

SECTION 02500 - ROADWAY AND APPURTENANCES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Earthwork.
- B. Base course.
- C. Pavement and surface course.
- D. Incidental construction.
 - 1. Curb and gutter.
 - 2. Sidewalks
 - 3. Curb ramps
 - 4. Drive approaches.
 - 5. Pavement sawing.
 - 6. Pavement markings.
 - 7. Drainage facilities.
 - 8. Signs.
 - 9. Traffic control.
 - 10. Guardrails.
 - 11. Retaining walls.
 - 12. Restoration.
 - 13. Asphalt curb.
 - 14. Rumble strips.

1.02 SUBMITTALS

- A. Informational: Base compaction test reports required. Follow 01410.
- B. Informational: Subbase compaction test reports required. Follow 01410.
- C. Informational: Paving mix delivery tickets.
 - 1. Asphaltic materials:
 - a. Furnish ticket before placing material.
 - b. Display on ticket:
 - 1) Project.
 - 2) Date.
 - 3) Time.
 - 4) Ticket number.
 - 5) Type of mix.
 - 6) Gross weight.
 - 7) Tare weight.
 - 8) Net weight.
 - 9) Job total.
 - 2. Concrete.
 - a. Furnish tickets after delivery.
 - b. Display on ticket:
 - 1) Project.
 - 2) Date.
 - 3) Time.
 - 4) Ticket number.

- 5) Class of concrete.
- 6) Grade of concrete.
- 7) Cement Weight.
- 8) Fly Ash type and weight.
- 9) Fine aggregate weight.
- 10) Coarse aggregate weight.
- 11) Gallons of water.
- 12) Time water was added.
- 13) Additives.

- D. Informational: Base course delivery tickets that display:
1. Project.
 2. Date.
 3. Ticket number.
 4. Type of material.
 5. Gross weight.
 6. Tare weight.
 7. Net weight.
 8. Job total.
- E. Informational: Base course sieve analysis from one certified laboratory 7 days before placing material.
- F. Informational: Written concrete cylinder compression test results. Submit to Owner.
- G. Mix design. Follow 01340. Submit before paving:
1. Follow State Specifications 460.2.7, and December 2016 ASP 6, 460.2.1 – Specification specifies all hot mix designs be designed at 4.0% air voids and subsequently regressed to 3.0% by adding asphalt cement.
 2. High-early-strength concrete pavement. Follow State Specification 415.2.1.
- H. Wisconsin DOT-verified Superpave mix design for each specified ESAL designation. Follow 01340. Submit before paving.
- I. Informational: Quality control plan including:
1. Documentation of lab qualification under Wisconsin DOT Lab Qualification Program
 2. Certification of lab technicians to a minimum level of HMA Tech 1 under the State Highway Technician Certification Program.

1.03 REFERENCES

- A. State Specifications: Standard Specifications for Highway and Structure Construction, latest Edition, State of Wisconsin Department of Transportation.
- B. December 2016 ASP 6, 460.2.1 – Specification specifies all hot mix designs be designed at 4.0% air voids and subsequently regressed to 3.0% by adding asphalt cement.
- C. Code: Muskego Municipal Code.

1.04 REGULATORY REQUIREMENTS

- A. Pay for local, county or state permits for Work on right-of-ways. Damage to pavements and to all property, public and private, due to this Work shall be repaired to same condition before construction by Contractor.

1.05 MEASUREMENT AND PAYMENT

- A. Follow 01025.

- B. Follow State Specifications only if applicable item is not listed in Section 01025.

1.06 SUPERPAVE PAVEMENT QUALITY ASSURANCE

- A. As a condition of acceptance, arrange, conduct, and pay for tests necessary to demonstrate satisfactory compliance with Contract Documents. Make adjustments at the plan necessary to meet requirements of Specifications including the instructions.

