

CHAPTER FOUR

SURVEY REQUIREMENTS

I. GENERAL

All sanitary sewer and water mains shall be field surveyed under the direct supervision of a Professional Land Surveyor registered in North Carolina. The Developer shall provide all surveys necessary to design the utility extension.

II. DATA FOR DESIGN

- A. All existing underground utilities (water, sewer, gas, storm drains, telephone, electric power, cable TV, etc.) along the route should be located horizontally. Where potential for significant elevation conflicts with the proposed water main exist, the existing utilities shall be exposed and elevations determined. The Developer or Surveyor should contact the individual utilities to determine location policies and procedures.
- B. Vertical control shall be tied to NGS or NCGS vertical control points having a base elevation of NAVD 29 and indicated on the plans.
- C. Horizontal control shall be tied to NC Grid Coordinates NAD 83.
- D. The location of all benchmarks and control points shall be indicated on the plans.
- E. Horizontal alignment shall be chosen in coordination with the Design Engineer and referenced to identifiable features; such as edge of pavement or right-of-way lines.
- F. Profile data shall include centerline shots at manholes and shall include all break points such as culverts, creeks, ditches, etc. When paralleling an adjacent stream, the streambed elevation is required at each manhole. Cross-sections shall be provided at fifty foot intervals in cut and fill slope sections.

III. DATA FOR CONSTRUCTION

A. CUT SHEET

- 1. Cut Sheets shall be prepared on a form acceptable to PWC, signed and sealed by a Professional Land Surveyor or Professional Engineer registered in North Carolina. Grade shall be calculated from centerline of manhole to centerline of manhole to the nearest .01'

for hub cuts and 0.1' for centerline cuts (reference only). Note: centerline cut is to assist contractor with error determination.

2. Cut sheet shall indicate station number of manholes, fittings, valves, or other structures, lengths of mains, grades, special coatings, different pipe class or other special conditions.
3. Cut sheets (1 original), signed and sealed by an N.C. PE or PLS shall be provided to the PWC Water Resources Engineering Department in advance of construction for water, sewer and/or force main. The approved cut sheet shall also be provided to the Contractor by the Engineer or Surveyor, concurrently with submittal to PWC.
4. Water and sewer main construction cannot begin until the Contractor possesses a signed and sealed cut sheet from the Engineer or Professional Land Surveyor.
5. The following minimum criteria shall be indicated on the cut sheet (an example of a cut sheet is provided at the end of this text):
 - Engineer's Name, Address, Phone No. and Fax No.
 - Project Name
 - Location within Project that cut sheet pertains to i.e., 8" Sanitary Sewer Sta. 0+00 to 12+00 Smith Street.
 - Sheet No. of cut sheet i.e., 1 of 2 etc.
 - Field Book Number that the field work is in and page number.
 - Type of pipe material and Station if material change is designed, i.e. 1-Joint DI centered at Storm Crossing Sta 1+00
 - Size of utility, i.e. 8"
 - Offset hub distance from centerline
 - Station of item
 - Hub elev. of perpendicular offset
 - Grade elevation of utility (invert)
 - Hub cut (vertical distance from offset hub to invert of utility being installed).
 - Centerline elevation to nearest 0.1'
 - Centerline cut to nearest 0.1'
 - A remarks column which indicates the Manhole Station, 20' offset hub, length of pipe and percent slope where applicable. For water, indicate station and location for fire hydrants, valves, etc.
Station for begin and end of casings, restrained joint pipe, etc.

B. SANITARY SEWERS

1. Stake and cut centerline, setting hubs at each manhole.

2. Flag both permanent and temporary easements using different color flagging for each.
3. Offset manholes 50' and 100' with hubs installed at right angle points to each manhole, prior to clearing operations.
4. Stake manholes for construction providing minimum 15' offset hub and a 50' offset check station for the sewer main grade.
5. Stake sewer cleanouts for construction providing minimum 5' offset hub.

C. WATER MAINS

1. Provide flat stakes with grades every 100' along tangents and every 50' along curves of the water main route and hubs with grades for every bend, valve, hydrant branch, fitting; or where necessary to accommodate a future or proposed utility extension.
2. Provide a hub for each fire hydrant location with an offset for the flange elevation.