement concrete surfaces.
 - 3.3 Prior to applying the markings, the Contractor shall remove all dirt, sand, dust, oil, grease and any other contaminants from the road surface.
 - 3.4 Application over temporary paint is not acceptable.
4. **Dimensions:** The pavement markings shall be placed only on properly prepared surfaces and at the widths and patterns as designated on the contract plans. The markings shall be applied in accordance with the "Manual on Uniform Traffic Control Devices" and in accordance with the Engineer's plans.
5. **Other Restrictions:** The Engineer and/or Contractor shall determine further restrictions and requirements of weather and pavement conditions necessary to meet the all other application specifications and produce markings that perform to the satisfaction of the Engineer.
6. **Binder Thickness:** The polyurea binder (mixed Part A and Part B) coating shall be applied at rates to achieve minimum uniform wet thicknesses as follows:

Surface Type	Recommended Polyurea Pavement Marking Thickness (1 inch=1000 mils)
Existing Smooth Asphalt or Concrete Surface	20±2 mils
New Concrete Surface ¹	20±2 mils
New Asphalt Surface (Standard Asphalt Mix)	20±2 mils
Open Grade Friction Course (OGFC) or Stone Matrix Asphalt (SMA) ²	25±2 mils
Rough Concrete or Asphalt	22±2 mils
Concrete or Asphalt after Grinding Off Pavement Markings ³	22±2 mils

¹ Use thicker binder (20 mils) on new concrete surfaces with heavy tines.

² Very large aggregate sizes for open grade friction course or stone matrix asphalt mixes may require a thickness of 25 mils for proper coverage.

³ Pavement marking thickness determined by the type of surface and roughness/texture created from grinding operation.

7. **Reflective Media Application:** The Contractor shall ensure that the reflective media are properly set in the polyurea coating so that their exposed portions are free of polyurea coating material. The specified reflective media shall be dropped per the manufacturer's specified rates to achieve their recommended coating weights:
8. **Volumetric Proportioning:** The Contractor shall ensure proper proportioning as required by manufacturer's specifications and mixing of the polyurea components so that the markings are adequately hardened throughout and are free of soft or uncured material. Typically, such areas will darken over time from dirt and tire residue.
9. **Overspray:** The Contractor shall ensure the polyurea coating does not exhibit excessive overspray.
10. **Adhesion:** The Contractor shall ensure that the polyurea coating is well adhered to the road surface, and that the reflective media are well adhered to the binder.

IV. Observation Period

Following initial completion of all pavement marking, there will be a 180-day observation period before final acceptance. During the observation period, the Contractor, at no expense to the Department of Roads, shall replace any marking that the Engineer determines are not performing satisfactorily due to defective materials and/or workmanship in manufacture and/or application. At the end of the observation period the minimum required retention percentage for marking installed shall be 90%.

Determination of Percentage Retained - The percentage retained shall be calculated as the nominal area of the strip less the area of loss divided by the nominal area and expressed as a percentage of the nominal area. A claim, made by the State against the Contractor, shall be submitted to the Contractor in writing within 30 days after the 180-day observation period. When such a claim is made prior to August 1, the replacement material shall be installed during that same construction season. Replacement material for any claim after August 1, shall be installed prior to June 1, of the following year. Marking replacement shall be performed in accordance with requirement specified herein for the initial application, including but not limited to surface cleaning, sealer application, etc.

Final acceptance of all marking will include an inspection of the appearance of the markings during daylight and darkness. Any markings that fail to have a satisfactory appearance during either period, as determined by the Engineer, shall be reapplied at no expense to the Department of Roads.

Final acceptance of the pavement marking will be: (1) 180 days after the initial completion of all work, or (2) upon completion of all corrective work, whichever occurs last.

V. Contract Units and Basis for Payment

- A. Linear pavement markings will be measured in linear feet complete-in-place for the width specified.
- B. Arrows and Legends are measured by the each.

Subsection 423.05 of the Standard Specifications is amended to include the item: " Wet Reflective Polyurea Pavement Marking". Payment shall be full compensation for furnishing and applying all markings, and for all materials, labor, tools, equipment and incidentals necessary to complete the work.

Payment will be made under:

Pay Item	Pay Unit
<u> </u> Wet Reflective Polyurea Pavement Marking	Linear Feet
<u> </u> Wet Reflective Polyurea Pavement Marking	Each

Payment is full compensation for all work prescribed in this Section.

PEDESTRIAN WALKWAY LUMINAIRE 8' T8 FIBERGLASS

Pedestrian Walkway Luminaire 8' T8 Fiberglass shall be Tandem (8 foot length) specification type wet location listed luminaire with a fiberglass reinforced polyester housing, polycarbonate lens and tamper resistant stainless steel cam action latches. Pedestrian Walkway Luminaire 8' T8 Fiberglass shall include 2 – 32W T8 extended performance lamps with 3500K CCT and low mercury content. Lamp Ballast shall be electronic with low temperature (0 degree F) program start and less than 10% THD. Pedestrian Walkway Luminaire 8' T8 Fiberglass shall include lifetime repair/replacement warranty to cover fixture that is found to be inoperable due to physical abuse. "Pedestrian Walkway Luminaire 8' T8 Fiberglass" shall be paid for by the Each for each complete fixture installed.

PASSIVE INFRARED MOTION DETECTOR

Passive Infrared Motion Detector shall be outdoor rated passive infrared (PIR) motion detector with a 200 degree field of view, adjustable sensitivity and immunity to RFI signals, surge suppression, temperature compensation, sensor neck adjustment and adjustable delayed – off time setting (20 seconds to 15 minutes). Sensor housing shall be water and impact resistant UV stabilized plastic. Sensor shall be mounted at the top of concrete culvert wall at locations shown on the electrical plan when mounted at 10 feet high, the sensor shall have a range of 50 feet. "Passive Infrared Motion Detector" shall be paid for by the Each for each complete sensor installed.

NEMA 3R NON-FUSED SAFETY SWITCH

Safety Switch shall be heavy duty, NEMA 3R, non-fused, 600V, 30 amp, 2 wire. "Safety Switch NEMA 3R Nonfused 30A" shall be paid for by the Each for each device installed.

SURGE PROTECTION DEVICE

Surge Protective Device (SPD) shall be a type 1, single phase, 3 wire NEMA 4X Rated, nipple-mounted with a status indicating light and a minimum peak surge current rating of 36 KA per phase. "Surge Protection Device" shall be paid for by the Each for each device installed.

CONDUIT

Paragraph 1. of Subsection 405.05 in the Standard Specifications is amended to include the following:

Pay Item	Pay Unit
___ Conduit	Linear Foot (LF)

GROUNDING CONDUCTOR GROUNDING ROD

Paragraph 1. of Subsection 402.05 in the Standard Specifications is amended to include the following:

Pay Item	Pay Unit
___ Grounding Conductor	Linear Foot (LF)
Ground Rod	Each (ea)

UNINTERRUPTIBLE POWER SUPPLY

Section 411 in the Standard Specifications for Highway Construction is amended to include the following:

Description

Furnish and install an Uninterruptible Power Supply (UPS) system to provide conditioned power and battery backup power to the traffic signal controller. This work also includes the concrete pad and all necessary labor, material, tools and equipment to properly install the UPS and have it in working order.

Material Requirement

1. General
 - 120VAC, 60 Hz system.
 - Battery power shall provide 2 hours full operation (700 watt load), followed by 4 hours of flashing operation (350 watt load) minimum.
 - Operating temperature range, -37°C to +74°C
 - Manufacturer Warranty: minimum two year full replacement of all components starting on the date that the system is placed into operation.

2. Basic Components
 - Manual Utility/Generator switch
 - Manual UPS bypass switch
 - Automatic transfer relay (max. 65 ms response time)
 - UPS
 - Batteries
 - Battery charger (may be a function of the UPS)
 - Enclosure

3. UPS
 - Minimum 1100VA, 850 watt
 - Pure sine wave output
 - Supply clean 100VAC to 130VAC to the signal controller cabinet with utility, battery, or generator power.
 - Communication port, cable, and MS Windows7 compatible software for status and log access.
 - Real time status available on UPS display or PC connection.
 - Downloadable time/date stamped event log.
 - Battery status monitor.
 - Programmable contact closure, 1 minimum.

4. Batteries
 - Sealed, no maintenance, with quick connectors.
5. Enclosure

House all components of the UPS system in a single door cabinet attached to the side of the 332 traffic signal cabinet. Enclosure features include:

 - NEMA 3R rated.
 - Minimum 0.125 inch thick natural or anodized aluminum.
 - Stainless steel hardware.
 - Maximum Size 26 in. wide, 56 in. tall, 18 in. deep.
 - Hinged door with Corbin number 2 lock or padlock latch.
 - Thermostat controlled ventilation fan.
 - Louvered vent with filter.
 - Thermostat controlled heater or battery heat mats.

Construction Methods

1. Build the concrete pad as shown on the plan.
2. Place the UPS enclosure on the concrete pad and attach the enclosure to the traffic signal controller cabinet.
3. Install bushings/grommets in all openings between the controller cabinet and the UPS enclosure to protect wiring.
4. Install other components per the manufacturer's instructions.
5. Connect UPS output to the power service terminal in the controller cabinet.
6. Connect the utility power service to the UPS.

Method of Measurement

Uninterruptible Power Supply shall be measured by the each.

Basis of Payment

- | | | |
|----|------------------------------|-----------------|
| 1. | Pay Item | Pay Unit |
| | Uninterruptible Power Supply | Each (ea) |
2. Payment is full compensation for all labor, equipment, and materials required to complete the work described above.

RELOCATE EXISTING LIGHTING UNIT

The four existing lighting units EP-1 thru EP-4 carry a 250 watt luminaire on a 12 foot mastarm, mounted 40 feet above the roadway. The poles are mounted on a concrete foundation using an anchor base.

The Contractor shall relocate the existing lighting units as indicated on the plans. The lighting units to be relocated shall be carefully dismantled, stored and protected from damage until installed at the new locations. The Engineer may designate specific areas for temporary storage of the salvaged material. It will be the Contractor's responsibility to protect all material from damage during removal and storage.

The Contractor shall remove the concrete foundations, including the steel and anchor bolts to a minimum of two feet below finished grade, backfill the excavation with clean soil and compact the soil to the density requirements of the project. Any debris resulting from the removal operation shall be removed from the project. Abandon existing unused conduit and cable in place.

The salvaged components shall be installed at the new locations indicated on the plans and connected electrically as shown. The salvaged luminaires shall be cleaned and provided with a new 250 watt HPS lamp.

Method of Measurement and Basis of Payment

Lighting unit, relocated as indicated in the plans, shall be measured for payment an individual unit. The relocated lighting unit, in place, and accepted by the Engineer, shall be paid for at the contract unit price, per each, for the item "Relocate Street Lighting Unit". This price shall be full compensation for the removal, salvage, storage, transportation, preparation, installation of salvaged material, disposal of surplus materials; for the termination and abandonment of existing underground feeders; for the 250 watt HPS lamp and for all materials, labor, equipment, tools and incidentals necessary to complete the work.

REMOVE WOOD POLE WITH LUMINAIRE

When the existing wood poles with mastarms and luminaires are no longer required as determined by the Engineer, the Contractor will remove the poles by disassembling the luminaire from the mastarm and the mastarm from the pole.

The Contractor shall remove the direct embedded poles. All voids resulting from the removal of the pole shall be filled with clean soil and compacted to the density of the surrounding soil. Any debris resulting from the removal operation shall be removed from the project. Abandon existing unused cable in place.

All components of the existing wood poles with luminaires will be salvaged for delivery to the City of Wahoo. Contact Mr. Dan Lanik at (402) 443-9114 two days prior to removal. Poles shall be free of external wiring, luminaries shall be clean and have their openings covered by duct tape.

It shall be the Contractor's responsibility to protect the salvaged material from damage during removal and stockpiling.

Method of Measurement and Basis of Payment

The item "Remove and Salvage Wood Pole" will be measured and paid for as a complete unit for each wood pole removed, accepted by the Engineer. This work shall include, but not be limited to the following: Removing, salvaging, preparing, and stockpiling the existing wood poles, mast arms and luminaires; all necessary excavation, backfilling and disposal of surplus material, for the termination and abandonment of existing feeders and for all materials, labor, tools and incidentals necessary to complete the work.

LUMINAIRE REQUIREMENTS (COBRA-HEAD)

Paragraph 2. of Subsection 415.02 in the Standard Specifications is void and superseded by the following:

2. Lamps provided shall be as shown in the plans.

Paragraph 7. of Subsection 1073.02 in the Standard Specifications is amended to include the following:

1. Conventional Roadway Luminaires

- A. Housing

Luminaire housing shall be "cobra-head" style, of pressure die-cast aluminum, Large Housing Series. The casting shall be sound, complete, with smooth edges and free of flash. The lower portion of the housing shall be hinged for easy access.

The optical compartment shall be effectively sealed and filtered using a dacron polyester filter. The seal/filter combination shall be provided between the reflector and lens and between the socket assembly and reflector. The seal/filter combination shall be under compression when the assembly is in operating position. Seal/filter combination shall be of heat resisting material selected to last the functional life of the unit, but shall be easily replaceable should they become damaged. The optical compartment door shall be secured in position with a positive latch mechanism. The hinge arrangement shall be designed to prevent accidental disengagement when it is in the open position.

Finish shall be a gray Polyester Powder Coat or an electrodeposited epoxidized acrylic paint coat capable of successfully withstanding 1,000 hours of salt spray test per ASTM B 117.

Attachment hardware used to secure components to the aluminum housing shall be organically coated. Stainless steel or galvanized hardware is not allowed.

Housing must be legibly and durably marked with the lamp size, using ANSI NEMA lamp identification label.

Luminaire must be UL listed as suitable for wet locations.

- B. Slipfitter

The slipfitter shall accept 1 1/4 inch to 2 inch (32 mm to 50 mm) pipe.

- C. Reflector

The reflector shall be hydroformed aluminum with an approved aluminum oxide or silica coating bonded to the inside and outside surfaces.

D. Socket

The socket shall be a mogul base porcelain.

E. Lens

The lens shall be made of clear tempered flat glass, heat resistant and free from imperfections.

F. Terminal Block

A terminal block will be required.

G. Ballast

The ballast shall be of the (CWA) Auto Regulator lead type for the high pressure sodium lamp size as indicated in the plans.

Ballast shall be dual volt 120/240 or multi tap, ballast to be factory wired to 240 volt.

The ballast and starting aid shall not incur significant life reduction should the lamp continue in open or shorted circuit condition for a six-month period.

Regulation and Operation:

At nominal line voltage and nominal lamp voltage, the ballast design center will not vary more than 5% from rated lamp wattage. Lamp wattage variation shall not exceed 10% for a $\pm 10\%$ line voltage variation.

The ballast/lamp combination must provide reliable starting to -40 degrees F (-40 degrees C).

Ballast starting current must not exceed normal operating current.

Power factor must range between 65% and 90% through all operational modes.

H. Photometric and Performance Requirement

The luminaire shall have "cutoff" control characteristics as follows: Candela per 1000 lumens shall not exceed 100 (10%) at a vertical angle of 80 degrees above nadir, and 25 (2.5%) at an angle of 90 degrees above nadir horizontal.

The luminaries, with lamp size and lumens as specified in the plans and installed in accordance with the following parameters, shall provide an average maintained horizontal illumination level of 0.9 FC with an average to minimum uniformity ratio not exceeding 3.5:1. The maximum to minimum uniformity ratio shall not exceed 7.5:1. Any adjustments to the luminaire's optical system needed to provide a light distribution meeting the preceding requirements shall be made at the factory prior to shipment.

Parameters used; roadway width 74', median width 12', pole spacing 125', mounting height 40', pole setback 15', mastarm length 12', maintenance factor .81, pole layout staggered.

I. Substitutions and Variations

No substitutions or variations of the above will be allowed.

J. Approval Requirements

In addition to the requirements for approval of the roadway lighting luminaires as outlined in Subsection 1073.02, the Contractor may be asked to supply electric files of IES formatted photometrics for each type of luminaire he/she proposes to furnish for the project. The electronic files must be compatible with the NDOR Operating System.

The Contractor shall be prepared, upon request, to furnish a working sample of any luminaire proposed for this project (sample will be returned to the Contractor or counted as part of the contract quantity).

The right is reserved to reject any and all proposals. The State of Nebraska will decide all questions which may arise as to the quality or acceptability of the luminaire submitted for approval under this specification.

Manufacturers allowed to submit luminaires for approval are as follows:

Cooper
General Electric
Hubbell
American Electric

UTILITY CONTACT PERSON

Paragraph 1 of Subsection 413.03 in the Standard Specifications is amended to include the following:

The utility contact persons for this project is:

Butler Public Power District, Operations Manager, (402) 367-3081
City of Wahoo, Utilities General Manager, (402) 443-3222

**SURFACING UNDER GUARDRAIL
(E-3-1212)**

Amend Section 503 in the Standard Specifications to include Surfacing Under Guardrail.

At the Contractor's option, the surfacing may be constructed using Class "47B-3000" Concrete, Class "AX-3000" Concrete, Class "PR-3000" Concrete (Class 47B-20 Concrete, Class AX-20 Concrete, Class PR-20 Concrete), or any commercially produced hot mix asphaltic concrete, which has been approved by the Engineer. These materials may be used interchangeably during the course of the work except that surfacing at any individual location must be completed with the same material with which the work was begun.

If concrete is used in the surfacing, it shall reach a minimum strength of 3000 psi (20 Mpa) before opening to traffic.

Amend Subsection 302.04 in the Standard Specifications to provide that the work of subgrade preparation for surfacing under guardrail will not be measured for payment, but shall be considered subsidiary to the item "Surfacing Under Guardrail".

Subsection 304.04 in the Standard Specifications is amended to provide that the work of earth shoulder construction associated with surfacing under guardrail will not be measured for payment, but shall be considered subsidiary to the item "Surfacing Under Guardrail."

Subsection 503.05 in the Standard Specifications is amended to provide that P.G. Binder used in the asphaltic concrete will not be measured for payment, but shall be considered subsidiary to the item "Surfacing Under Guardrail".

Subsection 504.04 in the Standard Specifications is amended to provide that the application of a tack coat, including furnishing emulsified asphalt, will not be measured for payment, but shall be considered subsidiary to the item "Surfacing Under Guardrail".

The work and materials required for any drainage curb placed on surfacing under guardrail will not be measured and paid for, but will be considered subsidiary to the item "Surfacing Under Guardrail".

The work and materials required for surfacing under guardrail will be paid for at the contract unit price per square yard (square meter) for the item "Surfacing Under Guardrail". Payment will be full compensation for the work prescribed in these Special Provisions and the Standard Specifications.

**ASPHALTIC CONCRETE
(E-8-1211)**

Paragraph 2.a.5.(ii) of Subsection 503.03 is void and superseded by the following:

During storage, the PG Binder temperature shall be maintained in accordance with binder supplier recommendations. All plants shall be equipped with a circulating system for PG Binder which is designed to assure proper and continuous circulation during the operating period. Storage tanks shall have sufficient capacity to provide for continuous operation. The tanks shall be situated and constructed to allow the volume of the PG Binder to be safely and accurately determined at any time.

Paragraph 2.a. of Subsection 503.04 is void and superseded by the following:

2. Asphalt Mix Control Strip:

- a. At the Contractor's option, the control strip may be waived. The decision to omit the control strip must be communicated to the Engineer prior to the start of production. When the control strip is waived:
 - (1) The moving average of four air voids values for the first three asphaltic concrete sublots is not valid and a pay factor of 1.0 shall be applied.
 - (2) The first three asphaltic concrete sublots shall be subject to the following removal criteria and removal shall be at no cost to the Department.

Sublot	Removal Criteria
1-1	$V_{a_{1-1}}$ less than 1.5 or greater than 7.0
1-2	$(V_{a_{1-1}} + V_{a_{1-2}}) \div 2$ less than 1.67 or greater than 6.67
1-3	$(V_{a_{1-1}} + V_{a_{1-2}} + V_{a_{1-3}}) \div 3$ less than 1.83 or greater than 6.33

Where: $V_{a_{1-1}}$ = the single test air voids for Sublot 1-1
 $V_{a_{1-2}}$ = the single test air voids for Sublot 1-2
 $V_{a_{1-3}}$ = the single test air voids for Sublot 1-3

- b. On the first production day, a 600 ton (544 Mg) control strip shall be placed and approved before full production begins. The Contractor shall construct the control strip using the approved asphalt mix design with laydown and compaction procedures that are representative for the project.
- c. The Contractor shall take at least 3 control strip mixture samples and record the test results for the mixture properties. The Contractor will also record compaction density values and rolling pattern information. This data will be for information only and shared with the Engineer.

Table 503.02 is void and superseded by the following:

Table 503.02

Control Strip Sampling			
Sample No.	Ton (Mg)	Air Voids for SPH	Air Voids for SPR
1	0 to 200 (0-180)	2.5 to 6.0	1.5 to 5.0
2	201 to 400 (181-363)	2.5 to 6.0	1.5 to 5.0
3	401 to 600 (364-544)	2.5 to 6.0	1.5 to 5.0

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

- (2) Marshall or Gyratory air voids of each sample shall be calculated using the maximum specific gravity of that sample.

Paragraph 2.b.(4) of Subsection 503.04 is void and superseded by the following:

The control strip will be accepted at 100% pay if all of the following test results are met. If any of the following test results are not met, the control strip will be subject to removal.

- (i) The Dust to Binder ratio is between 0.70 and 1.70.
- (ii) CAA is no more than 5% lower than the minimum specified shown on Table 1028.02 using blended cold feed material or ignition oven test results. FAA is no more than 0.5% lower than the minimum specified using blended cold feed material or no more than 1.0% lower than the minimum specified using ignition oven test results shown on Table 1028.03.
- (iii) Air voids are between 2.5% to 6.0% for SPH and between 1.5% to 5.0% for SPR.

Paragraph 2.h. of Subsection 503.04 is void.

Paragraph 2.j. of Subsection 503.04 is void and superseded by the following:

- j. When a control strip is constructed, the Contractor will use the three individual air void tests within the control strip and apply those individual values to the individual air void test result of the first 750 ton (680 Mg) subplot of Lot 1 to calculate the initial moving average of four and resulting pay factor for the initial 750 ton (680 Mg) subplot.

Paragraphs 5.a.(1) and 5.a.(3) of Subsection 503.04 are void and superseded by the following:

- a. (1) The actual mixing temperature shall be selected by the Contractor, in accordance with binder supplier recommendations, to provide adequate aggregate coating and mixture compaction at laydown.
- a. (3) Never shall the selection of the mixing temperature be such that drainage of the PG Binder from the aggregate will exceed contract specifications.

Paragraphs 10.a. and 10.b. of Subsection 503.04 are void.

Paragraphs 2.a. and 2.b.(1) of Subsection 503.06 are void.

Paragraph 2.b. (2) of Subsection 503.06 is void and superseded by the following;

- (2) For each subplot of Asphaltic Concrete Type SPR, SPS and SPH, the asphaltic concrete unit price is a product of all applicable pay factors for the item "Asphaltic Concrete, Type _____". Included in a subplot, following approval of the control strip(s), may be any roadway Asphaltic Concrete Type SPR, SPS and SPH which is produced, sampled and tested and approved by the Engineer for use as Patching, State Maintenance Patching, and Asphalt for Intersections and Driveways on project shall be eligible for inclusion in subplot(s) tonnage pay factor determination using the roadway Asphaltic Concrete Type _____ unit price. When a control strip is not constructed, the pay factor for the running average of four air voids shall be fixed at 1.0 for the first three asphaltic concrete sublots.

Paragraphs 5.a., 5.b., and 5.c. of Subsection 503.06 are void and superseded by the following:

- 5. a. When asphaltic concrete in any lot 3750 tons (3400 Mg) or portion of a lot 3750 tons (3400 Mg) is rejected and removed from the road, payment will not be made for the asphaltic concrete or for the PG Binder contained in the rejected material. The determination of the quantity of PG Binder for which payment will not be made will be based on the percent of PG Binder used in the rejected material.
- b. The order of precedence to determine the PG Binder quantity is:
 - (1) Actual lot 3750 tons (3400 Mg) tests.
 - (2) The average of the day's run.
 - (3) The job-mix formula.

Paragraph 12. of Subsection 503.06 void.

**TACK COAT
(E-8-0609)**

Paragraph 2. of Subsection 504.05 in the Standard Specifications is void and superseded by the following:

- 2. When materials do not meet plan and specification requirements, deductions will be made according to Table 504.01.

Section 504 is amended to include the following Table:

Table 504.01

<p>Emulsion Pay Factor Schedule</p> <p>Test of Residue Percentage</p> <p>1.00 for a deviation of minus less than or equal to 1%</p> <p>0.75 for deviation of minus greater than 1% to less than or equal to 5%</p> <p>0.40 or Reject for deviation of minus greater than 5%</p> <p>Tests for ALL other properties Specified</p> <p>1.00 for a deviation of \pm less than or equal to 10%</p> <p>0.75 for a deviation of \pm greater than 10% to less than or equal to 25%</p> <p>0.40 or Reject for deviation of \pm greater than 25%</p> <p>Note 1: Largest Pay Factor Reduction will be applied.</p>

**BITUMINOUS PAVEMENT PATCHING
(E-8-1212)**

Paragraphs 1, 2 and 3 of Subsection 516.05 in the Standard Specifications are void and superseded by the following:

1. a. Bituminous Pavement Patching of flexible pavement and the repair or replacement of any subgrade material authorized by the Engineer will be measured by one of the methods described in Paragraph 1.b. based upon the depth of the patch.
 - b.(1) For patches 16-inches (40cm) deep or less, determined at the time of patching, the patching will be measured by the ton (megagram) of "Asphaltic Concrete for Patching, Type ____" required to complete the patch and repair any faulty subgrade. No equipment rental will be paid for this work, and all equipment used to complete the work shall be subsidiary to the item, "Asphaltic Concrete for Patching, Type ____."
 - (2) For patches more than 16 inches (40cm) deep, determined at the time of patching, the patching will be measured by the ton (megagram) of "Asphaltic Concrete for Patching, Type ____" required to complete the patch and repair any faulty subgrade. Additionally, the hours of equipment rental required to complete the patching and repair in that portion of the patch deeper than 16-inches will be measured by the hour of equipment rental in accordance with Section 919. Only approved equipment needed to patch and excavate the failure is to be rented, and only the time utilized to perform the work in the region deeper than 16-inches (40 cm) is to be measured. Excluded is any equipment needed to haul asphalt to the site.
2. a. Bituminous Pavement Patching of concrete pavement and the repair or replacement of any subgrade material authorized by the Engineer will be measured by the square yard (square meter) of completed and accepted work regardless of depth. Additionally, the asphaltic concrete used to complete the patch will be measured for payment and included with the roadway tonnage.
 - b. Bituminous Pavement Patching of concrete pavement is divided into 3 types (see Table 516.02). The types are based on the size of the individual patches constructed in a single lane. If a damaged area spans 2 or more lanes, then the continuous patch will be counted as multiple patches -- 1 patch per lane.

Table 516.02

Asphalt Patch Sizes in Rigid Pavement	
Type	Size
A	5 SY (5 m ²) or less
B	Greater than 5 SY to 15 SY (5 m ² to 12.5 m ²)
C	Greater than 15 SY (12.5 m ²)

3. "Asphaltic Concrete, Type ____," "Asphaltic Concrete for Patching, Type ____," "Asphalt Cement ____," and "Hydrated Lime for Asphalt Mixtures" used in either the patching of flexible pavement or concrete pavement will be measured for payment by the ton (megagram) in accordance with Subsection 503.05.

**DROP-OFF/COLD-MILLED TAPERED EDGE
(E-8-0613)**

Paragraph 7 of Subsection 107.07 is void and superseded by the following.

7. a. The Contractor shall conduct all operations to minimize any drop-offs (abrupt changes in roadway elevation) exposed to traffic.
 - b.(1) Unless otherwise specified in the Contract, drop-offs greater than 2 inches tall at the shoulder edge that are adjacent to the traveled way shall be protected by a wedge of compacted stable material capable of carrying traffic (the wedge being 1 vertical to 3 horizontal or flatter). An edgeline warning stripe shall be placed on the traffic side of the drop-off.
 - (2) The Engineer shall authorize other methods, such as concrete barriers or Type II barricades, to protect drop-offs when conditions do not allow a wedge of compacted, stable material.
 - (3) Unless otherwise ordered by the Engineer, drop-offs up to 2 inches (50 mm) may remain exposed with appropriate warning signs alerting motorists to the condition.
- c. Open trenches which span all or part of the traveled way and/or auxiliary lanes shall be no wider than 18 inches (450 mm) and must have a steel-plate cover placed and anchored over them. The plate shall have sufficient strength so as to only allow a maximum vertical deflection of 1/2 inch (12.5 mm). A wedge of suitable material shall create a smooth transition between the pavement and the steel plate. Warning signs shall be used to alert motorists to the presence of the steel plates.

Paragraph 3. b. of Subsection 510.04 is void and superseded by the following.

3. b. The Contractor shall not leave a milled vertical edge greater than 1-inch tall between lanes overnight. One of the following options shall be performed if the milling will result in a vertical grade separation greater than 1 inch (25 mm) between lanes:
 - (1) Milling shall be performed in all adjacent traffic lanes on the same day so that at the end of each day, no drop off of over 1 inch (25 mm) remains.
 - (2) The milling shall create a tapered edge between the traffic lanes. The tapered edge shall have a slope from 3 [H]: 1 [V] to 4 [H]: 1 [V], not measured more than one foot in width nor extend into the lane more than one foot. Temporary pavement marking shall be placed at the top and contiguous with the tapered edge.
- c. If the Contractor fails to complete the above options, the Contractor shall provide – at no cost to the Department – additional traffic control necessary to maintain traffic on the milled lane (or lanes) as directed by the Engineer. This additional traffic control may require the use of a pilot car, flaggers, lighted flagger station, etc.
- d. Transitions between milled and unmilled in the direction of travel surfaces will be feathered either by milling or with wedges of bituminous material (maximum slope 1 vertical to 12 horizontal).

**RUMBLE STRIPS
(E-13-0911)**

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" (2 mm) between peaks and valleys].

Alignment of the edge of the pattern will be randomly checked by the Engineer. Any rumble strips misaligned [+/- 2 inches (+/-50 mm)] shall be re-cut.

The Contractor shall demonstrate to the Engineer on an initial 500 foot (150 m) 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 (150 m) 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 receiving rumble strips shall be measured separately in stations of 100 feet (100 meters). Centerline rumble strips placed left and right of centerline, as shown in the plans, shall be measured separately in stations of 100 feet (100 meters). 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) Station (StaM)
Rumble Strips, Concrete _____	Station (Sta) Station (StaM)

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

SURFACING 6"

The work shall consist of the construction of the surfacing on this project in accordance with plans, Standard Specifications and these Special Provisions.

The finished surface shall not vary more than 1/8" as determined by using a ten foot straightedge, or other devices approved by the Engineer. The Contractor shall correct any depressions or high areas in excess of 1/8".

Prepare the underlying subgrade, prior to placing the surfacing, in accordance with the requirements of Section 302 of the Standard Specifications or as shown in the Stabilized Subgrade Type Lime specifications, as shown in the plans.

At the Contractor's option the Surfacing 6" may be constructed using Class "BX-3000" Concrete, Class 47B-3500 Concrete or Asphaltic Concrete Type SPS. Whatever option is chosen shall be used throughout the project unless approved in writing by the Engineer.

Asphaltic Concrete used for surfacing shall meet all specifications and sampled and tested as shown in the Standard Specifications or the Special Provisions. Any asphaltic concrete not meeting the specifications will be subject to removal.

Subsection 503.05 is amended to provide that Asphaltic Concrete and P.G. Binder used in the asphaltic concrete for surfacing will not be measured for payment, but shall be considered subsidiary to the item "Surfacing 6". Performance Graded Binder 54-34 shall be used if asphaltic concrete is chosen as the surfacing.

Subsection 504.04 is amended to provide that the application of a tack coat, including furnishing emulsified asphalt, will not be measured for payment, but shall be considered subsidiary to the item "Surfacing 6".

If Asphaltic Concrete is chosen as the Surfacing, the Placement of Asphaltic Concrete for Intersections and Driveways will not be measured for payment, but shall be considered subsidiary to the item "Surfacing 6".

Subsection 508.04 is amended to provide that the work of Joint Sealing -Asphalt to Concrete for Surfacing will not be measured for payment, but shall be considered subsidiary to the item "Surfacing 6".

