

RULE NO.: R161-19.21

ADOPTION DATE: November 25, 2019

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NOTICE OF RULE ADOPTION

By: Jorge L. Morales, P.E., CFM, Director
Watershed Protection Department

The Director of the Watershed Protection Department has adopted the following rule. Notice of the proposed rule was posted on October 8, 2019. Public comment on the proposed rule was solicited in the October 8, 2019 notice. This notice is issued under Chapter 1-2 of the City Code. The adoption of a rule may be appealed to the City Manager in accordance with Section 1-2-10 of the City Code as explained below.

A copy of the complete text of the adopted rule is available for public inspection and copying at the following locations. Copies may be purchased at the locations at a cost of ten cents per page:

Watershed Protection Department, located at 505 Barton Springs Road, Suite 1200, Austin, TX, 78704; and

Office of the City Clerk, City Hall, located at 301 West 2nd Street, Austin, Texas.

EFFECTIVE DATE OF ADOPTED RULE

A rule adopted by this notice is effective on November 25, 2019.

TEXT OF ADOPTED RULE

R161-19.21: Repeals and replaces Drainage Criteria Manual Section 1.2.4, *Drainage System*. This section is being rewritten to remove redundancy, re-organize by subject, and update to current practices.

Introduction

- Clarifies the definition of a Stormwater Control Measure (SCM) for this section.
- Clarifies which additional sections of the DCM, ECM, standard specification, and standard manual apply.
- Clarifies the definition of residential and commercial development.
- Clarifies publicly maintained versus privately maintained requirements.
- privately maintained residential SCMs (e.g. HOA maintained) will now be required to meet the requirements of this section.
- Clarifies that these requirements do not apply to rain water harvesting, porous pavement, and subsurface ponds (unless otherwise specified)
- Adds table to clarify which phase of permitting an applicant should expect to address these requirements.
- Adds figure 1.2.4.E.1, Conceptual Layout, to clarify pictorially the requirements.
- Adds statement that the access, staging area, gates (d and e only), and signage requirements do not apply to SCMs with a total storage volume of less than 5,000 cubic feet and a total ponding depth of three feet or less.

1. Access

- Modifies the perimeter access road requirement to allow a variation. Variation would require the Director of Watershed Protection Department approval. This would not be considered a waiver.
- Clarifies that the requirement for ramps into each basin now include commercial developments.

2. Staging Area

- Updates criteria to include that staging area must be located within 100 feet of the basin.

3. Drainage Easements

- Adds references to LDC sections to clarify when easements will be required.

4. Setbacks

- Modifies the setback requirement to a minimum setback of 25 feet from any property line adjacent to residential development.
- Adds exclusion for rain gardens that use no concrete as per LDC 25-2-1063.

5. Fencing

- Clarifies that fencing is allowed on top of vertical walls that have a combined height of wall and fence meeting the six-foot requirement above the exterior finished grade.
- Removes language requiring fencing for any privately maintained SCMs within 500 feet of a residential structure. Fencing is required, per the requirements of this section, for all SCMs regardless of proximity to residential structures.
- Adds a handrail option for SCM with a total ponding depth of less than or equal to three feet. Standard details for pedestrian handrail 707S-1 and 707S-2 are allowed.

6. Gates

- Clarifies that no pipe gate is required if an access gate for a fully fenced SCM is located within 25 feet of the ROW.

7. Outfalls

- Clarifies that the angle of intersection between an outfall flow path and channel flow path shall not be greater than 45 degrees.

8. Slopes – No change from existing language.

9. Pilot Channels

- Modifies the language to clarify that pilot channels are not allowed in a water quality SCM.

10. Signage – No change from existing language.

11. Mechanical SCMs

- Adds language referring to ECM section 1.6.2.E for subsurface pond design standards.

12. Landscaping – No change from existing language.

COMMENTS AND CHANGES FROM PROPOSED RULE

No comments were received, and no changes were made.