- B. Lab Testing:

- 1. Test material from the plant at least once a day.
- 2. Meet the following parameters:
 - a. Air voids (VA): Between 2.7 percent and 5.3 percent
 - b. Voids in the mineral aggregate (VMA):

Design mm	Minimum VMA-percent
19.0	13
12.5	14.5
9.5	15.5

- c. Gradations: Job mix formula (JMF)

Sieve mm	JMF tolerance-percent
19.0	+/- 5.5
12.5	+/- 5.5
9.5	+/- 5.5
2.36	+/- 5.0
0.075	+/- 2.0

- C. Density testing:

- 1. Take a minimum one test per location and one test per 250 tons.
 - a. Use nuclear method.
 - b. Use the Maximum Specific Gravity running average of four from the specified mix design.
 - c. Targets will follow latest edition of State Specifications Section 460.3.3.

- 2. Locations will be at the Engineer's request.

- D. Results and reports:

- 1. Make Field adjustments to keep material within specified tolerances. If test results fall out of tolerance, increase testing frequency until material is within specification.
- 2. Submit test reports within at the end of the project to Owner.

- E. Follow State Specifications 460.2.8.2.2.

PART 2 - PRODUCTS

2.01 EMBANKMENTS

- A. Follow State Specifications 207. Do not use logs, stumps, brush, perishable material, frozen material or humus-bearing materials. No large stones or lumps within 2 feet of the surface.

2.02 EXCAVATION BELOW SUBGRADE (EBS) BACKFILL

- A. Borrow: State Specifications 208.
- B. Granular backfill: State Specifications 209, Grade 1.
- C. Dense Graded 3-inch: State Specification 305.
- D. Breaker run: State Specification 311, maximum particle size 3 inches.

2.03 BASE COURSE

- A. Follow State Specifications 305. Lower Base Course: 4 Inches of 1 ¼" Crushed Limestone T.B. Gradation No. 1 Upper Base Course: 4 Inches of ¾" Crushed Limestone T.B. Gradation No. 2
- B. Reclaimed crushed concrete (when Owner approved): Follow State Specifications 305.

2.04 ASPHALTIC CONCRETE PAVEMENT

- A. Follow State Specifications 460.2.7, and December 2016 ASP 6, 460.2.1 – Specification specifies all hot mix designs be designed at 4.0% air voids and subsequently regressed to 3.0% by adding asphalt cement. Submit mix design.
- B. Binder course: State Specification 460 and:
 - 1. Type LT and MT as specified in 00300
 - 2. Surface Gradation 3, 4, 5 as specified in 00300
 - 3. Binder Grade PG 58-28
 - 4. Designation S and H as specified in 00300
 - 5. Maximum recycled material content: State Specifications 460.2.5.
- C. Surface course: State Specification 460 and:
 - 1. Type LT and MT as specified in 00300
 - 2. Surface Gradation 3, 4, 5 as specified in 00300
 - 3. Binder Grade PG 58-28
 - 4. Designation S and H as specified in 00300
 - 5. Maximum recycled material content: State Specifications 460.2.5.
- D. Tack coat: State Specification 455.2.5 Asphaltic material dependent on weather conditions.

2.05 CONCRETE PAVEMENT

- A. Follow State Specifications 415.
- B. Concrete: State Specifications 501:

1. Slump:
 - a. Hand consolidated: 1 to 3 inch.
 - b. Vibratory consolidation: 1 to 2 1/2 inches.
 2. Compressive strength: 3500 pounds per square inch minimum.
 3. Do not add calcium chloride.
 4. Admixtures (if approved by Owner):
 - a. Set retarder: State Specifications 501.2.3.2.
 - b. Water reducer: State Specifications 501.2.3.3.
 - c. Air entrainment: State Specifications 501.2.2.
 4. High Early Strength Concrete: State Specifications 415.2.1, submit mix design.
- C. Steel reinforcement: State Specifications 505 and:
1. Deformed tie bars:
 - a. Grade: 60.
 - b. Length: 2 feet.
 - c. Epoxy coated.
 - d. Size: No. 4.
 2. Metal chairs: Stainless steel.
 3. Dowel bars: Follow State Specifications 505.2.6.2 Smooth and:
 - a. Grade: 60.
 - b. Length: 2 feet.
 - c. Size: 4.
 - d. Epoxy coated.
 4. Joint sealant: Hot poured elastic.

