

STREET DESIGN AND ACCESS CONTROL

Technical Design Manual #4



January 2020

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I. INTRODUCTION

1.1 Policy

All streets within, and adjacent to developments shall be improved to City Standards. The developer is responsible for all costs associated with the required improvements.

Functional classifications for principal arterials and major or minor arterial streets are contained in the City's latest Transportation Master Plan. Functional classifications for other streets shall be determined by the Public Works & Utilities Director or his designee. Minimum required rights-of-way widths shall be in accordance with the City Code.

A traffic analysis by a traffic consultant is required for proposed developments determined by the Public Works & Utilities Director or his designee to have a large impact on the street system. The required elements of the traffic analysis are contained in Section 5 Traffic Impact Studies. The developer is responsible for the costs of the analysis as well as the costs for implementing the recommendations of the analysis.

Improvements to pedestrian design facilities shall meet the accessibility requirements of the Americans with Disabilities Act (ADA).

1.2 Definitions

For the purposes of this manual, the following definitions are used:

Alley: A public thoroughfare that affords only a secondary means of access to abutting property.

Developer: The individual, firm, corporation, partnership, association, syndicate, trust, or other legal entity that files the application and initiates proceedings for the development and/or subdivision of land in accordance with the City Code and said developer need not be the owner of record of said land.

Easement: A grant by the owner for the use of specified land by the public, a

corporation, or persons, for specific uses and purposes and so designated and recorded in the county recorder's office.

Intermediate intersection: The intersection of any collector or local street or major driveway with any major or minor arterial functioning as the through roadway.

Major intersection: The intersection of any principal arterial (freeway or expressway) major or minor arterial with any major or minor arterial. These intersections are typically found at the section corners as the section-line roadways intersect. The intersection of two principal arterials normally requires an interchange.

Major generator: Any development (commercial, industrial, residential, or mixed use) which generates more than 5,000 trips per weekday.

Major driveway: Any driveway, which intersects a major or minor arterial and serves the main parking area of a major generator, with all movements permitted.

Minor driveway: Any non-major driveway, which provides access to a major or minor arterial. The access can be full, i.e., all movements permitted, or with certain movements restricted.

Median: A raised or flush area designed to separate and control vehicular movement.

Pedestrian Way: A public walk dedicated entirely through a block from street to street and/or providing access to a school, park, recreation area or shopping center.

Right-of-Way: Any land which by deed, conveyance, agreement, easement, dedication, usage, zoning condition, process of law or other means is reserved for or dedicated to the general public for street, highway, alley, public utility, or pedestrian walkway purposes and accepted by the City.

Street: Any existing or proposed street, avenue, boulevard, road, bridge, viaduct, or easement for public vehicular access or a street shown in a plat duly filed and recorded in the county recorder's office. A street includes all land within the street right-of-way whether improved or unimproved and includes such improvements as pavement, shoulders, curbs, gutters, sidewalks, parking spaces, bridges, viaducts and traffic-control devices.

- 1) Arterial street: A major street of exceptional continuity that is intended to carry the greater portion of through traffic from one area of the City to another and is generally positioned at one-mile intervals. Major and minor arterials are designated in the current City Transportation Plan.
- 2) Collector street: A street designed with the primary purpose of collecting and distributing traffic, to and from, arterial streets.
 - a. Industrial collector: A collector street serving commercial, industrial or other land uses expected to generate high traffic volumes or substantial heavy truck traffic.
 - b. Residential collector: A collector street serving predominantly residential land uses.
- 3) Local street: Typically, a street of limited continuity with the primary purpose of serving only those lots, which are adjacent.
- 4) Cul-de-sac: A short local street having but one end open for vehicular traffic, the opposite end being terminated with a permanent turnaround.
- 5) Private street: A street not owned or maintained by the City.
- 6) Public street: A street owned and maintained by the City.
- 7) Driveways:
 - a) Commercial driveway: Access for retail, office, high density residential

or government/community service building.

- b) Industrial driveway: Access for large industrial, office park, mixed use, or warehouse developments, which may also accommodate heavy truck movements.
- c) Residential driveway: Access to single-family residence from local or collector street only. Access from an arterial street is not allowed in the city.
- d) Private shared driveway: driveway serving more than one lot.
- e) Parking lot access way: Access to and circulation among parking areas within an integral apartment or townhouse complex

1.3 General

The City has adopted Maricopa Association of Governments (MAG) Standard Specifications and Standard Details. Several of those have been modified, as shown in the City's Standard Details and Specifications. MAG specifications and details shall be used except where corresponding specifications or details have been adopted by the City.

The design standards presented within this manual should be treated as minimum standards. The American Association of State Highway and Transportation Officials (AASHTO) has published several design standard policies. Should a conflict between this manual and an AASHTO policy occur, the City's standards or policies shall apply.

All traffic control signs and pavement markings shall be in accordance with the Manual on Uniform Traffic Control Devices (MUTCD) prepared by the U.S. Department of Transportation and the City of Chandler's Standard Details. All traffic control materials used shall conform to Arizona Department of Transportation Standard Drawings and Specifications (ADOT) unless otherwise noted.

The City Engineer may promulgate additions or revisions to the standards as needs arise.

Each successive phase of a development must satisfy all of the requirements given within this manual. In addition, all arterial street improvement requirements must be satisfied with the first phase. In the case of large developments, the City reserves the right to require satisfaction of collector street improvement requirements with the first phase.

Right-of-way width and required improvements for each street classification are found in the City Standard Details. Newly constructed and reconstructed arterial streets are to be designed to accommodate on-street bike lanes, except where the necessary street width is not feasible because of right-of-way or existing development constraints. Bike lanes are to be marked on collector streets selected by City staff in consultation with the developer or neighborhood representatives.

A brief summary of the City's design standards is shown in Table 1. Each of the design standards is discussed in detail in the following sections.

II. ROAD ELEMENTS

2.1 Alignment

2.1.1 Horizontal Alignment

The minimum horizontal centerline radii shown in Table 1 are for normally crowned streets. The use of super-elevation to reduce the minimum horizontal centerline radii is prohibited on all streets except arterials. Super-elevation may be used on arterial streets upon approval of the Public Works & Utilities Director or his designee, providing the street cross-slope does not exceed 4.0%. The City reserves the right to modify the design speeds shown in Table 1 for arterial and collector streets when justified by special circumstances where overall safety is not compromised.

For special cases where the minimum tangent lengths shown in Table 1 cannot be achieved, the Public Works & Utilities Director or his designee may approve reduced requirements providing that sight distance and overall safety are not compromised. In general, intersection tangents will not be required where the radii for both streets are 400 feet or greater.

All street intersections with arterials or major collectors shall be at 90 degrees. All other street intersections shall not vary from 90 degrees by more than ±15 degrees.

Horizontal curves are not required when the necessary alignment change can be accomplished with a taper. Taper requirements are given below:

For Redirection of Through Lanes:

$$\begin{aligned} \text{For Speeds } \geq 45 \text{ MPH,} & \quad L = S \times W \\ \text{For Speeds } \leq 40 \text{ MPH,} & \quad L = \frac{WS^2}{60} \end{aligned}$$

For Entry Into Turn Bays:

$$L = \frac{S \times W}{3} \quad \text{Where} \quad \begin{aligned} L &= \text{Taper Distance in Feet} \\ S &= \text{Speed Limit in Miles Per Hour} \\ W &= \text{Offset Distance in Feet} \end{aligned}$$

Length, L = 100 feet minimum, and should be extended as required by sight distance conditions.

Please note that these taper requirements also apply when narrowing the improved street width, and may apply to widened sections if traffic lanes are being offset.

Desirable cross-street intersection spacing along arterial streets is at quarter-mile intervals. Intermediate intersections may be located a minimum of one-eighth mile from the nearest major intersection with a maximum of five intersections permitted per mile of arterial street. Desirable minimum distances between cross-street intersections are 125' along local streets, 250' along collector streets with no raised median, and 400' along collector streets with a raised median.

The maximum allowable block length is 1,200 feet and, generally, the maximum allowable length of cul-de-sac is 400 feet, measured from the intersection of the right-of-way lines at the throat to the extreme end of the bulb. Generally, "dog-leg" type cul-de-sacs are discouraged.

Bubbles are normally constructed at all two-legged intersections on local streets, see Figure 1.

TABLE 1
SUMMARY OF DESIGN STANDARDS

<u>ITEM</u>	<u>ARTERIAL</u>	<u>COLLECTOR</u>	<u>LOCAL</u>
Design Speed (mph)	55	40	25
Minimum Horizontal Centerline Radius (ft.)	1,800	700 (with driveways)	250 (with driveways)
		400 minimum (no driveways)	150 minimum (no driveways)
Minimum Tangent Length at Intersections (ft.) (Measured from the intersection center line)*	550	300	150
Cross-Slope (%)	2.5-3.0	2.0-3.0	2.0-3.0
Maximum Longitudinal Slope Change Not Requiring a Vertical Curve (%)	1.0	2.0	2.0
Stopping Sight Distance (ft.) Height of eye 3.5 ft., and Object height 6 in.	495	305	200
Minimum Vertical Curve Length, Crest (ft.) A=Algebraic Difference in Grades (%)	220 x A	80 x A	20 x A

Minimum Vertical Curve
Length, Sag (ft.)
A=Algebraic Difference in
Grades (%)

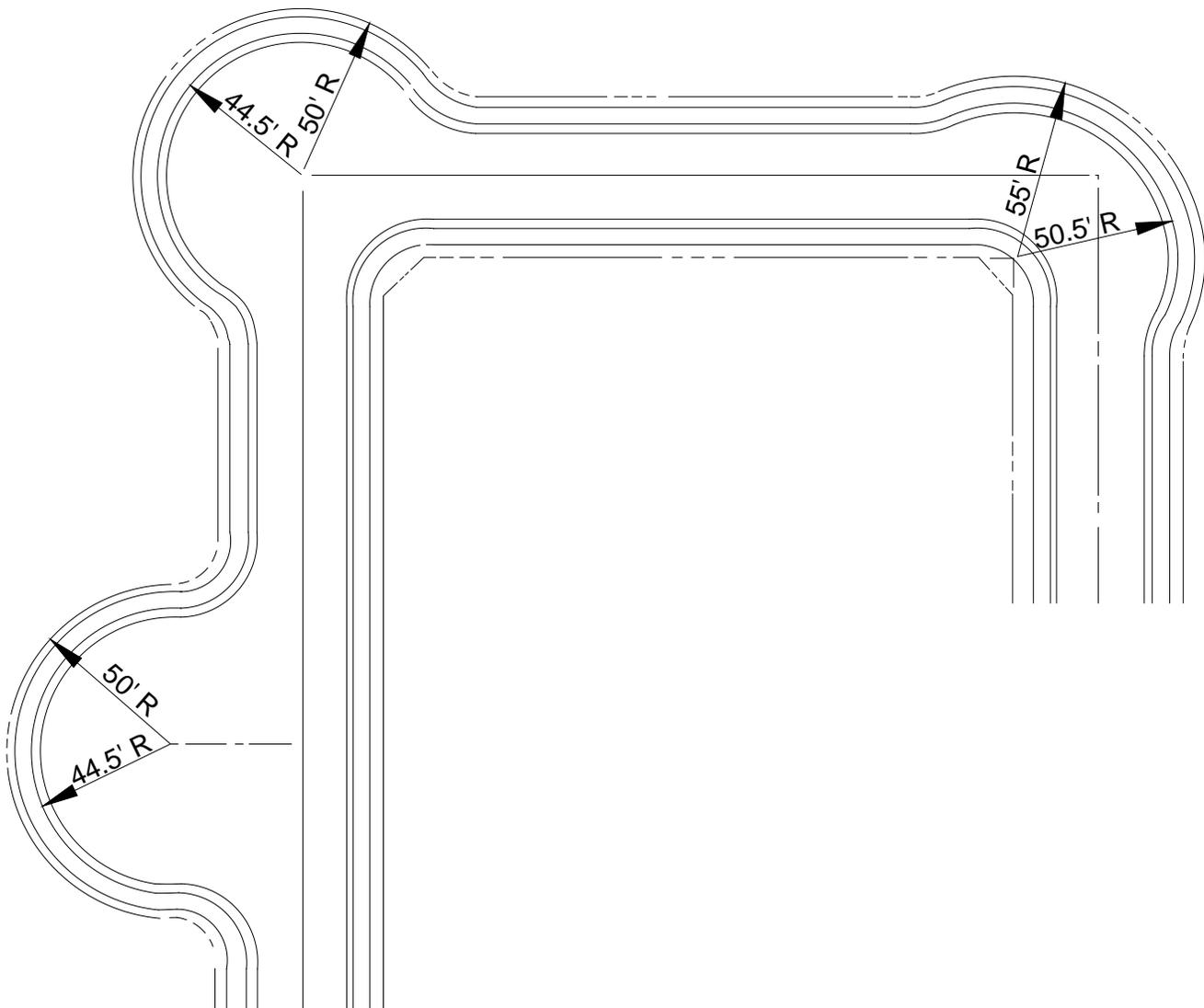
130 x A

70 x A

30 x A

*Not required on a local or collector street approach with a centerline radius ≥ 400 feet or more.