AUTHORITY FOR ADOPTION OF RULE

The authority and procedure for the adoption of a rule to assist in the implementation, administration, or enforcement of a provision of the City Code is established in Chapter 1-2 of the City Code. The authority to regulate design and construction of drainage facilities and improvements is established in Section 25-7-151 of the City Code.

APPEAL OF ADOPTED RULE TO CITY MANAGER

A person may appeal the adoption of a rule to the City Manager. **AN APPEAL MUST BE FILED WITH THE CITY CLERK NOT LATER THAN THE 30TH DAY AFTER THE DATE THIS NOTICE OF RULE ADOPTION IS POSTED. THE POSTING DATE IS NOTED ON THE FIRST PAGE OF THIS NOTICE.** If the 30th day is a Saturday, Sunday, or official city holiday, an appeal may be filed on the next day which is not a Saturday, Sunday, or official city holiday.

An adopted rule may be appealed by filing a written statement with the City Clerk. A person who appeals a rule must (1) provide the person's name, mailing address, and telephone number; (2) identify the rule being appealed; and (3) include a statement of specific reasons why the rule should be modified or withdrawn.

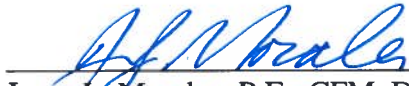
Notice that an appeal was filed and will be posted by the city clerk. A copy of the appeal will be provided to the City Council. An adopted rule will not be enforced pending the City Manager's decision. The City Manager may affirm, modify, or withdraw an adopted rule. If the City Manager does not act on an appeal on or before the 60th day after the date the notice of rule adoption is posted, the rule is withdrawn. Notice of the City Manager's decision on an appeal will be posted by the city clerk and provided to the City Council.

On or before the 16th day after the city clerk posts notice of the City Manager's decision, the City Manager may reconsider the decision on an appeal. Not later than the 31st day after giving written notice of an intent to reconsider, the City manager shall make a decision.

CERTIFICATION BY CITY ATTORNEY


By signing this Notice of Rule Adoption (R161-19.21), the City Attorney certifies that the City Attorney has reviewed the rule and finds that adoption of the rule is a valid exercise of the Director's administrative authority.

REVIEWED AND APPROVED



Jorge L. Morales, P.E., CFM, Director
Watershed Protection Department

Date: 11/13/19



Anne Morgan
City Attorney

Date: 11/14/19

DCM

1.2.4 - Drainage System

- A. All drainage system components that are within public right of way or public drainage easements shall be manufactured and installed in compliance with the City of Austin Standard Specifications and Standards and shall comply with all applicable portions of the City of Austin's Transportation Criteria Manual published by the Department of Transportation, unless:
 - 1. These components receive stormwater runoff solely from private property,
 - 2. That property consists solely of the property being developed, and
 - 3. Those components are privately maintained.
- B. Construction plans for proposed reinforced concrete box culverts, bridges and related structures may be adaptations of the Texas Department of Transportation (TxDOT) Standards.
- C. For bridges and culverts crossing local streets, runoff from the fully developed 100-year frequency storm shall not produce a headwater elevation at the roadway greater than either twelve (12) inches above the roadway crown elevation or any top of upstream curb elevation, whichever is lower.
- D. For bridges and culverts crossing streets other than a local street, runoff from the fully developed 100-year frequency storm shall not produce a headwater elevation at the roadway greater than six (6) inches above the roadway crown elevation or six (6) inches above any top of upstream curb elevation, whichever is lower.
- E. All drainage facilities (including but not limited to headwalls, open channels, storm drains, area inlets, and detention, retention and water quality controls and their appurtenances) shall comply with the following requirements, unless otherwise noted in this section or the Environmental Criteria Manual (ECM). See Figure 1-1 in DCM Appendix D for approximate representation. For the purposes of this section (1.2.4.E), the term residential structure means a building used for living accommodations.
 - 1. (a) Where a portion of the stormwater facility either has an interior slope or wall steeper than three (3) feet horizontal to one (1) foot vertical with a height exceeding one (1) foot, or, an exterior slope or wall steeper than three (3) feet horizontal to one (1) foot vertical with a height exceeding three (3) feet above adjacent ground, barrier type fences at least six (6) feet high, and/or steel grating are required for all single-family or duplex residential development, City maintained stormwater facilities, and/or for any privately maintained stormwater facilities located within 500 feet of a residential structure. Barrier type fences include, but are not limited to chain link, solid wood, masonry, stone or wrought iron.
 - (b) Metal components of the fence shall be corrosion resistant and wood components of the fence shall be weather resistant. Placement of the fence, shall be 20 feet past the toe of the embankment or to the edge of the property line. Any fence posts used shall be galvanized steel with a concrete footing of at least twelve (12) inches in diameter and at least eighteen (18) inches in depth (refer to City of Austin Standard Specification No. 701). All fences shall have at least one gate, which shall open fully inward and outward and shall be at least twelve (12) feet in width. The first gate shall provide access from either the easement or right of way. Access to the outfall structures is required for inspection and maintenance. If the fencing prohibits access to the outfall structure, then a second gate shall be provided allowing access to the outfall structure. Corrosion resistant aluminum or hot-dipped galvanized steel grates of load bearing strength are an acceptable means of vertical access control. Grates shall be securely bolted to the structure but shall allow for easy removal and replacement during maintenance operations.

