CHAPTER 8

Roadway Standards

A. Introduction

This chapter outlines the standards for all pavements and other roadway improvements, such as curb and gutter improvements, sidewalks, and driveway approaches within public or private developments. All roads shall be public unless written authorization is granted by the City Engineer. Private roads will meet all the same standards as public roads.

The City of Manitowoc constructs and accepts only concrete streets. Exceptions are very rare.

B. Design Requirements

1. All engineering plans and calculations shall be designed, prepared, stamped, and signed by a qualified, professional, and registered engineer in the State of Wisconsin.

2. The design engineer shall prepare a design in accordance with one or more of the following documents as they apply:

    a. Engineering Design Manual

    b. State Specifications

    c. Facilities Development Manual

    d. AASHTO book

    e. Standard Specifications

3. Acceleration and deceleration lanes shall be included in the geometric design of any development accessing other than a local street or cul-de-sac. Parking lanes can function as acceleration and deceleration lanes with the approval of the City Engineer.

4. Pavement Thickness Design

    a. Engineering design for new pavements must be rigid.

    b. The pavement structure thickness is shown on in Table 8-A.

TABLE 8-A

MINIMUM PAVEMENT STRUCTURE THICKNESS

	Concrete Thickness	Crushed Aggregate Base for Concrete	6″ Breaker Run
Residential	7"	8"	8"
Collector & Commercial	8″	8″	8″
Industrial & Arterial	9″	8″	8″

5. The radius between any intersecting streets shall be a minimum of 20', and greater if the traffic, geometrics, or design speed dictate.

TABLE 8-B

TYPICAL ROADWAY CROSS SECTION SPECIFICATIONS

Class	ROW Width	Street Width (face to face)	Design Speed	Min. Horz. Curve Radius
Arterial	100′	48′	As Requested	500′
Collector	80'	42'	40 MPH	300'
Local	66'	36'	30 MPH	100'
Cul de Sac	60′	32′	30 MPH	100′

6. Tables 8-A and 8-B provide minimum ROW widths and minimum design standards for different street classifications.

7. Developers are responsible for construction of the roadway base but not the concrete pavement. Typically, the street is paved three years after street acceptance.

8. The City Engineer may require additional roadway or ROW widths if the traffic use or geometric considerations warrant.

9. All driving and parking lanes shall have a cross slope of 2% and auxiliary lanes shall be a minimum of 2% and a maximum of 4%.

10. All geotextile fabric used shall conform to the State Specifications and shall be of one of the following types:

Type SAS	- subgrade, aggregate, separation
Type MS	- marsh stabilization
Type DF	- drainage fabric
Type SR	- subgrade reinforcement
Type R	- rip-rap
Type HR	- heavy rip-rap
Type C	- culverts

11. All crossroad culverts, storm sewer, or conduits shall have a minimum cover of 1' from the top of pipe to the subgrade.

12. End walls, flared end sections, or junction structures are required at all crossroad culverts or piped installations between home sites.

13. Stone rip-rap and geotextile fabric may be required at piped out falls to achieve acceptable velocity and prevent erosion.

14. Stone rip-rap shall be 6" minimum particle size placed in a layer twice the thickness of the largest particle. Under high velocity and/or flow conditions a minimum 12″ particle size may be required (velocity > 8ft/s).

15. Ditch requirements (See Chapter 5 - Storm Sewer)

16. Rigid Pavement

    a. Allowable materials for rigid pavement design are limited to those approved by the Wisconsin Department of Transportation. Specific bags of cement to cubic yard of concrete and admixture details shall be in the contract documents or shall be submitted by the developer to the City Engineer for approval.

    b. Portland cement concrete shall be designed for a minimum 28-day compressive strength of 3,500 PSI.

    c. Concrete material air entrainment shall be between 5% and 7%.

    d. The allowable slump of concrete materials shall range between 2" and 3".

    e. Concrete pavement design shall be based on the minimum thickness as specified in the tables contained in this manual.

    f. In no case shall concrete thickness be less than 7".

    g. No accelerators may be used. High-early will be achieved through extra cement.

19. Residential Driveways and Approaches

a. All residential building driveway approaches shall be constructed with 6" of portland cement (6 bag mix), over 2" of compacted aggregate base course materials.

b. Only one standard trapezoidal driveway will be allowed. The driveway shall be concrete thru the "sidewalk, section 8" from the property line.

c. Residential driveway width shall be between 10' and 25' measured at the ROW. Duplexes with two sets of adjacent two car garages may place up to a 35' wide driveway.

b. The maximum gradient for residential driveways is 10%.

c. The maximum driveway approach slope or that area between the sidewalk and the back of curb shall not exceed 12%. Driveways in excess of 12% shall be engineered to assure proper vehicle clearance and may require depressed design.

d. There shall be a 3-foot taper on either side of the driveway for a net opening of six feet wider than the above maximum (5 feet for industrial and heavy commercial).

