BASELINE MONITORING DOCUMENT AND AS-BUILT BASELINE REPORT

Final

AGONY ACRES MITIGATION SITE

Guilford County, NC
DENR Contract 004949
NCEEP Project Number 95716

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EXECUTIVE SUMMARY

Wildlands Engineering, Inc. (Wildlands) completed a full delivery project at the Agony Acres Mitigation Site (Site) for the North Carolina Ecosystem Enhancement Program (NCEEP) to restore, enhance, and preserve a total of 9,195 linear feet (LF) of perennial and intermittent stream in Guilford County, NC. The Site generated 6,596 Stream Mitigation Units (SMUs) and 3.0 Buffer Mitigation Units (BMUs). This site is located in the Reedy Fork Watershed within Cape Fear River Basin Hydrologic Unit Code (HUC) 03030002 (Cape Fear 02) near Ossipee, NC (Figure 1). The streams are all tributaries to Reedy Fork and are referred to herein as UT1, UT1A, UT1B, and UT2. The Site also includes 3.0 acres of riparian buffer restoration along Reedy Fork and UT1.

The Site is located within the Jordan Lake Water Supply Watershed which has been designated as a Nutrient Sensitive Water. The Site's watershed is within Cape Fear local watershed HUC 03030002020070, which was not identified as a Cape Fear 02 Targeted Local Watershed (TLW) in NCEEP's 2009 Cape Fear River Basin Restoration Priority (RBRP) plan; however, this local watershed was later designated as a Targeted Resource Area (TRA) in the 2011 Request for Proposals (RFP) in the Cape Fear 02. The Agony Acres Mitigation Site fully supports the Cataloging Unit (CU)-wide functional objectives stated in the 2011 RFP to reduce and control nutrient inputs, reduce and control sediment inputs, and protect and augment Significant Natural Heritage Areas in the Cape Fear 02 River Basin. The Project will contribute to meeting the CU-wide Functional Improvement Objectives by establishing the following project goals:

- Reduce sediment inputs by removing cattle from streams and restoring degraded and eroding stream channels;
- Return a network of streams to a stable form that is capable of supporting biological functions;
- Reduce fecal coliform, nitrogen, and phosphorous inputs through removing cattle from streams and establishing and augmenting a forested riparian corridor;
- Protect existing high quality streams and forested buffers; and
- Improve and protect hydrologic inputs to the adjacent Reedy Fork Aquatic Habitat Significant Natural Heritage Area.

The project is helping meet the goals for the watershed outlined in the RBRP and provide numerous ecological benefits within the Cape Fear River Basin. While many of these benefits are limited to the Agony Acres project area, others, such as pollutant removal, reduced sediment loading, and improved aquatic and terrestrial habitat, have farther-reaching effects.

The Site construction and as-built surveys were completed between August and December 2014. Minimal adjustments were made during construction, as needed, based on site conditions and availability of materials. Specific changes are detailed in Section 5.1. Baseline (MY0) profiles and cross section dimensions closely match the design parameters. The Site was built as designed and is on track to meeting the upcoming monitoring year's success criteria.

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Section 1: PROJECT GOALS, BACKGROUND AND ATTRIBUTES

1.1 Project Location and Setting

The Agony Acres Mitigation Site (Site) is located in northeastern Guilford County, north of Gibsonville (Figure 1). From Gibsonville take NC 61 north 5.5 miles. Turn right on Sockwell Road. Travel 1.4 miles. The project site is located north of Sockwell Road and is bound on the north by Reedy Fork. The Site is located on six tracts owned by four different property owners. See Agony Acres Mitigation Plan Table 1 (2014) for property owners, and Parcel Identification Numbers (PIN). A conservation easement was recorded on 30.78 acres within six parcels (Deed Book 7558, Pages 828, 853, 904, and 927).

The Site is located in the Reedy Fork Watershed within the Jordan Lake Water Supply Watershed which has been designated a Nutrient Sensitive Water. The project streams flow directly into Reedy Fork which flows into the Haw River and eventually into the Jordan Lake Reservoir. The Site's watershed is within Hydrologic Unit Code (HUC) 03030002020070 which was not identified as a Cape Fear 02 Targeted Local Watershed (TLW) in NCEEP's 2009 Cape Fear River Basin Restoration Priority (RBRP) plan; however, this HUC was later designated as a Targeted Resource Area (TRA) in the 2011 Request for Proposals (RFP) in the Cape Fear 02. The Site connects to Reedy Fork and three separate but connected Significant Natural Heritage areas. Reedy Fork Aquatic Habitat, Reedy Fork Slopes at NC 61, and Altamahaw Alluvial Forest are all listed on the NC Natural Heritage GIS database immediately adjacent to the project. There are also records for several state threatened, special concern, and significantly rare mussel species in Reedy Fork.

The Site is located in the Carolina Slate Belt of the Piedmont Physiographic Province. The Piedmont Province is characterized by gently rolling, well-rounded hills with long low ridges, with elevations ranging anywhere from 300 to 1500 feet above sea level. The Carolina Slate Belt consists of heated and deformed volcanic and sedimentary rocks. Approximately 550 to 650 million years ago, this region was the site of a series of oceanic volcanic islands. The belt is known for its numerous abandoned gold mines and prospects. Specifically, the Site is located in the CZfv subregion within the Carolina Slate Belt. The CZfv sub region is classified as felsic metavolcanic rock. These rock types are described as metamorphosed dacitic to rhyolitic flows and tuffs interbedded with mafic and intermediate metavolcanic rock, meta-argillite and metamudstone.

NCEEP completed a Local Watershed Plan (LWP) in 2008 on the HUC immediately downstream which begins at the confluence of Reedy Fork and the Haw River and includes Travis and Tickle Creeks. The Site is located less than one mile outside of the LWP area and has a very similar land use pattern. The 2008 Little Alamance, Travis, and Tickle Creeks LWP identified nutrient inputs from agriculture and stream bank erosion in altered reaches as major stressors within this TLW. The Site was identified as a stream and buffer restoration and cattle exclusion opportunity to improve water quality and buffers within the TRA. Restoration goals for the downstream LWP area are defined in the 2008 Little Alamance, Travis, and Tickle Creeks LWP. The primary goals for the agricultural regions of the LWP area are to promote nutrient and sediment reduction by restoring streams and riparian buffers and excluding livestock. The Cape Fear 02 2011 RFP established three CU-wide Functional Improvement Objectives as listed below:

- To reduce and control sediment inputs;
- To reduce and control nutrient inputs; and
- To protect and augment Significant Natural Heritage Areas.

The four tributaries to Reedy Fork on the Site are located within the North Carolina Division of Water Resources (NCDWR) subbasin 03-06-02 of the Cape Fear River Basin. The NCDWR assigns best usage

classifications to State Waters that reflect water quality conditions and potential resource usage. None of the four tributaries are classified by NCDWR and therefore are required to meet standards for Class C waters. Class C waters are protected for secondary recreation, fishing, and aquatic life. Reedy Fork (NCDWR Index No. 16-11-(9)) is classified as Water Supply V – Upstream (WS-V) and Nutrient Sensitive Waters (NSW) by NCDWR. Class WS-V waters are protected as water supplies and typically flow into other water bodies that are directly used as sources for drinking, culinary or food processing purposes. NSW classification represents water bodies that require nutrient management plans to reduce water quality impacts due to excessive nitrogen and phosphorus levels and algal populations.

Prior to construction activities, the stream channels exhibited varying degrees of degradation across the site. The site was used as agricultural and pasture land and most of the buffers had been maintained to narrow corridors to maximize agricultural and pasture land. Cattle also had free access to the streams, which resulted in sporadic degraded stream banks and poor bed forms.

The streams on the Site that were restored were previously severely over-enlarged channels that were extremely deep in many locations. The alterations of the Site to promote cattle grazing and farming resulted in elimination of many of the ecological functions of this small stream/wetland complex. Specifically, functional losses at the Site included degraded aquatic habitat, altered hydrology (related to loss of floodplain connection and lowered water table), and reduction of quality and amount of riparian wetland habitats and related water quality benefits. Ongoing bank erosion was also occurring at some locations due to high, overly steep banks and lack of bank vegetation. Table 4 in Appendix 1 and Tables 5a-d in Appendix 2 present the pre-restoration conditions in detail.

1.2 Project Goals and Objectives

The mitigation project is intended to provide numerous ecological benefits within the Cape Fear River Basin. While many of these benefits are limited to the Agony Acres Mitigation Site project area, others, such as pollutant removal and improved aquatic and terrestrial habitat, have more far-reaching effects. Expected improvements to water quality and ecological processes are outlined below as project goals and objectives. These project goals were established and completed with careful consideration of goals and objectives that were described in the RBRP and to meet the North Carolina Ecosystem Enhancement Program's (NCEEP) mitigation needs while maximizing the ecological and water quality uplift within the watershed.

The following project specific goals established in the mitigation plan (Wildlands, 2014) include:

- Reduce sediment inputs by removing cattle from streams and restoring degraded and eroding stream channels;
- Return a network of streams to a stable form that is capable of supporting biological functions important to sensitive species within and adjacent to the project site;
- Reduce fecal coliform, nitrogen, and phosphorous inputs through removing cattle from streams and establishing and augmenting a forested riparian corridor;
- Protect existing high quality streams and forested buffers that provide habitat important to sensitive species within and adjacent to the project site;
- Improve and protect hydrologic inputs to the adjacent Reedy Fork Aquatic Habitat Significant Natural Heritage Area; and
- Improve and protect hydrologic inputs to Reedy Fork, which is listed as impaired on the 2012 NC 303(d) list for impaired aquatic life and for elevated fecal coliform levels.

The project goals will be addressed through the following project objectives:

- On-site nutrient inputs were decreased by removing cattle from streams, re-establishing floodplain connectivity, and filtering on-site runoff through buffer zones. Off-site nutrient input will be absorbed on-site by filtering flood flows through restored floodplain areas, where flood flow will spread through native vegetation. Vegetation is expected to uptake excess nutrients.
- Stream bank erosion which contributes sediment load to the creeks was greatly reduced, if not eliminated, in the project area. Eroding stream banks were stabilized using bioengineering, natural channel design techniques, and grading to reduce bank angles and bank height. Storm flow containing grit and fine sediment is filtered through restored floodplain areas, where flow will spread through native vegetation. Spreading flood flows also reduces velocity and allows sediment to settle out. Sediment transport capacity of restored reaches was improved so that capacity balances more closely to load. Sediment load reduction will be monitored through assessing bank stability with cross section surveys and visual assessment through photo documentation which serves as an accepted surrogate for direct turbidity measurements.
- Restored riffle/pool sequences promote aeration of water and create deep water zones, helping to lower water temperature. Establishment and maintenance of riparian buffers creates long-term shading of the channel flow to minimize thermal heating. Lower water temperatures will help maintain dissolved oxygen concentrations.
- In-stream structures were constructed to improve habitat diversity and trap detritus. Wood habitat structures were included in the stream as part of the restoration design. Such structures include log drops and rock structures that incorporate woody debris and native onsite rock.
- Adjacent buffer and riparian habitats were restored with native vegetation as part of the project. Native vegetation provides cover and food for terrestrial creatures. Native plant species were planted and invasive species treated. Eroding and unstable areas were stabilized with vegetation as part of this project.
- The restored land is protected in perpetuity through a conservation easement.

1.3 Project Structure, Restoration Type and Approach

The design streams were restored to the appropriate type based on the surrounding landscape, climate, and natural vegetation communities but also with strong consideration to existing watershed conditions and trajectory. Specifically, the site design was developed to restore a small stream complex directly adjacent to the Reedy Fork to a naturally occurring community to create riparian habitat and improve water quality. Other key factors addressed in the design were to create stable habitats, improve riparian buffers, and restore the natural migration patterns for fish spawning. Figure 2 and Table 1 in Appendix 1 present the stream mitigation components for the Agony Acres Mitigation Site.

The final mitigation plan was submitted and accepted by the NCEEP in March 2014. Construction activities were completed by Land Mechanic Designs, Inc in September 2014. The planting was completed by Bruton Natural Systems, Inc. in December 2014. The baseline as-built survey was completed by Kee Mapping and Surveying, in October 2014. There were no significant deviations reported in the as-built project elements compared to the design plans. A few structures were either added, eliminated, or adjusted slightly based on field conditions. Field adjustments made during construction are described in detail in section 5.1. Appendix 1 provides more detailed project activity, history, contact information, and watershed/site background information for this project.

1.3.1 Project Structure

The project will provide 6,596 stream mitigation units (SMUs) and 3.0 buffer mitigation units (BMUs). Please refer to Figure 2 for the project component/asset map for the stream restoration feature exhibits

and Table 1 for the project component and mitigation credit information for the Agony Acres Mitigation Site.

1.3.2 Restoration Type and Approach

The design streams were restored to the appropriate type based on the surrounding landscape, climate, and natural vegetation communities but also with strong consideration to existing watershed conditions and trajectory. The Site consists of stream restoration, enhancement, and preservation (Figure 2). The specific proposed stream types are described below.

The stream restoration portion of this project includes six reaches:

- UT1-Reach 2: UT1 from approximately 1100 feet downstream of Sockwell Road to a sharp bend due east, approximately 1200 feet in length;
- UT1-Reach 5: UT1 beginning at the confluence with UT1A to its terminus with Reedy Fork, approximately 1500 feet in length;
- UT1A-Reach 1: UT1A beginning at Sockwell Road for a length of approximately 850 feet;
- UT1A-Reach 4: UT1A beginning approximately 700 feet upstream of the confluence with UT1 to its terminus with UT1;
- UT1B: UT1B beginning at the conservation easement to its terminus with UT1, approximately 200 feet; and
- UT2: UT2 beginning at an existing fence line to its terminus with Reedy Fork, approximately 1000 feet.

The project also includes stream enhancement on four reaches classified as either enhancement I (EI) or enhancement II (EII):

- UT1-Reach 1, EII: UT1 beginning at Sockwell Road for a length of approximately 1100 feet;
- UT1-Reach 2, EI: UT1 beginning near a sharp bend due east for a length of approximately 100 feet;
- UT1-Reach 4, EI/EII: UT1 beginning at an existing ford crossing to the confluence with UT1A, approximately 700 feet in length; and

UT1A-Reach 2, EII: UT1A beginning approximately 800 feet downstream of Sockwell Road to a sharp change in channel slope and bedrock material, approximately 300 feet in length. Additionally, there are two preservation reaches:

- UT1-Reach 3: UT1 beginning approximately 100 feet after a sharp bend due east to an existing ford crossing, approximately 1400 feet in length;
- UT1A-Reach 3: UT1A beginning at a sharp change in channel slope and bedrock material for a length of approximately 500 feet.

For UT1-Reach 3 and UT1A-Reach 3, the streams have not been heavily impacted by cattle and overall stream health is relatively good. For these reaches, preservation was proposed; mainly consisting of fencing out cattle.

The restoration reaches were designed to be similar to C-type streams according to the Rosgen classification system (Rosgen, 1996). Type C streams are slightly entrenched, meandering streams with access to the floodplain (entrenchment ratios >2.2) and channel slopes of 2% or less. They occur within a wide range of valley types and are appropriate for the project landscape.

The morphologic design parameters are shown in Appendix 2, Tables 5a through 5d for the restoration reaches, and fall within the ranges specified for C streams (Rosgen, 1996). The specific values for the

design parameters were selected based on designer experience and judgment and were verified with morphologic data form reference reach data sets.

1.4 Project History, Contacts and Attribute Data

The Site was restored by Wildlands Engineering, Inc. (Wildlands) through a full delivery contract with NCEEP. Tables 2, 3, and 4 in Appendix 1 provide detailed information regarding the Project Activity and Reporting History, Project Contacts, and Project Baseline Information and Attributes.

Section 2: SUCCESS CRITERIA

The stream and buffer performance criteria for the project site will follow approved performance criteria presented in the NCEEP Mitigation Plan Template (version 2.1, 09/01/2011), the NCEEP Monitoring Requirements and Performance Standards for Stream and/or Wetland Mitigation (11/7/2011), and the Stream Mitigation Guidelines issued in April 2003 by the United States Army Corps of Engineers (USACE) and NCDWR. Annual monitoring and semi-annual site visits will be conducted to assess the condition of the finished project. The stream restoration and enhancement sections and the buffer restoration sections of the project will be assigned specific performance criteria components for stream morphology (stream only), hydrology (stream only), and vegetation (stream and buffer). Performance criteria will be evaluated throughout the seven year post-construction monitoring period. If all performance criteria have been successfully met and two bankfull events have occurred during separate years, Wildlands may propose to terminate stream and/or vegetation monitoring. An outline of the performance criteria components follows.

2.1 Streams

2.1.1 Dimension

Riffle cross sections on the restoration and EI reaches should be stable and should show little change in bankfull area, maximum depth ratio, and width-to-depth ratio. Per NCEEP guidance, bank height ratios shall not exceed 1.2 and entrenchment ratios shall be at least 2.2 for restored channels to be considered stable. Reach riffle means should fall within the parameters defined for channels of the appropriate Rosgen stream type. If any changes do occur, these changes will be evaluated to assess whether the stream channel is showing signs of instability. Indicators of instability include a trend in vertical incision or eroding channel banks over the monitoring period. Changes in the channel that indicate a movement toward stability or enhanced habitat include a decrease in the width-to-depth ratio in meandering channels or an increase in pool depth. Remedial action would not be taken if channel changes indicate a movement toward stability.

2.1.2 Pattern and Profile

Longitudinal profile surveys will not be conducted during the seven year monitoring period unless other indicators during the annual monitoring indicate a trend toward vertical and lateral instability. If a longitudinal profile is deemed necessary, monitoring will follow standards as described in the NCEEP Monitoring Requirements and Performance Standards for Stream and/or Wetland Mitigation (11/7/2011) and the 2003 USACE and NCDWR Stream Mitigation Guidance for the necessary reaches. Visual assessments and photo documentation should indicate that streams are remaining stable and do not indicate a trend toward vertical or lateral instability.

2.1.3 Substrate

A reach-wide pebble count will be performed in each restoration and EI reach each year for classification purposes. A pebble count will be performed at each surveyed riffle to characterize the pavement. Substrate materials in the restoration and EI reaches should indicate a progression towards or the maintenance of coarser materials in the riffle features and smaller particles in the pool features.

2.1.4 Photo Documentation

Photographs should illustrate the site's vegetation and morphological stability on an annual basis. Cross section photos should demonstrate no excessive erosion or degradation of the banks. Longitudinal photos should indicate the absence of persistent bars within the channel or vertical incision. Grade control structures should remain stable. Deposition of sediment on the bank side of vane arms is preferable. Maintenance of scour pools on the channel side of vane arms is expected.

2.1.5 Hydrology Documentation

Two bankfull flow events must be documented on the restoration and enhancement reaches within the seven-year monitoring period. The two bankfull events must occur in separate years. Stream monitoring will continue until success criteria in the form of two bankfull events in separate years have been documented. In addition, the presence of baseflow must be documented along portions of UT1B constructed with a Priority I restoration approach. Baseflow must be present for at least some portion of the year (most likely in the winter/early spring) during years with normal rainfall conditions.

2.2 Vegetation

The final vegetative success criteria for the stream restoration and enhancement areas will be the survival of 210 planted stems per acre in the riparian corridor at the end of the required monitoring period (year seven). The interim measure of vegetative success will be the survival of at least 320 planted stems per acre at the end of the third monitoring year and at least 260 stems per acre at the end of the fifth year of monitoring. Planted vegetation must average 10 feet in height in each plot at the end of the seventh year of monitoring. If this performance standard is met by year five and stem density is trending towards success (i.e., no less than 260 five year old stems/acre), monitoring of vegetation on the site may be terminated with written approval by the USACE in consultation with the NC Interagency Review Team. The extent of invasive species coverage will also be monitored and controlled as necessary throughout the required monitoring period. The final vegetative success criteria for the buffer restoration areas will be the survival of 320 planted stems per acre in the riparian corridor at the end of the required monitoring period (year five).

2.3 Schedule and Reporting

Monitoring reports will be prepared in the fall of each year of monitoring and submitted to NCEEP. Based on the NCEEP Monitoring Report Template (version 1.4, 11/7/2011), the monitoring reports will include the following:

- Project background which includes project objectives, project structure, restoration type and approach, location and setting, history and background;
- As-built topographic plans of major project elements including such items as grade control structures, vegetation plots, permanent cross sections, crest gages, and pressure transducers;
- Photographs showing views of the restored Site taken from fixed point stations;
- Assessment of the stability of the Site based on the cross sections and longitudinal profile, where applicable;
- Vegetative data as described above including the identification of any invasion by undesirable plant species;
- Stream flow gage attainment;

- A description of damage by animals or vandalism;
- Maintenance issues and recommended remediation measures will be detailed and documented; and
- Wildlife observations.

Section 3: MONITORING PLAN

Monitoring will consist of collecting morphological, vegetative, and hydrological data to assess the project success based on the restoration goals and objectives on an annual basis or until success criteria is met. The success of the project will be assessed using measurements of the stream channel's dimension, pattern, substrate composition, permanent photographs, vegetation, and surface water hydrology. Any areas with identified high priority problems, such as streambank instability, aggradation/degradation, or lack of vegetation establishment will be evaluated on a case-by-case basis. The problem areas will be visually noted and remedial actions will be discussed with NCEEP staff to determine a plan of action. A remedial action plan will be submitted if maintenance is required. The monitoring period will extend seven years beyond completion of construction or until performance criteria have been met.

3.1 Stream

Geomorphic assessments will follow guidelines outlined in the Stream Channel Reference Sites: An Illustrated Guide to Field Techniques (Harrelson et al., 1994), methodologies utilized in the Rosgen stream assessment and classification document (Rosgen, 1994 and 1996), and in the Stream Restoration: A Natural Channel Design Handbook (Doll et al, 2003). Please refer to Appendix 4 for monitoring locations discussed below.

3.1.1 Dimension

A total of 16 cross sections were installed along the stream restoration and EI reaches. Two cross sections were installed per 1,000 linear feet of stream restoration work, with riffle and pool sections in proportion to NCEEP guidance. The mitigation plan (Wildlands, 2014) called for thirty two cross sections, but after discussions with NCEEP, it was determined that the wrong formula was used to calculate the number of cross sections needed on the Site. Therefore, with verbal approval from NCEEP, the correct number of cross sections were calculated and installed on the Site. Each cross section was permanently marked with pins to establish its location. Cross section surveys include points measured at all breaks in slope, including top of bank, bankfull, edge of water, and thalweg to monitor any trends in bank erosion. If moderate bank erosion is observed at a stream reach during the monitoring period, a series of bank pins will be installed in representative areas where erosion is occurring for reaches with a bankfull width of greater than three feet. Bank pins will be installed in at least three locations (one in upper third of the pool, one at the mid-point of the pool, and one in the lower third of the pool). Bank pins will be monitored by measuring exposed rebar and maintaining pins flush to bank to capture bank erosion progression. Annual cross section and bank pin surveys (if applicable) will be conducted in monitoring years one (MY1), two (MY2), three (MY3), five (MY5), and seven (MY7). Photographs will be taken annually of the cross sections looking upstream and downstream.

3.1.2 Pattern and Profile

Longitudinal profile surveys will not be conducted during the seven year monitoring period unless other indicators during the annual monitoring show a trend toward vertical and lateral instability. If a longitudinal profile is deemed necessary, monitoring will follow standards as described in the NCEEP Monitoring Requirements and Performance Standards for Stream and/or Wetland Mitigation (11/7/2011) and the 2003 USACE and NCDWR Stream Mitigation Guidance for the necessary reaches. Stream pattern and profile will be assessed visually as described below in section 3.1.6.

3.1.3 Substrate

A reach-wide pebble count will be performed in each restoration reach each year for classification purposes. A pebble count will be performed at each surveyed riffle to characterize the pavement.

3.1.4 Photo Reference Points

A total of 42 permanent photograph reference points were established within the project area after construction. Photographs will be taken once a year to visually document stability for seven years following construction. Permanent markers were established so that the same locations and view directions on the site are monitored each year. Photographs will be used to monitor stream restoration and enhancement reaches. The photographer will make every effort to maintain the same view in each photo over time. The representative digital photo(s) will be taken on the same day(s) the surveys are conducted.

3.1.5 Hydrology Documentation

Four manual crest gages and four pressure transducer automated gages were installed on the Site (Appendix 4). The crest gages and transducers were installed at four surveyed riffle cross sections along UT1 reach 2, UT1A Reach 4, UT1B, and UT2 and will be checked during each site visit to determine if a bankfull event has occurred since the last visit. Photographs will be used to document the occurrence of debris lines and sediment deposition as evidence of bankfull events. Additionally, the pressure transducer data will be plotted and included in the annual monitoring reports.

Baseflow in UT1B will be confirmed by two pressure transducer automated gages installed at the thalweg elevation of the channel. One transducer is located at the upper end of the reach, and one at the downstream end. The transducers are equipped with auto logging gages that are capable of monitoring stream stage. A rating curve has been developed for each of the transducer locations to correlate stage to discharge. Discharge data will be provided annually in the monitoring reports to demonstrate intermittent aquatic function has been maintained in the restored channel.

3.1.6 Visual Assessment

Visual assessments will be performed along all stream and buffer restoration areas on a semi-annual basis during the seven year monitoring period. Problem areas will be noted such as channel instability (i.e. lateral and/or vertical instability, in-stream structure failure/instability and/or piping, headcuts), vegetated health (i.e. low stem density, vegetation mortality, invasive species or encroachment), beaver activity, or livestock access. Areas of concern will be mapped and photographed accompanied by a written description in the annual report. Problem areas will be re-evaluated during each subsequent visual assessment. Should remedial actions be required, recommendations will be provided in the annual monitoring report.

3.2 Vegetation

Planted woody vegetation will be monitored in accordance with the guidelines and procedures developed by the Carolina Vegetation Survey-NCEEP Level 2 Protocol (Lee et al., 2006) to monitor and assess the planted woody vegetation. A total of 16 standard 10 meter by 10 meter vegetation plots were established within the project easement area.

Vegetation plots were randomly established within the planted corridor of the restoration areas to capture the heterogeneity of the designed vegetative communities. The vegetation plot corners have been marked and are recoverable either through field identification or with the use of a GPS unit.

Reference photographs were taken at the origin looking diagonally across the plot to the opposite corner during the baseline monitoring in January 2015. Subsequent annual assessments following baseline survey will capture the same reference photograph locations. Species composition, density and survival rates will be evaluated on an annual basis by plot and for the entire site. Individual plot data will be provided and will include height, density, vigor, damage (if any), and survival. Planted woody stems will be marked annually, as needed, based off of a known origin so they can be found in succeeding monitoring years. Mortality will be determined from the difference between the baseline year's living planted stems and the current year's living planted stems.

Section 4: MAINTENANCE AND CONTINGENCY PLAN

Any identified high priority problem areas, such as streambank instability, aggradation/degradation, lack of vegetation establishment, or failure to meet hydrology success criteria will be evaluated on a case-by-case basis. The problem areas will be visually noted and remedial actions will be discussed with NCEEP staff to determine a plan of action. A remedial action plan will be submitted if maintenance is required.

4.1 Stream

Stream problem areas will be mapped and included in the Current Condition Plan View (CCPV) as part of the annual stream assessment. Stream problems areas may include bank erosion, structure failure, beaver dams, aggradation/degradation, etc. Appropriate remedial actions will be determined with NCEEP correspondence. A proposal of work will be submitted if remediation of an area is required.

4.2 Vegetation

Vegetative problem areas will be mapped and included in the CCPV as part of the annual vegetation assessment. Vegetation problems areas may include planted vegetation not meeting success criteria, persistent invasive species, barren areas with little to no herbaceous cover, or grass suffocation/crowding of planted stems. Appropriate remedial actions will be determined with NCEEP correspondence. A proposal of work will be submitted if remediation of an area is required.

Section 5: AS-BUILT CONDITION (BASELINE)

The Site construction and as-built surveys were completed between June 2014 and December 2014. The survey included developing an as-built topographic surface, locating the channel boundaries, structures, and cross-sections. For comparison purposes, the baseline monitoring divided the reach assessments in the same way they were established for design parameters: UT1 Reach 2, UT1 Reach 4, UT1 Reach 5, UT1A Reach 1, UT1A Reach 4, UT1B, and UT2.

5.1 As-Built/Record Drawings

A half size baseline plan set is located in Appendix 4 with the post-construction survey and alignments for the project. A record drawing has also been provided to NCEEP as a separate document that redlines any significant field adjustments made during construction. Minimal adjustments were made during construction, where needed, based on field evaluation.

5.1.1 UT1

- Station 122+83 logs replaced with boulder toe to avoid excavating into hill slope;
- Station 143+44 brush toe replaced with boulder toe to avoid impact to nearby trees;
- Station 143+64 log sill not installed due to existing boulder providing grade control;
- Station 144+31 boulder sill replaced with log sill due to onsite availability;
- Station 147+45 rock outlet added to prevent erosion from overland flow;
- Station 151+26 log sills replaced with boulder sills due to onsite availability;
- Station 158+26 boulder sill replaced with log sill due to onsite availability; and
- Station 159+00 boulder toe added to provide additional bank stability.

5.1.2 UT1A

- Station 203+17 brush toe replaced with boulder toe to avoid impacts to existing trees;
- Station 210+88 it was determined during construction that boulder toe was not necessary; and
- Station 220+06 log sill replaced with boulder sill due to onsite availability.

5.1.3 UT1B

- No field adjustments were made during construction.

5.1.4 UT2

- No field adjustments were made during construction.

5.2 Baseline Data Assessment

Baseline monitoring (MY0) was conducted between October 2014 and December 2014. The first annual monitoring assessment (MY1) will be completed in the fall of 2015. The streams will be monitored for a total of seven years, with the final monitoring activities concluding in 2021. The buffers will be monitored

for a total of five years, with the final monitoring activities concluding in 2019. The close-out for the Agony Acres Mitigation Site will be conducted in 2022 given the success criteria has been met. As part of the closeout process, NCEEP will evaluate the Site at the end of the fourth year monitoring period to determine whether or not the Site is eligible to closeout following monitoring year five. If the Site is meeting success criteria, NCEEP will propose to the Interagency Review Team (IRT) to proceed with the closeout process. If the Site is not meeting success criteria, then an additional two years of monitoring will be conducted by Wildlands.

5.2.1 Morphological State of the Channel

Morphological data for the as-built profile was collected between October 2014 and December 2014. Please refer to Appendix 2 for summary data tables, morphological plots, and stream photographs.

Profile

The MY0 profiles closely match the profile design parameters. On the design profiles, riffles were depicted as straight lines with consistent slopes. However, at some locations on the as-built survey riffle profiles are not consistent in slope due to rock and log riffle features installed during construction for habitat variability. The as-built profile reflects the installation of log and rock sills with micro-pools interspersed in the riffle. The plotted longitudinal profiles and related summary data can be found in Appendix 2.

Dimension

The MY0 dimension numbers closely match the design parameters with some minor variability for all reaches. Summary data and cross-section plots of each project reach can be found in Appendix 2.

Pattern

The MY0 pattern metrics fell within the design parameters for all seven reaches. No major design changes were made to alignments during construction. Pattern data will be evaluated in monitoring year five if there are any indicators through the profile or dimensions that significant geomorphic adjustments have occurred.

Sediment Transport

As-built shear stresses and velocities are similar to design calculations and should reduce the risk of further erosion along all restoration reaches. The as-built condition for each of these reaches indicates an overall increase in substrate particle size (Table 5a – 5d). The substrate data for each constructed reach was compared to the design shear stress parameters from the mitigation plan to assess the potential for bed degradation. The shear stresses calculated for the constructed channels are within the allowable range, which indicates the channel is not at risk to trend toward channel degradation.

Although a few streams have smaller particle sizes than were designed for, this is not a concern. The riffles were constructed with rock material mined on the Site which contained a greater variation in substrate size than material that has been subjected to flushing flows within an active stream channel. The streams had very little flow during construction, and there was minimal rainfall between completion of construction and baseline monitoring assessment. Once the streams reach baseflow and a few rain events occur, most of this smaller sediment should flush out of the riffles and into the pools. During monitoring year one (MY1) it is fully expected that the riffles will show a larger particle size than what was observed at baseline monitoring.

5.2.2 Vegetation

The MY0 vegetation survey was complete in January 2015. The MY0 planted density is 650 stems/acre, which exceeds the MY5 density requirement. Summary data and photographs of each plot can be found in Appendix 3.

5.2.3 Hydrology

No bankfull events have been observed following completion of construction and baseline monitoring assessments. Bankfull events recorded will be included in the year one monitoring report.

Section 6: REFERENCES

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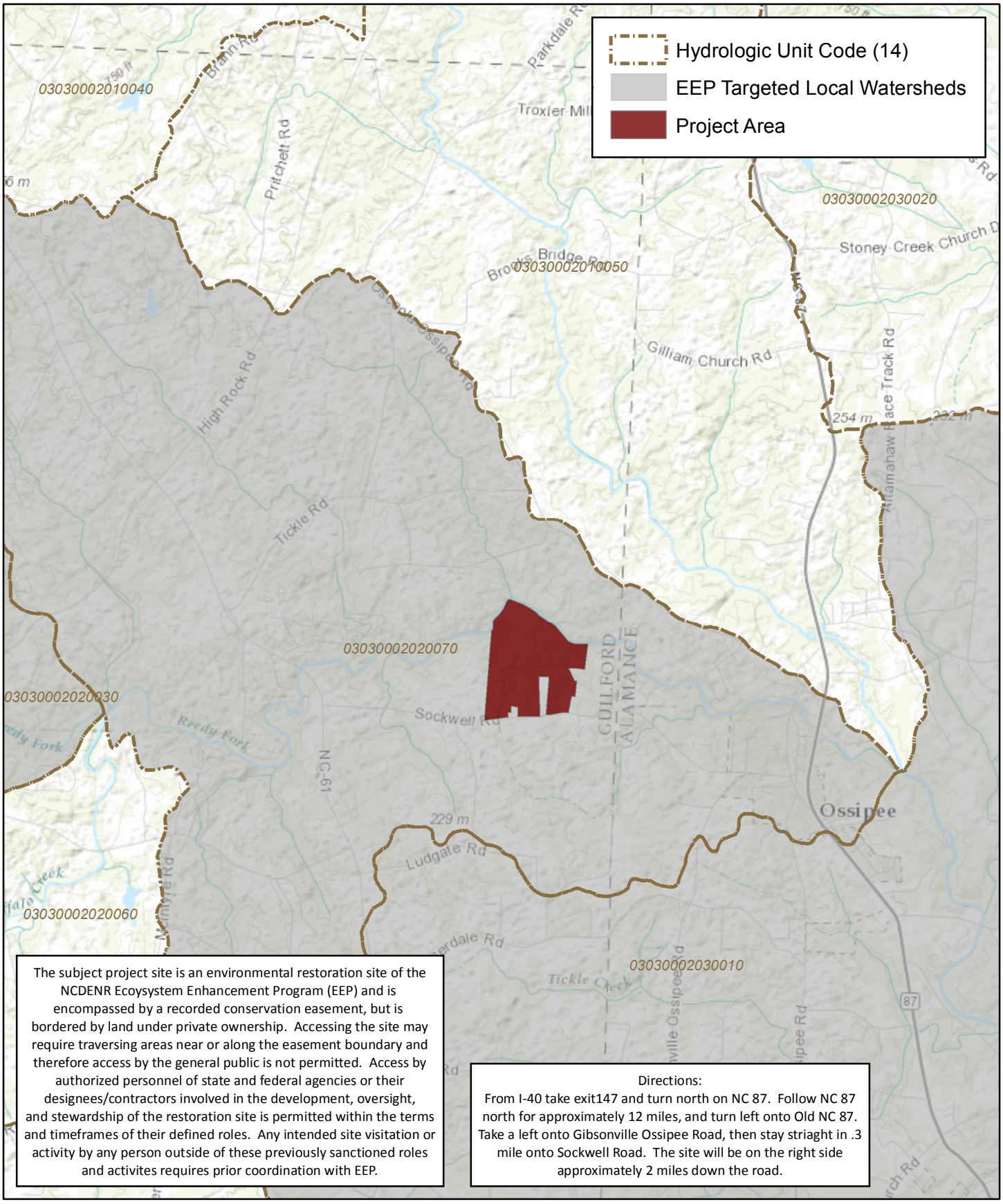
APPENDIX 1. General Tables and Figures



The subject project site is an environmental restoration site of the NCDENR Ecoysystem Enhancement Program (EEP) and is encompassed by a recorded conservation easement, but is bordered by land under private ownership. Accessing the site may require traversing areas near or along the easement boundary and therefore access by the general public is not permitted. Access by authorized personnel of state and federal agencies or their designees/contractors involved in the development, oversight, and stewardship of the restoration site is permitted within the terms and timeframes of their defined roles. Any intended site visitation or activity by any person outside of these previously sanctioned roles and activites requires prior coordination with EEP.

Directions:
From I-40 take exit147 and turn north on NC 87. Follow NC 87 north for approximately 12 miles, and turn left onto Old NC 87. Take a left onto Gibsonville Ossipee Road, then stay striaght in .3 mile onto Sockwell Road. The site will be on the right side approximately 2 miles down the road.