2.06 INCIDENTAL CONSTRUCTION

- A. Concrete curb and gutter:
 1. State Specifications 601.
 2. Do not add calcium chloride.
- B. Concrete sidewalks, steps, ramps, and islands:
 1. State Specifications 602.2.
 2. Do not add calcium chloride.
- C. Curb ramps.
 1. Detectable warning field color: yellow.
 2. State Specifications 602.2.
- D. Driveways.
 1. Concrete:
 - a. State Specifications 501.
 - b. Do not add calcium chloride.
 2. Asphaltic concrete: Follow 02500, 2.04.C., surface course if directed by CITY.
 3. High early strength cement; if directed by CITY.
- E. Pavement marking: State Specifications 646, as directed by CITY and:
 1. Paint.
 2. Cold preformed plastic.
 3. Epoxy.
 4. Glass beads, State Specifications 646.2.3. spheres.
 5. Temporary pavement marking: State Specifications 649, as directed by CITY:
 - a. Removable tape.
 - b. Reflectorized paint.
 - c. Reflectorized tape.
 6. Permanent raised markers:
 - a. One way white.

- b. Two way yellow.
- F. Drainage facilities:
- 1. Culvert pipe. See 02600 for new installations.
 - a. Reinforced concrete: State Specifications 522 class as specified by CITY.
 - b. Corrugated Steel: State Specifications 521 gauge as specified by CITY.
 - c. Corrugated aluminum: State Specifications 525 gauge as specified by CITY.
 - d. Structural flat pipe: State Specifications 522 gauge as specified by CITY.
 - e. Reinforced Concrete Horizontal Elliptical: State Specifications class as specified by CITY.
 - 2. Bedding:
 - a. For pipes 18-inches or less use 3/8-inch clear stone chips.
 - b. For pipes greater than 18-inches use 3/4-inch clear stone chips.
 - 3. Backfill: Granular, maximum particle size shall pass a 1-inch sieve.
 - 4. Apron endwalls: Same as pipe material.
 - 5. Replace existing pipe in kind as directed by CITY.
- G. Signs: State Specifications 637 Type F reflective sheeting
- 1. Posts: State Specifications 634, type as required by CITY.
 - a. Wood.
 - b. Steel.
 - 2. See: details for end of roads.
- H. Traffic Control: State Specifications 643.
- I. Guard Rails: State Specifications 614.
- J. Retaining Wall: See 02276 (if not applicable use State Specifications 504).
- K. Restoration. See 02900.
- L. Parking lot bumpers: Precast concrete. Nominal dimensions 96 by 6 inches high with 5/8 inch diameter holes at both ends. Include 18-inch long 1/2-inch diameter bars for securement.

2.06 SOURCE QUALITY CONTROL

- A. Asphaltic paving materials scale: State Specification 450.3
- B. Concrete paving materials scale: State Specification 501.
- C. Base course materials scale: State Specifications 109.1.4.

PART 3 - EXECUTION

3.01 EARTHWORK

- A. Follow 02300.
- B. Clearing and Grubbing: Follow State Specifications 201.
 - 1. Remove wood not claimed by landowner.
- C. Removing old culverts and bridges. Follow State Specifications 203.
- D. Removing miscellaneous structures. Follow State Specifications 204 for:
 - 1. Curb and gutter.

2. Asphaltic concrete pavement.
 3. Sidewalk.
 4. Guardrail.
 5. Other structures. Remove manholes, inlets, tanks, wells, and, buildings to 3 feet below existing or finished grade, whichever is lower.
 6. Follow Municipal Code Chapter for tanks and building.
- E. Roadway and drainage excavation. Follow State Specifications 205 for:
1. Common Excavation Unclassified excavation.
 2. Rock excavation.
 3. Marsh excavation.
 4. Stone piles or stone fences Excavation below subgrade backfill with: crushed aggregate base course material.
 5. Overhaul: No allowance for overhaul.
- F. Embankment: Follow State Specifications 207.
1. Maximum layer thickness: 8 inches.
 2. Compaction: Standard.
 - a. Allow CITY to inspect prepared subgrade and to witness proof roll test by fully loaded dump truck. Truck shall be a quad-axle with minimum total weight of 70,000 pounds. Reconstruct where deflection is indicated.
- G. Preparation of roadway foundation: Follow State Specifications 211.

