PUBLIC WORKS
AND
ENGINEERING STANDARDS

2015

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Table of Contents

List of Figures

List of Tables

1.0 GENERAL CONDITIONS AND REQUIREMENTS

1.1 PURPOSE AND INTENT

The goal of the Town of Gilbert is to achieve the development and improvement of property in a manner that provides a Quality of Life improvement for public health, safety and welfare. As part of its recent strategic initiative, the Town desires to update its current standards for Development. The purpose of these Public Works and Engineering Standards is to replace the current Town of Gilbert Engineering Design Standards Manual dated March 2005 and updated in 2009. This Manual will provide guidelines and minimum design criteria for the planning and designing of Town of Gilbert Capital Improvement Projects (CIP) and Development Services (DS) projects as defined in Section 1.2.

These Standards contain specific guidance for designing and installing improvements to real estate in accordance with accepted Town of Gilbert Standards. They are the general conditions and requirements for all improvements to or extensions of the Town of Gilbert's street, storm drainage and utility systems. The conditions as stated herein apply to all improvements made by public agencies, utilities, and private developers. They relate to the Town of Gilbert General Plan and other Chapters in the Gilbert Town Code in that these requirements are considered to be the minimum acceptable criteria for assuring community-wide development quality and safety.

Engineering details and related materials are updated from time-to-time by Town Staff and submitted to local government authorities for replacement of former standards in this code.

The intent of this Chapter is expressly to promote public safety and health while, at the same time, assure reasonable economy for affordable development. The intent of these Standards is to present clear and concise direction regarding technical requirements, policies, and processes to facilitate consistent uniform design during the plan preparation phase. However, the information presented is not intended to supersede sound engineering judgment. Accordingly, creative, innovative or cost-reducing use of materials, system design, or construction practices may be accepted by Town plan review personnel upon finding that public welfare is duly protected.

1.2 LEGAL AUTHORITY

1.2.1 Town Code and Ordinances

It is the purpose of the Gilbert Town Code, to outline and establish the minimum acceptable standards for improvement of public streets, utilities, and related infrastructure, to define the responsibility of the engineer/developer in the design, construction and financing of public improvements, and to establish procedures for review and approval of engineering plans.

The Public Works and Engineering Standards clarifies and supplements requirements in the Gilbert Town Code, including the zoning ordinances, Land Development Code, subdivision, floodplain and stormwater regulations, fire and

building codes, and other regulations for land development within the Town of Gilbert. Refer to the Town website for the Town of Gilbert Land Development Code.

The Public Works and Engineering Standards is not intended to interfere with, abrogate, or annul any other ordinance, rule or regulation, statute, or other provision of law except as provided in this Manual.

The Public Works and Engineering Standards shall govern all Capital Improvement Projects (CIP) and Development Services (DS) projects within Town of Gilbert's Town limits.

1.2.2 Applicability

These Standards shall apply to all transportation, utility, and right-of-way facilities and improvements, public and private, within the Town of Gilbert.

These Standards shall apply to modifications of street features or existing facilities which are within the scope of reconstruction, widening or narrowing, required off-site street improvements for land developments, or capital improvement projects when so required by the Town, or to the extent they are expressly referred to in the Town of Gilbert General Plan and associated subarea plans.

These Standards shall apply to every new placement and every planned, non-emergency replacement of existing utility poles, underground facilities, and other utility system structures within the Town right-of-way. Every effort shall be made to meet the Standards during emergency replacements.

1.2.3 Severability

If any part of these Standards as approved by the Town Engineer shall be found invalid, all other parts shall remain in effect.

1.3 PROJECT CLASSIFICATIONS

1.3.1 Public Works

Public Works Projects or Capital Improvement Projects (CIP) are projects that are installed as part of a Capital Improvement Plan. CIP projects are typically Town funded projects, usually inside the public right-of-way, that are managed by Town staff and designed by private engineering consultants. Ultimately, design services and construction of a CIP project are awarded by the Town.

1.3.2 Private Development Infrastructure

Private Development Infrastructure or Development Services (DS) projects are projects with construction improvements that are to be installed as part of a new land development. Requirements are outlined in this Manual as well as the Town codes. Refer to the Town website for specific information regarding the Development Services Processes. The website includes the applications, permits and a detailed flowchart outlining each step in the process.

1.4 COMPREHENSIVE PLANNING

1.4.1 General Plan

The Town of Gilbert General Plan was developed to provide the community with a vision to guide growth and development. At the same time, the General Plan addresses specific legislative requirements of Growing Smarter and Growing Smarter Plus legislation. The developer/engineer shall review the document to assure their proposed construction improvement accommodates the requirements outlined in the General Plan. Refer to the Town website for the Town of Gilbert General Plan.

1.4.2 Transportation Master Plan

The Transportation Master Plan is an Integrated Multi-Modal Transportation Master Plan. The Plan addresses transportation inventory, traffic volumes, and input from residents, businesses and travelers related to all modes of transportation in Gilbert. It also identifies future transportation infrastructure needs and sets directions for undertaking transportation projects that will provide the Town with an optimal transportation system to effectively serve future travel demands. The current Transportation Master Plan is available on the Town of Gilbert website.

1.4.3 Integrated Water Resources Master Plan

The Integrated Water Resources Master Plan identifies forecasted water supply and demand needs as well as infrastructure needs and sets directions for undertaking water system projects that will provide the Town with a reliable water system to effectively serve current and future demands. The Integrated Water Resources Master Plan also outlines the Town's wastewater and reclaimed water systems, and determines how new infrastructure should be developed to provide customers with an appropriate level of service, and to function efficiently and effectively along with the Town's existing infrastructure. The Integrated Water Resources Master Plan is typically updated every five years. The current version of the Integrated Water Resources Master Plan can be obtained by making a public records request to the Town Clerk's Office.

A related planning document is the Reclaimed Water Users Manual. The current Reclaimed Water Users Manual is available on the Town of Gilbert website.

1.4.4 Parks Master Plan

The Parks Master Plan identifies current and future community parks, their capital improvement and other infrastructure needs, and sets direction for undertaking parks projects that will enhance the Town's recreational opportunities afforded by a well developed parks system. The Parks, Recreation, and Trails Master Plan is typically updated every five years. The current Parks, Recreation, and Trails Integrated Master Plan is available on the Town of Gilbert website. A related planning document is the Landscape Regulations Article 4.3, of the Town Land Development Code.

1.5 REFERENCES

All references herein shall be to the editions or versions of documents in effect at the time a complete application for the required Permit is accepted by the Town, unless a Developer is otherwise vested by applicable law.

1.5.1 General References

The Standards are intended to be consistent with the following Codes, Plans, Programs, Manuals, Guidelines, Laws and regulations.

1. Town of Gilbert Land Development Code, as amended, including:

    - Town of Gilbert General Plan 2012
    - Town of Gilbert Capital Improvement Program
    - Town of Gilbert Transportation Improvement Plan
    - Town of Gilbert Integrated Water Resources Master Plan
    - Town of Gilbert Storm Water Master Plan
    - Town of Gilbert Transportation Master Plan
    - Town of Gilbert Downtown Design Review Guidelines
    - Latest adopted building and fire codes.
    - Americans with Disabilities Act (ADA) and rules adopted thereunder, including the Proposed Guidelines for Accessible Pedestrian Facilities in Public Right-of-Way (PROWAG)

1.5.2 Primary Design and Construction References

Except where these Standards provide otherwise, the design detail, construction workmanship, and materials shall comply with the editions or versions of the following publications, as amended by the Town of Gilbert.

1. Maricopa Association of Governments (MAG) Uniform Standards Specifications and Details, Latest Edition. These will be referred to as the "MAG Standard Specifications and Details."

2. Arizona Department of Transportation (ADOT), Standard Specifications for Road, Bridge, and Highway Construction. These will be referred to as the "ADOT Standard Specifications."

3. Arizona Department of Transportation (ADOT), Roadway Design Standards and Guidelines, latest edition; Roadway Design Standards

4. Arizona Department of Transportation (ADOT), Construction Manual, latest edition; Construction Manual

5. United States Environmental Protection Agency (EPA), Cross Connection Control Manual

6. United States Federal Highway Administration (FHWA), Manual on Uniform Traffic Control Devices (MUTCD), as adopted and supplemented by the State of Arizona.

1.5.3 Other Specifications and Guidelines

The following specifications and guidelines shall be applicable when specifically cited in these Standards, when required as a Development condition, and/or when required by state or federal funding authority.

1. Design criteria adopted by federal agencies, including, but not limited to, the United States Federal Housing Administration (FHA), United States Department of Housing and Urban Development (HUD), United States FHWA, and United States Department of Transportation (USDOT)

2. American Association of State Highway and Transportation Officials (AASHTO), Policy on Geometric Design of Highways and Streets, as adopted and supplemented by the State of Arizona.

3. AASHTO Standard Specifications for Highway Bridges

4. AASHTO Guide for the Development of Bicycle Facilities

5. American Society for Testing and Materials (ASTM), applicable standards and specifications as determined by the engineer

6. FHWA Roundabouts: An Informational Guide

7. AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals

8. Section 106 of the National Historic Preservation Act 49 U.S.C. 470 and 36 CFR 800

9. Section 4(f) of the Department of Transportation Act of 1966, 49 U.S.C. 303

10. American Water Works Association, American Water Works Standards

11. Institute of Transportation Engineers (ITE), Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities

12. Illuminating Engineers Society of North America (IESNA), RP-8-00 Roadway Lighting

13. Public Improvement Project Guide (PIPG)

1.6 DEFINITIONS

When referring to these Standards the following definitions shall apply:

ADA Standards/ADA Compliant: For the purposes of these Standards, ADA Standards and/ or ADA compliant shall refer to satisfaction of the Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way (PROWAG) and its supporting documents.

ADOT Standard Specifications: The Standard Specifications for Road and Bridge Construction, latest edition, herein after referred to as the ADOT Standard Specifications.

Alley: A public or private way providing vehicular access to the rear or side of abutting properties.

Applicant: For the purposes of these Standards, Applicant shall be considered the same as Developer, and may be used interchangeably.

Appurtenance: Equipment and/or accessories that are part of an operating system or subsystem.

Arterial Streets: A street classification designated by the Town of Gilbert Transportation Master Plan, and following the guidelines contained in the Federal Function Classification System.

Auxiliary Lane: That portion of the street adjoining the traveled way for speed change, turning, storage for turning, weaving, truck climbing, or other purposes supplementary to through-traffic movement.

Average Daily Traffic (ADT): The total volume during a given time period (in whole days), greater than one day and less than one year, divided by the number of days in that time period. ADT is typically used in quantifying the combined number of vehicles traveling in both directions on a particular street.

Backfill: Replacement of excavated material with suitable material compacted as specified.

Best Management Practices (BMPs): A schedule of activities, prohibitions of practices, physical structures, maintenance procedures, and other management practices undertaken to reduce or prevent increases in runoff quantity and pollution.

Bike Lane: A travel lane, located within the paved area of a street, which is provided for the exclusive use of bicycles designated by lane use signs and pavement markings.

Bill of Sale: The transfer of ownership document that Developer must provide before the Town will agree to accept, operate and maintain public improvements. The Bill of Sale will contain an itemized list and associated costs of all improvements to be conveyed to and subsequently owned and operated by the Town.

Bollard: A fixed or removable post designed to prevent vehicular access, or to prevent damage to an adjacent above-ground structure.

Boring: Grade and alignment controlled mechanical method of installing a pipe or casing under a street without disturbing the surrounding medium.

Breakaway Structure: A structure that has been crash tested in accordance with National Cooperative Highway Research Program procedures – NCHRP 350 and/or have received a "Letter of Acceptance" from the FHWA.

Caliper: The unit of measurement for a tree trunk measured at 6 inches above ground level for trees up to 4 inches in diameter, and at 12inches above the ground for trees larger in diameter.

Certificate of Materials: An approved list of materials certified by the manufacturer or supplier as meeting the minimum requirements of these Standards.

Channelization: The separation or regulation of conflicting traffic movements into definite paths of travel by the use of pavement markings, raised islands or other suitable means to facilitate the safe and orderly movement of both vehicles and pedestrians.

Clear Zone: The total roadside border area starting at the edge of the traveled way available for use by errant vehicles. This area may consist of a shoulder, a recoverable slope, a non-recoverable slope, and/or a clear run-out area.

Clearing: The act of destroying, trimming, altering, or removing vegetation by any means.

Commercial Development: Includes multi-family residential, and commercial, office or industrial buildings.

Compaction: The densification of fill by mechanical means.

Cost: The cost to make all improvements including, but not limited to, grading, paving, utility extensions, building additions, alterations or repairs on site for the purpose of determining whether or not a project is exempt from the requirements of these Standards. This cost shall be based on a construction cost estimate prepared by a licensed contractor, professional engineer or architect.

Critical Areas: Areas within the Town that include wetlands, streams, wildlife and fisheries habitat, geologic hazard areas, frequently flooded areas and aquifer recharge areas.

Cul-de-sac: A street connecting to another street at one end and terminating in a vehicular turnaround.

Culvert: Pipe, pipe arch or concrete box structure which drains open channels, swales or ditches under a street or embankment; typically with no catch basins along its length.

Cut: See Excavation.

Dead End: A street with a single location for ingress and egress for vehicles.

Deceleration Lane: The area within an exclusive right-turn lane in which vehicles can slow without interfering with the movement of vehicles in adjacent lanes.

Design Capacity: The traffic volume at which a particular class of street will operate at an established acceptable level-of-service. Typically, the design capacity of a street is the number of vehicles, in a 24-hour period at which that street would operate at a level-of-service "E" or "F," as defined in the Town of Gilbert Transportation Master Plan.

Design Deviation: The process and resulting documentation associated with a feature created or perpetuated by a Public Works improvement that does not conform to the minimum criteria set forth in these Standards and policies, but does provide the same safety elements to the public. This includes what some may refer to as a design exception or exemption.

Design Speed: The vehicle speed which is used to determine the design elements of a street, including but not limited to, intersection/driveway sight triangle, stopping sight distance, super-elevations, curve radii, etc. for residential and industrial streets, or equal to 5 mph above the current or expected posted speed for streets designated as arterials unless otherwise determined by the Town Engineer.

Design Vehicle: The FHWA classification of vehicle (such as "WB-50," BUS, or SU) that is used to establish the design of a particular street, intersection, or driveway; or the on-site maneuvering area required in the parking/loading area of a private business or public facility.

Developer: For the purposes of these Standards, the Developer means any person or entity designated or named in writing by the property or easement owner to be the Applicant, or a public agency or utility which owns a right-of-way or easement in a permit application or approval for a development proposal or capital improvement project. Developer also includes a permit applicant, one who has already been granted a permit, and the Town itself for those situations where Town construction activities are subject to approval under the particular standard.

Development: Land disturbing activities; structural development (including construction or installation of a building or other structure); creation of impervious surfaces; and subdivision, short subdivision and binding site plans.

Director: The Town of Gilbert's Public Works Director herein after referred to as "Director," and his or her authorized representatives.

Drainage Master Plan: The most recent Town of Gilbert Comprehensive Drainage Master Plan.

Driveway: A privately maintained access to residential, commercial or industrial properties.

Easement: A legal encumbrance that is placed against a property's title to reserve specified privileges for the users and beneficiaries, both public and private, within the boundaries of the easement.

Engineer: See Town Engineer.

Engineer Cost Estimate: The estimated cost of construction of all improvements included in the approved Engineering Plans. All fees referencing a percentage of the construction cost shall be based on this Engineer Cost Estimate.

Engineering Plans: The official drawings, plans, profiles, typical cross-sections and supplemental drawings, and specifications, technical reports, or reproductions thereof, approved by the engineer, which show the location, character, dimensions and details of work to be performed. The engineering plan shall be prepared, dated, stamped and signed by a Professional Engineer licensed in the State of Arizona. All such documents are to be considered as a part of the plans whether attached to or separate. An engineering plan may be supplemented with reports which contain detailed calculations, structural calculations, or other supporting documents needed to assess the total plan.

Engineering Review: An evaluation by the Development Services Department of a proposed project's compliance with these Standards and other applicable Town, State, and Federal regulations, ordinances, and policies.

Eyebrow: A partial cul-de-sac bulb located adjacent to the serving street that provides access to lots and serves as a vehicle turnaround.

Excavation: The removal of earth material by artificial means also referred to as cut.

Filling: Deposition of earth materials by artificial means.

Final Acceptance: Acceptance of the infrastructure improvements constructed by the Developer for ownership, operation and maintenance.

Final Construction Approval: The approval granted by the Town Engineer of all infrastructure improvements constructed by the Developer as required by the approved Engineering Plans. All items on the final inspection punchlist must be completed prior to receiving this approval.

Final Inspection: This is the last inspection of the physical infrastructure improvements by the Inspector representing the Town of Gilbert resulting in the list of correction items shown in the final inspection punchlist.

Final Inspection Punchlist: The list prepared by the Inspector of missing or defective work that must be completed in accordance with the approved Engineering Plans and any revisions.

Financial Guarantee: A surety bond, assignment of funds, irrevocable letter of credit, or other means acceptable to or required by the Town Engineer to guarantee that work is completed in compliance with the project's approved plans, and in

compliance with Town of Gilbert requirements.

Footcandle (fc): A measure of light intensity representing the amount of light received by 1 square foot of a surface located 1 foot from a point source of light equivalent to one candle in brightness or illumination.

Geometrics: The physical arrangement of the visible elements of a street such as alignment, grade, curvature, width and side slopes.

Grade: The vertical location of the ground surface.

Grade, Existing: The level of the ground or pavement at a specific location as it exists prior to disturbance in preparation for development.

Grade, Finished: The final elevation of the ground surface after man-made alterations.

Grading: An excavation or fill, or combination thereof.

H-20: A design load consisting of a two-axle loading specified by the AASHTO Standard Specifications for Highway Bridges.

HS-20: A design load consisting of a three-axle loading specified by the AASHTO Standard Specifications for Highway Bridges.

Half-Street: An interim street section built adjacent to the property line which eventually will be completed to a full width street section when the adjacent property is developed.

Hammerhead: A type of street feature used to provide a place for vehicles to turn around at the end of a private "dead-end" street. The turnaround is shaped like a hammer or the letter "T."

Heritage District Redevelopment Area: A special planning district within the Town of Gilbert, as shown in the Town of Gilbert Downtown Design Review Guidelines, 2003. Additional design criteria are required for streets, developments, properties and projects within this area.

Improved Town Street: A term referring to a public street typically paved with asphalt concrete, and having such features as sidewalks, landscaping, a paved area for parked vehicles, curbs and gutters, street lights, traffic signs, pavement markings, etc. This is in contrast to an "unimproved" street with no physical improvements or which might be built with only an unmaintained gravel surface.

Infrastructure Improvements: Street improvements, street lighting, traffic control devices and signage, water, sewer, street, landscaping and storm drainage systems, and conduit for fiber optic systems.

Ingress/Egress: Points of access to and from a property or parcel.

Inspector: The Town's authorized representative assigned to make all necessary

inspections of work performed, or of materials furnished or being furnished by the Developer.

Intersection: The area embraced within the prolongation or connection of the lateral curb lines, or, if none, then the lateral boundary lines of the roadways of two or more highways which join one another at, or approximately at, right angles; or the area within which vehicles traveling upon different highways joining at any other angle may come in conflict.

Intersection/Driveway Sight Triangle: The specified areas along intersection and driveway approach legs, and across their included corners, that are clear of obstructions that might block a driver's view of potentially conflicting vehicles. The dimensions of the legs of the sight triangles depend on the design speed and the type of traffic control used at the intersection.

Joint-Use Driveway: A private driveway jointly owned and maintained driveway serving two properties.

Keyway: A compacted fill placed in a trench excavated in earth material beneath the toe of a slope.

Landing: A street or driveway approach area to any public or private street. Also, this refers to the level area at the back of the sidewalk ramp, typically 4 feet wide.

Land Disturbing Activity: Any activity that results in movement of earth, or a change in the existing soil cover (both vegetative and non-vegetative) and/or the existing soil topography. Land disturbing activities include, but are not limited to, clearing, grading, filling, and excavation. Compaction that is associated with stabilization of structures and street construction shall also be considered land disturbing activity.

Light Loss Factor (LLF): In street lighting calculations, the factor that represents the product of the dirt factor and the end of life depreciation factor, sometimes called the lamp lumen depreciation factor.

Lot: A unit of land shown on a recorded subdivision plat, record of survey map, parcel map, or recorded as a metes and bounds description.

Lumen: The unit of measurement for lighting levels.

Luminance: The reflected light from street lights or other light sources from the pavement surface that is visible to the motorist's eye.

Mainline Extension: The extension or expansion of the system of water mains, sanitary sewer mains, storm drainage systems, streets, and all related appurtenances to be constructed in whole or in part as required by the conditions of approval. Generally mainline extension refers only to improvements that, following Town Council acceptance, become part of the Town utility or street systems.

Materials Testing Laboratory: A materials testing laboratory adhering to ASTM and AASHTO accepted standards and all reports shall be stamped and signed by a

Professional Engineer.

Monitoring: The collection of data by various methods for the purposes of understanding natural systems and features, evaluating the impacts of development proposals on such systems, and assessing the performance of mitigation measures imposed as conditions of development approval.

National Pollutant Discharge Elimination System (NPDES): This is the part of the federal Clean Water Act which requires point source dischargers to obtain permits. These permits are referred to as NPDES Permits and are administered by the Arizona Department of Environmental Quality (ADEQ).

Owner: For the purposes of these Standards, Owner shall be considered the same as Developer, and may be used interchangeably.

Pathway: A facility designated for pedestrian and non-motorized traffic. Pathways are typically constructed of asphalt and may be part of the paved shoulder. Separation from vehicle traffic may be provided by pavement striping, curbing, planter strip, a ditch or open space.

Pavement Widening: Pavement widening projects are expansion of the street surface for vehicular use and may involve earthwork, drainage and paving elements. These projects are considered alterations of the street and must address ADA accessibility for pedestrians.

Permit: Any land use or environmental permit or license required from the Town of Gilbert for a project action, including but not limited to building permits, site development permits, land use preparation permits, subdivisions, binding site plans, planned unit developments, conditional uses, shoreline substantial development permits, and engineering plan review.

Plan Approval: The approval of the Engineering Plans by Development Services staff for the appropriate permit application. This approval is a prerequisite for being able to have the permitted approval to work issued. Also required from the Developer for permit issuance are the appropriate financial guarantees, certificate of insurance, and payment of all applicable fees and charges.

Plans: See Engineering Plans.

Posted Speed: The speed limit as established by Town and State codes or posted on traffic signs along the street.

Pre-Construction Conference: Meeting held by the Town Engineer with the Developer, utilities, contractors and staff to convey information regarding the expectations of the Town.

Private Access Tract: A privately owned and maintained tract that provides vehicular access to single-family residential properties.

Private Street: Any street not required to be maintained by Town of Gilbert.

Professional Engineer: A person who is qualified to practice engineering as attested by his or her legal registration as a Professional Engineer.

Professional Land Surveyor: A person who is qualified to practice land surveying as attested to by his or her legal registration as a Professional Land Surveyor.

Profile Grade: Rate or percentage of change in elevation measured along the centerline of any infrastructure as defined herein, either ascending or descending from or along the said infrastructure.

Project: The proposed action by a Developer requiring improvements to the street, water, storm drainage, sewer and utility systems within the Town.

Protected Driveway Throat: That portion of an industrial/commercial driveway from the back of sidewalk into the property where no turning movements or parking stalls are allowed

Protected Left-Turn Storage: The area within an exclusive left-turn lane in which vehicles can be stopped without interfering with the movement of vehicles in adjacent lanes.

Public Street: Publicly owned facility providing for the movement of vehicles, bicycles, and pedestrians and/or access to adjacent properties, including the street and all other improvements, within the right-of-way.

Public Works: All work, construction, alteration, repair, or improvement other than ordinary maintenance, executed at the cost of the state or of any municipality, or which is by law a lien or charge on any property therein.

Record (As-Built) Drawing: This is the record of all changes to the intended physical product of approved Engineering Plans. Plans shall show all changes that occurred during construction, including changes in materials, distances, lengths, locations, elevations, volumes, etc. and shall contain a Record Drawings certification conforming to these Standards.

Record (As-Built) Drawings Certification: Certification by Professional Land Surveyor registered in the State of Arizona.

Redevelopment: On a site that is substantially developed (i.e., has 35% or more existing impervious surface coverage), the creation or addition of impervious surfaces; the expansion of a building footprint or addition or replacement of a structure; structural development including construction, installation or expansion of a building or structure; replacement of impervious surface that is not a part of a routine maintenance activity; and land disturbing activities.

Residential Local Access Street: Any public street serving private residences that is not designated as a residential collector. Most subdivision streets, for example, are residential streets.

Road: For the purposes of these Standards, Road shall be considered the same as Street, and may be used interchangeably.

Right-of-Way: A strip of publicly owned land occupied by or planned for a street, utilities, landscaping, sidewalks, trails, and similar facilities.

Rock Facing: Slope protection which is constructed of graded rocks, but without cement or grout to hold the rocks together, and which is designed to resist adjacent soil pressures primarily by resistance of their weight and mass only.

Shared Travel Lane: This is a widened travel lane adjacent to the curb or shoulder which is provided for the shared use of vehicles and bicycles. Bicycle route signing and pavement marking is required on these streets.

Shared Use Trail: A path or trail reserved for exclusive use by bicycles and pedestrians and physically separated from motorized vehicle traffic by an open space or barrier.

Site: The area defined by the legal boundaries of a parcel, or parcels of land, subject to new development or redevelopment. For street projects, the length of the project and the right-of-way boundaries define the site.

Shoulder: The paved or unpaved portion of the street outside the traveled way that is available for emergency parking or non-motorized use.

Slope: An inclined surface, the inclination of which is expressed as a ratio of horizontal distance to vertical distance.

Standards: These Town of Gilbert Public Works and Engineering Standards as adopted by the Town Council.

Street: A public or private thoroughfare for vehicular use providing access to public or private property and other streets, including dedicated roadway easements. A public street includes the associated right-of-way. A private street includes any associated roadway or access easement.

Street Frontage: The total length of all lot lines abutting streets.

Stopping Sight Distance: The sum of the distance traveled during a driver's perception of and reaction to a condition and the distance traveled while decelerating to a stop.

Stormwater Pollution Prevention Plan (SWPPP): A pollution prevention plan required by the NPDES stormwater permit requirements. The purpose of the SWPPP is to describe the proposed construction activities and all temporary and permanent erosion and sediment control (TESC) measures, pollution prevention measures, inspection/monitoring activities, and record keeping that will be implemented during the proposed construction project.

Superelevation: The change of the street from a cross-section where the elevation of the edge of the paved area, in a curve in the street, is either higher or lower than normal. Superelevation of the street has been commonly referred to as "banking the curve," and is used to allow a sharper (smaller radius) curve to be used.

Surety: A bonding company that is bound with the Developer to ensure performance of the work shown in the approved plans and specifications, payment of all obligations pertaining to the work, and fulfillment of other such conditions as are specified in the permit, contract, contract bond, or otherwise required by law.

Tile: To replace an above-ground irrigation ditch with an underground, piped system.

Town: The Town of Gilbert, acting through its legally constituted elected officials, employees or agents.

Town Engineer: The Town Engineer hereinafter referred to as "Town Engineer," including authorized representatives.

Traffic Calming Measures: Techniques of design and physical treatments located to encourage a reduction in traffic speeds and the creation of opportunities for streetscape to change the character of a street.

Transportation Demand Management (TDM): TDM is a combination of strategies or actions whose goal is to encourage travelers to use alternatives to driving alone.

Traveled Way: That portion of the street made for vehicle travel excluding shoulders and auxiliary lanes.

Thermoplastic: A type of plastic, bonded to the street surface with a heat source, which is used for marking the channelization.

Tract: A legally created parcel of property designated for special non-residential and non-commercial uses. Common tracts include stormwater drainage tracts, landscape tracts, sensitive area tracts, native growth protection tracts, private access tracts, and tracts for ingress/egress, and utilities that may serve more than one lot.

Uniformity Ratio: This is the ratio of the average light level on a section to the minimum light level of the same section.

Utility: A privately, publicly, or cooperatively owned line, facility, or system for producing, transmitting, or distributing communications, cable television, power, electricity, light, heat, gas, oil, crude products, water, steam, waste, or any other similar commodity which directly or indirectly serves the public. Additionally, the privately, publicly, or cooperatively owned company that owns the line, facility, or system.

Utility Easement: A legal encumbrance that is placed against a property's title to reserve specified privileges for the users and beneficiaries of utility system facilities, both public and private, within the boundaries of the Easement.

Work: The provision of all labor, materials, tools, equipment, and everything else needed to successfully complete the required infrastructure improvements based on approved Engineering Plans.

1.7 ABBREVIATIONS

AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
ADEQ	Arizona Department of Environmental Quality
ADOT	Arizona Department of Transportation
APWA	American Public Works Association
ASTM	American Society for Testing and Materials
ATB	Asphalt Treated Base
AWWA	American Water Works Association
AZPDES	Arizona Pollutant Discharge Elimination System
CATV	Cable Television
CB	Catch Basin
CMP	Corrugated Metal Pipe
DCVA	Double Check Valve Assembly
Diam.	Diameter
fps	Feet per second
GVW	Gross Vehicle Weight
HMA	Hot Mix Asphalt
LID	Local Improvement District or Low Impact Development
MCESD	Maricopa County Environmental Services Department
MH	Manhole
MPH	Miles Per Hour
MUTCD	The Manual for Uniform Traffic Control Devices
NPDES	National Pollutant Discharge Elimination System
NST	National Standard Threads
OCI	Overall Condition Index
PC	Point of Curvature
PCP	Plain Concrete Pipe
PI	Point of Intersection
PCC	Portland Cement Concrete
PKID	Parkway Improvement District
PLS	Professional Land Surveyor
PT	Point of Tangency
PVC	Polyvinyl Chloride or Point of Vertical Curvature
PVI	Point of Vertical Intersection
RCP	Reinforced Concrete Pipe
RPP	Reduced Pressure Principle Backflow Assembly
SWPPP	Storm Water Pollution Prevention Plan
TESCP	Temporary Erosion/Sedimentation Control Plan

1.8 DEVIATIONS FROM STANDARDS

The Town Engineer may approve a Technical Variance that would allow deviation from these Standards under the criteria set forth in this subsection. Technical Variance requests for plats and subdivisions should be proposed at the preliminary application and prior to any public hearing. All known deviations must be approved prior to approval of the Engineering Plans for construction.

An engineering standards Technical Variance is a formal request to allow deviation from the adopted engineering standards required by Town of Gilbert Municipal Code. This includes deviation from the code in regards to engineering requirements as well as deviation from any of the standards and requirements set forth in the Public Works and Engineering Standards and Town of Gilbert Supplement to MAG Specifications and Details.

In general the published standards are considered the minimum necessary to protect/preserve the public health, safety, & welfare; circumstances may arise that require stricter design parameters. Other circumstances may arise where the strict application of the published standards may be perceived as creating an undue hardship on a particular development. In such cases an applicant may request a Technical Variance for relief from a specific design requirement.

Basis and criteria for granting a Technical Variance would include, but not necessarily be limited to the following:

1. Is the matter a self-imposed hardship? If so relief is unlikely.

2. Does the strict application of the code requirement place an undue burden of the property inconsistent with the burden placed on other properties in similar situations under similar circumstances? If not then relief is unlikely.

3. Does the strict application of the design requirement have an unreasonable adverse impact on the property owner's ability to the reasonable use their property? If not then relief is unlikely.

4. Would granting the technical variance create an unnecessary precedent?

5. Financial considerations alone are not a deciding factor.

6. Will the proposed alternative provide a comparable level of protection to the public and otherwise meet the intent of the standards?

(Please note that even if all questions are answered in the affirmative a successful appeal isn't automatic; all circumstances of the situation need to be considered.)

Initial ruling will be made by the Engineering Division's "Development Engineer"; final appeal may be made to Town Engineer.

1.9 CONSEQUENCES OF FAILURE TO COMPLY TO THESE STANDARDS

Failure to comply with these Standards will be cause for denial or revocation of engineering plan approvals and permits; withholding of release of financial guarantees; delay of final inspection; delay or denial of final approval; denial of occupancy certificates (temporary and permanent); notice to surety or other financial institution and/or legal action for forfeiture of financial guarantees; code enforcement; and/or other penalties as provided by law.

2.0 IMPROVEMENT PLANS

2.1 GENERAL INFORMATION

The purpose of this Chapter is to present information, minimum specific guidelines, and provide minimum design criteria and guidance regarding the preparation of all types of improvement plans. This includes related work such as land surveying, use of GIS Data, preparation of Record Drawings, deliverable format and the general process for plan submittal review to the Town of Gilbert. While this section addresses the general requirements for all plan types, additional requirements are also listed in other Chapters relating to the specific type of improvement proposed.

2.2 LAND SURVEY REQUIREMENTS

2.2.1 General Information

The intent of this section is to ensure all projects that involve surveys, aerial mapping, and right-of-way improvement plans will apply consistent methods and standards pertaining to ground surface measurement within the Town of Gilbert.

1. Plans should reflect all existing bench marks in the area of the project and if it is necessary to remove or destroy them due to new construction, notify the Town Engineer for method of re-establishment.

2. All survey work in the Town of Gilbert will be performed under the direction of a professional land surveyor registered in accordance with requirements of the State of Arizona State Board of Technical Registration.

2.2.2 Survey Standards

2.2.2.1 BOUNDARY SURVEYS

All land survey work will be performed within the guidelines of the Arizona Boundary Survey Minimum Standards. These standards may be obtained from the State of Arizona Board of Technical Registration at 1110 West Washington Street, Suite 240, Phoenix, Arizona 85007, or online at: Arizona Boundary Survey Minimum Standards

2.2.2.2 ALTA SURVEYS

ALTA surveys will be based on the latest revision of the American Land Title Association, American Congress on Surveying and Mapping, and National Society of Professional Surveyors, Minimum Standard Detail Requirements for ALTA/ACSM Land Title Surveys.

2.2.3 Horizontal Datum

The horizontal datum for all engineering work (mapping, planning, design, right-of-way engineering and construction) for Town of Gilbert projects shall be the latest realization of the North American Datum of 1983, (NAD83) as defined by the National Geodetic Survey (NGS). The physical, on the ground based survey datum,

shall be Arizona State Plane coordinate system, central zone with a common unit of measure, the International foot.

2.2.3.1 GROUND ADJUSTMENT SCALE FACTOR

A combined scale factor shall be used to convert the horizontal control point values (grid) to ground measurements. The responsible survey registrant for each project shall provide the combined scale factor, adjustments, rotations and other pertinent meta-data used to obtain ground coordinates, as part of the project deliverable.

2.2.4 Vertical Datum

The vertical control datum for use within the Town of Gilbert is the North American Vertical Datum of 1988 (NAVD88), as defined by the National Geodetic Survey (NGS).

2.2.5 Horizontal and Vertical Control System

2.2.5.1 HORIZONTAL CONTROL

Horizontal control for determining NAD83 coordinates will be based on published NGS control stations. GPS Global Navigation satellite system surveys may use a recognized local continuously operating broadcast/reference (COBS or CORS) station signal or Real Time Network (RTN) provided they check into two NGS control station monuments in the vicinity of the project. Control station data used will be documented, described and referenced by name, position, elevation and date on the plans.

2.2.5.2 VERTICAL CONTROL

Vertical control for determining NAVD88 elevations will be based on published NGS control stations in the vicinity of the project.

GPS surveys should be augmented with level and continual survey work as necessary to obtain the desired accuracy for design.

2.2.5.3 NGS DATA SHEETS

Current NGS Survey Control Data Sheets should be downloaded for each project from the NGS website.

2.2.6 Benchmarks

Town Benchmarks can be requested at the Town of Gilbert Engineering Records.

2.2.6.1 PLAN BENCHMARK REFERENCES

All improvement plans must reference on the cover the published NGS monument used for vertical control. Description and elevation in the required NAVD88 datum will be shown.

2.2.6.2 PLAN DATUM REFERENCE

All improvement plans shall contain a statement certifying the datum used for all elevations which are represented in the plans. The statement shall be included on the cover sheet immediately below the benchmark.

2.2.6.3 CURRENT DATUM

Former Town of Gilbert Benchmarks which used the NGVD29 datum are no longer acceptable for vertical control. If conversions of Record Drawings are required to convert from old control in the NVGD29 datum, the survey registrant is responsible for determining the equation and providing on the plans.

2.2.7 Updating of Standards and Specifications

It is recognized that positioning technologies are continuously evolving and that control available for geo-referencing may be revised or augmented. Therefore these standards will be periodically updated and the version in force during data collection shall be specifically referenced in the project scope.

2.2.8 Digital Images

Digital images shall be obtained to adequately cover the project. The images shall be geo-referenced by survey coordinates with an accuracy of +/- 1 meter. A JPEG image format is preferred for all images with at least a 5 mega pixel resolution.

2.2.9 Deliverables

2.2.9.1 NON-DIGITAL MEDIA

1. Final full size base map drawings signed and sealed by an Arizona registered land surveyor.

2. Unrecorded surveys or Record Drawings not obtained from Town of Gilbert.

2.2.9.2 DIGITAL MEDIA

Directories and subdirectories shall be created so as to produce an organized structure that is easily followed to obtain the copied files and all referenced files. The following items shall be copied into the appropriate directories onto a CD with the Town of Gilbert project name, work order number, land surveyors stamp and signature on the label.

1. Data Collection Files

   This includes all files associated with the data collection, including but not limited to:

   - GPS project(s) (i.e., Trimble Business Center, Prism, etc.)

   - Digital level runs

2. Computer Aided Design (CAD)

   All files associated with generating the base map drawing, including but not limited to:

   - Raw Data: The appropriate raw data for the software utilized
   - Coordinates: Comma delimited ASCII format listing point number, northing, easting, elevation, descriptor code and notes
   - Digital Terrain Model
   - Drawings/Exhibits (.dwg)

3. Images

   All photographic images taken on the project.

4. Miscellaneous

   Any and all files that were used in conjunction with the base map generation.

2.3 GIS REQUIREMENTS

The Town is using GIS technology for capturing, managing, analyzing, and displaying all forms of geographically referenced data and information. GIS data submitted to the Town shall comply with the Arizona Spatial Data Accuracy and Geo-Referencing Standards available from the Arizona Professional Land Surveyors (APLS).

2.4 STATE AND COUNTY REGULATIONS

2.4.1 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 ADEQ Drywell Registration on the ADEQ website.

2.4.2 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 acres or greater.

The developer/contractor shall provide the Town of Gilbert 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. For additional information refer to the Maricopa County Air Quality Department website.

"All drywells shall be maintained by the owners and are to be replaced or repaired by the owner when they cease to drain the surface water in a thirty-six-hour period. Regular maintenance of the drywell silting chamber is required to achieve the best operation of the drywell."

All utility design must be per latest Maricopa County Environmental Services Department requirements and submitted to them for approval prior to the issuance of the Town of Gilbert permit.

2.4.3 Storm Water Quality

Projects disturbing 1 acre or more are subject to the National Pollution Discharge Elimination System (NPDES) requirements for construction sites under the Environmental Protection Agency (EPA) general permit for Arizona. Owners, developers, engineers, and/or contractors are required to prepare all documents required by this regulation, including but not limited to Stormwater Pollution Prevention Plan (SWPPP), Notice of Intent (NOI) and Notice of Termination (NOT).

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 Gilbert which will disturb 1.0 contiguous acres or greater, shall complete a Notice of Intent (NOI).

Stormwater 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 Water Quality Division.

2.5 IMPROVEMENT PLAN REQUIREMENTS

Engineering Plans for all public and private projects shall be prepared and submitted through the Town of Gilbert Development Services Department as part of a civil construction permit application or other applicable permit. The anticipated order of events is: submittal of Engineering Plans and permit application(s); acceptance of Engineering Plans as complete; approval of Engineering Plans; submittal of associated documents such as financial guarantees and certificate of insurance; and issuance of permit(s)/approval to work. Projects may be constructed in phases provided that all public and private infrastructure needed to serve the phase being accepted has met the conditions of these Standards. At a minimum, the Engineering Plans shall meet the following requirements:

2.5.1 General Plan Requirements

All improvement plans must comply with the following requirements:

1. All design must be in accordance with the Town of Gilbert Public Works and Engineering Design Standards and the Uniform Standard Specifications and Details published by the Maricopa Association of Governments and as amended by the Town of Gilbert.

2. New street right-of-way or utility easements must be coordinated through the Town of Gilbert Development Services.

3. All utility design must be per latest Maricopa County Environmental Services Department requirements and submitted to them for approval prior to the issuance of the Town of Gilbert permit.

4. All improvements within proposed retention basins and/or roadway parkways shall be designed and constructed in accordance with current Town policy and standards.

5. Review all comments made at Subdivision Preliminary Plat Review and incorporate into plans.

6. The improvement plans must include a general master utility layout for the subdivision as one of the sheets in the total set of plans.

7. The Town requires that all retention basins, arterial street parkways and right-of-way must be improved with sprinklers and landscaping as per the guidelines of the Town of Gilbert.

8. The developer shall provide for temporary retention of adjacent street runoff during construction. Developer is also required to comply with the Town of Gilbert Storm Water Regulations and the Environmental Protection Agency (EPA) Guidelines for storm water discharge.

9. A Professional Engineer licensed and in good standing with the State of Arizona shall prepare the Engineering Plans. The Engineering Plans must be signed and stamped by the responsible Professional Engineer, or clearly marked "PRELIMINARY NOT FOR CONSTRUCTION" per Arizona State Board of Technical Registration requirements prior to submittal to the Town.

10. The Engineering Plans' title block shall be located in the lower right corner or along the right margin of the drawing and include the project name, permit number, Developer's name, and the name, address, seal, date and signature of the responsible Professional Engineer. The permit number and project information must be in the lower right hand corner. The cover sheet and all engineering plan sheets shall include the same general title block including consecutive sheet numbers. The vicinity map and legend of symbols shall also be included on the cover sheet.

11. The engineering plan sheets shall be 24"x36" in size on good quality white paper and in reproducible black ink. Engineer scale and scale bar shall be required with horizontal 1"=20' and vertical 1"=2' for the street frontage/public improvements. Site work plans may use an engineering scale of 1"=50' for horizontal and 1"=5" for vertical. Channelization plans for intersections shall be provided at a 1"=20' scale. The engineering plan sheets may also be submitted in electronic (pdf) format.

12. All final Engineering Plans submitted to the Town shall be high resolution bond paper drawings and shall be clear, legible, contain a north arrow, and be

drawn to scale. Electronic copies of the final Engineering Plans shall be provided in the version of AutoCAD currently in use by the Town at the time of the submittal. Where modifications to existing streets and utilities are to be constructed, existing features shall be "screened or ghost lined." New construction and/or improvements shall be indicated with heavy bold lines using APWA standard CAD symbols and layers. Final real property documents shall be submitted in hard copy or an electronic copy which is non-alterable.

13. The Engineering Plans must include right-of-way information including existing and proposed survey monuments. The street centerline, easements, and other pertinent data shall be referenced to existing monuments.

14. The Town of Gilbert Engineer may require other plan elements in addition to those described above.

2.5.2 Cover Sheet Requirements

The front or cover sheet shall be 24" by 36" and shall contain the following Information:

1. Project Name and Street Address and any Town of Gilbert CIP information.

2. Name of Developer with address and contact information.

3. Small location map.

4. Small scale subdivision sheet index map (north to top or to right side of sheet).

5. A note concerning the different permits required and who is responsible for obtaining.

6. Engineer's seal and stamp of approval. Proper use of electronic signature for digital submittals is required.

7. Location provided for signature of approval for Maricopa County Environmental Services Department.

8. List all "Town of Gilbert" benchmarks used on this project. Contact the Development Services Department (480-503-6848) for location and elevation. Take ties to Salt River Valley Water User's Association, State and County bench marks if they are involved. Any project submitted to the Town of Gilbert for review must use approved Town datum.

9. A note: "Call the Arizona 811, Blue Stake Center (602) 263-1100, 48 hours before you dig for location of all underground utilities."

2.5.3 Notes, Quantity and Index Sheet Requirements

The notes sheet shall contain the latest applicable Town of Gilbert notes for the type of development improvements proposed. The latest version of the Town of

Gilbert Plan Notes is located on Town of Gilbert Development Services website. Listed below are the minimum notes required.

1. Any contractor found working on a project without an official set of stamped, approved drawings by the Town of Gilbert will be shut down until further notice.

2. The contractor shall notify the El Paso Natural Gas District Superintendent and the Southwest Gas District Superintendent 48 hours prior to commencing construction in the vicinity of the rights-of-way so that they may have a representative present at all times.

3. Excavation and construction work will not be permitted in public rights-of-way or public utility easements on Saturday, Sunday, or legal holidays.

4. All design and construction must be in accordance with the most recent version of the Uniform Standard Specifications and Details published by the Maricopa Association of Governments and as amended by the Town of Gilbert.

5. A note stating which lots will receive water and sewer services and the sizes.

6. The contractor shall notify the Town of Gilbert Development Services Department at least 24 hours in advance of any construction for inspection. Call (480) 503-6700.

7. A note regarding the coordination by the developer and contractor to avoid the placement of driveways in conflict with utility services.

8. A note pertaining to the responsibility for the coordination of the relocation of power poles and other utilities.

9. A typical note for the contractor to adjust all valves, manholes, cleanouts, etc., both new and old to finished pavement grade per standard details.

10. Backfill and compaction within County right-of-way shall be in accordance with the latest Maricopa County Special Provisions for installation of underground utilities.

11. Contractor shall comply with the provision for traffic control as per the latest edition of the Manual on Uniform Traffic Control Devices Handbook.

12. Call the Arizona 811, Blue Stake Center (602) 263-1100, 48 hours before you dig for location of all underground utilities.

13. Engineer certifies that he has contacted all interested utility companies and has transferred all existing and/or proposed utility lines and related information onto these plans, and that Engineer has also correctly plotted the existing and proposed right-of-way and easement lines.

14. The contractor shall be required to install a night tie-in for any new water line that will affect existing service sufficient to warrant same in the opinion of the Town Off-Site Inspector.

15. All improvements within the retention basin and/or roadway parkways shall be in accordance with the latest Town of Gilbert Procedures for developers and engineers.

16. Contractor is advised that an excavation and dirt moving permit is required by the Maricopa County Health Department and the Town of Gilbert. It shall be the responsibility of the contractor to obtain this permit and comply with its requirements.

17. All sprinkler and landscape must be installed in accordance with the approved design review requirements and approved.

18. All sight lines shall comply with Town of Gilbert Standard Detail GIL-211 or GIL-212 (whichever is applicable) at time of installation.

On a quantities sheet, provide a detailed list of quantities broken down by sheet. If project is to be phased, separate quantities must be provided for each phase.

On a separate key index sheet, provide a graphical index referencing the sheets for all improvements included with the project (i.e., sewer, water, paving, storm drain, etc.).

2.5.4 Plan Sheet Requirements

Construction plans for improvements typically consist of a variety of types of sheets. All construction plan design sheets shall include the following:

2.5.4.1 HORIZONTAL CONTROL

1. The origination point of all position systems shall be based on an established survey point or monument and identified on the plans and be on a Town approved benchmark.

2. Position systems shall be designed to proceed from south to north, west to east, left to right.

3. All plan sheets shall be stationed in 100-foot intervals minimum.

4. Bearing and distance on all horizontal control need to be clearly identified on each sheet. Bearing and distances need to be identified for each change in bearing.

5. CIP projects require Temporary Benchmarks (TBM) established by a project engineer or surveyor when it is necessary to maintain vertical control. All TBMs shall be per Town datum.

2.5.4.2 OTHER PLAN INFORMATION

1. All jurisdictions (Town, County, and State) in which this project falls. Projects that are adjacent to corporate limits of municipalities, County or State shall delineate the location of the corporate limits and identify the jurisdictions on all applicable sheets.

2. Plans shall differentiate between the existing and proposed improvements and show all the existing conditions.

3. Plans shall show all existing utilities complete with line sizes, types (i.e., water, sewer, gas, electrical, telecommunication, etc.) and locations. A distinct line type shall be created for each type of utility that notes the size of the utility and type of line.

2.5.5 Plan and Profile Sheet Requirements

1. Use a standard single plan and profile, 24” by 36”. The scale shall be one inch equals 20 feet horizontal and one inch equals 2 feet vertical. Double plan and profile is not acceptable.

2. Plans must show sizes, types and locations of all existing and new utilities, including services, paving, curb, sidewalk, fire hydrants, valves, manholes and all miscellaneous items of construction, such as street sign posts, driveways, etc.

3. Where gas is to be installed, a separate line for gas must be shown and labeled on each drawing. This must be coordinated with Southwest Gas and El Paso Natural Gas.

4. Clearly differentiate between new and old improvements (existing 6 inch pipe versus proposed 6 inch pipe). Also, shade pavement, etc.

5. Plans must be stationed from left to right with north being towards the top or right side of the sheet.

6. Sewer, reclaimed water and water shall be shown together on same sheet.

7. Paving and storm drain shall be shown together on same sheet.

2.5.6 Detail Sheets

Detail sheets are supplemental sheets that depict special construction details required to clarify some aspect of the proposed improvements.

MAG or Town of Gilbert Standard Details are not to be included on the detail sheets unless the Detail is being modified. The modifications shall be clearly identified and the detail shall be titled “Modified MAG or Town of Gilbert Detail.”

2.5.7 Plan Review Comments and Response

The project's plan review comments (including redlines) shall be addressed by correction or clarification response. If there is a discrepancy concerning a redline comment, contact the Town plan review staff. The redline set of plans shall be returned with the next improvement plan submittal. Include a separate redline correction response letter addressing each comment and correction measure provided. The letter shall address each comment with plan sheet location noted, along with the applicable resolution of the comment.

For CIP projects, review comments shall be tabulated by the engineer, and an initial disposition shall be attempted. The table shall depict the comment, comment originator, sheet number of the comment, and disposition to the comment. Upon completion, the table shall be forwarded to Town staff for review prior to the comment resolution meeting. During the comment resolution meeting, final disposition will be determined. The subsequent submittal shall then reflect all necessary changes as outlined by the direction in the disposition table. The subsequent submittal shall include a copy of the comment disposing table and final disposition with a set of the revised documents.

Failure to identify all of the changes may result in the return of the plans with an additional review required, and may require additional review fees based on the approved fee schedule. For CIP projects, this may require additional submittals at no cost to the Town.

Final Plan submittal procedure:

- Plans are reviewed and accepted
- The engineer submits for signatures:
  - Cover sheets for engineer's set of originals
  - One complete set of full-sized and two reduced (11" x 17") sets of prints.
  - Digital copy of the plans
- Project is constructed

2.6 PROCEDURE FOR IMPROVEMENT PLAN SUBMITTAL

2.6.1 General Submittal Requirements

1. The developer must comply with all the requirements of the Town of Gilbert.
2. Developer must contact the Town of Gilbert Development Services Department regarding existing and new private line agreements or waivers.
3. It is the responsibility of the Developer to obtain the Town's desired location for tile and then make necessary requests and coordination with Salt River Project and Roosevelt Water Conservation District (RWCD) to design tile for

existing ditches.

4. The developer is required to contact Qwest, Salt River Project, Arizona Public Service, Cox Cable, CenturyLink, El Paso Natural Gas and Southwest Gas for location of existing and proposed buried conduit or cable and must be shown on plans to ensure that no conflicts arise before approval can be given. Conflicts arising from failure to do this shall be the responsibility of the developer.

5. Provide five (5) complete sets of plans for all reviews. Where sprinkler systems and landscaping plans are required for parkways and retention basins, they must be included in the total set of drawings.

6. Refer to the building safety requirements for projects in conjunction with a site, apartment, townhouse or commercial property. See the Town of Gilbert Development Services Processes.

7. Do not submit preliminary plans unless previously arranged.

8. Deed for easements, rights-of-way, or parcels upon which improvements are being constructed will be prepared by the Town Development Services Department and signed by the owner. The engineer must prepare and submit legal descriptions required together with a map of the described area.

9. Developer is to provide a "Letter of Assurance or an approved performance bond" from his financial lender guaranteeing the off-site improvement money for each unit he proposes for construction or recording. Engineer to provide preliminary construction estimate to substantiate the amount. When "Letter of Assurance" expires, all construction will halt and permits will be held until a new "Letter of Assurance" is filed with Engineering. Other forms of financial assurances may be provided as approved by the Town Engineer.

10. The developer is to provide a copy of his project soil investigations for Town review. Any areas of expansive soil will require special treatment during project construction. The engineer shall note these areas and special requirements on the plans.

11. If the original developer sells a portion of acreage which was previously included in his overall Preliminary Plat, the new developer and engineer must resubmit their acreage and proposed plat for "staff" review. This applies even if they still plan to follow the original tentative plat.

12. Engineer must provide a closure of his final plat before it can be recorded. The closure should be furnished with the first set of improvement plans submitted for review.

13. Areas of all lots and tracts etc. shall be listed on plat.

14. Any projects planned within the Roosevelt Water Conservation District (RWCD) must convey to the Town of Gilbert their existing water rights that are no longer required, prior to issuing any construction permits. If the developer

plans to continue irrigating new lots, then only the water rights for the street and house pad areas need to be conveyed to the Town.

15. As a condition for, and prior to, the issuance of any grading permit, the contractor shall submit an application for a haul route permit along with any applicable temporary Traffic Control Plan. Upon approval of the proposed haul route, the off-site inspector and a representative of the contractor shall inspect the roadways to be used by the contractor and take photographs to verify their existing condition. After all grading is complete, the off-site inspector and the contractor will again inspect the haul route and if necessary, the contractor shall be charged with restoring the roadways to their previous condition or better.

16. All Private Development projects must have Preliminary Plat/Site Plan approval prior to improvement plan submittal.

17. A letter of transmittal, in duplicate and signed by the engineer, shall accompany all improvement plan submittals. The letter of transmittal shall indicate the following:

    - Date of delivery of submittal
    - The review number (1st review, 2nd review, etc.)
    - The number and type of plans which are being submitted
    - The number and type of all required standard forms being submitted
    - Engineering tracking number

18. All Private Development plans submitted to the Town of Gilbert shall be submitted at the Development Services Department; do not hand carry any plans to Department Directors or Plan Reviewers. Without your copy of the transmittal letter stamped "received," your plans are not in the review process. All review fees must be paid at the time of submittal.

19. One copy of the letter of transmittal, stamped "received" by the Town, will be your receipt for the submittal.

20. Improvement plan submittals will be distributed for review on the following business day.

21. The "red lined" checked prints from the previous review shall accompany all succeeding reviews (no exceptions).

22. After drawings have been completed, along with required changes and corrections, if any, a complete set of reproducibles must be furnished to the Development Services Department for their use, including any tile drawings by Salt River Valley User's Association or Roosevelt Water Conservation District (RWCD).

23. Upon completion of review, engineer will be notified by email or telephone when to pick up their submittal.

24. Fees are determined according to current Fee Schedules.

25. Off-site Improvement Fees: fees calculated from "Certificate of Quantities" shall be submitted with the final review of the Improvement Plans. All plats will be recorded by the Town of Gilbert (all recording fees will be paid by the developer).

2.6.2 First Review Submittal Requirements

First review submittals that are submitted in hard copy format shall contain the following plans and required standard forms:

- Final Plat 5 sets
- Landscape Plans 5 sets
- Grading Plans 5 sets
- Drainage Study 2 sets
- Paving Plans 5 sets
- Soils Report 1 set
- Water Plans 5 sets
- Sewer Plans/Reclaimed Water 5 sets
- Streetlight Plans 5 sets
- Traffic Signal/ Interconnect Plans 5 sets
- Signing and Striping Plans 5 sets
- Boundary Closure 1 set
- Executed Water Agreement
- Executed Reclaimed Water Agreement
- Executed Sewer Agreement
- Executed Garbage Agreement
- Executed Street Light Agreement
- Executed Street Light I.D. Petition, Legal Description and Vicinity Map
- Draft Covenants, Conditions and Restrictions (CC&Rs)

- Notice of Intent (NOI) and approved Stormwater Pollution Prevention Plan (SWPPP)
- Current Title Report (up to 60 days old is acceptable)
- A.L.T.A. Extend Coverage Policy

Electronic submittals shall be made with 5 discs, with all information included on each disc.

First reviews that are incomplete and do not contain all of the above itemized plats, plans, reports, studies and required forms will not be accepted.

2.6.3 Utility Company Approvals

A full set of improvement plans, including Landscape Plans, Grading Plans, Paving Plans, Water Plans, and Sewer Plans together with the "Utility Location and Conflict Notice" shall be submitted to each of the following utility companies in parallel with the First Submittal:

- Salt River Project (SRP)
- SRP Land Department
- Salt River Valley Water User's Association
- CenturyLink
- Cable Television Companies
- Arizona Public Service (APS) (if project is located in APS service area)
- Southwest Gas and/or El Paso Natural Gas (if gas service is required)
- RWCD - Roosevelt Water Conservation District (if in service area)
- Other utilities in the project area

2.6.4 Second Review Submittals

The second review and all subsequent reviews shall include 5 sets of the following (unless otherwise indicated):

- Final Plat
- Landscape Plans
- Grading Plans
- Drainage Study
- Paving Plans

- Water Plans
- Sewer Plans
- Streetlight Plans
- Traffic Signal/ Interconnect Plans
- Signing and Striping Plans
- Final Covenants, Conditions and Restrictions - 1 copy
- 8½" x 11" PMT of plat – 1 copy
- Engineer's Certificate of Quantities - 1 copy
- Assurance of Construction and Offsite Agreement Form - 1 copy
- Signed Utility Conflict Notices from all Utilities - 1 copy
- Engineer's Cost Estimate - 1 copy

2.7 PROCEDURE FOR SITE PLAN SUBMITTAL

2.7.1 Commercial and Multi-Family Projects

These plans usually contain a combination of off-site and on-site plans. All projects must have site plan approval prior to improvement plan submittal.

Requirements for hard copy submittal include:

1. 4 complete sets of both the architect's and engineer's drawings as a total package to the Development Services Department.
2. All engineering and landscaping plans must be submitted on 24" x 36" sheets. There will be no exceptions.
3. The applicant must submit these in person and complete an application information form at the Development Services Department.
4. A separate Signing and Pavement Marking Plan (1:20/1:40 scale) shall be submitted addressing both off-site and on-site Signing and Pavement Markings.

*Electronic submittals are also acceptable.

Resubmittals must always be returned to the Development Services Department as the coordinating agency for commercial and multi-family projects.

2.7.2 Subdivision Review

The following materials, along with the necessary fee and any other required

supporting data, must be submitted as a complete package, to Development Services Department. It is the applicant's responsibility to be sure their submittal is complete.

One requirement of Subdivision Review and, in some instances the most important step, is Pre-Application Preliminary Review. This step is designed to give guidance to an engineer or their developer with regard to the critical design aspects of their plat or project. These include general street patterns, possible need to rezone, availability of utilities, intersection conflicts, among other items. The Pre-Application review is to be completed prior to submittal of Preliminary Plat.

2.7.2.1 SUBMITTAL REQUIREMENTS

Following the Pre-Application Preliminary Review, the subdivider shall present to the Planning Department 15 copies of the Preliminary Plat, a summary of lot sizes together with a completed application form and the appropriate fee as noted on the Fee Schedule

2.7.2.2 GENERAL SUBMITTAL REQUIREMENTS

1. 15 copies of the Preliminary Plat and 1- 8½" by 11" photo transparency (PMT) of the Preliminary Plat.

2. The Preliminary Plat shall be drawn at a scale of not more than one 100 feet equals 1 inch or adjusted to produce an overall drawing of 24" by 36". (Use more than one sheet, if necessary.)

3. Submit a preliminary hydrology report in a separate bound folder. See Chapter 3.0, Storm Drain Facilities.

4. If the developer is planning to phase the improvement of their subdivision, it must be so indicated on their Preliminary Plat when submitted for subdivision review. If the developer later decides to phase improvement, it will be necessary to re-submit for a second review.

5. Submit a summary of lot sizes, which either indicate the size of lot within ranges, or state the square footage of each lot.

6. Construction Permit Fee Schedule (Certificate of Construction Quantities).

2.7.2.3 SUBMITTAL IDENTIFICATION

1. Name, address and telephone number of subdivider.

2. Name, address and telephone number of engineer, surveyor, landscape architect or land planner preparing plat.

3. Proposed name of subdivision and its location by Section, Township and Range referenced by dimension and bearing to 2 section corners. Basis of bearings used must be stated on plat.

4. Scale, north point and date of preparation including dates of any subsequent revisions.

5. Location map with reference to main arterials, canals, railroads, etc.

6. Name, book and page number of any recorded and adjacent subdivision having common boundary with tract.

7. By note, existing zoning classification of subject and adjacent tracts.

8. Boundary closure and acreage.

9. Boundaries of tract to be subdivided shall be fully dimensioned.

2.7.2.4 PLAT REQUIREMENTS

Preliminary Plat

1. Topography by contours and spot elevations related to approved Town datum. Contour interval shall not exceed 2 feet and shall adequately reflect character and drainage of land.

2. Location of fences, wells, lakes, ditches, power lines and trees.

3. Location and extent of areas subject to inundation and indicate frequency.

4. Location widths and names of all platted streets, railroads and utility rights-of-way of public record and any recorded easements. Permanent structures to remain, including water wells and utility lines within or adjacent to tract.

5. Show layout of proposed streets and alleys, giving widths, preliminary curve data and proposed names. For PADs, include the Architect's layout showing buildings, sidewalks, parking stalls, amenity package, etc., as part of the submittal.

6. Show "scaled" typical lot dimensions, dimensions of all corner lots and lots on curvilinear sections of streets; number each lot individually and give total number of lots and area of each lot, parcel and tract.

7. Give designation of all land to be dedicated or reserved for public use, with the use indicated. Describe the use of all tracts.

8. If multiple uses are planned, (multi-family, commercial, industrial) such areas shall be clearly designated together with existing zones and zoning changes, if any.

9. Show method of sewage disposal, a statement as to the type of facilities shall appear on the Preliminary Plat. Also show the preliminary sewer layout, indicating grades, manhole locations, cleanouts, slopes, depths. See Chapter 8.0, Wastewater Collection and Treatment Systems.

10. The preliminary layout of the water system shall be shown indicating fire hydrants, valves, meter vaults, water line sizes. See Chapter 7.0, Water Distribution and Transmission Systems.

11. Denote refuse collection system.

Final Plat

The Final Plat shall contain a "Full Metes and Bounds" description which shall include:

- Description of all "U.S. Public Land Survey Corners" used in determining the location of the plat.
- Descriptions of all exterior corners set that locate the plat within the section.
- Method of determining bearings and controlling corners used.
- Total area of plat and a "Certificate of Dedication" for all public rights-of-way, easements and tracts.
- Total area of each lot (in square feet).

2.7.2.5 PRELIMINARY PLAT REVIEW

Preliminary Plats will be routed to the following internal agencies:

- Landscape
- Planning
- Traffic Engineering
- Fire
- Engineering
- Water Resource
- Traffic Operations
- Sanitation
- Addressing

And the following outside agencies where applicable:

- Gilbert Schools
- Chandler Schools

- Higley Schools
- Maricopa County
- Chandler
- Mesa
- Queen Creek
- Pinal County
- SRP
- RWCD
- Union Pacific RR
- MDCOT
- ADOT
- Phoenix Mesa Gateway Airport

Reviewing agencies shall be requested to transmit their recommendations to the Development Services Department in writing. The Development Services Department shall summarize the reviewing offices' recommendations, prepare a staff report regarding the project and present it to the Planning Commission.

2.7.3 Standard Agreements and Forms

All site and subdivision plan submittals will need to include the following standard agreements and forms.

1. Off-site Improvement Agreement
    - Off-site Improvement Agreement for subdivisions
    - Off-site Improvement Agreement for non-subdivisions
2. Assurance of Construction (one or more required)
    - Assurance of Construction for subdivisions
    - Assurance of Construction for non-subdivisions
    - Performance bond or letter of credit
    - Alternate method of assurance letter
3. Construction Permit Fee Schedule (Certificate of Construction Quantities).

4. Utility locates and utility conflict notices

5. Reclaimed Water User's Agreement

2.8 RIGHT-OF-WAY MANAGEMENT

2.8.1 Transfer of Ownership of Real Property

All real property and interests therein shall be conveyed to the Town by statutory warranty deed (individual, partnership or corporate) or by dedication on final short plats and subdivision plats. All exceptions and encumbrances shall be cleared prior to conveyance. Interests to be conveyed include, but are not limited to, rights-of-way, storm drainage easements, slope easements and utility easements.

2.9 RECORD DRAWING REQUIREMENTS AND CERTIFICATION

This chapter provides guidance and minimum requirements for the preparation of Record Drawings. It is intended for use during and after construction and documentation of improvements installed.

NOTICE: THE RIGHT-OF-WAY INFRASTRUCTURE IMPROVEMENT CERTIFICATES OF COMPLETION RELEASES AND BUILDING CERTIFICATES OF OCCUPANCY WILL NOT BE RELEASED UNTIL CERTIFIED RECORD DRAWINGS HAVE BEEN SUBMITTED TO AND APPROVED BY THE TOWN.

2.9.1 Record Drawing Requirements

1. Developer's engineer and/or surveyor shall provide a letter and approved Record Drawings subsequent to construction. The Record Drawings shall be signed and stamped with a professional seal certifying that all improvements have been installed according to the approved plans. Certification shall be addressed to the Town Engineer and must be received before the specific items will be accepted by the Town. Record Drawings shall include property line ties to water and sewer services, curb ties to valves and stationary ties to sewer manholes, final street grades showing all grade breaks, top of curb and flow line elevations at all P.C.'s., the locations and depths of all electrical, telephone, TV cables and gas mains.

2. Record Drawings of all retention basins including landscaping, appurtenant electrical systems, sprinkler systems, drywells and capacity calculations.

3. Record Drawings shall be submitted in Digital Format CD. All Record Drawings shall contain the following certificate signed and stamped by the Design Engineer "I hereby certify that the Record Drawing measurements as shown or noted hereon were made by myself or under my supervision and are correct to the best of my knowledge and belief."

2.9.1.1 SUBMITTALS

1. 2 bond sets of plans shall be submitted with Record Drawing redline markings to the Town for review. Once the bond set of redlines Record Drawings are

approved and accepted, the engineer shall complete the submittal process noted in the paragraphs below.

2. Record Drawings shall be submitted in a digital file, "TIF" or "PDF" format.

2.9.1.2 RECORD DRAWING PLAN SUBMITTAL GUIDELINES

All Record Drawings shall have a company transmittal attached as documentation of who is submitting them. This is necessary in order to process the plans and for contact information when the review is complete. Plans will not be reviewed if transmittal documentation is missing.

