

**CITY OF CHARLOTTE ENGINEERING LAND DEVELOPMENT REVIEW**

*This is an internal document generated to facilitate consistent plan reviews. Additional requirements may be necessary based on site-specific conditions.*

**City of Charlotte Land Development Review  
Site Checklist <sup>2016</sup>**

Project Name: \_\_\_\_\_ Date Reviewed: \_\_\_\_\_  
Reviewer: \_\_\_\_\_ Telephone: \_\_\_\_\_  
Contact: \_\_\_\_\_ Telephone: \_\_\_\_\_

**GENERAL SUBMITTAL REQUIREMENTS**

- \_\_\_\_\_ Existing and proposed paved areas, buildings, structures & utilities
- \_\_\_\_\_ Off-site construction or grading requires a letter from the affected property owner granting permission
- \_\_\_\_\_ **Existing Storm Water Services Easements? If yes, coordinate with City SWS Design Management Team Leader.**
- \_\_\_\_\_ Construction or grading in utility easements or rights-of way requires a letter from the utility owner granting permission
- \_\_\_\_\_ Is site adjacent to imminent NCDOT, CDOT or City of Charlotte Engineering Services project? If yes, written approval is required from respective authority
- \_\_\_\_\_ Zoning: \_\_\_\_\_ Petition number \_\_\_\_\_ CD Notes \_\_\_\_\_
- \_\_\_\_\_ Parcel Tax Number \_\_\_\_\_
- \_\_\_\_\_ Jurisdiction (City or ETJ) \_\_\_\_\_ Vicinity map \_\_\_\_\_
- \_\_\_\_\_ Legible Scale \_\_\_\_\_ North arrow \_\_\_\_\_
- \_\_\_\_\_ Property Boundary and Adjoining \_\_\_\_\_ Adjacent existing streets & drainage \_\_\_\_\_
- \_\_\_\_\_ Property Boundaries & Owners \_\_\_\_\_ Title block w/ site name & location \_\_\_\_\_
- \_\_\_\_\_ Labeled Contours (4' max. interval, exist & prop) \_\_\_\_\_ Sealed Retaining Wall Design \_\_\_\_\_
- \_\_\_\_\_ SWIM Buffer Present (see SWIM checklist) \_\_\_\_\_ Wetlands Permits \_\_\_\_\_
- \_\_\_\_\_ If project falls inside CATS corridor buffer, coordinate with John Mrzygod (704-336-2245)

**DRAINAGE AREA MAPS**

- \_\_\_\_\_ All drainage area maps indicate project limits and are at a legible scale
- \_\_\_\_\_ Drainage area maps clearly and legibly depicts onsite and off-site areas (colored coded maps encouraged)
- \_\_\_\_\_ Maps are complete with properly labeled existing/proposed contours and indicate roof drainage direction
- \_\_\_\_\_ Off-Site topo for drainage basins must extend to a point where ridgelines can be clearly identified.
- \_\_\_\_\_ T<sub>c</sub> Travel Paths (pre/post) delineated on drainage area maps and labeled
- \_\_\_\_\_ Erosion Control Basin map labeled and shows drainage areas for each phase of construction
- \_\_\_\_\_ Storm drainage maps are labeled by inlet number and indicate acreage of drainage areas
- \_\_\_\_\_ Subdivision Drainage Areas are depicted in the plan set
- \_\_\_\_\_ Detention Basin maps show pre and post drainage areas and show SCS soil types on map

**GRADING & EROSION CONTROL** (See the North Carolina Erosion and Sediment Control Planning and Design Manual and the Charlotte Land Development Standards Manual [CLDSM], City of Charlotte Soil Erosion and Sediment Control Ordinance and Policies and Procedures guidelines)

- \_\_\_\_\_ Completed and notarized Financial Responsibility Form (if the financially responsible party is out of State, a North Carolina agent must be assigned)
- \_\_\_\_\_ Urban Forestry Staff approval is required.
- \_\_\_\_\_ Landscape Management Staff approval is required for tree removal in the R/W
- \_\_\_\_\_ Construction sequence (suggested sequence attached)
- \_\_\_\_\_ Denuded acres (outline denuded limits and list acreage)
- \_\_\_\_\_ Undisturbed buffer areas - dimensions and locations (grading in a buffer requires zoning approval)
- \_\_\_\_\_ Swales, berms & temporary diversion ditches [CLDSM #30.05]
- \_\_\_\_\_ Location of on-site and/or off-site waste burial areas; location of borrow sites
- \_\_\_\_\_ Stabilized gravel construction entrance [CLDSM #30.11A]
- \_\_\_\_\_ Temporary Silt fence [Used for sheet flow only], [CLDSM #30.06A]
- \_\_\_\_\_ High Hazard Temporary Silt fence [Used for sheet flow only], [CLDSM #30.06B]
- \_\_\_\_\_ Hardware cloth, Rip Rap w/ washed stone for outlet protection
- \_\_\_\_\_ Riser basin: Required within watershed areas or drainage areas >50 acres [CLDSM #30.01, 30.03]
- \_\_\_\_\_ Detail shown on Plans with Basin dimensions (top of berm, top of storage, bottom of storage, depth of storage)
- \_\_\_\_\_ Storage volume required/provided
- \_\_\_\_\_ Design of emergency spillway for 10-year storm (Dimensions and calculations)
- \_\_\_\_\_ Label basin contours. Tie into existing contours
- \_\_\_\_\_ Design of concrete ballast pad (Calculations)
- \_\_\_\_\_ Detail of anti-seep collars and locations
- \_\_\_\_\_ Design of riser and outlet pipes for 2-year storm (Calculations)

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**GRADING & EROSION CONTROL** (Continued from previous page)

- \_\_\_\_\_ Gravel and Riprap Filter Basin(for areas <50 acres not within watershed protection areas) [CLDSM #30.02, 30.03]
  - \_\_\_\_\_ Detail shown on Plans with Basin dimensions (Top of berm, top of storage, bottom of storage, depth of storage)
  - \_\_\_\_\_ Storage volume required/provided
  - \_\_\_\_\_ Design of spillway for 10-year storm - min. width is 10 ft. (Dimensions and calculations)
  - \_\_\_\_\_ Label basin contours; Tie into existing contours
- \_\_\_\_\_ Silt fence baffles in Sediment Basins
- \_\_\_\_\_ Temporary Rock Check Dam (Dimensions- Length, height, class of riprap) [CLDSM #30.10]
- \_\_\_\_\_ Gravel & Riprap Filter Berm Basin [CLDSM #30.12]
- \_\_\_\_\_ Inlet protection [CLDSM # 30.07, 30.08, 30.09, or 30.15]
- \_\_\_\_\_ Creek Crossing [CLDSM #30.14, 30.18]
- \_\_\_\_\_ Slope Drains [CLDSM #30.04]
- \_\_\_\_\_ Seeding schedule
- \_\_\_\_\_ Minimum 10' clear zone from Top of Channel Bank to denuded limit
- \_\_\_\_\_ Wetland Protection measures

