Tributary to Reedy Fork Creek Stream Restoration

Guilford County, North Carolina

Cape Fear River Basin
Cataloging Unit 03030002

CONTRACT # D06028-A

Prepared For:

Ecosystem Enhancement Program
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MITIGATION REPORT

July 2008

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EXECUTIVE SUMMARY

The Tributary to Reedy Fork Creek Stream Restoration Site (RFC) is located in Guilford County, North Carolina approximately 5 miles north of the community of Gibsonville. RFC is approximately 0.5 miles east of the intersection of NC Highway 61 and Sockwell Road (SR 2735) and is immediately south of SR 2735. RFC is situated within the Cape Fear River Basin, within US Geological Survey (USGS) 14-digit Hydrologic Unit Code (HUC) 03030002020070, within the 8-digit HUC 03030002 and within the NC Division of Water Quality (NCDWQ) Subbasin 03-06-02. Mulkey, Inc. (Mulkey) acquired an easement covering 19.64 acres, which will encompass the streams and associated buffers at RFC (Figure 1).

RFC is comprised of two main reaches (R1 and R2) and three smaller reaches (R2-4a, R2-4b, R2-4c). The main reach, R2, is sub-divided further into reaches R2-3, R2-2, and R2-1. Reaches R2-4a, R2-4b, and R2-4c converge at the upstream end of RFC where reach R2 begins. Prior to construction, these seven reaches (R1, R2-1, R2-2, R2-3, R2-4a, R2-4b, and R2-4c) were identified and proposed for restoration due to their distinct stream characteristics and drainage areas. The overall drainage area for RFC is 635 acres (0.99 square miles). These seven existing reaches totaled approximately 7,093 linear feet (Table 1 and Figure 2).

The existing conditions at RFC were a result of cattle use for the past 50 years. RFC lies within three parcels that have historically been used for pasture. Cattle and other land uses have resulted in substantial degradation to the stream throughout the site for the past 50 years. Currently, there are approximately 150 grazing cattle utilizing the pastures and directly accessing the stream channels. This continual livestock access to the streams has resulted in substantial erosion along the stream banks, incision of the channels, channel widening in some areas, and poor bed form diversity throughout the site, as well as reduced water quality due to the introduction of fecal matter into the stream system.

Restoration of the stream channels was accomplished by using Natural Stream Channel design methods developed by Rosgen (1996). The proposed Rosgen channel type for each of the reaches was a C4 channel. The restoration was implemented using Priority Level I and II methodologies.

To restore the riparian and upland buffer communities along RFC, a variety of plants that naturally occur in this physiographic province and within a specific hydrologic setting will be used. These plants will comprise a target community which will emulate the Piedmont/Low Mountain Alluvial Forest described by Shafale and Weakley (1990).

A total of 7,511 linear feet of stream channel was restored at RFC within the 19.64 acre conservation easement (Table 1). Stream restoration activities were accomplished by using Priority Level I and II methodologies as defined by Rosgen (1998).

The restoration of the stream channels and their adjacent buffers combined with the establishment of a fenced conservation easement has provided multiple ecological

improvements to RFC. The primary ecological benefits of these restoration activities include improved water quality, soil stabilization, improved aquatic and terrestrial habitat, and natural flooding capabilities.

Success criteria for stream mitigation sites are based on guidelines established by the USACE, US Environmental Protection Agency (USEPA), NC Wildlife Resources Commission (NCWRC) and the NCDWQ (USACE *et al.,* 2003). These guidelines establish criteria for both hydrologic conditions and vegetation survival. RFC will follow the success criteria set forth by these agencies.

Yearly monitoring reports will serve as the method for determining success at RFC. Monitoring will be performed until success criteria are met up to a period of five years. Monitoring is proposed for hydrologic stream stability and vegetation. The monitoring plan will be designed in accordance with Stream Mitigation Guidelines (USACE *et al.,* 2003) and as specified by the EEP's monitoring report requirements (EEP, 2005a). Results will be documented on an annual basis, with the associated reports submitted to EEP as evidence that goals are being achieved. In the event that goals are not being met, Mulkey will coordinate with EEP to develop a plan for ameliorating the areas of concern.

1.0 Introduction

RFC has historically been used for pasture for dairy cattle. Cattle and other land uses over the past 50 years have resulted in substantial degradation to the streams and riparian buffers. In addition, large quantities of fecal matter were observed in the stream channels during the initial site visits. As a result of these land and water quality issues, Mulkey submitted RFC for the Full Delivery RFP 16-D06028 to provide 7,000 Stream Mitigation Units (SMUs). Mulkey was awarded the stream restoration contract and began work on the project on November 26, 2007.

1.1 Project Goals and Objectives

The primary goals of RFC were to improve water quality, to reduce bank erosion, to reestablish a floodplain along each of the stream reaches, and to improve the aquatic and terrestrial wildlife habitat.

These goals will be met through the following objectives:

- By using natural channel design to restore stable pattern, dimension, and profile for 7,511 linear feet of stream channel
- By establishing a conservation easement, which will protect the streams from cattle intrusion and future development activities
- By establishing a floodplain or reconnecting the stream back to its historic floodplain, or a combination of both, for each project stream reach
- By creating or restoring floodplain features such as vernal pools, off channel ponds, or riparian wetlands
- By increasing the amount of aquatic habitat through the addition of rock and wood structures
- By reestablishing native plant communities throughout the conservation easement, whereby reintroducing shading, cover areas, and travel corridors.

1.2 Project Location

RFC is located in Guilford County approximately 5 miles north of the community of Gibsonville. RFC is approximately 0.5 miles east of the intersection of NC Highway 61 and Sockwell Road (SR 2735) and is immediately south of SR 2735 (Figure 1). RFC is part of the Cape Fear River Basin, and is situated within US Geological Survey (USGS) 14-digit Hydrologic Unit Code (HUC) 03030002020070, the 8-digit HUC 03030002, and the NC Division of Water Quality (NCDWQ) Subbasin 03-06-02. Mulkey has purchased an easement covering 19.64 acres, which will encompass the streams and associated buffers at RFC (Figure 2).

1.3 Project Description and Watershed Characterization

The main tributary or reach, R2, comprised of reaches R2-3, R2-2, and R2-1, is an unnamed tributary to Reedy Fork, and is a second order stream. This main tributary begins as a

second order stream where reaches R2-4a, R2-4b, and R2-4c converge at the southeastern end of RFC and retains its second order ranking as it leaves RFC at the northern end of the property. Five unnamed tributaries, which are all first order streams, converge with the main tributary at RFC. Reach R1 flows onto RFC at the northern end and, flowing westward, parallels SR 2735 until its confluence with the main tributary. The other three unnamed tributaries, reaches R2-4a, R2-4b, and R2-4c, are at the southern end of RFC. The headwaters of the streams at RFC are essentially bounded by NC Highway 61 on the west, SR 2735 on the north, SR 2736 on the east, and SR 2737 to the south. The main tributary flows in a northwesterly direction across RFC. Reach R2 has a drainage area of approximately 136 acres (0.21 mi^2) as it enters the Site and its watershed increases to approximately 635 acres (0.99 mi^2) as it flows off RFC.

Land use within RFC's watershed is approximately 75% of open land which includes pasture/hay, row crop, and transitional categories. It is estimated that 25% of the land use is forested. Although urbanization is dramatically increasing in the area, only 2% of the watershed is estimated to be impervious. Due to the increase in development in the adjacent properties surrounding RFC, the property currently encompassing the conservation easement will likely be developed in the next decade.

2.0 Post Construction Site Conditions

2.1 Methods

Mulkey utilized natural channel design methods to restore approximately 7,511 linear feet of stream channel (Rosgen, 1998). Restoration of the stream channels was accomplished by using Natural Stream Channel design methods developed by Rosgen (1996). The proposed stream classification for each of the reaches (R1, R2-3, R2-2, R2-1, R2-4a, R2-4b, and R2-4c) was a C4 channel. A combination of Priority Level I and II methods were used to construct these reaches.

During construction, modifications are always made to the plans due to various constraints including bedrock, vegetation, soil, etc. The restoration of the reaches proposed installing 169 rock structures (cross vane, j-hook, and rock vanes), 21 constructed riffles, and numerous rootwads throughout RFC.

Post construction surveys depicted in Appendix A (Sheets 13 – 19), illustrate the changes to the proposed design. Field changes at RFC site were typically minor, with most of the changes involving the adjustment of benches and grading to protect vegetation at RFC. Bedrock was encountered in several locations and structures were modified, relocated, or removed to account for its occurrence. In addition, rootwads (generated on site during construction) were used in some locations to in lieu of rock vanes and j-hooks to provide stream bank protection.

Mulkey conducted monitoring baseline surveys along the entire length of each of the restored project stream reaches using total station survey equipment. These surveys were conducted to establish or document baseline conditions for the newly restored stream

channels for future monitoring activities. As an industry standard, such surveys are also used for other purposes such as comparing how a proposed design was actually constructed versus what was proposed, including the length of stream actually constructed versus what length of stream was proposed by the design.

Streams are typically measured along their thalweg by surveying the representative points creating the known, repeating sequence of stream features (i.e., head of riffle, head of run, head of pool, max pool, and the head of glide) along with other supplemental points to adequately describe the stream's horizontal geometry (i.e., points on tangents and points on curves) or other site specific stream features. Once these points are surveyed, they are then typically "connected" via straight line segments when the survey is processed to create the drawing describing the alignment of the surveyed stream. Because a representative number of points connected by straight line segments are used to describe a stream alignment that is actually a smooth, continuous curve, accepted total station survey practices can only approximate, albeit closely, the actual length of a stream. The more feet of stream that are measured using this process, the greater the magnitude or difference between the actual stream footage and the measured stream footage, with the measured stream footage being shorter than the actual stream footage. As described above, because of the magnitude of this project, the footage of restored stream measured during the monitoring baseline survey was less than the footage of stream actually restored. To clearly demonstrate that at least 7,511 linear feet of stream were restored at RFC, Mulkey conducted supplemental measurements of the project stream reaches using additional, more accurate techniques. These techniques included diligently field-measuring the thalweg of the restored stream alignments with a cloth tape. This additional exercise was conducted solely to demonstrate that at least 7,511 linear feet of stream were restored at RFC. The results of these measurements of restored channel are shown in Table 1. As noted above, the alignments created using the results of the monitoring baseline surveys will be used to establish baseline stationing for as-built and monitoring documentation and activities.

Major grading and channel construction as well as site planting was completed April 14, 2008. As-Built Surveys were conducted immediately following the installation of plant material. The following sections describe the conditions of RFC following construction and follow the guidelines for Mitigation Reports (NCEEP, 2005).

2.2 Streams

The stream reaches at RFC were surveyed utilizing total station survey equipment and by following the protocols set forth by the 2003 USACE Stream Mitigation guidelines. Stream data included in this report shall serve as the basis for future monitoring reports.

Longitudinal profiles were surveyed along the entire length of all restored reaches. Longitudinal profiles were surveyed by identifying each stream feature (riffle, run, pool, or glide) and surveying specific points at each feature. These specific locations included top of bank, bankfull, water's edge or surface, and thalweg). A summary of the restored stream channel lengths and their proposed Stream Mitigation Units (SMUs) are outlined in Table 1.

A complete set of As-Built Drawings including a plan view, longitudinal profiles for restored channels, and a proposed versus as-built plan view can be found in Appendix A.

2.3 Oxbow Wetlands

Oxbow wetlands were created throughout RFC where conditions permitted their installation. Most of the oxbow wetlands were created by modifying sections of abandoned channel that were left unfilled. Where feasible, mature vegetation was saved around the oxbow wetland areas to provide shading, seed source, as well as woody detritus input. The oxbow wetlands will provide additional floodplain habitat diversity as well as providing some additional flood storage. It is anticipated that the oxbow wetlands will also trap sediment, woody debris and seeds during flood flows, thereby providing additional habitat benefits. During wet seasons, some of the oxbow wetlands are expected to catch and hold runoff as well as ground water, thus providing a greater diversity of aquatic habitat at the site. These oxbow wetlands are shown on the As-Built Drawings in Appendix A.

2.4 Planted Vegetation

All plant material was installed during the months of March and April 2008. A list of vegetation planted within each planting zone can be found in Table 2. Specific vegetation plot information including plot size, species, and species counts can be found in Table 3. A total of 16 vegetation plots were installed, surveyed, and assessed during the months of March, April, and May 2008 to provide a basis for monitoring the plant material. In addition to planted vegetation, great efforts were made during construction to save mature riparian vegetation along the restored and abandoned stream channels.

3.0 Monitoring Plan

Stream channel monitoring will determine the degree of success a mitigation project has achieved in meeting the objectives of providing proper channel function and improved aquatic habitat. Stream monitoring will be performed each year for a 5-year monitoring period. The following sections describe the methods, frequencies, and success criteria for preparing a monitoring report for RFC. Monitoring guidelines described in this section follow the outline described in the "Content, Format, and Data Requirements for EEP Monitoring Reports, Version 1.1" dated September 16, 2005. Success criteria for stream mitigation sites are based on guidelines established by the USACE, US Environmental Protection Agency (USEPA), NC Wildlife Resources Commission (NCWRC) and the NCDWQ (USACE *et. al,* 2003). These guidelines establish criteria for both hydrologic conditions and vegetation survival. RFC site conditions will be monitored during the latter part of the growing season months (August, September, and October) over the 5-year monitoring period. This monitoring period will allow compliance with the RFP#16-D0628 requirements.

3.1 Dimension

A total of 7 permanent cross sections were established across RFC to establish baseline data for future monitoring reports. Cross section information and photos for the 7 permanent cross sections can be found in Appendix B and C respectively. The number of cross sections was determined using the sampling rates outlined by the USACE et al. (2003).

These cross sections will be surveyed each year of the 5-year monitoring period. Specific stations for each permanent cross section have been established during the As-Built Surveys and should be recreated during the monitoring years. Stationing for the cross sections always begins on the left side (polyvinyl chloride (PVC) pipe and rebar pin) and moves to the right side (rebar pin) of the channel while facing downstream.

Dimension measurements should remain consistent from year to year and should fall within the proposed design parameter outlined in the restoration plan. It is expected that minor adjustments in dimension will occur such as the development of point bars and the subsequent deepening of pools. As vegetation becomes established and the stream banks are stabilized, it is anticipated that the width depth ratios will decrease and that the entrenchment ratios will likely increase slightly, both within the normal ranges for C and E stream channel types.

3.2 Pattern

Pattern for the constructed channels will be measured using Microstation after completing the yearly monitoring surveys. Three specific measurements will be made for each reach including radius of curvature, meander wavelength, and belt width. These measurements will be made along the specified sampling areas for monitoring which correspond directly to the longitudinal profiles for each reach.

Pattern measurements should remain consistent from year to year and fall within the proposed design parameters outlined in the restoration plan. As vegetation becomes established and the stream banks are stabilized, it is anticipated that the sinuosity of the streams will adjust, likely becoming more sinuous with time.

3.3 Profile

As a part of the As-built Surveys, longitudinal profiles were conducted for the entire lengths of the restored channels (Appendix A). Longitudinal profiles were surveyed by identifying each stream feature (riffle, run, pool, or glide) and surveying specific points at each feature. These specific locations included top of bank, bankfull, water's edge or surface, and thalweg). The monitoring lengths of each reach were determined using the sampling rates outlined by the USACE et al. (2003). A total of 3,000 linear feet of stream channel will be surveyed during the monitoring period.

