Badin Inn Stream Restoration
Stanly County, NC

Mitigation Plan and As-built Baseline Report
DRAFT

EEP Project Number 92666
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EXECUTIVE SUMMARY/PROJECT ABSTRACT

The Badin Inn Stream Restoration Project, located in Stanly County, North Carolina, involves the Priority I restoration of 4,174 feet of stream channel. This length consists of 3,994 feet of a perennial stream (UT to Little Mountain Creek) that was channelized and lined with concrete nearly a century ago, and the "daylighting" and restoration of 180 feet of an intermittent tributary that was routed through a culvert during the same period. The overall goals of the Badin Inn Stream Restoration Project are to restore the pre-disturbance ecology and hydrology of these stream systems and the riparian corridor thorough which they flow. Specifically, the restoration is intended to improve flood attenuation, remove some portion of the pollutant influx from the surrounding golf course, improve aquatic and riparian habitat, help create a contiguous wildlife corridor linking the upslope Uwharrie Mountain ridgeline with the Little Mountain Creek riparian corridor, and provide aesthetic value and educational opportunities.

To meet these goals, restored stream channels were designed and constructed in the relict floodplain with dimension, pattern and profile parameters derived from local reference reach data. Appropriately sized bedload was introduced into the channel to account for the lack of natural bedload, and the channels were raised where practical to meet the relict floodplain. In addition, a riparian area was established and protected through acquisition of a conservation easement. The riparian area was planted with native vegetation, and graded in many locations with low points ("wet swales") that, although not intended to be credit-generating wetland areas, would provide floodplain storage, protect the stream channel during flood events and increase diversity of vegetation within the riparian corridor.

A description of the overall restoration approach to the three primary project elements (stream, vegetation, hydrology) and how these elements compare in the as-built state to the design is outlined below:

Stream

The restoration approach to the channel of UT to Little Mountain Creek was to construct a new channel within the relict floodplain that would match the dimension, pattern, and profile obtained from dimensionless reference reach criteria of nearby streams. The restored bankfull elevation of most of the channel was to be reconnected with the relict floodplain. In several short sections where bankfull could not be reconnected, a new floodplain was to be constructed. In addition, a short tributary that flows into UT to Little Mountain Creek near the upstream end of the project was to be "daylighted" and also restored with a Priority I approach.

All of these goals were accomplished in the construction phase of the project; and the intent of the design was fully carried out. At the beginning of construction, the cross-sectional area of the channel was reduced slightly from that proposed in the restoration plan due to concerns of over-excavation, but this was

accomplished by reducing side slopes, and keeping the bankfull width and depth intact. Otherwise, the designed plan and profile were constructed as intended.

Vegetation

Vegetation plans called for planting a mixture of live stakes, bare root seedlings, and permanent seed mix of native perennial trees, shrubs and herbaceous species. Fourteen species of trees and four species of shrubs were planted on-site. Additionally, four species of live stakes and one herbaceous rush species were planted along the streambank. Temporary seed mix was applied in conjunction with the permanent seed mix to reduce the erosive effect of floodplain flows while the permanent vegetation was becoming established on-site. At the time of sampling for this report, vegetation density for the overall site was good averaging 621 stems per acre. The rush species and live stakes are growing well with little evidence of difficulty. The permanent seed mix has germinated and some species have reached flowering at the time of this report.

Hydrology

Besides the construction of restored stream channels, the only plans for hydrologic modification on this project were the grading of "wet swales" within the restored floodplain of UT to Little Mountain Creek. The intent of these features, which are graded low points within the restored floodplain, are to provide flood storage and attenuation, and to help protect the stream channel. Several of these swales were planned to capture some of the runoff of the golf course by being located at outfalls from the golf course drainage system. These swales were graded as planned and are functioning as expected: they hold water immediately following rain and flood events, and become dry during extended periods without rain. Various species of amphibians were observed inhabiting them immediately following construction. Moreover, several of the swales located at outfalls are exhibiting the growth of algae, indicating that they are helping to capture some of the fertilizers contained in runoff from the golf course.

The monitoring of the Badin Inn Stream Restoration Project encompasses geomorphic surveys to track any changes in dimension, pattern and profile, vegetation monitoring in established vegetation plots, hydrological monitoring through installation of a stream gauge, and biological monitoring by collecting Qual 4 macroinvertebrate samples. Baseline data was collected in July of 2009 and will serve as a basis for comparison for future monitoring efforts. Monitoring methods will be repeated for five years following the as-built effort.

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APPENDICES

1.0 PROJECT GOALS, BACKGROUND AND ATTRIBUTES

1.1 Location and Setting

The Badin Inn Stream Restoration Project is located in the Town of Badin in Stanly County, North Carolina and is situated entirely within the golf course of the Badin Inn Resort and Country Club (Figure 1). The project site encompasses a perennial, unnamed tributary to Little Mountain Creek (UT to Little Mountain Creek) and a small, first-order intermittent tributary of UT to Little Mountain Creek (Tributary) and the associated floodplain through which these channels flow. Prior to restoration, the channel of UT to Little Mountain Creek consisted of approximately 3,700 feet of a concrete-lined and straightened perennial stream that had been in its altered state for nearly a century. The Tributary consisted of approximately 141 feet of an intermittent channel routed through a culvert from where it entered the golf course property until it's confluence with UT to Little Mountain Creek. The channels are located in the Yadkin River Basin 8-digit Catalogue Unit 03040104 and the 14-digit hydrological unit 03040104010010. This watershed was identified by the NC Ecosystem Enhancement Program (EEP) as a Targeted Local Watershed and is also classified by the NC Division of Water Quality (NCDWQ) as a Water Supply Watershed (WSIV). The receiving stream, Little Mountain Creek, is listed on the 303(d) list for biological impairment (NCDENR, 2008).

The project location is shown on the Badin 7.5 minute United States Geological Service (USGS) Topographic Quadrangle Map at approximately 580331 E and 3917513 N.

The project site is located in the Carolina Slate Belt ecoregion (Griffith *et. al*, 2002). The primary adjacent land use throughout the project watershed consists of managed herbaceous areas (which consists mainly of the Badin Inn golf course), developed areas, including much of the residential areas of the Town of Badin, and forested areas on the slopes above the town. **Table 4** summarizes the land use of the UT to Little Mountain Creek watershed.

UT to Little Mountain Creek is a 2nd order stream, as several small 1st order tributaries flow into it near the top of the watershed. As it passes through the town, the channel has uniform rectangular dimensions and is lined with concrete. As the primary drainage feature in the Town of Badin, it receives the discharge of numerous stormwater pipes flowing from houses and townhouse complexes. The channelization of this stream occurred during the development of Badin by ALCOA during the early 1920's, and has since served as the primary stormwater conveyance system for a portion of the town. Where the stream enters the Badin Inn and Country Club golf course, the stream is confined to a narrow, stone-lined channel for roughly 700 feet. It continues in this form until reaching the conservation easement and the upstream end of the project reach, after passing through a 48" culvert under Henderson Street (State Road 1720). At this point, prior to restoration, the stream entered a much larger, concrete-lined channel that traveled straight down the valley until joining with Little Mountain Creek. An intermittent tributary that was routed underground through a culvert entered the main channel approximately 500 feet downstream of the beginning of the project. The relict floodplain

of the pre-restoration channel was covered by fairways of the Badin Inn and Resort golf course, and some modification to the valley had been done to create bunkers, greens and tee boxes. In addition, a network of drains, pipes and irrigation systems had been installed within the valley, and numerous stormwater outfalls discharged into the stream.

1.2 Project Goals and Objectives

The overarching goals of the Badin Inn stream restoration project are:

- Restoring the pre-disturbance ecology and hydrology of a perennial, unnamed tributary to Little Mountain Creek, which was hardened with concrete and relocated to its present location nearly a century ago.
- Improvement of flood attenuation characteristics of a highly urbanized and industrialized watershed.
- Removal of some portion of the pollutant influx from the adjacent golf course management practices.
- Improve aquatic habitat of the main channel with the use of natural material stabilization structures such as root wads, log vanes, woody debris, and a riparian buffer.
- Provide aesthetic value, wildlife habitat, and bank stability through the creation of a riparian zone.
- Create a contiguous wildlife corridor, with connection of the adjacent natural habitats and state natural heritage areas including Morrow Mountain State Park, Little Mountain Creek riparian corridor and Badin basic forest.
- Provide shading and biomass input to the stream and mast for wildlife when vegetation is mature.
- Provide educational opportunities with information signs along the project and take advantage of the high exposure of the project.

The objectives, which specify how each of the goals will be obtained, are:

1) construct a new stream channel in the valley of the existing stream that:
    a) Possesses dimension, profile and cross-section appropriate for streams in the Uwharrie Mountains region of the piedmont, as based on reference reaches.
    b) Will contain changes in stream type that are appropriate for changes in the valley slope along the project.
    c) Will have bedload introduced into channel to account for the lack of bedload produced by the watershed, and for any excess shear stress generated by the lack of bedload and to provide instream habitat. The bedload will be sized appropriately based on entrainment calculations, while also ensuring that the bedload will not be mobilized out of the stream completely following restoration.
    d) Will be raised where practical so that bankfull elevation meets the existing floodplain.
    e) Will have structural measures to protect outside meander bends before vegetation becomes established. The structures will contain woody

material for habitat, and stone material that is sized appropriately for a stream with a cross sectional area of only approximately 13 square feet.

2) establish a riparian corridor that:
    a) Is planted with local propagules of native vegetation.
    b) Meets the minimum vegetative criteria for survival(outlined below in Section 7.2).
    c) Contains riparian wetland "swales", to improve the quality of water passing through the buffer, to provide floodplain storage for reduction of overbank flood velocities and flooding, to increase the functional diversity of vegetation within the riparian corridor, and to protect the stream channel during flood events.
3) implement educational and aesthetic components:
    a) Install several information kiosks along the edge of the conservation easement with information on stream ecology, hydrology and stream restoration.
    b) Use blue bird boxes as conservation easement boundary markers, along with a barrier/low fence along the easement boundary that will prevent maintenance equipment from entering the easement.

1.3 Project Structure, Restoration Type and Approach

1.3.1 Project Structure

This project consists of 4,174 linear feet of stream restoration. This length consists of approximately 3,994 linear feet of Priority I restoration on UT Little Mountain Creek and approximately 180 linear feet of Priority I restoration on an intermittent tributary to UT to Little Mountain Creek. This information is summarized in **Table 1** and graphically depicted in **Figure 2**, both of which are found in Appendix A.

1.3.2 Restoration Type and Approach

The restoration of UT to Little Mountain Creek was planned as a Priority I restoration in that the bed elevation of the restored stream channel would be raised so that bankfull elevation is reconnected to the relict floodplain elevation. In some sections, the bankfull elevation would need to be lowered where certain constraints, such as pipe invert elevations, had to be met. In these areas, however a new floodplain was to be built a slightly lower elevation than the relict floodplain. The channel of UT to Little Mountain creek was designed as a C4 channel, and was intended to have a somewhat high width to depth ratio to account for a lack of natural channel roughness, a condition created by the lack of natural bed material in the pre-restoration channel, and the lack of a source of bedload from upstream. This lack of roughness was expected to have a tendency to increase mean velocity and shear stress in the design channel, thus the design called for a high width to depth ratio and the placement of bed material into the channel. Dimension, pattern and profile were designed in accordance with reference criteria obtained from two

reference reaches. The design approach to the small tributary was identical to that of the main channel.

Another element of the restoration approach was the incorporation of riparian wetland "swales", which are small depressions built within the floodplain of the restored stream. Research has shown that overbank flooding dampens the peak of the hydrograph, and that flows stored within the riparian floodplain typically undergo biochemical processes that improve the quality of water prior to it being retuned to the stream (Evans *et al*., 2008). Riparian wetland "swales" were incorporated into the design to improve the quality of water passing through the buffer, to provide floodplain storage for reduction of overbank flood velocities and flooding, to increase the functional diversity of vegetation within the riparian corridor, and to protect the stream channel during flood events. These riparian wetland swales were not intended to generate riparian wetland credits.

1.4 Project History, Contacts and Attribute Data

The Badin Inn stream restoration project was identified as part of a North Carolina Ecosystem Enhancement Program full-delivery proposal submitted in October of 2006. Upon winning the project, Earth Tech|AECOM acquired for the State of North Carolina a conservation easement on the golf course property of Badin Inn Resort and Club to protect in perpetuity the riparian corridor of the restored stream. Construction of the stream was completed in April of 2009. As-built data was collected following completion of construction, with the last data collected in July, 2009. Year one monitoring will begin in December 2009 and will take place once every year for five years. A complete project history is contained in **Table 2** in Appendix A. **Table 3** in Appendix A lists all of the relevant contact information pertaining to the project. Finally, **Table 4** in Appendix A contains a summation of project attribute data, including information about the UT to Little Mountain Creek watershed, floodplain soils and water quality classification of the restored channels.

2.0 SUCCESS CRITERIA

The following section outlines the success criteria for the three restoration elements: stream, hydrology and vegetation.

2.1 Stream

Considering the 5 year timeframe of standard mitigation monitoring, restored streams should demonstrate morphologic stability in order to be considered successful. Stability does not equate to an absence of change, but rather to sustainable rates of change or stable patterns of variation. Restored streams often demonstrate some level of initial adjustment in the several months that follow construction and some change/variation subsequent to that is to also be expected. However, the observed change should not indicate a high rate or be unidirectional over time such that a robust trend is evident. If some trend is evident, it should be very modest or indicate migration to another stable form. Examples of the latter include depositional processes resulting in the development

of constructive features on the banks and floodplain, such as an inner berm, slight channel narrowing, modest natural levees, and general floodplain deposition. Annual variation is to be expected, but over time this should demonstrate maintenance around some acceptable central tendency while also demonstrating consistency or a reduction in the amplitude of variation. Lastly, all of this must be evaluated in the context of hydrologic events to which the system is exposed over the monitoring period.

For channel dimension, cross-sectional overlays and key parameters such as cross-sectional area and the channel's width to depth ratio should demonstrate modest overall change and patterns of variation that are in keeping with above. For the channels' profile, the reach under assessment should not demonstrate any consistent trends in thalweg aggradation or degradation over any significant continuous portion of its length. Over the monitoring period, the profile should also demonstrate the maintenance or development of bedform (facets) more in keeping with reference level diversity and distributions for the stream type in question. It should also provide a meaningful contrast in terms of bedform diversity against the pre-existing condition. Bedform distributions, riffle/pool lengths and slopes will vary, but should do so with maintenance around design/As-built distributions. This requires that the majority of pools are maintained at greater depths with lower water surface slopes and riffles are shallow with greater water surface slopes. Substrate measurements should indicate the progression towards, or the maintenance of, the known distributions from the design phase.

2.2 Vegetation

The final vegetative success criteria will be a minimum survival rate of 260 trees per acre in the conservation easement at the end of five years, in accordance with USACE Stream Mitigation guidelines. An interim measure of vegetation planting success will be a minimum survival rate of 320 trees per acre in the riparian buffer at the end of 3 years. At least six different representative tree and shrub species should be present on the entire site throughout the monitoring period and at the end of five years.

2.3 Hydrology

Hydrologic success will be measured based on the ability of the restored stream to regularly access its floodplain during above-bankfull flows, and of the proper functioning of the wet swales.

3.0 MONITORING PLAN GUIDELINES

Monitoring is essential in order to document whether the success criteria discussed above are being met. The following section outlines the approach to monitoring the Badin Inn restoration project in the 5 years following construction. The monitoring effort will encompass both quantitative measurements and visual observation of the restored stream channel, hydrology and vegetation. In addition, biological monitoring of benthic

macroinvertebrates will be conducted in order to document biological uplift of the restored stream channel.

3.1 Stream Channel Stability and Geomorphology

3.2.1 Dimension

Channel dimension will be surveyed once each year in the five years following As-built at permanently established cross sections located along UT to Little Mountain Creek and the Tributary. These will be surveyed using RTK Survey Grade GPS and/or total station. The data will be analyzed for all of the geomorphic variables housed in **Table 5**, Appendix B of this report. Graphs of profile and cross-sections will be plotted against previous year's data using Rivermorph software.

Ten permanent cross-sections were established following construction and their endpoints marked with rebar. One cross-section is located on the Tributary reach, and the other nine are located on UT to Little Mountain Creek. The cross-section locations are as follows:

Cross-Section #1. UT to Little Mountain Creek, Station 47+67, riffle
Cross-Section #2. UT to Little Mountain Creek, Station 43+05, pool
Cross-Section #3. UT to Little Mountain Creek, Station 38+26, riffle
Cross-Section #4. UT to Little Mountain Creek, Station 33+72, riffle
Cross-Section #5. UT to Little Mountain Creek, Station 29+78, pool
Cross-Section #6. UT to Little Mountain Creek, Station 25+39, riffle
Cross-Section #7. UT to Little Mountain Creek, Station 20+45, pool
Cross-Section #8. UT to Little Mountain Creek, Station 16+50, pool
Cross-Section #9. UT to Little Mountain Creek, Station 13+61, riffle
Tributary Cross-Section. Tributary, Station 10+85, riffle

3.2.2 Pattern

Pattern will not be measured until year 5 unless the other assessments/measurements (e.g. profile and visual assessment) indicate pattern may be changing. Pattern measurements to be obtained will include radius of curvature, meander wavelength, sinuosity, and belt width. For stream pattern data refer to **Table 5** in Appendix B.

3.2.3 Profile

Channel profile will be surveyed once each year using RTK survey-grade GPS and/or total station in order to detect thalweg, bankfull, and water surface elevations of the UT to Little Mountain Creek and Tributary. Only 3,000 feet of UT to Little Mountain Creek

will be monitored in this way, with endpoints beginning at the downstream end of the project and extending upstream to approximately station 20+22. The entire length of the Tributary will be surveyed. Data will be collected for the thalweg, water surface and left and right bankfull elevations at each change in facet slope of the stream, and at any other locations necessary to provide sufficient detail of the various features of the stream.

3.2.3 Stream Substrate

Surface particle size distributions will be monitored over time to indicate if the bed subtrate is coarsening, fining or remaining constant. Monitoring of substrate will be done by conducting pebble counts at each of the ten cross-sections, following methods described by Bunte and Abt (2001).

3.2.4 Visual Assessment

A visual assessment of the stream to identify problem areas will be completed in accordance with the most recent version of the EEP Monitoring Report Template. Problem areas will be documented with photographs and will be depicted on a planview map showing their location and level of severity.

3.2.5 Bank Stability Assessments

Due to the channelized state of UT to Little Mountain Creek prior to restoration, no pre-construction bank stability data could be obtained. As such, bank stability assessments will not be included in the monitoring effort.

3.2 Vegetation

Monitoring of vegetation will follow the Level II protocols established in the 2006 version of the Carolina Vegetative Survey-EEP Protocol (Lee *et al*, 2006). Nine 10m X 10m ($100m^2$) plots were established following planting of permanent vegetation in 2009. These nine plots will be sampled in the fall of every year to determine vegetation survival and also demonstrate if vegetation survival is successful.

3.3 Hydrology

All bankfull events will be cataloged over the monitoring period using an instream crest gauge and/or visual evidence such as fresh alluvium or wrack lines. An instream crest gage will be installed in 2009. Without continuous recording, multiple bankfull events may occur between observation intervals and thus not every event may be cataloged. However, each crest gauge will be visited a minimum of three times annually as part of standard monitoring. This procedure will capture most bankfull events and provide ample opportunity to capture the two events as required by the 2008 EEP stream monitoring guidelines.

3.4 Digital Photos

Digital photos will be taken in each monitoring year to document the state of the channel and vegetation. Photos of the stream will be captured at each of the ten cross-section locations, and will be taken standing in the channel looking upstream and downstream from the cross-section. These photos will be taken when the vegetation is minimal and within the same 2-month window between monitoring years. Vegetation photos will also be taken at each of the nine vegetation plots from the same vantage point every year.

3.5 Biological Measurements

In order to document the increase in function from the restoration of UT Little Mountain Creek, Earth Tech|AECOM will monitor variables above the minimum requirements of stream restoration monitoring. Earth Tech|AECOM will survey for macroinvertebrates following the NCDENR Standard Operating Procedures for Benthic macroinvertebrates, developed by the Biological Assessment Unit. Because UT Little Mountain Creek is a small 2nd order stream with a 0.5 sq. mi. watershed, the Qual 4 sampling method will be used. Macroinvertebrates will be collected by an Earth Tech|AECOM biologist with the NC Certification required by the NCDWQ for performing this work. Use of the stream and riparian area by amphibians and other fauna will also be evaluated and documented.

4.0 MAINTENANCE AND CONTINGENCY PLANS

The following serves as a guideline for corrective actions that should be taken in the restored stream channel and floodplain in the event of a failure. In addition, several items of maintenance are listed that may be necessary through the monitoring period in order to help ensure the success of the project at the end of Year 5.

4.1 Stream

In general, corrective action will be taken in the channel whenever there is a failure in the intended plan, profile or dimension that is so great as to create the danger of the channel success criteria not being met. “Failure” may not have a precise threshold for each of the stream components. Some shifting in the pattern, profile and dimension of the channel is expected, and some localized area of scour, deposition or bank erosion might occur. It is only when a stream problem area poses a threat to the stability of the channel upstream or downstream that the problem area may rise to the level of a “failure”. Some examples of failures that might warrant corrective action are listed below:

- Significant bed scour or deposition creating the potential for instability upstream or downstream of the localized area of scour or deposition

- Avulsion of the stream channel
- Abandonment of the restored alignment/down-valley migration
- Significant bank failure

In the event that these or other types of failure occur, the stream channel should be evaluated for the source of the problem and appropriate action should be taken to correct the problem. If the failure is related to design criteria for profile, plan or dimension, re-grading of portions of the project within appropriate geomorphic parameters may be necessary. If the failure is related to structures, whether as to location or type of structure, then removal, replacement or reconfiguration of the structure may be necessary. In some cases the problem may be caused by outside sources, such as beaver influence. In these situations, appropriate corrective actions would include removal of the beavers and beaverdams.

4.1 Vegetation

The USACE Stream Mitigation Guidelines give an interim criterion for vegetative success of 320 woody stems/acre at the end of Year 3, and require that 260 stems/acre be present at the end of Year 5. In the event that the Year 3 criterion is not met, the site should be replanted with woody stems at an appropriate density to ensure the survival of at least 260 stems/acre to the end of Year 5.

Maintenance throughout the five-year monitoring period may include re-seeding of permanent or temporary seed mixes in areas where seed has washed away or is not growing properly.

5.0 DOCUMENTING THE AS-BUILT CONDITION (BASELINE)

5.1 Verification of Plantings

Vegetation was planted along the riparian easement of the restored tributary of Little Mountain Creek. Fourteen species of trees and four species of shrubs were planted on-site. Additionally, four species of live stakes and one herbaceous rush species were planted along the streambank. Temporary seed mix was applied in conjunction with the permanent seed mix to reduce the erosive effect of precipitation while the permanent vegetation was becoming established on-site.

Planted woody stems in each of the nine vegetation monitoring plots were flagged and counted to establish a baseline of planted vegetation for each plot. Based on this data collection, vegetation density for the overall site was good averaging 621 stems per acre. The range of stem densities encountered on the mitigation site varied from 324 to 850 stems per acre. Vegetation diversity was low in many individual plots. Species counts of 6 or fewer woody species occurred in 3 plots: plot 2, plot 7, and plot 9. Some dead stems were also noted in the vegetation plots with an average of 1.7 dead stems per plot.

Physical damage to stems was noted in most plots. The majority of the damage was minor and consisted of broken stems or branches on the bare root plantings. Fifty-nine percent of the stems had some damage of this nature. The majority of stems having this damage will continue to grow with ease despite having minor damage. Over time growth will bypass the damaged areas which will gradually disappear. Due to the easement's location along a golf course, it is unclear if this damage originated from the planting itself or from trampling by golfers searching for inaccurately hit balls. Other damage was noted but was fairly rare and did not occur on many stems. Of the less common damage categories stunted growth, due to the planting location being too wet, and insect damage were the most common but each of these damage categories occurred only on a few stems averaging less than one occurrence per plot.

The *Juncus* plugs and live stakes are growing well with little evidence of difficulty. The permanent seed mix has germinated and some species have reached flowering at the time of this report. Five of nine species planted in the permanent seed mix have been observed growing. It is unsure if the other four species have germinated and are in a small stage that would make observation difficult or did not germinate. The first year monitoring should provide additional information about the permanent seed mix survival.

5.2 As-Built Baseline Data Collection

Baseline cross-section and longitudinal surveys were completed in July of 2009. Ten cross-sections and the entire length of both UT to Little Mountain Creek and the Tributary were surveyed. A bed particle size distribution analysis (pebble count) was completed at each cross-section, and photos were captured looking upstream and downstream at each cross-section location. A summation of the geomorphic measurements obtained from the survey is contained in Tables 5 and 6 in Appendix B. Long profile, cross-section, and pebble count graphs are also included in Appendix B, along with photos taken at each of the cross-sections.

Topographic surveys were conducted of the restored channel following construction. The topography, thalweg and bankfull of the as-built channel are depicted in the As-Built Plansheets in Appendix D. Also included in Appendix D are overlays of the design channel alignment with the as-built channel alignment, and comparisons of the as-built profile with the design profile.

6.0 REFERENCES

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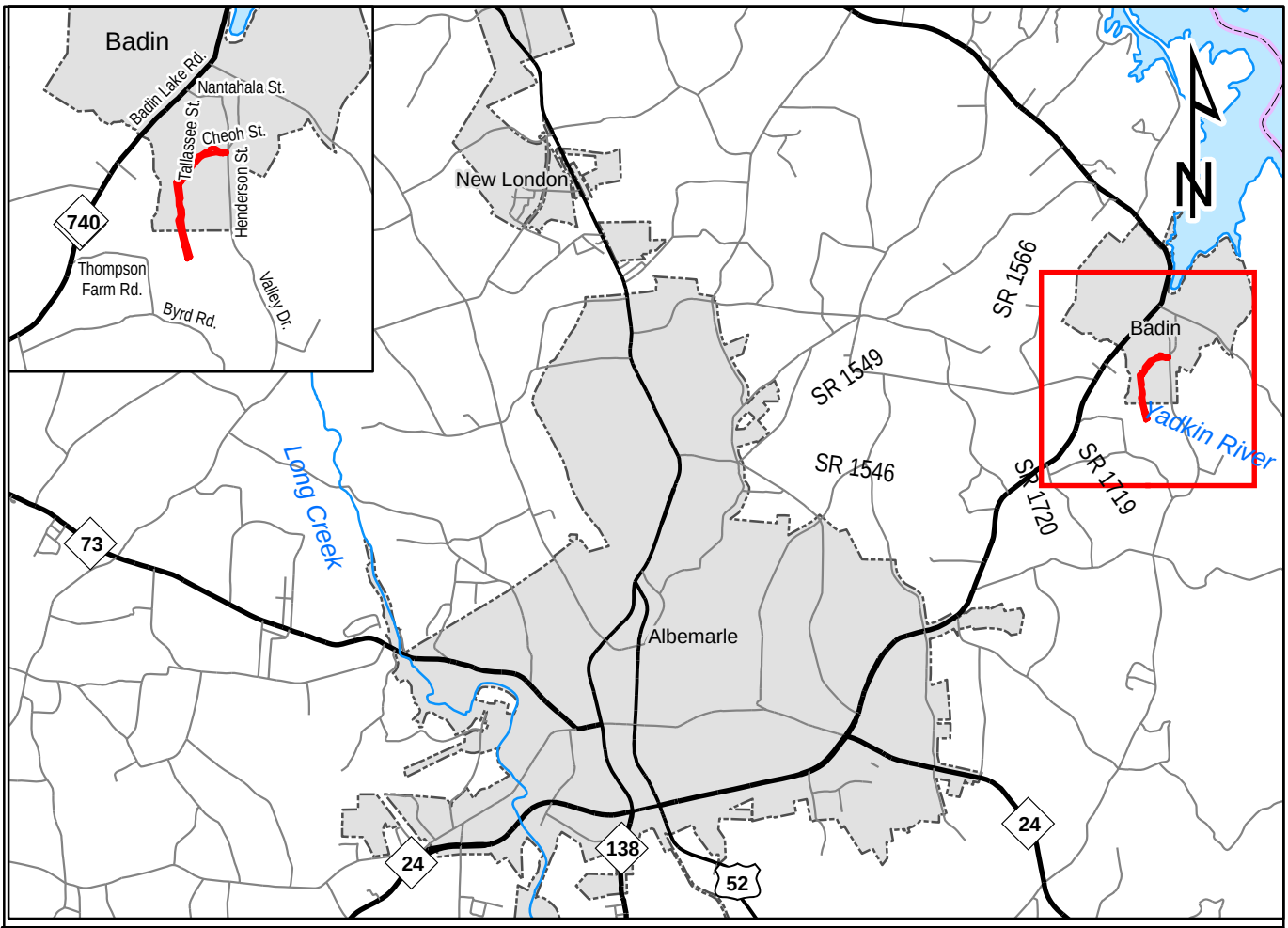
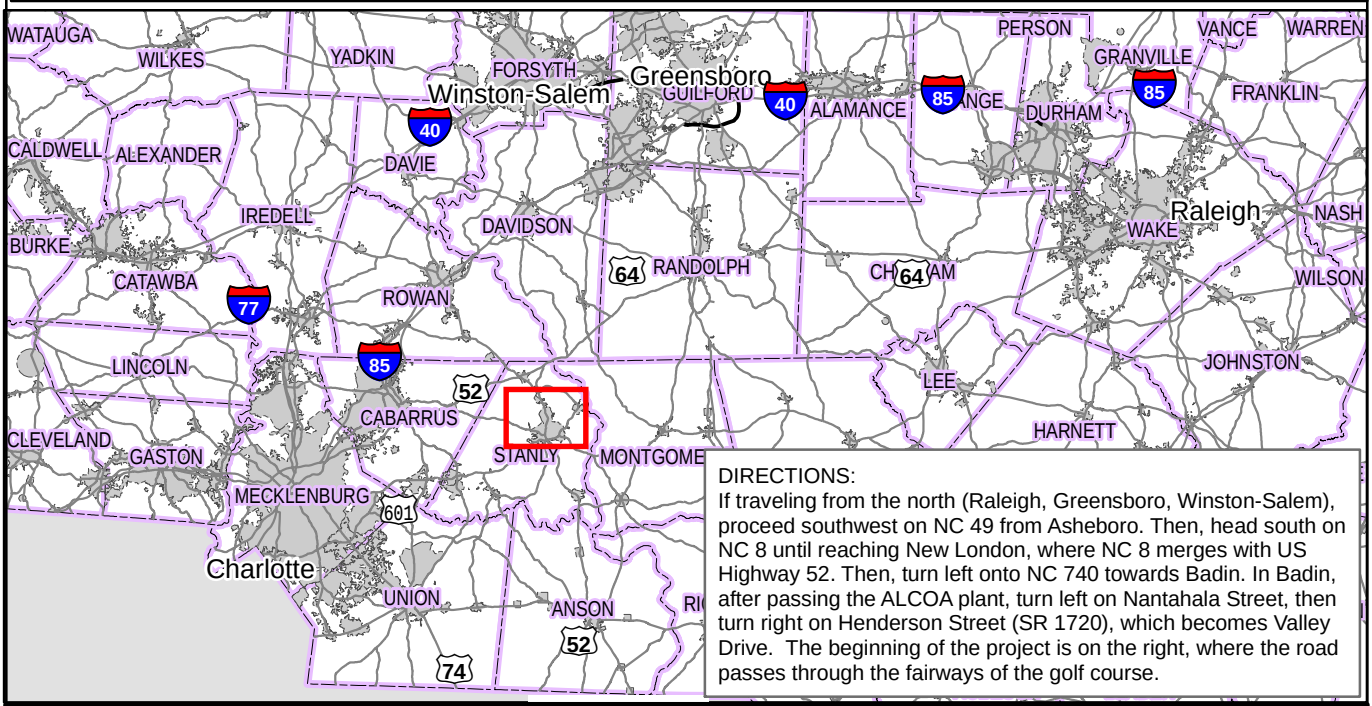
APPENDIX A

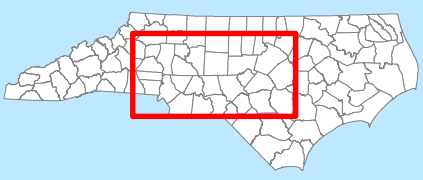
General Tables and Figures

Vicinity Maps and General Site Maps
Project Component/Asset Maps
Tables 1-4





DIRECTIONS:
If traveling from the north (Raleigh, Greensboro, Winston-Salem), proceed southwest on NC 49 from Asheboro. Then, head south on NC 8 until reaching New London, where NC 8 merges with US Highway 52. Then, turn left onto NC 740 towards Badin. In Badin, after passing the ALCOA plant, turn left on Nantahala Street, then turn right on Henderson Street (SR 1720), which becomes Valley Drive. The beginning of the project is on the right, where the road passes through the fairways of the golf course.



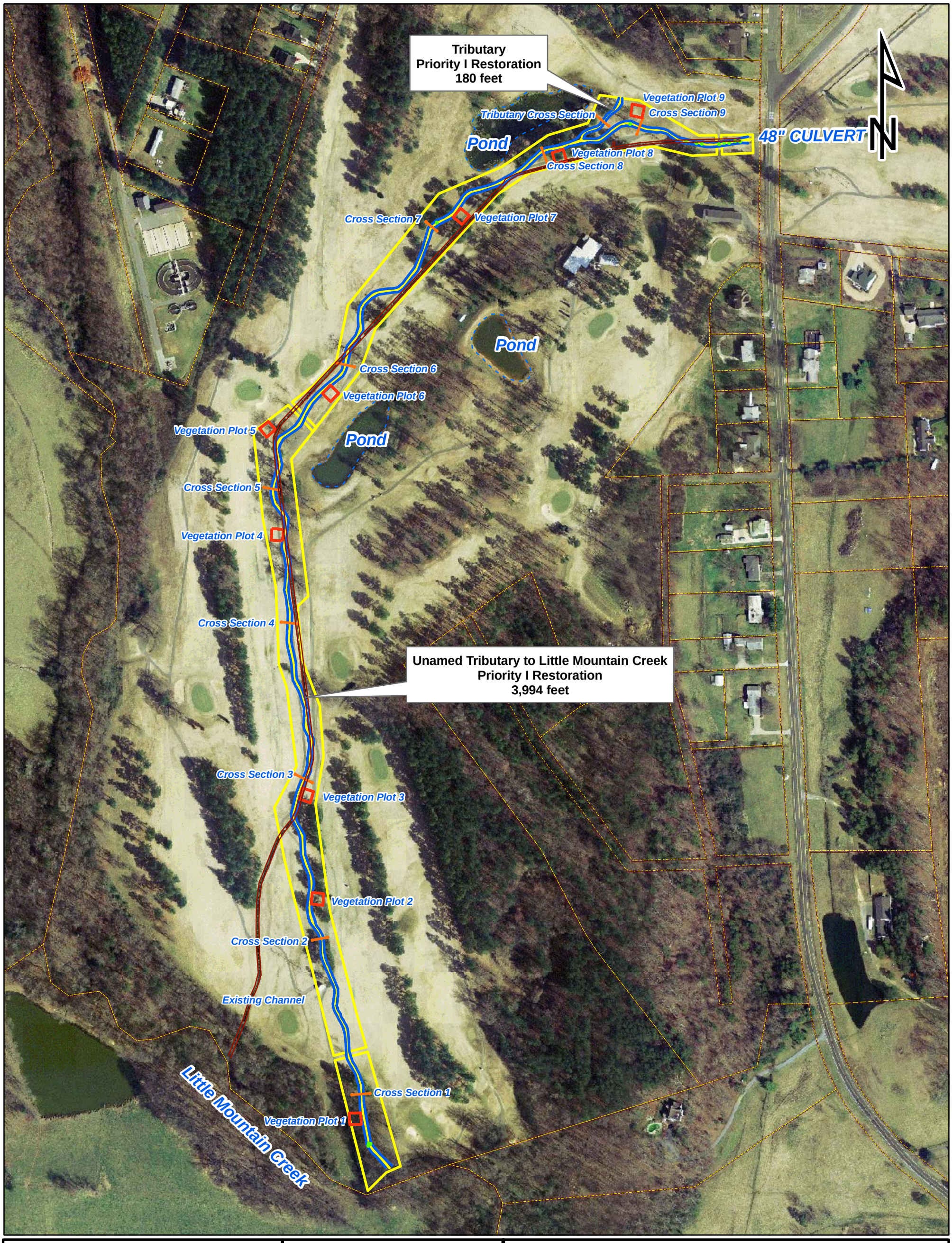
Ecosystem Enhancement Program

EARTH TECH | AECOM

FIGURE 1
VICINITY MAP

Badin Inn Mitigation Plan
Stanly County, North Carolina
EEP Project No. 92666
August, 2009

Not to Scale



Legend

- Pre-Restoration Channel
- Vegetation Plots
- Structures
- Cross Sections
- Restored Bankfull
- Restored Thalweg
- Ponds
- Parcel Boundaries
- Conservation Easement

Ecosystem Enhancement Program

EARTH TECH | AECOM

FIGURE 2
SITE MAP

Badin Inn Mitigation Plan
Stanly County, North Carolina
EEP Project No. 92666

August, 2009

0 250 500 1,000 Feet

Table 1a. Project Components Badin Inn Stream Restoration - EEP Project No. 92666								
Project Component or Reach ID	**Existing Feet/Acres**	**Restoration Level**	**Approach**	**Footage or Acreage**	**Stationing**	**Buffer Acres**	**BMP Elements**	**Comment**
UT to Little Mountain Creek	3,540 feet	R	PI	3,994 feet	10+00 - 50+22			Construction started 28 feet from the start of stationing
Tributary	141 feet	R	PI	180 feet	10+00 - 11+80			

Notes: R = Restoration
PI = Priority I

Table 1b. Component Summations Badin Inn Stream Restoration - EEP Project No. 92666							
Restoration	Stream	Riparian		Non-Ripar	Upland	Buffer	
Level	(lf)	Wetland (Ac)		(Ac)	(Ac)	(Ac)	BMP
		Riverine	Non-Riverine				
Restoration	4,174						
Enhancement							
Enhancement I							
Enhancement II							
Creation							
Preservation							
HQ Preservation							
		0	0				
Totals	**4174**	**0**		**0**	**0**	**0**	**Count**

Non-Applicable

Table 2. Project Activity and Reporting History Badin Inn Stream Restoration - EEP Project No. 92666		
Activity or Deliverable	**Data Collection Complete**	**Completion or Delivery**
Restoration Plan	Sep-07	Jul-08
Final Design – Construction Plans	Jul-08	Dec-08
Construction	NA	Apr-09
Temporary S&E mix applied to entire project area	NA	Jul-09
Permanent seed mix applied to reach/segments 1& 2	NA	Aug-09
Containerized and B&B plantings for reach/segments 1&2	NA	Apr-09
Mitigation Plan / As-built (Year 0 Monitoring – baseline)	Jul-09	Aug-09
Year 1 Monitoring	Dec-09	-
Year 2 Monitoring	Dec-10	-
Year 3 Monitoring	Dec-11	-
Year 4 Monitoring	Dec-12	-
Year 5 Monitoring	Dec-13	-

Table 3. Project Contacts Table Badin Inn Stream Restoration - EEP Project No. 92666		
Designer	Earth Tech | AECOM 701 Corporate Center Drive, Suite 475 Raleigh, NC 27607 Phone: (919) 854-6200	
Construction Contractor	River Works, Inc. 8000 Regency Parkway, Suite 200 Cary, NC 27511 Phone: (919) 459-9001	
Survey Contractor	Earth Tech | AECOM 701 Corporate Center Drive, Suite 475 Raleigh, NC 27607 Phone: (919) 854-6200	
Planting Contractor	Efird Landscaping, Inc 42759 Greenview Dr. Albemarle, NC 28001 Phone: (704) 983-1970	
Seeding Contractor	Efird Landscaping, Inc 42759 Greenview Dr. Albemarle, NC 28001 Phone: (704) 983-1970	
Seed Mix Sources	Mellow Marsh Farm, Inc. 1312 Woody Store Rd. Siler City, NC 27344 Phone: (919) 742-1200	
Nursery Stock Suppliers	Arborgen LLC 5594 Highway 38 Blenheim, SC 29516 Phone: (843) 528-9669	Carolina Wetland Services 550 E. Westinghouse Blvd. Charlotte, NC 28273 Phone: (704) 527-1177
Monitoring Performers	Earth Tech | AECOM 701 Corporate Center Drive, Suite 475 Raleigh, NC 27607	
Stream Monitoring	Earth Tech | AECOM	Phone: (919) 854-6200
Vegetation Monitoring	Earth Tech | AECOM	Phone: (919) 854-6200

Table 4. Project Attribute Table Badin Inn Stream Restoration - EEP Project No. 92666		
Project County	Stanly County	
Physiographic Region	Piedmont	
Ecoregion	Slate Belt	
Project River Basin	Yadkin-Pee Dee River Basin	
USGS HUC for Project (14 digit)	3040104010010	
NCDWQ Sub-basin for Project	Yadkin-Pee Dee River Sub-basin	
Within extent of EEP Watershed Plan?	Mountain, Little Mtn & Jacobs Creeks	
WRC Hab Class (Warm, Cool, Cold)	Warm	
% of project easement fenced or demarcated	100	
Beaver activity observed during design phase?	No	
Restoration Component Attribute Table		
	UT to Little Mountain Creek	Tributary
Drainage area	0.5 Sq. Miles	0.05 Sq. Miles
Stream order	2nd	1st
Restored length (feet)	3,994 feet	180 feet
Perennial or Intermittent	Perennial	Intermittent
Watershed type (Rural, Urban, Developing etc.)	Urban	Urban
Watershed LULC Distribution (e.g.)		
Urban	10.60%	100.00%
Ag-Pasture	30.70%	0.00%
Forested	58.70%	0.00%
Watershed impervious cover (%)	5%	15%
NCDWQ AU/Index number	13-5-1(2)	13-5-1(2)
NCDWQ classification	WS-IV	WS-IV
303d listed?	No	No
Upstream of a 303d listed segment?	Yes	Yes
Reasons for 303d listing or stressor	Biological Impairment	Biological Impairment
Total acreage of easement	8.235	
Total vegetated acreage within the easement	8.235	
Total planted acreage as part of the restoration	8.235	
Rosgen classification of pre-existing	NA	NA
Rosgen classification of As-built	C4	E4
Valley type	VIII	VIII
Valley slope	2.50%	2.50%
Valley side slope range (e.g. 2-3.%)	8-12%	7-8%
Valley toe slope range (e.g. 2-3.%)		
Cowardin classification	N/A	N/A
Trout waters designation	No	No
Species of concern, endangered etc.? (Y/N)	No	No
Dominant soil series and characteristics		
Series	Oakboro/Kirksey Silt Loams	Oakboro Silt Loam
Depth	<20 inches	<20 inches
Clay%	>35%	>35%
K		
T	59-64 degrees Farenheit	60 degrees Farenheit

APPENDIX B

Morphological Summary Data and Plots

Tables 5 - 6
Longitudinal Plots
XS-Plots
Pebble Count Plots
Photo Log

Exhibit Table 5. Baseline Stream Data Summary
Badin Inn Stream Restoration - EEP Project No. 92666

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition			UT to Meadow Fork Creek			Reference Reach Spencer Creek			Design UT to Little Mountain Creek			Design Tributary			As-Built UT to Little Mountain Creek			As-Built Tributary		
		LL	UL	Eq.	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Dimension and Substrate - Riffle																									
Bankfull Width (ft)	NA									11.81			12.3			10			5.6	9.37	11.63	10.914			6.29
Floodprone Width (ft)																				44.55	53.44	48.742			46.89
Bankfull Mean Depth (ft)	NA									1.3			0.88			0.7			0.57	0.65	0.8	0.734			0.42
[1]Bankfull Max Depth (ft)	NA				2.5					2.11			1.8			1			0.7	1.04	1.25	1.196			0.56
Bankfull Cross Sectional Area (ft^2)	NA									15.34			10.8			7			3.2	7.21	9	8.004			2.64
Width/Depth Ratio	NA									9.08			13.98			14.3			9.82	12.17	17.89	14.99			14.98
Entrenchment Ratio	NA									28.11			>2.2			>2.2			>2.2	3.97	5.37	4.498			7.45
[1]Bank Height Ratio	NA							**1.03**	**1.05**	**1.04**			**1.1**			**1**			**1**			**1**			**1**
Profile																									
Riffle Length (ft)														14.32	154.43	49.04	18.93	28.54	24.84	18.24	121.02	54.01	17.17	22.51	20.96
Riffle Slope (ft/ft)								0.011	0.021	0.017	0.02	0.036	0.026	0.012	0.037	0.019	0.022	0.04	0.03	0.0053	0.0205	0.0143	0.0162	0.0505	0.0275
Pool Length (ft)								12.98	20.86	18.02	9.29	23.92	17.78	18.3	31	24.65	10.25	17.36	13.8	14.79	41.85	22.14	10.89	25.78	16.34
Pool Max depth (ft)																2			1.1	1.29	3.54	2.06	1.34	1.7	1.55
Pool Spacing (ft)								79.48	96.97	88.23	13	46.5	24.2	68.4	83.1	75.75	5.92	21.17	13.54	36.33	148.07	66.65	36.63	39.7	38.17
Pattern																									
Channel Beltwidth (ft)								22	57.1	37.2	24	52	38	18.6	48.3	33.45	10.42	27.05	18.73	18.6	48.3	33.45	10.42	27.05	18.73
Radius of Curvature (ft)								18	42.8	25	5.4	22.1	12.9	22.1	42.3	32.2	12.38	23.69	18.03	22.1	42.3	32.2	12.38	23.69	18.03
Rc/Bankfull width (ft/ft)										**2.1169**			**1.0488**			**3.22**			**3.2196**	**2.3586**	**3.6371**	**2.9503**			**2.8665**
Meander Wavelength (ft)								78.5	149.9	107.1	54	196	125	43.9	159.35	101.63	24.59	89.24	56.91	43.9	159.35	101.63	24.59	89.24	56.91
Meander Width Ratio								1.86	4.83	3.15	1.95	4.23	3.09	1.86	4.83	3.35	1.86	4.83	3.35	1.86	4.83	3.35	1.86	4.83	3.35
Transport parameters																									
Reach Shear Stress (competency) lb/f^2																				0.549			0.314		
Max part size (mm) mobilized at bankfull																				97.88			64.9		
Stream Power (transport capacity) W/m^2																									
Additional Reach Parameters																									
Rosgen Classification					NA			E4			C4			C4			E4			C4			E4		
Bankfull Velocity (fps)																									
Bankfull Discharge (cfs)																									
Valley length (ft)					3540			200			235			3820			157								
Channel Thalweg length (ft)					3540			288			266			3994			180			3994			180		
Sinuosity (ft)					1			1.4			1.1			1.33			1.03			1.33			1.03		
Water Surface Slope (Channel) (ft/ft)					0.0178			0.0122			0.0132			0.0134			0.0147			0.012			0.012		
BF slope (ft/ft)					0.0178			0.0122			0.0132			0.0134			0.0147			0.012			0.012		
[3]Bankfull Floodplain Area (acres)					N/A			N/A			N/A									20.75			0.5		
[4]Proportion over wide (%)					N/A			N/A			N/A														
Channel Stability or Habitat Metric					N/A			N/A			N/A														
Biological or Other					N/A			N/A			N/A														

STREAM IS COMPLETELY MODIFIED

NOT APPLICABLE- STR

Exhibit Table 5b. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Badin Inn Stream Restoration - EEP Project No. 92666