WILDLANDS ENGINEERING

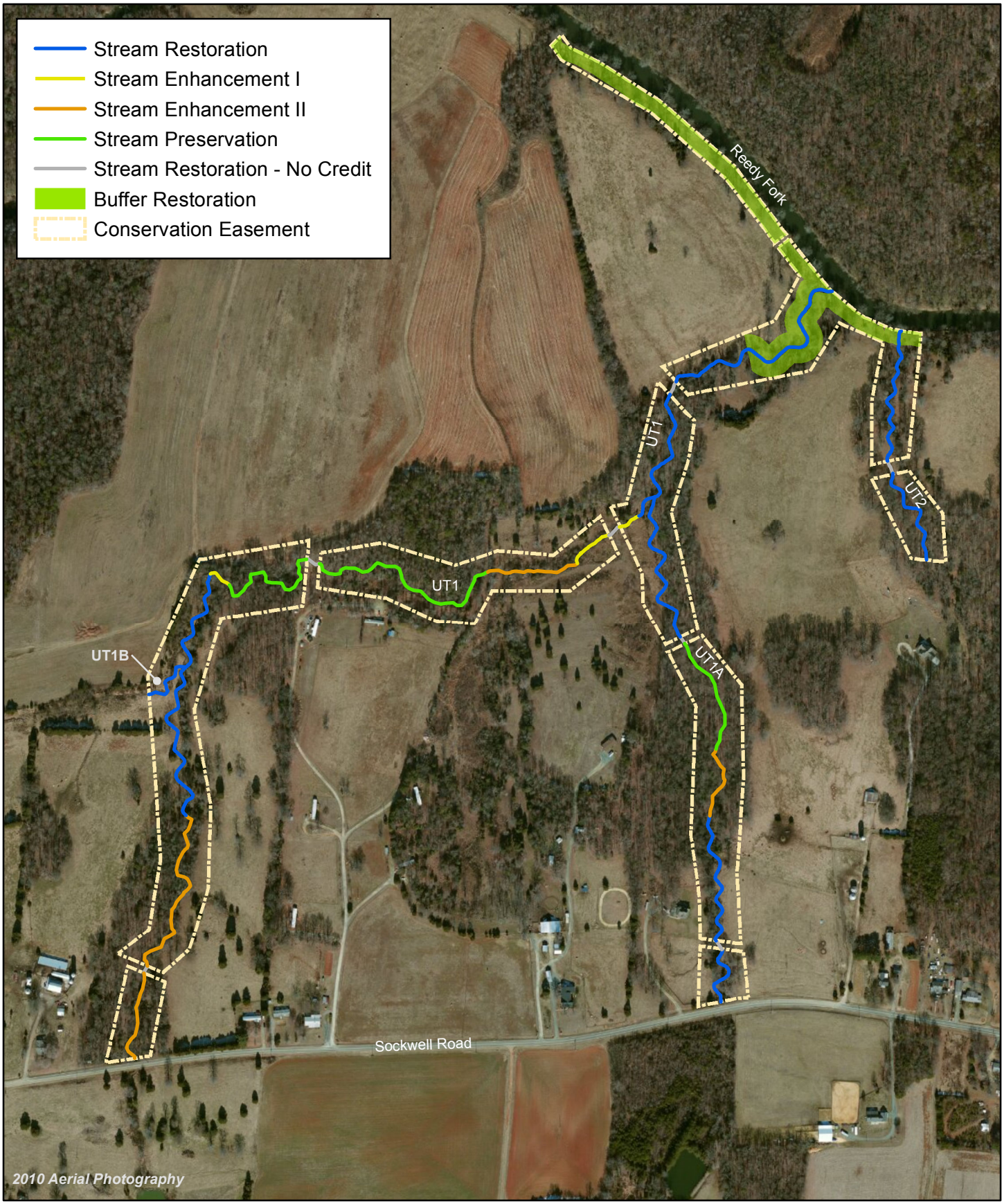
Ecosystem Enhancement Program

0 0.5 1 Miles

N

Figure 1 Project Vicinity Map
Agony Acres Mitigation Site
NCEEP Project No. 95716
Monitoring Year 0 - 2014

Guilford County, NC



WILDLANDS ENGINEERING

Ecosystem Enhancement Program

0 250 500 Feet

N

Figure 2 Project Component/ Asset Map
Agony Acres Mitigation Site
NCEEP Project No.95716
Monitoring Year 0 - 2014

Guilford County, NC

Table 1. Project Components and Mitigation Credits
Agony Acres Mitigation Site (NCEEP Project No.95716)
Monitoring Year 0 - 2014

MITIGATION CREDITS

	Stream		Riparian Wetland		Non-Riparian Wetland		Buffer	Nitrogen Nutrient Offset	Phosphorous Nutrient Offset
Type	R	RE	R	RE	R	RE			
Totals	6,235	361	N/A	N/A	N/A	N/A	3.0	N/A	N/A

PROJECT COMPONENTS

Reach ID	As-Built Stationing/ Location	Existing Footage/ Acreage	Approach	Restoration or Restoration Equivalent	Restoration Footage/ Acreage	Mitigation Ratio	Credits (SMU/ WMU)
STREAMS							
UT1-Reach 1 (DOT ROW)	100+00 to 100+14	14	EII	Enhancement (No Credit)	14	---	---
UT1-Reach 1	100+14 to 103+62; 103+93 to 111+24	1,079	EII	Enhancement	1,079	2.5	432
UT1-Reach 1 (Easement Break)	103+62 to 103+93	31	EII	Enhancement (No Credit)	31	---	---
UT1-Reach 2	111+24 to 122+61	1,039	P1	Restoration	1,137	1	1137
UT1-Reach 2	122+61 to 123+54	93	EI	Enhancement	93	1.5	62
UT1-Reach 3	123+54 to 128+73; 129+29 to 137+60	1,350		Preservation	1,350	5	270
UT1-Reach 3 (Easement Break)	128+73 to 129+29	56		Preservation (No Credit)	56	---	---
UT1-Reach 4	137+60 to 141+15	355	EII	Enhancement	355	2.5	142
UT1-Reach 4	141+15 to 142+90; 143+44 to 144+29	260	EI	Enhancement	260	1.5	173
UT1-Reach 4 (Easement Break)	142+90 to 143+44	54	EI	Enhancement (No Credit)	54	---	---
UT1-Reach 5	144+29 to 150+08; 150+62 to 159+64	1,355	P1/2	Restoration	1,481	1	1481
UT1-Reach 5 (Easement Break)	150+08 to 150+62	65	P1	Restoration (No Credit)	54	---	---
UT1A-Reach 1 (DOT ROW)	200+00 to 200+05	5	P1	Restoration (No Credit)	5	---	---
UT1A-Reach 1	200+05 to 202+69; 203+09 to 208+57	738	P1	Restoration	812	1	812
UT1A-Reach 1 (Easement Break)	202+69 to 203+09	32	P1	Restoration (No Credit)	40	---	---
UT1A-Reach 2	208+57 to 211+49	292	EII	Enhancement	292	2.5	117
UT1A-Reach 3	211+49 to 216+06	457		Preservation	457	5	91
UT1A-Reach 3 (Easement Break)	216+06 to 216+36	30	EII	Enhancement (No Credit)	30	---	---
UT1A-Reach 4	216+36 to 223+02	461	P1	Restoration	666	1	666
UT1B	300+00 to 302+32	243	P1	Restoration	232	1	232
UT2	400+00 to 404+19; 404+70 to 410+32	975	P1	Restoration	981	1	981
UT2 (Easement Break)	404+19 to 404+70	53	P1/2	Restoration (No Credit)	51	---	---

COMPONENT SUMMATION

Restoration Level	Stream (LF)	Riparian Wetland (acres)		Non-Riparian Wetland (acres)	Buffer (acres)	Upland (acres)
		Riverine	Non-Riverine			
Restoration	5,309	-	-	-	3.0	-
Enhancement		-	-	-	-	-
Enhancement I	353					
Enhancement II	1,726					
Creation		-	-	-		
Preservation	1,807	-	-	-		-
High Quality Preservation	-	-	-	-		-

N/A: not applicable

Table 2. Project Activity and Reporting History
Agony Acres Mitigation Site (NCEEP Project No.95716)
Monitoring Year 0 -2014

Activity or Report	Date Collection Complete	Completion or Scheduled Delivery
Mitigation Plan	October 2013-March 2014	March 2014
Final Design - Construction Plans	April 2014-June 2014	June 2014
Construction	June 2014-September 2014	September 2014
Temporary S&E mix applied to entire project area [1]	September 2014	September 2014
Permanent seed mix applied to reach/segments	September 2014	September 2014
Bare root and live stake plantings for reach/segments	December 2014	December 2014
Baseline Monitoring Document (Year 0)	October 2014-December 2014	February 2015
Year 1 Monitoring	2015	December 2015
Year 2 Monitoring	2016	December 2016
Year 3 Monitoring	2017	December 2017
Year 4 Monitoring	2018	December 2018
Year 5 Monitoring	2019	December 2019
Year 6 Monitoring	2020	December 2020
Year 7 Monitoring	2021	December 2021

[1]Seed and mulch is added as each section of construction is completed.

Table 3. Project Contact Table
Agony Acres Mitigation Site (NCEEP Project No.95716)
Monitoring Year 0 - 2014

Designer Nicole Macaluso, PE, CFM	**Wildlands Engineering, Inc.** 312 West Millbrook Road, Suite 225 Raleigh, NC 27609 919.851.9986
Construction Contractor	**Land Mechanic Designs, Inc.** 126 Circle G Lane Willow Spring, NC 27592
Planting Contractor	**Bruton Natural Systems, Inc** P.O. Box 1197 Fremont, NC 27830
Seeding Contractor	**Land Mechanic Designs, Inc.** 126 Circle G Lane Willow Spring, NC 27592
Seed Mix Sources	**Green Resource, LLC**
Nursery Stock Suppliers	
Bare Roots	**Dykes and Son Nursery**
Live Stakes	**Bruton Natural Systems, Inc**
Monitoring Performers Monitoring, POC	**Wildlands Engineering, Inc.** Jason Lorch 919.851.9986, ext. 107

Table 4. Project Information and Attributes
Agony Acres Mitigation Site (NCEEP Project No.95716)
Monitoring Year 0 - 2014

PROJECT INFORMATION	
Project Name	Agony Acres Mitigation Site
County	Guilford County
Project Area (acres)	31 acres
Project Coordinates (latitude and longitude)	36° 10' 40" N, 79° 33' 02" W
PROJECT WATERSHED SUMMARY INFORMATION	
Physiographic Province	Piedmont
River Basin	Cape Fear River
USGS Hydrologic Unit 8-digit	03030002
USGS Hydrologic Unit 14-digit	03030002020070
DWR Sub-basin	03-06-02
Project Drainiage Area (acres)	358 acres
Project Drainage Area Percentage of Impervious Area	<1%
CGIA Land Use Classification	65% Managed Herbaceous Cover, 30% Mixed Upland Hardwoods, 3% Cultivated, 2% Southern Yellow Pine, <1% Low Intensity Development

REACH SUMMARY INFORMATION

Parameters	UT1 - Reaches 1 -3	UT1 - Reaches 4 & 5	UT1A	UT1B	UT2	
Length of reach (linear feet) - Post-Restoration	3,760	2,204	2,302	232	1,032	
Drainage area (acres)	228	358	103	61	61	
NCDWR stream identification score	42.5	46.5	41	29.25	32.25	
NCDWR Water Quality Classification	WS-V					
Morphological Desription (stream type)	P	P	P/I	P		
Evolutionary trend (Simon's Model) - Pre- Restoration	I, III	III, IV	I, II/III	II/III	II/III	
Underlying mapped soils	Cecil sandy loam, Congaree loam, Coronaca clay loam, Enon fine sandy loam, Enon clay loam, Madison clay loam, Mecklenburg sandy clay loam, Wehadkee loam					
Drainage class	---	---	---	---	---	---
Soil Hydric status	---	---	---	---	---	---
Slope	---	---	---	---	---	---
FEMA classification	N/A					
Native vegetation community	Piedmont bottomland forest					
Percent composition exotic invasive vegetation -Post-Restoration	0%					

REGULATORY CONSIDERATIONS

Regulation	Applicable?	Resolved?	Supporting Documentation
Waters of the United States - Section 404	Yes	Yes	USACE Nationwide Permit No.27 and DWQ 401 Water Quality Certification No. 3885.
Waters of the United States - Section 401	Yes	Yes	
Division of Land Quality (Dam Safety)	No	N/A	N/A
Endangered Species Act	Yes	Yes	Agony Acres Mitigation Plan; Wildlands determined "no effect" on Guilford County listed endangered species.
Historic Preservation Act	Yes	Yes	No historic resources were found to be impacted (letter from SHPO dated 1/15/13).
Coastal Zone Management Act (CZMA)/Coastal Area Management Act (CAMA)	No	N/A	N/A
FEMA Floodplain Compliance	N/A	N/A	The project streams do not have an associated regulatory floodplain; however portions of UT1, UT1A, and UT2 are located within the floodway and flood fringe of Reedy Fork (FEMA Zone AE, FIRM panels 8838 and 8848).
Essential Fisheries Habitat	No	N/A	N/A

APPENDIX 2. Morphological Summary Data and Plots

Table 5a. Baseline Stream Data Summary
Agony Acres Mitigation Site (NCEEP Project No. 95716)
Monitoring Year 0 - 2014

UT1

		PRE-RESTORATION CONDITION			REFERENCE REACH DATA										DESIGN				AS-BUILT/BASELINE			
Parameter	**Gage**	**UT1 - Reach 2**	**UT1 - Reach 5**		**Onsite Reference Reach - UT1A - Reach 3**		**UT to Polecat Creek**		**Spencer Creek 1**		**Spencer Creek 2**		**UT To Cane Creek**		**UT1 - Reach 2**		**UT1 - Reach 5**		**UT1 - Reach 2**		**UT1 - Reach 5**	
			Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
Dimension and Substrate - Riffle																						
Bankfull Width (ft)	N/A	6.5	13.9	16.0	11.1		5.3	10.9	10.7	11.2	6.3	9.3	11.5	12.3	10.2		12.8		10.2	10.4	11.9	13.6
Floodprone Width (ft)		10	20	>50	25		25	65	60	>114	14	125	31		22	51	28	64	60.0	100.0	200.0	
Bankfull Mean Depth		0.8	1.5	4.3	0.7		1.0	1.1	1.6	1.8	0.8	1.0	0.8	1.0	0.8		0.9		0.6	0.9	0.8	0.9
Bankfull Max Depth		1.4	1.9	5.2	1.0		1.4	1.7	2.1	2.6	1	1.2	1.2	1.6	1.0	1.2	1.2	1.5	1.1	1.4	1.3	1.6
Bankfull Cross Sectional Area (ft^2)		5.2	24.6	59.0	7.4		5.4	12.4	17.8	19.7	6.6	8.7	8.9	12.2	7.9		12.0		6.2	9.0	9.1	11.9
Width/Depth Ratio		8.2	3.3	10.4	16.6		5.2	9.6	5.8	7.1	7.9	9.3	12.3	14.4	13.1		13.6		12.0	16.8	15.5	15.7
Entrenchment Ratio		1.5	1.2	>3.6	2		3.2	8.3	5.5	>10.2	1.7	4.3	>2.5		2.2	5.0	2.2	5.0	5.9	9.6	14.7	16.8
Bank Height Ratio		2.3	1.0	2.0	1.0		1.0	1.1	1.0		1.0	1.0	--	--	1.0	1.0	1.0	1.0	1.0		1.0	
D50 (mm)		3.47	14.60																Silt/ Clay		0.11	
Profile																						
Riffle Length (ft)	N/A				---		---		---		---		---		---		---		13.9	73.2	23.7	81.3
Riffle Slope (ft/ft)		---	---		N/A		0.004	0.047	0.013		0.0184	0.0343	0.0188	0.0704	0.0148	0.0453	0.0118	0.0363	0.0078	0.0317	0.0090	0.0304
Pool Length (ft)					---		---		---		---		---		---		---		17.2	42.8	17.6	76.6
Pool Max Depth (ft)		2.4	2.5		1.6		1.8		3.3		1.2	1.8	2.6		0.9	3.2	1.1	3.9	1.6	3.7	2.0	4.9
Pool Spacing (ft)		---	---		N/A		34	52	71		9	46	27	73	13	67	17	84	31	78	35	103
Pool Volume (ft^3)																						
Pattern																						
Channel Beltwidth (ft)	N/A	12	20	48	157	N/A	28	50	38	41	10	50	102		16	74	20	93	20	68	34	72
Radius of Curvature (ft)		6	18	13	86	N/A	19	50	11	15	12	85	23	38	18	31	23	38	18	26	23	38
Rc:Bankfull Width (ft/ft)		0.8	2.3	1.6	10.9	N/A	2.0	5.3	1.3	1.4	1.9	9.1	2.0	3.1	1.8	3.0	1.8	3.0	1.8	2.5	1.9	2.8
Meander Length (ft)		27	45	176	260	N/A	--	--	--	--	53	178	--	--	31	151	38	192	70	120	97	160
Meander Width Ratio		1.5	2.5	6.1	19.9	N/A	3.0	5.3	3.4	3.6	1.6	5.4	8.3	8.9	1.6	7.3	1.6	7.3	2.0	6.5	2.9	5.3
Substrate, Bed and Transport Parameters																						
Ri%/Ru%/P%/G%/S%	N/A																					
SC%/Sa%/G%/C%/B%/Be%																						
d16/d35/d50/d84/d95/d100		0.33/1.88/3.47/ 45.0/117/256	0.18/3.2/14.6/ 128/234/>2048		---		---		---		---		---						SC/ SC/SC/ 41.3/79.2/128.0		SC/SC/0.11/ 45.0/104.7/180.0	
Reach Shear Stress (Competency) lb/ft^2		0.43	1.26												0.49		0.63		0.38		0.56	
Max part size (mm) mobilized at bankfull																						
Stream Power (Capacity) W/m^2																						
Additional Reach Parameters																						
Drainage Area (SM)	N/A	0.25	0.56		0.15		0.41		0.96		0.37		0.29		0.25		0.56		0.25		0.56	
Watershed Impervious Cover Estimate (%)		<1%	<1%		---		---		---		---		---		<1%		<1%		<1%		<1%	
Rosgen Classification		G4	E4, G4		B3		E4		E4		E4		C4/E4		C4		C4		C4		C4	
Bankfull Velocity (fps)		2.7	1.7	5.7	4.9		2.2	3.5	4.9	5.4	5.0	5.6	3.8		2.5-5		2.5-5		2.6	3.4	3.3	3.6
Bankfull Discharge (cfs)		14	129		37		20		97		35		40		25.0		46.0		17.0	30.9	30.3	42.9
Q-NFF regression		---	---																			
Q-USGS extrapolation		---	---																			
Q-Mannings		---	---																			
Valley Length (ft)		---	---		---		---		---		---		---		907		1,232					
Channel Thalweg Length (ft)		1,132	1,417		---		---		---		---		---		1,114		1,488		1,137		1,535	
Sinuosity		1.14	1.24		1.04		1.4		2.3		1.0	1.3	1.4		1.20	1.30	1.20	1.30	1.2		1.2	
Water Surface Slope ($ft/ft)^2$		---	---		---		---		---		---		---		---		---		0.0111		0.0122	
Bankfull Slope (ft/ft)		0.0093	0.019	0.0005	0.013	0.0490	0.012		0.0047		0.019	0.022	0.015		0.007	0.015	0.0054	0.0172	0.0096		0.0104	

(---): Data was not provided
N/A: Not Applicable

Table 5b. Baseline Stream Data Summary
Agony Acres Mitigation Site (NCEEP Project No. 95716)
Monitoring Year 0 - 2014

UT1A

		PRE-RESTORATION CONDITION				REFERENCE REACH DATA										DESIGN				AS-BUILT/BASELINE			
Parameter	Gage	UT1A - Reach 1		UT1A - Reach 4		Onsite Reference Reach - UT1A - Reach 3		UT to Polecat Creek		Spencer Creek 1		Spencer Creek 2		UT To Cane Creek		UT1A - Reach 1		UT1A - Reach 4		UT1A - Reach 1		UT1A - Reach 4	
						Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle																							
Bankfull Width (ft)	N/A	5.8		9.3		11.1		5.3	10.9	10.7	11.2	6.3	9.3	11.5	12.3	8.0		8.2		8.0		8.1	
Floodprone Width (ft)		15		>80		25		25	65	60	>114	14	125	31		18	40	18	41	50.0		200.0	
Bankfull Mean Depth		1.1		1.0		0.7		1.0	1.1	1.6	1.8	0.8	1.0	0.8	1.0	0.6		0.6		0.5		0.6	
Bankfull Max Depth		1.4		1.5		1.0		1.4	1.7	2.1	2.6	1	1.2	1.2	1.6	0.7	0.9	0.8	1.0	0.9		1.8	
Bankfull Cross Sectional Area (ft^2)		6.3		9.3		7.4		5.4	12.4	17.8	19.7	6.6	8.7	8.9	12.2	4.8		5.0		4.0		5.0	
Width/Depth Ratio		5.3		9.0		16.6		5.2	9.6	5.8	7.1	7.9	9.3	12.3	14.4	13.4		13.6		15.9		13.2	
Entrenchment Ratio		2.6		>8.6		2		3.2	8.3	5.5	>10.2	1.7	4.3	>2.5		2.2	5.0	2.2	5.0	6.3		24.8	
Bank Height Ratio		1.7		1.5		1.0		1.0	1.1	1.0		1.0	1.0	--	--	1.0	1.0	1.0	1.0	1.0		1.0	
D50 (mm)		4.31		5.06																1.41		0.25	
Profile																							
Riffle Length (ft)	N/A					---		---		---		---		---		---		---		15.5	42.0	20.5	51.9
Riffle Slope (ft/ft)		---		---		N/A		0.004	0.047	0.013		0.0184	0.0343	0.0188	0.0704	0.0148	0.0453	0.0212	0.0652	0.0077	0.0505	0.0109	0.0449
Pool Length (ft)						---		---		---		---		---		---		---		5.4	52.2	9.1	35.5
Pool Max Depth (ft)		1.8		3.6		1.6		1.8		3.3		1.2	1.8	2.6		0.7	2.4	0.7	2.5	1.6	3.5	1.4	3.1
Pool Spacing (ft)		---		---		N/A		34	52	71		9	46	27	73	10	53	11	54	20	85	45	82
Pool Volume (ft^3)																							
Pattern																							
Channel Beltwidth (ft)	N/A	30	35	N/A	N/A	N/A		28	50	38	41	10	50	102		13	58	13	60	24	60	35	55
Radius of Curvature (ft)		12	57	N/A	N/A	N/A		19	50	11	15	12	85	23	38	14	24	15	25	14	23	15	23
Rc:Bankfull Width (ft/ft)		1.5	7.2	N/A	N/A	N/A		2.0	5.3	1.3	1.4	1.9	9.1	2.0	3.1	1.8	3.0	1.8	3.0	1.8	2.9	1.9	2.8
Meander Length (ft)		89	104	N/A	N/A	N/A		--	--	--	--	53	178	--	--	24	120	25	123	70	112	96	117
Meander Width Ratio		3.8	4.4	N/A	N/A	N/A		3.0	5.3	3.4	3.6	1.6	5.4	8.3	8.9	1.6	7.3	1.6	7.3	3.0	7.5	4.3	6.8
Substrate, Bed and Transport Parameters																							
Ri%/Ru%/P%/G%/S%	N/A																						
SC%/Sa%/G%/C%/B%/Be%																							
d16/d35/d50/d84/d95/d100		0.15/2.18/4.31/ 16/139/256		0.45/2.71/5.06/ 67.7/122/362		---		---		---		---		---						SC/SC/1.41/ 33.4/64.0/128.0		SC/SC/0.25/ 26.2/75.9/180.0	
Reach Shear Stress (Competency) lb/ft^2		0.5		1.76												0.48		0.54		0.38		0.49	
Max part size (mm) mobilized at bankfull																							
Stream Power (Capacity) W/m^2																							
Additional Reach Parameters																							
Drainage Area (SM)	N/A	0.12		0.16		0.15		0.41		0.96		0.37		0.29		0.12		0.16		0.12		0.16	
Watershed Impervious Cover Estimate (%)		<1%		<1%		---		---		---		---		---		<1%		<1%		<1%		<1%	
Rosgen Classification		E4		E4		B3		E4		E4		E4		C4/E4		C4		C4		C4		C4	
Bankfull Velocity (fps)		3.3		5.2		4.9		2.2	3.5	4.9	5.4	5.0	5.6	3.8		2.5-5		2.5-5		2.6		3.0	
Bankfull Discharge (cfs)		21		50		37		20		97		35		40		14.0		17.0		15.9		15.0	
Q-NFF regression		---		---																			
Q-USGS extrapolation		---		---																			
Q-Mannings		---		---																			
Valley Length (ft)		---		---		---		---		---		---		---		673		530					
Channel Thalweg Length (ft)		770		461		---		---		---		---		---		849		650		857		666	
Sinuosity		1.12		1.03		1.04		1.4		2.3		1.0	1.3	1.4		1.20	1.30	1.20	1.30	1.2		1.2	
Water Surface Slope $(ft/ft)^2$		---		---		---		---		---		---		---		---		---		0.0126		N/A	
Bankfull Slope (ft/ft)		0.0095		0.015		0.0490		0.012		0.0047		0.019	0.022	0.015		0.0103	0.0175	0.0141	0.0153	0.0137		0.0129	

(---): Data was not provided
N/A: Not Applicable

Table 5c. Baseline Stream Data Summary
Agony Acres Mitigation Site (NCEEP Project No. 95716)
Monitoring Year 0 - 2014

UT1B

		PRE-RESTORATION	REFERENCE REACH DATA												DESIGN		AS-BUILT/ BASELINE	
Parameter	**Gage**	**UT1B**	**Onsite Reference Reach - UT1A - Reach 3**		**UT to Polecat Creek**		**Spencer Creek 1**		**Spencer Creek 2**		**UT To Cane Creek**				**UT1B**		**UT1B**	
			Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**			**Min**	**Max**	**Min**	**Max**
Dimension and Substrate - Riffle																		
Bankfull Width (ft)	N/A	4.9	11.1		5.3	10.9	10.7	11.2	6.3	9.3	11.5	12.3			7.3		7.7	
Floodprone Width (ft)		36	25		25	65	60	>114	14	125	31				16	37	70.0	
Bankfull Mean Depth		1.1	0.7		1.0	1.1	1.6	1.8	0.8	1.0	0.8	1.0			0.6		0.5	
Bankfull Max Depth		1.9	1.0		1.4	1.7	2.1	2.6	1	1.2	1.2	1.6			0.7	0.9	0.7	
Bankfull Cross Sectional Area (ft^2)		5.4	7.4		5.4	12.4	17.8	19.7	6.6	8.7	8.9	12.2			5.2		3.5	
Width/Depth Ratio		4.4	16.6		5.2	9.6	5.8	7.1	7.9	9.3	12.3	14.4			12.6		17.0	
Entrenchment Ratio		7.5	2		3.2	8.3	5.5	>10.2	1.7	4.3	>2.5				2.2	5.0	9.1	
Bank Height Ratio		1.6	1.0		1.0	1.1	1.0		1.0	1.0	--	--			1.0	1.0	1.0	
D50 (mm)		---															Silt/Clay	
Profile																		
Riffle Length (ft)	N/A		---		---		---		---		---				---		12.1	24.4
Riffle Slope (ft/ft)		---	N/A		0.004	0.047	0.013		0.0184	0.0343	0.0188	0.0704			0.0222	0.068	0.0219	0.0425
Pool Length (ft)			---		---		---		---		---				---		11.9	30.9
Pool Max Depth (ft)		2.5	1.6		1.8		3.3		1.2	1.8	2.6				0.7	2.4	1.7	2.5
Pool Spacing (ft)		---	N/A		34	52	71		9	46	27	73			9	48	30	45
Pool Volume (ft^3)																		
Pattern																		
Channel Beltwidth (ft)	N/A	N/A	N/A	N/A	28	50	38	41	10	50	102				12	53	25	40
Radius of Curvature (ft)		N/A	N/A	N/A	19	50	11	15	12	85	23	38			13	22	14	20
Rc:Bankfull Width (ft/ft)		N/A	N/A	N/A	2.0	5.3	1.3	1.4	1.9	9.1	2.0	3.1			1.8	3	1.8	2.6
Meander Length (ft)		N/A	N/A	N/A	--	--	--	--	53	178	--	--			22	110	60	72
Meander Width Ratio		N/A	N/A	N/A	3.0	5.3	3.4	3.6	1.6	5.4	8.3	8.9			1.6	7.3	3.2	5.2
Substrate, Bed and Transport Parameters																		
Ri%/Ru%/P%/G%/S%	N/A																	
SC%/Sa%/G%/C%/B%/Be%																		
d16/d35/d50/d84/d95/d100		---	---		---		---		---		---						SC/SC/SC/ 19.5/40.2/90.0	
Reach Shear Stress (Competency) lb/ft^2		---													---		0.21	
Max part size (mm) mobilized at bankfull																		
Stream Power (Capacity) W/m^2																		
Additional Reach Parameters																		
Drainage Area (SM)	N/A	0.10	0.15		0.41		0.96		0.37		0.29				0.10		0.10	
Watershed Impervious Cover Estimate (%)		<1%	---		---		---		---		---				<1%		<1%	
Rosgen Classification		E4	B3		E4		E4		E4		C4/E4				C4		C4	
Bankfull Velocity (fps)		4.6	4.9		2.2	3.5	4.9	5.4	5.0	5.6	3.8				1.5-4		1.9	
Bankfull Discharge (cfs)		25	37		20		97		35		40				11.0		6.6	
Q-NFF regression		---																
Q-USGS extrapolation		---																
Q-Mannings		---																
Valley Length (ft)		---	---		---		---		---		---				199			
Channel Thalweg Length (ft)		243	---		---		---		---		---				219		232	
Sinuosity		1.06	1.04		1.4		2.3		1.0	1.3	1.4				1.20	1.30	1.3	
Water Surface Slope $(ft/ft)^2$		---	---		---		---		---		---				---		0.0095	
Bankfull Slope (ft/ft)		0.020	0.0490		0.012		0.0047		0.019	0.022	0.015				0.010	0.020	0.0181	

(---): Data was not provided
N/A: Not Applicable

Table 5d. Baseline Stream Data Summary
Agony Acres Mitigation Site (NCEEP Project No. 95716)
Monitoring Year 0 - 2014

UT2

		PRE-RESTORATION		REFERENCE REACH DATA												DESIGN		AS-BUILT/ BASELINE	
Parameter	**Gage**	**UT2**		**Onsite Reference Reach - UT1A - Reach 3**		**UT to Polecat Creek**		**Spencer Creek 1**		**Spencer Creek 2**		**UT To Cane Creek**				**UT2**		**UT2**	
				Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**			**Min**	**Max**	**Min**	**Max**
Dimension and Substrate - Riffle																			
Bankfull Width (ft)	N/A	6.2	9.6	11.1		5.3	10.9	10.7	11.2	6.3	9.3	11.5	12.3			6.6		6.7	
Floodprone Width (ft)		>20		25		25	65	60	>114	14	125	31				15	33	50.0	
Bankfull Mean Depth		0.6	1.1	0.7		1.0	1.1	1.6	1.8	0.8	1.0	0.8	1.0			0.5		0.5	
Bankfull Max Depth		1.0	2.0	1.0		1.4	1.7	2.1	2.6	1	1.2	1.2	1.6			0.6	0.8	0.7	
Bankfull Cross Sectional Area (ft^2)		5.2	7.0	7.4		5.4	12.4	17.8	19.7	6.6	8.7	8.9	12.2			3.4		3.4	
Width/Depth Ratio		5.5	15.5	16.6		5.2	9.6	5.8	7.1	7.9	9.3	12.3	14.4			12.8		12.9	
Entrenchment Ratio		>2.4		2		3.2	8.3	5.5	>10.2	1.7	4.3	>2.5				2.2	5.0	7.5	
Bank Height Ratio		1.0	2.1	1.0		1.0	1.1	1.0		1.0	1.0	--	--			1.0	1.0	1.0	
D50 (mm)		2.11																Silt/Clay	
Profile																			
Riffle Length (ft)	N/A			---		---		---		---		---				---		13.9	51.7
Riffle Slope (ft/ft)		---		N/A		0.004	0.047	0.013		0.0184	0.0343	0.0188	0.0704			0.0179	0.0549	0.0146	0.0525
Pool Length (ft)				---		---		---		---		---				---		10.0	28.4
Pool Max Depth (ft)		1.4		1.6		1.8		3.3		1.2	1.8	2.6				0.6	2.1	1.0	2.4
Pool Spacing (ft)		---		N/A		34	52	71		9	46	27	73			9	44	25	66
Pool Volume (ft^3)																			
Pattern																			
Channel Beltwidth (ft)	N/A	32	54	N/A		28	50	38	41	10	50	102				11	48	19	50
Radius of Curvature (ft)		12	43	N/A		19	50	11	15	12	85	23	38			12	20	12	20
Rc:Bankfull Width (ft/ft)		1.5	5.4	N/A		2.0	5.3	1.3	1.4	1.9	9.1	2.0	3.1			1.8	3.0	1.8	3.0
Meander Length (ft)		102	103	N/A		--	--	--	--	53	178	--	--			20	99	58	98
Meander Width Ratio		4.1	6.8	N/A		3.0	5.3	3.4	3.6	1.6	5.4	8.3	8.9			1.6	7.3	2.8	7.5
Substrate, Bed and Transport Parameters																			
Ri%/Ru%/P%/G%/S%	N/A																		
SC%/Sa%/G%/C%/B%/Be%																			
d16/d35/d50/d84/d95/d100		0.2/0.68/2.11/ 20.7/98.3/256		---		---		---		---		---						SC/SC/SC/ 30.2/64.0/128.0	
Reach Shear Stress (Competency) lb/ft^2		---														---		0.64	
Max part size (mm) mobilized at bankfull																			
Stream Power (Capacity) W/m^2																			
Additional Reach Parameters																			
Drainage Area (SM)	N/A	0.09		0.15		0.41		0.96		0.37		0.29				0.09		0.09	
Watershed Impervious Cover Estimate (%)		<1%		---		---		---		---		---				<1%		<1%	
Rosgen Classification		E4		B3		E4		E4		E4		C4/E4				C4		C4	
Bankfull Velocity (fps)		3.0	5.1	4.9		2.2	3.5	4.9	5.4	5.0	5.6	3.8				2.5-5		3.4	
Bankfull Discharge (cfs)		23		37		20		97		35		40				11.0		11.5	
Q-NFF regression		---																	
Q-USGS extrapolation		---																	
Q-Mannings		---																	
Valley Length (ft)		---		---		---		---		---		---				905		---	
Channel Thalweg Length (ft)		1,028		---		---		---		---		---				1,023		1,032	
Sinuosity		1.06		1.04		1.4		2.3		1.0	1.3	1.4				1.20	1.30	1.2	
Water Surface Slope $(ft/ft)^2$		---		---		---		---		---		---				---		0.0207	
Bankfull Slope (ft/ft)		0.013	0.022	0.0490		0.012		0.0047		0.019	0.022	0.015				0.0121	0.0231	0.0195	

(---): Data was not provided
N/A: Not Applicable

Table 6. Morphology and Hydraulic Summary (Dimensional Parameters - Cross Section)
Agony Acres Mitigation Site (NCEEP Project No. 95716)
Monitoring Year 0 - 2014

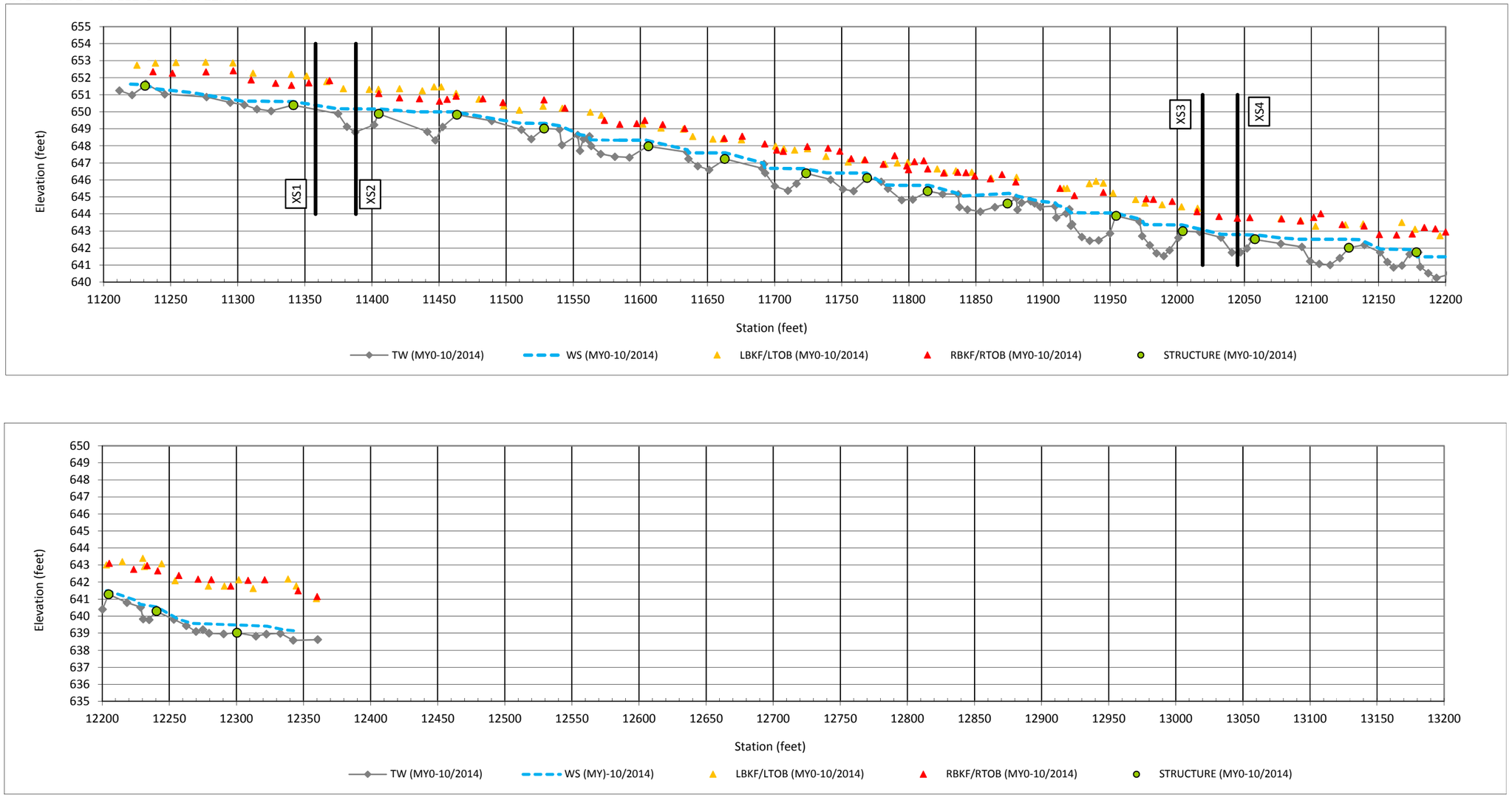
	UT1 Reach 2																													
	Cross Section 1 (Riffle)								Cross Section 2 (Pool)								Cross Section 3 (Riffle)								Cross Section 4 (Pool)							
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
based on fixed bankfull elevation	651.7								651.0								644.0								643.6							
Bankfull Width (ft)	10.4								9.6								10.2								13.5							
Floodprone Width (ft)	100.0								N/A								60.0								N/A							
Bankfull Mean Depth (ft)	0.9								1.2								0.6								1.1							
Bankfull Max Depth (ft)	1.4								2.1								1.1								1.9							
Bankfull Cross Sectional Area (ft^2)	9.0								11.6								6.2								14.7							
Bankfull Width/Depth Ratio	12.0								7.9								16.8								12.4							
Bankfull Entrenchment Ratio	9.6								N/A								5.9								N/A							
Bankfull Bank Height Ratio	1.0								1.0								1.0								1.0							
	UT1 Reach 5																													
	Cross Section 5 (Pool)								Cross Section 6 (Riffle)								Cross Section 7 (Riffle)								Cross Section 8 (Pool)							
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
based on fixed bankfull elevation	610.4								610								600.9								600.6							
Bankfull Width (ft)	15.9								13.6								11.9								15.2							
Floodprone Width (ft)	N/A								200.0								200.0								N/A							
Bankfull Mean Depth (ft)	1.2								0.9								0.8								1.4							
Bankfull Max Depth (ft)	2.4								1.6								1.3								2.7							
Bankfull Cross Sectional Area (ft^2)	18.5								11.9								9.1								21.3							
Bankfull Width/Depth Ratio	13.6								15.5								15.7								10.9							
Bankfull Entrenchment Ratio	N/A								14.7								16.8								N/A							
Bankfull Bank Height Ratio	1.0								1.0								1.0								1.0							
	UT1A Reach 1																UT1A Reach 4															
	Cross Section 9 (Riffle)								Cross Section 10 (Pool)								Cross Section 11 (Riffle)								Cross Section 12 (Pool)							
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
based on fixed bankfull elevation	656.4								656								615.8								615.1							
Bankfull Width (ft)	8.0								10.4								8.1								10.6							
Floodprone Width (ft)	50.0								N/A								200.0								N/A							
Bankfull Mean Depth (ft)	0.5								0.7								0.6								1.2							
Bankfull Max Depth (ft)	0.9								1.5								1.8								2.7							
Bankfull Cross Sectional Area (ft^2)	4.0								7.8								5.0								12.3							
Bankfull Width/Depth Ratio	15.9								13.9								13.2								9.1							
Bankfull Entrenchment Ratio	6.3								N/A								24.8								N/A							
Bankfull Bank Height Ratio	1.0								1.0								1.0								1.0							
	UT1B																UT2															
	Cross Section 13 (Riffle)								Cross Section 14 (Pool)								Cross Section 15 (Riffle)								Cross Section 16 (Pool)							
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
based on fixed bankfull elevation	647.1								646.9								602.9								602.4							
Bankfull Width (ft)	7.7								9.7								6.7								9.5							
Floodprone Width (ft)	70.0								N/A								50.0								N/A							
Bankfull Mean Depth (ft)	0.5								0.8								0.5								0.6							
Bankfull Max Depth (ft)	0.7								1.4								0.7								1.3							
Bankfull Cross Sectional Area (ft^2)	3.5								7.8								3.4								5.8							
Bankfull Width/Depth Ratio	17.0								12.1								12.9								15.5							
Bankfull Entrenchment Ratio	9.1								N/A								7.5								N/A							
Bankfull Bank Height Ratio	1.0								1.0								1.0								1.0							