Record Drawings submitted for review shall consist of two blackline paper sets (copied from the original plans, not a permit set) and two electronic copies (CD's) as requested by the Town, containing all the original signatures. One set will be reviewed and returned if there are Town comments. All comments must be addressed. Two revised plan sets will be required with each resubmittal along with the previous redlined review set until final Town approval is obtained. Items out of tolerance shall be required to be reconstructed and corrected prior to starting the next construction phase.

All final Record Drawings shall be submitted immediately following completion of the landscape phase. If the project is developed in phases, Record Drawings for each phase shall be submitted once the work is complete in that phase. Letters of Completion and Acceptance will not be issued until all items out of tolerance have been corrected and all final Record Drawings have been submitted and approved by the Town.

2.9.1.3 RECORD DRAWING DISCLAIMER

The Town of Gilbert assumes no responsibility for the accuracy of Record Drawing information provided as a public record.

The following records are required for Town owned facilities or facilities that will be transferred to the Town, including, but not limited to, test results, permits, certifications, registrations and reports such as:

- Property legal descriptions, survey, registration and certification
- Well abandonment registration and certification
- Drywell registration and drilling log for each drywell
- Acknowledgement of completion to satisfaction of other jurisdiction or agency requirements
- Spreadsheets/cards with all data on valves, fire hydrants, and other appurtenances including make, model, size, bury depth, etc.

2.9.2 Record Drawings Certification

1. The Town Engineer will accept off-site improvements following final inspection and receipt of approved Record Drawings. It is the responsibility of the developer, consulting engineer and contractor to coordinate timely submittals of the Record Drawings in order to affect a final letter of acceptance.

2. Furthermore a Final Letter of Acceptance shall not be issued to the developer of the project until all affected roadways are restored to their previous condition or better and all applicable signing and pavement markings have been installed and inspected by the Traffic Engineering Section.

3. A drillers log (including strata encountered and depth) will be required on all drywells prior to the Town writing Letters of Acceptance.

4. Record Drawings shall be submitted in Digital Format CD prior to any Letters of Acceptance.

5. Record Drawings shall be signed and sealed by a Professional Engineer or Land Surveyor registered in the State of Arizona with a completed and sealed "RECORD DRAWING CERTIFICATION" approval block.

The following is an example of the Record Drawing certification document required by the Town of Gilbert. It shall be sealed by a registered land surveyor or professional engineer, registered in the State of Arizona.

RECORD DRAWING CERTIFICATION

I hereby certify that the Record Drawing measurements as shown or noted hereon were made by myself or under my supervision and are correct to the best of my knowledge and belief.

_____ _____

Signature Date

SEAL

2.10 POLICY ON LETTERS OF ACCEPTANCE

2.10.1 Conditional Letter of Acceptance

A Conditional Letter of Acceptance will be issued on the sewer and water improvements when the following have been completed:

2.10.1.1 WATER SYSTEM

1. Compaction tests have been taken and approved (entire system) on the trench backfill.

2. Pressure and bacteria tests have been taken and approved on the entire system.

3. The meter and valve boxes are set (per an Arizona 811 Blue Stake for each box) or the Town receives a letter from the contractor stating they will be set after the concrete work is done.

2.10.1.2 SEWER SYSTEM/RECLAIMED WATER

1. Compaction tests have been taken and approved (entire system) on the trench backfill.

2. Pressure testing, Mandrel and close circuit televising of the sewer system have been completed and approved.

Notes:

- No other permits/approval to work will be issued until the above mentioned tests and conditions are met.

- The original contractor will make all repairs on the improvements they have installed.

- The original contractor will do all "locates" for the utilities they have installed until the Town issues a Final Letter of Acceptance.

2.10.2 Letter of Acceptance

A Letter of Acceptance for improvements will be issued when all of the following conditions have been met:

2.10.2.1 PAVING

1. All concrete and asphalt work has been completed and approved.

2. Manhole rings, covers and water valve boxes have been brought to grade and approved.

3. Record Drawings have been submitted and approved.

4. Pavement striping is completed and all street and regulatory signs are in place.

5. All monuments are in place.

2.10.2.2 SEWER SYSTEM/RECLAIMED WATER

1. The entire system has been cleaned and had passed a deflection test (if applicable).

2. Record Drawings complying with GIS Deliverable requirements outlined in Section 2.9.1 have been submitted and approved.

3. Manholes have been cleaned, sprayed with insecticide laden paint, and all plugs have been removed.

4. All manhole lids, valves, and meter boxes have been raised to grade.

5. All manholes with 12 inch or greater sewer line to be epoxy coated for H2S.

6. Length between manholes does not exceed six-hundred feet.

7. No clean outs for public sewer.

8. No 90 degree bends in manholes.

9. No inside drop manholes.

10. Channel in bench leading to flow in all drop manholes.

11. No steps in manholes.

12. Approval of Construct Letter from Maricopa County is received.

2.10.2.3 WATER

1. If (because of damage by other contractors) the Inspector deems it necessary, additional pressure and/or bacteria tests have been taken and accepted.

2. Record Drawings complying with GIS Deliverable requirements outlined in Section 2.9.1 have been submitted and approved.

3. All fire hydrants, valves, and meter boxes have been raised to grade.

4. Approval of Construction Letter from Maricopa County is received.

2.10.2.4 RETENTION FACILITIES

1. As facilities are completed and functional.

2. Record Drawings have been submitted and approved.

NOTE: All Record Drawing measurements and data are to be taken and collected by the Engineer of Record responsible for the plans.

2.10.3 One Year Warranty

A one year warranty for all infrastructure improvements is required in accordance with MAG Section 108.8. Other forms of financial assurance may be provided as approved by the Town Engineer.

At the end of the One Year Warranty period, an application of TRMSS (Tire Rubber Modified Slurry Seal) shall be applied to all streets. All striping that is affected by the TRMSS shall be reapplied.

3.0 STORM DRAINAGE FACILITIES

3.1 GENERAL INFORMATION

The purpose of this chapter is to present general information, minimum specific guidelines, and provide minimum design criteria and guidance regarding the preparation of drainage reports and grading, drainage, and storm water facility plans. Storm water facilities may include the following:

- Surface and sub-surface storm drain systems
- Sub-surface retention systems
- Retention basins

The Town of Gilbert has adopted the Uniform Drainage Policies and Standards for Maricopa County as published by the Flood Control District of Maricopa County (FCDMC) as modified herein. 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 and drainage plans using design standards and methodologies developed by the FCDMC.

FCDMC also publishes a Drainage Design Manual for Maricopa County. Refer to FCDMC website for the Drainage Design Manuals. Refer to Chapter 34 of the Town of Gilbert Municipal Code for requirements and restrictions of development within an area designated as a special flood hazard area.

3.2 TOWN CODE

All development and infrastructure must comply with the Town Codes, including but not limited to the Town of Gilbert Municipal Code, Chapter 34, Floodplain Management and Chapter 30 Article III, Pollution Prevention, which contains information regarding the control of pollutants in the Town's storm drain system, including complying with all national and state requirements.

An electronic version of the Town of Gilbert Municipal Code can be referred to on the Town of Gilbert website.

3.3 TOWN STANDARDS

New land development activities may result in potentially higher storm water drainage, more frequent flooding and increased pollutants. The Town of Gilbert has developed standards to alleviate or reduce these potential results. The engineer should be aware of and become familiar with the various drainage standards that pertain to land development within the Town of Gilbert.

3.3.1 Retention Requirements

All new developments shall provide retention for the run-off generated by the 50-year, 24-hour storm (3 inches). The area to be considered as generating run-off to

be retained shall be the development itself and one-half of the right-of-way of the adjacent street(s). In some cases, adjacent arterial or collector streets are designed and constructed prior to development of the adjacent properties. In such cases, temporary storm water retention facilities are to be replaced with permanent retention areas whenever site development occurs. The permanent retention area must retain the same volume of storm water as provided with the temporary basin– although the configuration of such drainage facilities may be modified to accommodate the on-site development.

3.3.2 Drywell Requirements

The Town of Gilbert permits the use of drywells to drain retention areas if there is no other convenient method available to drain the site, and where the drywells have been designated and constructed according to the standards of this manual.

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 Drywell Program.

It is the owner's responsibility to maintain the drywells. Drywells that cease to drain a retention basin within a 36 hour period are to be rehabilitated or replaced with new ones, or the site may be redesigned when alternate methods of drainage are now available.

3.3.2.1 DRYWELL DESIGN AND CONSTRUCTION

The Town of Gilbert standard drywell is the Maxwell IV or approved equal. In areas where enhanced environmental protection is warranted (gas stations, for example), drywells should be designed to prevent groundwater contamination from spills. All drywell details shall be shown on the construction drawings.

The number of drywells used shall be such that the volume to be drained by each well shall not exceed 43,560 cubic feet in 36 hours. The engineer shall submit information substantiating the number of drywells. Other standards include the following:

- Offset drywells a minimum of 20 feet from any basin surface inlet.
- The rim of the drywell shall be 2 inches above the finished basin elevation.
- Drywells are to remain sealed until all paving or basin landscaping is completed (or at least until new grass is stable) then unsealed and inspected.
- Drywells are to have a minimum settling basin depth of 19 feet with 30 inch bolt down grates, and shall penetrate a minimum of 10 feet into highly permeable soils.
- Drywells are to be spaced a minimum of 75 feet center to center.

- No allowance may be taken for drywell volume in basin capacity calculations.
- Drywells shall not be constructed within the street right-of-way.
- The Development Services Department shall inspect each well site prior to placement of the liner and backfill to verify 10 feet penetration into sand and gravel. Where it is unclear whether sand and gravel has been penetrated, a percolation test shall be performed.

3.3.2.2 DRYWELL PERCOLATION TEST

When a drywell percolation test is necessary, the drywell shall be filled with clean water until the rate of inflow and the percolation rate have stabilized for a period of one hour. If the rate of inflow is greater than or equal to 0.5 cfs, the drywell shall be considered acceptable. If the rate of inflow is less than 0.5 cfs, the succeeding drywells installed shall be increased in depth or the total number of drywells shall be increased, to make up the difference.

3.3.3 Flood Zone Requirements

Consult Town of Gilbert Municipal Code, Chapter 34.

All finished floor elevations shall be shown on the grading and drainage plans to be a minimum of 14 inches above the outfall of the lot.

3.3.3.1 STORM WATER QUALITY

The operator of a construction site is responsible to meet the requirements of ADEQ under the AZPDES permit. Operator shall also comply with the requirement of Town of Gilbert Municipal Code Chapter 30, Article III, Pollution Prevention. The operator can be the owner, developer, general contractor, or individual contractor responsible for operational control.

3.3.3.2 STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

The Town of Gilbert'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 Town:

- Submit a Notice of Intent (NOI) to ADEQ for authorization;
- Prepare and implement a Stormwater Pollution Prevention Plan (SWPPP) and keep a copy on site;
- Include 2 copies of the NOI and SWPPP with the erosion and sediment control plan submittal to the Town; and
- Send a Notice of Termination (NOT) to ADEQ and the Town once construction is completed, as defined in the general permit.

The Town will require a copy of the ADEQ approved plans along with the NOI to be submitted to the Development Services Department.

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

3.3.3.3 BEST MANAGEMENT PRACTICES (BMP)

Anyone who is required to prepare a Storm Water Pollution Prevention Plan (SWPPP) should refer to the following sources for Best Management Practice (BMP) options.

- Stormwater Quality Protection and the Drainage Design Manual for Maricopa County
- Flood Control District of Maricopa County Drainage Design Manual, Volume III, Erosion Control for the BMP Standard Details to include with the SWPPP submittal

3.4 AVAILABILITY OF STORM DRAIN

The existing Town of Gilbert storm drain system is limited. Due to the limited Town storm drain system, developments are required to retain their own runoff plus the runoff from adjacent half streets onsite. New developments may also be required to install a new storm drain system to serve their development.

After research of utility information, improvement plans and master plans, questions pertaining to the availability of Gilbert storm drains and their expansion or extension should be directed to the Development Services Department, Development Engineer at (480)503-6815.

3.5 DESIGN STANDARDS AND GUIDELINES

3.5.1 Retention Volume

The volume will be determined from the following formula:

V = DAC, where

V = volume (cubic feet)

D = 50-year, 24-hour rainfall depth – (0.25 feet)

A = area (square feet)

C = weighted run-off coefficient

A weighted run-off coefficient shall be determined based on the following:

- Roofs and concrete C = .95
- Asphalt C = .90
- Desert Landscaping C = .70
- Green Landscaping C = .25

3.5.2 Retention in Right-of-Way or Landscape Easement

Fifty percent of the right-of-way behind the sidewalk and fifty percent of the required landscape setback may be used for retention. The maximum allowable depth is 2.5 feet (measured from the adjacent street top of curb) and the maximum allowable side slope is 4:1.

3.5.3 On Lot Retention

On Lot retention may only be used in suburban ranch developments (20,000 square feet or greater in size) provided that:

- The lot is graded to provide a minimum of 3 inches of freeboard above the fifty-year, twenty-four-hour storm.
- Lots less than 35,000 square feet in size cannot use an Agrarian Street and must provide retention basins for street run-off.
- Plats are to contain the following statement: "On lot stormwater retention is required in this subdivision. No stormwater shall discharge onto neighboring properties or streets."

3.5.4 Grading for Irrigated Lot

Lots that are to be flood irrigated shall be graded per Figure 3-1.

3.5.5 Retention Basin Design

- A minimum 6 inches of freeboard is required between the high water surface elevation and the bottom-of-curb elevation adjacent to the basin inlet.
- The maximum allowable side slope on any basin is 4:1. For basins exceeding 3.5 feet in total depth, 6:1 minimum side slopes are required for the portion of the slope above 3.5 feet in depth.
- Any basin located on arterial street frontage is limited to a ponding depth of 2 feet. Other basins may pond water to a maximum depth of 3 feet.
- If water is ponded to a depth greater than one foot, a positive means of draining the water must be provided. If the water is ponded to a depth of

less than one foot, a percolation test must be performed to show the basin's ability to drain naturally within 36 hours.

- Any water that enters the basin must do so in a manner that does not damage the landscaping, create scouring, or cause erosion.
- The minimum pipe acceptable for use as an equalizer is 8 inches in diameter.
- Headwalls are to be provided for all pipe inlets/outlets. Headwall grates are required for all pipes size 10 inches and larger.

Retention Allowance in Paved Areas - Commercial/industrial areas only:

- A maximum of 50 percent of the paved areas (excluding driving lanes) may be used for retention. The maximum ponding depth is one foot and this may occur in only 15 percent of the inundated area.
- In paved areas where retention occurs, the maximum slopes are 4 percent in the parking areas. Handicap accessible parking spaces and paths are to meet ADA requirements.
- The first inch of rainfall run-off retention must be provided for off of pavement.

3.5.6 Street Capacity

For major and minor arterials and collector streets, the ten-year one-hour storm event shall only inundate the equivalent of one lane of traffic per half street (bike lane and half a lane maximum for Collector streets). For local streets, the ten-year, one-hour storm event must be contained between the two-curb faces at a maximum depth of 6 inches. There shall be no cross street flow on any streets, except secondary collectors and local streets, for any storm up to and including the ten-year, one-hour storm event. Cross street flow on secondary collectors and local streets shall be limited to 8 inches in depth. In all cases, the 50-year, 24-hour storm event must be contained within the street right-of-way. The one-hundred-year storm event must be contained below the finished floors of the building.

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

Scuppers are not to be used unless grade limitations mandate it. Scuppers will be built in accordance with MAG Standard Detail No. 206-1 and 206-2. Scuppers that use a metal cover (walking surface) are not allowed.

Catch basins may be curb opening type, grate opening type, or a combination curb and grate opening. All grate openings must be bicycle safe.

3.5.7 Storm Drain Design

Size of storm sewer pipe shall be determined by the Manning Formula which is expressed as:

$Q = VA = \frac{1.49}{n} \bullet r\ 2/3 \bullet S\ 1/2$, where:

Q = Quantity of flow in cubic feet per second

V = Velocity of flow in feet per second

A = Required area in square feet

n = Coefficient of roughness (use 0.013 concrete pipe; 0.011 for plastic pipe)

r = Hydraulic radius in feet - $\frac{\text{cross sectional area of flow}}{\text{wetted perimeter}}$

S = Slope of energy gradient in feet per foot

Adjustments of pipe sizes as determined by the Manning Formula may be necessary due to hydraulic gradient considerations.

Other guidelines related to size and configuration of storm sewer systems are as follows:

- The minimum pipe size allowed in Town of Gilbert right-of-way is 15 inches.
- Pipes will be designed for flows intercepted by the inlets.
- The maximum length between access openings shall not exceed five-hundred feet for pipes less than 36 inches in diameter or 800 feet for pipes 36 inches in diameter or greater. Access opening may be in the form of an inlet, manhole, junction box or other approved appurtenance.
- Minimum cover for storm sewer pipe shall be 2 feet from finish grade of the outside top of pipe, except where approved structural correction is provided when cover requirements cannot be met.
- Minimum easement widths, where necessary, shall be determined as follows:

Pipe Sizes	Easement Width
15” – 18”	10’
21” – 33”	15’
36” – 48”	20’

54" – 72"	24'

Where multiple pipes are installed, edge of easement shall be 5 feet clear of outside of pipe. Where easements do not generally follow established lot lines, add 5 feet to the easement width on side toward the building.

Storm sewers shall be designed to provide an average velocity when running full of not less than 3 feet per second. It is desirable that the sewer be so designed that the velocity of flow remains constant or gradually increases as flow moves downstream.

When a trunk line passes through a junction, the pipe crown lines will be at the same elevation. An exception is that when the inflow and outflow pipes are of the same diameter, the outflow pipe invert elevations will be one-tenth of one foot (0.1) lower than the inflow pipe invert.

The angle of an inflow trunk line pipe to the outflow trunk line pipe at a junction will not exceed 90 degrees.

If a lateral pipeline enters a junction and the invert elevation is above the crown elevation of the outflow trunkline, the lateral discharge will be considered as drop inlet inflow.

Storm drain manhole covers shall be East Jordan Iron Works #00222459 or Neenah #NF-Deeter 1295, for four-foot manholes and East Jordan Iron Works #00223124 or Neenah #NF-Deeter, 1296 for 5-foot manholes.

The total energy loss at a junction, H_L, is assumed to be made up on one or more of the following losses:

1. Expansion loss (h_i) when storm water enters the junction.

2. Contraction loss (h_o) when storm water leaves the junction.

3. Bend loss, Δh, due to the change in horizontal direction of storm water velocity. These losses shall be estimated as follows:

   $H_L = h_i + h_o + \Delta h$

   H_L = Total Energy

   h_i = Expansion Loss (Flow into junction)

   h_o = Contraction Loss (Flow out of junction)

   Δh = Bend loss

   v_i = Velocity in feet per second, Q/A of upstream pipe

   v_o = Velocity in feet per second, Q/A of downstream pipe

Δ = Horizontal angle in degrees between the direction of flow of incoming and outgoing pipes

k = Bend loss coefficient

The hydraulic grade line shall be a minimum of 1.0 foot below all manhole rims and inlet structures.

Note: If water is falling into the storm drain at junction box, the junction loss shall be increased by 30 percent.

Note: If a junction incorporates full diameter inlet shaping, the junction head loss may be reduced by 50 percent.

Note: It will not be necessary to calculate the hydraulic grade line if all the following apply:

- The top surfaces of successive runs are lined up at changes in size rather than the bottom surfaces.
- The surface of the water at the point of discharge does not lie above the top of the outlet.
- The invert of the outflow pipe is one-tenth of one foot (0.1) lower than the invert of the inflow pipe at a junction where inflow and outflow pipes are of the same size.
- The angle of an inflow trunk line to the outflow trunk line pipe at a junction is less than 30 degrees.

The engineering drawings must designate the type of pipe to be used including size and slope. Use the following as a guide for choosing pipe required in different situations.

- Reinforced concrete pipe (R.C.P. 36 inch diameter or larger and R.G.R.C.P., any diameter) may be used in all situations. The engineering drawings shall designate the Class or D-load specifications as per ASTM-C-76 and when requested, the engineer shall verify his choice of pipe with load computations.
- Cast-in-place pipe (C.I.P.P.) may be used in certain situations. The engineer is required to provide evidence that soil conditions are adequate for use of this pipe, and obtain permission to use C.I.P.P. as an alternate.

3.6 DRAINAGE REPORTS

3.6.1 Preliminary Drainage Report

A preliminary drainage report must be prepared for all projects, unless the project is within the boundaries of a larger project for which an approved drainage report has already been provided, and no changes are being made to the approved

grading and drainage for the site. No review will be scheduled without this report. This report shall be on separate, letter size sheets with any necessary maps. Handwritten comments are not acceptable.

A watershed boundary map shall be prepared. Indicate the drainage pattern, grade breaks and slopes of all streets, parking lots, and other relevant features. If the site is subject to off-site drainage, the watershed boundaries shall be delineated and any off-site drainage shall be accounted for in the report.

Indicate any existing drainage or irrigation structures such as: tailwater or delivery ditches, natural drainage channels etc., and what will be done with them.

Indicate the retention volume required. Present a preliminary retention basin plan including size, depth and proposed method(s) of draining the basin(s).

If the development, or any part of it, is located in a mapped floodplain, indicate the steps that will be taken to comply with the Town of Gilbert Municipal Code, Chapter 34, Floodplain Management.

3.6.2 Final Drainage Report

A final drainage report must be submitted with each submittal of the engineering plans. Reports shall be on letter size sheets with necessary maps neatly folded, all in a folder. Handwritten comments are not acceptable. Final drainage reports shall include all of the information contained in the preliminary drainage report, including the following:

- Justification of the weighted run-off coefficient (C factor) used in the calculations of run-off volume.
- Pertinent cross-sections that show conformance to depth and side slope requirements in retention basins.
- Calculations showing the methodology used in determining the basin(s) volume(s).
- Justification of the scupper and catch basin sizes called out in the plans. Assume 25 percent blockage and size the scuppers and catch basins accordingly. If a combination open curb-grate type catch basin is used, the 25 percent blockage factor is not required, but no credit is to be given to the open curb face in capacity calculations.
- Show (by engineering calculations) how water entering the basin(s) via scuppers, pipes, etc. will not cause scouring or adversely affect the landscaping.
- Provide any other information necessary for clarification purposes.

A map is to accompany the final drainage report clearly delineating the different areas to be considered and labeling critical points of interest, and where inlets are to be located.

Each subarea is to be analyzed for the peak flow generated by the ten-year one-hour storm event, the fifty-year twenty-four-hour storm event, and the one hundred year design storm. Engineer may assume a maximum of 15 minutes for run-off from lots for the ten-year, one-hour storm event.

Indicate how each basin will drain within 36 hours and provide pertinent calculations. Supply percolation tests if required (see Retention Basin Design, Section 3.5.4)

Show how the runoff not retained from the storm events greater than the fifty-year, twenty-four hour storm (one hundred year design storm) will exit the site and not increase the risk to downstream sites.

Indicate how the development will conform to Gilbert's Floodplain Ordinance No. 525.

Provide any information or calculations regarding off-site drainage affecting the site.

3.7 SUBMITTAL CHECKLIST

The latest version of the Storm Drainage Facilities Checklist can be found on the Town of Gilbert Engineering Services website. These checklists will be periodically updated by the Town of Gilbert. At the time of publication of these Standards it was as follows:

3.7.1 Preliminary Subdivision Review

- Preliminary drainage report submitted?
- Are limits of watershed shown, including off-site drainage?
- Are there any existing drainage structures such as waste or delivery ditches, channels, etc.?
- Is it clear what will be done with them?
- Has a drainage exhibit been submitted showing drainage patterns of all streets in the subdivisions?
- What is required retention and volume provided in cubic feet?
- What is the approximate size and depth of the basin?
- What method is available for draining the basin in 36 hours?
- Will subdivision be phased?
- Is it clear what will be done as a temporary solution of storm run-off during phasing?

- Are any special easements needed for pipes, ditches, temporary basins, etc.?
- Is the one-hundred-year flood plain, if applicable, shown on plat?
- If any part of the project is located in a one-hundred-year FEMA floodzone, contact the Town's Floodplain Administrator for necessary forms and information.
- Are pad and finished floor elevations shown on the Grading and Drainage Plans?
- Maximum allowable grade difference between adjacent developments to be no more than 1-½ feet.

3.7.2 Final Subdivision Review

1. Has final drainage report been included with the first submittal of plans?
2. Is a drainage exhibit showing peak street flows and drainage areas included?
3. Are tile sizing calculations included?
4. Are catch basin calculations included?
5. Is a detail of retention basin grading shown?
6. What is the required volume?
7. What is the calculated volume?
8. Are inlet and outlet structures shown?
9. Is irrigation system design included?
10. Is lot grading plan included?
11. Method of draining basin in 36 hours?
12. Is the one-hundred-year flood plain, if applicable, shown on final plat?
13. Do the civil and landscape plans for the basins coincide?
14. Are water surface elevations and relevant cross-sections shown?
15. Are pad and finished floor elevations shown on the Grading and Drainage Plans?

3.7.3 Commercial Site Drainage

1. Have all property lines, proposed or existing buildings, asphalt, grass, desert

landscape and concrete areas been shown and the dimensions of same?

2. Are all existing grades shown? Either by a grid method or contour lines especially at property lines, driveways and sidewalks.

3. Has the finished grade of all surfaces been indicated?

4. Are the finished floor and pad elevation shown?

5. Is the direction of roof drainage shown?

6. Are all items of construction that will affect drainage shown?

7. Is the site divided into drainage areas and calculations shown for the run-off and retention of each area?

8. Were the correct run-off coefficients used?

9. What method of draining the retention area is provided?

3.8 GENERAL NOTES

The latest version of Storm Drainage Facilities General Notes can be found on the Town of Gilbert Engineering Services website. These Notes will be periodically updated by the Town of Gilbert. At the time of the publication of these Standards they were as follows:

1. All design and construction must be in accordance with the Uniform Standard Specifications and Details published by the Maricopa Association of Governments and as amended by the Town of Gilbert.

2. The developer and contractor shall notify the Town of Gilbert Development Services Department at least 24 hours in advance of any construction of inspection. Call (480) 503-6700.

3. The developer and contractor shall avoid the placement of driveways in conflict with utility services.

4. The developer and contractor shall coordinate the relocation of power poles and other utilities.

5. Backfill and compaction within County right-of-way shall be in accordance with the latest Maricopa County Special Provisions for installation of underground utilities.

6. Contractor shall comply with the provision for traffic control as per the latest edition of the Manual on Uniform Traffic Control Devices Handbook.

7. Call the Arizona 811, Blue Stake Center (602) 263-1100, 48 hours before you dig for location of all underground utilities.

8. Engineer certifies that he has contacted all interested utility companies and has transferred all existing and/or proposed utility lines and related information onto these plans, and that he has also correctly plotted the existing and proposed right-of-way and easement lines.

9. The contractor shall be required to install a night tie in for any new water line that will affect existing service sufficient to warrant same in the opinion of the Town Inspector.

10. All improvements within the retention basin and/or roadway parkways shall be in accordance with the latest Town of Gilbert Public Works and Engineering Standards.

11. Contractor is advised that an excavation and dirt moving permit is required by the Maricopa County Health Department and the Town of Gilbert. It shall be the responsibility of the contractor to obtain this permit and comply with its requirements.

12. Contractor shall perform close circuit televising of the storm sewer system that verifies proper installation. This shall be submitted and approved by the Town of Gilbert prior to Final Acceptance.

3.9 FIGURES

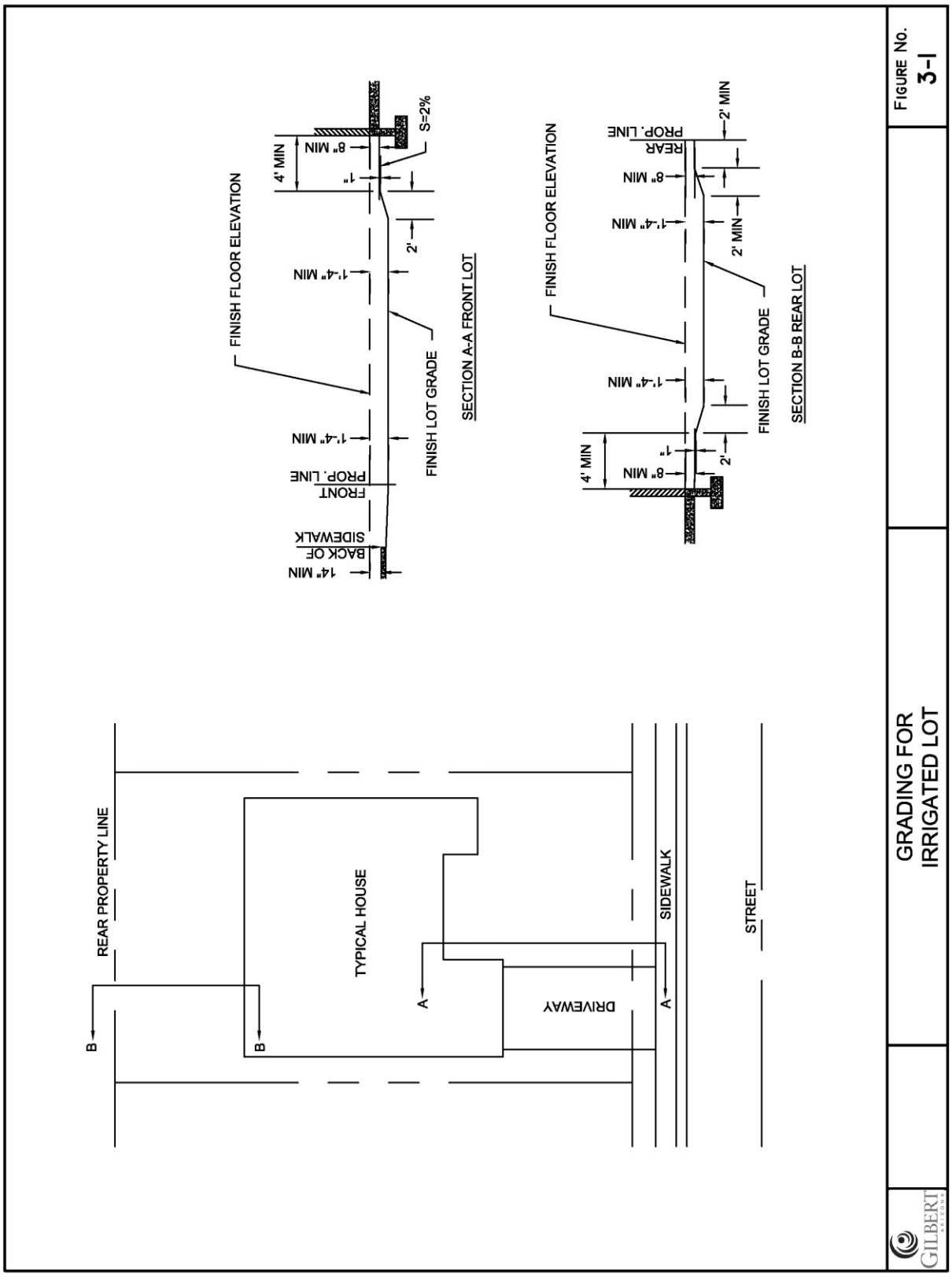


FIGURE 3-1 GRADING FOR IRRIGATED LOT

4.0 STREET IMPROVEMENTS

4.1 GENERAL INFORMATION

This chapter provides standards and geometric requirements for the design and construction of project improvements within the Town of Gilbert. Transportation facilities may include arterial, collector, and local streets, alleys, traffic signals, street signing, pavement markings, public transit, pedestrian facilities, bicycle paths, traffic calming and trails, and other facilities. The minimum requirements described herein are primarily based on safety considerations; therefore under most circumstances, standards that provide a greater degree of safety may be used.

4.2 TRANSPORTATION PLANNING DOCUMENTS

The Town of Gilbert has the following related transportation planning documents available:

- Town of Gilbert Transportation Master Plan
- Town of Gilbert General Plan
- Town of Gilbert Intersection Master Plan
- Town of Gilbert ADA Transition Plan
- Town of Gilbert Character Area Plan

The Town of Gilbert has adopted the Transportation Master Plan which addresses the Town's long range plans for local and regional transportation requirements. Town of Gilbert General Plan, Transportation Master Plan and a current traffic impact study shall be used to determine the specific roadway requirements.

4.2.1 Street Classification

The classification of arterial and collector streets to be constructed is identified in the Town of Gilbert General Plan. All collector streets are classified as collector but land use and density is ultimately what will determine the type of collector.

4.2.2 Number of Lanes

The number of lanes for various street classifications is shown in Figure 4-9 through Figure 4-14.

4.2.3 Locations of Existing and Future Transit Routes

The map showing the location of Existing and Long Term Transit Service is accessible from the Transportation Master Plan, available on the Town of Gilbert website.

4.2.4 Existing and Future Bike Paths

The map showing the location of existing and future Bike Paths is accessible from the Transportation Master Plan and the Parks, Recreation, and Trails Integrated Master Plan, available on the Town of Gilbert website.

4.3 TOWN CODE

Relevant sections of the Town of Gilbert Municipal Code including, but not limited to Streets, Sidewalks and other Public Places Chapter 54, Traffic and Vehicles Chapter 62, and Buildings and Construction Regulations Chapter 10 contain information regarding the development of the public streets in association with land development.

4.4 TOWN STANDARDS

Developers are required to install all street improvements necessary to provide transportation to their development. All street improvements shall be in accordance with the adopted Town General Plan, Transportation Master Plan and satisfy all required development fees.

The developer should be aware that ADA compliance per current regulation and proposed guidelines, i.e. PROWAG and associated instruments, may require expansion of the project scope, particularly as impacting the public right-of-way. Please confer with Town Traffic Engineering to confirm needs.

4.5 DESIGN STANDARDS AND GUIDELINES

The American Association of State Highway and Transportation Officials (AASHTO) "A Policy on Geometric Design of Highways and Streets", Development of Bicycle Facilities, and Guide for the Planning, Design and Operation of Pedestrian Facilities, and the Manual on Uniform Traffic Control Devices (MUTCD) prepared by the U.S. Department of Transportation are approved references and shall be used in conjunction with this manual. MAG Uniform Standard Details, Town of Gilbert Supplement to MAG Specifications and Details, Manual of Approved Signs (ADOT), Arizona Supplement to the Manual of Uniform Traffic Control Devices (ADOT), and Pavement Marking Manual (ADOT and MCDOT) shall also be used.

4.5.1 Street Widths

Public street widths shall be as specified in "Development Impact Summary" statements provided to those projects that are subject to regulatory processes or have participated in the "Technical Plan Review" service. Street widths may also be identified during the Subdivision Technical Review or plan review processes.

4.5.2 Trench Backfill and Pavement Replacement

The contractor is responsible for backfilling and replacing pavement in all public street excavations per the Town of Gilbert Standard Detail GIL-270.

4.6 STREET CLASSIFICATION

The Town of Gilbert has 6 basic classifications of streets for use relating to land development. The Town of Gilbert street classifications include the following general

types: Major Arterial, Minor Arterial, Major Collector, Minor Collector, Local Residential and Agrarian Streets.

The location of access points for various types of streets are shown in Figure 4-1 through Figure 4-6.

The location and street classification is determined as part of the site planning and platting process. The Town will review each subdivision plat and will specify any changes needed to conform with previously planned and approved street alignments. The Town will also specify the classification for each street involved in the subdivision plat. Street cross section requirements are shown in Figure 4-9 to Figure 4-14. All land development shall provide for public arterial and collector streets in accordance with Town of Gilbert General Plan at their normal alignments, widths and geometrics, as determined by the Town.

4.7 STREET RIGHT-OF-WAY REQUIREMENTS

All public street right-of-way dedication shall be unencumbered and free of environmental contamination per ASTM E-1527 current requirements. All right-of-way purchased by the Town of Gilbert is subject to the requirements as outlined in Chapter 21 of the Town Code. The public right-of-way requirements shall be based upon the requirements of the transportation plan and the ultimate needs of the development. The dedicated right-of-way shall provide sufficient area for the installation of utilities, cut or fill slopes, sidewalks, traffic control devices, signs, fire hydrants, landscaping, auxiliary turn lanes, transit facilities, street lights and other public facilities that may be located adjacent to street corridors.

General rights-of-way expectations/requirements are established to accommodate projected traffic generation demand according to various development types.

Roadway dimension specifications, by street type, are depicted in the following Figures:

Figure 4-9 Major Arterial Street with Standard Utility Locations

Figure 4-10 Minor Arterial Street with Standard Utility Locations

Figure 4-11 Major and Industrial Collector Street with Standard Utility Locations

Figure 4-12 Minor and Local Industrial Collector Street with Standard Utility Locations

Figure 4-13 Local Residential Street with Standard Utility Locations

Figure 4-14 Agrarian Street with Standard Utility Locations

4.7.1 Additional Right-of-Way Widths

Additional right-of-way widths may be required in special circumstances for the following conditions:

1. When auxiliary traffic lanes are required at arterial-to-arterial or collector-to-arterial intersections.

2. Auxiliary lanes at commercial driveways.

3. To facilitate public transit facilities (bus pull-outs and concrete pads).

4. Auxiliary lanes or other conditions per the results of a traffic impact study.

5. Offsets or roadway shifts.

6. Other conditions that may be required by the Town.

4.7.2 Intersection Right-of-Way Triangle Requirements

All street intersections will require the dedication of a right-of-way corner triangle per Table 4-1.

TABLE 4-1: INTERSECTION RIGHT-OF-WAY TRIANGLE REQUIREMENTS

Intersection Classification	Minimum Requirements (Feet)
Arterial to Arterial	40 x 40
Arterial to Collector	30 x 30
Collector to Collector	20 x 20
Collector to Local	20 x 20
Local to Local	20 x 20
Local to Arterial*	25 x 25

**Local to Arterial intersection must be approved by the Town Traffic Engineer*

4.7.3 Parallel Parking Allowances – Street Width Requirements

Requirements: (all measurements are from face of curb to face of curb)

1. 32 foot street width, parking on both sides.

2. 26-32 foot street width, parking on one side.

3. Less than 26 foot street width, no parking.

Traffic signing in these instances will be the responsibility of the developer and shall conform to current standards and practice.

4.8 STANDARD UTILITY LOCATIONS

Standard utility locations shall be as shown in Figure 4-9 through Figure 4-14.

4.9 EASEMENTS AND DEDICATIONS

4.9.1 Public Utility Easements (PUE)

PUEs shall be located adjacent to each side of the dedicated street right-of-way. Public Utility Easements may not be located within the side or back property lines

without the approval of the Town Engineer. Landscaping installed in PUEs shall be of the shallow root, and non-intrusive variety, and shall be maintained by the property owner.

4.9.2 Vehicular Non-Access Easement (VNAE)

VNAE limits vehicular access to a site from arterial and collector streets. On local streets, a VNAE on private lots is required adjacent to all greenbelts and open space areas. Vehicular access shall be restricted by use of a one foot VNAE, at locations other than street intersections and legitimate driveways. The ownership and maintenance of the VNAE remains with the property owner of the parcel from which the VNAE is granted.

4.9.3 Drainage Easement (DE)

DE dedications shall conform to the lines of any existing water course, drainage way, channel, or stream and such further width or construction, or both, as will be adequate for the purpose. Parallel streets or parkways may be required in connection therewith. All drainage easements shall be outside the roadway right-of-way. The ownership and maintenance of the DE remains with the property owner of the parcel from which the DE is granted.

4.9.4 Sight Visibility Triangle Easement (SVTE)

Sight Visibility Triangle Easements should be used as a means to limit the height of structures, vegetation, and other improvements on corner properties immediately adjacent to intersections. Refer to Town of Gilbert Standard Details for sight visibility triangle design. Sight visibility triangle easements shall not preclude additional right-of-way requirements or sight visibility triangle restrictions per AASHTO calculations.

4.9.5 Temporary Drainage Easement (TDE)

An easement placed on a parcel of land temporarily for the conveyance or storage of storm water. The easement shall be extinguished upon the development and completion of the permanent drainage facility.

4.9.6 Temporary Construction Easement (TCE)

An easement placed on a parcel of land temporarily for the use of construction personnel and equipment. The easement shall be extinguished upon the completion of the construction project.

4.10 DRIVEWAY DETAILS

Site access from public rights-of-way is specified according to land use and anticipated traffic type.

Details and figures pertaining to driveways and refuse truck maneuvering areas are:

MAG Detail 250	Residential Driveway
Figure 4-21	Driveways with Curb Returns
Figure 4-22	Gated Entrance
GIL-210	Minor Commercial Driveway
Figure 10-1	Driveway Standards for Refuse Trucks and Dumpster Bin Enclosure

All driveways serving property abutting public streets in the Town shall conform to Town of Gilbert Standard Details.

4.10.1 Driveway Spacing

Minimum spacing between driveways shall conform to the standards shown in Figure 4-1 through Figure 4-6 at the end of this section. This minimum spacing applies to proposed site driveway separation, as well as separation from existing or planned driveways on adjacent parcels and across the street. To provide safe turning movements from driveways on streets without raised medians, new driveways shall align with existing driveways on the opposite side street.

Refer to Figure 4-1 through Figure 4-6 for driveway location dimensions. Exceptions may be permitted by the Town Traffic Engineer.

4.10.2 Number of Driveways

The number of driveways for a development must comply with Town of Gilbert Land Development Code, unless justified by a Traffic Impact Study as approved by the Town Traffic Engineer.

4.11 PAVING STANDARDS

Specifications for paving of all types are set forth in this section. Related improvements, such as parkway treatments, pathways, curb, gutter, sidewalk and scuppers are also referenced.

Town of Gilbert requirements for paving base are as follows:

- Figure 4-15 - 4” Minimum Bituminous Surface (Major Arterials)
- Figure 4-16 - 2-½” Minimum Bituminous Surface (Minor Arterials, Major Collectors, Industrial – all types)
- Figure 4-17 - 2-½” Minimum Bituminous Surface (Residential Collectors)
- Figure 4-18- 2-½” Minimum Bituminous Surface (Local Residential, Agrarian)

Related paving specifications, pertaining to street designs include the following

Town of Gilbert requirements:

- Figure 4-19 Cul-De-Sac
- GIL-270 Backfill, Pavement and Surface Replacement

Town of Gilbert requirements for pathways and scuppers include:

- Figure 4-20 Meandering Sidewalk
- MAG Detail 206-1 and 206-2 Scupper

4.12 CONCRETE CURBS, GUTTERS AND SIDEWALKS

4.12.1 Vertical Curbs

Vertical curbs are required for all streets throughout the Town except local residential streets. Vertical curbs shall be used in place of roll curbs on local streets to meet the street drainage requirements.

On local streets, the vertical height of the curb shall be 4 inch, or 6 inch. On arterial or collector streets the vertical height of the curb shall be 6 inch unless otherwise approved by Town staff. Installation shall be per MAG Standard Detail 220, Type A. Vertical curbs shall be 6 inch at all medians, and curbs adjacent to landscaping tracts or vertical structures, unless otherwise approved by Town staff. A modified vertical curb with a 9 inch height is required at selective railroad crossings within the Town.

4.12.2 Roll Curb

Roll curb per MAG Standard Detail 221 may be installed on local streets as long as the 10-year 2-hour storm can be contained between the street curbs. Roll type curbing shall not exceed 4 inches in height.

4.12.3 Median Curb

Median curb shall be installed per MAG Standard Detail 220 Type A modified with an inverted gutter plan. In certain situations, the Town may require curb to be constructed per MAG Standard Detail 222 Type A. With Town approval, roll curb may be used around medians installed in low speed, low volume streets, to facilitate truck turning movements with traffic calming projects, or where needed to maintain adequate width for emergency vehicles, provided a Technical Variance from Town of Gilbert Public Works and Engineering Standards is granted per Section 1.8 of this manual.

4.12.4 Curb Returns

Vertical curb shall be used through the curb return from PC to PT regardless of whether the tangent curb sections are vertical or roll curb. Sidewalk at curb returns shall be per MAG Standard Details. The maximum grade at all curb returns is 1.5%.

1. Curb Return Radii on Streets: The radii for curb returns shall be in accordance with Table 4-2. All dimensions are to back of curb.

TABLE 4-2: CURB RETURN RADII

	Intersecting Street Classification			
Street Classification	**Arterial**	**Major Collector**	**Minor Collector**	**Local/Agrarian**
Arterial	35′	30′	30′	30′
Major Collector	30′	30′	30′	25′
Minor Collector	30′	30′	30′	25′
Local/Agrarian	30′	25′	25′	20′

2. Sidewalk Ramp: Sidewalk ramps shall be constructed at all curbed return street intersections, at medians, and wherever a pedestrian access route crosses a street, in accordance with ADA Standards. Sidewalk ramps shall align with the sidewalk ramps on the opposite side of the street. If a traffic signal exists or is planned, the sidewalk ramp and apron shall provide access to the pedestrian push button, per ADA requirements.

   - Directional or double sidewalk ramps per MAG Standard Details shall be installed at all arterial and collector street intersections, with exceptions as approved by the Town. Where directional sidewalk ramps are required, the minimum curb return radius shall be 20 feet.

   - Sidewalk ramps per MAG Standard Details shall be installed at all local street intersections.

   - At tee intersections, at least one pedestrian crossing of the major street and one pedestrian crossing of the single leg shall be provided per MAG Standard Details, or if ramp conflicts with proposed driveway, a joint driveway and sidewalk ramp per MAG Standard Details may be installed. The ramp shall align with one of the sidewalk ramps on the opposite side of the street.

   - Along designated pedestrian routes to school, any crosswalk location or trail connection, additional sidewalk ramps may be required.

   - Projects that include construction improvements at existing street intersections where existing sidewalk ramps are located shall note whether the ramps are in compliance with current MAG Standard Details and ADA Standards. If the sidewalk ramps are not in compliance, they shall be removed and replaced with sidewalk ramps that meet MAG Standard Details and ADA Standards.

4.13 SIDEWALKS

Installation of sidewalks shall promote and enhance pedestrian safety and the

aesthetic quality of the roadway. Streets constructed to Town of Gilbert Standards shall have sidewalks installed per Town of Gilbert Standard Details and conform to MAG Standard Detail 230. Sidewalks shall remain within the right-of-way or sidewalk easement.

Special Note: Sidewalks abutting schools require a minimum width of 10 feet. Sidewalks along designated pedestrian routes to schools may be required to have wider than minimum width as directed by the Town. Additional right-of-way or a sidewalk easement may be required to accommodate the extra width sidewalk.

4.13.1 Sidewalk Widths

4.13.1.1 ARTERIAL STREET

- Meandering Sidewalk:
    - Minimum 6 feet wide
    - Minimum radius of 150 feet
    - Minimum separation of 3 feet from back of curb at the closest point of meander and a maximum 10 foot separation from back of curb.
- Detached Sidewalk:
    - Minimum 6 feet wide
    - Minimum separation of 3 feet from back of curb
- Attached Sidewalk:
    - Minimum 6 feet wide
    - Attached sidewalks adjacent to auxiliary lanes and turning lanes at intersections and bus stops.

4.13.1.2 COLLECTOR STREET

- Meandering Sidewalk:
    - 6 feet wide
    - Minimum radius of 50 feet
    - Minimum separation of 3 feet from back of curb at the closest point of meander.
- Detached Sidewalk:
    - 6 feet wide
    - Minimum separation of 3 feet from back of curb

- Attached Sidewalk:
    - 6 feet wide
    - Attached sidewalks will only be approved adjacent to auxiliary lanes and turning lanes at intersections and bus stops.

4.13.1.3 LOCAL RESIDENTIAL STREET

- Detached Sidewalk:
    - 5 feet wide
    - Minimum separation of 3.5 feet from back of curb to be used on local streetscape section only
- Attached Sidewalk:
    - 5 feet wide
- Detached and meandering sidewalks shall connect to the attached sidewalk at each curb return. Use a concave type design with a minimum radius of 3 feet for the connection at curb return sidewalk.

4.13.1.4 PEDESTRIAN WAYS

Pedestrian ways shall be constructed to connect sidewalks with public and private facilities not located in the public street right-of-way. Public pedestrian ways shall be within a tract or easement for such purposes that define the access and maintenance responsibility. The minimum width shall be 6 feet, or a width consistent with adjacent trails, and may be used for additional purposes as approved by the Town. If additional uses are approved, the minimum required width may be increased depending on the specific use. The construction shall be in accordance with ADA Standards.

4.13.1.5 MULTI-USE PATHS/TRAILS

Multi-use path or trail surfaces should be firm, stable, and slip resistant material. Minimum design criteria for multi-use path are as follows:

- Two-way travel:
    - Minimum 12 foot width or 10-foot paved/concrete with a 2 foot decomposed granite path for joggers
- One-way travel:
    - Minimum 6 foot width

- Maximum longitudinal grade shall be 5% unless otherwise approved by the Town
- Minimum 2 foot graded area adjacent to both sides of the path
- Minimum separation of 5 feet from a roadway
- Maintain a minimum vertical clearance of 8 feet, and keep free to protruding objects
- Edge protection, if required, shall be a minimum height of 42 inches
- Paths designated for equestrian and pedestrian use, shall maintain a vertical clearance of 10 feet

4.14 PAVEMENT CROSS SLOPES

Undivided streets should have a normal crown that is a two-way cross-slope with the cross section high point on the street centerline. A raised crown with a constant cross slope of 2.5% is required on all public streets. Inverted crown sections are not allowed, unless otherwise approved by the Town, except as required at arterial or collector street intersections. Within an arterial or collector street intersection, the cross-slope shall comply with Town of Gilbert Standard Details to accommodate ride ability through the intersection.

Divided streets should have cross-slope on each pavement section. The high point of each slope on each pavement section must occur on the edge of the pavement nearest to the median. Unusual conditions may cause cross slope requirements to vary, but normally, the desirable cross-slope is 2.5%.

4.15 HORIZONTAL ALIGNMENT

A horizontal curve is required when the angle of change in horizontal alignment is equal to or greater than 5 degrees. The nature of the surrounding development and topography, and the street classification will establish the factors that determine the radius of the curve for small deflection angles.

4.15.1 Minimum Curve Radius

The minimum radius of curvature is determined by the design speed or by the stopping distance.

4.15.1.1 MINIMUM RADII BASED ON DESIGN SPEED

Table 4-3 contains the minimum radius of curvature for each street classification with and without a superelevation of 0.02 ft/ft. Wherever possible, the radii used should be larger. If stopping sight distance conditions require a larger radius than that shown, then that larger radius becomes the minimum radius for the curve.

TABLE 4-3: MINIMUM HORIZONTAL CURVE RADIUS

	Arterial	Major Collector	Minor Collector	Local/ Agrarian
Minimum Radius of Horizontal Curve without Superelevation	1800′	1100′	550′	275′
Minimum Radius of Horizontal Curve with 2% Superelevation	1350′	850′	450′	230′
Minimum Horizontal Curve Length	500′	500′	400′	100′
Stopping Sight Distance	425′	250′	200′	125′
Design Speed (MPH)	50	35	30	25

4.15.1.2 MINIMUM RADII BASED ON STOPPING SIGHT DISTANCE

When walls, buildings, bridge piers, cut slopes, vegetation, or other obstructions are near the roadway on the inside of a curve, they can block a driver's view of the road ahead. If they are too close, the driver will not have sufficient distance along the curved roadway to stop when a hazardous condition comes into view. For design purposes, the driver's eye is assumed to be 3½ feet above the center of the inside lane (the driving lane closest to the inside of the curve) and a hazardous condition is assumed to be an object 2 feet high in the center of the same lane, or most recent accepted AASHTO standards. The clear distance is measured from the center of the inside lane to the view obstruction. Refer to Table 4-3 for the minimum stopping sight distances for various street classifications.

4.15.2 Superelevation in Curves

Superelevation is discouraged on horizontal curves; however, superelevation of 2% may be used when the minimum radius cannot be provided due to circumstances beyond the control of the Engineer, when the general alignment cannot be changed. Superelevation greater than 2% may not be used, except when approved by the Town Traffic Engineer. In no case shall a superelevation exceed 6%.

Superelevation must be used appropriately in connection with drainage cross slopes on curved alignments.

4.15.2.1 SUPERELEVATION TRANSITIONS

For superelevation transitions refer to AASHTO, "A Policy on Geometric Design of Highways and Streets."

4.15.2.2 SUPERELEVATION STORM DRAIN REQUIREMENT

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

4.15.3 Compound Curves

Compound curves (two curves with different radii in same direction) should be avoided. However, if site conditions make the use of a compound curve unavoidable, the shorter radius shall be at least 2/3) the length of the longer radius when the shorter radius is 1,000 feet or less. Compound curves are not permitted when design speeds require the shorter radius to be greater than 1,000 feet.

4.15.4 Special Tangent Sections Between Curves in the Same Direction

On two-lane roads, tangent sections are needed between two curves in the same direction. If the pavement cross-sections throughout the curves do not have superelevation, then the minimum lengths for tangent sections are per Table 4-4.

TABLE 4-4: TANGENT SECTIONS (CURVES IN SAME DIRECTION)

Arterial	660’
Collector (Major)	500’
Collector (Minor)	400’
Local/Agrarian	250’

If superelevation is provided in the curved portions of the roadway, then the superelevation transition lengths per AASHTO “A Policy on Geometric Design of Highways and Streets” will determine the tangent lengths.

4.15.5 Tangent Sections Between Reverse Curves

Tangent section shall be provided between two curves that curve in the opposite direction. Abrupt reversals in alignment should be avoided when possible. The distance between reverse curves should be at least the sum of the superelevation runout length and the tangent runout lengths. The required minimum lengths for tangent sections between reverse curves without superelevation are provided in Table 4-5.

TABLE 4-5: MINIMUM TANGENT SECTIONS (REVERSE CURVES)

Arterial	300’
Collector (Major)	250’
Collector (Minor)	200’
Local/Agrarian	100’

The Town may approve the elimination of the tangent section between reverse curves provided the reverse curve radii are at least 50% greater than the minimum radii required.

4.15.6 Tangent Sections Approaching Intersections

A tangent section shall be provided between a street intersection and a curve unless otherwise approved by the Town. The minimum tangent length is shown in Table 4-6.

TABLE 4-6: TANGENT SECTIONS AT INTERSECTIONS

Arterial	300’
Collector (Major)	250’
Collector (Minor)	200’
Local/Agrarian	100’

4.16 VERTICAL ALIGNMENT

Vertical curves shall be designed to provide adequate sight distance, public safety and effective street drainage. Refer to AASHTO’s “A Policy on Geometric Design of Highways and Streets” for sight distance requirements.

Vertical curves are required when there is grade change equal to or greater than the percentages listed in Table 4-7. All sections of a street’s vertical alignment must meet passing and stopping sight distance requirements for design speed established for the street. Refer to the AASHTO publication, “A Policy on Geometric Design of Highways and Streets” for vertical alignment design.

TABLE 4-7: VERTICAL CURVE REQUIREMENTS

Street Classification	**Required When Grade Change is this %** (Algebraic Difference of the Two Grades)
Arterial	One (1) %
Collector (Major)	Two (2) %
Collector (Minor)	Two (2) %
Local/Agrarian	Three (3) %

4.17 HORIZONTAL AND VERTICAL CURVES

When horizontal and vertical curves are combined, the horizontal curve needs to lead or follow the vertical curve, and not be introduced near the top of a crest vertical curve or near the bottom of a sag vertical curve.

4.17.1 Longitudinal Street Grades

The longitudinal street grade requirements are per Table 4-8:

TABLE 4-8: LONGITUDINAL STREET GRADE

Street Classification	**Maximum**	**Minimum**
Arterial	6%	0.25%
Collector (Major)	7%	0.25%
Collector (Minor)	7%	0.25%
Local/Agrarian	10%	0.25%

4.18 INTERSECTIONS

All street intersections share the same objectives to accommodate conflicting traffic

movements efficiently and safely. However, each intersection shall be evaluated based on individual characteristics. Design shall be based on standard engineering criteria, Figure 4-7 and Figure 4-8, and the Traffic Impact Study requirements to minimize conflicts.

4.18.1 Typical Intersection Design Considerations

4.18.1.1 TRAFFIC FACTORS

Street capacities, turning movements, vehicle size and operating characteristics, vehicle speed, ride quality, pedestrian and bicycle movements, transit operations, schools in vicinity, traffic control, percentage of truck traffic, accident history and future traffic projections are factors for the intersection design.

4.18.1.2 PHYSICAL FACTORS

Existing topography, existing conditions, channelization requirements, and sight distances shall be taken into consideration.

4.18.1.3 HUMAN FACTORS

Human factors include but are not limited to, driving habits, reaction to surprises, decision and reaction time, and natural paths of movement.

4.18.2 Intersection Offsets (Centerline to Centerline)

The number of intersections along arterial streets should be kept to a minimum. New public or private street intersections on arterial streets should be located to align with planned median openings. New intersections on collector streets should be located to avoid creating conflicting turning movements with existing intersections or driveways. Refer to Figure 4-1 through Figure 4-6.

4.18.3 Lane/Intersection Alignment

Maximum offset of lanes across street intersections from each other is 2 feet. The offset dimension is measured from the traffic lane centerline to the corresponding traffic lane centerline at the nearest point of the curb return across the intersection.

4.18.4 Angle of Intersection

4.18.4.1 RIGHT-ANGLE

Intersections should be designed with right-angle street intercepts. Right-angle intersections provide the shortest crossing distance for intersecting traffic streams, meet driver expectations and the most favorable condition for drivers to judge the relative position and speed of intersecting vehicles. Where special conditions exist, intersection angles may deviate from a right-angle by up to a maximum of 2º unless the Town Engineer approves otherwise.

4.18.4.2 SKEWED ANGLE

For skewed intersections, where any of the intersection angles are less than 88º, sight distances must be calculated in accordance with the procedures described in AASHTO's publication "A Policy on Geometric Design of Highways and Streets."

4.18.4.3 NUMBER OF APPROACHES AT INTERSECTION

The maximum number of approaches at any one intersection is 4.

4.18.5 Alignment and Profile

Intersections occurring on the inside of crest vertical curves of all streets are prohibited. Where the grade of the through roadway is steep, flattening through the intersections is required as a safety measure. The intersecting street profiles and cross slopes shall be coordinated to ensure a safe and comfortable driving surface. Typically extending grades through the intersection for approximately 75 feet to 150 feet yields a satisfactory driving surface. Short vertical curves may also be necessary in lieu of grade breaks.

4.18.6 Sight Distance (Intersections and Driveways)

Adequate sight distance shall be provided at all intersections and driveways on all streets, or types of roadways per Town of Gilbert Standard Detail GIL-211 and GIL-212. The determination of whether an object constitutes a sight obstruction shall consider both the horizontal and vertical alignment of both intersecting roadways, as well as the height and position of the object. The sight distance required varies according to traffic speeds on the through road and widths of the intersecting streets or driveways. The Engineer may provide sight distance from their own calculations, as long as they are based on the AASHTO publication "A Policy on Geometric Design of Highways and Streets" and submitted with the plans.

Continuous unobstructed line of sight must be provided along sight line and throughout the approach to the intersection, providing an unobstructed sight triangle to the side street driver. Sight lines corresponding to each conflicting movement are to be drawn on roadway and landscaping plans to represent the areas that must be free of all objects. There shall be no fence, wall, shrubbery, sign, and any other obstruction to vision between a height of 2 feet, and 7 feet above the centerline grades of the intersecting streets and within the sight triangle. There should not be interference with the line of sight of a driver to an object, such as the overgrowth of a plant that is placed on the edge of the sight triangle.

Visibility must also be provided for traffic control devices, such as STOP signs and signal heads at intersections.

The designer must consider that other vehicles such as opposing left-turn vehicles in a median can block sight distance, and the design must account for this possibility. This is particularly evident along curves.

4.18.7 Valley Gutters at Intersections

Valley gutters and aprons are to be installed per MAG Standard Detail 240. The minimum grade for valley gutters is 0.25%.

Transverse valley gutters are prohibited on arterial or collector streets. The Town must approve the use of a transverse valley gutter on local streets.

4.18.8 Auxiliary Traffic Lanes

Auxiliary turning lanes permit the separation of conflicting traffic movements and remove turning vehicles from the flow of through traffic. Auxiliary traffic lanes apply to right and left turn lanes at street intersections and for deceleration lanes at mid-block driveways. The requirement for an auxiliary lane may necessitate additional rights-of-way. Refer to Town of Gilbert Standard Details for specific dimensions. Modifications to the storage and transition lengths may be allowed by the Town Traffic Engineer where the conditions do not allow the full design standard to be met.

4.18.9 Right-Turn Lanes/Deceleration Lanes

4.18.9.1 RIGHT-TURN LANES

Dedicated right-turn lanes are required on major arterials at all major arterial intersections. Dedicated right-turn lanes may be required by the Town at minor street intersections, collector street intersections and on collector streets at major arterial intersections. Refer to Town of Gilbert Standard Details for specific dimensions.

4.18.9.2 DECELERATION LANES

Deceleration lanes allow entering vehicles to slow and complete a right-turn out of the through traffic flows. Refer to Town of Gilbert Standard Details. Note that longer storage or tapers may be required depending on the site and the Traffic Impact Study. The criteria for deceleration lanes are found in the Town of Gilbert Traffic Impact Study Procedures.

Deceleration lanes may be required on streets in conjunction with driveways per the approved Traffic Impact Study, and may require additional right-of-way.

4.18.10 Left-Turn Lanes

Left-turn lanes are required at all street intersections involving any combination of arterials and collectors. Left-turn lanes can be accommodated with a two-way left-turn lane on a collector street. For left turn lanes at signalized intersections, width to accommodate dual turn lanes may be required based on the Traffic Impact Study, or the Gilbert Transportation Master Plan.

4.18.11 Raised Medians

Raised median islands shall be installed in accordance with Town of Gilbert Standard Details.

- Storage Lane Lengths and Tapers: Lengths and Tapers shall be in accordance with the Town of Gilbert Standard Details, unless the Traffic Impact Study or Town Traffic Engineer requires longer lengths.

- Termination: Medians shall terminate in a bull nose per Town of Gilbert Standard Details.

4.18.12 Median Openings

Raised medians on arterial streets are provided to reduce conflicts, channelize turning movements for safety, and improve traffic flow. It is not possible to provide an opening in the median for every street intersection or driveway location. Careful consideration should be given to each request for a median opening to insure that the safety and the intent of the median is not compromised by a proliferation of median cuts.

4.18.12.1 FULL ACCESS MEDIAN OPENINGS

The full access openings consist of right-in/right-out and left-in/left-out turning movements. Full access median openings may be required to be signalized.

The preference for access along arterial streets is to have aligning full access median openings at not less than 1/4 mile intervals. The design engineer should line up full access openings in compliance with the street grid system planned for the arterial corridor. Full access openings should generally occur at the mile, 1/2 mile, and 1/4 mile interval. The preference for access at less than 1/4 mile spacing is to have a partial access median opening; however, these openings are subject to such considerations as safety of operation, flow of traffic, requirements for storage, and feasibility of geometrics. These items should be addressed in a Traffic Impact Study when requesting a partial access opening. Lastly, it is the Town Standard that all median openings be prohibited within 660 feet of an arterial to arterial intersection.

Median openings are subject to the Driveway Spacing standards discussed in Section 4.10.1. Requests for consideration of other spacing must go through the Engineering Standards Design Technical Variance process outlined in Section 1.8 or otherwise approved by the Town Traffic Engineer via Traffic Impact Study. The study must demonstrate the following:

- The full access opening is spaced safely and will not be in conflict with the planned grid system for the corridor.
- The full access opening will allow for safe operation.
- The full access opening shall not compromise storage requirements.
- The full access opening shall not compromise safety for all other turning movements.
- The full access opening shall not significantly impact the flow of traffic on the arterial.

Spacing for median openings is measured from the center of the median opening to the center of the adjacent median opening or intersection.

4.19 CUL-DE-SACS, KNUCKLES AND BIRDSEYE

4.19.1 Cul-De-Sac Street

A cul-de-sac street is a street that serves more than one property owner and has only one direct access to the public street system.

Cul-de-sac streets shall be a maximum of 600 feet in length and terminate in a circular turnaround. See Figure 4-19 at the end of this section.

4.19.2 Knuckles

Knuckles are areas on the roadway expanded to provide a turn-around and additional access for lot frontage on local streets. Knuckles are required at intersections where each street extends in only one direction from the intersection. Knuckles are permitted between intersections to improve accessibility to odd-shaped sites. The use of knuckles (except for on a cul-de-sac) on other than local streets must be approved by the Town.

4.19.3 Birdseye

Birdseye street design should not be used on collector or arterial streets. The birdseye design provides necessary local street frontage for additional residential lots, and helps to balance lot size.

4.20 PAVEMENT TRANSITION TAPERS

For improvement projects that require the widening of a portion of the pavement of an existing road, pavement transitions tapers may be required at each end of the widened portion. Pavement transition tapers shall be constructed with a thickened edge per MAG Standard Detail 201, Type A.

4.20.1 Transition Tapers to a Wider Pavement Section

The taper rate may be 8:1 for design speeds up to 30 mph and 15:1 for design speeds up to 50 mph, per AASHTO's "A Policy on Geometric Design of Highways and Streets" with a minimum taper length of 50 feet.

4.20.2 Transition Tapers to a Narrower Pavement Section

Taper lengths on roads with a design speed 40 mph or less shall be: $L = (WS^2)/60$*

Where the design speed is 45 MPH or greater: $L = WS$*

Where:

W = Offset from drivable through lane in feet

S = Design speed

L = Taper length

**Source: FHWA, Manual on Uniform Traffic Control Devices*

4.21 DELINEATORS AND BARRICADES

Roadside delineators are required to guide traffic along transition pavement tapers. Minimum spacing between delineators is the same as the speed limit (in miles per hour) for the roadway. Refer to MCDOT Traffic Sign Manual for roadside delineator installation.

Temporary dead-end streets are required to be barricaded with advanced warning signs. Traffic barricades are to be installed per MAG Standard Detail 130, Type A.

A barricade per MAG Standard Detail 130, Type A is required to be installed at the back of a temporary turn-around.

4.22 PARTIAL STREET IMPROVEMENTS

For all Development Services projects, a full street cross-section is required for interior streets and a complete half-street cross-section for perimeter streets if the street centerline is the project's boundary line.

4.22.1 Design of Cross-Section for Half-Streets

Half-street construction shall consist of a minimum 24 foot wide pavement. In the event half-street construction is to be provided, the Engineer shall design the full cross-section of the street. The plans shall include, in dashed lines, the half-street, which will be constructed in the future. The half-street construction needs to provide adequate transitions and tapers to the adjoining roadways. Half-street improvements terminating at the roadway monument or centerline shall be constructed with a thickened edge per MAG Standard Detail 201 Type A.

