Engineering Design and Construction Standards

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INTRODUCTION

1.1 GENERAL INFORMATION

1.11 PURPOSE

The purpose of these standards is to aid developers, homebuilders and their designers in the planning and designing of public and private infrastructures. Design concepts and specific technical data are outlined; however, they are not intended to supersede sound engineering judgment. All plans are to be prepared with these concepts in mind and will be reviewed accordingly.

1.12 AUTHORITY

Chapter 28 of the Code of the City of Glendale authorizes the City Engineer to publish and amend standards for infrastructure construction within the City. These standards are published and periodically amended in accordance with that authority.

1.13 SCOPE

This document is divided into individual Chapters, which cover specific elements of the design and development review process. It begins with general information, followed by specific technical details. Updates will be published and made available periodically.

These standards are intended to be used in conjunction with the specifications of the Zoning, Subdivision, Floodplain Management, Grading and Drainage,

Landscape and other City of Glendale ordinances. The laws and regulations of other agencies will also be followed.

1.14 COMMUNITY DEVELOPMENT FEES

City Council adopted Section 2-3 of the City Code of Glendale by Ordinance No. 2260 and a fee schedule by Resolution No. 4839 on August 12, 2014. This ordinance established Community Development fees of the City of Glendale and further provides for an annual automatic adjustment in accordance with the Consumer Price Index Urban Users (CPIUU) Inflationary Index. A copy of the current fee schedule may be obtained from the Engineering Division or from the Development Services Center at 5850 W. Glendale Avenue.

1.15 CODES AND STANDARDS

All development within the City of Glendale shall comply with all requirements of the City of Glendale Code and Ordinances. Copies of these documents, with revisions, are on file in the Office of the Clerk of the City of Glendale as well as online at http://www.glendaleaz.com/codebook/. Preliminary and final design plans shall be prepared in accordance with these standards unless specific variances have been approved by the City.

All construction shall be in accordance with the most current Uniform Standard Details and Specifications published by the Maricopa Association of Governments (MAG), and the City's current Engineering Design and Construction Standards. Private on-site water and sewer lines shall be constructed in accordance with the Uniform Plumbing Code as adopted by the City.

1.16 PLANS REVIEW

Once the plans for a development have been prepared, they shall be submitted to the City's Development Services Center. From there they will be distributed to the appropriate City departments for review and comment. These comments will be compiled and consolidated by the Development Services Center and returned to the developer. All such comments shall be incorporated into the plans and reports by the developer prior to re-submittal.

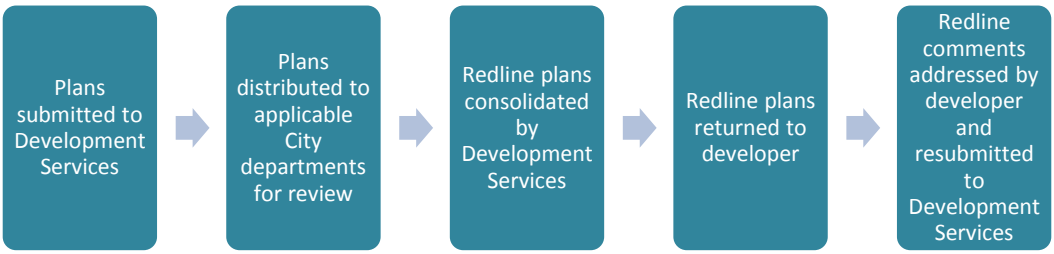

FIGURE 1.1 - Plans Review Process

1.17 RIGHT-OF-WAY AND EASEMENT DEDICATIONS

When required, the acquisition and dedication of new right-of-way and/or utility easements shall be coordinated through the City's Engineering Division. Deeds for these rights-of-way, easements and/or parcels shall be prepared by the developer in a format acceptable to the City and submitted to the City for approval, recordation and formal Council acceptance. The instructions for completing these documents are available from the Engineering Division. No real property transaction shall be executed until environmental due diligence has been performed. This includes a recent ASTM Phase I or, if needed, a Phase II Environmental Site Assessment (ESA) report submitted to Engineering with the deed or conveyance.

1.18 STREET LIGHTS

Street lights are required on all public streets within or adjacent to any proposed development. Plans for these facilities must be included in the overall submittal and plans should be prepared in accordance with the City's Street Lighting Manual.

1.19 CONSTRUCTION

Construction permits are required for all construction within the City. Any contractor found working on a project without an official set of approved plans and a current permit shall discontinue work. Prior to the issuance of a permit, the contractor shall provide a current Arizona State Contractor's License, proof of commercial general liability insurance and an appropriate letter of assurance or other guarantee for the completion of all off-site improvements as required by the City's Subdivision Ordinance. All construction shall be in accordance with the approved plans and the Uniform Standard Details and Specifications published by the Maricopa Association of Governments (MAG) and amended herein by these standards.

1.2 GENERAL IMPROVEMENT POLICIES

The following sections outline the City's policies related to various improvements associated with the development process. They are by nature general in scope. Reference should be made to the appropriate chapters within the balance of these standards for specific details.

1.21 STREET IMPROVEMENT POLICY (See Chapters 3 and 4)

A. General

All developments within the City shall provide an interior street system adequate to ensure that all parcels and/or facilities within the development shall have reasonable access to the balance of the public street system. Further, they shall provide access into the development for public service and/or emergency operations. Such facilities, be they public or private streets, shall be of such width and structural strength as to provide safe and unrestricted access.

B. Private Streets

Private streets are not normally allowed and must be specifically approved by the City Council. If approved, private streets must be improved to City standards to include an easement for utility and public safety access at least equal to the City standard right-of-way width for residential streets. Where private streets are authorized, the developer will be responsible for providing gates or other means of denying access by the general public. Private streets shall not be maintained by City forces.

C. Single Family Developments

In single-family developments, it is the intent of the City of Glendale that the street system be designed in conformance with the classifications outlined in Paragraphs 3.11 and 4.1. There shall be minimal direct access to the collectors, and extremely limited access to major arterials and arterials. When the development occurs adjacent to a boundary street, it is the City's requirement that the developer will install improvements along their development's frontage to the ultimate grade and alignment for the said boundary street. If the existing pavement does not meet current City design standards, the developer will be required to remove and replace the pavement to street centerline. If any existing pavement, sidewalk, curb, gutter, or any underground City utilities or manholes along the development's frontage do not meet current City design standards, the developer shall be required by the City to remove and replace to street centerline any such existing improvements.

1.22 STORM DRAINAGE POLICY (See Chapter 5)

Post-development runoff shall not exceed pre-development runoff in terms of the drainage pattern, rate and depth at the historical discharge point(s).

It is the City's policy that all developments within the City shall provide sufficient stormwater retention or detention so as to minimize the adverse impact of that development on its downstream neighbors. To that end, all development shall provide sufficient on-site retention or detention to

contain, at the least, the runoff generated by a 100-year, 2-hour storm falling on that property. Such facilities shall be separate and distinct parcels within the development and shall be planned for accordingly. Further, it is the City's policy that all developments shall provide adequate drainage facilities so as to convey runoff generated both on and off the project, around or through the project in such a manner as to insure that the structures will be free from flooding and that there is reasonable access for emergency and public service vehicles. Post-development runoff shall not exceed pre-development runoff in terms of the drainage pattern, rate and depth at the historical discharge point(s) onto adjacent properties. The developer shall install storm sewers, channels and/or other physical improvements necessary to achieve this result.

1.23 WATER LINE EXTENSION POLICY (See Chapter 6)

It is the City's policy that all development within the City shall have an adequate and secure source of potable water. To that end the City has developed a comprehensive program for supplying municipal water. Therefore, unless specifically excluded, all developments within the City shall be serviced by the City's potable water system. Further, the developer shall extend said system to and through the development as necessary to insure adequate supply to the development. If deemed necessary and appropriate, the developer shall extend the water distribution system to the extremities of the project so as to insure that more distant potential users shall have reasonable access to the City's water system. The City does not provide potable water to parcels west of 115th Avenue.

1.24 SEWER LINE EXTENSION POLICY (See Chapter 7)

It is the City's policy that, unless specifically excluded, all development within the City shall provide for the discharge of domestic and other liquid waste into the municipal sewerage system. All developers shall be required to extend to and through their project a sewage collection system of a size, depth and slope sufficient to dispose of these wastes to the public system. When deemed appropriate and necessary, the developer shall extend the main trunk and/or collector lines to the upstream extremities of the project so as to provide reasonable access for potential upstream users to the City system. The City does not provide sewer facilities to parcels west of 115th Avenue.

1.25 SITE DEVELOPMENT POLICY (See Chapter 9)

It is the City's policy that all development within the City shall be designed and constructed in such a manner as to provide a safe and pleasant environment for the citizens of Glendale.

All development within the City shall be designed and constructed in such a manner as to provide a safe and pleasant environment for the citizens of Glendale.

To that end, the appropriate standards have been established for site development to include: public and/or private access for general and special uses; public water and sewerage systems; on-site and off-site drainage; undergrounding of aerial utility lines; landscaping; stormwater retention; street lighting; and public utilities as may be required. The building structures themselves are to be constructed in accordance with the Residential Design and Development Manual, all city ordinances, the adopted building codes and these engineering standards.

1.3 ORDER OF PRECEDENCE

It is not intended by these standards to repeal, abrogate, annul, or in any way impair or interfere with existing provisions of other laws or ordinances except those specifically repealed with private agreement, or with restrictive covenants running with the land to which the City is a party. Where these standards impose a greater restriction on land, buildings, or structures than is imposed or required by such existing provisions of law, ordinance, contract, or deed, the provisions of these standards shall prevail.

1.4 DEFINITIONS AND ABBREVIATIONS

The words, abbreviations, or phrases used in these standards may be found in the Uniform Standard Specifications and Details for Public Works Construction Manual sponsored and distributed by the Maricopa Association of Governments (MAG). All other words or phrases shall be according to the generally accepted meaning in the English language.

CONSTRUCTION PLANS PREPARATION

2.1 GENERAL INFORMATION

2.11 GENERAL PLAN INFORMATION

This chapter gives general guidelines for construction plan preparation. The subsequent chapters should be consulted for specific requirements of each type of plan. Chapter 12 contains standard City details, which augment or replace some MAG Standard Details.

2.12 SHEET SIZE

Plan sheets shall not be smaller than 22 in. x 34 in. or larger than 24 in. x 36 in.

2.13 DRAFTING SYMBOLS

Plans for City Capital Improvement Projects (CIP) shall be drawn with conventional drafting symbols.

2.14 PLAN QUALITY

Plans shall be of a quality to allow scanning or reducing, i.e. line weight and letter size shall be easily read when reduced by 50%.

2.2 COVER SHEET

An individual cover sheet is required for each type of improvement plan.

2.21 COVER SHEET REQUIREMENTS

A. Project name, address, description, and total net and gross project acreage.

B. Developer's name, address, and telephone number.

C. Consultant's name, address, and telephone number.

D. Engineer's seal and signature is to be affixed on each sheet.

E. Vicinity map showing the project's location within the City limits (see Detail G-201).

F. Key map showing the project's location with a section and a graphic sheet index.

G. Project Benchmark:

A minimum of two Maricopa County Department of Transportation (MCDOT) GDACS Cadastral Corners shall be used and referenced with "Point Name". Note the datum will be NAD '83 international foot for horizontal control and NAVD '88 for vertical control. A master list of the GDACS control points can be found at the MCDOT website.

H. Quantities:
Provide a tabulation of the estimated quantities of all improvements within the public right-of-way or City easements (See Detail G-203). If the project is to be developed in phases, the estimate of quantities shall indicate quantities for each phase.

I. Specific reference should be made to soils investigation reports and/or pavement designs, if any.

J. Approval, acceptance and certification blocks (See Detail G-202).

K. Certification:

"I hereby certify that this design is based on a site visit or accurate field data which has been checked in the field within 180 days prior to submission for City approval."

By:_____ Date:_____

L. Utility Undergrounding Statement:

"PURSUANT TO CHAPTER 32.5 OF THE GLENDALE CITY CODE, ALL NEW AND EXISTING UTILITIES WITHIN OR CONTIGUOUS TO THIS SITE SHALL BE PLACED UNDERGROUND IN CONDUIT."

M. For private development plans, the Permit Fee Schedules as shown in Detail G-203.

N. Sheet Index.

O. FEMA Blocks and Information:

In accordance with the Federal Emergency Management Agency and City requirements the following information must be included on the cover sheet of all plans in order to establish lowest finish floor elevations and flood proofing elevations for both residential and nonresidential structures.

Community Number	Panel # Panel Date	Suffix	Date of FIRM (Index Date)	FIRM Zone	Base Flood Elevation (in AO zone use Depth)
040045					

2.3 DETAIL SHEET

A separate detail sheet may be provided at the discretion of the consultant or when required by the City.

2.31 DETAIL SHEET REQUIREMENTS

A. General Notes

For private development plans, General Notes as detailed in Section 2.6 shall be shown on this sheet.

B. Cross Sections

A typical cross section shall be shown for each street on street construction plans. The data required on a typical section are:

1. Dimensions.
2. Street centerline (and monument line, if offset from centerline) and right-of-way lines.
3. MAG Standard Details and Specifications.
4. Pavement structural design
5. Trim and match to existing pavement.
6. Existing and proposed utilities and easements.
7. Landscaped areas.

C. Details

Special construction details required shall be provided. Typically this would include:

1. Modification or relocation detail for existing private irrigation structures.
2. Special construction required where utility locations conflict.
3. Others determined by the consultant and/or the City as needed to clarify construction.

2.4 PLAN VIEW ONLY SHEETS

2.41 Plan view only is allowed for construction plans for:

Type of Plan	Scales
A. Minor collector and interior streets in undeveloped areas	1 inch = 20 feet only
B. Grading and drainage plans with supplemental cross sections as needed to explain drainage	1 inch = 40 feet minimum
C. Water line plans for new subdivisions for lines under 12-inches	1 inch = 40 feet minimum
D. Street light plans	1 inch = 40 feet minimum

TABLE 2.4-1 PLAN VIEW ONLY SHEETS

2.42 PLAN VIEW REQUIREMENTS

A. Plan view shall be oriented such that north is either at the top or the right side of the sheet. North shall be clearly indicated for each plan view.

B. The drawing scale shall be clearly indicated for each plan view, and a graphic scale at least 2 inches long, or 100 scale (in feet), shall be placed adjacent to each north arrow.

C. All existing topography shall be shown. Typically this will include:

1. Existing contours with adequate spot elevations to show drainage (including a minimum 100 feet beyond project limits).

2. Existing utilities – aerial and underground, including any cabinets, pull boxes and junction boxes.

3. Existing irrigation facilities.

4. City limits where applicable.

5. 100-year floodplain/floodway limits where applicable.

D. Existing and proposed right-of-way, easements, view-easements and property lines. Dimensions of these shall be clearly indicated.

E. Drafting and lettering of new construction shall be sufficiently heavier (darker) than existing topography so as to allow it to be quickly and clearly identified.

F. New construction notes should be boxed so that they contrast with general information notes.

G. New drainage slopes may be shown as a percentage of slope or in foot per foot change of grade (four decimal places).

H. Grade breaks shall be clearly shown.

I. Benchmark information.

2.5 PLAN/PROFILE AND CROSS SECTION SHEETS

2.51 PLAN AND PROFILE SHEETS

Plan and profile are required for construction plans for:

Type of Plan	Scale
A. All arterial, collector and residential streets, plus other streets when longitudinally matching existing streets	Horizontal: 1 inch = 20 feet or 1 inch = 40 feet Vertical: 1 inch = 2 feet 1 inch = 4 feet Storm Drain Connector Pipes: 1 inch = 5 feet H & V
B. Water line plans for construction of lines 12-inches and larger.	
C. All sewer plans	
D. All storm drain plans for main lines	

TABLE 2.5-1 PLAN AND PROFILE SHEETS

2.52 PLAN AND PROFILE REQUIREMENTS

A. Plan view shall be prepared in accordance with Section 2.4.

B. Profile view shall show the following:

1. Elevation and stationing grid clearly indicated.
2. Profile of existing surface over proposed construction.
3. Existing utility crossings.
4. Proposed construction (i.e. elevations, slopes, grade breaks).

C. New construction notes should be boxed so as to contrast with general information notes.

D. Where the sanitary sewer is approved to be less than five feet deep, the proposed water line shall be indicated in profile by a "ghost" line, and the building sewers shall be plotted at the locations and inverts where they cross the water line. The MAG Standard detail 404 shall be called out, when needed, on both plan and profile.

2.53 CROSS SECTION SHEETS

Cross section sheets are required for construction plans for all streets when longitudinally matching existing streets.

2.54 CROSS SECTION REQUIREMENTS

A. Maximum distance between cross sections shall be 100 feet and shall include cross sections at the ends of curb returns. Cross sections shall extend the full width of the right-of-way.

B. Existing ground shall be shown with dashed lines with break points indicated by elevation and distance from monument line. New construction shall be shown with solid lines with break points indicated by elevation and distance from monument line.

C. Minimum scale for horizontal is 1 inch = 10 feet. Minimum vertical scale is 1 inch = 1 feet.

2.6 GENERAL NOTES

2.61 The following notes shall be placed on the Detail Sheet or Cover Sheet for **all private development** construction plans:

CITY OF GLENDALE
GENERAL NOTES FOR CONSTRUCTION

A. All construction shall conform to the latest MAG Standard Details and Specifications and the City's current Engineering Design and Construction Standards.
B. This set of plans has been reviewed for compliance with City requirements prior to issuance of construction permits. However, such review and acceptance shall not prevent the City from requiring correction of errors in said plans and/or construction when in violation of any laws, ordinances, codes or standards that are in effect. Review and acceptance of plans does not release a developer or engineer from responsibility for errors or omissions on said plans.
C. The City does not warrant any quantities shown on these plans.
D. The City plans acceptance is for general layout in the right-of-way only. This acceptance is valid for a period of six months. Construction permits shall be obtained during this period or the plans shall be resubmitted for review.
E. A City accepted set of plans shall be available on the job site at all times.
F. The City shall be notified 48 hours prior to any construction work. Construction work concealed without inspection by the City shall be subject to exposure at the contractor's expense.
G. A Right-of-Way construction permit is required for all work within the public right-of-way or within a city easement. A 100% Performance Bond or equivalent form of financial surety may be required for all work within the right-of-way prior to the issuance of any right-of-way construction permit(s). All work within the right-of-way shall be inspected and approved by the City's Engineering Division.
H. Improvements shall not be accepted until "As-Built" plans and electronic (AutoCad) files have been submitted and approved by the City.
I. The developer is responsible for all costs and work related to the removal, relocation or abandonment of all obstructions and/or utilities within the right-of-way that conflict with the new improvements.
J. The developer is responsible for obtaining or dedicating all required rights-of-way and easements to the City prior to issuance of the building's certificate of occupancy.
K. The contractor shall contact Blue Stake (602-263-1100) 48 hours prior to construction.
L. The contractor shall barricade construction sites at all times per the City of Phoenix Traffic Barricade Manual. When required by the City, a traffic control plan shall be submitted for approval a minimum of 72 hours in advance of construction.
M. The contractor may obtain a fire hydrant meter for construction water from the City Water Services Department. The unlawful removal of water from a fire hydrant is a violation of the municipal code, punishable by fine and/or imprisonment.
N. Damage caused by the developer during construction to City infrastructure or facilities shall be repaired or replaced by the developer, at his expense, in a manner acceptable to the City.
O. There shall be no dirt ramps over sidewalks during construction.
P. An AZPDES permit is required for all construction that disturbs land over one (1) acre in size. Prior to start of any construction, the contractor shall submit a Notice of Intent (NOI) to the Arizona Department of Environmental Quality (ADEQ) and a copy to the City of Glendale and have a copy of the SWPPP on site at all times.

FIGURE 2.6-1 GENERAL NOTES FOR CONSTRUCTION

2.62 All **private development plans for street construction** within right-of-way or easements shall have the following shown on either the Cover Sheet or the Detail Sheet:

CITY OF GLENDALE
GENERAL NOTES FOR STREET CONSTRUCTION

A. The developer/contractor is responsible for paying permit fees prior to construction of any street improvements.
B. The paving contractor is responsible for obtaining water and sewer as-built plans before start of construction to determine the location of all existing utility frames and covers that must be adjusted to finish grade.
C. The paving contractor shall not start construction until conflicting underground utility construction is completed and service stubs to all lots have been adequately extended to the right-of-way or easement line.
D. If the existing pavement does not meet City requirements, the developer will be required to remove and replace the pavement to street centerline. The City shall determine the exact limits of pavement to be removed and replaced.
E. All existing street monuments must be preserved. Prior to construction, monuments will be referenced horizontally and vertically. After construction, monuments shall be reset and any new information shall be reflected on the as-built plans.
F. The maximum stake interval for grades of 0.2% or less shall be 25 feet for concrete work and 50 feet for asphalt roadway section, except on horizontal or vertical curves where a maximum stake interval of 20 feet for concrete work shall be required. All curb returns shall be staked at the P.C. and the midpoint of the return. No grade stake interval shall exceed 50 feet.
G. The developer is responsible for the installation of all new pavement markings and the removal of all existing pavement marking that are in conflict with the new pavement markings.
H. No person shall use any mechanical equipment for clearing, grubbing, road construction, trenching, excavating, demolition or engage in any earthmoving activity without first obtaining a dust control permit from Air Pollution Control, Maricopa County Department of Environmental Services.

FIGURE 2.6-2 GENERAL NOTES FOR STREET CONSTRUCTION

2.63 All **private development plans for public water main construction** within right-of-way or easements shall have the following shown on either the Cover Sheet or the Detail Sheet:

CITY OF GLENDALE
GENERAL NOTES FOR WATER MAIN CONSTRUCTION

A. The developer/contractor is responsible for paying permit fees prior to construction of any waterlines and appurtenances.
B. Bedding and backfill of all water mains and services within City rights-of-way or easements shall follow City of Glendale Standard Detail G-690.
C. Gate valves shall be resilient seated, solid wedge gate, fully encapsulated and open left. Butterfly valves are not allowed in lines 12-inch and smaller.
D. Tapping valves shall be flange by mechanical joint to allow tapping by Contractor.
E. Taps to existing mains shall be done by a City approved contractor. No tap shall be made until the City's Construction Engineering inspector has approved the installation of the tapping sleeve, thrust block, valve, and valve blocking. No tap shall be made without a City Water Services Department representative present. Prior to all taps, the City's Construction Engineering inspector will contact the City's Water Services Department no less than 24 hours prior to tapping.
F. Conflicts with existing utilities discovered during construction shall be called to the attention of the City and resolved prior to proceeding.
G. It shall be the responsibility of the contractor/developer to have the service line visible and accessible when requesting the installation of a water meter or a final inspection.
H. Only City forces are authorized to open and close water valves connected to the system.
I. Location of all water valves must be referenced at all times during construction and made available to the Water Services Department.
J. All materials which may come in contact with drinking water shall conform to the National Sanitation Foundation Standards 60 and 61.
K. Thrust blocks shall be installed at all valves, fire hydrants and fittings where there is a change in size or direction unless approval is obtained from the City.
L. The contractor shall place an "out of service" disk on all new hydrant installations until the water lines have passed all bacteriological tests and have been accepted by the City.
M. All procedures for testing, flushing and disinfection must be done in accordance to Chapter 6 of the city's Design Standards.
N. The contractor is responsible for notifying customers in writing that they will be out of water at least 24-hours in advance of any water main shutdown.
O. No person shall use any mechanical equipment for clearing, grubbing, road construction, trenching, excavating, demolition or engage in any earthmoving activity without first obtaining a dust control permit from Air Pollution Control, Maricopa County Department of Environmental Services.
P. Any existing water lines and water service lines to the property that will not be used must be abandoned by the developer per Chapter 6 even if discovered during construction.

FIGURE 2.6-3 GENERAL NOTES FOR WATER MAIN CONSTRUCTION

2.64 All **private development plans for public sewer main construction** within right-of-way or easements shall have the following shown on either the Cover Sheet or the Detail Sheet:

CITY OF GLENDALE
GENERAL NOTES FOR SEWER MAIN CONSTRUCTION

A. The developer/contractor is responsible for paying permit fees prior to construction of any sewer lines.
B. MAG Standard Detail 404 shall apply whether shown on the approved plans or not.
C. Conflicts with the existing utilities discovered during construction shall be called to the attention of the City and resolved prior to proceeding.
D. Location of all manholes and cleanouts must be referenced at all times during construction and made available to the City's Water Services Department.
E. All new sewer mains shall be inspected by closed circuit television methods acceptable to the City. Any defects discovered during televised inspection shall be corrected and re-televised at no cost to the City. Videotapes or CDs of all televised inspections shall be provided to the City prior to final acceptance of the sewer main. The televised inspection will be after the installation of dry utilities and paving.
F. Bedding and backfill of all sewer mains and services in City rights-of-way or easements shall follow City of Glendale Standard Detail G-690.
G. No person shall use any mechanical equipment for clearing, grubbing, road construction, trenching, excavating, demolition or engage in any earthmoving activity without first obtaining a dust control permit from Air Pollution Control, Maricopa County Department of Environmental Services.

FIGURE 2.6-4 GENERAL NOTES FOR SEWER MAIN CONSTRUCTION

2.65 All **private development plans for on-site grading and drainage construction** shall have the following shown on either the Cover Sheet or the Detail Sheet:

CITY OF GLENDALE
GENERAL NOTES FOR GRADING AND DRAINAGE CONSTRUCTION

A. The developer/contractor is responsible for paying permit fees prior to construction.
B. A separate permit is necessary for any construction in the right-of-way.
C. Prior to the start of any on-site grading operations, the contractor shall notify the City Engineering Division at least 48 hours prior to commencing work by calling 623-930-3630.
D. Staking pad and/or finished floor elevations are the responsibility of the developer or his engineer. In non-critical areas, the developer's engineer shall submit certifications of constructed building pad elevations prior to the City's acceptance of project. In a critical drainage area, certification of the finished building floor or stem wall elevation shall be submitted and approved prior to any vertical construction.
E. An approved grading and drainage plan shall be on the job site at all times. Deviations from the plan must be preceded by an approved plan revision.
F. Acceptance of grading and drainage improvements shall include, but not be limited to, the construction of retention basins, catch basins, curb for other drainage facilities, site grading, drywells, storm drain pipes, underground storage tanks and asphalt pavement.
G. Drywells must be drilled a minimum of 10 feet into permeable porous strata.
H. The contractor shall construct all retention basins to the elevations and slopes shown on the plans.
I. The contractor is responsible for locating and confirming depth of all the existing utility lines within proposed retention basin areas. If the basin cannot be constructed per plan as a result of conflict with underground utilities, the contractor should contact the City and design engineer and request modification of the basin design.
J. This set of plans has been reviewed for compliance with City requirements prior to issuance of construction permits and shall be kept at the construction site. Such review shall not prevent the City from requiring corrections to errors on the plans, which are found to be in violation of any law or ordinance.
K. No person shall use any mechanical equipment for clearing, grubbing, road construction, trenching, excavating, demolition or engage in any earthmoving activity without first obtaining a dust control permit from Maricopa County Department of Environmental Services.

