CHAPTER 3 STORMWATER

General Requirements, Design Standards, Water Quality Design, Special Flood Hazard Areas, Pipe Types (RCP, HDPE, HPPP, CAMP), Special Structures, Pipe Inspections/Reports/Acceptance, SCM Estimates and Sureties, SCM Maintenance Agreements

A. GENERAL REQUIREMENTS

1. All work and materials shall conform to the latest edition of the NCDOT Standard Specifications for Roads and Structures, NCDOT Standard Drawings, the NCDEQ Minimum Design Criteria, the Kannapolis Development Ordinance (KDO) and the Kannapolis Land Development Standards.
2. Site grading shall not increase the volume or velocity of runoff onto downstream properties for the one-year and ten-year storm events, unless specifically approved as part of a project's drainage plan. Exceptions to this will be at the discretion of the Director of Engineering.
3. Prior to beginning construction in the City of Kannapolis, a preconstruction meeting with the City Inspector shall be held, and submittals (shop drawings) shall be approved. The submittals should include all materials (roadway, storm, and utilities) to be used during construction.
4. An operation and maintenance agreement and operation and maintenance plan shall be provided to the City for review prior to final platting.
5. **Stormwater Permit**
   As provided in Article 5 of the KDO, The table below provides the minimum requirements for meeting the City's stormwater detention and water quality standards.

Site Condition	Stormwater Detention	Water Quality
< 1.0 ac & < 20,000 sf impervious area	See Note 1 below	No
< 1.0 ac & > 20,000 sf impervious area	Yes	No
> 1.0 ac & < 20,000 sf impervious area	Yes	Yes (low/high density)
> 1.0 ac & > 20,000 sf impervious area	Yes	Yes (low/high density)

Note 1:
If an existing site with less than 20,000 sf of impervious area is redeveloped, the applicant must provide detention for new impervious areas that create more than 20,000 sf of combined existing and proposed impervious area. If an existing site exceeds 20,000 sf of impervious area, stormwater detention for all proposed impervious areas is required.

Example 1: A site has 5,000 sf of existing impervious area. The proposed development will add 10,000 sf of impervious area, totaling 15,000 sf. No stormwater detention is required.

Example 2: A site has 10,000 sf of existing impervious area. The proposed development will add 15,000 sf of impervious area, totaling 25,000 sf. Stormwater detention is required for the proposed 15,000 sf.

6. **Access and Maintenance Easements**
   All storm drainage structures and piping shall be located within the public right of way or within a storm drainage easement identified on the final plat.
   a. Minimum of 20' wide, pipe centered in easement preferably in common open space.
   b. Width requirements based on pipe depth (see Appendix A) and must provide for 1:1 excavation, bottom width = outside pipe diameter + 2'.
   c. Width requirements for channels should accommodate a minimum 10' wide path for maintenance vehicles.
   d. SCM Access & Maintenance easements may be a minimum of 10' wide and must connect to a public right of way.
   e. Shall be dedicated to the City of Kannapolis.
   f. Maximum slopes for maintenance vehicles: longitudinal = 15%, cross slopes of 5%.
   g. See LDSM details for overlapping easements.

