APPENDIX D

As-Built Plan Sheets/Record Drawings

STATE	BAKER PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
NC	132700	1	15
	EEP ID No. 95729		

NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

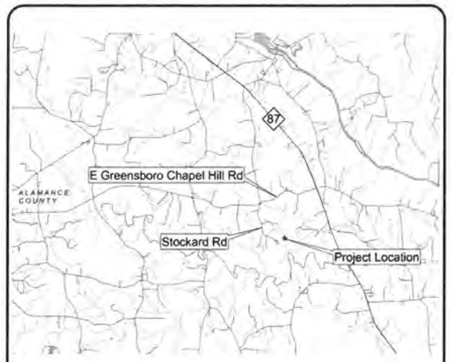
ALAMANCE COUNTY

LOCATION: APPROXIMATELY 3 MILES SOUTH OF THE TOWN OF SAXAPAHAW

TYPE OF WORK: AS – BUILT PLANS FOR STREAM RESTORATION AND ENHANCEMENT

UT TO CANE CREEK

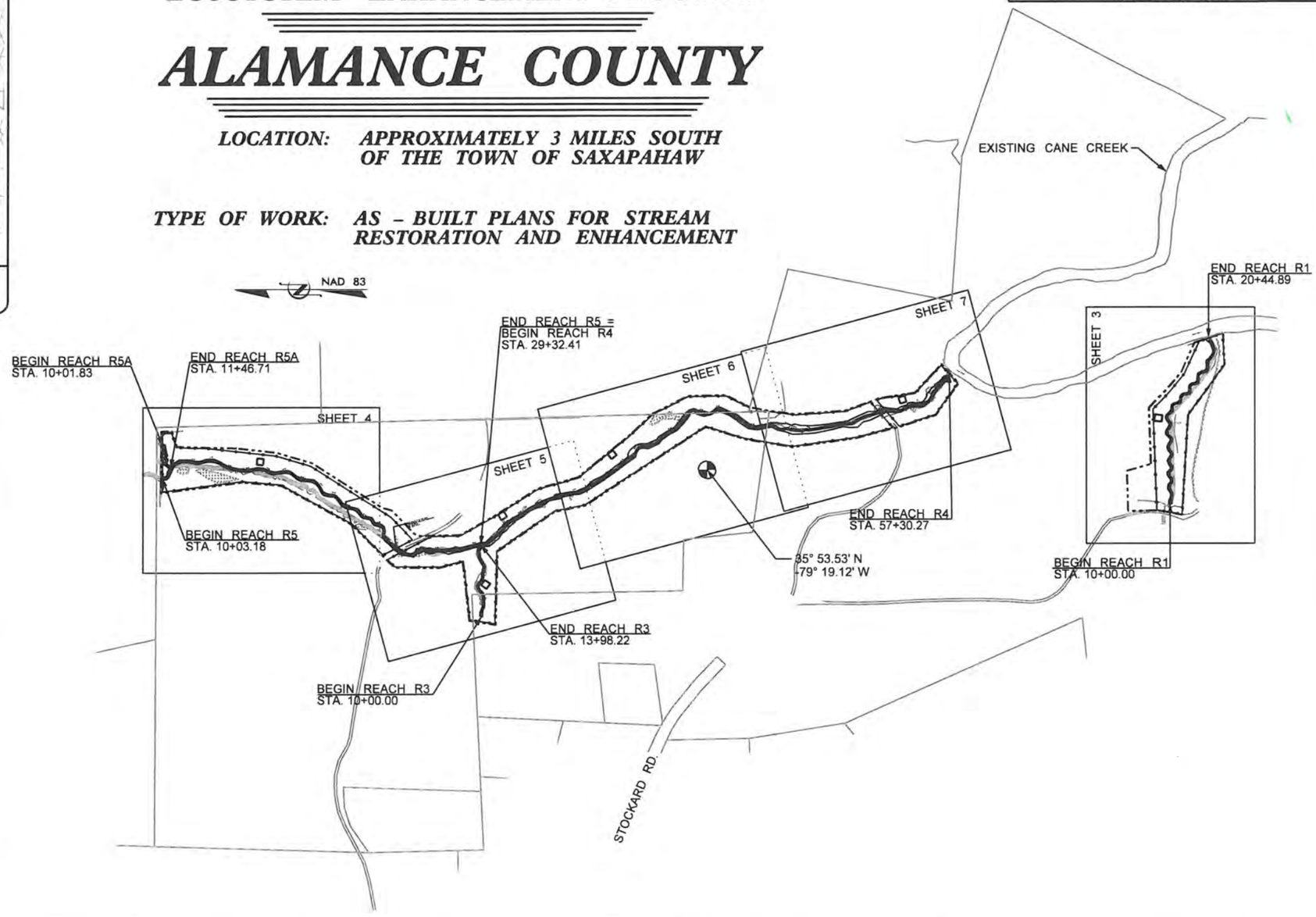
PROJECT: 132700



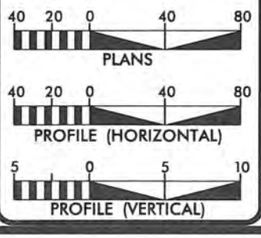
VICINITY MAP

INDEX OF SHEETS

DWR PROJECT #13-1177
USACE ACTION ID #2012-01907
APPROVAL DATE 02/19/14



GRAPHIC SCALES



PROJECT SUMMARY

AS-BUILT RESTORATION LENGTH REACH R1	=	1,045 FEET
AS-BUILT RESTORATION LENGTH REACH R3	=	398 FEET
AS-BUILT RESTORATION LENGTH REACH R4	=	410 FEET
AS-BUILT ENHANCEMENT LENGTH REACH R4	=	2,353 FEET
AS-BUILT RESTORATION LENGTH REACH R5	=	1,461 FEET
AS-BUILT ENHANCEMENT LENGTH REACH R5	=	433 FEET
AS-BUILT ENHANCEMENT LENGTH REACH R5A	=	145 FEET

PREPARED FOR THE OFFICE OF:

Ecosystem Enhancement Program

NCDENR
ECOSYSTEM ENHANCEMENT PROGRAM
1652 MAIL SERVICE CENTER
RALEIGH, NC 27699-1652

NCEEP CONTACT: JEFF SCHAFFER
PROJECT MANAGER

PREPARED IN THE OFFICE OF:

Baker

Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License # F-1084

JUNE 2014
COMPLETION DATE:

WILLIAM SCOTT HUNT, III, PE
PROJECT ENGINEER

KAYNE VAN STELL
PROJECT MANAGER

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 22967 ENGINEER WILLIAM SCOTT HUNT, III

10.22.14

SIGNATURE: *P.E.*

2/26/03

STREAM CONVENTIONAL SYMBOLS
SUPERCEDES SHEET 1-B

- ROCK J-HOOK
- ROOT WAD
- LOG J-HOOK
- LOG VANE
- LOG WEIR
- CONSTRUCTED RIFFLE
- BOULDER CLUSTER
- LOG STEP POOL
- PERMANENT STREAM CROSSING
- VEGETATION PLOT
- CONTROL POINT
- CREST GAUGE
- FIELD FENCE
- CONSERVATION EASEMENT
- 435 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- LIMITS OF DISTURBANCE
- PROPERTY LINE
- DITCH PLUG
- CHANNEL FILL
- BRUSH MATTRESS
- GEOLIFT WITH BRUSH TOE

GENERAL NOTES

1. CONSTRUCTION BEGAN IN MARCH 2014 AND WAS COMPLETED IN JUNE 2014.
2. VEGETATION PLANTING BEGAN IN APRIL 2014 AND WAS COMPLETED IN JUNE 2014.

PROJECT REFERENCE NO.	SHEET NO.
132700	1-A

PROJECT ENGINEER

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EEP ID No. 95729

STANDARD SPECIFICATIONS

NORTH CAROLINA
EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL
MARCH 2009 (REV 2013)

6.05 TREE PROTECTION
6.06 TEMPORARY GRAVEL CONSTRUCTION ENTRANCE
6.24 RIPARIAN AREA SEEDING
6.60 TEMPORARY SEDIMENT TRAP
6.62 TEMPORARY SILT FENCE
6.63 TEMPORARY ROCK DAM
6.70 TEMPORARY STREAM CROSSING

NORTH CAROLINA PROFESSIONAL SEAL 22967 ENGINEER WILLIAM SCOTT HUNT, III
10.22.14

VEGETATION SELECTION

The following table lists the bare root vegetation selection for the project site. Total planting area is approximately 14 acres. Species were planted at density of 680 stems per acre and a minimum of 50 feet from the stream banks to the revegetation limits. Exact placement of species were determined prior to site planting and based on apparent wetness of planting locations and per the vegetation specialist. Refer to the Revegetation Plan Sheets & Construction Specifications for vegetation planting locations and riparian buffer requirements.

Riparian Buffer - Overstory Trees (8'x8' spacing - 680 stems/acre)				
Scientific Name	**Common Name**	**% Planted By Species**	**Wetland Tolerance**	**Approx. Number of Stems**
Fraxinus pennsylvanica	Green Ash	9%	FACW	860
Betula nigra	River Birch	9%	FACW	860
Liriodendron tulipifera	Tulip Poplar	6%	FAC	570
Quercus michauxii	Swamp Chestnut Oak	6%	FACW-	570
Carpinus caroliniana	Ironwood	6%	FAC	570
Platanus occidentalis	American Sycamore	9%	FACW-	860
Quercus alba	White Oak	9%	FACU	860
Quercus nigra	White Oak	6%	FACU	570
	Sub-total	60%		**5,720**
Riparian Buffer - Understory (8'x8' spacing - 680 stems/acre)				
Scientific Name	**Common Name**			
Diospyros virginiana	Persimmon	6%	FAC	570
Lindera benzoin	Spicebush	8%	FACW	760
Hamamelis virginiana	Witch hazel	6%	FAC-	570
Viburnum dentatum	Arrowwood Viburnum	6%	FAC	570
Itea virginica	Virginia sweetspire	8%	FACW+	760
Asimina triloba	Paw paw	6%	FAC	570
	Sub-total	40%		**3,800**
	Total Bare-roots			**9,520**

Permanent herbaceous seed mixtures for the project site were planted throughout the floodplain and riparian buffer areas. Permanent seed mixtures were applied with temporary seed, as defined in the construction specifications.

Scientific Name	**Common Name**	**% Planted By Species**	**Total lbs per Acre**	**Wetland Tolerance**
Andropogon gerardii	Big blue stem	10%	1.50	FAC
Dichanthelium clandestinum	Deer Tongue	15%	1.50	FACW
Carex crinata	Fringed sedge	10%	2.25	FACW+
Chasmanthium latifolium	River oats	5%	1.50	FACU
Elymus virginicus	Virginia wild rye	15%	1.50	FAC
Juncus effusus	Soft rush	5%	2.25	FACW+
Panicum virgatum	Switchgrass	10%	1.50	FAC+
Polygonum pensylvanicum	Pennsylvania Smartweed	5%	0.75	FACW
Schizachyrium scoparium	Little blue stem	10%	0.75	FACU
Tripsacum dactyloides	Eastern gamagrass	5%	0.75	FAC+
Sorghastrum nutans	Indiangrass	10%	0.75	FACU
	Total	**100%**	**15.0**	

The following table lists temporary seed mix for the project site. All disturbed areas were stabilized using mulch and temporary seed as defined in the construction specifications.

Planting Dates	**Species Name**	**Rate (lbs./acre)**
September to March	Rye Grain (Cool Season)	130
April to August	Browntop Millet (Warm Season)	40

Live staking was applied to all restored streambanks following the details in this plan set and according to the construction specifications.

