CHAPTER 3

STREET DESIGN AND CONSTRUCTION

3-1 GENERAL INFORMATION

A. Street Definition and Purpose

A Street is defined as a dedicated public way primarily used to provide access, pedestrian, vehicular or otherwise, to all legitimate divisions of abutting property. Streets are intended to accommodate varying needs which are consistent with the use, maintenance, operation, construction, repair of such street and ancillary permitted facilities such as utilities, street lighting, landscaping, irrigation, signing, striping, traffic control, drainage and parking improvements. Street improvements include, but are not limited to pavement, shoulders, curb, gutter, sidewalk, parking space, street lighting, fire hydrants, landscaping, irrigation, signing, striping, traffic control, bike ways, safety facilities, utilities and appurtenances. Streets include bridges, culverts, slopes and embankments.

B. Street Basis and Types

The City street system has two bases. The primary basis is a grid layout intending to provide public access to all legitimate land parcels. The second, less predominant basis, is the conformance to topographic features and constraints in concert with land division boundaries intending to provide public access to legitimate land parcels, which are typically larger. Access within the larger parcels may be provided via private access with specific written request submitted to the City Engineer and written acknowledgment of approval by the City.

1. *Rural Street Type*. Rural streets are public streets intended to encourage and preserve the rural nature of the area. Certain improvements such as sidewalk, profile curb, gutter and provision of parking are optional. Street lighting and landscape standards and/or requirements may be modified with specific written request submitted to the City Engineer and written acknowledgment of approval by the City. Parkway and arterial streets are not considered rural.

2. *Urban Street Type*. Urban streets are intended to accommodate all aspects of public street purposes defined herein. Classification, standards, and required improvements shall be per the City of Peoria Infrastructure Development Guidelines.

3. *Private Street Type*. Private streets are intended to encourage and preserve development of neighborhoods. The City does not own and is not responsible to maintain private streets. Private Streets are required to be in accordance with the City Council Policy # 11 and Administrative Regulation A.R. 90-1. Public access is discouraged by controlling through traffic, traffic volume and speed. Street maintenance, street lighting, landscape standards, pavement section and design, street width, pedestrian access and/or other requirements may be modified with specific written request submitted to the City Engineer and written acknowledgment of approval by the City.

C. Street Classifications

The following classifications are based on street development policies and are determined by location, intended use and/or other factors. See the Peoria Street Classification Map and Section 3-1 of these guidelines for additional information.

1. *Parkway*. The Parkway is required to move large volumes of moderate speed (45 mph or less) traffic. The Parkway would be designated as a limited access road with major intersection locations at the mile points, potential half-mile signalized intersections, if sufficient cross street demand exists. As many as three right-in/right-out access points per mile per direction can be accommodated. The Lake Pleasant Parkway is to begin at 83rd Avenue and Union Hills Drive and run west and north toward Lake Pleasant to State Route 74.

2. *Major Arterial*. Major arterials move large volumes of moderate speed traffic to and from freeways and serve some metropolitan-wide trips. They connect areas that are major accesses for commercial uses along major arterials, and residential areas are served from side streets.

3. *Minor Arterial*. Minor arterial streets move large volumes of traffic from one part of Peoria to another. Spacing of arterials is a function of land use density, not distance. Direct property access is a secondary concern to the movement of through traffic. Minor arterials are used to primarily connect neighborhoods to local commercial uses.

4. *Collector*.

    a. Generally, a Collector Street allows neighborhood traffic to travel from local to arterial streets. Direct property access is a secondary concern to the movement of neighborhood traffic. Collectors serve internal neighborhood traffic movements, but not as connections for non-neighborhood through traffic movement.
    b. Major Collector Streets provide two lanes of travel in both directions, restrict street side parking and provide a center left turn lane.
    c. Minor Collector Streets provide one lane of travel in each direction and provide a center left turn lane.
    d. Widening of a collector street, right-of-way and pavement section, at the intersection with the parkway, arterial or another collector street may be necessary, based on provisions in Section 3-1.
    e. Bicycle routes are typically located on collector streets and may require additional right-of-way and street width.

5. *Local*. Local streets provide direct property access. They bring local neighborhood traffic to collectors which then feed into arterials. Local streets are designed to preserve privacy and encourage livable residential neighborhoods.

6. *Private Streets*. Private streets shall be designated in accordance with City of Peoria roadway details. Entrances into private subdivisions shall be designed to accommodate Detail PE-100 for Gate Entrances (i.e. adjacent tracts).

7. *Alleys*. The creation of new alleys is not permitted unless otherwise authorized by the City Engineer. The design of parcels in areas with existing alleys shall provide for continuation of the alley to a street or to an intersecting alley providing at least two access points to streets. All alleys must be improved to City Standards by the developer.

D. Unpaved Streets Policy

When unpaved streets are encountered which may provide access to and/or are adjacent to any development, provisions for paving or dust control per Ordinance 98-20 shall apply. Maricopa County has been designated by the U.S. Environmental Protection Agency (EPA) as being a Non-Attainment Area for Air Quality. Ordinance 98-20 has been adopted which addresses the City's compliance with the federal regulation. The City is mandated to not permit any new

unpaved streets and to eliminate any current unpaved streets within the City, whether public or private.

E. "Half-Street" Minimum Requirements

In cases where no adjacent street improvements exist, a developer is, at a minimum, responsible for installing half of the full street improvements. The minimum paving width for residential "half streets" shall be 25 feet, to permit two-way traffic. The width of the street shall be in accordance with the standard cross section of the specific street. Minimum pavement widths for other types of streets shall be established on a case-by-case basis. In most cases, the developer shall be required to install all required improvements of the half street and a thickened edge on the unfinished side, within the required right-of-way for the half street. If these minimum improvements will require additional right-of-way, it will be the developer's responsibility to obtain the required right-of-way. Additionally, the City may require improvements in excess of the minimum required half-street, if it is deemed necessary to support the proposed development and surrounding areas.

F. Intersections with Arterial Streets

Interior streets shall not intersect major arterial or minor arterial streets at other than the 1/4 or 1/2 mile points of an arterial, except with specific written request submitted to the City Engineer and acknowledgment of approval by the City. Widening of a collector street, right-of-way and pavement section, at the intersection with the parkway, arterial or another collector street may be necessary, based on provisions in Section 3-1. Refer to Section 3-4.I for intersection detailed design criteria.

G. Street and Lot Layout and Easement Planning

Streets, lots, tracts and easements planning and layout shall be in accordance with the Subdivision Regulations, Zoning Stipulations and Approved Site Plan.

H. Pavement Transitions

When development causes the widening of a portion of the pavement of an existing road, pavement transitions are required at each end of the widened portion. Design of the various features of the transition between pavements of different widths should be consistent with the design standards of the superior facility. The transitions should be made on a tangent section whenever possible. Locations with horizontal and vertical sight distance restrictions should be avoided. Whenever feasible, the entire transition should be visible to the driver of a vehicle approaching the narrower section. Intersections at grade within the transition area should be avoided. Refer to Figure 3-4 (see Appendix) for transition equations.

