

CHAPTER 3

ROADWAYS

3.0 GENERAL

All work performed shall conform to the latest edition of State of Wisconsin Standard Specifications for Road and Bridge Construction, and the Standards and these Specifications for the City of Franklin.

3.1 STANDARD CROSS-SECTIONS

- 3.1.1 All pavement widths with a standard residential section with curb and R.O.W. width of 60 feet shall be 24.0', not including the width of the curb and gutter. See Figure No. 2.
- 3.1.2 All pavement widths for the standard residential cul-de-sac shall have a 43.0' radius excluding the width of the curb. See Figures 2 and 3.
- 3.1.3 All temporary cul-de-sac's shall have curb and gutter.
- 3.1.4 All pavement with curb and gutter shall have a cross slope crown slope of 2 **1/2**% for a standard residential cross-section and a minimum of 0.75% slope for centerline profile gradient unless otherwise approved by the City Engineer.
- 3.1.5 For all new pavement construction, all pavement cross-sections shall be shown with concrete curb and gutter unless approved by the City Engineer.

3.2 SUBGRADE

- 3.2.1 All subgrade shall be rolled and compacted to meet a 95% modified proctor density. All fill placed to achieve roadway subgrade shall require compaction testing by a soils testing service. Reports shall be submitted to the City Engineer and inspection firm within three (3) days of test.
- 3.2.2 All subgrade material shall be dry before the City will allow the crushed stone base to be applied.
- 3.2.3 Any areas of the subgrade that appear to be unstable due to inadequate compaction or poor soils may require the services of a soil testing firm to determine the extent and causes of the unstable soil and arrive at solutions to correct the problem areas.
- 3.2.4 Prior to the installation of crushed stone, the subgrade shall be proof rolled with a fully loaded tri- axle dump truck. The maximum allowable deflection during a proof roll is 1/2 inch. Proof rolling shall be scheduled with the Engineering Department.

- 3.2.5 In unstable soil conditions undercutting in excess of three (3) feet in depth shall be backfilled to within one foot of grade with No. 3 traffic bond. Then **one foot** of 1 1/4 inch traffic bond shall be **compacted in 6 inch lifts and placed** to grade (sub-grade) as approved in writing by the City Engineer.
- 3.2.6 All soft spots located with a deflection greater than 1/2 inch, as a result of proof rolling shall be undercut and backfilled with approved traffic bond granular backfill.
- 3.2.7 The City requires an inspection of the subgrade before the crushed stone base may be applied. This inspection is done by the City of Franklin inspection services. A tolerance of ± 0.04 foot from the proposed subgrade elevation shall be allowed
- 3.2.8 The project surveyor is responsible for the horizontal and vertical control for the entire project. If stakes are missing or the contractor feels that a wrong grade has been set on some of the subgrade stakes, he is to contact the project surveyor.
- 3.2.9 The contractor responsible for the subgrade grading is to conform to the notification policy of the City of Franklin.

3.3 CRUSHED LIMESTONE BASE

- 3.3.1 The crushed stone base for the roadway shall consist of 8" of crushed stone conforming to State of Wisconsin Dept. of Transportation Standard Specification, Section 305. The first 4" lift shall be of 1 1/4 inch traffic bond base compacted as a 4" lift. The final **(top)** 4" shall be of 3/4 inch traffic bond compacted in **one** lift. Crushed concrete meeting all state WDOT standards may be substituted for crushed limestone base if approved by the City Engineer and upon submittal of a sieve analysis.
- 3.3.2 The crushed limestone base shall be spread, shaped and compacted to produce a stabilized base which conforms to the required cross-sections. The stone base shall be compacted to not less than 95% modified proctor density.
- 3.3.3 The City of Franklin requires an inspection of the limestone base before the first layer of asphalt can be placed. This inspection is done by the City of Franklin inspection services. The finished stone base elevation shall be 8" above the approved final subgrade ± 0.04 foot. The crushed stone base shall be dry before the first layer of asphalt can be placed. Additional proof roll of stone base may be required if in the opinion of the inspector conditions have changed.