2. The landscaping requirements of Section 2.9.1, part B. and C. only, of the ECM apply for all detention, retention and water quality facilities for single family or duplex residential development and/or for such facilities that will be maintained by the City. Landscaping and other vegetation shall not encroach into or impede use of any access drive or access strip, based upon the nominal size of the landscaping or vegetation at maturity.
3. (a) A 12 foot maintenance access strip is required around the perimeter of detention, retention, and water quality facilities for single family or duplex residential development and/or for such facilities that will be maintained by the City. This 12 foot maintenance access strip shall be outside the toe of any fill slope and the top of any cut slope and shall not have a post construction longitudinal slope greater than 15% nor a post construction transverse slope greater than 5%, shall not have a vertical grade break of greater than 12%, shall have an inside turning radius of no less than thirty six (36) feet, shall be cleared and graded, and shall have vertical clearance from existing and proposed vegetation and all other objects of no less than 14 feet.
- (b) A setback shall be provided for all detention, retention, and water quality facilities for single family or duplex residential development and/or for such facilities that will be maintained by the City so that no such facility shall be located within 50 feet of a residential structure. All detention, retention and water quality facilities that will be for single family or duplex residential development and/or for such facilities maintained by the City shall have a permanent maintenance equipment access ramp into each basin of the facilities, with a longitudinal slope not to exceed 4:1, a transverse slope not to exceed 5%, no vertical grade break greater than 12%, no vertical curve with a grade change greater than 1% per horizontal foot, an inside turning radius of no less than 36 feet, a minimum width of 12 feet and a clear distance from the bottom of the ramp to any facility interior slope of at least 15 feet.
- (c) Access/drainage easements and access drives are required for those detention, retention and water quality facilities for single family or duplex residential development and/or for such facilities that will be maintained by the City. Access drives shall have a longitudinal slope not to exceed 15%, a transverse slope not to exceed 5%, no vertical grade break greater than 12%, no vertical curve with grade change greater than 1% per horizontal foot, a centerline turning radius of no less than 50 feet, and a minimum width of 12 feet. The access drive shall include a means for equipment to turn around when located more than 200 feet from a paved public roadway. Access drives shall be cleared, graded and stabilized with stones in accordance with Standard Detail 662S-2, Pond Maintenance Road Typical Cross Section.
4. (a) For drainage facilities within a drainage easement, but not for single family or duplex residential development or such facilities maintained by the City, the set back rule discussed in section 3(b) above is not applicable for the proposed internal building(s), if they have a restrictive covenant for maintenance and 4 foot high barrier type fences with accessible maintenance ramp.
- (b) Any new commercial or multi family pond(s) shall have a minimum 50 foot setback from any adjacent existing residential structure.
5. The setback requirement shall be measured from the edge of any portion of the facility such as the top of facility embankment, end of concrete apron/rock rip rap or top of structural wall and shall be dedicated by deed restriction or restrictive covenant, and a note referencing the restriction will be placed on the plat, if a plat is being processed as part of the development. Replatting to add the note is not required.
6. Discharge from stormdrain outfalls shall not cause channel, bluff, or stream bank erosion. If the storm drain discharges to an open drainage facility (as determined by the City), the applicant must show acceptable nonerosive conveyance to that drainage facility, and appropriately designed outfall including adequate energy dissipation, which may include stream stabilization.

