

**SECTION 100
PRELIMINARY CONSIDERATIONS & INSTRUCTIONS**

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101 General

The Standard Specifications as contained herein are to be utilized as a minimum standard for all subdivision and utility construction projects within the jurisdiction of the Town of Apex.

The purpose of these Specifications is to present standards for typical conditions encountered. All subdivision roadway construction and utility extension projects require that the design services be performed by, or under the direct supervision of, a Professional Engineer licensed to practice in the State of North Carolina. The existence of these Standard Specifications and Details does in no way relieve the Professional Engineer of the responsibility to correctly adapt these standards to the actual site conditions encountered on any project. The PROJECT ENGINEER preparing construction drawings for a specific project must review the applicable portions of these specifications and determine that these minimum standards will function correctly for the project. There may be circumstances whereby the engineer may wish to increase pipe strength classification, bedding requirements, reinforcing, etc. In such situations where changes or modifications are proposed, the Town of Apex should be consulted prior to completion of final design and plan submittal. This will serve to help ensure that the plan

review time is minimized. Such deviations from the TOWN'S minimum standards receiving such preliminary approval by the Department Director shall be clearly indicated at one location on the construction drawings, and labeled, "**Exceptions to the Standard Specifications of the Town of Apex**".

Each set of plans for subdivision construction and/or utility extension which is submitted to the Town of Apex for review shall have affixed to the cover sheet or first sheet, the following note and certification:

These improvements shall be constructed in accordance with the following drawings and with the Standard Specifications of the Town of Apex.	
I, _____, PE, certify that the Standard Specifications of the Town of Apex have been thoroughly checked and found to be applicable to this project. All exceptions to the applicable Town Standards have been previously approved by the Town of Apex and said exceptions are shown on sheet(s) _____ of these drawings.	
S E A L	By: _____, PE
	Date: _____

Projects shall be constructed according to the Standard Specifications in effect at the time the project is submitted to the TOWN for initial review.

If construction of the project or phase of the project does not commence within 12 months after the date on which the final construction plans were approved, the approval shall be null and void. If a project approval is deemed null and void, all preliminary submittal procedures shall be repeated, and the resubmittal shall reflect any revisions in the Apex Standard Specifications and Details in effect on the date of the resubmittal. Upon written request, the TOWN may extend the approval of any project 12 months if the request is made within 12 months of the original approval.

The project contractor shall have at least 1 complete set of approved plans signed by the Town of Apex and specifications (including Town of Apex Standard Specifications and Details) at the job site at all times that work is being performed.

102 Submittal Requirements

Persons desiring to construct subdivisions or other utility extensions within the jurisdiction of the Town of Apex must submit **final** construction drawings **sealed** by a Professional Engineer licensed to practice in the State of North Carolina. The submittal shall be made to the Development Services office. Submittal of the construction drawings shall be made only after the project has received Site Plan approval.

The submittal process shall be as described below:

A. Initial Submittal

For the initial review, the following items shall be submitted:

- 1) Final Construction Plans –1 electronic file submittal through IDT Plans. The plan size and content shall conform to the requirements outlined in Section 103 hereof.
- 2) Storm Drainage Computations – 1 electronic copy of complete storm drainage calculations, maps, and other supporting material shall be submitted, addressing the following special issues as applicable:
 - * Design calculations and proof of compliance with the TOWN'S Watershed Protection Overlay District.
 - * Impact of concentrated run-off from upstream areas released onto the property being developed, and the measures selected to mitigate these impacts, i.e. either piping of this run-off into the storm water collection system, or the enhancement of existing drainage channels by enlargement, armoring, etc.
 - * Impact of concentrated run-off from the property being developed onto downstream private property. In such cases, the discharge velocity must be reduced to non-eroding levels. Refer to Section 501.
- 3) Wastewater Pump Station & Force Main Computations - (if applicable) 1 copy. These calculations shall include the basis for sizing and any other calculations requested by the Town (i.e. flotation calculations, wet well sizing, drainage area, suction-lift calculations).
- 4) The Town of Apex may require "utility easements" for the conveyance of water, sewer, electric power, and communications. All "utility easements" shall specifically allow for water, sewer, electric power, and communications utilities maintenance and conveyance.
- 5) Soil Erosion and Sedimentation Control Plan - 1 electronic copy of the "Request for Plan Approval Form" shall be submitted.

- 6) Additional Design Data - As may be requested.

