

2021 AMENDMENTS TO THE APACHE JUNCTION CITY CODE, VOLUME II, LAND DEVELOPMENT CODE, CHAPTER 10: ENGINEERING STANDARDS

The following amendments are made to the Apache Junction City Code, Volume II, Land Development Regulations, Chapter 10: Engineering Standards:

§ 10-4-2 STORMWATER STANDARDS.

The city requires that stormwater runoff for new commercial, industrial, multi-family and residential developments be managed as follows:

(A) Retention. The required retention to be contained is the stormwater runoff per divisions (A)(1) and (2) below. Half pavements of the adjoining streets may be considered part of the development.

(1) For the areas north of Baseline Avenue, the following retention requirement shall apply: 110% of the stormwater which falls within the development from a 10-year storm of 24-hour duration (approximately 2.4 inches) of which the difference between the natural runoff and the developed runoff must be retained within the boundaries of that development (including street areas if within a subdivision) (see Apache Junction City Code Vol. II, § 10-4-10(B)(1) and (2)).

(2) For the areas south of Baseline Avenue, the following retention requirement shall apply: stormwater which falls within the development from a 100-year storm of 2-hour duration (precipitation per NOAA Atlas 14 Documents) must be retained within the boundaries of that development (including street areas if within a subdivision) (see Apache Junction City Code Vol. II, § 10-4-10(B)(1) and (2)).

(3) Surface and underground retention is allowed in all newly developed areas.

(4) Underground retention is only allowed in commercial and industrial areas.

(B) Streets.

(1) Ten-year stormwater runoff. Streets must be constructed to carry the stormwater runoff from a 10-year storm event as follows:

(a) For local streets, there shall be no curb overtopping with no requirements for dry lane conditions.

(b) For collector, arterial and parkway streets, there shall be at least 1 dry 12-foot driving lane in each direction.

(2) One hundred-year stormwater runoff.

(a) Calculated peak flow shall be considered to be contained within the right-of-way with:

1. Six-inch maximum depth over the curb;
2. One hundred cfs maximum flow; and
3. Ten fps maximum velocity.

(b) See Apache Junction City Code Vol. II, § 10-4-6 for the street drainage design guide.

(3) Runoff in excess of street capacity. When the stormwater runoff in the streets exceeds the 10-year or 100-year conditions stated in divisions (B)(1) and (2) above, the excess flows shall be contained in an approved storm drain and/or channel system. No open channels are allowed in the city's right-of-way.

(4) Inverted crown streets. No new inverted crown streets are allowed within the city limits.

(5) Street cross drainage. Cross drainage shall be underground with culverts and bridges. Low water crossings shall not be used without the city engineer's approval.

(C) Off-site flows.

(1) Off-site flows are flows that originate upstream of the proposed land development site and have historically traversed either through the site or have been channelized in some form adjacent to the project.

(a) Land development projects are required to convey the 100-year, time of concentration (T_c) peak flows around or through the project site. These off-site flows shall be interpolated from Apache Junction's Stormwater Master Plan report.

(b) Off-site flows shall not be mixed with any stormwater flows originating from within the project's contributing drainage area unless specifically approved by the city engineer.

(c) Off-site flows shall be carried through the development and discharged at a location and in a manner consistent with historical flow patterns without adverse impact to adjacent, upstream or downstream properties.

(d) Storm drains or box culverts shall be required when off-site flows are discharged from a development site into public right-of-way. See Apache Junction City Code Vol. II, § 10-4-7 for additional information.

(2) Note that "off-site flows" does not include the stormwater runoff from adjacent public right-of-way that the project must retain in accordance with division (A) above.

(D) Special Flood Hazard Area (FEMA designated area). Any development or construction within a special flood hazard area shall conform to FEMA flood plain development requirements and to the requirements of the latest city floodplain management ordinance. See Apache Junction City Code Vol. II, § 10-4-13 and Apache Junction City Code Vol. II, Chapter 5.

(E) Conditions for developing property in flood areas.

(1) (a) Existing washes are not to be filled or altered without a city-approved engineering study. Existing washes can be relocated on-site based on a city-approved engineering study showing adequate capacity and slope for the relocated washes. The washes must enter and leave the subject property in the historic locations. This shall apply to the following lands within the corporate limits of the City of Apache Junction, including but not limited to:

1. All special flood hazard areas as defined by FEMA;
2. FEMA zone X-500, also known as Shaded Zone X, as it pertains to alluvial fan or sheet flooding;
3. Local floodplains associated with washes and/or sheet flow having a 100-year peak discharge of 50 cfs or more;
4. Areas within the erosion hazard setback of a watercourse;
5. All floodplains/flood-prone areas and erosion hazard setbacks identified on previously and subsequently recorded subdivision plats; and
6. All floodplains/flood-prone areas and erosion hazard setbacks identified on previously and subsequently drainage studies commissioned by the city engineer.
7. Any ephemeral natural watercourses that convey runoff during rain events.