Longitudinal Profile Plots

Agony Acres Mitigation Site (NCEEP Project No. 95716)

Monitoring Year 0 - 2014

UT1 Reach 2 - Sta 111+24 to Sta 123+54

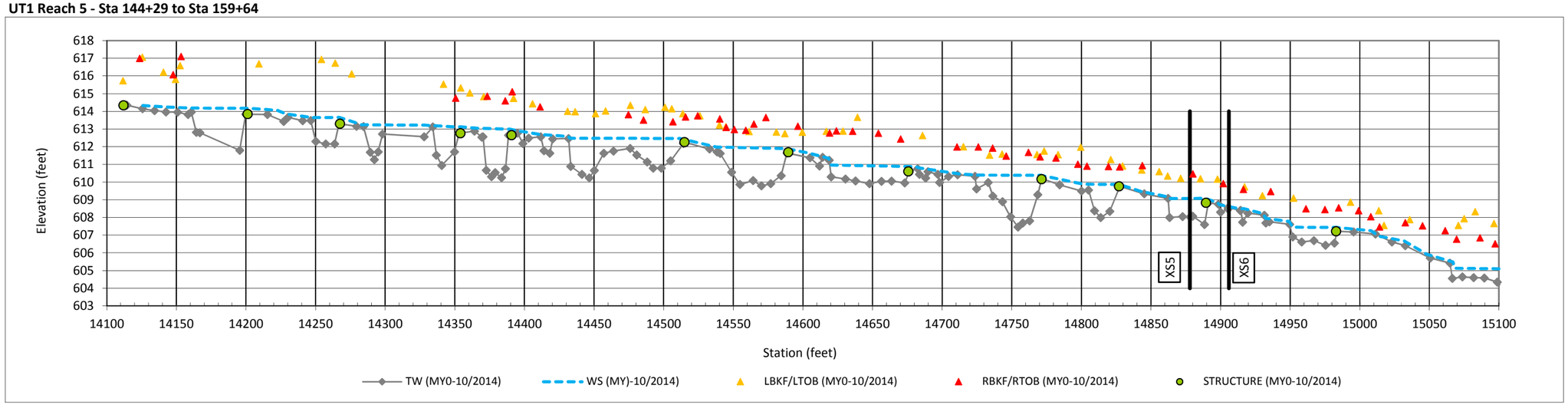


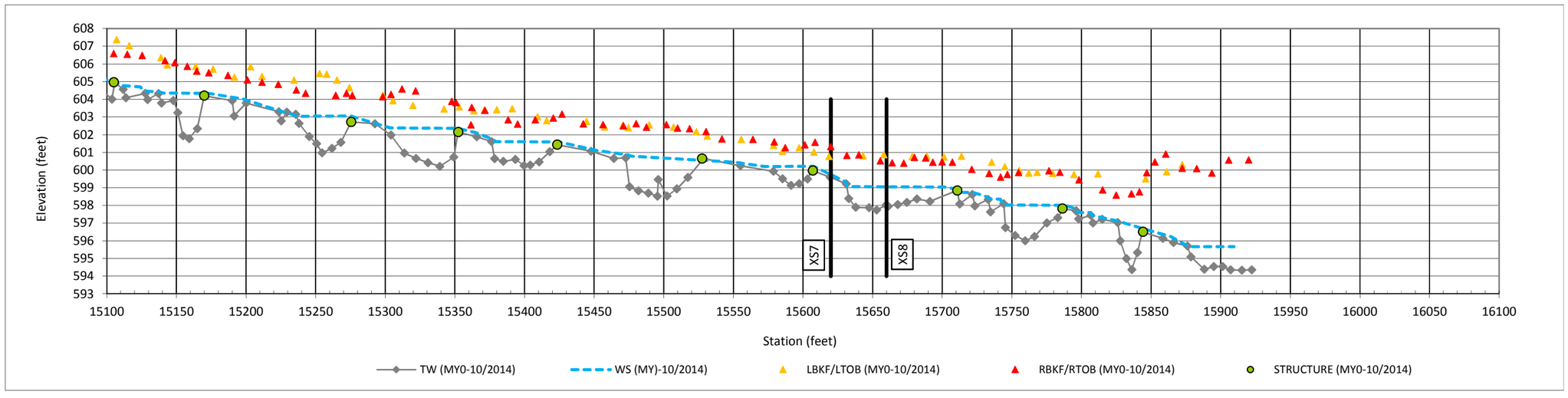
Longitudinal Profile Plots

Agony Acres Mitigation Site (NCEEP Project No. 95716)

Monitoring Year 0 - 2014

UT1 Reach 4 - Sta 141+15 to Sta 144+29
UT1 Reach 5 - Sta 144+29 to Sta 159+64



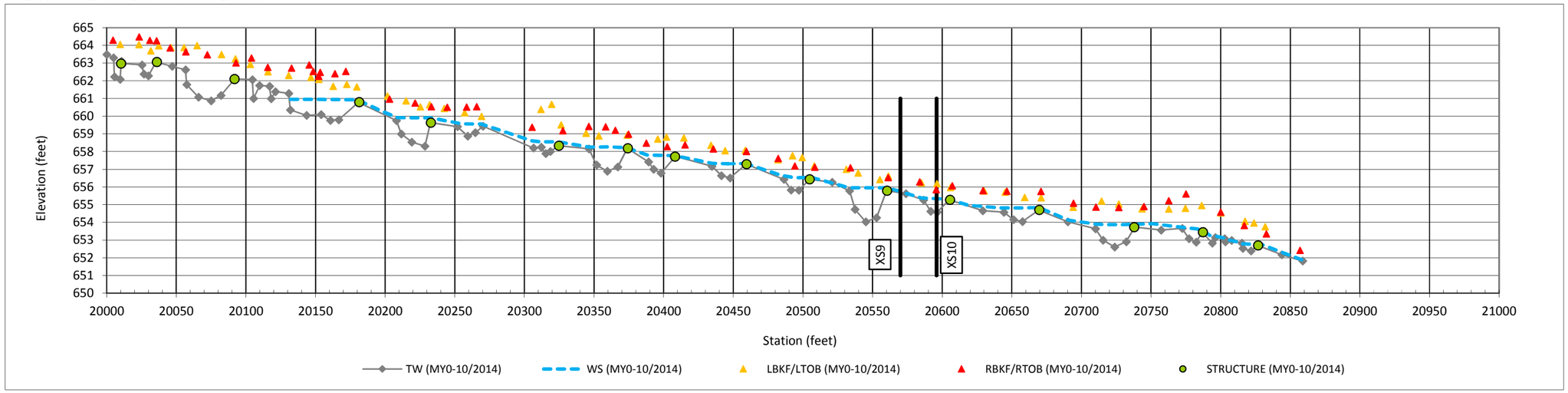


Longitudinal Profile Plots

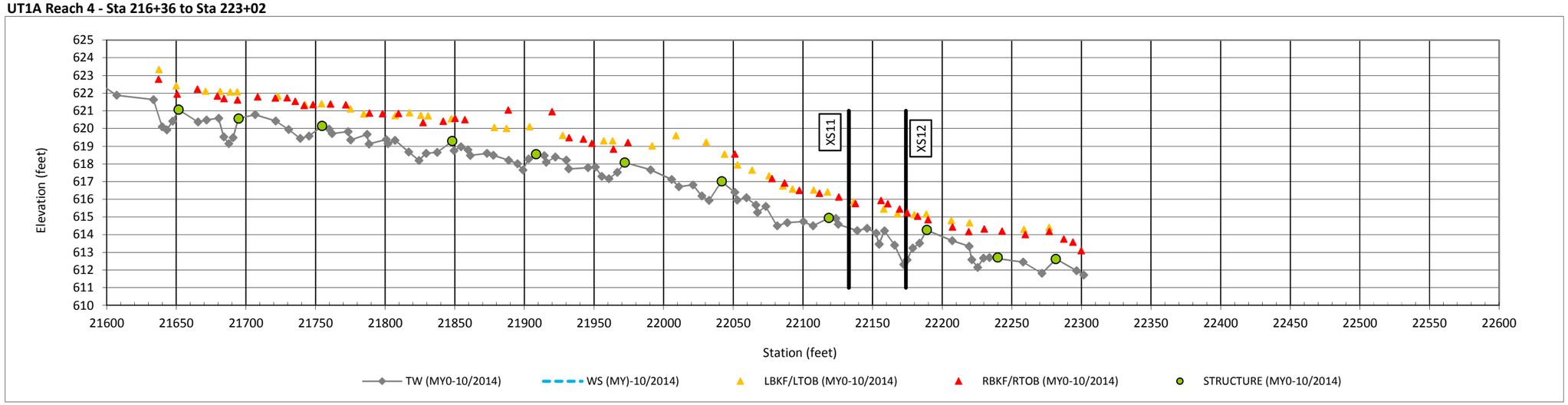
Agony Acres Mitigation Site (NCEEP Project No. 95716)

Monitoring Year 0 - 2014

UT1A Reach 1 - Sta 200+00 to Sta 208+57



UT1A Reach 4 - Sta 216+36 to Sta 223+02

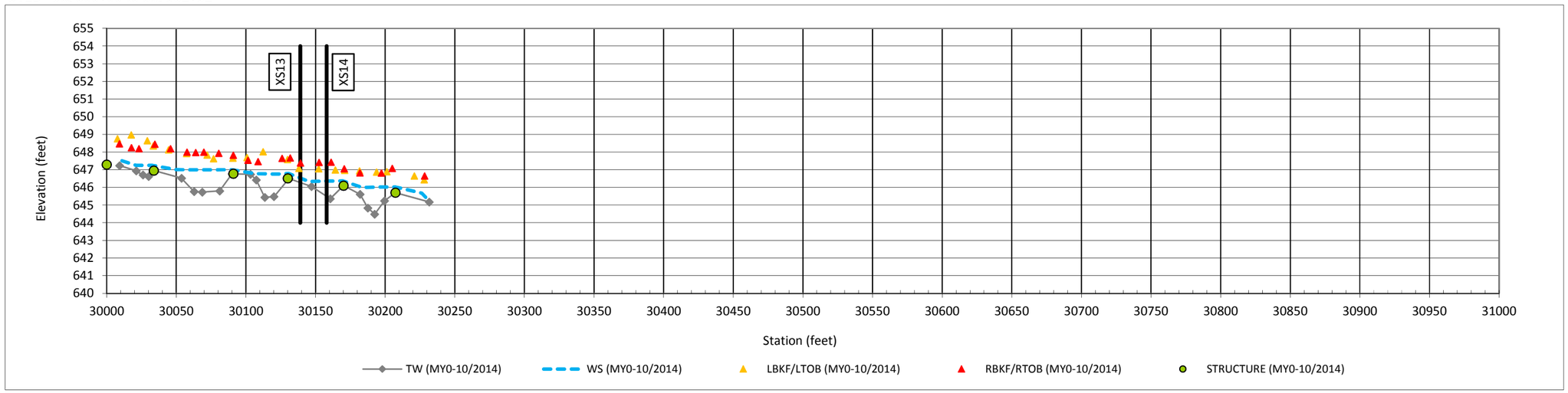


Longitudinal Profile Plots

Agony Acres Mitigation Site (NCEEP Project No. 95716)

Monitoring Year 0 - 2014

UT1B - Sta 300+00 to Sta 302+32

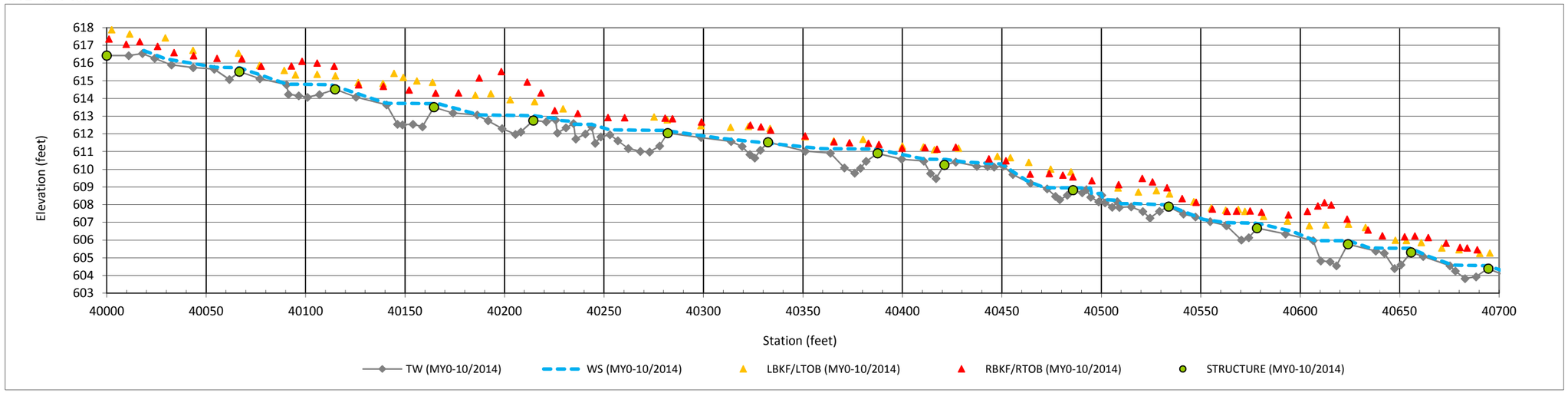


Longitudinal Profile Plots

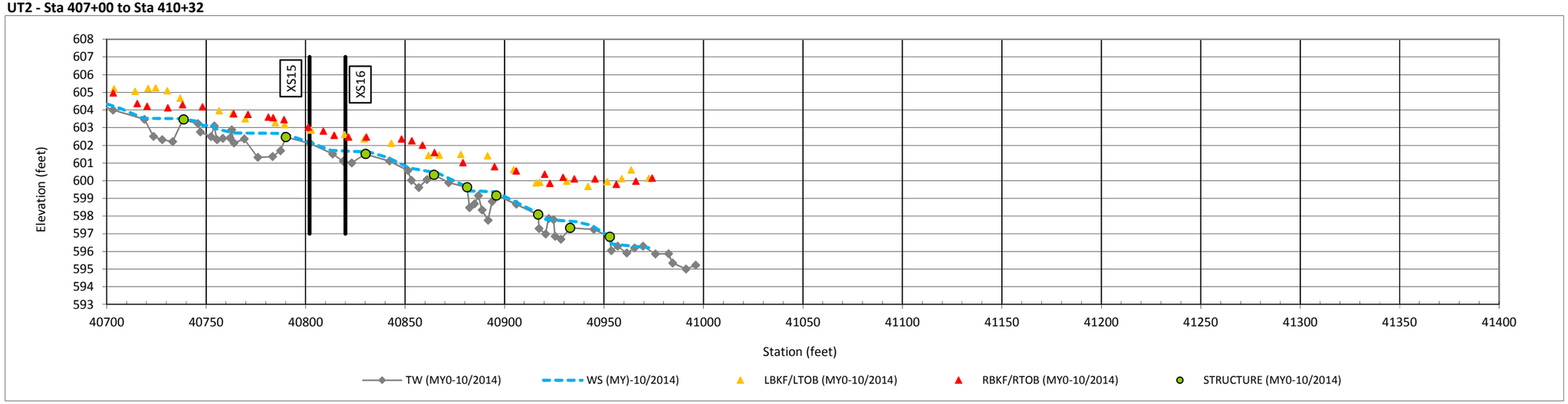
Agony Acres Mitigation Site (NCEEP Project No. 95716)

Monitoring Year 0 - 2014

UT2 - Sta 400+00 to Sta 407+00



UT2 - Sta 407+00 to Sta 410+32

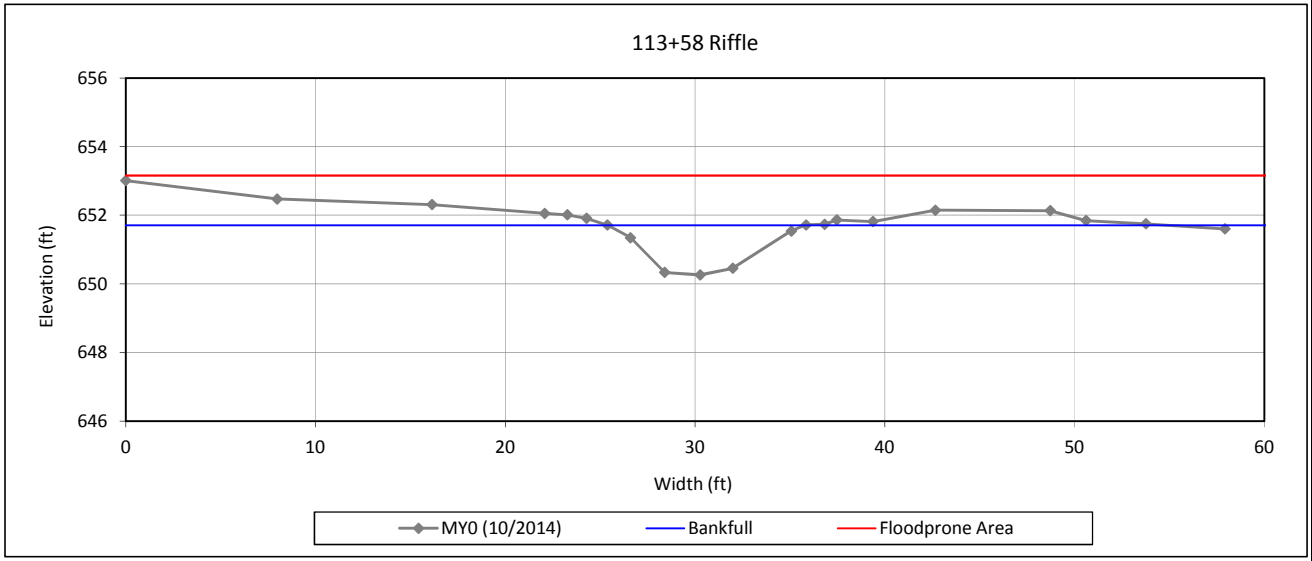


Cross Section Plots

Agony Acres Mitigtion Site (NCEEP Project No. 95716)

Monitoring Year 0 - 2014

Cross Section 1-UT1 Reach 2



Bankfull Dimensions	
9.0	x-section area (ft.sq.)
10.4	width (ft)
0.9	mean depth (ft)
1.4	max depth (ft)
10.9	wetted parimeter (ft)
0.8	hyd radi (ft)
12.0	width-depth ratio
100.0	W flood prone area (ft)
9.6	entrenchment ratio
1.0	low bank height ratio

Survey Date: 10/2014

Field Crew: Kee Mapping & Surveying

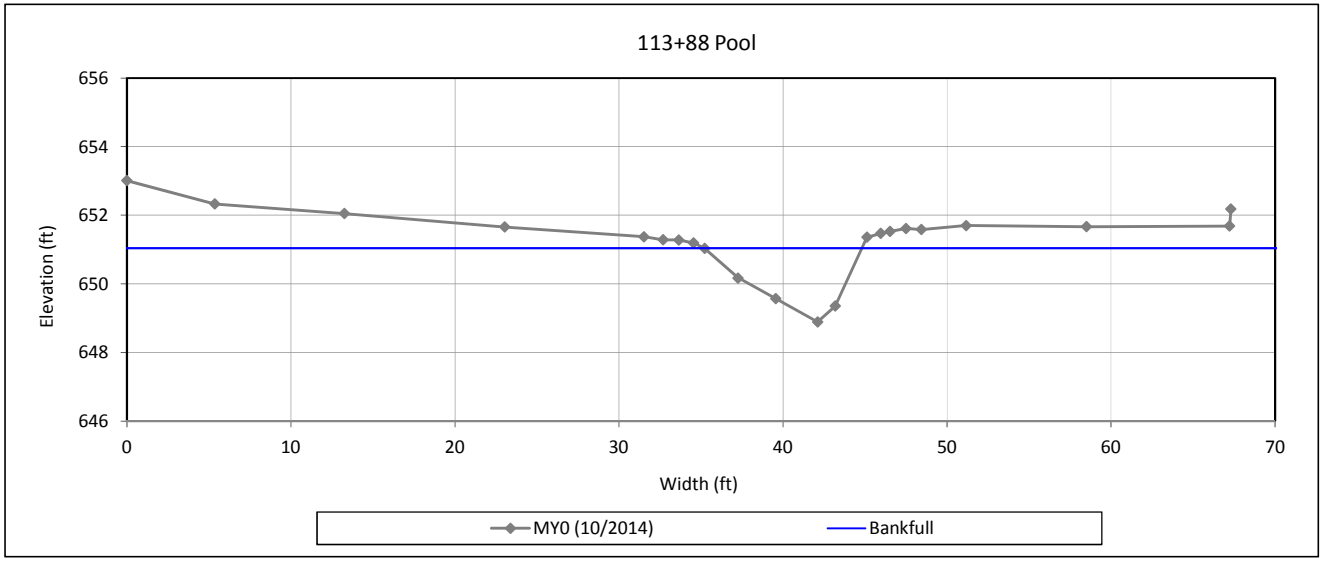
View Downstream

Cross Section Plots

Agony Acres Mitigtion Site (NCEEP Project No. 95716)

Monitoring Year 0 - 2014

Cross Section 2-UT1 Reach 2



Bankfull Dimensions	
11.6	x-section area (ft.sq.)
9.6	width (ft)
1.2	mean depth (ft)
2.1	max depth (ft)
10.7	wetted parimeter (ft)
1.1	hyd radi (ft)
7.9	width-depth ratio

Survey Date: 10/2014

Field Crew: Kee Mapping & Surveying

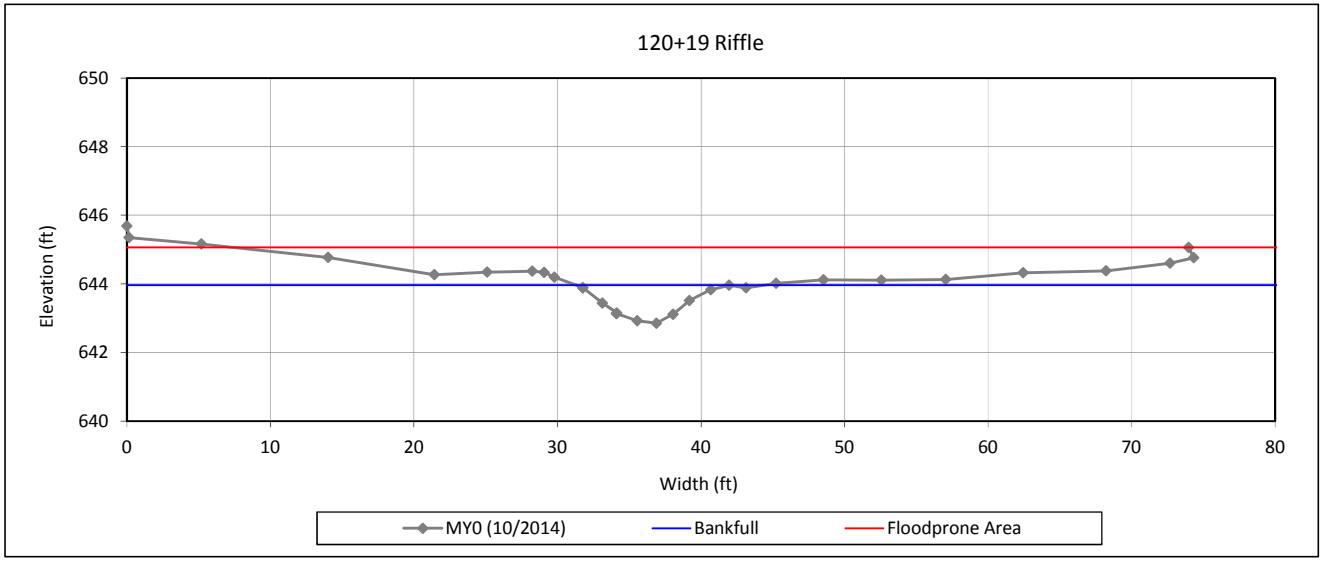
View Downstream

Cross Section Plots

Agony Acres Mitigtion Site (NCEEP Project No. 95716)

Monitoring Year 0 - 2014

Cross Section 3-UT1 Reach 2



Bankfull Dimensions	
6.2	x-section area (ft.sq.)
10.2	width (ft)
0.6	mean depth (ft)
1.1	max depth (ft)
10.5	wetted parimeter (ft)
0.6	hyd radi (ft)
16.8	width-depth ratio
60.0	W flood prone area (ft)
5.9	entrenchment ratio
1.0	low bank height ratio

Survey Date: 10/2014

Field Crew: Kee Mapping & Surveying

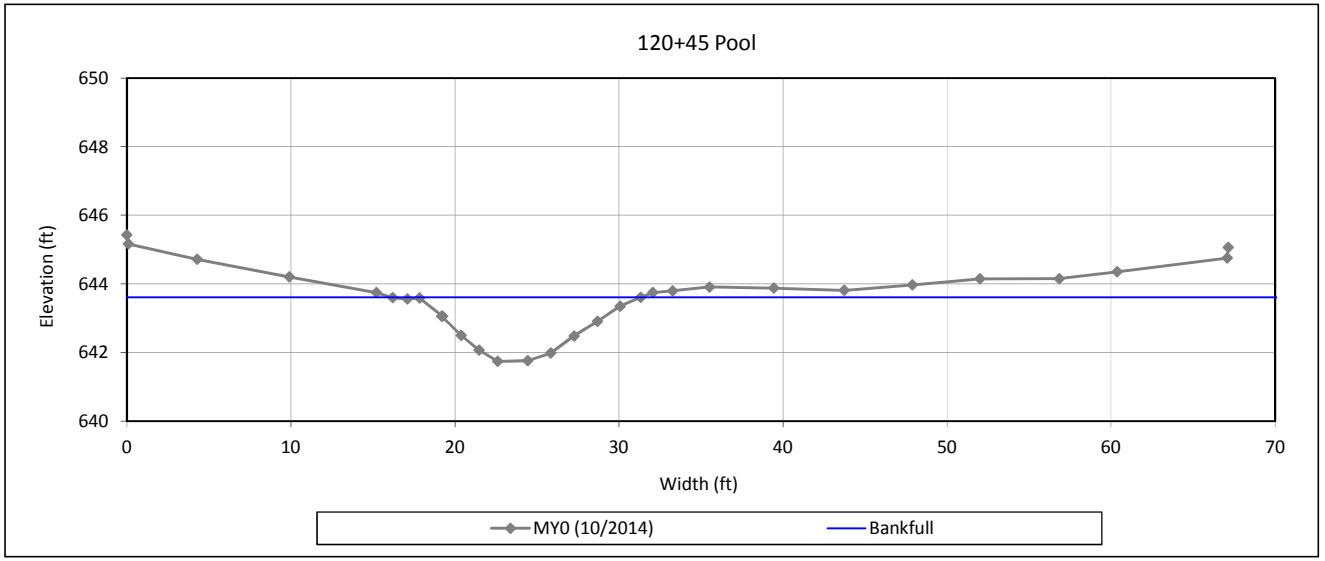
View Downstream

Cross Section Plots

Agony Acres Mitigtion Site (NCEEP Project No. 95716)

Monitoring Year 0 - 2014

Cross Section 4-UT1 Reach 2



Bankfull Dimensions	
14.7	x-section area (ft.sq.)
13.5	width (ft)
1.1	mean depth (ft)
1.9	max depth (ft)
14.2	wetted parimeter (ft)
1.0	hyd radi (ft)
12.4	width-depth ratio

Survey Date: 10/2014

Field Crew: Kee Mapping & Surveying

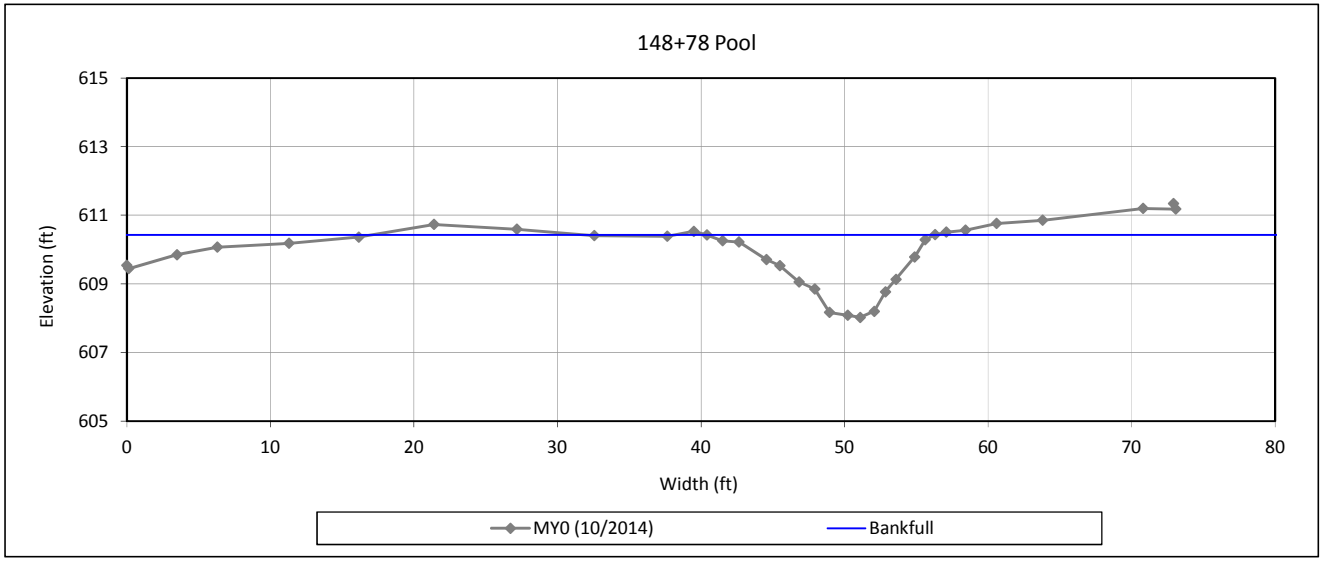
View Downstream

Cross Section Plots

Agony Acres Mitigtion Site (NCEEP Project No. 95716)

Monitoring Year 0 - 2014

Cross Section 5-UT1 Reach 5



Bankfull Dimensions	
18.5	x-section area (ft.sq.)
15.9	width (ft)
1.2	mean depth (ft)
2.4	max depth (ft)
16.9	wetted parimeter (ft)
1.1	hyd radi (ft)
13.6	width-depth ratio

Survey Date: 10/2014

Field Crew: Kee Mapping & Surveying

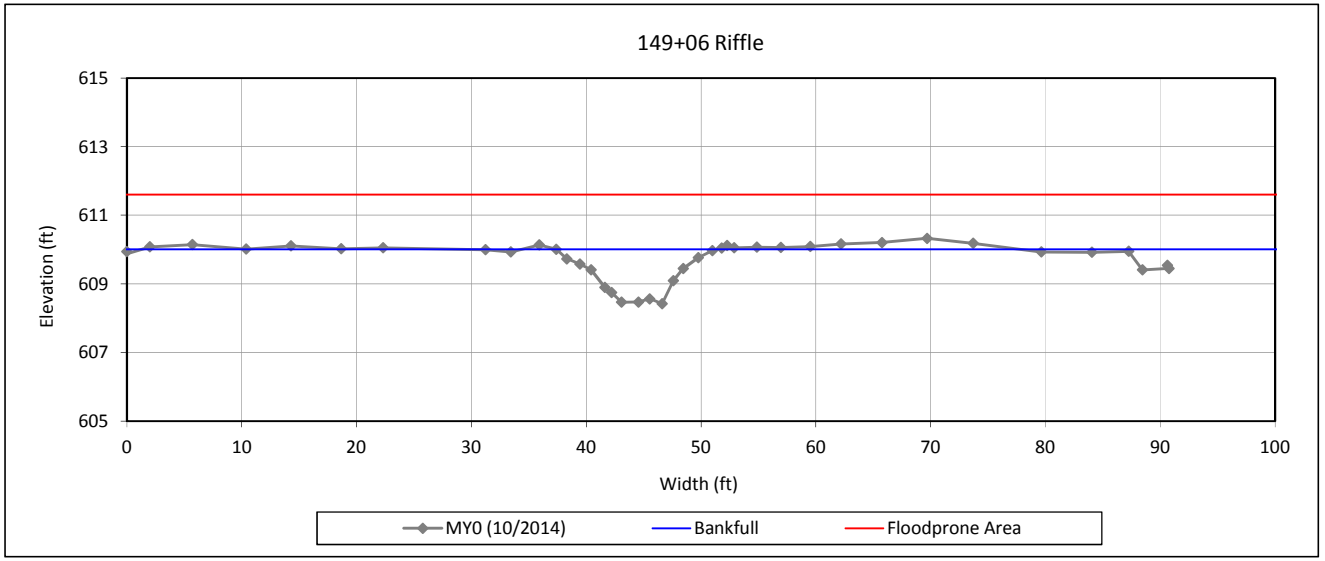
View Downstream

Cross Section Plots

Agony Acres Mitigtion Site (NCEEP Project No. 95716)

Monitoring Year 0 - 2014

Cross Section 6-UT1 Reach 5



Bankfull Dimensions	
11.9	x-section area (ft.sq.)
13.6	width (ft)
0.9	mean depth (ft)
1.6	max depth (ft)
14.2	wetted parimeter (ft)
0.8	hyd radi (ft)
15.5	width-depth ratio
200.0	W flood prone area (ft)
14.7	entrenchment ratio
1.0	low bank height ratio

Survey Date: 10/2014

Field Crew: Kee Mapping & Surveying

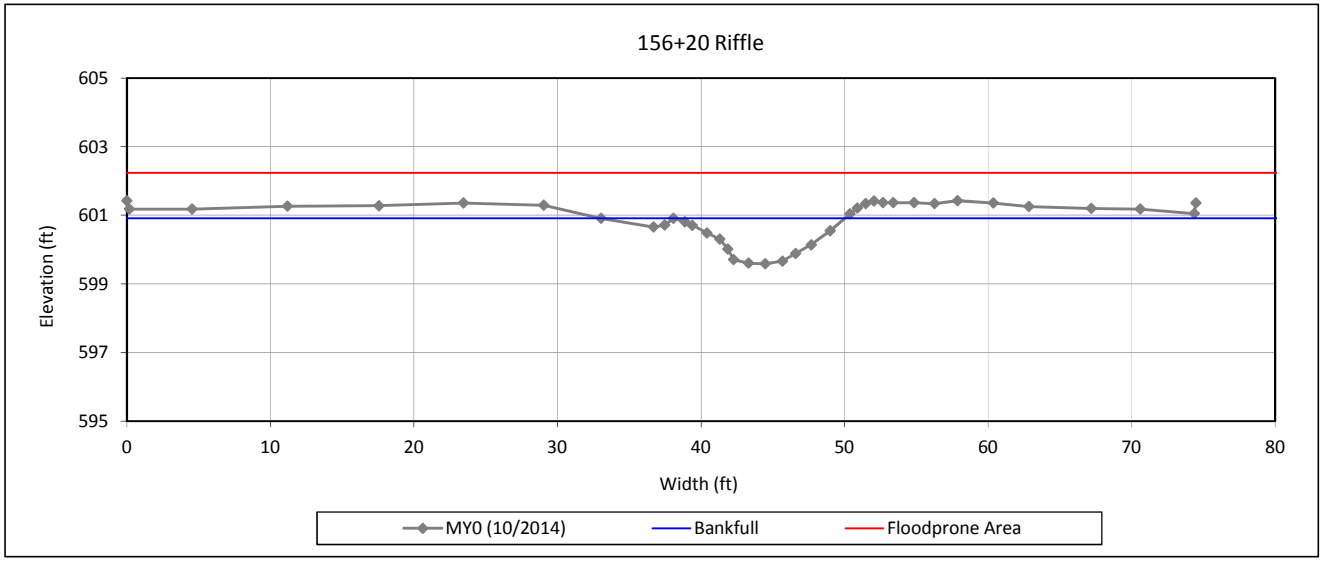
View Downstream

Cross Section Plots

Agony Acres Mitigtion Site (NCEEP Project No. 95716)

Monitoring Year 0 - 2014

Cross Section 7-UT1 Reach 5



Bankfull Dimensions	
9.1	x-section area (ft.sq.)
11.9	width (ft)
0.8	mean depth (ft)
1.3	max depth (ft)
12.4	wetted parimeter (ft)
0.7	hyd radi (ft)
15.7	width-depth ratio
200.0	W flood prone area (ft)
16.8	entrenchment ratio
1.0	low bank height ratio

Survey Date: 10/2014

Field Crew: Kee Mapping & Surveying

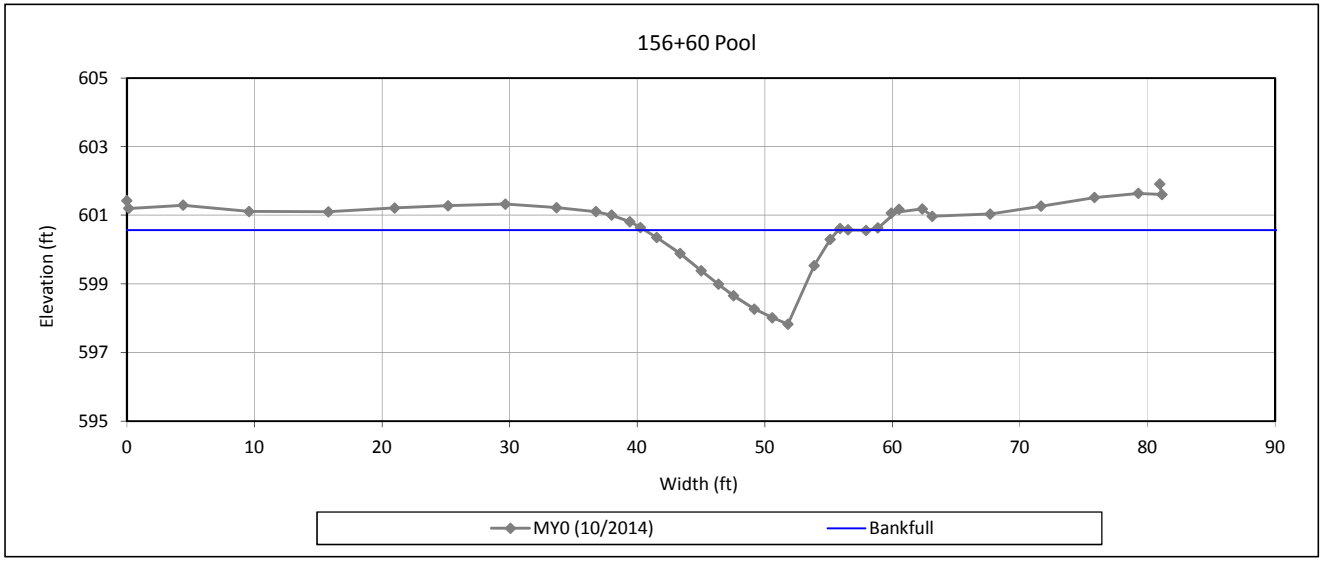
View Downstream

Cross Section Plots

Agony Acres Mitigtion Site (NCEEP Project No. 95716)

