Chapter 8
Street Design and Pavement Thickness

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8.1 General

8.1.1 This chapter sets forth the design and technical criteria to be used in the preparation of all roadway plans. Where design information is not provided herein, *"A Policy on Geometric Design of Highways and Streets"* (AASHTO Standards) as published by AASHTO's most current edition (English units) shall be used.

8.2 Access Management

8.2.1 Access

8.2.1.1 Access Defined. Access is defined as any connection, driveway, street, turnout, or other means of providing for the movement of vehicles to or from the public roadway system. Access is further defined as any full movement access, right in right out movement, or partial movement access.

Access Management is defined by the Transportation Research Board National Access Management Manual as the systematic control of the location, spacing, design, and operation of driveways, median openings, interchanges, and street connections to a roadway. It also involves the roadway design applications, such as median treatments and auxiliary lanes and the appropriate spacing of traffic signals. The purpose of access management is to provide vehicular access to land development in a manner that preserves the safety and efficiency of the transportation system. The contemporary practice of access management extends to concept of access design and location control to all roadways, not just limited access highways, streets, or interstates.

Access management principals and history can be reviewed in the Access Management Manual published by the Transportation Research Board. The City of Huron implements access management principals. Using access management techniques can reduce the crash rate on a roadway section roughly in half while keeping the traffic flowing.

The Office of the City Engineer may initiate an access management plan or corridor study that would supercede the design standards for access along an arterial or major collector street. Preparation of the study shall be the responsibility of the City of Huron, South Dakota Department of Transportation, and/or private individuals, or jointly prepared. However, the study must be prepared by a licensed design professional engineer with experience in transportation planning. The access plan or corridor study

shall be approved by the Office of the City Engineer and/or South Dakota Department of Transportation.

Access planning that has not been identified in any type of study in existing development areas will be considered on a case by case basis. Retrofit techniques will adhere to best access management practices as identified in the Transportation Research Board National Access Management Manual.

8.2.1.2 Access Permit. All access to arterial street public right-of-way (ROW) will be required to be permitted and approved by the City Engineer. An Access Permit is defined as a permit issued by a governmental agency for the construction, maintenance, and use of a driveway or public street that connects to a roadway. Access locations shall all be measured from the center line of ROW to centerline of ROW or driveway.

The City Engineer's Office will permit and approve the standard ¼ mile street locations along all arterial corridors. This permit will be referred to as the Administrative Access Permit. The City will facilitate coordination with all affected landowners before the access permit is approved for the ¼ mile locations. There will be no fee for this access permit.

The Development Access Permit is a non-standard access permit that will be completed by the property owner with a supporting map documenting the requested location of each direct or indirect access to arterial functional classification public ROW. For a non-standard access location that is approved, there will be an access fee as described in ordinance.

All types of Access permits will be reviewed based on access category criteria, dimensions from centerline of the ROW from adjacent streets, traffic analysis conducted by City staff, surrounding access points and any other information relevant to the operation of the access point. The Access Permit shall conform to the requirements listed in ordinance.

8.2.1.3. Access Category. Access category is defined as a classification system for regulating access that is used to assign a set of access management standards to roadways or roadway segments. The City has two categories of arterial streets with access standardsand the official access category map is on file at the City Engineer's Office.

Principal Arterial - Routes which provide continuity across and are spaced approximately 3 miles from the next parallel Arterial I classification. These routes primarily serve high commercial and commuter need.

Full movement access is generally allowed at the 1/4 mile locations. Traffic signal spacing will be 1/4 mile distance apart. Other types of access movements will be evaluated with a traffic analysis conducted by City Engineering.

Hwy37 and Hwy14 are under the jurisdiction of the SDDOT and any additional access points will be permitted through the SDDOT.

Minor Arterials with Control of Access - Routes that typically have continuity across the city. These routes serve a mixture of commercial and residential need.

West Park Ave (South of Hwy 37) and **21st St** (West Park Ave to Lincoln Ave.) have control of access. While designated as a Minor Arterial in the SDDOT functional classification map, it acts as a Principal Arterial in respect to access.

Full movement access is generally allowed at the 1/4 mile locations. Traffic signal spacing will be 1/4 mile distance apart. Other types of access movements will be evaluated with a traffic analysis conducted by City Engineering.

8.2.2 Spacing of Direct and Indirect Access, Angle of Intersection, and Offsets.

8.2.2.1 Spacing. For collectors and local streets in a subdivision, four-legged intersections will normally be spaced at least 300 feet apart.

8.2.2.2 Angle of Intersection. Proposed streets and driveways must intersect one another at 90° angles or as close to 90° as topography permits (no less than 80°).

8.2.2.3 Offsets. When “T” intersections are used, the center lines of the streets not in alignment must normally be offset a minimum of 125 feet on local streets, and 300 feet on nonresidential local, and collector streets.

8.2.3 Functional Street Classification.

8.2.3.1 Major Street Plan. The right-of-way requirements are noted in Section 24.20.020 in the Subdivision Ordinance of the Huron Municipal Code. The functional classification is a system used to group public roadways into classes according to their purpose in moving vehicles and providing access to the public.

8.2.3.2 Regional Arterial or Expressway. A regional arterial street or expressway is a general term denoting a roadway designed or operating with the following characteristics:

A. Defined as a roadway designed for relatively uninterrupted, high volume mobility between areas, access to which is limited, may include a mixture of intersections (at grade) and interchanges (grade-separated).

