TIP PROJECT: U-2525B

CONTRACT:

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

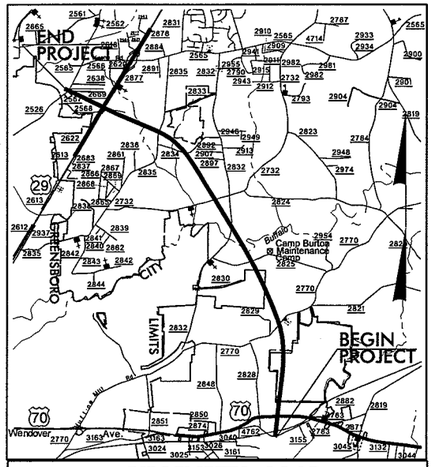
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2525B	OSM-1	36

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
34821.1.3		PE
34821.2.3		ROW

PLAN FOR ON-SITE MITIGATION GUILFORD COUNTY

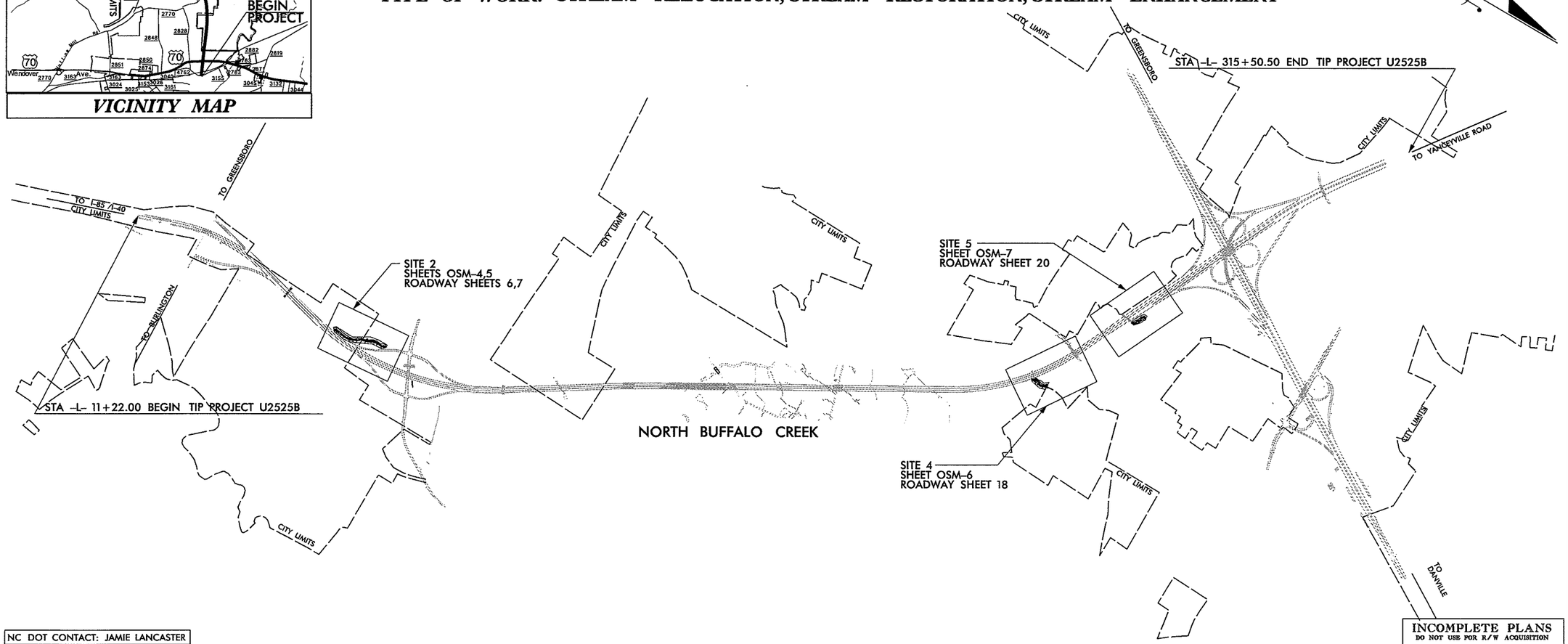
LOCATION: GREENSBORO EASTERN LOOP FROM NORTH OF US 70 TO US 29 NORTH OF GREENSBORO