Following the sampling rates discussed above, longitudinal profiles should be conducted for monitoring as shown below:

Stream Reach ID	Stations
R1	0+00.00 -R1- to 6+00.00 -R1-
R2-2	17+84.58 -R2- to 22+96.00 -R2-
R2-3	3+61.80 -R2- to 17+84.58 -R2-
R2-4a	0+36.00 -R2- to 3+61.80 -R2-
R2-4b	0+31.00 -R2-4b- to1+31.00 -R2-4b-
R2-4c	0+00.00 -R2-4c- to 1+00.00 -R2-4c-

Longitudinal profiles should remain relatively consistent (stable) from year to year. Profiles should not show aggrading or degrading conditions during the 5-year monitoring period, however, minor profile adjustments such as deepening of pools is expected. Channels should be indicative of the proposed Rosgen channel type (Rosgen 1994, 1996).

3.4 Hydrology

Hydrology will be assessed throughout the 5-year monitoring period to determine the occurrence of bankfull events at RFC. A minimum of two bankfull events must be documented within the 5-year monitoring period and these must occur during separate monitoring years. Crest gauges will be used to determine the occurrence of these bankfull events. To further document these events, a rain gauge with a datalogger will be installed at the RFC, so as to obtain on-site precipitation records.

Three crest gauges were installed across RFC, with two along Reach R2 and one at Reach R1. Photos of the crest gauges can be found in Appendix D. These gauges will be checked during each visit to RFC for the entire 5-year monitoring period.

3.5 Vegetation

Planted vegetation will be evaluated using stem counts and vegetation plots. Mulkey installed 16 vegetation plots throughout RFC to assess the survival of planted vegetation, photos of the plots can be found in Appendix E. Plots were installed randomly throughout the site and each have a total area of approximately 100 square meters. An iron pipe was installed at each plot corner and a PVC pipe was installed at the corner specified for photo documentation. A label specifying the plot number is attached to each PVC pipe corner. After the establishment of these plots, stems were identified, counted, and flagged on lateral branches. Specific information regarding each vegetation plot can be found in Table 3.

Vegetation success at RFC will be measured by survivability over a five year monitoring period. Survivability will be based on achieving at least 320 stems per acre after three years and 260 stems per acre after five years. Stem counts will be conducted on annual basis to calculate survivability.

If during any given year, the planted species are not anticipated to meet final criteria established for vegetation; supplemental plantings will be considered. In the event that this occurs, a remedial planting plan will be developed that will achieve the survivability goals established for Years 3 and 5.

3.6 Photo Documentation

Photo documentation is essential to monitoring the success of a restoration site because they provide a visual assessment of the stream and vegetation conditions. A total of 8 permanent reference photo points were installed at the site using rebar and PVC, the locations of these points are shown in Appendix A. Photos at these permanent photo locations can be found Appendix F. In the event that circumstances require, additional photographs may be taken to illustrate a particular situation.

3.7 Bed Material

Bed material will be assessed using the Modified Wolman pebble counts. These pebble counts will be conducted each year of the 5-year monitoring period during the specified monitoring time frame. Large reaches including R2-2, and R2-3 will be sampled at each permanent cross section location from bankfull to bankfull. These larger reaches should be sampled at a rate of 25 counts per cross section (Example – R2-3 has 4 cross sections which will equal 100 counts for the entire reach). The smaller tributary reaches including R1*, R2-4a, R2-4b, and R2-4c should be sampled at a rate of 100 counts per reach. Sampling should be completed from bankfull to bankfull on 5 riffle and 5 pool features across the reach with 10 counts being collected at each of the features specified above. Data collected for each reach is presented in Appendix G.

Success criteria for the bed material will be determined at the end of the 5-year monitoring period when data can be reviewed and compared to the proposed channel material type. Fluctuations in bed material will likely occur during the early years following construction and several years may be needed to observe a consistent bed material. Bed materials should ultimately reflect the proposed design conditions for each reach at RFC.

3.8 BEHI and NBS Assessments

Assessments of BEHI and NBS are currently recommended during monitoring years 3 & 5 following construction. Collection and presentation of the BEHI and NBS information should follow the format outlined by EEP's monitoring report guidelines (NCEEP, 2005a). Data collected during these years will be compared with pre-construction conditions to determine the change in bank erosion hazard indices and sediment export quantities for each reach assessed.

**Note that R1 was originally sampled at a rate of 75 counts per reach, spread across 2 riffles and 1 pool, giving a 66-33 riffle to pool ratio. In the following monitoring years, this rate will be increased to 100 counts per reach and the distribution will reflect a 50-50 riffle-pool ratio if deemed necessary.*

3.9 Reporting

The monitoring reports will follow the methods outlined by the latest version of the EEP Guidance document guidance for monitoring report content, format, and data requirements. Monitoring reports will be submitted to the EEP's designated project representative for coordination with the appropriate regulatory agencies on an annual basis. It is understood that the EEP will coordinate any necessary monitoring report submittals with the regulatory agencies. If monitoring reports indicate any deficiencies in achieving the success criteria on schedule, a remedial action plan will be included in the annual monitoring reports.

4.0 Maintenance and Contingency Plan

Mulkey will reassess the condition of the stream channels, structures, vegetation, and overall bank stability during the next five years of monitoring (2008 - 2012). In the event, there is significant problem or concern at the site, a meeting with EEP will be scheduled to discuss the problem. Mulkey will develop a remediation plan and schedule for addressing the particular problem and submit this to EEP for review and comment. Upon approval, Mulkey will initiate the remediation plan through the appropriate means.

5.0 References

NCEEP. 2005. Mitigation Report DRAFT outline. September 20, 2005. NCDENR, NCEEP. 4 pp.

NCEEP. 2005a. Content, Format, and Data Requirements for EEP Monitoring Reports. Version 1.1, September 16, 2005. NCDENR, NCEEP. 17 pp.

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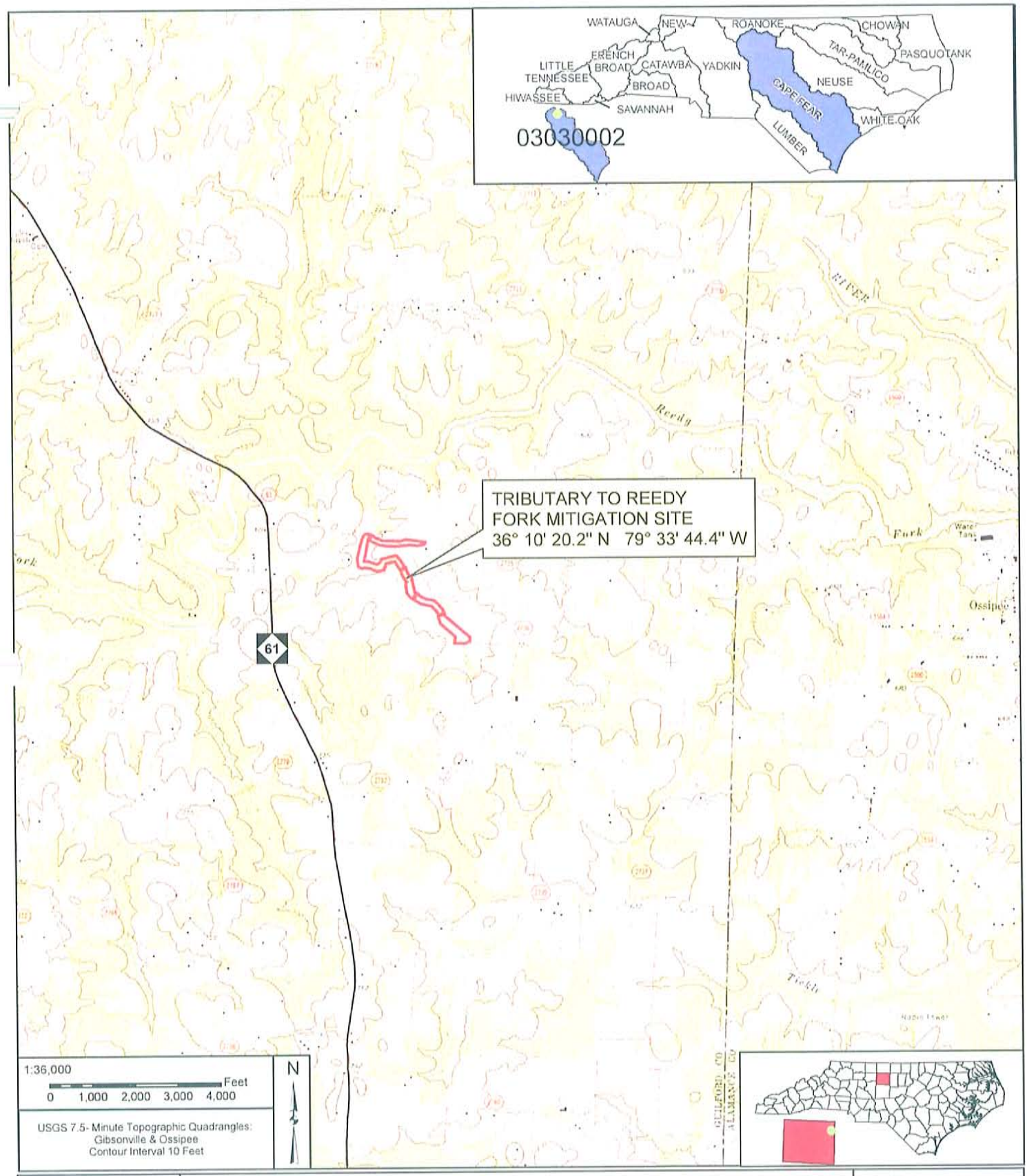
Rosgen, D.L. 1994. A Classification of Natural Rivers. Catena, 22:169-199.

Schafale, M.P. and A.S. Weakley. 1990. Classification of the Natural Communities of North Carolina, Third Approximation. North Carolina Natural Heritage Program, Division of Parks and Recreation, N.C. Department of Environment, Health and Natural Resources.

USACE, USEPA, NCWRC, and NCDWQ. 2003. Stream Mitigation Guidelines. April 2003.



LOCATION MAP

TRIBUTARY TO REEDY FORK

GUILFORD COUNTY, NORTH CAROLINA

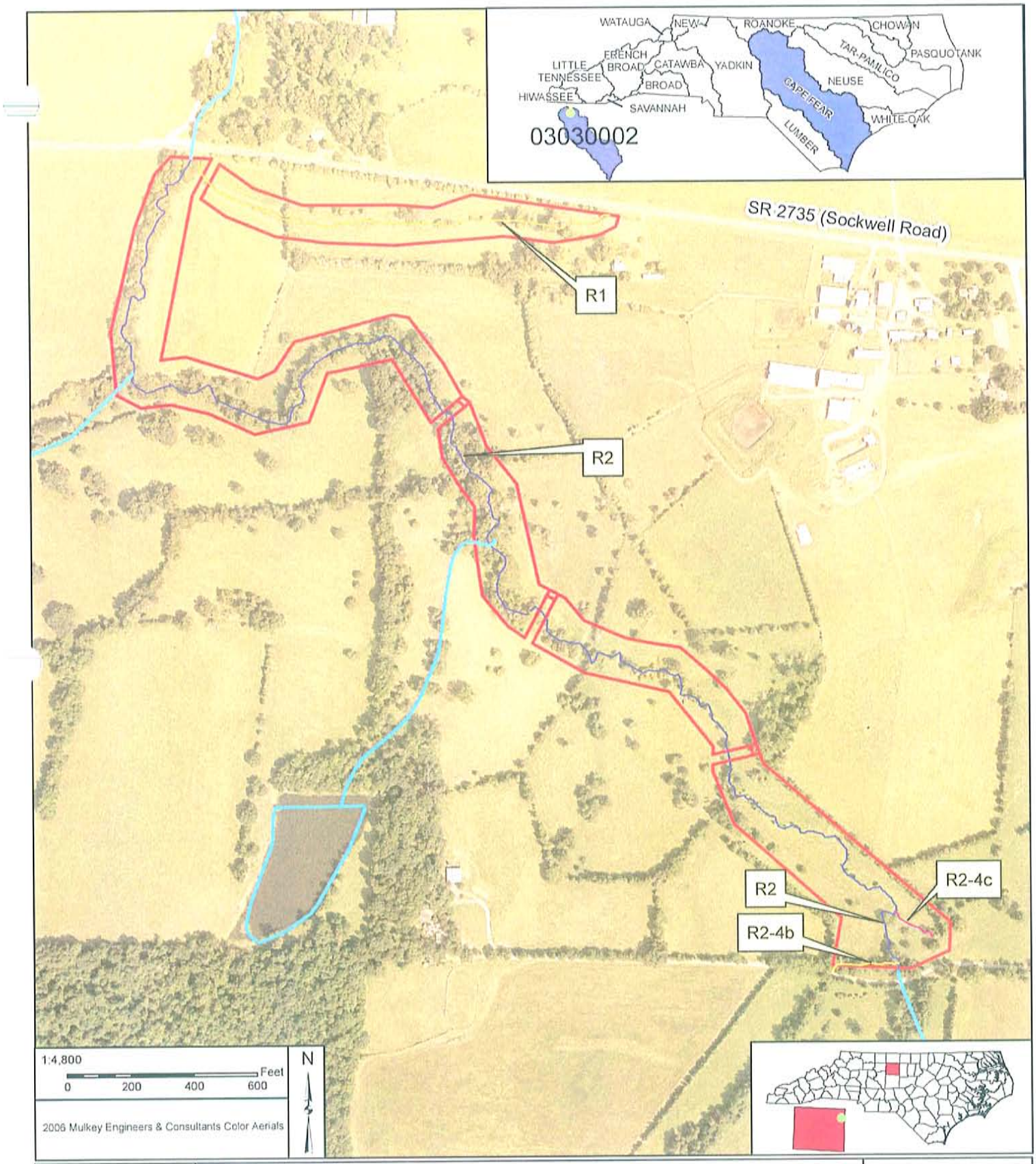
May 30, 2008

Figure 1

Ecosystem Planning

MULKEY

PROJECT NO. D06028-A



PROJECT MAP

TRIBUTARY TO REEDY FORK

GUILFORD COUNTY, NORTH CAROLINA

May 30, 2008

Figure 2

Ecosystem Enhancement

MULKEY

PROJECT NO. D06028-A

Table 1. Stream Restoration Summary

Project Number D06028-A (Tributary to Reedy Fork Stream Restoration)

Stream Channel Summary					
Stream Reach ID	**Priority Approach**	**Mitigation Type**	**Original Channel Length (lf)**	**Restored Channel Length (lf)**	**Stream Mitigation Units (SMU)***
R1	P1/P2	R	1409	1632	1600
R2-1	P2	R	906	819	819
R2-2	P1/P2	R	2522	853	853
	P2	EII		418	167
	P1/P2	R		1273	1213
R2-3	P2	R	1584	1771	1741
R2-4a	P2	R	289	231	195
R2-4b	P2	R	226	307	276
R2-4c	P2	R	157	208	208
		Totals	7093	7511	7072

* Stream Mitigation Units do not include restored channel outside of easement and within crossings.

