5. ROADWAY DESIGN CONTROL

5.1 Function Classification

The first step in the design process is to identify the functional classification of the roadway. The functional classification of existing City of Des Moines streets are established by ordinance by the City Council. A graphic representation of the street classification system can also be found in the City's Comprehensive Transportation Plan.

Existing and future traffic volumes must be documented. The estimated future traffic volumes serve as the design year for the roadway. Interim designs are based on a 5 or 10 year traffic study. All interim designs must contribute to, or be consistent with the ultimate roadway design identified in the Comprehensive Transportation Plan (typically 20 year design). The minimum number of lanes to be constructed for a particular road section shall be determined from the Comprehensive Transportation Plan. Additional lanes may be required above and beyond the Comprehensive Transportation Plan as identified in the Traffic Study.

5.1.1 Functional Classification System

Roads and highways are most effectively classified by their function, according to the character of service they are intended to provide. The primary functions of roads and highways are to provide mobility and to provide access, and the degree to which these functions are provided is considered an integral part of classifying roads. The functional classification system creates a hierarchy of classified roads.

Roads are grouped into a number of different classifications for administrative, planning, and design purposes. For example, the classification system can be used for planning for new routes, improvements to existing roads, and planning for area development in concert with the transportation network and providing minimum design standards or criteria to encourage the use of the road as intended.

The main considerations for classifying roads into functional groups are the travel desires of the public, land service needs based on existing and expected land use, and the overall continuity of the system. A classification plan which fits the various classes of roads together into a logical pattern and assigns realistic improvement standards to each class will promote the highest overall level of service for the funds that are available.

The City of Des Moines definitions for each functional classification are presented below. The City of Des Moines Comprehensive Transportation Plan includes transportation plans for modes other than passenger vehicles. These modal plans are intended to overlay onto the functional classification system. For example, the bicycle plan would overlay the functional classification system to identify those roadways that should include bicycle facilities as a design element of the roadway.

Streets within the City of Des Moines are classified functionally in one of five categories as defined in Section 5.1.2. All streets within the City of Des Moines are generally characterized as being urban, as there are no rural roadways within the City Limits. Function is the controlling element for classification and shall govern right-of-way widths, road widths, and road geometrics. Other given elements such as access, arterial spacing, and ADT have typical values for a given classification. However, these values alone do not determine a street's classification.

It is necessary to classify streets for purposes of traffic operations, control, and enforcement. Typically, arterials will have higher speed limits and more stringent traffic control measures at intersections, (e.g., traffic signals or stop signs), than non-arterials. In planning, functional classification establishes the hierarchy of streets and highways necessary for a complete transportation system that serves all types of travel needs. Each road has a specified function that produces a comprehensive network for travel and access throughout an area, when combined with the rest of the system.

5.1.2 Street Classifications

The definitions provided below serve as the general guide used in determining street classifications. Detailed cross sections for each street classification can be found in the Standard Drawings.

Principal Arterial: Urban principal arterials, also called Major Arterials, provide for movement across and between large sub-areas of an urban region. Principal arterials serve predominantly "through traffic", carry the highest traffic volumes, serve major centers of activity, and are fed by other arterials and local access streets. Principal arterials are expected to provide a high degree of mobility. Therefore, access to abutting properties should be very restricted. Spacing between parallel principals is generally two miles or greater. ADT is typically over 10,000 vehicles per day.

Minor Arterial: Urban minor arterials interconnect with and augment the principal arterial system. Minor arterials provide intra-community continuity connecting community centers and facilities. A minor arterial may also serve "through traffic". Access is partially restricted. Spacing between parallel minor arterials is generally less than two miles. ADT is typically between 4,000 and 12,000 vehicles per day.

Collector Arterial: Collector arterials typically are intra-community roadways connecting residential neighborhoods with community centers and facilities. They accumulate traffic from local roadways and distribute that traffic to roadways that are higher in the hierarchy of functional classification. Access is partially restricted. Spacing between collector arterials is generally a mile or less. ADT is typically between 1,000 and 5,000 vehicles per day.

Neighborhood Collectors: Neighborhood collectors connect two or more neighborhoods and typically connect to arterials or other neighborhood collectors. Although direct driveway access are typically allowed on neighborhood collectors, there are some project related exceptions. Whenever possible, direct driveway connections to neighborhood collectors should be avoided. Spacing is generally a half-mile or less. ADT is typically between 1,000 and 3,000 vehicles per day.

Local Streets: Local streets are a permanent cul-de-sac or short loop street with low traffic volumes that provides circulation and access to off-street parking within a residential development boundary. Local streets are not supportive of through traffic. Access is generally not limited. Spacing is as needed to access properties. ADT is typically less than 1,000 vehicles per day.

