

**Location of the 216 Foot Elevation
New Hope Creek,
Durham County, North Carolina**

June 25, 2009

**Prepared for:
Haw River Assembly
PO Box 187
Bynum, NC 27228**

Prepared By:



Ward Consulting Engineers, P.C.
8386 Six Forks Road, Suite 101
Raleigh, NC 27615-5088
Phone: 919-870-0526
Fax: 919-870-5359



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Background:

A survey was conducted by Williams - Pearce & Associates, P.A. (WPA) on New Hope Creek in May/June of 2009. The purpose of the study was to establish where the 216 foot elevation contour crosses the thalweg, the deepest part of the channel cross section, of New Hope Creek. The 216 foot elevation in this study is based on the vertical datum NGVD 29. Ward Consulting Engineers, P.C. (WCE) assisted WPA in the location of the 216 foot thalweg contour based our understanding of typical stream profile features.

Analysis:

WCE visited the New Hope Creek site on May 27th to advise the surveyor as to the type and location of data to be collected for the study. Cross Section #1, a riffle feature, was located by WCE and the elevation data was collected by WPA. WCE gave directions to the surveyor to obtain cross sections along the reach in straight portions of the channel and at the highest locations within these straight segments in an effort to obtain cross section data at riffle locations. Eleven cross sections were established over an approximate distance of 6,000 feet of stream length by the surveyor on June 1-2, 2009. Cross Section #1 was surveyed just upstream the location of the original determination of the easternmost point, normal pool of Jordan Lake elevation 216 ft as recognized by Durham County. The surveyor continued upstream obtaining cross section data on June 1st and 2nd. WCE again visited the site on June 2nd to observe the location of the Cross Sections 10 and 11. WCE confirmed that the location of Cross Section #10 represented a riffle feature in the stream. Cross Section #10 is the location where the surveyors obtained an approximate thalweg elevation of 216 ft. WCE examined the stream bedform upstream and downstream of Cross Section #10 to verify that the elevation found at this cross section was the highest within the area. The stream profile dropped in elevation upstream and downstream of this cross section which confirmed our assessment (Figure 1). Table A below lists data obtained in the survey for the eleven cross sections in the study.

Figure 1. Thalweg Profile of New Hope Creek at Cross Section 10.

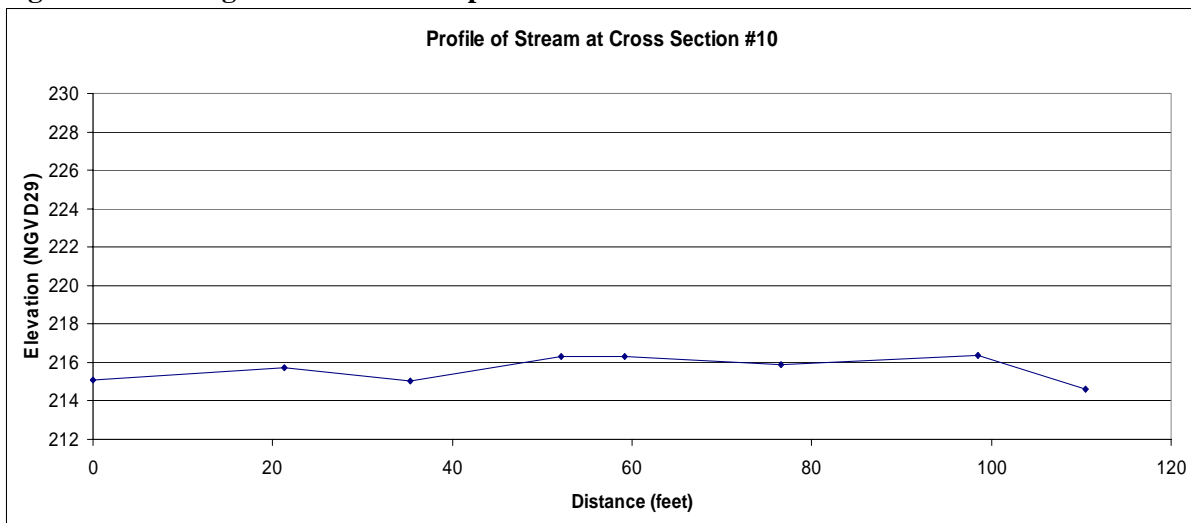


Table A. Cross Section Data

Cross Section Number	Date Field Survey Data Was Obtained	Cross Section Thalweg Elevation (ft) (NGVD29)	Cross Section Water Surface Elevation (ft)	New Hope Creek Published Mean Discharge (ft ³ /s) (1)	Jordan Lake Published Water Surface Elevation (NGVD29) (2)
1	May 27, 2009	212.5	216.7	21	216.66
2	June 1, 2009	214.7	216.9	19	216.76
3	June 1, 2009	213.6	216.9	19	216.76
4	June 1, 2009	214.2	217.2	19	216.76
5	June 2, 2009	213.6	217.2	16	216.74
6	June 2, 2009	215.1	217.2	16	216.74
7	June 2, 2009	214.4	217.3	16	216.74
8	June 2, 2009	214.8	217.4	16	216.74
9	June 2, 2009	215.0	217.3	16	216.74
10	June 2, 2009	216.2	217.5	16	216.74
11	June 2, 2009	215.3	217.5	16	216.74

