



### Donated Projects Plan Review Checklist

The following should be included if applying for public water/sewer through Donated Projects: **Please upload all project submittals/revisions via Accela website ([aca.accela.com/charlotte](http://aca.accela.com/charlotte))**

- Set of plans (on 24x36 – ARCH D size) *digital copy only*
- Topo map showing the drainage basin, topo lines with elevations at every 10 ft labeled, and your project (proposed sewer, existing sewer, property lines, and streets) *digital copy only*
- Copy of as-builts and mark tie-in point (can be obtained by emailing [cmuasbuilts@ci.charlotte.nc.us](mailto:cmuasbuilts@ci.charlotte.nc.us))
- Check for plan review/inspection fees (these are collected up front and review will not begin until plan review fees have been paid)

#### Cover Sheet (General)

Include the following information and blocks on cover sheet:

1. NC Professional Engineer Seal and Signature - *needs to be on every page*
2. CLTWater title block
3. CDOT note (*if applicable*) and towns
4. CLTWater legend
5. Design company, survey company, and developer (including contact person, phone, mailing address, and email addresses) and Plan Reviewer, Contractor, and Inspector – *bottom left side of page*
  - a. **NOTE: The developer information on cover sheet must match the information that will be used in the contract and start letter.**
6. Vicinity map: show and outline project location (can be a dot, arrow, hatch, etc) and closest major thoroughfare intersection with the major streets labeled and North arrow. *Vicinity map does not have to be to scale.*
7. Sheet index
8. Add “MUNICIPALITY: \_\_\_\_\_, NCDOT ENCROACHMENT NO. \_\_\_\_\_, CDOT PERMIT NO. \_\_\_\_\_, and NCDEQ PERMIT NO. \_\_\_\_\_” - *if applicable*
9. Encroachment and Permit Summary Table

Cover Sheet should include the following:

1. Scales: For SF/MF Use 1:40, 1:50, 1:60, 1:100 or 1:200 (for large subdivisions). For Commercial/Industrial use 1:40, 1:50, 1:60 or 1:100
2. North arrow
3. Show entire project boundary lines – *do not label bearing and length*
4. Connecting Streets – label street and note who owns the existing streets (CDOT, SR #, or private, or town maintained)
5. Proposed Streets – label street names and who owns the existing streets (CDOT, SR #, or private, or town maintained)
6. Show lot numbers or building numbers – *if applicable*
7. Adjacent properties – label address number (*the address street name is not necessary*) and tax parcel ID number – **do not include Owner Name or Zone**
8. Gas mains (24” and larger only): label size and owner
9. Duke Power, railroad, and gas right-of-way widths (*if applicable*) with deed book and page number
10. Use sheet designations for larger projects (5 sheets and up)

Do not show on cover sheet: trees, sidewalks, planting strips, sewer laterals, water services (for 3/4” residential meters), storm drains, small gas main (4” and smaller), underground electric, underground telephone, fiber optic, underground cable, overhead electric (unless if large transmission line), casing, bore pit, and receiving pit, roadway centerlines for anything larger than 40 scale



Do not fill in revision boxes until the plans have been permitted and the plans need to be revised. Please give a brief description of what triggered the revision (e.g. shifted lot line at lot 35 & 36). *Changes made between reviews are not to be considered revisions.*

### **Cover Sheet (Sanitary Sewer)**

Show Existing Sanitary Sewer:

1. Draw existing SS lines and direction of flow. Label Width, Job#, and File#
2. *NOTE: GIS ID'S will only be necessary if located in the Central Business District or if the GIS ID is needed for additional clarity*
3. Existing Sewer right-of-ways (not shaded) and widths
4. Existing Manholes (not shaded) – *call out as EX MH*

Show Proposed Sanitary Sewer:

1. Proposed on-street sewer lines: provide length and show flow direction
2. Proposed off-street sewer lines: Provide length, bearing, and show flow direction
3. Proposed Manholes (shaded)
  - a. Callout MH#'s for both on and off-street sewer
  - b. Number consecutively beginning with the first proposed downstream manhole (should begin with EX MH, then the first proposed manhole will start with MH-1 and be numbered consecutively from there. For new phases restart the numbering back to MH-1)
  - c. Proposed sewer easements (shaded): provide widths and bearings for off street sewer
  - d. Doghouse manholes – distance and bearing from doghouse manhole to upstream and downstream manhole