Scientific Name	**Common Name**	**% Planted By Species**	**Wetland Tolerance**
Cornus amomum	Silky Dogwood	10%	FACW+
Salix nigra	Black Willow	10%	OBL
Salix sericea	Silky Willow	40%	OBL
Sambucus canadensis	Elderberry	40%	FACW-

*S.U.E = SUBSURFACE UTILITY ENGINEER

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CONVENTIONAL SYMBOLS

NORTH CAROLINA PROFESSIONAL SEAL 22967 ENGINEER WILLIAM SCOTT HUNT III 10.22.14

BOUNDARIES AND PROPERTY:

- State Line
- County Line
- Township Line
- City Line
- Reservation Line
- Property Line
- Existing Iron Pin
- Property Corner
- Property Monument
- Parcel/Sequence Number
- Existing Fence Line
- Proposed Woven Wire Fence
- Proposed Chain Link Fence
- Proposed Barbed Wire Fence
- Existing Wetland Boundary
- Proposed Wetland Boundary
- Existing Endangered Animal Boundary
- Existing Endangered Plant Boundary

BUILDINGS AND OTHER CULTURE:

- Gas Pump Vent or U/G Tank Cap
- Sign
- Well
- Small Mine
- Foundation
- Area Outline
- Cemetery
- Building
- School
- Church
- Dam

HYDROLOGY:

- Stream or Body of Water
- Hydro, Pool or Reservoir
- Jurisdictional Stream — JS —
- Buffer Zone 1 — BZ 1 —
- Buffer Zone 2 — BZ 2 —
- Flow Arrow
- Disappearing Stream
- Spring
- Wetland
- Proposed Lateral, Tail, Head Ditch
- False Sump

RAILROADS:

- Standard Gauge — CSX TRANSPORTATION
- RR Signal Milepost — MILEPOST 35
- Switch — SWITCH
- RR Abandoned
- RR Dismantled

RIGHT OF WAY:

- Baseline Control Point
- Existing Right of Way Marker
- Existing Right of Way Line
- Proposed Right of Way Line
- Proposed Right of Way Line with Iron Pin and Cap Marker
- Proposed Right of Way Line with Concrete or Granite Marker
- Existing Control of Access
- Proposed Control of Access
- Existing Easement Line — E —
- Proposed Temporary Construction Easement — E —
- Proposed Temporary Drainage Easement — TDE —
- Proposed Permanent Drainage Easement — PDE —
- Proposed Permanent Utility Easement — PUE —
- Proposed Temporary Utility Easement — TUE —
- Proposed Permanent Easement with Iron Pin and Cap Marker

ROADS AND RELATED FEATURES:

- Existing Edge of Pavement
- Existing Curb
- Proposed Slope Stakes Cut — C —
- Proposed Slope Stakes Fill — F —
- Proposed Wheel Chair Ramp — WCR
- Existing Metal Guardrail
- Proposed Guardrail
- Existing Cable Guiderail
- Proposed Cable Guiderail
- Equality Symbol
- Pavement Removal

VEGETATION:

- Single Tree
- Single Shrub
- Hedge
- Woods Line
- Orchard
- Vineyard — Vineyard

EXISTING STRUCTURES:

MAJOR:

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

MINOR:

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

UTILITIES:

POWER:

- Existing Power Pole
- Proposed Power Pole
- Existing Joint Use Pole
- Proposed Joint Use Pole
- Power Manhole
- Power Line Tower
- Power Transformer
- U/G Power Cable Hand Hole
- H-Frame Pole
- Recorded U/G Power Line — P —
- Designated U/G Power Line (S.U.E.*) — P —

TELEPHONE:

- Existing Telephone Pole
- Proposed Telephone Pole
- Telephone Manhole
- Telephone Booth
- Telephone Pedestal
- Telephone Cell Tower
- U/G Telephone Cable Hand Hole
- Recorded U/G Telephone Cable — T —
- Designated U/G Telephone Cable (S.U.E.*) — T —
- Recorded U/G Telephone Conduit — TC —
- Designated U/G Telephone Conduit (S.U.E.*) — TC —
- Recorded U/G Fiber Optics Cable — T FO —
- Designated U/G Fiber Optics Cable (S.U.E.*) — T FO —

WATER:

- Water Manhole
- Water Meter
- Water Valve
- Water Hydrant
- Recorded U/G Water Line — W —
- Designated U/G Water Line (S.U.E.*) — W —
- Above Ground Water Line — A/G Water

TV:

- TV Satellite Dish
- TV Pedestal
- TV Tower
- U/G TV Cable Hand Hole
- Recorded U/G TV Cable — TV —
- Designated U/G TV Cable (S.U.E.*) — TV —
- Recorded U/G Fiber Optic Cable — TV FO —
- Designated U/G Fiber Optic Cable (S.U.E.*) — TV FO —

GAS:

- Gas Valve
- Gas Meter
- Recorded U/G Gas Line — G —
- Designated U/G Gas Line (S.U.E.*) — G —
- Above Ground Gas Line — A/G Gas

SANITARY SEWER:

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

MISCELLANEOUS:

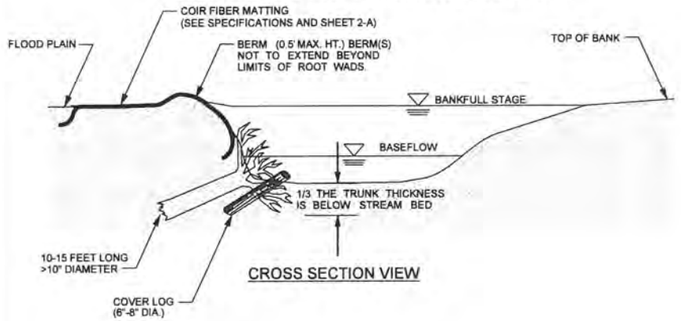
- Utility Pole
- Utility Pole with Base
- Utility Located Object
- Utility Traffic Signal Box
- Utility Unknown U/G Line — ?UTL —
- U/G Tank; Water, Gas, Oil
- A/G Tank; Water, Gas, Oil
- U/G Test Hole (S.U.E.*)
- Abandoned According to Utility Records — AATUR
- End of Information — E.O.I.

2/26/03
10/7/2014 R:\132700\Design\Plans\As-Built\132700_AB_PSH_1B.dgn mcorey UTCANECR 95729 AB BAKER FINAL

2/26/03

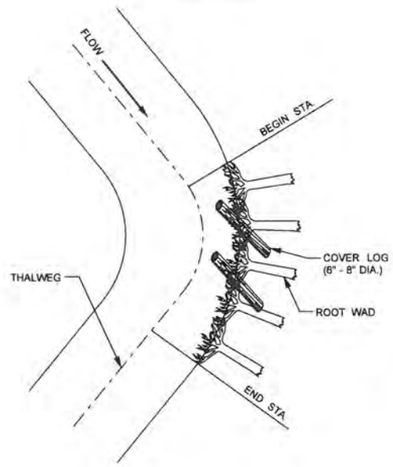
ROOT WADS

ROOT WADS WITHOUT TRANSPLANTS
USE IF TRANSPLANTS ARE NOT AVAILABLE ON-SITE



CROSS SECTION VIEW

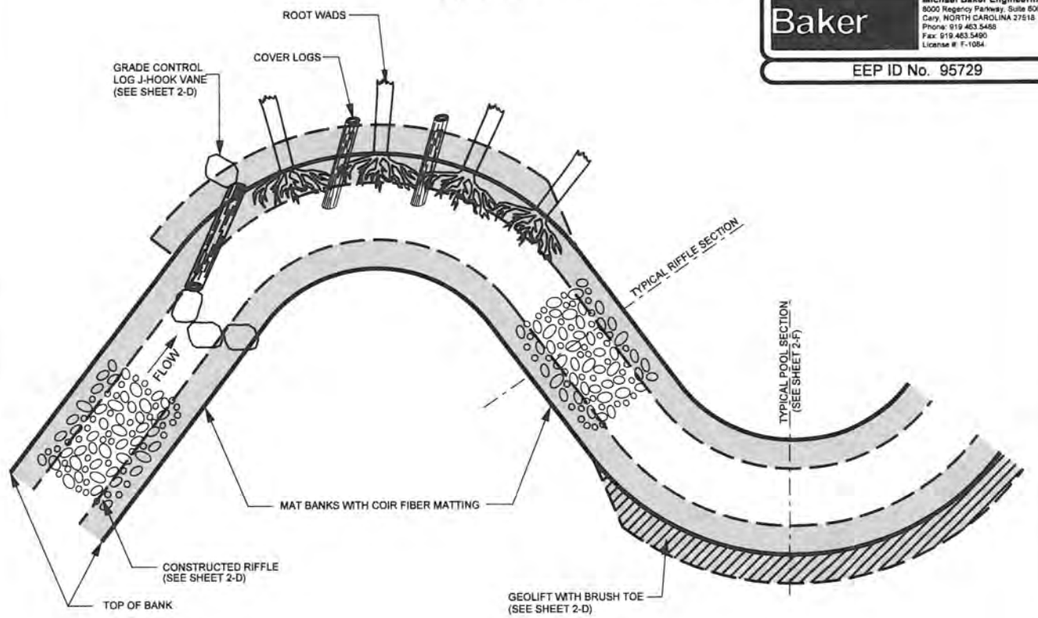
PLAN VIEW



NOTES:
1. INSTALLATION USING THE TRENCHING METHOD REQUIRES THAT A TRENCH BE EXCAVATED FOR THE LOG PORTION OF THE ROOT WAD. ONE-THIRD OF THE ROOT WAD SHOULD REMAIN BELOW NORMAL BASE FLOW CONDITIONS OR CHANNEL BOTTOM.
2. THE NUMBER OF ROOTWADS ESTIMATED MAY VARY DEPENDING ON THE ROOTMASS SIZE. IN GENERAL, ROOTWADS SHOULD PROTECT THE OUTER MEANDER BEND AS SHOWN. SEE STRUCTURE TABLE FOR APPROXIMATE STATION AND LOCATION.
3. INSTALL COVER LOGS BETWEEN ROOTWADS TO PROVIDE HABITAT ONLY WHEN AVAILABLE FROM ON-SITE HARVESTING.

TYPICAL STRUCTURE PLACEMENT

STRUCTURE NOTES:
1. GENERALLY CONSTRUCTED RIFFLES, ROOT WADS, LOG VANES AND COIR FIBER MATTING WILL BE INSTALLED IN THE LOCATION AND SEQUENCE AS SHOWN.
2. ANY CHANGES TO NUMBER OR LOCATION OF STRUCTURES DURING CONSTRUCTION MUST BE APPROVED BY THE DESIGN ENGINEER.
3. COIR FIBER MATTING TO BE INSTALLED ON ALL RESTORED STREAMBANKS, FLOODPLAIN BENCHING, AND TERRACE SLOPES AS DESCRIBED IN THE TECHNICAL SPECIFICATIONS.