7. **Stormwater SCM Embankments in the 100-yr floodplain**
   SCM embankments located in the 100-yr floodplain must have a licensed engineer certify the fill elevation, compaction, slope, and slope protection materials. See Appendix A for certification form.
8. In areas where downstream impoundments will create a tailwater that backs water up into the pipe system, culverts shall be constructed with O-ring seals in the joints, which may require testing of the system. Locations of the system testing will be determined by the Director of Engineering.
9. **Storm Drainage Pressure Testing**
   When pipe testing is required, the storm structures shall also be tested as required. Vacuum testing may be used as outlined in ASTM C1244. Exfiltration tests may also be performed as follows:
   a. Plug the inlet and outlet and fill the manhole with water to within 6.0' of the top of the manhole.
   b. Allow the water to stabilize for 1/2 hour and refill the manhole to the original elevation.
   c. Mark the initial depth of water, and after 1 hour record the drop in the water level in the manhole.
   d. The maximum allowable drop in vertical water height in the manhole shall be ¼" for all diameter sizes of manholes. If the water level in the manhole drops below the allowable drop amount, the Contractor shall repair the leak and retest.
   e. Storm drainage piping shall be placed in a straight alignment at uniform grade. No changes in alignment shall be allowed except at catch basins, manholes, or other junctions that provide appropriate clean out access. The maximum length between access points is 400'.
   f. Density tests shall be required on trench backfill at a frequency established in the NCDOT Specifications. Test reports shall be conveyed to the City on a weekly basis.
10. Precast waffle boxes may not be used in areas with traffic bearing loads. Pipe shall enter precast waffle boxes in the area provided for knock outs, the corner or supporting wall section of a waffle box shall not be cut.
11. All graded creek banks and slopes shall be at a maximum 2:1 and not to exceed 10' without terracing, otherwise the slopes shall be designed by a Professional Geotechnical Engineer and approved by the Director of Engineering on a case-by-case basis.
12. Acceptance of the storm requires: 2 videos (the 1st video is prior to the first proof roll, the 2nd video is after the installation of dry utilities, but prior to acceptance of the streets); as-built drawings; and certification by the design engineer using the Certification Form in Appendix A.
13. For pressurized systems, use O-ring culverts.

B. DESIGN STANDARDS

1. **Stormwater Drainage Network Standards**:
   a. The City of Kannapolis has adopted the Charlotte-Mecklenburg Stormwater Design Manual for the design and evaluation of storm water management facilities. Storm drainage design shall conform to the standards and specifications provided therein except for flood analysis, approximate flood limits, and detention facilities used for credits.
   b. Site grading and construction shall not increase the flow rate or velocity of runoff onto downstream properties.
2. Inlets and Catch Basins
   a. The interior surfaces of all storm drainage structures shall be pointed up and smoothed to an acceptable standard using mortar mixed to manufacturer's specifications.
   b. All pipes in storm drain structures shall be flush with the inside wall. The floor of all storm drain structures shall be filled with concrete to an elevation flush with the downstream invert.
   c. All storm drain structures over 3'-6" in height must have steps in accordance with standard details set forth in NCDOT Standard Specifications for Roads and Structures.

d. Catch basins, junction boxes, and storm drainage manholes shall be sized for the number and angle of pipes entering the structure. The following structures & non-standard structures require a PE's certification:

STRUCTURE	HEIGHT*
Brick catch basins	> 12'
Precast catch basins	> 16'
Open throat catch basins	> 16'
Drop inlets	> 12'
Junction Box	> 12'
Precast waffle wall structures	> 10'
Traffic bearing precast structures	> 15'
Precast manholes	> 30'
Brick manholes	Not Allowed

Refer to the NCDOT Roadway Standard Drawings for the location of the measurement points to determine maximum height.

e. Catch basins with frame, grates and hoods installed in curb and gutter sections less than 2'-6" wide shall offset the frame, grate, and hood to the back of the structure to maintain a consistent width of roadway.
f. Frames, grates, and hoods shall not be offset from the catch basin more than 4", front to back.
g. Inlets shall be located using a rainfall intensity of 4"/hour, maximum 400' spacing.
h. Spread in a travel lane should not exceed 8' in a standard curb and gutter section.
i. Double catch basins shall be provided at all sag points.
j. No curb overtopping may occur in sags.
k. Catch basins shall be placed at lot lines to avoid conflicts with driveways.

