

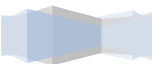
**CIVIL AND STRUCTURAL ENGINEERING SERVICES, PLLC**  
**SAMIR W. BAHHO, P.E.**  
**May 30, 2022**

**Stormwater Permit**  
**Chestnut Creek Subdivision**  
**Project Narrative**

**Subdivision and Roads design:** The Area of the project is approximately 50 Acres. The property is subdivided in 14 lots. The project includes construction of approximately 1,626 ft of new roads with 20' ribbon asphalt paved roads and roadside drainage ditches. Chestnut Creek Way and Meandering Way Court were designed to NCDOT Standards and will be petitioned for State Maintenance . Walnut Branch is an existing private road located on the property. Walnut Branch will be widened and upgraded to Chatham County Private Roads Construction Standard. [Attached is a copy of the approved NCDOT plans for Chatham County Files](#)

**Stormwater Management and Design:** To handle stormwater flow on the roads, 3-18" stormwater **drainage pipe** are proposed. An 18" stormwater pipe under Chestnut Creek Way to carry storm water from along the south side road ditch on Jones Ferry Road. Another 18" Storm pipe is across Meandering Way Court crossing a natural swell. A 3rd 18" pipe is across the existing Walnut Branch Road to carry stormwater of natural swell across the road. Pipe locations and sections are shown on the design plans The drainage pipes across proposed roads are sized to meet North Carolina Department of Transportation requirement of 25-Y Storm and 5 minutes concentration time. The Elements of Urban Stormwater Design was the reference for runoff discharge , pipe sizing and runoff velocities. Rip Rap outlets for the cross pipes were proposed to handle runoff velocities at the outlet of pipes. Discharge, velocity and sizing calculations are on page 1 of the drainage calculations

**Roadside ditches** are designed to meet State/County and NCDOT Standards. Ditches were designed with minimum cross slopes of 3/1 to help establish vegetation. Cross-sections of ditches are shown on the plan and profile sheets. Ditches Drainage computations are included in the drainage calculations package on page 1. Open channel (Manning Equation) was used for discharge and velocities calculations. Roadside ditches are to be used as temporary ditches and to be converted to roadside drainage ditches at the end of road construction . Jute matting is proposed to be installed for all roadside ditches.



To meet the Erosion & Sediment Control Requirement, The Chatham County Stormwater, Erosion Control Manual and the State Erosion Control and Stormwater Manuals and Ordinance were used. Erosion Control Measures (silt outlets, skimmer silt basins, road ditch and others were sized for 10-y storm events and 5 minute concentration time)

### Drainage Calculations

Attached are sealed and signed drainage calculations (page 1 thru page 13)

#### **Erosion and Sediment Control:**

- Drainage road crossing pipe sizing calculations are on page 1
- Roadside ditches calculations (page 2 thru page 6). Drainage basin areas were established for the ditches. C-runoff coefficient value of 0.35, 1-10 and 5 minute concentration time were used. For rainfall distribution, Appendix A of the Chatham County Stormwater Ordinance was used. *0.5 C value was used for temporary ditches and sizing of skimmer Basins*
- E&SC Skimmer basins #'s 1 and 2 (Calculation page 7). The Temporary skimmer basins were sized to meet the minimum surface area requirements and compared to State volume requirements. *3800 cuft x disturbed area used for minimum basin volume* Skimmer diameter size was determined based on 3 days release. Top and bottom area, size of skimmer, drainage area, depth of basin and weir length are shown on the plans. Temporary skimmer basins #1 and #2 are to be converted into Dry Detention basins for permanent Stormwater Management Best Measures to meet Chatham County Stormwater Ordinance. *Details of phasing and conversion were provided*
- Plan sheets *4. 5. 6 and 7* show Stormwater and Erosion & Sediment Control Designs. Silt Fence, Silt fence outlet, Roadside ditches, Construction entrances, skimmer and other standard devices are shown on the plan detail sheets 11 and 12, *13 and 14* The NCG01 Self-Inspection and Ground Stabilization and Maintenance Handling are included as plan sheet *s 8 and 9* as part of Erosion control plans and specification

### Stormwater Best Management Devices

2 Dry Ponds are proposed to control and treat stormwater runoff **for the roads**. Dry Pond #1 captures Chestnut Creek Way and Meandering Way Court drainage basin runoff .