**EROSION CONTROL NOTES**

- \_\_\_\_\_ All "Std." numbers refer to the Charlotte Land Development Standards Manual.
- \_\_\_\_\_ On-site burial pits require an on-site demolition landfill permit from the Zoning Administrator.
- \_\_\_\_\_ Any grading beyond the denuded limits shown on the plan is a violation of the City/County Erosion control Ordinance and is subject to a fine.
- \_\_\_\_\_ Grading more than one acre without an approved Erosion Control Plan is a violation of the City/County Erosion Control Ordinance and is subject to a fine.
- \_\_\_\_\_ All perimeter dikes, swales, ditches, perimeter slopes and all slopes steeper than 3 horizontal to 1 vertical (3:1) shall be provided temporary or permanent stabilization with ground cover as soon as practicable but in any event within 7 calendar days from the last land-disturbing activity.
- \_\_\_\_\_ All other disturbed areas shall be provided temporary or permanent stabilization with ground cover as soon as practicable but in any event within 14 calendar days from the last land-disturbing activity.
- \_\_\_\_\_ Additional measures to control erosion and sediment may be required by a representative of the City Engineering Department.
- \_\_\_\_\_ Slopes shall be graded no steeper than 2:1. Fill slopes greater than 10' require adequate terracing [CLDSM #30.16]
- \_\_\_\_\_ A grading plan must be submitted for any lot grading exceeding one acre that was not previously approved.
- \_\_\_\_\_ Driveway permit for construction entrances in NCDOT right of way must be presented at pre-construction meeting.

**STORM DRAINAGE** (Refer to Storm Water Design Manual [SWDM] Chapters 3-8)

- \_\_\_\_\_ All design in accordance with the CLDSM and SWDM - Provide details of all drainage structures
- \_\_\_\_\_ Location, size, invert and rim or grate elevations and pipe material for existing and proposed storm drains and culverts on and immediately adjacent to the site
- \_\_\_\_\_ Storm system pipes designed for 10-year storm [SWDM 3.5.1]
- \_\_\_\_\_ Where roadway overtopping is anticipated, drainage that is picked up in a culvert (or other drainage structure) prior to crossing the road must be conveyed in a system designed for the 25-year storm (50 year for thoroughfares). Flow calculations must be based on the appropriate design storm to the end of the system or to a relief point lower than the street elevation.
- \_\_\_\_\_ Discharge leaves site in same direction and relative location as pre-developed condition
- \_\_\_\_\_ Structures or flared end sections at all inlets and outlets of all pipe systems (no CMP or HDPE FES allowed) [SWDM 6.5.9]
- \_\_\_\_\_ Non-standard drainage structures (CBs, HWs, FESs, bottomless culverts) will require sealed construction drawings.
- \_\_\_\_\_ Minimum 2' cover on pipes
- \_\_\_\_\_ The minimum allowable slope is 0.5 percent, or the slope, which will produce a velocity of 2.5 fps when the storm water in system is flowing full, which ever is greater. [SWDM 5.9.6]
- \_\_\_\_\_ Maximum velocity in pipes 35 fps (10 fps for CMP) [SWDM 5.9.2 & 6.5.4]
- \_\_\_\_\_ Max. discharge velocity at pipe outlets is 10 fps except for pipes > 48" in diameter [SWDM 6.5.4]
- \_\_\_\_\_ Riprap required for all pipe outfalls (0% slope, Min. L=10', Min. Depth=10") [CLDSM #20.23] (NYDOT Method not allowed)
- \_\_\_\_\_ Corrugated metal pipes must be aluminum or aluminized steel

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**STORM DRAINAGE** *(Continued from previous page)*

- \_\_\_\_\_ Maximum of one (1) acre runoff draining into the street at one point
- \_\_\_\_\_ No concentrated runoff flowing over City sidewalks except at driveway entrances
- \_\_\_\_\_ Maximum spread of 6 feet on public streets based on rainfall intensity of 4 in/hr [SWDM 5.1.3]
- \_\_\_\_\_ Slope less than 2% across intersections may need additional CBs and spot elevations
- \_\_\_\_\_ Catch Basin placement at intersections [CLDSM 10.30]
- \_\_\_\_\_ Check drainage at stub streets: spread, future culvert crossings, and 100+1 analysis
- \_\_\_\_\_ Crossdrains/Culverts meet following criteria:
  - \_\_\_ Cross-drainage on thoroughfare classified roadways - 50 yr storm (25-yr storm for minor roadways)
  - \_\_\_ 12" freeboard for culverts ≤ 3' in dia. (18" for all culverts > 3' in. dia.)
  - \_\_\_ 6" freeboard for design storm at yard inlets
  - \_\_\_ HW/D ≤ 1.2
  - \_\_\_ Check applicability of Culvert Crossing [CLDSM #10.36a & 10.36b]
  - \_\_\_ Standard Headwall detail referenced or design sealed by Engineer
  - \_\_\_ For bottomless culverts, upstream and downstream footer elevations shown
  - \_\_\_ Existing creek/channel typical section
  - \_\_\_ Roadway cross section at culvert crossing
- \_\_\_\_\_ Pipes in R/W 48" or less in diameter may be HDPE or RCP, >48" may be RCP, >60" may be aluminized steel; minimum 15"
- \_\_\_\_\_ Provide details of curb cuts and flumes
- \_\_\_\_\_ Properly sized and labeled Storm Drainage Easements (SDE) see widths below from CLDSM #20.30

<u>Pipe Diameter (inches)</u>	<u>Pipe Easement Width (feet)</u>
15-24	15
30-36	20
42-48	25
54+	30' min. (Varies)

**CHANNEL DESIGN** (Refer to Storm Water Design Manual Chapter 4)

- \_\_\_\_\_ Channel cross-sections and calculations \_\_\_\_\_ Maximum 2:1 side slopes [SWDM 4.3.1]
- \_\_\_\_\_ Designed for 10 year storm \_\_\_\_\_ Minimum 6" freeboard
- \_\_\_\_\_ The final design of artificial open channels should be consistent with the velocity and shear strength limitations for the selected lining [SWDM 4.3.4]
- \_\_\_\_\_ Liner specifications and design information from manufacturer
- \_\_\_\_\_ Transition to channel sections with a minimum of 5:1 taper [SWDM 4.3.1]
- \_\_\_\_\_ Channels with bottom widths > 10' must have a minimum bottom cross slope of 12 to 1 [SWDM 4.3.1]
- \_\_\_\_\_ Properly sized and labeled storm drainage easement (SDE) see widths below from CLDSM #20.30