Paragraph 11. of Subsection 603.03 is amended to provide that concrete used in the surfacing, reach a minimum strength of 3000 psi before opening to traffic.

Subsection 603.04 is amended to provide that concrete pavement will not be measured for payment, but shall be considered subsidiary to the item "Surfacing 6".

Measure surfacing by the square yard of completed and accepted work.

The work and materials required for the surfacing will be paid for at the contract unit price per square yard for the item "Surfacing 6". Payment will be full compensation for the work prescribed in these Special Provisions and the Standard Specifications.

Surfacing 6" Thickness Cores

The Contractor will be required to core the Surfacing for final thickness determination. The cores will be cut prior to opening the surfacing to traffic. One core shall be taken for each 3500 square yards, or fraction thereof, of surfacing placed with a minimum of 1 core taken per project. The Engineer shall select the site where the core shall be taken. All work, materials and incidentals necessary to complete the work shall considered subsidiary to the item "Surfacing ____".

SURFACING 8"

The work shall consist of the construction of the surfacing on this project in accordance with plans, Standard Specifications and these Special Provisions.

The finished surface shall not vary more than 1/8" as determined by using a ten foot straightedge, or other devices approved by the Engineer. The Contractor shall correct any depressions or high areas in excess of 1/8".

Prior to placing the Surfacing, prepare the underlying subgrade in accordance with the requirements of Section 302 of the Standard Specifications.

At the Contractor's option the Surfacing 8" may be constructed using Class "47B-3500" Concrete or Asphaltic Concrete Type SPR. Whatever option is chosen shall be used throughout the project unless approved in writing by the Engineer.

Asphaltic Concrete used for surfacing shall meet all specifications and sampled and tested as shown in the Standard Specifications or the Special Provisions. Any asphaltic concrete not meeting the specifications will be subject to removal.

Subsection 503.05 is amended to provide that Asphaltic Concrete and P.G. Binder used in the asphaltic concrete for surfacing will not be measured for payment, but shall be considered subsidiary to the item "Surfacing 8". Performance Graded Binder 64-34 shall be used if asphaltic concrete is chosen as the surfacing.

Subsection 504.04 is amended to provide that the application of a tack coat, including furnishing emulsified asphalt, will not be measured for payment, but shall be considered subsidiary to the item "Surfacing 8".

If Asphaltic Concrete is chosen as the Surfacing, the Placement of Asphaltic Concrete for Intersections and Driveways will not be measured for payment, but shall be considered subsidiary to the item "Surfacing 8".

Subsection 508.04 is amended to provide that the work of Joint Sealing -Asphalt to Concrete for Surfacing will not be measured for payment, but shall be considered subsidiary to the item "Surfacing 8".

Hydrated Lime For Asphalt Mixtures used for surfacing will not be measured and paid for but shall be considered subsidiary to the item "Surfacing 8".

Subsection 603.04 is amended to provide that concrete pavement will not be measured for payment, but shall be considered subsidiary to the item "Surfacing 8".

Measure surfacing by the square yard of completed and accepted work.

The work and materials required for the surfacing will be paid for at the contract unit price per square yard for the item "Surfacing 8". Payment will be full compensation for the work prescribed in these Special Provisions and the Standard Specifications.

Surfacing 8" Thickness Cores

The Contractor will be required to core the Surfacing for final thickness determination. The cores will be cut prior to opening the surfacing to traffic. One core shall be taken for each 3500 square yards, or fraction thereof, of surfacing placed with a minimum of 1 core taken per project. The Engineer shall select the site where the core shall be taken. All work, materials and incidentals necessary to complete the work shall considered subsidiary to the item "Surfacing _____".

CONCRETE PAVEMENT CORING (F-17-0110)

Paragraphs 3. a. and 3.b. of Subsection 603.05 of the Standard Specifications are void and superseded by the following:

3. a. (1) A pay factor will be applied to each unit based on the compressive strength of 1 core per unit tested in accordance with AASHTO T 24.
- (2) Concrete cores must have a minimum age of 28 days before testing.
- (3) The paved area shall be divided into units, and each unit will be considered separately.
- (4) Units are 750 linear feet (230 m) of pavement for each separately placed width or width of each class of concrete whether or not placed separately starting at the beginning of the pavement.
- b. (1) When any unit core fails to have the required minimum compressive strength, the Contractor will have the option to obtain, at no cost to the Department, two additional cores from that unit provided that:
 - (i) The cores shall be cut by the contractor. (The cutting to be witnessed by the Engineer)
 - (ii) The cores shall be cut within seven (7) days of being notified of the strength deficiency, and
 - (iii) The cores shall be cut within 6 inches of the original unit core in the longitudinal direction.
- (2) The Engineer will take possession of the cores and have them tested within 24 hours at the Materials and Research laboratory.
- (3) The results of all three cores sampled at the location will be averaged for the final compressive strength calculation and pay factor.
- (4) The Department may agree to cut the additional cores if requested to do so by the Contractor, but will do so only if the Department's coring crew is available

on the project and has sufficient time to cut and transport the cores for testing during normal working hours within seven (7) days of the Contractor being notified of the strength deficiency.

Paragraph 4.a.(4) of Section 603.05 in the Standard Specifications is void and replaced by the following:

A separately placed width is the width between field constructed longitudinal joints, between a longitudinal construction joint and the edge, or between two pavement edges. A separately placed width may include more than one pay class of concrete, such as doweled and non-doweled.

PORTLAND CEMENT CONCRETE PAVEMENTS GENERAL REQUIREMENTS (F-20-0611)

Paragraph 7.b. of Subsection 601.02 in the Standard Specifications is void and superseded by the following:

- b. The finishing machine shall travel at a controlled speed such that it produces a uniform, well consolidated pavement that does not contain large voids.

Paragraph 10.d. of Subsection 601.02 is void and superseded by the following:

- d. The Contractor shall always have a tachometer available to monitor vibrator frequency. The vibrator frequency shall be within the manufacturer's specifications not to exceed 9,000 vpm.

Paragraph 12.d.(1) of Subsection 601.02 is void and superseded by the following:

- (1) The mechanical joint saw shall have an adjustable guide to insure a true line is cut. The mechanical joint saw blade shall be water-cooled, or specifically designed for early-entry sawing if air cooled.

Paragraph 12.d.(2) of Subsection 601.02 is void.

Paragraph 12.d.(3) of Subsection 601.02 is void and superseded by the following:

- d. (3) The joint cut shall be made with a diamond-toothed blade.

CONCRETE PAVEMENT (F-21-0611)

Paragraph 2.a. of Subsection 603.03 in the Standard Specifications is amended to include the following:

- (6) The base material shall be moistened through a uniform, lightly applied spray pattern prior to concrete placement as directed by the Engineer.

Paragraphs 2.d. and e. of Subsection 603.03 are void and superseded by the following:

- d. After being consolidated with internal mechanical vibration, the concrete shall be struck off to a uniform height approximately 0.5 inch (12 mm) above the finished surface and then finished to the final elevation by means of a vibrating mechanical or vibrating hand operated screed.
- e. Finished concrete shall be of uniform density with no segregation, honeycombing, or large voids.

Paragraph 3.f. of Subsection 603.03 is void and superseded by the following:

- f. (1) A wet burlap, carpet, or canvas drag will be drawn over the entire surface in a longitudinal direction for a final finish, dampening of this drag material will be accomplished through a uniform, lightly applied spray pattern.
- (2) The drag shall be suspended from a mandrel, or similar device, to insure a uniform texture.
- (3) The drag shall be lifted from the surface of the concrete pavement when the paving train is not in motion for 30 minutes or more and carefully reset before resuming the dragging operations.
- (4) Drags shall be rinsed or washed as necessary to obtain a uniform surface. Drags that cannot be cleaned shall be replaced.

Paragraphs 4.e., f., g., and h. of Subsection 603.03 are void and superseded by the following:

- e. For areas with pavement widening, dowel baskets shall be placed in all transverse contraction joints which are 6 feet (1.8 mm) or wider.
- f. If normal vibration is found inadequate to thoroughly consolidate the plastic concrete within and around the dowel basket assemblies, adjustments to the material and/or operations shall be made.
- g. Precautions shall be taken to assure that the sawed contraction joint is located directly over the center of the dowel bars.
- h. Transverse cracks which form in the concrete pavement panels between load transfer joints shall be stitched as shown in the plans, described in the Special Provision or repaired as directed by the Engineer. No payment will be made for this work.

Paragraph 6.b.(7)(i) of Subsection 603.03 is void and superseded by the following:

- (7) (i) The concrete shall be textured by dragging a wet burlap, carpet, or canvas belt over the full width of the surface in a longitudinal direction. Dampening of this drag material will be accomplished through a uniform, lightly applied spray pattern.

Paragraph 6.c.(4)(i) of Subsection 603.03 is void and superseded by the following:

- (4) (i) The concrete shall be textured by dragging a wet burlap, carpet, or canvas belt over the full width of the surface in a longitudinal direction. Dampening of this

drag material will be accomplished through a uniform, lightly applied spray pattern.

Paragraph 7.a.(3) of Subsection 603.03 is void and superseded by the following:

- (3) (i) The curing compound shall be applied in 2 equal applications immediately following each other or other methods approved by the Engineer.
- (ii) The total rate of applications shall be at a minimum of 1 Gal/100 SF (0.3 L/m²) of surface area for tined surfaces or 1 Gal/150 SF (0.2 L/m²) of surface area for all other finishes.

Paragraph 8.a.(6) of Subsection 603.03 is voided and superseded by the following:

- (6) Any panels that contain random cracking will be considered unacceptable. The Engineer will decide whether to replace or repair the panel. The Contractor shall replace or repair these panels at the direction of the Engineer at no cost to the Department. A 20% deduction will be assessed on any repaired panel. Any panel that is replaced will not be assessed a 20% deduction.

Paragraph 8.d.(3) of Subsection 603.03 is void.

Paragraphs 8.d.(4), (5) and (6) of Subsection 603.03 are void and superseded by the following:

- (4) Before sealing, the joint wall (not the bottom of joint) surfaces shall be sandblasted or water-blasted to remove all dirt, curing compound residue, laitance, and any other foreign material. After sandblasting, the entire joint shall be cleaned with compressed air having a minimum pressure of 90 psi (620 kPa). The compressed air shall be free of oil, water, and other contaminants. The joints shall be dry at the time of sealing.
- (5) (i) Transverse contraction joints in Portland cement concrete pavements shall be sealed so that the joint is filled to approximately 1/8" to 3/8" (3 to 9 mm) below the top of the joint with an approved hot poured sealant.
 - (ii) All overflow material shall be removed from the surface of the pavement.
 - (iii) If adhesion is not satisfactory, the material shall be rejected.
- (6) The Contractor shall give the Engineer one copy of the hot pour manufacturer's sealing recommendations.

Paragraph 9.b. of Subsection 603.03 in the 2007 edition of the NDOR Standard Specifications for Highway Construction is void and superseded by:

- b. When the pay item "Portland Cement Concrete Smoothness Testing" is not included in the contract, the Contractor shall test the hardened concrete for surface irregularities with a California Profilograph. Areas showing high spots (bumps) in excess of 0.30 inches in a 25 foot span will be plainly marked on the pavement and on the printed pavement profile trace. All identified high spots shall be ground to the required profile. The grinding shall be performed so that the cement-aggregate bond is not broken. The equipment and profilograph test procedure requirements of Section 602 of the Standard Specifications for Highway Construction shall apply to this surface testing.

Paragraph 9.c of Subsection 603.03 is amended to include:

- c. At the Engineer's option, the use of a 10 foot straightedge to locate high spots in excess of 1/8 inch may be allowed in lieu of bump detection using a profilograph testing.

Paragraphs 11.c., d. and e. of Subsection 603.03 are void and superseded by the following:

- c. The Contractor's forces may be allowed on the concrete pavement when the concrete has reached a minimum age of 14 days or when the concrete has reached a compressive strength of 3000 psi (24 MPa) when tested in accordance with ASTM C 39.
- d. With the approval of the Engineer, the Contractor may elect to increase the early strength of the concrete by adding cement and/or reducing the water/cement ratio, and then the pavement may be opened to traffic provided it has attained a compressive strength of 3500 psi (24 MPa). The concrete in the area where the early strength is required shall be paid for at the bid price.
- e. When required by the Special Provisions or when requested by the Contractor, the maturity method, as provided for in ASTM C 1074, may be used in lieu of the requirements of Subsection 603.03, Paragraph 10.c. and d. to determine the strength of concrete pavement for the purpose of early opening to traffic. Requests by the Contractor for use of the maturity method shall be on a project basis and shall be made in writing to the Materials and Research Engineer. The Contractor shall be responsible to coordinate with the Materials & Research Division to develop the maturity curve.

Paragraph 3.a. and b. of Subsection 603.05 is void and superseded by the following:

- 3. a. A pay factor will be applied to each unit based on the compressive strength of 1 core per unit tested in accordance with AASHTO T 24. Concrete cores must have a minimum age of 28 days before testing. The Contractor will have the option to obtain two additional cores for any unit core that fail to have the required minimum compressive strength provided that the cores are:
 - (1) Obtained and tested within seven (7) days of being notified of the strength deficiency, under the supervision of the Engineer.
 - (2) Cut within 6 inches of the original unit core in the longitudinal direction.

The results of all three cores sampled at the location will be averaged for the final compressive strength calculation and pay factor.

- b. The paved area shall be divided into units. Each unit will be considered separately. Units are 750 linear feet (230 m) of pavement for each separately placed width, or width of each class of concrete whether or not placed separately starting at the beginning of the pavement.

Paragraph 4.a.(7) of Subsection 603.05 is void and superseded by the following:

- (7) At the option of the Engineer, cores may not be required from irregular areas with widths less than 8 feet (2.4 m) or from an individual pavement type that involve less than 5,000 square yards (4200 m²) of pavement.

Paragraph 4.c.(4) of Subsection 603.05 is void and superseded by the following:

- (4) If the average thickness of the cores is deficient by more than 0.25 inch (6 mm) but not more than 0.50 inch (12.5 mm) an adjusted unit price will be paid in accordance with Table 603.04. Cores deficient by more than 0.50 inch (12.5 mm) will be treated as prescribed in Paragraph 4.d. of this Subsection.

PORTLAND CEMENT CONCRETE PAVEMENT SMOOTHNESS (F-23-1112)

Section 602 in the Standard Specifications is void and superseded by the following:

General

1. This specification establishes a standard for Portland cement concrete pavement smoothness, and defines defective pavement smoothness. The intent of the specification is to produce a finished Portland cement concrete pavement driving surface with an International Roughness Index (IRI) no greater than 93 inches per mile.
2. Pavement smoothness will be evaluated as prescribed in this section when the pay item "Portland Cement Concrete Pavement Smoothness" is included in the contract.
3. When the pay item "Portland Cement Concrete Pavement Smoothness" is not included in the contract, the Portland cement concrete pavement shall be evaluated in accordance with Paragraph 9.b. of Subsection 603.03.

Equipment

1. The Contractor shall furnish a non-contact inertial pavement profiler that meets the requirements of ASTM Standard E 950, certified by the manufacturer. The profiler must be approved by the Nebraska Department of Roads as specified in Subsection 602.03.
2. The non-contact profiler may be a lightweight version or a high speed version.
3. The non-contact profiler shall be equipped with a computerized system that will record, analyze, and print the test data. The profiler must also be equipped with a large-footprint height sensor specifically designed for surface profile measurements on textured Portland cement concrete surfaces.
4. The non-contact profiler shall produce a printed pavement profile report. The report shall include the following information.
 - a. Project number
 - b. Test date
 - c. Traffic lane
 - d. Test direction
 - e. Test path

- f. Pass number (1 for initial test; 2, 3, etc. for repeat tests)
- g. Operator's name
- h. Project stations
- i. Data filter values
- j. IRI values for each test section
- k. Bump and dip locations for each test section, as determined by California profilograph emulation
- l. California profilograph emulation traces (profilograms) for each test section with correctable bumps or dips

602.03 – Certification and Independent Assurance Testing

1. The Department shall calibrate and certify the Contractor's non-contact profiler annually at a test site established by the Department.
 - a. The non-contact profiler shall be inspected for compliance with general equipment requirements, including data analysis system, guidance system, and overall condition.
 - b. The non-contact profiler shall be calibrated for distance measurement by moving it over the prescribed path of a pre-measured test distance to determine its distance calibration factor.
 - c. The non-contact profiler shall be checked for vertical measurement accuracy by performing the height measurement calibration procedure described in Section 6 of AASHTO Designation PP 49-03, Certification of Inertial Profiling Systems.
 - d. The non-contact profiler shall be checked for overall performance by operating it over the prescribed path of a pre-measured pavement test section at its normal operating speed.
 - e. Distance measurement indicated by the non-contact profiler shall be within 0.2% tolerance of the actual pre-measured test section distance. To ensure accurate distance measurement during test runs, the air pressure of the distance measurement tire must always be maintained at the same level used for calibration.
 - f. The IRI reported by the non-contact profiler for the test section shall be within 10.0% tolerance of the IRI reported by a Nebraska Department of Roads non-contact profiler for the same test section.
 - g. A dated and signed decal will be placed on the non-contact profiler to certify its acceptability for use on Nebraska Department of Roads pavement construction projects. The certification expires one year from its issue date.
2. The Department shall certify the Contractor's non-contact profiler operator at least every 5 years. The operator may be certified by presenting certification from another state highway agency or by completing certification training conducted by the Nebraska Department of Roads.

3. The Department shall schedule and perform Independent Assurance tests for the Contractor's non-contact profilers and operators at least once per construction season. Independent Assurance testing shall be conducted at a randomly selected time on an active construction project. The criteria for the test will be similar to those used for certification.

602.04 – Profile Test Procedures

1. The Contractor shall perform all pavement smoothness specification tests with a Department certified profiler.
2. The Engineer shall furnish a report form to the Contractor identifying all required test sections.
 - a. The pavement surface shall be divided into lane-width segments that end at a bridge, railroad crossing or other designated termini.
 - b. The lane-width segments shall be further divided into individual 528 feet long test sections, in the direction of project stationing. The last test section in a segment is usually shorter than 528 feet.
 - c. If a test section is less than 300 feet long, it shall be combined with the preceding 528 feet long test section for analysis.
3. The Contractor's certified non-contact profiler operator shall perform smoothness specification tests in the Engineer's presence.
4. Smoothness testing shall be performed during normal daylight working hours unless otherwise approved by the Engineer.
5. The non-contact profiler operator shall perform pavement smoothness measurements in the right-hand or left-hand wheel path of all driving lanes, as directed by the Engineer, including climbing and fly-by lanes. The wheel path is the path followed by the right or left wheels of a truck or car traveling in the center of a traffic lane. It is assumed to be 3 feet from the left or right lane lines. In urban areas, where inlet block-outs or manholes are in the right or left hand wheel path, the pavement smoothness measurements shall be made in a location determined by the Engineer.
6. The Contractor shall remove all objects and foreign material from the pavement surface before testing, including any extra run-in or run-out lengths required for the non-contact profiler. Unless adequate traffic and personnel control is provided by the Contractor, the non-contact profiler must not be operated in active construction zones congested with construction equipment or personnel that could result in collision with the profiler.
7. The non-contact profiler operator shall guide the profiler along the specified wheel path of each traffic lane at a constant speed and directional path throughout the length of pavement being tested. The speed of the non-contact profiler must be within the speed range recommended by the manufacturer. Sudden changes in speed or direction during a test run will disqualify that test, and a new test must be performed.

8. A lateral location indicator shall be used to align the non-contact profiler in the required test path during testing. Pavement edges, longitudinal joints, or longitudinal pavement markings may be used as reference lines.
9. Before testing, the non-contact profiler operator shall perform routine check procedures of the measurement system as recommended by the manufacturer. To ensure consistent distance measurement, the operator shall also check and adjust the distance recording wheel tire pressure several times a day.
10. All station references on the non-contact profiler reports shall be actual project stations. Stations shall be accurately noted on any printed profiles at least every 100 feet. The distance measured by the non-contact profiler shall compare within 0.2 percent of the actual distance tested, as determined using project stationing, for all testing and retesting runs. Test runs that do not compare within 0.2 percent will disqualify that test. New tests must be performed for all disqualified tests, following calibration of the distance measuring system.
11. Immediately after completion of the tests, the non-contact profiler operator and the Engineer shall sign any printed reports and profiles to verify their authenticity. The signed prints then become the property of the Department.
12. The Engineer shall perform or schedule verification tests on at least 10 percent of the lane miles of pavement surface, with a non-contact profiler owned by the Department.
13. If the verification test, Independent Assurance tests, or other observations indicate that the Contractor's procedures or results are not acceptable or accurate, the Engineer may do any of the following.
 - a. Require the Contractor to calibrate the non-contact profiler and re-run the tests.
 - b. Disqualify the Contractor's equipment or operator.
 - c. Perform the tests for part, or all, of the project with a non-contact profiler owned by the Department, and charge the Contractor \$500.00 per lane mile for all testing done by the Department.
14. The following areas of pavement shall be excluded from the IRI requirements, unless otherwise specified in the special provisions.
 - a. Pavement on horizontal curves having a centerline radius of curvature of less than 1,000 feet, and pavement within the superelevation transition of such curves.
 - b. Pavement within 50 feet of a transverse joint that separates the pavement from an approach slab to a bridge deck or existing pavement not constructed under the contract.
 - c. Pavement for truck weigh stations or rest areas, acceleration/deceleration lanes, and interchange ramps and loops.
 - d. Pavement within 50 feet of railroad crossings and associated transitions.

- e. Pavement with a posted speed limit of 45 miles per hour or less.
 - f. Mandated blockouts for access at intersections and driveways including 50 feet on either side.
 - g. Pavement that would require handwork by normal industry practices.
 - h. Additional exceptions shown on the summary sheet in the plans.
15. Excluded pavement sections shall be measured for bumps and dips with either a profilograph, non-contact profiler, or a 10-foot straight edge. If the profilograph or non-contact profiler is used, the bump or dip surface deviation shall not exceed 0.30 inch. The deviation of the surface shall not exceed 1/8 inch, if a 10-foot straightedge is used.

602.05 – Evaluation

1. The Contractor shall determine the IRI and number of correctable bumps and dips for each test section, record the information on the report form, and provide a copy of the report, along with the corresponding printed reports and profiles, to the Engineer.
 - a. The International Roughness Index (IRI) shall be calculated by the non-contact profiler software using the quarter-car simulation. IRI shall be reported in units of inches per mile.
 - b. Correctable bumps shall be separately identified by the non-contact profiler software in a summary report using the California profilograph emulation. Bumps will appear as high points on the printed profile, and correspond to high points on the pavement surface. Correctable bumps are vertical deviations on the pavement surface that exceed 0.30 inch in height above a base line span of 25 feet.
 - c. Correctable dips shall be separately identified by the non-contact profiler software in a summary report using the California profilograph emulation. Dips will appear as low points on the printed profile, and correspond to low points on the pavement surface. Correctable dips are vertical deviations on the pavement surface that exceed 0.30 inch in depth below a base line span of 25 feet.

602.06 – Pavement Surface Correction

1. The Contractor shall locate and perform all required pavement surface corrective work, with the approval of and in the presence of, the Engineer. Corrective work may also be required for any combination of bumps, dips, or other roughness that, in the opinion of the Engineer, produces an objectionable ride. The Contractor may also locate and perform voluntary corrective work as described in Paragraphs 2.b and 2.c of this Subsection.
 - a. Corrective work shall be accomplished by diamond grinding or by removal and replacement, at no cost to the Department.

- b. Diamond grinding equipment used for surface correction shall be power driven, self-propelled units specifically designed to grind and texture pavements. The cutting head shall be at least 36 inches wide and consist of many diamond blades with spacers. The Engineer may approve equipment with a narrower width for irregular and confined areas which will not accommodate larger equipment and for bumps of limited number and area.
 - c. The Contractor shall re-test all corrected test sections with the non-contact profiler.
2. All bumps and dips, as defined in Subsection 602.05, Paragraphs 1.b and 1.c, shall be corrected until they are at or below the 0.30 inch limit. All dips shall be corrected by diamond grinding on either or both sides of the dip.
- a. When the initial IRI of a test section is 93 in/mi or less, mandatory bump and dip correction is the only corrective work allowed for that section.
 - b. When the IRI of a test section exceeds 93 in/mi, the Contractor may perform voluntary corrective work in that section, in addition to mandatory bump and dip correction work.
 - c. When the IRI of a test section exceeds 124 in/mi, mandatory corrective work shall be performed to reduce the IRI of that section to a value of 124 in/mi or less. The Contractor may perform voluntary corrective work in that section, in addition to mandatory work.
 - d. Dip correction by diamond grinding shall not reduce the pavement thickness to less than the required plan thickness minus $\frac{1}{4}$ inch.
3. When pavement removal and replacement is used for correction, the Contractor shall furnish the replacement material and construction at no cost to the Department.
- a. All replacement material shall meet the original specifications for the material removed.
 - b. Removal and replacement shall be for the full lane width for a distance determined by the Engineer.
 - c. Replacement material must meet the same smoothness requirements as the removed pavement.

602.07 - Traffic Control

- 1. The Contractor shall provide all traffic control for smoothness testing and corrective work at no cost to the Department.

602.08 – Method of Measurement

1. The unit price of the accepted quantity of Portland cement concrete pavement in each profile test section shall be adjusted according to the schedule in Table 602.01, subject to the limitations in Paragraphs 2, 3 and 4 of this Subsection. Pavement sections excluded from this smoothness specification shall not qualify for incentive pay.

Table 602.01

<i>Payment Adjustment Schedule</i>	
IRI Inches Per Mile	Percent of Contract Prices
0 to 43	106
Greater than 43 to 56	104
Greater than 56 to 68	102
Greater than 68 to 93	100
Greater than 93 to 99	98
Greater than 99 to 105	96
Greater than 105 to 111	94
Greater than 111 to 117	92
Greater than 117 to 124	90
Greater than 124	Corrective work required

2. When the initial IRI of a test section is 93 in/mi or less, that value shall determine the percent of incentive pay for the section, except that any mandatory correction work performed in that section may increase the percent of pay up to the 106 percent level indicated in Table 602.01.
3. When the initial IRI of a test section is greater than 93 in/mi, mandatory or voluntary corrective work performed in that section may increase the percent of pay up to the 100 percent level indicated in Table 602.01.
4. When the initial IRI of a test section is greater than 124 in/mi, mandatory and voluntary corrective work performed in that section may increase the percent of pay up to the 100 percent level indicated in Table 602.01.

602.09 – Basis of Payment

1. The overall pay factor for the accepted quantity of Portland cement concrete pavement in all profile test sections shall be determined according to the formula in Table 602.02.

Table 602.02**Pay Factor Formula**

$$\text{PF} = \frac{A(1.06) + B(1.04) + C(1.02) + D(1.00) + E(0.98) + F(0.96) + G(0.94) + H(0.92) + I(0.90)}{A + B + C + D + E + F + G + H + I}$$

Where:

A = Length of pavement with an IRI of 0 to 43 inches per mile.

B = Length of pavement with an IRI greater than 43 to 56 inches per mile.

C = Length of pavement with an IRI greater than 56 to 68 inches per mile.

D = Length of pavement with an IRI greater than 68 to 93 inches per mile.

E = Length of pavement with an IRI greater than 93 to 99 inches per mile.

F = Length of pavement with an IRI greater than 99 to 105 inches per mile.

G = Length of pavement with an IRI greater than 105 to 111 inches per mile.

H = Length of pavement with an IRI greater than 111 to 117 inches per mile.

I = Length of pavement with an IRI greater than 117 to 124 inches per mile.

2. The work of smoothness testing shall be paid for at the lump sum contract unit price. This price shall be full compensation for all smoothness testing as set forth in this specification.

CONCRETE CONSTRUCTION (G-5-1111)

Section 704 in the Standard Specifications is amended to include the following:

All concrete rails on bridges and approach slabs shall be cast-in-place. Slip-forming will not be permitted for concrete rails on bridges and approach slabs.

Paragraph 8. of Subsection 704.03 is amended to provide that forms for 42 inch bridge rails shall be made of steel.

The fourth subparagraph of Paragraph 8.j. of Subsection 704.03 is void and superseded by the following:

Steel stay-in-place form material shall conform to the requirements of ASTM A 653/A 653M Coating Designation G165/Z500.

Paragraphs 8.a., b. and c. of Subsection 704.05 are void and superseded by the following:

8. Payment Deductions:
 - a. The 28-day compressive strength is determined by the average strength of all cylinders made on a specific day to determine the 28-day compressive strength of all of a group's class of concrete poured that day. Concrete with a 28-day compressive strength not meeting the design compressive strength is subject to removal.
 - b. If the 28-day compressive strength is less than the design compressive strength, cores may be taken within 45 days after the concrete was poured. The average of the cores will be used to determine the compressive strength. If the average of the cores is equal to or greater than 85% of the design compressive strength, the concrete is acceptable for use and is not subject to removal or a pay reduction. Cores will be taken by the Department at no cost to the Contractor.
 - c. If either the 28-day compressive strength or the average core strength is less than the design strength and the Engineer determines that the concrete is acceptable for use, the concrete is subject to a payment deduction. The pay deduction is shown below:

$$\frac{2 \times (\text{Design Compressive Strength} - 28\text{-day Compressive Strength})}{\text{Design Compressive Strength}} = \text{Percent Reduction}$$

Or

$$\frac{2 \times (\text{Design Compressive Strength} - \text{Average Core Compressive Strength})}{\text{Design Compressive Strength}} = \text{Percent Reduction}$$

PILES AND PILE DRIVING (G-6-0611)

Paragraph 1.m.(1) of Subsection 703.03 of the Standard Specifications for Highway Construction is void and superseded by the following:

All welding to be done on steel piles shall be in accordance with the plans and the applicable requirements of Section 708 in the Standard Specifications. Welder qualification certification is required and must be submitted to the Bridge Fabrication Manager for approval prior to any welding.

All field welding on steel piles shall be done in the SMAW process using electrode E7018.

For bridges with design live load "HL-93", the tables in paragraph 4.c. of Subsection 703.03 (on pages 444 and 445) in the Standard Specifications are void and superseded by the following:

Dynamic Formulas (English and Metric)

Diesel Hammers:

$$P = \frac{4.0 E}{S+0.5} \quad \text{For all piles driven from the top with a single-acting diesel hammers (English)}$$

$$P = \frac{3.27 E}{S+12.7} \quad \text{For all piles driven from the top with a single-acting diesel hammers (Metric)}$$

Where:

P = the bearing capacity, in kips (English) or kN (Metric)

W = the mass of the ram, in kips (English) or kg (Metric)

M = the mass of the pile and driving cap, in kips (English) or kg (Metric)

S = the average penetration per blow, in inches (English) or millimeters (Metric), of the last 10 blows for diesel hammers

H = the height of fall of the ram, in feet (English) or meters (Metric) (less twice the height of bounce for gravity and steam hammers)

E = the energy per blow in foot-kips (English) or meter-kilogram (Metric).
For single-acting diesel hammers, $E + W \times H$

Unless permitted by the NDR Geotechnical Section, all piles driven with hammers other than single-acting diesel hammers shall be tested with the Pile Driving Analyzer to verify capacity.

$$P = \frac{4.9 WH}{S+0.35} \quad \times \quad \frac{W}{W+M} \quad \text{For gravity hammers}$$

$$P = \frac{4.9 E}{S+0.1} \quad \times \quad \frac{W}{W+M} \quad \text{For steam hammers}$$

$$P = \frac{2.2 E}{S+0.1} \quad \text{For driving mandrel driven pile shells}$$

Paragraph 7.a. of Subsection 703.03 is void and superseded by the following:

- a. "Practical Refusal" occurs when actual bearing capacity is 2.0 times the Design Pile Bearing.

Paragraph 2. of Subsection 703.05 is void and superseded by the following:

2. a. (1) Provided that the Contractor furnishes the Engineer signed purchase orders for bearing and sheet piling, authorized "cutoff" of bearing and sheet piling shall be made at the invoice price per linear foot (meter) of bearing piling, and per square foot (meter) of sheet piling.
- (2) The signed purchase orders shall be furnished at the pre-construction conference.
- b. In those cases where signed purchase orders for bearing and sheet piling are not furnished at the pre-construction conference, authorized "cutoff" of bearing and sheet piling shall be made at 60 percent of the piling's contract unit price.

- c. No payment is made for "cutoff" beyond the order length.
- d. When bearing or sheet pile are authorized for cutoff and are suitable for use as spliced material for the same purpose on the project, the length of material subsequently driven as service piling shall be deducted from the payment for cutoff. No piece of piling can qualify for more than one measurement as pay cutoff.