- 3.3.4 The contractor responsible for the stone base installation is responsible for notifying the City for inspection as per the requirements of the notification policy.
- 3.3.5 All testing, including segment televising of the sanitary sewer and water main testing, is to be successfully completed before the pavement is to be installed.

3.4 PULVERIZING AND MILLING OF EXISTING ASPHALT PAVEMENT

PULVERIZING

- 3.4.1 Pavement pulverization shall be for the full depth of the pavement, but in no case less than six (6) inches nor more than twelve (12) inches.
- 3.4.2 The pulverizing equipment employed shall be of adequate size such that 97 percent of the pulverized asphalt materials shall pass a two (2) inch screen. Pieces **four (4)** inches and larger shall be removed from the site by the contractor.
- 3.4.3 Following the pulverizing of the pavement, the material shall be compacted, graded and shaped to a proper cross-section (1/4 inch per foot transverse slope). Under no circumstances shall the contractor pulverize more material than can be regraded during the same day.
- 3.4.4 The relayed material shall be immediately compacted in the following sequence: first with either a rubber tired roller or vibratory pads foot roller, and second with a vibratory steel roller. Water shall be added prior to and during compaction as required. Each layer shall be compacted to the extent required for Standard Compaction in Section 305 of the Wisconsin Department of Transportation Specifications.
- 3.4.5 For a compacted depth of pulverized materials, up to 4 inches, compaction equipment shall be in accordance with Section **305** of the Wisconsin Department of Transportation Specifications.
- 3.4.6 For a compacted depth of pulverized material, greater than 6-inches and up to 8-inches, a minimum 25 ton rubber tired roller with 90 psi tire pressure or 25,000 lb. pads foot vibratory roller, and a minimum 8 ton vibratory steel roller shall be used.

- 3.4.7 For compacted depths greater than 8-inches, split lift compaction according to the above described methods will be required.
- 3.4.8 For reconstruction of existing concrete curb and gutter pavements ramping to existing driveways shall be done using wooden ramps. Franklin D.P.W. will deliver the ramp to the job site. The contractor will then be responsible for their installation as needed during the reconstruction process.
- MILLING**
- 3.4.9 Milling shall be of bituminous concrete surface coarse to a depth (2 - 2 1/2 inches typically) to expose a uniform layer of binder coarse pavement.
- 3.4.10 Millings shall be to 100 percent passing 1 1/2 inch sieve. Millings to be cast into receiving trucks for haul off site.
- 3.4.11 After milling, should a deteriorated area of binder be found, it shall be removed and replaced.

3.5 ASPHALT PAVEMENT

- 3.5.1 The City of Franklin has accepted into these specifications the requirements of the latest edition of the Wisconsin Department of Transportation (WDOT) Specifications, Sections 450, 455 and 460 as applicable to these specifications.
- 3.5.2 City streets shall be constructed of a lower layer with a No.3 (19.0 mm) gradation. Low-volume streets shall receive an upper layer LT mix with a No. 4 (12.5 mm) gradation (4 LT 58-28 S) and high-volume or trucking streets shall receive an upper layer MT mix with a No. 4 (12.5 mm) gradation (4 MT 58-28 H). In addition to standard compaction a pneumatic rubber tire roller must be added."
- 3.5.3 Design standards for residential streets shall consist of four (4) inches of binder course, constructed in one lift of four inches and a surface course of two inches.
- 3.5.4 Pavement density testing shall be performed the day of placement. Compaction shall be not less than 91 percent for binder course (lower) and 93 percent for surface course (upper) for traffic lanes and 91 percent for binder course and 92 percent for surface course for shoulders and drives. Density tests will not be required on leveling courses.

