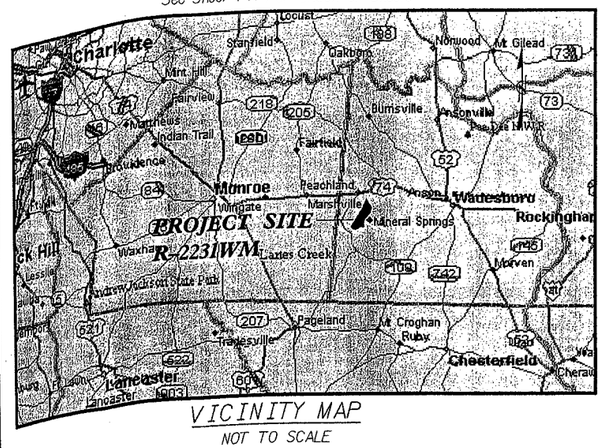
R-2231WM

PROJECT: 6.589013T

See Sheet 1-A For Index of Sheets



VICINITY MAP

NOT TO SCALE

FROM PEACHLAND, NORTH CAROLINA GO APPROXIMATELY 1.5 MILES SOUTH ON MINERAL SPRINGS CHURCH ROAD TO LOWER WHITE STORE ROAD. GO WEST ON LOWER WHITE STORE ROAD APPROXIAMTELY 2.6 MILES TO THE LEFT TURN ONTO THE SITE ENTRANCE/ACCESS ROAD

= As-Built

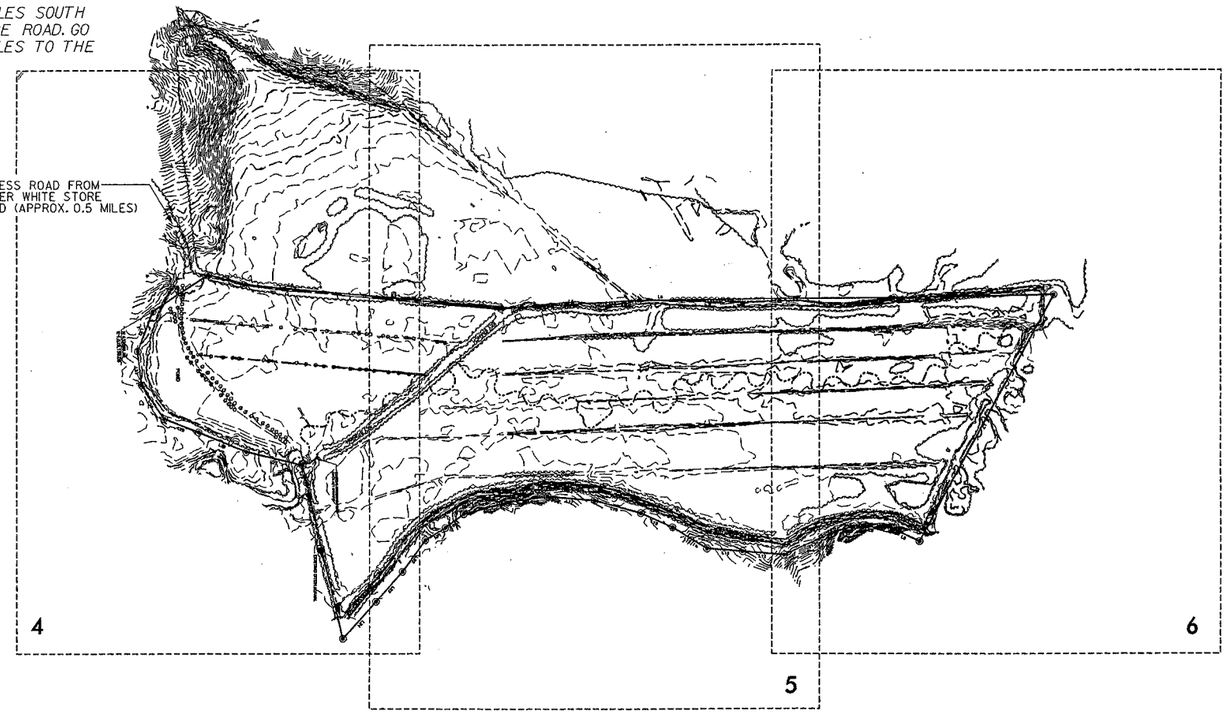
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

ANSON COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R - 2231WM	1	34
STATE PROJ. NO.	P. A. PROJ. NO.	DESCRIPTION	
6.589013T		P.E. & CONST.	

LOCATION: *KEY BRANCH MITIGATION SITE, LOCATED BETWEEN LOWER WHITE STORE ROAD (SR 1252) AND MINERAL SPRINGS CHURCH ROAD (SR 1240) ON THE BROWN CREEK FLOODPLAIN IN ANSON COUNTY, NORTH CAROLINA*

TYPE OF WORK: *GRADING, CLEARING AND GRUBBING, MOWING, RIPPING, DISCING, DRAINAGE, AND STREAM RESTORATION*



NC GRID NAD '83

GRAPHIC SCALES

PLANS: -100 -50 0 100 200

PROFILE (HORIZONTAL): -50 -25 0 50 100

PROFILE (VERTICAL): -5 -2.5 0 5 10

PROJECT LENGTH

TOTAL WETLAND MITIGATION = 118 ACRES

LENGTH OF STREAM RESTORATION = 6,183 FEET

Prepared In the Office of:

KCI Associates of North Carolina, P.A.

SUITE 200 LANDMARK CENTER I, 4601 SIX FORKS RD., RALEIGH NC

ENGINEERS • PLANNERS • ECOLOGISTS

for the:

DIVISION OF HIGHWAYS

2002 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:

LETTING DATE:

DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 14351 ENGINEER JAMES WALDO BLAKE

SIGNATURE: 7.16.03 P.E.

WETLAND SCIENTIST

SIGNATURE:

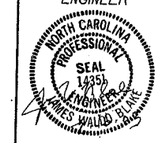
DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE DESIGN ENGINEER P.E.

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR DATE

PROJECT REFERENCE NO.	SHEET NO.
R-2231WM	1-A
R/W SHEET NO.	
ENGINEER	SCIENTIST



INDEX OF SHEETS:

ROADWAY STANDARD DRAWINGS:
(REV. JAN. 15, 2002)

THE FOLLOWING ROADWAY STANDARDS AS APPEAR IN "ROADWAY STANDARD DRAWINGS" - HIGHWAY DESIGN BRANCH - N.C. DEPARTMENT OF TRANSPORTATION - RALEIGH, N.C., DATED JANUARY 15, 2002 AND THE LATEST REVISION THERETO ARE APPLICABLE TO THIS PROJECT AND BY REFERENCE HEREBY ARE CONSIDERED A PART OF THESE PLANS:

STD. NO.	TITLE
866.02	WOVEN WIRE FENCE WITH WOOD POSTS
866.04	BARBED WIRE FENCE WITH WOOD POSTS (ALTERNATE CATTLE GATE)
1605.01	TEMPORARY SILT FENCE
1636.01	ROCK SILT SCREEN
1633.01	TEMPORARY ROCK SILT CHECK TYPE A

GENERAL NOTES:

PROJECT SURVEY DATA HAS BEEN DEVELOPED AND PROVIDED IN PART BY NCDOT AND IN PART BY KCI.

PROPERTY BOUNDARY AND PROJECT/CONSERVATION EASEMENT BOUNDARY DATA HAS BEEN SUPPLIED BY NCDOT.

BEARINGS AND DISTANCES:
ALL DISTANCES AND COORDINATES SHOWN ARE HORIZONTAL (GROUND) VALUES.
ALL INFORMATION IS BASED ON THE FOLLOWING CONTROL DATA, AS PUBLISHED BY NCDOT:
"KB-1": N=435,839.42, E=1,616,856.12, ELEV.=373.37 FT.
"KB-2": N=436,416.45, E=1,618,106.49, ELEV.=360.20 FT.
(ALL BEARINGS ARE NAD '83 GRID BEARINGS.)

SUBSURFACE PLANS:
NO SUBSURFACE PLANS ARE AVAILABLE ON THIS PROJECT. THE CONTRACTOR SHOULD MAKE HIS OWN INVESTIGATION AS TO THE SUBSURFACE CONDITIONS.

UTILITIES:
UTILITY LOCATIONS NOTED ON THE PLANS, IF ANY, ARE FOR INFORMATIONAL PURPOSES ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO LOCATE AND VERIFY ANY EXISTING UTILITIES. THE CONTRACTOR SHOULD CONTACT THE NORTH CAROLINA ONE-CALL CENTER (1-800-632-4949) A MINIMUM OF 48 HOURS IN ADVANCE OF OCCUPYING THE PROJECT SITE.

GRADING:
ALL INFLECTION POINTS BETWEEN SLOPE ANGLES SHALL BE SLIGHTLY ROUNDED IN ORDER TO PROVIDE FOR SMOOTH TRANSITIONS AND A MORE NATURAL APPEARANCE.

KCI Associates
of North Carolina, P.A.
LANDMARK CENTER II, SUITE 220
4601 SIX FORKS ROAD, RALEIGH, NC 27609-5210
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DIVISION OF HIGHWAYS

CONVENTIONAL SYMBOLS

PROJECT REFERENCE NO.	SHEET NO.
R-2231WM	1-B
RW SHEET NO.	
ENGINEER	SCIENTIST

NORTH CAROLINA PROFESSIONAL SEAL 19851 ENGINEER JAMES WALDO BLAKE

ROADS & RELATED ITEMS

- Edge of Pavement
- Curb
- Prop. Slope Stakes Cut — C
- Prop. Slope Stakes Fill — F
- Prop. Woven Wire Fence
- Prop. Chain Link Fence
- Prop. Barbed Wire Fence
- Prop. Wheelchair Ramp — WCR
- Exist. Guardrail
- Prop. Guardrail
- Equality Symbol
- Pavement Removal

RIGHT OF WAY

- Baseline Control Point
- Existing Right of Way Marker
- Exist. Right of Way Line w/Marker
- Prop. Right of Way Line with Proposed R/W Marker (Iron Pin & Cap)
- Prop. Right of Way Line with Proposed (Concrete or Granite) R/W Marker
- Exist. Control of Access Line — CA
- Prop. Control of Access Line — CA
- Exist. Easement Line — E
- Prop. Temp. Construction Easement Line — E
- Prop. Temp. Drainage Easement Line — TDE
- Prop. Perm. Drainage Easement Line — PDE

HYDROLOGY

- Stream or Body of Water
- Flow Arrow
- Disappearing Stream
- Spring
- Swamp Marsh
- Shoreline
- Falls, Rapids
- Prop Lateral, Tail, Head Ditches — FLOW

STRUCTURES

MAJOR

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

MINOR

- Head & End Wall — CONC HW
- Pipe Culvert
- Footbridge
- Drainage Boxes — CB
- Paved Ditch Gutter

UTILITIES

- Exist. Pole
- Exist. Power Pole
- Prop. Power Pole
- Exist. Telephone Pole
- Prop. Telephone Pole
- Exist. Joint Use Pole
- Prop. Joint Use Pole
- Telephone Pedestal — T
- Cable TV Pedestal — C
- Hydrant
- Satellite Dish
- Exist. Water Valve
- Sewer Clean Out
- Power Manhole
- Telephone Booth — P
- Water Manhole — D
- Light Pole — W
- H-Frame Pole
- Power Line Tower
- Pole with Base
- Gas Valve
- Gas Meter
- Telephone Manhole
- Power Transformer — T
- Sanitary Sewer Manhole
- Storm Sewer Manhole — S
- Tank; Water, Gas, Oil
- Water Tank With Legs
- Traffic Signal Junction Box — S
- Fiber Optic Splice Box — F
- Television or Radio Tower
- Utility Power Line Connects to Traffic Signal Lines Cut Into the Pavement — TS — TS

- Water Line — W — W
- Sanitary Sewer — SS — SS
- Sanitary Sewer Force Main — FSS — FSS
- Gas Line — G — G
- Storm Sewer — S — S
- Power Line — P — P
- Telephone Cable — T — T
- U/G Telephone Conduit — TC — TC
- Unknown Utility — ?UTL — ?UTL
- Television Cable — TV — TV
- Fiber Optics Cable — FO — FO
- Exist. Water Meter — 0
- Drawn According to U/G Records — DATUR
- Abandoned According to U/G Records — AATUR
- End Of Information — E.O.I.

BOUNDARIES & PROPERTIES

- State Line
- County Line
- Township Line
- City Line
- Reservation Line
- Property Line
- Property Line Symbol — PL
- Exist. Iron Pin — EIP
- Property Corner
- Property Monument — ECM
- Property Number — 123
- Parcel Number — 6
- Fence Line — WW & ISBW
- Existing Wetland Boundaries — WLB
- Proposed Wetland Boundaries — WLB
- Existing Endangered Animal Boundaries — EAB
- Existing Endangered Plant Boundaries — EPB

BUILDINGS & OTHER CULTURE

- Buildings
- Foundations
- Area Outline
- Gate

- Gas Pump Vent or U/G Tank Cap
- Church
- School
- Park
- Cemetery — t
- Dam
- Sign — S
- Well — W
- Small Mine
- Swimming Pool

TOPOGRAPHY

- Loose Surface
- Hard Surface
- Change in Road Surface
- Curb
- Right of Way Symbol — R/W
- Guard Post — GP
- Paved Walk
- Bridge
- Box Culvert or Tunnel
- Ferry
- Culvert
- Footbridge
- Trail, Footpath
- Light House

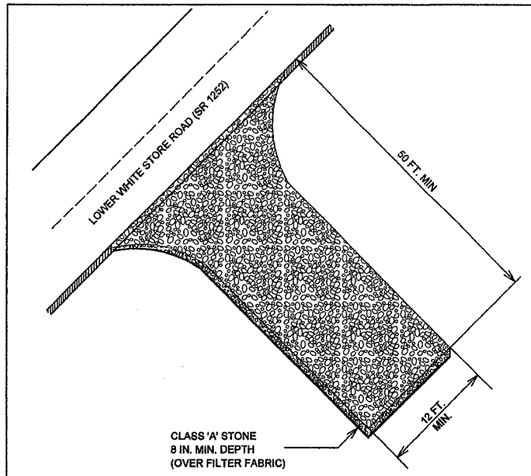
VEGETATION

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

RAILROADS

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

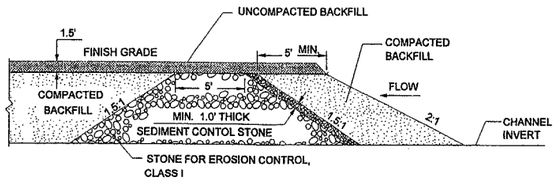
PROJECT REFERENCE NO.	SHE
R-2231WM	
R/W SHEET NO.	
ENGINEER	SCIENT



STABILIZED CONSTRUCTION ENTRANCE (SCE)

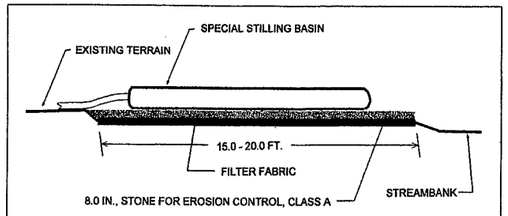
SCALE: NTS

NOTES:
1. TURNING RADIUS SUFFICIENT TO ACCOMODATE LARGE TRUCKS SHALL BE PROVIDED.
2. ENTRANCE(S) SHOULD BE LOCATED TO PROVIDE FOR UTILIZATION BY ALL CONSTRUCTION VEHICLES.
3. MUST BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR DIRECT FLOW OF MUD ONTO STREETS. PERIODIC TOPDRESSING WITH STONE WILL BE NECESSARY.
4. ANY MATERIAL TRACKED ONTO THE ROADWAY MUST BE CLEANED UP IMMEDIATELY.
5. GRAVEL CONSTRUCTION ENTRANCE SHALL BE LOCATED AT ALL POINTS OF INGRESS AND EGRESS UNTIL SITE IS STABILIZED. FREQUENT CHECKS OF THE DEVICE AND TIMELY MAINTENANCE MUST BE PROVIDED.



CHANNEL BLOCK

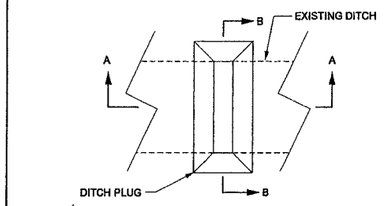
SCALE: NTS



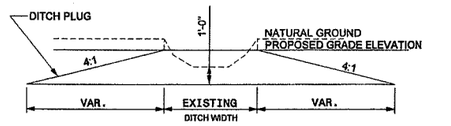
SPECIAL STILLING BASIN WITH ROCK PAD

SCALE: NTS

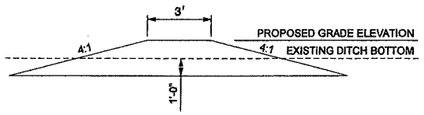
NOTE: PROVIDE STABILIZED OUTLET DOWN BANK TO STREAM



PLAN VIEW



SECTION B-B

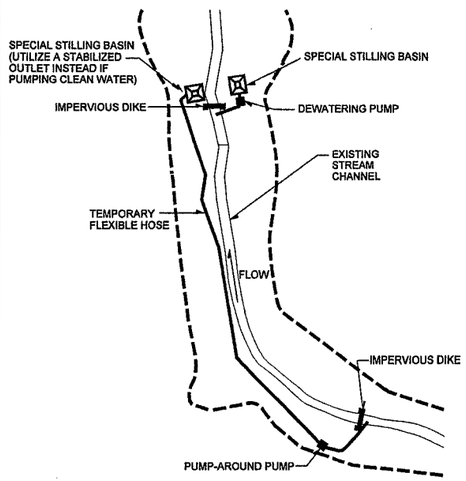


SECTION A-A

DITCH PLUG DETAIL

NOTES:
SEE PLAN SHEETS FOR LOCATIONS OF DITCH PLUGS.
SEE PROJECT SPECIAL PROVISONS FOR MATERIAL SPECIFICATIONS.

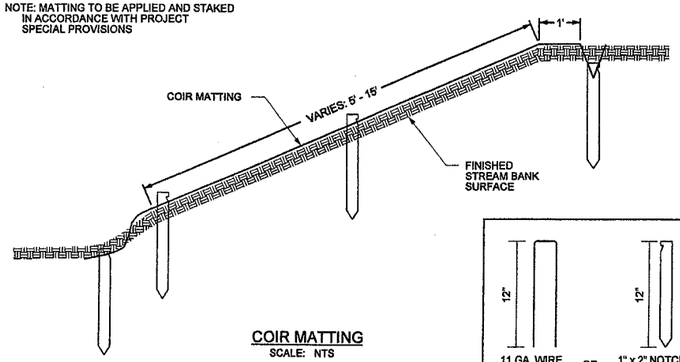
EXAMPLE OF PUMP-AROUND OPERATION



SEQUENCE OF DEWATERING OPERATIONS

1. INSTALL SPECIAL STILLING BASIN(S).
2. INSTALL UPSTREAM PUMP AND TEMPORARY FLEXIBLE HOSE.
3. PLACE UPSTREAM IMPERVIOUS DIKE AND BEGIN PUMPING OPERATIONS FOR STREAM DIVERSION.
4. PLACE DOWNSTREAM IMPERVIOUS DIKE AND PUMPING APPARATUS. DEWATER ENTRAPPED AREA. AREA TO BE DEWATERED SHALL BE EQUAL TO ONE DAY'S WORK.
5. PERFORM STREAM RESTORATION WORK IN ACCORDANCE WITH THE PLANS.
6. EXCAVATE ANY ACCUMULATED SILT AND DEWATER BEFORE REMOVAL OF IMPERVIOUS DIKES. REMOVE IMPERVIOUS DIKES, PUMPS, AND TEMPORARY FLEXIBLE HOSE. (DOWNSTREAM IMPERVIOUS DIKES FIRST).
7. ALL GRADING AND STABILIZATION MUST BE COMPLETED IN ONE DAY WITHIN THE PUMP AROUND AREAS BETWEEN THE IMPERVIOUS DIKES. THE IMPERVIOUS DIKE LOCATIONS AS SHOWN ON THIS SHEET ONLY SHOW THE UPPER AND LOWER EXTENT OF WORK FOR EACH STREAM SEGMENT. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF THE IMPERVIOUS DIKE(S) FOR EACH DAY'S WORK.
8. REMOVE SPECIAL STILLING BASIN(S) AND STABILIZE DISTURBED AREA WITH SEED AND MULCH.

NOTE: MATTING TO BE APPLIED AND STAKED IN ACCORDANCE WITH PROJECT SPECIAL PROVISIONS



COIR MATTING

SCALE: NTS

DETAILS

KCI Associates of North Carolina, P
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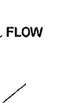
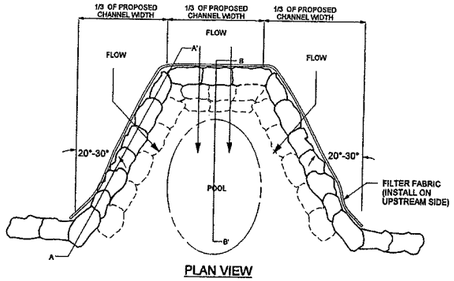
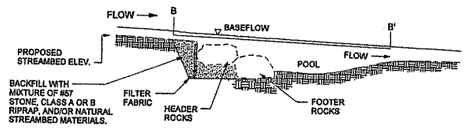
PROJECT REFERENCE NO.	
R-2231WM	
R/W SHEET NO.	
ENGINEER	SCIEN

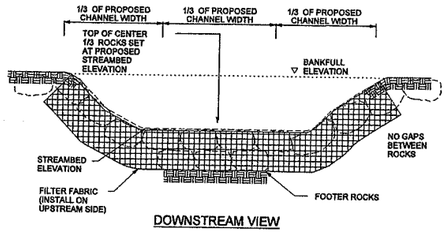




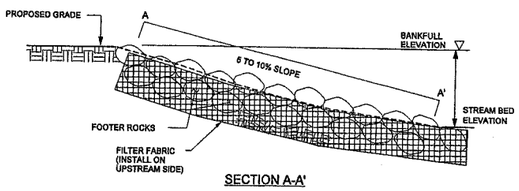
PLAN VIEW



SECTION B-B' (PROFILE VIEW)



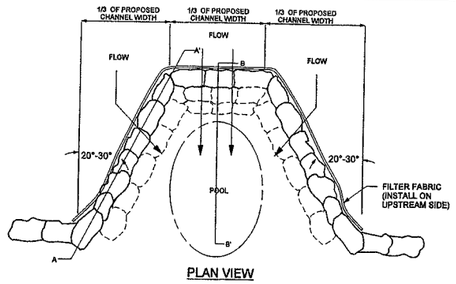
DOWNSTREAM VIEW



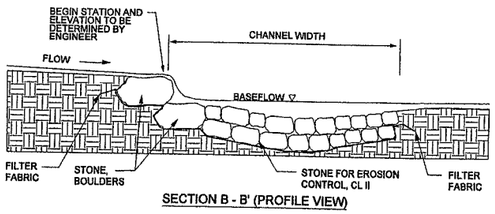
SECTION A-A'

ROCK CROSS VANE
SCALE: NTS

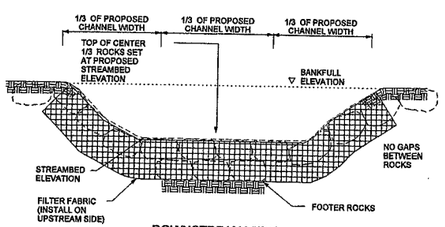
NOTE: ALL ROCKS OR STONES IN THE VANE STRUCTURE ARE STONE, BOULDERS



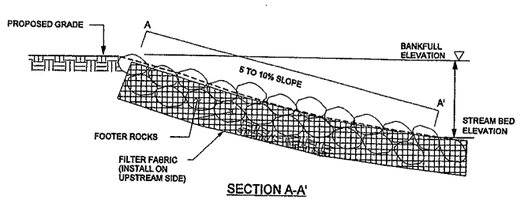
PLAN VIEW



SECTION B - B' (PROFILE VIEW)



DOWNSTREAM VIEW

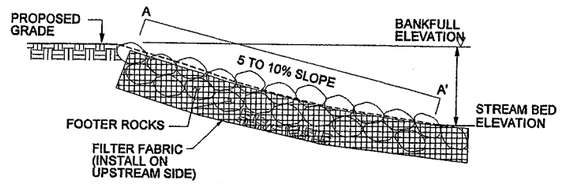


SECTION A-A'

STEP POOL
SCALE: NTS

NOTE: ALL ROCKS OR STONES IN THE VANE STRUCTURE ARE STONE, BOULDERS

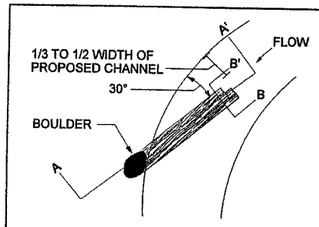
PLAN VIEW



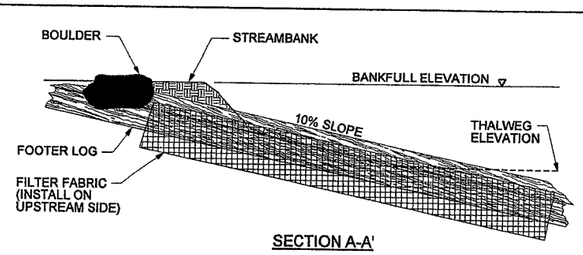
SECTION A-A'

J-VANE
SCALE: NTS

NOTE: ALL ROCKS OR STONES IN THE VANE STRUCTURE ARE STONE, BOULDERS. GAPS BETWEEN THE HOOK ROCKS ONLY.



PLAN VIEW

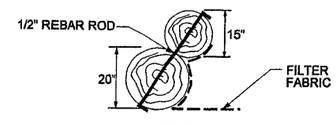


SECTION A-A'

CONSTRUCTION NOTE:

THE TOP AND BOTTOM LOGS SHALL BE FASTENED TOGETHER BY DRILLING HOLES EVERY 5' THROUGH EACH LOG. ALGIN THE CORRESPONDING HOLES IN EACH LOG AND INSERT THE 1/2" REBAR RODS. THE ENDS OF THE REBAR RODS SHOULD EXTEND AT LEAST 4 INCHES OUT OF THE LOGS. THEN BEND THE PROTRUDING ENDS OF THE REBAR IN ORDER TO SECURE THE LOGS TOGETHER.