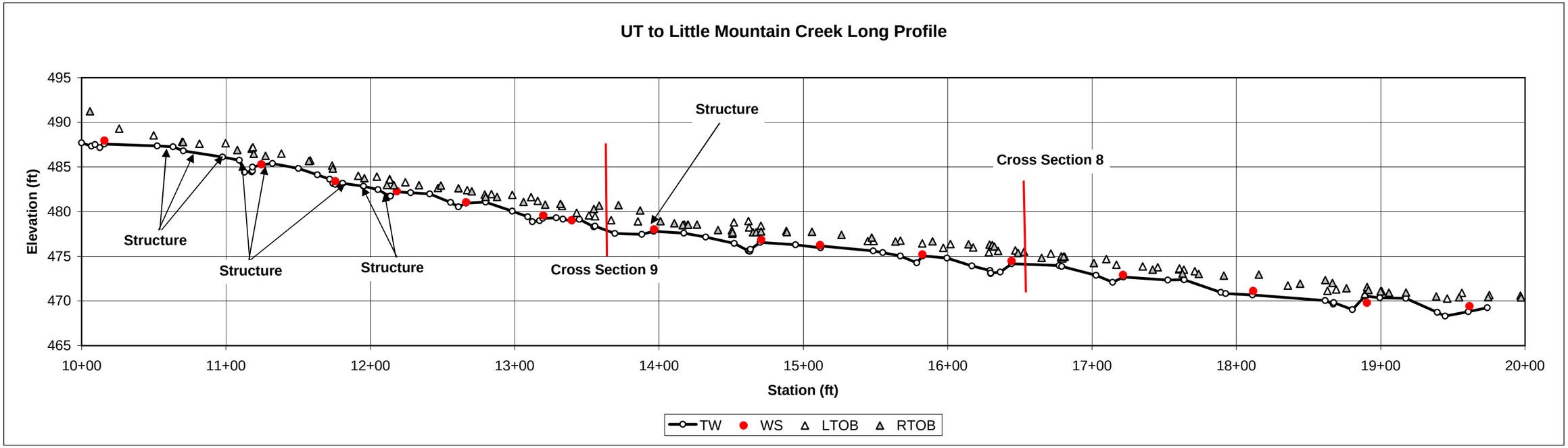
Parameter	Pre-Existing Condition							UT to Meadow Fork Creek							Spencer Creek						
[1]Ri% / Ru% / P% / G% / S%								40		60					45		55				
[1]SC% / Sa% / G% / C% / B% / Be%		NOT APPLICABLE						8	12	67	13	0	0		5	27	47	19	1	1	
[1]d16 / d35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)		DUE TO CHANNELIZATION						0.7	13.83	21.4	58.82	84.8			0.35	16.42	18.53	70.84	85.89		
[2]Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10										2-4.9							2-4.9				
[3]Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0								<1.2							<1.2						
BEHI VL% / L% / M% / H% / VH% / E%									100												

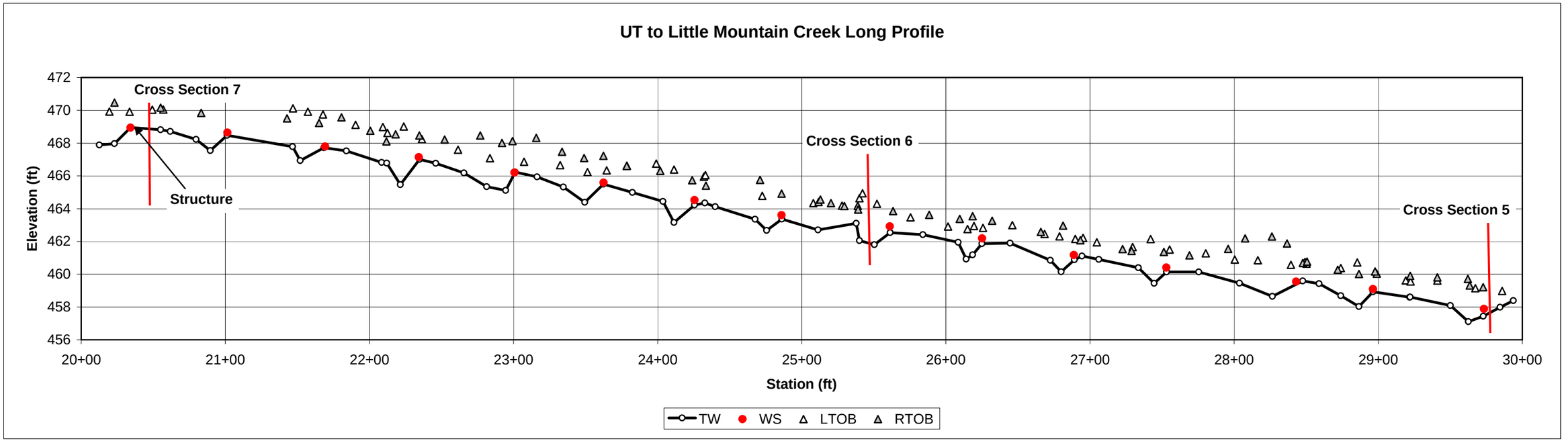
Parameter	Design							As-built/Baseline						
[1]Ri% / Ru% / P% / G% / S%	73.2		26.8					75		25				
[1]SC% / Sa% / G% / C% / B% / Be%								22.38	9.786	60.46	6.68	0.698		
[1]d16 / d35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)								2.356	6.654	12.64	37.41	84		
[2]Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10												>10		
[3]Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0								<1.2						
BEHI VL% / L% / M% / H% / VH% / E%	100							100						

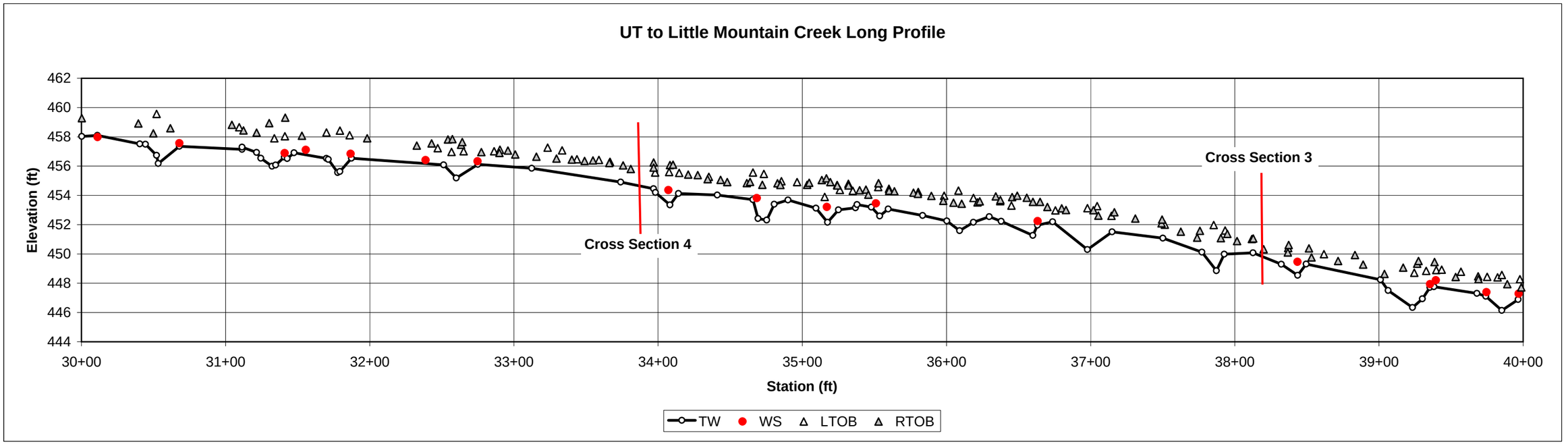
Exhibit Table 6. Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)

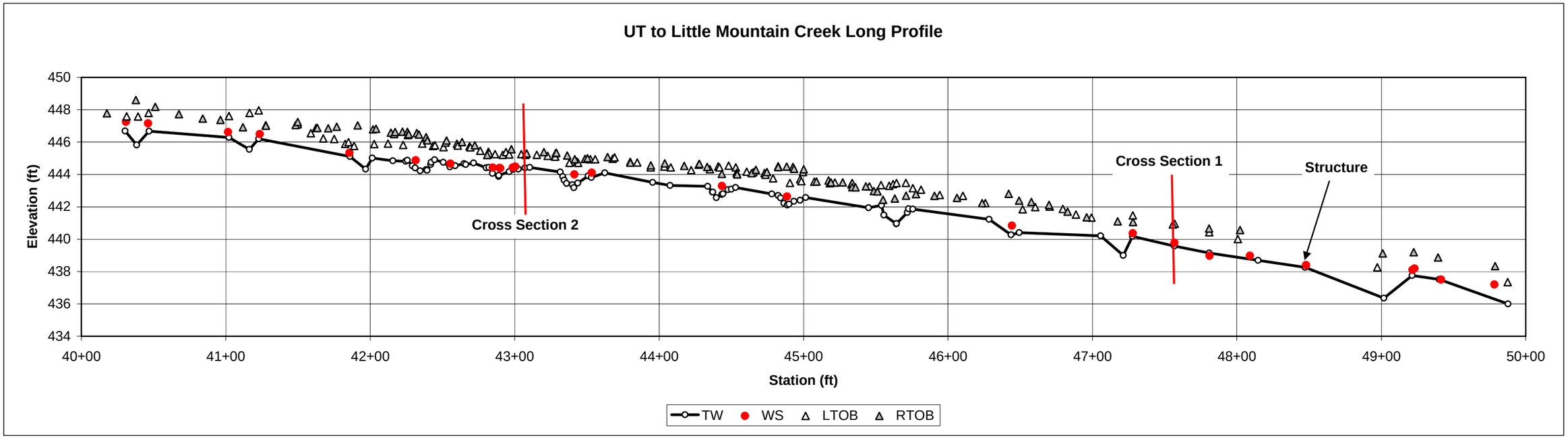
Project Name/Number (XYZ) Segment/Reach: XYZ (4500 feet)

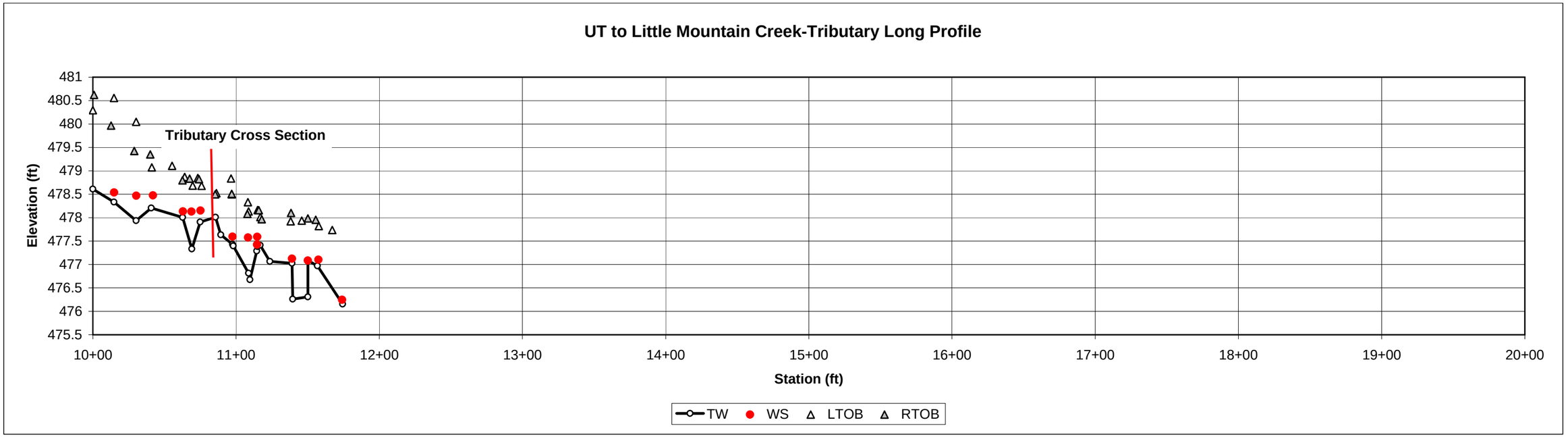
	Cross Section 1 (Riffle)							Cross Section 2 (Pool)							Cross Section 3 (Riffle)							Cross Section 4 (Riffle)							Cross Section 5 (Pool)						
Based on fixed baseline bankfull elevation[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Width (ft)	11.63							13.91							11.23							11.23							11.98						
Floodprone Width (ft)	48.11							41.31							53.44							44.55							42.02						
Bankfull Mean Depth (ft)	0.65							0.7							0.7							0.8							0.96						
Bankfull Max Depth (ft)	1.24							1.4							1.21							1.24							2.17						
Bankfull Cross Sectional Area (ft^2)	7.62							9.78							7.87							9							11.52						
Bankfull Width/Depth Ratio	17.89							19.87							16.04							14.04							12.48						
Bankfull Entrenchment Ratio	4.14							2.97							4.76							3.97							3.51						
Bankfull Bank Height Ratio	1							1							1							1							1						
Based on current/developing bankfull feature[2]																																			
Bankfull Width (ft)																																			
Floodprone Width (ft)																																			
Bankfull Mean Depth (ft)																																			
Bankfull Max Depth (ft)																																			
Bankfull Cross Sectional Area (ft^2)																																			
Bankfull Width/Depth Ratio																																			
Bankfull Entrenchment Ratio																																			
Bankfull Bank Height Ratio																																			
Cross Sectional Area between end pins (ft^2)																																			
d50 (mm)	21.4							11.3							5.46							17.8							0.83						
	Cross Section 6 (Riffle)							**Cross Section 7 (Pool)**							**Cross Section 8 (Pool)**							**Cross Section 9 (Riffle)**							**Tributary (Riffle)**						
Based on fixed baseline bankfull elevation[1]	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Width (ft)	9.37							16.05							10.64							11.11							6.29						
Floodprone Width (ft)	50.33							40.5							45.83							47.28							46.89						
Bankfull Mean Depth (ft)	0.77							0.88							1.19							0.75							0.42						
Bankfull Max Depth (ft)	1.04							2.3							2.47							1.25							0.56						
Bankfull Cross Sectional Area (ft^2)	7.21							14.18							12.69							8.32							2.64						
Bankfull Width/Depth Ratio	12.17							18.24							8.94							14.81							14.98						
Bankfull Entrenchment Ratio	5.37							2.52							4.31							4.25							7.45						
Bankfull Bank Height Ratio	1							1							1							1							1						
Based on current/developing bankfull feature[2]																																			
Bankfull Width (ft)																																			
Floodprone Width (ft)																																			
Bankfull Mean Depth (ft)																																			
Bankfull Max Depth (ft)																																			
Bankfull Cross Sectional Area (ft^2)																																			
Bankfull Width/Depth Ratio																																			
Bankfull Entrenchment Ratio																																			
Bankfull Bank Height Ratio																																			
Cross Sectional Area between end pins (ft^2)																																			
d50 (mm)	26.71							0.79							0.04							13.39							28.64						


UT to Little Mountain Creek Long Profile
Elevation (ft)
495
490
485
480
475
470
465
10+00
11+00
12+00
13+00
14+00
15+00
16+00
17+00
18+00
19+00
20+00
Station (ft)
Structure
Structure
Structure
Structure
Cross Section 9
Cross Section 8
TW
WS
LTOB
RTOB

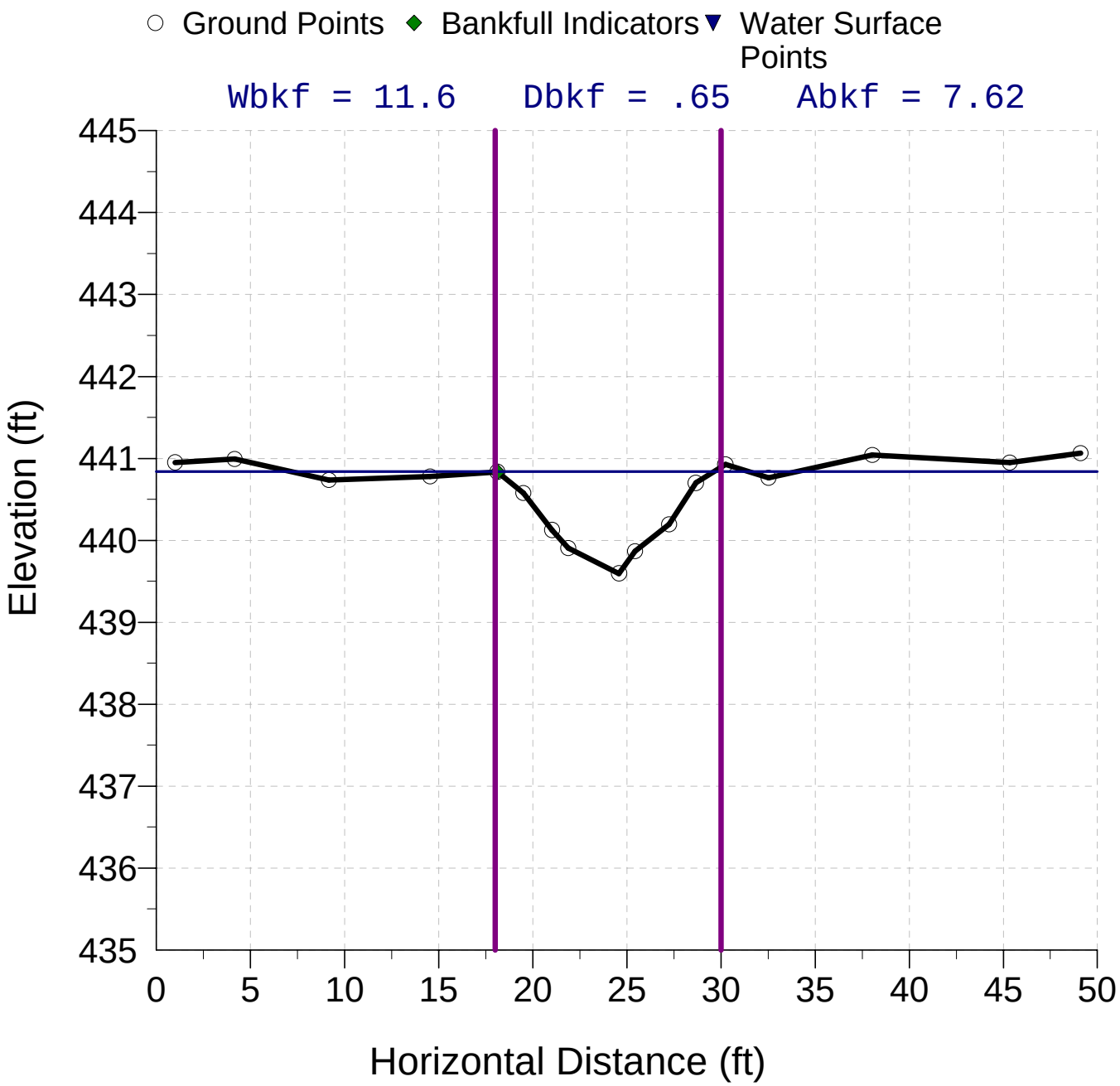

UT to Little Mountain Creek Long Profile
Elevation (ft)
472
470
468
466
464
462
460
458
456
20+00
21+00
22+00
23+00
24+00
25+00
26+00
27+00
28+00
29+00
30+00
Station (ft)
Cross Section 7
Structure
Cross Section 6
Cross Section 5
TW
WS
LTOB
RTOB


UT to Little Mountain Creek Long Profile
Elevation (ft)
462
460
458
456
454
452
450
448
446
444
30+00
31+00
32+00
33+00
34+00
35+00
36+00
37+00
38+00
39+00
40+00
Station (ft)
Cross Section 4
Cross Section 3
TW
WS
LTOB
RTOB

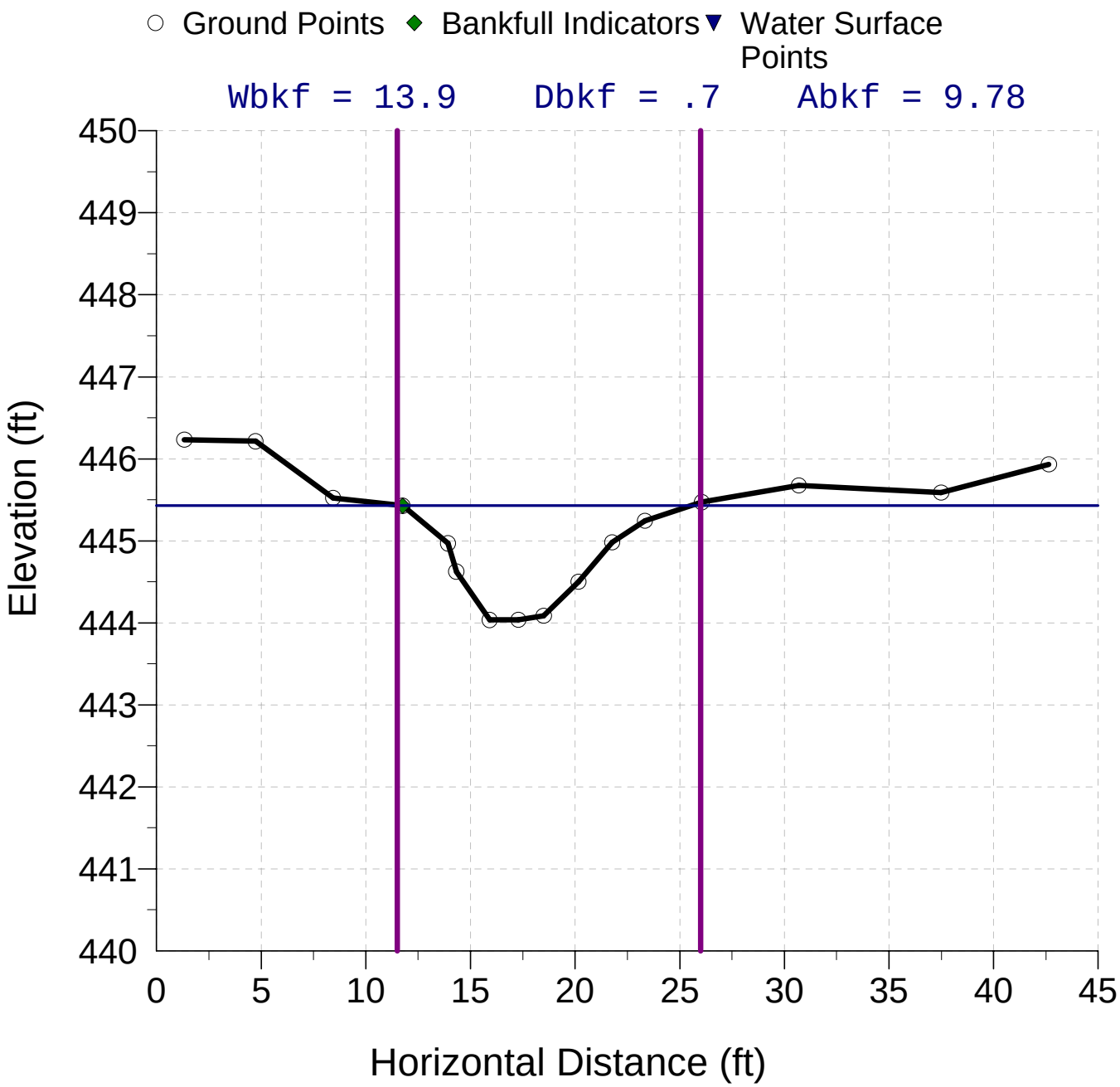

UT to Little Mountain Creek Long Profile
Elevation (ft)
450
448
446
444
442
440
438
436
434
40+00
41+00
42+00
43+00
44+00
45+00
46+00
47+00
48+00
49+00
50+00
Station (ft)
Cross Section 2
Cross Section 1
Structure
TW
WS
LTOB
RTOB


UT to Little Mountain Creek-Tributary Long Profile
Tributary Cross Section
Elevation (ft)
481
480.5
480
479.5
479
478.5
478
477.5
477
476.5
476
475.5
10+00
11+00
12+00
13+00
14+00
15+00
16+00
17+00
18+00
19+00
20+00
Station (ft)
TW
WS
LTOB
RTOB