FIGURE 2.6-5 GENERAL NOTES FOR GRADING AND DRAINAGE CONSTRUCTION

2.66 All plans requiring a **Storm Water Pollution Prevention Plan** shall have the following shown on either the Cover Sheet or the Detail Sheet:

CITY OF GLENDALE
GENERAL NOTES FOR STORM WATER POLLUTION PREVENTION PLAN

A. A copy of the contractor's NOI and two (2) copies of the reviewed and signed SWPPP must be received by the City's Development Services Center prior to any permit being issued. A copy of the approved grading and drainage plan, together with a copy of the Notice of Intent (NOI) and the Storm Water Pollution Prevention Plan (SWPPP), shall be maintained on the site and available for review. Those elements of the grading and drainage plan pertinent to or referenced on the SWPPP shall be considered a part of the SWPPP. All Storm Water Pollution Prevention Plans shall follow the Drainage Design Manual for Maricopa County, Arizona, Volume III, Erosion Control.
B. The City's review of all AZPDES submittals including NOI, NOT & SWPPP is intended as review only, and does not constitute approval of the methods or plans for managing the storm water and protecting the waters of the United States. The Contractor is solely responsible for ensuring that all requirements of the Clean Water Act are adhered to.
C. The City's Engineering Division shall be notified 48 hours before any on-site and/or off-site construction begins. Phone: 623-390-3630.
D. The operator shall obtain a Dust Control Permit from Maricopa County Department of Environmental Services and perform measures to prevent excess dust.
E. The operator shall perform, at a minimum, a visual inspection of the construction site once every month and within 24 hours of rainfall greater than or equal to one-half inch. The operator shall prepare a report documenting his/her findings on the conditions of the SWPPP controls and note any erosion problems.
F. The operator's report is to be submitted to the City's Inspector for review. Facilities shall be maintained as necessary to ensure their continued functioning. In addition, all temporary siltation controls shall be maintained in a satisfactory condition until such time that clearing and/or construction is completed, permanent drainage facilities are operational, and the potential for erosion has passed.
G. The operator shall amend this plan as necessary during the course of construction to resolve any problem areas, which become evident during the construction and/or during rainfalls. All changes to the SWPPP must conform to the Drainage Design Manual for Maricopa County – Volume III, Erosion Control.
H. The permittee shall file a Notice of Termination (NOT) after completion of construction and placement of final landscape materials. A copy of the NOT is to be submitted to the City's Engineering Division to close the SWPPP permit.
I. The permittee shall save all records, including the NOI, SWPPP, NOT, and inspection reports, on file for minimum of three years from the date of filing the NOT.
J. The implementation of these plans and the construction, maintenance, replacement, and upgrading of these facilities is the responsibility of the permittee/contractor until all construction is approve and the NOT is submitted to the City's Engineering Division.
K. The facilities shown on this plan must be constructed in conjunction with all clearing and grading activities in such a manner as to insure that sediment-laden water does not enter the city's drainage system or violate applicable water standards. The facilities must be installed and in operation prior to any grading or land clearing.

FIGURE 2.6-6 GENERAL NOTES FOR SWPPP

2.67 All capital improvement project plans requiring an **Irrigation Plan** shall have the following shown on the Detail Sheet:

CITY OF GLENDALE
GENERAL NOTES FOR IRRIGATION PLAN

A. This irrigation system requires a minimum water pressure at the water meter as shown on the approved plans. If the minimum pressure is not available, the contractor shall notify the landscape architect prior to proceeding.
B. The contractor shall visit the site prior to bidding on project to verify conditions.
C. Prior to commencement of any work, the contractor shall contact Blue Stake to verify locations and depths of underground utilities that may be affected by his work and he shall be responsible for damages to such utilities caused as a result of his irrigation installation.
D. The contractor shall be responsible for compensating the owner and/or the owner's representative for any design changes made as a result of deviation by the contractor from the plans and specifications or due to errors, faulty material or faulty workmanship.
E. Install all mainlines with a minimum of 24" of cover.
F. Install all laterals with a minimum of 18" of cover.
G. All pipe to be installed per the manufacturer's specifications.
H. All threaded joints to be coated with Teflon tape unless otherwise specified by the manufacturer. Use liquid Teflon on metal pipe threads only.
I. Flushing of lines prior to installation of sprinklers and emitters is required.
J. Install all irrigation system, emitters, and related material per irrigation system specifications and details.
K. Install all 24 volt electrical joints with 3-M waterproof connectors.
L. All electrical 24 volt connections shall be made at the remote control valve boxes, controller enclosures and valve boxes specifically for electrical connections.
M. The contractor shall be responsible for installing all wiring from the circuit breaker at the 120 volt source location to automatic controller.
N. All 120 volt power wire to be installed per local code.
O. Install all valve wiring in mainline trench as detailed.
P. Install all remote control valves at height indicated on details, as high as possible but allowing clearance between valve box lid and flow control handle on remote control valve.
Q. Install all mainline gate valves in a round plastic valve box per details.
R. All PVC pipe to be cleaned with a PVC solvent primer before gluing. DO NOT use gray colored glue. 725 IPS weld on type glue is preferred.
S. The mainline and lateral pipe valves are shown schematically and shall be installed within the landscape area, adjacent to sidewalk.
T. Supply the following material to the owner:
    1. Two keys for each of the controllers.
    2. Two valve box keys.
U. All mainline pipe and fittings are to be PVC schedule 80
V. Paint all new and existing utility boxes, backflow preventers, controllers, etc. to match perimeter walls or as per landscape plans.
W. The contractor shall provide a certification certificate of all backflow preventers at the time of acceptance.

FIGURE 2.6-7 GENERAL NOTES FOR IRRIGATION

2.68 All capital improvement project plans requiring a **Landscape Plan** for shall have the following shown on the Detail Sheet:

CITY OF GLENDALE
GENERAL NOTES FOR LANDSCAPE PLAN

A. All plants shall be planted within right-of-way. Plants shown outside of the right-of-way are for graphic clarity only.
B. Finished grade of decomposed granite shall be no less than ½" below top of adjacent concrete or other paved surfaces.
C. Provide 2" depth of 3/4" minus decomposed granite cover in all new landscape areas.
D. Coordinate work with other trades. Identify site conditions in conflict with plans or specifications to landscape architect or owner's representative.
E. Call Blue Stake for utility locations prior to commencement of work.
F. Tree heights and caliper to conform to the most recent Arizona Nursery Association Standards.
G. Stake all plant material locations for approval by landscape architect or owner's representative prior to installations.
H. Provide positive drainage away from walls. Excess soil planting operations may be spread on site but shall not alter drainage patterns or retention requirements.
I. Quantities shown are for the convenience of the contractor only. Contractor shall provide all plants necessary to complete plantings as shown on the plans.
J. Contractor shall refer to the Uniform Standard Specifications of Public Works Construction as prepared by the Maricopa Association of Governments for construction specifications, except as modified by City of Glendale supplemental provisions.
K. Refer to City of Glendale Standard Details G-447 and G-448 for requirements pertaining to site distance standards and restrictions.
L. The information shown in the detail sheets are shown for reference only and while every effort has been taken in its compilation, the City of Glendale does not guarantee the accuracy or completeness of the information shown herein.
M. All tree and pruning shall be done by an Arizona Certified Arborist.
N. The contractor shall provide certification of all pre-emergent applications to be applied, at full label rate, at the time of acceptance.
O. Landscaping between the back of curb and the property line (ROW) shall be maintained by the property owner.

FIGURE 2.6-8 GENERAL NOTES FOR LANDSCAPING

STREET DESIGN AND CONSTRUCTION

3.1 GENERAL INFORMATION

3.11 STREET SYSTEM AND CLASSIFICATIONS

The City street system is based on a grid layout to provide access to all land parcels. There are four (4) basic classifications of streets. These classifications are based on street development policies and are determined by location and/or intended use. For additional information see Section 4.1 of these standards.

A. Major Arterial

Major arterials move large volumes of moderate speed traffic to and from freeways and serve some metropolitan wide trips. They connect to areas that are major traffic generators. There is controlled access from commercial uses along major arterials, and residential areas are served from side streets.

B. Arterial

Arterial streets move large volumes of traffic from one part of Glendale 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. Arterials are used to primarily connect neighborhoods to local commercial uses.

C. Collector

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 movements.

D. 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.

E. Alleys

The creation of new alleys is not acceptable. The design for development of parcels in areas with existing alleys shall provide for primary access by public streets. Secondary access to alleys is allowed, but the alley must be improved to City standards by the developer.

3.12 STREET NAMES

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.

3.13 INTERSECTIONS TO MAJOR ARTERIAL OR ARTERIAL STREETS

Interior streets shall not intersect major arterial or arterial streets other than at the 1/4 and 1/2 mile points of the arterial.

3.14 "HALF-STREET" MINIMUM REQUIREMENTS

In cases where no adjacent street improvements exist, a developer is responsible for installing half of the full street improvements, but the minimum paving width for residential "half streets" shall be 24 feet. 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 full improvements on 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. Unless specifically waived by the City in advance, public rights-of-way shall consist of unencumbered fee interest in land. Parking shall not be allowed on the finished side of half-streets. "No Parking" signs shall be installed by the developer per City standards.

3.2 GENERAL TECHNICAL INFORMATION

3.21 IRRIGATION FACILITIES

All new developments shall provide for continued and undiminished service of affected irrigation systems. The developer is responsible for coordinating with the irrigation company as to the design and construction of irrigation company facilities. New irrigation tile shall be located outside of the right-of-way. Private irrigation facilities shall be located on private property and sized to carry at least the same flow as the existing ditch. The Engineer shall submit appropriate data to support the design. Where there is a need to cross the public right-of-way, it shall be done at approximately 90 degrees and must be tiled with RGRCP Class III (minimum) pipe. 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. The City will not accept the liability of pipe failure for irrigation systems.

3.22 CURB RETURNS AND RAMPS

All street intersections shall be constructed with concrete vertical curb returns and a single sidewalk handicap ramp per MAG Standard Detail 235. Dual handicap ramps will be required on arterial intersections.

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

Street Classification	Major Arterial	Arterial	Collector	Local
Major Arterial	35'*	35'*	30'	20'
Arterial	35'*	35'*	30'	20'
Collector	30'	30'	30'	20'
Local	20'	20'	20'	20'
*For intersections with bus pullouts, see Standard Detail G-406.				

TABLE 3.1 – Curb Return Back of Curb Required Radius

A. Handicap Ramps

Handicap ramps shall be placed wherever a pedestrian access route crosses a street; at intersections, medians; and where a public sidewalk ends and

pedestrian travel continues on the roadway. Curb ramps shall be wholly contained with the crosswalk markings, if they exist. Curb ramps shall be flush with the street without “lips”. Detectable warning devices (non-adhesive truncated domes) shall be installed in conjunction with these ramps.

Directional ramps are preferred and shall be installed at all intersections where there is room for both the ramps and the required four foot landing area. Where there is not room for the full directional ramp treatment, diagonal ramps with a minimum 8-foot width and a 4 foot landing area are acceptable; however, if there is not room for the landing, a blended transition ramp should be used.

Non-adhesive truncated domes will be installed on all existing sidewalk ramps in the public right-of-way adjacent to City Capital Improvement projects.

3.23 VALLEY GUTTERS

Concrete valley gutters shall be constructed at all intersections where the drainage pattern requires them. However, valley gutters are not allowed to cross major arterial and arterial streets. Valley gutters crossing collector or residential street intersections with major arterial or arterial shall be six (6) feet wide. Valley gutters not at intersections shall be six feet wide (minimum). Asphalt valley gutters are not allowed on public streets.

3.24 PAVING BLOCKS

All paving blocks used within the public streets for crosswalks or to enhance the visual quality of the entry way to a development shall conform to the following and the City’s standard details.

A. Interlocking Paving Stones:

1. All interlocking concrete paving stones shall be sound and free of defects that would interfere with the proper placing of the unit or impair the strength or permanence of the construction.

2. Size, shape, design and colors shall be approved by the City’s Engineering Division.

B. Dry Set Mortar Bed for Median Pavers: The thickness of the dry set mortar bed course shall be uniform to insure an even surface and shall be provided and installed by the paving stone installer.

C. Installation:

1. Paving work should be plumb, level and true to line and grade to properly coincide and align with adjacent work and elevations. All edges must be retained to secure the perimeter stones and the dry set mortar bed.

2. Cutting of paving stones hall be done with a masonry saw.

3. The completed paving stone installation shall be swept and cleaned to provide a clean finished workmanlike installation.

3.25 SIDEWALKS

Sidewalks shall be detached a minimum of 7 feet from the back of curb on all arterial and major arterial streets, and 5 feet from back of curb for collector streets. Detached sidewalks enhance pedestrian safety and the visual quality of the roadway by creating a boulevard landscaped area between the street and the detached sidewalk. Sidewalks shall remain within the City's right-of-way or within an easement dedicated for that purpose. Sidewalks for local streets shall be 5 feet wide attached to the curb.

3.26 CONCRETE PLACEMENT AND CURING

All concrete shall be mixed, placed and cured as required by MAG Specifications. Subgrade densities shall follow Table 3.4. Moisture specifications are +2 to -3% of optimum. White-pigmented curing compound shall be used on all concrete paving items such as streets, curbs, gutters, driveways and sidewalks. The particular white-pigmented curing compound selected by the contractor must meet the requirements of either AASHTO M-148, Type 2, Class A, or that of ASTM C 309, Type 2, Class A. It is important to begin the application of curing compound immediately after the surface water has disappeared from the concrete and the surface will support walking workmen. The coverage should be uniform, not spotty or with missed areas. The curing compound should be applied per manufacturers' recommendation, but at a minimum of 200 square feet per gallon.

3.3 TECHNICAL REPORTS

3.31 GENERAL INFORMATION

Developers are responsible for submitting a Design Study Report to validate the design shown on the construction plans. 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; explain "special" solutions to problems encountered, etc. All reports must be sealed by an Arizona registered engineer. The following sections shall be contained in the report:

A. **Soils Report:** A "Soils Report" shall be submitted with new street construction plans indicating "R" value, sieve analysis, plasticity index of the subgrade, shrink-swell potential and corrosiveness.

B. **Drainage Report:** A "Drainage Report" shall be submitted for projects 10 acres or larger. This report shall be prepared per Chapter 5 herein and the Grading and Drainage Ordinance, Chapter 18.5 of the City Municipal Code.

C. **Paving Evaluation Report:** A "Pavement Evaluation Report" shall be submitted with new street construction plans when it is proposed to match existing pavement. If the existing pavement does meet the structural requirements, it may be matched by trimming a minimum of two (2) feet for a longitudinal or perpendicular match. Exact pavement sawcut locations shall be determined in the field by the City Inspector.

D. **Details:** Supplemental sketches, details, calculations, design rational and cross sections as required in Section 2.5.

E. **Pavement Structure Design Report:** A "Pavement Structure Design Report" shall be submitted with new street construction plans utilizing the design procedures in the "AASHTO GUIDE FOR DESIGN OF PAVEMENT STRUCTURES 1993." The report shall document the values used in determining the design 18 kips E.S.A.L. Traffic Loading. Current ADOT load equivalency factors for each of the various vehicle classifications shall be used for the traffic loading calculations. The structural layer coefficients used for each layer in the pavement structure shall be the current values utilized by ADOT. The following values shall be utilized in the pavement structure design analysis for the various street classifications.

Classification	Analysis Period (Years)	Reliability (%)	Serviceability	
			Initial	Terminal
Major Arterial & Arterial	20	95	4.5	2.5
Industrial & Commercial	20	95	4.5	2.5
Collector	20	90	4.4	2.3
Residential & Parking Lots	20	80	4.2	2.0
*The overall standard of deviation shall be 0.35 and 0.45 for rigid and flexible pavements, respectively.				

TABLE 3.2 – Parameters for Pavement Structure Design Analysis

3.4 TECHNICAL DESIGN REQUIREMENTS BY STREET CLASSIFICATION

Technical design requirements for all street classifications are as follow:

3.41 Street Cross Sections

All street cross sections shall follow COG Details G-302 through G-306. Utility locations shall follow COG Details G-313, G-315 and G-316. Cul-de-sacs shall have a 55' right-of-way radius with a 50' radius to the back of curb. The sidewalk in a cul-de-sac may be reduced to 4' wide to allow meter boxes, street lights and fire hydrants to remain in the right of way.

3.42 Street Curb

Vertical curb and gutter per MAG Detail 220A shall be used for arterial and collector streets. For residential streets, roll curb per MAG Detail 220C should generally be used except at intersections and where the gutter flows exceed 4" in depth. A drainage report shall identify these locations.

3.43 Sidewalks

Residential sidewalks shall be 5' wide and attached to the curb. Sidewalks along collector streets shall be 5' wide and detached from the curb per COG Details G-304 and G-305. Sidewalks along arterials shall be 6' wide and detached from the curb per COG Details G-302 and G-303. Handicap ramps shall follow MAG Detail 235 and shall have a detectable warning device (truncated domes) per MAG detail 234. Glued down truncated domes are not allowed in the city's right of way.

3.44 Pavement Structure

Residential streets shall have a minimum of 3" of asphalt over 8" of aggregate base course material (ABC) or shall follow the recommendations of a soils report, whichever is greater. For collectors and arterials, the pavement sections shall follow the soils report recommendations. However, the minimum asphalt depth shall be 4" (for collectors) and 5" (for arterials) and the minimum ABC depth shall be 12" for both. If no soils report is submitted, then the minimum asphalt/ABC depths shall be followed.

3.45 Longitudinal Slope and Cross Slope

Street longitudinal slopes shall generally be designed between 0.4% and 12%. The slope of 0.2% may be used for arterials upon approval of the Engineering Division. In no case shall the longitudinal slope fall less than 0.2%. Cross slopes for all streets shall be designed between 2% and 5%.

3.46 Horizontal and Vertical Curves

Horizontal and vertical curves shall follow the tables below:

A = Algebraic Difference of the Slopes	Major Arterial	Arterial	Collector	Local
	Grade Change Exceeds 1%		Grade Change Exceeds 2%	
Crest Curve	Length = 160A	Length = 85A	Length = 55A	Length = 28A
Sag Curve	Length = 160A	Length = 75A	Length = 55A	Length = 35A

TABLE 3.3 Vertical Curves (Minimum)

Curve Geometry	Major Arterial	Arterial	Collector	Local
	Tangent Centerline Deflects More Than 7 Degrees		Tangent Centerline Deflects More Than 10 Degrees	
Radius	500 feet	500 feet	100 feet	100 feet
Tangent Centerline Between Reverse Curves	150 feet	150 feet	100 feet	100 feet

TABLE 3.4 Horizontal Curves (Minimum)

3.47 Cul-de-Sac Geometry

The maximum length of a cul-de-sac shall be 400 feet, measured from the intersecting street center lines to the radius point. Cul-de-sac geometry shall follow the table below:

	Arterial	Commercial/ Industrial
Throat	50 feet	50 feet
Back of Curb Radius	50 feet	50 feet
ROW Radius	55 feet	55 feet

Table 3.5 Cul-de-Sacs

3.5 CONSTRUCTION

3.51 STREET CONSTRUCTION

All construction shall conform to the latest MAG Standard Details and Specifications and the current City of Glendale Design and Construction Standards. Plans shall be prepared per the standards in Chapter 2, Construction Plans Preparation.

A. **Asphalt Mix Designs:** Asphalt mix designs shall be prepared and submitted for approval in accordance with the current MAG Standard Details and Specifications Section 710. Design methodology shall be either the Marshall Method for residential mixes, or Gyratory for collectors and arterial mixes.

B. **Conformance:** Asphalt mixtures placed within the existing and proposed right-of-way of the City shall conform to the approved mix design, subject to normal production tolerances defined in the above referenced document. Sample testing will be in conformance with sampling frequency specified in MAG 321.10.2 or at the discretion of the City. ***The City provides guidance only.*** Acceptance is contingent upon lab results and core samples. Any material placed which does not conform to the approved mix design tolerances specified in MAG 321.10.2 will be subject to removal and replacement at the expense of the Contractor.

C. **Placement:** All courses of asphaltic concrete shall be placed and finished by means of a self-propelled paving machine equipped with a screed and automatic controls. Spreader boxes will not be permitted to place asphalt material on city facilities, streets, alleys, and parking lots.

D. **Lift Thickness:** Completed pavement which is deficient in either thickness or density shall be subject to removal and replacement at the expense of the contractor. The choice of asphaltic concrete mix designation shall be governed by the following target lift thicknesses. The following table (Table 710-1) displays the recommended lift thickness for various asphalt concrete mix designations found within Section 710. Please note that these recommended lift thicknesses are minimums based on each mix designation's "Nominal Aggregate Size" and the relative coarseness of its gradation. The compacted thickness of layers placed shall not exceed 150% of the Minimum Lift Thickness of Table 710-1 except as otherwise provided in the plans and specifications, or if approved in writing by the Engineer.

Asphalt Concrete Mix Designation	Minimum Lift Thickness Marshall Mixes	Minimum Lift Thickness Gyratory Mixes
3/8" or 9.5mm	1.0 inches	1.5 inches
1/2" or 12.5mm	1.5 inches	2.0 inches
3/4"" or 19mm	2.5 inches	3.0 inches

TABLE 3.6 – Target Lift Thicknesses for Pavement

3.52 PERMITS, BOND AND INSURANCE

A right-of-way construction permit is required prior to the start of any construction within the City's right-of-way. A 100% Performance Bond or equivalent is required for all work within the right-of-way prior to the issuance of any right-of-way construction permit(s). All contractors working within the right-of-way shall provide the City with proof of insurance in a form and with limits of coverage acceptable to the City.

3.53 INSPECTION

All work within the right-of-way shall be inspected and approved by the City's Engineering Division.

3.54 PUBLIC ACCESS

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.

3.55 PAVEMENT MATCHING

Pavement matching and surfacing replacement shall conform to MAG Standard Specifications, Section 336. Sidewalk removal and replacement may be required prior to final acceptance and will be made to the nearest joint or score line.

3.56 PAVEMENT CUTS

All trenches and pavement cuts shall be 4' minimum in width in order to mechanically compact the aggregate base course and lower lifts of asphaltic concrete.

3.57 SUBGRADE

Subgrade preparation shall be performed in accordance to MAG Section 301 for all right-of-way projects. The City shall also require that subgrade moisture content be maintained between the limits of +2 and -4% of optimum moisture content as determined by AASHTO T-99 or ASTM D-698.

3.58 COMPACTION AND MATERIALS TESTING

All compaction test results for water, sewer, dry utilities, must be received final approval prior to pavement placement. Relative compaction requirements will adhere to MAG Section 301.3 with the following exceptions:

Location	Compaction Requirement
Curb, gutters and sidewalks	95%
Bus bays, driveways and valley gutters	95%

TABLE 3.7 – Exceptions to MAG Compaction Requirements

3.59 ABOVE GROUND UTILITY STRUCTURES

Above ground utility structures, including down guy wires, shall not be placed within the limits of an alley, driveway, or easements which may obstruct ingress or egress to that alley or driveway.

CHAPTER 4

TRAFFIC ENGINEERING

4.1 STREET STANDARDS/GEOMETRICS

4.11 ARTERIAL STREETS

Arterial streets are the backbone of the City of Glendale's transportation infrastructure. Arterials handle high traffic volumes at moderate traffic speeds. The City of Glendale classifies arterials as "major arterials" or "arterials". Major arterials are intended to carry traffic volumes in excess of 40,000 vehicles per day. Arterials are intended to carry traffic volumes between 20,000 and 40,000 vehicles per day. Arterial classifications are established in the Circulation Element of the General Plan, and are based upon projected future traffic demands. Right-of-Way and Street Section requirements for each arterial street and each arterial intersection are specified on the Arterial Streets Standards map (Detail G-300). Standard Arterial Street Sections are included in the Standard Details of this publication.

4.12 ARTERIAL AND MAJOR ARTERIAL SECTIONS

A. **Section A-1:** Section A-1 (Detail G-302) is intended for use on arterial streets (not major arterials) with standard lane configuration (2/1/2). Section A-1 includes wide curb lanes. The basic section is a 72 foot roadway width (measured to back of curb) in a 110 foot right of way.

B. **Section A-2:** Section A-2 (Detail G-302) is intended for use on arterial streets and major arterial streets where unbalanced lanes (3/1/2) are specified. Curb lanes are 12 feet wide. The basic section is a 71 foot roadway width (measured to back of curb) in a 110 foot right of way.

C. **Section A-3:** Section A-3 (Detail G-303) is intended for use on arterial streets and major arterial streets where unbalanced lanes (3/1/2) and wide curb lanes are specified. The basic section is an 83 foot roadway width (measured to back of curb) in a 120 foot right of way.

D. **Section A-4**: Section A-4 (Detail G-303) is intended for use on major arterial streets where six through lanes and wide curb lanes are specified. The basic section is a 99 foot roadway width (measured to back of curb) in a 130 foot right of way.

E. **Additional Standards:** Additional standards with respect to arterial and major arterial street sections include the following:

1. Intersection approach widening and additional right-of-way are required on most arterial to arterial intersections. Refer to the Arterial Street Standards (Details G-322 and G-323) for specific information on these requirements.

2. Far side bus bays (turnouts) are required on all arterial streets at arterial street intersections.

3. Continuous raised medians are required on all streets designated as “major arterials”. Intersection approach medians are required on all other arterial streets at arterial intersections.