BAKER PROJECT REFERENCE NO.	SHEET NO.
132700	2

PROJECT ENGINEER

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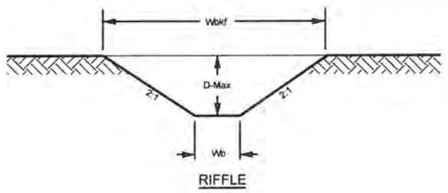
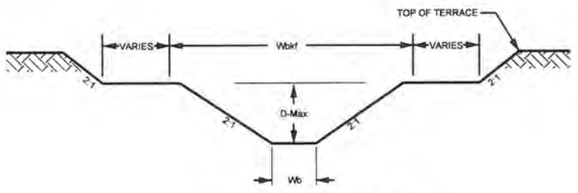
EEP ID No. 95729

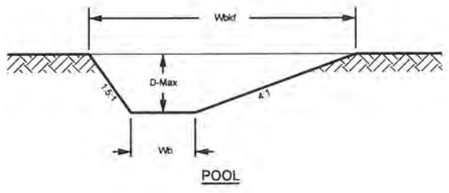
TYPICAL RIFFLE, POOL, AND BANKFULL BENCH CROSS-SECTIONS



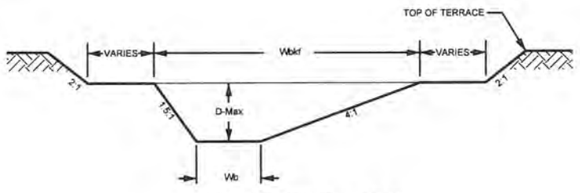
RIFFLE



RIFFLE WITH BANKFULL BENCH

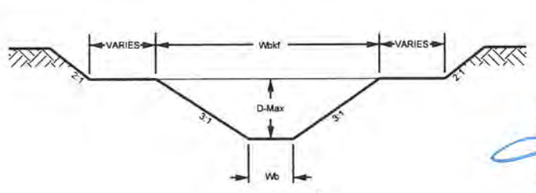


POOL



POOL WITH BANKFULL BENCH

R1		R3		R4		R5		R5A		
RIFFLE	POOL	RIFFLE	POOL	RIFFLE	POOL	RIFFLE	POOL	RIFFLE	POOL	
6.9	9.0	7.2	9.2	14.0	17.0	10.8	13.0	3.2	5.0	WIDTH OF BANKFULL (Wbkf)
0.7	1.5	0.7	1.3	1.2	2.2	1.1	2.0	0.4	1.0	MAXIMUM DEPTH (D-Max)
13.0	11.1	13.0	12.3	14.0	12.6	13.0	12.1	12.0	10.0	WIDTH TO DEPTH RATIO (Wbkf / D)
3.7	7.3	4.0	6.9	14.0	22.9	9.0	14.0	0.9	2.5	BANKFULL AREA (Abkf)
4.3	0.8	4.5	1.4	9.2	3.8	5.2	1.0	1.3	0.1	BOTTOM WIDTH (Wb)



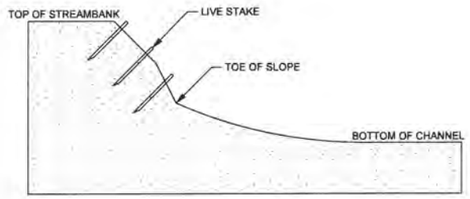
STEP - POOL

NOTES:
1. DURING CONSTRUCTION CORNERS OF DESIGN CHANNEL WILL BE ROUNDED AND A THALWEG WILL BE SHAPED PER DIRECTION OF ENGINEER.
2. POOLS SHOWN ABOVE ARE LEFT POOLS FOR MEANDER CHANNELS

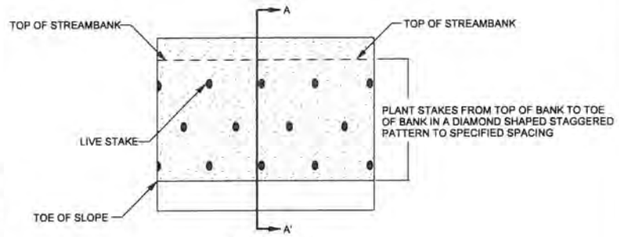
NORTH CAROLINA PROFESSIONAL SEAL 22967 ENGINEER WILLIAM SCOTT HUNT, III
10.22.14

2/26/03

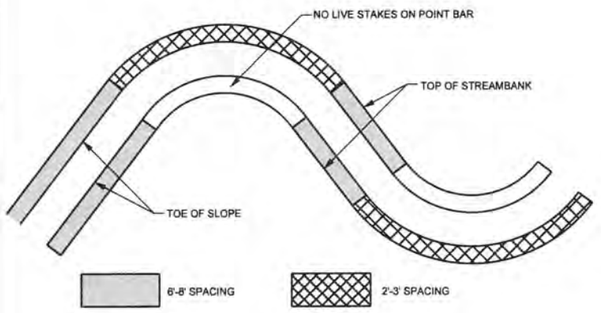
LIVE STAKING



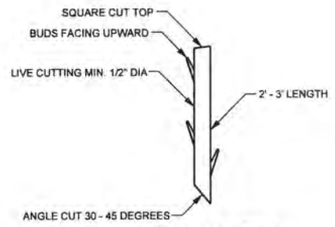
SECTION A - A'



PLAN VIEW



LIVE STAKE SPACING PLAN VIEW

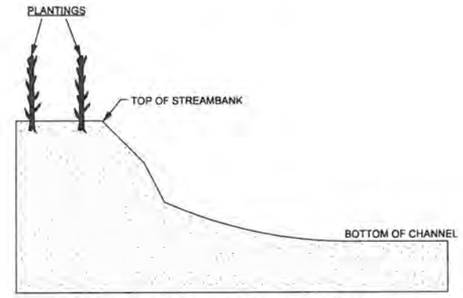


LIVE STAKE DETAIL

NOTES:

1. STAKES SHOULD BE CUT AND INSTALLED ON THE SAME DAY.
2. DO NOT INSTALL STAKES THAT HAVE BEEN SPLIT.
3. STAKES MUST BE INSTALLED WITH BUDS POINTING UPWARDS.
4. STAKES SHOULD BE INSTALLED PERPENDICULAR TO BANK.
5. STAKES SHOULD BE 1/2 TO 2 INCHES IN DIAMETER AND 2 TO 3 FT LONG.
6. STAKES SHOULD BE INSTALLED LEAVING 1/5 OF STAKE ABOVE GROUND.

PLANTING SPECIFICATIONS



CROSS SECTION VIEW OF BARE ROOT PLANTING

NOTES:

1. PLANT BARE ROOT SHRUBS AND TREES TO THE WIDTH OF THE BUFFER/PLANTING ZONE AS SHOWN ON THE PLANS.
2. ALLOW FOR 6-10 FEET BETWEEN PLANTINGS, DEPENDING ON SIZE.
3. LOOSEN COMPACTED SOIL.
4. PLANT IN HOLES MADE BY A MATTOCK, DIBBLE, PLANTING BAR, OR OTHER APPROVED MEANS.
5. PLANT IN HOLES DEEP AND WIDE ENOUGH TO ALLOW THE ROOTS TO SPREAD OUT AND DOWN WITHOUT J-ROOTING.
6. KEEP ROOTS MOIST WHILE DISTRIBUTING OR WAITING TO PLANT BY MEANS OF WET CANVAS, BURLAP, OR STRAW.
7. HEEL-IN PLANTS IN MOIST SOIL OR SAWDUST IF NOT PROMPTLY PLANTED UPON ARRIVAL TO PROJECT SITE.

BAKER PROJECT REFERENCE NO.	SHEET NO.
132700	2-A

PROJECT ENGINEER

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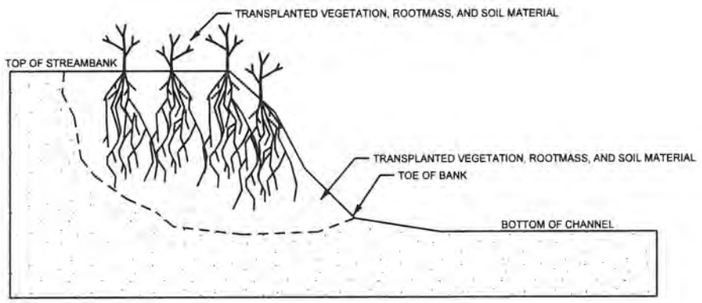
License #: F-1084

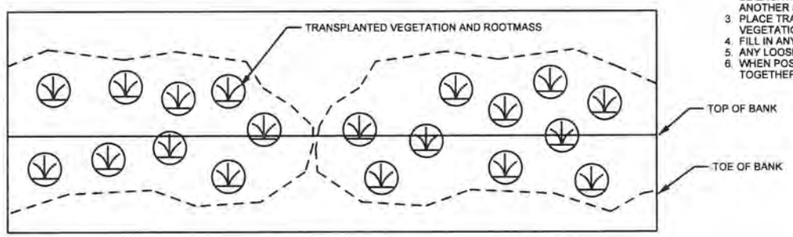
EEP ID No.: 95729

NORTH CAROLINA PROFESSIONAL SEAL 22967 ENGINEER WILLIAM SCOTT HUNT, III
10.22.14

TRANSPLANTED VEGETATION



CROSS SECTION VIEW

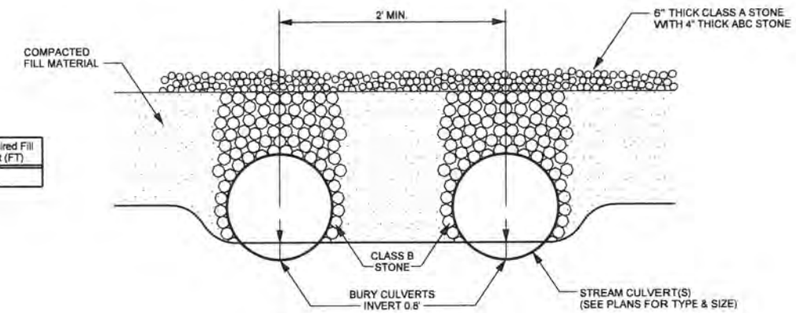


PLAN VIEW

NOTES:

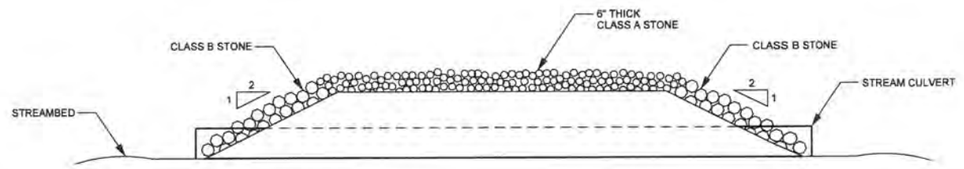
1. EXCAVATE A HOLE IN THE BANK TO BE STABILIZED THAT WILL ACCOMMODATE THE SIZE OF TRANSPLANT TO BE PLACED. BEGIN EXCAVATION AT THE TOE OF THE BANK.
2. EXCAVATE THE ENTIRE ROOT MASS AND AS MUCH ADDITIONAL SOIL MATERIAL AS POSSIBLE. IF ENTIRE ROOT MASS CAN NOT BE EXCAVATED AT ONCE, THE TRANSPLANT IS TOO LARGE AND ANOTHER SHOULD BE SELECTED.
3. PLACE TRANSPLANT IN THE BANK TO BE STABILIZED SO THAT VEGETATION IS ORIENTATED VERTICALLY.
4. FILL IN ANY HOLES AROUND THE TRANSPLANT AND COMPACT.
5. ANY LOOSE SOIL LEFT IN THE STREAM SHOULD BE REMOVED.
6. WHEN POSSIBLE, PLACE MULTIPLE TRANSPLANTS CLOSE TOGETHER SUCH THAT THEY TOUCH.

PERMANENT ROAD CULVERT CROSSING



Culvert Type	Depth of Required Fill Over Culvert (FT)
STREAM	2.0

PROFILE VIEW ALONG ROAD



CROSS SECTION

NOTES:

1. APPLY SUFFICIENT FILL OVER CULVERTS TO PREVENT CULVERT COLLAPSE.
2. STABILIZE FILL AROUND CULVERTS WITH CLASS B STONE. STABILIZE REMAINING ROADSIDE SLOPES WITH EROSION MATTING ACCORDING TO SPECIFICATIONS.
3. CULVERT SPACING A MINIMUM OF 2' APART.