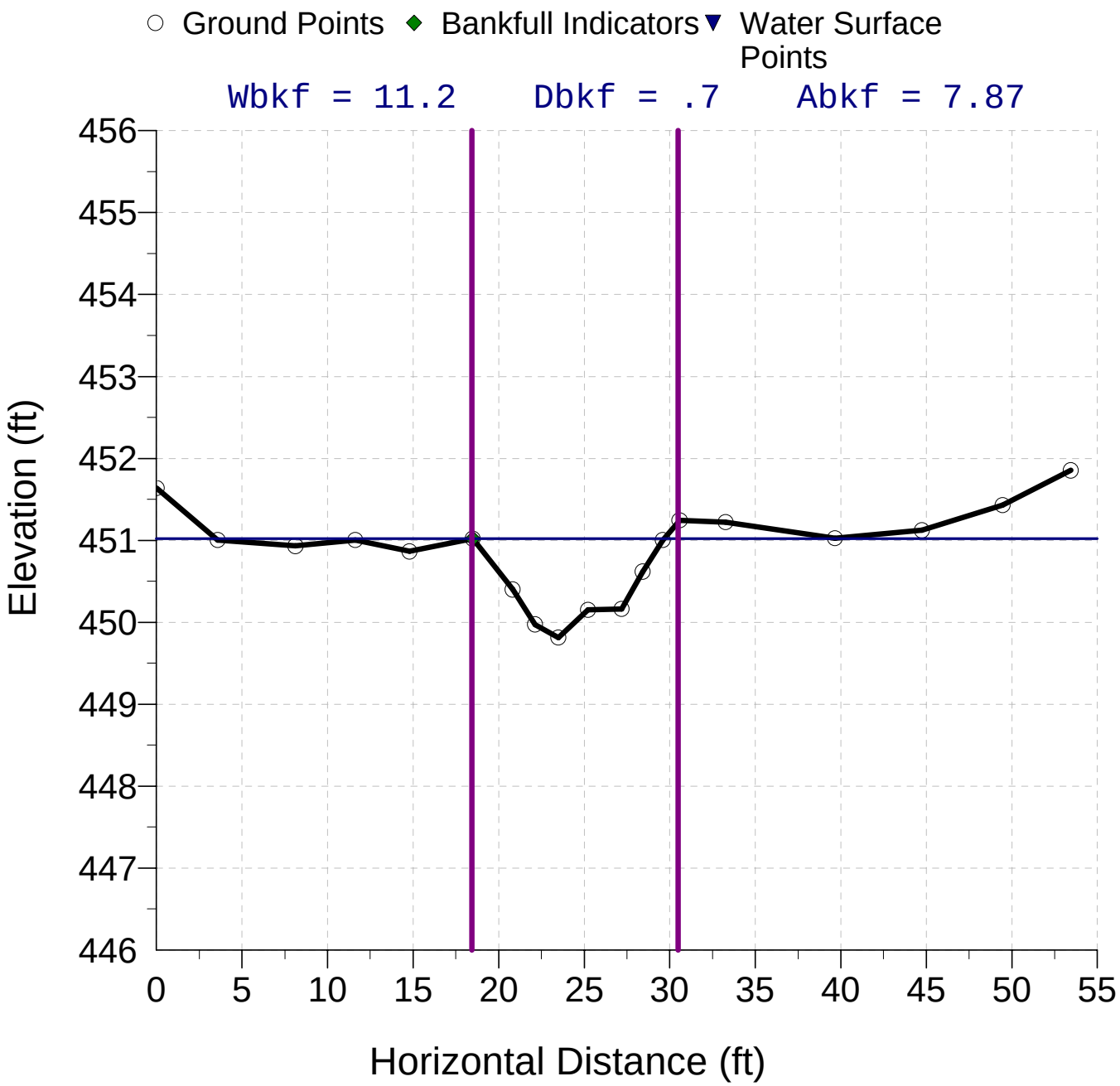
Cross Section 1 Riffle



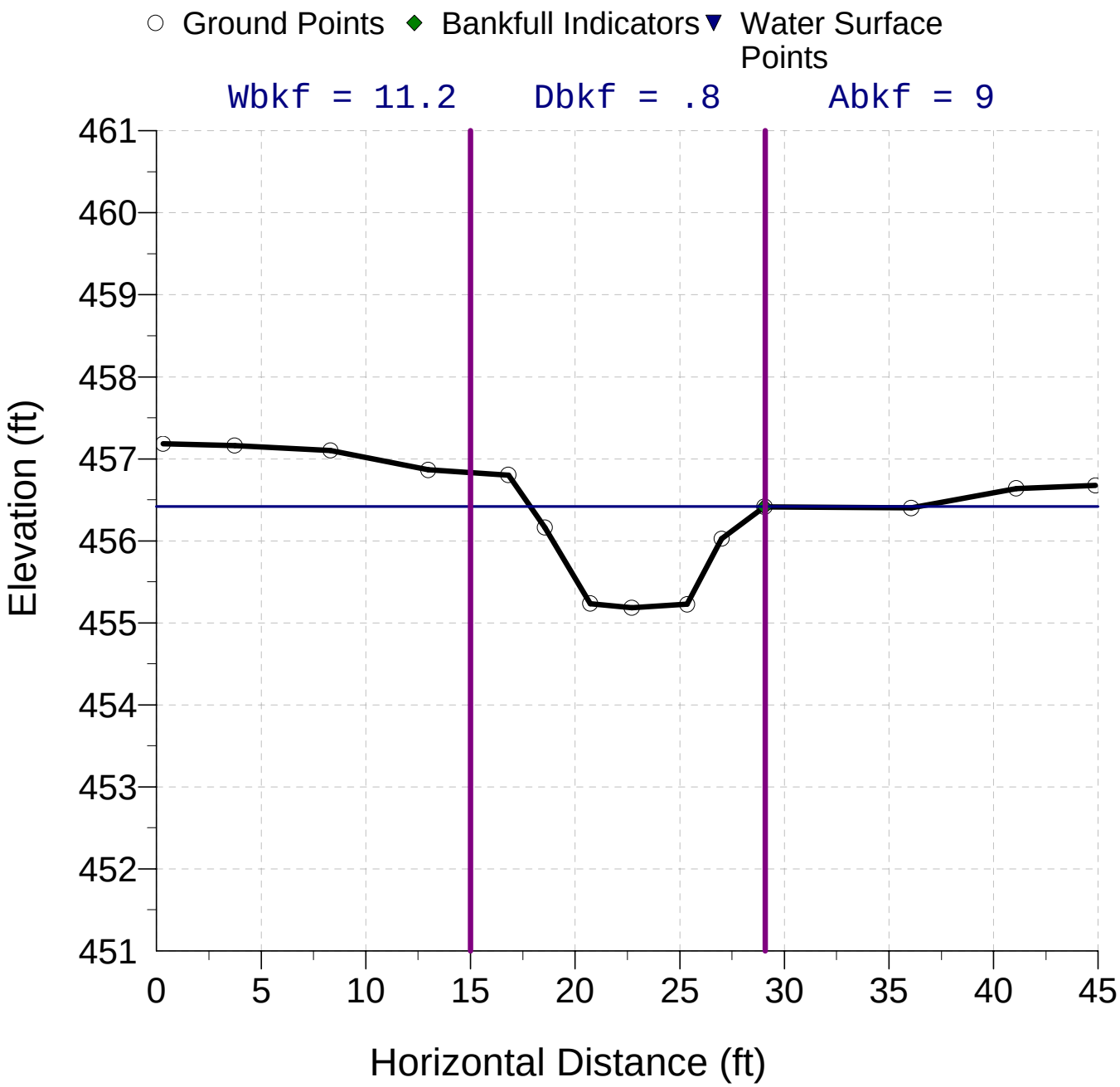
Cross Section 2 Pool



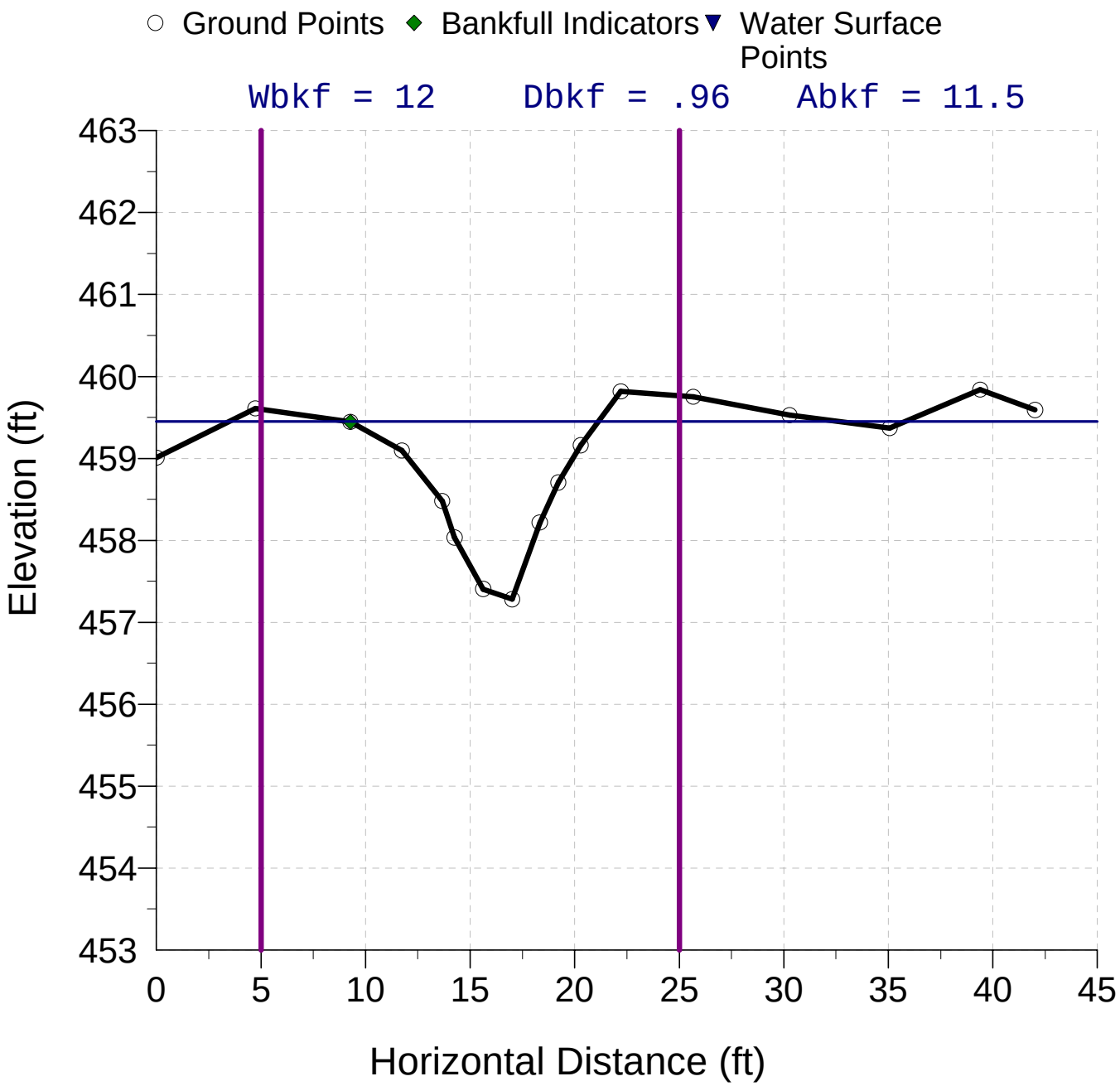
Cross Section 3 Riffle



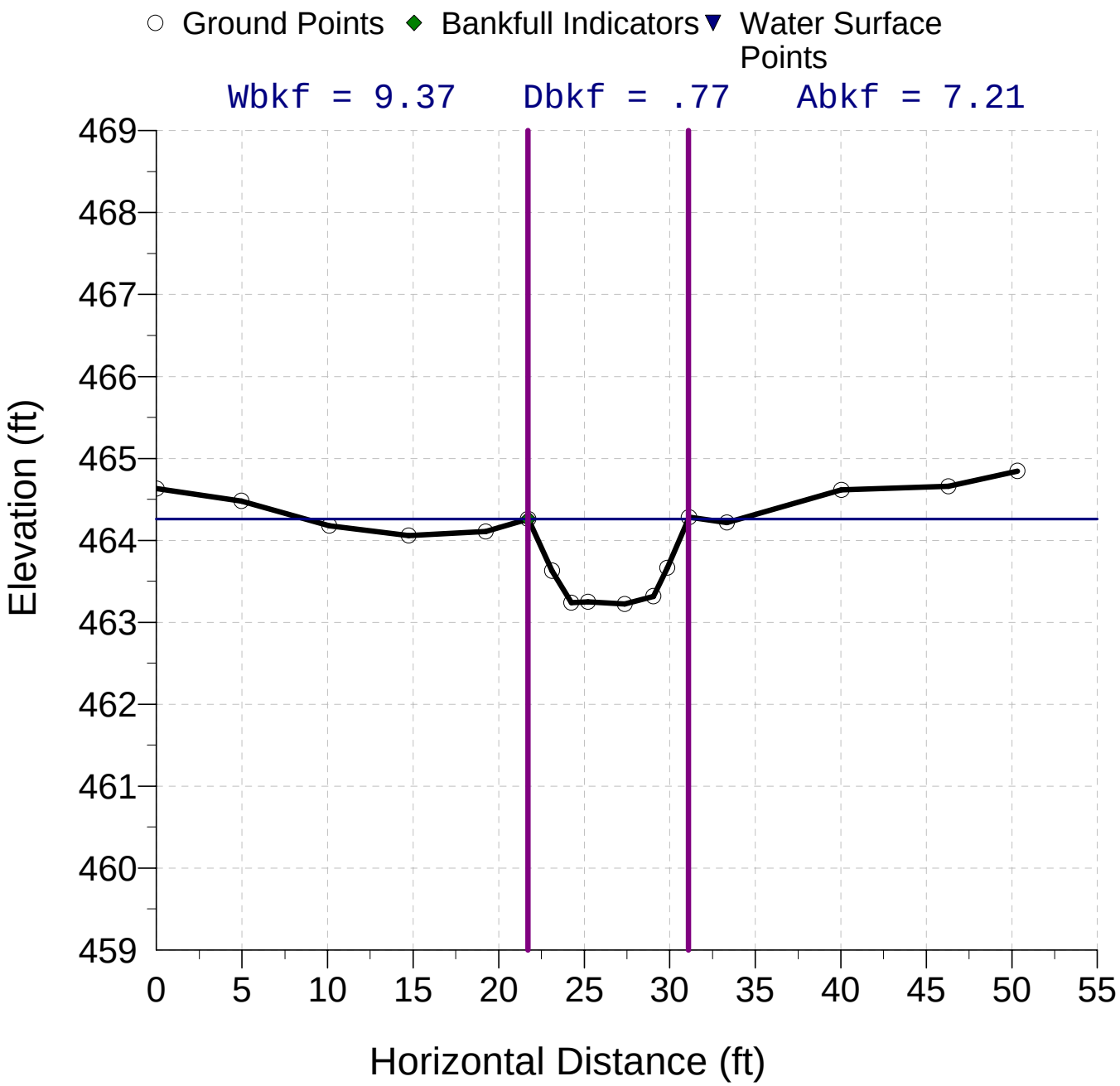
Cross Section 4 Riffle



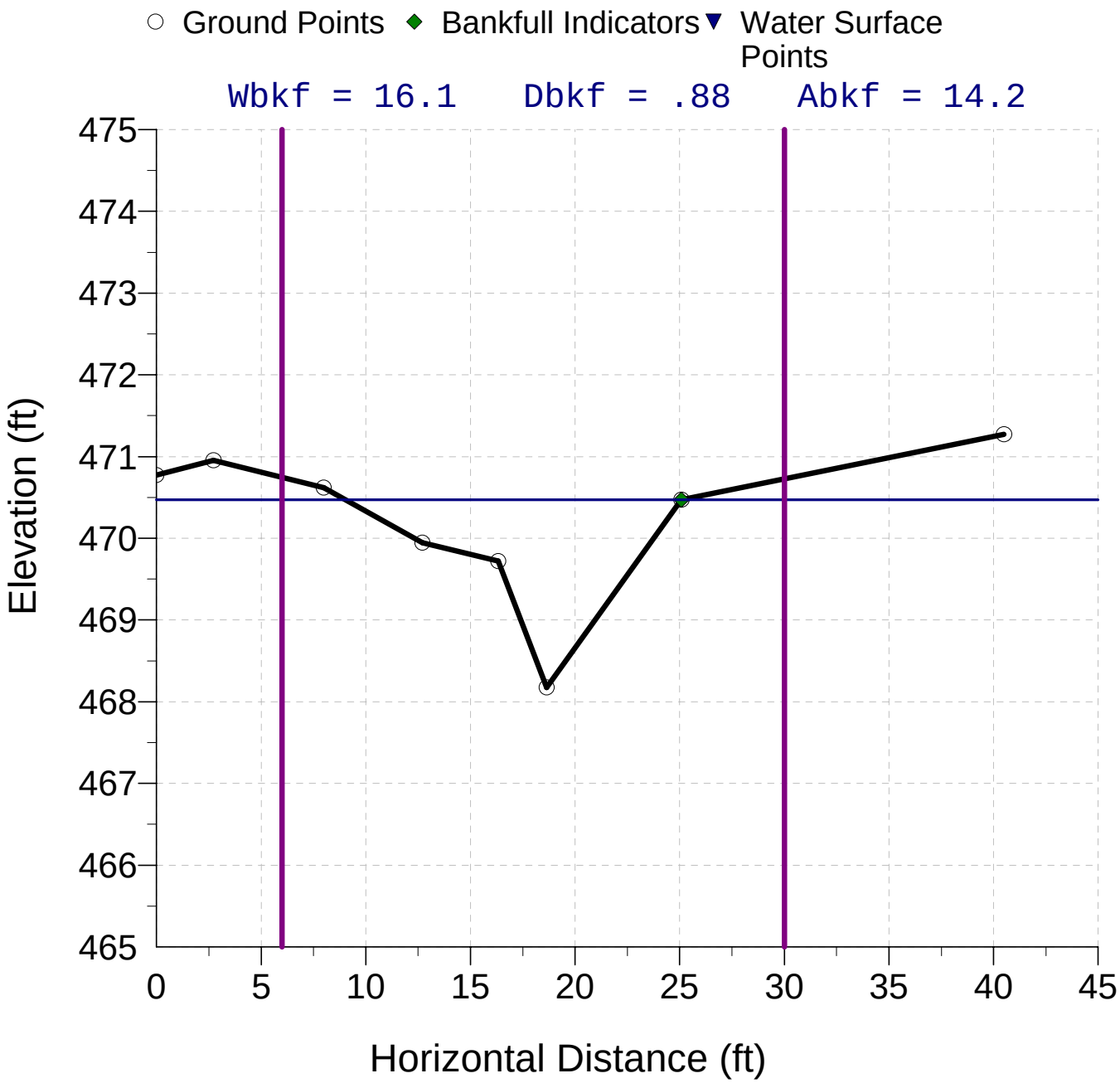
Cross Section 5 Pool



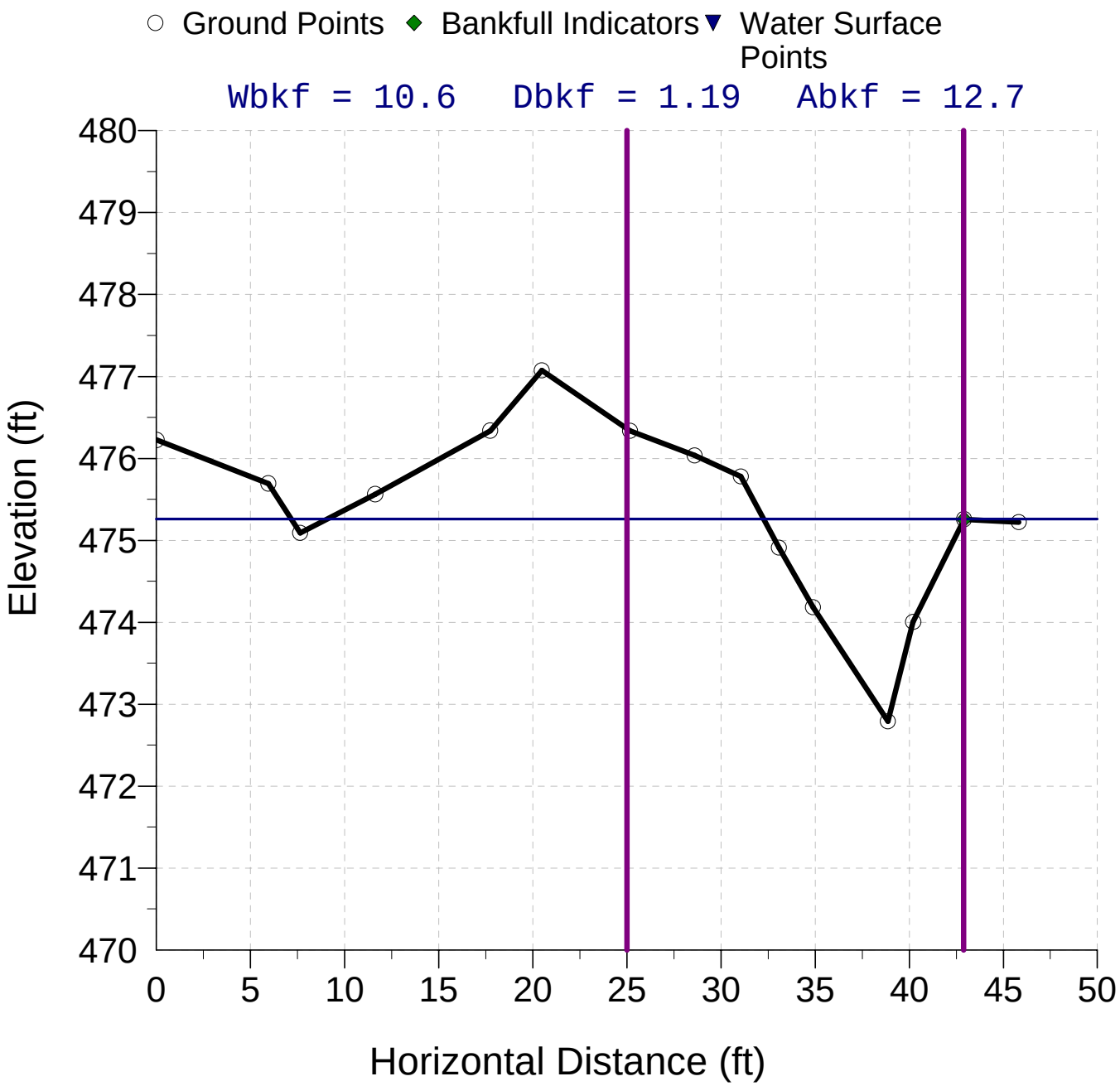
Cross Section 6 Riffle



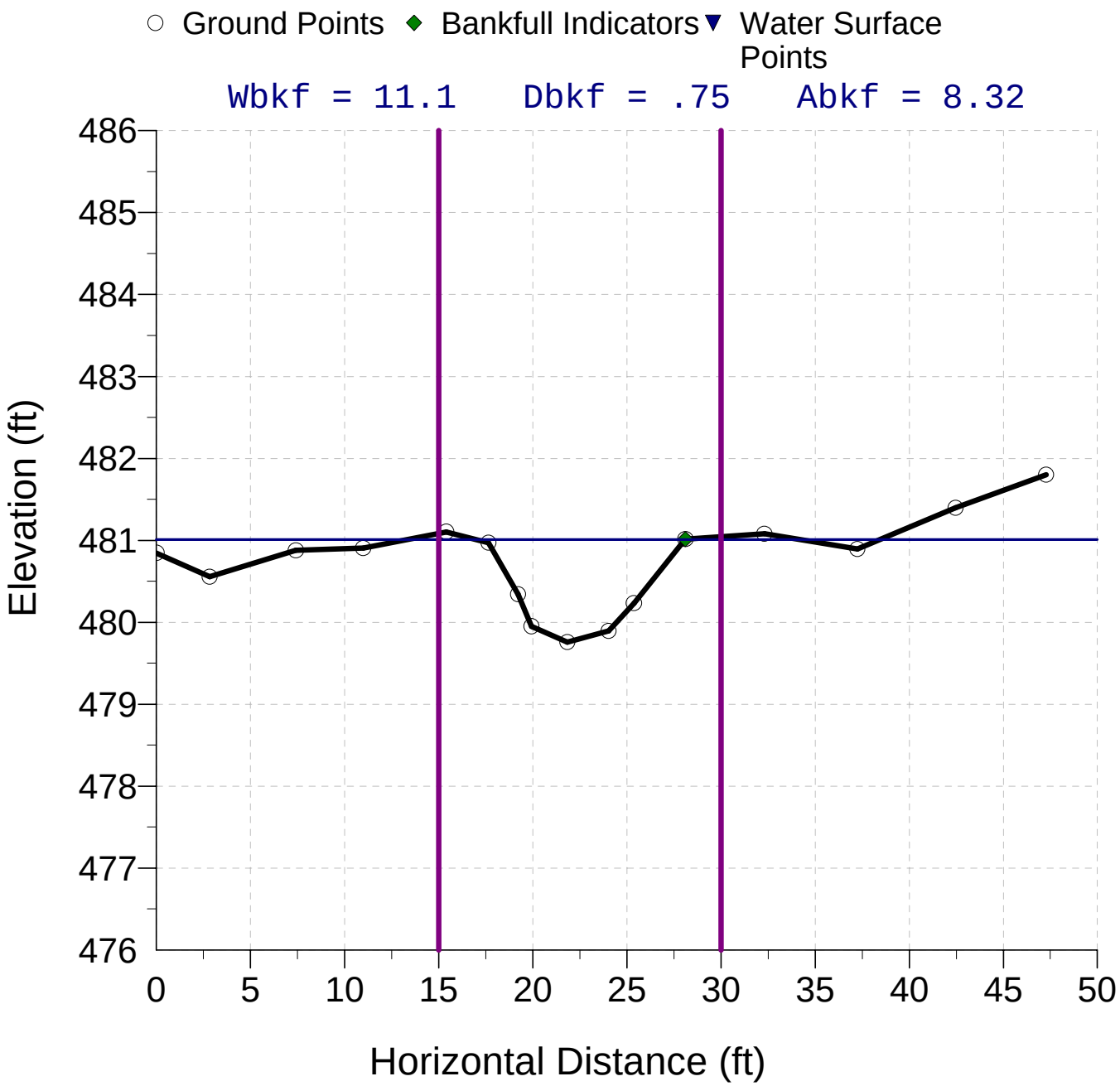
Cross Section 7 Pool



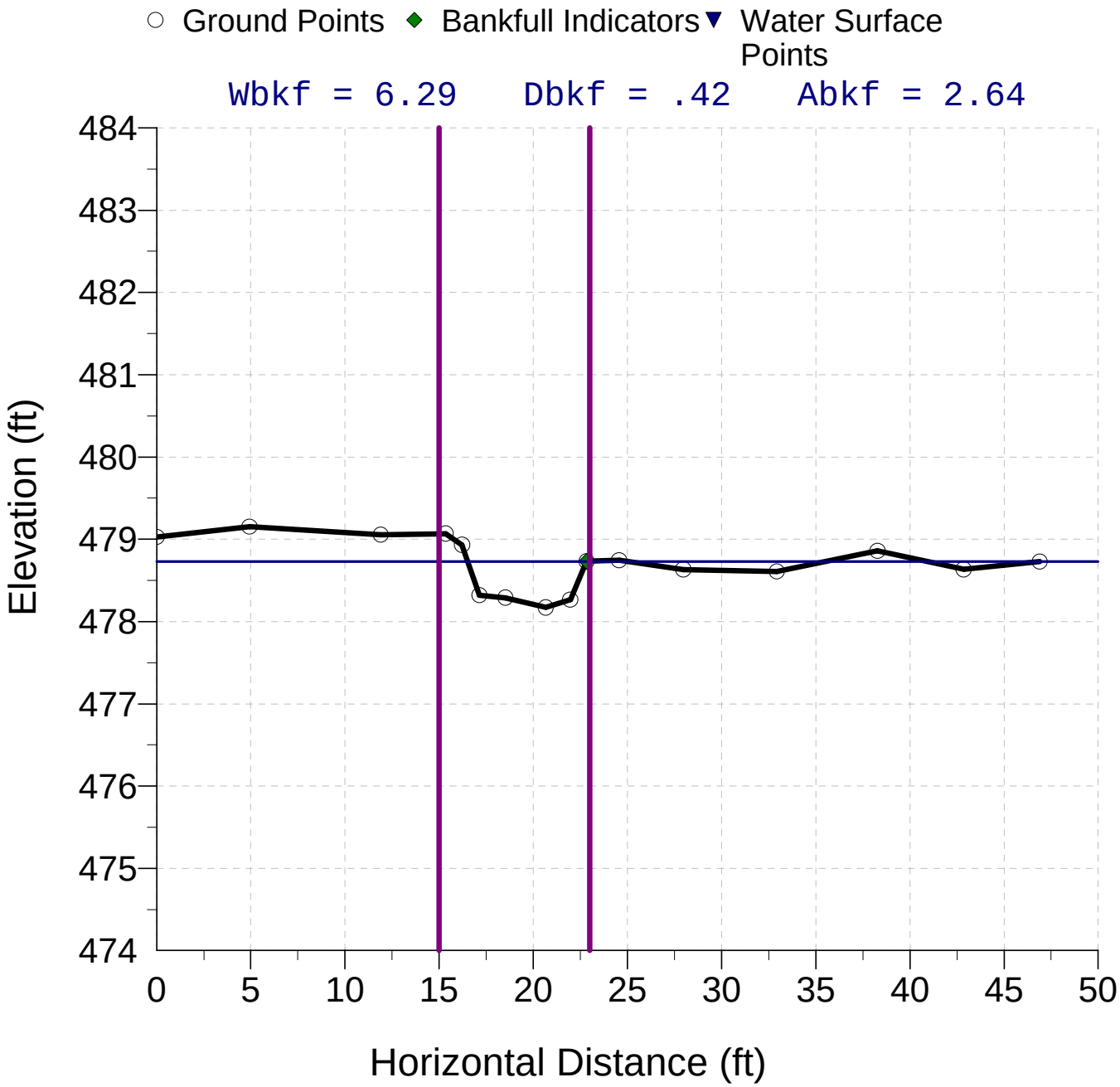
Cross Section 8 Pool



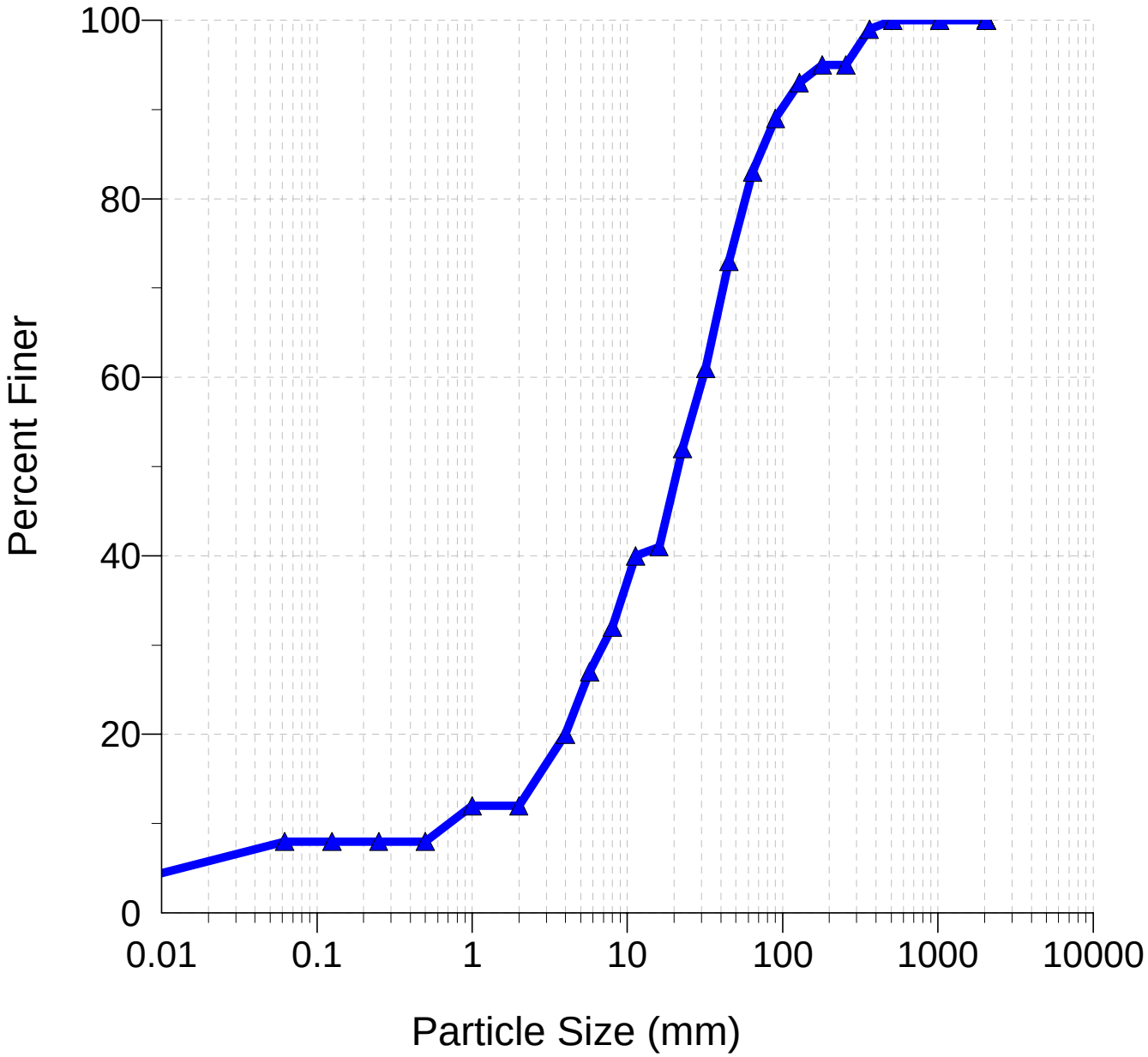
Cross Section 9 Riffle



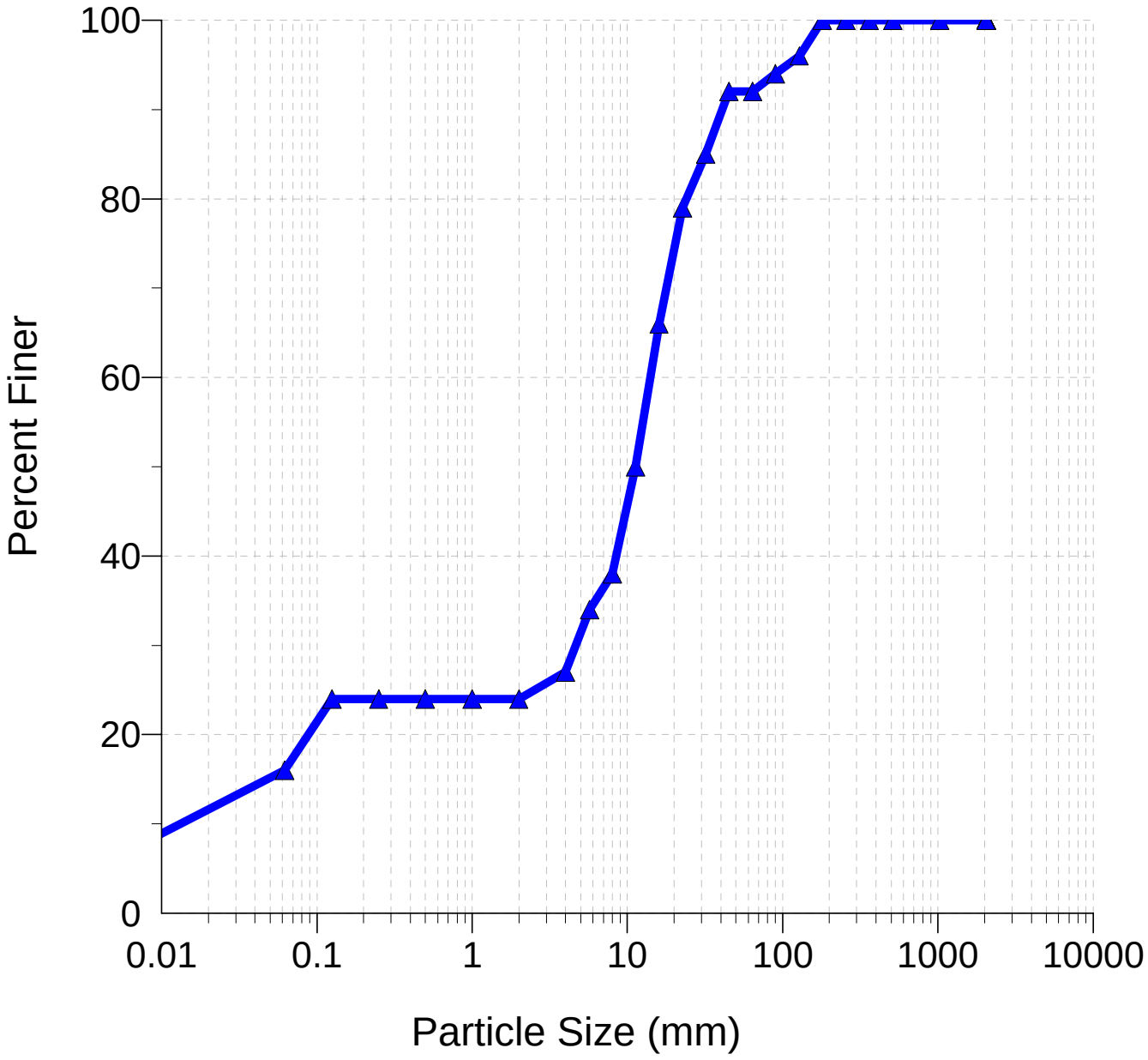
Tributary Cross Section Riffle



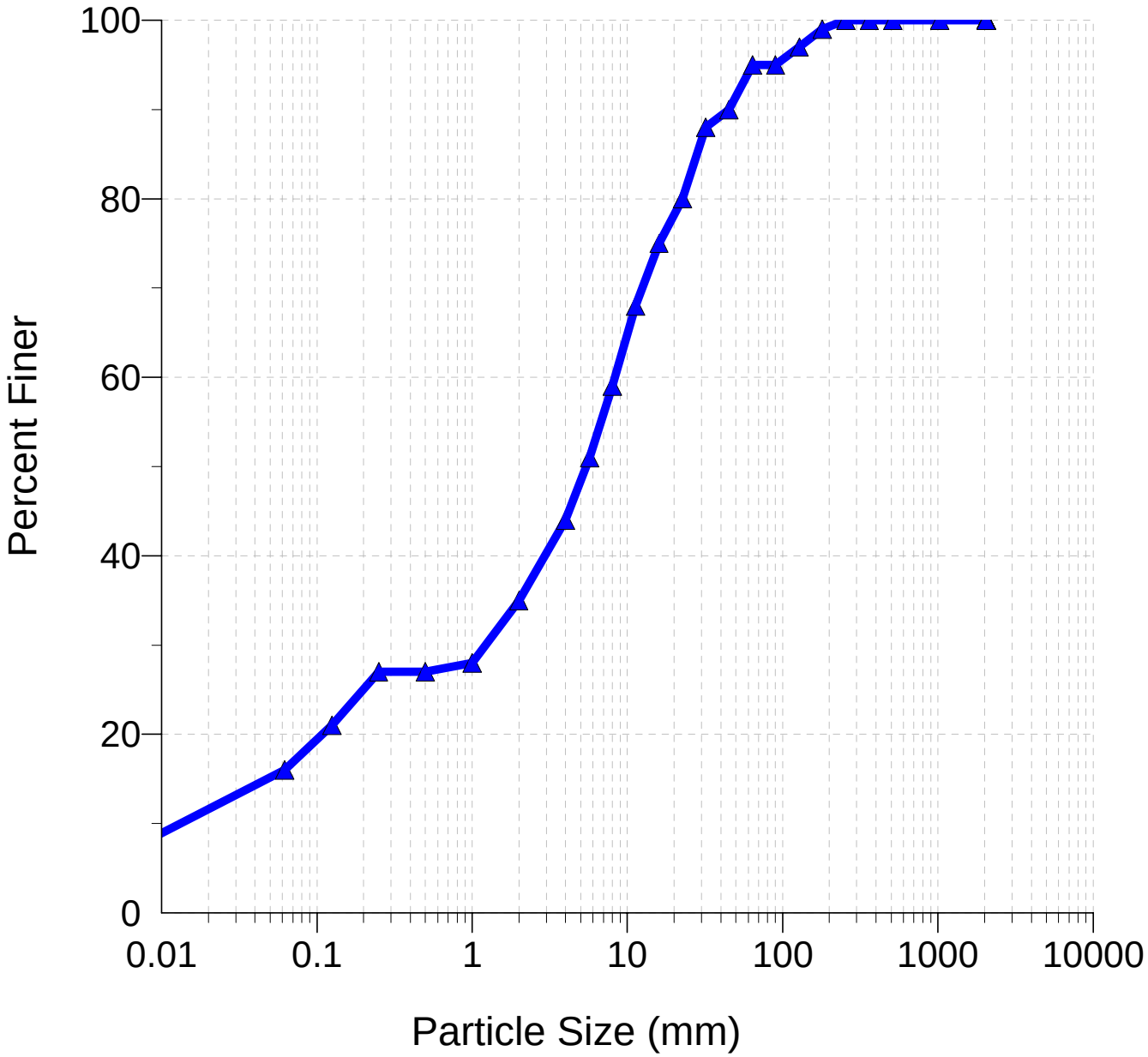
Pebble Count 1 Riffle



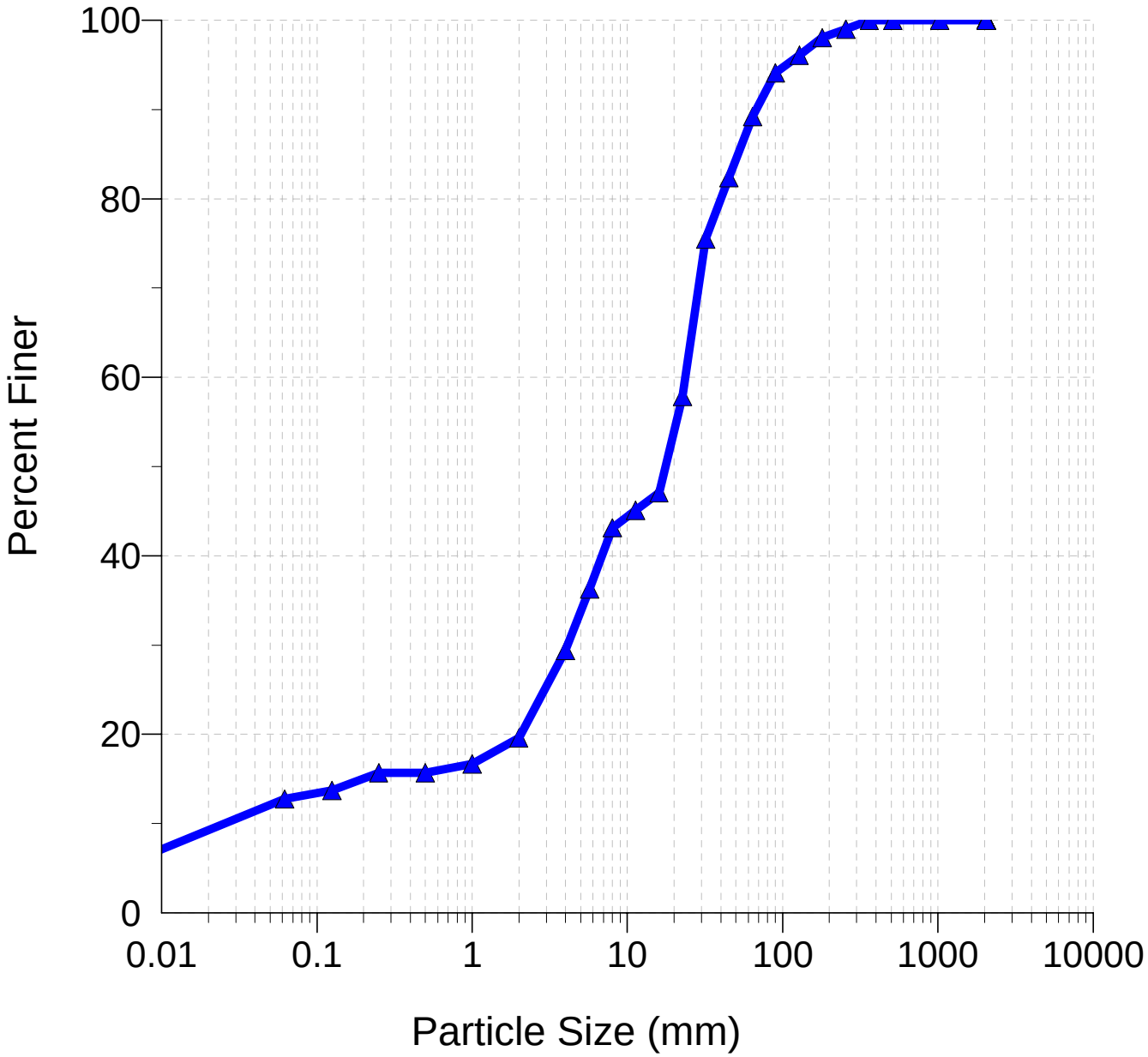
Pebble Count 2 Pool



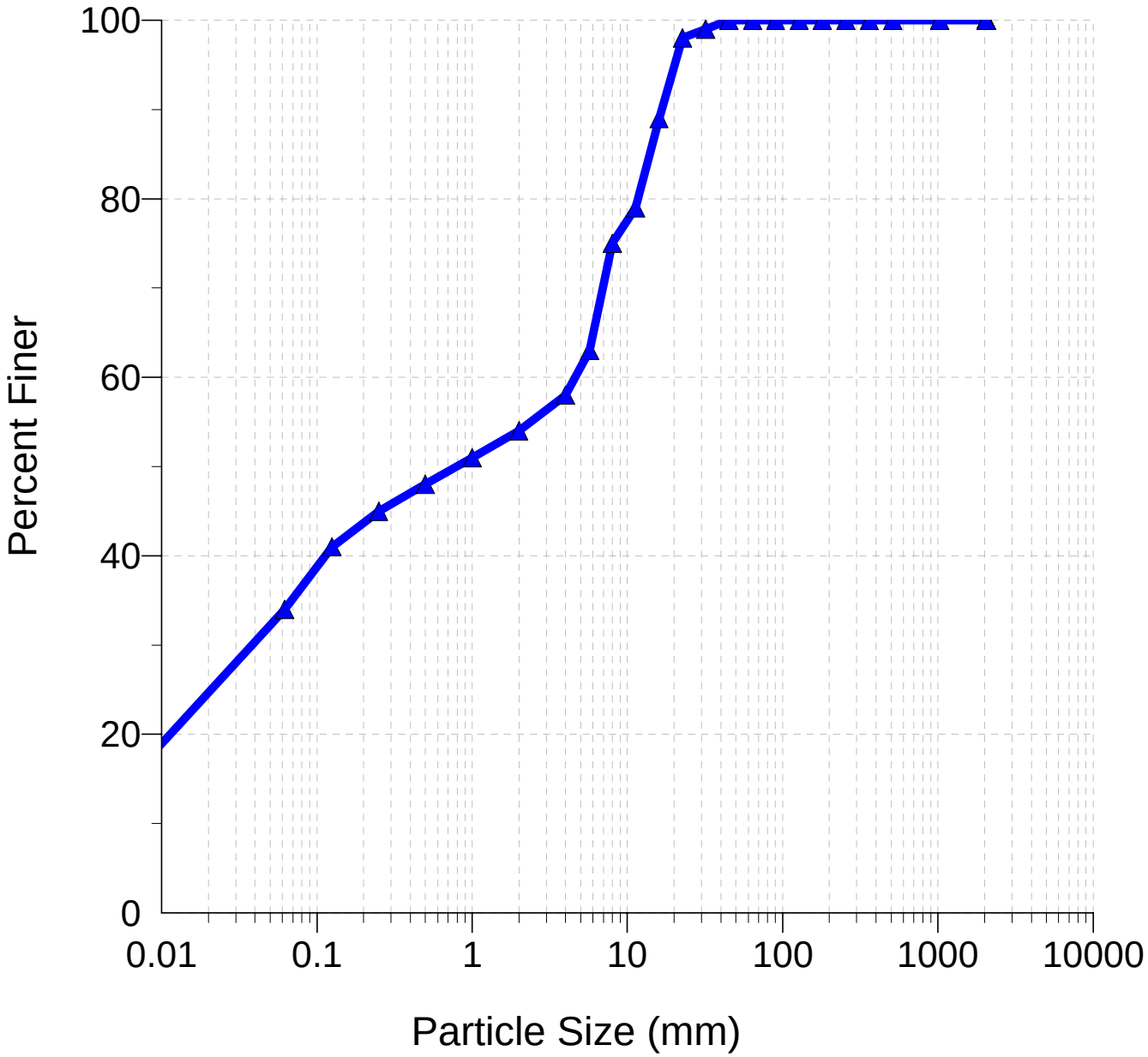
Pebble Count 3 Riffle

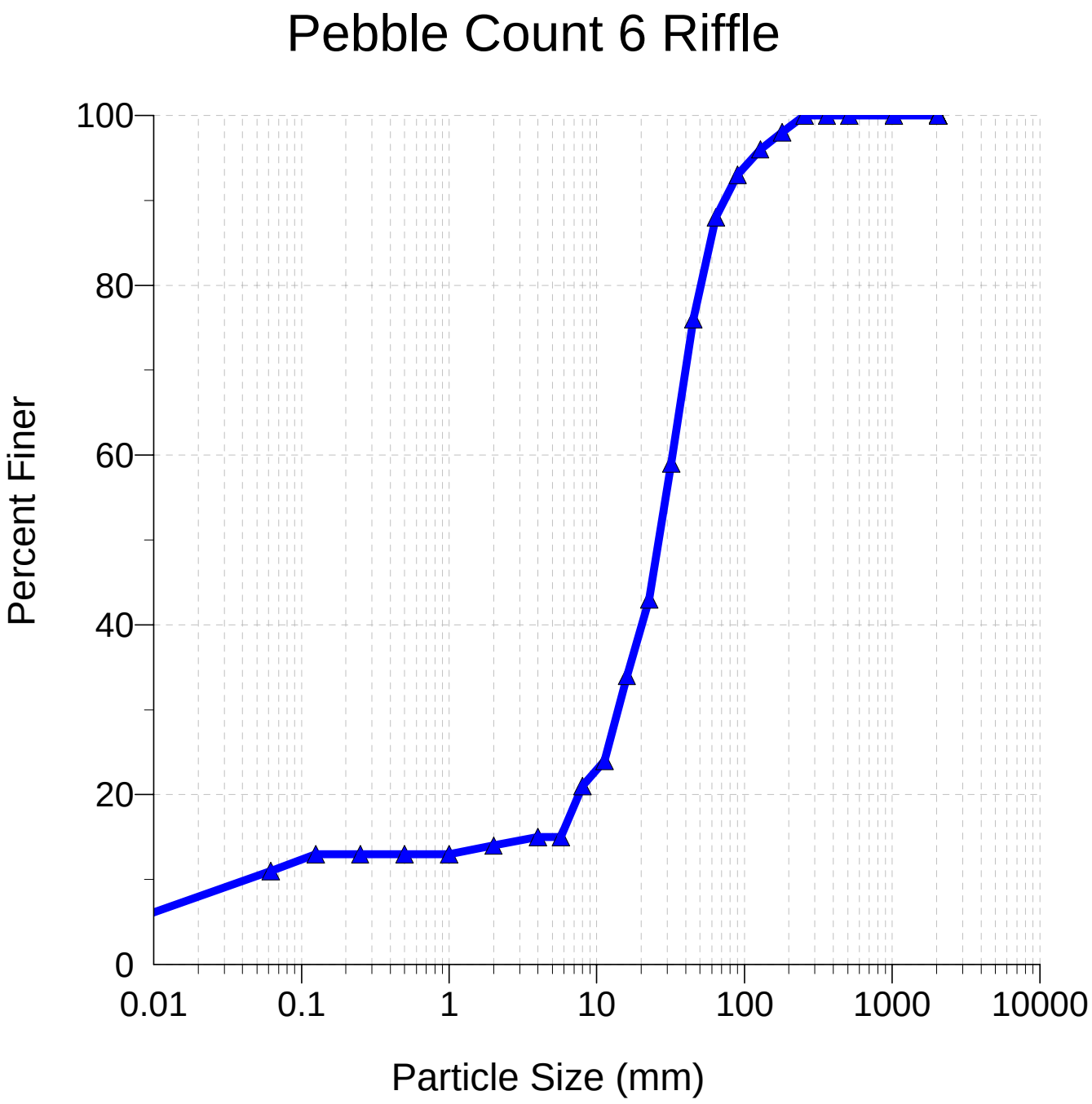


Pebble Count 4 Riffle

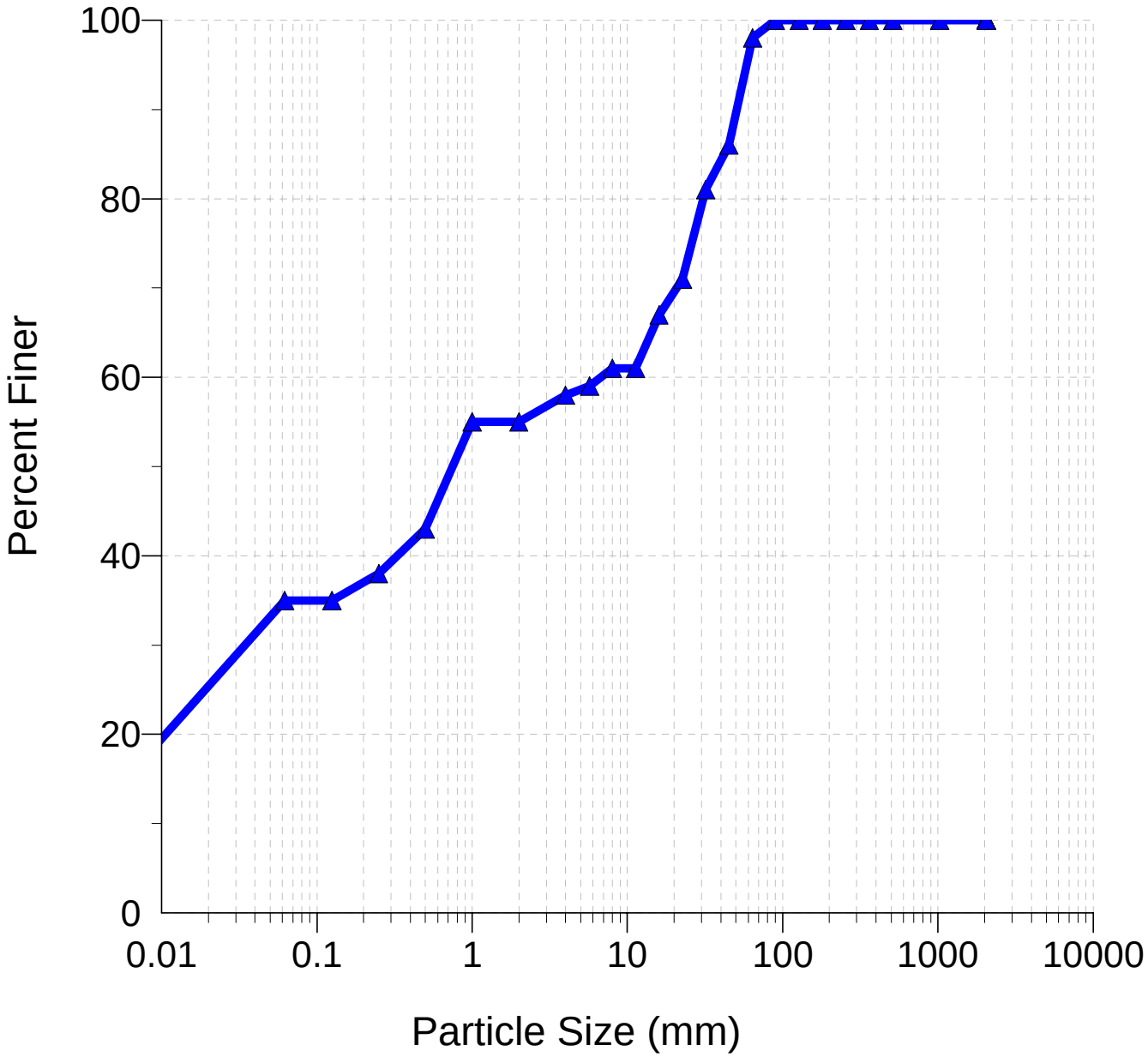


Pebble Count 5 Pool

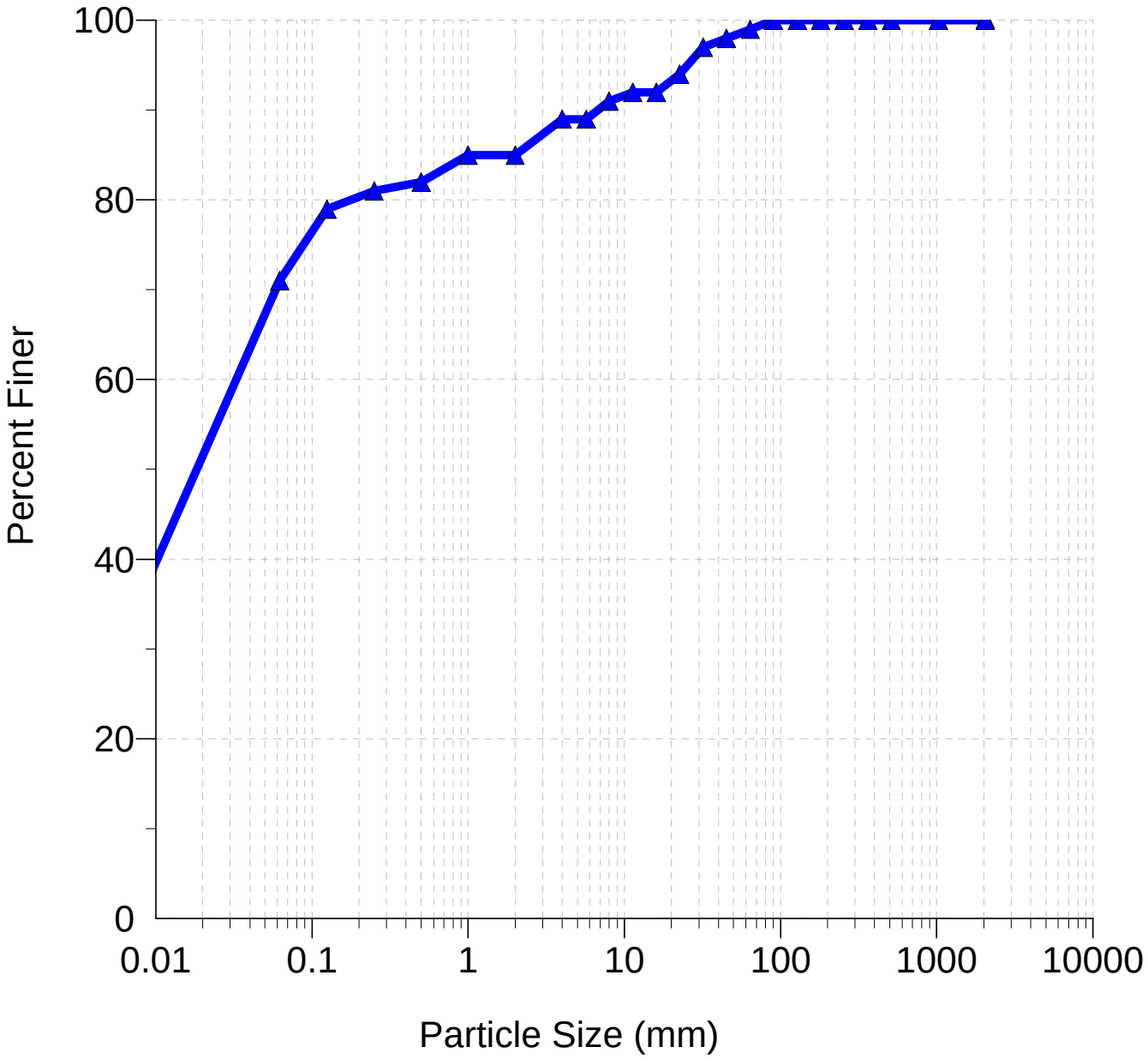


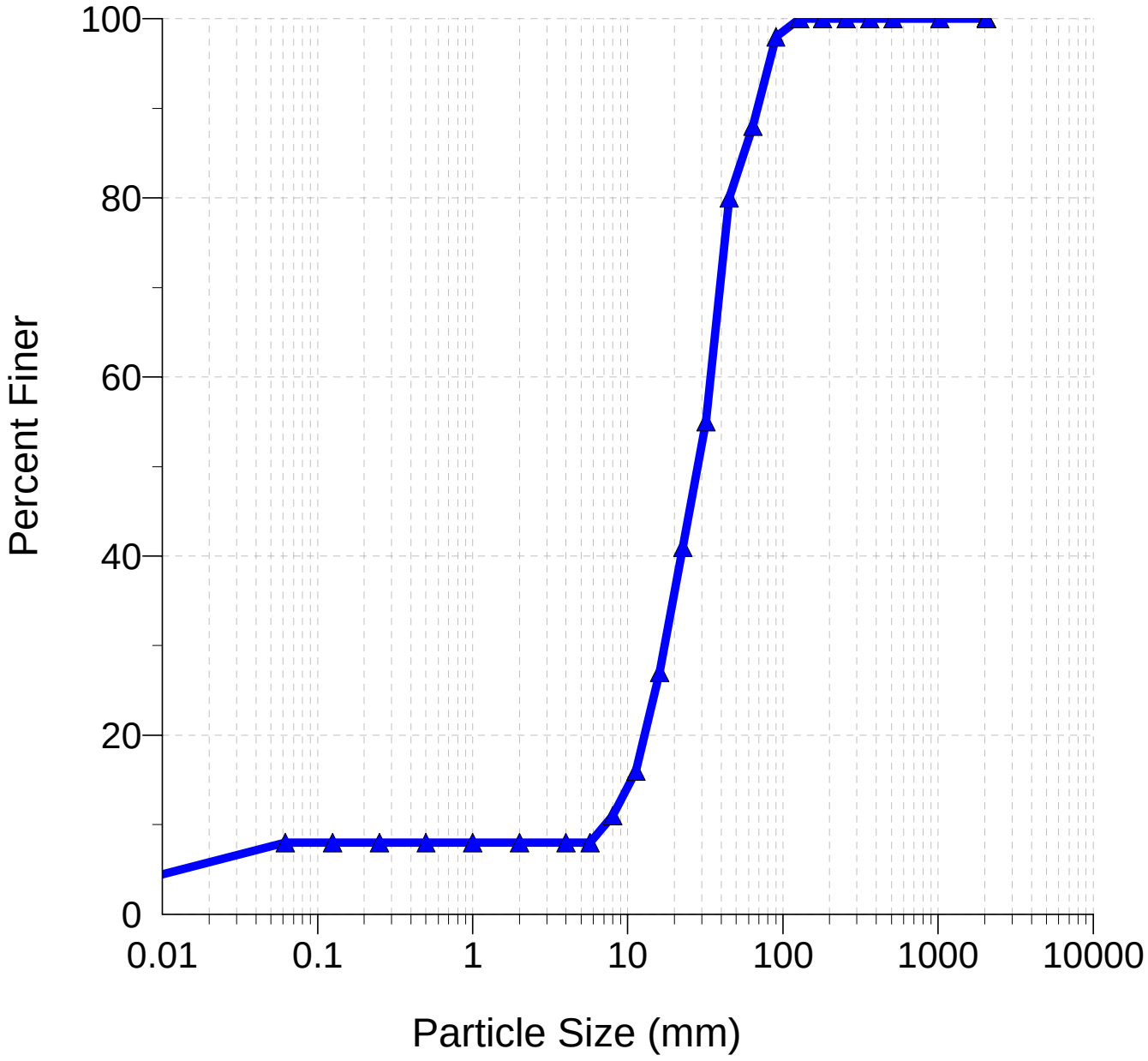

Pebble Count 6 Riffle
Percent Finer
100
80
60
40
20
0
0.01
0.1
1
10
100
1000
10000
Particle Size (mm)

Pebble Count 7 Pool



Pebble Count 8 Pool




Pebble Count 9 Riffle
Percent Finer
100
80
60
40
20
0
0.01
0.1
1
10
100
1000
10000
Particle Size (mm)

Tributary Pebble Count Riffle

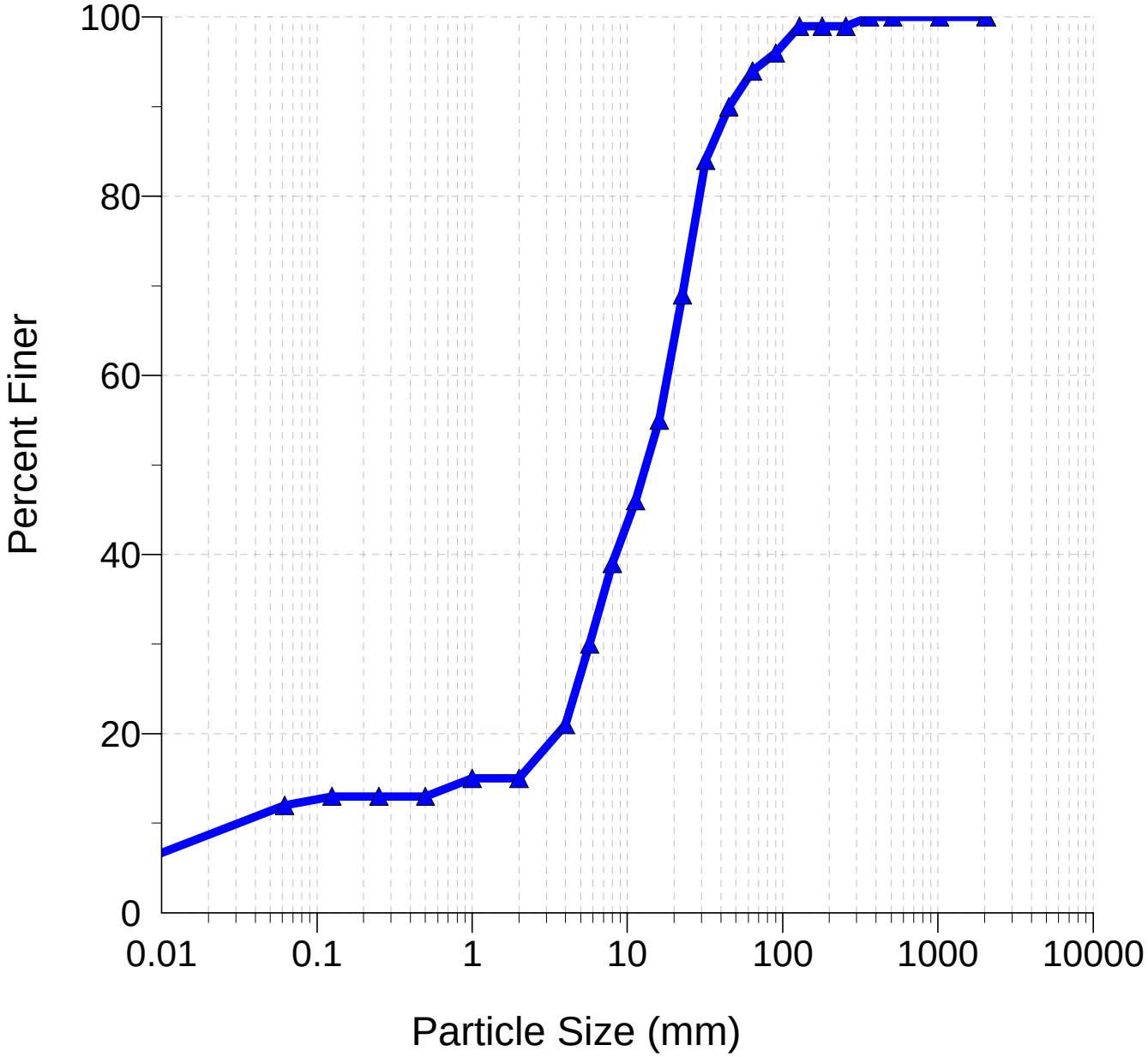


Photo Log

Badin Inn Restoration Plan, Stanly County, North Carolina

1. UT to Little Mountain Creek at Cross Section 1, facing downstream.
Date: 07/29/2009 Monitoring Year: 0

2. UT to Little Mountain Creek at Cross Section 1, facing downstream
Date: 07/29/2009 Monitoring Year: 0

3. UT to Little Mountain Creek at Cross Section 2, facing downstream.
Date: 07/29/2009 Monitoring Year: 0

4. UT to Little Mountain Creek at Cross Section 2, facing upstream.
Date: 07/29/2009 Monitoring Year: 0

5. UT to Little Mountain Creek at Cross Section 3, facing upstream.
Date: 07/29/2009 Monitoring Year: 0

6. UT to Little Mountain Creek at Cross Section 3, facing downstream.
Date: 07/29/2009 Monitoring Year: 0

7. UT to Little Mountain Creek at Cross Section 4, facing upstream.
Date: 07/29/2009 Monitoring Year: 0

8. UT to Little Mountain Creek at Cross Section 4, facing downstream.
Date: 07/29/2009 Monitoring Year: 0

9. UT to Little Mountain Creek at Cross Section 5, facing upstream.
Date: 07/29/2009 Monitoring Year: 0

10. UT to Little Mountain Creek at Cross Section 5, facing downstream.
Date: 07/29/2009 Monitoring Year: 0

11. UT to Little Mountain Creek at Cross Section 6, facing upstream.
Date: 07/29/2009 Monitoring Year: 0

12. UT to Little Mountain Creek at Cross Section 6, facing downstream.
Date: 07/29/2009 Monitoring Year: 0

14. UT to Little Mountain Creek at Cross Section 7, facing upstream.
Date: 07/29/2009 Monitoring Year: 0

15. UT to Little Mountain Creek at Cross Section 7, facing downstream.
Date: 07/29/2009 Monitoring Year: 0

16. UT to Little Mountain Creek at Cross Section 8, facing upstream.
Date: 07/29/2009 Monitoring Year: 0

17. UT to Little Mountain Creek at Cross Section 8, facing downstream.
Date: 07/29/2009 Monitoring Year: 0

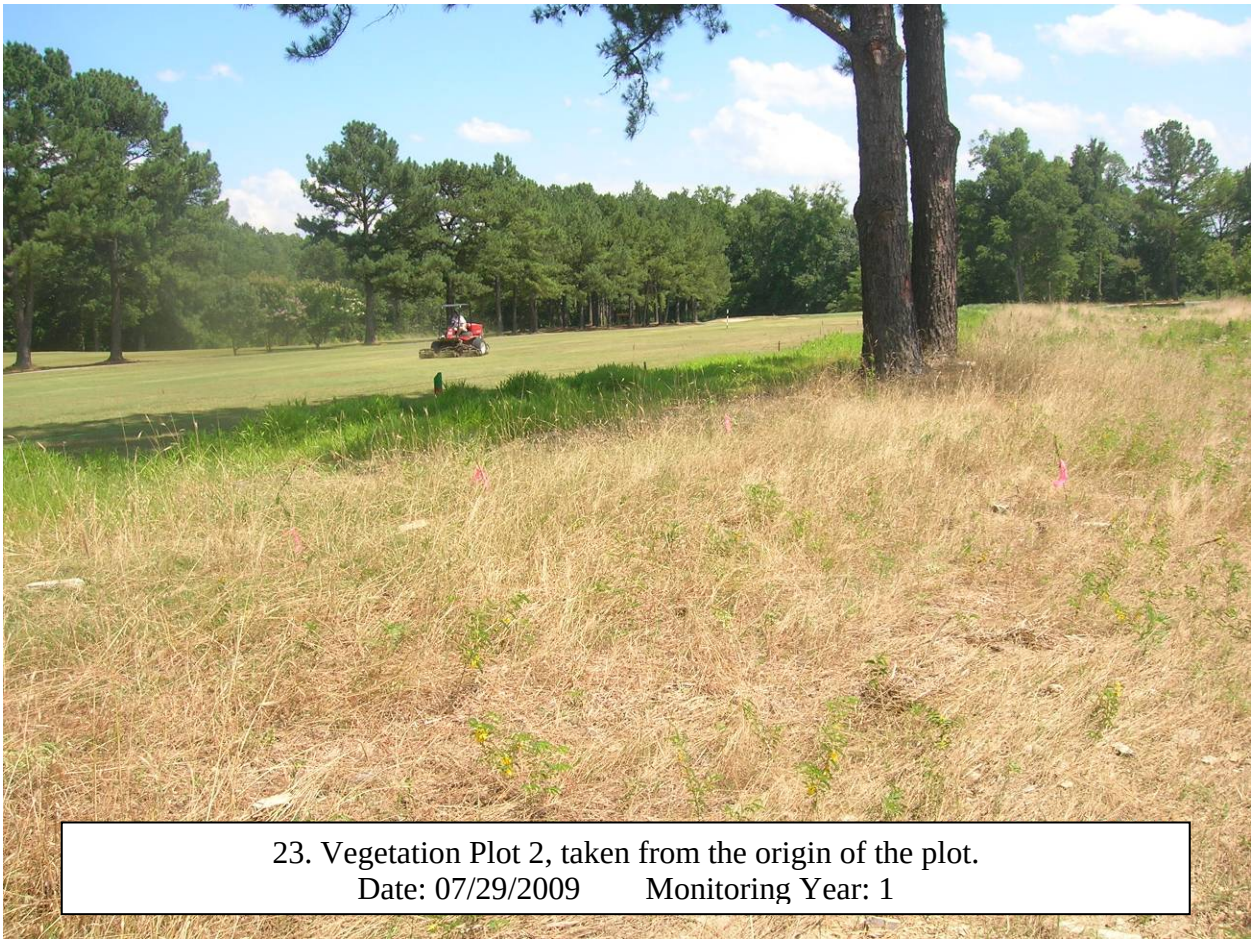
18. UT to Little Mountain Creek at Cross Section 9, facing upstream.
Date: 07/29/2009 Monitoring Year: 0