Paragraph 3. of Subsection 703.05 is void and superseded by the following:

- 3. Splices ordered by the Engineer shall be paid for at 5 times the unit bid price (2 times the unit bid price for Metric projects) for HP steel piling, pipe, piling, and cast-in-place piling; and at 20 times the unit bid price (7 times the unit bid price for Metric projects) for driving and build-up splices for precast/prestressed concrete piling.

REINFORCING STEEL SUPPORTS (G-8-0508)

Paragraph 3.b.(2) of Subsection 707.03 of the Standard Specifications is void and superseded by the following:

Reinforcing steel in concrete slabs shall be positioned on plastic coated supports or chairs to accurately maintain the specified clearance to the surface of the concrete. Supports shall be spaced at distances not greater than 3 feet for #4 top bars or 4 feet for all other reinforcing.

PREFORMED EXPANSION JOINT (G-11-1212)

Section 734 of the Standard Specifications is void and superseded by the following:

Description

1. This work shall consist of furnishing and installing a Preformed Expansion Joint in a preformed gap at the locations and limits shown on the plans.
2. The Preformed Expansion Joint shall be either a Precompressed Polyurethane Foam Joint or a Preformed Silicone Joint, as indicated in the plans.
 - a. When the item is "Precompressed Polyurethane Foam Joint, Type ____" the joint shall be a Precompressed Polyurethane Foam Joint of the type indicated in the plans.
 - b. When the item is "Preformed Silicone Joint, Type ____", the joint shall be a Preformed Silicone Joint of the type indicated in the plans.
 - c. When the item is "Preformed Expansion Joint, Type ____", the joint may be either a Precompressed Polyurethane Foam Joint or a Preformed Silicone Joint of the type indicated in the plans.

Material Requirements

1. Precompressed Polyurethane Foam Joints:
 - a. PPF Joint shall be precompressed self-expanding polyurethane foam with factory applied silicone facing on top of the foam.
 - b. PPF joints shall be ordered for the joint material dimension shown in the plans.
 - c. Approved PPF Joint systems are shown on the NDOR Approved Products List under Precompressed Polyurethane Foam Joint, Type A or B.
2. The approved Preformed Silicone Joint systems are shown on the NDOR Approved Products List under Preformed Silicone Joint, Type A or B.
3. Primers, epoxy adhesives, and silicone sealants shall comply with the manufacturer's recommendations.
4. Materials shall be resistant to ozone, ultraviolet rays, petroleum products, solvents, industrial cleaners, corrosive vapors and acids.
5. Joint material shall be delivered to the Contractor's storage area and to the job site in the Manufacturer's original undamaged containers with wrapping intact. Storage of joint material shall be in a dry, enclosed area, off the ground, between 60°F (16°C) and 75° F (24°C) and out of direct sunlight until immediately prior to installation.

Construction Methods

1. The installation of the Preformed Expansion Joint and the adhesives shall be completed according to the manufacturer's specifications. Additional field applied silicone is required on both sides of the top of the joint. Any installation that fails to meet the manufacturer's specifications shall be removed and replaced at no cost to the Department.
2. The installation instructions and specifications shall be given to the Engineer 7 days prior to the installation.
3. The Preformed Expansion Joint shall be installed in the presence of the Engineer.
4. The joint opening in the concrete shall be cleaned by sandblasting and shall be dry and free of oil and other deleterious materials before the installation of the Preformed Expansion Joint.
5. The installation of the Preformed Expansion Joint shall be completed between 45°F (7°C) and 90°F (32°C).
6. Any joint material damaged during corrective grinding shall be replaced at no cost to the Department.

Method of Measurement

1. The Preformed Expansion Joint shall be measured for payment by the linear foot (meter) of the joint properly installed and accepted by the Engineer.
2. Pay limits for the Preformed Expansion Joints shall be the horizontal distance from end to end along the centerline of the joint assembly at the locations shown in the plans and 1 foot (0.3 m) upward at the gutter line if shown.

Basis of Payment

- | | | |
|----|--|------------------------------|
| 1. | Pay Item | Pay Unit |
| | Preformed Expansion Joint, Type ____ | Linear Foot (LF) [Meter (m)] |
| | Precompressed Polyurethane Foam Joint, Type ____ | Linear Foot (LF) [Meter (m)] |
| | Preformed Silicone Joint, Type ____ | Linear Foot (LF) [Meter (m)] |
2. Payment is full compensation for furnishing and installing the Preformed Expansion Joint and for all labor, equipment, tools and incidentals necessary to complete the work.

**SHIM CONCRETE PAYMENT
(G-13-1110)**

Paragraph 1. of Subsection 706.04 in the Standard Specifications is void and superseded by the following:

1. a. The Department will pay plan quantity when items are constructed according to the plan geometrics.
- b. The Contractor may request that the Department recalculate the quantity for the concrete haunch, using the girder shim shots on a prestressed concrete girder bridge.

Subsection 706.05 is amended to include the following:

If the recalculated concrete quantity of the concrete haunch on a prestressed concrete girder bridge is greater than the plan quantity, the additional concrete quantity will be paid at 1.33 times the concrete invoice price. The Contractor shall furnish the Engineer signed invoices for the Concrete Class _____ for Bridges prior to the request for recalculating the concrete haunch quantity.

**PRECAST OR PRECAST/PRESTRESSED CONCRETE
STRUCTURAL UNITS
(G-14-0412)**

Section 705 in the Standard Specifications is void and superseded by the following:

Description

1. This work consists of all labor, materials, and equipment required in the production of Precast or Precast/Prestressed Structural Units.
2. Contract plans shall be supplemented by Contractor-provided working drawings submitted in accordance with Subsection 105.02.

Material Requirements

1. The materials used shall meet the requirements prescribed in Table 705.01.

Table 705.01

Material Requirements	
Applicable Material	Section
Concrete	1002
Admixtures	1007
Water	1005
Fine Aggregate	1033
Course Aggregate	1033
Fly Ash	1008
Spiral Reinforcing Wire	1023
Prestressed Steel Strand	1026
Post-Tensioning Assembly Steel	1025

2. The concrete class used in the manufacture of Precast or Precast/Prestressed Structural Units shall be shown in the plans.
3. The Contractor shall be responsible for the Concrete Mix Design. Concrete Mix Designs shall be proportioned in accordance with ACI Standard 318 and the following additional requirements:
 - a. The mix designs or change to a mix design shall be submitted for approval to the Engineer 4 weeks before beginning any concrete work. Refer to Table 705.03 for required testing for any mix design.
 - b. Concrete shall consist of Type I, Type II, or Type III Portland cement, aggregate, air-entraining admixture, and water. Concrete may also contain Class C or Class F fly ash, Slag Cement or Silica Fume and ASTM C 494 approved Type A, Type B, Type D, and Type F admixtures.
 - c. No change shall be made in the approved Concrete Mix Design during the progress of the work without the prior written permission of the Portland Cement Concrete (PCC) Engineer.
4. Reinforcement shall be furnished, handled, stored, and placed in accordance with the requirements of Section 707.
5. Welding of reinforcing steel is prohibited unless specifically authorized by the Engineer.
6. Prestressing steel other than that specified in the plans or Special Provisions may be furnished with the approval of the Engineer. The yield and ultimate strength and other pertinent characteristics of this steel shall be submitted to the Engineer.
7. The area of broken wires shall not exceed 2% of the cross sectional area of the stressing strands when the number of strands is 14 or less.
8. No more than 1 broken wire will be allowed in a single strand.
9. Bars for post-tensioning shall be of high tensile strength steel. They shall be equipped with wedge type end anchorages which will develop the minimum specified ultimate bar stress on the nominal bar area. The physical properties of the bar steel determined by static tensile tests shall conform to the requirements in Table 705.02.

Table 705.02

High Strength Steel Post-Tensioning Requirements	
Ultimate Stress	145,000 psi (1000 MPa) minimum
Stress at 0.7% Elongation	130,000 psi (900 MPa) minimum
Stress at 0.3% Elongation	75,000 psi (500 MPa) minimum
Elongation in 20 Diameters.....	4% minimum
Modulus of Elasticity	25,000,000 psi (172,00 MPa) minimum
Diameter Tolerance	Plus or Minus 0.1 inch (2.5 mm)

10. Materials specified for testing shall be furnished 30 days before the anticipated time of use. All materials required for testing shall be furnished by the Contractor to the Engineer without additional costs to the Department. The Engineer shall select a representative sample length for the various prestressed steel as follows:
 - a. Six feet (1.8 m) for wires requiring heading.
 - b. For wires not requiring heading, sufficient length to make up one parallel-lay cable 6 feet (1.8 m) long consisting of the same number of wires as the cable to be furnished.
 - c. Six feet (1.8 m) between near ends of fittings for a strand furnished with fittings.
 - d. Six feet between threads at the ends of bars furnished with threaded ends.
11. If the anchorage assemblies are not attached to prestress steel samples, 2 anchorage assemblies shall be furnished for testing, complete with distribution plates of each size or type of prestress steel to be used.
12. Any defective material shall be rejected.
13. Concrete quality control shall be the responsibility of the Contractor. Concrete shall be sampled and tested as shown in Table 705.03.
 - a. The Contractor's test results are the basis for acceptance. If the Department's quality assurance testing is not within 10% of the Contractor's test results on any given sets of three cylinders, the Engineer will initiate an investigation to find the cause of the variation between the Contractor's and the Department's test results. While the investigation is in progress, the Department will continue with quality assurance testing as shown in Table 705.03. Any structural units represented by these tests will be subject to rejection.
 - b. If more than one set of cylinders is required per Table 705.03 for a single Precast or Precast/Prestressed Concrete Structural Unit, each set of three cylinders will be averaged separately. All averaged sets must meet the minimum design strengths.
 - c. If 40 cubic yards makes more than one Precast or Precast/Prestressed Concrete Structural Unit and the Contractor elects to make the minimum set of cylinders, that single set of cylinders will be used to determine the girder strength for all of the Precast or Precast/Prestressed Concrete Structural Units that set of cylinders represents. If the Contractor elects to make more than the minimum cylinders required, in order to represent each Precast or Precast/Prestressed Concrete Structural Unit, only the set of cylinders representing the corresponding unit will be used to determine the strength of that unit.

Table 705.03 Precast Plant Approval		
Plant Certification	<p>Contractor <u>Prestressed:</u> Shall submit PCI Certification every two years to the PCC Engineer. <u>Precast:</u> Precast plants that are not PCI certified will be NRMCA certified.</p>	<p>NDOR Approve and add to site Manager.</p>
Quality Control & Quality Assurance at Plant Site		
Frequency	Daily	Weekly
Number of Acceptance Cylinders to be fabricated	<p>Contractor Quality Control - Will make a minimum of six cylinders for every 40 cubic yards. - NDOR personnel will record results and enter into site manager. These samples will be identified, and tagged by NDOR. NDOR shall have access to these QC samples at all times.</p>	<p>NDOR Personnel Quality Assurance - Will make a minimum of three sets of three cylinders per mix design per week of production. - The NDOR samples will be taken at the same location within a load of concrete as the Contractor's QC samples. NDOR shall choose the location of these samples within the load/girder. - Enter results into Site-manager.</p>
Required Testing for Acceptance Cylinders	<p>Contractor Laboratory -7 Day Compressive Strength: three cylinders averaged at Contractor's discretion. -28 Day Compressive Strength: three cylinders averaged. -56 Day Compressive Strength: The remaining three cylinders will be tested for 56 day compressive strengths; only if the 28 day compressive strength failed to meet specification requirements. NOTE: No cylinders are to be discarded until all design strengths are met and the prestressed unit(s) is accepted. - Air Content – ASTM C 231 - Slump Flow – ASTM C 1621 - Visual Stability Index (VSI) Appendix of ASTM C 1611 is required.</p>	<p>NDOR Laboratory: -28 Day Compressive strength: Three cylinders averaged. • The 28 day compressive strength is to be used for validation of the Contractor's strength. • <u>NOTE: If the Contractor's and Department's 28 day test results are not within 10%, the Engineer will investigate the variation.</u> • NDOR will be on-site to witness the testing for all Acceptance Cylinders. - Air Content – ASTM C 231 - Witness Slump Flow & Visual Stability Index</p>
Inspection at Plant Site		
Frequency	Weekly	
Required Inspection	Refer to policy in the Material & Sampling Guide for the following: <ul style="list-style-type: none"> • Precast/Prestressed Concrete Plant Inspection-NDOR Inspector • Precast/Prestressed Concrete Plant Inspection-Fabricator Inspector 	

Table 705.04 Mix Design Approval/ Change Cement or Aggregate Source		
Trial Mix	<p>Contractor Data from 15 trial tests as a minimum (New Mix Design) Data from 5 trial tests as a minimum (Change in Cement or Aggregate)</p>	<p>NDOR Contractor is responsible to notify PCC Engineer 4 weeks in advance.</p>
Testing	<p>Contractor - Compression Strength – AASHTO T 22 - Flexure Strength of concrete (using simple beam with third-point Loading) - ASTM C 78 - Air Content – ASTM C 231 - Slump Flow – ASTM C 1611 - Passing Ability by J-Ring Method - ASTM C 1621 - Visual Stability Index (VSI) - Appendix of ASTM C 1611 is required.</p>	<p>NDOR Sampling and Testing two of the Contractor's trial test. - Compression Strength – AASHTO T 22 - Flexure Strength of concrete (using simple beam with third-point Loading) - ASTM C 78 - Air Content – ASTM C 231 - Witness (Slump Flow & J Ring)</p>
Approval	<p>Contractor Submit data from lab testing to PCC Engineer.</p>	<p>NDOR - Data review / ensure specification are met - Approve mix design - Add to Site Manager with NDOR Mix Design Number</p>
Change to Admixtures in Approved Mix Design		
Testing/Approval	<p>Contractor Contractor is responsible to notify the PCC Engineer 3-4 weeks in advance. - Air Content – ASTM C 231 - Slump Flow – ASTM C 1621 - Passing Ability by J-Ring Method - ASTM C 1621 - Visual Stability Index (VSI) Appendix of ASTM C 1611 is required.</p>	<p>NDOR - Air Content – ASTM C 231 - Witness Slump Flow, Passing Ability and Visual Stability Index</p>

14. Plant Approval Requirements:

- a. All Prestressed Concrete Structural Units shall be produced in a Precast/Prestressed Concrete Institute (PCI) certified plant.
- b. All concrete for Precast/Prestressed Concrete Structural Units shall be produced at a PCI or NRMCA certified plant.
 - (1) Whenever there is reason to suspect a problem with the equipment, any or all of the equipment may be inspected.
- c. The method of manufacture and quality of concrete are also subject to Department approval/inspection.

- d. A Contractor proposing to furnish Precast or Precast/Prestressed Structural Units shall submit the following additional details to the Department concerning the method of manufacture:
 - (1) Type, number, size, and location of the prestressing elements, and the name of the manufacturer of the post-tensioning or pretensioning elements.
 - (2) Complete information as to type, size, and method of installation of devices for anchoring post-tensioning elements.
 - (3) The proposed manufacturing methods and the plans and design details of proposed casting beds and forms.
 - e. The use of portable pretensioning beds for the manufacture of concrete structural units or piles will not be allowed.
15. Mix Design Approval Requirements:
- a. The results of 15 individual trial mixes shall be produced using the same process as the plants normal production run. All test results of individual trial mixes shall be given to the Engineer. The test results collected shall include the following:
 - (1) The release and 28-day compressive strength test results shall conform to AASHTO T 22.
 - (2) The water/cement ratio.
 - (3) The air content (between 2.0 percent and 6.0 percent inclusive).
 - (4) The cement, fly ash, Slag Cement and Silica Fume content.
 - (5) The amount of fine aggregate, coarse aggregate, and sand and gravel.
 - (6) Slump Flow test results shall conform to ASTM C 1611
 - (7) Passing Ability by J-Ring Method test results shall conform to ASTM 1621.
 - (8) Visual Stability Index (VSI) test results shall conform to the Appendix of ASTM C 1611.
 - (9) Flexure Strength of concrete at 28-day test results shall conform to (using simple beam with third-point loading) ASTM C 78.
 - b. Any change of cement or aggregate source which must be on the NDR Approved Product List shall require 5 new individual trial mixes. Refer to Table 705.04 for required testing procedures.
 - c. Any changes using admixtures, the Contractor shall verify the properties of the concrete. Refer to Table 705.04 for the required testing procedures.

- d. The compressive strength test results of 15 individual trial mixes shall be performed by the Contractor. An individual trial mix shall consist of two sets of three cylinders with three cylinders being averaged at release and at 28-day. One set shall be taken within the first third of the load and the second set shall be taken within the two thirds of the load.
- e. All tests for elastic modulus and compressive strength will be conducted using 4 inch x 8 inch (100 mm x 200 mm) cylinders.
- f. The flexure strength test results of 15 individual trial mixes shall be performed by the Contractor. An individual trial mix shall consist of two sets of two beams with two beams being averaged at 28-day. One set shall be taken within the first third of the load and the second set shall be taken within the two thirds of the load.

Construction Methods

- 1. The Contractor shall construct Precast or Precast/Prestressed Structures and piles as shown in the plans.
- 2. The Contractor shall provide the Engineer a 4-week production schedule that is updated as necessary. If the Engineer is given less than 1 NDOR work day notice of a schedule change, then the fabricator may not proceed until the Engineer has reviewed the change. The Engineer may observe any or all of the procedures and shall have access to all reported data at any time during fabrication. The Engineer shall report any inconsistencies to the job superintendent.
- 3. The concrete producer shall report the following information for each load of concrete used to fabricate girders:
 - a. Brand, mill, type, certified test number, and weight of cement.
 - b. Brand, mill, class, certified test number, and weight of fly ash.
 - c. Type, source, location, weight, and free moisture content for each aggregate. Aggregate moisture shall be determined according to NDR T 506 for each half day.
 - d. Source, type, name, and amount of each admixture.
 - e. Water added during batching and at placement site.
 - f. Time water and cement are initially mixed into the batch.
 - g. Time placement is completed.

4. Tensioning:

a. Methods:

- (1) In all methods of tensioning, the stress induced in the prestressing elements shall be measured by the Contractor both with jacking gauges and by elongation of the elements; and these results shall be the same within a 5% tolerance.
- (2) Means shall be provided for measuring the elongation of reinforcement to at least the nearest 1/8 inch (3 mm).
- (3) All steel stressing devices, whether hydraulic jacks or screw jacks, shall be equipped with accurate reading calibrated pressure gauges, rings, or other devices as applicable to the jack being used.
- (4) All devices shall be calibrated and, if necessary, recalibrated so as to allow the stress in the prestressing steel to be computed at all times.
- (5) A certified calibration curve shall accompany each device.
- (6) Safety measures must be taken by the Contractor to prevent accidents due to possible breaking of the prestressing steel or the slipping of the grips during the prestressing process.

b. Measurement:

- (1) Pressure gauges, load cells, dynamometers, and any other devices used in determination of loads and/or pressures shall be accurate in their effective range within a 2% tolerance.
- (2) Such equipment shall be calibrated by an approved testing laboratory.
- (3) The Contractor's laboratory shall furnish calibration curves for each device and shall certify the curves as being accurate and verifiable.
- (4) The calibration of tensioning devices shall be accomplished in place.
- (5) The configuration of jacks, gauges, and other components during calibration shall be exactly the same as during the actual stressing operation.
- (6) The method of calibration shall be as approved by the Engineer.
- (7) Tensioning devices shall be calibrated at least once a year and at any time a system appears to be operating in an erratic or inaccurate manner or gauge pressure and elongation measurements fail to correlate.

- c. If the strand tension indicated by the gauge pressure and by elongation methods fail to agree within 5%, the operation shall be carefully checked and the source of error determined before proceeding further.

- d. Measurement Consideration:
- (1) The Contractor's elongation and jacking pressure measurements shall make appropriate allowance for friction and all possible slippage or relaxation of the anchorage.
 - (2) For pretensioned members, independent references shall be established adjacent to each anchorage by the Contractor to indicate any yielding or slippage that may occur between the time of initial stressing and final release of the cables.
 - (3) The Contractor may tension straight post-tensioned tendons from one end. Curved tendons shall generally be stressed by simultaneous jacking from both ends.
- e. In all stressing operations, the Contractor shall keep stressing force symmetrical about the member's vertical axis.
5. Stressing Procedure:
- a. Prestressing methods are shown in the plans. When the Contractor elects to use a method other than that shown in the plans, the Contractor shall submit complete shop plans for the proposed method.
 - b. Pretensioning Method:
 - (1) The amount of stress to be given each strand by the Contractor shall be as shown in the plans.
 - (2) All strands to be prestressed in a group shall be brought to a uniform initial tension before being given their full pretensioning. This uniform initial tension of approximately 1,000 to 2,000 pounds (450 to 900 kg) shall be measured by a dynamometer or other approved means so that it can be used as a check against the computed and measured elongation.
 - (3) After initial tensioning, either single strand or multiple strand groups shall be stressed until the required elongation and jacking pressure are attained and reconciled within the 5% tolerance.
 - (4) With the strand stressed in accordance with the plan requirements and these *Specifications*, and with all other reinforcing in place, the Contractor shall cast the concrete to the lengths desired. Strand stress shall be maintained between anchorages until the concrete has reached the compressive strength specified in the plans.
 - c. Post-tensioning Method - For all post-tensioned elements, the Contractor shall set the anchor plates exactly normal in all directions to the axis of the bar or tensioning strand. Parallel wire anchorage cones shall be recessed within the beams. Tensioning shall not be done until the concrete has reached the compressive strength specified in the plans.

- d. Combined Method - In the event that the girders are manufactured with part of the reinforcement pretensioned and part post-tensioned, the applicable portions of the requirements listed above shall apply to each type.
6. Forms:
- a. Forms for Precast or Precast/Prestressed Concrete Structural Units shall conform to the requirements for concrete formwork as provided in Subsection 704.03.
 - b. Precast or precast/prestressed forms shall be accessible for the vibration and consolidation of concrete.
 - c. If the ambient temperatures are above 90°F (32°C), precautions shall be taken so the forms, reinforcing steel and steel beams of structural units will be the ambient temperature.
7. Placing Concrete:
- a. The Contractor shall provide the Department a 4-week production schedule that is updated as necessary. Unscheduled production changes may delay fabrication. Unscheduled production may result in rejection of Precast or Precast/Prestressed Concrete Structural Units.
 - b. The Engineer may observe any or all of the procedures. The Contractor shall provide access to all reported data at any time during fabrication. The Engineer will report any inconsistencies to the job superintendent.
 - c. Concrete shall not be placed before completing the forming and placing of reinforcement.
 - d. Placing Procedure:
 - (1) Concrete shall be placed continuously in each unit, taking care to avoid horizontal or diagonal planes of weakness.
 - (2) However, if there is a delay in delivery of concrete or for some other reason placement is interrupted for more than 30 minutes, then the concrete shall be rejected.
 - e. Consolidation:
 - (1) Whether concrete requires vibration or self-consolidating concrete is used, special care shall be exercised to work and consolidate the concrete around the reinforcement and to avoid the formation of stone pockets, honeycombs and other defects.
 - (2) Self-consolidated concrete (SCC) shall not be vibrated. Rodding of Self-Consolidated Concrete (SCC) is permissible in areas of tight reinforcement.
 - (3) The other concrete shall be consolidated by vibrating.

- f. The concrete shall be a homogenous mixture and shall not contain cement balls.
 - g. The forms shall be overfilled, the excess concrete screeded off, and the top surfaces finished to a uniform, even texture.
 - h. Each Precast or Precast/Prestressed Concrete Structural Unit shall be stamped or marked with an identification number and its manufacture date.
 - i. Environmental Limitations:
 - (1) The optimum range of concrete temperatures from the time the concrete is completely mixed until the beginning of the presteam segment of the steam curing cycle shall be 50° to 95°F (10° to 35°C). Failure to operate within the optimum range shall be cause for curtailment of operations. During the presteam segment of the curing cycle, the temperature of the concrete shall not exceed 100°F (38°C) nor fall below 50°F (10°C). These temperature restrictions apply when heat is supplied to the curing enclosure prior to initial set.
 - (2) When placing concrete under cold weather conditions (ambient air temperature less than 36°F [2°C]), the Cold Weather Specifications in Sections 1002 and 704 shall be followed.
 - (3) Forms and reinforcing materials shall be preheated to a minimum temperature of 40°F (4°C) and a maximum temperature not to exceed that of the concrete at the time of placement.
 - (4) The Contractor may preheat the drums of the mixer-trucks to the limits set for forms and reinforcing, but under no condition shall heat be applied to the drums while they contain any of the batch materials or concrete.
8. Curing:
- a. General:
 - (1) The Contractor shall cure the concrete with wet burlap, waterproof covers, polyethylene sheets, or liquid membrane-forming compounds. Curing with liquid membrane-forming compounds shall be accomplished in accordance with the requirements of Section 1012 and Subsection 704.03, except that liquid membrane-forming compounds shall not be used on that portion of precast/prestressed concrete girders, twin tees, or bridge beams upon which concrete will be cast later.
 - (2) Water spray curing or other moist curing methods may be used subject to the approval of the Engineer.
 - (3) The period of concrete curing shall be determined by the results of the compressive strength test on cylinders made during the progress of the work and cured to closely approximate the concrete strength of the product it represents.

- (4) Side forms may be removed 12 hours after placing the concrete, provided curing is continued with one of the approved Department curing procedures.
- b. Steam or radiant heat will be allowed for accelerated curing provided the following procedure is adhered to:
- (1) Curing chambers shall be reasonably free of leakage and shall have a minimum clearance of 3 inches (75 mm) in order to insure adequate circulation of heat. The relative humidity within the curing enclosure shall be maintained between 70 and 100 percent.
 - (2) Temperature:
 - (i) One approved continuous recording thermometer for each 115 feet (35 m) of casting bed, with a minimum of 2 continuous recording thermometers, shall be located in each enclosure or curing chamber.
 - (ii) Continuous temperature record charts for each casting shall be available to the Engineer for examination and approval at any time.
 - (iii) If the temperature records or other temperature readings taken by the Engineer indicate that manual control of heat is producing temperature changes in excess of those specified, the Engineer may reject the Precast or Precast/Prestress Structural Unit.
 - (iv) Temperature of the curing concrete shall be 50°F to 105°F (10°C to 40°C) and shall be maintained near placement temperature until the concrete has reached initial set as determined by ASTM C 403 "Time of Setting of Concrete Mixture by Penetration Resistance". These temperature restrictions apply when heat is supplied to the curing enclosure prior to initial set.
 - (v) The temperature rate of rise shall not exceed 60°F (15.5°C) per hour.
 - (3) The concrete shall be completely enclosed with a waterproof curing chamber during accelerated curing periods.
 - (4) Steam jets shall not be directed at the concrete or the steel forms.
 - (5) If the temperature of the concrete rises above 175°F (79°C), the concrete shall be rejected.
 - (6) The temperature in the concrete shall be maintained so that at any given time the difference between the highest and lowest temperature station readings will not be more than 30°F (-1°C). If the temperature varies more than 30°F (16°C), the product shall be rejected.
 - (7) Eight hours after placing the concrete, individual sections may be uncovered to remove their forms. The curing may be discontinued during this operation. The section shall not be left uncovered longer than necessary and never longer than 30 minutes. Waterproofed covers shall be used to recover the product.

- (8) After the heat source has been turned off, the curing cover shall be maintained in place during the curing period until the release strength has been reached.
 - (9) Detensioning shall be accomplished before the temperatures of the units drop more than 60°F from the peak cure strength temperature and while they are still moist.
 - (10) Master slave heat curing system may be used for curing quality control cylinders.
- c. After detensioning, prestressed concrete girders shall be inspected for cracking. If any cracks are discovered between quarter points in the middle of the girder on the bottom flange face, the girder shall be rejected.
9. Defects and Repair Procedures:
- a. After the forms are removed, stone pockets, honeycombs, or other defects may be exposed. The Engineer shall determine if these defects affect the item's structural integrity and whether the item will be rejected.
 - b. Precast or Precast/Prestressed Concrete Structural Units which have chipped, spalled, honeycombed, or otherwise defective areas which are not considered detrimental to the structural integrity may be used after being repaired by the Grooming and Repair Procedures for Precast Concrete Products in the NDR Materials Sampling Guide.
10. Surface Finish:
- a. On structures serving as highway grade separations, the following shall apply:
 - (1) The exterior face of all exterior girders or beams plus the bottoms and chamfers on all lower flanges shall be given the following finish:
 - (i) All uneven form joints in excess of 1/8 inch (3 mm) shall be ground smooth.
 - (ii) The surface shall be steel brushed to remove scale, laitance, and to open partially obstructed holes.
 - (iii) The surface shall be dampened.
 - (iv) Grout shall be applied to the surface.
 - (v) The grout shall consist of 1.5 parts of fine sand, 1 part of Portland cement, and sufficient water to produce a consistency of thick paint. The cement used in the grout shall be a blend of regular Type I and white Portland cement to duplicate the lighter appearance of the steam cured units.
 - (vi) If necessary, an admixture which will not discolor the concrete may be used in the grout to reduce shrinkage if approved by the Engineer. Admixtures containing iron particles shall not be used.
 - (vii) The surface shall be float finished with a cork or other suitable float. This operation shall completely fill all holes and depressions on the surface.

- (viii) When the grout is of such plasticity that it will not be pulled from holes or depressions, sponge rubber or burlap shall be used to remove all excess grout.
- (ix) Surface finishing during cold weather shall not be performed unless the temperature is 40°F (4°C) and rising. The surface shall be protected against temperature drops below 40°F (4°C) for a period of 12 hours after finishing.
- (x) A uniform appearance will be required. In the event the appearance produced by the above procedure is not uniform, both in texture and coloration, the Precast or Precast/Prestress Structural Unit will be rejected. The Contractor may request other methods approved by the Engineer to create a uniform appearance.

11. Grouting for Post-Tensioned Units:

- a. The Contractor shall install steel in flexible or other approved tubes which shall be cast in the concrete and shall be pressure-grouted after the post-tensioning process has been completed.
- b. Bonding grout shall be made to the consistency of thick paint and shall be mixed in the proportions as follows: Portland cement (Type I), 100 pounds (45 kg); fly ash (ASTM C 618), 34 pounds (15 kg); water, 45 to 62 pounds (20 to 28 kg) (adjust at site); and nonshrink admixture approved by the PCC Engineer.
- c. The final grouting pressure shall be at least 80 psi (550 kPa).
- d. The Contractor shall make provisions to demonstrate to the Engineer that grouting material has completely filled all areas within the conduit.

12. Handling, Transporting, and Storing:

- a. (1) Prestressed Concrete Structural Units must be at least 9 days old before they can be set on the bridge substructure. Surveying for shim shots, forming the bridge deck or diaphragms and placing construction material on the girder is not allowed until the girders have attained the minimum age and design strength specified in the plans.
- (2) The Contractor shall be responsible for exercising extreme care in lifting, handling, storing and transporting the Prestressed Concrete Structural Units to prevent cracking or damage. Prestressed concrete bridge girders shall be maintained in an upright position and supported within 18 inches of the ends at all times. When supported at the proper positions, no part of the units shall be allowed to rest on the ground. Prestressed concrete bridge girders shall be set on a level area to prevent field bowing and adequate supports shall be placed under their bearing devices to prevent settlement into the ground. Proper support bearings shall be used to avoid twisting of the prestressed concrete bridge girders. Prestressed Concrete Structural Units shall be lifted by devices designed by the Contractor.
- (3) The Contractor must provide any temporary intermediate diaphragms and/or bracing necessary to provide lateral and torsional stability for the

girders during construction of the concrete slab. The temporary intermediate diaphragms/bracing shall be removed after the concrete has attained its design strength. The cost of furnishing, installing and removing the temporary intermediate diaphragms and/or bracing shall be subsidiary to the pay item "Class 47BD-4000 Concrete for Bridges".

- (4) (i) The girders shall be transported in an upright position and the points of support and direction of the reactions with respect to the girder shall be approximately the same during the transportation and storage as when the girder is in its final position. If the Contractor finds it necessary to transport the precast girders in some other position, the Contractor shall be prepared to prove that no internal damage results.
- (ii) Adequate padding shall be provided between tie chains and cables to prevent chipping of the concrete.
- (iii) Live loads shall not be allowed on the superstructure units until the floor slab is placed and attains the design strength shown in the plans.