4.22.2 Joining Existing Street Pavement

The half-street shall be designed to match existing construction as much as possible unless doing so is likely to create an unsatisfactory condition. If changes are needed to correct conditions on an existing half-street in order to properly construct the other half of the street, the solutions must be developed with Town staff on a case-by-case basis. The plans for the new half-street must contain sufficient information on the profile and cross-sections of the existing street to demonstrate that the new construction will match the old construction and result in a full-street with proper cross-sections.

4.22.3 Culverts Under Half-Streets

A culvert to be provided in conjunction with half-street construction must extend a minimum of 10 feet beyond the edge of the traveled way into the area where the other half of the street will be constructed in the future (subject to right-of-way availability). The 10-foot distance is measured perpendicular to the street

alignment. The culvert capacity, flow line slope, and alignment must be based upon the ultimate design requirements for the culvert if it were to be built under the full cross-section where it could be considerably longer.

4.23 DEAD END STREETS

Dead end streets shall be required where a street connection is necessary to serve adjacent unplatted land that will develop at a future date. A paved temporary turn-around shall be provided at all dead end public streets.

4.24 SURVEY MONUMENTS

Projects are required to install survey monuments at all street intersections, section corners, quarter corners, and points of curvature per MAG Standard Detail 120. The monuments shall be set to the Town of Gilbert datum.

4.25 PUBLIC TRANSIT FACILITIES

The Gilbert Transportation Master Plan has identified the existing and future public transit system throughout the Gilbert Urbanized Area. Projects that create high-activity centers, such as shopping malls or high-density living areas may require the installation of transit facility improvements. The design of the transit facility shall consider the needs of the transit user, bus operator, the general public, and neighbors adjacent to bus stops.

4.25.1 Bus Pull-Out Bays

Bus pull-out bays are generally installed on the departure side of the intersection and allow buses to pull completely out of the traffic lane while loading and unloading passengers. Bus pull-out bays shall be installed along arterial streets at locations required by the Town's Traffic Engineering staff. The bus pull-out bays shall be designed per MAG Standard Detail 252.

4.25.2 Bus Shelter Pads

A bus shelter pad shall be installed at all bus stops locations. Bus shelter pads shall be designed per MAG Standard Details and be ADA compliant.

4.26 SUBDIVISION LOCAL STREETS

4.26.1 Street Location and Arrangement

4.26.1.1 STREET LAYOUT

Street layout shall provide for the continuation of arterial and collector streets in adjacent areas, but should discourage through traffic.

4.26.1.2 FUTURE CONNECTION

Certain proposed streets, as designated by the Town, shall be extended to the

subdivision boundary to provide future connection with adjoining unplatted lands. In general, these extensions should not be farther apart than the maximum permitted length of a block, as specified in the Town Code Chapter 22 Subdivision Regulations, Sub-Section (e) of Section 22-80.

4.26.1.3 LOCAL STREETS

Local streets shall be so arranged as to discourage their use as through routes by traffic originating outside the immediate area.

4.26.1.4 TRAFFIC CALMING

Traffic calming measures can be implemented as part of new communities, or retrofitted into existing neighborhoods. If a community design calls for traffic-calming elements, or is required by the Town, the Town will work with the project engineer with suggestions and guidance on acceptable treatments. Traffic calming measures can vary, depending on the specific application. Example traffic calming measures include speed cushions, speed tables, medians, traffic circles, street narrowing, and other elements designed as integral parts of the roadway infrastructure. The Town Traffic Engineer must approve the use of traffic calming measures within Town right-of-way.

4.26.1.5 ARTERIAL ROUTE

When a proposed subdivision abuts or contains an existing or proposed arterial route, the Town may require limited access streets or reverse frontage with non-access easements along the arterial route, or such other treatment as may be justified for protection of properties and for preservation of the traffic function of the arterial route.

4.26.1.6 RIGHT-OF-WAY OF A RAILROAD

When a residential subdivision abuts the right-of-way of a railroad, a limited access highway, or abuts a commercial or industrial land use, the Town may recommend location of a frontage street parallel to such right-of-way or use buffer area at a distance suitable for appropriate use of intervening land, such distance being determined with due regard for approach grades, drainage, bridges or future grade separations.

4.26.1.7 EXISTING TOPOGRAPHY

Streets shall be so arranged in relation to existing topography as to produce desirable lots of maximum utility and streets of reasonable gradient, and to facilitate adequate drainage.

4.26.1.8 ALLEYS

Construction of new alleys shall provide adequate provision for solid waste and utility vehicle circulation and avoid alley outlets opposite fronts of residential lots.

Alleys designated as a primary or secondary necessary for fire access need to

accommodate fire/emergency vehicles. If it was not anticipated for fire access, the alley does not need to accommodate for fire/emergency vehicles.

4.26.2 Subdivision Blocks

Block lengths, widths, and shapes of blocks shall be determined with due regard to:

1. Provision of sites suitable to the type of use contemplated.
2. Zoning requirements as to lot sizes and dimensions.
3. Need for convenient access, circulation, control and safety of vehicle, bicycle and pedestrian traffic.
4. Limitations and opportunities of topography.
5. Circulation within the subdivision, and access to the community facilities.
6. Lengths as short as practicable but not to exceed 1,200 feet. If longer blocks are approved by the Town, traffic calming measures may be required.

4.27 FINAL STREET IMPROVEMENT PLAN REQUIREMENTS

Construction Plan Submittal Requirements for the preparation of final plans in the Town are described in Chapter 2.0; this section supplements the requirements of Chapter 2.0.

1. An index map with the following information:
    - Street names.
    - Sheet numbers.
    - Town limits, where applicable.
    - Phasing construction limits, phase numbers and identify which phasing the model homes are located.
2. Typical sections for each street to be improved shall be shown on the detail sheet. The sections shall include the following information:
    - Right-of-way width.
    - Width of sidewalk.
    - Dimensions to back of curb.
    - Width of paved surface.
    - Type of curb and gutter; i.e., roll, vertical, or ribbon.

- Pavement cross-section.
- Pavement structural sections conforming to geotechnical report or minimum Town of Gilbert standard pavement sections.
- Finished slope behind sidewalk to right-of-way limits.

3. The following utility items shall be shown on each sheet
   - All existing and proposed manholes under new pavement must be adjusted to grade per MAG Standard Detail 422 and MAG Specification Section 505 with concrete collar.
   - All existing and proposed valve boxes and covers affected by construction must be adjusted to grade per Town of Gilbert Standard Details and MAG Specification Section 505 with concrete collar.
4. The following design items shall be shown on each sheet in plan view:
   - Existing right-of-way, with width dimensioned
   - Existing pavement, with width dimensioned
   - Existing curbs, with width dimensioned
   - Existing sidewalk, with width dimensioned
   - Existing sidewalk ramps
   - Proposed right-of-way, with width dimensioned
   - Proposed pavement, with width dimensioned
   - Proposed curbs, with width dimensioned and standard detail number call-out
   - Proposed sidewalk, with width dimensioned and standard detail number call-out
   - Proposed sidewalk ramps at intersections, including T-intersections
   - Existing items "to be protected in place" shall be noted
   - Curb transitions
   - Curb return radii with dimensions
   - Curb radii at cul-de-sacs, knuckles and "birdseye" with dimensions
   - Survey monuments, with standard detail number callout
   - Town limits where applicable

- Valley gutters at all locations where storm water will cross the street, with width and standard detail number callout

5. The following design items shall be shown on each sheet in profile view:

   - Existing grade at right curb line
   - Existing grade at left curb line
   - Existing grade at centerline (when no median)
   - Proposed grade at right curb line
   - Proposed grade at left curb line
   - Proposed grade at right median curb
   - Proposed grade at left median curb
   - Proposed grade at centerline (when no median)
   - The proposed longitudinal grades shall be labeled
   - Longitudinal grades on curves must be computed based on their true lengths
   - Concrete longitudinal slopes around cul-de-sacs, knuckles, "birdseye" and across valley
   - Storm drain, utility and other crossings whenever minimal cover below subgrade, is encountered

6. All existing water wells within the right-of-way must be shown on the plans with their Department of Water Resources registration number. If not registered, so note on the plans.

7. The following existing and proposed traffic engineering items shall be shown in plan view:

   - Street name sign bases
   - Streetlights
   - Traffic control devices (all signs, signals, flashers)
   - Temporary turn-around at dead-end streets, and at phase lines
   - Street barricade per MAG Standard Detail 130, Type B
   - Traffic signal conduits and pull boxes
   - Interconnect conduits, pull boxes and vaults

8. The following survey design items shall be shown on each sheet:

   - Construction centerline station numbers with sheet reference at all match lines in plan or profile views.
   - Centerline survey data.
   - Station numbers at all changes in street alignment, intersections, curb returns, and grade breaks in profile.
   - Gutter and centerline spot elevations at all grade breaks.
   - Gutter spot elevations at all intersections.
   - Centerline spot elevations at all intersections.

4.28 SUBMITTAL CHECKLIST

The latest version of the Street Improvements Checklist can be found on the Town of Gilbert Engineering Services website. This Checklist will be periodically updated by the Town of Gilbert. At the time of the publication of these Standards it was as follows:

1. Compliance with the Town of Gilbert standard street widths, as specified in Subdivision review, and all dimensions on plans shown as face to face of curb.
2. Minimum curb grade in the Town of Gilbert is 0.0025 ft/ft.
3. Grade changes and grade breaks are clearly marked in the plan review.
4. All curve information shown on the plan and profile sheets.
5. Curb returns shall have a minimum 0.10 foot drop.
6. "Grade to daylight" or provide catch basins at the end of new paving projects where necessary.
7. Provide barricades or delineators where there are traffic hazards immediately following end of project paving as directed by the Town of Gilbert. Refer to the current Manual on Uniform Traffic Control Devices Handbook.
8. The Town requires a "crown" on all streets. See Typical Street Sections in Town of Gilbert Standard Details.
9. 8 inch thick sidewalk required for alley and commercial driveway entrances. All other sidewalk to be 4 inch thick.
10. Minimum curb return radii meet the Town of Gilbert Design Standards.
11. Survey monuments required at all street intersections, all section corners and quarter corners. Brass caps in concrete bases can be used at all curve or P.I.

points and in cul-de-sacs as per Standard Details. Street centerlines and monument lines shall coincide. Monuments for section corners and quarter corners "shall" be per MAG Standard Detail 120 Type A.

12. Show sufficient pavement tapers at beginning and end of projects to properly channel traffic back to original or new alignment. Generally tapers should be of temporary construction consisting of at least 2 inch asphaltic base course over compacted native soil (tapers are to be sawcut and removed when pavement is extended).

13. Installation of street sign posts at each intersection shown and labeled per Town of Gilbert Standard Detail. Locations normally coincide with the corner where a STOP sign would be located. Developer shall furnish and install all street signs per Town of Gilbert Standard Detail GIL-220through GIL-227 and traffic control signs per Manual on Uniform Traffic Control Devices.

14. Complete field survey and all topographic features shown and called for what is to be done with them on plans. (Power poles, trees, ditches, existing signs and striping, etc.)

15. Plans must show installation of 2½ inches AC and base as required by soils report on all alleys and private access ways.

16. Sufficient sight distance is provided where necessary, such as removal of existing obstructions near an intersection, etc.

17. All driveway widths and locations shall be as per Town of Gilbert requirements.

18. Any project proposing to pave the alleys must coordinate with all existing utility companies to alert them to the need for telecommunication junction boxes installed flush with paving to avoid damage.

19. Projects calling for widening an existing pavement to a new curb and gutter location require, at minimum, the sawcut and removal of existing pavement to the monument line.

20. Accessible ramps and detectable warning fields as per ADA requirements.

21. Show all existing concrete or dirt ditches on plans and indicate that they are to be tiled or removed and/or filled and compacted per MAG Specifications 205 and 211.

22. Show the public utility easement at the front of all lots. Indicate and show that the sewer connections must be installed all the way to the easement line (8 foot PUE). This is required to avoid possible conflict with electrical lines when the plumber connects the house to the service.

23. Make sure that PVC sleeves required for sprinkler system, gas mains, street light, traffic signals and cable television are shown on the paving plans. Size the PVC sleeves as per landscape architect, utility company or Town Engineer.

24. All developers of residential, apartment/condominium, commercial, industrial and business parks, etc., are responsible for paying the design, materials and installation cost for street lighting.

25. The developer's engineer is responsible for coordinating locations of all utilities within the street right-of-way, such that the street lights are able to be installed with the light pole at the back of the sidewalk, or within 2 feet of the back of sidewalk.

26. A minimum sight distance with clear visibility, measured along the centerline, shall be provided for horizontal curves.

27. A tangent shall be introduced between reverse curves and between curves and at street intersection on major and collector streets.

28. Installation of valley gutters must be approved by the Town Engineer.

29. Traffic control design is required for all streets. Developer shall be responsible for the design and construction of all traffic (vehicle and pedestrian) controls on and related to this project. Traffic control shall be per current Manual on Uniform Traffic Control Devices and Town of Gilbert Standard Details. All traffic control, including required signage, shall be installed within one week of the installation of the "first lift" of paving.

30. The maximum length of a cul-de-sac shall not be exceeded.

31. Provide typical sections of all streets showing curb, gutter, sidewalk, paving, subgrade and proposed locations of all utilities.

32. Any development which, by its nature, would invite heavier than normal truck traffic shall be required to make a study of the expected Equivalent Axle Loadings (EALs) for a 20-year design period and design a pavement depth as warranted by that study and in accordance with the design criteria of the Asphalt Institute.

33. As a condition for, and prior to, the issuance of any grading permit, the contractor shall submit an application for haul route permit along with any applicable temporary Traffic Control Plan. Upon approval of the proposed haul route, the off-site inspector and a representative of the contractor shall inspect the roadways to be used by contractor and take photographs to verify their existing condition. After all grading is complete; the off-site inspector and contractor will again inspect the haul route and, if necessary, the contractor shall be charged with restoring the roadways to their previous condition or better. Furthermore, final letters of acceptance shall not be issued to the developer of the project until all affected roadways are restored to their previous condition or better.

34. Private streets shall be constructed to meet the same Town standards for public streets in order to be approved through the planning, zoning, platting and Town Council process.

35. Private streets that are not gated shall provide traffic controls that comply with the current edition of the Manual on Uniform Traffic Control Devices.

4.29 GENERAL NOTES

The latest version of Street Improvement Plans General Notes can be found on the Town of Gilbert Engineering Services website. These Notes will be periodically updated by the Town of Gilbert. At the time of the publication of these Standards they were as follows:

1. All construction shall be in accordance with the current MAG Specifications and Details, with the Town of Gilbert additions and deletions.

2. The contractor shall obtain all necessary permits prior to construction. The Town Engineer shall be notified 24 hours prior to starting the different phases of construction for scheduling inspections.

3. Acceptance of the completed right-of-way improvements will not be given until Record Drawings have been submitted to and approved by the Town Engineer.

4. Location of all water valves must be referenced at all times during construction and made available to the Water Distribution Division. Only Town Employees are authorized to operate the water valves and fire hydrant connections to the Town's water system.

5. No paving construction shall be started until all underground utilities within the roadway prism are completed.

6. Work performed without approval of the Town Engineer and/or all work and materials not in conformance with the specifications is subject to removal and replacement at the contractor's expense.

7. The maximum stake interval for grades of 0.2 percent or less shall be 12.5 feet for concrete work and 25 feet for asphalt roadway section. All curb returns shall be staked for the P.C., P.T. and the midpoint of return.

8. Base course will not be placed on subgrade until base requirements have been completed and accepted by the Town Engineer.

9. Gutters will be water tested in the presence of the Town Engineer or his authorized representative to insure proper drainage, prior to final approval by the Town Engineer.

10. Exact point of matching, termination and overlay, if necessary, may be determined in the field by the Town Engineer.

11. No job will be considered completed until all curbs, pavement and sidewalks have been swept clean of all dirt and debris and all survey monuments are installed, punched and dated according to the plans.

12. The contractor is responsible for locating all valves, manholes and blow offs in

advance of construction and replacing same to finished grade.

13. The Town of Gilbert is not responsible for liability accrued due to delays and/or damage to utilities in conjunction with this construction. Also, the Town will not participate in the cost of construction or utility relocation.

14. Traffic control shall be maintained in accordance with MAG Specification 401, and the current edition of the Manual on Uniform Traffic Control Devices. All traffic controls, including striping and required signage, shall be installed within one week of the installation of the "first lift" of paving.

15. Testing

    - Testing of materials and construction performance by an Arizona Technical testing Institute (ATTI) or American Concrete Institute (ACI) approved testing lab is required.

    - The Town Inspector will determine the number and type of tests needed.

    - The contractor/developer will notify the testing lab of the needed tests, coordinate with the inspector and testing lab and pay the costs to perform the tests.

16. Ordinance #1437, approved by the Town Council in October 2002, states: No construction water from fire hydrants shall be used on parcel or lots of ten acres or more in size. For more information, the ordinance is located on the Town of Gilbert website. To obtain construction water, the contractor is required to make application with the Public Works Water Division. A security deposit is required to receive a fire hydrant meter. The Town reserves the right to specify the time and location that construction water can be delivered.

17. All flood retention basin development and installations must be completed and accepted before the paving permit/approval to work will be issued for the subdivision.

18. Prior to final approval and acceptance of the work, the developer/contractor will be required to clean and repair adjacent (off-project) roadways used during the course of their construction.

19. Use of "Reclaimed Asphalt" is prohibited unless approved by the Town Engineer.

20. Grinding and/or patching of curbs, gutters, aprons, valley gutters, driveways, scuppers, manhole bases and inverts or any concrete structure to correct deficiencies that result from improper grade setting, or construction methods, or breakage due to any circumstances shall not be permitted.

21. All metallic materials inlets, grates, frames and covers, catch basins and nose angles shall be painted per MAG Specification No. 790, Paint No. 9 (light gray).

22. Parkway grading shall be designed to insure that runoff cannot be retained behind curbs or walks.

23. All parkway grading must be completed before any paving may begin.

24. All signs shall be installed per Town of Gilbert Standard Detail GIL-227.

4.30 FIGURES

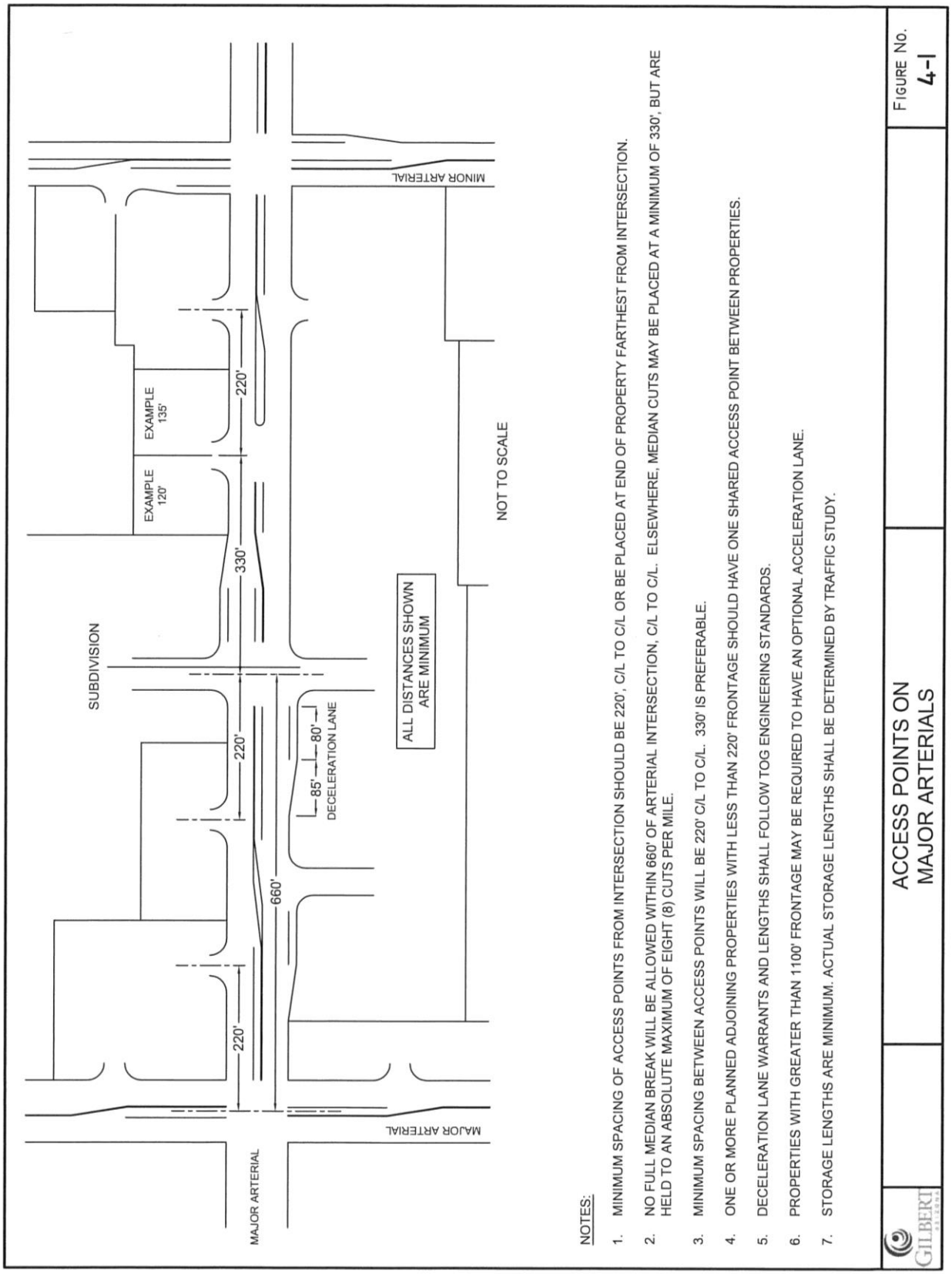


FIGURE 4-1 ACCESS POINTS ON MAJOR ARTERIALS

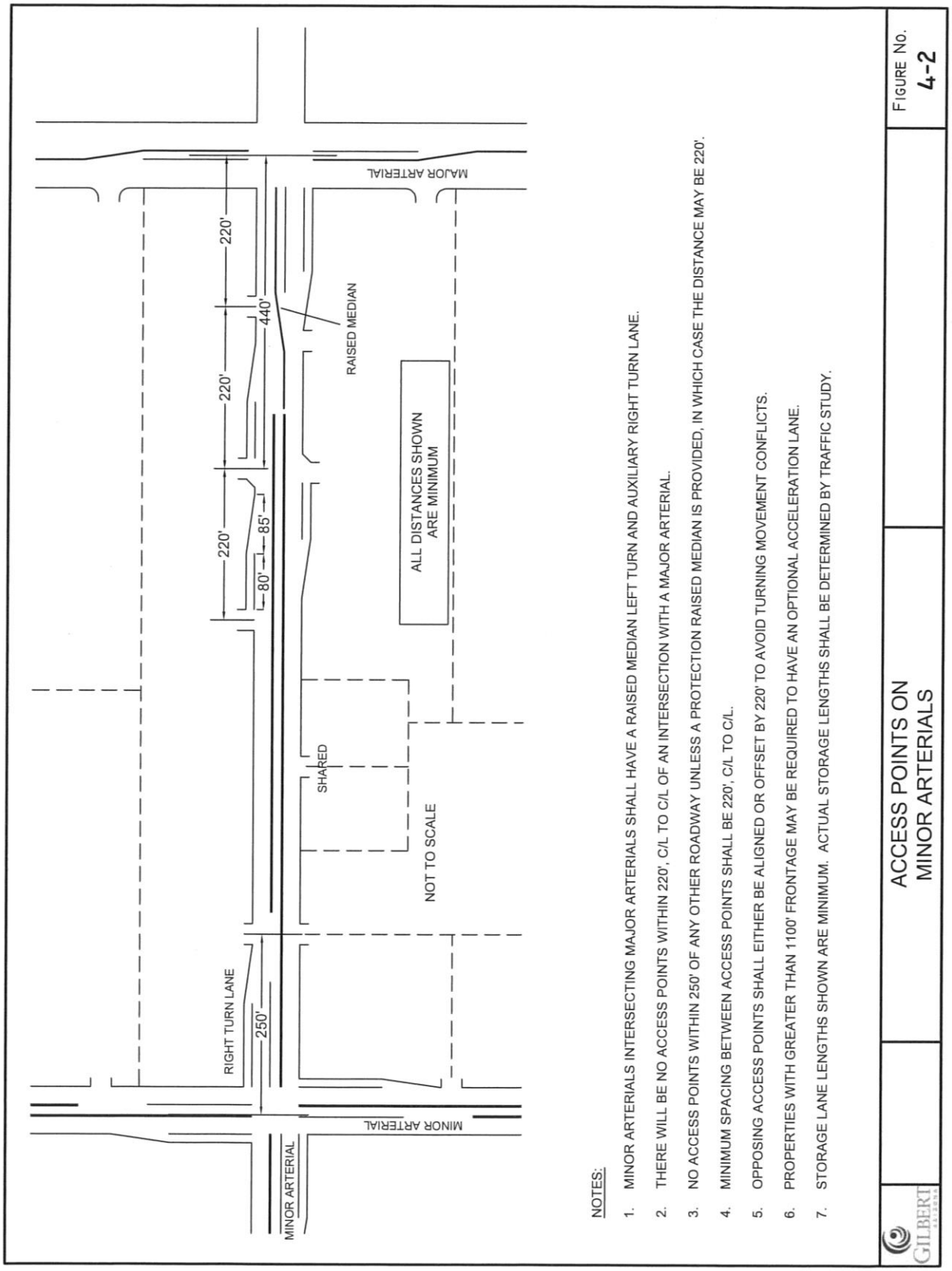


FIGURE 4-2 ACCESS POINTS ON MINOR ARTERIALS

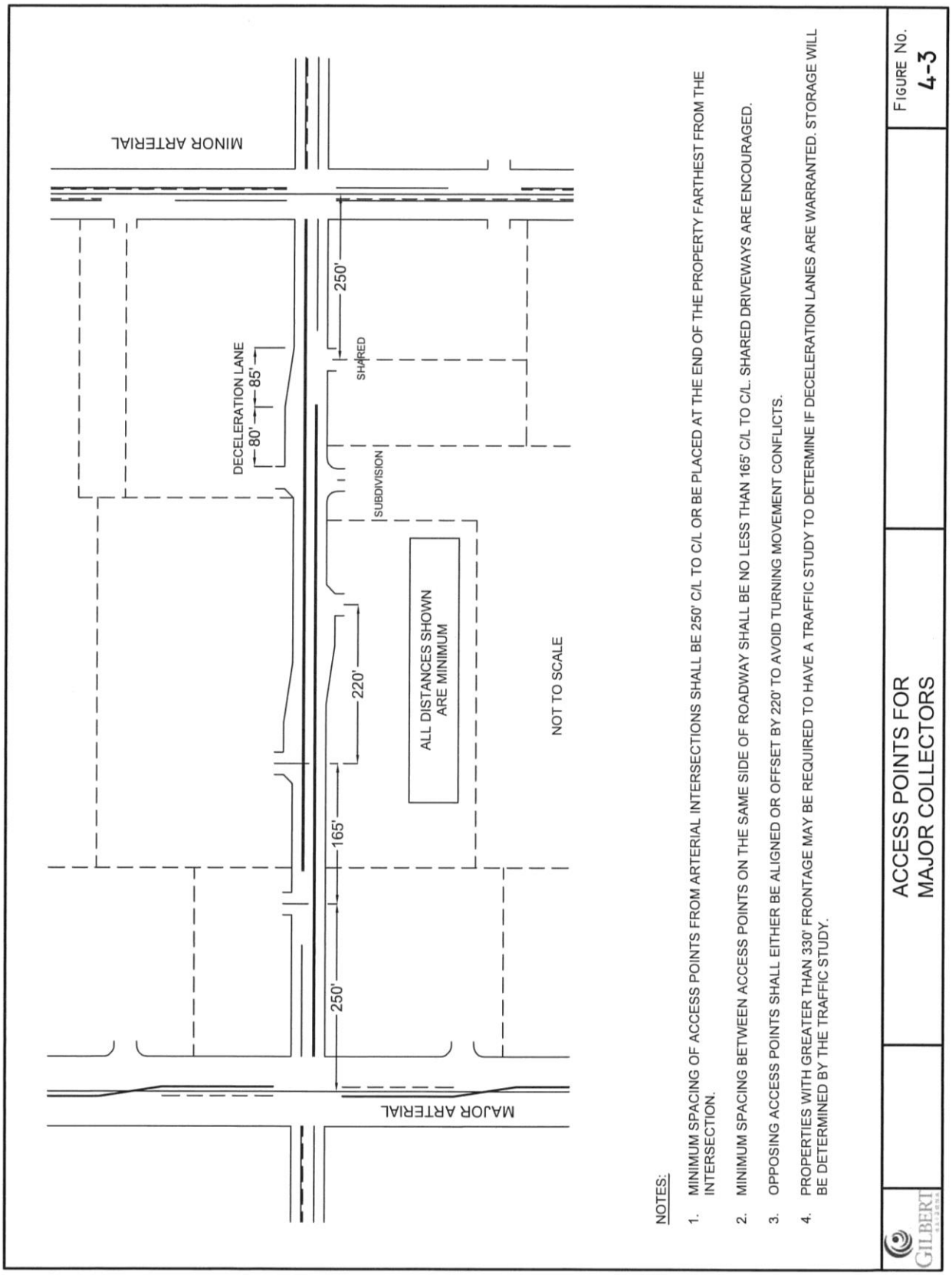


FIGURE 4-3 ACCESS POINTS FOR MAJOR COLLECTORS

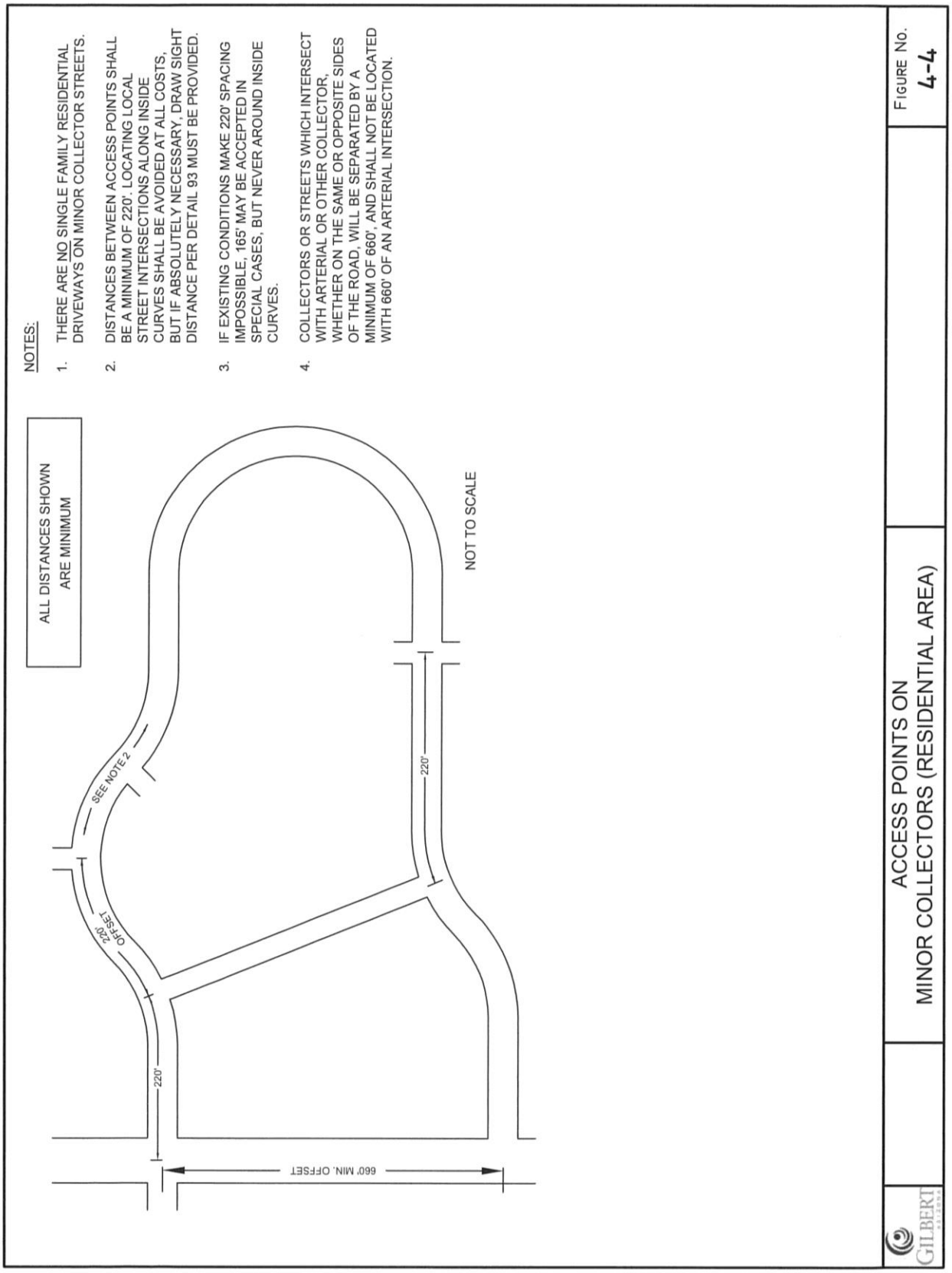


FIGURE 4-4 ACCESS POINTS ON MINOR COLLECTORS (RESIDENTIAL AREA)

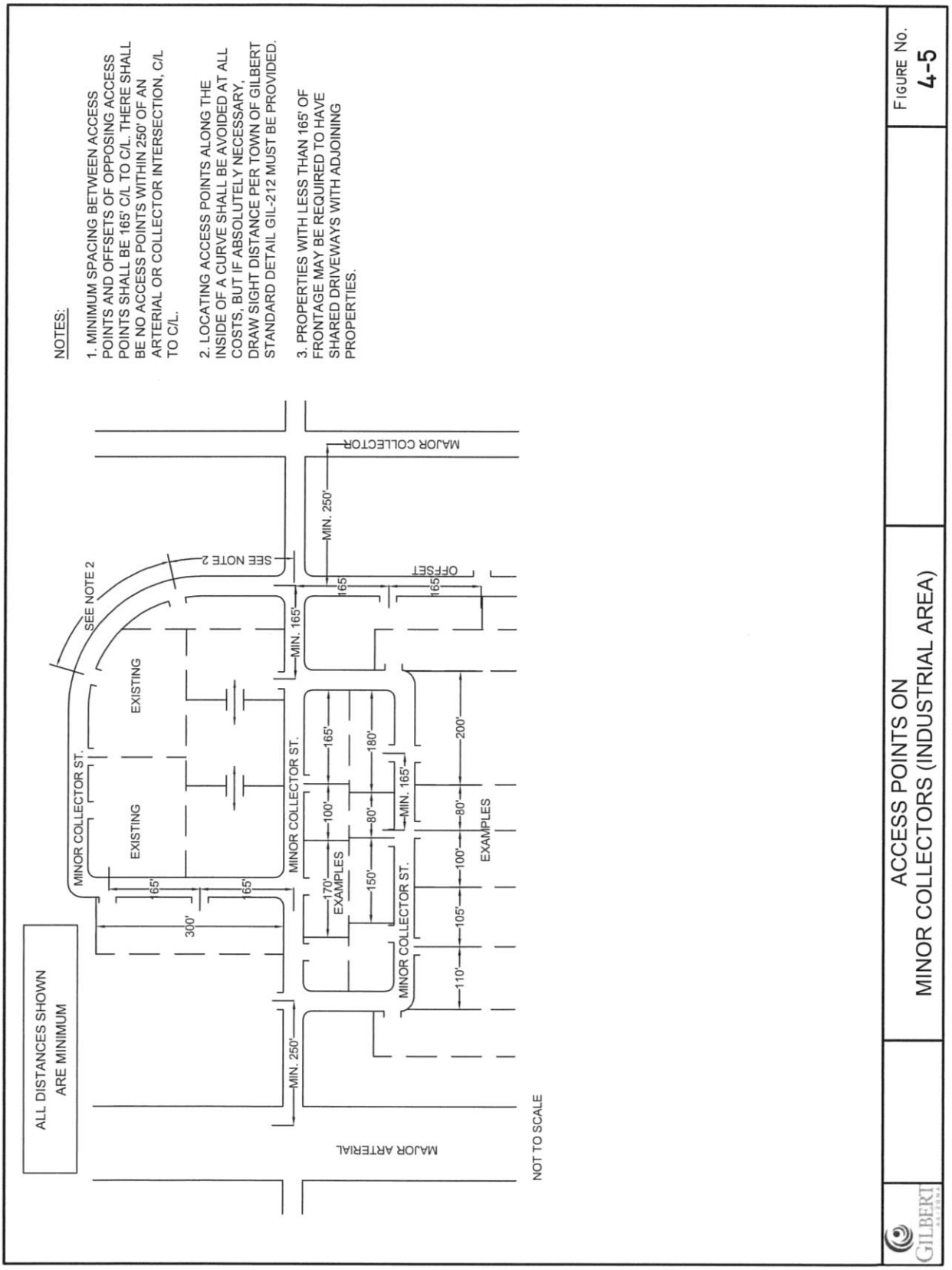


FIGURE 4-5 ACCESS POINTS ON MINOR COLLECTORS (INDUSTRIAL AREA)

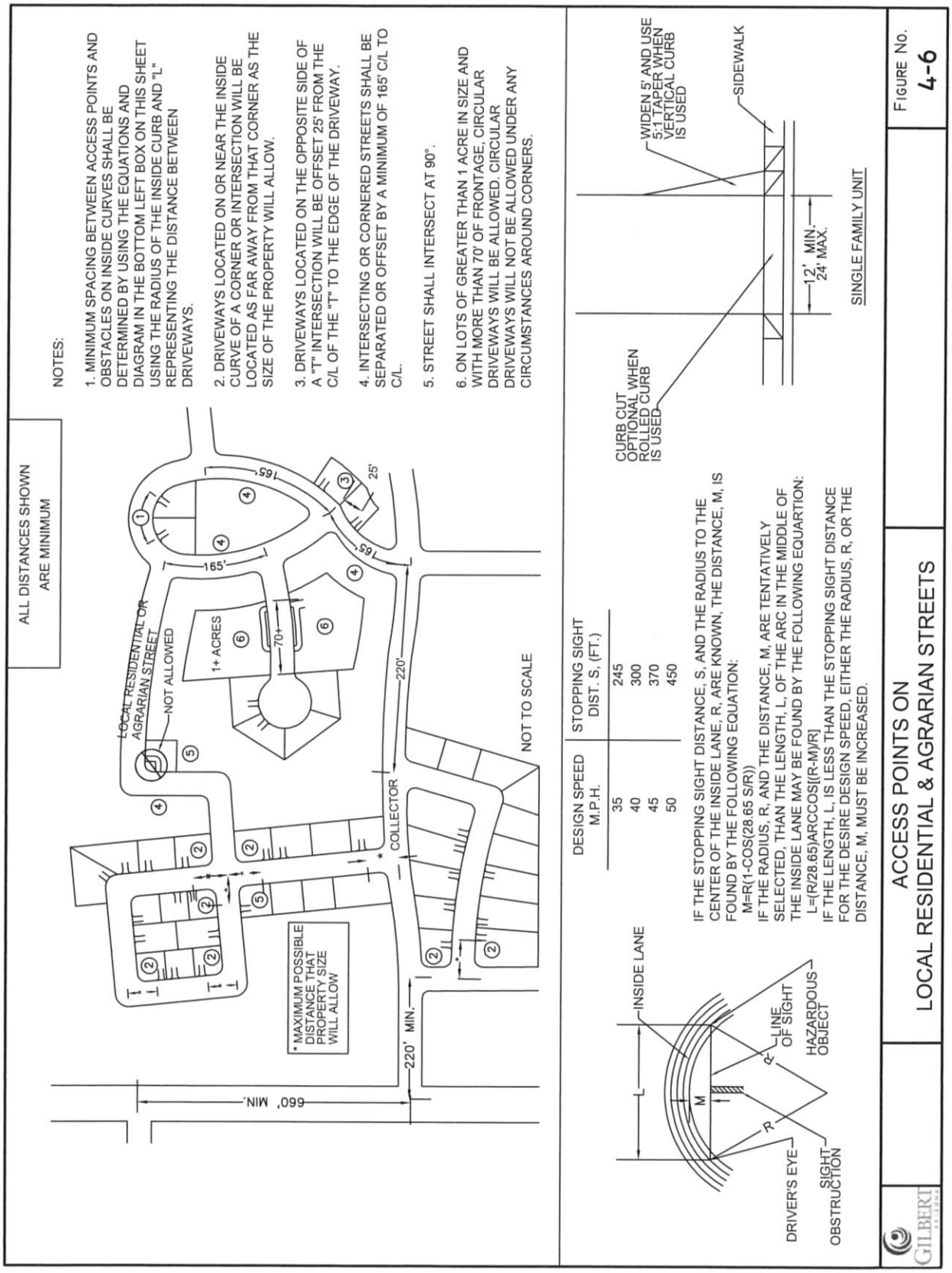


FIGURE 4-6 ACCESS POINTS ON LOCAL RESIDENTIAL & AGRARIAN STREETS

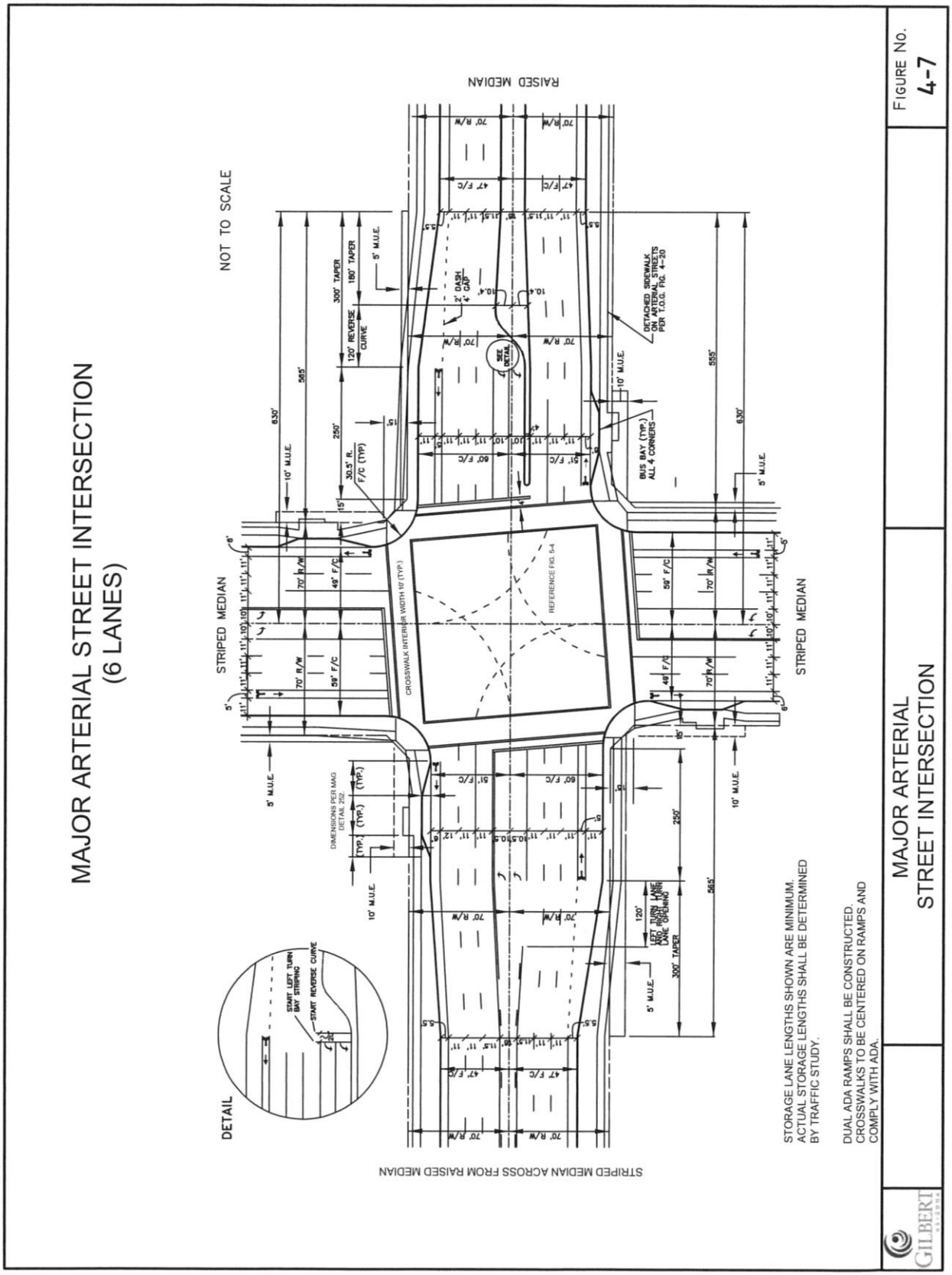


FIGURE 4-7 MAJOR ARTERIAL STREET INTERSECTION

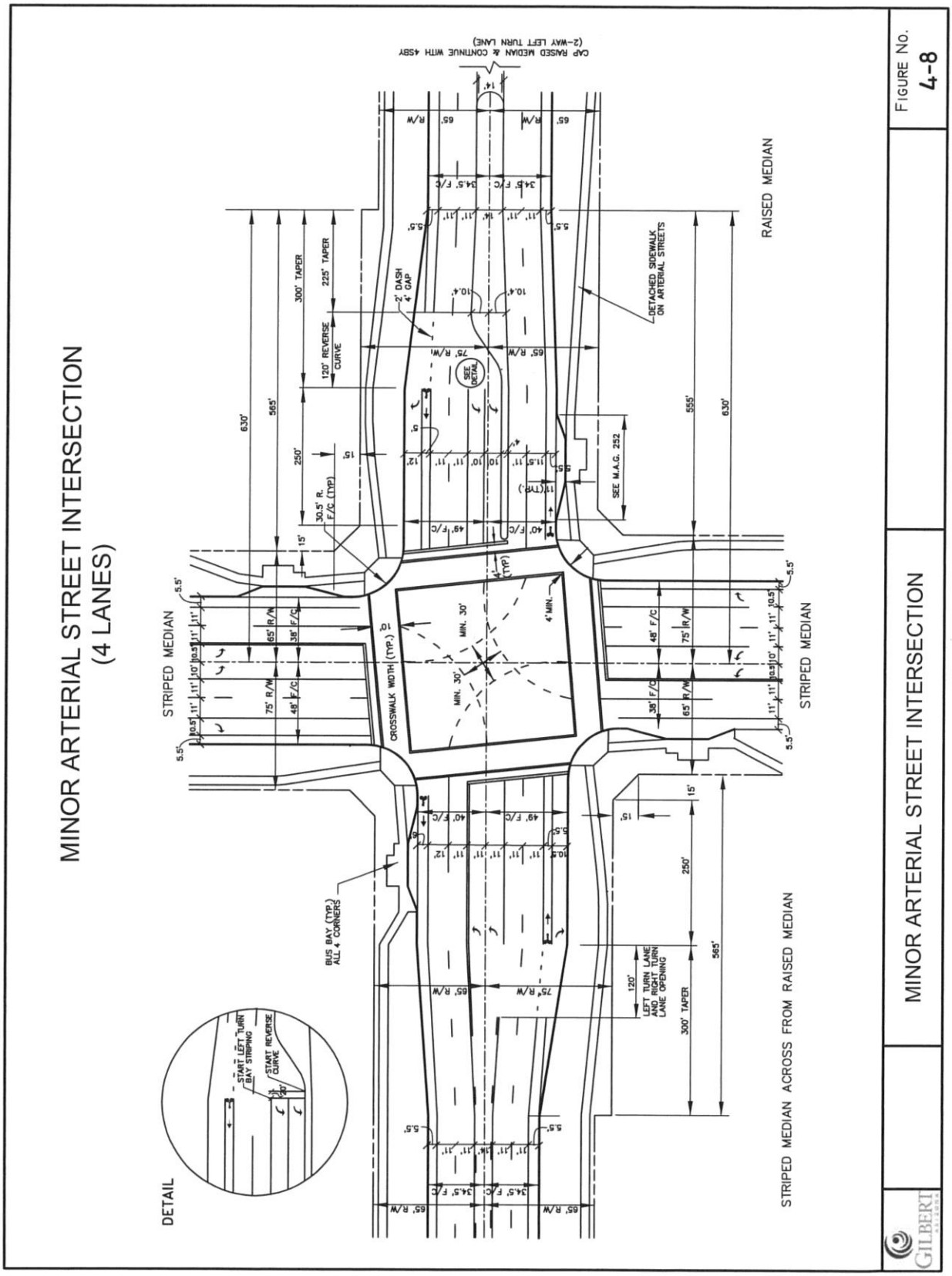


FIGURE 4-8 MINOR ARTERIAL STREET INTERSECTION

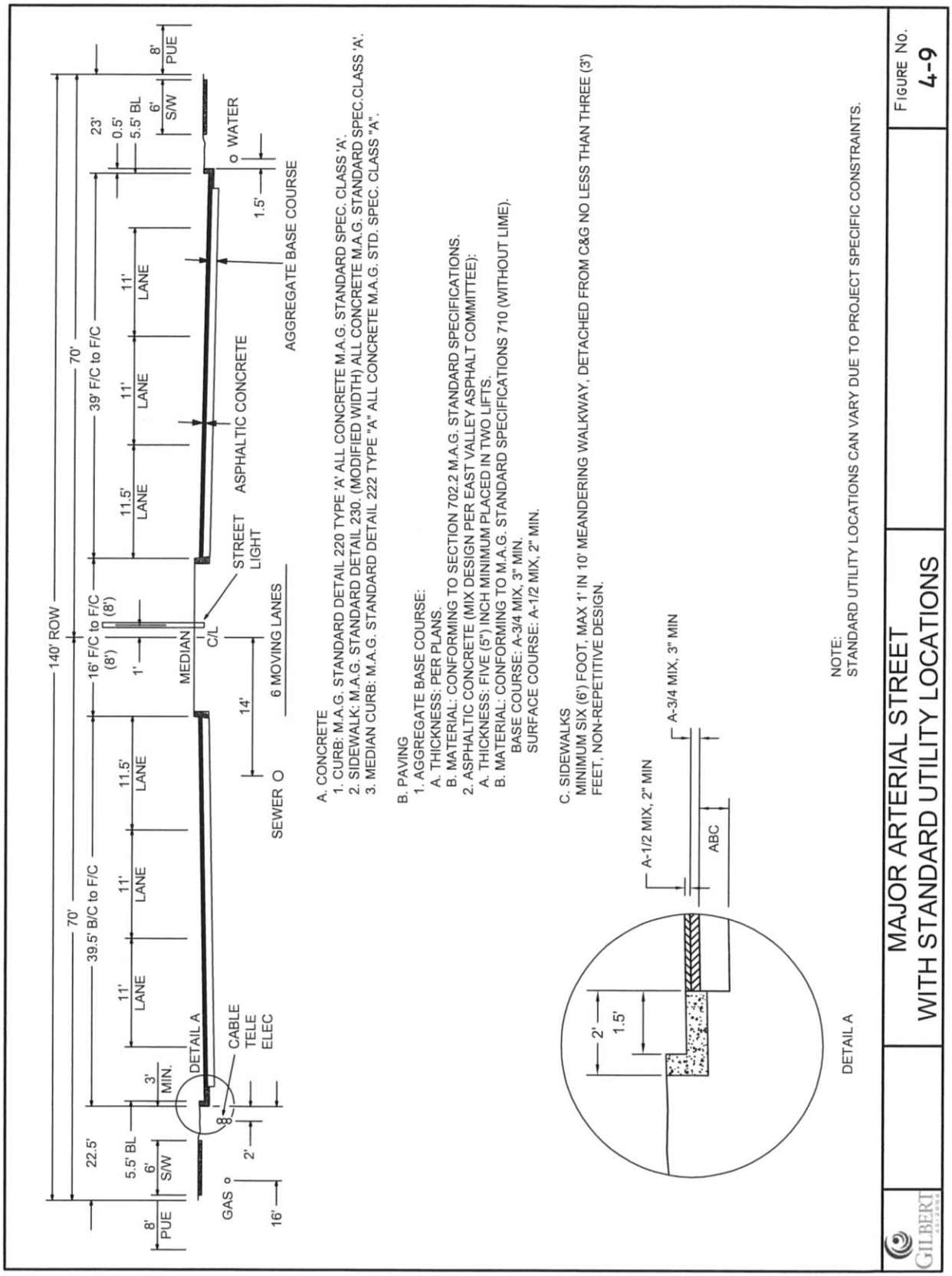


FIGURE 4-9 MAJOR ARTERIAL STREET WITH STANDARD UTILITY LOCATIONS

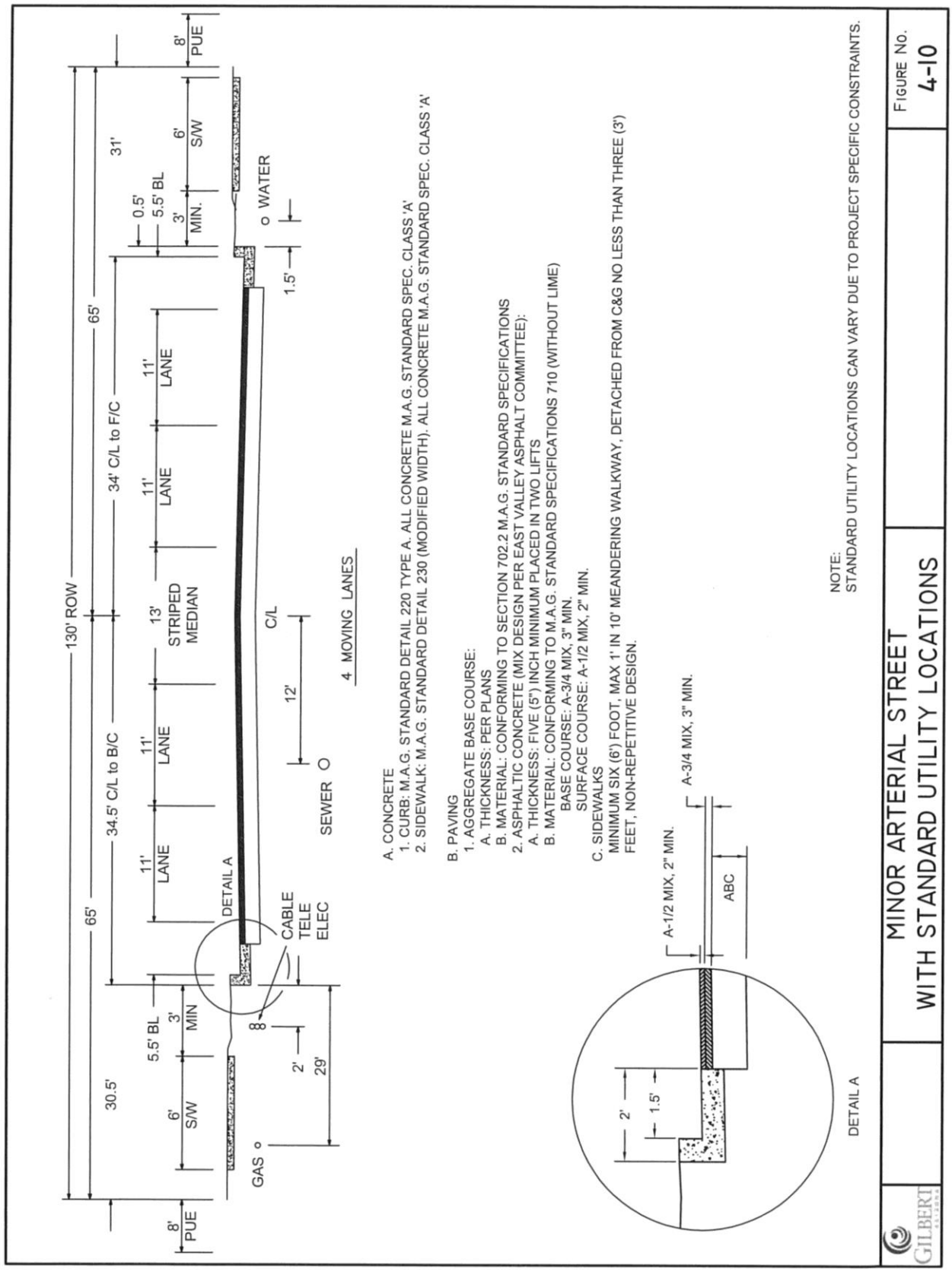


FIGURE 4-10 MINOR ARTERIAL STREET WITH STANDARD UTILITY LOCATIONS

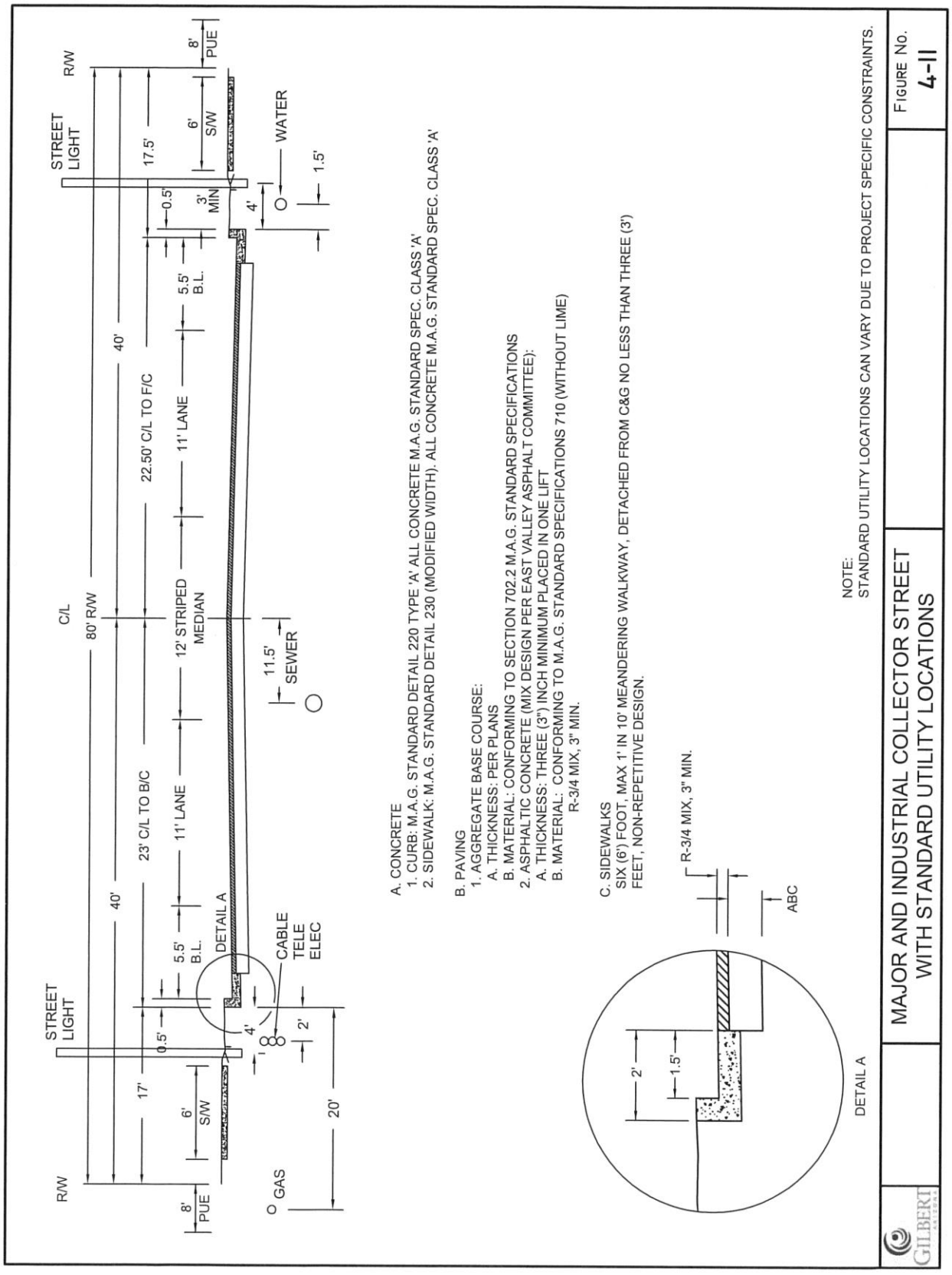


FIGURE 4-11 MAJOR AND INDUSTRIAL COLLECTOR STREET WITH STANDARD UTILITY LOCATIONS

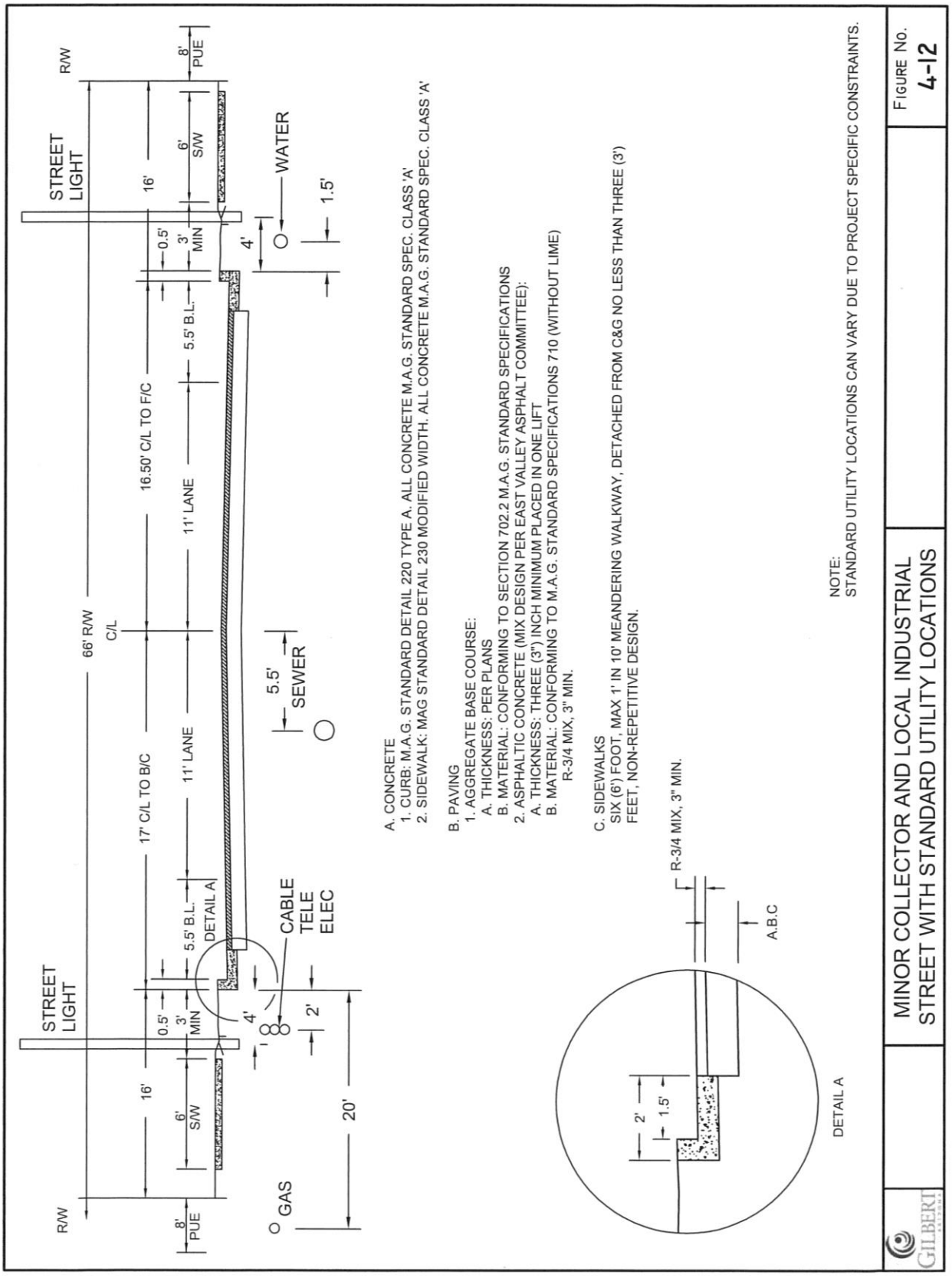


FIGURE 4-12 MINOR COLLECTOR AND LOCAL INDUSTRIAL STREET WITH STANDARD UTILITY LOCATIONS

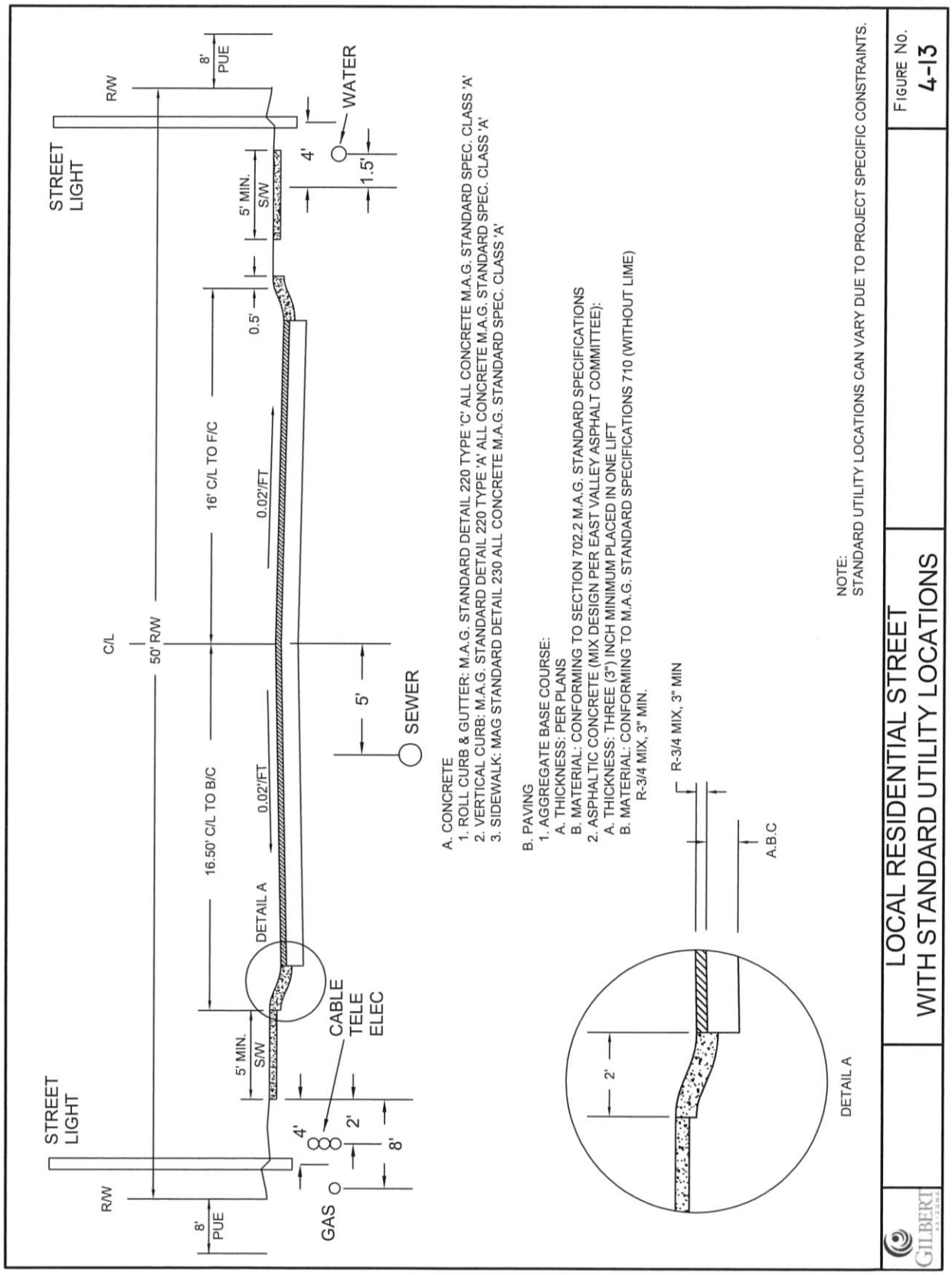


FIGURE 4-13 LOCAL RESIDENTIAL STREET WITH STANDARD UTILITY LOCATIONS

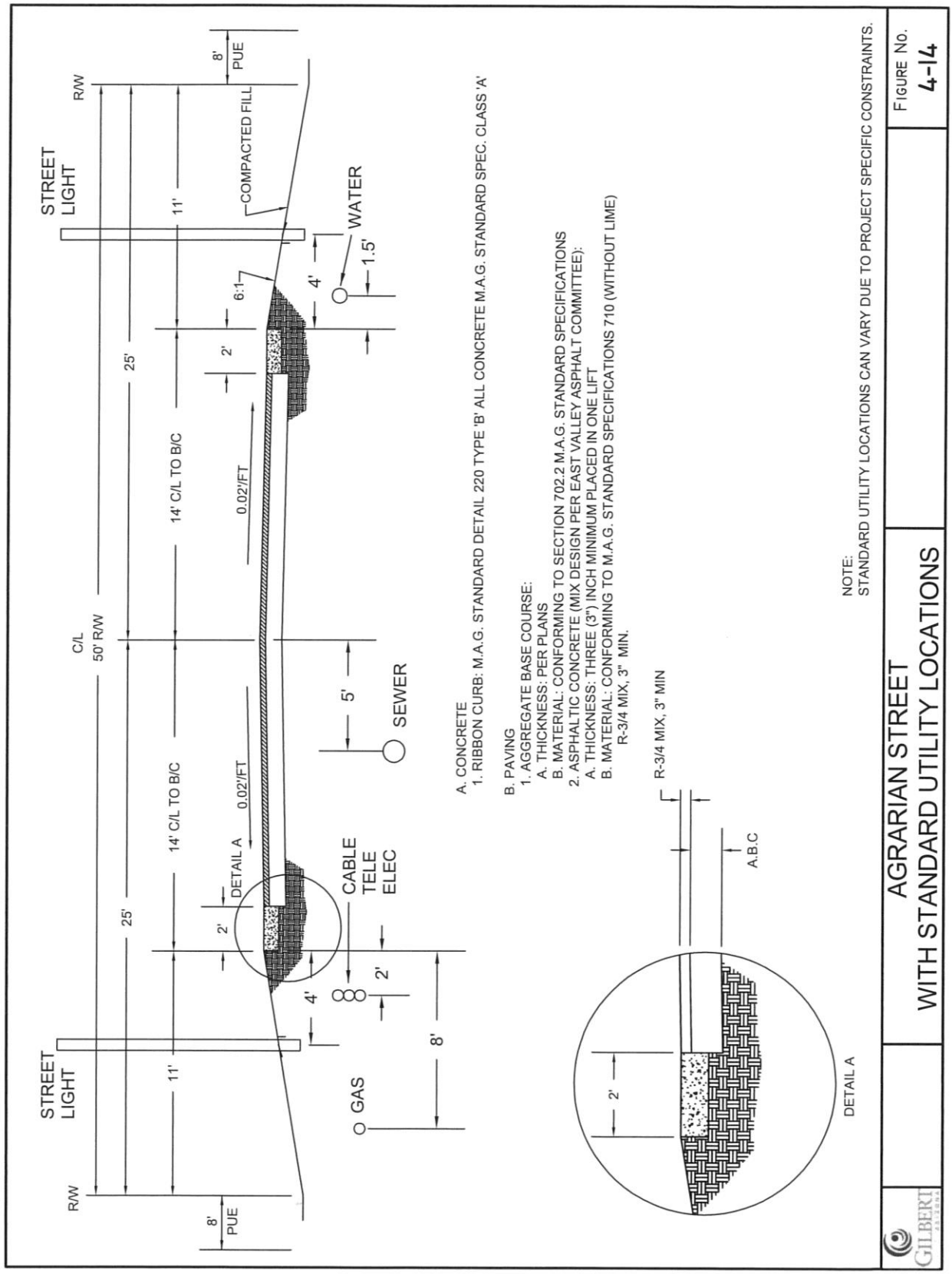


FIGURE 4-14 AGRARIAN STREET WITH STANDARD UTILITY LOCATIONS

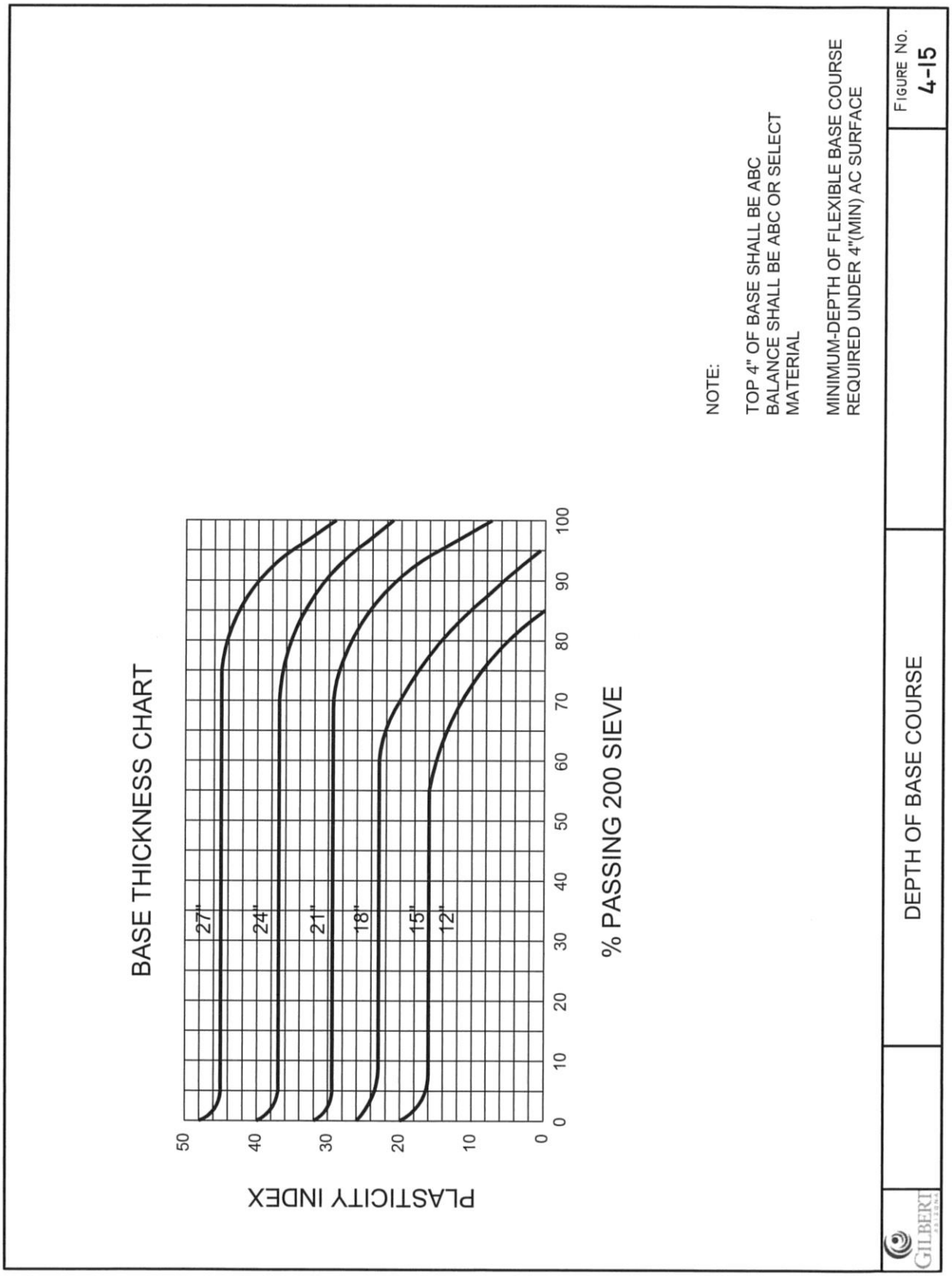


FIGURE 4-15 DEPTH OF BASE COURSE (MAJOR ARTERIAL)

