CITY OF TEMPE
PUBLIC WORKS DEPARTMENT

ENGINEERING
DESIGN CRITERIA

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INTRODUCTION

Welcome to the City of Tempe's Engineering Design Criteria. This document provides direction and guidance to professionals designing plans for private development and Capital Improvement Program (CIP) projects.

All work performed in the City of Tempe's right-of-way requires a permit issued by the Engineering Division of the Public Works Department or by the Private Development Engineering Group of the Community Development Department.

An investigation assessment will be charged for any work within the City of Tempe right-of-way that commenced prior to being issued a permit. The cost of an investigation assessment is defined by the Tempe City Code, Appendix A – Schedule of Fees and Charges.

Any existing vacant land submitted for proposed improvements is required to meet all current City codes, standards, and regulations. This includes undergrounding of overhead utilities that are on or adjacent to the property (excluding transmission lines greater than 12.5kv).

This document adopts by reference the latest edition of the following documents:

- Maricopa Association of Governments "Uniform Standard Specifications and Details for Public Works Construction"
- "Tempe Standard Details Supplement to the MAG Uniform Standard Details"
- "City of Tempe Utility Permit and Construction Manual" (shall govern all utility and associated construction within the City right-of-way).
- Tempe City Code including, but not limited to:

    - Chapter 12 – Drainage and Flood Control
    - Chapter 25 – Planning and Development
    - Chapter 27 – Sewers and Sewage Disposal
    - Chapter 29 – Streets and Sidewalks
    - Chapter 33 – Water
    - Appendix A – Schedule of Fees and Charges

The City Engineer, or their designee, is authorized to interpret this criteria and grant variances where application would cause undue hardship to an applicant. Refer to "Variance / Interpretations / Appeals" section of this manual for the procedures and appeals form.

DRAINAGE AND STORMWATER RETENTION - APPLICABILITY

The Drainage and Stormwater Retention criterion in this document applies to all new projects and any redevelopment projects:

- **That will affect the existing lot grading or storm water retention, and/or**
- **Where the original permitted floor area is cumulatively increased by at least 25%, and/or**
- **When the site/building improvements increase the valuation* (excluding the land) by 50% or more.**

*Valuation is determined by comparing the total construction cost estimate to the current appraised value of the property (excluding the land) at time of application. For example, a $51,000 construction cost estimate compared to a $100,000 appraised value (not including land value) at time of application is an increase of 51% (exceeds 50%). Note that construction costs include any site modifications such as “remove and replace” items or any site improvements that affect grading and drainage features such as building, landscaping, utility, parking, resurfacing, site amenities, etc. The total construction cost estimate must be prepared, sealed, signed, and submitted to the City of Tempe by an Arizona licensed professional Engineer or Architect.

FEE SCHEDULE

Plan review fees for Private Development Engineering projects are due before downloading initial reviewed redline comments. Additional plan review fees will be charged after the second submittal of engineering plans or if additional sheets or documents were included after the first submittal. Any additional review fees will be determined by the Plan Reviewer during the plan review process. Additional review fees beyond the third review will be based on an hourly review rate.

Permit fees are separate and will be due before approved plans can be released. The following are the typical permits associated with a project:

- Drainage (DR): retention basins, underground retention, storm pipes, catch basins and shoring.
- Paving (PV): bus shelters, curbs, ramps sidewalks, driveways within the right-of-way.
- Sewer (SW): sewer lines, cleanouts, and manholes for entire project.
- Streetlights (ST): public streetlights.
- Underground Fire (UF): fire lines for building sprinklers.
- Water (WA): water meters, fire hydrants, and public water lines.

The latest fee schedule for Engineering plan review, permits, purchase of engineering records, etc. can be found in Tempe City Code, Appendix A – Schedule of Fees and Charges.

EXISTING SINGLE-FAMILY RESIDENTIAL IMPROVEMENTS

SINGLE-FAMILY RESIDENTIAL PERMITS:

The owner of a single-family residence may need to apply for a Single Family Residential (SFR) permit if improvements to the residence or lot affect existing drainage or volume of storage for storm water retention. There are various conditions, as explained in the next few paragraphs, that would affect the requirement for an SFR permit. **The volume of storage for storm water retention is based on the total lot area plus applicable half-street or half-alley areas.** The detail for typical grading of single-family lots is shown in **Figure 1**.

AN SFR PERMIT IS REQUIRED ***if existing drainage retention areas are affected (regardless of expansion area).*** As part of the SFR permit, a Grading & Drainage Plan must be included for review/approval. For single family improvements, the SFR Permit acts as a Drainage Permit.

AN SFR PERMIT IS REQUIRED ***if the floor area of expansion to the residence and/or accessory structure(s) is greater than twenty-five percent (25%) of the floor area of the original permitted building and accessory structure(s).*** As part of the SFR permit, a Grading & Drainage Plan must be included for review/approval when the original permitted floor area is cumulatively increased by at least 25%. For single family improvements, the SFR Permit acts as a Drainage Permit.

AN SFR PERMIT IS NOT REQUIRED if the floor area of expansion to the residence and/or accessory structure(s) is less than or equal to twenty-five percent (25%) of the floor area of the original permitted building and accessory structure(s) and the area of expansion does not affect existing drainage retention areas.

NOTE: Grading & Drainage Plans shall be prepared, sealed and signed by an Arizona licensed professional engineer.

The SFR Permit only covers “onsite” grading and drainage. For any “offsite” work within the street or alley right-of-way (driveways, sidewalks, sewer services, water services, etc.), existing single-family homeowners must submit engineering plans to Private Development Engineering for review/approval and get appropriate permits. **All engineering plans must be approved prior to any building permit (BP) approvals.**

OTHER PERMITS (FOR SINGLE FAMILY RESIDENTIAL IMPROVEMENTS):

If the proposed improvements affect the paving within the right-of-way, then a **Paving Permit (PV)** is required. If the proposed improvements are for a new water service to the home, upgrade of water service meter, hydrants, installation/modification of water mains, or abandonment of water facilities, then a **Water Permit (WA)** is required. An associated **Water/Sewer (WS) Permit** may be required for upgrades to a water meter service. A **Sewer Permit** is required for all sewer service connections, repairs, or replacements for

the portion of the sewer service that is in the street right of way or in the alley. An **Underground Fire Permit** is required for a new fire line connection to the water main.

DRAINAGE DESIGN (FOR SINGLE FAMILY RESIDENTIAL ON EXISTING SINGLE-FAMILY RESIDENTIAL LOTS):

NOTE: This section does not apply to New Residential Subdivisions, New Single-Family Lot Development, Commercial Developments, and Industrial Developments. These shall be designed and maintained in accordance with the "Drainage Design Criteria" section of this manual.

There are two methods accepted by the City of Tempe for calculating required retention volume for improvements to single family homes. Both methods use the following formula:

V = (P ÷ 12) * A * C

V = Volume of storm water required to retain (cubic feet)
P = Precipitation Depth (in inches) of storm water required to be retained
A = Total area of lot (in square feet) plus any additionally required areas. For some subdivisions, the additionally required areas include one-half of the street (excluding arterials) fronting onto the lot and one-half of the alley.
C = Coefficient of Non-Absorption

METHOD 1: The Tempe Standard Method.

Tempe's standard method of calculating onsite storm water retention uses the formula above with the following data:

P = 2.2 inches (based on the 100-year, 1-hour storm event)
C = 0.95

V = (2.2 ÷ 12) * A * (0.95)

METHOD 2: The Maricopa County Method.

The City allows the usage of the most currently adopted "Drainage Policies and Standards for Maricopa County, Arizona" as an alternative method for determining required retention volume. This method determines the volume based on a 100-year, 2-hour storm event, which has a precipitation depth (P) of **2.2 inches**. This method also has different Coefficient of Non-Absorption (C) values that vary by the size of the lot and the approximate percentage of the lot covered with improvements (house, decking, driveway, sidewalks, etc.).

V = (2.2 ÷ 12) * A * C

NOTE: Retention of the 100-year, 1-hour storm event (or 100-year, 2-hour storm event for Method 2) on property outside the public rights-of-way (onsite) is required. The rare exception to the onsite retention requirement is limited to properties in the **Alternative Retention Criteria Area (ARCA)** where retention of the 2-year, 1-hour storm event is required. In the ARCA the precipitation depth (P) shall be one of the following:

- P = 0.9 inches, or
- P = 1.2 inches (for 5-yr rainfall depth), or
- P = 1.4 inches (for 10-yr rainfall depth)

The defined area of the ARCA can be found in Section 12-57 of the Tempe City Code. A visual reference is included as **Figure 2** in this manual.

NOTE: For any projects one acre or greater that contain drainage infrastructure, a "Declaration for Inspection and Maintenance of Drainage Structures" is required.

NOTE: In no event shall a Drainage Permit be issued unless the drainage plan has been approved by the Engineering Division or the Private Development Engineering Group, establishing that storm water runoff from the lot, plot, or parcel of land will not adversely impact other property or City infrastructure.

NOTE: The Arizona-registered civil engineer performing the calculations shall confirm retention requirements with either the Engineering Division or the Private Development Engineering Group.

STORAGE AND DESIGN REQUIREMENTS FOR RETENTION BASINS:

Individual lot storage shall consist of providing adequate surface storage volume for the lot or parcel of land using either Method 1 or Method 2 (as described below).

Storage Requirements:

- Storage volume shall include adjacent alley storm water run-off.
- A maximum depression of 1-foot is allowed for single-family lots.
- Maximum 4:1 side-slopes.
- Finish floor elevations for single-family residences are to be a minimum of 14" above outfall of lot and 10" above the high-water elevation per **Figure 1**.

Design Requirements for Retention Basins:

- Retention volume must be disposed of in 36 hours.
- Basins *greater* than 1.0' in depth *will* require a dual-chamber drywell or other approved disposal mechanism.
- Basins *less* than 1.0' in depth *may* require a dual-chamber drywell or other approved disposal mechanism.
- Maximum allowable design dissipation rate for drywell is 0.10 cfs unless substantiated by percolation test then after applying a reduction factor of 50%, a maximum rate of 0.25 cfs may be used.

- Retaining walls will not be allowed for retention in front yard.
- Follow maintenance requirements for drainage infrastructure on lots greater than one (1) acre.

MINIMUM PLAN REQUIREMENTS FOR SINGLE-FAMILY RESIDENTIAL (SFR) PERMIT SUBMITTALS:

NOTE: See website for latest forms.

1. Include a complete legal description (containing subdivision name and lot number) of the property as it appears on the deed.

2. Include a vicinity map showing the property in relation to the nearest major street intersection and closest streets.

3. Include a north arrow (pointing to right or top edge of sheet).

4. Include the owner's name or names as it appears on the deed (property, business, developer, etc.) and mailing addresses.

5. Include name, address, and phone number of person to whom plans should be returned and who has prepared the plans. Designate as "CONTACT".

6. Include legal address of property and Assessor's parcel number (APN).

7. Show all lot dimensions, widths and descriptions of easements (including recording number), and adjacent rights-of-way. Any easements not dedicated to the city shall be labeled as private.

8. Show and dimension the location of all existing and proposed structures, drainage patterns, proposed spot elevations, and existing topography of the site and adjacent areas.

9. Show the finished floor elevation for the new home, existing home, and the proposed construction. Label the lot outfall location and elevation. Label retention basin bottom elevations and proposed high water elevations. (New replacement home finished floors must be a minimum of 14" above the lot outfall).

10. Show and dimension all topography in City right-of-way including pavement, curb, gutter, sidewalks, etc. Note type of existing curb and gutter (6" vertical curb; 4" roll curb, or ribbon curb). For new homes, show the new or existing water meter location and size, sewer tap location, driveways, and sidewalks.

11. Distinguish between all existing and proposed construction. Give areas of existing and proposed structures based upon slab dimensions in square feet.

12. Signature block as follows (lower right-hand corner of first sheet):

APPROVAL FOR Offsites, Drainage, Paving, Sewer, Street Lights, Underground Fire, and Water (Remove items in Approval block if they do not apply.)

_____ _____

CITY OF TEMPE **DATE**

(Provide minimum ½" space for signature)

13. Acknowledgement statement block for PROPERTY OWNER signature (lower right-hand corner of first sheet. This must be signed before plans can be approved):

I hereby acknowledge this Grading & Drainage design and agree to contact the Private Development Engineering Inspector at 480-350-8072 for a pre-construction meeting. Any changes to or deviations from this plan require City approval.

_____ _____

OWNER – Signature & Print Name DATE

14. Use an engineering scale, 1" = 30' maximum scale.

15. All plans must be submitted in PDF (24"x36") format through the Citizen's Portal. Plans must be legible when reduced to 11" x 17" sheet size.

16. All PDF documents shall have security settings set to "Allowed" to allow plan reviewers to place comments and signature on plans through Bluebeam Studio.

17. See additional project submittal guidelines:
https://www.tempe.gov/government/community-development/building-safety
Select "Electronic Plan (E-Plan) Review Submittal Guidelines" at the top of the webpage.

18. Show net area of site in square feet and include percentage of lot coverage. Lot coverage is all improvements including structures, driveways, sidewalks, etc.

19. Surface retention on-site of the 100-year storm per City of Tempe Drainage Criteria is required. Show calculations on the grading and drainage plan for the retention volume required and the retention volume provided, show high water levels and bottom elevations for retention areas, and show 4:1 maximum side slope for landscaped retention areas. Per the Design Manual's Drainage Requirements, the maximum allowable depth of water for calculation of retention volume provided for single-family residential lots will be 8 inches.

20. Show positive grade breaks at all property and right-of-way lines including finished grades at all lot corners.

21. Grading and drainage plans for single family residences must be prepared by an engineer, surveyor, or architect registered to practice in the State of Arizona, include the registrant's seal, date, and signature.

22. Show the Engineering Private Development (EN) Number, Development Services (DS) Number (assigned during the first review), property address and quarter section in the lower right-hand margin on each sheet. Minimum 36 pt font size.

23. Provide title block on each sheet showing project name, type of drawing (grading and drainage plan) and sheet numbers.

24. Plan check is valid for one year following the initial application date. Construction permits shall be obtained during this one-year period, or the plans must be resubmitted for review and approval. Permits expire one year from the issue date but may be extended (in six months increments) upon request and following payment of appropriate fees.

25. The lot grading plan should include the cross sections shown on **Figure 1** of this document or similar cross sections through the property. On the cross sections include the type of curb and the elevation difference between the finished floor and lot outfall.

26. On the Grading & Drainage Plan, include the applicable "Site Plan Notes", which are as follows:

SITE PLAN NOTES

1. This set of plans has been reviewed for compliance with City requirements prior to issuance of construction permits. However, such review shall not prevent the City from requiring correction of errors in plans found to be in violation of any law or ordinance.

2. The City does not warrant any quantities shown on these plans.

3. The City approval is for on-site grading, drainage. Plan check is valid for one year following the initial application date. Construction permits must be obtained prior to plan check expiration date. Permits expire one year from the issue date but may be extended upon request and the payment of appropriate fees for subsequent periods of six months each.

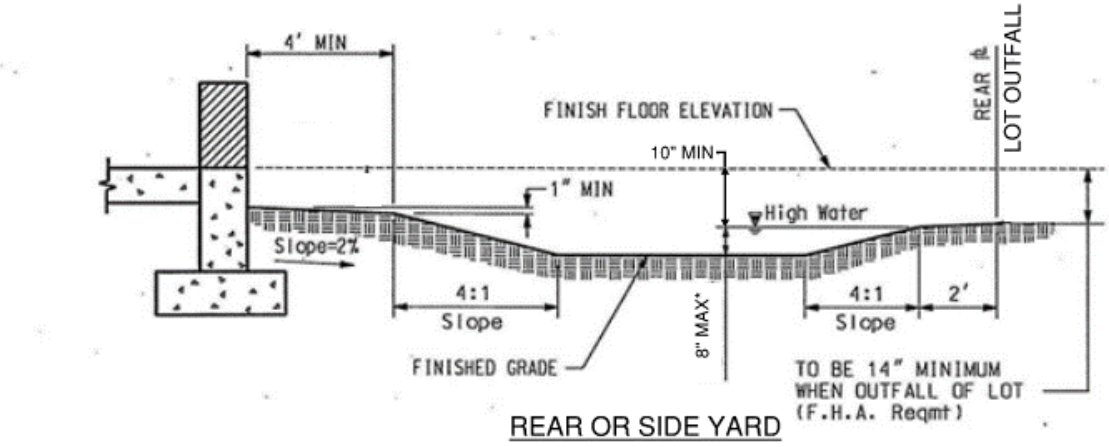
4. An approved set of plans shall be available on the job site at all times.

5. Call the engineering inspection request line at **(480) 350-8072** at least one business day before construction to request inspection of grading and drainage. Construction work concealed without inspection by the City shall be subject to exposure at the contractor's expense.

6. The homeowners shall contact “AZ 811” 48 hours prior to construction.

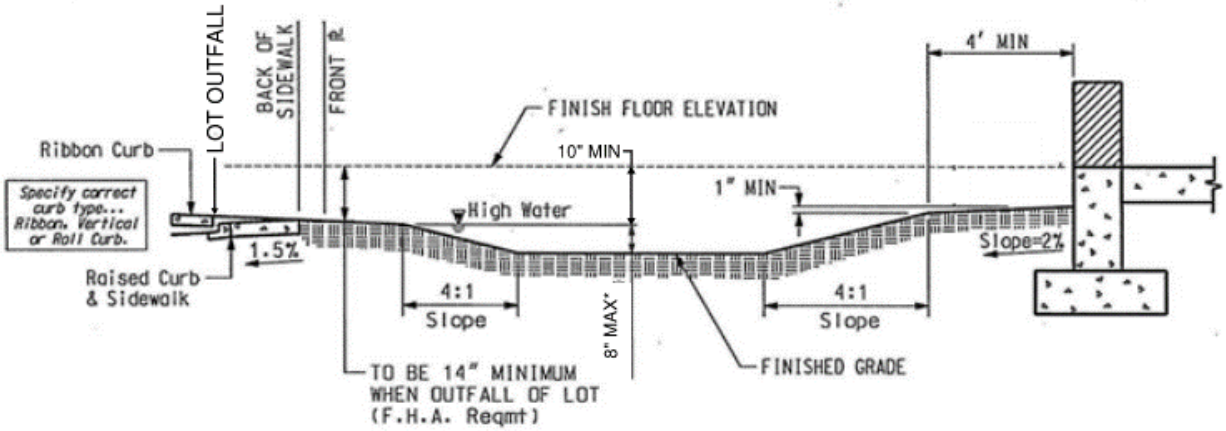
7. All broken or displaced existing concrete curb, gutter, or sidewalk shall be removed and replaced as directed by the City of Tempe Engineering Division inspector.

FIGURE 1: EXAMPLE FOR SINGLE-FAMILY HOMES



REAR OR SIDE YARD

* 12" MAX WITH CITY ENGINEER APPOVAL.



FRONT YARD

* 12" MAX WITH CITY ENGINEER APPOVAL.

PLAN "A" PLAN "B"

NOTE:
Include the appropriate PLAN "A" or PLAN ""B" plus the following note on the recorded plat. "These lots are to be graded to retain storm water in accordance with ordinance ".

ARIZONA POLLUTANT DISCHARGE ELIMINATION SYSTEM (AZPDES)

Resources:

- United States Environmental Protections Agency (EPA).
- National Pollutant Discharge Elimination System (NPDES).
- Arizona Department of Environmental Quality (ADEQ).
- Arizona Pollutant Discharge Elimination System (AZDPES).
- Drainage Design Manual for Maricopa County.

Arizona Pollutant Discharge Elimination System (AZPDES) regulations require the City of Tempe to promulgate a storm water management system that regulates storm water "quantity" and "quality". The statute is Section 402(p) of the Water Quality Act of 1987.

Since 1967, the City of Tempe has been implementing a policy of requiring 100-year on-site retention for new residential and commercial development. This policy (Chapter 12, Article IV of the City Code) has resulted in incrementally decreasing the amount of storm water, and related pollutants, from entering the City's right-of-way and municipal separate storm sewer system (MS4).

In August 1998, Chapter 12 was modified by adding Article VI (Storm Water Pollution Control).

In April 2004, Chapter 12, Article IV was modified to accommodate more dense development in and around downtown Tempe and the Rio Salado corridor, an area designated as the Alternative Retention Criteria Area (ARCA).

In February 2023, Chapter 12, Articles IV and VI were modified to include inspection and maintenance requirements for all private and public developments one acre or greater, including those less than one acre but are part of a larger common plan of development.

The AZPDES requires a General Permit for discharges from regulated construction activities. Per the "Drainage Design Manual for Maricopa Country":

> *"The Construction General Permit (CGP) seeks the minimization of stormwater flows, prevention of soil erosion, capture of waterborne sediment that has been unavoidably released from uncovered or disturbed soils, and at the same time, protection of water quality from onsite pollutant sources through the planning, implementation, and maintenance of Best Management Practices (BMPs)."*

For developments one acre and larger, including those less than one acre but are part of a larger common plan of development, an Arizona Department of Environmental Quality (ADEQ) Notice of Intent (NOI) or No Discharge Certificate (NDC) shall be submitted prior to plan approval in order to show that the development is in compliance with Construction General Permit (CGP) requirements.

The applicant must develop and implement a Storm Water Pollution Prevention Plan (SWPPP) that satisfies the conditions of the permit. **The SWPPP is the responsibility of the owner and will be reviewed as a part of the Drainage Plan review.** The SWPPP should be developed in accordance with all ADEQ requirements (azdeq.gov). The SWPPP will include Best Management Practices (BMPs) that meet the needs of each construction site. BMPs are schedules of activities, prohibition of practices, structural and non-structural controls, operational and maintenance procedures, control techniques or systems, design and engineering methods, and other management practices to prevent or reduce the discharge of pollutants.

All Best Management Practices (BMPs) shall be installed and maintained in accordance with the specifications of the "Drainage Design Manual" issued by the Flood Control District of Maricopa County (Maricopa.gov).

Among the other requirements, the SWPPP shall implement (at a minimum) the following design parameters:

1. The perimeter of the project site shall have BMPs for preventing discharges from the site. These BMPs would typically be Stabilized Construction Entrance (EC-5), Storm Wattles (SPC-1), and/ or Silt Fence (SPC-5). Storm Wattles shall be anchored by wooden stakes. Stakes shall penetrate soil a minimum of 12". Stakes shall have a maximum spacing of 5 feet on center. At Storm Wattles ends, stakes shall have a maximum spacing of 12-inches.

2. Designated Washdown Areas shall be onsite and follow the specifications of the General Housekeeping Best Management Practice GH-4.

3. Onsite stockpiles shall have perimeter control BMPS installed around the stockpile. These BMPs would typically be Storm Wattles (SPC-1) and/ or Silt Fence (SPC-5).

4. Offsite storm drain inlets shall be protected by Gravel Bags (SPC-7) if upstream construction activities may result in stormwater discharges. Storm Wattles are not acceptable for offsite storm drain inlet protection.

   NOTE: BMPs for internal drainage and sediment control shall be indicated on the SWPPP. These BMPs would typically be Temporary Sediment Basins (SPC-8), Temporary Sediment Traps (SPC-9) and/ or internal drainage channels that directs storm water flows to onsite retention basins.

5. During active construction stormwater best management practices will be inspected by Tempe staff. The frequency of inspection is based upon the potential for pollutant runoff; at least one (1) time every three (3) months for highest priority sites and at least one (1) time every six (6) months for lowest priority sites.

6. The site will be inspected within one year of project closeout to determine compliance of post construction stormwater controls.

7. For developments that contain drainage infrastructure such as drywell, underground retention storage, etc, a “Declaration for Inspection and Maintenance of Drainage Structures” will be required. See Attachments A-C.

GREEN STORMWATER INFRASTRUCTURE (GSI) GUIDELINES

Green Stormwater Infrastructure (GSI) is a sustainable approach to stormwater management. The goal of low GSI is to reduce the offsite flows that can contribute to the pollution of natural waterways, urban flooding, and resultant infrastructure costs. Green Stormwater Infrastructure (GSI) uses vegetation, soil, and other permeable surfaces to capture stormwater where it falls. Whereas conventional stormwater systems focus on moving water away from a site using gutters, pipes, and tunnels, green stormwater infrastructure is used to collect, filter, and absorb stormwater into the ground. By soaking up water instead of redirecting it away, GSI can help to reduce stormwater runoff while providing water for on-site vegetation.
The design professional is encouraged to use the following resources for details, specifications, and calculations, that can be found at each organization's web site:

- **City of Tempe** – Sustainability.
- **"Greater Phoenix Metro Green Infrastructure & Lid Handbook".**
- **"City of Mesa Low Impact Development Toolkit".**
- **"Pima County Low Impact Development and Green Infrastructure Guidance Manual".**
- **"City of Tucson Water Harvesting Guidance Manual".**

For utilization of GSI Tools in the right-of way, a maintenance agreement will be necessary for non-standard details. An 8.5" x 11" exhibit and legal description of the area will need to be submitted along with the rest of the project documents, such as plans and drainage report. Contact the Real Estate Management Coordinator for more information. For the exhibit requirements, see "Easements and Underground Retention Systems Exhibit Requirements" https://www.tempe.gov/government/community-development/building-safety/applications-forms Scroll down the webpage and look for the form under Private Development Engineering.