FIGURE 1 – BUBBLES FOR STREETS



2.1.2 Vertical Alignment

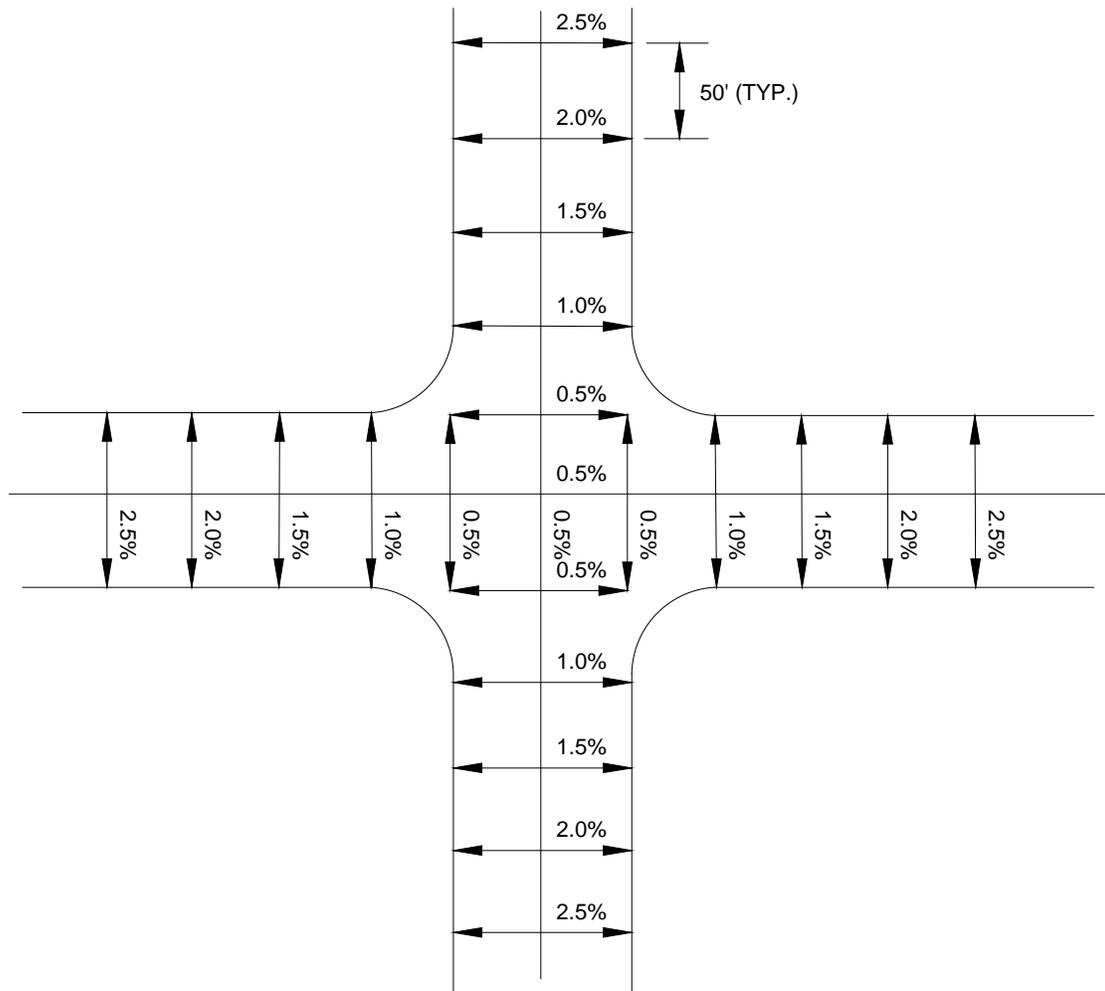
Variances to the slope requirements shown in Table 1 may be approved by the Public Works & Utilities Director or his designee if the following conditions are met:

- 1) The variance must be justified on an engineering basis,
- 2) No alternatives are available,
- 3) Safety is not compromised,
- 4) Drainage problems will not be created, and
- 5) The variance benefits the City.

The minimum vertical curve lengths shown in Table 1 are preferred values. The Public Works & Utilities Director or his designee may approve shorter lengths if justified by a detailed analysis and if safety is not compromised.

A design aid for street cross-slopes at intersections along arterial streets and along major collector streets is presented in Figure 2. This figure should be treated as a conceptual guideline, not an absolute requirement. The objective of this design aid is to provide for the smooth flow of traffic through intersections. The street longitudinal and cross slope requirements shown in Table 1 do not apply within the intersection, except for the maximum longitudinal slope change not requiring a vertical curve. However, positive drainage must still be achieved.

FIGURE 2 – DESIGN AID FOR MAJOR INTERSECTION CROSS-SECTION



2.2 Road and Right-of-Way Widths

In general, right-of-way widths shall follow City Standard Details C-203 – C-223.

2.2.1 Public Streets

Arterials

All newly constructed or reconstructed arterial streets shall be marked with bike lanes. Arterial street bike lanes shall generally be five feet wide, not including any part of an adjacent gutter pan. Vehicle lane widths on a six-lane arterial street shall be 12 feet for lanes next to the median and next to the bike lanes, and 11 feet for the center through lane in each direction of flow. See City Standard Detail C-619.

For remarking of existing arterial streets, lane widths are as follows:

- A two-way left turn lane shall be at least 10 feet wide, 10.5 feet preferred.
- A vehicle through lane shall be at least 10.5 feet wide, 11 feet preferred.
- A vehicle through lane next to a median curb or bike lane shall be at least 11 feet wide, 12 feet preferred.
- A bike lane shall be at least four feet wide, but the bike lane shall be increased to a width of five feet where possible with the preferred vehicle lane widths listed above. Gutter pans shall not be included in the measurement of bike lane widths.

Along existing arterial streets too narrow to provide bike lanes, the outside lane will be made as wide as possible by using the minimum vehicle lane widths described above for the center and inside lanes.

Collectors

A 45' collector road (to back-of-curb) may be striped in a number of ways to accommodate vehicular traffic, bikes, and on-street parking. Three typical configurations are shown below:

- An 11' two-way left turn lane (TWLTL), one 11' travel lane and 4' bike lane (as measured to the lip-of-gutter) in each direction.
- A straight centerline with a 14' travel lane and 8' parking lane (as measured to the face-of-curb).
- A straight centerline with a 12' travel lane, a 3.5' hatched buffer, and 5' bike lane (as measured to the face-of-curb) in each direction.

2.2.2 Private Streets

Private streets are subject to all of the requirements for public streets except for the minimum allowable widths shown in Table 2. Continuous through streets cannot be comprised of both public and private roadway sections.

Street name signs, City Standard Details C-601 and C-605, shall be installed at all private street intersections.

TABLE 2

MINIMUM WIDTH REQUIREMENTS FOR PRIVATE STREETS

Road Width (to back-of-curb, ft.)	Private Street Tract Width (ft.)	Parking
25	33	None allowed *
29	37	One side only *
35	43	Both sides

- 1) Refer to Section 2.3 for applications of these standards.
- 2) Refer to Section 2.7 for sidewalk requirements. The width shown assumes 4 ft. sidewalk on both sides. Tract width requirements with a 5 ft. sidewalk increase by 2 ft. to 35, 39 and 45 feet, respectively.
- 3) *Refer to Fire Department Detail FD111 for Fire Lane signing and marking requirements.

2.2.3 Cluster Developments with Private Shared Driveways

Cluster developments with a private shared driveway shall adhere to the configuration options shown in Figure 3 and the requirements shown below:

Design Standards

- a. Private driveway specifications shall be per City Standard Detail C-214. Minimum width is 24'.
- b. Driveway entrance per MAG Standard Detail 250. Additional sidewalk easement may be required.

General Requirements

- a. Solid waste collection will be picked up only on private or public streets in a designated area. For private street widths less than 29', an additional (off street) designated area will be required.

Utility Requirements

- a. Standard water, sewer and electric locations are shown on City Standard Detail C-214.
- b. Separate easements or P.U.E.'s are required for water meters, fire hydrants, transformers, streetlights, utility pedestals, etc.
- c. All dry utilities shall be joint trenched within the 24' P.U.E.
- d. Some type of private streetlights are to be provided.
- e. Water shall be 6" minimum on a private drive.
- f. GPS coordinates shall be provided for all bends in water and sewer service lines.