- 3.5.5 The City requires a full-time inspector be present on the job site whenever any asphalt pavement is being constructed.
- 3.5.6 The City requires that any asphalt to be placed on a roadway in the City of Franklin arrive at the job site at a temperature of 275° +/- 25°. The asphalt inspector will periodically test the temperature of the arriving trucks for the temperature of the asphalt. Any trucks not falling within the guidelines for asphalt temperatures shall be rejected.
- 3.5.7 All asphaltic binder courses shall be constructed on a dry, rolled and compacted crushed stone base.
- 3.5.8 A tack coat will be required, as a bonding agent between binder, **leveling surface** and surface course. Any defects in the binder course are to be repaired prior to asphalt surface installation. Pavement shall be thoroughly cleaned and any vegetation removed prior to applying the tack coat.
- Tack shall be uniformly applied at a rate of 0.05 gallon per square yard over the entire receiving surface.
- 3.5.9 The contractor responsible for asphalt paving is also responsible for notifying the City as per the notification policy of the City of Franklin.
- 3.5.10 All manhole rims and water valve boxes shall be left 1/4" below base course and final lift of asphalt surface.
- 3.5.11 All manhole frames, raising rings and covers shall be of like manufacturer having corresponding part number and size. Welded raising rings will not be allowed, only cast iron rings will be allowed. Trowelable mastic shall be installed between the frame and all raising rings.

3.5.12 Quality Control - Asphalt

Job Mix Certification

At the pre-construction conference, the contractor shall submit a proposed Job Mix Formula (JMF) for the City's review.

The contractor shall take samples of JMF. For each mix (binder or surface) produced, one sample shall be

tested once per day. Each sample shall be tested for gradation and air voids. The average of all tests shall comply with the JMF Wisconsin Department of Transportation specifications as:

Gradation (+/-) 5%

Air Voids (+/-) 2.5 - 4.5%

A certified report statement shall be furnished to the City Engineer.

3.6 ROADWAY DRAINAGE SYSTEM

Install underdrain system, applicable on a **project by project** basis as required by City Engineer. This system design will be required to be shown on a plan and profile sheet.

- 3.6.1 A continuous 6" diameter perforated or slotted longitudinal underdrain pipe shall be installed as per the standard typical section for the City of Franklin.

Pipe perforations may be holes or slots and may be in 3 or 4 lines spaced around the circumference of the pipe at 120° or 90° respectively.

- 3.6.2 As shown on Figure No. 21 Geo-textile fabric shall be used to line the excavation before the underdrain is installed and backfilled. Enough fabric must be provided as to cover the trench and overlapped trench side by a minimum of 4 inches. The fabric shall consist of either knitted, woven or non-woven fibers of polyester, polypropylene, stabilized nylons, polyethylene or polyvinyl Idene chloride. Slit films or woven fabrics shall not be used for this work. Geo- textile fabrics shall be clearly marked to identify the type of fabric.

- 3.6.3 The 6" underdrain shall be laid in an **18"** deep by **18"** wide trench and backfilled with open graded base 1" clear crushed limestone. The trench itself shall be flat bottom with square sides. Any damaged underdrain shall be replaced before the open graded stone is to be installed.

- 3.6.4 At a maximum of 400' intervals, and at all low points of the road, a 45° wye and bleeder will be installed on the 6" underdrain. The bleeder shall be bedded with the same material as the 6" underdrain and the downstream end shall terminate 1.0' from the centerline of ditch or in an approved storm sewer catch basin, inlet or pipe.

- 3.6.5 Roadside Ditches All roadside ditches shall have a minimum slope of one percent (1%).