Table 2. Designed Vegetative Communities Project Number D06028-A (Tributary to Reedy Fork Stream Restoration)				
Planting Zone	**Acres**	**Zone Description**	**Recommended Plant Species**	
			Scientific Name	**Common Name**
1	2.10	Stream Banks	*Betula nigra*	River birch
			Cephalanthus occidentalis	Buttonbush
			Cornus amomum	Silky dogwood
			Salix caroliniana	Carolina willow
			Salix nigra	Black willow
			Salix sericea	Silky willow
			Sambucus canadensis	Elderberry
2	5.50	Riparian Buffer	*Betula nigra*	River birch
			Quercus michauxii	Swamp chestnut oak
			Quercus nigra	Water oak
			Quercus phellos	Willow oak
3	0.12	Wetland Pockets/Oxbows	*Betula nigra*	River birch
			Quercus michauxii	Swamp chestnut oak
			Quercus nigra	Water oak
			Quercus phellos	Willow oak
4	12.30	Upland Buffer	*Diospyros virginiana*	Persimmon
			Pinus echinata	Shortleaf pine
			Pinus strobus	Eastern white pine
			Pinus virginiana	Virginia Pine
			Prunus serotina	Black cherry
			Quercus alba	White oak
			Quercus falcata	Southern red oak

Table 3. Vegetation Sampling Plot Information.

Vegetation Plot	Zone Description	Actual Plot Size, sq. meters (sq. feet)	Identified Species Common Name
1	Riparian/Upland	100.8 (1085.4)	River birch (1) Southern red oak (5) White oak (2) Willow oak (14) **Total – 22**
2	Riparian/Upland	99.6 (1072.3)	Persimmon (2) River birch (2) Shortleaf pine (1) Southern red oak (2) Virginia pine (3) White pine (3) White oak (1) Willow oak (4) **Total – 18**
3	Riparian/Upland	99.2 (1068.0)	River birch (5) Swamp chestnut oak (7) White pine (1) Willow oak (7) **Total – 20**
4	Riparian/Upland	101.4 (1091.7)	Black cherry (1) Persimmon (1) Shortleaf pine (3) Southern red oak (2) Virginia pine (1) Water oak (3) White oak (1) White pine (1) Willow oak (3) **Total – 16**
5	Riparian/Upland	100.6 (1082.8)	Shortleaf pine (2) Southern red oak (7) Water oak (1) White oak (2) Willow oak (1) **Total – 13**

( ) Denotes the number of species found within a particular vegetation plot (bareroot or live stake)
[A] Species designated for live staking at 1,742 stakes/acre, which is a 5' x 5' spacing.
Note: All bareroot species were planted at 680 stems/acre, which is an 8' x 8' spacing.

Table 3 contd. Vegetation Sampling Plot Information.

Vegetation Plot	Zone Description	Actual Plot Size, sq. meters (sq. feet)	Identified Species Common Name
6	Riparian	100.3 (1080.0)	River birch (1) Swamp chestnut oak (1) Water oak (14) Willow oak (8) **Total – 19**
7	Riparian/Upland	96.7 (1040.8)	Persimmon (4) Virginia pine (2) Water oak (3) Willow oak (7) **Total – 16**
8	Riparian	99.9 (1075.6)	River birch (4) Swamp chestnut oak (2) Water oak (10) Willow oak (8) **Total – 24**
9	Riparian/Upland	99.1 (1067.0)	Black willow (2) ^ River birch (4) Swamp chestnut oak (5) Water oak (7) White oak (1) **Total – 19**
10	Riparian	99.2 (1068.2)	River birch (5) Swamp chestnut oak (1) Water oak (6) Willow oak (5) **Total – 17**
11	Riparian/Upland	101.6 (1093.6)	Persimmon (6) Southern red oak (3) Water oak (4) Willow oak (2) White oak (3) **Total – 18**

( ) Denotes the number of species found within a particular vegetation plot (bareroot or live stake)
^ Species designated for live staking at 1,742 stakes/acre, which is a 5' x 5' spacing.
Note: All bareroot species were planted at 680 stems/acre, which is an 8' x 8' spacing.

Table 3 contd. Vegetation Sampling Plot Information.

Vegetation Plot	Zone Description	Actual Plot Size, sq. meters (sq. feet)	Identified Species Common Name
12	Upland	100.2 (1078.7)	Persimmon (1) Shortleaf pine (4) White pine (1) White Oak (3) Southern red oak (4) **Total – 13**
13	Riparian/Upland	98.6 (1060.9)	Persimmon (4) River birch (1) Shortleaf pine (3) Southern red oak (1) Swamp chestnut oak (4) White pine (2) Virginia pine (1) **Total – 16**
14	Riparian/Upland	104.2 (1121.6)	Black cherry (3) Persimmon (1) Shortleaf pine (4) Southern red oak (2) Water oak (2) White pine (1) Virginia pine (2) **Total – 15**
15	Riparian	100.2 (1078.5)	Persimmon (6) Silky dogwood (1) ^ Southern red oak (4) Swamp chestnut oak (3) White oak (6) Willow oak (2) **Total - 22**
16	Riparian	100.4 (1080.3)	River birch (1) Shortleaf pine (2) Southern red oak (2) Swamp chestnut oak (5) Virginia pine (2) Water oak (2) White oak (1) White pine (5) Willow oak (1) **Total – 21**

( ) Denotes the number of species found within a particular vegetation plot (bareroot or live stake)
^ Species designated for live staking at 1,742 stakes/acre, which is a 5' x 5' spacing.
Note: All bareroot species were planted at 680 stems/acre, which is an 8' x 8' spacing.

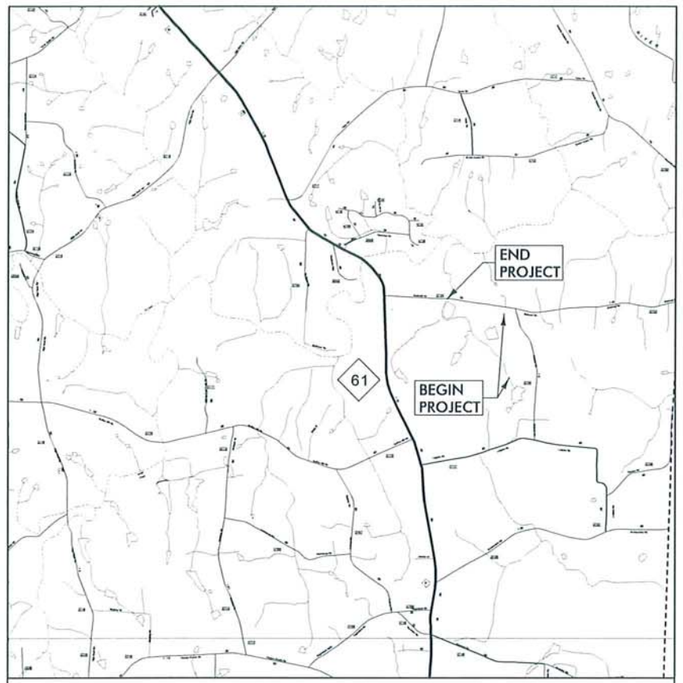
SCO ID NO. D06028–A

GUILFORD COUNTY

TRIBUTARY TO REEDY FORK STREAM RESTORATION SITE

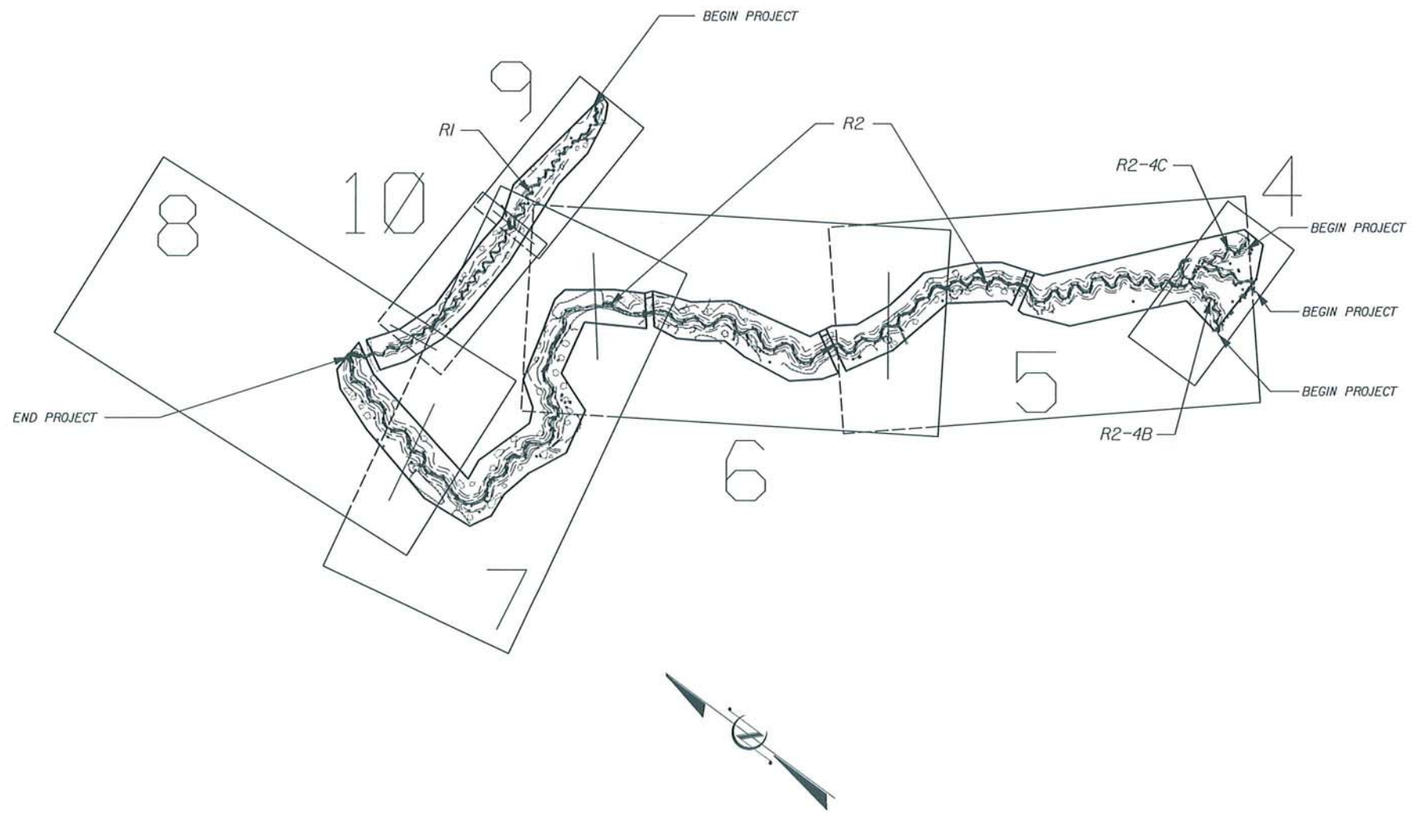
LOCATION: APPROXIMATELY 0.5 MILES EAST OF THE INTERSECTION OF NC 61 AND SR 2735 (SOCKWELL RD) AND IMMEDIATELY SOUTH OF SR 2735

AS–BUILT DRAWINGS



VICINITY MAP

NOT TO SCALE



NOT TO SCALE

INDEX OF SHEETS

SHEET NUMBER	SHEET
1	TITLE SHEET
2	LEGEND
3	PROJECT OVERVIEW
4 – 19	AS-BUILT DRAWINGS

REVISIONS		
DATE	BY	DESCRIPTION
6/2/08	JTL	AS-BUILT DRAWINGS

SCALE AS SHOWN

DATE:	6/2/08
DESIGNED:	WSH
DRAWN:	JTL
CHECKED:	WSH
APPROVED:	WSH

MULKEY PROJECT NUMBER
2006240.00

PLANS PREPARED BY:

MULKEY ENGINEERS & CONSULTANTS
PO Box 33127
Raleigh, N.C. 27636
(919) 851-1912
(919) 851-1918 (FAX)
www.mulkeyinc.com

MULKEY PROJECT MANAGER
WILLIAM SCOTT HUNT, III, PE

MULKEY SENIOR ENGINEER
WILLIAM SCOTT HUNT, III, PE

MULKEY SENIOR SCIENTIST
THOMAS BARRETT, RF

PROJECT ENGINEER

PLANS PREPARED FOR

TITLE SHEET

SHEET 1 OF 19

NOTE: NOT TO SCALE
Not all symbols used in plans

LEGEND

REVISIONS		
DATE	BY	DESCRIPTION
5/30/08	JTL	AS-BUILT DRAWINGS

TRIBUTARY TO REEDY FORK | SHEET NO. 2

LEGEND

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BOUNDARIES AND PROPERTY:

- State Line
- County Line
- Township Line
- City Line
- Reservation Line
- Property Line
- Existing Iron Pin (EIP)
- Property Corner
- Property Monument (ECM)
- Existing Fence
- Temporary Fence
- Proposed Woven Wire Fence
- Proposed Chain Link Fence
- Proposed Barbed Wire Fence
- Tree Protection Fence
- Wetland Boundary
- Proposed Oxbow Wetland Boundary (WLB)
- Conservation Easement
- Construction Limits
- Limits Of Disturbance
- Proposed Gate (G)
- Bench Mark
- Control Point

BUILDINGS AND OTHER CULTURE:

- Sign
- Foundation
- Area Outline
- Building
- School
- Church

HYDROLOGY:

- Hydro, Pool or Reservoir
- River Basin Buffer (RBB)
- Flow Arrow
- Disappearing Stream
- Spring
- Thalweg
- Top Of Bank
- Swamp Marsh
- Proposed Lateral, Tail, Head Ditch (flow)
- Bedrock

RAILROADS:

- Standard Guage (CSX TRANSPORTATION)
- RR Signal Milepost (MILEPOST 35)
- Switch (SWITCH)
- RR Abandoned

ROADS AND RELATED FEATURES:

- Existing Edge of Pavement
- Existing Curb
- Existing Soil Road
- Existing Metal Guardrail
- Existing Cable Guiderail

VEGETATION:

- Single Tree
- Single Shrub
- Hedge
- Woods Line
- Orchard
- Vineyard (Vineyard)

EXISTING STRUCTURES:

MAJOR:

- Bridge, Tunnel or Box Culvert (CONC)
- Bridge Wing Wall, Head Wall and End Wall (CONC WW)

MINOR:

- Head and End Wall (CONC HW)
- Pipe Culvert
- Footbridge
- Drainage Box: Catch Basin, DI or JB (CB)
- Paved Ditch Gutter
- Storm Sewer Manhole (S)
- Storm Sewer (S)

UTILITIES:

POWER:

- Existing Power Pole
- Existing Joint Use Pole
- Power Manhole (P)
- Power Line Tower
- Power Transformer
- U/G Power Cable Hand Hole (HH)
- H-Frame Pole
- Recorded U/G Power Line (P)

GAS:

- Gas Meter
- Recorded U/G Gas Line (G)
- Above Ground Gas Line (A/G Gas)

TELEPHONE:

- Existing Telephone Pole
- Telephone Manhole (T)
- Telephone Booth
- Telephone Pedestal
- Telephone Cell Tower
- U/G Telephone Cable Hand Hole (HH)
- Recorded U/G Telephone Cable (T)
- Recorded U/G Telephone Conduit (TC)
- Recorded U/G Fiber Optics Cable (T FO)

WATER:

- Water Manhole (W)
- Water Valve
- Water Hydrant
- Recorded U/G Water Line (W)
- Above Ground Water Line (A/G Water)

TV:

- TV Satellite Dish
- TV Pedestal (C)
- TV Tower
- U/G TV Cable Hand Hole (HH)
- Recorded U/G TV Cable (TV)
- Recorded U/G Fiber Optic Cable (TV FO)

MISCELLANEOUS:

- Utility Pole
- Utility Pole with Base
- Utility Located Object
- Utility Traffic Signal Box (S)
- Utility Unknown U/G Line (?UTL)
- U/G Tank; Water, Gas, Oil
- A/G Tank; Water, Gas, Oil
- Abandoned According to Utility Records (AATUR)
- End of Information (E.O.I.)