19. UT to Little Mountain Creek at Cross Section 9, facing downstream.
Date: 07/29/2009 Monitoring Year: 0

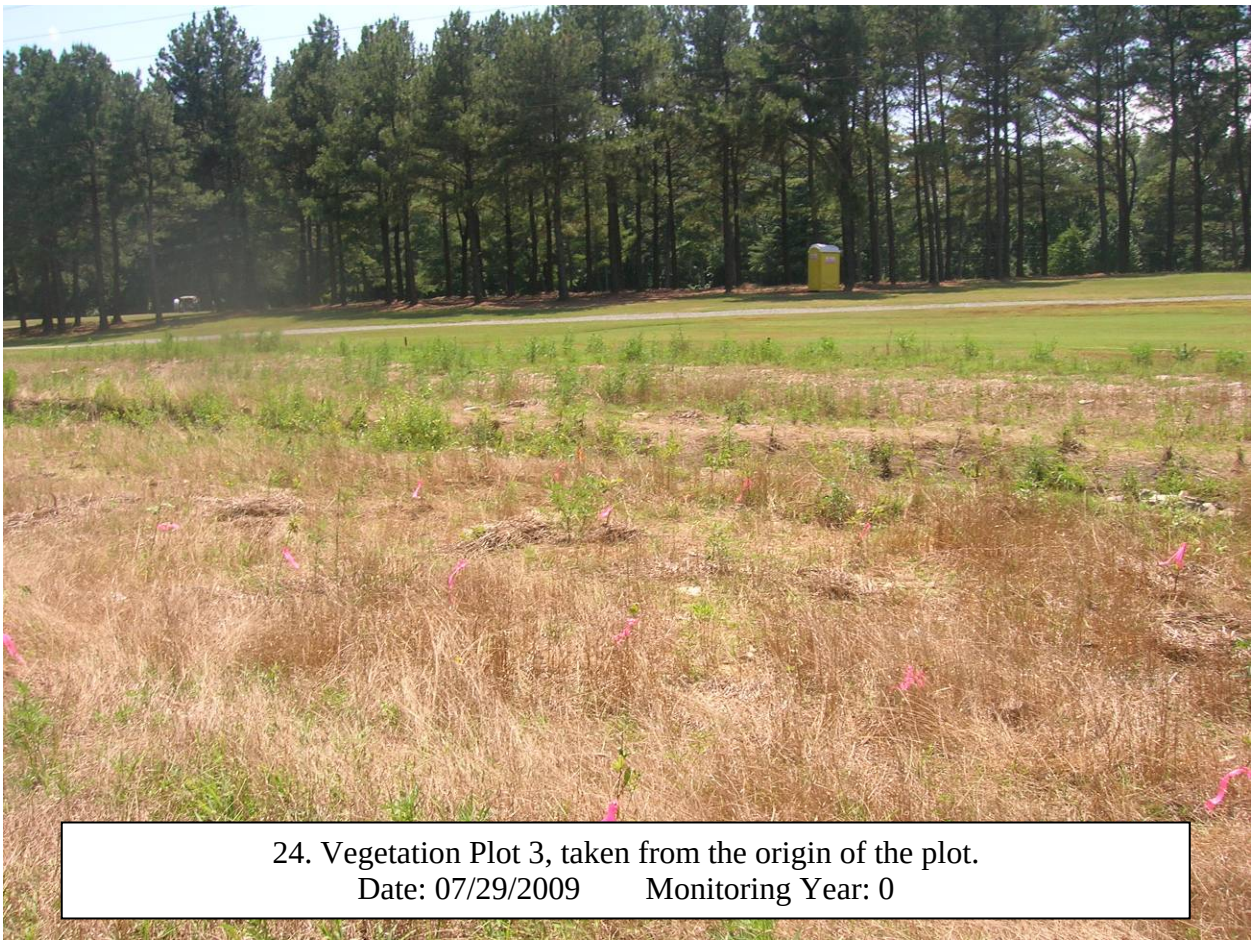
20. UT to Little Mountain Creek at Cross Section 10, facing upstream.
Date: 07/29/2009 Monitoring Year: 0

21. UT to Little Mountain Creek at Cross Section 10, facing downstream.
Date: 07/29/2009 Monitoring Year: 1

22. Vegetation Plot 1, taken from the origin of the plot.
Date: 07/29/2009 Monitoring Year: 1



23. Vegetation Plot 2, taken from the origin of the plot.
Date: 07/29/2009 Monitoring Year: 1

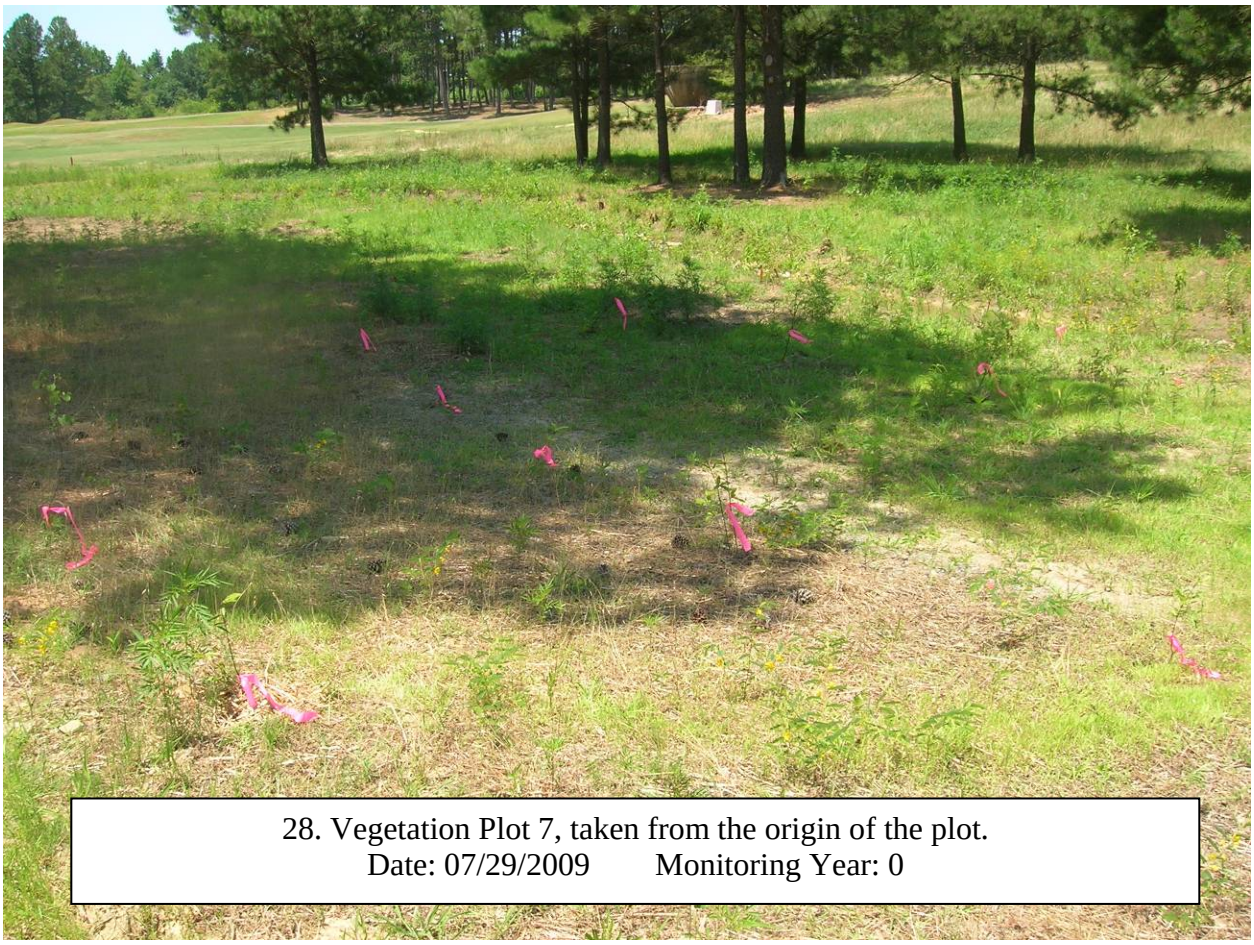


24. Vegetation Plot 3, taken from the origin of the plot.
Date: 07/29/2009 Monitoring Year: 0

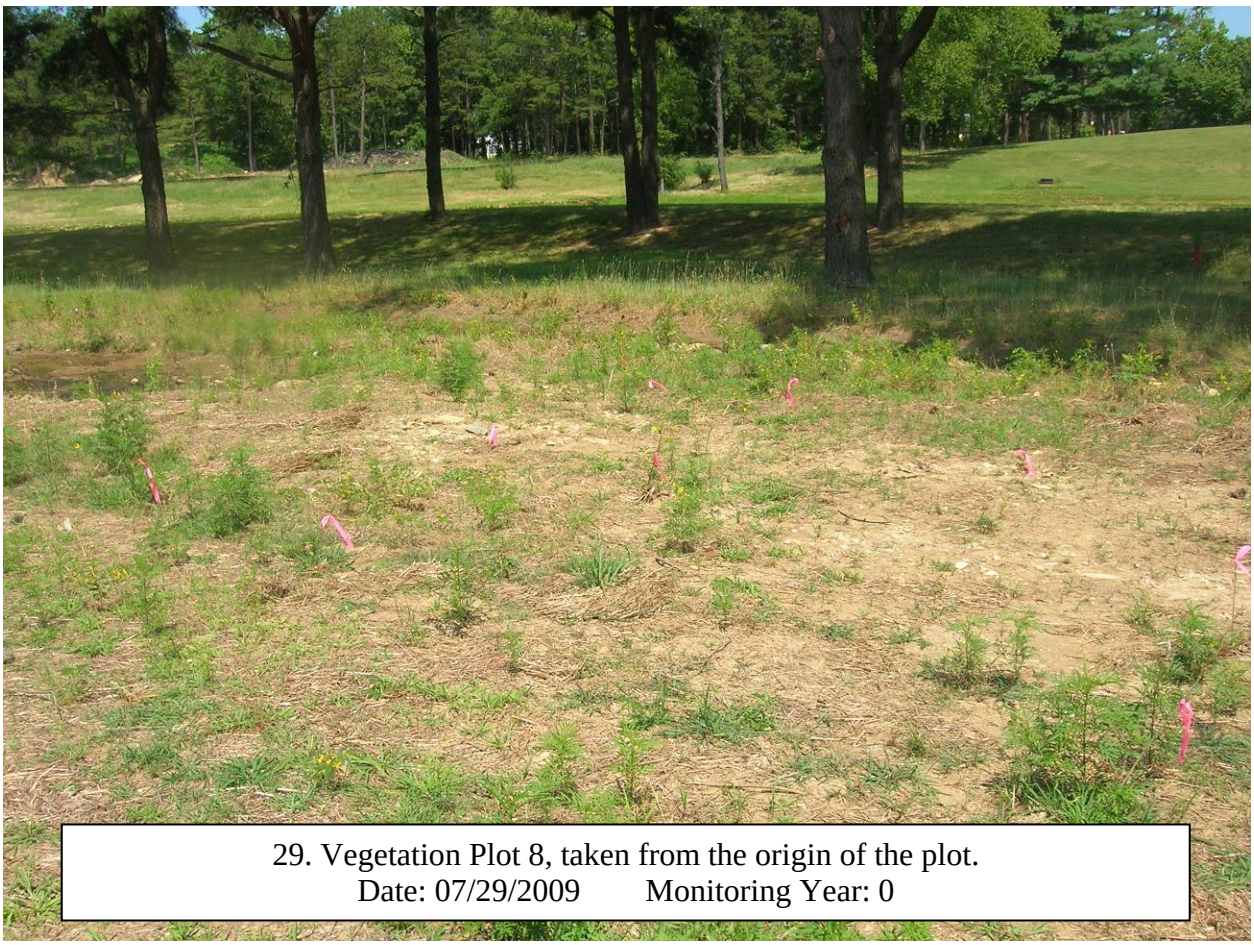
25. Vegetation Plot 4, taken from the origin of the plot.
Date: 07/29/2009 Monitoring Year: 0

26. Vegetation Plot 5, taken from the origin of the plot.
Date: 07/29/2009 Monitoring Year: 1

27. Vegetation Plot 6, taken from the origin of the plot.
Date: 07/29/2009 Monitoring Year: 1



28. Vegetation Plot 7, taken from the origin of the plot.
Date: 07/29/2009 Monitoring Year: 0



29. Vegetation Plot 8, taken from the origin of the plot.
Date: 07/29/2009 Monitoring Year: 0

30. Vegetation Plot 9, taken from the origin of the plot.
Date: 07/29/2009 Monitoring Year: 0

APPENDIX C
Vegetation Data

Table 7
CVS Output Tables

Table 7. Vegetation Plot Attribute Data Badin Inn Stream Restoration - EEP Project No. 92666						
Plot ID	**Community Type**	**Planting Zone ID**	**Reach ID**	**Associated Gauge(s)**	**Method[1]**	**CVS Level**
1	Mesic Mixed Hardwood Forest	Well Drained Riparian Floodplain	1	NA	CVS	2
2	Mesic Mixed Hardwood Forest	Well Drained Riparian Floodplain	1	NA	CVS	2
3	Mesic Mixed Hardwood Forest	Well Drained Riparian Floodplain	1	NA	CVS	2
4	Mesic Mixed Hardwood Forest	Well Drained Riparian Floodplain	1	NA	CVS	2
5	Mesic Mixed Hardwood Forest	Well Drained Riparian Floodplain	1	NA	CVS	2
6	Mesic Mixed Hardwood Forest	Well Drained Riparian Floodplain	1	NA	CVS	2
7	Mesic Mixed Hardwood Forest	Well Drained Riparian Floodplain	1	NA	CVS	2
8	Mesic Mixed Hardwood Forest	Well Drained Riparian Floodplain	1	NA	CVS	2
9	Mesic Mixed Hardwood Forest	Well Drained Riparian Floodplain	1	NA	CVS	2

Table 8. Stem Counts for Each Species by Plot Badin Inn/Project No. 92666												
Species		**Plots***									**Initial Totals**	
Scientific Name	**Common Name**	**01**	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**		
Shrubs												
Sambucus canadensis	Elderberry	3				2					***5***	
Callicarpa americana	American Beautyberry	2	1			3	1	1	1	7	***16***	
Prunus americana	American plum		1								***1***	
	Total Shrubs	***5***	***2***	***0***	***0***	***5***	***1***	***1***	***1***	***7***	***22***	
Trees												
Cercis canadensis	Redbud	1	3	2	1		7	5	3		***22***	
Carpinus caroliniana	Ironwood	3			1						***4***	
Quercus alba	White oak	3		1							***4***	Plot size
Quercus nigra	Water oak	2									***2***	10
Quercus velutina	Black oak	1		4					1		***6***	10
Nyssa sylvatica	Black gum	1	1		3	1	1				***7***	
Asimina triloba	Paw Paw	1				1				8	***10***	100
Quercus phellos	Willow oak		1	1				1			***3***	
Cornus florida	Flowering dogwood		1	1	1	1		2			***6***	
Castanea pumila	Chinquapin			7	4	3	1	12	5		***32***	
Diospyros virginiana	American persimmon			3	3	2	1		2		***11***	
Morus rubra	Red mulberry	3		1	1						***5***	
Quercus sp.	Oak species								1		***1***	
Betula nigra	River birch						1		2		***3***	
	Total Trees	***15***	***6***	***20***	***14***	***8***	***11***	***20***	***14***	***8***	***116***	10000
												1%
TABLE SUMMARY	*Total Stems of planted woody vegetation*	20	8	20	14	13	12	21	15	15	***138***	2.471044
	% Shrubs	25%	25%	0%	0%	38%	8%	5%	7%	47%	***16%***	
	% Trees	75%	75%	100%	100%	62%	92%	95%	93%	53%	***84%***	
	Current Density											
	Shrubs per acre	202	81	0	0	202	40	40	40	283	99	
	Shrubs per hectare	500	200	0	0	500	100	100	100	700	244	
	Trees per acre	607	243	809	567	324	445	809	567	324	522	
	Trees per hectare	1500	600	2000	1400	800	1100	2000	1400	800	1289	
	Total stems per acre	***809***	***324***	***809***	***567***	***526***	***486***	***850***	***607***	***607***	***621***	
	Total stems per hectare	***2000***	***800***	***2000***	***1400***	***1300***	***1200***	***2100***	***1500***	***1500***	***1533***	

Report Prepared By	Kevin Lapp	
Date Prepared		8/10/2009 8:09
database name	AECOM-2008-0.mdb	
database location	Q:\99255\Monitoring\Vegetation	
computer name	USRAL3PC035	
file size		41586688

DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------

Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
ALL Stems by Plot and spp	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.

PROJECT SUMMARY----------

Project Code		92666
project Name	Badin Inn	
Description		
River Basin	Yadkin-Pee Dee	
length(ft)		4174
stream-to-edge width (ft)		42
area (sq m)		32570
Required Plots (calculated)		9
Sampled Plots		9

Living planted stems, excluding live stakes, per acre:
Negative (red) numbers indicate the project failed to reach requirements in a particular year.

Project Code	Project Name	River Basin	Year 0 (baseline)
92666	Badin Inn	Yadkin-Pee Dee	607.03

Total stems, including planted stems of all kinds (including live stakes) and natural/volunteer stems:

Project Code	Project Name	River Basin	Year 0 (baseline)
92666	Badin Inn	Yadkin-Pee Dee	607.0284645

plot	Plot Level	Year	Latitude/Northing	Longitude/Easting	Zone	Datum	Date Sampled	Planted Living Stems	Planted Living Stems EXCLUDING Live Stakes	Dead/Missing Stems
92666-01-0001	2	0	599291.44	1666637.61		NAD83/WGS84	7/1/2009	20	20	2
92666-01-0002	2	0	599948.92	1666498.25		NAD83/WGS84	7/1/2009	8	8	0
92666-01-0003	2	0	600244.88	1666470.66		NAD83/WGS84	7/1/2009	20	20	0
92666-01-0004	2	0	600945.80	1666413.75		NAD83/WGS84	7/1/2009	14	14	2
92666-01-0005	2	0	601239.80	1666369.81		NAD83/WGS84	7/1/2009	13	13	1
92666-01-0006	2	0	601387.46	1666549.82		NAD83/WGS84	7/1/2009	12	12	5
92666-01-0007	2	0	601868.31	1666943.00		NAD83/WGS84	7/1/2009	19	19	2
92666-01-0008	2	0	602056.52	1667209.19		NAD83/WGS84	7/1/2009	14	14	3
92666-01-0009	2	0	602152.13	1667400.27		NAD83/WGS84	7/1/2009	15	15	0

Natural (Volunteer) Stems	Total Living Stems	Total Living Stems EXCLUDING Live Stakes	Planted Living Stems per ACRE	Planted Living Stems EXCLUDING Live Stakes PER ACRE
	20	20	809.371286	809.371286
	8	8	323.7485144	323.7485144
	20	20	809.371286	809.371286
	14	14	566.5599002	566.5599002
	13	13	526.0913359	526.0913359
	12	12	485.6227716	485.6227716
	19	19	768.9027217	768.9027217
	14	14	566.5599002	566.5599002
	15	15	607.0284645	607.0284645

Natural (Volunteer) Stems PER ACRE	Total Living Stems PER ACRE	Total Living Stems EXCLUDING Live Stakes PER ACRE	# species
	809.371286	809.371286	10
	323.7485144	323.7485144	6
	809.371286	809.371286	8
	566.5599002	566.5599002	7
	526.0913359	526.0913359	7
	485.6227716	485.6227716	6
	768.9027217	768.9027217	5
	566.5599002	566.5599002	7
	607.0284645	607.0284645	2

vigor	Count	Percent
0	15	10
1	11	7.3
2	41	27.3
3	52	34.7
4	31	20.7

	Species	4	3	2	1	0	Missing	Unknown
	Asimina triloba	4	6					
	Betula nigra	1		1	1			
	Callicarpa americana	8	6	2				
	Castanea pumila	5	13	9	3	5		
	Cornus florida		2	4				
	Diospyros virginiana	4	4	3				
	Nyssa sylvatica	2	2	4				
	Prunus americana	1						
	Quercus alba	3		1				
	Quercus nigra				2			
	Quercus phellos	2	1					
	Quercus velutina		2	3				
	Sambucus canadensis		1	3	1			
	Morus rubra		2	3				
	Carpinus caroliniana		4					
	Cercis canadensis	1	9	8	3	4		
	Quercus				1	1		
	Unknown					5		
TOT:	**18**	**31**	**52**	**41**	**11**	**15**		

Damage	Count	Percent Of Stems
[Enter other damage]	88	58.7
(no damage)	43	28.7
Site Too Wet	7	4.7
Insects	5	3.3
Other/Unknown Animal	3	2
Site Too Dry	2	1.3
Unknown	1	0.7
Human Trampled	1	0.7

	Species	All Damage Categories	(no damage)	Enter other damage	Human Trampled	Insects	Other/Unknown Animal	Site Too Dry	Site Too Wet	Unknown
	Asimina triloba	10	6	4						
	Betula nigra	3	1	2						
	Callicarpa americana	16	5	11						
	Carpinus caroliniana	4	1	1			2			
	Castanea pumila	35	11	23						1
	Cercis canadensis	25	5	14			1	1	4	
	Cornus florida	6	2	1		2		1		
	Diospyros virginiana	11	4	7						
	Morus rubra	5		5						
	Nyssa sylvatica	8	1	7						
	Prunus americana	1		1						
	Quercus	2	1	1						
	Quercus alba	4	2	2						
	Quercus nigra	2				1			1	
	Quercus phellos	3	2	1						
	Quercus velutina	5	1	2		2				
	Sambucus canadensis	5		5						
	Unknown	5	1	1	1				2	
TOT:	**18**	**150**	**43**	**88**	**1**	**5**	**3**	**2**	**7**	**1**

	plot	All Damage Categories	(no damage)	Enter other damage	Human Trampled	Insects	Other/Unknown Animal	Site Too Dry	Site Too Wet	Unknown
	92666-01-0001	22	7	10		1	2	1	1	
	92666-01-0002	8		8						
	92666-01-0003	20	5	12		2				1
	92666-01-0004	16	8	8						
	92666-01-0005	14	3	10				1		
	92666-01-0006	17	4	7					6	
	92666-01-0007	21	6	12		2	1			
	92666-01-0008	17	4	12	1					
	92666-01-0009	15	6	9						
TOT:	**9**	**150**	**43**	**88**	**1**	**5**	**3**	**2**	**7**	**1**

	Species	Total Planted Stems	# plots	avg# stems	plot 92666-01-0001	plot 92666-01-0002	plot 92666-01-0003	plot 92666-01-0004	plot 92666-01-0005	plot 92666-01-0006	plot 92666-01-0007	plot 92666-01-0008	plot 92666-01-0009
	Asimina triloba	10	3	3.33	1				1				8
	Betula nigra	3	2	1.5						1		2	
	Callicarpa americana	16	7	2.29	2	1			3	1	1	1	7
	Carpinus caroliniana	4	2	2	3			1					
	Castanea pumila	30	6	5			7	4	3	1	10	5	
	Cercis canadensis	21	7	3	1	3	2	1		7	5	2	
	Cornus florida	6	5	1.2		1	1	1	1		2		
	Diospyros virginiana	11	5	2.2			3	3	2	1		2	
	Morus rubra	5	3	1.67	3		1	1					
	Nyssa sylvatica	8	6	1.33	1	1		3	1	1		1	
	Prunus americana	1	1	1		1							
	Quercus	1	1	1								1	
	Quercus alba	4	2	2	3		1						
	Quercus nigra	2	1	2	2								
	Quercus phellos	3	3	1		1	1				1		
	Quercus velutina	5	2	2.5	1		4						
	Sambucus canadensis	5	2	2.5	3				2				
TOT:	**17**	**135**	**17**		**20**	**8**	**20**	**14**	**13**	**12**	**19**	**14**	**15**

	Species	Total Stems	# plots	avg# stems	92666-01-0001	92666-01-0002	92666-01-0003	92666-01-0004	92666-01-0005	92666-01-0006	92666-01-0007	92666-01-0008	92666-01-0009
	Asimina triloba	10	3	3.33	1			1				8	
	Betula nigra	3	2	1.5					1		2		
	Callicarpa americana	16	7	2.29	2	1		3	1	1	1	7	
	Castanea pumila	35	7	5	1		7	6	3	1	12	5	
	Cornus florida	6	5	1.2		1	1	1	1		2		
	Diospyros virginiana	11	5	2.2			3	3	2	1		2	
	Nyssa sylvatica	8	6	1.33	1	1		3	1	1		1	
	Prunus americana	1	1	1		1							
	Quercus alba	4	2	2	3		1						
	Quercus nigra	2	1	2	2								
	Quercus phellos	3	3	1		1	1				1		
	Quercus velutina	5	2	2.5	1		4						
	Sambucus canadensis	5	2	2.5	3				2				
	Morus rubra	5	3	1.67	3		1	1					
	Carpinus caroliniana	4	2	2	3			1					
	Cercis canadensis	25	7	3.57	1	3	2	1		10	5	3	
	Quercus	2	2	1					1			1	
	Unknown	5	3	1.67	1					2		2	
TOT:	**18**	**150**	**18**		**22**	**8**	**20**	**16**	**14**	**17**	**21**	**17**	**15**

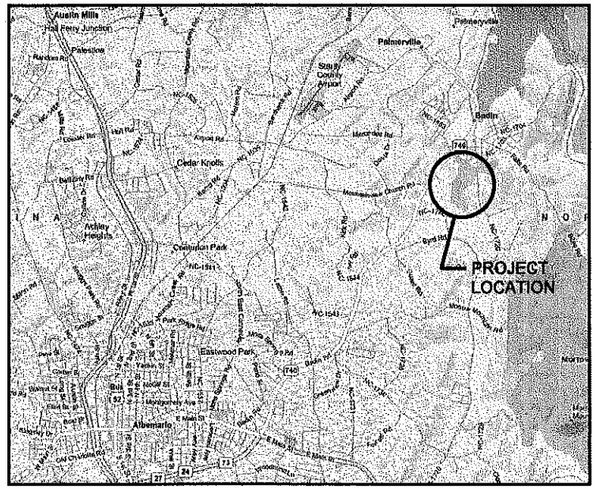
APPENDIX D

As-Built Plan Sheets

BADIN INN
STREAM RESTORATION
STANLY COUNTY, NC
(CONSTRUCTION PLANS)

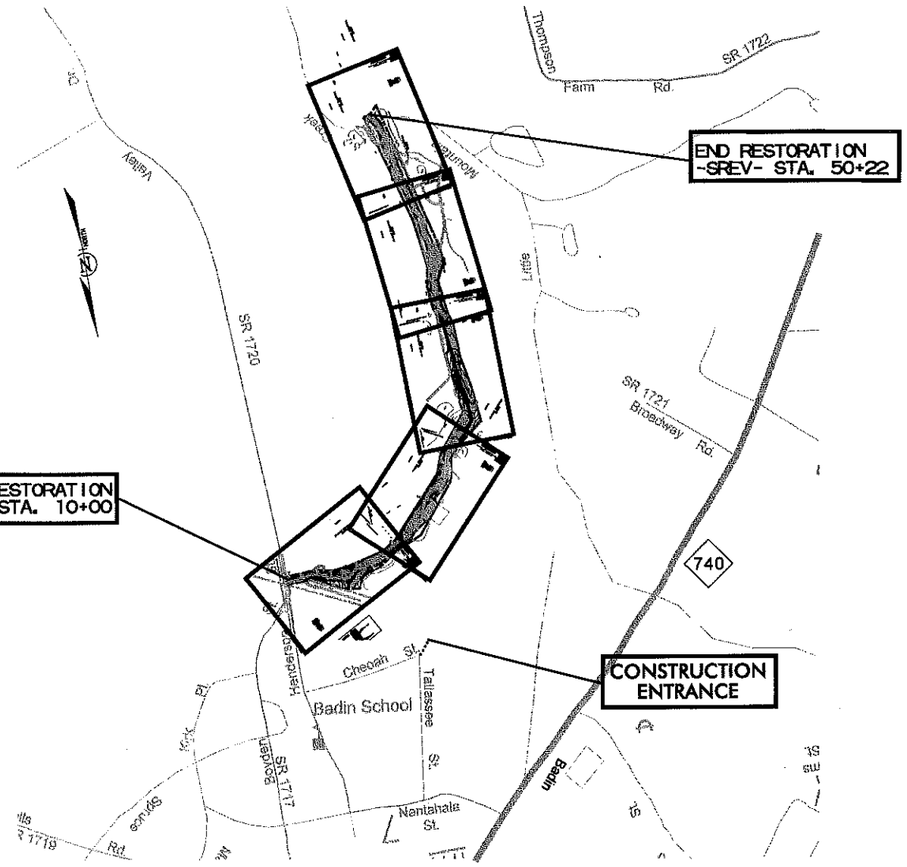
Clearing, grading, erosion control, stream restoration, drainage, debris removal, landscaping, and other improvements as noted on the plans. This work will include all items necessary to construct the stream, the wet swales, and associated structures with the associated landscaping, plantings, seeding and live staking.

RECIEVING STREAM: LITTLE MOUNTAIN CREEK
NCDWQ CLASSIFICATION: WS IV



VICINITY MAP

(Not to Scale)



INDEX OF SHEETS

CONSULTANT: EARTH TECH | AECOM

701 Corporate Center Drive, Suite #475 Raleigh, NC 27607
Phone: (919) 854-6200 Fax: (919) 854-6259

SENIOR DESIGN CONTACT: BRYAN DICK (919-854-6252)

NORTH CAROLINA PROFESSIONAL SEAL 035726 ENGINEER BRYAN M. DICK 8/19/2009

AS-BUILT DRAWINGS
08/17/09

NO	REVISIONS	DRN	CHK	DATE
1	REVISED DISTURBED AREA_ADDED CONST. ENTRANCE	RR	IJ	2/6/09
2				
3				

EARTHWORK

UNCLASSIFIED EXCAVATION (CY)	UNDERCUT (CY)	EMBANKMENT (CY)	BORROW (CY)	WASTE (CY)
5742		5103	0	639

STREAM DATA

STREAM REACH	PROPOSED CENTER LENGTH	MODIFICATION TYPE
SREV	3994 FT	RESTORATION
TRIB	180 FT	ENHANCEMENT

LONGITUDE AND LATITUDE:

STA. ..... 10+00
LONGITUDE ..... 80° 6' 54" W
LATITUDE ..... 35° 23' 57" N

DISTURBED AREA:

9.5 ACRES

BADIN INN STREAM RESTORATION
TITLE SHEET

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE #475, RALEIGH, NC 27607
919-854-6200 919-854-6259 FAX

DATE	8/19/2009
PROJECT NO	99255
FILENAME	99255_title.dgn
SHEET NO	C-1
DRAWN BY	CHKD BY
ICJ	JWJ

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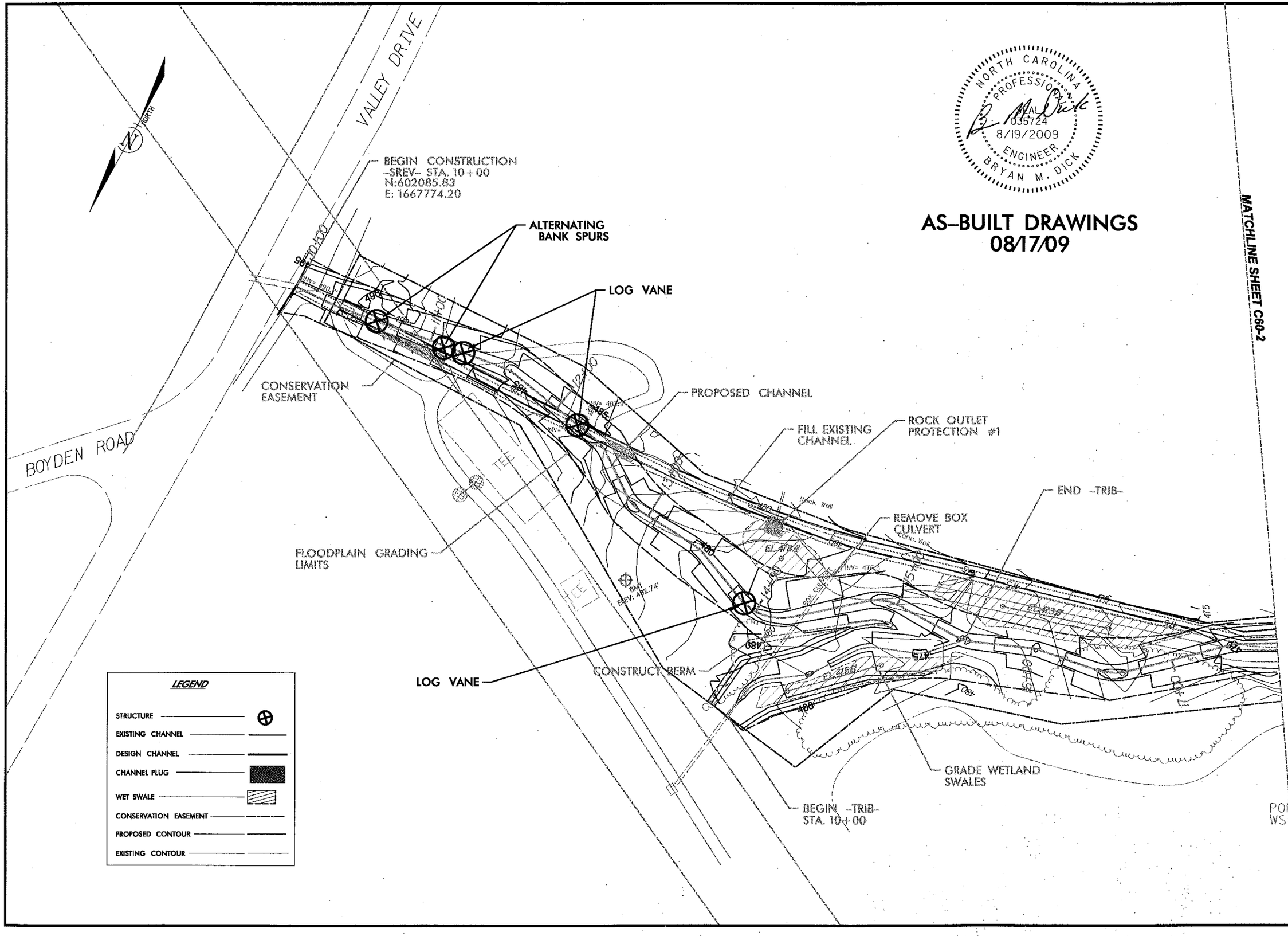

NORTH CAROLINA PROFESSIONAL SEAL 035724 8/19/2009 ENGINEER BRYAN M. DICK

AS-BUILT DRAWINGS
08/17/09

MATCHLINE SHEET C60-2

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

HORIZONTAL SCALE
100 50 0 50

BADIN INN STREAM RESTORATION
SITE PLAN, GRADING AND DRAINAGE

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 FAX

DATE	8/19/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-2
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CHKD BY	BMD

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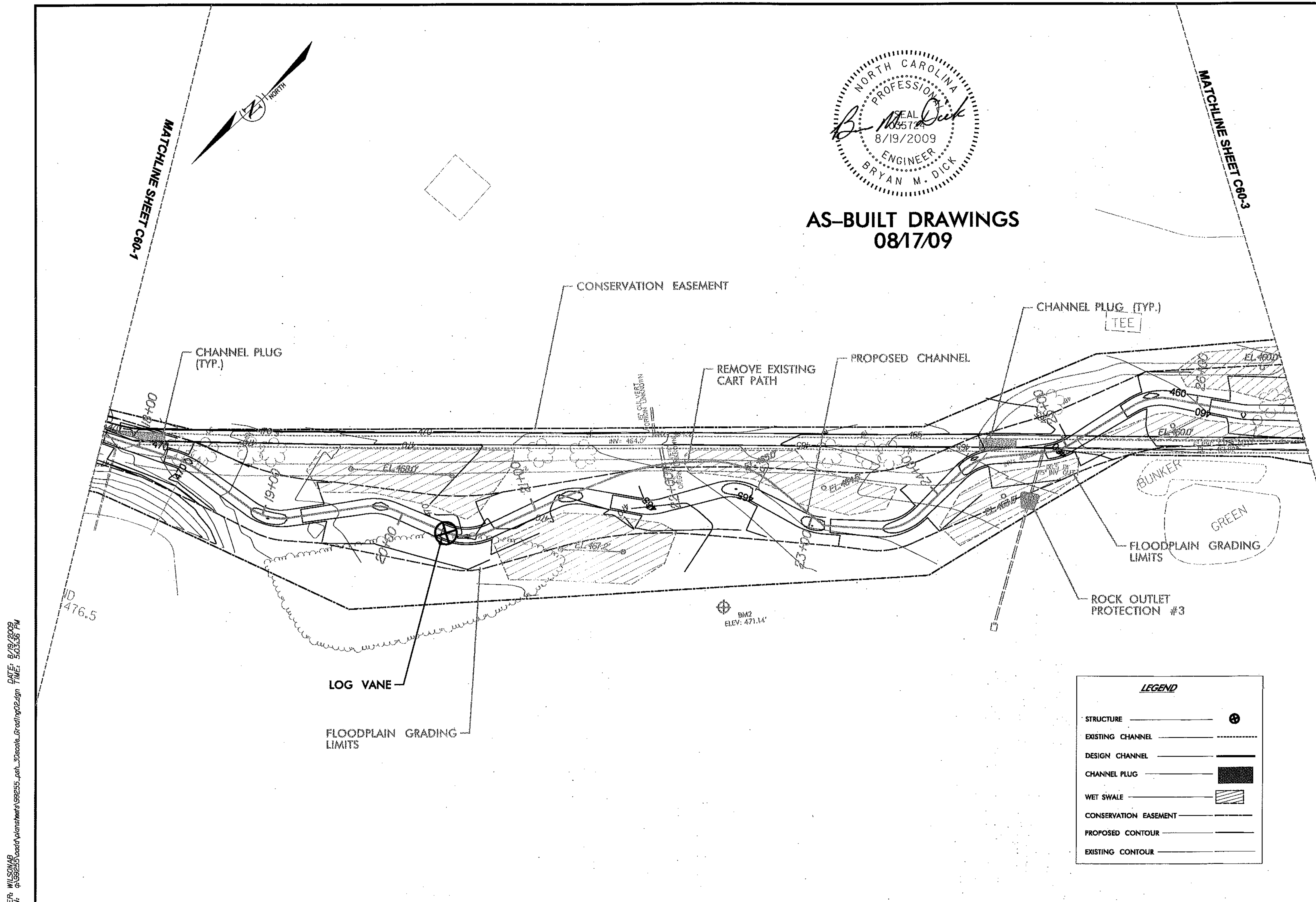

NO	REVISIONS	DRN	CHK	DATE
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2				
3				

BADIN INN STREAM RESTORATION

SITE PLAN, GRADING AND DRAINAGE

EARTH TECH | AECOM

701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (fax)

DATE 8/19/2009

PROJECT NO 99255

FILENAME

SHEET NO C-3

DRAWN BY ABW | CHKD BY BMD

NORTH

MATCHLINE SHEET C60-2

MATCHLINE SHEET C60-4

NORTH CAROLINA PROFESSIONAL SEAL 033124 ENGINEER BRYAN M. DICK
8/19/2009

AS-BUILT DRAWINGS
08/17/09

POND WS=461.5

TEE

BLEND DITCH INTO NEW CHANNEL

FILL EXISTING CHANNEL

FLOODPLAIN GRADING LIMITS

GREEN

TEE

BUNKER

ELEV: 460.83'

REMOVE EXISTING CART PATH

WETLAND SWALE

FLOODPLAIN GRADING LIMITS

CONSERVATION EASEMENT

LEGEND

- STRUCTURE
- EXISTING CHANNEL
- DESIGN CHANNEL
- CHANNEL PLUG
- WET SWALE
- CONSERVATION EASEMENT
- PROPOSED CONTOUR
- EXISTING CONTOUR

NO	REVISIONS	DIN	CHK	DATE
1				
2				
3				

HORIZONTAL SCALE
50 0 50 100

BADIN INN STREAM RESTORATION
SITE PLAN, GRADING AND DRAINAGE

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 FAX

DATE	8/19/2009
PROJECT NO	99255
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ABW	BMD

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MATCHLINE SHEET C60-3

MATCHLINE SHEET C60-5

NORTH

NORTH CAROLINA PROFESSIONAL SEAL 035724 8/19/2009 ENGINEER BRYAN M. DICK

AS-BUILT DRAWINGS
08/17/09

REMOVE EXISTING CART PATH
NEW CART PATH TO BE INSTALLED OFF-SITE BY OTHERS

TEE

CHANNEL PLUG (TYP.)

