DC4 - DESIGN CRITERIA FOR STREET IMPROVEMENTS

DC4-001 **GENERAL.** Proposed street improvements within the City shall conform to the criteria established in the Gardner Comprehensive Plan as well as this Section and the City of Gardner *Technical Specifications for Public Improvements*.

Street improvements within the City of Gardner shall be designed to conform to all applicable codes, regulations, and ordinances as established by the City. Plans for said improvements containing all information specified or requested shall be submitted to the City Engineer for approval.

DC4-002 **FUNCTIONAL CLASSIFICATION OF STREETS.** The City defines geometric design standards for streets and highways which result in adequate traffic mobility and suitable access to abutting property.

The street design standards included in this section are based upon the street functional classifications outlined in the Access Management Code, latest edition.

Typical cross-sections of these classifications are shown on applicable Standard Details.

Table DC4-002-1 – *Design Criteria for Functional Street Classifications*

Designation	Arterial	Collector	Local[7]	Reference Documents
Number of Traffic Lanes[2]	2-6	2-3	2	Land Development Code
Width of Traffic Lanes[2]	12' - 14'[3]	12' - 14'[3]	12'	Land Development Code
Left Turn Lanes	Double at Signals[4]	As needed from TIS	N/A	Access Management Code Traffic Impact Study
Right Turn Lanes	Yes	Yes	As needed from TIS	Access Management Code Traffic Impact Study
Bike Lanes	As Shown in TMP	As Shown in TMP	N/A	Land Development Code
Minimum R/W Width[5]	120'	60' - 80'	50'	
Minimum Design Speed	50 MPH	40 MPH	30 MPH[7]	
Posted Speed	40-45 MPH	30-35 MPH	25 MPH[7]	
Stopping Site Distance	425'	305'	200 '[7]	
K Value[6] (Crest / Sag)	84 / 96	44 / 64	19 / 37[7]	
Minimum Radii Horizontal Curve[7]	750'	250'	175'[7]	
Sidewalks/Multi-use paths	5' Sidewalk + 10' SP	5' Sidewalk - Both Sides	5' Sidewalk - Both Sides in Multi- Family	Municipal Code
On Street Parking	Prohibited	Permitted	Permitted	Land Development Code
Min./Max. Grade	0.8%/6%	1%/8%	1%/10%	Access Management Code
Curb Radii	25-30'	10-20’	5-15'	Municipal Code

[1] Denotes fully improved condition

[2] Denotes width of outside lane with no shoulder or bike lane

[3] Double at Arterial/Arterial intersections, all other intersections as defined in TIS

[4] See Technical Specifications and Standard Details for R/W width at intersections

[5] Per AASHTO Green Book Table 3.34

[6] Multi-Family Local Street minim design speed may be reduced to 15 MPH

[7] TIS = Traffic Impact Study

DC4-003 **RIGHT-OF-WAY GRADING.** Within the limits of the right-of-way, the finished grade shall slope toward the curb with grades varying from two (2) percent to four (4) percent. These gradients may be varied only upon written approval of the City Engineer.

DC4-004 **TANGENT LENGTH.** The minimum tangent length between reverse curves shall be fifty (50) feet for local streets. No tangent will be required for radii longer than five hundred (500) feet.

DC4-005 **OFF-CENTER STREET INTERSECTIONS.** Off-center street intersections shall be separated by a minimum centerline to centerline dimension of one hundred-fifty (150) feet.

DC4-006 **CONNECTIONS TO EXISTING PAVEMENTS.** Where new street construction connects to an existing street, a minimum of five (5) feet of the existing pavement shall be saw cut and removed to subgrade. The exposed subgrade shall be re-compacted or replaced with aggregate base in accordance with the Standard Details, and repaved with the new construction.

DC4-007 **MINIMUM ANGLE OF INTERSECTION.** All intersections shall meet at a 90-degree

angle, unless otherwise approved by the City Engineer. The minimum acceptable angle for driveways that serve two-way traffic is 80 degrees. Driveways that serve one-way traffic may have an acute angular placement from 60 to 90 degrees.

DC4-008 **SIDEWALKS.** Sidewalk construction shall typically follow the requirements in the Standard Details. Temporary sidewalks on unimproved streets may be required to facilitate pedestrian ingress/egress. Construction of temporary sidewalks shall be funded by the developer.

DC4-009 **STORM DRAINAGE.** All storm drainage facilities constructed in connection with street improvements shall be designed in accordance with the City of Gardner *Design Criteria for Storm Drainage Facilities.*

DC4-010 **CUL-DE-SACS.** At locations where streets are to be terminated and a vehicular connection between adjacent streets is not required, a cul-de-sac shall be constructed. Such cul-de-sac shall be constructed with a length no greater than 800 feet and the minimum radius shall be 39 feet.

DC4-011 **TEMPORARY TURN-AROUNDS.** At locations where streets are to be temporarily terminated which will be extended at a later date, and said street extends beyond the intersection of an adjacent street more than one hundred-fifty (150) feet measured from the edge of pavement, a temporary cul-de-sac shall be constructed with a minimum radius of thirty-five (35) feet. The temporary cul-de-sac shall be constructed of asphaltic concrete with a minimum thickness of six (6) inches. Curb and gutter are not required. The cul-de-sac shall be constructed within the limits of a permanent construction easement.