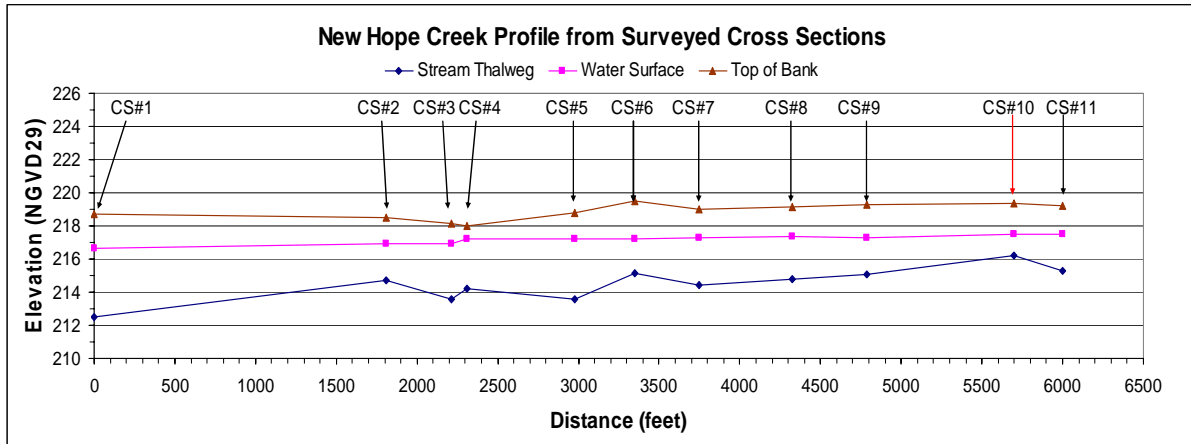
(1) (2) Cited References

A file was provided to WCE by WPA showing the location of the eleven cross sections surveyed on New Hope Creek overlaid on an aerial map of the area. An AutoCAD drawing and ascii file with point data information was also supplied by WPA to WCE. The location of the stream length between surveyed cross sections was approximated based on a visual assessment of the aerial photograph to connect the surveyed cross section locations. From this approximated stream alignment, the relationship of the position of the surveyed cross sections along the stream length was established to obtain stream and water surface slopes.

At each of the surveyed cross sections the ground elevation data was obtained by WPA from top of bank to top of bank and the water surface elevation was established for the flow in the channel at the time of data collection. It should be noted that obtaining water surface elevations holding a survey rod on the water surface is approximate. Additionally, the elevations of the channel bed are subject to the depth and texture of existing sediment layers on the channel bottom. The elevation of the channel bottom is a function of how deep the survey rod sinks into the channel bed substrate. Therefore, it is assumed for this survey that the stream bed elevations represent a position in the sediment where the rod had settled to a point where the bed would support its weight. Based on the surveyed cross section data, the average channel width within the study reach is 39 feet and the average depth of the stream, as measured from the low bank height of the stream to the thalweg of the channel, is 3.8 feet.

The thalweg of the channel was obtained from the lowest surveyed point within each cross section. The approximate 216 ft elevation crossing the bottom of the channel was located at Cross Section #10 approximately 6,000 linear feet upstream of the original determination location. A graph was generated to show the thalweg and water surface profile elevations along the surveyed stream length (Figure B). This graph shows the approximate slope of the channel bottom, channel bottom at each cross section, and the water surface slope at the time of the study within the surveyed reach.

Figure 2. Longitudinal Profile of New Hope Creek



The water surface slope was determined to be 0.00016 ft/ft and the stream slope approximately 2.5 times the water surface slope at 0.0004 ft/ft through this reach at the time of the study.

The 216 ft contour crossing at the bottom of the channel was established near Cross Section #10 of the study. This location is the point in the channel where the backwater of Jordan Lake would reach to if no water is present in the New Hope Creek channel.

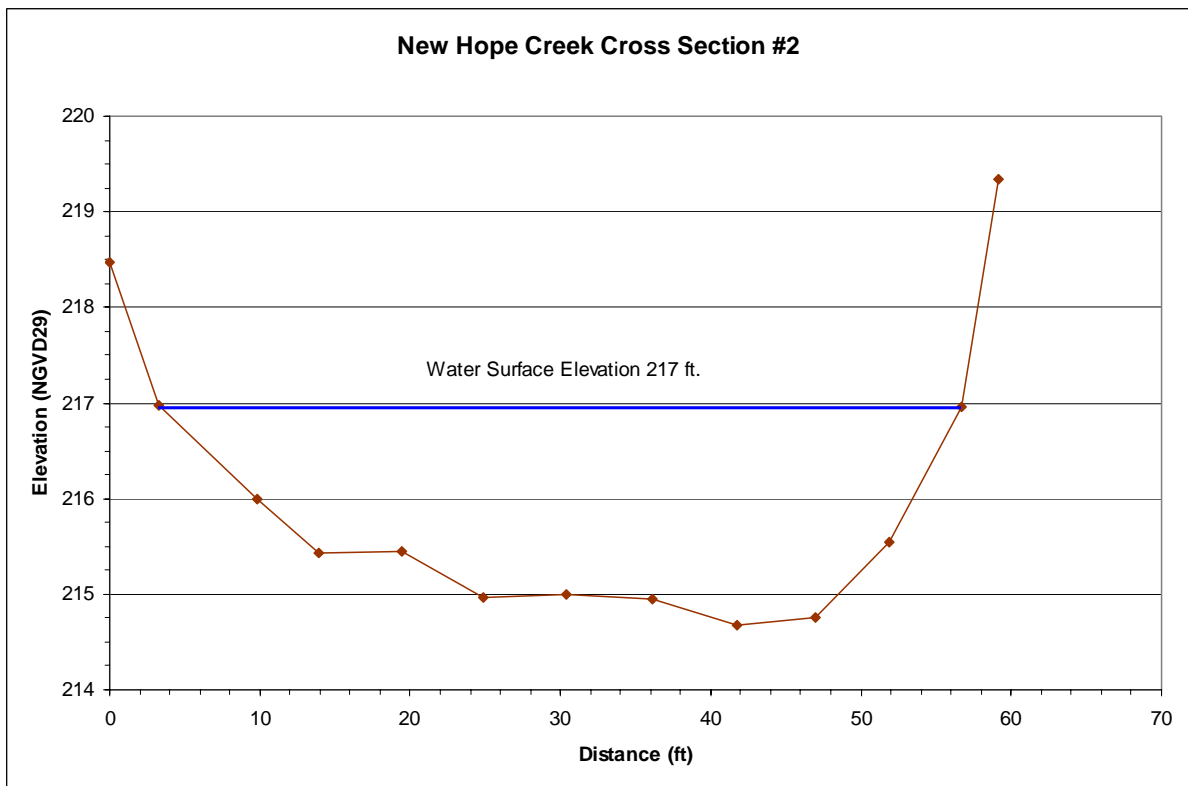
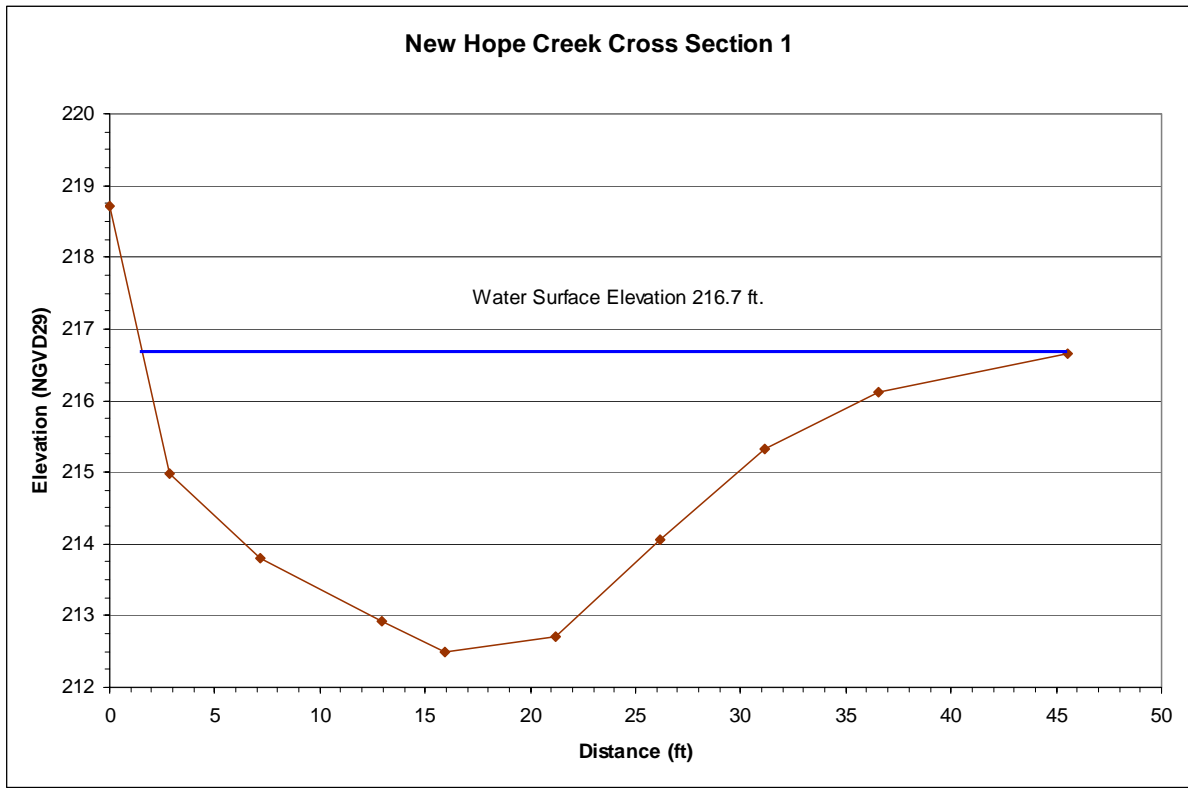
Conclusion:

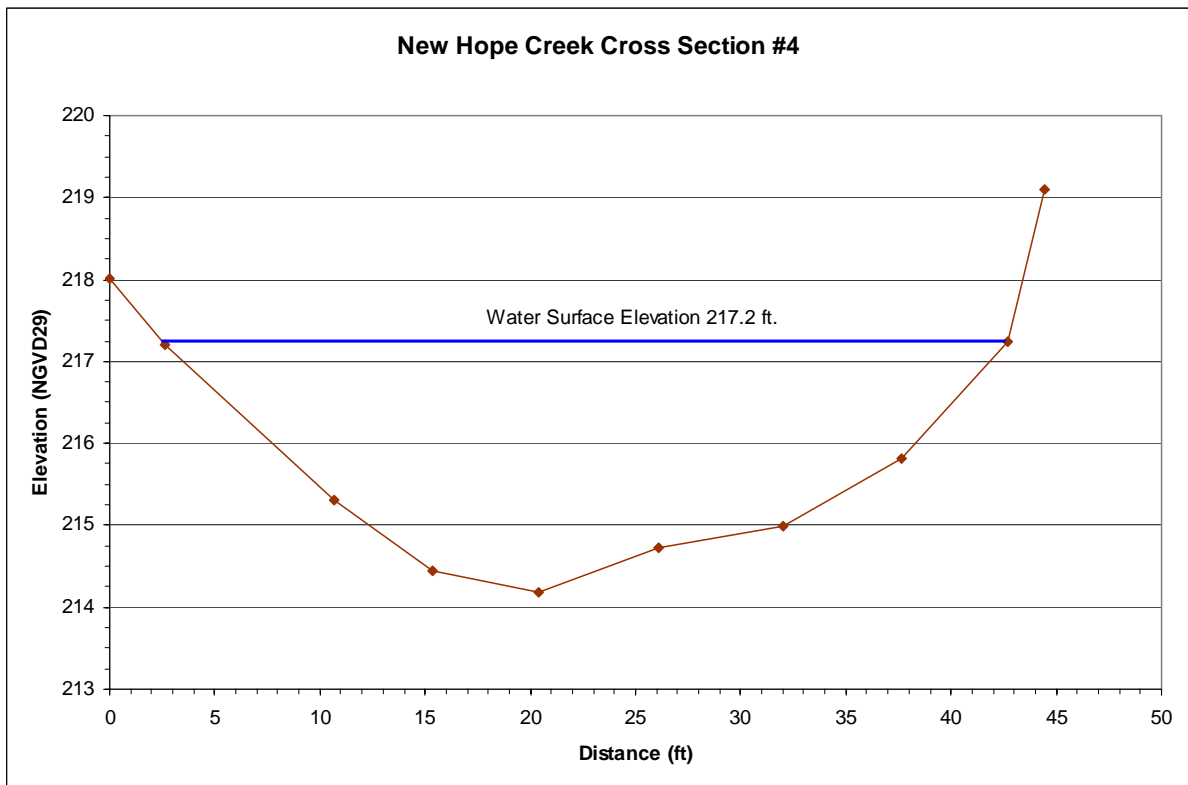
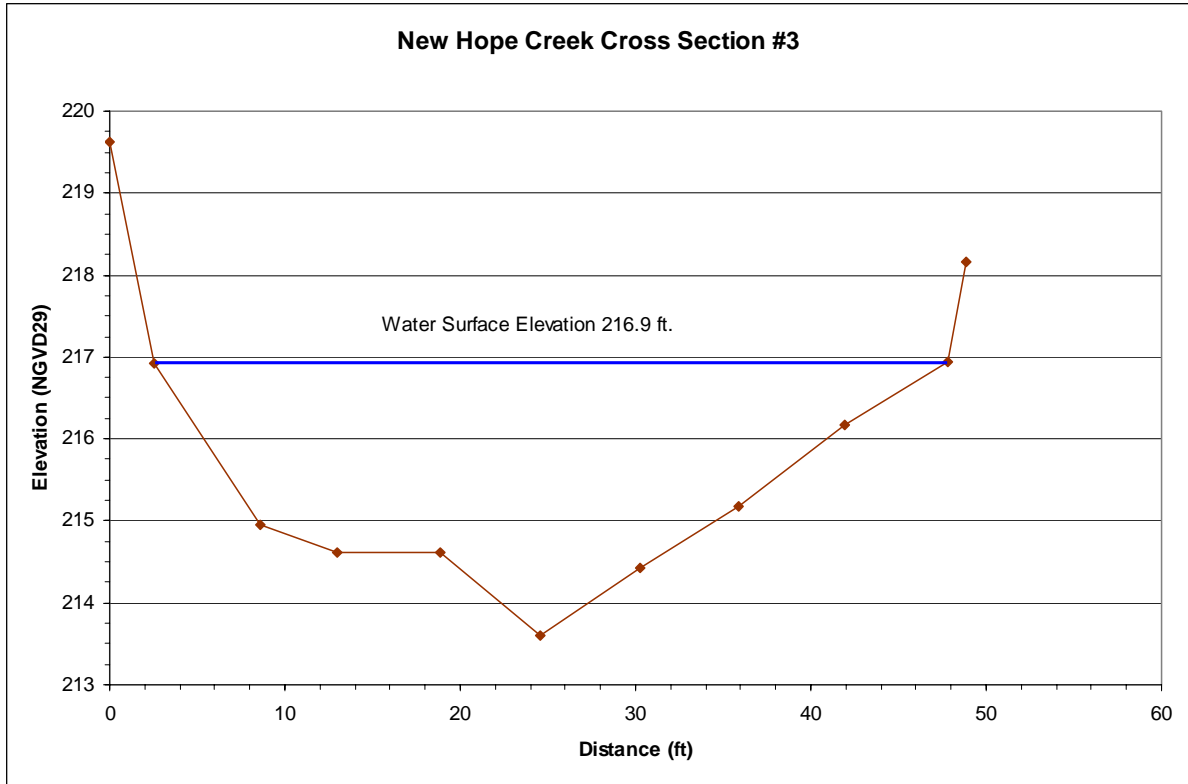
Based on the cross sections established on New Hope Creek by WPA and stream profile that was established by these cross sections, it is our opinion that the approximate location of the 216 foot contour crossing of New Hope Creek is located at survey cross section #10 which is approximately 6,200 feet upstream as measured along the channel length, of the of the original determination of the easternmost point, normal pool of Jordan Lake elevation 216 ft as recognized by Durham County.