SANITARY SEWER:

- Sanitary Sewer Manhole (S)
- Sanitary Sewer Cleanout
- U/G Sanitary Sewer Line (SS)
- Above Ground Sanitary Sewer (A/G Sanitary Sewer)
- Recorded SS Forced Main Line (FSS)

PROPOSED STREAM WORK:

STREAM STRUCTURES:

- Rock Crossvane
- Rock Vane
- J Hook Rock Vane
- Flood Plane Interceptor
- Constructed Riffle
- Root Wad
- Log Weir
- Structure Number
- Constructed Flood Plane Interceptor

STREAM FEATURES:

- Constructed Bankfull/Top Of Bank
- Old Top Of Bank
- Constructed Thalweg
- Proposed Thalweg
- Waters Edge
- Old Waters Edge
- Vernal Pool
- Surface Water
- Staging Area
- Impervious Dike
- Permanent Improved Gravel Road
- Temporary Gravel Road
- Stone Outlet Sediment Trap
- Impervious Stream Channel Plug
- Fill Existing Stream Channel
- Vegetation Plot
- Brush Pile

MISCELLANEOUS:

- Photo Point (PP #1)
- Cross Section
- Crest Gauge

Legend

- Easement
- Restored Streams

PROJECT ENGINEER	PROJECT REFERENCE NO.	SHEET NO.
	TRIBUTARY TO REEDY FORK	3
	AS-BUILT DRAWING	

MULKEY
PO BOX 99127
RALEIGH, N.C. 27624
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(919) 851-1918 (FAX)
WWW.MULKEYINC.COM

N

1:1,800
1 inch equals 150 feet

REVISIONS		
DATE	BY	DESCRIPTION
5/30/08	JTL	AS-BUILT DRAWINGS

PROJECT ENGINEER

PROJECT REFERENCE NO.	SHEET NO.
TRIBUTARY TO REEDY FORK	4

AS-BUILT DRAWING

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EXISTING 24" RCP

GRAVEL DRIVEWAY

00+0

START R2 PROFILE SURVEY FOR MONITORING AT STA 0+36 -R2-

EXISTING 30" RCP

XS #1

START R2-4C PROFILE SURVEY FOR MONITORING AT STA 0+00 -R2-4C-

VEG PLOT #1

PASTURE

START R2-4B PROFILE SURVEY FOR MONITORING AT STA 0+31 -R2-4B-

XS #2

00+0

PASTURE

END R2-4B PROFILE SURVEY FOR MONITORING AT STA 1+31 -R2-4B-

CR-4

PP #1

VEG PLOT #3

PASTURE

END R2-4C PROFILE SURVEY FOR MONITORING AT STA 1+00 -R2-4C-

VEG PLOT #2

CR-3

CR-1

POINT# 100 (NAD 83 / 96)
N = 880763.207 ft
E = 1835215.966 ft
ELEV = 669.27 ft (NAVD 88)
#5 REBAR

POINT# 21 (NAD 83 / 96)
N = 880763.460 ft
E = 1835075.700 ft
ELEV = 671.79 ft (NAVD 88)
#5 REBAR

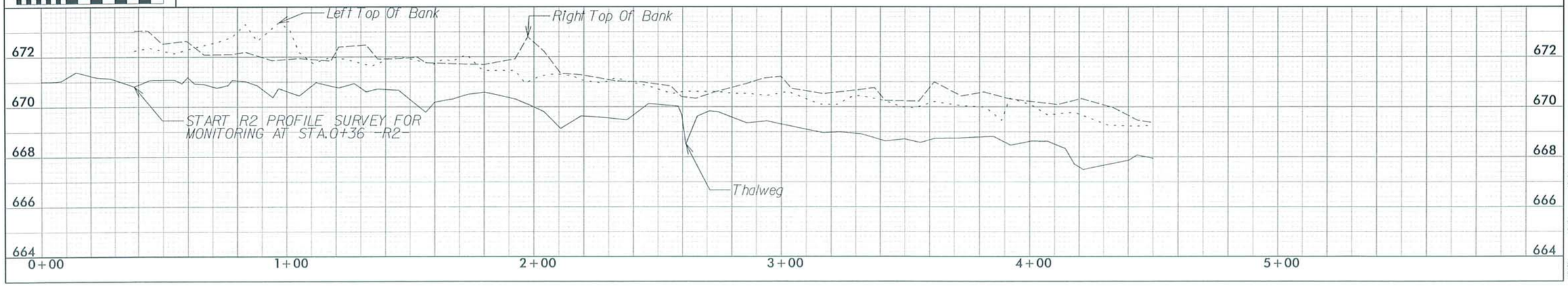
CONSERVATION EASEMENT

MATCH TO SHEET 5

PROJECT CONTROL			
PT	NORTHING	EASTING	ELEV
1	882635.486	1836650.439	709.24
3	883045.930	1833987.836	659.34
8	883176.140	1832887.260	639.98
9	883165.690	1833166.680	635.36
10	882996.250	1833092.760	630.95
11	882724.700	1833013.410	635.78
12	882530.290	1833120.310	644.73
13	882504.040	1833345.040	647.87
14	882624.010	1833599.280	652.25
15	882618.620	1833844.520	669.88
16	882245.430	1834077.110	663.16
17	881887.050	1834217.040	659.75
18	881689.020	1834268.580	657.91
19	881317.340	1834574.690	673.03
20	881247.830	1834861.440	665.04
21	880763.460	1835075.700	671.79
100	880763.207	1835215.966	669.27
101	880886.696	1834997.543	667.87
300	882831.020	1833936.544	662.64
301	882849.487	1833633.149	654.82
600	880847.484	1835232.374	670.54

20 0 40

* R2-4B & R2-4C PROFILES ARE ON SHEET NO. 12 *



PROJECT CONTROL			
PT	NORTHING	EASTING	ELEV
1	882635.486	1836650.439	709.24
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301	882849.487	1833633.149	654.82
600	880847.484	1835232.374	670.54

REVISIONS		
DATE	BY	DESCRIPTION
5/30/08	JTL	AS-BUILT DRAWINGS

PROJECT ENGINEER

PROJECT REFERENCE NO.	SHEET NO.
TRIBUTARY TO REEDY FORK	5

AS-BUILT DRAWING

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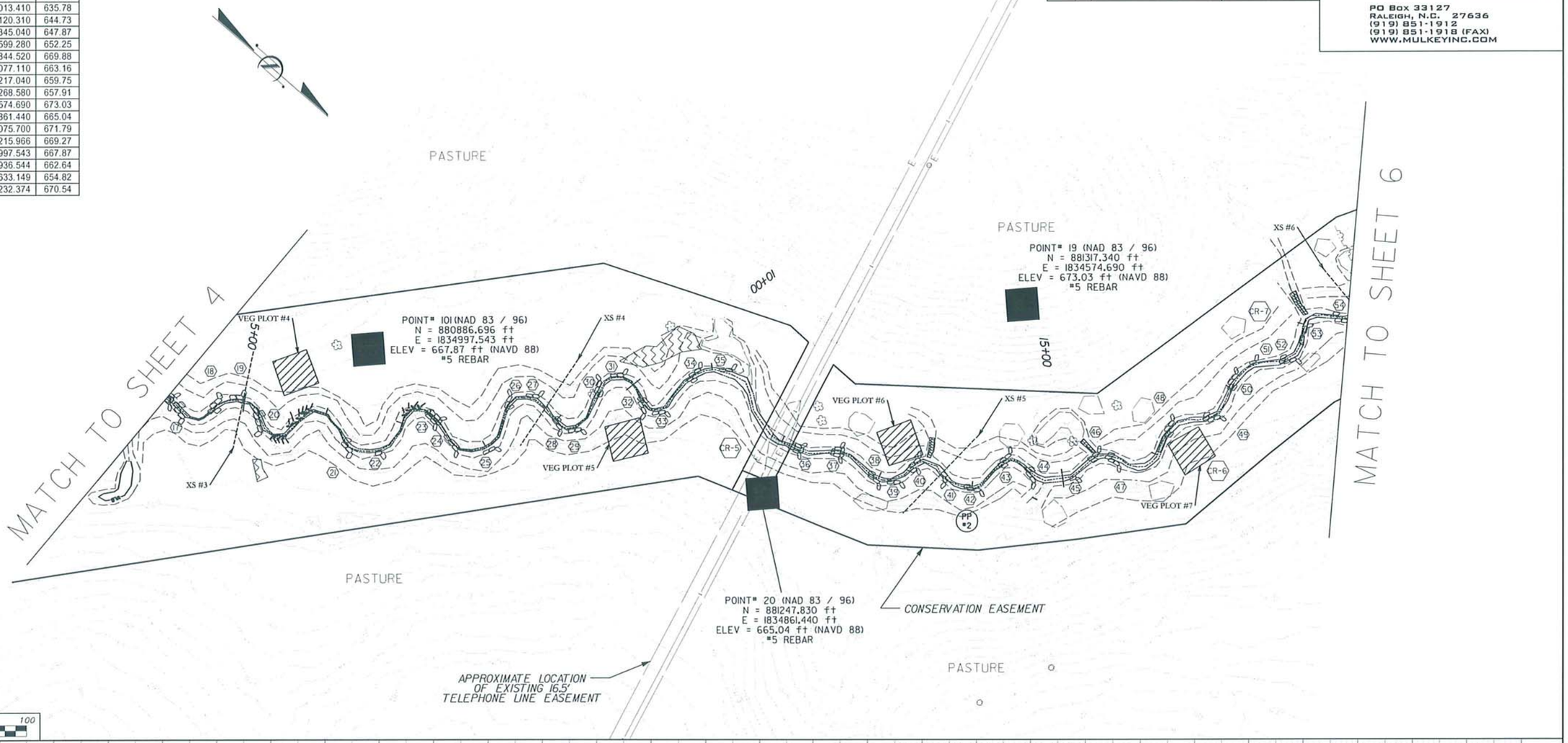

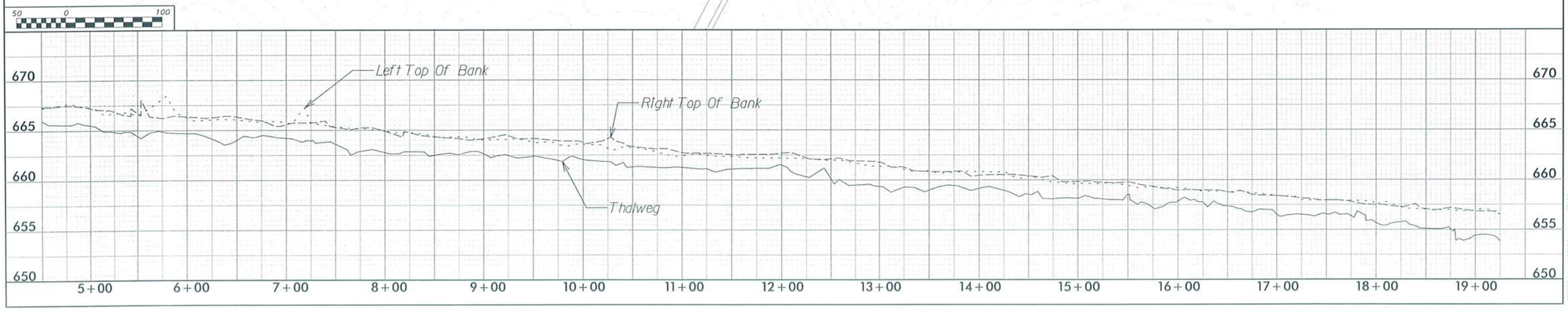

REVISIONS		
DATE	BY	DESCRIPTION
5/30/08	JTL	AS-BUILT DRAWINGS

PROJECT ENGINEER

PROJECT REFERENCE NO.	SHEET NO.
TRIBUTARY TO REEDY FORK	6

AS-BUILT DRAWING

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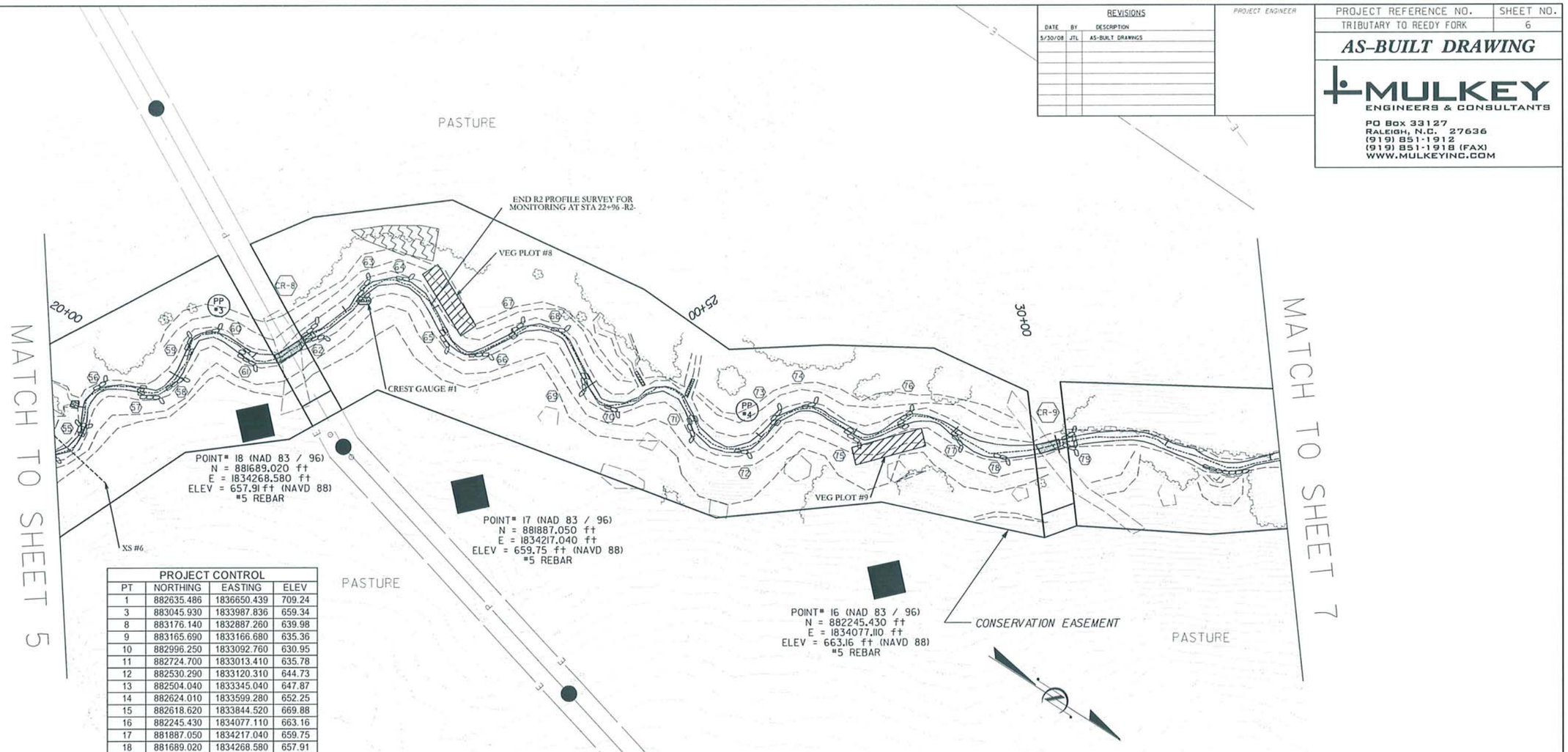