4. Raised median and median break locations must be in accordance with the approved Median Break Policy of the City of Glendale (See Section 4.19).

5. All proposed street and intersection designs are subject to review by the Transportation Engineer for applicability, capacity and safety.

6. The location of obstructions in the median and roadside must be in accordance with current Obstruction Policy of the City of Glendale (See Section 4.33).

7. EXCEPTIONS: Several arterial streets have existing or approved sections which do not satisfy any of the preceding standards. These are identified on the Arterial Street Standards Map (Detail G-300) as “Special Sections”.

4.13 COLLECTOR STREETS

Collector streets serve to connect local streets to arterials or other collectors. The City of Glendale normally requires one north-south and one east-west collector street with bike routes on both sides for each square mile section. This collector is normally located on the half mile mid-section line, but the location may vary in accordance with current subdivision street layout practices, planned unit developments or the approved bikeway plan. Additional collector streets are also

needed to provide good traffic circulation and traffic access within proposed subdivisions and other developments. These collectors normally would not have bike route requirements, unless otherwise specified by the Transportation Engineer. The city of Glendale uses four collector street standards. Selection of the standard to be used in a given situation shall be in accordance with the following guidelines:

4.14 COLLECTOR STREET SECTIONS

A. **Section C-1:** Section C-1 (Detail G-304) is the preferred section for single family developments. The section shall only be used where houses do not front the street and no access to proposed single family lots is intended. The basic section is a 36 foot roadway width (measured to the back-of-curb) in a 70 foot right-of-way with detached sidewalks. Section C-4 or C-2 shall be used as alternates to C-1 only when this requirement is not satisfied.

B. **Section C-2:** Section C-2 (Detail G-304) is intended for use in single family developments with houses fronting the street and where BIKE ROUTES ARE NOT REQUIRED. The basic section is a 40 foot roadway width (measured to the back of curb) in a 60 foot right-of-way with detached sidewalks.

C. **Section C-3:** Section C-3 (Detail G-305) is intended for use in commercial/industrial and multifamily developments where BIKE ROUTES ARE NOT REQUIRED. Section C-3 MAY NOT be used for single family developments. The basic section is a 44 foot roadway width (measured to the back of curb) in a 70 foot right-of-way with detached sidewalks.

D. **Section C-4:** Section C-4 (Detail G-305) is intended for use in commercial, industrial, multifamily and single family developments where BIKE ROUTES ARE REQUIRED on both sides of the street. The basic section is a 48 foot roadway width (measured to the back of curb) in a 70 foot right-of-way with detached sidewalks.

E. **Additional Standards:** Additional standards with respect to all collector street sections include the following:

1. Entry medians to new subdivisions and commercial developments are permitted. See intersection design standards (Details G-325 and G-326) for collector street approaches.

2. Intersection throat widening is required at all collector/arterial intersections. See intersection design standards for collector street approaches (Details G-325 and G-326).

3. In mixed use subdivisions and developments, the widest collector street section required shall take precedence over a narrower section.

4. The minimum length of collector streets to be constructed to a given standard is 1/4 mile.

5. All collector street sections require six foot detached sidewalks adjacent to schools.

6. All proposed collector and local streets are subject to review by the Transportation Engineer for applicability, safety and circulation needs.

7. The minimum width of paving for half streets is 24 feet for all street sections.

8. Bicycle facilities are required on many collector streets as shown on the City's approved bicycle plan.

4.15 LOCAL STREETS

Local streets primarily serve to provide access to abutting properties. Local streets connect to the collector street system. They normally do not connect directly to the arterial street system.

4.16 LOCAL STREET SECTION

Section L-1 and L-2 (Detail G-306) are intended for use in single family detached developments. The basic section is a 32 foot wide street on a 50 foot right-of-way with attached 5 foot wide sidewalks. Narrower streets may be considered under special circumstances and must be approved during design review by the City Engineer, Planning Director and Transportation Engineer.

4.17 BUS BAYS

At major intersections and at arterial intersections, bus bays are required on the far side of the intersection (Detail G-406). At high volume mid-block locations, bus bays may be required, as determined by the Transportation Engineer (Detail G-407).

4.18 DECELERATION LANES AND LEFT TURN LANES

A. **Deceleration Lanes:** At major intersections and major driveways, a deceleration right turn lane may be required, as determined by the Transportation Engineer.

B. **Left Turn Lanes:** At major intersections, dual left turn lanes may be required, as determined by the Transportation Engineer.

4.19 RAISED MEDIAN POLICY

A. General Policy:

In the interest of public safety and street aesthetics, it is the policy of the City of Glendale to have raised medians installed on its major arterial and arterial street system, as identified in the Glendale General Plan. Medians shall be installed as required under the Guidelines and Standards section of this policy.

B. Guidelines and Standards:

1. Major Arterials: Continuous raised medians are required.

2. Arterials: Raised medians are required only within 500 feet of an arterial or major arterial intersection. Medians between mile intersections are optional, as determined by the City.

3. Collector and Residential Streets: At the option of the City, raised medians may be provided on collector and residential streets at arterial and major arterial intersections. These "entry statement" medians shall be installed and maintained at a developer's expense and are subject to prior approval of the Transportation Engineer.

4. Median Breaks: Median breaks in new or existing medians on arterials and major arterials normally will be provided at mile, half mile and quarter mile points. Other median breaks, for either streets or driveways, no closer than 500 feet to an arterial or major arterial intersection or 360 feet to another existing or potential median break may be considered for approval. For streets with posted speed limits under 35 miles per hour, the 360 foot minimum spacing required between median breaks may be reduced to 240 feet at the discretion of the Transportation Engineer.

5. Driveways: Median breaks for driveways on major arterial streets shall normally be restricted to left turn in only. Full median breaks may be permitted on arterial streets. Minimum design standards for driveways with full median breaks shall be as follows:

   a) An entering exclusive right turn deceleration lane on the arterial street.

   b) A minimum driveway width of one entering and two exiting lanes.

C. Median Criteria:

The spacing and design standards stated in this section are to be considered minimums, and are not automatic. In determining if a median break request should be approved, the following issues will be considered:

1. The proposed median break is necessary for adequate access to an abutting property and must improve access and circulation without increasing accidents or accident rates.

2. The proposed median break will not cause a significant problem elsewhere (e.g. increased traffic in neighborhoods, increased accidents at another location, etc.)

3. If requested for development access, full consideration must be given to adjacent and opposite properties. Median break locations for individual developments must be coordinated with other affected property owners.

4. The location and design of any proposed median break meets acceptable engineering design standards for expected traffic speeds and volumes.

5. The proposed median break will not interfere with the continuity of traffic flow at or between intersections.

6. Before approving any median break request, the City may require a traffic engineering analysis by a professional traffic engineer. Such an analysis shall address the issues stated in 1 through 5, and shall be at the sole expense of the requestor.

D. Median Construction:

1. The construction of optional or required medians as described by this median policy shall normally be accomplished when a street is constructed or improved to current City street standards. The cost of the median or of any break in the median shall be the responsibility of the benefiting property owners, and shall include any necessary traffic control devices.

2. In instances where immediate construction of a median is impractical, the City, at its option, may require the developer or property owner to pay the City for estimated cost of his share of the median. The median will then be constructed by the City at a future date.

E. Approval and Appeal Process:

1. Requests for new medians, median breaks or median removals shall be submitted to the Transportation Engineer, subject to the guidelines and standards stated, may approve or disapprove the request. He may also request submission of a traffic analysis before a decision is made.

2. The requestor may appeal the Transportation Engineer's decision to the appropriate Deputy City Manager.

F. Public Notice Requirement:

1. The construction of raised medians may alter existing or future access patterns to properties abutting an arterial street. For this reason, it shall be the policy of the City to provide for adequate public notice and discussion prior to the installation or modification of raised medians on any arterial street.

2. Public notice shall consist of written notification to all property owners or tenants whose existing or future access could be altered by the construction of raised medians. An alteration in access could include the elimination of existing or potential left or right turns into or out of a public street or private driveway that currently exists or is planned.

3. After giving public notice, the City will hold a public meeting. The purpose of the meeting will be to present, discuss and resolve to the extent possible, access issues related to the construction of raised medians and the location of median breaks.

4.2 TRAFFIC CONTROL DEVICES

4.21 TRAFFIC SIGNS

All new developments shall install the required traffic control signs, street name signs and sign posts on all streets and intersections. The City will inspect these signs and posts. Construction bonds will not be released and streets will not be opened to traffic until these signs have been installed.

4.22 TRAFFIC SIGNALS

Refer to the City of Glendale Traffic Signal and ITS Standard Specifications Manual. All traffic loops shall be installed prior to the placement of the final lift of asphalt pavement.

4.23 BARRICADES

A. Requirements: All new developments shall provide for barricades at all dead ends and incomplete streets per Detail G-460, except when waived by the Transportation Engineer.

B. Construction: New barricades shall be constructed per MAG Detail 130-B.

C. Removal: If an existing barricade is removed, it shall be delivered by the contractor to the City Traffic Sign Shop at 6210 West Myrtle Avenue.

D. Phased Construction: Barricades installed with phased construction may be relocated within the same development.

E. Location: Barricades shall be set one foot inside the subdivision being developed. The pavement should stop short of the barricade.

4.24 STREET AND LANE CLOSURE PERMITS

A street/lane closure permit is required from the City before any work can be done within the street right of way per City ordinance. The City also requires a traffic control plan be submitted a minimum of 72 hours prior to the issuance of a permit. All construction zone signing shall be installed and maintained per the Phoenix Barricade Manual and the Federal Manual of Uniform Traffic Control Devices, at the developer's expense.

4.25 PAVEMENT MARKINGS

All new developments are responsible for the cost, design and installation of pavement markings on City streets adjacent to the development project. This includes the removal of all existing pavement markings that are in conflict with the proposed new pavement markings. All pavement marking work shall be done per City of Glendale pavement marking specifications. Striping specifications can be obtained from the Transportation Division. A field layout of new pavement markings must be reviewed and approved by the Transportation Engineer prior to installation.

4.3 LIGHTING/VISIBILITY STANDARDS

4.31 STREET LIGHTING

The developer is responsible for the design and installation of streetlights on the public streets within and adjacent to the development. All street lights will be installed at the developer's expense, based on plans prepared and sealed by a licensed engineer registered in the State of Arizona. The street lighting design shall be reviewed and approved by the Transportation Division. Street light poles shall be numbered at the developer's expense. For additional standards, refer to the City of Glendale Street Light Manual.

4.32 SIGHT DISTANCE

As a minimum, the sight distance requirements of Detail G-448 shall be followed to provide adequate visibility on arterial and collector streets. The construction plans shall have the sight lines drawn on the plan sheets, along with a statement that the design meets the requirements of Detail G-448.

4.4 PARKING AND ACCESS

For parking lot requirements, refer to Section 9.3 and Detail G-450 of these standards. For driveway requirements, refer to Section 4.5 below.

4.5 DRIVEWAYS

4.51 DRIVEWAY DESIGN

All driveways serving properties adjacent to public streets shall conform to the following standards and Detail G-454:

A. **Width:** The width of a driveway shall be the width at the throat of the driveway exclusive of wings or return radii.

B. **Distance Between Driveways:** The distance is measured between the near edges of the throats of the two driveways. See Detail G-454 for specific distance requirements. Driveways should line up with driveways directly across the street to avoid left turn conflicts. In cases where this cannot be accomplished, a right-in right-out driveway may be required by the City's Transportation Engineer.

C. **Construction:**

1. Residential Driveways: With vertical curb, replace the curb per MAG Detail 250.

2. Commercial Driveways and Private Streets: With either roll or vertical curb, replace curb per Detail G-456 or G-458.

4.52 MAXIMUM DRIVEWAY WIDTH

Notwithstanding the provision of these standards, where ample justification exists, the City may approve driveways up to a maximum width of 45 feet.

4.6 BICYCLE/MULTI-USE/EQUESTRAIN TRAILS

4.61 BICYCLE FACILITIES

The use of bicycles as an alternate mode of transportation shall be considered in all new developments. This includes bicycle paths and routes, bicycle access to the development, bike racks and other amenities. Bicycle racks are required in parks and at other publicly accessible areas as determined by the Transportation Engineer. See the City's approved Bicycle Plan for additional information.

4.62 MULTI-USE PATHS

Multi-use paths are required in large parks, along the banks of creeks, rivers and canals, in recreation areas and at other locations as determined by the City. Since these paths serve multiple uses for bicyclists, joggers, walkers, and skaters, the path shall be a minimum of 10-feet wide with 2 feet or shoulder clearance on either side of the pavement and constructed with either an asphaltic concrete or portland cement concrete surface. Decomposed granite or other soft surfaces are not allowed.

4.63 EQUESTRAIN TRAIL DESIGN STANDARDS

A.	**LOCATION**	Equestrian trails shall be located and developed in accordance with the locations identified on the "Trails and Bikeways" map contained in the City of Glendale General Plan.
B.	**DEDICATION**	All equestrian trails shall be dedicated in fee title to the City or, if approved by the City, located within a recorded easement granted for the purpose of equestrian use.
C.	**WIDTH**	A minimum width of fifteen feet is required in urban areas for equestrian use for the safety of horses and riders. For rural, undeveloped areas void of manmade improvements, the minimum width shall be four feet with 2 feet of shoulder clearance on either side of the pavement.
D.	**DRAINAGE**	All equestrian trails should be designed and constructed to provide adequate drainage. Surface material for trails in urban, developed areas shall be a minimum of four inches of one-quarter-inch minus decomposed granite. Trails in rural, unimproved areas may be constructed of natural, native materials.
E.	**LANDSCAPING**	Any landscaping, other than natural vegetation or ground cover, adjacent to the trail shall have a minimum height clearance of eight feet above the adjacent trail. No plant material shall be placed within the areas defined by widths in paragraph C above. Plants should not include anything considered to be poisonous to horses or with sharp edges or thorns.
F.	**SRUCTURES**	Above grade utility structures to include, but not necessarily limited to: electrical transformers, utility poles, traffic signal controller, fire hydrants, telephone switch gear, natural gas pressure regulator, etc., shall not be placed anywhere within the widths specified in Paragraph C above. Underground utilities may be placed in equestrian trails provided they will not present a hazard to horses or riders or create a potential for damage to the utility due to equestrian traffic.

G.	HEIGHT	Any overhead obstacles such as street overpasses, tunnels, cables, etc., shall have a minimum vertical clearance of ten feet.
H.	GRADE	The maximum average longitudinal grade for any equestrian trail in urban areas, over a minimum horizontal distance of 300 feet, shall be twenty percent (20%). In rural, undeveloped areas, trails may follow natural existing grades.
I.	CONCRETE SURFACE	Where concrete driveways or parking lot entrances interest equestrian trails, the concrete shall have a coarse broom finish to provide a surface which is not slippery when wet.
J.	DETOURS	During construction operations, where construction activities may cross existing equestrian trails, developers shall be responsible for providing safe, well defined equestrian trail detours.
K.	SIGNS	Equestrian trail identification signs shall be in accordance with ADOT Sign Code W11-7 and shall be placed at all locations where trails intersect streets or alleys. Signs shall be placed on both sides of the trail at a height of five feet above the adjacent grade.
L.	EXCEPTIONS	The above standards will be adhered to whenever practicable. In situations where the application of any of these standards may be impractical, requests for exceptions shall be made in writing to the City Engineer. The City Engineer will have the authority to grant exceptions to these standards after receiving advice from the City's Parks and Recreation Department.

Table 6.3 Equestrian Trail Standards

4.7 TRAFFIC IMPACT REPORTS

It is the responsibility of the developer to provide a Traffic Impact Analysis (TIA) if a proposed development project will generate 100 or more vehicle trips during the project's peak traffic hour. A report may also be required if the project generates significant additional traffic on the surrounding street network, even though the 100 vehicle peak hour threshold is not met.

GRADING & DRAINAGE

5.1 GENERAL INFORMATION

5.11 PURPOSE

This chapter provides guidance for complying with specific federal, state, county, and city regulations applicable to floodplain management, water quality, and storm water management. It presents general information, minimum specific guidelines, and provides minimum design criteria for preparing drainage reports, grading and drainage plans, and storm water facility plans.

The City of Glendale has adopted the Uniform Drainage Policies and Standards for Maricopa County, as published by the Flood Control District of Maricopa County (FCDMC). The FCDMC has developed the Drainage Design Manuals Volume One (Hydrology), Volume Two (Hydraulics), and Volume Three (Erosion Control). Specific guidance is presented for preparing drainage reports and grading plans using design standards and methodologies developed by the FCDMC. Refer to FCDMC website for the Drainage Design Manuals. Refer to Chapter 17, “FLOODPLAIN MANAGEMENT” of the City of Glendale City Code for requirements and restrictions of development within areas designated as a Special Flood Hazard Area (SFHA) on the Flood Insurance Rate Map for the City of Glendale. All development in the SFHA will require special review considerations by the Engineering and Building Safety Divisions.

Area Drainage Master Plans (ADMP) that may impact areas within the City of Glendale are on file with the Flood Control District of Maricopa County, including but not limited to the following:

- Glendale Area Storm Water Management Plan
- Glendale/Peoria Area Drainage Master Plan
- Maryvale Area Drainage Master Study
- Loop 303 Corridor/White Tanks Area Drainage Master Plan
- Arizona Canal Diversion Channel Area Drainage Master Study

New development shall reference the applicable ADMP's and included the study's pertinent data in the preparation of the development's drainage report.

APPLICABLE CODES

The standards contained in this section are intended to expand upon and supplement information contained in legally adopted Chapters of the Code of the City of Glendale. All designers should familiarize themselves with the provisions of Chapter 17, "FLOODPLAIN MANAGEMENT", Chapter 18.5, "GRADING AND DRAINAGE" and Chapter 33, Water, Sewers and Sewage Disposal of the City Code prior to undertaking projects within the City. In case of conflict between these provisions and those of the Code, the more restrictive code or ordinance shall govern.

5.12 ADVERSE IMPACT

All developments within the City shall provide such storm drainage facilities as are necessary to insure that all structures and properties, both within the development and those located up and downstream of the development, shall be protected from the adverse impact of retained or redirected storm waters due to the proposed development.

Existing major surface drainage courses shall be maintained, and dedicated as drainage easements including maintenance access. Where storm water is discharged into any outfall not specifically controlled by the City, the development shall submit satisfactory evidence that the discharge can be accommodated by the outfall and is approved by the owner through a maintenance agreement.

FEDERAL, STATE AND COUNTY REGULATIONS

Maricopa County Environmental Services Department (MCESD)

Maricopa County Earth Moving Permit and Dust Control Plan: MCESD regulates development projects that involve earth-moving operations or dust-generating operations that will disturb 0.10 contiguous acre or greater.

The Developer/Contractor shall provide the City of Glendale with copies of their Maricopa County Earth Moving Permit and Dust Control Plan in conjunction with the issuance of any Construction and/or Right-of-Way Permits.

Arizona Department of Environmental Quality (ADEQ)

ADEQ regulates water quality and the quality of storm water discharges, including those directed to drywells. Prior to drilling, installing or abandoning a drywell, permission must be obtained from ADEQ. It is the responsibility of the engineer or drywell owner to obtain the required ADEQ Drywell Registration. For additional information regarding this aspect of ADEQ, refer to the ADEQ website.

Storm Water Quality

Projects disturbing one (1) acre or more are subject to the National Pollutant Discharge Elimination System (NPDES) requirements for construction sites under the Environmental Protection Agency (EPA) Construction General Permit (GCP) for Arizona. Owners, developers, engineers, and /or contractors are required to prepare all documents required by this regulation, including but not limited to Storm Water Pollution Prevention Plan (SWPPP), Notice of Intent (NOI) prior to construction and Notice of Termination (NOT) upon final site stabilization.

As prescribed by the Arizona Pollutant Discharge Elimination System (AZPDES) General Permit for Discharge from Construction Activities to the Waters of the U.S., any development project in Glendale which will disturb 1.0 contiguous acres or greater, shall complete a Notice of Intent (NOI) and the subsequent notice of termination (NOT).

Storm water runoff from construction sites cannot include pollutants such as phosphorous and nitrogen, pesticides, petroleum derivatives, construction chemicals, solid wastes, and sediment that adversely affect water quality. For additional information refer to the ADEQ website.

City of Glendale Requirements

The operator of a construction site is responsible to meet the requirements of ADEQ under the AZPDES permit. Operator shall also comply with the

requirements of City of Glendale City Code Chapter 17, Chapter 18.5 and Chapter 33. The operator can be the owner, developer, general contractor, or individual contractor who is responsible for operational control of the site.

Storm Water Pollution Prevention Plan (SWPPP)

The City of Glendale's SWPPP is designed to address the need to prevent or reduce discharges of pollutants to Waters of the United States. The following information shall be submitted to the City:

Submit Notice of Intent (NOI) to ADEQ for authorization

Prepare and implement a SWPPP and keep a working copy on site

Include two (2) copies of the NOI and SWPPP with the erosion and sediment control plan submittal to the City.

Send a Notice of Termination (NOT) to ADEQ and the City once construction is completed, as defined in the general permit. An NOT is required before the release of the Grading and Drainage permit.

The City will review storm water pollution prevention plans and is authorized to enforce storm water management requirements, and inspect and respond to complaints of violations.

Contact ADEQ for specific permit requirements or see their website for NOI and NOT forms and guidance preparing the SWPPP.

Best Management Practices (BMP)

Refer to City of Glendale City Code Chapter 17, Chapter 18.5 and Chapter 33 and the Drainage Design Manual for Maricopa County, Volume III, Erosion Control for the BMP Standard Details to include with the SWPPP submittal.

FEMA Requirements

As a participant in the National Flood Insurance Program (NFIP) that is administered by the Federal Emergency Management Agency (FEMA) and the Arizona Department of Water Resources (ADWR), the City of Glendale must require the following:

Lowest floor elevations shall be referenced to the Maricopa County's datum, NAVD '88. If benchmarks or topographic information is not on this datum, then a datum equation shall be shown on the plans to equate the plan information to the city's datum.

All affected structures must be designed such that they will not be flooded during any storm event, up to and including the 100-year event in accordance with Glendale City Code, including basements.

Construction documents that establish the lowest floor elevation for a structure shall include a completed FEMA information block.

Special Flood Hazard Areas (SFHA)

Portions of the City of Glendale fall within areas that have been designated Special Flood Hazard Areas (SFHA), as mapped by FEMA and require specific building requirements and clearances.

Any development must comply with the City's Floodplain Ordinance, FEMA or additional requirements located in an area designated as a SFHA on the current Flood Insurance Rate Map (FIRM) and must include an Engineer's Certification Statement. A FEMA Elevation Certificate must be completed for all development located in a SFHA at stem wall placement and finished floor completion.

Section 404 Permits

Glendale is a participant in the National Flood Insurance Program (NFIP). The Code of Federal Regulations requires that if a community chooses to participate in the NFIP, it must assure that developments within its boundaries comply with Section 404 of the federal Clean Water Act (CWA).

Regulated Activities

The US Army Corps of Engineers (Corps) and the US Environmental Protection Agency (EPA) jointly administer Section 404 of the CWA. The CWA regulates the discharge of dredged or fill material into washes, rivers, streams, lakes, certain man-made canals and other waters of the United States including wetlands. Examples of activities that might be regulated under this program include:

- Stream crossings
- Water diversion for canals, irrigation systems and stock tanks
- Streambed modification and stabilization

In addition, the US Fish and Wildlife Service, Arizona Department of Environmental Quality (ADEQ), Arizona Game & Fish Department and Arizona Department of Water Resources have important advisory roles. In order to allow time for permit processing and coordinating with their timeframes, contact the Corps early in the project planning stage for information about permits, and submittal and notification requirements.

Section 401 Certification

While the Corps issues the Section 404 permit, Section 401 of the CWA requires ADEQ to certify (possibly with additional conditions) that the draft permit complies with effluent limits, state water quality standards, and appropriate requirements of state law. The goal of the program is that no discharge of dredged or fill material be permitted if either a practicable alternative exists that is less damaging to the aquatic environment, or if the nation's waters would be significantly degraded.

ADEQ has authority under Section 401 of the CWA to grant, deny or waive water quality certification for both individual and nationwide Section 404 permits. The Corps cannot issue a permit, individual or general, where ADEQ has not approved or waived certification or where ADEQ has denied certification.

5.13 STORM DRAINAGE SYSTEM CLASSIFICATIONS

The City's storm drainage system shall be developed within two broad classifications as follows:

A. MINOR SYSTEM (10-Year Event)

The "MINOR SYSTEM" (10-year) shall consist of those collection and/or retention/detention facilities necessary to collect, convey, retain and/or detain storm water runoff from the more frequent rainfalls. (This is generally considered as the "formal" drainage system). The "Minor System" shall be designed to accommodate storms up to and including a "ten year storm" as defined in Chapter 18.5 Grading and Drainage of the City Code.

B. MAJOR SYSTEM (100-Year Event)

The "MAJOR SYSTEM" (100-year) shall consist of those facilities necessary to convey storm water runoff from storms up to and including a "one-hundred year storm". The design of the "Major System" is somewhat less formal than that of the "Minor System". It consists primarily of the planning and/or analysis of the overall drainage system to ensure: that there is always positive drainage from all areas; that the "one-hundred year" flows, as defined in Chapter 18.5 Grading and Drainage of the City Code, can safely pass through the project; and that all structures' finish floors are 1 foot minimum above the high water elevation in areas where temporary and/or long duration ponding may occur.

5.14 DRAINAGE FACILITY COMPONENTS

A. Collection System

This portion of the system is intended to collect and convey runoff to either retention/detention facilities and/or outfall points. In general this system consists of the following:

1. Surface Drainage Facilities
    a. Streets
    b. Open channels
        (1) Natural
        (2) Man-made
            a) Grass lined
            b) Gunite/concrete
            c) Riprap
            d) Gabions
            e) Covered gabions
2. Sub-surface or Underground Drainage Facilities (not allowed in residential developments): Sub-surface drainage facilities are required whenever the capacity of the surface system is exceeded. It is comprised of the following:
    a. Corrugated metal or galvanized pipes
    b. Manholes
    c. Catch basins
    d. Drywells

B. Retention/Detention Facilities

This portion of the system is intended to retain/detain sufficient volumes of runoff to minimize the adverse impact of the new developments on downstream areas. Projects with a gross land area of one-half acre or less will not normally be required to provide storm water retention/detention basins. All other developments must provide retention/detention facilities, which consist of one or both of the following:

1. On-Site basins on private property to be maintained by the property owner are required for the following types of developments:

    a. Apartment complexes (Rental)

    b. Townhomes, Condos, Patio Homes where a Homeowners' Association will maintain the common area.

    c. Large lot Single Family Subdivisions, where each lot is at least one acre or larger. (Note: This is an option in lieu of a "public" facility.)

    d. Industrial Subdivision (Note: This is an option in lieu of a "public" facility.)

    e. Commercial Developments

    f. Separate Tract of Land to be maintained by a Homeowners' Association.