5.2 Right-of-Way

5.2.1 Widths

Standard right-of-way widths for road classifications are as shown in Table 5-1. These right-of-way widths shall apply for road design, except where these Standards specify other right-of-way requirements.

Any new road to be constructed as part of a land development proposal shall be classified in the development proposal and designed with a right-of-way width conforming to the standards below, unless otherwise approved.

Where right-of-way is to be deeded or dedicated from a parcel under development, the right-of-way shall be a uniform width across the parcel and not tapered. Exceptions to this requirement may be allowed where off-site right-of-way is to be acquired for a clear sight triangle or sight distance easement (refer to Section 6.7).

Table 5-1. Standard Right-of-Way Widths

Principal Arterial	80 feet
Minor Arterial	70 feet
Collector Arterial	60 feet
Neighborhood Collector	50 feet
Local Street	50 feet

There shall be a minimum amount of public right-of-way between the back of the public sidewalk and the private property line. Refer to Standard Drawings DM.A1.1 through DM.A5.3.

5.2.2 Right-of-Way Width Evaluation

Wider or narrower right-of-way widths than the standard may be required as determined by the Public Works Director. Right-of-way width must accommodate the road section applicable for the particular road classification, as described further in this chapter. Any change to the applicable road section must be approved by deviation.

The right-of-way width may be reduced to minimum roadway width, plus storm drainage, sidewalk, maintenance areas behind sidewalk, provided that potential serving utilities are accommodated within permanent public easements. The reduced right-of-way, plus easement, at a minimum shall allow for construction and maintenance of the sidewalks, 3 feet behind sidewalk, planting strips, drainage facilities, and sign placement. Additionally, they shall allow for sidewalk widening around mailbox locations.

5.2.3 Right-of-Way Dedications

All required right-of-way dedications shall be completed on a “Statutory Warranty Deed” and shall be recorded by King County prior to final plan approval. All easements shall be completed in a format to the City’s requirements. Easements for utilities shall be drafted and signed by the property owner and given to the City prior to final plan approval. Upon completion of the project, the original easement shall be modified, if necessary, then recorded at the property owner’s expense. All such easements and dedications shall be clearly shown on the engineering plans.

5.3 Easements

5.3.1 Utility Easements

Where utilities and/or their conveyance systems cross private lands, an easement must be granted. If the property is platted, the easement may be conveyed when the short plat or final plat is filed. An

attorney, licensed land surveyor, or engineering firm capable of performing such work must prepare all easements not shown on a plat.

Easement requirements are subject to each utility provider and reviewed by the Public Works Director, widths will be centered on the utility and be a minimum of 10 feet wide. Construction/slope easements will be required when appropriate, with widths as necessary to encompass work area. For stormwater conveyance systems, easement widths and building setbacks shall be as established by the KCSWDM or Chapter 17.35 of the DMMC.

5.3.2 Slope, Sight Distance, Wall, and Drainage Easements

Either the functional classification or particular design features of a road may necessitate slope, sight distance, and wall or drainage easements beyond the right-of-way line. The Public Works Director may require such easements in conjunction with dedication or acquisition of right-of-way. The design engineer must document there is sufficient right-of-way to include cuts and fills and necessary clear zone.

5.3.3 Construction Easements

Often times, construction easement are needed in order to facilitate public roadway and right-of-way improvements. Construction easements are also needed to make improvements to driveway accesses. The design engineer is responsible to secure all necessary construction easements from the affected property owners.

5.3.4 Submittal Process

Easements are required to be submitted in draft, unsigned form for review and approval prior to plan approval. Any change in design that places an amenity (i.e., water, sewer, sidewalk, etc.) outside of the easement may necessitate stopping construction until plans and easements can be resubmitted and approved.

5.4 Tracts

5.4.1 Private Access Tracts

Private access tracts shall meet the requirements contained in Section 5.5.1 Private Streets.

5.4.2 Tracts for Public Facilities

Under certain circumstances, it may be desirable to reduce right-of-way width and locate facilities, such as sidewalks, walkways or trails, in separate tracts of land outside the right-of-way. Such tracts shall be owned and maintained by a homeowners association and guaranteed by covenants recorded with the plat. The recorded covenants shall be referenced on the approved final plat document.

Locating public roadways (e.g., travel lanes) in Tracts for public facilities is expressly forbidden.

Tracts for Public Facilities must be approved by the Public Works Director through a request for deviation.

5.5 Other Roadway Types

5.5.1 Private Streets

While public streets, owned and maintained by the City, usually best serve community street requirements, private streets may be appropriate for some local access streets. Usually these are local roads, either residential or commercial, serving a low volume of daily traffic.