- 3.6.6 All ditches shall be located as per the standard residential cross-section of the City of Franklin.
- 3.6.7 All roadside ditches shall have a minimum depth of 18" and graded to accommodate a properly sized driveway culvert. Any roadside ditches deeper than 36" shall be piped.
- 3.6.8 All roadside ditches shall be covered with 4" of topsoil, seed, fertilizer and mulch.
- 3.6.9 All crossroad culverts shall be designed to provide a minimum of 14" of cover as referenced from the centerline elevation of the finished road to the top of the pipe.
- 3.6.10 Endwalls, flared end sections or junction structures shall be required at all crossroad culverts or piped installations through or between home sites. Riprap on fabric may be needed at outfalls depending upon the situations.
- 3.6.11 Sideslopes of roadside ditches shall not be steeper than one foot of rise to **three** feet (3:1) of run on road side and 4:1 for back slope **(to front yards)**.
- 3.6.12 Restoration of roadside ditches with a flowline gradient between 1% and 3% requires topsoil and seed restoration; between 3% and 5% requires sod/staked or stabilized; greater than 5% are required to be piped.
- 3.6.13 All existing ditches fronting on existing roadways or existing drainageways within development shall be regraded to conform to these specifications.
- 3.6.14** The City requires a full-time inspector at the job site during placement of the roadway underdrain. The contractor responsible for the placement of the roadway underdrain is also responsible for notifying the City. **Forty-eight hours notification required.**

3.7 LATE SEASON ASPHALT PAVING CRITERIA

- 3.7.1 Asphalt surface course installation will not be permitted after October 15th unless approved by the City Engineer. In all cases the air temperature shall be 50°F and rising.
- 3.7.2 Asphalt binder course installation will be permitted if conditions indicated in 3.8.3, 3.8.4 and 3.8.5 can be met.
- 3.7.3** Asphalt binder course installation will not be permitted unless air temperature is 35° and rising at the start of paving operations. **A Cold Weather Paving Plan meeting**

the requirements of FDM Section 450.3.2.1.2 450.3.2.1.2 is required if lower level is to be placed in temperatures between 35 degrees and 40 degrees.

- 3.7.4 Asphalt paving will not be permitted on wet stone bases or in the rain.
- 3.7.5 No asphalt pavement shall be constructed on a frozen base.

3.8 CONCRETE CURB AND GUTTER

- 3.8.1 The standard public street cross-section with curb and gutter shall utilize a 6" vertical face curb and gutter type that is 30" wide (6" top curb and 24" flange) and 9" deep at the flange and 14" deep at the back of curb. See Figure No. 8.
- 3.8.2 The standard private street/driveway or parking lot cross-section shall conform to 3.8.1 as shown above or shall conform to minimum design standards in Figure No. 9. No asphalt curb and gutter shall be allowed.
- 3.8.3 Any cul-de-sacs that have an island (**See Figure 7A**) in the interior shall use a **mountable** curb and gutter system for the island. This **mountable** curb is **9"** at the face of curb and **12"** at the back of curb. **See Figure 7.**
- 3.8.4 All concrete curb construction shall conform to Section 601 of the **Wisconsin Department of Transportation (WDOT) Specifications.**
- 3.8.5 Concrete for curbs shall be grade A, air entrained and shall conform to Section 501 of the W.D.O.T. Specifications, and in particular, meet the following requirements: minimum concrete content, 6.0 **bags** per cubic yard; compressive strength after 28 days cured, 3,500 psi; size of course aggregate required, #1 plus #2; slump, 1"-3"; air content, 3.0%-7.0%. Curing membrane meeting for requirements for Type 2 of the W.D.O.T. specifications for liquid membrane performing compounds for curing concrete AASHTO designation M148 shall be used to cover all finished concrete. Fly ash as a mix additive may be used between April 15 and October 15 if approved in writing by the City Engineer.
- 3.8.6 The curb and gutter and aggregate base shall be constructed at the locations and grades as shown on the plans. All curb and gutter shall be placed on 5" crushed limestone base.
- 3.8.7 Transverse contraction joints for curbs shall be cut or sawed at maximum 10' intervals. One and one-half inch expansion joints shall be provided at ends of radii,

points of considerable change in grade and alignment, at intervals not to exceed 300' and where abutting existing curb and gutter.