GENERAL PLAT REQUIREMENTS

A. GENERAL

1. Show the proposed subdivision name on the plat. The name must be unique and not be the address of the property or another plat name. Avoid using street intersections.

2. Provide legal description before subdivision.

3. Provide a Tract Table describing intended use for each Tract (if applicable). Declare the use, ownership, and maintenance responsibility of all tracts, and dedicate the necessary easements over them. The following are examples for typical tract language:

   - Tracts “A” and “B” are hereby declared as common areas to be owned and maintained by the homeowners’ association. An easement for drainage is hereby dedicated over tracts “B".

   - Tract “X” is hereby declared as a private accessway to be owned and maintained by the homeowners’ association. An easement for public water and sewer, refuse collection, drainage, and emergency and service type vehicle access is hereby dedicated to the public over tract “X”.

4. Locate the plat by section, township, range and county.

5. The plan shall have mathematical ties to a minimum of two record survey control corners, either section corners or quarter corners as shown on the City of Tempe Horizontal & Vertical Survey Control Map

6. Show and note City of Tempe elevation benchmark used for vertical datum if needed (example: Condo Plats.)

7. Include the names, addresses, and phone numbers of the subdivider and the Engineer/Surveyor who prepared the plat.

8. Show the scale, north arrow, date of preparation, and any revision dates. (Orient “North” to top of page).

9. Show the subdivision on a location map of the area and label closest streets.

10. The plat is required to be signed by an Arizona Registered Land Surveyor.

11. Maximum scale shall be 1” = 50’ except for Tract Maps which shall be 1” = 100’ maximum. Show a bar scale on each plan sheet with a written scale e.g. 1” = 30’.

12. All plans must be submitted in 24” x 36” in PDF format only and be legible and to scale at 50% reduction. Font sizes shall be as follows:
    - Plat Title, 48pt and subsequent information 24pt.
    - All other categories shall be 24pt for the Heading and all subsequent information shall be 16pt.
    - For the site plan, font size must be at least 11 point type per ARS 11-480
    - Per Maricopa County Recorder’s Office, left margin needs to be 2 inches.

13. Include a key map if two or more sheets are required for the drafting of the final plat.

14. On each sheet show the Subdivision (SBD), Recordings (REC), or Development Services (DS) number (assigned during the first review) on the bottom and on the right side. Use 20 pt. font size.

15. Provide title block on each sheet showing project name, type of drawing (preliminary plat, final plat, etc.), sheet number, and quarter section.

16. Provide an H.O.A. Ratification Block (if needed).

17. Provide a Lien Holder’s Block (if needed).

18. Show access to the Plat site and provide a recorded document number if it is by easement only. If cross access is needed, then the property owners will need to provide a recorded agreement to the City prior to recordation of the plat. This is a private agreement to which the City is not a party.

B. EXISTING CONDITIONS

1. Identify and dimension all existing rights-of-way and easements along with recording numbers (list granting documents when available).

2. Add note that “Plat Does Not Extinguish Existing Easements.”

3. Show municipal corporation lines adjacent to site (if applicable).

4. Show the Assessor’s Parcel Number (APN), name, book, and page number of adjacent recorded tracts. Label as “Not a Part.”

5. Reference recording numbers for CC&R’s. Add note: The plat is subject to the original CC&R’s recording and all subsequent recordings numbers. (Note any recording number why property is not subject to the CC&R’s).

C. PROPOSED DEVELOPMENT

1. Show the proposed street and alley layout and centerline dimensions of streets. New streets shall be monumented at intersections, points of curvature, and dead ends.

2. Show proposed street names. They shall conform to the City of Tempe grid.

3. Show street connections to adjoining platted tracts.

4. All cul-de-sac streets shall terminate in a circular right-of-way with a minimum radius of 55’ and shall have an improved traffic turning circle with a minimum radius of 45’. The maximum length of any cul-de-sac street shall be 400’ measured from the intersecting right-of-way lines to the face of curb at the back of the cul-de-sac.

5. If the tangent centerlines deflect more than 10° and less than 90°, they shall be connected by a 600’ minimum radius curve for collector streets or a 200’ minimum radius curve for local streets.

6. There shall be a tangent of at least 100’ between reverse curves for collector and local streets.

7. All streets intersecting an arterial route shall do so at a 90° angle.

8. All local streets shall intersect at an angle between 75° and 105°.

9. Right-of-way widths shall match the City’s standard street and alley cross sections as shown in the Tempe -Uniform Standard Details-300 Series & 400 Series.

10. Alleys shall be 20’ wide.

11. Alleys shall have corners cut off a minimum of 15’ on each side of the corner at all changes of alignment.

12. Dead-end alleys are prohibited.

13. Local streets that intersect collector or arterial streets shall have a tangent centerline length of at least 150’.

14. If a local street curve intersects a collector or arterial street, it shall have a centerline radius greater than 400’.

15. All street corners shall have minimum right of way triangular cutoffs as follows:

    a. 15’ x 15’ cutoff where local streets intersect.
    b. 15’ x 15’ cutoff where local street intersects collector street.
    c. 20’ x 20’ cutoff where collector streets intersect.
    d. 20’ x 20’ cutoff where local and collector streets intersect arterial streets.
    e. 30’ x 30’ cutoff where arterial streets intersect.

16. For non-residential lots less than 100’ in width, common access easements shall be provided for Refuse and Fire Department circulation.

17. Show dimensions and bearings for all lots, tracts, easements, common units, and/or land divisions.

18. Where two streets intersect a common local or collector street and those streets are offset from each other, the minimum offset shall be 125’. Where the common street is an arterial street the minimum offset shall be 330’.

19. Show the location, width dimensions and use of all existing or proposed easements.

20. Label proposed easements as “Dedicated Hereon”.

21. Any easements not dedicated to the city shall be labeled as private.

22. Provide the recording number for all existing easements.

23. Private easements cannot be dedicated by a plat. Add note on the plans: Disclaimer: The city does not verify private easements.

24. Easements outside of the property lines must be dedicated by separate instrument and not by plat.

25. Place note if cross access and cross drainage is dedicated by separate instrument or will be maintained (if applicable).

26. Define and dimension area of cross access agreement (if applicable). If area does not cover the new driveway location, then provide new cross access agreement.

27. Show only symbols and line types used on the site plan in a Legend.

28. Add note on cover sheet: No structures, walls, signs, foundations, lights, poles, trees, deep-rooted plants, etc. are allowed in easements or above underground utilities.

ADDITIONAL PLAT REQUIREMENTS

A. GENERAL

1. Engineering plans shall be approved by the City Engineer prior to recordation of the final plat.

2. Fully dimension the map and submit a digital copy of the coordinate point map and coordinate list from the land surveyor with all project coordinates in ASCII format.

3. Fully dimension each parcel, lot, and tract and show its area on the plat.

4. Fully dimension and clearly identify all excepted parcels and label them “exception” or as “not a part.”

5. The plat shall have mathematical ties to a minimum of two section corners or quarter corners as shown on the City of Tempe Horizontal & Vertical Survey Control Map.

6. Locate and identify existing monuments.

7. Identify survey monuments to be set.

8. For all curvilinear streets, show points of curvature, curve radius, central angle, and length. For non-tangent curves, sow the chord distance and bearing. Tangent and radial bearings may also be shown.

9. Show drainage easements for areas where retention is required for street run-off.

10. Show flood hazard boundary from FEMA Maps and cite restrictions in declaration.

11. Comply with all of the conditions of approval as evidenced by the minutes of the following meetings.

    a. City Council.
    b. Board of Adjustment.
    c. Development Review Commission.
    d. Historic Preservation Commission.
    e. Joint Review Committee.

12. Any property with a common basin and drywell and/or an underground retention tank/system shall add the following notes to the plat plan sheet:

"For any retention system and/or drywell, as shown on the grading and drainage plans, it shall be the sole responsibility of the property owner to:

(1) regularly inspect the system (at least annually), and
(2) maintain the system in a condition that will allow the system to store and dissipate the volume of storm water within 36 hours, as shown on the design plans.
(3) This property is:
   a. required to hold the 100-year, 1-hour storm event on site, OR
   b. in the Alternative Retention Criteria Area (ARCA) and is require to hold the 2-year, 1-hour storm event on site, OR
   c. required to hold the 100-year, 1-hour storm event on site using a common basin to hold the retention and each individual lot is not required to hold retention."

NOTE: The foregoing restriction cannot be changed without the prior written consent of the City Engineer.

13. Provide current title report and/or ALTA survey (less than three months old) of land being platted. If Trust is listed, then provide Trust disclosure.

14. Any new easement or dedication not shown on the plat or subsequent to plat recordation is required to be prepared via separate instrument. This instrument/document shall be prepared by City staff only and shall be done after receiving proof of property ownership. Proof of property ownership shall be a copy of the current Warranty Deed or Title Report, current to within six months from date of initial engineering submittal. Preparation of the legal description and exhibits, complying with Maricopa County Recorder requirements, shall be done by the design engineer. The original instrument/document must be signed by the property owner and notarized prior to submitting to City for final review. After the entire packet has been reviewed by the City it will be held as "Recordation Pending" until the facilities have been installed and inspected. Upon completion, the City will record the document and forward it to the owner or owner contact.

15. Proposed public water and sewer line easements cannot be dedicated per plat and must be granted via separate instrument.

16. Public or private easements cannot be extinguished per plat and must be granted via separate document. A plat may label existing easements as "To Be Extinguished by Separate Document," however the separate document must be filed before the easement will be officially terminated.

17. Permission from the City of Tempe is not required to revise or abandon private easements unless the City has a vested interest in it.

18. For lot splits, verify that each parcel has access to a street or alley. Verify outside boundaries match original property lines. Prefer starting lot numbers with 1,2, etc., instead of original lot numbers.

B. DEDICATION AND ACKNOWLEDGMENT

1. Include all necessary dedications on the plat.

2. Include the location by section, township, range, and county in the dedication.

3. The execution of the dedication shall be acknowledged.

4. The acknowledgment shall be certified by a notary public.

C. STREET DESIGN

1. Where the subdivision abuts an arterial street, use reverse frontage lots with a 1’ wide vehicular non-access easement along the arterial street.

2. Collector streets may be extended to the subdivision boundary for future connection with adjacent land that is not subdivided, but not necessarily as a straight-line street (e.g. can be curved or offset appropriately.)

3. Where the subdivision abuts or contains a railroad right-of-way, limited access highway, irrigation canal, or abuts Industrial zoned land, the streets parallel and on each side of such right-of-way for a suitable distance may be required.

4. Half-streets shall be used where necessary to comply with the approved street pattern. Where such half street furnishes the only access to the subdivision, the remaining half shall be constructed or a portion thereof to make the necessary transition as determined by the Traffic Engineering Division.

D. CERTIFICATIONS

1. Certification by an Arizona Registered Land Surveyor.

2. Certificate of plat approval by the Community Development Director.

3. Certificate of plat approval by the City Engineer.

4. Certificate of plat approval by the City Council (does not apply to administratively approved plats by the Community Development Planning Division).

5. Certificate of assured water supply. Provided by Tempe Water Utilities.

E. CHANGES TO A RECORDED PLAT:

1. Any material change to a recorded subdivision plat requires that the plat be amended. Material change includes, but is not limited to:
   - Any change in location or dimensions of a property line, tract, dedicated easement, or right of way.
   - Any change in acreage due to listed item above.
   - Any change in the legal description which alters the dimensions of the plat or its area.
   - Any change, except for obvious spelling errors, in the dedicatory statement.
   - Other matters as determined by the City Engineer or representatives thereof.

2. Minor typographical errors in dimensioning or annotation shall be corrected by a Certificate of Correction.

   Procedure:
   The Certificate of Correction shall include the following:
   - The corrections and/or changes requested.
   - The date that the plat was recorded.
   - The Maricopa County recorders instrument number of the plat which is to be modified.
   - A signature line for approval by the City Engineer or representatives thereof.
   - An imprint of the seal and signature of a Registered Land Surveyor in Arizona.

3. The developer or his representative shall have the certificate recorded in the Office of the Maricopa County Recorder. A copy of the recorded certificate shall be filed in the Office of the City Clerk and a copy shall be returned to the City Engineer, Community Development Planning Division, or designee.

PLAN SUBMITTAL AND REVIEW PROCEDURES

NOTE: Additional criteria are included in other areas of this document including (but not limited to) Paving & Street Design, Multimodal Transportation Design, Street Lighting Design, Sewer Design, Water Design, and Drainage Design.

1. All **Capital Improvement Program (CIP)** project documents shall be submitted directly to the designated Engineering Division – CIP Project Manager.

2. All **Private Development Engineering** project documents shall be submitted under an EN number through the Citizen's Portal in PDF format: https://epermits.tempe.gov

3. Obtain a copy of the City of Tempe Engineering Design Criteria manual, latest edition, for requirements for engineering plan submittals.

4. The following are typical responses to common questions that arise during the Private Development Engineering plan review:

    a. The first review of all Private Development Engineering project documents by the City's Engineering Plan Reviewer will normally take up to 20 working days to complete. (Refer to the review times posted on the website for subsequent reviews).

    b. Payment of the engineering plan review fee is required before picking up the first reviewed documents.

    c. Additional plan review fees will be charged after the second submittal of engineering plans or if additional sheets or documents were included after the first submittal. Expedited review fees are double and accepted on a case-by-case inquiry.

    d. Appendix A of the City Code has the schedule of fees for engineering plan review and inspections.

    e. After all comments have been successfully addressed, the design engineer will be notified by Community Development that permits are ready to be issued.

    f. After the permits have been issued, the General Contractor (GC) shall contact the City's Engineering inspector to schedule a pre-construction meeting with the GC and any subcontractors. Engineering inspectors will then provide the required inspections needed for final acceptance of the engineering work.

g. Engineering Applications are valid for one year from the application date. Only one 6-month extension of time may be granted if requested prior to the expiration of the one-year period or within 30 days of expiration at an additional cost of 25% of the total plan review fee. If the application expires then a new submittal is required to start the process again with new fees.

h. If no building permit is associated with the application and the application with issued permit status expires, then the application can have one time one-year renewal after paying 100% of the original permit fees under same permit number.

i. All expired permits will be issued using the fee structure effective at the time of issue.

j. For Single Family Residence (SFR) projects an additional 65% of the original fees will be added for the extension of all applications

REQUIREMENTS FOR ALL PROJECT PLAN SUBMITTALS

NOTE: Additional criteria are included in other areas of this document including but not limited to Paving & Street Design, Multimodal Transportation Design, Street Lighting Design, Sewer Design, Water Design, and Drainage Design.

1. General Notes and other discipline Plan Notes (shown in the latest edition of the City's Engineering Design Criteria) shall be listed on the engineering plans submitted for City review. Other discipline Plan Notes include Site, Paving, Sewer and Water, On-site Drainage, and Street Lighting.

2. For Private Development Engineering projects, all General Notes and all applicable Plan Notes shall be shown in their entirety.

3. For Capital Improvement Project (CIP) projects, coordinate with the CIP Engineering project manager and/or Engineering website for CIP project Notes.

4. On individual plan sheets, only include engineering notes that apply to each sheet. Remove notes that are not used on the sheet (typ. all plan sheets).

5. Engineering plans shall be submitted on 24" x 36" sheets in PDF-A format. Plan submittals should include water, sewer, onsite grading and drainage, underground fire lines, sidewalk/street/paving plans (including storm drains), and street lighting (if not included with paving plans).

6. All plans must be legible and to scale, when printed, at 50% reduction.

7. The maximum scale for engineering plans is 1" = 30. Show a bar scale with written scale. Avoid overstrikes, tight hatch patterns, heavy shading, etc. All text & drawings *must* be clear, legible & scalable @ 50% reduction (half-size prints). Minimum 12 pt font size.

8. All plans must include a north arrow, pointing to the right or top of the sheet.

9. The Cover Sheet must have:

   A. The signature of the Deputy Engineering and Transportation Director/City Engineer (only for CIP projects).

   B. A complete legal description as it appears on the property's deed and the Assessor Parcel Number (APN).

   C. A vicinity map showing the property in relation to that of the nearest major streets intersection and closest streets.

D. Owner's name or names as appears on the deed (property, business, developer, etc.) and mailing addresses. Provide a copy of warranty deed or other title document, which shall be dated within 6 months of initial submittal.

E. "Contact" name, address, and phone number of person to whom plans should be returned.

F. Legal address of property.

G. Utility Company Submittals. See the back of this manual. Provide contact names and dates. Show all notes and remove any utility company that does not affect the project.

H. Permit and "As-Built" information block. See the back of this manual for this block. Mark applicable items on the right side of the block. The Engineering inspector will mark the left side.

I. A sheet index.

J. A benchmark (use and note City of Tempe datum). See the City's Horizontal & Vertical Survey Control Map

K. Signature block as follows (lower right-hand corner of cover/first sheet):

APPROVAL FOR Offsites, Drainage, Paving, Sewer, Street Lights, Underground Fire, and Water (Remove items in Approval block if they do not apply.)

_____ _____

CITY OF TEMPE **DATE**

(Provide minimum ½" space for signature)

10. For Private Development Engineering Projects, each sheet shall show the Engineering Private Development Project Number (EN - assigned during the first review), the Development Services (DS) Number, and project address in the lower right-hand corner in the bottom margin of each sheet. Use 36 pt. font size.

11. Provide title block on each sheet showing project name, type of drawing (water, sewer, paving, grading and drainage, etc.) and sheet number. Show Township range and quarter section along right-hand margin.

12. Include the Arizona Registered Professional Civil Engineer's seal, signature, and date signed on each sheet.

13. Include the most current local Arizona Blue Stake block on all construction plan sheets.

14. Call out all applicable standard specifications and standard details (City of Tempe, MAG, etc.) on the plans. Reproduction of the detail is not required in the plan set.

GUIDANCE FOR PROJECT PLAN SUBMITTALS

NOTE: Additional criteria are included in other areas of this document including but not limited to Paving & Street Design, Multimodal Transportation Design, Street Lighting Design, Sewer Design, Water Design, and Drainage Design.

1. All overhead utilities on or adjacent to site must be placed underground, including street crossings, per Tempe Code, Section 25-120 thru 25-126 & Ord # 88.85 except for transmission lines (greater than 12.5kv). The property owner must sign and date an Agreement to Underground Overhead Utility Lines before plan approval.

   NOTE: Single-family home and single duplex are exempt from undergrounding overhead utilities that are adjacent to the site.

2. Refer to special overlay zoning districts (Southwest, Rio Salado, and Transportation) for special design and retention requirements during Planning's Site Plan Review (SPR) process. These districts are defined in Part 5 of the Zoning and Development Code. Maps of the overlay districts are shown in this manual.

3. On-site storm water retention is required for the 100-year, 1-hour storm per the City of Tempe "Drainage Criteria" section unless the property is located in the Alternative Retention Criteria Area (ARCA).

4. The Arizona-registered civil engineer shall confirm retention requirements with either Engineering or Private Development Engineering.

5. For all redevelopment projects, all onsite storm water for the 100-yr design event is to remain on property including new single-family residences (except in ARCA or subdivisions with common basins).

6. A drainage report is required for all commercial and multi-family projects. Add the following note to the Grading & Drainage sheets: "A FULL DRAINAGE REPORT EXISTS UNDER SEPARATE COVER." Always provide a summary table of storm water retention on the plans. Single-family homes and duplexes must meet drainage requirements but are exempt from providing a formal drainage report.

7. Dual-chamber drywell systems or approved equal are required on all projects where a drywell is needed. No exceptions.

8. All storm water is required to dissipate within 36 hours. The City requires that surface retention be maximized (including use of paved areas up to one foot deep with positive means of dissipation) before sub-surface retention will be considered. Underground storm water retention storage is allowed only with specific approval of the City Engineer, or designee. When allowed, all underground storage tanks require means of disposal within 36 hours by use of a dual-chamber drywell system. Refer to the "Underground Retention Storage Tanks" section of the City of Tempe Engineering

Design Criteria manual, latest edition. Fuel dispensing sites require special consideration and a multi-stage drywell system for storm water disposal.

NOTE: All developments one acre or greater shall meet the Arizona Pollution Discharge Elimination System (AZPDES) requirements. Provide, with the engineering plan submittal, a copy of the "*NOI Certificate*" or No Discharge Certificate (NDC) from ADEQ. The Storm Water Pollution Prevention Plan (SWPPP) is the responsibility of the property owner and shall be submitted with the project. Project will be inspected routinely during construction and one year after project closeout.

9. Show the net area of site in square feet and acres. Also, provide disturbed area.

10. Show finished floor elevations. Commercial: minimum of 8" above lot outfall and 12" above high-water level. New residential: minimum 14" above lot outfall.

11. Show on plans the following:

- retention volume required and provided,
- top and bottom elevations for retention areas,
- rim elevations for drywells and catch basins,
- invert elevations for catch basins and drainage pipes.
- 4:1 maximum side slope for landscaped retention areas.
- Maximum depth of 3' in landscaped areas and 1' maximum depth in paved areas.
- Show the high-water levels (HWL) at all basins and at grates or manholes for catch basins and underground storage tanks.
- Include cross-sections at all property lines and frontages, basins, swales, ditches, means of storm water conveyance and retention. **Figure 1** in the Single-Family Residential Improvements section of this manual can be used for single-family residential projects.

12. Show positive grade breaks at all property and right-of-way lines.

13. Show existing and proposed landscaping out of water, sewer, and storm drain easements. Add the following note to plans that have a public water line or sewer line easement: Public water mains and sewer mains must have a minimum of 16' clearance from trees and 16' from building foundations. Trees may be planted as close as 8' to water and sewer mains if they are planted with the requirements of COT Standard Detail T-460-1, 2. Trees may never be closer than 8' to a water or sewer main. No trees allowed within a public easement.

14. Any new easement, dedication or agreement not shown on the plat or subsequent to plat recordation is required to be prepared via separate instrument. This instrument/document shall be prepared by City staff *only* and shall be done after receiving proof of property ownership. Proof of property ownership shall be a copy of the current Warranty Deed or Title Report, current to within six months. Preparation of the legal description and exhibits, complying with Maricopa County Recorder

requirements, shall be done by the design engineer. The *original* instrument/document must be signed by the property owner and notarized prior to submitting to City for final review. After the entire packet has been reviewed by the City it will be held as "Recordation Pending" until the facilities have been installed and inspected. Upon project completion, the City will record the document and forward it to the owner or owner contact.

NOTE: Proposed public water and sewer line easements cannot be dedicated per plat and must be granted per separate document unless approved by the City Engineer.

15. An encroachment permit or a license agreement is required for any part of a building including but not limited to canopies, awnings, balconies which protrude into the City right-of-way and for any type of crossing of a public water or sewer easement. An Encroachment Permit is required for any approved encroachment, temporary and removable in nature, that lies within, over or across any public Right of Way. A License Agreement will be required for any approved permanent structural encroachment into the Right of Way (roadway easements and PUE's are included by Tempe City Code definition).

16. A boundary survey and/or a title report less than six months old may be required.

17. Tie property to at least two official record survey control corners, preferably section and/or quarter corners per Tempe Horizontal & Vertical Survey Control Map.

18. Show all lot dimensions, widths of easements (along with recording number), and rights-of-way, including bearings and distances.

19. Show and dimension the parking lot layout, drainage pattern, proposed spot elevations and existing topography of site and adjacent areas.

20. Sidewalks are required in all zoning categories, including all non-residential classifications. Sidewalks shall meet the provisions of the Americans with Disabilities Act. This includes sidewalks that are affected by existing driveways. Sidewalks and driveways shall be brought up to meet all current codes and standards. Easements and maintenance agreements will be needed for public sidewalks if they are not within the right-of-way. Any non-standard material within the right-of-way may require a maintenance agreement.

21. Sidewalks are required adjacent to both sides of all city streets. Arterial streets require 8' wide sidewalks, L-1 streets require 5'-6" wide sidewalks, and all other streets require 6'-0" wide sidewalks. No exceptions. Vertical curb height to be 7 inches for arterial streets.

22. Pavement cutting for utility installation (or any other reason) is prohibited without prior approval of the City Engineer, or designee.