B. Posted speed limits of greater than or equal to 45 miles per hour.

C. Anticipated traffic volumes in excess of 25,000 vehicles per day within the corridor. This arterial is designed to carry regional traffic.

D. Direct intersections, with local streets and access from adjacent properties, shall not be allowed except on existing lots with no other method of access.

E. The indirect access intersections will be with arterials or major collectors and will normally be spaced at 1-mile intervals and may be at one-half mile intervals for commercial areas.

F. Traffic control devices may be provided to enhance through traffic movements.

G. No on-street parking will be allowed.

H. Detached bicycle and/or pedestrian facilities shall normally be constructed.

I. Right-of-way is typically 200 feet in width.

8.2.3.3 Principal Arterial. A principal arterial street is a general term denoting a roadway designed or operating with the following characteristics:

A. Defined as a primary roadway intended to serve regional traffic, where access is carefully controlled; generally roadways of regional

importance, intended to serve high volumes of traffic traveling relatively long distances and at higher speeds.

B. Anticipated traffic volumes in excess of 15,000 vehicles per day within the corridor. Posted speed limits of greater than or equal to 40 miles per hour.

C. Designed to accommodate through traffic, intersecting with Minor Arterial and Collector Streets only. Intersections with local streets and access from adjacent properties shall not be allowed except for existing lots with no other method of access. The number of intersections will normally not be spaced less than one-half mile. ("T" intersections will be considered an intersection for half-mile spacing purposes.)

D. Continuous for several miles through the urban area and are typically on section line right-of-ways. Right-of-way is 100 feet in width.

E. Provides continuity for rural arterials which intercept the urban boundary.

F. Traffic control devices provided to enhance through traffic primarily by signal control and/or limited access. Right turn lane and/or acceleration/deceleration lanes should be considered at the arterial/collector street intersections.

G. No on-street parking will be allowed.

H. Principal Arterials:
Highway 37
Highway 14

8.2.3.4 Minor Arterial. A minor arterial street is a general term denoting a roadway designed or operating with the following characteristics:

A. Defined as a major roadway intended primarily to serve through traffic, where access is carefully controlled; generally roadways of community importance, intended to serve moderate to high volumes of traffic traveling relatively long distances and at high speeds.

B. Anticipated traffic volumes in excess of 10,000 vehicles per day within the corridor. Posted speed limit of greater than or equal to 35 miles per hour.

C. Designed to accommodate through traffic and serve adjacent major developments. Intersections with local streets will not be allowed. Development access will use shared driveways and be encouraged to utilize collector streets. The number of intersections will normally not

be spaced less than one-quarter mile. ("T" intersections will be considered an intersection for spacing purposes.)

D. Continuous for several miles and are typically on section line right-of-ways. Right-of-way is typically 80 feet in width.

E. Provides continuity for rural arterials which intercept the urban boundary.

F. Traffic control devices provided to enhance through traffic primarily by signal control. Right turn lanes and/or acceleration/deceleration lanes should be considered at the collector street intersections or high traffic generators.

G. No on-street parking will be allowed.

H. Minor Arterials:

West Park Ave (Hwy 14 to 21st St. SW)
21st St (West Park Ave to the James River)
Lincoln Ave (7th St NW to 21st St SW)

8.2.3.5 Major Collector. A major collector street is a general term denoting a roadway designed or operating with the following characteristics:

A. Defined as roadways intended to serve moderate volumes of traffic from local roads to arterials

B. Anticipated traffic volume generally greater than 5,000 vehicles per day. Posted speed limit of greater than or equal to 30 miles per hour.

C. Continuous for two or more miles and typically, but not limited to, located on the 1/2 mile location of a section. Right-of-way is 80 feet. A traffic impact study may determine if there is extra width required to handle a development's traffic.

D. Designed to handle traffic volumes loading from and onto local, other collector, and arterial roadways.

E. Traffic control is provided generally by signs.

F. On-street parking may be allowed.

G. Access locations will not be allowed within 300 feet from the intersection with an arterial street.

H. Generally, serves predominantly multi-family residential, commercial, and/or industrial uses.

I. Major collectors could transition into minor collectors if approved by the City Engineer.

J. Major Collectors:

Old Hwy 14 (West Park Ave. to Lincoln Ave.)
Market St (Lincoln Ave. to Frank Ave.)
3rd St (Lincoln Ave to Jersey Ave)

8.2.3.6 Minor Collector. A minor collector street is a general term denoting a roadway designed or operating with the following characteristics:

A. Defined as roadways intended to move traffic from local roads to arterials.

B. Anticipated traffic volume generally less than 5,000 vehicles per day. Posted speed limits of greater than or equal to 25 miles per hour.

C. Continuous for less than two miles and should be designed to not promote through traffic in residential areas and generally located on the 1/4 and 3/4 points along a section line.

D. Designed to handle traffic volumes loading from and onto local, other collector, and arterial roadways.

E. Generally, adjacent land use is predominantly residential.

F. On-street parking may be permitted.

G. Right-of-way width is 66 feet. When minor collectors intersect with arterials, the right-of-way is required to be 80 feet within a minimum of 300 feet of the centerline of the arterial street right-of-way.

H. Traffic control is by signage or rules for uncontrolled intersections.

I. Minor Collectors:

9th St
14th St SW (McDonald Ave. to Dakota Ave.)
15th St SW (Lincoln Ave. to McDonald Ave.)
McDonald Ave (15th St to 14th St)
15th St SE (Dakota Ave. to Riverview Dr.)
18th St S. (Lincoln Ave to Riverview Dr.)
Arizona Ave. (9th St. to 21st St.)
Idaho Ave. (Market St. to 21st St.)
Frank Ave. (3rd St to 21st St)
Jersey Ave.