7. Free standing structural walls/facilities located on or adjacent to a residential structure shall not be greater than six (6) feet in height.
8. Drainage or drainage access easements that are required along side lot lines shall be located adjacent to a property line and shall not be centered on a property line.
9. Access drives are required for those area inlets and headwalls for single family or duplex residential development and/or for such facilities that will be maintained by the City when access is proposed between single family lots or when access from any other location exceeds 20% grade. Access drives shall meet the criteria of section 3(c) above.
10. Points of access to water quality and detention facilities for single family or duplex residential development and/or for such facilities that will be maintained by the City shall have a standard City of Austin Type II concrete driveway approach and curb cut on the abutting street. A pipe gate is required at the end of the driveway at the ROW limits in accordance with Standard Detail 662S-1, Pond Pipe Gate At Ramp Detail.
11. Detention, retention and water quality facilities for facilities that will be maintained by the City shall have a staging area not less than 800 square feet in area (with no dimension less than 20 feet) if the storage volume of the pond exceeds 2,000 cubic feet. No portion of the staging area shall be located further than 100 feet from the detention, retention or water quality facility and the access drive and the staging area shall be within an access easement. No portion of the staging area shall be located within or on any ponding area, interior slope of the facility, or access drive or strip. The staging area shall be cleared, shall have vertical clearance from existing and proposed vegetation and all other objects of no less than 14 feet and shall have no finished slope greater than 10%.
12. Environmental Criteria Manual Section 1.6.3 shall apply to all Stormwater Control Measures (SCMs), detention, and retention facilities and their appurtenances.
13. All pond bottoms, side slopes and earthen embankments shall be compacted to 95% of maximum density in accordance with City of Austin Standard Specifications, excluding rain gardens and any water quality features that require infiltration to meet water quality standards. Side slopes for earthen embankments shall not exceed three (3) horizontal to one (1) vertical. Rock slopes may exceed these limits if a geotechnical report warrants a deviation. Actual field conditions may override the geotechnical report. Concrete walls shall be built to City of Austin Standards Specifications. Expansion joints on free standing walls shall have water tight seals as needed. Ponds for single family or duplex residential development and/or for City maintained ponds with other than full concrete bottoms must have bottom slopes of no less than 2%. Ponds with full concrete bottoms must have bottom slopes of no less than 0.5%; all grass lined portions of the pond bottom must have a slope of no less than 2% from that portion to the concrete lined pilot channel. The pilot channel must be at least four (4) feet wide and have a V-shaped cross sectional flow area two (2) inches deep. Pilot channels are discouraged in water quality ponds due to the creation of short-circuiting and standing water problems. Where it is deemed necessary due to topographic constraints a pilot channel installed in a water quality pond must be designed to prevent short-circuiting, standing water problems, and shall have a flow spreader installed, refer to Section 1.6.2.D of the ECM. The bottom slope for ponds is defined as the effective slope from any point in the bottom of the pond to the discharge elevation at the point of discharge from the pond, as measured by a straight line between those two points.
14. Section 8.3.3 of this manual shall apply for all stormwater management facilities, including water quality facilities and stormwater management infrastructure.
15. All mechanical stormwater management facilities to be maintained by the City shall meet City of Austin Water and Wastewater criteria. OSHA requirements for ingress and egress are also required for any facility that will be located in a confined space above or under ground.