3-2 GENERAL TECHNICAL INFORMATION

A. Bridges, Retaining Walls, and Structural Clearances

1. *Bridges*

a. *Bridge Roadway Width.* The clear roadway width of all bridges, including grade separation structures, shall equal the full width of the approach roadway including the proposed physical improvements consisting of the street pavement, median, bike lane, and curb and gutter.

b. *Approach guardrail*. If a vehicular railing or safety-shaped barrier is provided which is within

10 feet of a traveled way with or without a sidewalk, approach guardrails shall be installed on all approach ends in accordance with AASHTO guidelines and paragraph e.4 below.

c. *Cross slope*. The crown is normally centered on the bridge, except for one-way bridges, where a straight cross slope in one direction shall be used. The cross slope shall match the approach pavement.

d. *Median*. On multi-lane divided highways, a bridge median that is 26 feet wide or less shall be decked.

e. *Railings*. The railings to be used are the State of Arizona Department of Transportation standard railing designs. There are four types of railings, which are described below:

(1) Vehicular Barrier Railings. The primary function of these railings is to retain and redirect errant vehicles.

(2) Combination Vehicular and Pedestrian Railings. These railings perform the dual function of retaining both vehicles and pedestrians on the bridge. They consist of two parts: 1) a concrete barrier railing with a sidewalk, and 2) a metal hand railing or fence-type railing.

(3) Pedestrian Railings. These railings prevent pedestrians from accidentally falling from the structure and, in the case of the fence-type railing, prevent objects from being thrown to the roadway below the bridge.

(4) Bridge Approach Railings.

(a) Approach railings are required at the ends of bridge railings exposed to approach traffic. On divided highways, with separate one-way structures, they shall be placed to the left and right of approach traffic.

(b) On two-way roadways with a clear width less than 60 feet across the structure, approach railings shall be placed on both sides of the structure.

(c) When the clear width is 60 feet or more, approach railings shall be placed only to the right of approach traffic.

(d) Several types of approach railings are available, including Metal beam Guardrail, Bridge Approach Guardrail (Types I and II), and Safety-Shape Barriers. The type of approach railing selected should match the rail used on the bridge. When long runs of guardrail (such as embankment guardrail) precede the bridge, the guardrail should connect to the bridge railing and thus serve the approach railing function.

(e) Approach railings shall be flared at their exposed end. The greatest flare offset possible should be used commensurate with the approach roadway. For detailed information, refer to the AASHTO publication, Roadside Design Guide.

2. *Retaining Walls*

a. Types and Uses. Recommended types of retaining walls include reinforced concrete and structural masonry. Refer to City of Peoria Details PE-121-1, PE-121-2 and PE-121-3. Heavy timber construction is not encouraged, except when approved by the City Engineer. Retaining walls shall include integral attachments for handrails and weep holes for

drainage, where applicable.

b. Aesthetic Considerations. In general, the materials and design of retaining walls shall match or blend with the adjacent natural features, landscaping, and/or buildings. The surface of the retaining wall should have low light reflectance. Suggested surface treatments include exposed aggregate, stucco or mortar wash, and native stone, or other surfaces as approved by the Community Development Department.

The height of retaining walls shall not exceed 6-feet except when approved by the City Engineer. If approved to retain above 6 feet, terracing is encouraged and the length of the alignment of the retaining walls should be foreshortened by vertical grooves, periodic offsets, and height changes, or other configurations as approved by the Community Development Department.

c. Retaining Walls may be constructed per the City of Peoria Details PE121-1 to PE121-3 or per a structural engineered design.

d. Submittal requirements for structural engineered designs are as follows:
- Plans must be signed and sealed by an AZ registered engineer. Plans shall be submitted with the grading and drainage plans.
- Provide wall elevations and cross-sections including the structural details, ground slope, method of drainage, and need for safety railing
- Specifications for the construction materials and backfill material and compaction requirements.
- Two copies of the signed and sealed design calculations. Calculations shall address the effect of any surcharges on the wall and shall use the minimum factor of safety of 1.5 for both sliding and overturning.
- One copy of the geotechnical report used for soil pressure or excessive slopes.

3. *Safety Railings*

Safety railings are required on or adjacent to vertical faces such as retaining walls, culvert headwalls, bridge wing-walls, etc. where the vertical drop is 30 inches or more. In areas of pedestrian activity a safety railing may be required where the vertical drop is 12 inches or more. The safety railing shall be constructed per the City of Peoria Detail PE-119.

4. Structural Clearances

a. Horizontal Clearance

(1) A fixed object other than street lights, signal poles and utility poles will not be allowed within 10 feet of the traveled way unless approved by the City Engineer and a safety barrier is provided. A lesser clearance may only be allowed when other controls make the desired clearance unreasonable and appropriate traffic barriers are installed. In no case shall a fixed object be allowed within 2-feet of a traveled way.

(2) The horizontal clearance to bridge piers, abutments, and retaining walls on all streets shall not be less than 10-feet from the edge of the traveled way.

b. Vertical Clearance

The minimum vertical clearance shall be 16.5-feet over the entire width of the traveled way of an arterial street or major collector street. On other streets, the minimum shall be

14.5- feet. Exceptions must be submitted to the City Engineer for review and approval.

B. Side Slopes

1. *Side Slope Standards*. Side slopes should be designed for functional effectiveness, ease of maintenance, and pleasing appearance. For areas greater than 10- feet back of curb, slopes of 4:1 or flatter shall be provided. Steeper slopes may be approved in areas more than 30-feet back of curb when soils are not highly susceptible to erosion, or when a cut is not more than 4 feet. Consult the AASHTO publication, Roadside Design Guide for further details.

2. *Slope Rounding.* The top of all cut slopes shall be rounded where the material is other than solid rock. A layer of earth overlaying a rock cut also shall be rounded. The top and bottoms of all fill slopes for, or adjacent to a traveled way, sidewalk, or bicycle path shall also be rounded.

C. Driveway Spacing & Location

Driveway Spacing and Location shall be in accordance with Section 2-4, City of Peoria Detail PE-251-3, and the Access Management Guidelines.

D. Sidewalk and Pedestrian Areas

1. *General*. Placement of sidewalks and pedestrian ways shall promote and enhance pedestrian safety and the visual quality of the roadway by creating a boulevard landscaped area between the street, fence, wall, railing and the detached sidewalk. Sidewalks and pedestrian ways shall be constructed to a width, line and grade in accordance with ADA requirements and as approved by the City. Construction shall conform to the MAG Standard Detail 230.

2. *Sidewalks*. Sidewalks are required along both sides of the pavement section on all public streets. Sidewalks shall be a minimum of 8-feet in width and detached from the back of curb on all arterial streets. Sidewalks shall be 6-feet in width and detached on all collector streets. Sidewalks shall be 5-feet in width on all local streets.

3. *Pedestrian Ways*. Pedestrian ways shall be constructed to connect sidewalks with public and private facilities not located in the public street right-of-way. Public pedestrian ways shall be within a tract or easement for such purposes. The minimum width shall be 5-feet or a width consistent with adjacent trails, and may be used for additional purposes as approved by the City. If additional uses are approved, the minimum required width may be increased depending specific use.