8.2.3.7 Local Street. A local street is a general term denoting a roadway designed or operating with the following characteristics:

A. Posted speed limit not in excess of 25 miles per hour.

B. No criteria for traffic volumes.

C. Limited continuity.

D. Designed for ease of access to adjacent developments.

E. Traffic control is by signage or rules for uncontrolled intersections.

F. On-street parking permitted.

G. Right-of-way is 66 feet.

8.3 Roadway Design and Technical Criteria

The highway design speed shall be used to establish features such as superelevation rate, critical length of grade, vertical and horizontal curves, intersections, etc. See Table 8.1 for design standards for each of these street classifications.

8.3.1 Traffic Lane Widths.

8.3.1.1 The minimum traffic lane width shall be 11 feet. For arterial streets and streets with anticipated truck traffic count in excess of 3 percent of the total traffic count, the lane width shall be 12 feet.

8.3.1.2 In the design of local streets, the number of lanes for moving traffic will be a secondary consideration.

Table 8.1

Minimum Street Design Criteria

	Local			Collector		Arterial	
Design Elements	Residential Cul-de-sac*	Single Family	Commercial, Industrial, Multifamily	Minor	Major	Minor	Regional or Principal
24-hour Volumes (vpd)	500 or less	2000 or less	2500 or less	<5000	>5000	10,000	15,000
Design Speed (mph)	—	—	—	25	30	35	50
Driving Lanes	—	—	2	2	2-4	4	4 or more
Right-of-Way (ft.)	66 *100	66	66	66	80	80 +	100 +
Roadway Width (ft.) (1)	31-37 *80	37	37	37	41 or 49	41-53	65 or more
Lane Width (ft.)	—	—	11	11	11	12	12
Sidewalk (2)	4’ detached	4’ detached	5’ detached	5’ detached		5’ detached	
Curb & Gutter	6” vertical	6” vertical	6” vertical	6” vertical		6” vertical	
Min.-Max. Grade (%)	0.1-8.0	0.1-8.0	0.1-8.0	0.1-7.0		0.5-6.0	
Curb Return Radii (ft.)							
- intersect local	15	15	15	20		--	
- intersect collector	20	20	20	25		30	
- intersect arterial				30		35	
Horizontal Curve Radius (ft.)	150	150	300	—		AASHTO Standards	
Vertical Alignment Control	- - - - - - - - - - - - - - - - - AASHTO Standards -						

(1) All dimensions are measured to back of curb.
(2) Where sidewalk is attached to curb, sidewalk shall be one foot wider.
* Nonresidential cul-de-sac dimensions will differ.

8.3.2 Separate Turning Lanes.

8.3.2.1 Separate turning lanes may be constructed on arterial and collector streets but will, as a rule, not be found on local streets.

8.3.2.2 Where separate turning lanes are constructed on the basis of a capacity analysis at the intersection, a width of 12 feet will be used for arterial streets where truck traffic is involved and 11 feet in width for other streets.

8.3.2.3 A directional median or ¾ turn or partial opening is allowed in a median section and allows for right in, right out, and left in and/or u-turn movements. The left out movement is prohibited. This directional median opening improves safety at intersections and has been proven to reduce crash rates.

8.3.3 Parking.

8.3.3.1 Parking lanes will not be allowed on arterial streets. Parking lanes may not be allowed on major collector streets.

8.3.3.2 No diagonal or perpendicular parking will be allowed on any City street.

8.3.3.3 Where on-street parking is provided on collector streets, the parallel lane width shall be a minimum of eight (8) feet, which would include the gutter pan.

8.3.4 Medians.

8.3.4.1 A median is a physical barrier that separates traffic traveling in opposite directions. Medians should be constructed on arterial streets with four or six lanes of through travel. Medians should be constructed at arterial to arterial intersections to provide for more capacity, safety, and improve the operations of the roadway.

Median openings are normally designated at collector street intersections. These intersections are normally at each quarter mile location intersecting the arterial street. These openings may be full movement intersections that provide both left in and left out maneuvers. These openings also may be controlled by a traffic signal.

8.3.4.2 Full median breaks shall not be allowed closer than 1,000 feet from an arterial to arterial intersection, unless an approved exception by the City Engineer.

8.3.4.3 The median width to accommodate a left turn lane is typically 16 feet. The minimum width of a median may be 4 feet back of curb to back of curb.

8.3.4.4 Medians and boulevards are not typically desired on local streets. However, when permitted, the median or boulevard shall conform to the same design standards as set forth for arterial streets.

8.3.4.5 Median design may include an irrigation system and landscaping plan to enhance the street corridor. A median landscape design plan shall be approved by the City Engineer. The plan shall include type of groundcover, trees, low shrubbery, and or other vegetation which will be approved by the City Engineer. If the median width is less than 6 feet wide, other treatments may be explored, for example colored and/or stamped concrete, concrete pavers. Asphalt is not considered an acceptable paving material for medians. The slopes across a median should be at a minimum 1% from back of curb to the middle of the median to allow for proper drainage off of the median.

8.3.4.6 U turns at arterial and collector street intersections may be considered and approved if acceptable right-of-way width is acquired and/or dedicated. U turns will be allowed at traffic signalized and un-signalized intersections where it is signed appropriately.

8.3.4.7 Splash guards may be designed in the median. The minimum splash guard width shall be 18 inches.

8.3.5 Roundabouts. Roundabouts are considered a form of traffic control. Roundabouts shall be considered as two types: (a) modern roundabouts and (b) mini-roundabouts.