DC4-012 **MONUMENT BOXES.** Monument boxes conforming to applicable Standard Details shall be installed at all quarter section corners during street construction.

DC4-013 **SIGHT DISTANCES.** Sight distance is the length of roadway ahead visible to the driver. The minimum sight distance available on a roadway should be sufficiently long to enable a vehicle driving at the design speed to stop before reaching a stationary object in its path.

A. Stopping Sight Distance--Stopping sight distance represents the sum of the brake reaction distance and the braking distance. These distances are measured from the height of the driver's eye to the height of the object, 3.5 feet and 2.0 feet above the road surface, respectively. Design controls for stopping sight distances vary slightly for crest vertical curves and sag vertical curves, and are dependent on the algebraic difference in the grades as well as the design speed. Refer to American Association of State Highway and Transportation Officials' (AASHTO) "A Policy on Geometric Design of Highways and Streets", 2001 or latest version for the minimum stopping sight distances to be used in design of roadways.

B. Intersection Sight Distance-- Sight distances at intersections vary from stopping sight distance. The intersection sight distance should be sufficient to permit a vehicle on the minor leg of the intersection to cross the traveled way without requiring the approaching through traffic to slow down. To achieve this, an area free of visual obstruction is required at every corner of an intersection.

An obstruction to vision shall be defined as an obstacle (i.e., a parked vehicle, a wall or commercial sign, bush or hedge, guardrail, or fence, etc.) which forms a restriction

to an assumed line of sight measured from the driver's eye height to a target some distance along the cross street.

Every effort shall be made to select intersection locations which maximize the sight distance. The location of intersections shall always consider the grade changes along the adjacent street in terms of possible sight obstructions.

C. *Sight Triangle--Sight triangle requirements vary based on the type of intersecting streets* and are summarized in Table DC4-014-1. All measurements are taken from the point of intersection of the extended curb lines of each intersecting street. The values in the table are dependent on the travel speed of the vehicles on the intersecting street and on the typical vehicle which will approach the intersection. The standard assumed height of the driver's eye for a passenger vehicle is 3.5 feet above the roadway surface (7.6 feet above the pavement for a single unit truck or large semi). This relates to the line of sight required to detect an approaching vehicle on the cross street (regarded as a point 3.5 feet above the roadway surface). See City of Gardner Access Management Code for additional details.

Table DC4-014-1 *– Clear Sight Distance*

Design Speed of Intersecting Street	**Intersection Sight Distance (measured along centerline of intersecting street)**
15 mph	105’
20 mph	125’
25 mph	150’
30 mph	200’
35 mph	225’ – 250’
40 mph	275’ – 325’
45 mph	325’ – 400’

All corner lots within the City of Gardner (except those in the Central Business District) shall have a sight triangle free of visual obstructions from a point twenty-five (25) feet back along the minor leg as measured from the point of intersection of the extended curb lines of each intersecting street to a point that varies with the street type and is stated in Table DC4-014-1. This area shall remain free of visual obstructions higher than three (3) feet and lower than ten (10) feet above the roadway surface. Within the Central

Business District, the sight distance triangle shall conform as closely as possible to the above specification, as approved by the City Engineer.

DC4-014 **UNDERDRAIN.** In areas that have known subsurface moisture problems, underdrains will be required. They shall be built as shown in the Standard Details.

If during construction it does becomes apparent that there is a need for underdrain in a location that was not previously designed for underdrain, the City Engineer can require that the consultant submit a revised plan including underdrains that will provide for subsurface drainage. The standard detail is a minimum. Upon approval of the City Engineer, alternate details for increased capacity may be allowed.

DC4-015 OPEN CUTTING OF STREETS. No open cutting of streets for utilities shall be allowed unless approved by the City Engineer. If an open cut is approved by the City Engineer, a traffic plan in accordance with MUTCD guidelines will be required to be submitted and approved prior to construction. One lane shall remain open at all times or flashing signboards provided at appropriate locations informing drivers of detours. The signboards must be placed at the site at least 5 days in advance of construction.

DC4-016 PRIVATE STREETS. All streets and roadways within any development which are classified as "Private Streets" shall conform to the standards and specifications for public streets, as stipulated in the Technical Specifications and Design Criteria for Public Improvement Projects for the City of Gardner.

DC4-017 BICYCLE PEDESTRIAN TRAIL SYSTEM. The design engineer shall contact the Parks and Recreation Department, Public Works, and/or Planning Department to determine whether any portion of the proposed construction will involve the City of Gardner's Trail System. Multi-use paths constructed as part of this system shall be 10 feet in width with a 25' wide pedestrian easement.

DC4-018 EMERGENCY ACCESS ROADS. Emergency access roads connecting to public streets shall only be permitted at locations approved by the City Engineer.

DC4-019 DEVELOPMENT ADJACENT TO UNIMPROVED ARTERIAL ROADS. A vertical profile, horizontal limits of future arterial roadway improvements and elevations at the future right of way shall be established for all developments adjacent to an unimproved arterial roadway. The elevation of the proposed development shall match the elevation at the future right of way. An unimproved arterial road shall be defined as an arterial road which has not been constructed to its ultimate typical section as defined by the Major Street Map or as required by the City Engineer.

During these improvements, an interim stage for safety improvements will be needed. These improvements include proper grading, drainage, storm sewer, roadway signage, sidewalk improvements, and shoulder modifications.