E. Curb Returns and Ramps

All urban street intersections shall be constructed with concrete vertical curb returns. All street intersections with arterial and collector to collector intersections shall provide a dual sidewalk ramp at the P.T. and P.C. of each return. All other street intersections shall provide at least one sidewalk ramp at the mid point of the return.

For non-arterial and non-collector to collector intersections with a face of curb radius 30-feet and greater, use MCDOT Standard Detail 2031, Type A. For non-arterial and non-collector to collector intersections with a face of curb radius less than 30 feet use MCDOT Standard Detail 2031, Type B. For mid-block sidewalk ramps use MCDOT Standard Detail 2032, Type B.

Truncated domes are required at all locations where pedestrians are being directed to cross traffic (including new or reconstructed ramps at curb returns, mid block crossings, and commercial driveways). Truncated domes must be specified as CASTinTACT, StrongGo, or approved equal. Truncated domes on public streets shall be yellow; domes on private streets may be any color, so long as it meets the requirements of the federal ADA Accessibility Guidelines.

The radius to face of curb for the return shall be:

Street Classification	Major Arterial	Minor Arterial	Collector	Local
Major Arterial	35'	35'	30'	20'
Minor Arterial	35'	35'	30'	20'
Collector	30'	30'	30'	20'
Local	20'	20'	20'	20'

F. Valley Gutter

Concrete valley gutters per MAG Standard Detail 240, shall be constructed at all intersections where the drainage pattern requires them. Concrete for valley gutters shall comply with MAG Standard Specification 725 for Class 'A' concrete. Valley gutters are not allowed to cross major arterial and minor arterial streets. Valley gutters are not allowed where storm drain facilities are existing. Valley gutters crossing collector or residential street intersections with major arterial or minor arterial streets shall be six feet wide, minimum. Valley gutters not at intersections shall be six feet wide, minimum. Asphalt valley gutters are not allowed on public streets.

G. Designated Tracts

Vertical curbs shall be constructed along the street frontage of all designated tracts.

H. Street Drainage Facilities

Street drainage facilities shall be in accordance with Section 4-2.

I. Street Lighting

Street Lighting shall be in accordance with the Street Lighting Policy in the Appendix.

J. Fire Hydrants

Fire hydrants shall be installed and located in accordance with Chapter 5.

K. Irrigation Facilities (Flood Irrigation)

All new developments shall provide for continued and undiminished service of affected irrigation systems.

The developer is responsible for coordinating with S.R.P. the design and construction of S.R.P. facilities. An S.R.P. license may be required for construction and entry onto S.R.P rights-of-way. New S.R.P. irrigation tile may be located within the public right-of-way provided the appropriate authorization. The exact location shall be coordinated with S.R.P. and the City of Peoria.

Private irrigation facilities shall be Concrete or PVC (minimum SDR 35) irrigation pipe and shall be located on private property, within a private irrigation easement, and sized to carry at least the same flow as the existing or replaced facilities, or as may otherwise be directed by the City. The Engineer shall submit appropriate data to support the design.

Where there is a need for irrigation facilities to cross the public right-of-way, it shall be done at approximately 90 degrees and must be tiled with Rubber-Gasket Reinforced Concrete Pipe (RGRCP) Class V (minimum) in accordance with the criteria outlined in ASTM Specifications Section C 76. Any private irrigation pipe proposed to be constructed in City right-of-way shall be constructed with RGRCP as above. Work outside of the limits of the development may be required to effect such irrigation.

It is not intended that the above material requirements be applied to existing tiled irrigation facilities where minor roadway improvements (as determined by the City Engineer), such as a driveway, are proposed and investigation by the owner of the irrigation facilities shows the existing tile to be functionally and structurally adequate.

L. Power, Communication and Gas Utilities

1. All new and existing utility, electrical facilities less than 69 KVA, cable T.V., telecommunications, fiber optics, etc. shall be installed underground as part of the street improvements. Gas facilities shall be installed underground, except where geological conditions prohibit such undergrounding and with specific written request submitted to the City Engineer and acknowledgment of approval by the City. Work outside of the limits of the development may be required to effect such undergrounding.

   If new facilities are proposed in an area that has existing overhead lines, the new facilities shall be undergrounded along with any existing overhead facilities. There may be an opportunity to delay installation of facilities underground until such time as the developer may participate in reinstalling these facilities underground when a joint trench opportunity is provided. When major upgrades are planned by utilities and telecommunications providers to their networks, the providers may underground existing facilities that are currently on existing poles.

2. Installation of new facilities or major enhancements to existing facilities shall be installed underground unless it can be demonstrated that the public's general health, safety and welfare are affected by the underground installation. The fact that an underground installation is more costly than an overhead installation shall not, in and of itself, constitute a health or safety issue.

3. All above ground appurtenances that are required to provide services shall be designated and installed with attention to minimizing the number of appurtenances, joint location, combined use with existing boxes, and shared facilities where ever possible. All locations will meet industry standards for sight distance locations, all industry safety requirements and the aesthetic requirements of the City. A permit shall be issued for the installation or conversion of any overhead to underground facilities. The issuance of a permit in violation of any requirements will not void the permitee's responsibility unless the standard installation is clearly noticed and approved separately from normal permit requirements.

M. Survey Monuments

All developments shall provide survey monuments at section corners, street centerline intersections, street centerline alignment changes (P.C.'s, P.T.'s, or P.I. if it is within street pavement), and subdivision corners.

All section corners, 1/4 corners, and center of section shall be a brass cap in a hand hole per MAG Standard Detail 120-1-A. All other required survey monuments shall be a brass cap on the surface per MAG Standard Detail 120-1-B. All existing monumentation shall be preserved both horizontally and vertically.

Any survey monuments disturbed by construction must be reset and certified at the contractor's or Developer's expense. Any disturbed monument in the City's 2002 Vertical Survey Datum list shall be reset and a new vertical datum established and certified. At least two other monuments on the City's survey list shall be referenced as a check. The survey notes showing these reference monuments and the elevation certification will be required before any project will be accepted as complete.

N. Street Names

Wherever a plan indicates a public or private street, the street name shall be shown. Street names shall be consistent with the natural alignment and extension of existing streets and the "MAG Address and Street Assignment Policy". New street names shall not duplicate in whole or in part, or be confusing with existing street names. The City reserves the right to modify street names to conform to City standards at the technical review stage. Aisles or drives shall not be named or numbered. The site shall receive a single address based on the public street on which it fronts. Lots, homes, units and spaces, within the project will be assigned sub-addresses by the City staff for mail or delivery, emergency or other service needs.

O. Street Name Signs

Street name signs shall be located at all street intersections. The subdivider/developer shall be responsible for submitting the necessary plans to the Engineering Department for review and approval. The contractor shall ensure the landscape area behind the curb/sidewalk is level and prepared prior to installation of the sign posts. The subdivider/developer shall be responsible for the fabrication and installation of all signs, in accordance with the City standards.