BAKER PROJECT REFERENCE NO.	SHEET NO.
132700	2-B

PROJECT ENGINEER

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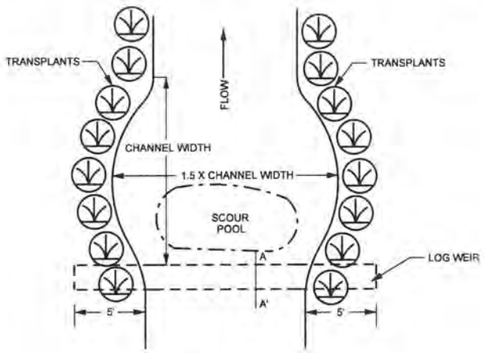
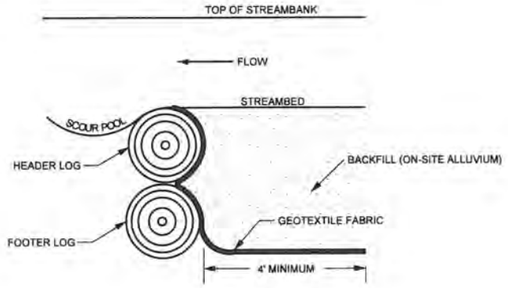
License # F-1084

EEP ID No. 95729

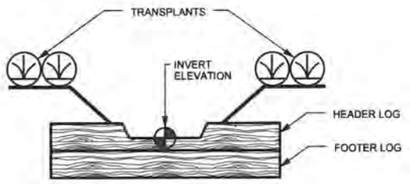
LOG WEIR



PLAN VIEW



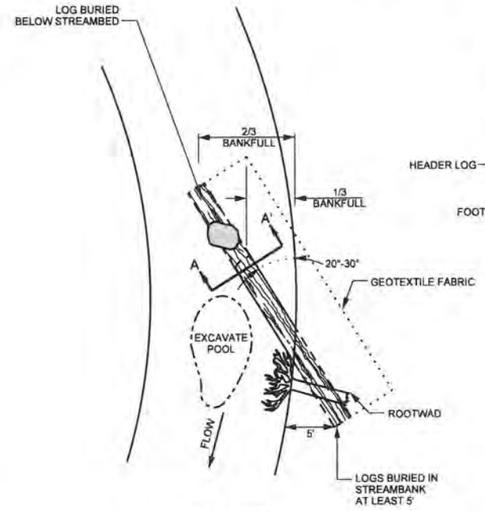
SECTION A-A'



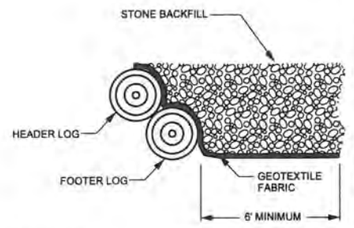
CROSS SECTION VIEW

NOTES:
1. LOGS SHOULD BE AT LEAST 12 INCHES IN DIAMETER, RELATIVELY STRAIGHT, HARDWOOD, AND RECENTLY HARVESTED.
2. LOGS >24 INCHES IN DIAMETER MAY BE USED ALONE WITHOUT AN ADDITIONAL LOG. GEOTEXTILE FABRIC SHOULD STILL BE USED TO SEAL AROUND LOG.
3. PLACE FOOTER LOGS FIRST AND THEN HEADER (TOP) LOG. SET HEADER LOG APPROXIMATLEY 3 INCHES ABOVE THE INVERT ELEVATION.
4. CUT A NOTCH IN THE HEADER LOG APPROXIMATLEY 50 PERCENT OF THE CHANNEL BOTTOM WIDTH AND EXTENDING DOWN TO THE INVERT ELEVATION.
5. USE GEOTEXTILE FABRIC TO SEAL GAPS BETWEEN LOGS.
6. PLACE TRANSPLANTS FROM TOE OF STREAMBANK TO TOP OF STREAMBANK.

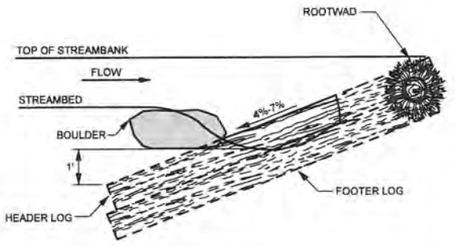
LOG VANE



PLAN VIEW



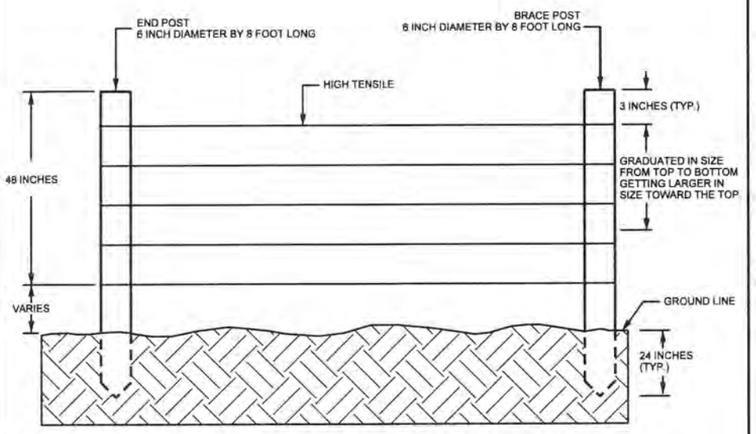
SECTION A - A'



PROFILE VIEW

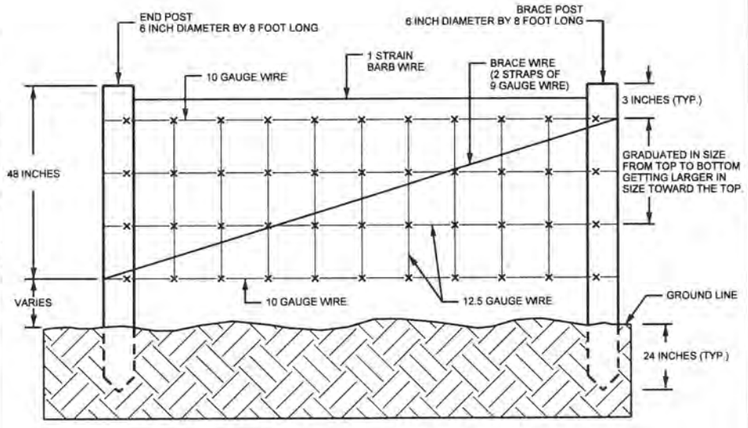
NOTES:
1. LOGS SHOULD BE AT LEAST 10" IN DIAMETER, RELATIVELY STRAIGHT, HARDWOOD, AND RECENTLY HARVESTED.
2. BOULDERS MUST BE OF SUFFICIENT SIZE TO ANCHOR LOGS.
3. SOIL SHOULD BE COMPACTED WELL AROUND BURIED PORTIONS OF LOGS.
4. ROOTWADS SHOULD BE PLACED BENEATH THE HEADER LOG AND PLACED SO THAT IT LOCKS THE HEADER LOG INTO THE BANK. SEE ROOTWAD DETAIL.
5. BOULDER SHOULD BE PLACED ON TOP OF HEADER LOG FOR ANCHORING.
6. GEOTEXTILE FABRIC SHOULD BE NAILED TO THE LOG BELOW THE BACKFILL.
7. TRANSPLANTS CAN BE USED INSTEAD OF ROOTWADS, PER DIRECTION OF ENGINEER.

HIGH TENSILE FIELD FENCE



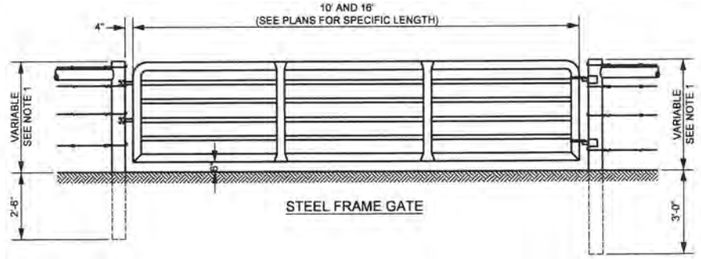
NOTE:
1. END POSTS SHALL BE INSTALLED AT A SPACING OF 10-15 FEET.

WOVEN FIELD FENCE



NOTE:
1. END POSTS SHALL BE INSTALLED AT A SPACING OF 10-15 FEET.

STEEL GATES



STEEL FRAME GATE

NOTES:
1. POST HEIGHT DIMENSION SHALL BE THE SAME AS REQUIRED FOR THE ADJACENT FENCE.
2. CONSTRUCT AN END OR STRESS PANEL AS REQUIRED IN THE SPECIFICATION, ON EACH SIDE OF GATE.
3. HINGES AND LOCKS SHALL BE INSTALLED AS SPECIFIED BY GATE MANUFACTURER.

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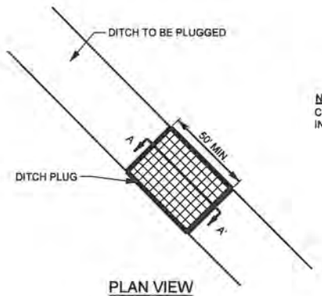
10.22.14

2/26/03

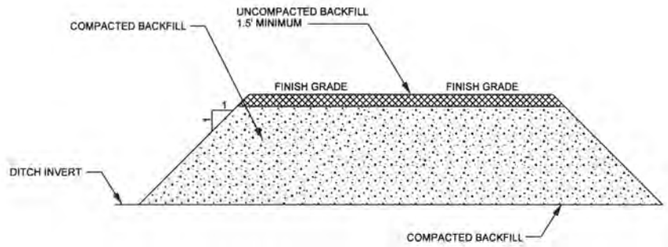
2/26/03

DITCH PLUG



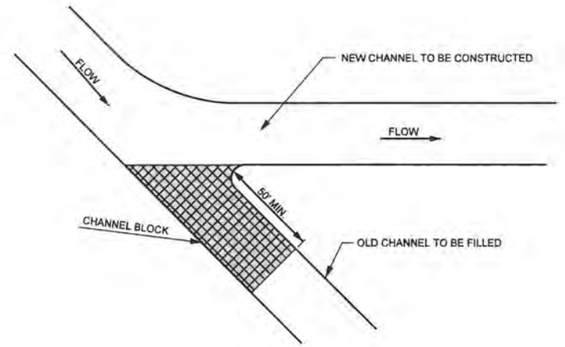
NOTE:
COMPACT BACKFILL USING ON-SITE HEAVY EQUIPMENT IN 10 INCH LIFTS.