<u>Area in Acreage</u>	<u>Channel Easement Width (feet)</u>
1-45	20
45-120	30
120-500	40
500+	See Std. # 20.30

- \_\_\_\_\_ Driveway pipes sized for Q<sub>10</sub>, check for roadway overtopping as required
- \_\_\_\_\_ In case of 100+1 Overland Relief Channel
  - \_\_\_ Cross-sections at back of curb (beginning of channel), front of building pad(s), and back of building pad(s). Typical detail may be used beyond building pad(s).
  - \_\_\_ 1' minimum freeboard at building pad(s)

**100+1 FLOOD ANALYSIS** [Q<sub>100</sub>>50 cfs]

- \_\_\_\_\_ For pipe systems not designed for Q<sub>100</sub> that receives >50 cfs in Q<sub>100</sub>, flood protection analysis is required.
- \_\_\_\_\_ Overland Relief Point identified on plans.
- \_\_\_\_\_ Flood study calculations shall be sealed by PE
- \_\_\_\_\_ Calculations for flow and t<sub>c</sub>
- \_\_\_\_\_ Runoff coefficients shall be based on assumption of full development of parcels per current zoning
- \_\_\_\_\_ Include digital copy of channel analysis input file in submittal (e-mail or CD acceptable)
- \_\_\_\_\_ Proposed Stormwater Protection Elevations (SWPE) shall be labeled on site and grading plan for each lot (the SWPE should be based on Overland Relief Channel if applicable)
- \_\_\_\_\_ Show and label location of 100+1 Stormwater Elevation Line (SWEL) on site and grading plan

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**100+1 FLOOD ANALYSIS** *(Continued from previous page)*

- \_\_\_\_\_ Minimum 1,200 sf of buildable area per lot
- \_\_\_\_\_ Show or describe on plan the location and elevation (ref. vertical datum, i.e. NAVD 88) of permanent benchmark used in channel survey. All topographic information shown on grading plan shall also be referenced to this benchmark
- \_\_\_\_\_ Existing channel cross-section geometry used in analysis shall be based on a "Class A" field survey and shall be sealed by RLS
- \_\_\_\_\_ When fill is proposed within the 100+1 Stormwater Elevation Line, plotted channel cross-sections shall be included in the subdivision plan set and shall show both existing and proposed cross-section geometry. Sheets to be signed by RLS for existing and PE for proposed conditions.
- \_\_\_\_\_ When no grading is proposed within the 100+1 Stormwater Elevation Line, it is not necessary to include plotted cross-sections in the subdivision plan set. A note shall be added to the grading plan specifying that there shall be no grading within the limits of the 100+1 Stormwater Elevation Line
- \_\_\_\_\_ Cross sections taken perpendicular to the stream centerline, maximum 100' stations
- \_\_\_\_\_ Plot cross-sections showing the 100+1 elevation on site and grading plan
- \_\_\_\_\_ Cross-sections based on topographic map are subject to approval of the Review Engineer
- \_\_\_\_\_ In case of a bridge or culvert:
  - \_\_\_\_\_ Cross-sections should be prepared at 25 feet from inlet and 5 to 20 feet from outlet
  - \_\_\_\_\_ Road profile at culvert crossing to an elevation 2 feet above the low point of road
  - \_\_\_\_\_ A physical description of the culvert (type, shape, invert, etc.).
  - \_\_\_\_\_ Upstream and downstream top of footer elevations for natural bottom culverts
  - \_\_\_\_\_ Stormwater Protection Elevations for lots upstream of street crossings shall be based on the higher of the elevation determined by analysis or the low point of the road plus 1 foot

**FLOODWAY** [Drainage Area > 640 Acres]

- \_\_\_\_\_ Creek name (label centerline)
- \_\_\_\_\_ Label the following lines clearly on grading and site plan:
  - \_\_\_\_\_ Community Flood Fringe Line
  - \_\_\_\_\_ FEMA Flood Fringe Line
  - \_\_\_\_\_ Community Encroachment Line
  - \_\_\_\_\_ FEMA Floodway Encroachment Line
- \_\_\_\_\_ Floodway Cross-sections (Label, Stream Station, Location, Future Conditions Flood Elevation)
- \_\_\_\_\_ Flood Protection Elevation (FPE) (Community Flood Elevation + 1' / Community Flood Elevation + 2' along Catawba River)
- \_\_\_\_\_ Contact Bill Tingle at (704) 336-3734 concerning floodland development permit if grading in a Community Flood Fringe area. Approval required prior to plan approval.

**DETENTION** [Refer to Storm Water Design Manual - Chapter 7]

- \_\_\_\_\_ Detention worksheet completely filled out for each facility
- \_\_\_\_\_ Design for release rate of pre-developed 2 yr & 10 yr storm (6hr or 24hr storm) [SWDM 7.3.2]
- \_\_\_\_\_ Routing calculations are required for storage volume and emergency spillway (sealed) [SWDM 7.3.3]
- \_\_\_\_\_ The same hydrologic procedure shall be used to determine pre and post-development hydrology
- \_\_\_\_\_ Design Calculations must include:
  - \_\_\_\_\_ Calculations for pre & post weighted runoff coefficients (coefficients specified and justified)
  - \_\_\_\_\_ Time of concentration calculations (use SCS method) [SWDM 3.9.6.1]
  - \_\_\_\_\_ Time of concentration travel path (clearly label segments on contoured drainage area map)
  - \_\_\_\_\_ Inflow hydrograph for all design storms for fully developed and pre-developed conditions  
[See Chapter 3 of SWDM for approved inflow hydrographs – HEC-1 output will be used to verify unrecognized software]
  - \_\_\_\_\_ Stage-storage table for proposed storage facilities
  - \_\_\_\_\_ Stage-discharge table for all outlet control structures
- \_\_\_\_\_ Undetained runoff must be accounted for in calculations
- \_\_\_\_\_ All detention volume shall be drained within 72 hours
- \_\_\_\_\_ Emergency spillways for ponds shall be designed to pass 50 yr storm [SWDM 7.3.2] (Lined in fill areas)
- \_\_\_\_\_ Maximum 6" depth of storage in code-required parking areas, 10" in additional parking areas, 15" storage allowed in truck storage and loading areas (depth based on 10 yr. storm) [SWDM 7.3.3]

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**DETENTION** *(Continued from previous page)*

