

DESIGN CRITERIA FOR
STREET IMPROVEMENTS

DC3-001 GENERAL. Proposed street improvements within the city shall conform to the pattern as established in the Gardner Comprehensive Plan as adopted by the governing body of the City of Gardner. The major goal for transportation is to provide a safe and efficient transportation system which facilitates the movement of people and goods within the city.

To this end, street improvements within the City of Gardner shall be designed to conform with all applicable codes, regulations, and ordinances as established by the city. Plans for said improvements shall be submitted to the City Engineer for approvals, and all plans shall include all information as may be required or described hereafter.

DC3-002 FUNCTIONAL CLASSIFICATION OF STREETS. In fulfilling the goal of creating a "safe and efficient transportation system," the city must define geometric design standards for streets and highways which would afford both adequate traffic mobility and suitable access to abutting property. The following paragraphs provide a description of the street system based on functional classes. Typical street cross sections are shown in Section 13 of the Standard Specifications.

Arterial:

Expressway or Freeway: Since its main purpose is to carry through traffic movement, expressways and freeways are properly classified as arterials. However, owing to their unique geometric and access design, they are more appropriately the function of federal or state control. As a result, geometric design shall conform to those criteria defined by state or federal transportation agencies.

Arterial: An arterial shall mean a street or highway that provides for rapid and efficient movement of large volumes of through traffic between sections of the city and across the urbanized area. It is not primarily intended to provide land access service. Therefore, the number of curb cuts on a planned arterial shall be held to a minimum where they can be controlled and adequately protected.

In general, the arterial has full or partial access control, but is not restricted to controlled access facilities. Arterials can be four to six lanes wide, with or without medians, and commonly can be found on the mile section lines of the city. Signalized intersections along arterials should be spaced far enough apart to permit efficient two-way progressive movement of traffic between intersections at the desirable off-peak and peak hour operating speeds.

Collector Street: The collector street provides traffic circulation within residential areas. Land access is a secondary function of the collector. The collector distributes trips from

the arterials to the local street network. Collectors penetrate but should not have direct continuity through residential areas.

Operating speeds should be 25 to 30 mph. Since speeds are slower and turning movements are anticipated, closer intersection/access spacings can be used than on arterials. Because land access is a secondary function of collectors, the number of lots fronting onto a collector should be held to a minimum in order to reduce the numbers of driveways, and thus, the number of friction points.

Service Street: The service street provides traffic circulation within commercial and industrial complexes from the arterial street system. Service streets should not have direct continuity with residential areas.

Operating speeds should be 25 to 30 mph. Since speeds are slower and turning movements are anticipated, closer intersection/access spacings can be used than on arterials.

Because service streets facilitate truck-related land uses, the special provisions associated with truck accessibility shall be considered within design. Wider turning radii and turning lanes shall be considered. Service streets shall not be utilized for backing or loading maneuvers. All such trucking maneuvers shall be handled on-site of the adjacent land uses.

Local Street: The major purpose of the local street is to provide direct traffic access to abutting land.

Traffic movement on local streets is incidental and involves traveling to or from a collector facility. Therefore, trip length on the local street is short, and as a result, both traffic volumes and operating speeds are usually low. Generally, through traffic is deliberately discouraged.

A traffic study may be required by the City Engineer as necessary to determine whether additional street improvements and/or turn lanes are required for developments due to proposed traffic volumes.

DC3-003 STREET DESIGN STANDARDS.

	ARTERIALS	COLLECTOR	SERVICE ROADS	LOCAL STREETS
NUMBER OF TRAFFIC LANES	4-6	2-5	2-5	2
WIDTH OF TRAFFIC LANES	12'	12'	12'	12'
LEFT TURN LANES	DOUBLE AT SIGNALS	N/A	N/A	N/A
MINIMUM R/W WIDTH (FT)*	120 FT	60 FT	60 FT	50 FT
DESIGN VOLUME (VPD) RANGE	12,000-42,000	1,500-12,000	1,500-12,000	LESS THAN 1,500
MINIMUM DESIGN SPEED (MPH)	50 MPH	40 MPH	40 MPH	30 MPH
OPERATING SPEED MPH	45 MPH	35 MPH	35 MPH	25 MPH
STOPPING SIGHT DISTANCE (FT)	400-475 FT	275-325 FT	275-325 FT	200 FT
MINIMUM RADII HORIZONTAL CURVE	750 FT	250 FT	250 FT	200 FT
SIDEWALKS	5 FT BOTH SIDES	4 FT BOTH SIDES	COMM'L: BOTH SIDES 4 FT INDUST: AS REQ'D BY CITY ENGINEER	4 FT BOTH SIDES
ON STREET PARKING	PROHIBITED	PERMITTED	PERMITTED	PERMITTED
MAXIMUM GRADE (PERCENT) **	5%	8%	8%	10%
MINIMUM GRADE**	1%	1%	1%	1%
CURB RADII (FT)	50 FT	30 FT	30 FT	25 FT
MINIMUM SPACING OF SIMILAR ROADWAYS	1 MILE	400 FT	400 FT	300 FT
INTERSECTION *** R-O-W LINE TO NEAR EDGE OF CURB CUT	250 FT	100 FT	150 FT	50 FT MINIMUM 75 FT DESIRABLE

* A minimum 10' U/E is required on both sides of all streets.

