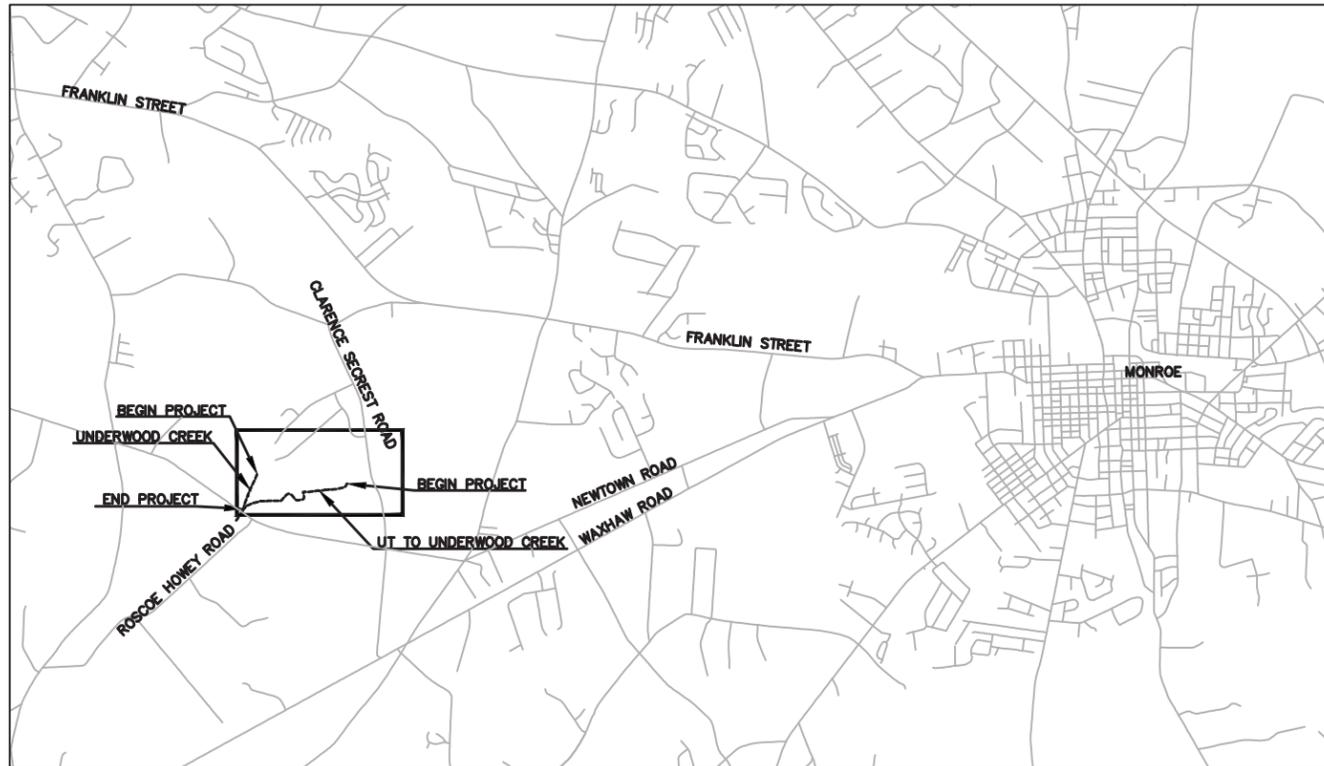


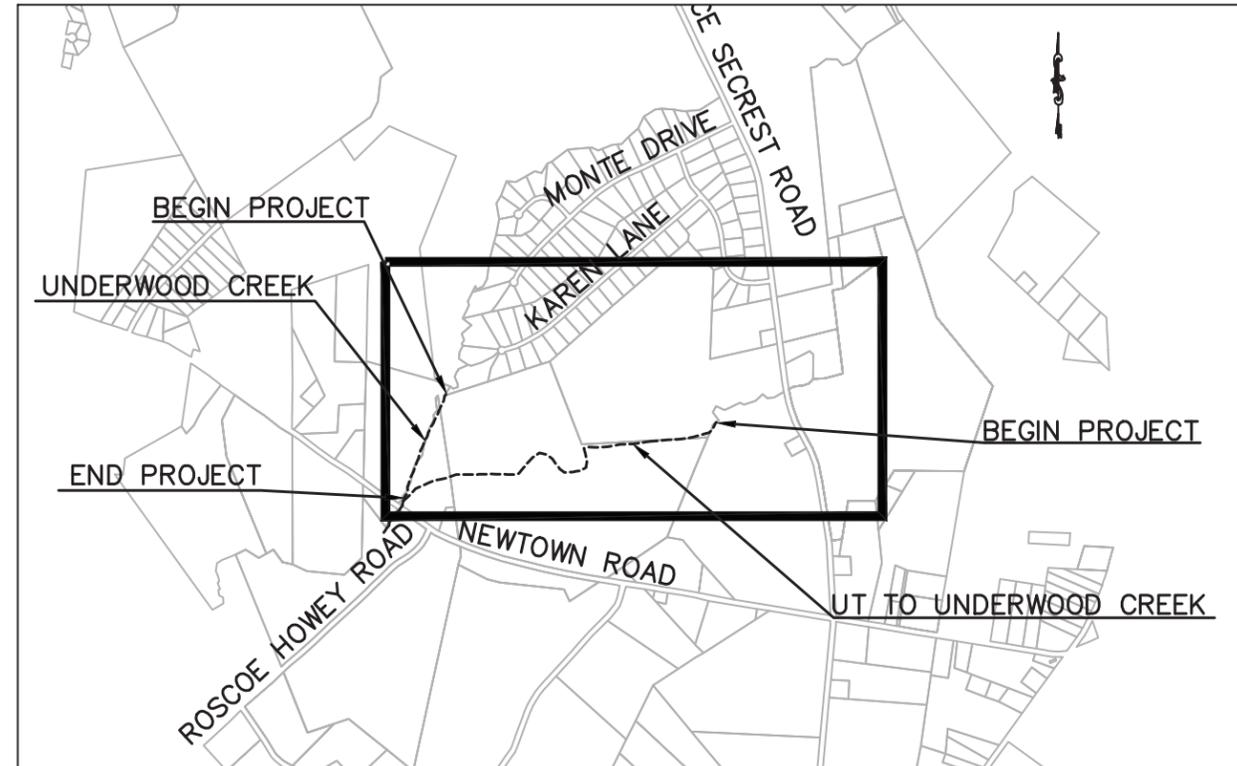
# RECORD DRAWINGS FOR NEWTOWN STREAM AND WETLAND RESTORATION PROJECT UNION COUNTY, NORTH CAROLINA STATE CONTRACT NO:002025 RFP 16-001117



VICINITY MAP



VICINITY MAP



LOCATION MAP

## INDEX OF SHEETS

SHEET NO.	DESCRIPTION
T1	TITLE SHEET
L1	LEGENDS SYMBOLS AND SHEET KEY
TCS1	TYPICAL CONSTRUCTED CROSS SECTIONS
PLN1-PLN2	STREAM PLAN UNDERWOOD CREEK
PLN3-PLN6	STREAM PLAN UT TO UNDERWOOD CREEK
PRO1	PROFILE UNDERWOOD CREEK
PRO2-PRO3	PROFILES UT TO UNDERWOOD CREEK
PRO4	PROFILE TABLES
VP1	PLANT QUANTITIES
VP3	PLANTING PLAN LEGENDS AND KEY
VP4-VP8	PLANTING PLAN
ABF1-ABF5	UNDERWOOD CREEK FEMA AS-BUILT SURVEY AND CROSS SECTIONS

SURVEY DATA PROVIDED BY: R.B. Pharr & Associates  
420 Hawthorne Lane  
Charlotte NC 28204  
PHONE: 704-376-2186  
FAX: 704-333-8724

**NATURAL SYSTEMS INVESTIGATION:**

The Catena Group Inc.  
410-B Millstone Drive  
Hillsborough, NC 27278  
PH: 919-732-1300  
FAX: 919-732-1303

NCEP CONTACT: GUY PEARCE (919) 715-1656  
WARD CONSULTING ENGINEERS CONTACT: BECKY WARD, PE (919) 870-0526  
ENVIRONMENTAL BANC AND EXCHANGE CONTACT: NORTON WEBSTER (919) 829-9909

**Ward Consulting Engineers, P.C.**  
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Raleigh, NC 27615-5083 FAX (919) 870-5359  
Environmental Banc & Exchange  
909 Capability Drive, Suite 3100  
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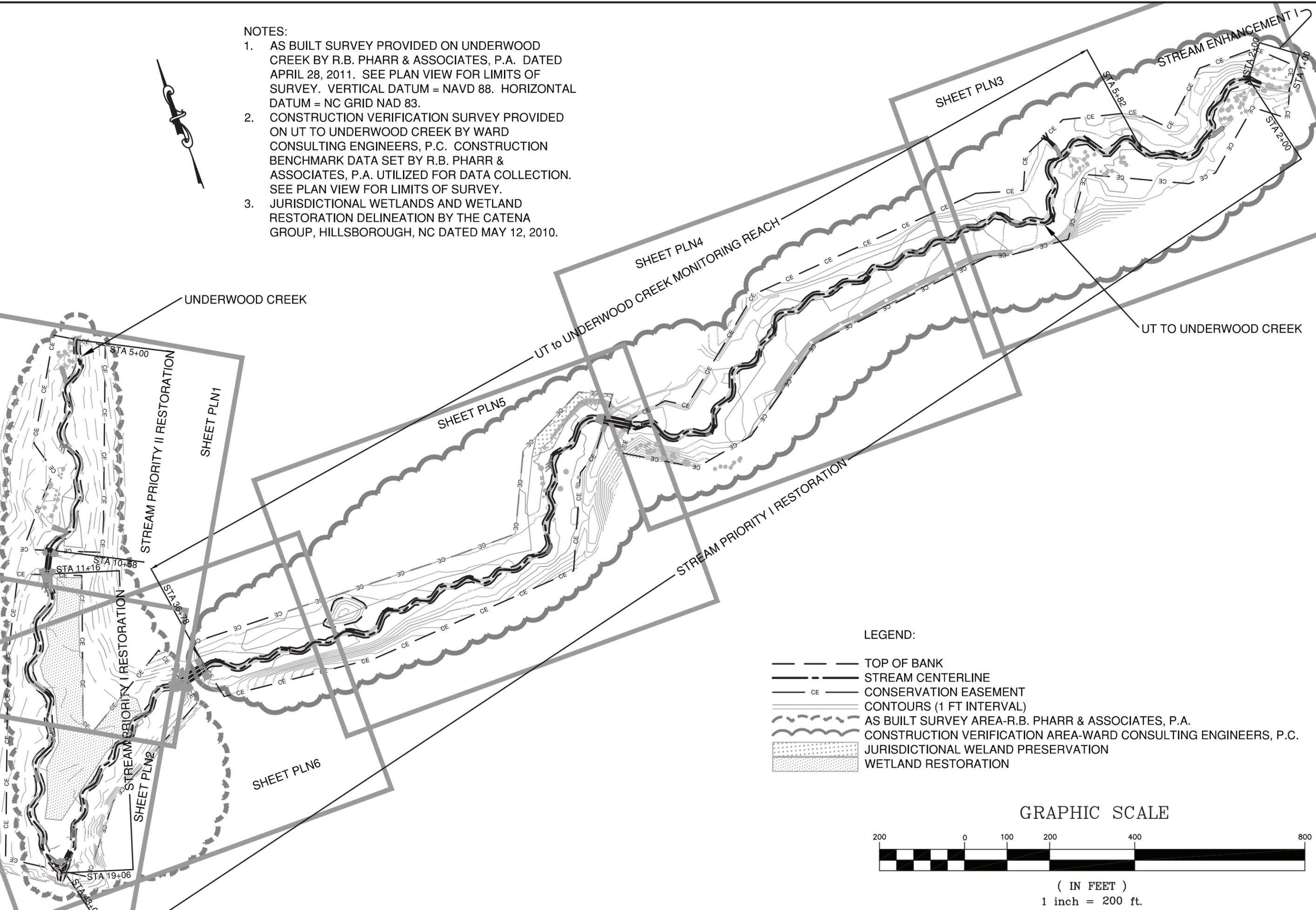


**NEWTOWN**  
**TITLE SHEET**  
**UNION COUNTY, NORTH CAROLINA**

DATE: 5-27-2011
REVISIONS:
PROJECT NAME: Newtown Creek
DWG NAME: Construction Cover Sheet
SCALE: NTS
RECORD DRAWINGS
SHEET NO.

**NOTES:**

1. AS BUILT SURVEY PROVIDED ON UNDERWOOD CREEK BY R.B. PHARR & ASSOCIATES, P.A. DATED APRIL 28, 2011. SEE PLAN VIEW FOR LIMITS OF SURVEY. VERTICAL DATUM = NAVD 88. HORIZONTAL DATUM = NC GRID NAD 83.
2. CONSTRUCTION VERIFICATION SURVEY PROVIDED ON UT TO UNDERWOOD CREEK BY WARD CONSULTING ENGINEERS, P.C. CONSTRUCTION BENCHMARK DATA SET BY R.B. PHARR & ASSOCIATES, P.A. UTILIZED FOR DATA COLLECTION. SEE PLAN VIEW FOR LIMITS OF SURVEY.
3. JURISDICTIONAL WETLANDS AND WETLAND RESTORATION DELINEATION BY THE CATENA GROUP, HILLSBOROUGH, NC DATED MAY 12, 2010.



**LEGEND:**

- — — — — TOP OF BANK
- — — — — STREAM CENTERLINE
- CE — — — CONSERVATION EASEMENT
- — — — — CONTOURS (1 FT INTERVAL)
- — — — — AS BUILT SURVEY AREA-R.B. PHARR & ASSOCIATES, P.A.
- — — — — CONSTRUCTION VERIFICATION AREA-WARD CONSULTING ENGINEERS, P.C.
- — — — — JURISDICTIONAL WETLAND PRESERVATION
- — — — — WETLAND RESTORATION

**GRAPHIC SCALE**



( IN FEET )  
1 inch = 200 ft.