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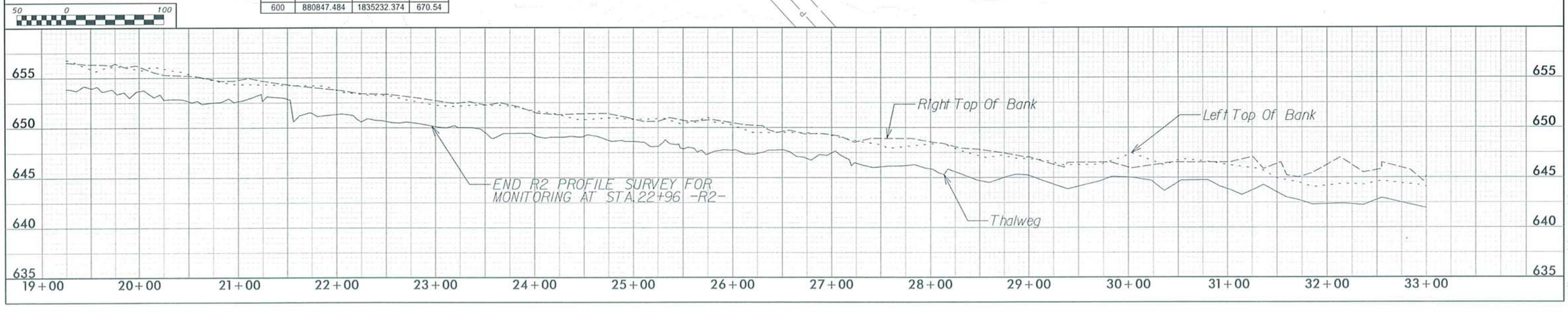

REVISIONS		
DATE	BY	DESCRIPTION
5/30/08	JTL	AS-BUILT DRAWINGS

PROJECT ENGINEER

PROJECT REFERENCE NO.	SHEET NO.
TRIBUTARY TO REEDY FORK	7

AS-BUILT DRAWING

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PROJECT CONTROL			
PT	NORTHING	EASTING	ELEV
1	882635.486	1836650.439	709.24
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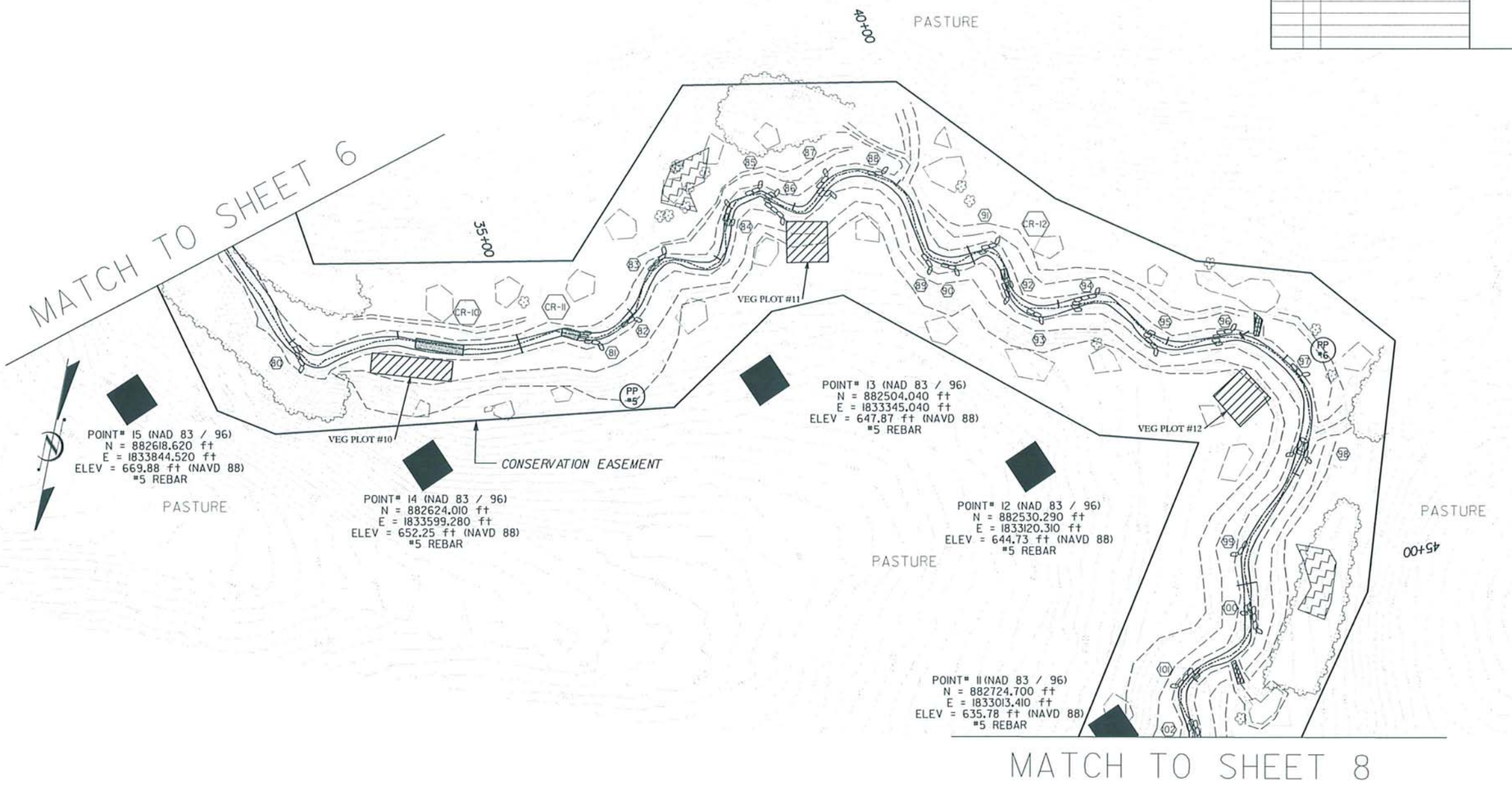

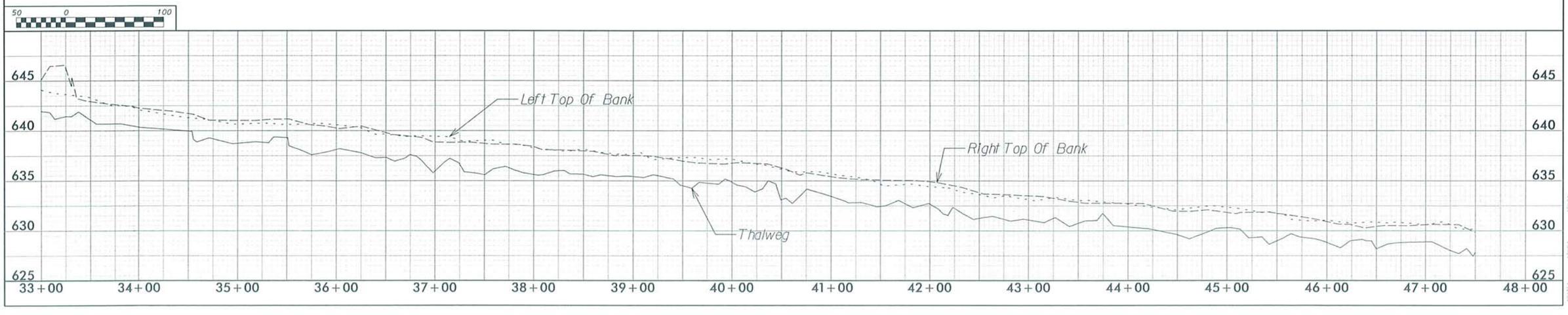

REVISIONS		
DATE	BY	DESCRIPTION
5/30/08	JTL	AS-BUILT DRAWINGS

PROJECT ENGINEER

PROJECT REFERENCE NO.	SHEET NO.
TRIBUTARY TO REEDY FORK	8

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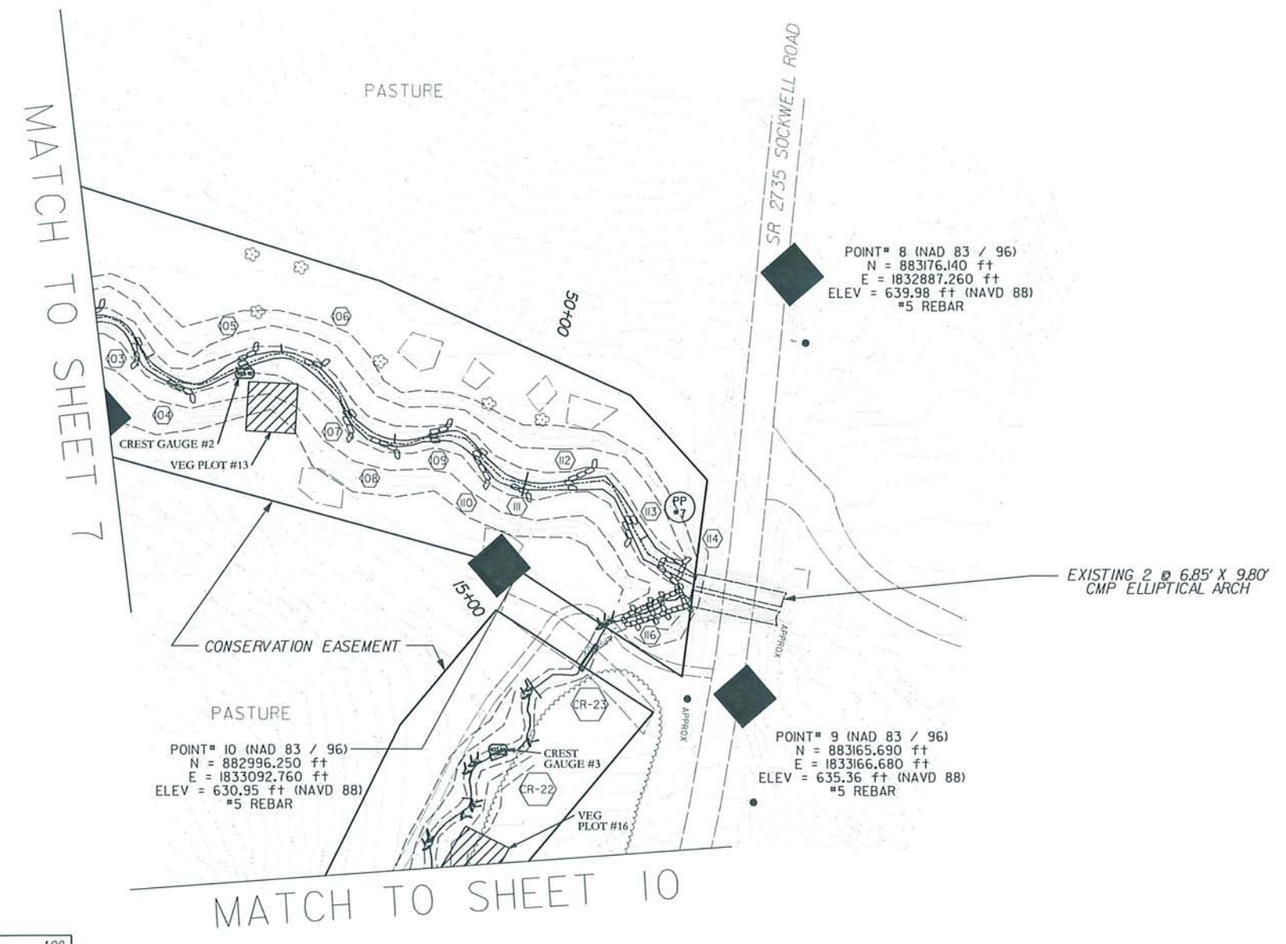
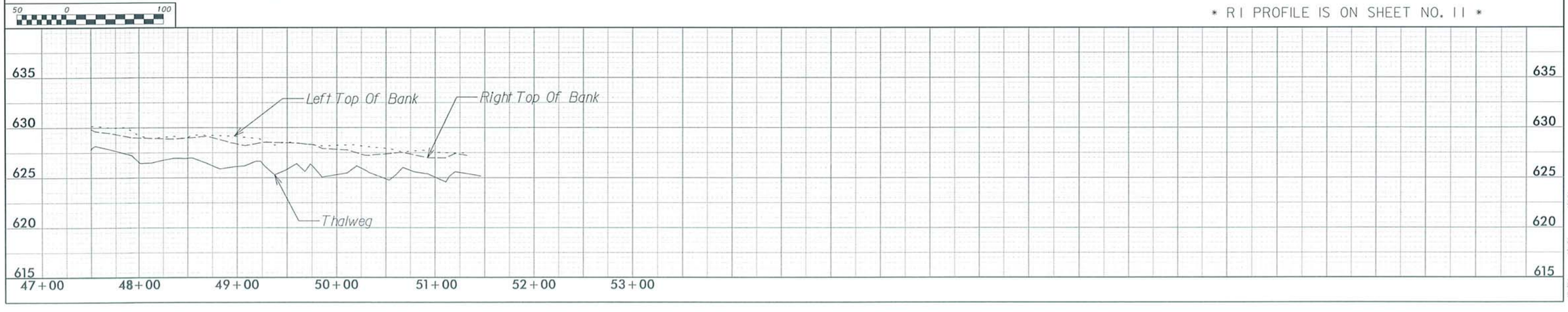


* R1 PROFILE IS ON SHEET NO. 11 *



PROJECT CONTROL			
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600	880847.484	1835232.374	670.54

REVISIONS		
DATE	BY	DESCRIPTION
5/30/08	JTL	AS-BUILT DRAWINGS

PROJECT ENGINEER

PROJECT REFERENCE NO.	SHEET NO.
TRIBUTARY TO REEDY FORK	9

AS-BUILT DRAWING

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POINT# 300 (NAD 83 / 96)
N = 882831.020 ft
E = 1833936.544 ft
ELEV = 662.64 ft (NAVD 88)
#5 REBAR

PASTURE

END R1 PROFILE SURVEY FOR MONITORING AT STA 5+00 -R1-

CONSERVATION EASEMENT

VEG PLOT #14

XS #7

5+00

CR-13

CR-14

CR-15

CR-16

CR-17

115

0+00

PASTURE

MATCH TO SHEET 10

SR 2735 SOCKWELL ROAD

POINT# 3 (NAD 83 / 96)
N = 883045.930 ft
E = 1833987.836 ft
ELEV = 659.34 ft (NAVD 88)
#5 REBAR