PLAN VIEW

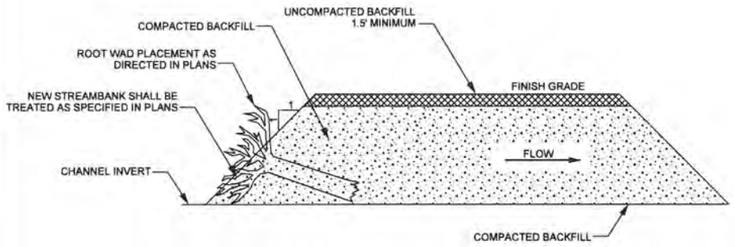


SECTION A - A'

CHANNEL BLOCK



PLAN VIEW



PROFILE VIEW

BAKER PROJECT REFERENCE NO.	SHEET NO.
132700	2-C

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EEP ID No. 95729

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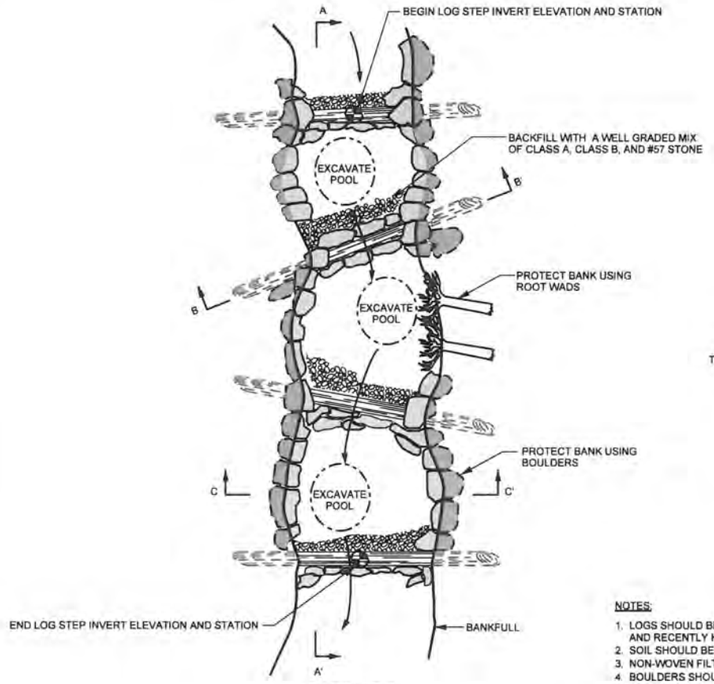
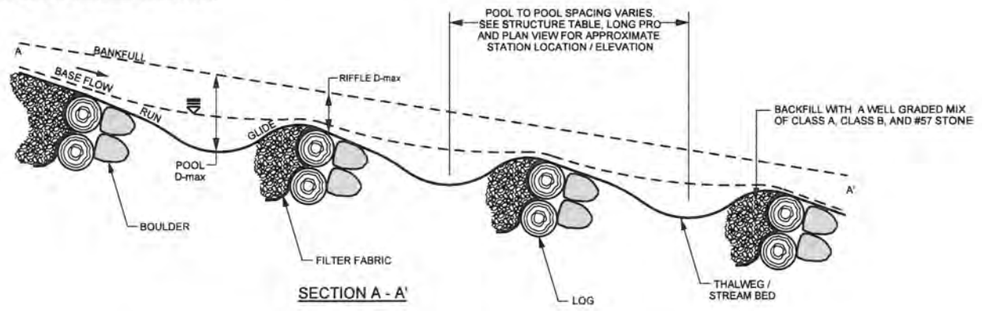
10.22.14

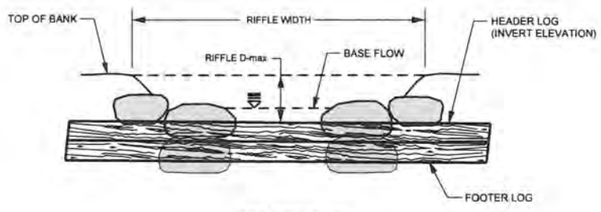
LOG AND ROCK STEP-POOL



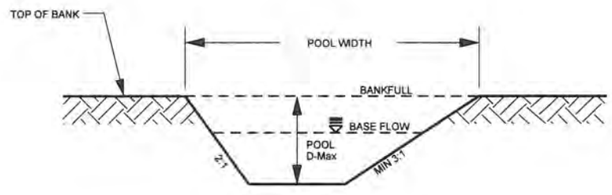
PLAN VIEW



SECTION A - A'



SECTION B - B'



SECTION C - C'

NOTES:

1. LOGS SHOULD BE AT LEAST 10" IN DIAMETER, RELATIVELY STRAIGHT, HARDWOOD, AND RECENTLY HARVESTED AND EXTENDING INTO THE BANK 5' ON EACH SIDE.
2. SOIL SHOULD BE COMPACTED WELL AROUND BURIED PORTIONS OF LOG.
3. NON-WOVEN FILTER FABRIC SHOULD BE NAILED/STAPLED TO THE LOG BELOW THE BACKFILL.
4. BOULDERS SHOULD BE 3' X 2' X 2' AND PLACED ON TOP OF HEADER LOG FOR ANCHORING.
5. LOGS SHOULD BE ANGLED 60° - 70° FROM THE STREAM BANK AND CROSS SLOPES SHOULD NOT EXCEED 2%.
6. STEP HEIGHTS/DROPS SHALL NOT EXCEED 0.4 FT AND POOL DEPTHS NOT TO EXCEED 1.8 FT.
7. THE NUMBER LOG STEPS MAY VARY BETWEEN BEGIN AND END STATIONING DEPENDING ON LOG DIAMETER SIZE. SEE LONGITUDINAL PROFILE AND STRUCTURE TABLE FOR STATION AND ELEVATION.

10/17/2014
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BAKER PROJECT REFERENCE NO.	SHEET NO.
132700	2-D

PROJECT ENGINEER

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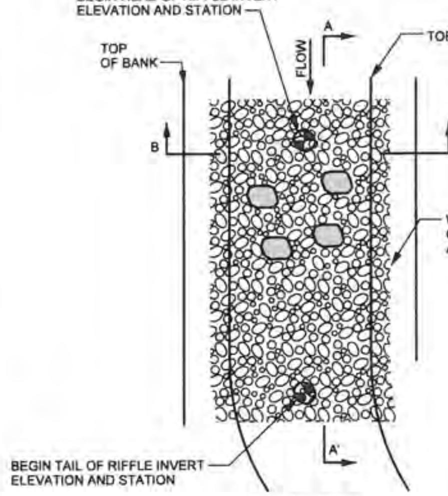
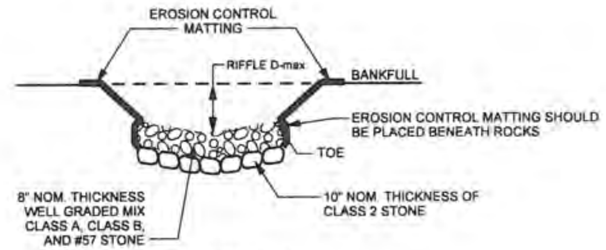
EEP ID No. 95729

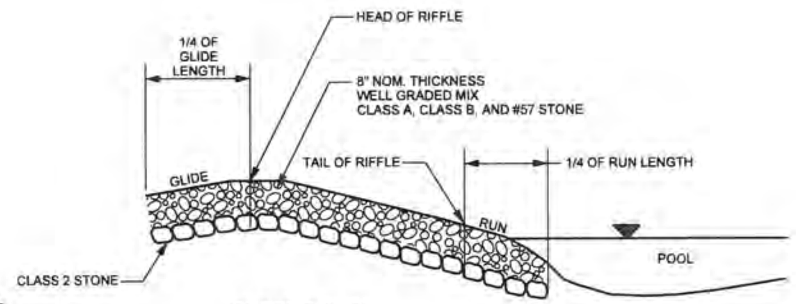
CONSTRUCTED RIFFLE



PLAN VIEW



SECTION B - B'



PROFILE A - A'

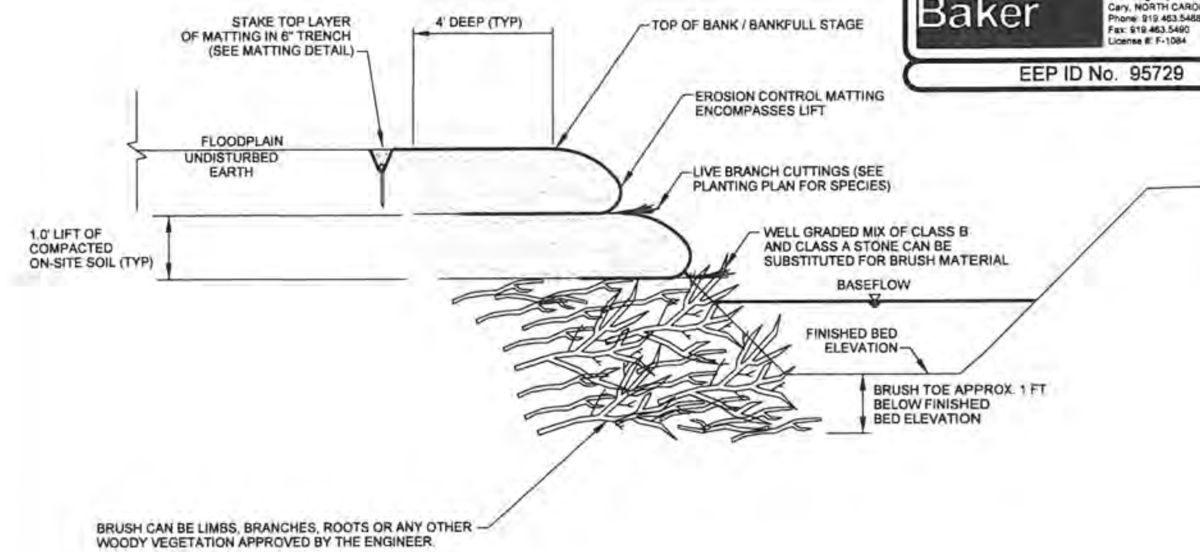
NOTES:

1. UNDERCUT CHANNEL BED ELEVATION 18 INCHES TO ALLOW FOR LAYERS OF STONE.
2. INSTALL EROSION CONTROL MATTING ALONG COMPLETED BANKS SUCH THAT THE EROSION CONTROL MATTING AT THE TOE OF THE BANK EXTENDS DOWN TO THE UNDERCUT ELEVATION.
3. INSTALL SUB LAYER OF CLASS 2 STONE.
4. INSTALL A WELL GRADED MIX OF SPECIFIED STONE, COMPACTED TO GRADE.
5. FINAL CHANNEL BED SHAPE SHOULD BE ROUNDED, SMOOTH, AND CONCAVE, WITH THE ELEVATION OF THE BED 0.2 FT DEEPER IN THE CENTER THAN AT THE EDGES.
6. RIFFLE LENGTHS WILL VARY. SEE LONGITUDINAL PROFILE AND STRUCTURE TABLE FOR BEGINNING AND ENDING STATIONS AND ELEVATIONS.

GEOLIFT WITH BRUSH TOE

NOTES:

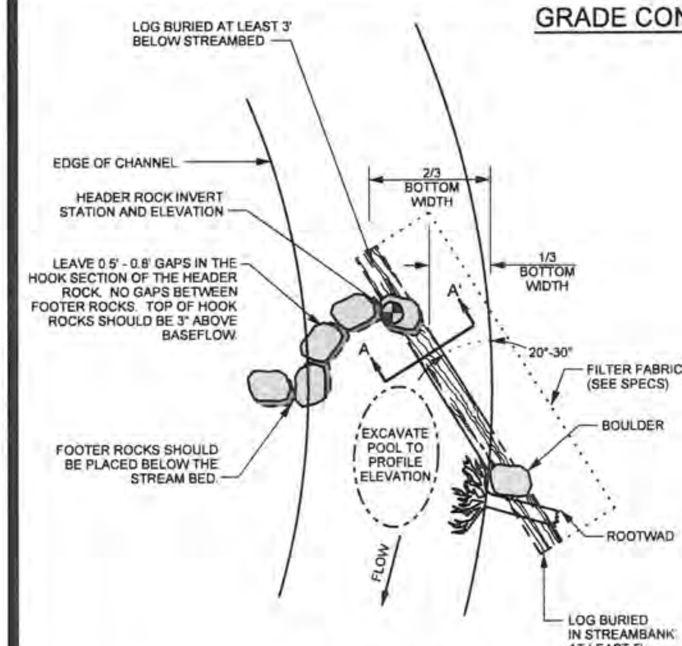
1. LIVE BRANCH CUTTINGS SHALL BE THE SAME SPECIES AS THE LIVE STAKES AND SHALL BE INSTALLED DURING VEGETATION DORMANCY.
2. LIVE BRANCH CUTTINGS SHALL BE INSTALLED AT A DENSITY OF 20-30 CUTTINGS PER LINEAR FOOT AND A MAXIMUM DIAMETER OF 2.5 INCHES.
3. NUMBER OF SOIL LIFTS MAY VARY, IN GENERAL LIFTS SHALL EXTEND TO THE TOP OF BANK OR BANKFULL STAGE.
4. GEOLIFTS TO BE INSTALLED IN CHANNEL SECTIONS ALONG SIDE SLOPES STEEPER THAN 2:1 AND/OR ADJACENT TO HILL SLOPES.