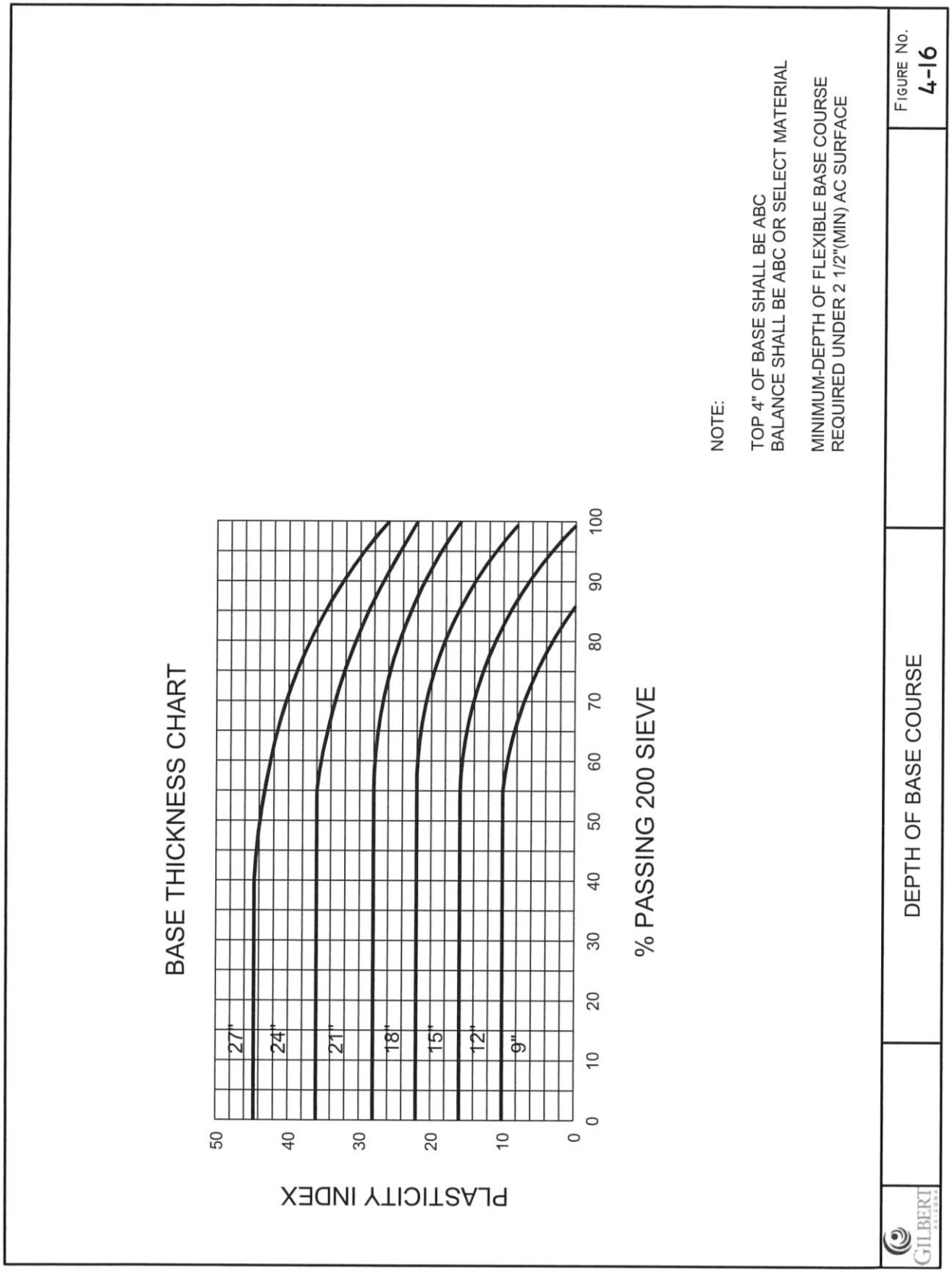


FIGURE 4-16 DEPTH OF BASE COURSE (MINOR ARTERIAL, MAJOR COLLECTOR, INDUSTRIAL)

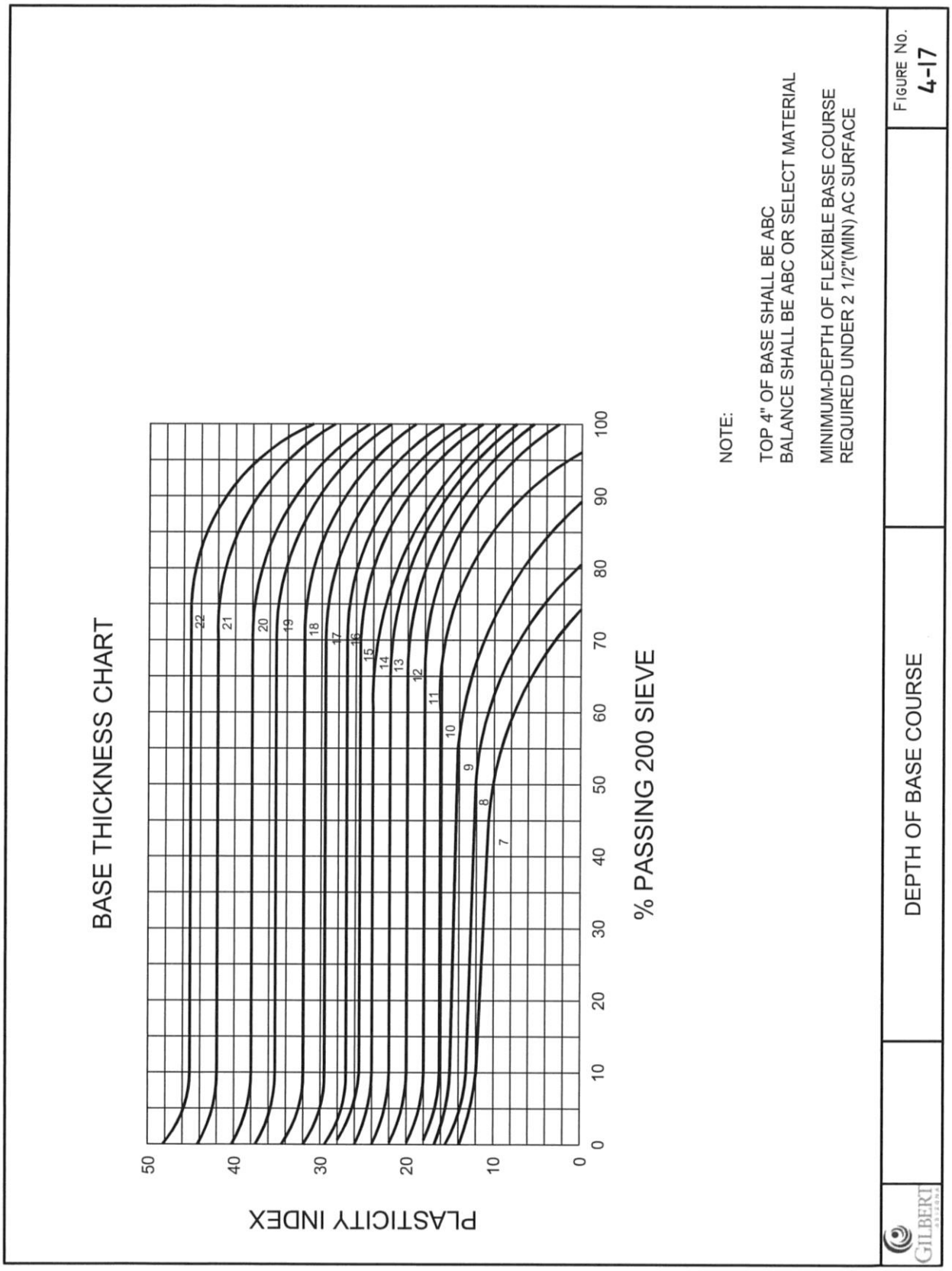


FIGURE 4-17 DEPTH OF BASE COURSE (RESIDENTIAL COLLECTOR)

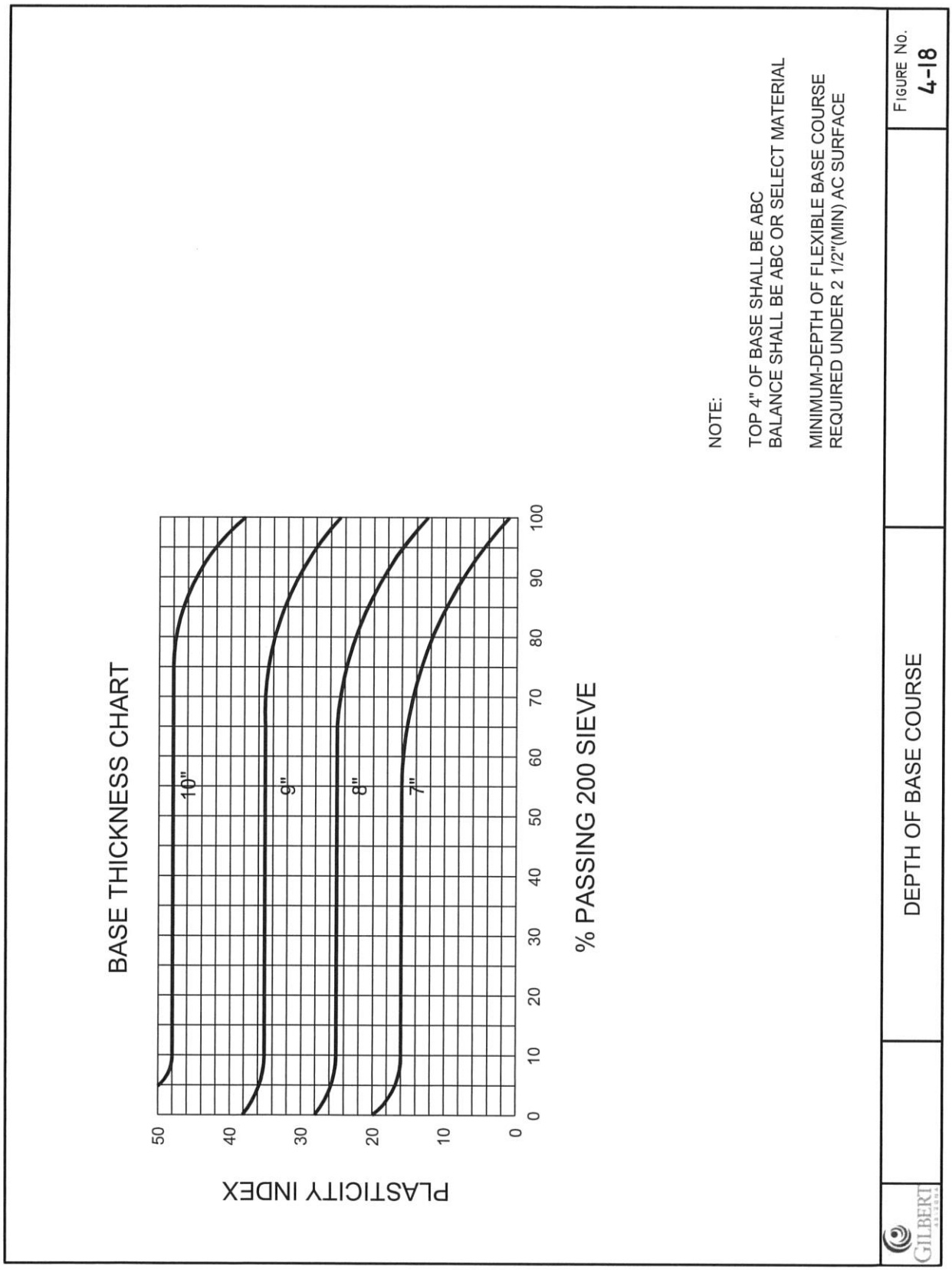


FIGURE 4-18 DEPTH OF BASE COURSE (LOCAL RESIDENTIAL, AGRARIAN)

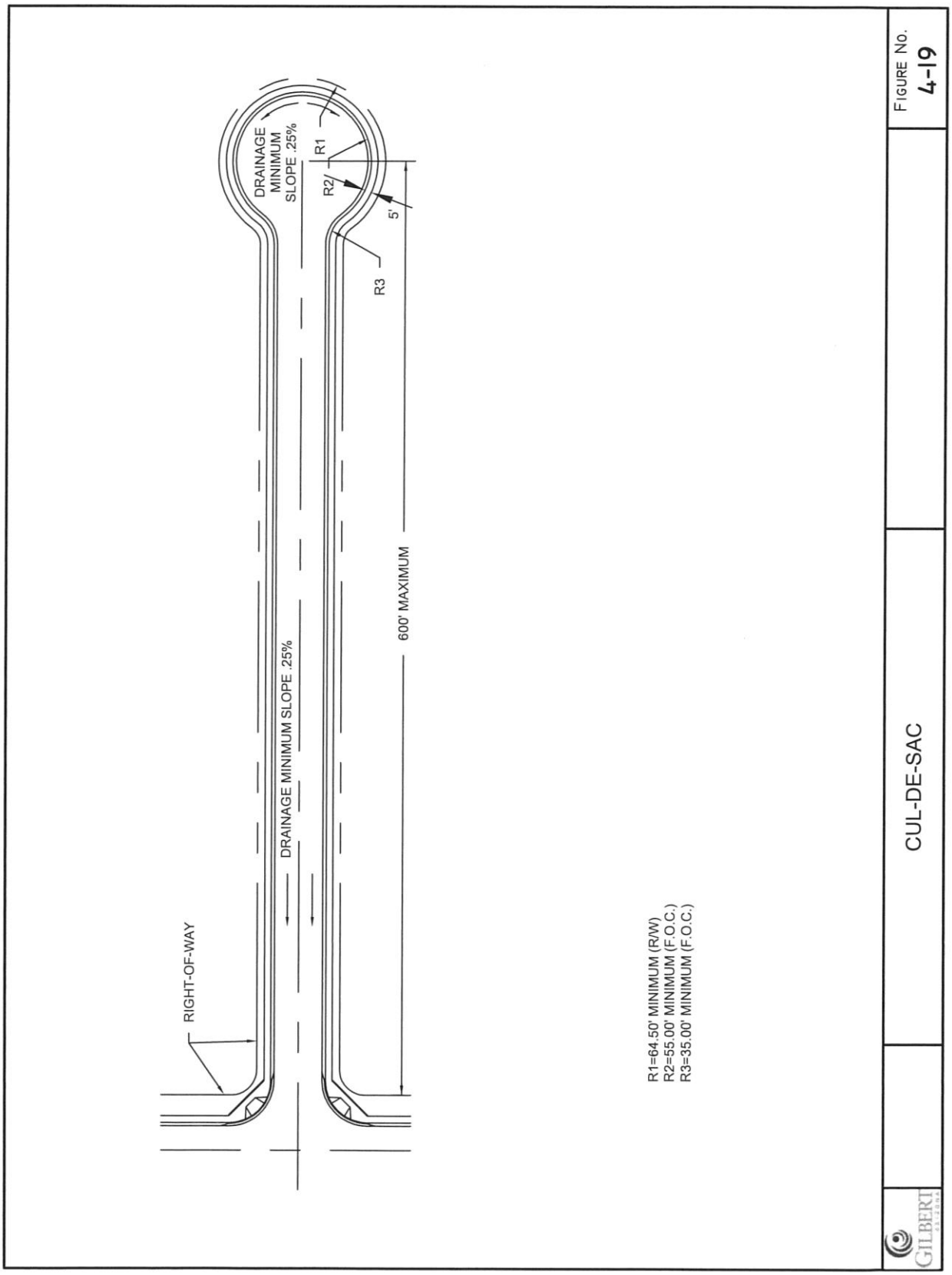


FIGURE 4-19 CUL-DE-SAC

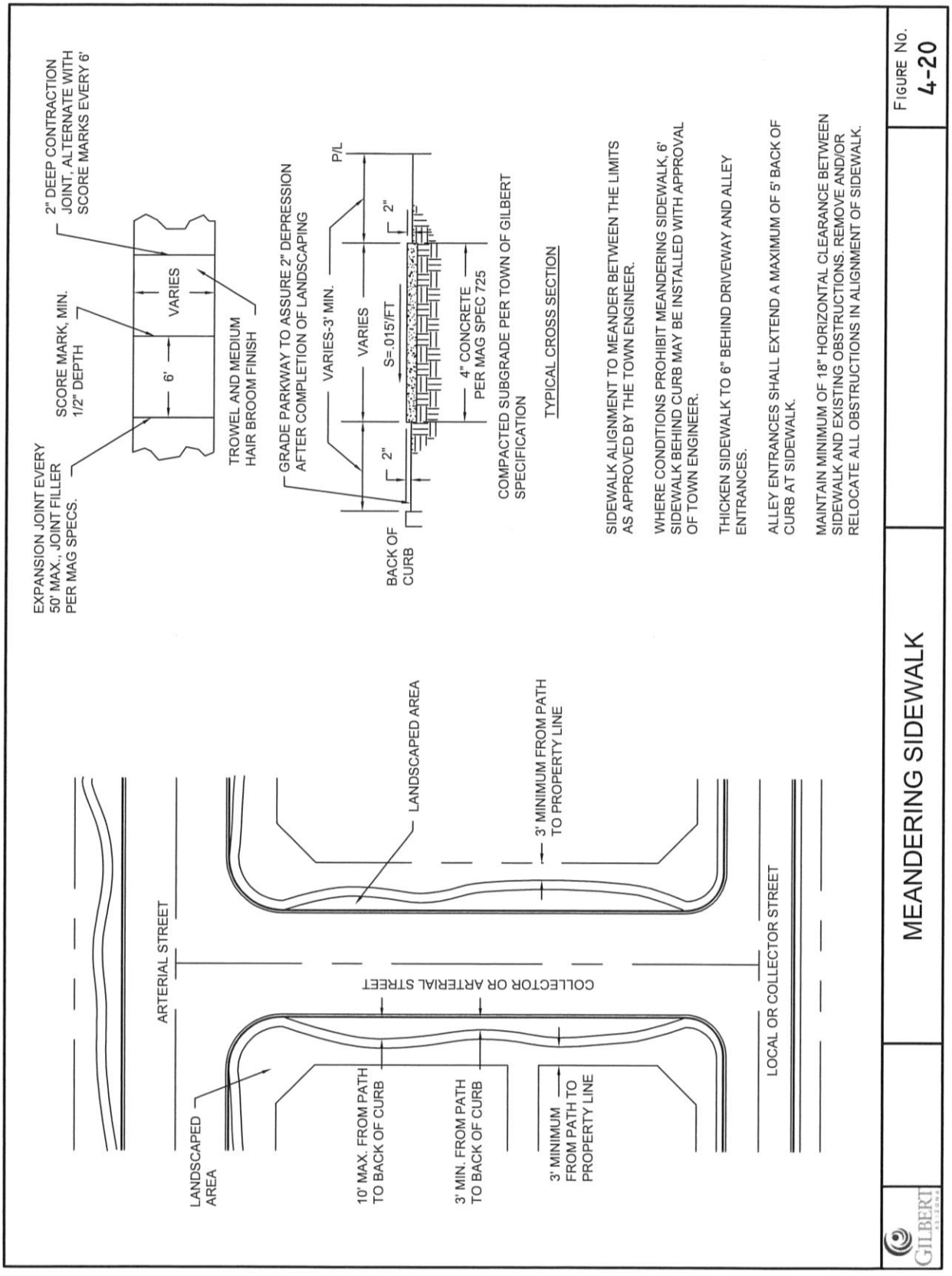


FIGURE 4-20 MEANDERING SIDEWALK

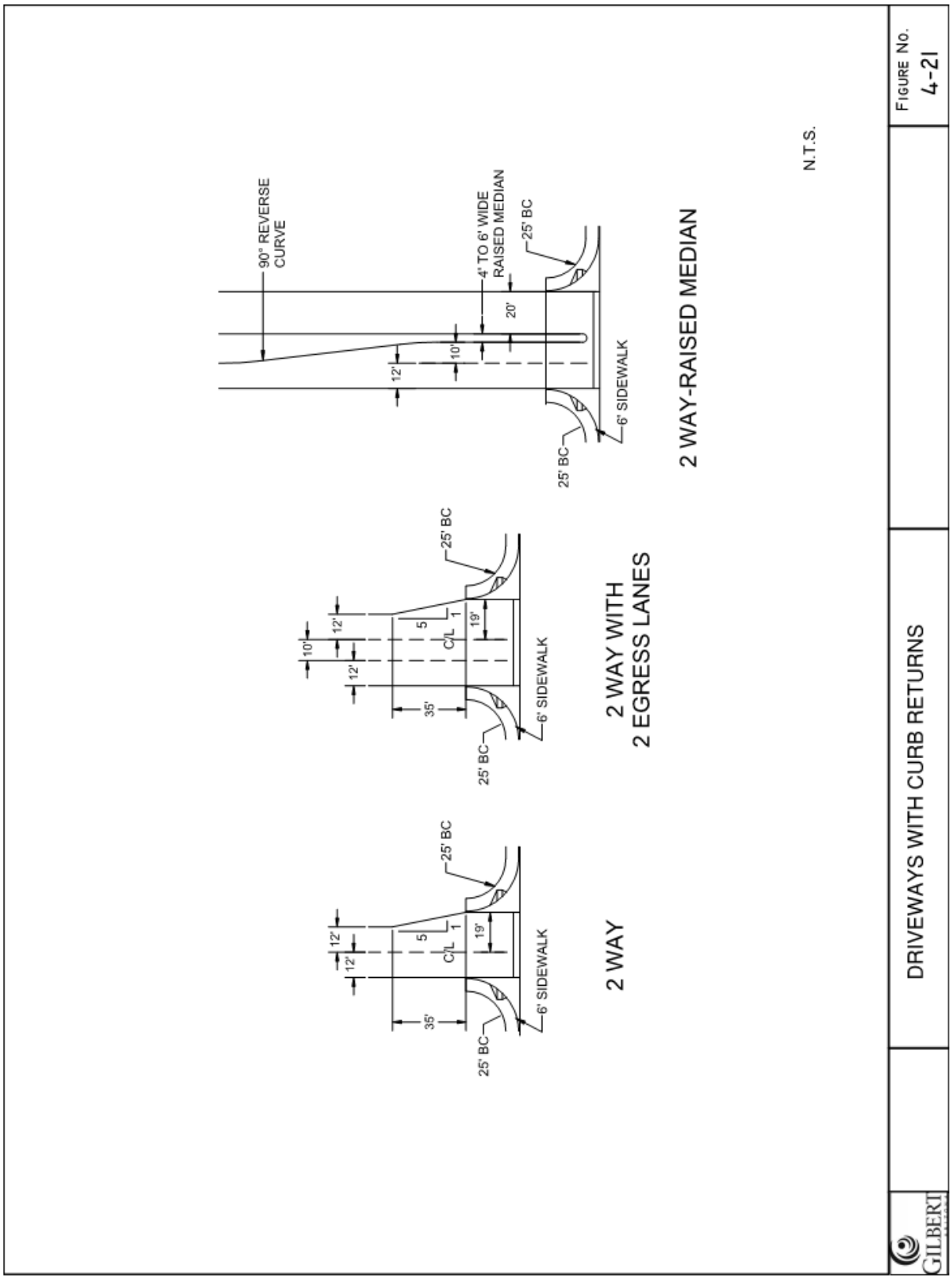


FIGURE 4-21 DRIVEWAYS WITH CURB RETURNS

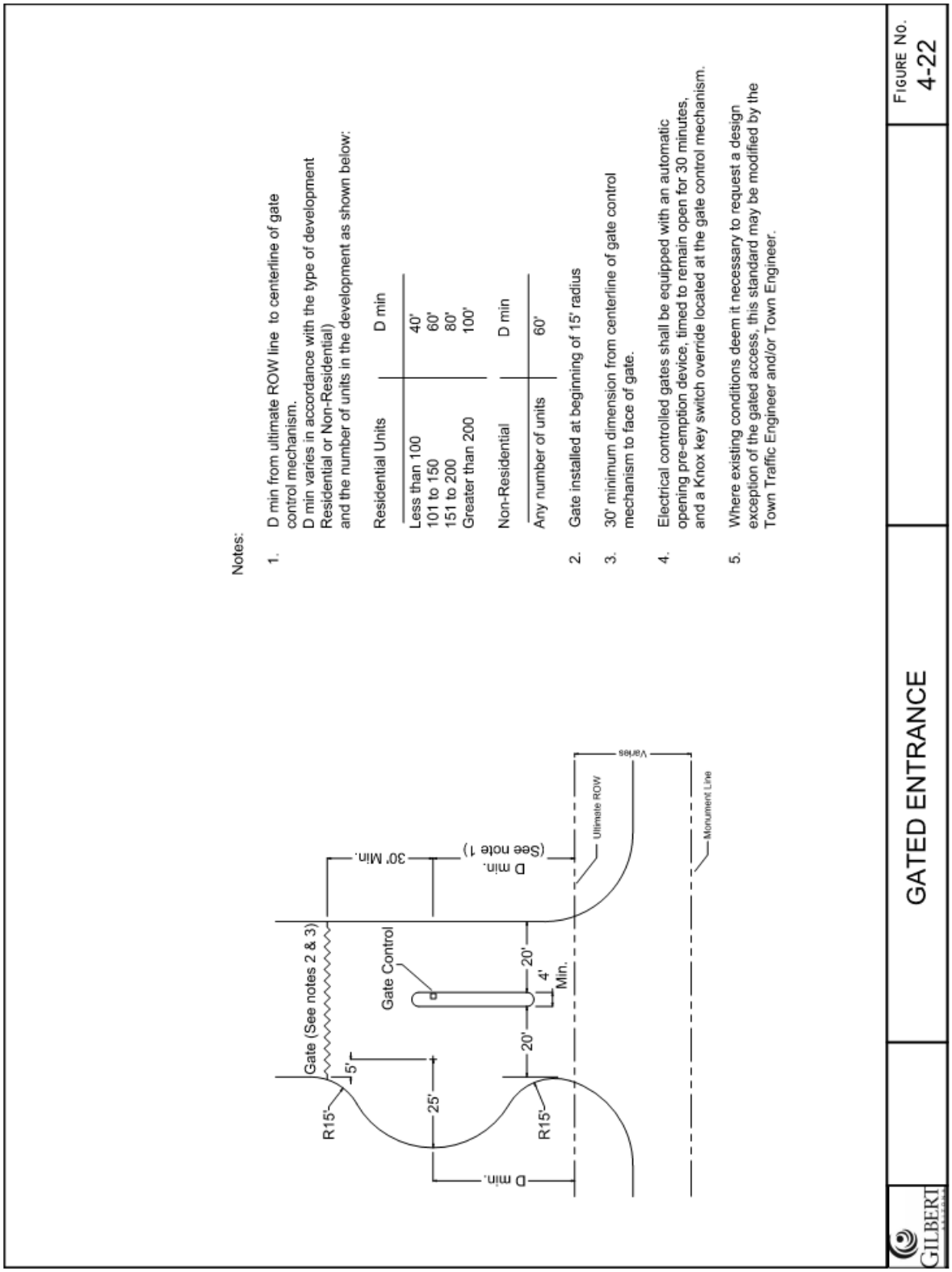


FIGURE 4-22 GATED ENTRANCE

5.0 TRAFFIC ENGINEERING

5.1 GENERAL INFORMATION

This chapter provides standards for the development of traffic engineering documents such as a traffic impact study. The minimum requirements described herein are primarily based on safety considerations; therefore, under most circumstances, standards that provide a greater degree of safety may be used.

5.2 TRANSPORTATION PLANNING DOCUMENTS

The Town of Gilbert has available the following related transportation planning documents:

- Town of Gilbert Transportation Master Plan
- Town of Gilbert General Plan
- Town of Gilbert Intersection Master Plan
- Town of Gilbert ADA Transition Plan
- Town of Gilbert Character Area Plan

5.3 TOWN CODE

Relevant sections of the Town of Gilbert Municipal Code including, but not limited to Streets, Sidewalks and other Public Places Chapter 54, Traffic and Vehicles Chapter 62, Buildings and Construction Regulations Chapter 10, Streets and Sidewalks Chapter 21, and Article IV, Subdivision Regulations Chapter 22, contain information regarding the development of the public streets in association with land development.

5.4 TOWN STANDARDS

Developers are required to install, all improvements necessary to provide service to their development. This includes any traffic signing, traffic pavement marking, other traffic improvements and the payment of all required development fees.

5.5 TRAFFIC IMPACT STUDIES

The purpose of this document is to provide guidelines for preparing Traffic Impact Studies, TIS, for proposed land development projects or additions to existing developments in the Town of Gilbert. This Scope of Work is a general guideline only, and additional requirements may be identified for specific developments. Users of this document may wish to contact Traffic Engineering Services of the Town of Gilbert to confirm these requirements.

One of the Town of Gilbert's primary objectives is to operate and maintain a safe and efficient roadway system. The review and management of development-generated traffic is an integral part of operating and maintaining a safe and efficient

roadway system. The Traffic Impact Study Procedures as outlined in this document have been established to meet this objective. The Traffic Impact Study Procedures establish a range of traffic impact study categories based on the characteristics of the development and the estimated peak hour traffic volumes. The procedures also outline the analysis approach and methods.

5.5.1 TIS Timing

A Traffic Impact Study, TIS, identifies existing traffic volumes and conditions, development traffic volumes and conditions and their combined impacts on the existing and future roadway system. The TIS is a useful tool for early identification of potential traffic problems and can play an important part in the success of a development. When insufficient attention is given to the assessment of traffic impacts, the following problems may result:

- On-site congestion and/or congestion on adjacent roadways;
- Inadequate access capacity;
- High accident experience; and/or
- Limited flexibility to modify the development to eliminate problems or adjust to changed conditions.

These problems can negatively affect the success of a development and can damage the marketability and return on investment of the development. The performance of a TIS provides an opportunity for the Town and the developer to share information and jointly address traffic related problems. It provides a means of balancing development needs with the functional integrity of the roadways that serve both the development and the region.

The need for a Traffic Impact Study should be assessed as early as possible in the development process when there is maximum flexibility for eliminating traffic-related problems.

5.5.2 TIS Requirements

Traffic Impact Studies are required for developments that are expected to generate 200 or more trips during any one peak hour (weekday AM, mid-day, PM or weekend).

The developer should estimate the numbers of trips generated by the development and confirm with the Town Traffic Engineer whether a study is needed and the category of study before initiating any work.

For mixed-use developments, a Traffic Impact Study is required when the combined trips generated by the combined individual land uses exceed 200 trips per peak hour.

A Traffic Impact Study may also be required at the discretion of the Town Traffic Engineer where site conditions indicate:

- Existing traffic problems or congestion;
- Public concerns regarding the development;
- Negative impacts on adjacent developments;
- The development proposes a deviation from Town of Gilbert roadway design standards; or
- Other local issues that may be present.

Where the need for a Traffic Impact Study has been identified, this study should be completed and submitted to the Town Traffic Engineer for review to allow traffic engineering conditions and other requirements to be included in the Development Services staff report. Review comments will be provided within two weeks of submittal.

Developments processed under Development Master Plans (DMP), Comprehensive Plan Amendments (CPA), or as rezoning cases will not be required to provide a revised TIS during the subdivision or building permit processes unless:

- The level of development changes significantly to warrant a new study;
- The adjacent roadway system changes significantly to warrant a new study; or
- Detailed information for commercial access analysis was not available during the initial study

5.5.3 Pre-TIS Scoping Discussion

The purpose of the pre-TIS scoping discussion is to examine the project scope and required/expected level of analysis to be conducted in completing the TIS. Applicants should contact the Planning Department or the Town Traffic Engineer to request a pre-TIS scoping discussion in order to go over the required level of analysis for the TIS and base assumptions for the development.

5.5.4 Other Jurisdictions

If applicable, the requirements for a Traffic Impact Study as noted in this document may need to be coordinated with the requirements of other local agencies such as adjacent cities or towns, the Maricopa County Department of Transportation or the Arizona Department of Transportation. Any deviation from the requirements of this document due to the requirements of other agencies should be presented in written form to the local reviewing agency for review and approval. It is the applicant's responsibility to coordinate review and approval by other jurisdictions as needed.

5.5.5 Level of Analysis

Traffic Impact Studies for the Town of Gilbert are classified into three categories. The most recent version of the ITE Trip Generation Manual should be used for all trip generation calculations unless otherwise approved by the Town Traffic Engineer.

- **Category I** - Developments that generate fewer than 500 vehicle trips during any peak hour.
- **Category II** - Developments that generate between 500 and 1,000 vehicle trips during any peak hour.
- **Category III** - Developments that generate more than 1,000 vehicle trips during any peak hour.

5.5.6 Methodology

5.5.6.1 STUDY AREA

The study area for the proposed development should include:

TABLE 5-9: STUDY AREA

	Category I	Category II	Category III
All site driveways	✓	✓	✓
All intersections adjacent to the development	✓	✓	✓
All signalized intersections within l /2 mile		✓	✓
All signalized intersections within 1 mile			✓
Additional locations as required by the Town		✓	✓

5.5.6.2 STUDY HORIZON

The TIS should include an analysis of the expected traffic conditions for the following scenarios:

- Existing conditions
- Background conditions

- Opening day conditions
- Each phase of the proposed development
- 5-year horizon beyond the full build-out of the development.

Additional scenarios are required for the following categories unless specifically waived by the Town Traffic Engineer:

- Category II: 10-year horizon beyond the full build-out of the development
- Category III: 10 -year horizon beyond the full build-out of the development

5.5.6.3 ANALYSIS TIME PERIODS

The study should include an analysis of the impact of the development traffic on the adjacent street's weekday A.M. peak and P.M. peak hours, which normally occurs between 7:00 to 9:00 a.m. and 4:00 to 6:00 p.m. respectively. The report will analyze the peak 15 minute time period, during the peak periods.

For developments with unusual peak hours, an analysis of the peak hour of the traffic generator is also required. For example, schools require an analysis of the peak period during the school arrival, and school dismissal. For banquet or church facilities, an analysis of evening and/or weekends may be required.

5.5.6.4 DATA COLLECTION

The Traffic Impact Study should include information on the existing conditions within the study area.

The analysis shall be based on traffic counts that are no more than one year old, or less if there are significant changes in traffic patterns. If current traffic volume data is not available from the Town, the applicant shall be responsible to collect all necessary data. The estimation of existing peak hour turning movements based on automatic machine counts is not acceptable.

Turning movement counts for the existing intersections and driveways should include the A.M. peak hour and P.M. peak hour (and other time periods as noted in the previous section). Daily traffic volumes should be provided as 24-hour volumes, and peak hour volumes at intersections and driveways should be provided as turning movements. Every effort should be made to collect data on typical weekdays for the land use type.

5.5.6.5 BACKGROUND INFORMATION

The background information should include a discussion of the existing and proposed land use of the development site. Roadway geometric conditions within the study area should include, but not limited to, intersection and driveway spacing, traffic lanes, medians, turn lanes, curb and gutter, speed limits, horizontal and vertical curvature, traffic control devices and traffic signal phasing. The roadway classification and regional significance should be identified. The discussion on

geometric conditions should include locations of driveways and intersections across the street from the development, and how this may impact traffic operations. Current aerial photographs or maps may be provided and referenced.

5.5.6.6 TRAFFIC PROJECTIONS

Projected traffic volumes should be based on the latest available traffic projections from the Maricopa Association of Governments Transportation and Planning Office (MAGTPO), the Town of Gilbert Transportation Master Plan, or historical traffic volume trends. Projected traffic volumes shall include adjustments, as necessary, to reflect other adjacent future development.

5.5.6.7 TRIP GENERATION

The trip generation for the proposed development shall be estimated using the latest edition of Trip Generation as published by the Institute of Transportation Engineers (ITE). Actual measured trip generation rates from similar developments (in both land use and size) within the Phoenix Metropolitan area may be accepted, and must be approved by the Town Traffic Engineer before use.

If adjustments to the site trip generation rates such as pass-by traffic or official trip reduction programs are proposed, this should be discussed with the Town Traffic Engineer during the pre-TIS scoping discussion. Any deviations should be clearly documented in the report.

5.5.6.8 MODAL SPLIT

Due to the low modal split for trips by transit, cycling and walking within in the Town of Gilbert, the combined mode split for these modes should be assumed to be zero. In special situations where the modal split may be significant, this should be discussed with the Town Traffic Engineer during the pre-TIS scoping discussion.

The Gilbert Transportation Master Plan, as adopted by Town Council, supports encouraging alternative travel modes. Therefore, the Traffic Impact Study should identify how transit vehicles and patrons, bicycle parking, and pedestrian connections are accommodated.

5.5.6.9 TRIP DISTRIBUTION

Trip distribution should be based on population and employment figures depending on the whether the development is a trip generator or attractor. The market area for commercial developments should be identified. The percentage of trips generated to and from each directional quadrant (North, South, East and West) should be identified in the report.

Market studies, in combination with traffic factors, should be used to develop the area of influence and trip distribution.

It is recommended that proposed trip distribution be discussed with the Town Traffic Engineer prior to further analysis.

5.5.6.10 TRIP ASSIGNMENT

When trip distribution is completed, trip assignment is used to determine the amount of traffic that will use certain roadway links within the influence area. The result of the trip assignment process is the total project-generated trips, by direction and turning movement.

Trip assignment should be made considering logical routings, available roadway capacities, left turns at critical intersections, and travel times. The assignment should also reflect the horizon year(s) and the roadway and land use conditions at that time.

5.5.7 Traffic Analysis

5.5.7.1 ANALYSIS TOOLS AND REPORTING

Level of Service for signalized and unsignalized study intersections shall be performed in accordance with the most recent edition of the Highway Capacity Manual (HCM). Software that accurately replicates the HCM computations should be used in the TIS analysis. The consultant must verify the Town has access to the software that it intends to use to assure that Town staff can verify calculations.

The 2010 HCM does not analyze signalized intersections with more than two barriers in the timing plan which many Town traffic signals utilize. In these cases, the preferred tool for traffic analysis is the latest version of Synchro/ SimTraffic software. The Town will provide Town of Gilbert Synchro models of current traffic signal phasing and timing for the study area, if requested and available.

If Synchro is used, the preferred report for TIS documentation is a one-page report including the Lane and Volume Output, Level of Service Info and Queues sections.

5.5.7.2 CAPACITY ANALYSIS

Capacity analysis of all driveways, signalized and unsignalized intersections containing site-generated traffic are required.

The results of the above analysis shall be summarized in tabular or diagram format identifying the average delay and Level of Service (LOS) for the intersection and all critical movements. Delay may be reported rounded to the next whole number. All intersections and specific turning movements with LOS D, E or F shall clearly identified with its associated delay.

5.5.7.3 QUEUING ANALYSIS

Queuing analysis shall be conducted to determine recommended intersection storage lengths and the extent of queues spilling out of left-turn bays, right-turn bays, drive-thru facilities, and also from intersection to intersection.

Analysis methodology should be verified by Town Traffic Engineer for the TIS. If Synchro software is used, the preferred measurement is the 95th percentile queue. Values for all lane groups, including "thru lanes", should be provided.

Recommended storage lengths should be provided in feet per lane, by multiples of 25.

5.5.7.4 TRAFFIC SIGNAL WARRANT ANALYSIS

Where appropriate, traffic signal warrants for unsignalized intersections shall be conducted using the criteria provided in the latest adopted edition of the Manual on Uniform Traffic Control Devices (MUTCD). No reduction of right-turn volume should be employed unless approved by the Town Traffic Engineer.

5.5.7.5 RIGHT-TURN DECELERATION LANE WARRANT ANALYSIS

Each project site driveway should be analyzed for the need of a right-turn deceleration lane. As a guideline, a right-turn deceleration lane will be warranted if the projected right-turn in hourly volume is greater than 60 vehicles per hour for 2-lane or 4-lane roadways and 90 vehicles per hour for 6-lane roadways. In addition, special consideration for right-turn deceleration lanes should be considered for conditions that negatively impact the flow of traffic and may be required by the Town Traffic Engineer even if volumes do not meet the volume thresholds.

5.5.7.6 OTHER ANALYSES

Other analyses as requested by the Town of Gilbert may be required due to the type and location of the proposed development, such as weaving analyses, parking analyses, on-site circulation and queuing, pick-up and drop-offs, and the number of accesses among others.

5.5.8 Traffic Impact Mitigation Measures

All signalized intersections showing an overall LOS D or greater must be analyzed for on-site and off-site traffic and roadway improvements that are necessary to bring the intersection back to LOS D if the background traffic condition is LOS D or better. If the background traffic condition is LOS E or worse, the signalized intersection must be analyzed with improvements that are necessary to bring the intersection back to the delay of the background condition.

Controlled movements with excessive delays will also be reviewed for possible mitigation: signalized movements with LOS D or worse and unsignalized movements with average delay of 90 or more seconds.

It is important to emphasize that this analysis is required regardless of whether congested conditions exist, or are projected, without the proposed development.

A list of recommended on-site and off-site improvements required to mitigate the projected traffic congestion or safety issues shall be identified in the TIS report for comparison to the "before" conditions.

5.5.9 Additional Criteria For School Sites

The study for any public, charter, or private school with students ranging in grades K-12 shall provide the following additional information:

a) Student Enrollment

The maximum student enrollment at build out shall be indicated in the TIS Introduction and Summary. Partial student enrollment may be discussed for opening day conditions, but the final horizon year analysis will include maximum build-out and build-out conditions will be used for on-site queuing requirements.

b) Minimum Required Parent Vehicle Queue Calculation

The site shall accommodate a minimum parent vehicle queue for student drop-off and pick-up.

1. The minimum number of parent vehicles to be accommodated shall be calculated by multiplying the school's maximum dismissal student enrollment by release time. A value of 0.10 shall be required for traditional public schools with walking and busing to school. A value of 0.15 shall be required for magnet, charter, and private schools that generate a greater number of parent vehicles trips than an average neighborhood school. The engineer may provide values based on observations of existing comparable school sites, subject to the Town Traffic Engineer's approval.

2. The minimum vehicle queue length shall be calculated by multiplying the number of parent vehicles by 25 feet.

    a) The entire vehicle queue should be contained within the school site and/or on a consenting adjacent shared-use site.

    b) The length of an adjacent right turn lane may be added to the minimum required queue if approved by the Town Traffic Engineer.

c) School Traffic Circulation Overview

A school traffic circulation overview with diagrams shall detail motor vehicle, bus, bicycle, and pedestrian circulation on site, including:

1. Direction of traffic flow and number of lanes throughout diagram;

2. Ingress and egress from the site;

3. Vehicular drop-off/pick-up locations;

4. Minimum required parent vehicle queue;

5. School bus loading areas; and

6. Pedestrians and bicycle routes that avoid crossing school driveways.

7. On-site and off-site school-related traffic control

5.5.10 Report Format

The Traffic Impact Study should include the following items and report sections:

1. Title Page.
2. Table of Contents, List of Figures and Tables.
3. Executive Summary including brief description of project, major study conclusions and recommendations.
4. Introduction including description of project and purpose of report.
5. Proposed development description including location, land use and proposed use. Include vicinity map and site plan.
6. Study Area description.
7. Existing conditions including study site land use, adjacent roadway description and traffic volumes. Include summary of existing traffic counts, graphic of existing daily and peak hour traffic and roadway condition diagram.
8. Projected traffic including site traffic generation, distribution and assignment and non-site traffic for each time period to be analyzed. Graphics should be included showing the daily and peak hour traffic volumes for each analysis time period and project phase for both the on and off-site traffic.
9. Background, Site Traffic, and Total Traffic volumes should be shown for each analysis time period.
10. Traffic analysis showing tabular and graphic results of the analyses.
11. Summary and Conclusions.
12. Recommended on-site and off-site improvements.
13. Appendix to include all collected data and analysis documentation. Provide any material related to the traffic study data collection and study results.

The Traffic Impact Study, including the cover letter, the body of the report, appendices including data collection, Synchro output, tables and graphs may be submitted for review in electronic (PDF) format. For Town review, submittal of the associated Synchro models is preferred over printed output.

Upon the Town's final approval, two hard copies of the Traffic Impact Study with all supporting appendices and documentation will be required.

5.6 TRAFFIC SIGNING AND PAVEMENT MARKING DESIGN

Signing and pavement marking plans are required for any development that modifies existing pavement or builds new pavement.

5.6.1 Street Signage Requirements

Street name sign specifications are set forth on Town of Gilbert Standard Detail GIL-220 through GIL-227. Typical arterial signing is shown in Figure 5-1.

5.6.2 Traffic Signing and Pavement Marking Requirements

The most current of the following publications are to be used in conjunction with the design criteria in this Manual for traffic signs and pavement markings design work.

- Manual on Uniform Traffic Control Device for Streets and Highways (MUTCD)
- Signing and Marking Standard Drawings (ADOT)
- Traffic Control Design Guidelines (ADOT)
- Manual of Approved Signs (ADOT)
- Traffic Engineering Policies, Guidelines and Procedures (ADOT)
- Pavement Marking Manual (MCDOT)
- Uniform Standard Specifications for Public Works Construction (MAG)
- Uniform Standard Details for Public Works Construction (MAG)
- Public Works and Engineering Standards and Details (Town of Gilbert)

1. Traffic signing plans shall be submitted on separate sheets apart from any other part of the construction documents with a scale no less than 1”=40’. Signing and pavement markings should be shown on the same sheets.

2. Show the existing roadway and proposed signing for 500 feet beyond the project limits on each approach to the project.

3. Identify all ingress/egress points to include street intersections and residential/commercial driveways within 500 feet of the project limits on both approaches and on both sides of the street.

4. Show all new and existing signs within the right-of-way and identify them. Label existing signs “EXISTING” and show them grayed out.

5. Show all Town limits and Town right-of-way and identify each.

6. All islands on roadways shall be signed per the MUTCD guidelines, to include an R4-7 and Type I Object Marker per Town of Gilbert Standard Detail GIL-233. The beginning of each median where none exists prior, are to be signed.

7. STOP signs are to be shown at all local streets that intersect with collector or

arterial streets within a subdivision. Local/local street intersections will not be STOP controlled unless directed by the Town Traffic Engineer. STOP signs will be shown at all unsignalized collector/collector and collector/arterial street intersections.

8. All signing shall conform to the current Manual on Uniform Traffic Control Devices with regard to size, color, shape, and placement.

5.6.3 Sign Sheeting Requirements

1. At a minimum, all signing will incorporate ASTM Type IV sheeting. The exceptions are as follows:

   - All WARNING signs (yellow series) shall be ASTM Type XI (fluorescent Yellow) sheeting.
   - All regulatory signs shall be ASTM Type XI sheeting.

2. Street Name signing is as follows:

   - Any arterial street intersection shall be ASTM Type XI sheeting.
   - All other intersections shall be ASTM Type IV sheeting.
   - All overhead internally illuminated street name signs shall be ASTM Type XI translucent sheeting.
   - All school area signing shall be ASTM Type XI sheeting (fluorescent yellow-green).

3. All sheeting stated above shall be 3M or approved equivalent to include the same warranty period. Any requests to use sheeting other than 3M shall be made in writing 30 days prior to installation.

5.6.4 Signing General Notes

The latest version of Signing Improvement Plan General Notes can be found on the Town of Gilbert Engineering Services website. These Notes will be periodically updated by the Town of Gilbert. At the time of the publication of these Standards they were as follows:

1. The contractor installing signing with the Town's right-of-way will be required to obtain a signing installation permit 15 days prior to any installation.

2. The signing contractor shall make contact with the Traffic Engineering Section at 480-503-6186 to arrange for a pre-installation meeting. No signing is to be installed prior to meeting with a representative from the Traffic Engineering Section.

3. All signing shall conform to the requirements contained in the latest edition of the Manual on Uniform Traffic Control Devices (MUTCD) and Handbook, and

the latest edition of the Arizona Supplement published by the Arizona Department of Transportation.

4. All signs shall be installed using 1-3/4 inch or 2 inch square tubing as per Town of Gilbert Standard Detail GIL-227.

5. Signs shall be secured to post using 3/8 inch x 2-1/2 inch plated hex head bolts with flat washers (2 each) and nylon stop nuts. A nylon washer shall be placed next to sign face.

6. Signs that are required to be removed or relocated during construction will be the responsibility of the contractor. Any signing that is to be relocated or removed due to construction shall be reinstalled in its final location per Town of Gilbert Standard Detail GIL-227.

7. The contractor shall allow the concrete in the postholes to cure for at least 24-hours prior to standing the poles and hanging any signing.

8. The contractor shall ensure that at no time a traffic sign is installed in such a way as to be blocked by trees or any type of vegetation. In these cases, the contractor shall contact the Traffic Engineering Section at 480-503-6186 to provide an alternative location for the installation of signing in question.

9. Any signing that is to be affixed to a street light pole shall be done so using ¾ inch Stainless Steel banding with appropriate fasteners.

10. Any signing installed within the Town's right-of-way shall be installed by an individual that has current certification in signing installation or inspection from American Traffic Safety Services Association (ATSSA) or the International Municipal Signal Association (IMSA). Equivalents will be considered but must be submitted in writing to the Traffic Engineer 30 days prior to installation of any signing.

11. Signing quantities and installation locations are subject to change at the time of installation based upon current accepted practice. The contractor completing the signing installation shall make contact with the Traffic Engineering Section prior to any signing being installed within the Town's right-of-way.

12. All signing will incorporate ASTM Type IV (High Intensity) sheeting as a minimum with the following exceptions:

    - All Warning signs (yellow series) shall be ASTM Type XI (fluorescent yellow sheeting).

    - All regulatory signs shall be ASTM Type XI sheeting.

    - Street Name signs:

        - Any arterial street intersection (all blades) shall be ASTM TYPE XI sheeting

- All other intersections shall be ASTM Type IV sheeting

- All overhead internally illuminated street name signs shall be ASTM Type XI translucent sheeting

- All School Area signing shall be ASTM Type XI sheeting (fluorescent yellow-green)

13. All signing specified to be ASTM Type IV (high intensity) shall be 3M 3930 sheeting or equivalent, to include the same warranty period.

14. All signing specified to be ASTM Type XI shall be 3M 4000 (diamond grade) sheeting or equivalent, to include the same warranty period.

15. Sign imaging shall be in compliance with the reflective sheeting manufacturers matched component system. Sign imaging shall consist of an acrylic based electronic cuttable film (3M 1170 Series or equivalent) or silk screened (depending on the quantity of signage) with standard highway colors.

16. Any request to use sheeting other than that specified above shall be made in writing to the Traffic Engineer 30 days in advance of installation.

5.6.5 Pavement Marking General Notes

The latest version of Pavement Marking General Notes can be found on the Town of Gilbert Engineering Services website. These notes will be periodically updated by the Town of Gilbert. At the time of the publication of these Standards they were as follows:

1. The Contractor or the sub-contractor installing pavement markings within the Town's right-of-way is required to obtain a striping permit prior to any installation. Permit applications can be obtained from the Development Services Department located at 90 E. Civic Center Dr, Gilbert, AZ. 85296, or by calling (480) 503-6700.

2. All pavement markings shall conform to the Arizona Department of Transportation Standard Drawings and Specifications unless otherwise specified in the current edition of the Manual on Uniform Traffic Control Devices, or as noted on the plans.

3. The Contractor shall spot mark the entire project before applying any markings. When the spotting is complete, the Contractor shall contact the Traffic Engineering Section at (480) 503-6186 to make arrangements for inspection prior to applying any paint (3 business days advance notice is required). The permanent marking plans may be modified as directed by the Engineer. The contractor shall refer any questions concerning pavement markings to the Town of Gilbert Traffic Engineering Section.

4. Any pavement markings applied prior to field inspection by the Town of Gilbert's Traffic Engineering Section shall be removed and re-striped at the Contractor's expense.

5. All no passing zones shown are subject to change in the field by the Engineer. As a result, striping quantities could vary.

6. All striping will be applied initially in paint (to include all items specified to be applied in thermoplastic). The Contractor will be required to re-stripe the entire project 30 to 45 days after initial striping. At this time all symbols, transverse markings, and holding bars will be re-striped in a Melt-In-place Preformed Thermoplastic Tape or Extruded Thermoplastic and the remainder of the project in paint.

7. All striping within 200 feet of signalized intersection shall be applied in Extruded Thermoplastic.

8. Painted pavement markings shall be placed on the pavement by spray-type, self propelled pavement marking machine designed for application of paint and beads.

9. Raised pavement markers shall be installed on the new pavement. They shall be installed per ADOT Standard Detail M-19. They shall be non-adhesive with an abrasive resistant surface. They shall be secured to the pavement with a hot, flexible marker adhesive. All markers shall be installed so that the reflective face of each marker is facing the direction of traffic and is perpendicular to the direction of traffic flow.

10. Where raised pavement markers are placed along solid striping, the nearest edge of each marker shall be offset no less than 4 inches and no more than 6 inches from the nearest edge of the striping.

11. The dimensions shown to the pavement marking stripes are to the center of the stripe, or in the case of a double stripe, to the center of the double stripe.

12. All permanent pavement lines parallel to the flow of traffic shall be installed at a minimum thickness of 15 mills and shall be placed in accordance with the Arizona Department of Transportation Section 708 – Permanent Pavement Markings.

13. All striping shall be a minimum width of 4 inches except where noted on the plans, or as noted below:

    - All edge or bike lines shall be 6 inches in width
    - All holding bars shall be 8 inches in width
    - All crosswalk lines shall be 12 inches in width
    - All STOP bars shall be 18 inches in width

14. The pavement marking dimensions on any given set of plans may be schematic and not to scale; therefore, the Contractor shall follow all standard details that are noted on the plans when installing pavement markings.

15. When striping obliteration is necessary, it shall be accomplished by water blasting (other methods may be allowed with prior approval of the Town Traffic Engineer). A sealant approved by the Town of Gilbert Traffic Engineer shall be provided and applied by the Contractor to all areas of pavement marking obliteration. Applying paint over striping DOES NOT constitute stripe obliteration. Striping obliteration may go beyond the project limits so that the new striping will match existing pavement markings. The Town of Gilbert Traffic Engineer may require the Contractor to adjust signing and striping as necessary. Removal of raised pavement markers within obliteration limits is incidental.

16. Median ends shall be marked in accordance with the Town of Gilbert Standard Detail GIL-240.

17. If necessary for smooth traffic flow, the Contractor may be required to add additional asphalt to accommodate traffic. The Contractor or Developer will be required to complete this at their expense.

18. Should field conditions change due to construction on adjacent pieces of roadway, the Contractor shall be responsible for notifying the Town of Gilbert Traffic Engineer at (480) 503-6186 and will be required to submit for review, an updated pavement marking and signing plan 21 days prior to paving. The Contractor may be required to re-stripe, stripe, and design striping for adjacent portions of roadway that are affected by their construction. Any changes, additions, or deletions will be accomplished by the Contractor at their expense.

19. All signing and pavement markings shall be installed within 5 days of completion of the final lift of asphalt or as required by the Engineer. Temporary traffic control may be required between final paving and completion of signing and striping.