START R1 PROFILE SURVEY FOR MONITORING AT STA 0+00 -R1-

20 0 40

SEE SHEET NO. 11 FOR -R1- PROFILE

REVISIONS		
DATE	BY	DESCRIPTION
5/30/08	JTL	AS-BUILT DRAWINGS

PROJECT ENGINEER

PROJECT REFERENCE NO.	SHEET NO.
TRIBUTARY TO REEDY FORK	10

AS-BUILT DRAWING

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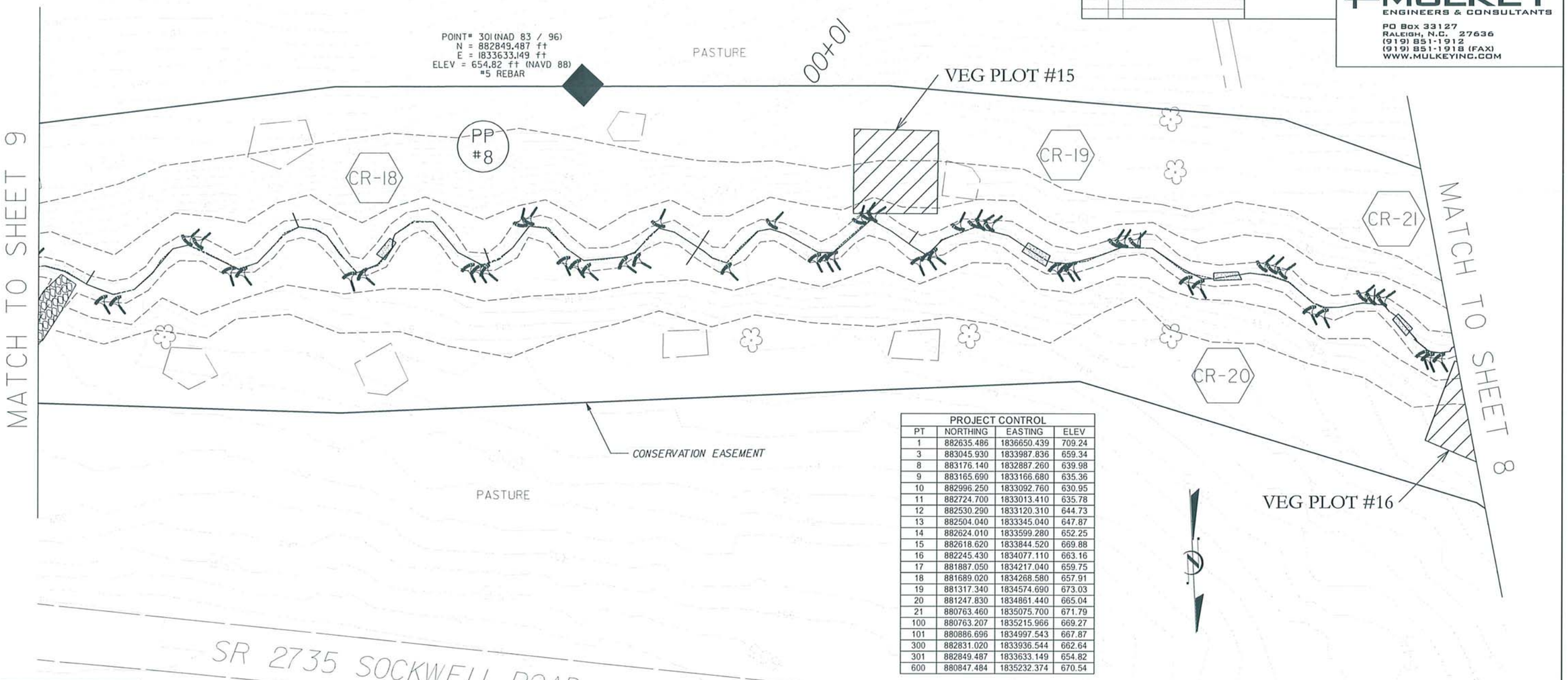
PO Box 33127
RALEIGH, N.C. 27636
(919) 851-1912
(919) 851-1918 (FAX)
WWW.MULKEYINC.COM



PROJECT CONTROL			
PT	NORTHING	EASTING	ELEV
1	882635.486	1836650.439	709.24
3	883045.930	1833987.836	659.34
8	883176.140	1832887.260	639.98
9	883165.690	1833166.680	635.36
10	882996.250	1833092.760	630.95
11	882724.700	1833013.410	635.78
12	882530.290	1833120.310	644.73
13	882504.040	1833345.040	647.87
14	882624.010	1833599.280	652.25
15	882618.620	1833844.520	669.88
16	882245.430	1834077.110	663.16
17	881887.050	1834217.040	659.75
18	881689.020	1834268.580	657.91
19	881317.340	1834574.690	673.03
20	881247.830	1834861.440	665.04
21	880763.460	1835075.700	671.79
100	880763.207	1835215.966	669.27
101	880886.696	1834997.543	667.87
300	882831.020	1833936.544	662.64
301	882849.487	1833633.149	654.82
600	880847.484	1835232.374	670.54

SEE SHEET NO. 11 FOR -R1- PROFILE

AS-BUILT PROFILES

REVISIONS		
DATE	BY	DESCRIPTION
5/30/08	JTL	AS-BUILT DRAWINGS

PROJECT ENGINEER

PROJECT REFERENCE NO.	SHEET NO.
TRIBUTARY TO REEDY FORK	11

AS-BUILT DRAWING

MULKEY
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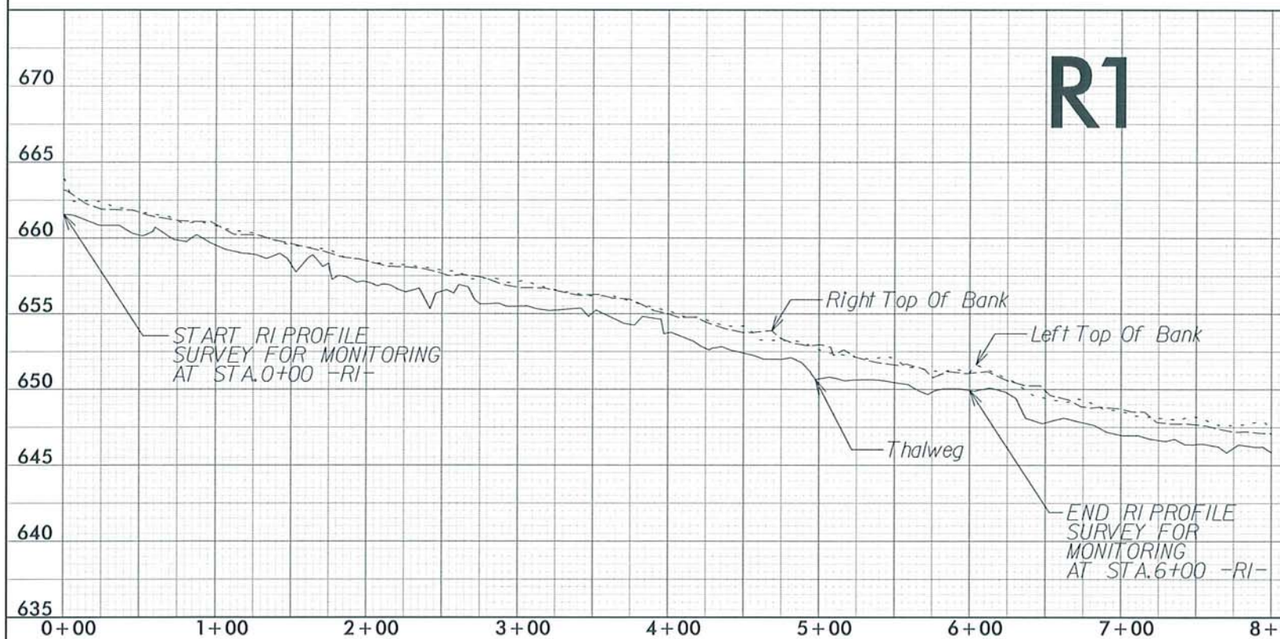
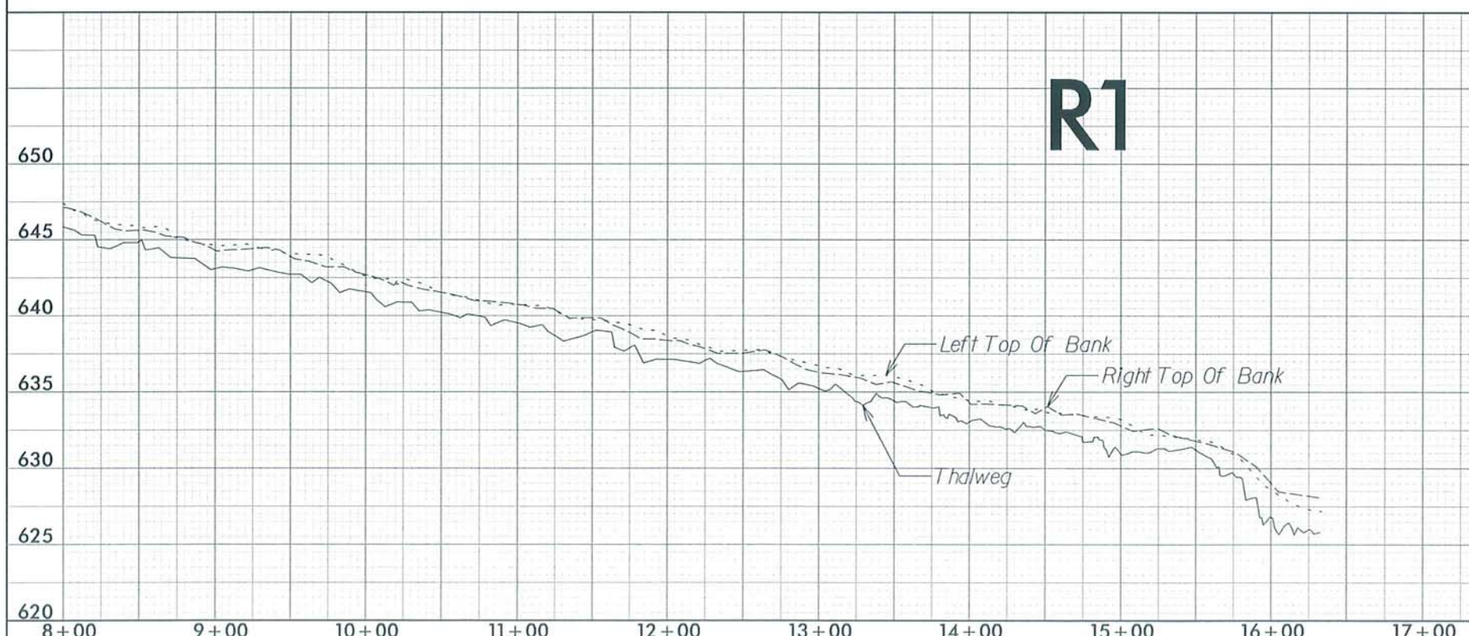
HORIZONTAL SCALE 50 0 100

VERTICAL SCALE 5 0 10

R1



R1



AS-BUILT PROFILES

REVISIONS		
DATE	BY	DESCRIPTION
5/30/08	JTL	AS-BUILT DRAWINGS

PROJECT ENGINEER

PROJECT REFERENCE NO. | SHEET NO.
TRIBUTARY TO REEDY FORK | 12

AS-BUILT DRAWING

MULKEY
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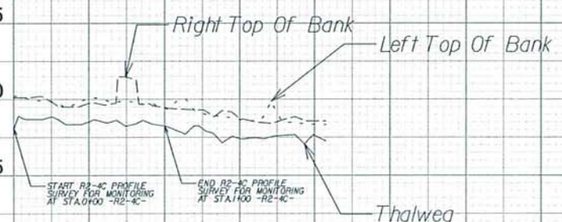
HORIZONTAL SCALE 50 0 100
VERTICAL SCALE 5 0 10

R2-4B

690 685 680 675 670 665 660 655

0+00 1+00 2+00 3+00 4+00

R2-4C



680 675 670 665 660 655 650

0+00 1+00 2+00 3+00

REVISIONS		
DATE	BY	DESCRIPTION
5/30/08	JTL	AS-BUILT DRAWINGS

PROJECT ENGINEER

PROJECT REFERENCE NO.	SHEET NO.
TRIBUTARY TO REEDY FORK	13

AS-BUILT DRAWING

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EXISTING 24" RCP

00+0

START R2 PROFILE SURVEY FOR MONITORING AT STA 0+36 -R2-

GRAVEL DRIVEWAY

EXISTING 30" RCP

XS #1

START R2-4C PROFILE SURVEY FOR MONITORING AT STA 0+00 -R2-4C-

XS #2

00+0

VEG PLOT #1

PASTURE

CR-2

00+0

START R2-4B PROFILE SURVEY FOR MONITORING AT STA 0+31 -R2-4B-

PASTURE

END R2-4B PROFILE SURVEY FOR MONITORING AT STA 1+31 -R2-4B-

VEG PLOT #3

CR-4

PP #1

PASTURE

END R2-4C PROFILE SURVEY FOR MONITORING AT STA 1+00 -R2-4C-

VEG PLOT #2

CR-3

CR-1

POINT* 100 (NAD 83 / 96)
N = 880763.207 ft
E = 1835215.966 ft
ELEV = 669.27 ft (NAVD 88)
#5 REBAR

POINT* 21 (NAD 83 / 96)
N = 880763.460 ft
E = 1835075.700 ft
ELEV = 671.79 ft (NAVD 88)
#5 REBAR

CONSERVATION EASEMENT

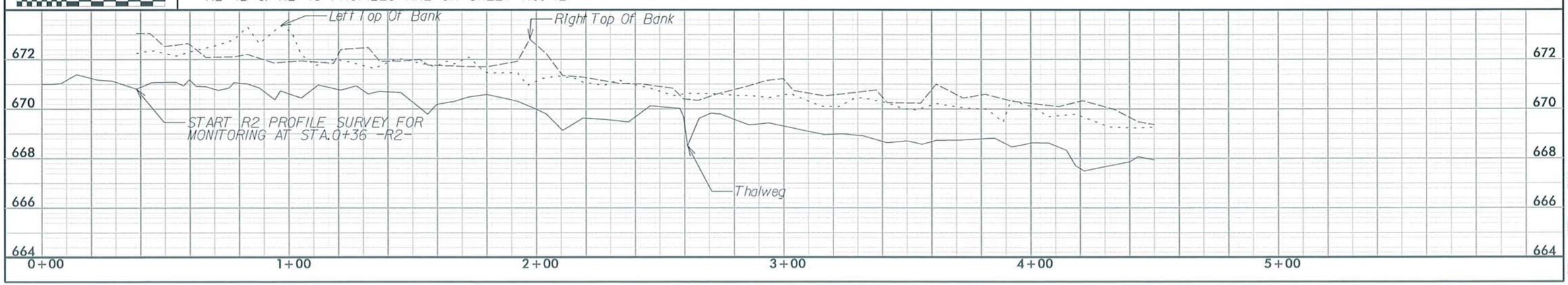
MATCH TO SHEET 14

PROJECT CONTROL			
PT	NORTHING	EASTING	ELEV
1	882635.486	1836650.439	709.24
3	883045.930	1833987.836	659.34
8	883176.140	1832887.260	639.98
9	883165.690	1833166.680	635.36
10	882996.250	1833092.760	630.95
11	882724.700	1833013.410	635.78
12	882530.290	1833120.310	644.73
13	882504.040	1833345.040	647.87
14	882624.010	1833599.280	652.25
15	882618.620	1833844.520	669.88
16	882245.430	1834077.110	663.16
17	881887.050	1834217.040	659.75
18	881689.020	1834268.580	657.91
19	881317.340	1834574.690	673.03
20	881247.830	1834861.440	665.04
21	880763.460	1835075.700	671.79
100	880763.207	1835215.966	669.27
101	880886.696	1834997.543	667.87
300	882831.020	1833936.544	662.64
301	882849.487	1833633.149	654.82
600	880847.484	1835232.374	670.54