3. Pipes and Culverts
   a. Construction plans shall include profiles and hydraulic grade lines of all pipe systems greater than 15".
   b. Minimum pipe size is 15".
   c. Storm system pipes shall be designed for non-pressure conditions using the 10-yr, 24-hr storm event.
   d. Storm system pipes under roadways shall be designed for a 25-yr, 24-hr storm event. Storm system pipes under thoroughfares shall be designed for a 50-yr 24-hr storm event. Minimum pipe size crossing under roadways is 18".
   e. Storm drainage pipe cover is a minimum 2.0'. For maximum cover, reference NCDOT Highway Design Branch Roadway Design Manual.
   f. Provide hydraulic gradeline (HGL) calculations for the design storm. Minor losses are to be included in the evaluation and the HGL must be a minimum of 6" below the surface inlet elevation. Stormwater report must clearly show minor losses have been calculated. SCM water surface elevation shall be used as the tailwater condition for all storm sewer HGL determinations.
   g. Drainage area maps for each catch basin shall be provided.
   h. Minimum pipe slope is 0.5% or that which produces a velocity of 2.5 fps when flowing full.
   i. Maximum pipe velocities shall not exceed 20 fps.
   j. Maximum discharge velocities at pipe outlets shall not exceed 10 fps.
   k. Influent and effluent pipe crowns shall match at junctions where the influent pipe diameter is smaller than the effluent pipe. At junctions where pipes are the same size, a minimum 0.2' drop shall be provided.
   l. Pipe diameters shall not be reduced downstream.

m. Storm drainage outfalls that run through lots shall extend to the rear lot line before daylighting.
n. Maximum headwater HW/D ≤ 1.2.
o. Minimum freeboard:
    a. 12” for pipes ≤ 3’
    b. 18” for pipes > 3’
    c. 6” at yard inlets
p. All connections to existing system(s) shall be engineered and shown on plans. Where tying into an existing system, the downstream receiving system shall be analyzed to the greatest extent practical for a determination of the ability to convey additional point discharges.
q. Outlet pipes shall be designed to provide non-erosive velocities leaving the storm sewer. Energy dissipation calculations shall be provided for all outfalls.

4. Open channels and Swales
    a. Channels shall be designed to convey the 10-year Design storm and such that the channel can convey the peak flow from the design storm without erosion, as demonstrated by engineering calculations.
    b. Channels shall have a maximum side slope of 3:1
    c. Channels shall have a minimum running grade of 2%
    d. Minimum freeboard: 6”
    e. Final design of open channels should be consistent with the velocity and shear strength limitations of the selected lining. Engineer shall provide all liner specifications and design information.
    f. Channels with bottom widths greater than 10’ must have a minimum cross slope of 12:1.
    g. Rear yard drainage swales shall have a minimum distance of 10 feet from building foundations.
5. Low Density Design Standards
    a. Low density development shall be in compliance with 15 A NCAC 02H.1003.
    b. Low density projects shall be designed to maximize dispersed flow through vegetated areas and minimize channelization of flow.
    c. Stormwater that cannot be released as dispersed flow shall be transported by vegetated conveyances. A minimal amount of non-vegetated conveyances for erosion protection or piping for driveways or culverts under a road shall be allowed when it cannot be avoided. Maximum slope for low density development is 3:1.
    d. The developer shall record deed restrictions and protective covenants prior to the issuance of a certificate of occupancy to ensure the development will be maintained in perpetuity consistent with the plans and specifications approved by the City.
6. **Stormwater Control Measure Standards**:
    a. All proposed site plans that require an NCDEQ Sediment & Erosion Control Plan, or that will exceed 20,000 sf in impervious area, shall be required to construct stormwater detention facilities to mitigate increased runoff. Calculations shall include:
        i. Pre & post development drainage basin maps & hydrographs.
        ii. If applicable, bypass runoff must be accounted for in calculations.
        iii. Rainfall runoff intensities and depths for Cabarrus/Rowan county.
        iv. Documentation for curve number, C values, time of concentration, and the equations used to generate the stage/storage/discharge tables.
        v. Buoyancy calculations for the riser and uplift anchors.
        vi. Detention facilities shall be designed to maintain the pre-developed runoff rate for 1-yr & 10-yr, 24-hr storm events.
        vii. Emergency spillways shall accommodate the 50-yr, 24-hr storm event.
        viii. Provide 6” of freeboard for emergency spillway.
    b. Utilities are not permitted within impoundment areas.
    c. Any orifice smaller than 4.0” in diameter must be protected to prevent blockage.
7. **Analysis of Existing Ponds**
    a. Existing ponds upstream of proposed development:
        i. Provide jurisdictional determination of dam classification
        ii. Provide approximate flood limits and elevations resulting from a dam breach using the 100-yr storm event

