TABLE OF DETAILS

Street and Storm Drainage "Record Drawings" Submittal Requirements

The following identifies the requirements, information, and format for submitting Record Drawings to the Engineering Department for review and approval. Record Drawings shall be submitted for any street and storm drainage infrastructure proposed for maintenance by the City of Greenville. Record Drawings shall be submitted and approved prior to scheduling of the pre-final street acceptance inspection.

All Record Drawings shall include, but not necessarily be limited to, the following:

1. Streets:
   - A. Centerline horizontal location and final surface elevation:
     - a. intersections - crossing of street centerlines
     - b. points of vertical inflection (pvi) - street centerline at point of inflection
     - c. radius points of cul-de-sacs
     - d. radius points for "hammerheads"
     - e. beginning of pavement construction (street centerline)
     - f. end of pavement construction (street centerline)

2. Stormwater System:
   - A. Stormwater Pipes (Including flared end sections)
     - a. Size
     - b. Shape
     - c. Material
     - d. Length
     - e. Slope

   - B. Structures (Junction Box, Drop Inlets, Catch Basins, Interference Boxes, Outlet Structures)
     - a. Rim/hood elevation
     - b. All pipe invert elevations
     - c. Material

   - C. Level Spreaders / Flow Diffusers
     - a. Length
     - b. Material
     - c. Depth
     - d. Width

The following standards shall be followed for collection and submittal of all record drawings:

Data Collection:

- Survey data collection can utilize conventional surveying methods, GNSS/GPS surveying methods, or a combination of both.
- Coordinate System: State Plane North Carolina 3200.
- Horizontal Datum: NAD 83 (2011); Vertical Datum: NAVD 88. GEOID Model: GEOID12B or the current Model as published by National Geodetic Survey (NGS).
- Unit of Measurement: US Survey Foot.
- All work shall be "Class A" (1:10,000) surveying standard and performed in compliance with the Standards of Practice for Land Surveying in North Carolina, 21 NCAC 56.1600.
- When using GNSS/GPS for data collection of structure control points, the observation to be a minimum of 180 epochs with a tolerance of 0.04' horizontal, and 0.07' vertical.
- The North Carolina Real-time Kinematic Network or NGS published stations with NAD 83 (2011) positions are to be utilized for control.
- Storm Water System Data Collection:
  - Each drainage structure is to be located by a single "Structure Control Point" for horizontal and vertical position. The point is to be marked with paint in the field. Control point observations are not required for inverts of pipes within structures. Measuring down from the control point to the inverts is a generally accepted surveying practice.

    - Catch Basin - center of the hood at back of curb line
    - Drop Inlet or Yard Inlet - center of the grate
    - Junction or Conflict Box - center of the manhole cover
    - Pond Outlet Structure - top center of the structure, grate or manhole cover
    - FES - top of the pipe section before the start of the flare
    - Pipe End, bell or socket - top of pipe at pipe end
    - Headwall - top center of the headwall above the pipe(s)
    - Level Spreader - top center of the structure

Certification:

- The Professional Land Surveyor shall sign, seal, and certifiy the record drawings for the horizontal and vertical information. Certification to be in compliance with Standards of Practice for Land Surveying in North Carolina.
- The Professional Engineer shall sign, seal, and certify in accordance with detail C30.02.

Record Drawing Submittal Process

The submittal process for the review and approval of Record Drawings is as follows:

1. Submittal of Record Drawings

   a. Submit either a contractor's "red-lined" mark-ups of approved construction drawings or an electronic submission of approved construction drawing with changes to the above "clouded" based on a contractor's "red-lined" mark-ups to the Engineering Department's Land Development Division online at the City's Customer Self Service Portal.

      i) Only changes from the approved construction drawings need to be presented.

      ii) The "red-lined" information will have a single line placed through it with the revised information or measurement placed next to it.

      iii) If an electronic drawing is submitted in place of the contractor's red line drawings, then a single line will be drawn through the errant information. The correct information will be placed next to the errant information and a "cloud" will surround both.