13. Inspection Facilities:

The Contractor shall arrange with the producer of Precast or Precast/Prestressed Concrete Structural Units to provide an office, laboratory and bathroom for the Department's inspector. The areas shall meet the following requirements:

- a. Thermostatically controlled heating and air conditioning shall be provided so that temperature can be maintained between 68° and 77°F (20° and 25°C).
- b. The floors shall be tile or a similar floor covering.
- c. Interior and exterior walls shall be well maintained and painted.
- d. All exterior doors shall have cylinder locks, and all keys shall be turned over to the Engineer.
- e. Ceiling lighting shall provide a minimum of 465 foot-candles (5000 lx) of light on all working surfaces.
- f. Electrical outlets shall be spaced no more than 6 feet (1.8 m) apart with no less than 1 outlet on any wall of the office or lab.
- g. A single trunk telephone and a means to the Internet with a minimum of 1.5 mb of download stream shall be installed in the office, and the installation charges shall be paid by the Contractor. The monthly service charges will be paid by the Department.
- h. A fire extinguisher and First-Aid kit shall be provided.
- i. A ventilated bathroom with a toilet and sink shall be provided in the structure. A fresh water supply and drain will be required in the lab area.
- j. The lab, office, and bathroom shall be separate rooms with interconnecting doors.
- k. The minimum lab area is 230 square feet (21 m²).

- l. The minimum toilet area is 20 square feet (2 m²).
- m. The minimum office area is 160 square feet (15 m²).
- n. The Contractor shall clean and maintain the rooms and shall supply all heating fuel, electricity, and water.
- o. The Contractor shall also supply for the sole use of the inspectors all desks, work tables, chairs, files, lockers, and sanitary supplies necessary and commensurate with the inspection of his/her plant. It is anticipated that the following minimum amount of office and lab equipment will be required: One desk with approximately 3 foot x 6 foot (0.9 m x 1.8 m) top; one upright locker or wardrobe, with shelves, approximately 5 feet (1.5 m) deep; two 4-drawer file cabinets; 1 chair per inspector; 10 square feet (1 m²) of work surface per inspector in the office area; and a lab counter (approximately 3 x 18 feet [0.9 m x 5.5 m]) with storage space beneath.

Method of Measurement

- 1. Precast or Precast/Prestressed Concrete piles shall be measured in accordance with the requirements of Section 703.
- 2. Precast or Precast/Prestressed Concrete superstructures will be measured for payment by the lump sum.

Basis of Payment

- 1. Prestressed and/or Precast Concrete piles shall be measured and paid for as prescribed in Section 703.

2.	Pay Item	Pay Unit
	Precast/Prestressed Concrete	Lump Sum (LS)
	_____ Superstructure at Station _____ *	

* Reinforcing steel, prestressing tendons, and all other components of the Precast or Precast/Prestressed Concrete superstructure are subsidiary to this pay item.

- 3. The cost of furnishing and maintaining the inspection facilities will not be paid for directly, but shall be subsidiary to "Precast/Prestressed Concrete _____ Superstructure at Station _____".
- 4. If a Precast or Precast/Prestressed Structural item's 56-day compressive strength is less than the design strength, then the Engineer will determine if the item can be used. If the item is to be used, a payment deduction of 25% will be taken if the 56-day compressive strength is less than 95 percent of the design strength.
- 5. All equipment calibrations and tests are subsidiary to "Precast/Prestressed Concrete _____ Superstructure at Station _____".
- 6. Payment is considered full compensation for all work prescribed in this Section, including the cost of prestressing and precasting.

DEBONDING PRESTRESSING STRANDS (G-15-0612)

General

Where shown, debond prestressing strands by encasing the strands in plastic sheathing along the entire length shown and sealing the ends of the sheathing with waterproof tape.

Materials

Sheathing must:

1. Be split or un-split flexible polymer plastic tubing
2. Have a minimum wall thickness of 0.025 inch
3. Have an inside diameter exceeding the maximum outside diameter of the strand by 0.025 to 0.14 inch
4. Not react with the concrete or steel

Split sheathing must have a minimum overlap of 3/8 inch.

Waterproofing tape must be flexible adhesive tape.

Construction

Distribute the debonded strands symmetrically about the vertical centerline of the girder. The debonded lengths of pairs of strands must be equal. Do not terminate debonding at any one cross section of the member for more than 40 percent of the debonded strands or 4 strands, whichever is greater. Do not debond the outside strands. Thoroughly seal the ends of the sheathing encasing the strand with waterproof tape before placing the concrete to prevent the intrusion of water or cement paste. Do not debond the extended strands.

Payment

Full compensation for Debonding Prestressing Strands shall be considered as included in the contract price paid for the Pay Item "Precast-Prestressed Concrete Superstructure at Sta ____", and no separate payment will be made.

EXPANSION BEARINGS, TFE TYPE (G-16-0612)

Paragraph 2.a. of Subsection 712.02 of the Standard Specifications is void and superseded by the following:

2. Expansion Bearings, TFE Type:
 - a. (1) The upper assembly shall consist of a sole plate conforming to the requirements of ASTM A709/A709M grade 50W (345W) weathering steel with an ASTM A240/A240M Type 304 stainless steel plate (13 gage) attached to the lower surface. As an alternate, the sole plate may be grade 36 (250) steel, metallized. If the grade 36 alternate is used, all flame cut edges of the sole plate shall be ground to reduce hardness and facilitate blast cleaning. All corners of the sole plate shall be rounded to a 1/16 inch (1.5 mm) radius. All exposed plain steel surfaces shall be blast cleaned to a near white finish and zinc metallized with a minimum thickness of 8 mils (200 mm). Zinc metallizing must be performed in accordance with the American Welding Specification AWS C2.2.

CONCRETE CONSTRUCTION

Paragraph 3. of Subsection 704.04 in the Standard Specifications for Highway Construction is void and superseded by the following:

3. The volume of concrete piles, cast-in-place concrete piles or steel pipe piles encased in the concrete has not been included in the concrete plan quantity.

CRUSHED ROCK BASE COURSE FOR CONCRETE BOX CULVERTS

Section 717 in the Standard Specifications is amended to include the following:

The Contractor may elect to use crushed rock or crushed concrete as a base for the floor of the box culvert. Riprap filter fabric shall be placed under all crushed rock or crushed concrete. Crushed rock shall meet the general aggregate properties of Paragraph 2. of Subsection 1033.02.

The item "Crushed Rock For Base Course" shall be measured and paid for by the Cubic Yard. Payment for the Crushed Rock For Base Course shall include the crushed rock or crushed concrete, filter fabric, excavation and any additional labor or materials necessary to construct the base.

The limits for payment will be 6 inch depth and 18 inches outside any concrete face, including aprons. No adjustment in plan quantity will be made unless the dimensions of the box are changed. Any crushed rock or crushed concrete, fabric, or excavation outside the limits described will be at no cost to the Department.

Any unsuitable material encountered below the 6 inch depth during the box culvert construction shall be excavated and removed from the site and the resulting void may be filled with crushed rock or crushed concrete as directed by the Engineer. This work shall be measured and paid for by the item "Removal of Unsuitable Material".

Bidders must submit a bid for the item "Crushed Rock For Base Course" in the Schedule of Items. The Contractor will only be paid for this item if they use the crushed rock or crushed concrete as a base.

If the Contractor does not plan to utilize crushed rock or crushed concrete as a base, they shall bid the item "Crushed Rock For Base Course" at \$0. If the Contractor bids this item at \$0 and later decides to utilize crushed rock or crushed concrete, it will be at the Contractor's expense.

No change orders will be approved to increase the cost of the "Crushed Rock For Base Course" item after award of the contract.

CONTRACTOR'S ACCESS CROSSING

It will be the Contractor's option to use an access crossing to construct the bridge on this project.

Bidders must submit a bid for the item "Access Crossing" in the Schedule of Items.

The item "Access Crossing" will be paid for as a lump sum. The bid price shall be considered full compensation for all work required for the Contractor to construct and remove the access crossing. The Contractor will only be paid for this item if they construct the access crossing. The Contractor will be paid 90% of the lump sum when the access crossing is installed. The remaining 10% of the lump sum will be paid when the access crossing is removed.

If the Contractor does not plan to utilize an access crossing, they shall bid the item "Access Crossing" at 0\$. If the Contractor bids this item at 0\$ and later decides to utilize an access crossing, it will be at the Contractor's expense.

Crushed rock surfacing and erosion control items necessary for building and maintaining the approaches to the access crossing will not be paid for directly, but shall be considered subsidiary to the item "Access Crossing".

No change orders will be approved to increase the cost of the "Access Crossing" item after award of the contract.

RELAYING DRIVEWAY CULVERT PIPE

Paragraph 1. of Subsection 721.05 in the Standard Specifications is amended to include the following:

Pay Item	Pay Unit
Relaying Driveway Culvert Pipe	Linear Foot (LF)

SEEDING

Subsection 803.02 in the Standard Specifications is amended to include the following:

Type "A"	Minimum Purity	Broadcast Application Rate in lb. of Pure Live Seed/Acre	Approved Mechanical Drill Application Rate in lb. of Pure Live Seed/Acre
Canada wildrye – NE or IA native, Mandan	85		4
Slender wheatgrass	85		3
Western wheatgrass – Barton, Flintlock	85		3
Switchgrass – Trailblazer, Blackwell, Cave-in Rock, Pathfinder	90		1
Indiangrass – Oto, NE-54, Holt	75		2
Little bluestem – Aldous, Blaze, Camper	60		2.5
Big bluestem – Pawnee, Roundtree, Bonanza	60		3
Sideoats grama – Butte, El Reno, Trailway	75		3
Sand dropseed (<i>Sporobolus cryptandrus</i>)	85		0.2
Prairie cordgrass (<i>Spartina pectinata</i>)	85		0.75
Partridge pea – Platte, inoculated	90		0.15
Purple prairie clover – Kaneb, inoculated	90		0.1
Grayhead prairie coneflower (<i>Ratibida pinnata</i>)	90		0.2
Mexican red hat (<i>Ratibida columnifera</i> , red)	90		0.25
Black-eyed Susan (<i>Rudbeckia hirta</i>)	90		0.5
Pale purple coneflower (<i>Echinacea pallida</i>)	85		0.3
Shell leaf penstemon (<i>Penstemon grandiflorus</i>)	75		0.3
Blue flax (<i>Linum lewisii</i>)	90		1
Maximilian sunflower (<i>Helianthus maximiliani</i>)	85		0.5
Pitcher sage (<i>Salvia azurea</i>)	70		0.25
Compass plant (<i>Silphium laciniatum</i>)	75		0.4
Butterfly milkweed (<i>Asclepias tuberosa</i>)	90		0.2
Spiked gayfeather (<i>Liatris spicata</i>)	90		0.15
Plains coreopsis (<i>Coreopsis tinctoria</i>)	85		0.2
Oats/wheat*	90		14

*Wheat in the fall

Type "B"	Minimum Purity	Broadcast Application Rate in lb. of Pure Live Seed/Acre	Approved Mechanical Drill Application Rate in lb. of Pure Live Seed/Acre
Perennial ryegrass – Linn	85		7
Western wheatgrass – Flintlock, Barton	85		7
Slender wheatgrass	85		6
Kentucky fescue	85		2.5
Blue grama – NE, KS, SD, CO, MN	30		2
Buffalograss – Sharp's Improved, Cody, Bison, Texoka	80		5
Sideoats grama – Butte, El Reno, Trailway	75		4
Sand dropseed (<i>Sporobolus cryptandrus</i>)	90		0.3
Oats/wheat*	90		16

*wheat in the fall

All seeds shall be origin Nebraska, adjoining states, or as specified. A Contractor proposing to use a substitute variety or origin shall submit for the Engineer's consideration a seed tag representing the seed, which shows the variety, origin and analysis of the seed.

Rate of application of commercial inorganic fertilizer shall be:

	Rate of Application per Acre (Minimum)
Available Nitrogen (N ₂)	19 or 36 lbs.
Available Phosphoric Acid (P ₂ O ₅)	92 or 96 lbs.

Rate of application of granular sulphur coated urea fertilizer shall be:

Nitrogen (Total Available)	0 lbs.
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The Contractor may, at his option, apply granular urea formaldehyde in lieu of the sulphur coated urea fertilizer at the following rate:

Nitrogen (Total Available)	0 lbs.
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EROSION CONTROL

Subsection 807.02 in the Standard Specifications is amended to include the following:

Erosion Control	Minimum Purity	Approved Application Rate in lb of Pure Live Seed/1000 sq. yard
Perennial ryegrass – Linn	85	1.25
Western wheatgrass – Barton, Flintlock	85	1.25
Slender wheatgrass	85	1
Canada wildrye – Mandan, NE native	85	1.25
Blue grama – NE, KS, SD, CO, MN	30	0.4
Little bluestem – Aldous, Blaze, Camper	60	0.75
Sideoats grama – Butte, El Reno, Trailway	75	0.75
Big bluestem – Pawnee, Roundtree, Bonanza	60	0.75
Switchgrass – Trailblazer, Blackwell, Cave-in Rock, Pathfinder	90	0.5
Sand lovegrass – Nebraska 27	90	0.2
Indian blanket flower (Gaillardia pulchella)	80	0.3
Blue flax (Linum lewisii)	80	0.2
Oats/wheat*	90	5

*wheat in the fall

All seed shall be origin Nebraska, adjoining states, or as specified. A Contractor proposing to use a substitute variety, or origin shall submit for the Engineer's consideration a seed tag representing the seed which shows the variety, origin and analysis of the seed.

Rate of application of commercial inorganic fertilizer shall be:

	Rate of Application per 1000 SY (Minimum)
Available Nitrogen (N ₂)	4 or 9 lb.
Available Phosphoric Acid (P ₂ O ₅)	23 or 24 lb.

Rate of application of granular sulphur coated urea fertilizer shall be:

Nitrogen (Total Available)	0 lb.
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EROSION CONTROL

Subsection 807.01 is void and superseded by the following:

This work shall consist of the preparation of slopes and waterways and the furnishing and application of soil retention blankets at the locations shown in the plans.

Subsection 807.02

Paragraphs 2., 2.a., 2.b. and 2.c. are void and superseded by the following:

Wire staples shall be used for anchoring the soil retention blanket. The staples shall be a minimum of 13 gauge U-shaped steel wire with a 1 inch or larger throat with at least 6 inch long legs.

Paragraph 5. is void.

Subsection 807.03

Paragraph 6.c. is void.

Paragraphs 7.a.i. and 7.a.ii. are void.

Paragraph 8. is void.

Paragraph 1. of Subsection 807.05 is amended to include the following:

Pay Item	Pay Unit
Erosion Control, Class_____	Square Yard (SY)

EROSION CHECKS

Subsection 808.01 is void and superseded by the following:

This work shall consist of seeding, trenching, furnishing and placing soil retention blankets, and furnishing and placing hay bales to construct erosion checks at the locations shown in the plans. There are two separate and distinct types of erosion checks – “Erosion Checks” which are permanent and placed as shown in the plans or as directed by the Engineer after final grading is complete; and “Temporary Silt Checks” which are temporary and placed as shown in the plans or as directed by the Engineer when rough grading is begun or as necessary.

Subsection 808.02

Paragraph 4. is void.

Paragraph 5.a. is void and superseded by the following:

The “Temporary Silt Checks” shall be on the NDR Approved Products List.

Paragraph 5.b. is void and superseded by the following:

The wire staples for “Temporary Silt Checks” shall be a minimum of 13 gauge steel wire with a 1 inch (25 mm) or larger throat and 6 inch (150 mm) legs.

Subsection 808.03

Paragraph 3. is void.

Paragraph 4. is void.

Paragraph 6.b. is void.

Paragraph 7. is void and superseded by the following:

The hay bales shall then be placed in the trench over the soil retention blanket with bale ties up and backfilled to the level of the finished ditch elevation.

Paragraphs 12., 12.a., 12.b., 12.c. and 12.d. are void and superseded by the following:

Paragraph 12. Temporary Silt Checks

- a. The “Temporary Silt Checks” shall be installed at the locations shown in the plans, and as directed by the Engineer. The upstream edge shall be slightly buried and pinned with wire staples on approximately 24 inch (600 mm) spacings. The pins may be left slightly exposed for easier removal. The triangular portion shall be pinned on 3 foot (1 m) centers.
- b. The “Temporary Silt Check” shall be in place immediately after the rough grading is completed in that area.
- c. The “Temporary Silt Check” shall be left in place until the finish grading begins. Reinstall the “Temporary Silt Checks” as soon as finish grading is complete unless the permanent erosion control is initiated immediately

after finish grading. "Temporary Silt Checks" should be in place at all times after finish grading until the permanent "Erosion Checks" are in place.

- d. At the completion of the project, the "Temporary Silt Checks" shall remain the property of the Contractor.

Subsection 808.04

Paragraph 2. is void and superseded by the following:

"Temporary Silt Checks" shall be measured by the linear foot (meter) for the initial installation. The removing or relocating of the "Temporary Silt Checks" will not be measured for payment, but will be considered subsidiary to the initial installation.

Subsection 808.05

Paragraphs 1., 2. and 3. are void and superseded by the following:

- | 1. | Pay Item | Pay Unit |
|----|--------------------------------|------------------------------|
| | Erosion Check | Bale |
| | Erosion Checks, Type _____ | Bale |
| | Erosion Checks, Type Wattle | Linear Foot (LF) [Meter (m)] |
| | Erosion Check "Type Synthetic" | Linear Foot (LF) [Meter (m)] |
| | Temporary Silt Check | Linear Foot (LF) [Meter (m)] |
| | Erosion Checks, Type _____ | Linear Foot (LF) [Meter (m)] |
- 2. If cleanout of an "Erosion Check" or "Temporary Silt Check" is required, it will be paid as equipment rental as prescribed in Subsections 809.04 and 809.05.
 - 3. Payment for "Temporary Silt Checks" includes any costs incurred to reinstall the "Temporary Silt Checks" once the area is finished graded.

COVERCROP SEEDING

Subsection 812.01

Paragraph 2. is void and superseded by the following:

Cover crop seeding shall be applied to any disturbed area requiring erosion protection. It is intended to be used in staged construction areas, surcharge areas, or other disturbed areas that have not been permanently seeded.

Subsection 812.02

Paragraph 4. is void.

Subsection 812.04 is void and superseded by the following:

Subsection 812.04

- 1. Cover crop seeding is measured by the acre of ground surface seeded. The areas will be calculated from surface measurements of the length and width ± 1 yard (± 900 mm).

TRANSITION MAT

Description

A transition mat is a semi-rigid plastic mat that mechanically protects the soil from scour and erosion. It is placed at the culvert outlet and allows water to smoothly transition from a concentrated flow to a laminar flow resulting in a diminished shear force. It is generally used in conjunction with a soil retention blanket.

Material Requirements

The Transition Mat shall be listed on the NDR Approved Products List.

Construction Methods

1. This work shall be performed as soon as possible after the finish grading operations have been completed.
2. The Contractor shall install the soil retention blanket as detailed in Section 807.
3. The transition mat shall be placed as per the manufacturer's recommended installation instructions at the locations as shown in the plans.

Method of Measurement

The quantity of transition mat for which payment will be made will be the number of square feet placed.

Sod placed will be paid for according to Section 806 – Sodding.

Soil retention blankets placed will be paid for according to Section 807 – Erosion Control.

Basis of Payment

Pay Item	Pay Unit
Transition Mat	Square Yard

Payment is full compensation for all work prescribed in this Section.

All anchoring devices shall be subsidiary to the item "Transition Mat".

MULCH PERIMETER CONTROL

Description

This work shall consist of grinding and placing slash mulch at locations as shown in the plans or as directed by the Engineer.

Material Requirements

1. All tree and shrub debris, generated during the Clearing and Grubbing operations, shall be ground by a mechanical chipper, hammermill, tub grinder, or other approved method.

2. Maximum length of individual pieces shall not exceed 20 inches. Maximum width shall not exceed 2 inches. Material shall be accepted based upon a visual inspection.
3. The Contractor shall be responsible for all labor, materials, equipment and services as may be necessary for and incidental to the generation of the slash mulch.

Construction Methods

1. Slash Mulch berms shall be constructed prior to grading activities occurring in the locations noted in the plans.
2. Mulch shall be placed where mulch perimeter control or low porosity silt fence is indicated on plans. The perimeter control shall be a trapezoid 6 feet wide at the base, 30 inches in height, and 1/2:1 side slopes. The maximum height of the berm shall not exceed 40 inches.
3. In the event that the quantity of mulch generated exceeds the amount necessary to construct the berms shown on the plans, additional berms shall be constructed as an alternative to low porosity silt fence or erosion checks at locations approved by the Engineer.
4. Upon completion of the project, all slash mulch berms shall be left in place or spread out around the area of their original placement.

Method of Measurement

1. Slash Mulch-Grinding will be measured by the amount produced after grinding in cubic yards.
2. Slash Mulch-Placement will be measured by the amount placed in cubic yards.

Basis of Payment

1.

Pay Item	Pay Unit
Slash Mulch-Grinding	Cubic Yard (CY)
Slash Mulch-Placement	Cubic Yard (CY)
2. Stockpiling and rehandling of material is subsidiary to the Slash Mulch-Grinding item.
3. Maintenance of the Slash Mulch berms will be paid with equipment rental.
4. Payment is full compensation for all work prescribed in this Section.

CURB INLET SEDIMENT FILTER

Description

This work shall consist of furnishing, installing, and removing Curb Inlet Sediment Filters.

Material Requirements

The Curb Inlet Sediment Filter shall be selected from the Approved Products List.

Construction Methods

The Curb Inlet Sediment Filter shall be installed according to the manufacturer's instructions. The Engineer shall be given a copy of the instructions before any are placed on the project.

Removal of the Curb Inlet Sediment Filters

The Curb Inlet Sediment Filter shall be removed when the Engineer determines that it no longer effective or at the completion of the project and shall remain the property of the Contractor.

When the road is open to traffic, all ponded sediment must be removed from the roadway within 24 hours of a rain event.

Measurement and Payment:

All work and materials described herein shall be included in the item "Curb Inlet Sediment Filter". The Curb Inlet Sediment Filter shall be measured and paid for per each inlet protected.

FABRIC SILT FENCE (HIGH POROSITY AND LOW POROSITY)

Paragraph 3. of Subsection 809.03 in the Standard Specifications is amended to include the following:

Silt Fence may be installed mechanically with a silt fence plow in lieu of the trenching procedures.

Paragraph 4. of Subsection 809.03 in the Standard Specifications is amended to include the following:

At the completion of the project, the silt fence shall be left in good working condition.

**GUARDRAIL END TREATMENT, TYPE I
(I-1-0813)**

Section 902 in the Standard Specifications is amended to include "Guardrail End Treatment, Type I".

This work consists of furnishing and installing a guardrail end treatment system according to the details and at the locations shown in the plans.

The Contractor has the option of installing one of the following systems:

- | | |
|----------------|---|
| 1.) ET-31 | Manufactured by Trinity Industries, Inc.
2525 N. Stemmons Freeway
Dallas, TX 75207
(800) 644-7976 |
| 2.) SKT-SP-MGS | Manufactured by Road Systems, Inc.
3616 Old Howard County Airport
Big Springs, TX 79720
(915) 263-2435 |

The Contractor will be required to furnish two sets of shop plans to the Department of the system to be installed. The guardrail end treatment shall be installed in accordance with the recommendations of the manufacturer.

Payment shall be full compensation for all work required to provide and install the system.

GRANULAR SUBDRAINS

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

Aggregate that is used in granular subdrains shall consist of crushed gravel or crushed rock and shall conform to the requirements of Paragraphs 1. and 2. of Subsection 1033.02.

Crushed gravel shall have a fine aggregate angularity value of 43.0 or greater. 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 as defined in AASHTO T 304 Method A, except the specific gravity material shall be washed over the No. 100 (150 µm) sieve. Gravel aggregate shall have a soundness loss of not more than 12 percent by weight at the end of 5 cycles using sodium sulfate solution.

Crushed rock shall conform to the requirements of Paragraph 7.f. of Subsection 1033.02. Crushed rock shall have a percentage loss of not more than 14 at the end of 16 cycles of the freezing and thawing test.

The crushed gravel or crushed rock shall meet the following gradation requirements.

Granular Subdrains Gradation Requirements		
Sieve Size	Target Value (Percent Passing)	Tolerance
1 inch	100	0
No. 4	40	±20
No. 10	15	±15
No. 200	4	±4

Paragraph 2. of Subsection 915.03 of the Standard Specifications is void and superseded by the following:

The Contractor shall provide and place aggregate in the trench as prescribed in the plans but shall be placed at the midpoint of the adjacent concrete slab (midway between contraction joints) or as directed by the Engineer.

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 or used for shoulder construction on the project.

Following Earth Shoulder Construction, additional work may be required to daylight previously installed drains and to install granular material up to the existing earth shoulder elevation.

SPECIAL SURFACE COURSE FOR MAILBOX TURNOUTS

Paragraphs 1. and 2. of Subsection 912.02 in the Standard Specifications are void and superseded by the following:

The Special Surface Course for Mailbox Turnouts shall be the Asphaltic Concrete used on the project and placed as shown in the plans.

Paragraph 2. of Subsection 912.05 in the Standard Specifications is void and superseded by the following:

2. The asphaltic concrete used, including asphalt cement, is subsidiary to the pay item, "Special Surface Course for Mailbox Turnouts".

POSTS AND FASTENERS FOR HIGHWAY SIGNING (J-3-0411)

Paragraph 1.G.(3) of Subsection 1071.02 in the Standard Specifications is void and superseded by the following:

- (3) Light-duty posts shall be painted black or dark green.

TIMBER AND LUMBER (J-5-0711)

Paragraphs 2.a. and 2.b. of Subsection 1075.02 in the Standard Specifications are void and superseded by the following:

2. a. The creosote, pentachlorophenol and copper naphthenate preservative treatment for timber and lumber shall be by the Empty-cell (Rueping) Process; and, where allowed, the ammoniacal copper arsenate (ACA), chromated copper arsenate (CCA), and ammoniacal copper zinc arsenate (ACZA) preservative treatment for timber and lumber shall be by the Full-cell (Bethel) Process. Treatment shall conform to the requirements as specified in T1-Use Category System: User Specification for Treated Wood of the American Wood-Preservers' Association Standards and AASHTO M 133. Preservatives shall meet the requirements of Section 1076.

- b. Preservative Treatment. The preservative treatment and minimum retentions for timber and lumber shall conform to the requirements as specified in U1-Use Category System: User Specification for Treated Wood of the American Wood Preservers' Association Standards as amended herein. Minimum retentions for all timber and lumber shall conform to Use Category UC4C. Minimum retentions for fence posts shall conform to Use Category UC4A. Timber and lumber to be treated with ammoniacal copper arsenate or ammoniacal copper zinc arsenate shall be dried to the fiber saturation point required to put the timber into satisfactory condition to accept the preservative and attain the required preservative retention and penetration. After treatment, with the exception of offset blocks and posts for guardrail terminals systems, the material shall be redried and have a moisture content of not more than 30 percent at the time of shipment to the job site.

Paragraph 1.b. of Subsection 1075.05 is void and superseded by the following:

- b. Species. Unless otherwise specified, sawn wood guardrail posts shall be either Douglas Fir (Coast Region) or Southern Yellow Pine.

Wood offset blocks shall be either Douglas Fir (Coast Region), Southern Yellow Pine (major or minor species), or Ponderosa Pine.

PERFORMANCE GRADED BINDER

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

Section 1029 in the Standard Specifications is void and superseded by the following:

I. Description

The Performance Graded Binder to be used on this project shall be PG Binder 52-34 for Asphaltic Concrete, Type SPS and PG Binder 64-34 for Asphaltic Concrete, Type SPR supplied by a Certified Supplier.

II. Certified Supplier

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

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

The supplier must also 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.

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.

A certified supplier can voluntarily submit samples of binders proposed for use to the Materials and Research Bituminous Laboratory for quality and verification testing.

III. Supplier Certification

A supplier may request certification by contacting the Nebraska Department of Roads, Materials and Research Division, Flexible Pavement Engineer at (402) 479-3839. 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 NDR. The NDR 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.

IV. Loss of Certification

Certification will be withdrawn from a supplier for a minimum of 6 months when one or more of the following conditions exist.

1. Inability to consistently supply material meeting specifications as outlined herein.
2. Failure to maintain an acceptable quality control program.
3. The failure to meet one or more of the conditions of being a Certified Supplier as outlined above.

Notification of decertification of a supplier will be submitted in writing by the NDR. Material from a decertified source will not be accepted for use on NDR projects and the NDR districts will be notified of this action.

V. Supplier Recertification

If a supplier has lost certification and seeks to be recertified, the following steps are required.

1. Fulfill the requirements outlined above for gaining Certified Supplier status.
2. Submit documentation to the Flexible Pavement Engineer explaining why decertification occurred, and the actions that are going to be taken to correct the problems identified in writing by the NDR.

VI. Binder Sampling and Testing:

1. Lots: Each 3750 tons (3400 Mg) of HMA type produced, or portion thereof, will be a binder lot.
2. A binder lot will include only one PG Binder grade or a blend as allowed in paragraph VI.6.e.
3. A binder lot will only include one supplier of the PG Binder or a blend as allowed in paragraph VI.6.e.
4. Blending of different binder grades and binders from different suppliers will be allowed with restrictions as noted in paragraph VI.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.
 - 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 specification compliance, and the other can portion will be saved for check tests and dispute resolution, if needed. The sampling process shall follow procedures of the NDR Materials Sampling Guide.
 - 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 and 3. Overall project average testing requirements and price adjustments will also apply, as stated in Table 4.
 - c. In cases where the total HMA type is less than 3750 tons, only one PG Binder lot sample per grade per supplier is required. If the tested PG Binder does not comply, the price of the PG Binder lot shall be adjusted according to Tables 2 and 3.

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 to, and approval by, the Engineer. The substitution of the PG Binder shall also be identified in the sample identification submittals.
- 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 PG+ (modified binders) and/or AASHTO M320 specifications when tested as $\pm 3^{\circ}$ C of the specified PG Binder. The sample of the blended material 1) will be considered as a lot sample, 2) will be taken during initial production following the blending of the binders, and 3) shall have deductions applied as per Tables 2, 3, and 4 when not meeting specifications. 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 AASHTO M320 and PG+ (if modified) specifications.
 - (2) Modified Binders - Only blending of the same type of elastomer modifiers listed in VI.6.f.(1) will be allowed.
- f. When modified binders 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.

- (2) 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 as per the supplier's storage and handling recommendations.
- (3) The composite material shall be homogenous, and shall not demonstrate evidence of 1) localized gellation or over-crosslinking of polymers, 2) improper use of gelling modifiers used in addition to polymer modification, or 3) otherwise any other lumpy conglomerations.
- (4) To insure the binder is of a modification system in which no acid is used, the Materials and Research Bituminous Laboratory will perform a random free-acid verification test. 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. Binders tested for acid modification shall meet AASHTO 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 the verification test. If the verification test reveals material that does not meet AASHTO M320 specifications, or shows a drop of $G^*/\sin(\delta)$ greater than 25%, the material that is represented by the sample will be rejected. If a random sample demonstrates acid modification, additional samples will be tested.
- (5) Supplier-submitted samples of binder proposed for use, can be tested for acid modification. Binders that demonstrate acid modification will not be accepted for use.
- (6) Lot samples of the binder shall meet or exceed the PG+ specifications as listed, in addition to AASHTO 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. Project lot samples can also be tested for acid modification as described in VI.6.f.(4).
- (7) When it is determined that material exceeds Table 1, Table 2 will apply. When it is determined that a single sample(s) does not meet AASHTO M320 specifications, Table 3 will apply.

- (8) All project samples will be tested for original binder dynamic shear rheometry compliance.
- (9) Modified binders with a temperature spread of 104 shall be exempt of the AASHTO M320 requirement for the test of Viscosity, AASHTO T316.
- (10) All specified binders with a temperature spread of 92 or greater, shall be modified with an elastomer modifier as specified in paragraph VI.6.f.(1).

Table 1

Additional Specifications for Modified Binders

PG+ Specifications	Spec Base			Spec w/Tol.²		
	92	98	104	92	98	104
Temperature Spread ¹						
Elastic Recovery; AASHTO T301 tested at 77°F (RTFO Aged AASHTO T301)	Minimum 65%			Minimum 60%		
Phase Angle; degrees (Maximum) (Original Binder)	77.0	75.0	73.0	79.0	77.0	75.0

¹ Temperature Spread is determined by subtracting the low temperature from the high temperature. Example (PG 64-28: 64 – (-28) = 92).

² Tolerances were determined from CSBG round robin data and AASHTO or ASTM precision statements. Material exceeding these tolerances is subject to 75% pay or removal.