(b) For the purpose of this section, the following definition shall apply unless the context clearly indicates or requires a different meaning.

FLOODPLAIN or FLOOD- PRONE AREA. Any land area susceptible to being inundated by water from any source. For regulatory purposes this involves either a FEMA Special Flood Hazard Area, areas platted on accepted city plans as being flood-prone or areas near washes which in the opinion of the Floodplain Administrator may be impacted by water during a base flood.

(2) It is unlawful to divert, obstruct or retard a watercourse. Affected agencies or persons may seek legal action.

(3) Construction in designated flood zones.

(a) Construction in an AH designated flood zone, as shown on the FIRM, requires an existing site topography be prepared by a State of Arizona registered land surveyor and a city-approved engineered grading plan. The lowest floor, garage and equipment is to be designed to be at least 1 foot (State of Arizona regulatory flood elevation ("RFE") above the base flood elevation ("BFE")). Certification by a State of Arizona registered civil engineer stating that the development will not raise the base flood elevation more than 1 foot is required.

(b) A subdivision of 5 or more acres or 50 or more lots located all or partially in an A designated flood zone shall have the base flood elevations determined for the A Zone. The base flood elevations may extend outside the A Zone and the limits of the base flood elevations shall be shown on the grading and drainage plan of the subdivision. The lowest floor, garage and equipment is to be designed to the RFE.

(c) When constructing in an A designated flood zone, without designated floodway and base flood elevations determined, the lowest floor of a structure shall be a minimum of 2 feet above the highest adjacent grade ("HAG") at the pad location of the structure.

(d) Construction in an AE designated flood zone where the floodway and base flood elevation is determined, the lowest floor of a structure to be constructed outside the floodway shall be a minimum of 1 foot RFE above the base flood elevation shown on the FIRM.

(e) Construction in Flood Zones A and AE will allow fill dirt to be imported to the site with a city-approved engineered grading plan. A city excavation and grading permit shall be required.

(f) After construction of the building and after all machinery and/or equipment such as water heaters, air conditioners and other associated equipment have been installed and the grading around the building is completed, a State of Arizona registered land surveyor or a registered engineer shall file a finished construction FEMA elevation certificate for city files.

(4) Any grading resulting in alteration of floodwater capacity or re-alignment of a flood area in an A Zone area may require an Army Corps of Engineer's 404 Permit and/or FEMA approval.

(5) Manufactured homes shall be elevated so that the bottom of the structural frame or the lowest point of any attached appliances (e.g., ground-mounted AC unit), whichever is lower, is at or above the regulatory flood elevation and be securely anchored to an adequately anchored foundation system to resist flotation, collapse or lateral movement.

(6) Nonresidential buildings constructed in any A Flood Zone are to be elevated or floodproofed to 1 foot above the base flood elevation or higher. A certification by a State of Arizona registered civil engineer is required stating that the development grading and building will not raise the base flood elevation more than 1 foot. An as-built FEMA elevation certificate prepared by a State of Arizona registered land surveyor or registered engineer is also required.

(7) Constructing buildings on posts or pilings does not remove the building from the Special Flood Hazard Area for flood insurance purposes. The posts or pilings are to be designed to resist lateral movement due to forces of the floodwaters.

(8) Construction is prohibited in floodways unless it has been determined by a State of Arizona registered civil engineer that construction will not increase flood levels during the occurrence of the base flood discharge by any amount. Construction in the FEMA floodways as indicated on the area FIRM map requires that there be no rise in the 100-year flood elevation and certification letter by a State of Arizona registered civil engineer to this. The work may require an Army Corps of Engineers 404 Permit and/or approval of FEMA.

(9) Waste disposal systems cannot be installed wholly or partially in a floodway.

(10) Removing a property from a FEMA flood zone requires a State of Arizona registered civil engineer to process a request in accordance with FEMA procedures.

(11) The city's floodplain management ordinance set forth in Apache Junction City Code Vol. II, Chapter 5 should be consulted for further information.

(F) Stormwater collection and retention plan. A conceptual stormwater collection and retention plan and a preliminary drainage report shall be submitted to the city with a preliminary plat or site development plan, and shall be approved prior to the approval of the plat or plan. Drawings, plats, plans and the like shall comply with the city standards, set forth in Apache Junction City Code Vol. II, § 10-4-4(A).

(G) Drainage report. A drainage report shall be submitted to the city wherever development and/or grading is proposed within the city limits. DEVELOPMENT shall mean any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling. See Apache Junction City Code Vol. II, § 10-4-4(B).