Purpose. The roundabout is a traffic control device in lieu of a multi-way stop or a traffic signal. Roundabouts may assist in improving the performance of intersections that have the following characteristics:

a. High number of crashes

b. High delays

c. 4 legs or more or usual geometry

d. Frequent U-turns

e. High left-turn movements

8.3.5.1 Modern Roundabouts. Modern roundabouts shall be specially designed to the need on high traffic volume streets and used to improve traffic flow.

1. Design Basis. The design shall be in accordance with the *Federal Highway Administration (FHWA), Roundabouts: an Informational Guide, Publication No. FHWA-RD-00-067*, or other design criteria approved by the City Engineer.

2. Design Vehicle. Modern roundabouts shall be designed to accommodate Wheel Base (WB)-67 trucks.

3. Roadway Width. The circulatory roadway width shall be a minimum of 1.2 times the width of the widest entering roadway. This width may include the apron when approved by the City Engineer. Truck aprons with a minimum width of 8 feet shall be provided on the perimeter of the central island.

   Each roadway section shall be analyzed to conditions that are available to that particular intersection. Such items as available Right- of-Way (ROW), special or existing features, and number of lanes and roadway width entering the intersection shall be a consideration in determining the width of the roundabout roadway.

4. Design Entry Speed. Maximum design entry speed for urban roundabout shall not exceed 25 mph. Maximum design entry speed for rural roundabout shall not exceed 30 mph.

5. All modern roundabouts landscaping plans need to be approved by the City Engineer.

8.3.5.2 Mini-Roundabouts. Mini-roundabouts may be allowed in a neighborhood setting to improve intersection characteristics. Mini-roundabouts may be designed in conditions where a maximum of 1 lane may be entering per approach. The center median of a mini-roundabout may be designed so that the median may be mountable in some cases.

1. Design Basis. The design shall be performed in accordance with the *FHWA, Roundabouts: an Informational Guide, Publication No. FHWA-RD-00-067*, or other design criteria approved by the City Engineer. Each design shall have a peer review.

2. Design Vehicle. Mini roundabouts shall be designed to accommodate WB-50 vehicles. Consideration to emergency vehicles must also be explored with the City during design.

3. Roadway Width. Each roadway section shall be analyzed to conditions that are available to that particular intersection. Such items as available right-of-way, special or existing features, and roadway width entering the intersection shall be a consideration in determining the width of the mini-roundabout.

4. All mini-roundabouts landscaping plans need to be approved by the City Engineer.

8.3.6 Traffic Calming. Traffic calming is the process by which vehicular speeds and volumes on local streets are reduced to acceptable levels. This is achieved through the installation of approved devices such as traffic circles, flares, and center islands. Traffic calming serves the purpose of reducing cut-through traffic, truck traffic, excessive speeding, noise, vibration, air pollution, and accidents in an attempt to provide a safer environment for motorists and pedestrians.

Traffic calming devices may be installed if the traffic volume exceeds, or is projected to exceed, 1,000 vehicles per day; and if the 85th percentile speed of traffic exceeds, or is reasonably expected to exceed, 30 mph.

Traffic calming devices shall be designed to accommodate emergency vehicles that may use the local street. All final construction plans are to be approved by the City Engineer.

Landscaping agreements for the continued care of vegetation within traffic circles and center islands shall be considered with adjacent property owners and determined on a case by case basis.

8.3.6.1 Flares. A flare is a roadway narrowing option used to achieve speed reductions. Flares are usually coupled with sidewalks and serve to make streets more pedestrian friendly by reducing the amount of roadway the pedestrian is exposed to. They also draw motorists' attention to pedestrians via the raised peninsulas.

1. Street Characteristics: Flares may be installed on streets that have on-street parking. Flares can be located at street intersections or mid-block.

2. Pedestrian Generators: Flares should be considered on streets adjacent to pedestrian generators such as schools, parks, and bike paths.

3. Width of Flares: Flares shall be constructed so that driving lanes are no less than 10 feet wide.

8.3.6.2 Center Islands. Center Islands are raised islands located at the centerline of a street that narrows the travel lanes at that location. When used in conjunction with sidewalks, center islands can provide a refuge area for pedestrians to wait while traffic passes. Center islands can be located near intersections or mid-block.

1. Street Characteristics: Center islands may be used downstream of intersections to reduce the speed of turning vehicles. Center islands

may also be used on curves to reduce vehicle speeds and prevent motorists from driving into the path of oncoming vehicles.

2. Length of Center Islands: Center islands should be constructed in short interruptions rather than as a long median that channelizes and separates opposing flows. Island lengths shall be between 25 feet and 75 feet.

3. Width of Center Islands: Center islands shall be constructed such that the driving lane, excluding drainage gutter, is limited to 11 feet in each direction.

4. Pedestrian Characteristics: Center Islands may be required to accommodate pedestrians.

8.4 Sidewalks

8.4.1 General Standards and Location. Sidewalks shall be constructed on both sides of all roadways unless specifically waived by the City Engineer. Any sidewalk design standard listed in this section that is unable to be met is required to be waived by the City Engineer. Generally, the sidewalks shall be located one (1) foot from the property line within the street right-of-way.