B. Second Submittal

The Town of Apex staff will review the initial items and will comment on any items needing correction or attention. The submitter shall then make the corrections, additions, or changes to the construction drawings, pursuant to the initial review comments. The second submittal shall then be made to include the following items:

- 1) Final Construction Plans –1 electronic copy submittal through IDT Plans.
- 2) "Water Distribution Extension Permit Application" - Form provided by the Town of Apex - 1 original for review by the Town Engineer. All Water Distribution Extension Permit Applications shall be accompanied by a Sealed Engineer's Report per the Town of Apex Water System Management Plan. Refer to Appendix A of these Specifications.
- 3) "Gravity Sanitary Sewer Extension Permit Application" - Form provided by the Town of Apex - 1 original for review by the Town Engineer. All pump stations and force mains shall still require permitting by the North Carolina Department of Environment and Natural Resources (NCDENR). Refer to Appendix A of these Specifications.
- 4) NC Department of Transportation (NCDOT) - Encroachment Forms, Driveway Permits, etc. - Sufficient copies as required and prepared to conform to the NCDOT requirements.
- 5) Storm Drainage Computations - 1 electronic copy of computations, if revised after initial review as per Section 501.
- 6) Wastewater Pump Station & Force Main Computations - 1 electronic copy of computations, if revised after initial review.

The Town of Apex will review the revised plans and, if they are satisfactory, the submitter will be requested to upload final plans to IDT Plans for approval signatures and upload final CAD design file to IDT. At that time, the executed forms will also be returned to the applicant or the design engineer so that the applications and proper number of plans may be submitted to the various state regulatory agencies.

Erosion and sedimentation control plans should be submitted directly by the owner to *Development Services* along with the "Request for Plan Approval" and permit fees. After construction drawings have been signed by the Town, and a preconstruction meeting has been scheduled, submit 1 electronic copy of the "Financial Responsibility / Ownership Form". After the Town issues the "Letter of Plan Approval", a NPDES Storm Water Notice of Intent for all sites greater than 1 acre is also required.

103 Plan Requirements

A. Subdivisions

All plan submittals for subdivision construction shall include the following elements:

- 1) Plans sealed and signed by a professional engineer registered to practice in North Carolina. Plan size shall be 24" x 36" at a scale of not less than:
1" = 50' horizontal, 1" = 5' vertical
- 2) Plan/profile drawings shall be provided for all street improvements, off-street sanitary sewers and storm sewers, water mains, sanitary sewer force mains, and for all utility extensions. All plan/profile drawings shall be prepared at a scale of not less than: 1" = 50' horizontal, 1" = 5' vertical
- 3) Boundary of the tract with all courses and distances indicated. 1 corner of the tract shall be tied to the NC Plane Coordinate System if within 2000 feet of a USGS or NCGS monument.
- 4) Vicinity Map, scale of drawings, and north arrow.
- 5) Master Plan(s) showing all improvements including: existing contour elevations (2-foot intervals) and USGS datum with benchmarks indicated. Existing and proposed elevation contours shall be based on Town of Apex LIDAR topography within the corporate limits and ETJ or topography verified by a professional land surveyor.
- 6) 100-year flood plain as required by Section 6.2 of the Town's Unified Development Ordinance.
- 7) Owner and zoning of all properties adjoining the site.
- 8) Tract area and specific data required by the Apex Subdivision Ordinance or Unified Development Ordinance - number of lots, average and minimum lot size, etc.
- 9) Public Streets
- Street width (back-to-back of curbs).

- Right-of-way width.
- Horizontal curve data for each curve (centerline only).
- Vertical curve alignment.
- Sight Triangles.
- Entrance Islands with turn radii and turn paths.
- Distances to existing streets and intersections.
- Centerline linear footage (intersection to intersection, intersection to center of cul-de-sacs).
- Cross sections.

10) Wastewater Facilities

- Outfall lines drawings - stream location, ability to serve adjoining property.
- Pipe material, size, length, slope, invert elevations at all manholes, distance(s) from other utilities.
- 100-year flood elevations and manhole top elevations, vent elevations.
- Special construction details - piers, boring, encasement, drop manholes, etc.
- Easement widths.
- Pump station and force main calculations.
- Location of service laterals.
- Capacity of downstream facilities.
- Capacity of upstream facilities (existing and predicted future).

11) Water Distribution Facilities

- Pipe material (DIP), size, location and separation from other utilities.
- Valves, fittings, blow-offs, air release valves.
- Fire hydrant locations - conforming to maximum spacing.
- Service lateral locations.
- Special details - boring, etc.
- Easement widths.
- Test pressures and flow rates for any existing line to be tapped (upon request).

12) Storm Drainage

- Complete storm drainage calculations (Note special requirement to address impact of off-site drainage, per Section 102(A)(2)).
- Invert elevations and top elevations at each structure - catch basin, curb inlet,

yard inlet, etc.