2. "Off-Site" facilities for projects in a separate tract are typically required of the following types of development.

    a. Single-Family development when the lots are less than one acre in area.

    b. Master Planned Developments 80 acres or larger.

3. Retention/detention basins shall be protected from further development and must be fully improved with landscaping, irrigation systems, lighting and such other aesthetic improvements as may be required by the City. Any changes to the retention/detention basin must be approved by the City Engineer. Any basin which is accepted by the City for maintenance shall be deemed public property and shall be deeded to the City in fee simple title. If a basin is not accepted for maintenance by the City, the developer shall be responsible for establishing some satisfactory means (i.e. maintenance agreement) to maintain the area in perpetuity.

5.15 REPORTS

A. Preliminary Drainage Report

A preliminary drainage report must be submitted at the time of the preliminary plat review, for all developments 10 acres or larger. The preliminary plat review will not be accepted without this report.

B. Final Drainage Report

A final drainage report must be submitted as part of the construction drawing review for all developments 10 acres or larger. The final review of the detailed plans will not proceed without this report. No Grading and Drainage permit will be issued until the final drainage report is approved. For developments less than 10 acres, all retention calculations shall be shown on the grading and drainage construction plans.

5.16 HYDROLOGY - GENERAL

A. Study Requirements

A hydrology study shall be performed for each development within the City over ten (10) acres (gross) in size unless waived by the City Engineer. The study shall define the overall and sub-drainage areas. It shall also determine appropriate hydrologic data for the following:

1. Off-Project Areas: The peak flows, times of concentration, and other hydrologic data for each off-project drainage area tributary to the project shall be computed and submitted in summary form.

2. Project Sub-Basins: the project shall be divided into sub-basins tributary to appropriate design points. The pertinent hydrologic data shall be computed for each and submitted in summary form.

3. “Appropriate Design Points” are those points wherein the peak flow rates or other pertinent data is needed to determine flow capacity requirements, inflow-outflow relationships, etc. These “points” would include, but not necessarily be limited to the following: inflow-outflow points of retention/detention basins, up and/or downstream ends of culverts; intake points for storm drains (i.e. inlets, catch basins, scuppers, etc.) points immediately upstream and downstream of channel junctions and/or street intersections; others as may be necessary to give a complete hydrologic picture and allow a thorough hydraulic evaluation and/or design of the drainage system.

B. Basis of Design

The basis of design shall be the "Hydrologic Design Manual" as prepared and published by the Flood Control District of Maricopa County. The Rational Method shall be used for all studies where the drainage area is less than 80 acres. Studies for drainage areas over 160 acres shall use the HEC-1 hydrologic model as detailed in the Manual. For studies involving drainage areas between 80 and 160 acres in size, either the Rational Method or HEC-1 model may be used.

5.17 HYDRAULICS – GENERAL

A. Basis of Design

1. Storm drainage pipes and open channels shall be designed using "Manning's Formula".
2. Values of "n" for "non-typical" materials shall be noted in the report.
3. The Single-Step Method is the preferred method for hydraulic calculations on open channels.
4. Street capacity may be computed using the following formula:

$$\frac{Q = 0.56(z)S^2 d^{8/3}}{n}$$

Where:

Q = flow capacity of the street section in cfs

Z = reciprocal of the cross slope

N = Manning's "n" for the surface type

S = longitudinal slope of the street

D = depth of flow at the gutter line

5. Inlet capacity shall be computed for each inlet of the system. The design method or technical reference used for these calculations shall be cited.

B. Calculations Format

1. All hydraulic calculations submitted for review shall be submitted in tabular summary form only. Voluminous reports containing page after page of routine detailed calculations may be returned un-reviewed and the review of the construction plans will be delayed until these calculations are resubmitted in summary form. (Remember, most hydrologic and hydraulic analyses consist of a repetitious series of standard routine calculations. The City does not intend to check the designer's arithmetic.) Summary forms for hydrologic or hydraulic calculations as published by the City of Phoenix or by the City of Mesa or as found in various technical publications (such as ASCE Manual Number 77), or comparable format may be used.

2. Occasionally circumstances will warrant or require special solutions that do not fall within the routine forms and formula prescribed above. In such cases the design engineer shall use formula appropriate for the solution. If necessary, a single typical calculation may be shown in detail to clarify the logic of the solution. The balance of similar calculations is to be presented in tabular summary form.

C. Retention/Detention Areas

1. The design engineer shall determine and present calculations on each retention or detention facility required for their project. The retention/detention volumes shall be provided.

2. Each retention/detention basin is required to provide sufficient volume to retain one hundred percent of the 100-year, 2-hour storm and a safe overflow (outfall). All finished floors must be set at a minimum of one foot above the basin's high water elevation.

5.2 TECHNICAL DESIGN REQUIREMENTS - STORM DRAINS

5.21 DRAINAGE

A. Street Drainage

1. The basis of design for local streets shall be the ten-year storm.

2. Streets shall be designed to carry the following minimum flows (both on-site and off-site):

    a. Major arterials and arterials to carry a ten-year flow between the curbs and maintain a twelve-foot dry lane in each direction, and carry the one hundred year flow within the right-of-way.

    b. Collectors and local streets to carry ten-year flows between the curbs, the fifty-year flows within the right-of-way. The finished floor of all habitable structures (and all machines and equipment) shall be placed a minimum of one-foot above the 100-year flood elevation, or one-foot above the top of curb, whichever is greater.

3. Underground or open channel storm drains are required when the street capacity is exceeded.

4. In general, dip crossings of open channels shall be avoided. Low water crossings passing a ten-year storm shall be provided.

5. All storm drains and channels shall be constructed in public rights-of-way or dedicated drainage easements.

B. Drainage Between Lots

1. Routing of drainage ways between lots or buildings is discouraged and will be allowed only with written approval of the City Engineer.

2. The channel shall be designed to convey the one hundred year flow without flooding adjacent properties.

3. When allowed, the channel shall be constructed in a dedicated drainage right-of-way or easement leading to a positive outfall point. The minimum width of the right-of-way shall be the top width of the channel plus twelve feet for a maintenance roadway. The ends of the right-of-way shall be treated in such a manner as to prevent non-maintenance vehicular access without diminishing the hydraulic capacity of the channel. A minimum of 25% of the up-stream opening shall be assumed to be clogged with debris.

C. Underground Storm Drains

1. Underground storm drains shall be provided whenever the capacity of the streets is exceeded by the design storm event.

2. Pipes shall be sized using "Manning's Formula". Values of Manning's "n" shall be from appropriate technical literature and shall be referenced.

3. Velocities shall range from 3 fps to 9 fps.

4. The minimum pipe size shall be 15-inch ID.

5. The hydraulic grade line for the design storm may be above the pipe, provided that it remains at least one foot below the ground elevation at all manholes, catch basins, inlets, etc.

6. When the pipe changes direction more than 30 degrees, there shall be a drop between match points of at least 0.1 feet. In no case shall the deflection angle be greater than 90 degrees.

D. Pipe Bedding and Backfill Requirements

All storm drain pipe within City of Glendale right-of-way or easements shall be bedded and backfilled per City of Glendale Standard Detail G-690 and MAG Section 601 with the following modifications. All other specification sections of MAG Section 601 shall remain the same:

1. MAG 601.4.2 Bedding: *(This section of MAG to be replaced in its entirety.)*

    a. Storm drain, water and sewer pipelines installed in the City of Glendale easements and rights-of-way shall be bedded from bottom of excavation to one foot (compacted) above the top of pipe with MAG ABC material meeting the requirements of MAG Section 601.4.6 and MAG Section 702. Chips or open graded rock will not be permitted.

    b. Bedding material for all sizes of pipe or conduit shall be placed in lifts, with the maximum compacted thickness not to exceed 8 inches. In no case shall the depth of the first lift exceed the spring line of the pipe.

    c. Water consolidation is not allowed for bedding material.

2. MAG 601.4.3 Backfill: *(This section of MAG to be replaced in its entirety.)*

    a. Backfill material shall be clean sound earthen material free from broken concrete, broken pavement, wood or other deleterious material. Unless otherwise specified, backfill may be screened native material with no piece larger than four (4) inches, select material or aggregate base course.

b. Water consolidation shall not be permitted under any circumstance. Mechanical compaction shall be required except when ABC Slurry or CLSM is chosen as the backfill material. The maximum uncompacted lift thickness for mechanically compacted backfill shall be 12 inches for any trench width. Nothing contained in these specifications shall be construed to violate or reduce any trench shoring requirements normally required by O.S.H.A.

c. The moisture content of backfill materials shall be carefully maintained between the limits of +2 and -4 percent of optimum moisture content as determined by AASHTO T-99 or ASTM D-698.

3. MAG 601.4.4 Compaction Densities: *(This section of MAG to be replaced as noted.)* Unless otherwise noted, all backfill **compaction densities shall be 95.0% minimum** relative density as determined by ASTM D-2922 (nuclear density method) and D-3017 (water content by nuclear method) using the Standard Proctor Method, AASHTO T-99 or ASTM D-698.

4. MAG 601.4.5 Compaction Methods: *(This section of MAG to be replaced in its entirety.)* Water consolidation for backfill will not be permitted within the City of Glendale. The backfill compaction shall be accomplished by mechanical methods using equipment such as rollers, pneumatic tamps, hydro hammers, or other approved devices which provide secure uniform and required density without injury to the pipe or related structures.

5.22 MATERIALS

A. Pipes

1. Standard material for storm drain pipes in the public right-of-way shall be rubber gasket, reinforced concrete pipe (RGRCP) per ASTM C76. The minimum rating shall be Class III. When the cover is less than two feet the rating shall be Class V, subject to City approval.

2. The Design Engineer shall be prepared to justify the pipe class specified.

3. Cast-in-place concrete pipe or HDPE pipe shall not be used in the City right-of-way unless approved by the City Engineer.

B. Storm Drain Manholes/Junction Boxes

1. Materials: All storm drain manholes shall be 5 feet in diameter per MAG Standard Details and Specifications. Manhole frames and covers shall be

Class 35. Their weights and dimensions shall be in accordance with MAG Standard Detail 424. Manholes constructed within the City shall not have built-in steps. Lids shall display the City logo per COG Detail G-704.

2. Locations: Manholes are required at the following locations:

   a. Junction of three or more pipes

   b. Changes in pipe sizes or alignment (greater than a 45 degree horizontal deflection).

3. Spacing: The maximum spacing for storm drain manholes shall be 400 feet for pipes 15" to 36" in diameter; and 600 feet for pipe greater than 36" in diameter.

C. Open Channels

1. Natural Channels: Whenever possible and appropriate it is the City's preference that existing drainage channels are left in a natural state. When this is the case a drainage easement or right-of-way shall be dedicated over the 100-year flood plain of the natural drainage way.

2. Man-made Channels: When man-made channels are required the emphasis would be placed on a "natural" appearance. Grass lining with side slopes 6:1 or flatter are preferred.

3. Maximum Velocities/Erosion Protection: In general, the maximum velocity for the 100-year event or other less frequent event, whichever creates the worse scour potential, shall not exceed the scouring velocity of the soil (with natural cover in a maintained state). When the scour velocity is exceeded, additional erosion protection shall be provided. The protection may consist of one or more of the following:

   a. Reinforced concrete/gunite lining

   b. Natural stone grouted riprap 4" to 12" diameter stones leaving a minimum of ¼ diameter face exposed.

   c. Gabions.

D. Catch Basins

Catch basins are to be curb-opening inlets. Drywells and catch basins with grates shall be heavy-duty H-20 loading, bicycle safe, meet ASTM A536 and are subject to the approval of the City Engineer. All new catch basins and

scuppers shall be identified by the contractor placing a storm drain marker on the top of the curb above the inlet. Storm drain markers shall be properly epoxied on the structure. The contractor shall provide an acceptable 2-part epoxy for gluing the marker to the concrete. Only round access covers per MAG 536-2 will be allowed. Catch basins with a square access cover will not be accepted.

5.3 TECHNICAL DESIGN REQUIREMENTS - RETENTION FACILITIES

5.31 SIZING

A. Basis of Design

1. All retention/detention facilities shall be sized to retain 100% of the one hundred year, two hour storm falling over the entire project (gross area including adjacent half streets). For purpose of determining the volume required the project shall be considered to extend to the centerline of all existing and/or future streets on the exterior boundaries and to include all interior streets and other rights-of-way within the project.

2. There shall be a minimum of one-foot of freeboard from the basin's high water surface elevation to the lowest building elevation (finished floor).

B. Volume

1. Volume Required: The volume required in acre feet can be computed using the following formula:

   V = (C) (D) (A)/12

   C = coefficient of runoff

   D = rainfall depth in inches, for the 100 year, 2 hour event per FCDMC Hydrology Manual Appendix A.1, Figure A.56. This value will vary within the city limits

   A = area, in acres

2. Volume Provided: The volume provided shall be calculated from the basin's bottom grade to the basin's outfall grade.

3. Storm water Storage Volume Certification: The property owner will provide the City with certified as-built dimensions of the basins and the actual volume of storage provided. This must be based on "as-built" topographic surveys made by either a civil engineer or land surveyor who is registered to practice in the State of Arizona. These as-built volumes shall be certified by the Design Engineer whether the volume provided meets or exceeds the required design volumes per COG ordinance and the approved Grading and Drainage Plan. The volume of storage provided must equal or exceed the approved design volumes before the City will issue Letters of Acceptance for maintenance of any public facilities.

C. Retention/Detention Basins

Basins shall be located such that they can intercept the flows from the entire site. If the basin is located other than at the lowest point of the project, the Design Engineer shall denote on the master drainage map the actual or effective drainage area of each basin. If portions of the project cannot drain to the primary basin, additional basins shall be added to retain runoff from these areas.

D. Basin Outfall

A positive outfall from the basin must be provided for events in excess of the 100-year event and clearly identified on all construction drawings.

5.32 GRADING

A. Depths

1. The basins shall not exceed 1.5 feet of water depth within 10 feet of the right-of-way. The basin depth is measured from the basin's bottom elevation to the 100-year, 2-hour high water elevation.

2. While it is the City's intent that the basin depths not exceed 3 feet, it is also the City's intent that the basins be contoured to present an aesthetically pleasing appearance. To that end, up to 25% of the bottom area may be up to 4 feet deep.

3. In no case shall the depth exceed 1.0 foot without a positive means of disposing of accumulated runoff.

B. Slopes, Side and Bottom:

1. Bottom: The bottom of all basins shall be sloped towards the discharge points. The minimum bottom slope shall be 0.5%.

2. Side Slopes:

   a. Side Slopes adjacent to public or private sidewalks shall have a side slope of 6:1 or flatter. There shall be a minimum of 5 foot horizontal distance from the edge of sidewalk to the top of bank of an adjacent basin.

   b. Side slopes adjacent to walls, fences, hedges, etc. (i.e., limited or no pedestrian type access in that area) may have side slopes up to 4:1.

   c. Retaining walls (i.e. vertical slopes) and stepped walls, with no more than 3' of exposed wall, may be used in areas adjacent to permanent walls, fences, etc.

   d. A concrete or riprap spillway shall be provided when street runoff is collected and conveyed to the basin via a scupper

C. Grading and Landscaping

1. It is the intent of the City that retention and detention basins present an aesthetically pleasing appearance. The Design Engineer shall endeavor to contour the sides and bottoms of the basins to enhance appearance through varied slopes.

2. It is not the intent of these guidelines to dictate the specific details of the configuration to the designers, however, the following concepts will be used as the basis of reviewing the plans:

   a. Curvilinear sides should be used in lieu of long stretches of straight lines.

   b. Side slopes should be varied (i.e., start with 6:1 then change to 7:1 or 8:1 or more. With appropriate use of landscaping, side slopes can even be reduced to 4:1

   c. Bottom areas should contour to varying depths in lieu of uniform depth/slope

3. The tops and bottoms of side slopes shall be rounded off.

4. Landscaping: Chapter 10 and the City's Landscape Ordinance outline the basin landscaping requirements for retention and detention basins. As with the grading, the landscape plans shall be reviewed in regard to aesthetic effect of the proposed design.

5. No more than fifty (50) percent of the required streetscape landscape area may be used for storm water retention purposes.

D. Retention/Detention in Parking Lots

1. Surface retention/detention in parking lots of multi-family developments is not allowed. All retention/detention of such developments shall be in landscaped areas. Underground retention will be allowed in parking areas.

2. Retention/detention of runoff in parking lots of industrial and commercial developments is allowed subject to the following standards:

   a. No more than 75% of the volume required may be retained/detained in parking lots. The balance shall be provided in landscaped areas or in underground facilities. The tributary areas to each basin shall be noted on the final drainage report.

   b. Depth in parking lots shall not exceed 0.67 feet, nor shall it exceed 0.15 feet at the midpoint of any parking space. If paved areas are designed to store water at a depth greater than 0.67 feet, the developer shall post conspicuous warning signs in these areas advising that flooding may occur and vehicles may be subject to inundation.

   c. A continuous emergency vehicle access land route shall be provided throughout the development, and it shall be free of ponded water from the retention areas.

E. Site Overflow/Outfall

1. Outfall: Each project shall be designed such that the ultimate outfall for all drainage is a public street, storm drain, drainage channel, drainage easement or a natural watercourse. The outfall shall be accessible without draining over private property unless specific, recorded drainage easements are provided over the private property. Design engineers must evaluate cases where overflow conditions occur and take necessary actions to prevent flooding, erosion or damage to properties located downstream of the outfall. In all cases, the engineer must insure that the

"post development flow" does not exceed flow that would result had no development taken place (for the 100-year, 2-hour event).

2. If such an outfall does not exist, the project must provide an outfall. If an outfall cannot be created, then all finished floors shall be a minimum of two (2) feet above the 100 year, 2 hour high water elevation.

3. Overflow/Conveyance:

   a. Off-project flows, which historically flowed through the project, may be routed through the retention or detention facilities.

   b. Runoff volumes in excess of those required to be retained/detained (currently the 100-year, 2-hour storm) may be routed directly through the outfall and must be routed via the retention/detention facilities.

F. Location/Conflicts With Existing Utilities

1. Retention/detention facilities shall not encroach into existing easements for private utilities without written approval of the encroachment from all utilities using the easement.

2. Retention/detention facilities shall not encroach into public rights-of-way. If necessary, the developer shall relocate conflicting utilities into a new dedicated easement.

3. The top of the retention/detention facilities (i.e., freeboard elevation) shall be at least four horizontal feet from any building.

4. Retention/detention facilities shall not be located within 20 feet of an active septic system nor within 100 feet of an active water well.

5. A minimum three feet of cover (from the bottom of the basin to the top of the pipe) shall be maintained over water and sewer main lines.

G. Disposal/Discharge

1. All retention/detention facilities shall have a positive method of disposing of retained or detained runoff waters. All water so retained or detained shall be disposed of within 36 hours. Public streets are not considered an acceptable outlet for disposal of retained/detained runoff, however, they are considered an acceptable outfall.

2. Acceptable methods of disposal of accumulated storm water runoff are:

a. Discharge to an existing storm drain or drainage channel of sufficient capacity to convey the anticipated flows from the tributary drainage area after the storm via a valve or slide gate.

b. Drywells are considered an acceptable method of disposing of the retained runoff, subject to the following:

1) Drywells shall penetrate a minimum of 10 feet into permeable soil defined as mostly cobbles and gravel with no material passing a No. 40 sieve. Soil shall not form a cast when air-dried and squeezed in the hand, and shall fall apart when pressure is released. When hand squeezed, the soil shall be moist and make a cast, which shall crumble when lightly touched, and cannot be ribboned between thumb and fingers.

2) The maximum designed disposal rate shall not exceed 0.1 cfs per drywell unless a higher rate is supported by a certified test of an actual drywell and approved by the City. No surface percolation tests will be allowed. If an actual drywell test is performed, the resultant design disposal rate shall not exceed 50% of the rate determined by the test, in order to compensate for deterioration of percolation rates over time.

3) The maximum number of drywells per retention/detention basin shall be computed and noted in the drainage report per the following:

$$N = V_p/(36)(R)(3600)$$

Where:

N = maximum number of drywells required

V_p = volume provided in the retention basin

R = discharge rate per drywell in “cfs”. Test percolation rates will be determined in a drywell. A surface percolation test in an excavated pit is not acceptable. Test rates will be reduced by half to account for clogging and lack of maintenance. 0.1 cubic feet per second (cfs) is the default percolation rate if no tests are provided.

36 = maximum number of hours required to drain the retention/detention basin

3600 = conversion from cfs to cfh (cubic feet per hour)

4) Based on the above formula, and a design R value of 0.1 cfs, one drywell will percolate 12,960 cubic feet of runoff in 36 hours. The number of drywells based on the above formula shall be shown on the grading and drainage plans. An in-field percolation test of the first drilled drywell per basin may reduce the total number of drywells. The Engineering Division must approve the number of deleted drywells based on the percolation test results. The deleted drywells shall be shown on the grading and drainage as-builts.

5) A drywell certification stating the drywell(s) has been registered with and conforms to the requirements of the Arizona Department of Environmental Quality requirements shall be signed on the as-built civil plans cover sheet when submitted to the City of Glendale Engineering Division upon project completion.

6) All drywells are to be equipped with a secured grate to prevent unauthorized removal. The grate shall be at least 0.2 feet above adjacent finished grade.

H. Nuisance Water

Basins may be designed with “sump” areas wherein runoff from the more frequent storms and nuisance runoff may be retained without flooding the balance of the basin. Positive methods of disposal shall be provided for each sump.

CHAPTER 6

WATER MAIN DESIGN AND CONSTRUCTION

6.1 GENERAL INFORMATION

6.11 WATER MAIN SYSTEM

A. Classification

The City water main system is based on a grid system with three (3) basic classifications of water lines which are determined by use. These classifications are:

1. Services
2. Distribution
3. Transmission

B. Typical Sizes and Location

All developments shall provide for water distribution and service lines of appropriate sizes and locations as follows:

1. Distribution Water Lines:

   a. In major arterial, arterial and collector alignments, 12-inch minimum diameter lines.

   b. All other locations, 8-inch minimum diameter lines.

c. These are minimum standards and the City may require larger sizes in unusual circumstances.

2. Service Water Lines:

a. Metered taps for single-family residences shall be located per Details G-642 and G-643. The minimum service line size shall be 1-inch.

b. The service line shall be constructed with Type K roll copper.

c. For all other types of development, metered taps shall be located outside of street improvements but within the right-of-way or an easement.

d. Service taps are prohibited on any line, which is primarily designed to service either fire sprinkler systems and/or fire hydrants.

C. Water Studies

Water studies shall follow the City of Glendale's design criteria. The design criteria are available from the Water Services Department.

6.12 FIRE LINES AND APPURTENANCES

A. FIRE SPRINKLER LINES AND MAINS

Fire sprinkler line locations shall be such that maintenance activity will not disrupt normal access to the development. The owner will be responsible for the sprinkler line/main up to the valve coming off the City main. After installation, only City forces may operate the fire line valve at the main. Each fire sprinkler line shall have an isolation valve so that maintenance can be done to the sprinkler system without interrupting service in the distribution system.

B. FIRE HYDRANTS

1. Location:

a. Fire hydrants shall be located outside of street improvements but within the right-of-way or easement.

b. Fire hydrants shall be located between 1 foot and 6 feet off the back of curb on all streets.

c. Fire hydrants shall not be installed on any portion of a dead end line that is more than 400 feet from its source of supply (point of connection on 8-inch water lines).

2. Spacing: General spacing for fire hydrants shall be:

   a. 500 feet maximum in a single-family residential development.

   b. 300 feet maximum in a multi-family residential development.

   c. 300 feet maximum in commercial/industrial areas with at least one hydrant per 100,000 square feet of coverage.

   d. Hydrant spacing and location may be modified by the fire flow requirements found in the International Fire Code.

6.2 TECHNICAL DESIGN REQUIREMENTS

6.21 WATER LINES

A. Materials and Details

1. Standard materials and details for pipe 12-inches in diameter and smaller shall be per Maricopa Association of Governments, Uniform Standard Specifications and Details for Public Works Construction (ductile iron pipe only). Materials and details for pipe larger than 12-inch diameter shall be considered individually.

2. Where ductile iron pipe is used, all pipe and fittings shall be encased in a polyethylene tube and installed in accordance with AWWA C105 and C600 unless directed otherwise by the City.

3. Pavement replacement type and compaction type shall be indicated on each sheet. All trench bedding and backfill shall conform to Detail G-690.

4. All dead-end lines, such as at the end of a cul-de-sac, will be terminated with a fire hydrant. No dead-end lines shall exceed 400 feet in length.

5. Private water lines or fire lines shall be ductile iron pipe (DIP) in City right-of-way. Once outside the right-of-way, the pipe material may be C900 PVC Class 200 pipe.

B. Location Within Right-of-Way

1. Right-of-way shall be dedicated prior to a Certificate of Occupancy.

2. Major arterial streets: water main alignment shall be reviewed individually.

3. Arterial Streets: water mains shall offset from street centerline by 16 feet.

4. Collector and Residential-Local Streets: water mains shall be offset from street centerline by 10 feet.

5. All water main stub-outs, bends without valves and end-of-service lines shall be located with an electronic marker of the 3M “Magic Ball” type, or an approved equal. The depth of the marker ball shall be no more than 3 feet below finished grade.

C. Easements

1. Easements shall be dedicated in a manner approved by the City, through the City’s Engineering Division prior to issuing any building’s Certificate of Occupancy. The easement’s legal description shall follow as-builts of the water line, not the approved water line design plan.

2. The minimum width of the easement for all water lines shall be 20 feet. Around fire hydrants and water meter boxes, the easement may be reduced to 10 feet wide.