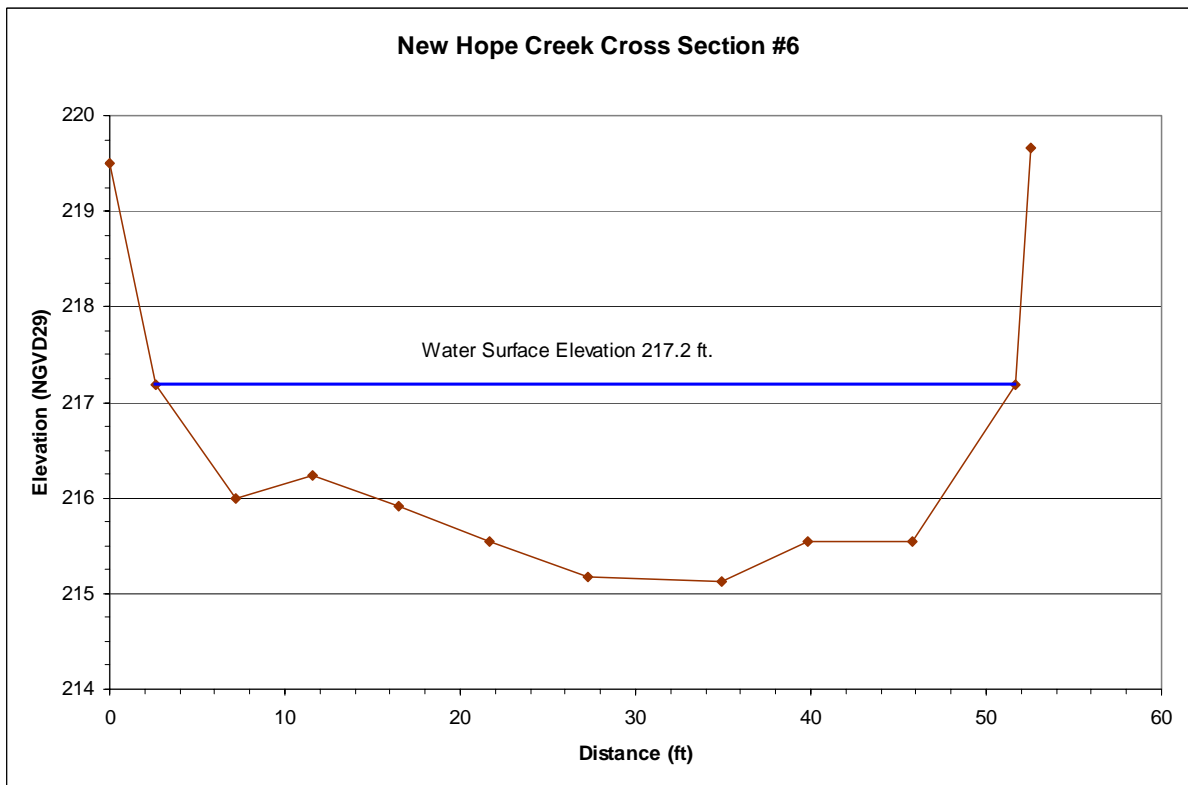
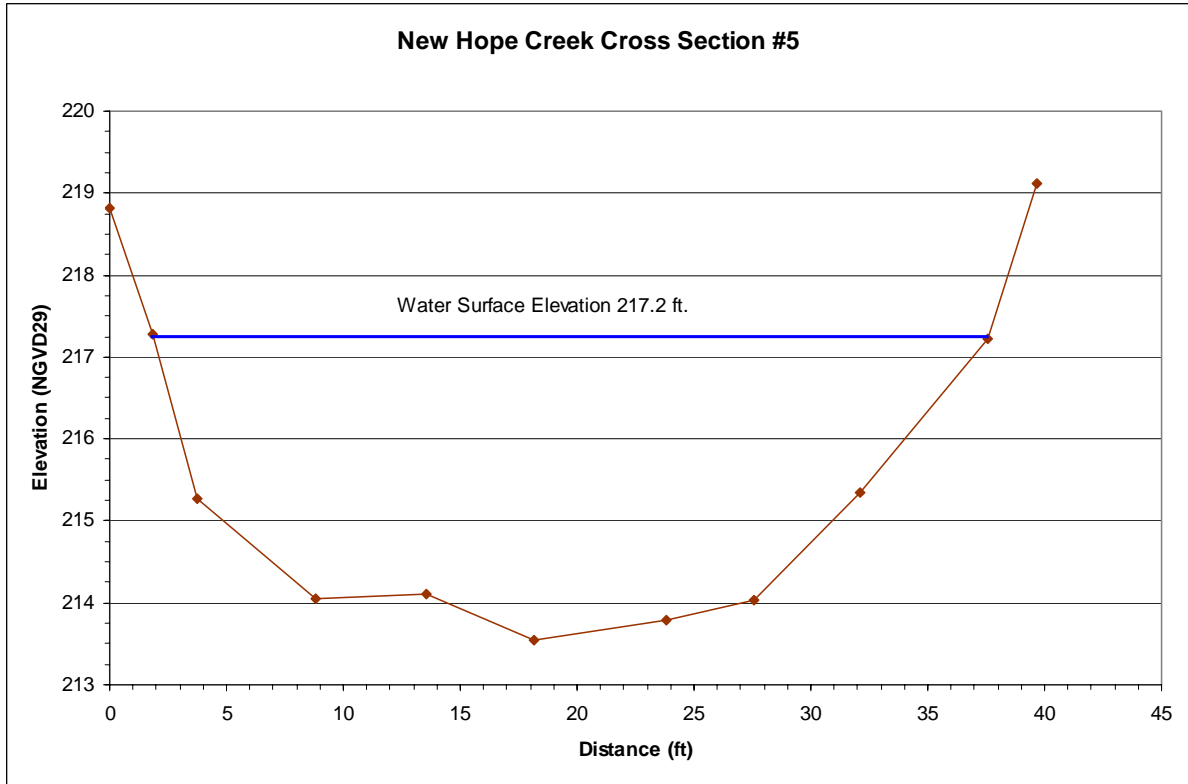
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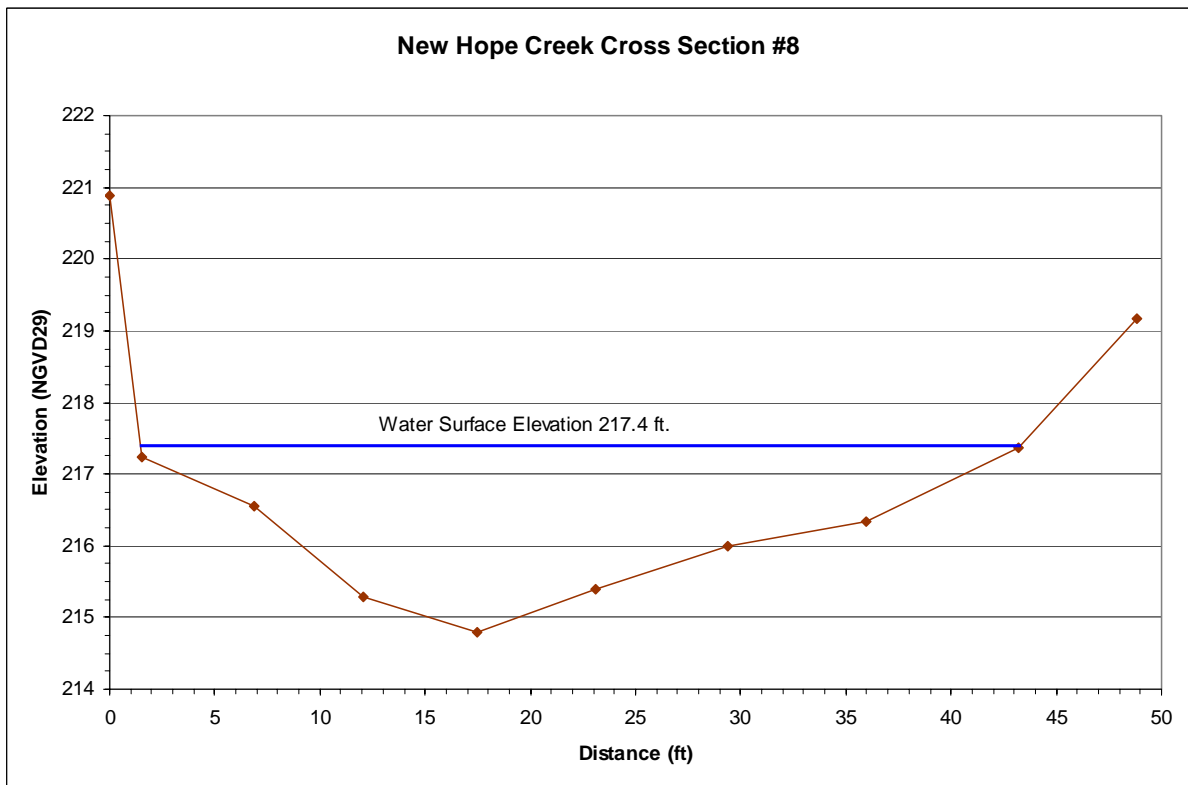
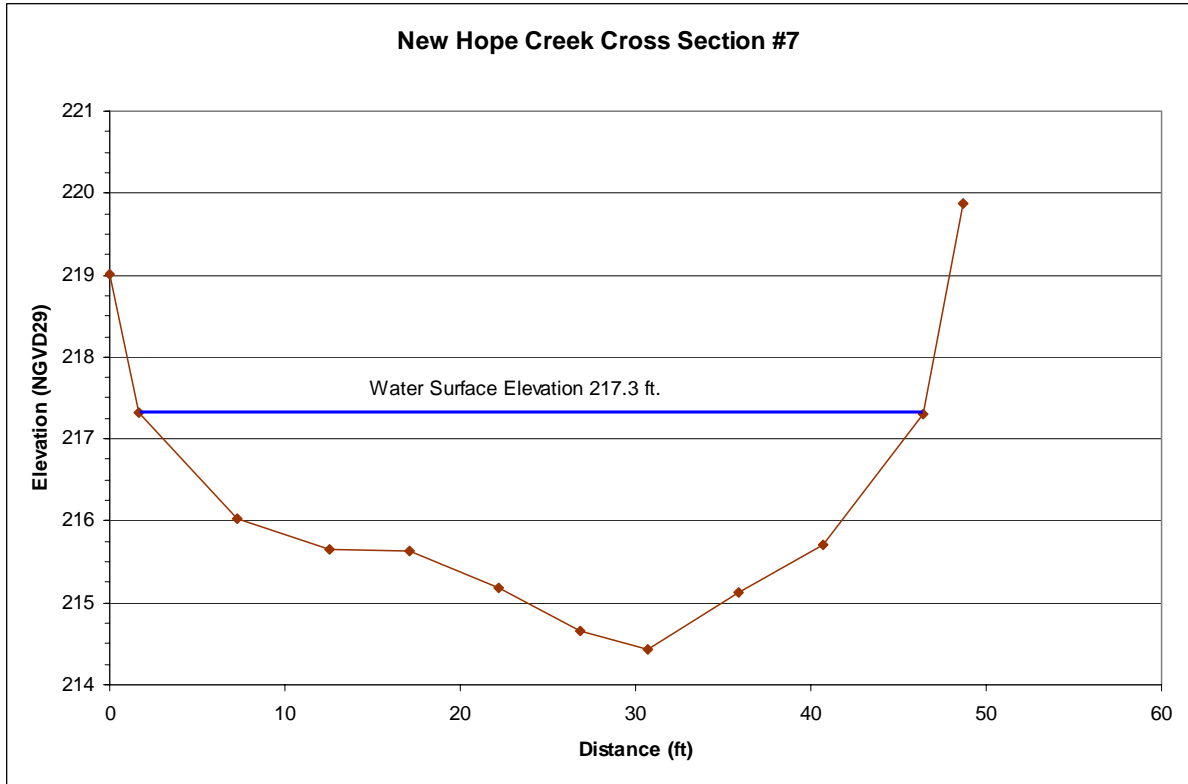
1. U.S. Army Corps of Engineers, Wilmington District; Daily Information for the B. Everett Jordan Project. <http://epec.saw.usace.army.mil/dss180j.txt>
2. U. S. Department of the Interior/ U.S. Geological Survey; USGS Surface-Water Daily Data for USGS 02097314 New Hope Creek, Near Blands, NC. http://waterdata.usgs.gov/nc/nwis/uv/?site_no=02097314&PARAMeter_cd=00065,00060