- 3.8.8 Concrete curb and gutter shall cure a minimum of four days prior to backfilling and crushed stone base installation.
- 3.8.9 Four days after the curbs have been placed and the City has approved the concrete work, the contractor shall immediately backfill behind the curbs to preclude any erosion or undermining.
- 3.8.10 The City requires three test cylinders per 1,000 lineal feet to be taken during the course of the curb and gutter operations. The testing firm, who has been hired by the Developer, shall pick up the cylinders at the project site within 24 hours after notification, break the cylinders at the appropriate time and submit a test report to the City and the inspection firm. Paving will not be allowed until the test results are received.
- 3.8.11 The City requires an inspector be present for the placement of concrete curb and gutter. This includes the inspection of the base under the curb and gutter, and a check of the alignment and grade of the curb and gutter.
- 3.8.12 Curb and gutter and walk elevations will be considered acceptable if certified elevations are within 0.10 ft. of design elevations, not compromising the minimum 0.75% vertical slope.**
- 3.8.13 Where connection is made to existing curb, **rebars** are required as shown in Figure No. 8. All median islands shall have a snub-nosed front and rear. See Figure No. 25.
- 3.8.14 The City will require the presence of an inspector during string line setting.

3.9 CONCRETE DRIVEWAY APPROACH REQUIREMENTS

- 3.9.1 All driveway approaches, installation and repair pours require a permit issued by the City of Franklin.**
- 3.9.2 Concrete for approaches shall be grade A, air entrained and shall conform to Section 501 of the WDOT Specifications, and in particular, meet the following requirements: minimum concrete content, 6.0 bags per cubic yards; compressive strength after 28 days cured, 3,500 psi; maximum amount of water per bag of cement, 6.0 gallons; size of coarse aggregate required, #1 plus #2; slump, 1"-3"; air content, 4.5%-7.5%. White curing membrane meeting the requirements for Type 2 of the

WDOT specifications for liquid membrane performing compounds for curing concrete AASHTO designation M148 shall be used to cover all finished concrete. **The use of fiber mesh to these above specifications will be allowed.**

- 3.9.3 Drive approach and walk sections of the approach shall be a minimum of 7" thick. **The subgrade shall be thoroughly compacted to receive a minimum two (2) inches of ¾ TB to a proper elevation before the forms are set.**
- 3.9.4 One-half inch (1/2") x 7" expansion joint material full depth shall be placed between the curb and gutter and the approach or as directed by the City of Franklin Engineering staff.
- 3.9.5 Approach grades and configuration shall conform to these specifications as given in Figures No. 11, No. 12, No. 13 and No. 14.
- 3.9.6 It is required to remove and replace the entire existing curb and gutter section to provide an opening for the driveway approach installation. A driveway approach permit is required for curb and gutter removal and replacement and must be obtained from the Building Inspection Office prior to starting this work. Remaining undisturbed curb and gutter sections cannot be less than 5' in length.
- If abutting asphalt is disturbed it shall be removed to minimum of 24" wide the entire width of the approach and replaced in like and kind.**
- 3.9.7 New curb and gutter shall allow for 1/2" rise from the gutter to the beginning of the cut of the curb back. The ascending slope from that rise to the back of the curb shall be 1 inch.
- 3.9.8 New curb and gutter shall have an 18 inch down slope at each side of the driveway opening.
- 3.9.9 Existing curb expansion joints shall be a minimum of 6 inches from the down slope on each side of the driveway opening. Existing curb expansion joints will not be allowed in either down slope cut. An inspection is required prior to cutting, certifying proper location. See Figure No. 11.
- 3.9.10 A special driveway approach has been designed for commercial and industrial development by the City of Franklin Engineering Department. This detail is available through the Engineering Department.

3.10 CONCRETE WALK

- 3.10.1 Concrete walks shall be constructed **on a minimum two inch bed of ¾" traffic bond. The walk being** five feet wide and five inches thick and to the line and grade

shown on the plans unless otherwise specified. Concrete driveways shall be seven inches thick and shall be built to the width and location directed by the Engineer. Walk sections shall be 7" thick for the width of all pre-engineered driveway opening in the curb and gutter.