LOG VANE
SCALE: NTS



SECTION B-B'
(LOOKING DOWNSTREAM)

DETAILS - INSTREAM STRUCT

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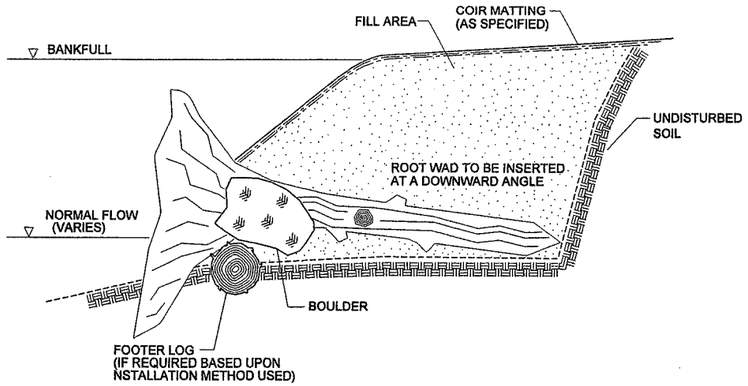
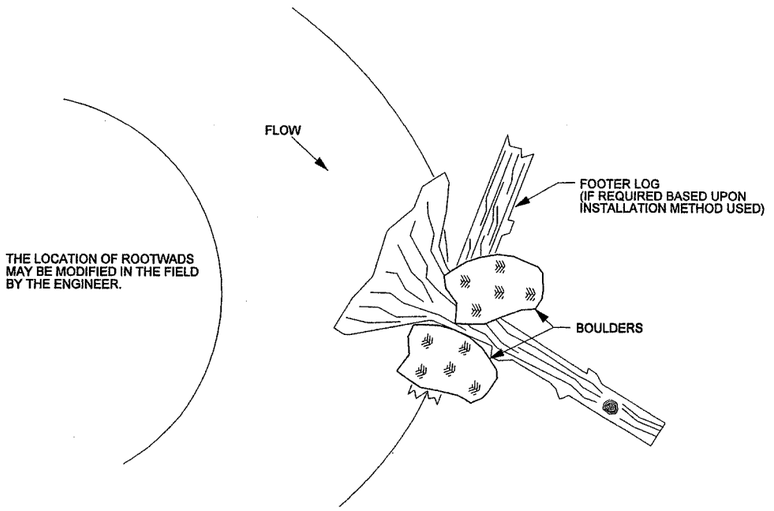
4601 SIX FORKS ROAD, RALEIGH, NC 2760
•ENGINEERS • SURVEYORS • SCIENTISTS

PROJECT REFERENCE NO.	SHEET NO.
R-2231WM	2-B
RW SHEET NO.	
ENGINEER	SCIENTIST

NORTH CAROLINA PROFESSIONAL SEAL 14351 ENGINEER JAMES WALDO BLAKE



SECTION VIEW



PROFILE VIEW

ROOT WAD

SCALE: NTS

NOTE: ALL WOOD MATERIAL (STUMP, LOGS, ETC) SHALL BE HARDWOOD. FOOTER LOG AND BACKFILL NOT REQUIRED IF POINT-DRIVE INSTALLATION METHOD IS USED. ROOTWADS SHALL BE ORIENTED PERPENDICULAR TO DIRECTION OF FLOW.

DETAILS - ROOT WAD

KCI Associates of North Carolina, P.A.
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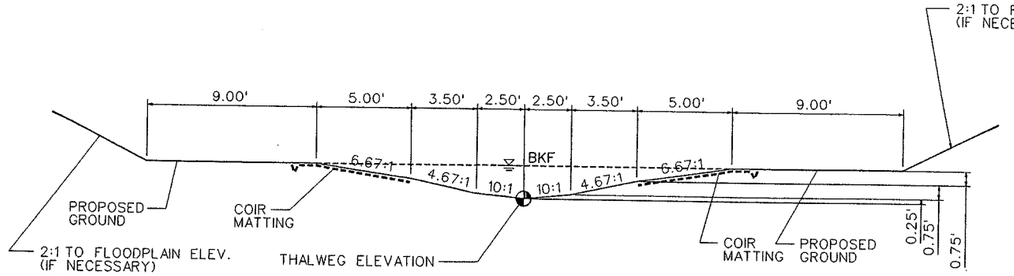
4601 SIX FORKS ROAD, RALEIGH, NC 27609-5210
•ENGINEERS • SURVEYORS • SCIENTISTS

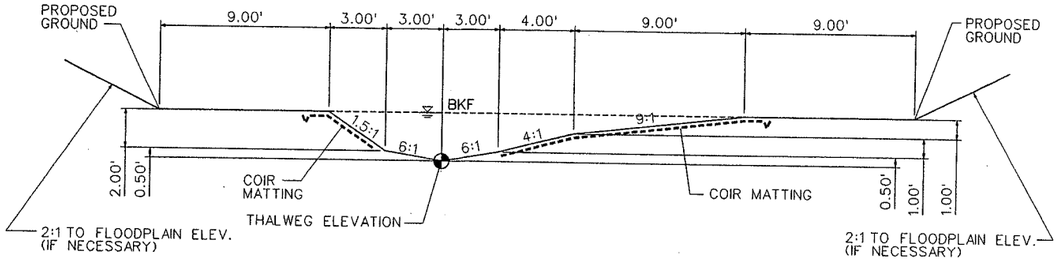
PROJECT REFERENCE NO.	SHEET NO.
R-2231WM	2-C
RW SHEET NO.	
ENGINEER	SCIENTIST

NORTH CAROLINA PROFESSIONAL SEAL 14351 ENGINEER JAMES WALDO BLAKE

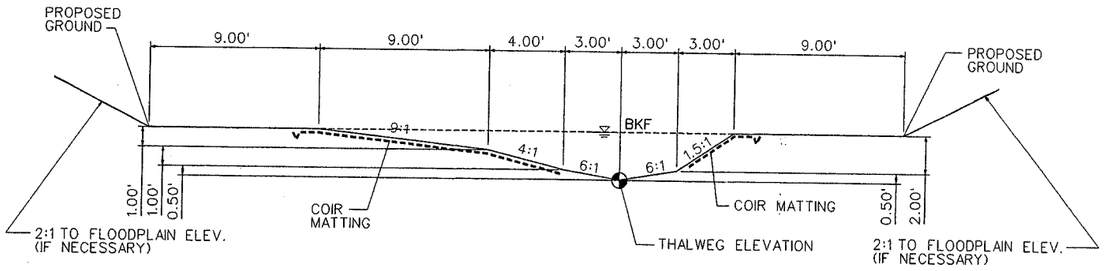
TYPICAL CHANNEL CROSS SECTIONS



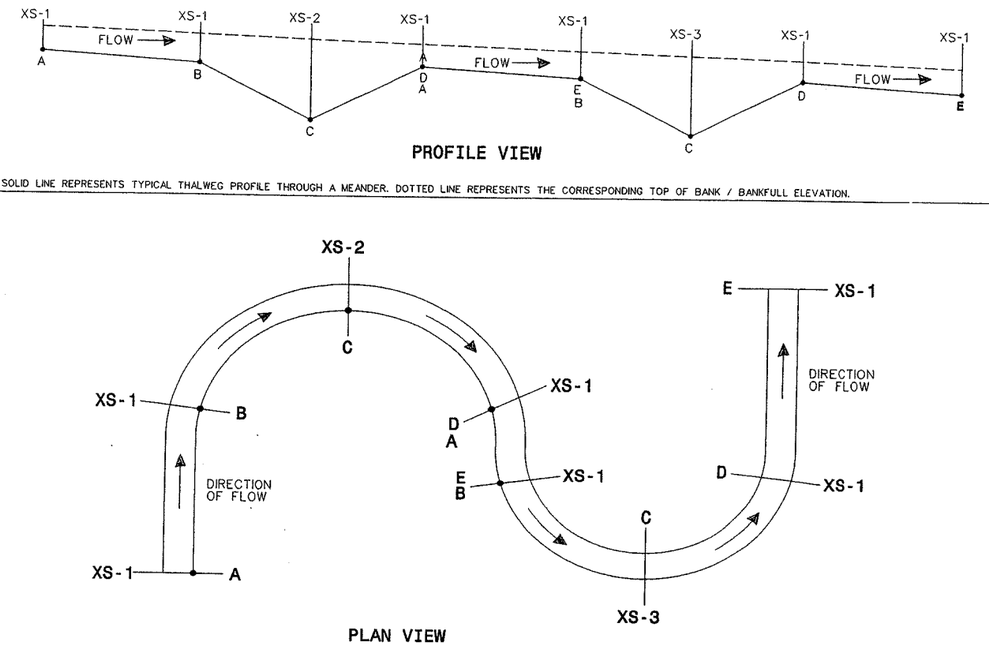
CROSS SECTION 1 (XS-1) - TYPICAL RIFFLE
SCALE: 1"= 4'



CROSS SECTION 2 (XS-2) - TYPICAL LEFT POOL
SCALE: 1"= 4'



CROSS SECTION 3 (XS-3) - TYPICAL RIGHT POOL
SCALE: 1"= 4'



CROSS SECTION LOCATION DETAIL
SCALE: NTS

DETAILS - TYPICAL CROSS SECTIONS

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PROJECT REFERENCE NO.	SHEET NO.
R-2231WM	3
R/W SHEET NO.	
ENGINEER	SCIENTIST

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

SUMMARY OF QUANTITIES

SECT.	QUANTITY	UNIT	ITEM DESCRIPTION
800	1	LS	MOBILIZATION
SP	1	LS	CONSTRUCTION SURVEY
1605	5,400	LF	TEMPORARY SILT FENCE
SP	1,100	LF	1/4 INCH HARDWARE CLOTH
SP	300	SY	EROSION CONTROL MATTING FOR LEVEE BREAK
SP	89	AC	MOWING
SP	1	LS	GRADING
SP	5	AC	SUPPLEMENTAL CLEARING AND GRUBBING
SP	6	EA	SPECIAL STILLING BASIN
SP	510	CY	IMPERVIOUS SELECT MATERIAL
SP	80	AC	RIPPING
SP	80	AC	DISCING
1056	1,500	SY	FILTER FABRIC FOR DRAINAGE
SP	88	AC	SEEDING AND MULCHING
545	400	TON	INCIDENTAL STONE BASE
1610	200	TON	SEDIMENT CONTROL STONE
1610	25	TON	STONE FOR EROSION CONTROL, CLASS A
1610	100	TON	STONE FOR EROSION CONTROL, CLASS B
1610	350	TON	STONE FOR EROSION CONTROL, CLASS 1
SP	225	TON	STONE, CLASS 2
SP	650	TON	STONE, BOULDER
SP	32	EA	ROOT WADS
SP	12	EA	LOG VANES
SP	14,000	SY	COIR MATTING
SP	12,145	LF	WOVEN WIRE FENCE, 47" FAB
SP	1,012	EA	5" TIMBER POSTS, 8' LONG
SP	2	EA	SINGLE GATES, 52" HIGH, 14' WIDE, 14' OPENING
SP	61	EA	SIGN ERECTION, TYPE F
SP	488	LF	SUPPORTS, 3-LB STEEL U-CHANNEL

SUMMARY OF EARTHWORK

IN CUBIC YARDS

SITE EXCAVATION =	17496 CY
STREAM EXCAVATION =	5267 CY
EXCAVATION TOTAL =	22763 CY
SITE EMBANKMENT =	22736 CY
NET WASTE =	0 CY
NET BORROW =	27 CY

SUMMARY SHEET

KCI Associates
of North Carolina, P.A.
LANDMARK CENTER II, SUITE 220
4601 SIX FORKS ROAD, RALEIGH, NC 27609-5210
•ENGINEERS • SURVEYORS • SCIENTISTS

PROJECT REFERENCE NO.	SHEET NO.
R-2231 WM	4
R/W SHEET NO.	

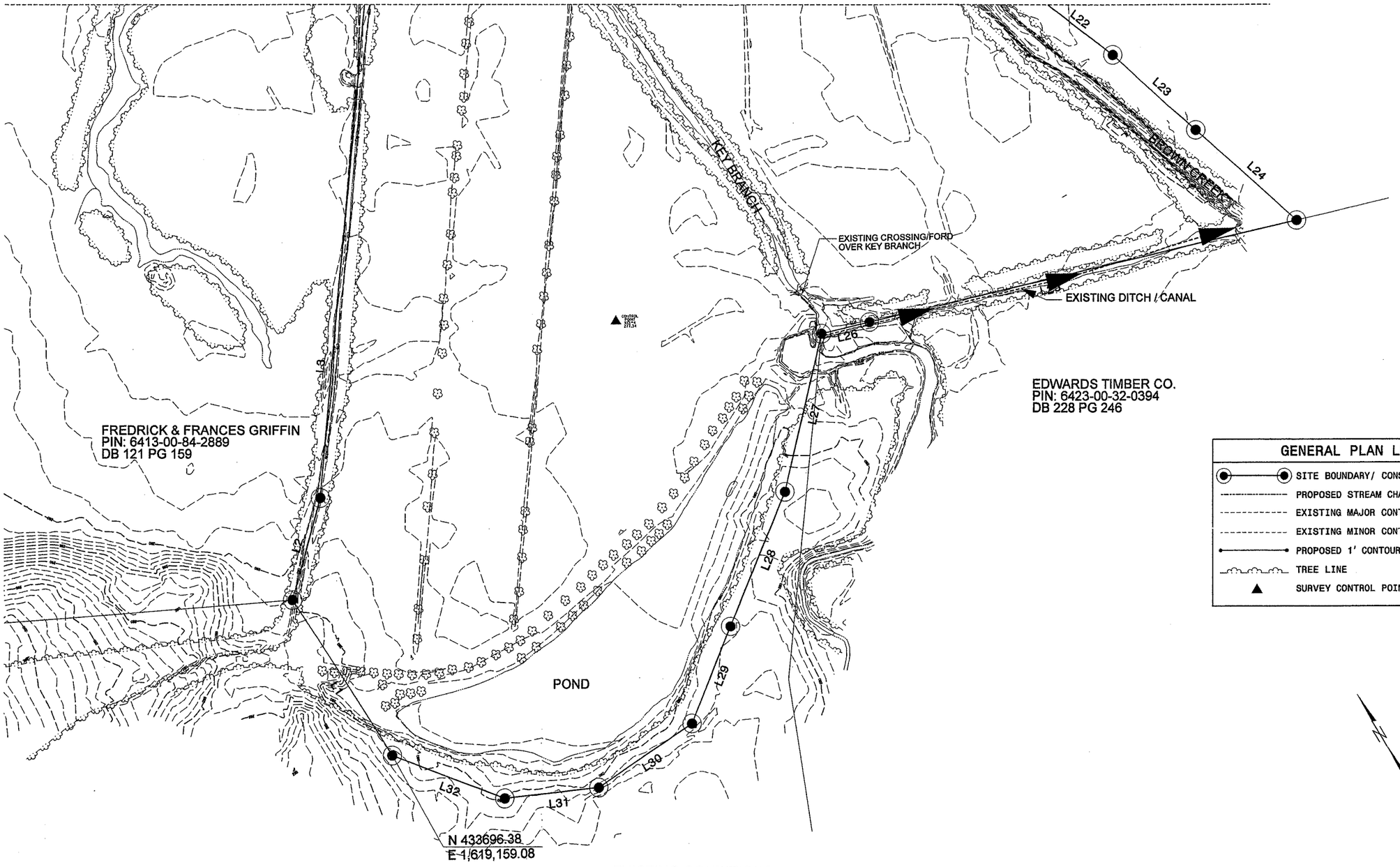
ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 19351 ENGINEER JAMES WALDO BLAKE

SCIENTIST

MATCHLINE SEE SHEET 5

MATCHLINE SEE SHEET 5



FREDRICK & FRANCES GRIFFIN
PIN: 6413-00-84-2889
DB 121 PG 159

EDWARDS TIMBER CO.
PIN: 6423-00-32-0394
DB 228 PG 246

GENERAL PLAN LEGEND

- SITE BOUNDARY/ CONSERVATION EASEMENT
- PROPOSED STREAM CHANNEL PLANFORM
- EXISTING MAJOR CONTOUR LINES
- EXISTING MINOR CONTOUR LINES
- PROPOSED 1' CONTOUR LINES
- TREE LINE
- SURVEY CONTROL POINT

N

EXISTING CONDITIONS

0 50 100 200

GRAPHIC SCALE (1" = 100')

EXISTING CONDITIONS 1

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PROJECT REFERENCE NO.	SHEET NO.
R-2231 WM	5
R/W SHEET NO.	

ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 14894 ENGINEER JAMES WALDO BLAKE
2-16-09

SCIENTIST

MATCHLINE SEE SHEET 6

MATCHLINE SEE SHEET 6

MALVIN H. & RACHEL T. PORTER
PIN: 6413-00-85-6834
DB 182 PG 872

FREDRICK & FRANCES GRIFFIN
PIN: 6413-00-84-2889
DB 121 PG 159

KEY BRANCH

BROWN CREEK

L5 L14 L15 L16 L17 L18 L19 L20 L21

GENERAL PLAN LEGEND

- SITE BOUNDARY/ CONSERVATION EASEMENT
- PROPOSED STREAM CHANNEL PLANFORM
- EXISTING MAJOR CONTOUR LINES
- EXISTING MINOR CONTOUR LINES
- PROPOSED 1' CONTOUR LINES
- TREE LINE
- SURVEY CONTROL POINT

MATCHLINE SEE SHEET 4

MATCHLINE SEE SHEET 4

EXISTING CONDITIONS

0 50 100 200
GRAPHIC SCALE (1" = 100')

EXISTING CONDITIONS 2

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PROJECT REFERENCE NO.	SHEET NO.
R-2231WM	6
R/W SHEET NO.	
ENGINEER	SCIENTIST

NORTH CAROLINA PROFESSIONAL SEAL 019951 ENGINEER JAMES WALDO BLAKE

MARGARET B. DELLINGER
PIN: 6423-00-36-2407
WB 88 PG E-25

SUSTAINABLE FORESTS LLC
PIN: 6413-00-98-9674
DB 487 PG 262

RICHARD M. & KIMBERLY H. PORTER
PIN: 6413-00-86-7461
DB 297 PG 369

MALVIN H. & RACHEL T. PORTER
PIN: 6413-00-85-6834
DB 182 PG 872

KEY BRANCH

BROWN CREEK

L7 L8 L9 L10 L11 L12 L13

MATCHLINE SEE SHEET 5

MATCHLINE SEE SHEET 5

GENERAL PLAN LEGEND

- SITE BOUNDARY/ CONSERVATION EASEMENT
- PROPOSED STREAM CHANNEL PLANFORM
- EXISTING MAJOR CONTOUR LINES
- EXISTING MINOR CONTOUR LINES
- PROPOSED 1' CONTOUR LINES
- TREE LINE
- SURVEY CONTROL POINT

EXISTING CONDITIONS

0 50 100 200
GRAPHIC SCALE (1" = 100')

EXISTING CONDITIONS 3

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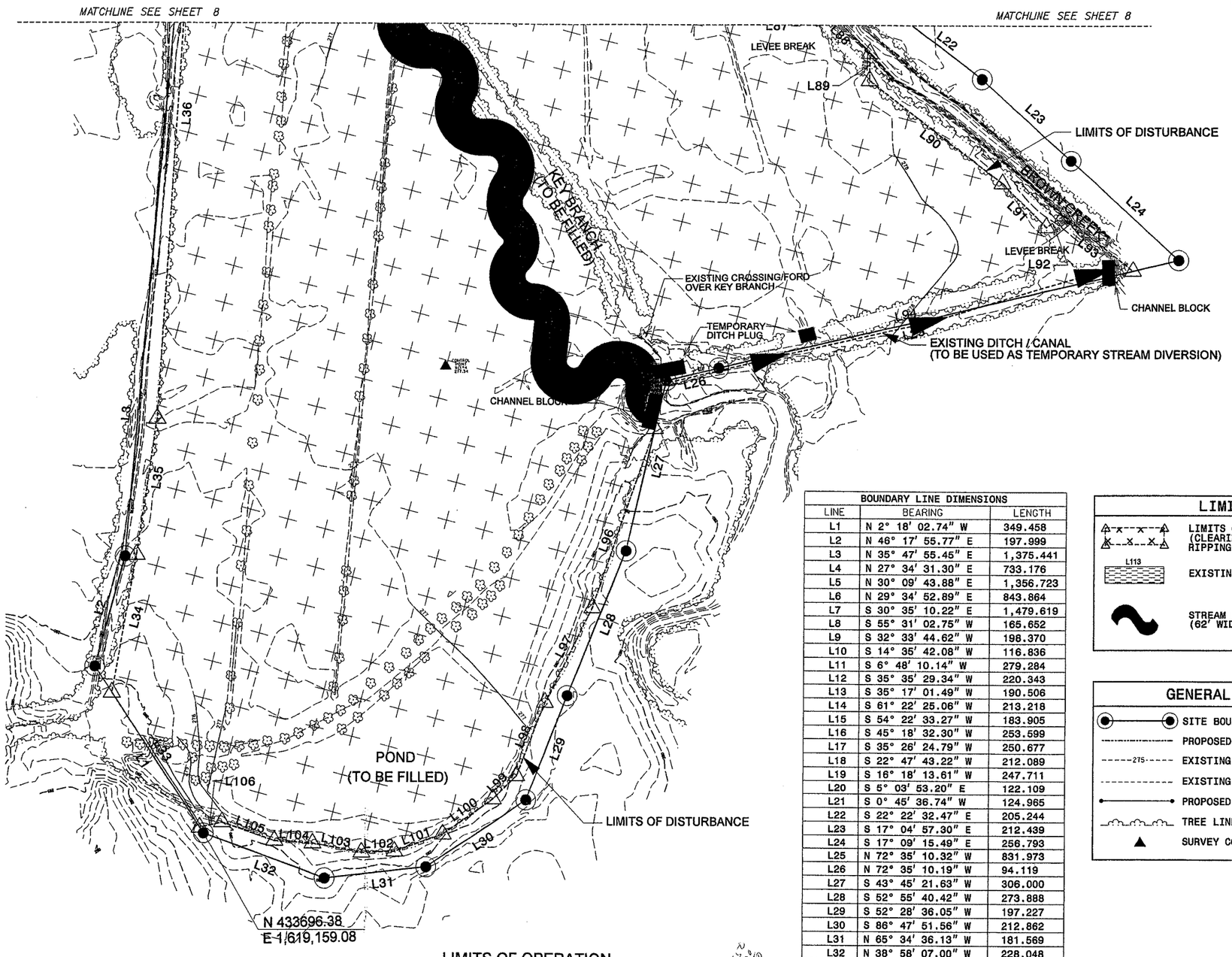
PROJECT REFERENCE NO.	SHEET NO.
R-2231WM	7
R/W SHEET NO.	
ENGINEER	SCIENTIST

NORTH CAROLINA PROFESSIONAL SEAL 19390 ENGINEER JAMES WALDO BLAKE

LIMITS OF DISTURBANCE BOUNDARY		
LINE	BEARING	LENGTH
L33	N 2° 24' 18.99" W	281.784
L34	N 40° 54' 02.59" E	244.223
L35	N 39° 14' 41.77" E	239.411
L36	N 34° 20' 30.12" E	1,106.496
L37	N 28° 27' 13.71" E	157.246
L38	S 84° 27' 40.26" E	55.497
L39	N 19° 34' 24.58" E	165.856
L40	N 34° 50' 39.69" E	256.285
L41	N 22° 47' 39.41" E	222.074
L42	N 58° 33' 27.37" W	27.259
L43	N 30° 41' 51.83" E	58.706
L44	S 59° 15' 27.21" E	142.159
L45	N 29° 51' 53.21" E	622.279
L46	S 59° 22' 16.58" E	164.881
L47	N 28° 38' 09.12" E	707.729
L48	N 59° 13' 03.48" W	197.659
L49	N 21° 06' 33.34" E	152.859
L50	N 30° 45' 35.90" E	371.033
L51	N 48° 42' 13.83" E	157.955
L52	S 30° 55' 08.44" E	43.490
L53	S 9° 05' 39.43" W	36.479
L54	S 30° 16' 16.23" E	129.731
L55	S 2° 17' 10.32" W	292.069
L56	S 59° 14' 22.86" E	215.587
L57	S 30° 45' 36.46" W	72.737
L58	N 59° 13' 21.00" W	166.394
L59	S 26° 52' 14.70" W	611.349
L60	S 59° 17' 34.20" E	527.163
L61	S 12° 45' 12.95" W	209.037
L62	S 22° 11' 17.96" E	150.910
L63	S 21° 06' 10.84" W	47.239
L64	S 39° 42' 13.74" W	280.655
L65	S 10° 12' 50.86" W	44.381
L66	S 47° 02' 04.54" W	107.905
L67	N 86° 29' 16.10" W	49.640
L68	S 56° 31' 01.74" W	41.816
L69	S 3° 49' 58.71" W	44.426
L70	S 52° 28' 42.05" W	212.208
L71	N 40° 03' 05.00" W	15.805
L72	S 49° 13' 17.72" W	133.510
L73	S 43° 50' 17.23" W	100.679
L74	S 48° 49' 36.42" E	16.166
L75	S 32° 34' 14.26" W	74.488
L76	S 41° 06' 14.88" W	119.188
L77	N 56° 02' 51.40" W	16.249
L78	S 30° 26' 11.20" W	114.940
L79	S 25° 12' 52.44" W	120.898
L80	S 38° 43' 42.53" E	39.845
L81	S 23° 30' 18.29" W	95.084
L82	S 80° 52' 52.22" W	41.018
L83	S 21° 37' 19.81" W	114.255
L84	S 14° 36' 13.39" W	69.973
L85	S 1° 48' 41.18" E	64.500
L86	S 7° 17' 26.01" W	125.484
L87	S 41° 56' 09.14" E	56.762
L88	S 13° 20' 48.67" E	109.760
L89	S 30° 45' 35.89" W	46.754
L90	S 21° 55' 05.60" E	296.253
L91	S 15° 11' 44.29" E	108.350
L92	N 86° 46' 05.76" E	36.007
L93	S 21° 20' 15.15" E	155.898
L94	N 72° 35' 10.28" W	749.402
L26	N 72° 35' 10.19" W	94.119
L95	S 43° 45' 21.75" W	87.436
L96	S 49° 54' 12.69" W	329.607
L97	S 57° 20' 33.92" W	187.394
L98	S 52° 09' 32.22" W	137.854
L99	S 76° 24' 47.70" W	58.991
L100	S 85° 37' 14.94" W	107.539
L101	N 79° 16' 39.11" W	90.981
L102	N 61° 09' 00.76" W	58.443
L103	N 48° 39' 59.17" W	88.469
L104	N 55° 23' 14.34" W	67.650
L105	N 39° 57' 29.48" W	98.323
L106	N 72° 51' 55.23" W	40.486



LIMITS OF OPERATION

0 50 100 200

GRAPHIC SCALE (1" = 100')

BOUNDARY LINE DIMENSIONS		
LINE	BEARING	LENGTH
L1	N 2° 18' 02.74" W	349.458
L2	N 46° 17' 55.77" E	197.999
L3	N 35° 47' 55.45" E	1,375.441
L4	N 27° 34' 31.30" E	733.176
L5	N 30° 09' 43.88" E	1,356.723
L6	N 29° 34' 52.89" E	843.864
L7	S 30° 35' 10.22" E	1,479.619
L8	S 55° 31' 02.75" W	165.652
L9	S 32° 33' 44.62" W	198.370
L10	S 14° 35' 42.08" W	116.836
L11	S 6° 48' 10.14" W	279.284
L12	S 35° 35' 29.34" W	220.343
L13	S 35° 17' 01.49" W	190.506
L14	S 61° 22' 25.06" W	213.218
L15	S 54° 22' 33.27" W	183.905
L16	S 45° 18' 32.30" W	253.599
L17	S 35° 26' 24.79" W	250.677
L18	S 22° 47' 43.22" W	212.089
L19	S 16° 18' 13.61" W	247.711
L20	S 5° 03' 53.20" E	122.109
L21	S 0° 45' 36.74" W	124.965
L22	S 22° 22' 32.47" E	205.244
L23	S 17° 04' 57.30" E	212.439
L24	S 17° 09' 15.49" E	256.793
L25	N 72° 35' 10.32" W	831.973
L26	N 72° 35' 10.19" W	94.119
L27	S 43° 45' 21.63" W	306.000
L28	S 52° 55' 40.42" W	273.888
L29	S 52° 28' 36.05" W	197.227
L30	S 86° 47' 51.56" W	212.862
L31	N 65° 34' 36.13" W	181.569
L32	N 38° 58' 07.00" W	228.048

LIMITS LEGEND

- LIMITS OF DISTURBANCE (CLEARING AND GRUBBING, MOWING, RIPPING, DISCING, AND GRADING)
- L113 — EXISTING WETLAND - SENSITIVE AREA
- STREAM NON-RIP AREA (62' WIDE, CENTERED ALONG STREAM)

GENERAL PLAN LEGEND

- SITE BOUNDARY/ CONSERVATION EASEMENT
- PROPOSED STREAM CHANNEL PLANFORM
- 275 — EXISTING MAJOR CONTOUR LINES
- EXISTING MINOR CONTOUR LINES
- PROPOSED 1' CONTOUR LINES
- TREE LINE
- SURVEY CONTROL POINT