5.7 FIGURES

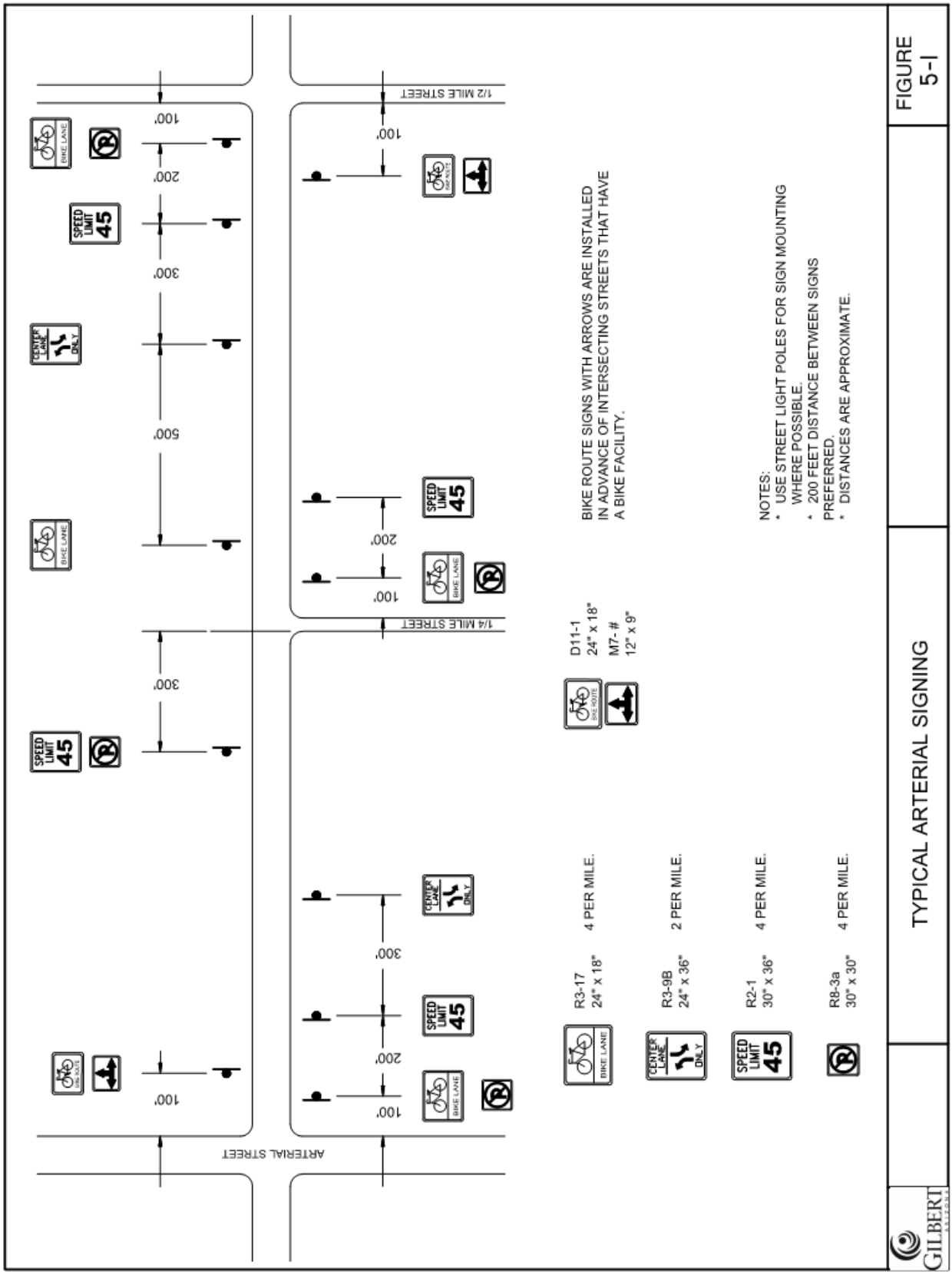


FIGURE 5-1 TYPICAL ARTERIAL SIGNING

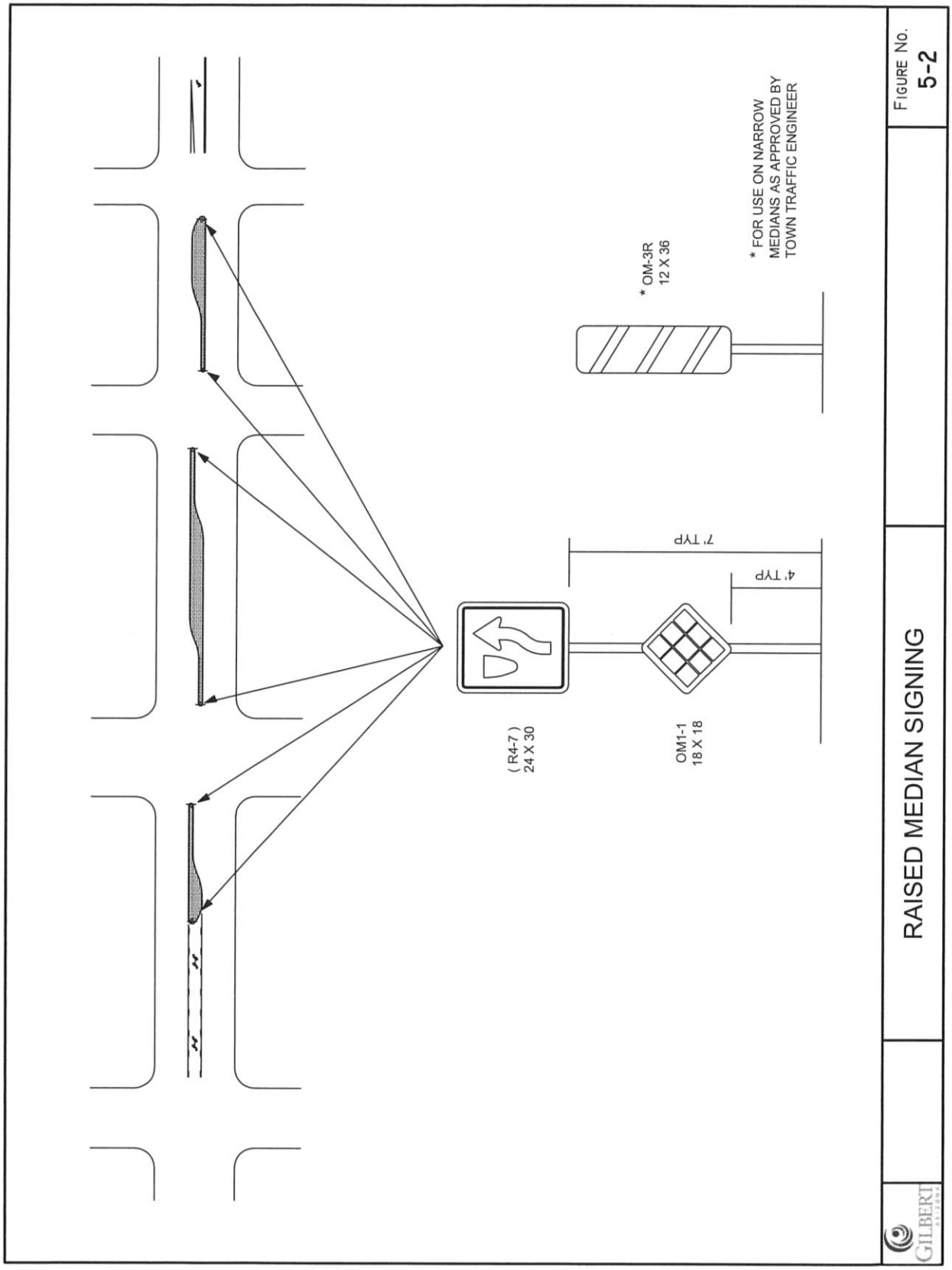


FIGURE 5-2 RAISED MEDIAN SIGNING

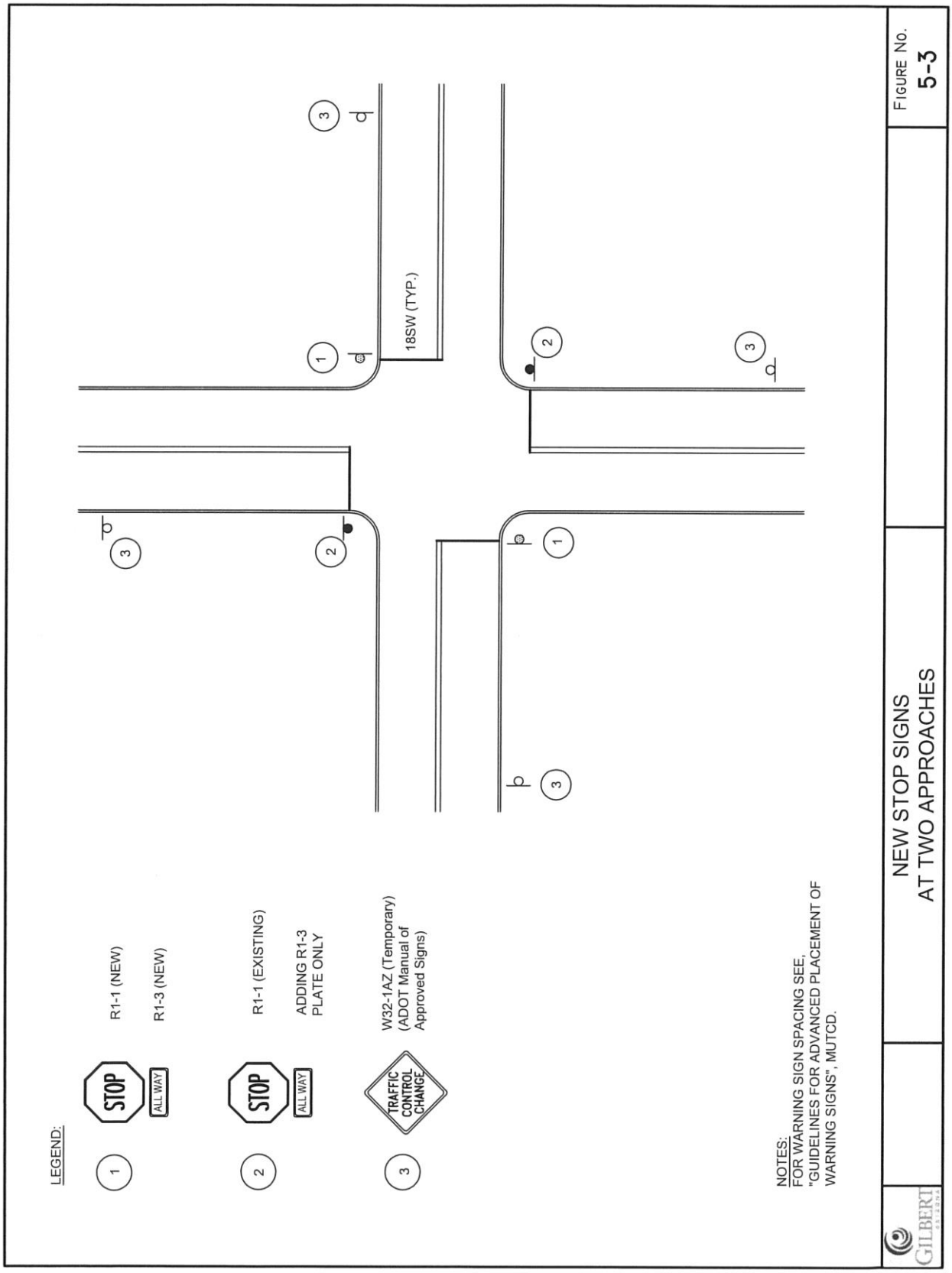


FIGURE 5-3 NEW STOP SIGNS AT TWO APPROACHES

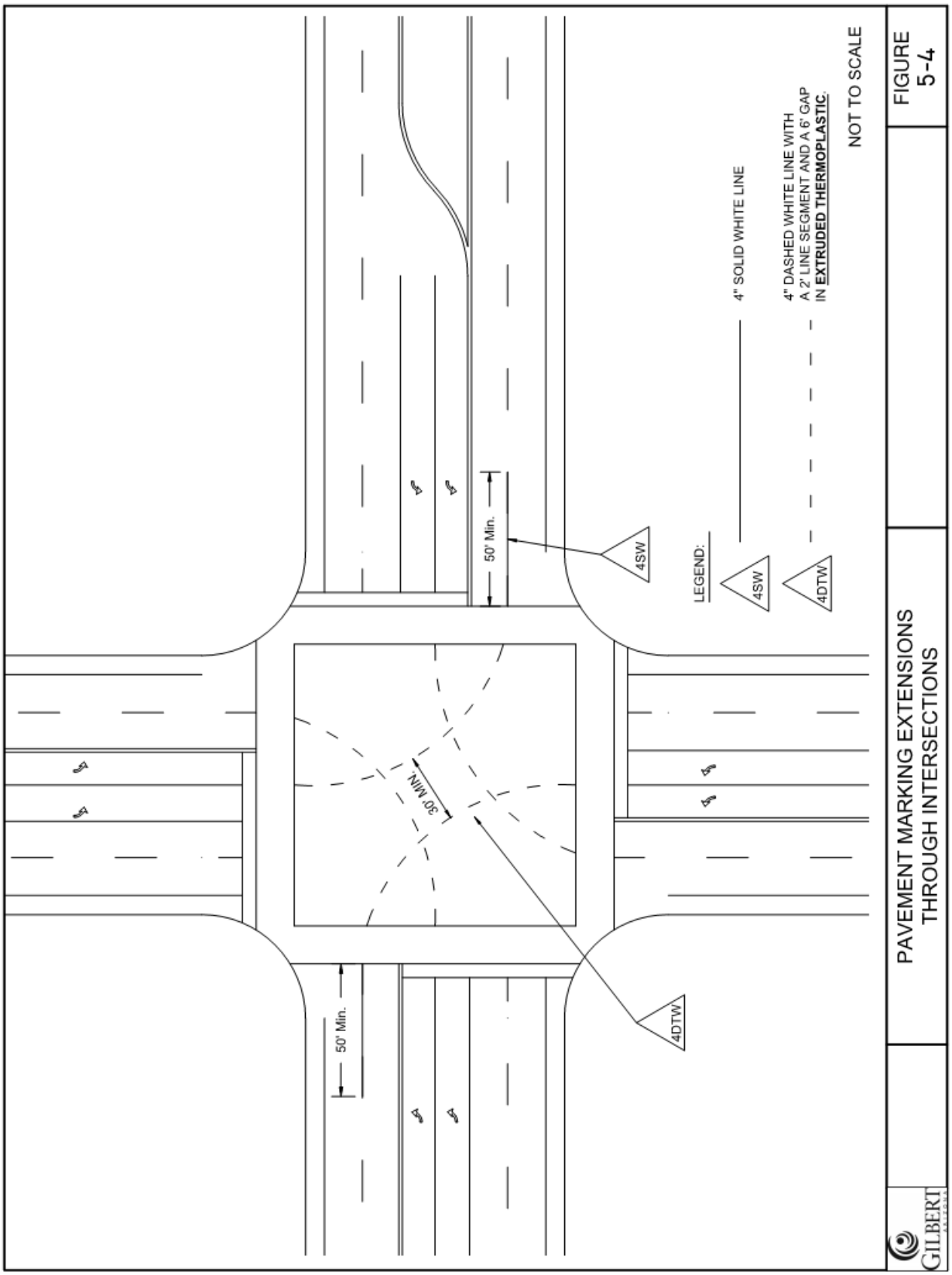


FIGURE 5-4 PAVEMENT MARKING EXTENSIONS THROUGH INTERSECTIONS

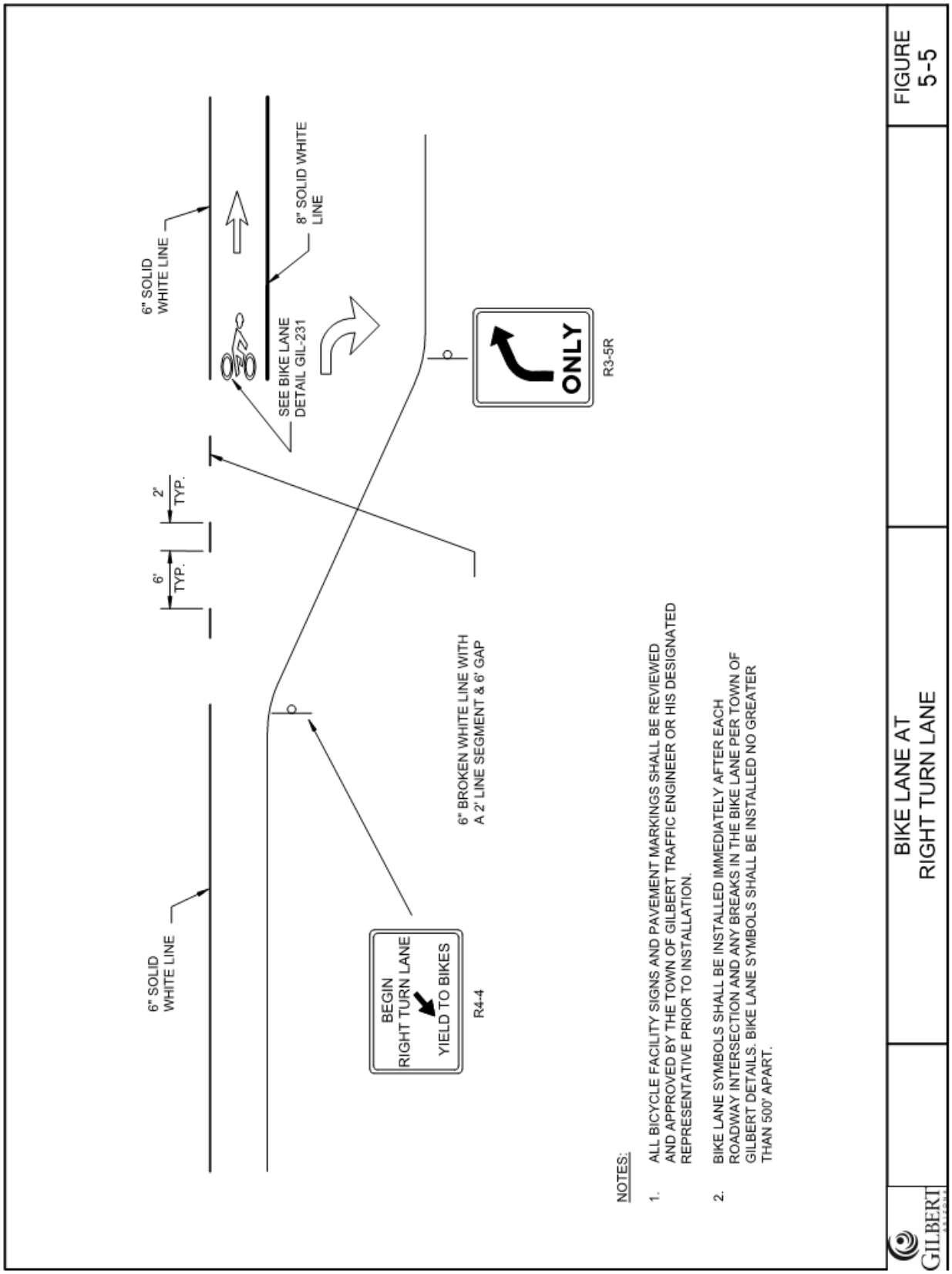


FIGURE 5-5 BIKE LANE AT RIGHT TURN LANE

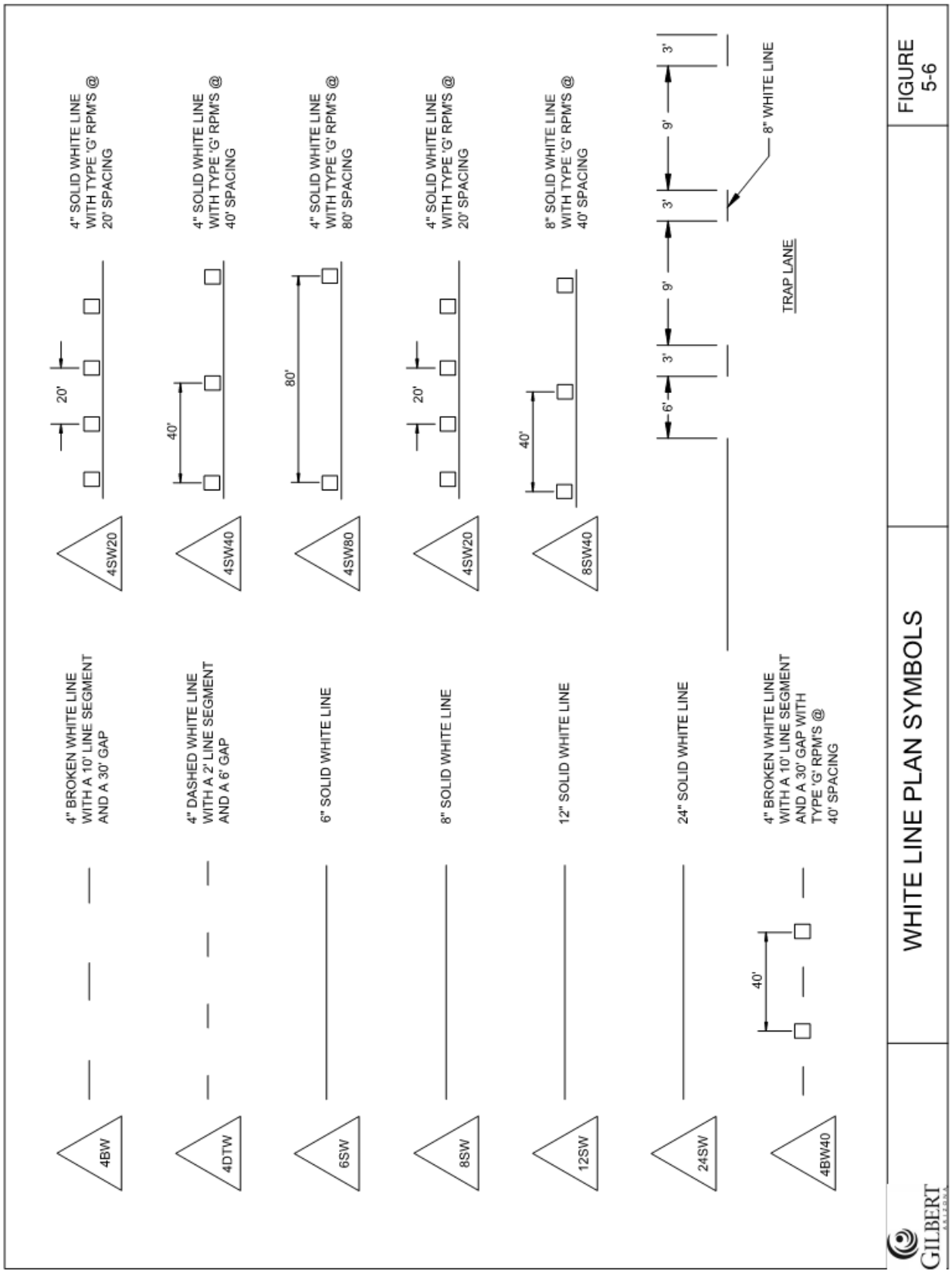


FIGURE 5-6 WHITE LINE PLAN SYMBOLS

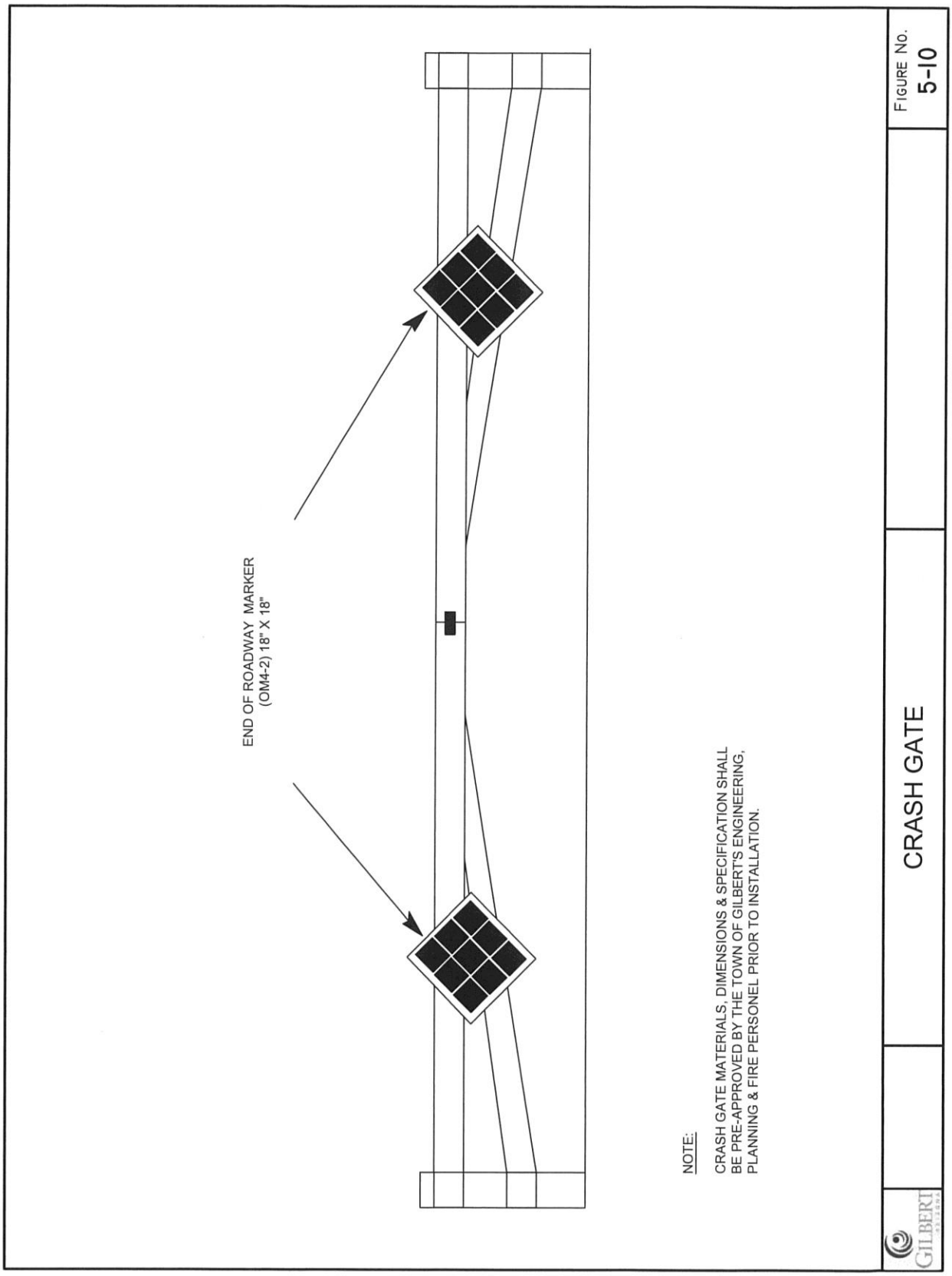


FIGURE 5-7 CRASH GATE

6.0 TRAFFIC SIGNALS AND STREET LIGHTING SYSTEM

6.1 GENERAL INFORMATION

The purpose of this chapter is to outline the process to design professionals for incorporation of the Town's traffic signal and public street lighting requirements into their project. This document contains general information regarding the processes that are required during the construction document preparation, plan review, approval and permitting stages of land development. The minimum requirements described herein are primarily based on safety considerations; therefore under most circumstances, standards that provide a greater degree of safety may be used.

6.2 TRANSPORTATION PLANNING DOCUMENTS

The Town of Gilbert has available the following related transportation planning documents:

- Town of Gilbert Transportation Master Plan
- Town of Gilbert General Plan
- Town of Gilbert Intersection Master Plan
- Town of Gilbert ADA Transition Plan
- Town of Gilbert Character Area Plan

6.3 TOWN CODE

Relevant sections of the Town of Gilbert Municipal Code include, but are not limited to Chapter 21, Streets and Sidewalks and Chapter 22, Article IV, Subdivision Regulations.

6.4 TOWN STANDARDS

Developers are required to install, all improvements necessary to provide service to their development. This includes any traffic signals, street lighting and the payment of all required development fees.

6.5 ARIZONA STATE STATUTES

Title 49 – The Environment, Chapter 7 – Light Pollution contains requirements for shielding of outdoor light fixtures as well as the prohibition of mercury vapor light fixtures. The provisions of this Title apply to both public and private lighting systems.

In accordance with ARS Title 49, the Town of Gilbert requires the use of cutoff light fixtures (i.e., fully shielded) on the public street lighting system and prohibits the use of Mercury Vapor (MV) lamps.

Title 4, Chapter 6 of the Gilbert Town Code pertaining to Outdoor Light Control supersedes the requirements of the Title 49 in accordance with Article 49-1106.

6.6 TRAFFIC SIGNAL/TRAFFIC SIGNAL INTERCONNECT DESIGN

6.6.1 Design Requirements

This section will present the criteria and procedures to be utilized by consultants when performing traffic signal design work in and for the Town of Gilbert.

1. Any conduit for a new signal or traffic signal interconnect, shall have detectable #8 green tracer wire and pull tape placed in each conduit.

2. When required, the design shall provide two, 4 inch conduits with pull boxes to "box in" an intersection for future signalization by the Town.

3. When installing traffic signal interconnect, use the Town of Gilbert Standard Detail GIL-831, GIL-841, and GIL-844. Pull boxes are to be spaced every 1000 feet on a conduit run.

4. Traffic signal conduit and pull boxes shall be installed using Town of Gilbert Standard Details GIL-841, GIL-842, and GIL-843.

5. Detection at traffic signal shall be video detection unless otherwise approved.

6. All signal pole foundations and sidewalk ramps shall be modified to satisfy current ADA design guidelines per the Proposed Guidelines for Accessible Pedestrian Facilites in the Public Right-of-Way (PROWAG).

7. CCTV camera details (when applicable) shall conform to Town of Gilbert Standard Detail GIL-861.

8. Ethernet radio antennas shall be mounted in accordance with Town of Gilbert Standard Detail GIL-862.

9. Phasing and Preemption shall conform to Town of Gilbert Standard Detail GIL-851.

10. Control cabinet foundation shall conform to Town of Gilbert Standard Detail GIL-872.

6.6.1.2 DESIGN AND CONSTRUCTION SPECIFICATIONS

Traffic signal plans must have specifications which can be part of the plan sheets. Use the basic specifications provided by The Town of Gilbert and modify them as necessary to meet the needs of a specific job. Do not prepare new specifications without first discussing the proposal with the Town Traffic Engineer or designee. Ensure that the latest revision of the base specifications is utilized.

6.6.2 Final Traffic Signal Plan Requirements

1. Traffic signal plans shall be submitted on separate sheets apart from any other part of the construction documents with a scale no less than 1”=40’.

2. Identify all ingress/egress points to include street intersections and residential/commercial driveways within 500 feet of the installation point of the traffic signal.

3. Show all new and existing utilities within the right-of-way and label them accordingly.

4. Show all existing town limits and the existing and proposed right-of-way and dimension them accordingly.

6.7 PUBLIC STREET LIGHTING DESIGN

6.7.1 Street Light System Types

6.7.1.1 NEW DEVELOPMENT/PUBLIC STREETS

For public streets, street light installation and electricity for street lighting in new developments will be provided by the Street Light Improvement District process.

The process for the initiation of an improvement district will be begin with a petition of request by the developer to create the district, and will follow the outline set forth in Section 6.7.2.

6.7.1.2 NEW DEVELOPMENTS/PRIVATE STREETS

Streetlight installation and electricity for street lighting in new developments containing private streets will be provided by agreement between the Developer and the serving utility. Plans for street lights on private streets are to comply with utility company standards.

6.7.2 Street Light Improvement District (SLID)

A Street Light Improvement District is created under the provisions of Arizona Revised Statutes Title 48, Chapter 6, Article 1, which provides a means for a municipality to provide street lighting for unincorporated and incorporated communities. It is formed by a petition to the Town signed by a majority of the property owners in the district. It may also be formed by the Town on its own initiative, subject to the approval of the property owners in the district.

Any owner of record can sign such a petition. In the case of jointly owned property between husband and wife, either may sign for that particular parcel of property. The petition is then returned to the Town Development Services Department which completes the balance of the legal documents necessary to form the District.

After posting the Resolution of Intention, if protests are insufficient to stop the proceeding, the work is ordered by the Town. Thereafter, the utility or private contractor will process an agreement and schedule the work. Since these lights are on public streets controlled by the Town, the Town Engineer approves the location and placement of the lights.

Any costs involved in forming such a district are borne by the Town and the serving utility once the petition is received. The developer pays for the street lights and the installation cost. The property owners within the district are assessed annually for the electricity, operation, maintenance and replacement.

The Town Council acts as the Board of Directors of the Street Light Improvement District. The lights are owned, operated and maintained by the Town of Gilbert under the SLID Guidelines.

6.7.2.1 STREET LIGHT IMPROVEMENT DISTRICT PROCESS

The process for forming a Street Light Improvement District (SLID) is as follows:

1. Prepare district limits
2. Utility company to be provided an approved street light layout for facility design purposes.
3. Developer is required to install street lights in accordance with approved plans.
4. Council considers adoption of Street Light Improvement District Resolution.
5. Town/utility enters into a district agreement.
6. Utility or contractor schedules work.
7. Utility or contractor installs improvements.
8. Town and utility if necessary, accepts improvements.
9. County collects charges with annual tax assessments.

NOTE: Generally, it takes 8 to 11 months from start to completion of the project.

6.7.2.2 STREET LIGHT IMPROVEMENT DISTRICT CHECKLIST

1. Obtain Unanimous Petition from developer/owner with appropriate certificates.
2. Assign Street Light Improvement District file number (Example: SLID 95-10) and log number in index.
3. After the petition has been received by the Town, prepare Council Communication, Resolution of Intention and Ordering Street Light Improvements.

4. A "Full Metes and Bounds Description" of the plat shall be typed on the reverse side of the Unanimous Petition for Street Light Improvement District. The description shall include:

   - Description of all "U.S. Public Land Corners" used in determining the location of the plat.
   - Description of all exterior corners set that locates the plat within the section.
   - Methods of determining bearings and controlling corners used.
   - Total area of plat.
   - A map showing the location of said improvement district shall be attached.

6.7.3 LED Street Light Design Guidelines

Developers of all residential, commercial, industrial or other types of properties are responsible for the design and installation of street lighting on all streets within and adjacent to their sites. Street light plans shall be prepared and sealed by a licensed electrical engineer registered in the State of Arizona. The street lighting design shall be reviewed and approved by the Town. The street light design shall include the numbering of the street light poles as directed by the Town. The contractor shall furnish and install a number on each light pole.

1. Street light plans and details shall be included with the improvement plans.

2. All new subdivisions, new roadways, and in-fill projects on existing roadways shall use LED luminaires as specified in this Section unless otherwise approved by the Town Engineer. LED luminaires shall conform to the Town specifications.

3. The developer shall retain a professional electrical engineer, registered in the State of Arizona, to prepare the lighting system design and appropriate calculations relative to illumination levels. Illumination design shall follow the recommendation of the American National Standard Practice for Roadway Lighting, Illuminating Engineering Society of North America, IES RP-8. The Luminance criteria, with light loss factor calculated as lumen depreciation factor based on 50,000 hour lumen maintenance at 40 C from TM-21 report data times luminaire dirt depreciation factor of 0.9, shall be used to determine the compliance with the IES RP-8 and Town street lighting design guidelines. LED fixtures are the standard for all installations.

4. Spacing of street lights shall be based on light level requirements and illumination level requirements listed in Table 6-10, below.

TABLE 6-10: LUMINAIRE AND ILLUMINATION LEVEL REQUIREMENTS

Street Type	Luminaire	Avg (fc)	Avg/Min	Mounting Heights

Major Arterial	Dual 11,800 lumen LED	.9	3:1	40′
Minor Arterial	11,800 lumen LED	.9	3:1	40′
Minor/Major Collector	6,800 lumen LED	.6	4:1	32′
Local	5,000 lumen LED	.4	6:1	32′

5. All new street lighting circuits shall be installed underground and will be owned by the utility.

6. Street lights shall be fully shielded in such a manner that light emitted by the fixture, either directly from the lamp or indirectly from the luminaire, is projected below or horizontal plane running through the lowest point on the fixture where light is emitted. External shields or reflectors are not allowed.

7. Intersection at all local and collector type streets shall have at least one street light at the intersection. Minor and major arterial intersections shall have at least 2 street lights at the intersection. At signalized intersections, street light plans shall be coordinated with street lights mounted on traffic signals.

8. The developer shall coordinate all design, electrical service criteria and needs with the utility company serving the lighting system.

9. The developer shall conform to the latest requirements of the serving utility and pay all fees for design and energization.

10. Plans for street lighting shall show the locations, distance between lights, luminaire types/sizes, mounting heights and pole types. The Town may require computerized calculations to show the light levels and intensities on the roadway.

11. Street lights for local and minor collector streets shall generally be located at the side lot lines. On major collector and minor arterial streets, street lights shall be placed on both sides of street. Major arterials shall typically have lights placed in the median using double mast arm tenons.

6.7.3.1 INTERSECTION LIGHTING LEVELS

Intersection lighting levels should be at least equal to the sum of the values recommended by IES for each street that forms the intersection. Photometric lighting analysis shall be provided to show that this requirement is satisfied.

6.7.3.2 STREETLIGHT SPACING AND FIXTURE HEIGHTS

Average spacing of street lights and fixture height requirements are listed in Table 6-11, below:

TABLE 6-11: AVERAGE STREETLIGHT SPACING AND FIXTURE HEIGHT REQUIREMENTS

Street Classification	Average* Spacing	Pole Height	Mast Arm	Fixture Height
Arterial Street (No Medians)*	200' **	32'	12' x 8'	40'
Arterial Street (Medians)*	195' (Installed in Medians)	40'	None	40'
Major/Minor Collector Road	270' **	32'	None	32'
Local Road	325'	32'	None	32'

** Average Street light spacing is a recommendation. The minimum photometrics must be verified by a registered electrical engineer through a sealed photometric lighting analysis.*

*** Spacing on each road side based on double sided staggered poles.*

1. All poles and mast arms shall be steel construction finished per Gilbert Detail GIL-901.

2. Contractors shall submit technical material specifications on all items listed above for Town review and approval.

6.7.4 Final Street Light Plan Requirements

1. Show all utility locations, sizes, easements, rights-of-way, and other structural features.

2. A key map with the following information:

   - All streets, alleys, easements, tracts and parcels.
   - Existing utility systems, including fire hydrants and valves in and around the development.
   - Proposed utility systems including fire hydrants and valves.
   - Utility pipe line sizes.

3. Provide a legend on the plans identifying the following items:

TABLE 6-12: POLE SELECTION

Street Classification	Pole Type	Pole Mounting Type	Fixture Mounting Height *
Arterial Street	Round Tapered	Foundation	40'

(No Medians)			
Arterial Street (Medians)	Round Tapered	Foundation	40’
Major/Minor Collector Road	Round Tapered	Foundation	32’
Local Road	Round Tapered	Foundation	32’

**Electric service providers Arizona Public Service (APS) or Salt River Project (SRP)*

4. Meandering sidewalks shall not conflict with streetlight poles.

5. All point of curvature and point of tangency to be stationed off of centerline.

6. Streetlight poles shall be a minimum of 6 feet from the edge of a driveway wing.

7. Streetlight poles are not to be located in the radius of intersections.

8. All streetlights to be located within right-of-way.

9. All pole foundations and pull boxes to be at sidewalk grade unless otherwise noted.

10. Apply specific construction requirements of APS and SRP.

11. Show all existing and proposed water lines and fire hydrants and provide dimensional ties to water lines and fire hydrants where potential conflicts may occur.

12. All future and existing streetlights adjacent to and within 300 feet from the first proposed streetlight must be shown with stationing and dimensional ties to the street centerline.

13. Streetlights on lot frontages in residential areas shall be located at property lines whenever possible. Lights on non-frontage conditions may be located by station only.

14. Arterial-to-arterial intersections must have 4 streetlights. All other intersections require 2 streetlights, and cul-de-sacs require one streetlight.

15. All phasing must be shown on the plans.

16. Lights in elbows and cul-de-sacs (anywhere other than standard street locations) require radial ties.

17. Survey Data is required for street centerlines (bearing and distances).

18. Provide stations at all intersections and changes of alignment.

6.7.5 LED LUMINAIRE REQUIREMENTS

1. A nominal Correlated Color Temperature (CCT) of 4000 ºK binned per ANSI

C78.377-2008.

2. A typical Color Rendering Index (CRI) ≥ 65.

3. The complete luminaire designated shall operate one or more optimized LED arrays from a nominal 120-277 volt, 60 Hz power source and shall be capable of starting and operating the optic assembly(s) within the limits specified by the LED manufacturer.

4. The luminaire shall contain prewired integral drivers and optical assembly that shall provide an asymmetric medium distribution type. Labeling shall be in accordance with ANSI standards.

5. The arterial LED luminaire shall be 125W or less and provide a minimum of 11,800 initial lumens.

6. The collector LED luminaire shall be 75W or less and provide a minimum of 6,800 initial lumens.

7. The residential LED luminaire shall be 60W or less and provide a minimum of 5,000 initial lumens.

8. Maximum LED drive current shall not exceed 700 mA.

9. Manufacturer must have a minimum of a 15-year history of designing and manufacturing outdoor luminaires and at least 10 years of LED design history in some form of outdoor application which can include signage, traffic signals or roadway/parking fixtures.

10. A limited system warranty must be provided for the replacement or repair of the luminaire due to any electrical failure (including light source and or power supplies/drivers) for ten (10) years.

11. Luminaire shall conform to IESNA TM-15 BUG rating of B3-U0-G2 or better. Uplight shall be zero (0) light above 90-degrees.

12. UL 1598 listed operating temperature range of -10º C to +50º C.

13. Lumen maintenance at 50,000 hours and 40°C ambient based on testing per TM-21 shall be 91% or greater.

14. Each optical assembly shall be a fixture sub-assembly and be comprised of:

    i. A precision reflector system that is metallic coated with a high quality reflectance finish material containing a long life finish designed to last the life of the fixture without corroding, peeling or fading under normal operating conditions.

    ii. A 16 gauge aluminum metal core printed circuit board assembly, designed to operate as a class 1 circuit.

iii. LED's shall be surface mounted to the aluminum core board using advanced SMT manufacturing processes.

iv. The circuit board shall be attached to a machined surface on the casting using tri-lobular thread forming screws so as to maximize heat transfer over the life of the fixture.

v. Each optical assembly circuit board shall use discrete LED. No chip on board optics allowed.

vi. The LED pad temperature shall not exceed 75°C at 25°C ambient.

vii. Each fixture shall contain a single serviceable transparent flat tempered glass optical lens.

viii. Optical cavity must be vented while maintaining the IP66 enclosure rating.

15. The Luminaire Fixture Assembly Shall Have The Following Electrical Requirements:

i. Off-state power draw of 0 watts (excluding PE or remote control devices).

ii. 7-pin locking ANSI C136.41 dimming photocell receptacle.

iii. Drivers shall be dimming type with 0-10 volt leads wired to 7-prong photocell receptacle.

iv. A minimum system power factor of .9 tested and specified at 120v input at full power.

v. Maximum THD < 20% tested and specified at 120v input at full power.

vi. Driver and LED modules shall be replaceable as separate units with tool-less plug-in electrical connections.

vii. Cooling shall be done with heat sinks. No fans, pumps, or liquids shall be used.

viii. Driver shall have a minimum life rating of 90,000 hours.

ix. UL Class 1 power supply units (i.e. drivers) operating in DC constant current mode.

x. EMI compliance with FCC 47 CFR Part 15 Class A.

xi. Electrical components have a Class A sound rating.

xii. The luminaire shall contain the factory-installed driver supplied

with the optic assembly.

xiii. The driver, optic assembly and housing shall be from the same manufacturer.

xiv. The electrical system shall have integral surge protection per IEEE/ANSI C62.41.-1991, 6kV/3kA Location Category B3 (120 Events).

xv. Electrical cavity shall use only copper wire within the fixture.

xvi. Electronic components for the fixture shall have quick disconnect connectors.

16. Terminal block shall be oriented to be lineman friendly within the electrical cavity to allow for easy wire Luminaire shall have a minimum 3-lead terminal board mounted within the housing. Terminal board screws shall be of the captive type with wire grips that raise and lower with the terminal screw. Terminals shall be capable of accepting #8 to #14 AWG wire.

17. Main voltage harness and wiring insulation shall be AWM rated for 125°C and 600 Volt.

18. The die-cast aluminum housing construction will incorporate heat sink fins that are integrally cast with the housing to maximize heat transfer and minimize thermal impacts of environmental conditions such as debris-clogged fins.

19. The fixture power door shall be die-cast aluminum from a precision machined die cast tool steel mold.

20. The fixture assembly for the power door shall have a threaded screw that can be tightened to positively secure the door against the main fixture casting.

21. Shall contain a hinge system that does not require any tools to remove the door from the fixture.

22. Warranty shall not be affected by opening the power door and/or accessing the electrical cavity.

23. Meets 3G vibration per ANSI C136.32-2001.

24. Finish shall be corrosion resistant Polyester powder paint capable of surviving the ASTM B117 salt fog environment for a minimum of 500 hours without blistering or peeling.

25. The coating must demonstrate the gloss retention of great than or equal to 90% for 500 hours QUV test per ASTM G154 UVB-313, 4 hour UV-B 60 degrees Celsius, 4 hour condensation 50 degrees. Dry film thickness of the dark bronze powder paint shall be a minimum of 2.0 mils thickness. Fixture color shall match the pole color.

26. Luminaire housing shall be UL listed for wet locations.

27. Slipfitter in the housing shall contain two-bolt single piece clamp fastening to mount on 1.66" to 2.375" O.D. horizontal tenons, and provide +/- 5 degrees of tilt adjustment.

28. The fixture shall not be greater than 26 in x 15 in x 5.5 in (L x W x H).

29. The effective projected area (EPA) shall not exceed .5 square foot maximum and 28lb weight.

30. Luminaires must be independently tested and comply with IESNA LM79-08 and LM80-08. A copy of all LM79 and LM80 independent test reports shall be provided to the Town.

31. CCT and CRI and shall be tested and measured in accordance with LM-79.

32. Lumen depreciation data shall be provided to the Town per LM-80 and TM-21 at 40º C ambient.

33. Documentation showing compliance with all performance, mechanical, and photometric requirements as detailed above shall be provided to the Town, if requested.

6.7.6 Photocontrol Requirements

1. Photocell shall operate at nominal 120-277V.

2. Photocell shall be designed for use with LED and will protect the LED fixture from inrush current spikes.

3. Photocell shall use infrared filtering phototransistor light sensing element.

4. Unit shall include 320J MOV Surge Protection and consume .5W power at 120V.

5. Operating temperature range is -10C to 50C.

6. Unit will turn on at 1.5fc and off by 2.25FC. The unit will fail on.

7. Product shall have a 10 year warranty for use with LED.

6.8 SUBMITTAL CHECKLIST

6.8.1 Traffic Signal Plan Checklist

At the time these Standards were published there was no Traffic Signal Plan Checklist. Please go to the Town of Gilbert Engineering Services website to verify if a Traffic Signal Plan Checklist has been developed.

6.8.2 Street Light Plan Checklist

The latest version of the Street Light Plan Checklist can be found on the Town of Gilbert Engineering Services website. This Checklist will be periodically updated by the Town of Gilbert. At the time of the publication of these Standards it was as follows:

- Retain a professional engineer of the appropriate discipline to design streetlight and coordinate plans with the Town staff.
- Street light plans will be submitted at a scale of 100 feet to one inch. Final light pole locations will be shown on the Paving and/or Utility plans.
- The Town's plan review schedule and review turnaround time is also in effect for street lighting plans and review process.
- Street lighting plans submittals will be coordinated through the normal approval plan process. The review and compliance to standards will be the responsibility of the Town Engineer.
- Submit a street light site plan, indicating the street light locations with the corresponding photometric calculations/distribution sheets for review and approval by the Town.
- The approved street light site plan shall be submitted to the appropriate utility company (Arizona Public Service or Salt River Project) to prepare the streetlight improvement plans.
- Submit a minimum of 2 sets of the street light improvement plans to the Town for issuance of the streetlight improvement construction permit.
- Private street lights must be labeled as "Private Street lights" and must meet public street illumination standards.

6.9 GENERAL NOTES

6.9.1 Traffic Signal General Notes

The latest version of Traffic Signal General Notes can be found on the Town of Gilbert Engineering Services website. These Notes will be periodically updated by the Town of Gilbert. At the time of the publication of these Standards they were as follows:

1. All materials and installation shall conform to current editions of the Town of Gilbert (TOG) Standards and Details, Arizona Department of Transportation (ADOT) "Standard Specifications for Road and Bridge Construction", ADOT "Traffic Signals & Lighting Standard Drawings", Manual on Uniform Traffic Control Devices (MUTCD), MAG Specifications and Details, the Special Provisions, and these plans.

2. The utilities depicted hereon are based upon the best available information at the time of the field survey. The contractor shall contact Arizona 811, Blue Stake Center at (602) 263-1100 a minimum of 48 hours prior to any construction and field-verify exact locations of all utilities. If discrepancies exist, contractor shall notify engineer immediately. See Cover Sheet for utility contacts.

3. Prior to construction, the contractor shall pothole for utilities. Prior to installation of conduit, the contractor shall pothole for utilities where conduit installation shall cross existing facilities.

4. The contractor shall maintain at least 2 feet clearance from RWCD utility lines, 4 feet from drainage "V" ditches, and at least 1 foot clearance from all other utilities. The contractor is responsible to confirm with utilities.

5. The contractor shall replace all landscaping and irrigation facilities that may be disturbed or damaged during traffic signal construction at his own expense. Contact the Town of Gilbert Street Department at (480) 503-6400 for information on locations of irrigation equipment.

6. Tops of pole foundations shall be at same elevation as that of adjacent sidewalk or flush with the sidewalk. Concrete pole aprons shall be installed around pole bases as necessary to satisfy current ADA accessibility guidelines. If no sidewalk is present, the elevations shall match top of adjacent curb.

7. Approximate station and offset are shown in the Pull Box Schedule. The contractor shall contact TOG Traffic Operations at (480) 503-6910 or 6933 to coordinate location of the traffic signal pull boxes.

8. Where the existing pull box is to be removed and replaced with a new pull box or splice vault, the contractor shall adjust the existing conduit sweeps to enter the new pull box or splice vault installation per Town of Gilbert Standard Details GIL-841 and GIL-842.

9. The Town of Gilbert will supply a complete controller & cabinet assembly, signal poles, signal & luminaire mast arms, LED signal & pedestrian heads, APS pedestrian push buttons, detection systems and anchor bolts. Contractor shall supply luminaire heads, pre-emption equipment, wire and meter pedestal as well as all other equipment, materials and labor required by the project.

10. The contractor shall provide and install luminaires. Luminaires shall be Cooper Lighting OVF-6-LED-E-U-T3A-BZ-4-OA/RA1013 or approved equal. All luminaires will have shorting caps installed.

11. Internally illuminated street name signs (I.S.N.S.) shall be provided and installed by the contractor. Individual Inline Fuse Holder, part numbers WPBJ - (Rubber Boot) and HEB - (AA Buss Fuse Holders) shall be installed for both I.S.N.S. and luminaires in the pull box at the base of each pole.

12. The contractor shall paint poles, mast arms, and luminaires brown per the current TOG Standard Details and Specifications (Tnemec – Series 1075 Dark Bronze 86BR, Series 1079 Clear Semi-Gloss).

13. The contractor shall provide and install the conduit runs from the SRP power source pod to the meter pedestal. SRP will install the service wire from the SRP power supply (pod) to the meter pedestal.

14. The contractor shall contact SRP at (602) 236-6326 a minimum of three weeks prior to construction for power source point of delivery (pod) location and installation requirements.

15. All conduit shall be schedule 40 PVC.

16. Installation of all conduit, pull boxes, traffic signal interconnect, and conductors, shall be done in accordance with the Town of Gilbert Standard Details.

17. All conduit runs under existing pavement and driveways shall be installed by directional boring, unless prior approval is obtained from Town of Gilbert.

18. The contractor shall contact TOG Traffic Operations At (480) 503-6910 or 6933 to coordinate the emergency pre-emption detector line of sight. Emergency pre-emption shall be 4-Channel Strobecom II manufactured by Tomar Corp. or approved equal. Terminations shall be done in accordance with Town of Gilbert Standard Details.

19. The contractor shall provide and install the radio interconnect system in accordance with the project's Special Provisions and plans. Ethernet Radio Antennas shall be mounted in accordance with Town of Gilbert Standard Detail GIL-862. Prior to installation of the antennas, the contractor shall contact TOG Traffic Operations for part numbers of radio interconnect system and to coordinate installation.

20. The contractor shall install video detection system in accordance with the project's Special Provisions and plans. The system will be Video IQ System manufactured by PEEK. The materials and construction shall comply with Town of Gilbert Standard Details and Specifications for video detection and the manufacturer's recommendations. The contractor shall verify mounting locations with Town of Gilbert prior to installation.

21. The contractor shall provide Ruggedcom RS900G-H1-N-2LC25 Shelf-Mount Unit or approved equal for future use. Contact TOG Traffic Operations for details.

22. The signal cabinet shall be installed such that maintenance personnel facing the door of the cabinet shall be able to view the intersection.

23. The contractor shall install new APS pedestrian push buttons (PPB) in compliance with the current Proposed Guidelines for Pedestrian Facilities in the

Public Right-of-Way (PROWAG) and ADOT Standard T.S. 11-1. The PPB shall be mounted in accordance with ADOT T.S. 4-21, except the center of the push button shall be a maximum of 42 inches above the finished sidewalk.

24. The contractor shall provide and install CCTV system in accordance with the project's Special Provisions and plans. CCTV cameras shall be mounted in accordance with Town of Gilbert Standard Detail GIL-861. Prior to installation of the CCTV systems, the contractor shall contact TOG Traffic Operations At (480) 503-6910 to coordinate installation. The CCTV system shall include pressurized SIQURA HSSD621PRH manufactured by TKH Group or approved equal.

25. The contractor shall provide and install advance detection in accordance with the project's Special Provisions and plans. The system shall be Wavetronix Smart Advance.

26. All work must be supervised on site by a Certified IMSA Level II Traffic Signal Technician. The Contractor shall submit the name of the technician and a copy of their certification to the Town of Gilbert prior to the start of construction activities. All traffic signal work on the project shall take place and be supervised by this technician at all times.

6.9.2 Street Light General Notes

The latest version of Street Lighting General Notes can be found on the Town of Gilbert Engineering Services website. These Notes will be periodically updated by the Town of Gilbert. At the time of the publication of these Standards they were as follows:

1. The contractor shall comply with State and Town statutes, and manufacturer's recommendations.

2. The electrical contractor shall comply with all licensing requirements set forth by the State Registrar of Contractors office to perform work relating to street light installation in the Town right-of-way.

3. Contractor shall obtain an underground utilities (right-of-way) permit and a street light permit for the project prior to construction.

4. Acceptance of the completed improvements will not be given until Record Drawings have been submitted to and approved by the Town Engineer.

5. Light poles shall be installed plumb, be adjusted to provide proper alignment to the roadway being lighted and be properly grounded when the installation is completed. The contractor shall furnish and install a number on each light pole. Street light pole identification and specifications will be provided by the Town of Gilbert.

6. Luminaires:

    - Luminaires shall be installed level and include a lamp and photocell.

Contractor shall assure that the luminaries shall be free of dust, dirt or anything that would impair the output of the light before he/she leaves the site.

- Luminaires furnished with multi-tap ballasts shall be rewired or reconnected to match the voltage supplied by the electric utility company.

7. For embedment, the following requirements shall apply:

   - A ground rod shall be installed in pull box in undisturbed soil and a lead in solid copper bare bond wire (#8) shall be installed in 1 inch liquid-tight flexible steel conduit with PVC jacket for pole grounding.

   - Surplus excavation shall be disposed of by the contractor.

8. Wiring and Conduit requirements are:

   - Wiring shall be installed per Utility Standards.

   - Conduit shall be installed at the depth specified on the plans. Conduit shall be one inch Liquid-Tight Flexible Steel Conduit with PVC jacket. Conduit must be UL rated and suitable for underground use.

9. Connections and Grounding:

   - Connections shall be per Utility Standards.

   - Each pole shall have an 8 feet ⅝ inches copper clad ground rod driven beneath pull box. A #8 bare copper lead from the ground rod in pull box to landing lug in street light pole hand hole.

10. Excavation for pull boxes and material specifications shall be per the electric utility company standards.

11. Trench shall be installed per the Utility Company Standards. The use of a common Electric Utility Company trench is permitted. It is the contractor's responsibility to contact the Utility Company for coordination of the trenching and the installation of conduit.

12. It is the contractor's responsibility to restore all property, landscaping, paving and driveways that are disturbed during street light construction to their original condition in conformance with MAG Specification Section 107.9.

13. The developer shall be responsible for furnishing all personnel and equipment to successfully perform the following test:

    - Prior to acceptance, the developer shall energize and operate the entire roadway lighting system, 48 hours for 2 consecutive days without interruption or failure. If a LED should fail, it shall be immediately replaced.

14. For all arterial roadways, the street lighting system will need to include fiber optic traffic signal interconnect conduits and pull boxes, per Town of Gilbert Standard Detail GIL-831.

15. The contractor shall guarantee all work for a period of one year from the date of final acceptance by the Town of Gilbert, against imperfect workmanship, failure, malfunction of materials and/or equipment due to faulty or imperfect workmanship. This guarantee is to be in writing to the Town at the time of issuing final acceptance. Work found to be defective within the warranty period shall be replaced without cost to the Town.

6.9.3 Fiber Optic Interconnect General Notes

The latest version of Fiber Optic Interconnect General Notes can be found on the Town of Gilbert Engineering Services website. These Notes will be periodically updated by the Town of Gilbert. At the time of the publication of these Standards they were as follows:

1. All materials and installation shall conform to the current editions of the Town of Gilbert (TOG) Standard Details, the Arizona Department of Transportation (ADOT) "Standard Specifications for Road and Bridge Construction, the " ADOT "Traffic Signals & Lighting Standard Drawings," the Manual of Uniform Traffic Control Devices (MUTCD), MAG Specifications and Details, the Special Provisions, and these plans.

2. The utilities depicted hereon are based upon the best available information at the time of the field survey. The contractor shall contact Blue Stake at (602) 263-1100 a minimum of 48 hours prior to any construction and field-verify exact locations of all utilities. If discrepancies exist, the contractor shall notify the Engineer immediately.

3. Prior to construction, the contractor shall pothole for utilities. Prior to installation of conduit, the contractor shall pothole for utilities where conduit installation shall cross existing facilities.

4. The contractor shall maintain at least 2' clearance from RWCD utility lines, 4' from drainage "V" ditches, and at least 1' clearance from all other utilities. The contractor is responsible to confirm with utilities.

5. The contractor shall replace all landscaping and irrigation facilities that may be disturbed or damaged during construction at his own expense. Contact the Town of Gilbert Street Department at (480) 503-6400 for information on locations of irrigation equipment.

6. Tops of pull boxes and vaults shall be at the same elevation as that of adjacent sidewalk or flush with the sidewalk.

7. Approximate station and offset are shown on the plan sheets. The contractor shall contact TOG Traffic Operations at (480) 503-6910 or 6933 to coordinate location of pull boxes and vaults.

8. All conduit shall be schedule 40 P.V.C. Conduit routing is shown schematically to indicate connections to boxes and vaults and may be adjusted to avoid conflicts with underground utilities or other conflicts. All installation locations, specifications, bend radii, clearances to other utilities, etc. shall be per Town of Gilbert specifications and requirements.

9. All conduit runs under existing pavement and driveways shall be installed by directional boring, unless prior approval is obtained from Town of Gilbert.

10. A tracer wire and 2500 lb mule tape shall be placed in all conduits and spliced at all pull boxes.

11. Contractor shall provide splices per the fiber splicing tables.

12. The contractor shall run a metal disk mandrel through existing conduit to clean it and ensure continuity.

6.10 FIGURES

7.0 WATER DISTRIBUTION AND TRANSMISSION SYSTEMS

7.1 GENERAL INFORMATION

The purpose of this chapter is to provide a consistent engineering approach and the minimum criteria for design of water distribution mains, construction, and modification of the public water system to be owned and operated by the Town. The chapter is intended for use in design, plan preparation, and the plan review process. The information provided in this chapter is not intended to cover all situations that arise, but shall provide general guidance yet not a substitute for sound engineering principles.

7.2 INTEGRATED WATER RESOURCES MASTER PLAN

The Town of Gilbert currently uses the most recent version of the Integrated Water Resources Master Plan (IWRMP) report. At the time this manual was updated, the most recent version of the IWRMP was prepared by Carollo Engineers in 2012.

The current version of the Integrated Water Resources Master Plan can be obtained by making a public records request to the Town Clerk's Office.

7.3 WATER SERVICE AGREEMENTS

Land subdivision developments are required to file a "Water Service Agreement" document with the Maricopa County Environmental Services Department. This document should be completed by the engineer and submitted with the final plans to the Town of Gilbert. The agreement will not be signed prior to the Town approving the final plans.

The following is the specific information regarding the Town of Gilbert municipal water system, and the appropriate identification numbers:

- Potable water system # 04-07-092
- System Name: Gilbert Municipal Public Water System
- Address: Development Services and Engineering, 90 E. Civic Center Drive, Gilbert, AZ 85296.
- Address: Public Works Administration/Water Department, 900 E. Juniper Avenue, Gilbert AZ 85234

7.4 AVAILABILITY OF TOWN OF GILBERT WATER

Questions pertaining to the availability of public water service from the Town of Gilbert should be directed to Public Works Department.

Questions regarding water system expansion or extension requirements to serve proposed new projects may be directed to Public Works Department.

7.5 TOWN CODE

Various Town codes, including, but not limited to Chapters 10, 30 and 66 of the Town of Gilbert Municipal Code apply to the development of the municipal water system and contain information regarding the development in association with land development.

An electronic version of the Town of Gilbert Municipal Code can be found on the Town of Gilbert website.

7.6 TOWN STANDARDS

Developers are required to install all improvements necessary to provide water service to their development. This includes any waterlines, storage facilities, booster pump stations, pressure reducing valves or other facilities in accordance with the adopted Integrated Water Resources Master Plan. They are also responsible for the payment of all required development fees.

7.7 STATE AND COUNTY REGULATIONS

7.7.1 Arizona Department of Environmental Quality (ADEQ)

ADEQ's Engineering Manual Bulletin No. 8 "Disinfection of Water Systems" and No. 10, "Guidelines for the Construction of Water Systems" and the Arizona Administrative Code, "Title 18 - Environmental Quality," contain specific requirements for submittals, approvals, and notifications when extension of a public water line is proposed. The developer and the Engineer are expected to be aware of, and comply with, the above referenced regulations.

7.7.2 Maricopa County Environmental Services Department (MCESD)

The MCESD is required to review and approve all public water main extensions and construction of water related facilities within the Town's service area, prior to the Town approving the final plans.

The developer and the Engineer are expected to be aware of, and comply, with the MCESD regulations. The MCESD is required to review and approve all public water main extensions and construction of water related facilitates within the Town's service area. Prior to Town approval of final plans, the engineer will submit a cover sheet for the final plans with a completed signature and date of approval from MCESD.

7.8 DESIGN STANDARDS AND GUIDELINES

New public water supply distribution and storage facilities shall be designed in accordance with the Town of Gilbert Supplement to MAG Specifications and Details, Maricopa Association of Governments (MAG) Standard Specifications and Details, and American Water Works Association (AWWA) Standards.

The Town of Gilbert public water system is a looped system that is grid based, and currently operates as 4 pressure zones, separated by the Eastern Canal and RWCD

Canal. To insure appropriate water pressure, water circulation, and redundancy, all new water mains must be designed in a looped and interconnected system wherever possible so that there is more than one path for water to flow to supply customer's demands and fire flows.

The Town's supply and distribution mains currently include the following components:

- Transmission Mains, which are pipelines 16 inches in diameter and larger. Size and location will be in accordance with the Town of Gilbert Master Plan and Utility System Evaluation report.

  NOTE: Service connections will not be allowed on transmission mains without specific Town approval.

- Distribution Mains, which are pipelines 8 inches to 12 inches in diameter.

- Service Connections are pipelines connecting the distribution main to the water meter.

- Well Transmission Mains are low pressure pipelines that are used to transfer well water to treatment facilities or booster stations. They are sized in accordance with the Town of Gilbert Integrated Water Resources Master Plan. Well supply mains may not be tapped for service.

Water mains shall be installed along the entire length of the property line frontage of that property being developed. The property line frontage is defined as that portion of a parcel of property that abuts a street, easement, or public rights-of-way. If a parcel to be developed has more than one frontage, improvements shall be installed along all frontages

7.8.1 Water System Analysis

7.8.1.1 PROJECT SPECIFIC MASTER PLAN

A project-specific Water Master Plan will be required for phased developments or projects involving significant extensions of the public water system, or as directed by the Public Works Department. Water master plans shall include system hydraulic models calibrated using a hydrant flow test per Section 7.8.2.3 or as directed by the Town. The hydraulic model shall establish a skeletal water system and demonstrate adequate water design pressures (40 psi minimum under Peak Hour demands) and main line hydrant flows (20 psi minimum during Max Day demand plus fire flows) for all phases of development.

7.8.1.2 WATER SYSTEM DEMAND

The water system demand criterion describes the standards against which the water infrastructure is measured to determine the acceptability of the proposed infrastructure. This water system demand criteria is based on the Town's standards as well as the Arizona Administrative Code.

Infrastructure shall be sized to supply the average daily demands listed in Table 7-13, which lists water usage in categories that can be easily correlated to acreage. The Town has been divided into 4 pressure zones; see Figure 7-1 for the water pressure zones.

TABLE 7-13: UNIT DAILY DESIGN FLOWS FOR WATER - PER LAND USE

Water Unit Demands Used for Demand Projections Town of Gilbert 2012 Integrated Water Resources Master Plan Update					
Land Use Category	**Unit Demand (gpad)**				
	2006 Master Plan	**Pressure Zone 1**	**Pressure Zone 2**	**Pressure Zone 3**	**Pressure Zone 4**
Rural Residential	576	550	**550**	550	550
Low Density Residential 1	1,224	1,600	1,350	**1,350**	1,450
Low Density Residential 2	1,224	1,730	1,040	1,070	**1,040**
Medium Density Residential 1	1,800	1,740	1,450	**1,450**	1,530
Medium Density Residential 2	1,800	1,750	1,570	0	1,790
High Density Residential 1	3,024	2,040	**1,370**	0	1,370
High Density Residential 2	3,024	3,100	**2,560**	2,210	2,560
High Density Residential 3	3024	2630	0	0	0
Commercial	1,728	1,010	**1,010**	**1,010**	**1,010**
Regional Commercial	2,016	**1,325**	**1,325**	**1,325**	**1,325**
Industrial	936	690	**690**	**690**	**690**
Public (Schools)	1,080	920	**920**	**920**	1,460
No Water Service	0	0	0	0	0
Open Space	0	0	0	0	0
Note: **Bold** numbers indicate adjusted values					

7.8.1.3 WATER SYSTEM ANALYSIS CRITERIA

1. The Average Day to Maximum Day peaking factor and the Average Day to Peak Hour peaking factor for each pressure zone are summarized in Table 7-14 below.

TABLE 7-14: WATER SYSTEM PEAKING FACTORS

	Water System Peaking Factors Town of Gilbert 2012 Integrated Water Resources Master Plan Update			
	Pressure Zone			
Peaking Factor	**1**	**2**	**3**	**4**
MD/AD	1.55	1.55	1.55	1.55
PH/MD (2011-2010)	1.9	1.9	2.4	2.4
PH/MD(2030-Build-out)	1.9	1.8	2.2	2.2
Note: (1) Peaking Factors adjusted based on the Average Day demand projections in Pressure Zones 2 through 4				

2. Minimum water pressures shall not be less than 40 psi during Maximum Day and Peak Hour demand conditions.

3. Minimum pressures during Fire Flow conditions shall not be less than 20 psi.

4. Maximum pressures in excess of 80 psi will require service line pressure reducing valves (PRVs) or a distinct subzone created through the use of PRVs. PRV maintenance and repair is the responsibility of the owner.

5. Water main velocities for all mains less than 36 inches in diameter shall not exceed five (5) feet per second during Maximum Day demand conditions. Peak Hour velocities shall not exceed seven (7) feet per second.

6. Water main velocities for all mains that are 36 inches in diameter and larger shall not exceed six(6) feet per second during Maximum Day demand conditions. Peak Hour velocities shall not exceed seven (7) feet per second.