3. Water lines should generally be centered in the easements.

D. Depth

1. Minimum cover from finish grade to the top of the pipe shall be:

   a. Forty-eight (48) inches for water lines 12-inches and larger, and all lines in major arterial and arterial streets.

   b. Thirty-six (36) inches for water lines 8-inches and smaller, and all lines in collector streets, residential streets, and other locations.

2. The proposed depth shall be clearly noted in each plan sheet. Any changes in depth to avoid conflicting utilities shall be noted.

E. Air Release

Air release valves, vacuum release valves, or other suitable means of air control shall be installed at high points in a line, or where a long line changes slope.

F. Main Abandonment

Water lines and fire lines that are not going to be used are to be abandoned. This will require the complete removal of the old tee/tapping sleeve and valve and replacing them with a straight piece of main unless otherwise approved by the City’s Water Services Department.

G. Pipe Bedding and Backfill Requirements

The bedding and backfill requirements for all water lines installed within the City of Glendale right-of-way or easements shall be constructed per City of Glendale Standard Detail G-690, MAG Section 601 and Section 5.21.D of these standards. All other specification sections of MAG Section 601 shall remain the same.

6.22 FIRE HYDRANTS

A. Materials and Details

1. Fire hydrants shall be installed per City of Glendale Detail G-660, G-662 or G-665 as applicable.

2. The developer shall provide all labor, fire hydrants, valves, fittings, and all other necessary materials for the complete installation of the fire hydrants for the project.

3. The only acceptable fire hydrant models and manufacturers are:

    - Kennedy Guardian
    - Mueller Centurion
    - Clow Medallion
    - Waterous Pacer

B. Locations

1. Fire hydrants shall be placed a minimum of 1 foot and a maximum of 6 feet from back of curb. Fire hydrants in mid-block shall be placed at the common property lines. Care shall be taken to minimize conflicts with future driveways, traffic signals and handicap ramps.

2. Location of the fire hydrant shall be such that the pipe leading to the hydrant will be under the least amount of pavement.

3. On private property, the fire hydrant shall be contained within a dedicated easement (5 foot minimum clearance). Hydrants not in a dedicated easement or right-of-way are considered private and shall be painted red.

4. A finished grade elevation shall be shown for the “break-away” flange on each fire hydrant. This shall be such that there is at least 18 inches but not more than 24 inches clearance from finished grade to the lowest nozzle. Vertical extensions are to be no more than 12 inches, and there shall be no more than one extension per hydrant.

5. Hydrants shall be installed in such a way that the depth of bury does not exceed 5 feet.

6. Bedding and backfill around fire hydrants and over fire lines within the right of way shall follow Detail G-690.

C. Fire Hydrant Marker Locations

1. **Marker Specifications:** Blue retro-reflective pavement markers shall be used as a method of identifying fire hydrant locations. Retro-reflective pavement markers shall be 911A-blue, Fire Lite, Amerace Corporation, Signal Products Division or equal.

2. **Two-Way Streets or Roads:** Markers should be placed 6 inches from edge of painted centerline on the side nearest the fire hydrant. If the street has no centerline, the marker should be placed 6 inches from the approximate center of the roadway on the side nearest the hydrant.

3. **Streets with Left Turn Land at Intersection:** Markers should be placed 6 inches from edge of painted white channelizing line on the side nearest the hydrant.

4. **Streets with Continuous Two-Way Turn Lane:** Markers should be placed 6 inches from the edge of the painted yellow barrier line on the side nearest the fire hydrant.

5. **Freeways and Expressways:** Markers should be placed on the shoulder 1 foot to the right of the painted edge line opposite the off-right-of-way fire hydrant location.

6. **Private Drives:** The marker should be placed 6 inches from the approximate center of the roadway on the side nearest the hydrant.

7. **Cul-de-sacs:** On cul-de-sacs, marker shall be placed off the center monument of the cul-de-sac in the direction of the hydrant.

6.23 VALVES

A. Materials and Details

1. All gate valves shall be resilient seated, solid wedge gate and shall open left. The following are the only acceptable manufacturers of valves to be used on public water mains:

   - Clow
   - Mueller
   - Kennedy
   - American Flow Control

2. Butterfly valves shall not be permitted on mains less than 16-inch diameter. Manholes are to be installed at all butterfly valve locations.

3. Blocking will be concrete only per MAG Standard Detail 340 and COG Detail G-601.

4. Valve boxes shall be 8-inch slip joint concrete pipe or 8-inch SDR PVC with 8-inch lids. Lids shall have the word "WATER" clearly marked on them. Valve boxes shall also conform to MAG Detail 391-1, Type A.

5. Bedding and backfill around all water valves shall conform to COG Detail G-690.

6. If the valve operating nut is greater than 5-feet below finished grade, then an extension shall be required.

B. Spacing

1. The maximum spacing of valves in industrial, commercial and multi-family districts shall be 500 feet. In single-family residential, the maximum spacing shall be 700 feet. A valve shall be placed at every tee and cross in the mainline, for each pipe run. A valve shall be placed on each side of the tap/tee for water meters 3" and larger.

2. One fire hydrant is the preferred number to be out of service and twenty (20) homes per fire hydrant shutdown shall be the maximum number to be without water per closure.

3. Any main that will be extended in the future shall have a valve, along with a capped stub. No blow offs are allowed on the capped end of a water main. The valve shall remain closed after acceptance of the main.

4. For distribution lines 12-inches and smaller, one valve shall be placed on each side of major canals, railroads, bridges, etc.

5. One gate valve shall be placed between each fire hydrant and the main. For fire hydrants on lines of 100 feet or more, a second gate valve is required within 20 feet of the hydrant.

C. Location

1. In arterials, a valve shall be located in line with curb returns at the intersections. In mid-block they shall be in line with property line extensions. In local streets, the valves shall be located within 3 feet of the tee or cross.

2. Valves for fire hydrant connections shall be flanged to the tee. When a second valve is required, it shall be placed within 20 feet of the hydrant.

3. No valve shall be designed or located in concrete pavement, sidewalks, brick pavers or concrete curb.

D. Operation

1. All valves that control the City's energized water lines shall only be operated by a Valve System Operator from the City's Water Services Department or a City of Glendale Construction Engineering inspector.

2. City personnel will be responsible for opening and closing all existing water valves where a contractor must tie into an existing water main. A minimum 24 hour notification is required.

3. Only City personnel shall turn on the water that lies between the new system and the existing system for the purposes of chlorinating the water lines, flushing lines, pressure testing water lines, and bacteria sampling.

4. Only City personnel shall operate valves that control the Water system Zone Split. These valves are normally designated by a welded "Z" on the valve cover with a debris cap inside the valve box.

6.24 WATER SERVICES

A. The developer shall install all 1-inch, 1-1/2 inch and 2-inch water services and water meter boxes in new subdivisions per Details G-642 and G-643. The minimum service line size shall be 1-inch. Only soft K copper is to be used on water services. Only brass pack joint fittings shall be used. Sweated joints will not be allowed in the City right-of-way. Only double strap brass saddles manufactured by Ford or Mueller are to be used. All corporation stops, straight stops, angle stops (plug style) and couplings shall be pack joint manufactured by Ford or Mueller. All brass wetted surfaces must comply with NSF 61 Annex F & G, NSF 372 and ANSI/AWWA C800. Water services shall not be installed under concrete pavement.

B. Existing water service lines to the property that will not be used must be abandoned by the developer. The service's corporation stop shall be removed and the brass saddle plugged with a brass plug. If the abandoned service has a steel strap saddle, it will be removed and a full circle leak clamp shall be installed.

C. The developer is responsible for securing a right-of-way permit and paying all applicable fees.

D. Water services installed outside of public right-of-way shall be contained within a dedicated 6-foot wide (minimum) easement.

E. Water meters shall not be located in sidewalks, parking lots, service driveways, residential driveways, or in areas of concrete or asphalt paving.

F. If a 1-inch water service must be moved to avoid conflicts, the City may relocate the service at the developer's expense and in accordance with the City ordinance. Water services 1-1/2 inch and 2-inches will be relocated by the Contractor and inspected by the City's Construction Engineering inspector prior to backfill. Services will be relocated in a manner that is in the City's best interest. The developer will be required to obtain a right-of-way permit and will be responsible for abandoning the service at the main. The service line and corporation stop shall be removed and the brass saddle plugged with a brass plug. If the abandoned service has a steel strap saddle it will be removed and a full circle leak clamp will be installed. Both services shall be noted on "as-built" plans. All new services, relocations, and meter installations will be done only after the developer has paid the prevailing fees.

G. Typically, the size of the meter will be the same size as the service line, and there will be one meter per service line. The following exceptions are allowed if supported by the plumbing calculations:

Service Size	Allowable Meter Size	Notes
1"	1" or ¾"	See note 1.
1 ½ "	1 ½" or 1"	See note 1.
2"	2" , 1 ½" or 1"	See notes 1 and 2.
4"	3" or 4"	See notes 1 and 3.

NOTES:

1. A decrease in meter size from service size must be supported by the plumbing calculations and a reducer fitting fee will be applied based on the current fee schedule.
2. A 2" to 1 ½" reducer is not allowed. Developer's requesting a reduction from a 2" service to a 1 ½" inch meter are required, at their own expense, to install a curb stop which allows for the installation of either a 2" or a 1 ½" meter.
3. A 3" water meter shall require a 4" water tap and 4" x 3" reducer placed in the vault (see Details G-674 and G-676).

H. Meters will not be fenced in or enclosed and must be accessible at all times. Meter boxes will be installed so that any runoff will flow away from the meter.

I. The use of alternative material for backfilling any trench with an exposed water service line shall require the installation of a PVC conduit around the service line prior to backfilling. The size of the conduit will be two (2) times greater than the service line diameter. If Controlled Low Strength Material (CLSM) is used, then the water service shall be backfilled using ABC to within 1 foot above service.

J. To assist in compliance with the most recent Arizona Department of Water Resources (ADWR) reporting requirements for cooling towers, turf facilities, and water features the following conditions would require individual metering:

1. Cooling towers are required to be individually metered and must be designed to implement water re-circulation.

2. Outdoor water use is to be separately metered from indoor domestic uses (does not apply to residential water use). Landscapes defined as turf facilities by the ADWR are required to have individual meters for the outdoor water use.

3. Water features are required to be individually metered. Decorative fountains are also required to be designed to implement water recirculation.

6.25 WATER METERS

A. All water meters shall be sized and designed in accordance with the requirements of the Uniform Plumbing Code with City amendments. The water meter box shall be #1, #2 or #4 and sized according to the water meter size or water service size, whichever is larger. The #3 meter box is no longer allowed.

B. Water meters 3-inches and larger shall be installed in accordance with Details G-674 or G-676. Alternative water meter vaults will be considered. Water meter vaults shall comply with Detail G-672 if the vault is located in paved areas.

C. Water meters 8” and larger shall comply with the requirements set by the Safe Drinking Water Act and NSF/ANSI 61 Annex F and G and approved by the Water Services Department prior to installation. The Water Services Department will supply all water meters 6” and smaller and will meet the following requirements:

1. Nutating Disc: Single and multi-family residential

2. Compound: Generally residential, this unit is designed for use where most of the flow is low, some intermittent and no more than occasionally high.

3. Turbo: This shall be used where a wide variety of flows can be expected but most are at the high end.

4. Propeller: This shall be used where low flows never occur, the flows shall be consistent within a limited range.

6.26 TAPS

All tapping companies must be approved by the Water Services Department.

A. **Wet Taps:** Tapping sleeves will not be installed on machined over all ACP and must be a minimum of 18 inches from any pipe joint per MAG Detail 340. The Contractor shall make all wet taps into the City's energized water system. No tap shall be made without a City Water Services Department representative present. No tap shall be made until the City inspector has approved the installation and testing of the tapping sleeve, valve and thrust block. Prior to all taps, the City Construction Engineering inspector will contact the City's Water Service Department no less than 24 hours prior to tapping.

B. **Dry Taps:** The developer shall make all dry taps for 1-inch, 1-1/2 inch, and 2-inch water service connections.

C. **Separation:** A 3-foot minimum separation is required between taps, service lines, and meter boxes.

D. **Marker Balls:** All taps shall be located with an electronic marker of the 3M "Magic Ball" type, or the equivalent.

6.27 FLOW TESTS

A. A right-of-way permit to conduct a flow test shall be obtained from the Development Services Center on the 2nd floor of City Hall at 5850 West Glendale Avenue.

B. The permittee shall identify, at the time of application, the fire hydrants to be used for the flow test. Fire hydrants may be identified by a hydrant number stamped on or near the bonnet. The fire hydrant number may be obtained from the City's Mapping Division.

C. A hydrant flow test permit shall be valid for one flow test only. Should additional tests be required, an additional permit and fee will be required for each test.

D. Each flow test shall be observed by the City's right-of-way inspector. Instructions for scheduling an inspector are on the back of the permit. At least 48 hours notice is required.

E. The inspector will observe only, and will not participate in the test. The permittee is responsible for providing the required number of staff to conduct the test. The inspector shall be provided with the results of the test.

F. The permittee shall include the water flow permit number on all plans, or communications that reference the water flow results.

6.28 BACKFLOW PREVENTION

A. **Requirements:** No person shall connect to the City water system any water operated equipment or mechanism, or any water treating chemical or

substance, if it is determined by the City that such equipment, mechanism, chemical or substance may cause pollution of the domestic water supply. Such equipment or mechanism may be permitted only when equipped with a backflow prevention assembly approved by the City. A complete list of specific activities requiring backflow prevention is provided in Section 33-90 of the Code of the City of Glendale and on the Cross Connection Web page. Questions on the requirement for a backflow prevention system should be directed to the City's Building Safety Division – Cross Connection.

B. **Type:** The following types of backflow prevention methods are recognized in the City. For detailed descriptions of each type, see Section 33-89 of the Code of the City of Glendale or the Cross Connection web page.

1. Air Gap (AG)
2. Reduced Pressure (RP) (See Detail G-669)
3. Double Check Valve (DC) (See Detail G-668)
4. Pressure Vacuum Breaker (PVB)
5. Spill Resistant Vacuum Breaker (SVB)

6.3 ZONE SPLITS

6.31 GENERAL

The City's water distribution system is divided into various pressure zones (see Detail G-600). Each zone operates as an independent water distribution system, and cross connections between zones are prohibited.

6.32 VALVES

At selected locations between the zones special valves have been installed. Operation of these valves shall be by a City Valve Operator from the Water Services Department.

6.33 SPECIAL REQUIREMENTS FOR DEVELOPMENTS BORDERING ZONE SPLITS

Special Requirements for Developments Bordering Zone Splits: In those situations wherein a proposed development borders on the zone split boundary, the developer shall install a redundant main on the development side of the zone split boundary in order to ensure that the subject development has a closed loop distribution system. A redundant parallel main shall be required to close the loop within the development and shall be extended as necessary to connect to other

distribution mains within the zone. All plans for water distribution mains adjacent to zone split boundaries shall be reviewed and approved by the City.

6.4 CONSTRUCTION

6.41 PRESSURE TESTING

Pressure testing of new mains shall be by the contractor per MAG Specifications. All testing must be witnessed by the City right-of-way inspector.

6.42 CHLORINATION

Chlorination and flushing of new mains shall be performed by the contractor per Section 6.6. All expenses associated with chlorination and testing shall be paid for by the contractor.

6.43 EXISTING WATER SYSTEM FACILITY IMPACTS

A. Water Service Lowering and Extensions; Relocation of Meters: and Sewer Lateral Adjustment:

   1. Contractor shall do all work including meter disconnects and reconnects.

   2. Service material to be copper and service to be placed “below sub-grade”.

   3. Contractor’s representative to handle water customer notification.

B. Fire Hydrant Set-Backs and Water Main Relocations to Eliminate conflicts: Work to be done by contractor. Only a City Valve Operator shall operate valves, and chlorination and testing requirements shall apply.

C. Switchovers and Abandonments: work will be done by Contractor after authorization by the City Engineering Division or Water Services Department.

6.5 CHLORINATION OF NEW WATER MAINS

The City of Glendale requires that all contractors adhere to the following standards of new main disinfection to prevent contamination of the City’s potable water system. The following outline provides the disinfection procedures that must be applied to all new mains before placing them into service. They are based on standards recommended by the American Water Works Association (AWWA) and mandated by the Maricopa Association of Governments (MAG).

Any water line 2-inches or larger is subject to pressure testing, chlorination, and bacteriologic testing. Alternative testing and chlorination methods could be authorized by

the City, due to field conditions, for new water lines and appurtenances up to 60 feet in length.

6.51 FLUSHING

A. All mains shall be cleared of all debris and soil that may have accumulated during construction prior to starting the disinfection process. The most practical way to achieve this it to flush the main.

B. Fill the main with fresh water from the distribution system and flush at a velocity of 2.5 feet per second. Continue flushing using a unidirectional method only until the volume of the main is replaced at least three times. Only one valve to the existing distribution system must be open at a time. Only City Water Services employees may operate the valve. No flushed water may enter the city's right-of-way. This water must remain onsite or be flushed into a water truck.

6.52 DISINFECTION OF MAINS AND FIRE LINES INCLUDING FEEDER LINES TO HYDRANT

A. The following methods of chlorination may be used, subject to the approval of the Construction Engineering Inspector.

- Liquid chlorine gas-water mixture
- Direct chlorine feed
- Calcium or sodium hypochlorite and water mixture

B. For the purpose of disinfection/sampling:

1. The number of sampling locations shall be as follows: Waterlines up to but less than 150 feet in length require one sampling riser installed as near the end as possible; lines 150 to 300 feet in length, two sampling risers, one near each end of the line; lines 300 to 3,000 feet in length, a minimum of three sampling risers.
2. Each riser is to be flushed to ensure the chlorine solution contacts all portions of the pipe.
3. Chlorine will be applied at a minimum concentration of 50 mg/L for the 24 hour disinfection period. This minimum concentration is to be present at all risers.
4. This high-strength chlorinated water shall be retained in the main for 24 hours, during which time all valves and hydrants in the treated section shall remain closed as to allow isolation of the main.
5. At the end of the 24 hour period, the treated water in all portions of the main shall have a minimum concentration of 20 mg/L chlorine prior to

flushing for bacteriological testing. COG employees will very this concentration.

6. After confirmation of the 20 mg/L minimum chlorine residual, the water in the main shall be flushed from the main until measurements show that the chlorine levels leaving the main is similar to the chlorine levels in the distribution system (0.8-1.5 mg/L). There shall be a 24-hour waiting period before taking the first sample. The chlorine concentration must be greater than 0.2 mg/L and less than 2.0 mg/L before sampling can begin.

7. It is recommended that contractors bag the sampling risers to prevent any unnecessary contamination of usage of the riser. The riser should stay bagged until after all bacteriological sampling is completed.

6.53 BACTERIOLOGICAL TESTING AND ACCEPTANCE

A. After disinfection and flushing are completed, the City's water quality lab or a City employee designated by the lab will obtain the first set of samples from each riser. The second set of samples will be obtained 24 hours later.

B. No water will be drawn from any portion of the main until the testing period is complete and the City releases the main. This requires 5 days from the time when the first set of samples are obtained.

C. The requirements for acceptance are:

1. The main must be free of coliform bacteria and shall have less than 500 cfu/ml heterotrophic bacteria (HPC) throughout the 48 hour sampling period.

D. If these standards are not met, the main shall be re-flushed, re-chlorinated and re-sampled as stated above.

E. The initial 2-day testing of new water mains will be performed free of charge. Subsequent testing will be charged according to the current fee schedule.

CHAPTER 7

SEWER MAIN DESIGN AND CONSTRUCTION

7.1 GENERAL INFORMATION

7.11 SEWERAGE SYSTEM

A. All developments are required to connect to the City's or a private wastewater provider's sewerage system. On-site disposal systems are not allowed. Exceptions are made only with the written approval of the City Engineer. Septic systems for custom homes will be allowed if tying into the city's nearest sewer main is cost prohibitive. A letter from the City Engineer allowing a septic system will be required for a septic system permit from Maricopa County Environmental Services Department.

B. The City's sewerage system includes various classifications of sewer lines which are determined by use. A "building sewer service" is a pipe conveying sewage from the plumbing system of a single building to a "lateral sewer main". A "lateral sewer main" collects discharges from individual buildings to a "branch sewer" and has no tributary lines other than building sewers. "Branch sewers" convey discharges to larger "trunk sewers" which in turn convey flows from large areas to treatment facilities.

C. All developments shall provide for all categories of sewer lines required to provide sewer service for not only the individual development but for the ultimate service area, as deemed necessary by the City Engineer.

D. Sewer lines shall be sized to accommodate their ultimate service area. The minimum size line for the public mains is 8-inch diameter.

E. Public sewage lift stations are discouraged and are allowed only under unusual circumstances with the approval of the City Engineer and the Water Services Department.

F. A sewerage feasibility report shall be required to determine that the current line has the capacity for connection and that the minimum slopes will allow for the installation of services to each parcel.

G. All lateral sewers shall be a minimum of 8-inch diameter. Larger mains may be required depending upon the maximum flows anticipated with full development of the ultimate service area. The following data may be used as a general guide for planning purposes. Additional engineering studies may be required in individual cases to verify validity of these general capacities:

1. A maximum of 120 acres of combined commercial and residential property may drain into any 8-inch line.

2. A maximum of 250 acres of combined commercial and residential property may drain into any 10-inch line. A 10-inch line may be used between 120 and 250 acres.

3. A maximum of one square mile may drain into a 12-inch line with the written approval of the City Engineer. A 12-inch line may be used for between 250 and 640 acres.

H. Sewer studies shall follow the City of Glendale's design criteria. The design criteria are available from the Water Services Department.

I. Public sewer mains designed or installed at less than minimum slopes are not allowed unless approved by the City Engineer. A 20-year maintenance fee shall be paid by the developer as part of the development fees.

J. All construction shall follow MAG Standard Details and Specifications and these Engineering Design and Construction Standards.

7.2 WASTE CONTROL

7.21 All developments shall provide for waste control per the following standards:

A. Laundry Room Facilities

1. Laundry rooms with ten or more washing machines shall be equipped with a 350 gallon lint interceptor, Smith Pre-Cast or approved equal. See Detail G-710.

2. No wastes other than those requiring treatment or separation shall be discharged into the lint interceptor.

3. Each interceptor shall be properly vented and shall have a clean out on the discharge pipeline.

4. For outside installations, the interceptor shall be elevated three (3) inches above existing grade to exclude surface water.

5. The interceptor shall be located as to be readily and easily accessible for cleaning and inspection.

B. Commercial Developments

1. Interceptors are required:

   a. Grease, oil, or sand interceptors shall be provided for laundries, restaurants, service stations, auto repair shops, car washes and other facilities when the City determines they are necessary for the proper handling of liquid wastes containing grease or oil in excessive amounts of any flammable wastes, sand, and other harmful ingredients.

   b. All interceptors shall be of a type and capacity approved by the City and shall be located as to be readily and easily accessible for cleaning and inspection.

   c. Grease and oil interceptors shall be constructed of impervious materials capable of withstanding abrupt and extreme changes in temperature. They shall be of substantial construction, watertight, and equipped with easily removable covers. When bolted covers are required, they shall be gas tight and watertight.

   d. All grease, oil, and sand interceptors shall be maintained by and at the expense of the owner in continuously efficient operation at all times.

C. Industrial Developments

1. Preliminary treatment facilities: Where necessary, and as determined by the City, any user of the sewer system shall provide, at their expense, such preliminary treatment as may be necessary to reduce objectionable characteristics or constituents to within the maximum limits provided for in the Glendale City Code, Chapter 33. Plans, specifications, and any other pertinent information relating to proposed preliminary treatment facilities shall be submitted for the approval of the City's Pretreatment Program Manager. No construction of such facilities shall be commenced until the City's Pretreatment Program Manager's approval is obtained in writing.

The completed facilities shall not be placed in service until they have been inspected for conformance to the approved plans and the final construction approved by the City's Pretreatment Program Manager. The approval of the plans and inspection of construction shall not relieve the owner from complying with discharge limitations set forth in the Glendale City Code, Chapter 33. The City shall enforce Federal pretreatment requirements as set forth in the Code of Federal Regulations, Title 40, Part 403.

2. Cross-connections are prohibited: No person shall connect to the City water system any water operated equipment or mechanism, or any water treating chemical or substance, if it is determined by the City that such equipment, mechanism, chemical or substance may cause pollution of the domestic water supply. Such equipment or mechanism may be permitted only when equipped with a backflow prevention assembly approved by the City's Building Safety Division.

3. Control vaults are required:

   a. When required by the City, the owner of any property served by a building sewer carrying potentially harmful or other industrial wastes shall install an industrial waste control vault in the building sewer to facilitate observation, measurement and sampling of the wastes. Such control vault, when required, shall be accessible and safely located and shall be constructed in accordance with plans approved by the City's Pretreatment Program Manager. The control vault shall be installed by the owner at his expense and shall be maintained by him so as to be safe and accessible at all times. The sampling vault shall be installed on the owner's property as close to the public right-of-way as to allow reasonable access for City personnel and yet installed within the limits of the manufacturer's requirements. After the installation is complete, the owner shall provide the City's Pretreatment Program Manager with necessary keys to access the vault.

   b. Where required, vaults will be constructed to Detail G-740 and the following standards:

      1) All concrete for the floor, walls and top slab of the structure shall conform to MAG Standard Specification Section 725, Class A, with a minimum 28 day compressive strength of 3,000 psi.

      2) All concrete for the grout fillet inside the structure shall conform to MAG Standard Specification Section 725, Class C, with a minimum 28 day compressive strength of 2,000 psi.

3) All steel reinforcement shall be deformed bars, Grade 60, billet steel conforming to ASTM Specification No. A-615, latest edition.

4) Flume size should be based upon minimum and maximum flow rates and velocities to insure free-flow conditions. Maximum flow shall be 70 – 100% of maximum capacity of selected flume size. A minimum flow depth of 0.5 inches should exist at the minimum actual flow.

5) Flume floor elevation should be high enough, relative to the downstream conditions, to prevent submerged flow (50% submergence is acceptable at maximum flow). Install the flume level with the floor longitudinally and transversely in the converging section.

6) Upstream flow should be wave free, non-turbulent, symmetrical and have a uniform velocity 91 fps minimum to 3 fps maximum) at least 10 times flume throat in length in the approach channel. Bends in the outlet or inlet pipe will not be permitted for a distance of 25 pipe diameters up and down stream.