Monitoring Year 0 - 2014

Cross Section 8-UT1 Reach 5



Bankfull Dimensions	
21.3	x-section area (ft.sq.)
15.2	width (ft)
1.4	mean depth (ft)
2.7	max depth (ft)
16.5	wetted parimeter (ft)
1.3	hyd radi (ft)
10.9	width-depth ratio

Survey Date: 10/2014

Field Crew: Kee Mapping & Surveying

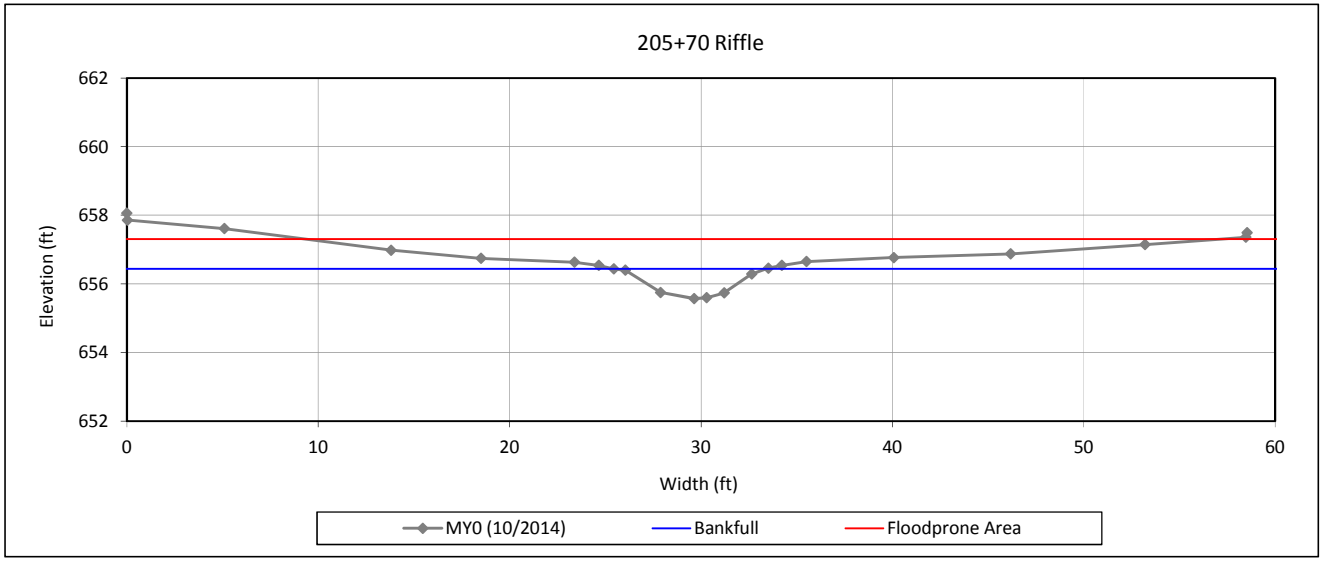
View Downstream

Cross Section Plots

Agony Acres Mitigtion Site (NCEEP Project No. 95716)

Monitoring Year 0 - 2014

Cross Section 9-UT1A Reach 1



Bankfull Dimensions	
4.0	x-section area (ft.sq.)
8.0	width (ft)
0.5	mean depth (ft)
0.9	max depth (ft)
8.2	wetted parimeter (ft)
0.5	hyd radi (ft)
15.9	width-depth ratio
50.0	W flood prone area (ft)
6.3	entrenchment ratio
1.0	low bank height ratio

Survey Date: 10/2014

Field Crew: Kee Mapping & Surveying

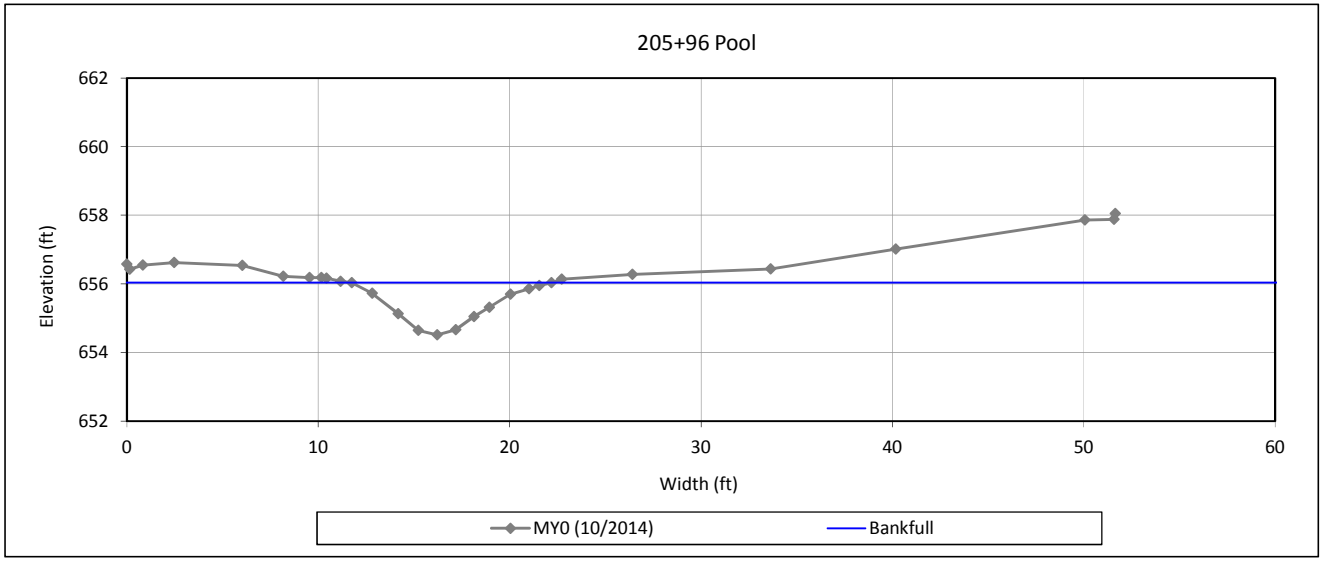
View Downstream

Cross Section Plots

Agony Acres Mitigtion Site (NCEEP Project No. 95716)

Monitoring Year 0 - 2014

Cross Section 10-UT1A Reach 1



Bankfull Dimensions	
7.8	x-section area (ft.sq.)
10.4	width (ft)
0.7	mean depth (ft)
1.5	max depth (ft)
10.9	wetted parimeter (ft)
0.7	hyd radi (ft)
13.9	width-depth ratio

Survey Date: 10/2014

Field Crew: Kee Mapping & Surveying

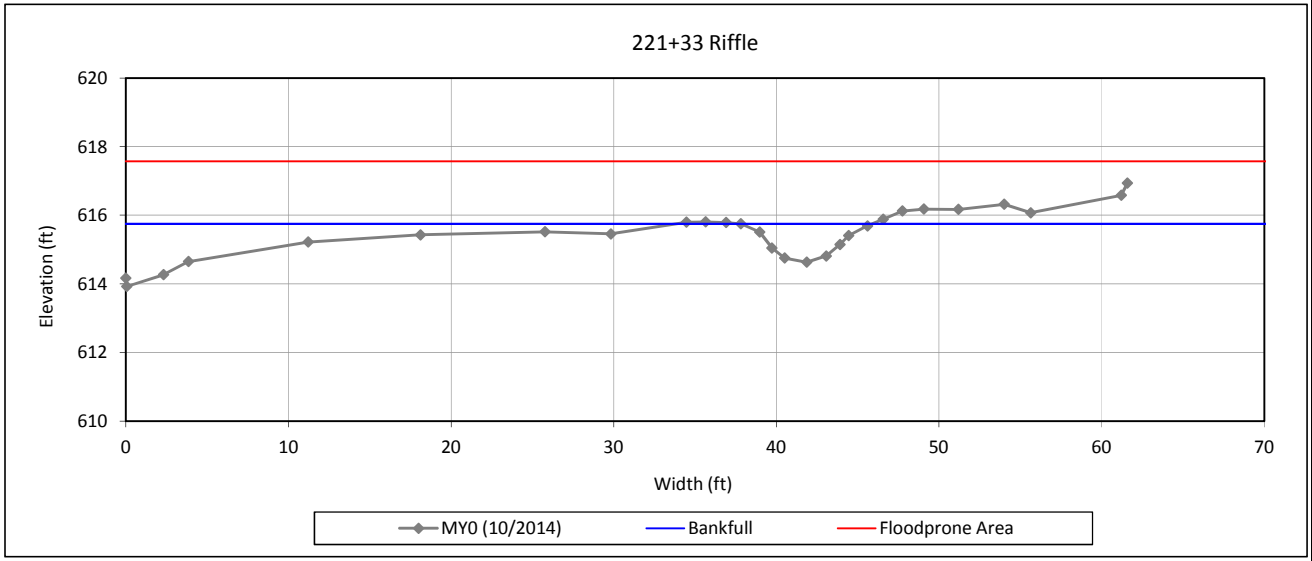
View Downstream

Cross Section Plots

Agony Acres Mitigtion Site (NCEEP Project No. 95716)

Monitoring Year 0 - 2014

Cross Section 11-UT1A Reach 4



Bankfull Dimensions	
5.0	x-section area (ft.sq.)
8.1	width (ft)
0.6	mean depth (ft)
1.8	max depth (ft)
8.5	wetted parimeter (ft)
0.6	hyd radi (ft)
13.2	width-depth ratio
200.0	W flood prone area (ft)
24.8	entrenchment ratio
1.0	low bank height ratio

Survey Date: 10/2014

Field Crew: Kee Mapping & Surveying

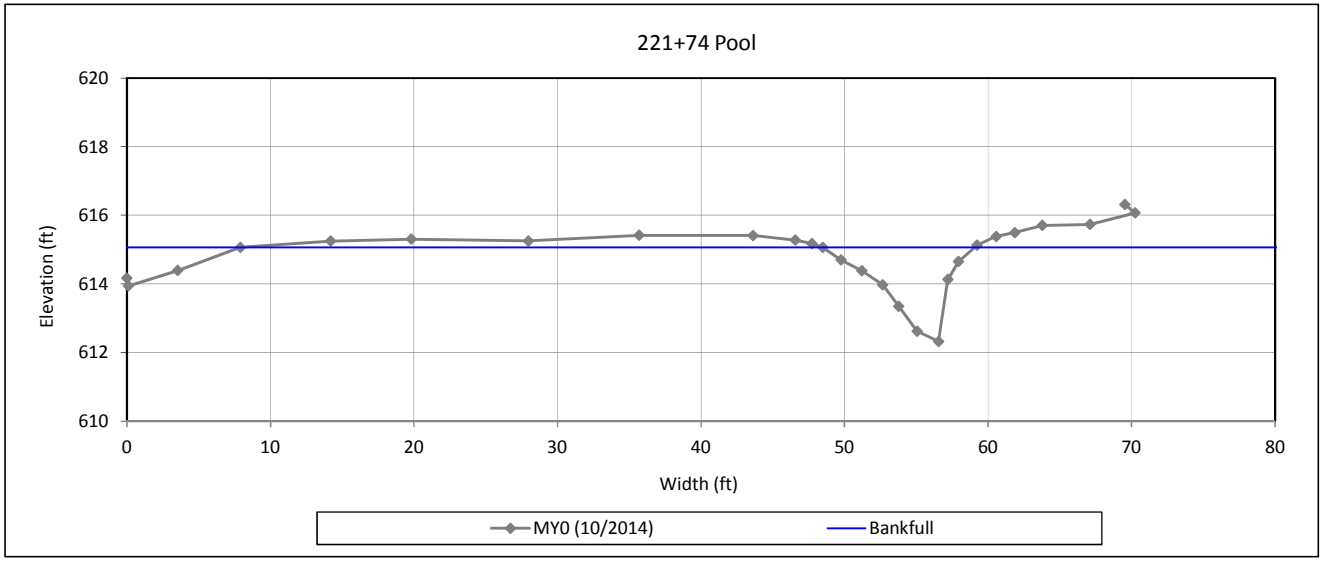
View Downstream

Cross Section Plots

Agony Acres Mitigtion Site (NCEEP Project No. 95716)

Monitoring Year 0 - 2014

Cross Section 12-UT1A Reach 4



Bankfull Dimensions	
12.3	x-section area (ft.sq.)
10.6	width (ft)
1.2	mean depth (ft)
2.7	max depth (ft)
12.6	wetted parimeter (ft)
1.0	hyd radi (ft)
9.1	width-depth ratio

Survey Date: 10/2014

Field Crew: Kee Mapping & Surveying

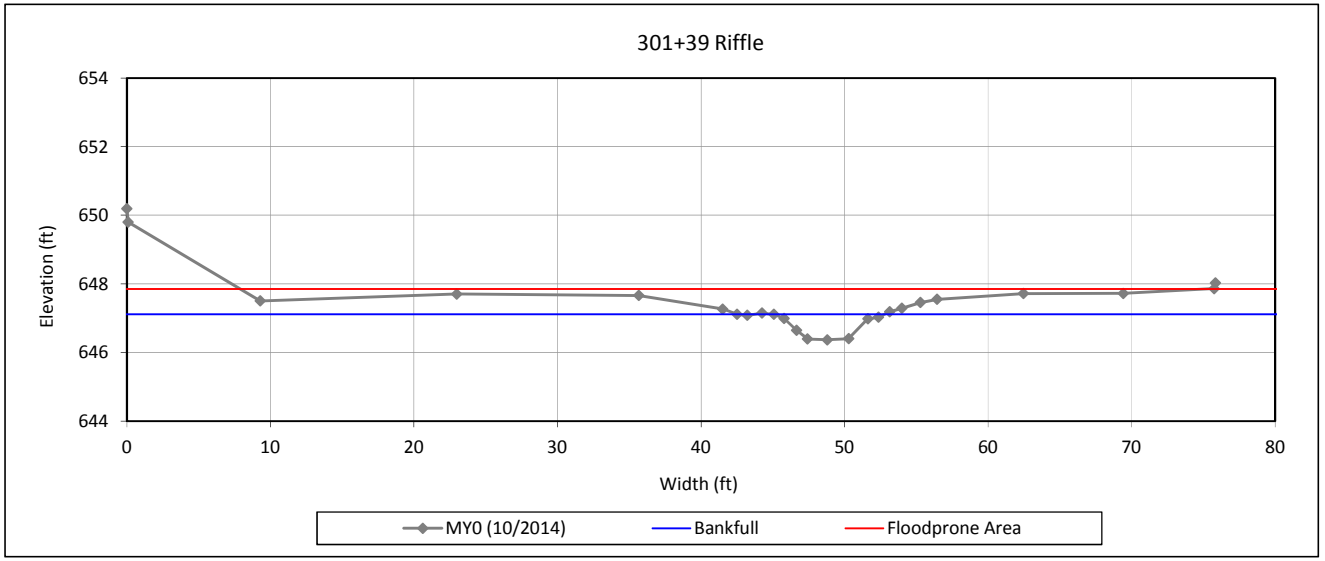
View Downstream

Cross Section Plots

Agony Acres Mitigtion Site (NCEEP Project No. 95716)

Monitoring Year 0 - 2014

Cross Section 13-UT1B



Bankfull Dimensions	
3.5	x-section area (ft.sq.)
7.7	width (ft)
0.5	mean depth (ft)
0.7	max depth (ft)
7.9	wetted parimeter (ft)
0.4	hyd radi (ft)
17.0	width-depth ratio
70.0	W flood prone area (ft)
9.1	entrenchment ratio
1.0	low bank height ratio

Survey Date: 10/2014

Field Crew: Kee Mapping & Surveying

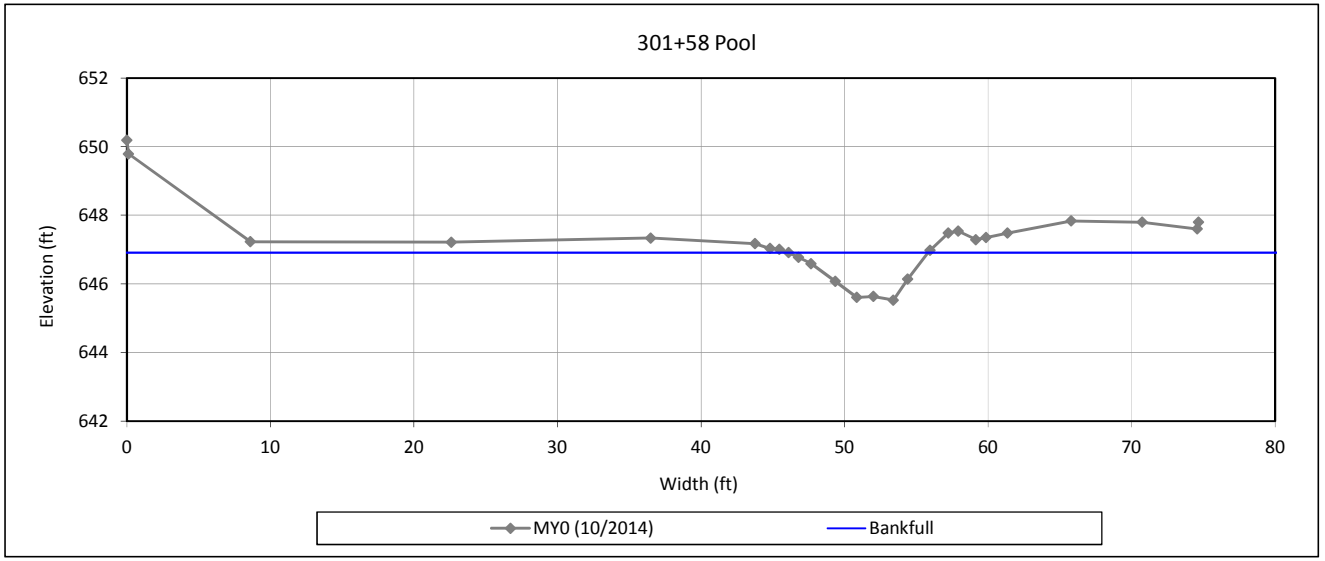
View Downstream

Cross Section Plots

Agony Acres Mitigtion Site (NCEEP Project No. 95716)

Monitoring Year 0 - 2014

Cross Section 14-UT1B



Bankfull Dimensions	
7.8	x-section area (ft.sq.)
9.7	width (ft)
0.8	mean depth (ft)
1.4	max depth (ft)
10.3	wetted parimeter (ft)
0.8	hyd radi (ft)
12.1	width-depth ratio

Survey Date: 10/2014

Field Crew: Kee Mapping & Surveying

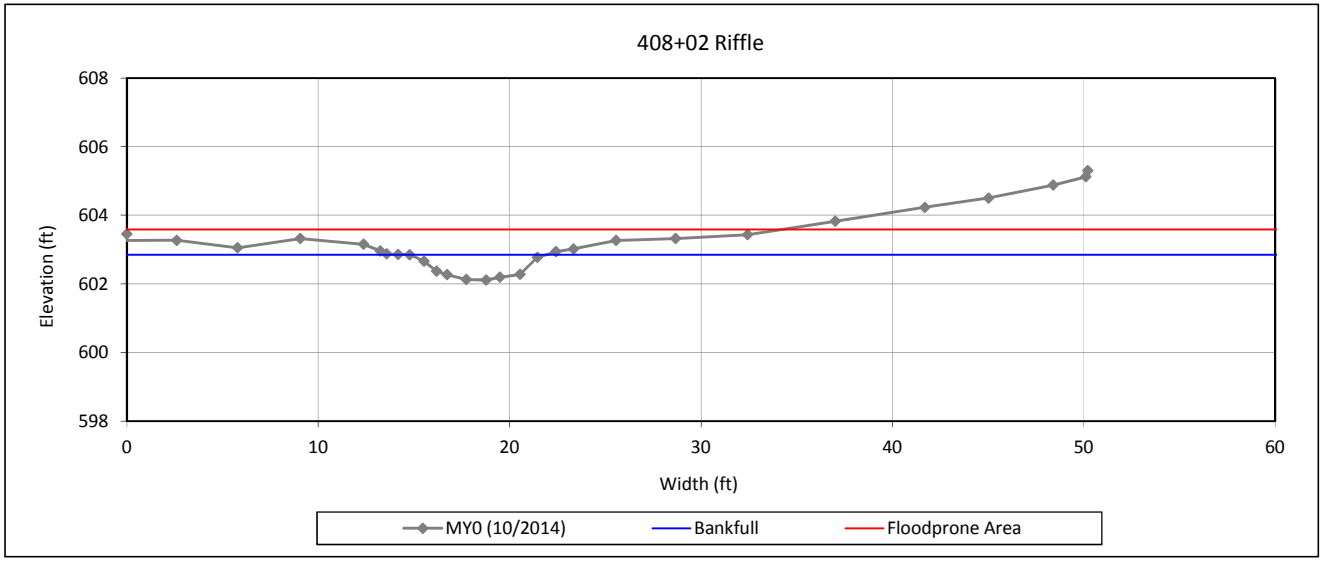
View Downstream

Cross Section Plots

Agony Acres Mitigtion Site (NCEEP Project No. 95716)

Monitoring Year 0 - 2014

Cross Section 15-UT2



Bankfull Dimensions	
3.4	x-section area (ft.sq.)
6.7	width (ft)
0.5	mean depth (ft)
0.7	max depth (ft)
6.9	wetted parimeter (ft)
0.5	hyd radi (ft)
12.9	width-depth ratio
50.0	W flood prone area (ft)
7.5	entrenchment ratio
1.0	low bank height ratio

Survey Date: 10/2014

Field Crew: Kee Mapping & Surveying

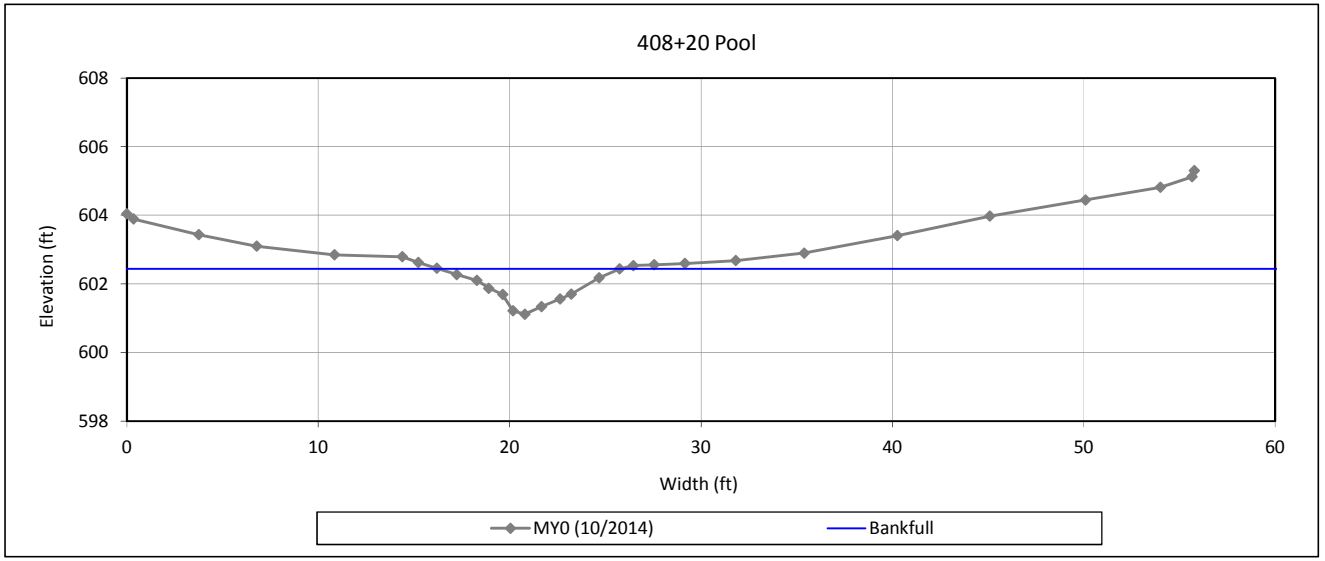
View Downstream

Cross Section Plots

Agony Acres Mitigtion Site (NCEEP Project No. 95716)

Monitoring Year 0 - 2014

Cross Section 16-UT2



Bankfull Dimensions	
5.8	x-section area (ft.sq.)
9.5	width (ft)
0.6	mean depth (ft)
1.3	max depth (ft)
9.9	wetted parimeter (ft)
0.6	hyd radi (ft)
15.5	width-depth ratio

Survey Date: 10/2014

Field Crew: Kee Mapping & Surveying

View Downstream

Reachwide and Cross Section Pebble Count Plots

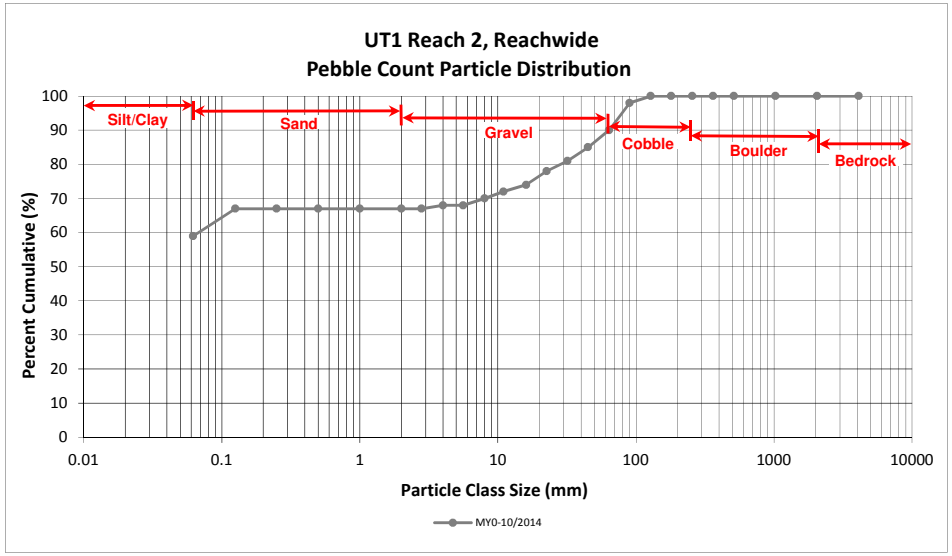
Agony Acres Mitigation Site (NCEEP Project No. 95716)

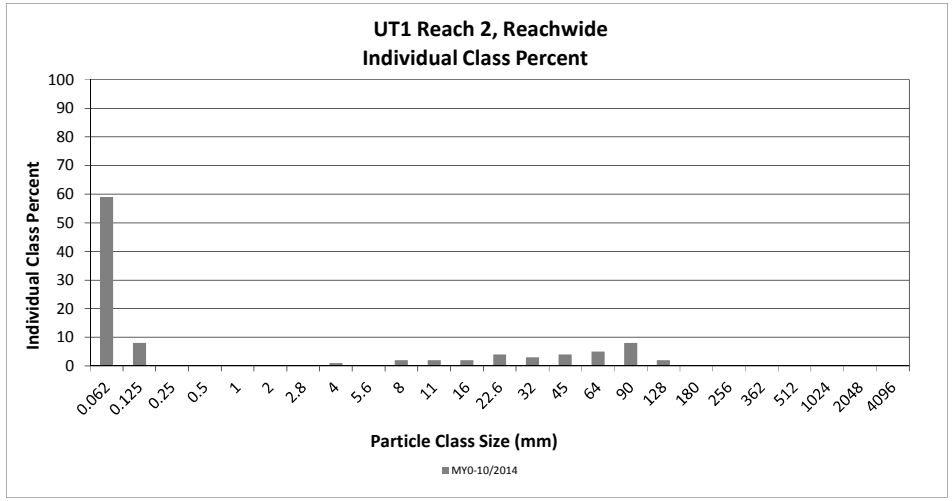
Monitoring Year 0 - 2014

UT1 Reach 2, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	25	34	59	59	59
SAND	Very fine	0.062	0.125	2	6	8	8	67
	Fine	0.125	0.250					67
	Medium	0.25	0.50					67
	Coarse	0.5	1.0					67
	Very Coarse	1.0	2.0					67
GRAVEL	Very Fine	2.0	2.8					67
	Very Fine	2.8	4.0	1		1	1	68
	Fine	4.0	5.6					68
	Fine	5.6	8.0	2		2	2	70
	Medium	8.0	11.0	2		2	2	72
	Medium	11.0	16.0	2		2	2	74
	Coarse	16.0	22.6	4		4	4	78
	Coarse	22.6	32	3		3	3	81
	Very Coarse	32	45	4		4	4	85
	Very Coarse	45	64	5		5	5	90
COBBLE	Small	64	90	8		8	8	98
	Small	90	128	2		2	2	100
	Large	128	180					100
	Large	180	256					100
BOULDER	Small	256	362					100
	Small	362	512					100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
BEDROCK	Bedrock	2048	>2048					100
			Total	**60**	**40**	**100**	**100**	**100**

Reachwide	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	Silt/Clay
D_{50} =	Silt/Clay
D_{84} =	41.3
D_{95} =	79.2
D_{100} =	128.0





Reachwide and Cross Section Pebble Count Plots

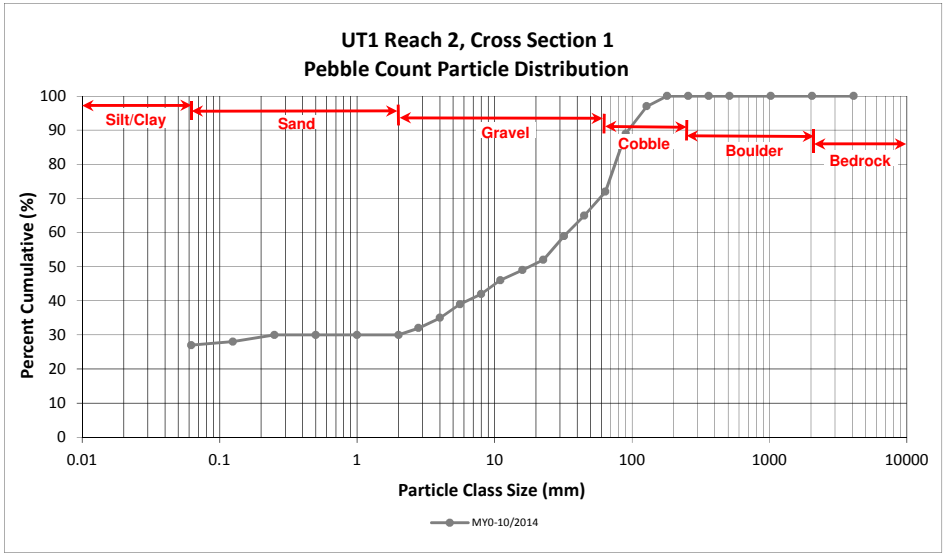
Agony Acres Mitigation Site (NCEEP Project No. 95716)

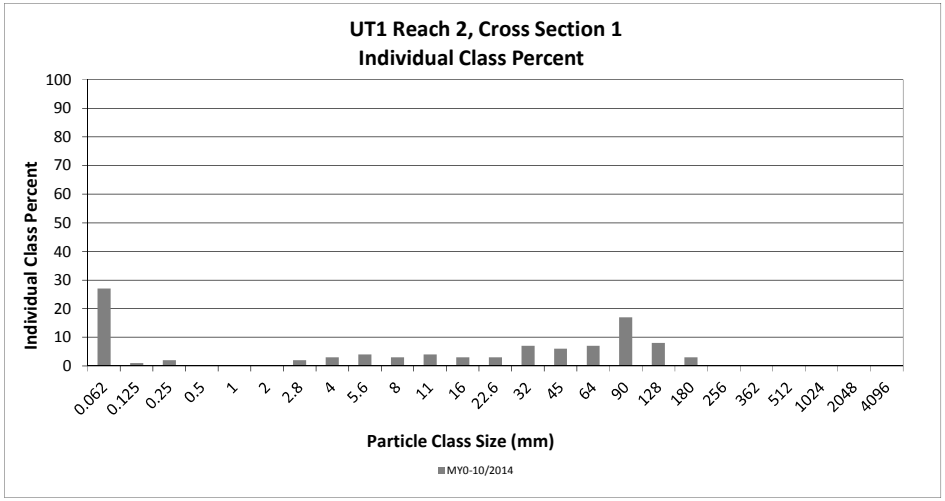
Monitoring Year 0 - 2014

UT1 Reach 2, Cross Section 1

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary: Class Percentage	Summary: Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	27	27	27
SAND	Very fine	0.062	0.125	1	1	28
	Fine	0.125	0.250	2	2	30
	Medium	0.25	0.50			30
	Coarse	0.5	1.0			30
	Very Coarse	1.0	2.0			30
GRAVEL	Very Fine	2.0	2.8	2	2	32
	Very Fine	2.8	4.0	3	3	35
	Fine	4.0	5.6	4	4	39
	Fine	5.6	8.0	3	3	42
	Medium	8.0	11.0	4	4	46
	Medium	11.0	16.0	3	3	49
	Coarse	16.0	22.6	3	3	52
	Coarse	22.6	32	7	7	59
	Very Coarse	32	45	6	6	65
	Very Coarse	45	64	7	7	72
COBBLE	Small	64	90	17	17	89
	Small	90	128	8	8	97
	Large	128	180	3	3	100
	Large	180	256			100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross Section 1	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	4.00
D_{50} =	18.0
D_{84} =	81.4
D_{95} =	117.2
D_{100} =	180.0





Reachwide and Cross Section Pebble Count Plots

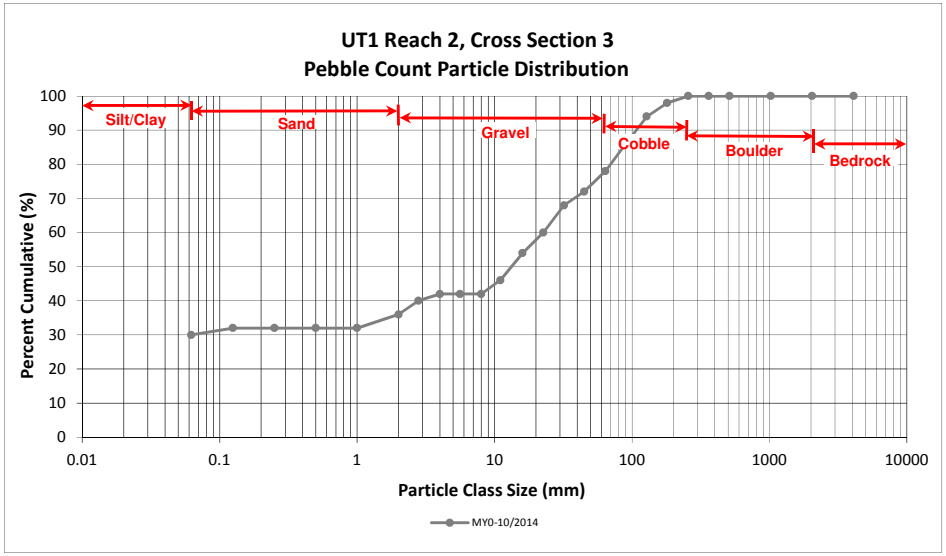
Agony Acres Mitigation Site (NCEEP Project No. 95716)

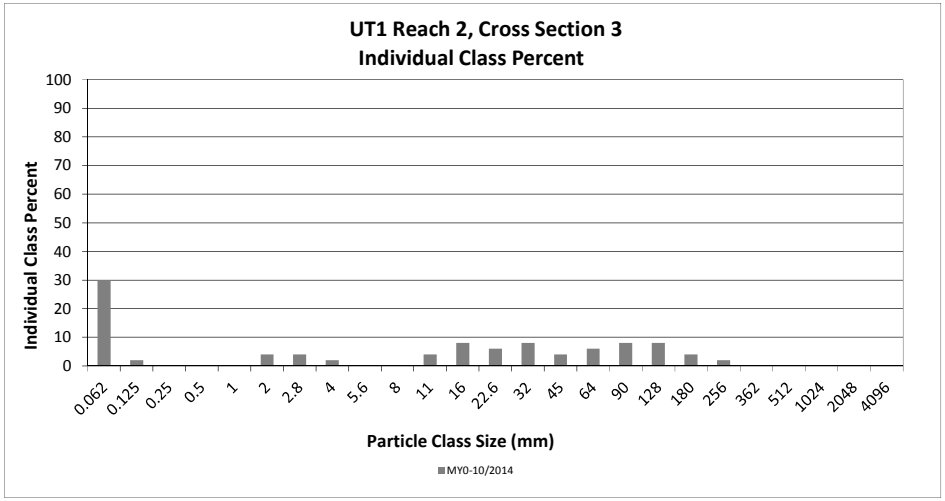
Monitoring Year 0 - 2014

UT1 Reach 2, Cross Section 3

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary: Class Percentage	Summary: Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	30	30	30
SAND	Very fine	0.062	0.125	2	2	32
	Fine	0.125	0.250			32
	Medium	0.25	0.50			32
	Coarse	0.5	1.0			32
	Very Coarse	1.0	2.0	4	4	36
GRAVEL	Very Fine	2.0	2.8	4	4	40
	Very Fine	2.8	4.0	2	2	42
	Fine	4.0	5.6			42
	Fine	5.6	8.0			42
	Medium	8.0	11.0	4	4	46
	Medium	11.0	16.0	8	8	54
	Coarse	16.0	22.6	6	6	60
	Coarse	22.6	32	8	8	68
	Very Coarse	32	45	4	4	72
	Very Coarse	45	64	6	6	78
COBBLE	Small	64	90	8	8	86
	Small	90	128	8	8	94
	Large	128	180	4	4	98
	Large	180	256	2	2	100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross Section 3	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	1.68
D_{50} =	13.3
D_{84} =	82.6
D_{95} =	139.4
D_{100} =	256.0





Reachwide and Cross Section Pebble Count Plots

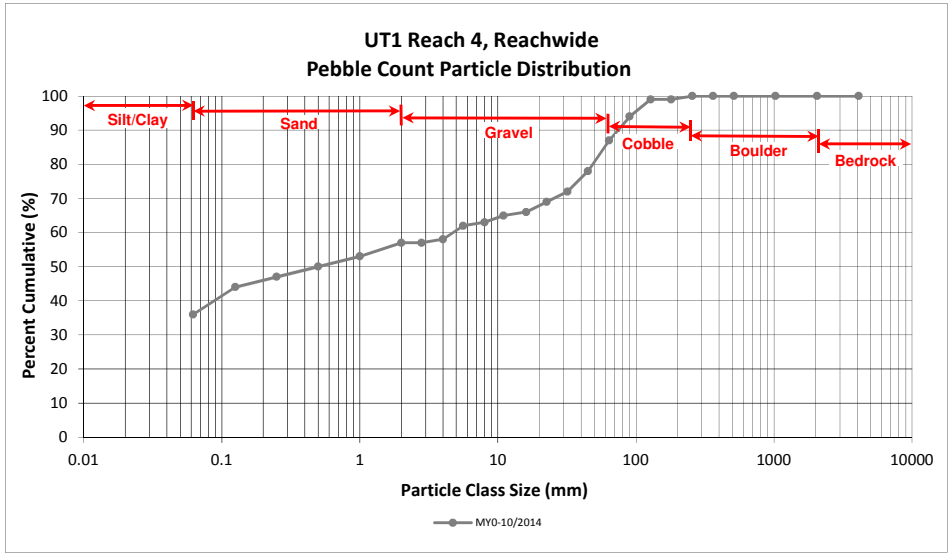
Agony Acres Mitigation Site (NCEEP Project No. 95716)