23. New sewer services shall be a minimum of 6” diameter for all commercial projects and be constructed according to Maricopa Association of Government (MAG) Standard Details 440-1 and 440-4. Construction of all other underground utilities that cannot be located using surface features (valve boxes, meter boxes, manholes, cleanouts, catch basins, etc.) shall include some type of metallic pull wire, locator strip, or other type of locating device in accordance with ARS 40-360.22.

24. Show size of all sewer taps (new, existing, and proposed abandoned) on the Civil plans and locate them using centerline station and offset or dimension from property line.

25. Projects with water or sewer construction may require completion of an “Approval To Construct” (ATC) packet and Maricopa County Environmental Service Department (MCESD) approval. Visit MCESD office or website for additional information and current County forms. Documents needing ‘City of Tempe’ signature will be submitted to the Engineering Plan Reviewer and will be processed for signature when the Water/ Sewer plans reach an ‘Approvable’ status. Plans must be signed by MCESD prior to City’s final plan approval when an ATC is required. An “Approval Of Construction” (AOC) packet is required to be completed by the design engineer at the end of any project for which an ATC was required. Provide required water and sewer design reports to City with first submittal for permit review.

26. Show size of all new, existing and abandoned water service meters, including gallons per minute (gpm) needed, on the Civil plans and locate them using centerline station and offset or dimension from property line.

27. All irrigation ditches shall be tiled with rubber gasket reinforced concrete pipe (RGRCP.)

28. The engineer shall furnish satisfactory information to permit abandonment or relocation of existing irrigation facilities.

29. If the existing flood irrigation is proposed to be altered in any way, the engineer shall submit a letter, which verifies that provision for both delivery and tailwater will be adequate.

30. Show, identify and dimension all topography in City right-of-way including pavement, driveways, curb, gutter, sidewalk, poles, medians, traffic signal equipment, streetlights, etc. and how each will be handled.

31. Show and dimension all existing utilities (water, gas, power, irrigation, sewer, storm drain, etc.) and locate by tying to property line and/or street centerline.

32. Show all proposed utilities (electric, telecommunications, television, gas, data/communication, etc.) on civil plans or on separate plans. Profiles are required for bores. A miscellaneous trenching permit is required for utility construction. And shall be obtained directly through the Engineering Division.

33. Distinguish between all existing and proposed construction and clearly show any planned phasing.

34. Show and dimension all existing and proposed curb cuts for driveways per Tempe Standard Detail T-320. Driveway entrances may not be required on roll curb streets for single-family residential. Driveway curb cuts shall not be located within 100’ of the point of intersection of property lines at arterial/arterial or arterial/collector street intersections.

35. Vertical curb required at all street frontages except for single-family homes where the existing curb is other than vertical curb. (7 inches required for arterial streets).

36. Show, dimension and locate all existing streets, sidewalks, driveways, medians and median openings within 125’ of the project boundaries on both sides of the street.

37. During the Site Plan Review (SPR) process, clearly indicate drive aisle widths & turning radii. 45' min turn radius, 20' minimum width, 23' minimum when parking on both sides. Refer to the City of Tempe Zoning & Development Code manual, Chapter 5, Figure 4-502 G, for the maneuvering diagrams.

38. Show all underground electric circuits, conduit, traffic signal poles, pole foundations, pull boxes, and other traffic furniture approved by the Transportation Division. Show locations of any required streetlights to be installed with project. Call out the correct type of streetlights per the City’s requirement. Locate all streetlights from the center line of roadway and/or the nearest property line.

39. Show and dimension proposed and existing perimeter walls, wall heights, spot grades on both sides of walls, and adjacent building faces near property line.

40. Be sure to comply with all City comments from a preliminary Site Plan Review (SPR) and Development Review Commission (DRC), when applicable, prior to formal engineering plan submittal.

41. Provide copies of private cross-access & cross-drainage easements/agreements, where applicable. Include recording number.

42. Discipline:

    Type of work shown on engineering plans such as:

    - Water (including fire hydrants, mains, and water meters) *****
    - Sewer (label as private or public) *****
    - Underground fire sprinkler lines for buildings
    - Onsite grading and drainage; storm water retention, drywells
    - Street/paving plans (including but not limited to: streets, signing, striping, sidewalks, driveways, ramps, etc.) *

- Street lighting when plan is not shown on paving plans*
- Provide a master storm drain plan if site is divided into multiple sheets. This is separate from sewer and water. Label lot outfall, basin high water elevations, tanks, tank volumes, drywells, and pipe size.
- Provide master utility sheet for water and sewer if site is divided into multiple sheets. Label water meter sizes, fire hydrant locations, and pipe sizes. Label manholes, pipe sizes, and invert elevations.
- Traffic signal plans

(*) in City right-of-way or easement.

43. Provide an estimate of quantities of construction items (Item, Unit, Quantity). Separate public and private utilities. See following page for list.

ESTIMATED QUANTITIES

The following is a list of quantities currently used by the City to determine fees for permits. Select all applicable items and show on the first sheet of the plans showing actual quantities for your project (complete the following table and select only the items applicable to your project.) Provide separate public and private quantities on the cover sheet.

Item	Unit	Quantity
WATER (WA Permit for public items only)		
Tap Sleeve and Valve	EA	
Water Mains Inspection	LF	
Pipe Encasement	EA	
Water Services	EA	
New Fire Hydrants	EA	
Removal of Fire Hydrants	EA	
Valve Cluster	EA	
Pothole	EA	
New Water Meters (Provide size and type e.g. domestic or landscape)	EA	
Removal of Existing Water Meters (Provide size and type e.g. domestic or landscape)	EA	
Waterline Shutdown over 12”	EA	
Waterline Shutdown under 12”	EA	
PAVING (PV Permit for items within right-of-way only)		
Driveway or Alley Entrance	EA	
Bus Bays	EA	
Bus Shelter	EA	
Concrete Curb and Gutter	LF	
Sidewalk or Bike Path	LF	
Sidewalk Ramp	EA	
Valley Gutter and Apron	EA	
New/Replacement Paving	SY	

Alley Surfacing	SY	
Irrigation Lines	LF	
Manhole Adjustments	EA	
Valve Box Adjustments	EA	
Pothole	EA	
DRAINAGE (DR Permit)		
Drywells	EA	
Interceptor Chamber	EA	
Oil Stop Structure	EA	
Underground Storage	LF	
Storm drain Pipes	LF	
Street Name Sign	EA	
Headwalls	EA	
Catch Basin	EA	
Scuppers	EA	
Other Drainage Structures	EA	
Grouted Rip Rap	SF	
Manholes	EA	
SEWER (SW Permit. Provide separate public and private quantities)		
Sewer Services	EA	
Manholes/Drop Connects/Cleanouts	EA	
Pothole	EA	
Sewer Drill Tap	EA	
Sewer Lines	LF	
UNDERGROUND FIRE (UF Permit)		
Underground Fire Sprinkler Line	LF	
Valves	EA	
Tap Sleeve and Valve	EA	

Pothole	EA	
Waterline Shutdown over 12”	EA	
Waterline Shutdown under 12”	EA	
STREETLIGHTS (ST Permit for items within R.O.W. only)		
Energization (overhead)	EA	
Energization (underground)	EA	
Trench for conduit	LF	
Pothole	EA	
Street Light Pole Inspection	EA	
Street Light Relocation	EA	
Traffic Signals	EA	

PAVING & STREET DESIGN CRITERIA

A. GENERAL

1. In addition to this section refer to the section labeled “REQUIREMENTS FOR ALL PROJECT PLAN SUBMITTALS”, in this manual.

2. Street design should also be consistent with and comply with the guidelines in the current issue of AASHTO’s “A Policy on Geometric Design of Highways and Streets”.

3. Include all applicable standard specifications and standard details on the plan.

4. Include a vicinity map showing the property in relation to that of the nearest major streets intersection on the cover sheet.

5. Benchmark shall be on City of Tempe datum. Horizontal control will be the same as the subdivision plat datum.

6. Include an index map showing sheet numbers on the title sheet.

7. If any streets are located within the jurisdiction of the State or County, a permit from that jurisdiction is required.

8. Contact Valley Metro if there is work adjacent to or within the light rail right-of-way: https://www.valleymetro.org/contact/track-access/permitting-process
Add note on the plan: Contractor must have track access training and permit to work near the light rail.

9. Contact Union Pacific Railroad (UPRR) if there will be construction adjacent to or within the railroad right-of-way. Contractors performing the work must have a Right of Entry (ROE) permit and any other permits necessary from UPRR prior to beginning work.

10. If any streets are located within the jurisdiction of the State or County, a permit from that jurisdiction is required.

11. Show all existing and proposed utility surface features, including valves, manholes, hydrants, and cleanouts. Call out adjustments to final grade if not on other sheets in plan set.

12. If City Engineer or Designee determines that the pavement structural adequacy and/or pavement surface condition of existing frontage of a proposed development are in question and/or not in acceptable condition prior to construction of the development, The City of Tempe may require developers to

perform testing of the bound pavement and/or base materials. If such testing reveals an inadequacy, the City of Tempe may require the developers to complete such improvements to bring the street section to current City standards and to maintain and/or improve the pavement condition after completion of construction of the proposed development.

Single family residence homes and single duplex construction that are not part of a new planned development will be granted an exception to this requirement.

The pavement structure thickness shall meet requirement of Tempe Standard Details T-311, T-312 or T-313. The pavement materials shall meet the requirements of Paving and Street Design Criteria Section C of this document.

If City Engineer or Designee determines that the pavement structural adequacy and/or pavement surface condition of existing frontage of a proposed development are properly installed and are in good repair, operational and are not hazardous prior to construction of the development and will continue to be after proposed development is constructed, the development shall be exempt from these requirements.

13. Asphaltic paving of alleys is required from the point of entry to the length of the property line being developed per Chapter 5, Part 4, Section 4-502 of City Code. Asphaltic paving of the alley shall follow MAG Standard Detail 202.

    A full civil design for the entire length of the alley shall be completed by the developer and must include drainage of water as part of the design.

    The asphalt, concrete, and aggregate base course (ABC) materials and structural thickness shall meet the requirements of Paving and Street Design Criteria Section C of this document.

    Single family residence homes and single duplex construction that are not part of a new planned development will be granted an exception to this alley asphaltic paving requirement.

14. Alleys adjacent to single family residence homes, accessory dwelling units and single duplex construction that are not part of a new planned development will be required to dustproof the alley from the point of entry to the length of the property line being developed per City Code Chapter 29, Section 29-3. Dustproofing materials and application processes shall meet the requirements of MAG Section 792.

B. LAYOUT OF STREETS & ALLEYS

1. New streets and alleys require platting. Show street names, locations, widths, and easements; they shall agree with the final plat.

2. The alley and street drainage shall agree with the accepted drainage plan.

3. All cross-sections and dimensions of streets and alleys shall meet City Standards.

4. Valley gutters are not permitted transverse to the centerline of collector or arterial streets.

5. All valley gutters with flow line parallel to the centerline of an arterial street must be 6 feet in width, per MAG Standard Detail 240. All other valley gutters shall be 3 feet in width unless otherwise is required by the City Engineer or designee.

6. Projects are required to install the necessary sidewalk ramps to comply with Americans with Disabilities (ADA) requirements when they are adjacent to or include an existing public street intersection which sidewalk ramps are not existing or non-compliant with ADA standards. Ramps from City of Tempe Standard Details or Maricopa Association of Governments Standard Details shall be used, per the next section. There may be instances where existing conditions at a curb return include physical constraints or limited right-of-way. ADA allows for some flexibility for retrofit conditions, but the basic parameters such as ramp slope, width, and cross-slope must be met. The City of Tempe can assist with design of curb ramp modifications options, if necessary, during the design review process.

7. All Curb returns shall be constructed with vertical curb. Sidewalk ramps are required at all public intersections, in accordance with the Americans with Disabilities (ADA) Act. The minimum curb return radius and ramp type shall the following:

Curb Returns and Ramp Types		
Intersection Type	**Corner Radius**	**Ramp Type**
Local Street with Local	20'*	T-326 Single Ramp
Local Street with Collector (Signalized)	25'	MAG 236-3 Dual Ramp
Local Street with Collector (Non-Signalized)	25'	MAG 236-3 Single Ramp
Local Street with Arterial (Signalized)	25'	MAG 237-3 Dual Ramp
Local Street with Arterial (Non-Signalized)	25'	MAG 237-3 Single Ramp
Collector Street with	25'	MAG 237-3 Dual Ramp

Curb Returns and Ramp Types		
Intersection Type	**Corner Radius**	**Ramp Type**
Collector (Signalized)		
Collector Street with Collector (Non-Signalized)	25’	MAG 237-3 Single Ramp
Arterial Street with Arterial Street	30’	MAG 237-3 Dual Ramp

* If intersection is not at 90-degree angle, corner radius shall be 25ft and sidewalk ramp shall be per MAG 236-5 Single Ramp

The installation of a sidewalk ramp in an existing curb shall be made by a horizontal saw-cut of the curb. Vertical saw cutting of the curb and gutter is not allowed. If the existing curb and gutter is cracked or has deteriorated, complete removal and replacement of the curb and gutter is required. The asphalt pavement directly adjacent to the removed curb and gutter shall be removed and replaced at a minimum width of 2 feet from the lip of gutter.

8. Curb returns shall have:

    a. A 25’ radius where a local or residential collector street turns 90°.

    b. A 30’ radius where two arterials intersect.

    c. All others 20’ radius.

9. For cul-de-sac dimensions, the minimum radius to the face of curb is 45’ and the radius for the right-of-way is 55'.

10. All dead-end streets serving more than four lots shall be provided with temporary connections or turnarounds. (Refer to the City of Tempe, Zoning & Development Code, Chapter 5, Access and Circulation).

11. Location of driveways and dimensions shall be shown. Use street alignment stationing to locate driveway centerlines or locate from nearest property line. Include driveways width dimensions consistent with the C.O.T. Details. Along arterial and collector roadways, driveways should be located across from driveways on the opposite side of the roadway, where possible, in order to decrease potential turning conflicts.

12. Driveways in the right-of-way shall be constructed of concrete. Specify depth. No other surfaces, including brick pavers, are allowed unless a variance is granted by the City Engineer.

13. All abandoned driveways must be removed and replaced with curb, gutter, and sidewalk. Sidewalks need to be ADA compliant.

14. Dead end alleys are prohibited.

15. All new and existing survey monuments shall be shown on the plans and are required at all street intersections, P.C.'s, P.T.'s, P.I.'s, section corners, quarter corners, sixteenth corners, and subdivision corners if applicable. After all improvements have been installed, an Arizona Registered Land Surveyor shall check the location of monuments and certify their accuracy and compliance.

16. Street names shall conform to the existing City grid.

17. Local streets shall be designed to minimize through traffic use.

18. Maximum block length shall be 1200' except that in the case of 1/2-acre lots the maximum block length shall be 1700'.

19. Minimum 15' X 15' property line cutoffs are required at all angles and intersections of alleys.

20. 15' X 15' property line corner cutoffs are required at local street intersections and where local and collector streets intersect. 20' x 20' cutoffs are required at collector street intersections and where local and collector streets intersect arterial streets. 30' x 30' cutoffs are required at all arterial intersections.

21. Where two streets intersect, a common local or collector street and those streets are offset from each other, the minimum offset shall be 125'. Where the common street is an arterial street, the minimum offset shall be 330'.

22. All intersections with arterial streets shall be at 90°.

23. Local street intersections shall vary no more than 15° from a 90° angle.

24. Intersecting street center lines with an angle between them at more than 10° but less than 90° shall be connected by a minimum centerline radius of 600' for collector streets or 200' minimum radius for local streets.

25. Where a local street intersects a collector or arterial street, provide minimum tangent approach distance of 150' (measured from the right-of-way line of the major street) or a minimum radius of 400'.

26. Provide 100' minimum tangent distance between reverse curves on local and collector streets.

27. Right of way shall be dedicated in accordance with Tempe's Standard Details.

C. DESIGN OF CURB, GUTTER, SIDEWALK, & PAVING

1. The engineer shall provide sufficient cross-sections and profiles of existing and proposed improvements. Include typical sections and pavement structural sections.

2. Single-family residential development shall have 4” roll curb and gutter, arterial streets shall have 7” vertical curb and gutter and all other streets shall have 6” vertical curb and gutter.

3. Provide sufficient information showing existing upstream and downstream construction to justify the design.

4. The proposed paving grades shall match existing or proposed improvements both upstream and downstream.

5. The design grades shall match the existing or proposed improvements on the opposite side of the street.

6. Wing type driveway entrances shall be located on all streets except for local residential streets with roll curbs in front of single-family homes and where approved by the Engineering Division.

7. Locate entire driveways (including the side ramps) so it is in front of the property and not extending to adjacent property. Any improvements being proposed/constructed on adjacent properties will require adjacent property owner authorization and/or easement documents.

8. Sidewalks are required adjacent to both sides of all city streets and shall be 8’ wide along arterial streets, 5’-6” wide on L-1 local streets, and 6’-0” wide for all other streets. All sidewalks within the Transportation Overlay District are required to be a minimum 8’ wide.

9. Label and show easement for any public sidewalks located on property. Submit legal description and exhibit for review. Once approved, then the Real Estate Management Coordinator will send signature documents. Signature documents must be signed by the property owner and notarize PRIOR to plan approval.

10. Material used in accordance with City Details for design thickness of select material and aggregate base course shall be verified by soil tests. All aggregate base course materials installed must be on the current edition of the City of Phoenix products list for ABC Suppliers.

11. A soil report shall be submitted to verify the designed pavement section.

12. The pavement section profile for public streets shall be specified per the most current edition of Tempe’s Standard Details T-311, T-312 or T-313.

13. The following are the requirements for pavement and concrete materials within the City right-of-way. All asphaltic materials installed must be on the current edition of the City of Mesa approved products list for Asphalt Mixes. All concrete materials installed must be on the current edition of the City of Phoenix approved products list for Concrete Mix Designs.

Infrastructure	**Material**
Asphalt Surface Course	Arterial Functional Classification: • EVAC ½ PG76-22 PMTR Collector Functional Classification: • EVAC ½ PG70-16TR Local Functional Classification: • MAG/EVAC ½ PG 70-10
Asphalt Base Course	MAG/EVAC ¾ PG 70-10
Aggregate Base Course	MAG Table 702-1
Select Material	MAG Table 702-1 Type A
Sidewalk	MAG Class A
Sidewalk Ramps	MAG Class A
Utility Concrete Collars	MAG Class AA
Curb and Gutter	MAG Class A
Driveway or Alley Entrance	MAG Class A
Valley Gutters and Aprons	MAG Class A

14. Locate bike racks out of right-of-way. Bike racks in the right-of-way will need a maintenance agreement if they are not the City standard detail.

15. All pavement termination or extent of overlay shall be determined in the field by the City Engineer, or designee.

16. Excessive downhill gradient from an existing or proposed street intersection to a point where minimum gradient is used along the remainder of the street length will not be permitted. A straight grade must be used unless it will create a difficult problem in terms of grading or drainage.

17. Minimum street grade shall be S=0.0020 ft/ft. Where practicable street gradients shall exceed minimums (S=0.004 ft./ft. is desirable). Maximum street grade for collector streets is 0.07 ft./ft. and for local streets it is 0.09 ft./ft.

18. The minimum length for a vertical curve is 100’.

19. Minimum cross slope shall be 0.025 ft/ft. for all streets and alleys.

20. Minimum longitudinal slope across valley gutter shall be S=0.0020 ft/ft.

21. Minimum elevation difference from radius point of cul-de-sac to highest gutter shall be 0.5’.

22. Minimum slope on paved alley shall be S=0.0020 ft/ft.

23. Minimum slope on A.B.C. surfaced alleys shall be S=0.0015 ft/ft.

24. Show all proposed valley gutters, aprons, catch basins, scuppers, and other drainage structures.

25. Sidewalk ramps are required at all public street intersections, in accordance with Americans with Disabilities Act. All sidewalk ramps shall have truncated domes. All truncated domes shall be Terra-cotta in color.

26. Show all curb transitions.

27. Show taper lengths and locations in both plan and profile.

28. Show invert elevations, pipe size, slope, hydraulic grade line, stationing, and material for all proposed storm drains.

29. All catch basins are to be curb opening type (5.5’ minimum length.) No grate type catch basins shall be used. Slotted drain with angled slots may be used in combination with catch basins.

30. Scuppers are not preferred. Replacement of existing scuppers with catch basins is encouraged.

31. Call out all M.A.G. and Tempe Details in the construction notes or show “special” detail on plan.

32. Show all underground electric circuits, conduit, traffic signal poles, pole foundations, pull boxes, and other traffic furniture approved by the Transportation Division.

33. If the existing curb and gutter must be removed and replaced, the existing asphalt pavement must be saw cut and removed to a minimum width of two feet (2’) from the lip of the new gutter. Replacement of asphalt pavement shall be per City of Tempe Detail T-450.

34. Saw cuts of existing pavement when approved by the City Engineer, or designee, shall be a neat straight edge. For saw cuts in bicycle lanes, the entire bicycle lane width must be slurry- or micro-sealed, from lip of gutter to center of edge line, for the length of the proposed saw cut to provide a smooth riding surface.

35. Within the Southwest Overlay Zoning District, show the sidewalk in the right of way to be constructed per Tempe Standard Detail T-351. When the sidewalk is joined with the street curb, show the curb and gutter detail, MAG Standard Detail 220-1, Type A, to have contraction joint and expansion joint spacing of 12 feet to align with the sidewalk contraction and expansion joints.

36. Backfilling and replacing of pavement in all public street excavations must be per City of Tempe Standard Detail T-450.

STREET NAME SIGN REQUIREMENTS

Procedure for street name sign installation on public streets for new subdivisions:

1. During the development review process, unit numbers & suite numbers, and addresses and street names (including private streets) will be assigned by Community Development.

2. Once addresses are assigned, Traffic Engineering prepares the bill for materials and installation that is sent to the developer.

3. After receiving payment, Traffic Engineering prepares the work order to initiate sign preparation and installation.

4. The City maintains street name signs installed on public streets.

5. Condition of subdivision plat approval is for the developer to pay for new street name signs.

Procedure for street name sign installation on private streets for new subdivisions:

1. The developer shall install private street name signs in accordance with City of Tempe Detail T-655.

2. The developer is responsible for sign preparation and installation.

3. The neighborhood association maintains street name signs installed on private streets.

4. Prior to clearance for occupancy, street name signs shall be installed per City requirements.

MULTIMODAL TRANSPORTATION DESIGN CRITERIA

A. GENERAL REQUIREMENTS

1. Plans submitted for review shall show all existing bus bays, bus stops, shelters, furniture, and easements within 250' of the site.

2. Plans submitted for review shall show all existing bicycle and pedestrian paths, easements, and facilities within 250' of the site.

3. Plans submitted for review shall include a pedestrian plan indicating proposed circulation within the site and access from the streets abutting the site. Pedestrian plans must conform to Americans with Disabilities Act (ADA) requirements.

B. GUIDELINES FOR DEDICATIONS AND IMPROVEMENTS

1. Development of parcels located at the far side of arterial to arterial and arterial to collector intersections shall be required to dedicate minimum easements of 9' by 27' for transit shelters and 11' by 175' for bus bays per the City's exaction policy.

2. Development of parcels located along multi-use paths designated by the most recently adopted Tempe Bicycle Plan and Updates may be required to dedicate a 25' easement per the City's exaction policy.

3. Bus shelter and bus bay improvements shall conform to City of Tempe Standard Detail T-654 specifications.

4. Multi-use path improvements shall conform to City of Tempe Standard Detail T-656 specifications.

C. TRANSIT RELATED DESIGN CRITERIA

1. Building frontages and location of main buildings should be oriented towards arterial streets or streets with existing or planned transit service (all arterial and collector streets).

2. Bus stops shall be integrated into the overall pedestrian plan of any project. Pedestrian walkways shall be designed to provide a direct connection between the main building entrance to public sidewalks and transit stops. Landscaping plans shall be designed to provide shading to the pedestrian walkways.

3. Pedestrian and transit user access to buildings is encouraged by locating buildings at the minimum setback at arterial-to-arterial intersections and arterial to collector intersections, or where transit service is provided or planned (all arterial and collector streets).

4. Distance of pedestrian access from bus stops to building entrances shall be minimized by using minimum setback requirements for locations of buildings on the site.

5. Pedestrian and bicycle access to the main building entrances from all sides of the site by providing more links to street frontages. At a minimum, it is suggested that pedestrian and bicycle ingress and egress pathways into the site shall be equal to the number of proposed driveways.

6. It is desirable that buildings locate closer to the street intersection by minimizing parking at street frontages or locating all parking behind or to the side of the building.