A private Street is a street, privately owned and maintained, located in a tract. Private streets may be utilized for access in accordance with Chapter 4. Private streets shall be designed and constructed in accordance with public street standards, except as permitted otherwise herein.

Private streets shall be permanently established by tract providing legal access to each affected lot, dwelling unit, or business and sufficient to accommodate required improvements, including provision for future use by adjacent property owners where applicable.

Each private street shall be clearly described on the face of the plat, short plat, or other development authorization and clearly signed as a private road. Private streets shall be maintained by capable and legally responsible owners, a homeowners association or other legal entity made up of all benefited property owners, in accordance with the provisions of Chapter 17.35 of the DMMC. Maintenance shall be guaranteed by covenants filed with the recorded binding site plan, record of survey, plat or short plat.

Private Streets may be approved only when they are:

1. Accessible at all times for emergency and public service vehicle use.
2. Not obstructing, or part of, the present or future public neighborhood circulation plan developed in processes such as the Comprehensive Plan, Comprehensive Transportation Plan, or Capital Improvement Program.
3. Not going to result in land locking of present or future parcels.
4. Not needed as public roads to meet the minimum road spacing requirements of these Standards.
5. Designed to serve a maximum potential of 16 single-family dwelling units when the entire length of the private road system to the nearest public maintained road is considered. The maximum potential is the number of dwelling units that can possibly be served by the road when physical barriers, zoning or other legal constraints are considered.
6. Clearly described on the face of the plat, short plat, binding site plan, site development permit or other development authorization and clearly signed at street location as a private street, for the maintenance of which the City of Des Moines is not responsible.

The City of Des Moines will not accept private streets for maintenance as public streets until such streets are brought into conformance with the current DMMC and these Standards for public streets.

Best Management Practices (BMPs) should be used when maintaining private roadways.

The following table provides Private Street requirements.

Table 5-2. Private Street Requirements

Number of Lots	Minimum Tract Width	Minimum Paved Width	Pedestrian Facilities	Minimum Turnaround if over 150 feet	Street Lighting Required
1-2	25*	15	No	Hammerhead	No
3-4	26*	16	No	Hammerhead	No
5-6	30*	20	No	Hammerhead	No
7-10	34*	24	No	Hammerhead	No
11-16	40*	24	Yes, 5-foot walking path	Cul-de-sac	Yes

The maximum to be served by a single private tract is 16 lots.

*Tract width may be reduced by up to 5 feet along properties that access tract. 20 feet is absolute minimum tract width.

5.5.2 Alleys

Alleys are streets that provide secondary access. Although there are pre-existing alleys within the City that are public, all new alleys shall be private streets meeting the requirements of Section 5.5.1.

5.5.3 Half Streets

A half street may be permitted when:

1. Such street shall not serve as primary access to more than 20 dwelling units or equivalent ADT; and
2. Such alignment is consistent with or will establish a reasonable circulation pattern; and
3. There is reasonable assurance of obtaining the prescribed additional right-of-way from the adjoining property with topography suitable for completion of a full-section road.

A half street shall meet the following requirements:

1. Right-of-way width of the half street shall be a minimum width of 30 feet and sufficient to construct the roadway and related grading. Refer to Standard Drawing DM.A1.1 through DM.A5.3.
2. Traveled way shall be surfaced the same as the designated road type to a width not less than 20 feet, sidewalk shall be constructed as required for the designated road type.
3. Property line edge of street shall be finished with temporary curbing, shoulders, ditches, and/or side slopes in order to assure proper drainage, bank stability, and traffic safety.
4. Half streets shall not intersect other half streets.
5. Half-streets shall meet the requirements of Section 7.4.6 of these Standards.

When a half street is eventually completed to a whole street, the completing builder shall reconstruct the original half street as necessary to produce a proper full-width crowned street of a designated section.

Obtaining any right-of-way or easements shall be the responsibility of the applicant or developer.

5.5.4 Fire Apparatus Access Road (Fire Lane)

A fire apparatus access road or fire lane is any road or driving surface, whether public or private, which is used to meet the access requirement of the Uniform Fire Code, codified in Chapter 14 of the DMMC.