Planning and Platting Requirements

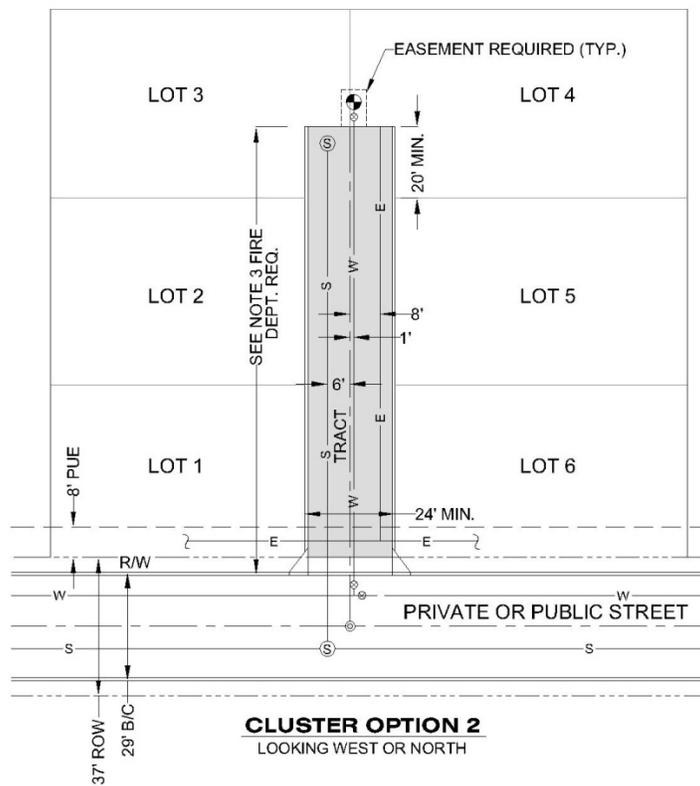
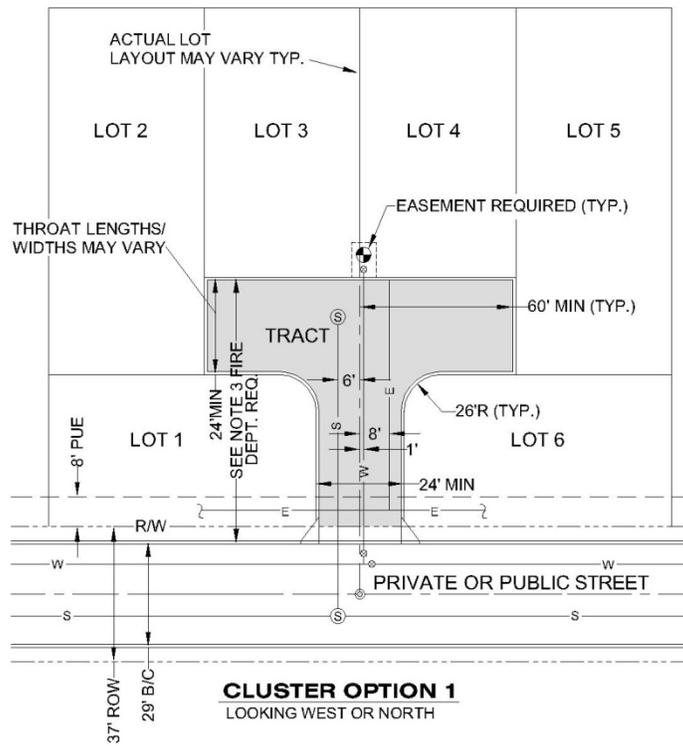
- a. The 6-pack cluster options shown are the standard approved lot configurations. Other configurations may be approved by the Public Works & Utilities Director or designee.
- b. Each private driveway shall be designated as a tract and responsibility dedicated appropriately.
- c. Easements required over private driveway (tract) shall be dedicated appropriately in this order:
 1. Water & Sewer Easement (to City of Chandler).

2. Public Utility Easement
3. Cross Access Easement
4. Drainage Easement

Fire Department Requirements

- a. No parking will be permitted on private driveway. Visitor parking must be provided in designated areas.
- b. See City Fire Department Detail FD-111 and/or FD-112 for fire lane signage and parking restrictions on a private street.
- c. Private driveway shall have a turnaround (hammer head) as shown on Cluster Option 1 or when Cluster Option 2 depth exceeds 150'. This supersedes City Fire Department Detail FD-141 requirements.

FIGURE 3 – CLUSTER CONFIGURATION OPTIONS



2.3 Parking

This section deals specifically with on-street parking on private residential streets. It clarifies the requirements that will allow use of a 25-foot wide private road within developments, as specified in Table 3 of Section 2.2.2. The rules that follow do not apply to apartments, or developments similar to apartments, where all parking is already commonly shared. Exceptions to this rule may also be permitted in very large lot (greater than 90' lot frontage) subdivisions where circular or very long driveways can accommodate large number of visitors parking privately on the same lot.

A 25-foot wide road requires that 'No Parking' be permitted on both sides of the street. In such instances, all residential developments must have adequate visitor parking within a convenient distance of individual lots to ensure that drivers do not park on-street. This 'No Parking' requirement allows for safe access by emergency vehicles, and provides for two-way circulating traffic.

The City Code Section 47-14 currently specifies that *"The minimum allowable width of the private streets will be determined by the City Engineer based on projected traffic volume and availability of off-street parking."* As a general rule, a minimum of 10 parking spaces or 0.25 spaces/unit, whichever is greater, will be required for on-site visitor parking before a 25-foot wide private road will be considered. Visitor parking spaces are defined as common-area spaces, and are in addition to the parking for individual units (i.e. driveway parking). These commonly shared parking spaces may be grouped together for convenience, but must be evenly spaced throughout the site to minimize the walking distance to individual lots.

2.4 Intersections

2.4.1 Allowable Intersection Types

Design types permitted for major intersections on arterial streets are as follows:

- Basic crossing with four legs.
- T-intersection with three legs.
- Roundabouts

No five- or six-leg intersections are permitted.

2.4.2 Corner Radii

Curb return radii requirements are shown on Table 3. Deviations from this standard will required City staff approval.

TABLE 3
TYPICAL INTERSECTION CURB RETURN RADII

Type of Intersection	Typical Radii (Face-Of-Curb), ft.
Arterial-Arterial, Arterial-Collectors, and Industrial Roads	30
Arterial-Locals*, Collector-Collectors, and Collector-Locals	25
Local-Locals	20

* For gated entries, refer to Table 6A for driveways.

2.4.3 Sight Distance

Corner sight distance requirements at intersections are given on City Standard Details C-246 and C-247. An additional requirement from the Zoning Code, known as the "triangle area," is shown in Figure 4. There is an additional engineering requirement for traffic control device visibility noted on Figure 4.

No obstructions of any type over 18 inches high, including landscaping, are allowed within 1 foot of the back-of-curb.

Stopping sight distance is the minimum sight distance allowable for all intersection approaches. Minimum stopping sight distances are shown in Table 1 for flat terrain. Roadways on grade will increase or decrease these distances, and in such

cases, references such as the American Association of State Highway Transportation Official's (AASHTO) policies and guidelines for roadway design should be consulted.

Three types of movements for traffic entering a major street from a minor side street or driveway result in three different sets of sight distance requirements:

1. Right turns from the minor street onto the major street
2. Left turns from the minor street onto the major street
3. Left turns into the intersection or access point from the major street

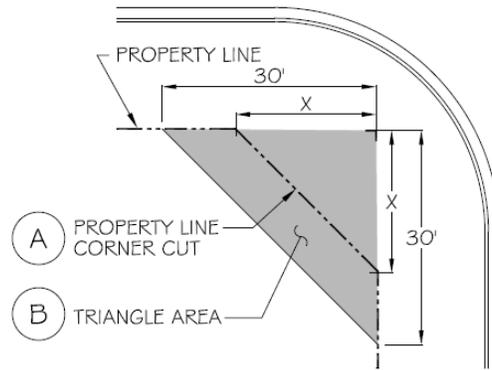
Sight-distance requirements for entering arterial or collector streets are shown on City Standard Detail C-246. Heights of buildings, walls, landscaping and other similar obstructions should be restricted within the sight triangles. Sight distance is measured from a driver's eye height of 3.5 feet to an approaching target 4.25 feet high.

Along local or collector streets with residential frontage where motorists can expect frequent conflicts with vehicles entering or exiting driveways, a minimum sight distance of 200 feet is required, as illustrated in City Standard Details C-247 and C-248. As explained above for arterial and collector streets, heights of obstructions should be restricted within the sight triangles to provide a clear field of vision from a driver's eye height of 3.5 feet to an approaching target 4.25 feet high.

2.4.4 Corner Restrictions

The City's Municipal Code Chapter 48-10.2 (Public Works - Subdivision) specifies a range of triangular cutoffs for the corner property line at intersections. Additionally, Figure 4 below requires that the 30' x 30' area be kept clear of visual obstructions between 2' and 6' in height.

FIGURE 4 – TRIANGLE AREA



NOTES:

- (A) X = 10' FOR ALLEYS
 15' FOR LOCAL-LOCAL INTERSECTIONS,
 20' FOR ALL OTHER INTERSECTIONS,
 PER MUNICIPAL CODE CHAPTER 48-10.2
- (B) GROUND COVER, FLOWERS, AND GRANITE LESS THAN 2' (MATURE) IN HEIGHT
 AND /OR TREES WITH BRANCHES NOT LESS THAN 6' ABOVE GROUND IN THIS
 AREA.
 TREES SHALL NOT BE SPACED LESS THAN 8' APART.
 PER MUNICIPAL CODE CHAPTER 35-2204

SEE STANDARD DETAIL NO. C-246, C-247 AND C-248 FOR SIGHT DISTANCE
 REQUIRED AT DRIVEWAYS AND INTERSECTIONS.

2.5 Clearance to Obstructions

Streetlight poles, utility poles, and similar obstructions are not allowed within 1 foot of a sidewalk. Streetlight poles are not allowed within 2.5 feet of the back-of-curb. Utility poles and similar obstructions are not allowed within 5.5 feet of the back-of-curb, but obstructions may be located as close as 2.5 feet from back of curb when adjacent to deceleration lanes, parking lanes, right turn lanes or bus bays. All dimensions above refer to face-of-pole.

2.6 Medians

Raised medians shall be installed on all new arterial streets complete with curbs, pavers and landscaping, unless otherwise specified. Flush medians may be installed on arterial reconstruction projects where flush medians currently exist, with approval of the Public Works & Utilities Director or his designee.

Median breaks shall generally be constructed at one-eighth, one-quarter, and one-half mile spacing from major intersections. All other median breaks must be justified by a traffic study *and approved in writing by the City Transportation Engineer. Please refer to Section 6.4 for details on other access spacing.* Median breaks will not be allowed in medians of less than 14 feet in width.

Raised median noses shall be designed as shown in Figures 5 and 6. Typical median designs are shown in City Standard Details C-225, C-226, and C-227. Median terminations at midblock locations not at a driveway or intersection shall be semi-circular.

When designing oversized raised medians that allow for future widening from four lanes to six lanes, the left turn bays shall be constructed at their ultimate locations.

FIGURE 5 - TYPICAL MEDIAN NOSE LOCATION

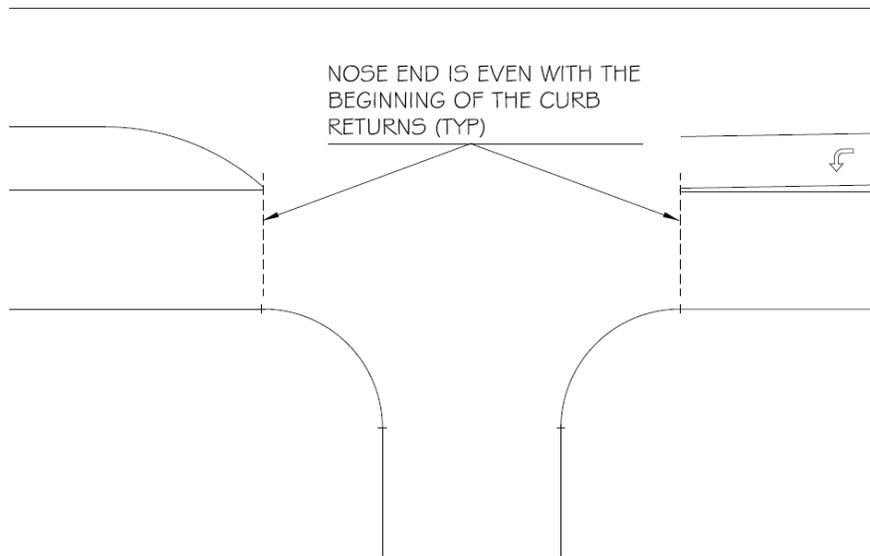
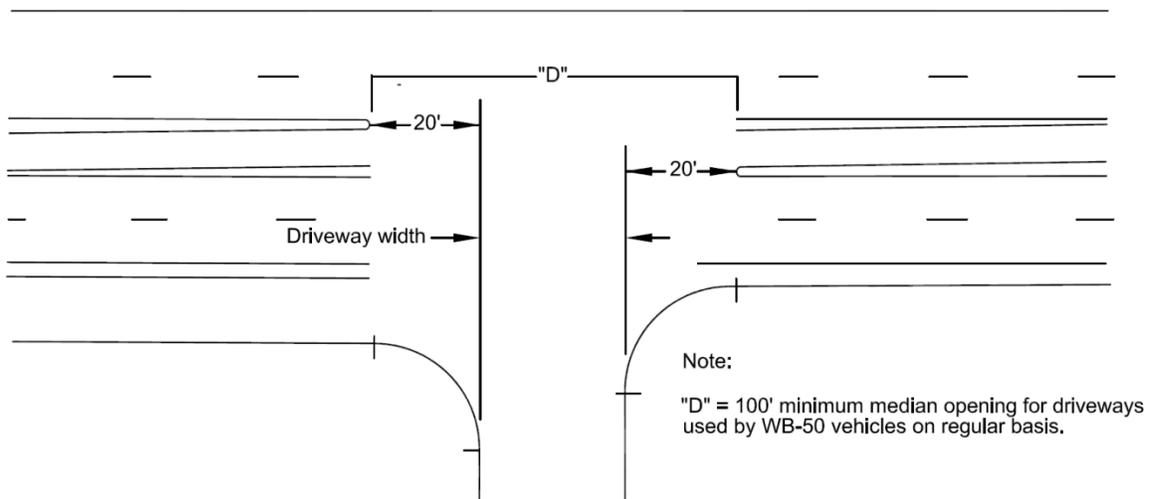