For public streets, street name signs shall be a black on white, or white on brown. For private streets, the street name signs may be black on white, or white on brown, with a 1" color band of the same color as the lettering. All street name signs shall be retro-reflective. Private street name signs are considered non-standard and shall be maintained by the Homeowner's Association. Refer to City of Peoria Details PE-030, PE-031 and PE-032.

P. Mailbox Standards

Mailbox facilities shall be in accordance with the U.S. Postal Service standards and requirements and as approved by the City. Mailboxes shall not be located within 3 feet of a fire hydrant. A streetlight shall be located such that the clustered mailbox locations are illuminated in the same manner as the street.

3-3 TECHNICAL REPORTS

A. General Information

Developers are responsible for submitting a Design Study Report to validate the design shown on the construction plans. The Design Study Report is a compilation of the following as applicable to the development. The Design Study Report should not be excessively long or complex. Rather it is to briefly describe the basis of the design and the assumptions made and explain "special" solutions to problems encountered as detailed below. All reports must be sealed by an Arizona registered engineer. The following sections shall be contained in the report:

1. *Soils Investigation Report*. A "Soils Investigation Report" shall be submitted with new street construction plans indicating "R" value, sieve analysis, and plasticity index of the sub-grade.

2. *Drainage/Hydrology Report*. A "Drainage Report" shall be submitted with new street construction plans and/or the grading plans. This report shall be prepared per Chapter 4 herein.

3. *Pavement Evaluation and Design Report*.

   A "Pavement Evaluation and Design Report" shall be submitted with new street construction plans. When the design is proposed to match existing pavement, the report shall evaluate if the existing pavement condition and structure meet current structural requirements. The design engineer is responsible to provide the Soils Investigation Report, Traffic Impact Study and Pavement Core sampling which are required to determine the condition and structure and for investigating and evaluating the existing pavement structure.

   If the existing pavement does not meet the structural requirements, it must be removed and new pavement constructed to the monument line.

   Existing pavement to remain may be matched by trimming a minimum of 1-foot for a longitudinal match, or 2-feet for a perpendicular match. Exact point of matching and sawcut shall be determined in the field by the City.

   If an existing pavement section is less than five years old, and it can be demonstrated by a comprehensive pavement analysis that it meets or exceeds the current guidelines for an appropriate pavement structure, the subdivider/developer may request a waiver from removing the existing pavement to monument line and new pavement constructed. The Engineering Department will consider the application, review the pavement analysis and grant or deny the application.

   Such pavement analysis shall include the following at minimum:

   - Identify the average thickness of the existing AC.
   - Identify the base course thickness, density, gradation, PI
   - Identify the density of native subgrade
   - Identify the extraction and viscosity of the existing AC

   The location and number of test locations required shall be recommended by a geotechnical engineer, reviewed, and confirmed by the Engineering Department.

The pavement design method shall be approved by the City of Peoria Engineering Department. Soils tests required to perform the design are not provided by the City. The flowing tests are the minimum required for pavement design purposes:

a. Samples shall be taken to a minimum of 18- inches below proposed grade elevation. Depths up to 3-feet on arterial streets may be required in certain instances.

b. One (1) test per eight hundred (800) lineal feet with at least one test per proposed street. Additional tests may be required in certain instances.

c. Each sample shall have a sieve analysis per AASHTO T27 with results reported as percent passing #200 sieve, plus a plasticity index per AASHTO T90.

d. Test results shall be forwarded to the City of Peoria Engineering Department.

e. Subgrade, Base Course and Surface Course. The report also is intended to provide the design of the new pavement subgrade, base course and surface course for compliance with these guidelines. The components shall be in accordance with MAG Specifications. The design shall recommend the minimum structure composition and thicknesses.

f. Pavement Mix Design. A pavement mix design for concrete, asphaltic concrete and admixtures to base and subgrade components of the pavement structure in accordance with MAG Specification Parts 300 and 700, are required for review and approval by the City.

4. *Supplemental Sketches, Details, Calculations, and Design Rational*. Provide any support sketches, details, calculations and design rational used and pertaining to the design of required improvements.

5. *Traffic Impact Analysis (TIA)*. A "Traffic Impact Analysis" in accordance with *Traffic Impact Study Criteria* in the appendix shall be submitted with new street improvement plans.

6. *Visibility/Sight Line Study*. A "Visibility/Sight Line Study" to verify and preserve the visibility and/or sight line in accordance with AASHTO Guidelines, City of Peoria Details PE-090 and PE-091 and generally accepted engineering practices, shall be submitted with new street improvement plans. Sight lines and dimension and shall be provided on the paving plans. Easements or tracts shall be dedicated on the plat or by separate instrument, to provide the perpetual sight line clearances.

3-4 TECHNICAL DESIGN REQUIREMENTS

A. General

Technical design requirements for geometrics, layout and planning for all street classifications are provided herein. Figure 3-4 (see Appendix) provides specific geometric requirements.

B. Street Layout and Planning

1. *Arterial Streets*. Arterial streets design requirements shall be as determined by the City or other responsible agency.

2. *Street Classification Map*. Whenever the development embraces any part of a street designed in the adopted Streets Classification Map, such street shall be platted in conformity therewith.

3. *Neighborhood Street Plan*. Whenever the tract is located within the area for which a Neighborhood Street Plan has been approved by the City Engineer, the street arrangement shall conform substantially to that approved plan.

4. *Continuation*. Street layouts shall provide for the continuation of existing collector streets in adjacent areas, and such other streets as the City Engineer may designate.

5. *Future Street Extensions*. Certain proposed streets, as designated by the City Engineer or an approved Neighborhood Street Plan shall be extended to the development boundary to provide future connection with adjoining unplatted lands. In general, these extensions should not be farther apart than the maximum permitted length of a block, as specified herein.

6. *Local Street Arrangement*. Local streets shall be so arranged as to discourage their use by traffic originating outside the immediate neighborhood. Local streets shall be discontinuous and generally should be interrupted with jogs and offsets. Refer to City of Peoria Detail PE-270. Four-way intersections of local streets should be avoided.

7. *Marginal Access and Reverse Frontage Streets*. Lots intended for single-family residential use shall not front or have access from arterial streets. When a proposed development abuts or contains an existing or proposed arterial street, the arrangement of interior streets and lots shall prohibit marginal access streets and minimize reverse frontage streets, and shall provide non-access easements along the arterial street, or such other treatment as may be justified for protection of properties from the nuisance and hazard of high volume traffic and for preservation of the traffic function of the arterial street.

8. *Access Provisions for Development Boundary Constraint*. When a residential subdivision abuts the right-of-way of a railroad or limited access highway or abuts a commercial or industrial land use, the City Engineer may require location of a street approximately parallel to such right-of-way or use at a distance suitable for appropriate use of intervening land, such distance being determined with due regard for approach grades, drainage, embankments, bridges, and future grade separations.

9. *Dead End Streets*. Dead End Streets shall be prohibited except in locations approved by the City Engineer for future street connection to adjacent unplatted lands.