LIMITS OF OPERATION 1

KCI Associates of North Carolina, P.A.
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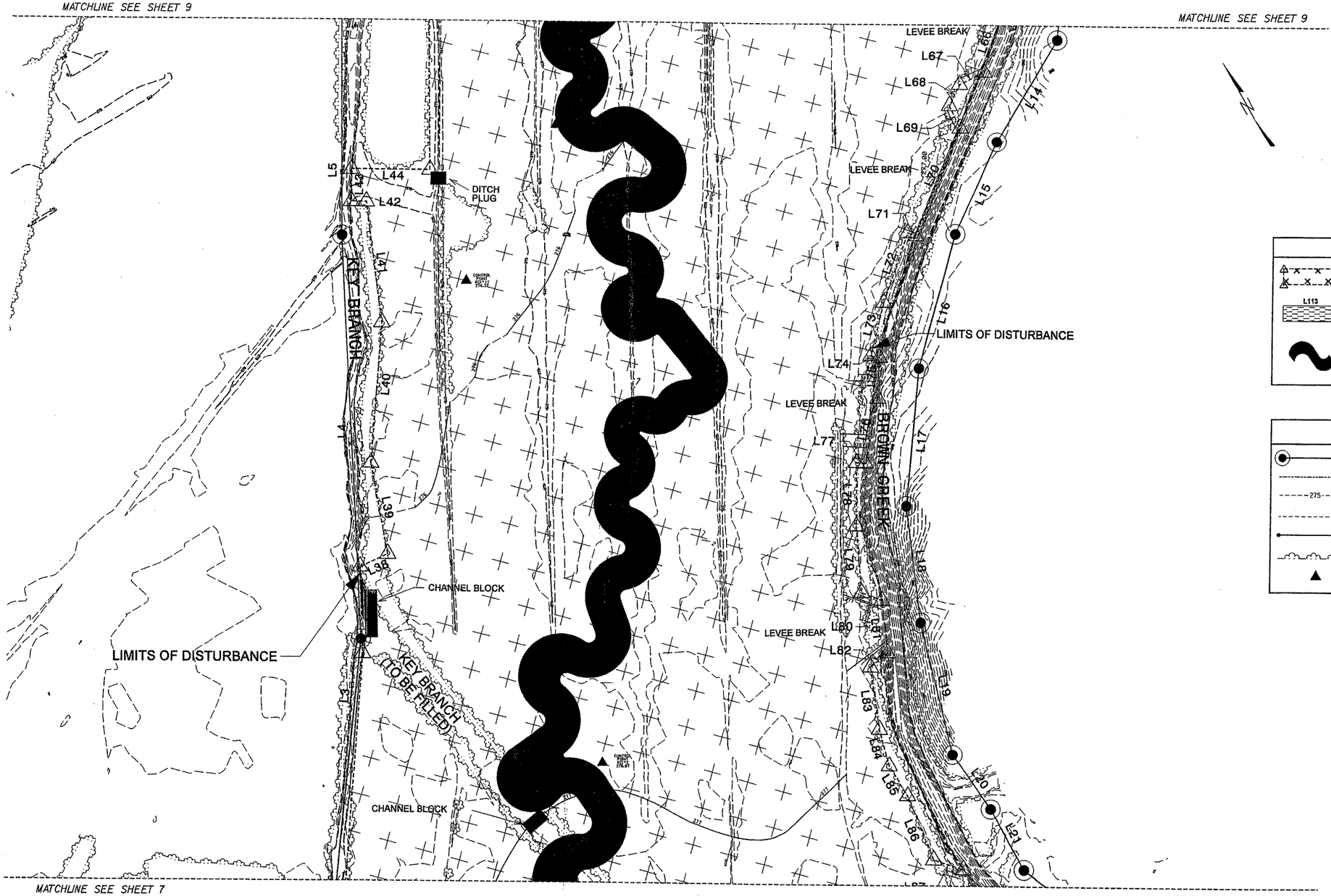
•ENGINEERS • SURVEYORS • SCIENTISTS

PROJECT REFERENCE NO.	SHEET NO.
R-2231WM	8
R/W SHEET NO.	
ENGINEER	SCIENTIST

NORTH CAROLINA PROFESSIONAL SEAL 14451 ENGINEER 7-16-97 JAMES WALDO BLAKE



LIMITS LEGEND

- LIMITS OF DISTURBANCE (CLEARING AND GRUBBING, MOWING, RIPPING, DISCING, AND GRADING)
- L113 — EXISTING WETLAND - SENSITIVE AREA
- STREAM NON-RIP AREA (62' WIDE, CENTERED ALONG STREAM)

GENERAL PLAN LEGEND

- SITE BOUNDARY/ CONSERVATION EASEMENT
- PROPOSED STREAM CHANNEL PLANFORM
- 275 — EXISTING MAJOR CONTOUR LINES
- EXISTING MINOR CONTOUR LINES
- PROPOSED 1' CONTOUR LINES
- TREE LINE
- SURVEY CONTROL POINT

LIMITS OF OPERATION

0 50 100 200

GRAPHIC SCALE (1" = 100')

LIMITS OF OPERATION

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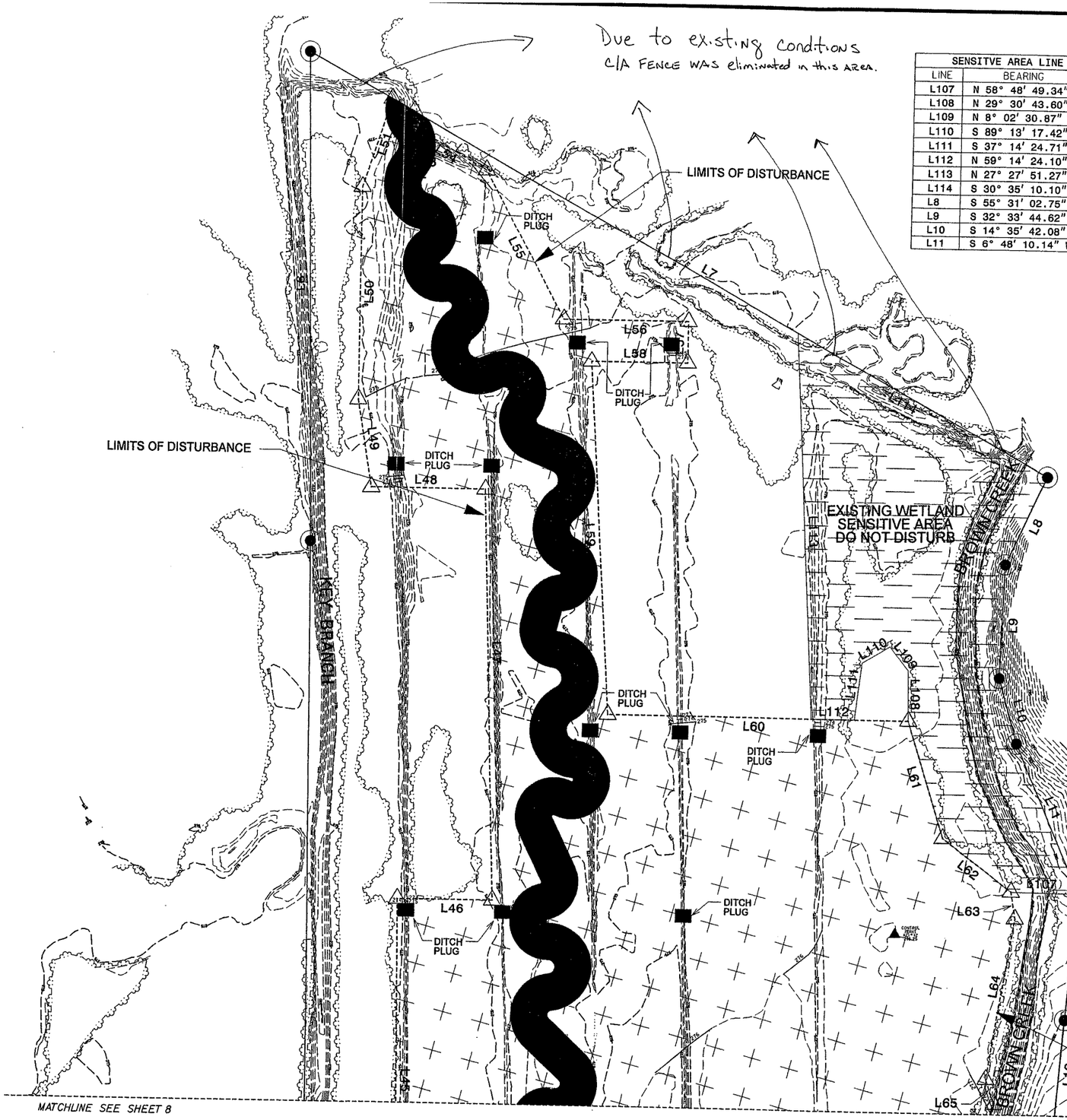
PROJECT REFERENCE NO.	SHEET NO.
R-2231WM	9
R/W SHEET NO.	
ENGINEER	SCIENTIST

NORTH CAROLINA PROFESSIONAL 16534 ENGINEER JAMES WALDO BLAKE

Due to existing conditions C/A FENCE WAS eliminated in this area.

SENSITVE AREA LINE DIMENSIONS		
LINE	BEARING	LENGTH
L107	N 58° 48′ 49.34″ W	117.170
L108	N 29° 30′ 43.60″ E	87.049
L109	N 8° 02′ 30.87″ W	53.148
L110	S 89° 13′ 17.42″ W	56.230
L111	S 37° 14′ 24.71″ W	99.673
L112	N 59° 14′ 24.10″ W	76.052
L113	N 27° 27′ 51.27″ E	667.461
L114	S 30° 35′ 10.10″ E	502.204
L8	S 55° 31′ 02.75″ W	165.652
L9	S 32° 33′ 44.62″ W	198.370
L10	S 14° 35′ 42.08″ W	116.836
L11	S 6° 48′ 10.14″ W	279.284



LIMITS LEGEND

- LIMITS OF DISTURBANCE (CLEARING AND GRUBBING, MOWING, RIPPING, DISCING, AND GRADING)
- L113 — EXISTING WETLAND - SENSITIVE AREA
- STREAM NON-RIP AREA (62′ WIDE, CENTERED ALONG STREAM)

GENERAL PLAN LEGEND

- SITE BOUNDARY/ CONSERVATION EASEMENT
- PROPOSED STREAM CHANNEL PLANFORM
- 275 — EXISTING MAJOR CONTOUR LINES
- EXISTING MINOR CONTOUR LINES
- PROPOSED 1′ CONTOUR LINES
- TREE LINE
- SURVEY CONTROL POINT

LIMITS OF OPERATION

0 50 100 200

GRAPHIC SCALE (1" = 100')

LIMITS OF OPERATION 3

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PROJECT REFERENCE NO.	SHEET NO.
R-2231WM	10
R/W SHEET NO.	
ENGINEER	SCIENTIST

NORTH CAROLINA PROFESSIONAL SEAL 14951 ENGINEER JAMES WALDO BLAKE

MATCHLINE SEE SHEET 11

MATCHLINE SEE SHEET 11

LEVEE BREAK

L89

L22

L23

L24

L90

L91

L93

L92

LIMITS OF DISTURBANCE

BEGIN KEY CREEK

KEY BRANCH (TO BE FILLED)

EXISTING CROSSING/FORD OVER KEY BRANCH

TEMPORARY DITCH PLUG

CHANNEL BLOCK

EXISTING DITCH / CANAL (TO BE USED AS TEMPORARY STREAM DIVERSION)

CHANNEL BLOCK

L26

L27

L96

L97

L28

L29

L98

L99

L109

L30

L31

L32

L101

L102

L103

L104

L105

L106

L34

L35

L36

L3

POND (TO BE FILLED)

LIMITS OF DISTURBANCE

N 433696.38
E 1,619,159.08

20+00
19+00
18+00
17+00
16+00
15+00
14+00
13+00
12+00
11+00
10+00

GENERAL PLAN LEGEND

- SITE BOUNDARY/ CONSERVATION EASEMENT
- PROPOSED STREAM CHANNEL PLANFORM
- 275 EXISTING MAJOR CONTOUR LINES
- EXISTING MINOR CONTOUR LINES
- PROPOSED 1' CONTOUR LINES
- TREE LINE
- SURVEY CONTROL POINT

GRADING PLAN

0 50 100 200

GRAPHIC SCALE (1" = 100')

GRADING PLAN 1

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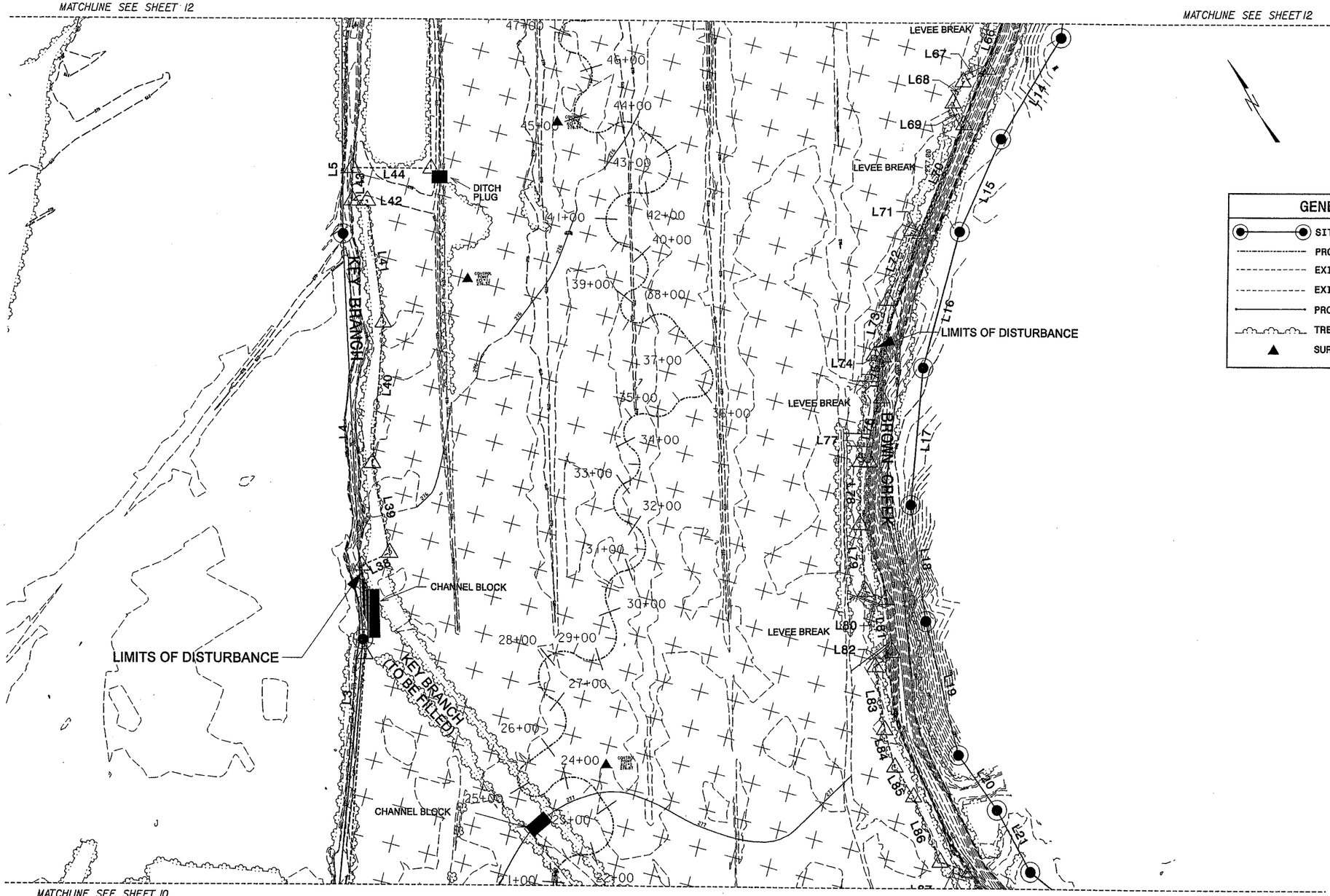
PROJECT REFERENCE NO.	SHEET NO.
R-2231WM	11
R/W SHEET NO.	
ENGINEER	SCIENTIST

NORTH CAROLINA PROFESSIONAL SEAL 14351 ENGINEER JAMES WALDO BLAKE

MATCHLINE SEE SHEET 12

MATCHLINE SEE SHEET 12



MATCHLINE SEE SHEET 10

MATCHLINE SEE SHEET 10

GENERAL PLAN LEGEND

- SITE BOUNDARY/ CONSERVATION EASEMENT
- PROPOSED STREAM CHANNEL PLANFORM
- EXISTING MAJOR CONTOUR LINES
- EXISTING MINOR CONTOUR LINES
- PROPOSED 1' CONTOUR LINES
- TREE LINE
- SURVEY CONTROL POINT

GRADING PLAN

0 50 100 200

GRAPHIC SCALE (1" = 100')

GRADING PLAN 2

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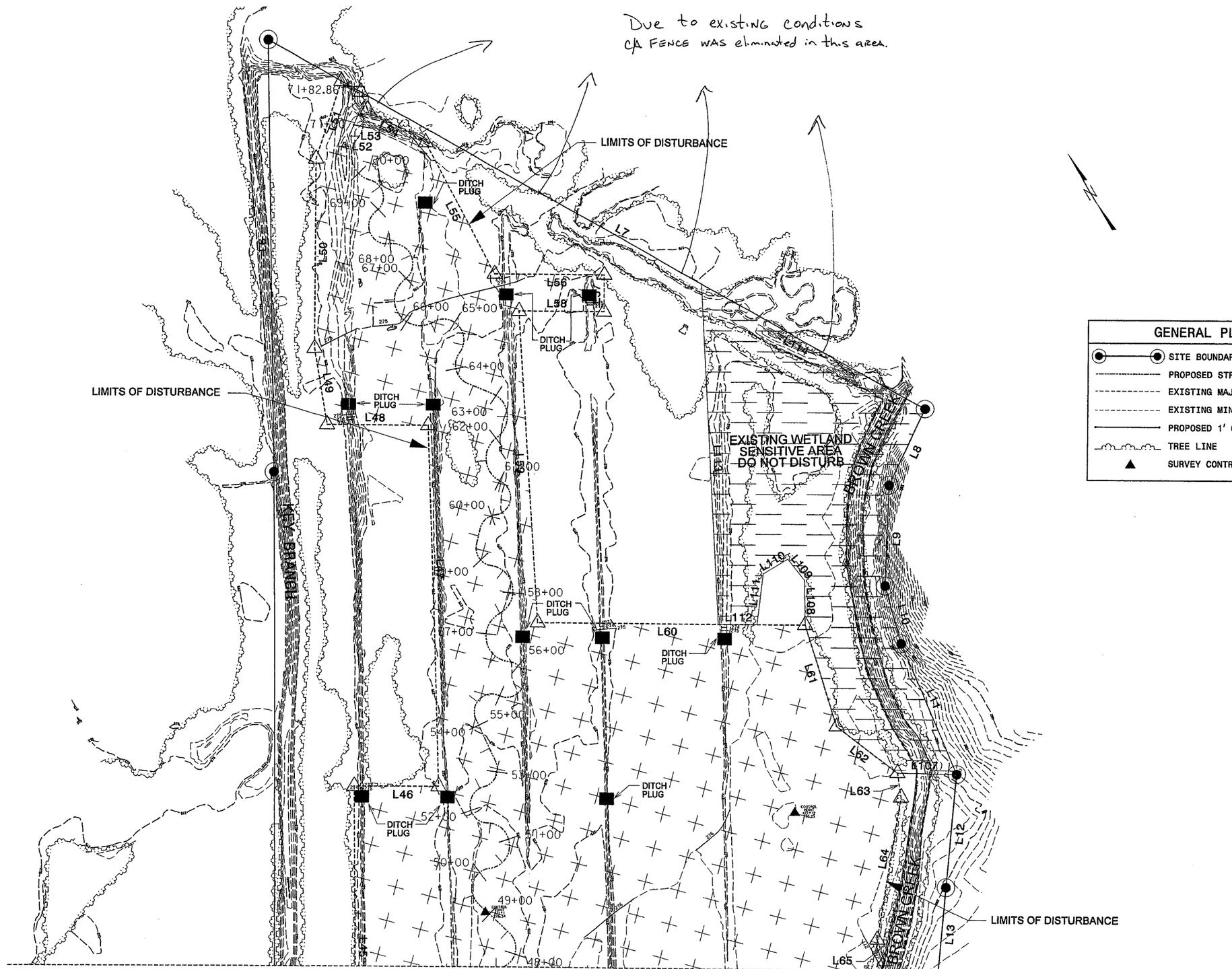
•ENGINEERS • SURVEYORS • SCIENTISTS

PROJECT REFERENCE NO.	SHEET NO.
R-2231WM	12
R/W SHEET NO.	
ENGINEER	SCIENTIST

NORTH CAROLINA PROFESSIONAL SEAL L4351 ENGINEER JAMES WALDO BLAKE

Due to existing conditions
CA FENCE WAS eliminated in this area.



GENERAL PLAN LEGEND

- SITE BOUNDARY/ CONSERVATION EASEMENT
- PROPOSED STREAM CHANNEL PLANFORM
- EXISTING MAJOR CONTOUR LINES
- EXISTING MINOR CONTOUR LINES
- PROPOSED 1' CONTOUR LINES
- TREE LINE
- SURVEY CONTROL POINT

GRADING PLAN

0 50 100 200

GRAPHIC SCALE (1" = 100')

GRADING PLAN 3

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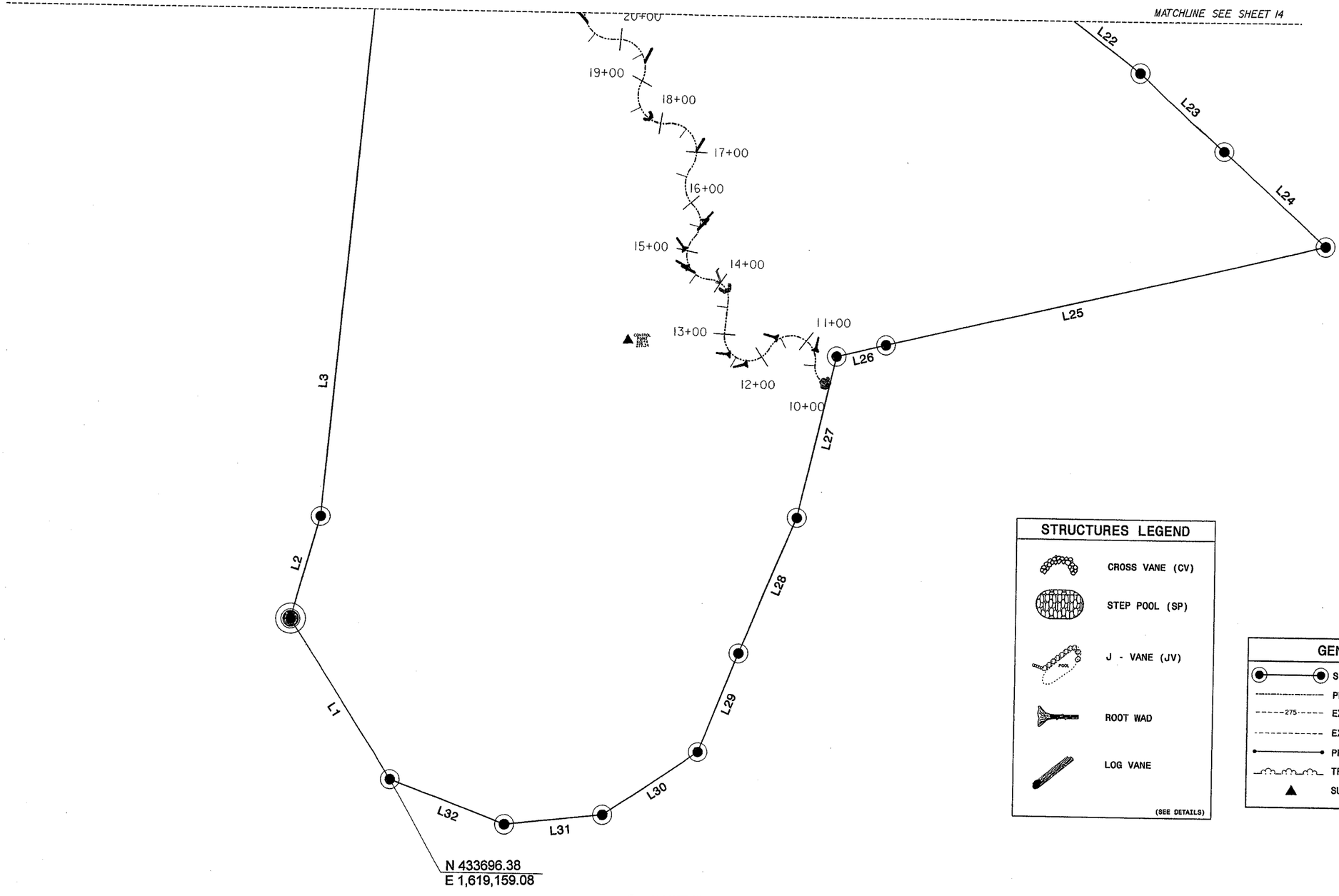
•ENGINEERS • SURVEYORS • SCIENTISTS

PROJECT REFERENCE NO.	SHEET NO.
R-2231WM	13
RW SHEET NO.	
ENGINEER	SCIENTIST

NORTH CAROLINA PROFESSIONAL SEAL 14351 ENGINEER CHARLES WALDO BLAKE



STRUCTURES PLAN

0 50 100 200

GRAPHIC SCALE (1" = 100')

STRUCTURES LEGEND

- CROSS VANE (CV)
- STEP POOL (SP)
- J - VANE (JV)
- ROOT WAD
- LOG VANE

(SEE DETAILS)

GENERAL PLAN LEGEND

- SITE BOUNDARY/ CONSERVATION EASEMENT
- PROPOSED STREAM CHANNEL PLANFORM
- 275 EXISTING MAJOR CONTOUR LINES
- EXISTING MINOR CONTOUR LINES
- PROPOSED 1' CONTOUR LINES
- TREE LINE
- SURVEY CONTROL POINT

STRUCTURES 1

KCI Associates of North Carolina, P.A.
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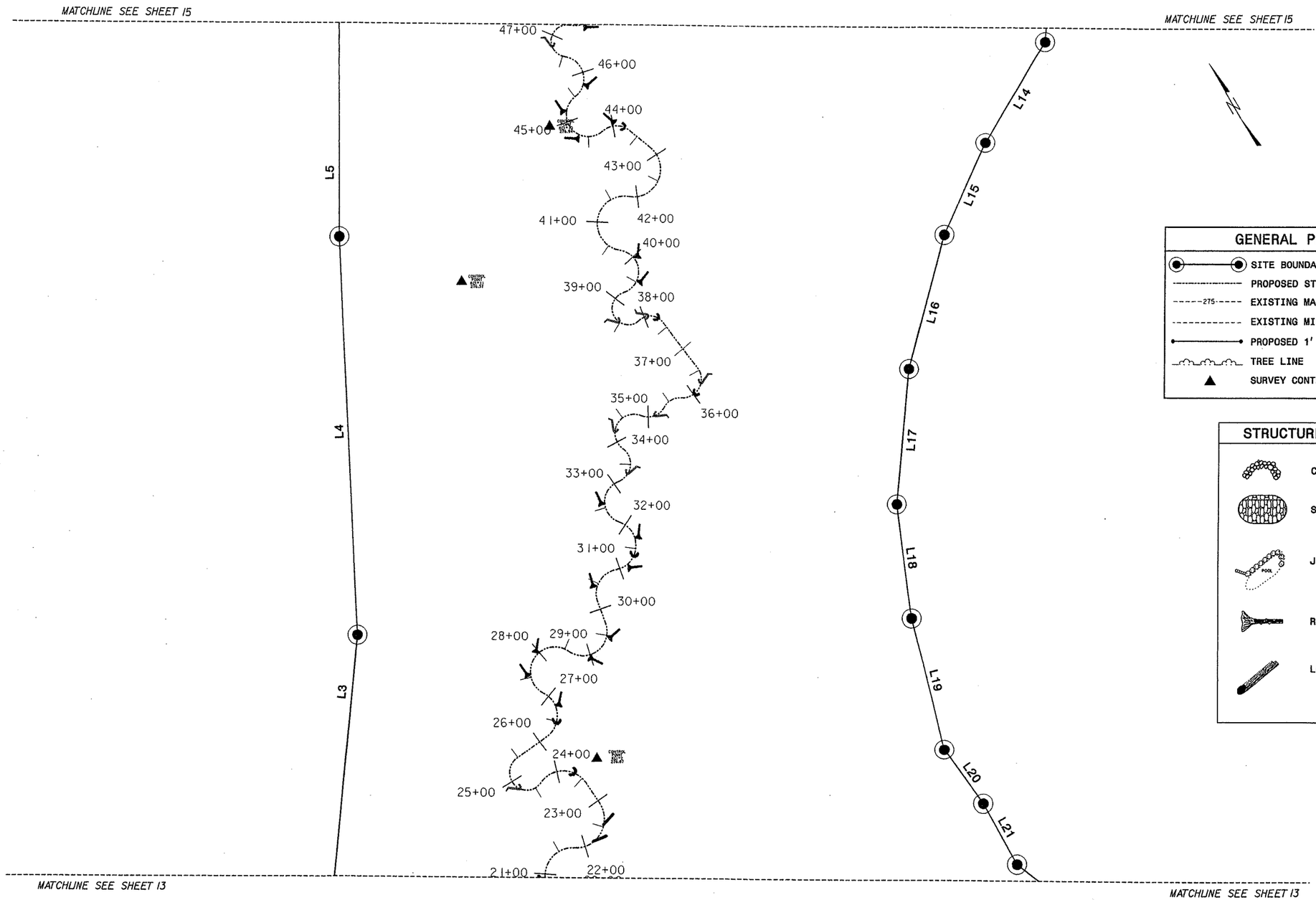
PROJECT REFERENCE NO.	SHEET NO.
R-2231WM	14
R/W SHEET NO.	

ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 14351 ENGINEER JAMES WALDO BLAKE

SCIENTIST



GENERAL PLAN LEGEND

- SITE BOUNDARY/ CONSERVATION EASEMENT
- PROPOSED STREAM CHANNEL PLANFORM
- 275 EXISTING MAJOR CONTOUR LINES
- EXISTING MINOR CONTOUR LINES
- PROPOSED 1' CONTOUR LINES
- TREE LINE
- SURVEY CONTROL POINT

STRUCTURES LEGEND

- CROSS VANE (CV)
- STEP POOL (SP)
- J - VANE (JV)
- ROOT WAD
- LOG VANE

(SEE DETAILS)

STRUCTURES PLAN

0 50 100 200

GRAPHIC SCALE (1" = 100')

STRUCTURES 2

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4601 SIX FORKS ROAD, RALEIGH, NC 27609-5210
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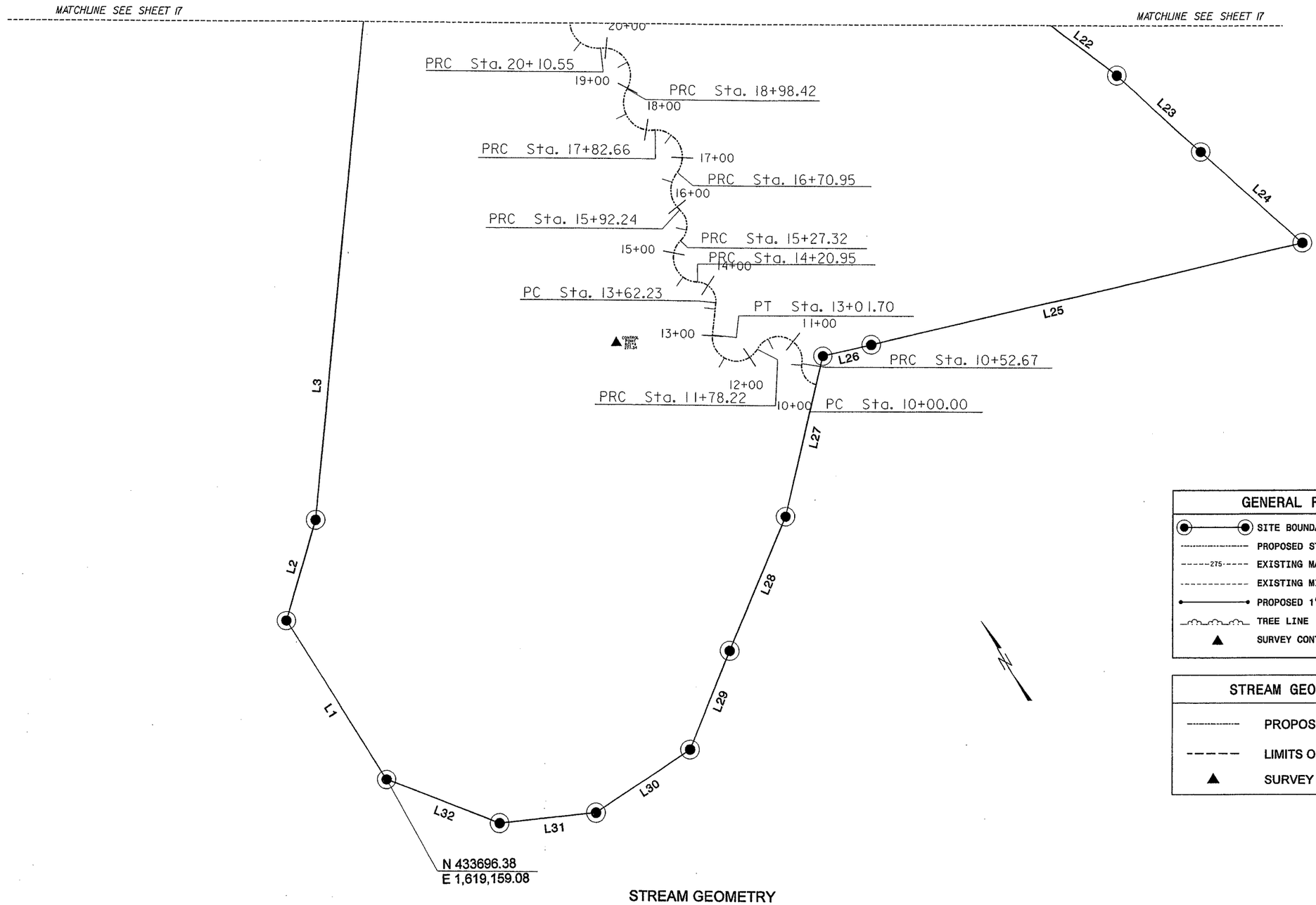
PROJECT REFERENCE NO.	SHEET NO.
R-2231 WM	16
R/W SHEET NO.	
ENGINEER	SCIENTIST

NORTH CAROLINA PROFESSIONAL SEAL 14351 ENGINEER JAMES WALDO BLAKE



STREAM GEOMETRY

0 50 100 200

GRAPHIC SCALE (1" = 100')

GENERAL PLAN LEGEND

- SITE BOUNDARY/ CONSERVATION EASEMENT
- PROPOSED STREAM CHANNEL PLANFORM
- 275 EXISTING MAJOR CONTOUR LINES
- EXISTING MINOR CONTOUR LINES
- PROPOSED 1' CONTOUR LINES
- TREE LINE
- SURVEY CONTROL POINT

STREAM GEOMETRY LEGEND

- PROPOSED STREAM ALIGNMENT
- LIMITS OF DISTURBANCE
- SURVEY CONTROL POINT

STREAM GEOMETRY 1

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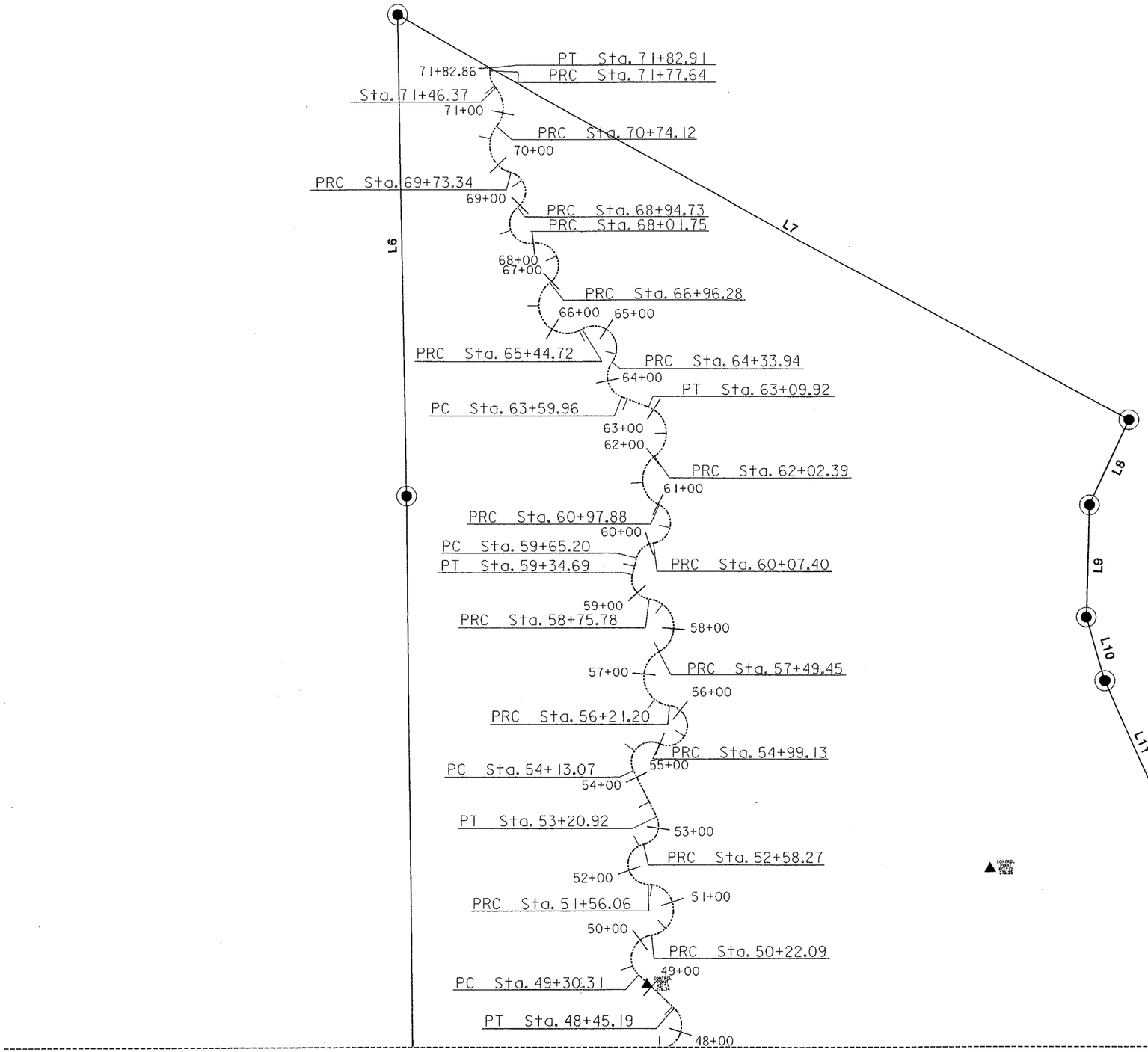
PROJECT REFERENCE NO.	SHEET NO.
R-2231WM	18
RW SHEET NO.	
ENGINEER	SCIENTIST

NORTH CAROLINA PROFESSIONAL SEAL 14351 ENGINEER JAMES WALDO BLUE



GENERAL PLAN LEGEND

- SITE BOUNDARY/ CONSERVATION EASEMENT
- PROPOSED STREAM CHANNEL PLANFORM
- EXISTING MAJOR CONTOUR LINES (275)
- EXISTING MINOR CONTOUR LINES
- PROPOSED 1' CONTOUR LINES
- TREE LINE
- SURVEY CONTROL POINT

STREAM GEOMETRY LEGEND

- PROPOSED STREAM ALIGNMENT
- LIMITS OF DISTURBANCE
- SURVEY CONTROL POINT

MATCHLINE SEE SHEET 17

MATCHLINE SEE SHEET 17

STREAM GEOMETRY

0 50 100 200
GRAPHIC SCALE (1" = 100')

STREAM GEOMETRY 3

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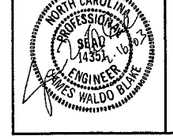
PROJECT REFERENCE NO.	SHEET NO.
R-2231WM	19
R/W SHEET NO.	
ENGINEER	SCIENTIST



Curve Data

Curve STREAM-1					
P.I. Station	10+32.76	N	433,944.3579	E	1,620,204.5419
Delta =	86° 12′ 57.61″ (RT)				
Degree =	163° 42′ 08.02″				
Tangent =	32.7616				
Length =	52.6664				
Radius =	35.0000				
External =	12.9408				
Long Chord =	47.8363				
Mid. Ord. =	9.4477				
P.C. Station	10+00.00	N	433,922.1126	E	1,620,228.5932
P.T. Station	10+52.67	N	433,969.8249	E	1,620,225.1514
C.C.		N	433,947.8072	E	1,620,252.3584
Back = N	47° 14′ 02.39″ W				
Ahead = N	38° 58′ 55.23″ E				
Chord Bear = N	4° 07′ 33.58″ W				

Curve Data

Curve STREAM-2					
P.I. Station	13+06.11	N	434,166.8349	E	1,620,384.5846
Delta =	159° 51′ 48.09″ (LT)				
Degree =	127° 19′ 26.24″				
Tangent =	253.4401				
Length =	125.5564				
Radius =	45.0000				
External =	212.4042				
Long Chord =	88.6140				
Mid. Ord. =	37.1330				
P.C. Station	10+52.67	N	433,969.8249	E	1,620,225.1514
P.T. Station	11+78.22	N	434,036.7538	E	1,620,167.0742
C.C.		N	433,998.1333	E	1,620,190.1710
Back = N	38° 58′ 55.23″ E				
Ahead = S	59° 07′ 07.14″ W				
Chord Bear = N	40° 56′ 58.82″ W				

Curve Data

Curve STREAM-3					
P.I. Station	14+01.54	N	433,922.1327	E	1,619,975.4148
Delta =	157° 12′ 51.45″ (RT)				
Degree =	127° 19′ 26.24″				
Tangent =	223.3189				
Length =	123.4758				
Radius =	45.0000				
External =	182.8076				
Long Chord =	88.2266				
Mid. Ord. =	36.1109				
P.C. Station	11+78.22	N	434,036.7538	E	1,620,167.0742
P.T. Station	13+01.70	N	434,102.0356	E	1,620,107.7259
C.C.		N	434,075.3742	E	1,620,143.9774
Back = S	59° 07′ 07.14″ W				
Ahead = N	36° 19′ 58.58″ E				
Chord Bear = N	42° 16′ 27.14″ W				

Course from PT STREAM-3 to PC STREAM-4 N 36° 19′ 58.58″ E Dist 60.5307

Curve Data

Curve STREAM-4					
P.I. Station	14+01.19	N	434,182.1871	E	1,620,166.6740
Delta =	96° 08′ 05.77″ (LT)				
Degree =	163° 42′ 08.02″				
Tangent =	38.9636				
Length =	58.7255				
Radius =	35.0000				
External =	17.3752				
Long Chord =	52.0753				
Mid. Ord. =	11.6111				
P.C. Station	13+62.23	N	434,150.7984	E	1,620,143.5890
P.T. Station	14+20.95	N	434,201.7853	E	1,620,132.9980
C.C.		N	434,171.5351	E	1,620,115.3934
Back = N	36° 19′ 58.58″ E				
Ahead = N	59° 48′ 07.19″ W				
Chord Bear = N	11° 44′ 04.30″ W				

Curve Data

Curve STREAM-5					
P.I. Station	15+30.77	N	434,257.0191	E	1,620,038.0894
Delta =	135° 25′ 58.01″ (RT)				
Degree =	127° 19′ 26.24″				
Tangent =	109.8108				
Length =	106.3687				
Radius =	45.0000				
External =	73.6736				
Long Chord =	83.2786				
Mid. Ord. =	27.9364				
P.C. Station	14+20.95	N	434,201.7853	E	1,620,132.9980
P.T. Station	15+27.32	N	434,284.2708	E	1,620,144.4649
C.C.		N	434,240.6785	E	1,620,155.6326
Back = N	59° 48′ 07.19″ W				
Ahead = N	75° 37′ 50.82″ E				
Chord Bear = N	7° 54′ 51.82″ E				

Curve Data

Curve STREAM-6					
P.I. Station	15+69.46	N	434,294.7283	E	1,620,185.2853
Delta =	92° 58′ 58.42″ (LT)				
Degree =	143° 14′ 22.02″				
Tangent =	42.1386				
Length =	64.9143				
Radius =	40.0000				
External =	18.1004				
Long Chord =	58.0217				
Mid. Ord. =	12.4615				
P.C. Station	15+27.32	N	434,284.2708	E	1,620,144.4649
P.T. Station	15+92.24	N	434,334.9491	E	1,620,172.7178
C.C.		N	434,323.0194	E	1,620,134.5382
Back = N	75° 37′ 50.82″ E				
Ahead = N	17° 21′ 07.60″ W				
Chord Bear = N	29° 08′ 21.61″ E				

Curve Data

Curve STREAM-7					
P.I. Station	16+41.76	N	434,382.2134	E	1,620,157.9494
Delta =	88° 05′ 10.42″ (RT)				
Degree =	111° 54′ 20.93″				
Tangent =	49.5178				
Length =	78.7146				
Radius =	51.2000				
External =	20.0282				
Long Chord =	71.1884				
Mid. Ord. =	14.3966				
P.C. Station	15+92.24	N	434,334.9491	E	1,620,172.7178
P.T. Station	16+70.95	N	434,398.5519	E	1,620,204.6941
C.C.		N	434,350.2192	E	1,620,221.5876
Back = N	17° 21′ 07.60″ W				
Ahead = N	70° 44′ 02.82″ E				
Chord Bear = N	26° 41′ 27.61″ E				

Curve Data

Curve STREAM-8					
P.I. Station	17+69.33	N	434,440.1105	E	1,620,293.8633
Delta =	125° 00′ 41.09″ (LT)				
Degree =	111° 54′ 20.97″				
Tangent =	98.3782				
Length =	111.7113				
Radius =	51.2000				
External =	59.7041				
Long Chord =	90.8346				
Mid. Ord. =	27.5630				
P.C. Station	16+70.95	N	434,398.5519	E	1,620,204.6941
P.T. Station	17+82.66	N	434,489.2996	E	1,620,208.6653
C.C.		N	434,444.9591	E	1,620,183.0653
Back = N	65° 00′ 41.08″ E				
Ahead = N	60° 00′ 00.01″ W				
Chord Bear = N	2° 30′ 20.53″ E				

Curve Data

Curve STREAM-9					
P.I. Station	18+91.32	N	434,526.4841	E	1,620,106.5650
Delta =	129° 32′ 28.15″ (RT)				
Degree =	111° 54′ 20.92″				
Tangent =	108.6607				
Length =	115.7591				
Radius =	51.2000				
External =	68.9190				
Long Chord =	92.6319				
Mid. Ord. =	29.3763				
P.C. Station	17+82.66	N	434,489.2996	E	1,620,208.6653
P.T. Station	18+98.42	N	434,581.5476	E	1,620,200.2408
C.C.		N	434,537.4084	E	1,620,226.1863
Back = N	69° 59′ 18.91″ W				
Ahead = N	59° 33′ 09.24″ E				
Chord Bear = N	5° 13′ 04.84″ W				

Curve Data

Curve STREAM-10					
P.I. Station	19+97.78	N	434,631.8950	E	1,620,285.8932
Delta =	125° 28′ 23.51″ (LT)				
Degree =	111° 54′ 20.99″				
Tangent =	99.3538				
Length =	112.1239				
Radius =	51.2000				
External =	60.5704				
Long Chord =	91.0244				
Mid. Ord. =	27.7462				
P.C. Station	18+98.42	N	434,581.5476	E	1,620,200.2408
P.T. Station	20+10.55	N	434,672.4315	E	1,620,195.1850
C.C.		N	434,625.6869	E	1,620,174.2953
Back = N	59° 33′ 09.24″ E				
Ahead = N	65° 55′ 14.27″ W				
Chord Bear = N	3° 11′ 02.51″ W				

Curve Data

Curve STREAM-11					
P.I. Station	25+85.23	N	434,437.9604	E	1,620,719.8585
Delta =	190° 10′ 56.64″ (RT)				
Degree =	111° 54′ 20.95″				
Tangent =	574.6817				
Length =	169.9486				
Radius =	51.2000				
External =	628.1579				
Long Chord =	101.9960				
Mid. Ord. =	55.7436				
P.C. Station	20+10.55	N	434,672.4315	E	1,620,195.1850
P.T. Station	21+80.50	N	434,761.4916	E	1,620,244.8990
C.C.		N	434,719.1761	E	1,620,216.0747
Back = N	65° 55′ 14.27″ W				
Ahead = S	55° 44′ 17.63″ E				
Chord Bear = N	29° 10′ 14.05″ E				

Curve Data

Curve STREAM-12					
P.I. Station	22+87.21	N	434,701.4152	E	1,620,333.0940
Delta =	128° 44′ 13.76″ (LT)				
Degree =	111° 54′ 20.95″				
Tangent =	106.7124				
Length =	115.0406				
Radius =	51.2000				
External =	67.1595				
Long Chord =	92.3234				
Mid. Ord. =	29.0519				
P.C. Station	21+80.50	N	434,761.4916	E	1,620,244.8990
P.T. Station	22+95.54	N	434,807.8023	E	1,620,324.7672
C.C.		N	434,803.8071	E	1,620,273.7233
Back = S	55° 44′ 17.63″ E				
Ahead = N	4° 28′ 31.39″ W				
Chord Bear = N	59° 53′ 35.49″ E				

Course from PT STREAM-12 to PC STREAM-13 N 4° 28′ 31.39″ W Dist 43.1619

Curve Data

Curve STREAM-13					
P.I. Station	24+11.21	N	434,923.1231	E	1,620,315.7411
Delta =	109° 32′ 55.06″ (LT)				
Degree =	111° 54′ 20.95″				
Tangent =	72.5116				
Length =	97.8936				
Radius =	51.2000				
External =	37.5658				
Long Chord =	83.6492				
Mid. Ord. =	21.6679				
P.C. Station	23+38.70	N	434,850.8326	E	1,620,321.3992
P.T. Station	24+36.59	N	434,893.6022	E	1,620,249.5108
C.C.		N	434,846.8374	E	1,620,270.3553
Back = N	4° 28′ 31.39″ W				
Ahead = S	65° 58′ 33.55″ W				
Chord Bear = N	59° 14′ 58.92″ W				

Curve Data

Curve STREAM-14					
P.I. Station	26+36.70	N	434,975.0712	E	1,620,432.2870
Delta =	198° 10′ 14.36″ (RT)				
Degree =	179° 02′ 57.52″				
Tangent =	200.1108				
Length =	110.6794				
Radius =	32.0000				
External =	234.6532				
Long Chord =	63.1971				
Mid. Ord. =	37.0530				
P.C. Station	24+36.59	N	434,893.6022	E	1,620,249.5108
P.T. Station	25+47.27	N	434,954.6634	E	1,620,233.2196
C.C.		N	434,922.8302	E	1,620,236.4830
Back = S	65° 58′ 33.55″ W				
Ahead = N	84° 08′ 47.91″ E				
Chord Bear = N	14° 56′ 19.27″ W				

Course from PT STREAM-14 to PC STREAM-15 N 84° 08′ 47.91″ E Dist 70.5751

Curve Data

Curve STREAM-15					
P.I. Station	26+92.10	N	434,969.4336	E	1,620,377.2947
Delta =	117° 34′ 00.19″ (LT)				
Degree =	127° 19′ 26.24″				
Tangent =	74.2552				
Length =	92.3367				
Radius =	45.0000				
External =	41.8264				
Long Chord =	76.9692				
Mid. Ord. =	21.6776				
P.C. Station	26+17.85	N	434,961.8608	E	1,620,303.4267
P.T. Station	27+10.18	N	435,031.4110	E	1,620,336.3969
C.C.		N	435,006.6262	E	1,620,298.8375
Back = N	84° 08′ 47.91″ E				
Ahead = N	33° 25′ 12.28″ W				
Chord Bear = N	25° 21′ 47.81″ E				

Curve Data

Curve STREAM-16					
P.I. Station	32+86.30	N	434,550.5486	E	1,620,653.7091
Delta =	188° 55′ 56.80″ (RT)				
Degree =	127° 19′ 26.24″				
Tangent =	576.1213				
Length =	148.3872				
Radius =	45.0000				
External =	622.8760				
Long Chord =	89.7267				
Mid. Ord. =	48.5042				
P.C. Station	27+10.18	N	435,031.4110	E	1,620,336.3969
P.T. Station	28+58.57	N	435,074.8482	E	1,620,414.9087
C.C.		N	435,056.1958	E	1,620,373.9564
Back = N	33° 25′ 12.28″ W				
Ahead = S	24° 29′ 15.48″ E				
Chord Bear = N	61° 02′ 46.12″ E				

STREAM GEOMETRY DATA 1

KCI Associates of North Carolina, P.A.
LANDMARK CENTER II, SUITE 220
4601 SIX FORKS ROAD, RALEIGH, NC 27609-5210
•ENGINEERS • SURVEYORS • SCIENTISTS

PROJECT REFERENCE NO.	SHEET NO.
R-2231WM	20
R/W SHEET NO.	
ENGINEER	SCIENTIST

NORTH CAROLINA PROFESSIONAL SEAL 14351 ENGINEER JAMES WALDO BLAKE

Curve Data

Curve STREAM-17					
P.I. Station	30+03.05	N	434,943.3669	E	1,620,474.7939
Delta =	145° 23′ 59.93″ (LT)				
Degree =	127° 19′ 30.65″				
Tangent =	144.4769				
Length =	114.1958				
Radius =	44.9996				
External =	106.3230				
Long Chord =	85.9276				
Mid. Ord. =	31.6178				
P.C. Station	28+58.57	N	435,074.8482	E	1,620,414.9087
P.T. Station	29+72.77	N	435,085.5993	E	1,620,500.1611
C.C.		N	435,093.5003	E	1,620,455.8606
Back = S	24° 29′ 15.48″ E				
Ahead = N	10° 06′ 44.59″ E				
Chord Bear = N	82° 48′ 44.56″ E				

Course from PT STREAM-17 to PC STREAM-18 N 10° 06′ 44.59″ E Dist 42.1047

Curve Data

Curve STREAM-18					
P.I. Station	30+68.03	N	435,179.3881	E	1,620,516.8883
Delta =	99° 30′ 30.13″ (RT)				
Degree =	127° 19′ 26.24″				
Tangent =	53.1640				
Length =	78.1537				
Radius =	45.0000				
External =	24.6521				
Long Chord =	68.6952				
Mid. Ord. =	15.9269				
P.C. Station	30+14.87	N	435,127.0499	E	1,620,507.5538
P.T. Station	30+93.02	N	435,161.5360	E	1,620,566.9654
C.C.		N	435,119.1489	E	1,620,551.8548
Back = N	10° 06′ 44.59″ E				
Ahead = S	70° 22′ 45.28″ E				
Chord Bear = N	59° 51′ 59.65″ E				

Curve Data

Curve STREAM-19					
P.I. Station	32+66.87	N	435,103.1600	E	1,620,730.7166
Delta =	150° 58′ 29.82″ (LT)				
Degree =	127° 19′ 26.24″				
Tangent =	173.8453				
Length =	118.5754				
Radius =	45.0000				
External =	134.5750				
Long Chord =	87.1284				
Mid. Ord. =	33.7234				
P.C. Station	30+93.02	N	435,161.5360	E	1,620,566.9654
P.T. Station	32+11.60	N	435,233.6551	E	1,620,615.8549
C.C.		N	435,203.9231	E	1,620,582.0761
Back = S	70° 22′ 45.28″ E				
Ahead = N	41° 21′ 15.10″ W				
Chord Bear = N	34° 07′ 59.81″ E				