7. Bus stops shall be located between 60' and 110' from point of tangency of the intersection curb return.

8. Furniture installed at bus stops shall be located so as to provide minimum 48” clearance for access and maintenance between components and switch boxes, mailboxes, and utility boxes. All bus stops shall meet current ADA requirements for transit.

9. Bus stops shall be provided with convenient and safe pedestrian access to and from building entrances to streets. It is recommended that driveways not be located within a bus stop and/or pullout area.

10. The landscape plan shall incorporate shade trees for bus stops, maximizing shading for summer morning and afternoon hours. All landscaping shall be located so as not to obstruct the shelter canopy or visibility of the bus stop.

11. Mixed-use development is encouraged, allowing people to work and play where they live.

12. New and existing cul-de-sac and dead-end streets, especially those abutting arterial and collector streets, should provide connecting pedestrian and bike paths to the major streets. Cul-de-sacs and dead-end streets are not encouraged for new or re-development.

13. Pedestrian and bicycle access to alleys shall be encouraged. Pedestrian and bicycle access to alleys may provide additional means for those users to access arterial streets.

D. BIKE FACILITIES

1. Bike racks shall be installed near main building entrances and located to take advantage of available building shade.

2. Provide direct access to the site from designated multi-use paths and other bike facilities abutting the site.

3. Bicycle rack design and installation shall conform to the City of Tempe Standard Detail T-578.

E. AMERICANS WITH DISABILITIES ACT (ADA) ACCESS

1. Sidewalks shall be required on all streets surrounding the property, including industrial, commercial, and residential developments.

2. Sidewalks and pedestrian paths shall be built in compliance with the requirements of the Americans with Disabilities Act but achieve a level that can account for construction tolerance by aiming towards running slopes that shall not exceed 4.5% and cross slopes that shall not exceed 1.8%.

3. ADA compliant ramps and landings shall be provided at all street corners abutting the property.

4. A minimum 8’ X 8' concrete clear area adjacent to the curb shall be required at all bus stops. Bus stops in areas with sidewalks less than 8' wide or with sidewalks separated from the curb shall be upgraded to meet the minimum clear area per the City's exaction policy.

STREET LIGHT DESIGN CRITERIA

A. PROCEDURE

Streetlight installation shall conform to the standards set forth in this document. Developers of all residential, commercial, industrial, or other types of properties are responsible for the design and installation of streetlighting on all streets within and adjacent to their sites. Streetlight plans shall be prepared and sealed by a State of Arizona registered professional engineer (Electrical preferred). The streetlighting design shall be reviewed and approved by the City.

Developer shall:

1. Submit plans to the Private Development Engineering of Community Development showing the proposed street lighting locations designed per requirements of this document.

2. Projects outside of Old Town Special District: Streetlights are direct powered by utility company. Upon receipt of preliminary approval of the streetlight locations from the Transportation Division, work with the appropriate utility and make payment to the utility for design fees for preparing circuit plans. (Utility to design the street lighting electrical circuits). Submit one utility circuit design plan set to the Engineering Division.

3. Projects in Old Town Special District: Streetlights are powered from meter pedestal. The developer's engineer will design meter pedestal location and street lighting circuits including all conduit and wire sizing. Upon receipt of preliminary approval of the meter pedestal location from the Transportation Division, work with appropriate utility and make payment to the utility for design fees power service design to meter pedestal.

4. Pay the City, Community Development, all required energy connection, development, and construction fees.

5. The developer shall provide and install all trench/boring and conduit per utility company plans and specifications.

6. The developer shall provide and install streetlights and pull boxes per approved plans and City details. The streetlights shall be installed concurrent with other required off-site and on-site improvements prior to occupancy.

7. Street light locations may be adjusted not more than 10 feet in the field with approval of inspector. If the approved pole locations require modifications in excess of 10 feet, 2 copies of the revised plans showing new pole locations will be submitted to the Transportation Division for review, and approval. All additional costs associated with field changes are the responsibility of Developer or Contractor.

8. The developer shall provide and submit to the City Engineering Division, accurate "As-Built" plans on the approved set of construction plans, prior receiving "Occupancy" approval.

9. The developer shall warranty all workmanship for a period of not less than one full year from the date of acceptance by the City.

City shall:

1. Upon initial receipt of the plans from the developer, the Engineering Division shall review the submittal for compliance with City codes and standards and provide for final approval.

2. Upon receipt of the plans from the utility, approval of the plans by the Engineering Division, and payment of all fees by the developer, Development Services shall issue appropriate permits.

3. The City shall provide the utility company a written authorization for the connection and energization of new street lightings that have been properly installed and have been approved, in writing by a City Engineering designee.

4. The City will accept the street lighting system upon verification by the utility, approval by the City Engineering designee, Traffic Maintenance Group, and successful energization of the system.

Utility Company shall:

1. Upon receipt of the approved street lighting plan, the utility company shall design the street lighting circuits and assign street identification numbers for each proposed street lighting structure.

2. After conduit is installed by contractor, the utility shall install conductors from power source to pull box adjacent to streetlight and make all termination in pull box.

B. NEW DEVELOPMENT/PUBLIC STREETS

1. Streetlight 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 City Engineer or designee. LED luminaires shall conform to the City specifications.

3. Streetlights shall be fully shielded (full cut-off) in such a manner that light emitted by the fixture, either directly from the lamp or indirectly from the luminaire, is projected below a horizontal plane running through the lowest point on the fixture where light is emitted. This requirement does not apply to post top lights in the Old Town Special District.

4. Streetlighting shall be designed to meet the light level criteria shown in Table 1 below.

Table 1: Illumination Light Levels for Public Streets

STREET TYPE	AVERAGE FOOTCANDLES	UNIFORMITY RATIO (AVG/MIN)	SPACING TYPE
MAJOR & MINOR ARTERIAL	1.6	3.5	STAGGERED
COLLECTOR	0.6	4.0	SINGLE SIDE
LOCAL	0.4	6.0	SINGLE SIDE

5. Photometric calculations shall be submitted with streetlight plans to demonstrate design is in compliance with light levels in Table 1.

   (a) Average footcandles must be greater than or equal to value in table for given street type.

   (b) Uniformity Ratio (Average/Minimum) must be less than or equal to value in table for given street type.

   (c) A light loss factor (LLF) of 0.90 shall be used for all LED luminaires.

   (d) Calculation grid spacing shall be a maximum of 10 ft x 10 ft.

6. Local/local intersections shall have at least one (1) streetlight at the intersection. Local/collector, collector/collector, arterial/local and arterial/collector intersections shall have at least two (2) streetlights at the intersection. Arterial/arterial intersections and all other signalized intersections shall have eight (8) lights at the intersection typically mounted on the signal poles. Exceptions may be granted for this requirement where existing overhead electric lines prevent installation of streetlights. At signalized intersections, streetlight plans shall be coordinated with streetlights mounted on traffic signals. Poles located within 5 feet of curb radius return are considered at the intersection.

7. All new streetlighting circuits shall be installed underground and will be owned and maintained by the utility company.

8. The developer shall coordinate all power distribution design and electrical service criteria with the utility company serving the lighting system. The developer shall conform to the latest requirements of the serving utility and pay all fees for design and energization.

C. NEW DEVELOPMENT/PUBLIC STREETS

Streetlights on private roadways shall meet the light levels in Table 1, and the requirements listed below.

1. Developer is responsible for all costs of design and installation of streetlight system.
2. Streetlight plans and details shall be included with the improvement plans.
3. The developer can select the pole and luminaire style.
4. Streetlights shall be fully shielded (full cut-off) in such a manner that light emitted by the fixture, either directly from the lamp or indirectly from the luminaire, is projected below a horizontal plane running through the lowest point on the fixture where light is emitted. External reflectors are not allowed.
5. Maximum mounting height of 32 feet. Mounting height is measured from finished grade to bottom of luminaire.
6. Minimum setback of 2’ from back of curb.
7. The developer/HOA is responsible for all maintenance and operations of all private streetlighting.

D. STREETLIGHT PLAN REQUIREMENTS

Streetlight plans shall include the following information:

1. Show all proposed and existing curb, easements, PUE, right-of-way, lot numbers, and other structural features.
2. Show all proposed and existing utility locations and maintain minimum clearances required by respective utility.
3. Show pole type, luminaire mounting height, luminaire wattage, and lumen output.
4. Show centerline station and offset for all streetlights.
5. On cover sheet include a key map showing all streets.
6. Provide a legend on the plans identifying the following items:
    a. Streetlight types with lumen output.
    b. Pull boxes.
    c. Conduit.

7. Show proposed and existing traffic signal poles and luminaires.

8. Meandering sidewalks shall not conflict with streetlight poles.

9. Where sidewalk is attached to curb, streetlights shall be centered 2’ behind sidewalk. Where sidewalk is detached, streetlights shall be centered a minimum of 2’ from back of curb.

10. Streetlight poles shall be a minimum of 6 feet from the edge of a driveway wing.

11. Streetlight poles shall be a minimum of 6 feet from water lines and hydrants. Where there is limited right-of-way or other geometric constraint, Engineering Division staff may reduce required clearance from water lines.

12. 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.

13. Streetlight poles shall not be located in the radius of intersections.

14. Streetlight poles shall be oriented perpendicular to street.

15. All streetlights to be located within right-of-way. When necessary due to conflicts, streetlights may be in PUE or roadway easement with City approval.

16. Tops of all pole foundations and pull boxes shall be flush with sidewalk grade unless otherwise noted.

17. All future and existing streetlights adjacent to and within 300 feet of project frontage must be shown with stationing and dimensional ties to the street centerline.

18. Streetlights on lot frontages in residential areas shall be located at property lines whenever possible.

19. All construction phasing must be shown and labeled on the plans.

20. Streetlight plans will be submitted at a scale no smaller than 40 feet to one inch. Final light pole locations will be shown on the Paving and/or Utility plans or as required.

21. Streetlight plan submittals will be coordinated through the Site Plan Review process and shall be submitted with the civil improvement plans for review and approval prior to construction.

22. The approved streetlight plans shall be submitted to power company for final design of power distribution for streetlights. The developer is responsible for all coordination with power company.

E. STREETLIGHT POLES

1. All poles and mast arms shall be per City of Tempe Standard Details.
2. Pole heights and arm types to be used in Standard Districts on local, collector, and Arterial streets shall be per Table 2 below.
3. All poles shall be mounted on concrete foundations.
4. Poles in the Old Town Special District and other special districts shall match the style of existing poles in those areas.

Table 2: Pole and Arm Dimensions for Standard Districts

STREET TYPE	STREETLIGHT STYLE	MOUNTING HEIGHT	ARM
ARTERIAL	ARCHITECTURAL (SQUARE POLE)	32’-0”	12’X8’
ARTERIAL	COBRAHEAD (ROUND POLE)	32’-0”	6’ RADIUS
COLLECTOR	COBRAHEAD (ROUND POLE)	30’-0”	4’ RADIUS
LOCAL	COBRAHEAD (ROUND POLE)	30’-0”	4’ RADIUS

F. LED LUMINAIRES

All LED luminaires shall meet the following specifications. See Tempe Approved Products List for approved manufacturers and catalog numbers.

1. Luminaire shall have typical Color Rendering Index (CRI) ≥ 65.
2. CCT and CRI of luminaire shall be tested and measured in accordance with LM-79-19.

3. Luminaires must be independently tested and comply with IESNA LM79-19 and LM80-20. A copy of all LM79 and LM80 independent test reports shall be provided to the City upon request.

4. Luminaires shall have discreet LED chips. Chip on board are not allowed.

5. The luminaire shall operate 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.

6. Luminaire shall have a minimum system power factor of 0.9 tested and specified at 120V input at full power.

7. Luminaire shall have maximum total harmonic distortion (THD) < 20% tested and specified at 120V input at full power

8. Driver shall have a minimum life rating of 90,000 hours at 25º C.

9. The luminaire shall contain prewired integral drivers and optical assembly. Internal labeling shall be in accordance with ANSI standards.

10. Luminaire shall have UL Class 1 power supply units (i.e. drivers) operating in DC constant current mode.

11. Luminaire shall have EMI compliance with FCC 47 CFR Part 15 Class A.

12. The luminaire circuitry shall include surge protection devices (SPD) to withstand high repetition noise transients as a result of utility line switching, nearby lightning strikes, and other interference. Minimum surge protections shall be 10 kV/5 kA per ANSI C136.2 (2015) Enhanced category.

13. Off-state power draw shall be 0 watts (excluding PE or remote-control devices).

14. Electrical cavity shall use only copper wire within the fixture.

15. Terminal block shall be oriented to be lineman friendly within the electrical cavity to allow for easy wiring. 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.

16. Cooling shall be done with heat sinks. No fans, pumps, or liquids shall be used.

17. 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.

18. A 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.

19. Warranty shall not be affected by opening the power door and/or accessing the electrical cavity.

20. Luminaire shall meet 3G vibration per ANSI C136.32-2001.

21. 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.

22. The coating must demonstrate the gloss retention of greater 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 powder paint shall be a minimum of 2.5 mils thickness. Fixture color shall match the pole color.

23. Luminaire housing and door shall be die-cast aluminum and shall be UL listed for wet locations.

24. Luminaire shall be UL 1598 listed for operating temperature range of -10º C to +50º C.

25. Lumen maintenance at 50,000 hours and 25°C ambient based on testing per TM-21-19 shall be 90% or greater. Lumen depreciation data per LM-80-20 and TM-21-19 at 25°C ambient shall be available.

26. Drivers shall be dimming type with 0-10-volt leads wired to 7-prong photocell receptacle.

G. Standard District Luminaires

LED luminaires in Standard Districts shall also comply with these specifications.

1. Luminaire Correlated Color Temperature (CCT) shall be 4000K for arterial streets, 3000K for local and collector streets, binned per ANSI C78.377-2008.

2. Luminaire shall have the lumen output, and IESNA TM-15 BUG rating per table below. Uplight shall be zero (0) light above 90-degrees.

Table 3: Luminaire Types for Standard Districts

Street Type	Lumen Designation	Nominal Lumens	Max BUG Rating	Replaces HPS
Local	7L	7,000 ±10%	B2-U0-G2	100W
Collector	9L	9,000 ±10%	B2-U0-G2	150W
Arterial	18L	18,000 ±6%	B3-U0-G3	250W
Arterial Signal	27L	27,000 ±6%	B3-U0-G3	400W

3. Luminaire efficacy shall be a minimum of 105 lumens per watt.

4. Finish Color shall be dark bronze for architectural luminaires and gray for cobrahead luminaires unless otherwise approved by engineering department.

5. Heat sink fins shall be incorporated into housing to maximize heat transfer and minimize thermal impacts of environmental conditions such as debris-clogged fins.

6. Slipfitter in the housing shall contain two or four-bolt clamp fastening to mount on 1.66” to 2.375” O.D. horizontal tenons and provide +/- 5 degrees of tilt adjustment.

7. The effective projected area (EPA) shall not exceed 1.2 square feet and maximum 35 lb weight.

8. Luminaire shall have 7-pin locking ANSI C136.41 photocell receptacle.

9. Luminaire shall have an option for a field installable house side shield from the manufacturer.

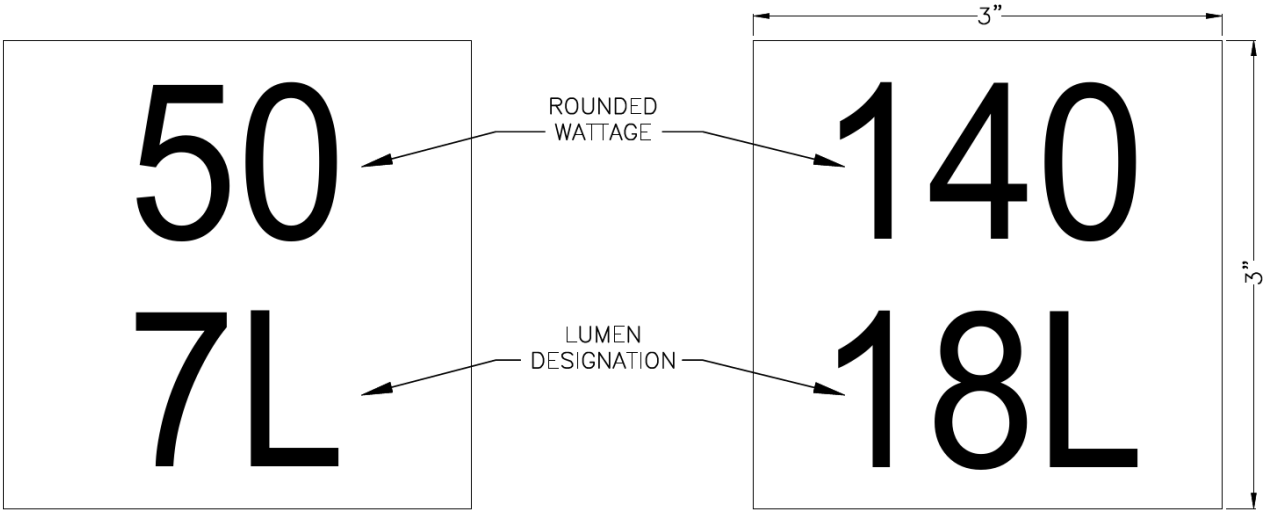
10. Luminaire shall have an external label for field identification.

    a. Label shall meet the physical requirements, dimensions, and font size per ANSI C136.15 (2015): large 3” marker type.

    b. Top row of label shall indicate luminaire wattage rounded to nearest 10 watts per ANSI C136.15 (2015).

    c. Bottom row of label shall indicate Lumen Designation per Table 3.

    d. See example labels below for information to be shown on label:



H. Old Town District Luminaires

LED luminaires in Old Town District shall also comply with these specifications.

1. Luminaire Correlated Color Temperature (CCT) shall be 4000K binned per ANSI C78.377-2008.

2. Luminaire shall have the lumen output per table below.

Table 4: Luminaire Types for Old Town District

Street Type	Lumen Designation	Nominal Lumens	Replaces HPS
Pedestrian	3L	3,000 ±15%	70W
Local & Collector	5L	5,000 ±10%	150W
Arterial	10L	10,000 ±10%	250W

3. Luminaire efficacy shall be a minimum of 110 lumens per watt.

4. Finish Color shall be Tempe bronze unless otherwise approved by engineering department.

5. The effective projected area (EPA) shall not exceed 2.5 square feet and maximum 50 lb weight.

I. Other Special District Luminaires

LED luminaires in Special Districts shall also comply with these specifications.

1. Luminaire Correlated Color Temperature (CCT) shall be 3000K binned per ANSI C78.377-2008.
2. Luminaire shall have the lumen output per table below.

Table 5: Luminaire Types for Special Districts

Style	Lumen Designation	Nominal Lumens	Max BUG Rating	Replaces HPS
AAL Universe	6L	6,000 ±10%	B1-U0-G2	100W
AAL Largent	11L	11,000 ±10%	B2-U0-G3	NA

3. Luminaire efficacy shall be a minimum of 105 lumens per watt.

4. Finish Color for AAL Universe shall be Tempe bronze unless otherwise approved by engineering department. Finish Color for AAL Largent shall be silver unless otherwise approved by engineering department.

5. The effective projected area (EPA) shall not exceed 1.5 square feet and maximum 45 lb. weight.

J. PHOTOELECTRIC CONTROL

All photocells for LED luminaires shall be long-life NEMA twist-lock type that meet the following requirements:

1. 15-year rated life with minimum 10-year warranty.

2. Meet surge protection level 10 kV/5 kA per ANSI C136.2 (2015) enhanced category.

3. Minimum 510 Joule MOV surge protection component.

4. Designed to withstand high in-rush current of LED luminaires.

5. ANSI C136.10 compliant.

6. Fail mode OFF.

7. 2-5 second turn-off delay.

8. Voltage range 105-305 VAC, 60 Hz.

9. Operating temperature range -40º to 70ºC.

10. Load Rating 1800 VA driver or ballast.

K. POLES

1. Structures:

   a. Poles to be designed per 2013 AASHTO standard by a registered professional structural engineer.

   b. The site location is Tempe, Arizona. Maximum Steady Wind Speed requirements shall be ninety (90) miles per hour as indicated by the National Wind Speed Map (Isotach) in miles per hour: annual extreme miles per hour thirty (30) feet above the ground, fifty (50) year mean recurrence interval. Calculations shall include a 1.14X wind gust factor.

   c. All tubing to be ASTM A500 Grade B (46,000 psi minimum). All material shall be mill certified. No secondary materials allowed.

   d. All welders used to fabricate poles shall be AWS certified. Certifications shall be available upon request.

   e. The contractor shall secure a pole (street light structure) manufacturer's warranty, in the City's name, which warrants the pole structural integrity. The warranty shall be for a 5-year period, starting from the date of final acceptance by the City. Upon final acceptance, the contractor will surrender the warranty to the City.

   f. All metal components shall be free of gouges, pits or other surface defects. Steel and aluminum tubes shall be of such quality that welds will be ground smooth or otherwise dressed and not readily seen on casual inspection or otherwise objectionable to the engineer.

   g. Poles shall be capped and watertight at the top in such a manner that the steel cap appears to be one with the pole. Only a minimum visible lip or protrusion shall be permitted. All welds shall be ground smooth and flush with adjacent surface.

   h. Each structural pole shall have a reinforced wiring hand hole located on the street side of the pole, dimensions per City standard details. Install grounding connector, ILSCO TA6-S or equivalent with a 1/4" round head alien drive machine screw and nut.

   i. The structure shall consist of the vertical pole, mast arms, caps and covers, screws, bolts and other hardware required for completion of the unit according to the requirements of the specifications and drawings for the project.

j. All necessary holes for assembly of the structure, mounting of mast arms, installation of the structure or any other purpose required by the specifications and drawings shall be factory made prior to coating. HOLES SHALL NOT BE PUT ON THE STRUCTURE, OR ANY OF ITS COMPONENT PARTS, AFTER THE STRUCTURE IS COATED.

2. Threaded Holes:

   a. Where threaded holes are required, those holes shall have threaded filler plugs placed in them prior to coating to avoid filling threads with coating materials. Filler plugs shall have hex heads or other similar type heads for ease of removal. Filler plugs shall not be removed by the coater prior to shipment to the City.

   b. The manufacturer shall provide a means of ventilating the structure poles at the top to allow a flow of air through the poles to keep the interior of the poles dry. Ventilation shall be placed in a location wherein it will not be visible from normal viewing angles.

3. Anchor Base:

   a. The anchor base shall consist of a four-bolt plate welded to the structure pole. Each plate shall be a rectangular plate of size, steel thickness and composition sufficient to enable the structure to meet all AASHTO and local codes and shall be designed by a registered professional engineer.

   b. The manufacturer shall submit complete drawings of the anchor base detail indicating all sizes, materials, welding details, anchor bolts to be used, and all other pertinent data.

   c. Provide two anchor bolt templates for the structure. Templates shall have all holes for anchor bolts, wiring conduit, etc.

4. Mast Arms:

   a. The mast arm shall be of welded construction so that it is a single unit with regard to its structural members. The corners of the mast arm shall be mitered and welded so that there are no gaps or openings in the joint between the members. The welds shall be ground smooth and flush with surrounding metal so that the adjoining members are continuous.

   b. The mast arm shall accommodate the luminaire. The mast arm shall contain such holes, couplings, etc., as are required for the proper installation.

   c. The mast arm shall be fastened to the structure pole so that it meets the requirements of AASHTO and other applicable codes. The mast arm shall be attached to the structure in the field by mechanical means and no welding shall be allowed between the arm and the vertical structure. The mast arm shall be removable from the vertical structure without burning, cutting or otherwise damaging or defacing the mast arm, vertical structure or the finish of either.

d. All fastening hardware shall be non-corrosive or treated with a corrosion retardant.

e. It shall be the responsibility of the manufacturer to allow sufficient access to wiring and working area, to assure the City free and easy access to those areas for maintenance.

f. Submittal drawings shall clearly indicate how wiring of the luminaire is to be accomplished through the structure and its mast arm.

g. At no time or point shall the top of the arm sag below the horizontal. The mast arm must be physically and visually perpendicular at the top of the arm to the vertical structure. No shims or other devices shall be used to level the arm. Raking or adjusting of the vertical structure will not be allowed.

h. Should the mast arm fail to meet the requirements herein, the developer shall replace the arm with another arm that does meet these specifications. NO modification or correction of the mast arm will be allowed other than at the manufacturer's plant unless prior approval of such modification is given by the owner or his representative in writing.

i. The luminaire shall mount to the mast arm which, in turn, shall bolt to the pole. The last six inches (6") of the luminaire mast arm shall be 2-3/8" O.D. pipe to accept luminaire.