FIGURE 6 - MEDIAN NOSE AT DRIVEWAY ENTRANCE



2.7 Sidewalks

Sidewalks shall be provided along all arterial, collector and local streets as shown on Typical Cross Section Standard Details C-203 – C-222. Typical minimum width is 6 foot for arterials and 5 foot for collectors and locals. In areas with high pedestrian volumes, wider sidewalks may be required. Construction shall be per MAG Standard Detail 230, and may be modified to 4 foot minimum provided that, per ADA, a 5 foot by 5 foot passing area is provided every 200 feet to allow wheelchairs to pass on all sidewalks. Driveways and other connecting sidewalks may be used to provide the passing area, as long as the cross-slope is less than 2%.

2.8 Street Lights

Please refer to the City's Street Light Design (Technical Manual #6).

2.9 Drainage

Valley gutters are not allowed to cross arterial streets under any circumstances. Six-foot wide gutters (per MAG Standard Detail 240) are to be used where there is stop control for through traffic and eight-foot (mid-block) valley gutters (per City Standard Detail C-233) are to be used where there is no stop control.

For inlet options and requirements, refer to City Drainage Policies and Standards, TDM #3.

Storm drains are normally installed whenever the 10-year design storm flows cannot be contained within the top-of-curbs. However, the installation of 7-inch vertical curb instead of the standard 6-inch vertical curb may eliminate the need for storm drains. The use of 7-inch vertical curb requires special approval of the Public Works & Utilities Director or his designee and may only be installed on short sections of street near the drainage inlets.

2.10 Deceleration Lanes

Left turn and right turn lanes shall be provided on all approaches to major (arterial-arterial) intersections as shown in City Standard Detail C-223. Left turn lanes shall be provided on all median breaks, and right turn lanes shall be provided where warranted by projected traffic demands (per Section 2.10.1).

Where turn lanes are constructed, length of storage lanes shall be a minimum of 100 feet. Turn lane lengths at intersections for which traffic signals may be warranted shall be designed to accommodate 15 to 20-year traffic demands with less than a 5-percent probability of overflow during peak flow periods. Design guidelines for deceleration lanes on arterial streets are presented in City Standard Details C-224, C-225, C-226, C-227 and C-231. In most cases, it is preferable to provide more turn-lane storage rather than longer taper lengths.

Where the demand warrants and cross-sectional widths are available on both the intersecting streets, dual right-turn and/or left-turn lanes can be incorporated.

If additional right-of-way is required above the normal right-of-way requirement in order to construct a deceleration lane or the sidewalk associated with a deceleration lane, it is the developer's responsibility to provide it. Normally, the right-of-way required will extend a minimum of 4 feet back of the sidewalk.

2.10.1 Right Turn Deceleration Lanes

A right turn deceleration lane shall be provided at cross streets and driveways when projected right turns into the site exceed 40 vehicles for a typical peak hour.

Where successive driveways are less than 400 feet apart (nearest edge to nearest edge), a continuous right turn lane rather than separate right turn lanes shall be constructed. Where a driveway warranting provision of a right turn deceleration lane is located less than 450 feet in advance of an arterial cross street, a continuous right turn lane rather than separate right turn lanes shall be constructed.

Driveways are not permitted within the taper itself. All driveways shall be contained within the fully developed deceleration lane itself, including the curb returns. The design of a continuous right-turn deceleration lane should not continue through a full-access intersection or driveway entrance (median break).

The City Transportation Engineer on a case-by-case basis may waive the right turn deceleration lane requirement.

2.10.2 Left Turn Deceleration Lanes

Left turn deceleration lanes are required as specified in Section 2.10. On arterial streets without a median (roadways not yet upgraded to City standards), temporary widening shall be constructed to accommodate a left turn lane and through lane redirection tapers as shown in City Standard Detail C-229.

2.11 Bus bays

1. Placement of Bus Bays.

- A. All Bus bay locations must have prior written approved of the City's Transportation Engineer and must be consistent with the City's Transportation Master Plan.
- B. Bus bays will generally be placed at one mile intervals along arterial streets with existing or planned bus routes, adjusted as necessary to ensure that boarding and de-boarding will be convenient for service to abutting land uses. Additional bus bays, if warranted, may be spaced at one-half mile intervals, but in no case spaced less than one-quarter mile apart.
- C. Generally bus bays should be installed only at signalized intersections.
- D. Bus bays should be located at the far side of street intersections (on departures from the intersection) and within two hundred feet (200') of signalized intersections.
- E. Bus bays should not be installed at mid-block locations.
- F. Bus bays may be integrated with right-turn deceleration lanes. The integrated design will provide a constant lane cross-slope with no valley gutter existing or constructed between the through travel lanes and the combination bus bay/ deceleration lane.

- G. Bus bays should be located at route transfer points and layover locations at the end of bus routes.
- H. Bus bays should be located at stops with high peak period passenger boardings, or at stops with a high proportion of wheelchair or bicycle boardings.
- I. Right-of-way impacts and utility relocations should be avoided or minimized when determining bus bay locations.
- J. Bus bay locations will be prioritized and programmed in the City's Capital Improvements Program based on the following criteria: average daily traffic volumes, street lane capacity, frequency of bus service and average number of passenger boardings.
- K. The City will require dedication of right-of-way from new developments along existing and planned transit routes for construction of bus bays and associated landing and shelter pads.

2. Design and Construction of Bus Bays

- A. Bus Bays shall be constructed of concrete and designed in accordance with City of Chandler Standard Details and Specifications C-230 when not integrated with a deceleration lane and with C-231 when integrated with a deceleration lane.
- B. Bus bays should be incorporated into the design and construction of larger arterial street and intersection improvement projects to reduce costs.
- C. All bus bays should include a concrete pad of sufficient dimensions located behind the adjacent sidewalk to accommodate a passenger shelter, bench, trash receptacle and advertising/information kiosk.

2.12 Bus Shelters

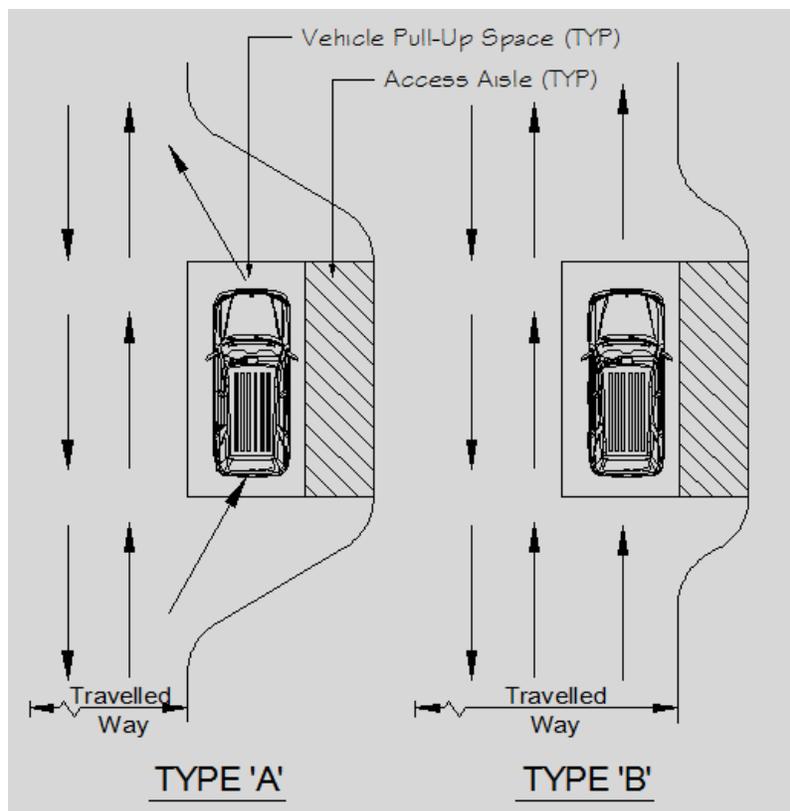
- A. Advertising at bus stops located on arterial streets areas should be permitted to offset the costs of installing and maintaining passenger shelters and associated fixtures.
- B. Advertising revenues will be used to offset transit operating costs.
- C. All new passenger shelters should be lighted or located in proximity to an existing streetlight.
- D. Where irrigation is available, landscaping and shade trees should be provided in proximity to the shelter pad to increase shade to the passenger waiting area.
- E. The design of developer installed bus shelters and associated fixtures require prior written approval of the City Engineer before construction. Shelter ownership, long-term maintenance responsibilities, and replacement cost due to damage are primary considerations.
- F. All new bus stops shall meet the accessibility requirements set forth under the Americans with Disabilities Act (ADA).
- G. For existing bus stops, any necessary upgrades to meet ADA requirements shall occur with adjacent projects including mill and overlay, private development and CIP.
- H. Bus shelters should only be installed along streets served by a transit route.

2.13 Passenger Loading Zones (Autonomous Vehicles and Ride Sharing)

This section deals specifically with passenger loading zones intended for on-site passenger drop-off and pick-up scenarios, but may also be applied to public rights-of-way with the approval of the City Transportation Engineer. Please reference City Zoning Code Section 35-1808 and Chandler Building Code for other requirements or allowances.

Generally, there are two types of passenger loading zone scenarios provided to accommodate traffic flow, travelled way width restrictions and other site or design considerations. For Type 'A' both the vehicle pull-up space and access aisle are outside the travelled way, while Type 'B' only the access aisle, as shown on Figure 7 below.

FIGURE 7 – PASSENGER LOADING ZONE TYPES



Further guidelines are listed below and presented on City Standard Detail C-261. This section provides general guidance on a variety of curbing and accessible ramp

options, some of which are shown, that may be tailored to meet the needs of each site.

- 1) Access aisles shall be marked as shown and must connect to an accessible route to the building.
- 2) Access aisles shall be at the same level as the vehicle pull-up space they serve and shall not overlap the travelled way.
- 3) Access aisles and pull-up spaces shall have slopes no steeper than 2% in any direction.
- 4) Passenger loading zones shall be signed as shown.
- 5) Bollards or other types of barriers may be used adjacent to loading zones as long as minimum ADA widths are provided.
- 6) All single loading zones shall be accessible. For multiple and continuous loading zones, one accessible loading zone shall be provided every 100 feet.