§ 10-4-4 STORMWATER PLAN AND DRAINAGE REPORTS.

(A) Stormwater Collection and Retention Plan. The Stormwater Collection and Retention Plan shall include but not be limited to the following:

(1) The watershed boundaries, both on-site and off-site, shall be delineated with any existing drainage or irrigation structures such as waste or delivery ditches, natural drainage channels and the like, and the proposed development's impact on existing features;

(2) A topographic map which shows the location of the project area; a 1- or 2-foot contour interval shall be used as the base map for both existing and proposed. The map shall also show the location of the property with respect to the street system and other features such as existing and proposed stormwater retention basins and the like;

(3) Method of collection (surface and/or subsurface);

(4) Depth, side slopes and volume of retention basins;

(5) Calculations showing retention required and provided;

(6) Method of disposal of water within 36 hours;

(7) Areas tributary to each retention basin;

(8) The development's low outfall elevation and location relative to city datum shall be explained and the location on all watershed and topographic maps shall be identified;

(9) The drainage pattern of all streets within and adjacent to the proposed development on the drainage maps shall be indicated;

(10) A preliminary retention basin plan including size, depth and possible methods of draining the retention basin shall be proposed;

(11) Areas within any 100-year floodplain including any FEMA designated floodplain shall be indicated; and

(12) All stormwater plans and preliminary drainage reports shall be prepared and signed by a professional civil engineer who is registered by the State of Arizona.

(B) Drainage reports. Drainage reports shall be submitted for approval by the city with the site improvement plans. The report shall be typewritten on letter-size sheets with necessary maps folded and inserted into the report in the proper order. All drainage reports shall be prepared and sealed by a qualified professional civil engineer registered in the State of Arizona. All elevations shown on the plans shall be referenced to a benchmark on the city datum unless otherwise approved by the city engineer.

(1) Preliminary drainage report. A preliminary drainage report shall be required for all commercial, industrial, multi-family and residential subdivision developments. The report must be presented with preliminary development plans. Complete engineering reviews shall not occur without this report, which shall be on separate, letter-size, typewritten sheets with necessary maps and attachments. Handwritten comments on a plan sheet are not acceptable and shall be returned unapproved. The preliminary drainage report shall include, but not be limited to:

(a) Adequate maps that delineate the boundaries of on-site and off-site drainage areas;

(b) Maps or drawings that indicate the drainage pattern of all existing drainage, irrigation, structures, streets and the like, and proposed streets and building sites. The different critical

points and where inlets/outlets are to be located shall be labeled. The inlets/outlets are to have the same numbers as the drainage areas draining to them;

(c) Each sub-area is to be analyzed for the peak flow generated by a 10-year and 100-year storm. Use of the rational method is preferred for drainage areas less than 160 acres.

Hydrology and hydraulics design methods shall be consistent with the Maricopa County Drainage Design Manual, Volumes I, II and III;

(d) Storm drain design computations;

(e) Inlets shall be analyzed separately and catch basin computations shall be submitted;

(f) The off-site storm runoff flows shall be described in detail. Drainage area, calculated peak flows, and other pertinent runoff data must be clearly set forth. If the flow is in a defined channel, the channel can be improved. An 8-foot bottom to accommodate maintenance vehicles may be required. Special consideration of the use of open channels is to be given on each individual project by the city. Channels for the runoff from areas outside the development may be realigned through the new development. Special precautions at the point of discharge for flow rate, velocity, erosion and sedimentation shall be evaluated to prevent adverse effects on downstream properties;

(g) The retention volumes required by the formula defined in Section 10-4-10 (B)(2)(b):

Drainage area (square feet) x drainage area coefficient (C) x 0.2 x 1.1 (freeboard) = retention volume in cubic feet; and

(h) Proposed retention basin location(s), size(s) and means of stormwater conveyance and disposal shall be shown on the drainage map(s). Narrative discussion and supporting calculations shall be provided in the body of the report.

(2) Final drainage report. A final drainage report shall be required and accompanied with the drainage and retention agreement (Exhibit 10-4.1, following the text of this Article) to be recorded. The final drainage report shall include but not be limited to:

(a) Cover sheet.