- \_\_\_\_\_ Limits of 10 yr. detention storage elevation in parking lots labeled
- \_\_\_\_\_ Maximum slope on basins of 2:1 [SWDM 7.3.4]
- \_\_\_\_\_ Minimum 6" freeboard above 50-year elevation on earthen basins (on basins less than 15' deep) [SWDM 7.3.4]
- \_\_\_\_\_ Any orifice smaller than 4" in diameter must be protected to prevent blockage [SWDM 7.5.6]
- \_\_\_\_\_ Locate & label on site plan elevation of dam with dimensions and spot elevations
- \_\_\_\_\_ Locate & label on site plan location of primary and emergency outlets
- \_\_\_\_\_ Provide detail of outlet restrictive device
- \_\_\_\_\_ 2-year and 10-year 6 hour storm, good pre-developed condition must be used when applying for Storm Water fee credit
- \_\_\_\_\_ No utilities or habitable structures within impoundment areas
- \_\_\_\_\_ Detention facilities are not allowed within required buffers [Zoning Ordinance 12.302]
- \_\_\_\_\_ Detention facilities are not allowed within the existing or proposed r/w [Zoning Ord. 12.103]

**Underground Detention systems**

- \_\_\_\_\_ All pipes maintain minimum 0.5% slope.
- \_\_\_\_\_ All pipe network nodes labeled with spot elevations.
- \_\_\_\_\_ Adequate access for maintenance at control structures.
- \_\_\_\_\_ Upper reaches of system provided with access points and proper ventilation.
- \_\_\_\_\_ Discharge point for 50-year storm is evaluated.

**Regional Detention Basins or Easements Recorded to the Floodway**

- \_\_\_\_\_ Drainage Area map with clear delineation of parcels served
- \_\_\_\_\_ Pipe systems/channels from site to regional facility/floodway sized for 10 yr storm water runoff
- \_\_\_\_\_ Permanent Detention Easements labeled on plan [CLDSM #20.30]
- \_\_\_\_\_ Off-site detention requires Permanent Detention Easement recorded at Mecklenburg County's Register of Deeds. (Easements must be reviewed by City of Charlotte Engineering Department)

**POST CONSTRUCTION**

**High & Low Density Projects:**

- \_\_\_\_\_ Total percentage of built-upon area for site.
- \_\_\_\_\_ The average slope and the longest flow length for each drainage area for  $T_c$  calculation.
- \_\_\_\_\_ Vegetated conveyance of runoff.
- \_\_\_\_\_ Buffer location, zones and top of bank for intermittent and perennial streams. Stream side zone indicated as "UNDISTURBED." (see applicable Ordinance for requirements).. Note, buffer lengths can be verified using Polaris.
- \_\_\_\_\_ Designate undisturbed open space and percentage of site (see applicable Ordinance for requirements).
- \_\_\_\_\_ Surface areas (in square feet) of all storm water management facilities or BMPs.
- \_\_\_\_\_ The division of land uses, impervious areas, and storm water management facilities for the condition of the site prior to development. For most sites the existing land use shall be a combination of forest/wetland and meadow.
- \_\_\_\_\_ Drainage areas for each BMP.
- \_\_\_\_\_ Pollutant removal efficiencies for each BMP.
- \_\_\_\_\_ Hydraulic properties for each BMP.
- \_\_\_\_\_ BMP summary table, which lists all BMPs on the site and corresponding NAD 83 (feet). Coordinates provided for the center of each structure based on state plane coordinates.

**High Density Projects:**

- \_\_\_\_\_ 85% TSS removal (see Ordinance for requirements).
- \_\_\_\_\_ 70% TP removal (see Ordinance for requirements).
- \_\_\_\_\_ Water quality treatment for runoff from the first inch of rainfall (1-inch, 6-hour storm).
- \_\_\_\_\_ Water quality treatment for the runoff from pre minus post development for the 1-yr., 24-hr. storm (Goose Creek District only).
- \_\_\_\_\_ Volume control for the entire 1-year, 24-hour storm (Channel Protection Volume).
- \_\_\_\_\_ Volume drawdown between 48 hours and 120 hours. 50% left at 36 hours
- \_\_\_\_\_ Control the 10-yr, 6-hour and 25-year, 6-hour storms to pre-developed peak if downstream analysis is not performed (see ordinance I-1, I-2 must do 2yr and 10yr peak control).

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**POST CONSTRUCTION High Density** *(Continued from previous page)*

- \_\_\_\_\_ Downstream flood analysis performed and attached with required volume and peak control specified (see ordinance). **Note:** The plan reviewer has the discretion to vary from the requirement for a downstream flood analysis for peak control when it is evident that it is not warranted. For example, the plan reviewer may waive the requirement for a downstream analysis in situations where storm water discharge from a development site enters directly into a FEMA stream where there are no downstream structures that might be subject to flooding, including roads, houses, businesses, etc. In such situations, this must be documented in the comments section of this document.
- \_\_\_\_\_ Treatment train option selected for BMPs with cumulative effectiveness indicated.
- \_\_\_\_\_ 20-foot maintenance access storm drain easement (SDE) to a public right-of-way for all BMPs.
- \_\_\_\_\_ 12-foot wide maintenance access through the 20-foot SDE with 15% maximum long slope and 5% maximum cross-slope.
- \_\_\_\_\_ 10-foot permanent maintenance easement around all BMPs.
- \_\_\_\_\_ Operation and Maintenance Agreement and Maintenance Plan recorded and attached for each BMP.

**Bioretention (Rain Garden): (4.1)**

- \_\_\_\_\_ Completed Design Procedure Form (section 4.1.7)
- \_\_\_\_\_ 10-acre maximum drainage area is (5 acres per inflow point). 1-inch depth and 1 fps controls size.
- \_\_\_\_\_ 12-inch maximum ponding depth.
- \_\_\_\_\_ 2-foot minimum depth of soil mixture (4-foot minimum depth if trees proposed)..
- \_\_\_\_\_ Pretreatment such as grass buffers or swales, filter strip, forebay, or gravel diaphragm.
- \_\_\_\_\_ Sheet flow into basin, no more than 1 inch in depth at 1 fps.
- \_\_\_\_\_ Design detention time of 24-48 hours (31 hours optimal).
- \_\_\_\_\_ No dry weather flow into basin. 2 feet between bottom of basin and high water table.
- \_\_\_\_\_ 6-inch perforated PVC underdrains, spaced no more than 10 feet on center.
- \_\_\_\_\_ Assume 50% capacity loss in determining number of underdrain pipes needed.
- \_\_\_\_\_ 6-inch PVC cleanout pipes every 100 feet.
- \_\_\_\_\_ Non-woven filter fabric & gravel around underdrain pipe.
- \_\_\_\_\_ Soil mixture using mason sand ASTM C-144.
- \_\_\_\_\_ 3-inch deep double-hammered hardwood mulch layer, aged 6 months or more.
- \_\_\_\_\_ Overflow spillway.
- \_\_\_\_\_ Plant selection.
- \_\_\_\_\_ Note on plan: "Drainage area must be stabilized to the Inspector's satisfaction before bioretention areas are installed."
- \_\_\_\_\_ Note on plan: "Compaction should be minimized during excavation and placement of soil mixture."
- \_\_\_\_\_ Note on plan: "Soil mixture is to be placed in 12 inch lifts and watered until water flows out of underdrain before placing the next layer."