- Invert elevation at each inlet and outlet point - flared end section, head walls, etc.
- Pipe material, length, slope, etc.
- Exit velocity and details of velocity reduction facilities at each open outlet.
- Complete hydraulic calculations including hydraulic grade line analysis.
- Storm water easements and widths.
- Special details - easement widths, open channels, etc.

13) Miscellaneous Data

- OWNER/DEVELOPER: name, address, and telephone number.
- PROJECT ENGINEER: name, address, and telephone number.
- Utility easements as required by the TOWN.

14) Review Certification By Town Of Apex

The design engineer shall affix certificates to the cover sheet of the construction drawings and a signature block to the lower right hand corner of each sheet of the construction drawings except the cover page. Refer to the Construction Plan Application requirements provided by Development Services.

B. Site Plans

All site plans submittals should include, but not limited to, the following elements:
Reference the Unified Development Ordinance for additional Site Plan requirements.

- 1) Plans sealed and signed by an engineer registered to practice in North Carolina, where public utilities, streets and pavement designs are involved, or where otherwise required by North Carolina General Statutes. Plan sheet size shall be 24" x 36".
- 2) Boundary of the tract with all courses and distances indicated. One corner of the tract shall be tied to the NC Plane Coordinate System if tract is located within 2000 feet of a USGS or NCGS monument. Total gross area of tract shall be indicated.
- 3) Vicinity map, scale of drawing, and north arrow.
- 4) Existing and proposed contour elevations at a maximum interval of 2 feet. Elevations based on USGS Datum with benchmark indicated.
- 5) 100 year flood plain as required by Section 6.2 of the Town's Unified Development Ordinance.

- 6) Owner and zoning of all properties adjoining the site.
- 7) Benchmark elevation and location.
- 8) Data on Adjoining Streets
 - Street name.
 - Street width and right-of-way dimensions.
 - Existing utilities and storm drainage (size, material type, location).
 - Driveway entrances onto site and adjoining properties.
- 9) Building Site Data
 - Landscape plan including tree protection buffers.
 - Number of buildings and dwelling units in each.
 - Building footprint dimensions and finished ground floor elevation.
 - Front, side, and rear yard set backs.
- 10) Parking Data
 - Number of parking spaces provided and required.
 - Location and dimensions of parking areas - angle of parking, typical width, length, aisle width, etc.
 - Number of handicap spaces provided and required.
- 11) Storm Drainage
 - Pipe material, size, length, slope, etc.
 - Drainage areas and run-off for each storm drain pipe.
 - Invert elevation, and top elevation for each structure - catch basin, yard inlet. Invert elevations for each flared end section, head wall, etc.
 - Exit velocity and details of velocity reduction facilities at each outlet.
 - Complete hydraulic calculations including hydraulic grade line analysis.
 - Complete Storm Drainage Calculations (Note special requirement to address impact of off-site drainage, per Section 102(A)(2) and Section 500).
 - Special details and storm drainage easements widths as required.
- 12) Utilities
 - Waterline location, profile, type of material, and size.
 - Water meter location and size; size of service branch.

- Sewer line location, profile, type of material, and size.
- Sewer service lateral - size and location.
- Water and sewer easements and required utility easements.
- Fire hydrant location.
- Valve vault for fire sprinkler line (if applicable).
- Suggested transformer location.
- Electric power easements (if required).
- Storm Water Drainage Structures - yard inlets, impoundments, catch basins, etc.

104 Approval of Materials

All materials to be used in the project shall conform to TOWN Specifications. Any variation from the pre-approved materials shall be submitted to the TOWN prior to beginning construction. The list shall include the manufacturer, model number and such other additional information as may be requested by the TOWN to determine compliance with these Specifications.

105 Permits

The owner shall be responsible for all applicable permits and associated fees.

106 Record Drawings

Record drawings which reflect “AS-BUILT” conditions must be submitted electronically through IDTPlans prior to start of warranty for roadways and/or public utilities to be maintained by the Town of Apex. The record drawings must be labeled “RECORD DRAWINGS” and signed by the Project Engineer of Record and/or PLS. An electronic file in AutoCAD format shall be submitted to the Town Engineer through IDTPlans. A survey data file (.txt) denoting the coordinates and description for each utility feature in the project scope shall be submitted to the Town Development Services group. All applicable information listed below shall be included on all “AS-BUILT” drawings:

NOTE: Record drawings of roadways and utilities are required prior to the beginning of the one-year warranty or acceptance by the TOWN.