7) It shall be the owner's responsibility to properly maintain the flume in accordance with the manufacturer's recommendations to insure the accuracy of the measurement.

c. Industries included in, but not necessarily limited to, the following list shall install a control vault in the building sewer. Final interpretation in case of questions on the list below will be made by the City's Pretreatment Program Manager.

- Adhesives manufacturing
- Aluminum forming
- Asbestos manufacturing
- Battery manufacturing
- Carbon black manufacturing
- Coil coating
- Copper forming
- Electrical and electronic components manufacturing
- Electroplating
- Feedlots
- Ferroalloy manufacturing
- Fertilizer manufacturing
- Foundries (metal molding and casting)
- Glass manufacturing
- Grain mills
- Hospitals
- Ink formulating
- Inorganic chemicals manufacturing
- Iron and steel manufacturing
- Laundries
- Leather tanning and finishing
- Mechanical products manufacturing
- Metal finishing
- Metal molding and casting (foundries)
- Nonferrous metals manufacturing
- Paint formulating
- Pesticides chemicals manufacturing
- Petroleum refining
- Pharmaceutical manufacturing
- Porcelain enameling
- Printing and publishing
- Pulp, paper and paperboard manufacturing
- Rubber manufacturing
- Soap and detergent manufacturing
- Steam electric power generating
- Sugar processing
- Tars and asphalt paving and roofing materials manufacturing
- Textile mills
- Timber products processing

7.3 TECHNICAL DESIGN REQUIREMENTS

7.31 PUBLIC SEWER LINES

A. Materials and Details

1. For service mains in City right of way or in a dedicated easement, standard materials for mains and services shall be either vitrified clay pipe (VCP) or solid wall, SDR35, polyvinyl chloride (PVC) pipe. Ductile iron pipe with internal corrosion resistant epoxy coating shall only be used when meeting the requirements of MAG Standard Detail 404. Materials and details for sewer mains of 18-inch diameter or larger will be considered individually.

2. Pavement replacement type shall be indicated on each sheet. All trench bedding and backfill shall be per City Detail G-690.

3. Private on-site sewer lines shall be constructed of materials and at slopes as specified in the Uniform Plumbing Code as adopted by the City.

B. Slopes

Slopes shall be sufficient to maintain velocity of 2.5 feet per second in the sewer at the design flow rate. The maximum velocity shall not exceed 9 feet per second. The following table indicates the minimum slopes generally considered necessary to obtain minimum 2.5 feet per second. Exceptions to these slopes and in cases where the minimum slope cannot be met, upsizing to the next pipe size will not be allowed.

Design Slopes for Sanitary Sewers in the Right-Of-Way (n = 0.013)		
Size	Minimum Design Slope	Maximum Design Slope
4 in. Building Connection	0.0200 ft/ft	n/a
6 in. Building Connection	0.0100 ft/ft	n/a
8 in. Sewer Main	0.0053 ft/ft	0.0535 ft/ft
10 in. Sewer Main	0.0039 ft/ft	0.0397 ft/ft
12 in. Sewer Main	0.0031 ft/ft	0.0312 ft/ft
15 in Sewer Main	0.0016 ft/ft	0.0231 ft/ft
18 in. Sewer Main	0.0012 ft/ft	0.0182 ft/ft

The goal is to limit velocities to 8 feet per second (fps). If steeper slopes are required to match grade, drop manholes should be used on the line so that the above slopes are not exceeded. Drop manholes shall conform to MAG Standard Detail 426.

C. Location Within the Right-of-Way

1. Sewer lines shall be offset 6 feet of centerline (except major arterials and arterials). Curved sewer mains will not be allowed

2. All sewers shall be parallel to the property lines or center lines, or as close to parallel as possible.

3. Minimum horizontal distance from the sewer line to another underground utility shall be 6 feet.

4. In some cases, public sewers may be authorized outside of public rights-of-way. In these cases, sewers shall be installed within an exclusive dedicated 20-foot wide sewer easement.

5. All sewer main stub-outs, end of sewer service lines, and sewer force mains where there is a change in direction, shall be located by electronic marker of the 3M, “Magic Ball” type, or equivalent.

D. Cover and Depth

1. All sewer services shall have a minimum of 4 feet of cover measured from finished ground at the property line or edge of easement.

2. All laterals, mains, or branches shall have a sufficient depth to service the ultimate drainage area with a minimum cover of 4 feet. At manhole locations, the sewer main shall have a minimum of 5 feet of cover.

3. When a sewer line crosses an irrigation ditch, at least 3 feet of cover between the flow line of the ditch and the crown of the sewer shall be maintained.

4. Under no conditions will sewer mains have less than 4 feet of cover.

E. Pipe Bedding and Backfill Requirements

The bedding and backfill requirements for all sewer lines within the City of Glendale right-of-way or easements shall be constructed per City of Glendale Standard Detail G-690, MAG Section 601 and Section 5.21.D of these standards. All other specification sections of MAG Section 601 shall remain the same.

F. Intersecting Lines

1. Lateral sewers may have a maximum of 12-inch drop (flow line to flow line) without a drop connection.

2. When the pipe size changes, the spring lines or crowns shall match.

3. Manholes with the through line having a change of direction of more than 45 degrees shall have a minimum 0.10 foot drop through the manhole.

4. Manholes with a line intersecting the through line: the intersecting line invert shall be 0.10 foot above the flow line of the through line. The lines shall intersect at no more than a 90 degree angle.

5. Where water and sewer mains cross, MAG Standard Detail 404 shall apply.

G. Tie-in to an Existing System

Construction plans shall call for contractor to tie-in new work to the existing, active system only after completion of the new work and specific approval of the Construction Engineering Inspector to make the tie-in. An additional odor-control manhole may be required when the existing line has odor problems.

The odor control manhole shall be located in the right-of-way. An odor control device will be installed and maintained by City of Glendale forces.

7.32 MANHOLES

A. Materials and Details

All manholes shall be 5 feet in diameter and per MAG Standard Details and Specifications. Manhole frames and covers shall be Class 35 and their weights and dimensions shall be in accordance with details shown in MAG Standard Detail 424 and COG Standard Detail G-704. Manholes constructed within the City shall not contain built-in steps. The interior of all manholes shall be coated with Sewer Shield 100, Ravon 405, Sauereisen, or other approved corrosion resistant coating or lining. Manholes bases shall be poured on a 6-inch thick base of MAG ABC compacted to 95% standard proctor. At the point where pipes connect to manholes, the pipe bedding material shall extend to, and around the manhole, maintaining the same thickness, to form a "collar" around the manhole. Pre-cast manhole bases are not allowed in Glendale.

B. Spacing

1. Manholes are required at all changes in slope, alignment, or pipe material.

2. Maximum manhole spacing shall be:

PIPE SIZE	MAXIMUM MANHOLE SPACING
8-inch or 10-inch	400 Feet
12-inch to 21-inch	500 Feet
24-inch or larger	600 Feet

3. Cleanouts are not allowed on city sewer mains. If there are services between the last manhole and the end of the line, a manhole shall be required at the end of the line.

4. Manholes on boundaries of the subdivision or improvement district shall have stubs with shaped inverts in appropriate directions for future connections.

5. A sewer manhole shall be required at the upstream end of a cul-de-sac. All manholes shall be located in such a manner as to provide easy access for the City's combination jetter and vacuum trucks.

6. All manhole bases must be formed. Pre-cast manhole bases are not allowed.

7. Connections into a manhole for a lateral pipe shall be accomplished by coring. Jack hammering is not allowed.

7.33 TAPS

A. Taps

1. All taps into a sewer main or into a manhole will be performed by a licensed contractor at the expense of the developer.

2. No wet tap shall be made without a City Water Services representative present. Prior to all taps, the City's Construction Engineering inspector will contact the Water Services Department no less than 24 hours prior to tapping.

B. Materials and Details

1. New sewer taps shall be per MAG Standard Details 440 and 441.

2. The maximum number of taps into manholes shall be three (3) for a manhole in a cul-de-sac and two (2) into a manhole in all other situations. No tap will be allowed into a manhole against incoming flow through the manhole.

3. A 3-foot minimum separation between service taps is required.

4. All taps shall be stationed using the closest downstream manhole as Station 0 + 00.

5. All taps, when installed, shall be perpendicular to the lateral or at an angle with the flow. Taps may also be at an angle if located into a manhole.

6. No taps will be made directly into 12-inch or larger sewers. Such taps must be into an existing manhole or the developer shall install a new manhole at his expense.

7. Plans shall be reviewed for backflow prevention valves which are required where finish floor elevations are below both upstream and downstream manhole rim elevations. When a backflow prevention valve is required, the owner of the property will be responsible for maintaining the backflow valve.

8. The owner will be responsible for the sewer service line from the main to the building or service facility.

9. No sewer taps will be allowed between the sewer trunk and the odor control manhole.

10. An odor control manhole and device may be required when tapping into an existing line with odor problems. The odor control manhole shall be installed by the developer and maintained by the City's Water Services Department.

C. Sizes

1. Tap sizes for single family residential lots shall be 4-inch and shall be provided for each platted lot.

2. Commercial lots with buildings shall have 6-inch minimum taps and provide service adequate for discharge.

3. Multi-family developments shall have a minimum 6-inch tap.

4. All taps larger then 6-inch require the installation of a manhole at the sewer main.

D. Location

1. Taps shall be located as shown on Detail G-643.

2. Proposed tap locations shall be shown on all plans and shall only be changed in the field if written approval is obtained from the City. Any change shall be noted on the as-built plans.

3. All sewer taps shall be located with an electronic marker of the 3M "Magic Ball" variety, or equivalent. The marker balls shall be placed per MAG Standard Detail 440.

7.4 TELEVISED INSPECTION

7.41. All newly installed sewers shall be inspected by closed circuit television methods acceptable to the City. Any defects discovered during televised inspection shall be corrected at no cost to the City. After correction of defects has been completed, affected sewer sections shall be re-televised, at no cost to the City. Video tapes or CDs of all televised inspections shall be provided to the City prior to final acceptance of the sewers. Televising of sewer mains by closed circuit methods acceptable to the City shall occur after the street has been paved and the manhole frames have been adjusted to grade.

CHAPTER 8

RECORD DRAWING REQUIREMENTS

NOTICE: *RIGHT-OF-WAY CONSTRUCTION RELEASES OR BUILDING CERTIFICATES OF OCCUPANCY WILL NOT BE ISSUED NOR ANY TYPE OF CONSTRUCTION ACCEPTED UNTIL CERTIFIED AS-BUILT PLANS HAVE BEEN SUBMITTED AND APPROVED BY THE CITY.*

8.1 SUBMITTALS

8.11 PLATS

Approved plats shall be submitted in AutoCAD format (DWG), scanned "TIF" or "PDF" format, and on reproducible mylar (24" x 36", 4 mil thickness), and be of a quality allowing clear reproduction. In lieu of the mylars, the City will accept a 24" x 36" paper copy of the recorded mylar. No vellums will be accepted.

8.12 SUBDIVISION AND SITE IMPROVEMENT PLANS

A CD containing complete improvement base file(s) in AutoCAD DWG format shall be submitted at the time of City plan approval. AutoCAD files will include, but not be limited to, water, wastewater, storm drain, street centerline, right-of-way, curb and gutter, easements, and building foot prints (commercial sites only).

8.13 AS-BUILTS

As-Built plans shall be submitted as a scanned "TIF" or "PDF" format and on a paper copy (24" x 36") to be of quality that allows for reproduction. No vellums will be accepted.

All signature blocks must be signed prior to submitting As-Built plans.

8.14 CERTIFICATION

A "Record Drawing Certification" statement on the cover sheet of the As-Built plans shall be signed and sealed by a Registered Professional Engineer or a Registered Land Surveyor. The Drywell Certification shall be signed by a representative of the drywell drilling company.

8.2 MINIMUM TECHNICAL REQUIREMENTS

8.21 PAVING PLANS

A. Station for all grade breaks.

B. Back of curb offset dimension at all changes in alignment.

C. Top of curb, gutter and pavement centerline elevations at all grade breaks, curb returns, valley gutters, plus any other location necessary to adequately show drainage.

As-Built plans need to note any deviation from proposed plans and be of a quality allowing legible reproduction.

D. Survey monuments – installation and accuracy certification.

E. Right-of-way limits.

8.22 IRRIGATION AND STORM DRAIN PLANS

A. Street centerline station and offset dimension to the main at all changes in alignment and/or changes in grade.

B. Street centerline station and offset dimension to all structures and changes in alignment.

C. Top and invert elevations for all structures.

D. The irrigation or storm drain pipe material, diameter, and length that actually were installed shall be shown on as-built plan and/or plan and profile sheets. Pipe material information shall also be shown on the cover sheet adjacent to material quantity lists.

8.23 GRADING AND DRAINAGE PLANS

A. Elevations at all drainage control points (i.e. retention overflow point, tops and bottoms of retention basins, drywell rim, valley gutters, top of curbs, perimeter property boundary).

B. Dimensions of all retention areas.

C. Retention calculations revised to as-built condition – volume provided must equal or exceed the City mandated volume for the 100-year, 2-hour event. Record Drawing Certification is required. The City reserves the right to ask for the calculations, procedures, and the survey data used to produce the As-builts and certify the retention volumes.

D. Finished floor and pad elevations. Finished floor elevations within the SFHA require a FEMA accepted Elevation Certificate before certificate of Occupancy.

E. Location of all structures (i.e. buildings).

8.24 WATER PLANS

A. Street centerline station and offset dimension to:

1. All fire hydrants, fittings and valves.
2. Main at all changes in alignment.
3. All horizontal control points (i.e. centerline intersects, PC, PT).

B. Station and elevations given at all vertical alignment changes.

C. Centerline station and offset to each service tap: size of tap and dimension to nearest side property line. (**NOTE:** *At least 50% of the front property corners must be visible to verify information for approval.*)

D. Note centerline station, offset and elevations to all changes in vertical alignment (i.e. dips, bends, etc.) required to avoid conflicts with other utilities.

All taps, valves, hydrants and manholes must be stationed and/or tied in a manner to allow accurate mapping.

E. The water pipe material, diameter, and length that were actually installed shall be shown on as-built plan and/or plan and profile sheets. Pipe material information shall also be shown on the cover sheet adjacent to material quantity lists.

8.25 SEWER PLANS

A. Street centerline station and offset dimension from street centerline to main at manholes and all changes in alignment.

B. Sewer line station at centerline of each manhole.

C. Rim and invert elevation for each manhole.

D. Calculated slope between manholes.

E. All taps shall be stationed using the closest downstream manhole as station 0+00 for taps at 90° to main, if not installed 90° to main, station and offset to end of each service tap. (**NOTE:** *At least 50% of front property corners must be visible to verify information for approval*).

F. All taps into manhole shall be dimensioned from a property line (service line locations at ROW from nearest property line).

G. The sewer pipe material, diameter, and length that were actually installed shall be shown on all plan and/or plan and profile sheets. Pipe material information shall also be shown on the cover sheet adjacent to material quantity lists.

As-built plans shall denote the diameter, length, and material for all installed pipes.

8.26 AS-BUILT RECORDS

The City of Glendale assumes no responsibility for the accuracy of as-built information provided as a public record.

8.3 ELECTRONIC SUBMITTAL REQUIREMENTS

8.31 COMPACT DISC (CD) REQUIREMENTS

A CD containing AutoCAD drawing files will be required for plats, subdivision site improvement and As-Built plans. The CD shall be labeled with the following:

- Project Name

- Date
- Location
- Engineering Firm
- City of Glendale Project Number
- Description of Files

FIGURE 8.1 – CD Format for Electronic Plan Submittal

8.32 MODEL SPACE/PAPER SPACE

A. **Model Space:** All CAD as-built line work is to be created in model space.

B. **Paper Space:** CAD work in paper space is for Page Layout, Title Block, Notes, Legend, and other text.

8.33 COORDINATE SYSTEM AND UNITS

A. **Coordinate System:** CAD drawings site/civil base models supplied will be created in relation to its geographic location. Use the Arizona State Plan Coordinate system, FIPSZONE 0202, North American Datum 1983.

B. **Units:** International Feet (0.3048 meters) will be used to ensure consistency with the current City of Glendale files.

8.34 GEODETIC TIES

All CAD drawings (model space) will be referenced to at least two accepted geodetic control points which must be part of the Maricopa County Geodetic Densification and Control Survey (GDACS) control network published through the Maricopa County Department of Transportation (MCDOT).

8.35 X REFERENCES

The City would prefer that X references NOT be used to help expedite the as-built process. If X references are used, each drawing will need to be opened prior to sending to verify the X references will load properly.

8.36 REFERENCES INFORMATION

Ensure that all non-related CAD structures such as empty layers, unused blocks, line types, dimension styles, plot styles, text styles, shapes, etc. are purged from the files. As-Builts will not be accepted without adherence to this standard.

8.37 FONTS

The use of standard AutoCAD fonts and shapes is required. Non-standard fonts and shapes must be transmitted with the drawings in the original file format in a separate “Fonts” subdirectory.

8.38 BLOCKS

All blocks or symbols will include a single point feature. If block attributes are used, the block attributes structures and block nesting should be included in the transmittal.

SITE DEVELOPMENT AND CONSTRUCTION

9.1 GENERAL INFORMATION

All new developments shall provide for vehicle parking, refuse collection, Fire Department access, landscaping, waste control, on-site water and sewer systems, and on-site storm water retention per the following standards and as approved through the design review process.

9.2 REFUSE COLLECTION ENCLOSURES - DESIGN & CONSTRUCTION

9.21 SANITATION SERVICES

The City provides a wide variety of sanitation services for residential and commercial business. The City requires that all refuse be collected and disposed of a minimum of once a week. Refuse collection services are provided to multiple dwellings, including apartments, condominiums, townhouses, mobile home parks, trailer parks, rooming houses, boarding houses and restaurants twice a week. Private contractors are also permitted to service businesses within the City of Glendale, but must have a valid City permit to operate in Glendale. For information on schedules and collection fees, contact the Sanitation Division at 623-930-2660.

9.22 CONTAINER ENCLOSURE REQUIREMENTS

All service and construction of enclosures will be in accordance with Maricopa County Health codes. Health codes can be obtained by calling the Maricopa County Health Department. All container enclosures must be constructed according to the standards herein and must be designed to accommodate front-loading sanitation collection vehicles. The construction of refuse container enclosures will be inspected by the City of Glendale Solid Waste Division. Enclosures are subject to reconstruction at owner's expense if standards are not met.

9.23 CONSTRUCTION STANDARDS

All developments shall provide areas for refuse containers per the following standards:

A. Single-Family Subdivisions

Refuse and recycling must be placed at the curb in approved containers provided by the City. Collection for both containers is on the same day. Arrangements will be made for distribution of Rules and Regulations to citizens concerning container usage.

B. Multi-Family Developments

1. Sanitation collection services will be provided by the City of Glendale. Refuse containers two (2), three (3), four (4), six (6), and (8) cubic yards will be provided by the City.

2. The developer must construct a concrete pad and apron for each required container as shown in Detail G-934 and Table 9.1. All enclosures will include a concrete approach apron of 6-inch thick rebar-reinforced concrete extending 12 feet out from the front edge of the enclosure and extend to the outside edges of the enclosure walls. The concrete approach apron at the front of the enclosure must be at an elevation matching the adjacent asphalt and graded to provide positive drainage and must not exceed a 3% slope. Detailed grades and slopes must be denoted on the Grading and Drainage Plans for the site. The City will not be responsible for repairing any damage to the pavement within the development during normal collection activities.

Enclosure Type	Concrete Pad Dimensions	Concrete Apron Dimensions
Single	12' Wide x 10' Deep x 4" Thick	13'4" Wide x 12' Deep x 6" Thick
Double	24' Wide x 10' Deep x 4" Thick	25'4" Wide x 12' Deep x 6" Thick
Triple	36' Wide x 10' Deep x 4" Thick	37'4" Wide x 12' Deep x 6" Thick
Restaurants	16' Wide x 10' Deep x 4" Thick	17'4" Wide x12' Deep x 6" Thick

1. Concrete pad dimensions stated are all inside dimensions.
2. Concrete apron to extend to outside edges of enclosure wall.
3. Apron to be constructed of rebar reinforced concrete.

TABLE 9.1 – Container Enclosures: Concrete Pad & Apron Requirements

3. All multiple container enclosures must be constructed on the same side of the driveway or the private street so the collection truck may be routed through the site in one direction only. Multiple container enclosures must have horizontal fronts, not staggered fronts. If the collection truck provides service in a manner perpendicular to the enclosure, then containers must be on casters. If a straight approach is provided, then they do not need casters.

4. The driveway or private street, along which the container enclosure is located, must provide access through the site or provide a turning radius (52.5 feet minimum) that meets Detail G-954.

5. In order for trucks to back up safely, container enclosures must be free from obstructions for a distance of 54 feet. A 25 foot clearance of overhead obstructions is necessary where the truck will lift and empty the container. Other ground obstructions include speed humps and manhole covers which must be 20 feet away from either side of the enclosures concrete pad. Low landscape elements are used on the sides and back to screen the container enclosures.

6. Container enclosures must be gated if visible from a public street. Gates must be made of metal or similar type material (no wood or chain link fence) and must be the same height as the enclosure wall. Gates must be hinged to the bollards that are installed at the outside front of each wall. Gates are to have cane bolts installed on the outside of gates, a minimum of 3 feet in length which lock in an open position at or past 90 degrees. Cane bolts must have at least 3" sleeved in the concrete slab in both the

open and closed positions. The cane bolts must have weld tabs so they cannot be removed from gate sleeve.

C. BUSINESS/INDUSTRIAL DEVELOPMENTS

1. Refuse containers may be provided by the City. Size of container(s) and frequency of collection will be determined by the City in cooperation with the customer.

2. Sizes and Facilities:

   a. Sizes: Available sizes of front loading containers are listed in Table 9.2. Specialized container serviceability options may be considered where applicable.

Size	Available with Casters
2 cubic yard	YES
3 cubic yard	YES
4 cubic yard	YES
6 cubic yard	NO
8 cubic yard	NO

TABLE 9.2 – Front Loading Container Sizes

   b. Concrete Pad & Approach: The developer must construct a concrete pad for each required container enclosure, as shown per Detail G-934 and Table 9.1. All refuse enclosures will include a concrete approach apron of 6-inch thick rebar-reinforced concrete extending 12 feet out from the front edge of the enclosure. The concrete approach apron at the front of the enclosure must be at an elevation matching the adjacent asphalt and graded to provide positive drainage and must not exceed a 3% slope. Detailed grades and slopes must be denoted on the Grading and Drainage Plans for the site. The City will not be responsible for repairing any damage to the pavement within the development during normal collection activities.

   c. Restaurants Only: Container enclosure(s) must meet all requirements and shall provide a separate containment area a minimum of 4 feet wide if other items such as grease cans, soft drink cylinders or plastic trays are placed inside enclosure.

   d. Location of Enclosure/Concrete Pad: All container enclosures must be located on the same side of the driveway or the private street at an

angle of 20 to 90 degrees to centerline so collection trucks may be routed through the site in one direction only. Refuse enclosures which are visible from any public street must be walled and gated as specified in paragraph 9.23.B.6 above and per Detail G-934.

1. Container enclosures will not be constructed at a dead end street unless there is a turning radius of 52.5 feet.

2. Roll off container(s) must be located such that the containers may be rolled on/off the transport truck. This requires a concrete pad area, as shown per Detail G-936, 15-feet wide x 64-feet deep x 6-inches thick rebar-reinforced parallel with the driveway, which gives adequate room in the front for the transport truck to maneuver.

3. Compactors: The compactors electrical and hydraulic hook-ups must be installed on the driver's side of the pad toward the front.

9.3 PARKING LOT - DESIGN & CONSTRUCTION

9.31 PARKING SPACES

All developments shall provide for on-site vehicular parking. The number of parking spaces required for each development shall be in accordance with the City's Zoning Ordinance.

9.32 PARKING SPACE AND DRIVE AISLE DIMENSIONS

A. **Parking Space Dimensions:** All parking spaces shall be 10-feet x 20-feet for 90 degree parking. Of this, a minimum of 10-feet x 18.5-feet shall be pavement, except handicapped spaces (see Section 9.33.B). For 60 degree angle parking or less, 9-foot wide stalls are acceptable.

B. **Drive Aisle Dimensions:** All parking areas (except single-family residential) shall provide adequate area to maneuver in and out of parking spaces without vehicle backing into or across public right-of-way, including alleys. The minimum drive aisle width for 90 degree angle parking is 23 feet. Drive aisle width for other angles of parking varies, but a 20-foot width is the minimum allowed where Fire Department access is required.

C. **Parking Overhang:** The front of a parking space is allowed to overhang 1.5 feet onto landscaped areas or a sidewalk if vertical curb or pre-cast curbs are provided. If the parking space overhangs a sidewalk, the sidewalk shall be wide enough to maintain a minimum 4-foot clear walkway. Parking spaces shall not encroach into public right-of-way or roadway easements.

D. Parking Adjacent to Walls: Parking spaces adjacent to walls shall be configured with sufficient space that vehicles cannot make contact with the wall.

9.33 HANDICAP PARKING FACILITIES

Federal and State legislation has created the "Americans with Disabilities Act" (ADA) which establishes strict requirements for handicapped person accessibility. Where the provisions of this Chapter and Federal or State laws differ, the more stringent requirements shall apply.

A. Number of Handicap Spaces Required

1. Multi-Family Residential: The International Building Code establishes the number of handicapped accessible units required based on the total number of dwelling units in the development. The development shall provide one (minimum) handicapped parking space for each required handicap living unit. These parking spaces shall be located as near as possible to the living unit to which they are assigned.

2. Commercial/Industrial: All new developments shall provide for handicap parking spaces per the following table:

Total number of parking spaces provided in the lot			Required minimum number of handicap parking spaces
1	to	25	1
26	to	50	2
51	to	75	3
76	to	100	4
101	to	150	5
151	to	200	6
201	to	300	7
301	to	400	8
401	to	500	9
501	to	1,000	2% of total spaces
1001 and over			20 plus 1 for each 100 spaces over 1,000

TABLE 9.3 – Commercial/Industrial Handicap Parking Space Requirements

3. Location: These parking spaces shall be located so as to provide the most convenient access to the proposed facilities.