3.02 BASE COURSE

- A. Crushed aggregate base course: Follow State Specifications 301 and 305.
1. Compaction: Standard compaction.
 - a. Allow CITY to inspect prepared base course and to witness proof roll test by a fully loaded dump truck. Truck shall be a quad-axle with minimum total weight of 70,000 pounds. Reconstruct where deflection is greater than 1/4 inch.
 1. Allowable deviation from design grade: 1/2 inch
 2. Utility structures: Set to finish course elevation.
 3. Manholes: Set to finish course elevation.
 4. Valve Boxes & Inlets: Set to binder course elevation.

3.03 PAVEMENT AND SURFACE COURSES

- A. Tack coat: Follow State Specification 455.3.2.
1. Apply between each layer of asphaltic concrete.
 2. Allow to cure before paving.
- B. Mill butt joints: Mill and dispose of 1-1/2 inches or as directed by CITY of existing pavement at locations shown. Minimum width 3 feet.
- C. Asphaltic concrete pavement: Follow State Specifications 450,460,465.
1. Maximum variations:
 - a. 1/8 inch across a 5 foot straight edge.
 - b. Thickness: Within 1/4 inch of design.
 - c. Finish elevation: Within 1/4 inch of design.
 2. Temperatures:
 - a. Delivered binder course: 225 degrees Fahrenheit minimum.
 - b. Delivered surface course: 250 degrees Fahrenheit minimum.
 - c. Asphaltic concrete at placement: Between 235 and 330 degrees Fahrenheit.
 - d. Air temperature: State Specifications 450.3.2.1.
 - e. Subgrade: Above 35 degrees Fahrenheit.

3. Layer thickness (as directed by City):
 - a. As shown on standard detail #1A in appendix, or
 - b. As shown on Drawing if provided, or
 - c. As directed in 01010 if provided
4. Compaction: Follow State Specifications Section 407 Maximum Density Method.
5. Use 30 foot ski to achieve uniform surface.
6. When interim binder pavement is to be used, wedging around manholes and curb face shall follow. Interim Inlets shall be used. See standard details #7A, 7B, & 7C in appendix.
7. Safety edge (section 450.3.2.11) is not required.

3.04. CONCRETE PAVEMENT

- A. Follow State Specification 415 and 501.
- B. Placement delays.
 1. If less than 30 minutes: Cover unfinished end with wet burlap.
 2. If greater than 30 minutes: Install construction joint.
 3. If concrete attains initial set: Install construction joint.
 4. If finishing equipment breaks down: Discontinue placement.
 5. If finishing and curing operations cannot be kept within their time sequence: Discontinue placement.
- C. Maximum delivery time:
 1. Below 60 degrees Fahrenheit: 1-1/2 hours.
 2. Above 60 degrees Fahrenheit: 1 hour.
 3. Begins with addition of water to cement or cement to aggregates. Time ends when completely discharged.
 4. Extend time above 60 degrees Fahrenheit to 1-1/2 hours with approved retarder.
- D. Joints.
 1. Saw cut joints to prevent surface shrinkage cracks within 24 hours.
 2. Spacing: 10 feet minimum and as shown on Drawings.
 3. Longitudinal: 3 feet on center placed at mid depth of slab.
 4. Transverse: 2 feet on center placed at mid depth of slab.
 5. Width: 1/4 inch.
- E. Curing: Apply impervious coating.
- F. Cold weather concreting.
 1. Do not place below 35 degrees Fahrenheit.
 2. Do not place on frozen grade.
 3. Cover completed Work: Follow State Specifications 415.5.14.
- G. Testing:
 1. Follow State Specifications 501.
 2. Perform slump test.
 3. Measure air entrainment: Follow State Specifications 501, AASHTO T152.
 3. Cast 6 inch diameter by 12 inch high compression strength cylinders at CONTRACTORS cost.
 4. Cast 3 test cylinders for every 100 cubic yards placed.
 5. Allow ENGINEER to observe field testing.
 6. Test cylinders in lab at CONTRACTORS cost:
 - a. at 7 days.
 - b. and at 28 days.
 - c. Follow State Specifications 501, AASHTO T22 and T23.