WETLAND SWALE

CONSERVATION EASEMENT

FLOODPLAIN GRADING LIMITS

PROPOSED CHANNEL

BM4
ELEV: 447.52'

TEE

TEE

FILL EXISTING CHANNEL

LEGEND

- STRUCTURE
- EXISTING CHANNEL
- DESIGN CHANNEL
- CHANNEL PLUG
- WET SWALE
- CONSERVATION EASEMENT
- PROPOSED CONTOUR
- EXISTING CONTOUR

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

HORIZONTAL SCALE
50 0 50 100

BADIN INN STREAM RESTORATION
SITE PLAN, GRADING AND DRAINAGE

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (Fax)

DATE	8/19/2009
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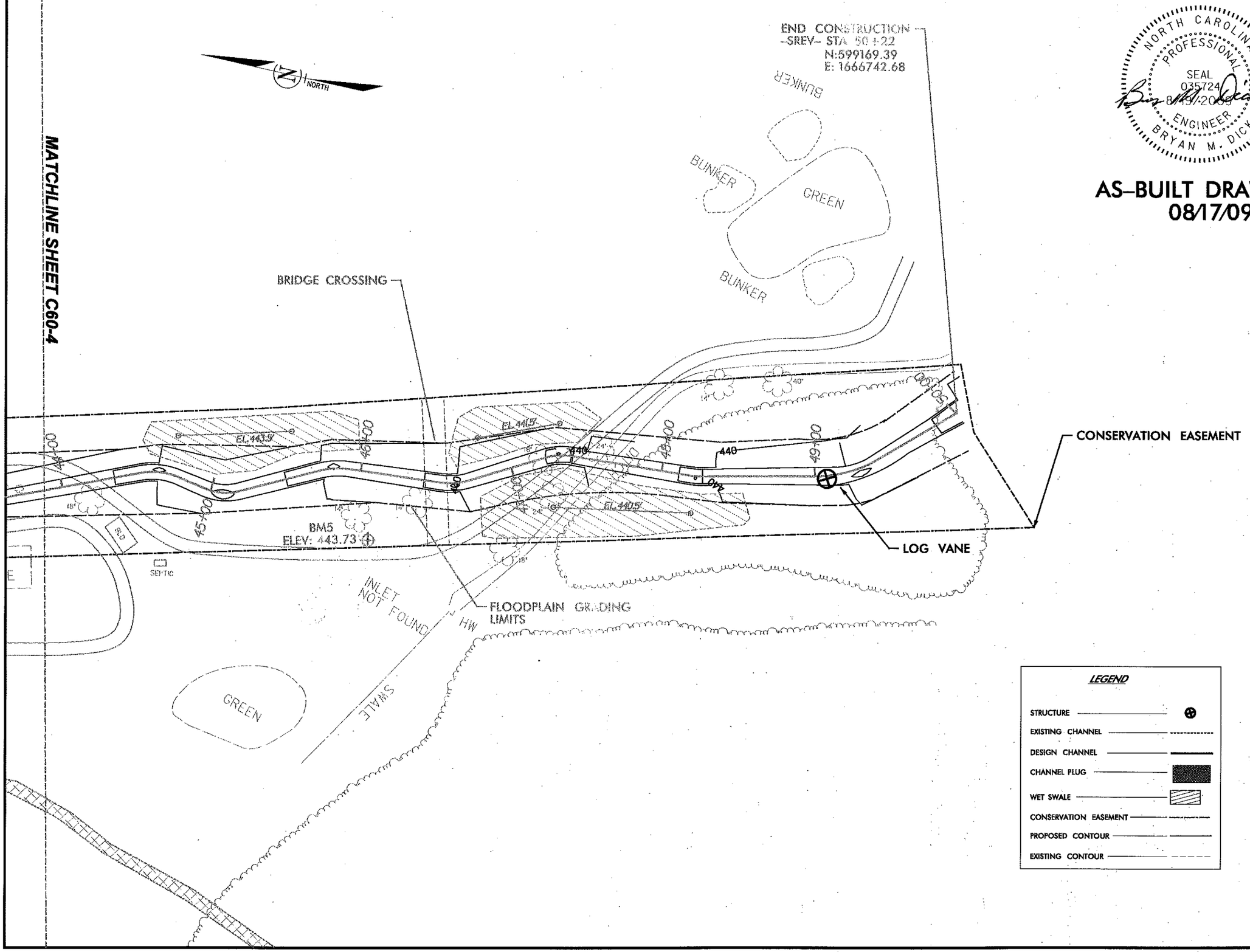

MATCHLINE SHEET C60-4

NORTH CAROLINA PROFESSIONAL SEAL 035724 ENGINEER BRYAN M. DICK
8/19/2009

AS-BUILT DRAWINGS
08/17/09

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

HORIZONTAL SCALE
50 0 50 100

LEGEND

- STRUCTURE
- EXISTING CHANNEL
- DESIGN CHANNEL
- CHANNEL PLUG
- WET SWALE
- CONSERVATION EASEMENT
- PROPOSED CONTOUR
- EXISTING CONTOUR

BADIN INN STREAM RESTORATION
SITE PLAN, GRADING AND DRAINAGE

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (FAX)

DATE	8/19/2009
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TIME: 3:03:28 PM

BEGIN -SREV- PROFILE
STA. 10+00
EL. 490.07'

USE STONE WITH VERY LITTLE SMALL SIZED STONE INCLUDED (SIMILAR TO STONE AT STA. 38+00 TO 39+00)

PROPOSED BANKFULL

EXISTING GROUND

PROPOSED THALWEG

EXISTING GROUND DATA UNAVAILABLE STA. 15+45 TO 16+70

PI =10+28.32
EI = 489.23'

PI =11+54.43
EI = 485.38'
PI =11+58.81
EI = 484.35'
PI =11+63.19
EI = 485.32'

PI =12+33.59
EI = 482.90'
PI =12+40.80
EI = 481.92'
PI =12+47.91
EI = 482.81'

PI =12+77.28
EI = 481.74'
PI =12+86.64
EI = 480.56'
PI =12+96.01
EI = 481.38'

PI =13+35.25
EI = 480.02'
PI =13+41.72
EI = 478.92'
PI =13+48.18
EI = 479.88'

PI =13+85.76
EI = 478.60'
PI =14+05.80
EI = 477.57'
PI =14+25.84
EI = 478.25'

PI =14+78.82
EI = 476.94'
PI =14+90.10
EI = 475.80'
PI =15+01.38
EI = 476.87'

PI =15+46.15
EI = 476.67'
PI =15+52.75
EI = 475.09'
PI =15+59.34
EI = 476.10'

PI =15+98.79
EI = 475.42'
PI =16+02.84
EI = 474.42'
PI =16+06.88
EI = 475.42'

PI =16+43.79
EI = 474.78'
PI =16+57.25
EI = 473.70'
PI =16+70.70
EI = 474.53'

500
490
480
470
460
10+00
11+00
12+00
13+00
14+00
15+00
16+00
17+00

EXISTING GROUND

PROPOSED BANKFULL

PROPOSED THALWEG

PI =17+39.78
EI = 473.11'
PI =17+44.29
EI = 472.13'
PI =17+48.80
EI = 473.15'

PI =18+27.12
EI = 471.58'
PI =18+36.03
EI = 470.50'
PI =18+44.93
EI = 471.44'

PI =18+89.79
EI = 470.45'
PI =19+04.53
EI = 469.29'

PI =19+19.27
EI = 470.30'

PI =19+73.34
EI = 469.75'
PI =19+83.83
EI = 468.79'
PI =19+94.32
EI = 469.82'

PI =20+31.60
EI = 469.38'
PI =20+46.34
EI = 469.37'

PI =20+65.09
EI = 469.36'

PI =21+15.14
EI = 468.84'
PI =21+26.24
EI = 467.87'
PI =21+37.34
EI = 468.90'

PI =21+74.76
EI = 468.21'
PI =21+83.15
EI = 467.20'
PI =21+91.55
EI = 468.18'

PI =22+32.43
EI = 467.45'
PI =22+44.54
EI = 466.39'
PI =22+56.65
EI = 467.33'

PI =23+03.22
EI = 465.61'
PI =23+19.70
EI = 466.64'
PI =23+12.74
EI = 466.59'

PI =23+49.82
EI = 465.90'
PI =23+66.00
EI = 464.79'
PI =23+82.18
EI = 465.67'

480
470
460
450
440
17+00
18+00
19+00
20+00
21+00
22+00
23+00
24+00

NORTH CAROLINA PROFESSIONAL SEAL 025721 ENGINEER BRYAN M. DICK
8/19/2009

AS-BUILT DRAWINGS
08/17/09

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

HORIZONTAL SCALE 0 25 50
VERTICAL SCALE 0 5 10

BADIN INN STREAM RESTORATION
PROPOSED CHANNEL PROFILE

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 FAX

DATE	8/19/2009
PROJECT NO	99255
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ICJ	JWJ

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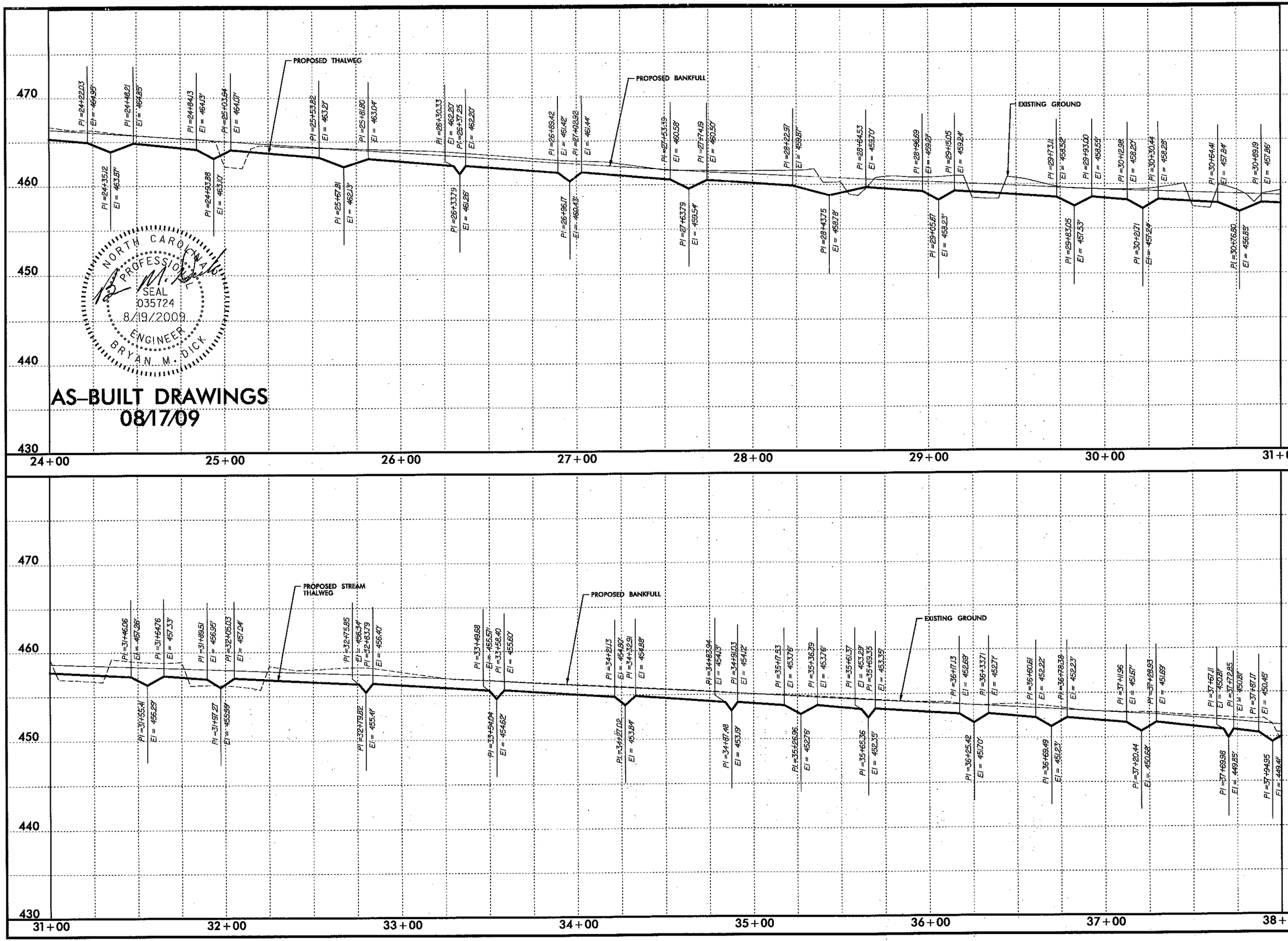

NORTH CAROLINA PROFESSIONAL SEAL 035724 8/19/2009 ENGINEER BRYAN M. DICK

AS-BUILT DRAWINGS
08/17/09

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

HORIZONTAL SCALE 0 25 50
VERTICAL SCALE 5 0 5 10

BADIN INN STREAM RESTORATION
PROPOSED CHANNEL PROFILE

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 FAX 919-854-6259

DATE	8/19/2009
PROJECT NO	99255
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ICJ	JWJ

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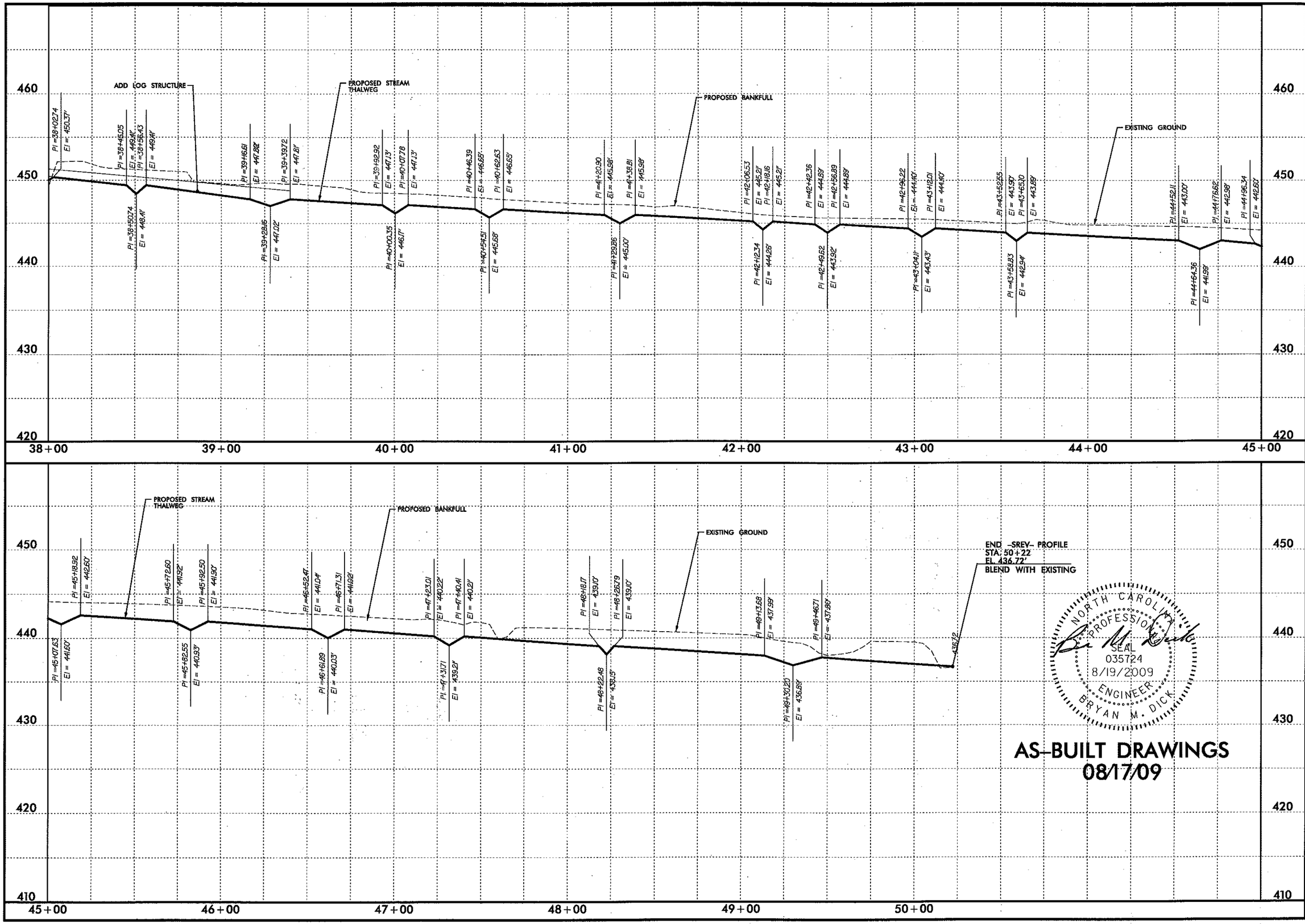

NORTH CAROLINA PROFESSIONAL SEAL 035724 8/19/2009 ENGINEER BRYAN M. DICK

AS-BUILT DRAWINGS
08/17/09

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

HORIZONTAL SCALE 0 25 50
VERTICAL SCALE 0 5 10

BADIN INN STREAM RESTORATION
PROPOSED CHANNEL PROFILE

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (FAX)

DATE	8/19/2009
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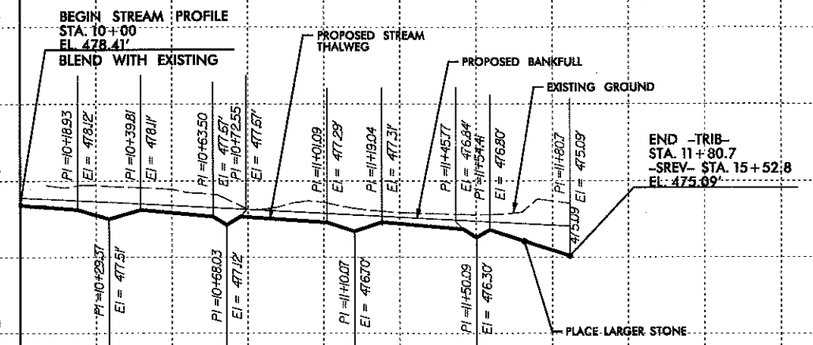

AS-BUILT DRAWINGS
08/17/09

NORTH CAROLINA PROFESSIONAL SEAL 035724 8/19/2009 ENGINEER BRYAN M. DICK

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

HORIZONTAL SCALE 25 0 25 50

VERTICAL SCALE 5 0 5 10

BADIN INN STREAM RESTORATION
PROPOSED CHANNEL PROFILE

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (fax)

DATE	8/19/2009
PROJECT NO	99255
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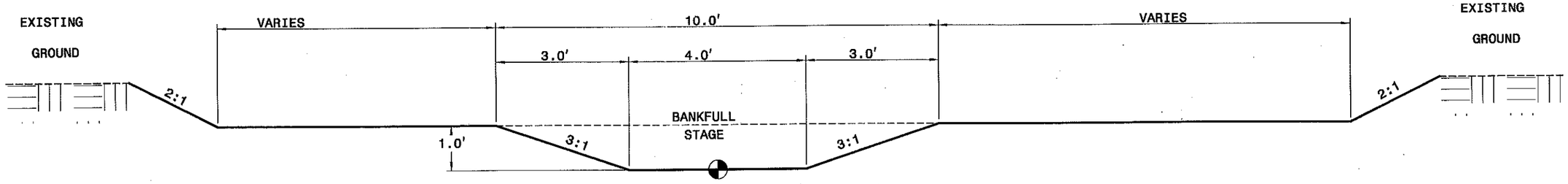
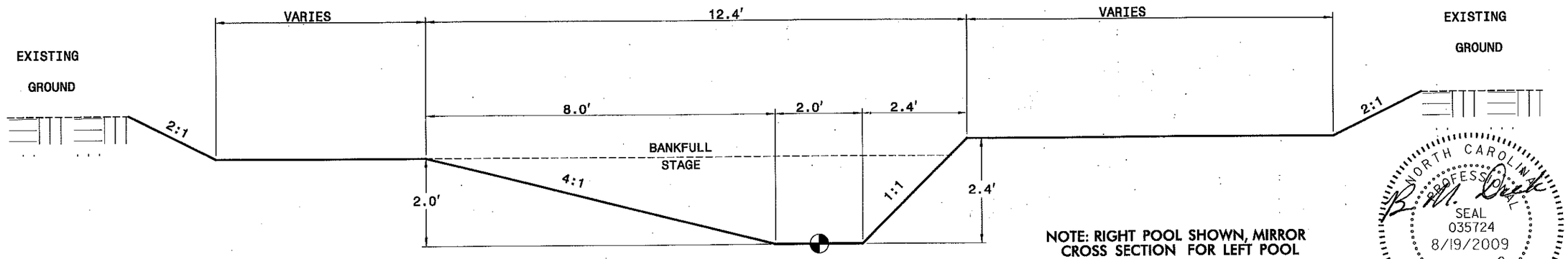
⊕ = THALWEG LOCATION



TYPICAL SECTION –SREV–

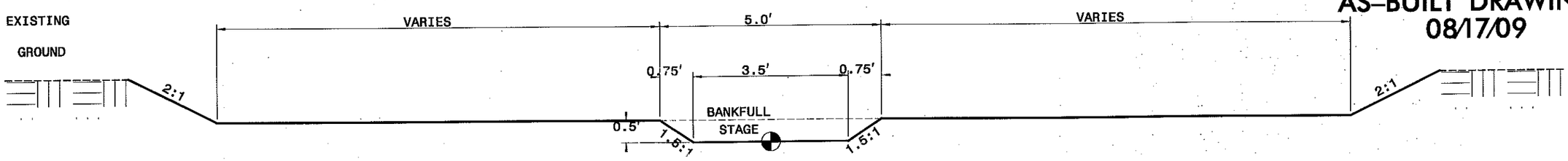
RIFFLE



NOTE: RIGHT POOL SHOWN, MIRROR CROSS SECTION FOR LEFT POOL

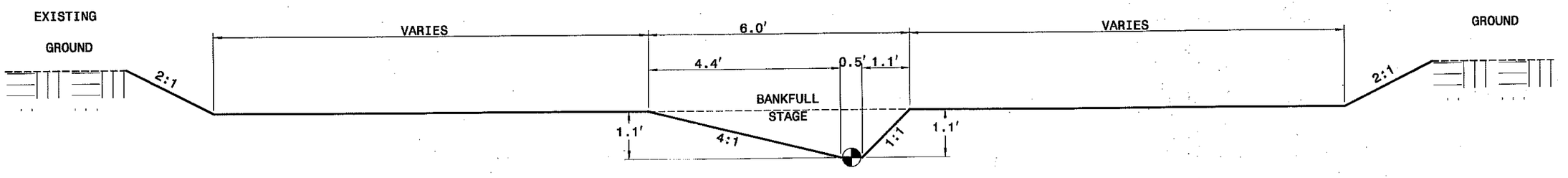
TYPICAL SECTION –SREV–

POOL



TYPICAL SECTION –TRIB–

RIFFLE



TYPICAL SECTION –TRIB–

POOL

NOTE: RIGHT POOL SHOWN, MIRROR CROSS SECTION FOR LEFT POOL

NORTH CAROLINA PROFESSIONAL SEAL 035724 8/19/2009 ENGINEER BRYAN M. DICK

AS–BUILT DRAWINGS 08/17/09

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

BADIN INN STREAM RESTORATION

TYPICAL CROSS SECTIONS

EARTH TECH | AECOM

701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6300 FAX 919-854-6259 (fax)

DATE	8/19/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C–11
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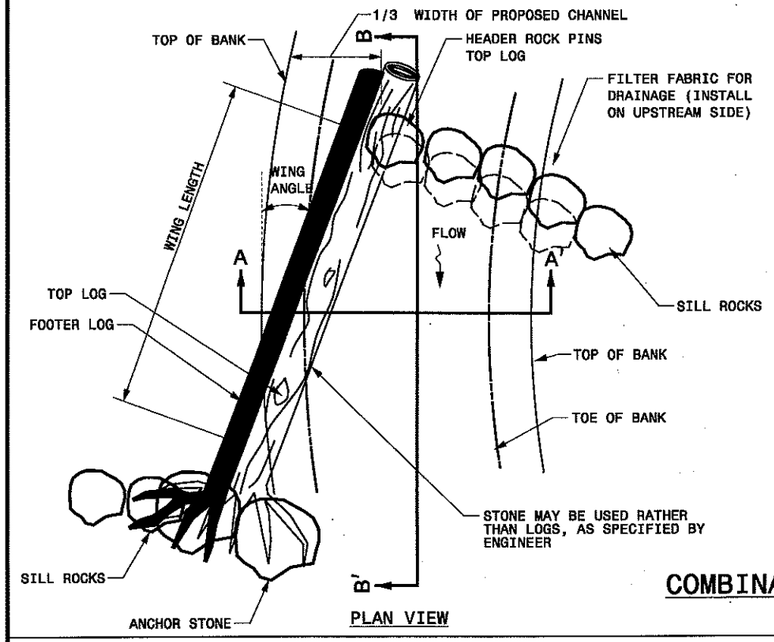


PLAN VIEW

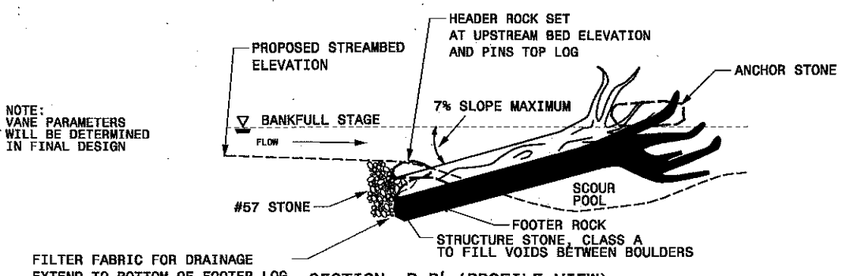
	-SREV-
WING LENGTH	
APPROXIMATE LENGTH ALONG CENTERLINE	
WING ANGLE	

NOTE: VANE PARAMETERS WILL BE DETERMINED IN FINAL DESIGN

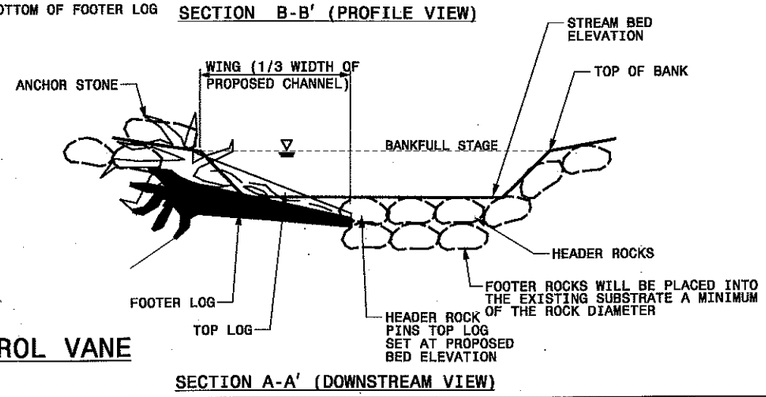
NOTES:

HEADER, FOOTER, AND SILL ROCKS TO BE STRUCTURE STONE, 18"-30".

AT THE DISCRETION OF THE ENGINEER, SURGE STONE MAY BE USED IN LIEU OF #57 STONE AND CLASS 'A' USED TO FILL VOIDS.



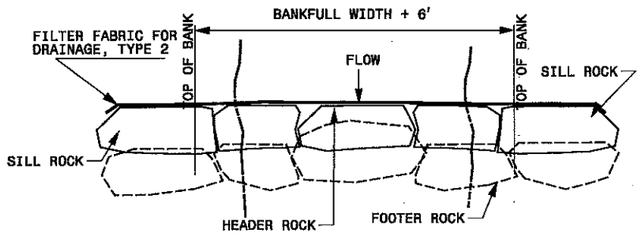
SECTION B-B' (PROFILE VIEW)



SECTION A-A' (DOWNSTREAM VIEW)

COMBINATION GRADE CONTROL VANE/ ROCK GRADE CONTROL VANE

SCALE: NTS

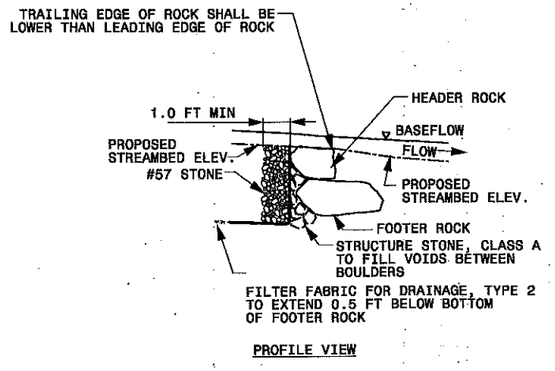


PLAN VIEW

NOTES:

HEADER, FOOTER, AND SILL ROCKS TO BE STRUCTURE STONE, CLASS BOULDER

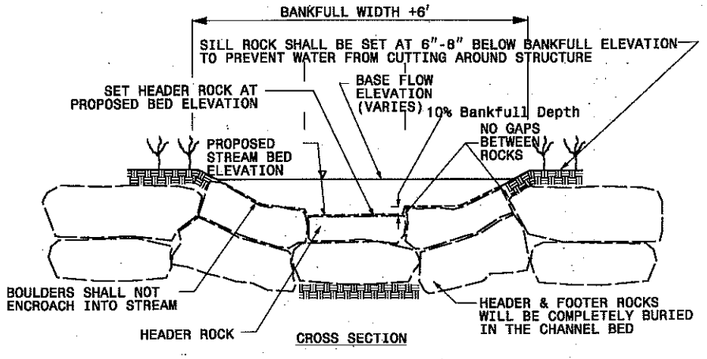
HEADER ROCK IS PLACED LOWER THAN TOE ROCKS



PROFILE VIEW

ROCK SILL

SCALE: NTS



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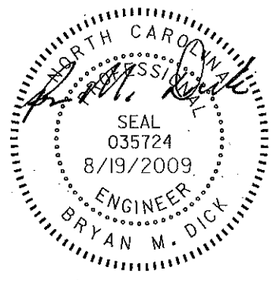

AS-BUILT DRAWINGS 08/17/09

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

BADIN INN STREAM RESTORATION

GENERAL DETAILS

EARTH TECH | AECOM

701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (fax)

DATE	8/19/2009
PROJECT NO	99255
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ICJ	BMD

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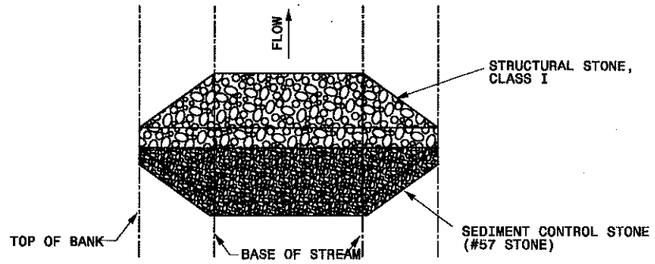
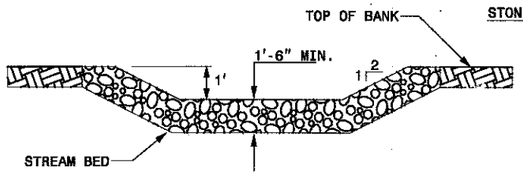
DATE: 8/19/2009
TIME: 5:03:59 PM

NORTH CAROLINA PROFESSIONAL SEAL 035724 8/19/2009 ENGINEER BRYAN M. DICK

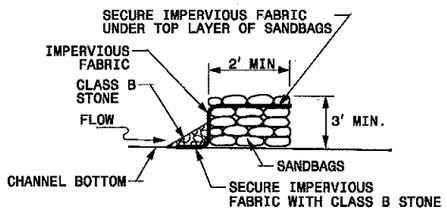
AS-BUILT DRAWINGS
08/17/09



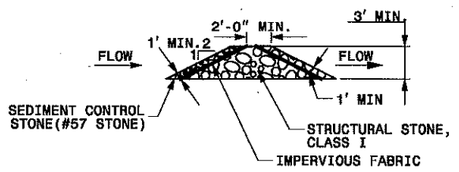
STONE IMPERVIOUS DIKE
PLAN VIEW



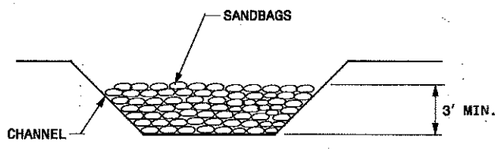
STONE IMPERVIOUS DIKE
CROSS SECTION



SANDBAG IMPERVIOUS
DIKE PROFILE



STONE IMPERVIOUS DIKE
PROFILE



SANDBAG IMPERVIOUS DIKE
CROSS SECTION

NOTES:

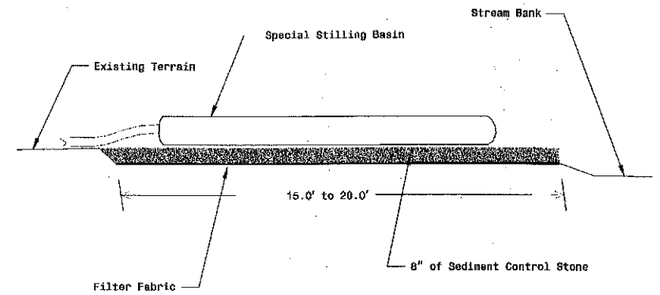
1. THE STRUCTURE SHALL BE USED FOR DIVERTING AND PUMPING ONLY. THE STRUCTURE SHALL BE RELOCATED OR REMOVED ONCE PUMPING/DIVERTING IS COMPLETE.
2. EITHER TYPE OF IMPERVIOUS DIKE (SANDBAG OR STONE) MAY BE USED.

IMPERVIOUS DIKE
SCALE: NTS

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C. — Z-306

ENGLISH STANDARD DRAWING FOR **SPECIAL STILLING BASIN**

SHEET 1 OF 1 — 1630.06



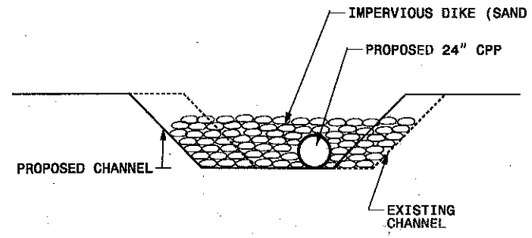
Note: Provide Stabilized Outlet to Streambank
Not To Scale

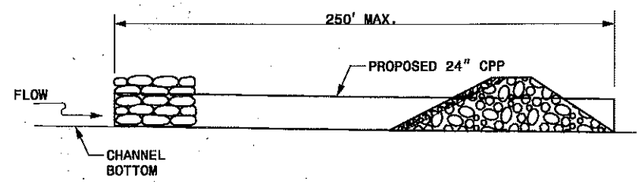
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C. — Z-306

ENGLISH STANDARD DRAWING FOR **SPECIAL STILLING BASIN**

SHEET 1 OF 1 — 1630.06

SPECIAL STILLING BASIN
SCALE: NTS



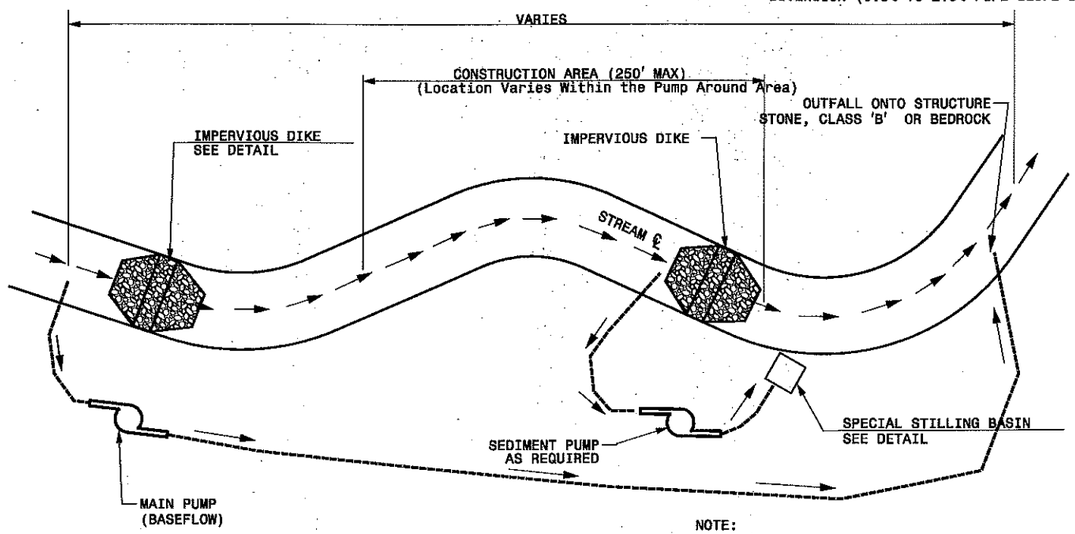


DIVERSION CROSS SECTION

DIVERSION PROFILE

NOTE:

PIPE MUST HAVE POSITIVE DRAINAGE WHEN USING DIVERSION (0.3% TO 2.0% PIPE SLOPE IS RECOMMENDED)



NOTE:

CHANNEL SHALL BE MATTED WITH COIR FIBER MATTING (SEE DETAIL) PRIOR TO THE CLOSE OF EACH WORK DAY.

PUMP-AROUND/PIPE DIVERSION
SCALE: NTS

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

BADIN INN STREAM RESTORATION
GENERAL DETAILS

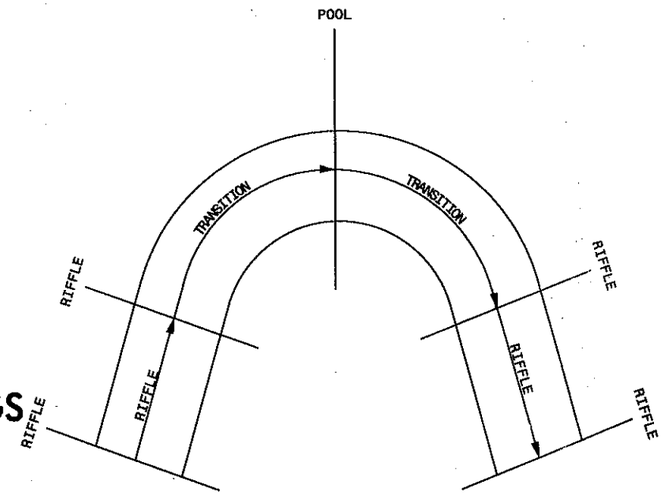
EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 (FAX)

DATE	8/19/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-13
DRAWN BY	CHKD BY
ICJ	BMD

USER: WILSONAB
DGN: d:\99255\cadd\plansheets\99255_psh_C-10-15 Details.dgn
DATE: 8/19/2009
TIME: 5:05:59 PM

NORTH CAROLINA PROFESSIONAL SEAL 035724 ENGINEER BRYAN M. DICK
B. M. Dick 8/19/2009

AS-BUILT DRAWINGS 08/17/09

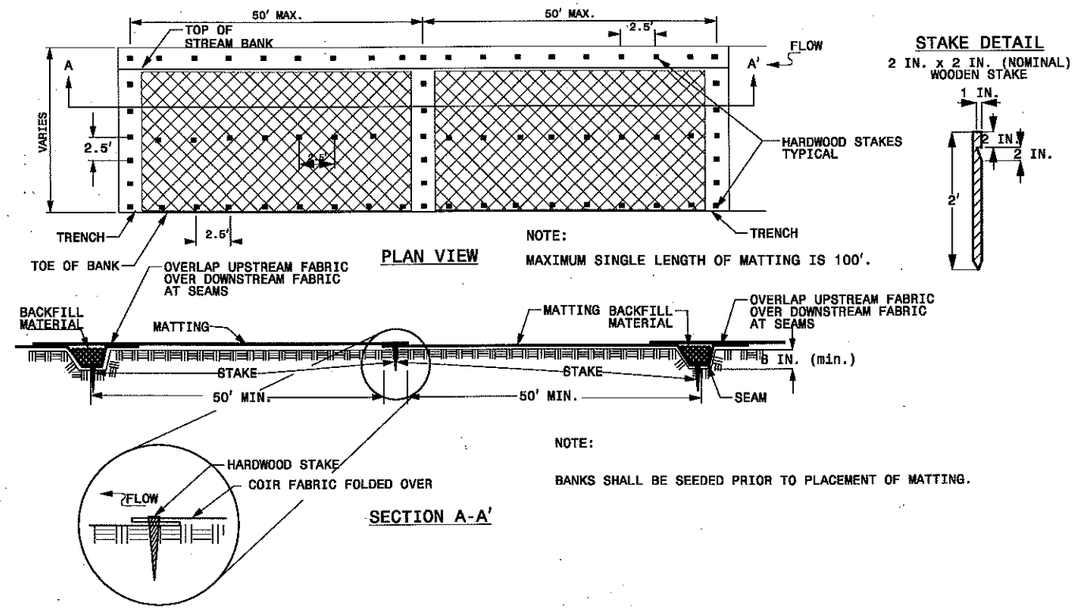


NOTES:

1. AREAS IN BETWEEN LABELED FEATURES ARE TRANSITION AREAS.
2. SEE TYPICALS AND STATIONING FOR MORE DETAIL.
3. THE AREA BETWEEN THE CONCURRENT RIFFLE CROSS-SECTIONS ARE CONSIDERED THE RIFFLE SECTION.
4. THE AREA BETWEEN THE DOWNSTREAM RIFFLE AND RUN CROSS-SECTION IS CONSIDERED THE RUN SECTION.
5. THE AREA BETWEEN THE RUN AND GLIDE CROSS-SECTION IS CONSIDERED THE POOL SECTION.
6. THE AREA BETWEEN THE GLIDE AND THE UPSTREAM RIFFLE CROSS-SECTION IS CONSIDERED THE GLIDE SECTION.

CROSS SECTION TRANSITION LOCATIONS

SCALE: NTS



PLAN VIEW

NOTE:

MAXIMUM SINGLE LENGTH OF MATTING IS 100'.

SECTION A-A'

NOTE:

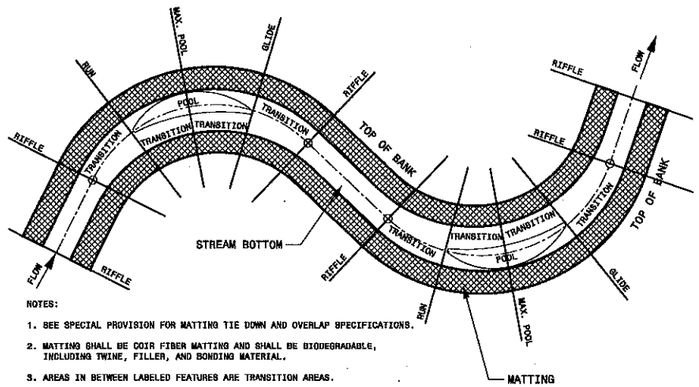
BANKS SHALL BE SEEDED PRIOR TO PLACEMENT OF MATTING.

STAKE DETAIL

2 IN. x 2 IN. (NOMINAL) WOODEN STAKE

COIR FABRIC

SCALE: NTS



NOTES:

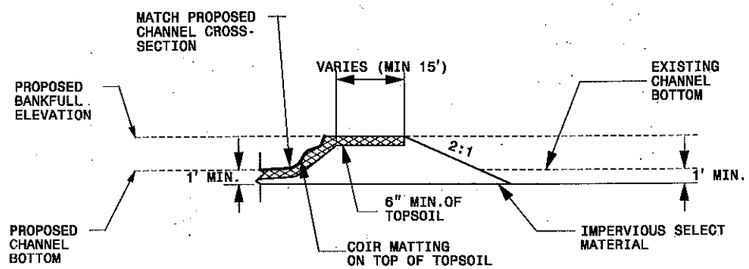
1. SEE SPECIAL PROVISION FOR MATTING TIE DOWN AND OVERLAP SPECIFICATIONS.
2. MATTING SHALL BE COIR FIBER MATTING AND SHALL BE BIODEGRADABLE, INCLUDING TWINE, FILLER, AND BONDING MATERIAL.
3. AREAS IN BETWEEN LABELED FEATURES ARE TRANSITION AREAS.
4. THE AREA BETWEEN THE CONCURRENT RIFFLE CROSS-SECTIONS ARE CONSIDERED THE RIFFLE SECTION.
5. THE AREA BETWEEN THE DOWNSTREAM RIFFLE AND RUN CROSS-SECTION IS CONSIDERED THE RUN SECTION.
6. THE AREA BETWEEN THE RUN AND GLIDE CROSS-SECTION IS CONSIDERED THE POOL SECTION.
7. THE AREA BETWEEN THE GLIDE AND THE UPSTREAM RIFFLE CROSS-SECTION IS CONSIDERED THE GLIDE SECTION.

TYPICAL MATTING LOCATION & STANDARD PLAN LAYOUT

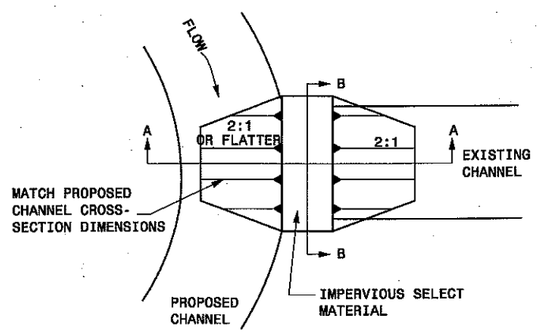
SCALE: NTS

NOTES:

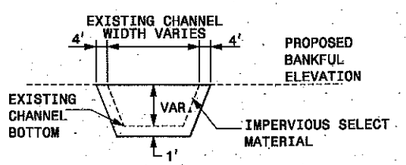
1. 90% COMPACTION RATE IS REQUIRED ON CHANNEL PLUG OR AS APPROVED BY THE ENGINEER.
2. SIDE SLOPE THAT IS ADJACENT TO PROPOSED STREAM NEEDS TO MATCH PROPOSED CROSS SECTION IN THAT REGION.
3. THIS STRUCTURE SHALL BE PLACED AS DIRECTED BY THE ENGINEER.



SECTION A-A



PLAN VIEW OF EXISTING CHANNEL WITH CHANNEL PLUG



SECTION B-B

CHANNEL PLUG

SCALE: NTS

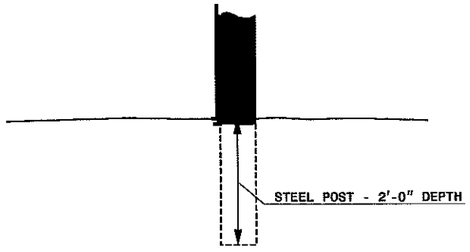
NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

BADIN INN STREAM RESTORATION
GENERAL DETAILS

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (FAX)

DATE	8/19/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-14
DRAWN BY	CHKD BY
ICJ	BMD

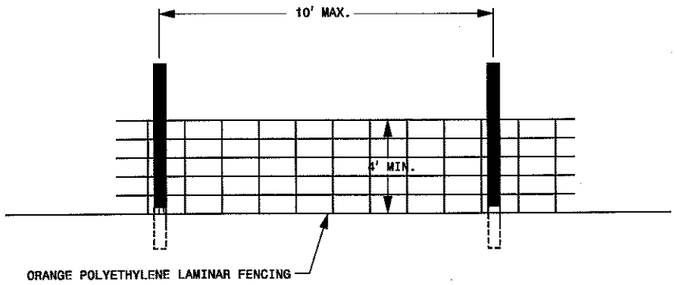
USER: WILSONAB
DGN: q:\99255\cadd\plansheets\99255_psh_C-10-15 Details.dgn
DATE: 8/19/2009
TIME: 5:03:07 PM



POSTS

NOTES:

1. STEEL POSTS SHALL BE 5'-0" IN HEIGHT AND BE OF THE SELF-FASTENER ANGLE STEEL TYPE.
2. WOOD POST SHALL BE 6'-0" IN HEIGHT AND 3" MINIMUM IN DIAMETER.

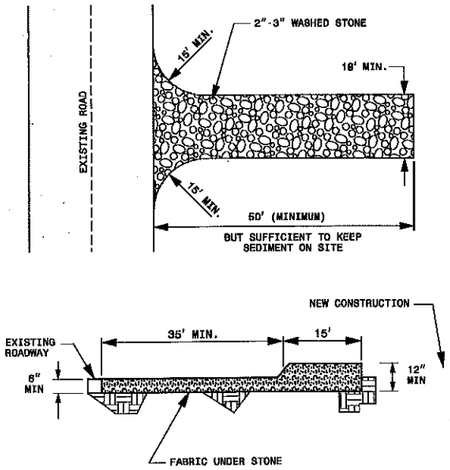


SAFETY FENCE/TREE PROTECTION FENCE

SCALE: NTS

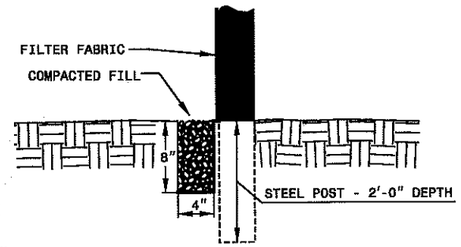
NOTES:

1. PUT SILT FENCE OR TREE PROTECTION FENCE UP TO ENSURE CONSTRUCTION ENTRANCE IS USED
2. A 6" TO 12" MINIMUM STABILIZED PAD OF WASHED STONE SHALL BE LOCATED WHERE TRAFFIC WILL BE ENTERING OR LEAVING A CONSTRUCTION SITE TO OR FROM A PUBLIC STREET. THE STONE SHALL BE PLACED ON TOP OF FILTER FABRIC FOR A DISTANCE OF 50 FEET MINIMUM.
3. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC STREETS OR EXISTING PAVEMENT. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEAN OUT OF ANY MEASURES USED TO TRAP SEDIMENT.
4. ALL SEDIMENT SPILLED, DROPPED, WASHED, OR TRACKED ONTO PUBLIC STREETS MUST BE REMOVED IMMEDIATELY.
5. IF CONSTRUCTION ON THE SITES ARE SUCH THAT THE MUD IS NOT REMOVED BY THE VEHICLE TRAVELING OVER THE STONE, THEN THE TIRES OF THE VEHICLES MUST BE WASHED BEFORE ENTERING THE PUBLIC ROAD. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE WHICH DRAINS INTO AN APPROVED SEDIMENT BASIN.
6. ADDITIONAL GRADING SHALL BE REQUIRED TO CONNECT THE STONE ENTRANCE TO THE EXISTING GROUND. UPON COMPLETION OF THE PROJECT, THE ROAD SHALL BE RETURNED TO A CONDITION THAT MEETS OR EXCEEDS THE PRE-EXISTING CONDITIONS.



TEMPORARY CONSTRUCTION ENTRANCE

SCALE: NTS

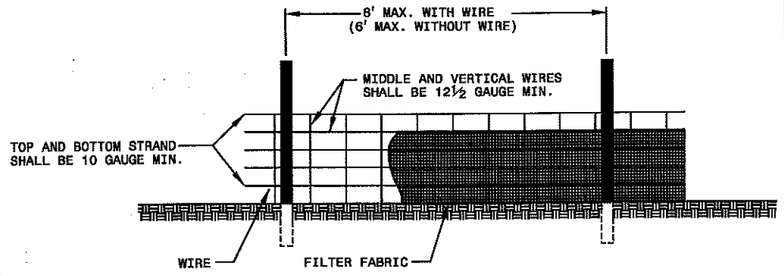


NOTES

WIRE SHALL BE A MINIMUM OF 32" IN WIDTH AND SHALL HAVE A MINIMUM OF 6 LINE WIRES WITH 12" STAY SPACING.

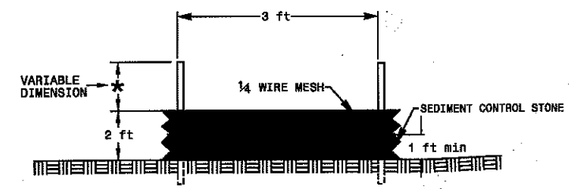
FILTER FABRIC SHALL BE A MINIMUM OF 36" IN WIDTH AND SHALL BE FASTENED ADEQUATELY TO THE WIRE AS DIRECTED BY THE ENGINEER.

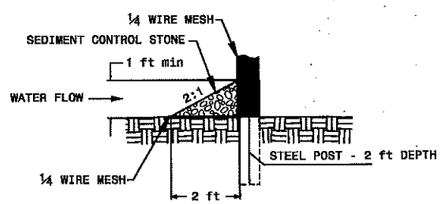
STEEL POST SHALL BE 5'-0" IN HEIGHT AND BE OF THE SELF-FASTENER ANGLE STEEL TYPE.



TEMPORARY SILT FENCE (HIGH VISIBILITY)

SCALE: NTS





GENERAL NOTES:

SEDIMENT CONTROL STONE SHALL BE NO. 5 OR NO. 57 AND SHALL BE PAID FOR AT THE CONTRACT UNIT PRICE PER TON "SEDIMENT CONTROL STONE."

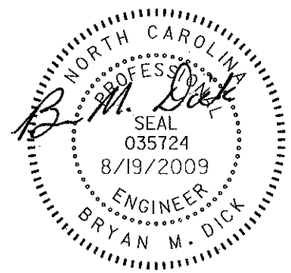
USE HARDWARE CLOTH 24 GAUGE WIRE MESH WITH ¼ INCH MESH OPENINGS.

INSTALL 5 FT. SELF FASTENER ANGLE STEEL POST 2 FT. DEEP MINIMUM.

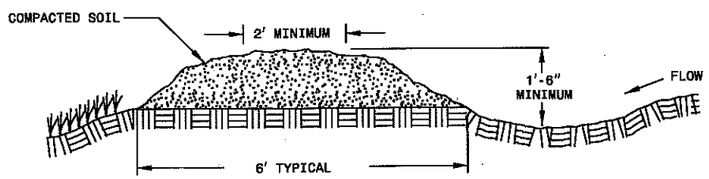
POST SPACING SHALL BE A MAXIMUM OF 3 FT.

SPECIAL SEDIMENT CONTROL FENCE

SCALE: NTS



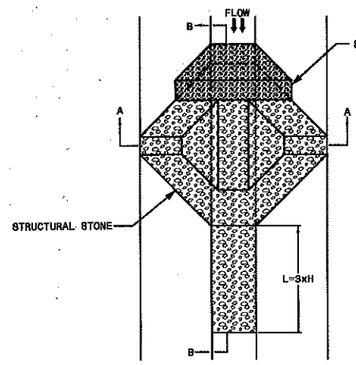
AS-BUILT DRAWINGS
08/17/09



CROSS SECTIONAL VIEW

TEMPORARY DIVERSION

SCALE: NTS

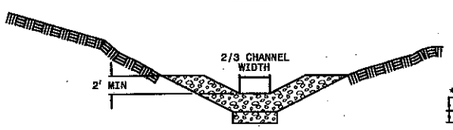


PLAN

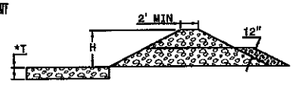
NOTE

STRUCTURAL STONE SHALL BE STONE FOR EROSION CONTROL (CLASS "B") AND SHALL BE PAID FOR AT THE CONTRACT BID PRICE FOR "LUMP SUM FOR EROSION CONTROL."

SEDIMENT CONTROL STONE SHALL BE NO. 5 OR NO. 57 STONE AND SHALL BE PAID FOR AT THE CONTRACT BID PRICE FOR "LUMP SUM FOR EROSION CONTROL."