8.4.2 Sidewalk Curb Ramps. State law requires that curb ramps be installed at all intersections and at certain mid-block locations for all new construction or reconstruction of curb and sidewalk. Curb ramps shall be constructed in accordance with the City of Huron Standard Plates. Curb ramps may be shown at all curb returns or called out by a general note on the development plans, but must be shown (located) at all “T” intersections. Whenever referencing a curb ramp, specify the City of Huron Standard Plates to be used to construct that ramp.

8.4.3 Sidewalk Curb Ramp Landing. The minimum dimensions for a landing shall be 48” by 48”. A landing shall not have a grade exceeding 2% in any direction. If a landing is at a signalized intersection and has pedestrian push buttons the horizontal distance between the edge of the landing and the push button location shall not exceed 10”.

8.4.4 Sidewalk Width. Minimum sidewalk width shall be as shown in table 8.1. In areas where high pedestrian traffic is anticipated by the City Engineer’s Office it may be necessary to install wider sidewalks to allow for an adequate level of service.

8.4.5 Sidewalk Cross Slopes. The maximum cross slope for a sidewalk is 2%. This includes where sidewalks cross driveways. The minimum cross slope is 1%.

8.4.6 Sidewalk Grade. All grades on a sidewalk shall meet the current Americans with Disabilities Act standards.

8.4.7 Sidewalk Vertical Clearance. Sidewalks which go under a roadway or structure shall have a minimum clearance of 8’ from the top of the sidewalk to the lowest part of the structure.

8.5 Bicycle Paths

8.5.1 General. The current AASHTO *Guide for the Development of Bicycle Facilities* shall be used as a design guide for the design of bicycle paths. A bicycle path, also referred to as a shared use path, is defined as a bikeway physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right-of-way or within an independent right-of-way. Bike paths may also be used by pedestrians, skaters, wheelchair users, runners, and other non-motorized users.

8.5.2 Bicycle Path Width. A bicycle path should have a preferred minimum of an 8’-wide area of travel. Under special circumstances the City Engineer may allow a narrower path.

8.5.3 Bicycle Path Shoulder. A bicycle path may have shoulders on both sides, with a minimum 24” width.

8.5.4 Bicycle Path Cross Slopes. The maximum cross slope for a bicycle path is 2%. The minimum cross slope is 1%.

8.5.5 Bicycle Path Grade. All grades on a bicycle path shall meet the current Americans with Disabilities Act standards.

8.5.6 Bicycle Path Vertical Clearance. Bicycle paths which go under a roadway or structure shall have a minimum clearance of 8’ from the top of the path to the lowest part of the structure.

8.5.7 Bicycle Path Horizontal Clearance. Bicycle paths which pass through tunnels shall have at least an 8’ horizontal clearance from wall to wall. The entrances and exits to tunnel sections shall be as visually free of trees, shrubs, and other obstructions to facilitate a wide field of view when exiting tunnels.

8.5.8 Bicycle Path Tunnel Lighting. Tunnel sections shall be lit according to current AASHTO lighting guidelines. It is recommended that the ceilings in the tunnel are painted white.

8.5.9 Bicycle Path Surfacing. As directed by the City Engineer.

8.5.10 Paved Bicycle Path Surface. A paved bicycle path shall have an accessible vibration free route that is at least 48” wide. The number of surface variations such as junction boxes, grates, decorative pavers, etc. in the accessible vibration free route shall be minimized. If grates are present the openings should run perpendicular to the traveled way, with less than a 1/2”

opening with the traveled way. In tunnel sections a non-slip surface shall be utilized such as brushed concrete or a rubberized surface.

8.6 Drainage

Drainage systems shall be designed in accordance with Chapter 11—Drainage Improvements. Development plans, including the drainage report, shall be considered as part of the street design and will be required for concurrent review with the street construction plans. Safe conveyance of traffic is the major function of streets; the storm drainage function of the street must therefore be designed to the limits set forth in Chapter 11—Drainage Improvements.

8.6.1 Valley Gutters. Valley gutters shall be constructed in accordance with the City of Huron Standard Plates. Valley gutters are not permitted across arterial streets and are discouraged across collector streets. Valley gutters are not allowed on streets with storm sewer systems.

8.6.2 Inlets. Inlets shall be located to intercept the curb flow at the point curb flow capacity is exceeded by the storm runoff. Refer to Chapter 11—Drainage Improvements for curb capacity. Inlets shall also be installed to intercept crosspavement flows at points of transition in superelevation. Due to the presence of curb ramps, inlets are not allowed in the curb return, but will be located at the tangent points of the curb returns. Where possible, inlets shall be placed on the upstream side of the intersection so as to intercept the water before it reaches the pedestrian crosswalk.

8.6.3 Cross-slope. Except at intersections or where superelevation is required, streets, in general, shall be level from top of curb to top of curb (or flowline to flowline) and shall have a one and one-half (1.5) percent to three (3) percent crown as measured from centerline to lip of gutter, or lip of median gutter to lip of outside curb on roadways with medians. Where the crownpoint is not centered in the street, the crownpoint can be no further out than the quarter point of the street.

8.6.4 Temporary Erosion Control. Temporary erosion control is required at the ends of all roadways that are not completed due to project phasing, subdivision boundaries, etc., in accordance with Chapter 12—Erosion Control and with the Subdivision Ordinance of the City of Huron.

8.6.5 Sidewalk. Storm water from concentrated points of discharge shall not be allowed to flow over sidewalks, but shall drain to the roadway by use of storm sewers. Sidewalk chases will not be allowed unless specifically approved by the City Engineer. If permitted, sidewalk chase sections shall not be located within the driveway.

8.7 Horizontal Alignment

8.7.1 Horizontal Curves. Any angular break in horizontal alignment of more than two (2) degrees shall require a horizontal curve (Table 8.1).