- H. Opening to traffic: Permitted when design compressive strength achieved by lab test samples and with ENGINEER's approval.

3.05 INCIDENTAL CONSTRUCTION

- A. Concrete curb and gutter: Follow State Specification 601.

- 1. Joints.
 - a. Construct expansion joints at:
 - 1) 3 feet from inlets or catch basins.
 - 2) End of curves.
 - 3) 150 feet maximum intervals.
 - b. Construct contraction joints at 10 feet spacing.
 - 1) Minimum spacing: 6 feet.
 - 2) Maximum spacing: 20 feet.
 - 3) Match abutting concrete joints.
- 2. Handicap ramp. Follow State Specification 601. Provide at all corners of intersections.
- 3. Curing:
 - a. Apply impervious coating within one hour of placement.
 - b. Coat all sides of curb including exposed surface after forms removed.
 - c. Apply two coats in perpendicular directions.

- B. Sidewalks: Follow State Specifications 602.

- 1. Joints.
 - a. Provide expansion joints abutting existing construction and structures with 1/2 inch expansion joint filler.
 - b. Provide contraction joints at spacing equal to width of walk and:
 - 1) Minimum 3 feet.
 - 2) Maximum 12 feet.
- 2. Curb ramps: Follow State Specifications 602.
- 3. Curing:
 - a. Follow State Specifications 415.3.12.
 - b. Apply impervious coating within one hour of placement.
 - c. Coat all sides of sidewalk curb including exposed surface after forms removed.
 - d. Apply two coats in perpendicular directions.

- C. Concrete Drive approaches: Follow State Specifications 415.

- 1. Joints.
 - a. Expansion Joints abutting curb or walk: Use 1/2 inch expansion joint filler.
 - b. Contraction Joints: Locate at midpoint of drive, perpendicular to curb.
 - 1) Minimum spacing 6 feet.
 - 2) Maximum spacing 12 feet.
- 2. Curing.
 - a. Follow State Specifications 415.3.12.
 - b. Apply impervious coating within one hour of placement.
 - c. Coat all sides of concrete drive approach curb including exposed surface after forms removed.
 - d. Apply two coats in perpendicular directions.

- D. Asphaltic concrete drive approaches. Follow 02500, 3.03 except place single 3-inch layer thickness.

- E. Pavement sawing. Follow State Specifications 690. Cut depth: full pavement thickness.

- F. Pavement marking: Follow State Specifications 646.
 - 1. Apply same day on pavements open to traffic: State Specifications 646.3.1
 - 2. Pavement surface temperature:
 - a. Painted: Above 35 degrees Fahrenheit.
 - b. Hot thermoplastic: Above 60 degrees Fahrenheit.
 - c. Epoxy: Above 50 degrees Fahrenheit.
 - 2. Provide clean pavement to ensure proper bonding.
 - 3. Provide temporary centerline marking at 50 foot interval between paving operations and application of final pavement marking.
 - 4. Temporary pavement marking: Follow State Specification 649 and Drawings.
- G. Drainage facilities:
 - 1. Follow 02600.
- H. Signs: Follow State Specifications 637.
 - 1. Relocating signs: Follow State Specifications 638.
- I. Traffic control: Follow State Specification 643.
 - 1. Warning lights: Type A.
- J. Guardrail: Follow State Specification 614.
- K. Retaining walls: Follow 02276 or State Specifications 465.3.2 as directed by CITY.
- L. Asphaltic concrete curb: Follow State Specifications 465.3.2.

END OF SECTION