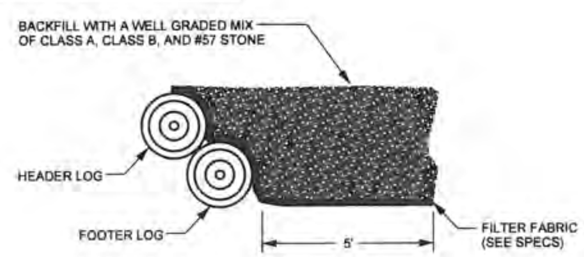
NOTES:

1. WHEN GEOLIFTS ARE BUILT ABOVE ROOTWAD CLUSTER, USE LARGE STONE BACKFILL BEHIND ROOT MASS TO BUILT FOUNDATION

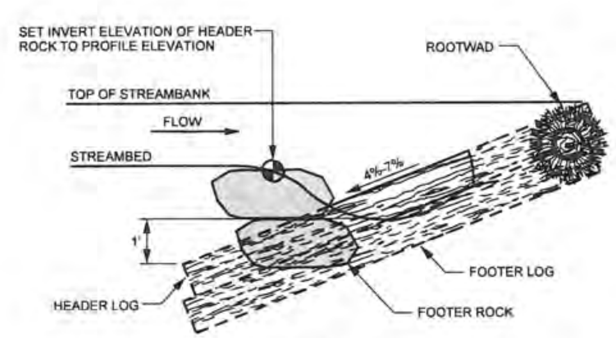
GRADE CONTROL LOG J-HOOK VANE



PLAN VIEW



SECTION A - A'



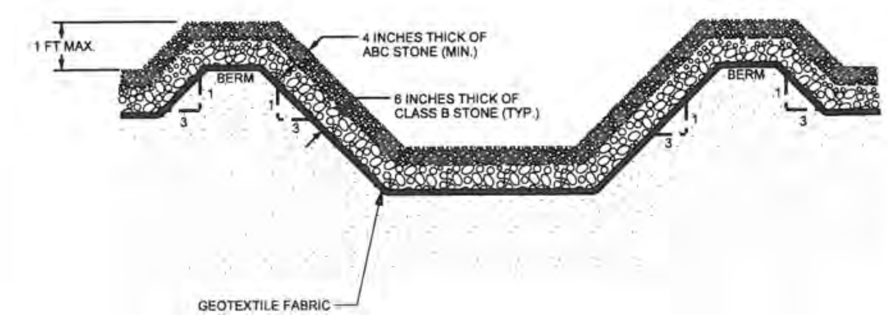
PROFILE VIEW

NOTES:

1. LOGS SHOULD BE AT LEAST 10" IN DIAMETER, RELATIVELY STRAIGHT, HARDWOOD, AND RECENTLY HARVESTED.
2. BOULDERS MUST BE 3' x 2' x 2'.
3. SOIL SHOULD BE COMPACTED WELL AROUND BURIED PORTIONS OF LOG.
4. ROOTWADS SHOULD BE PLACED BENEATH THE HEADER LOG AND PLACED SO THAT IT SECURES THE HEADER LOG INTO THE BANK. SEE ROOTWAD DETAIL.
5. BOULDERS SHOULD BE PLACED ON TOP OF HEADER LOG FOR ACHORING.
6. HEADER BOULDERS TO BE PLACED 0.5 TO 0.8 FEET APART.
7. NON-WOVEN FILTER FABRIC SHOULD BE NAILED TO THE LOG BELOW THE BACKFILL.
8. FOOTERS SHALL BE INSTALLED SUCH THAT 1/4 TO 1/3 OF THE LENGTH IS DOWNSTREAM OF THE HEADER.

PERMANENT FORD STREAM CROSSING

NORTH CAROLINA PROFESSIONAL SEAL 22967 ENGINEER WILLIAM SCOTT HUNT, III 10.22.14



NOTES:

1. CONSTRUCT STREAM CROSSING WHEN FLOW IS LOW.
2. HAVE ALL NECESSARY MATERIALS AND EQUIPMENT ON-SITE BEFORE WORK BEGINS.
3. MINIMIZE CLEARING AND EXCAVATION OF STREAMBANKS. DO NOT EXCAVATE CHANNEL BOTTOM. COMPLETE ONE SIDE BEFORE STARTING ON THE OTHER SIDE.
4. INSTALL STREAM CROSSING AT RIGHT ANGLE TO THE FLOW.
5. GRADE SLOPES TO A 3:1 SLOPE. TRANSPLANT SOD FROM ORIGINAL STREAMBANK ONTO SIDE SLOPES.
6. MAINTAIN CROSSING SO THAT RUNOFF IN THE CONSTRUCTION ROAD DOES NOT ENTER EXISTING CHANNEL.
7. A STABILIZED PAD OF STONE BACKFILL, 6 INCHES THICK, LINED WITH GEOTEXTILE FABRIC SHALL BE USED OVER THE BERM AND ACCESS SLOPES.
8. WIDTH OF THE CROSSING SHALL BE SUFFICIENT TO ACCOMMODATE THE LARGEST VEHICLE CROSSING THE CHANNEL.
9. CONTRACTOR SHALL DETERMINE AN APPROPRIATE RAMP ANGLE ACCORDING TO EQUIPMENT UTILIZED.

2/25/03
10/7/2014
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mcorey
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2/26/03

BAKER PROJECT REFERENCE NO.	SHEET NO.
132700	3

PROJECT ENGINEER

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NORTH CAROLINA PROFESSIONAL SEAL 22967 ENGINEER WILLIAM SCOTT HUNT, III

NORTH CAROLINA PROFESSIONAL SEAL L-5034 LAND SURVEYOR MARSHALL G. WIGHT

NAD 83

N/F
ELWOOD PAUL & SHELBY McBANE
DB 306, PG 221
PIN 9707574849

EXISTING FARM PATH

FARM PATH

BCP 1
X = 1905466.21
Y = 777600.08
Z = 448.34

BCP 2
X = 1905925.77
Y = 777531.48
Z = 437.37

VEG PLOT 5

8" PVC PIPE
INV. 443.81

VERNAL POOL

VERNAL POOL

X-10

X-11

X-12

AS-BUILT THALWEG (TYP)

PRE-CONSTRUCTION CHANNEL ALIGNMENT

AS-BUILT TOP OF BANK (TYP)

LIMITS OF DISTURBANCE

LIMITS OF DISTURBANCE

ADDED CONSTRUCTED RIFFLES USING ON-SITE ALLUVIUM

BACK OF BENCH

GRADING LIMITS

CANE CREEK

GRADING LIMITS

BACK OF BENCH

BEGIN REACH R1
STA. 10+00.00

END REACH R1
STA. 20+44.89

FILL EXISTING CHANNEL

DITCH PLUG / CHANNEL BLOCK

NOTES:
1. CONTOURS SHOWN ARE PRE-RESTORATION.
2. FENCE LOCATIONS SHOWN ARE APPROXIMATE AND INSTALLED OUTSIDE OF THE CONSERVATION EASEMENT BOUNDARY.

UT TO CANE CREEK AS-BUILT PLAN

40 20 0 40 80
SCALE (FT)

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2/26/03

BAKER PROJECT REFERENCE NO.	SHEET NO.
132700	4

PROJECT ENGINEER

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EEP ID No. 95729

NAD 83

BEGIN REACH R5A
STA. 10+01.83

TIED INTO EXISTING FENCE

SLOPE BANK
SEED, MAT, AND LIVE STAKE
ALONG LEFT BANK

BCP 9
X = 1905705.3060
Y = 782379.1797
Z = 502.16

VEG PLOT 1

AS-BUILT THALWEG (TYP)

BCP 10
X = 1905608.3540
Y = 782573.2609
Z = 499.80

END REACH R5A
STA. 11+46.71 =
REACH R5
STA. 10+80.09

LIMITS OF DISTURBANCE

RESHAPED THALWEG AND
ADDED CONSTRUCTED RIFFLES

AS-BUILT TOP OF BANK (TYP)

BEGIN REACH R5
STA. 10+03.18

TIED INTO EXISTING FENCE

X-1

X-2

X-3

VERNAL POOL

PRE-CONSTRUCTION
CHANNEL ALIGNMENT

CREST GAUGE 1

MATCH LINE STA. 22+00
SEE SHEET 5

NORTH CAROLINA PROFESSIONAL SEAL 22967 ENGINEER WILLIAM SCOTT HUNT
10.22.14

NORTH CAROLINA PROFESSIONAL SEAL L-5034 LAND SURVEYOR MARSHALL G. WIGHT
10-22-14

NOTES:
1. CONTOURS SHOWN ARE PRE-RESTORATION.
2. FENCE LOCATIONS SHOWN ARE APPROXIMATE AND INSTALLED OUTSIDE OF THE CONSERVATION EASEMENT BOUNDARY.

FILL EXISTING CHANNEL

DITCH PLUG / CHANNEL BLOCK

UT TO CANE CREEK AS-BUILT

40 20 0 40 80
SCALE (FT)

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mcarey
UTCANECR 95729 AB BAKER FINAL