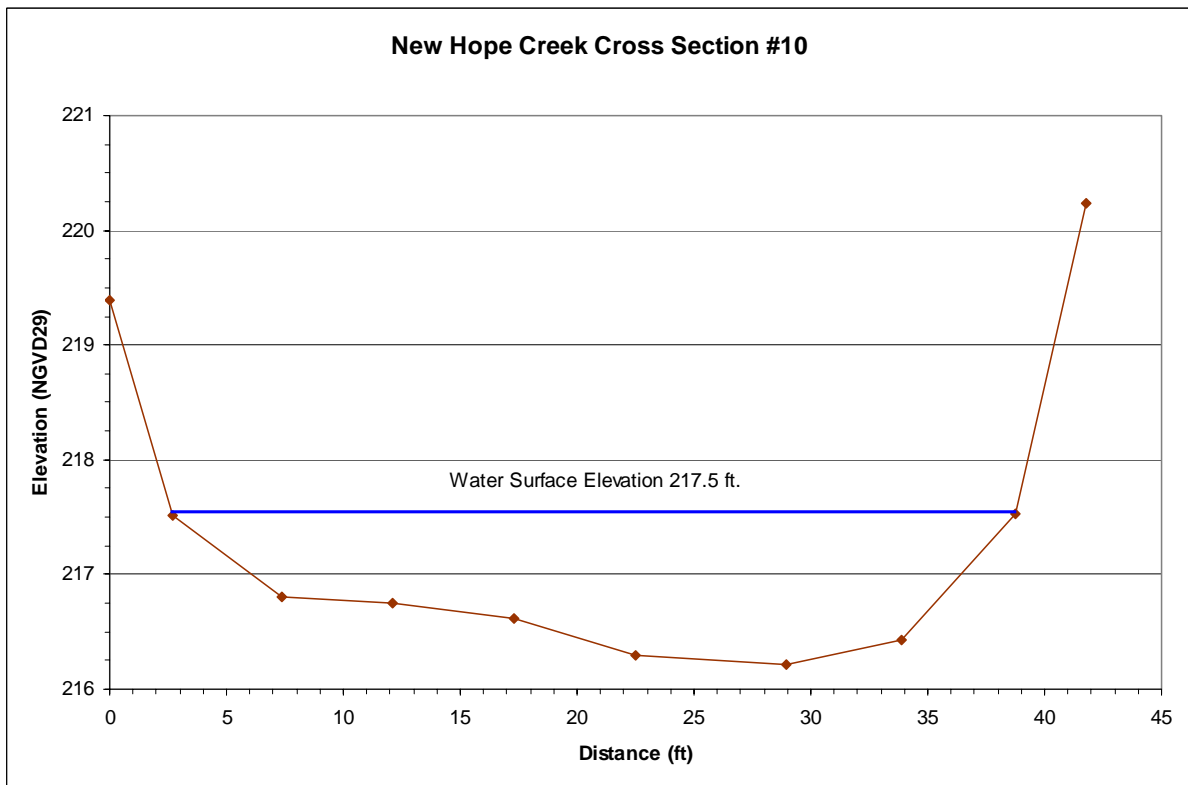
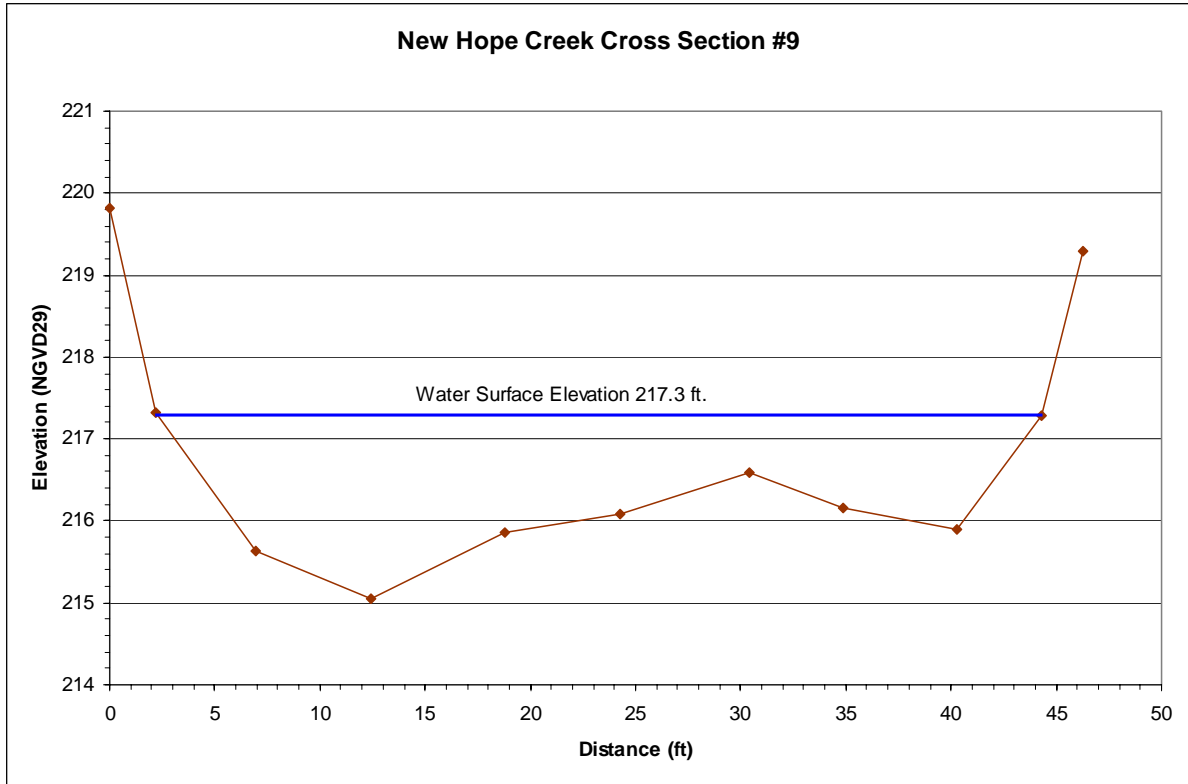
Appendix A: New Hope Creek Surveyed Cross Sections