      iv) A licensed professional engineer with the State of North Carolina (either the engineer of record or one hired by the developer) shall also be responsible for reviewing and certifying the contractor's red line mark-ups of approved construction drawings prior to submittal to the City of Greenville.

   b. Submit storm drainage calculations

      i) The engineer shall review the Record Drawings to determine and establish if any construction deviations will impact positive storm drainage flow throughout the system or place the system out of compliance with the City of Greenville requirements.

      ii) The engineer must submit revised storm drainage calculations based on the record drawings for review and evaluation by the Engineering Department, as well as discuss any issue(s) with the City Engineer or his designee to determine a viable solution(s).

   c. Submit concrete load tickets for curb & gutter, valley gutter, and sidewalks. Submit concrete test results for structural concrete.

d. Record Drawings shall be reviewed within ten (10) working days after date of receipt.

i) The benchmark(s) and datum used for measurements of the record drawings shall be conveyed and easily interpreted on the submitted drawings and shall be the same as used for the design of the original approved construction drawings and for construction.

(1) If the referenced benchmark(s) used for design and construction and shown on the approved construction drawings have been compromised, new benchmark(s) must be reestablished to an accuracy on the site from published NGS monuments in accordance with the Standard of Practice For Land Surveyors in North Carolina, N.C.A.C. Title 21, Chapter 56, Section .1600, and by either conventional survey methods or Global Positioning Systems survey methods (21 NCAC 56.1607).

* Revisions to the record drawing submittals or requests for additional information may be required by the City of Greenville staff and may delay approval.

ii) Any exceptions or deviations from the approved construction drawings determined as acceptable by the City Engineer shall be noted on and incorporated as part of the final Record Drawings.

2. Upon approval of all Record Drawings

e. An electronic copy of the Record Drawing shall be returned by the Engineering Department to the engineer with an approval stamp.

f. The engineer shall submit an electronic copy of the drawing in "pdf" format with the following certification:

"I, _____, as a duly registered Professional Engineer in the State of North Carolina, hereby certify that construction of the street(s) and storm drainage infrastructure as presented on these Record Drawings has been competed in substantial accordance with the approved plans and specifications and that the information pertaining to said infrastructure provided by _____ and prepared under the supervision of _____ is correct to the best of my knowledge and belief."

g. The engineer shall also submit an electronic drawing in a version of AutoCad "DWG" format compatible with the City of Greenville's current system. The digital record drawings should be submitted in AutoCAD State Plane North Carolina 3200 drawing format. Each type of stormwater infrastructure should be on its own layer in the AutoCAD drawing (e.g. pipes on one layer, catch basins on one layer, drop inlets on one layer, and junction boxes on one layer).

h. The Engineer's & Owner's Certificate of Completion forms (Std. detail No. C31.01 & C31.02, respectively) shall be submitted to the Engineering Department.

3. A pre-final street acceptance inspection shall be scheduled following approval and completion of all submittal requirements stated above.

Street Acceptance Timeline

The following is a summary of the Street Acceptance Process. Details on the Record Drawing Submittal Process can be found within the document named “Record Drawing Submittal Process” (Std. detail No. C30.02). Details on the Final Inspection Process can be found within the document named “Final Inspections - Subdivision” (Std. detail No. C30.04).