**Wet Pond: (4.2)**

- \_\_\_\_\_ Completed Design Procedure Form (section 4.2.7)
- \_\_\_\_\_ 25-acre minimum drainage area or positive water balance computation.
- \_\_\_\_\_ Average depth between 3 feet and 9 feet.
- \_\_\_\_\_ Sediment forebay sized for 0.2acre-inch/impervious area draining to pond, 4-6 feet deep.
- \_\_\_\_\_ Vertical sediment depth marker in forebay.
- \_\_\_\_\_ Permanent pool.
- \_\_\_\_\_ Side slopes not to exceed 3:1.
- \_\_\_\_\_ 10-foot littoral shelf (no steeper than 10:1)
- \_\_\_\_\_ 1.5:1 minimum length to width ratio.
- \_\_\_\_\_ Design detention time of 48 to 96 hours (96 hours optimal).
- \_\_\_\_\_ W<sub>Q<sub>v</sub></sub>/PP<sub>v</sub> Ratio.
- \_\_\_\_\_ Outlet structure.
- \_\_\_\_\_ Anti-clogging device at pond outlet.
- \_\_\_\_\_ Anti-seep collar on outlet barrel.
- \_\_\_\_\_ Access into outlet riser via manhole cover and steps.
- \_\_\_\_\_ Bottom drain pipe with adjustable valve.
- \_\_\_\_\_ 50-year emergency spillway.
- \_\_\_\_\_ 0.5-foot freeboard on embankment elevation above 50-year peak.

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**Wet Pond: (4.2)** *(Continued from previous page)*

- \_\_\_\_\_ Embankment & spillway designed in accordance with N.C. Dam Safety Law.
- \_\_\_\_\_ Plant selection for littoral shelf.
- \_\_\_\_\_ No utilities in pond area.
- \_\_\_\_\_ Setback requirements.
- \_\_\_\_\_ 10 feet from property line.
- \_\_\_\_\_ 100 feet from private well (250 feet from hotspot land use).
- \_\_\_\_\_ 50 feet from septic systems and leach fields.

**Wetland: (4.3)**

- \_\_\_\_\_ Completed Design Procedure Form (section 4.3.7)
- \_\_\_\_\_ 10-acre minimum drainage area with positive water balance computation.
- \_\_\_\_\_ 1.5:1 minimum length to width ratio for dry weather path.
- \_\_\_\_\_ Depth: 45%=0-6 inches, 35%=6-18 inches, 10%>18 inches to 9 feet.
- \_\_\_\_\_ Sediment forebay.
- \_\_\_\_\_ Safety bench adjacent to pools 3 feet or deeper.
- \_\_\_\_\_ 3-foot maximum temporary ponding above normal pool level.
- \_\_\_\_\_ Design detention time of 48 to 96 hours (96 hours optimal).
- \_\_\_\_\_ WQ<sub>v</sub>/PP<sub>v</sub> Ratio.
- \_\_\_\_\_ Sediment forebay sized for 0.2acre-inch/impervious area draining to pond, 4 to 6 feet deep.
- \_\_\_\_\_ Outlet structure.
- \_\_\_\_\_ Anti-clogging device at pond outlet.
- \_\_\_\_\_ Access into outlet riser via manhole cover and steps.
- \_\_\_\_\_ Bottom drain pipe with adjustable valve.
- \_\_\_\_\_ 50-year emergency spillway.
- \_\_\_\_\_ 0.5-foot freeboard on embankment elevation above 50-year peak.
- \_\_\_\_\_ Embankment & spillway designed in accordance with NC Dam Safety Law.
- \_\_\_\_\_ Plant selection.
- \_\_\_\_\_ No utilities in pond area.
- \_\_\_\_\_ Setback requirements.
- \_\_\_\_\_ 10 feet from property line.
- \_\_\_\_\_ 100 feet from private well (250 feet from hotspot land use).
- \_\_\_\_\_ 50 feet from septic systems and leach fields.

**Enhanced Swales: (4.4)**

- \_\_\_\_\_ Completed Design Procedure Form (section 4.4.7)
- \_\_\_\_\_ 5-acre maximum drainage area.
- \_\_\_\_\_ 4-inch maximum depth of flow in 1-inch, 6-hour storm at 1 fps velocity.
- \_\_\_\_\_ Minimum 100 feet long.
- \_\_\_\_\_ Trapezoidal shape with 2 feet to 8 feet bottom width.
- \_\_\_\_\_ Side slopes not to exceed 3:1.
- \_\_\_\_\_ Effective slope of 2% or less (check dams at greater than 50-foot intervals may be used for up to 5% slopes).
- \_\_\_\_\_ Non-erosive velocities in 10-yr., 25-yr., and 100-yr. storms.
- \_\_\_\_\_ 0.5-foot freeboard above 10-yr. storm elevation.
- \_\_\_\_\_ 1.5-foot maximum ponding depth for all storms.
- \_\_\_\_\_ Pretreatment of 0.2acre-inch/impervious area draining to swale.
- \_\_\_\_\_ Ponding time of 30 minutes to 48 hours.
- \_\_\_\_\_ No dry weather flow into swale.
- \_\_\_\_\_ 6-inch perforated PVC underdrain w/ cleanouts
- \_\_\_\_\_ 6-inch gravel layer.
- \_\_\_\_\_ Permeable, non-woven filter fabric between gravel and overlaying soil mixture.
- \_\_\_\_\_ Soil mixture (1 foot/day infiltration rate).
- \_\_\_\_\_ Grass selection.

**Grassed Channel: (4.5)**

- \_\_\_\_\_ Completed Design Procedure Form (section 4.5.7)
- \_\_\_\_\_ 20-acre maximum drainage area.
- \_\_\_\_\_ 4-inch maximum depth of flow in 1-inch, 6-hour storm.
- \_\_\_\_\_ 100 feet minimum length.

**CITY OF CHARLOTTE ENGINEERING LAND DEVELOPMENT REVIEW**

**Grassed Channel: (4.5)** *(Continued from previous page)*

- \_\_\_\_\_ Trapezoidal shape with minimum 2-foot bottom width (compound cross-sections for wider channels).
- \_\_\_\_\_ Side slopes not to exceed 3:1 (4:1 or flatter for side inflow).
- \_\_\_\_\_ Effective slope of 2% or less (check dams at greater than 50-foot intervals may be used for up to 5% slopes).
- \_\_\_\_\_ Non-erosive velocities in 10-yr., 25-yr., and 100-yr. storms.
- \_\_\_\_\_ 0.5-foot freeboard above 10-yr. storm elevation.
- \_\_\_\_\_ 1.5-foot maximum ponding depth for all storms .
- \_\_\_\_\_ Pretreatment of 0.2 acre-inch/impervious area draining to swale.
- \_\_\_\_\_ No dry weather flow into swale.
- \_\_\_\_\_ Grass selection.