TYPE OF WORK: STREAM RELOCATION, STREAM RESTORATION, STREAM ENHANCEMENT



VICINITY MAP

NAD 83



NC DOT CONTACT: JAMIE LANCASTER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALES

30 15 0 30 60
PLANS

30 15 0 30 60
PROFILE (HORIZONTAL)

6 3 0 6 12
PROFILE (VERTICAL)

DESIGN DATA

PROJECT LENGTH

MITIGATION SITE	MITIGATION TYPE	LENGTH
SITE 2	RESTORATION/RELOCATION	1,307LF
SITE 4	RESTORATION	386LF
SITE 5	RELOCATION	362LF

PREPARED IN THE OFFICE OF:
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P.O. BOX 33068 - RALEIGH, NORTH CAROLINA 27636-3068
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NC License F-0102

2002 STANDARD SPECIFICATIONS

DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 030000 ENGINEER DAREN M. PAIT

SIGNATURE: P.E.

DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA

STATE DESIGN ENGINEER P.E.

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR DATE

GENERAL NOTES

ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE FOLLOWING STANDARDS:

A) NORTH CAROLINA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES, DATED JULY 2006, AND ANY SUPPLEMENTS THERETO ISSUED PRIOR TO THE DATE OF RECEIPT OF BIDS.

B) NORTH CAROLINA DEPARTMENT OF TRANSPORTATION "ROADWAY STANDARD DRAWINGS, ENGLISH" DATED JULY 2006, AND ANY SUPPLEMENTS ISSUED THERETO PRIOR TO THE DATE OF RECEIPT OF BIDS.

ALL RIGHT OF WAY CORNER MARKERS OR FENCING SHALL BE PLACED BY OTHERS AS NECESSARY.

THE CONTRACTOR IS RESPONSIBLE FOR AVOIDING ANY DISTURBANCE OR DAMAGE TO EXISTING UTILITIES AND SHALL BE RESPONSIBLE FOR IMMEDIATELY REPAIRING ANY DAMAGES AT A COST INCIDENT TO THIS CONTRACT.

ABANDONED SECTIONS OF THE EXISTING CHANNEL SHALL BE FILLED TO THE MAXIMUM EXTENT FEASIBLE WITH MATERIAL EXCAVATED ON-SITE. THIS EXCAVATED MATERIAL SHALL BE STOCKPILED ADJACENT TO THE REACHES OF CHANNEL OR DITCHES TO BE BACKFILLED.

THE CONTRACTOR MAY UTILIZE THE DESIGNATED STAGING AREA AND THE AREA INSIDE THE PROPOSED RIGHT OF WAY FOR STAGING AND STOCKPILING EQUIPMENT AND MATERIALS.

THE STREAM SHALL BE CONSTRUCTED IN ACCORDANCE TO THE TYPICAL SECTIONS.

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

ROADWAY STANDARD DRAWINGS

(REV. JULY 2006)

THE FOLLOWING ROADWAY STANDARDS AS APPEAR IN "ROADWAY STANDARD DRAWINGS" - ROADWAY DESIGN UNIT - N.C. DEPARTMENT OF TRANSPORTATION - RALEIGH, N.C., DATED JULY 2006 AND THE LATEST REVISION THERETO ARE APPLICABLE TO THIS PROJECT AND BY REFERENCE HEREBY ARE CONSIDERED A PART OF THESE PLANS:

CONSTRUCTION SEQUENCING

THIS STREAM MITIGATION PROJECT CONSISTS OF THREE SITES. ONCE WORK BEGINS ON A STREAM SITE, THE CONTRACTOR MUST COMPLETE THAT SITE BEFORE MOVING WORK CREWS AND EQUIPMENT TO A DIFFERENT SITE, UNLESS APPROVED TO DO SO BY THE ENGINEER.

LAYOUT LOCATION OF THE NEW STREAM CHANNEL, CONSTRUCTION EASEMENT LIMITS, AND GRADE STAKES. THE ENGINEER MUST INSPECT AND APPROVE ALL LAYOUT WORK BEFORE CONSTRUCTION MAY BEGIN.

MOBILIZE EQUIPMENT AND MATERIALS TO THE SITE.