### **Cover Sheet (Water Distribution)**

Draw and Label Existing:

1. Water mains: label size, Job #, File #
2. Valves, tees, crosses, and significant appurtenances drawn (not shaded) and called out (include size and type) (Example: EX 6" GV – existing 6" gate valve)
3. Fire hydrants drawn (not shaded) and called out – include distance to existing fire hydrants
4. Shut-off Valves drawn (not shaded) at tie in location (i.e. next GV or BFV location) and callout the distance from the project to the valve.
5. *NOTE: GIS ID'S will only be necessary if located in the Central Business District or if the GIS ID is needed for additional clarity*

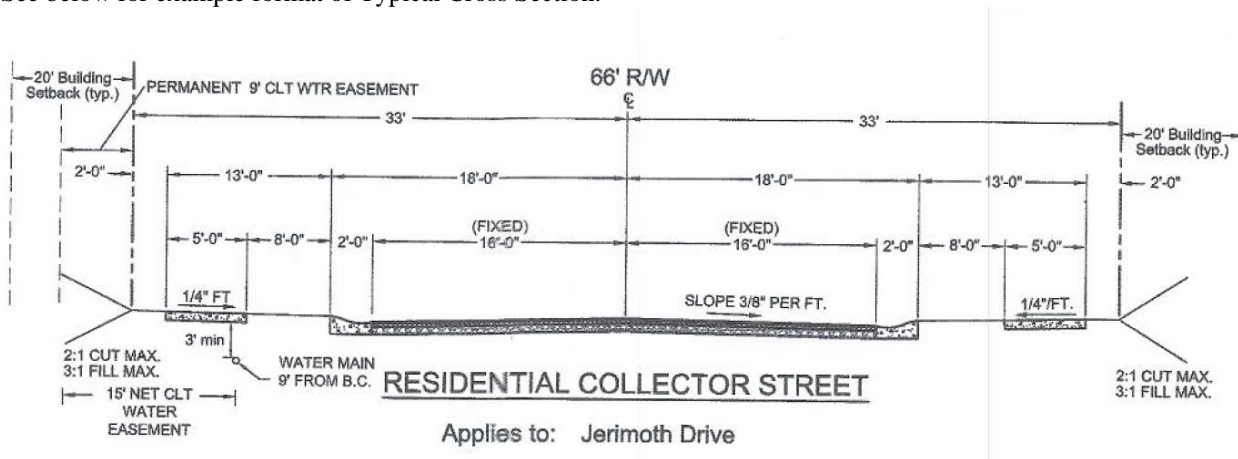
Draw and Label Proposed:

- a. Water lines (bolder than road features): *Label sizes and length*
- b. Fire hydrants (shaded): *show on sheet large enough to see, but do not label*
- c. Valves (shaded): *show on sheet large enough to see, but do not label*

**Permit Sheet**

1. NC Professional Engineer Seal, Sign and date permit form
2. Application for Water/Sewer Extension Permit – *if applicable*
3. CLTWater Donated Projects General Notes – **contact ([IDSplansubmittals@charlottenc.gov](mailto:IDSplansubmittals@charlottenc.gov)) for most recent general notes**
4. Show typical street cross sections and include: (see example below)
  - a. Building setback lines
  - b. Location of proposed water lines: 1' inside sidewalk (unless design permits otherwise)
  - c. water meters: 1' BOC
  - d. Net 15' Water Main Easement
  - e. Dimensions of: sidewalks, planting strips, pavement, right-of-ways, parking lanes, and additional CLTWater easement (if applicable)
  - f. **Do not include:** Sewer, Storm Drain
  - g. **NOTE:** Submit cross section to CLTWater ([IDSplansubmittals@charlottenc.gov](mailto:IDSplansubmittals@charlottenc.gov)) to determine water line location for non-standard streets during preliminary design phase.
  - h. *Typicals may be shown on the Cover Sheet or Water Distribution Sheet if space is available.*

See below for example format of Typical Cross Section:





### Water Distribution Sheet

1. *Keep entire project on one sheet if possible* using 1"=40', 1"=50', 1"=60' and 1"=100' for single family sites and maximum of 1"=50' scale for multifamily or commercial sites (see Cover Sheet (General) section for additional acceptable scales)
2. In existing road right-of-ways, at bore locations, or complex work zones, use details of 1"=40' scale for construction (Scales of 1:10, 1:20, 1:30, and 1:40 are acceptable for complex work zones)
3. Show NC Professional Engineer Seal Sign

### Water Distribution Sheet: Draw and Label Existing:

1. Water mains: label size, Job #, File #
2. Valves, tees, crosses, and significant appurtenances drawn (not shaded) and called out (include size and type) (Example: EX 6" GV – existing 6" gate valve)
3. Fire hydrants drawn (not shaded) and called out – include distance to existing fire hydrants
4. Shut-off Valves drawn (not shaded) at tie in location (i.e. next GV or BFV location) and callout the distance from the project to the valve.
5. Gas Mains: label size and owner
6. **NOTE: GIS ID'S will only be necessary if located in the Central Business District or if the GIS ID is needed for additional clarity**

### Water Distribution Sheet: Draw and Label Proposed:

1. At all tie-in locations, add note: CONNECT TO EX \_\_ " WM AFTER SUCCESSFUL TESTING & SAMPLING. RP BACKFLOW DEVICES MUST BE TESTED AND CERTIFIED AT EACH LOCATION.
2. Water lines (*bolder than road features*): Label sizes, length, distance from Back of Curb
3. Provide elevation crossings for proposed water over existing sewer
4. Fire hydrants and gate valves (*shaded*)
5. Tees, crosses, bends, valves
6. Show Driveways: *Shade using concrete hatch*
7. Show Sidewalks (*Shade sidewalks using concrete hatch*), planting strips, and parking lanes: Label all widths
8. Easements
9. Storm pipes: call out size. For 24" and larger storm pipes, call out water/storm drain crossing elevations (including ground elevations) and clearance
10. Show BMP's, detention ponds, and sediment basins if applicable. Please note that BMP's cannot overlap CLTWater's easement. Our easement shall not overlap earthen impoundment.
11. Show planned/future community pool sites
12. Dismantlements: Clearly label any dismantlements. Note who will perform the dismantlement (site contractor or CLTWater New Services). A dismantlement application is required for all dismantlement's submitted to CLTWater New Services. The application can be found here:  
<http://charlottenc.gov/Water/Documents/Application%20-%20Dismantlement.pdf>

### Do not show on water distribution sheet:

- a. Manhole Elevation information
- b. Centerline of roadways



### Placement Considerations for Water Distribution:

#### Water Main and Meter Placement:

1. If no ditch line is present, water mains should generally be located 1' inside of the sidewalk and 3' deep, from bottom of sidewalk
2. If ditch line is present or does not have standard street cross section, submit water main distribution sheet and street cross section to CLT Water ([IDSplansubmittals@charlottenc.gov](mailto:IDSplansubmittals@charlottenc.gov)) prior to first review.
3. Maximum of 10 lots on dead-end 2-inch main, maximum of 20 lots on looped 2-inch main
4. Water main alignment is designed along the same side of the road the entire length unless a variance is allowed by CLTWater.
5. Connect all water lines within the project except cul-de-sacs and temporary ends
6. Terminating Water Lines:
  - a. Cul-de-sacs: Terminate 10' past the property line (driveway when applicable)
  - b. Stub Streets: Terminate at the end of pavement/sidewalk
  - c. *Eliminate dead-end mains when possible*
7. Lengths of restrained joint ductile iron pipe and calculations per DIPRA program
8. Water meters (not to be located in future driveways) including irrigation meters
  - a. Minimum 3' between water meter services
  - b. Water meters/services shall be perpendicular to the main and meters directly in front of the property. If lot lines move meters and services may have to be moved to serve the proposed parcel.
  - c. Label if larger than 5/8" or 3/4"
  - d. Water meters must not be placed within 5' of a sewer laterals
9. We accept the following configuration for commercial and residential services:
  - c. For commercial settings we accept splits off of a fire line for irrigation and fire
  - d. For residential settings we accept splits off of service line for irrigation and domestic
  - e. If main is back of curb, we accept individual taps.
  - f. If main is in the street, we accept one tap with split services for the site.