7. Water velocities during fire flow conditions shall not exceed ten (10) feet per second.

8. Fire Flow demands are 1,000 gpm for 2 hours for single-family residential areas. Fire Flows for commercial and industrial areas are 3,500 gpm for 4 hours. Large commercial, industrial, or hospital developments may have unique fire flow requirements that would be approved by the Town. A fire flow test shall be conducted to determine fire flow capabilities at hydrants in new developments. Refer to Town of Gilbert website for a sample fire flow test report. If the actual land use type or construction material changes, then a new report and fire hydrant test may be required. The Town's Fire Marshal may require other fire flow rates for large commercial or industrial sites.

9. Pump stations and reservoirs serve the overall pressure zone within the Town, and will be sized according to the Town's criteria that is shown in Table 7-15. Reservoirs, wells, and pump stations are to be sized based on the Town's overall requirements and not the requirements for a specific subdivision.

10. Pump stations and wells that pump directly into the distribution system shall be designed to deliver water into the distribution system at a hydraulic grade line that is equal to or greater than the prevailing hydraulic grade line for the pressure zone.

TABLE 7-15: WATER SYSTEM PERFORMANCE CRITERIA SUMMARY

Criteria	Demand Condition	Requirement to Satisfy
Total Supply	Maximum Day	Satisfy demand with largest well out of service
Reliable Supply	Maximum Day	Satisfy demand with all wells operating 18 hours or less
Peak Hour Storage	Peak Hour	Satisfy demand for 4 hours with 50 percent of storage capacity and 50 percent of source capacity
Fire Flow	Maximum Day and Fire Flow	Satisfy demand utilizing all sources and 80 percent of total storage
Operating Storage	Maximum Day	Total storage should be equal to or greater than 20 percent of demand
Emergency Supply	Average Day	Satisfy demand with 80 percent of storage volume and 50 percent of well supply operated no more than 18 hours
Booster Pump Capacity	Maximum Day and Fire Flow or Peak Hour	Satisfy the maximum of the listed demands without the single largest pump in service

7.8.2 Water System Design Report

All projects may be required to submit a Water System Design Report. The purpose of this report is to provide the Town with the potential water demands of the project and verify the capability of the Town water supply to provide the necessary domestic and fire flows that will be required. The Water System Design Report can have up to three sections as delineated below. The Fire Flow Demand Report can be included in the Water System Design Report, or be submitted as a separate report. The required fire flows for the project must be summarized in the Water System Design Report in any case.

The Water System Design Report shall be sealed and signed in accordance with the requirements of the State of Arizona Board of Technical Registration, and submitted to Development Services Department. Report shall be letter sized (8.5” x 11”) with any larger maps included within the report shall be folded to letter size and bound or provided in a folder. Electronic submittals containing all required information are acceptable.

7.8.2.1 WATER DEMAND REQUIREMENTS

All projects shall provide a summary of the anticipated water demands for the project. These figures will be based on the unit factors listed in Section 7.8.1. If the proposed use does not match the tables, provide an estimate of what the flows will be from other sources and provide a justification for their use. Flows may be calculated on a sub-area basis, but provide a total flow for the entire development as well. Flow rates to be provided include average day, maximum day, and peak hour.

Include in the report fire flows and fire sprinkler system demands that will be required for the development in accordance with the International Fire Code and Town Amendments. Flows may be taken from the Fire Flow Demand Report.

7.8.2.2 WATER SYSTEM MODEL ANALYSIS

Provide a model of the planned water system as described in a later section of this manual. This modeling will be required where new public waterlines are being added to the Town system. The model will provide the data in a format that will update the Town's master model and verify flows in the Town system. A water model is required to demonstrate that the required fire flow is adequate in accordance with the International Fire Code and Town Amendments. Infill projects will not require a model. Infill projects include single lot development where fire and domestic flows are taken directly from existing Town mains, where the zoning is in conformance with the Town General Plan (i.e., any rezoning has been in conformance with the Town's General Plan.), and residential subdivisions of 5 acres, or less.

Water hydraulic modeling information shall be provided to the Town so that this information can be added to the Town's hydraulic model. This section describes the requirements to be met to deliver model data to the Town.

1. Model Software

   The Town of Gilbert currently uses the H2O Map by Innovyze (formerly MWH Soft) Water System modeling software. The modeling software used to evaluate a proposed development does not need to be the same software, but the data needs to be easily transferred into the Town's software.

   For water system models, GIS file format is the easiest way to transfer model information. Innovyze and most leading software vendors can allow the water model data to be saved in GIS format which allows for the file to be read by the same or other hydraulic model software or to just be viewed using GIS. The final water model must be provided electronically in a useable GIS format.

2. Model Development

   The developer or developer's engineer shall create and utilize a hydraulic model to demonstrate that the proposed infrastructure of the water is adequate, and satisfies the performance criteria. The model or model information will then need to be delivered to the Town to be added to the Town's models, where modeling evaluations will be performed to verify that the proposed infrastructure will work well with the Town's system. For water systems, the Town's overall water supply, pumping, and storage requirements will be evaluated.

   The Town's model will be updated to include planned infrastructure. This planned infrastructure data will be labeled uniquely in the model to distinguish it from Record Drawing infrastructure data. Once the infrastructure has been constructed, the Town or its designated agent will enter the data into the Town's GIS system through procedures that have been established by the

Town. When the Town updates its models on a periodic basis using the most current GIS data, planned infrastructure in the model will be replaced with Record Drawing information as contained in the GIS database

3. Hydraulic Model Data

- Coordinate Systems: All drawings and model data shall use the NAD_1983 State Plane Arizona Central Coordinate System, with the transverse Mercator projection system. Elevations shall be the elevation above mean sea level. This is the same coordinate system the Town plans to use in the future. If drawings are prepared before the Town converts to the NAD_1983 coordinate system, then drawings shall be provided in the Town's current coordinate system. The developer should check with the Town to be certain that the correct coordinate system is being used.

- Topology: Table 7-16 shows the common connectivity errors that must be removed before a model will work. Model data should be free from these errors before delivering to the Town.

- Attributes: Each physical entity in the model of the proposed development will require information and attributes as defined below.

- Water Distribution System:

  - Mains: Diameter, length, material, location, connectivity with other entities.

  - Reservoirs: Base elevation, height, volume, location, connectivity with other entities.

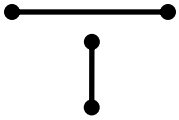
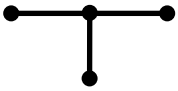
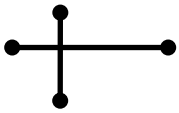
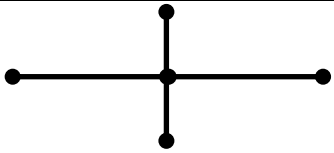
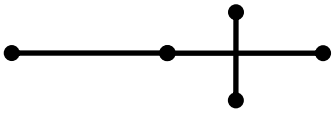
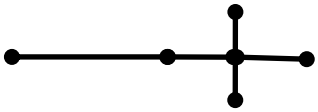
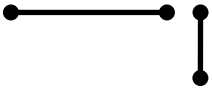
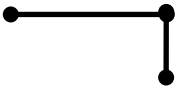
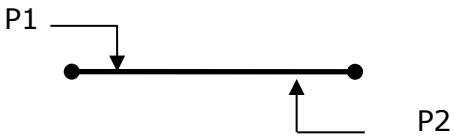
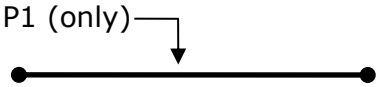
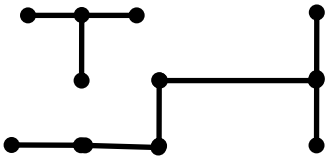
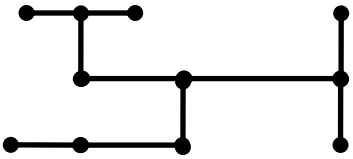
  - Pump Stations: Layout, number of pumps, pump curve or design point, elevation, location, connectivity with other entities, pump control scheme.

  - Nodes (Connection Points): Location, elevation, demand.

  - Pressure Reducing Valves and Tank Fill Valves: Location, connectivity with other entities, elevation, number of valves, diameter, valve set points.

  - Wells: Location, connectivity, design flow, control scheme.

TABLE 7-16: EXAMPLES OF INCORRECT AND CORRECT TOPOLOGY

Name	Incorrect	Correct
Pipe Junction		
Tee		
Four-Way		
Four-Way		
Orphan Pipe		
Duplicate Pipe		
Isolated Network		

4. If a model is not required, include discussion of the proposed connections to the Town system, and anticipated connection sizes.

5. Hydraulic Evaluation:

   New developments that do not constitute infill shall be modeled to determine if the infrastructure is adequate to serve the development and provide the level of service as defined by the Town's performance criteria.

   The Town would use the Town's water model to determine the ability of the water distribution system to deliver water to the site of the development.

   Supplemental fire hydrant tests may also be used to make this determination.

The developer is responsible to make certain that all hydrants and/or sprinklers within the development will satisfy the fire flow requirements.

The following scenarios shall be modeled:

- Maximum Day Demands
- Peak Hour Demands
- Fire Flow Demands, which are defined as the maximum daily demand plus the appropriate fire flow demand

Model simulations shall be documented in a graphical or tabular format to demonstrate that the water distribution system will provide the required flow at suitable pressures and water main velocities. Fire flow model results shall also be documented.

Boundary conditions that represent the interface between the model of the development and the rest of the distribution system need to be explained clearly.

7.8.2.3 FIRE HYDRANT FLOW TESTS

When required, fire hydrant flow tests shall be performed near the planned point of water system connection at the project site. The test shall be performed by a private, approved testing company.

7.8.2.4 FIRE FLOW DEMAND REPORT

All projects shall be required to provide a fire analysis that will demonstrate that there are adequate fire flows available from the Town system to meet the required fire demands of the proposed development, considering the building construction type, layout, etc. The exception is residential subdivisions where modeling is being completed as part of the water demand analysis. The Engineer will use the Town's hydraulic model to evaluate the ability of the water distribution system to deliver fire flows to the development. The developer is responsible for understanding the fire flow requirements of the structures that are to be built and shall assure that the water distribution system within the development is capable of delivering the required fire flows.

When preparing the Fire Flow Demand Report, the Arizona Board of Technical Registration Substantive Policy Statement for fire sprinkler systems shall be applied. The fire flow report must be in compliance with the International Fire Code (IFC) and the National Fire Protection Association (NFPA), Standard 13, Installation of Sprinkler Systems as adopted by the Town of Gilbert. The report must list the applicable codes and standards and the appropriate engineering practices.

The Fire Flow Demand Report shall be sealed by a registered professional engineer in the State of Arizona and shall provide the following information:

1. Engineers name, company, address, city, state, zip code, and phone number

2. Project name, limits, and address

3. Detail physical aspects of the proposed on-site structures including

   - Building height (feet)
   - Number of stories above finished grade
   - International Building Code (IBC) construction type
   - Building area (square feet)

4. The fire flow demand report shall provide

   - IFC and Town Amendment required fire flow
   - Percentage of reduction allowed for the installation of a fire sprinkler system
   - Revised IFC and Town Amendment required fire flow

5. Projects that install fire sprinkler systems are required to be in accordance with the Arizona Board of Technical Registration Substantive Policy Statement regarding fire sprinkler systems the following information shall be included:

   - Range of the fire hazards of the project
   - The hazard classification of the intended occupancy, including any special hazards
   - The appropriate engineering practices
   - The availability and adequacy of the water supply
   - Based on a hazard analysis for the proposed use of each building (including special hazards), the appropriate fire sprinkler design density and area of operation shall be provided for each hazard area
   - Required fire sprinkler demand (psi and gpm)
   - Required fire flow and fire sprinkler demand shall be provided for the project in accordance with the International Fire Code and Town Amendments

6. In order to ascertain the availability and adequacy of the water supply for the project, the fire flow report shall provide test results based on a certified test of the existing water system within the previous 60 days. The flow test information shall include

   - Test date

- Test time
- Test location
- Test hydrants
- Orifice size
- Orifice coefficient
- Flow test data
  - Static pressure (psi)
  - Residual pressure (psi)
  - Pitot measurement (psi)
  - Recorded flow rate (gpm)
  - Flow rate (gpm) converted to 20 (psi)
- Testing technician
- Copy of the written report showing they witnessed the flow test

7.8.2.5 PRELIMINARY WATER SYSTEM DESIGN REPORT

A preliminary report is required at the entitlement stage of a project. The type and size of buildings may or may not be known at this stage. The preliminary report should provide the following information:

1. Provide the preliminary water demand requirements (based on either acreage or building size and use.) This data may be refined or changed due to changes in the plan through the entitlement stage. Provide a summary of the minimum fire flow requirements as supported by the Fire Flow Demand Report

2. Provide a water model analysis if required. For single family residential developments, the model may be delayed until the Final Water Report submittal if desired. Any plan or system changes required due to inadequacies of the system as modeled will require construction plan changes as necessary to meet requirements.

3. The Fire Flow Demand Report

4. If no changes are anticipated or required with the construction plans, this report may be submitted as the Final Water System Design Report.

5. The following sections are to be included in a Water System Design Report:

- **Cover Page**:
  - Project Title
  - Prepared For
  - Prepared By
  - Engineer's Seal
  - Date
  - Town Datum Benchmarks (BM)
- **Executive Summary:** Provide a one or two page statement indicating that the criteria is met, what criteria was used, and an explanation of specific steps that were taken to modify the design so that the criteria is met. Unique characteristics or challenges associated with the project should also be presented.
- **Introduction:**
  - Provide the project name, size, type of development
  - Project owner
  - Summarize the content that would be found in each major section of the report
- **Project Location**:
  - Provide a site description
  - Project size
  - Addresses and major streets
  - Township, Range and Section
  - Relationship to other developments or significant water features
  - Include a site map
- **Purpose of Report:** Explain the objectives of the report, which could be to define infrastructure requirements, satisfy regulatory requirements, identify water supplies, or evaluate the impact of the new development on the existing collection system.
- **Existing Water System Conditions:** Describe adjacent infrastructure or existing infrastructure that will provide water to, or be affected by the new development**.** Include a discussion of intended water sources and

storage

- **Proposed Water System Conditions:** Describe planned infrastructure that will be added as part of the development.

  Refer to relevant Town or adjacent development master plan reports where appropriate.

  Include tables showing the number and size of proposed infrastructure where appropriate.

  Include a map of proposed infrastructure showing locations, sizes, and relationship to streets and property parcels. The map should also be used to correlate demands in tables with specific locations in the proposed development.

- **Design Criteria:** Summarize the Town's standard design requirements that were applied to this development.

- **Design Methodology**

  - Modeling: Identify the model used and key model assumptions such as friction factors, simplifying assumptions, and boundary conditions.

  - Topology and Pressure Zones: Identify the pressure zone(s) where the development is located. The developer should check with the Town to determine if pressure zones have been established that affect the development.

  - Water Demand Development: Describe land use categories, population, acreages of various types of land use, demands and demand peaking factors. Include a discussion of phasing and interim demands in cases where the infrastructure for the development will need to be phased.

  - Transmission/Distribution Network: Show a network of mains with location, size, connections, hydrants, valves, and water supply sources.

  - Pumping Wells: Identify well locations if possible, expected well capacities, water quality issues, and well pumping requirements.

  - Water Storage Tanks and Booster Stations: Describe location, pumping requirements, storage volumes, site layout, and fill valves where appropriate.

- **Water Model and Results:** Describe pressures, flows for conditions that have been simulated.

  Provide a figure including a graphical representation of the model. To

demonstrate infrastructure adequacy, the model is to be color coded to show pressures at nodes and water velocities in mains for each simulation completed.

Provide tabular results where appropriate to highlight model results.

- **Conclusions:** Summarize work that has been completed; state recommendations, areas where further evaluation may be needed.
- **References:** List documents used in the report that contain relevant information.
- **Appendices:** Figures
  - Vicinity Map
  - Land Use Exhibit
  - Water Master Plan
- **Land Use Data:**
  - Table summarizing parcels, acreages, land use, and population
  - Water System Anticipated Demands
  - Water Storage Calculations
- **Model Output:**
  - Maps showing pressures and pipe velocities from the model maximum day and peak hour demand conditions
  - Maps or tables showing fire flow analysis results using a maximum day demand plus the fire flow
- **ADWR Data:**
  - Wells in the Vicinity
  - Well Data Tables

7.8.2.6 FINAL WATER SYSTEM DESIGN REPORT

The final report will be required at the time of civil plan submittal. The final report will be basically the same as the preliminary report, but modified to include any changes to the project between the entitlement stage and the construction plan stage.

7.8.3 Water System Design

The water system design shall plan for future extensions to the water system with appropriate placement of valves, stub-outs, etc. to prevent future loss of service and avoid future pavement cuts.

During design the Engineer shall take into consideration means to flush and test the new main. Minimum flushing velocity is 2 feet per second (fps) and air relief methods are required. For smaller mains, fire hydrants may serve both purposes.

7.8.3.1 WATER SYSTEM DESCRIPTION

The Town of Gilbert operates a looped water system that is comprised of several pressure zones and some reduced pressure zones. The existing water system is defined by the Town's utility quarter section and Record Drawing information and the major components for the system expansion are defined in the Town's Integrated Water Resources Master Plan. The Town's supply and distribution mains are defined in the Town's Integrated Water Resources Master Plan.

The current version of the Integrated Water Resources Master Plan can be obtained by making a public records request to the Town Clerk's Office.

7.8.3.2 UTILITY TRENCHING

All trenching, bedding, backfill, compaction, and pavement replacement shall comply with Town of Gilbert Supplement to MAG Specification 601. All pavement replacement shall be in accordance with Town of Gilbert Standard Detail GIL-270.

7.8.3.3 PIPE SIZING

Table 7-17 lists the minimum water line sizes for the Town's water distribution system. Larger waterlines may be required if warranted by the development's water report, specific water demands, or by the Town's Integrated Water Master Plan.

TABLE 7-17: MINIMUM WATER LINE SIZE

Street Classification	Size
Residential	8 inch
Collector	12 inch
Arterials or Section Line	16 inch

Refer to the International Fire Code and Town Amendments for the maximum length of dead end fire lines that may be used for fire protection.

- The Town of Gilbert has standardized the supply and distribution aspects of the public water system. Water mains shall be sized to limit flow velocities to approximately five (5) feet per second during Peak Hour demands and ten (10) feet per second during Maximum Day demand plus fire flow.

- Minimum size of a public water supply or distribution main is 8 inches.

- 6 inch dead end lines are only permitted to fire hydrants and the 6 inch lines cannot be tapped and cannot be over 100 feet long without fire flow calculations.
- 8 inch water mains shall be installed on all public local streets.
- 12 inch water mains shall be installed on all mid-section street alignments unless otherwise directed.
- 16 inch water mains shall be installed on all public arterial streets or section street alignments unless otherwise directed.
- The preceding line size requirements shall apply unless the most current Town Integrated Water Resources Master Plan requires a larger size.

7.8.3.4 PIPE LOCATIONS

Public water mains are required to be located within dedicated public right-of-way, or water line easements.

- Public water mains are required to be located within dedicated public rights-of-way (ROW) or easements (PUFE, PUE). See Section 4.9, concerning the dedication of ROW or easements.
- Water mains may be required on both sides of the street along water zone boundaries and along some major arterial streets with heavy demands. If so required, this is the responsibility of the proposed development.
- Water mains located within a pressure zone that is not the intended service zone shall be located beneath the street paving or the future street paving. Location or alignment shall be as designated by the Town. Public water mains located outside of their intended pressure service zone shall clearly identify on the plan view of the construction plans the pressure zone the main has been designated to serve.
- When water mains for different service zones are located in a parallel configuration, they shall be placed on opposite sides of the street and on the side of the street or right-of-way serving their respective zones where possible.

1. Horizontal Location: All water lines will be aligned parallel to property lines or street center lines and shall not cross and re-cross the center line, except in cases justifiable to the Town. Normal placement of the public water distribution mains, are shown in Figure 4-9 through Figure 4-14 and generally shall be on the north or east side of streets. However the location with regard to the sidewalk may vary depending on local conditions

   Public water lines that are to be installed in public easements on private property are to be located under pavement. Generally, the water line shall be in the center of the public easement and the easement centered in the private drive aisle(s). Installations under parking stalls, landscape areas, fences/walls,

retention basins and overhangs shall be avoided unless an engineering evaluation of the necessity and feasibility is approved.

There shall be a minimum of 5 feet of horizontal separation from base of tree trunk to outside of water main.

- Water lines under streets in the public right-of-way refer to Town of Gilbert Standard Details.

- Public water lines in commercial, multifamily, and industrial developments shall be located under driveways, or drive aisles and provided with a 15 feet wide water line easement. Generally, the water line shall be in the center of the water line easement. If the proposed water line is deeper than 10 feet, then a wider easement may be required by the Town of Gilbert.

- In all other street corridors the horizontal location shall be determined on a project by project basis. The water line should maintain minimum spacing from non-potable lines and should be centered in a through lane.

- New water lines, fire lines, and water service lines are not allowed to pass under retention basins. This does not apply to landscape irrigation lines downstream of proposed backflow prevention devices.

2. Vertical Location: Vertical alignments must be carefully considered in the design of transmission mains. Pipeline segments shall be set at a constant slope. A roller coaster type of vertical alignment shall be avoided to minimize air pocket formation at the high points of the profile. Design of the main shall provide for a minimum number of high and low points consistent with economic feasibility.

   Water mains shall be installed to minimum depth measured from the proposed finished grade to top of pipe as follows:

   - All public water mains in arterial or collector streets shall have a minimum cover of 48 inches over the top of the pipe.

   - Public water mains that are installed through undeveloped property (i.e., locations where the final finished grade elevation is not known, particularly along future street alignments), shall have a minimum cover of 60 inches over the top of the pipe from the existing grades.

   - Public water mains not in arterial or collector streets that are less than 12 inches in diameter shall have a minimum cover of 36 inches over the top of the pipe.

   - Public water mains not in arterial or collector streets that are twelve 12 inches but less than 16 inches in diameter shall have a minimum cover of 48 inches over the top of the pipe.

For water lines larger than 16 inches in diameter, provide a minimum cover of 60 inches over the top of pipe. The Town of Gilbert strongly encourages the engineer to establish their alignments based on all available information regarding the existing conditions, existing and/or planned utilities and verify the location of the existing utilities by potholing. This is especially critical for the larger diameter water mains in order to avoid re-alignment of either the existing or proposed utility in the field.

7.8.3.5 MINIMUM SEPARATION

In order to protect the public water supply from contamination the engineer shall maintain separation distances in accordance with the current Maricopa County Health Code, Arizona Department of Environmental Quality Engineering Bulletin 10 and/or MAG Standard Details 404-1 through 404-3. Mains conveying a higher quality of water shall be located above mains conveying a lower quality of water.

1. Minimum separation between water mains and sanitary sewer mains shall be:
    - 6 foot horizontal as measured from the outside of pipes
    - 2 feet vertical as measured from the outside of pipes
2. Minimum separation between potable water mains and reclaimed water mains or sanitary sewer manholes shall be:
    - 6 foot horizontal as measured from the center of the main/manhole and the outside of the water main.
3. Minimum separation between potable water mains and a storm drain shall be:
    - 6 foot horizontal as measured from the center of the manhole and the outside of the water main.
    - 2 feet vertical as measured from the outside of pipes.
4. Water mains crossing less than 2 feet below a storm drain or culvert shall require additional protection such as the use of ductile iron pipe or a pipe casing.
5. There shall be a minimum of 2 feet of horizontal separation and one-foot vertical separation between public water mains and Non-Town utilities (electric, telephone, CATV, etc.).
6. There shall be five feet of horizontal separation from base of tree trunk to outside of water main.
7. Individual house services or building plumbing beyond dedicated public right-of-way or public easements shall conform to the latest Plumbing Code adopted by the Town of Gilbert.

7.8.3.6 WATER LINE PROTECTION

Where conditions prevent the proper separation of water, reclaimed water and sewer mains, extra protection of the water main is required. The type of extra protection required or allowed shall be per the current Maricopa County Health Code, Arizona Department of Environmental Quality Engineering Bulletin 10 and/or MAG Standard Details 404-1 through 404-3.

7.8.3.7 VERTICAL REALIGNMENT

The Town of Gilbert allows for water mains 6 inches to 12 inches in diameter to be realigned per MAG Standard Detail 370. However, ACP line is not allowed in the Town of Gilbert. Water lines larger than 12 inches shall have all vertical realignments detailed by the Engineer on the construction plans and shall be subject to Engineering/Public Works Department Approval.

Vertical realignment by means of pipe deflection shall not exceed the pipe manufacturer's recommendations. Deflection angle information shall be given on the plans. Vertical realignment by means of bends and offsets shall be per MAG Standard Detail 370.

The vertical realignment shall be constructed of ductile iron pipe and shall not be deflected or swept. Air release valves and isolation valves will be installed as per the following:

- Install air release valves at localized high points where air entrapment or cavitation may occur. At pipe line terminations, fire hydrants can be used in lieu of air release valves, when approved by the Town staff.
- Do not place tees, fire hydrants, service lines, and other appurtenances within any portion of the vertical realignment unless approved by Town staff.
- Give special attention to vertical realignments on existing waterlines in order to avoid disruption to the distribution system.
- Separation from storm drains and culverts: Water mains shall maintain 6 feet horizontal and 2 feet vertical separation from storm drains and culverts.
- Water mains crossing less than 2 feet below a storm drain or culvert shall require additional protection such as the use of ductile iron pipe or concrete encasement per MAG Standard Detail 404-3.

7.8.3.8 COUPLINGS, JOINTS, GASKETS, AND FLANGES

Couplings, joints, gaskets, and flanges shall conform to Section 610.13 of the MAG Uniform Standard Specifications, unless otherwise approved.

7.8.3.9 RESTRAINED JONTS

1. Thrust Restraint: Joint restraint shall be used at all bends elbows, tees, crosses, dead ends, stubs, curb stops, fire hydrants, taps, valve locations on

large diameter water mains, etc where water flow changes direction or is stopped. The joint restraint limits shall be shown on the plan in the profile view. Restrained joint calculations shall be prepared and submitted when necessary keeping in mind that concrete thrust blocks are not to be considered in the calculations. Restrained joints are required at all bends, elbows, tees, crosses, dead ends, stubs, curb stops, fire hydrants, taps, valve locations on water mains where water flow changes direction or is stopped.

Joint restraints shall be clearly shown in profile sheets for water mains. Restraint lengths shall include stationing callouts at the beginning and end of each segment of pipe to be restrained.

When the water main is 30 inches or larger, the engineer shall submit joint restraint calculations and details to the Public Works Department for review and approval.

2. Thrust Block: Thrust Blocks will not be allowed for new construction on the Town's water system unless approved by the Town. In cases where a new system is being tied into an existing system with unknown joint restraint, thrust blocks may be used, per MAG Standard Detail 380 for water mains that are 6 inches through 16 inches in diameter.

7.8.3.10 ADDITIONAL REQUIREMENTS FOR TRANSMISSION MAINS

The Public Works Department must approve the location of outlets or tie-ins to existing or proposed transmission mains. In general, service connections to existing or planned transmission mains constructed of concrete-cylinder pipe (CCP) or pre-stressed concrete cylinder pipe (PCCP) are prohibited.

Historically, water mains with diameters 16 inches and above consisted primarily of concrete-cylinder pipe (CCP) or pre-stressed concrete cylinder pipe (PCCP) and were considered transmission mains. Planned connections to existing CCP or PCCP mains will be evaluated by the Development Services Department on an individual basis.

Access manholes shall be installed on 42 inches diameter and larger transmission mains on each side of line valves and spacing shall not exceed 2600 feet unless otherwise approved.

The contractor is responsible for backfilling and replacing pavement in all public street excavations per Town of Gilbert requirements.

7.8.3.11 DEAD-END WATER LINES

The Public Works Department must approve the location of dead-end water lines.

Whenever possible, temporary dead-end waterlines must be extended beyond paved surfaces to avoid pavement cutting at time of future connection and must be equipped with a flushing pipe assembly installed out of traffic per MAG Standard Detail 390, Type A.

Dead-end water mains are to supply no more than 25 water services. Developments containing 26 or more services require at least two different water supply sources. The Development Services Department may require multiple water supply sources for non-residential developments with high domestic or fire flow demands.

A gate valve must be installed on every dead-end waterline between the last fitting and the flushing pipe assembly at the terminus of the waterline. The minimum distance between the gate valve and the flushing pipe assembly shall be 20 feet.

7.8.3.12 WASH CROSSING

All wash crossings will be constructed using restrained joint ductile iron pipe. Bury requirements to place water lines under washes or channels shall be based upon the 100-year peak design discharge (Q100) in the channel or wash. The additional depth of bury shown below is in addition to the normal cover requirements.

TABLE 7-18: WASH CROSSING DEPTH OF BURY

100 year flow rate	Additional depth of cover
1 to 49 cfs	1 foot
50 to 99 cfs	2 feet
100 to 499 cfs	3 feet
More than 499 cfs	Scour depth based on scour analysis required

- Scour depth shall be estimated using Arizona State Standard Attachment (SSA) 5-96, Guideline 2, Level I, as published by the Arizona Department of Water Resources. The engineer will estimate the depth of scour and design the top of pipe to conform to Section 6-1.413. The engineer shall submit the scour analysis with the final plans.

- All pipelines that must be located within the scour zone, or with less than the minimum required depth of bury as indicated above, may require additional protection against scouring at the discretion of the Town. Water mains in easements at wash crossings shall not locate appurtenances such as manholes, fire hydrants, or valves within the 100-year flood elevation of the wash.

7.8.3.13 CORROSION PROTECTION

Installation of ductile iron pipe requires Polyethylene Corrosion Protection per Section 610.5 of the MAG Uniform Standard Specifications, or as specified by the Town.

A corrosion monitoring system shall be installed on concrete cylinder water mains. Ductile iron pipe and fire hydrants shall also be isolated from the concrete cylinder water main by the use of flange isolation kits equipped with test leads for monitoring purposes.

Concrete cylinder water transmission lines shall be designed and installed to

provide for future cathodic protection. Continuity tests shall be conducted and certified by a qualified corrosion-engineering firm employed by the developer or their representatives.

The brass corporation stop and the end of any concrete cylinder water pipe shall be coated with a protective coating prior to backfill.

Tapping sleeves shall incorporate a flange isolation kit between the tapping sleeve and the cast iron valve.

7.8.3.14 EASEMENT WIDTH

Water lines located outside of public right-of-way shall be installed in a minimum 12-foot wide dedicated water line easement. The easement shall be accessible from public right-of-way, free of obstruction and accessible at all times to Town service equipment.

- 8 inches and smaller: Minimum 12 foot dedicated easement or as otherwise required by the Town
- 12 inches: Minimum 15 foot typical dedicated easement or as otherwise required by the Town
- 16 inches and larger: Width based on design conditions or as otherwise required by the Town

The Town staff may require additional easement width if in their opinion excessive laying depth of the pipe would require the additional width for maintenance purposes.

7.8.3.15 EASEMENT DEDICATION

Water line easements or right-of-way dedication shall be through a Map of Dedication, Final Plat or separate instrument. Contact the Town for the best method for a particular project. All dedicated land shall be free of environmental contamination per ASTM E-1527 current requirement.

For water easements not located within a paved roadway or other paved access way, an all-weather access road is required if pipelines, valves, fire hydrants, or other appurtenance requiring Town access are located within the easement. The access road shall have a minimum width of 10 feet and shall be paved or constructed of minimum 6 inch thick stabilized decomposed granite. Each end of the access road shall connect to a public street or private access way or a turn-around easement conforming to Town of Gilbert requirements.

7.8.4 Water Appurtenances

7.8.4.1 VALVES

The Town of Gilbert requires the installation of isolation valves to facilitate the operation, maintenance, and expansion of the water distribution system. The types

of valves required are dependent on the water main size. The Town has standardized the sizes, types and locations of the water valves, with the specifics discussed below. Gate valves required to control the operation of the water system shall be installed per Section 630.3 of the MAG Uniform Standard Specifications. Water line valves shall meet or exceed the pressure classification of the water line.

7.8.4.2 VALVE SPACING

Valve spacing shall be in accordance with the Maricopa County Health Code, and Town of Gilbert requirements:

- Maximum valve spacing on mains less than 12 inches in diameter is:
  - Maximum of 600 feet in industrial/commercial districts.
  - Maximum of 800 feet in residential areas.
- Maximum valve spacing on mains 12 inches through 16 inches in diameter is 800 feet.
- Maximum valve spacing on mains 20 inches or larger in diameter is one-half (½) of a mile.
- In residential developments valves shall be located so that a maximum of 30 single family dwelling units, or a maximum of 2 fire hydrants, or a maximum of 4 valves are involved in a water line shutdown.

Actual valve spacing will be less due to several variable conditions such as the location of street intersections, tees or branches, crosses, zone splits, phasing boundaries, etc. The actual valve location shall be as determined by the Town.

7.8.4.3 VALVE LOCATION

The Town of Gilbert requires valves to be installed on all feeder branches so that the distribution system can be segmented and a limited number of customers would be affected during a shutdown for maintenance or extension.

Valves are required on each branch of a cross or tee and in other locations as designated by the Town of Gilbert Development Services Department. In locations where adjacent tees or crosses are placed with no intermediate laterals or waterline connections, valves are not required at both locations.

- A valve shall be located on each side of a canal, wash, railroad, or freeway crossing.
- Avoid valve locations in curbs, sidewalks, driveways and valley gutters, bike lanes, and vehicle wheel paths.
- Provide a valve on each fire hydrant lateral and flange the valve to the tee.
- Provide a valve for all fire protection water supply connections in accordance

with International Fire Code and Town Amendments.

The preferred locations of valves shall be at the curb return of the intersecting street, or at a fire hydrant location.

7.8.4.4 VALVE TYPES

All valves 12 inches and smaller shall be resilient seat/wedge gate valves, epoxy coated inside per AWWA C-550. Valves 16 inches to 24 inches shall be double disc gate valves, epoxy-coated inside per AWWA C-550. Valves larger than 24 inches shall be butterfly valves per MAG Specification 630.5.

1. Gate Valves

   Resilient seat gate valves mounted vertically are required on water mains 12 inches in diameter or smaller.

   Resilient seat gate valves mounted in a vertical position are preferred for water mains that are 16 inches and larger. If clearances do not permit the installation of the valve stem and 2 inch square operating nut to be installed vertically, a horizontally-mounted gate valve or butterfly valve may be used. In general, all gate valves shall be direct-buried and shall not be located in vaults.

   All gate valves shall conform to Section 630.3 of the MAG Uniform Standard Specifications, with the following exceptions:

   - Bypass valves are not required on gate valve assemblies, regardless of size;
   - Due to the rigidity of the joint, valves shall not typically contain flanged ends.
   - All valves require a minimum clearance of 24 inches from top of valve nut to finish grade.
   - Valve blocking details or requirements shall be provided for all valves greater than 12 inch in diameter.

2. Butterfly Valves

   Butterfly valves are approved for installation on water mains, 16 inches and larger in diameter in which a resilient gate valve cannot be installed.

   At the discretion of the Public Works Department, butterfly valves with vaults may be used on water mains that are larger than 24 inches in diameter. When not in a vault, provide minimum 24 inch clearance to top of valve from finish grade.

   The engineer is required to coordinate with the contractor the submittal of certified shop drawings to the Town of Gilbert Public Works Department for review and approval prior to the shipment of the butterfly valves.

All butterfly valves shall conform to Section 630.5(A) of the MAG Uniform Standard Specifications.

3. Tapping Sleeves and Valves

   Tapping sleeves and valves (TS and V) are to be installed per MAG Standard Detail 340, which covers the installation of taps on existing 6 inch through 16 inch water mains.

   Tapping sleeves and valves are not allowed for connection of same size pipes. In this case, a new tee must be installed and cut into the existing pipe.

   A tee is preferred over a tapping sleeve and valve if the tapped water main can be shut down with no service disruption.

   Connections to existing asbestos-cement pipe (ACP) should be made by cutting in a new section of ductile iron pipe with a ductile iron tee and proper joint restraint in lieu of a tapping sleeve.

   Reverse taps for new mains and services (taps to side of main away from project receiving tapped pipe) are strongly discouraged and require special permission from the Development Services Department.

   The engineer shall detail on the improvement plans all wet taps not addressed by MAG Standard Detail 340.

   The engineer, architect or designer is hereby notified that a contractor approved by the Town of Gilbert Development Services Department shall perform all wet taps on the Town of Gilbert public water system. A list of the currently approved contractors is accessible on the Town of Gilbert Engineering Services website.

   Tapping sleeves shall conform to Section 630.4 of the MAG Uniform Standard Specifications. A list of the currently approved stainless steel tapping sleeve and valve assemblies is accessible on the Town of Gilbert Engineering Services website.

4. Zone Inter-Tie Valves:

   Zone Inter-Tie valves between adjacent water service zones are not allowed.

5. Pressure Reducing Valves on Public Mains:

   Pressure reducing valves on public mains are not allowed unless approved in writing by the Development Services Department.

6. Pressure Reducing Valves - Private Systems:

   Pressure reducing or regulating valves are required to be installed on the customer side of the water meter, where the static pressure exceeds 80 psi or as required per the latest adopted Plumbing Code. Maintenance of the

pressure-reducing valve shall be the customer's responsibility.

7. Air/Vacuum Release Valves:

   Approved air valves, including air-release, vacuum and combination valves shall be installed on water mains with diameters 12 inches and above at all high points on the water line, and at additional locations as determined by pipeline surge analyses or as requested by the Development Services Department. A list of the currently approved air valve assemblies is accessible on the Town of Gilbert Engineering Services website.

   Air release valves will be installed at all changes in slope of water lines 8 inches or larger in diameter, as follows:

   - When water line changes from a positive slope to a zero slope, or a negative slope, in the primary direction of flow.
   - For vertical alignment changes to cross under or over another facility (such as other utilities, drainage washes, etc.).
   - Slopes on all water lines shall not be less than 0.002 ft/ft. No zero slopes in the waterline will be approved. In the absence of any changes in slope, air release valves will be installed only at high points.
   - All air release valves will be a combination air/vacuum release type, per Town of Gilbert Standard Detail GIL-360.

7.8.4.5 VALVE BOX AND COVERS

All water valves on the Town of Gilbert public water system are required to have a valve box, cover, and debris cap installed. All valve boxes and covers shall be installed per MAG Standard Detail 391-1, Type C. Valve covers shall be plastic "non-pop" type. Debris cap shall be per MAG Standard Detail 392.

Valve boxes adjacent to or within a storm water retention basin shall be located so that the bottom of the box shall be above the high water elevation for the required retention volume.

7.8.4.6 WATER SERVICES

Final plans shall indicate the water service, sewer service, and water meter location for each proposed development. For single family residential developments a typical lot layout indicating the water service, sewer service and water meter location in relation to the driveway will be required. Service lines and meter boxes will be located within public rights-of-way, or a public utility easement. Meters are to be accessible to Town workers at all times.

Service taps on a line which is primarily designed to service fire sprinkler systems and/or fire hydrants must be approved by Town staff. The fire line as well as each service connection requires its own backflow prevention device.

The Developer shall install all water services and meter boxes in new development projects. The Developer is responsible for application and payment of all applicable fees.

Water meter boxes shall be installed out of traffic and out of sidewalk ramps. Residential meter boxes are to be at the back edge of the sidewalk.

1. Metered Services:

    - Subdivision plans shall provide a typical water service location detail Where water services are being designed for isolated locations, provide stationing and offset to property line

    - Minimum water service size is 1 inch. For landscape use only water service size may be 3/4 inches.

    - Standard Water Meters (1 inch to 2 inch Meter Sizes): Water meters of these sizes require the installation of a water meter box and lid per Town of Gilbert Standard Detail GIL-310.

    - Large Water Meters (3, 4, 6, and 8 inch Meter Sizes): Meters of these sizes shall be installed in accordance with Town of Gilbert Standard Detail GIL-340-1 and 340-2.

2. Specialized Vaults (Pressure Relief/Sustaining):

    Where the installation of a valve or meter vault has been approved or required, the following guidelines shall apply:

    - Where possible, the vault should be located out of the pavement (i.e., behind the curb or sidewalk).

    - The engineer shall design and detail all necessary realignments of the waterline to accommodate the size of the vault including the adjusting rings, frame and cover on the access manhole.

    - When it is necessary for the vault to be installed within an existing or future paved public roadway, the top of the vault should be 3 feet below the finished pavement grade.

    - The engineer shall detail the vault installation on the improvement plans.

3. Water Services:

    Locate all water services either within dedicated right-of-way or public easements (PUE or PUFE).

    - The water service line and meter shall be sized based upon the total daily demands for the development and the recommended maximum capacity of the meter.

- That portion of the water service from the water main up to, and including the meter is public and will be maintained by the Town. That portion of the water service from the meter into the site is private and will be maintained by the property owner. Design of the private on-site portion of the water service shall comply with the current Plumbing Code and may require a pressure regulating valve.

- Service lines are necessary to meet domestic, fire, and irrigation demands. Residential fire sprinkler and irrigation demand is usually supplied through the domestic service line and meter. Commercial developments typically will use separate meters for building and landscape service and provide separate lines for fire protection.

- Final plans will show locations of service lines and meters to each unit referenced with stations and dimensions, or offsets, from the street centerline or monument line. Service lines and meter boxes will be located within a public rights-of-way easement within a private street tract, or a utility easement. Meters are to be accessible to Town workers and be located as close as possible to the water main.

- Do not place water service lines and meters in driveways, sidewalks, washes, or detention basins.

- Water services can be located in a "joint-trench" with natural gas services. Sanitary sewer services, as well as Non-Town utilities shall utilize separate trenches when located within dedicated right-of-way or public easements.

- Existing water and fire lines not used by a development shall be noted on the plans to be abandoned at the main by the contractor.

- Water service connections to transmission mains with diameters 30 inches and above are not allowed.

- Water services shall be perpendicular to the main and in a straight line between the meter and main, except if necessary at line end in a cul-de-sac.

- The Town of Gilbert has standardized service sizes that are acceptable for connection to the public water system.

- Service size shall be equal to, or one size larger than the proposed water meter size (i.e., a ¾ inch meter on a 1 inch service would be acceptable whereas a ¾ inch meter on a 2 inch service would not).

- Where a service size must be adapted for a different size water meter, there shall be approximately 48 inches in service piping on either side of the water meter box before a transition to a different size or material occurs.

- 1 inch through 2 inches water services shall be installed per Town of Gilbert Standard Detail 310.

- Water services larger than 2 inches in diameter on an existing public water main shall be installed via a wet tap per the "Tapping Sleeves and Valves" section above.

- Projects that require a 3 inch water service are required to install two 2 inch water services, which are manifolded.

- The water service size shall be noted on the improvement plans at all water service locations.

4. Water Meters:

   The Town of Gilbert requires that all service connections to the public water system be metered.

   - All water meters to be installed on the public water system shall be purchased from the Town.

   - Water meters are to be located within dedicated public right-of-way or easements and installed on or at the property or easement line in accordance with Town of Gilbert Standard Detail GIL-310.

   - Meters shall be located to avoid crossing back through the right-of-way or easement with a service line.

   - The engineer, architect, or designer shall provide on the improvement plans, the criteria used to determine the water service and meter size selected for use on the proposed project.

   - The water meter size shall be noted on the improvement plans at all water meter locations.

   - The designer shall provide on the improvement plans the address of the water meter. Submit a plan that shows the meter location(s) to the permit services section for addressing.

5. Water Meters for Multiple Units/Buildings:

   Projects that involve or will result in individual ownership of the land, unit or building are required to install a separate water meter for each building or unit thereof.

   For those projects that involve the subdivision of land that will result in individual ownership of land (i.e., condominiums, town homes, patio homes, etc.), may be served by one meter and service connection when the real property under ownership by multiple parties is governed by a homeowners' association or a unit owners' association.

For projects in which the property will remain under one ownership (i.e., apartments, residential duplex, etc.), the Town allows the use of one of the following options:

- Individual water meters to serve each unit;
- One meter to serve a single building and all units or suites contained within
- A "master meter" to serve the entire project site.

7.8.4.7 BACKFLOW PREVENTION DEVICES (BPD)

The Town of Gilbert is responsible for protecting the quality of the public water supply. To prevent contamination of the public water supply by backflow and cross connections, the Town has identified types of developments requiring backflow prevention, and approved types of devices to prevent backflow.

- Per MuniCode, Chapter 10, Article III the following types of backflow prevention devices are approved for installation on the Town of Gilbert water system:
  - Double Check Valve Assembly (DC);
  - Reduced Pressure Principle (RPP) Device;
  - Air Gap Separation (AG) Assembly
- All testing, maintenance and repairs to the backflow preventive devices shall be made at the water service customer's expense by a certified backflow prevention device tester approved by the Development Services Department. The initial testing and the required annual testing are the responsibility of the water service customer.
- Install a double check valve backflow prevention assembly at all fire protection water connections. The assembly shall be located within 150 feet of a fire hydrant that is connected directly to a Town waterline.
- The backflow prevention device location (if applicable) on the plans.
  - Devices shall be located outside the public right-of-way and PUEs.

Per MuniCode, Chapter 10, Article III, the types of developments presented in Table 7-19 require an approved backflow preventive device. The Town of Gilbert has identified the backflow prevention device for standard installation at each service connection.

TABLE 7-19: PREMISE AND SERVICE CONNECTIONS

Premise and Service Connections that Require an RPP or AG	
Aircraft and Missile Plants	Food Processing Plants
Automotive Plants	High Schools and Colleges
Interconnected Auxiliary Water Systems	Holding Tank Disposal Stations
Auxiliary Water Systems	Hospitals and Mortuaries
Beverage Bottling Plants	Medical and Dental Buildings, Sanitariums, Rest and Convalescent Homes
Breweries	Premises having separate irrigation systems
Buildings greater than three (3) stories or greater than thirty four (34) feet in height from curb level	Laboratories using toxic materials
Buildings with house pumps and/or a potable water storage tank	Manufacturing, Processing and Fabricating Plants using toxic materials
Buildings or properties with sewage ejectors	Motion Picture Studios
Canneries, Packing houses and Reduction Plants	Oil and Gas Production Facilities
Car Washes with a water reclamation system	Paper and Paper Production Plants
Centralized Heating and Air Conditioning Plants	Plating Plants
Chemical Plants	Private Fire Lines with Hydrants
Chemically Treated Potable or Non Potable Water Systems	Radioactive Materials Processing Facilities
Civil Works	Rubber Plants Restricted, Classified or other closed facilities
Commercial Laundries	Sand and Gravel Plants
Dairies and Cold Storage Plants	Service Connections for Multiple Tenants
Dye Works	Sewage and Storm Drainage Facilities
Film Processing Laboratories	Shell Buildings
Fire Hydrant Meters	Premises where a cross connection is maintained

Portable water hauling equipment such as water trucks, hydraulic sewer cleaning equipment and pesticide rigs are forbidden connection to the public water system unless the rig is equipped with an Air Gap per Town of Gilbert Requirements.

Any development where water supplied by the Town is subject to deterioration in sanitary quality and its entry into the public water system is possible, shall properly install an RPP Device at the meter.

7.8.4.8 FIRE HYDRANTS

All new fire hydrants are required to be "dry-barrel" type hydrants. Fire hydrants shall comply with the International Fire Code and Town Amendments and be located in the public rights-of-way or in dedicated water line easements for private development. Separate types of fire hydrants are required in single family

subdivisions and commercial and multi-family developments.

Fire hydrants in the public rights-of-way, public easement, or on public properties shall be installed per MAG Standard Details 360 and 362.

- Isolation valves for public fire hydrants shall be placed directly on the distribution or transmission main tee.
- Maximum fire hydrant spacing is 500 feet as measured along the fire truck travel path. Actual spacing may be less due to several variables, such as intersections, etc., spacing will be as determined by the Town.
- The normal location of fire hydrants is the northeast corner of public street intersections.
- Gilbert fire hydrants not in Gilbert right-of-way shall be in PUE or PUFE extending a minimum 5 feet beyond the hydrant.
- Fire hydrants shall have 3 foot flat clear zone, and shall not be located in retention basins.

The Fire Marshal shall make the determination regarding fire hydrant spacing, flow, and pressure requirements where special fire protection conditions are warranted

7.8.4.9 FIRE HYDRANT SPACING

The spacing of fire hydrants shall comply with the International Fire Code and Town Amendments and is to be measured along the street or roadway in which a fire hose would be laid. Generally, this spacing is measured along the curb line.

TABLE 7-20: FIRE HYDRANT SPACING

Description	Spacing *
Single Family Residence	500 ft. maximum spacing
Cul de Sacs	250 ft. maximum spacing
Two-Story Townhouses and Apartments	300 ft. maximum spacing
Business and Industrial	300 ft. maximum spacing (including shopping centers), but at least 1 hydrant per 100,000 sq. feet of coverage
Arterial/Collector without Frontage Structures and with Medians	500 ft maximum spacing
Arterial/Collector without Median	1,000 ft. maximum spacing

**Refer to the International Fire Code and Town Amendments for fire hydrant spacing with the installation of automatic fire sprinkler system.*

- Locations: Fire hydrants to have 3 feet clearance on all sides and a maximum of 8 feet from face of curb. Offsets from the street monument line shall comply with MAG Standard Detail 362.

- Use as Air Release: Fire hydrants shall be used at the end of the dead-end water lines on 12 inch and larger as an air release mechanism and installed using a tangential tee.

- Private Fire Protection Water Supply Systems: On private property, the fire hydrant shall be contained within a dedicated waterline easement or right-of-way. Fire hydrants not in dedicated easement or right-of-way are considered private and shall comply with the International Fire Code and Town Amendments

- Pavement Markers: All fire hydrants shall be clearly identified by installation of reflective blue markers in accordance with Town of Gilbert Standard Details.

7.8.4.10 FIRE SYSTEMS/FIRE LINES

Fire systems shall have the following backflow prevention devices shown in Table 7-21 below.

TABLE 7-21: FIRE SPRINKLER SYSTEMS AND BACKFLOW DEVICES

Type of System	Backflow Device Required
Fire sprinkler systems connected to potable water system only. No tanks or reservoirs. No additives of any kind. In-line booster pumps are OK	Check Valve* and **
Fire Systems with a Storage Tank	Reduced Pressure Principle (RPP)***
Fire sprinkler systems connected to an auxiliary water supply or with FDCs within 1700 feet of an auxiliary supply	Reduced Pressure Principle (RPP)***
Fire Systems with Chemical Additives	Reduced Pressure Principle (RPP)***

** Not required if the entire sprinkler system is constructed with potable water materials.*

*** Double Check Assembly will be used for fire system to buildings greater than 3 stories high*

**** This RPP is to be installed on the fire line outside of the building not on the riser*

- Per 8-1-3 (A) of the Gilbert Town Code, backflow prevention devices shall be installed at the service connection(s) in an accessible location. All backflow assemblies shall be installed above ground. Installation in a vault is prohibited.

- Single check valves and Double check valves on Fire Systems shall be installed on the fire riser. Reduced pressure principle devices shall be installed per Town of Gilbert Standard Detail GIL-350 and GIL-351 depending on the device size.

- The backflow prevention device should be located as close as possible to the water meter.

- Backflow prevention devices that are adjacent to a storm water retention basin shall be installed so that the bottom of the device is located above the high water elevation of the required retention volume.

- The size of the backflow prevention device shall be equal to, or greater than, the size of the water meter.

- On the improvement plans, the designer shall provide the address of the backflow prevention assembly. The designer shall submit a plan showing the assembly location(s) to the Permit Services Section.

- Termination of Public Water Mains: The Town requires the use of a curb stop and flushing pipe at the permanent or temporary terminus of all public water mains under 12 inches in diameter. If a water main 12 inches or larger is terminated, it must have a fire hydrant installed at the end of the line.

- A minimum of one pipe length is required beyond a fitting prior to the installation of the curb stop.

- Curb stops with flushing pipe per MAG Standard Detail 390 Type A may be used on projects where the termination is temporary, such as residential, phased condominiums or townhouse projects.

- Curb stops with flushing pipe per MAG Standard Detail 390 Type B shall be used on projects where the termination is considered more or less permanent, such as at the boundary of a subdivision or at the end of the public water line within a street cul-de-sac.

7.8.4.11 FIRE LINES AND BUILDING SPRINKLER LINES**:**

Water lines that are designed to solely provide water supply to a fire sprinkler system, also known as fire lines, from the public water system shall be installed with a shutoff valve.

- Fire line sizes shall be determined based on flow test data provided by the engineer for design of the project.

- Show all fire lines on the civil site final plans.

- Fire service lines shall be installed perpendicular or radial to the main line within the right-of-way or easement.

- All on-site fire line construction shall comply with the MAG Standard Specifications and Details and the Town of Gilbert Supplements.

Private fire lines with hydrants are private pipe systems connected directly to the Town water system. Private fire lines, by the nature of their function and use, are susceptible to backflow. Consequently, they are subject to the requirements for backflow prevention within this manual. See Section 7.8.4.7 and Section 7.8.4.10 for information regarding cross-connection devices that are required to be installed on fire lines.

7.8.4.12 REMOVAL OF ABANDONED WATER LINES

Existing public water lines that have been abandoned either by the Town of Gilbert or utility provider that are adjacent to or within the boundaries of the proposed project are required to be removed in their entirety within the limits of the project. Gilbert prefers trenchless technology (i.e., pipe pulling) for the replacement in the same location of a smaller diameter service line by a larger diameter service line. In general, abandoned waterlines located under paved roadways are allowed to remain in place.

Engineer, architect or designer shall identify the size; location and material of all abandoned waterlines and provide construction notes to the contractor regarding safe removal and disposal.

Removal and disposal of Asbestos Cement Pipe (ACP) shall be in accordance with the Policy Statement for Removal and Disposal of Asbestos Cement Pipe in the Town of Gilbert, Arizona; Revised September 29, 1999. Copies of this policy statement are available on the Town of Gilbert Engineering Services website.

7.8.5 Water System Materials

7.8.5.1 PIPE MATERIALS

All pipe for public water lines shall be in accordance with Section 610.3 of the MAG Uniform Standard Specifications, except as modified below.

- Water lines; 6 inches to 12 inches:
  - Ductile Iron Pipe (DIP) cement mortar lined, per MAG Standard Specification 750 with polyethylene corrosion protection per MAG Standard Specification 610.5.
  - Polyvinyl Chloride (PVC) pipe is an acceptable pipe material for public water main installations. PVC water pipe shall conform to the requirements of AWWA C900 and shall be a minimum pressure class 235 PSI (DR 18) (FM Approved For 150 psi). All PVC pipe used for potable applications shall meet the requirements of ANSI/NSF 61.
- Water lines larger than 12 Inches:
  - Ductile Iron Pipe (DIP) that is cement mortar lined and seal coated. Pipe is per MAG Standard Specification 750 with polyethylene corrosion protection per MAG Standard Specification 610.5.
  - Concrete Cylinder Pipe (CCP) shall be designed, manufactured and tested in accordance with AWWA C-303. Pipe must also comply with MAG Standard Specification 758.
  - Polyvinyl Chloride (PVC) pipe for larger than 12 inches is not an acceptable pipe material for public water main installations or extensions to the Town of Gilbert public water system.

  - Prestressed Concrete Cylinder Pipe (PCCP) is acceptable for water mains with diameters equal to or greater than 42 inches, and shall be designed, manufactured and tested in accordance with AWWA C-301. Pipe must also comply with MAG Standard Specification 758.

- Service connections for meters
  - Less than 4 inches shall use copper
  - 4 inches and greater shall use DIP
- Electronic Marker
  - Tracer wire shall be placed above all public water lines.

All other pipe materials shall be considered on a case-by-case basis. Projects desiring to utilize a different pipe material shall provide an analysis report providing the justification for the desired material during the plan review process.

7.8.5.2 CORROSION PROTECTION

Installation of Ductile Iron Pipe requires Polyethylene Corrosion Protection per Section 610.5 of the MAG Uniform Standard Specifications, or as specified by the Town.

- A corrosion monitoring system shall be installed on concrete cylinder water mains. Ductile Iron Pipe and Fire Hydrants shall also be isolated from the concrete cylinder water main by the use of flange isolation kits equipped with test leads for monitoring purposes.
- The brass corporation stop and the end of any concrete cylinder water pipe shall be coated with a protective coating prior to backfill.
- Tapping sleeves shall incorporate a flange isolation kit between the tapping sleeve and the cast iron valve.
- Concrete cylinder water transmission lines shall be designed and installed to provide for future cathodic protection. Continuity tests shall be conducted and certified by a qualified corrosion-engineering firm employed by the developer or their representatives.

7.8.5.3 COUPLINGS, JOINTS, GASKETS AND FLANGES

Couplings, Joints, Gaskets and Flanges shall conform to Section 610.13 of the MAG Uniform Standard Specifications, unless otherwise approved.

7.8.5.4 RESTRAINED JOINTS

Restrained joints are required at all bends, elbows, tees, crosses, dead ends, stubs, curb stops, fire hydrants, taps, valve locations on large diameter water mains, etc where water flow changes direction or is stopped.

Acceptable restrained joint systems include the following:

- Ductile Iron Pipe (DIP) joint restraint shall comply with MAG Standard Detail 303-1. Deviations from restrained lengths presented in MAG Standard Detail 303-2 must be supported by engineering calculations and accepted by the Development Services Department prior to construction.
- Restraining joints with tie rods per MAG Standard Detail 302.
- All restrained fittings shall be protected from corrosion by encasement in a polyethylene (Polywrap) wrapping and installed per MAG Specification 610.6.3.
- Retainer glands of the "Megalug" Series 1100 or approved equal are acceptable. Retainer glands utilizing setscrews are not acceptable.
- Mechanical restraining systems such as Pacific States lock mechanical joint, Clow Super-lock joint, US Pipe TR-Flex Gripper ring, American Lock-ring restraining joint, Griffin snap-lock restraining joint, TUF-Grip by Tyler Union, StarGrip by Star Pipe Products, or other approved equals as determined by the Town Engineer.
- Flanged type restraining for above ground piping or piping within a vault.
- Continuously welded joints with variable pipe cylinder thickness for Concrete Cylinder Pipe water mains.

7.8.5.5 FIRE HYDRANT ACCEPTABLE MATERIALS, MANUFACTURERS AND MODELS

Fire hydrants shall meet or exceed AWWA Standard C502 latest revision and listed by Underwriters Laboratories, Inc. and have Factory Mutual Research Approval.

Fire hydrants shall be manufactured with two 2-½ inch nozzles and one 4-½ inch pumper nozzles with National Standard Threads. All nozzles shall be constructed to be mechanically locked in to the hydrant body and capable to rotate 360 degrees.

- Fire hydrant shall be a Traffic Model design, with safety flanges and steel stem coupling. The nozzle section must rotate 360 degrees.
- Fire hydrant shall be manufactured with a main valve opening of 5-1/4 inches. Main valve seat ring shall be bronze and threaded into a bronze seat ring.
- Fire hydrant shall be a Traffic Model design, with safety flanges and steel stem coupling. The nozzle section must rotate 360 degrees.
- Fire hydrant shall be constructed having an "O" ring sealed lubrication reservoir.
- Fire hydrant connection shall be 6 inch inlet with a mechanical Mega-lug

Restraint connection. Fire hydrant direction of opening shall be counter clockwise.

- Fire hydrant operating nut: 1-1/2 inch pentagon measured from point to opposite flat at base of nut.
- Fire hydrants shall have a depth of bury of 3-1/2 feet.
- External surfaces above grade shall be factory coated with an epoxy primer and a two-part polyurethane top coating. Fire hydrant shall be painted Safety Yellow.
- Fire Hydrants shall be configured with bronze-on-bronze seating.
- Fire Hydrant shall be designed with a ductile iron body to withstand 250 psi working pressure and tested to 500 psi Hydrostatic pressure.
- The Town has standardized the manufacturers and models that are allowed to be installed where the Town of Gilbert provides, or intends to provide fire protection services. The Town of Gilbert Development Services Department reserves the right to change or amend the list of approved fire hydrants without advance notice or publication.
- The Town of Gilbert is not responsible for the maintenance and/or removal and replacement of private fire hydrants.
- The Town of Gilbert Fire Department shall be notified of properties that have private fire hydrants that are beyond the maintenance responsibilities of the Town of Gilbert.

Refer to Town of Gilbert Supplement to MAG Standard Specifications for approved fire hydrant manufacturers. This list will be periodically updated by the Town of Gilbert.

7.9 FINAL WATER PLAN REQUIREMENTS

Construction Plan Submittal Requirements for the preparation of final plans in the Town are described in Chapter 2.0.

1. Show all existing utility locations, sizes, easements, rights-of-way, and other structural features of the water line.
2. A key map with the following information:
    - All streets, alleys, easements, tracts and parcels
    - Existing water system including fire hydrants and valves in and around the development
    - Proposed water system including fire hydrants and valves

- Pipe sizes

3. Note all jurisdictions in which the project is located, including City, State, and County. It is the contractor's responsibility to acquire the appropriate permit.

4. Phase limits and phase numbers if applicable.

5. Match lines and sheet references must be shown on each sheet with stations. Paving match lines may not always work.

6. Phase limits and numbers must be shown on all applicable sheets. Phase lines are to follow lot lines where possible.

7. All existing water lines and all existing fire hydrants (within 350 feet) must be shown with dimensions to the centerline of the street.

8. All water lines proposed by adjacent projects shall be shown and dimensioned.

9. Station water lines along the centerline of the street or the pipe. Profile all water lines 12 inches and larger with slope and invert elevation depicted. Show in profile the finish ground elevations over the water line where the water line is constructed outside of paving, or show in profile the finish pavement design elevations where the water line is constructed under paving.

10. Where water lines cross sewer lines, storm drains, or drainage culverts, show the relationship in both plan and profile with minimum clearances dimensioned. Identify all pipes, valves, and appurtenances, etc.

11. No permits for public water line construction will be issued until the owner or engineer has provided the necessary easements and rights-of-way. The instruments of dedication must be approved and submitted to the Town for recording at the Maricopa County Recorder's Office.

7.10 SUBMITTAL CHECKLIST

The latest version of the Water Distribution and Transmission System Checklist can be found on the Town of Gilbert Engineering Services website. This Checklist will be periodically updated by the Town of Gilbert. At the time of the publication of these Standards it was as follows:

1. Water lines shall comply with AWWA standard PVC C-900 DR18 (or DR14). Rieber sealing system gasket joint is recommended and preferred.

2. All fittings and valves shall be "mechanical joint" type, except as shown on Town of Gilbert Standard Detail GIL-320.

3. Pipe bedding for PVC C-900 shall conform to Town of Gilbert Standard Detail GIL-302.

4. Valve spacing as per Town of Gilbert requirements. Water plans shall show

distances between all fittings. This will be required to obtain approval of Record Drawings.

5. A note is required on the Plans: "The contractor shall be required to install a night tie-in for any new water line that will affect existing services sufficient to warrant same in the opinion of the Town of Gilbert Off-Site Inspector" (This note could be placed on the cover sheet).

6. A note for the contractor to install a temporary plug or valves on a section of new line is required to test lines before connecting to existing water system where there is no valve on the end of existing line.

7. All services to lots shall run parallel with the lot line to the main. Minimum six-foot spacing between sewer, reclaimed water and water services. In no case shall services or meter boxes be located under or in driveways. Services shall be placed at a maximum of 3 feet from the property line.

8. New waterlines shall be designed with adequate valving to allow for future extensions of waterline without loss of service to water customers.

9. Gas lines shall not be permitted in the same trench or public utility easement (PUE) that contains any water mains. All gas services are to be installed in a separate trench.

10. Fire hydrant locations and spacing shall be as determined by Town Fire Department and Engineering Department. Hydrants are to be on same side of street as the water main. Distance between hydrants in residential areas not to exceed 500 feet. In commercial/industrial areas hydrant distance should not exceed 350 feet from buildings and not exceed 660 feet of hose lay between hydrants.

11. Typical placement of water mains is shown in figures in Chapter 4 of these standards on the east or north side of streets. Where meandering walks are used, the water mains shall be placed 1 to 2 feet behind the curb and gutter.

12. Valves on dead end water lines shall be placed to cause the least amount of inconvenience to existing services when the line is extended. If the valve is to be placed near the end of the stub, there should be at least 2 full joints of pipe between the valve and the plug for lines 12 inches and larger. One full joint should be installed between valve and plug for lines smaller than 12 inches.

13. Fire hydrants will normally be required at the end of all "Dead End Lines."

14. Twelve-foot "exclusive water line easement" is required for all water lines that will be installed on private property or private streets. Water main "shall" be centered in the easement.

15. Call out the number of the MAG Standard Detail Numbers for Meter Boxes and Covers in the list of quantities

16. All commercial/industrial projects shall be equipped with a "Backflow

Prevention Device" for the fire sprinkler line.

17. All commercial, or industrial, or manufacturing or processing facility shall provide for "Reverse Pressure Backflow Device" per Town of Gilbert Standard Detail GIL-351.

7.11 GENERAL NOTES

The latest version of Water Distribution and Transmission System General Notes can be found on the Town of Gilbert Engineering Services website. These Notes will be periodically updated by the Town of Gilbert. At the time of the publication of these Standards they were as follows:

1. All construction shall be in accordance with current MAG Specifications and Details with the Town of Gilbert's additions and deletions.

2. Water lines shall comply with AWWA standard PVC C-900 Class 235. Rieber sealing system gasket joint is recommended and preferred. Pipe bedding for PVC C-900 shall conform to Town of Gilbert Standard Detail GIL-302. All fittings and valves shall be "mechanical joint" type, except as shown on Town of Gilbert Standard Detail GIL-320. All water lines to be properly restrained using joint system such as: Megalug or an approved equal.

3. The Town Engineer shall be notified 24 hours prior to starting the different phases of construction for scheduling inspections.

4. Acceptance of the completed right-of-way improvements will not be given until Record Drawings have been submitted to and approved by the Town Engineer.

5. Location of all water valves must be referenced at all times during construction and made available to the Water Distribution Division. Only Town employees are authorized to operate the valves and fire hydrant connections to the Town's water system.

6. Any work performed without the approval of the Town Engineer and/or all work and materials not in conformance with the specifications is subject to removal and replacement at the contactor's expense.

7. The contractor will uncover all existing lines being tied into to verify their location prior to trenching. The contractor will locate or have located all existing underground pipelines, telephone and electric conduits, and structures in advance of construction and will observe all possible precautions to avoid damage to same. Call Arizona 811, Blue Stake Center at (602) 263-1100 and notify SRP.

8. All valves shall be gate type, unless otherwise noted, and open counter clockwise. Water valves shall be Mueller, Clow, Waterous or approved equal.

9. Summits in water lines shall be located at fire hydrants.

10. Backfilling shall not be started until lines are approved by the Town Engineer's

Representative.

11. All backfill for water lines shall be per Town of Gilbert Standard Detail GIL-302. All pavement and surface restoration shall be per Town of Gilbert Standard Detail GIL-270.