INSTALL CONSTRUCTION ENTRANCE PER EROSION CONTROL PLAN.

ESTABLISH STAGING AREAS AND MARK CONSTRUCTION EQUIPMENT ACCESS LOCATIONS WITH VISIBLE MARKERS. CONSTRUCTION EQUIPMENT SHALL BE CONTAINED WITHIN THE LIMITS OF CONSTRUCTION AS DEPICTED IN THE PLANS OR SPECIFIED BY THE ENGINEER.

INSTALL TEMPORARY EROSION CONTROL MEASURES.

BEGIN FLOODPLAIN GRADING, INCLUDING EXCAVATION OF BANKFULL BENCHES AT LOCATIONS DEPICTED IN THE PLANS AND AS DIRECTED BY THE ENGINEER. STOCKPILE MATERIALS IN AREAS DESIGNATED ON THE PLANS. KEEP TOPSOIL SEPARATE FROM OTHER STOCKPILE MATERIAL. TOPSOIL MATERIAL WILL BE USED LATER ON FLOODPLAIN.

TOPSOIL SHALL BE EXCAVATED AND STOCKPILED SEPARATELY FROM THE WASTE MATERIAL SO THAT IT CAN BE PLACED BACK ON THE FLOODPLAIN ONCE GRADING IS COMPLETE. NO DIRECT PAYMENT WILL BE MADE FOR THIS EXCAVATION.OVER-EXCAVATE FLOODPLAIN AND FLOODPLAIN SLOPES TO A DEPTH OF 6" BELOW FINAL GRADE AND PLACE 6" OF TOPSOIL TO FILL TO FINAL GRADE. OVER-EXCAVATION SHOULD BEGIN 3' FROM TOP OF BANK AND EXTEND TO EXCAVATION LIMITS. SEE TYPICAL SECTIONS FOR DETAIL.

INSTALL IMPERVIOUS DIKES AND PUMP AROUND SYSTEM TO PUMP STREAM DISCHARGE AROUND THE IMMEDIATE WORK AREA AS NECESSARY.

CONSTRUCTION SHALL PROCEED IN SUCCESSIVE REACHES WITH THE UPSTREAM REACH BEING COMPLETED PRIOR TO INITIATING CONSTRUCTION OF THE ADJACENT DOWNSTREAM REACH. EACH REACH SHALL BE LIMITED IN LENGTH TO WORK THAT CAN BE COMPLETED BEFORE ALLOWING WATER TO FLOW THROUGH THAT REACH. COMPLETION OF A REACH SHALL CONSIST OF CHANNEL CONSTRUCTION, FLOODPLAIN GRADING, IN-STREAM STRUCTURE INSTALLATION, BED MATERIAL INSTALLATION, AND EROSION CONTROL MEASURES. CONSTRUCTION SHALL BE DONE IN THE DRY, WITH THE CHANNEL FLOW PUMPED AROUND THE REACH UNDER CONSTRUCTION AS NECESSARY.

AT THE END OF EACH DAYS CONSTRUCTION WORK, THE CONTRACTOR SHALL SEED ALL DISTURBED AREAS AND COVER THE STREAM BANKS AND BANKFULL BENCHES WITH COIR FIBER MATTING. IN ADDITION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL TEMPORARY EROSION CONTROL MEASURES ON A DAILY BASIS THROUGHOUT THE CONSTRUCTION PROCESS.

ONCE NEW CHANNEL CONSTRUCTION IS COMPLETE, THE CONTRACTOR SHALL INSTALL STREAM PLUGS TO DIRECT STREAM FLOW INTO THE NEW CHANNEL. THE CONTRACTOR SHALL THEN FILL IN THE ABANDONED SECTIONS OF THE EXISTING CHANNEL TO THE EXTENT FEASIBLE AND AS DIRECTED BY THE ENGINEER. CONTRACTOR WILL ENSURE THAT VEGETATION HAS BEEN ESTABLISHED ALONG THE BANKS OF THE NEW STREAM CHANNEL BEFORE DIRECTING FLOW INTO THE NEW STREAM CHANNEL. FOR NEW STREAM CHANNEL REACHES WHERE THIS IS NOT POSSIBLE, THE CONTRACTOR SHOULD GET APPROVAL FROM THE ENGINEER BEFORE DIRECTING FLOW INTO THE NEW STREAM CHANNEL.