1. Developer completes all construction infrastructure proposed for continuous maintenance by the City of Greenville*.
2. The Record Drawing Submittal Process is initialized with the submission of the developer's contractor's red-lined drawings or electronic drawings with “clouded” changes to the approved construction drawings.
3. A licensed professional engineer with the State of North Carolina (either the engineer of record or one hired by the developer) will verify that the street(s) and storm drainage infrastructure as presented on these Record of Drawings has been completed in substantial accordance with the approved plans and specifications. The engineer will review this information to confirm that the system meets the City of Greenville requirements. If the storm drainage system is not in compliance with the approved construction drawings or the City of Greenville's requirements, the engineer will submit revised storm drainage calculations based on the Record Drawings for review and evaluation by the Engineering Department, as well discuss the issue(s) with the City Engineer or his designee to determine a viable solution(s).
4. Red-lined drawings and stormwater calculations are reviewed within ten (10) working days, unless additional information is required.
5. A pre-final inspection may be scheduled by the contractor with the City Engineer or his designee upon: approval of the Record Drawings; the submittal of the electronic Record Drawings with the certification statement by the engineer; submittal and acceptance of all asphalt thickness and density test results, and the submittal of the Engineer's and Owner's Certificate of Completion forms (Std. detail No. C31.01 & C31.02, respectively).
6. After the pre-final inspection is performed and all punch-list items from the pre-final inspection are completed, the final inspection with the City Engineer may be scheduled - this will be coordinated through the City Engineer or his designee. Upon notification, the date of the final inspection will be scheduled within three (3) working days.
7. The Contractor has thirty (30) days to complete any additional items found deficient during the final inspection or a re-inspection will need to be performed.

(*) Developer is responsible for meeting all acceptance and inspection requirements for infrastructure proposed for continuous maintenance by the Greenville Utilities Commission.

Final Inspection - Subdivision

INTRODUCTION

As subdivision development nears completion, it becomes necessary for the City of Greenville to conduct a "final inspection" of work performed in anticipation of street acceptance for continuous maintenance by the City. This inspection will encompass review of all aspects of subdivision construction to ensure compliance with approved plans, applicable regulations and standards. So as to maintain consistency and thoroughness in conduction of the "final inspection", the following guidelines are to be followed:

Single family, Industrial, Multi-family, and Innovative Subdivisions:

A. Once the subdivision has been completed, Record Drawings of the subdivision (as identified in the Street and Storm Drainage Record Drawing Submittal Requirements, Std. detail No. C30.01) shall be completed and sent to the City Engineer or his designee for acceptance. These drawings will be reviewed within ten (10) working days after date of receipt.

B. After the Record Drawings have been accepted by the City Engineer and the electronic Record Drawings with the certification statement by the Owner's engineer and the Engineer's and Owner's Certificate of Completion forms (Std. detail No. C31.01 & C31.02, respectively) have been submitted, the subdivision developer shall formally request a pre-final inspection through the Engineer Department's Subdivision Inspector, which may be presented in writing or by telephone. This will allow for the subdivision to be prepared for the final inspection to be conducted by the City Engineer. After all items identified in the pre-final process are addressed, the final inspection may be requested.

C. It will be the responsibility of the subdivision developer or representative to formally request a final inspection through the City Engineer's office. This shall be done in writing by the developer or representative thereof.

D. The Subdivision Inspector will verify status of the involved subdivision to the City Engineer. It will be the Subdivision Inspector's responsibility to ensure the subdivision is constructed according to the approved preliminary subdivision plan and Manual of Standard Designs and Details, unless approved through an official variance or plan revision.

E. Once the subdivision is determined ready for final inspection, the Subdivision Inspector will schedule the final inspection with the subdivision developer or his appointed designee at a time convenient for himself and the City Engineer. It will be the Subdivision Inspector's responsibility to notify the aforementioned persons of the confirmed inspection time within three (3) working days once it has been determined that the subdivision is ready for final inspection.

F. Should the subdivision not be ready for inspection, the Subdivision Inspector will work with the developer to bring the involved subdivision into conformance. This will include, but not be limited to:

1. Streets shall be swept clean up to the gutter line of the curb.
2. Check asphalt pavement, all concrete ramps, sidewalks, and curb and gutter for cracks, alignment, and settlement. The developer is responsible for testing and providing test results to verify the specified thickness and density.
3. Check storm drain manholes and catch basins for proper construction. Pipes within the manholes and catch basins shall be cut off flush with the wall of structure and the end of the pipe grouted and brushed smooth.
4. Look through the pipe to check alignment and to determine if pipe is free of debris.
5. Check headwalls, end walls, and flared end sections. Pipe to be cut flush with face of the wall and grouted and brushed smooth.
6. Right of way monuments shall be placed as required.
7. Right of way to be graded to the proper slope and seeded and mulched before a final inspection can be made.
8. Detention basins shall be completed and functioning.
9. All erosion control measures shall be removed in stabilized areas and maintained in non-stabilized areas.
10. Barricades shall be placed as required.
11. The area from the back of the curb to the right of way is to remain clear of all obstructions other than those permitted by existing policies.
12. Stormwater facility installed and inspected by Stormwater inspector.