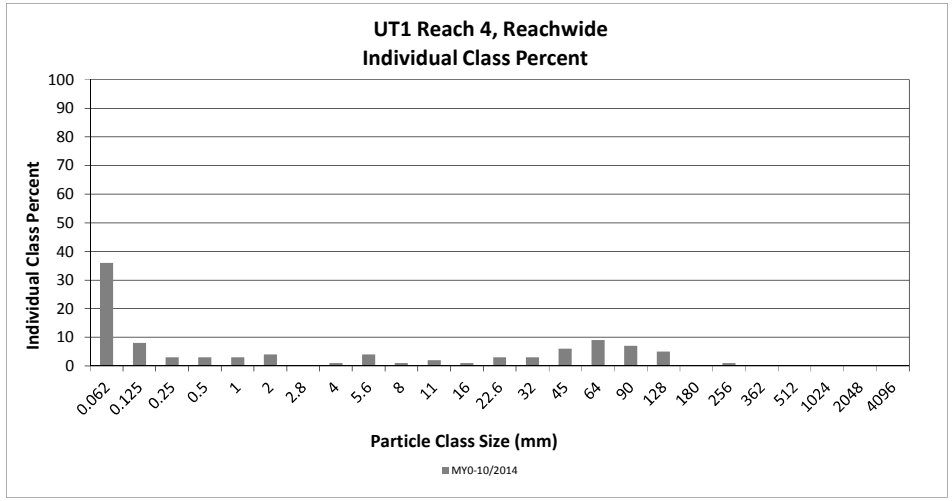
Monitoring Year 0 - 2014

UT1 Reach 4, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	13	23	36	36	36
SAND	Very fine	0.062	0.125	6	2	8	8	44
	Fine	0.125	0.250		3	3	3	47
	Medium	0.25	0.50		3	3	3	50
	Coarse	0.5	1.0		3	3	3	53
	Very Coarse	1.0	2.0		4	4	4	57
GRAVEL	Very Fine	2.0	2.8					57
	Very Fine	2.8	4.0	1		1	1	58
	Fine	4.0	5.6	2	2	4	4	62
	Fine	5.6	8.0	1		1	1	63
	Medium	8.0	11.0	2		2	2	65
	Medium	11.0	16.0	1		1	1	66
	Coarse	16.0	22.6	3		3	3	69
	Coarse	22.6	32	3		3	3	72
	Very Coarse	32	45	6		6	6	78
	Very Coarse	45	64	9		9	9	87
COBBLE	Small	64	90	7		7	7	94
	Small	90	128	5		5	5	99
	Large	128	180					99
	Large	180	256	1		1	1	100
BOULDER	Small	256	362					100
	Small	362	512					100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
BEDROCK	Bedrock	2048	>2048					100
			Total	**60**	**40**	**100**	**100**	**100**

Reachwide	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	Silt/Clay
D_{50} =	0.5
D_{84} =	56.9
D_{95} =	96.6
D_{100} =	256.0





Reachwide and Cross Section Pebble Count Plots

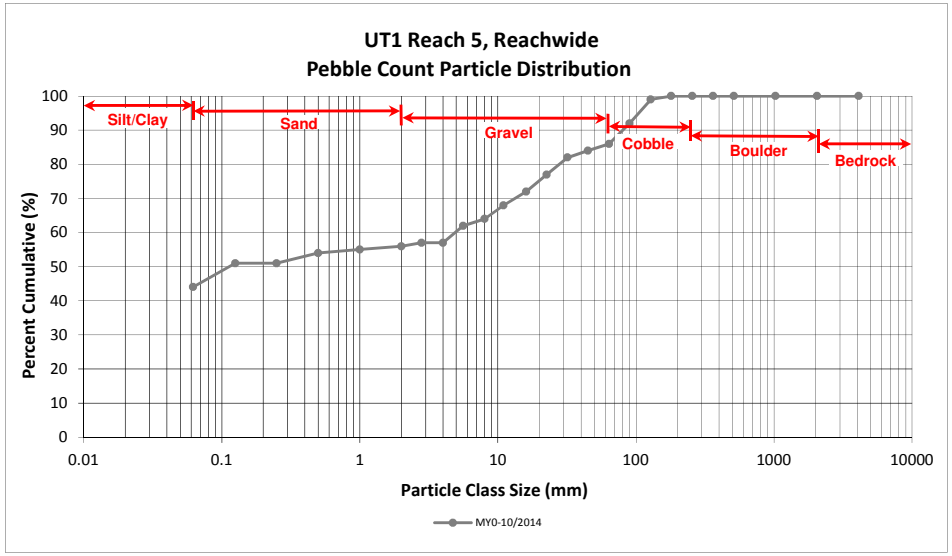
Agony Acres Mitigation Site (NCEEP Project No. 95716)

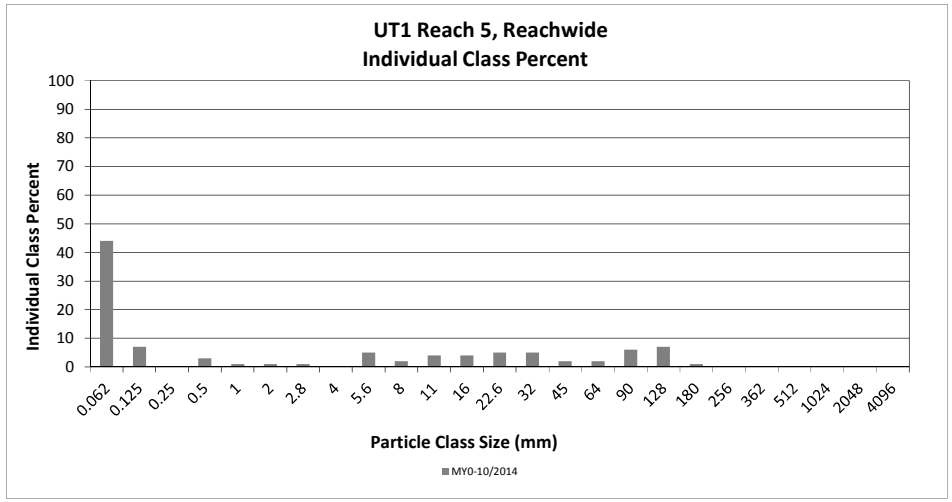
Monitoring Year 0 - 2014

UT1 Reach 5, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	16	28	44	44	44
SAND	Very fine	0.062	0.125	1	6	7	7	51
	Fine	0.125	0.250					51
	Medium	0.25	0.50		3	3	3	54
	Coarse	0.5	1.0		1	1	1	55
	Very Coarse	1.0	2.0	1		1	1	56
GRAVEL	Very Fine	2.0	2.8	1		1	1	57
	Very Fine	2.8	4.0					57
	Fine	4.0	5.6	4	1	5	5	62
	Fine	5.6	8.0	2		2	2	64
	Medium	8.0	11.0	3	1	4	4	68
	Medium	11.0	16.0	4		4	4	72
	Coarse	16.0	22.6	5		5	5	77
	Coarse	22.6	32	5		5	5	82
	Very Coarse	32	45	2		2	2	84
	Very Coarse	45	64	2		2	2	86
COBBLE	Small	64	90	6		6	6	92
	Small	90	128	7		7	7	99
	Large	128	180	1		1	1	100
	Large	180	256					100
BOULDER	Small	256	362					100
	Small	362	512					100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
BEDROCK	Bedrock	2048	>2048					100
			Total	**60**	**40**	**100**	**100**	**100**

Reachwide	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	Silt/Clay
D_{50} =	0.1
D_{84} =	45.0
D_{95} =	104.7
D_{100} =	180.0





Reachwide and Cross Section Pebble Count Plots

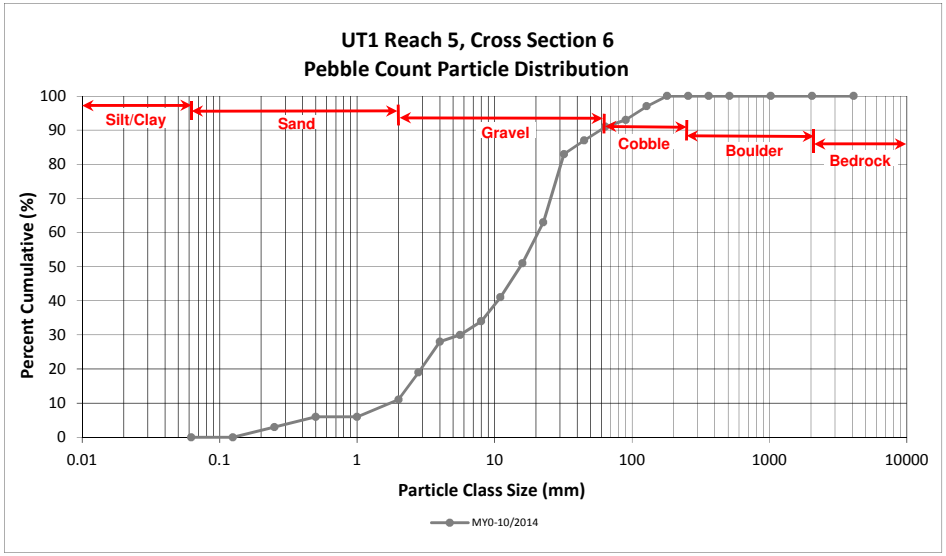
Agony Acres Mitigation Site (NCEEP Project No. 95716)

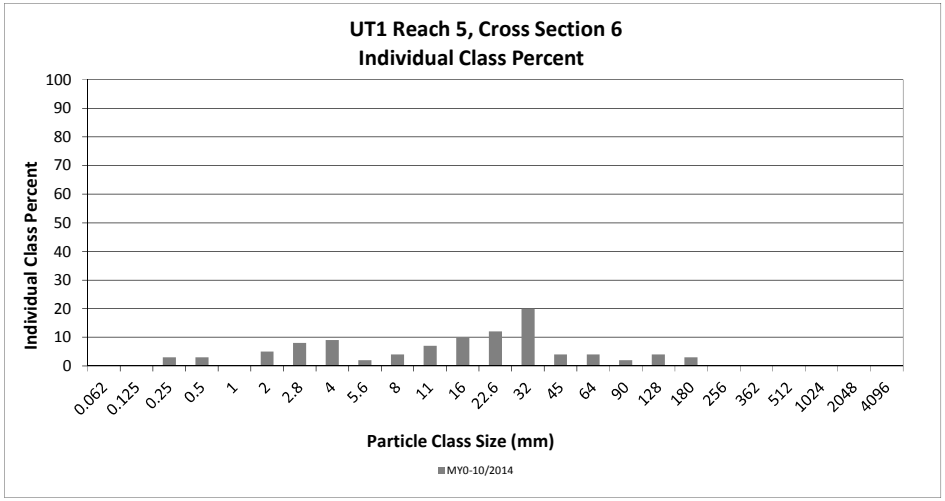
Monitoring Year 0 - 2014

UT1 Reach 5, Cross Section 6

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250	3	3	3
	Medium	0.25	0.50	3	3	6
	Coarse	0.5	1.0			6
	Very Coarse	1.0	2.0	5	5	11
GRAVEL	Very Fine	2.0	2.8	8	8	19
	Very Fine	2.8	4.0	9	9	28
	Fine	4.0	5.6	2	2	30
	Fine	5.6	8.0	4	4	34
	Medium	8.0	11.0	7	7	41
	Medium	11.0	16.0	10	10	51
	Coarse	16.0	22.6	12	12	63
	Coarse	22.6	32	20	20	83
	Very Coarse	32	45	4	4	87
	Very Coarse	45	64	4	4	91
COBBLE	Small	64	90	2	2	93
	Small	90	128	4	4	97
	Large	128	180	3	3	100
	Large	180	256			100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross Section 6	
Channel materials (mm)	
D_{16} =	2.47
D_{35} =	8.37
D_{50} =	15.4
D_{84} =	34.8
D_{95} =	107.3
D_{100} =	180.0





Reachwide and Cross Section Pebble Count Plots

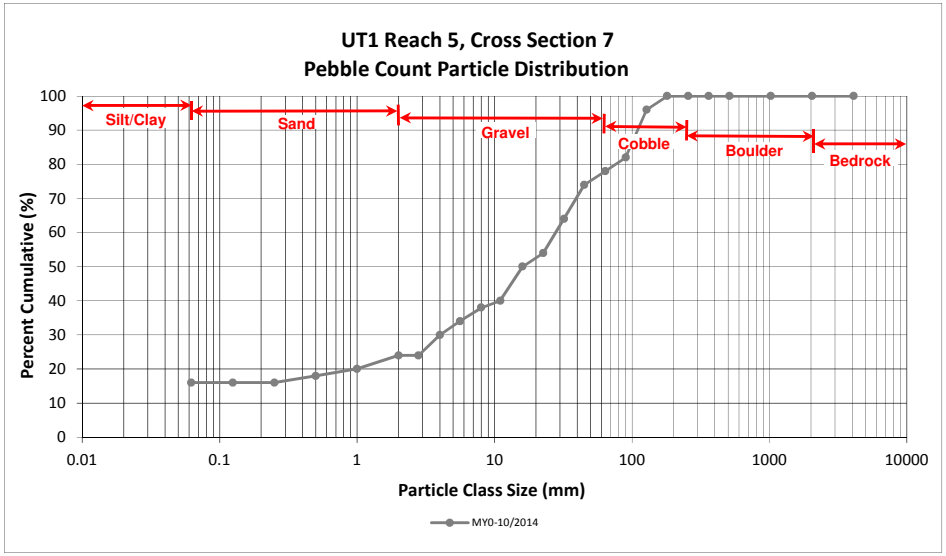
Agony Acres Mitigation Site (NCEEP Project No. 95716)

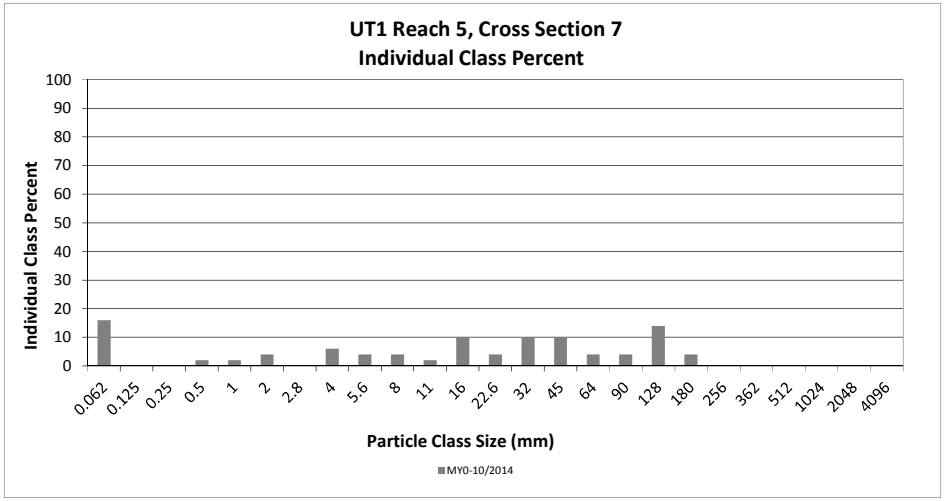
Monitoring Year 0 - 2014

UT1 Reach 5, Cross Section 7

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary: Class Percentage	Summary: Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	16	16	16
SAND	Very fine	0.062	0.125			16
	Fine	0.125	0.250			16
	Medium	0.25	0.50	2	2	18
	Coarse	0.5	1.0	2	2	20
	Very Coarse	1.0	2.0	4	4	24
GRAVEL	Very Fine	2.0	2.8			24
	Very Fine	2.8	4.0	6	6	30
	Fine	4.0	5.6	4	4	34
	Fine	5.6	8.0	4	4	38
	Medium	8.0	11.0	2	2	40
	Medium	11.0	16.0	10	10	50
	Coarse	16.0	22.6	4	4	54
	Coarse	22.6	32	10	10	64
	Very Coarse	32	45	10	10	74
	Very Coarse	45	64	4	4	78
COBBLE	Small	64	90	4	4	82
	Small	90	128	14	14	96
	Large	128	180	4	4	100
	Large	180	256			100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross Section 7	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	6.12
D_{50} =	16.0
D_{84} =	94.6
D_{95} =	124.8
D_{100} =	180.0





Reachwide and Cross Section Pebble Count Plots

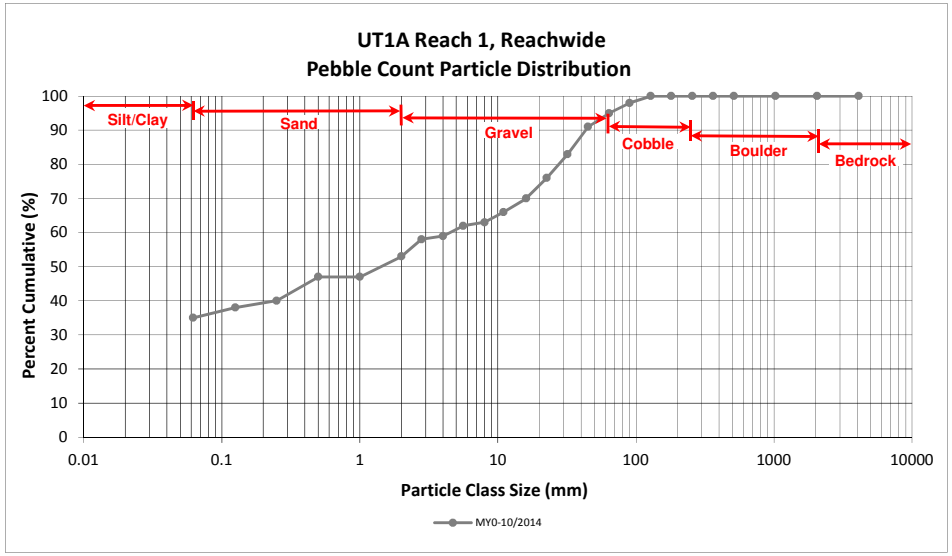
Agony Acres Mitigation Site (NCEEP Project No. 95716)

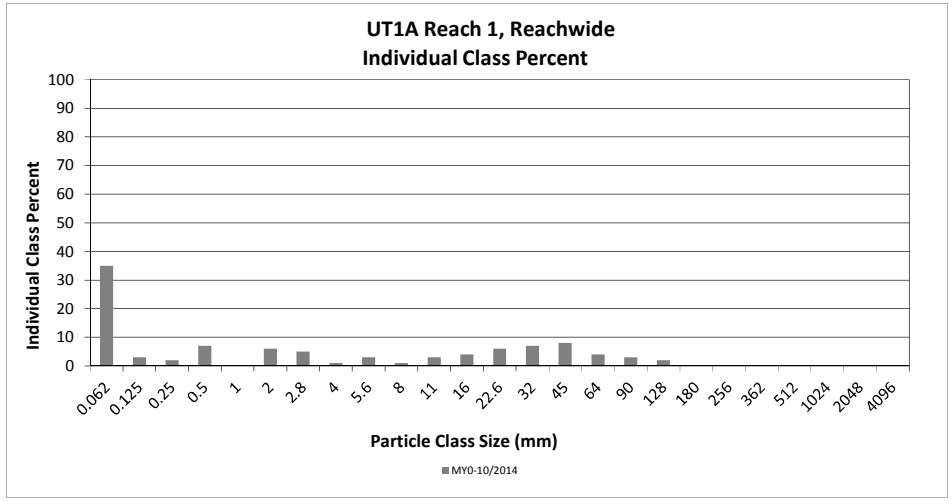
Monitoring Year 0 - 2014

UT1A Reach 1, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	12	23	35	35	35
SAND	Very fine	0.062	0.125		3	3	3	38
	Fine	0.125	0.250		2	2	2	40
	Medium	0.25	0.50	1	6	7	7	47
	Coarse	0.5	1.0					47
	Very Coarse	1.0	2.0	3	3	6	6	53
GRAVEL	Very Fine	2.0	2.8	3	2	5	5	58
	Very Fine	2.8	4.0	1		1	1	59
	Fine	4.0	5.6	2	1	3	3	62
	Fine	5.6	8.0	1		1	1	63
	Medium	8.0	11.0	3		3	3	66
	Medium	11.0	16.0	4		4	4	70
	Coarse	16.0	22.6	6		6	6	76
	Coarse	22.6	32	7		7	7	83
	Very Coarse	32	45	8		8	8	91
	Very Coarse	45	64	4		4	4	95
COBBLE	Small	64	90	3		3	3	98
	Small	90	128	2		2	2	100
	Large	128	180					100
	Large	180	256					100
BOULDER	Small	256	362					100
	Small	362	512					100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
BEDROCK	Bedrock	2048	>2048					100
			Total	**60**	**40**	**100**	**100**	**100**

Reachwide	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	Silt/Clay
D_{50} =	1.4
D_{84} =	33.4
D_{95} =	64.0
D_{100} =	128.0





Reachwide and Cross Section Pebble Count Plots

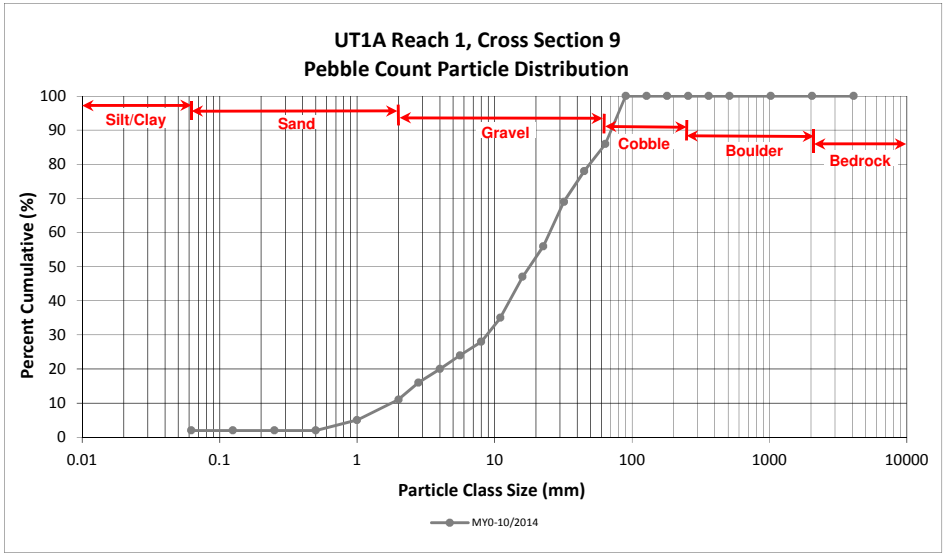
Agony Acres Mitigation Site (NCEEP Project No. 95716)

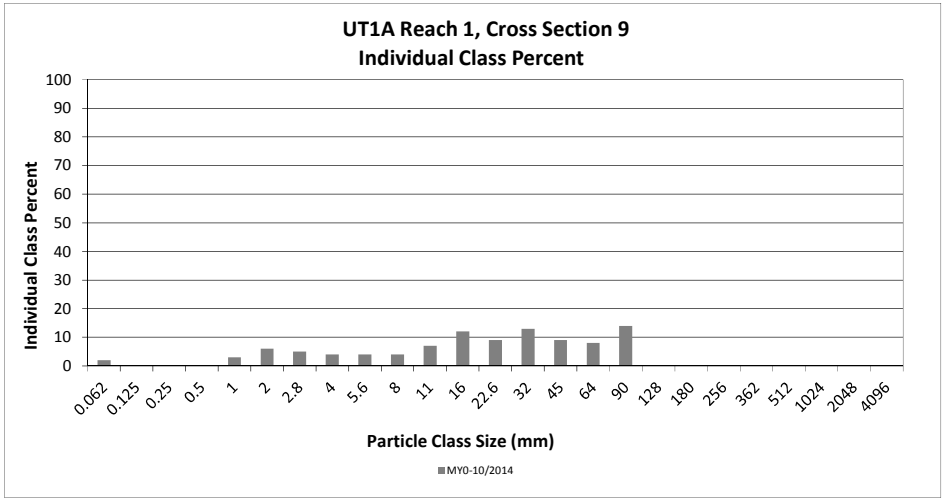
Monitoring Year 0 - 2014

UT1A Reach 1, Cross Section 9

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	2	2	2
SAND	Very fine	0.062	0.125			2
	Fine	0.125	0.250			2
	Medium	0.25	0.50			2
	Coarse	0.5	1.0	3	3	5
	Very Coarse	1.0	2.0	6	6	11
GRAVEL	Very Fine	2.0	2.8	5	5	16
	Very Fine	2.8	4.0	4	4	20
	Fine	4.0	5.6	4	4	24
	Fine	5.6	8.0	4	4	28
	Medium	8.0	11.0	7	7	35
	Medium	11.0	16.0	12	12	47
	Coarse	16.0	22.6	9	9	56
	Coarse	22.6	32	13	13	69
	Very Coarse	32	45	9	9	78
	Very Coarse	45	64	8	8	86
COBBLE	Small	64	90	14	14	100
	Small	90	128			100
	Large	128	180			100
	Large	180	256			100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross Section 9	
Channel materials (mm)	
D_{16} =	2.80
D_{35} =	11.00
D_{50} =	18.0
D_{84} =	58.6
D_{95} =	79.7
D_{100} =	90.0





Reachwide and Cross Section Pebble Count Plots

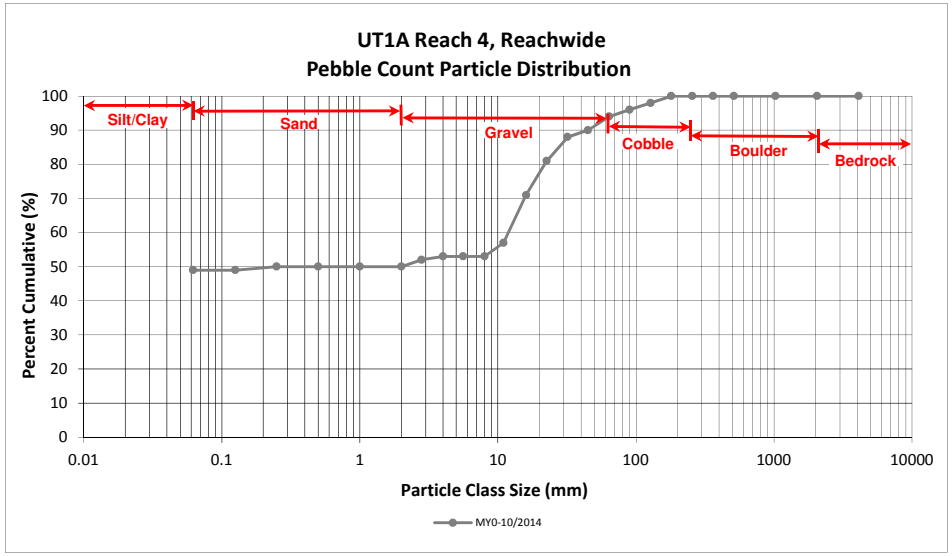
Agony Acres Mitigation Site (NCEEP Project No. 95716)

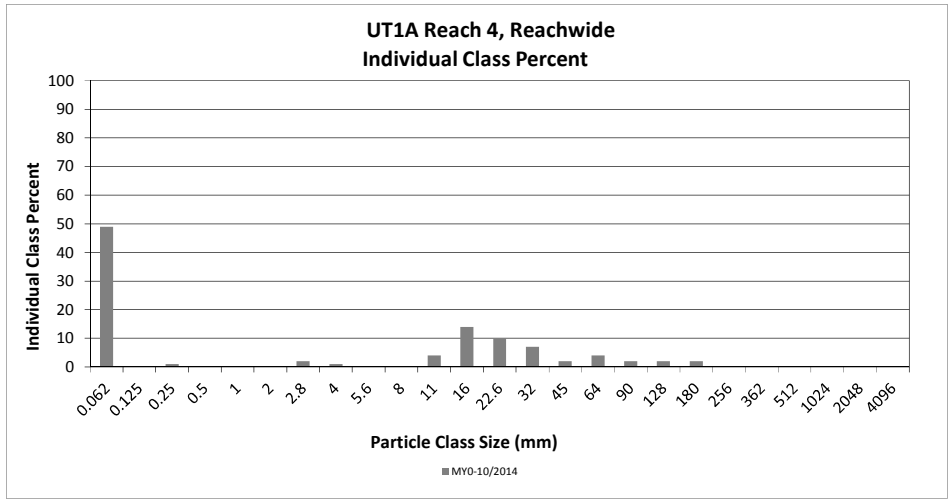
Monitoring Year 0 - 2014

UT1A Reach 4, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	11	38	49	49	49
SAND	Very fine	0.062	0.125					49
	Fine	0.125	0.250	1		1	1	50
	Medium	0.25	0.50					50
	Coarse	0.5	1.0					50
	Very Coarse	1.0	2.0					50
GRAVEL	Very Fine	2.0	2.8		2	2	2	52
	Very Fine	2.8	4.0	1		1	1	53
	Fine	4.0	5.6					53
	Fine	5.6	8.0					53
	Medium	8.0	11.0	4		4	4	57
	Medium	11.0	16.0	14		14	14	71
	Coarse	16.0	22.6	10		10	10	81
	Coarse	22.6	32	7		7	7	88
	Very Coarse	32	45	2		2	2	90
	Very Coarse	45	64	4		4	4	94
COBBLE	Small	64	90	2		2	2	96
	Small	90	128	2		2	2	98
	Large	128	180	2		2	2	100
	Large	180	256					100
BOULDER	Small	256	362					100
	Small	362	512					100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
BEDROCK	Bedrock	2048	>2048					100
			Total	**60**	**40**	**100**	**100**	**100**

Reachwide	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	Silt/Clay
D_{50} =	0.25
D_{84} =	26.2
D_{95} =	75.9
D_{100} =	180.0





Reachwide and Cross Section Pebble Count Plots

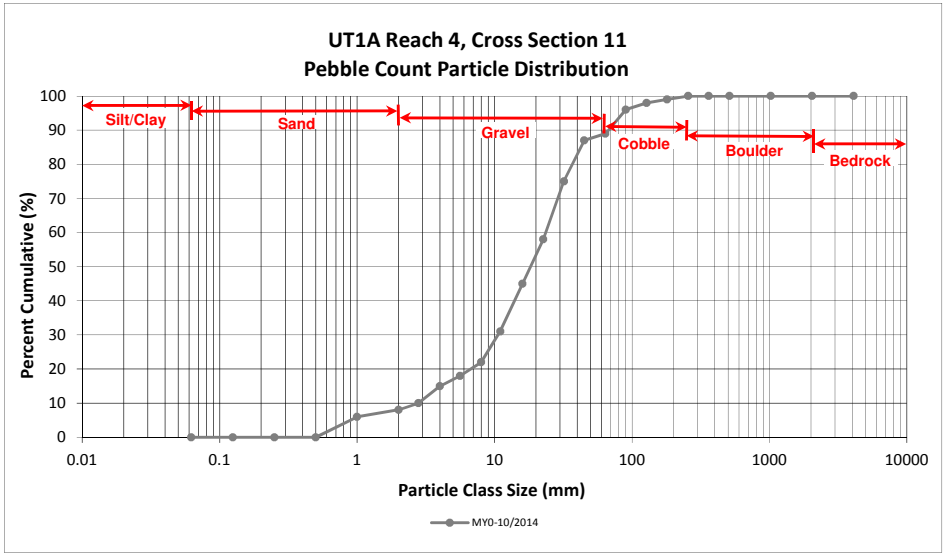
Agony Acres Mitigation Site (NCEEP Project No. 95716)

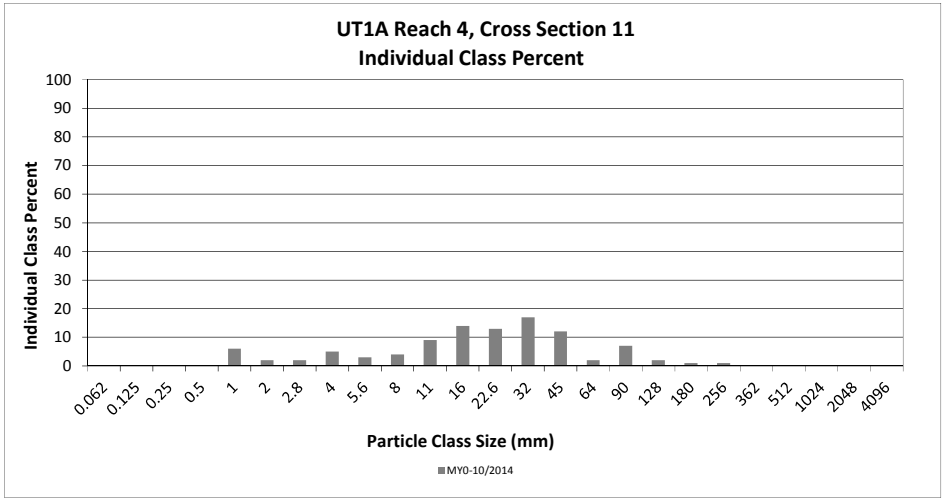
Monitoring Year 0 - 2014

UT1A Reach 4, Cross Section 11

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary: Class Percentage	Summary: Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50			0
	Coarse	0.5	1.0	6	6	6
	Very Coarse	1.0	2.0	2	2	8
GRAVEL	Very Fine	2.0	2.8	2	2	10
	Very Fine	2.8	4.0	5	5	15
	Fine	4.0	5.6	3	3	18
	Fine	5.6	8.0	4	4	22
	Medium	8.0	11.0	9	9	31
	Medium	11.0	16.0	14	14	45
	Coarse	16.0	22.6	13	13	58
	Coarse	22.6	32	17	17	75
	Very Coarse	32	45	12	12	87
	Very Coarse	45	64	2	2	89
COBBLE	Small	64	90	7	7	96
	Small	90	128	2	2	98
	Large	128	180	1	1	99
	Large	180	256	1	1	100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross Section 11	
Channel materials (mm)	
D_{16} =	4.47
D_{35} =	12.24
D_{50} =	18.3
D_{84} =	41.3
D_{95} =	85.7
D_{100} =	256.0





Reachwide and Cross Section Pebble Count Plots

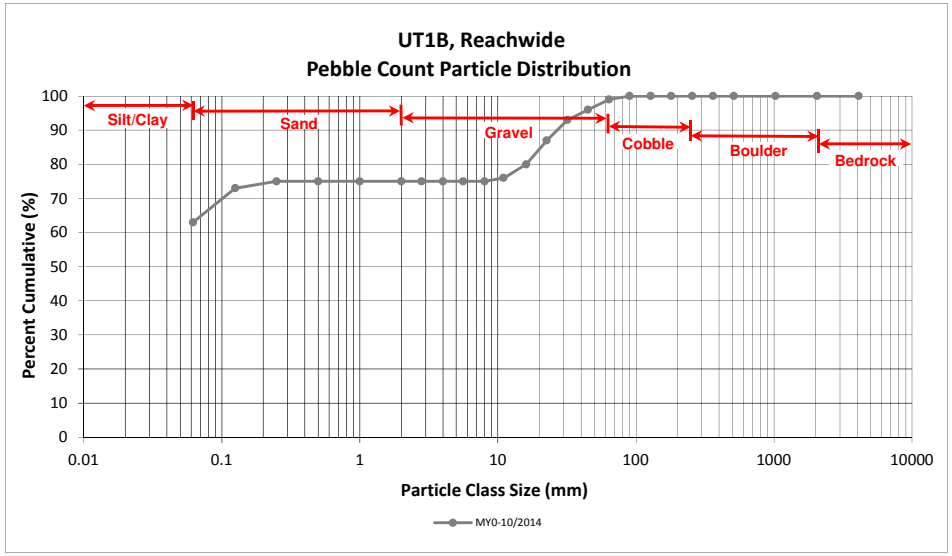
Agony Acres Mitigation Site (NCEEP Project No. 95716)

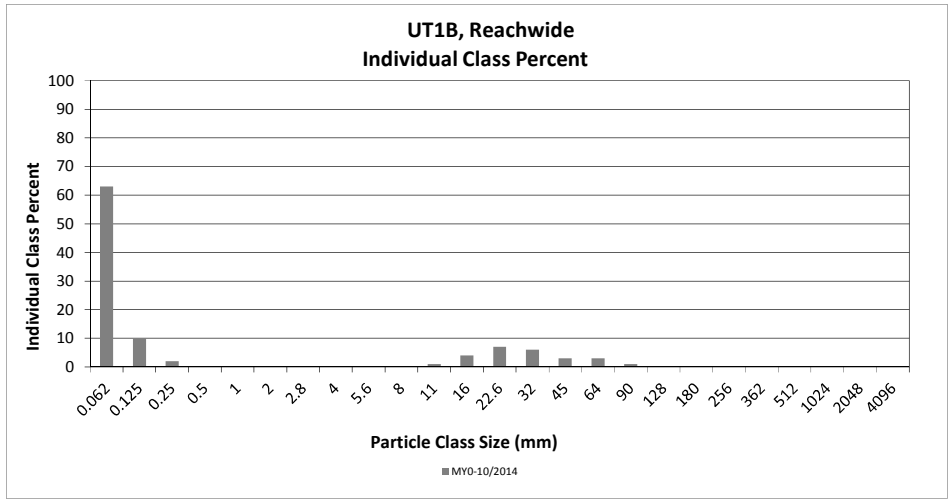
Monitoring Year 0 - 2014

UT1B, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	27	36	63	63	63
SAND	Very fine	0.062	0.125	6	4	10	10	73
	Fine	0.125	0.250	2		2	2	75
	Medium	0.25	0.50					75
	Coarse	0.5	1.0					75
	Very Coarse	1.0	2.0					75
GRAVEL	Very Fine	2.0	2.8					75
	Very Fine	2.8	4.0					75
	Fine	4.0	5.6					75
	Fine	5.6	8.0					75
	Medium	8.0	11.0	1		1	1	76
	Medium	11.0	16.0	4		4	4	80
	Coarse	16.0	22.6	7		7	7	87
	Coarse	22.6	32	6		6	6	93
	Very Coarse	32	45	3		3	3	96
	Very Coarse	45	64	3		3	3	99
COBBLE	Small	64	90	1		1	1	100
	Small	90	128					100
	Large	128	180					100
	Large	180	256					100
BOULDER	Small	256	362					100
	Small	362	512					100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
BEDROCK	Bedrock	2048	>2048					100
			Total	**60**	**40**	**100**	**100**	**100**

Reachwide	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	Silt/Clay
D_{50} =	Silt/Clay
D_{84} =	19.5
D_{95} =	40.2
D_{100} =	90.0





Reachwide and Cross Section Pebble Count Plots

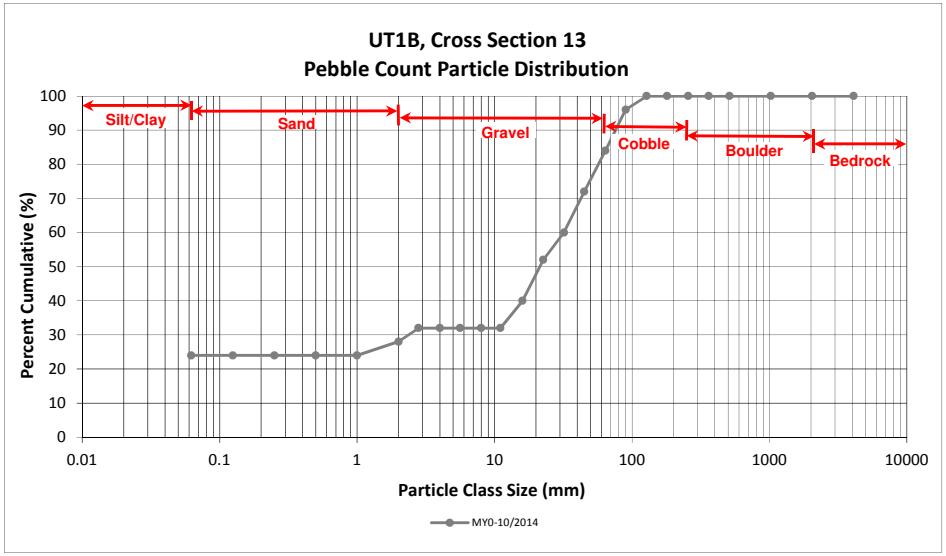
Agony Acres Mitigation Site (NCEEP Project No. 95716)