16. Signs are required on each side of a single family residential, duplex residential, and/or City-maintained stormwater control measure in accordance with Standard Detail 662S-3, Storm Water Facility Sign.
 17. Maximum retention or "draw-down" time for detention ponds shall not exceed 24 hours from the time of peak storage to the time of complete emptying of the pond, as determined by hydrograph routing or other calculations acceptable to the City. This requirement does not apply to facilities in which retention or "draw-down" time is required to be greater than 24 hours. All volume required for detention shall be available after 24 hours to allow for subsequent storms, including any portion of the water quality volume utilized for detention purposes.
 18. In order to minimize vandalism and deterioration, use of exposed piping and appurtenances and any loose materials (other than access drive rock) shall be avoided or minimized. Use of all such items shall be approved by the City.
- F. Any concentrated flow necessitates the dedication of a drainage easement to the larger of following: the limits of the fully developed 100-year storm water surface elevation, or minimum easements widths as required in this Drainage Criteria Manual.
- G. An easement or right-of-way as required in this Drainage Criteria Manual must be of sufficient width to provide continuous access for the operation, maintenance, or repair of a drainage facility or conveyance of stormwater.
- (1) A minimum of 25 feet in width for an open drainage system; or
 - (2) A minimum of 15 feet in width for an enclosed drainage system.

Introduction

Drainage facilities, referred to as stormwater control measures (SCMs) throughout this section, include but are not limited to headwalls, open channels, storm drains, area inlets, easements, detention ponds, retention ponds, water quality controls, and their appurtenances. In addition to this section all SCMs shall comply with the following requirements in: DCM Section 8.3, Stormwater Management Ponds, ECM Section 1.6.3, Maintenance and Construction Requirements, and applicable City of Austin Standard Specifications and Standards manuals.

The following table lists which requirements apply to residential development (single family/duplex) and which requirements apply to commercial development. Throughout this section residential development is defined as single family and duplex development and commercial development is defined as all development other than open space and residential development (pursuant to the definition in LDC Section 25-8-1). The requirements below shall apply to all City maintained SCMs and all SCMs for residential development regardless of whether they are publicly or privately maintained.

The requirements of this section do not apply to rainwater harvesting, porous pavement, and subsurface ponds, unless otherwise stated in ECM 1.6.2.E, Subsurface Ponds.