RED DENOTES PROPOSED DESIGN

20 0 40

* R2-4B & R2-4C PROFILES ARE ON SHEET NO. 12 *



PROJECT CONTROL			
PT	NORTHING	EASTING	ELEV
1	882635.486	1836650.439	709.24
3	883045.930	1833987.836	659.34
8	883176.140	1832887.260	639.98
9	883165.690	1833166.680	635.36
10	882996.250	1833092.760	630.95
11	882724.700	1833013.410	635.78
12	882530.290	1833120.310	644.73
13	882504.040	1833345.040	647.87
14	882624.010	1833599.280	652.25
15	882618.620	1833844.520	669.88
16	882245.430	1834077.110	663.16
17	881887.050	1834217.040	659.75
18	881689.020	1834268.580	657.91
19	881317.340	1834574.690	673.03
20	881247.830	1834861.440	665.04
21	880763.460	1835075.700	671.79
100	880763.207	1835215.966	669.27
101	880886.696	1834997.543	667.87
300	882831.020	1833936.544	662.64
301	882849.487	1833633.149	654.82
600	880847.484	1835232.374	670.54

REVISIONS		
DATE	BY	DESCRIPTION
5/30/08	JTL	AS-BUILT DRAWINGS

PROJECT ENGINEER

PROJECT REFERENCE NO.	SHEET NO.
TRIBUTARY TO REEDY FORK	14

AS-BUILT DRAWING

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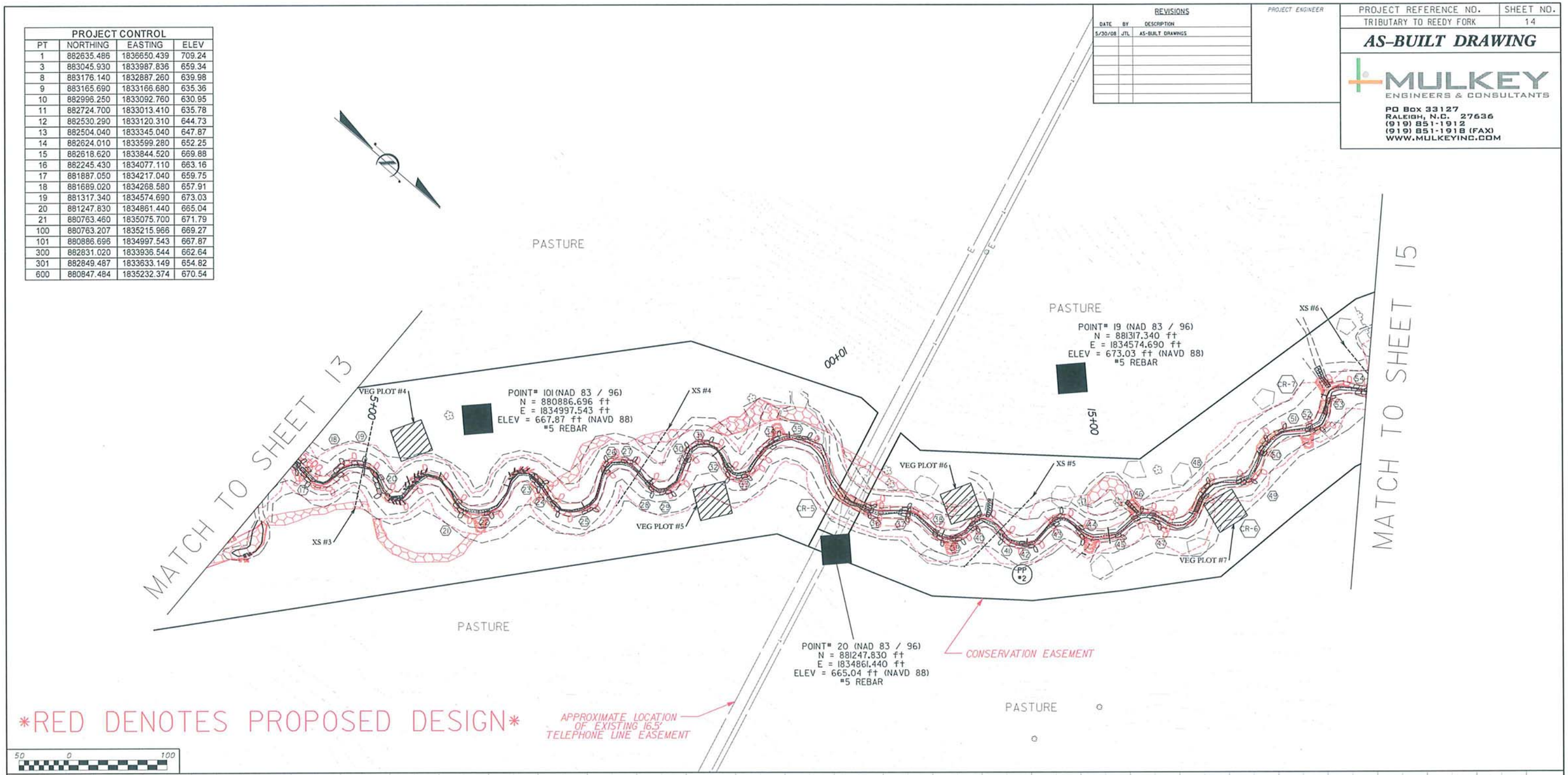
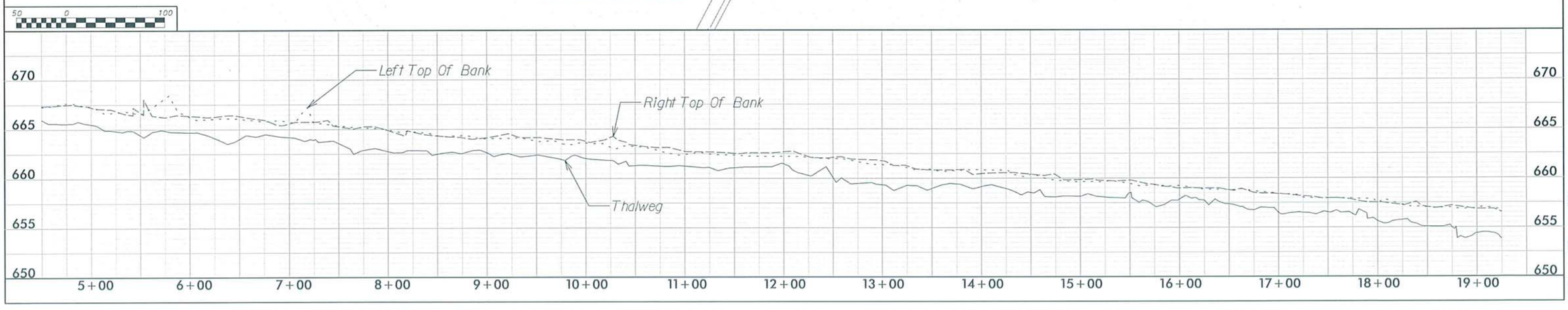


RED DENOTES PROPOSED DESIGN



REVISIONS		
DATE	BY	DESCRIPTION
5/30/08	JTL	AS-BUILT DRAWINGS

PROJECT ENGINEER

PROJECT REFERENCE NO.	SHEET NO.
TRIBUTARY TO REEDY FORK	15

AS-BUILT DRAWING

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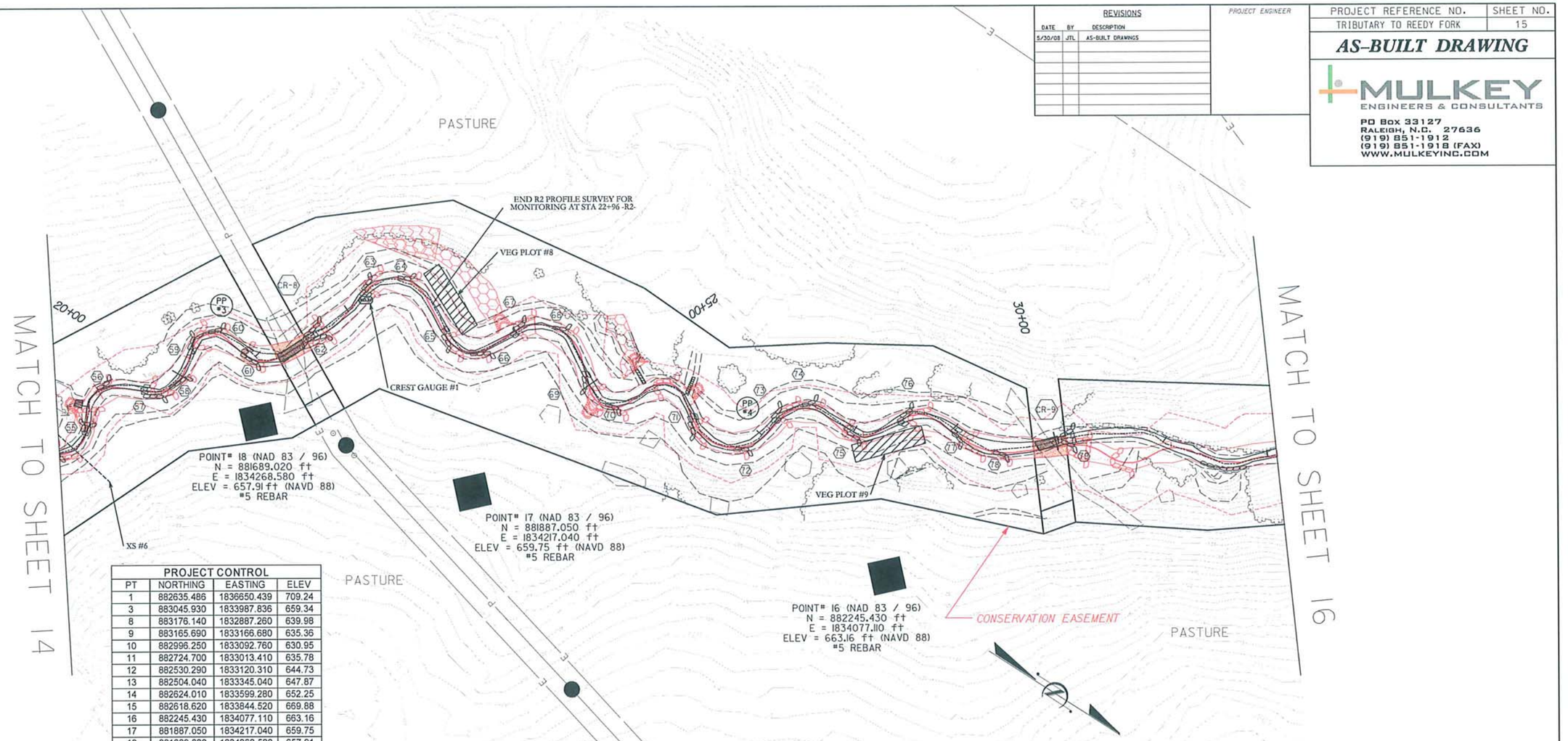
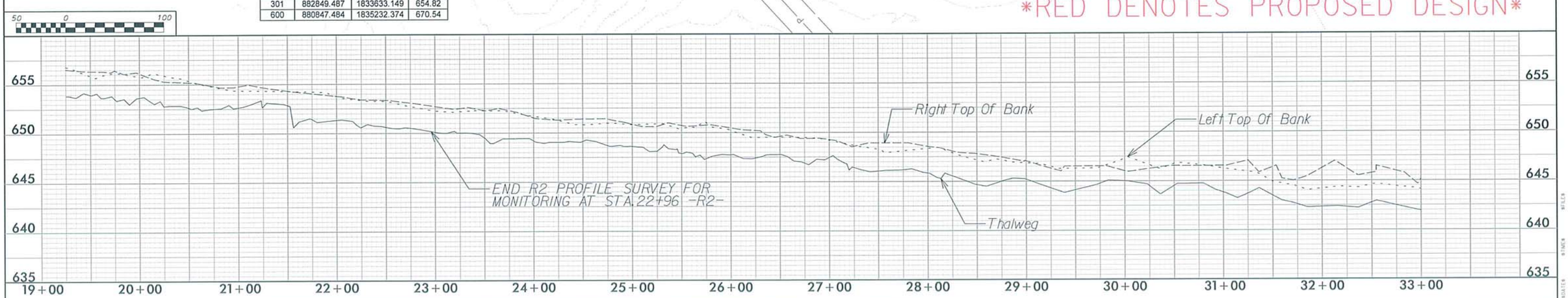


PROJECT CONTROL			
PT	NORTHING	EASTING	ELEV
1	882635.486	1836650.439	709.24
3	883045.930	1833987.836	659.34
8	883176.140	1832887.260	639.98
9	883165.690	1833166.680	635.36
10	882996.250	1833092.760	630.95
11	882724.700	1833013.410	635.78
12	882530.290	1833120.310	644.73
13	882504.040	1833345.040	647.87
14	882624.010	1833599.280	652.25
15	882618.620	1833844.520	669.88
16	882245.430	1834077.110	663.16
17	881887.050	1834217.040	659.75
18	881689.020	1834268.580	657.91
19	881317.340	1834574.690	673.03
20	881247.830	1834861.440	665.04
21	880763.460	1835075.700	671.79
100	880763.207	1835215.966	669.27
101	880886.696	1834997.543	667.87
300	882831.020	1833936.544	662.64
301	882849.487	1833633.149	654.82
600	880847.484	1835232.374	670.54