SECTION A-A



SECTION B-B

*T = 12" MIN., 18" MAX.

TEMPORARY ROCK SILT CHECK TYPE 'A'

SCALE: NTS

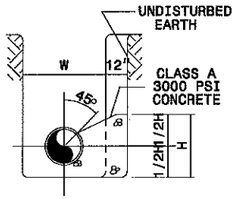
NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

BADIN INN STREAM RESTORATION
GENERAL DETAILS

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 FAX

DATE	8/19/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-15
DRAWN BY	CHKD BY
ICJ	BMD

USER: WILSONAB
DGN: q:\99255\cadd\plansheets\99255_psh_C-10-15 Details.dgn
DATE: 8/19/2009
TIME: 5:03:07 PM

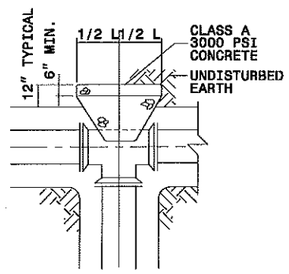


TYPICAL SECTION
TEE OR BEND

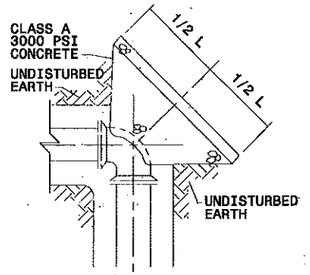
CONCRETE THRUST BLOCK SCHEDULE								
PIPE SIZE INCHES	BEND 90 (TEE) 45*				22**		11 1/16*	
	H	L	H	L	H	L	H	L
2"	.75'	1.5'	.50'	1.0'	.50'	.75'	.50'	.50'
4"	1.5'	3.0'	1.0'	2.5'	1.0'	1.5'	1.0'	1.0'
6"	2.0'	4.0'	1.5'	3.5'	1.0'	3.0'	1.0'	1.5'
8"	2.5'	5.0'	2.5'	4.0'	1.5'	3.5'	1.0'	2.5'
10"	3.0'	6.5'	2.5'	5.0'	2.0'	4.0'	1.0'	3.0'
12"	3.5'	8.0'	3.0'	5.0'	2.5'	5.0'	1.5'	3.5'

* FOR DESIGN PRESSURE=200 PSI

SIZE SCHEDULE



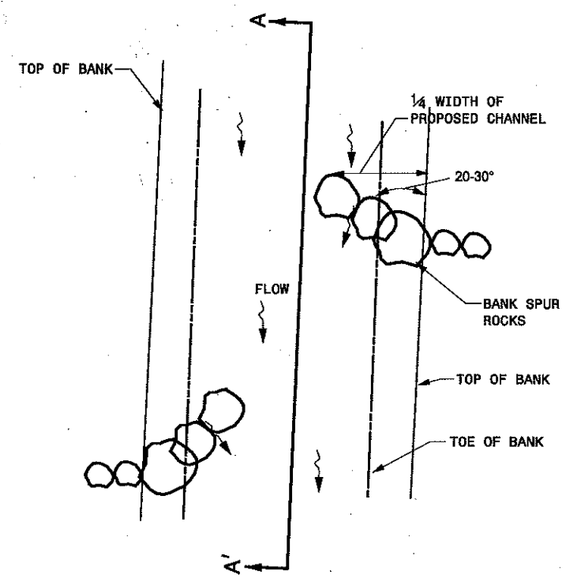
PLAN - TEE



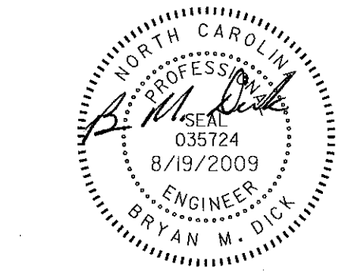
PLAN - BEND

THRUST BLOCKING

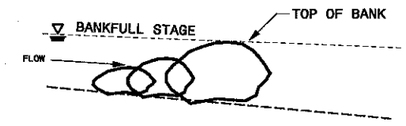
SCALE: NTS



PLAN VIEW



AS-BUILT DRAWINGS 08/17/09

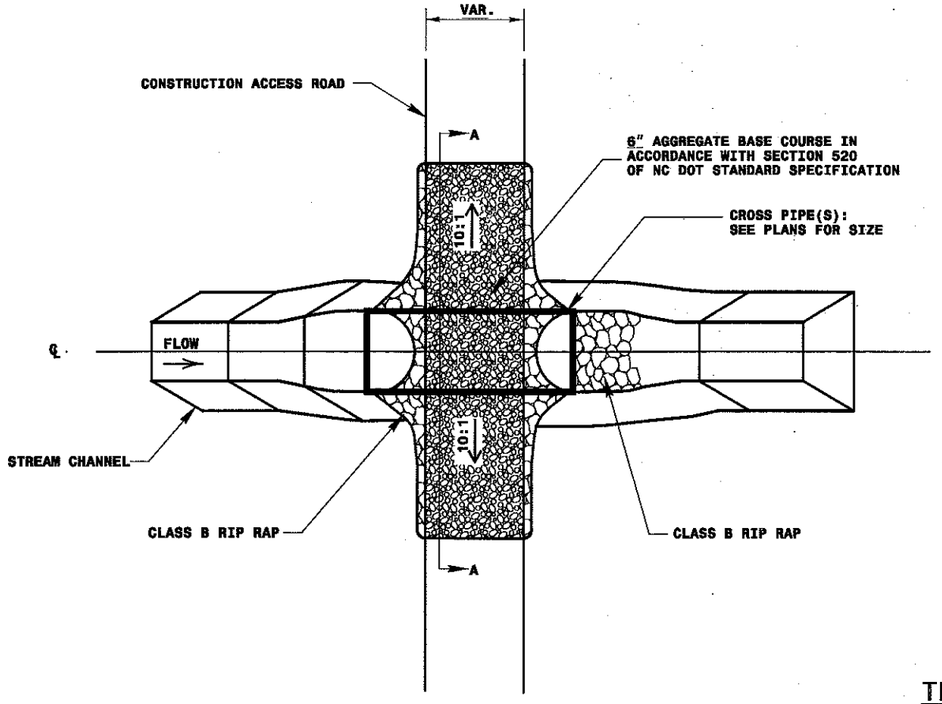


SECTION A-A' (PROFILE VIEW)

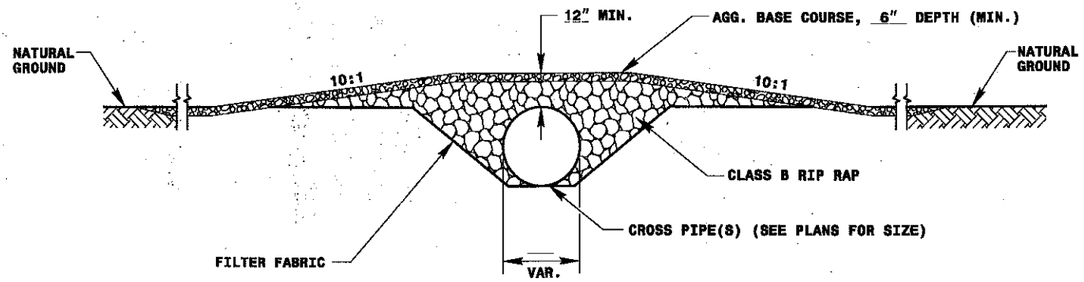
BANK SPUR

SCALE: NTS

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				



PLAN VIEW



SECTION A-A
NOT TO SCALE

TEMPORARY STREAM CROSSING

SCALE: NTS

BADIN INN STREAM RESTORATION
GENERAL DETAILS

EARTHTECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (FAX)

DATE	8/19/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-16
DRAWN BY	CHKD BY
ICJ	BMD

USER: WILSONAB
DGN: q:\99255\cadd\plansheet\99255_psh_C-10-15 Details.dgn
DATE: 8/19/2009
TIME: 3:03:06 PM

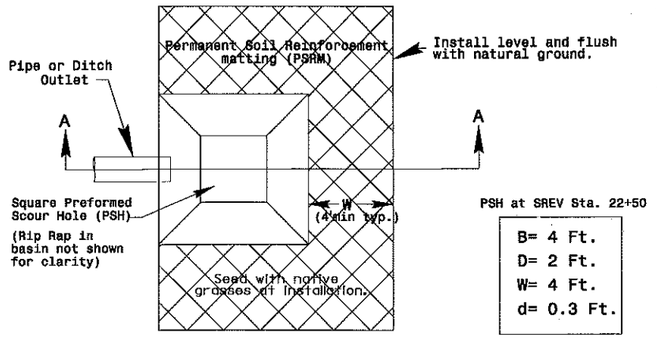
TEMPORARY SEEDING SCHEDULE

SEEDING DATES	SEEDING MIXTURE	SEEDING RATE (POUNDS/ACRE)	FERTILIZATION	FERTILIZER RATE (POUNDS/ACRE) ##	MULCH $	MULCHING RATE (POUNDS/ACRE)	MAINTENANCE
OCT 1 – MAR 31 (WINTER)	WRENS ABRUZZI WINTER RYE	50	4–12–12	500	STRAW	4000	REFERTILIZE IF GROWTH IS NOT FULLY ADEQUATE. RESEED, REFERTILIZE, AND MULCH IMMEDIATELY FOLLOWING EROSION OR OTHER DAMAGE
APR 1– SEP 30 (SUMMER)	BROWN–TOP MILLET	50	4–12–12	2000	STRAW	4000	REFERTILIZE IF GROWTH IS NOT FULLY ADEQUATE. RESEED, REFERTILIZE, AND MULCH IMMEDIATELY FOLLOWING EROSION OR OTHER DAMAGE

IF SOIL TESTS ARE PERFORMED, APPLY LIME ACCORDING TO RECOMMENDATIONS. SOILS WITH A pH OF 6 OR HIGHER DO NOT NEED LIME.

$ USE JUTE/EXCELSIOR MATTING TO COVER THE BOTTOM OF GRASS– LINED CHANNELS. GRAIN STRAW SHOULD BE USED ON CHANNEL SIDE SLOPES ABOVE THE HIGHEST CALCULATED DEPTH OF FLOW.

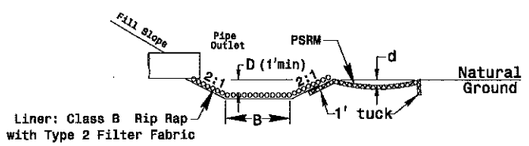
PLAN VIEW



PSH at SREV Sta. 22+50

B= 4 Ft.
D= 2 Ft.
W= 4 Ft.
d= 0.3 Ft.

SECTION A-A



PREFORMED SCOUR HOLE

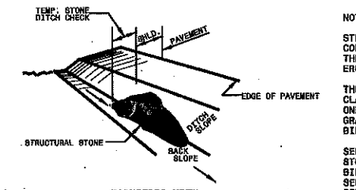
SCALE: NTS

AS–BUILT DRAWINGS 08/17/09

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

ENGLISH STANDARD DRAWING FOR TEMPORARY ROCK SILT CHECK TYPE 'B'

DRAWING NO. 1633.02



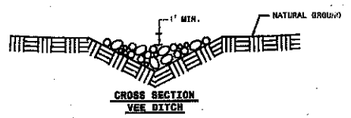
ISOMETRIC VIEW

NOTES:

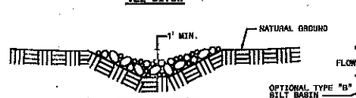
STRUCTURAL STONE SHALL BE STONE FOR EROSION CONTROL CLASS "B" AND SHALL BE PAID FOR AT THE CONTRACT BID PRICE FOR "LUMP SUM FOR EROSION CONTROL."

THE ENGINEER MAY DIRECT THE OPTION OF CLASS "A" STONE FOR SITES HAVING LESS THAN ONE (1) ACRE DRAINAGE AREA AND A DITCH GRADE LESS THAN 3%. PAYMENT SHALL BE CONTRACT BID PRICE FOR "LUMP SUM FOR EROSION CONTROL."

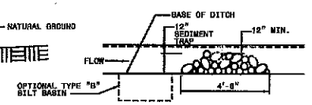
SEDIMENT CONTROL STONE SHALL BE NO. 6 OR 57 STONE AND SHALL BE PAID FOR AT THE CONTRACT BID PRICE FOR "LUMP SUM FOR EROSION CONTROL." SEDIMENT CONTROL STONE SHALL BE USED AS DIRECTED BY THE ENGINEER.



CROSS SECTION VEE DITCH



CROSS SECTION TRAPEZOIDAL DITCH



ELEVATION VIEW

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

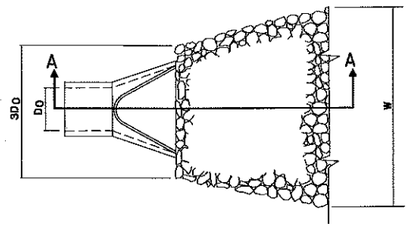
ENGLISH STANDARD DRAWING FOR TEMPORARY ROCK SILT CHECK TYPE 'B'

SHEET NO. 1 OF 1

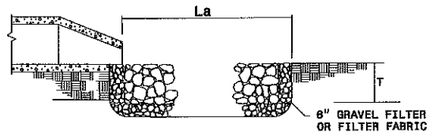
1633.02

TEMPORARY ROCK SILT CHECK TYPE "B"

SCALE: NTS



PLAN VIEW



SECTION A-A

NOTES:

1. La IS THE LENGTH OF THE RIPRAP APRON.
2. THE DOWNSTREAM WIDTH OF THE APRON IS EQUAL TO Do+0.4La
3. A FILTER BLANKET OR FILTER FABRIC SHOULD BE INSTALLED BETWEEN THE RIPRAP AND SOIL FOUNDATION.
4. IN A WELL DEFINED CHANNEL EXTEND THE APRON UP THE CHANNEL BANKS TO AN ELEVATION OF 6" ABOVE THE MAXIMUM TAILWATER DEPTH OR TO THE TOP OF THE BANK, WHICHEVER IS LESS.

REQUIRED OUTLET PROTECTION DIMENSIONS

RIP RAP OUTLET NUMBER	D_O (in.)	$3D_O$ (ft.)	La (ft.)	W (ft.)	T (in.)	RIP-RAP CLASS
1	15	3.75	7	4	5.5	B
2	12	3.00	4	2.75	5.5	B
3	15	3.75	7	4	5.5	B

OUTLET STABILIZATION

SCALE: NTS

NO	DRN	CHK	DATE
1			
2			
3			

REVISIONS

BADIN INN STREAM RESTORATION

GENERAL DETAILS

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (FAX)

DATE	8/19/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-17
DRAWN BY	RR
CHKD BY	BMD

USER: WILSONAB
DGN: q:\99255\cadd\plansheets\99255_psh_C-10-15 Details.dgn
DATE: 8/19/2009
TIME: 503305 PM

NORTH

VEGETATION ZONES

Description	Symbol
Limits of Disturbance	
Conservation Easement	
Zone 1 Well-Drained Floodplain	
Zone 2 Wetland Swale	
Zone 3 Stream Bank	

NORTH CAROLINA PROFESSIONAL SEAL 035724 8/19/2009 ENGINEER BRYAN M. DICK

AS-BUILT DRAWINGS
08/17/09

TEMPORARY SEEDED FOR STABILIZATION PERMANENT GRASS PLANTED BY OTHERS.

POND
WS=476.5

MATCHLINE SHEET L-2

EXISTING GRAVEL ROAD

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

HORIZONTAL SCALE
50 0 50 100

BADIN INN STREAM RESTORATION
VEGETATION PLANS

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 FAX

DATE	8/19/2009
PROJECT NO	99255
FILENAME	
SHEET NO	L-1
DRAWN BY	CHKD BY
ICJ	BMD

USER: WILSONAB
DGN: q:\99255\cadd\plansheets\99255_psh_L-01 Vegetation.dgn
DATE: 8/19/2009
TIME: 5:03:01 PM

NORTH

MATCHLINE SHEET L-1

MATCHLINE SHEET L-3

EXISTING GRAVEL ROAD

VEGETATION ZONES

Description	Symbol
Limits of Disturbance	
Conservation Easement	
Zone 1 Well-Drained Floodplain	
Zone 2 Wetland Swale	
Zone 3 Stream Bank	

NORTH CAROLINA PROFESSIONAL SEAL 035724 8/19/2009 ENGINEER BRYAN M. DICK

AS-BUILT DRAWINGS
08/17/09

TEMPORARY SEEDED FOR STABILIZATION
PERMANENT GRASS PLANTED BY OTHERS.

TEE
TEE
TEE
GREEN
GREEN
BUNKER
BUNKER
POND 95+50'S

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

HORIZONTAL SCALE
50 0 50 100

BADIN INN STREAM RESTORATION
VEGETATION PLAN

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (FAX)

DATE	8/19/2009
PROJECT NO	99255
FILENAME	
SHEET NO	L-2
DRAWN BY	CHKD BY
ICJ	BMD

USER: WILSONAB
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TIME: 5:02:58 PM

NORTH

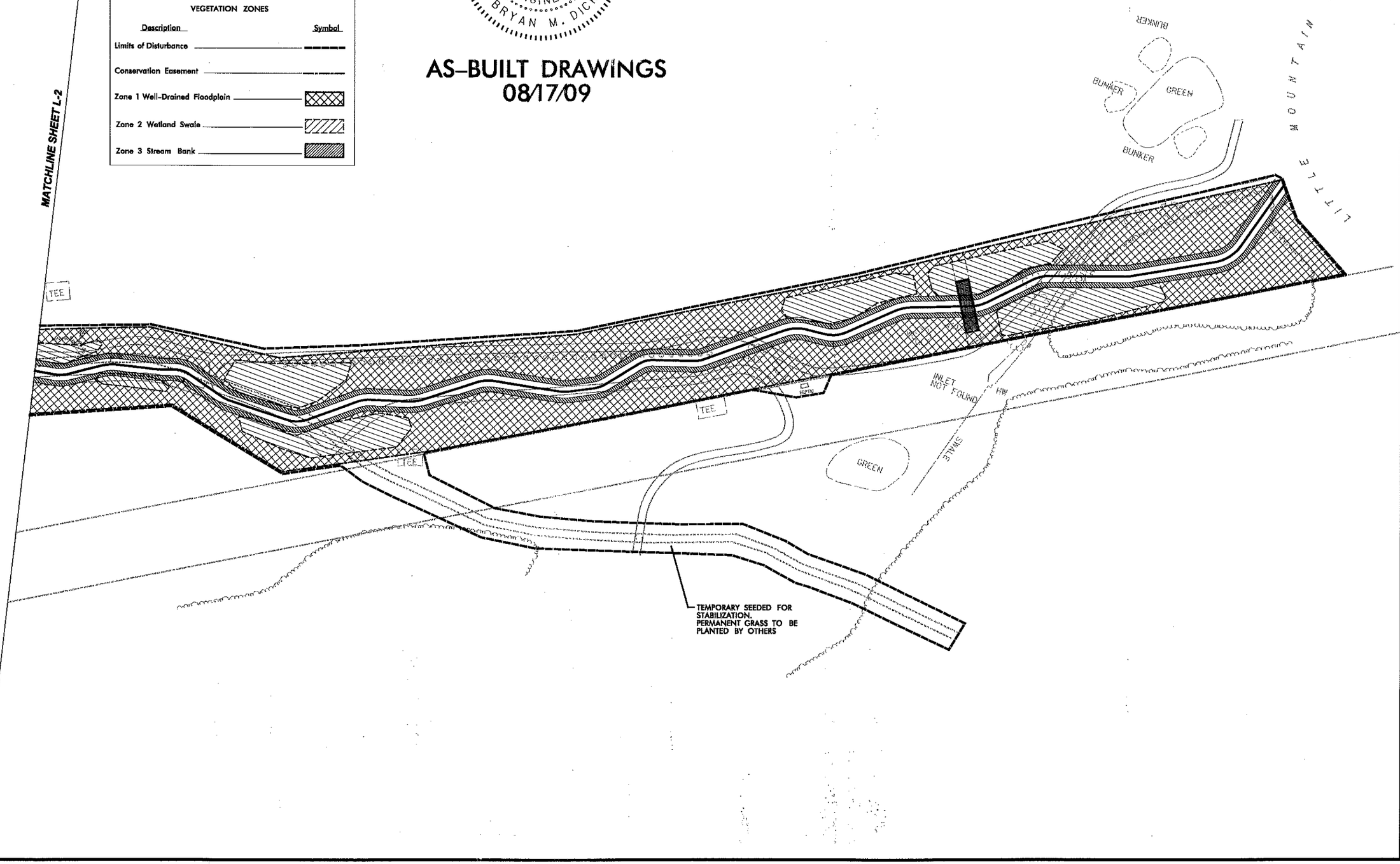
MATCHLINE SHEET L-2

VEGETATION ZONES

Description	Symbol
Limits of Disturbance	
Conservation Easement	
Zone 1 Well-Drained Floodplain	
Zone 2 Wetland Swale	
Zone 3 Stream Bank	

NORTH CAROLINA PROFESSIONAL SEAL 035724 8/19/2009 ENGINEER BRYAN M. DICK

AS-BUILT DRAWINGS
08/17/09



NO	REVISIONS	DIN	CHK	DATE
1				
2				
3				

HORIZONTAL SCALE
50 0 50 100

BADIN INN STREAM RESTORATION
VEGETATION PLAN

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (FAX)

DATE	8/19/2009
PROJECT NO	99255
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DRAWN BY	CHKD BY
ICJ	BMD

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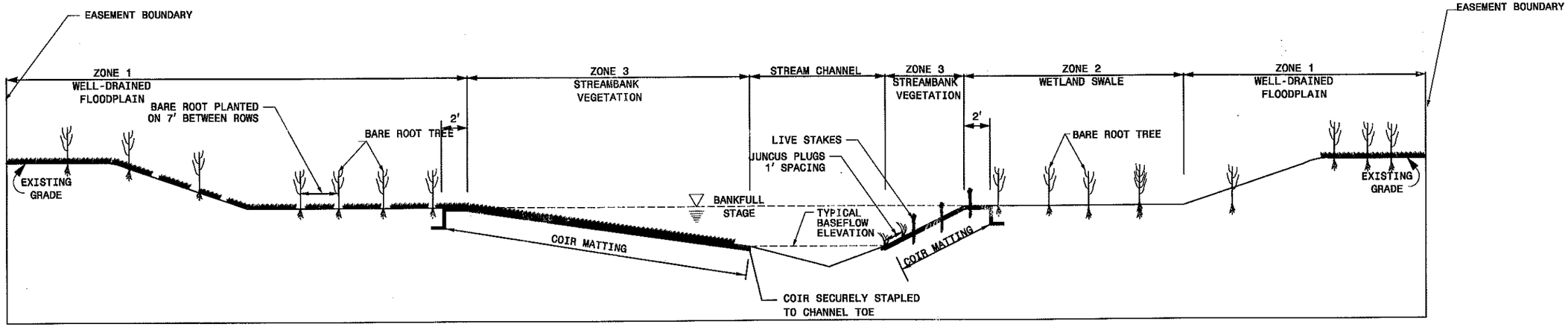
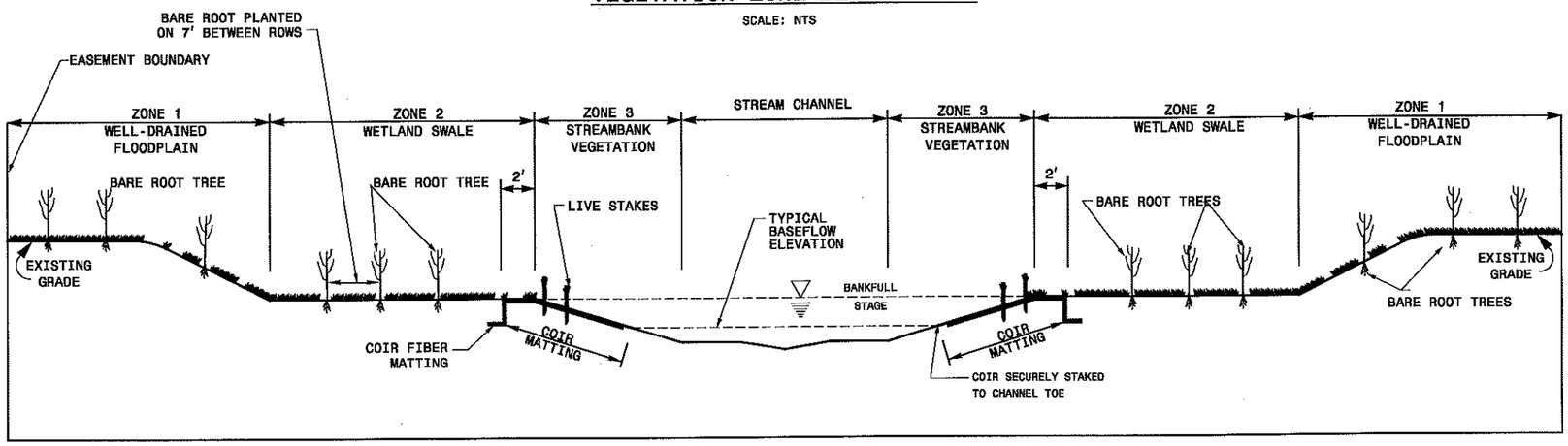


VEGETATION ZONE DETAIL-POOL

SCALE: NTS



VEGETATION ZONE DETAIL- RIFFLE

SCALE: NTS

VEGETATION ZONE DETAIL

NORTH CAROLINA
PROFESSIONAL
SEAL
035724
8/19/2009
ENGINEER
BRYAN M. DICK

AS-BUILT DRAWINGS
08/17/09

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

BADIN INN STREAM RESTORATION
VEGETATION DETAILS

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 (fax) 919-854-6259

DATE	8/19/2009
PROJECT NO	99255
FILENAME	
SHEET NO	L-4
DRAWN BY	CHKD BY
ICJ	BMD

USER: WILSONAB
DGN: q:\99255\cadd\plansheets\99255_psh_L-04-7 Vegetation Details.dgn
DATE: 8/19/2009
TIME: 5:02:50 PM

PLANTING SCHEDULE
SCALE: NTS

			Key	Scientific Name	Common Name	LS	BR	Plug	Zone %	Remarks
ZONE 1	WELL-DRAINED FLOODPLAIN COMMUNITY	TREES		*Cornus florida*	Flowering dogwood		620		20.00%	Bare root 1/0 seedlings randomly placed on 8-ft centers. Place 2 fertilizer packets per stem.
				Cercis canadensis	Redbud		620		20.00%	
				Nyssa sylvatica	Black gum		160		5.00%	
				Robinia psuedoacacia	Black locust		160		5.00%	
				Magnolia grandiflora	Bull bay magnolia		160		5.00%	
				Quercus rubra	Northern red oak		60		2.00%	
				Quercus phellos	Willow Oak		60		2.00%	
				Quercus velutina	Black Oak		60		2.00%	
				Quercus alba	White Oak		60		2.00%	
				Crataegus spp.	Hawthorne		160		5.00%	
		SHRUBS		*Amelanchier aborea*	Downy Serviceberry		220		7.00%	Begin first row of plantings 7' inside easement, outermost row shall consist only of shrubs.
				Sambucus canadensis	Elderberry		220		7.00%	
				Calicarpa americana	American Beautyberry		220		7.00%	
				Lindera benzoin	Spicebush		190		6.00%	
ZONE 2	WETLAND SWALE COMMUNITY	TREES		*Carpinus caroliniana*	Ironwood		300		25.00%	Bare root 1/0 seedlings randomly placed on 8-ft centers.
				Cercis canadensis	Redbud		300		25.00%	
		SHRUBS		*Ilex verticallata*	Winterberry		300		25.00%	Bare root 1/0 seedlings randomly placed on 8-ft centers.
				Alnus serrulata	Tag alder		300		25.00%	
ZONE 3	STREAMBANK VEGETATION	TREES		*Salix nigra*	Black willow	1500			30.00%	Install upstream and downstream of rock structures where sill intersects bank.
		SHRUBS		*Alnus serrulata*	Tag alder	2000			40.00%	
				Cornus amomum	Silky dogwood	1500			30.00%	
		PLUGS		*Juncus effusus*	Soft rush			2200		Two rows of plugs on outer meander of pools only: one row at baseflow elevation, and one half way up slope, spacing is 1 foot between plugs.
ZONE 1-3	PERMANENT SEED MIX			Use Mellow Marsh Farm Piedmont Shade Mix						Apply at 15 lbs/acre, apply juncus seed to riffle sections
				Use Hancocks Wildflower mix near road						
ZONES 1-3	TEMPORARY SEED MIX - WINTER									Winter - Apply at 50 lbs/acre to all disturbed areas in Zones 1-5.
				Secale cereale	Wrens Abuzze Winter rye				50	
	TEMPORARY SEED MIX - SUMMER			*Panicum ramosum*	Brown-top millet				50	Summer - Apply at 50 lbs/acre to all disturbed areas in Zones 1-5.

NORTH CAROLINA PROFESSIONAL SEAL 035724 8/19/2009 ENGINEER BRYAN M. DICK

AS-BUILT DRAWINGS 08/17/09

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

BADIN INN STREAM RESTORATION
VEGETATION DETAILS

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-851-6259 (fax)

DATE 8/19/2009
PROJECT NO 99255
FILENAME
SHEET NO L-5
DRAWN BY ICJ
CHKD BY BMD

USER: WILSONAB
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DATE: 8/19/2009
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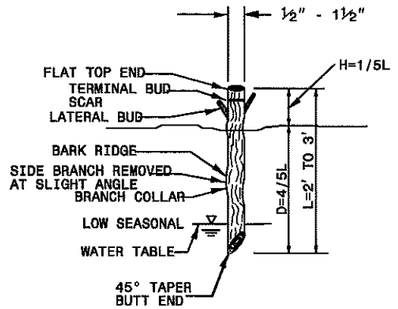
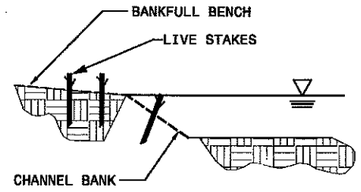


NOTES:

1. ALL LATERAL BRANCHES SHALL BE TRIMMED TO AVOID DAMAGE TO THE BARK RIDGE AND BRANCH COLLAR.

2. A MINIMUM OF TWO BUDS (ONE LATERAL PLUS ONE TERMINAL OR TWO TERMINAL) SHALL BE ABOVE THE PLANTING DEPTH.

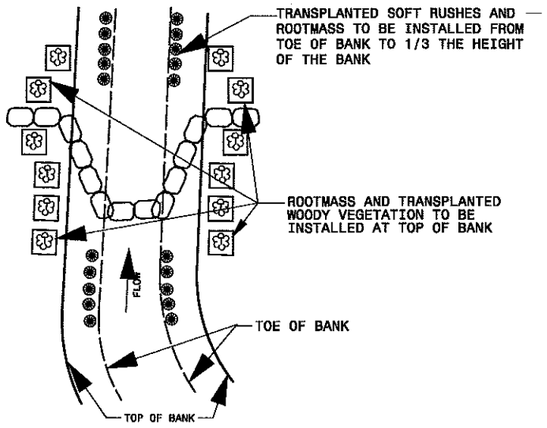


LIVE STAKE

SCALE: NTS

NORTH CAROLINA PROFESSIONAL SEAL 035724 8/19/2009 ENGINEER BRYAN M. DICK

AS-BUILT DRAWINGS 08/17/09



CROSS VANE/GRADE CONTROL VANE

TRANSPLANT PLACEMENT BY STRUCTURE TYPE

SCALE: NTS

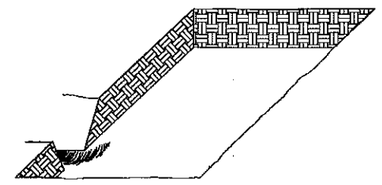
BARE ROOT PLANTING DETAILS

SEEDLING/LINER BAREROOT PLANTING DETAIL

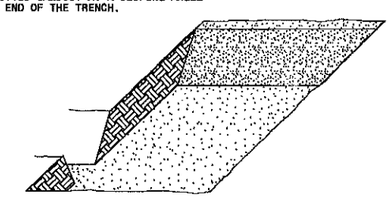
HEALING IN

1. LOCATE A HEALING-IN SITE IN A SHADY, WELL PROTECTED AREA.

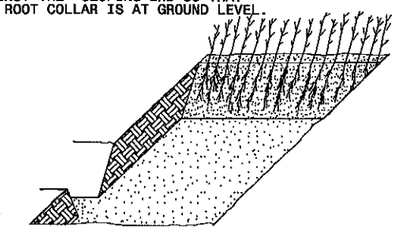
2. EXCAVATE A FLAT BOTTOM TRENCH 300 MM DEEP AND PROVIDE DRAINAGE.



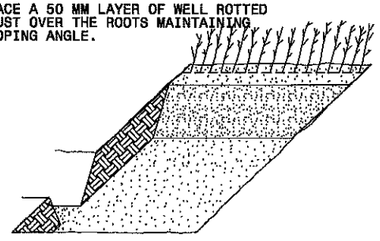
3. BACKFILL THE TRENCH WITH 50 MM OF WELL ROTTED SAWDUST. PLACE A 50 MM LAYER OF WELL ROTTED SAWDUST AT A SLOPING ANGLE AT ONE END OF THE TRENCH.



4. PLACE A SINGLE LAYER OF PLANTS AGAINST THE SLOPING END SO THAT THE ROOT COLLAR IS AT GROUND LEVEL.

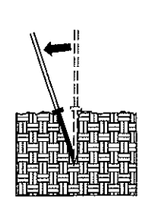


5. PLACE A 50 MM LAYER OF WELL ROTTED SAWDUST OVER THE ROOTS MAINTAINING A SLOPING ANGLE.

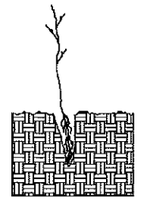


6. REPEAT LAYERS OF PLANTS AND SAWDUST AS NECESSARY AND WATER THOROUGHLY.

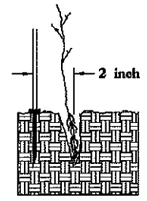
DIBBLE PLANTING METHOD USING THE KBC PLANTING BAR



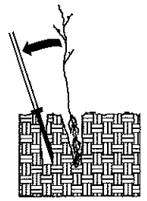
1. INSERT PLANTING BAR AS SHOWN AND PULL HANDLE TOWARD PLANTER.



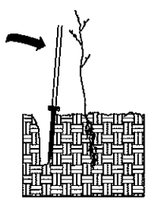
2. REMOVE PLANTING BAR AND PLACE SEEDLING AT CORRECT DEPTH.



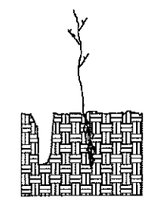
3. INSERT PLANTING BAR 50 MM TOWARD PLANTER FROM SEEDLING.



4. PULL HANDLE OF BAR TOWARD PLANTER, FIRMING SOIL AT BOTTOM.



5. PUSH HANDLE FORWARD FIRMING SOIL AT TOP.



6. LEAVE COMPACTION HOLE OPEN. WATER THOROUGHLY.

PLANTING NOTES:

PLANTING BAG
DURING PLANTING, SEEDLINGS SHALL BE KEPT IN A MOIST CANVAS BAG OR SIMILAR CONTAINER TO PREVENT THE ROOT SYSTEMS FROM DRYING.

KBC PLANTING BAR
PLANTING BAR SHALL HAVE A BLADE WITH A TRIANGULAR CROSS SECTION, AND SHALL BE 300 MM LONG, 100 MM WIDE AND 25 MM THICK AT CENTER.

ROOT PRUNING
ALL SEEDLINGS SHALL BE ROOT PRUNED, IF NECESSARY, SO THAT NO ROOTS EXTEND MORE THAN 250 MM BELOW THE ROOT COLLAR.

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

BADIN INN STREAM RESTORATION
VEGETATION DETAILS

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (FAX)

DATE	8/19/2009
PROJECT NO	99255
FILENAME	
SHEET NO	L-6
DRAWN BY	CHKD BY
ICJ	BMD

USER: WILSONAB
DGN: q:\99255\cadd\plansheet\99255_psh_L-04-7 Vegetation Details.dgn DATE: 8/19/2009 9:01:48 PM

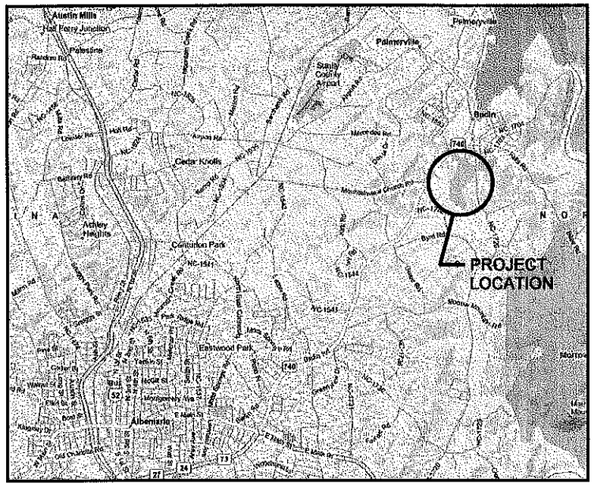
BADIN INN
STREAM RESTORATION
STANLY COUNTY, NC
(AS–BUILT PLANS)

Clearing, grading, erosion control, stream restoration, drainage, debris removal, landscaping, and other improvements as noted on the plans. This work will include all items necessary to construct the stream, the wet swales, and associated structures with the associated landscaping, plantings, seeding and live staking.

RECIEVING STREAM: LITTLE MOUNTAIN CREEK
NCDWQ CLASSIFICATION: WS IV

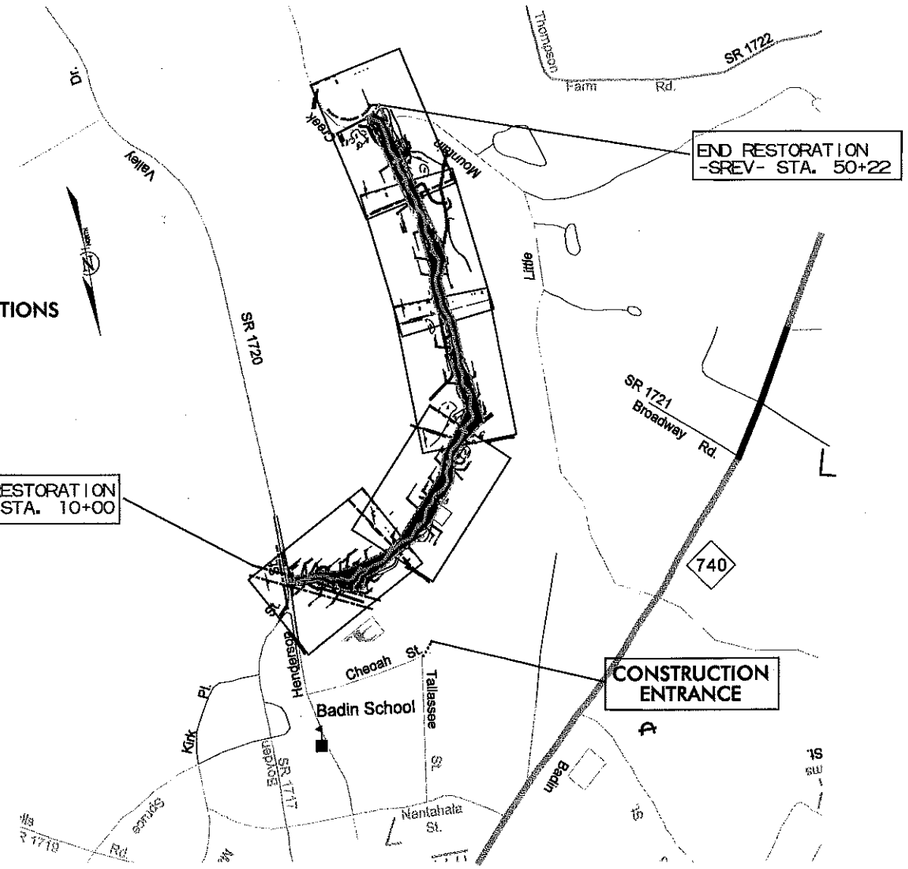
NORTH CAROLINA PROFESSIONAL SEAL 035724 8/19/2009 ENGINEER BRYAN M. DICK

AS–BUILT DRAWINGS
08/17/09



VICINITY MAP

(Not to Scale)



INDEX OF SHEETS

CONSULTANT: EARTH TECH | AECOM
701 Corporate Center Drive, Suite #475 Raleigh, NC 27607
Phone: (919) 854–6200 Fax: (919) 854–6259
SENIOR DESIGN CONTACT: BRYAN DICK (919–854–6252)

EARTHWORK

UNCLASSIFIED EXCAVATION (CY)	UNDERCUT (CY)	EMBANKMENT (CY)	BORROW (CY)	WASTE (CY)
5742		5103	0	639

STREAM REACH	PROPOSED CENTER LENGTH	MODIFICATION TYPE
SREV	3994 FT	RESTORATION
TRIB	180 FT	ENHANCEMENT

LONGITUDE AND LATITUDE:

STA. ..... 10+00
LONGITUDE ..... 80° 6' 54" W
LATITUDE ..... 35° 23' 57" N

DISTURBED AREA:

9.5 ACRES

NO	REVISIONS	DRN	CHK	DATE
1	REVISED DISTURBED AREA, ADDED CONST. ENTRANCE	RR	LI	2/5/09
2				
3				

BADIN INN STREAM RESTORATION
TITLE SHEET

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (FAX)

DATE	8/19/2009
PROJECT NO	99255
FILENAME	99255_title.dgn
SHEET NO	C–18
DRAWN BY	CCJ
CHKD BY	JWJ

USER: WILSONAB
DGN: G:\99255\cad\As-Built Files\99255_ASBUILT_pch_C-18 TITLE.dgn
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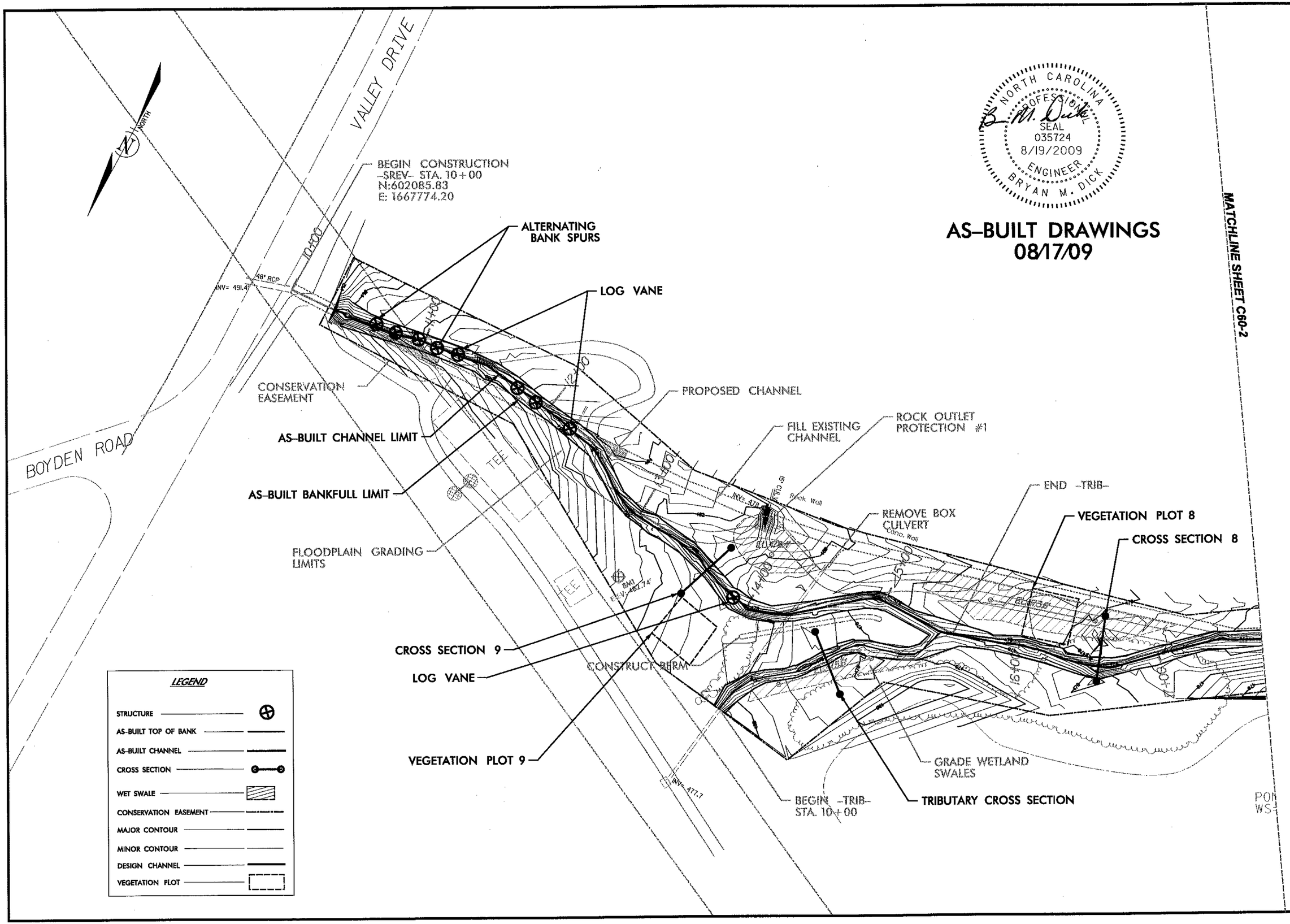
TIME: 4:51:48 PM



NORTH CAROLINA PROFESSIONAL SEAL 035724 8/19/2009 ENGINEER BRYAN M. DICK

AS-BUILT DRAWINGS
08/17/09

MATCHLINE SHEET C60-2

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

HORIZONTAL SCALE 100 50 0 50

BADIN INN STREAM RESTORATION
AS-BUILT DRAWINGS
OVER DESIGN DRAWINGS

EARTH TECH | AECOM

701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (fax)

DATE	8/19/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-19
DRAWN BY	CHKD BY
ABW	BMD

USER: WILSONAB
DGN: Q:\99255\cadd\As-Built Files\AS-BUILT_Plansheets\99255_pat1BScadetail.dgn
DATE: 8/19/2009

NORTH CAROLINA PROFESSIONAL SEAL 035724 8/19/2009 ENGINEER BRYAN M. DICK

AS-BUILT DRAWINGS
08/17/09

MATCHLINE SHEET C60-1

MATCHLINE SHEET C60-3

AS-BUILT CHANNEL LIMIT

AS-BUILT BANKFULL LIMIT

CONSERVATION EASEMENT

CHANNEL PLUG (TYP.)

VEGETATION PLOT 7

REMOVE EXISTING CART PATH

PROPOSED CHANNEL

VEGETATION PLOT 6

CHANNEL PLUG (TYP.)