** The maximum and minimum grade may be waived only upon written approval of the City Engineer.

*** Curb cuts are not allowed on controlled access routes. For other major arterials, minimum distance to curb cuts shall be 200 feet.

- DC3-004 RIGHT-OF-WAY GRADING. Within the limits of the right-of-way, the finished grade shall slope from 1/4-inch vertical to 1 foot horizontal (1/4" vert.:1' horiz.) minimum, to one-half-inch vertical to one foot horizontal (1/2" vert.:1' horiz.) maximum measured above the back of the curb. These gradients may be varied only upon written approval of the City Engineer.
- DC3-005 TANGENT LENGTH. The minimum tangent length between reverse curves shall be 50 feet for local streets. No tangent will be required for radii longer than 500 feet. Because the minimum radii requirements for horizontal curves exceed 500 feet, tangents are not required for arterial roads.
- DC3-006 OFF-CENTER STREET INTERSECTIONS. Off center street intersections shall be separated by a minimum centerline to centerline dimension of 200 feet.
- DC3-007 CONNECTIONS TO EXISTING PAVEMENTS. Where new street construction is to connect to an existing street, a minimum of five feet of the existing pavement is to be removed to subgrade. This subgrade is to be prepared with that of the new improvement and repaved with the new construction. Existing pavement is to be removed at a saw cut for entire width of street from curb face to curb face. If full-depth pavement removal is required, the subgrade shall be re-compacted to 95 percent of standard density.
- DC3-008 MINIMUM ANGLE OF INTERSECTION. It is desirable for all intersections to meet at approximately a 90^o angle. Skewed intersections should be avoided and in no case should the angle be less than 75^o.
- DC3-009 SIDEWALKS. Sidewalk construction shall typically follow the requirements in Standard Detail 21-4 thru 21-8. Temporary sidewalks on unimproved streets may be required to facilitate pedestrian ingress/egress. Construction of temporary sidewalks shall be funded by the developer.
- DC3-010 STORM DRAINAGE. All storm drainage works constructed in connection with street improvements shall be designed in accordance with the City of Gardner Design Criteria for Storm Sewers and Appurtenances and APWA 5600, latest edition.
- DC3-011 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 may be permitted. Such cul-de-sac shall be constructed with a length no greater than 800 feet and a minimum radius of 39 feet to the back of the curb.
- DC3-012 TEMPORARY TURNAROUNDS. 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 three lots, a temporary cul-de-sac shall be constructed with a minimum radius of 35 feet. The temporary cul-de-sac shall be constructed of asphaltic concrete with a minimum depth of six inches. Curb and gutter

will not be required. The cul-de-sac shall be constructed within the limits of permanent right-of-way.

DC3-013 MONUMENT BOXES. Monument boxes conforming to Standard Detail 13-5 shall be installed at all quarter section corners as an element of the street construction.

DC3-014 SIGHT DISTANCES.

A. Stopping Sight Distance--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 or near the design speed to stop before reaching a stationary object in its path.

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 (3.50 feet and 0.5 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 allow this, an area free of visual obstruction is required at every corner of an intersection. This area is known as the sight triangle.

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 so that the maximum sight distance is possible. As an element of this, location of intersections shall always consider the grade changes along the adjacent street in terms of possible sight obstructions.

C. Sight triangle requirements vary based on the type of intersecting streets and are summarized in the following table. 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 3.75 feet above the roadway surface (6.0 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 4.25 feet above the roadway surface).

Major Road Type	Required Clear Distance (ft)
Arterial	215
Collector	170
Residential	130

All corner lots within the city limits of Gardner shall have a sight triangle free of visual obstructions from a point 20 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 above. Such an area shall be and remain free of visual obstructions higher than three feet (3') and lower than ten feet (10') above the roadway surface.

DC3-015 UNDERDRAIN. In areas that have known subsurface moisture problems, underdrains will be required. They shall be built as shown in Standard Detail 40-11.

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.

DC3-016 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.

DC3-017 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.

DC3-018 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. Sidewalks constructed as part of this system shall be 10 feet in width with a 25' wide pedestrian easement. Trail materials shall include asphalt four inches in depth with a six inch crushed rock (AB-3) base underneath.