3.10.2 Concrete for walk shall be grade A, air entrained and shall conform to Section 501 of the WDOT Specifications, and in particular, meet the following requirements: minimum concrete content, 6.0 bags per cubic yard; maximum amount of water per bag of cement, 6.0 gallons; size of course aggregate required, #1 plus #2; slump, 1"-3"; air content, 4.5%-7.5%. Curing membrane meeting the requirements for Type 2 of the standard specifications for liquid membrane performing compounds for curing concrete AASHTO designation M148 shall be used to cover all finished concrete. Fly ash as a mix additive may be used between April 15 and October 15 if approved in writing by City Engineer.

3.10.3 The subgrade shall be thoroughly compacted **to receive a minimum two (2) inches of 3/4" traffic bond** to a proper elevation before the forms are set. Any soft or spongy subgrade material shall be removed and replaced with suitable granular material. Where the walk is to be poured adjacent to the curb, the backfill material behind the curb shall be compacted in a manner suitable to the Engineer.

3.10.4 The forms shall be an approved type of metal form extending the full depth of the concrete. The forms shall be set upon the prepared subgrade to proper line and grade and firmly staked in position. The slope across the walk shall be **3/16 inch (1.5%) meeting WISDOT ADA requirements** per foot unless otherwise directed or shown on the plans. Where walk is being installed on a radius of less than 250 feet, flexible forms shall be used. The fine grading shall then be completed and the subgrade thoroughly compacted by a power roller weighing not less than three tons. Areas which are inaccessible to the roller shall be compacted by using an approved mechanical vibratory compactor. The contact surfaces of the forms shall be clean and coated with oil. The Contractor must continually have, in advance of the concrete pour, at least two hundred (200) lineal feet of form setting and fine grading completed for inspection.

The forms and form pins shall not be loosened or removed for at least eight (8) hours after the concrete is poured.

3.10.5 Before placing concrete, the forms shall be checked for correct line and grade and the subgrade checked for correct height. The subgrade shall then be sprinkled with sufficient water to thoroughly dampen it, but not enough to form muddy areas. The concrete shall then be placed

to the proper height, consolidated and struck off flush with the top of the forms.

3.10.6 One-half inch non-extruding expansion joint material extending the full depth of adjacent concrete shall be installed at or near all street lines and all other locations as designated in the field. The expansion joint shall be held in place by the use of full depth plates firmly staked in place. The distance between expansion joints shall in no case exceed 75 feet. One-half inch X 5-inch expansion joint material shall also be furnished at all locations where the sidewalk abuts the curb, a building or other field obstruction.

3.10.7 After depositing the concrete, the surface of the walk shall be struck off at finished grade with an approved type of screed. A mechanical vibrator shall be attached to the screed if directed.

The surface shall then be worked with wood or metal floats until a thick, uniform mortar surface is obtained. A hand float operated in a circular motion shall be the final floating operation. Immediately after the water glaze or sheen has disappeared, the surface shall be troweled smooth by the use of a metal trowel. The second troweling shall be performed with a rectangular steel trowel operated by hand in a circular motion. The application of neat cement to the surface is prohibited.

The separator plates shall be removed and the edges of all slabs rounded with an edging tool having a one-quarter inch radius. After all troweling and edging is completed and the concrete has attained a partial set, the surface shall be brushed with a damp soft bristle brush.

The Contractor shall mark the ends of each portion of work with a stamp, showing contractors name and date of work. The Contractor shall protect the fresh concrete with a barricade at each end of the pour and at intervals of approximately two hundred (200) feet.

3.10.8 Curing of the concrete shall comply with the requirements of Chapter 10.

3.10.9 No concrete walk shall be installed on a frozen base.

3.10.10 The contractor may, with the approval of the Engineer, elect to use a machine for placing, forming, and consolidating concrete for concrete walk. If a machine is used, the resulting concrete walk shall be of such quality as to equal or exceed that produced by formed methods.

The concrete shall be deposited, consolidated, and slip formed to the required section and depth.

Contraction joints shall be formed by the use of steel separator plates. Construction joints shall be not less than 1/4 inch wide and one inch deep. Contraction joint spacing shall be 5 feet or as directed. Finished joints shall have 1/4 inch radius.

After floating, troweling, and jointing, the concrete shall be brushed with a damp bristle brush.