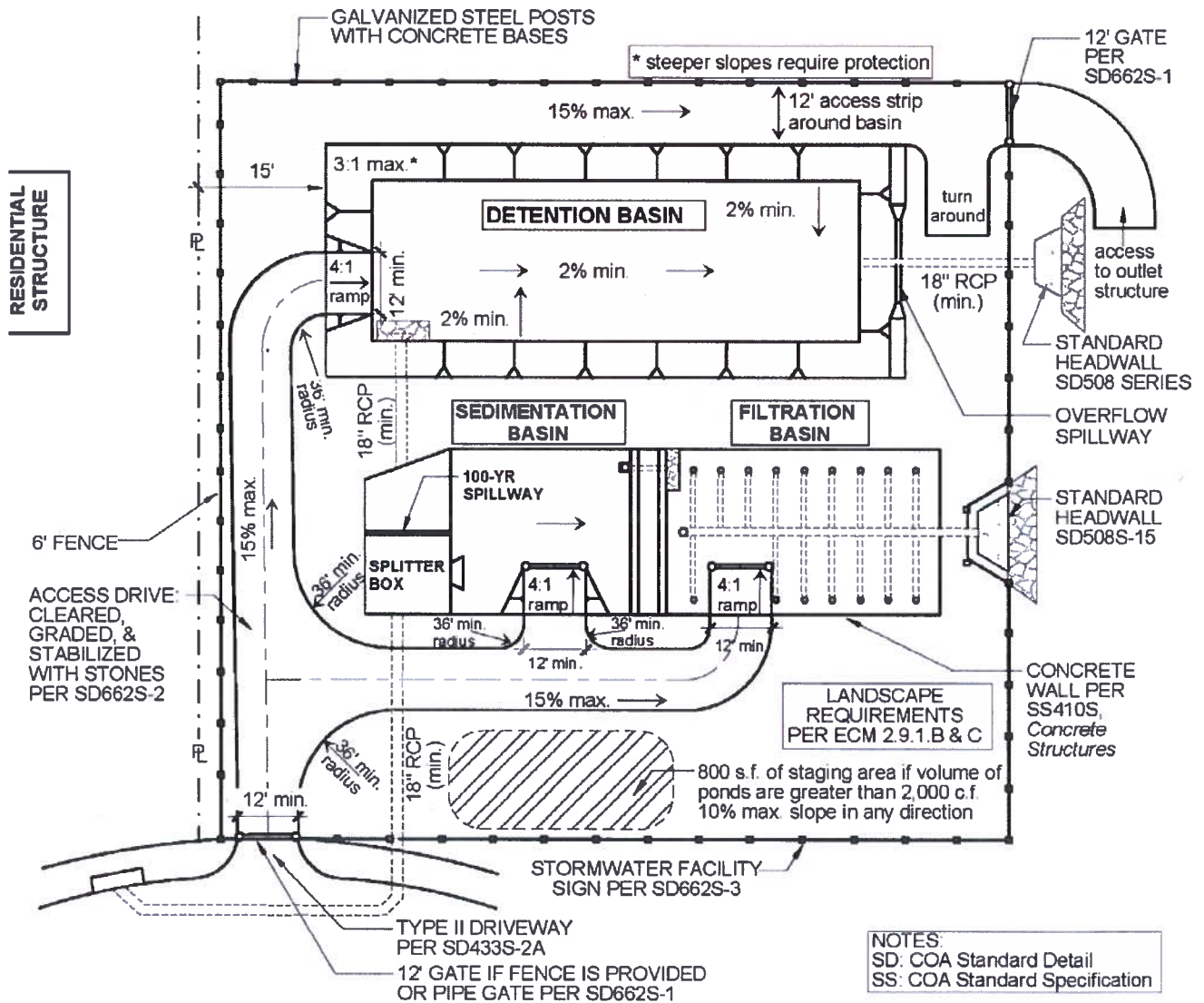
The requirements of subsections 1-Access, 2-Staging Area, 6-Gates (a only), and 10-Signage do not apply if the total required storage volume (includes both detention and water quality as applicable) of the SCM(s), associated with a permit application, is less than or equal to 5,000 cubic feet and the maximum ponding depth is less than or equal to three (3) feet.

The requirements below are organized by the typical phase of permitting (preliminary plan, final plat, subdivision construction plan, and site plan) when these items will need to be addressed.

<u>Preliminary Plan and Final Plat:</u>	<u>COA Maintained and Residential Development</u>	<u>Commercial Development</u>
<u>1. Access Requirements for the following items:</u>		
<u>From ROW</u>	<u>X</u>	
<u>12 ft. perimeter</u>	<u>X</u>	
<u>To inlets and outlets</u>	<u>X</u>	
<u>Ramps into basins</u>	<u>X</u>	<u>X *</u>
<u>2. Staging area</u>	<u>X</u>	
<u>3. Drainage Easements</u>	<u>X</u>	<u>X *</u>
<u>4. Setbacks</u>	<u>X</u>	<u>X *</u>
<u>Subdivision Construction and Site Plan:</u>		
<u>5. Fencing</u>	<u>X</u>	<u>X</u>
<u>6. Gates</u>	<u>X</u>	<u>X</u>
<u>7. Outfalls</u>	<u>X</u>	<u>X</u>
<u>8. Slopes</u>	<u>X</u>	<u>X</u>
<u>9. Pilot Channels</u>	<u>X</u>	<u>X</u>
<u>10. Signage</u>	<u>X</u>	<u>X</u>
<u>11. Mechanical SCMs</u>	<u>X</u>	
<u>12. Landscaping</u>	<u>X</u>	<u>X</u>

* Item may be addressed at site plan or subdivision construction plan stage

Figure 1.2.4.E.1 Conceptual Layout (not to scale) – The layout of this figure is only conceptual, and code should be used as guidance for design.