iii. Set finished floor elevations at BFE +2’

b. Existing ponds downstream of proposed development:
   i. Provide jurisdictional determination of dam classification
   ii. If the proposed upstream development increases runoff which impacts an existing pond, provide analysis of the pond using the 1-yr, 10-yr, and 50-yr storm event. Improvements to the pond may be required.

C. WATER QUALITY DESIGN

1. The City of Kannapolis utilizes the State of North Carolina Department of Environmental Quality Design Manual for standards of design to obtain compliance to these requirements within the city limits or ETJ.
2. Alternate SCM designs may be used, but the products to be used must be part of the NCDEQ Preliminary Evaluation Period Program and include specifications for monitoring and replacement with an approved SCM if the product does not perform as designed.
3. Both point and non-point source pollutants shall be managed to comply with the Phase II NPDES Storm Water Permit requirements for post-construction pollution control. Reference the KDO for post-construction requirements.
4. All SCM embankments constructed must have a licensed engineer certify the fill elevation, compaction, slope, and slope protection materials.

D. SPECIAL FLOOD HAZARD AREAS

1. The Planning Department regulates floodplain development. Please review Article 3.8.D of the KDO for floodplain development and permitting requirements.
2. The lowest finish-floor elevations for residential structures must be a minimum of 2.0’ above the downstream road crossing elevation or 2.0’ above the calculated 100-yr flood elevation. Areas with the potential to flood during the 100-yr event shall have no basement finished floor elevation lower than the downstream catch basin rim elevation, plus 2.0’. Slab on grade residential structures must be a minimum of 1.0’ above the highest point of the downstream catch basin or yard inlet.
3. Flood studies documenting the impact of drainage structures to be constructed within a 100-yr floodplain are required. The culvert design capacity for these structures is the 100-yr storm event.
4. Flood Studies documenting the impact of fill placed in the 100-yr floodplain is required. See the KDO sections related to Flood Protection for additional guidance.
5. Flood Studies submittals should include digital files of the HEC-RAS models used to evaluate the impacts and a copy of the work maps used to prepare the study.
6. Plans should clearly label the existing and proposed conditions, the existing FEMA data, and the proposed ineffective areas, floodway modifications, revised flood fringe areas, and the revised 100-yr flood fringe.
7. Guidance for the Preparation of Flood Studies can be found in the following documents:
   a. NC Department of Floodplain Mapping – Riverine Hydrologic & Hydraulic Engineering Guidelines and Standards.
   b. FEMA – Procedures For “No-Impact” Certification for Proposed Developments in Regulatory Floodways.
   c. FEMA – MT-2 Application Forms and Instructions for Conditional Letters of Map Revision and Letters of Map Revision.
   d. FEMA – MT-1 Application Forms & Instructions Conditional Letters of Map Amendment (CLOMAs), Final Letters of Map Amendment (LOMAs), Letters of Map Revision Based on Fill (LOMR-Fs) and Conditional Letters of Map Revisions Based on Fill (CLOMR-Fs).
   e. NCDOT – Guidelines for Drainage Studies and Hydraulic Design.