B. **Handicap Space Dimensions:** The minimum required depth shall be 20 feet. At a minimum, each handicap space shall consist of a space 8 feet wide with a striped adjacent access lane of 5-foot width. The International Building Code requires that one in every six (6) accessible spaces, but not less than one, shall be "van accessible" which consists of an 8-foot parking space with an adjacent, striped, 8-foot wide access lane or an 11-foot parking space with an adjacent, striped, 5-foot wide access lane.

C. **Marking Handicapped Spaces:** Each parking space for physically disabled persons shall be painted with a wheelchair symbol, an access aisle and posted with a permanent sign located not less than three (3) feet but not more than six (6) feet above grade and of a color and design approved by the Arizona Department of Transportation bearing the internationally accepted wheelchair symbol, the caption "RESERVED PARKING" and C.O.G. Sec. 26-3. Van accessible spaces must have a "VAN ACCESSIBLE" sign below the normal handicap sign, if the van accessible space is 8 feet wide.

D. **Handicapped Access Ramps:** All parking areas shall provide access ramps for the handicapped. Ramp slopes will be the least possible and in no case shall any ramp be steeper than one vertical to twelve horizontal (1:12). The minimum clear width of any ramp shall be 36 inches.

9.34 PARKING LOT SURFACES

A. Multi-Family Residential

1. All parking areas shall be constructed to a minimum thickness of either 5 inches of portland cement concrete on compacted native, or a minimum of 2 inches of asphaltic concrete pavement over 6 inches of aggregate base course.

2. Public water mains and valves shall not be located under concrete pavement, unless written approval is given by the City Engineer.

B. Commercial/Industrial

1. All parking areas shall be constructed to a minimum thickness of either 5 inches of portland cement concrete, or a minimum of 2 inches of asphaltic concrete over 6 inches of aggregate base.

2. Public water mains and valves shall not be located under concrete pavement, unless written approval is given by the City Engineer.

3. Areas of minimal vehicular activity, such as storage yards, may be surfaced with 2 inches of washed, crushed granite over an aggregate base capable of supporting the City's Fire Department equipment (16 tons

minimum). Areas surfaced in this manner shall be maintained smooth and be weed and dust free by the owner.

9.35 PARKING LOT CURBING

A. Multi-Family Residential, Commercial, and Industrial

1. A 6-inch x 18-inch concrete curb with 6 inches exposed above finished grade (MAG Standard Detail 222) is required along the edge of driveways and between parking areas and public right-of-way. Extruded curb placed directly on pavement will not be allowed. Concrete block screen walls, may also be required along any parking areas adjacent to city right-of-way.

2. Pre-cast concrete curbs fixed in place with iron pins are allowed. The owner shall maintain these curbs in place and replace when damaged or dislodged.

9.4 FIRE DEPARTMENT ACCESS

9.41 GENERAL INFORMATION

All developments shall provide access for Fire Department vehicles and personnel per the following standards. The Fire Department has the right of final approval and may revise these standards as individual situations require.

9.42 DRIVE AISLE WIDTH AND TURNING RADII

A. Drive Aisle: A 20-foot wide paved drive aisle is required for fire truck access. For buildings greater than 30 feet in height, the paved surface must be 26 feet wide. If a paved surface appears out of character with its surroundings, then and alternate surface treatment must be approved by the Fire Marshall's Office.

B. Turning Radii: Turning radii per Detail G-954 is required at all entrances and interior driveway intersections where access is required.

9.43 BUILDING ACCESS

A. Building Location: Buildings shall be located so that Fire Department trucks may be parked within 150 feet of the farthest point on the ground floor of the building. This 150-foot dimension is measured along the route a person would follow from the truck to a given point on the building.

B. Fire Sprinkler Requirements: All commercial buildings must be sprinkled. Specifications for the sprinkler system vary with the type of development. It is

the developer's responsibility to contact the Fire Marshal's Office to determine the specific requirements for the development.

C. **Retention Areas:** Retention areas shall not be considered as part of the required access.

D. **Vertical Clearance:** Where structures are placed above the fire lane, provide a minimum of 13'-6" vertical clearance.

E. **Building Setback:** There shall be a minimum 10-foot setback from fire lanes. For buildings greater than 30' in height, there is a minimum 15' setback from fire lanes.

F. **Road Slope:** Any roadway intended for Fire Department access shall not have a grade greater than 8%.

G. **No Parking Signs:** No parking signs must follow Detail G-434 and shall be posted for fire lanes as directed by the Fire Department.

H. **Traffic Calming:** The Fire Department will allow traffic calming devices in fire lanes. These devices must be shown on the fire lane access plan in great detail and must be approved by the Fire Marshall's Office.

LANDSCAPING & IRRIGATION

10.1 GENERAL INFORMATION

10.11 PURPOSE

All developments which require the approval of a development site plan or subdivision plat by the City of Glendale shall be required to provide on-site and right-of-way landscaping supported by an automatic irrigation system. Agricultural uses, single-family and two-family residences and their accessories are exempt from this requirement.

The purpose of this chapter is to:

- Outline the minimum requirements for landscape and irrigation on private property.
- Outline the requirements for landscape and irrigation within city right-of-way.
- Outline specific landscape and irrigation requirements for areas that will be maintained by the City of Glendale, including but not limited to medians, city parks, and other city facilities.

10.12 ADDITIONAL REQUIREMENTS AND GUIDELINES

In addition to the requirements outlined in this chapter, the designer should consult the following documents for additional standards and specifications:

- City of Glendale Landscape Ordinance
- City of Glendale Zoning Ordinance
- City of Glendale Residential Design and Development Manual
- City of Glendale Commercial and Industrial Design Guidelines
- West Glendale Avenue Design Plan (applies to Glendale Avenue Corridor between 67th Avenue and 115th Avenue)
- Uniform Standard Details and Specifications published by the Maricopa Association of Governments (MAG) as amended by the city.
- Supplemental Specifications for Capital Improvement Projects (may be obtained from the Engineering Division for CIP projects).
- Arizona Department of Water Resources Phoenix AMA Low Water Use Plant List

10.2 CONSTRUCTION PLANS

10.21 IRRIGATION PLAN REQUIREMENTS

All irrigation plans submitted for approval must specify the following:

- A key map identifying the location of all controllers and the location, addresses and sizes of all water meters. (Required for all subdivisions, industrial parks and large scale development projects).
- A legend showing all symbols utilized in the system
- Location, brand, model and size of backflow prevention assembly
- Location, brand and model numbers of electric controllers
- Size and type of pipe for mains and laterals
- Size and location of sleeves
- Location, brand, model, and sizes of all valves
- Data on valve boxes and covers
- Location, brand, model, and nozzle size(s) of heads and emitters

- Show any existing irrigation mainlines in the right-of-way
- Additional applicable details
- Friction pressure loss calculation for the longest run in the system for both full-circle and part-circle circuits
- The irrigation plans shall also clearly delineate the areas that are maintained by the City and maintained by a Home Owner's Association or other private entity. Section 19-10 of the Landscape Ordinance outlines which rights-of-way may be accepted by the city for the maintenance and operation of all landscaping and appurtenances.

10.22 LANDSCAPE PLAN REQUIREMENTS

Refer to the Landscape Ordinance for required landscaped areas, improvements required for specific areas, such as street frontages, multi-family developments, commercial developments, etc., specific plant material, sizes and planting configurations. Refer to the Landscape Ordinance, Sec. 19-66 Non-residential Landscaping for conservation requirements and calculations to determine the percentage of water intensive landscapes.

All landscape plans shall include the following:

- Calculations reflecting the required and provided amount of all proposed landscaped areas, including calculations regarding the amount of water intensive landscape.
- Net site area.
- Turf and water intensive landscape area with calculations. Right-of-way plants must be from the Phoenix AMA Low Water Use Plant List. No turf is allowed in the right-of-way.
- Location and dimensions of all landscaped areas (on-site, street right-of-way, parking area, landscape buffers, retention areas, etc.).
- A plant schedule listing plant type and spacing.
- Locations of trees, shrubs, ground cover, berms, screen walls, outdoor furniture, public art, theme lighting and other materials that comply with the applicable ordinances and design guidelines.
- Describe building use and provide building square footage. Identify location of building windows and doors.
- Number of required and proposed parking spaces.

- Location, height, type, and general design and finish of all proposed screen walls.
- Site distance lines per Details G-447 and G-448. Additional discussion on sight distance requirements can be found in Chapter 4 of these standards.
- Locations of proposed freestanding sign(s), directory and directional signs.
- Location and types of proposed on-site lighting. Parking lot lighting shall be at a pedestrian scale and located within landscape planters.

10.3 IRRIGATION SYSTEMS

10.31 GENERAL SYSTEM REQUIREMENTS

The City will review and approve all irrigation systems prior to any installation. All sprinkler systems shall be automatic and shall utilize a reduced pressure principle backflow prevention assembly before the remote control valves. All applicable codes shall be adhered to and plumbing and electrical permits will be required. All irrigation systems and landscaped areas shall be designed, constructed, and maintained so as to promote water conservation and prevent water overflow or seepage into the street, sidewalk, or parking areas.

If the city will be maintaining a portion of the landscaping installed in conjunction with a private development, for example a landscaped median, then a separate irrigation system will need to be installed including separate meters (water and electric), backflow preventers, controllers, etc.

10.32 IRRIGATION SYSTEMS

The following design and construction standards will apply to irrigation systems which will be maintained by city forces. The irrigation system installation shall conform to MAG Section 440 and MAG Section 757 except as modified herein.

A. Existing Utilities, Structures and Trees

The contractor shall protect existing structures, utility services and trees and be responsible for their replacement. The location of existing trees and the requirements for performing work around them shall be shown on all irrigation plans. Minor adjustments to the system will be permitted to clear existing obstructions subject to the approval of the City.

B. Materials

Once the plans have been approved by the City, no substitutions shall be allowed, except when unavailable from the supplier, and another approved product is locally available. All such substitutions must be approved in writing by the City. All materials shall be new and the best of their class and kind. All materials and workmanship shall be guaranteed for a period of one (1) year against defective material and workmanship.

C. Backflow Prevention Assemblies

1. A reduced pressure principle backflow prevention assembly shall be required after the landscape meter. (See Detail G-669)
2. All backflow assemblies shall be FEBCO 825YA or a City approved equal.
3. Assemblies shall be enclosed in a lockable, expanded metal cage such as BPDI Guardshack, or approved equal. (See Detail G-673)
4. All assemblies shall be tested by a certified tester prior to final inspection and a copy of the Certificate of Certification shall be provided at the time of acceptance.

D. General Pipe Requirements

The following outlines the type of pipe required for the different system components:

1. Meter to backflow prevention assembly shall be Type K soft copper.
2. Backflow prevention assembly risers shall be Type K hard copper.
3. All other exposed main line pipe to be Type K hard copper. (Extend 18 inches below finished grade).
4. All buried mains and laterals downstream of a backflow prevention assembly (or booster pump) – PVC pipe.
5. No steel pipe or fittings shall be used.

E. Pipe

1. Main Line Pipe and Lateral Pipe Under Pressure

   a. Pressure pipe and fittings shall be NSF approved Type 1, Grade 1, PVC, Schedule 80 pipe. All PVC pipe is to be free of burrs and cleaned with a PVC solvent primer before gluing. Primer shall be Weldon P-70. Glue shall be Christy's Red Hot or Weld-On 705/725, gray heavy bodied fast seal or an approved equal. No gray colored

glue shall be allowed. "Weld-On" Type 725 or approved equal glue is preferred.

b. Plastic pipe shall be extruded from PVC 1120-1220 compound and so labelled.

2. Lateral Pipe (Not Under Pressure)

Non-pressure lateral piping, including emitter lateral piping, shall conform to the following:

- ½" – Class 315, PVC
- ¾" and larger – Class 200, SDR 21, PVC, solvent weld pipe

3. No 580 tube or Marlex tube shall be allowed.

4. Pipe Marking

All PVC pipe shall be continuously and permanently marked with the following information:

- Manufacturer's name
- Nominal pipe size
- Schedule
- Type of pipe
- Working pressure at 73° F (psi)
- National Sanitation Foundation (NSF) approval

5. Pipe Locating

All mainlines that do not have valve wires run beside them should have a separate wire run, including mainlines crossing streets, and labeled in the controller for future locating purposes. The locating wire shall be of a different color than valve wires or common.

F. Fittings and Connections

1. All mainline fittings are to be PVC Schedule 80.

2. All threaded joints are to be coated with Teflon tape unless otherwise specified by the manufacturer. Use liquid Teflon on metal pipe threads only. Fittings shall be Lasco, Dura or Spears factory assembled fittings or an approved equal. When connections are plastic to metal, female adaptors shall be used and hand tightened, plus one turn, with a strap wrench.

3. All PVC pipe is to be free of burrs and cleaned with a PVC solvent primer before gluing. Primer shall be Weld-On P-70. Glue shall be Christy's Red Hot or Weld-On 705/725, gray heavy bodied fast seal or an approved equal. **No gray colored glue shall be allowed.** "Weld-On" Type 725 or approved equal glue is preferred.

G. Sleeves

All mainlines, laterals and wires which cross underneath roads and sidewalks must be sleeved. Sleeves shall be PVC Schedule 40 and should extend a minimum of 12" beyond edge of concrete or pavement. The sleeves must be verified by city inspection staff prior to backfilling.

H. Excavation, Backfilling and Compaction

1. In Landscaped Areas

   Trenches for sprinkler lines and control wiring shall be excavated to a minimum depth of 24 inches.

   When in common trenches, all control wires shall be placed first, followed by a layer of fine backfill; then the main line followed by a minimum of 6 inches fine backfill; then the laterals, and final backfill and compaction. No lumps or rocks greater than 2" in diameter will be allowed in the backfill.

2. Under Right-of-Way Pavement

   All lines crossing under pavement in City right-of-way shall be installed in sleeves and follow Detail G-690 for bedding and backfill.

I. Electric Controllers

Controllers shall be pedestal mount or wall mount with factory supplied hardware for either. Remote control valves shall be compatible with the controller. The controller shall be enclosed in a lockable, vandal proof rounded metal cage.

The following manufacturers and models or an approved equal shall be used:

- Irritrol MC-E Series
- Motorola IRRInet Series

To promote best practices for water management, irrigation controllers that are not on the approved list are required to have a 30 day or more programmable frequency (days between watering) capability. All wiring to the controllers must be in conduits and be buried to a depth of at least 24". All control wires must be 14 gauge solid core (minimum), run in the main line

trench and be taped to the main line every ten (10) feet. Where it is not possible to run the controller wire in the main line trench, the wires are to be buried 24 inches deep in a conduit. Spare wire and a tracer wire must run to every valve along the entire mainline. Controller wire colors are as follows:

1. Common White
2. Valve wire Red
3. Spare Orange
4. Tracer Yellow

Installation and connection of the 110-volt electrical service to the controller must comply with all local, state and national codes. Splices shall be in a ten-inch (10) round valve box with a 3M "DBR" or "DBY" dry splice or approved equivalent. All wiring under pavement or asphalt must be in conduit.

J. Solar Controllers

Solar controllers will only be allowed for areas encompassing less than 5000 square feet. The following manufacturer and model or an approved equal shall be used:

- Irritrol IBOC Plus

K. Gate Valves, Sprinkler Heads and Quick Couplers

Irrigation control valves shall be electric, remote control valves and conform to the following standards and criteria:

1. Valves shall be Irritrol 700 Series or approved equal.
2. Minimum size shall be 1-inch.
3. Valves shall have brass or high strength plastic bodies and flow controls.
4. The Y strainer attached to the Irritrol 700 Series valve shall be an agricultural product type with a Senninger Pressure Regulator or approved equal.
5. Expansion coils shall be provided at each wire connection in the valve box.
6. Valve boxes shall be Carson, Brooks, or an approved equal with locking cover.
7. All gate valves shall be resilient wedge with square key of domestic manufacture with non-rising stem; 200 lb. water, oil, gas rated (i.e.

Milwaukee series 105 gate valve or equivalent). All gate valves shall be installed with valve boxes. Six (6) inch or twelve (12) inch extensions shall be added when necessary to bring the valve boxes level with finish grade.

8. Tree and shrubs need to be on separate valves due to different watering requirements. Also, sprinkler heads in the bottom of retention basins need to be on separate valves from the sprinkler heads on the slopes of basins

9. Irrigation valves shall be labeled on a piece of paper placed in the controller(s) with stations corresponding to valve areas in the field.

10. Quick-Coupling valves shall commercial grade, manufactured by Rainbird and are allowed in parks only. All quick-coupling valves must have a shut off located at or near the valve. No quick-coupling valves shall be installed in right-of-way irrigation systems. Quick-coupling valves shall be installed in a 10-inch round valve box. All quick coupling valve keys shall be Rainbird 44K or 33DK and shall have a hose swivel attached to the key. Two (2) keys are to be turned over to the Parks Department upon completion of the project.

11. Sprinkler heads shall be pop-up, rotary pop-up or gear drive sprinklers, part circle, adjustable and full circle types. All sprinkler heads shall be set to grade and perpendicular to the finished grades. Heads adjacent to curbs and sidewalks shall be 1” away from the curb or sidewalk. All nozzles shall be adjusted for the proper radius, arc and flow rate. All rotor pop-up sprinklers shall have an adjustable riser assembly (double swing joint). Spray pop-up sprinkler heads shall have double swing joint risers constructed of funny pipe, barbed fittings and marlex street ells on the head side. The following manufacturers and models or an approved equal shall be used:

    - Hunter I-20, I-25 and I-40 series.
    - Rainbird, pop-up 1800 series.
    - Low precipitation rate sprinkler heads such as MP Rotators are to be used in the bottom of retention areas. This requires that sprinkler heads in the basins be designed on separate valves from the sprinkler heads on the slopes.

12. Swing Joints: All sprinklers heads shall be installed on swing joints consisting of one PVC Schedule 80 nipple. Schedule 80 nipples shall be 8 inches to 12 inches in lengths attached with one Marlex street ell

at the bottom and two Marlex street ells at the top end, so that the sprinkler can rise or fall without breaking the pipe.

L. Emitters

1. Type and Configuration: Emitters are to be placed below grade and on threaded riser and tee in emitter boxes. The following manufacturer and model or an approved equal shall be used:

    - Bowsmith multi-outlet emitters

2. Emitter Requirements:

    - 6 port, 2 gallons per hour for trees (1 emitter per tree)
    - 6 port, 1 gallon per hour for shrubs (3 shrubs per emitter)

M. Water for Trees

All trees shall receive water from one of the following systems:

1. A drip irrigation system with electric solenoid valves, Y-strainer and pressure regulating valve, or

2. A bubbler system with electric solenoid valves, surface bubblers and PVC pipe.

N. Flushing and Testing

At the end of each run, flush caps in Telco boxes shall be installed. After all new sprinkler piping and risers are in place and connected and all necessary division work has been completed and prior to the installation of sprinkler heads, control valves shall be opened and a full head of water used to flush out the system. After the system is thoroughly flushed, risers shall be capped off and the system pressure tested for a period of one (1) hour prior to backfilling the laterals.

10.33 AS-BUILT DRAWINGS

The contractor shall be responsible for providing as-builts all changes accurately marked on the drawing. This shall be submitted to the City prior to final acceptance. As-Built plans shall be submitted in AutoCAD DWG format, scanned “TIF” or “PDF” format, and on a paper copy (24” x 36”) to be of quality that allows for reproduction. No vellums will be accepted.

10.4 RECLAIMED WATER SYSTEMS

10.41 GENERAL INFORMATION

A. Availability and Use

The use of reclaimed water (including but not limited to treated sanitary sewer effluent) for landscape irrigation is available in limited areas within the city. Projects wishing to utilize reclaimed water for irrigation of landscaped areas should check with the city for availability.

Reclaimed water shall not be used to irrigate landscaping located in Section 404 washes or any landscaping that may ultimately runoff or drain to a Section 404 wash or waters of the U.S. (i.e., open channels, catch basins, and retention/detention facilities).

B. System Operation

The City operates the major, "wholesale" effluent transmission system. This system is designed to provide reclaimed water to storage areas (lakes) which form the reservoirs for individual irrigation systems. No individual irrigation systems shall be connected directly to any part of the city transmission system. All vaults, transmission lines, wells, mechanical and control equipment, etc. connected to City-owned effluent transmission systems are to be reviewed and approved by the City's Water Services Department and the City's Engineering Division.

C. Maricopa County Environmental Services Department

Any extension of the effluent transmission system must be submitted to the Maricopa County Environmental Services Department (MCESD) and receive an "Approval to Construct" (ATC) prior to beginning construction. Upon completion of the extension an "Approval of Construction" (AOC) must be obtained from MCESD. The system will not be accepted by the City until the AOC is received from MCESD.

10.42 CODES AND SPECIFICATIONS

Design and construction of reclaimed water lines shall be in accordance with the following codes and specifications:

- MAG Section 616 except as amended herein.
- Maricopa County Health Code, Chapter II, Sewage and Wastes

- Arizona Administrative Code, R18-9-602

10.43 DESIGN

A. Location and Pipe Separation

Reclaimed water systems shall be totally separate from all potable water systems and may not be placed in the same trench with potable water lines. Reclaimed water lines shall be placed on the opposite side of street centerlines from any potable water lines. Other vertical and horizontal separations shall be in accordance with those outlined in Arizona Rule R18-9-602, Pipeline Conveyances of Reclaimed Water.

B. Cross Connection

Cross connections between potable water facilities and reclaimed water facilities are strictly forbidden.

Cross connections between potable water facilities and reclaimed water facilities are strictly forbidden.

C. System Limitations

The following will not be allowed in reclaimed water systems:

1. Hose bibs or other outlets accessible to the general public.
2. Drinking fountains.
3. Fire hydrants. Hydrants may be placed in areas served by reclaimed water but shall not be served by the reclaimed water system.

D. Overspray and Runoff

The following shall be considered in the design of all systems to reduce or eliminate overspray and runoff:

1. Type of System: The use of drip systems or underground irrigation systems is encouraged.
2. Moisture Demand: Reclaimed water irrigation facilities shall be designed to meet the peak moisture demand of all plant materials used within the area. The use of moisture sensors is encouraged but not mandatory.
3. Containment: Reclaimed water facilities shall be designed to prevent discharge onto areas not intended for reclaimed water irrigation. Part circle sprinklers shall be used adjacent to roadways and property lines to confine the discharge from sprinklers to the design area.

4. Optimal Watering Time: The design of reclaimed water irrigation systems shall provide for watering during periods of minimal use of the design area. This is typically between the hours of 10 p.m. and 5 a.m. Consideration should be given to allow a maximum dry out time before the design area will be used by the public.

5. Infiltration Rate: Reclaimed water shall be applied at a rate that does not exceed the infiltration rate of the soil. Where varying soil types are present, the design of the facilities shall be consistent with the lowest infiltration rate present. Copies of infiltration rate determinations may be required by the City.

10.44 CONSTRUCTION

A. Pipe Material

1. In Public Right-of-Way: Reclaimed water systems located within the public right-of-way must use ductile iron pipe with purple marking tape indicating the pipeline as "Reclaimed Water."

2. In Landscaped Areas: In landscaped areas, purple-colored polyvinyl chloride (PVC) piping and fittings conforming to AWWA Guidelines for Distribution of Non-potable Water shall be used. The pipe shall be identified as reclaimed water pipe by continuous markings, which shall include the following, at a minimum:

"CAUTION: RECLAIMED WATER – DO NOT DRINK"

B. Pipe Cover & Sleeves

The minimum cover to the top of the pipe shall be 24 inches in landscaped areas. All PVC reclaimed water lines crossing under paved areas shall be contained in ductile iron sleeves.

The color purple shall be used for identifying all pipes, valves and other equipment used for conveying reclaimed water.

C. Vaults

Vaults will be reviewed under the following criteria:

1. Construction Requirements: Access hatches shall be fully lockable, with automatic hold-open arm and cover release, safety chain and diamond plate covers. These shall be a minimum of 4-feet by 6-feet unless otherwise approved by the City.

2. Ladders: Entry ladders shall include pull-up arms and will be designed to meet all OSHA standards.

3. System Requirements: Private irrigation and lake quality control systems must be housed in separate vaults.

D. Backflow Prevention Assemblies

All systems shall be isolated from main lines by a backflow prevention device.

E. Quick Coupling Valves are not allowed in reclaimed water systems.

F. Meters

All systems shall also contain a meter for billing and for providing data to comply with ADWR reporting requirements. Meter types shall be supplied by the developer and meet city water meter specifications.

G. Labeling of System Components

All pipe valves, sprinklers, air relief valves, pressure reducing valves, pumps, control valves, meter box lids, meter box interiors, and any other appurtenances of the reclaimed water system shall be painted purple and labeled as outlined in MAG Section 616.4, except that labelling shall be printed in English and Spanish.

H. Other Components

Other items such as telemetry systems, controls, electronics, piping valves, etc. shall be reviewed to insure compatibility with the site and other effluent reuse system components and City standards.

10.5 LANDSCAPE AND PLANTING STANDARDS

10.51 LANDSCAPING IN MEDIANS AND RIGHT-OF-WAYS

The city encourages Smart Growth and the use of LID storm water techniques in the right-of-way. Below are some design standards for landscaping in the right-of-way or median:

1. All plant material must be selected from the Arizona Department of Water Resources Low Water Use Plant List. Not all plant materials are appropriate for use within the public right-of-way. The selected plant materials are also to

be consistent with the appropriate character of the areas described. Date palms are required in the landscaped medians for Bell Road, Glendale Avenue and 59th Avenue along with the medians in 93rd and 95th Avenues at Westgate.