2/26/03

BAKER PROJECT REFERENCE NO.	SHEET NO.
132700	5

PROJECT ENGINEER

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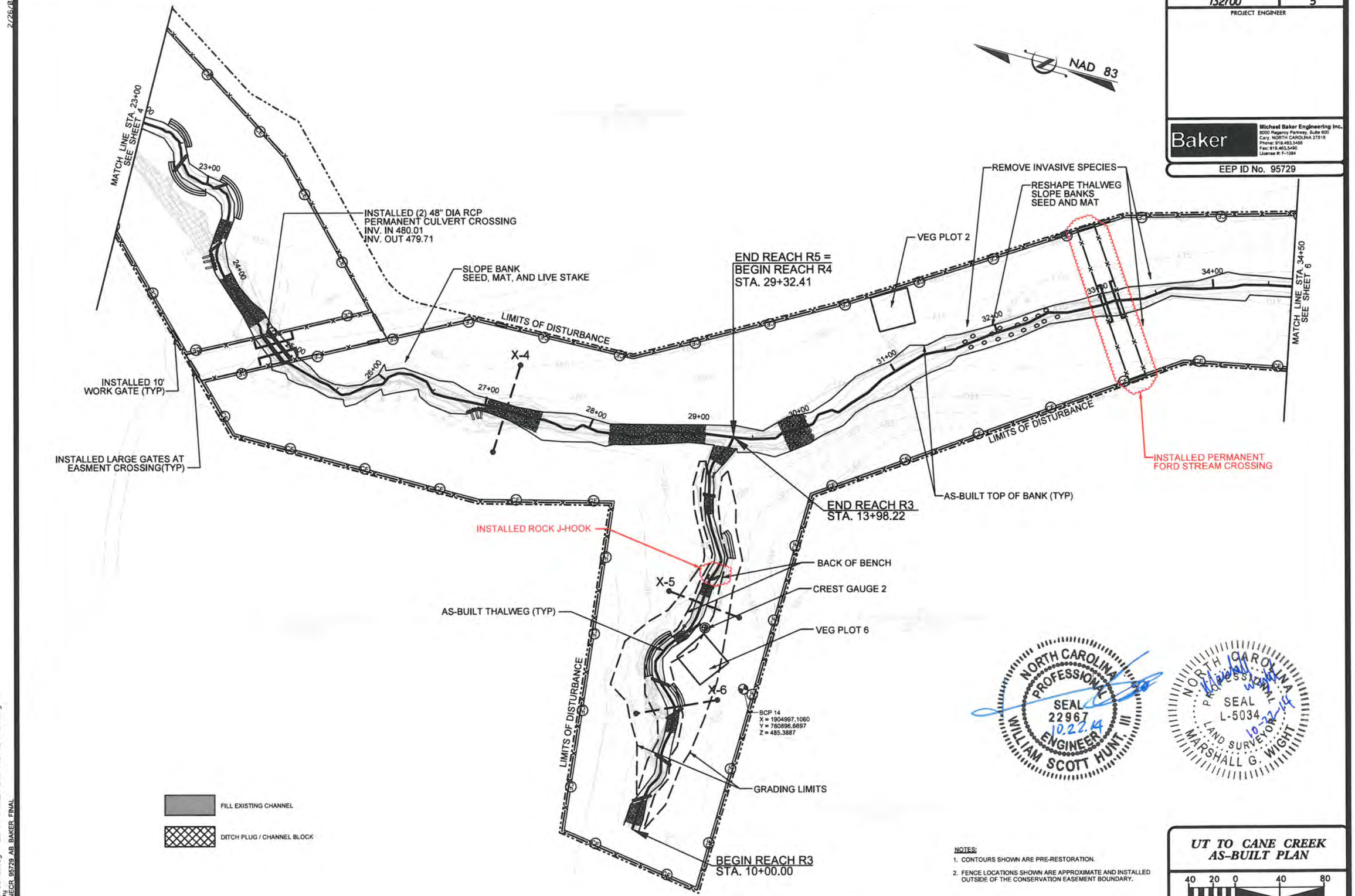
License #: F-1084

EEP ID No. 95729



NORTH CAROLINA PROFESSIONAL SEAL 22967 ENGINEER WILLIAM SCOTT HUNT, III
10.22.14

NORTH CAROLINA PROFESSIONAL SEAL L-5034 LAND SURVEYOR MARSHALL G. WIGHT
10-22-14

NOTES:
1. CONTOURS SHOWN ARE PRE-RESTORATION.
2. FENCE LOCATIONS SHOWN ARE APPROXIMATE AND INSTALLED OUTSIDE OF THE CONSERVATION EASEMENT BOUNDARY.

UT TO CANE CREEK AS-BUILT PLAN

40 20 0 40 80
SCALE (FT)

10/17/2014
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mmoore
UTCANECR 95729 AB BAKER FINAL

2/26/03

BAKER PROJECT REFERENCE NO.	SHEET NO.
132700	6

PROJECT ENGINEER

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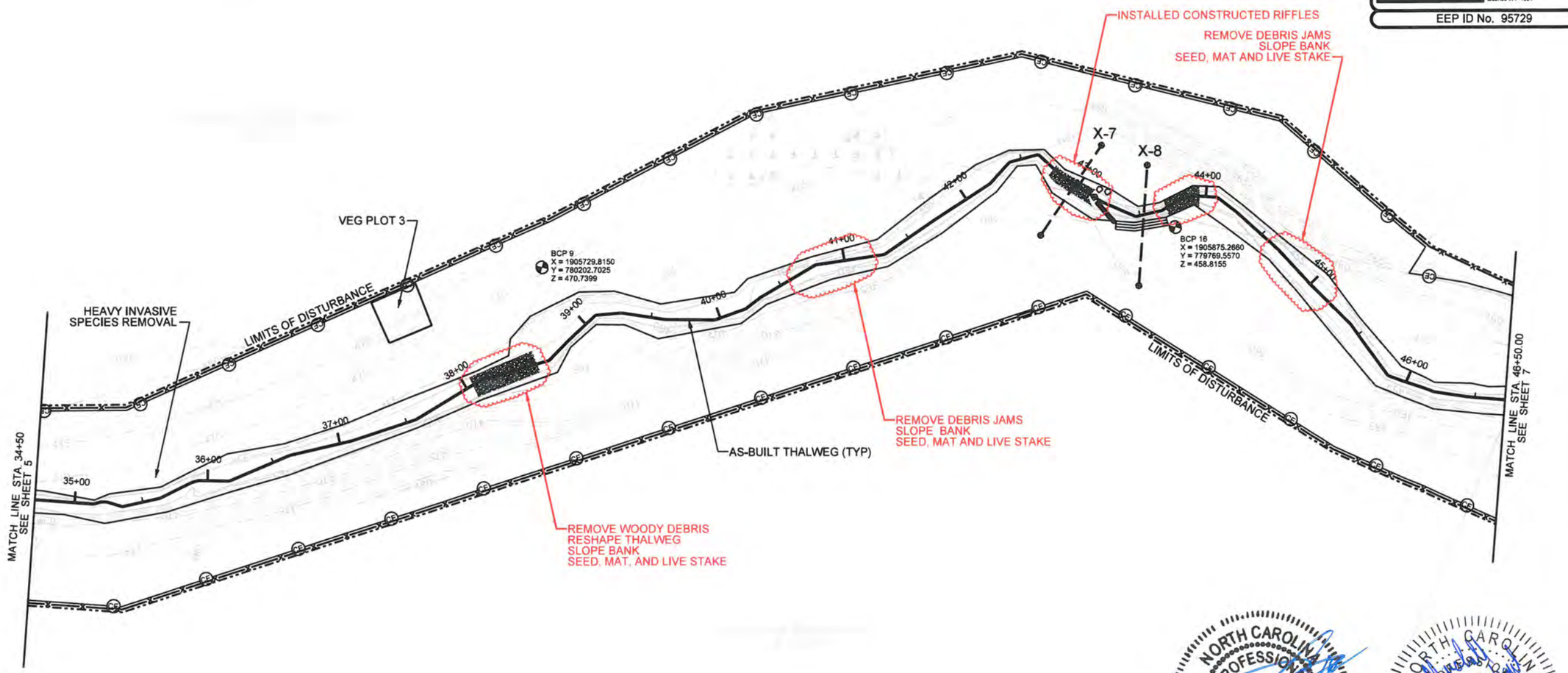
EEP ID No. 95729

NAD 83



NORTH CAROLINA PROFESSIONAL SEAL 22967 ENGINEER WILLIAM SCOTT HUNT, III 10.22.14

NORTH CAROLINA PROFESSIONAL SEAL L-5034 LAND SURVEYOR MARSHALL G. WIGHT 10-22-14

NOTES:
1. CONTOURS SHOWN ARE PRE-RESTORATION.
2. FENCE LOCATIONS SHOWN ARE APPROXIMATE AND INSTALLED OUTSIDE OF THE CONSERVATION EASEMENT BOUNDARY.

UT TO CANE CREEK
AS-BUILT PLAN

40 20 0 40 80
SCALE (FT)

10/16/2006
H:\132700\Design\Plans\As-Built\132700_AB_PSH_06.dgn
mcarey
UTCANECR 95729 AB BAKER FINAL

2/26/03

BAKER PROJECT REFERENCE NO.	SHEET NO.
132700	7

PROJECT ENGINEER

Baker
Michael Baker Engineering Inc.
8000 Regency Parkway, Suite 600
Cary, NORTH CAROLINA 27518
Phone: 919.463.5488
Fax: 919.463.5490
License #: F-1084

EEP ID No. 95729

NAD 83

BCP 12
X = 1905876.2560
Y = 779372.7483
Z = 466.13

BCP 11
X = 1905977.3990
Y = 779113.3505
Z = 452.89

MATCH LINE STA. 46+50.00
SEE SHEET 6

LIMITS OF DISTURBANCE

INSTALLED LARGE GATES AT EASEMENT CROSSING (TYP)

AS-BUILT TOP OF BANK (TYP)

VEG PLOT 4

CANE CREEK

47+00 48+00 49+00 50+00 51+00 52+00 53+00 54+00 55+00 56+00 57+00 58+00

END REACH R4
STA. 57+30.27

X-9

AS-BUILT THALWEG (TYP)

INSTALLED PERMANENT FORD STREAM CROSSING

HEAVY INVASIVE SPECIES REMOVAL

GRADING LIMITS

BACK OF BENCH

LIMITS OF DISTURBANCE

INSTALLED CONSTRUCTED RIFFLE USING ON-SITE ALLUVIUM

INSTALLED 10' WALK GATES (TYP)

NORTH CAROLINA PROFESSIONAL SEAL 22967 ENGINEER WILLIAM SCOTT HUNT, III 10.22.14

NORTH CAROLINA PROFESSIONAL SEAL L-5034 LAND SURVEYOR MARSHALL G. WIGHT 10-22-14

FILL EXISTING CHANNEL

NOTES:
1. CONTOURS SHOWN ARE PRE-RESTORATION.
2. FENCE LOCATIONS SHOWN ARE APPROXIMATE AND INSTALLED OUTSIDE OF THE CONSERVATION EASEMENT BOUNDARY.

UT TO CANE CREEK AS-BUILT PLAN

40 20 0 40 80
SCALE (FT)

10/7/2014
K:\132700\Design\Plans\As-Built\132700_AB_PSH_07.dgn
mcarey
UTCANECR 95729 AB BAKER FINAL

BAKER PROJECT REFERENCE NO.	SHEET NO.
132700	8

PROJECT ENGINEER

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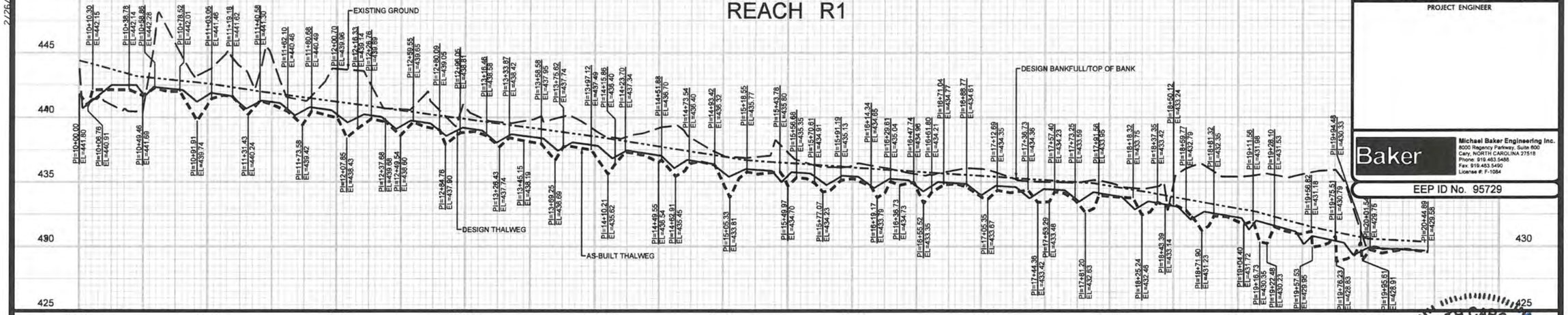
EEP ID No. 95729