1. With submittal number, name and address of project, parcel or development for which the report is submitted;

2. Name, address and phone number of engineer and property owner; and

3. Seal, signature and date of State of Arizona professional civil engineer.

(b) A narrative with topographic maps that describe the location and condition of the property the project is located on (on-site conditions); and the upstream (off-site) watersheds as well as any downstream constraints which affect the property;

(c) Calculations demonstrating required retention volume, tributary areas to each basin and volume provided and basin grades, depth, high water elevation, pipe invert elevations, basin outfall elevation and side slopes;

(d) Retention basin percolation test results;

(e) Elevation and location of low outfall elevation for the development, sub-area or site improvement;

(f) Explanation of the effect of a basin overflow due to back-to-back storms or a storm greater than the design storm;

(g) Street capacity calculations for the 10-year and 100-year storm;

- (h) Time of concentration calculations;
- (i) Storm drain piping and catch basin hydraulic calculations, including the hydraulic grade line (“HGL”);
- (j) The routing of off-site flows through or around the proposed development;
- (k) The city datum benchmark to which all site and facility elevations are referenced;
- (l) Tailwater and backwater elevations at all culverts;
- (m) Lowest floor elevations of all habitable structures;
- (n) Method of disposing of retained stormwater within 36 hours, and provide shallow pit percolation test results and calculations;
- (o) Inflow and outflow points at retention/detention basins and culverts;
- (p) Points of concentration and intake point for catch basins, scuppers, channels and street intersections;
- (q) Calculations of the retention basin(s) drain time, the number of drywells per city criteria and percolation test results;
- (r) Drainage report based upon computerized hydraulic models with all values and variables identified in the report. Software manuals and documentation shall be made available upon request by the city;
- (s) Long-term maintenance responsibility shall specify the name, address, and phone number(s) of the person(s), firm(s) or agency responsible for ownership, operation, liability and maintenance of drainage improvements. Other documents where these responsibilities are documented (i.e., CCRs, final plats and the like);
- (t) Catch basin V-depth calculations; and
- (u) All hydrology and hydraulic calculations as required by the city that includes a summary of the following of each drainage area:
 - 1. Retention required and provided;
 - 2. Street capacity and depths; and
 - 3. Catch basin and storm drain pipe capacity, HGL and velocities.

§ 10-4-10 DETENTION OR RETENTION FACILITIES.

(A) Retention methods. Allowable methods of providing stormwater retention are:

(1) Surface storage. Where surface storage (i.e., the traditional retention basin) of the required retention is planned or provided, the basin(s) shall comply with the following:

(a) Irregular areas. Retention is to be accommodated within a limited number of well-defined irregular shaped areas. Pursuant to the Apache Junction City Code, Vol. I, multiple small retention basins are not acceptable for either public or private developments unless approved by the city engineer for public developments and by the development services project engineer for private developments and are in conformance with city standards.

1. To count separate retention areas as one, they must have the same high water elevation and be connected by equalizer pipes.

2. On-lot retention is prohibited in all residential subdivisions.

3. Maximum depth of the required retention that shall be retained within a surface retention basin is 3 feet (see division (D)(1) below).

4. The high water elevation shall be lower than the adjacent grades of adjoining property unless an engineered berm is approved by the city.

(b) Within city right-of-way or PUE.

1. Retention facilities (surface basins, underground pipes, tanks and the like) are to be located within the private property or “on-lot” of the proposed land development. Right-of-way areas shall not be excavated, depressed or encroached upon without prior approval of the City of Engineer. When allowed, the retention facility shall conform to division (D)(1).

2. Retention area(s) including the high water elevation limits for the design storm can encroach into public utility easements (“PUE”) subject to:

a. Adequate protection and cover is maintained for any existing public utilities.

b. Buoyancy calculations for the public utilities, whether existing or proposed, are required when the pipe diameter is larger than 16 inches.

c. Where wastewater manholes exist or are planned within the high water limits, the manholes shall have a watertight frame and cover per MAG Standard Detail 423, and the rim shall be higher than the high water elevation of the design storm.

(2) Paved surface storage. In commercial and industrial areas retention may be accomplished upon paved areas (e.g., impervious surfaces such as asphalt, concrete and the like). See division (E) of this section.

(3) Underground storage. Underground storage utilizes storage tanks, vaults, pipes and the like to place the required stormwater retention volume underground on the development site. Underground storage is permitted within residential and non-residential development.

(a) The design engineer shall consider the following during the design process for any project involving underground storage:

1. Venting of the structure;

2. Access to the underground structure for routine maintenance;

3. Structural loads including any surface loads;

4. Buoyancy of the structure; and
5. Drainage of the structure within the required 36 hours.

(b) The engineer shall include in the drainage report for the project the justifications, design criteria, operational and maintenance information for the underground structure and any associated equipment such as pumps.

(c) See division (L) below for underground storage guidelines.

(B) Sizing.

(1) Basis of design.

(a) All retention/detention facilities shall be sized to retain the storm event falling over the entire project (gross area including streets) (see division (B)(2)(a) and (b) below). For the purpose of determining the volume required, the project shall be considered to extend to the centerline of all existing and/or future streets on the exterior boundaries unless it is impractical to capture those flows (ex. street is separated from the project by a drainage channel), and to include all interior streets and other rights-of-way within the project.