III. PAVEMENT STRUCTURAL DESIGN

3.1 Flexible Pavement

City Standard Details C-203 through C-222 for street cross-sections also include notes referring to the appropriate City Standard Detail for asphaltic pavement thickness and the appropriate MAG Standards for material requirements.

3.2 Rigid Pavement

Rigid pavements, such as Portland cement concrete, are generally not used for City streets. If rigid pavements are used, each design must be approved by the Public Works & Utilities Director or his designee on an individual basis.

3.3 Decorative Pavement

The use of interlocking paving blocks in roadways and medians must be approved by the Public Works & Utilities Director or his designee. When approved, they shall be installed in accordance with MAG Standard Detail 225 using pattern and stone per City List of Approved Products. In addition a minimum of 25 paving blocks of the type installed must be deposited free of charge at the City's maintenance yard for future City maintenance operations.

The use of decorative concrete may be approved optionally by the Public Works & Utilities Director or his designee.

3.4 Miscellaneous Pavement Standards

For cases where the full depth of base course cannot be constructed due to insufficient cover over existing facilities, the City reserves the authority to approve equivalent alternate designs if justified.

The minimum pavement cross-sectional requirement for temporary turnarounds, which are constructed at project phase lines, is 6 inches of aggregate base course over 6 inches of subgrade; see MAG Standard Specifications Sections 301, 310 and 702. If the temporary turnaround is constructed at a project boundary, a surface course of 2 inches of asphaltic concrete is required in addition to the base and subgrade noted above; see MAG Standard Specifications Sections 321 and 710, without lime.

Temporary pavement cross-sections shall consist of 2 inches of asphaltic concrete over 6 inches of aggregate base course over 6 inches of subgrade, see the same MAG Standard Specifications sections noted above.

Sub-grade relative compaction requirements for curbs, gutters and sidewalks are presented below. These shall be used in place of Section 301.3 of the MAG Standard Specifications.

<u>SWELL, %</u>	<u>COMPACTION, %</u>
0 to 1.5	Minimum of 85
Greater than 1.5	Minimum of 80, Maximum of 90

Note: The swell percentage is determined by placing a sample compacted, remolded, at 2 to 3 percent below the optimum moisture content, Standard Proctor Test, in a consolodometer apparatus and applying a 100 psf surcharge. The sample is then saturated and swell values are determined.

IV. TRAFFIC CONTROL DEVICES

4.1 Signing & Striping

Yield signs may be placed at intersections with no acceleration lane where the safe entry speed is greater than 10 MPH. All yield sign use and placement shall be by the approval of the Public Works & Utilities Director or his designee.

All signs must be manufactured of "ASTM D-4956-04 Type IV Sheeting" which will be attached to the standard signage aluminum plates. Sign imaging shall be in compliance with the reflective sheeting manufactures matched component system. Sign imaging shall consist of an acrylic based electrocut film or silk screened using inks (depending on the quantity of signage) with standard highway colors.

Barricades, MAG Standard Detail 130 Type "B," are required at all dead end streets and street stub-outs, except cul-de-sacs. An end of road marker (18"x18"), MUTCD OM4-3 (retro-reflective red diamond panel), spaced on 5 foot center along the barricade are required. A turn-around area is also required (see Sections 6.3 of this manual).

Deceleration and right-turn lanes are signed and striped in accordance with Detail C-620 of the Standard Details and Specifications Document.

Speed limit signs, MUTCD R2-1, are installed on all local and collector streets at approximately 100 to 200 feet from arterial intersections. Speed limit sign locations on arterial streets are shown in Detail C-621 of the Standard Details and Specification Document. The posted speed limit for local streets is 25 mph. The posted speed limit for collector and arterial streets is determined by the City Transportation Engineer, based upon individual circumstances. No parking signs, MUTCD R8-3a, are 24" x 24" on arterials and 18" x 18" on all other streets.

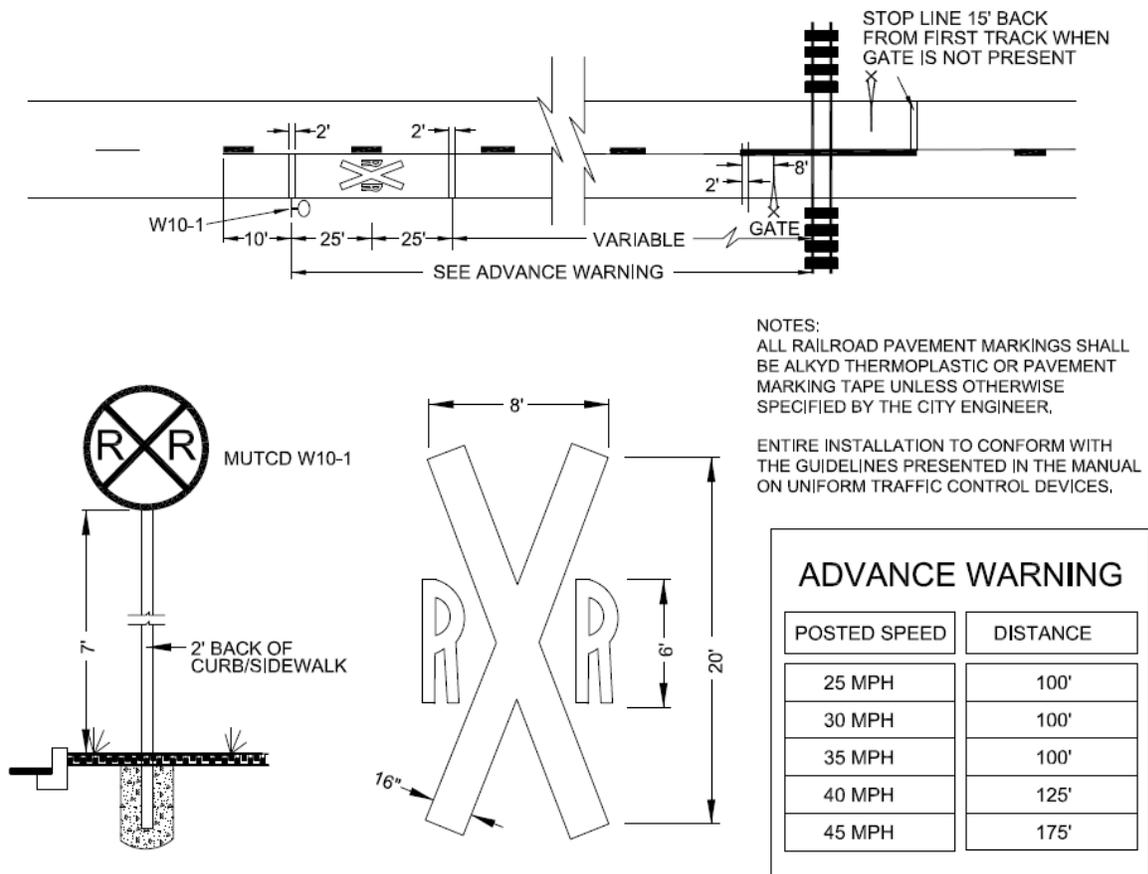
Arterial and collector signage and striping standards are shown on Detail C-600 through Detail C-623. Reflective markers are required on all arterial streets. On collector streets reflective markers are required only along street sections with unusual conditions, such as: intersection approaches where through lanes converge

after the end of a median or left turn lane. Where conditions require use of reflective markers, the markers are to be installed from a point 500 feet or more in advance of the conditions to a point 500 feet or more beyond the conditions. Pavement markers shall be prismatic reflectors only.

Typical median signage is shown on Detail C-600 of the Standard Details and Specifications.

Typical railroad crossing signage and striping is shown on Figure 8.

FIGURE 8 - RAILROAD MARKINGS



Developments are required to supply and install sign posts at all intersections for new stop signs and street name signs. Public street name signs will be installed by the City after payment of the prevailing fees by the developer. This is the only case where the City will perform any work associated with a development. Private street name signs are the responsibility of the developer.

Signal conduit, 4-inch diameter schedule 40 PVC with detectable mule tape and with ADOT No. 7 pull boxes, is installed at all legs of arterial intersections where median breaks are present, including arterial-arterial intersections. See ADOT Standard Detail T.S. 1-4 for No. 7 pullbox.

Traffic signal interconnect conduit and fiber are required on all arterial roads. Interconnect conduit shall be 4-inch conduit with three 1¼ inch innerducts colored red, orange, and black. All unused innerduct shall have 2500-lb detectable mule tape installed with detectable members spliced across pullboxes, creating a continuous detectable run. ADOT standard #9 pullboxes shall be installed at all arterial/arterial intersections, or as designated by Traffic Engineering staff. ADOT standard #7 pullboxes with extension shall be installed at ¼ mile intervals, or as designated by Traffic Engineering staff. All conduits shall enter pullboxes with 45 degree sweeps with no less than a 36-inch bend radius. Every effort shall be made to minimize variations in the conduit profile (i.e. bends, vertical & horizontal shifts, etc.)

4.2 Half Road Standards

Generally, developments are required to construct all full roads internal to the development, and half-roads bordering the development.

A half-road shall be a minimum of 24 feet from face-of-curb to the edge of pavement.

For arterial and collector half-roads with a raised median, the half-road shall include the full raised median, and one through lane in the opposing direction. Arterials with flush medians and two-way-left-turn lanes should be treated in the same manner.

All typical road infrastructure requirements (such as street lights, landscaping, irrigation, sidewalk, etc.) shall apply to half-roads. There may be other additional

improvements, as deemed necessary by the Public Works & Utilities Director or his designee.

4.3 On-Street Parking with Bulb-Outs

The following requirements shall apply for all on-street parking using bulb-outs. See City Standard Detail C-215 for the typical street cross-section. The standard allows for both the normal crown and valley gutter option; however, additional drainage considerations will be necessary when not using a valley gutter.

Parallel parking spaces shall be 8' x 22'. Angle parking spaces shall be 9' x 19' (measured perpendicular to face-of-curb) at a standard angle of 60 degrees. See City Standard Detail C-260 for further details and requirements.

Figure 9 and 10 illustrate the placement of trees, street lights, utility boxes, etc. See Fire Department Standard Details for further requirements, and also Downtown Streetscape Guidelines for additional recommendations.

4.4 Accessible Parking Spaces

Per the Proposed Rights-of-way Access Guidelines (PROWAG) R309, accessible parking spaces are required whenever “marked” on-street parking spaces are provided on a City block. The number of required spaces is 4% of the total number of spaces on that block, with a minimum of one per block.

PROWAG requires access aisles only in specific situations where sufficient sidewalk width is provided. (See PROWAG R309) For parallel parking, an available sidewalk width of 14' or more will require an access aisle. When used, the accessible spaces shall conform to Standard Detail C-260, Page 2.

For existing designated on-street parking spaces, any necessary upgrades to meet ADA requirements shall occur with adjacent projects including mill and overlay, private development and CIP.