G. The final inspection will be performed under the supervision of the City Engineer or his designee. It will be the Subdivision Inspector's responsibility to be familiar with the approved plan, revisions, variances, bond status, and all other administrative details related to the involved development.

H. It will be the responsibility of the Subdivision Inspector to ensure that all deficiencies are properly noted on the Project Inspection Report Form. The form will be completed and signed by the appropriate persons.

I. The Subdivision Inspector will present a copy of the completed Project Inspection Report Form to the Developer (or his representative) and the Contractor upon completion of the final inspection, but no later than the next working day.

J. After each inspection, the developer will have a thirty (30) day limit to correct the deficiencies noted on the Project Inspection Report Form. Otherwise a re-inspection will be scheduled the day after the time limit expires and an updated Project Report Form will be processed.

K. It will be the responsibility of the Subdivision developer to notify the Subdivision Inspector once the deficiencies noted on the aforementioned Project Inspection Report Form are corrected.

L. It will be the responsibility of the Subdivision Inspector to ensure the deficiencies are corrected and in conformance with the approved plan, the Manual of Standard Designs and Details, or as noted on the Project Inspection Report Form. Once the Subdivision Inspector is satisfied that the deficiencies have been corrected, he will so notify the City Engineer.

M. The Subdivision Inspector will distribute the Acceptance of Physical Improvements Form to the City Engineer and the designated representative for Greenville Utilities Commission. Upon return receipt of these forms, the City Engineer will begin proceedings for continuous maintenance, approval of involved record plats, and release of posted bonds. Permanent record will be maintained by the Engineering Department.

Stormwater Control Measures "Record Drawings" Checklists

1. General Requirements for ALL Stormwater SCM Record Drawings

a. The survey for the as-built plans must be completed by a land surveyor registered in the State of North Carolina.

b. Provide two sealed, signed and dated copies for review and approval along with a proposed list of plantings (if applicable) for review and approval before proceeding with planting of the SCM.

2) Wet Detention Pond

a. Outlet Structure Details
   - i. Inverts of all outlets
   - ii. Inverts of all draw down orifices
   - iii. Inverts and dimensions of all weirs

b. Flared End Sections

c. 1' Contours (As-built contours overlaid on approved design contours)

d. 50' cross section of entire SCM (top of bank to top of bank)

e. Spot Elevations
   - i. Bottom of clearing, grubbing, & stripping under dam footprint
   - ii. Bottom of pond
   - iii. Bottom of riser
   - iv. Top of riser
   - v. Water quality orifice
   - vi. Invert of inflow & outflow pipe(s)
   - vii. Permanent pool
   - viii. Top of berm between forebay and main pool
   - ix. Depth of deep pool

f. Top of dam (elevation & width)

g. Normal pool depth (measured from top of sediment storage)

h. Width of vegetated shelf

i. Width of maintenance bench

j. Type & Size of barrel seepage control

k. Size & material of riser/barrel

l. Emergency spillway (width & crest elevation)