(b) There shall be a minimum of 1 foot freeboard from the water surface elevation to the lowest building elevation and/or the gutter of the upstream streets.

(2) Volume required. The volume required for each retention/detention basin shall be calculated as follows:

(a) North of Baseline Avenue:

$$V R = 1.1 \times 0.2 (C_{\text{post}} - C_{\text{pre}}) \times A$$

where:

V R = Retention volume required (cubic feet)

1.1 = An additional 10% of retained volume to account for losses due to sedimentation, weed growth and the like

0.2 = 10-year, 24-hour depth of rainfall (2.4 inches/12)

C_{post} = a coefficient relating the runoff to rainfall for the proposed construction (per FCDMC Drainage Design Manual, Volume 1, Table 3.2).

C_{pre} = a coefficient relating the runoff to rainfall for the existing condition (per FCDMC Drainage Design Manual, Volume 1, Table 3.2).

A = drainage area, including ½ of all abutting streets (square feet)

(b) South of Baseline Avenue:

$$V R = DC \times A$$

where:

V R = Retention volume required (cubic feet)

D = 100-year, 2-hour depth of rainfall per current NOAA Atlas Documents

C = a coefficient relating the runoff to rainfall (per FCDMC Drainage Design Manual, Volume 1, Table 3.2).

A = drainage area, including ½ of all abutting streets (square feet)

Drywell volumes shall not be included in the proposed storage capacities.

(3) Location.

(a) Retention/detention basins shall be located such that they can intercept the flows from all developed portions of the site not used to convey offsite flows.

(b) If the basin is located other than at the lowest point of the project, the developer's engineer shall denote on the master drainage map the actual or effective drainage area. If portions of the project cannot drain to the primary basin, additional basins shall be added to retain runoff from these areas. Credit will not be given for providing volume in excess of that needed to retain the required storm event from a basin's effective drainage area.

(C) Volume certification. The developer will provide the city with certified as-built dimensions of the basins and the actual volume of storage provided. This must be based on as-built topographic surveys made by either a civil engineer or land surveyor who is registered to practice in the State of Arizona. These as-built volumes must reflect permanent finished landscaping in place. The volumes shall be certified by the design engineer that the volumes provided meet or exceed the required design volumes per city ordinance and the approved drainage plan. The volume of storage provided must equal or exceed the approved design volumes before the city engineer will issue letters of acceptance for maintenance of any public facilities.

(D) Grading.

(1) Depths.

(a) Retention basins are not permitted within the city ROW. Where unusual circumstances are encountered, retention basins may encroach in city ROW with prior written approval from the city engineer. When retention basins are allowed to encroach, the basins shall not extend more than 10 feet into the city ROW and shall not exceed 1.5 feet of water depth within the city ROW unless there is a fence or other similar protection to restrict access to the area.

(b) The overall average depth shall not exceed 3 feet without authorization of the city engineer. If granted, the basin must be fenced to prohibit access or a side slope of 8:1 shall be provided for a minimum distance of 25 feet measured from the 100-year high water level.

(c) While it is the city's intent that the "average" depth not exceed 3 feet, it is also the city's intent that the basins be contoured to present an aesthetically pleasing appearance as determined by the city engineer. Therefore, up to 25% of the bottom area may be up to 4 feet deep.

(d) In no case shall the depth exceed 1 foot without a positive means of disposing of accumulated runoff.

(2) Slopes, side and bottom.

(a) Bottom. The bottom of all basins shall be sloped towards the discharge points. The minimum bottom slope shall be 0.5%.

(b) Side slopes.

1. Side slopes adjacent to public rights-of-way, or when there is pedestrian type access to that portion of the basin, shall have a side slope of 6:1 or flatter.

2. Side slopes adjacent to walls, fences, hedges and the like (e.g., no or limited pedestrian type access in that area) may have side slopes up to 4:1.

3. Retaining walls (e.g., vertical slopes) may be used in areas adjacent to permanent walls, fences and the like.

(3) Grading/landscaping/joint use as parks.

(a) 1. It is the intent of the city that retention/detention basins present an aesthetically pleasing appearance. The developer's engineer shall contour the sides and bottoms of the basins to enhance appearance through varied slopes.

2. The developer and designer shall work with representatives of the city's development services department and parks and recreation department to determine the need/desirability and feasibility of joint usage of the basin as a park site. If appropriate, the design shall provide for appropriate open areas for the recreational facilities. All design shall be approved by the city parks and recreation department.

(b) It is not the intent of these standards to dictate the specific details of the configuration to the designers; however, the following concepts will be used as the basis of reviewing the plans:

1. Curvilinear sides should be used in lieu of long stretches of straight lines.
2. Side slopes should be varied (e.g., start with 6:1 then change to 7-8:1 or more). With appropriate use of landscaping, side slopes can even be reduced to 4:1.
3. bottom areas should contour to varying depths in lieu of uniform depth/slope.