FIGURE 9 - STREET FURNITURE AND UTILITY LOCATIONS

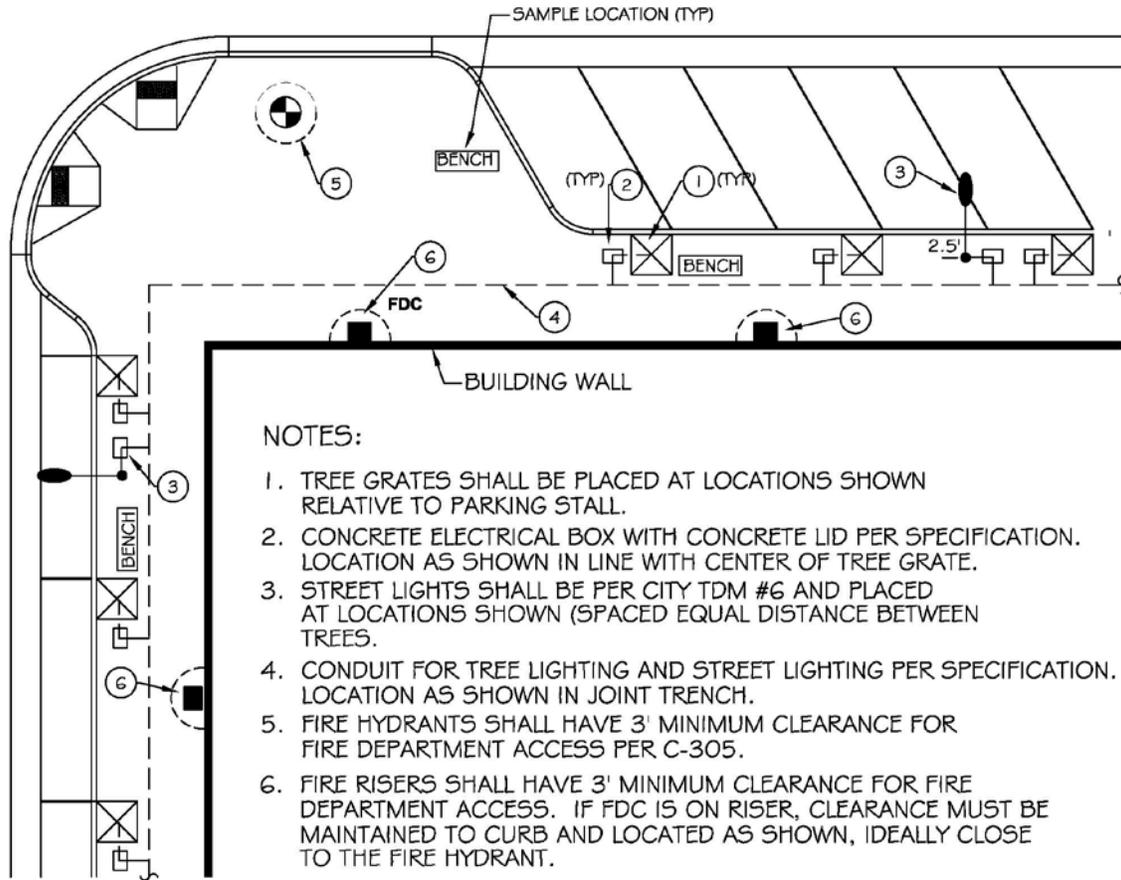
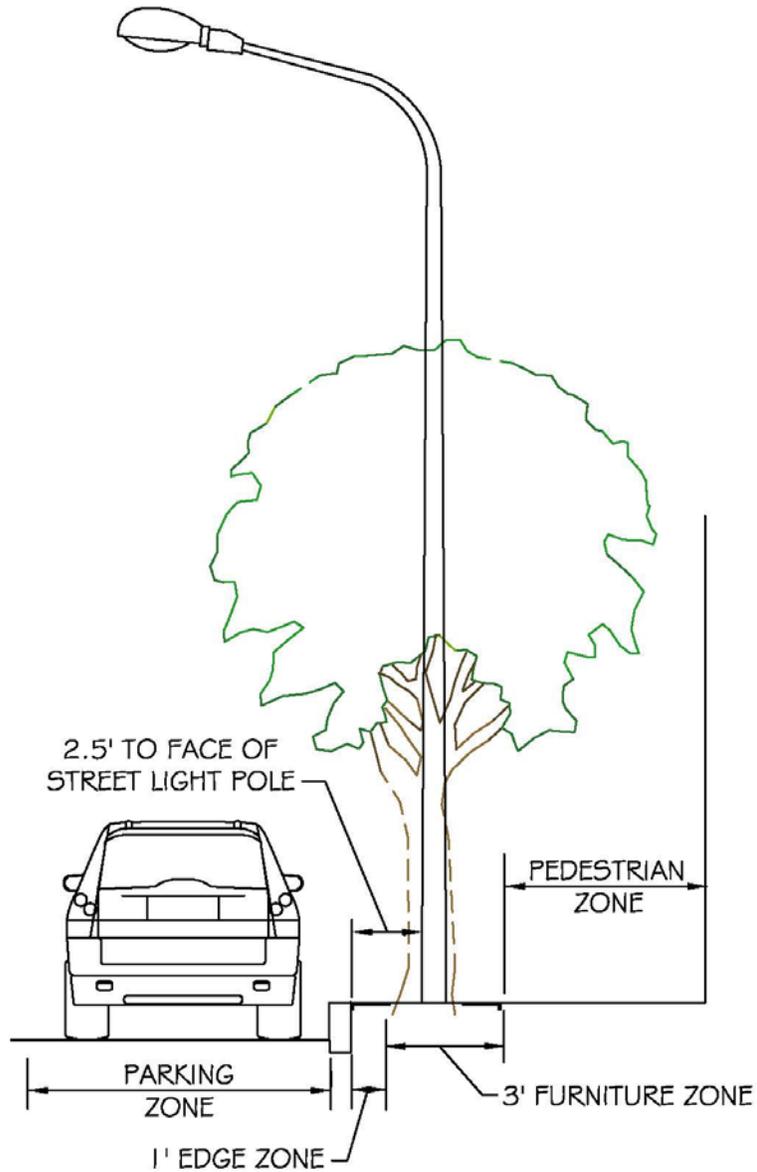


FIGURE 10 - TYPICAL ON-STREET PARKING CROSS SECTION



ZONE	NOTES
PARKING	PARALLEL OR ANGLE PARKING.
EDGE	NO ABOVE GROUND OBSTRUCTIONS ALLOWED.
FURNITURE	SIGN POSTS, STREET LIGHTS, TREES, BENCHES, BIKE RACKS, ETC.
PEDESTRIAN	TYPICALLY 6' WIDE OR MORE, BUT NO LESS THAN 4' TO MEET ADA. ENTIRE ZONE SHALL BE WITHIN RIGHT-OF-WAY OR PUBLIC EASEMENT.

4.5 Traffic Signals

If new development requires the relocation of existing traffic signals, the developer is responsible for the redesign and all costs associated with reconstruction. The redesign must be submitted to the City for approval prior to relocation.

Traffic signals will be installed upon satisfaction of warrants contained in the current edition of the Manual on Uniform Traffic Control Devices. The warrants shall be factored to exclude right turn movements. Warrants must be used in conjunction with professional judgment based on experience and consideration of related factors.

Traffic signals should be located where timings of successive signals may be coordinated to allow progression in both directions of movement. Signal spacing must be on consistent intervals along an arterial to allow two-way progression. Two-way progression is not mandatory but is highly desirable.

Traffic signal locations between major intersections should be kept to a maximum of three installations, ordinarily at the half- and quarter-mile points. Slight shifts from quarter-mile signal spacing locations are permissible depending upon a review of storage length requirements and traffic progression impacts. (Shifts of up to 50 feet in either direction from the quarter-mile spacing point do not require analysis.) Upon satisfaction of warrants for installation of a traffic signal, a semi-actuated traffic signal may be considered at an intermediate intersection or major driveway located at other than quarter-mile spacing. City approval or denial will be based on review of a traffic impact assessment report evaluating effects of the proposed median opening and signal on provision of sufficient taper and storage lengths for turn lanes, and on progression of through traffic along the arterial street.

4.6 Traffic Calming

Traffic calming devices are required along all newly constructed local streets with single-family residential frontage on straight or nearly straight segments over 600 feet in length. Typical traffic calming devices are speed humps (City Standard Detail C-234), traffic circles, raised crosswalks, chicanes, and chokers. Traffic calming devices should be spaced about 300 to 500 feet apart and should generally be at

least 200 feet away from a stop-controlled intersection or right-angle turn in the roadway. Contact Traffic Engineering at 480-782-3454 to suggest and obtain approval of traffic calming options.

V. TRAFFIC IMPACT STUDIES

The City of Chandler has a Scope of Work for Traffic Impact Studies, which is available on www.chandleraz.gov or by calling (480) 782-3454. Per the Scope of Work, a Traffic Impact Study will be required:

- 1) If the development land use and intensity meets or exceeds 100 trips during the peak hour;
- 2) If the project intensifies the land use and/or density, or modifies the occupancy of an existing facility;
- 3) Or as directed by the City Transportation Engineer.

The cost of the traffic analysis and the cost of implementing the recommendation shall be the responsibility of the developer.

VI. ACCESS MANAGEMENT

6.1 Access Control

These guidelines are to be used in the planning, design and approval of access to the arterial street system and emergency access requirements. The arterial street system is as defined in the Chandler Transportation Study and generally consists of all section-line roadways within the City of Chandler.

The primary function of the arterial street system is to provide mobility for intra-city and inter-city travel. Access to abutting land is secondary to providing a high level of mobility and safety.

General access to the arterial network is provided by intersections with collector and local roadways and by major and minor driveways to developments. The spacing of access intersections will vary between the arterial functional classes, according to the level of land access, which may be allowed.

Single family residences are not allowed direct access to arterial streets.

6.2 Location and Number of Access Points

Arterial street access to any parcel with less than 200 feet of arterial street frontage shall be limited to one two-way driveway or one pair of one-way driveways on that frontage. Access points should conform to Section 6.4 of these guidelines concerning spacing between access points. Additional driveways may be permitted if the following conditions are met:

1. Driveway two-way volume exceeds 1,500 vehicles per day with build-out of site.
2. Traffic volumes exiting the site under build-out conditions exceed capacity of stop-sign controlled intersections during peak hour of street or peak hour of site.
3. Traffic impact analysis determines that two driveways are required to safely and efficiently accommodate demand.

Developers of large sites or abutting sites along arterial streets should seek to consolidate major driveways at the appropriate intermediate intersection/median break points. Such consolidation may assist in meeting traffic signal warrants and in providing for acceptable signal progression on the through street.