8. **100+1 Flood Analysis**
   a. For areas located outside of the 100-yr floodplain, the 100+1 analysis may be required for all portions of a drainage system expected to carry ≥ 50 cubic feet per second for the 100-year storm event if the estimated runoff or proposed modifications to a storm water conveyance system would create a hazard for the adjacent properties or residents, as determined by the Director of Engineering.

b. The 100-yr storm water surface elevations should be calculated using a method acceptable to the City as described in section 3.6 of the Charlotte Mecklenburg Storm Water Design Manual (Approximate Flood Limits).
c. The peak flow rate used in the 100+1 analysis shall be based on an assumption of full build out of the tributary drainage area.

E. REINFORCED CONCRETE PIPE (RCP)

1. All concrete shall meet the minimum specifications set forth in Section 1032 of the NCDOT Standard Specifications for Roads and Structures.
2. Concrete pipe used within the street right-of-way shall be a minimum of Class III Reinforced Concrete Pipe, with a minimum diameter of 15" (18" minimum on cross drain culverts within the ETJ and open-ended culverts under a road). Installation of Class IV or higher concrete pipe shall be identified on the as-built plan and the City inspector shall be given documentation and notification of this information prior to construction.
3. Use flexible plastic joint material except when material of another type is specified in the contract documents. Joint material of another type may be used when permitted.
4. RCP < 42" in diameter, NCDOT Section 300 shall be used for installation.
5. RCP ≥ 42" in diameter:
    a. Wrap filtration geotextile fabric around all pipe joints. Extend geotextile at least 12" beyond each side of the joint. Secure geotextile against the outside of the pipe by methods approved by the Engineer.
    b. #57 stone shall be used as bedding. Bedding shall consist of a minimum of 7" in depth under the pipe, continuing up to the spring line of the pipe.
6. ASTM C969 and ASTM C1103 are acceptable methods of testing concrete pipe when testing is required by the Director of Engineering.

F. HIGH DENSITY POLYETHYLENE PIPE (HDPE)

1. HDPE pipe may be used outside the right-of-way.
2. The Product used shall be corrugated exterior/smooth interior pipe (Type S), conforming to the requirements of AASHTO Specification M294 (latest edition) for Corrugated Polyethylene Pipe and meet the minimum specifications set forth in Section 1032 of the NCDOT Standard Specifications for Roads and Structures.
3. Bell and spigot joints shall be required on all pipes inside the right-of-way. Bells shall cover at least 2 full corrugations on each section of pipe. The bell and spigot joint shall have an O-ring rubber gasket meeting ASTM F477 with the gasket factory installed, placed on the spigot end of the pipe. Pipe joints shall meet all requirements of AASHTO M294.
4. All HDPE pipe installed must be inspected and approved by the City's Inspector prior to any backfill being placed. The City inspector must be present during the backfilling operation as well.
5. Bedding for HDPE pipe shall be Select Material Class III or Class II, Type 1, loosely placed to a depth as outlined in NCDOT Standard Drawing 300.01, Flexible Pipe.
6. The minimum length of HDPE pipe permitted for use shall be 4'. HDPE flared end sections or fittings are not allowed.
7. All HDPE pipe installed shall be third party certified and shall bear the Plastic Pipe Institute's (PPI) certificate sticker.
8. All HDPE pipe shall be checked for deflection using a mandrel no sooner than 30 days after installation of the final backfill and prior to the final acceptance of the pipe. The mandrel size shall not be more than 5% of the inside diameter of the pipe, see Appendix A for dimensions of mandrel.
9. ASTM F1417 or ASTM 2487 shall be used when testing is required by the Director of Engineering.