**Infiltration Trench: (4.6)**

- \_\_\_\_\_ Completed Design Procedure Form (section 4.6.7)
- \_\_\_\_\_ 5-acre maximum drainage area.
- \_\_\_\_\_ Soils in drainage area have <20% clay and <40% silt/clay.
- \_\_\_\_\_ Trench depth of 3 to 8 feet.
- \_\_\_\_\_ 25-foot maximum trench width.
- \_\_\_\_\_ Flat bottom.
- \_\_\_\_\_ Pretreatment such as forebay, sediment chamber, grass channel, or vegetated filter strip.
- \_\_\_\_\_ Pretreatment sized for 25% of water quality volume (50% for exfiltration rates>2 inches/hr.).
- \_\_\_\_\_ Storage above filter media sized for 100% of water quality volume.
- \_\_\_\_\_ 0.5 inch/hr. minimum exfiltration rate.
- \_\_\_\_\_ Uniform aggregate 1.5-2.5 inches in size with 40% void space (0.32 or aggregate-specific porosity value, P-index of 0.1).
- \_\_\_\_\_ 6-inch sand bed at bottom of trench.
- \_\_\_\_\_ Non-woven Permeable filter fabric on sides of trench.
- \_\_\_\_\_ Non-woven permeable filter fabric, 2 to 6 inches below surface of trench.
- \_\_\_\_\_ No dry weather flow, 4 feet between bottom of trench and high water table.
- \_\_\_\_\_ Capped observation wells, 4 to 6-inch perforated PVC pipe with floating marker.
- \_\_\_\_\_ Setback requirements.
- \_\_\_\_\_ 10 feet from property line.
- \_\_\_\_\_ 25 feet from building foundation.
- \_\_\_\_\_ 100 feet from private well.
- \_\_\_\_\_ 1200 feet from public water supply well.
- \_\_\_\_\_ 400 feet from surface drinking water sources.
- \_\_\_\_\_ 100 feet from septic systems and leach fields.
- \_\_\_\_\_ 30 feet from class SA waters.

Notes for Enhanced Swales, Grassed Channels and Infiltration Trenches:

- \_\_\_\_\_ “The bottom should be scarified and must not be loaded in a way that causes soil compaction. The sides must be trimmed of all large roots. The sidewalls must be uniform with no voids and scarified. This should be done prior to backfilling.”

**Filter Strip/Wooded Buffer Strip: (4.7)**

- \_\_\_\_\_ Completed Design Procedure Form (section 4.7.7)
- \_\_\_\_\_ 5-acre maximum drainage area.
- \_\_\_\_\_ 2% maximum slope on filter strip.
- \_\_\_\_\_ 5% maximum slope on buffer strip.
- \_\_\_\_\_ 1-inch maximum flow depth in 1-inch, 6-hour storm.
- \_\_\_\_\_ 2 fps maximum velocity in 10-year storm.
- \_\_\_\_\_ Length of filter strip sufficient for desired pollutant removal rate.
- \_\_\_\_\_ Pea gravel diaphragm level spreader along top of filter strip.
- \_\_\_\_\_ 24 hour maximum detention time.
- \_\_\_\_\_ 12-inch maximum berm height.
- \_\_\_\_\_ Sand/gravel/sandy loam berm material.
- \_\_\_\_\_ Grass or plant selection.



**CITY OF CHARLOTTE ENGINEERING LAND DEVELOPMENT REVIEW**

**Sand Filter: (4.8)**

- \_\_\_\_\_ Completed Design Procedure Form (section 4.8.7)
- \_\_\_\_\_ 10-acre maximum drainage area (2-acre max. for perimeter sand filter; 5-acre maximum for underground sand filter).
- \_\_\_\_\_ 24-inch maximum ponding for water quality volume.
- \_\_\_\_\_ 60-inch maximum ponding depth for all storms. (includes 24" water quality volume)
- \_\_\_\_\_ Pretreatment sediment chamber sized for 20% of water quality volume.
- \_\_\_\_\_ Additional pretreatment if <50% impervious or high clay/silt in drainage area.
- \_\_\_\_\_ Design detention time of 24-48 hours (24 hours optimal).
- \_\_\_\_\_ No dry weather flow.
- \_\_\_\_\_ 2 feet between bottom of basin and high water table for surface sand filters.
- \_\_\_\_\_ Filtration media surface sized using Darcy's Equation with 1.75 inches/hr. filtration rate.
- \_\_\_\_\_ 1-inch thick debris screen on top of sand filter.
- \_\_\_\_\_ Flat surface on top of sand filter.
- \_\_\_\_\_ 24 to 48-inch sand filter media (ASTM C33).
- \_\_\_\_\_ Permeable non-woven filter fabric above and below sand filter media.
- \_\_\_\_\_ 6-inch perforated PVC pipe underdrain, spaced no more than 10 feet on center.
- \_\_\_\_\_ Assume 50% capacity loss in determining number of underdrain pipes needed.
- \_\_\_\_\_ 0.5% minimum slope on underdrain; minimum 1fps flow velocity.
- \_\_\_\_\_ Cleanouts for underdrain system every 50 feet.
- \_\_\_\_\_ 12-inch gravel layer around underdrain.
- \_\_\_\_\_ Filter fabric on earthen walls and bottom, if applicable.
- \_\_\_\_\_ Emergency spillway.
- \_\_\_\_\_ Maintenance access within 25 feet of any point in facility.
- \_\_\_\_\_ Easy removal of surface material.
- \_\_\_\_\_ Note: "Drainage area must be stabilized before filtration controls and filter media are installed."

**Extended Dry Detention Pond: (4.9)**

- \_\_\_\_\_ Completed Design Procedure Form (section 4.9.7)
- \_\_\_\_\_ Maximum depth of 9 feet.
- \_\_\_\_\_ Sediment forebay sized for 0.2 acre-inch/impervious area draining to pond, 4-6 feet deep.
- \_\_\_\_\_ Volume sized 1.2 times the required volume to account for sediment accumulation.
- \_\_\_\_\_ Energy dissipation required for inlet pipes exceeding 15-inch diameter.
- \_\_\_\_\_ Side slopes not to exceed 3:1.
- \_\_\_\_\_ 3:1 minimum length to width ratio.
- \_\_\_\_\_ Design detention time a minimum of 48 hours
- \_\_\_\_\_ Outlet structure.
- \_\_\_\_\_ Minimum outlet pipe diameter of 2.5 inches unless anti-clogging device provided.
- \_\_\_\_\_ Anti-seep collar on outlet barrel.
- \_\_\_\_\_ Access into outlet riser via manhole cover and steps.
- \_\_\_\_\_ 50-year emergency spillway.
- \_\_\_\_\_ 0.5-foot freeboard on embankment elevation above 50-year peak.
- \_\_\_\_\_ Plant selection.