10. *Maximum Lengths for Blocks and Cul-de-sacs*.

    a. Maximum length of blocks, measured along the centerline of the street, and between intersecting street center lines, shall not exceed fifteen hundred feet; except that in development with lot areas averaging one-half acre or larger or where extreme topographic conditions warrant, this maximum may be exceeded by up to five hundred feet. Blocks shall be as long as reasonably possible under the circumstances within the above maximums in order to achieve depth and possible street economy and to reduce the expense and safety hazard arising from excessive street intersections.

    b. The maximum length of cul-de-sac streets shall not exceed four hundred feet, measured from the intersection of right-of-way lines to the extreme depth of the turning circle along the cul-de-sac street center line, unless specifically approved by the City Engineer. An exception may be made where topography constrains the number of adjacent lots

served, and shall not be made merely because the tract has restrictive boundary dimensions. In such cases, provision should be made for extension of the street pattern to the adjoining unplatted parcel and a temporary turnaround installed, or to alter the street pattern to eliminate the constraint. Cul-de-sac streets shall terminate in a circular right-of-way fifty feet in radius with an improved unobstructed traffic turning circle of at least forty-five feet in radius. Refer to City of Peoria Detail PE-110.

11. *Non-Vehicular Access*. Access to the parkway, arterial, and major collector streets shall be restricted by use of a 1 foot, Non-Vehicular Access Easement at locations other than street intersections and legitimate driveways.

12. *Topography*: Streets shall be arranged in relation to topography as to produce desirable lots of maximum utility and streets of reasonable gradient, safe ingress-egress and to facilitate adequate surface drainage.

C. Design Standards

Figure 3-4 lists most of the design standards data necessary for the design of streets within the City of Peoria. Subsequent paragraphs herein discuss this data and provide other standards that could not be included in Figure 3-4 (see Appendix).

1. *Street Right of Way Requirements*. The right of way requirements in Figure 3-4 are based on the space needed for the street when it is constructed to meet ultimate development requirements. The right of way must also provide space for utilities, cut or fill slopes, sidewalks, bicycle paths, trails, traffic control devices and information signs, fire hydrants, landscaping, transit facilities, and other public facilities that must be located adjacent to street pavements.

   Right of Way widths in excess of the standard widths may be required in special circumstances such as when:

   a. Cut or fill slopes cannot be confined within the standard width
   b. Minimum sight distance lines on horizontal curves are not within the standards
   c. Minimum sight distances at intersections are not within the standards
   d. Auxiliary lanes are to be provided

2. *Pavement Cross-Section slopes*

   a. *Typical Street Cross-Sections.* Undivided streets should have a normal crown that is a two-way cross-slope with the cross-section high point on the street centerline. Divided streets should have cross-slope on each pavement section. The high point of each slope on each pavement section shall occur on the edge of the pavement nearest to the median. Unusual conditions may cause cross-slope requirements to vary, but normally the desirable cross-slope is 2%, with a maximum cross-slope of 3%. Any deviation from the desirable cross-slope is subject to review by the Engineering Department.

   b. Cross-*Sections in Street Dip Sections.* While dip sections are discouraged, where storm drainage runoff flows must cross the street, dip sections are needed. The pavement through the dip section should have a one-way slope (no crown), curbing and medians must not be raised, and cut-off walls shall be installed in accordance with MAG Standard Details. Transitions back to normal street cross-slopes will be needed at both ends of the dip section.

c. Inverted crown cross-sections will not be allowed for any project. This applies to public streets, private streets, private driveways, and access aisles for commercial or multi-family developments.

3. *Medians*

a. *Median Widths*. The width of a median is measured from back of median curb to back of median curb. If a median has no curb, the width is measured between the centers of the continuous painted median stripes. Median widths are specified in Figure 3-4. In special circumstances, the City Engineer may approve widths other than those listed, but in no case shall a median be constructed with a width less than 3 feet.

b. *Paved Medians.* A median less than 5 feet wide should be paved. The paved surface should be crowned and have the same cross-slope as the street pavement. Acceptable paving materials are Portland cement concrete or concrete pavers.

c. *Unpaved and Landscaped Medians*. Medians that are greater than 5 feet in width are normally not paved. Landscaping and other median features shall not restrict sight distance for left turning vehicles on the through street. Median landscaping shall not restrict sight distance in the vicinity of intersections for side street traffic; refer to City of Peoria Details PE-090 and PE-091.

4. *Curbs*. All curbs except for mountable curbs shall conform to the appropriate MAG Standard Detail and MAG Standard Specifications, except that concrete for curbs shall be Class 'A' concrete, per MAG Standard Specification 725. For mountable curbs refer to MAG Detail 220-2, Type E.

a. *Vertical Curbs*. Vertical curbs are required for all streets except local residential streets. Vertical curbs may be used where roll curbs are specified if drainage considerations make such use desirable. Vertical curbs with gutter are to be constructed in accordance with MAG Standard Detail 220-1, Type 'A'. Vertical curb and gutter shall match the adjacent pavement slope to the gutter cross section direction. The curb height shown on the Standard Detail is 6 inches, but where fire lane or public maintenance vehicle access to abutting property must be provided over the curb, use mountable curb, per MAG Detail 220-2, Type E.

b. *Roll Curb, Ribbon Curb, Maricopa Edge.* Roll curb is preferred for local residential streets except where vertical curb is required, and is to be constructed in accordance with MAG Standard Details. Ribbon curb may be used in lieu of roll curb for local residential streets. When ribbon curb is used, drainage runoff from the road shall not drain with the road but shall be directed to roadside ditches. See Chapter 4 for additional details. For local rural roads, a Type 'A' Maricopa Edge per MAG Standard Detail 201 may be used. The pavement width of the local road shall be twenty-four feet. When a Maricopa edge is used, drainage runoff from the road shall not drain with the road but shall be directed to roadside ditches.

c. *Cut-Off Walls*. In locations where dip sections are permitted to allow drainage flows to cross roadways, cut-off walls conforming to MAG Standard Detail 552 shall be installed. Cut-off walls shall be at least three-feet deep and have a top that is flush with the pavement surface. The exposed portion of the cut-off wall shall have the appearance of ribbon curb, with the same width as the street's regular curb and gutter. The cut-off walls shall extend across the flow path in the dip section to protect the pavement structure during runoff flows from a 100-year storm event. Transitions will be needed between the regular curbs and the cut-off walls at each end of the dip section.

d. *Curb Returns*. Vertical curb shall be used through the curb return from PC to PT regardless of whether the tangent curb sections are vertical or roll curb. All curb returns shall be provided with sidewalk from PC to PT of the same width as that provided for the sidewalk behind the tangent curb sections. If no sidewalk is provided behind the tangent curb sections, the curb return sidewalk shall be at least five-feet wide.