#### Fire Hydrant Placement:

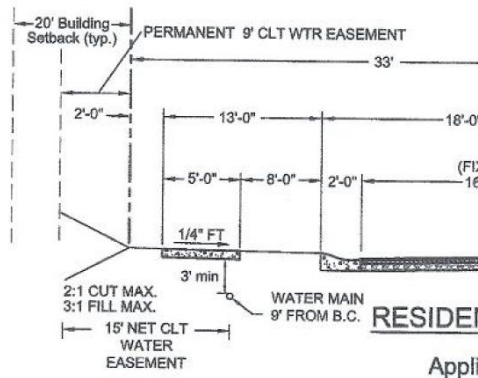
1. FHS in intersections should be placed at the curb radius point (place 15' from curb radius point if ADA ramp is present). Typically place FH 6" BOC, otherwise submit to CLT Water ([IDSplansubmittals@charlottenc.gov](mailto:IDSplansubmittals@charlottenc.gov)) prior to first review
2. Try to keep FHS at entrance of subdivision.
3. Keep FHS at lot lines and not in the center of lots
4. FHS may not be placed behind on-street parking

#### Gate Valve Placement:

1. Gate valves will be required at the following locations: (At intersections, GVs must be located 15' past curb radius point if ADA ramp is present)
  - a. Any change in pipe diameter: 1 GV required
  - b. At tees: two GVs required
  - c. At crosses: three GVs required
  - d. GVs will be 3' from tees or crosses at other locations
2. Gate Valves in intersections should be placed at the curb radius point (place 15' from curb radius point if ADA ramp is present).



Easements: A net 15' is required for all proposed water mains. For example, if a proposed water main is 5' from the R/W line we would require a 10' easement. Water lines shall be no closer than 15' from buildings/building setback line behind the R/W line. No buildings/structures of any kind are permitted in our easement.



#### Water Mains inside NCDOT R/W:

If water line is inside NCDOT R/W, the proposed water line cannot be more than 10' deep without getting an active shoring detail from a Geotechnical Engineer. NCDOT will only approve on a case by case basis. In general, if a water line is 3' deep it must be a minimum of 8' off edge of pavement due to the states' 1:1 + 5' rule. Water mains must be 3' deep based on edge of pavements. Valves and Fire Hydrants are not to be placed in ditch lines or side of ditch lines and near culverts. To get an encroachment from NCDOT please send the following:

- a. NPDES-1 Form signed and sealed by engineer
- b. Typical trench detail (must show depth, distance off edge of pavement, and distance from R/W line)
- c. Bore pit with receiving pit detail (must show the depth of bore pit and receiving pit, distance off edge of pavement, distance from R/W line, width of pavement, depth of utility line, and length of utility line) if applicable
- d. Encroachment map on legal size sheet
- e. Traffic Control Plan if inside 1:1 or pavement cut is required

#### For water mains inside CDOT Roads, developer is responsible for the following:

1. Acquiring pavement degradation permits and paying applicable fees
2. Obtaining CDOT R/W use permit before beginning construction.
3. Include CDOT Note on plans: Email ([IDSplansubmittals@charlottenc.gov](mailto:IDSplansubmittals@charlottenc.gov)) for note

#### Conditions that Require Water Distribution Profiles:

1. Water Mains 16" and larger will require profiles
  - a. STA 0+00 should start with an existing BFV or GV
  - b. Must have air releases at high points
2. Projects in Central Business District (CBD) and complex worksites require stationing and profile
3. Engineer may require stationing and profile as needed (e.g. creek crossings, culverts, high pressure gas mains)
4. Profiles and cross sections required when water main is near large culverts or retaining walls. Retaining wall tie-back geogrid influence area must be clearly indicated; water main and water main easement must be located outside influence area