2. Trees should be located so that the expected mature tree canopy does not ultimately extend into the travel lanes. Consider the mature tree height and placement of trees to minimize potentially adverse effects on above-ground utilities, street lighting or signage. Tree density must be no closer than 25 feet on center along pedestrian corridors. Trees should not be planted within 10 feet of an existing private wall, sign or street light pole. Natural growth habits and excessive watering frequencies shall be taken into consideration to minimize maintenance needs. Plant material clearance shall be provided to prevent conflict with signs, lighting, fire equipment or median crossings. Landscaping must not create hazards to public safety through plant growth habit, structure, or location. Trees should be provided at the rate of 1 tree per 35 lineal feet on center. The minimum size is 15 gallon with 50 percent of the trees to be 24" box or larger.
3. Decomposed Granite must be ¾- inch screened Desert Gold or of a matching color to adjacent landscaped areas. A sample will be submitted to the Engineering Division for approval prior to the contractor ordering and bringing it to the site. Color shall match what exists in the area. Decomposed granite will be distributed uniformly to a depth of 2 inches covering the entire landscape area. A pre-emergent herbicide shall be applied before and after placing the granite.
4. Care should be taken when designing landscaping within the sight distance triangles. Mounds within sight distance easements must not exceed 18 inches as measured above the final grade elevation. The maximum slope of any mounding shall be 4:1. The finished landscape grade of the decomposed granite should be smooth, uniform, and a minimum of 2 inches below the top of curb.
5. Backflow preventers and controllers may be placed in the median.
6. The Engineering Division will inspect all landscape and irrigation work in the medians.
7. All street right-of-way landscaping shall conform to the city's Landscape Ordinance and an approved street landscape master plan, and shall contain plant materials listed in that master plan.
8. Within thirty (30) feet of any street intersection trees shall not be planted which are so numerous or so close together that the trunks obstruct more than twenty (20) percent of the view of operators of vehicles on the adjacent street.
9. Design trees and plants so they will not grow within two (2) feet of the face of any curb or within one (1) foot of any sidewalk located on public right-of-way, except that tree canopies over eighty-four (84) inches in height and plants under two (2) foot in height are exempted from this provision.

10. Sight distance requirements for trees and shrubs shall follow the City's Standard Details G-447 and G-448. These sight lines must clearly show on the landscape plans. Trees planted within the sight triangle are to have the canopy pruned to a height of 8 feet or higher upon installation. Height will be measured from pavement grade and total height will include the height of any mounding.
11. Median bull noses less than 4' wide shall have brick pavers or stamped concrete installed. No plant material will be allowed.

10.52 MAINTENANCE RESPONSIBILITY

Maintenance of landscaping within rights-of-ways behind the street curb will be the responsibility of the developer, property owner, or a homeowners association. Median landscaping will be maintained by the City after the landscape establishment period ends and the landscaping is accepted by the City. The landscape establishment period for median landscaping shall be 180 days or as stated in the project specifications. During the landscape establishment period, the developer will be responsible for all costs, including trash pickup, watering, electric for the controller and plant replacement. The landscape establishment period begins after the approval of the landscaping and irrigation system by the City's Inspector and Parks Department. The water and electric meter accounts will be in the contractor's name until the landscape establishment period expires.

10.53 NOMENCLATURE

For inspection and identification, durable and legible labels written in weather resistant ink shall identify the correct plant name and size, as specified in the plant list, and shall be securely attached to all tree trunks delivered to the site.

10.54 SOIL

Soil shall be natural and fertile and shall not be excessive in acid or alkaline, nor contain toxic substances harmful to plant growth, and be reasonably free of noxious weeds, clay lumps, clods, stones, roots, stumps and debris of any kind. Mulch in planting basins shall consist of 25 pounds of soil sulphur thoroughly mixed with one cubic yard of organic mulch. Mulch shall be evenly spread throughout the tree basin to a depth of 2 inches.

10.55 TREE PLANTING

Remove the nursery stakes and ties. Do not prune unless there are dead or broken branches. Once planted, the top of the root ball should be level or slightly above the finished grade to avoid crown rots. Do not pack the soil. Apply enough water to thoroughly wet the soil to the depth of the root ball. Apply organic mulch at a depth of three to four inches on top of the soil area that was tilled. See the University of Arizona, College of Agriculture: Planting Guidelines publication AZ1022.

10.56 RIGHT-OF-WAY INSPECTIONS FOR CITY PROJECTS

The City's Engineering Division will arrange a pre-construction meeting with the contractor to review approved plans, MAG requirements, testing, maintenance responsibility, project schedule, etc. City staff will inspect the work during construction for compliance with the approved plans. City staff will perform a walk-through with the contractor after completion of work to begin the landscape establishment period. The warranty period once any punch list items are completed. At the end of the landscape establishment period, a final walk through with the contractor will be performed to determine any plant replacements or repairs to the system. Once completed, the Engineering Division will issue the Final Letter of Acceptance to end the warranty period and begin city maintenance of the landscaping. Upon acceptance, the contractor will remove his name from the water and electric accounts and establish them in the City's name.

CHAPTER 11

UTILITY PERMITS AND CONSTRUCTION

11.1 PURPOSE

11.1 PURPOSE

This chapter outlines the requirements and provides guidance for working in the City's right-of-way or public utility easements. It provides specifics for obtaining a right-of-way permit and also includes utility construction guidelines.

11.2 AUTHORITY AND GOVERNING GUIDES AND STANDARDS

11.21 AUTHORITY

The City of Glendale grants permission for locating existing utilities and for construction, or maintenance work in public rights-of-way and public utility easements by issuance of a permit from the City Engineering Division per Chapter 30 of the City Code.

11.22 GOVERNING GUIDES AND STANDARDS

The City of Glendale administers all utility line planning, permitting and construction processes in accordance with the Arizona Utility Coordinating Committee (AUCC) Public Improvement Project Guide and the Maricopa Association of Governments (MAG) Uniform Standards and Specifications, except as may be modified by these City of Glendale Engineering Design and

Construction Standards. The City requires that all permitted projects comply with the Arizona Utility Coordinating Committee project models, including the Joint Trench Use Model and the Western Underground Trench Formula.

11.3 NEED FOR A PERMIT

11.31 PERMITTING

Utility companies, irrigation and power districts, governmental agencies as well as other companies providing cable television, communication lines, electricity, gas, irrigation, petroleum, etc., **must** obtain permits from the Engineering Division.

Permits are required for not only construction or maintaining all utility company facilities, but also for all barricading for traffic control and locating existing facilities within public rights-of-way and public utility easements.

Permits are necessary to ensure that all utility company facilities are:

- constructed in the proper location with adequate spacing
- built with acceptable materials and in accordance with current specifications
- installed in a safe manner

In addition the permit ensures:

- infrastructure is protected
- landscaping is restored
- liability issues are properly addressed
- final completion is assured and accepted

11.4 PROCESS OVERVIEW

11.41 OVERVIEW

Figure 11.1 summarizes the process for obtaining a permit and constructing utilities in City of Glendale rights-of-way or easements. Subsequent sections in this chapter provide details for each step of the process.

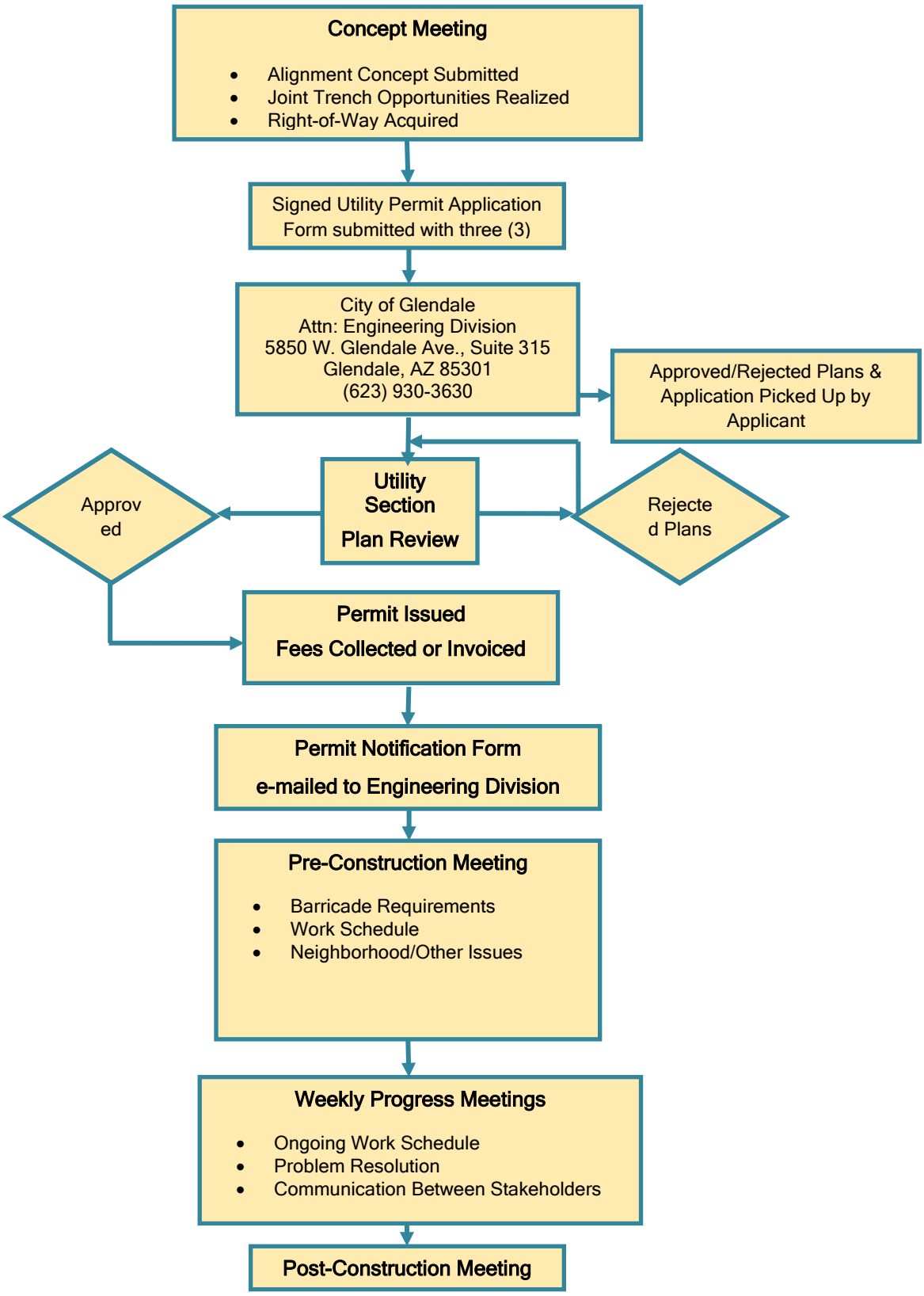

Figure 11.1 – Utility Permit Processing and Construction Flow Chart

11.5 PERMIT APPLICATION AND FEES

11.51 SUBMITTAL REQUIREMENTS

A "*Permit Application for Construction in the Public Right-of-Way and Public Utility Easements*" needs to be obtained from the City of Glendale Engineering Division, completed, and submitted to the Engineering Division together with a minimum of (3) sets of construction plans (drawings, details, notes, etc.). The submittal will be logged into the City's permitting system and routed for technical review.

If the application is contingent on the right-of-way, trenching, conduit, etc. supplied by customer, this should be noted. The permit will be issued but no work shall commence until the applicant has completed these requirements and obtained the appropriate permits.

11.52 PLAN REVIEW

Plans will be reviewed for compliance with Section 11.6 and other applicable standards. Upon completion of the review (approximately ten (10) working days), the plans will be approved or returned to the applicant for modification. If additions or corrections are required to the plans or permit application, the applicant will be asked to make corrections and resubmit. The applicant will be responsible for checking periodically with the City on the plan review status.

11.53 PERMIT AND FEE REQUIREMENTS

The following requirements must be met prior to the City issuing a permit:

1. City has reviewed and approved plans.
2. Permittee must demonstrate proof of insurance with agreed to limits of liability and naming the City as additionally insured. (Requirement may be satisfied by license or franchise agreement.)
3. Fees must be paid or invoiced according to the Engineering Fee Schedule as approved by the City Council.

Permits are generally issued for six (6) months. Special conditions or stipulations for compliance may have been added to the permit before issuance, so it is important that the applicant carefully review these conditions.

The following fees will be charged in accordance with the current Community Development Fee Schedule as adopted by the City, except as superseded by license or franchise agreement:

- Plan Review Fees
- Permit Fees
- Inspection Services
- Administrative Fees
- Annual Emergency Permits

Seal coat charges are also billed upon permit issuance in accordance with MAG Specification 336.2.4.

Charges are typically invoiced on a monthly basis.

Annual Emergency Permits, which are issued for reoccurring facility maintenance work in public right-of-way and public utility easements, are invoiced on a fiscal yearly basis.

11.6 CONSTRUCTION PLAN REQUIREMENTS

11.61 CONSTRUCTION PLANS OBJECTIVES

Engineered construction drawings (plans) must be submitted for review. The general objectives of plan review are to

- Optimize utilization of the space available in the public rights-of-way and public utility easements
- Assure compliance with all City policies
- Coordinate with other utility companies, agencies and City projects
- Reduce risk and/or inconvenience to the public

Plans will be specifically reviewed to

- Check for compliance with construction standards
- Approve alignments
- Verify that the work is in the public right-of-way or public utility easement
- Determine if other work is occurring at the same time near the site
- Verify that all joint trench opportunities have been incorporated into design
- Check for conflicts

- Determine if the work is proposed in newly paved streets or alleys
- Check traffic flow requirements
- Verify that proper pavement replacement or bore requirements have been incorporated into the plans
- Verify that all City requirements have been met

11.62 PLAN VIEW REQUIREMENTS

Table 11.6-1 provides guidelines for developing construction plans and specifics on information to be provided in plan view.

A.	**SCALE**	• An appropriate scale to accurately indicate relationships among the physical features within the construction area. • A scale of 1" = 40' is suggested as a minimum.
B.	**RIGHTS-OF-WAY AND EASEMENTS**	• Existing and proposed rights-of-way and City utility easements with dimensions. • Information about existing rights-of-way and City easements is available from the City's Mapping Division (623-930-3656).

C.	**EXISTING AND PROPOSED FACILITIES**	• Location and size of all existing and proposed facilities and street improvements that the proposed construction will either cross or run parallel within the right-of-way corridor.
		• All proposed facilities shall maintain a six (6) foot parallel separation from city facilities.
		  ○ When facilities are located within an alley or behind curb and gutter, all of the following facilities shall be shown to scale for the entire alley or area behind the curb: *curb, gutters, sidewalk, paving, storm drains, sanitary sewers, water lines, irrigation facilities, other utilities, landscaping, structures, and traffic signals.*
		  ○ Using only a symbol to indicate these facilities is not sufficient. A legend should be included to distinguish each type of improvement.
		  ○ Service installations in alley (excluding bores) or public utility easements shall show sufficient information to indicate location and to prevent conflict or hazard.

D.	**PROPOSED CONSTRUCTION**	• Location and limits of proposed construction.
E.	**DIMENSIONED TIES**	• Dimensioned ties to monument lines in streets and to property lines in alley and easements.
F.	**BENCHMARK**	• Denote benchmark on plans. See Section 2.21 for benchmark information.
G.	**TOPOGRAPHY**	• Topography taken by field or aerial surveys or from up-to-date City record drawings showing existing conditions in the area of proposed construction.

H.	**VICINITY MAP**	• Vicinity map indicating major cross streets and North arrow.
I.	**BLUE STAKE**	• A note stating “Notify Arizona Blue Stake before construction”.
J.	**GENERAL NOTES**	• Glendale General Notes for Utility Construction per Figure 11.1

Table 11.6-1 Construction Plan Requirements – Plan View

11.63 PROFILE REQUIREMENTS

Complete profile drawings showing the minimum requirements shown in Table 11.6.2 shall be provided for all projects that require utilities be bored. An accurate profile must be approved on the permitted plans before starting the bore. Those requirements apply not only to longitudinal and lateral street bores but also utility bores outside paved areas crossing existing utilities.

A.	**BORINGS**	• Show a plan and profile of each proposed bore along with boring and receiving pit locations.
B.	**ELEVATIONS**	• Provide elevations taken from the existing surface grades at intervals of 100 feet or less in the same alignment as the proposed construction. • The profile shall be shown as a continuous line on the plans throughout the project. • Finish and/or natural grade profile shall be shown within the proposed construction area.
C.	**EXISTING AND PROPOSED UNDERGROUND FACILITIES**	• Show all existing and proposed facilities that the proposed construction would cross. • Storm drains, sanitary sewer lines, waterlines, conduit systems and underground utilities shall be drawn to full scale. • When exact depths are unreliable on as-built plans, existing utilities must be potholed in the field and their locations shown accurately on the plans before the permit is issued. • Existing facilities shall be drawn showing their approximate outside dimensions.
D.	**SCALE**	• For clarity, a vertical scale that adequately depicts installation of existing facilities is required. • Specify scale (1” = 2’, 1” = 3’, or 1” = 4’).
E.	**CLEARANCES**	• Profile designs shall provide minimum clearance of 24 inches between the outer edge of the facilities being bored to and City owned infrastructures, including water, sewer, storm drains, and irrigation lines. • Clearance between all other utilities shall be a minimum of 12 inches or per the requirements of the owner of the

		utility, whichever is greater.
F.	SOILS ANALYSIS	• If requested by the City, a soil analysis shall be required, showing the gradation of the soil in the bore area indicating the feasibility of the boring through the existing material. • Use the data sheet (Detail G-320) to complete bore planning and submit this with the plans. • Reliable historical information about the existing soil conditions, such as previous project soil analyses, may be used instead of providing new soil data.

Table 11.6-2 Construction Plan Requirements – Profile View

11.64 UNDERGROUNDING REQUIREMENTS

- All new facilities are required to be installed underground unless specific approval is obtained from the City Engineer.
- Temporary overhead services for construction may be permitted for a special period. No final occupancy will be given until all temporary services and poles are removed.
- Location for new facilities shall be in accordance with the City of Glendale Standard Details.
- Depth requirements shall be in accordance with Table 11.3.

11.7 CONSTRUCTION REQUIREMENTS

11.7 CONSTRUCTION

After permits are obtained, the applicant must submit a *"Permit Notification Form"* via e-mail to the City Engineering Division. The applicant will be contacted to schedule a pre-construction meeting. The form may be found on the Engineering web page.

11.71 GENERAL INSTALLATION REQUIREMENTS

Any work in the right-of-way requires:

1. A right-of-way permit
2. Approved construction plans
3. A site-specific Traffic Control Plan (TCP)

These three items must be available at the project site at all times. Lack of any of these items may cause construction to be halted.

All installations shall:

1. Be governed by the City of Phoenix Traffic Barricade Manual and/or specific traffic regulations, which shall be attached to the approved permit whenever applicable.

2. Conform to the latest MAG Uniform Standard Details and Specifications and current City of Glendale Design and Construction Standards.

11.72 SPECIFIC REQUIREMENTS

Table 11.7-1 summarizes specific construction requirements to be followed in City rights-of-way and easements.

A.	**TRAFFIC CONTROL PLAN**	• Although it is not part of the construction plans that must be submitted, a TCP must be approved by the City Transportation Division before construction may commence.
B.	**NOTIFICATION OF CONSTRUCTION**	• Notification may be made by email (mgibson@glendaleaz.com).
C.	**INSPECTIONS**	• The utility company is to inspect its work with the City providing periodic oversight. • Request for inspections should be made 48 hours in advance of required inspection. • Excavations may not be backfilled without satisfactory City inspection.
D.	**BACKFILL/PAVEMENT REPLACEMENT**	• Backfill shall conform to COG Detail G-690. • Pavement replacement shall conform to COG Detail G-317.
E.	**STREET BORES**	• Before starting any street bore that crosses a major roadway, the contractor must schedule a separate field meeting with the City of Glendale Inspector to verify that all Blue Stake requirements are met.
F.	**POTHOLES**	• At least one hole at each location must be marked with the initials of the excavating company. A spray stencil is acceptable. • No plugs will be allowed. • Unauthorized nighttime and weekend excavation will not be allowed.
G.	**CONSTRUCTION SCHEDULES**	• A construction schedule shall be submitted, noting starting and completion dates, five (5) working days before starting construction. •
H.	**CONSTRUCTION**	• All “CIP” type utility construction projects, which are on major streets and meet either of the following criteria, must have

	SIGNS	stationary signs posted at the beginning and end of the project.
		• Stationary sign criteria:
		  ○ Projects 1 mile or greater in length.
		  ○ Projects that will last 30 days or longer.
		• Signs must be posted one week before the project begins and remain until the project is completed. The signs shall indicate the name and phone number of the permit holder along with the start and estimated completion dates for the project.
		• All other utility company construction projects lasting less than 30 days must have portable signs posted for the duration of the project indicating the permit holder's name and phone number. This does not apply to routine maintenance work.

I.	**ABANDONMENT OF FACILITIES**	• All facilities that are being abandoned shall be removed and existing infrastructure restored. • No abandoned facilities may remain in place.
J.	**FINAL INSPECTION/ WALK THROUGH**	• All permits require final inspection and/or final walk through. • Please contact your assigned utility inspector and schedule a final walk through.

Table 11.7-1 Construction Requirements

11.73 SPECIAL CONSTRUCTION CONSIDERATIONS

A. Steel Trench Plates in the Roadway

No plugs will be allowed in arterial streets. Steel plates must be used in all cases. When installing plates, refer to MAG Standard Detail 211 with the following modifications:

1. Pavement to be milled and plates to be depressed at speeds of 25 mph and greater

2. Pavement replacement to be per COG Detail 317 (full depth replacement)

B. Telecommunications Cable Installation (Copper or Fiber Optic)

1. "Trunk Lines"

   Trunk lines provide telecommunication services by connecting regions or states or by connecting central offices within a metropolitan area shall be installed as described below:

   - If the cable is to be installed within an open trench, the cable shall be placed within a schedule 40 PVC or an approved equivalent conduit with a minimum inside diameter of 4 inches. The conduit shall be buried at a minimum depth of 48 inches, measured to the top of the conduit. A color coded plastic warning tape with a minimum thickness of 5 mil and a minimum of 3 inches in length shall be installed in the

trench above and centered over the concrete cap at the depth of 12 to 18 inches below the surface.

- Cable crossing under existing arterial paved streets shall be accomplished by directional bore only, unless the City Engineer authorizes an open trench. The cable shall be placed within schedule 40 PVC conduit, or an approved equivalent or better alternate, at a minimum depth of 48 inches.

- If cables are to be installed in existing duct banks, they shall be placed within the duct bank in a manner that provides the best available protection for the cables to minimize the chance for damage to the cables by excavation around the duct bank systems.

2. Non “Trunk Lines”

- If a cable is to be installed within the right-of-way of a local street, it shall be placed within a schedule 40 PVC or an approved equivalent conduit with a minimum inside diameter of 4 inches. The conduit shall be placed at a minimum depth of 36 inches, except when it is under a planned street pavement, and then it shall be a minimum depth of 48 inches.

- Cable crossings under existing arterial paved streets shall be accomplished by directional bore only, unless the City Engineer authorizes open trenching.

- Cable crossings under existing collector paved streets shall be accomplished by jack bore method for service drops only unless otherwise authorized by the City Engineer.

- Cables to be installed in existing duct banks shall be placed within the bank in a manner that provides protection appropriate for the level of service provided by the cable.

If a cable that is to be installed is fiber optic, a tracing wire shall be installed in the conduit or the trench.

11.74 DAMAGE TO CITY FACILITIES

As provided in A.R.S. SEC. 40-360.22, the permittee is required to locate all underground facilities before start of excavation or boring and take measures to protect the facilities during construction.

11.8 RECORD DRAWINGS

11.81 RECORD DRAWINGS

Record drawings of the complete construction shall be maintained by permittee in accordance with State Statutes and provided to the City as requested.

CITY OF GLENDALE
GENERAL NOTES FOR DRY UTILITY CONSTRUCTION

A. All utilities crossing existing City streets must be directional bores unless permission to open cut has been given by the City Engineer or his authorized representative. Before starting any street bore that crosses a major roadway, the contractor must schedule a separate field meeting with the City of Glendale Inspector to verify that all Blue Stake and design requirements are met.
B. The utility company shall call the City Engineering Division 48 hours in advance of starting work giving location and permit number in order to schedule inspections. Verbal status updates shall be made weekly.
C. Alignment on plans may not deviate more than 1 foot without the approval of the City Engineer or his authorized representative.
D. All work requiring asphalt replacement, concrete replacement or resurfacing alleys in the City right-of-way will require a final inspection with the utility company representatives at the time of completion.
E. All work performed in the City of Glendale right-of-way shall be governed by the latest City of Phoenix Traffic Control Barricade Manual.
F. All alley and street excavations shall be compacted to a minimum of 95% of standard proctor density, or ½ sack slurry back filled. The approved plan alley grade shall not be changed by more than one-tenth of a foot in a crowned alley. Inverted alleys shall be graded to match the original plan grade and original construction. Paved streets and alleys shall be repaved in a manner that matches the grade of the undisturbed pavement before construction.
G. PROTECTIVE DEVICES ARE REQUIRED. City of Glendale requires that **anyone** working within the right-of-way shall be equipped with protective devices. Protective devices include, but are not limited to, orange vest (daytime), reflectorized orange vest (nighttime), hardhats, traffic cones, barricades, flashing lights, flares and any other traffic control devices required by the City. Any person violating any of the provisions of this section shall be guilty of a misdemeanor and punishable as set forth in the City of Glendale Municipal Codes.

FIGURE 11-1 GENERAL NOTES FOR DRY UTILITY CONSTRUCTION

Description	Major Street	Collector Street	Local Street & Alley	Undeveloped (No Curb & Gutter)
POWER				
0 – 600 volts	36"[1]	36"	24"	36"[1]
601 – 7200 volts	42"	42"	42"	48"
12KV (local dist)	42"	42"	42"	48"
12KV + (30 feeder)	48"	48"	48"	54"
Street Light Circuit back of sidewalk	24"	24"	24"	36"
GAS				
Services	36"	36"	36"	42"
1" to 6" diameter	36"[1]	36"	36"	42"
> 6" diameter	48"	48"	48"	54"
Manholes	36"	36"	36"	42"
Conduits	36"	36"	36"	42"
TELECOMMUNICATIONS (COPPER OR FIBER OPTIC)				
Trunk lines	48"	48"	48"	54"
Copper service drops	36"	36"	36"	42"
Other	36"[1]	36"	36"	42"
Coaxial	36"[1]	36"	24"	48"

[1]48" depth is required when installation is the first utility back of sidewalk.

NOTE: The City Engineer may approve deviations from these standards under unusual and compelling circumstances.

Table 11.3 – Minimum Cover Requirements for Non-City Utilities in Public Right-of-Way