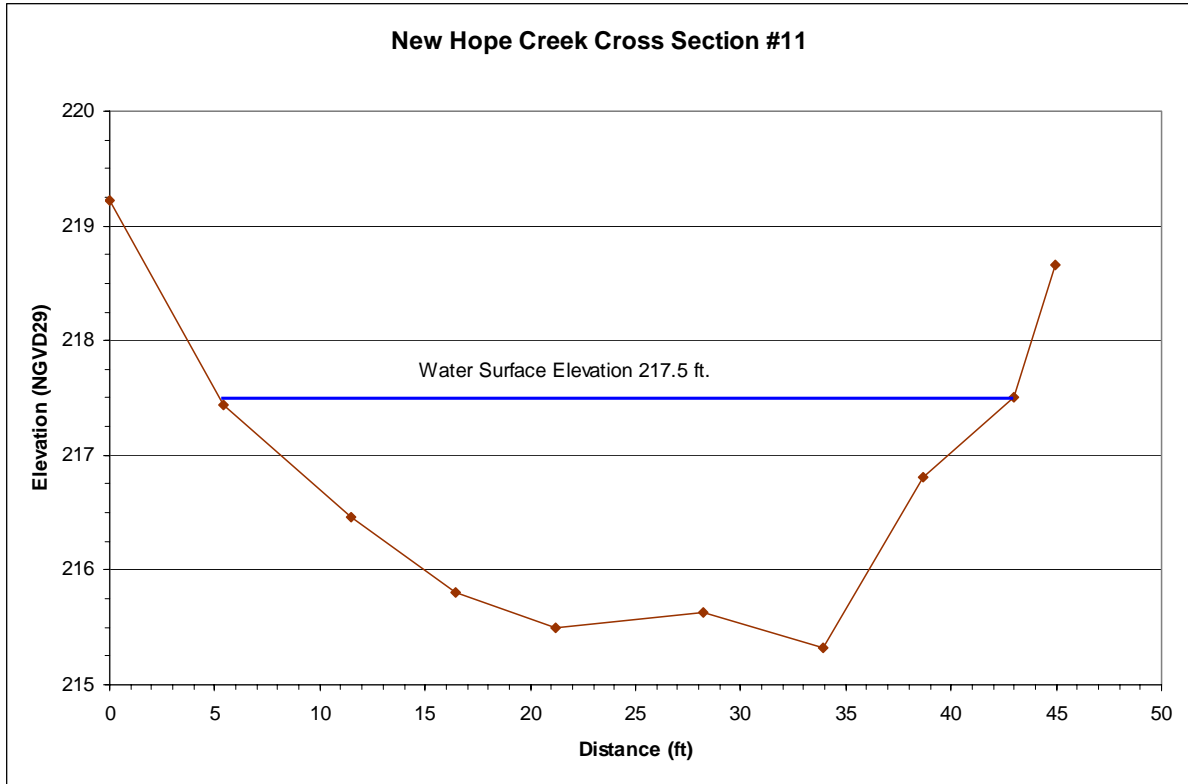


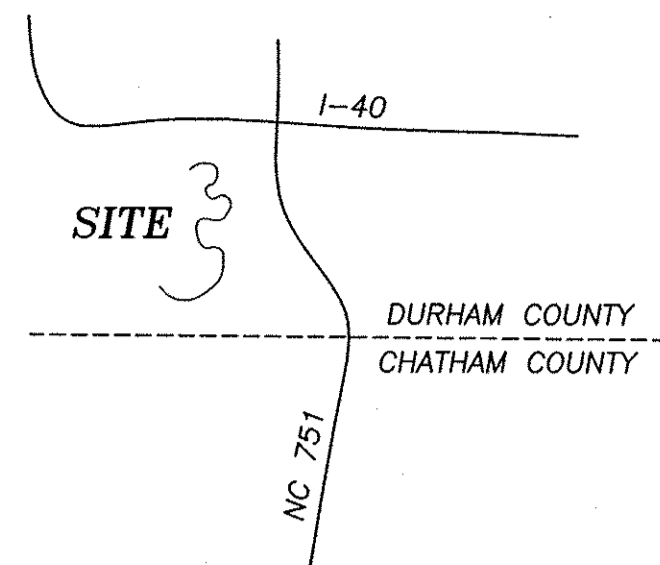






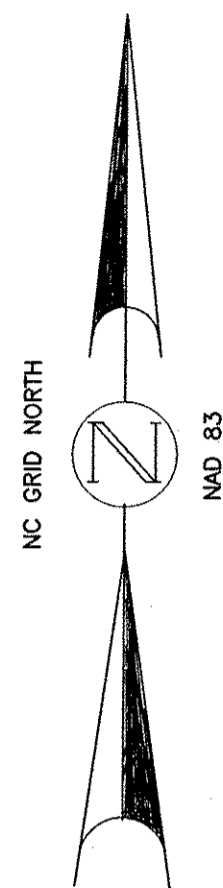




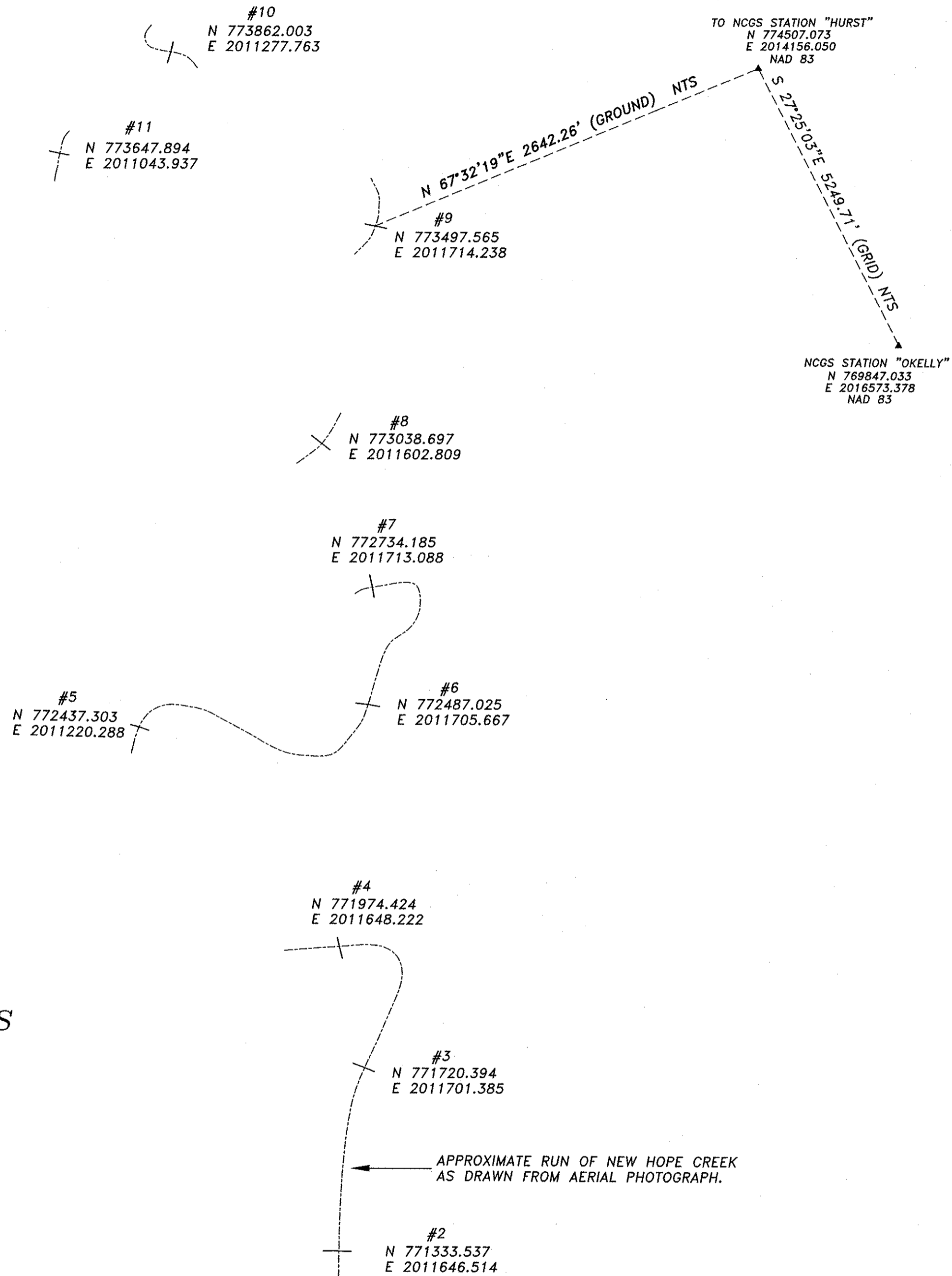


VICINITY MAP (NOT TO SCALE)

NOTE: THIS IS NOT A BOUNDARY SURVEY. THIS SURVEY REPORTS THE LOCATION OF ELEVEN CROSS SECTIONS THAT WERE TAKEN OF NEW HOPE CREEK IN DURHAM COUNTY ON MAY 27, JUNE 1, AND JUNE 2 OF 2009. THE COORDINATES SHOWN ARE BASED ON NAD 83 NORTH CAROLINA GRID COORDINATES AND ARE AT THE CENTER OF THE CREEK. NCGS BOOTH HAVING A NGVD 29 ELEVATION OF 287.608' WAS USED AS A BENCHMARK. NCGS OKELLY AND HURST WERE USED FOR HORIZONTAL CONTROL. A COMBINATION OF SURVEY GRADE GPS AND CONVENTIONAL SURVEYING METHODS WERE USED TO OBTAIN THE RESULTS OF THE CROSS SECTIONS. COORDINATES SHOWN ARE GROUND.