Dry Pond #2 captures Walnut Branch Road drainage basin runoff. Dry Pond #1 and #2 are designed and sized to meet Chatham County Stormwater Ordinance. Element of Urban Stormwater Design, State Stormwater Manual, Energy Equation and Orifice Equation were used to calculate the components of the Dry Ponds. For detailed calculation refer to Drainage Calculation page 8 thru 13

- **Pond # 1:** Pond # 1 calculations are shown on page 8 thru page 10. Volumes were calculated based on NCDENR Stormwater BMP Manual, chapter 3 Stormwater Calculations. The size of the pond is based on the 50-Y event plus 1' free board (34780



Cu. Ft.). Predevelopment and post-development runoff discharge for the 1-Y, 2-Y, 5-Y, 10-Y, 25-Y and 50-Y were calculated. Volume and discharge for the 1" to be retained and released over 3 days was calculated. Routing of storm events was conducted vs. pond volume and controlled release. Orifice size was computed to balance runoff storage Vs. runoff release at predevelopment runoff discharge for all Rain-Events as per Chatham County Stormwater Ordinance. Refer to drainage calculations page 9 highlighted lines. An outlet orifice of 12" controls discharge released at calculated

Less than Predevelopment Q for all regulated rain-full events. Page 10 shows 1" rainfall volume is retained and released over 3 days period using 0.75" drain pipe. (Refer to sheet 11 of the plans for detailed design of Dry Pond # 1 and runoff release control orifices). All routed Q. Values for 1-yr, 2-yr, 5-yr, 10-yr, 25-yr and 50-yr are less than Q. pre-development See sheet 9 of Calculation with the highlight.

- **Pond # 2:** Pond # 2 calculations are shown on page 10, 11 and 12 . Volumes were calculated based on NCDENR Stormwater BMP Manual, chapter 3 Stormwater Calculations. The size of the pond is based on the 50-Y event plus 1' free board (66000 Cu. Ft.). Predevelopment and post-development runoff discharge for the 1-Y, 2-Y, 5-Y, 10-Y, 25-Y and 50-Y were calculated. Volume and discharge for the 1" to be retained and released over 3 days was calculated. Routing of storm events was conducted vs. pond volume and controlled release. Orifice size was computed to balance runoff storage Vs. runoff release at predevelopment runoff discharge for all Rain-Events as per Chatham County Stormwater Ordinance. Refer to drainage calculations page 11 highlighted lines. An outlet orifice of 14" controls discharge released at calculated predevelopment values or less for all regulated rain-full events. Page 12 shows 1" rainfall volume is retained and released over 2.88 days period using 1.5" drain pipe. (Refer to sheet 12 of the plans for detailed design of Dry Pond # 1)
- Page 13 shows calculations for outlet pipes, 18" Pipe out of control box, pond # 1 and 24" Pipe out of control box, pond #2 can handle the 50-Y predevelopment discharge. The emergency spill can handle emergency storm events over the 50-Y storm events
- Forebays are added as an energy dissipaters and pretreatment device. Slope drains were added to convey stormwater to the ponds and protect slopes against erosion.

Pones cross-slopes are 3/1 to protect against erosion and better standing vegetation . All routed Q. Values for 1-yr, 2-yr, 5-yr, 10-yr, 25-yr and 50-yr are less than Q. pre-development See sheets 11 and 12 of Calculation with the highlight. The was 2 miscalculation of the Pr-Dev Q, corrected on

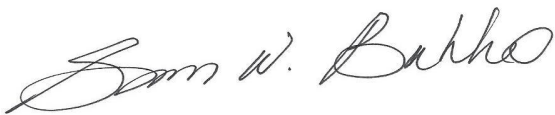
**Stormwater Devices Operation and Maintenance Manual:** sheet 12 of calculation

- Included in the package Dry Detention maintenance and inspection guidance measures taken from Chatham County Web as a manual.
- An Homeowner Association is to be formed to oversee and be responsible for the maintenance and inspection of the ponds
- Access Easement is provided to allow County Inspector to do regular inspection and as defined by the Ordinance



- Before an association is fully established, the owner/developer shall be responsible for maintenance and regular inspection of the ponds
- Inspections shall be conducted, inspection reports prepared on a regular bases as regulated by County Ordinance. After completion of the Pond devices and construction approved by Chatham County, it is recommended to conduct at least 4 inspections the first year after completion until the ponds are stabilized. It is recommended to conduct a minimum of yearly inspection after the first year and submit a report to Stormwater Administrator , Chatham County
- Inspection shall be conducted by and inspection reports issues by a registered engineer, landscape architect, or person certified by NCSU for Stormwater Inspection and Maintenance
- The Entity responsible for maintenance of the detention basins and the Professional conducting the inspection shall use The Stormwater Inspection Reports and Dry Detention Basin literature and manuals issued by the Chatham County and posted on the County as guide to maintenance and inspection
- Easements shall be provided for all components of the ponds and access to maintenance. Easement shall be platted and recorded.
- The Entity responsible of maintenance shall sign Maintenance and Inspection document. The Document shall be recorded.

2 Stream Crossings of septic lines are proposed as a part of this project. Crossing was limited to only 2 crossing. Rest of septic lines do not impact creeks and can be done as a part of construction of houses. Locations of houses and septic fields can not be determined at this time.. The work in the easement area included with the project are counted as part of the disturbed area. Sheets13 and 14 detail construction of the septic lines across the streams in stages



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