TEE

CROSS SECTION 6

FLOODPLAIN GRADING LIMITS

ROCK OUTLET PROTECTION #3

15" CULVERT

BM2
ELEV: 471.14'

INV= 463.2'

4x4 DI
2-12"INV IN
UNKNOWN
ORIGIN

TOP=466.18'

48" CONC CULVERT

TOP=468.7'

CROSS SECTION 7

LOG VANE

FLOODPLAIN GRADING LIMITS

LEGEND

- STRUCTURE
- AS-BUILT TOP OF BANK
- AS-BUILT CHANNEL
- CROSS SECTION
- WET SWALE
- CONSERVATION EASEMENT
- MAJOR CONTOUR
- MINOR CONTOUR
- DESIGN CHANNEL
- VEGETATION PLOT

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

HORIZONTAL SCALE
50 0 50 100

BADIN INN STREAM RESTORATION
AS-BUILT DRAWINGS
OVER DESIGN DRAWINGS

EARTH TECH | AECOM

701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (FAX)

DATE	8/19/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-20
DRAWN BY	CHKD BY
ABW	BMD

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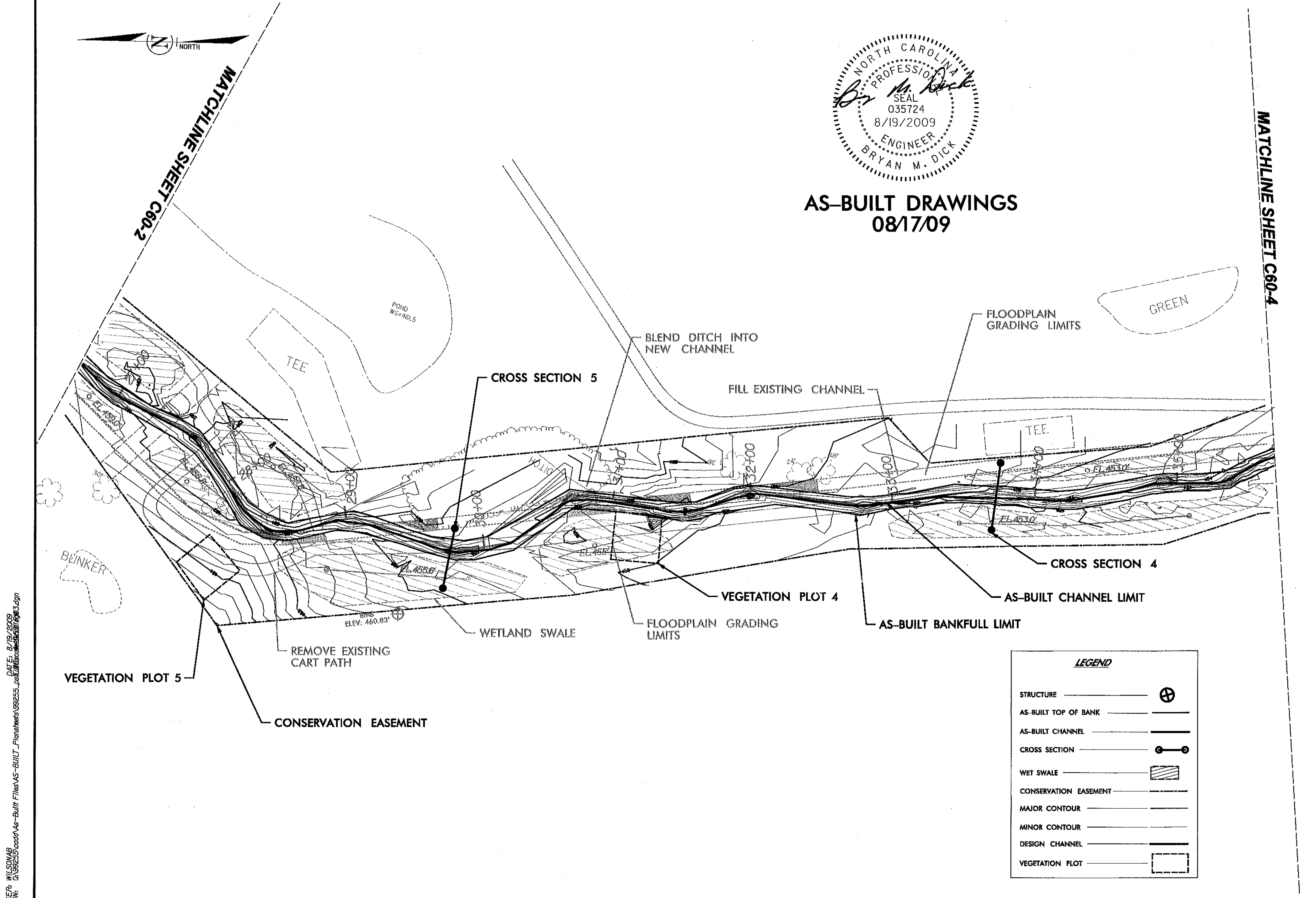


BADIN INN STREAM RESTORATION
AS-BUILT DRAWINGS
OVER DESIGN DRAWINGS

EARTH TECH | AECOM

701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (fax)

DATE	8/19/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-21
DRAWN BY: ABW	CHKD BY: BMD

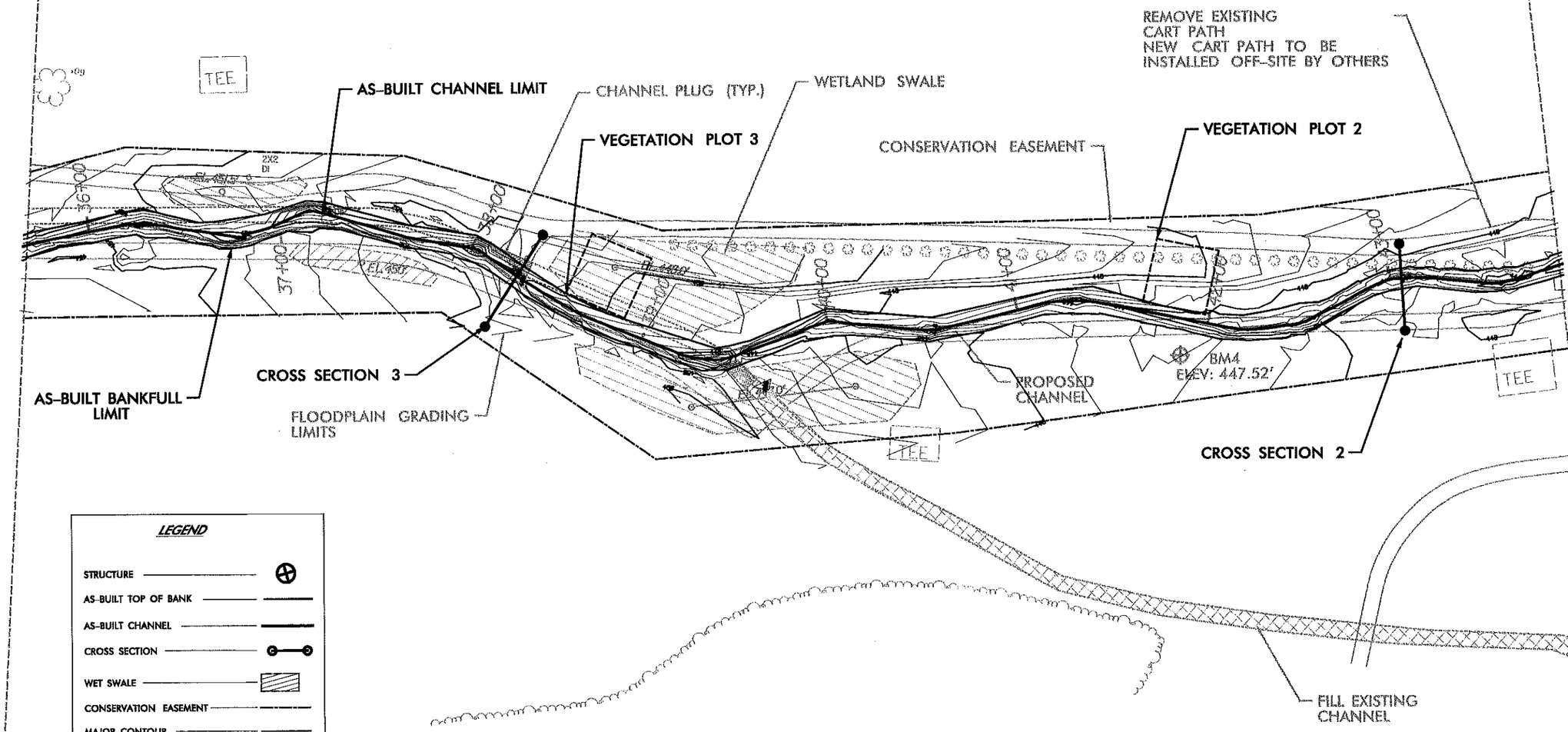
MATCHLINE SHEET C60-3

MATCHLINE SHEET C60-5

NORTH

NORTH CAROLINA PROFESSIONAL SEAL 035724 8/19/2009 ENGINEER BRYAN M. DICK

AS-BUILT DRAWINGS
08/17/09



LEGEND

- STRUCTURE
- AS-BUILT TOP OF BANK
- AS-BUILT CHANNEL
- CROSS SECTION
- WET SWALE
- CONSERVATION EASEMENT
- MAJOR CONTOUR
- MINOR CONTOUR
- DESIGN CHANNEL
- VEGETATION PLOT

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

HORIZONTAL SCALE
100 50 0 50

BADIN INN STREAM RESTORATION
AS-BUILT DRAWINGS
OVER DESIGN DRAWINGS

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (FAX)

DATE	8/19/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-22
DRAWN BY	CHKD BY
ABW	BMD

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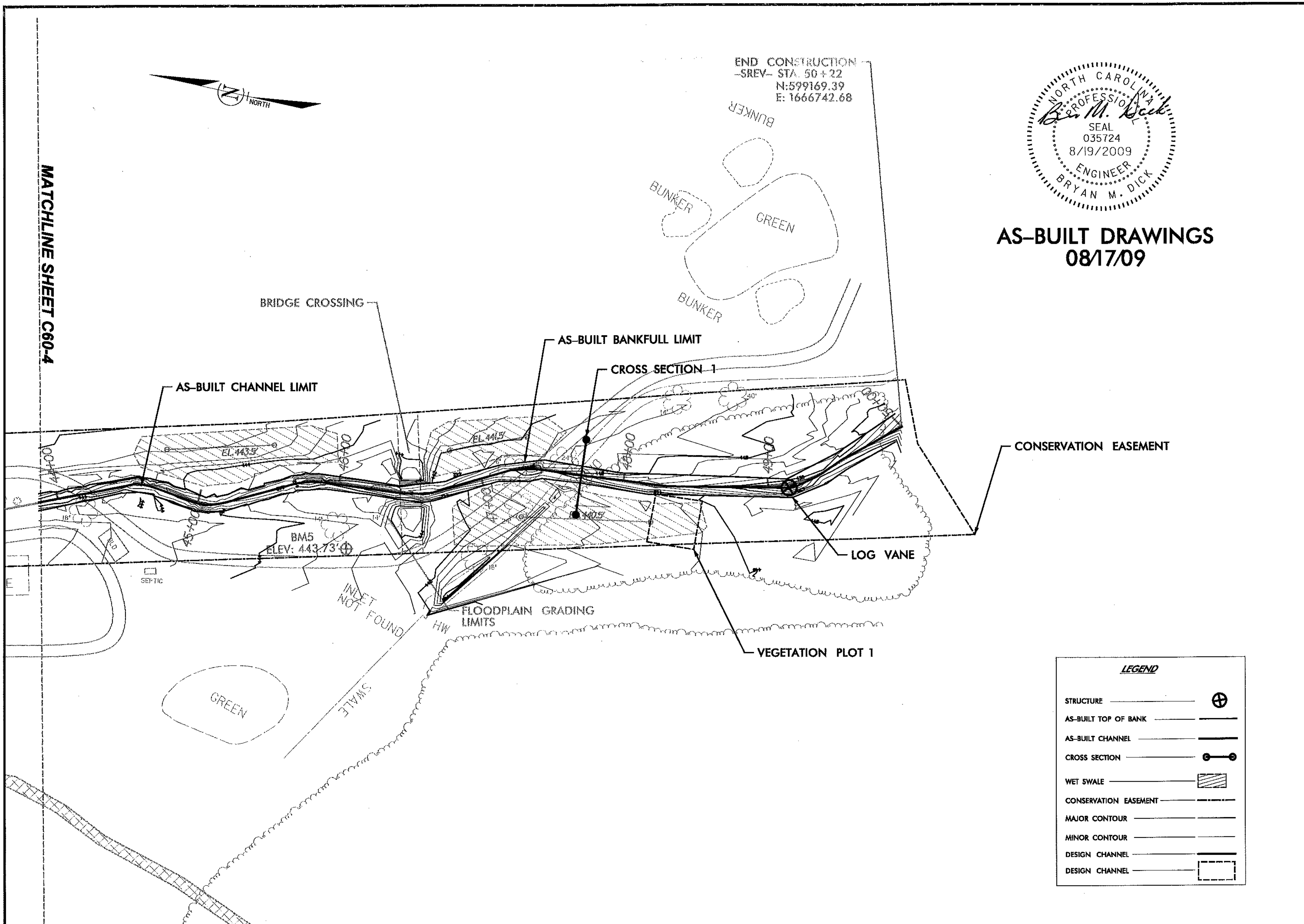

NO	REVISIONS	DRN	CHK	DATE
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2				
3				

BADIN INN STREAM RESTORATION
AS-BUILT DRAWINGS
OVER DESIGN DRAWINGS

EARTH TECH | AECOM

DATE 8/19/2009
PROJECT NO 99255
FILENAME
SHEET NO C-23
DRAWN BY ABW | CHKD BY BMD

BEGIN -SREV- PROFILE
STA. 10+00
EL. 490.07'

USE STONE WITH VERY LITTLE SMALL SIZED STONE INCLUDED (SIMILAR TO STONE AT STA. 38+00 TO 39+00)

AS-BUILT BANKFULL

AS-BUILT BANKFULL

AS-BUILT THALWEG

PROPOSED BANKFULL

EXISTING GROUND

PROPOSED THALWEG

EXISTING GROUND DATA UNAVAILABLE
STA. 15+45 TO 16+78

500
490
480
470
460

10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00

EXISTING GROUND

PROPOSED BANKFULL

AS-BUILT BANKFULL

AS-BUILT BANKFULL

PROPOSED THALWEG

AS-BUILT THALWEG

480
470
460
450
440

17+00 18+00 19+00 20+00 21+00 22+00 23+00 24+00

NORTH CAROLINA
PROFESSIONAL
SEAL
035724
8/19/2009
ENGINEER
BRYAN M. DICK

AS-BUILT DRAWINGS
08/17/09

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

HORIZONTAL SCALE 0 25 50

VERTICAL SCALE 0 5 10

BADIN INN STREAM RESTORATION
AS-BUILT CHANNEL PROFILE

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (FAX)

DATE	8/19/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-24
DRAWN BY	ABW
CHKD BY	BMD

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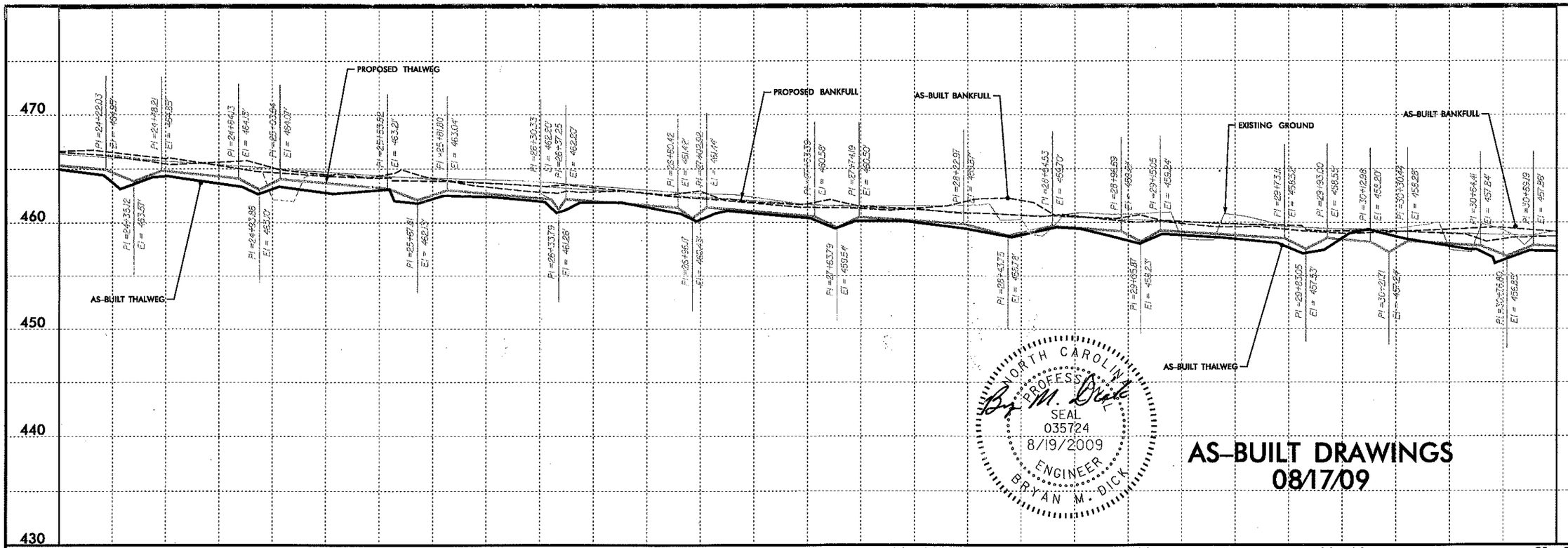
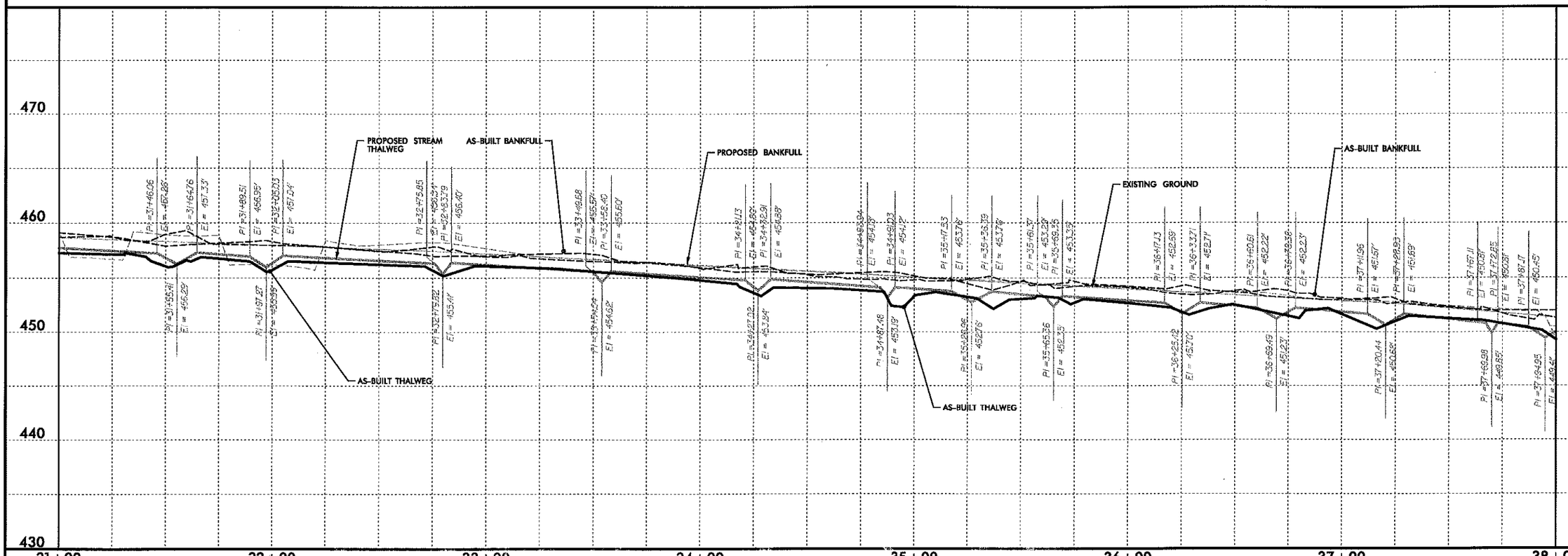


NORTH CAROLINA PROFESSIONAL SEAL 035724 8/19/2009 ENGINEER BRYAN M. DICK

AS-BUILT DRAWINGS 08/17/09



NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

HORIZONTAL SCALE 0 25 50

VERTICAL SCALE 0 5 10

BADIN INN STREAM RESTORATION

AS-BUILT CHANNEL PROFILE

EARTH TECH | AECOM

701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607 919-854-6200 FAX 919-854-6259

DATE	8/19/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-25
DRAWN BY	CHKD BY
ABW	BMD

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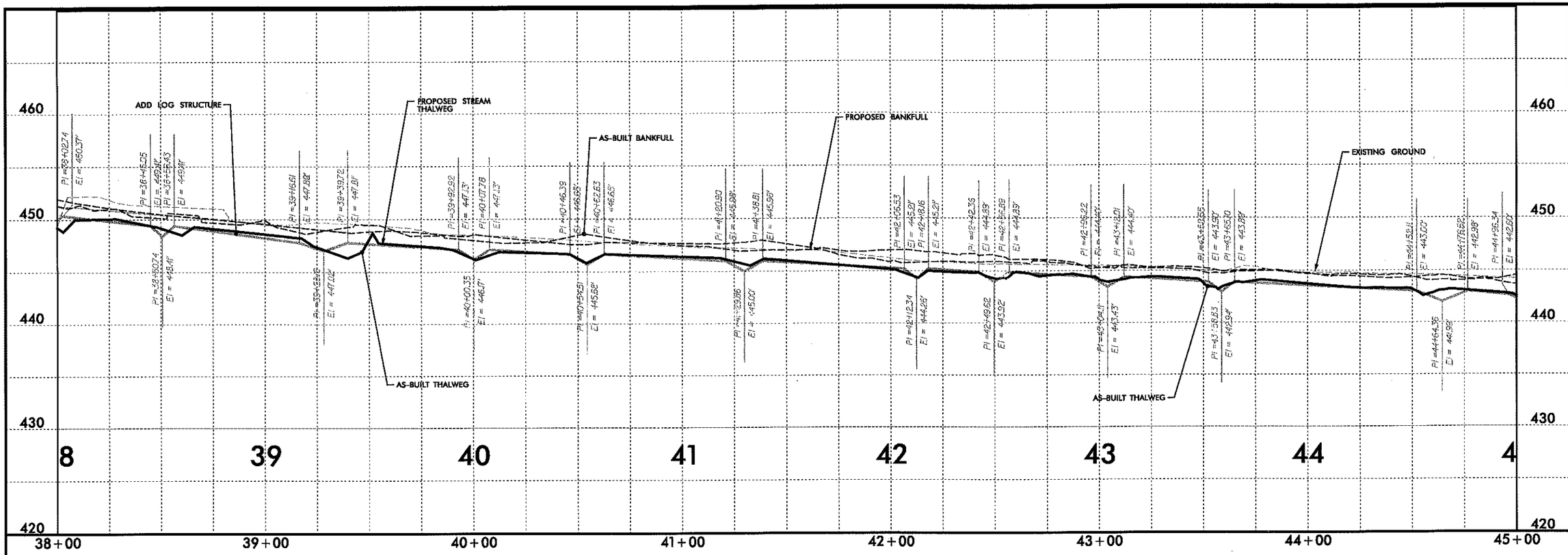

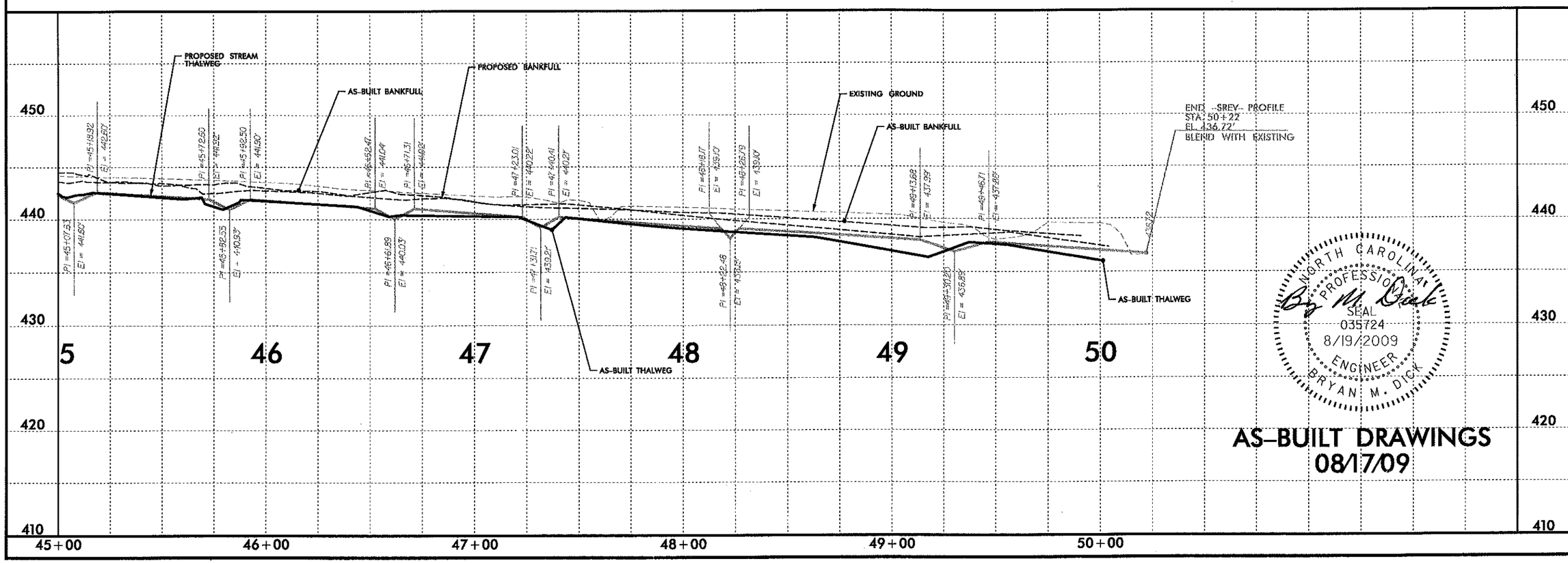

NORTH CAROLINA
PROFESSIONAL
SEAL
035724
8/19/2009
ENGINEER
BRYAN M. DICK

AS-BUILT DRAWINGS
08/17/09

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

HORIZONTAL SCALE 0 25 50

VERTICAL SCALE 0 5 10

BADIN INN STREAM RESTORATION
AS-BUILT CHANNEL PROFILE

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (FAX)

DATE	8/19/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-26
DRAWN BY	CHKD BY
ABW	BMD

USER: WILSONAB
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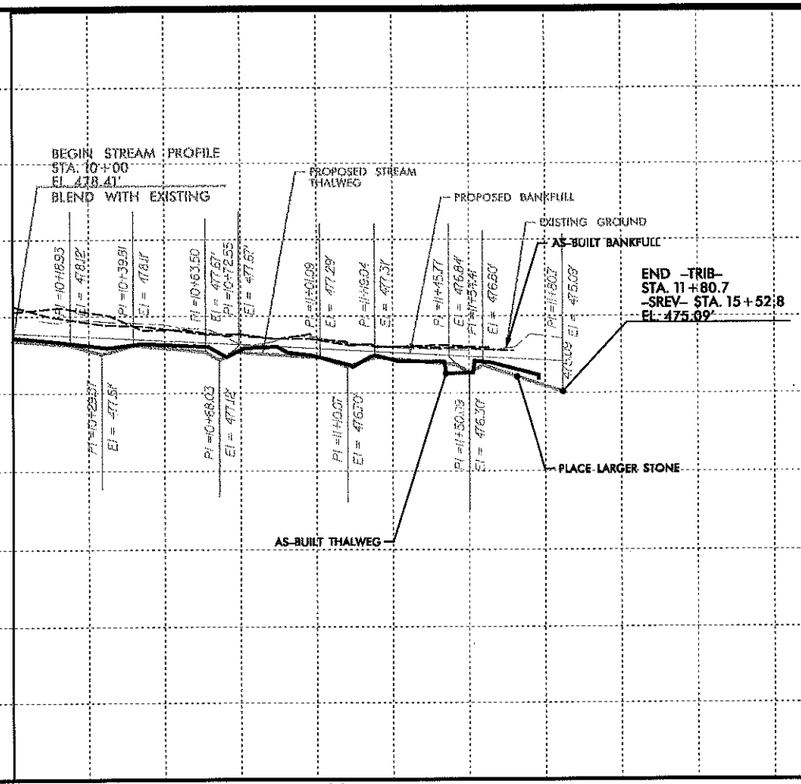

AS-BUILT DRAWINGS
08/17/09

NORTH CAROLINA PROFESSIONAL SEAL 035724 8/19/2009 ENGINEER BRYAN M. DICK

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

HORIZONTAL SCALE 0 25 50
VERTICAL SCALE 0 5 10

BADIN INN STREAM RESTORATION
AS-BUILT CHANNEL PROFILE

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (FAX)

DATE	8/19/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-27
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CHKD BY	BMD

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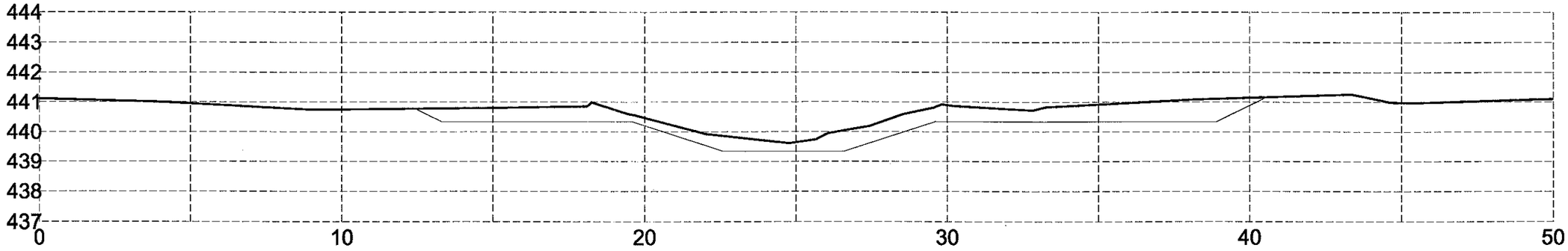
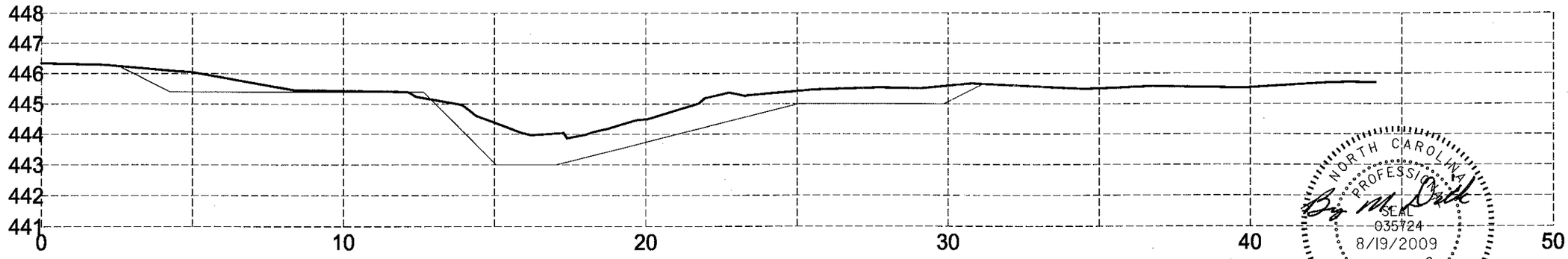
DATE: 8/19/2009



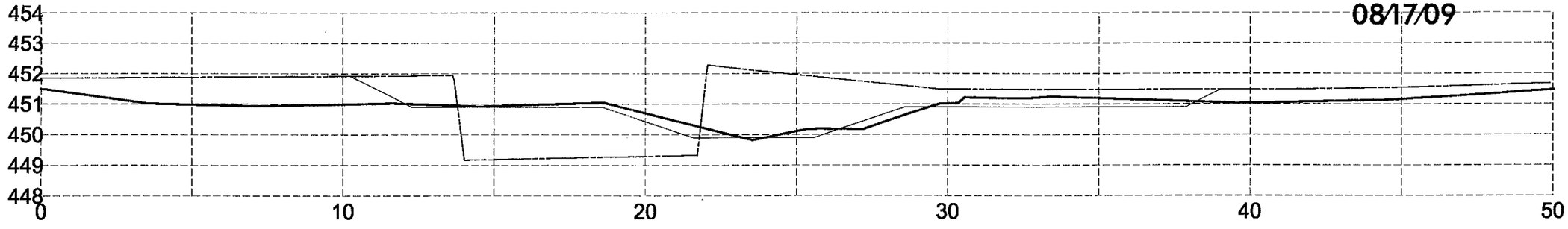
CROSS SECTION 1 – RIFFLE

STA. 47+67



CROSS SECTION 2 – POOL

STA. 43+05



CROSS SECTION 3 – RIFFLE

STA. 38+26

NORTH CAROLINA PROFESSIONAL SEAL 035724 8/19/2009 ENGINEER BRYAN M. DICK

AS-BUILT DRAWINGS
08/17/09

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

BADIN INN STREAM RESTORATION
CROSS SECTIONS AND TYPICALS

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (FAX)

DATE	8/19/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-28
DRAWN BY	ABW
CHKD BY	BMD

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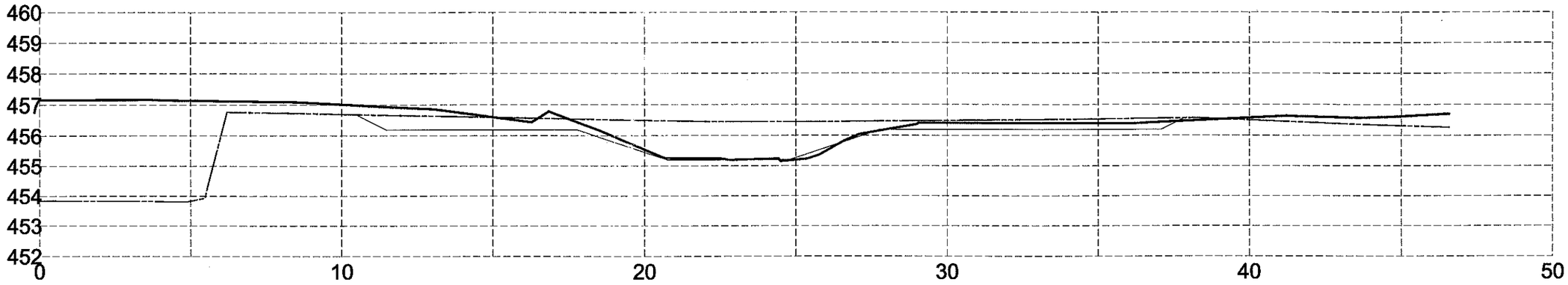
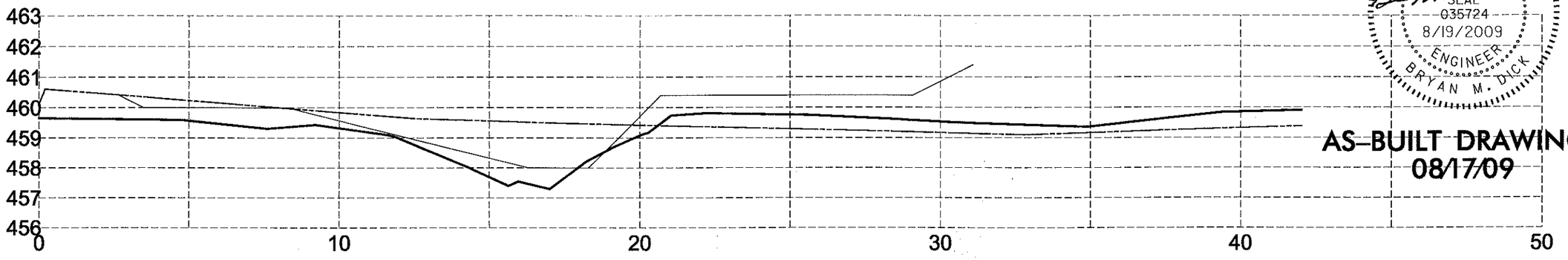


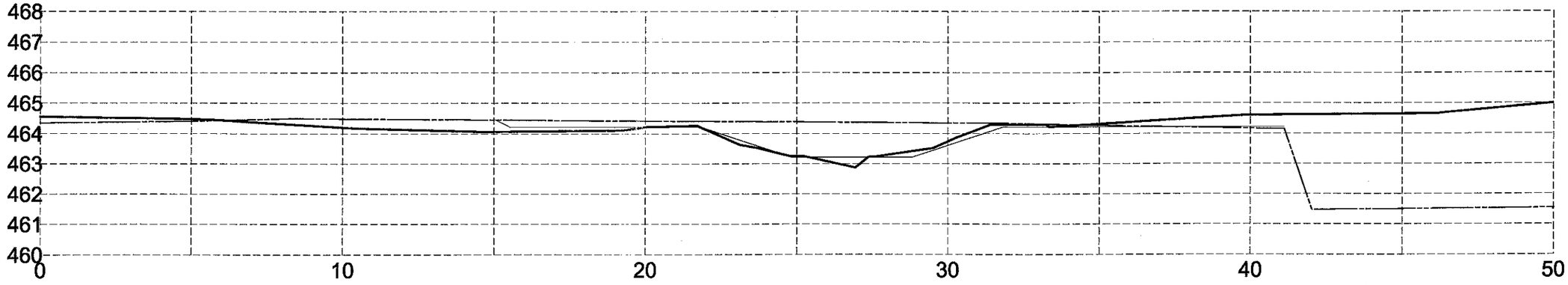
CROSS SECTION 4 – RIFFLE

STA. 33+72



CROSS SECTION 5 – POOL

STA. 29+78



CROSS SECTION 6 – RIFFLE

STA. 25+39

NORTH CAROLINA PROFESSIONAL SEAL 035724 8/19/2009 ENGINEER BRYAN M. DICK

AS-BUILT DRAWINGS 08/17/09

NO	REVISIONS	DIN	CHK	DATE
1				
2				
3				

BADIN INN STREAM RESTORATION
CROSS SECTIONS AND TYPICALS

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 fax

DATE	8/19/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-29
DRAWN BY	CHKD BY
ABW	BMD

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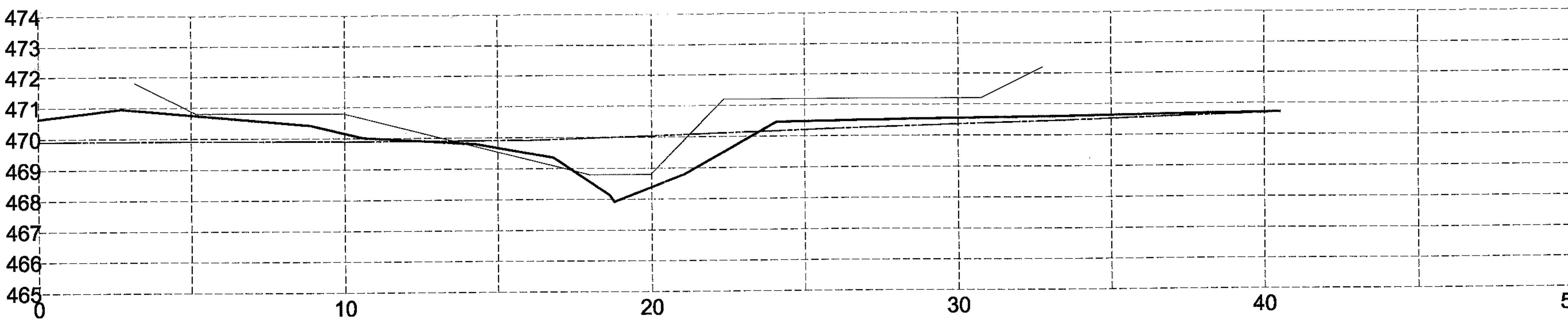
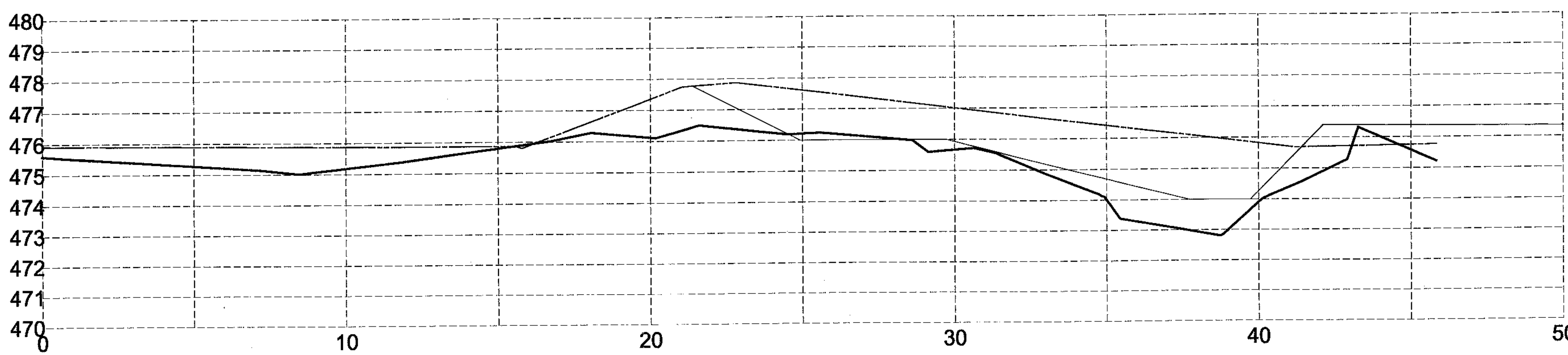


CROSS SECTION 7 – POOL

STA. 20+45



CROSS SECTION 8 – POOL

STA. 16+50

NORTH CAROLINA
PROFESSIONAL
SEAL
035724
8/19/2009
ENGINEER
BRYAN M. DICK

AS–BUILT DRAWINGS
08/17/09

REVISIONS

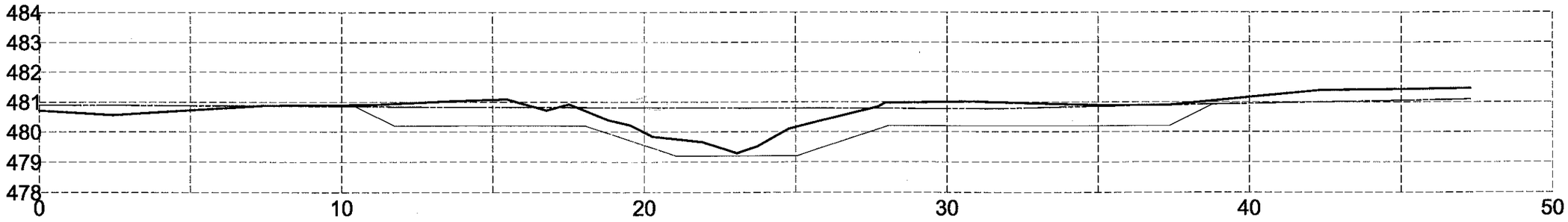
NO		DRN	CHK	DATE
1				
2				
3				

BADIN INN STREAM RESTORATION
CROSS SECTIONS AND TYPICALS

EARTH TECH | AECOM

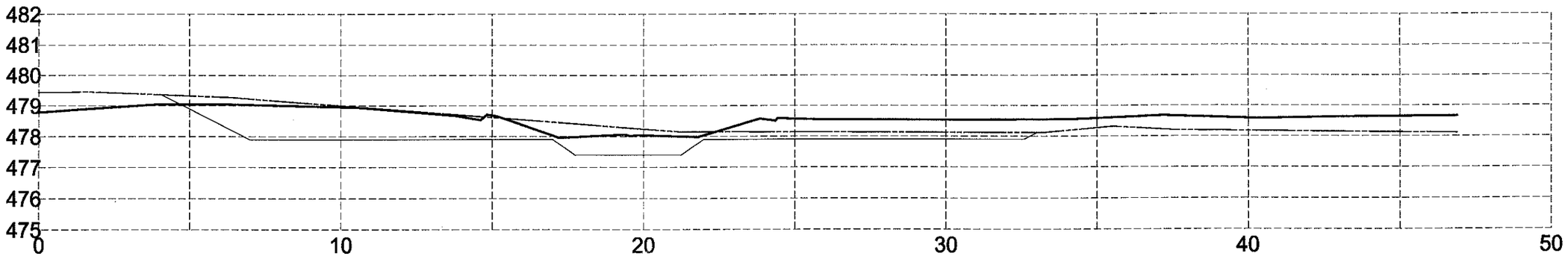
DATE	8/19/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-30
DRAWN BY ABW	CHKD BY BMD

USER: WILSONAB
DATE: 8/19/2009



CROSS SECTION 9 – RIFFLE

STA. 13+61



TRIBUTARY CROSS SECTION – RIFFLE

STA. 10+85

NORTH CAROLINA PROFESSIONAL SEAL 035724 8/19/2009 ENGINEER BRYAN M. DICK

AS-BUILT DRAWINGS
08/17/09

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

BADIN INN STREAM RESTORATION
CROSS SECTIONS AND TYPICALS

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (FAX)

DATE	8/19/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-31
DRAWN BY	ABW
CHKD BY	BMD

USER: WILSONAB
DGN: G:\99255\cadd\As-Built Files\AS-BUILT_Plansheets\99255_cs08.dgn
DATE: 8/19/2009

I, DONALD T. ISRAEL, PLS, CERTIFY THAT THIS STREAM RESTORATION PROJECT WAS CONSTRUCTED IN SUBSTANCIAL CONFORMANCE WITH THE PLANS AND SPECIFICATIONS; AND THAT THE STREAM LIES WHOLLY WITHIN THE CONSERVATION EASEMENT AS SHOWN ON THE PLAT ENTITLED "BADIN INN STREAM RESTORATION" DATED 4-23-07 AND FOUND IN THE STANLEY COUNTY REGISTRY IN PLAT BOOK 20 PAGE 54.

BY Donald T. Israel (SURVEYOR)

PROFESSIONAL LAND SURVEYOR L-3756

EARTH TECH | AECOM

NORTH CAROLINA PROFESSIONAL SEAL L-3756 LAND SURVEYOR DONALD T. ISRAEL

MATCHLINE SHEET C60-2

VALLEY DRIVE

BOYDEN ROAD

NORTH

BEGIN CONSTRUCTION
-SREV- STA. 10+00
N:602085.83
E: 1667774.20

10+00

ALTERNATING BANK SPURS

LOG VANE

11+00

12+00

13+00

AS-BUILT CHANNEL

AS-BUILT BANKFULL

VEGETATION PLOT 8

CROSS SECTION 8

14+00

15+00

16+00

17+00

BM1
ELEV.=482.74'

CROSS SECTION 9

LOG VANE

VEGETATION PLOT 9

TRIBUTARY CROSS SECTION

LEGEND

- STRUCTURE
- AS-BUILT TOP OF BANK
- AS-BUILT CHANNEL
- CROSS SECTION
- VEGETATION PLOT
- CONSERVATION EASEMENT
- MAJOR CONTOUR
- MINOR CONTOUR
- DESIGN CHANNEL

NO	REVISIONS	DRN	CHK.	DATE
1				
2				
3				

HORIZONTAL SCALE
1" = 100'
50 0 50 100

BADIN INN STREAM RESTORATION
AS-BUILT FEATURES

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (FAX)

DATE	8/18/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-32
DRAWN BY	ABW
CHKD BY	BMD

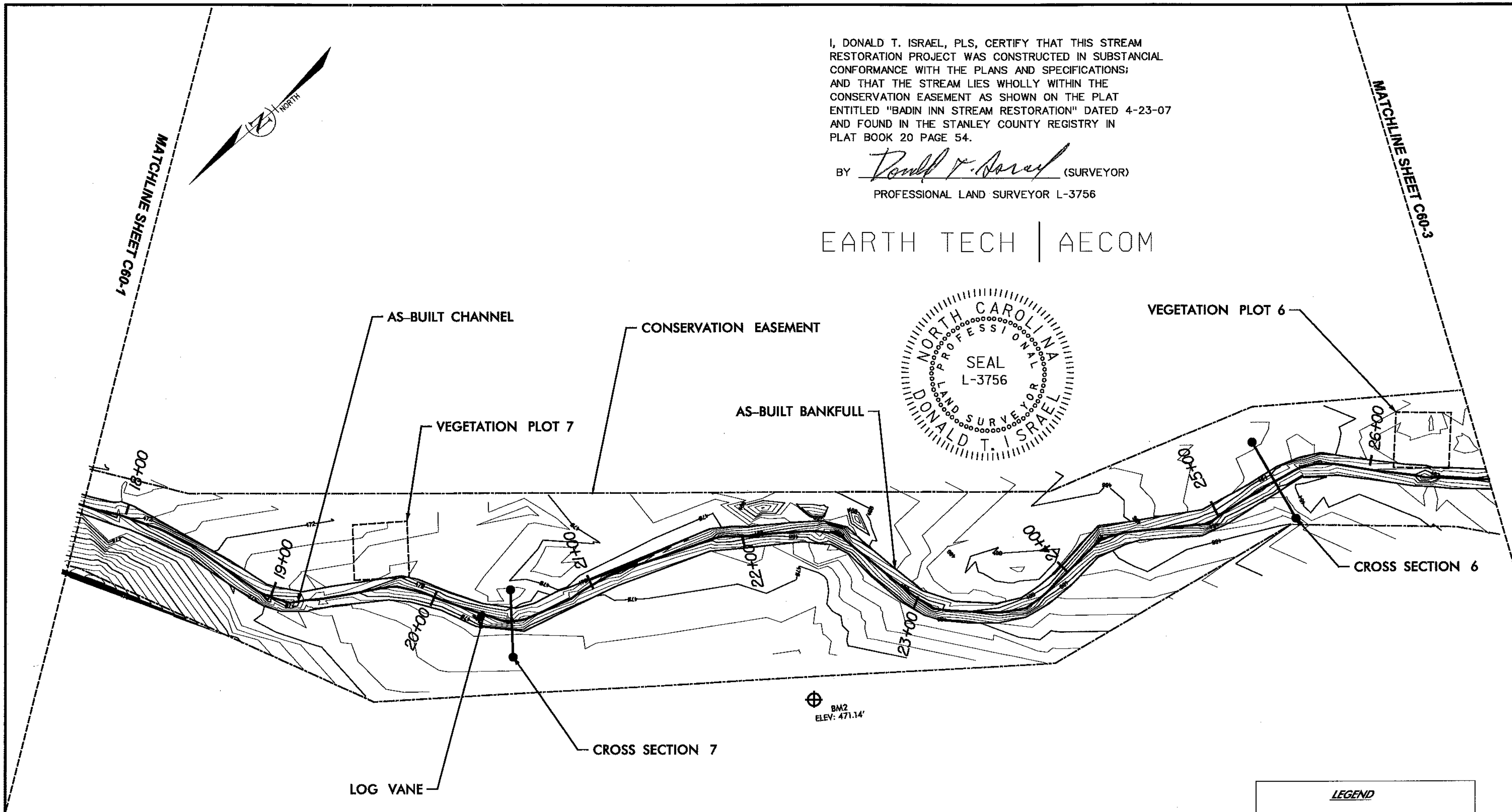
USER: WILSONAB
DGN: G:\99255\cadd\As-Built Files\AS-BUILT_Plansheets\99255_psAsBuilt_Only.dgn
DATE: 8/18/2009

I, DONALD T. ISRAEL, PLS, CERTIFY THAT THIS STREAM RESTORATION PROJECT WAS CONSTRUCTED IN SUBSTANCIAL CONFORMANCE WITH THE PLANS AND SPECIFICATIONS; AND THAT THE STREAM LIES WHOLLY WITHIN THE CONSERVATION EASEMENT AS SHOWN ON THE PLAT ENTITLED "BADIN INN STREAM RESTORATION" DATED 4-23-07 AND FOUND IN THE STANLEY COUNTY REGISTRY IN PLAT BOOK 20 PAGE 54.