5.6 Cul-de-sacs and Hammerheads

5.6.1 Cul-de-Sacs

Whenever a public dead-end street serves or will serve more than 6 lots or extends more than 150 feet from centerline of accessing street to farthest extent of surfaced traveled way, a widened "bulb," (refer to Standard Drawing DM.A9.1) shall be constructed as follows:

1. Minimum right-of-way diameter across bulb section: 100 feet in a permanent cul-de-sac; 84 feet in a temporary cul-de-sac, with bulb area lying outside straight-street right-of-way provided as temporary easement pending forward extension of the street. Right-of-way may be reduced, provided utilities and necessary drainage are accommodated on permanent easements within the development. See Section 5.3.1.
2. Minimum diameter of surfacing across bulb: 80 feet of paving in curb-type road.
3. Where required on cul-de-sacs, sidewalks shall be constructed on both sides.
4. A permanent cul-de-sac shall not be longer than 600 feet measured from centerline of intersecting loop or through street to the center of the bulb section. If a bulb out/eyebrow is utilized the roadway may extend up to an additional 600 feet. Refer to Standard Drawing DM.A9.3. On the basis of pertinent traffic planning factors such as topography, sensitive areas and existing development, the Public Works Director will consider deviations to this requirement.
5. The Public Works Director may require an emergency vehicle access and/or an off-street walkway to connect a cul-de-sac at its terminus with other streets, parks, schools, bus stops, or other pedestrian traffic generators.
6. If a street temporarily terminates at a property boundary, serves or will serve more than 6 lots, or is longer than 150 feet, a temporary bulb shall be constructed near the development boundary. The paved bulb shall be 80 feet in diameter with sidewalks terminated at the point where the bulb radius begins. Removal of the temporary constructed cul-de-sac and construction of the extension of the sidewalk shall be the responsibility of the applicant/developer who extends the road. Refer to Standard Drawing DM.A9.1.
7. The maximum cross slope in a bulb shall not exceed 4 percent in any direction.
8. Partial bulbs or eyebrows shall have a minimum paved radius and configuration as shown on Standard Drawing DM.A9.3.
9. Temporary cul-de-sac easements are extinguished, when applicable, through the right-of-way vacation process in accordance with Chapter 12 of the DMMC.

10. When a commercial access street changes from a public to private designation, a public turnaround shall be required, regardless whether another fire access turnaround is provided elsewhere.
11. Planter strips may be installed, but are not required, around permanent or temporary road ends. Additional right-of-way will be required.

5.6.2 Cul-de-Sac Islands

A cul-de-sac island is not allowed for any cul-de-sac when bulb paved diameter is 80 feet or less. A cul-de-sac island is an optional feature when bulb paved diameter exceeds 80 feet. If provided, the island shall have full-depth cement concrete vertical curb and gutter. Minimum island diameter shall be 20 feet and there shall be at least 30-foot wide paved traveled way around the circumference. An island shall be grassed or landscaped. The adjoining property owners are responsible for the landscaped and or grassed area within the island.

5.6.3 Drop-Curb Cul-de-Sac

A drop-curb cul-de-sac is a design option that may be used where multiple driveways around a cul-de-sac bulb will reduce the functionality of vertical curbs, planter strips and sidewalks. Where five or more access points are taken around the bulb, vertical curb may be eliminated and a drop-curb 1-inch lip (see Standard Drawing WSDOT DEPRESSED CURB F-10.12-04).

5.6.4 Hammerheads

A hammerhead may be used to satisfy the turnaround requirements where a private street serves or will serve 10 or fewer lots. Refer to Standard Drawing DM.A9.7.

5.7 Auxiliary Lanes

The design of road width transition tapers, speed change lanes, left-turn or right-turn lanes will be evaluated on a case-by-case basis using the AASHTO Green Book and the WSDOT Design Manual as a guide, and shall be consistent with Section 7.1.

5.8 Turn Lanes

Turning lanes and acceleration/deceleration lanes will be provided as required by the Public Works Director. Guidelines include the following: the *WSDOT Design Manual, Highway Research Record 211,* and *Guidelines for Right-Turn Treatment at Signalized Intersections*.

5.9 Medians

Unless otherwise required by the Public Works Director, Medians are an optional design feature.

Median width shall be additional to, not part of the specified width of traveled way. Edges shall be similar to outer road edges: the island shall have full-depth cement concrete vertical curb and gutter. Fourteen to 15 feet of drivable surface shall be provided on both sides of the median. The median may be grassed, landscaped, or surfaced with aggregate or pavement. Medians shall be designed so as not to limit turning radii or sight distance at intersections. No portion of a side street median may extend into the right-of-way for an arterial street. The Public Works Director may require revisions to medians as

necessary to provide for new access points and to maintain required sight distance. Nonyielding or non-breakaway structures shall not be installed in medians. Street trees may be planted in the median subject to approval by the Public Works Director. Medians and landscape islands shall be illuminated, as determined by the Public Works Director. Refer to Section 7.11 of these Standards.

5.10 One-Way Streets

Local access streets, including loops and bulbs, may be designated one-way upon a finding by the Public Works Director that topography or other site features make two-way traffic impractical.

5.11 Frontage Improvements

Frontage improvements shall be as required in Chapter 12 of the DMMC.