G. POLYPROPYLENE PROFILE WALL PIPE (HPPP)

1. The Director of Engineering may approve the use of HPPP for use both within and outside the right-of-way.

2. HPPP 12” – 60” dual pipe shall have a smooth interior and annular exterior corrugations; 30” – 60” triple wall pipe shall have smooth interior and exterior surfaces with the exterior having minor annular corrugations.
3. HPPP of the sizes shown or specified shall conform to:
    a. ASTM F2736 Standard Specification for 6” - 30” Polypropylene (PP) Corrugated Single Wall Pipe and Double Wall Pipe
    b. ASTM F2764 Standard Specification for 30” - 60” Polypropylene (PP) Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications
4. Submittals shall include:
    a. Manufacturer’s product information including details of installation, joints and pipe/manhole connections; properties and strengths of pipes; and instructions on storage, handling, transporting and installation.
    b. Pipe design load calculations (suggested if deep burial is an issue).
    c. Factory test reports.
5. Pipe shall be joined with a gasketed integral bell and spigot joint meeting the requirements of ASTM F2736.
6. Pipe diameters 12” - 60” shall be watertight according to the requirements of ASTM D3212, with the addition of a 15-psi requirement. Spigot shall have 2 gaskets meeting the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable, protective wrap to ensure the gaskets are free from debris. A joint lubricant available from the manufacturer shall be used on the gasket and bell during assembly.
7. 12” - 60” diameters shall have a reinforced bell with a polymer composite band installed by the manufacturer.
8. Damaged pipe will be rejected and shall be replaced at the Contractor’s expense. Pipe and specials stored prior to use shall be stored in such a manner as to keep the interior free from dirt and foreign matter.
9. Fittings shall not be allowed. Any change in direction and/or additional pipes shall have a catch basin, manhole or junction box installed at the necessary location.
10. HPPP shall be installed within 6 months of delivery to project site unless written approval is granted from the manufacturer and approved by the Engineer. Approval of an extension in storage time must be requested in writing and accompanied by inspection within 2 weeks prior to installation by an authorized representative of the manufacturer.
11. Long-term above ground storage of HPPP and fittings shall conform to the following procedure:
    a. Pipe shall be stored on flat timber supports to facilitate placement and removal of lifting slings around pipe. All pipes shall be chocked to prevent rolling in high winds.
    b. If stacked, minimum 3” wide timber supports shall be used and placed at the quarter points with chocks. Pipe shall not be stacked higher than 10’ above the ground.
    c. Pipe and Fitting laydown should be relatively flat and free of other potentially damaging debris. Laydown area should have proper drainage. At no time, shall any portion of pipe or fittings be stored in standing water for more than 24 hrs.
12. Pipe shall be handled using textile slings or other means recommended by manufacturer. Chains and cables in direct contact with pipe are not recommended.
13. Installation
    a. Shall be in accordance with NCDOT Specifications, Section 300, and ASTM D2321 and manufacturer recommended installation guidelines.
    b. Minimum cover in traffic areas for ≤ 48” shall be 1.0’
    c. Minimum cover in traffic areas for ≥ 60” shall be 2.0’.
    d. Backfill material for minimum cover situations shall consist of:
        i. Class 1
        ii. Class 2: 95-85% SPD
        iii. Class 3: 95-90%
        iv. Class 4: 95%
14. Jointing:
    a. Clean ends of pipe and coupling components.
    b. Apply joint lubricant to pipe ends and elastomeric seals of coupling. Use only lubricants approved by the pipe manufacturer.

c. Use suitable equipment and end protection to push or pull the pipes together.
d. Do not exceed forces recommended by the manufacturer for coupling pipe.
e. Join pipes in straight alignment. Do not allow any deflection angle or pipe misalignment to exceed the maximum permitted by the manufacturer.

15. Backfill
    a. Use non-cohesive materials include gravels, gravel-sand mixtures, sands, and gravelly sands.
    b. Accomplish immediately after the pipe is laid.
    c. The fill around the pipe shall be placed in layers not to exceed 8”.
    d. Compacted to 95% of the maximum density with the AASHTO T 99 Modified Proctor Test.
    e. A density of 100% AASHTO T 99 Modified Proctor is required for the top 8”.
16. Testing Polypropylene Profile Wall Pipe
    a. Water tightness test (if required by the Director of Engineering) may be accomplished in accordance with ASTM F1417 or ASTM F2487.
    b. Deflection shall be checked using a mandrel no sooner than 30 days after installation of the final backfill. The mandrel size shall not be more than 5% of the inside diameter of the pipe, see Appendix A for dimensions of mandrel.
17. Provide properly trained manufacturer’s service technician employed by the manufacturer to ensure proper installation of Polypropylene Profile Wall Pipe.