Curve Data

Curve STREAM-20					
P.I. Station	33+21.60	N	435,316.2255	E	1,620,543.1766
Delta =	140° 02′ 03.60″ (RT)				
Degree =	143° 14′ 29.52″				
Tangent =	110.0000				
Length =	97.7610				
Radius =	39.9994				
External =	77.0474				
Long Chord =	75.1825				
Mid. Ord. =	26.3301				
P.C. Station	32+11.60	N	435,233.6551	E	1,620,615.8549
P.T. Station	33+09.36	N	435,299.6245	E	1,620,651.9167
C.C.		N	435,260.0832	E	1,620,645.8800
Back = N	41° 21′ 15.10″ W				
Ahead = S	81° 19′ 11.50″ E				
Chord Bear = N	28° 39′ 46.70″ E				

Curve Data

Curve STREAM-21					
P.I. Station	33+73.20	N	435,289.9905	E	1,620,715.0217
Delta =	122° 31′ 43.54″ (LT)				
Degree =	163° 41′ 53.24″				
Tangent =	63.8362				
Length =	74.8504				
Radius =	35.0009				
External =	37.8010				
Long Chord =	61.3809				
Mid. Ord. =	18.1736				
P.C. Station	33+09.36	N	435,299.6245	E	1,620,651.9167
P.T. Station	33+84.21	N	435,348.3761	E	1,620,689.2113
C.C.		N	435,334.2245	E	1,620,657.1989
Back = S	81° 19′ 11.50″ E				
Ahead = N	23° 50′ 55.03″ W				
Chord Bear = N	37° 24′ 56.73″ E				

Curve Data

Curve STREAM-22					
P.I. Station	36+72.89	N	435,612.4080	E	1,620,572.4917
Delta =	166° 10′ 27.54″ (RT)				
Degree =	163° 42′ 11.29″				
Tangent =	288.6803				
Length =	101.5095				
Radius =	34.9998				
External =	255.7944				
Long Chord =	69.4907				
Mid. Ord. =	30.7873				
P.C. Station	33+84.21	N	435,348.3761	E	1,620,689.2113
P.T. Station	34+85.72	N	435,383.9182	E	1,620,748.9250
C.C.		N	435,362.5273	E	1,620,721.2228
Back = N	23° 50′ 55.03″ W				
Ahead = S	37° 40′ 27.50″ E				
Chord Bear = N	59° 14′ 18.73″ E				

Curve Data

Curve STREAM-23					
P.I. Station	35+16.31	N	435,359.7030	E	1,620,767.6233
Delta =	82° 18′ 41.42″ (LT)				
Degree =	163° 41′ 37.13″				
Tangent =	30.5941				
Length =	50.2839				
Radius =	35.0018				
External =	11.4861				
Long Chord =	46.0700				
Mid. Ord. =	8.6481				
P.C. Station	34+85.72	N	435,383.9182	E	1,620,748.9250
P.T. Station	35+36.00	N	435,374.9935	E	1,620,794.1223
C.C.		N	435,405.3103	E	1,620,776.6289
Back = S	37° 40′ 27.50″ E				
Ahead = N	60° 00′ 51.08″ E				
Chord Bear = S	78° 49′ 48.21″ E				

Curve Data

Curve STREAM-24					
P.I. Station	35+58.11	N	435,386.0441	E	1,620,813.2733
Delta =	64° 34′ 02.83″ (RT)				
Degree =	163° 42′ 50.74″				
Tangent =	22.1106				
Length =	39.4392				
Radius =	34.9975				
External =	6.3994				
Long Chord =	37.3851				
Mid. Ord. =	5.4101				
P.C. Station	35+36.00	N	435,374.9935	E	1,620,794.1223
P.T. Station	35+75.44	N	435,373.4945	E	1,620,831.4774
C.C.		N	435,344.6805	E	1,620,811.6135
Back = N	60° 00′ 51.08″ E				
Ahead = S	55° 25′ 06.09″ E				
Chord Bear = S	87° 42′ 07.51″ E				

Curve Data

Curve STREAM-25					
P.I. Station	36+59.94	N	435,325.5341	E	1,620,901.0476
Delta =	135° 00′ 03.14″ (LT)				
Degree =	163° 42′ 04.27″				
Tangent =	84.4998				
Length =	82.4679				
Radius =	35.0002				
External =	56.4614				
Long Chord =	64.6722				
Mid. Ord. =	21.6065				
P.C. Station	35+75.44	N	435,373.4945	E	1,620,831.4774
P.T. Station	36+57.91	N	435,408.6406	E	1,620,885.7659
C.C.		N	435,402.3109	E	1,620,851.3428
Back = S	55° 25′ 06.09″ E				
Ahead = N	10° 25′ 09.23″ W				
Chord Bear = N	57° 04′ 52.34″ E				

Course from PT STREAM-25 to PC STREAM-26 N 8° 34′ 13.28″ W Dist 103.7724

Curve Data

Curve STREAM-26					
P.I. Station	37+94.06	N	435,543.2703	E	1,620,865.4763
Delta =	94° 21′ 56.25″ (LT)				
Degree =	190° 59′ 09.35″				
Tangent =	32.3776				
Length =	49.4097				
Radius =	30.0000				
External =	14.1396				
Long Chord =	44.0116				
Mid. Ord. =	9.6102				
P.C. Station	37+61.68	N	435,511.2543	E	1,620,870.3013
P.T. Station	38+11.09	N	435,536.0222	E	1,620,833.9205
C.C.		N	435,506.7836	E	1,620,840.6363
Back = N	8° 34′ 13.28″ W				
Ahead = S	77° 03′ 50.48″ W				
Chord Bear = N	55° 45′ 11.40″ W				

Curve Data

Curve STREAM-27					
P.I. Station	39+41.45	N	435,565.2039	E	1,620,960.9675
Delta =	205° 55′ 14.82″ (RT)				
Degree =	190° 59′ 09.35″				
Tangent =	130.3553				
Length =	107.8199				
Radius =	30.0000				
External =	163.7629				
Long Chord =	58.4715				
Mid. Ord. =	36.7283				
P.C. Station	38+11.09	N	435,536.0222	E	1,620,833.9205
P.T. Station	39+18.91	N	435,594.4937	E	1,620,833.9454
C.C.		N	435,565.2608	E	1,620,827.2046
Back = S	77° 03′ 50.48″ W				
Ahead = S	77° 00′ 54.71″ E				
Chord Bear = N	0° 01′ 27.88″ E				

Curve Data

Curve STREAM-28					
P.I. Station	40+93.25	N	435,555.3219	E	1,621,003.8227
Delta =	154° 09′ 18.28″ (LT)				
Degree =	143° 14′ 22.02″				
Tangent =	174.3351				
Length =	107.6205				
Radius =	40.0000				
External =	138.8651				
Long Chord =	77.9739				
Mid. Ord. =	31.0547				
P.C. Station	39+18.91	N	435,594.4937	E	1,620,833.9454
P.T. Station	40+26.53	N	435,664.6314	E	1,620,868.0134
C.C.		N	435,633.4709	E	1,620,842.9331
Back = S	77° 00′ 54.71″ E				
Ahead = N	51° 10′ 12.99″ W				
Chord Bear = N	25° 54′ 26.15″ E				

Curve Data

Curve STREAM-29					
P.I. Station	82+39.65	N	433,022.9710	E	1,624,150.0883
Delta =	181° 21′ 35.54″ (RT)				
Degree =	114° 35′ 29.61″				
Tangent =	4,213.1206				
Length =	158.2663				
Radius =	50.0000				
External =	4,263.4173				
Long Chord =	99.9930				
Mid. Ord. =	50.5933				
P.C. Station	40+26.53	N	435,664.6314	E	1,620,868.0134
P.T. Station	41+84.80	N	435,741.7777	E	1,620,931.6298
C.C.		N	435,703.5821	E	1,620,899.3638
Back = N	51° 10′ 12.99″ W				
Ahead = S	49° 48′ 37.45″ E				
Chord Bear = N	39° 30′ 34.78″ E				

Curve Data

Curve STREAM-30					
P.I. Station	43+73.51	N	435,620.0006	E	1,621,075.7867
Delta =	150° 19′ 11.79″ (LT)				
Degree =	114° 35′ 29.61″				
Tangent =	188.7085				
Length =	131.1789				
Radius =	50.0000				
External =	145.2201				
Long Chord =	96.6645				
Mid. Ord. =	37.1939				
P.C. Station	41+84.80	N	435,741.7777	E	1,620,931.6298
P.T. Station	43+15.98	N	435,797.1812	E	1,621,010.8413
C.C.		N	435,779.9734	E	1,620,963.8957
Back = S	49° 48′ 37.45″ E				
Ahead = N	20° 07′ 49.24″ W				
Chord Bear = N	55° 01′ 46.65″ E				

Course from PT STREAM-30 to PC STREAM-31 N 20° 07′ 49.24″ W Dist 49.9101

Curve Data

Curve STREAM-31					
P.I. Station	43+99.73	N	435,875.8162	E	1,620,982.0178
Delta =	80° 27′ 50.58″ (LT)				
Degree =	143° 14′ 22.02″				
Tangent =	33.8410				
Length =	56.1745				
Radius =	40.0000				
External =	12.3948				
Long Chord =	51.6708				
Mid. Ord. =	9.4626				
P.C. Station	43+65.89	N	435,844.0425	E	1,620,993.6644
P.T. Station	44+22.06	N	435,869.5943	E	1,620,948.7537
C.C.		N	435,830.2762	E	1,620,956.1079
Back = N	20° 07′ 49.24″ W				
Ahead = S	79° 24′ 20.17″ W				
Chord Bear = N	60° 21′ 44.54″ W				

Curve Data

Curve STREAM-32					
P.I. Station	55+25.21	N	436,072.4142	E	1,622,033.0986
Delta =	184° 09′ 11.69″ (RT)				
Degree =	143° 14′ 22.02″				
Tangent =	1,103.1499				
Length =	128.5632				
Radius =	40.0000				
External =	1,143.8749				
Long Chord =	79.9475				
Mid. Ord. =	41.4494				
P.C. Station	44+22.06	N	435,869.5943	E	1,620,948.7537
P.T. Station	45+50.63	N	435,948.6600	E	1,620,936.9122
C.C.		N	435,908.9125	E	1,620,941.3995
Back = S	79° 24′ 20.17″ W				
Ahead = N	83° 33′ 31.87″ E				
Chord Bear = N	8° 31′ 03.98″ W				

STREAM GEOMETRY DATA 2

KCI Associates of North Carolina, P.A.
LANDMARK CENTER II, SUITE 220
4601 SIX FORKS ROAD, RALEIGH, NC 27609-5210
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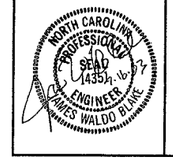
PROJECT REFERENCE NO.	SHEET NO.
R-2231WM	20
R/W SHEET NO.	
ENGINEER	SCIENTIST



Curve Data

Curve STREAM-17
P.I. Station 30+03.05 N 434,943.3669 E 1,620,474.7939
Delta = 145° 23′ 59.93″ (LT)
Degree = 127° 19′ 30.65″
Tangent = 144.4769
Length = 114.1958
Radius = 44.9996
External = 106.3230
Long Chord = 85.9276
Mid. Ord. = 31.6178
P.C. Station 29+58.57 N 435,074.8482 E 1,620,414.9087
P.T. Station 29+72.77 N 435,085.5993 E 1,620,500.1611
C.C. N 435,093.5003 E 1,620,455.8606
Back = S 24° 29′ 15.48″ E
Ahead = N 10° 06′ 44.59″ E
Chord Bear = N 82° 48′ 44.56″ E

Course from PT STREAM-17 to PC STREAM-18 N 10° 06′ 44.59″ E Dist 42.1047

Curve Data

Curve STREAM-18
P.I. Station 30+68.03 N 435,179.3881 E 1,620,516.8883
Delta = 99° 30′ 30.13″ (RT)
Degree = 127° 19′ 26.24″
Tangent = 53.1640
Length = 78.1537
Radius = 45.0000
External = 24.6521
Long Chord = 68.6952
Mid. Ord. = 15.9269
P.C. Station 30+14.87 N 435,127.0499 E 1,620,507.5538
P.T. Station 30+93.02 N 435,161.5360 E 1,620,566.9654
C.C. N 435,119.1489 E 1,620,551.8548
Back = N 10° 06′ 44.59″ E
Ahead = S 70° 22′ 45.28″ E
Chord Bear = N 59° 51′ 59.65″ E

Curve Data

Curve STREAM-19
P.I. Station 32+66.87 N 435,103.1600 E 1,620,730.7166
Delta = 150° 58′ 29.82″ (LT)
Degree = 127° 19′ 26.24″
Tangent = 173.8453
Length = 118.5754
Radius = 45.0000
External = 134.5750
Long Chord = 87.1284
Mid. Ord. = 33.7234
P.C. Station 30+93.02 N 435,161.5360 E 1,620,566.9654
P.T. Station 32+11.60 N 435,233.6551 E 1,620,615.8549
C.C. N 435,203.9231 E 1,620,582.0761
Back = S 70° 22′ 45.28″ E
Ahead = N 41° 21′ 15.10″ W
Chord Bear = N 34° 07′ 59.81″ E

Curve Data

Curve STREAM-20
P.I. Station 33+21.60 N 435,316.2255 E 1,620,543.1766
Delta = 140° 02′ 03.60″ (RT)
Degree = 143° 14′ 29.52″
Tangent = 110.0000
Length = 97.7610
Radius = 39.9994
External = 77.0474
Long Chord = 75.1825
Mid. Ord. = 26.3301
P.C. Station 32+11.60 N 435,233.6551 E 1,620,615.8549
P.T. Station 33+09.36 N 435,299.6245 E 1,620,651.9167
C.C. N 435,260.0832 E 1,620,645.8800
Back = N 41° 21′ 15.10″ W
Ahead = S 81° 19′ 11.50″ E
Chord Bear = N 28° 39′ 46.70″ E

Curve Data

Curve STREAM-21
P.I. Station 33+73.20 N 435,289.9905 E 1,620,715.0217
Delta = 122° 31′ 43.54″ (LT)
Degree = 163° 41′ 53.24″
Tangent = 63.8362
Length = 74.8504
Radius = 35.0009
External = 37.8010
Long Chord = 61.3809
Mid. Ord. = 18.1736
P.C. Station 33+09.36 N 435,299.6245 E 1,620,651.9167
P.T. Station 33+84.21 N 435,348.3761 E 1,620,689.2113
C.C. N 435,334.2245 E 1,620,657.1989
Back = S 81° 19′ 11.50″ E
Ahead = N 23° 50′ 55.03″ W
Chord Bear = N 37° 24′ 56.73″ E

Curve Data

Curve STREAM-22
P.I. Station 36+72.89 N 435,612.4080 E 1,620,572.4917
Delta = 166° 10′ 27.54″ (RT)
Degree = 163° 42′ 11.29″
Tangent = 288.6803
Length = 101.5095
Radius = 34.9998
External = 255.7944
Long Chord = 69.4907
Mid. Ord. = 30.7873
P.C. Station 33+84.21 N 435,348.3761 E 1,620,689.2113
P.T. Station 34+85.72 N 435,383.9182 E 1,620,748.9250
C.C. N 435,362.5273 E 1,620,721.2228
Back = N 23° 50′ 55.03″ W
Ahead = S 37° 40′ 27.50″ E
Chord Bear = N 59° 14′ 18.73″ E

Curve Data

Curve STREAM-23
P.I. Station 35+16.31 N 435,359.7030 E 1,620,767.6233
Delta = 82° 18′ 41.42″ (LT)
Degree = 163° 41′ 37.13″
Tangent = 30.5941
Length = 50.2839
Radius = 35.0018
External = 11.4861
Long Chord = 46.0700
Mid. Ord. = 8.6481
P.C. Station 34+85.72 N 435,383.9182 E 1,620,748.9250
P.T. Station 35+36.00 N 435,374.9935 E 1,620,794.1223
C.C. N 435,405.3103 E 1,620,776.6289
Back = S 37° 40′ 27.50″ E
Ahead = N 60° 00′ 51.08″ E
Chord Bear = S 78° 49′ 48.21″ E

Curve Data

Curve STREAM-24
P.I. Station 35+58.11 N 435,386.0441 E 1,620,813.2733
Delta = 64° 34′ 02.83″ (RT)
Degree = 163° 42′ 50.74″
Tangent = 22.1106
Length = 39.4392
Radius = 34.9975
External = 6.3994
Long Chord = 37.3851
Mid. Ord. = 5.4101
P.C. Station 35+36.00 N 435,374.9935 E 1,620,794.1223
P.T. Station 35+75.44 N 435,373.4945 E 1,620,831.4774
C.C. N 435,344.6805 E 1,620,811.6135
Back = N 60° 00′ 51.08″ E
Ahead = S 55° 25′ 06.09″ E
Chord Bear = S 87° 42′ 07.51″ E

Curve Data

Curve STREAM-25
P.I. Station 36+59.94 N 435,325.5341 E 1,620,901.0476
Delta = 135° 00′ 03.14″ (LT)
Degree = 163° 42′ 04.27″
Tangent = 84.4998
Length = 82.4679
Radius = 35.0002
External = 56.4614
Long Chord = 64.6722
Mid. Ord. = 21.6065
P.C. Station 35+75.44 N 435,373.4945 E 1,620,831.4774
P.T. Station 36+57.91 N 435,408.6406 E 1,620,885.7659
C.C. N 435,402.3109 E 1,620,851.3428
Back = S 55° 25′ 06.09″ E
Ahead = N 10° 25′ 09.23″ W
Chord Bear = N 57° 04′ 52.34″ E

Course from PT STREAM-25 to PC STREAM-26 N 8° 34′ 13.28″ W Dist 103.7724

Curve Data

Curve STREAM-26
P.I. Station 37+94.06 N 435,543.2703 E 1,620,865.4763
Delta = 94° 21′ 56.25″ (LT)
Degree = 190° 59′ 09.35″
Tangent = 32.3776
Length = 49.4097
Radius = 30.0000
External = 14.1396
Long Chord = 44.0116
Mid. Ord. = 9.6102
P.C. Station 37+61.68 N 435,511.2543 E 1,620,870.3013
P.T. Station 38+11.09 N 435,536.0222 E 1,620,833.9205
C.C. N 435,506.7836 E 1,620,840.6363
Back = N 8° 34′ 13.28″ W
Ahead = S 77° 03′ 50.48″ W
Chord Bear = N 55° 45′ 11.40″ W

Curve Data

Curve STREAM-27
P.I. Station 39+41.45 N 435,565.2039 E 1,620,960.9675
Delta = 205° 55′ 14.82″ (RT)
Degree = 190° 59′ 09.35″
Tangent = 130.3553
Length = 107.8199
Radius = 30.0000
External = 163.7629
Long Chord = 58.4715
Mid. Ord. = 36.7283
P.C. Station 38+11.09 N 435,536.0222 E 1,620,833.9205
P.T. Station 39+18.91 N 435,594.4937 E 1,620,833.9454
C.C. N 435,565.2608 E 1,620,827.2046
Back = S 77° 03′ 50.48″ W
Ahead = S 77° 00′ 54.71″ E
Chord Bear = N 0° 01′ 27.88″ E

Curve Data

Curve STREAM-28
P.I. Station 40+93.25 N 435,555.3219 E 1,621,003.8227
Delta = 154° 09′ 18.28″ (LT)
Degree = 143° 14′ 22.02″
Tangent = 174.3351
Length = 107.6205
Radius = 40.0000
External = 138.8651
Long Chord = 77.9739
Mid. Ord. = 31.0547
P.C. Station 39+18.91 N 435,594.4937 E 1,620,833.9454
P.T. Station 40+26.53 N 435,664.6314 E 1,620,868.0134
C.C. N 435,633.4709 E 1,620,842.9331
Back = S 77° 00′ 54.71″ E
Ahead = N 51° 10′ 12.99″ W
Chord Bear = N 25° 54′ 26.15″ E

Curve Data

Curve STREAM-29
P.I. Station 82+39.65 N 433,022.9710 E 1,624,150.0883
Delta = 181° 21′ 35.54″ (RT)
Degree = 114° 35′ 29.61″
Tangent = 4,213.1206
Length = 158.2663
Radius = 50.0000
External = 4,263.4173
Long Chord = 99.9930
Mid. Ord. = 50.5933
P.C. Station 40+26.53 N 435,664.6314 E 1,620,868.0134
P.T. Station 41+84.80 N 435,741.7777 E 1,620,931.6298
C.C. N 435,703.5821 E 1,620,899.3638
Back = N 51° 10′ 12.99″ W
Ahead = S 49° 48′ 37.45″ E
Chord Bear = N 39° 30′ 34.78″ E

Curve Data

Curve STREAM-30
P.I. Station 43+73.51 N 435,620.0006 E 1,621,075.7867
Delta = 150° 19′ 11.79″ (LT)
Degree = 114° 35′ 29.61″
Tangent = 188.7085
Length = 131.1789
Radius = 50.0000
External = 145.2201
Long Chord = 96.6645
Mid. Ord. = 37.1939
P.C. Station 41+84.80 N 435,741.7777 E 1,620,931.6298
P.T. Station 43+15.98 N 435,797.1812 E 1,621,010.8413
C.C. N 435,779.9734 E 1,620,963.8957
Back = S 49° 48′ 37.45″ E
Ahead = N 20° 07′ 49.24″ W
Chord Bear = N 55° 01′ 46.65″ E

Course from PT STREAM-30 to PC STREAM-31 N 20° 07′ 49.24″ W Dist 49.9101

Curve Data

Curve STREAM-31
P.I. Station 43+99.73 N 435,875.8162 E 1,620,982.0178
Delta = 80° 27′ 50.58″ (LT)
Degree = 143° 14′ 22.02″
Tangent = 33.8410
Length = 56.1745
Radius = 40.0000
External = 12.3948
Long Chord = 51.6708
Mid. Ord. = 9.4626
P.C. Station 43+65.89 N 435,844.0425 E 1,620,993.6644
P.T. Station 44+22.06 N 435,869.5943 E 1,620,948.7537
C.C. N 435,830.2762 E 1,620,956.1079
Back = N 20° 07′ 49.24″ W
Ahead = S 79° 24′ 20.17″ W
Chord Bear = N 60° 21′ 44.54″ W

Curve Data

Curve STREAM-32
P.I. Station 55+25.21 N 436,072.4142 E 1,622,033.0986
Delta = 184° 09′ 11.69″ (RT)
Degree = 143° 14′ 22.02″
Tangent = 1,103.1499
Length = 128.5632
Radius = 40.0000
External = 1,143.8749
Long Chord = 79.9475
Mid. Ord. = 41.4494
P.C. Station 44+22.06 N 435,869.5943 E 1,620,948.7537
P.T. Station 45+50.63 N 435,948.6600 E 1,620,936.9122
C.C. N 435,908.9125 E 1,620,941.3995
Back = S 79° 24′ 20.17″ W
Ahead = N 83° 33′ 31.87″ E
Chord Bear = N 8° 31′ 03.98″ W

STREAM GEOMETRY DATA 2

KCI Associates of North Carolina, P.A.
LANDMARK CENTER II, SUITE 220
4601 SIX FORKS ROAD, RALEIGH, NC 27609-5210
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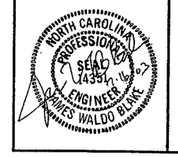
PROJECT REFERENCE NO.	SHEET NO.
R-2231WM	21
R/W SHEET NO.	
ENGINEER	SCIENTIST



Curve Data

Curve STREAM-33

P.I. Station	46+48.35	N 435,959.6229	E 1,621,034.0191
Delta =	135° 28′ 47.20″ (LT)		
Degree =	143° 14′ 22.01″		
Tangent =	97.7238		
Length =	94.5827		
Radius =	40.0000		
External =	65.5933		
Long Chord =	74.0379		
Mid. Ord. =	24.8475		
P.C. Station	45+50.63	N 435,948.6600	E 1,620,936.9122
P.T. Station	46+45.21	N 436,019.8939	E 1,620,957.0948
C.C.		N 435,988.4075	E 1,620,932.4249
Back = N	83° 33′ 31.87″ E		
Ahead = N	51° 55′ 15.33″ W		
Chord Bear = N	15° 49′ 08.27″ E		

Curve Data

Curve STREAM-34

P.I. Station	55+91.89	N 435,436.0291	E 1,621,702.2855
Delta =	183° 37′ 48.53″ (RT)		
Degree =	190° 59′ 09.35″		
Tangent =	946.6823		
Length =	96.1485		
Radius =	30.0000		
External =	977.1575		
Long Chord =	59.9899		
Mid. Ord. =	30.9502		
P.C. Station	46+45.21	N 436,019.8939	E 1,620,957.0948
P.T. Station	47+41.36	N 436,065.9046	E 1,620,995.5578
C.C.		N 436,043.5087	E 1,620,975.5973
Back = N	51° 55′ 15.33″ W		
Ahead = S	48° 17′ 26.80″ E		
Chord Bear = N	39° 53′ 38.94″ E		

Curve Data

Curve STREAM-35

P.I. Station	48+84.30	N 435,970.8015	E 1,621,102.2647
Delta =	148° 43′ 56.48″ (LT)		
Degree =	143° 14′ 26.09″		
Tangent =	142.9370		
Length =	103.8340		
Radius =	39.9997		
External =	108.4286		
Long Chord =	77.0397		
Mid. Ord. =	29.2202		
P.C. Station	47+41.36	N 436,065.9046	E 1,620,995.5578
P.T. Station	48+45.19	N 436,107.4759	E 1,621,060.4188
C.C.		N 436,095.7656	E 1,621,022.1716
Back = S	48° 17′ 26.80″ E		
Ahead = N	17° 01′ 23.28″ W		
Chord Bear = N	57° 20′ 34.96″ E		

Course from PT STREAM-35 to PC STREAM-36 N 17° 01′ 23.28″ W Dist 85.1167

Curve Data

Curve STREAM-36

P.I. Station	50+19.04	N 436,273.7107	E 1,621,009.5223
Delta =	131° 28′ 12.90″ (RT)		
Degree =	143° 14′ 22.02″		
Tangent =	88.7352		
Length =	91.7835		
Radius =	40.0000		
External =	57.3341		
Long Chord =	72.9324		
Mid. Ord. =	23.5618		
P.C. Station	49+30.31	N 436,188.8633	E 1,621,035.5002
P.T. Station	50+22.09	N 436,236.9874	E 1,621,090.3018
C.C.		N 436,200.5736	E 1,621,073.7477
Back = N	17° 01′ 23.28″ W		
Ahead = S	65° 33′ 10.38″ E		
Chord Bear = N	48° 42′ 43.17″ E		

Curve Data

Curve STREAM-37

P.I. Station	59+29.55	N 435,861.4335	E 1,621,916.3992
Delta =	174° 26′ 53.26″ (LT)		
Degree =	130° 13′ 03.65″		
Tangent =	907.4567		
Length =	133.9665		
Radius =	44.0000		
External =	864.5228		
Long Chord =	87.8967		
Mid. Ord. =	41.8691		
P.C. Station	50+22.09	N 436,236.9874	E 1,621,090.3018
P.T. Station	51+56.06	N 436,315.1480	E 1,621,130.5107
C.C.		N 436,277.0425	E 1,621,108.5113
Back = S	65° 33′ 10.38″ E		
Ahead = N	60° 00′ 03.65″ W		
Chord Bear = N	27° 13′ 22.99″ E		

Curve Data

Curve STREAM-38

P.I. Station	54+71.02	N 436,472.6225	E 1,620,857.7457
Delta =	167° 19′ 04.88″ (RT)		
Degree =	163° 42′ 10.62″		
Tangent =	314.9587		
Length =	102.2083		
Radius =	34.9998		
External =	281.8975		
Long Chord =	69.5714		
Mid. Ord. =	31.1343		
P.C. Station	51+56.06	N 436,315.1480	E 1,621,130.5107
P.T. Station	52+58.27	N 436,378.8724	E 1,621,158.4280
C.C.		N 436,345.4591	E 1,621,148.0100
Back = N	60° 00′ 03.65″ W		
Ahead = S	72° 40′ 58.77″ E		
Chord Bear = N	23° 39′ 28.79″ E		