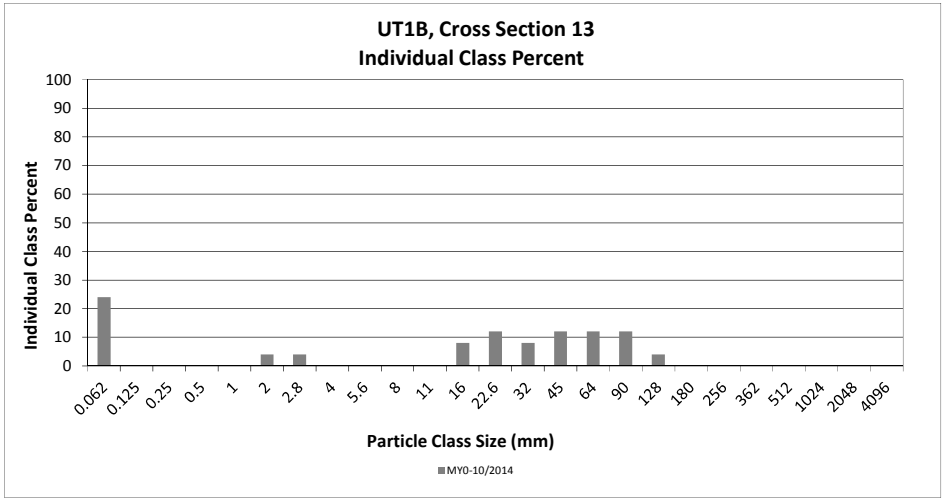
Monitoring Year 0 - 2014

UT1B, Cross Section 13

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary: Class Percentage	Summary: Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	24	24	24
SAND	Very fine	0.062	0.125			24
	Fine	0.125	0.250			24
	Medium	0.25	0.50			24
	Coarse	0.5	1.0			24
	Very Coarse	1.0	2.0	4	4	28
GRAVEL	Very Fine	2.0	2.8	4	4	32
	Very Fine	2.8	4.0			32
	Fine	4.0	5.6			32
	Fine	5.6	8.0			32
	Medium	8.0	11.0			32
	Medium	11.0	16.0	8	8	40
	Coarse	16.0	22.6	12	12	52
	Coarse	22.6	32	8	8	60
	Very Coarse	32	45	12	12	72
	Very Coarse	45	64	12	12	84
COBBLE	Small	64	90	12	12	96
	Small	90	128	4	4	100
	Large	128	180			100
	Large	180	256			100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross Section 13	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	12.66
D_{50} =	21.3
D_{84} =	64.0
D_{95} =	87.5
D_{100} =	128.0





Reachwide and Cross Section Pebble Count Plots

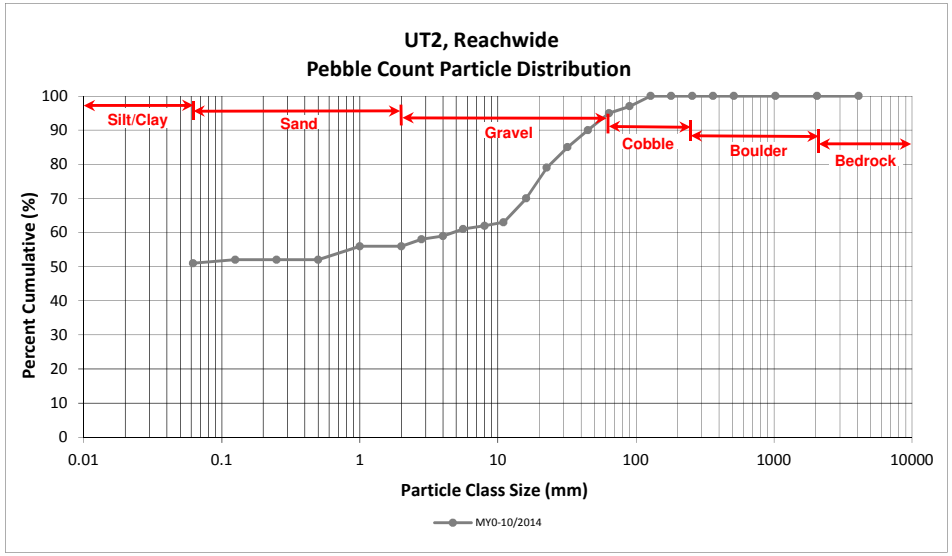
Agony Acres Mitigation Site (NCEEP Project No. 95716)

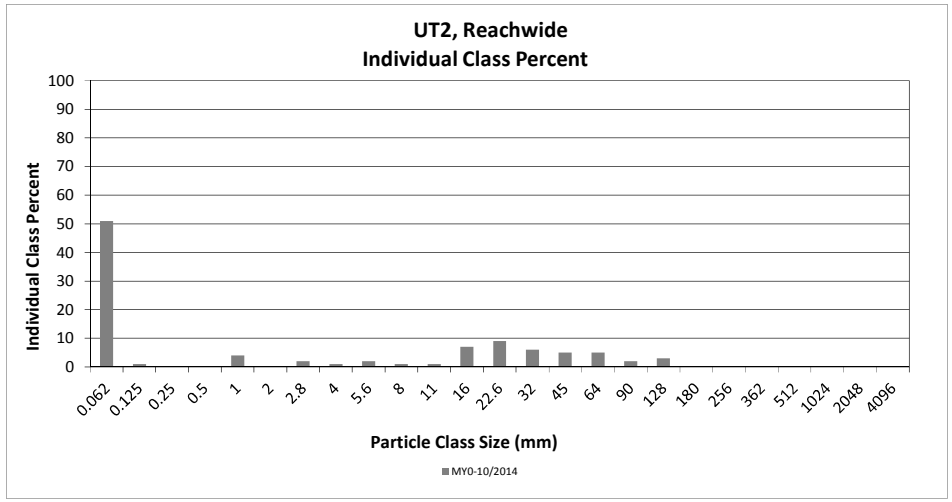
Monitoring Year 0 - 2014

UT2, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	12	39	51	51	51
SAND	Very fine	0.062	0.125		1	1	1	52
	Fine	0.125	0.250					52
	Medium	0.25	0.50					52
	Coarse	0.5	1.0	4		4	4	56
	Very Coarse	1.0	2.0					56
GRAVEL	Very Fine	2.0	2.8	2		2	2	58
	Very Fine	2.8	4.0	1		1	1	59
	Fine	4.0	5.6	2		2	2	61
	Fine	5.6	8.0	1		1	1	62
	Medium	8.0	11.0	1		1	1	63
	Medium	11.0	16.0	7		7	7	70
	Coarse	16.0	22.6	9		9	9	79
	Coarse	22.6	32	6		6	6	85
	Very Coarse	32	45	5		5	5	90
	Very Coarse	45	64	5		5	5	95
COBBLE	Small	64	90	2		2	2	97
	Small	90	128	3		3	3	100
	Large	128	180					100
	Large	180	256					100
BOULDER	Small	256	362					100
	Small	362	512					100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
BEDROCK	Bedrock	2048	>2048					100
			Total	**60**	**40**	**100**	**100**	**100**

Reachwide	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	Silt/Clay
D_{50} =	Silt/Clay
D_{84} =	30.2
D_{95} =	64.0
D_{100} =	128.0





Reachwide and Cross Section Pebble Count Plots

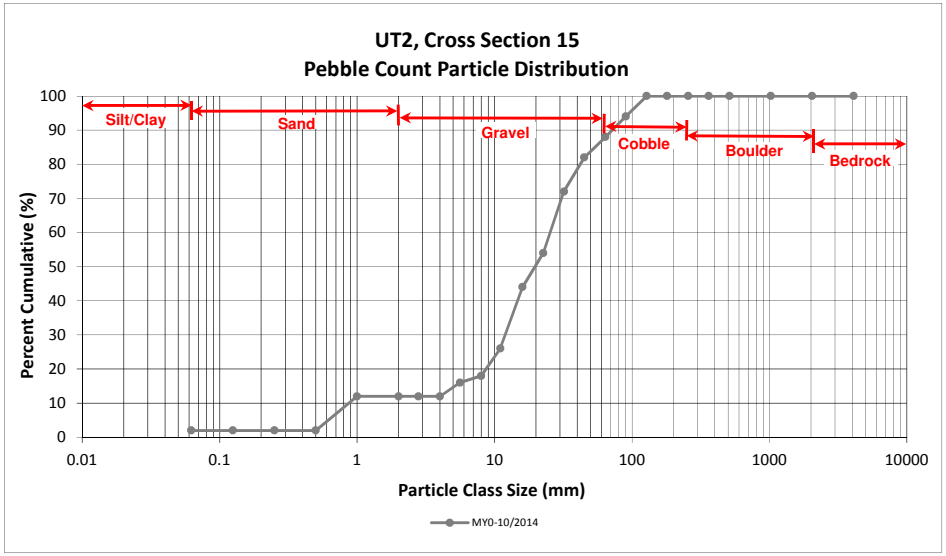
Agony Acres Mitigation Site (NCEEP Project No. 95716)

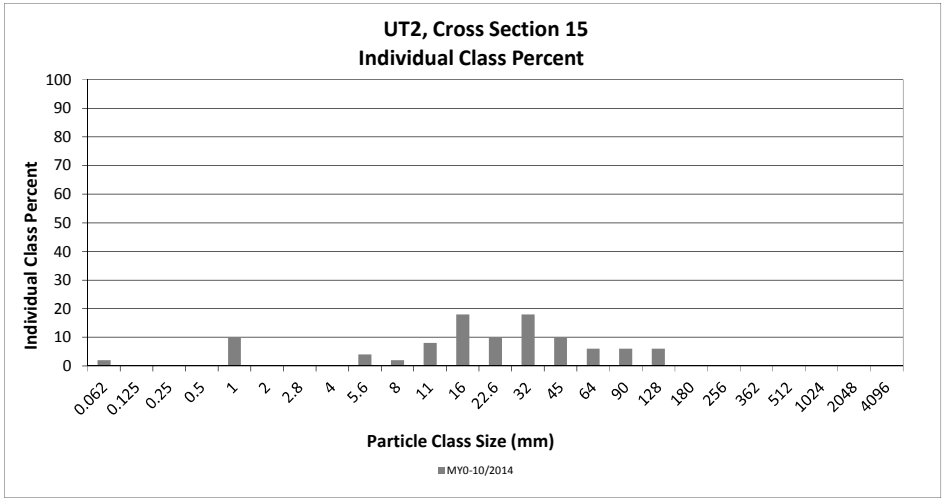
Monitoring Year 0 - 2014

UT2, Cross Section 15

Particle Class		Diameter (mm) min	Diameter (mm) max	Riffle 100-Count	Summary: Class Percentage	Summary: Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	2	2	2
SAND	Very fine	0.062	0.125			2
	Fine	0.125	0.250			2
	Medium	0.25	0.50			2
	Coarse	0.5	1.0	10	10	12
	Very Coarse	1.0	2.0			12
GRAVEL	Very Fine	2.0	2.8			12
	Very Fine	2.8	4.0			12
	Fine	4.0	5.6	4	4	16
	Fine	5.6	8.0	2	2	18
	Medium	8.0	11.0	8	8	26
	Medium	11.0	16.0	18	18	44
	Coarse	16.0	22.6	10	10	54
	Coarse	22.6	32	18	18	72
	Very Coarse	32	45	10	10	82
	Very Coarse	45	64	6	6	88
COBBLE	Small	64	90	6	6	94
	Small	90	128	6	6	100
	Large	128	180			100
	Large	180	256			100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross Section 15	
Channel materials (mm)	
D_{16} =	5.60
D_{35} =	13.27
D_{50} =	19.7
D_{84} =	50.6
D_{95} =	95.4
D_{100} =	128.0





STREAM PHOTOGRAPHS
UT2

	
PHOTO POINT 1 – looking upstream *(10/13/2014)*	**PHOTO POINT 1** – looking downstream *(10/13/2014)*
	
PHOTO POINT 2 – looking upstream *(10/13/2014)*	**PHOTO POINT 2** – looking downstream *(10/13/2014)*
	
PHOTO POINT 3 – looking upstream *(10/13/2014)*	**PHOTO POINT 3** – looking downstream *(10/13/2014)*

	
PHOTO POINT 4 – looking upstream *(10/13/2014)*	**PHOTO POINT 4** – looking downstream *(10/13/2014)*
	
PHOTO POINT 5 – looking upstream *(10/13/2014)*	**PHOTO POINT 5** – looking downstream *(10/13/2014)*

STREAM PHOTOGRAPHS
Reedy Fork (Buffer)

	
PHOTO POINT 6 – looking upstream *(10/13/2014)*	**PHOTO POINT 6** – looking downstream *(10/13/2014)*
	
PHOTO POINT 7 – looking upstream *(10/13/2014)*	**PHOTO POINT 7** – looking downstream *(10/13/2014)*

STREAM PHOTOGRAPHS
UT1 Reach 5

	
PHOTO POINT 8 – looking upstream *(10/13/2014)*	**PHOTO POINT 8** – looking downstream *(10/13/2014)*
	
PHOTO POINT 9 – looking upstream *(10/13/2014)*	**PHOTO POINT 9** – looking downstream *(10/13/2014)*
	
PHOTO POINT 10 – looking upstream *(10/13/2014)*	**PHOTO POINT 10** – looking downstream *(10/13/2014)*

	
PHOTO POINT 11 – looking upstream *(10/13/2014)*	**PHOTO POINT 11** – looking downstream *(10/13/2014)*
	
PHOTO POINT 12 – looking upstream *(10/13/2014)*	**PHOTO POINT 12** – looking downstream *(10/13/2014)*
	
PHOTO POINT 13 – looking upstream *(10/13/2014)*	**PHOTO POINT 13** – looking downstream *(10/13/2014)*

	
PHOTO POINT 14 – looking upstream *(10/13/2014)*	**PHOTO POINT 14** – looking downstream *(10/13/2014)*
	
PHOTO POINT 15 – looking upstream *(10/13/2014)*	**PHOTO POINT 15** – looking downstream *(10/13/2014)*

STREAM PHOTOGRAPHS
UT1 Reach 4

	
PHOTO POINT 16 – looking upstream *(10/13/2014)*	**PHOTO POINT 16** – looking downstream *(10/13/2014)*
	
PHOTO POINT 17 – looking upstream *(10/13/2014)*	**PHOTO POINT 17** – looking downstream *(10/13/2014)*
	
PHOTO POINT 42 – looking upstream *(10/13/2014)*	**PHOTO POINT 42** – looking downstream *(10/13/2014)*

STREAM PHOTOGRAPHS
UT1 Reach 3

	
PHOTO POINT 18 – looking upstream *(10/13/2014)*	**PHOTO POINT 18** – looking downstream *(10/13/2014)*
	
PHOTO POINT 19 – looking upstream *(10/13/2014)*	**PHOTO POINT 19** – looking downstream *(10/13/2014)*
	
PHOTO POINT 20 – looking upstream *(10/13/2014)*	**PHOTO POINT 20** – looking downstream *(10/13/2014)*

STREAM PHOTOGRAPHS
UT1B

	
PHOTO POINT 21 – looking upstream *(10/13/2014)*	**PHOTO POINT 21** – looking downstream *(10/13/2014)*

STREAM PHOTOGRAPHS
UT1 Reach 2

	
PHOTO POINT 22 – looking upstream *(10/13/2014)*	**PHOTO POINT 22** – looking downstream *(10/13/2014)*
	
PHOTO POINT 23 – looking upstream *(10/13/2014)*	**PHOTO POINT 23** – looking downstream *(10/13/2014)*
	
PHOTO POINT 24 – looking upstream *(10/13/2014)*	**PHOTO POINT 24** – looking downstream *(10/13/2014)*

	
PHOTO POINT 25 – looking upstream *(10/13/2014)*	**PHOTO POINT 25** – looking downstream *(10/13/2014)*
	
PHOTO POINT 26 – looking upstream *(10/13/2014)*	**PHOTO POINT 26** – looking downstream *(10/13/2014)*
	
PHOTO POINT 27 – looking upstream *(10/13/2014)*	**PHOTO POINT 27** – looking downstream *(10/13/2014)*

STREAM PHOTOGRAPHS
UT1 Reach 1

	
PHOTO POINT 28 – looking upstream *(10/13/2014)*	**PHOTO POINT 28** – looking downstream *(10/13/2014)*
	
PHOTO POINT 29 – looking upstream *(10/13/2014)*	**PHOTO POINT 29** – looking downstream *(10/13/2014)*
	
PHOTO POINT 30 – looking upstream *(10/13/2014)*	**PHOTO POINT 30** – looking downstream *(10/13/2014)*

	
PHOTO POINT 31 – looking upstream *(10/13/2014)*	**PHOTO POINT 31** – looking downstream *(10/13/2014)*
	
PHOTO POINT 32 – looking upstream *(10/13/2014)*	**PHOTO POINT 32** – looking downstream *(10/13/2014)*

STREAM PHOTOGRAPHS
UT1A Reach 1

	
PHOTO POINT 33 – looking upstream *(10/13/2014)*	**PHOTO POINT 33** – looking downstream *(10/13/2014)*
	
PHOTO POINT 34 – looking upstream *(10/13/2014)*	**PHOTO POINT 34** – looking downstream *(10/13/2014)*
	
PHOTO POINT 35 – looking upstream *(10/13/2014)*	**PHOTO POINT 35** – looking downstream *(10/13/2014)*

	
PHOTO POINT 36 – looking upstream *(10/13/2014)*	**PHOTO POINT 36** – looking downstream *(10/13/2014)*

STREAM PHOTOGRAPHS
UT1A Reach 2

	
PHOTO POINT 37 – looking upstream *(10/13/2014)*	**PHOTO POINT 37** – looking downstream *(10/13/2014)*

STREAM PHOTOGRAPHS
UT1A Reach 3

	
PHOTO POINT 38 – looking upstream *(10/13/2014)*	**PHOTO POINT 38** – looking downstream *(10/13/2014)*

STREAM PHOTOGRAPHS
UT1A Reach 4

	
PHOTO POINT 39 – looking upstream *(10/13/2014)*	**PHOTO POINT 39** – looking downstream *(10/13/2014)*
	
PHOTO POINT 40 – looking upstream *(10/13/2014)*	**PHOTO POINT 40** – looking downstream *(10/13/2014)*
	
PHOTO POINT 41 – looking upstream *(10/13/2014)*	**PHOTO POINT 41** – looking downstream *(10/13/2014)*

APPENDIX 3. Vegetation Plot Data

Table 7. Planted and Total Stem Counts

Agony Acres Mitigation Site (NCEEP Project No.95716)

Monitoring Year 0 -2014

			Current Plot Data (MY0 2015)																	
			95716-WEI-0001			95716-WEI-0002			95716-WEI-0003			95716-WEI-0004			95716-WEI-0005			95716-WEI-0006		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Alnus serrulata	tag alder	Shrub	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	4	4	4
Betula nigra	river birch	Tree				1	1	1	2	2	2	4	4	4	1	1	1	5	5	5
Fraxinus pennsylvanica	green ash	Tree	5	5	5	4	4	4	3	3	3	2	2	2	2	2	2	2	2	2
Platanus occidentalis	American sycamore	Tree	5	5	5				4	4	4	4	4	4	4	4	4	2	2	2
Quercus michauxii	swamp chestnut oak	Tree							1	1	1	2	2	2	5	5	5	2	2	2
Quercus pagoda	cherrybark oak	Tree	2	2	2	5	5	5	2	2	2	2	2	2	1	1	1	1	1	1
Quercus phellos	willow oak	Tree	2	2	2	4	4	4	2	2	2	1	1	1	2	2	2			
		Stem count	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
		size (ares)		1			1			1			1			1			1	
		size (ACRES)		0.02			0.02			0.02			0.02			0.02			0.02	
		Species count	5	5	5	5	5	5	7	7	7	7	7	7	7	7	7	6	6	6
		Stems per ACRE	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5

Color Coding for Table

Exceeds requirements by 10%

Exceeds requirements, but by less than 10%

Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

PnoLS: Number of Planted stems excluding live stakes

P-all: Number of planted stems including live stakes,

T: Total Stems

Table 7. Planted and Total Stem Counts

Agony Acres Mitigation Site (NCEEP Project No.95716)

Monitoring Year 0 -2014

			Current Plot Data (MY0 2015)																	
			95716-WEI-0007			95716-WEI-0008			95716-WEI-0009			95716-WEI-0010			95716-WEI-0011			95716-WEI-0012		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Alnus serrulata	tag alder	Shrub	1	1	1				1	1	1	4	4	4	2	2	2	2	2	2
Betula nigra	river birch	Tree	4	4	4	1	1	1							2	2	2			
Fraxinus pennsylvanica	green ash	Tree	4	4	4	5	5	5	6	6	6	2	2	2	8	8	8	3	3	3
Platanus occidentalis	American sycamore	Tree	3	3	3	6	6	6	7	7	7	1	1	1	3	3	3	5	5	5
Quercus michauxii	swamp chestnut oak	Tree	4	4	4	4	4	4	1	1	1	1	1	1				2	2	2
Quercus pagoda	cherrybark oak	Tree										2	2	2				1	1	1
Quercus phellos	willow oak	Tree							2	2	2	6	6	6	1	1	1	3	3	3
		Stem count	16	16	16	16	16	16	17	17	17	16	16	16	16	16	16	16	16	16
		size (ares)	1			1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02		
		Species count	5	5	5	4	4	4	5	5	5	6	6	6	5	5	5	6	6	6
		Stems per ACRE	647.5	647.5	647.5	647.5	647.5	647.5	688	688	688	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5

Color Coding for Table

Exceeds requirements by 10%

Exceeds requirements, but by less than 10%

Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

PnoLS: Number of Planted stems excluding live stakes

P-all: Number of planted stems including live stakes,

T: Total Stems

Table 7. Planted and Total Stem Counts

Agony Acres Mitigation Site (NCEEP Project No.95716)

Monitoring Year 0 -2014

			Current Plot Data (MY0 2015)												Annual Means		
			95716-WEI-0013			95716-WEI-0014			95716-WEI-0015			95716-WEI-0016			MY0 (2015)		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Alnus serrulata	tag alder	Shrub	1	1	1	1	1	1	2	2	2	1	1	1	27	27	27
Betula nigra	river birch	Tree	4	4	4	2	2	2	1	1	1	1	1	1	28	28	28
Fraxinus pennsylvanica	green ash	Tree	2	2	2	2	2	2	3	3	3	2	2	2	55	55	55
Platanus occidentalis	American sycamore	Tree	1	1	1	3	3	3	5	5	5	3	3	3	56	56	56
Quercus michauxii	swamp chestnut oak	Tree	6	6	6	4	4	4	2	2	2	2	2	2	36	36	36
Quercus pagoda	cherrybark oak	Tree	2	2	2	3	3	3	1	1	1	3	3	3	25	25	25
Quercus phellos	willow oak	Tree				1	1	1	2	2	2	4	4	4	30	30	30
		Stem count	16	16	16	16	16	16	16	16	16	16	16	16	257	257	257
		size (ares)	1			1			1			1			16		
		size (ACRES)	0.02			0.02			0.02			0.02			0.40		
		Species count	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7
		Stems per ACRE	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	647.5	650	650	650

Color Coding for Table

Exceeds requirements by 10%

Exceeds requirements, but by less than 10%

Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

PnoLS: Number of Planted stems excluding live stakes

P-all: Number of planted stems including live stakes,

T: Total Stems

VEGETATION PHOTOGRAPHS
Agony Acres

VEG PLOT 1 *(01/06/2015)*

VEG PLOT 2 *(01/06/2015)*

VEG PLOT 3 *(01/06/2015)*

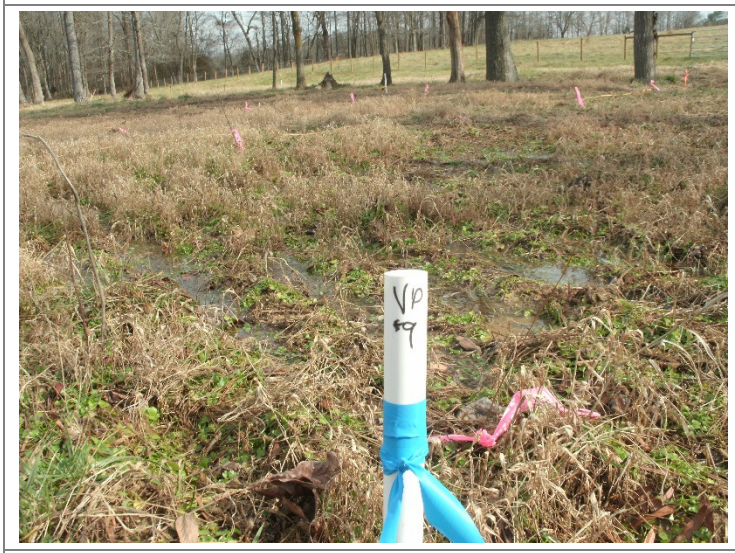
VEG PLOT 4 *(01/06/2015)*

VEG PLOT 5 *(01/06/2015)*

VEG PLOT 6 *(01/06/2015)*

VEG PLOT 7 *(01/06/2015)*

VEG PLOT 8 *(01/06/2015)*



VEG PLOT 9 *(01/06/2015)*

VEG PLOT 10 *(01/06/2015)*

VEG PLOT 11 *(01/06/2015)*

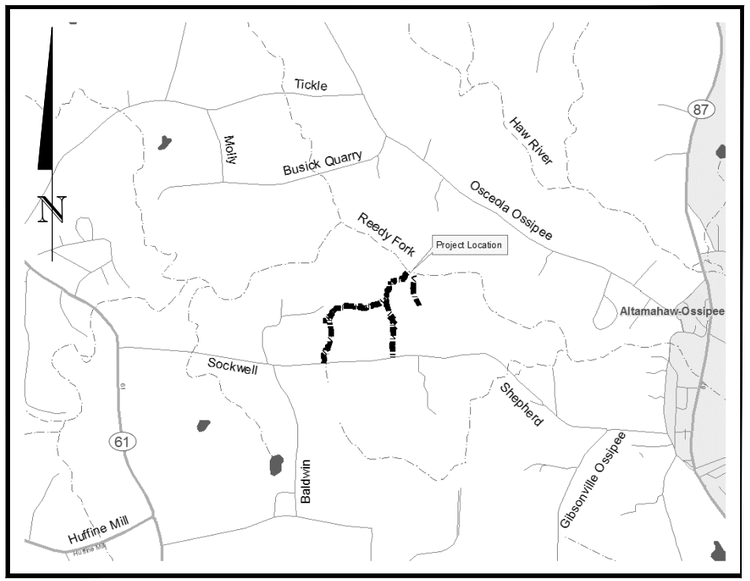
VEG PLOT 12 *(01/06/2015)*

	
VEG PLOT 13 *(01/06/2015)*	**VEG PLOT 14** *(01/06/2015)*
	
VEG PLOT 15 *(01/06/2015)*	**VEG PLOT 16** *(01/06/2015)*

APPENDIX 4. As-Built Plan Sheets

Agony Acres Mitigation Site

Cape Fear River Basin 03030002
Guilford County, North Carolina
for
North Carolina Ecosystem Enhancement Program



Vicinity Map
Not to Scale

Ecosystem Enhancement PROGRAM

BASELINE DRAWING
Issued February 2015

Stream Origins

Stream	Latitude	Longitude
UT1	N 36° 10' 27.15"	W 79° 33' 03.90"
UT1A	N 36° 10' 29.43"	W 79° 32' 37.10"
UT1B	N 36° 10' 40.87"	W 79° 33' 03.05"
UT2	N 36° 10' 46.12"	W 79° 32' 27.79"

Sheet Index

Project Directory

Surveying:
Kee Mapping & Surveying, PA
111 Central Avenue
Asheville, NC 28801
Brad Kee, PLS
828-645-8275

Owner:
Ecosystem Enhancement Program
1652 Mail Service Center
Raleigh, NC 27699-1652
Jeff Schaffer
919-707-8976

Engineering:
Wildlands Engineering, Inc
License No. F-0831
312 West Millbrook Road, Suite 225
Raleigh, NC 27609
Nicole Macaluso, PE
919-851-9986

DENR Contract No. 004949
EEP ID No. 95716

WILDLANDS ENGINEERING
312 W. Millbrook Road, Ste 225
Raleigh, NC 27609
Tel: 919.851.9986
Firm License No. F-0831

Agony Acres Mitigation Site
Guilford County, NC

Title Sheet

Baseline Drawing

Date: 02/16/2015
Job Number: 005-02156
Project Engineer: NMM
Drawn By: CLM
Checked By: DMT
Revisions:

Sheet 0.1

February 16, 2015

E:\Projects\005-02156 Agony Acres\Geo\Plans\As-Built\Baseline\02156-AB-Title Sheet.dwg

February 16, 2015

LEGEND

XS 1 — Permanent Cross Section

CG 1 — Crest Gage

FG 1 — Flow Gage

RG — Rain Gage

BT — Barotroll

PP 1 — Photo Point

VP 1 — Vegetation Plot

10+00 — As-Built Thalweg Alignment - Restoration

10+00 — As-Built Thalweg Alignment - Enhancement I

10+00 — As-Built Thalweg Alignment - Enhancement II

10+00 — As-Built Thalweg Alignment - Preservation

10+00 — As-Built Thalweg Alignment - Not for Credit

As-Built Bankfull

CE — CE — Conservation Easement

As-Built Major Contour

As-Built Minor Contour

As-Built Constructed Riffle

As-Built Angled Log Sill

As-Built Boulder J-Hook with Sill

As-Built Log Vane

As-Built Boulder Sill

As-Built Rock Outlet

As-Built Brush Toe

As-Built Rootwad

As-Built Tree

As-Built Cover Log

As-Built Transplanted Sod Mats

As-Built Roller Log

As-Built Boulder Toe

As-Built Plunge Pool Energy Dissipator

As-Built Pipe Culvert

As-Built Culvert Outlet Protection

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Guilford County, NC

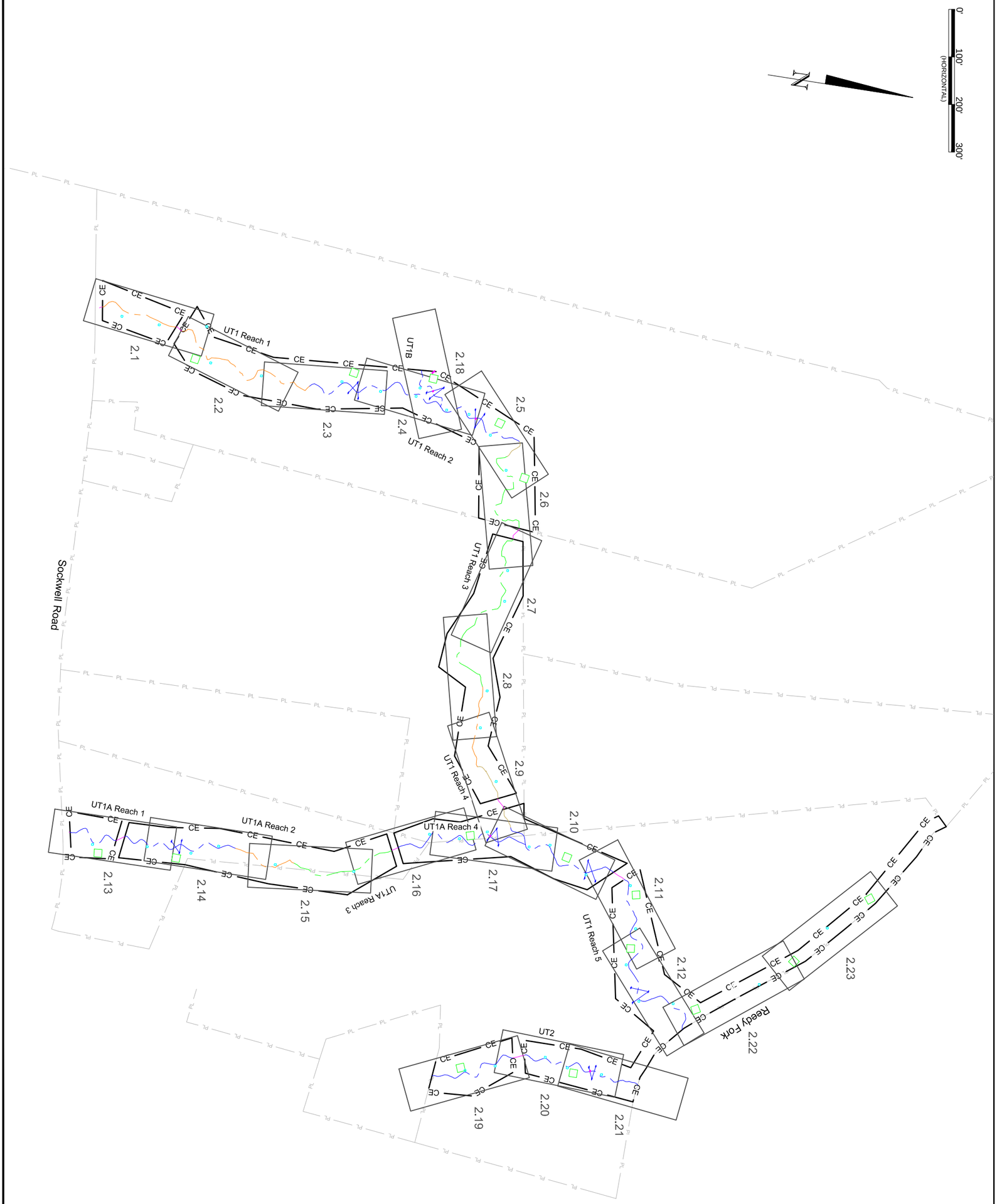
Legend

Baseline Drawing

Date: 02.16.2015
Job Number: 005-02156
Project Engineer: NSM
Drawn By: CLM
Checked By: DMT

Revisions:

Sheet 0.2



Baseline Drawing

Date:	02.16.2015
Job Number:	005-02136
Project Engineer:	NMM
Drawn By:	CLM
Checked By:	DMT

1.0
Sheet

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Stream Baseline Overview

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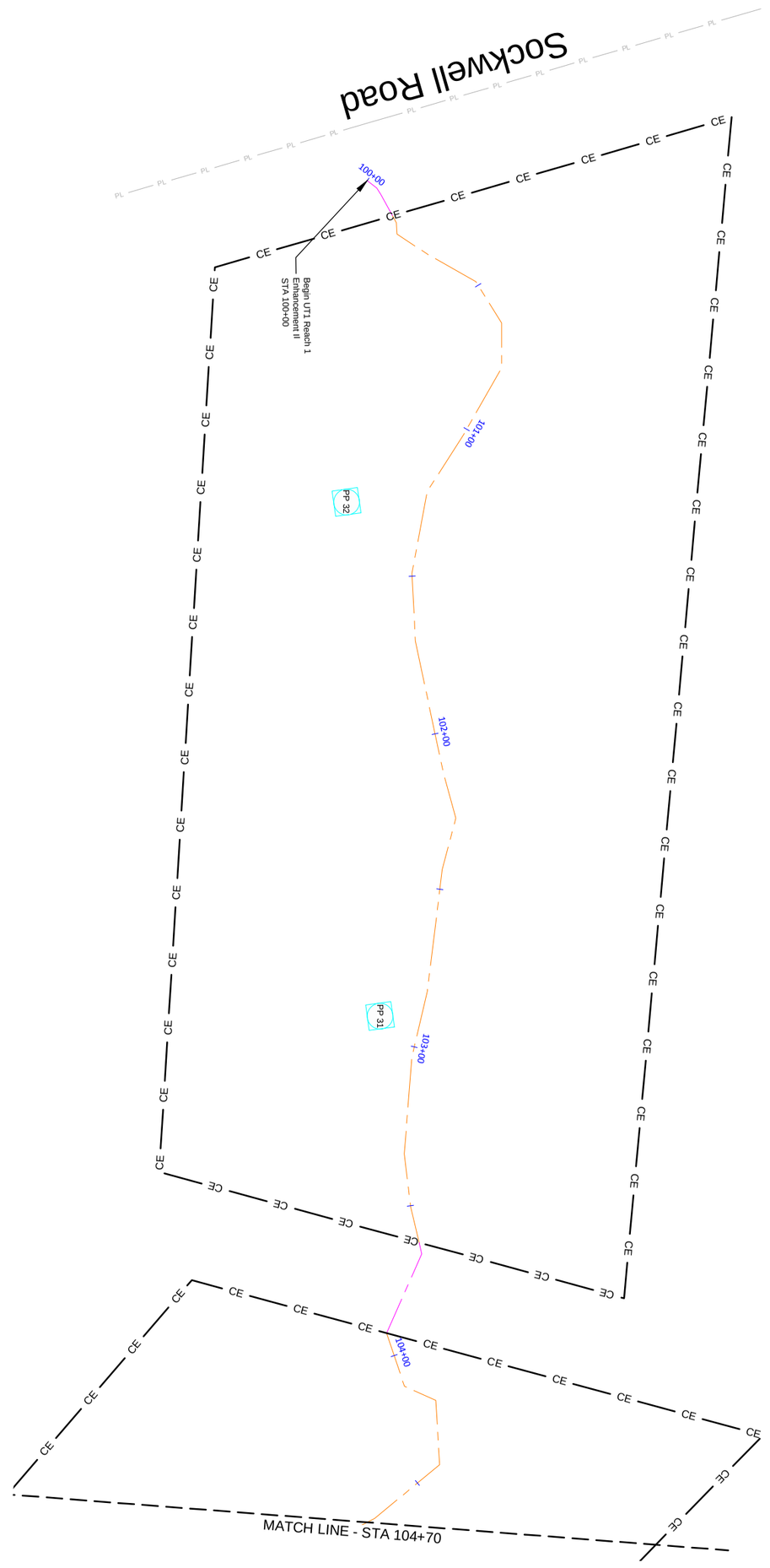

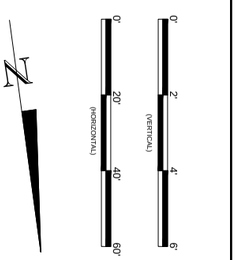

Baseline Drawing

Date:	02.16.2015
Job Number:	005-02136
Project Engineer:	NMM
Drawn By:	CLM
Checked By:	DMT

Revisions:

2.1

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Agony Acres Mitigation Site
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UT1 Reach 1
Stream Baseline Plans