3) **Stormwater Wetlands**

a. Outlet Structure Details
   i. Inverts of all outlets
   ii. Inverts of all draw down orifices
   iii. Inverts and dimensions of all weirs

b. Flared End Sections

c. 1' Contours (As-built contours overlaid on approved design contours)

d. 50' cross section of entire SCM (top of bank to top of bank)

e. Spot Elevations
   i. Bottom of clearing, grubbing, & stripping under dam footprint
   ii. Bottom of forebay & micropool
   iii. Bottom of riser
   iv. Top of riser
   v. Water quality orifice
   vi. Invert of inflow & outflow pipe(s)
   vii. Permanent pool
   viii. Top of berm between forebay and micropool
   ix. Depth of pools

f. Top of dam (elevation & width)

g. Width of vegetated shelf

h. Width of maintenance bench

i. Type & Size of barrel seepage control

j. Size & material of riser/barrel

k. Pool elevation at principal spillway

l. Emergency spillway (width & crest elevation)

4) **Bioretention Area**

a. Outlet Structure Details
   i. Inverts of all outlets
   ii. Inverts of all draw down orifices
   iii. Inverts and dimensions of all weirs
b. Flared End Sections
c. 1' Contours (As-built contours overlaid on approved design contours)
d. 50' cross section of entire SCM (top of bank to top of bank)
e. Bioretention surface area
f. Type and dimensions of pretreatment
g. Elevations
   i. Bottom of planting soil
   ii. Top of planting soil
   iii. Top of mulch layer
   iv. Inlet of overflow / bypass structure
h. Ponding depth
i. Underdrain system specifications
   i. Size & type of perforated pipe
   ii. Number of branch lines & spacing width of perforated pipe
   iii. Invert elevation of underdrain
   iv. Invert elevation of outflow pipe at outlet

5) **Underground Detention System**

a. Outlet Structure (See Item 4)
b. Flared End Sections (See Item 5)
c. 50' cross section of entire SCM (top of bank to top of bank)
d. Detention tank or pipe length, width, depth (or diameter)
e. Detention tank material
f. Elevations
   i. Bottom of excavation for detention systems
   ii. Depth of system bedding
   iii. Invert of detention tank/pipe(s)
   iv. Invert of inflow & outflow pipe(s)
   v. Invert of low flow orifice
   vi. Invert of overflow weir or orifice
   vii. Top of manhole covers
g. Temporary sediment max depth
h. Low flow orifice material of construction

6) **Restored Riparian Buffer**

a. 1' Contours (As-built contours overlaid on approved design contours)
b. 50' cross section of entire SCM (top of bank to top of bank)
c. Elevations
    i. Top of distribution device
    ii. Upper edge of Riparian Buffer
    iii. Lower edge of Riparian Buffer
d. Length of distribution device
e. Length of Riparian Buffer
f. Width of Riparian Buffer
    i. Width of grass zone
    ii. Width of forest vegetation zone

7) **Dry Detention Basin**

a. Outlet Structure
    i. Inverts of all outlets
    ii. Inverts of all draw down orifices
    iii. Inverts and dimensions of all weirs
    iv. Size and dimensions of structure
b. Flared End Sections (See Item 5)
c. 1' Contours (As-built contours overlaid on approved design contours)
d. 50' cross section of entire SCM (top of bank to top of bank)
e. Elevations
    i. Bottom of clearing, grubbing, & stripping under dam footprint
    ii. Bottom of basin
    iii. Bottom of riser
    iv. Top of riser
    v. Low flow orifice
    vi. Invert of inflow & outflow pipe(s)
f. Top of dam (elevation & width)
g. Sedimentation basin surface area
h. Width of maintenance bench
i. Barrel seepage control (type & size)
j. Size & material of riser/barrel
k. Emergency spillway (width & crest elevation)
l. Outfall pipe/swale elevations

8) **Sand Filter**

a. Outlet Structure Details
   i. Inverts of all outlets
   ii. Inverts of all draw down orifices
   iii. Inverts and dimensions of all weirs
b. Flared End Sections
c. 1' Contours (As-built contours overlaid on approved design contours)
d. 50' cross section of entire SCM (top of bank to top of bank)
e. Sand filter type
f. Sediment chamber specifications
   i. Bottom elevation
   ii. Depth
   iii. Surface area
g. Sand filter chamber specifications
   i. Elevation at top of filter media
   ii. Depth of filter media
   iii. Filter bed area
h. Underdrain system specifications
   i. Size & type of perforated pipe
   ii. Type & thickness of filters
   iii. Number of branch lines
   iv. Invert elevation of underdrain
   v. Invert elevation of outflow pipe at outlet
   vi. Invert elevation of receiving storm sewer / receiving stream water surface
   vii. Depth of gravel jacket
   viii. Invert elevation of overflow / bypass structure
   ix. Dissipater pad length & width