1. **Access** - This section provides the minimum requirements for reasonable access into SCMs for maintenance and inspection activities for both residential and commercial developments.

- a. Maintenance access drives and ramps shall be cleared, graded and stabilized with rock and comply with Standard Detail 662S-2 (Pond Maintenance Road Typical Cross Section).
- b. For residential development, access from the right of way (ROW) to the SCM shall comply with Standard Detail 433S-2 (Type II Driveway) approach and curb cut on the abutting street.
- c. Residential development shall provide a maintenance access drive around the perimeter of the SCM. The Director of the Watershed Protection Department may approve a maintenance access drive that does not follow the entire perimeter of the SCM if the applicant demonstrates that access is provided to all key components, including but not limited to basins, inlets, and outlets.
- d. Maintenance access drives shall also be provided for facilities that will be maintained by the City when access is proposed between single family lots or when access from any other location exceeds a grade of twenty percent (20%).
- e. Maintenance access drives shall meet the following requirements:
 - i. A minimum horizontal width of twelve (12) feet.
 - ii. A minimum vertical clearance of fourteen (14) feet from existing and proposed vegetation and all other objects.
 - iii. Be located outside the toe of any fill slope and the top of any cut slope, and
 - iv. An inside turning radius of no less than thirty-six (36) feet.
 - v. A means for equipment to turn around when located more than 200 feet from the public ROW.

- vi. A maximum longitudinal slope of fifteen (15) percent.
 - vii. A maximum transverse slope of five (5) percent.
 - viii. A maximum vertical grade break of twelve percent (12%), and
 - ix. A maximum vertical curve grade change of one percent (1%) per horizontal foot.
- f. Residential developments shall provide maintenance access ramps into each basin of the SCM. Commercial developments shall provide a maintenance access ramp into at least one basin of the SCM. Maintenance access ramps shall meet the following requirements:
- i. Have a longitudinal slope no steeper than 4:1, and
 - ii. Have a clear distance of fifteen (15) feet from the bottom of the ramp to any interior slope.

2. Staging Area – A staging area is required in order to allow for storage of materials and equipment during inspection and maintenance operations.

The staging area must meet the following requirements:

- a. Be at least 800 square feet in area with no dimension less than twenty (20) feet.
- b. Be located within 100 feet of the SCM basin.
- c. Be adjacent to the access drive and within an access or drainage easement.
- d. No portion can be located within any ponding area, interior slope of the facility, or access drive.
- e. Have a vertical clearance from existing and proposed vegetation and all other objects of no less than fourteen (14) feet, and

- f. Have no finished slope greater than ten (10) percent.

3. Drainage Easements

- a. Drainage or drainage access easements are required per LDC 25-7-151 and 25-7-152.
- b. Drainage or drainage access easements that are required along property lines shall be located adjacent to a property line and shall not be centered on a property line.

4. Setbacks

- a. For any new development, the SCM basin shall have a minimum fifteen (15) foot setback from any property line adjacent to a residential development. This requirement does not apply to rain gardens that use no concrete per LDC 25-2-1062.
- b. The setback shall be measured from the outside edge of the SCM basin. If the basin is an earthen embankment the outside edge is measured from the toe of the slope on the outside (dry side) of the basin.

5. Fencing - This section applies to all residential and commercial development.

- a. A six (6) foot high fence is required when:
 - i. A portion of the SCM basin has an interior slope or wall steeper than three (3) feet horizontal to one (1) foot vertical with a height exceeding one (1) foot, or,
 - ii. An exterior slope or wall steeper than three (3) feet horizontal to one (1) foot vertical with a height exceeding three (3) feet above adjacent ground.

b. Fence Location

- i. Fencing is allowed on top of vertical walls to achieve the six (6) foot minimum requirement. The total combined height of the wall and fence must be a minimum of six (6) feet above the exterior finished grade, or
- ii. If the fence is not placed on top of the vertical walls, the fence shall be located no less than twenty (20) feet past the toe of the embankment or to the edge of the property line.

c. Materials – Allowable fence materials include, but are not limited to, chain link, solid wood, masonry, stone or wrought iron.