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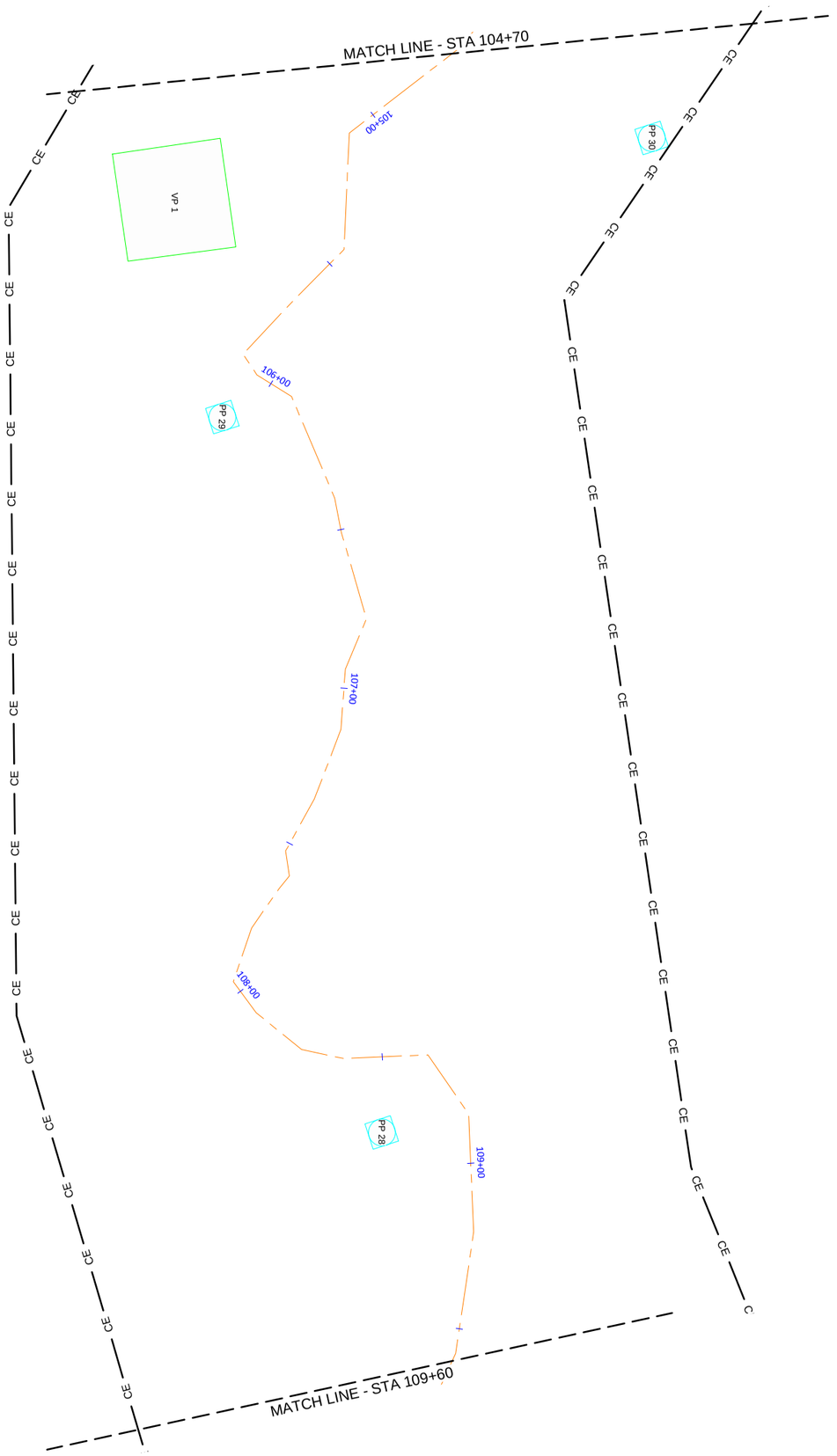

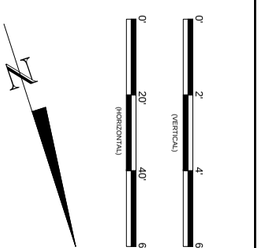

Baseline Drawing

Date:	02.16.2015
Job Number:	005-02136
Project Engineer:	NMM
Drawn By:	CLM
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Agony Acres Mitigation Site
Guilford County, NC

UT1 Reach 1
Stream Baseline Plans

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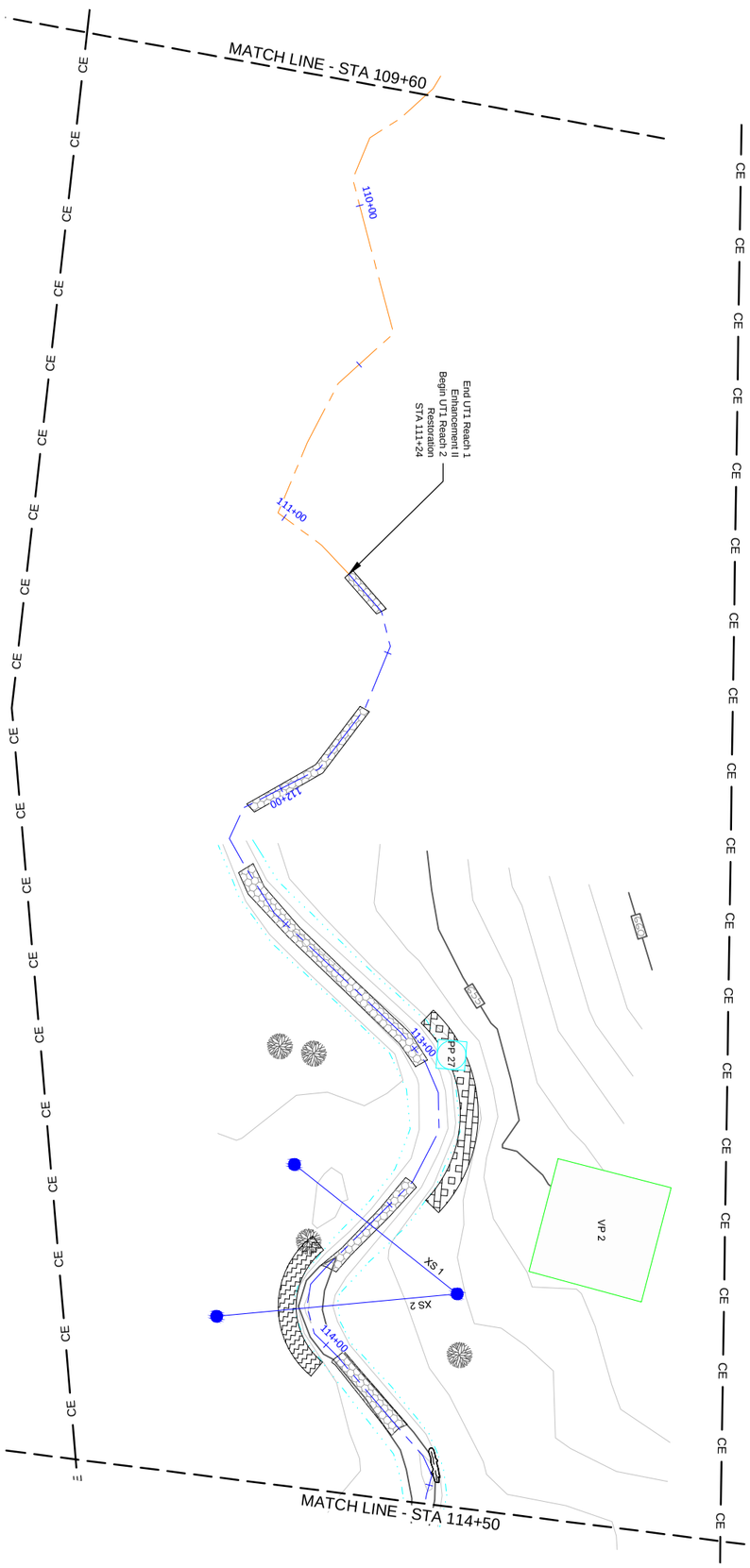

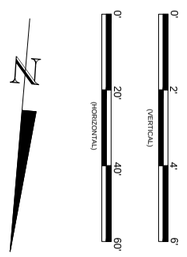

Baseline Drawing

Date:	02.16.2015
Job Number:	005-02136
Project Engineer:	NMM
Drawn By:	CLM
Checked By:	DMT

2.3
Sheet

Revisions:

Agony Acres Mitigation Site
Guilford County, NC

UT1 Reach 1 & 2
Stream Baseline Plans

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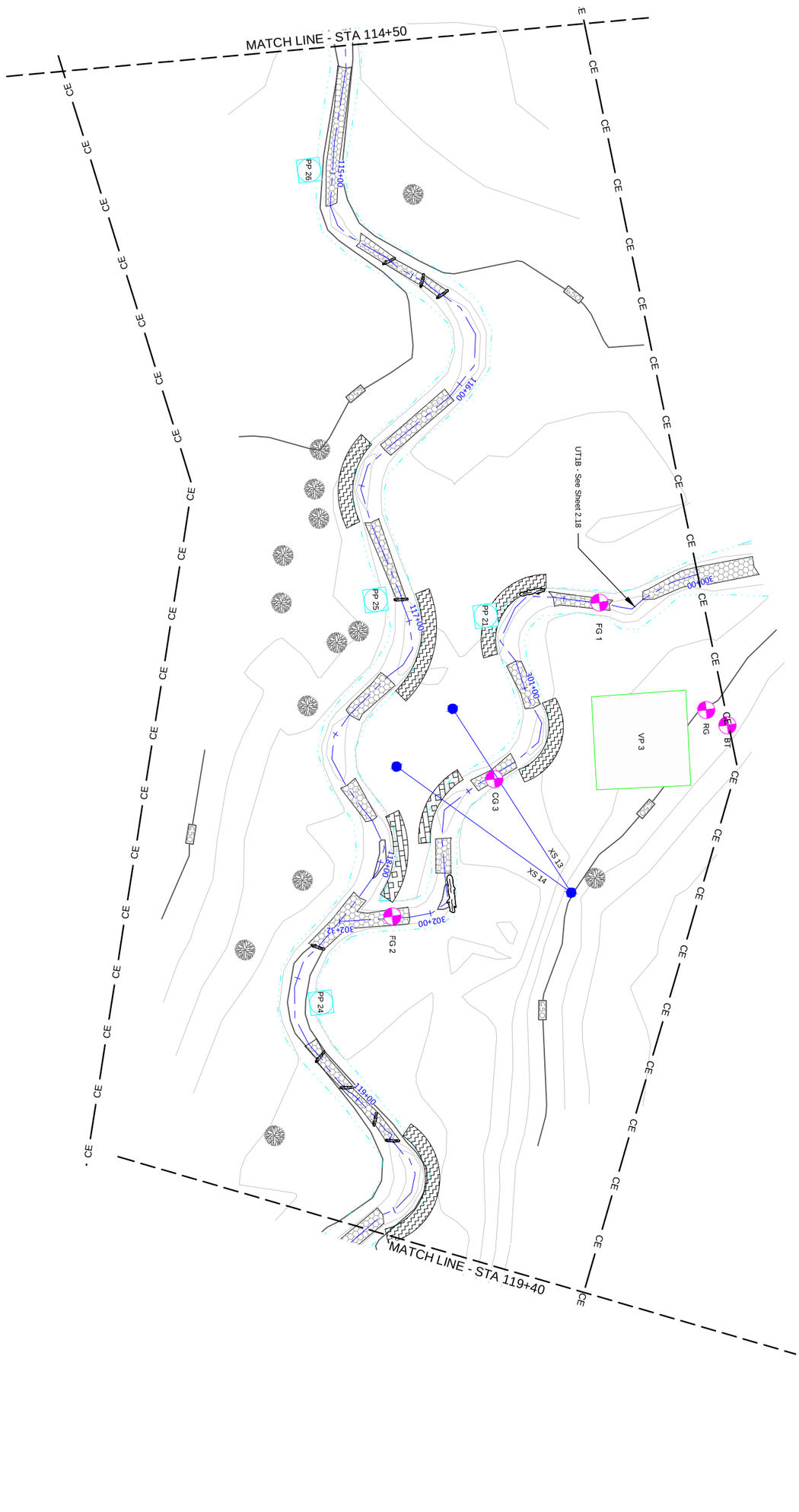

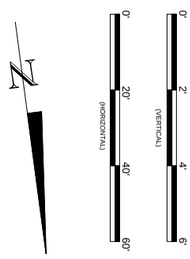

Baseline Drawing

Date:	02.16.2015
Job Number:	005-02136
Project Engineer:	NMM
Drawn By:	CLM
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UT1 Reach 2
Stream Baseline Plans

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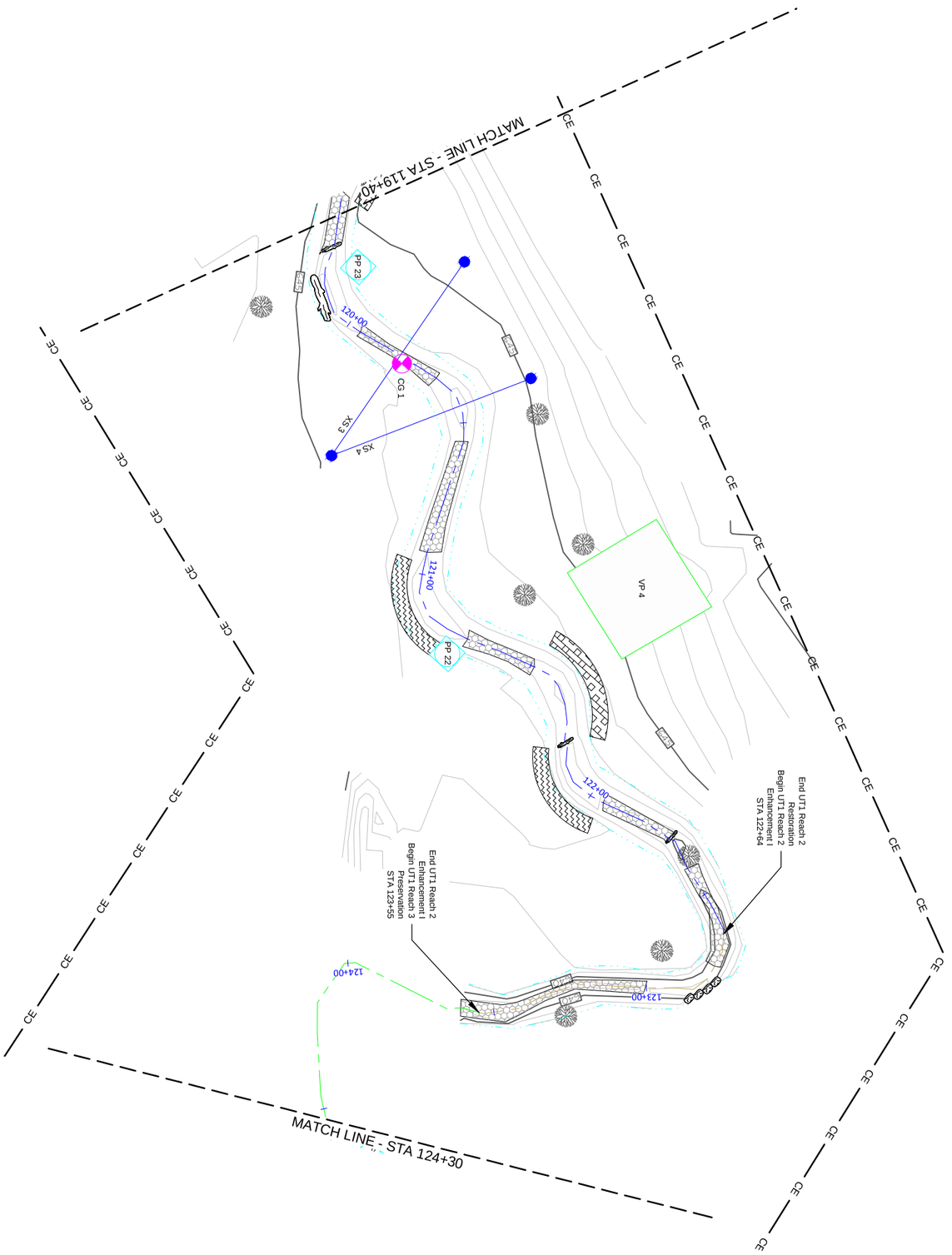

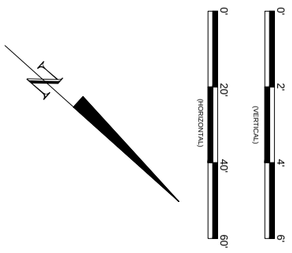

Baseline Drawing

Date:	02.16.2015
Job Number:	005-02136
Project Engineer:	NMM
Drawn By:	CLM
Checked By:	DMT

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Agony Acres Mitigation Site
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UT1 Reach 2 & 3
Stream Baseline Plans

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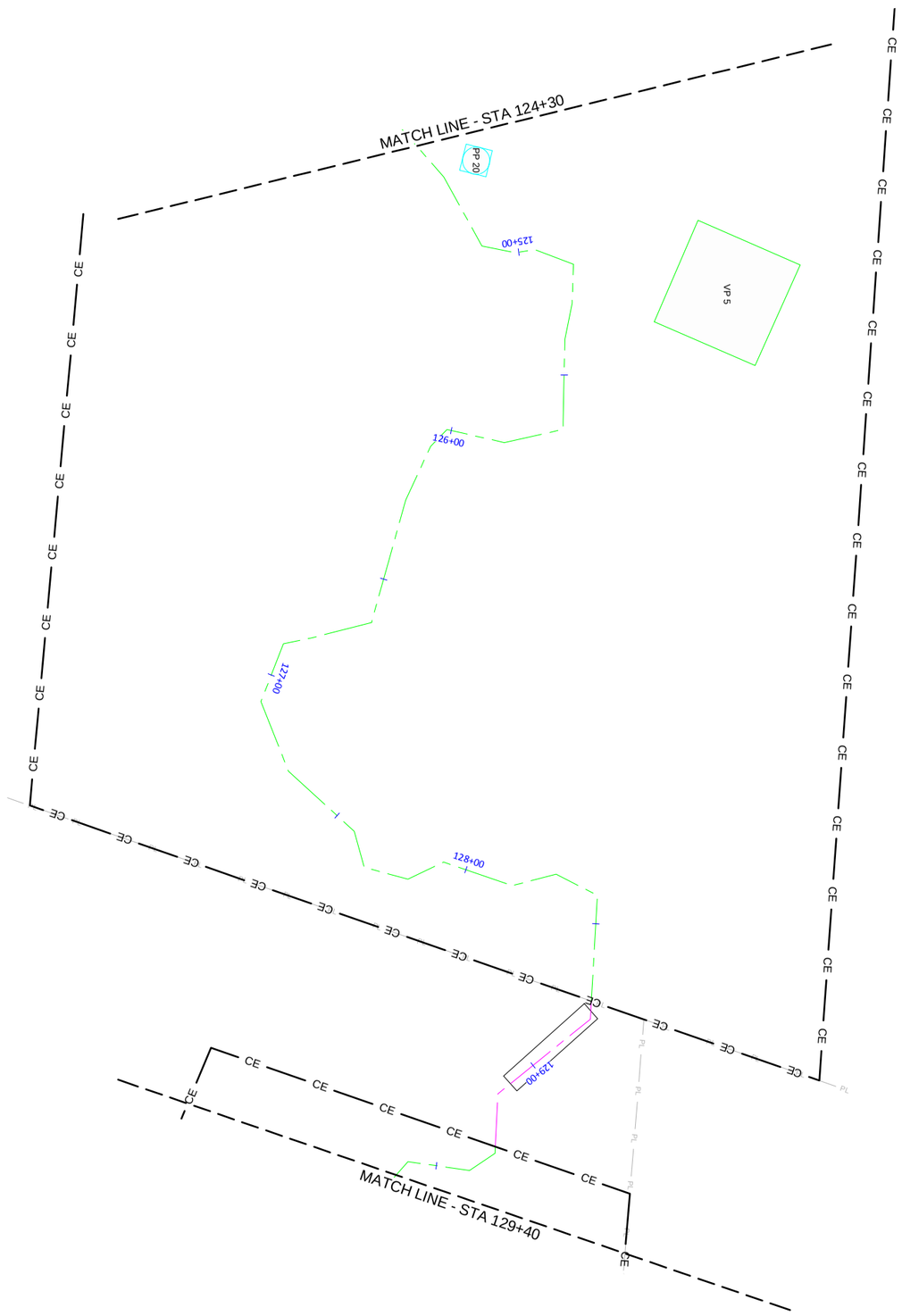

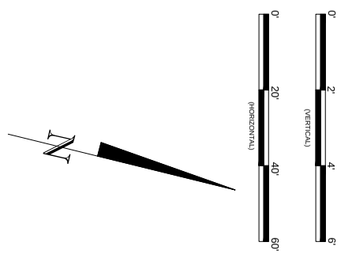

Baseline Drawing

Date:	02.16.2015
Job Number:	005-02136
Project Engineer:	NMM
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Agony Acres Mitigation Site
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UT1 Reach 3
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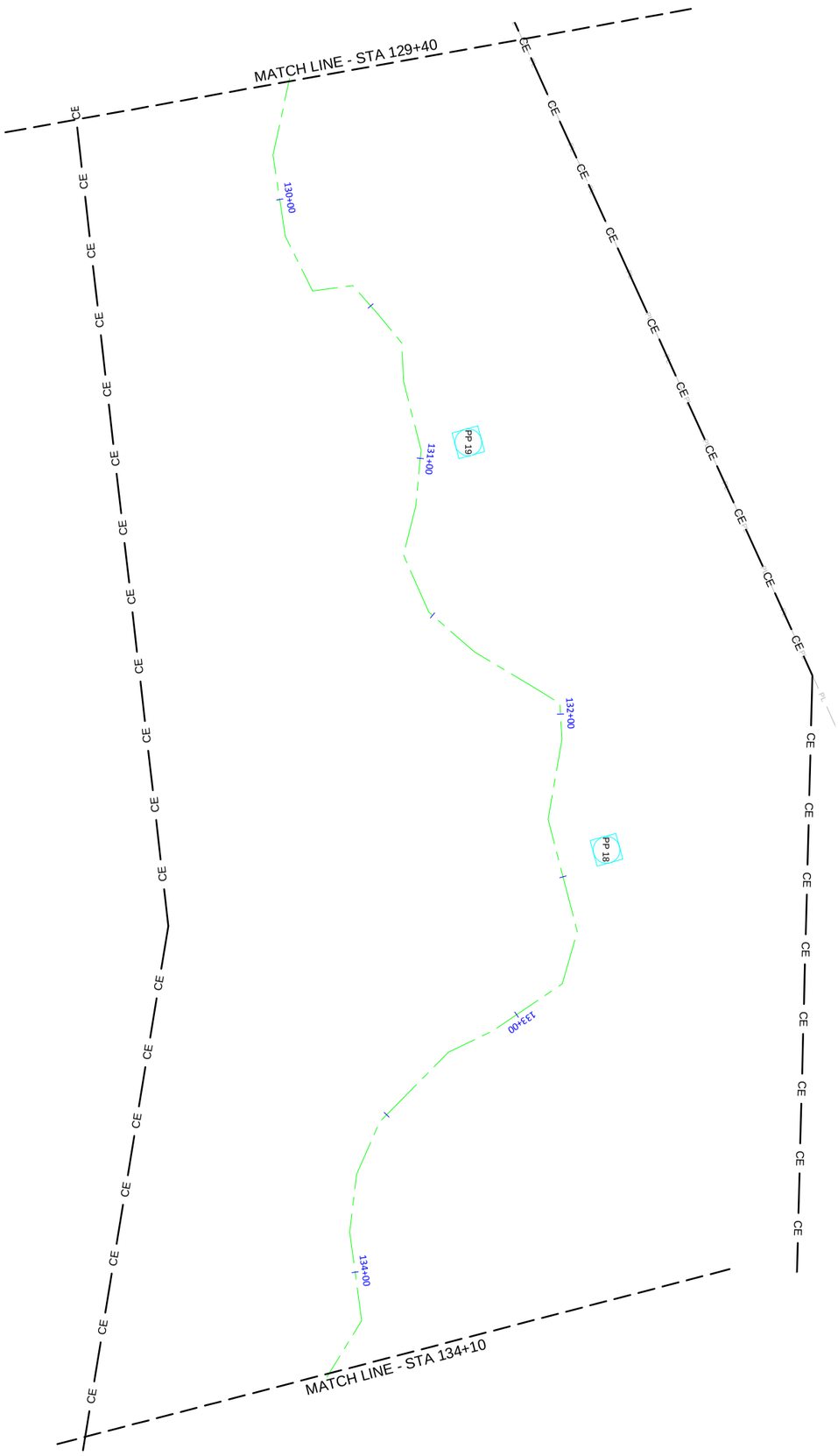

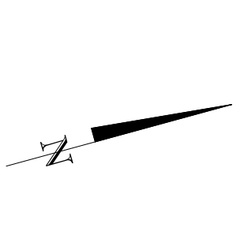

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UT1 Reach 3
Stream Baseline Plans

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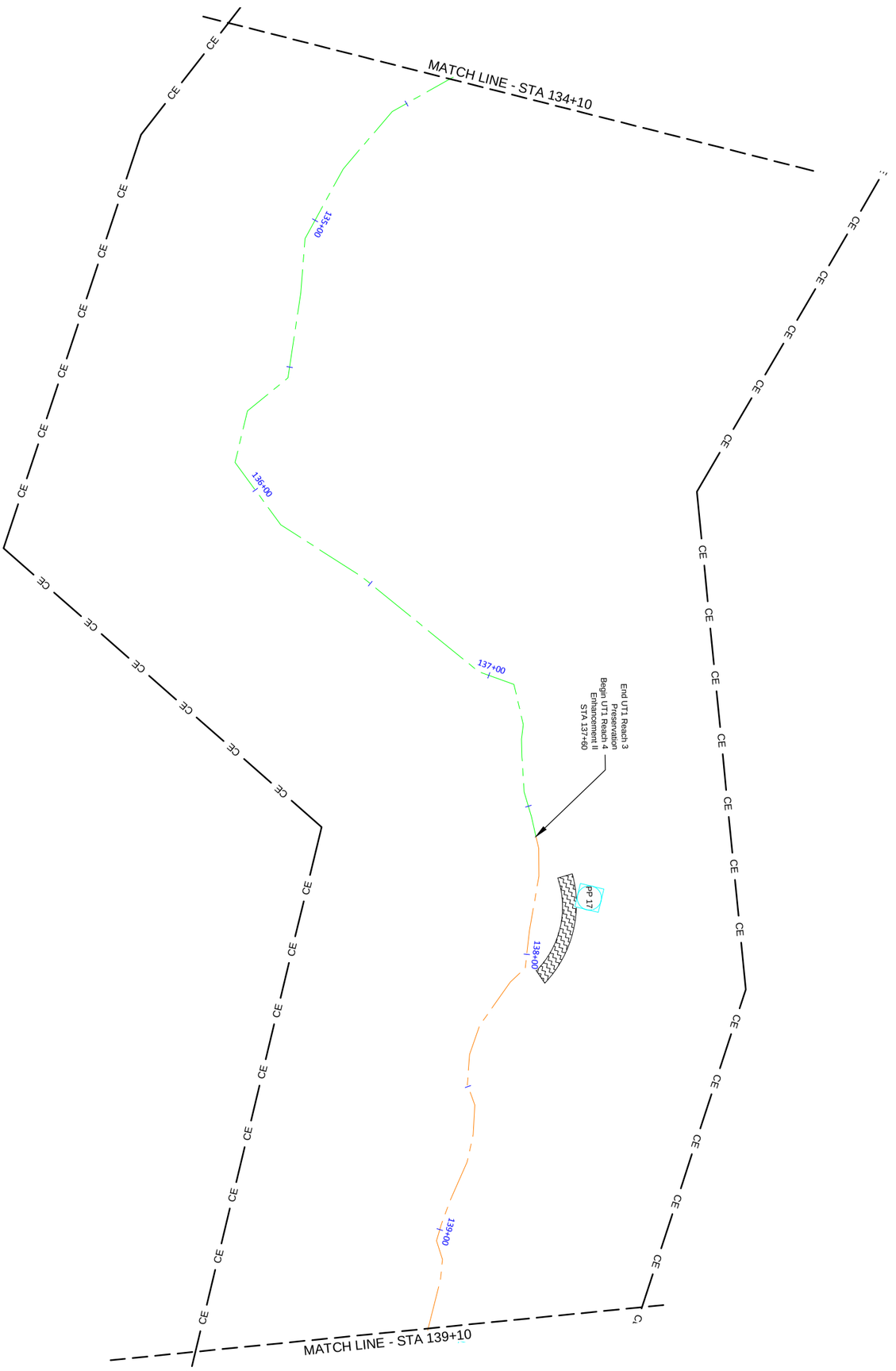

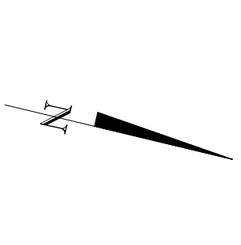

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UT1 Reach 3 & 4
Stream Baseline Plans

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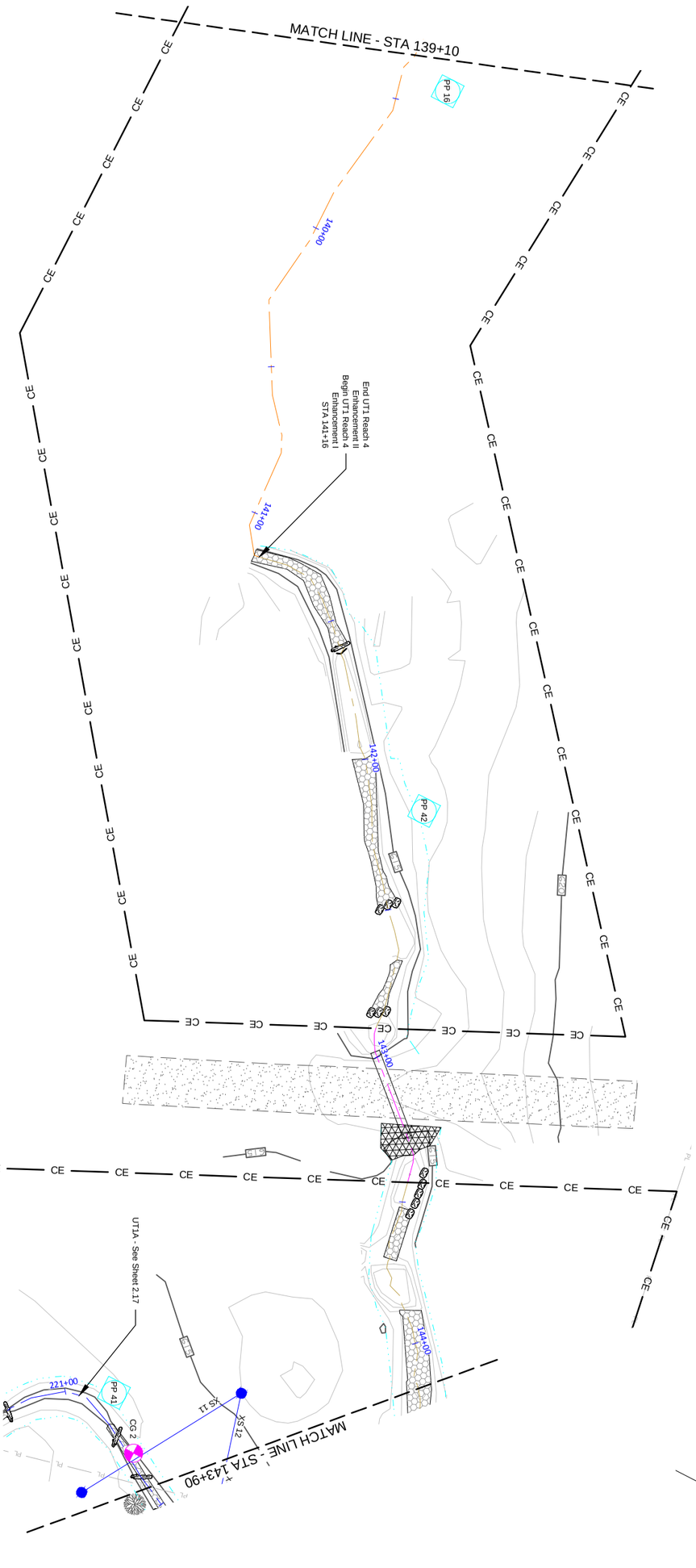

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UT1 Reach 4
Stream Baseline Plans

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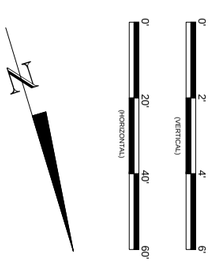

Baseline Drawing

Date:	02.16.2015
Job Number:	005-02136
Project Engineer:	NMM
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Agony Acres Mitigation Site
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UT1 Reach 4 & 5
Stream Baseline Plans

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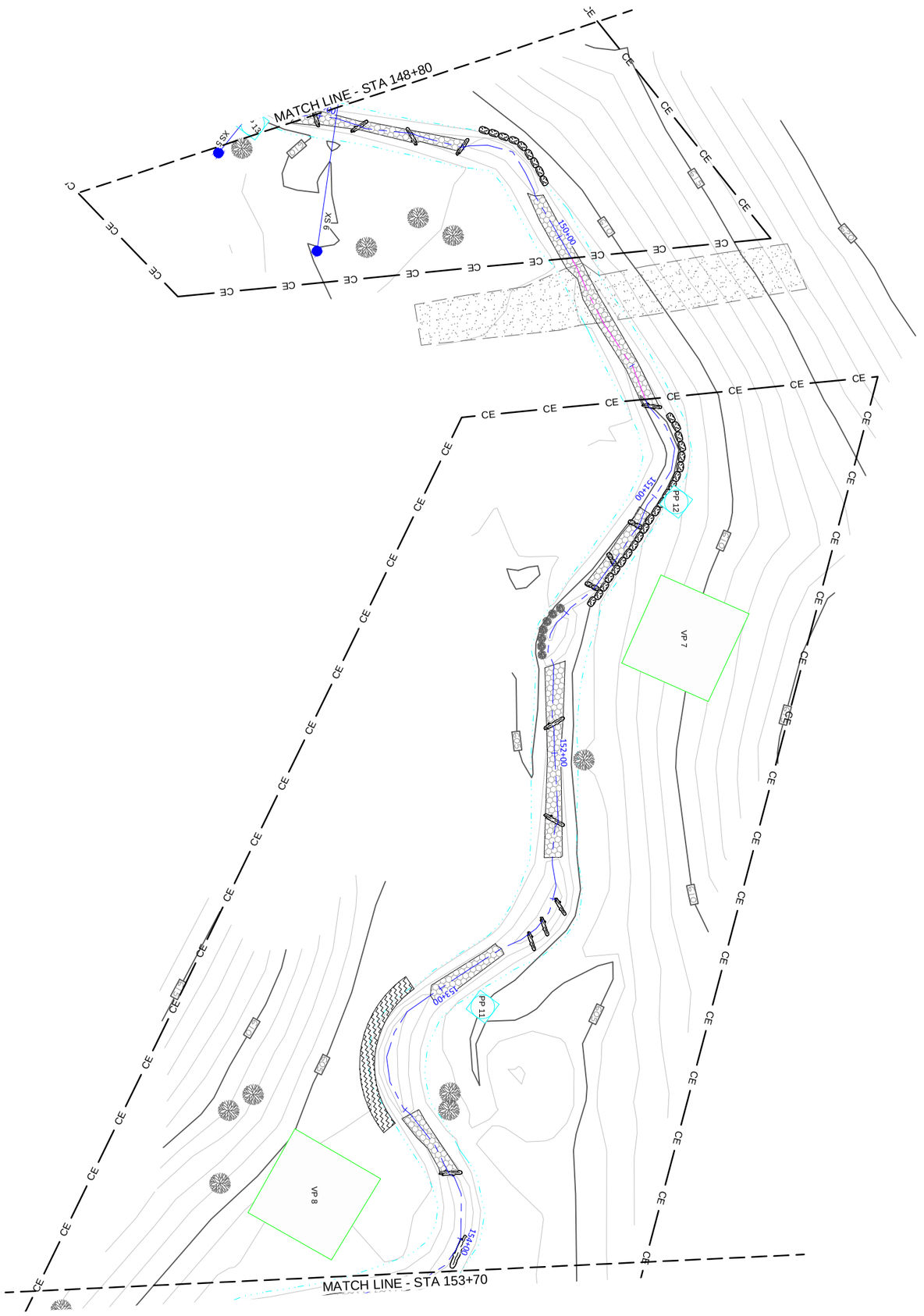

Baseline Drawing

Date:	02.16.2015
Job Number:	005-02136
Project Engineer:	NMM
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UT1 Reach 5
Stream Baseline Plans

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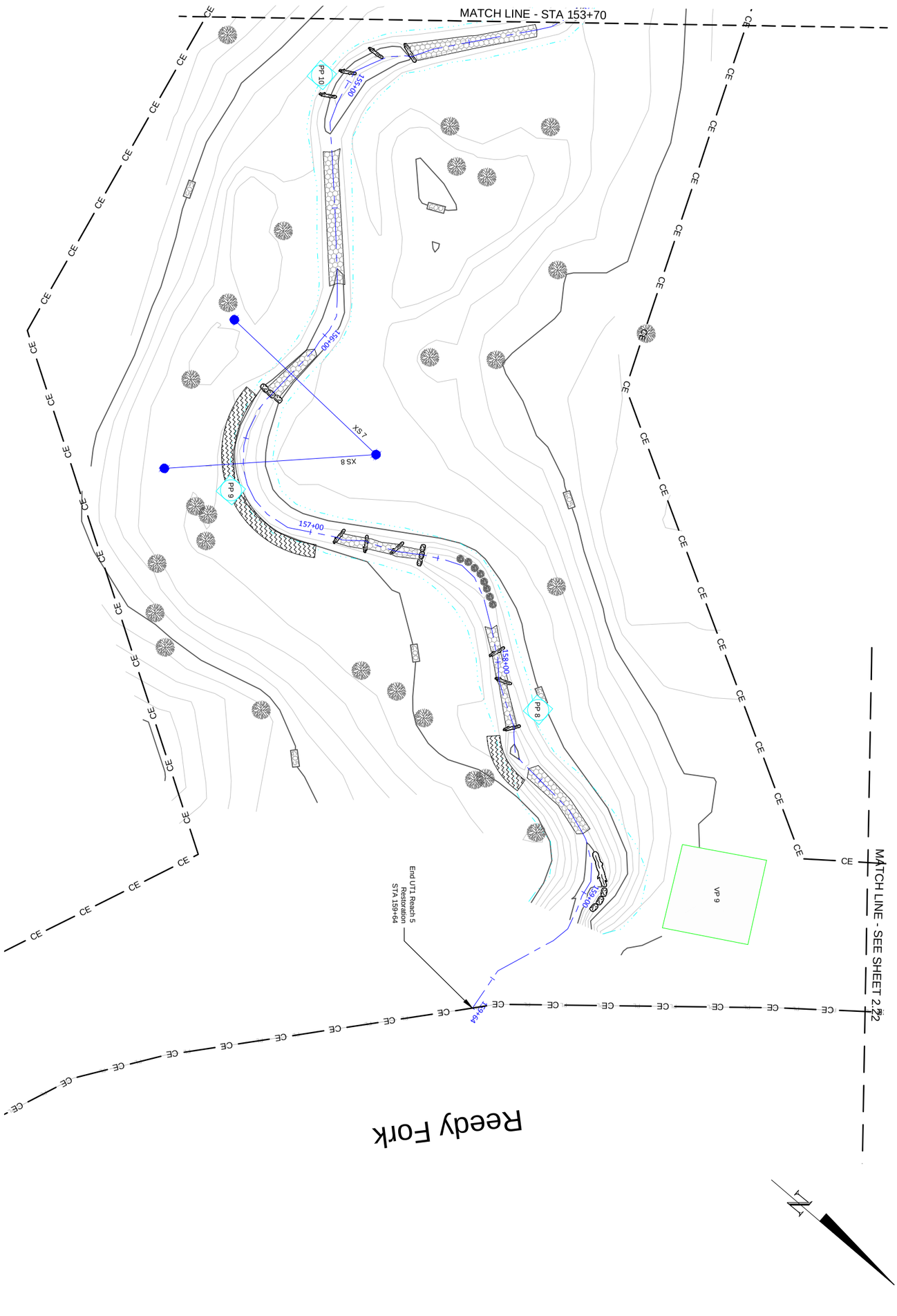