D. Selection of a Design Speed

The design of geometric features such as horizontal and vertical curves will depend on the design speed selected for the street. The choice of the design speed is primarily determined by street classification. The design speed is the maximum speed for the safe operation of a vehicle that can be maintained over a specific section of a street when conditions are so favorable that the design features of the street govern. Design speeds for the various classifications of streets may be found in Figure 3-4 (see Appendix). The use of speeds other than those shown in Figure 3-4 (see Appendix) must be approved by the City Engineer. Posted speed limit for a street is generally the Design speed less 10 miles per hour, unless otherwise determined by the City Engineer.

E. Superelevation in Curves

Superelevation is discouraged on horizontal curves in the urbanized area of the city.

1. *0.02 ft/ft Superelevation.* Superelevation of 0.02 ft/ft may be used, with approval of the City Engineer, when the standard radius cannot be provided due to circumstances beyond the control of the Design Engineer and the general alignment cannot be changed due to physical topographical constraints.

2. *Superelevation Greater than 0.02 ft/ft.* Superelevation greater than 0.02 ft/ft may not be used except when approved by the City Engineer. In no case shall a superelevation exceed 0.06 ft/ft.

3. *Transition for Superelevation*

   a. The length of superelevation transition shall be based on the superelevation rate and the width of rotation. The axis of rotation shall generally be about the pavement centerline. The transition lengths for a superelevation of 0.02 ft/ft are provided in Figure 3-4 (see Appendix) for other superelevation rates; refer to the AASHTO publication, A Policy on Geometric Design of Highways and Streets.

   b. With respect to the beginning or ending of a horizontal curve, one-third (1/3) of the transition should be on the curve, and two-thirds (2/3) of the transition should be on the tangent pavement section.

4. *Drainage on Superelevated Curves.* Whenever superelevation is allowed on a divided street, a storm drainage system to collect the runoff along the median curb shall be provided. In no case shall nuisance water from the higher traveled way be allowed to cross the lower traveled way.

F. Horizontal Curves

Horizontal alignments should provide for safe and continuous operation of motor vehicles at a uniform design speed for substantial lengths of street. A horizontal curve is required when the angle of change in horizontal alignment is equal to or greater than five degrees. The nature of the

surrounding development and topography, and the street classification will establish the factors that determine the radius of curve.

1. *Minimum Radii of Curvature*. The minimum radius of curvature will be determined by the design speed or by the stopping sight distance.

   a. *Minimum Radii Based on Design Speed*. Figure 3-4 (see Appendix) contains the minimum radius of curvature for each street classification with and without superelevation of 0.02 ft/ft. Whenever possible, the radii used in design should be larger. If stopping sight distance conditions require a larger radius than that shown in Figure 3-4 (see Appendix), then that larger radius becomes the minimum radius for the curve.

   b. *Consideration of Stopping Sight Distance.* When wall, buildings, bridge piers, cut slopes, vegetation, or other obstructions are near the roadway on the inside of a curve, they can block a driver's view of the road ahead. If they are too close, the driver will not have sufficient distance along the curved roadway to stop when a hazardous condition comes into view. For design, the drivers eye is 3.5-feet above the center of the inside lane (the driving lane closest to the inside of the curve) and that the hazardous condition is an object 0.5 feet high in the center of the inside lane. The clear distance "M" is measured from the center of the inside lane to the view obstruction.

2. *Reduced Design Speed on Curves*. The reduction of a street design speed on a curve should be avoided. However, where physical restrictions prohibit increasing the radius of the curve or the clear distance, "M", the design speed for the curved section may be reduced. In such circumstances, signing in accordance with the MUTCD is required. The difference between the design speed for the roadway approaching the curve and the design speed for the curve shall not be greater than 10 miles per hour. The design speed for a curved roadway section must not be reduced if the reduction would occur at the end of a long tangent or at any location where high approach speeds may be expected.

3. *Compound Curves.* Compound curves should be avoided. However, if site conditions make the use of a compound curve unavoidable, the minimum lengths for tangents between two curves curving in the same direction are listed in Figure 3-4 (see Appendix). The shorter radius shall be at least 2/3 the length of the long radius when the shorter radius is 1,000 feet or less. Compound curves are not permitted when design speeds require the shorter radius to be greater than 1,000 feet.

4. *Tangent Sections between Curves in the Same Direction*. On two-lane roads, tangent sections are needed between two curves in the same direction. If the pavement cross-sections through, the curves do not have superelevation. (The minimum lengths for tangent sections are listed in Figure 3-4) (see Appendix). If superelevation is provided in the curved portions of the roadway, then the tangent lengths will be determined by the superelevation transition lengths indicated in Figure 3-4 (see Appendix).

5. *Tangent Sections between Reverse Curves and Approaching Intersections*. A tangent section must be provided between two curves that curve in opposite direction. A tangent section must also be provided between an intersection and a curve. Minimum lengths for tangent sections between reverse curves without superelevation are provided in Figure 3-4 (see Appendix). If the curve radii are at least 50% greater than the radii required by the design speed, the tangent sections may not be required depending on the grades, topography, and vegetation. If superelevation is provided for the curves, then the superelevation transition lengths indicated in Figure 3-4 (see Appendix) will determine the minimum length of tangent sections between reverse curves.

G. Vertical Alignment

A vertical curve is required when grade changes are equal to or greater than 1.5%. All sections of a street's vertical alignment must meet passing and stopping sight distance requirements for the design speed established for the street. For further details, see the AASHTO Publication, A Policy on Geometric Design of Highways and Streets.

1. *Longitudinal Street Grades*. For parkways, expressways, and arterial streets, the maximum grade is 6%; for collector and local streets the maximum grade is 9%. The minimum longitudinal street grade for all streets is 0.4%. Wherever possible, longitudinal street grades greater than or equal to the minimum grade shall be provided. Where necessary, grades less than 0.4% may be used with approval by the City Engineer.

2. *Vertical Curves*. Properly designed vertical curves should provide adequate sight distance, safety, and effective drainage.
   a. *Type of Curve.* A parabolic vertical curve is to be used. Figure 3-4 (see Appendix) provides all necessary mathematical relations for computing a vertical curve, either crests or sags.

   b. *Sight Distance Requirements.* Sight distance is the continuous length of street ahead visible to the driver. For vertical alignment design, two sight distances are considered: passing sight distance and stopping sight distance. Stopping sight distance is the minimum sight distance to be provided at all points on multi-lane streets and on two-lane streets when passing sight distance is not economically obtainable. Stopping sight distance shall also be provided in the vicinity of intersections. Figure 3-4 (see Appendix) lists the minimum passing and stopping sight distances for the various street classifications and design speeds.

      (1) Stopping Sight Distance. The minimum stopping sight distance is the distance required by the driver of a vehicle, traveling at a given speed, to bring the vehicle to a stop after an object on the road becomes visible. Stopping sight distance is measured from the driver's eyes, 3.5-feet above the pavement surface, to an object 2-feet high on the roadway, or currently accepted AASHTO standards.