5. Finishing – Painted Poles:

a. Poles per Details T-530, T-645, T-652, & T-653 shall be painted.

b. Steel poles & arms: After fabrication, poles shall be sandblasted, primed and painted. Sandblasting will be in accordance with SSPC Specification SP-6-63. This will be followed with a prime coat of paint within 24 hours. The prime coat of paint will be compatible with the finish coat of paint. Do not paint over dirt, rust, scale, grease, moisture or conditions otherwise detrimental to formation of a durable paint film. An approved Polyurethane Enamel (Catalyzed) paint shall be used for the finish coat. Minimum dry coat thickness to be 3.0 mil. The coating shall meet the requirements of AAMA 2604 and have a 5 year warranty.

c. Aluminum poles & arms: Do not paint over dirt, rust, scale, grease, moisture or conditions otherwise detrimental to formation of a durable paint film. The coating shall meet the requirements of AAMA 2604 and have a 5 year warranty.

d. The City shall consider other coating systems shown to be of equal or greater durability.

e. Contractor shall touch-up any damaged paint after installation with matching color, as directed by the City Traffic Engineer.

6. Finishing – Galvanized Poles:

    a. Poles per Detail T-651 shall be galvanized.

    b. The pole, anchor bolts, and all pole parts shall be hot dipped galvanized per MAG standard 771.

    c. All Poles and anchor bolts shall be fully galvanized to ASTM A153 and deglared.

L. CONDUCTORS

1. All electrical wiring shall comply with the requirements of the Uniform Building Code (UBC), 1985 edition, as adopted and amended by the City of Tempe, the National Electric Code, and Underwriters' Laboratories, Inc.

2. All conductors, from the pull box to the lighting structures, shall be at a minimum No. 10 AWG soft-drawn copper and bear the UL label. Insulation shall be type THWN. The following wire color code shall be used:

    a. Black - 120V Power.

    b. Black & Red - 240V Power.

    c. White – Neutral.

    d. Green – Grounding.

3. Conductors shall be connected to luminaire and extended down the pole. Terminate conductors at pull box for connection by the utility.

4. The power conductor shall be fused, in-line, using Bussman No. HEB-AA (120V luminaires) or No. HEX-AA (240 V luminaires) waterproof fuse holders, or approved equal. Install the fuse holders inside the pull boxes and install Bussman FNM fuse.

SEWER DESIGN CRITERIA

A. GENERAL

1. Reference all applicable standard specifications and standard details on the plan.

2. Include the current general notes on the plan.

3. Include the completed utility approval block on the plan.

4. Include the permit and as-built information block.

5. Benchmark shall be on City of Tempe datum. Horizontal control will be the same as the subdivision plat datum. Each project shall have two mathematical ties to an approved City of Tempe datum.

6. Show a north arrow on each sheet of plans pointing up or to the right.

7. Include an index map showing the sheet numbers, pipe sizes, pipe type, manholes, and cleanouts on the cover sheet if more than two sheets are used.

8. Include a site plan/location map showing pipe sizes, pipe type, manholes, direction of flow, and cleanouts.

9. Based upon centerline stationing and offsets show, locate, and dimension all existing and proposed utilities on the plan.

10. Show dimensions of right-of-way features and all easements with the recording number. Any easements not dedicated to the city should be labeled as private.

11. Public sewers shall be located in either the right-of-way or a minimum 12-foot-wide exclusive sewer easement. When located in an easement, the sewer line shall be centered in the easement. Wider easements may be required based upon pipe diameter, depth of cover or location of adjacent utilities.

12. If any lines are located within the jurisdiction of the State or County their permit is required.

13. Plan and profiles are required for all public sewers showing existing and proposed surface grades, all other utilities, and other appropriate information (buildings, hardscape, landscape, drainage, etc.).

14. Provide a service stub for each lot in the subdivision and extend it to property line or easement line. Show centerline station, offset location, and elevation for each service.

15. Access to all sewer mains for maintenance purposes shall be provided.

16. All sheets shall be stamped, signed, and dated by an Arizona Registered Professional Engineer.

17. Provide an estimate of quantities of construction items. Separate private vs public items

18. Show an estimate of the sanitary sewer average discharge rate in gal/day for each service line per Arizona Administrative Code Title 18 Chapter 9.

19. The maximum scale for sewer plans is 1" = 30'; show a bar scale on each plan sheet.

20. Provide the applicable legend and notes on each sheet.

21. Provide a key map on each sheet showing page location within the overall plan.

22. The following requirement must be met when an existing sewer tap, which is not currently in use, is to be utilized: A signed statement from the designer or owner must be submitted with the plans indicating that the existing sewer tap has been physically located and has been flow tested or CCTV recorded to ensure the sewer tap is connected to City sewer. This must be received prior to City plan approval.

B. PIPES

1. The minimum design velocity shall be 2'/sec. (flowing full) with n = 0.013 for all pipe materials, unless otherwise approved by the City Engineer.

    a. The minimum grade for 8" sewers is 0.33%.

    b. The minimum grade for 10" sewers is 0.24%.

    c. The minimum grade for 12" sewers is 0.20%.

2. The sewer system shall be extended full frontage of parcel to be developed to serve adjacent property.

3. All abandoned sewer services shall be capped (glued or mechanically fastened) within 6-inches of the sewer main.

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

5. Include sewer line station at centerline of each manhole.

6. Include distance between manhole/centerlines.

7. Include calculated slope between manholes.

8. Include sewer line stationing and elevation at property line at centerline of each service tap at 90° to main; if not installed 90° to main, station, and offset to end of each service tap.

9. The maximum sewer velocity is 7'/sec unless specifically approved by the City Engineer.

10. Sewer lines shall be deep enough to have a minimum of 5' of cover at the property line.

11. All parallel water and sewer lines shall be separated by a minimum horizontal distance of 10' and contained in an exclusive water/sewer easement. The minimum easement width for this configuration is 20'. A wider easement may be required depending on pipe size and depth of bury.

12. All pipes shall be V.C.P. extra strength for pipe diameters of 8, 10, 12, 15 inches.

13. All taps shall be machine drilled only. Individual single-family residential taps shall be minimum 4-inch. All others shall be a minimum of 6-inch diameter.

14. Any service lines or sewer connections larger than 6-inch require a manhole.

15. Profiles for services may be required (based on the additional underground infrastructure in the area) from the site to the sewer.

16. No individual direct service taps to lines larger than 15-inch diameter will be allowed.

17. Determination will be made on a project specific basis whether public sewer in lieu of private sewer will be allowed onsite.

18. Public sewer lines shall be a minimum of 16ft. away from any trees without protection, trees between 8' and 16' shall conform to City of Tempe Standard Detail T-460-1 and T-460-2.

19. Public sewer lines shall be a minimum of 16 ft. away from any foundations without special geotechnical or structural design considerations and approved by the City Engineer.

20. Additional appurtenances are required based on use to satisfy the Fats, Oils and Grease (FOG) Ordinance. These appurtenances shall be installed on private property only. Refer to City of Tempe Environmental Services Pretreatment FOG requirements at tempe.gov.

21. All bored street crossings shall be encased per Tempe Standard Detail T-215 or approved by the City Engineer.

22. Trench, backfill, and pavement replacement shall conform to Tempe Standard Detail T-450 for all street cuts.

23. Dry utility separation distance shall be a minimum of 6-feet horizontally and 2 feet vertically from all City of Tempe utilities.

24. New sewer line crossing of existing water, sewer or storm drain lines shall be provided in accordance with MAG Standard Detail 404.

25. Electronic marker shall be installed at all services per MAG Standard Detail 440.

C. MANHOLES

1. The maximum distance between manholes is 400 ft. for 8” to 12” sewer and 500’ for sizes larger than 12”.

2. Show all rim elevations and pipe invert elevations at manholes.

3. Maintain an invert drop of 0.1’, minimum for angle deviations 45° or larger across each manhole.

4. All changes of gradient or direction shall occur with a manhole at the point of change.

5. A manhole shall be provided for all sewer intersections 8” or larger.

6. Use drop manholes only when absolutely necessary and conform to M.A.G. Standard Detail No. 426.

7. All other manholes shall conform to M.A.G. Standard Detail Nos. 420, 421 and 422.

8. No service taps are allowed into manholes or cleanouts.

9. The maximum distance from a cleanout to the nearest manhole is 150’.

10. Use a 30” manhole frame and cover on all manholes.

11. All manholes shall be 5’ diameter with no steps.

D. SYSTEM ANALYSIS

1. The peaking factor shall be per Section R18-9-E301 of the Arizona Administrative Code Title 18-Chapter 9-Part E.

2. Manning’s friction factor shall be 0.013 regardless of material of pipe construction.

3. d/D shall be 0.50 for diameters up to 15” per the US EPA's Capacity, Management, Operations, and Maintenance (CMOM) regulations. If the pipe diameter is greater than 15”, then d/D shall be 0.70.

4. Sewage Flow Factors and Assumptions shall be per the Arizona Administrative Code Title 18-Chapter 9-Part E, Type 4 General Permits, Table 1 - Unit Design Flows.

WATER DESIGN CRITERIA

A. GENERAL

1. Call out or show all applicable standard specifications and standard details on the plan.

2. Include the current general and site plan notes on the plan.

3. Include the completed utility approval block on the plan.

4. Include the permit and as-built information block.

5. Include approval blocks for the Maricopa County Environmental Services Department (if required) and the City Engineer. Note that the signature from the Maricopa County Environmental Services Department is required prior to City Engineer signing. It is the consultant's responsibility to confirm the current policy and make that final determination for MCESD submittal.

6. Include a site plan/location map showing valves, hydrants, meters, back flow preventers, easements, and pipe sizes.

7. If any lines are located within the jurisdiction of the State or County, a permit is required.

8. Benchmark shall be on an official City of Tempe datum. Horizontal control will be the same as the subdivision plat datum. Each project shall include two mathematical ties to an approved City of Tempe datum.

9. Show a north arrow on each sheet pointing up or to the right.

10. Include an index map.

11. Based upon centerline stationing and offsets, show, locate, and dimension all existing and proposed utilities on the plans.

12. Label size and type of existing water meter e.g. domestic or landscape. Provide serial number if type is not known.

13. Show dimensions of right-of-way features and all easements, existing and proposed. Provide recording number. Any easements not dedicated to the city shall be labeled as private.

14. For public water lines including water meters and fire hydrants not located within the Public right of way, exclusive public water easements are required and shall be a minimum of 12 ft. wide centered on the pipe. (Wider easements may be required based on pipe diameter and depth of cover).

15. For water services not located within the Public right of way, exclusive public water easements are required for the service lines from the main up to and including the water meter.

16. The maximum scale for water plans is 1” = 30’; show a bar scale on each plan sheet.

17. Each lot in a subdivision shall be supplied with water in sufficient volume and pressure for domestic use and fire protection. Locations of all taps shall be dimensioned on the plans.

18. All plans must be submitted on 24” x 36” pdf format size and be legible and to scale at 50% reduction.

19. All sheets shall be stamped, signed, and dated by an Arizona Registered Professional Engineer in compliance with the latest Arizona Board of Technical Registration requirements.

20. Provide an estimate of private vs public quantities of construction items.

21. For new water services, show an estimate of flowrate in gallons per minute for average day water demand for each service.

22. Provide the applicable legend and notes on each sheet.

23. Provide a key map on each sheet showing page location within the overall plan.

24. Where possible, all water meters shall be located out of driveways and sidewalks due to ADA and tripping issues.

25. Backflow preventers shall be located on private property as close to the meter as possible and outside of public easements.

26. Tee fittings installed at branch connections on water system shall be outfitted with a minimum of two valves, with one valve always on the branch of the tee.

27. A valve shall be installed on the main line between the building fireline and adjacent hydrant.

B. PIPE

1. All public waterline pipes shall be ductile iron Pressure Class 350 and shall be wrapped in high-density polyethylene in accordance with MAG Standard Specification 610.

2. All section and mid-section water lines shall be 12 inches. All sixteenth section lines shall have 8 inches waterlines.

3. All looped water mains shall be minimum 8 inches.

4. Water lines smaller than 12 inches shall have a minimum cover of 36 inches. Water lines 12 inches and larger shall have a minimum cover of 48 inches.

5. Provide a minimum of 2 feet vertical clearance from water to all other utilities; except sewer shall be per MAG Standard Detail 404.

6. Provide a minimum of 10 feet horizontal separation between water and sewer.

7. Storm drain shall be considered as sewer when crossing potable waterlines, thereby, referencing MAG Std Det 404.

8. Fire protection water flows may increase line sizes and require line looping.

9. All fire hydrant valves shall be flanged to the tee or 90° elbow.

10. Main line valves shall be spaced every 500’ to 600’ and placed in locations which allow appropriate water main isolation.

11. All valve boxes shall be per MAG Standard Detail 3911, Type “C”. Deep shouldered/skirted non-locking valve box covers are required.

12. Main line valves at line intersections shall be flanged to fittings.

    a. Show coordinates (C.O.T. datum), bearings, and distances, or street centerline station and offset dimensions to:

        - All fire hydrants and fittings (i.e. valves, tees, ells)
        - Main at all changes in alignment.
        - All horizontal control points (i.e. centerline intersects, pc, pt).

    b. Show centerline station and offset to each service tap; size of tap; water meter and meter size; and dimension to nearest side property line.

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

13. Electronic ball marker (3M Model 1423XR/iD Blue) shall be installed at all horizontal and vertical changes in pipe direction without a valve. Marker shall be installed no greater than five feet (5') deep and installed per manufacturer's directions, cinch tied to pipe or above pipe if greater than five feet (5') deep.

14. Install a fire hydrant on all dead-end lines unless otherwise approved by the City of Tempe, in which case use a M.A.G. Standard Detail 390, Type "B" curb stop with flushing pipe.

15. All single-family residential water service taps and meters shall be installed by the City of Tempe.

16. Commercial water service taps will be installed by the contractor/developer. The contractor/developer shall install the water meter box/vault and shall extend the pipe through the box/vault in preparation of the meter installation. The City of Tempe shall provide water meters for contractor installation. Duplex, multi-family, townhome, and condominium residential units are considered to be commercial.

17. Water services are not permitted off dedicated fire lines or fire hydrant lines. Exception, 1 and 2 family dwellings are permitted to have fire sprinkler systems supplied by the domestic water service line.

18. All bored street crossings require City of Tempe approval and shall be encased per Tempe Standard Detail T-215.

19. Trench, backfill, and pavement replacement shall conform to Tempe Standard Detail T-450 for all street cuts approved by the City of Tempe.

20. Service taps shall not be closer than 5' on existing cast iron, asbestos cement, or PVC. Service taps shall not be closer than 18 inches on ductile iron pipe.

21. Potable water service lines, meters and back flow devices shall be the same size, unless approved by City of Tempe.

22. Meter size will be based on the design flowrate, latest meter technology and capability.

23. Valves shall have a flanged (FL) connection directly to fittings (Tees, Crosses). Valves may have flange (FL) or mechanical joint (MJ) connections to pipe. Flanged fittings shall be rated at 250 psi (minimum).

24. Public water lines should be 16 ft. minimum away from any foundations or 16 ft. minimum away from any trees. Trees between 8' and 16' from a water line must conform to City of Tempe Standard Detail T-460.

25. In all cases the public water line shall be above any crossing (other public utility, onsite private utilities, and other non-structural appurtenances).

26. Water lines should be centered in paved drive aisles when located on private property.

27. Permanent overhead structures will not be allowed above public water or sewer easements or right-of-way unless the vertical clearance is 30 feet or greater.

28. Appropriate backflow prevention devices are required based on onsite use (Landscape, domestic midrise, high-rise, internally boosted, etc.).

29. Add note to the plans: If painting backflow, to tape over the attached or stamped on the body of an assembly the manufacture plate(s) i.e.: Make, Model, Serial #, Size etc. prior to painting

30. Public water easements are required for service lines from the main up to and including the water meter.

31. Dry/private utility separation distance shall be a minimum of 6 feet horizontally and 2 feet vertically from all City of Tempe utilities.

32. New water line crossing of existing water, sewer or storm drain lines shall have a minimum vertical separation of two (2) feet. This separation criteria also applies to a line serving a fire hydrant. Protection of the water line and/or the line serving a fire hydrant shall be provided in accordance with MAG Standard Detail 404.

C. FIRE HYDRANTS AND SPRINKLER LINES

1. Where a portion of the facility or building hereafter constructed or moved into or within the jurisdiction is more than 400 feet from a hydrant on a fire apparatus access road, as measured by an approved route around the exterior of the facility or building, on-site fire hydrants and mains shall be provided where required by the fire code official. Exceptions:

    a. For Group R-3 and Group U occupancies, the distance requirement shall be 600 feet.

    b. For buildings equipped throughout with an approved automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 of the 2018 International Fire Code, the distance requirement shall be 600 feet.

2. An approved water supply capable of supplying the required fire flow for fire protection shall be provided to premises on which facilities, buildings or portions of buildings are hereafter constructed or moved into or within the jurisdiction.

   The procedure for determining fire-flow requirements shall be in accordance with the 2018 International Fire Code Appendix B. This appendix does not apply to structures other than buildings.

3. For fire sprinkler lines and new fire hydrants off of existing mains, three-valve clusters will be required for hospitals, high rise buildings, schools, and other high-density areas as determined during plan review.

4. Fire sprinkler lines off new looped mains will be required to be properly isolated, which may require a three-valve cluster if there is not an adjacent valve in the loop.

5. Fire suppression system connections must be isolatable at the main from supporting fire hydrants. (This may require cut in tees with three valve clusters and/or Insertion Valves.)

6. A fire hydrant shall maintain a minimum clear distance of 3 feet from back of sidewalks and curbs. Access to fire hydrants shall not be obstructed by parking spaces.

MARICOPA COUNTY ENVIRONMENTAL SERVICES DEPT (MCESD) REQUIREMENTS

Include approval blocks for both the Maricopa County Environmental Services Department (if required) and the City Engineer. Sewer and Water plans shall be reviewed by the City of Tempe but approved by the MCESD prior to final approval by the City Engineer. Tempe Municipal Utilities Division (MUD) may require MCESD processing. The design engineer is to contact MCESD regarding their current requirements for Approval to Construct (ATC), Approval of Construction (AOC) and Health Certificate Packets.

PROCESSING REQUIREMENTS:

1. Approval to Construct (ATC)

   An appropriately completed application is to be submitted to Development Services Department (DSD) along with the Engineering plan review set. This occurs after the plans are complete and acceptable to MUD.

   When MUD has determined that the plans are complete and approvable, the ATC documents will be signed, and MUD will generate a Sewer Capacity Letter. It is the consultant's responsibility to confirm the current policy and make that final determination for MCESD submittal.

2. Approval of Construction (AOC)

   AOC documents are generated post-construction and testing. The AOC documents and testing data are submitted by the design engineer along with as-built documents to MCESD to fulfill the ATC process.

3. "Health Cert." Packet (Approval of Sanitary Facilities for Subdivisions)

   The "Health Certs." are agreements by the providers of water, sanitary sewer and refuse collection & disposal relative to for-sale residential or non-residential projects. MUD will process the water and sewer portion of the "Certs." upon completion, testing and as-builting of the proposed public infrastructure improvements as documented by the appropriately completed "Health Cert." packet and MCESD processed AOC document.

   The appropriately completed "Health Cert." packets need to be submitted by the engineer to DSD (Engineering review) to be forwarded to the applicable City of Tempe provider of the specific service category (water, sanitary sewer, refuse) for final signature. Please note that the City of Tempe signs the collection portion of the refuse agreement only. Waste Management, Inc. signs the disposal site portion. This required a separate submittal to Waste Management, Inc.

WILL SERVE LETTERS

A Will Serve letter is a generic form letter that states if a proposed development meets all the reviews, approvals, and payment of the appropriate fees that the MUD will provide water and sewer service.

Will serve letters may be directly requested of MUD by the owner once a Community Development (CD) project number, project name and project address have been identified and recognized by CD. The following information is required to complete a Will Serve Letter.

Project Name
Project Address
Owner's information (name, address, email address)
Or if not an individual owner then a Company name and contact person and title (this person needs to have fiduciary authority)
Company name and address
Email Address

UTILITY EASEMENT ENCROACHMENT GUIDELINES

A. GENERAL REQUIREMENTS

1. The need for an encroachment permit or license agreement for use of the Public right-of-way will be determined at the time of submittal based upon specific use.

2. Any underground facility may only traverse a public water or sewer easement via an encroachment permit.

3. Only perpendicular encroachments are allowed.

4. The encroachment exhibit will be formalized during the encroachment permit process.

DRAINAGE DESIGN CRITERIA

In accordance with Ordinance No. 819.1 adopted by the Tempe City Council on April 21, 1977, Ordinance No. 93.03, adopted February 11, 1993, and Ordinance 2012.45 adopted September 20, 2012, the following criteria are established to provide proper measures for handling and disposal of storm water runoff. Requirements for specific development (new subdivision, commercial, industrial) will be determined by the applicable criteria.

Drainage reports are required for all developments except for single-family and duplex homes unless part of a new master planned subdivision.

For new construction or redevelopment projects that will result in land disturbance of one (1) acre or more (including those less than one (1) acre but are part of a larger common plan of development) that discharge to the municipal separate storm sewer system (MS4), the owner will be required to sign and submit a Declaration for Inspection and Maintenance of Drainage Infrastructure, see attachments A-C.

In addition to this section refer to the section labeled “REQUIREMENTS FOR ALL PROJECT PLAN SUBMITTALS”, in this manual.

A. HYDROLOGY REPORTS

Flows (Q’s) should be calculated for the 100-year storm according to the methods outlined in the Drainage Design Manual for Maricopa County, Arizona, Volume I, Hydrology published by the Flood Control District of Maricopa County. The rational method may be used for areas of 160 acres or less. At the option of the Engineer, the Drainage Design Manual for Maricopa County, Arizona, Volume II, Hydraulics published by the Flood Control District of Maricopa County may be used to determine required retention volumes.

1. Subdivisions

A **hydrology report** must be provided before construction plans will be reviewed. The report will show:

a. A complete runoff analysis in tabular form.

b. Points of concentration with peak street flows and drainage areas.

c. Calculation for sizing catch basins and pipes and locations of catch basins.

d. Retention basin characteristics:

- Inlet structure.
- Detailed calculation of volume required and actual holding volume.
- Calculation and verification for disposing of water within thirty-six (36) hours.

e. Calculations of 100-year runoff at critical points of subdivisions, such as low points and constrictions to overland relief.

f. Maximum elevation difference shall be 1’ between adjacent residential finished floors not separated by a street.

2. Commercial and Industrial

For developments not requiring a subdivision map, the hydrology, hydraulics and retention volume calculations shall be included in a formal Drainage Report and also tabularized on the “Grading & Drainage Plan.” The report must contain the following:

a. Cover Sheet, Table of Contents, Introduction, Location, Site Description & Proposed Development, Existing Drainage Conditions & Characteristics inclusive of Offsite Drainage, Proposed Drainage Plan, Data Analysis & Methods Used, References, Tables, Figures. Appendices.

b. Hydrology, hydraulics and retention calculations for a 100-year storm event including the “Volume Required” and the “Volume Provided”.

c. A plan sheet with delineated drainage areas that easily identifies the retention areas, fully dimensioned with high water elevation noted. Include section views if needed for clarity.

d. Finish floor elevation is to be a minimum of 10” above the retention high-water design and 14” above the lot outfall.

e. Show lot outfall, high water elevations, and finish floor elevations on overall drainage map

f. When paved areas are incorporated into lot retention, water depth is not to exceed 1.0’ and must provide means of dissipation.

g. Retention Basin Volume calculations that can be <u>easily</u> verified and shown by basin.

h. An acceptable method of dissipating storm water within a 36-hour period. If a drywell is to be used, the drywell volume can be included in the calculations for volume provided. A dual-chamber drywell such as the Maxwell Plus drywell or an approved equal is required for dissipation whenever any basins or paved areas greater than 1.0' in depth are incorporated into retention. No allowances for volume due to percolation rate will be given. See Sections C.3 and C.4 for drywell limitations. Any projects at locations involved in fuel dispensing shall use a multi-stage drywell system such the Envibro System drywell or an approved equal; be aware that these drywells have limiting flow capacities which will govern the dissipation rate of the basin.

- Drywells must penetrate a minimum of 10' into suitable permeable strata.
- Drywells and Drywell system interceptor chamber grates shall be 0.25' above basin bottoms.
- Drywells in paved areas shall have water-tight lids.
- Drywells must be registered with the Arizona State Department of Environmental Quality. An Aquifer Protection Permit (APP) may also be required.

B. STREET AND STORM DRAIN DESIGN

1. Peak runoff for subdivisions shall be determined by using The Drainage Design Manual for Maricopa County, Arizona, Volume II, Hydraulics published by the Flood Control District of Maricopa County or the Rational Method using this section and chart/nomograph of **Figure 3**.