8.7.2 Curb Return Radius. Minimum curb return radius shall be as shown in Table 8.1. Where truck traffic is significant, curb return radii shall be provided in accordance with AASHTO standards.

8.7.3 Construction Signs and Barricades. Design and construction shall comply with the requirements of the *Manual on Uniform Traffic Control Devices*, latest edition. Details shall be shown on the construction drawings, and installation shall be provided by the contractor and/or owner.

8.7.4 Superelevation. The use of superelevation is discouraged for all streets. However, where superelevation is required for curves, arterial streets and collector streets, horizontal curve radius and superelevation shall be in accordance with the recommendations of the AASHTO standards. Superelevation shall not be used on local roadways. All roadway designs utilizing superelevation are subject to review and acceptance by the City Engineer.

8.7.5 Spiral Curves. Spiral curves shall not be used on streets within the City (State highways excluded) except upon written acceptance of the City Engineer.

8.7.6 Cul-de-sacs. The following criteria shall be used for the horizontal geometry of cul-de-sac turnarounds.

(1)	Minimum property line radius: residential	50.0 feet
	Non-residential	60.0 feet
(2)	Minimum back of curb radius: residential	40.0 feet
	Non residential	50.0 feet
(3)	Maximum length of cul-de-sac measured measured along centerline, between the radius point of the turnaround and the R.O.W. line of the abutting street	650.0 feet

8.7.8 Transition Length. If lanes are added, deleted, or adjusted, it will be necessary to construct a transition section for the safe conveyance of traffic. The following formula shall be applied to the taper or lane change necessary for this transition:

$$L=WS^2/60$$

where:

L = Length of transition in feet
W = Width of offset in feet
S = Speed limit or 85th percentile speed

8.8 Vertical Alignment

8.8.1 Changing Grades. The use of grade breaks, in lieu of vertical curves, is not encouraged. However, if a grade break is necessary and the algebraic difference in grade does not exceed eight tenths (0.008 ft/ft) of a percent, the grade break will be permitted.

8.8.2 Vertical Curves. Design controls for vertical alignment must be in accordance with AASHTO standards. When the algebraic difference in grade (A) is at or exceeds eight-tenths (0.008 ft/ft) of a percent, a vertical curve is to be used. All vertical curves shall be labeled, in the profile, with length of curve (L) and K (defined as L/A).

8.8.3 Intersections. The following criteria shall apply at intersections.

8.8.3.1 The grade of the “through” street shall take precedence at intersections. At intersections of roadways with the same classification, the more important roadway, as determined by the City Engineer, shall have this precedence.

8.8.3.2 The elevation at the end of curb return on the through street is always set by the grade of the through street in conjunction with normal pavement cross-slope.

8.8.3.3 Carrying the crown of the side street into the through street is not permitted.

8.8.3.4 Dipping the flowline to the extent that the lip of gutter is dipped is not permitted, except as specified by Standard Plates concerning curb opening inlets. Tipping an inlet for the benefit of drainage is also not permitted.

8.8.3.5 A more detailed review shall be performed for arterial-arterial intersection to maximize driveability.

8.8.3.6 Flowline profiles and pavement cross-slopes shall be shown through an intersection until a normal cross-section is obtained. Elevations on a 15-foot grid shall be shown on a plan view drawing. This information shall be submitted using a scale of 1" = 20’ horizontally and 1" = 2’ vertically.

8.8.3.7 Parabolic or curved crowns are not allowed. In no case shall the pavement cross-slope at intersections exceed the grade of the through street.

8.8.3.8 The rate of change in pavement cross-slope, when warping side streets at intersections, shall not exceed one (1) percent every twenty-five (25) feet horizontally on a local roadway, one (1) percent every thirty-seven and one-half (37.5) feet horizontally on a collector roadway, or one (1) percent every fifty six and one-half (56.5) feet horizontally on arterial roadways.

8.8.4 Curb Returns. Minimum fall around curb returns shall be 0.2 percent.

8.8.5 Connection with Existing Roadways

8.8.5.1 Existing grade(s) shall be shown for a sufficient distance to assure that horizontal and vertical curve requirements are being or can be met with field verified as-builts showing stations and elevations at twenty-five (25) foot intervals. In the case of connection with an existing intersection, these as-builts are to be shown within a one hundred (100) foot radius of the intersection. This information shall be included in the plan and profile that shows that proposed roadway. Limits and characteristics of the existing improvement are the primary concern in the plan view. Such characteristics include horizontal alignment, offset intersections, limits of the improvements, etc.

8.8.5.2 Previously approved designs for the existing improvement are not an acceptable means of establishing existing grades; however, they are to be referenced on the construction plan where they occur.

8.8.5.3 The basis of the as-built elevations shall be the same as the design elevations (both flowline or both top of curb, etc.) when possible.

8.9 Off-Site Design

The design grade, and existing ground at that design grade, of all roadways that dead end due to project phasing, subdivision boundaries, etc., shall be continued, in the same plan and profile as the proposed design, for at least three hundred (300) feet or to its intersection with another roadway. This limit shall be extended to six hundred (600) feet when arterial roadways are being designed.

8.10 Construction Traffic Control

8.10.1 Pedestrian Traffic

8.10.1.1 Every precaution shall be taken to ensure that construction work does not interfere with the movement of pedestrian traffic, which shall be maintained on the sidewalk at all times and flagmen provided for guidance as necessary.