Curve Data

Curve STREAM-39

P.I. Station	53+01.92	N 436,365.8791	E 1,621,200.1013
Delta =	102° 33′ 10.93″ (LT)		
Degree =	163° 41′ 49.24″		
Tangent =	43.6519		
Length =	62.6481		
Radius =	35.0011		
External =	20.9503		
Long Chord =	54.6139		
Mid. Ord. =	13.1057		
P.C. Station	52+58.27	N 436,378.8724	E 1,621,158.4280
P.T. Station	53+20.92	N 436,409.3802	E 1,621,203.7266
C.C.		N 436,412.2870	E 1,621,168.8464
Back = S	72° 40′ 58.77″ E		
Ahead = N	4° 45′ 50.31″ E		
Chord Bear = N	56° 02′ 25.77″ E		

Course from PT STREAM-39 to PC STREAM-40 N 4° 45′ 50.31″ E Dist 92.1506

Curve Data

Curve STREAM-40

P.I. Station	55+11.59	N 436,599.3957	E 1,621,219.5623
Delta =	140° 53′ 07.33″ (RT)		
Degree =	163° 42′ 08.02″		
Tangent =	98.5236		
Length =	86.0620		
Radius =	35.0000		
External =	69.5557		
Long Chord =	65.9615		
Mid. Ord. =	23.2838		
P.C. Station	54+13.07	N 436,501.2124	E 1,621,211.3798
P.T. Station	54+99.13	N 436,518.0546	E 1,621,275.1549
C.C.		N 436,498.3057	E 1,621,246.2589
Back = N	4° 45′ 50.31″ E		
Ahead = S	34° 21′ 02.36″ E		
Chord Bear = N	75° 12′ 23.97″ E		

Curve Data

Curve STREAM-41

P.I. Station	56+99.39	N 436,683.3919	E 1,621,162.1551
Delta =	199° 49′ 36.87″ (LT)		
Degree =	163° 42′ 08.02″		
Tangent =	200.2633		
Length =	122.0673		
Radius =	35.0000		
External =	238.2988		
Long Chord =	68.9548		
Mid. Ord. =	41.0256		
P.C. Station	54+99.13	N 436,518.0546	E 1,621,275.1549
P.T. Station	56+21.20	N 436,566.1828	E 1,621,324.5355
C.C.		N 436,537.8036	E 1,621,304.0509
Back = S	34° 21′ 02.36″ E		
Ahead = N	54° 10′ 39.24″ W		
Chord Bear = N	45° 44′ 09.20″ E		

Curve Data

Curve STREAM-42

P.I. Station	57+89.85	N 436,664.8903	E 1,621,187.7870
Delta =	146° 58′ 22.98″ (RT)		
Degree =	114° 35′ 29.60″		
Tangent =	168.6515		
Length =	128.2582		
Radius =	50.0000		
External =	125.9072		
Long Chord =	95.8753		
Mid. Ord. =	35.7880		
P.C. Station	56+21.20	N 436,566.1828	E 1,621,324.5355
P.T. Station	57+49.45	N 436,656.6650	E 1,621,356.2378
C.C.		N 436,606.7245	E 1,621,353.7993
Back = N	54° 10′ 39.24″ W		
Ahead = S	87° 12′ 16.26″ E		
Chord Bear = N	19° 18′ 32.25″ E		

Curve Data

Curve STREAM-43

P.I. Station	59+06.86	N 436,648.9880	E 1,621,513.4600
Delta =	144° 45′ 21.05″ (LT)		
Degree =	114° 35′ 29.62″		
Tangent =	157.4095		
Length =	126.3233		
Radius =	50.0000		
External =	115.1598		
Long Chord =	95.3074		
Mid. Ord. =	34.8631		
P.C. Station	57+49.45	N 436,656.6650	E 1,621,356.2378
P.T. Station	58+75.78	N 436,745.9848	E 1,621,389.4867
C.C.		N 436,706.6055	E 1,621,358.6764
Back = S	87° 12′ 16.26″ E		
Ahead = N	51° 57′ 37.31″ W		
Chord Bear = N	20° 25′ 03.22″ E		

Curve Data

Curve STREAM-44

P.I. Station	59+14.96	N 436,770.1280	E 1,621,358.6289
Delta =	96° 27′ 10.86″ (RT)		
Degree =	163° 42′ 30.02″		
Tangent =	39.1804		
Length =	58.9176		
Radius =	34.9987		
External =	17.5371		
Long Chord =	52.2030		
Mid. Ord. =	11.6830		
P.C. Station	58+75.78	N 436,745.9848	E 1,621,389.4867
P.T. Station	59+34.69	N 436,798.0769	E 1,621,386.0872
C.C.		N 436,773.5492	E 1,621,411.0531
Back = N	51° 57′ 37.31″ W		
Ahead = N	44° 29′ 33.56″ E		
Chord Bear = N	3° 44′ 01.87″ W		

Course from PT STREAM-44 to PC STREAM-45 N 44° 29′ 33.56″ E Dist 30.5050

Curve Data

Curve STREAM-45

P.I. Station	59+89.289	N 436,837.021	E 1,621,424.348
Delta =	69° 04′ 38.39″ (RT)		
Degree =	163° 42′ 08.02″		
Tangent =	24.090		
Length =	42.197		
Radius =	35.000		
External =	7.489		
Long Chord =	39.687		
Mid. Ord. =	8.169		
P.C. Station	59+65.199	N 436,819.837	E 1,621,407.466
P.T. Station	60+07.396	N 436,827.389	E 1,621,446.428
C.C.		N 436,795.309	E 1,621,432.433
Back = N	44° 29′ 33.56″ E		
Ahead = S	66° 25′ 48.06″ E		
Chord Bear = N	79° 01′ 52.75″ E		

Curve Data

Curve STREAM-46

P.I. Station	61+29.962	N 436,778.378	E 1,621,558.769
Delta =	148° 07′ 31.97″ (LT)		
Degree =	163° 42′ 08.02″		
Tangent =	122.566		
Length =	90.485		
Radius =	35.000		
External =	92.466		
Long Chord =	67.309		
Mid. Ord. =	25.390		
P.C. Station	60+07.396	N 436,827.389	E 1,621,446.428
P.T. Station	60+97.881	N 436,879.321	E 1,621,489.249
C.C.		N 436,859.469	E 1,621,460.423
Back = S	66° 25′ 48.06″ E		
Ahead = N	34° 33′ 20.02″ W		
Chord Bear = N	39° 30′ 25.96″ E		

Curve Data

Curve STREAM-47

P.I. Station	61+84.056	N 436,950.293	E 1,621,440.370
Delta =	119° 45′ 14.74″ (RT)		
Degree =	114° 35′ 29.61″		
Tangent =	86.175		
Length =	104.505		
Radius =	50.000		
External =	49.630		
Long Chord =	86.495		
Mid. Ord. =	24.907		
P.C. Station	60+97.881	N 436,879.321	E 1,621,489.249
P.T. Station	62+02.386	N 436,957.506	E 1,621,526.242
C.C.		N 436,907.681	E 1,621,530.427
Back = N	34° 33′ 20.02″ W		
Ahead = N	85° 11′ 54.72″ E		
Chord Bear = N	25° 19′ 17.35″ E		

Curve Data

Curve STREAM-48

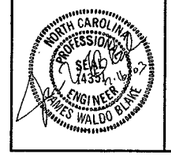
P.I. Station	62+94.902	N 436,965.250	E 1,621,618.434
Delta =	123° 13′ 20.27″ (LT)		
Degree =	114° 35′ 29.61″		
Tangent =	92.516		
Length =	107.532		
Radius =	50.000		
External =	55.163		
Long Chord =	87.974		
Mid. Ord. =	26.227		
P.C. Station	62+02.386	N 436,957.506	E 1,621,526.242
P.T. Station	63+09.918	N 437,038.130	E 1,621,561.445
C.C.		N 437,007.330	E 1,621,522.057
Back = N	85° 11′ 54.72″ E		
Ahead = N	38° 01′ 25.56″ W		
Chord Bear = N	23° 35′ 14.58″ E		

Course from PT STREAM-48 to PC STREAM-49 N 38° 01′ 25.56″ W Dist 50.041

STREAM GEOMETRY DATA 3

KCI Associates of North Carolina, P.A.
LANDMARK CENTER II, SUITE 220
4601 SIX FORKS ROAD, RALEIGH, NC 27609-5210
• ENGINEERS • SURVEYORS • SCIENTISTS

PROJECT REFERENCE NO.	SHEET NO.
R-2231WM	21
R/W SHEET NO.	
ENGINEER	SCIENTIST



Curve Data

Curve STREAM-33
P.I. Station 46+48.35 N 435,959.6229 E 1,621,034.0191
Delta = 135° 28′ 47.20″ (LT)
Degree = 143° 14′ 22.01″
Tangent = 97.7238
Length = 94.5827
Radius = 40.0000
External = 65.5933
Long Chord = 74.0379
Mid. Ord. = 24.8475
P.C. Station 45+50.63 N 435,948.6600 E 1,620,936.9122
P.T. Station 46+45.21 N 436,019.8939 E 1,620,957.0948
C.C. N 435,988.4075 E 1,620,932.4249
Back = N 83° 33′ 31.87″ E
Ahead = N 51° 55′ 15.33″ W
Chord Bear = N 15° 49′ 08.27″ E

Curve Data

Curve STREAM-34
P.I. Station 55+91.89 N 435,436.0291 E 1,621,702.2855
Delta = 183° 37′ 48.53″ (RT)
Degree = 190° 59′ 09.35″
Tangent = 946.6823
Length = 96.1485
Radius = 30.0000
External = 977.1575
Long Chord = 59.9699
Mid. Ord. = 30.9502
P.C. Station 46+45.21 N 436,019.8939 E 1,620,957.0948
P.T. Station 47+41.36 N 436,065.9046 E 1,620,995.5578
C.C. N 436,043.5087 E 1,620,975.5973
Back = N 51° 55′ 15.33″ W
Ahead = S 48° 17′ 26.80″ E
Chord Bear = N 39° 53′ 38.94″ E

Curve Data

Curve STREAM-35
P.I. Station 48+84.30 N 435,970.8015 E 1,621,102.2647
Delta = 148° 43′ 56.48″ (LT)
Degree = 143° 14′ 26.09″
Tangent = 142.9370
Length = 103.8340
Radius = 39.9997
External = 108.4286
Long Chord = 77.0397
Mid. Ord. = 29.2202
P.C. Station 47+41.36 N 436,065.9046 E 1,620,995.5578
P.T. Station 48+45.19 N 436,107.4759 E 1,621,060.4188
C.C. N 436,095.7656 E 1,621,022.1716
Back = S 48° 17′ 26.80″ E
Ahead = N 17° 01′ 23.28″ W
Chord Bear = N 57° 20′ 34.96″ E

Course from PT STREAM-35 to PC STREAM-36 N 17° 01′ 23.28″ W Dist 85.1167

Curve Data

Curve STREAM-36
P.I. Station 50+19.04 N 436,273.7107 E 1,621,009.5223
Delta = 131° 28′ 12.90″ (RT)
Degree = 143° 14′ 22.02″
Tangent = 88.7352
Length = 91.7835
Radius = 40.0000
External = 57.3341
Long Chord = 72.9324
Mid. Ord. = 23.5618
P.C. Station 49+30.31 N 436,188.8633 E 1,621,035.5002
P.T. Station 50+22.09 N 436,236.9874 E 1,621,090.3018
C.C. N 436,200.5736 E 1,621,073.7477
Back = N 17° 01′ 23.28″ W
Ahead = S 65° 33′ 10.38″ E
Chord Bear = N 48° 42′ 43.17″ E

Curve Data

Curve STREAM-37
P.I. Station 59+29.55 N 435,861.4335 E 1,621,916.3992
Delta = 174° 26′ 53.26″ (LT)
Degree = 130° 13′ 03.65″
Tangent = 907.4567
Length = 133.9665
Radius = 44.0000
External = 864.5228
Long Chord = 87.8967
Mid. Ord. = 41.8691
P.C. Station 50+22.09 N 436,236.9874 E 1,621,090.3018
P.T. Station 51+56.06 N 436,315.1480 E 1,621,130.5107
C.C. N 436,277.0425 E 1,621,108.5113
Back = S 65° 33′ 10.38″ E
Ahead = N 60° 00′ 03.65″ W
Chord Bear = N 27° 13′ 22.99″ E

Curve Data

Curve STREAM-38
P.I. Station 54+71.02 N 436,472.6225 E 1,620,857.7457
Delta = 167° 19′ 04.88″ (RT)
Degree = 163° 42′ 10.62″
Tangent = 314.9587
Length = 102.2083
Radius = 34.9998
External = 281.8975
Long Chord = 69.5714
Mid. Ord. = 31.1343
P.C. Station 51+56.06 N 436,315.1480 E 1,621,130.5107
P.T. Station 52+58.27 N 436,378.8724 E 1,621,158.4280
C.C. N 436,345.4591 E 1,621,148.0100
Back = N 60° 00′ 03.65″ W
Ahead = S 72° 40′ 58.77″ E
Chord Bear = N 23° 39′ 28.79″ E

Curve Data

Curve STREAM-39
P.I. Station 53+01.92 N 436,365.8791 E 1,621,200.1013
Delta = 102° 33′ 10.93″ (LT)
Degree = 163° 41′ 49.24″
Tangent = 43.6519
Length = 62.6481
Radius = 35.0011
External = 20.9503
Long Chord = 54.6139
Mid. Ord. = 13.1057
P.C. Station 52+58.27 N 436,378.8724 E 1,621,158.4280
P.T. Station 53+20.92 N 436,409.3802 E 1,621,203.7266
C.C. N 436,412.2870 E 1,621,168.8464
Back = S 72° 40′ 58.77″ E
Ahead = N 4° 45′ 50.31″ E
Chord Bear = N 56° 02′ 25.77″ E

Course from PT STREAM-39 to PC STREAM-40 N 4° 45′ 50.31″ E Dist 92.1506

Curve Data

Curve STREAM-40
P.I. Station 55+11.59 N 436,599.3957 E 1,621,219.5623
Delta = 140° 53′ 07.33″ (RT)
Degree = 163° 42′ 08.02″
Tangent = 98.5236
Length = 86.0620
Radius = 35.0000
External = 69.5557
Long Chord = 65.9615
Mid. Ord. = 23.2838
P.C. Station 54+13.07 N 436,501.2124 E 1,621,211.3798
P.T. Station 54+99.13 N 436,518.0546 E 1,621,275.1549
C.C. N 436,498.3057 E 1,621,246.2589
Back = N 4° 45′ 50.31″ E
Ahead = S 34° 21′ 02.36″ E
Chord Bear = N 75° 12′ 23.97″ E

Curve Data

Curve STREAM-41
P.I. Station 56+99.39 N 436,683.3919 E 1,621,162.1551
Delta = 199° 49′ 36.87″ (LT)
Degree = 163° 42′ 08.02″
Tangent = 200.2633
Length = 122.0673
Radius = 35.0000
External = 238.2988
Long Chord = 68.9548
Mid. Ord. = 41.0256
P.C. Station 54+99.13 N 436,518.0546 E 1,621,275.1549
P.T. Station 56+21.20 N 436,566.1828 E 1,621,324.5355
C.C. N 436,537.8036 E 1,621,304.0509
Back = S 34° 21′ 02.36″ E
Ahead = N 54° 10′ 39.24″ W
Chord Bear = N 45° 44′ 09.20″ E

Curve Data

Curve STREAM-42
P.I. Station 57+89.85 N 436,664.8903 E 1,621,187.7870
Delta = 146° 58′ 22.98″ (RT)
Degree = 114° 35′ 29.60″
Tangent = 168.6515
Length = 128.2582
Radius = 50.0000
External = 125.9072
Long Chord = 95.8753
Mid. Ord. = 35.7880
P.C. Station 56+21.20 N 436,566.1828 E 1,621,324.5355
P.T. Station 57+49.45 N 436,656.6650 E 1,621,356.2378
C.C. N 436,606.7245 E 1,621,353.7993
Back = N 54° 10′ 39.24″ W
Ahead = S 87° 12′ 16.26″ E
Chord Bear = N 19° 18′ 32.25″ E

Curve Data

Curve STREAM-43
P.I. Station 59+06.86 N 436,648.9880 E 1,621,513.4600
Delta = 144° 45′ 21.05″ (LT)
Degree = 114° 35′ 29.62″
Tangent = 157.4095
Length = 126.3233
Radius = 50.0000
External = 115.1598
Long Chord = 95.3074
Mid. Ord. = 34.8631
P.C. Station 57+49.45 N 436,656.6650 E 1,621,356.2378
P.T. Station 58+75.78 N 436,745.9848 E 1,621,389.4867
C.C. N 436,706.6055 E 1,621,358.6764
Back = S 87° 12′ 16.26″ E
Ahead = N 51° 57′ 37.31″ W
Chord Bear = N 20° 25′ 03.22″ E

Curve Data

Curve STREAM-44
P.I. Station 59+14.96 N 436,770.1280 E 1,621,358.6289
Delta = 96° 27′ 10.86″ (RT)
Degree = 163° 42′ 30.02″
Tangent = 39.1804
Length = 58.9176
Radius = 34.9987
External = 17.5371
Long Chord = 52.2030
Mid. Ord. = 11.6830
P.C. Station 58+75.78 N 436,745.9848 E 1,621,389.4867
P.T. Station 59+34.69 N 436,798.0769 E 1,621,386.0872
C.C. N 436,773.5492 E 1,621,411.0531
Back = N 51° 57′ 37.31″ W
Ahead = N 44° 29′ 33.56″ E
Chord Bear = N 3° 44′ 01.87″ W

Course from PT STREAM-44 to PC STREAM-45 N 44° 29′ 33.56″ E Dist 30.5050

Curve Data

Curve STREAM-45
P.I. Station 59+89.289 N 436,837.021 E 1,621,424.348
Delta = 69° 04′ 38.39″ (RT)
Degree = 163° 42′ 08.02″
Tangent = 24.090
Length = 42.197
Radius = 35.000
External = 7.489
Long Chord = 39.687
Mid. Ord. = 6.169
P.C. Station 59+65.199 N 436,819.837 E 1,621,407.466
P.T. Station 60+07.396 N 436,827.389 E 1,621,446.428
C.C. N 436,795.309 E 1,621,432.433
Back = N 44° 29′ 33.56″ E
Ahead = S 66° 25′ 48.06″ E
Chord Bear = N 79° 01′ 52.75″ E

Curve Data

Curve STREAM-46
P.I. Station 61+29.962 N 436,778.378 E 1,621,558.769
Delta = 148° 07′ 31.97″ (LT)
Degree = 163° 42′ 08.02″
Tangent = 122.566
Length = 90.485
Radius = 35.000
External = 92.466
Long Chord = 67.309
Mid. Ord. = 25.390
P.C. Station 60+07.396 N 436,827.389 E 1,621,446.428
P.T. Station 60+97.881 N 436,879.321 E 1,621,489.249
C.C. N 436,859.469 E 1,621,460.423
Back = S 66° 25′ 48.06″ E
Ahead = N 34° 33′ 20.02″ W
Chord Bear = N 39° 30′ 25.96″ E

Curve Data

Curve STREAM-47
P.I. Station 61+84.056 N 436,950.293 E 1,621,440.370
Delta = 119° 45′ 14.74″ (RT)
Degree = 114° 35′ 29.61″
Tangent = 86.175
Length = 104.505
Radius = 50.000
External = 49.630
Long Chord = 86.495
Mid. Ord. = 24.907
P.C. Station 60+97.881 N 436,879.321 E 1,621,489.249
P.T. Station 62+02.386 N 436,957.506 E 1,621,526.242
C.C. N 436,907.681 E 1,621,530.427
Back = N 34° 33′ 20.02″ W
Ahead = N 85° 11′ 54.72″ E
Chord Bear = N 25° 19′ 17.35″ E

Curve Data

Curve STREAM-48
P.I. Station 62+94.902 N 436,965.250 E 1,621,618.434
Delta = 123° 13′ 20.27″ (LT)
Degree = 114° 35′ 29.61″
Tangent = 92.516
Length = 107.532
Radius = 50.000
External = 55.163
Long Chord = 87.974
Mid. Ord. = 26.227
P.C. Station 62+02.386 N 436,957.506 E 1,621,526.242
P.T. Station 63+09.918 N 437,038.130 E 1,621,561.445
C.C. N 437,007.330 E 1,621,522.057
Back = N 85° 11′ 54.72″ E
Ahead = N 38° 01′ 25.56″ W
Chord Bear = N 23° 35′ 14.58″ E

Course from PT STREAM-48 to PC STREAM-49 N 38° 01′ 25.56″ W Dist 50.041

STREAM GEOMETRY DATA 3

KCI Associates of North Carolina, P.A.
LANDMARK CENTER II, SUITE 220
4601 SIX FORKS ROAD, RALEIGH, NC 27609-5210
•ENGINEERS • SURVEYORS • SCIENTISTS

PROJECT REFERENCE NO.	SHEET NO.
R-2231WM	22
RW SHEET NO.	
ENGINEER	SCIENTIST

NORTH CAROLINA PROFESSIONAL SEAL 15439 ENGINEER JAMES WALDO BLAKE

Curve Data

Curve STREAM-49					
P.I. Station	64+13.01	N	437,119.3431	E	1,621,497.9397
Delta =	105° 58′ 14.05″ (RT)				
Degree =	143° 14′ 22.02″				
Tangent =	53.0534				
Length =	73.9814				
Radius =	40.0000				
External =	26.4430				
Long Chord =	63.8785				
Mid. Ord. =	15.9192				
P.C. Station	63+59.96	N	437,077.5499	E	1,621,530.6200
P.T. Station	64+33.94	N	437,139.2629	E	1,621,547.1115
C.C.		N	437,102.1895	E	1,621,562.1302
Back = N	38° 01′ 25.56″ W				
Ahead = N	67° 56′ 48.50″ E				
Chord Bear = N	14° 57′ 41.47″ E				

Curve Data

Curve STREAM-50					
P.I. Station	66+46.51	N	437,219.0742	E	1,621,744.1247
Delta =	158° 41′ 08.56″ (LT)				
Degree =	143° 14′ 22.02″				
Tangent =	212.5654				
Length =	110.7835				
Radius =	40.0000				
External =	176.2962				
Long Chord =	78.6201				
Mid. Ord. =	32.6027				
P.C. Station	64+33.94	N	437,139.2629	E	1,621,547.1115
P.T. Station	65+44.72	N	437,216.3330	E	1,621,531.5770
C.C.		N	437,176.3363	E	1,621,532.0928
Back = N	67° 56′ 48.50″ E				
Ahead = S	89° 15′ 39.94″ W				
Chord Bear = N	11° 23′ 45.78″ W				

Curve Data

Curve STREAM-51					
P.I. Station	74+49.05	N	437,204.6709	E	1,620,627.3293
Delta =	173° 40′ 14.47″ (RT)				
Degree =	114° 35′ 30.20″				
Tangent =	904.3228				
Length =	151.5561				
Radius =	49.9999				
External =	855.7041				
Long Chord =	99.8474				
Mid. Ord. =	47.2397				
P.C. Station	65+44.72	N	437,216.3330	E	1,621,531.5770
P.T. Station	66+96.28	N	437,315.9487	E	1,621,524.7796
C.C.		N	437,266.3288	E	1,621,530.9322
Back = S	89° 15′ 39.94″ W				
Ahead = N	82° 55′ 54.41″ E				
Chord Bear = N	3° 54′ 12.82″ W				

Curve Data

Curve STREAM-52					
P.I. Station	68+51.32	N	437,335.0268	E	1,621,678.6438
Delta =	151° 04′ 00.41″ (LT)				
Degree =	143° 14′ 17.75″				
Tangent =	155.0425				
Length =	105.4654				
Radius =	40.0003				
External =	120.1190				
Long Chord =	77.4641				
Mid. Ord. =	30.0076				
P.C. Station	66+96.28	N	437,315.9487	E	1,621,524.7796
P.T. Station	68+01.75	N	437,392.7679	E	1,621,534.7545
C.C.		N	437,355.6450	E	1,621,519.8575
Back = N	82° 55′ 54.41″ E				
Ahead = N	68° 08′ 05.99″ W				
Chord Bear = N	7° 23′ 54.21″ E				

Curve Data

Curve STREAM-53					
P.I. Station	69+43.29	N	437,445.4825	E	1,621,403.3910
Delta =	152° 13′ 20.60″ (RT)				
Degree =	163° 42′ 13.35″				
Tangent =	141.5457				
Length =	92.9865				
Radius =	34.9997				
External =	110.8090				
Long Chord =	67.9528				
Mid. Ord. =	26.5984				
P.C. Station	68+01.75	N	437,392.7679	E	1,621,534.7545
P.T. Station	68+94.73	N	437,460.0633	E	1,621,544.1838
C.C.		N	437,425.2498	E	1,621,547.7891
Back = N	68° 08′ 05.99″ W				
Ahead = N	84° 05′ 14.61″ E				
Chord Bear = N	7° 58′ 34.31″ E				

Curve Data

Curve STREAM-54					
P.I. Station	69+67.58	N	437,467.5673	E	1,621,616.6419
Delta =	128° 40′ 25.04″ (LT)				
Degree =	163° 41′ 57.66″				
Tangent =	72.8456				
Length =	78.6036				
Radius =	35.0006				
External =	45.8173				
Long Chord =	63.0960				
Mid. Ord. =	19.8425				
P.C. Station	68+94.73	N	437,460.0633	E	1,621,544.1838
P.T. Station	69+73.34	N	437,519.4476	E	1,621,565.5055
C.C.		N	437,494.8778	E	1,621,540.5783
Back = N	84° 05′ 14.61″ E				
Ahead = N	44° 35′ 10.44″ W				
Chord Bear = N	19° 45′ 02.09″ E				

Curve Data

Curve STREAM-55					
P.I. Station	70+52.57	N	437,575.8805	E	1,621,509.8819
Delta =	115° 29′ 46.15″ (RT)				
Degree =	114° 35′ 36.28″				
Tangent =	79.2380				
Length =	100.7878				
Radius =	49.9992				
External =	43.6949				
Long Chord =	84.5696				
Mid. Ord. =	23.3175				
P.C. Station	69+73.34	N	437,519.4476	E	1,621,565.5055
P.T. Station	70+74.12	N	437,601.7956	E	1,621,584.7623
C.C.		N	437,554.5461	E	1,621,601.1147
Back = N	44° 35′ 10.44″ W				
Ahead = N	70° 54′ 35.72″ E				
Chord Bear = N	13° 09′ 42.64″ E				

Curve Data

Curve STREAM-56					
P.I. Station	71+18.19	N	437,616.2087	E	1,621,626.4080
Delta =	82° 47′ 00.16″ (LT)				
Degree =	114° 35′ 17.62″				
Tangent =	44.0693				
Length =	72.2442				
Radius =	50.0015				
External =	16.6488				
Long Chord =	66.1222				
Mid. Ord. =	12.4900				
P.C. Station	70+74.12	N	437,601.7956	E	1,621,584.7623
P.T. Station	71+46.37	N	437,659.3351	E	1,621,617.3407
C.C.		N	437,649.0473	E	1,621,568.4091
Back = N	70° 54′ 35.72″ E				
Ahead = N	11° 52′ 24.44″ W				
Chord Bear = N	29° 31′ 05.64″ E				

Curve Data

Curve STREAM-57					
P.I. Station	71+62.85	N	437,675.4661	E	1,621,613.9492
Delta =	44° 47′ 43.40″ (RT)				
Degree =	143° 15′ 02.07″				
Tangent =	16.4836				
Length =	31.2707				
Radius =	39.9969				
External =	3.2635				
Long Chord =	30.4803				
Mid. Ord. =	3.0173				
P.C. Station	71+46.37	N	437,659.3351	E	1,621,617.3407
P.T. Station	71+77.64	N	437,689.3026	E	1,621,622.9080
C.C.		N	437,667.5645	E	1,621,656.4819
Back = N	11° 52′ 24.44″ W				
Ahead = N	32° 55′ 18.96″ E				
Chord Bear = N	10° 31′ 27.26″ E				