ENGINEER'S CERTIFICATE OF COMPLETION

To: City of Greenville, Engineering Division

From: _____

Date: _____

RE: Certificate of Completion
Name of Development: _____
Project No.:_____

I, the undersigned here certify:

1. That based upon my periodic inspection, the construction of the street(s) and storm drainage infrastructure for the referenced development has been completed in substantial accordance with the approved plans and specification on record with the City of Greenville dated _____. (Any exceptions must be approved by the City Engineer.)
2. That street(s) and storm drainage infrastructure for the referenced development have been installed as shown on the Record Drawings submitted to the City of Greenville Engineering Division.

_____ _____ _____

SIGNATURE OF PROFESSIONAL ENGINEER DATE

_____

COMPANY

_____

LICENSE NO. SEAL

ENGINEERING DEPARTMENT
Greenville, North Carolina 27834

CITY OF GREENVILLE, N.C. www.greenvillenc.gov

Rev.	Date	Description	Approved
1	9/1/23	APPROVAL	L. KIRBY

ENGINEER'S CERTIFICATE OF COMPLETION

Scale:	Sheet #:	Detail #
not to scale	1 of 1	C31.01

OWNER'S CERTIFICATE OF COMPLETION

To: City of Greenville, Engineering Department

From: _____

Date: _____

RE: Certificate of Completion
Name of Development: _____
Project No.:_____

I, the undersigned here certify:

1. That I am the owner/or authorized representative of the referenced project.
2. That the street(s) and storm drainage infrastructure for the referenced development are in accordance with the approved construction drawings dated _____ and/or subsequent plan modifications as approved by the City of Greenville. That I hereby convey ownership, upon acceptance by the City of Greenville City Council, of all street(s), easements, and storm drainage infrastructure to the City of Greenville as called for on the Record Drawings prepared by_____.
   (Name of Consulting Engineer)
3. That I/we, as the developer(s), guarantee the materials and workmanship as directly associated with, but not necessarily limited to, the installation of the street(s), storm drainage infrastructure, and restoration of any disturbed areas located within the rights-of-way for a period of one (1) year that are proposed for acceptance and maintenance by the City of Greenville. For the one (1) year warranty period, I/we, as the developer(s), shall be responsible for performing all repairs and restoration, as deemed necessary or required by the City, on the street(s), storm drainage infrastructure, and disturbed areas. The one year period shall begin at the date the street(s) and storm drainage infrastructure is formally accepted by the City Council of Greenville. If, for any reason that I/we, as the developer(s), cannot make repairs within a time period accepted by the City of Greenville, we will reimburse the City of Greenville for the cost of any repairs that it deems necessary to make with its own forces including the cost of materials, labor, and equipment.
4. I further warrant to the City that all fees and liens have been paid by the owner such that there is not outstanding indebtedness remaining and holding the City harmless in each instance.
5. That I hereby convey all necessary easements for the street(s) and storm drainage system to the City of Greenville as recorded with the Pitt County Register of Deeds and as described in Plat Book

   _____ Page _____.

_____ _____ _____
NAME (PRINT) DATE SIGNATURE / TITLE

As a duly registered professional in the State of North Carolina, I hereby attest that all required stormwater control facilities for the above referenced project were thoroughly inspected under my responsible charge, and to the best of my knowledge the construction, safety, and function are in compliance with the intent of the approved plans and the City of Greenville and NCDEQ standards and regulations.

_____ _____

SIGNATURE OF PROFESSIONAL ENGINEER DATE

_____

COMPANY

_____

LICENSE NO. SEAL