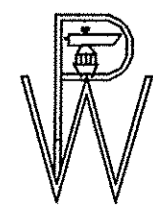
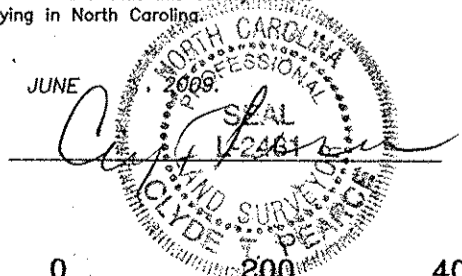
LOCATION OF CROSS SECTIONS
ALONG NEW HOPE CREEK
DURHAM COUNTY
TRIANGLE TOWNSHIP
NORTH CAROLINA



I, CLYDE T. PEARCE, certify that under my direction and supervision this map was drawn from an actual field survey; that the error of closure of the survey as calculated by latitudes and departures is 1:10000; and that this survey meets general standards of practice for land surveying in North Carolina.

Witness my hand and seal this 2ND day of JUNE

P. L. S. L-2481



WILLIAMS - PEARCE & ASSOC., P.A.

Professional Land Surveyors

P.O. Box 892, Zebulon, N.C. 27597

FILE: HAW RIVER ASSEMBLY
FINAL X-SECTIONS DAB771
SCALE: 1" = 200'
DATE: 06-03-2009

Phone (919)269-9605