Table 2

PG + Single Sample Tolerance and Pay Factor Table

	Pay Factor of 0.75 or Removal¹		
Temperature Spread	92	98	104
Elastic Recovery Percentage (RTFO Aged AASHTO T301)	< 60%		
Phase Angle (degrees) (Original Binder)	> 79.0	> 77.0	>75.0

¹ Price Reduction will be applied to contract unit price of asphalt binder. 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 0.75 will be applied. The price factor will be applied to the contract unit price of asphalt binder.

Table 3
Single Sample Tolerance and Price Factor Table

	Pay Factor of 0.75 or Removal¹
<u>Tests on Original Binder</u> Dynamic Shear, $G^*/\sin \delta$, kPa	< 0.93
<u>Tests on Rolling Thin Film Oven Residue</u> Dynamic Shear, $G^*/\sin \delta$, kPa	< 1.98
<u>Tests on Pressure Aging Vessel Residue</u> Dynamic Shear, $G^*\sin \delta$, kPa	> 5600
<u>Creep Stiffness</u> S, mPa	> 325
m-Value	< 0.285

¹ Price Reduction will be applied to contract unit price of asphalt binder. 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 0.75 will be applied. The price factor will be applied to the contract unit price of asphalt binder.

VII. Overall Project Average - Price Reduction Based on Complete M320 Testing

1. Binders that demonstrate acid modification as per VI.6.f.(4) shall be rejected, and the test results will not be included in Overall Project Averages.
2. PG+, Table 1 specifications do not apply to Overall Project Averages.
3. Out of specification material will be determined by the specifications outlined in AASHTO M320, excluding Direct Tension.
4. The Nebraska Department of Roads, Materials and Research Bituminous Laboratory, will do complete specifications testing on at least one sample per HMA type from the project. The Department will randomly select one sample for complete specifications testing out of every five samples received. When any test result shows a sample not meeting specifications, the previous and following lot sample received will also be tested for complete specifications compliance. Adjacent lot sample testing will continue in this manner until tested samples meet all specifications, or there are no more lot samples to be tested.
5. Samples not selected for complete specifications testing are "control" samples. Control samples will be tested for original binder AASHTO M320 Dynamic Shear, as well as PG+ phase angle if modified. When a control sample falls out of AASHTO M320 Dynamic Shear and/or PG+ phase angle specification, it will then be tested for complete M320 and PG+ specifications compliance. And, as mentioned in VII.4, adjacent lot samples will be tested when any results do not meet specification. Adjacent lot testing will continue until tested samples meet all specifications, or there are no more lot samples to be tested. This additional

complete testing for M320 and PG+ compliance is in addition to the minimum number of samples that will be tested for complete M320 and PG+ compliance.

6. At the completion of testing, all M320 test results will be averaged. The average will not include M320 results from any binder lots that have already been reduced in pay by Table 3. For averages that do not meet M320 specifications, the largest reduction shown in Table 4 will be applied to all the Performance Graded Binder used on the project, with the exception of any binder lots that were already reduced in pay by Tables 2 and/or 3. In cases where there is only one PG Binder Grade lot sample left when determining the Overall Project Average tests results, then the Pay Factor for the PG Binder lot represented by that sample is determined by Table 4.

Table 4
Overall Project Average – Pay Factor Table

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

VIII. Single Sample Reduction and Overall Project Average Reduction

A sample representing a lot, incurring pay reduction or removal by Table 2 and/or 3, will incur pay reduction or removal only for the material that the sample represents.

Only the largest overall project average reduction from Table 4 will apply when more than one test average falls out of AASHTO M320 specifications.

Pay Factors or removals, based on single sample test results, and pay factors based on overall project average test results, are separate from each other, and both will be applied.

IX. 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 sample as determined necessary to confirm or disaffirm the original test result(s).
2. The Bituminous Laboratory will notify the NDR project personnel, who will in turn notify the Contractor. All will arrange to investigate all aspects of the testing, loading, handling and delivery of the material in question. The Contractor and NDR project personnel shall report findings to the Bituminous Laboratory.
3. The Bituminous Laboratory will collect and compile all information provided.
4. The Bituminous Laboratory will issue the standard report of tests for all samples tested, to include any resulting pay factor deductions or removals. A copy of the report of tests will be distributed to the District and Construction Division. The District will then provide a copy to the Contractor. Supplier requests for a copy of this report will be directed to the Contractor.

X. Dispute Resolution

After testing and investigations have been completed on the sample, and there is still a dispute, the NDR will select an independent laboratory for referee testing to take place on the remainder of the sample, or any other representative samples obtained. The identity of the independent laboratory will not be revealed until the selected laboratory has completed the referee testing, and the NDR has submitted a final report of the results. If the independent lab's tests indicate failing results and pay deductions equal to or greater than the NDR's, the Contractor will reimburse the NDR 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 NDR's, the NDR will assume the cost of testing. When the independent lab's tests indicate a pay deduction, the lesser of the NDR's and the independent lab's deductions will be applied.

Only the Contractor can initiate dispute resolution, and request referee testing. The request must be made, in writing, to the NDR Construction Division within 60 days of awareness of sample results. For any period of time past 60 days, dispute resolution is forfeited.

XI. Method of Measurement

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

XII. Basis of Payment

Subsection 503.06 in the Standard 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.

SECTION 1028 - SUPERPAVE ASPHALTIC CONCRETE (J-7-0213)

Section 1028 in the Standard Specifications is void and superseded by the following:

1028.01 -- Description

1. a. Superpave Asphaltic Concrete is a Contractor-designed mix.
- b. The Contractor shall be required to define properties using a gyratory compactor that has met the Superpave evaluation test procedures, during mix design and production.
2. Job Mix Formula
 - a. Before production of asphaltic concrete, the Contractor shall submit, in writing, a tentative Job Mix Formula (JMF) on the NDOR Mix Design Submittal Form for verification to the Department.
 - b. The JMF shall be determined from a mix design for each mixture. A volumetric mixture design in accordance with AASHTO R 35 as modified within this specification will be required. However, the mixture for the Superpave specimens and maximum specific gravity mixture shall be aged for two hours at compaction temperature. The mixture shall be prepared using the following:
 - (1) Mixture Conditioning of Hot Mix Asphalt (HMA), AASHTO R 30.
 - (2) Method for Preparing and Determining the Density of Hot Mix Asphalt Specimens by Means of the SHRP Gyratory Compactor, AASHTO T312.
 - c. The JMF shall identify:
 - (1) The virgin mineral aggregates and pit locations
 - (2) Recycled Asphalt Pavement (RAP) and source locations
 - (3) Hydrated lime
 - (4) Mineral filler
 - (5) The percent passing value for each specified sieve for the individual and blended materials
 - d.
 - (1) The Contractor shall submit one uncoated, proportioned 22 lb. (10,000 gram) sample of the blended mineral aggregates for consensus properties and specific gravity testing, for all mix types except SPS. Once verified, the Contractor may begin plant production and QC testing with the QA/QC program.
 - (2) The Contractor has the option of submitting the following; 2 proportioned 22 lb. (10,000 gram) samples of the blended mineral aggregates (which are precoated with hydrated lime) and two one-quart (liter) samples of the proposed PG Binder to be used in the mixture to the Department Materials and Research

Central Laboratory at least 15 NDR working days before production of asphaltic concrete. If submitted these samples will be used to verify the Contractor's Superpave mix design test results and mix properties.

- (3) Submitted with these samples shall be a copy of the Contractor's results for all Superpave mix design tests.
 - (4) Mix design shall include at a minimum:
 - (i) The bulk specific gravity (Gsb), which shall be 2.585, for data purposes and as information only, for all mixes.
 - (ii) The target binder content. The binder content will be determined by ignition oven results. A correction factor of 0.3% will be added to the ignition oven results for mixes containing hydrated lime.
 - (iii) The supplier and grade of PG Binder.
 - (iv) The maximum specific gravity of the combined mixture (Rice).
 - (v) The bulk specific gravity (Gmb) and air voids at N initial (Nini), N design (Ndes) and N maximum (Nmax) of the gyratory compacted specimens.
 - (vi) Voids in the Mineral Aggregate (VMA) and Voids Filled with Asphalt (VFA) at Ndes.
 - (vii) Fine Aggregate Angularity (FAA) and specific gravity, Coarse Aggregate Angularity (CAA), Flat and Elongated Particles and Sand Equivalent 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) JMF compaction temperatures from NDOR Gyratory Temperature Table (See Table 1028.11).
 - (xi) The hydrated lime content.
3. 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.

- d. (1) The Contractor shall develop and submit a copy of their QC Program to the Department. 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) Inspection requirements.
 - (i) Equipment.
 - (ii) Asphalt concrete production.
 - (iii) Asphalt concrete placement.
 - (3) QC testing plan.
 - (4) Documentation of QC activities.
 - (5) Requirements for corrective action when QC or acceptance criteria are not met.
 - (6) Any additional elements deemed necessary.
 - (7) A list, with the name and manufacturers model number, for all test equipment used during laboratory testing.
 - (8) 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) 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 every 5 years by the Department 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 training records shall be submitted to the Department.
 - (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.
- 4. 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) A gyratory compactor and molds meeting AASHTO criteria.
 - (2) An Asphalt Content Ignition Oven meeting AASHTO criteria.
 - (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 specified in AASHTO T304.
 - (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 which contain the following:
 - Air conditioner.
 - Dedicated phone.
 - FAX machine or email.
 - Photocopy 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 minimum 3 inch (75 mm).

- (9) Oven, 347°F (175°C) minimum, sensitive plus 5°F (plus 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 the latest version of Department Superpave software, creating an electronic copy of the data, and printing to a Color Printer.

5. QC Testing Plan:

- a. The testing plan shall provide that the samples be collected in accordance with the Department statistically based procedure of random sampling.
- b. The Contractor may add any tests necessary to adequately control production.
- c. All QC test results shall be reported on the latest version of the Department's provided Superpave software by the Contractor with a copy provided to the Engineer within 1 week after the tests are complete. Daily review by the Engineer shall be allowed. At the completion of the asphalt production, the Contractor shall submit to the Department a final copy of the Superpave test results on electronic recording media (CD, e-mail, flash drive, etc.).
- d. 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 relating to the mixture approach the specification limits:
 - (I) Plant produced mix gradations at laydown (See gradation tolerances).
 - (II) Binder content.
 - (III) Air voids.
 - (IV) VMA (mix design only).
 - (V) VFA (mix design only).
 - (VI) FAA AASHTO T 304.
CAA ASTM D 5821.
 - (VII) Dust to Binder Ratio.
 - (VIII) Density.

- (IX) Contaminates.
- (iii) Corrective actions that will be taken when the following conditions occur:
 - (I) Rutting.
 - (II) Segregation.
 - (III) Surface voids.
 - (IV) Tearing.
 - (V) Irregular surface.
 - (VI) Low Density.

1028.02 -- Material Characteristics

1. The type of PG Binder will be shown in the contract.
2. Recycled Asphalt Pavement:
 - a. The Contractor may submit to the State a proposal to supplement the virgin aggregates of the asphaltic concrete mix with a Contractor's specified percentage of Recycled Asphalt Pavement (RAP). The Contractor is responsible for investigating and maintaining the quality and verifying the quantity of the RAP material.
 - b. In recycled asphaltic concrete mixtures, the allowable percent of RAP will be as shown in Table 1028.01.

Table 1028.01

Asphaltic Concrete Type	Percent, RAP	
	Minimum	Maximum
SPS	0	50
SPR	0	50
SPH	0	35

3. 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 80% limestone on the final surface lift of asphaltic concrete.
 - c. Asphaltic Concrete Type SPR may contain a total maximum of 10% of the virgin material that is composed of natural, uncrushed aggregate by manmade methods commonly known as but not limited to: 47B gravel, 2A gravel, gravel surfacing, sluice sand, blow sand, waste sand, fill sand, road gravel, roofing gravel, hot mix sand or gravel, coarse sand, fine sand, plaster sand, masonry sand, pit run sand or gravel. For clarification on any proposed gravel, contact the Department Flexible Pavements Engineer.
 - d. Chat or coal sand will not be allowed in any mix.
 - e. Crushed rock material for use in asphaltic concrete, 1/4 inch (6.35 mm) and smaller, screenings and manufactured sand shall have a Sodium

Sulfate loss of not more than 12% by mass at the end of 5 cycles. Sampling size and frequency shall adhere to the current Department Materials Sampling Guide.

- f. Quartzite and granite shall conform to the requirements of Subsection 1033.02, Paragraph 4, a. (8). Sampling size and frequency shall adhere to the current Department Materials Sampling Guide.
- g. 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 Department Materials Sampling Guide.
- h. Soundness tests shall not be required for fine sand.
- i. 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, as determined by the Materials Sampling Guide
- j. Aggregate consensus properties may be performed on material prior to the application of hydrated lime.
- k. 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. If the coarse portion of the blend is all ledge rock the CAA tests may be waived.

**Table 1028.02
Coarse Aggregate Angularity
(ASTM D 5821)**

Asphaltic Concrete Type	CAA (minimum)
SPS	--
SPR	83
SPH	95/90*

* Denotes two faced crushed requirements

- l. 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.
- m. The specific gravity for calculation of the Fine Aggregate Angularity (FAA) shall be determined on a washed 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 Department Aggregate Laboratory, this same value can be used throughout production. The verification value determined by the Department 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 Department 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	--
SPR	43.0
SPH	45.0

- n. 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
SPR	10
SPH	10

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

- o. 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
Sand Equivalent Criteria
(AASHTO T 176)**

Asphaltic Concrete Type	Sand Equivalent, Minimum
SPS	30
SPR	45
SPH	45

- p. Dust to binder ratio is the ratio of the percentage by weight of aggregate finer than the No. 200 (75 μ m) sieve to the asphalt content expressed as a percent by weight of total mix. The dust to binder ratio shall be within 0.70 and 1.70.
- q. The blended aggregate shall conform to the gradation requirements specified in Table 1028.06 and Table 1028.07 for the appropriate nominal size.

Table 1028.06
Gradation Control Points for 0.75 Inch (19 mm) and 0.5 Inch (12.5 mm) Nominal Size

English Sieve (Metric)	0.75 Inch (19 mm) Control Points (percent passing)		0.5 Inch (12.5 mm) Control Points (percent passing)	
	Minimum	Maximum	Minimum	Maximum
1 inch (25 mm)	100.0			
3/4 inch (19 mm)	90.0	100.0	100.0	
1/2 inch (12.5 mm)		90.0	90.0	100.0
3/8 inch (9.5 mm)				90.0
No. 8 (2.36 mm)	23.0	49.0	28.0	58.0
No. 16 (1.18 mm)				
No. 30 (600 µm)				
No. 50 (300 µm)				
No. 200 (75 µm)	2.0	8.0	2.0	10.0

Table 1028.07
Gradation Control Points for 0.375 Inch (9.5 mm) Nominal Size and SPR

English Sieve (Metric)	0.375 Inch (9.5 mm) Control Points (percent passing)		SPR Control Points (percent passing)		SPR (Fine) Control Points (percent passing)	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
3/4 inch (19 mm)			98.0	100.0		
1/2 inch (12.5 mm)	100.0					
3/8 inch (9.5 mm)	90.0	100.0	81.0	89.0	81.0	96.0
No. 4 (4.75 mm)		90.0				
No. 8 (2.36 mm)	32.0	67.0	46.0	56.0	46.0	56.0
No. 16 (1.18 mm)						
No. 30 (600 µm)						
No. 50 (300 µm)			12.0	21.0	12.0	21.0
No. 200 (75 µm)	2.0	10.0	4.0	9.0	4.0	9.0

- r. The combined mineral aggregate for Asphaltic Concrete, Type SPS, shall be an aggregate or a combination of aggregates, and mineral filler if needed, that conforms to the gradation requirements specified in Table 1028.08.

**Table 1028.08
Gradation Control Points for Type SPS**

English Sieve (Metric)	Control Points (percent passing)	
	Minimum	Maximum
1 inch (25 mm)	100.0	
¾ inch (19 mm)	94.0	100.0
½ inch (12.5 mm)	81.0	100.0
No. 4 (4.75 mm)	70.0	90.0
No. 8 (2.36 mm)	42.0	70.0
No. 16 (1.18 mm)	29.0	43.0
No. 30 (600 µm)	19.0	34.0
No. 50 (300 µm)	11.0	20.0
No. 200 (75 µm)	2.0	10.0

- s. 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 requirements in Table 1028.09.

**Table 1028.09
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

1028.03 -- Acceptance Requirements

1. Mix Criteria:
 - a. The target value for the air voids of the SPH Asphaltic Concrete shall be 4% ($\pm 1\%$) at the Ndes number of gyrations. For Type SPS Asphaltic Concrete the air voids at Ndes shall be a minimum of 1.5% with a maximum of 5.0%. For Type SPR Asphaltic Concrete the air voids shall be 3% ($\pm 1\%$) at the Ndes number of gyrations.
 - b. The design criteria for each mixture shall be determined from Tables 1028.10, 1028.11, and 1028.12.

**Table 1028.10
Gyratory Compaction Effort
(Average Design High Air Temperature <39 degrees C)**

Asphaltic Concrete Type	Nini	Ndes	Nmax
SPS	6	40	62
SPR	7	65	100
SPH	8	95	150

**Table 1028.11
Gyratory Compaction Temperatures**

Mix Type	% RAP	Compaction Temp °F
SPS	0-25	270 ± 5
	26-50	280 ± 5
SPR	0-35	280 ± 5
	36-50	290 ± 5
SPH	0-35	300 ± 5

**Table 1028.12
Minimum Binder Content**

Mix Type (Metric)	Minimum Binder Content, Percent
SPS	4.8
SPR	5.0
3/8 inch (9.5 mm)	5.5
1/2 inch (12.5 mm)	5.1
3/4 inch (19 mm)	5.0

- c. During production of Lot #1, the Contractor shall provide to the Department 6 properly prepared gyratory samples for AASHTO T 283 testing for all mixtures. Superpave mixtures shall contain 1.25% hydrated lime as specified in the Special Provision "Hydrated Lime for Asphaltic Mixtures". Each Superpave mixture shall be tested for moisture sensitivity in accordance with AASHTO T 283. The 6 inch (150 mm) specimens shall be compacted in accordance with AASHTO T 312 to 7% ($\pm 0.5\%$) air voids at 95 mm in height and evaluated to determine the Tensile Strength Ratio (TSR).
 - d. During production of Lot #1, the Contractor shall provide to the Department two 75mm gyratory puck samples at 4.0% voids ($\pm 0.5\%$) for APA testing for all mixtures except Asphaltic Concrete Type SPS.
2. The Contractor shall make Mix adjustments when:
 - a. The mix does not meet the current approved JMF or any other requirements of the contract.
 - b. Surface voids create a surface or texture that does not meet the criteria of Sections 502 and 503 in these Standard Specifications.
 - c. Rutting occurs.
 3. The Contractor shall inform the Engineer when changes in mixture properties or materials used occur for any reason. Changes such as, but not limited to, types or sources of aggregates or changes in grades, sources, properties or modification procedures (if modified) of PG Binders. The Department 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.

4. Mix adjustments at the plant are authorized within the limits shown in Table 1028.13 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 1028.13 will be the tolerances allowed for adjustments from the Department verified mix design "Combined Gradation" target values which resulted from production or mix design adjustments, but cannot deviate from Superpave gradation criteria. 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 1028.13

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), No. 4 (4.75 mm)	± 6%
No. 8 (2.36 mm), No. 16 (1.18 mm), No. 30 (600 µm), No. 50 (300 µm)	± 5%
No. 200 (75 µm)	± 2%

5. Sampling and Testing:
- a. The Contractor shall take samples at frequencies identified by the Engineer, according to the Department statistically based procedure. The samples shall be approximately 75 lbs (34 kg) and split according to AASHTO T-248 to create a companion sample. This sample splitting can be either at: 1) the sampling location, with the Department taking custody of their sample at that time or 2) after being transported to the test facility in an insulated container, with the Department taking custody of their sample at that time 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 or faxing the lab calculation sheet from the latest version of the superpave software, stored, and retained by the Contractor until the Department has completed the verification testing process. Transporting of all samples will be under the observation of Department.
 - c. (1) The sample shall be taken from the roadway, behind the paver before compaction or from the windrow. For SPS mixes, the Contractor has the option to obtain the samples directly at the plant.

- (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 and quality control may be performed at the Contractor's discretion. Any additional testing will not be used in pay factor determination.
- (4) (i) When cold feed samples are being taken, the acquisition shall be timed such that the material in the sample represents, as close as possible, the same material in the sample taken behind the paver. If cold feeds are sampled and tested by Contractor, a split of that sample must be submitted with the hot mix subplot sample. The Contractor will be notified what subplot (a minimum of 1 subplot per lot) sample must be tested for FAA and CAA from the blended cold feed material according to the Department random sampling schedule. All other FAA and CAA subplot samples may be taken from the randomly selected portion of the blended cold feed material or obtained from the random samples taken behind the paver. Samples shall be taken under the observation of Department and split according to AASHTO T-248, with the Department taking custody of their sample at that time.
 - (ii) 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) 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 2.585 for information only for all mixes.
 - (ii) FAA - AASHTO T 304 Method A. The pour time of the test sample into the funnel shall be completed in 5±1 seconds.

- (iii) CAA - ASTM 5821. For SPR mixes, CAA testing and results are only required on the cold feed verification test for the lot.
- (4) The laboratory air voids shall be determined in accordance with the following:

Table 1028.14

$\text{Gmb}(\text{corr})@N_{\text{any}} = \text{Gmb}(\text{meas})@N_{\text{max}} \times \left(\frac{\text{height}@N_{\text{max}}}{\text{height}@N_{\text{any}}} \right)$ $\% \text{Gmm}(\text{corr})@N_{\text{any}} = 100 \times \left(\frac{\text{Gmb}(\text{corr})@N_{\text{any}}}{\text{Gmm}(\text{meas})} \right)$ $\% \text{ Air Voids}@N_{\text{any}} = 100 - \% \text{Gmm}(\text{corr})@N_{\text{any}}$ $\text{VMA}@N_{\text{des}} = 100 - (\text{Gmb}(\text{corr})@N_{\text{des}} \times \text{Ps} \div \text{Gsb})$ $\text{VFA}@N_{\text{des}} = 100 \times \left(\frac{\text{VMA}@N_{\text{des}} - \% \text{ Air Voids}@N_{\text{des}}}{\text{VMA}@N_{\text{des}}} \right)$ $\text{Measured} = (\text{meas})$ $\text{Corrected} = (\text{corr})$

- (5) (i) The percent of PG Binder shall be determined for each QC test. The percent of PG Binder will be computed by ignition oven results. A correction factor of 0.3% will be added to the ignition oven results for mixes containing hydrated lime.
- (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 Department 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 latest version of Department provided "Superpave" software. A copy containing complete project documentation will be provided to the Department at the completion of asphalt production.
- g. Superpave Software:
- (1) QC charts from the software shall be made available for review by the Engineer at any time.
- (2) As a minimum, the following values shall be reported on Department 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 0.01% by ignition oven results in accordance with AASHTO T 308.
- (iv) The theoretical maximum specific gravity (Rice) to the nearest 0.001% will be reported.
- (v) Laboratory Gyratory air voids at Ndes shall be plotted to nearest 0.1%. Laboratory Gyratory air voids, at Nini, Ndes and Nmax shall be reported to nearest 0.1%.

- (vi) FAA and CAA of the asphaltic concrete for both cold feed and ignition oven samples will be reported to the nearest 0.1% for FAA and 1% for CAA. A minimum of one subplot FAA and CAA cold feed sample per lot will be tested and recorded on Department provided software.
 - (vii) VMA content shall be plotted to nearest 0.1% and VFA shall be reported to the nearest 0.1%.
 - (viii) Dust to Binder ratio to the nearest 0.01 will be reported.
6. Verification Sampling and Testing:
- a. The Department will select and test at random one of the subplot samples (750 tons, 680 Mg) within a Lot (3750 tons, 3400 Mg) for verification and report results.
 - b. The results of Contractor QC testing will be verified by the Department's verification tests. Any samples outside of the tolerances in Table 1028.15 and 1028.16 will result in an Independent Assurance (IA) review of testing and may result in the Department test results being applied.
 - (1) On any given Lot, if the results of Air Void verification testing and its companion QC testing are within 1.0% 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 subplot. Any or all of the remaining four Department subplot samples may be tested and the Department subplot test results may be applied to the respective sublots and the resulting pay factors will apply.
 - (2) On any given Lot, if the results of the FAA verification testing and its companion QC testing are within 0.5 percent, the FAA verification for the entire Lot is complete and the Contractor test results will be used to determine the pay factor. If the FAA 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 subplot. Any or all of the remaining four Department subplot samples may be tested and the Department subplot test results may be applied to the respective sublots and the resulting pay factors will apply.
 - c. When verification tests are within testing tolerance but results show a consistent pattern of deviation from the QC results, the Engineer may cease production and/or request additional verification testing or initiate a complete IA review.

**Table 1028.15
Asphaltic Concrete Testing Tolerances**

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%
Field Core Density	0.020
Air Voids	1.0%

**Table 1028.16
Blended Aggregate Gradation
Testing Tolerances**

Sieve Size	Tolerance
3/4 inch (19 mm), 1/2 inch (12.5 mm), 3/8 inch (9.5 mm), No. 4 (12.5 mm), No. 8 (2.36 mm)	5%
No. 16 (1.18 mm), No. 30 (600 µm), No. 50 (300 µm)	4%
No. 200 (75 µm)	2%

- d. Independent Assurance (IA) Review of Testing:
- (1) The Contractor shall allow the Department personnel access to their laboratory to conduct IA review of technician testing procedures and apparatus. Any deficiencies discovered in testing procedures will be reported by the department and corrected by the Contractor.
 - (2) During IA review, the Department personnel and the Contractor will split a sample for the purpose of IA testing. The samples selected will be tested in the Department Branch Laboratory. Any IA test results found to be outside of defined testing tolerances above will be reported. The Contractor shall verify the testing apparatus and make corrections if the apparatus is out of tolerance.
 - (3) See Section 28 of the Materials Sample Guide for more information on IA testing.
- e. If the project personnel and the Contractor cannot reach agreement on the accuracy of the test results, the Department will be asked to resolve the dispute, which will be final. It is the Contractor's responsibility to obtain a large enough sample size for any referee testing (a total sample size of 6000 grams, to be retained by the Department after splitting, is recommended for FAA testing). All dispute resolutions will be in accordance with the Quality Assurance Program requirements in the NDOR Materials Sampling Guide.

7. Production Tolerances, Acceptance, and Pay Factors

**Table 1028.17
Production Tolerances***

Test	Allowable Deviation from Specification
<i>Dust to Asphalt Ratio</i>	None
<i>Coarse Aggregate Angularity</i>	- 5% below Min.
<i>Fine Aggregate Angularity for SPR Only</i>	- 0.2% below Min. for cold feed - 0.5% below Min. for ignition oven
<i>Fine Aggregate Angularity for all other mixes</i>	- 0.5% below Min. for cold feed - 1.0% below Min. for ignition oven
Minimum Binder Content	None

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

- a. The Contractor shall notify the Engineer whenever a test result approaches the Specification limits.
- b. When any single test result for FAA testing falls outside the allowable production tolerances in Table 1028.17, the material represented by this test will be accepted with a penalty as shown in Table 1028.18 or rejected, as determined by the Engineer. For all other tests, when any single test result, on the same mix property, from two consecutive QC samples fall outside the allowable production tolerances in Table 1028.17, the material represented by these tests will be accepted with a 20% penalty or rejected, as determined by the Engineer.

**Table 1028.18
FAA Penalty Scale**

Percentage outside of allowable deviation given in Table 1028.17	Penalty for SPR	Penalty for SPH
<i>0.1%</i>	20% or reject	5% or reject
<i>0.2%</i>	20% or reject	10% or reject
<i>0.3%</i>	20% or reject	15% or reject
<i>0.4% or greater</i>	20% or reject	20% or reject

- c. The Contractor shall assume the responsibility to cease operations when specifications are not being met.
- d. Acceptance and pay factors for Asphaltic Concrete Type SPS will be based on compacted in place average density.
- e. For each subplot of Asphaltic Concrete Type SPR and SPH, the asphaltic concrete unit price is a product of all applicable pay factors for the item "Asphaltic Concrete, Type ____". Included in a subplot, following approval of the control strips, may be any roadway Asphaltic Concrete Type SPR or SPH which is produced and approved by the Engineer for use as Patching, State Maintenance Patching, and Asphalt for Intersections and Driveways on project shall be eligible for inclusion in

sublot(s) tonnage pay factor determination using the roadway Asphaltic Concrete Type _____ unit price. When a control strip is not constructed, the pay factor for the running average of four air voids shall be fixed at 1.0 for the first three asphaltic concrete sublots.

- (1) When there is a production tolerance pay factor penalty as stated in Paragraph 7.b. subsection 1028.03 this penalty percentage will be entered in the Superpave Asphalt Pay Factor Summary under production specifications for each sublot affected. These individual pay factors will then be multiplied by each other to determine a total pay factor for each sublot [(750 tons) (680 Mg)].
- f. 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 1028.19.

**Table 1028.19
Acceptance Schedule
Air Voids - N_{des}**

Air voids test results for Asphaltic Concrete Type SPR	Air voids test results for SPH Asphaltic Concrete	Pay Factor	
		Moving average of four	Single test
Less than 0.5%	Less than 1.5%	50% or Reject	50% or Reject
0.5% to 0.9%	1.5% to 1.9%	50% or Reject	50%
1.0% to 1.4%	2.0% to 2.4%	50% or Reject	95%
1.5% to 1.9%	2.5% to 2.9%	90%	95%
2.0% to 2.4%	3.0% to 3.4%	100%	100%
2.5% to 3.5%	3.5% to 4.5%	102%	104%
3.6% to 4.0%	4.6% to 5.0%	100%	100%
4.1% to 4.5%	5.1% to 5.5%	95%	95%
4.6% to 5.0%	5.6% to 6.0%	90%	95%
5.1% to 5.5%	6.1% to 6.5%	50% or Reject	90%
5.6% to 6.0%	6.6% to 7.0%	50% or Reject	50%
6.1% and over	7.1% and over	50% or Reject	50% or Reject

- 8. Asphalt Concrete Density Samples:
 - a. The Contractor shall perform density tests under direct observation of Department personnel. The Contractor shall establish the method of testing in the preconstruction conference and shall test in accordance with the AASHTO T 166, NDR T 587, or as otherwise described in these Special Provisions. The Contractor shall insure that the proper adjustment bias and/or correction factors are used and accessible to Department 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 Department Density spreadsheet. When AASHTO T 166 is being used, the Department will observe the Contractor taking, transporting, and testing the cores. The Department will take immediate custody of the cores at the completion of the testing. All disputed values determined using NDR T 587 will be resolved using AASHTO T 166.

- b. The Contractor shall determine the density of samples 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:

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

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

Note: The individual QC test value of the Maximum Mix Specific Gravity (Rice), determined by AASHTO T 209, will be used to calculate the density of each corresponding core.

- c. The Contractor shall cut cores the first day of work following placement of the mixture. The core samples shall be a minimum of a 3 inch (75mm) diameter.
- d. Normally, 1 sample for determination of density will be taken from each subplot (750 tons) (680 Mg) at locations determined by the Engineer.
- e. 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.
- f. (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 1028.20.
 - (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 1028.20

Acceptance Schedule Density of Compacted Asphaltic Concrete	
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

- g. If requested by the Contractor, check tests for all density tests in the original set, taken no later than the working day following the receipt of all test results for the lot, 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 provided by the Engineer from the Random Sampling Schedule. The average density obtained by the check tests shall be used to establish the density pay factor for the lot.
- h. The location of density samples are identified by the Random Sampling Schedule. When the random location is noted as zero or the lane width (i.e., zero or 12 ft. on a 12-foot lane), the core shall be cut with the outer edge of the core barrel no greater than 4 inches away (laterally) from the edge of the top of the mat for an unconfined edge or from the edge of the top of the hot mat (joint) for a confined edge. If using a nuclear gauge, the 4 inches would be measured to the edge of the gauge base. The percent density value at these edge-of-lane locations shall be adjusted upward by 2.5%, but to a value of no greater than 92.5%, and the resultant value used in determining the density pay factor. No initial value of 92.5 or greater shall be adjusted.

WARM MIX ASPHALT (J-7-0213)

The Contractor has the option to use Warm Mix Asphalt (WMA) meeting the following requirements.