**IMPROVEMENTS TO EXISTING RIGHT-OF-WAY**

- \_\_\_\_\_ Offsite R/W requirements shown on plans (for symmetrical widening, off-site frontage improvement tie-ins)
- \_\_\_\_\_ Storm drainage associated with street improvements
- \_\_\_\_\_ Show and label cross-section and profile of existing street with proposed improvements (ie: c&g, s/w, pavement section, ditch cross-section, associated drainage, etc.)
- \_\_\_\_\_ If the existing street is maintained by NCDOT, a NCDOT Encroachment Agreement is required for the proposed improvements (contact NCDOT, 704-596-6900).
- \_\_\_\_\_ Bicycle improvements along roadway may be required (check Bikeway Improvement Plan map)
- \_\_\_\_\_ Rezoning petition could list requirements for additional or non-standard right-of-way improvements

**CITY OF CHARLOTTE ENGINEERING LAND DEVELOPMENT REVIEW**

When a proposed street ties into an existing street (classified below), street improvements are required:

	<b>Arterials</b>	<b>Commercial Arterials</b>	<b>Collectors</b>	<b>Commercial Collectors</b>
<b>Property Frontage Typical</b>	CLDSM# 11.09	CLDSM# 11.09	CLDSM# 11.06	CLDSM #11.11, 11.12
Right-of-way width	Major: 100’* Minor: 70’*	100’ Dedicated 50’ Reserved	60’ min.	60’ min.
Curb & gutter (CLDSM#10.17)	2’6”	2’6”	2’6” OR 2’0”	2’6”
C/G Turn out from CL to F/C	24’ (to locate sidewalk)	24’ (to locate sidewalk)	17’	20’
Sidewalk, Planting Strip	5’, 4’	5’, 4’	4’, 4’	4’, 4’
Minimum Shoulder	8’ (6’ for NC-maintained)	8’ (6’ for NC-maintained)	8’	8’
Recommended Taper	100’	100’	50’	50’

\* R/W widths different for urban arterials (see Section 7.110 of Subdivision Ordinance)

**PUBLIC STREETS**

- \_\_\_\_\_ Cross-sections must conform to CLDSM standards
- \_\_\_\_\_ Accessible ramps required at all intersections [CLDSM # 10.31 thru 10.35]
- \_\_\_\_\_ Taper from local to local-limited [CLDSM #10.37]
- \_\_\_\_\_ Bicycle improvements along roadway may be required

**CUL-DE-SACS**

- \_\_\_\_\_ Residential [CLDSM # 11.16, 11.21] with appropriate pavement radius ♦
- \_\_\_\_\_ Commercial [CLDSM # 11.17]
- \_\_\_\_\_ Provide spot elevations along lip of cul-de-sac to insure positive drainage for profiles ≤ 2%
- ♦ 42’ recommended to allow for emergency vehicles turning with minimal reverse movement. R/W must be adjusted to accommodate larger pavement radius.

**PRIVATE STREETS**

- \_\_\_\_\_ Maximum grade 10%
- \_\_\_\_\_ Show limits of private street
- \_\_\_\_\_ Cross-section per CLDSM # 11.13 (CLDSM # 11.14 for divided private street)
- \_\_\_\_\_ 35’ x 35’ sight triangles @ intersection w/public street
- \_\_\_\_\_ Parking bays (Angled Parking) allowed on only one side of the street unless a median is provided.

**HORIZONTAL AND VERTICAL REQUIREMENTS**

**Use of level or hilly terrain criteria not permitted without prior approval of the Review Engineer**

Terrain Classification -Slope Range (%)		<u>Level /Rolling (0-15)</u>	<u>Hilly (15+)</u>
Minimum Sight Distance	Local	<b>155</b>	125
	Collector	<b>200</b>	150
Maximum Grade (%)	Local	<b>10</b>	12
	Collector	<b>8</b>	10
Minimum Grade (%)	All	<b>0.5</b>	0.5
Minimum Radius (ft)	Local	<b>150</b>	90
	Collector	<b>250</b>	175
K Values (Crest/Sag)	Local	<b>20/20</b>	15/20
	Collector	<b>28/35 (City) 30/35 (ETJ)</b>	20/20
Minimum tangent between Horizontal curves	Local	<b>50</b>	50
	Collector	<b>100</b>	100

- \_\_\_\_\_ (NO REVERSE CURVES)
- \_\_\_\_\_ Show profiles with vertical data and storm drainage for all proposed streets (Public and Private)
- \_\_\_\_\_ Profiles for streets to be barricaded must extend 300 feet beyond the phase/property line or to the proposed future end of the street, whichever is less [CLDSM #50.07, 50.08]
- \_\_\_\_\_ Non-symmetrical vertical curves must have L1 or L2 ≥ one-third of total length
- \_\_\_\_\_ Thoroughfares - refer to AASHTO "A Policy on Geometric Design of Highways and Streets"

**CITY OF CHARLOTTE ENGINEERING LAND DEVELOPMENT REVIEW**

**INTERSECTIONS**

Terrain Classification-Slope Range (%)	<u>Level / Rolling (0-15)</u>	<u>Hilly (15+)</u>
_____ Clear sight distance (ft.)	35	35
_____ Vertical alignment (max) within 100' (%)	5	
_____ Minimum angle of intersection (°)	75	75
_____ Minimum curb and Local	20 (City) 25 (ETJ)	20 (City) 25 (ETJ)
_____ R/W radius Collector	30	30
_____ Minimum intersection separation:		
Along local streets (ft)	125	125
Along collector streets (ft)	200	200
Along thoroughfares	To be determined by CDOT/NCDOT	