BY Donald T. Israel (SURVEYOR)

PROFESSIONAL LAND SURVEYOR L-3756

EARTH TECH | AECOM



LEGEND

STRUCTURE	⊕
AS-BUILT TOP OF BANK	
AS-BUILT CHANNEL	
CROSS SECTION	
VEGETATION PLOT	
CONSERVATION EASEMENT	
MAJOR CONTOUR	
MINOR CONTOUR	
DESIGN CHANNEL	

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

BADIN INN STREAM RESTORATION

AS-BUILT FEATURES

EARTH TECH | AECOM

701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (fax)

DATE	8/18/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-33
DRAWN BY ABW	CHKD BY BMD

USER: WILSONAB DATE: 8/18/2009
DGN: G:\99255\cadd\As-Built Files\AS-BUILT_Plansheets\99255_psht_...AsBuilt_Only.dgn

I, DONALD T. ISRAEL, PLS, CERTIFY THAT THIS STREAM RESTORATION PROJECT WAS CONSTRUCTED IN SUBSTANCIAL CONFORMANCE WITH THE PLANS AND SPECIFICATIONS; AND THAT THE STREAM LIES WHOLLY WITHIN THE CONSERVATION EASEMENT AS SHOWN ON THE PLAT ENTITLED "BADIN INN STREAM RESTORATION" DATED 4-23-07 AND FOUND IN THE STANLEY COUNTY REGISTRY IN PLAT BOOK 20 PAGE 54.

BY Donald T. Israel (SURVEYOR)

PROFESSIONAL LAND SURVEYOR L-3756

EARTH TECH | AECOM

NORTH CAROLINA PROFESSIONAL SEAL L-3756 LAND SURVEYOR DONALD T. ISRAEL

NORTH

MATCHLINE SHEET C60-2

MATCHLINE SHEET C60-4

CROSS SECTION 5

CROSS SECTION 4

AS-BUILT CHANNEL

AS-BUILT BANKFULL

VEGETATION PLOT 4

VEGETATION PLOT 5

CONSERVATION EASEMENT

27+00 28+00 29+00 30+00 31+00 32+00 33+00 34+00 35+00

LEGEND

- STRUCTURE
- AS-BUILT TOP OF BANK
- AS-BUILT CHANNEL
- CROSS SECTION
- VEGETATION PLOT
- CONSERVATION EASEMENT
- MAJOR CONTOUR
- MINOR CONTOUR
- DESIGN CHANNEL

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

HORIZONTAL SCALE 100 50 0 50 100

BADIN INN STREAM RESTORATION

AS-BUILT FEATURES

EARTH TECH | AECOM

701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607 919-854-6200 919-854-6259 (Fax)

DATE	8/18/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-34
DRAWN BY	ABW
CHKD BY	BMD

USER: WILSONAB
DGN: G:\99255\cadd\As-Built Files\AS-BUILT_Plansheets\99255_ps1.dgn DATE: 8/18/2009

I, DONALD T. ISRAEL, PLS, CERTIFY THAT THIS STREAM RESTORATION PROJECT WAS CONSTRUCTED IN SUBSTANCIAL CONFORMANCE WITH THE PLANS AND SPECIFICATIONS; AND THAT THE STREAM LIES WHOLLY WITHIN THE CONSERVATION EASEMENT AS SHOWN ON THE PLAT ENTITLED "BADIN INN STREAM RESTORATION" DATED 4-23-07 AND FOUND IN THE STANLEY COUNTY REGISTRY IN PLAT BOOK 20 PAGE 54.

BY _____ (SURVEYOR)

PROFESSIONAL LAND SURVEYOR L-3756

EARTH TECH | AECOM

NORTH CAROLINA PROFESSIONAL LAND SURVEYOR SEAL L-3756 DONALD T. ISRAEL

MATCHLINE SHEET C60-3

MATCHLINE SHEET C60-5

NORTH

AS-BUILT CHANNEL

VEGETATION PLOT 3

VEGETATION PLOT 2

CONSERVATION EASEMENT

AS-BUILT BANKFULL

CROSS SECTION 3

CROSS SECTION 2

BM4
ELEV: 447.52'

35+00 36+00 37+00 38+00 39+00 40+00 41+00 42+00 43+00

LEGEND

- STRUCTURE
- AS-BUILT TOP OF BANK
- AS-BUILT CHANNEL
- CROSS SECTION
- VEGETATION PLOT
- CONSERVATION EASEMENT
- MAJOR CONTOUR
- MINOR CONTOUR
- DESIGN CHANNEL

NO	REVISIONS	DRN.	CHK.	DATE
1				
2				
3				

HORIZONTAL SCALE
50 0 50 100

BADIN INN STREAM RESTORATION
AS-BUILT FEATURES

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (FAX)

DATE	8/18/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-35
DRAWN BY	ABW
CHKD BY	BMD

USER: WILSONAB
DGN: Q:\99255\cadd\As-Built Files\AS-BUILT_Plansheets\99255_asBuiltFeatures_8x36_As-Built_Only.dgn
DATE: 8/18/2009

I, DONALD T. ISRAEL, PLS, CERTIFY THAT THIS STREAM RESTORATION PROJECT WAS CONSTRUCTED IN SUBSTANCIAL CONFORMANCE WITH THE PLANS AND SPECIFICATIONS; AND THAT THE STREAM LIES WHOLLY WITHIN THE CONSERVATION EASEMENT AS SHOWN ON THE PLAT ENTITLED "BADIN INN STREAM RESTORATION" DATED 4-23-07 AND FOUND IN THE STANLEY COUNTY REGISTRY IN PLAT BOOK 20 PAGE 54.

BY Donald T. Israel (SURVEYOR)

PROFESSIONAL LAND SURVEYOR L-3756

EARTH TECH | AECOM

NORTH CAROLINA PROFESSIONAL LAND SURVEYOR SEAL L-3756 DONALD T. ISRAEL

MATCHLINE SHEET C60-4

NORTH

BRIDGE CROSSING

AS-BUILT BANKFULL

CROSS SECTION 1

AS-BUILT CHANNEL

CONSERVATION EASEMENT

44+00 45+00 46+00 47+00 48+00 49+00 50+00

BM5
ELEV: 443.73'

LOG VANE

VEGETATION PLOT 1

LEGEND

- STRUCTURE
- AS-BUILT TOP OF BANK
- AS-BUILT CHANNEL
- CROSS SECTION
- VEGETATION PLOT
- CONSERVATION EASEMENT
- MAJOR CONTOUR
- MINOR CONTOUR
- DESIGN CHANNEL

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

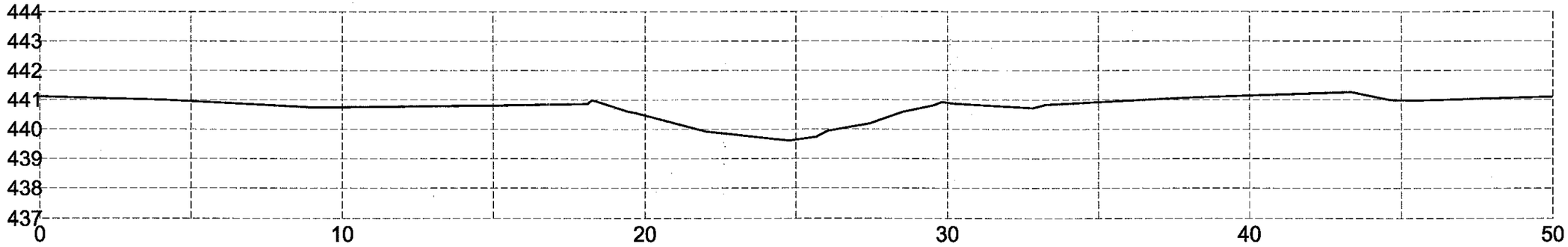
HORIZONTAL SCALE
100 50 0 50 100

BADIN INN STREAM RESTORATION
AS-BUILT FEATURES

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (fax)

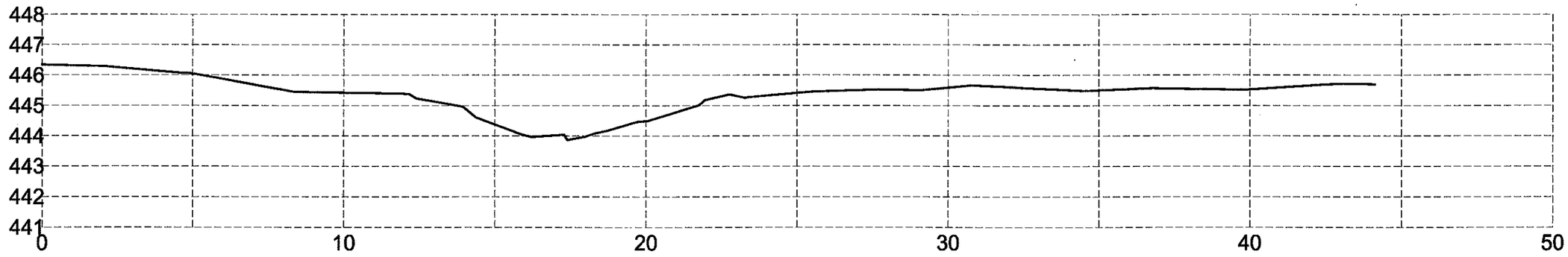
DATE	8/18/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-36
DRAWN BY	AEW
CHKD BY	BMD

USER: WILSONAB
DGN: Q:\99255\cadd\As-Built Files\AS-BUILT_Plansheets\99255_pst.tbl\Discipline\As-Built_Only.dgn
DATE: 8/18/2009



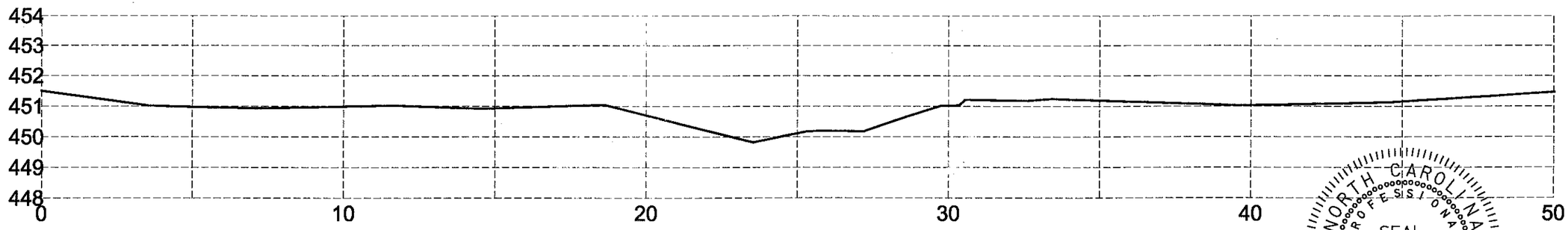
CROSS SECTION 1 – RIFFLE

STA. 47+67



CROSS SECTION 2 – POOL

STA. 43+05



CROSS SECTION 3 – RIFFLE

STA. 38+26

NORTH CAROLINA PROFESSIONAL SEAL L-3756 LAND SURVEYOR DONALD T. ISRAEL

NO	REVISIONS	DRN	CHK	DATE
1		ABW		
2				
3				

BADIN INN STREAM RESTORATION

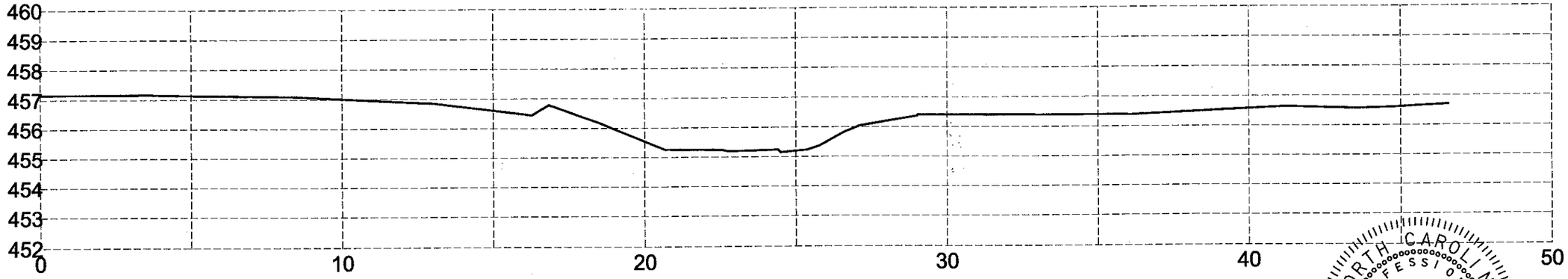
AS-BUILT CROSS SECTIONS

EARTH TECH | AECOM

701 CORPORATE CENTER DRIVE, SUITE #75, RALEIGH, NC 27607
919-854-6200 919-854-6259 (FAX)

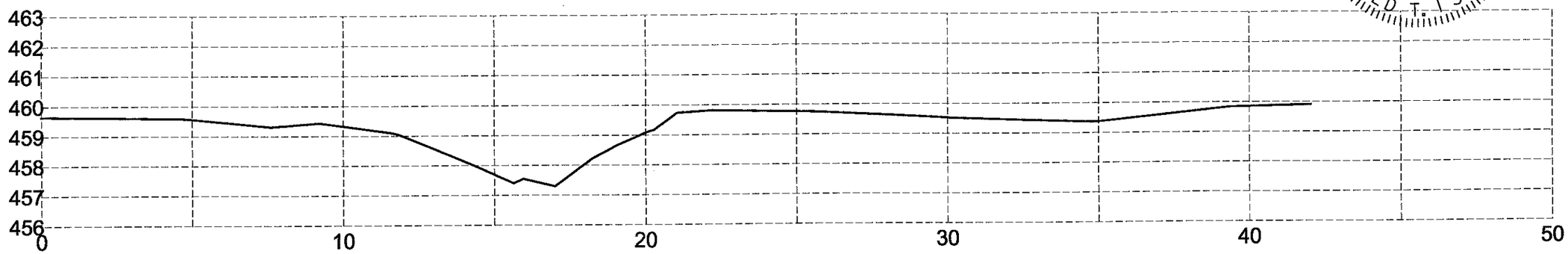
DATE	8/18/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-37
DRAWN BY	CHKD BY
ABW	BMD

USER: WILSONAB
DGN: G:\99255\cadd\As-Built Files\AS-BUILT_Plansheets\99255_AST_ABW.dgn sections.dgn
DATE: 8/18/2009



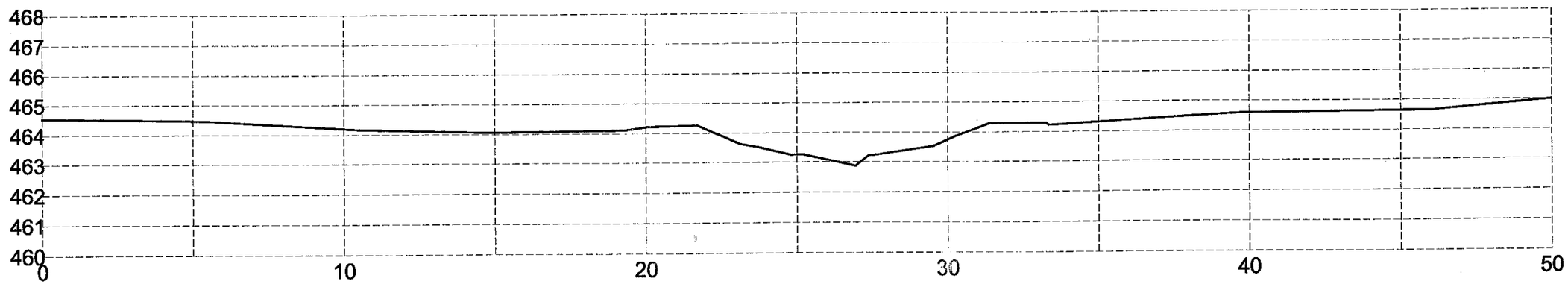
CROSS SECTION 4 – RIFFLE

STA. 33+72



CROSS SECTION 5 – POOL

STA. 29+78



CROSS SECTION 6 – RIFFLE

STA. 25+39

NORTH CAROLINA PROFESSIONAL SEAL L-3756 LAND SURVEYOR DONALD T. ISRAEL

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

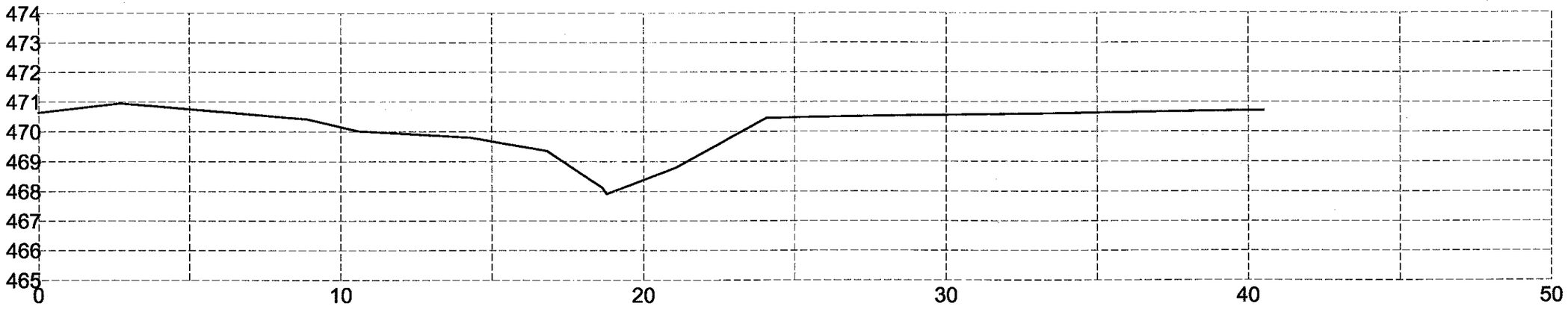
BADIN INN STREAM RESTORATION
AS-BUILT CROSS SECTIONS

EARTH TECH | AECOM

701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (FAX)

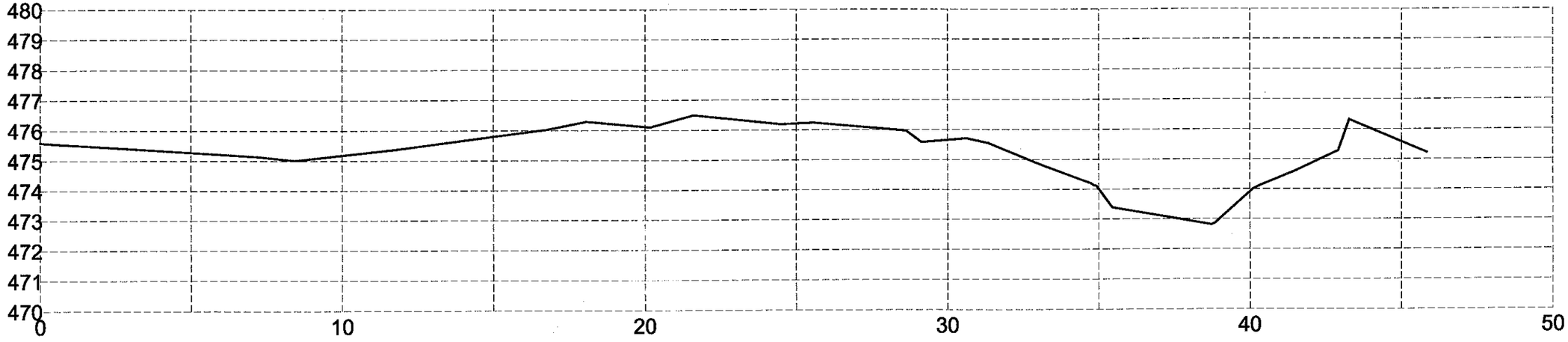
DATE	8/18/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-38
DRAWN BY	CHKD BY
ABW	BMD

USER: WILSONAB
DGN: Q:\99255\cadd\As-Built Files\AS-BUILT_Pionshets\99255_AS-BUILT_CrossSections.dgn DATE: 8/18/2009



CROSS SECTION 7 – POOL

STA. 20+45



CROSS SECTION 8 – POOL

STA. 16+50

I, DONALD T. ISRAEL, PLS, CERTIFY THAT THIS STREAM RESTORATION PROJECT WAS CONSTRUCTED IN SUBSTANCIAL CONFORMANCE WITH THE PLANS AND SPECIFICATIONS; AND THAT THE STREAM LIES WHOLLY WITHIN THE CONSERVATION EASEMENT AS SHOWN ON THE PLAT ENTITLED "BADIN INN STREAM RESTORATION" DATED 4-23-07 AND FOUND IN THE STANLEY COUNTY REGISTRY IN PLAT BOOK 20 PAGE 54.

BY Donald T. Israel (SURVEYOR)

PROFESSIONAL LAND SURVEYOR L-3756

EARTH TECH AECOM

NORTH CAROLINA PROFESSIONAL SEAL L-3756 LAND SURVEYOR DONALD T. ISRAEL

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

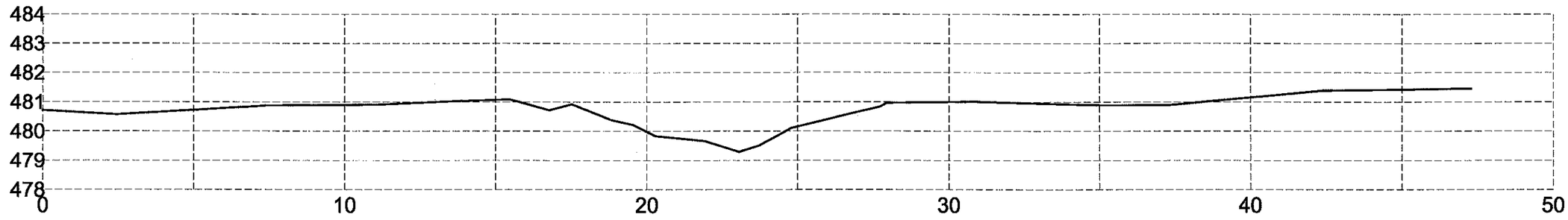
BADIN INN STREAM RESTORATION
AS-BUILT CROSS SECTIONS

EARTH TECH | AECOM

701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (fax)

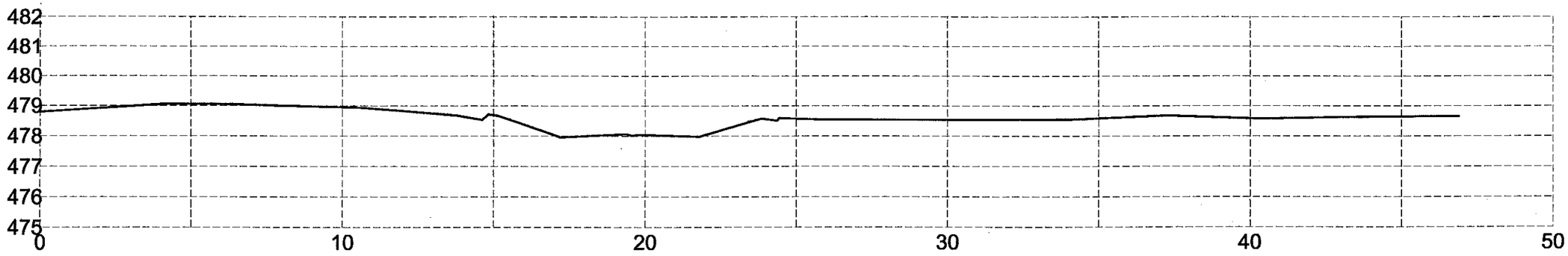
DATE	8/18/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-39
DRAWN BY	CHKD BY
ABW	BMD

USER: WILSONAB
DGN: Q:\99255\cadd\As-Built Files\AS-BUILT_Plansheets\99255_AST-BUILT CROSS SECTIONS sections.dgn
DATE: 8/18/2009



CROSS SECTION 9 – RIFFLE

STA. 13+61



TRIBUTARY CROSS SECTION – RIFFLE

STA. 10+85

I, DONALD T. ISRAEL, PLS, CERTIFY THAT THIS STREAM RESTORATION PROJECT WAS CONSTRUCTED IN SUBSTANCIAL CONFORMANCE WITH THE PLANS AND SPECIFICATIONS; AND THAT THE STREAM LIES WHOLLY WITHIN THE CONSERVATION EASEMENT AS SHOWN ON THE PLAT ENTITLED "BADIN INN STREAM RESTORATION" DATED 4-23-07 AND FOUND IN THE STANLEY COUNTY REGISTRY IN PLAT BOOK 20 PAGE 54.

BY _____ (SURVEYOR)

PROFESSIONAL LAND SURVEYOR L-3756

EARTH TECH | AECOM

NORTH CAROLINA PROFESSIONAL SEAL L-3756 LAND SURVEYOR DONALD T. ISRAEL

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

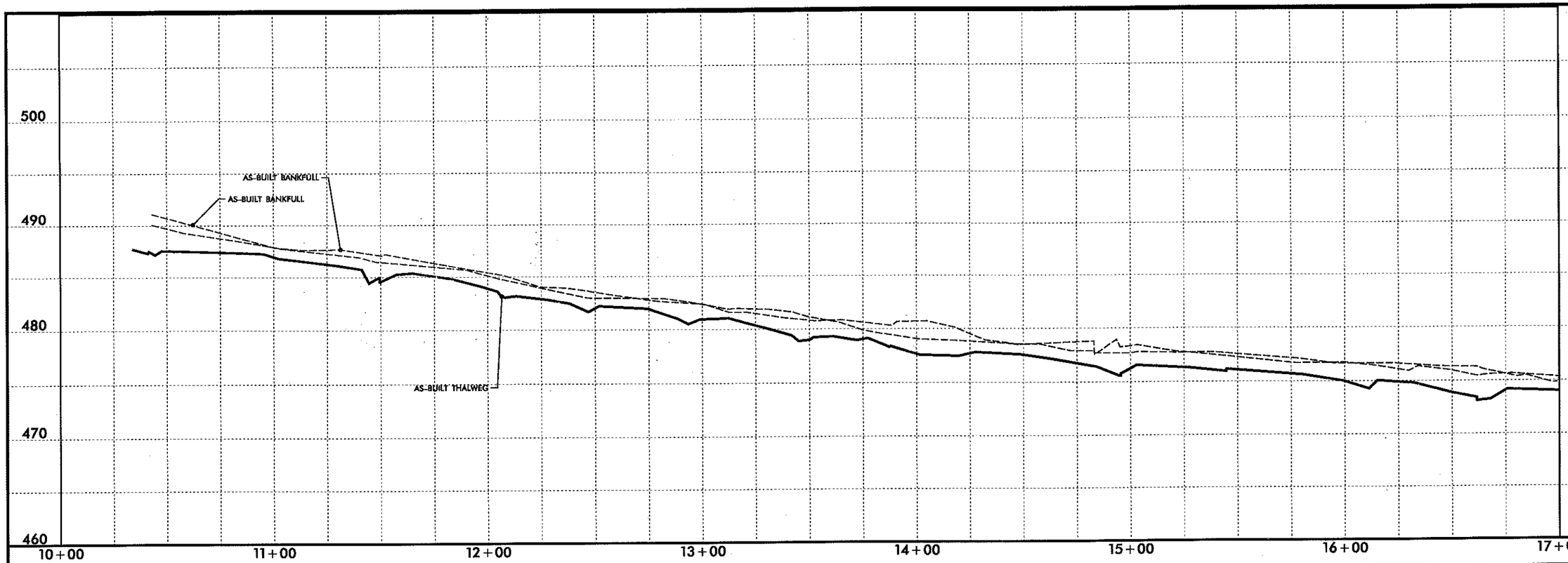
BADIN INN STREAM RESTORATION
AS-BUILT CROSS SECTIONS

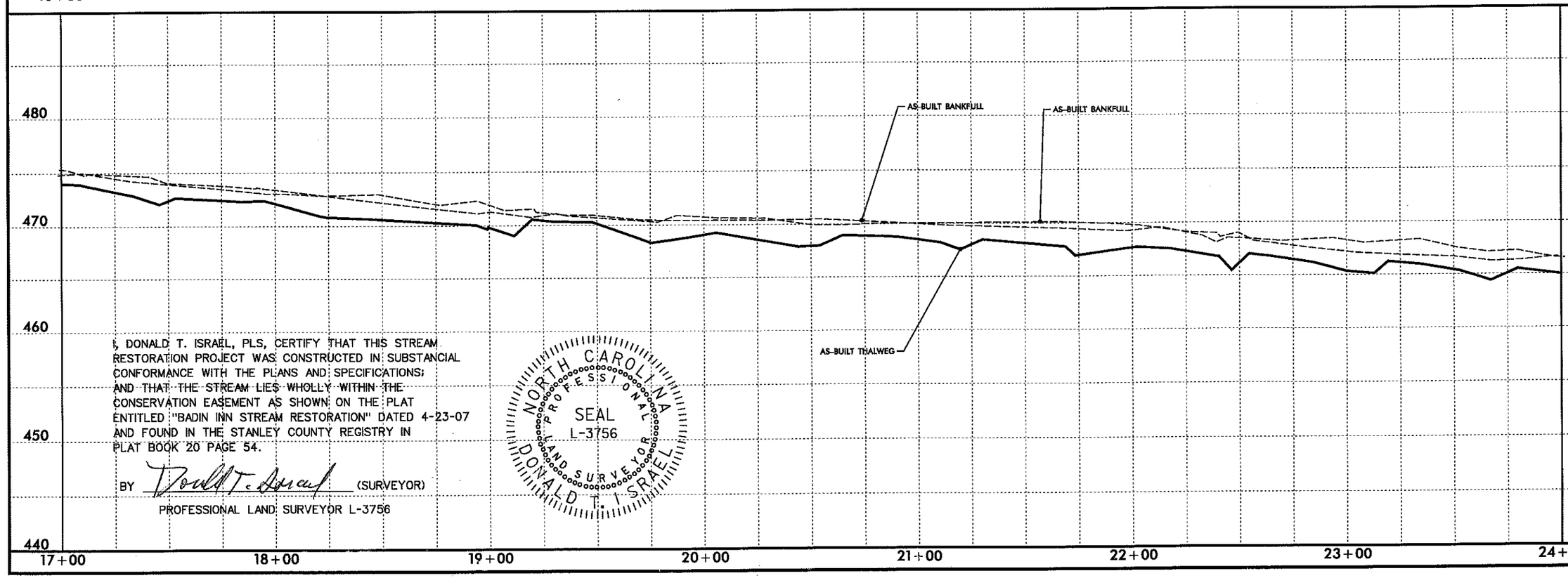
EARTH TECH | AECOM

701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (FAX)

DATE	8/18/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-40
DRAWN BY	CHKD BY
ABW	BMD

USER: WILSONAB
DGN: G:\99255\cadd\As-Built Files\AS-BUILT_Plansheets\99255_AS-BUILT 2008 Cross sections.dgn
DATE: 8/18/2009





I, DONALD T. ISRAEL, PLS, CERTIFY THAT THIS STREAM RESTORATION PROJECT WAS CONSTRUCTED IN SUBSTANCIAL CONFORMANCE WITH THE PLANS AND SPECIFICATIONS; AND THAT THE STREAM LIES WHOLLY WITHIN THE CONSERVATION EASEMENT AS SHOWN ON THE PLAT ENTITLED "BADIN INN STREAM RESTORATION" DATED 4-23-07 AND FOUND IN THE STANLEY COUNTY REGISTRY IN PLAT BOOK 20 PAGE 54.

BY _____ (SURVEYOR)

PROFESSIONAL LAND SURVEYOR L-3756

NORTH CAROLINA PROFESSIONAL LAND SURVEYOR SEAL L-3756 DONALD T. ISRAEL

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

HORIZONTAL SCALE 0 25 50

VERTICAL SCALE 0 5 10

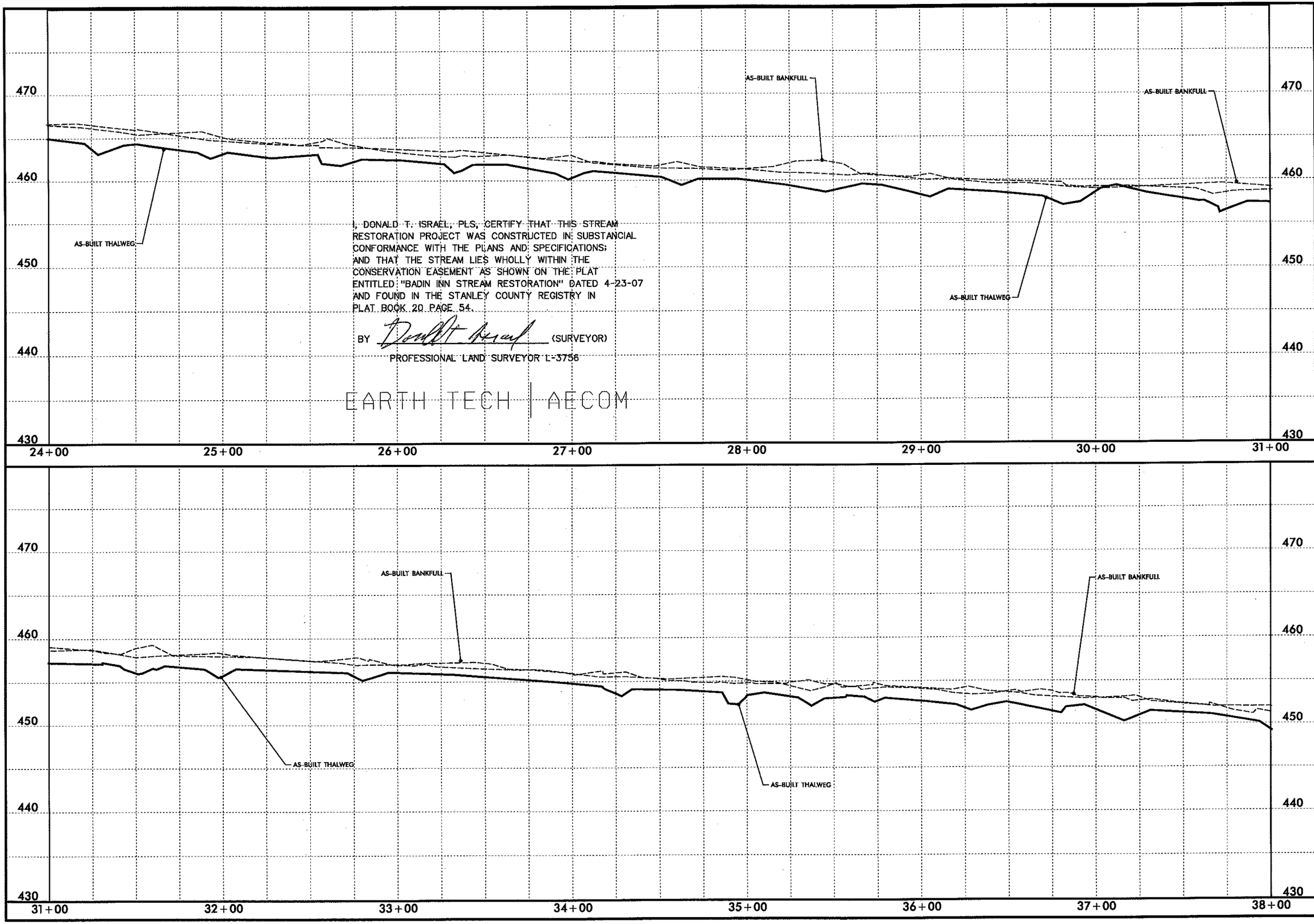
BADIN INN STREAM RESTORATION

AS-BUILT CHANNEL PROFILE

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 FAX

DATE	8/18/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-41
DRAWN BY	ABW
CHKD BY	BMD

USER: WILSONAB
DGN: Q:\99255\cadd\As-Built Files\AS-BUILT_Plansheets\99255_AS-BUILT_Sheets_C-41 Profile.dgn DATE: 8/18/2009



I, DONALD T. ISRAEL, PLS, CERTIFY THAT THIS STREAM RESTORATION PROJECT WAS CONSTRUCTED IN SUBSTANCIAL CONFORMANCE WITH THE PLANS AND SPECIFICATIONS; AND THAT THE STREAM LIES WHOLLY WITHIN THE CONSERVATION EASEMENT AS SHOWN ON THE PLAT ENTITLED "BADIN INN STREAM RESTORATION" DATED 4-23-07 AND FOUND IN THE STANLEY COUNTY REGISTRY IN PLAT BOOK 20 PAGE 54.

BY _____ (SURVEYOR)

PROFESSIONAL LAND SURVEYOR L-3756

EARTH TECH | AECOM

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

HORIZONTAL SCALE 50 25 0 25

VERTICAL SCALE 10 5 0 5

BADIN INN STREAM RESTORATION

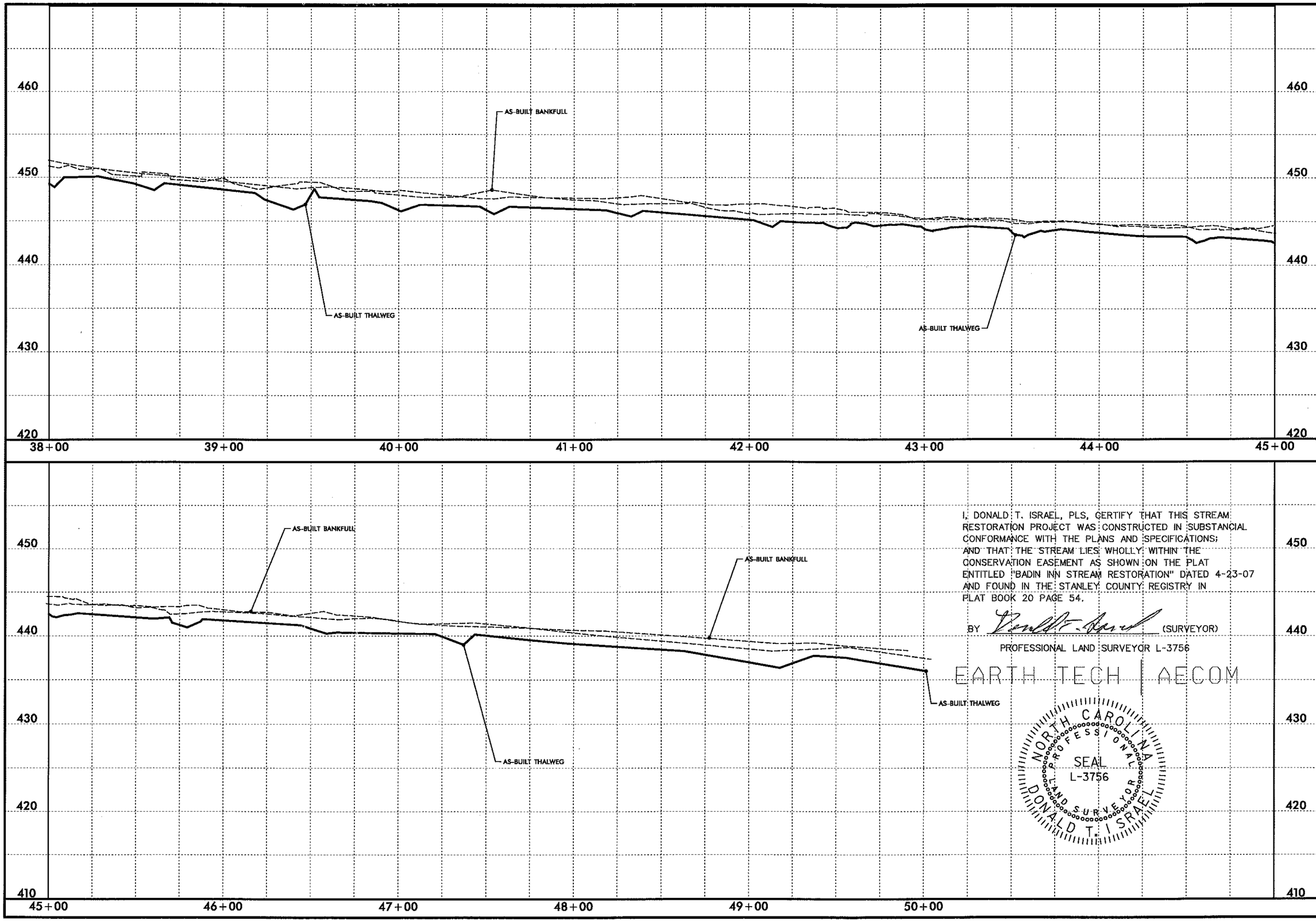
AS-BUILT CHANNEL PROFILE

EARTH TECH | AECOM

701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 FAX

DATE	8/18/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-42
DRAWN BY	CHKD BY
ABW	BMD

USER: WILSONAB
DGN: Q:\99255\cadd\As-Built Files\AS-BUILT_Plansheets\99255_AS-BUILT_C-42_Prof1eadgn DATE: 8/18/2009



I, DONALD T. ISRAEL, PLS, CERTIFY THAT THIS STREAM RESTORATION PROJECT WAS CONSTRUCTED IN SUBSTANCIAL CONFORMANCE WITH THE PLANS AND SPECIFICATIONS; AND THAT THE STREAM LIES WHOLLY WITHIN THE CONSERVATION EASEMENT AS SHOWN ON THE PLAT ENTITLED "BADIN INN STREAM RESTORATION" DATED 4-23-07 AND FOUND IN THE STANLEY COUNTY REGISTRY IN PLAT BOOK 20 PAGE 54.

BY _____ (SURVEYOR)

PROFESSIONAL LAND SURVEYOR L-3756

EARTH TECH | AECOM

NORTH CAROLINA PROFESSIONAL SEAL L-3756 LAND SURVEYOR DONALD T. ISRAEL

NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

HORIZONTAL SCALE 0 25 50

VERTICAL SCALE 0 5 10

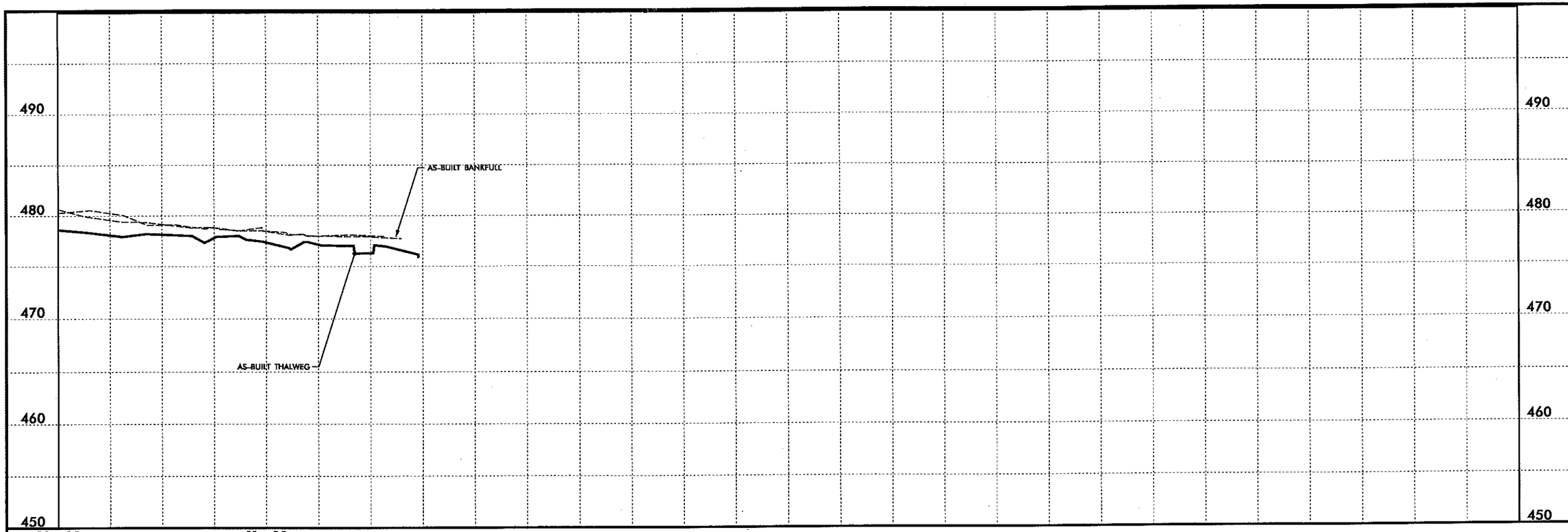
BADIN INN STREAM RESTORATION

AS-BUILT CHANNEL PROFILE

EARTH TECH | AECOM
701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6200 919-854-6259 (FAX)

DATE	8/18/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-43
DRAWN BY	CHKD BY
ABW	BMD

USER: WILSONAB
DGN: G:\99255\cadd\As-Built Files\AS-BUILT_Plansheets\99255_AS-BUILT_C-43 Profile.dgn
DATE: 8/18/2009



NO	REVISIONS	DRN	CHK	DATE
1				
2				
3				

HORIZONTAL SCALE 50 25 0 25

VERTICAL SCALE 10 5 0 5

I, DONALD T. ISRAEL, PLS, CERTIFY THAT THIS STREAM RESTORATION PROJECT WAS CONSTRUCTED IN SUBSTANCIAL CONFORMANCE WITH THE PLANS AND SPECIFICATIONS; AND THAT THE STREAM LIES WHOLLY WITHIN THE CONSERVATION EASEMENT AS SHOWN ON THE PLAT ENTITLED "BADIN INN STREAM RESTORATION" DATED 4-23-07 AND FOUND IN THE STANLEY COUNTY REGISTRY IN PLAT BOOK 20 PAGE 54.

BY _____ (SURVEYOR)

PROFESSIONAL LAND SURVEYOR L-3756

EARTH TECH | AECOM

NORTH CAROLINA PROFESSIONAL LAND SURVEYOR SEAL L-3756 DONALD T. ISRAEL

BADIN INN STREAM RESTORATION

AS-BUILT CHANNEL PROFILE

EARTH TECH | AECOM

701 CORPORATE CENTER DRIVE, SUITE 475, RALEIGH, NC 27607
919-854-6259 FAX: 919-854-6259

DATE	8/18/2009
PROJECT NO	99255
FILENAME	
SHEET NO	C-44
DRAWN BY	CHKD BY
ABW	DWD

USER: WILSONAB
DGN: Q:\99255\cadd\As-Built Files\AS-BUILT_Plansheets\99255_AST-BUILT_PROFILE_C-44 Profile.dgn
DATE: 8/18/2009