(c) The tops and bottoms of side slopes shall be rounded off, generally over a distance of 5 feet each way of the curve point of intersection ("PI").

(d) All landscaping within city ROW, easements or dedicated tracts shall be approved by the city parks and recreation department.

(E) Retention/detention in parking lots.

(1) Retention/detention in parking lots of multi-family developments is not allowed. All retention/detention of such developments shall be in landscaped areas or underground vaults.

(2) Retention/detention of runoff in parking lots of industrial/commercial developments is allowed subject to the following guidelines:

(a) No more than 50% of the required storage volume may be retained/detained in parking areas. The balance shall be provided in landscaped areas and underground vaults. The tributary areas to each basin shall be noted on the master drainage map.

(b) No more than 50% of the required parking spaces shall be covered by stormwater retention/detention.

(c) Storage system shall be designed to store the first 30% of the required runoff volume off paved areas (to avoid nuisance water constantly ponding on the pavement).

(d) Depth of water shall not exceed 6 inches within the parking area, nor shall it exceed 0.15 feet at the midpoint of any parking space.

(e) Interference with pedestrian traffic will be minimized in the design of the storage facility.

(f) A continuous fire access lane shall be provided throughout the development, and it shall be free of ponded water from the retention areas.

(g) All parking spaces shall be accessible during periods when the basins are filled to capacity, without pedestrians having to cross ponded water deeper than 0.15 feet.

(3) Before final plan approval, an approved drainage report must show the calculated stormwater storage volume based on runoff from the 100-year, 2-hour storm, or the pre-approved 10-year, 24-hour storm for the Downtown Area and in-fill projects north of Baseline Avenue.

(F) Overflow/outfall.

(1) Each project shall be designed such that the “ultimate” outfall for all drainage in excess of the 100-year, 2-hour storm is routed to a public street, storm drain, drainage channel or natural watercourse. The outfall shall be accessible without draining over private property.

(2) If such an outfall does not exist, the project must provide an outfall.

(G) Overflow/conveyance.

(1) Off-project flows which historically flowed through the project may be routed through the project. Off-site runoff volumes shall not be allowed across private lots, streets or public/private access ways.

(2) Runoff volumes in excess of those required to be retained/detained may be routed directly through the outfall, although they shall be routed via the retention/detention facilities.

(H) Location/conflicts with existing utilities.

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

(2) Retention/detention facilities shall not encroach into public ROW nor into public easements. If necessary, the developer shall relocate conflicting utilities into a new dedicated easement.

(3) The top of the retention/detention facilities (e.g., freeboard elevation) shall be at least 4 horizontal feet from any building or public roadway.

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

(5) A minimum 3 feet of cover (from the bottom of the basin to the top of the pipe) shall be maintained over water and sewer service lines.

(I) Disposal/discharge.

(1) All retention/detention facilities shall have a positive method of disposing of retained/detained runoff waters. All water so retained/detained shall be disposed of within 36 hours. Public streets are not considered an acceptable outlet for disposal of retained/detained runoff, however are considered an acceptable outlet for overflow. Only under special circumstances with prior city engineer approval should pump disposal methods be used.

(2) The minimum allowable pipe size for primary outlet structures is 12 inches. A headwall (MAG Standard Detail 501-4) and an access barrier shall be constructed at the outlet.

(3) Acceptable methods of disposal of accumulated stormwater runoff are:

(a) Positive gravity outlet.

1. Surface infiltration. A percolation test is required in each retention basin location to determine natural percolation. Test results shall be submitted to the city engineer for approval of the retention basin(s).

2. Drywells.

a. Drywells are permitted when no other means of disposal are available. Infiltration into the drywell cannot be considered to reduce the size of the retention area.

b. The property owner of record shall be responsible for the design, performance, operation or maintenance of drywells used with on-site retention.

c. Drywells must penetrate at least 10 feet into a permeable stratum and a percolation test must be carried out on the drywell before acceptance. The percolation test results are to be filed with the development services project engineer.

d. Drywells shall comply with the ADEQ publication Guidance for Design, Installation, Operation, Maintenance, and Inspection of Drywells and the additional requirements described herein. A copy of the application for registration by ADEQ of the proposed drywell(s) shall be submitted prior to approval of grading plans.

e. Multiple drywell installations shall be located a minimum of 100 feet apart, unless waived by the city engineer, and a minimum of 20 feet away from a basin inlet.

f. All drywells draining runoff from more than 1 acre of pavement are to be a dual chamber type similar to the MaxWell dual chamber drywell (Torrent Resources) or approved alternate.