## Sanitary Sewer Plan and Profile Sheets

### Sanitary Sewer Plan View

1. Show NC Professional Engineer Seal Sign
2. Plans begin at existing sewer system and progress with proposed manhole (shaded) numbering and stationing in ascending order. *Label any sheets accordingly with profile view.*
3. CLTWater sewer GIS ID # on existing sewer where the project will tie-in
4. Show sidewalks and driveways – **shade using concrete hatch**
5. Show and label (per CLTWater legend) existing road features:
  - a. Utilities, mailboxes, driveways, roadside ditches, culverts, retaining walls, etc. for extensions that parallel existing roads and at connection points.
  - b. Retaining wall tie-back geogrid influence area must be clearly indicated. sewer main and easement located outside influence area
6. Show and Label Adjacent property address and tax parcel ID number – *do not include Owner Name or Zone*
7. Off Street Sewer (all sections): label bearings, distances, flow directions, and 20' easement width (shaded)
8. Storm drain systems: Show sizes and easements
9. Manholes: Label type of frame and cover for each manhole. Labeling preference is MH#, STA#, and F&C type in that order.
10. Doghouse Manholes: Call out doghouse manhole. Show upstream and downstream manhole inverts. Show lengths and bearings from doghouse manhole to upstream and downstream manhole
11. Show water lines, sizes, fittings, and laterals; reference Water Distribution Sheet number for detailed labeling
12. Show BMP's, detention ponds, and sediment basins if applicable.
13. Planned/future community pool sites should be clearly indicated

### Sanitary Sewer Profile View

1. 1"=40' horizontal scale and 1"=4' vertical scale
2. Profile view should be directly over plan view when possible and run left to right (downstream to upstream)
3. Stations begin at existing sewer system and progress with proposed manhole (shaded) numbering and stationing in ascending order
4. Match lines at manholes only, label corresponding sheet numbers in plan view
5. Provide road profile 300' past the property line at stub streets
6. Pipe:
  - a. Slopes calculated to 2 decimal points (0.00%)
    - i. 8" SS min slope is 0.60%.
    - ii. SS Max Slope is 10.00%. \*See below for exceptions
  - b. DIP pipe is not shaded. PVC pipe is shaded.
  - c. Pipe must have a minimum of 3' cover from top of pipe to finished grade
  - d. \* High Velocity Sewer Mains, with a maximum of 19% slope, may be allowed in situations where all of the following conditions are met:
    - i. 8 inch diameter pipe only.
    - ii. Maximum 19% slope
    - iii. Minimum design flow of 20 upstream single family lots or equal design flow(250x20 or 5000 GPD).
    - iv. Maximum design flow depth, limited to ½ pipe diameter.
    - v. If design velocity is greater than 10 ft/sec, the pipe shall be minimum SDR26 PVC pipe.
    - vi. If design velocity is greater than 15 ft/sec, the pipe shall be DIP.
    - vii. No drops permitted in the slopes greater than 10 % or at a downstream manhole.



- viii. Deflection angle in manholes and downstream manhole shall be less than 45 degrees.
- 7. Match crown of smaller pipe to crown of larger pipe
- 8. Sewer pipe depths should not exceed 14' especially for on-street sewer. *Off-street/trunk sewers are subject to CLTWater approval.*
- 9. Manholes:
  - a. Must have 0.20 ft. drop between INV IN and INV OUT.
  - b. Minimum manhole depth is 4'
  - c. Label:
    - i. all inverts
    - ii. manhole number for each incoming pipe
    - iii. Inside/outside drop information when applicable
- 10. Drop manholes: drop manholes are not preferred and should only be used in cases where there are utility conflicts or steep slopes (over 10%)
  - a. All Drops:
    - i. 5' from rim/grade to top of incoming pipe - label elevation and add note "5' MIN FROM FINISHED GRADE TO TOP OF PIPE"
    - ii. 0.2' drop is required between INV IN (at the base of the manhole) and INV OUT on 15-inch and smaller diameter mains
  - b. Inside Drop: allowed in 5' diameter and larger manholes; *unpiped inside drops are not permitted*
  - c. Outside Drop: minimum 2 1/2' outside drop structure from bottom of pipe to invert "in" elevation at the manhole base
- 11. Storm Drain Systems: Draw inside and outside diameter of parallel storm drain and crossings. Label pipe size and type, and label pipe crossings
- 12. Show/label water lines, gas mains, utility crossings information in profile
- 13. For off-street sewer where fill is to be added, use DIP.