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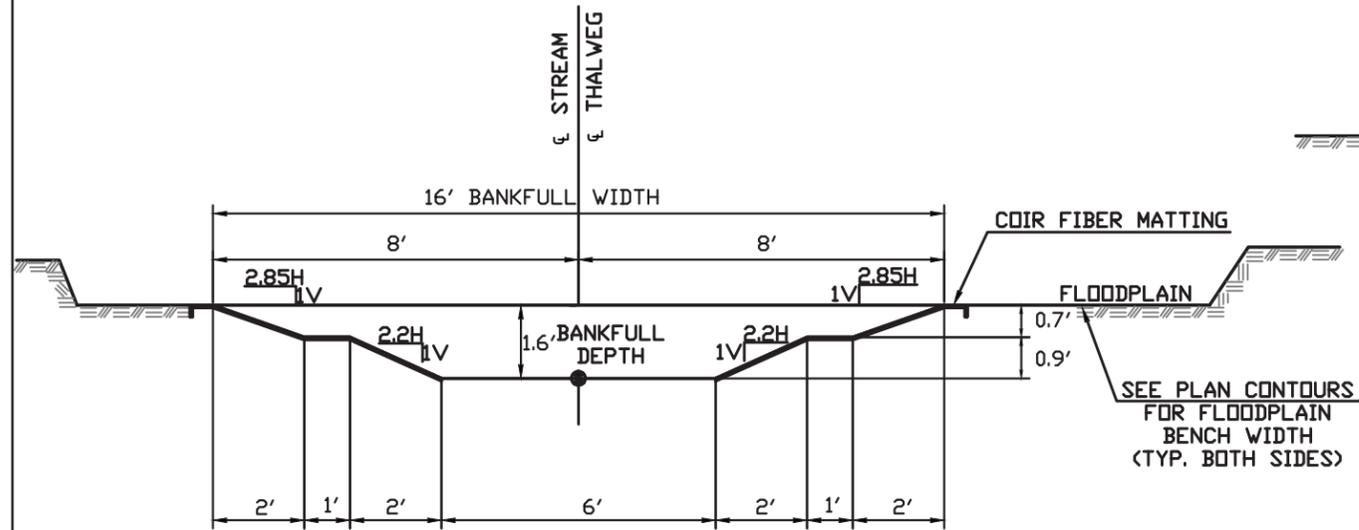


**NEWTOWN  
 LEGENDS, SYMBOLS AND  
 SHEET KEY  
 UNION COUNTY, NORTH CAROLINA**

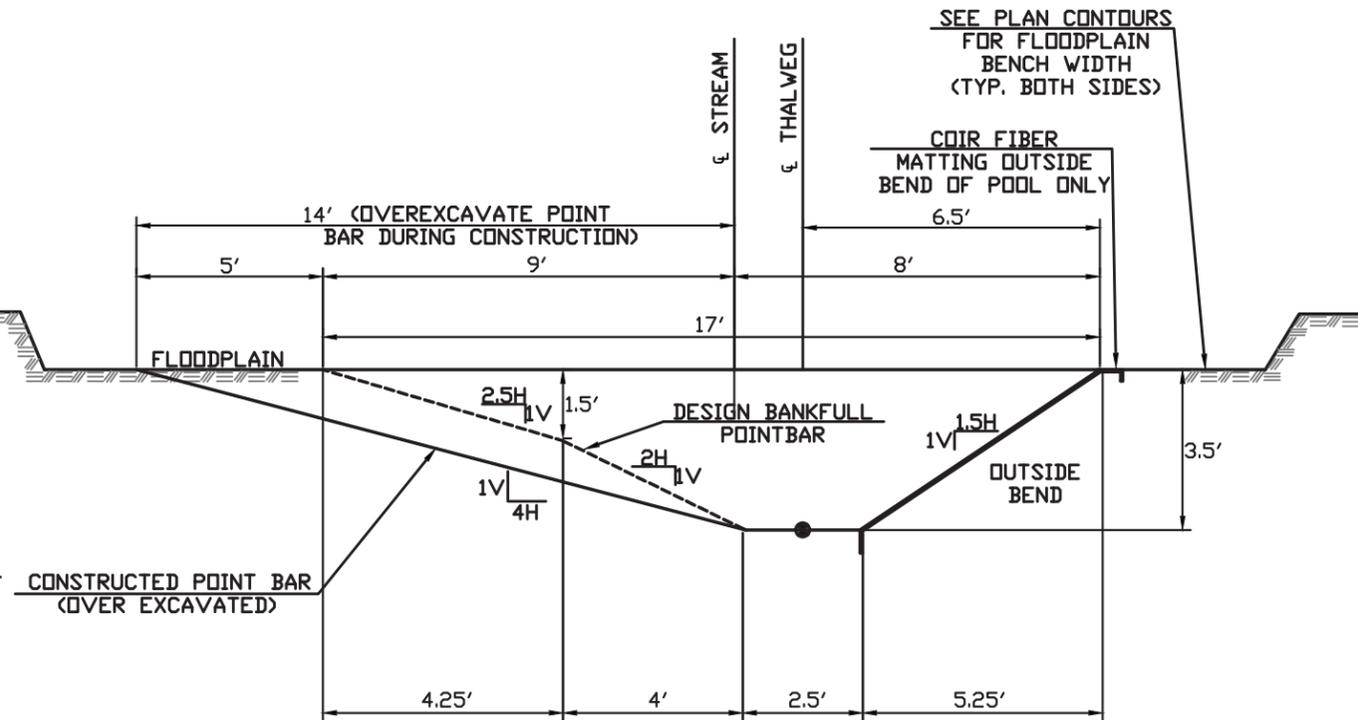
DATE:	5-27-2011
REVISIONS:	
PROJECT NAME:	EBX NEWTOWN
DWG NAME:	AS-BUILT
SCALE:	1" = 200'
RECORD DRAWINGS	
SHEET NO.	L1

**NOTES:**

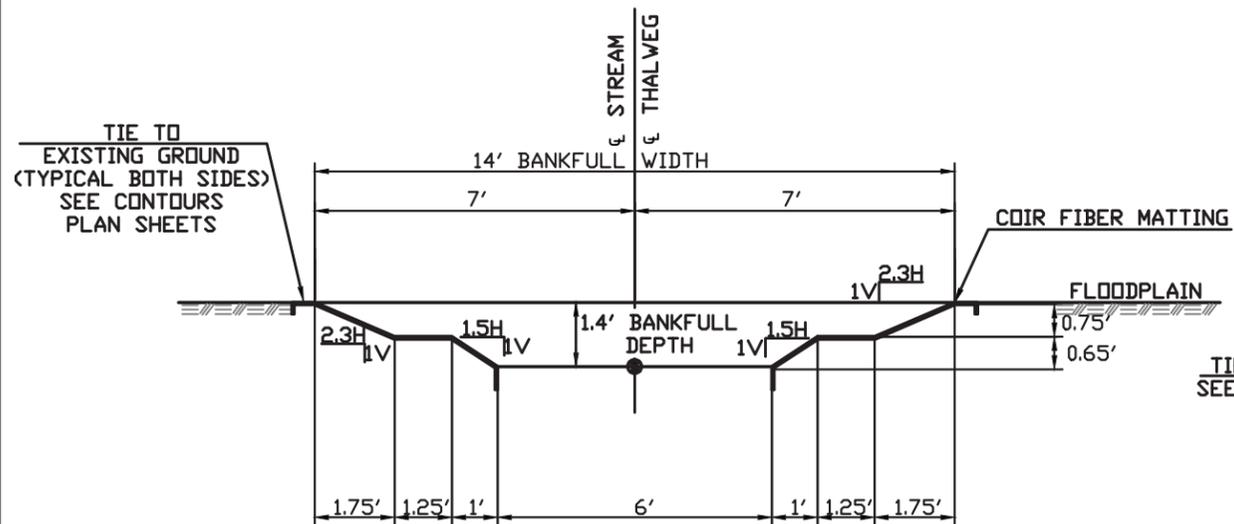
1. POOLS TO BE EXCAVATED BY CONTRACTOR ONE FOOT DEEPER TO ALLOW FOR SEDIMENTATION.
2. CONTRACTOR TO PROVIDE A SMOOTH TRANSITION BETWEEN THE RIFFLE AND POOL SECTIONS SHOWN BELOW.
3. CENTER LINE THALWEG. SEE STAKING PLAN SHEETS (SP) FOR VERTICAL ELEVATIONS AND HORIZONTAL LAYOUTS.
4.  $\epsilon$  OF STREAM FOR HORIZONTAL LAYOUT AND  $\epsilon$  OF THALWEG ARE AT DIFFERENT LOCATIONS IN POOL SECTIONS.
5. USE 700 GRAM COIR FIBER MATTING BLANKET WESTERN EXCELSIOR CORPORATION COIR MAT 700 OR APPROVED EQUAL.



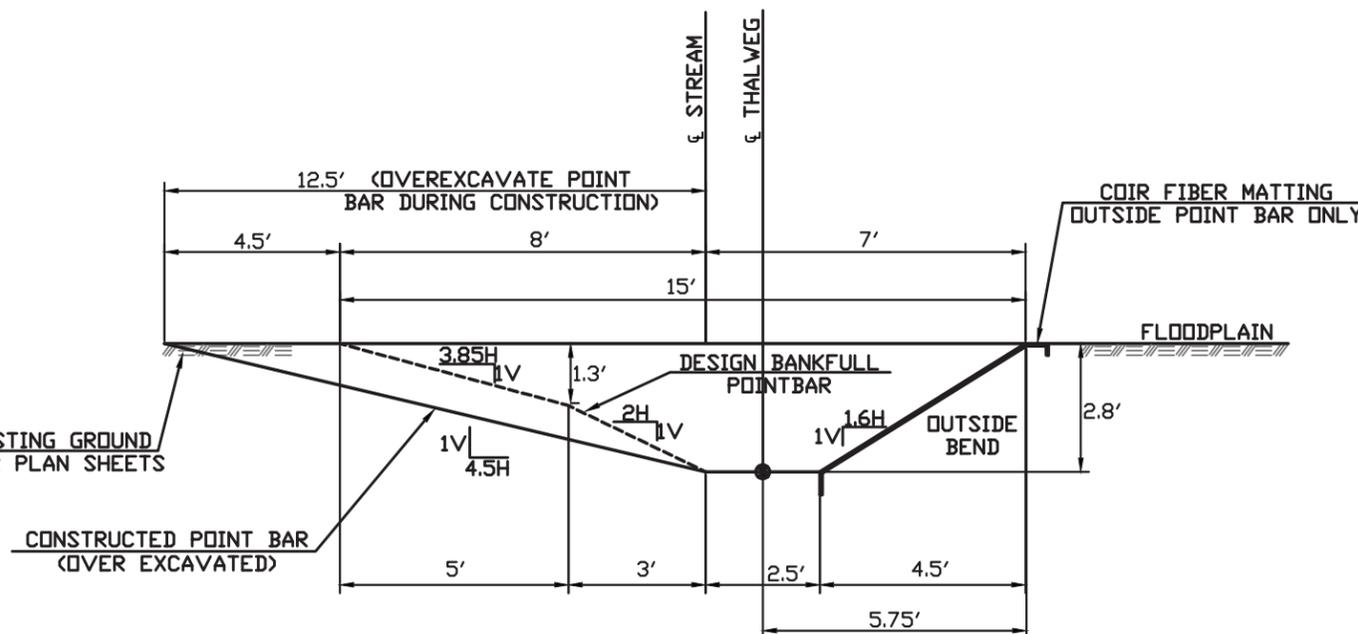
**1** PROPOSED RIFFLE SECTION (UNDERWOOD CREEK)  
SCALE: NOT TO SCALE (PRIORITY TWO RESTORATION)



**2** PROPOSED POOL SECTION (UNDERWOOD CREEK)  
SCALE: NOT TO SCALE (PRIORITY TWO RESTORATION)



**3** PROPOSED RIFFLE SECTION (UT-UNDERWOOD CREEK)  
SCALE: NOT TO SCALE (PRIORITY ONE RESTORATION)



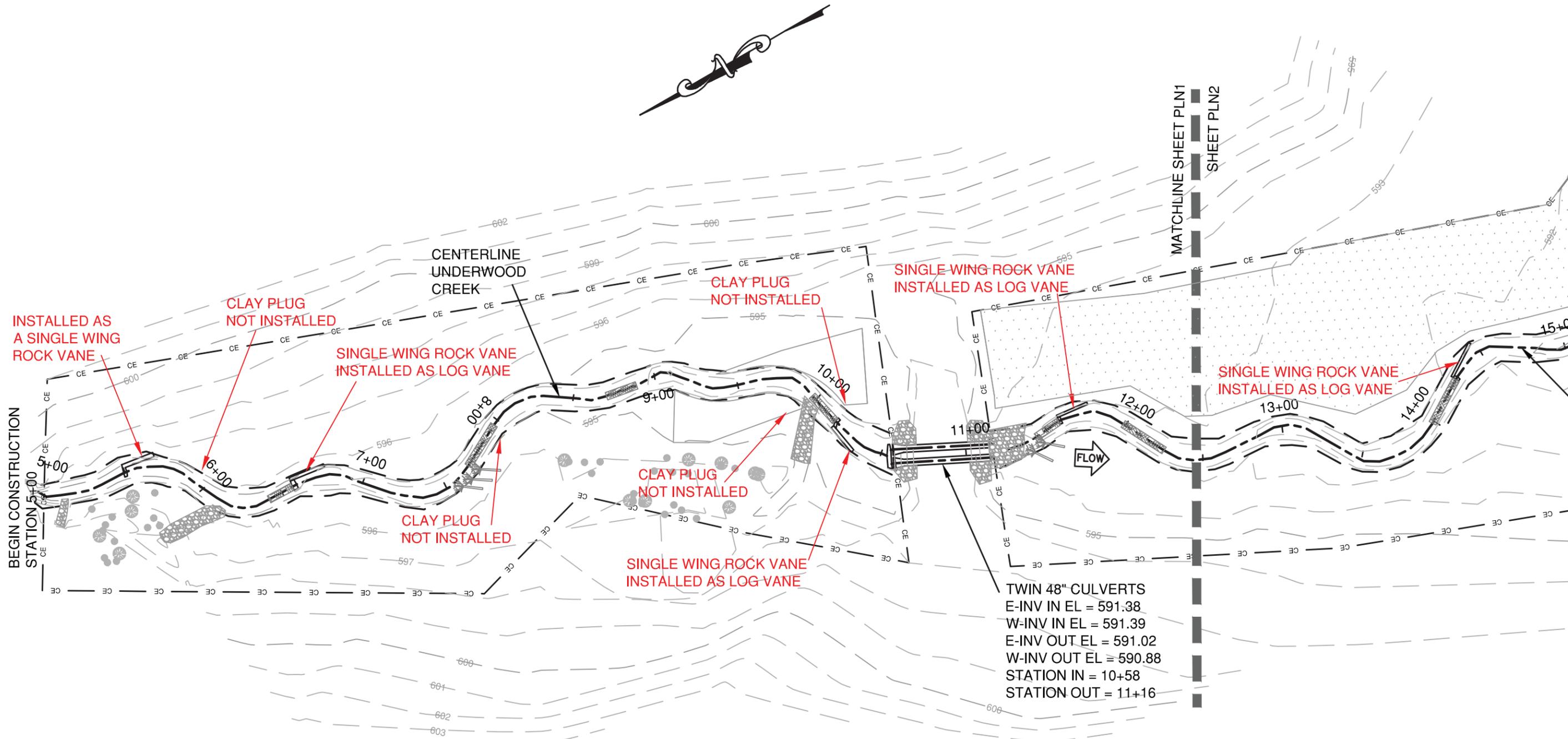
**4** PROPOSED POOL SECTION (UT-UNDERWOOD CREEK)  
SCALE: NOT TO SCALE (PRIORITY ONE RESTORATION)

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Environmental Banc & Exchange  
909 Capability Drive, Suite 3100  
Raleigh NC 27606 Phone: (919) 829-9909  
Fax: (919) 229-9913



**NEWTOWN**  
**TYPICAL CONSTRUCTED**  
**CROSS SECTIONS WITH LEGENDS**  
**UNION COUNTY, NORTH CAROLINA**

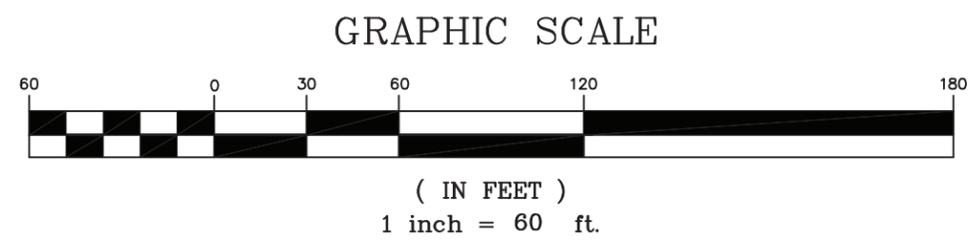
DATE:	5-27-2011
REVISIONS:	
PROJECT NAME:	Newtown Creek
DWG NAME:	Typical Cross Sections
SCALE:	NTS
RECORD DRAWINGS	
SHEET NO.	