      (2) Passing Sight Distance. Passing sight distance is the minimum sight distance that must be available to enable the driver of one vehicle to pass another vehicle safely, without interfering with the speed of an on coming vehicle traveling at the design speed should it come into view after the overtaking maneuver is started. The sight distance available for passing at any one place is the distance at which a driver whose eyes are 3.5-feet above the roadway surface can see the top of an object 3.5-feet high on the road, or currently accepted AASHTO standards.

   c. *Minimum Vertical Curve Lengths*. Minimum vertical curve lengths are determined by sight distance requirements for a given design speed.

      (1) Crest Vertical Curve Lengths. Minimum crest vertical curve lengths are determined by either the stopping sight distance or the passing sight distance, whichever provides the greatest curve length.

         (a) The minimum crest vertical curve lengths must only meet stopping sight distance requirements on streets with two or more through travel lanes per direction.

(b) Two-Lane Streets. Passing sight distance requirements should be met on streets with one through travel lane per direction. When crest curve construction in accordance with passing sight distance requirements would result in the creation of drainage problems or excessive cuts or fills, the curve length may be reduced with the installation of appropriate traffic control measures.

(c) Minimum Crest Vertical Curve Length Determined by Stopping Sight Distance. The following equations are to be used to determine the minimum crest vertical curve lengths based upon stopping sight distance requirements:

When $S_s < L$, $L = (AS_s^2)/2158$

When $S_s > L$, $L = (2S_s) – (2158/A)$

Where:

S_s = Stopping Sight Distance in feet for a given design speed
L = Length of Curve in feet
A = Algebraic grade difference in percent

(d) Minimum Crest Vertical Curve Length Determined by Passing Sight Distance

The following equations are to be used to determine the minimum crest vertical curve lengths based upon passing sight distance requirements:

When $S_p < L$, $L = (AS_p^2)/2800$

When $S_p > L$, $L = (2S_p) – (2800/A)$

Where:

S_p = Passing Sight Distance in feet for a given design speed
L = Length of Curve in feet
A = Algebraic grade difference in percent

(2) Sag Vertical Curve Lengths. Minimum sag vertical curve lengths are determined by either the stopping sight distance or comfort factors. The longer of the two possible minimum curve lengths will be used.

(a) Minimum Sag Vertical Curve Length Determined by Stopping Sight Distance. The following equations are to be used to determine the minimum sag vertical curve lengths based upon stopping sight distance requirements:

When $S_s < L$, $L = (AS_s^2)/(400+3.5S_s)$

When $S_s > L$, $L = (2S_s) – ((400+3.5S_s)/A)$

Where:

S_s = Stopping Sight Distance in feet for a given design speed
L = Length of Curve in feet
A = Algebraic grade difference in percent

b. Minimum Sag Vertical Curve Length Determined by Comfort Factors

The following equation is to be used to determine the minimum sag vertical curve lengths based upon comfort factors:

$L = (AV^2)/46.5$

Where:

L = Length of Curve in feet
A = Algebraic grade difference in percent
V = Design Speed in Miles per Hour

H. Combined Horizontal and Vertical Curves

When horizontal and vertical curves are combined, the horizontal curve shall lead and follow the vertical curve. For additional information on this topic, refer to the AASHTO publication, A Policy on Geometric Design of Highways and Streets.

I. Intersections

Although all intersections share certain common elements, they are not subject to generalized treatment. To minimize conflicts and provide for anticipated traffic movements each intersection must be evaluated with regard to its individual characteristics and designed based on the following factors:

- Traffic factors such as capacities, turning movements, vehicle size and operating characteristics, vehicle speed, pedestrian and bicycle movements, transit operations, and accident history.

- Physical factors such as topography, existing conditions, channelization requirements, and available sight distance.

- Human Factors such as driving habits, reaction to surprises, decision and reaction time, and natural paths of movement.

1. *Angle of Intersection.* A right angle intersection provides the shortest crossing distance for intersecting traffic streams. It also provides the most favorable condition for drivers to judge the relative position and speed of intersecting vehicles. Where special conditions exist, intersection angles may diverge from a right-angle by a maximum of 2 degrees (4 degrees with approval of the City Engineer) on parkways, expressways, arterial streets and major collector streets; and by a maximum of 4 degrees (15 degrees with special approval of the City Engineer) on minor and local collector streets and local streets.

2. *Alignment and Profile.* Intersections occurring on horizontal or crest vertical curves are undesirable. When there is latitude in the selection of intersection locations, vertical or horizontal curvature should be avoided. A line or grade change is frequently warranted when major intersections are involved. If a curve is unavoidable, it should be as flat as site conditions permit. Where the grade of the through roadway is steep, flattening through the intersection is desirable as a safety measure.

3. *Intersection Sight Distance.* In order to provide the opportunity for vehicles at an intersection to safely cross or make left or right turns onto a through street, adequate sight distance must be provided. Sight lines are to be drawn on roadway and landscaping plans to represent the

areas that must be free of all objects and topography in excess of 24" above the roadway surface. City of Peoria Detail PE-090 depicts the technique used to determine driver's eye locations; a line is then drawn to connect these two points. Continuous unobstructed line of sight must be provided along this line and throughout the approach to the intersection, providing an unobstructed sight triangle to the side street driver. Vegetation placed within the sight triangle shall be of a low variety that remains below 24"when mature. Trees can be considered within the triangle as long as the canopy is above 7 feet and if it is a single trunk variety.

a. *Right Angle Intersection*. If the street intersection legs meet at an angle of 88 to 90 degrees, the sight distances shown in Figure 3-4 are to be used with City of Peoria Detail PE-090 to calculate the sight triangle. The intersection sight distance shown on Figure 3-4 for all street classifications, except local industrial was determined assuming passenger car traffic. If high volumes of truck traffic are anticipated on other than local industrial street, the procedures in the AASHTO publication, A Policy on Geometric Design of Highway and Streets should be consulted to determine the necessary sight distances.

b. *Skewed Intersections*. For skewed intersections where the intersection angles are less than 88 degrees, sight distances must be calculated in accordance with the procedures described in Chapter 9 of the AASHTO publication A Policy on Geometric Design of Highways and Streets.

c. *Intersections within or near a curve*. Distances 'A' and 'B' shown in City of Peoria Detail PE-090 shall follow the street alignment when the intersection is within or near a horizontal curve.

d. *Traffic Safety Triangles*. Traffic Safety Triangles should be used as a means to limit the height of structures, vegetation, and other improvements on corner properties immediately adjacent to intersections. Safety triangles are not to be used as a substitute for intersection sight distance. Safety triangles provide additional visibility around corners for all intersection approaches, and should be applied to the design of perimeter walls and landscape features. Items within the safety triangle shall be no higher than 24" measured from the roadway surface. City of Peoria Detail PE-091 depicts the method used to determine the safety triangle location.

4. *Intersections with an unpaved leg.* If an intersection has a leg that is unpaved, the paving to be placed in the intersection shall extend to the end of the normal curb return location on the unpaved leg at a minimum.

5. *Valley Gutters at Street Locations*

a. *Locations of Valley Gutters.* Valley gutters may only be used across minor and local collector streets, and local residential streets. Exceptions must be approved by the City Engineer.

b. *Valley Gutter Widths.* Valley gutters should be constructed in accordance with MAG Standard Detail 240, except that concrete for valley gutters shall conform to MAG Standard Specification 725, Type 'A' with a minimum 28-day compressive strength of 3,000 psi.