<b>Maximum Depth of Cover - DIP</b>				
Pipe Size	Pressure Class	Bedding		
		Type I	Type II	Type III
8"	350	20'	34'	50'

For other sizes please refer to the Sewer Specifications/Details on Page XV-31 in the Design Manual

**Sewer System Placement Considerations**

- 1. Provide recorded document if proposed sewer is to be installed in existing easement
- 2. Sewer mains:
  - a. Must have minimum 2' from center of pipe to edge of pavement
  - b. Keep sewer mains towards center of street when possible
  - c. SS should terminate in a street with the exception of trunk lines that will be extended along a drainage pattern in the future
  - d. Should not cross under retaining walls; when allowed by CLTWater under hardship conditions, casing pipe is required within influence zone
  - e. Shall be no closer than 10' from buildings
- 3. Clearance between SS Mains and Storm Drains/Water Mains:
  - a. For clearance less than 24", 20' length of DIP pipe must be centered at storm crossing
  - b. If the SS Main is to be installed over top of the storm drain, the SS Main must be DIP
  - c. If the sewer lateral is to be installed over top of the storm drain, the lateral must be DIP.
  - d. If the sewer main is to be installed within 18" vertically of a water main, then both the water main and the sewer main must be DIP.
- 4. Off street sewer:
  - a. **Must have 20' easement width (shaded)**



- b. Sewer Easements cannot overlap the following: Structures, BMP's, Earthen Impound, Building Setback lines
  - c. Storm Drain can only cross SS perpendicular and is not otherwise permitted in SS easement
  - d. Easements paralleling streams should be 10' from edge of easement to top of bank.
  - e. No easements shall be located in SWIM buffer unless approved by the engineer.
  - f. Proposed sewer to be installed in an off-street fill area must be DIP. In lieu of DIP, PVC sewer can be installed with structural fill (Compaction report and proper stationing documentation required if using structural fill)
5. **SS running between lots:**
- a. Must have 20' easement width
  - b. Must be PC 350 DIP with Protecto 401 lining – *from rear of the property line to the street R/W line at a minimum*
  - c. No casing is required
  - d. A variance for the DIP requirement may be granted with a 30' easement width - *subject to CLTWater approval*
6. Planned/future community pool site must be clearly indicated; the lateral that serves the pool must be 4-inch diameter only. A separate lateral for other pool/clubhouse facilities may be larger than 4-inch if necessary
7. Outfalls that parallel creeks should be designed with the top of pipe a minimum of 2' below the creek flow line (show/label in profile) and with horizontal consideration of Streamside Zones (show/label in plan view). Manhole rims or vents must be 2' above the 100 year flood elevation (show/label in profile). Manholes and all sewer shall be minimum 10' off top of bank.
8. Drainage patterns that continue beyond the limits of the project must be served by providing acceptable horizontal and vertical locations of the proposed sewer system and dedicating any necessary easements within the project beyond the CLTWater required termination point of the pipe. Include profile 300' past the project property line
9. Outfalls that parallel impounded water (lakes and ponds) shall be ductile iron pipe when more than 6 feet below full pond. Anti-seep collars required to prevent groundwater movement along trench; bedding shall be flowable fill to spring line
10. Sewer lines that terminate at a proposed subdivision entrance must be designed at an acceptable vertical and horizontal location to allow future street main extensions. If subject to future extension, the terminal manhole shall be located on the shoulder of the road.
11. Existing sewer with proposed fill will require plan and profile. Must clearly indicate proposed fill over existing sewer main.
12. Manholes:
- a. In subdivision streets, place manholes in middle of the street. In curves, keep minimum 4' from center of manhole to edge of pavement
  - b. In subdivision streets, for town of Huntersville only, place manholes in middle of travel lane. In curves, keep minimum 4' from center of manhole to edge of pavement
  - c. In stub streets, terminate 7 ½' inside edge of pavement
13. Laterals:
- a. Sewer laterals must not be placed within 5' of a water meter
  - b. Note size if larger than 4-inch
  - c. Driveways: Sewer cleanouts should ideally be placed outside of driveways (*minimum 2' away from driveway*). If the cleanout must be placed in the driveway, call out standard detail FF, but don't show the detail.
  - d. All sewer laterals shall be perpendicular to the mains
  - e. Laterals cannot be any closer than 7' apart, and cannot be closer than 7' from the side of a manhole (*though laterals can enter directly into a manhole*)