LEGEND:

- AS-BUILT CONTOURS RBPA (1 FT INTERVALS)
- AS-BUILT TOP OF BANK
- AS-BUILT THALWEG
- 2+00 | | | DESIGN CENTERLINE STATIONING
- CE --- CONSERVATION EASEMENT
- [Pattern] WETLAND RESTORATION
- [Pattern] WETLAND PRESERVATION
- [Symbol] AS-BUILT STRUCTURE
- [Symbol] AS-BUILT CONSTRUCTED RIFFLE
- [Symbol] AS-BUILT GRADE TRANSITION STRUCTURE
- [Symbol] ROOT WADS
- [Symbol] ROCK TOE
- [Symbol] BRUSH TOE
- [Symbol] EARTHEN BERM
- [Symbol] BRUSH WETLAND EDGE
- [Symbol] RIP RAP PROTECTION

NOTE: ASBUILT SURVEY DATA THIS SHEET PROVIDED BY R.B. PHARR & ASSOCIATES, P.A.

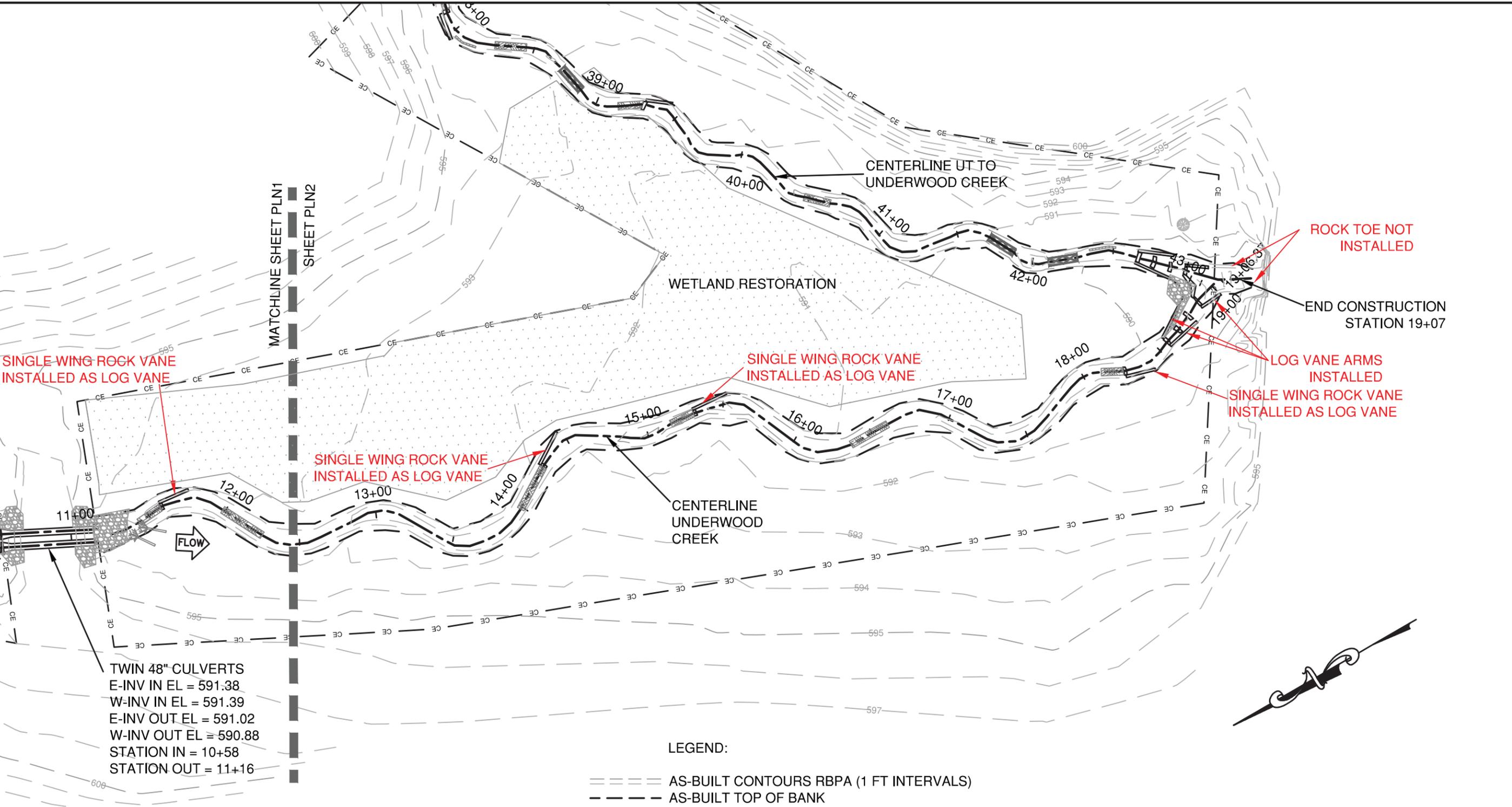


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**NEWTOWN  
 UNDERWOOD CREEK  
 UNION COUNTY, NORTH CAROLINA**

DATE:	5-27-2011
REVISIONS:	
PROJECT NAME:	EBX NEWTOWN
DWG NAME:	AS-BUILT
SCALE:	1" = 60'
RECORD DRAWINGS	
SHEET NO.	



SINGLE-WING ROCK VANE  
INSTALLED AS LOG VANE

SINGLE WING ROCK VANE  
INSTALLED AS LOG VANE

SINGLE WING ROCK VANE  
INSTALLED AS LOG VANE

LOG VANE ARMS  
INSTALLED  
SINGLE WING ROCK VANE  
INSTALLED AS LOG VANE

ROCK TOE NOT  
INSTALLED

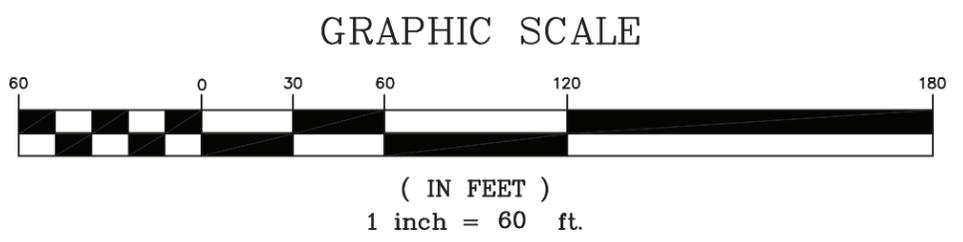
END CONSTRUCTION  
STATION 19+07

TWIN 48" CULVERTS  
E-INV IN EL = 591.38  
W-INV IN EL = 591.39  
E-INV OUT EL = 591.02  
W-INV OUT EL = 590.88  
STATION IN = 10+58  
STATION OUT = 11+16

LEGEND:

- AS-BUILT CONTOURS RBPA (1 FT INTERVALS)
- - - AS-BUILT TOP OF BANK
- AS-BUILT THALWEG
- 2+00 | | DESIGN CENTERLINE STATIONING
- CE — CONSERVATION EASEMENT
- [Pattern] WETLAND RESTORATION
- [Pattern] WETLAND PRESERVATION
- [Symbol] AS-BUILT STRUCTURE
- [Symbol] AS-BUILT CONSTRUCTED RIFFLE
- [Symbol] AS-BUILT GRADE TRANSITION STRUCTURE
- [Symbol] ROOT WADS
- [Symbol] ROCK TOE
- [Symbol] BRUSH TOE
- [Symbol] EARTHEN BERM
- [Symbol] BRUSH WETLAND EDGE
- [Symbol] RIP RAP PROTECTION

NOTE: ASBUILT SURVEY DATA THIS SHEET  
PROVIDED BY R.B. PHARR & ASSOCIATES, P.A.



MATCHLINE SHEET PLN1  
SHEET PLN2

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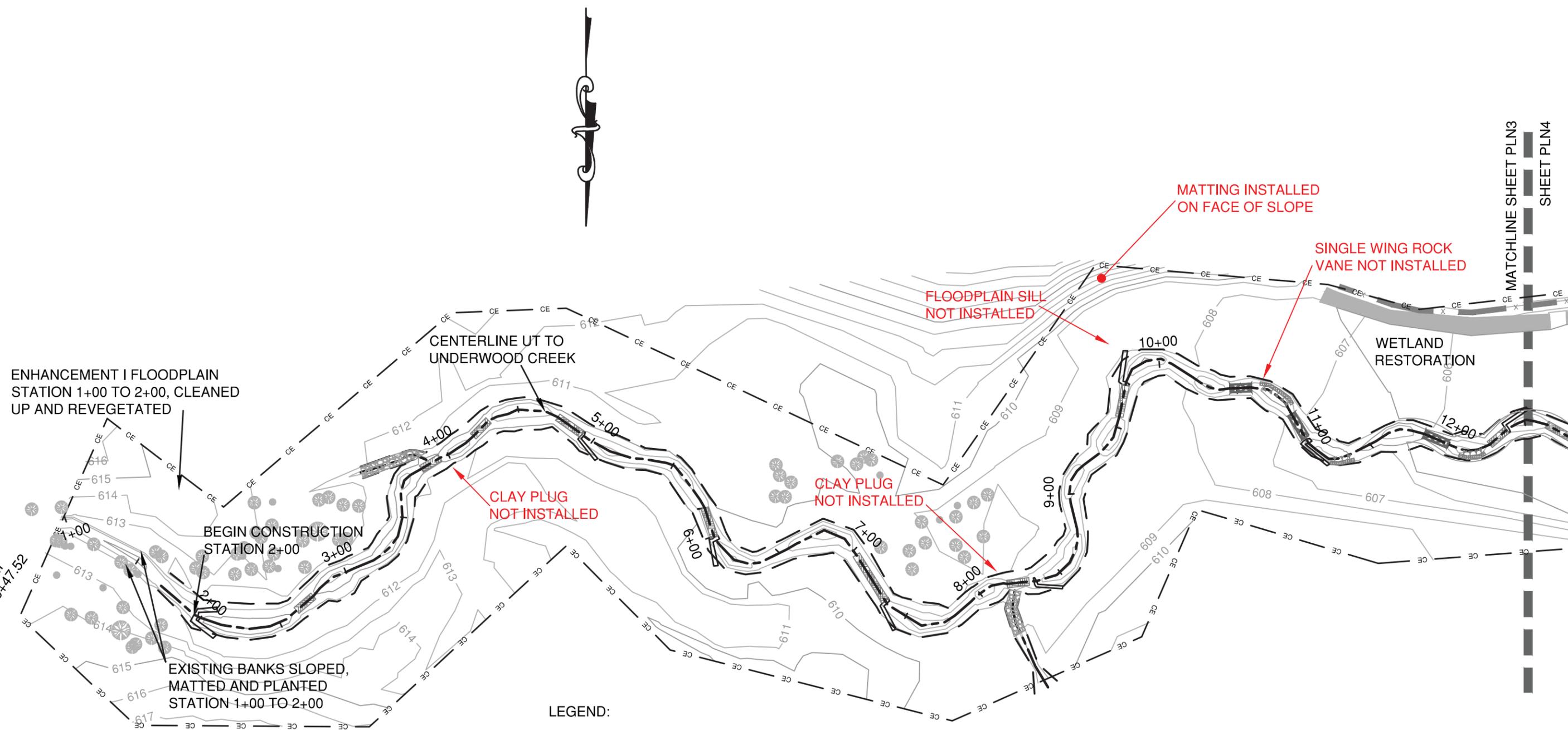
**NEWTOWN  
UNDERWOOD CREEK**  
 UNION COUNTY, NORTH CAROLINA

DATE:	5-27-2011
REVISIONS:	
PROJECT NAME:	EBX NEWTOWN
DWG NAME:	AS-BUILT
SCALE:	1" = 60'
RECORD DRAWINGS	
SHEET NO.	PLN2



**NEWTOWN  
 UT to UNDERWOOD CREEK  
 UNION COUNTY, NORTH CAROLINA**

DATE:	5-27-2011
REVISIONS:	
PROJECT NAME:	EBX NEWTOWN
DWG NAME:	AS-BUILT
SCALE:	1" = 60'
RECORD DRAWINGS	
SHEET NO.	PLN3



ENHANCEMENT I FLOODPLAIN  
 STATION 1+00 TO 2+00, CLEANED  
 UP AND REVEGETATED

BEGIN CONSTRUCTION  
 STATION 2+00

EXISTING BANKS SLOPED,  
 MATTED AND PLANTED  
 STATION 1+00 TO 2+00

CENTERLINE UT TO  
 UNDERWOOD CREEK

SINGLE WING ROCK  
 VANE NOT INSTALLED

FLOODPLAIN SILL  
 NOT INSTALLED

CLAY PLUG  
 NOT INSTALLED

CLAY PLUG  
 NOT INSTALLED

MATTING INSTALLED  
 ON FACE OF SLOPE

WETLAND  
 RESTORATION

**LEGEND:**

- AS-BUILT CONTOURS WCE (1 FT INTERVALS)
- AS-BUILT TOP OF BANK
- AS-BUILT THALWEG
- DESIGN CENTERLINE STATIONING
- CONSERVATION EASEMENT
- WETLAND RESTORATION
- WETLAND PRESERVATION
- AS-BUILT STRUCTURE
- AS-BUILT CONSTRUCTED RIFFLE
- AS-BUILT GRADE TRANSITION STRUCTURE
- ROOT WADS
- ROCK TOE
- BRUSH TOE
- EARTHEN BERM
- BRUSH WETLAND EDGE
- RIP RAP PROTECTION

NOTE: ASBUILT CONSTRUCTION VERIFICATION  
 SURVEY DATA THIS SHEET PROVIDED BY WARD  
 CONSULTING ENGINEERS, P.C.