   Note: A composite C-value may be used in the Rational Equation when determining flows for storm drain design purposes only. Required retention volume is calculated in accordance with Section C, Retention Design Criteria.

2. Streets, catch basins, and storm sewers shall be designed for a 10-year storm. When the computed runoff exceeds the capacity of a street (where the depth of flow is at the top of curb) subsurface drainage will be required, i.e. storm drain piping system. Each sub-basin contributing to an inlet structure is to be delineated and flows calculated at point locations; longitudinal slopes, cross slopes and superelevations must be considered when designing roadway drainage. Peak flows from a 100-year storm must be carried within the cross section between buildings (front yards and streets).

3. Rainfall intensity is related to time of concentration. Time of concentration is the summation of Overland Flow Time, Street Time, and Pipe Time.

   a. Overland Flow Time is the time required for a drop of water falling on an open area (lawn, field, etc.) to reach an outlet point (street, ditch, pipe, etc.) Smaller lots, larger building footprints, and increasing non-pervious services (roots, driveway, patio, etc.) require overland travel time of 10 minutes maximum.

   b. Street Time is the time required for the runoff to travel from entrance onto the street to entrance into a catch basin, drainage channel (or to some other point along the street where the runoff exits from the street).

   c. Pipe Time is the time required for the runoff to travel in the pipe from the entrance catch basin to another point along the storm drain - usually an entrance structure for another drainage area, retention basin, drainage channel, etc.

      The time of concentration shall be arrived at in the following sequence:

      I. Determine Overland Flow Time by referring to above paragraph (B.3.a) and **Figure 3**, Seelye Chart, in this manual.

      II. Compute Street Time by dividing the length of street flow by the runoff velocity when flowing at top of curb. Velocity shall be computed using Manning's equation with "n" value of 0.015.

      III. Compute Pipe Time by using the velocity occurring at design flow in a pipe or channel of given size and material. Velocity shall be computed using Manning's equation with the "n" value for pipe of 0.012. Refer to any published table for "n" values of channels.

4. Storm sewers shall be designed with a velocity of at least 3 feet per second. Minimum pipe diameter is 18".

5. New storm drain line crossing of existing public water, sewer or storm drain lines shall have a minimum vertical separation of two (2) feet. Protection of the water line and/or the line serving a fire hydrant shall be provided in accordance with MAG Standard Detail 404-1.

6. When a pipe size has been established, it shall not be reduced, unless for a metered situation. The upstream effects of this size reduction must be analyzed.

7. Maximum manhole spacing for 36" pipe or less is 400' and above 36" is 800'. Manholes will be required at a change of grade, pipe size, or alignment.

8. Curved pipe will not be permitted for pipe of 36” in diameter or less.

9. Catch basins shall be designed to intercept a minimum of 80% of the total runoff delivered to the point in the street where depth of street flow reaches curb height or a storm water spread limitation restricted to one 12-foot lane of traffic in each direction. Only curb-opening inlets will be allowed on City of Tempe streets unless prior specific written approval has been attained from the City’s Engineering Division. Bicycle-safe grates shall be used where grated inlets or trench drains have been approved.

10. Sump catch basins shall be designed to receive all of the runoff at the catch basin. In situations where catch basins are in sump condition, the Engineer will verify that overland relief for the 100-year storm is available without damage to buildings. Catch basin capacities shall be determined from Hydraulic Engineering Circular No. 12 published by the Federal Highway Administration or the Flood Control District of Maricopa County Drainage Design Manual, Volume II, Hydraulics. No grate type catch basins are permitted in streets.

11. Length of curb opening shall be 5.5’ minimum. Slotted drain with angled slots (minimum length - 10’) may be used in combination with catch basins.

12. Inlet clogging factors shall be applied as follows:

Inlet Type	Clogging Factor
Grate Inlets	
On grade	0.50
Sump	0.50
Curb-opening Inlets	
On grade	0.20
Sump	0.20
Combined Curb and Slotted	
On grade	
Curb inlet	0.20
Slotted inlet	0.33
Sump	
Curb inlet	0.20
Slotted inlet	0.33
Combined Grate and Slotted	
On grade	
Grate inlet	0.50
Slotted inlet	0.33
Sump	
Grate inlet	0.50
Slotted inlet	0.50

13. Storm drains shall be designed to provide the required capacity without surcharging the line. Storm drain outlets shall be designed to function as a part of the ultimate drainage system.

14. Valley gutters will not be permitted across midsection collector streets or arterial streets. Valley gutters will be discouraged on other collector streets.

15. Pipe outlets 12” or larger require an access barrier gate unless a backflow preventer is used at the outlet; provide a detail on the plans. Pipe inlets 12” or larger require a trash rack or an access barrier gate. Trash racks per MAG Std Detail 502 or provide a special detail on plans.

C. RETENTION DESIGN CRITERIA

There are two methods accepted by the Engineering Division for calculating required retention volume for improvements to single-family homes. Both methods use the following formula:

V = (P ÷ 12) * A * C

V = Volume required to retain (cubic feet)
P = Precipitation Depth (in inches) of storm water required to be retained
A = Total area of lot (in square feet) plus any additionally required areas
C = Coefficient of Non-Absorption

METHOD 1:

Tempe's standard method of calculating onsite storm water retention uses the formula above with the following data:

Where,
P = 2.2 inches (based on the 100-year, 1-hour storm event)
C = 0.95

V = (2.2 ÷ 12) * A * (0.95)

METHOD 2:

The City allows the usage of the **Drainage Design Manual, Volume I for the Flood Control District of Maricopa County** (Fourth Edition, Chapter 3, Rational Method) as an alternative method for determining required retention volume. This method determines the volume based on a 100-year 2-hour storm event, which has a precipitation depth (P) of **2.2 inches**. This method also has different Coefficient of Non-Absorption (C) values that vary by the size of the lot and the approximate percentage of the lot covered with improvements (house, decking, driveway, sidewalks, etc., i.e. anything other than undeveloped land). For single-family lots, Tables 3.2 and 3.3 of the County Drainage Design Manual for determining Coefficients of Non-Absorption will be interpreted as follows:

Coefficients Non-Absorption for Single-Family Lots			
Lot Size	20% or Less Lot Coverage Improvements	20% to 39% Lot Coverage Improvements	40% or More Lot Coverage Improvements
6,000 to 12,000 square feet	0.60	0.71	0.82
12,000 to 40,000 square feet	0.53	0.56	0.60
Over 40,000 square feet	0.41	0.47	0.53

V = (2.2 ÷ 12) * A * C

1. Retention of the 100-year 1-hour storm event (or 100-year 2-hour for Method 2) on property outside the public rights-of-way is required. The rare exception to the on-site retention requirement above includes only properties in the Alternative Retention Criteria Area (ARCA) where retention of the 2-year 1-hour storm event is required. In this case the precipitation depth, P = 0.9 inch. In no event shall a drainage permit be issued unless the drainage plan has been approved by the City Engineer and establishes that storm water runoff from the lot, plot or parcel of land will not adversely impact other property or City infrastructure. Refer to Section 12-57 of the Tempe City Code for defined areas of ARCA or see **Figure 2** of this manual for visual location of ARCA.

2. All redeveloped parcels shall provide 100-year 1-hour storm event.

3. Methods of Storage:

    a. Individual lot storage shall consist of providing adequate storage volume for the lot, plot or parcel of land using either Method 1 or Method as described above. Storage volume shall include adjacent streets and alleys run-off except for arterial streets. A maximum depression of 1-foot is allowed for single-family lots with 4:1 side slope.

    The maximum allowable depth of storm water for calculation of retention volume provided for new single-family residential lots as part of a new subdivision project shall be a depth of 8-inches.

    b. Central retention storage shall provide adequate volume to handle runoff from the property being developed. If the central retention basin will be privately owned, maintained and operated by the subdivision or similar entity, and all maintenance and operation shall be the responsibility of the owner of the property. If the central retention basin will be dedicated to the City for public use, an easement for the drainage area will be required, and all maintenance and operation shall be the responsibility of the City.

    The City may require the owner to comply with the following conditions:

    - Construction of drywells as necessary to dispose of nuisance water.
    - Seeding to provide ground cover.
    - Construction of flood irrigation and/or sprinkler systems.
    - Other construction as the City may deem necessary to the proper public use of the property.

Upon acceptance of the easement dedication and the completion of the required construction, the City will assume responsibility for operation and maintenance when dedicated for public use. Design of such storage is outlined in the following section (C.3).

c. Combination storage consists of providing retention on individual lots and the balance of the volume within a central storage area. The "C" factor is the Coefficient of Non-Absorption of (0.95) for the onsite lot area and the run-off factor for the right-of-way water contributing to the central storage.

New subdivisions with lots of less than 18,000 sq. ft. (single-family zoning) will be required to utilize combination storage. The perimeter and house footing berm configurations shall be submitted with the final hydrology to substantiate the retention volume provided, see **Figure 1**. Individual storage over 1's in depth will require a disposal mechanism to meet the 36-hour dissipation criteria.

- Where a residential subdivision is designed using combination storage, the entire volume of water generated minus the amount held by the depressed lots is the amount of central storage required.

- Finish floor elevations for new single-family residences to be a minimum of 14" above outfall of lot per **Figure 1**.

4. Design Requirements

a. All central storage basins must be graded to drain towards the outlet where applicable.

b. The typical maximum side slope is 4:1; City parks require flat bottoms (irrigated) & 10:1 side slope. Private retention basins utilized for recreation require maximum 5:1 side slope. Minimum bottom grade is 1%, except at City parks.

c. Maximum depth of water in central storage basins shall be 3', as measured from the bottom elevation of the basin to the high-water elevation. Freeboard shall be minimum of 14-inches from lot outfall location to lowest development finished floor elevation.

d. When special exceptions are granted for water depth in storm water retention basins greater than 3' the basins must be secured. An acceptable means of securing is to provide a locking 8.0' high architecturally pleasing fence (no chain link fencing will be allowed).

Place safety railings or solid wall at least 42-inches tall above finished grade or walking surface, where grade change is vertically 30-inches or

greater, or a side slope greater than 3:1.

All retaining walls, regardless of height, shall comply with the city building code. Plans for retaining walls greater in height than 3 feet must be signed and sealed by a registered Civil Engineer or Structural Engineer in the State of Arizona. 2 feet of separation for placement of retaining wall along the property lines for retention basin will be required. Vertical walls for retention basins may not be located within 5 feet adjacent to any public street, alley or right-of-way.

e. Above-grade retention areas shall not occupy more than 67% of the onsite landscaped street frontage areas. This applies to retention basins more than 1' deep.

f. Provide a minimum of 1' freeboard above the high-water design elevation to the ultimate outfall on all sides of a central retention area, including lowest development gutter flow line.

g. Wherever possible, overland relief must be provided.

h. Discharge requirements:

- Retention volume must be disposed of in 36 hours.
- Basins *greater* than 1.0' in depth *will* require a dual-chamber drywell or other approved disposal mechanism.
- Maximum allowable design dissipation rate for drywell is 0.10 cfs unless substantiated by percolation test then after applying a reduction factor of 50%, a maximum rate of 0.25 cfs may be used.
- Multi-stage drywell systems such as the Envibro Drywell System or equivalent are restricted by flow capacity; therefore, the flow capacity shall govern the dissipation rate and time.

i. Drywells will be permitted pending the approval by the Arizona Department of Environmental Quality for disposal of water.

j. No percolation rate will be considered for reduction of retention volume.

k. Invert of inlet pipe shall not be lower than bottom of retention facility at point of entrance unless otherwise approved.

l. Any outlet inverts and the top of grate for drywells and interceptor chambers shall be set at 3" above the bottom of the basin.

m. Inlet and outlet structures shall have a minimum 6’ wide concrete apron at the opening and shall be constructed to prevent easy access, particularly by children.

5. **Underground Storm Water Retention Tanks** may be acceptable requiring specific approval by the City Engineer and at a minimum must meet the following requirements. Note that these requirements may change without notice.

a. The installation of corrugated metal pipe with aluminum coating for underground retention tank system shall be in accordance with MAG Specification No.621. Excavation, bedding, and backfill shall be in accordance with MAG Specification No.601 and the material per MAG Specification No. 760. Corrugated high density polyethylene (CHDPE) pipe may be used provided supporting documents are submitted with design plans and the following requirements are met.

b. Required is a report prepared by a soils engineer registered in Arizona, showing the following information at each proposed location of the underground tank system(s). The report must include:

(1). Soil boring results to a depth of at least 10 feet below the bottom of the proposed retention tank(s), at each location, showing the depth of the proposed installation and the depth to groundwater.

(2). Soil conditions at each location of underground retention tank system(s). Include in the report and also show on the plans the following data:

(a) Soil pH
(b) Resistivity in ohm-cm
(c) Chloride concentration in ppm
(d) Sulfate concentration in ppm
(e) Moisture content

c. Submit documentation demonstrating that the design life of the lining and coating of the underground retention tank system will be greater than 50 years. Design life of tank is also to be noted on plan sheet. The methodology for determining the soil side service life of the corrugated steel pipe must conform to the Soil Side Durability of Corrugated Steel Pipe, Final Report 1991, prepared for the National Corrugated Steel Pipe Association.

(1). Show details for the lining and coating of the corrugated metal pipe retention tank(s) on the plans.

(2). Submit a letter from the soils engineer stating that the pipe material, lining, and coating are suitable for the soil conditions at the site and the pipe will last at least 50 years based on the soils conditions encountered; also when using CHDPE pipe.

d. Submit calculations showing traffic and load bearing capacity of the underground retention tank system.
(1). Show the pipe gauge and corrugation size for CMP on the plans.
(2). Show the D-Load for RCP on the plans.
(3). Meet the manufacturer's minimum cover requirements for CHDPE pipe. These minimum cover requirements may have to be exceeded in order to install the required access manholes.

e. Provide a minimum of two access points for each underground retention tank.
(1). The access shall consist of 48-inch manhole shafts with 30-inch manhole frames and covers at grade labeled "RETENTION TANK", refer to MAG Std Details 424 & 522. Grated covers to allow for the inlet of surface storm water run-off may also be used in lieu of the solid covers.
(2). The access may include a fixed ladder, anchored to the wall of the retention tank. A structural engineer or the manufacturer must certify the structural integrity of the ladder installation.
(3). Provide concrete collars, per City of Tempe Standard Detail T-446, for all manholes located in pavement areas or subject to wheel loads.
(4). Concrete manholes are not recommended on Corrugated Metal Pipe (CMP) detention systems. Risers should be CMP with a traffic rated concrete collar.

f. Show a backfill detail on the plans. The detail shall include the material and compaction requirements and must address backfill and compaction under the pipe haunches, to the springline of the pipe.

g. Include a note on the plans specifying that all joints in the underground retention tank system(s) will be water-tight, manufactured joints.

h. Provide a minimum of 3 feet of cover, to the bottom of the base of the pavement structure, over the underground retention tank system(s) located in traffic areas. Provide a minimum of 3 feet of cover over the retention tank(s) in non-pavement areas.

i. Provide a detail on the plans showing the connection of the retention tank drainpipe into the interceptor chamber of the dry well. The invert of the drainpipe must be at or above the elevation of the inlet to the 4-inch cross-over pipe to the dry well chamber.

j. The drainpipe from the retention tank to the drywell interceptor chamber cannot be used to convey water from a retention basin into the underground retention tanks. Any water conveyed from a retention basin, road or parking surface is to be conveyed via storm drainpipe tied independently into the underground retention tank. Surface run-off water may also be directly discharged into underground retention tanks when grated lids are substituted for the solid covers at any of the manhole access points noted in e.(1) above, however, this is not a preferred inlet.

k. Underground Storm Water Retention Tank location and proximity to any structure is also to be clearly shown on the Architectural site plan.

6. **Subsurface Storm Water Management** may be acceptable requiring specific approval by the City Engineer and at a minimum must meet the following requirements. Note that these requirements may change without notice.

a. Acceptable systems may include *StormTech Chamber System*, *CONTECH technologies* or an approved equal.

b. Not for use at a fuel dispensing or fuel storage sites.

c. A manifold is required in multi-chamber systems.

d. A drywell is required in any case and shall be located downstream of a manifold.

e. Multi-stage pollutant/sediment treatment required upstream of chambers. Include an “isolation” chamber wrapped in soil fabric to trap sands/silts/fines. Show overlap detail.

f. Inspection/cleaning ports are required at each end of each chamber.

g. Cleanouts are required at each end of manifold.

h. The rock backfill delivered to the jobsite shall be certified by ADS to be the correct material specified in the Stormtech detail. The contractor shall provide documentation to the City inspector that the correct amount of rock backfill was delivered and installed per the approved plan.

i. Provide depth of stone cover and base e.g. 12" stone cover and 9" stone base

j. Provide void space e.g. 40% void space.

k. Subsurface Storm Water Management system location and proximity to any structure is also to be clearly shown on the Architectural site plan.

Drainage plans shall implement the following design parameters.

a. No direct connections from a catch basin or storm drain allowed to drywells.

b. On-site storm water retention is required for all lots and parcels within City limits and shall comply with this manual.

c. No drywells or other outlets allowed in truck wells.

d. Drywells should be installed as far as possible, but no closer than 20 feet, from underground storage tanks (concrete and CMP) or fuel tanks and fuel loading areas (per ADEQ)

e. Drywell covers cannot be covered unless they are decommissioned and abandoned (per ADEQ)

f. Multiple drywells should be spaced a minimum of 100 feet apart center to center (per ADEQ).

g. Drywell inlets should be located at least 20 feet from retention basin surface inlets. (per ADEQ).

h. Truck wells shall not be designed to accept flow from other areas of the site. Provide sump pump with manual switch for draining truck wells.

i. Generally, retention basins should have grass bottoms as preferred. All basins greater than one foot in depth will require a dual-chamber drywell similar to the Maxwell Plus System or an approved equal form of dissipation. All developments require vehicular access to drywells for maintenance and repair.

j. Interceptors for commercial/industrial/multi-family developments may be required to filter and treat runoff.

k. Reduce water use where possible.

l. The above surface retention requirements avoids unnecessary “out of site-out of mind” maintenance/monitoring requirements to avoid groundwater contamination in the future.

m. All above-grade retention areas shall maintain slopes no steeper than 4:1.

n. All on-site water retention areas, other than paved surfaces or piped systems shall be entirely landscaped.

o. The City prefers that surface retention be maximized before sub-surface retention will be considered. The City will allow underground storm water retention with specific approval from Engineering. Refer to the "Underground Retention Storage Tanks" section of the City of Tempe Engineering Design Criteria manual, latest edition.

p. Existing basins or storm drain lines from properties other than City properties that bleed-off to the public storm drain system shall be eliminated.

D. DRAINAGE INFRASTRUCTURE MAINTENANCE GUIDELINES

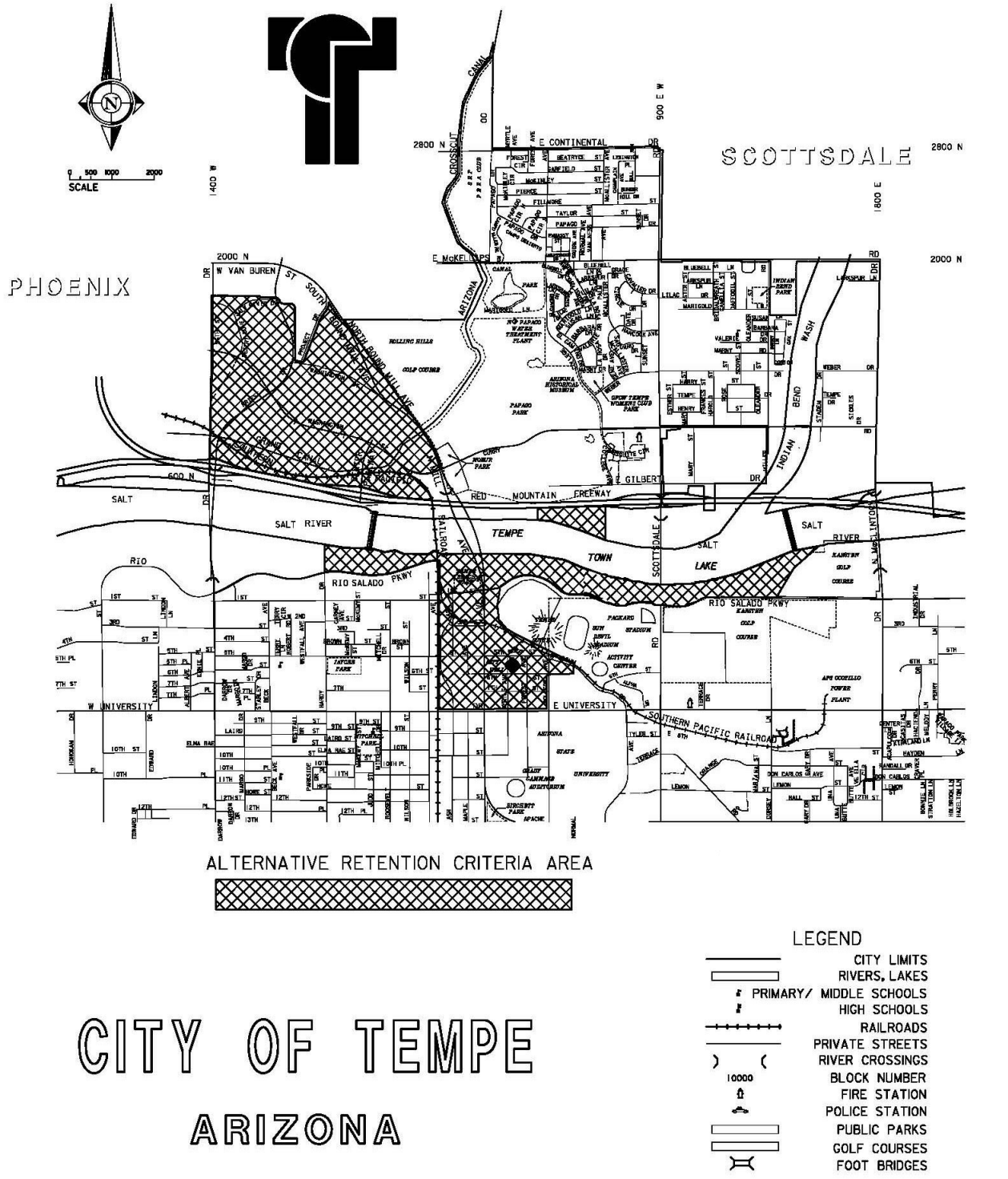
The required maintenance interval for the drainage infrastructure is dependent upon the degree of pollutant loading from a particular drainage basin. Though each drainage infrastructure type has its own unique characteristics, **inspections** will generally consist of an assessment to assure functionality to design capacity and the general condition. Inspections should be performed following a rain event to ensure 36-hour water dissipation. **Routine maintenance** should consist of trash and vegetation removal, unclogging of drains, minor sediment removal and exchange of filter media where applicable. Major maintenance will be completed as required from inspections and would consist of reconstruction due to failures in the infrastructure. Examples of Major Maintenance include dredging, excavation, removal of existing media, replacing fabric, replacing the under- drain, and re-establishment of vegetation, etc. The following schedule is offered as a guideline for performing inspections and routine maintenance for a range of infrastructure. Optimum maintenance frequency is met when routine maintenance is performed more frequently than inspection intervals. If the maintenance threshold has been exceeded by the time the infrastructure is inspected, it has been operating at reduced capacity. Routine maintenance will also help avoid more costly rehabilitative maintenance to repair damages that may occur when infrastructure has not been adequately maintained on a routine basis.

Records must be kept and made available to the City of Tempe upon request.

Records shall be kept for a period of at least five years.