Curve Data

Curve STREAM-58					
P.I. Station	71+80.28	N	437,691.5166	E	1,621,624.3414
Delta =	7° 32′ 28.48″ (LT)				
Degree =	143° 10′ 11.66″				
Tangent =	2.6375				
Length =	5.2673				
Radius =	40.0194				
External =	0.0868				
Long Chord =	5.2635				
Mid. Ord. =	0.0866				
P.C. Station	71+77.64	N	437,689.3026	E	1,621,622.9080
P.T. Station	71+82.91	N	437,693.8995	E	1,621,625.4719
C.C.		N	437,711.0530	E	1,621,589.3152
Back = N	32° 55′ 18.96″ E				
Ahead = N	25° 22′ 50.49″ E				
Chord Bear = N	29° 09′ 04.72″ E				

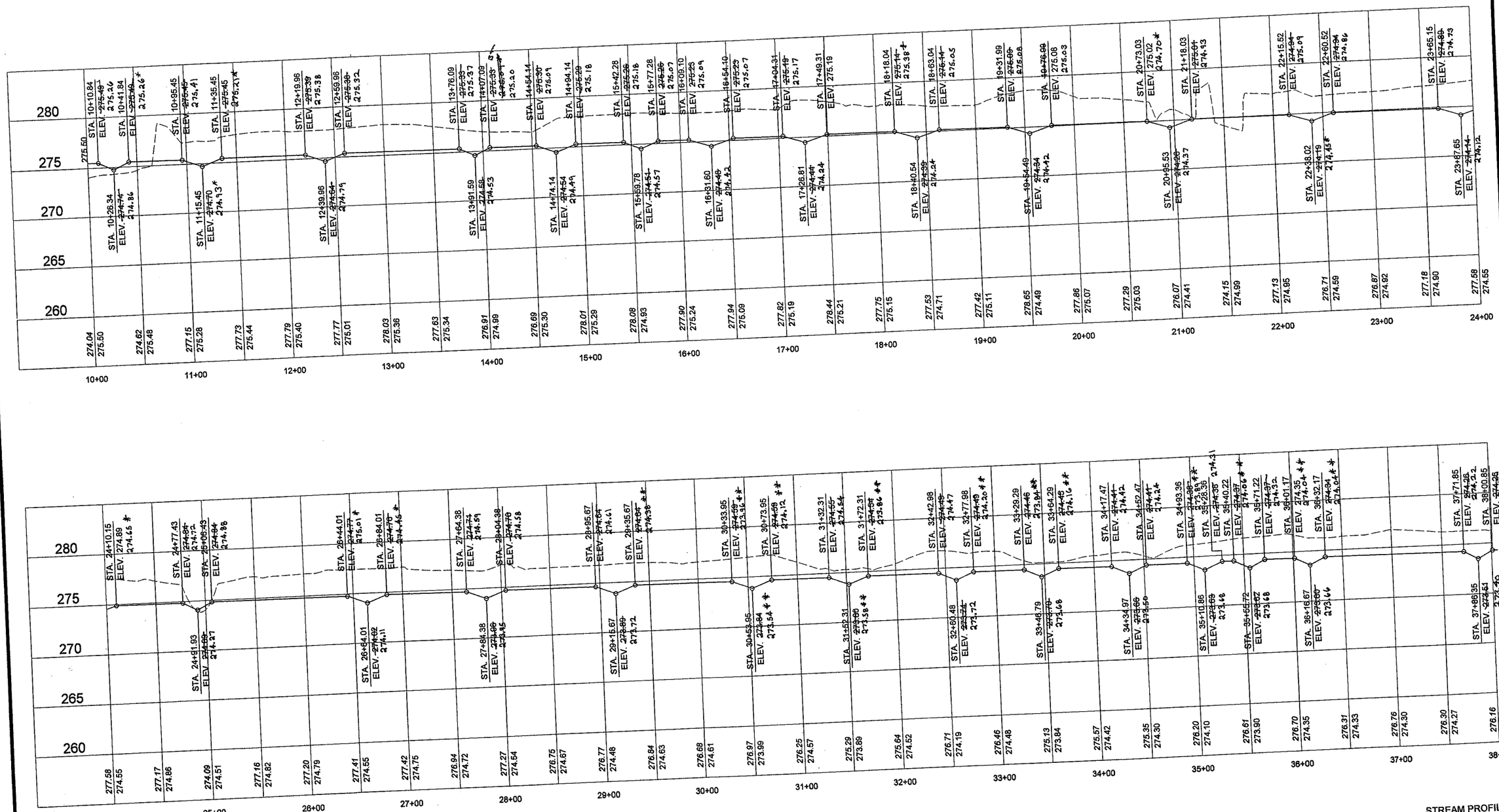
KCI Associates of North Carolina, P.A.
LANDMARK CENTER II, SUITE 220
4601 SIX FORKS ROAD, RALEIGH, NC 27609-5210
• ENGINEERS • SURVEYORS • SCIENTISTS

R/W SHEET NO.

ENGINEER

SCIENTIST

NORTH CAROLINA PROFESSIONAL SEAL 19367 ENGINEER JAMES WALDO BLAKE



0 25 50 100
HORIZONTAL SCALE (1" = 50')

0 2.5 5 10
VERTICAL SCALE (1" = 5')

* elevation accepted

** Due to water flowing back into channel, accurate grades could not be attained.

STREAM PROFILE 1

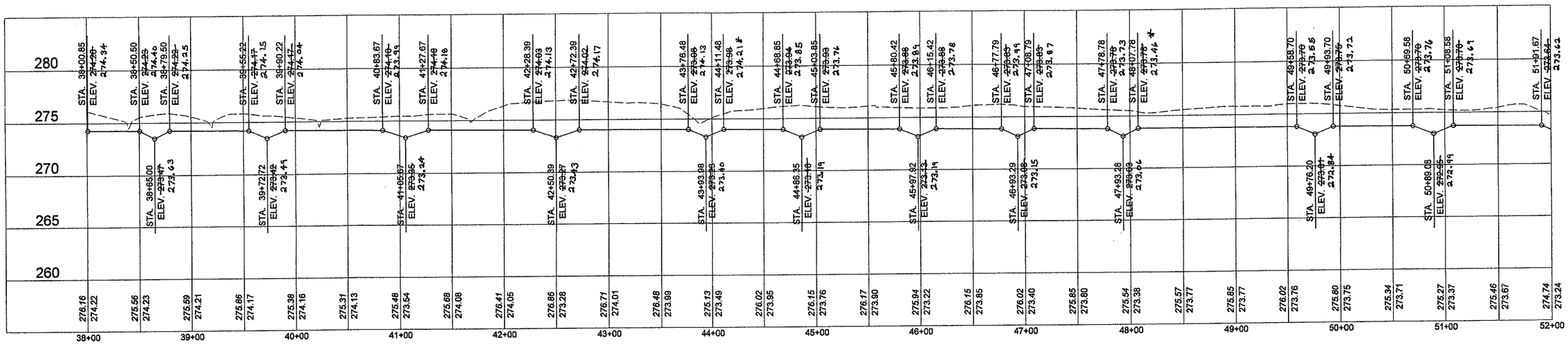
KCI Associates of North Carolina, P.A.
LANDMARK CENTER II, SUITE 220
4601 SIX FORKS ROAD, RALEIGH, NC 27609-5210
• ENGINEERS • SURVEYORS • SCIENTISTS

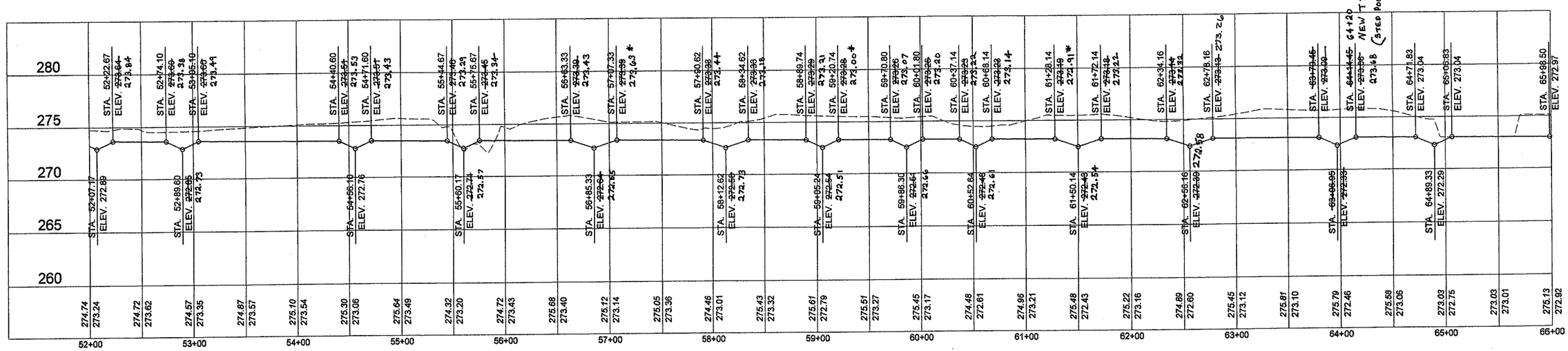
PROJECT REFERENCE NO.	SHEET NO.
R-2231 WM	24
R/W SHEET NO.	

ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 19353 ENGINEER JAMES WALDO BLAKE

SCIENTIST





* elevation accepted

0 25 50 100
HORIZONTAL SCALE (1" = 50')

0 2.5 5 10
VERTICAL SCALE (1" = 5')

STREAM PROFILE 2

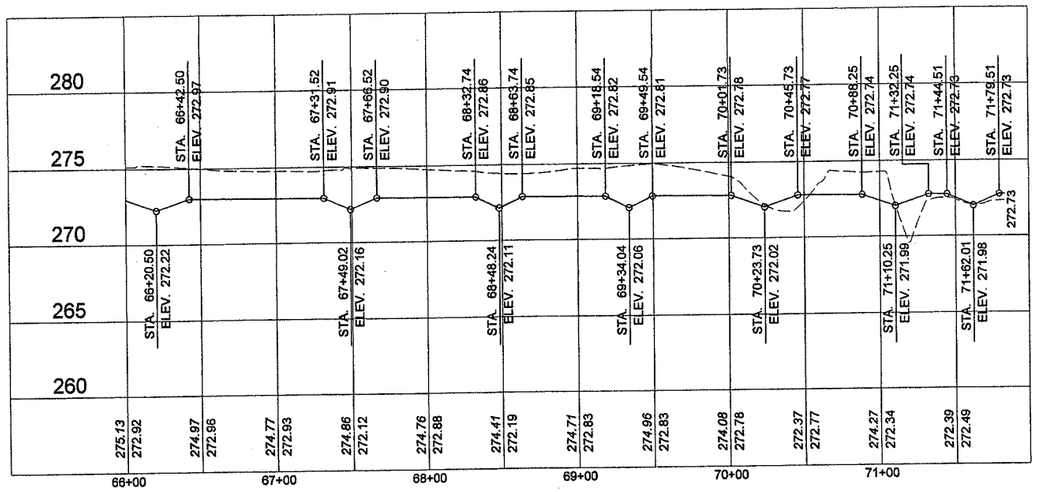
KCI Associates of North Carolina, P.A.
LANDMARK CENTER II, SUITE 220
4601 SIX FORKS ROAD, RALEIGH, NC 27609-5210
•ENGINEERS • SURVEYORS • SCIENTISTS

PROJECT REFERENCE NO.	SHEET NO.
R-2231 WM	25
R/W SHEET NO.	

ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 14851 ENGINEER JAMES WALDO BLAKE

SCIENTIST



STATION	ELEVATION	DESCRIPTION
1000.00	275.50	BEGIN PROJECT, CROSS VANE
1010.84	~~275.49~~ 275.36	HEAD OF POOL
1026.34	~~274.74~~ 274.86	MAX POOL
1041.84	~~275.49~~ 275.26	HEAD OF RIFFLE
1095.45	~~275.45~~ 275.41	HEAD OF POOL
1115.45	~~274.70~~ 274.93	MAX POOL
1135.45	~~275.45~~ 275.21	HEAD OF RIFFLE
1219.96	~~275.39~~ 275.38	HEAD OF POOL
1239.96	~~274.64~~ 274.79	MAX POOL
1259.96	~~275.38~~ 276.32	HEAD OF RIFFLE
1376.09	~~275.33~~ 275.37	HEAD OF POOL, CROSS VANE
1391.59	~~274.58~~ 274.63	MAX POOL
1407.09	~~275.33~~ 276.20	HEAD OF RIFFLE
1454.14	~~275.30~~ 275.09	HEAD OF POOL, LOG VANE
1474.14	~~274.54~~ 274.49	MAX POOL
1494.14	~~275.29~~ 275.18	HEAD OF RIFFLE
1542.28	~~275.26~~ 275.18	HEAD OF POOL, LOG VANE
1559.78	~~274.51~~ 274.57	MAX POOL
1577.28	~~275.26~~ 275.07	HEAD OF RIFFLE
1609.10	~~275.23~~ 275.09	HEAD OF POOL
1631.60	~~274.48~~ 274.42	MAX POOL
1654.10	~~275.23~~ 275.07	HEAD OF RIFFLE
1704.31	~~275.19~~ 275.17	HEAD OF POOL, LOG VANE
1726.81	~~274.44~~ 274.24	MAX POOL
1749.31	~~275.19~~	HEAD OF RIFFLE
1818.04	~~275.14~~ 275.38	HEAD OF POOL, CROSS VANE
1840.54	~~274.39~~ 275.24	MAX POOL
1863.04	~~275.14~~ 275.05	HEAD OF RIFFLE
1931.99	~~275.09~~ 275.08	HEAD OF POOL, LOG VANE
1954.49	~~274.34~~ 274.42	MAX POOL
1976.99	~~275.08~~ 275.08	HEAD OF RIFFLE

STATION	ELEVATION	DESCRIPTION
2073.03	~~275.02~~ 274.70	HEAD OF POOL, LOG VANE
2095.53	~~274.26~~ 274.37	MAX POOL
2118.03	~~275.01~~ 274.93	HEAD OF RIFFLE
2215.52	~~274.94~~ 275.09	HEAD OF POOL, LOG VANE
2238.02	~~274.19~~ 274.45	MAX POOL
2260.52	~~274.94~~ 274.96	HEAD OF RIFFLE
2365.15	~~274.89~~ 274.73	HEAD OF POOL, CROSS VANE
2387.65	~~274.14~~ 274.12	MAX POOL
2410.15	~~274.89~~ 274.65	HEAD OF RIFFLE
2477.43	~~274.84~~ 274.72	HEAD OF POOL, J-VANE
2491.93	~~274.09~~ 274.27	MAX POOL
2506.43	~~274.84~~ 274.98	HEAD OF RIFFLE
2644.01	~~274.77~~ 275.01	HEAD OF POOL, CROSS VANE
2664.01	~~274.02~~ 274.11	MAX POOL
2684.01	~~274.76~~ 274.45	HEAD OF RIFFLE
2764.38	~~274.71~~ 274.59	HEAD OF POOL
2784.38	~~273.96~~ 273.95	MAX POOL
2804.38	~~274.70~~ 274.58	HEAD OF RIFFLE
2895.67	~~274.64~~ 274.61	HEAD OF POOL
2915.67	~~273.89~~ 273.72	MAX POOL
2935.67	~~274.64~~ 274.38	HEAD OF RIFFLE
3033.95	~~274.59~~ 273.96	HEAD OF POOL
3053.95	~~273.84~~ 273.54	MAX POOL
3073.95	~~274.59~~ 276.12	HEAD OF RIFFLE
3132.31	~~274.55~~ 274.54	HEAD OF POOL, CROSS VANE
3152.31	~~273.80~~ 273.58	MAX POOL
3172.31	~~274.54~~ 273.86	HEAD OF RIFFLE
3242.98	~~274.49~~ 274.47	HEAD OF POOL
3260.48	~~273.74~~ 273.72	MAX POOL
3277.98	~~274.49~~ 274.20	HEAD OF RIFFLE
3329.29	~~274.48~~ 273.94	HEAD OF POOL, J-VANE

STATION	ELEVATION	DESCRIPTION
3346.79	~~273.70~~ 273.69	MAX POOL
3364.29	~~274.48~~ 274.16	HEAD OF RIFFLE
3417.47	~~274.41~~ 274.42	HEAD OF POOL, J-VANE
3434.97	~~273.66~~ 273.60	MAX POOL
3452.47	~~274.41~~ 274.24	HEAD OF RIFFLE
3493.36	~~274.38~~ 273.85	HEAD OF POOL
3510.86	~~273.63~~ 273.68	MAX POOL
3528.36	~~274.38~~ 274.31	HEAD OF RIFFLE
3540.22	~~274.37~~ 274.06	HEAD OF POOL
3555.72	~~273.62~~ 273.68	MAX POOL
3571.22	~~274.37~~ 274.32	HEAD OF RIFFLE
3601.17	~~274.35~~ 274.04	HEAD OF POOL, CROSS VANE
3616.67	~~273.60~~ 273.66	MAX POOL
3632.17	~~274.34~~ 274.04	HEAD OF RIFFLE
3771.85	~~274.26~~ 274.22	HEAD OF POOL, CROSS VANE
3786.35	~~273.51~~ 273.40	MAX POOL
3800.85	~~274.26~~ 274.34	HEAD OF RIFFLE
3850.50	~~274.23~~ 274.40	HEAD OF POOL, J-VANE
3865.00	~~273.47~~ 273.63	MAX POOL
3879.50	~~274.22~~ 274.25	HEAD OF RIFFLE
3955.22	~~274.17~~ 274.15	HEAD OF POOL
3972.72	~~273.42~~ 273.49	MAX POOL
3990.22	~~274.17~~ 274.04	HEAD OF RIFFLE
4083.67	~~274.10~~ 273.99	HEAD OF POOL
4105.67	~~273.36~~ 273.24	MAX POOL
4127.67	~~274.10~~ 274.18	HEAD OF RIFFLE
4228.39	~~274.03~~ 274.13	HEAD OF POOL
4250.39	~~273.27~~ 273.43	MAX POOL
4272.39	~~274.02~~ 274.17	HEAD OF RIFFLE
4376.48	~~273.98~~ 274.13	HEAD OF POOL, CROSS VANE
4393.98	~~273.23~~ 273.40	MAX POOL
4411.48	~~273.98~~ 274.21	HEAD OF RIFFLE
4468.85	~~273.94~~ 273.85	HEAD OF POOL
4486.35	~~273.18~~ 273.19	MAX POOL
4503.85	~~273.93~~ 273.76	HEAD OF RIFFLE
4580.42	~~273.88~~ 273.89	HEAD OF POOL
4597.92	~~273.13~~ 273.15	MAX POOL
4615.42	~~273.88~~ 273.78	HEAD OF RIFFLE
4677.79	~~273.83~~ 273.99	HEAD OF POOL, J-VANE
4693.29	~~273.08~~ 273.15	MAX POOL
4708.79	~~273.83~~ 273.87	HEAD OF RIFFLE
4778.78	~~273.78~~ 273.73	HEAD OF POOL
4793.28	~~273.03~~ 273.06	MAX POOL
4807.78	~~273.78~~ 273.66	HEAD OF RIFFLE
4958.70	~~273.76~~ 273.56	HEAD OF POOL, CROSS VANE
4976.20	~~273.01~~ 272.84	MAX POOL
4993.70	~~273.75~~ 273.72	HEAD OF RIFFLE
5069.58	~~273.70~~ 273.76	HEAD OF POOL
5089.08	~~272.95~~ 272.99	MAX POOL
5108.58	~~273.70~~ 273.69	HEAD OF RIFFLE
5191.67	~~273.64~~ 273.62	HEAD OF POOL, J-VANE
5207.17	~~272.89~~ 89	MAX POOL
5222.67	~~273.64~~ 273.64	HEAD OF RIFFLE
5274.10	~~273.60~~ 273.38	HEAD OF POOL, J-VANE
5289.60	~~272.85~~ 272.73	MAX POOL
5305.10	~~273.60~~ 273.45	HEAD OF RIFFLE
5440.60	~~273.51~~ 273.53	HEAD OF POOL, CROSS VANE
5456.10	~~272.76~~	MAX POOL
5471.60	~~273.51~~ 273.43	HEAD OF RIFFLE
5544.67	~~273.46~~ 273.39	HEAD OF POOL, J-VANE
5560.17	~~272.71~~ 272.57	MAX POOL
5575.67	~~273.45~~ 273.34	HEAD OF RIFFLE

STATION	ELEVATION	DESCRIPTION
5663.33	~~273.39~~ 273.43	HEAD OF POOL
5685.33	~~272.64~~ 272.65	MAX POOL
5707.33	273.39 273.63	HEAD OF RIFFLE
5790.62	273.33 273.44	HEAD OF POOL
5812.62	272.58 272.73	MAX POOL
5834.62	273.33 273.18	HEAD OF RIFFLE
5889.74	273.29 273.21	HEAD OF POOL, J-VANE
5905.24	272.54 272.61	MAX POOL
5920.74	273.28 273.00	HEAD OF RIFFLE
5970.80	273.26 273.07	HEAD OF POOL, CROSS VANE
5986.30	272.51 272.66	MAX POOL
6001.80	273.26 273.20	HEAD OF RIFFLE
6037.14	273.23 273.22	HEAD OF POOL, LOG VANE
6052.64	272.48 272.61	MAX POOL
6068.14	273.23 273.14	HEAD OF RIFFLE
6128.14	273.19 272.91	HEAD OF POOL, LOG VANE
6150.14	272.43 272.54	MAX POOL
6172.14	273.18 273.32	HEAD OF RIFFLE
6234.16	~~273.14~~ 273.32	HEAD OF POOL, LOG VANE
6256.16	~~272.39~~ 272.58	MAX POOL
6278.16	~~273.13~~ 273.21	HEAD OF RIFFLE
6379.45	~~273.08~~	HEAD OF POOL, CROSS VANE
6396.95	~~272.33~~	MAX POOL
~~6414.45~~ 64+20	~~273.08~~ 273.68	~~HEAD OF RIFFLE~~ STRM POOL
6471.83	273.04	HEAD OF POOL, LOG VANE
6489.33	272.29	MAX POOL
6506.83	273.04	HEAD OF RIFFLE
6598.50	272.97	HEAD OF POOL
6620.50	272.22	MAX POOL
6642.50	272.97	HEAD OF RIFFLE
6731.52	272.91	HEAD OF POOL, LOG VANE
6749.02	272.16	MAX POOL
6766.52	272.90	HEAD OF RIFFLE
6832.74	272.86	HEAD OF POOL, J-VANE
6848.24	272.11	MAX POOL
6863.74	272.85	HEAD OF RIFFLE
6918.54	272.82	HEAD OF POOL, J-VANE
6934.04	272.06	MAX POOL
6949.54	272.81	HEAD OF RIFFLE
7001.73	272.78	HEAD OF POOL
7023.73	272.02	MAX POOL
7045.73	272.77	HEAD OF RIFFLE
7088.25	272.74	HEAD OF POOL
7110.25	271.99	MAX POOL
7132.25	272.74	HEAD OF RIFFLE
7144.51	272.73	HEAD OF POOL, CROSS VANE
7162.01	271.98	MAX POOL
7179.51	272.73	HEAD OF RIFFLE
7182.91	272.73	END PROJECT

0 25 50 100
HORIZONTAL SCALE (1" = 50')

0 2.5 5 10
VERTICAL SCALE (1" = 5')

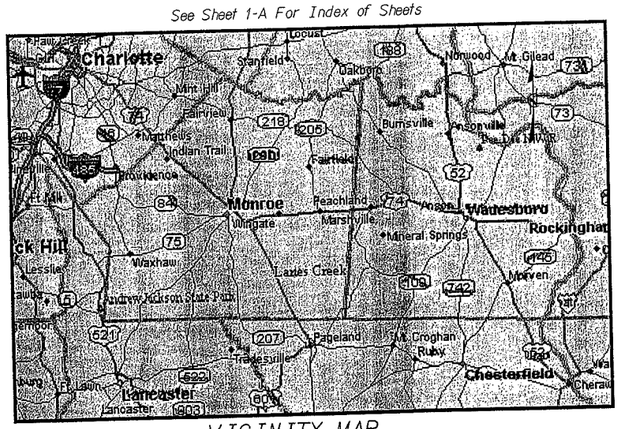
STREAM PROFILE 3

KCI Associates of North Carolina, P.A.
LANDMARK CENTER II, SUITE 220
4601 SIX FORKS ROAD, RALEIGH, NC 27609-5210
• ENGINEERS • SURVEYORS • SCIENTISTS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R - 2231WM	EC-1	4
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	
6.589013T		P.E. & CONST.	

PROJECT: 6.589013T R-2231WM

See Sheet 1-A For Index of Sheets



VICINITY MAP

NOT TO SCALE

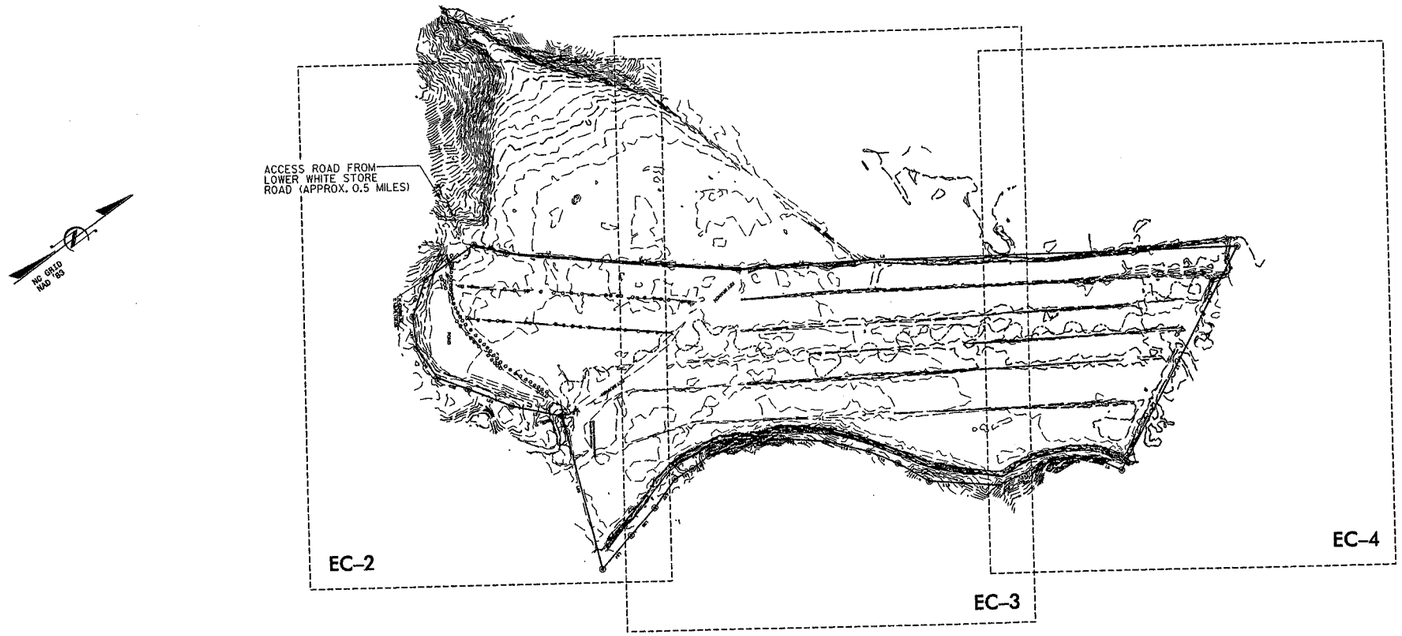
FROM PEACHLAND, NORTH CAROLINA GO APPROXIMATELY 1.5 MILES SOUTH ON MINERAL SPRINGS CHURCH ROAD TO LOWER WHITE STORE ROAD. GO WEST ON LOWER WHITE STORE ROAD APPROXIAMTELY 2.6 MILES TO THE LEFT TURN ONTO THE SITE ENTRANCE/ACCESS ROAD

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PLAN FOR PROPOSED
HIGHWAY EROSION CONTROL

ANSON COUNTY

LOCATION: KEY BRANCH MITIGATION SITE, LOCATED BETWEEN LOWER WHITE STORE ROAD (SR 1252) AND MINERAL SPRINGS CHURCH ROAD (SR 1240) ON THE BROWN CREEK FLOODPLAIN IN ANSON COUNTY, NORTH CAROLINA



EROSION AND SEDIMENT CONTROL MEASURES

Std. #	Description	Symbol
	Reforestation	
1630.03	Temporary Silt Ditch	TSD
1630.05	Temporary Diversion	TD
1605.01	Temporary Silt Fence	
1606.01	Special Sediment Control Fence	
1622.01	Temporary Berms and Slope Drains	
1630.01	Riser Basin	
1630.02	Silt Basin Type B	
1633.01	Temporary Rock Silt Check Type-A	
1633.02	Temporary Rock Silt Check Type-B	
1634.01	Temporary Rock Sediment Dam Type-A	
1634.02	Temporary Rock Sediment Dam Type-B	
1635.01	Rock Pipe Inlet Sediment Trap Type-A	
1635.02	Rock Pipe Inlet Sediment Trap Type-B	
1636.01	Rock Silt Screen	
1630.04	Stilling Basin	
	Rock Inlet Sediment Trap:	
1632.01	Type A	A OR A)
1632.02	Type B	B OR B)
1632.03	Type C	C OR C)

ENVIRONMENTALLY SENSITIVE AREA(S) EXIST ON THIS PROJECT

Refer To E. C. Special Provisions for Special Considerations.