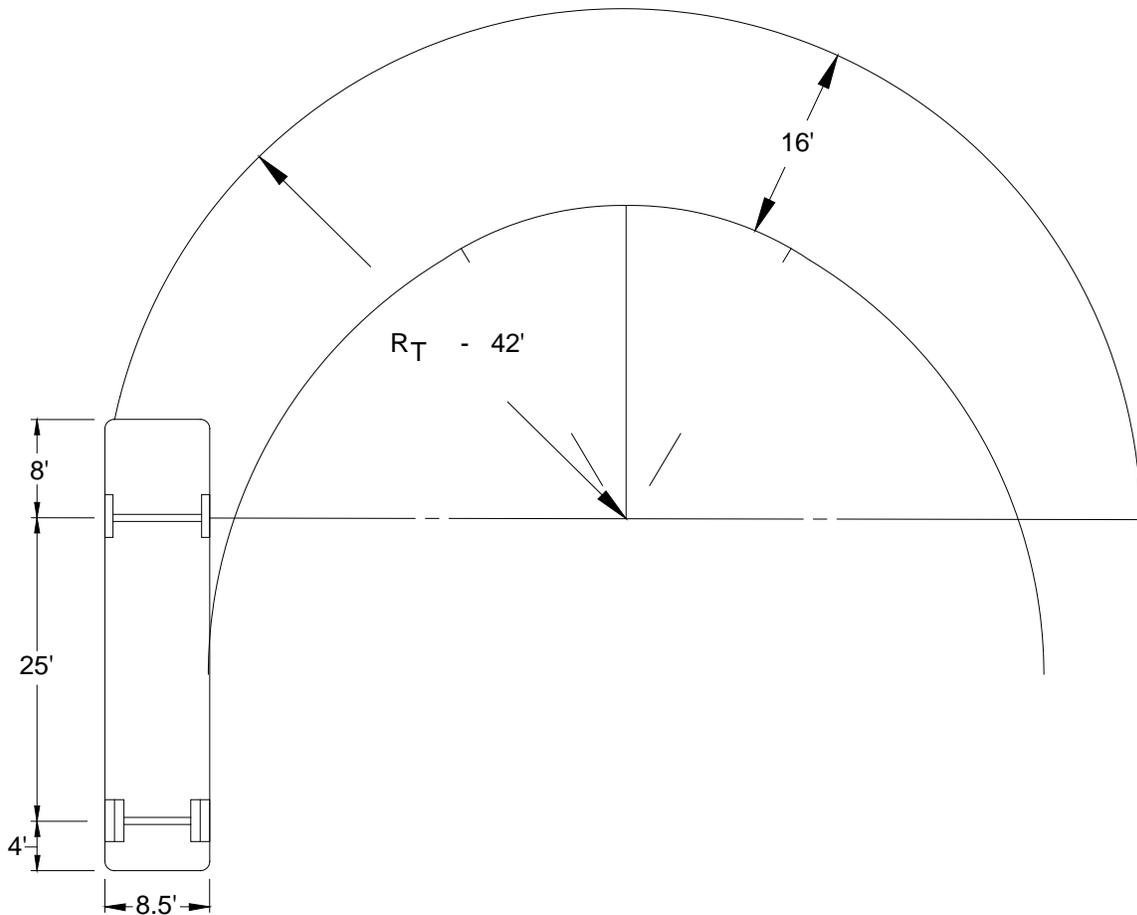
Residential developments should have at least one access per 200 single-family residential units, 1 access per 350 multi-family units, or 1 access per 350 mobile homes. Developers proposing fewer accesses for their project must provide a traffic study showing acceptable levels of service.

6.3 Emergency Access Requirements

Minimum turning radii requirements for temporary turnarounds and access roads, including on-site parking and driving areas for commercial, industrial or multi-family residential sites, are given in Figure 11. When constructing a temporary turnaround the configuration, such as a hammerhead or bulb, is flexible.

The Fire Department requires all developments and all sub-areas within a development to be served by two independent access routes. One of these routes may be designed or controlled for use by emergency vehicles only.

FIGURE 11 - MINIMUM TURNING RADII FOR TEMPORARY TURN-AROUND AND ON-SITE ROADWAYS PROVIDING EMERGENCY VEHICLE ACCESS



6.4 Driveway Spacing and Storage

Figure 12 shows recommended minimum spacing between driveways and adjacent intersections, driveways and median ends along arterial and collector streets. Location of major driveways (serving a major generator, with no restriction of turning movements) is controlled by distances needed for provision of left turn storage lanes and approach tapers. Major driveways on opposite sides of the street should be aligned to accommodate cross travel and to avoid conflicts between left-turning vehicles. Where a flush median design is used (two-way left turn lane), minor driveways on opposite sides of the street should either be aligned

or offset a minimum of 200 feet along arterial streets and 100 feet along collector streets. All driveways, including minor driveways restricted to right turn movements, should be spaced at least 100 feet apart along arterial streets and 50 feet apart along collector streets.

Intermediate intersections with collector and local roadways and major driveways should be limited to a maximum of five per mile. Intermediate intersections may be located a minimum of one-eighth mile from the nearest major intersection. Desirable intersection spacing is at quarter-mile intervals. Intersections should be located at consistent intervals to allow for two-way traffic-signal progression.

Direct land access should be controlled, and new residential developments shall not front an arterial street. Right-in, right-out access points may be allowed based on travel demand.

6.4.1 Driveway Storage

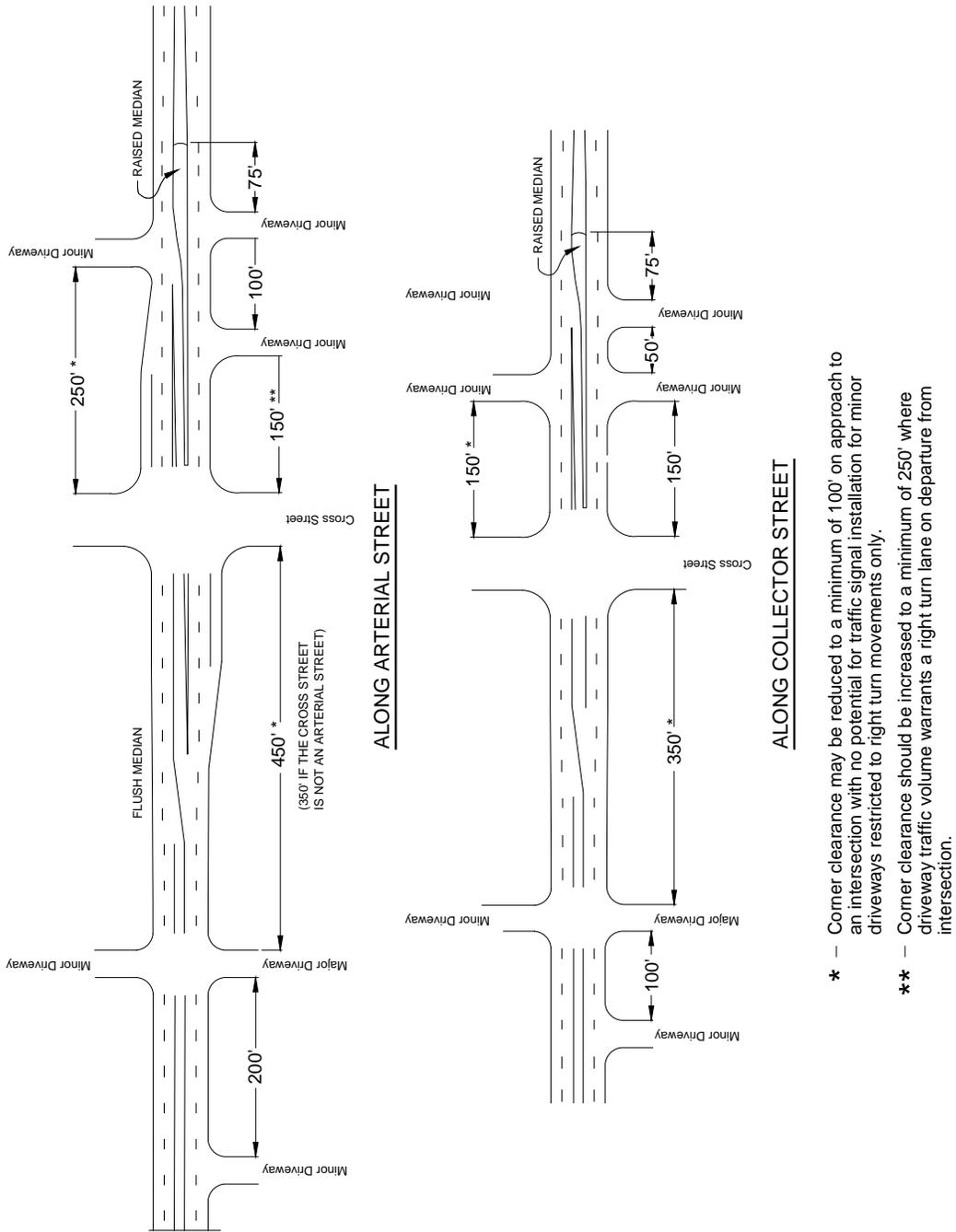
Along an access drive from which left turns may be made onto an arterial street, cross-aisles must be located at least 80 feet from the arterial street (right-of-way line to nearest edge of driveway). A larger setback may be required where traffic impact studies indicate greater than a five-percent probability of driveway blockage during the peak hour of a typical weekday.

6.4.2 Intersection Clearance

Minimum corner clearances at public intersections are shown in Figure 11. Where narrow lot widths do not permit the enforcement of the minimum clearances, an absolute minimum corner clearance of 50 feet may be used. On arterial streets, left turns into and out of such a driveway shall not be permitted.

On-site geometrics are especially critical at drive-through facilities such as banks, fast-food restaurants and car washes. Sufficient stacking space should be provided to prevent blockage of arterial street access and egress. Where information about peak arrival rates and service times is not available, the preferred storage length in advance of a menu board or service bay is 150 feet (100 feet minimum).

FIGURE 12 - DRIVEWAY SPACING ALONG ARTERIAL AND COLLECTOR STREETS



6.5 Driveway Widths

All driveways onto arterial streets shall be constructed with curb returns, except for utility maintenance driveways with two trips per day or less. Recommended dimensions are shown in Table 4.

TABLE 4
DRIVEWAY WIDTHS (to-face-of-curb)

Width	Multi-Family Residential	Commercial	Industrial
Min. Width (1-way)	16'	16'	16'
Min. Width (2-way)	24'	24'	24'
Max. Width	30'	40'	40'

Where high pedestrian traffic is expected (e.g., in the central business district or close to a high school, auditorium or library), a maximum width of 30 feet is desirable. Where large truck movements are expected on a regular basis (5 or more trips per day), the corner radius and driveway lane width should be designed to accommodate the truck turning path without encroachment on the arterial street parallel traffic lane or the driveway opposing traffic lane.

6.6 Curb Return radii

Unless otherwise noted, the following are typical corner radii for the various land uses.

TABLE 5

DRIVEWAY CURB RETURN RADII (to-face-of-curb)

Radii	Residential	Commercial	Industrial
Minimum Radius	20'	20'	25'
Maximum Radius	20'	25'	30'

VII. ADA UPGRADE REQUIREMENTS

7.1 ADA Curb Ramps

Curb Ramps shall be constructed or upgraded to achieve ADA compliance when constructing mill and overlay projects, capital improvement projects and private development projects per the procedures below. There may be limitations, which make it technically infeasible for an intersection (or single curb ramp) to achieve full compliance within the scope of a project. These limitations should be noted and the locations added to the City’s ADA Transition Plan.

7.1.1 Standard Curb Ramps and Detectable Warning System Placement

Truncated domes are the standard design requirement for detectable warnings to denote the boundary between the sidewalk and street for people with visual disabilities. The placement of the truncated domes is dependent on the type of curb ramp to be used. Directional curb ramps per City Standard Details C-257 and C-258 should be used at street intersections (or driveways) and truncated domes shall be aligned per City Standard Detail C-249. Aligning the domes to the opposing ramp enhances the ability for safely crossing the street.

Truncated domes are to be placed at the back-of-curb (BOC) on straight curb lines, or when within the corner radius return one corner of the truncated dome insert shall be placed at 2” from BOC (alleviating maintenance concerns of narrow strips of concrete that typically crack and dislodge).

There may be limitations that will not allow the use of our standard directional curb ramp (C-258) or in-line ramp (C-257). Other curb ramp designs or modifications to our standards may be approved by the City Engineer; however, every curb ramp shall be made compliant with ADA requirements.