g. For any project involving hazardous materials, including fuels, the drywell must include the "Envibro" Drainage System (Torrent Resources) or approved alternate.

h. Drywells shall be located a minimum of 100 feet away from water wells and underground storage tanks (except stormwater underground storage tanks).

i. Top of the drywell grate shall be set 2 inches above the bottom elevation of the retention basin.

j. Number and type of drywells are to be called out on the engineering plans.

k. Each drywell will be percolation tested after installation and a 50% value of its disposal rate shall be used, up to but not exceeding 0.5 cfs. The percolation test results are to be submitted to the development services project engineer with the final as-built drawings of the stormwater collection and retention plan.

l. Drywells which encounter perched water shall be sealed in the perched water zone of the well.

m. All drywells shall be registered with the ADEQ and constructed by an ADEQ licensed contractor. The approved drywell registration shall be submitted to the city by the developer at the time as-builts are submitted. A tabulation showing drywell number, registration number, and percolation rate will be added to the grading plan coversheet before submitting as-builts.

n. The property owner of record shall be responsible for the design, performance, operation and maintenance of drywells used with on-site retention.

o. Drywells that cease to drain a project area in a 36-hour period shall be replaced by the maintenance authority with new ones.

p. Drywells are not to be located within public street ROW or private street roadway tracts unless authorized by the city engineer.

3. Storm drain discharge. Discharge to an existing storm drain with a maximum discharge of 1 cubic foot per second. A waiver is required.

4. Drainage channel discharge. Discharge to a drainage channel either natural or man-made of sufficient capacity to convey the anticipated flows from the tributary drainage area. A waiver is required.

5. Prohibited discharge. Water cannot be discharged into a city street, gutter or alley.

(b) Pump station (waiver required).

1. Permitted direction:

a. To an open channel, either natural or man-made;

b. Subsurface direction to a nearby storm sewer system with a maximum discharge of 1 cubic foot per second; or

c. Surface to a storm sewer system if pumped water can be discharged directly into a catch basin or other inlet.

2. Water cannot be discharged into a city street, gutter or alley.

3. Pump stations shall comply with the requirements of Chapter 9 of Volume II of the FCDMC Drainage Design Manual, except as noted below.

a. Pumping facilities shall be set at an elevation at or above the anticipated level of the 100-year event, considering that a total power failure may occur.

b. Pumps shall be capable of handling solids up to a maximum of 3 inches.

(J) Nuisance water. Each basin, particularly those used as a park, shall be graded such that there are one or more “sump” areas wherein runoff from the more frequent storms and nuisance runoff may be retained/detained without flooding the balance of the basin, with preference to surface percolation.

(K) Embankments.

(1) Detention or retention facilities should be constructed below the natural ground surface.

(2) The use of embankments to impound stormwater runoff requires prior approval by the development services project engineer. Embankments become small dams that can be a serious potential downstream flood hazard.

(3) If approval is obtained, all the design requirements shall comply with Section 8.2.3, Embankment Design Criteria, of Chapter 8 of Volume II of the FCDMC Drainage Design Manual.

(4) The developer must provide the city with as-built certification by a State of Arizona registered geotechnical or civil engineer experienced in dam technology, that the embankment was designed and constructed properly, is stable and will safely impound the design volumes of water.

(L) Underground retention storage requirements.

(1) Underground retention shall be permitted in residential and non-residential uses.

(2) Each request for underground storage will be evaluated on an individual basis and permitted if approved by the development services project engineer.

(3) The following guidelines are not meant to be exclusive and, based on the type of underground storage approved, may require additional data and details be submitted to the city engineer.

(a) Installation of corrugated metal pipe ("CMP") shall be in accordance with MAG Standard Specification No. 621, MAG Standard Detail 510 and a note on strutting spacing, if required, demonstrating that they are within manufacturer's specification and recommendation for installation. Excavation, bedding and backfill shall be in accordance with MAG Standard Specification No. 601 and material per MAG Standard Specification No. 760;

(b) Provide the depth of groundwater and the depth of the proposed installation. Provide soil boring results to at least 10 feet below the bottom of the proposed drywell;

(c) Demonstration of a 50-year life of the installation (lining and coating must be specified). Aluminized CMP is usually good for more than 50 years depending on the soil chemistry;

(d) Traffic/load bearing capacity of the installation. Pipe gauge and corrugation size of CMP and D-load for RCP must be specified;

(e) The storage pipe must drain into a dual chamber drywell. Include a detail of how the installation will be drained into the drywell. The standard drywell detail does not address anything other than normal installation. The sedimentation chamber and drain must be lower than the tank drain so the tank drains completely. The system must drain within 36 hours;

(f) Provide a backfill detail. Include material and compaction requirements, particularly under the haunches and to the springline of the pipe;

(g) Provide a minimum 30-inch diameter manhole shaft at each end of underground pipes up to 150 feet in length. Underground pipes longer than 150 feet require an additional minimum 30-inch manhole shaft every 150 feet or fraction thereof. All manhole shafts shall be equally spaced no more than 150 feet measured from center to center.