- f. 4" laterals, that enter a manhole, must be spaced at least 35° apart
  - g. Terminal manholes have a maximum of 3 laterals.
  - h. Sewer cleanouts are not allowed within a public R/W.
  - i. A private manhole is required behind the R/W line when private sewer is connecting to public sewer – if private sewer size is less than 8 inches, a cleanout is acceptable in lieu of a private MH
14. Sewer inside NCDOT R/W
- a. Any depth greater than 10' deep require an active shoring detail from a Geotechnical Engineer and will only be approved on a case by case basis
  - b. In general, if a sewer manhole is 10' deep, it must be a minimum of 15' off edge of pavement (due to the states' 1:1 + 5' rule)
  - c. Manholes are not to be placed in ditch lines or side of ditch lines and near culverts.
  - d. To get an encroachment from NCDOT please send the following:
    - i. NPDES-1 Form signed and sealed by engineer
    - ii. Typical manhole detail (must show depth, distance off edge of pavement, and distance from R/W line)
    - iii. Bore pit with receiving pit detail (must show the depth of bore pit and receiving pit, distance off edge of pavement, distance from R/W line, width of pavement, depth of utility line, and length of utility line)
    - iv. Encroachment map on legal size sheet
    - v. Traffic Control Plan if inside 1:1 or pavement cut is required
15. Sewer and Easements for Future Extension: A sewer extension shall follow the drainage pattern in the proposed development. In some cases, proposed stubbed out sanitary sewer will be required to serve the upstream drainage basin. In other cases, a proposed sanitary sewer easement shall be required to serve the upstream drainage pattern to serve future developments and future CLTWater customers.

### **Low Pressure Sanitary Sewer (LPSS)**

The following will need to be included in your submittal:

1. ASEA 04-16 (<http://deq.nc.gov/about/divisions/water-resources/water-resources-permits/wastewater-branch/collection-systems/sewer-extension-permitting>) – **1 original, 1 copy**
2. FTSE 04-16 (<http://deq.nc.gov/about/divisions/water-resources/water-resources-permits/wastewater-branch/collection-systems/sewer-extension-permitting>)
3. Developer Operational Agreement (DEV) or Homeowners Operational Agreement (HOA) if applicable (<http://deq.nc.gov/about/divisions/water-resources/water-resources-permits/wastewater-branch/collection-systems/sewer-extension-permitting>)
4. Watershed Stream Classification Form: WSCAS 01-15
5. Sketch of your LPSS model showing the nodes used
6. Three year power outage history for the area being served from power company (Duke Energy, Town of Pineville, etc.)
7. FIRM Map (can be obtained from our POLARIS webpage)
8. Grinder Pump Specifications
9. Customer Brochure (must include pump tables for all lots and copy of CLTWater's Standard Details #5 & #8) – **2 copies**
10. Application Fee \$480.00 payable to NCDEQ (if not using express permitting)
11. Site Map (USGS map)
12. Detailed Plans – **2 copies**
13. Engineering Report – **2 copies**



- a. Cover Page sealed by PE
  - b. Table of Contents
  - c. Cover letter to NCDEQ (tell them what you are submitting and how much the check amount is)
  - d. Form ASEA 04-16
  - e. Form FTSE 04-16
  - f. Form WSCAS 01-15
  - g. Site topographic map (USGS maps are great)
  - h. Project Narrative (describe the project, location, and any unique features about the project)
  - i. Model calculations (computer model print out) and pump curves
  - j. Sketch of model and all zones and nodes labeled (should match the model calculations)
  - k. Flow calculations
  - l. Letter/email from power company outlining the power outage history for the past three years
  - m. Wetwell reliability requirements calculations (there should be sufficient storage in the wetwell for the longest period of time the power was out)
  - n. Flotation resistance calculations (concrete ring around the wetwell)
  - o. Flood Insurance Rate Map (FIRM) available for download on POLARIS
  - p. Variance letter (ask your plan reviewer for a copy of this letter)
  - q. Grinder pump, wetwell, controls, and alarm specifications
14. Overall LPSS sheet (shows the overall big picture of the LPSS with the nodes labeled so they can be matched up with the model that was used, and zones labeled)
15. Model used to design the LPSS system (i.e., copy of the WaterCAD, SewerCAD, or Excel file used to design the system)
16. Station numbers must be included on both plan and profile for all wyes, reducers, air releases, valves, and bushings. The stationing for a cleanout assembly is not required in the profile. Additional stationing on branch off fittings required on as-builts.