Baseline Drawing

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Job Number:	005-02136
Project Engineer:	NMM
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Agony Acres Mitigation Site
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UT1 Reach 5
Stream Baseline Plans

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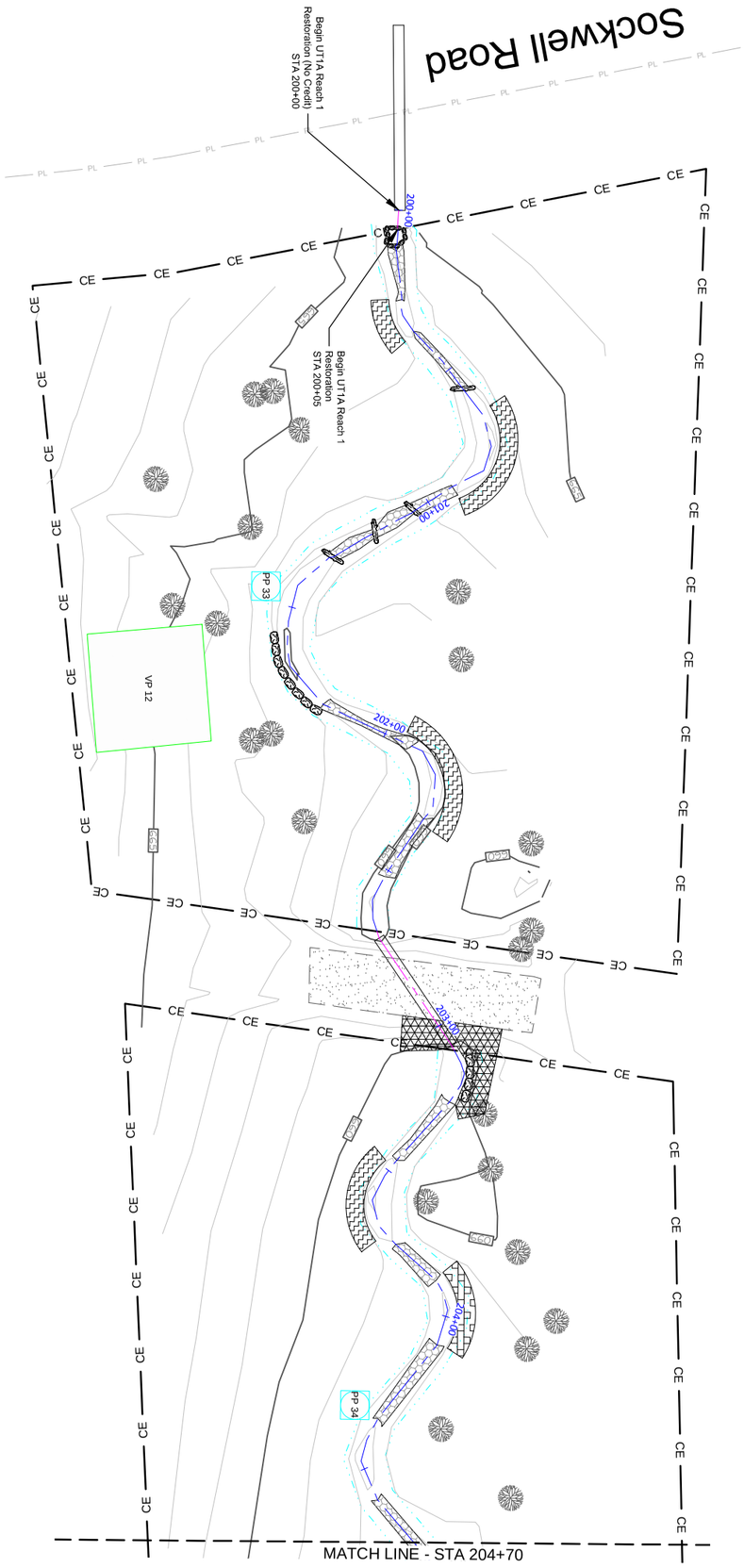

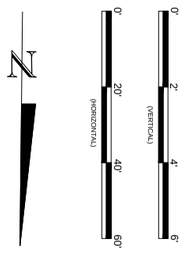

Baseline Drawing

Date:	02.16.2015
Job Number:	005-02136
Project Engineer:	NMM
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Agony Acres Mitigation Site
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UT1A Reach 1
Stream Baseline Plans

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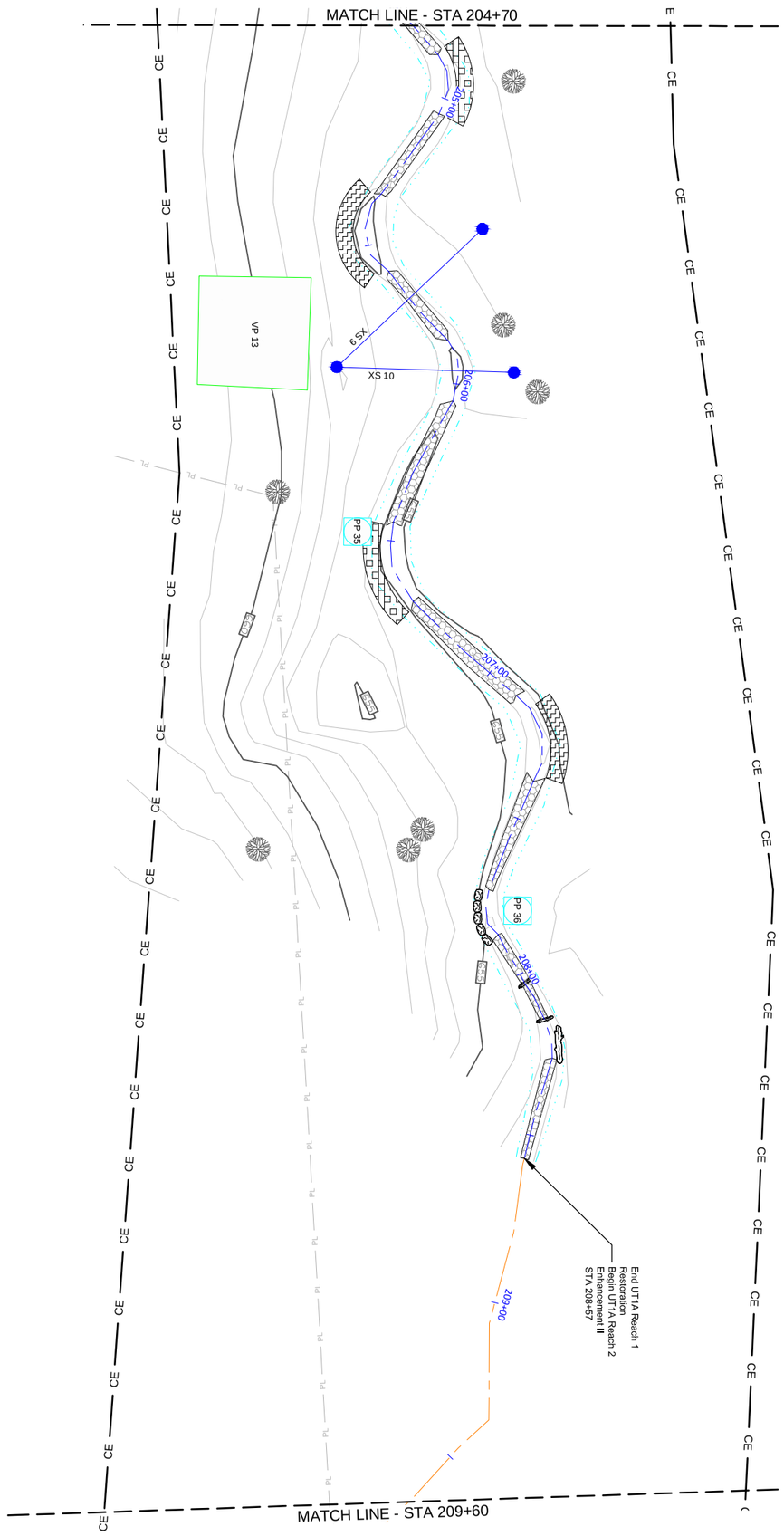

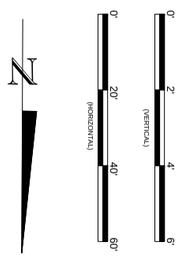

Baseline Drawing

Date:	02.16.2015
Job Number:	005-02136
Project Engineer:	NMM
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Agony Acres Mitigation Site
Guilford County, NC

UT1A Reach 1 & 2
Stream Baseline Plans

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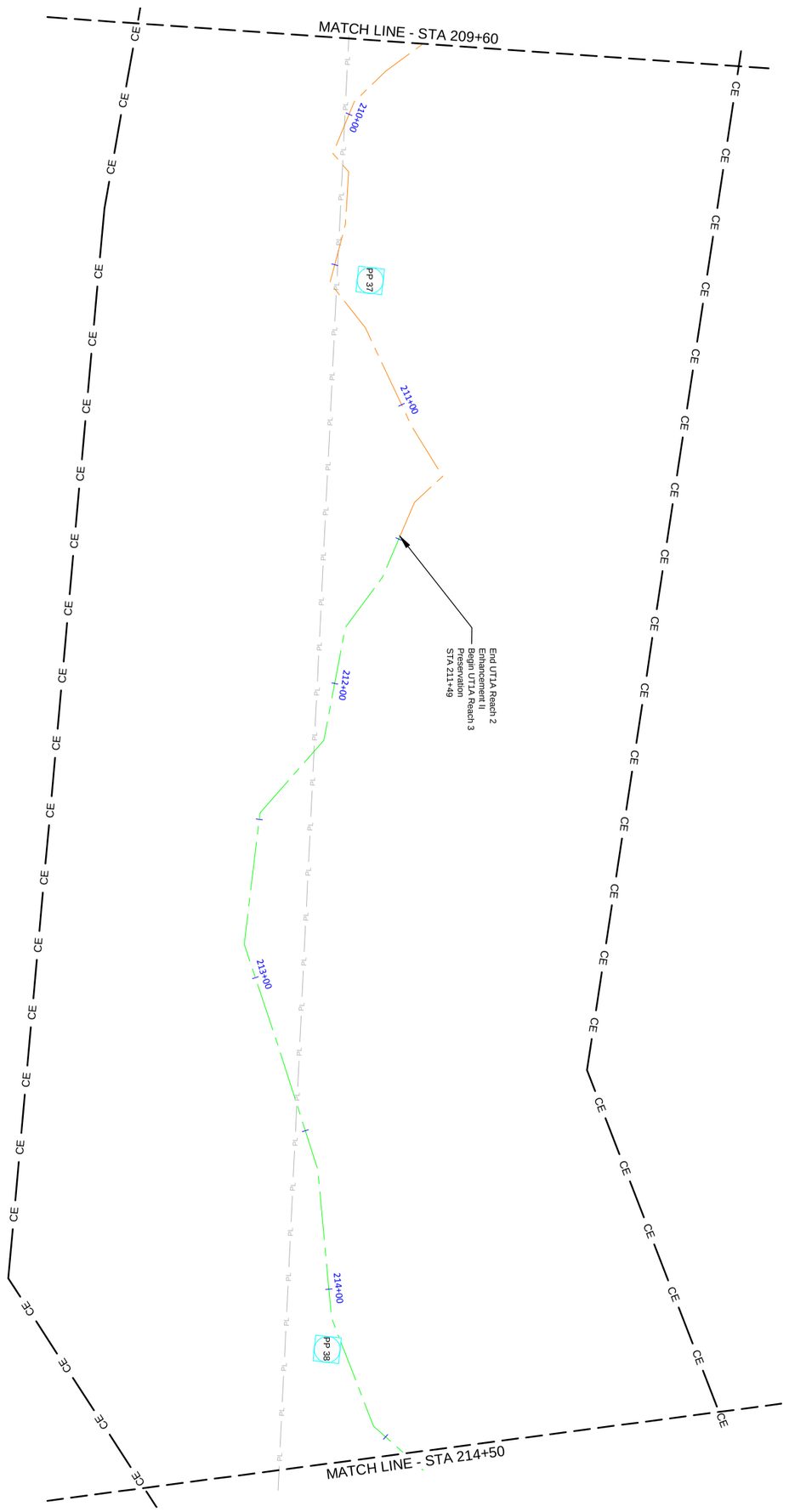

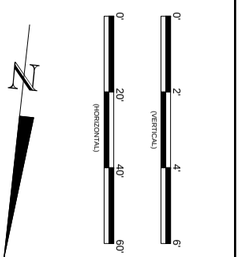

Baseline Drawing

Date:	02.16.2015
Job Number:	005-02136
Project Engineer:	NMM
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Agony Acres Mitigation Site
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UT1A Reach 2 & 3
Stream Baseline Plans

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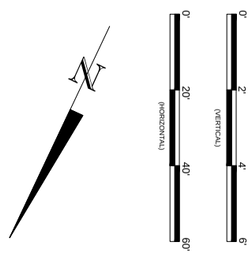

Baseline Drawing

Date:	02.16.2015
Job Number:	005-02136
Project Engineer:	NMM
Drawn By:	CLM
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Agony Acres Mitigation Site
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UT1A Reach 3 & 4
Stream Baseline Plans

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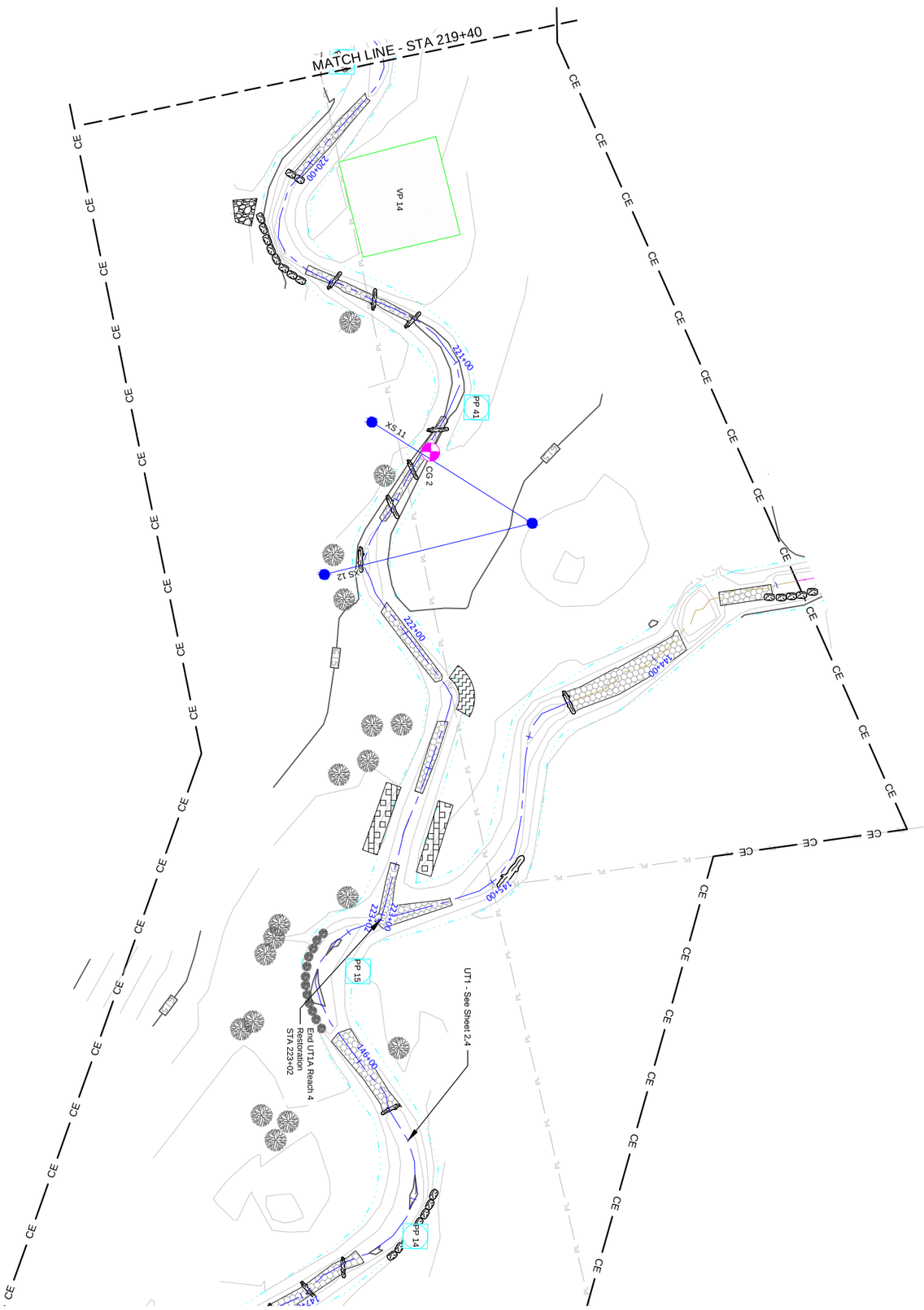

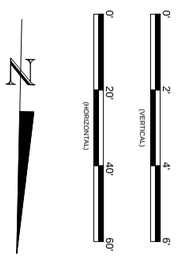

Baseline Drawing

Date:	02.16.2015
Job Number:	005-02136
Project Engineer:	NMM
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Agony Acres Mitigation Site
Guilford County, NC

UT1A Reach 4
Stream Baseline Plans

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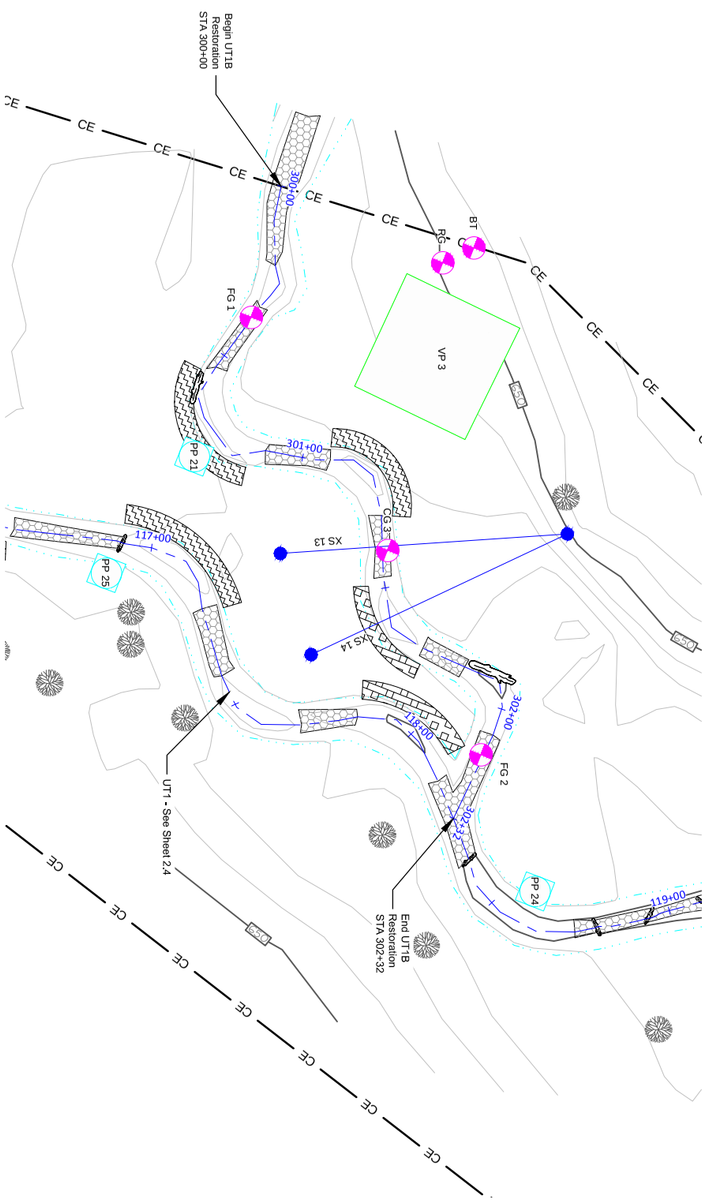

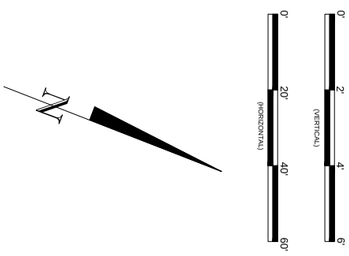

Baseline Drawing

Date:	02.16.2015
Job Number:	005-02136
Project Engineer:	NMM
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Agony Acres Mitigation Site
Guilford County, NC

UT1B
Stream Baseline Plans

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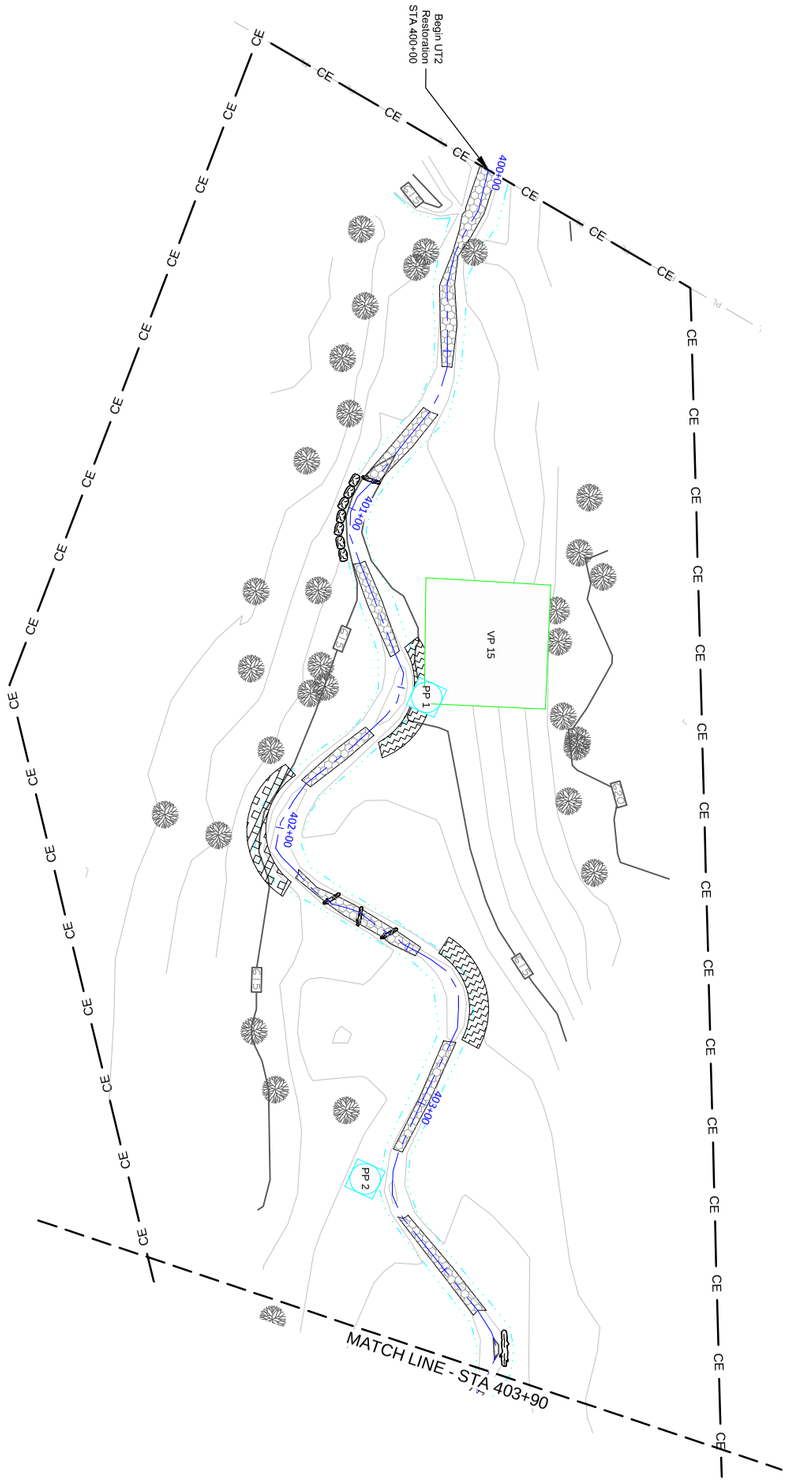

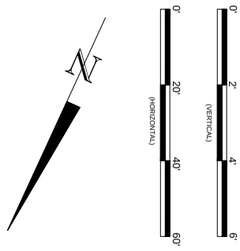

Baseline Drawing

Date:	02.16.2015
Job Number:	005-02136
Project Engineer:	NMM
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Agony Acres Mitigation Site
Guilford County, NC

UT2
Stream Baseline Plans

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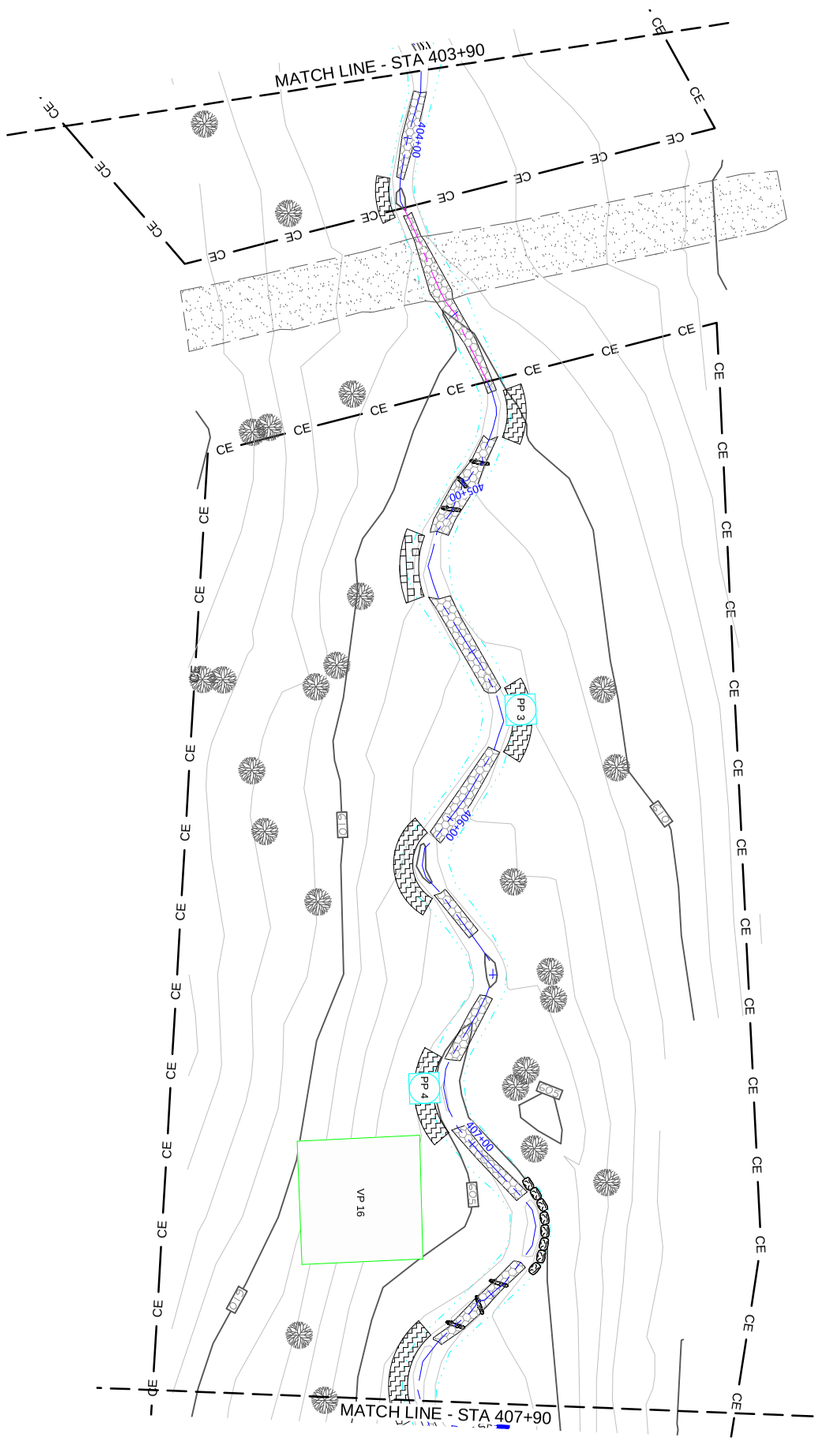

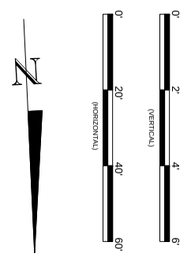

Baseline Drawing

Date:	02.16.2015
Job Number:	005-02136
Project Engineer:	NMM
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Agony Acres Mitigation Site
Guilford County, NC

UT2
Stream Baseline Plans

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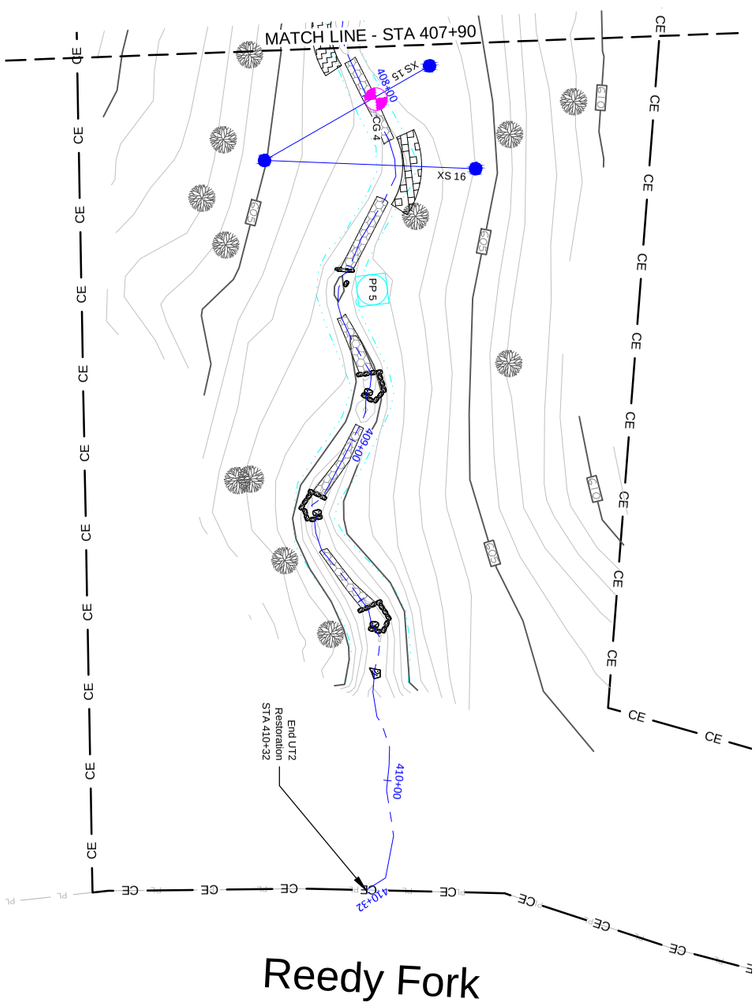

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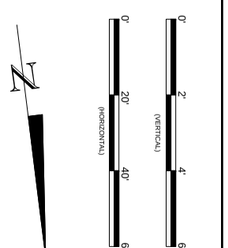

Baseline Drawing

Date:	02.16.2015
Job Number:	005-02136
Project Engineer:	NMM
Drawn By:	CLM
Checked By:	DMT

2.21
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Revisions:

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UT2
Stream Baseline Plans

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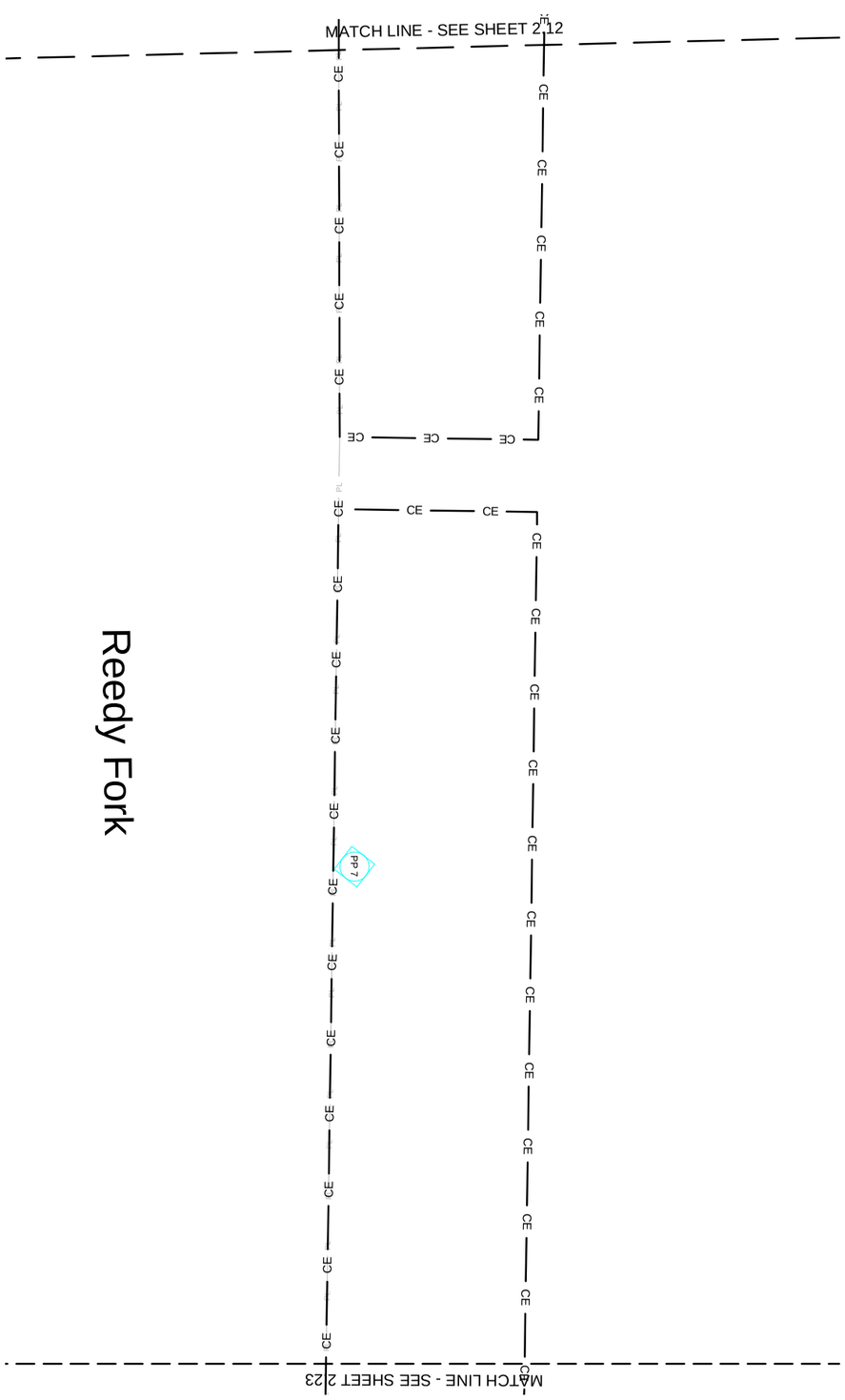

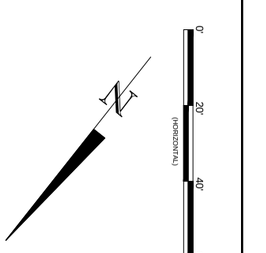

Baseline Drawing

Date:	02.16.2015
Job Number:	005-02136
Project Engineer:	NMM
Drawn By:	CLM
Checked By:	DMT

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Revisions:

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Reedy Fork Buffer
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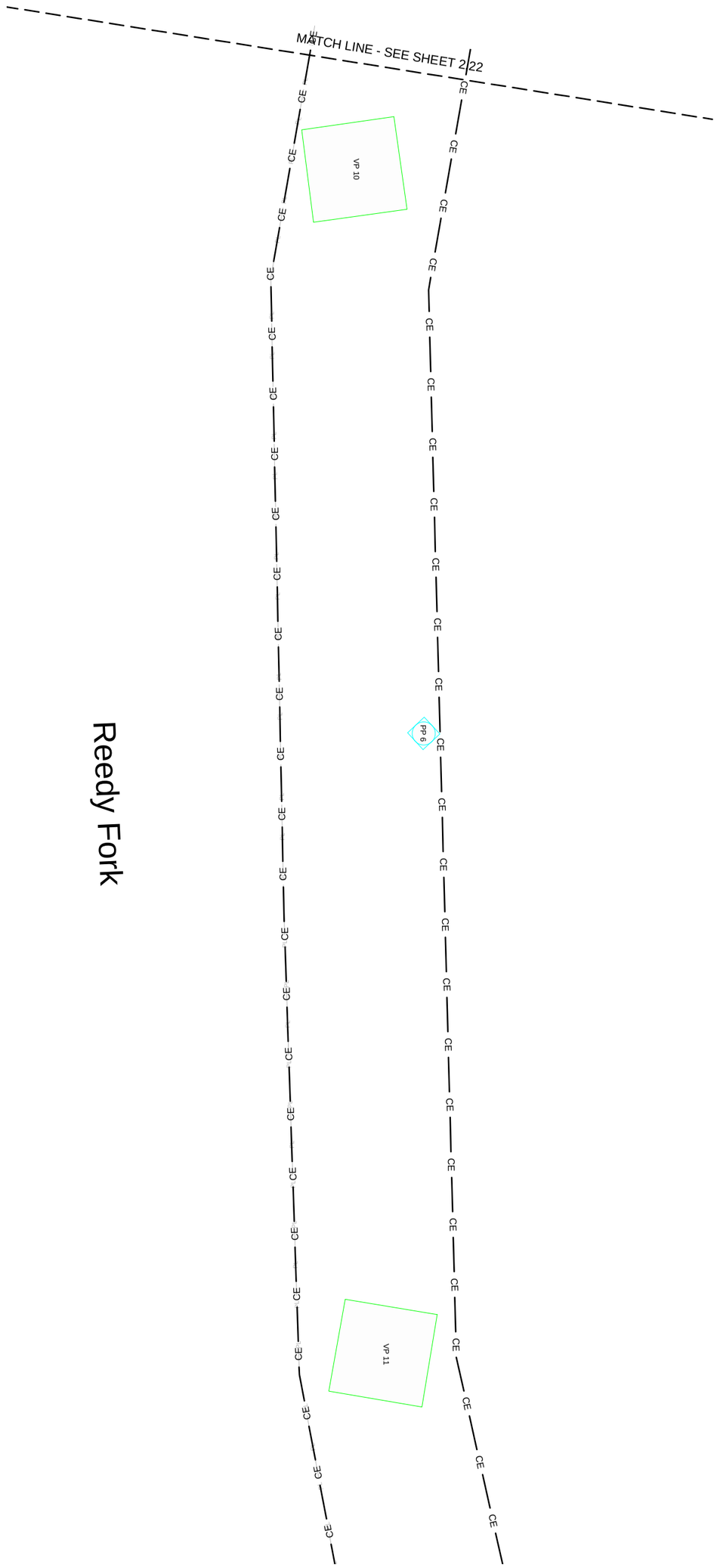

Baseline Drawing

Date:	02.16.2015
Job Number:	005-02136
Project Engineer:	NMM
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