1. A 30-inch manhole frame and cover can be used at grade with a concrete collar where subject to wheel loads. Provide assurance that the pipe will structurally accommodate the manholes where there is traffic loading on the manhole.

2. The manhole shaft is to be 30 inches in unobstructed diameter. No projections or obstructions are permitted into the manhole shaft. If the manhole shaft is to be provided with a ladder, the distance from any part of the ladder measured on the side of the ladder to the opposite wall of the manhole shaft shall not be less than 30 inches. This may result in the necessity of a larger diameter manhole to accommodate a ladder. A detail of how the ladders are to be anchored must be specified and the material to be used for the ladders in order to assure a 50-year life.

(h) Provide assurance that the material used for the piping is suitable for the site's soil (letter from the Soils Engineer);

(i) Specify water-tight manufactured joints;

(j) Provide end walls for pipe per manufacturer's recommendation with a detail or MAG Standard Detail 427;

(k) Cover to be 3 feet minimum in traffic areas (or manufacturer's recommendation); and

(I) RGRCP is suggested for strength and durability. Structural strength calculations based on subgrade capacity are required in areas subject to wheel loads.

(4) The above requirements are to be shown or specified on the plan or otherwise satisfactorily addressed. The requested assurances are to be provided for the city's project file.

(M) Operation and maintenance.

(1) Maintenance of on-site detention or detention facilities within the city shall be the responsibility of the property owner.

(2) All retention basins that will be maintained by the city shall be improved by the developer per city standards for retention basin development and installed prior to the city's acceptance of the retention. Retention basins, when not privately maintained, shall be dedicated to the city in fee title as stormwater retention basins or drainage ROW. In the case where private retention basins receive water, other than that which falls upon the property and adjacent streets and/or alleys, the areas shall be designated as easement areas for retention purposes and shall have a recorded restrictive covenant requiring perpetual maintenance.

(N) Retention basins within SRP transmission line ROW.

(1) Retention basins are to be designed to the latest SRP's requirements.

(2) Developer shall submit drawings to the city and SRP for approval. SRP will consider both existing and planned future power facilities in their review. SRP approval letter shall be forwarded to the city engineer before final city approvals.

§ 10-4-11 DRAINAGE EASEMENTS AND COVENANTS.

For a drainage easement, the following apply:

(A) A drainage easement is an area designed and used for conveyance and/or retention of stormwater runoff in which nothing can be placed which will impede, divert or cause the runoff to have an adverse affect on adjoining property.

(B) The city engineer requires that all drainage easements and covenants be recorded on a subdivision plat or for those projects that do not require a land subdivision map or plat, the easements and covenants will be recorded by a separate instrument or document.

(C) Public easements and covenants shall be prepared and recorded by the city engineer. Private easements and covenants shall be prepared and recorded by the developer or representative after review and approval of the associated documents.

(D) It is the developer's responsibility to execute or cause the execution of the legal documents. The developer shall return the executed documents to the city engineer along with any recording fees as well as provide recorded copies of all private easements in order to receive construction document approval and/or permits.

(1) Public drainage easements. A public drainage easement is required if the stormwater conveyance or storage occurs per the following:

(a) The conveyance is through city property.

(b) The storage is on city property.

(c) Where stormwater is conveyed from public right-of-way onto private property.

(d) Public easements can only be extinguished through city council action.

(e) The developer's engineer shall provide the following documents with the construction documents for the preparation of a public drainage easement:

1. A sealed legal description of the easement area (Exhibit "A") (see Figure 10-7.1 in Article 10-7); and

2. A graphic exhibit of the easement area (Exhibit "B") (see Figure 10-7.2 in Article 10-7).

(2) Private drainage easements. Where the stormwater runoff will be retained on private property in which any of the following is true, a private drainage easement is required.

(a) Where the stormwater is conveyed across property lines; or

(b) Where stormwater is stored in a common retention area.

(3) Temporary drainage easements. Where the stormwater is retained in an area subject to future development, the easement can be described as a "temporary drainage easement."

These easements shall allow for the recordation of a document that extinguishes the Temporary Drainage Easement upon the submittal of a permanent location.

(4) Drainage covenants. A drainage covenant is a restrictive promise specifying the use of the property relating to storm runoff, drainage and retention. A drainage covenant shall be recorded for private property when it conveys or retains stormwater runoff from public streets or property.