1. Warm Mix Asphalt (WMA)

Warm Mix Asphalt mixtures shall follow the requirements of Superpave Asphaltic Concrete and all other applicable sections with the following exceptions:

- a. The Contractor shall request the use of a WMA additive in writing when submitting the Job Mix Formula. The requested additive shall be an approved Level I or II production product or combination thereof. The manufacturer's recommended additive rates, specifications, and all other pertinent information shall be included in the requests. All requests must be approved by the Flexible Pavements Engineer prior to their use.

- b. Level I Production
 - (1) Level I WMA additives are as follows: water injection devices.
 - (2) Hydrated Lime at 1.25% by weight of virgin aggregate is required for all mixtures.
 - (3) The allowable drop in temperature shall be a maximum of 40°F below the producer's recommended production temperature for Hot Mix Asphalt (HMA), or less as required during production to achieve proper laydown and compaction properties. Plant production temperatures shall not drop below 230°F.
- c. Level II Production
 - (1) Level II WMA additives are as follows: Advera, Evotherm (DAT, ET, 3G), and Sasobit.
 - (2) For amine based WMA additives, 25% of the additive must be considered an amine based anti-striping agent. Amine based WMA additives with anti-striping agents shall be terminal blended by the binder supplier or a system approved by the Flexible Pavements Engineer for application at the plant. For all other warm mix technologies hydrated lime shall be added at a minimum rate of 1.25% by weight of virgin aggregate, including the weight of limestone. Hydrated Lime shall not be used on Level II WMA mixtures when the WMA additive is an Amine based additive or when the Amine WMA additives are used in combination with Level I water injection. The minimum rate for amine based WMA additives shall be 0.7%. The dosage rate of anti-strip shall not exceed manufacturer's recommendations.
 - (3) The drop in temperature shall be a maximum of 90°F from the producer's recommended production temperature for HMA. Plant production temperatures shall not drop below 215°F.
- d. Other WMA additives shall not be used unless otherwise approved by the Flexible Pavements Engineer.
- e. WMA additives may be used in combination by approval of the Flexible Pavements Engineer.
- f. Asphalt mixes shall be tested for TSR on the first lot of production and then on randomly selected lots thereafter.
- g. Field samples shall be heated and compacted using the following table unless otherwise approved by the Flexible Pavements Engineer.

Gyratory Compaction Temperatures

Mix Type	% Rap	Compaction Temp °F
SPS	0-25	270 + 5
	26-50	280 + 5
SPR	0-35	280 + 5
	36-50	290 + 5
SPH	0-35	300 + 5

- h. NDOR may suspend or eliminate the use of WMA on a project if any of the following conditions occur: rutting, segregation, surface voids, tearing, irregular surface, low density, raveling, stripping, or if pavement does not meet any other design criteria.
2. Warm Mix Asphalt (WMA) additives will be measured and paid for directly by the unit of each for the item "Hydrated Lime/Warm Mix Asphalt" for each ton of hot mix asphalt produced.

**ASPHALT DENSITY GAUGE
(J-7-0213)**

Description

An Asphalt Density Gauge may be used for Quality Control when determining the in-place density of asphaltic concrete.

Material Requirements

The device must be approved by the Flexible Pavements Engineer.

Testing Method

1. The Contractor shall establish the method of testing in the preconstruction conference. All testing shall be in accordance with AASHTO TP 68 and as directed in this provision.
2. The first 3 density locations of the project shall be cored in accordance with AASHTO T166 to calibrate the asphalt density gauge. Prior to coring, the Contractor shall calibrate the device at each core location.
3. Calibration: A correction factor shall be established for the first 3 cores by calculating the difference between the average density measurement of the asphalt density gauge and the roadway core density. This correction factor shall be entered into the device and used for measuring subsequent densities. The correction factor shall be verified with another core for every 15 density readings that are to be recorded.

4. Density Reading Procedure: Place the asphalt density gauge on the asphalt mat over the area to be tested. Record the density reading, and repeat this process for a total of 5 readings, as detailed in Figure 1. An average of the 5 readings will be used as the density reading for each location.

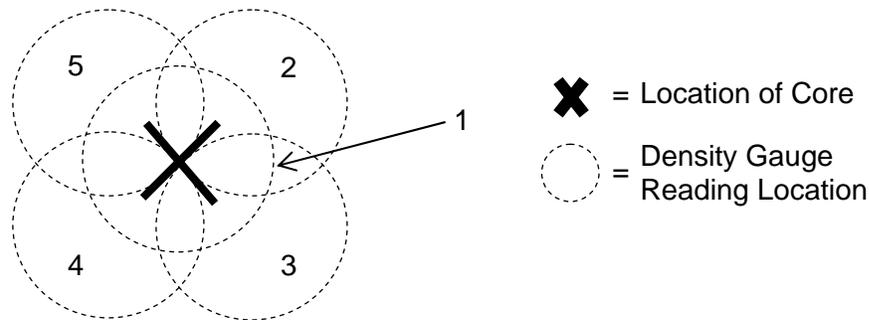


Figure 1: Asphalt density gauge reading

5. If any density measured by the asphalt density gauge is below 90%, a density core shall be cut at that location and used for density measurement for that subplot. Density readings below 90% shall not be used to calculate a correction factor. All disputed values determined using the asphalt density gauge will be resolved using AASHTO T 166.

HYDRATED LIME FOR ASPHALT MIXTURES (J-12-0213)

1. General

Hydrated lime will be added to all aggregates (at the Contractor's option, limestone may be excluded) used for asphalt mixtures except Asphaltic Concrete used for Temporary Surfacing, and Asphaltic Concrete Type SPS, HRB and SPL. Hydrated lime will be added to pre-moistened aggregates whether it is used directly into the mix or stockpiled for marinating purposes. The application of moisture and hydrated lime to the aggregates along with equipment calibration and procedures to prevent any "dusting" shall be documented and approved in the Contractor's Quality Control (QC) Plan.

2. Material Requirements

The lime shall meet the chemical and physical properties defined in AASHTO M 303 for Type I - High calcium-hydrated lime, or meet the requirements of ASTM 1097 for Type S Hydrated Lime.

The hydrated lime being used, whether for mix design or plant mix production, shall be stored in an enclosed container and must be used within 90 days. Stockpiles marinating shall also be used within 90 days. Lime that is stored over 90 days in a protected storage silo environment may be submitted for chemical analysis to verify that it meets the specification for use in the mix.

Water shall conform to the requirements of Section 1005.

3. Construction

Prior to the addition of hydrated lime the aggregates shall have a minimum moisture content of 3% by weight of aggregate. The surface of the aggregate shall be uniformly dampened by water.

If additional moisture is required it shall be added at the entry end of an enclosed pug mill mixer and prior to the addition of hydrated lime.

Hydrated Lime shall be added at a rate of 1.25 percent by weight of virgin aggregate, including the weight of the limestone.

4. Equipment

The addition of lime shall be plant controlled, and blended with an enclosed twin-shaft pug mill with a production capacity rating that exceeds the aggregate feed rate. It shall be capable of effective mixing in the full range of asphaltic concrete production rates.

The pug mill set up shall be located in the system at a location where the mixed material can be readily inspected on a belt prior to entry into the drum.

The pug mill shall be designed such that the mixture of aggregate and hydrated lime is moved in a near horizontal direction (within 20 degrees of horizontal) by the mixing paddles without the aid of conveyor belts for a distance of at least three feet (900 mm). Mixing devices which permit the mixture of aggregate and hydrated lime to fall through the mixing blades onto a belt or chute are not acceptable.

A positive signal system and a limit switch device shall be installed in the plant at the point of introduction of the hydrated lime. The positive signal system shall be placed between a metering device and the drum plant, and utilized during production whereby an alarm is activated, alerting the plant that the hydrated lime is not being introduced into the mixture.

The hydrated lime storage silo shall have enough capacity for continuous production. The silo shall be replenished by pneumatic delivery from road tankers at a pressure that will not create dusting. Hydrated lime will be dispensed from the silo into the pug mill by a conventional vane feeder or a load cell pod system.

The mechanism for adding moisture to the aggregate will be configured and located to insure that all virgin aggregate is uniformly coated with moisture prior to the lime application.

5. Sampling and Testing

Hydrated lime shall be certified by the supplier stating its compliance to the specifications.

A physical inventory of hydrated lime usage will be required during mix production. A daily silo inventory, noting "beginning weight", "weight added during the day's production", and "end of day weight", will be recorded and made available for review by the Engineer. When a weigh pod system is used, an accumulative accounting method shall be used to calculate and review lime addition rates throughout production. When calculations indicate a hydrated lime usage of ± 0.15 percent from the design percentage

the Contractor shall assume the responsibility to cease production and recalibrate the system prior to resuming mix production. Any asphaltic concrete placed having 0.15 percent below the design percentage shall be removed and replaced at no cost.

The percent of moisture shall be determined and documented: 1) from belt samples or 2) from stockpile samples, a minimum of once per day.

6. Mixture QC and Verification Testing

During an ignition oven burn off, lime will combine with the sulfur in the binder and produce ash. Therefore, when mix containing hydrated lime is being designed and produced a correction factor to the ignition oven burn off result of +0.30% shall be used. This correction factor shall be added to the ignition oven binder content reading in order for the actual binder content to be determined.

7. Method of Measurement:

Hydrated Lime shall be measured for payment by the unit of each for each ton of hot mix asphalt used and incorporated into the project, or for State Maintenance Patching.

Water applied shall not be measured and paid for but shall be considered subsidiary to the item "Hydrated Lime/Warm Mix Asphalt".

8. Basis of Payment:

Lime, measured as provided herein and incorporated into the project, shall be paid for at the contract unit price per each for the item "Hydrated Lime/Warm Mix Asphalt". Lime measured as provided herein and used for State Maintenance Patching shall be paid for at the contract unit price per each for the item "Hydrated Lime/Warm Mix Asphalt for State Maintenance Patching". This price shall be full compensation for furnishing, delivering, hauling, storing, all labor, equipment, tools and incidentals necessary to complete the work.

**HYDRATED LIME SLURRY FOR ASPHALT MIXTURES
(J-12-0213)**

1. **General** — The Contractor will have the option of using Hydrated Lime Slurry For Asphalt Mixtures or Hydrated Lime For Asphalt Mixtures. Hydrated lime slurry will be added to all aggregates (at the Contractor's option, limestone may be excluded) used for asphalt mixtures except Asphaltic Concrete used for Temporary Surfacing, and Asphaltic Concrete Type SPS and SPL. Hydrated lime slurry will be added to aggregates whether it is used directly into the mix or stockpiled for marinating purposes. The application of hydrated lime slurry to the aggregates along with equipment calibration and procedures shall be documented and approved in the Contractor's Quality Control (QC) Plan.
2. **Material Requirements** — The lime shall meet the chemical and physical properties defined in AASHTO M 303 for Type I - High calcium-hydrated lime, or meet the requirements of ASTM 1097 for Type S Hydrated Lime.

The dry hydrated lime being used, whether for mix design or plant mix production, shall be stored in an enclosed container and must be used within 90 days. Stockpiles marinating shall also be used within 90 days. Hydrated lime (dry or slurry) that is stored over 90 days in a protected storage silo or slurry tank may be submitted for chemical analysis to verify that it meets the specification for use in the mix.

Water shall conform to the requirements of Section 1005.

3. **Construction** — Hydrated Lime shall be added at a rate of 1.25 percent by weight of virgin aggregate, including the weight of the limestone.
4. **Equipment** — The addition of lime shall be plant controlled, and blended with an enclosed twin-shaft pug mill with a production capacity rating that exceeds the aggregate feed rate. It shall be capable of effective mixing in the full range of asphaltic concrete production rates.

The pug mill set up shall be located in the system at a location where the mixed material can be readily inspected on a belt prior to entry into the drum.

The pug mill shall be designed such that the mixture of aggregate and hydrated lime is moved in a near horizontal direction (within 20 degrees of horizontal) by the mixing paddles without the aid of conveyor belts for a distance of at least three feet (900 mm).

Mixing devices which permit the mixture of aggregate and hydrated lime to fall through the mixing blades onto a belt or chute are not acceptable.

A positive signal system and a limit switch device shall be installed in the plant at the point of introduction of the hydrated lime. The positive signal system shall be placed between a metering device and the drum plant, and utilized during production whereby an alarm is activated; alerting the plant that the hydrated lime is not being introduced into the mixture.

A minimum of two hydrated lime slurry tanks shall be used for blending and supply. Slurry shall be drawn for production from only one tank at a time. The hydrated lime slurry tanks shall have enough capacity for continuous production.

Hydrated lime slurry shall be dispensed from a slurry tank into the pug mill by a pressure regulated spray system having an electronic flow measurement system that has been calibrated to insure the proper application rates will be provided. Certificate of Calibration for the spray bar system should be provided by the Contractor with the calibration being performed by a third party every 12 months (minimum) or at the Engineer's request.

The electronic flow measurement system shall automatically record the flow rate of the lime slurry being feed to the pug mill. The data recorder system shall be capable of recording the flow rate (in gallons per minute) at intervals of not more than 5 minutes and shall have the capability of calculating the volume of lime slurry used each day, from each slurry tank, and shall be capable of printing a summary of the daily lime slurry usage for each tank. This printout of the daily lime slurry volumes shall be presented to the NDOR representative at the end of each day's production.

5. **Blending and Supply Hydrated Lime Slurry** — The Contractor shall determine the target hydrated lime slurry concentration (percent solids) that will be used to produce the asphalt mixture. This target concentration value shall be provided to the Engineer prior to production of the asphalt mixture and shall not be less than 30 percent. The target concentration value shall not be modified without the approval of the Engineer. It is the Contractors responsibility to control the concentration of the hydrated lime slurry.

Only valid weights of dry hydrated lime shall be added to the required quantity of water to provide uniform hydrated lime slurry having a dry solids content within ± 0.5 percent of

the Contractor's target value. Water or dry hydrated lime shall not be added to a tank that is actively supplying hydrated lime slurry to the pug mill. Hydrated lime slurry shall not be drawn from a tank that is not completely blended in accordance with the manufacturer's recommendations.

The hydrated lime slurry in the active supply tank shall be agitated prior to and during production in accordance with the manufacturer's recommendations.

Dry hydrated lime shall be transferred at a pressure that will not create dusting.

- 5.1 If individual hydrated lime slurry tanks are dedicated to only blending or supply, then thoroughly mixed hydrated lime slurry may be added from the blending tank(s) to the supply tank during production, provided the concentrations are within ± 0.5 percent.
- 5.2 If the hydrated lime slurry tanks are used for both blending and supply, the tanks shall be plumbed such that hydrated lime slurry can be supplied to the pug mill from any of the blending/supply tanks without disruption of the slurry supply.

6. Sampling and Testing — Hydrated lime shall be certified by the supplier stating its compliance to the specifications.

The concentration of the lime slurry shall be controlled within ± 0.5 percent of the target hydrated lime slurry concentration (percent solids). The concentration of the hydrated lime shall be determined in accordance with section 6.1. It is the Contractor's responsibility to halt production to make adjustments when the concentrations fall out of compliance.

The concentration of the lime slurry shall be determined and recorded by the Contractor immediately following blending each batch of lime slurry for the project. These records shall include date and time of test, sample collection information, and the unit weight, temperature and concentration of slurry. These records shall be made available to the Engineer upon request.

A physical inventory of hydrated lime usage will be required during mix production. This inventory shall be used to verify the lime application rate, and for payment of the hydrated lime. The concentration of the lime slurry shall be determined and recorded by the Contractor at the beginning and at approximately the mid-point of each day's production. The hydrated lime slurry samples shall be collected from the supply line leading to the pug mill. These records shall include date and time of test, sample collection information, and the unit weight, temperature and concentration of slurry. These records shall be presented to the NDOR representative at the end of each day's production.

When calculations indicate that the application rate of "dry" hydrated lime to the aggregate is ± 0.15 percent from the design percentage the Contractor shall assume the responsibility to cease production and recalibrate the system prior to resuming mix production. Any asphaltic concrete placed having a "dry" hydrated lime application rate (applied to aggregate) of 0.15 percent below the design percentage shall be removed and replaced at no cost.

- 6.1 The Contractor shall determine the solids content (concentration) of the hydrated lime slurry using Table 1, Table 2 and the Slurry Worksheet. The Contractor

shall provide and use the standard weight per 83.205-ml Gardner cup meeting the requirements of ASTM D 244.

After a batch of lime slurry has been produced, use the following procedures to verify that the intended percent solids have been achieved.

1. Fill a quart container 3/4 full with lime slurry. Samples can be taken from ports located at either end of the vessel. Do not use glass.
 2. Weigh a dry, empty Gardner (WPG) cup and cover to the nearest 0.01 of a gram. Record this weight.
 3. Shake the lime slurry sample well. Immediately fill the WPG cup.
 4. Tap the WPG cup lightly on an immovable object to allow for the escape of air bubbles.
 5. Slowly turn the cap of the WPG cup until it is completely seated. If the cover is pushed on quickly, lime slurry will squirt out through the hole in the center. Be sure to point the top of the WPG away from you (or others) while putting on the cap.
 6. Hold the WPG cup by the top and bottom with thumb and forefinger. Be sure to cover the hole in the cap.
 7. Rinse the WPG cup under running water to remove any lime from the outside of the cup.
 8. Dry the outside of the cup thoroughly.
 9. Weigh the dry, filled WPG cup to the nearest 0.01 of a gram. Record this weight.
 10. Promptly remove the cover, insert thermometer and record the temperature.
 11. Subtract the empty cup weight (from step 2) from the filled cup weight (step 9) and record the difference.
 12. Multiply the difference by 0.1. This number is the density (lbs./gallon) of the lime slurry. Record this number.
 13. Look up the temperature correction in Table 2 and record the value.
 14. Multiply the slurry density times the temperature correction value. This is the adjusted slurry density. Record the adjusted slurry density on the slurry worksheet.
 15. Find the nearest density to that recorded above on the "Slurry Solids Chart" on Table 1, Slurry Solids Chart - 24 degrees C. The corresponding number is the percent solids (concentration) of the lime slurry sample. Record on worksheet.
7. **Mixture QC and Verification Testing** — During an ignition oven burn off, lime will combine with the sulfur in the binder and produce ash. Therefore, when mix containing hydrated lime is being designed and produced a correction factor to the ignition oven burn off result of +0.30% shall be used. This correction factor shall be added to the ignition oven binder content reading in order for the actual binder content to be determined.

8. **Method of Measurement** — Hydrated Lime shall be measured for payment by the unit of each for each ton of hot mix asphalt used and incorporated into the project, or for State Maintenance Patching.

Water applied shall not be measured and paid for but shall be considered subsidiary to the item "Hydrated Lime/Warm Mix Asphalt".

9. **Basis of Payment** — Lime, measured as provided herein and incorporated into the project, shall be paid for at the contract unit price per each for the item "Hydrated Lime/Warm Mix Asphalt". Lime measured as provided herein and used for State Maintenance Patching shall be paid for at the contract unit price per each for the item "Hydrated Lime/Warm Mix Asphalt for State Maintenance Patching". This price shall be full compensation for furnishing, delivering, hauling, storing, all labor, equipment, tools and incidentals necessary to complete the work.

Table 1, Page 1
Slurry Solids Chart – 24°C

Density lbs./gal.	Slurry Solids %	Density lbs./gal.	Slurry Solids %	Density lbs./gal.	Slurry Solids %	Density lbs./gal.	Slurry Solids %
9.108	15.1	9.402	20.1	9.715	25.1	10.050	30.1
9.114	15.2	9.406	20.2	9.722	25.2	10.057	30.2
9.120	15.3	9.414	20.3	9.728	25.3	10.064	30.3
9.128	15.4	9.420	20.4	9.735	25.4	10.071	30.4
9.131	15.5	9.426	20.5	9.741	25.5	10.078	30.5
9.137	15.6	9.433	20.6	9.748	25.6	10.085	30.6
9.143	15.7	9.439	20.7	9.755	25.7	10.092	30.7
9.148	15.8	9.445	20.8	9.761	25.8	10.099	30.8
9.154	15.9	9.451	20.9	9.768	25.9	10.106	30.9
9.160	16.0	9.457	21.0	9.774	26.0	10.113	31.0
9.166	16.1	9.463	21.1	9.781	26.1	10.120	31.1
9.171	16.2	9.469	21.2	9.787	26.2	10.127	31.2
9.177	16.3	9.476	21.3	9.794	26.3	10.134	31.3
9.183	16.4	9.482	21.4	9.800	26.4	10.141	31.4
9.189	16.5	9.488	21.5	9.807	26.5	10.148	31.5
9.195	16.6	9.494	21.6	9.814	26.6	10.155	31.6
9.200	16.7	9.500	21.7	9.820	26.7	10.163	31.7
9.206	16.8	9.506	21.8	9.827	26.8	10.170	31.8
9.212	16.9	9.513	21.9	9.833	26.9	10.177	31.9
9.218	17.0	9.519	22.0	9.840	27.0	10.184	32.0
9.224	17.1	9.525	22.1	9.847	27.1	10.191	32.1
9.230	17.2	9.531	22.2	9.853	27.2	10.198	32.2
9.235	17.3	9.538	22.3	9.860	27.3	10.205	32.3
9.241	17.4	9.544	22.4	9.867	27.4	10.212	32.4
9.247	17.5	9.550	22.5	9.873	27.5	10.220	32.5
9.253	17.6	9.556	22.6	9.880	27.6	10.227	32.6
9.259	17.7	9.563	22.7	9.887	27.7	10.234	32.7
9.265	17.8	9.569	22.8	9.894	27.8	10.241	32.8
9.271	17.9	9.575	22.9	9.900	27.9	10.248	32.9
9.277	18.0	9.581	23.0	9.907	28.0	10.255	33.0
9.282	18.1	9.588	23.1	9.914	28.1	10.263	33.1
9.288	18.2	9.594	23.2	9.920	28.2	10.270	33.2
9.294	18.3	9.600	23.3	9.927	28.3	10.277	33.3
9.300	18.4	9.607	23.4	9.934	28.4	10.284	33.4
9.306	18.5	9.613	23.5	9.941	28.5	10.292	33.5
9.312	18.6	9.619	23.6	2.948	28.6	10.299	33.6
9.318	18.7	9.626	23.7	9.954	28.7	10.306	33.7
9.324	18.8	9.632	23.8	9.961	28.8	10.314	33.8
9.330	18.9	9.638	23.9	9.968	28.9	10.321	33.9
9.336	19.0	9.645	24.0	9.975	29.0	10.328	34.0
9.342	19.1	9.651	24.1	9.982	29.1	10.335	34.1
9.348	19.2	9.658	24.2	9.988	29.2	10.343	34.2
9.354	19.3	9.664	24.3	9.995	29.3	10.350	34.3
9.360	19.4	9.670	24.4	10.002	29.4	10.358	34.4
9.366	19.5	9.677	24.5	10.009	29.5	10.365	34.5
9.372	19.6	9.683	24.6	10.016	29.6	10.372	34.6
9.378	19.7	9.690	24.7	10.023	29.7	10.380	34.7
9.384	19.8	9.696	24.8	10.030	29.8	10.387	34.8
9.390	19.9	9.703	24.9	10.037	29.9	10.394	34.9
9.396	20.0	9.709	25.0	10.044	30.0	10.402	35.0

Table 1, Page 2
Slurry Solids Chart – 24°C

Density lbs./gal.	Slurry Solids %	Density lbs./gal.	Slurry Solids %	Density lbs./gal.	Slurry Solids %	Density lbs./gal.	Slurry Solids %
10.409	35.1	10.795	40.1	11.210	45.1	11.658	50.1
10.417	35.2	10.803	40.2	11.218	45.2	11.667	50.2
10.424	35.3	10.811	40.3	11.227	45.3	11.677	50.3
10.432	35.4	10.819	40.4	11.236	45.4	11.686	50.4
10.439	35.5	10.827	40.5	11.244	45.5	11.695	50.5
10.447	35.6	10.835	40.6	11.253	45.6	11.705	50.6
10.454	35.7	10.843	40.7	11.262	45.7	11.714	50.7
10.462	35.8	10.851	40.8	11.270	45.8	11.724	50.8
10.469	35.9	10.859	40.9	11.279	45.9	11.733	50.9
10.477	36.0	10.867	41.0	11.288	46.0	11.743	51.0
10.484	36.1	10.875	41.1	11.297	46.1	11.752	51.1
10.492	36.2	10.883	41.2	11.305	46.2	11.762	51.2
10.499	36.3	10.892	41.3	11.314	46.3	11.771	51.3
10.507	36.4	10.900	41.4	11.323	46.4	11.781	51.4
10.514	36.5	10.908	41.5	11.332	46.5	11.790	51.5
10.522	36.6	10.916	41.6	11.341	46.6	11.800	51.6
10.530	36.7	10.924	41.7	11.349	46.7	11.809	51.7
10.537	36.8	10.932	41.8	11.358	46.8	11.819	51.8
10.545	36.9	10.941	41.9	11.367	46.9	11.828	51.9
10.552	37.0	10.949	42.0	11.376	47.0	11.838	52.0
10.560	37.1	10.957	42.1	11.385	47.1	11.848	52.1
10.568	37.2	10.965	42.2	11.394	47.2	11.857	52.2
10.575	37.3	10.974	42.3	11.403	47.3	11.867	52.3
10.583	37.4	10.982	42.4	11.412	47.4	11.877	52.4
10.591	37.5	10.990	42.5	11.421	47.5	11.886	52.5
10.599	37.6	10.998	42.6	11.430	47.6	11.896	52.6
10.606	37.7	11.007	42.7	11.439	47.7	11.906	52.7
10.614	37.8	11.015	42.8	11.447	47.8	11.915	52.8
10.622	37.9	11.023	42.9	11.456	47.9	11.925	52.9
10.629	38.0	11.032	43.0	11.465	48.0	11.935	53.0
10.637	38.1	11.040	43.1	11.475	48.1	11.945	53.1
10.645	38.2	11.048	43.2	11.484	48.2	11.954	53.2
10.653	38.3	11.057	43.3	11.493	48.3	11.964	53.3
10.661	38.4	11.065	43.4	11.502	48.4	11.974	53.4
10.668	38.5	11.074	43.5	11.511	48.5	11.984	53.5
10.676	38.6	11.082	43.6	11.520	48.6	11.994	53.6
10.684	38.7	11.090	43.7	11.529	48.7	12.004	53.7
10.692	38.8	11.099	43.8	11.538	48.8	12.014	53.8
10.700	38.9	11.107	43.9	11.547	48.9	12.023	53.9
10.707	39.0	11.116	44.0	11.556	49.0	12.033	54.0
10.715	39.1	11.124	44.1	11.566	49.1	12.043	54.1
10.723	39.2	11.133	44.2	11.575	49.2	12.053	54.2
10.731	39.3	11.141	44.3	11.584	49.3	12.063	54.3
10.739	39.4	11.150	44.4	11.593	49.4	12.073	54.4
10.747	39.5	11.158	44.5	11.602	49.5	12.083	54.5
10.755	39.6	11.167	44.6	11.612	49.6	12.093	54.6
10.763	39.7	11.175	44.7	11.621	49.7	12.103	54.7
10.771	39.8	11.184	44.8	11.630	49.8	12.113	54.8
10.779	39.9	11.193	44.9	11.639	49.9	12.123	54.9
10.787	40.0	11.201	45.0	11.649	50.0	12.134	55.0

Table 2
Correction Factor to Adjust Slurry Densities for Temperature

Temp (C)	Factor	Temp (C)	Factor
20	0.99927	61	1.01176
21	0.99944	62	1.01218
22	0.99962	63	1.01262
23	0.99981	64	1.01305
24	1.00000	65	1.01349
25	1.00002	66	1.01394
26	1.00041	67	1.01439
27	1.00063	68	1.01485
28	1.00085	69	1.01531
29	1.00109	70	1.01578
30	1.00132	71	1.01626
31	1.00157	72	1.01673
32	1.00182	73	1.01722
33	1.00208	74	1.01770
34	1.00234	75	1.01820
35	1.00261	76	1.01870
36	1.00289	77	1.01920
37	1.00318	78	1.01971
38	1.00347	79	1.02022
39	1.00376	80	1.02074
40	1.00407	81	1.02126
41	1.00438	82	1.02179
42	1.00469	83	1.02232
43	1.00501	84	1.02286
44	1.00534	85	1.02341
45	1.00567	86	1.02395
46	1.00601	87	1.02451
47	1.00635	88	1.02506
48	1.00670	89	1.02563
49	1.00706	90	1.02619
50	1.00742	91	1.02677
51	1.00779	92	1.02734
52	1.00816	93	1.02793
53	1.00854	94	1.02851
54	1.00892	95	1.02911
55	1.00931	96	1.02970
56	1.00970	97	1.03031
57	1.01010	98	1.03091
58	1.01051	99	1.03152
59	1.01092	100	1.03214
60	1.01134	101	1.03276

**PORTLAND CEMENT CONCRETE
(J-15-0813)**

Paragraph 1. of Subsection 1002.02 in the Standard Specifications is amended to include the following:

- b. Concrete mixes will be in accordance of Table 1002.02.

Paragraph 3. of Subsection 1002.02 is void and superseded by the following:

3. Type 1PF and 1PN cement shall be used for all classes of concrete except for pavement repair. Pavement repair shall include Type I/II Portland cement for Class PR1 concrete and Type III Portland cement shall be used in Class PR3 concrete. Type 1P cement shall meet all requirements of ASTM C 595.

Tables 1002.02, 1002.02M and 1002.03 in Subsection 1002.02 are void and superseded by the following:

**ENGLISH
TABLE 1002.02**

Concrete Mixes (Cubic Yard Batch)

Class of Concrete (1)	Base Cement Type*	Portland Cement (Min. lb/cy)	Pre-Blended Class F Fly Ash or Pozzolan* (Min. lb/cy)	Slag Cement (Min. lb/cy)	Class C Fly Ash (Min. lb/cy)	Silica Fume (Min. lb/cy)	Total Cementitious Materials (Min. lb/cy)	Total Agg. (Min. lb/cy)	Total Agg. (Max. lb/cy)	Coarse Agg. (%) (3)	Type of Coarse Agg.****	Air Content (% Min.-Max.) (2)	Water/Cement Ratio Max. (4)	Required Strength (Min. psi) (7)
47B**	1PF/1PN	423	141	0	0	0	564	2850	3150	30±3	Limestone	7.5 -10.0	0.48	3500
47B***	1PF/1PN	423	141	0	0	0	564	2850	3150	30±3	Limestone	6.0 - 8.5	0.48	3500
47BD	1PF/1PN	494	164	0	0	0	658	2500	3000	30±3	Limestone	6.0 - 8.5	0.42	4000
PR1	I/II	752	0	0	0	0	752	2500	2950	30±3	Limestone	6.0 - 8.5	0.36	3500
PR3	III	799	0	0	0	0	799	2500	2950	30±3	Limestone	6.0 - 8.5	0.45	3500
SF	I/II	564	0	0	0	25	589	2850	3200	50±3	Limestone	6.0 - 8.5	0.36	4000
47BHE	1PF/1PN	564	188	0	0	0	752	2500	3000	30±3	Limestone	6.0 - 8.5	0.40	3500
BX ₍₆₎	1PF/1PN	423	141	0	0	0	564	2850	3150	0	0 (5)	6.0 - 8.5	0.48	3500
47BFS** ₍₆₎	1PF/1PN	338	113	113	0	0	564	2850	3150	30±3	Limestone	7.5 -10.0	0.48	3500
47BFS*** ₍₆₎	1PF/1PN	338	113	113	0	0	564	2850	3150	30±3	Limestone	6.0 - 8.5	0.48	3500
47BDFS ₍₆₎	1PF/1PN	396	131	131	0	0	658	2850	3000	30±3	Limestone	6.0 - 8.5	0.42	3500

- (1) Each class shall identify the minimum strength requirement. (For example, 47B-3500, where the last four digits indicate the strength in pounds per square inch. In the chart, strength of 3500 psi is indicated for 47B-3500; however, other strengths may be authorized elsewhere in the contract. The classes shown in the chart are typical examples.)
All classes of concrete shall be air-entrained, and a water-reducing admixture shall be used.
A slump test shall be performed to check for consistency and/or workability. Any increase in slump must be pre-approved by the Engineer.
A water reducer admixture shall be used at the manufacturer's recommendations.
- (2) As determined by ASTM C 138 or ASTM C 231.
FOR INFORMATION ONLY. The Contractor may develop a Quality Control Program to check the quantity of air content on any given project; such as checking the air content behind the paver.
- (3) Coarse aggregate shall be limestone unless otherwise specified.
- (4) The Contractor is responsible to adjust the water/cement ratio so that the concrete supplied achieves the required compressive strength without exceeding the maximum water/cement ratio. The minimum water/cement ratio for any slip form concrete pavement is 0.38, unless the Contractor obtains written approval from the NDR Materials & Research Division prior to any placement on the project. The Contractor may request approval from Materials & Research in writing to change the water/cement ratio to 0.36.
- (5) Single aggregate (sand-gravel) used for these classes of concrete.
- (6) 47BFS is an acceptable substitute for 47B and 47BDFS is an acceptable substitute for 47BD.
- (7) For acceptance of each class of concrete, refer to the specifications.
- (8) For temporary surfacing, straight Type I/II cement is allowed.
- (*) Mixes with Type 1PF and 1PN are pre-blended or interground with Class F fly ash or Class N Pozzolan by the cement mill producer at a rate of 25%±2%, no additional Class F fly ash or Class N Pozzolan is added at the batch plant. Lithium Nitrate may be used in place of Class F fly ash or Class N Pozzolan, see Section 1007 of the Standard Specifications as modified in these Special Provisions.
- (**) For slip form applications.
- (***) For hand-pours and substructures applications.
- (****) Quartzite aggregate can be used in place of limestone providing the aggregate meets Paragraph 3.b. of Subsection 1033.02.