GRAPHIC SCALES

PLANS: –100 –50 0 100 200

PROFILE (HORIZONTAL): –50 –25 0 50 100

PROFILE (VERTICAL): –5 –2.5 0 5 10

Roadway Standard Drawings

The following roadway English Standards as appear in "Roadway Standard Drawings"– Roadway Design Unit – N. C. Department of Transportation – Raleigh, N. C., dated January 20, 2002 and the latest revison thereto are applicable to this project and by reference hereby are considered a part of these plans.

1605.01	Temporary Silt Fence	1632.01	Rock Inlet Sediment Trap Type A
1606.01	Special Sediment Control Fence	1632.03	Rock Inlet Sediment Trap Type C
1622.01	Temporary Berms and Slope Drains	1633.01	Temporary Rock Silt Check Type A
1630.01	Riser Basin	1633.02	Temporary Rock Silt Check Type B
1630.02	Silt Basin Type B	1634.01	Temporary Rock Sediment Dam Type A
1630.03	Temporary Silt Ditch	1634.02	Temporary Rock Sediment Dam Type B
1630.04	Stilling Basin	1635.01	Rock Pipe Inlet Sediment Trap Type A
1630.05	Temporary Diversion	1636.01	Rock Silt Screen

Prepared In the Office of:

KCI Associates of North Carolina, P.A.
SUITE 200 LANDMARK CENTER I, 4601 SIX FORKS RD., RALEIGH NC
ENGINEERS • PLANNERS • ECOLOGISTS

for the:

DIVISION OF HIGHWAYS

2002 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:

LETTING DATE:

DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 14351 ENGINEER JAMES WALDO BLANKS

SIGNATURE: 7-16-03 P.E.

WETLAND SCIENTIST

SIGNATURE:

DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA

P.E.

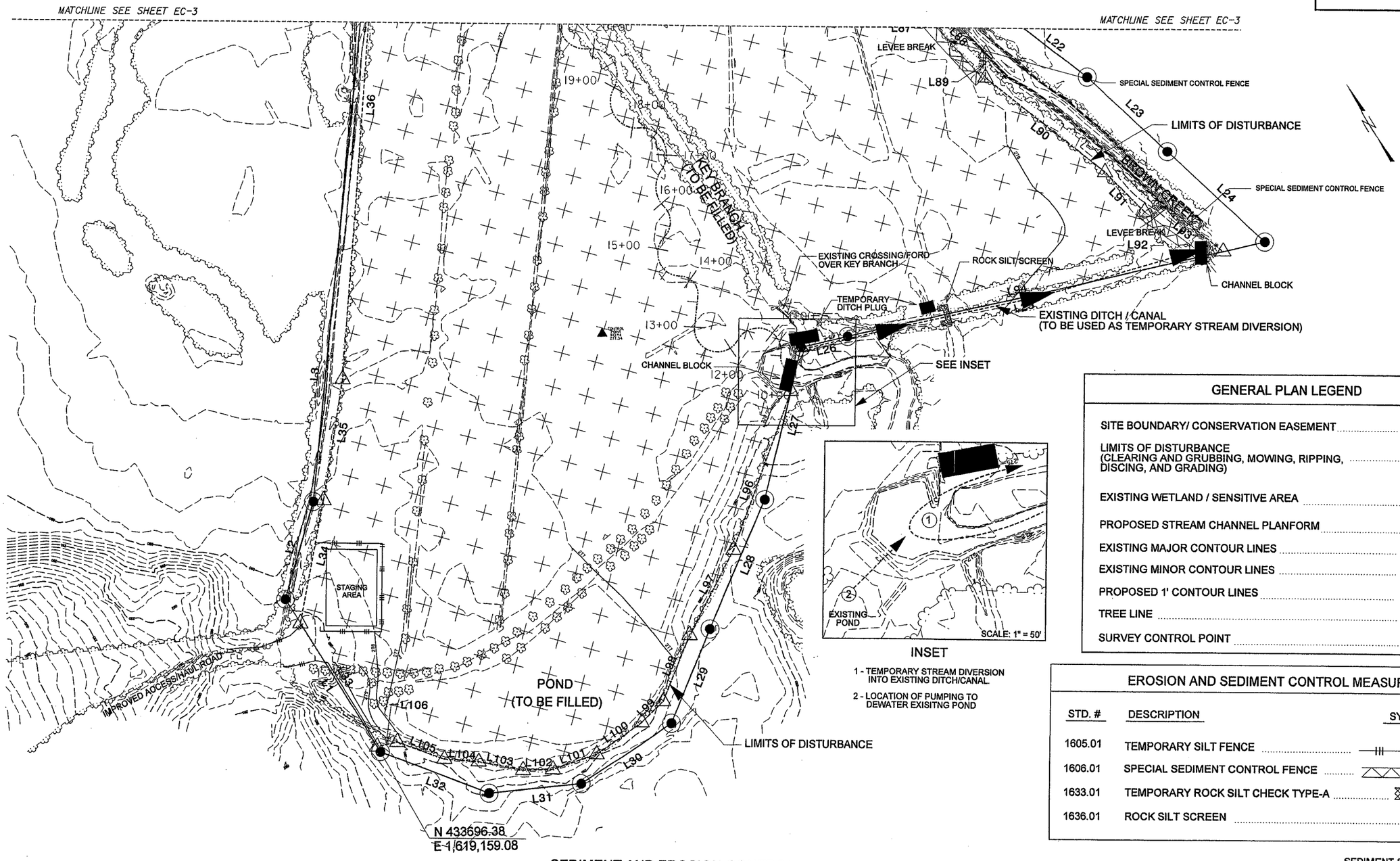
STATE DESIGN ENGINEER

DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION

APPROVED DIVISION ADMINISTRATOR DATE

PROJECT REFERENCE NO.	SHEET NO.
R-2231WM	EC-2
R/W SHEET NO.	
ENGINEER	SCIENTIST

NORTH CAROLINA PROFESSIONAL SEAL 14351 ENGINEER JAMES WALDO BLAKE



GENERAL PLAN LEGEND

- SITE BOUNDARY/ CONSERVATION EASEMENT
- LIMITS OF DISTURBANCE (CLEARING AND GRUBBING, MOWING, RIPPING, DISCING, AND GRADING)
- EXISTING WETLAND / SENSITIVE AREA (L113)
- PROPOSED STREAM CHANNEL PLANFORM
- EXISTING MAJOR CONTOUR LINES (276)
- EXISTING MINOR CONTOUR LINES
- PROPOSED 1' CONTOUR LINES (278)
- TREE LINE
- SURVEY CONTROL POINT

EROSION AND SEDIMENT CONTROL MEASURES

STD. #	DESCRIPTION	SYMBOL
1605.01	TEMPORARY SILT FENCE	
1606.01	SPECIAL SEDIMENT CONTROL FENCE	
1633.01	TEMPORARY ROCK SILT CHECK TYPE-A	
1636.01	ROCK SILT SCREEN	

SEDIMENT & EROSION CONTROL

KCI Associates of North Carolina, P.A.
LANDMARK CENTER II, SUITE 220
4601 SIX FORKS ROAD, RALEIGH, NC 27609-5210
•ENGINEERS • SURVEYORS • SCIENTISTS

PROJECT REFERENCE NO.	SHEET
R-2231 WM	EC-
R/W SHEET NO.	
ENGINEER	SCIENTIST

NORTH CAROLINA PROFESSIONAL SEAL L4351 ENGINEER JAMES WALDO BLAKE

MATCHLINE SEE SHEET EC-4

MATCHLINE SEE SHEET EC-4

TEMPORARY ROCK SILT CHECK TYPE-A

DITCH PLUG

KEY BRANCH

KEY BRANCH (TO BE FILLED)

BROWN CREEK

LEVEE BREAK

LEVEE BREAK

LEVEE BREAK

LEVEE BREAK

SPECIAL SEDIMENT CONTROL FENCE

SPECIAL SEDIMENT CONTROL FENCE

SPECIAL SEDIMENT CONTROL FENCE

LIMITS OF DISTURBANCE

LIMITS OF DISTURBANCE

CHANNEL BLOCK

CHANNEL BLOCK

ROCK SILT SCREEN

MATCHLINE SEE SHEET EC-2

MATCHLINE SEE SHEET EC-2

GENERAL PLAN LEGEND

- SITE BOUNDARY/ CONSERVATION EASEMENT
- LIMITS OF DISTURBANCE (CLEARING AND GRUBBING, MOWING, RIPPING, DISCING, AND GRADING)
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SEDIMENT AND EROSION CONTROL

0 50 100 200

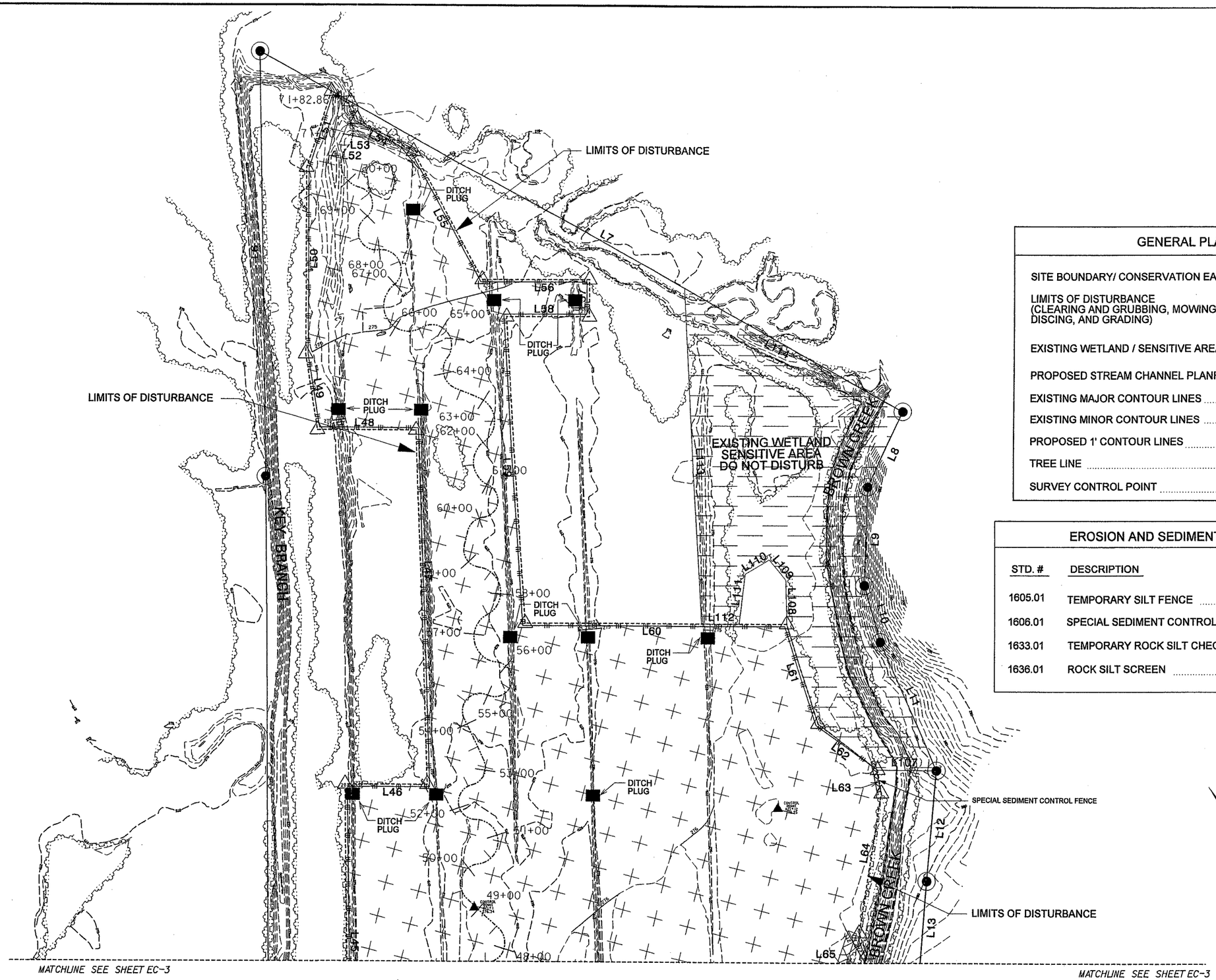
GRAPHIC SCALE (1" = 100')

SEDIMENT & EROSION CONTROL

KCI Associates of North Carolina, P.A.
LANDMARK CENTER II, SUITE 220
4601 SIX FORKS ROAD, RALEIGH, NC 27609-5210
• ENGINEERS • SURVEYORS •

PROJECT REFERENCE NO.	SHEET NO.
R-2231 WM	EC-4
R/W SHEET NO.	
ENGINEER	SCIENTIST

NORTH CAROLINA PROFESSIONAL SEAL 14982 ENGINEER JAMES WALDO BLACK



GENERAL PLAN LEGEND

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- LIMITS OF DISTURBANCE (CLEARING AND GRUBBING, MOWING, RIPPING, DISCING, AND GRADING)
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SEDIMENT AND EROSION CONTROL

0 50 100 200

GRAPHIC SCALE (1" = 100')

SEDIMENT & EROSION CONTROL

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•ENGINEERS • SURVEYORS • SCIENTISTS

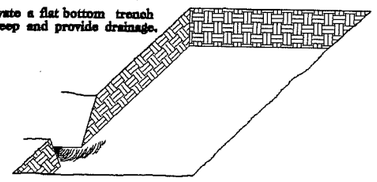
PLANTING DETAILS

SEEDLING / LINER BAREROOT PLANTING DETAIL

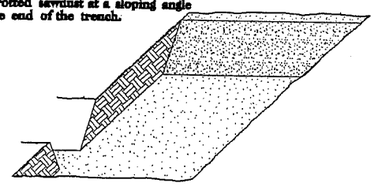
HEALING IN

1. Locate a healing-in site in a shady, well protected area.

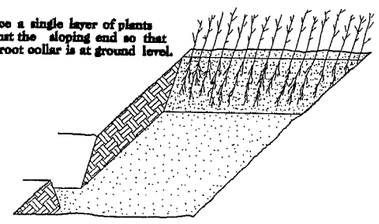
2. Excavate a flat bottom trench 12" deep and provide drainage.



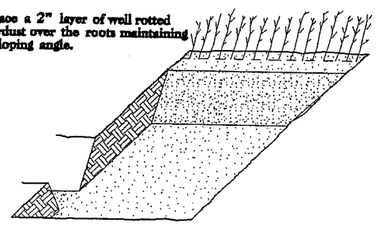
3. Backfill the trench with 2" well rotted sawdust. Place a 2" layer of well rotted sawdust at a sloping angle at one end of the trench.



4. Place a single layer of plants against the sloping end so that the root collar is at ground level.

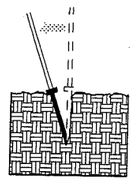


5. Place a 2" layer of well rotted sawdust over the roots maintaining a sloping angle.

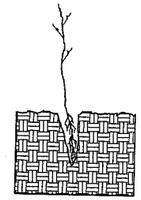


6. Repeat layers of plants and sawdust as necessary and water thoroughly.

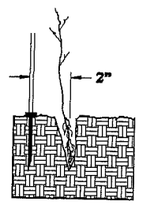
DIBBLE PLANTING METHOD USING THE KBC PLANTING BAR



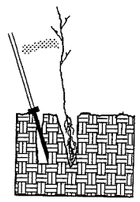
1. Insert planting bar as shown and pull handle toward planter.



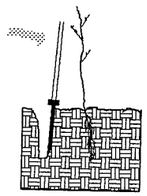
2. Remove planting bar and place seedling at correct depth.



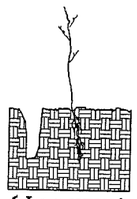
3. Insert planting bar 2" toward planter from seedling.



4. Pull handle of bar toward planter, firming soil at bottom.



5. Push handle forward firming soil at top.



6. Leave compaction hole open. Water thoroughly.

PLANTING NOTES:

PLANTING BAG
During planting, seedlings shall be kept in a moist canvas bag or similar container to prevent the root systems from drying.

KBC PLANTING BAR
Planting bar shall have a blade with a triangular cross section, and shall be 12" long, 4" wide and 1" thick at center.

ROOT PRUNING
All seedlings shall be root pruned, if necessary, so that no roots extend more than 10 inches (10") below the root collar.

KEY BRANCH WETLAND PLANTING

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2231WM	RF-1	
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	

WETLAND TREE REFORESTATION

MIXTURE, TYPE, SIZE, AND FURNISH SHALL CONFORM TO THE FOLLOWING:

FRAXINUS PENNSYLVANICA	GREEN ASH	BAREROOT SEEDLING
QUERCUS LYRATA	OVERCUP OAK	BAREROOT SEEDLING
BETULA NIGRA	RIVER BIRCH	BAREROOT SEEDLING
QUERCUS MICHAUXII	SWAMP CHESTNUT OAK	BAREROOT SEEDLING
QUERCUS NIGRA	WATER OAK	BAREROOT SEEDLING
QUERCUS PHELLOS	WILLOW OAK	BAREROOT SEEDLING

TREE REFORESTATION SHALL BE PLANTED 6' TO 10' ON CENTER, RANDOM SPACING, AVERAGING 8' ON CENTER, APPROXIMATELY 680 PLANTS PER ACRE.

SEE PLAN SHEETS FOR AREAS TO BE PLANTED

WETLAND REFORESTATION DETAIL SHEET

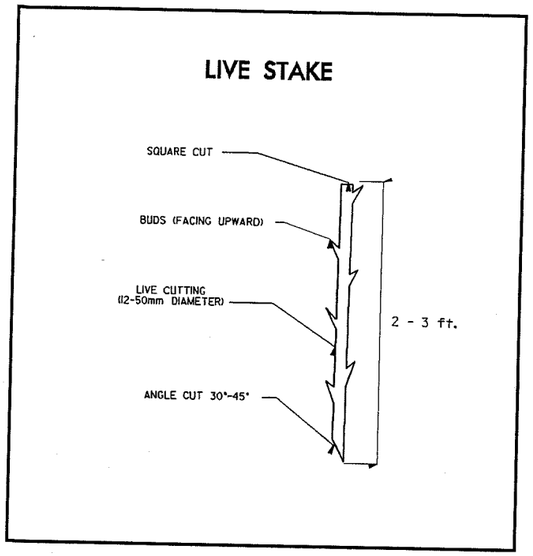
N.C.D.O.T. - ROADSIDE ENVIRONMENTAL UNIT

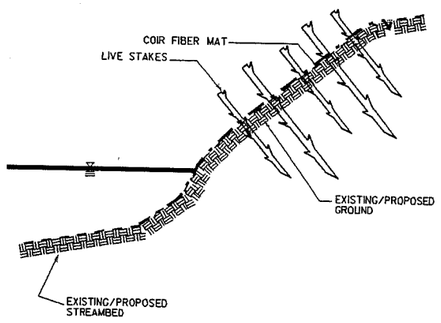
$$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2231WM	RF-2	
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	

PLANTING DETAILS

LIVE STAKES PLANTING DETAIL

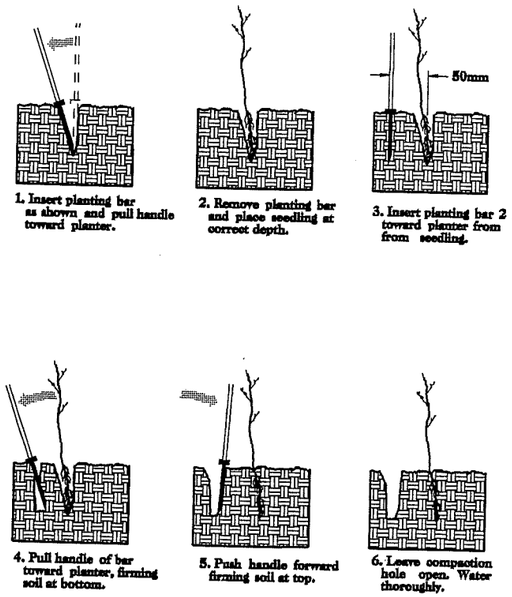




BANK STABILIZATION WITH LIVE STAKES

NOTE:
LIVE STAKES SHALL BE DRIVEN UNTIL APPROXIMATELY 3/4 OF LIVE STAKE IS WITHIN GROUND

BAREROOT PLANTING DETAIL DIBBLE PLANTING METHOD USING THE KBC PLANTING BAR



1. Insert planting bar as shown and pull handle toward planter.
2. Remove planting bar and place seedling at correct depth.
3. Insert planting bar 2 in. toward planter from from seedling.
4. Pull handle of bar toward planter, firming soil at bottom.
5. Push handle forward firming soil at top.
6. Leave compaction hole open. Water thoroughly.

PLANTING NOTES:

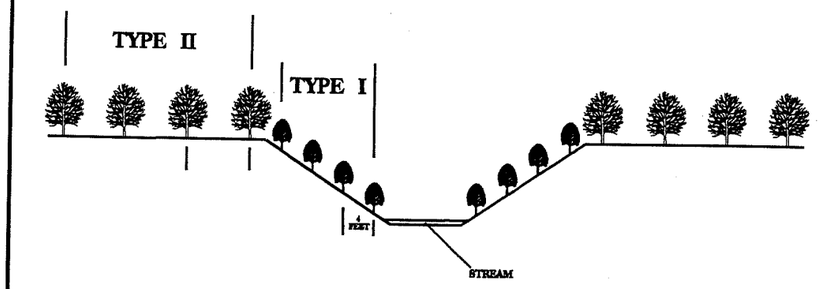
PLANTING BAG
During planting, seedlings shall be kept in a moist canvas bag or similar container to prevent the root systems from drying.

KBC PLANTING BAR
Planting bar shall have a blade with a triangular cross section, and shall be 12 in. long, 4 in. wide and 1 in. thick at center.

ROOT PRUNING
All seedlings shall be root pruned, if necessary, so that no roots extend more than 10 in. below the root collar.

☐ TYPE 1 STREAMBANK REFORESTATION SHALL BE PLANTED 3 ft. TO 5 ft. ON CENTER, RANDOM SPACING, AVERAGING 4 ft. ON CENTER, APPROXIMATELY 2723 PLANTS PER ACRE.

STREAMBANK REFORESTATION TYPICAL



STREAMBANK REFORESTATION

MIXTURE, TYPE, SIZE, AND FURNISH SHALL CONFORM TO THE FOLLOWING:

TYPE 1

50% SALIX NIGRA	BLACK WILLOW	24 in. to 36 in. LIVE STAKES
50% CORNUS AMOMUM	SILKY DOGWOOD	24 in. to 36 in. LIVE STAKES

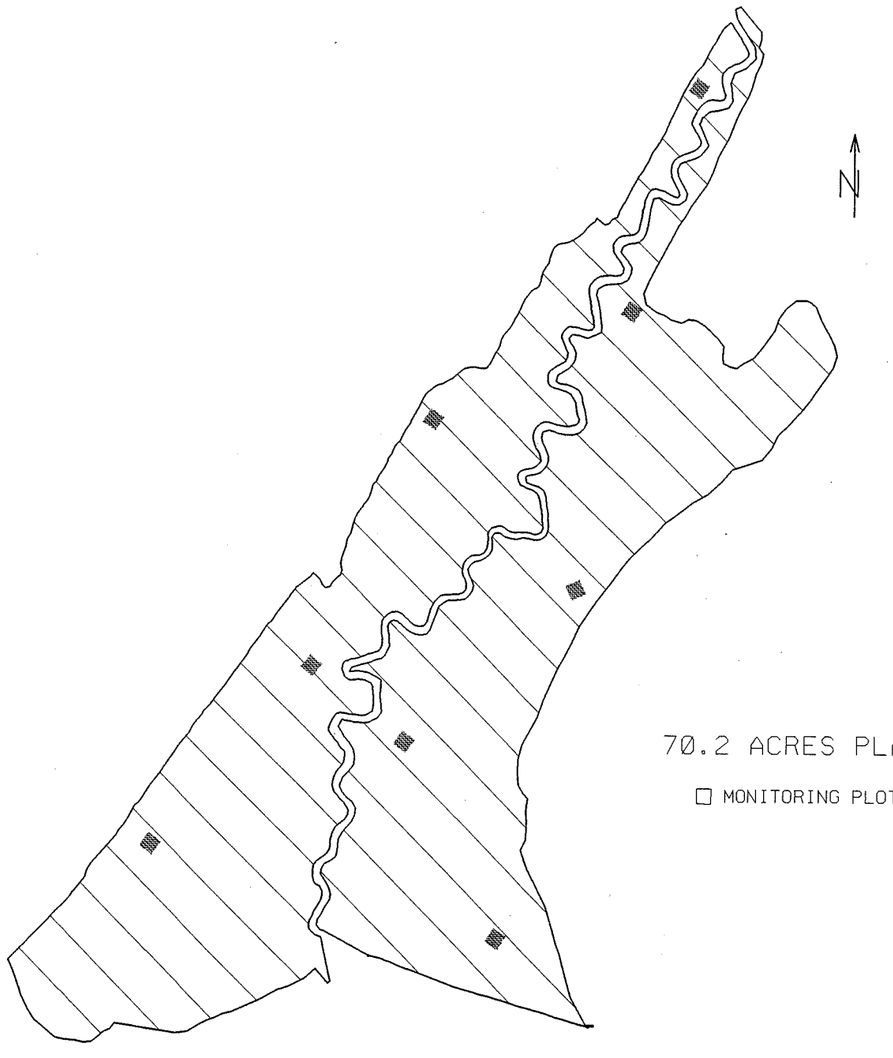
☐ SEE PLAN SHEETS FOR AREAS TO BE PLANTED

STREAMBANK REFORESTATION DETAIL SHEET

N.C.D.O.T. - ROADSIDE ENVIRONMENTAL UNIT

PROJECT REFERENCE NO.	SHEET NO.
R-2231 WM	
R/W SHEET NO.	
ENGINEER	SCIENTIST

KEY BRANCH PLANTING PLAN



70.2 ACRES PLANTED

☐ MONITORING PLOTS

MONITORING GAUGE & VEGETATION PLOT MAP

PROJECT REFERENCE NO.	SHEET NO.
R-2231WM	
R/W SHEET NO.	
ENGINEER	SCIENTIST