REACH R1



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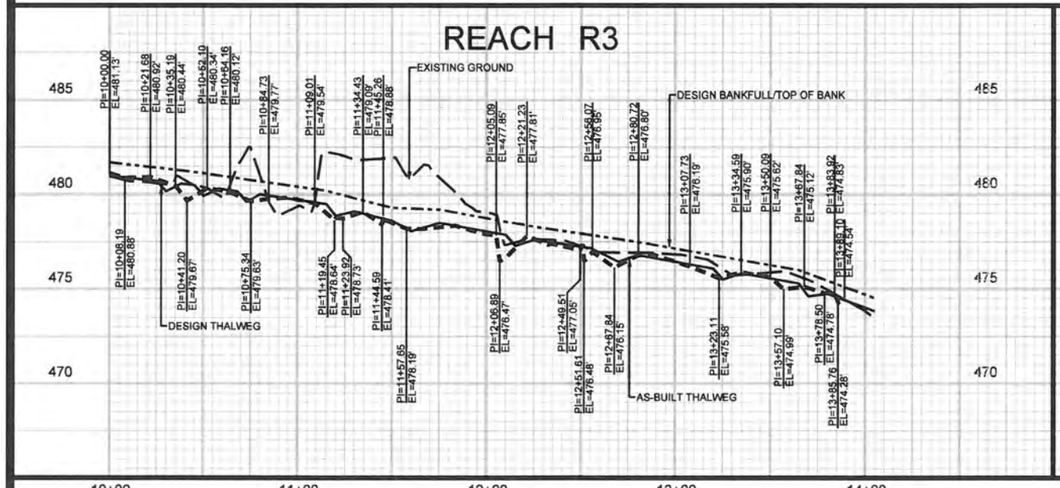

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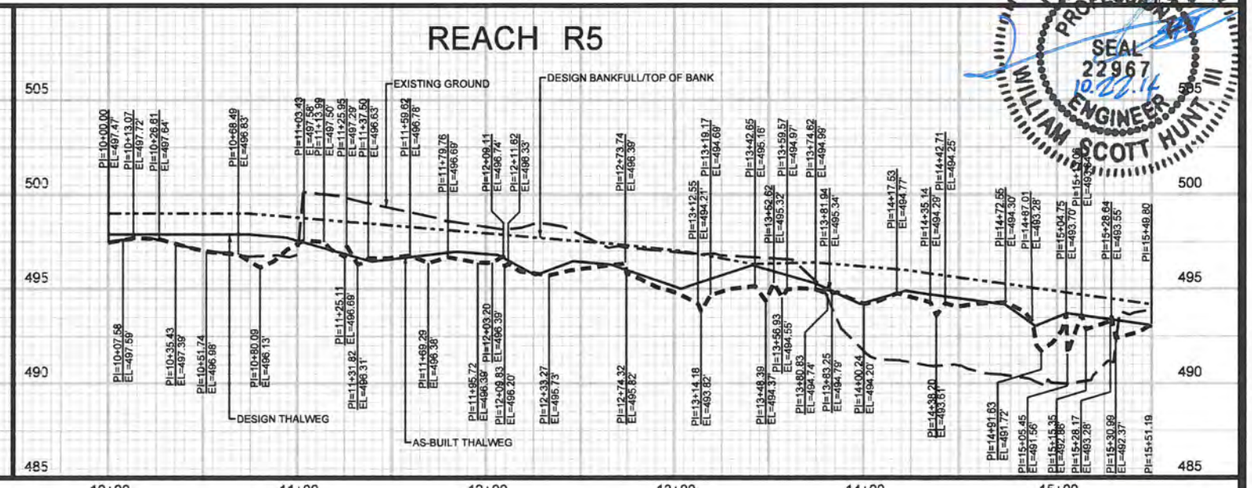
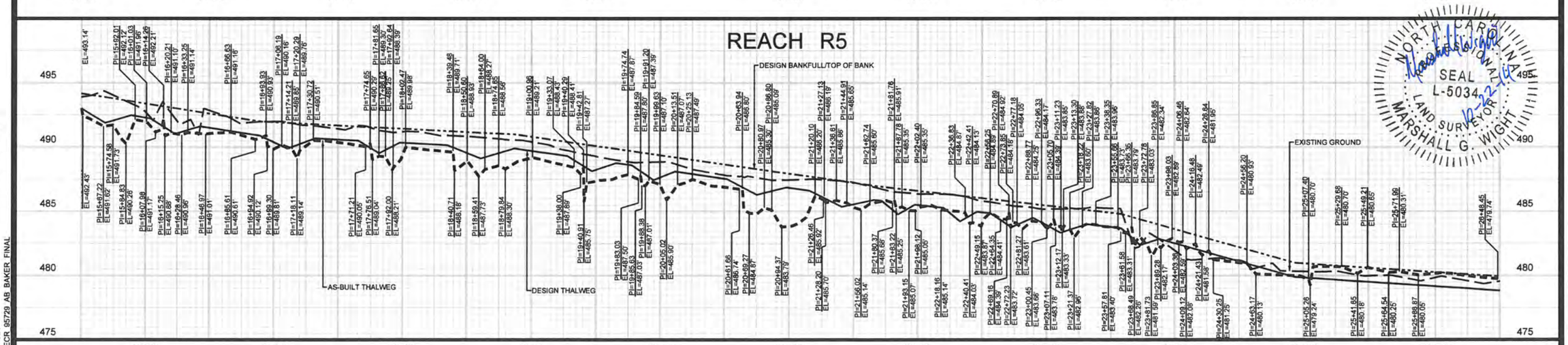
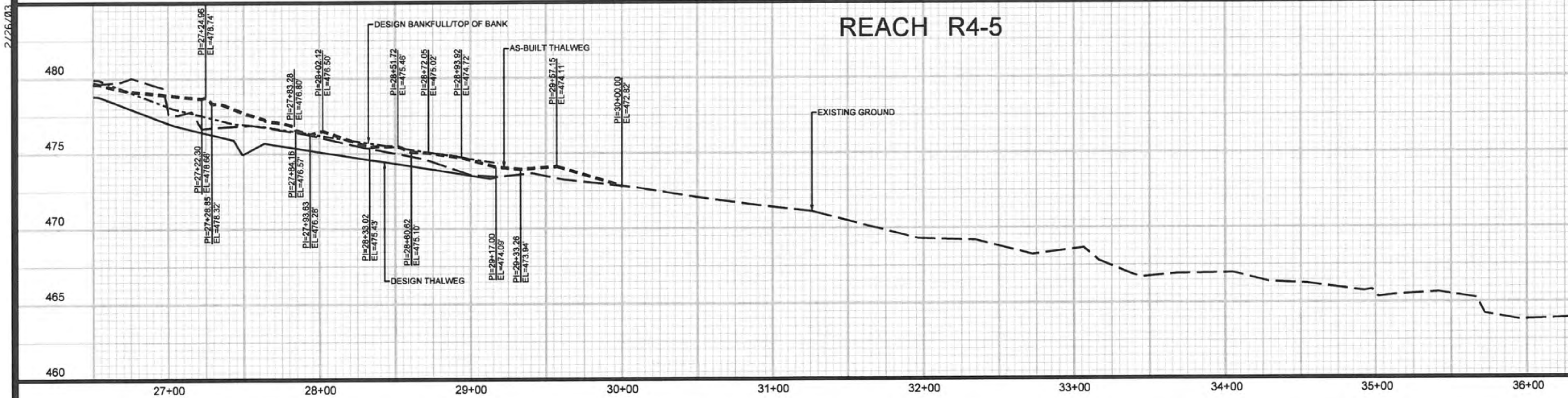


REACH R5



NORTH CAROLINA PROFESSIONAL SEAL 22967 ENGINEER WILLIAM SCOTT HUNT, III
10.22.14

NORTH CAROLINA SEAL L-5034 LAND SURVEYOR MARSHALL G. WIGHT
10-22-14



BAKER PROJECT REFERENCE NO.	SHEET NO.
132700	9

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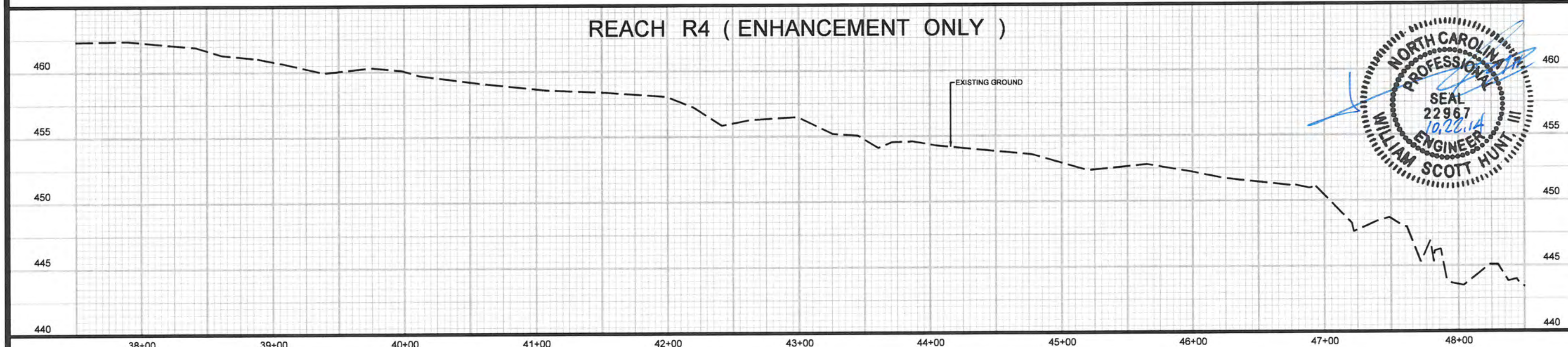

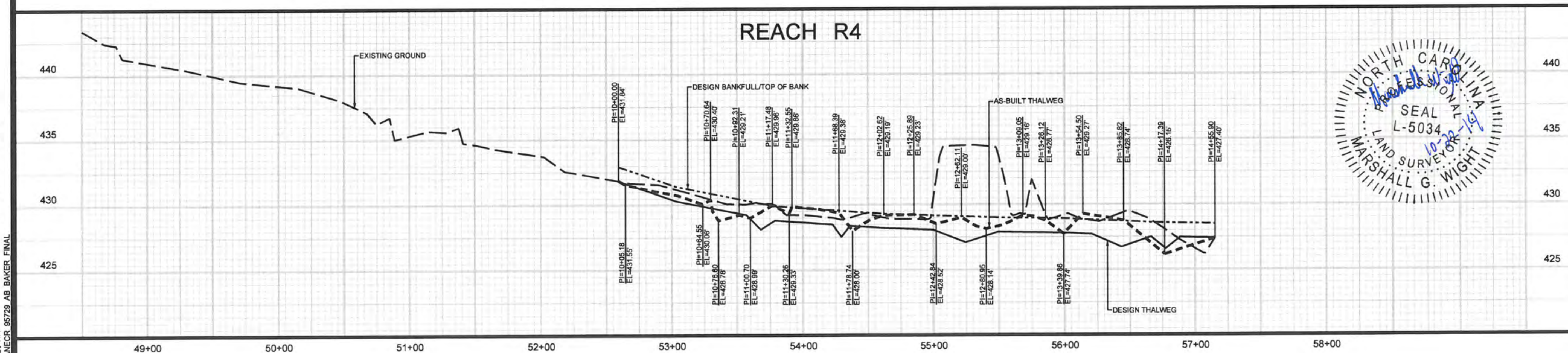

10/7/2014
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