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 Specifications for the City of Franklin.

3.1 STANDARD CROSS-SECTIONS

3.1.1 All pavement widths for the standard residential section without curb, shall be 24.0' measured from edge of pavement to edge of pavement.

3.1.2 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 2.

3.1.3. All pavement widths for a standard residential cul-de-sac without curb shall have a 45.0' radius measured from edge of pavement.

3.1.4 All pavement widths for the standard residential cul-de-sac with curb shall have a 43.0' radius excluding the width of the curb. See Figures 2 and 3.

3.1.5 The centerline of ditch for the standard residential section without curb shall be located 22' from the centerline of the road.

3.1.6 The centerline of ditch around the standard residential cul-de-sac without curb shall be located 54' from the center of the cul-de-sac.

3.1.7 All pavement with curb and gutter shall have a cross slope crown slope of 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. A pavement with ditch sections shall have a minimum 1.00% centerline profile gradient.

3.1.8 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 ½ 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** six **(6)** inch**es** of **1 ½ inch** traffic bond **shall be placed followed by six inches of ¾ inch traffic bond to grade (sub-grade)**as approved in writing by the City Engineer.

3.2.6 All soft spots located **with a deflection greater than ½ 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 with 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 304.2.6 and new edition(s) gradation No. 1. The first 4" lift shall be of 1 1/2 to 3 inch traffic bond base compacted as a 4" lift. The final 4" shall be of 3/4 to 1 inch traffic bond compacted in two lifts. 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 EXISTING ASPHALT PAVEMENT

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 five (5) 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 304.5 of the Standard Specifications.

3.4.5 For a compacted depth of pulverized materials, up to 4 inches, compaction equipment shall be in accordance with section 304.4 of the Standard 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.

3.5 ASPHALT PAVEMENT

3.5.1 The City of Franklin has adopted the Wis. DOT and supplemental specification 4.3 mix design gradations using the HV or MV mixes for various types of anticipated traffic loadings. The total asphalt pavement for residential streets shall consist of four inches of binder course constructed in two lifts of two-inches each and two inches of surface course.

3.5.2 The E-1 mix design shall be used for collector and residential streets unless otherwise **specified**. A MV gradation #2 mix may be used for binder course and gradation #3 mix may be used for surface course each if approved by the City Engineer.

3.5.3 The E-3 mix design shall be used for all streets subject to heavy traffic and/or heavy trucking. An HV mix gradation may be used in business and industrial areas if **required** by the City Engineer.

3.5.4 The City requires that both the binder course and surface (top) course be compacted to not less than 9**1.5%** as determined by **field measurement through the use of an approved nuclear density machine**.

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 and surface courses. **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 0.10 gallon per square yard over the entire receiving surface.

3.5.9 The City may require a roller to be positioned ahead of the paver to recompact any ruts caused by the asphalt haul trucks.

3.5.10 The contractor responsible for asphalt paving is also responsible for notifying the City as per the notification policy of the City of Franklin.

3.5.11 All manhole rims and water valve boxes shall be left 1/4" below base course and final lift of asphalt surface.

3.5.12 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.

3.6 ROADWAY DRAINAGE SYSTEM (Applicable on a job-by-job 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 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 a 10 1/2" deep by 10" 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 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 12" 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 four feet (4:1) of run on road side and 3:1 for back slope.

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 located 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.

3.7 CONCRETE CURB AND GUTTER

3.7.1 The standard public street cross-section with curb and gutter shall utilize a 6" vertical face curb and gutter type that is 31" wide (7" top curb and 24" flange) and 9" deep at the flange and 14" deep at the back of curb. See Figure 8.

3.7.2 The standard private street/driveway or parking lot cross-section shall conform to 3.7.1 as shown above or shall conform to minimum design standards in Figure No. 9. No asphalt curb and gutter shall be allowed.

3.7.3 Any cul-de-sacs that have an island in the interior shall use a 6" vertical face curb and gutter system for the island. This vertical face curb is 6" at the face of curb and 14" at the back of curb. See concrete curb details for specific measurements.

3.7.4 All concrete curb construction shall conform to Section 601 of the State of Wisconsin Standard Specifications for Road and Bridge Construction.

3.7.5 Concrete for curbs shall be grade A, air entrained and shall conform to Section 501 of the State of Wisconsin Standard Specifications for Road and Bridge Construction, and in particular, meet the following requirements: minimum concrete content, 6.0 sacks 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 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 the City Engineer.

3.7.6 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.

3.7.7 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.

3.7.8 Concrete curb and gutter shall cure a minimum of four days prior to backfilling and crushed stone base installation.

3.7.9 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.

3.7.10 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**.

3.7.11 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.

3.7.12 Curb and gutter and walk elevations will be considered acceptable if certified elevations are within 0.10 ft. of design elevations.

3.7.13 Where connection is made to existing curb, dowels are required as shown in Figure 8. All median islands shall have a snub-nosed front and rear. See figure No.26.

3.7.14 The City will require the presence of an inspector during string line setting.

3.8 LATE SEASON ASPHALT PAVINGS CRITERIA

3.8.1 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.**

3.8.2 Asphalt binder course installation will be permitted if conditions indicated in 3.8.3, 3.8.4 and 3.8.5 can be met.

3.8.3 Asphalt **binder course installation** will not be permitted unless air temperature is 35° and rising at the start of paving operations.

3.8.4 Asphalt paving will not be permitted on wet stone bases or in the rain.

3.8.5 No asphalt pavement shall be constructed on a frozen base.

3.9 CONCRETE DRIVEWAY APPROACH REQUIREMENTS

3.9.1 All driveway approaches 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 State of Wisconsin Standard Specifications for Road and Bridge Construction, 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 course 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 standard specifications for liquid membrane performing compounds for curing concrete AASHTO designation M148 shall be used to cover all finished concrete.

3.9.3 Drive approach and walk sections of the approach shall be a minimum of 7" thick.

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 specifications as given in Figures No. 11, No. 12, No. 13 and No. 14.

3.9.6 It is the City's intent to allow the removal of the existing curb **head** section of the concrete curb and gutter to provide an opening to be used for the installation of the driveway approach. A driveway approach permit is required for curb **head** removal and must be obtained from the Building Inspection Office prior to starting this work. **Complete removal and replacement of curb sections for drive approach openings is also allowed, but remaining undisturbed sections cannot be less than 5' in length.**

3.9.7 The curb cut 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 Existing curb shall be cut with 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 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 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 State of Wisconsin Standard Specifications for Road and Bridge Construction, 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 within two inches of proper elevation before the forms are set. Any soft or spongy subgrade material shall be removed and replaced with suitable filling 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.

3.10.4.1 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 1/4 inch 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.