Drainage Infrastructure	Routine Inspection and Maintenance Frequency*	Inspection Record Submittal (or sooner upon request)
Bioretention System	2 per year	Once every 5 years
Bubbler Boxes	1 per year	Once every 5 years
Cartridge or Module Media Filtration Structures	1–2 per year	Once every 5 years
Catch Basins/Trenches/Slotted Drain	1 per year	Once every 5 years
Catch Basin Inserts (long term)	3–4 per year	Once every 5 years
Channels	1 per year	Once every 5 years
Conduits/Culverts	1 per year	Once every 5 years
Detention/Retention Ponds/Basins	1 per year	Once every 5 years
Dry Pond	1 per year	Once every 5 years
Dry Wells	1 per year	Once every 5 years
Ditches	1 per year	Once every 5 years
Filter Strips or Swales	3-4 per year	Once every 5 years
Flumes	1 per year	Once every 5 years
Infiltration Trenches	3-4 per year	Once every 5 years
Permeable Pavement	1 per year	Once every 5 years
Rainwater Gardens	2–3 per year	Once every 5 years
Rainwater Harvesting	2–3 per year	Once every 5 years
Sand Filter	1–2 per year	Once every 5 years
Scupper	1 per year	Once every 5 years
Trash & Debris Screens	3–4 per year	Once every 5 years
Underground Storage Facilities	1 per year	Once every 5 years
Wetlands	2 per year	Once every 5 years
*Perform inspections within 36 hours of a rain event		

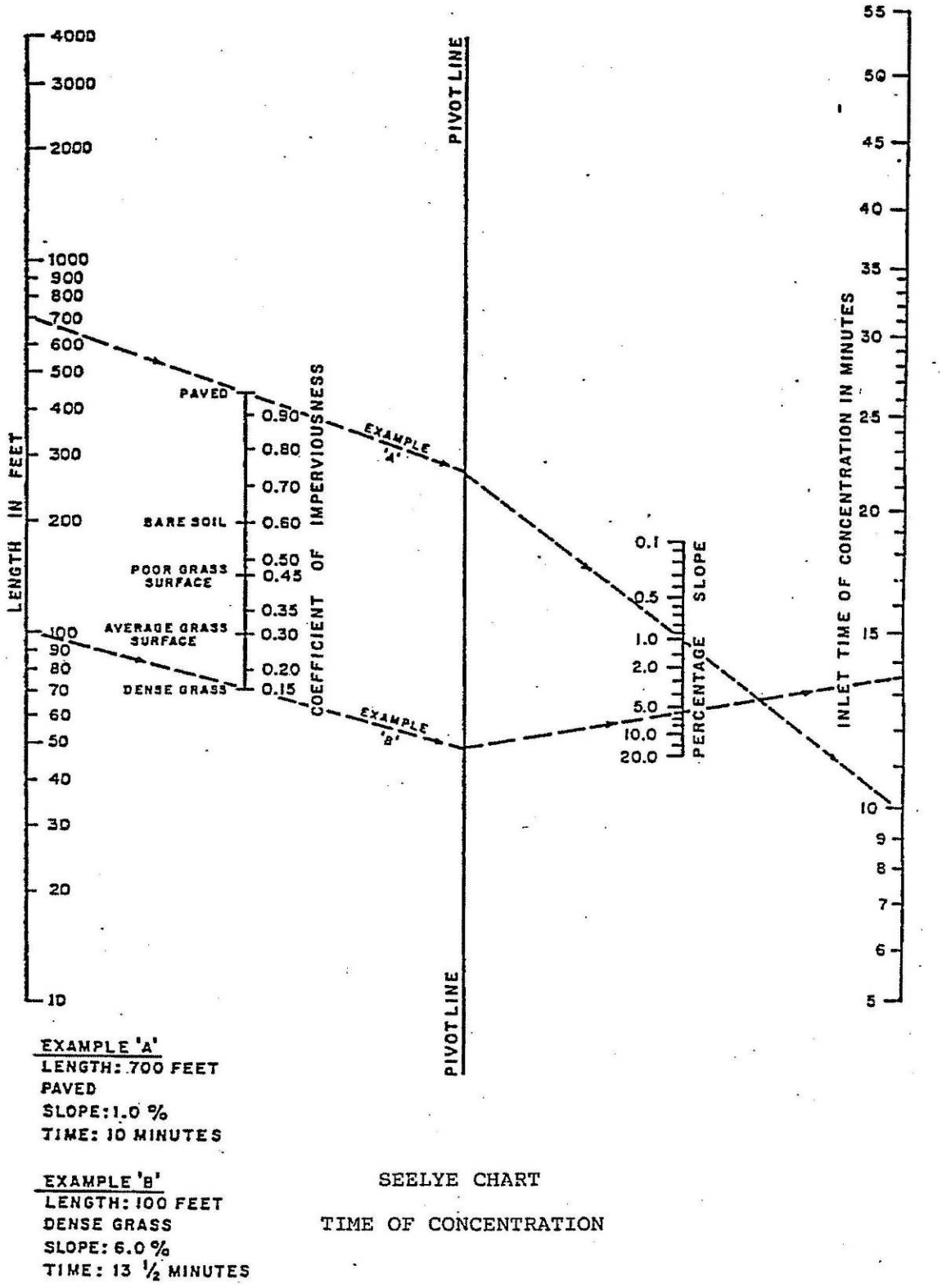
FIGURE 2: ARCA MAP



CITY OF TEMPE

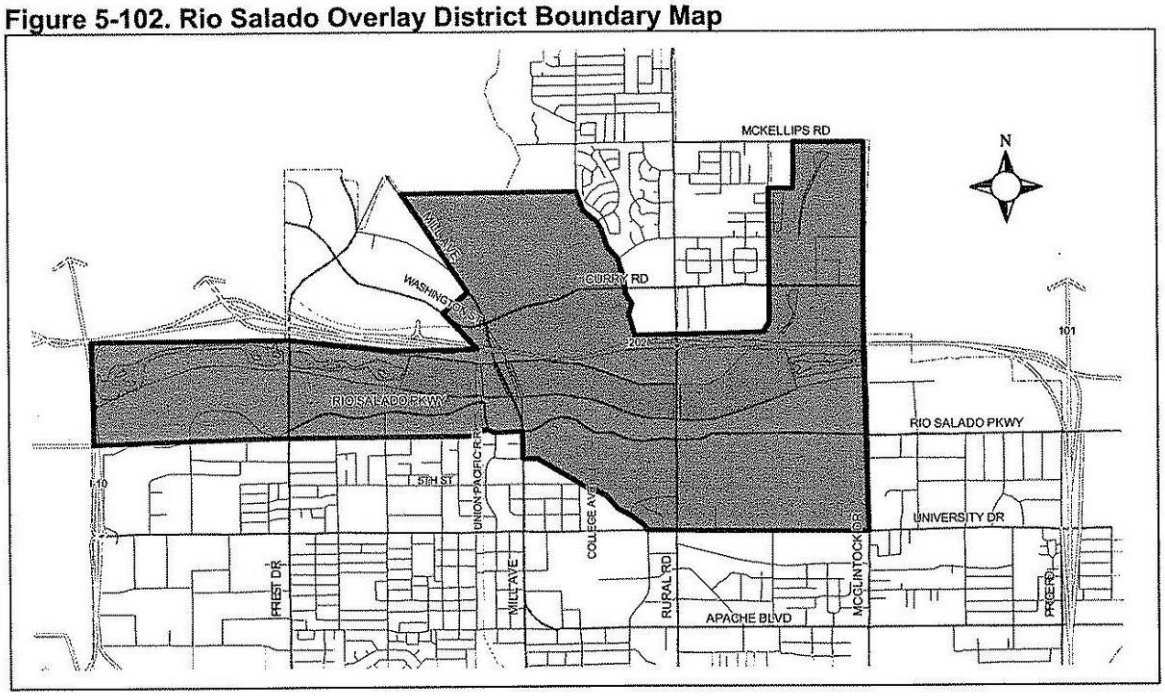
ARIZONA

FIGURE 3: TIME OF CONCENTRATION FOR OVERLAND FLOW, SEELYE CHART



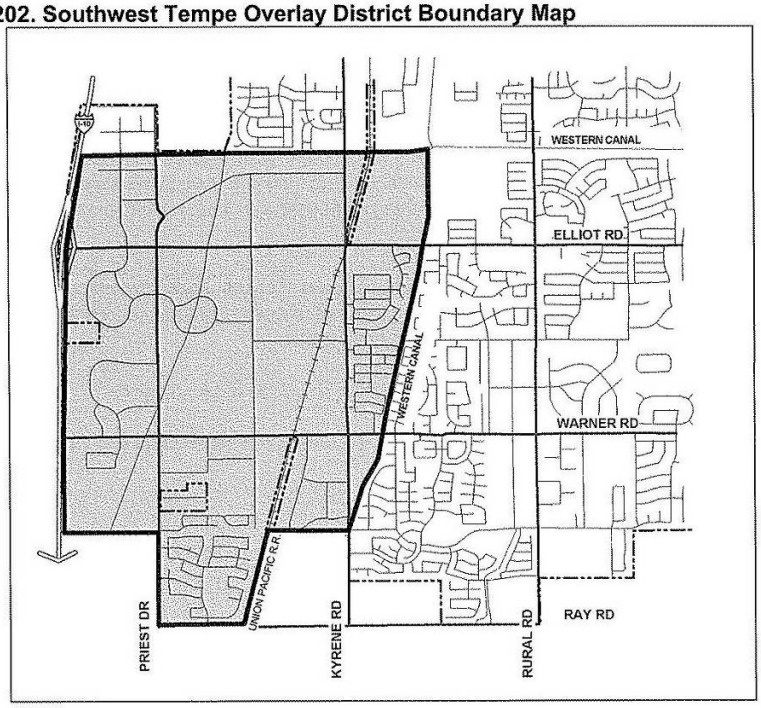
RIO SALADO OVERLAY DISTRICT MAP

Figure 5-102. Rio Salado Overlay District Boundary Map



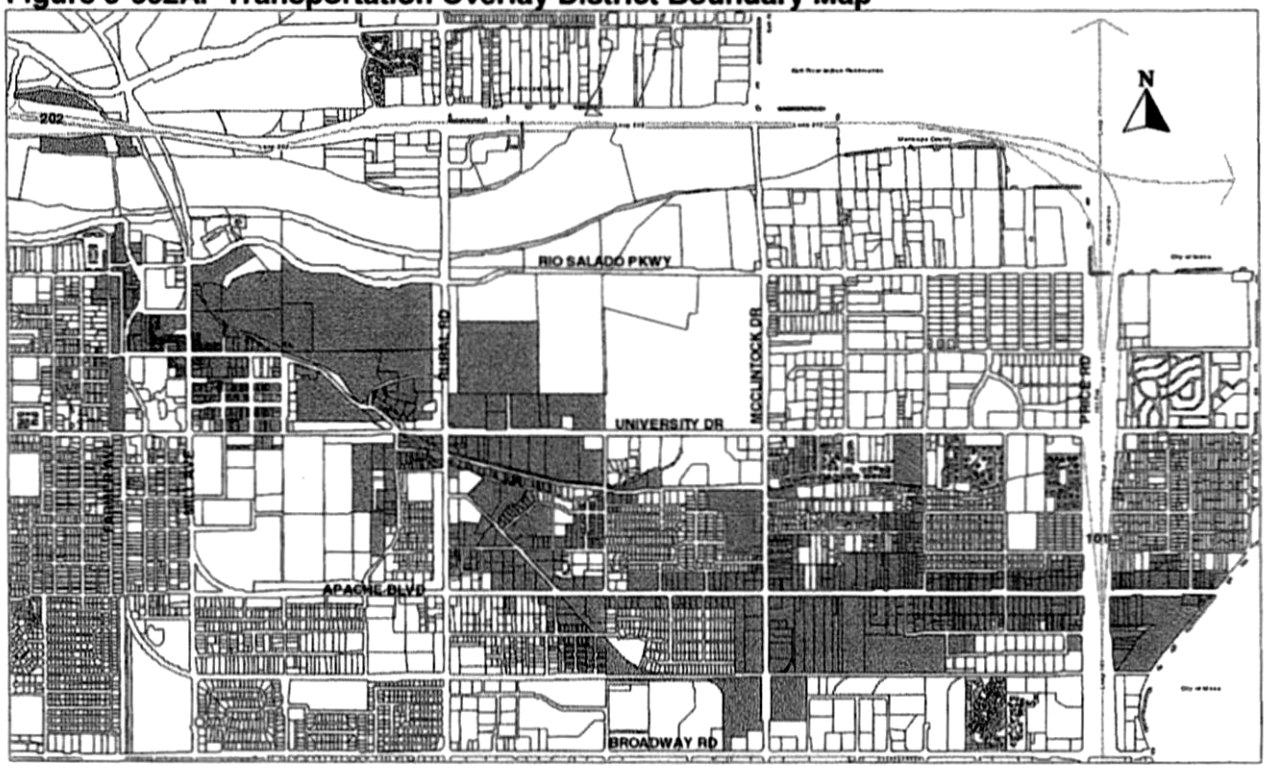
SOUTHWEST TEMPE OVERLAY DISTRICT MAP

Figure 5-202. Southwest Tempe Overlay District Boundary Map



TRANSPORTATION OVERLAY DISTRICT MAP

Figure 5-602A. Transportation Overlay District Boundary Map



VARIANCE / INTERPRETATIONS / APPEALS

The City Engineer or the Principal Civil Engineer of Community Development is authorized to interpret the criteria and grant variances where particular application would cause undue hardship to an applicant.

An applicant can appeal the decision of the City Engineer or the Principal Civil Engineer of Community Development to the City Council upon filing a written notice of appeal with the City or the Principal Civil Engineer of Community Development within fifteen days of mailing of notice of interpretation or denial of variance to the address on file for applicant. Applicant shall pay an appeal fee of $40.00 to the City of Tempe upon filing of the Notice of Appeal.

The City Council upon receipt of a Notice to Appeal shall set a hearing on the appeal and may grant, deny, or remand the decision with directions to the City Engineer or the Principal Civil Engineer of Community Development.

VARIANCE / INTERPRETATIONS REQUEST FORM

ENGINEERING DESIGN CRITERIA

Project Name: _____Project Address: _____

Owner: _____ Telephone Number: _____

Applicant: _____ Title: _____

Description of Variance/Interpretation Request:

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Originator: _____ Organization: _____

Title:_____ Telephone Number: _____

For City Use Only:

Staff Recommendation: _____Approval _____Rejection

By:_____ Department/Division_____

CD Engineering Principal Civil Engineer: _____ Approved_____ Rejected

By: _____ Date: _____
CD Principal Civil Engineer

City Engineer: _____ Approved _____Rejected

By: _____ Date _____
City Engineer

Applicant Notified By:_____ Date:_____

FINAL DECISION REGARDING EXACTIONS / DEDICATIONS

Per the Tempe City Code, the City Engineer or the Community Development Principal Civil Engineer is responsible for formulating criteria necessary to enforce the intent of the Code. Typical improvements required for a development include water and sewer extensions, street paving (including curb, catch basins, streetlights, sidewalks, etc.), storm water retention and undergrounding of overhead utilities on or adjacent to the development.

The requirements that you may receive on marked-up plans include both City Code/Ordinance requirements and policy requirements established by the City Engineer or Community Development Principal Civil Engineer. Exaction (non-ordinance) items are identified by “1a,” “1b,” etc. through “3i” on the following matrix. Comments on the marked-up plan identified by “1a,”, “1b,” etc. through “3i” may be appealed. Please see the “Notice of Appeal Rights” for instructions for the appeal procedure.

EXACTION POLICY: NOTICE OF APPEAL RIGHTS

Applying for final approval for development or a building permit may lead to an administrative decision to condition approval of your permit on a dedication or an exaction. In accordance with ARS §9-500.12, we must inform you of your right to appeal such a determination and how that process operates.

In order to comply with the requirements for appeal, you must file with or mail a Notice of Appeal (in writing) with the City's designated hearing officer within thirty (30) days of the administrative decision. The Notice of Appeal shall set forth specifically the condition of approval requiring a dedication or exaction which does not bear an essential nexus with a legitimate government interest and is not a condition which is roughly proportional to the impact of the use to which you wish to place your property together with any reasons underlying your disagreement with said condition.

Mail your Notice of Appeal to one of the following:

City of Tempe Hearing Officer
Deputy Public Works Director/City Engineer
31 East 5th Street
Tempe, AZ 85281

City of Tempe Hearing Officer
Deputy Community Development Director
31 East 5th Street
Tempe, AZ 85281

There is no fee for filing. A hearing will be scheduled within thirty (30) days of the receipt of the appeal, and you will receive then (10) days' notice of the date, time and place of your hearing, unless you indicate that you do not need then (10) days. A decision must be made by the hearing officer within five (5) days of the hearing, and he may affirm, modify, or delete the requirement.

If you are dissatisfied with the decision, you may file a complaint for a new trial with the Maricopa County Superior Court within thirty (30) days of the hearing officer's decision. At all times during the appeals process, the burden is on the City to prove the conditions placed on your permit bear an essential nexus with a legitimate government interest and that the condition required is roughly proportional to the impact of the use, improvement, or development you have proposed.

You will be notified of specific requirements for exactions or dedications in writing by the City upon final plan check.

MATRIX OF PROPORTIONATE DEVELOPMENT REQUIREMENTS

R = Required unless individualized determination finds unnecessary

N = Not required unless individualized determination finds unnecessary

Definition of Categories	Large	Medium	Small
Manufacturing/Industrial	70,000 + SF	18,000-70,000 SF	0-18,000 SF (Building Size)
Commercial/Retail	45,000 + SF	8,000-45,000 SF	0-8,000 SF (Building Size)
Residential (Single & Multifamily)	75 + UNITS	25-75 UNITS	0-25 UNITS (Building Size)

RIGHT OF WAY (ROW) DEDICATION/IMPROVEMENTS	Manufacturing/Industrial			Commercial/Retail			Residential		
	Large	Medium	Small	Large	Medium	Small	Large	Medium	Small
1. Public Health and Safety Requirements or Requests									
1a. ROW/Install turning lane	R	R	R	R	R	N	R	R	N
1b. Install looped water system where pressure/supply problems would otherwise exist.	R	R	R	R	R	R	R	R	R
2. Trip Generation Rate Requirements or Requests									
2a. ROW for arterial street	R	R	N	R	R	N	R	R	N
2b. Full arterial half-street improvements (see 1b & 1e)	R	R	N	R	R	N	R	R	N
3. Individualized Determination or Requests									
3a. Bus pad dedications for bench	R	R	N	R	R	N	R	R	N
3b. Bus pad installation for bench	R	N	N	R	N	N	R	N	N
3c. Bus shelter dedication	R	R	N	R	R	N	R	R	N
3d. Bus shelter installation	R	N	N	R	N	N	R	N	N
3e. Bus bay dedication (Arterial/Arterial, Arterial/Collector)	R	R	R	R	R	R	R	R	R
3f. Bus bay installation (Arterial/Arterial, Arterial/Collector)	R	N	N	R	N	N	R	N	N
3g. Multi-use path easement	R	N	N	R	N	N	R	N	N
3h. Multi-use path construction (including Lighting)	N	N	N	R	N	N	R	N	N
3i. Construction of looped water main where existing pressure/supply is inadequate to service subject property	N	N	N	N	N	N	N	N	N

MATRIX OF PROPORTIONATE DEVELOPMENT REQUIREMENTS

GENERAL AND SITE PLAN NOTES

1. All construction under this permit shall conform to the City of Tempe Supplement to the MAG Specifications and Details, Maricopa Association of Governments Uniform Standard Specifications and Details (MAG Specifications and Details), and City of Tempe Traffic Barricade Manual.

2. A permit issued by Community Development, or the Engineering Division shall be required for all work in the City of Tempe rights of way. An investigation assessment, in the amount defined by section 29-19 Engineering Fees, Appendix A of Tempe City Code, will be charged for any work within the City of Tempe rights-of-way in which a permit has not been issued prior to commencement of work.

3. The City shall be notified prior to any construction work. Call the Engineering Request Line at (480) 350-8072 at least one business day before start of construction to request inspections. Construction work concealed without inspection by the City shall be subject to exposure at the contractor's expense.

4. Right of way improvements shall not be accepted until a clean and clear approved set of bond black line reproducible or PDF of "as-built" plans have been submitted to and approved by Community Development or the Engineering Division.

5. Location of all water valves, manholes, and cleanouts must be referenced at all times during construction and made available to the Water Utilities Division.

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

7. The City will not participate in the cost of construction, utility relocation, construction staking, or as-built plans.

8. All existing street monuments must be preserved. Prior to construction, monuments will be referenced horizontally and vertically. After construction, monuments shall be reset and field notes, including new elevation, shall be filed with the City.

9. Fire riser, details and FDC are for reference only and are not approved on these drawings. Fire sprinkler plans must be submitted for separate fire department review and approval.

10. All overhead utility lines (other than transmission lines 12.5KV or greater) that on or adjacent to the site, including street or alley crossings, shall be placed underground per City Code Section 25-120 through Section 25-126 and Ordinance No. 88.85

11. All onsite private utilities and details shown in these plans are for reference only and are not approved on these drawings. See plans that are approved by Building Safety for onsite private utilities.

12. This set of plans has been reviewed for compliance with City requirements prior to issuance of construction permits. However, such review shall not prevent the City from requiring correction of errors in plans found to be in violation of any law or ordinance. It is the responsibility of the professional engineer sealing and signing these plans to be certain that they are in full compliance with Tempe standards, details, criterion, laws and ordinances.

13. The City does not warrant any quantities shown on these plans.

14. The City approval is for general layout in the right-of-way, on-site grading, drainage, water and sewer. This plan check approval is valid for a period of one year from application date. Construction permits shall be obtained during this period or the plans shall be resubmitted for review and approval. One 6-month extension may be granted upon request if the request is made prior to the expiration of the one-year period at a cost of 25% of the total plan check fee. Permits must then be issued with 6-months and they will be valid for one year from issue date, otherwise, the project expires and permits are voided.

15. An approved set of plans shall be available on the job site at all times.

16. Construction items shall not be accepted until a clean and clear approved set of bond or PDF reproducible “As-Built” plans have been submitted to and approved by Community Development or the Engineering Division.

17. The developer is responsible for the removal or relocation of all obstructions within the right-of-way prior to starting new construction.

18. The developer is responsible for arranging the relocation and associated costs of all utilities. A utility relocation schedule shall be submitted prior to the start of new construction.

19. The developer is responsible for obtaining or dedicating all required rights-of-way and easements to the City prior to approval of improvement plans.

20. The contractor shall contact Arizona 811 to create a ticket at least 2 working days prior to construction, in accordance with A.R.S. § 40-360.21, *et seq*.

21. The contractor shall barricade construction sites at all times per the City of Tempe Traffic Barricade Manual. When required by the City, a traffic control plan shall be submitted for approval in advance of construction.

22. The contractor may obtain a fire hydrant meter for construction water from Customer Services. This meter should be ordered two working days prior to the start of construction. The unlawful removal of water from a fire hydrant is a violation of the municipal code, punishable by fine and/or imprisonment.

23. All broken or displaced existing concrete curb, gutter, or sidewalk adjacent to project site shall be removed and replaced as directed by the City of Tempe Engineering or Community Development inspector.

24. All City facilities, alleys and roadway surfaces damaged by developer/contractor during construction shall be repaired/restored to the satisfaction of the City of Tempe Engineering or Community Development inspector per the respective City and/or MAG standard detail.

25. All trees planted between 8’ and 16’ from a public utility line (including water, sanitary sewer, storm drain, or irrigation main lines) are required to conform to the City of Tempe Standard Root Barrier Detail T-460.

26. For new development and redevelopment projects one acre or greater discharging to the municipal separate storm sewer system (MS4), will be required to sign a Declaration for Inspection and Maintenance of Drainage structures.

PAVING PLAN NOTES

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

2. The maximum stake interval for grades of 0.2% or less shall be 25’ for concrete work and 50’ for asphalt roadway section, except on horizontal or vertical curves where a maximum stake interval of 20’ for concrete work shall be required. All curb returns shall be staked at the P.C., P.T. and the midpoint of the return. No grade stake interval shall exceed 50’.

3. Gutters will be water tested in the presence of the City Engineer, or designee, to insure proper drainage, prior to final approval by the Engineering Division.

4. Exact point of matching, termination and overlay, if necessary, may be determined in the field by the Engineering Division.

5. Underground streetlight and traffic signal circuits shall be installed as part of the offsite improvements. New foundations for traffic signal poles shall be poured far enough in advance to allow sufficient time for concrete curing and for scheduling the relocation of the existing traffic signals.

6. Address overlay requirements where open cutting is permitted. Finished pavement surface materials such as rubberized asphalt shall be matched in field.

7. Paving improvements shall not be accepted until a clear and clean approved set of bond copy or PDF of “as-built” plans have been submitted to and approved by the Engineering Inspector.

SEWER, WATER and UTILITY PLAN NOTES

1. The contractor shall uncover all existing lines being tied into to verify their location, size, material type, etc. prior to construction of new lines. 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. Contact Arizona 811 to create a ticket.

2. Summits in water lines shall be located at fire hydrants.

3. Backfilling shall not be started until lines are approved by the Engineering Division.

4. If a backflow prevention assembly is required to be installed, the contractor will call the Community Development Department at 480-350-8341 for an inspection before backfilling the assembly.

5. All public water lines shall be Pressure Class 350 DIP, protected with high density polyethylene corrosion protection per MAG Specification 610.

6. All new water and sewer connections to existing lines shall be done only by open-cut on major arterial streets, major intersections or the presence of a major water or sewer line. Bored installations must be clearly identified and specifically approved by the City Engineer, or designee.