H. SPECIAL STRUCTURES

1. Bridges, arch culverts, retaining walls, box culverts bottomless culverts, large headwalls, etc. shall be reviewed on a case-by-case basis depending on the intended use and environmental impacts associated with the project. The Director of Engineering shall set forth guidelines for the design of Special Structures.
2. All Special Structures shall be designed by a licensed professional with credentials to support the intended design and work.
3. All Special Structures shall follow the specifications, certifications and approval processes associated with Federal, State, and Local agencies, along with the requirements of this manual.

I. PIPE INSPECTIONS, REPORTS, AND ACCEPTANCE

1. All storm drainage pipe installed in the right of way and/or easements require pipe video inspections submitted to the City of Kannapolis Engineering Department for review. Pipe video inspection shall be performed prior to roadway proof roll and prior to final street acceptance by the City
2. Remote inspection video equipment shall be able to accurately measure and verify crack widths as small as 0.05”.
3. The pipe inspection report shall include the location, length, and width measurements of all cracks. Cracks shall be recorded to the nearest 0.50” for length and 0.05” for width.
4. The pipe inspection report shall include all pipe joint separations ≥ 0.50”.
5. For longitudinal cracks having widths ≥ 0.10” and ≥ 3.0’ in length, replace the pipe.
6. For circumferential cracks allowing entry of backfill, replace the pipe.
7. For multi-directional crack patterns where the damage extends over ≥ 25% of inside circumference at a single location and crack widths ≥ 0.05”, replace the pipe.
8. If infiltration or exfiltration is observed and the joint gap is < 0.75”, provide minor repair in method to be approved and field verified by the design engineer.
9. If the pipe joint gap is > 0.75”, replace the pipe.
10. For pipe with spalling that has exposed reinforcement, replace the pipe.
11. For flexible pipes with deflections > 7.5%, replace the pipe.
12. A new pipe video inspection shall be performed following repair or replacement of storm drainage pipes.

J. SCM BONDS

Single family residential developments require SCM construction sureties which include a signed and sealed cost estimate from the design engineer. The surety serves as a means for the City to construct the SCM in its entirety in the event of the developer's default. The surety must be approved by the Engineering Director and issued to the City prior to recordation of the final plat. The following line items shall be included in the estimate for review and approval:

1. Contractor mobilization costs.
2. Complete SCM construction cost based on current average construction costs that would be incurred for the entire SCM, not a contractor's bid value for the project. Assume that any existing sediment basins must be reworked prior to the conversion of the basin into a permanent SCM. The value should include the cost of installing erosion control measures for the basin construction (e.g. construction entrance, silt fence, sediment basin pump out, and any other site-specific erosion and sediment control items required to construct the SCM).
3. Surveying costs for the as-built record drawing certifications.
4. Engineering costs for the as-built record drawing certifications.
5. Easement plat surveying for the plat dedication.
6. Easement acquisition costs including land value for the easement, attorney fees, and condemnation costs.
7. A contingency of 25% of total construction costs.

K. SCM MAINTENANCE AGREEMENTS

Prior to the conveyance or transfer of any lot or building site to be served by a structural SCM in accordance with section 5.10 of the KDO, and prior to issuance of any permit for construction, development, or redevelopment requiring a structural SCM, the applicant or owner of the site must execute an operation and maintenance agreement that shall run with the land and be binding on all subsequent owners of the site, portions of the site, and lots or parcels served by the structural SCM. Until the transference of all property, sites, or lots served by the structural SCM, the original owner or applicant shall have primary responsibility for carrying out the provisions of the maintenance agreement. See Section 5.10.F.2 of the KDO for general requirements pertaining to the agreement.