7.1.2 Asphalt Overlay Projects

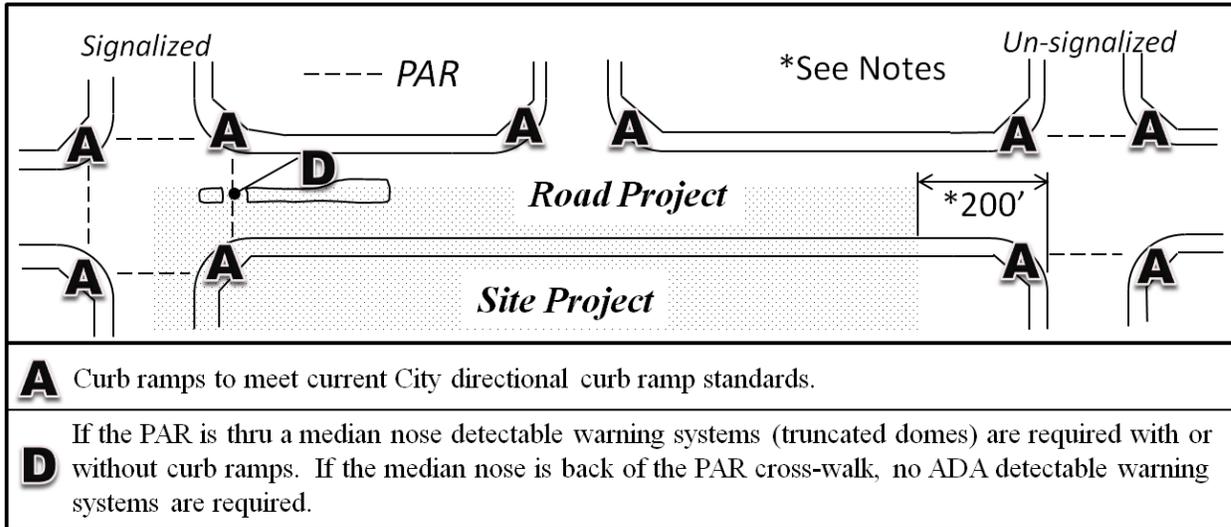
For Mill and Overlay Projects (and hot-in-place recycling), existing curb ramps within the extents and adjacent to the project will be evaluated for current ADA compliance and City directional curb ramp standards. All non-compliant (and diagonal) ramps are required to be replaced to City directional curb ramp standards. If the project is less than 200' away from the curb line extension of an adjacent intersection, then the project is required to make ADA upgrades at these intersections.

7.1.3 Capital Improvement Projects

For City Capital Improvement Projects (CIP), curb ramps will be replaced based on the following requirements and as shown in Figure 13:

- a) Pedestrian Access Routes (PAR) shall be determined and shown on the plans for the project including connections to curb ramps across the street.
- b) Existing curb ramps within the extents and adjacent to the project will be evaluated for current ADA compliance and City directional curb ramp standards. All non-compliant (and diagonal) ramps are required to be replaced to City standards.
- c) ADA compliance criteria: meets ADA slopes and landing area requirements.
- d) For arterial street construct/reconstruction projects, all curb ramps, sidewalks, and driveways are required to be upgraded to meet current ADA standards, as shown. For collector and local street construction/reconstruction projects, the same requirements as for mill and overlay will apply.
- e) City site development projects are required to make ADA upgrades to an adjacent intersection when constructing new sidewalks, and curb ramps, or replacing existing driveways less than 200' from any intersection, as shown below, or otherwise required by the City Engineer.

FIGURE 13 – CAPITAL IMPROVEMENT PROJECT CURB RAMP REPLACEMENT REQUIREMENTS

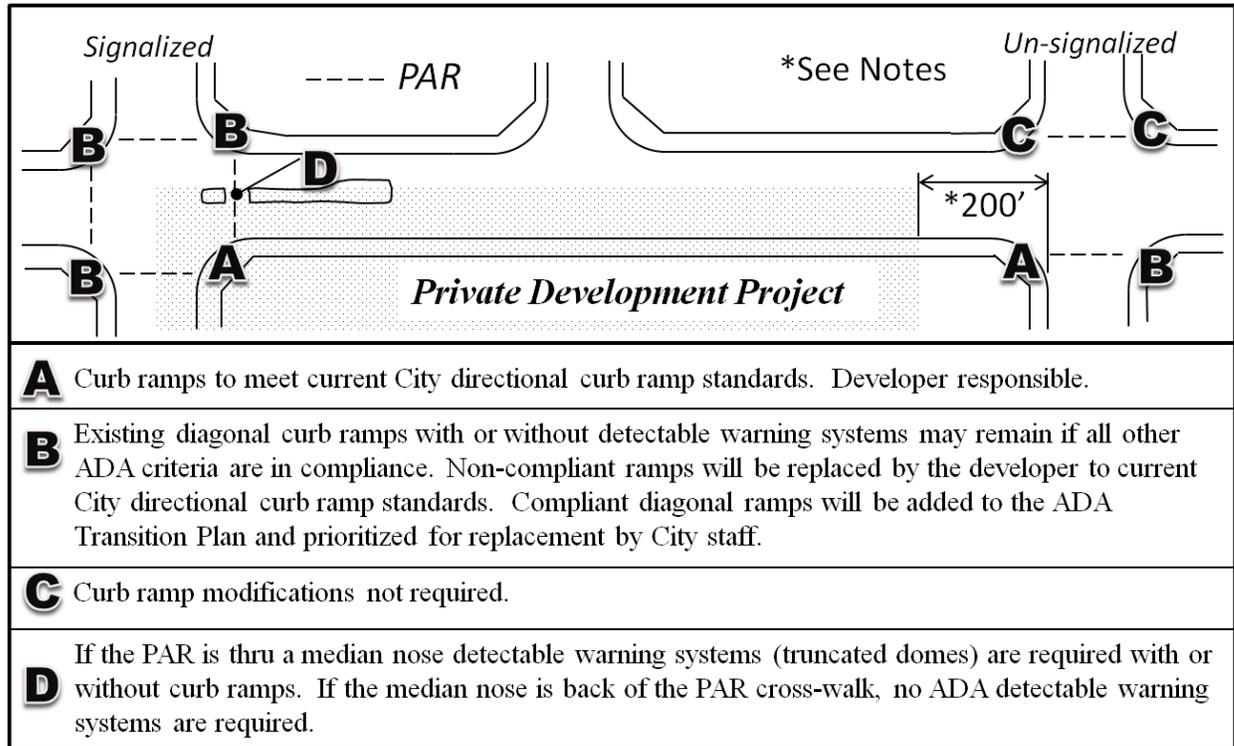


7.1.4 Private Development Projects

For Private Development Projects, curb ramps will be replaced based on the following requirements and as shown in Figure 14:

- Pedestrian Access Routes (PAR) shall be determined and shown on both the on-site and off-site plans for the project including connections to curb ramps across the street.
- Existing curb ramps within the extents and adjacent to the project will be evaluated for current ADA compliance and City directional curb ramp standards. Non-compliant curb ramps are required to be replaced as shown.
- ADA compliance criteria: meets ADA slopes and landing area requirements.
- Site development projects are required to make ADA upgrades to an adjacent intersection when constructing new sidewalks, and curb ramps, or replacing existing driveways less than 200' from any intersection, as shown below, or otherwise required by the City Engineer.

FIGURE 14 – PRIVATE DEVELOPMENT PROJECT CURB RAMP REPLACEMENT REQUIREMENTS



7.2 ADA Sidewalks

Sidewalks are intended to be constructed or upgraded to achieve compliance within mill and overlay projects, capital improvement projects and private development projects per the procedures below. There may be limitations, which make it technically infeasible for segments of sidewalk to achieve full accessibility within the scope of a project. Those limitations will be noted and those segments will remain on the ADA Transition Plan.

A. New construction sidewalks (and sidewalks crossing driveways) shall be built with a cross slope of 1.5% to ensure tolerance does not fall outside of ADA requirements.

B. Upgrades with CIP or private development projects – Cross slope:

Existing sidewalks adjacent to private development or major (over \$250K) capital improvement projects that exceed the ADA 2.0% maximum cross slope along the Pedestrian Access Route (PAR) shall be replaced to meet current standards.

C. Upgrades with CIP or private development projects – Tripping hazards:

Existing sidewalks adjacent to private development or major (over \$250K) capital improvement projects that contain tripping hazards or obstructions along the Pedestrian Access Route (PAR) shall be brought to current ADA compliance.

D. General upgrades to existing sidewalks shall be based on evaluation and rectification procedures below:

a. Typical upgrades to existing sidewalks that exceed a 2.0% cross slope:

- i. If the average slope is over 2.0% and less than 3% for any length, sidewalk will be replaced when a private development or capital improvement project occurs or complete reconstruction of street or sidewalk occurs.
- ii. If the average slope is 3.0% and less than 4.0% for a distance of 10 feet or more, sidewalk will be documented in the ADA Transition Plan and scheduled for replacement in the normal mill and overlay program. Locations less than 10 feet will be replaced per item i) above.
- iii. If the average slope is 4.0% and less than 5.0% for a distance of 10 feet or more, sidewalk will be documented in the ADA Transition Plan and scheduled for replacement within next five fiscal years. Locations less than 10 feet will be replaced per item ii) above.
- iv. If the slope of any segment of sidewalk is 5.0% or greater the location will be documented in the ADA Transition Plan and scheduled for replacement within next two fiscal years.

- b. Typical upgrades to existing sidewalks that contain uneven surfaces:
- i. If a difference in elevation is between $\frac{1}{4}$ inch and $\frac{1}{2}$ inch remediation will occur with a private development or major capital roadway improvement project, or when complete reconstruction of street or sidewalk occurs.
 - ii. If a difference in elevation is between $\frac{1}{2}$ inch and one inch, location will be documented in the ADA Transition Plan and scheduled for remediation within next ten fiscal years.
 - iii. If the change in level is greater than one inch, location will be documented in the ADA Transition Plan and scheduled for remediation as soon as practical.
- c. Typical upgrades to driveways will follow the same procedures outlined above for the sidewalk segment crossing the driveway.

VIII. PLAN SUBMISSION REQUIREMENTS

All off-site construction plans, except landscaping, shall be prepared and signed by a professional engineer who is qualified and registered by the State of Arizona to practice in the particular field of competency required by the type of improvements. Landscaping plans shall be prepared by a landscape architect that is qualified and registered by the State of Arizona.

Plans shall be submitted on 24" x 36" sheets. The plans shall be drawn to an engineering scale. Architectural scales are not allowed, including landscaping plans.

There are no specific engineering scale requirements, but one inch equal to 20 feet and one inch equal to 40 feet are the preferred horizontal scales. The vertical scale, when profile is required, need not differ from the horizontal scale by a precise factor of 10. Water, sewer, and paving plans for non-arterial streets may all be shown on the same plan sheets if a horizontal scale no smaller than one inch equal to 40 feet is used. Arterial street plans must always be prepared at a horizontal scale of one inch equal to 20 feet. Separate plan sheets must be shown for:

- paving plans
- signs, pavement markings (with streetlights as a background layer)
- street lighting
- landscaping, and
- water and sewer plans
- traffic signal plans (with striping as a background layer)

Requirements for street lighting are given in the City's Streetlight Design Manual.

All landscaping within arterial street rights-of-way must be reviewed and approved by the City Landscape Maintenance & Design Coordinator. All plant material must comply with the Arizona Department of Water Resources approved "Low-Water" list. Refer to the City's Landscape Design of Rights-of-Way, Medians and Retention Basins for additional information.

All elevations shown on the plans shall be referenced to a benchmark on the City

datum unless otherwise approved by the City Engineer.

Additional plan requirements are given in the pavement and street light plans checklists. The checklists are to be included with paving and/or street light plans with each submittal for City review. The most current versions of the City's general, paving, and street light plan notes, and pavement and street light checklists, are available at the Development Services Counter, 215 East Buffalo Street.