- i. Metal components of the fence shall be corrosion resistant and wood components of the fence shall be weather resistant.
- ii. Any fence posts used shall be galvanized steel with a concrete footing of at least twelve (12) inches in diameter and at least eighteen (18) inches in depth (see Standard Specification No. 701).

d. Handrail option – SCMs with a total ponding depth less than or equal to three (3) feet and that require fencing per (a) above may provide a pedestrian handrail in lieu of the six (6) foot high fence. The design must meet the requirements in Standard Details 707S-1 or 707S-2 (Pedestrian Handrail).

6. Gates

- a. For residential development, a pipe gate is required at the end of the driveway at the ROW. The design must meet the requirements in Standard Detail 662S-1 (Pond Pipe Gate at Ramp Detail).

- i. No pipe gate is required if an access gate for a fully fenced pond or SCM is located within twenty-five (25) feet of the ROW.
 - b. All fences shall have at least one gate, which shall open fully inward and outward and shall be at least twelve (12) feet in width.
 - c. The first gate shall provide access to the SCM from either the easement or ROW. Access to the outfall structures is required for inspection and maintenance.
 - d. If the fencing prohibits access to the outfall structure, then a second gate shall be provided allowing access to the outfall structure.
- 7. Outfalls - Discharge from storm drain outfalls shall not cause channel, bluff, or stream bank erosion. If the storm drains discharge to an open channel system; creeks, channels, or ditches that convey stormwater (as determined by the City), the applicant shall show:
 - a. Acceptable nonerosive conveyance from the SCM per section 5.8.0.
 - b. That the angle of intersection between the outfall flow path and the channel flow path is not greater than 45-degrees.
 - c. That storm drains that discharge into open channels conform to the design guidelines in Standards 508S-13 or 508S-16 through 508S-20, as appropriate for site specific conditions and,
 - d. Appropriately designed outfalls including adequate energy dissipation, which may include stream stabilization.

8. Slopes

- a. All side slopes, earthen embankments, and pond bottoms, shall be compacted to ninety-five (95) percent of maximum density in accordance with established embankment construction requirements (Standard Specification 132S).
 - i. The bottom of the SCM is not required to meet the compaction requirements above if the design proposes a SCM that is fully reliant on infiltration to meet water quality standards.
- b. Side slopes for earthen embankments shall not exceed three (3) horizontal to one (1) vertical.
- c. Rock slopes may exceed these limits if a geotechnical report warrants a deviation. Actual field conditions may override the geotechnical report.
- d. Detention ponds with earthen berms shall have a minimum bottom slope of two (2) percent.
- e. Detention ponds with full concrete bottoms shall have a minimum slope of one-half (0.5) percent.

9. Pilot Channels

- a. The pilot channel shall be at least four (4) feet wide and two (2) inches deep. Refer to DCM Section 6.4.1.C.
- b. Pilot channels are not permitted in water quality SCMs due to short-circuiting and standing water problems.

10. Signage - Signs are required on each side of a residential or City-maintained stormwater control measure. The design must meet the requirements shown in Storm Water Facility Sign (Standard Detail 662S-3).

11. Mechanical SCMs – Mechanical SCMs include, but are not limited to, detention, rainwater harvesting, and retention irrigation SCMs that utilize pump systems to redistribute stormwater to meet a required discharge rate.

- a. All mechanical SCMs to be maintained by the City shall meet City of Austin Water and Wastewater criteria as stated in the Utilities Criteria Manual, Section 2.
- b. OSHA confined space requirements must be met for any facility determined to be a confined space or that is subsurface. For subsurface SCMs, refer to ECM Section 1.6.2.E, Subsurface Ponds, for specific design standards.

12. Landscaping

- a. The landscaping requirements of ECM Section 2.9.1 apply to SCMs for residential development or for such facilities that will be maintained by the City. This requirement may only be provided via screening types B or C.
- b. Landscaping and other vegetation shall not encroach into or impede use of any access drive or access strip, based upon the size of the landscaping or vegetation at maturity.