8.10.1.2 Where an excavation interrupts the continuity of the sidewalk, the Contractor shall provide suitable bridge or deck facilities, to be supplemented by the use of such proper devices and measures as prescribed in the *Manual on Uniform Traffic Control Devices*, latest edition, for the safe and uninterrupted movement of pedestrian traffic. The edges or ends of the pedestrian bridge or decking shall be beveled or chamfered to a thin edge to prevent tripping.

8.10.1.3 Temporary diversion walkways shall be hard surfaced and electric lighting shall be provided and kept continuously burning during hours of darkness, when required by the City Engineer.

8.10.1.4 Unless otherwise authorized by the City Engineer, pedestrians shall not be channeled to walk on the traveled portion of a roadway.

8.10.1.5 Under certain conditions, it may be necessary to divert pedestrians to the sidewalk on the opposite side of the street. Such crossings shall only be made at intersections or marked pedestrian crossovers.

8.10.1.6 Facilities satisfactory to the City Engineer shall be provided for pedestrians crossing at corners, pedestrian crossovers, and public transportation stops.

8.10.2 Vehicular Traffic.

8.10.2.1 Construction work zone traffic shall be controlled by signs, barricades, detours, etc., which are designed and installed in accordance with the *Manual on Uniform Traffic Control Devices*, latest edition. A traffic control plan shall be submitted to and approved by the City Engineer, or designated agent, prior to start of any construction.

8.10.2.2 For construction of new facilities, traffic control should strive to keep the motorist from entering the facility. The primary means to accomplish this are by use of temporary barricades, located in advance of the construction area and with appropriate signing. New construction shall not be opened to traffic, and the construction traffic control removed, without the approval of the Project Engineer and the City Engineer.

8.10.2.3 The details of the traffic control plan must be shown on a map. For minor projects or local roadways, a neat sketch of the roadways and the proposed control devices will suffice. For major projects or major roadways, the traffic control plan shall be superimposed on as-builts, construction plan drawings, or other detailed map.

8.10.2.4 The *Manual on Uniform Traffic Control Devices*, latest edition, shall be the basis upon which the traffic control plan is designed, in concert with proper, prudent, and safe engineering practice. All necessary signing, striping, coning, barricading, flagging, etc., shall be shown on the plan.

8.10.2.5 Any plan for traffic control during construction that indicates a complete closure of an arterial or collector street must show detour routes and must be approved by the City Engineer. Requirements as to rerouting of traffic, signing, time of closure, and length of closure will be determined on a case-by-case basis. When a local street is to be closed to traffic, the City Engineer must be notified, preferably 24 hours in advance.

8.10.2.6 Directional access on roadways may be restricted (minimum travel lane width in construction area is ten [10] feet), but proper controls including flagging must be indicated. Removal of on-street parking shall be considered, and noted where applicable.

8.11 Turn Lanes

The design of the arterial street system depends upon the proper control of access to developments and turn lanes at collector street intersections. The location and design of access points must minimize traffic hazards and interference to through-traffic movements. In order to ensure proper access control, the following standards for turn lanes have been established.

8.11.1 Where Required. Turn lanes may be required along segments of potential for creating a traffic hazard or unnecessarily impedes through-traffic movements as determined by the Traffic Impact Report or the City Engineer. A high volume access must be provided with a turning lane to allow the driver to maneuver out of the main travel lanes before slowing down. Left-turn lanes must be provided in the center or median of the road for left-turning traffic at a high volume access. If such lanes cannot be provided, left turns will be restricted.

Turn lanes for right-turning movements will be required as necessary at intersections for capacity and safety. Turn lanes for access points shall be according to Table 8.2

Table 8.2: Volume Warrants For Turn Lanes for Access Points For Right-Turning Movements

	POSTED SPEED OF STREET IN MPH				
	Less than 25	26 to 40	41 to 50	51 or greater	For
If the design hour volume of the high-way lanes will exceed	500 1400	400 1200	200 800	150 600	2-lane streets 4 or more lanes
and the design hour volume of the access approach will exceed	50 70	40 60	20 40	15 25	2-lane streets 4 or more lanes

For streets with four or more through travel lanes, design hour volumes shall be measured only in the direction of the access approach.

8.11.1.2 For left-turning movements, turn lanes will be required as necessary at intersections for capacity and safety. Turn lanes for access points shall be according to Table 8.3

Table 8.3: Volume Warrants For Turn Lanes at Access Points For Left-Turning Movements

	POSTED SPEED OF STREET IN MPH				
	to 25	to 40	to 50	greater	For
When design hour volume of the high-way will exceed	500 1000	400 900	200 600	150 400	2-lane streets 4 or more lanes
and the left-turning design hour volume into the access approach will exceed	50 70	40 60	20 40	15 25	2-lane streets 4 or more lanes

For streets with four or more through travel lanes, design hour volumes shall be measured only in the direction of the median turn lane.

8.11.1.3 For both tables, where the existing street design hour volume is below the values in the tables, a prediction using the Metropolitan Planning Organization horizon year planning model shall be made and compared to the table.

8.11.1.4 Where public safety so requires, due to specific site conditions, such as sight distance, a turn lane may be required even though the warrants in Tables 8.2 and 8.3 are not met. Where the design hour volume of the street is twice the street design hour volume in Tables 8.2 and 8.3, the City may require a minimum turn lane for any access approach.