In addition to what is already required on the gravity sanitary sewer plans each plan sheet should include the following:

1. Pump tables for each lot shown on the sheet (example below)

PUMP INFORMATION LPSS – (STREET NAME)				
ADDRESS (OR LOT #)	TAX PARCEL ID NO.	APPROX. PUMP ELEVATION	PUMP DESIGN POINT (GPM/TH or TDH) SHUT OFF TH = XXX	APPROX. TOP OF WET WELL ELEVATION
9300	199-391-18	570.76	28.06 GPM – 39.63 TH	576.26
9316	199-391-17	588.23	26.54 GPM – 43.35 TH	593.73
9332	199-391-16	585.59	17.34 GPM – 60.22 TH	591.09

2. Show the “BASE FLOOD ELEV = \_\_\_\_\_” on each plan sheet
3. Include the following notes for the grinder pumps used:
  1. PUMP CURVE FROM MYERS WGL20 2 HP DUAL SEAL GRINDER WITH 4-1/2” IMPELLER USED TO DETERMINE FLOW RATE.
  2. WETWELL FOR THE RESIDENTIAL GRINDER SHALL BE 3’ DIA. x 6’ DEEP.
  3. SERVICE BOX TO BE LOCATED DIRECTLY OUTSIDE OF R/W OF (NAME OF STREET)



4. EACH SERVICE INSTALLED ALONG (NAME OF STREET) SHALL BE 1-1/2" PER CLTWATER STANDARDS.
5. GRINDER PUMP WETWELL SHALL HAVE WATER TIGHT COVER WITH A VENT 2' ABOVE THE BASE FLOOD ELEVATION.
6. POSITIVE DISPLACEMENT PUMPS ARE NOT PERMITTED.
4. When designing the LPSS system do not use 190 gpd for your flows. Use 250 gpd/lot per NCDEQ requirements.

The LPSS line should be sized to serve all future extensions and should be included in the model. A separate sewer sheet showing the overall area and a table for all lots with the appropriate size grinder pump shall be included. Examples can be provided upon request.

To determine the flow rate for LPSS we use:

$$Q = 15 + \frac{1}{2}D$$

Q = Flow in gpm

D = Number of dwelling units

### Regional Pump Stations

1. Drainage basin map showing the entire drainage basin the pump station is intended to serve, the projected flows for the drainage basin, and proposed flows for the project. If drainage map cannot fit on one sheet call Donated Projects to discuss the scale to be used.
2. Fee Simple Deed for the entire pump station site deed to the City of Charlotte (must include the pump station site, overflow containment basin, area around the basin to adequately maintain it, access road, truck turnaround, and access up to a public street)
3. Operation and Maintenance Manuals
4. Engineer's report/calculations
5. Electronic file used to model the pump station
6. Shop drawings required for all pump station (PS) and force main (FM) components.
7. Electrical drawings for PS
8. Shop drawings for terminal points for tracing wire system. Terminal points are required no more than 1,000 ft intervals.
9. Shop drawings for FM markers
10. PS with less than 2 MGD or pumps of 150 hp or less shall have submersible type pumps.
11. Calculations on the PS sheet should include the following:
  - a. Total dynamic head (TDH)
  - b. System curve/pump curve used to determine pump selection and operating point
  - c. Detailed surge analysis under all operating conditions
  - d. Pump Station cycle and pump run times
  - e. Pump Station flotation/buoyancy calcs
  - f. Available emergency storage capacities at average and peak flows
  - g. Min velocity in FM
  - h. Max detention times within the PS & FM
  - i. Downstream sewer evaluation demonstrating that the pump discharge will not overload the receiving sewer.
12. Pumps shall be non-clog type designed and manufactured for use in conveying raw, unscreened wastewater
13. Pump suction/discharge openings shall be no less than 4" in diameter
14. Calculate PF (min is 2.5) using:  $PF = \frac{Q_{phf}}{Q_{ddf}} = \frac{18 + \sqrt{P}}{4 + \sqrt{P}}$