20. Industrial and Commercial Driveway Approaches

a. The portion of the driveway between the property line and back of curb or pavement edge shall be constructed to a minimum of ~~7"~~ 8" concrete pavement (6-bag mix); over 6" of compacted aggregate base course materials.

b. The width of commercial and industrial driveways shall be between 24' and 35' measured at the ROW.

c. The maximum gradient for commercial and industrial driveways, excluding truck wells is 6%.

d. The maximum driveway approach slope or that area between the sidewalk and the back of curb shall not exceed 12%. Driveways in excess of 12% shall be engineered to assure proper vehicle clearance and may require depressed design.

e. Only standard trapezoidal driveways will be allowed. The driveway shall be concrete thru the "sidewalk, section 8" from the property line.

f. Exceptions to the above can only be granted by the Director of Public Works or the Board of Public Works, depending upon the item.

(Note: All Driveway approaches and access points require permitting by the City. County and State Permit may also be required. It is the developer's responsibility to investigate driveway matters early. In some cases, access requests will not be granted as desired).

21. Horizontal and Vertical Alignment

    a. The design of all horizontal and vertical curves shall conform to the requirements of both the FDM and AASHTO.

    b. The maximum gradient on local streets shall not exceed 8% and 6% for all other streets unless approved, in writing, by the City Engineer.

    c. The minimum gradient on any street shall not be less than 0.50%. This slope will be allowed on rural sections provided the ditch section is at 1%.

    d. If the overall grade differential between two tangent profiles is less than 0.8%, a vertical curve shall not be required.

    e. Should the engineering design of a public or private street require a vertical curve, the length of a vertical curve shall be based on the FDM, with a 100' minimum.

    f. At least 100' tangent shall be introduced between reverse curves.

    g. Grade breaks shall not be used instead of vertical curves.

    h. A 50' "stopping zone" shall be placed at all intersection approaches and shall be less than 2.5% in profile to allow for winter conditions.

22. Sight Distances

    a. Public and private street design shall include safe stopping distances as determined by AASHTO and the FDM.

    b. Minimum sight distance at the points of intersection of roadways shall be as indicated by AASHTO and the FDM.

23. Curb and Gutter

    a. All curb and combination curb and gutter shall be constructed of concrete.

    b. Curb and gutter shall be 30" overall width. In new construction, integral curb shall be constructed.

c. Epoxy-coated tie bars shall be used when curb and gutter are placed adjacent to concrete pavement. The spacing and size are shown on the standard details.

d. Concrete for curb and gutter shall conform to the concrete pavement requirements.

e. Vertical face curb shall be used on all public and private streets.

f. Mountable curb may not be used without authorization of the City Engineer. Authorization will be rare and typically be given only to private roads.

g. All curb returns at street intersections shall have a minimum radius of 20' to the face of curb.

h. In industrial and commercial areas, the radius and curb returns shall be a minimum of 25' and shall be increased to 50' at the intersections of collector and arterial streets, or as required by the City Engineer.

i. Depressed curbs (zero face) are required for all driveway locations crossing a curb and at the intersections with public or private sidewalks.

j. Should the curb and gutter improvements be completed without depressed curb before the installation of the driveway approach, the curb and gutter shall be removed and replaced with depressed curb and gutter. The replaced portion shall be tied in with epoxy coated rebars.

k. A curb ramp shall be installed at all intersections, existing or proposed, where sidewalk is to be installed. All curb ramps shall be center of radius type (see detail drawing in Appendix A) and constructed according to the Standard Specifications.

24. Sidewalks

a. Concrete sidewalks shall be 4" thick and placed on a compacted 2" minimum bed of aggregate base course.

b. Public sidewalks on all local streets shall be a minimum of 4'0" in width. On collector and arterial streets, sidewalks should be 5′ 4″ in width. The Engineer will grant approval for 6′ wide walk in certain cases to facilitate plowing vehicles.

c. The portion of sidewalk through a driveway shall be the same thickness of concrete and aggregate as specified for the driveway approach (minimum 6" concrete and 4" base course).

d. Sidewalk concrete shall comply with the concrete pavement requirements.

25. Cul-de-sacs and Dead End Streets

a. A 60' minimum radius to ROW temporary cul-de-sac shall be installed for each dead end street in excess of 200' measured from the ROW of origin to the end of its ROW.

b. Permanent cul-de-sac streets shall not be more than 500', measured along their centerlines from the street of origin to the ends of their ROW.

c. Each cul-de-sac street shall have a terminus constructed according to the standard details.

d. The standard cul-de-sac design shall be a 45 feet radius from the centerpoint to the face of the curb, unless approved otherwise by the Engineer.

C. Construction Requirements

1. All exposed concrete work, including sidewalks and curbs, must have an anti-spalling curing compound applied in accordance with the State Specifications.

2. All underground utility main line and crossings under the road shall be installed and approved before placing the base courses.

3. All permanent paving and curb and gutter in public ROW's shall be the responsibility of the City of Manitowoc unless other arrangements are made prior to plan approvals.

4. Before the crushed aggregate base course installation, the subgrade shall be proof-rolled in the presence of a City inspector with a tri-axle dump truck loaded with 20 tons of stone. Subgrade deflections greater than 1" may warrant undercutting or other base stabilization techniques. The responsibility and cost of special measures is the developers.

5. All soft spots, located as a result of the proof-roll, shall be undercut and backfilled with material approved by the City Engineer.

6. The base course for concrete streets shall be constructed to a final grade two inches above plan grade.

7. Traffic control and road closures shall not be removed until after acceptance of the street by the City Engineer.