12. The contractor shall obtain all necessary permits prior to construction.

13. The Town of Gilbert is not responsible for liability accrued due to delays and/or damage to utilities in conjunction with this construction. Also, the Town will not participate in the cost of construction or utility relocation.

14. Ordinance #1437, approved by the Town Council in October 2002, states: No construction water from fire hydrants shall be used on parcels or lots of ten acres or more in size. For more information, the ordinance is located on the Town of Gilbert website. To obtain construction water, the contractor is required to make application with the Public Works Water Division. A security deposit is required to receive a fire hydrant meter. The Town reserves the right to specify the time and location that construction water can be delivered.

15. Water services shall be installed in accordance with the Town of Gilbert Standard Detail GIL-310.

16. Fire hydrants shall be per Town of Gilbert Supplement to MAG Standard Specifications or approved equal and installed per Town of Gilbert Standard Detail GIL-320. Fire hydrants shall be 3 feet 6 inch depth of bury. Adjustments in grade shall be done using "Gradelok" offset. Extensions on fire hydrants will not be permitted. A black, heavy duty bag with a "tie down" shall be placed over all new hydrants and maintained until the system has been approved by the inspector.

17. Traffic control shall be per the 2009 Edition of the Manual on Uniform Traffic Control Devices handbook and Town of Gilbert Standard Details.

18. The Town Inspector will determine the number and location of the required compaction tests. The contractor/developer will notify the testing lab, and pay the costs to perform the tests.

19. The Town will not accept water lines with less than 3 feet of cover.

20. A minimum of six-foot horizontal spacing between water mains, sewer, reclaimed water, and water services shall be maintained.

21. Prior to final approval and acceptance of the work the developer/contractor will be required to clean and repair adjacent (off-project) roadways used during the course of their construction.

22. A 2" x 4" stake (painted blue) shall be set one foot behind each water service. All 2" x 4" stakes marking water services shall be 5 feet in length and firmly set into the ground to a depth of 3 feet.

23. All backflow prevention devices shall meet the requirements of the Town of Gilbert Backflow Protection Ordinance (#869), otherwise known as Article 7-14 of the Town of Gilbert Municipal Code: Cross Connection Control.

24. All backflow devices shall be tested by a State Certified Backflow tester and test results forwarded to the Town of Gilbert Backflow Specialist. The Town will provide an up-to-date list of certified testers from which to be selected. Tester fees will be at the expense of the installer.

NOTE: A Town of Gilbert permit is required for the installation of any landscaping or irrigation system. Irrigation lines must be inspected before backfilling. Record Drawings are also required.

Use the following table for meter boxes and meter box covers:

MAG Standard Details		
Meter Size	**MAG Std Detail**	**MAG Std Box No**
¾"	#A6000485*	#A6000484*
1"	#A6000485*	#A6000484*
1 ½" to 2" Pedestrian Rated	#P6001854X12	#A6001852-H2
1 ½" to 2" Traffic Rated	#A6001640PCX12	#A6001947T-H2

**Armorcast Products Company or DFWA2C-12-1A DFW plastic Company; cover with hole for touch pad.*

25. Water main Chlorination: Calcium Hypochlorite shall be added to all new water mains/fire lines for disinfection per the following:

    12 inch mains - .35 lbs. or 5.6 oz. per 100 feet of pipe

    8 inch mains - .12 lbs. or 1.92 oz. per 100 feet of pipe

    6 inch mains - .08 lbs. or .48 oz per 100 feet of pipe

26. All water meter registers furnished to, or installed in the Town of Gilbert, Arizona shall conform to the following specifications.

    - All registers shall have an encoded output and utilize Sensus Protocol. Registers will have electronic touch read capability and be entirely compatible with current Town of Gilbert meter reading equipment.

    - Register resolution for meter size shall be as follows:

Register Resolution		
Meter Size	**(Gallons)**	**Meter Type**
3/4"	1,000	Multi-jet or Single-jet
1"	1,000	Multi-jet or Single-jet
1-1/2" thru 10"	1,000	Single-jet

- All meters shall meet AWWA new meter test standards.

Water and sewer service installation specifications are depicted in the Town of Gilbert Standard Details (300 and 400 Series)

7.12 FIGURES

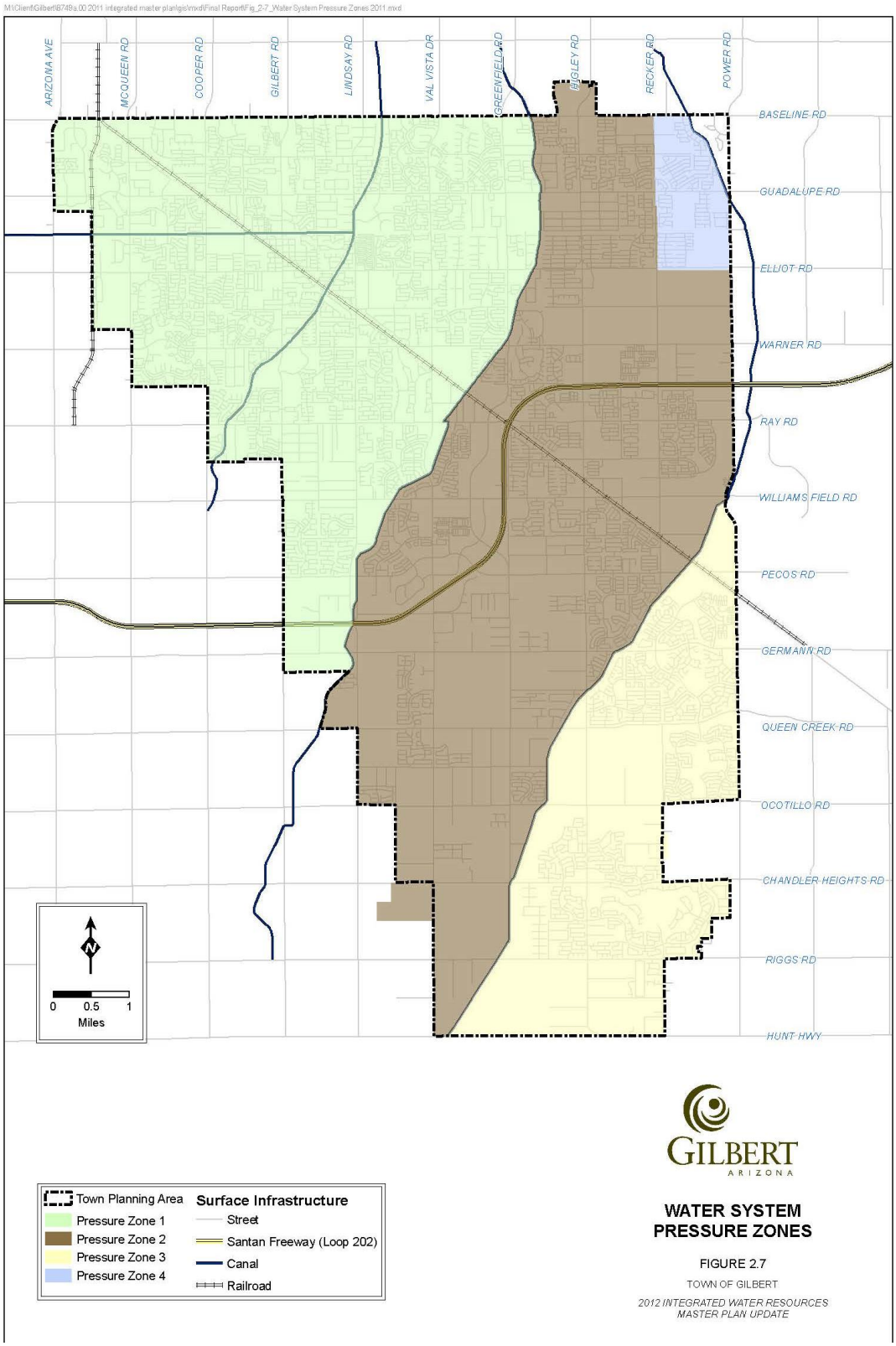


FIGURE 7-1 WATER SYSTEM PRESSURE ZONES

8.0 WASTEWATER COLLECTION AND TREATMENT SYSTEMS

8.1 GENERAL INFORMATION

The purpose of this chapter is to present a consistent engineering approach for the minimum criteria for design of a public wastewater collection system. This chapter is intended for the use in planning, design, plan preparation, and the plan review process. The information put forth in this chapter is not intended to cover all situations that arise, nor may it be a substitute for sound engineering principles.

8.2 WASTEWATER MASTER PLAN

The Town of Gilbert currently uses the most recent version of the Integrated Water Resources Master Plan (IWRMP) report. At the time this manual was updated, the most recent version of the IWRMP was prepared by Carollo Engineers in 2012.

The current version of the Integrated Water Resources Master Plan can be obtained by making a public records request to the Town Clerk's Office.

8.3 SEWER SERVICE AGREEMENT

All sewage collection systems must obtain a General Aquifer Protection Permit from ADEQ prior to construction of sewer infrastructure. The first phase is for construction authorization. The engineer shall submit to ADEQ a Notice of Intent to Discharge for a Sewage Collection System, Sewage Collection System Capacity Assurance form (if applicable), and Sewage Treatment Facility Capacity Assurance form and applicable fee. ADEQ will review the NOI and the supplemental information to verify that the applicant has submitted all required documents. Refer to ADEQ website for further information and applicable forms.

The Engineering Division of the Town of Gilbert will issue a letter to Maricopa County Environmental Services Department acknowledging that the Town of Gilbert has adequate capacity in the public sanitary sewer system to serve the proposed development. The Engineer shall submit the request for the acknowledgement letter to the Gilbert Engineering Division. Development of this letter shall be contingent upon the information provided in the Preliminary Sewer Report.

8.4 AVAILABILITY OF TOWN OF GILBERT SEWER

Questions pertaining to the availability of public sewer service from the Town of Gilbert should be directed to Development Services. Questions regarding system expansion or extension requirements to serve proposed new projects may also be directed to the Development Services.

8.5 TOWN CODE

Various Town Codes apply to the development of the Municipal Wastewater System including, but not limited to Chapters 10, 30, 33 and 66 of the Gilbert Municipal Code of Ordinances which contain information regarding the development in association with land development.

An electronic version of the Town of Gilbert Municipal Code can be referred to on the Town of Gilbert website.

8.6 TOWN STANDARDS

Developers are required to install, all improvements necessary to provide wastewater service to their development. This includes any sanitary sewer lines, lift stations, force mains, or other facilities, and the payment of all required development fees.

Developers must also adhere to the Town's standards for extension of the Town's wastewater system to newly developed areas and subdivisions inside the Town's service area.

8.7 FEDERAL, STATE, AND COUNTY REGULATIONS

8.7.1.1 EPA REGULATIONS

The U.S. Environmental Protection Agency (EPA) requires the Town to develop and implement a program to control discharges that might harm the Publicly Owned Treatment Works (POTW). The program establishes local discharge limits for nonresidential users, and provides a permitting process based on the users' discharges and types of businesses. Specific information may be obtained by calling the Development Services Department.

8.7.1.2 ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY (ADEQ)

Engineering Bulletin No. 10, "Guidelines for the Construction of Wastewater Systems" published by the Arizona Department of Environmental Quality (ADEQ), and Arizona Administrative Code, "Title 18 - Environmental Quality," contain specific requirements for submittals, approvals, and notifications when extension of a public sanitary sewer line is proposed.

8.7.1.3 MARICOPA COUNTY ENVIRONMENTAL SERVICES DEPARTMENT (MCESD)

Maricopa County Environmental Services Department (MCESD) is required to review and approve all public sanitary sewer line extensions and construction of wastewater related facilities within the Town's service area, prior to the Town approving the final plans.

As stipulated by the Maricopa County Health Code, all sewage systems including the installation of septic tank systems require an "Approval to Construct" document, which is issued by the MCESD.

Maricopa County also requires a Sewer Service Agreement be executed by the Town of Gilbert for all industrial and residential subdivisions including condominiums.

8.8 DESIGN STANDARDS AND GUIDELINES

All public sanitary sewer systems are to be of a gravity flow design, unless other

factors dictate the use of a force main and lift station. For force main and lift station requirements, refer to Chapter 8.0. Developments that need to construct force mains and lift stations facilities shall address the facilities compatibility with the Town's Wastewater Collection System Master Plan and Utility Systems Evaluation Report.

The Engineer should be familiar with the MAG Uniform Standard Specifications and the Town of Gilbert Supplement to MAGs Uniform Standard Specifications, including all applicable Town of Gilbert Standard Details. These documents contain construction related specifications, and details that impact the design of wastewater systems, including trenching, bedding, backfill, pavement replacement, etc.

8.8.1 Wastewater System Analysis

This section describes the measurement standards for gravity sewer lines that are to be used to evaluate the suitability of wastewater collection system improvements and additions.

8.8.1.1 WASTEWATER SYSTEM LOADS

TABLE 8-22 lists unit loads that can be easily correlated to acreages for types of land use. The Town has been divided into 10 wastewater flow monitoring basin areas; see Figure 8-1 for wastewater flow monitoring basins.

TABLE 8-22: UNIT DAILY DESIGN FLOWS FOR SEWER- PER LAND USE

Unit Wastewater Loads Developed from Flow Monitoring Study Town of Gilbert 2012 Integrated Water Resources Master Plan Update										
Land Use Category	**Unit Wastewater Loads (gpad)**									
	2006 MP	**Basin 1 & 2**	**Basin 3**	**Basin 4**	**Basin 5**	**Basin 6**	**Basin 7**	**Basin 8**	**Basin 9**	**Basin 10**
Rural Residential	150	220	220	220	220	220	220	220	220	220
Low Density Residential 1	325	480	384	384	384	480	320	480	320	480
Low Density Residential 2	325	519	415	415	415	519	346	519	346	519
Medium Density Residential 1	750	653	522	522	522	653	435	653	435	653
Medium Density Residential 2	750	656	525	525	525	656	438	656	438	656
High Density Residential 1	1,000	918	734	734	734	918	612	918	612	918
High Density Residential 2	1,000	1,395	1,116	1,116	1,116	1,395	930	1,395	930	1,395
High Density Residential 3	1,000	-	1,578	1,578	1,578	-	-	-	-	-
Commercial	600	707	707	707	707	707	707	707	707	707
Regional Commercial	800	928	928	928	928	928	928	928	928	928
Industrial	400	414	414	414	414	414	414	414	414	414
Public	200	552	552	552	552	552	552	552	552	552
No Water Service	0	0	0	0	0	0	0	0	0	0
Open Space	0	0	0	0	0	0	0	0	0	0

The peaking factor shall be as defined in the Arizona Administrative Code Section

R18-9-E301 (TABLE 8-23).

TABLE 8-23: WASTEWATER FLOW PEAKING FACTOR

Upstream Population	Dry Weather Peaking Factor
100	3.62
200	3.14
300	2.90
400	2.74
500	2.64
600	2.56
700	2.50
800	2.46
900	2.42
1,000	2.38
1,001 to 10,000	$PF = (6.330 \times p^{-0.231}) + 1.094$
10,001 to 100,000	$PF = (6.177 \times p^{-0.233}) + 1.128$
More than 100,000	$PF = (4.500 \times p^{-0.174}) + 1.945$
PF = Dry Weather Peaking Factor p = Upstream Population	

8.8.1.2 WASTEWATER SYSTEM ANALYSIS CRITERIA

The Manning Coefficient shall be 0.013 for gravity mains. The Town may choose to use a lower Manning's Coefficient if, in the Town's discretion, doing so would eliminate the need for a lift station.

The flow depth/diameter (d/D) ratio for sewer mains are as follows:

d/D=0.5 for sewer line less than 12 inches.

d/D=0.75 for sewer line 12 inches and greater. This maximum d/D Ration applies to the ultimate or buildout peak flow.

Gravity sewer main velocities shall not be less than 2 feet per second with the pipe flowing half full in order to maintain cleaning velocities. Table 8-24 lists the minimum slopes for maintaining self-cleaning full flow velocities with d/D = 0.5.

The minimum slope listed in the table is 0.0008 ft/ft, which is the minimum practical slope for gravity sewer construction. Greater slopes are desirable as long as the flow velocity does not exceed 8 feet per second, but the slopes must be at least equal to the minimum slope.

8.8.2 Wastewater System Design Report

All projects involving residential, commercial/industrial subdivisions and land development projects may be required to provide a sewer system design report of the project's impact on the Town's wastewater system. The Wastewater System Design Report shall be submitted prior to the construction plans. The construction plans shall not be reviewed until the Wastewater System Design Report has been approved.

In addition to the report's analysis of the impact to the Town's wastewater system the report shall determine the development's wastewater load, and analyze the hydraulics of the proposed sanitary sewer system. The analysis shall include the effects of the peak flow to ensure correct sizing and layout of the new wastewater facilities.

The design report shall be sealed and signed in accordance with the requirements of the State of Arizona Board of Technical Registration, and submitted to Development Services Department. Report shall be letter sized (8.5" x 11") with any larger maps included within the report shall be folded to letter size and bound or provided in a folder.

8.8.2.1 SEWER LOAD REQUIREMENTS

All projects shall provide a summary of the anticipated sewer loads for the project and calculations of the anticipated sewer flows based on the unit factors listed in Section 8.8.1. If the proposed use does not match the tables, provide an estimate of what the flows will be from other sources and provide a justification for their use. Flows may be calculated on a sub-area basis, but provide a total flow for the entire development as well.

8.8.2.2 SEWER SYSTEM MODEL ANALYSIS

Provide a model of the planned sewer system as delineated in later section of this manual. This modeling will be required where new public sewers are being added to the Town system. The model will provide the data in a format that will update the Town's master model and verify flows in the Town system. Infill projects will not require a model. Infill projects include the following single lot development where sewer connection is directly to existing Town mains and residential subdivisions of five acres or less.

1. Sewer Model Requirements: Sewer hydraulic modeling information shall be provided to the Town so that this information can be added to the Town's hydraulic model. This section describes the requirements to be met to deliver model data to the Town.

2. Model Software: The Town of Gilbert currently uses the H2OMAP Sewer software. The modeling software used to evaluate a proposed development does not need to be the same software, but the data needs to be easily transferred into the Town's software.

   For sewer system models, collection system data can be moved from one

modeling program to another using common file formats. The easiest and preferred formats for transferring data to or from H2OMAP is the GIS shape file format, and the Microsoft Excel file format.

3. Model Development: The developer or developer's engineer shall create and utilize a hydraulic model to demonstrate that the proposed infrastructure of the sewer system is adequate, and satisfies the performance criteria. The model or model information will then need to be delivered to the Town to be added to the Town's models, where modeling evaluations will be performed to verify that the proposed infrastructure will work well with the Town's system. For wastewater systems, collection main capacity from the development to the treatment plant, treatment plant inflows, and lift station capacity will be evaluated, where necessary.

   The Town's model will be updated to include planned infrastructure. This planned infrastructure data will be labeled uniquely in the model to distinguish it from Record Drawing infrastructure data. Once the infrastructure has been constructed, the Town or its designated agent will enter the data into the Town's GIS system through procedures that have been established by the Town. When the Town updates its models on a periodic basis using the most current GIS data, planned infrastructure in the model will be replaced with Record Drawing information as contained in the GIS database.

8.8.2.3 HYDRAULIC MODEL DATA

1. Coordinate Systems: All drawings and model data shall use the NAD_1983 State Plane Arizona Central coordinate system, with the transverse Mercator projection system. Elevations shall be the elevation above mean sea level. This is the same coordinate system the Town plans to use in the future. If drawings are prepared before the Town converts to the NAD_1983 coordinate system, then drawings shall be provided in the Town's current coordinate system. The developer should check with the Town to be certain that the correct coordinate system is being used.

2. Attributes: Each physical entity in the model of the proposed development will require information and attributes as defined below.

3. Sewer Collection System:

   - Gravity Mains: Diameter, material, length, location, connectivity with mains and manholes, upstream invert elevation, downstream invert elevation.

   - Manholes: Diameter, location, connecting mains, drop manhole details (if any), wastewater load, and bottom elevation.

   - Lift Stations: Layout, location, and connectivity with other entities, number of pumps, pump design point or curve, number of pumps, pump start/stop controls, elevation, wet well dimensions, wetwell invert, outfall elevation.

   - Force Mains: Diameter, location, connectivity, pipe material.

- Diversion Structures: Diameter, invert elevation, location, connectivity, weir height and size, control scheme, desired flow through each diversion.

- Outfalls: Location, connectivity, invert elevation.

8.8.2.4 HYDRAULIC EVALUATION

New developments that do not constitute infill shall be modeled to determine if the infrastructure is adequate to service the development and provide the level of service as defined by the Town's performance criteria.

The Town would use the Town's model to determine the available capacity in sewer interceptors to convey wastewater from the development. The developer would be responsible to make certain that wastewater can be safely conveyed from the points of origin to the Town's interceptors.

Boundary conditions that represent the interface between the model of the development and the rest of the distribution system need to be explained clearly.

The steady-state peak hour of the day simulations shall be completed to show that the collection system mains are sized adequately and that slopes are greater than the minimum slope.

8.8.2.5 PRELIMINARY WASTEWATER SYSTEM DESIGN REPORT

A preliminary report is required at the entitlement stage of a project. The type and size of buildings may or may not be known at this stage. The preliminary report should provide the following information:

- Provide the preliminary sewer flow requirements (based on either acreage or building size and use) This data may be refined or changed due to changes in the plan through the entitlement stage.

- Provide a sewer model analysis if required. For single family residential developments, the model may be delayed until the Final Sewer Report submittal if desired. Any plan or system changes required due to inadequacies of the system as modeled will require construction plan changes as necessary to meet requirements.

- If no changes are anticipated or required with the construction plans, this report may be submitted as the Final Wastewater System Design Report.

Preliminary Wastewater System Design Report Format:

The following sections are to be included in a development Wastewater System Design Report:

- Cover Page:
  - Project Title

  - Prepared For
  - Prepared By
  - Engineer's Seal
  - Date
  - Town Datum Benchmarks (BM)

- Executive Summary: Provide a one or two page statement indicating that the criteria is met, what criteria was used, and an explanation of specific steps that were taken to modify the design so that the criteria is met. Unique characteristics or challenges associated with the project should also be presented.

- Introduction:
  - Provide the project name, size, type of development
  - Purpose of the report
  - Project owner
  - Summarize the content that would be found in each major section of the report

- Project Location:
  - Provide a site description
  - Project size
  - Addresses and major streets
  - Township, Range and Section
  - Relationship to other developments or significant sewer features
  - Include a site map

- Purpose of Report: Explain the objectives of the report, which could be to define infrastructure requirements, satisfy regulatory requirements, or evaluate the impact of the new development on the existing collection system.

- Existing Collection System Conditions: Describe existing collection system infrastructure that affects the development.

  Identify lift stations, and downstream trunk mains that will be used to convey wastewater from the development.

- Proposed Collection System Conditions: Describe infrastructure needed to take wastewater from the development to the water reclamation plant.
- Design Criteria: Summarize the Town's design standard requirements that were applied to this project.
- Design Methodology:
  - Modeling: Identify the software used and specific assumptions in the model.
  - Wastewater Flows: Identify land use, population, population density, loads and peaking factors.
  - Collection System Network: Identify and describe mains that will be needed to serve the development.
  - Lift Stations: Describe lift stations where required. Provide design parameters, and layouts when appropriate.
  - Outfalls: Identify and describe location and size.
- Wastewater Model and Results: Identify main sizes, slopes, and other results as obtained from the model.

  Include a map of the collection system for each simulation where pipes are color coded by d/D to demonstrate that the mains are adequately sized.
- Conclusions: Summarize work that has been completed; state recommendations, areas, where further evaluation may be needed.
- References: List documents used in the report that contain relevant information.
- Appendices: Figures
  - Vicinity Map
  - Land Use Exhibit
- Land Used Data: Table summarizing parcels, acreages, land use, and population.

8.8.2.6 FINAL WASTEWATER SYSTEM DESIGN REPORT

The final report will be required at the time of the civil improvement plan submittal. The final report will be basically the same as the preliminary report, however, modified to include any changes to the project between the entitlement stage and the construction plan stage.

8.8.3 Wastewater System Design

Sewer main lines installed by improvement projects which are adjacent to undeveloped parcels are required to install main line stubs from the adjoining manhole(s) to facilitate the future extension of the public sewer system to serve future developments. Stubs from the manholes are to be extended to the right-of-way line and be 8 inches minimum in diameter.

8.8.3.1 UTILITY TRENCHING

All trenching, bedding, backfill, compaction, and pavement replacement shall comply with Town of Gilbert Supplement to MAG Construction Specifications and Standard Details, MAG Specification 601. All pavement replacement shall be in accordance with Town of Gilbert Standard Details.

8.8.3.2 PIPE SIZING

Minimum size for sewer main lines shall be 8 inches in diameter. Sewer line sizing criteria shall comply with ADEQ requirements. Larger sewer lines may be required if warranted by the project's Wastewater System Design Report, specific sewer loads, or by the Town's Wastewater Collection System Master Plan and Utility Systems Evaluation Report.

8.8.3.3 CURVILINEAR SEWER

The installation of new curvilinear sewer mains for public sanitary sewer collection systems are not permitted within the Town of Gilbert service area.

8.8.3.4 SEWER MAIN LOCATIONS

Public sewer mains are required to be located within dedicated public rights-of-way (ROW) or easements (PUFE, PUE). Sewer alignments should generally be parallel to property or street center line. Alignment should be straight and uniform within the street or easement. See Chapter 1.0, General Requirements concerning the dedication of ROW or easements.

Caution should be taken in the design and construction of the sanitary sewer lines to protect all water supplies from wastewater contamination. To minimize the potential of contamination, the Engineer must design the horizontal and vertical separation of water and sanitary sewer lines, in accordance with the Arizona Administrative Code, Title 18, Chapter 9, "Water Pollution Control" and MAG Specification Section 610.5.

- Horizontal Locations:
    - The standard location for public sewer mains is shown in the Figure 4-9 through Figure 4-14.
    - Minimum horizontal separation from the sewer main to any underground wet utility shall be 6 feet, outside diameter to outside diameter. Exceptions must be approved by the Town.

- Public sewer mains within easements are normally to be centered within a 20 foot Public Utility Easement or a 20 foot Public Utilities and Facilities Easement. When more than one public utility will occupy the easement, the public sewer main shall be offset 5 feet from the centerline of the easement.

- Where a raised median divides a public street, the sewer main is to be offset from the median curb. While a minimum dimension for an offset has not been established, Gilbert does require that the manhole ring or cover not encroach upon the median curb or gutter.

- Alignments within retention/detention basins shall be avoided. Where conditions dictate construction through a retention/detention area, special approval from the Town is required. The Engineer shall provide written justification for the alignment.

- Vertical Locations:

  - Sewer mains shall have a minimum 5 foot cover over top of the sewer main as measured from surface course of finished grade.

  - Trench loading calculations shall be made available to the Town upon request.

  - Where a sewer main crosses below an irrigation ditch, there shall be at least 2 feet of separation between the flow line of the ditch and the top of the sewer.

  - Where cover is less than 3 feet, due to topography such as unlined canals, washes, etc., the sewer main line shall be constructed of Ductile Iron Pipe (DIP) with an approved lining. The DIP shall extend a minimum of 10 feet each side of the canal, wash, etc., and be protected from any settlement or washout. Any sewer line that crosses a wash shall be encased in concrete in accordance with MAG Standard Detail No. 402.

  - Sanitary sewer lines will have a minimum of 6 feet of horizontal clearance from any structural footing, or substantial improvement.

  - Sanitary sewer lines crossing less than 2 feet below a storm drain or culvert, or under large structures such as box culverts and bridges, will require additional protection such as the use of DIP or encasement. Sanitary sewer lines crossing over storm drains and culverts must be a minimum of one foot above and provide extra protection per MAG Standard Detail 404-1 through 404-3.

  - Sanitary sewer lines will have a minimum cover of 6 feet located in a retention area as measured from finished grade. Cover of less than 6 feet will be considered on a case-by-case basis and requires approval by the Town Engineer.

8.8.3.5 SEWER LINE EASEMENT WIDTH

- Sewer mains located outside of public right-of-way shall be installed in a minimum 20 foot wide dedicated sewer line easement. The easement shall be accessible from public right-of-way, free of obstructions and accessible at all times to Town maintenance equipment.
- Sewer line depth of 10 feet or less: Minimum width shall be 20 feet
- Sewer line depth greater than 10 feet: Minimum width shall be 2 times the depth (centered in easement).
- Regardless of pipe size, there shall be a minimum of 2 feet between the sewer line and any property line.
- Sewers placed between private lots shall be required to provide a 30 foot wide public utility easement with the sewer line located in the center of the easement.

1. Easement Locations: The 20 foot public easements should generally be located or centered within a private drive or aisle of the proposed project. Installations under parking stalls, landscape areas, fences/walls, and overhangs shall be avoided unless an engineering evaluation of the necessity and feasibility is approved by the Town of Gilbert.

2. Easement Access: When a sewer line is located within an easement that is not within a paved roadway or other paved access way, an all-weather access road shall be provided to enable the Town to access to the pipe, manholes, and other appurtenances for maintenance and repair. The access road shall have a minimum width of 15 feet and shall be paved or constructed of a minimum of six inches of stabilized decomposed granite. Each end of the access road shall be connected to a public street, private access way, or turn-around easement conforming to Town of Gilbert requirements.

3. Easement Dedication: Sewer line easements or right-of-way may be dedicated by a Map of Dedication, Subdivision Final Plat, or separate instrument, and conveyed to the Town. Contact the Town for the best method for a particular project. All dedicated land shall be free of environmental contamination per ASTM E-1527 current requirements.

8.8.3.6 PIPE SLOPES

Pipe slopes to generate a minimum velocity of 2 feet per second shall be as shown in TABLE 8-24.

Gravity sewer main velocities shall not be less than 2 feet per second with the pipe flowing half full in order to maintain cleaning velocities. TABLE 8-24 lists the minimum slopes for maintaining self-cleaning full flow velocities with d/D = 0.5. The minimum slope listed in the table is 0.0008 ft/ft, which is the minimum practical slope for gravity sewer construction. Greater slopes are desirable as long as the flow velocity does not exceed 8 feet per second, but the slopes must be at

least equal to the minimum slope.

TABLE 8-24: MINIMUM SLOPES FOR CIRCULAR PIPE

Pipe Size (inches)	Minimum Slope[(f)] (ft/ft)
8	0.0040
10	0.0025
12	0.0020
14	0.0016
15	0.0015
16	0.0014
18	0.0012
20	0.0010
21	0.0010
24	0.0008

Note:

(1) Sewer mains larger than 24 inches should still have a slope no less than 0.0008.

(2) Pipe Capacity presented based on full capacity flow.

(3) Table assumes Manning's N coefficient of 0.013.

8.8.3.7 MANHOLES

Manhole diameter is to be 4 feet, unless the manhole is more than 10 feet deep, or the line is over 10 inches in diameter; then, the manhole is to be 5 feet in diameter.

Manhole lids must be 24 inch diameter for four foot manholes and must be 30 inch diameter on 5 foot manholes. All manholes in arterial streets must have 30 inch diameter manhole frames and lids.

Except as itemized below, manholes shall be installed: at the end of each line; at all changes of grade, pipe size, or alignment; at all sewer pipe intersections; and at distances not exceeding the following:

TABLE 8-25: MANHOLE SPACING

Pipe Size (Inches)	Maximum Spacing (Feet)
8 to 10	400
12 to 21	500
24 and Larger	600

(1) Source: ADEQ Engineering Bulletin 11

Manholes with pipeline deflections of 45 degrees or greater shall provide 0.2 feet of invert drop through the manhole. All other manholes shall provide a minimum 0.1 feet invert drop. Pipeline deflections greater than 90 degrees will not be allowed.

When pipe sizes change through a manhole, the crown of the upstream pipe(s) shall be equal to or higher than the crown of the downstream pipe. If this causes an invert drop greater than 12 inches, match springlines. In large trunk lines, inverts at junctions should be designed to maintain the energy gradient across the junction and prevent backflow.

Standard manholes on the Town of Gilbert public sewer system shall conform to MAG Standard Details 420-1, 420-2 and 424. Use only cast in place manhole bases. The manholes shall have no steps.

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

Manhole covers to be non-rocking, traffic rated, and located outside the wheel path of vehicles, bike lanes and sidewalk ramps.

Any necessary manhole within a retention/detention basin shall have its rim above the high water elevation and shall be watertight.

8.8.3.8 MANHOLE LINING

Manholes are required to be lined per Town of Gilbert Supplement to MAG Specifications and Standard Details.

8.8.3.9 DROP MANHOLES

Sewer mains may have a maximum of 24 inches drop (flow line-to-flow line) without a drop connection. Drop manholes are to be avoided due to the increased maintenance issues, generation of odors due to the turbulence of the flow, and safety hazards for maintenance personnel.

Engineers that are contemplating the use of drop structures to address grade and depth issues are required to discuss the situations with the Town staff and receive approval to proceed with a design that includes drop manholes.

- Approval to Use: The Town shall determine when the use of drop manhole structure(s) is appropriate. When specifically approved by the Town, the drop manhole structures shall be in accordance with MAG Standard Detail 426.
  - For drops up to and including 5 feet, use Type A.
  - For drops greater than 5 feet, use Type B.
- No sewer cleanouts are allowed.

8.8.3.10 SEWER SERVICES

Final plans shall indicate the sewer service location for each proposed development. The location shall not be changed in the field except with approval by the Town. For single family residential developments a typical lot layout indicating the sewer service in relation to the driveway will be required. Service lines will be located within public rights-of-way, or a public utility easement. Record Drawings shall reflect any revisions made during construction. Sewer services under paved driveways should be avoided whenever possible.

Sewer service may use single wyes only.

8.8.3.11 BUILDING CONNECTIONS (SEWER TAPS)

- The Engineer shall make every effort to utilize the existing sewer line that has been stubbed out to the property by previous construction.
- All building line connections will be installed perpendicular to the sanitary sewer line per MAG Standard Detail 440.
- Taps into manholes shall be avoided when possible. The maximum number of taps into manholes shall be two. No tap is allowed into a manhole against incoming flow through the manhole.
- Sewer lines 12 inches in diameter or larger may be tapped only with Town approval.
- All taps shall be a minimum of 6 feet from the centerline of the manhole.
- A 3 foot minimum separation between service taps is required.
- All taps shall be stationed using the closest downstream manhole as station 0+00.
- Plans shall be reviewed by the Town for backflow prevention valves which are required where finish floor elevations are below either upstream or downstream manhole rim elevations. When a backflow prevention valve is required, the owner of the property will be responsible for maintaining the backflow valve and shall be identified on the plans.
- The owner will be responsible for the sewer service line from the sewer mainline (Note - refer to current Town code) to the service facility.
- An Electronic Locator Ball and Sewer Service Curb Crossing Stamp per MAG Standard Detail 440-1 through 440-4 shall be installed on each individual sewer tap.
- A single tap per lot is required and permitted. Additional taps for any one lot must specifically provide written request submitted to the Town and receive written acknowledgment of approval by the Town.

- All sewer taps into existing sewer main lines shall be performed by a licensed contractor. Contractor shall obtain a right-of way permit and provide a not less than a 24-hour notification for inspection services prior to installation of the sewer tap.

8.8.3.12 SIZE OF SEWER TAPS SHALL BE DETERMINED AS FOLLOWS

- Single family residential developments shall be 4 inch. A 4 inch diameter tap shall be provided for each platted lot. Additional taps for common areas shall be determined by the Engineer.
- Multi-family developments shall have a minimum 6 inch taps.
- Commercial developments shall have a 6 inch tap unless a smaller size is demonstrated to be sufficient.
- Commercial/Industrial subdivisions shall provide 6 inch services to each lot.
- All taps larger than 6 inches require the installation of a manhole.

8.8.3.13 PUBLIC SEWER FORCE MAINS

Proposed sewer force mains to serve a land development project will be reviewed and approved on a case by case basis by the Town.

Public force mains will be located within a right-of-way, or sewer line easement. The line should be located under pavement wherever possible.

- Velocity Requirements: The operational flow velocity in the force main must be between 3 and 7 fps. The pipe diameter must be approved by the Town to verify adequate scour velocity and the Town's ability to maintain the pipe.
- Pipe Material: All pipe material used in design of the force mains must have established ASTM, ANSI, AWNA, and NSF standards of manufacture, or seals of approval, and shall be designated as pressure sanitary sewer pipe. Force mains must be identified as such, with marking tape buried one foot above the pipe.

  Force mains will be constructed of restrained glass lined ductile iron pipe, or approved equal for the following conditions:

  - All locations where a vertical realignment is required;
  - Drainage wash crossings;
  - Air release assemblies;
  - Clean-out assemblies.

- Air Release Valves: Air release valves designed for sewage must be provided on force mains at all peaks in elevation. Air relief valve will be installed into an

approved vault.

- Line Separation: Where a force main crosses a water main or transmission line, protection must be provided as per ADEQ Engineering Bulletin No. 10, and the Arizona Administrative Code, Title 18, Chapter 9, Water Pollution Control. At a minimum, pipe separation and extra protection shall comply with MAG Specification 610.5.5 and MAG Standard Detail 404.

- Odor Control: A nuisance odor is defined as an emission of any gas, vapor, fume, or mist, or combination thereof, from facilities, in whatever quantities, that causes, either alone or in reaction with other air contaminants, injurious effects to human health or safety; unreasonable injurious effects to animal life, plant life or significant value, property; or unreasonable interference with the comfortable enjoyment of life or property.

  The Engineer must evaluate and provide provisions for the potential for odor to develop from a force main downstream of the receiving manhole. One-way valves on building service lines shall be specified where there is potential for gasses to seep from the waste stream. The valves should be located at or near the building cleanout and include provisions for access and maintenance by the property owner. When applicable, a sealed type sewer manhole lid shall be used when force mainlines connect to a gravity sewer system.

8.8.3.14 WASTEWATER LIFT STATIONS

Private lift stations are not permitted to be located within dedicated public rights-of-way or public easement. Lift stations shall be designed and sized to serve a regional area to avoid having multiple lift stations serving specific development. The use of lift stations shall be minimized wherever possible. Private lift stations shall provide the annual operation and maintenance records to the Town of Gilbert.

- Site Selection: Lift station sites shall provide the following:

  - In selecting a site for a sewage lift station, consider accessibility, drainage patterns, visual impact, potential odor issues, functions, design constraints, and ultimate street section.

  - Consider the potential for flooding when selecting a pump station location. The station's equipment must be protected from damage and remain operable during a 100 year storm event.

  - Reasonable access for vactor trucks, crane trucks, and other maintenance vehicles.

  - Visual compatibility with surrounding developments including block walls around the lift station.

  - Odor control equipment will be installed

  - Proper separation from all future development in an effort to avoid potential site odor issues. Proper odor control devices to abate lift station

odors shall also be incorporated when deemed necessary by the Town.

- Lift Station Requirements: Arizona Administrative Code, Title 18, Chapter 9, "Water Pollution Control," contains minimum requirements for a wastewater lift station. Additional requirements specific to the Town must be obtained from the Town's Wastewater Division before beginning design. At a minimum, radio pathway study and test, ultra sonic sensor and a two float backup system, telemetry, dual pumps, backup power supply, three-phase power, odor control, and perimeter walls will be required. The site will also be large enough to contain all the equipment and to access and service equipment for repairs.

  Prior to the preparation of construction drawings, a preliminary wastewater design report will be prepared and submitted to the Public Works Wastewater Division for review and approval. The preliminary report will outline the type of equipment and controls proposed for the station. A final wastewater design report prepared by a registered professional engineer licensed in the State of Arizona must accompany all pump station design drawings submitted to the Town for review.

- Lift Station Design (Submersible Pump): The lift station shall include the following as a minimum:

  - Lift station shall be sized so that the number of pump starts per hour does not exceed seven.

  - Design for current, interim and ultimate conditions.

  - Triple the station's minimum requirements, unless approved otherwise by the Town Engineer or Public Works Director.

  - Station shall have a minimum of 2 pumps and be capable of operating at the designed flow with the largest pump out of service.

  - Size of pumps to be the same, except as approved otherwise by the Town Public Works Director.

  - Pumps to be submersible (Flygt brand pumps, or approved equal by the Town's Wastewater Division).

  - Aluminum trash rack with stainless steel rails. Provide detail on plans.

  - Portable hoists with separate mounts for each pump and trash rack. Provide electric winch (12 volt) with manual override.

  - Valve pit with shut-off and check valves.

  - Aeration odor control.

  - Aluminum access covers.

- Precast or cast-in-place concrete walls. All interior walls shall be lined per Town of Gilbert requirements.
- Electrical control unit (EG Controls, or Town approved equal).
- Controls to have hour meters, run and failure lights with rotating beacon light, HOA switch, auto dialers, and provide for alternating sequencing of pumps.
- 4 inch minimum static vent.
- All pump rails and hardware should be 316 stainless steel.
- 6 inch DIP emergency by-pass line with valve and a quick coupling hose nozzle with cap, or flanged end with blind flange.
- Emergency power source and redundant level controls that provide immediate service when required
- Communication to Town's SCADA monitoring system for operations, monitoring and security.
- Discharge piping by-pass system.
- Equipped with visual or audible alarms if exceedingly high or low water levels are detected.

8.8.3.15 FLOW METERING STRUCTURE

The Public Works Department has sole discretion when to require an engineer to install a flow metering structure for monitoring of the wastewater collection system capacities. The engineer shall design the flow metering structure as part of the projects improvements. The flow metering structure design shall include:

- Adequate land area for the structure with access to public right-of-way
- Perimeter fence for site.
- Parshall flume installed true and level without distortions.
- Vault or structure for flume and appurtenances.
- SCADA radio monitoring system.
- Electrical control system.
- Flow meter (ultrasonic transducer type)
- Ventilation system design including all wiring, conduits, and switches and designed to comply with the current OSHA confined space regulations.

- Odor control equipment.
- Pipe and conduit penetrations in vault shall be core drilled.
- Access hatches with 36 inch clear opening.
- Fiberglass reinforced polyester grating.

8.8.4 Wastewater Monitoring Appurtenances

8.8.4.1 MONITORING VAULTS

The Public Works Department has sole discretion when to require an engineer to install a monitoring vault for testing wastewater flow and composition. Generally, properties in industrial land use/zoned areas with a projected wastewater discharge of 25,000 gallons per day will be required to install a monitoring vault.

8.8.4.2 MONITORING MANHOLES

The Public Works Department retains sole discretion as to when to require an engineer to install a monitoring manhole. Generally, commercial properties with potential mixed uses, restaurants, and developments that will use chemicals or solvents are required to install monitoring manholes.

Monitoring manholes will be constructed per MAG Standard Detail No. 429, with a straight channel, and no taps or bends for 10 feet upstream or downstream, or as approved by the Public Works Department. Design details for monitoring manholes on sanitary sewer lines 6 inches or larger with a peak flow greater than 40 gallons per minute (gpm), must be approved by the Development Services Department.

8.8.4.3 LOCATION FOR VAULTS AND MANHOLES

Monitoring vaults and manholes will be located in a minimum 20 foot wide access and maintenance easement that extends from the vault/manhole/structure to the existing public wastewater system, and be designed for access at all times to monitoring crews and vehicles.

8.8.4.4 SEPTIC SYSTEMS

The Town of Gilbert does not issue approval for the installation of a septic system. Approval for septic systems, in lieu of connection to the Town of Gilbert public sanitary sewer system is granted by the Maricopa County Environmental Services Department. The property owner is responsible for the design, receipt of a permit from MCESD, construction, operation, and maintenance of septic systems.

8.8.5 Wastewater System Materials

8.8.5.1 RIGID PIPE MATERIAL

- Ductile Iron Pipe (DIP) with a ceramic epoxy lining only when approved by the Development Services Department.

- Rubber Gasket Reinforced Concrete Pipe (RGRCP) with a PVC lining: shall conform to Sections 735 and 741 of the MAG Uniform Standard Specifications as amended by the Town of Gilbert.

- RGRCP pipe is approved for constructing public sewer mains 20 inches or larger in diameter.

8.8.5.2 FLEXIBLE PIPE MATERIAL

- Polyvinyl Chloride (PVC) pipe: shall conform to Section 745 of the MAG Uniform Standard Specifications as amended by the Town of Gilbert.

- PVC pipe is approved for public sewer mains 8 inches through 18 inches diameters only.

- The use of 18 inch PVC will require that granular bedding (ABC) shall be installed and compacted to one foot above the pipe.

- The installation of PVC sewer mains in excess of 18 inch diameter will be considered on a case-by-case basis. The engineer shall provide a comprehensive report that provides the justification for the installation of the larger diameter PVC main(s).

- No HDPE pipe

8.8.5.3 FORCE MAIN MATERIAL

Force mains can be constructed with DIP or PVC as specified herein.

8.8.5.4 MANHOLE MATERIALS

Standard manholes on the Town of Gilbert public sewer system shall conform to MAG Standard Details 420-1, 420-2 and 424. Use only cast in place manhole bases. The manholes shall have no steps.

Manhole frames and lids shall be as East Jordan Iron Works #00222459 or Neenah #NF-Deeter 1295 for 4 foot manholes and East Jordan Iron Works #00223124 or Neenah #NF-Deeter, 1296 for 5 foot manholes.

Manhole lids must be 24 inch diameter for four foot manholes and must be 30 inch diameter on 5 foot manholes. All manholes in arterial streets must have 30 inch diameter manhole frames and lids.

Manhole covers to be non-rocking, traffic rated, and located outside the wheel path of vehicles, bike lanes and sidewalk ramps.

8.8.6 Wastewater Construction Requirements

8.8.6.1 INSTALLATION AND TESTING

1. PVC pipe and fitting installation shall be in accordance with the applicable

provisions of MAG Section 601 and 615 and Town of Gilbert Standard Detail GIL-401.

2. Granular material for the purpose of this section shall mean a material approved by the Town Engineer. (⅜ inch chips)

3. After trenching has been completed, a four-inch layer of granular material shall be placed on the bottom of the trench and hand leveled. The pipe shall then be installed in accordance with Town of Gilbert Standard Detail GIL-401.

4. A required inspection will be made by the Town's Inspector after completion of laying of pipe but prior to haunching.

5. After the Town's Inspector is satisfied with the laying of pipe, the contractor will haunch the pipe with a granular material around the sides of the pipe to the spring line by hand. The granular material shall be carefully placed, fill all voids around the pipe and prevent lateral movement.

6. The contractor will place a second lift of granular material around the pipe to a level of at least 6 inches above the pipe.

7. Each layer of granular material shall be compacted to a density of 95 percent standard proctor.

8. A required inspection after completion of pipe bedding shall be made by the Town's Inspector. Compaction tests of the material around the pipe may be required by the Town Engineer and if required, the tests shall be paid by the contractor.

9. Upon completion and acceptance of backfilling and after a minimum of 20 days, but before surface course of asphalt paving, a 5 percent deflection testing device (go-no-go) will be pulled through the entire length of the main installed. Any section failing to pass this test shall be repaired and retested at no expense to the Town.

10. The contractor shall have a string placed through all sewer lines prior to calling for a deflection test.

TABLE 8-26: DEFLECTION LIMITS

Pipe Size	Minimum Diameter of Service (in.)	
	5%	**7.5%**
8″	7.49	7.29
10″	9.37	9.12
12″	11.15	10.86
15″	13.66	13.30

8.8.6.2 SEWER INSPECTION REQUIREMENTS FOR NEW LINES

The contractor shall have a television inspection performed on all new sewer lines

including sewer services and a manhole pressure test per ASTM (C1244-93) prior to issuance of a conditional letter of acceptance. Air test 100 percent of sewer lines after dry utility trenching and backfill has been tested.

8.8.6.3 ONE-YEAR WARRANTY

The contractor/developer shall warranty the work performed under these specifications in accordance with MAG Section 108.8.

8.9 FINAL SEWER PLAN REQUIREMENTS

Construction plan submittal requirements for the preparation of final plans in the Town are described in Chapter 2.0. This section supplements the requirements of Chapter 2.

1. All proposed public sewer lines must be shown in both plan and profile views on the same sheet, and pipe material called out. Sewer lines that are not public sewer lines may not require a profile.

2. Phase limits and numbers must be shown on all applicable sheets. Phase lines are to run on lot lines.

3. Dimensional ties must be provided for all existing sewer lines being connected to. Providing both the street centerline station and the perpendicular distance (offset) from the street centerline usually satisfies this requirement.

4. Manholes on boundaries of subdivisions must have stubs with shaped inverts for future connections. Stubs shall be extended a minimum of 5 feet past the phase line or paving limits, whichever is greater. Both slopes and elevations must be shown on all proposed sanitary sewer lines stubbed-out for future extension.

5. Where sanitary sewer lines cross water lines, storm drain, or drainage culverts the clearance shall be indicated in the profile view.

6. The following items must be shown on the plans: For existing and proposed manholes:

    - Rim elevation to the nearest 0.10 foot.
    - Invert elevations.
    - Manhole station: Each manhole will have a unique identifier and be labeled in both plan and profile.
    - Dimensional ties, i.e., station and offset, from the street centerline to the manhole.
    - Where a proposed manhole is constructed on an existing sewer, horizontal distance from the nearest downstream manhole; the invert elevation of that manhole, and the slope of the existing sewer.

- Distance from centerline to centerline of manholes.

7. Sewer stationing is measured horizontally along the horizontal alignment of the sewer.

8. The minimum cover allowed for sewer mains is 5 feet. At crossings of open ditches, 4 feet is required between crown of pipe and flow line of ditch. At canal or wash crossings, minimum cover is 3 feet from the scour line. If less than 3 feet cover is designed, the pipe must be DIP with approved lining, and extended 6 feet beyond each side of the wash and protected from any settlement or washout.

9. All abandoned sewer taps must be capped.

10. Concrete encasement will be shown in both plan and profile. The beginning and ending stations of the encasement shall be called out.

11. Lift station plans will show all invert elevations, structural elevations, existing and finished grades, control setting elevations, structural design of the wetwell and drywell, valves and piping, surge control devices, pump suction and discharge details, and any other details necessary to provide construction of the design.

12. Plans and profiles of force mains will show size, invert and grade elevations, material, existing and proposed utility locations, and any other necessary details.

8.10 SUBMITTAL CHECKLIST

The latest version of the Wastewater Collection and Treatment System Checklist can be found on the Town of Gilbert Engineering Services website. This Checklist will be periodically updated by the Town of Gilbert. At the time of the publication of these Standards it was as follows:

1. The developer must use PVC pipe. Alternate pipe materials to be approved in advance by Town Engineer.

2. The use of cleanouts will be permitted only upon review and approval by the Town Engineer.

3. Show both on plan and profile the concrete encasement of sewer lines and water lines where necessary per MAG Standard Detail 404.

4. Each lot or parcel must be provided with its own individual service unless otherwise approved. The location should be near the center of the lot and be coordinated as to avoid placement in conflict with proposed driveway locations.

5. Maintain minimum horizontal and vertical clearance from water lines per County Health Department requirements unless otherwise previously approved. If so, provide by special design such as encasements, etc.

6. A note must be on plans for "contractor to verify elevation of existing sewer stub before proceeding with balance of sewer trenching."

7. Design slopes and depths to satisfy the future need for sewer in the surrounding area.

8. Show in the profile the relationship between sewer and water at each crossing.

9. Both the slope and the end elevation must be shown on all sewer main stubs.

10. Engineers to furnish a copy of cut sheets to Town Off-Site Inspector.

11. Sewer mains are normally placed 5 feet south or west of street centerlines.

12. Sewer mains shall be low enough to avoid conflicts with all other utilities (water services, telephone lines, electric lines, storm drains, gas, etc.).

13. Drop manholes are to be avoided except in extreme circumstances.

14. Prior to submitting subdivision plans a master plan of the sewer with sizes, slopes, manhole flow lines and natural grades shall be submitted for review on the Preliminary Plat for subdivision review.

15. Maricopa County Environmental Services Department requires that sewer lines and water lines be encased in concrete and that the water line be ductile iron whenever the water line crosses under the sewer line.

16. Maintain a minimum of six-foot spacing between sewer, reclaimed water, water mains and water services and show property line ties to each service.

17. Call out five-foot diameter manholes where conditions require it.

    NOTE: In all cases where the line is over 10 feet deep or pipe size is greater than 10 inches, 5 foot diameter manholes will be required.

18. Manhole frames and lids shall be East Jordan Iron Works #00222459 or Neenah #NF-Deeter 1295, for four-foot manholes and East Jordan Iron Works #00223124 or Neenah #NF-Deeter, 1296 for five-foot manholes.

19. Service taps into manholes will not be permitted, unless approved by the Town Engineer.

20. Consultant preparing plans shall add this note, in box with arrow to the appropriate manhole, on all sewer plans.

    NOTE: Access to existing sanitary sewer mains will not be permitted until all new sewer construction has been approved and accepted. New sewer construction shall be isolated from the existing system as follows:

    A reinforced plug will be placed in the outlet of the last manhole (most downstream) in the system under construction. This plug will not be removed

without:

- All paving completed and manhole completed and manhole rings and covers at correct grade.
- Inspectors' permission.
- Manholes having been sprayed with insecticide laden paint.

21. All sewers shall be so designed and constructed to give mean velocities, when flowing full, of not less than 2 feet per second.

8.11 GENERAL NOTES

The latest version of Wastewater Collection and Treatment System General Notes can be found on the Town of Gilbert Engineering Services website. These Notes will be periodically updated by the Town of Gilbert. At the time of the publication of these Standards they were as follows:

1. All construction shall be in accordance with current MAG Specifications and Details with the Town of Gilbert's additions and deletions.

2. The contractor shall obtain all necessary permits prior to construction. The Town Engineer shall be notified 24 hours prior to the different phases of construction for scheduling inspections.

3. Acceptance of the completed right-of-way improvements will not be given until Record Drawings have been submitted to and approved by the Town representative or inspector.

4. Location of all water valves must be referenced at all times during construction and made available to the Public Works Department. Only Town employees are authorized to operate the valves and fire hydrant connections to the Town's water system.

5. Any work performed without the approval of the Town Engineer and/or all work and materials not in conformance with the specifications is subject to removal and replacement at the contractor's expense.

6. The contractor will uncover all existing lines being tied into to verify their location prior to trenching. The contractor will locate or have located all existing underground pipelines, telephone and electric conduits, and structures in advance of construction and will observe all possible precautions to avoid damage to the same. Call Arizona 811, Blue Stake Center at (602) 263-1100 and notify SRP.

7. Backfilling shall not be started until all lines are approved by the Town Engineer, Town Representative or Town Inspector.

8. All backfill for PVC sewer lines shall be per Town of Gilbert Standard Detail GIL-401. All backfill for VCP sewer lines shall be per Town of Gilbert Standard

Detail GIL-402. All pavement and surface restoration "shall" be per Town of Gilbert Standard Detail GIL-270.

9. The Town of Gilbert is not responsible for liability accrued due to delays and/or damages to utilities in conjunction with this construction. Also, the Town will not participate in the cost of construction or utility relocation.

10. Manhole steps shall not be permitted in any sanitary sewer manholes.

11. Precast manholes to have impression ring type bases, and use grout or Ramnek between each precast section.

12. All rings and covers shall be East Jordan Iron Works #00222459 or Neenah #NF-Deeter 1295 for four-foot manholes and East Jordan Iron Works #00223124 or Neenah #NF-Deeter, 1296 for five-foot manholes.

13. All taps shall be wye type.

14. All sewer taps should be 4¼ feet deep at the property line.

15. A minimum of 6 feet of horizontal spacing between sewer and water services shall be maintained.

16. Traffic control shall be per the 2009 Edition of the Manual on Uniform Traffic Control Devices handbook and Town of Gilbert Standard Details.

17. The Town Inspector will determine the number and location of the required compaction tests. The contractor/developer will notify the testing lab, coordinate with the inspector and testing lab, and pay the costs to perform the tests.

18. Ordinance #1437, approved by the Town Council in October 2002, states: No construction water from fire hydrants shall be used on parcels or lots of ten acres or more in size. For more information, the ordinance is located on the Town of Gilbert website. To obtain construction water, the contractor is required to make application with the Public Works Water Division. A security deposit is required to receive a fire hydrant meter. The Town reserves the right to specify the time and location that construction water can be delivered.

19. The Town will not accept sewer lines with less than 5 feet of cover, unless approved by the Town Engineer.

20. Prior to final approval and acceptance of the work the developer/contractor will be required to clean and repair adjacent (off-project) roadways used during the course of their construction.

21. A 2" x 4" stake (painted green) shall be set one foot behind each sewer service. All 2" x 4" stakes marking sewer services shall be firmly set into the ground at the elevation of the flow line and shall extend 2 feet above the ground surface.

8.12 FIGURES

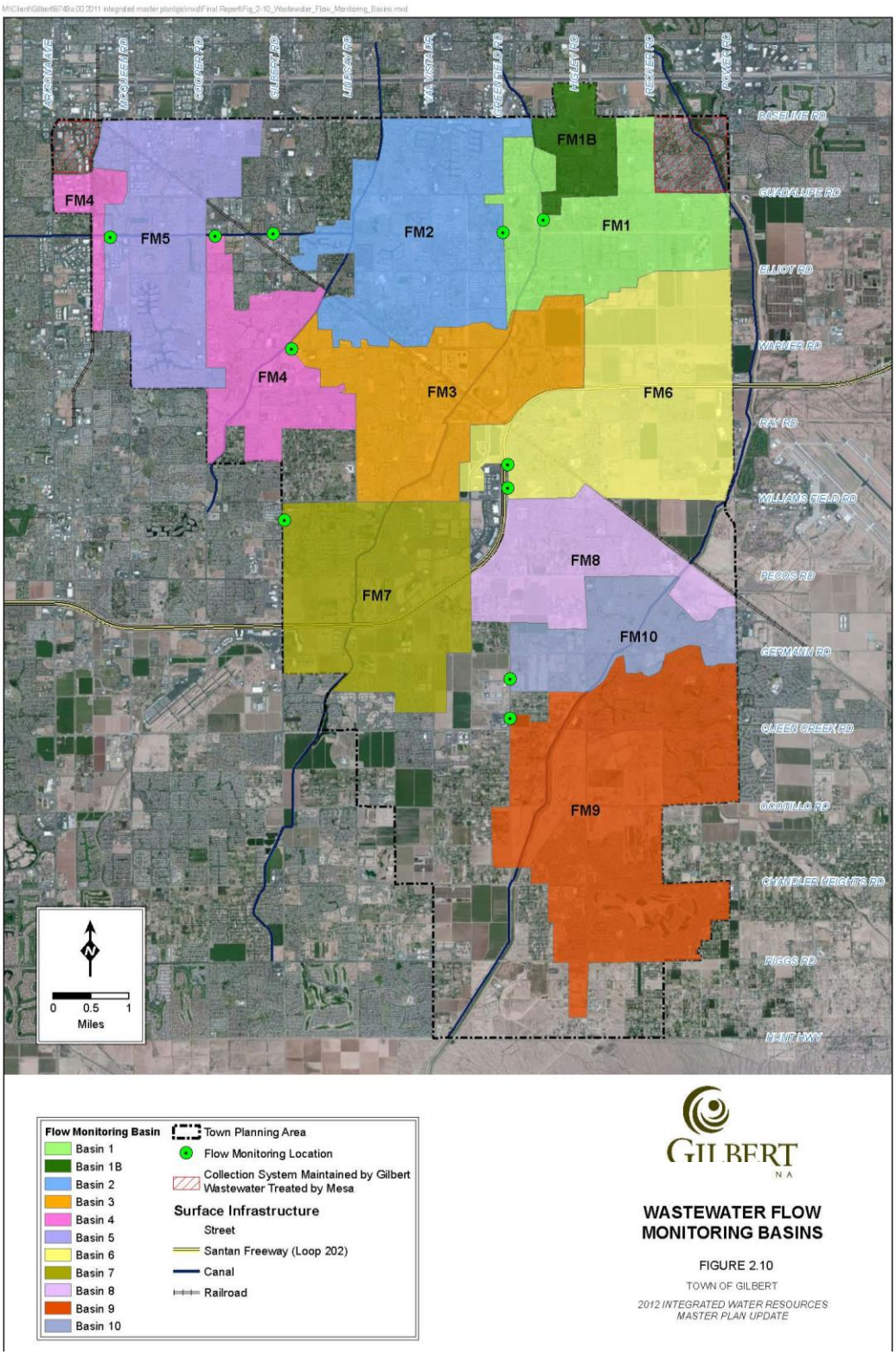


FIGURE 8-1 WASTEWATER FLOW MONITORING BASINS

9.0 RECLAIMED WATER SYSTEM

9.1 GENERAL INFORMATION

The purpose of this chapter is to provide a consistent engineering approach for the minimum criteria for design of reclaimed water distribution mains, construction, and modifying of the public reclaimed water system to be owned and operated by the Town. The chapter is intended for use in plan design, plan preparation, and the plan review process. The information provided in this chapter is not intended to cover all situations that arise, but shall provide general guidance yet not a substitute for sound engineering principles.

9.2 RECLAIMED WATER SYSTEM MASTER PLAN

The Town of Gilbert currently uses the most recent version of the Integrated Water Resources Master Plan (IWRMP) report. At the time this manual was updated, the most recent version of the IWRMP was prepared by Carollo Engineers in 2012.

The current version of the Integrated Water Resources Master Plan can be obtained by making a public records request to the Town Clerk's Office.

9.3 RECLAIMED WATER SERVICE AGREEMENTS

The Town of Gilbert requires new developments to have a Reclaimed Water Agreement in place prior to design/construction/modification of the reclaimed water system.

9.4 AVAILABILITY OF TOWN OF GILBERT RECLAIMED WATER

Questions pertaining to the availability of reclaimed water service from the Town of Gilbert should be directed to Development Services/Public Works Departments.

Questions regarding reclaimed water system expansion or extension requirements to serve proposed new projects may be directed to Development Services/Public Works Departments.

9.5 TOWN CODE

Various Town codes apply to the development of the municipal reclaimed water system including, but not limited to Chapters 10, 30, 33 and 66 of the Gilbert Municipal Code of Ordinances which contain information regarding the development in association with land development.

An electronic version of the Town Land Development Code can be referred to on the Town of Gilbert website.

A related planning document is the Reclaimed Water User's Manual. The current Reclaimed Water User's Manual is available on the Town of Gilbert website.

9.6 TOWN STANDARDS

Developers are required to install all improvements necessary to provide reclaimed water service to their development. This includes any water lines, booster pump stations, or other facilities in accordance with the adopted Reclaimed Water System Master Plan and the payment of all required development fees.

9.7 STATE AND COUNTY REGULATIONS

Arizona Department of Environmental Quality (ADEQ): Arizona Administrative Code, Title 18, Chapter 9 contains specific requirements for submittals, approvals, and notifications when extension of a public reclaimed water line is proposed. The developer and the Engineer are expected to be aware of and comply with the above referenced regulations.

Maricopa County Department of Environmental Services (MCESD): Maricopa County Environmental Services Department (MCESD) is required to review and approve all public reclaimed water line extensions and construction of wastewater related facilities within the Town's service area, prior to the Town approving the final plans.

As stipulated by the Maricopa County Health Code, all reclaimed water systems require an "Approval to Construct" document, which is issued by the MCESD.

Maricopa County also requires a Reclaimed Water Agreement be executed by the Town of Gilbert for all properties using reclaimed water.

The developer and the Engineer are expected to be aware of, and comply with, the MCESD regulations. Maricopa County Environmental Services Department (MCESD) is required to review and approve all public reclaimed water main extensions and construction of reclaimed water related facilitates within the Town's service area. Prior to Town approval of final plans, the engineer will submit a cover sheet for the final plans with a completed signature and date of approval from MCESD.

9.8 DESIGN STANDARDS AND GUIDELINES

9.8.1 Reclaimed Water System Analysis

The reclaimed water system demand can be calculated using the Reclaimed Water User's Manual, available on the Town of Gilbert website. Please refer to the manual to determine the capacity requirements for the system to be designed.

9.8.2 Reclaimed Water System Design Report

All Reclaimed water system projects may be required to submit a Reclaimed Water System Design Report. The purpose of this report is to provide the Town with the potential reclaimed water demands of the project and verify the capability of the Town's reclaimed water supply to provide the necessary flows that will be required. The Reclaimed Water System Design Report shall be prepared as delineated in Chapter 7.0.

9.8.2.1 HYDRAULIC EVALUATION

New developments that do not constitute infill shall be modeled to determine if the infrastructure is adequate to serve the development and provide the level of service as defined by the Town's performance criteria.

The Town would use the Town's reclaimed water model to determine the ability of the reclaimed water distribution system to deliver water to the site of the development.

The following scenarios shall be modeled:

- Maximum Day Demands
- Peak Hour Demands

Model simulations shall be documented in a graphical or tabular format to demonstrate that the reclaimed water distribution system will provide the required flow at suitable pressures and reclaimed water main velocities.

Boundary conditions that represent the interface between the model of the development and the rest of the distribution system need to be explained clearly.

9.8.2.2 PRELIMINARY RECLAIMED WATER SYSTEM DESIGN REPORT

A preliminary report is required at the entitlement stage of a project. The type and size of buildings may or may not be known at this stage. The preliminary report should provide the following information:

- Provide the preliminary reclaimed water demand requirements (based on either acreage or use.) This data may be refined or changed due to changes in the plan through the entitlement stage.
- If no changes are anticipated or required with the construction plans, this report may be submitted as the Final Reclaimed Water System Design Report.

The following sections are to be included in a development reclaimed water design plan report:

- Cover Page
  - Project Title
  - Prepared For
  - Prepared By
  - Engineer’s Seal
  - Date

  - Town Datum Benchmarks (BM)

- Executive Summary: Provide a one or two page statement indicating that the criteria is met, what criteria was used, and an explanation of specific steps that were taken to modify the design so that the criteria is met. Unique characteristics or challenges associated with the project should also be presented.

- Introduction:

  - Provide the project name, size, type of development

  - Purpose of the report

  - Project owner

  - Summarize the content that would be found in each major section of the report

- Project Location:

  - Provide a site description

  - Project size

  - Addresses and major streets

  - Township, Range and Section

  - Relationship to other developments or significant water features

  - Include a site map

- Purpose of Report: Explain the objectives of the report, which could be to define infrastructure requirements, satisfy regulatory requirements, identify reclaimed water supplies.

- Existing Reclaimed Water System Conditions: Describe adjacent infrastructure or existing infrastructure that will provide reclaimed water or be affected by the new development**.** Include a discussion of intended reclaimed water sources and storage.

- Proposed Reclaimed Water System Conditions: Describe planned infrastructure that will be added as part of the development.