**OTHER NOTES TO APPEAR ON PLAN**

- \_\_\_\_\_ Coordinate all curb and street grades in intersection with Inspector.
- \_\_\_\_\_ All road improvements at \_\_\_\_\_ are to be coordinated with the City of Charlotte Engineering Department prior to construction.
- \_\_\_\_\_ Developer will provide street signs per CLDSM# 50.05 (9" signs only)
- \_\_\_\_\_ Sight triangles shown are the minimum required.
- \_\_\_\_\_ Direct vehicular access to \_\_\_\_\_ from lots \_\_\_\_\_ is prohibited.
- \_\_\_\_\_ In rolling and hilly terrains, sweeping of the stone base and/or application of a tack coat may be required near intersections. These requirements will be established by the Inspector and based on field conditions.
- \_\_\_\_\_ Approval of this plan is not an authorization to grade adjacent properties. When field conditions warrant off-site grading, permission must be obtained from the affected property owners.
- \_\_\_\_\_ In order to ensure proper drainage, keep a minimum of 0.5% slope on the curb.
- \_\_\_\_\_ Subsurface drainage facilities may be required in the street right-of-way if deemed necessary by the inspector.
- \_\_\_\_\_ Curb and gutter shown on plans along \_\_\_\_\_ may be adjusted based upon field staking by City Engineering. Associated storm drainage may also require modification based upon field conditions.
- \_\_\_\_\_ The purpose of the storm drainage easement (SDE) is to provide storm water conveyance. Buildings are not permitted in the easement area. Any other objects which impede storm water flow or system maintenance are also prohibited.
- \_\_\_\_\_ High-density polyethylene (HDPE) storm drainage pipe installed within existing or proposed public street right-of-way must be approved by the City's Inspector prior to any backfill being placed.
- \_\_\_\_\_ Backfill material must be approved by the City Inspector prior to placement of the material within the public street right-of-way.
- \_\_\_\_\_ The developer shall maintain each stream, creek, or backwash channel in an unobstructed state and shall remove from the channel and banks of the stream all debris, logs, timber, junk and other accumulations.
- \_\_\_\_\_ Any building within the 100+1 Stormwater Elevation Line is subject to the restrictions of the (City of Charlotte/Mecklenburg County) Subdivision Ordinance, Section 7.200.8.
- \_\_\_\_\_ Any construction or use within the Future Conditions Flood Fringe Line is subject to the restrictions imposed by the Floodway Regulations of the City of Charlotte and Mecklenburg County.
- \_\_\_\_\_ All openings (e.g., doors, windows, vents) in structures built on lot #'s \_\_\_\_\_ should be located a minimum of one foot above the adjacent finished ground surface (Applies to lots which may experience significant overland flow not considered in the 100+1 flood analysis.)
- \_\_\_\_\_ PE sealed shop drawings for retaining wall must be submitted to City Engineer prior to construction.
- \_\_\_\_\_ "As-built" drawings and plans of the storm drainage system, including designed ditches, must be submitted prior to subdivision final inspection to the City/County Engineering Department in accordance with the City/County Subdivision Ordinance.
- \_\_\_\_\_ Prior to installation, PE sealed shop drawings for underground detention systems must be furnished to City of Charlotte Engineering for approval.
- \_\_\_\_\_ Prior to CO, surveyor sealed as-built drawings of all water quality BMP's and detention systems must be provided.
- \_\_\_\_\_ Prior to plat recordation, Offsite R/W and/or construction easements are required to be obtained according to the guidelines of the "Offsite R/W Acquisition Process". These needed R/W and construction limits are clearly shown on the roadway improvement plan.
- \_\_\_\_\_ Per Section 18-175(e) of City Code and Section 10.0 of the City's Post Construction Controls Administrative Manual, all required Natural Areas and/or Post Construction Controls easements (PCCEs) must be recorded prior to the issuance of the Certificate of Occupancy.

**OTHER NOTES TO APPEAR ON PLAN** *(Continued from previous page)*

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- The Developer shall contact the Charlotte Department of Transportation (Gus Jordi, 704-336-7086) to identify any conflicts with traffic signalization equipment. 60- 90 days will be required to coordinate relocation. Developer shall be responsible for all related relocation cost and/or any repair cost caused by the contractor/developer.
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- Certification and Street cut permits are required for utility cuts on City streets. Allow 7 days processing for permit. For information contact Charlotte Department of Transportation (704-336-4025) or visit <http://www.charmeck.org/Departments/Transportation/Street+Maintenance/Home.htm>
- 
- Non-standard items (ie: pavers, irrigation systems, etc.) in the right-of-way require a Right-of-Way Encroachment Agreement with the Charlotte Department of Transportation/North Carolina Department of Transportation before installation. For City of Charlotte maintained streets, contact CDOT at (704) 336-3888.
- 
- Sidewalk within the City's R/W that requires replacement as part of the development and/or street improvements should be phased in such a way as to minimize the duration of the sidewalk closure to the extent feasible. The developer should make every attempt to have sidewalk repaired and reopened for public use within 30 days of removal.
- 
- Any work within the City's R/W that requires closure of the sidewalk or travel lane for less than 30 days requires a R/W use permit. Traffic control plans for any sidewalk or travel lane closures must be submitted as part of the R/W use permit request. Traffic control plans must be in accordance with CDOT's Work Area Traffic Control Handbook (WATCH) and must be reviewed and approved. Contractor shall contact CDOT at least 5 business days in advance of beginning of work at (704) 432-1562.
- 
- Right-of-way closures longer than 30 days require a R/W Lease agreement which will include the submittal of a traffic control plan. Traffic control plans required through a lease agreement may be different from the one required during the Land Development plan review and are subject to revisions. The revised traffic control plans must be submitted as part of the lease agreement process for approval prior to start of R/W closures. Contractor shall contact CDOT at (704) 336-8348.
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- Construction staging within City R/W lasting more than 30 days requires a R/W Lease agreement. Contractor shall contact CDOT at (704) 336-8348.

**CONSTRUCTION SEQUENCE** *(City of Charlotte)*

The Construction Sequence must be project specific and include the following **(additional items shall be added depending on site conditions)**:

1. Obtain Grading/Erosion Control plan approval from the City of Charlotte Engineering Department.
2. Set up a on-site pre-construction conference with Erosion Control Inspector of the City Engineering Department to discuss erosion control measures. Failure to schedule such conference 48 hours prior to any land disturbing activity is a violation of Chapter 17 of the City Code and is subject to fine.
3. Install silt fence, inlet protection, sediment traps, diversion ditches, tree protection, and other measures as shown on plans, clearing only as necessary to install these devices.
4. Call for on-site inspection by Inspector. When approved, Inspector issues the Grading Permit and clearing and grubbing may begin.
5. The contractor shall diligently and continuously maintain all erosion control devices and structures.
6. For phased erosion control plans, contractor shall meet with Erosion Control Inspector prior to commencing with each phase of erosion control measures.
7. Stabilize site as areas are brought to finished grade.
8. Coordinate with Erosion Control Inspector prior to removal of erosion control measure.
9. All erosion control measures shall be constructed in accordance with the N. C. Erosion and Sediment Control Planning and Design Manual, U. S. Dept. of Agriculture, City of Charlotte Erosion Control Ordinance, and the Charlotte Land Development Standards Manual.