6. *Turning Lanes.* A separate turning lane permits separation of conflicting traffic movements and removes turning vehicles for the intersection area. Right turn lanes shall be provided on streets classified as Major Arterial or higher, at all street intersections and at driveways where warranted. For left turn lanes at signalized intersections, dual turn lanes should be considered

when the turn volume exceeds 200 vehicles per hour, the opposing through volume exceeds 1,000 vehicles per hour, or the delay to left turning vehicles exceeds 45 seconds. Abrupt reduction of alignment and sight distance standards should be avoided. The length of these lanes depends on several factors and must be determined on a case-by-case basis and approved by the City Engineer.

7. *Median Design*. Raised medians are required on parkways, expressways, and arterial streets to separate traffic flows, channelize left turns, and reduce conflicts. On collector streets, flush or painted medians provide space between the through traffic lanes for left turning vehicles. Required median widths are listed for each street classification in Figure 3-4 (see Appendix).

   a. *Raised Medians.* Raised medians, where required, must be provided in accordance with the applicable City of Peoria Details, with the appropriate median width, as noted above.

      (1) Spacing and Location of Median openings. If a street has a raised median, it is not possible to provide an opening in the median for every street intersection or driveway. Full median openings should occur at not less than ¼-mile intervals on parkways, expressways, and major arterial streets. Partial median openings, which allow only left turns off the major street, are acceptable at 1/8-mile spacing. On minor arterials, full median breaks should be no closer than1/8-mile intervals. In built up areas, where reasonable alternate access is not available, median openings may be provided at smaller intervals with the approval of the City Engineer.

      (2) Configuration of Median Openings. The median opening configuration shall be determined to the satisfaction of the City Engineer.

      (3) Cross Slope. The cross-slope in the median opening shall be limited to 0.02 ft/ft. Median openings on curves with superelevation exceeding 0.02 ft/ft will not be permitted.

   d. Flush Medians. Flush painted medians are required on major, minor and local collector streets. Median widths for these streets are listed in Figure 3-4 (see Appendix).

3-5 CONSTRUCTION

A. Standard Details and Specifications

All construction shall conform to the latest City of Peoria Supplement to MAG Uniform Standard Details, MAG Uniform Standard Specifications and Details for Public Works Construction, as revised herein.

1. *Asphalt Concrete Pavement Application***.** Asphalt concrete pavement shall be placed in lift thicknesses per the following requirements:

Mix Design	Min. Compacted Lift Thickness	Max. Compacted Lift Thickness	Use
D ½	1”	1.5”	Surface or leveling course (required on all street classifications except residential)
C ¾	1.5”	3”	Base course (surface course for residential and parking lots only)
A 1-½	3”	4”	Base course only.

***NOTE**: An asphalt concrete preservative seal, in accordance with City specifications. This seal shall be paid for by the developer.

B. Permits

An Offsite Construction Permit is required for any and all work within the public right-of-way and public easement(s). The consultant, developer, and/or contractor shall obtain any and all permits required by other agencies or jurisdictions for access and construction of improvements governed by such agency or jurisdiction.

C. Assurance

Assurance in accordance with the Subdivision Regulations of the City Code is required for all work within the public right-of-way and public easements.

D. Insurance

All engineers, consultants, developers, contractors and subcontractors working within the public right-of-way and/or public easements shall provide the City with proof of insurance in a form and with limits of coverage acceptable to the City. Insurance forms are required to identify the City of Peoria as additionally insured.

E. Inspections

All work within the public right-of-way and public easements shall be inspected and approved by the appropriate City Department, public utility company or franchised utility company.

F. Access During Construction

All newly constructed public ways shall be kept barricaded and access denied to the public until such public way is accepted by the City and all traffic control devices are installed to the approval of the City.

G. Pavement Matching

Pavement matching and surfacing replacement shall conform to MAG Standard Specifications, Section 336. Sidewalk removal may be made either to the nearest joint, score line or five foot interval.

All testing required by the City of Peoria shall be performed under the supervision of a civil engineer registered in the State of Arizona. All test reports shall be submitted to the City of Peoria Engineering Department and are to be sealed by a professional civil engineer. Each report shall identify the location of the test, type and source of material tested, test designation being used and the name of the person and company performing the test.

The following are practical guidelines for some required tests. This listing is not all inclusive. Additional tests may be required, or different procedures call for by the City Engineer or his designee.

1. *Sand Cone Correlations*. Sand cone correlations are required wherever a nuclear compaction testing device is used. These correlations shall be provided for every tenth compaction test (per nuclear compaction testing device). If possible, that the correlation be run on the City of Peoria project being tested at the time of the nuclear density testing. As an alternative, a documented correlation test will be accepted from another project (test being in proper documented correlation test will be accepted from another project being in proper sequence). All correlation test results shall reference the serial number of the comparitive nuclear device and the technician performing the test. Correlation test results shall be submitted with the related compaction tests.

2. *Rock Correction Procedure*. A rock correction procedure shall be required unless:

    a. Either ASTM D-1557 procedure C or ASTM D-698 procedure C is used.

    b. Tests are waived by the Off-site Inspection Supervisor (in writing). An assumed value of 2.6 shall be used for the bulk specific gravity of rock unless a higher value is determined by the testing agency.

3. *Test Results*. Written results (file copy) shall be submitted to the City of Peoria Off-site Inspection Supervisor in a timely manner. Verbal results are unacceptable. All test results shall be submitted to the Off-site Inspection Supervisor for his review (prior to commencing the next phase of construction).

4. *Trench Bedding*. In addition to normally required denisty testing, density tests shall be performed at the bottom of the trench (prior to placement of AB). An additional test may be required after placement of AB if AB thickness exceeds 4 inches or at the descretion of the Off-site Inspection Supervisor.

5. *Materials Testing Prior to Paving*. The following tests shall be performed and the test results submitted to the Off-site Inspection Supervisor prior to paving:

    - Plasticity Index on AB
    - Gradation on AB
    - All Density on Subgrade
    - AC Mix Design

    Unless otherwise specified, the mix design for all asphaltic concrete shall be City of Phoenix Standard C-3/4 inch mix. Copies of the mix design and product codes are available in the City of Peoria Engineering Department.

H. Site Cleanup

Clean up of the construction area must be performed daily utilizing a broom sweeper.

I. Disposal

A location for the disposal of waste materials generated in the pursuit of the work shall be identified and approved by the owner of the site and the City.

J. Arizona Pollutant Discharge Elimination System (AZPDES)

A NPDES permit is required in accordance with the Federal and State Regulations, including a Notice of Intent (NOI), Notice of Termination (NOT), and Storm Water Pollution Prevention Plan (SWPPP). A copy of the SWPPP and the NOI shall be submitted and reviewed by the City of Peoria. Refer to Section 4-5 Pollutant Discharge Elimination System.