**METRIC
TABLE 1002.02**

Concrete Mixes (Cubic Meter Batch)														
Class of Concrete (1)	Base Cement Type*	Portland Cement (Min. kg/m ³)	Pre-Blended Class F Fly Ash or Pozzolan* (Min. kg/m ³)	Slag Cement (Min. kg/m ³)	Class C Fly Ash (Min. kg/m ³)	Silica Fume (Min. kg/m ³)	Total Cementitious Materials (Min. kg/m ³)	Total Agg. (Min. kg/m ³)	Total Agg. (Max. kg/m ³)	Coarse Agg. (%) (3)	Type of Coarse Agg.****	Air Content (% Min.-Max.) (2)	Water/Cement Ratio Max. (4)	Required Strength (Min. Mpa) (7)
47B**	1PF/1PN	251	84	0	0	0	335	1691	1869	30±3	Limestone	7.5 -10.0	0.48	25
47B***	1PF/1PN	251	84	0	0	0	335	1691	1869	30±3	Limestone	6.0 - 8.5	0.48	25
47BD	1PF/1PN	293	97	0	0	0	390	1483	1780	30±3	Limestone	6.0 - 8.5	0.42	30
PR1	I/II	446	0	0	0	0	446	1483	1750	30±3	Limestone	6.0 - 8.5	0.36	25
PR3	III	474	0	0	0	0	474	1483	1750	30±3	Limestone	6.0 - 8.5	0.45	25
SF	I/II	335	0	0	0	15	349	1483	1899	50±3	Limestone	6.0 - 8.5	0.36	30
47BHE	1PF/1PN	335	112	0	0	0	446	1483	1780	30±3	Limestone	6.0 - 8.5	0.40	25
BX ⁽⁸⁾	1PF/1PN	251	84	0	0	0	335	1691	1869	0	0 (5)	7.5 - 8.5	0.48	25
47BFS** ⁽⁶⁾	1PF/1PN	201	67	67	0	0	335	1691	1869	30±3	Limestone	7.5 -10.0	0.48	25
47BFS*** ⁽⁶⁾	1PF/1PN	201	67	67	0	0	335	1691	1869	30±3	Limestone	6.0 - 8.5	0.48	25
47BDFS ⁽⁶⁾	1PF/1PN	234	78	78	0	0	390	1483	1780	30±3	Limestone	6.0 - 8.5	0.42	30

- (1) Each class shall identify the minimum strength requirement. (For example, 47B-25, where the last two digits indicate the strength in MPa. In the chart, strength of 25 MPa is indicated for 47B-25; however, other strengths may be authorized elsewhere in the contract. The classes shown in the chart are typical examples.)
All classes of concrete shall be air-entrained, and a water-reducing admixture shall be used.
A slump test shall be performed to check for consistency and/or workability. Any increase in slump must be pre-approved by the Engineer.
A water reducer admixture shall be used at the manufacturer's recommendations.
- (2) As determined by ASTM C 138 or ASTM C 231.
FOR INFORMATION ONLY. The Contractor may develop a Quality Control Program to check the quantity of air content on any given project; such as checking the air content behind the paver.
- (3) Coarse aggregate shall be limestone unless otherwise specified.
- (4) The Contractor is responsible to adjust the water/cement ratio so that the concrete supplied achieves the required compressive strength without exceeding the maximum water/cement ratio. The minimum water/cement ratio for any slip form concrete pavement is 0.38, unless the Contractor obtains written approval from the NDR Materials & Research Division prior to any placement on the project. The Contractor may request approval from Materials & Research in writing to change the water/cement ratio to 0.36..
- (5) Single aggregate (sand-gravel) used for these classes of concrete.
- (6) 47BFS is an acceptable substitute for 47B and 47BDFS is an acceptable substitute for 47BD.
- (7) For acceptance of each class of concrete, refer to the specifications.
- (8) For temporary surfacing, straight Type I/II cement is allowed.
- (*) Mixes with Type 1PF and 1PN are pre-blended or interground with Class F fly ash or Class N Pozzolan by the cement mill producer at a rate of 25%±2%, no additional Class F fly ash or Class N Pozzolan is added at the batch plant. Lithium Nitrate may be used in place of Class F fly ash or Class N Pozzolan, see Section 1007 of the Standard Specifications as modified in these Special Provisions.
- (**) For slip form applications.
- (***) For hand-pours and substructures applications.
- (****) Quartzite aggregate can be used in place of limestone providing the aggregate meets Paragraph 3.b. of Subsection 1033.02.

Table 1002.03	
Table of Acceptable Concrete Class	
Class	Acceptable Class for
BX	47B, 47BD, or 47B-HE
47B	47BD, or 47B-HE

Paragraph 5, 6, 7, 8, 9, and 10 of Subsection 1002.02 are void and superseded by the following:

5. Class PR1 and PR3 Concrete:
 - a. The calcium chloride for use in PR concrete shall be either:
 - (1) A commercially prepared solution with a concentration of approximately 32 percent by weight.
 - (2) A Contractor prepared solution made by dissolving 4.5 pounds (0.54 Kg) of Grade 2 or 6.2 pounds (0.74 Kg) of Grade 1 calcium chloride per gallon (liter) of water to provide a solution of approximately 32 percent by weight.
 - b. The 7.4 pounds (10.89 Kg) of water in each gallon (liter) of solution shall be considered part of the total water per batch of concrete.
 - c. The calcium chloride solution shall be added, just prior to placement, at a rate of 0.375 gallons/100 pounds of cement (1.4 lb. calcium chloride per 100 lb. cement) [3.13 L/100 Kg of cement (1.4 Kg calcium chloride per 100 Kg cement)].
 - d. Class A, Flaked or Pellet Calcium Chloride shall be added at a rate not to exceed 2.0 percent of the weight of the cement for Grade 1, or 1.6 percent of the weight of the cement for Grade 2. Grade 1 Calcium Chloride purity is between 70 and 90 percent and Grade 2 Calcium Chloride is between 91 and 100 percent.
 - e. Where mixing trucks are used:
 - (1) For Class PR3 concrete, calcium chloride shall be thoroughly mixed into the concrete before placement. The minimum mixing time is 2 minutes.
 - (2) For Class PR1 concrete, calcium chloride shall be added first and then the concrete mixed at least 2 minutes or as required by manufacturer. Next, the Type F high range water-reducer admixture is added and the concrete is mixed an additional 5 minutes.
 - f. Where continuous batching equipment is employed, such as a concrete mobile mixer, the calcium chloride solution and Type F high range water-reducer admixture shall be incorporated in the concrete through a flow meter.

6. Class High Early (HE) Concrete
 - a. High Early (HE) strength concrete shall be cured as prescribed in Subsection 603.03, Paragraph 7. The Contractor shall take necessary curing measures so the required strength is achieved.
 - b. High Early concrete shall achieve a compressive strength of 3,500 psi (25 MPa) at 48 hours after placement.
 - c. The 48-hour compressive strengths shall be used to determine pay factor deductions for high early concrete in accordance with Table 603.03.
 - d. A non-calcium chloride accelerator shall be used when the ambient temperature at the time of the placement of concrete is 70°F or less.
 - e. When requested by the Contractor, the maturity method, as provided in NDR C 1074, may be used in lieu of the requirements of Subsection 603.03, Paragraphs 11.c. and d. to determine the strength of concrete pavement for the purpose of early opening to traffic and acceptance. Requests by the Contractor for use of the maturity method shall be on a project basis and shall be made in writing to the Engineer.
7. The yield of the concrete proportions shall be determined and adjusted by the Producer or Engineer.

Subsection 1002.02 is amended to include the following:

11. All Classes of Concrete with the exception of PR1 and PR3 shall have a Durability Factor not less than 70 and a mass loss not greater than five percent after 300 freeze/thaw cycles when tested in accordance with ASTM C 666. The freeze/thaw testing shall be conducted according to Procedure A.

Paragraph 1. and 2. of Subsection 1002.03 is void and superseded by the following:

1. The Contractor shall identify the plant that will supply the concrete 14 days before use and be entirely responsible for its calibration, batching of concrete, aggregate and sampling of cement per NDR Sampling Guide.
 - a. The Contractor shall be responsible for the following:
 - 1) Batching concrete.
 - 2) Contractor shall sample aggregate from the conveyor belt or stockpile. Gradations from a split sample shall be reported to the Engineer at the frequency required by the Materials Sampling Guide.
 - i. Contractor shall retain possession of the split samples on-site at the Contractor's facility until such a time as determined by the Engineer.
 - a) At the pre-construction meeting:
 - 1) Contractor shall determine the location of testing and report the names of the technician performing the sampling and testing.

- 2) Engineer will notify the Contractor of the retrieval of the split samples.
 - ii. The Contractor shall immediately seal the split sample after splitting and before testing has begun. The cloth sample bag shall be supplied by the Contractor.
 - iii. The sampling splitting and placement of the security seal of aggregate samples shall be witnessed by certified Department personnel.
 - iv. Contractor shall secure the split sample using a consecutively numbered security seal of 75 pounds breaking strength provided by the Department. The Contractor shall use the consecutively numbered security seals to identify and track each Aggregate Class. Samples that are not consecutively numbered will be investigated for custody of the sample and the Engineer may cease production until it is determined what action will be required.
 - v. The Contractor shall report the security seal tracking number with the split sample gradation.
 - b. The following training shall be required for personnel who oversee the batching of the concrete:
 - 1) Concrete technician personnel.
 - i. Concrete Plant Technician
 - 2) Portland cement sampler.
 - i. NDR Portland Cement Sampler.
2. Portland Cement Concrete shall be supplied by certified Ready Mix Plants that are in compliance with the requirements in the *Quality Control Manual*, Section 3, -- Certification of Ready Mixed Concrete Production Facilities published by the National Ready Mixed Concrete Association. Refer to NDR Material Sampling Guide for the policy on stationary and portable plants.

Paragraph 4. of Subsection 1002.03 is void and superseded by the following:

4.
 - a. Mix times shall meet the requirements of ASTM C 94. Mixing time tests shall be repeated whenever the concrete appearance indicates that mixing was inadequate.
 - b. Batch plants that are transporting the concrete in non-agitating trucks, the mixing time will not be less than 60 seconds, and for agitating trucks, the mixing time will not be less than 45 seconds.
 - c. The Certification of stationary and portable ready mix plants will conform to the tests that are required in the NDR Materials Sampling Guide.

Paragraph 6. of Subsection 1002.03 is void and superseded by the following:

6. Batch tickets shall be prepared as prescribed in the National Ready Mixed Concrete Associations *Quality Control Manual*. The Contractor shall keep all gradations and batch tickets until final acceptance by the Department. Projects that have less than 200 cubic yards of concrete placed will be allowed to have

handwritten tickets. The concrete batch tickets shall show batch weights, aggregate moisture, admixtures used, water, and mix design calculations. A copy of the batch ticket shall be given to the Engineer upon delivery of concrete.

Paragraph 8. of Subsection 1002.03 is void and superseded by the following:

8. Aggregate from a dry pit and coarse aggregate shall be uniformly saturated with water before it is used. The wetting shall begin 24 hours before concrete mixing to allow complete saturation.

Paragraph 1.b. of Subsection 1002.04 is void.

Paragraph 6 of Subsection 1002.04 is void and superseded by the following:

6. Compressive strength tests shall be made in accordance with ASTM C 39. Compressive strength cylinders shall be cured in accordance with ASTM C 31 paragraph 10. The compressive strength requirements shall be as specified. In general, 7-day compressive strength should be 70 percent of the 28-day compressive strength.

Subsection 1002.04 is amended to include the following:

8. Aggregate Acceptance, Verification, Sampling and Testing:
 - a. The aggregate will be accepted based on the Contractor's testing results except as noted below.
 - b. The aggregate verification sampling and testing by the Department will be randomly selected and tested according to subplot sizes in Table 1002.5

Table 1002.05

Aggregate Class	Lot	Sublot
E and F	3000 tons	1000 tons
A, B and C	6000 tons	2000 tons

- c. The results of Contractor split sample will be verified by the Department's verification tests. Any samples outside of the tolerances as specified according to the Materials Sampling Guide, Section 28 under the *Acceptable Tolerance Limits for Independent Assurance* will result in an Independent Assurance (IA) review of testing and may result in the Department test results being applied.
- d. On any given Lot, if the results of the gradation from the verification test are within Department's specification, the Contractor's results will be used for the entire lot. On any given Lot, if the gradation results from the verification test are outside Department's specification, further investigation will be initiated by the Engineer for that subplot. Any or all of the remaining Department subplot samples may be tested and the Department subplot test results may be applied to the respective subplot and the acceptance will apply.

- e. When verification tests are within testing tolerance but results show a consistent pattern of deviation from the split sample results, the Engineer will exercise one or more of the following:
 - Cease production
 - Request additional verification testing
 - Initiate a complete IA review

- f. Independent Assurance (IA) Review of Testing:
 - 1) The Contractor shall allow the Department personnel access to the Contractor's laboratory to conduct IA review of technician testing procedures and apparatus. Any deficiencies discovered in the Contractor's testing procedures will be reported to the Contractor and corrected by the Contractor.
 - 2) During IA review, the Department personnel and the Contractor shall split a sample for the purpose of IA testing. The samples selected will be tested in the Department's Branch Laboratory. Any IA test results found to be outside of defined testing tolerances as stated in Paragraph 8.c. of Subsection 1002.04 will be reported to the Contractor. The Contractor shall immediately correct any deficiencies found during the IA review.

- g. If the project personnel and the Contractor cannot reach agreement on the accuracy of the test results, the Department Central Laboratory will be asked to resolve the dispute, which will be final. All dispute resolutions will be in accordance with the Quality Assurance Program requirements in the NDR Materials Sampling Guide.

PORTLAND CEMENT (J-15-0812)

Section 1004 in the Standard Specifications is void and superseded by the following:

1004.01 – Description

- 1. Portland cement is the binder in concrete, locking the aggregate into a solid structure. It is manufactured from lime, silica, and alumina (with a small amount of plaster of gypsum).
- 2. Equivalent alkali referred to herein is hereby defined as the sum of the sodium oxide (Na_2O_e) and the potassium oxide (K_2O) calculated as sodium oxide (equivalent alkali as $\text{Na}_2\text{O}_e = \text{Na}_2\text{O} + 0.658 \text{K}_2\text{O}$).

1004.02 – Material Characteristics

- 1. Type I, Type II and Type III Portland cement shall conform to the requirements in ASTM C 150 with the following additional requirements:
 - a. Portland cement shall not contain more than 0.60 percent equivalent alkali.
 - b. Processing additions may be used in the manufacture of the cement, provided such materials have been shown to meet the requirements of ASTM C 465 and the total amount does not exceed 1 percent of the weight of Portland cement clinker.

2. Type 1PF or 1PN shall be a Type 1P made exclusively with Class “F” fly ash or Class N as the pozzolan. Type 1P cement shall conform to the requirements as prescribed in ASTM C 595 and the following requirements:
 - a. The pozzolan content shall be 25±2 percent of the cementitious materials by weight.
 - b. The pozzolan shall be Class F fly ash or Class N pozzolan.
 - c. Additional fly ash substitution shall not be allowed with Type 1P cement containing Class F fly ash or Class N pozzolan.

1004.03 – Procedures

1. The Contractor shall provide adequate protection for the cement against dampness.
 - a. Cement shall be hauled or stored in railroad cars, dry bulk trailers or in suitable moisture-proof buildings.
 - b. The use of tarpaulins for the protection of the cement against moisture will not be allowed.
2. No cement which has become caked or lumpy shall be used.
3. Cement which has been spilled shall not be used.
4. Accepted cement which has been held in storage at the concrete mix plant more than 90 days shall be retested.
5. Cement coming directly from the manufacturer shall not be used until the temperature is 150°F (66°C) or less.

1004.04 – Acceptance Requirements

1. a. Cements for use on NDR projects must be on the NDR Approved Products List.
 - b. Cements will be placed on the NDR Approved Products List based on conformance with the NDR Acceptance Policy for Portland and Blended Cements. This information can be found on the NDR Materials and Research website.
2. Portland cement chemical and physical test requirements shall conform to NDR Acceptance Policy for Portland and Blended Cements contained in the NDR’s Materials Sampling Guide.
3. All cements shall be sampled and tested at the rate as described in the NDR’s Materials Sampling Guide.
 - a. NDR will inform the Contractor when a sample is required.
 - b. A sample shall be taken by a Contractor’s Certified Portland Cement Sampler and must be under the supervision of NDR certified personnel.

- c. The sample shall be taken at the plant from a bulk shipment of a rail car, dry bulk trailer, batch plant silo or from the line between the bulk truck and the silo. Upon sampling, NDR will take custody of the sample.
4. a. Blended cements shall be tested according to the provisions of ASTM C 1567. The mortar bars shall be composed of the Type 1PF/1PN cement and sand/gravel from a Platte River Valley source approved by NDR Materials and Research Division. The mortar bars for the ASTM C 1567 shall not exceed 0.10% expansion at 28-days. To accommodate precision within multi-laboratory testing, expansion up to and including 0.13% will be accepted for use. If the expansion is above 0.13%, the material will be noncompliant.
- b. Noncompliant material from the terminal or mill will be temporarily removed from the Approved Products List pending further investigation.
5. If the noncompliant cement is removed from the Approval Products List, all shipments from the supplier will be held until the investigation of the failing samples have been completed by the NDR Materials and Research Division. These procedures shall be in accordance with NDR Acceptance Policy for Portland and Blended Cements in the NDR's Material Sampling Guide.

WATER FOR CONCRETE (J-15-0512)

Section 1005 in the Standard Specifications is void and superseded by the following:

1005.01 – Description

Water shall be free from objectionable quantities of oil, acid, alkali, salt, organic matter, or other deleterious materials and shall not be used until the source of supply has been approved.

1005.02 – Material Characteristics

1. Water which contains more than 0.25 percent total solids by weight shall not be used.
2. When required by the Engineer, the quality of mixing water shall be determined by ASTM C 1603, ASTM C 114 and ASTM C 1602.
3. Upon written request by the concrete producer and approval by Materials and Research, the concrete producer may utilize up to 10% wash water for batching fresh concrete, only in mixes using 1P under the following conditions:
 - a. Wash water shall conform to the requirements in NDR's Material Sampling Guide.
 - b. Wash water must be clarified wash water that has been passed through a settling pond system.
 - c. Wash water must be scalped off of a settling basin that has been undisturbed for a minimum of 12 hours.
 - d. Wash water must be metered into each load.
 - e. Wash water quantities shall be shown on the batch ticket.

**CALCIUM CHLORIDE
(J-15-0307)**

Section 1006 of the Standard Specifications is void and superseded by the following:

1006.01 – Description

Calcium Chloride shall be Type S (Solid) or Type L (Liquid). Calcium Chloride can be used for, but not limited to, dust control and acceleration of the set of concrete.

1006.02 – Material Characteristics

The requirements for calcium chloride shall be as shown in ASTM D 98.

1006.03 – Acceptance Requirements

Acceptance shall be based on sampling and testing in accordance with AASHTO T 143 and requirements contained in the NDR Materials Sampling Guide.

**SECTION 1007 -- CHEMICAL ADMIXTURES
(J-15-0211)**

Section 1007 in the Standard Specifications is void and superseded by the following:

1007.01 -- Description

1. Admixtures are materials added to Portland cement concrete to change characteristics such as workability, strength, imperviousness, freezing point, and curing.
2. The Department's concrete admixture types are:
 - a. Type A - Water-Reducing Admixture - An admixture that reduces the quantity of mixing water required to produce concrete of a given slump.
 - b. Type B - Retarding Admixture - An admixture that slows the setting of concrete.
 - c. Type C - Accelerating Admixture - An admixture that speeds the setting and early strength development of concrete.
 - d. Type D - Water-Reducing and Retarding Admixture - An admixture that reduces the quantity of mixing water required to produce concrete of a given slump and slows the setting of concrete.
 - e. Type E - Water-Reducing and Accelerating Admixture - An admixture that reduces the quantity of mixing water required to produce concrete of a given slump and speeds the setting and early strength development of concrete.
 - f. Type F - Water-Reducing, High Range Admixture - An admixture that reduces the quantity of mixing water required to produce concrete of a given slump by 12 percent or greater.

- g. Type G - Water-Reducing, High Range and Retarding Admixture - An admixture that reduces the quantity of mixing water required to produce concrete of a given slump by 12 percent or greater and slows the setting of concrete.
- h. Air-Entraining - An admixture that encapsulates air in the concrete.
- i. Lithium Nitrate – An admixture used to control the Akali-Silica-Reaction (ASR) in concrete.

1007.02 -- Material Characteristics

- 1. Type A through G admixtures shall meet the requirements in ASTM C 494.
- 2. Air-entraining admixtures shall meet the requirements in ASTM C 260.
- 3. Use of admixtures other than those cited may be requested by the Contractor.
- 4. Admixtures shall not contain more than 1 percent of chlorides calculated as calcium chloride.
- 5. Admixtures shall be used at the manufacturer's recommended dosage rates.
- 6. The air-entraining admixture characteristics shall produce concrete with satisfactory workability and a total air content as prescribed in Table 1002.02.
- 7. a. When using the Lithium Nitrate admixture, the Contractor shall submit to the Engineer:
 - (i) A five pound sample of cement that will be used on the project.
 - (ii) The Manufacturer's method for determining the recommendation for the required dose rate based on the equivalent alkali content.
 - (iii) Water content of the Lithium Nitrate admixture solution.
- b. The Engineer will report the equivalent alkali content to the Contractor. The Contractor shall use the reported equivalent alkali content to determine the required dose rate based on the manufacturer's recommendation.

1007.03 -- Procedures

- 1. The process for adding admixtures to a ready mix truck on the project site involves positioning the load of concrete up to the truck chute, stopping short of discharge.
 - a. The admixture is then poured over the surface of the concrete and mixed for at least 5 minutes.
 - b. No more than 1.3 gallons (5L) of water shall be used to rinse the admixture from the fins and top chute. This water must be shown on the proportioning report and shall not exceed the water cement ratio.
 - c. When Lithium Nitrate is used, the portion of the admixture that is water will be shown on the proportioning report and shall not exceed the water cement ratio.

- d. The Contractor is responsible for the addition of the admixture.
- 2. a. If the air content is less than the minimum specified, addition of air-entraining admixtures is allowed.
 - b. The Contractor shall take measures based on manufacturer's recommendations, that are within compliance of NDR Specifications, to bring the load of concrete into NDR prescribed limits according to Table 1002.02.
 - c. If the air content is then outside the limits in Table 1002.02, the load of concrete shall be rejected.

1007.04 -- Acceptance Requirements

- 1. a. Approved chemical admixtures are shown on the NDR Approved Products List.
 - b. Admixture approval shall be based upon annual certifications and certified test results submitted to the NDR Materials and Research Division.
- 2. The admixture must be essentially identical in concentration, composition, and performance to the admixture tested for certification.
- 3. Admixtures not identified on the NDR Approved Products List may be used under the following conditions:
 - a. A certificate of compliance and certified test results must be submitted to the NDR Materials and Research Division, and;
 - b. Approval for use must be given by the NDR Materials and Research Division.

**FLY ASH AND CALCINED NATURAL POZZOLAN
(J-15-0512)**

Subsection 1008.02 in the Standard Specifications is void and superseded by the following:

1008.02 – Material Characteristics

- 1. All fly ash and calcined clay natural pozzolan will be acceptance tested by the NDR Materials and Research Division. This includes production plant samples and field samples.
- 2. Fly ash shall conform to the requirements of Class C, Class F, and Class N pozzolan as defined in ASTM C 618 except that the maximum loss on ignition for Class F pozzolan shall be 3.0 percent. Either class of fly ash shall not contain more than 1.5 percent of available alkalis as Na_2O_e .
- 3. Fly ash produced in furnace operations utilizing liming materials or soda ash (sodium carbonate) as an additive will not be acceptable.

**SILICA FUME
(J-15-0307)**

Paragraph 2 of Subsection 1009.03 in the Standard Specifications is void and superseded by the following:

2. Silica fume shall be protected from temperatures in excess of 90°F (32°C).

**LIQUID MEMBRANE-FORMING COMPOUNDS FOR CURING CONCRETE
(J-15-0307)**

Subsection 1012.03 in the Standard Specifications is void and superseded by the following:

1012.03 – Acceptance Requirements

1. All curing compounds to be approved must be from the current calendar year with no carry-over from the previous years.
2. Approved compounds are on the NDR Approved Products List.
3. Products not on the NDR Approved Products List shall be sampled and tested in accordance with requirements of the NDR Materials Sampling Guide.

**BITUMINOUS LIQUID COMPOUNDS FOR CURING CONCRETE
(J-15-1007)**

Section 1013 in the Standard Specifications is void and superseded by the following:

1013.01 – Description

The compound shall consist essentially of an asphaltic base and shall be of a consistency suitable for spraying at temperatures existing at the time of construction operations. It shall form a continuous, uniform film. It shall be free of precipitated matter caused by conditions of storage or temperature. The compounds shall be relatively nontoxic.

1013.02 – Material Characteristics

- a. When tested in accordance with AASHTO T 155, the loss of water shall not be more than 0.11 lb/ft² (0.55 kg/m²) of surface area at 3 days, unless otherwise specified by the Engineer.
- b. The Contractor has the option of using bituminous tack coat. The tack coat shall conform to all requirements of Section 504.

1013.03 – Acceptance Requirements

Products shall be sampled and tested in accordance with requirements of the NDR Materials Sampling Guide.

JOINT AND CRACK SEALING FILLER (J-15-0813)

Section 1014 in the Standard Specifications is void and superseded by the following:

1014.01 – Description

Joint sealing filler shall be either a cold applied silicone product or an asphalt product (hot pour) conforming to the requirements of this Section. The type of joint filler to be used shall be as specified in the plans or special provisions. If not specified, any of the joint sealing fillers in this Section may be used.

Crack sealing filler shall be a hot pour sealer conforming to the requirements of this Section.

1014.02 -- Material Characteristics

1. NE-3405 and NE-3405LM (hot pour)
 - a. NE-3405 joint and crack sealer shall conform to the requirements of ASTM D6690, Type II. The material shall conform to the requirements of Table 1 with the following exception:
 - (i) The test of Bond, non-immersed, ASTM D5329, 3 specimens through 3 cycles shall be run at 0°F (-18°C), 100% extension.
 - b. NE-3405LM (Low Modulus) joint and crack sealer shall conform to the requirements of ASTM D6690, Type IV. The material shall conform to the requirements of Table 1.
 - c. The test of Bond, non-immersed, ASTM-D5329, will be tested on concrete blocks that will be constructed by the NDR Concrete Laboratory. The concrete blocks will be made of a 47B concrete mixture as prescribed in Section 1002 in the NDR Standard Specifications. The design is amended so that no fly ash is used in the mixture. All other specifications for Portland Cement Concrete apply.
 - d. Sample conditioning, preparation and heating shall be in accordance with ASTM D 5167 with the following exceptions:
 - (i) The following sentence of Section 8.1.2, “Also, if present, remove container liner by cutting it away”, is void and superseded by the following:

“Also, if present, as much of the polyethylene bag as possible, shall be removed by cutting it away. Wholly-meltable type container in contact with the sample section shall be left in place.”
 - (ii) The last sentence of Section 8.1.2 “Solid Materials” is void and superseded by the following:

The entire vertical section which has been cut, shall be placed into the pot for melting.

(iii) The Section of 8.2.2.1 "Solid Materials" is void.

(iv) The Section of 8.2.3 is void and superseded by the following:

After the solid segment is added to the melter, the material shall be allowed to minimally melt to a uniform viscous state suitable for the installation of the stirrer or paddle. The sample shall then be stirred for one full hour. The oil bath temperature shall be regulated to bring the material to the maximum heating temperature within the one hour of stirring.

(v) The Section of 8.2.4.1 is void and superseded by the following:

During the one full hour of stirring, check the temperature of the material at maximum 15 minute intervals using a Type K thermocouple with the calibration verified in accordance with Section 6.1.7 to ensure conformance with specified temperature requirements. Stop the mechanical stirrer when measuring temperatures. If material temperatures ever exceed the maximum heating temperature, or ever drop below the minimum application temperature after the maximum heating temperature was reached, discard the sample and re-do the heating. Maintain appropriate records of times and temperatures to verify conformance with specification requirements.

(vi) The Section of 8.2.4.2 is void.

e. ASTM D 5329 shall include the following changes:

(i) Sections 6.4 and 12.4 "Specimen Preparation" shall have the reference of "177 ml (6 oz.)" replaced with "3 oz."

(ii) Section 6 "Cone Penetration, Non-Immersed" shall be superseded with the following exceptions:

1. Section 6.5 "Procedure" is void and superseded by the following:

Place the specimen in a water bath maintained at 77 +/- 0.2°F (25 +/- 0.1°C) for two hours immediately before testing. Remove the specimen from the bath and dry the surface by shaking gently to remove free water from the surface of the specimen. Using the apparatus described in Section 6.3, make one determination at or near the center of the specimen. Take care to ensure the cone point is placed on a point in the specimen that is representative of the material itself, and is free of dust, water, bubbles, or other foreign material.

2. Section 6.6 "Report" is void and superseded by the following:

Record the value as penetration of the specimen in dmm units.

- (iii) Section 12 “Resilience” shall be superseded with the following exceptions:
 - 1. Section 12.5 “Procedure”, void the sentence “Make determinations at three points equally spaced from each other and less than 13mm (½ inch) from the container rim” and supersede with the sentence “Make one determination at or near the center of the tin.”
 - 2. Section 12.6 “Report” is void.

2. Silicone Joint Sealer (cold applied)

- a. Silicone joint sealers may be either self-leveling or non-sag and shall meet the requirements in Table 1014.01.

Table 1014.01

Silicone Joint Sealer Requirement		
Property	Requirement	Test
As supplied:		
Specific Gravity	1.010-1.515	ASTM D792
Work Time, minimum	10 minutes	
Tack-Free, at 25°C	20-360 minutes	
Cure Time, at 25°C, maximum	14 days	
Full Adhesion, maximum	21 days	
As cured, at 25°C + 1.5		
Elongation, minimum	800%	ASTM D412
Durometer		
Non-Sag, Shore A	10-25	ASTM D2240
Self-Leveling, Shore 00, minimum	40	ASTM D2240
Joint Movement Capacity	+100% to -50%	ASTM C719
Tensile Stress, at 150% Elongation	45 psi	ASTM D412

1014.03 -- Packaging

- 1. NE-3405 and NE-3405LM
 - a. The joint and crack sealer can be packaged in either cardboard box of wholly-meltable type containers.
 - (i) Cardboard box containers shall be manufactured from double wall kraft board producing a minimum bursting test certification of 350 PSI (241 N/cm²) and using water-resistant adhesives. The use of metal staples or fasteners of any kind will be prohibited for closing the lids of the boxes. Tape or other like material is acceptable.
 - 1. The joint and crack sealer shall be in meltable [300°F (149°C)] polyethylene bag(s).
 - (ii) Wholly-meltable type containers, and any of their components, shall be fully meltable and integrational with the joint and crack sealer by the time the manufacturer’s minimum application temperature is reached.
 - 1. The wholly-melted and integrated container must not adversely affect the test specifications of the joint and crack sealer.