**GRAPHIC SCALE**



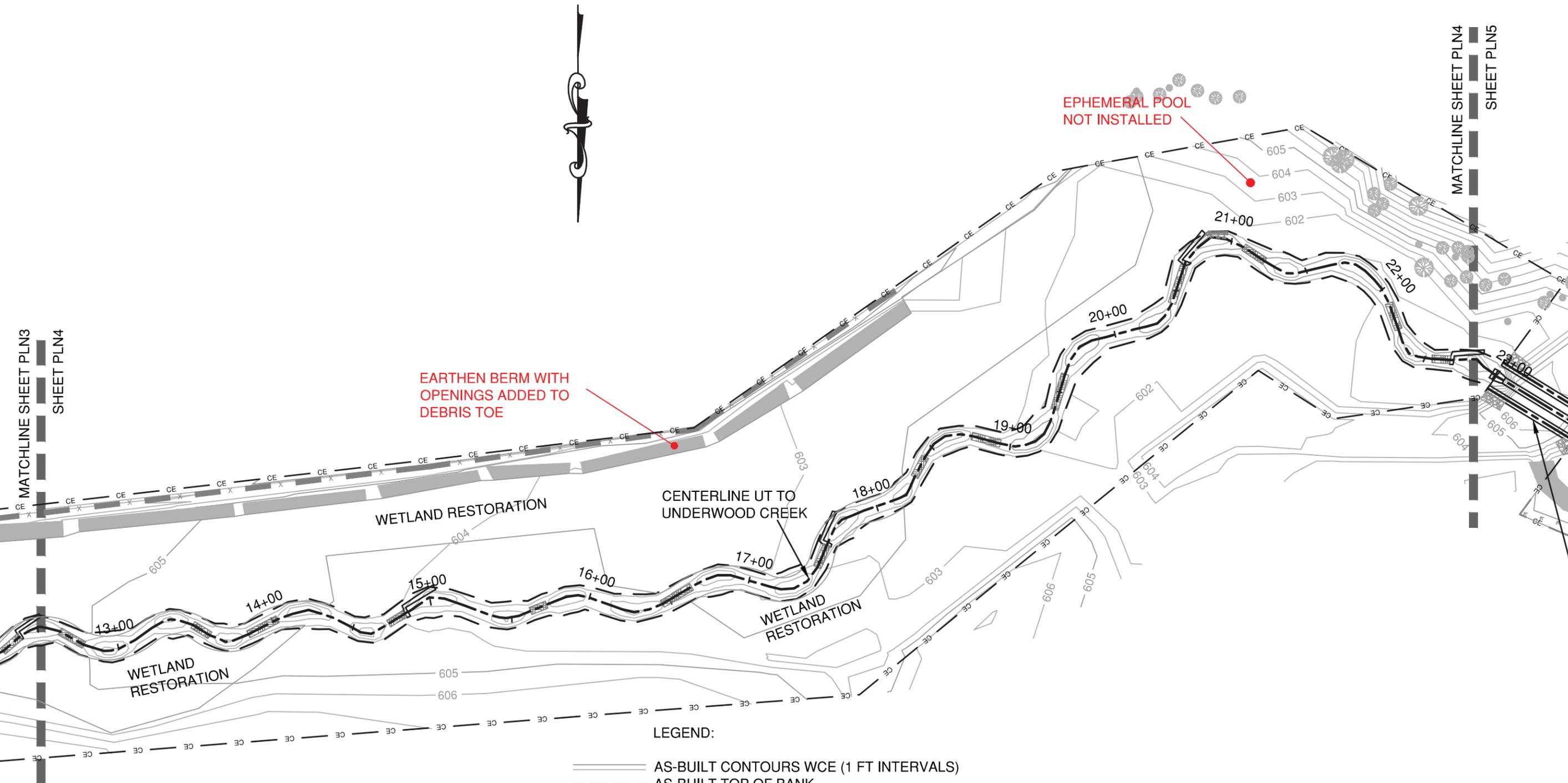
( IN FEET )  
 1 inch = 60 ft.

MATCHLINE SHEET PLN3  
 SHEET PLN4



**NEWTOWN  
 UT to UNDERWOOD CREEK  
 UNION COUNTY, NORTH CAROLINA**

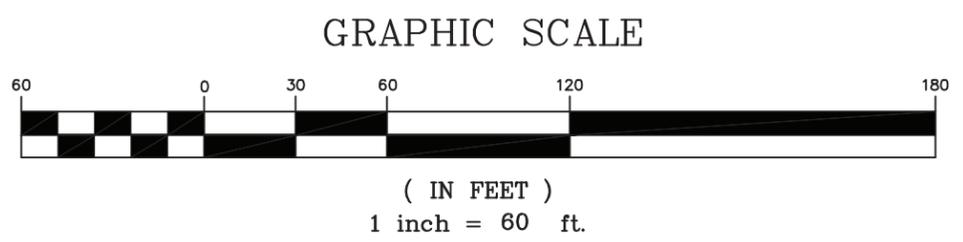
DATE:	5-27-2011
REVISIONS:	
PROJECT NAME:	EBX NEWTOWN
DWG NAME:	AS-BUILT
SCALE:	1" = 60'
RECORD DRAWINGS	
SHEET NO.	PLN4



**LEGEND:**

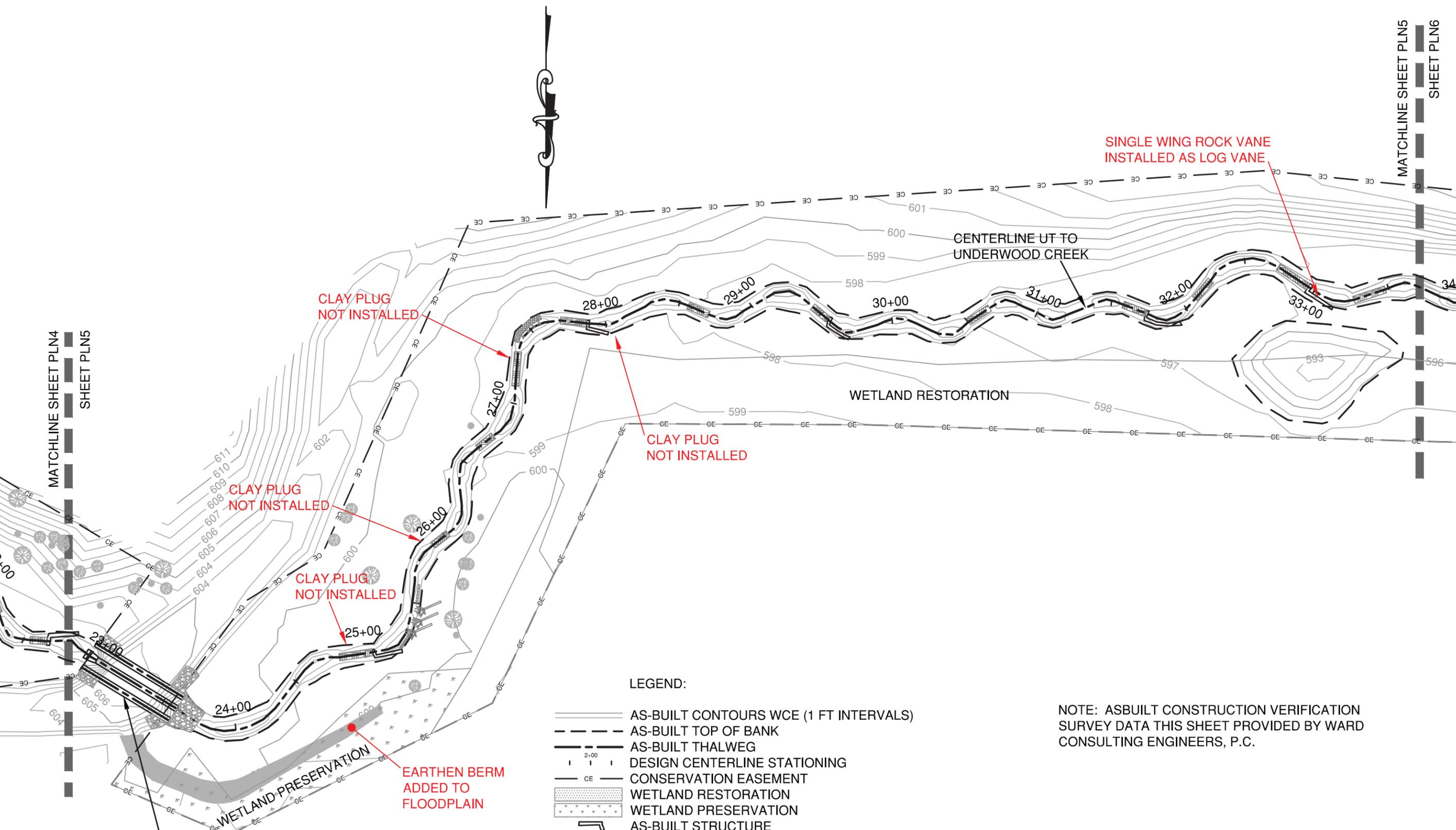
- AS-BUILT CONTOURS WCE (1 FT INTERVALS)
- AS-BUILT TOP OF BANK
- AS-BUILT THALWEG
- DESIGN CENTERLINE STATIONING
- CONSERVATION EASEMENT
- WETLAND RESTORATION
- WETLAND PRESERVATION
- AS-BUILT STRUCTURE
- AS-BUILT CONSTRUCTED RIFFLE
- AS-BUILT GRADE TRANSITION STRUCTURE
- ROOT WADS
- ROCK TOE
- BRUSH TOE
- EARTHEN BERM
- BRUSH WETLAND EDGE
- RIP RAP PROTECTION

NOTE: ASBUILT CONSTRUCTION VERIFICATION SURVEY DATA THIS SHEET PROVIDED BY WARD CONSULTING ENGINEERS, P.C.



MATCHLINE SHEET PLN4  
SHEET PLN5

MATCHLINE SHEET PLN5  
SHEET PLN6

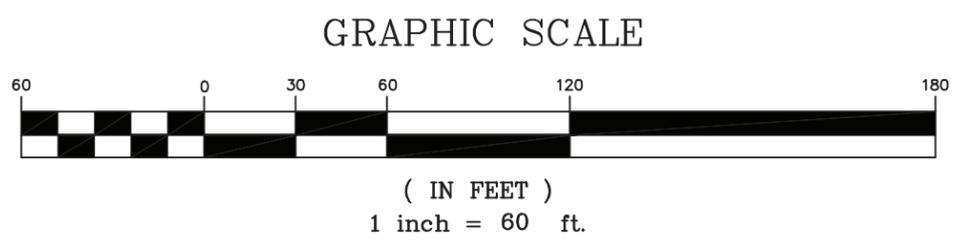


CHANNEL 48" RCP STATION IN = 22+95, 64 LF  
 FLOODPLAIN S-36" RCP STATION IN = 22+95, 64 LF  
 FLOODPLAIN N-36" RCP STATION IN = 22+95, 64 LF  
 48" INV IN = 598.34  
 N-36" INV IN = 600.55  
 S-36" INV IN = 600.55  
 48" INV OUT = 597.79  
 N-36" INV OUT = 600.00  
 S-36" INV OUT = 600.00

LEGEND:

- AS-BUILT CONTOURS WCE (1 FT INTERVALS)
- AS-BUILT TOP OF BANK
- AS-BUILT THALWEG
- DESIGN CENTERLINE STATIONING
- CONSERVATION EASEMENT
- WETLAND RESTORATION
- WETLAND PRESERVATION
- AS-BUILT STRUCTURE
- AS-BUILT CONSTRUCTED RIFFLE
- AS-BUILT GRADE TRANSITION STRUCTURE
- ROOT WADS
- ROCK TOE
- BRUSH TOE
- EARTHEN BERM
- BRUSH WETLAND EDGE
- RIP RAP PROTECTION

NOTE: ASBUILT CONSTRUCTION VERIFICATION SURVEY DATA THIS SHEET PROVIDED BY WARD CONSULTING ENGINEERS, P.C.



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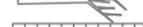
Environmental Banc & Exchange  
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**NEWTOWN  
 UT to UNDERWOOD CREEK  
 UNION COUNTY, NORTH CAROLINA**

DATE: 5-27-2011  
 REVISIONS:  
 PROJECT NAME: EBX NEWTOWN  
 DWG NAME: AS-BUILT  
 SCALE: 1" = 60'  
 RECORD DRAWINGS  
 SHEET NO. **PLN5**

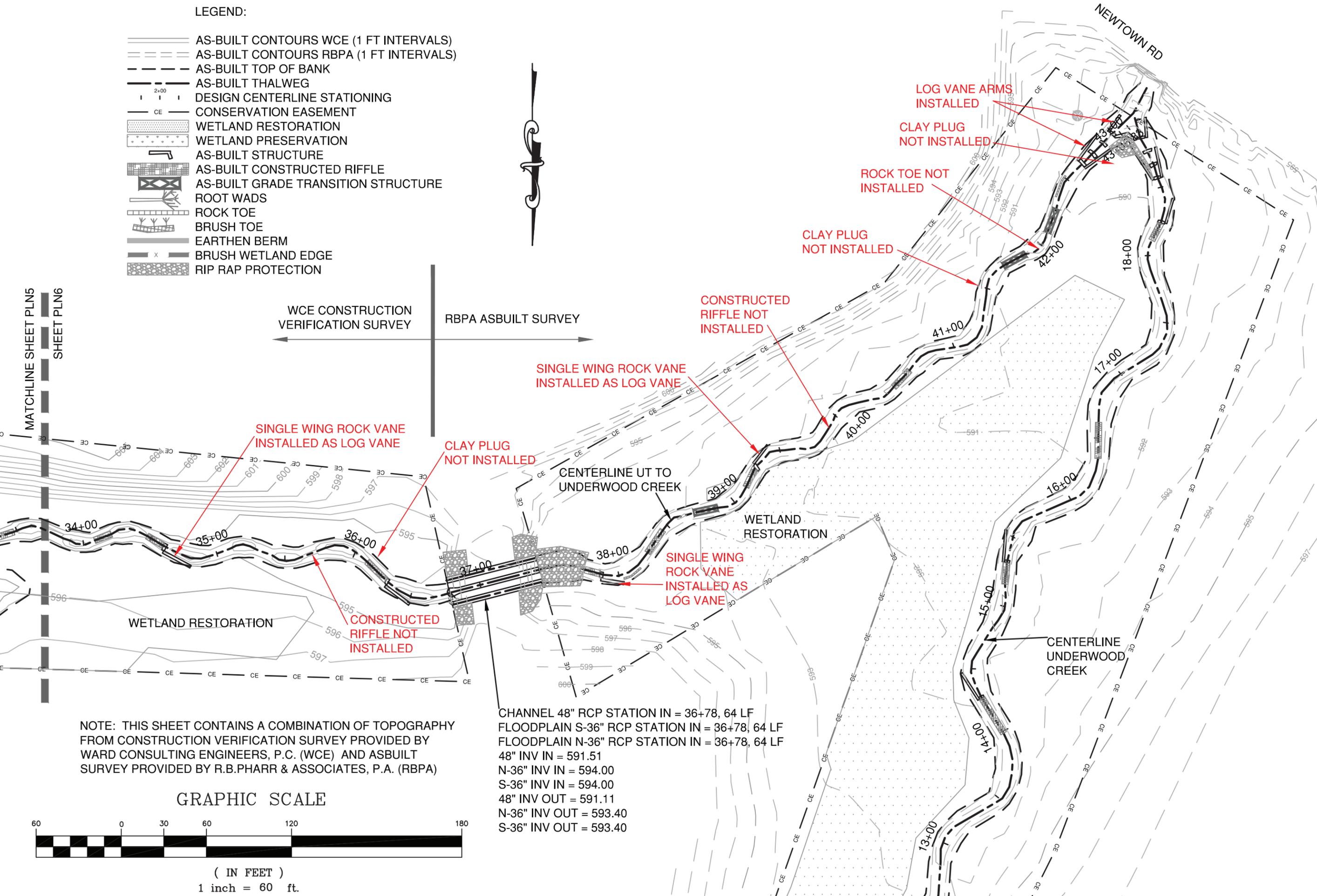
LEGEND:

-  AS-BUILT CONTOURS WCE (1 FT INTERVALS)
-  AS-BUILT CONTOURS RBPA (1 FT INTERVALS)
-  AS-BUILT TOP OF BANK
-  AS-BUILT THALWEG
-  DESIGN CENTERLINE STATIONING
-  CONSERVATION EASEMENT
-  WETLAND RESTORATION
-  WETLAND PRESERVATION
-  AS-BUILT STRUCTURE
-  AS-BUILT CONSTRUCTED RIFFLE
-  AS-BUILT GRADE TRANSITION STRUCTURE
-  ROOT WADS
-  ROCK TOE
-  BRUSH TOE
-  EARTHEN BERM
-  BRUSH WETLAND EDGE
-  RIP RAP PROTECTION



← WCE CONSTRUCTION VERIFICATION SURVEY →  
 ← RBPA ASBUILT SURVEY →

MATCHLINE SHEET PLN5  
SHEET PLN6



NOTE: THIS SHEET CONTAINS A COMBINATION OF TOPOGRAPHY FROM CONSTRUCTION VERIFICATION SURVEY PROVIDED BY WARD CONSULTING ENGINEERS, P.C. (WCE) AND ASBUILT SURVEY PROVIDED BY R.B.PHARR & ASSOCIATES, P.A. (RBPA)

CHANNEL 48" RCP STATION IN = 36+78, 64 LF  
 FLOODPLAIN S-36" RCP STATION IN = 36+78, 64 LF  
 FLOODPLAIN N-36" RCP STATION IN = 36+78, 64 LF  
 48" INV IN = 591.51  
 N-36" INV IN = 594.00  
 S-36" INV IN = 594.00  
 48" INV OUT = 591.11  
 N-36" INV OUT = 593.40  
 S-36" INV OUT = 593.40

GRAPHIC SCALE



( IN FEET )  
1 inch = 60 ft.

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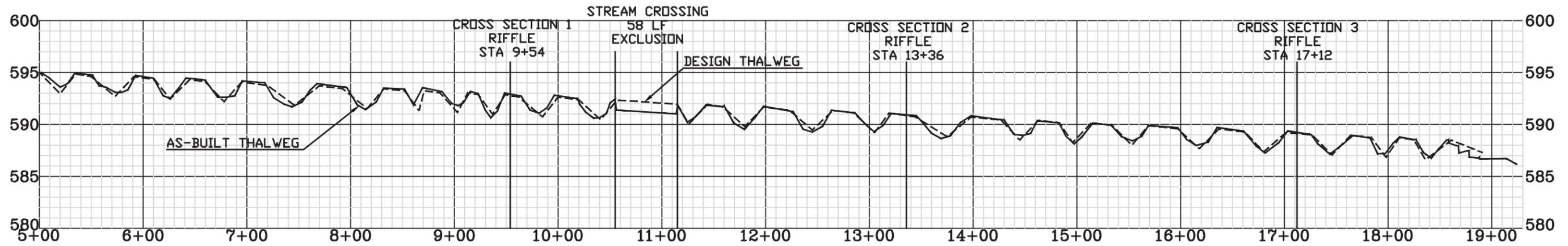
Environmental Banc & Exchange  
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 Raleigh NC 27606 Phone: (919) 829-9909  
 Fax: (919) 229-9913



**NEWTOWN**  
**UT to UNDERWOOD CREEK**  
**UNION COUNTY, NORTH CAROLINA**

DATE:	5-27-2011
REVISIONS:	
PROJECT NAME:	EBX NEWTOWN
DWG NAME:	AS-BUILT
SCALE:	1" = 60'
RECORD DRAWINGS	
SHEET NO.	PLN6

AS-BUILT UNDERWOOD CREEK (NEWTOWN)  
LONGITUDINAL PROFILE  
MAIN CHANNEL



SCALE:  
HORIZONTAL - 1" = 100'  
VERTICAL - 1" = 10'

LEGEND

- AS-BUILT TW
- DESIGN TW

GRAPHIC SCALE



( IN FEET )  
1 inch = 100 ft.

**Ward Consulting Engineers, P.C.**  
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NEWTOWN  
AS-BUILT PROFILE  
UNDERWOOD CREEK  
UNION COUNTY, NORTH CAROLINA

DATE: 5-27-2011

REVISIONS:

PROJECT NAME:  
EBX NEWTOWN

DWG NAME:  
ASBUILT PROFILES

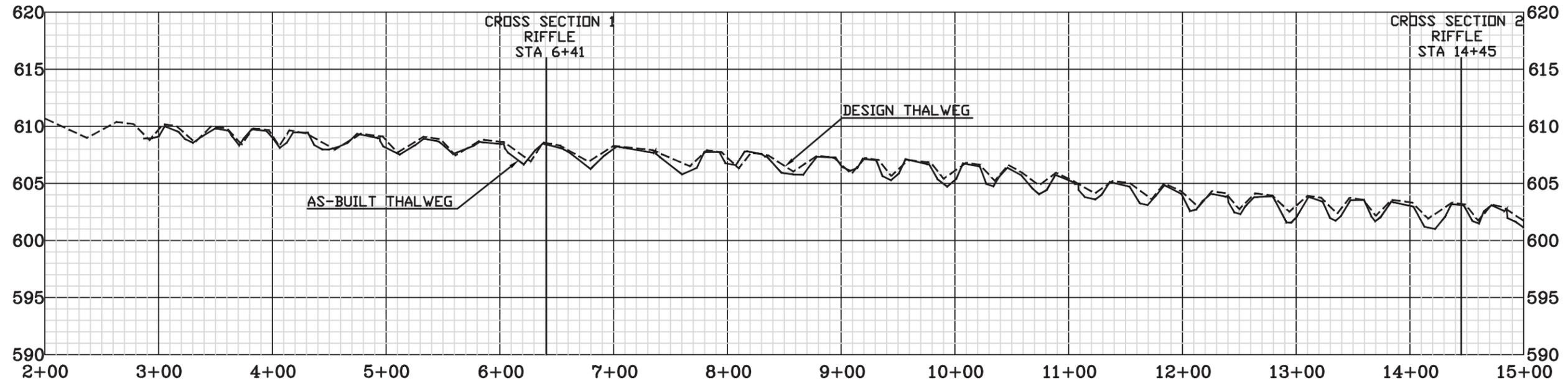
SCALE:  
1" = 100

RECORD DRAWINGS

SHEET NO.

PR01

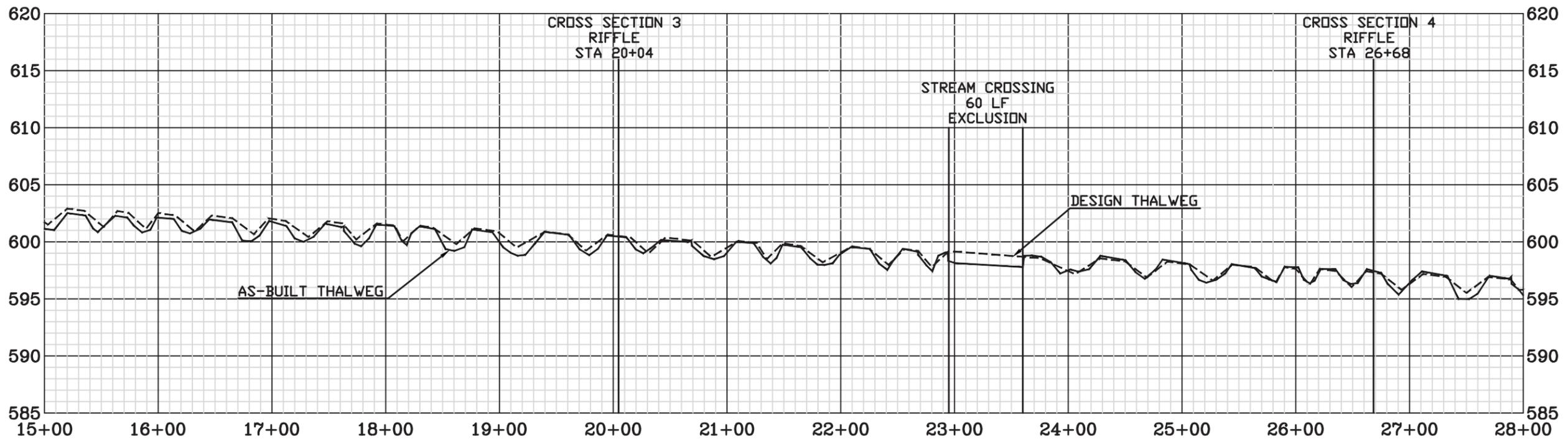
AS-BUILT UT TO UNDERWOOD CREEK (NEWTOWN)  
LONGITUDINAL PROFILE  
TRIBUTARY CHANNEL



SCALE:  
HORIZONTAL - 1" = 100'  
VERTICAL - 1" = 10'

LEGEND

— AS-BUILT TW  
- - - DESIGN TW



SCALE:  
HORIZONTAL - 1" = 100'  
VERTICAL - 1" = 10'

GRAPHIC SCALE



( IN FEET )  
1 inch = 100 ft.

**Ward Consulting Engineers, P.C.**  
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**NEWTOWN  
AS-BUILT PROFILES  
UT TO UNDERWOOD CREEK  
UNION COUNTY, NORTH CAROLINA**

DATE: 5-27-2011

REVISIONS:

PROJECT NAME:  
EBX NEWTOWN

DWG NAME:  
ASBUILT PROFILES

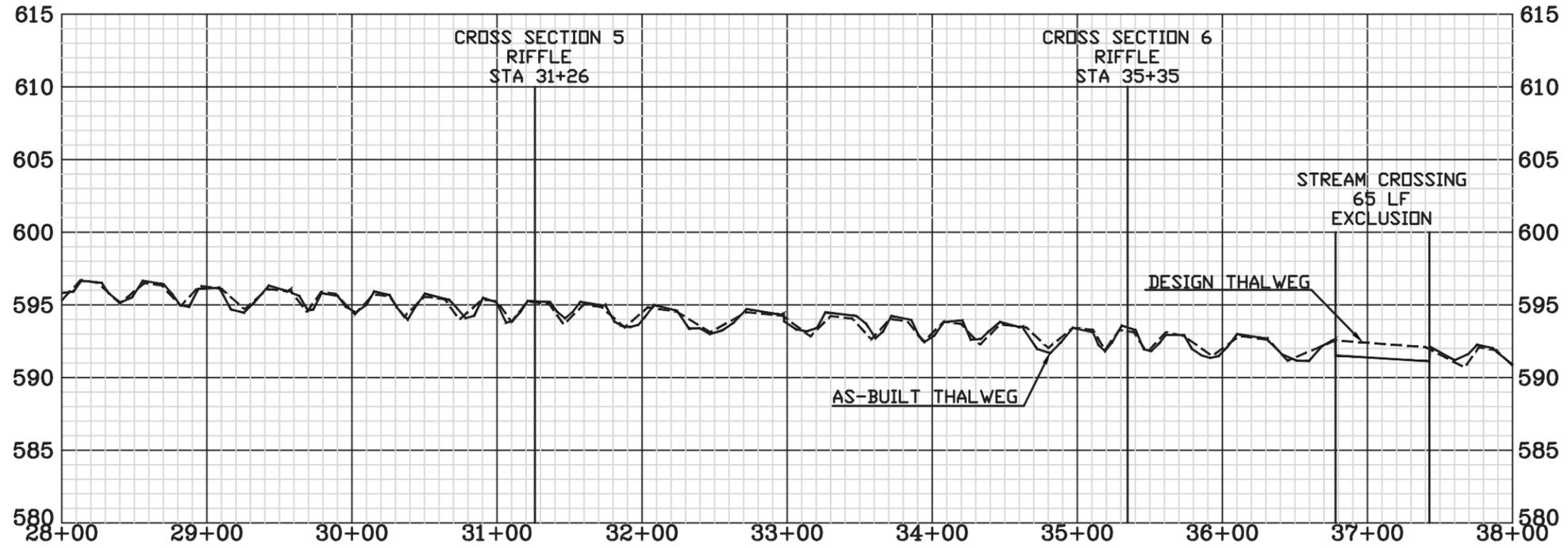
SCALE:  
1" = 100

RECORD DRAWINGS

SHEET NO.

**PR02**

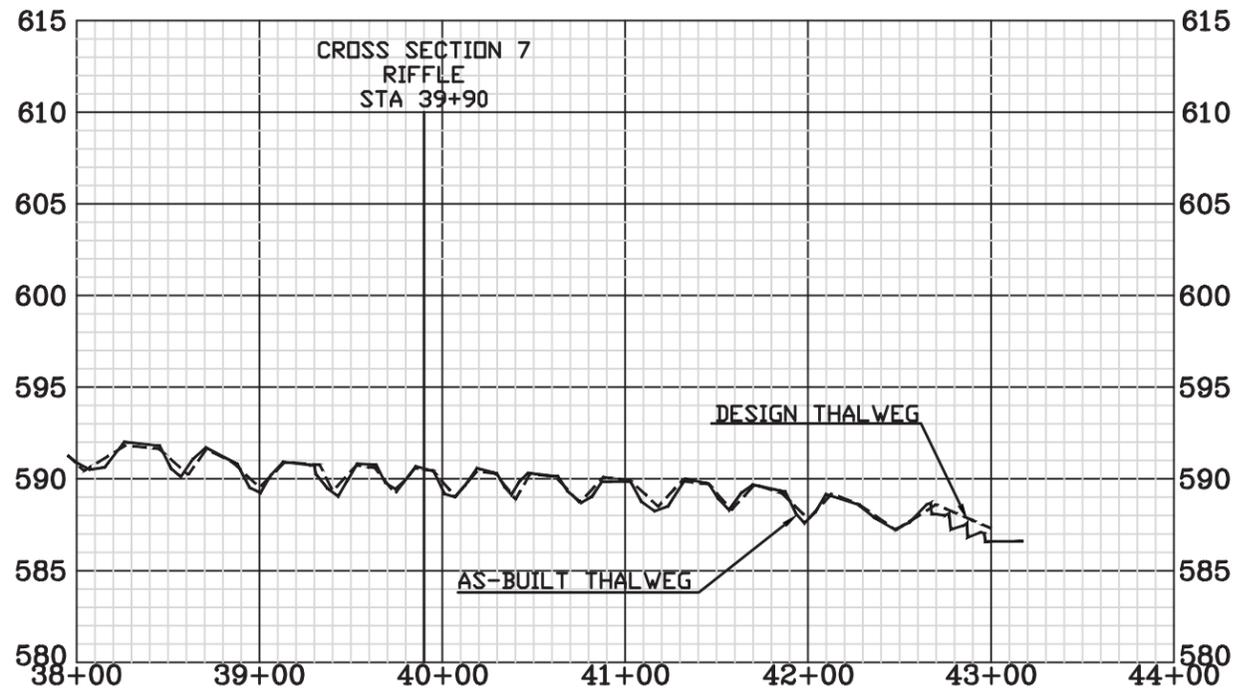
AS-BUILT UT TO UNDERWOOD CREEK (NEWTOWN)  
LONGITUDINAL PROFILE  
TRIBUTARY CHANNEL



SCALE:  
HORIZONTAL - 1" = 100'  
VERTICAL - 1" = 10'

LEGEND

———— AS-BUILT TW  
----- DESIGN TW



SCALE:  
HORIZONTAL - 1" = 100'  
VERTICAL - 1" = 10'



GRAPHIC SCALE

( IN FEET )  
1 inch = 100 ft.