All PDF sheets shall show the base file (approved CD) in a transparent manner, surveyed data will be shown in a bold/solid color.

“Record Drawing” plans shall be the certified plans sealed by a professional land surveyor locating the various features applicable to the project.

The “Construction Drawing” shall be the construction document designed and certified by

a professional engineer who has periodically monitored the project throughout construction and agrees with the "Record Drawing" plan as defined above.

Record Drawings are required for:

- Water and/or sanitary sewer service connections
- Doghouse manhole for service connections
- Irrigation system connections
- Water main extensions
- Fire lines (sprinkler lines)
- Fire Hydrants (including relocations of existing hydrants)
- Sewer main extensions
- Sewer outfalls
- Pump stations and force mains

The following PE and PLS Certifications are required on each sheet of the Record Drawings:

I certify that these as-builts are accurate and that each of the items listed on the Town's "Record Drawing Checklist" as contained in the Town of Apex Standard Specifications is provided on this set of record drawings (_____ total sheets in this set).

I certify that all of the information provided is field-verified record drawing information.

Name: _____ Date: _____
(Seal) _____
Signature Registered Land Surveyor

Name: _____ Date: _____
(Seal) _____
Signature Professional Engineer

The following Field Survey Certification Statement is required on the cover sheet of the Record Drawings and the Survey data file:

I, _____, as a duly registered Professional Land Surveyor in the State of North Carolina, hereby certify that the data shown on this drawing, obtained under my supervision, is an accurate and complete representation of what was constructed in the field, that the physical dimensions or elevations shown thus are as-built conditions and the facility was constructed according to the approved plans, except otherwise noted herein.

Name: _____ Date: _____
(Seal) _____
Signature Registered Land Surveyor

A. Site Data

1. Boundary of tract with all courses and distances indicated. 1 corner of the tract shall be tied to the NC Plane Coordinate System if within 2000 feet of a USGS or NCGS monument.
2. Vicinity map, scale of drawings, and north arrow.
3. Master plan(s) showing all improvements and including existing contour elevations (2-foot intervals) and USGS datum with benchmarks indicated.
4. All easements identified and dimensioned.
5. Tract total acreage.
6. Total number of lots and average size.
7. Benchmark location and elevation.

B. Public Roadway System

1. Street widths (back-to-back of curb) and right-of-way dimensions.
2. Horizontal alignment with radii, PC's, and PT's of all curves and curve data.
3. Vertical alignment with centerline grades, vertical curve lengths, station numbers, and elevation of all PVC's and PVT's, and centerline profile and curve data.
4. Pavement sections and typical cross sections.
5. Geotextile fabric locations, type, and manufacturer.
6. Engineer's certification indicating construction of the pavement in accordance with the pavement design and specifications.

C. Storm Water Drainage System

1. 100-year flood limits and elevations.
2. Structure top and invert elevations.
3. Pipe size and type material.
4. Pipe grades and distances.
5. Structural BMP's (see Section 500 for detailed As-Built requirements).
6. Include all outlet structure details and invert elevations.
7. Include any applicable maintenance clauses from homeowner covenants.
8. Storm water easements.

D. Water Distribution System

1. Pipe size, location, and type material.
2. Separation from sanitary and storm sewer systems.

3. Location of valves, fire hydrants, meters, blow-off assemblies, bore and jack casings with distance locations provided in a survey .txt file that includes location data x,y,z.
4. Easement locations and widths.
5. Copy of PROJECT ENGINEER'S certification indicating construction of the water system in accordance with the approved plans and specifications.
6. Copy of the PLS certification indicating accuracy of data.

E. Sanitary Sewer System

1. Pipe size, location, and type material.
2. Manhole top and invert (in & out) elevations.
3. Pipe grades and manhole to manhole distances.
4. Clean-out locations with distance references provided in a survey .txt file that includes location data x,y,z.
5. Horizontal control (at manholes).
6. Easement location and widths.
7. Separation from water distribution and storm water systems.
8. Pump station test results.
9. Force main location, size, material type, location of air release valves and check valves, etc.
10. Pump station and associated appurtenances operation and maintenance manuals per Section 800 of these specifications.
11. Copy of the PROJECT ENGINEER'S certification indicating construction in accordance with the approved plans and specifications.
12. Copy of the PLS certification indicating accuracy of data.

For all structures and appurtenances, an electronic coordinate survey text file (.txt) shall be submitted in the format of P,N,E,Z,D (Point Number, Northing, Easting, Elevation, Description). The descriptions used shall be common industry abbreviated terms (MH, CB, FH, WV, WM, CO, etc.) that are correctly labeled as they are in the CD file with any applicable reference numbers.