RED DENOTES PROPOSED DESIGN



REVISIONS		
DATE	BY	DESCRIPTION
5/30/08	JTL	AS-BUILT DRAWINGS

PROJECT ENGINEER

PROJECT REFERENCE NO.	SHEET NO.
TRIBUTARY TO REEDY FORK	16

AS-BUILT DRAWING

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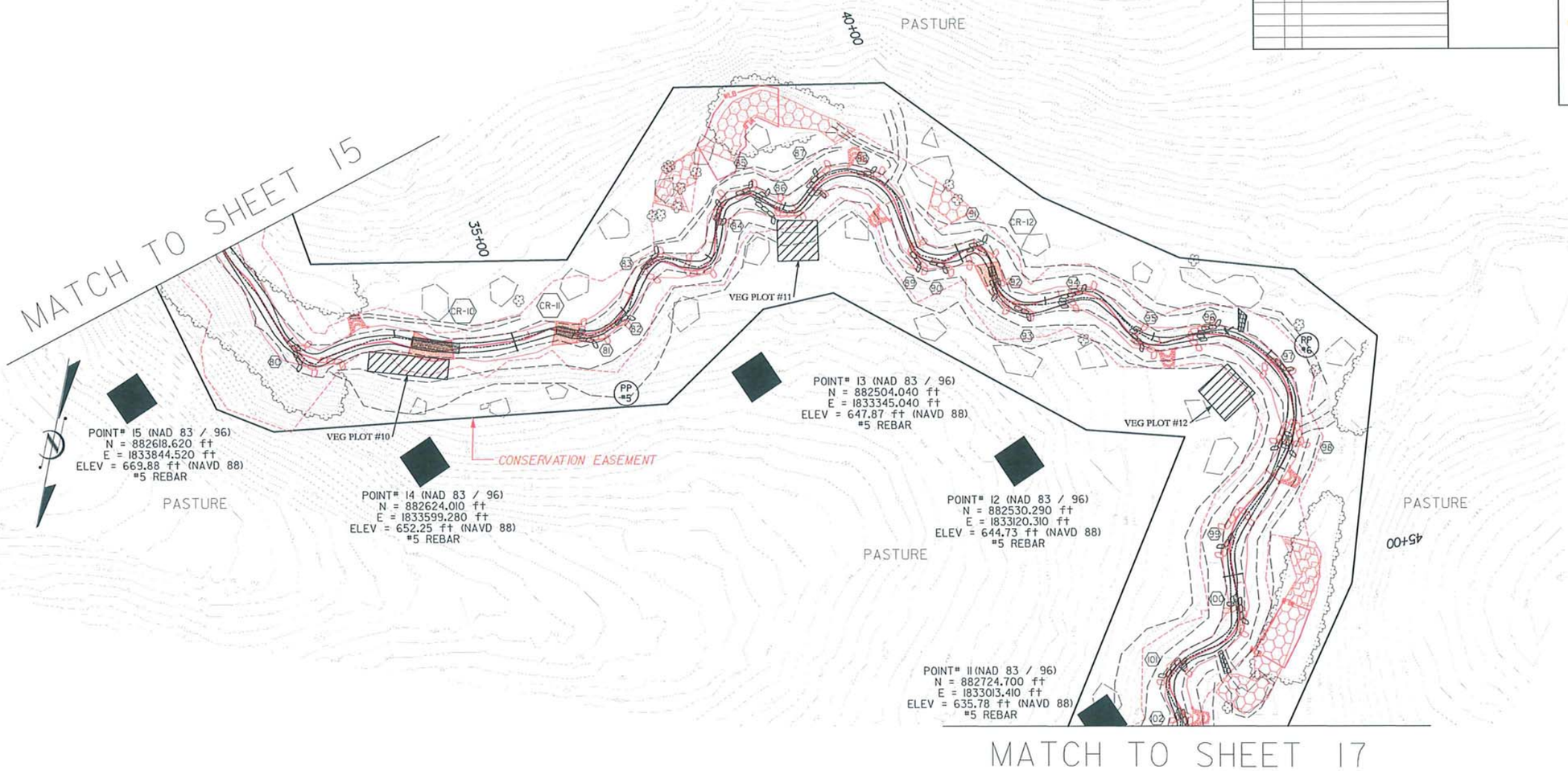
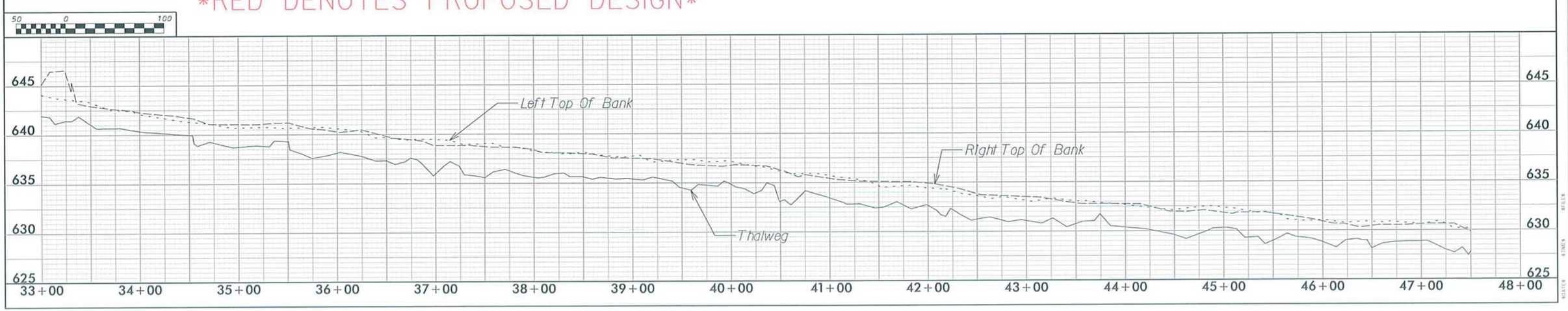
PROJECT CONTROL			
PT	NORTHING	EASTING	ELEV
1	882635.486	1836650.439	709.24
3	883045.930	1833987.836	659.34
8	883176.140	1832887.260	639.98
9	883165.690	1833166.680	635.36
10	882996.250	1833092.760	630.95
11	882724.700	1833013.410	635.78
12	882530.290	1833120.310	644.73
13	882504.040	1833345.040	647.87
14	882624.010	1833599.280	652.25
15	882618.620	1833844.520	669.88
16	882245.430	1834077.110	663.16
17	881887.050	1834217.040	659.75
18	881689.020	1834268.580	657.91
19	881317.340	1834574.690	673.03
20	881247.830	1834861.440	665.04
21	880763.460	1835075.700	671.79
100	880763.207	1835215.966	669.27
101	880886.696	1834997.543	667.87
300	882831.020	1833936.544	662.64
301	882849.487	1833633.149	654.82
600	880847.484	1835232.374	670.54



RED DENOTES PROPOSED DESIGN



REVISIONS		
DATE	BY	DESCRIPTION
5/30/08	JTL	AS-BUILT DRAWINGS

PROJECT ENGINEER

PROJECT REFERENCE NO.	SHEET NO.
TRIBUTARY TO REEDY FORK	17

AS-BUILT DRAWING

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PROJECT CONTROL			
PT	NORTHING	EASTING	ELEV
1	882635.486	1836650.439	709.24
3	883045.930	1833987.836	659.34
8	883176.140	1832887.260	639.98
9	883165.690	1833166.680	635.36
10	882996.250	1833092.760	630.95
11	882724.700	1833013.410	635.78
12	882530.290	1833120.310	644.73
13	882504.040	1833345.040	647.87
14	882624.010	1833599.280	652.25
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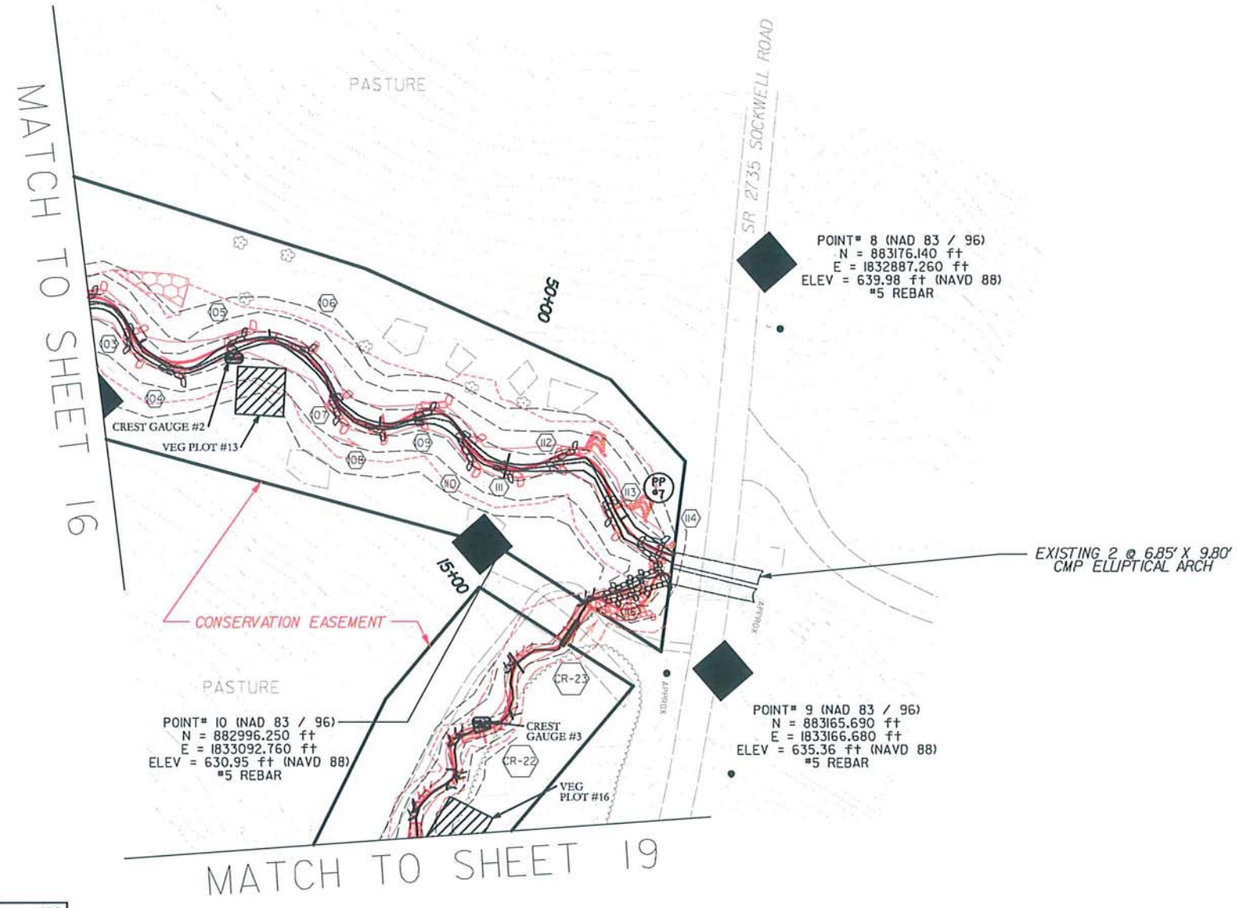
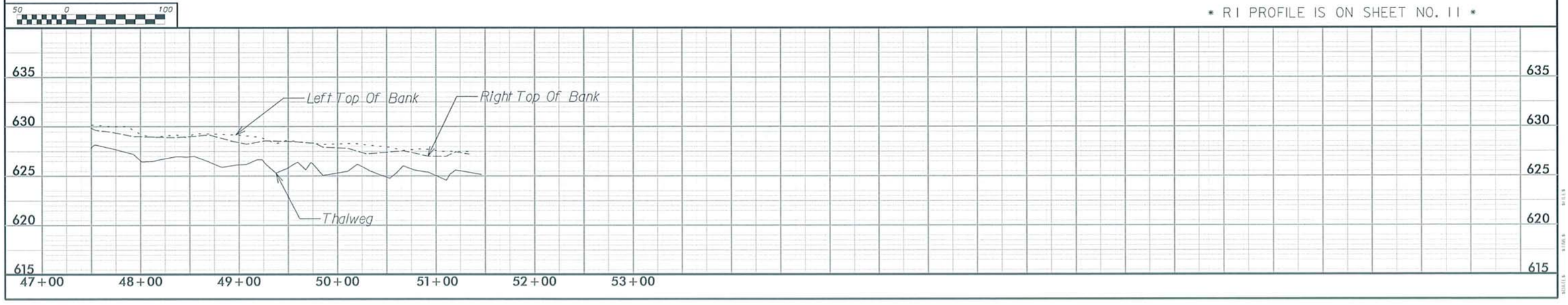
20	881247.830	1834861.440	665.04
21	880763.460	1835075.700	671.79
100	880763.207	1835215.966	669.27
101	880886.696	1834997.543	667.87
300	882831.020	1833936.544	662.64
301	882849.487	1833633.149	654.82
600	880847.484	1835232.374	670.54



RED DENOTES PROPOSED DESIGN

* R1 PROFILE IS ON SHEET NO. 11 *



PROJECT CONTROL			
PT	NORTHING	EASTING	ELEV
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3	883045.930	1833987.836	659.34
8	883176.140	1832887.260	639.98
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10	882996.250	1833092.760	630.95
11	882724.700	1833013.410	635.78
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15	882618.620	1833844.520	669.88
16	882245.430	1834077.110	663.16
17	881887.050	1834217.040	659.75
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19	881317.340	1834574.690	673.03
20	881247.830	1834861.440	665.04
21	880763.460	1835075.700	671.79
100	880763.207	1835215.966	669.27
101	880886.696	1834997.543	667.87
300	882831.020	1833936.544	662.64
301	882849.487	1833633.149	654.82
600	880847.484	1835232.374	670.54

REVISIONS		
DATE	BY	DESCRIPTION
5/30/08	JTL	AS-BUILT DRAWINGS

PROJECT ENGINEER

PROJECT REFERENCE NO.	SHEET NO.
TRIBUTARY TO REEDY FORK	18

AS-BUILT DRAWING

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RED DENOTES PROPOSED DESIGN

CONSERVATION EASEMENT

VEG PLOT #14

XS #7

END R1 PROFILE SURVEY FOR MONITORING AT STA 6+00 -R1-

POINT# 300 (NAD 83 / 96)
N = 882831.020 ft
E = 1833936.544 ft
ELEV = 662.64 ft (NAVD 88)
#5 REBAR

PASTURE

CR-13

CR-14

CR-15

CR-16

CR-17

115

0+00

6+00

PASTURE

SR 2735 SOCKWELL ROAD

START R1 PROFILE SURVEY FOR MONITORING AT STA 0+00 -R1-

POINT# 3 (NAD 83 / 96)
N = 883045.930 ft
E = 1833987.836 ft
ELEV = 659.34 ft (NAVD 88)
#5 REBAR

MATCH TO SHEET 19

20 0 40

SEE SHEET NO. 11 FOR -R1- PROFILE

*RED DENOTES
PROPOSED DESIGN*

REVISIONS		
DATE	BY	DESCRIPTION
5/30/08	JTL	AS-BUILT DRAWINGS

PROJECT ENGINEER

PROJECT REFERENCE NO.	SHEET NO.
TRIBUTARY TO REEDY FORK	19

AS-BUILT DRAWING

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POINT# 301 (NAD 83 / 96)
N = 882849.487 ft
E = 1833633.149 ft
ELEV = 654.82 ft (NAVD 88)
#5 REBAR

PASTURE

10+00

VEG PLOT #15

PP #8

CR-18

CR-19

CR-21

CR-20

MATCH TO SHEET 18

MATCH TO SHEET 17

CONSERVATION EASEMENT

PASTURE

VEG PLOT #16

SR 2735 SOCKWELL ROAD

20 0 40

PROJECT CONTROL			
PT	NORTHING	EASTING	ELEV
1	882635.486	1836650.439	709.24
3	883045.930	1833987.836	659.34
8	883176.140	1832887.260	639.98
9	883165.690	1833166.680	635.36
10	882996.250	1833092.760	630.95
11	882724.700	1833013.410	635.78
12	882530.290	1833120.310	644.73
13	882504.040	1833345.040	647.87
14	882624.010	1833599.280	652.25
15	882618.620	1833844.520	669.88
16	882245.430	1834077.110	663.16
17	881887.050	1834217.040	659.75
18	881689.020	1834268.580	657.91
19	881317.340	1834574.690	673.03
20	881247.830	1834861.440	665.04
21	880763.460	1835075.700	671.79
100	880763.207	1835215.966	669.27
101	880886.696	1834997.543	667.87
300	882831.020	1833936.544	662.64
301	882849.487	1833633.149	654.82
600	880847.484	1835232.374	670.54

SEE SHEET NO. 11 FOR -R1- PROFILE

Click on the Desired Link Below

Section 2