

SECTION 3100 – PORTLAND CEMENT CONCRETE PAVEMENT

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PART 1 – GENERAL

1.01 Section Summary

- A. Construction of Portland Cement Concrete Pavements.

1.02 Related Sections

- A. Section 1800 – Excavation and Embankment
- B. Section 2900 – Aggregate Base Course.
- C. Section 3200 – Concrete Curb and Gutter.
- D. Section 3300 – Concrete Walks, Medians and Driveways.

1.03 References

- A. North Dakota Department of Transportation “Standard Specification for Road and Bridge Construction” 2014 Edition, As Revised.
 - 1. Section 550 – Concrete Pavement
 - 2. Section 802 – Portland Cement Concrete
 - 3. Section 804 – Cement and Lime
 - 4. Section 806 – Grout and Epoxy
 - 5. Section 808 – Concrete Admixtures
 - 6. Section 810 – Concrete Curing Materials
 - 7. Section 816 – Aggregates
 - 8. Section 820 – Fly Ash
 - 9. Section 826 – Joint Materials
 - 10. Section 836 – Reinforcing Steel, Dowel Bars, and Tie Bars

1.04 Submittals

- A. Contractor shall submit the following to the Engineer at least 14 days before construction:

1. Concrete mix design
 - a. Certified by a professional engineer licensed in ND.
 - b. Identification of aggregate source and compliance test to specified requirements.
 - c. Compressive strength at 7 days.
 - d. Brand, type, and amount of cementitious material in mix.
 - e. Proportions of each material required per cubic yard.
 2. Batch plant information including its name, address, phone number, distance to project site, and evidence of NRMCA certification.
 3. Fly ash certification (if used).
 4. Steel certification.
 5. Manufacturer's descriptive literature and product specifications for each product, such as curing compound.
- B. Batch Tickets
1. Generate a batch ticket for each load of concrete and send one copy with the load to the work site.
 2. Include the following information on each batch ticket:
 - a. Ticket number;
 - b. City project number;
 - c. Delivery date;
 - d. Contractor name and Subcontractor name if applicable;
 - e. Time of weighing;
 - f. Identification number of truck; and
 - g. Quantity of each material in the mix.

PART 2 – PRODUCTS

2.01 Concrete Equipment

- A. Provide a NRMCA Certified plant for concrete supplied for this Section and Section 3110 – Concrete Pavement Repair.

- 2.02 Portland Cement Concrete
 - A. Conform to NDDOT Specification Section 550.03 except as modified herein:
 - 1. Where high early strength concrete is specified, concrete mix shall be Class ASE.
- 2.03 Aggregate
 - A. Coarse Aggregate: Conform to NDDOT Specification Section 802.01.C.2, Size No. 3.
 - B. Fine Aggregate: Conform to NDDOT Specification Section 802.01.C.3.
- 2.04 Water
 - A. Use only potable water, free of contaminants.
- 2.05 Fly Ash
 - A. Conform to NDDOT Specification Section 820 for Fly Ash requirements.
- 2.06 Admixtures
 - A. Conform to NDDOT Specification Section 808 except as modified herein:
 - 1. Concrete with air content measured at time of placement of below 5 percent or above 8 percent will be rejected.
- 2.07 Reinforcing Steel, Dowel Bars, and Tie Bars
 - A. Conform to NDDOT Specification Section 836 except as modified herein:
 - 1. All reinforcing steel, dowel bars, and tie bars shall be epoxy coated.
- 2.08 Concrete Curing Materials
 - A. Concrete curing compound shall be white liquid-membrane Type 2, Class B per Section 810 of the NDDOT Specification.
- 2.09 Jointing Materials
 - A. Conform to NDDOT Specification Section 826.02.A.2, Hot Applied Joint Sealant, Type IV.

PART 3 – EXECUTION

- 3.01 Pavement Installation
 - A. Conform to NDDOT Specification Section 550 except as modified herein:

1. Reinforcing steel shall not be more than 1-inch out of specified tolerance. Reinforcing steel out of tolerance shall cause the concrete to be rejected and shall be replaced at the expense of the Contractor.
2. Dowel bars shall be placed in close alignment, both horizontally and vertically, with the direction of the anticipated thermal movement of the slab. Tolerances are as follows:
 - a. Rotational alignment, both horizontal and vertical: 1/8-inch per foot.
 - b. Longitudinal shift: 1.5-inches.
 - c. Vertical placement: 1/4-inch above, 1/2-inch below the height specified.
3. Final surface finish shall provide a minimum texture depth of 0.06 inches.
4. Imprinting: The Contractor is not required to imprint information required in Section 550.04.H.1e, but shall stamp the concrete pavement at each leg of each intersection with the Contractor's name and year the work was done. The stamp shall have letters 5/8-inch-high and shall imprint the concrete 1/8 inch deep.
5. Curing: All surfaces shall be coated with membrane curing compound within 30 minutes of finishing at the specified rate. Curing compound shall be applied in 2 different directions perpendicular to each other. Applications shall not be more than 30 minutes apart.
6. Tolerance in Surface and Ride Quality shall be as specified below in this Section.
7. Pavement thickness shall not vary from the thickness specified by more than 0.3 inches. The Contractor is not required to core the pavement as specified in Section 550.04.N. The Engineer will monitor thicknesses during construction and may core the pavement for verification. Pavement that is deficient by 0.3 inches or more shall be removed and replaced at the expense of the Contractor.