**Ward Consulting Engineers, P.C.**  
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Fax: (919) 229-9913



NEWTOWN  
AS-BUILT PROFILES  
UT TO UNDERWOOD CREEK  
UNION COUNTY, NORTH CAROLINA

DATE:	5-27-2011
REVISIONS:	
PROJECT NAME:	EBX NEWTOWN
DWG NAME:	ASBUILT PROFILES
SCALE:	1" = 100
RECORD DRAWINGS	
SHEET NO.	

**AS-BUILT  
UNDERWOOD CREEK TABLE**

ASBUILT			ASBUILT		
Station	TW Elevation	Description	Station	TW Elevation	Description
501.44	595.02	TIE IN	1053.58	592.33	HR
520	593.59	CP	1056.08	591.38	FES
534.38	594.96	HR	1113.99	591.02	CI
551.19	594.73	ER	1115.91	591.85	ER
572.94	593.1	CP	1142.62	591.86	HR
592.93	594.73	HR	1160.09	591.8	ER
610.05	594.44	ER	1179.68	589.52	CP
625.94	592.5	CP	1198.08	591.74	HR
641.48	594.47	HR	1226.78	591.23	ER
659.86	594.25	ER	1244.95	589.27	CP
679.9	592.61	CP	1263.66	591.37	HR
695.73	594.2	HR	1286.18	591.12	ER
717.47	593.99	ER	1304.4	589.31	CP
743.58	591.69	CP	1321.1	591.06	HR
767.79	593.93	HR	1345.42	590.84	ER
796.45	593.55	ER	1369.07	588.64	CP
814.41	591.43	CP	1398.24	590.84	HR
831.96	593.5	HR	1429.78	590.46	ER
852	593.4	ER	1447.53	588.94	CP
860.53	591.88	CP	1461.86	590.35	HR
869.45	593.54	HR	1482.83	590.14	ER
888.09	593.16	ER	1497.46	588.13	CP
903.64	591.81	CP	1515.5	590.13	HR
915.55	593.18	HR	1532.77	589.97	ER
922.91	592.97	ER	1553.59	588.42	CP
935.11	590.65	CP	1569.13	589.9	HR
948.48	593.02	HR	1597.36	589.69	ER
964.35	592.73	ER	1615.02	587.98	CP
981.59	591.08	CP	1635.31	589.71	HR
996.52	592.82	HR	1660.76	589.35	ER
1018.65	592.51	ER	1681.47	587.25	CP
1034.14	590.61	CP	1703.4	589.38	HR
			1725.97	589.02	ER
			1743.91	587.13	CP
			1766.37	588.94	HR
			1782.82	588.7	ER
			1797.4	587.21	CP
			1811.27	588.79	HR
			1826.8	588.57	ER
			1841.68	586.76	CP
			1858.12	588.54	A-VANE
			1867.82	587.95	CENTER
			1877.97	587.47	A-VANE
			1887.99	586.84	CENTER
			1924.15	586.15	TIE IN

**AS-BUILT  
UT TO UNDERWOOD CREEK TABLES**

ASBUILT		
Station	TW Elevation	Description
292.2	608.5	CP
305.38	610.01	HR
317.71	609.51	ER
330.16	608.56	CP
349.99	609.82	HR
361.7	609.61	ER
370.82	608.33	CP
381.92	609.74	HR
394.72	609.6	ER
406.51	608.12	CP
418.44	609.49	HR
431.35	609.43	ER
449.58	607.97	CP
474.57	609.35	HR
494.23	608.98	ER
511.83	607.53	CP
533.31	608.92	HR
546.11	608.68	ER
582.15	608.64	HR
603.44	608.45	ER
621.01	606.66	CP
637.87	608.49	HR
654.96	608.05	ER
679.61	606.26	CP
702.92	608.23	HR
736.96	607.88	ER
760.12	605.79	CP
779.83	607.77	HR
792.95	607.75	ER
807.41	606.6	CP
817.23	607.81	HR
834.94	607.34	ER
858.04	605.79	CP
878.82	607.33	HR
895.21	607.25	ER
907.94	606.11	CP
919.16	607.16	HR
930.97	607.03	ER
943.72	605.27	CP
956.7	607.13	HR
977.45	606.67	ER
993.25	604.72	CP
1007.16	606.76	HR
1022.07	606.47	ER
1033.77	604.75	CP
1046.25	606.38	HR
1058.48	605.7	ER
1074.02	604.05	CP
1088.49	605.75	HR
1104.51	605.1	ER
1123.37	603.59	CP
1136.24	605.13	HR
1153.75	604.71	ER
1169.44	603.1	CP
1184.24	604.85	HR
1199.3	604.07	ER
1212.06	602.7	CP
1225.22	604.1	HR
1239.84	603.91	ER
1251.06	602.31	CP
1263.19	603.8	HR
1279.56	603.87	ER
1295.63	601.56	CP
1311.05	603.83	HR
1323.36	603.39	ER
1334.57	601.73	CP
1347.91	603.54	HR
1359.72	603.56	ER
1369.54	601.69	CP
1383.59	603.39	HR

ASBUILT		
Station	TW Elevation	Description
1403.2	602.96	ER
1422.07	601	CP
1436.58	603.18	HR
1447.42	603.09	ER
1460.71	601.48	CP
1471.82	603.1	HR
1485.19	602.77	ER
1499.7	601.15	CP
1520.18	602.52	HR
1536.09	602.3	ER
1546.7	600.86	CP
1562.3	602.29	HR
1572.87	602.12	ER
1585.71	600.82	CP
1598.72	602.14	HR
1613.7	602	ER
1627.69	600.74	CP
1644.82	601.96	HR
1665.1	601.7	ER
1681.42	600.03	CP
1697.52	601.83	HR
1712.73	601.38	ER
1727.44	600	CP
1746.71	601.59	HR
1762.96	601.35	ER
1778.21	599.61	CP
1791.79	601.52	HR
1807.64	601.38	ER
1818.4	599.72	CP
1829.69	601.35	HR
1843.22	601.12	ER
1860.05	599.2	CP
1875.94	601.09	HR
1893.86	600.83	ER
1915.74	598.79	CP
1939.51	600.88	HR
1961.11	600.61	ER
1978.7	598.83	CP
1994.53	600.56	HR
2011.72	600.39	ER
2026.31	598.99	CP
2041.87	600.17	HR
2068.58	600.11	ER
2088.52	598.48	CP
2108.09	600	HR
2123.32	599.89	ER
2138.27	598.11	CP
2148.85	599.75	HR
2165.19	599.52	ER
2185.38	597.97	CP
2209.02	599.53	HR
2225.65	599.38	ER
2240.85	597.55	CP
2254.46	599.39	HR
2267.7	599.13	ER
2280.37	597.43	CP
2291.79	599.05	HR
2294.36	598.34	FES
2300.34	598.14	CI
2359.95	597.79	CI
2361.15	598.79	ER
2401.97	597.58	CP
2428.38	598.78	HR
2450.31	598.39	ER
2467.06	596.76	CP
2482.96	598.45	HR
2506.47	598.03	ER
2521.18	596.42	CP
2543.72	598.05	HR
2564.03	597.7	ER
2576.33	596.72	CP
2590.25	597.82	HR
2602.32	597.75	ER
2612.15	596.37	CP
2622	597.62	HR
2634.92	597.61	ER

ASBUILT		
Station	TW Elevation	Description
2648.17	596.31	CP
2662.49	597.61	HR
2675.21	597.27	ER
2690.25	595.37	CP
2711.05	597.41	HR
2733.35	597.01	ER
2752.34	594.99	CP
2770.32	597.04	HR
2789.34	596.93	ER
2801.91	595.82	CP
2813.66	596.66	HR
2827.63	596.51	ER
2840.29	595.16	CP
2855.98	596.66	HR
2870.32	596.42	ER
2881.81	594.97	CP
2894.23	596.1	HR
2908.65	596.17	ER
2925.46	594.45	CP
2942.79	596.32	HR
2958.02	596.09	ER
2968.66	594.6	CP
2979.13	595.8	HR
2990.23	595.61	ER
3002.6	594.47	CP
3015.43	595.92	HR
3026.09	595.66	ER
3038.47	593.98	CP
3050.32	595.77	HR
3067.33	595.33	ER
3078.43	594.08	CP
3090.52	595.48	HR
3099.71	595.17	ER
3110.65	593.88	CP
3121.36	595.27	HR
3136.69	595.18	ER
3146.9	594.07	CP
3157.65	595.21	HR
3174.67	595	ER
3191.65	593.47	CP
3208.42	594.99	HR
3224.18	594.59	ER
3246.62	592.99	CP
3272.22	594.71	HR
3297.73	594.41	ER
3313.18	593.17	CP
3326.47	594.49	HR
3347.88	594.23	ER
3360.9	592.7	CP
3372	594.24	HR
3385.72	593.95	ER
3394.72	592.44	CP
3408.02	593.81	HR
3420.87	593.93	ER
3433.54	592.65	CP
3446.88	593.82	HR
3462.57	593.5	ER
3481.31	591.67	CP
3497.08	593.41	HR
3510.84	593.1	ER
3519.17	591.81	CP
3530.82	593.57	HR
3540.28	593.26	ER
3550.96	591.81	CP
3561.08	592.93	HR
3573.69	592.91	ER
3591.56	591.34	CP
3610.26	592.99	HR
3631.02	592.69	ER
3651.08	591.16	CP
3676.14	592.57	HR
3678.08	591.51	FES
3742.72	591.11	CI
3743.32	592.11	ER
3760.08	591.19	CP

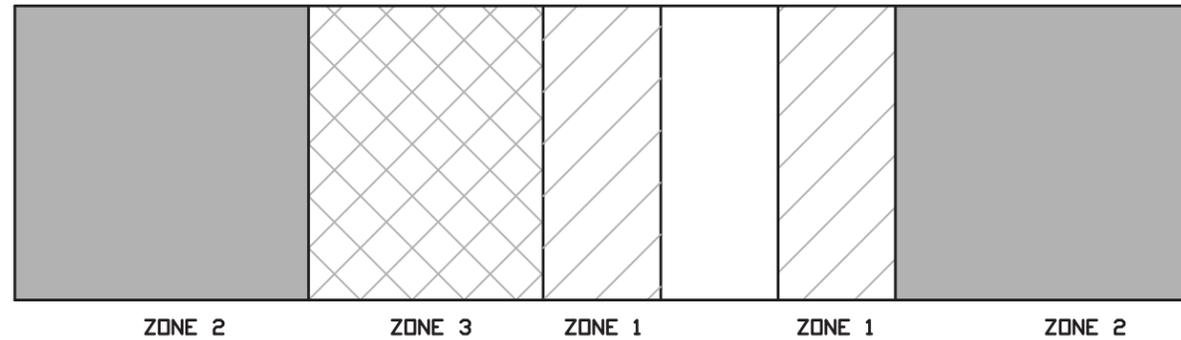
ASBUILT		
Station	TW Elevation	Description
3775.78	592.25	HR
3788.93	591.79	ER
3807.03	590.51	CP
3826.15	592.02	HR
3845.41	591.8	ER
3856.87	590.11	CP
3870.73	591.71	HR
3887.89	590.8	ER
3900.5	589.24	CP
3912.91	590.93	HR
3929.94	590.76	ER
3942.91	589.05	CP
3953.46	590.82	HR
3963.77	590.78	ER
3974.16	589.45	CP
3985.48	590.69	HR
3995.22	590.42	ER
4006.74	589.01	CP
4019.06	590.58	HR
4029.77	590.3	ER
4037.74	589.14	CP
4047	590.33	HR
4063.37	590.12	ER
4075.9	588.7	CP
4087.31	589.85	HR
4102.98	589.86	ER
4115.99	588.24	CP
4132.95	590	HR
4145.53	589.75	ER
4156.64	588.31	CP
4169.94	589.68	HR
4187.55	589.29	ER
4197.98	587.58	CP
4209.81	589.17	HR
4227.4	588.6	ER
4247.24	587.24	CP
4267.06	588.69	A-VANE
4277.09	588.11	CENTER
4286.95	587.59	A-VANE
4296.41	587.02	CENTER

NOTE: ELEVATION IN CHART IS THALWEG ELEVATION (TW)

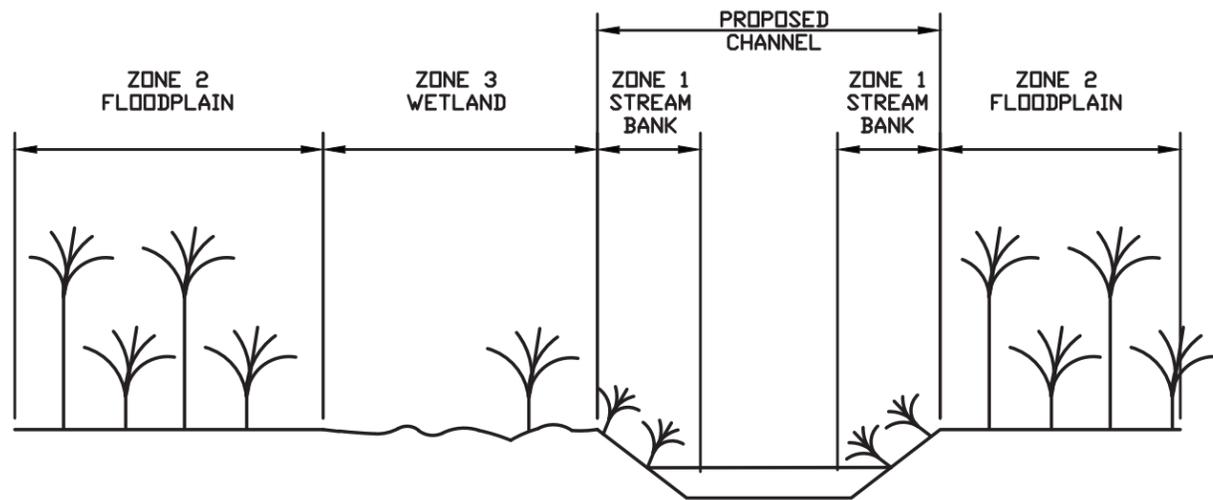
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**PROFILE TABLES  
 UNDERWOOD CREEK AND  
 UT TO UNDERWOOD CREEK  
 UNION COUNTY, NORTH CAROLINA</**