2. Silicone Joint Sealer
 - a. Each container shall include information regarding manufacturer and product name.

1014.04 -- Acceptance Requirements

1. NE-3405 and NE-3405LM
 - a. Acceptance of the manufactured material is based on pre-approval by either on or off-site sampling. Acceptable hot pour sealant lots are listed on the NDR Approved Products List.
 - (i) NDR on-site field sampling shall be in accordance with the NDR Materials Sampling Guide.
 - (ii) Off-site (Proxy) sampling shall be in accordance with ASTM D 6690.
 1. Proxy sampling shall be overseen by an outside party approved by the NDR, preferably another DOT Agency. Proxy samples shall include a manufacturer's Certificate of Compliance. Proxy samples shall also include a dated signature of origin by the Representative that is not affiliated with the manufacturer, and can either be on the Certificate of Compliance, or separate letter.
 2. For convenience in both sampling and shipping samples, sample containers smaller than a manufacturer's usual production containers are allowed, as long as the sample is 1500 grams min.
 3. Samples shall be sent to the NDR Bituminous Laboratory, or alternatively, sent to an NDR-approved independent laboratory for testing which will be at no cost to the Department. If a NDR-approved independent laboratory will be used for testing purposes, the NDR Bituminous Laboratory must be notified so that NDR concrete blocks for Bond testing can be sent to it.

2. Silicone Joint Sealer
 - a. Acceptance of applied silicone joint sealers shall be in accordance with the NDR *Materials Sampling Guide*.
 - b. Acceptable silicone joint sealer manufacturer products are listed on the NDR Approved Products List.
 - (i) For products that are not listed, approval may be based upon test results from an independent laboratory submitted to the NDR Concrete Materials Section by the manufacturer, and testing by the NDR. Approval must be made prior to product use.

EPOXY COMPOUNDS AND ADHESIVES (J-15-0308)

Section 1018 in the Standard Specifications is void and superseded by the following:

1018.01 – Description

This specification provides requirements for two-component, epoxy-resin bonding systems for use in non-load bearing applications and resin adhesives for application to Portland cement concrete.

1018.02 – Material Characteristics

1. Epoxy-resin bonding systems shall conform to the requirements of ASTM C 881. Approved systems are shown on the NDR Approved Products List.
2. The classification of Epoxy-Resin Bonding Systems is as follows:
 - a. Type I For use in non-load bearing applications for bonding hardened concrete and other material to hardened concrete.
 - Type II For use in non-load bearing applications for bonding freshly mixed concrete to hardened concrete.
 - Type III For use in bonding skid resistant materials to hardened concrete, and as a binder in epoxy mortars or epoxy concretes.
 - b. Grade 1 Low viscosity.
 - Grade 2 Medium viscosity.
 - Grade 3 Non-sagging consistency.
 - c. Class A For use below 40°F (4°C); the lowest allowable temperature to be defined by the manufacturer of the product.
 - Class B For use between 40°F and 60°F (4°C and 15°C).
 - Class C For use above 60°F (15°C); the highest allowable temperature to be defined by the manufacturer of the product.
 - Class D For use between 40°F and 65°F (4°C and 18°C).
 - Class E For use between 60°F and 80°F (15°C and 26°C)
 - Class F For use between 75°F and 90°F (24°C and 32°C)
3. Resin adhesives for embedding dowel bars, threaded rods, rebars and other fixtures in hardened concrete are shown on the NDR Approved Products List.

1018.03 – Procedures

1. The compounds shall be of the type and grade specified in the plans or as directed by the Engineer.
2. The class of the compounds shall be selected for use according to climatic conditions at the time of application.
3. All bonding surfaces shall be clean and free of all oil, dirt, grease, or any other materials which would prevent bonding.
4. Mixing and application shall be in strict accordance with the manufacturer's instructions.

1018.04 – Acceptance Requirements

1. Epoxy-resin bonding systems and resin adhesives approved for use are shown on the NDR Approved Products List.
2. Epoxy-resin bonding systems that are not on the NDR Approved Products List may be accepted based on a manufacturer's certificate of compliance.

**DEFORMED METAL CENTER JOINT AND METAL KEYWAY
(J-15-0307)**

Paragraph 1 a. of Subsection 1027.01 in the Standard Specifications is void and superseded by the following:

a. Metal Center Joint:

Metal center joint sections shall be manufactured from sheets no less than 18 gauge [0.05 inch (1.3 mm)] thick and shall be of the size and trapezoidal shape shown in the plans. The sections shall be punched along the centerline of the narrow face of the trapezoid to admit the tie bars required by the plans and also at intervals of not greater than 2 feet (600 mm) to receive pins that are driven vertically into the subgrade to support the metal center joint.

**AGGREGATES
(J-15-1112)**

Table 1033.02B of Subsection 1033.02 in the Standard Specifications is void and superseded by the following:

Table 1033.02B	
Aggregate Classes and Uses	
Aggregate Class	Concrete Description
A	Overlay Concrete SF
B	47B, 47B-HE, 47BD, PR 1, and PR 3
C	BX

Table 1033.03B of Subsection 1033.03 in the Standard Specifications is void and superseded by the following:

Table 1033.03B	
Aggregate Classes and Uses	
Aggregate Class	Concrete Description
E	47B, and 47B-HE 47BD, PR 1, and PR 3
F	Overlay Concrete SF

Paragraph 3.a.(3) of Subsection 1033.02 is void and superseded by the following:

- (3) Aggregates from a dry pit shall be washed and have a sand equivalent not less than 90 percent.

**SLAG CEMENT
(J-15-0512)**

Description

Slag cement shall meet the requirements of ASTM C 989, Grade 120.

Material Characteristics

1. All Slag cement will be acceptance tested by the NDR Materials and Research Division. This includes production plant samples and field samples.

Procedures

1. Slag cement shall be protected, stored, handled, and sampled in the same manner as specified for Portland Cement in Sections 1002 and 1004 and the NDR *Materials Sampling Guide*.
2. Each shipment of Slag cement sent to the project or ready mix plant shall be accompanied with a certificate of compliance from the supplier or manufacturing plant. The certificate must include the following information:
 - a. Name of the supplier or manufacturer.
 - b. Source of the Slag cement.
 - c. Consignee and destination of the shipment.
 - d. Project number to be used on, if available, and date shipped.
 - e. Railroad car number or truck identification number.
 - f. Weight of the shipment.
 - g. Certified test number representing the material being shipped.
 - h. An unrepeated order number or other identification number so that each shipment is separately identified.
 - i. The NDR specifications that the product is in compliance with.
3. The following signed certification statement, or similar wording, must also be included on the form:

"This is to certify that this shipment of Slag Cement meets the Specification Requirements of the Nebraska Department of Roads for Slag Cement, Grade 120."

Signed _____

For _____
(Supplier)

4. Two copies of the certificate of compliance shall be sent with the shipment for the Engineer. The Engineer will retain one copy for his/her file and send the other copy to the NDR Materials and Research Division to serve as notification of receipt and identification of the Slag cement.

5. Slag cement may be used as soon as it is received; provided it is accompanied by the proper certificate of compliance and the results of previous tests indicate a satisfactory product.

Acceptance Requirements

1.
 - a. Approved Slag cement will be on the NDR Approved Products List.
 - b. Slag cement may be added to the NDR Approved Products List if it is in conformance with the NDR Acceptance Policy for Slag cement. This information is available upon request from the Department's Concrete Materials Section.
2.
 - a. Should any sample indicate noncompliance with the specifications, use of material from that source based on certification only may be withheld. It will be necessary that the Slag cement be held in special silos or bins at the plant or some facility under control of the company furnishing the Slag cement until such time that test results show compliance.
 - b. When it can be shown that continuing production from that plant has a high assurance of meeting specifications, material acceptance may once again be based on certification only.
3.
 - a. If tests made on field samples taken by the Department fail to meet any of the specification requirements, all shipments from the supplier will be held until tests have been completed by the NDR Materials and Research Division and approval for use is issued.
 - b. This procedure will be continued until it can reasonably be assured that the Slag cement from the supplier will again continue to meet contract requirements.

DOWEL BARS (J-15-0812)

Paragraph 1.c. of Subsection 1022.01 in the Standard Specifications is void and superseded by the following:

1. c. Both Type A and Type B coated dowel bars shall be coated with a bond breaker shown on the NDR Approved Products List, dipped in asphalt or paraffin, or greased in accordance with the specified requirements as shown in the Standard Plans.

EPOXY COATED REINFORCING STEEL (J-15-0509)

Paragraph 5. of Subsection 1021.03 in the Standard Specifications is void and superseded by the following:

5. In order to protect the coated reinforcement from damage, the Contractor shall use padded or nonmetallic slings and padded straps. Bundled bars shall be

handled in a manner which will prevent excessive sagging of bars which will damage the coating. If circumstances require storing coated steel reinforcing bars outdoors for more than two months, protective storage measures shall be implemented to protect the material from sunlight, salt spray and weather exposure. Coated steel reinforcing bars, whether individual bars or bundles of bars, or both, shall be covered with opaque polyethylene sheeting or other suitable opaque protective material. For stacked bundles, the protective covering shall be draped around the perimeter of the stack. The covering shall be secured adequately, and allow for air circulation around the bars to minimize condensation under the covering. Coated steel reinforcing bars, whether individual bars or bundles of bars, or both, shall be stored off the ground on protective cribbing. The bundled bars shall not be dropped or dragged. If, in the opinion of the Engineer, the coated bars have been extensively damaged, the material will be rejected. The Contractor may propose, for the approval of the Engineer, alternate precautionary measures.

**REINFORCED CONCRETE PIPE, MANHOLE RISERS,
AND FLARED END SECTIONS
(J-21-0108)**

The AASHTO reference made in paragraphs 4.a. and 4.b. of Subsection 1037.02 in the Standard Specifications is amended to read AASHTO M 170 / M 170M-95.

The AASHTO reference made in paragraph 5. of Subsection 1037.02 is amended to read AASHTO M 206 / M 206M-95.

The AASHTO reference made in paragraph 6. of Subsection 1037.02 is amended to read AASHTO M 207 / M 207M-95.

Paragraph 8. of Subsection 1037.02 is void and superseded by the following:

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

**PROPOSAL GUARANTY
(A-40-0307)**

As an evidence of good faith in submitting a bid for this work, the bidder shall indicate the type of bid bond applied to this project in accordance with the Proposal Guaranty Bid Bond Section of these Special Provisions.

* * * * *

110INFSEP13

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NEBRASKA DEPARTMENT OF ROADS

PAGE: 1
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SCHEDULE OF ITEMS

CONTRACT ID: 1801Y

PROJECT(S): S-77-2(1025)

CALL ORDER NO. : 110

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
SECTION 0001 GROUP 1 GRADING						
0001	0030.10 MOBILIZATION	LUMP		LUMP		.
0002	1000.00 LARGE TREE REMOVAL	10.000 EACH		.		.
0003	1009.00 GENERAL CLEARING AND GRUBBING	LUMP		LUMP		.
0004	1010.00 EXCAVATION	443441.000 CY		.		.
0005	1011.00 WATER	1231.000 MGAL		30.00000		36930.00
0006	1012.00 RIGHT-OF-WAY MARKERS	89.000 EACH		.		.
0007	1016.00 RE-ESTABLISH PROPERTY CORNER	30.000 EACH		.		.
0008	1016.01 ESTABLISH PROPERTY CORNER	45.000 EACH		.		.
0009	1041.00 SALVAGING AND PLACING TOPSOIL	312567.000 SY		.		.
0010	1101.00 REMOVE PAVEMENT	8878.000 SY		.		.

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SCHEDULE OF ITEMS

CONTRACT ID: 1801Y

PROJECT(S): S-77-2(1025)

CALL ORDER NO. : 110

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0011	1143.00 REMOVE DRIVEWAY CULVERT PIPE	36.000 LF	.		.	
0012	1300.24 24" DRIVEWAY CULVERT PIPE TYPE 3,4,5 OR 6	76.000 LF	.		.	
0013	1300.30 30" DRIVEWAY CULVERT PIPE TYPE 3,4,5 OR 6	156.000 LF	.		.	
0014	1300.36 36" DRIVEWAY CULVERT PIPE TYPE 3,4,5 OR 6	68.000 LF	.		.	
0015	1405.00 RELAYING DRIVEWAY CULVERT PIPE	36.000 LF	.		.	
0016	1701.24 24" DRIVEWAY CULVERT PIPE, TYPE 2,3,4, 5,6,7 OR 8	365.000 LF	.		.	
0017	1701.36 36" DRIVEWAY CULVERT PIPE, TYPE 2,3,4, 5,6,7 OR 8	72.000 LF	.		.	
0018	4035.25 REMOVE AND SALVAGE FLARED-END SECTION	2.000 EACH	.		.	
0019	4050.01 EXCAVATION FOR PIPE, PIPE-ARCH CULVERTS, AND HEADWALLS	285.000 CY	.		.	
0020	4100.06 CLASS 47B-3000 CONCRETE FOR HEADWALL	4.500 CY	.		.	
0021	4150.00 REINFORCING STEEL FOR HEADWALL	460.000 LB	.		.	

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SCHEDULE OF ITEMS

CONTRACT ID: 1801Y

PROJECT(S): S-77-2(1025)

CALL ORDER NO. : 110

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0022	4360.18 18" METAL FLARED-END SECTION	6.000 EACH	.		.	
0023	4360.24 24" METAL FLARED-END SECTION	5.000 EACH	.		.	
0024	4362.24 INSTALL 24" METAL FLARED-END SECTION	2.000 EACH	.		.	
0025	7390.00 REMOVE SIGN AND POST	1.000 EACH	.		.	
0026	L006.00 COVER CROP SEEDING	67.000 ACRE	.		.	
0027	L019.13 EROSION CONTROL, CLASS 1D	8764.000 SY	.		.	
0028	L019.20 EROSION CONTROL, CLASS 2A	7459.000 SY	.		.	
0029	L020.50 TRANSITION MAT	135.000 SY	.		.	
0030	L021.51 EROSION CHECKS, TYPE WATTLE	3151.000 LF	.		.	
0031	L022.11 FABRIC SILT FENCE-LOW POROSITY	5619.000 LF	.		.	
0032	L032.56 SLASH MULCH GRINDING	1000.000 CY	.		.	

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SCHEDULE OF ITEMS

CONTRACT ID: 1801Y

PROJECT(S): S-77-2(1025)

CALL ORDER NO. : 110

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0033	P300.24 24" CULVERT PIPE, TYPE 3,4 OR 5	76.000 LF	.		.	
0034	P402.18 18" CULVERT PIPE, TYPE 3,4,5 OR 6	189.000 LF	.		.	
0035	P402.24 24" CULVERT PIPE, TYPE 3,4,5 OR 6	81.000 LF	.		.	
	SECTION 0001 TOTAL				.	

SECTION 0002 GROUP 3 CONCRETE PAVEMENT

0036	0030.30 MOBILIZATION	LUMP	LUMP		.	
0037	1020.06 FLEXIBLE POST DELINEATOR	152.000 EACH	.		.	
0038	1020.20 INSTALL CHEVRONS	4.000 EACH	.		.	
0039	2001.03 GRAVEL SURFACE COURSE	247.000 TON	.		.	
0040	2009.10 GRAVEL EMBEDMENT	7.610 STA	.		.	
0041	2020.00 SPECIAL SURFACE COURSE FOR MAILBOX TURNOUTS	18.000 SY	.		.	

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0042	2021.05 REMOVE AND RESET MAILBOX	2.000 EACH	.		.	
0043	3017.40 CONCRETE CLASS 47B-3000 MEDIAN SURFACING	18675.000 SY	.		.	
0044	3075.52 10" CONCRETE PAVEMENT, CLASS 47B-3500	1725.000 SY	.		.	
0045	3075.56 10" DOWELED CONCRETE PAVEMENT, CLASS 47B-3500	126377.000 SY	.		.	
0046	4763.26 UNDERDRAIN HEADWALL	4.000 EACH	.		.	
0047	4764.35 4" PERFORATED PIPE UNDERDRAIN	6208.000 LF	.		.	
0048	7500.43 ARROW, PREFORMED PAVEMENT MARKING, TYPE 4 GROOVED	2.000 EACH	.		.	
0049	7515.36 5" WHITE WET REFLECTIVE POLYUREA PAVEMENT MARKING, GROOVED	63000.000 LF	.		.	
0050	7515.37 5" WHITE WET REFLECTIVE POLYUREA PAVEMENT MARKING	750.000 LF	.		.	
0051	7515.38 12" WHITE WET REFLECTIVE POLYUREA PAVEMENT MARKING, GROOVED	1450.000 LF	.		.	

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			DOLLARS	CTS	DOLLARS	CTS
0052	7515.39 12" WHITE WET REFLECTIVE POLYUREA PAVEMENT MARKING	350.000 LF	.		.	
0053	7516.35 5" YELLOW WET REFLECTIVE POLYUREA PAVEMENT MARKING, GROOVED	45000.000 LF	.		.	
0054	8022.00 HYDRATED LIME	2750.815 TON	.		.	
0055	8029.25 FOUNDATION COURSE 4"	144940.000 SY	.		.	
0056	8060.05 GRANULAR SUBDRAIN	185.000 EACH	.		.	
0057	8101.50 STABILIZED SUBGRADE TYPE LIME	144940.000 SY	.		.	
0058	9009.86 SURFACING 6"	19590.000 SY	.		.	
0059	9009.87 SURFACING 8"	6080.000 SY	.		.	
0060	9034.00 PREPARATION OF INTERSECTIONS AND DRIVEWAYS	1027.000 SY	.		.	
0061	9111.00 WATER	644.000 MGAL	.		.	
0062	9170.00 EARTH SHOULDER CONSTRUCTION	390.006 STA	.		.	

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			DOLLARS	CTS	DOLLARS	CTS
0063	9173.20 SUBGRADE PREPARATION	7805.000 SY	.		.	
0064	9185.77 RUMBLE STRIPS, CONCRETE	328.940 STA	.		.	
0065	9188.50 SURFACING UNDER GUARDRAIL	336.000 SY	.		.	
	SECTION 0002 TOTAL				.	

SECTION 0003 GROUP 4 CULVERTS

0066	0030.40 MOBILIZATION	LUMP	LUMP		.	
0067	1043.50 RIPRAP FILTER FABRIC	137.000 SY	.		.	
0068	4002.00 CAST IRON COVER AND FRAME	500.000 LB	.		.	
0069	4004.50 CAST IRON GRATE AND FRAME	80760.000 LB	.		.	
0070	4016.00 MANHOLE AT STA. 489+56.80 LT	1.000 EACH	.		.	
0071	4050.01 EXCAVATION FOR PIPE, PIPE-ARCH CULVERTS, AND HEADWALLS	746.000 CY	.		.	

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0072	4051.01 EXCAVATION FOR BOX CULVERTS	5139.000 CY	.		.	
0073	4101.06 CLASS 47B-3000 CONCRETE FOR BOX CULVERT	437.710 CY	.		.	
0074	4105.59 CLASS 47B-3000 CONCRETE FOR INLET AND JUNCTION BOX	180.800 CY	.		.	
0075	4151.00 REINFORCING STEEL FOR BOX CULVERT	53088.000 LB	.		.	
0076	4155.50 REINFORCING STEEL FOR INLET AND JUNCTION BOX	14037.000 LB	.		.	
0077	4310.18 18" FLARED-END SECTION	13.000 EACH	.		.	
0078	4310.24 24" FLARED-END SECTION	2.000 EACH	.		.	
0079	4310.30 30" FLARED-END SECTION	2.000 EACH	.		.	
0080	4310.42 42" FLARED-END SECTION	2.000 EACH	.		.	
0081	4310.48 48" FLARED-END SECTION	2.000 EACH	.		.	
0082	4310.60 60" FLARED-END SECTION	6.000 EACH	.		.	

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0083	4360.15 15" METAL FLARED-END SECTION	2.000 EACH	.		.	
0084	4900.25 CURB INLET SEDIMENT FILTER	108.000 EACH	.		.	
0085	6105.02 ROCK RIPRAP, TYPE B	112.000 TON	.		.	
0086	8010.03 CRUSHED ROCK FOR BASE COURSE	114.200 CY	.		.	
0087	P080.15 15" SLOTTED CULVERT PIPE, TYPE 3	1150.000 LF	.		.	
0088	P200.42 42" CULVERT PIPE, TYPE 2 OR 5	160.000 LF	.		.	
0089	P200.48 48" CULVERT PIPE, TYPE 2 OR 5	59.000 LF	.		.	
0090	P200.60 60" CULVERT PIPE, TYPE 2 OR 5	443.000 LF	.		.	
0091	P300.15 15" CULVERT PIPE, TYPE 3,4 OR 5	84.000 LF	.		.	
0092	P400.24 24" CULVERT PIPE, TYPE 2,5,7 OR 8	138.000 LF	.		.	
0093	P400.30 30" CULVERT PIPE, TYPE 2,5,7 OR 8	76.000 LF	.		.	

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0094	P700.18 18" STORM SEWER PIPE, TYPE 1,7 OR 8	5295.000 LF	.		.	
0095	P707.15 15" STORM SEWER PIPE, TYPE 3,4 OR 5	33.000 LF	.		.	
SECTION 0003 TOTAL					.	

SECTION 0004 GROUP 4A CULVERT AT STA. 428+69.26
TRIPLE 10' X 157'

0096	0030.40 MOBILIZATION	LUMP	LUMP		.	
0097	4051.01 EXCAVATION FOR BOX CULVERTS	740.000 CY	.		.	
0098	4101.06 CLASS 47B-3000 CONCRETE FOR BOX CULVERT	504.960 CY	.		.	
0099	4151.00 REINFORCING STEEL FOR BOX CULVERT	55533.000 LB	.		.	
0100	8010.03 CRUSHED ROCK FOR BASE COURSE	71.000 CY	.		.	
SECTION 0004 TOTAL					.	

SECTION 0005 GROUP 5 SEEDING

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			DOLLARS	CTS	DOLLARS	CTS
0101	0030.50 MOBILIZATION	LUMP	LUMP			.
0102	L001.01 SEEDING, TYPE A	55.000 ACRE	.			.
0103	L001.02 SEEDING, TYPE B	12.000 ACRE	.			.
0104	L032.75 MULCH	150.000 TON	.			.
	SECTION 0005 TOTAL					.

SECTION 0006 GROUP 6 BRIDGE AT STA. 435+18.69
200'-0" 3-SPAN PRESTRESSED NU1100 CONCRETE GIRDER BRIDGE

0105	0030.60 MOBILIZATION	LUMP	LUMP			.
0106	1043.50 RIPRAP FILTER FABRIC	725.000 SY	.			.
0107	3050.15 CONCRETE FOR PAVEMENT APPROACHES CLASS 47BD-4000	614.800 CY	.			.
0108	3051.10 EPOXY COATED REINFORCING STEEL FOR PAVEMENT APPROACHES	103155.000 LB	.			.
0109	6000.10 ABUTMENT NO.1 EXCAVATION	LUMP	LUMP			.

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0110	6000.11 ABUTMENT NO.2 EXCAVATION	LUMP	LUMP			.
0111	6001.50 BENT NO.1 EXCAVATION	LUMP	LUMP			.
0112	6001.51 BENT NO.2 EXCAVATION	LUMP	LUMP			.
0113	6005.32 PREFORMED EXPANSION JOINT, TYPE A	125.100 LF		.		.
0114	6005.78 EXPANSION BEARING, TFE TYPE	40.000 EACH		.		.
0115	6005.83 FIXED BEARING	20.000 EACH		.		.
0116	6010.22 CLASS 47B-3000 CONCRETE FOR BRIDGE	888.700 CY		.		.
0117	6010.26 CLASS 47BD-4000 CONCRETE FOR BRIDGE	844.500 CY		.		.
0118	6011.11 PRECAST/PRESTRESSED CONCRETE SUPERSTRUCTURE AT STATION 435+18.69	LUMP	LUMP			.
0119	6052.55 ACCESS CROSSING	LUMP	LUMP			.
0120	6080.00 STRUCTURAL STEEL FOR SUBSTRUCTURE	11405.000 LB		.		.

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0121	6100.00 FLOOR DRAINS	2.000 EACH	.		.	
0122	6105.01 ROCK RIPRAP, TYPE A	15.000 TON	.		.	
0123	6105.02 ROCK RIPRAP, TYPE B	725.000 TON	.		.	
0124	6131.50 EPOXY COATED REINFORCING STEEL	274255.000 LB	.		.	
0125	6139.50 SUBSURFACE DRAINAGE MATTING	214.000 SY	.		.	
0126	6210.50 PIPE PILING	9875.000 LF	.		.	
0127	6251.00 TEST PILE	4.000 EACH	.		.	
0128	6310.00 STEEL SHEET PILING	7605.000 SF	.		.	
0129	8091.00 GRANULAR BACKFILL	775.000 CY	.		.	
	SECTION 0006 TOTAL				.	

SECTION 0007 GROUP 7 GUARDRAIL

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			DOLLARS	CTS	DOLLARS	CTS
0130	0030.70 MOBILIZATION	LUMP	LUMP			.
0131	7011.20 W-BEAM GUARDRAIL	468.750 LF		.		.
0132	7020.00 BRIDGE APPROACH SECTIONS	2.000 EACH		.		.
0133	7024.25 GUARDRAIL END TREATMENT, TYPE I	2.000 EACH		.		.
	SECTION 0007 TOTAL					.

SECTION 0008 GROUP 8B ELECTRICAL

0134	0030.81 MOBILIZATION	LUMP	LUMP			.
0135	A001.01 PULL BOX, TYPE PB-1	10.000 EACH		.		.
0136	A001.02 PULL BOX, TYPE PB-1A	2.000 EACH		.		.
0137	A001.05 PULL BOX, TYPE PB-2	2.000 EACH		.		.
0138	A001.06 PULL BOX, TYPE PB-2A	4.000 EACH		.		.

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0139	A001.12 PULL BOX, TYPE PB-5	2.000 EACH	.		.	
0140	A001.80 PASSIVE INFRARED MOTION DETECTOR	3.000 EACH	.		.	
0141	A003.10 TRAFFIC SIGNAL, TYPE TS-1	8.000 EACH	.		.	
0142	A003.20 TRAFFIC SIGNAL, TYPE TS-1A	2.000 EACH	.		.	
0143	A004.40 TRAFFIC SIGNAL, TYPE TS-2	6.000 EACH	.		.	
0144	A005.28 TRAFFIC SIGNAL CONTROLLER, TYPE TC-2070	1.000 EACH	.		.	
0145	A006.84 PEDESTAL POLE, TYPE PP-10	6.000 EACH	.		.	
0146	A006.98 VEHICLE DETECTOR, TYPE A PREFORMED	13.000 EACH	.		.	
0147	A007.00 VEHICLE DETECTOR, TYPE B PREFORMED	13.000 EACH	.		.	
0148	A007.08 VEHICLE DETECTOR, TYPE TD-3	4.000 EACH	.		.	
0149	A009.14 STREET LIGHTING UNIT, TYPE SL-BT-40-12-0.25	9.000 EACH	.		.	

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0150	A010.88 PEDESTRIAN WALKWAY LUMINAIRE 8' T8 FIBERGLASS	9.000 EACH	.		.	
0151	A012.80 COMBINATION MAST ARM SIGNAL AND LIGHTING POLE, TYPE CMP-55-12	2.000 EACH	.		.	
0152	A012.95 COMBINATION MAST ARM SIGNAL AND LIGHTING POLE, TYPE CMP-65-12	2.000 EACH	.		.	
0153	A019.08 LED TRAFFIC SIGNAL MODULE, TYPE 12" YELLOW	4.000 EACH	.		.	
0154	A020.10 LIGHTING CONTROL CENTER, TYPE D	1.000 EACH	.		.	
0155	A020.30 LIGHTING CONTROL CENTER, TYPE R	2.000 EACH	.		.	
0156	A030.01 SAFETY SWITCH NEMA 3R NON-FUSED 30A	1.000 EACH	.		.	
0157	A065.45 1/2-INCH PVC CONDUIT	10.000 LF	.		.	
0158	A065.48 1-INCH PVC CONDUIT	190.000 LF	.		.	
0159	A070.04 3/4" ROUND METAL CONDUIT	195.000 LF	.		.	
0160	A070.10 1 1/2-INCH CONDUIT IN TRENCH	2080.000 LF	.		.	

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			DOLLARS	CTS	DOLLARS	CTS
0161	A070.14 2-INCH CONDUIT IN TRENCH	3395.000 LF	.		.	
0162	A070.18 3-INCH CONDUIT IN TRENCH	120.000 LF	.		.	
0163	A072.10 1 1/2-INCH CONDUIT UNDER ROADWAY	474.000 LF	.		.	
0164	A072.14 2-INCH CONDUIT UNDER ROADWAY	50.000 LF	.		.	
0165	A072.18 3-INCH CONDUIT UNDER ROADWAY	419.000 LF	.		.	
0166	A074.14 2-INCH CONDUIT, JACKED	150.000 LF	.		.	
0167	A077.13 3/C #14 AWG TRAFFIC SIGNAL CABLE	3470.000 LF	.		.	
0168	A077.22 12/C #14 AWG TRAFFIC SIGNAL CABLE	626.000 LF	.		.	
0169	A079.01 2/C #14 AWG DETECTOR LEAD-IN CABLE	6641.000 LF	.		.	
0170	A079.43 #8 GROUNDING CONDUCTOR	10.000 LF	.		.	
0171	A079.48 GROUND ROD	1.000 EACH	.		.	

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			DOLLARS	CTS	DOLLARS	CTS
0172	A079.50 GROUNDING CONDUCTOR	3479.000 LF	.		.	
0173	A079.55 SERVICE CABLE	160.000 LF	.		.	
0174	A079.69 SURGE PROTECTIVE DEVICE	1.000 EACH	.		.	
0175	A080.22 STREET LIGHTING CABLE, NO. 6 BARE	2849.000 LF	.		.	
0176	A080.24 STREET LIGHTING CABLE, NO. 6 USE	5698.000 LF	.		.	
0177	A080.44 STREET LIGHTING CABLE, NO. 10 THWN	570.000 LF	.		.	
0178	A080.47 STREET LIGHTING CABLE, NO. 12 THWN	750.000 LF	.		.	
0179	A110.75 UNINTERRUPTIBLE POWER SUPPLY	1.000 EACH	.		.	
0180	A500.21 INSTALL TRAFFIC SIGNAL CONTROLLER, TYPE TC-2070	1.000 EACH	.		.	
0181	A630.20 REMOVE PULL BOX	2.000 EACH	.		.	
0182	A699.90 REMOVE AND SALVAGE WOOD POLE	8.000 EACH	.		.	

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			DOLLARS	CTS	DOLLARS	CTS
0183	A700.20 RELOCATE STREET LIGHTING UNIT	4.000 EACH	.		.	
0184	A706.00 RELOCATE PULL BOX TYPE PB-1	4.000 EACH	.		.	
	SECTION 0008 TOTAL				.	

SECTION 0009 GROUP 10 GENERAL ITEMS

0185	0001.08 BARRICADE, TYPE II	30050.000 BDAY	0.50000		15025.00	
0186	0001.10 BARRICADE, TYPE III	33990.000 BDAY	.		.	
0187	0001.90 SIGN DAY	9103.000 EACH	.		.	
0188	0001.99 CONTRACTOR FURNISHED SIGN DAY	11330.000 EACH	.		.	
0189	0002.30 PAVEMENT MARKING REMOVAL	18000.000 LF	.		.	
0190	0010.04 FIELD OFFICE	1.000 EACH	.		.	
0191	0030.00 MOBILIZATION	LUMP	LUMP		.	

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			DOLLARS	CTS	DOLLARS	CTS
0192	9110.01 RENTAL OF LOADER, FULLY OPERATED	50.000 HOUR	.		.	
0193	9110.03 RENTAL OF DUMP TRUCK, FULLY OPERATED	50.000 HOUR	.		.	
0194	9110.07 RENTAL OF SKID LOADER, FULLY OPERATED	50.000 HOUR	.		.	
0195	9110.27 RENTAL OF CRAWLER MOUNTED HYDRAULIC EXCAVATOR, FULLY OPERATED	50.000 HOUR	.		.	
0196	L007.01 CONTOUR CULTIVATION OF BACKSLOPES	8000.000 LF	.		.	
0197	L022.75 TEMPORARY SILT CHECK	3000.000 LF	.		.	
0198	L022.90 TEMPORARY SILT FENCE	3000.000 LF	.		.	
0199	L022.92 TEMPORARY EARTH CHECK	3000.000 LF	.		.	
0200	L032.57 SLASH MULCH PLACEMENT	1000.000 CY	.		.	
0201	L032.70 TEMPORARY MULCH	10.000 TON	.		.	
	SECTION 0009 TOTAL				.	
	TOTAL BID				.	