  Refer to relevant Town or adjacent development master plan reports where appropriate.

  Include tables showing the number and size of proposed infrastructure where appropriate.

Include a map of proposed infrastructure showing locations, sizes, and relationship to streets and property parcels. The map should also be used to correlate demands in tables with specific locations in the proposed development.

- Design Criteria: Summarize the Town's standard design requirements that were applied to this development.

- Design Methodology

  - Modeling: Identify the model used and key model assumptions such as friction factors, simplifying assumptions, and boundary conditions.

  - Topology and Pressure Zones: Identify the pressure zone(s) where the development is located. The developer should check with the Town to determine if pressure zones have been established that affect the development.

  - Reclaimed Water Demand Development: Describe land use categories, population, acreages of various types of land use, demands and demand peaking factors. Include a discussion of phasing and interim demands in cases where the infrastructure for the development will need to be phased.

  - Transmission/Distribution Network: Show a network of mains with location, size, connections, valves, and reclaimed water supply sources.

  - Reclaimed Water Storage Tanks and Booster Stations: Describe location, pumping requirements, storage volumes, site layout, and fill valves where appropriate.

- Reclaimed Water Model and Results: Describe pressures, flows for conditions that have been simulated.

  Provide a figure containing a graphical representation of the model that is color coded to show pressures at nodes and reclaimed water velocities in mains for each simulation that is completed to demonstrate infrastructure adequacy.

  Provide tabular results where appropriate to highlight model results.

- Conclusions: Summarize work that has been completed; state recommendations, areas where further evaluation may be needed.

- References: List documents used in the report that contain relevant information.

- Appendices:

  Figures:

  - Vicinity Map
  - Land Use Exhibit
  - Reclaimed Water Master Plan
- Land Use Data
  - Table summarizing parcels, acreages and land use
  - Reclaimed Water System Anticipated Demands
  - Reclaimed Water Storage Calculations
- Model Output
  - Maps showing pressures and pipe velocities from the model maximum day and peak hour demand conditions

9.8.2.3 FINAL RECLAIMED WATER SYSTEM DESIGN REPORT

The final report will be required at the time of civil plan submittal. The final report will be basically the same as the preliminary report, but modified to include any changes to the project between the entitlement stage and the construction plan stage.

9.8.3 Reclaimed Water System Design

The reclaimed water system design shall follow the design requirements listed in Chapter 7.0 of this document.

9.8.4 Reclaimed Water Appurtenances

9.8.4.1 VALVES

The Town of Gilbert requires the installation of isolation valves to facilitate the operation, maintenance, and expansion of the reclaimed water distribution system. The types of valves required are dependent on the reclaimed water main size. The Town has standardized the sizes, types and locations of the water valves, with the specifics discussed below. Gate valves, required to control the operation of the reclaimed water system, shall be installed per Town of Gilbert Standard Detail GIL-710. Reclaimed water line valves shall meet or exceed the pressure classification of the water line.

9.8.4.2 VALVE SPACING

Valve spacing shall be in accordance with the Maricopa County Health Code, Arizona Department of Environmental Quality Engineering Bulletin 10 and Town of Gilbert requirements:

- Maximum valve spacing on mains less than 20 inches in diameter is 800 feet.

- Maximum valve spacing on mains 20 inches or larger in diameter is ½ of a mile.

Actual valve spacing will be less due to several variable conditions such as the location of street intersections, tees or branches, crosses, zone splits, phasing boundaries, etc., the actual valve location shall be as determined by the Town.

9.8.4.3 VALVE LOCATION

The Town of Gilbert requires valves to be installed on all feeder branches so that the distribution system can be segmented and a limited number of customers would be affected during a shutdown for maintenance or extension.

Valves are required on each branch of a cross or tee and in other locations as designated by the Town of Gilbert Public Works Department. In locations where adjacent tees or crosses are placed with no intermediate laterals or reclaimed waterline connections, valves are not required at both locations.

- A valve shall be located on each side of a canal, wash, railroad, or freeway crossing.

- Avoid valve locations in curbs, sidewalks, driveways and valley gutters, bike lanes, and vehicle wheel paths.

The preferred locations of valves shall be at the curb return of the intersecting street.

9.8.4.4 VALVE TYPES

- All valves 12 inches and smaller shall be resilient seat/wedge gate valves, epoxy coated inside per AWWA C-550.

- Valves 16 inch to 24 inch shall be double disc gate valves, epoxy-coated inside per AWWA C-550.

- Valves larger than 24 inches shall be butterfly valves per MAG Specification 630.5.

- All gate valves shall conform to Section 630.3 of the MAG Uniform Standard Specifications.

1. Gate Valves: Resilient seat gate valves mounted vertically are required on water mains 12 inches in diameter or smaller.

   Resilient seat gate valves mounted in a vertical position are preferred for reclaimed water mains that are 16 inches and larger. If clearances do not permit the installation of the valve stem and 2 inch square operating nut to be installed vertically, a horizontally-mounted gate valve or butterfly valve may be used. In general, all gate valves shall be direct-buried and shall not be located in vaults.

All gate valves shall conform to Section 630.3 of the MAG Uniform Standard Specifications, with the following exceptions:

- Bypass valves are not required on gate valve assemblies, regardless of size;
- Due to the rigidity of the joint, valves shall not contain flanged ends except when placed in vaults.
- All valves require a minimum clearance of 24 inches from top of valve nut to finish grade.
- Valve blocking details or requirements shall be provided for all valves greater than 12 inches in diameter.

2. Butterfly Valves: Butterfly valves are approved for installation on water mains, 16 inches and larger in diameter in which a resilient gate valve cannot be installed.

   At the discretion of the Public Works Department, butterfly valves with vaults may be used on reclaimed water mains that are larger than 24 inches in diameter. When not in a vault, provide minimum 24 inches clearance to top of valve from finish grade.

   The engineer is required to coordinate with the contractor the submittal of certified shop drawings to the Town of Gilbert Engineering Department Construction Services Division for review and approval prior to the shipment of the butterfly valves.

   All butterfly valves shall conform to Section 630.5(A) of the MAG Uniform Standard Specifications.

3. Tapping Sleeves and Valves: Tapping sleeves and valves (TSandV) are to be installed per MAG Standard Detail 340, which covers the installation of taps on existing 6 inch through 16 inch DIP water mains.

   TSandVs are not allowed on same size pipes. Instead, install a tee.
   A tee is preferred over a TSandV if the tapped water main can be shut down with no service disruption.

   Reverse taps for new mains and services (taps to side of main away from project receiving tapped pipe) are strongly discouraged and require special permission from the Public Works Department.

   The engineer shall detail on the improvement plans all wet taps not addressed by MAG Detail 340.

   The engineer, architect or designer is hereby notified that a contractor approved by the Town of Gilbert Public Works Department shall perform all wet taps on the Town of Gilbert public reclaimed water system. A list of the currently approved contractors is accessible on the Town of Gilbert

Engineering Services website.

Tapping sleeves shall conform to section 630.4 of the MAG Uniform Standard Specifications. A list of the currently approved stainless steel tapping sleeve and valve assemblies is accessible on the Town of Gilbert Engineering Services website.

4. Air/Vacuum Release Valves:

- Approved Air Valves: including air-release, vacuum and combination valves shall be installed on reclaimed water mains with diameters 12 inches and above at all high points on the water line, and at additional locations as determined by pipeline surge analyses or as requested by the Public Works Department. A list of the currently approved air valve assemblies is accessible on the Town of Gilbert Engineering Services website.

- Air release valves will be installed at all changes in slope of reclaimed waterlines 8 inches or larger in diameter, as follows:

  - When waterline changes from a positive slope to a zero slope, or a negative slope, in the primary direction of flow.

  - For vertical alignment changes to cross under or over another facility (such as other utilities, drainage washes, etc.).

  - Slopes on all waterlines shall not be less than 0.002 ft/ft. No zero slopes in the waterline will be approved. In the absence of any changes in slope, air release valves will be installed only at high points.

  - All air release valves will be a combination air/vacuum release type, per Town of Gilbert Standard Details.

9.8.4.5 VALVE BOX AND COVERS

All reclaimed water valves on the Town of Gilbert public water system are required to have a valve box installed. All valve boxes and covers shall be installed per MAG Standard Detail 391-1, Type C (square lid, with "Reclaimed Water" molded into the top and painted purple.

Meter boxes adjacent to or within a storm water retention basin shall be located so that the bottom of the box shall be above the high water elevation for the required retention volume.

9.8.5 Reclaimed Water System Materials

9.8.5.1 PIPE MATERIALS

All pipe for public water lines shall be in accordance with Section 610.3 of the MAG

Uniform Standard Specifications and shall meet NSF 61 Certification, except as modified below.

- Reclaimed Waterlines; 6 inches to 16 inches:
  - Ductile Iron Pipe (DIP) cement mortar lined, per MAG Standard Specification 750 with polyethylene corrosion protection per MAG Standard Specification 610.5. Sleeved in purple with "Reclaimed Water" written on the sleeve
  - Polyvinyl Chloride (PVC) pipe, pre AWWA C-900 is an acceptable pipe material for public reclaimed water main installations for pipe sizes 12 inch and under (purple, or sleeved in purple with "Reclaimed Water" written on the sleeve
- Reclaimed Waterlines Larger than 16 inches:
  - Ductile Iron Pipe (DIP) that is cement mortar lined and seal coated. Pipe is per MAG Standard Specification 750 with polyethylene corrosion protection per MAG Standard Specification 610.5 sleeved in purple with "Reclaimed Water" written on the sleeve.
  - Concrete Cylinder Pipe (CCP) shall be designed, manufactured and tested in accordance with AWWA C-303. Pipe must also comply with MAG Standard Specification 758. sleeved in purple with "Reclaimed Water" written on the sleeve
  - Polyvinyl Chloride (PVC) pipe is not an acceptable pipe material for public water main installations or extensions to the Town of Gilbert public reclaimed water system.
  - Pre-stressed Concrete Cylinder Pipe (PCCP) is acceptable for reclaimed water mains with diameters equal to or greater than 42 inches, and shall be designed, manufactured and tested in accordance with AWWA C-301. Pipe must also comply with MAG Standard Specification 758. sleeved in purple with "Reclaimed Water" written on the sleeve.
- Service connections for meters
  - Less than 4 inches shall use copper
  - 4 inches and greater shall use DIP
- Electronic Marker
  - Tracer wire shall be placed above all public waterlines.
  - Install radio balls at each waterline bend (11¼, 22½, 45, and 90 degree), per Town of Gilbert Standard Details.

All other pipe materials shall be considered on a case-by-case basis. Projects

desiring to utilize a different pipe material shall provide an analysis report providing the justification for the desired material during the plan review process.

9.8.5.2 CORROSION PROTECTION

Installation of Ductile Iron Pipe requires Polyethylene Corrosion Protection per Section 610.5 of the MAG Uniform Standard Specifications, or as specified by the Town.

- A corrosion monitoring system shall be installed on concrete cylinder water mains. Ductile Iron Pipe shall also be isolated from the concrete cylinder water main by the use of flange isolation kits equipped with test leads for monitoring purposes.
- The brass corporation stop and the end of any concrete cylinder water pipe shall be coated with a protective coating prior to backfill.
- Tapping sleeves shall incorporate a flange isolation kit between the tapping sleeve and the cast iron valve.
- Concrete cylinder water transmission lines shall be designed and installed to provide for future cathodic protection. Continuity tests shall be conducted and certified by a qualified corrosion-engineering firm employed by the developer or their representatives.

9.8.5.3 COUPLINGS, JOINTS, GASKETS AND FLANGES

Couplings, Joints, Gaskets and Flanges shall conform to Section 610.13 of the MAG Standard Specifications, unless otherwise approved.

9.8.5.4 RESTRAINED JOINTS

Restrained joints are required at all bends, elbows, tees, crosses, dead ends, stubs, curb stops, taps, valve locations on large diameter reclaimed water mains, etc where water flow changes direction or is stopped.

Acceptable restrained joint systems include the following:

- Thrust blocking per MAG Standard Detail 380 for water mains that are 6 inches through 16 inches in diameter.
- Ductile Iron Pipe (DIP) joint restraint shall comply with MAG Standard Detail 303. Deviations from restrained lengths presented in MAG Standard Detail 303 must be supported by engineering calculations and accepted by the Development Services Department prior to construction.
- Restraining joints with tie rods per MAG Standard Detail 302.
- Retainer glands of the "Megalug" Series 1100 or approved equal are acceptable. Retainer glands utilizing setscrews are not acceptable.

- Mechanical restraining systems such as Pacific States lock mechanical joint, Clow Super-lock joint, US Pipe TR-Flex Gripper ring, American Lock-ring restraining joint, Griffin snap-lock restraining joint, TUF-Grip by Tyler Union, StarGrip by Star Pipe Products, or other approved equals as determined by the Town Engineer.

- Flanged type restraining for above ground piping or piping within a vault.

- Continuously welded joints with variable pipe cylinder thickness for Concrete Cylinder Pipe reclaimed water mains.

Joint restraints shall be clearly shown in profile sheets for reclaimed water mains with diameters 12 inches and above. Restraint lengths shall include stationing callouts at the beginning and end of each segment of pipe to be restrained.

When the reclaimed water main is 30 inches or larger, the engineer shall submit joint restraint calculations and details to the Development Services Department for review and approval.

9.8.5.5 APPROVED VALVE MANUFACTURERS

The Town of Gilbert maintains a list of the approved manufacturers for various types of valves that are used as appurtenances to the waterline distribution system.

The latest list can be found on the Town of Gilbert Engineering Services website.

9.9 FINAL RECLAIMED WATER PLAN REQUIREMENTS

Construction Plan Submittal Requirements for the preparation of final plans in the Town are described in Chapter 2.0.

1. Show all existing utility locations, sizes, easements, rights-of-way, and other structural features of the reclaimed water line.

2. A key map with the following information:

    - All streets, alleys, easements, tracts and parcels

    - Proposed reclaimed water system including valves

    - Pipe sizes

3. Note all jurisdictions in which the project is located, including City, State, and County. It is the contractor's responsibility to acquire the appropriate permit.

4. Phase limits and phase numbers if applicable.

5. Match lines and sheet references must be shown on each sheet with stations. Paving match lines may not always work.

6. Phase limits and numbers must be shown on all applicable sheets. Phase lines

are to follow lot lines where possible.

7. All existing reclaimed water lines must be shown with dimensions to the centerline of the street.

8. All reclaimed water lines proposed by adjacent projects shall be shown and dimensioned.

9. Station reclaimed water lines along the centerline of the street or the pipe. Profile all reclaimed water lines 12 inches and larger with slope and invert elevation depicted. Show in profile the finish ground elevations over the reclaimed water line where the reclaimed water line is constructed outside of paving, or show in profile the finish pavement design elevations where the reclaimed water line is constructed under paving.

10. Where reclaimed water lines cross sewer lines, storm drains, or drainage culverts, show the relationship in both plan and profile with minimum clearances dimensioned. Identify all pipes, valves, and appurtenances, etc.

11. No permits for public reclaimed water line construction will be issued until the owner or engineer has provided the necessary easements and rights-of-way. The instruments of dedication must be approved and submitted to the Town for recording at the Maricopa County Recorder's Office.

9.10 SUBMITTAL CHECKLIST

The latest version of the Reclaimed Water System Checklist can be found on the Town of Gilbert Engineering Services website. This Checklist will be periodically updated by the Town of Gilbert. At the time of the publication of these Standards it was as follows:

1. Reclaimed water lines shall comply with AWWA standard PVC C-900 Class 200. Rieber sealing system gasket joint is recommended and preferred.

2. All fittings and valves shall be "mechanical joint" type, except as shown on Town of Gilbert Standard Detail GIL-320.

3. Pipe bedding for PVC C-900 shall conform to Town of Gilbert Standard Detail GIL-302.

4. Valve spacing as per Town of Gilbert requirements. Reclaimed Water plans shall show distances between all fittings. This will be required to obtain approval of Record Drawings.

5. A note for the contractor to install a temporary plug or valves on a section of new line is required to test lines before connecting to existing reclaimed water system where there is no valve on the end of existing line.

6. All services to lots shall run parallel with the lot line to the main. Minimum six-foot spacing between sewer, reclaimed water and water services. In no case shall services or meter boxes be located under or in driveways. Services

shall be placed at a maximum of 3 feet from the property line.

7. Review of future extension problems with respect to proposed lines and valves in order to prevent loss of service to customers.

8. Gas lines shall not be permitted in the same trench or public utility easement (PUE) that contains any reclaimed water mains. All gas services are to be installed in a separate trench.

9. Valves on dead end reclaimed water lines shall be placed to cause the least amount of inconvenience to existing services when the line is extended. If the valve is to be placed near the end of the stub, there should be at least 2 full joints of pipe between the valve and the plug for lines 12 inches and larger. One full joint should be installed between valve and plug for lines smaller than 12 inches.

10. 12 foot "exclusive reclaimed water line easement" is required for all reclaimed water lines that will be installed on private property or private streets.

    Use the following table for Meter Boxes and Meter Box Covers:

MAG Standard Details		
Meter Size	**Box No**	**Box Cover No**
¾"	#A6000485*	#A6000484*
1"	#A6000485*	#A6000484*
2"	320-4	313-No. 4

* Armorcast Products Company; Cover should be purple.

    Callout the number of the MAG Standard Detail Numbers for your Meter Boxes and Covers in your list of quantities.

11. All connections to Reclaimed Water Reservoirs from the Reclaimed Water Distribution system shall have an air gap.

9.11 GENERAL NOTES

The latest version of Reclaimed Water System General Notes can be found on the Town of Gilbert Engineering Services website. These Notes will be periodically updated by the Town of Gilbert. At the time of the publication of these Standards they were as follows:

1. All construction shall be in accordance with current MAG Specifications and Details with the Town of Gilbert's additions and deletions.

2. Reclaimed water lines shall comply with AWWA standard PVC C-900 Class 200. Rieber sealing system gasket joint is recommended and preferred. Pipe bedding for PVC C-900 shall conform to Town of Gilbert Standard Detail GIL-302. All fittings and valves shall be "mechanical joint" type, except as shown on Town of Gilbert Standard Detail GIL-320. All water lines to be properly restrained using joint system such as: Megalug or an approved equal.

3. The Town Engineer shall be notified 24 hours prior to starting the different phases of construction for scheduling inspections.

4. Acceptance of the completed right-of-way improvements will not be given until Record Drawings have been submitted to and approved by the Town Engineer.

5. Location of all reclaimed water valves must be referenced at all times during construction and made available to the Reclaimed Water Distribution Section. Only Town employees are authorized to operate the valves and connections to the Town's reclaimed water system.

6. Any work performed without the approval of the Town Engineer and/or all work and materials not in conformance with the specifications is subject to removal and replacement at the contactor's expense.

7. The contractor will uncover all existing lines being tied into to verify their location prior to trenching. The contractor will locate or have located all existing underground pipelines, telephone and electric conduits, and structures in advance of construction and will observe all possible precautions to avoid damage to same. Call Arizona 811, Blue Stake Center at (602) 263-1100 and notify SRP.

8. All valves shall be gate type, unless otherwise noted, and open counter clockwise. Reclaimed Water valves shall be Mueller, Clow, Waterous or approved equal.

9. Backfilling shall not be started until lines are approved by the Town Engineer's Representative.

10. All backfill for reclaimed water lines "shall" be per Town of Gilbert Standard Detail No. GIL-302. All pavement and surface restoration "shall" be per Town of Gilbert Standard Detail GIL-270.

11. The contractor shall obtain all necessary permits prior to construction.

12. The Town of Gilbert is not responsible for liability accrued due to delays and/or damage to utilities in conjunction with this construction. Also, the Town will not participate in the cost of construction or utility relocation.

13. Ordinance #1437, approved by the Town Council in October 2002, states: No construction water from fire hydrants shall be used on parcels or lots of ten acres or more in size. For more information, the ordinance is located on the Town of Gilbert website. To obtain construction water, the contractor is required to make application with the Reclaimed Water Section of the Public Works Department. A security deposit is required to receive a fire hydrant meter. The Town reserves the right to specify the time and location that construction water can be delivered.

14. Water services shall be installed in accordance with the Town of Gilbert Standard Detail GIL-310.

15. Traffic control shall be per the latest Edition of the Manual on Uniform Traffic Control Devices and Town of Gilbert Standard Details.

16. The Town Inspector will determine the number and location of the required compaction tests. The contractor/developer will notify the testing lab, and pay the costs to perform the tests.

17. The Town will not accept reclaimed water lines with less than 3 feet of cover.

18. A minimum of six-foot horizontal spacing between sewer, reclaimed water and water services shall be maintained.

19. Prior to final approval and acceptance of the work the developer/contractor will be required to clean and repair adjacent (off-project) roadways used during the course of their construction.

20. A 2" x 4" stake (painted purple) shall be set one foot behind each reclaimed water service. All 2" x 4" stakes marking reclaimed water services shall be 5 feet in length and firmly set into the ground to a depth of 3 feet.

    NOTE: A Town of Gilbert permit is required for the installation of any landscaping or irrigation system. Irrigation lines must be inspected before backfilling.

    Use the following table for meter boxes and meter box covers:

MAG Standard Details		
Meter Size	**MAG Std Detail**	**MAG Std Box No**
¾"	#A6000485*	#A6000484*
1"	#A6000485*	#A6000484*
2"	320-4	313-No. 4

* Armorcast Products Company; purple cover.

All meters shall meet AWWA new meter test standards. Contact the Reclaimed Water Section for meter specifications (480-503-6475).

10.0 SOLID WASTE FACILITIES

10.1 GENERAL INFORMATION

The purpose of this chapter is to provide a consistent engineering approach for the minimum criteria for design of solid waste collection and support facilities, both private and those to be owned and operated by the Town. The chapter is intended for use in plan design, plan preparation, and the plan review process. The information provided in this chapter is not intended to cover all situations that arise, but shall provide general guidance yet not a substitute for sound engineering principles.

10.2 TOWN CODE

An electronic version of the Town of Gilbert Municipal Code can be referred to on the Town of Gilbert website.

10.3 TOWN STANDARDS

New land development activities will result in a need for a new solid waste facilities and an expansion of the solid waste collection system. The Town of Gilbert has developed standards to alleviate or reduce these potential results. The Engineer should be aware of, and become familiar with, the various standards that pertain to land development within the Town of Gilbert.

10.4 SOLID WASTE DESIGN REQUIREMENTS

10.4.1 Single-Family Residential Developments

Applicable to zoning classifications R1-43 (Rural Residential) through R-2 (Two-Family Duplex Residential, with individual garages)

The Town of Gilbert is required by Arizona law to provide single-family residences with twice weekly service--one for collection of trash and one for collection of commingled recyclable materials. Additionally, the Town provides single-family residences with a monthly uncontained (or bulk) trash and green waste collection service. In order for the Town to continue to meet its obligation to all of its customers, developer plans for new single-family residential developments must accommodate weekly trash and recycling collection and monthly uncontained trash and green waste collection.

The Maricopa County Department of Public Health requires the Town of Gilbert to inspect a percentage of residential trash containers each service day to ensure compliance with County health regulations (e.g., compliance with bag and tie requirements). Additionally, a percentage of residential recycling containers are inspected each service day to ensure that non-recyclable contaminants are not present. In order for the Town's inspection program to be effective, inspectors must be able to identify each non-compliant serviced entity to allow corrective action to be taken. Developer plans for new single-family residential developments must, therefore, provide a means for correlating a trash and recycling container, which has been set out for service, with the dwelling unit from which it came.

The Town of Gilbert uses automated side-loading collection equipment for both trash and recycling collection. This equipment services the plastic trash or recycling containers from the right side only.

For safety reasons, Town of Gilbert collection equipment is not allowed to back more than 50 feet. As a result, collection service will not be provided for containers located on dead end streets or drives.

As a general rule, refuse collection services (trash, recycling, bulk trash and green waste) will not be provided in alleys. Service in alleys requires the specific approval of the Public Works Field Operations Manager, or his designee. A minimum criterion for the approval of alley service is that the safe and unimpeded operation of collection equipment can be assured. This requires that no obstructions be allowed in the alley, and may require single-sided service (i.e., all dwelling units backing onto the alley would be required to place their containers on the same side of the alley).

Minimum alley width is 20 feet where alleys are 23 feet and wider, two sided collection is possible. There will be no bulk trash collection in an alley. Alleys less than 23 feet wide require one sided collection, with location identified by a curb marking or 3 feet by 3 feet pad, with 2 feet between. No parking in alleys will be allowed. Design of drives within a project site shall take solid waste collection routes into account. The collection vehicle shall travel through a site once without backtracking. Drives shall have a minimum width of 20 feet, and shall be free of speed humps and speed bumps.

Restrictions similar to those for alleys may also be necessary for narrow streets. In this instance, on-street parking may be prohibited, or restricted to one side of the street, and, for collection efficiency, single-sided refuse collection service may be specified.

Solid waste collection vehicle routes shall be clear of all obstructions to prevent damage from the collection vehicle or damage to the vehicle itself. Obstructions, including but not limited to, plant growth, structures, and athletic equipment, shall not project into the roadway or alley, and a minimum overhead clearance of 14 feet is required.

10.4.2 Multi-family Residential Developments

Applicable to zoning classifications R-2 (Two-Family Duplex Residential, without individual garages), R-3 (Multi-Family Residential, 18 dwelling units per acre), and R-4 (Multi-Family Residential, 22 dwelling units per acre)

Refuse container enclosures shall be installed per Figure 10-1. The Public Works Field Operations Manager, or his designee, shall approve all enclosures and enclosure locations.

Refuse container enclosures shall accommodate 3-cubic yard, 4-cubic yard, 6-cubic yard, and 8-cubic yard containers.

The size and number of refuse containers needed depends on the size of the

development. Typically, total volume needs can be calculated based on one-half cubic yard per living unit per week. For example, a development with 240 units x 0.5 yards = 120 cubic yards per week or 10 6-cubic yard containers serviced two times per week (10 x 6 x 2 = 120 cubic yards).

Refuse container enclosures shall be located such that each living unit is no more than 300 feet from a container.

Multi-family residential developments shall be designed with either single- or double-wide enclosures for trash. A 5 foot by 5 foot concrete pad shall be located adjacent to each enclosure to accommodate a 300-gallon recycling container. The area around the pad may be screened but must be clear of obstructions to allow the container to be serviced by an automated side-loading collection vehicle.

The basic dimensions and construction criteria for container enclosures are as follows:

10.4.2.1 SINGLE-WIDE ENCLOSURE (See Town of Gilbert Standard Detail GIL–180)

- Enclosure depth: 9 feet minimum
- Three safety posts shall be installed, spaced 3 feet apart, centered on the back screen wall and 8 feet from the inside edge of the enclosure gate to the inside edge of the safety post. Safety posts shall be painted to contrast with the enclosure, in a color used for trim in the development.
- Gates shall be solid and architecturally coordinated with the development.

10.4.2.2 DOUBLE-WIDE ENCLOSURE (See Town of Gilbert Standard Detail GIL–181)

- Two sets of three of safety posts shall be installed, spaced 3 feet apart, centered on each 11 or 12 foot segment of the back screen wall and 8 feet from the inside edge of the enclosure gate to the inside edge of the safety post. Safety posts shall be painted to contrast with the enclosure, in a color used for trim in the development.
- Gates shall be solid and architecturally coordinated with the development.

10.4.2.3 TRIPLE-WIDE ENCLOSURE (See Town of Gilbert Standard Detail GIL–182)

- Three sets of three safety posts shall be installed, spaced 3 feet apart, centered on each 11 or 12 foot segment of the back screen wall and 8 feet from the inside edge of the enclosure gate to the inside edge of the safety post. Safety posts shall be painted to contrast with the enclosure, in a color used for trim in the development.
- Gates shall be solid and architecturally coordinated with the development.
- Double- and triple-wide enclosures may be designed and constructed in an echelon (angled) configuration. When this option is chosen, each half or third of the enclosures, respectively, shall follow the design and construction criteria

of a single-wide enclosure with common internal screen walls.

10.4.2.4 REQUIREMENTS FOR ALL ENCLOSURES

- Containers that are visible from a public roadway shall have enclosure gates that fully screen the containers from public view.
- Gates, hinges, and mounting hardware shall be installed so there is a minimum 9 foot depth created within each enclosure.
- Gates, hinges, and mounting hardware shall not intrude upon the minimum net enclosure opening.
- Each enclosure gate shall have drop pins installed and holes drilled in the concrete at both the open and closed positions to prevent gates from closing into the collection vehicle or opening into drives and obstructing the movement of other vehicles.
- Container enclosures are to be angled no more than 30 degrees from the center line of the solid waste collection vehicle route.
- Container enclosures shall be a minimum of 5 feet from any planned or existing structure at its closest point (per Uniform Fire Code).
- Enclosure gates must be kept closed at all times except for the day(s) of collection. A person gate may be installed to allow access to the container(s) without the need to open the main gates.
- Solid waste collection vehicles require a minimum turning radius of 35 feet inside and 55 feet outside.
- Refuse and recycling collection truck driveways, routes, and turn-arounds to the containers and enclosure area shall be asphalt, designed for collection vehicles weighing approximately 30 tons when loaded. The property owner shall be responsible for the maintenance of the asphalt.
- No awnings, building projections, or landscaping vegetation shall project into the solid waste collection vehicle route. A minimum overhead clearance of 14 feet is required in the drive and 25 feet over the container enclosure area from the steel safety posts back a distance of 50 feet.
- Routes shall be clear of all obstructions (curbs, walls, overhead wires, awnings, building projections, and vegetation) to prevent damage from the collection vehicle or damage to the vehicle itself.
- Design of drives within a project site shall take solid waste collection routes into account. The collection vehicle shall travel through a site once without backtracking. Drives shall have a minimum width of 20 feet, and shall be free of speed humps and speed bumps. Container enclosures shall be oriented with respect to the drives to allow a straight-in approach to the container by the collection vehicle. The collection vehicle will not perform "Y" turns or

related maneuvers (i.e., turn and back up) in order to line up with the container.

10.4.3 Non-Residential Developments

Non-residential refuse container enclosures shall be installed per Figure 10-1. The Environmental Services Manager, or his designee, shall approve all enclosures and enclosure locations.

Refuse container enclosures shall accommodate 3-cubic yard, 4-cubic yard, 6-cubic yard, and 8-cubic yard containers.

The basic dimensions and construction criteria for Single-wide, Double-wide and Triple-wide enclosures shall be the same as for Multi-Family developments.

Restaurants and Fast Food Establishments -The enclosure shall be designed to accommodate refuse and recycling containers and a tallow bin for the collection of concentrated waste oil and grease. This will require a minimum of 5 feet greater width for the enclosure than reflected in Town of Gilbert Standard Detail GIL-183 and installation of an additional interior wall.

10.4.4 Solid Waste Requirements

Roll off and compactor installation: Concrete pad – preferred dimensions of pad are 14 feet wide and a length of 5 feet greater than the combined length of the compactor and container. (See Town of Gilbert Standard Detail GIL-184)

Examples:

Pad: 40 feet long – stationary and container

Pad: 35 feet long – self contained

Pad: 12 feet long – vertical compactor

Pad: 30 feet long – 20 and 40 yard roll offs

- The pad should be a minimum of 3000 psi concrete, wire mesh reinforced and 6 inches thick
- Electrical installation – to be designed by a registered State of Arizona electrical engineer

10.5 SUBMITTAL CHECKLIST

At the time these Standards were published there was no Solid Waste Facilities Checklist. Please go to the Town of Gilbert Engineering Services website to verify if a Solid Waste Facilities Checklist has been developed for the latest one.

10.6 GENERAL NOTES

At the time these Standards were published there were no Solid Waste Facilities General Notes. Please go to the Town of Gilbert Engineering Services website to verify if Solid Waste Facilities General Notes have been developed.

10.7 FIGURES

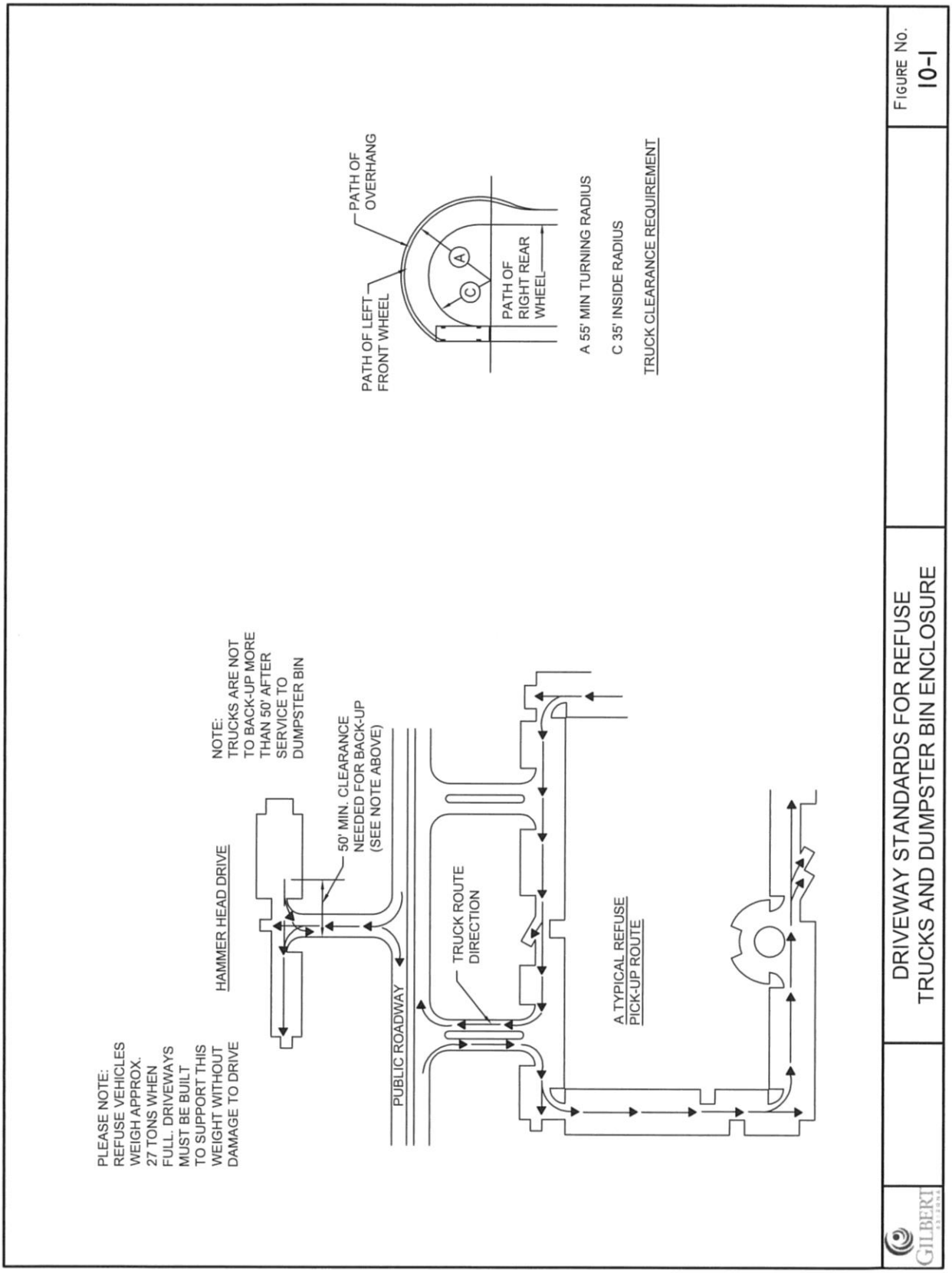


FIGURE 10-1 DRIVEWAY STANDARDS FOR REFUSE TRUCKS AND DUMPSTER BIN ENCLOSURE

11.0 PUBLIC UTILITIES (NOT OWNED BY TOWN OF GILBERT)

11.1 GENERAL INFORMATION

The purpose of this chapter is to provide a consistent approach and set the minimum criteria for design, construction, and modification of utilities or Town Franchisee's other than those owned by the Town of Gilbert. The chapter is intended for use in plan design, plan preparation, and the plan review and permitting process. The information provided in this chapter is not intended to cover all situations that arise, but shall provide general guidance yet not a substitute for sound engineering and design principles.

Non-Town utilities are those companies, corporations, or entities that provide some type of utility service, whether it is electricity, telecommunications, water, or information services that are not owned, operated or generated by the Town of Gilbert. Within the Town of Gilbert, Non-Town utilities are provided by, but not limited, to the following companies or utilities: AGL Networks, Air Products, Arizona Water Company, AT&T, Cox Communications, Eagle West Communications, CenturyLink, Roosevelt Water Conservation District, Salt River Project, APS, Southwest Gas Corporation, and Williams Communications.

11.2 TOWN CODE

An electronic version of the Town of Gilbert Municipal Code can be referred to on the Town of Gilbert website.

11.3 TOWN STANDARDS

Non-Town Utility franchisees and permitees are required to install all improvements necessary to provide Non-Town utilities to their customers. All improvements must comply with these standards and the permitee is responsible for the payment of all required permit fees.

11.3.1 Placement in Right-Of-Way & Easements

Utility companies that are recognized as a public utility or have been granted a franchise license by the Town Council to serve the citizens of Gilbert are allowed to place facilities within the dedicated public rights-of-way and public easements subject to the review and approval of the Town of Gilbert. All other private facilities are prohibited from utilizing the public rights-of-way and public easements without an encroachment agreement.

11.3.2 Regulated Use of Right-Of-Way & Easements

In order to prevent or reduce utility conflicts between the Town utilities and those provided by other companies, the Town of Gilbert has adopted ordinances and standards to regulate the use of the public right-of-way, which includes dedicated right-of-way for public streets as well as the public utility easements (PUE).

The design professional and the Non-Town Utility providers should be aware of, and become familiar with, the various regulations that pertain to land development

within the Town of Gilbert and its utility service areas.

Town ordinances provide for, and require that, all private land developments in the Town of Gilbert be developed, operated and maintained in accordance with applicable regulations, standards and requirements.

11.3.3 Utility Undergrounding

Town policy requires that electric lines and communication lines shall be constructed underground in accordance with the requirements of the Town Code, Chapter 10, Article VIII.

11.3.4 Utility Street Crossings

Utility crossings of public streets are to be avoided, whether overhead or underground. Open trenching (pavement cut) of public streets are not allowed for pavement less than 5 years old. When the designer deems a utility must cross a public street, the designer shall provide an engineering evaluation that explains why alternatives to the crossing cannot be avoided.

11.3.5 Permits for Maintenance & Repair

Any maintenance or repairs performed on irrigation tile, pipe, conduit or facilities located in the public right-of-way or public utility easements will require:

- That construction plans be submitted to the Development Services Department for review, comment and/or approval.
- The Permit Services section of Development Services Department shall issue a right-of-way permit, before repairs are made.

11.4 PERMITS

Permits are required for projects where the developer's contractor(s) will be installing facilities (i.e., conduit) for the use of the Non-Town Utilities. A contractor with the appropriate license and current Certificate of Insurance on file may obtain this permit from the Permit Services Section of the Development Services Department.

11.5 AVAILABILITY OF NON-TOWN UTILITIES

Questions regarding the products, services, operations and processes of the various utility providers should be directed to the individual utility companies.

11.6 DESIGN STANDARDS, SPECIFICATIONS, AND GUIDELINES

11.6.1 Location

In general, Non-Town utility/facilities shall be located on the south or west sides of the public streets, and on the opposite side of the public street from the public water system unless otherwise approved. Unusual conditions or sites will be

reviewed on a case-by-case basis as to the appropriate location of the Non-Town facility in relation to Town's public utilities and pavement. Utilize Record Drawings and physical verification to locate existing pavement and utility stubs and design to connect to the existing stubs where feasible.

11.6.2 Adequate Clearances

Proposed Non-Town utilities/facilities must maintain adequate clearances between the proposed Non-Town facility and the Town of Gilbert public utilities. Clearances are measured from the outer edge of the conduits or structures.

11.6.3 Horizontal Bores

Where the utility provider will be placing facilities in a developer provided conduit, the developer will be required to provide construction plans showing the bore(s) required to install the utility conduit. It is the utility provider's responsibility to coordinate this requirement with the project developer. Pothole and profile information shall be provided to the Engineering Inspector prior to boring.

11.6.4 Pavement Cuts

Where appropriate, designs with public street pavement cuts shall be in accordance with Town of Gilbert Standard Details. Where the utility provider will be placing facilities in developer provided conduit, the developer will be required to provide construction plans showing the alignments, trenches, and bore holes required to install the utility conduit in Gilbert's rights-of-way and easement. It is the responsibility of the project developer and utility provider to coordinate this requirement with each other.

11.6.5 Trench Backfill & Pavement Replacement

The contractor is responsible for backfilling and replacing pavement in all public street excavations per the Town of Gilbert Standard Details.

11.6.6 Overhead Facilities

Town policy requires that electric lines and communication lines shall be constructed underground in accordance with the requirements of the Town Code, Chapter 10, Article VIII.

11.6.7 Flood Irrigation Facilities

11.6.7.1 STORM DRAIN CONNECTIONS

The Town of Gilbert prohibits the connection of any flood irrigation system to a public storm drain facility.

The Town of Gilbert prohibits the connection of any storm drain facility accepting public street storm water runoff, directly or indirectly, to the Salt River Project or Roosevelt Water Conservation District irrigation systems.

11.6.7.2 ACCESS TO FACILITIES

The Town of Gilbert requires that access to irrigation facilities be provided from the property side of the site.

11.6.7.3 ABANDONMENT

The abandonment / vacation process for easements and right-of-way is provided in the Town's Land Development Code, Chapter 3, Article 1.3.

11.7 NON-TOWN UTILITY CONSTRUCTION PLANS

Non-Town Utility plans are typically submitted to the Town by the public or private utility for approval to place their facilities within the public rights-of-way and public easements. The Non-Town Utility facilities range from totally utility owned and provided to utility facilities within a developer provided conduit.

11.7.1 Minimum Standards

Identify and dimension from the monument and/or centerline of the road right of way the following:

- All existing and/or proposed public right of way;
- All existing and/or proposed public utility and/or public utility and facility easements or other public easements;
- The existing and/or proposed street improvements (pavement, curb and gutter, sidewalk, driveways, street light poles and cabinets);
- All existing and/or proposed Town of Gilbert public utilities, (water, sewer, gas, storm drain, street lights)
- All above ground facilities including those owned by other providers.
- All private utility systems including any developer provided conduit, located within the public right of way or public utility easements shall be clearly identified and dimensioned.

11.7.2 Sheet Size for Non-Town Utility Plans

- Minimum sheet size of 8.5" x 11"
- Maximum sheet size of 24" x 36"

11.8 PERMIT APPLICATION & PLAN SUBMITTAL

11.8.1 Submittal to Town

Submittals of the construction documents for the proposed Non-Town Utility shall be made to the Development Services Department.

11.8.2 Application Form

The Town of Gilbert Permit Application is a one page application that is filled out, signed by an appropriate and authorized representative of the utility provider, and included with the construction plan submittal. Copies of the application form are available on the Town of Gilbert website.

11.8.3 Required Copies

Submit 3 complete sets of plans along with the completed permit application. The applicant will be notified of plan correction comments and/or permit approval by email or telephone. The applicant may be required to pick up their plans, correction comments and/or permit at Development Services Department.

11.9 PERMIT REVIEW, APPROVAL AND ISSUANCE

11.9.1 Plan Review

Town of Gilbert staff will perform a review of the proposed Non-Town Utility plans to examine the relationship to existing and/or proposed Town of Gilbert utilities and facilities.

Upon completion of the review, staff will either generate a list of correction comments or will approve the proposed Non-Town Utility facilities by issuing a permit for the proposed facilities.

11.9.2 Condition Adherence

The applicant shall adhere to all conditions stated on Permit.

12.0 LANDSCAPING AND IRRIGATION

12.1 GENERAL INFORMATION

The purpose of this chapter is to provide a consistent approach and set the minimum criteria for design, construction, and modifying of landscaping and irrigation systems. The chapter is intended for use in plan design, plan preparation, and the plan review process. The information provided in this chapter is not intended to cover all situations that arise, but shall provide general guidance yet not a substitute for sound engineering and design principles.

12.2 TOWN CODE

The Town of Gilbert currently uses the most recent version of Land Development Code (LDC) to regulate and guide the development of landscaping and irrigation. Refer to the Town website for the Town of Gilbert Land Development Code.

Various articles of the LDC apply to the development of landscape improvements including, but not limited to LDC Sections 4.2010, 4.212, LDC Article 4.3, Town of Gilbert Standard (Water Conservation) Ordinance #1316, Residential Design and Development Guidelines, Gateway Area Right-of-Way Improvement Standards and Streetscape Design Standards, Commercial Design Guidelines, Industrial/Employment Design Guidelines, Trail Design Guidelines, Heritage District Design Guidelines and the Town of Gilbert General Plan.

12.3 TOWN STANDARDS

Developers are required to install all improvements necessary to provide landscaping and irrigation to their development and, where required, in public rights of way. This includes any landscape and irrigation improvements that are required in the Land Development Code. They are also responsible for the payment of all required development fees.

12.4 STATE REGULATIONS

Street trees, shrubs, accent plants, and ground covers planted in the right-of-way shall be selected from the (ADWR) Arizona Department of Water Resources Low Water Use / Drought Tolerant Plant List for the Phoenix Active Management Area per LDC 4.303M1.6.

12.5 DESIGN STANDARDS AND GUIDELINES

Landscaping Design Standards and Guidelines are contained in the Town of Gilbert Land Development Code – Article 4.3 Landscape Regulations.

12.6 DESCRIPTION OF STREETSCAPES

A streetscape refers to the many visible above grade and surface elements that make up a typical roadway environment. However, due to the fact that many of the visible elements are directly affected by the existence of utilities and systems that occur below grade, the designer must work around and make consideration for both

surface and sub-surface elements and their impact on overall streetscape environment. Typical streetscape elements include: vehicular and pedestrian pavements, transit and bicycle lanes and facilities such as bus stops, above ground, surface and sub-surface utilities and lines, traffic signals, visibility, accessibility, grading and drainage, lighting, walls, signage, and landscaping.

12.7 DESIGN INTENT FOR STREETSCAPES

Streetscapes are signature features of various communities throughout the Town of Gilbert. Freeways, arterial, collector, and local streets, contribute greatly to the aesthetics of our community and set a precedent for coordination with private developers. Streetscapes enhance and define the character of the adjacent community as viewed by residents and visitors. Streetscapes also help to organize the visual quality of the community by providing continuity and improving the image and character of the overall Town. Although not always aware of it, the general public is influenced by the aesthetic appeal provided by streetscape design as well as how it supports or fits the vision of their community.

Streetscape design should consider local context of the roadway as well as unique features and focal points of the adjacent community. Quality streetscape design is beneficial toward enhancement of positive community landmarks and features and reduces or mitigates undesirable features.

Streetscape design within public rights-of-way should consider views of the immediate streetscape from the perspective of the vehicle and pedestrian users as well as views between the roadway and the adjacent community. Where distant views offer visual access to scenic or significant features, these views should be maintained or enhanced whenever possible.

12.8 GENERAL PROVISIONS FOR STREETSCAPES

12.8.1 Landscape Elements

Streetscapes include landscape related elements that fulfill the purposes of the design criteria. Landscape elements can include planting materials, site features and furnishings, decorative paving, boulders, river rock, benches, water features, sculpture, shade structures, signage, and other materials used for enhancing the appearance of a streetscape.

12.8.2 Safety and Accessibility

Safety must be an integral part of all public right-of-way design, including streetscape improvements. Streetscape design must consider the safety of all right-of-way users from vehicular and pedestrian to bicycle and maintenance personnel. Because many of the landscape elements that make up the streetscape are not constant, the designer must be aware of how the various elements will change and how these changes will affect the relationship between the streetscape elements and the users.

Accessibility issues are required to comply with the American Disabilities Act. Coordination of landscape elements with civil and other improvements should be a

priority early in the design phase to address accessibility issues.

12.9 PLANT MATERIAL IN RIGHT-OF-WAY; REQUIREMENTS, DENSITY AND SELECTION

Plant materials shall consist of ground cover plants, ornamental grasses, succulents, cacti, shrubs, and trees. All plant material in public right-of-way shall be selected from the Arizona Department of Water Resources (ADWR) approved list of low water use plants for use within the public right-of-way. Although allowed by the ADWR approved list, not all plant materials are appropriate for use within the public right-of-way. All plant material used in right-of-way and median landscaping must be approved by the Town of Gilbert.

The use of palm trees is prohibited within Town of Gilbert maintained right-of-way medians, unless approved for use under a special design district or development agreement.

12.9.1 Plant Density Requirements for Medians

Trees shall not be planted within median landscape areas that measure less than 8 feet in width, from back of curb to back of curb.

1. The desired location for increased median tree densities is within the median landscape areas, outside vehicular sight distance/visibility clear zones.

2. At the time of the first submittal review, the Town of Gilbert may exercise the option to modify the tree density requirements, which may result in the addition or deletion of trees.

12.9.2 Plant Selection Considerations

Careful consideration must be given to the selection and placement of plant materials with regards to frost/heat sensitivity, solar or shade exposure, and susceptibility to pests and diseases.

It is strongly recommended that the designer utilize a multiple plant species palette and multiple plant massing combinations to increase visual diversity, enhance seasonal interest and avoid potential large scale plant losses. Designers should avoid over-use of a particular plant species due to the potential for single species die-out or maintenance problems resulting from horticultural conditions, climate hardiness or diseases impacting a monoculture plant type.

Plants shall be spaced appropriate for their normal mature size for this climate. Planting at an appropriate spacing will enable the plant to grow to its natural size and form and alleviate the need for excessive pruning. Over planting is discouraged so plants can attain their natural size, form, and display blooms in season.

12.10 SIGHT VISABILITY AND CLEARANCES

12.10.1 Vehicular and Pedestrian Sight Distances and Visibility Clear Zones

The following referenced detail and sight distance regulations are with regard to vehicular visibility and safety. The sight distance standards provided herein may not be applicable to every intersection or vehicular sight distance condition. Each vehicular sight distance must be evaluated on an individual basis due to the multiple site specific conditions and roadway geometric factors that may vary at any location. The information contained herein is based on 90 degree intersections, flat (vertical alignment) and straight (horizontal alignment) roadway conditions. Variations in design speeds and posted speed limits, roadway elevation changes, alignment skews and curves or various other conditions are but a few of the factors that may significantly alter required sight distance criteria and visibility clear zones. Refer to Standard Details GIL-211 and GIL-212.

Sight distance criteria and visibility clear zones shall pertain to all classifications of roadway intersections and commercial/shopping center driveways with access onto any public roadway.

All trees within vehicular sight distance/visibility clear zones shall have a vertical canopy clearance/clear trunk to 7 feet above the nearest vehicular pavement or curb. Trees with growth characteristics such as low branching or multiple trunks may require larger size specimens to be installed to provide the required canopy clearance or increased tree spacing distances will be necessary to insure adequate sight visibility is provided and maintained.

Visibility obstruction by all other landscape elements, other than trees, within vehicular sight distance clear zones shall not exceed 2 feet in height at maturity. In other words, no single or combination of shrubs and ground cover plant material, inert ground cover materials or elevated land form, within vehicular sight distance visibility clear zones, shall exceed 2 feet in height above the nearest vehicular pavement curb (when fully matured).

12.10.2 Landscape Setbacks and Clearances

Plant material setbacks as indicated below shall be adhered to for the safety of the public, maintenance personnel, and during maintenance operations.

All tree trunks within median landscape areas shall maintain a minimum 3 foot horizontal setback from the face of any curb and be centered in the median. In the areas affected by turn lanes, trees should be a minimum 6 feet from the face of curb.

There shall be no tree within 30 feet from the end of any median.

All plant material shall be located to prevent encroachment of normal growth patterns into pedestrian or vehicular circulation areas and sight distance clear zones.

All shrub and groundcover plantings shall maintain a minimum one foot setback from walkways and curbs at maturity. All median shrubs and ground cover plantings shall maintain a minimum 2 feet setback from curbs at maturity.

Trees shall be selected and located to provide adequate vertical canopy clearance

above pedestrian or vehicular circulation areas as follows: seven 7 feet minimum above pedestrian walkways and 15 feet minimum above vehicular traffic routes.

All trees must be located so the center line of the tree trunk is a minimum 6 feet behind the face of the curb and a minimum 3 feet from walls or fences installed along the property line/right-of-way (for all frontage landscape areas of sufficient size to allow tree installations). The location and position of any plant materials shall not obstruct visibility of or restrict maintenance access to any signage or traffic control devices.

All plant materials shall be selected and arranged to meet the above setback and clear zone requirements. Some tree species may require occasional pruning to encourage strong growth and maintain the required sight distance clear zones and setbacks.

12.10.3 Street Lighting Clearances

Coordinate landscaping to avoid conflicts with street and pedestrian light poles, wiring, conduit and illumination patterns. Maintain minimum 15' distance between light pole and tree trunk.

Decorative and accent lighting shall not be designed or installed within the right-of-way without approval from the Town of Gilbert Public Works Department except in the Gateway Character Area (see Town of Gilbert Gateway Area Right-of-Way Improvement Standards and Streetscape Design Guidelines).

12.10.4 Utility Clearances

The right-of-way landscape design shall take into consideration any potential conflicts between proposed landscape items and existing or planned utility installations. Landscape plants and irrigation system components shall be selected and located to maintain all required access, clearances and setbacks adjacent to utility installations. This shall be coordinated by the designer and verified by the developer and/or contractor with the utility companies prior to any installation.

No trees should be installed adjacent to or beneath overhead utility lines if the mature growth habit of the plant will conflict with the overhead lines or restrict utility service access. Confirm requirements from each utility provider.

12.11 TREE PLANTING IN RIGHT-OF-WAY

All trees shall be planted and staked in accordance with the Arizona Nursery Association standards.

12.12 INORGANIC MATERIALS IN RIGHT-OF-WAY

All landscape areas not covered by turf, sidewalks, water or hardscape features shall be covered by an approved inorganic ground cover. Inorganic ground covers are defined as rock ground covers and decorative pavements. Rock ground covers include: decomposed or crushed granite, gravel, stone, and boulders. Boulders, stone or rock aggregate with a dimension greater than an 8 inch diameter shall not

be used within median landscape areas. The depth of coverage shall be specified on the approved final landscape plan.

In accordance with the Arizona Department of Water Resources (ADWR), new turf area introductions are not allowed within the public right-of-way. Whenever possible, existing turf areas shall be replaced with low water requirement plantings and/or inert ground cover materials.

Rock ground covers are considered to be any boulder, rock, stone, or aggregate material used to mulch or cover landscape area soil surfaces. Decomposed or crushed granite is the recommended rock ground cover material for use within Town of Gilbert right-of-way landscape areas. Rock ground covers shall provide a minimum of 2 inch thick uniform depth after settlement. Color, gradation, aggregate size and required installation depth of rock ground cover material shall be approved by the Town of Gilbert Development Services Department. Recommended color range is gold, tan or brown tones. Other color selections will require prior approval and will be reviewed on a case by case basis.

12.12.1 Installation and Maintenance

All rock ground cover areas shall be sprayed with pre-emergent herbicide, by a licensed applicator, as part of installation as follows (a minimum of three applications are required):

1st - Prior to the application of the rock ground cover - 1/2 gallon per acre.

2nd - After rock ground cover has been applied - 1/2 gallon per acre.

3rd - Prior to final acceptance at end of maintenance period - one gallon per acre.

The Town shall be furnished, for approval, written documentation of applicators license, all materials and application rates and the scheduled dates for application prior to the start of any applications.

12.12.2 Decorative Pavement in Medians

In median landscape design, the designer shall follow the dimensions and layout as shown. This requirement is mandatory at all median left turn bay locations; at all other median breaks to enhance non-planted areas and facilitate adequate visibility for motorized vehicles and to provide enhancement of median areas that are too narrow for planting and too narrow for safe access by maintenance personnel.

12.13 GRADING AND DRAINAGE IN RIGHT-OF-WAY

Aesthetic grading and land form design (mounding and depressions) of right-of-way areas and medians will be used to provide visual relief, control surface drainage, maintain scale of the adjacent walls and to visually reduce the appearance of long continuous runs of straight wall.

Aesthetic grading or land form surface variations greater than 12 inches in height within right-of-way and median landscape areas is not permitted. Plans which

indicate aesthetic grading shall show proposed contours in 6 inch increments and label the height of each contour relative to the adjacent grade.

Aesthetic grading and land form surface variations in right-of-way and in medians in areas that are less than 8 feet in width is not recommended. For areas 8 feet or greater in width, aesthetic grading and land form design is recommended if properly coordinated with other disciplines.

Cut or depressed slopes and fill or elevated slopes shall be constructed in accordance with the engineering grading and drainage plans. Fill areas should be compacted between 85% and 90% in 8 inch maximum depth lifts.

Upon completion of site grading, underground utilities and landscape irrigation system installations, the entire site shall be fine graded by dragging and raking to remove all clods and rocks 2 inches and larger. All landscape area soil shall be water settled and compacted to required densities. Prior to any planting, an inspection shall be requested and completed by an authorized Town of Gilbert representative. All grades shall be kept within a tolerance of 0.1 foot, plus or minus in landscape areas.

Designers should attempt to balance earthwork requirements between cut and fill whenever possible to avoid importing and exporting requirements.

All imported soil and other backfill or amendments shall be thoroughly tested and approved by a State of Arizona certified soils testing laboratory to meet the requirements for topsoil and be free of any toxic substances. Recommended amendments from the lab test shall be included as part of landscape installations. Plans shall include a statement to this effect.

12.14 FENCES, WALLS AND SCREENING IN RIGHT-OF-WAY

Unless approved by the Town of Gilbert Public Works Department, walls, fences or other screening or decorative type structures will not be installed within the limits of right-of-way.

12.15 STREETSCAPES ADJACENT TO PRIVATE PROPERTIES

Where publicly maintained and privately maintained landscape areas abut each other, a method of separation shall be provided to establish clear limits of maintenance responsibility. Acceptable methods for providing separation between public and private landscape areas shall be as follows: walls, fences, walkways or concrete/metal headers (plastic or wood headers shall not be allowed).

All right-of-way landscape and irrigation system installations shall be located entirely within the limits of the right-of-way. There shall be no overlap between public and privately maintained systems without prior approval and written authorization from the Town of Gilbert Public Works Department.

12.16 SUBMITTAL CHECKLIST

The latest version of the Landscaping and Irrigation Checklist can be found on the

Town of Gilbert Engineering Services website. This Checklist will be periodically updated by the Town of Gilbert. At the time of the publication of these Standards it was as follows:

TOWN OF GILBERT – LANDSCAPE IMPROVEMENTS CHECKLIST (FOR PRIVATE DEVELOPMENT)

This checklist shall be used as a guide only for landscape design and construction and shall not be interpreted as an absolute list of requirements. The Town of Gilbert reserves the right to request additional documentation and information to ensure that the project meets and complies with all Town codes, guidelines, ordinances and approvals.

The landscape drawings are considered part of the improvement plan approval process and shall be submitted along with the civil development plans. If civil development plans are not necessary, the landscape plans will be recognized and accepted for review independently.

	Exempt	Done	Needed
Submittal Requirements			
• (5) sets of Landscape Improvement Plans (24"x36" sheet size)			
• Plans shall be in conformance with the Design Review Board approved exhibits including the Landscape Plan, Site Plan, Grading & Drainage Plan and all conditions of approval			
General Information			
• Project name and address			
• North arrow and scale (written & graphic), 40 scale maximum			
• Vicinity Map			
• Key Map (if multiple sheets are provided)			
• Sheet Index			
• Town of Gilbert Standard Notes, Maintenance Note & Irrigation Notes			
• Arizona Registered Landscape Architect's seal, dated& signed (other registered design professional seal accepted if incidental to work)			
• Landscape area calculations: on-site area + off-site area = total landscape area (square feet)			
• Landscape & Irrigation General Notes per consultant			
• Name & contact information of Design Consultant(s)			
Landscape Plan			
• Plant palette and concept design shall match Design Review approved exhibits and address all conditions of approval			
• Dimension and identify property/r.o.w. lines, landscape setbacks, utility easements			
• Locate proposed (and existing) landscape materials – individual symbols are required for each plant			
• Size landscape symbols to represent approximate mature diameter of the plant/tree canopy			
• Plant Schedule/Legend including plant symbols, botanical & common names, size, quantity, applicable remarks, inert materials (i.e. concrete header, decomposed granite, rip-rap, boulders)			

	Exempt	Done	Needed
• Specify decomposed granite size, color, 2" depth			
• Show curb, sidewalk, buildings, walls, ramps, transformers, utility equipment, fire hydrants, light poles, power poles, bike rack, site furnishings, monument signage, etc.			
• No plant material permitted within 3' of a fire hydrant			
• Planting areas with trees shall have a minimum width of 6 feet			
• Show berm & retention basin contours & elevations			
• Identify match lines with sheet references where applicable			
• Identify Sight Distance Triangles per Town of Gilbert Standard Detail GIL-211 and GIL-212; maximum mature height of plant material within s.d.t. is 2 feet; minimum clear canopy of trees within s.d.t. is 7 feet			
• Label street names			
• Label all zoning districts adjacent to project			
• No turf permitted in public right-of-ways			
• Trees shall be located so that the mature canopy does not extend into the street or trees overhanging the street shall be maintained with a 15 foot clear canopy			
• Plant material in public right-of-ways shall comply with the Az. Dept. of Water Resources Low Water Use Plant List, Phoenix Active Management Area			
• If project is phased, indicate phasing limits & provide min. 1" deep d.g. over undeveloped portions of site			
• Provide landscape details including: tree, shrub, groundcover, decomposed granite, etc.			
Irrigation Plan			
• All irrigation systems shall be automatically controlled and designed, installed and maintained to promote water conservation and prevent water overflow or seepage into paved areas			
• Provide Irrigation Equipment Schedule including symbols, equipment type, size, valve stationing key			
• If irrigation system uses effluent, provide **Town of Gilbert Standard Reclaimed Water Note:** Reclaimed water pipe, marking tape and locator tape shall be installed in accordance with MAG Spec. 616, and the latest edition of The Town of Gilbert Reclaimed Water Users Manual.			
• Indicate system design pressure with note to confirm existing pressure and report any discrepancy to designer prior to construction			
• Locate water meter location & specify size on plan – include a note to coordinate with Civil plans; irrigation plan shall show the meter in the same location as shown on the Civil plans			
• Locate backflow preventer – reference Town of Gilbert Standard Detail GIL-350; provide a wire mesh enclosure for devices sized 2" and less; provide a landscape screen for devices greater than 2"			
• Locate irrigation controller – indicate if it's wall or pedestal mounted; if controller is on exterior, provide note to paint conduit to match building/wall			

	Exempt	Done	Needed
• Show mainline, laterals, spray heads, flush caps, sleeving			
• All sleeving shall be Schedule 40 or harder			
• Provide separate valves for trees and shrubs			
• All irrigation systems must be independent of other users, i.e. landscape dedicated to the Town for maintenance shall have a separate water meter, controller and power source			
• Provide pipe & sleeving size schedules or note sizes on plan			
• Provide irrigation details including: reduced pressure backflow device (Town of Gilbert Standard detail GIL-350), controller, valves, emitter details & schedule, spray heads, flush cap, trenching, etc.			
• Fountain/water feature lines shall be coordinated with Civil or plumbing plans and shall be noted as such on the irrigation plan			
Open Space Amenity Plans (Subdivisions)			
• Amenity area plan enlargements (as necessary)			
• Amenity Schedule including amenity description, manufacturer, model number, color, quantity, detail sheet references			
• Amenity details including (but not limited to): tot lot, ramada, picnic table, seating, bbq grill, trash receptacle, bike rack, drinking fountain, pet waste station, specialty paving			
• Opens Space Lighting to include landscape lighting, pedestrian area lighting, light bollards, ramada lighting, power to irrigation controllers			
Wall Plans (Subdivisions)			
• Wall Legend including distinct symbols for each wall type, pilasters, project monuments, pedestrian gates, community mailboxes, etc. – provide detail sheet references			
• Details for all plan elements identified in Wall Legend including dimensions, materials, textures, colors, features, etc.			
• Provide note stating that walls are shown for reference only and shall be reviewed under separate permit			

12.17 GENERAL NOTES

The latest version of Landscaping and Irrigation General Notes can be found on the Town of Gilbert Engineering Services website. These Notes will be periodically updated by the Town of Gilbert. At the time of the publication of these Standards they were as follows:

Include the following notes on the Landscape Construction Documents (Cover Sheet or Landscape Plan) submitted for permit.

Notes are not required on Design Review Board exhibits.

TOWN OF GILBERT NOTES:

1. A Town of Gilbert permit is required for the installation of any landscape or

irrigation system. A CD with pdf format Record Drawings of the landscape and irrigation plans is also required.

2. Before the Town of Gilbert will accept an installed backflow device for approval, the following must be accomplished: The device must be tested by a State Certified Backflow Tester and the test results forwarded to the Town of Gilbert Backflow Specialist. The Town will provide a current list of Certified Testers from which to select. Tester fees will be at the expense of the installer.

3. Design of any walls, entry monument signage or ramadas that may be presented herein have been reviewed as conceptual only and will require a separate review and permit from the Building Department. In no case shall the depicted walls, entry monument signage or ramadas be considered final. Approval by the Planning Department is required prior to the issuance of a Building Permit for said walls, entry monuments and ramadas.

4. No plant material shall come within 3 feet of fire hydrants or any Fire Department equipment.

5. No planting or objects within the Town of Gilbert sight visibility triangles shall exceed 2 feet. Trees shall have a 7 feet minimum clear canopy.

6. All trees, shrubs and groundcover shall meet or exceed Arizona Nursery Association (ANA) specifications.

7. Construction may begin after all permits have been obtained.

MAINTENANCE NOTE:

All landscape areas and materials shall be maintained in a healthy, neat, clean and weed-free condition. This shall be the responsibility of the PROPERTY OWNER (OR HOMEOWNERS ASSOCIATION)

CONSTRUCTION AND INSTALLATION SHALL BE IN ACCORDANCE WITH THESE PLANS AND ANY DEVIATIONS WILL REQUIRE REAPPROVAL. LANDSCAPE INSTALLATIONS SHALL BE APPROVED BY TOWN OF GILBERT INSPECTION SERVICES BEFORE A CERTIFICATE OF OCCUPANCY CAN BE ISSUED.

(Reclaimed Water notes to be in BOLD LETTERING on the cover sheet of the Irrigation Plans of the Landscape set of improvement plans)

TOWN OF GILBERT RECLAIMED WATER NOTES:

Reclaimed water pipe, marking tape and locator tape shall be installed in accordance with MAG Standard Specification 616, and the latest edition of the Town of Gilbert Reclaimed Water Users Manual.