PLAN VIEW



PLANTING ZONE PROFILE SCHEMATIC  
NOT TO SCALE

**GENERAL NOTES:**

1. TEMPORARY PLANTING WILL OCCUR IMMEDIATELY AFTER CONSTRUCTION TO STABILIZE AREAS OF BARE SOIL. PERMANENT PLANTING AND SEEDINGS SHALL BEGIN IN SEASON OPTIMALLY BETWEEN NOVEMBER 15 AND APRIL 15.
2. PRIOR TO PERMANENT PLANTINGS AND SEEDINGS, THE SITE SOILS SHALL BE PREPARED FOR PLANTING. WHERE NEEDED THE SOILS SHOULD BE PLOWED OR RIPPED TO IMPROVE COMPACTED SOILS AND ELIMINATE CHANNELIZED FLOW FROM NON-TARGET AREAS. IF NECESSARY SOILS SHALL BE AMENDED WITH STORED SITE TOPSOIL TO FACILITATE VIGOROUS PLANT GROWTH. EXOTIC AND INVASIVE PLANTS SHALL BE TREATED AND REMOVED.
3. SUMMARY OF PLANT QUANTITIES CHART SIZE REFERS TO THE SIZE OF THE PLANTS AT INSTALLATION.
4. THE SPACING OF THE PLANTS SHALL BE 3' ON CENTER FOR SMALL PLANTS, WETLAND FORBES, AND ON STREAM BANK ZONES FOR TREES AND SHRUBS. SPACING SHALL BE 10 FEET ALONG ROWS WITH 10 FOOT ROW SPACING. FOR TREES AND SHRUBS PLANTING DENSITY IS TO BE 640 PLANTS/ACRE.
5. PLANTS WILL BE KEPT SHADED AND WELL WATERED TO MAINTAIN HEALTHY, VIGOROUS CONDITION PRIOR TO PLANTING.
6. PERMANENT SEED MIX REQUIRES ADVANCE PRE-ORDER AND SHIPMENT.
7. ALL PLANT MATERIAL SHALL CONFORM TO OR EXCEED THE AMERICAN STANDARD FOR NURSERY STOCK (LATEST EDITION) AS PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN.
8. THE SITE SHALL BE PLANTED BY THE ZONES DEPICTED IN THE PLANTING PLAN SHEETS WITH SPECIES LISTED IN THE PLANTING TABLES.
9. PLANTING ZONE DESCRIPTIONS:
  - ZONE 1- STREAM BANK  
THE STREAM BANK ZONE INCLUDES THE STREAM CHANNEL FROM BASE FLOW TO THE BANKFULL ELEVATION.
  - ZONE 2- STREAM BUFFER  
THE STREAM BUFFER INCLUDES THE AREA FROM THE BANKFULL ELEVATION TO THE CONSERVATION EASEMENT LIMIT.
  - ZONE 3- WETLAND  
THE WETLAND ZONES INCLUDE POCKETS OF RESTORED WETLAND AREAS WITHIN ZONE 2.

Plant Table			
Bare Roots	Zone 1 (Stream banks)	Zone 2 (Buffer)	Zone 3 (Wetland)
Willow Oak ( <i>Quercus phellos</i> )		1500	500
Swamp Chestnut Oak ( <i>Quercus michauxii</i> )		2000	500
Hackberry ( <i>Celtis laevigata</i> )		500	
Paw Paw ( <i>Asimina triloba</i> )		500	
American Sycamore ( <i>Platanus occidentalis</i> )		1300	300
Green Ash ( <i>Fraxinus Pennsylvanica</i> )		1500	300
American Hornbeam/Ironwood ( <i>Carpinus caroliniana</i> )		500	
Silky Dogwood ( <i>Comus amomum</i> )			200
Buttonbush ( <i>Cephalanthus occidentalis</i> )			300
Persimmon ( <i>Diospyros virginiana</i> )		500	200
River Birch ( <i>Betula nigra</i> )		300	300
<b>Bare Root Total =</b>	<b>0</b>	<b>8600</b>	<b>2600</b>
<b>Live Stakes</b>			
Silky Dogwood ( <i>Comus amomum</i> )	2000		
Black Willow ( <i>Salix nigra</i> )	3700		

Wetland Planting Zones - Permanent Seed Mix		
Recommended application rate: 20 lbs. per acre		
Species	Common Name	Percent
<i>Agrostis stolonifera</i>	Creeping bentgrass	33
<i>Carex vulpinoidea</i>	Fox sedge	20
<i>Elymus virginicus</i>	Virginia wild rye	25
<i>Helenium autumnale</i> VA ecotype	Sneezeweed	5
<i>Iris versicolor</i>	Blue flag	5
<i>Juncus effusus</i>	Showy tick trefoil	4
<i>Rudbeckia hirta</i>	Black-eyed susan	4
<i>Verbena hastata</i>	Blue vervain	4
	Total:	100
	3.38 Total Acres	
	20 lbs./acre	
	<b>67.6 Total lbs.</b>	

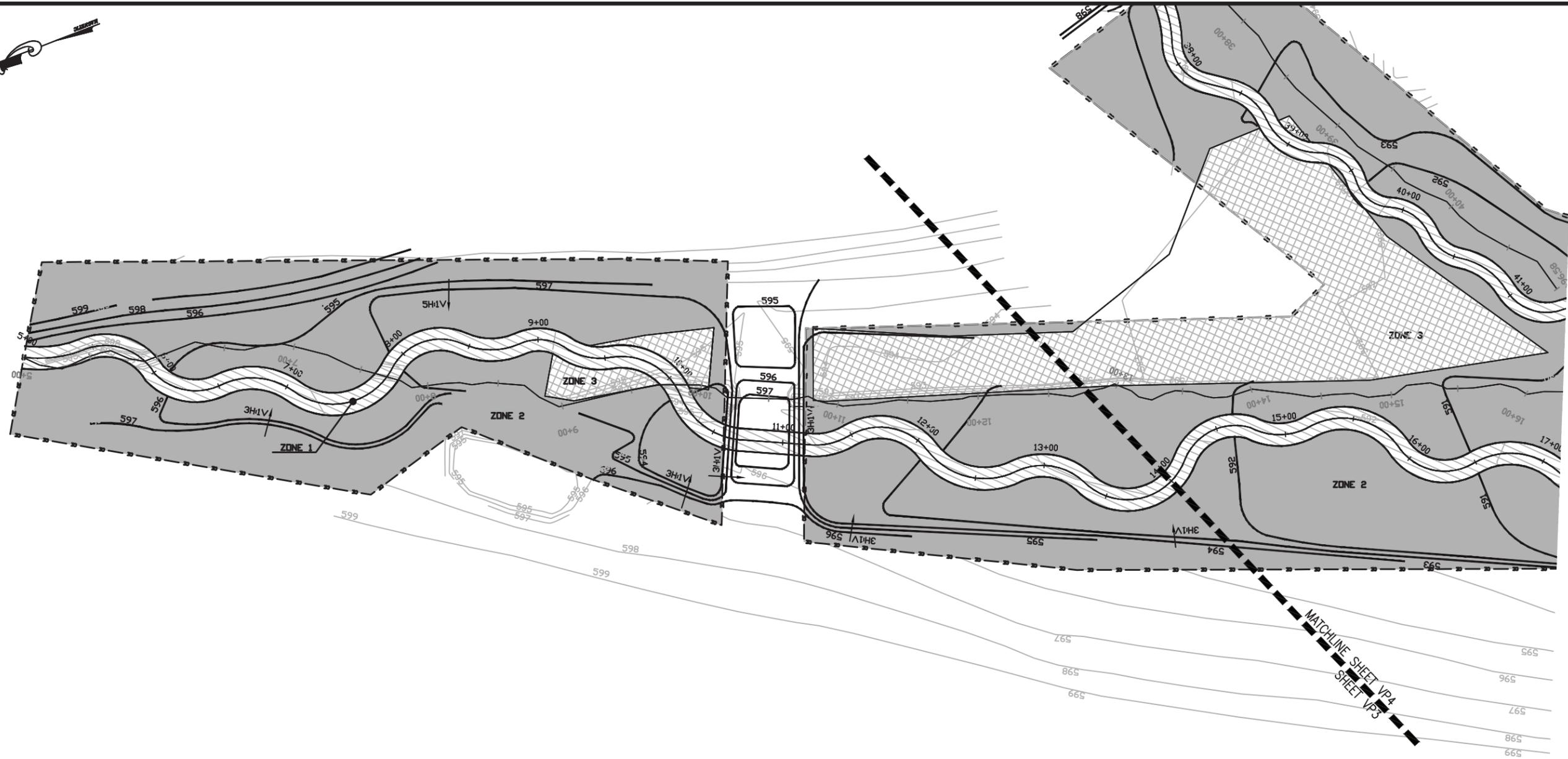
Stream Buffer and Stream Banks Planting Zones-Permanent Seed Mix		
Recommended application rate: 20 lbs. per acre		
Scientific Name	Common Name	Percent
<i>Elymus virginicus</i>	Virginia wild rye	20
<i>Panicum virgatum</i>	Switchgrass	20
<i>Agrostis stolonifera</i>	Creeping bentgrass	15
<i>Coreopsis lanceolata</i>	Coreopsis	10
<i>Panicum clandestinum</i>	Deer tongue	10
<i>Andropogon gerardii</i>	Big bluestem	5
<i>Juncus effusus</i>	Soft rush	5
<i>Polygonum pennsylvanicum</i>	Penn. Smartweed	5
<i>Schizachyrium scoparium</i>	Little bluestem	5
<i>Sorghastrum nutans</i>	Indian grass	5
		100
	13.86 Total Acres	
	20 lbs./acre	
	<b>277.2 Total lbs.</b>	

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 Raleigh NC 27606 Phone: (919) 829-9909  
 Fax: (919) 229-9913



NEWTOWN  
 PLANT QUANTITIES  
 UNION COUNTY, NORTH CAROLINA

DATE: 5-27-2011  
 REVISIONS:  
 PROJECT NAME:  
 Newtown Creek  
 DWG NAME:  
 Planting Notes  
 SCALE:  
 NTS  
 RECORD DRAWINGS  
 SHEET NO.



**LEGEND**

-  ZONE 1 - PIEDMONT ALLUVIAL FOREST STREAM BANK-1.87 ACRES
-  ZONE 2 - PIEDMONT ALLUVIAL FOREST STREAM BUFFER-11.99 ACRES
-  ZONE 3 - PIEDMONT ALLUVIAL FOREST WETLAND RESTORATION-3.38 ACRES

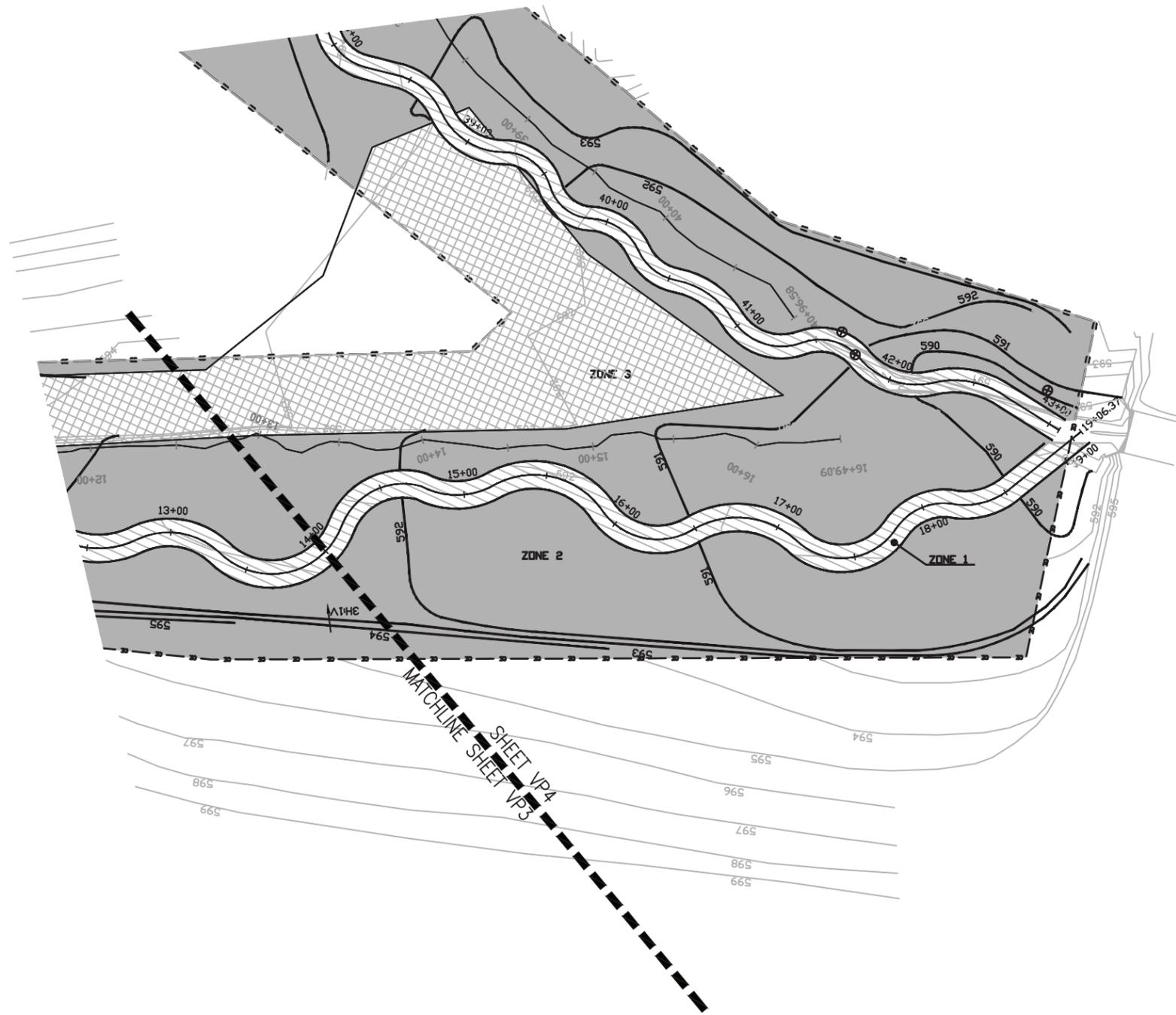


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 Fax: (919) 229-9913



**NEWTOWN PLANTING PLAN**  
**STATION 5+00 TO 14+00**  
**UNDERWOOD CREEK**  
**UNION COUNTY, NORTH CAROLINA**

DATE: 5-27-2011
REVISIONS:
PROJECT NAME: Newtown Creek
DWG NAME: Planting Plan
SCALE: 1"=40'
RECORD DRAWINGS
SHEET NO. <b>VP3</b>



**LEGEND**

- ZONE 1 - PIEDMONT ALLUVIAL FOREST STREAM BANK
- ZONE 2 - PIEDMONT ALLUVIAL FOREST STREAM BUFFER
- ZONE 3 - PIEDMONT ALLUVIAL FOREST WETLAND RESTORATION



**NEWTOWN PLANTING PLAN  
STATION 14+00 TO 19+06.37  
UNDERWOOD CREEK  
UNION COUNTY, NORTH CAROLINA**

DATE: 5-27-2011

REVISIONS:


PROJECT NAME:  
Newtown Creek

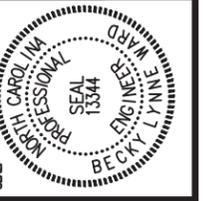
DWG NAME:  
Planting Plan

SCALE:  
1"=40'

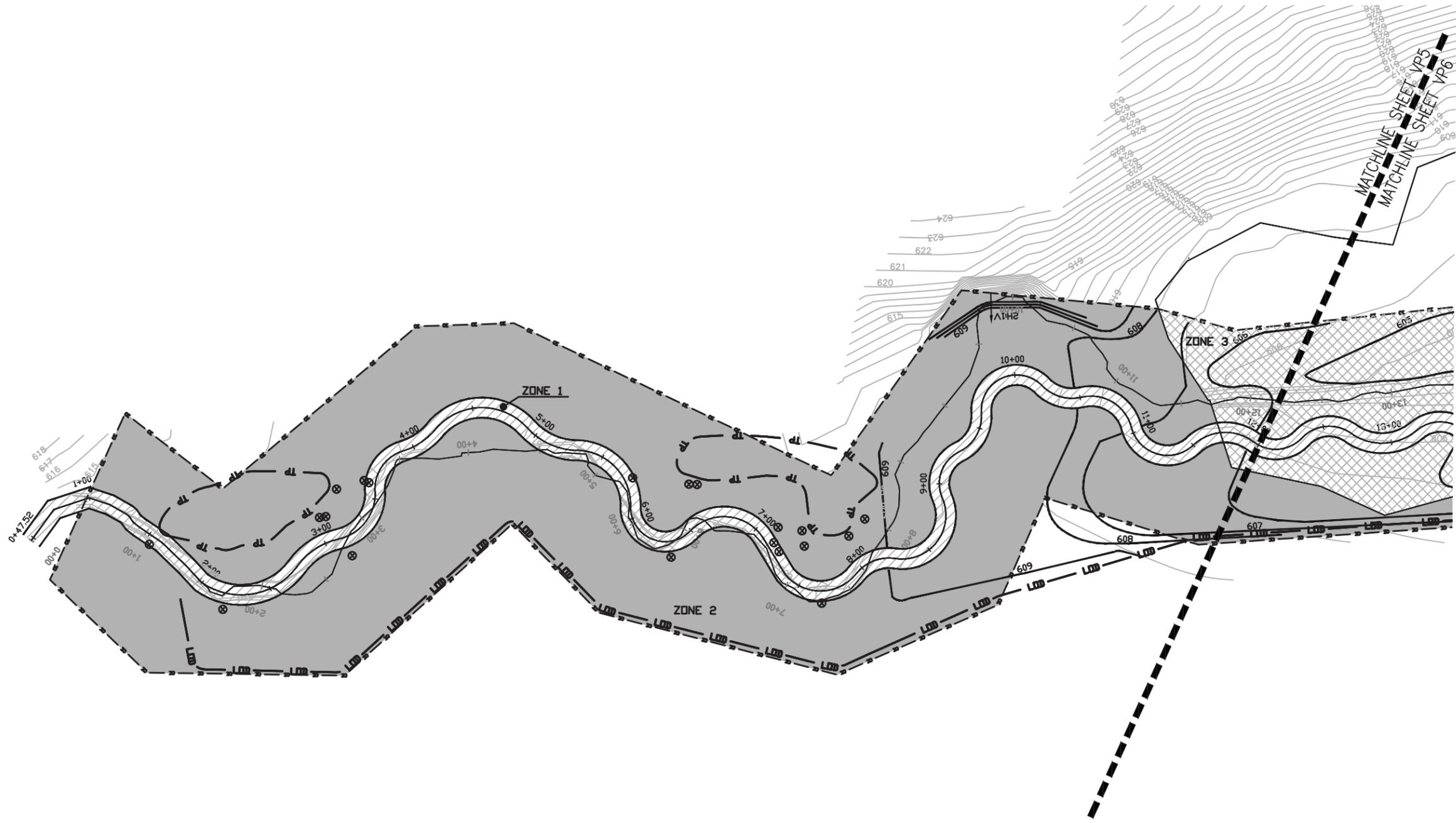
RECORD DRAWINGS

SHEET NO.

**VP4**



**Ward Consulting Engineers, P.C.**  
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- LEGEND**
-  ZONE 1 - PIEDMONT ALLUVIAL FOREST STREAM BANK
  -  ZONE 2 - PIEDMONT ALLUVIAL FOREST STREAM BUFFER
  -  ZONE 3 - PIEDMONT ALLUVIAL FOREST WETLAND RESTORATION



**NEWTOWN PLANTING PLAN**  
**STATION 0+00 TO 12+00**  
**UT TO UNDERWOOD CREEK**  
**UNION COUNTY, NORTH CAROLINA**

DATE:	5-27-2011
REVISIONS:	
PROJECT NAME:	New Town Creek
DWG NAME:	Planting Plan
SCALE:	1"=40'
RECORD DRAWINGS	
SHEET NO.	

**VP5**



**Ward Consulting Engineers, P.C.**  
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- LEGEND**
- ZONE 1 - PIEDMONT ALLUVIAL FOREST STREAM BANK
  - ZONE 2 - PIEDMONT ALLUVIAL FOREST STREAM BUFFER
  - ZONE 3 - PIEDMONT ALLUVIAL FOREST WETLAND RESTORATION

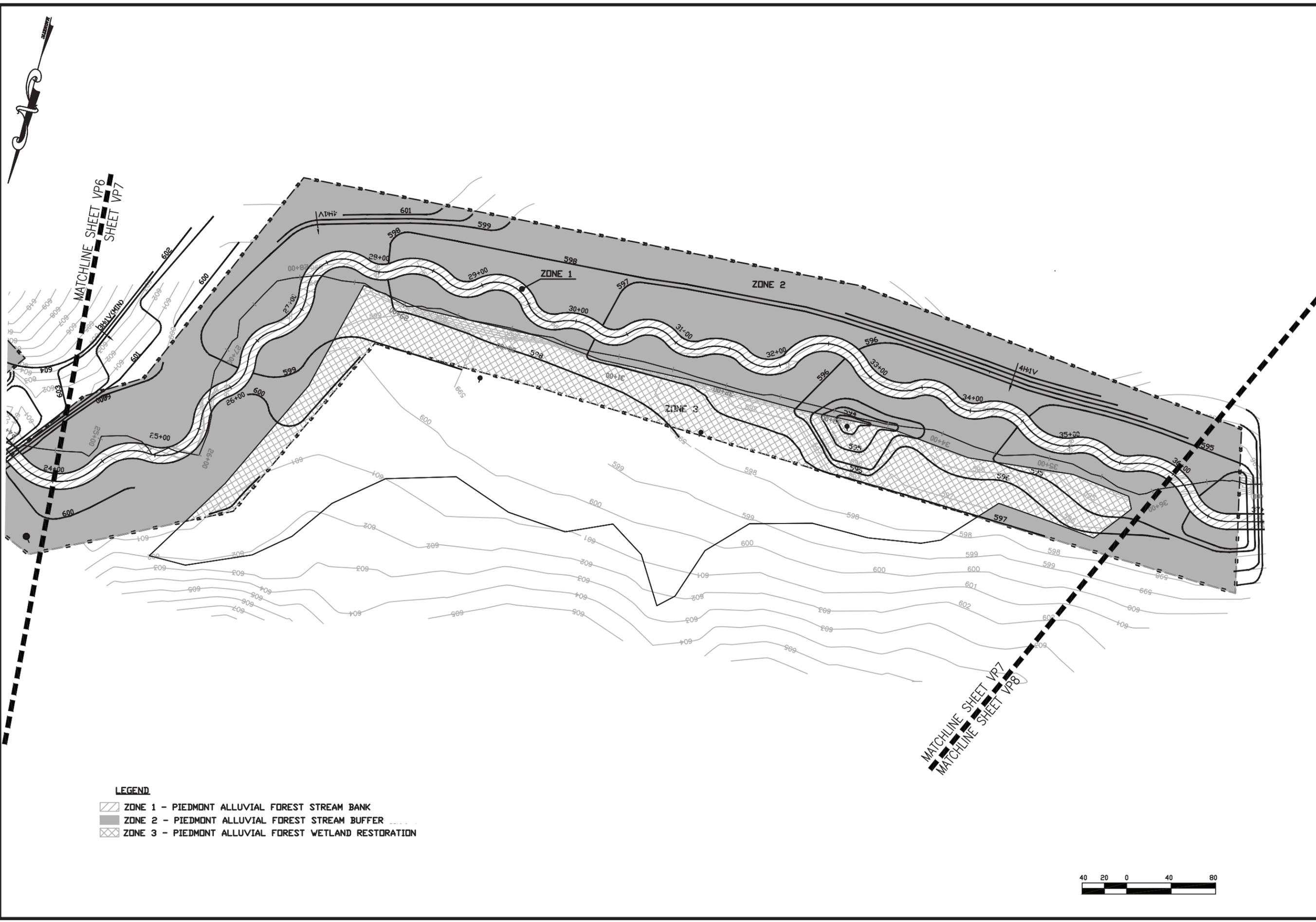


**NEWTOWN PLANTING PLAN  
STATION 12+00 TO 24+00  
UT TO UNDERWOOD CREEK  
UNION COUNTY, NORTH CAROLINA**

DATE:	5-27-2011
REVISIONS:	
PROJECT NAME:	Newtown Creek
DWG NAME:	Planting Plan
SCALE:	1"=40'
RECORD DRAWINGS	
SHEET NO.	

**VP6**

**Ward Consulting Engineers, P.C.**  
 FIRM LICENSE NO. C-2619  
 8368 Six Forks Rd, Suite 104 (919) 870-0526  
 Raleigh, NC 27615-5083 FAX (919) 870-5359  
 Environmental Banc & Exchange  
 909 Capability Drive, Suite 3100  
 Raleigh NC 27606 Phone: (919) 829-9909  
 Fax: (919) 229-9913



- LEGEND**
- ZONE 1 - PIEDMONT ALLUVIAL FOREST STREAM BANK
  - ZONE 2 - PIEDMONT ALLUVIAL FOREST STREAM BUFFER
  - ZONE 3 - PIEDMONT ALLUVIAL FOREST WETLAND RESTORATION

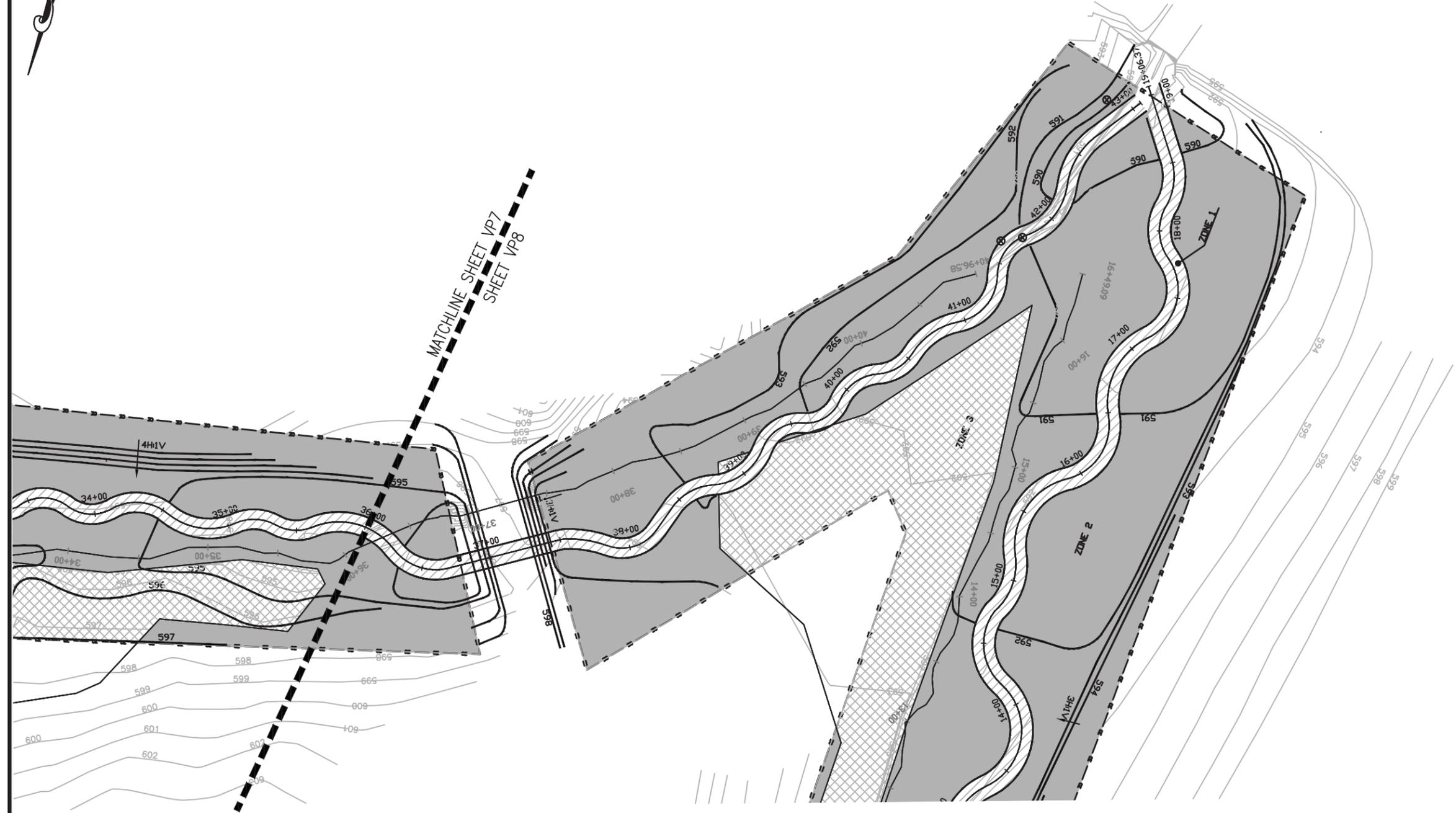


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**NEWTOWN PLANTING PLAN**  
**STATION 24+00 TO 36+00**  
**UT TO UNDERWOOD CREEK**  
**UNION COUNTY, NORTH CAROLINA**

DATE: 5-27-2011
REVISIONS:
PROJECT NAME: Newtown Creek
DWG NAME: Planting Plan
SCALE: 1"=40'
RECORD DRAWINGS
SHEET NO. <b>VP7</b>



- LEGEND**
-  ZONE 1 - PIEDMONT ALLUVIAL FOREST STREAM BANK
  -  ZONE 2 - PIEDMONT ALLUVIAL FOREST STREAM BUFFER
  -  ZONE 3 - PIEDMONT ALLUVIAL FOREST WETLAND RESTORATION



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 Fax: (919) 229-9913



**NEWTOWN PLANTING PLAN  
 STATION 36+00 TO 43+06  
 UT TO UNDERWOOD CREEK  
 UNION COUNTY, NORTH CAROLINA**

DATE: 5-27-2011  
 REVISIONS:  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 PROJECT NAME:  
 Newtown Creek  
 DWG NAME:  
 Planting Plan  
 SCALE:  
 1"=40'  
 RECORD DRAWINGS  
 SHEET NO.

**VP8**