B. Rumble strips shall not be installed unless called for in the Plans.

3.02 Field Quality Control

A. Testing shall follow the requirements of Section 1000 – Quality Requirements.

3.03 Protection

- A. Freshly finished surface shall be protected, surfaces pitted by rain will be considered unacceptable. Concrete damaged by traffic, rain, cold weather, or other causes occurring prior to final acceptance shall be removed and replaced at expense of the Contractor.

3.04 High Early Strength Concrete

- A. Use only when specified or specifically requested by the Engineer.

3.05 Cold Weather Concrete

- A. When temperatures are outside the recommended temperature ranges set forth by the NDDOT, the Contractor shall adhere to the requirements of Section 550.04.I.1 and 602.04.F of the NDDOT Specification.
- B. A written request shall be submitted to the Engineer for approval before concrete can be placed at temperatures below 35 degrees. Concrete placed without approval shall be rejected.

3.06 Tolerance in Surface and Ride Quality

A. General

1. All profiling and grinding shall be at the Contractor's expense.
2. Pavement roughness shall be determined and reported in 0.1-mile segments using a profiler on all traffic lanes, including intersections, roundabouts, tapered sections, and turn lane widening segments.
3. Profiles shall be measured by the Contractor in each wheel path per lane and shall be reported as inches per mile in International Roughness Index (IRI) in graph and tabular formats.
4. Intersections, roundabouts, tapered sections, and turn lane widening segments will not be included in pay adjustment calculations. However, all areas of localized roughness found to be out of tolerance will be required to be corrected.

B. Profiler

1. The Contractor shall furnish a lightweight, non-contact profile measuring device/vehicle capable of measuring IRI in dual wheel paths using a line laser.
2. Prior to performing profiling operations, proof of profiler calibration shall be furnished to the Engineer by the Contractor.

C. Measuring Roughness with a 10-foot Straightedge

1. Where directed by the Engineer, pavement shall be measured for roughness using a 10-foot straightedge.
2. Tolerances:
 - a. High spots of more than 1/4-inch but not exceeding 5/8-inch in 10 feet shall be grinded to an elevation where the deviation is less than 1/4-inch.
 - b. When the deviation exceeds 5/8-inch, the area shall be grinded to the specified 1/4-inch deviation or the pavement shall be removed and replaced at the Contractor's expense. The Contractor shall repair the area as directed by the Engineer, including installing dowel bars at each end of the repair.

D. Corrective Action

1. Correct all areas identified through the use of a 10-foot straightedge.
2. Correct all localized roughness areas having deviations in excess of 0.3 inches in 25 feet or less as indicated by the profiler.
3. Correct areas in accordance with the Pay Adjustment section below.
4. All grinding shall be performed as follows:
 - a. Use equipment that does not cause strain or damage to the underlying surface of the pavement.
 - b. Do not cause excessive ravels, aggregate fractures, spalling, or disturbance of the joints.
 - c. Perform grinding in the longitudinal direction so grinding begins and ends at lines normal to the pavement centerline.
 - d. Do not overlap more than 2 inches between passes and ensure the depth variance between adjacent passes is less than 1/8 inch.
 - e. Feather the grinding at the beginning and end of each pass.
 - f. Ensure the surface of the ground pavement has a texture consisting of grooves between 0.090 and 0.130 inches wide. Keep the peaks of the ridges approximately 1/32 inch higher than the bottom of the grooves.

- g. Where shoulders are present, grind high shoulders to provide drainage and safety. Daylight on the shoulder by performing a feather pass.
- h. Grinding areas shall be no narrower than one lane in width nor shorter than one panel in length. Join grind sections if the distance between grind sections is less than 30 feet.
- i. Continuously collect all slurry or residue resulting from the grinding operation. Dispose of the slurry or residue as specified in Section 107.17 of the NDDOT Specification.

E. Ride Quality Pay Adjustment

- 1. The Engineer will review the profile data supplied by the Contractor for each individual wheel track to determine areas of localized roughness and the average IRI per lane per segment.
- 2. Using the table below, the Engineer will determine if a payment adjustment is acceptable or if the Contractor will be required to correct the deficient segments to produce an IRI below the acceptable threshold.
- 3. Areas measured for roughness using a 10-foot straightedge shall be paid for at 100% when they are replaced or corrected to within the tolerances specified above.

Payment (Percent of Contract Unit Price)				
	100%	98% or Correct	95% or Correct	Correct or Replace
IRI	<121	121-130	131-140	>140

- 4. Areas measured for roughness using a 10-foot straightedge shall be paid for at 100% when they are replaced or corrected to within the tolerances specified above.
- 5. The Contractor may, at its option, attempt to reduce the IRI and reduce the pay adjustment by correcting rough pavement.
- 6. Wherever corrections are completed, second profiler runs shall be performed to verify that the corrections have produced an IRI under the acceptable threshold, and to determine the pay adjustment, if any.

PART 4 - MEASUREMENT AND PAYMENT

- A. IN Non-Reinforced Concrete Pavement CI - Doweled: Shall be paid for by the square yard (SY) and shall include all equipment, materials and labor necessary for installation of concrete pavement including all dowels, tie bars, curing, sawing, and sealing of joints.
- B. IN Reinforced Concrete Pavement CI : Shall be paid for by the square yard (SY) and shall include all equipment, materials and labor necessary for installation of concrete pavement including all dowels, tie bars, reinforcement, curing, sawing and sealing of joints.
- C. All costs to properly complete the work specified herein and/or shown on the Plans shall be included in the prices bid for these or other items unless applicable bid items are included on the Bid Form.

END OF SECTION