8.11.2 Turn Lane and Acceleration Lane Design

8.11.2.1 On highway arterial and collector streets in the City, the design of acceleration/deceleration lanes shall meet the minimum requirements as shown in Tables 8.4 and 8.5, providing sufficient off-site right-of-way is available. These absolute minimum requirements were developed recognizing the severe limitations that currently exist on right-of-way availability for most of the urban street network. Where grades are significant, modifications to these lengths will be required by the City. If off-site right-of-way is insufficient, lanes will be designed to maximize the use of available right-of-way at the time that construction plans receive final approval.

Table 8.4: Acceleration Lane Lengths

(1) SPEED (MPH)	LANE LENGTH		TAPER LENGTH
	Stop Condition	From 15 mph(2)	
30	150’	125’	120’
35	175’	150’	150’
40	250’	200’	180’
45	300’	250’	180’

(1) 85th percentile speed.
(2) Assumes vehicles start at 15 miles per hour.

Table 8.5: Turn Lane Lengths

Posted Speed	Taper	Opening	Deceleration	50th Percentile Queue	95th Percentile Queue
30 mph	60’	60’	75’	Values determined by software analysis	
35 mph	60’	85’	75’		
40 mph	90’	120’	100’		
45 mph	120’	150’	125’		

8.11.3 Exemptions. Requests for exemption from the requirements for a deceleration lane shall be based upon a traffic engineering study that presents trip generation data for the proposed development in terms of impacts upon through-traffic flows. Such requests shall be reviewed by the City Engineer and

may be approved, except that such an approval cannot be granted if through-traffic would be impeded more than three (3) percent of the total time or more than five (5) percent of the time during peak traffic flow periods or if other unique circumstances warrant special design considerations.

8.12 Pavement Thickness

Design of pavement thickness for collector and arterial streets and local streets in industrial and commercial zoned areas shall be based on *AASHTO Guide for Design of Pavement Structures*, latest edition. Pavement design shall be based on an inherent reliability of 75 percent. For traffic conditions where the equivalent 18 kip/single axle loading is less than 1,000,000, the low-volume road design method may be used. Recommendations and subgrade properties developed by the Geotechnical Exploration Report shall be used in the design of the pavement structure.

8.12.1 Industrial and Arterial Streets must be designed for pavement thickness on an individual street-by-street basis. However, in no event may the pavement thickness be less than that specified in Table 8.6. Local Residential Streets need not be designed on an individual basis, but must meet the minimum pavement thickness as set forth in Table 8.6.

8.12.2 Minimum compressive strength for Portland Cement concrete paving shall be 4000 psi at 28 days.

8.12.3 Traffic Data. Where traffic data is available, actual counts shall be used along with projections of traffic growth in determining the pavement design. If traffic data is not available, Table 8.7 may be used to provide data for the pavement design. Traffic data for all arterial streets will be determined by the City Engineer.

Table 8.6 Minimum Pavement Thickness Requirements

	Local Residential Streets	Commercial, Industrial & Collector Streets	Arterial Streets
Portland Cement Concrete (Requires Aggregate Cushion)	6"	8"	8"
Asphaltic Concrete with Aggregate Base	3" AC 6-12" Aggregate	4" AC 12" Aggregate	5" AC 12" Aggregate

Table 8.7 Traffic Volumes

Street Classification	ADT (2 way)	No. of Lots	18-kip ESAL Traffic	AASHTO Traffic Level
Cul-de-sacs and Local Residential	200	20-30	10,000-50,000	Low
Local, Local Multi-Family, or Commercial	300-700	60-140	50,000-300,000	Low
Local Industrial	200-700		400,000-600,000	Medium
Collector	7,000		400,000-1,000,000	High
Arterial	To be determined by the City Engineer			

8.13 Rural Urban Street Standards

Rural urban streets, including local, collector, and arterials, shall conform to the current edition of the AASHTO *Policy on Geometric Design of Highway and Streets.* Reference should be made to the current edition of the AASHTO *Roadside Design Guide* where high fills, right-of-way restrictions, watercourses, or other issues render a design where recoverable slopes are not practical. All rural urban street locations will be approved by the City Engineer.

Where bicycle facilities are included as part of the design, reference should be made to the current edition of the AASHTO *Guide for the Development of Bicycle Facilities.*

8.14 Rural Subdivision Road Standards

8.14.1 Subdivisions outside of the City limits and within the Joint Jurisdictional platting jurisdiction shall comply with these requirements.

8.14.2 Access shall be determined by street classification. Roadway serving the subdivision must be hard surfaced as approved by the City Engineer.

8.14.3 Driveways shall be hard surfaced and comply with Figure 5.3 of the Engineering Design Standards.

8.14.4 Minimum width of the driving surface shall be 24 feet of 4/6 asphalt paving/base and two-foot shoulders. Ditches shall have a maximum 4:1 side slope. Additional lanes may be required for higher traffic roadways as determined by the City Engineer.

8.14.5 A plan and profile for connection to existing trunk sanitary sewer and its extension upstream is required. Where trunk sewers cross roadways the ultimate roadway grade shall be called out.

8.14.6 An access road agreement or other arrangements for maintenance of detention ponds and/or BMP facilities shall be provided by association or other perpetual contract.

8.14.7 Culverts in the street right-of-way shall comply with county requirements. Flared end sections or slope concrete headwalls are required on all culverts within the road right-of-way.

8.14.8 The size of culverts shall be determined by a drainage study for the entire subdivision.

8.14.9 The City Engineer's Office will be responsible for accepting final street and drainage plans and coordination of road access and approach permits with County, Township, and SDDOT officials.

8.14.10 Traffic control signs and street name signs shall be properly posted. Street names shall be approved by the City Administrator.