7. All on-site sewer systems are considered private unless otherwise noted on plans and must be approved by the City of Tempe Building Safety Division of the Community Development Department.

8. In accordance with AAC R18-4-119, all materials which may come into contact with drinking water shall conform to National Sanitation Foundation Standards 60 and 61.

9. All manhole installations shall be complete in place including all excavation, backfill, sweeps, and conduits necessary to complete the installation of the manhole and connections to the mainline conduits.

10. For the existing sewer stub connections only. (To be signed on “As-Built”.)
“This is to certify that an actual field flow test on the existing sewer stub was performed and was found to be acceptable and free of any obstructions prior to final building connection”.

_____	_____	_____
Engineer	Date	Arizona P.E. Number

11. All valves shall be flanged to fittings, preferably tees.

12. Thrust & anchor blocks per MAG Standard Detail 301, 380 & 381.

13. Only the City of Tempe Water Utilities Division personnel shall operate any existing valves or any valve connecting new work to the existing city water system.

14. Sewer, water, and utility improvements shall not be accepted until a clear and clean copy of “as-built” plans in PDF format have been submitted to and approved by the city.

15. Water, storm drain & sanitary sewer separation/protection shall be per MAG Standard Detail 404-1 with City approval. The City considers storm drains to be “sewer” when crossing water lines. The City considers storm drains to be “potable water” when crossing sanitary sewer lines.

16. The contractor shall take every precaution to prevent foreign material from entering the pipe while it is being stored.

17. During installation and at all times when pipe laying is not in progress, the open ends of the pipe in the trench shall be closed by a water-tight plug or other means approved by the City of Tempe Engineering inspector. If in the opinion of the City of Tempe Engineering Inspector the pipe contains dirt that will not be removed during the flushing operation, the interior of the pipe shall be cleaned and swabbed, as necessary, with a .005 to .010 percent chlorine solution.

18. After pressure testing and before placing in service, all water lines shall be disinfected and tested for water quality in accordance with MAG Standard Specifications Section 611. If the waterline fails the chlorine residual test or fails to meet the water quality test more than three (3) times, the City of Tempe Engineering inspector reserves the right to require the installed waterline to be cleaned by pigging the line, in accordance with standard procedures, at no cost to the City.

ON-SITE DRAINAGE PLAN NOTES

1. A permit issued by Community Development, or the Engineering Division shall be required for the onsite drainage of the project.

2. Drywells must be registered with the Arizona State Department of Environmental Quality. An Aquifer Protection Permit (APP) may also be required.

3. Prior to acceptance, the owner/developer shall furnish the following:

   a. Drilling log and certification of compliance for all dry wells.

   b. A clean and clear bond copy or PDF of the approved plans with this certification signed by a registered professional engineer:

4. "This is to certify that an actual field survey was made under my supervision of the subject site and that finish floor and retention elevations are the true "As-Built" conditions, and they meet or exceed the original retention requirements as shown on this approved plan."

_____	_____	_____
Engineer	Date	Arizona P.E. Number

5. Underground storm water drainage infrastructure, when used and specifically approved by the City Engineer, Community Development Principal Civil Engineer, or designee shall be the sole responsibility of the owner, including the design, construction, inspection, monitoring and maintenance. The owner shall be liable for any and all claims resulting there from. The City of Tempe, by allowing this system assumes no liability or responsibility for the design, construction, inspection, monitoring, and/or maintenance of the system. A deed restriction describing the system shall be recorded. This document shall state that the deed restriction cannot be relinquished or abandoned without the written approval of the City of Tempe.

6. All best management practices (BMPs) shall be installed and maintained in accordance with the specifications of Volume III, Erosion Control, of the Drainage Design Manual issued by the Flood Control District of Maricopa County (2012). The perimeter of the project site shall have BMPs in accordance with the Storm Water Pollution Prevention Plan (SWPPP). Designated Washdown Areas shall be onsite and follow the specifications of the General Housekeeping Best Management Practice GH-4. Onsite stockpiles shall have perimeter control BMPS installed around the stock pile. Offsite storm drain inlets shall be protected by BMP SPC-7 if upstream construction activities may result in stormwater discharges.

STREET LIGHTING PLAN NOTES

(For Street Lighting Plan notes 1-4, use only notes that apply to this project)

1. Streetlights to be Streamline Steel Poles and installed on foundations per City of Tempe Standard Detail T-651.

2. Streetlights to be Architectural Street Lights and installed on foundations per City of Tempe Standard Detail T-652.

3. Streetlights to be architectural Tempe Special District Lighting and installed on foundations per City of Tempe Standard Detail T-645.

4. Streetlights to be decorative Special District Street Lights and installed on foundations per City of Tempe Standard Detail T-653.

5. All streetlights are to have individual pull box (J-Box), (provided by the utility company), installed within 2 to 4’ from the base of the pole and per City of Tempe standard Detail T-650.

6. All streetlights to be 2’ from back of curb where recessed or no sidewalk exists, or 2’ back of walk to the face of pole unless otherwise approved by City.

7. All street light conduits to be 2-1/2” PVC Schedule 40.

8. Street lighting improvements shall not be accepted until the “as-built” plans (24” x 36” PDF) have been submitted to and approved by Community Development or the Engineering inspector.

PERMIT AND AS-BUILT INFORMATION BLOCK

NOTE: To be placed on the cover sheet of all projects requiring permits. Mark items that apply to the project on the right side only. The city inspector will mark the left side.

AS-BUILT INFORMATION IS INCLUDED IN THESE AREAS ON THIS SET OF DRAWINGS		PERMITS REQUIRED FOR THIS SET OF DRAWINGS
___☐ SEWER	___☐ U.G. FIRE LINE	___ DRAINAGE
___☐ WATER	___☐ CITY IRRIG.	___ PAVING
___☐ WATER-RECLAIMED	___☐ BIKE PATH	___ WATER
___☐ STORM DRAIN	___☐ LANDSCAPE	___ SEWER
___☐ DRYWELL	___☐ SPRINKLER	___ STREETLIGHTS
___☐ PAVING	___☐ STREETLIGHTS	___ FLOODPLAIN
___☐ OFFSITE (C,G,SW,DW)	___☐ BUILDINGS	___ U.G. FIRELINE
___☐ GRADING/DRAINAGE	___☐ _____	___ OTHER
AS-BUILT PLANS CHECKED FOR FIELD CHANGES INSPECTOR: _____ DATE: _____		PROJECT #_____

UTILITY COMPANY SUBMITTALS

1. These plans have been submitted to the following utility companies and the work contained in these plans has been approved by these companies within their area of interest. The size and locations, as shown, of the gas, telephone and power lines, and connections agree with the information contained in the utility company's records. Where the work to be done conflicts with any of these utilities, the conflicts shall be resolved as specified in the special provisions and/or as otherwise noted on these plans. Conflicts arising during the course of construction from unforeseen circumstances shall be reported to the interested utility company and be resolved by them and the design engineer.

2. The City will not participate in the cost of construction or utility relocation.

Salt River Power District _____
Company Representative Contacted Date

SRVWUA _____
Company Representative Contacted Date

Arizona Public Service _____
Company Representative Contacted Date

CenturyLink _____
Company Representative Contacted Date

El Paso Natural Gas Co. _____
Company Representative Contacted Date

Southwest Gas Co. _____
Company Representative Contacted Date

Cox Cable T.V. _____
Company Representative Contacted Date

Air Products _____
Company Representative Contacted Date

_____ _____
Company Representative Contacted Date

_____ _____
Company Representative Contacted Date

NOTE: The companies listed above are just a sample list. Add or remove any utilities that apply or don't apply to the project.

CONSTRUCTION IN FLOODPLAINS

A. NEW STRUCTURES

When new structures or other improvements are proposed to be constructed in a Special Flood Hazard Area (SFHA) also referred to as a delineated 100-year Floodplain, additional steps must be followed to assure they are built per the requirements of the City of Tempe Floodplain Ordinance and the National Flood Insurance Program (NFIP). The drainage report for the improvements must show that there are no adverse impacts to the surrounding properties. For structures, FEMA Elevation Certificates must be submitted to the Floodplain Management Section of the Engineering Division. The Elevation Certificate is an administrative tool that is used to provide elevation information necessary to ensure compliance with community floodplain management ordinances, to determine the proper insurance premium rate, and to support a request for a Letter of Map Amendment (LOMA) or Letter of Map Revision based on fill (LOMR-F). Community Development makes the owner/engineer/architect/builder aware of these requirements during the site plan review process, receives, and forwards the certificate as part of the building inspection.

Any changes made to the boundaries of the SFHA will require a LOMA/LOMR whichever is appropriate.

Plan Review

As part of the Preliminary Site Plan Review Process, the civil site plan reviewer checks the Flood Insurance Rate Map (FIRM) or GIS to determine if the site is in a Special Flood Hazard Area (SFHA).

- All new building plans must reflect the Lowest Floor at least one foot above Base Flood Elevation (BFE), and that the construction does not adversely alter the floodplain limits beyond the site. If there is no BFE, a professional engineer must determine and seal the BFE determination for the SFHA and provide a Design FEMA ELEVATION CERTIFICATE prior to issuance of a Grading and Drainage Permit.

Note: Non-residential structures and equipment may be flood-proofed in lieu of raising the lowest floor one foot above the BFE. A qualified register engineer or architect must provide a FEMA 81-65 FLOOD PROOFING CERTIFICATE prior to the issuance of a grading and drainage permit. For more information on flood proofing please see the FEMA website: https://www.fema.gov

- Customer returns with the completed FLOODPLAIN CLEARANCE PERMIT form or forms. If the property is determined to be within a SFHA, the Floodplain administrator will require:

- The Owner or their Agent must provide a signed copy of the “DISCLAIMER OF LIABILITY”.

- The applicant will include the BFE, the Lowest Floor Elevation and the note below on G&D plans.
- A Design Elevation Certificate stamped by a professional civil engineer.

Typical note to add to Grading and Drainage Plan:

"Federal Emergency Management Agency (FEMA) Elevation Certificates must be completed for each new structure constructed in a Special Flood Hazard Area (SFHA) prior to clearance for framing of the structure can be given and again prior to the Certificate of Occupancy. Two copies of these Elevation Certificates are to be submitted to the General or Structural Inspector."

The Floodplain Management Section will sign off on clearance for framing and again for the Certificate of Occupancy (C of O) upon receipt of the Elevation Certificate.

INSPECTION

- Building Safety Inspector will verify with the Owner and Contractor when Elevation Certificates are required.

- Two copies of completed CONSTRUCTION ELEVATION CERTIFICATE must be submitted to Inspector prior to the first framing inspection.

- Elevation Certificates must be sealed by surveyor or engineer and must include the elevation of the lowest floor slab and lowest adjacent grade. The elevation certificate must reflect the built condition (e.g. slab on grade, basement, attached garage, split level, crawl space, elevated floors).

- Inspector forwards one copy to Development Services Division and one to the Floodplain Management Section of the Engineering Department.

CERTIFICATE OF OCCUPANCY (C of O)

- Two copies of the final Elevation Certificate must be submitted to Inspector prior to issuance of the C of O.

- Elevation Certificates must be sealed by surveyor or engineer or and must include the elevation of the lowest floor slab and lowest adjacent grade. The elevation certificate must reflect the final built condition (e.g. slab on grade, basement, attached garage, split level, crawl space, elevated floors).

- Inspector forwards one copy to Development Services Division and one to the Floodplain Management Section of the Engineering Department.

MANUFACTURED OR MOBILE HOMES

The Arizona Department of Fire, Building and Life Safety Office of Manufactured Housing (OMH) provides the Building Safety plan review and inspection for these structures. The applicant will need to provide the approved City of Tempe FLOODPLAIN CLEARANCE PERMIT to the OMH as part of their plan review application.

When an applicant applies for a Zoning or Mobile Home Permit the Permits Counter will:

- If the property is flagged as being in a Special Flood Hazard Area (SFHA), it will be duly noted on the ZT Permit and the applicant will be notified of the additional requirements.
- The applicant will need to provide a Design Elevation Certificate. Plans must showing the bottom of the structural frame or the lowest point of any attached appliances, whichever is lower, is at the regulatory flood elevation (one foot above Base Flood Elevation (BFE)), and show that the construction does not adversely alter the floodplain limits beyond the site A professional engineer must determine and seal the BFE determination for any SFHA and provide a design FEMA ELEVATION CERTIFICATE with the completed FLOODPLAIN CLEARANCE PERMIT form.

The Floodplain Administrator will then provide a City of Tempe FLOODPLAIN CLEARANCE PERMIT and the design FEMA ELEVATION CERTIFICATE for submittal to OMH as part of their plan review process.

Prior to final closeout of the ZT Permit and the FLOODPLAIN CLEARANCE PERMIT, the applicant must provide a copy of the C of O from the OMH and a copy of the final FEMA ELEVATION CERTIFICATE for the completed structure.

B. EXISTING STRUCTURES

When improvements or repairs are made to a building is constructed in a Special Flood Hazard Area (SFHA) also referred to as a delineated 100-year floodplain, additional steps must be followed to assure the structure is built per the requirements of the City of Tempe Floodplain Ordinance and the National Flood Insurance Program (NFIP).

If the structure to be improved or repaired is within the SFHA, an evaluation must be made to determine if the improvements/ repairs for the last constitute “Substantial Improvements” or “Substantial Damage” as defined by the NFIP. Therefore, a part of the approval process includes a SUBSTANTIAL IMPROVEMENT FLOODPLAIN CLEARANCE or DAMAGE FLOODPLAIN CLEARANCE must be obtained by the owner or their representative. If the improvement/ damage repairs are determined to substantial, the existing structure as well as the improvements/repairs may need to be brought up to NFIP standards for structures within a SFHA.

Plan Review

As the part of the Preliminary Site Plan Review Process, the Civil reviewer checks the Flood Insurance Rate Map (FIRM) or GIS to determine if site is in a Special Flood Hazard Area (SFHA):

- If the property is in a Special Flood Hazard Area (SFHA), it will be duly noted on the review plan set and the project flagged for the additional requirements.

- The Owner or their Agent must provide a signed "DISCLAIMER OF LIABILITY"

- If the project is an improvement or repair to and existing structure, the SUBSTANTIAL IMPROVEMENT FLOODPLAIN CLEARANCE or a SUBSTANTIAL DAMAGE FLOODPLAIN CLEARANCE will need to be completed.

- If the improvements/ repairs do not initially qualify for clearance, the owner or their representative must complete the FLOODPLAIN CLEARANCE IMPROVEMENT/ DAMAGE REPAIR CALCULATION FORM. If the calculation shows that the "Improvement/Damage Repair Ratio" does not exceed 50%, then the work is not considered a Substantial Improvement or Substantial Damage Repair.

If the "Improvement/Damage Repair Ratio" exceeds 50%, then the work is considered a Substantial Improvement or Substantial Damage Repair and additional requirements will need to be met to obtain a FLOODPLAIN CLEARANCE PERMIT.

Depending on if the original structure was built prior to or after the determination that the area was a SFHA (Pre-FIRM or Post-FIRM) will regulate which improvements/ repairs need to be brought up to current NFIP standards.

If the new additions are to be built and/or existing structures are required to be raised to one foot or more above the Base Flood Elevation, the requirements for Elevation Certificates and other requirements in the FLOODPLAIN DEVELOPMENT REVIEW PROCEDURES NEW IMPROVEMENTS must be met.

The City of Tempe Floodplain Manager or their designee will outline for the Owner what requirements need to be met.

The ***FEMA P-758, Substantial Improvement/Substantial Damage Desk Reference*** provides the information needed on how to calculate Substantial Improvements/Damage and to what level the new improvement/repairs and the existing building needs to be brought up to NFIP standards.

https://www.fema.gov/sites/default/files/2020-08/fema_p_758_complete_r3_0.pdf

DECLARATION FOR INSPECTION AND MAINTENANCE OF DRAINAGE

Reference Attachments A, B, & C on the following pages.

Attachment "A" for Disturbed Areas over 1 Acre

Recorded at the request of CITY OF TEMPE

AFFIDAVIT AND FEE EXEMPT
PURSUANT TO A.R.S. SECTION
11-1134.A-3.

SW03N4 ADDRESS
Parcel #XXX-XX-XXX REC------ DS------- EN----------

Declaration for Inspection and Maintenance of Drainage Infrastructure

WHEREAS, in approving the stormwater drainage infrastructure shown on the grading and drainage plans for PROJECT, located at ADDRESS and owned by OWNER NAME, LLC, an Arizona corporation, the City of Tempe assumes no liability for any ongoing maintenance for the property as described and delineated on the as-built plans, incorporated hereto by reference.

It shall be the sole responsibility of the OWNER, heirs, administrators, executors, personal representatives, legal representatives, successors (including successors in ownership and estate); hereafter referenced as OWNER, and assigns and lessees to:

1. Provide for adequate long-term maintenance of the stormwater control measures and drainage infrastructure described in/on the as-built plans to ensure that the drainage infrastructure is and remains in proper working condition in accordance with approved as-builts, rules and regulations and applicable laws.

2. Maintain infrastructure in a condition that will allow the volume of stormwater shown on the approved grading and drainage plans (as-builts) on file with the City of Tempe to dissipate within 36 hours.

3. Perform annual drainage infrastructure inspections (no less often than annually) and retain documentation onsite and available for inspection upon request by the City of Tempe or regulatory agency.

4. Have drainage infrastructure inspected by the OWNER'S representative (engineer, registered geologist, certified stormwater inspector, landscape designer or otherwise qualified person on the Arizona Registrar of Contactors or State Board of Technical Registration list) in accordance with the terms of the City of Tempe Engineering Design Criteria.

5. Grant to the City of Tempe or its agent or contractor the right of entry at reasonable times and in a reasonable manner for the purpose of inspecting for potential non-conformance.

6. Indemnify and hold harmless the City of Tempe and its officers, agents, and employees for any and all damages, accidents, casualties, occurrences, claims or attorney's fees which might arise or be asserted, in whole or in part, against the City of Tempe from the construction, presence,

existence, or maintenance of the drainage infrastructure subject to the Declaration. In the event a claim is asserted against the City of Tempe, its officers, agents or employees, the City of Tempe shall notify OWNER(S) and the OWNER(S) shall defend at OWNER(S) expense any suit based on such claim. If any judgment or claims against the City of Tempe, its officers, agents, or employees, shall be allowed, the OWNER(S) shall pay all costs and expenses in connection therewith. The City of Tempe will not indemnify, defend, or hold harmless in any fashion the OWNER(S) from any claims arising from any failure, regardless of any language in any attachment or other document that the OWNER(S) may provide.

7. Declaration to be recorded in the Maricopa County Recorder's office for the county of Maricopa, Arizona. and the Declaration shall constitute a covenant running with the land and shall be binding upon the OWNER(S) and the OWNER(S) heirs, administrators, executors, assigns and any other successors in interest.

Property Owner:

Signed by: _____

Print Name: _____

Title: _____

Notary Acknowledgment:

State of: _____

County of: _____

The foregoing instrument was acknowledged before me this _____

day of _____ ,20___ ,by _____
(Name of Signer)

Notary Public Signature: _____

My Commission Expires: _____

(Notary Seal)

Attachment "B" for Disturbed Areas Less Than 1 Acre

Recorded at the request of CITY OF TEMPE

When recorded, return to:
CITY OF TEMPE BASKET

AFFIDAVIT AND FEE EXEMPT
PURSUANT TO A.R.S. SECTION
11-1134.A-3.

SW03N4 ADDRESS
Parcel #XXX-XX-XXX REC------ DS------- EN----------

Declaration for Maintenance and Repair of Underground Retention System

WHEREAS, in approving the Underground Retention System shown on the grading and drainage plans for PROJECT, located at ADDRESS and owned by OWNER NAME, LLC, a Delaware corporation, the City of Tempe assumes no liability for any ongoing maintenance for the property as described and delineated on the as-built plans, incorporated hereto by reference. It shall be the sole responsibility of the owner, heirs, administrators, executors, personal representatives, legal representatives, successors (including successors in ownership and estate) and assigns and lessees to:

1. Inspect the Underground Retention System on a regular basis (annually, at the minimum)
2. Maintain the Underground Retention System in a condition that will allow it to store and dissipate, within 36 hours, the volume of stormwater shown on the approved grading and drainage plans on file with the City of Tempe. The foregoing restriction cannot be changed without the prior written consent of the City Engineer.
3. Indemnify and hold City of Tempe harmless for, from, and against any and all claims, damages, losses, costs, suits, liabilities, and expenses (including, without limitation, reasonable attorneys' fees) that may be brought or made against or incurred by owner or its permittees, licensees, invitees or guests' or any violation or breach by any of them of the terms hereof, including, without limitation, as a result of any damages, injuries, or death to persons or property.

Signatures appear on the following page

Signed by: _____

Print Name: _____

Title: _____

STATE OF _____)
) ss
County of _____)

The foregoing instrument was acknowledged before me this _____

day of _____, 20__, by _____.
(Name of Signer)

My Commission Expires: _____ _____

(Notary Seal)

Attachment "C" for Retention Vaults Under Buildings

Recorded at the request of CITY OF TEMPE

When recorded, return to:
CITY OF TEMPE BASKET

AFFIDAVIT AND FEE EXEMPT
PURSUANT TO A.R.S. SECTION
11-1134.A-3.

SW03N4 ADDRESS
Parcel #XXX-XX-XXX REC------ DS------- EN----------

Declaration for Maintenance and Repair of Underground Retention System

This Declaration is made by and among the City of Tempe, Arizona ("City"), and PROJECT, located at ADDRESS and owned by OWNER NAME, LLC, an Arizona corporation ("Owner").

WHEREAS, in approving the stormwater drainage infrastructure (the "System") shown on the grading and drainage plans for PROJECT, located at ADDRESS (the "Property") and owned by OWNER NAME, LLC, an Arizona corporation, the City of Tempe assumes no liability for any ongoing maintenance for the property as described and delineated on the as-built plans, incorporated hereto by reference.

City requires that the Owner execute this Declaration as a condition to its approval.

Now, therefore, the parties hereby agree as follows:

1. Owner acknowledges that the City shall have no obligation or liability for any ongoing maintenance of the System or the Property, and that City shall not be liable for any claims and damages for personal injury, property damage, or death arising out of the installation, construction, maintenance, or repair of the System, or any failure to perform the agreements and covenants outlined in this Declaration. Owner, for themselves and their successors, assigns, representatives, agents, invitees, officers, employees, managers, members and directors, hereby fully and completely release the City from any and all damages, liabilities, causes of action, judgments or claims for personal injury or property damage arising out of or related to the System. The foregoing release is given in consideration of the City's approval of the System, and shall run with the land, and be binding upon and inure to the benefit of the parties and their respective successors and assigns.

2. At all times, Owner shall be solely responsible for maintaining and inspecting the System, including all costs, expenses and fees associated therewith. Specifically, Owner shall:

    a. Inspect the Underground Retention System on a regular basis (no less often than annually) and retain documentation of said inspections for a period of five (5) years, from the date of each inspection; and

b. Maintain the Underground Retention System in a condition that will allow it to store and dissipate within 36 hours, the volume of stormwater shown on the approved grading and drainage plans on file with the City of Tempe. The foregoing restriction cannot be changed without the prior written consent of the City Engineer.

3. Owner, its successors and assigns, shall indemnify, release, defend and hold harmless City, its Council members, officers, employees, agents, representatives, volunteers, successors and assigns against and from any and all damages, losses, costs, suits, liabilities, expenses, claims, demands, lawsuits or actions of any kind for damages or loss, whether such injury, damage or loss is to person (including death) or property, arising in whole or in part out of (a) acts or omissions of Owner, its agents, contractors, agents, invitees, officers, directors, or employees; (b) claims by third parties with regard to the System or the Property; and/or (c) Owner's failure to comply with or fulfill its obligations established by this Declaration or by law. Such obligation to indemnify shall extend to and encompass all costs incurred by City in defending against such claims, demands, lawsuits or actions, including but not limited to attorney, witness and expert fees, and any other litigation related expenses. In the event that any action or proceeding shall be brought against City by reason of any claim referred to in this paragraph, Owner, upon written notice from City, shall at Owner's sole cost and expense, resist or defend the same through counsel reasonably approved by City.

4. For purposes hereof, the term "City" shall mean and include City, its council members, employees, agents, representatives and volunteers.

5. This Declaration may be executed in any number of counterparts, each of which shall be an original, and all of which together shall constitute one and the same instrument.

Signatures appear on the following pages.

Dated this _____ day of _____, 20__.

By: _____ Its: _____
Signature Title

Print Name: _____

STATE OF _____)
) ss
County of _____)

The foregoing instrument was acknowledged before me this _____day of_____, 20__,
by _____, it's _____of
(Name of Signer)

My Commission Expires:_____ _____
Date Notary Public

(Notary Seal)