

07.06.03 STORMWATER CHECKLIST

This Stormwater Checklist shall accompany all plan submittals or the submittal shall be considered incomplete. Items not applicable should be marked "N.A." Refer to the City of Monroe "Standard Specifications and Detail Manual".

Show impervious areas/runoff coefficients per the City of Monroe Standard Specifications and Detail Manual, Appendix A, Rational Method.

Show stormwater runoff controls

<input type="checkbox"/> wet detention pond	<input type="checkbox"/> extended dry detention pond	<input type="checkbox"/> grassed swales
<input type="checkbox"/> sand filters	<input type="checkbox"/> stormwater wetlands	<input type="checkbox"/> bio-retention
<input type="checkbox"/> proprietary systems	<input type="checkbox"/> infiltration devices	<input type="checkbox"/> filter strips
<input type="checkbox"/> stream buffers	<input type="checkbox"/> permeable pavement	<input type="checkbox"/> other

Show soil types.

Provide boring/test pits, infiltration tests, groundwater impacts for infiltration structures.

Provide calculations of pre- and post-development peak runoff rates, volumes and velocities. The same hydrologic procedure shall be used to determine pre and post-developed hydrology.

Provide copy of the 404 Permit from the US Army Corp of Engineers (wetlands) and 401 permit from the North Carolina Department of Environmental Quality.

Show the water body that the SCM is discharging into, if applicable.

Provide a map and certified reports that includes locations of all perennial and intermittent streams, wetlands, 100-year floodplain boundaries, and other natural features as determined by survey.

Show time of concentration calculations for all hydrographs.

Show curve number calculations for both pre-developed and post-developed conditions for hydrographs.

Provide 2 drainage area maps, one for pre-development and one for post-development, that shows the dividing lines and direction of flow for each drainage area contributing to the project site.

Delineate sub-watershed areas on the plan for both pre- and post-development conditions. Clearly show and label the "Tc" path, slope and soil types in each sub watershed; provide the areas in acres.

Show a maintenance plan and schedule for all permanent Stormwater Control Measures.

Provide inlet and outlet invert elevations for all drainage structures.

_____ Provide profiles for all outfall pipes 15" and larger and channels located within recorded public easements. Include the Hydraulic Grade Line (HGL) profile for the Ten Year Return Period.

_____ Provide cross sections for diversions, ditches, ponds, swales, infiltration structures, etc.

_____ Provide a name of the person responsible for longtime maintenance of stormwater management facilities.

_____ Show natural and manmade features at the site, including wetlands, watercourses, floodplains and developments (roads, buildings, and other structures).

_____ Design criteria for drainage collection facilities within the right-of-ways must follow Standard Specifications and Detail Manual, Section 04.02.01.

_____ The following construction notes shall be included on the plans:

1. All roadway construction methods shall be in accordance with the City of Monroe Standard Specifications and Detail Manual and the NCDOT Standard Specifications for Roads and Structures, latest edition except when otherwise noted.
2. All storm drain pipes shall be placed to proper grade and alignment per approved plans.
3. No cracked or broken pipes shall be placed or accepted in construction of the project.
4. All catch basins 3'-6" deep or more shall have steps placed at 1'-2" on center.
5. Erosion control measures shall be placed around drainage inlets and catch basins.
6. All pipes in storm drainage structures shall be cut off flush with the inside wall.
7. All structures shall be smooth inside and outside of the structure using mortar mixed to manufacturer's specifications to avoid debris build-up obstructing flow.
8. All tail ditches shall have positive drainage with a minimum 1.0% slope.
9. The Developer shall obtain any off-site drainage easement from adjacent property owners required to complete the improvements or provide positive drainage flow prior to construction plan approval.
10. All concrete for drainage structures shall be a minimum of 3,600 psi except where otherwise noted or required.
11. All precast storm drainage structures must be certified to adequately carry H20 loading.

12. Pre-cast storm drainage structure shall not be cut or altered without a Professional Engineer's Certification of adequate load bearing strength following the alteration of the structure, except where designated "knock-out" panels are provided.
13. Under no circumstances shall water be permitted to rise in un-backfilled trenches after the pipe has been placed.
14. The laying of pipe in the finished trench shall be started at the lowest point and laid upgrade. The bell shall be laid upgrade.
15. Survey staking and proposed grades shall be consistent with plans and field conditions.
16. No construction activities are allowed to take place beyond the floodplain line or the stream buffer line, whichever is greater, without a permit issued by the U.S. Army Corps of Engineers, the North Carolina Department of Environmental Quality, and/or the City of Monroe.

Clearly delineate the following on the site and grading plans:

- Proposed FEMA floodplain line
- Existing FEMA floodplain line (to be shown until FEMA approval of proposed line)
- Existing FEMA floodway line
- Floodway cross-sections (stream station, location, existing and future flood elevations)
- Undisturbed vegetated stream buffer lines (35' intermittent and perennial streams, 50' for Legislative Rezoning, measured from the top of bank)
- Building setback for streams outside designated floodplains (5 times the stream width at the top of bank or 35' each side, whichever is greater)

25+1 Flood Analysis

For streams located outside of FEMA regulated waters and FEMA regulated "A" zones which serve a drainage area of 10 acres or more, perform a flood analysis utilizing the 25-year storm to establish finish floor elevations. Finish floor shall be established at least one foot above the 25-year storm elevation.

- Runoff coefficients shall be based on assumption of full development of parcels per current zoning
- Proposed elevations shall be labeled on the site and grading plans for each lot
- Show and label 25+1 flood elevation flood line on site and grading plan
- Show and label 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.
- Provide a hard copy of all channel analysis input and output files along with plan submittal.