AFTER ALL IN-STREAM WORK IS COMPLETED, THE CONTRACTOR SHALL REMOVE TEMPORARY EROSION CONTROL MEASURES AND TEMPORARY STREAM ACCESS AND SCARIFY ANY COMPACTED AREAS AS DIRECTED BY THE ENGINEER. ALL PORTIONS OF THE SITE SHALL BE STABILIZED WITH TEMPORARY EROSION CONTROL MEASURES.

PREPARED IN THE OFFICE OF:
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NC LICENSE F-0102

PROJECT REFERENCE NO.	SHEET NO.
U2525B	OSM-1A

PROJECT ENGINEER

APPROVED BY:

DATE:

U-2525B
ON-SITE MITIGATION
GUILFORD COUNTY

INDEX OF SHEETS

OSM-1	TITLE SHEET
OSM-1A	INDEX OF SHEETS, CONSTRUCTION SEQUENCING, GENERAL NOTES
OSM-1B	CONVENTIONAL PLAN SHEET SYMBOLS
OSM-2	TYPICAL SECTIONS
OSM-2A	DETAILS -COIR FIBER MATTING -ROCK CROSS VANE -LOG CROSS VANE -STORMWATER STEP POOL PROTECTION STRUCTURE
OSM-2B	-ROCK A-VANE -CONSTRUCTED RIFFLE -ROOTWAD -BOULDER TOE PROTECTION
OSM-2C	-ROCK VANE -LOG VANE -STREAM PLUG
OSM-2D	-PUMP AROUND OPERATION
OSM-2E-2F	-MORPHOLOGICAL TABLES
OSM-3	SUMMARY OF QUANTITIES EARTHWORK SUMMARY
OSM-4-7	PLAN SHEETS
OSM-8-11	PROFILE SHEETS
OSM-12-22	CROSS SECTIONS
RF-1-2	REFORESTATION DETAILS
RF-3-6	REFORESTATION PLAN SHEETS

STREAM SYMBOLS

PLAN VIEW SYMBOLS

ROCK VANE

LOG VANE

LOG CROSS VANE

STORMWATER OUTLET STEP POOL

FP FP FLOODPLAIN LINE

BOULDER TOE PROTECTION

ROCK A-VANE

ROCK CROSS VANE

CONSTRUCTED RIFFLE

STREAM PLUG

BACKFILL EXISTING CHANNEL

PROFILE SYMBOLS

EXISTING GROUND ELEVATION

PROPOSED GROUND ELEVATION

PROPOSED BANKFULL

PROPOSED LOG SILL

PROPOSED LOG CROSS VANE

CONSTRUCTED RIFFLE

PROPOSED ROCK CROSS VANE

PROPOSED ROCK A-VANE

PROPOSED STEP POOL STRUCTURE

PLANTING SYMBOLS

TYPE I

TYPE II

PROJECT REFERENCE NO.	SHEET NO.
U-2525B	OSM-1B

Note: Not to Scale

**S.U.E. = Subsurface Utility Engineering*

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CONVENTIONAL PLAN SHEET SYMBOLS

BOUNDARIES AND PROPERTY:

- State Line
- County Line
- Township Line
- City Line
- Reservation Line
- Property Line
- Existing Iron Pin — EP
- Property Corner
- Property Monument — ECM
- Parcel/Sequence Number — 123
- Existing Fence Line
- Proposed Woven Wire Fence
- Proposed Chain Link Fence
- Proposed Barbed Wire Fence
- Existing Wetland Boundary — WLB
- Proposed Wetland Boundary — WLB
- Existing Endangered Animal Boundary — EAB
- Existing Endangered Plant Boundary — EPB

BUILDINGS AND OTHER CULTURE:

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

HYDROLOGY:

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

RAILROADS:

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

RIGHT OF WAY:

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

ROADS AND RELATED FEATURES:

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

VEGETATION:

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

EXISTING STRUCTURES:

MAJOR:

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

MINOR:

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

UTILITIES:

POWER:

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

TELEPHONE:

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

WATER:

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

TV:

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

GAS:

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

SANITARY SEWER:

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

MISCELLANEOUS:

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

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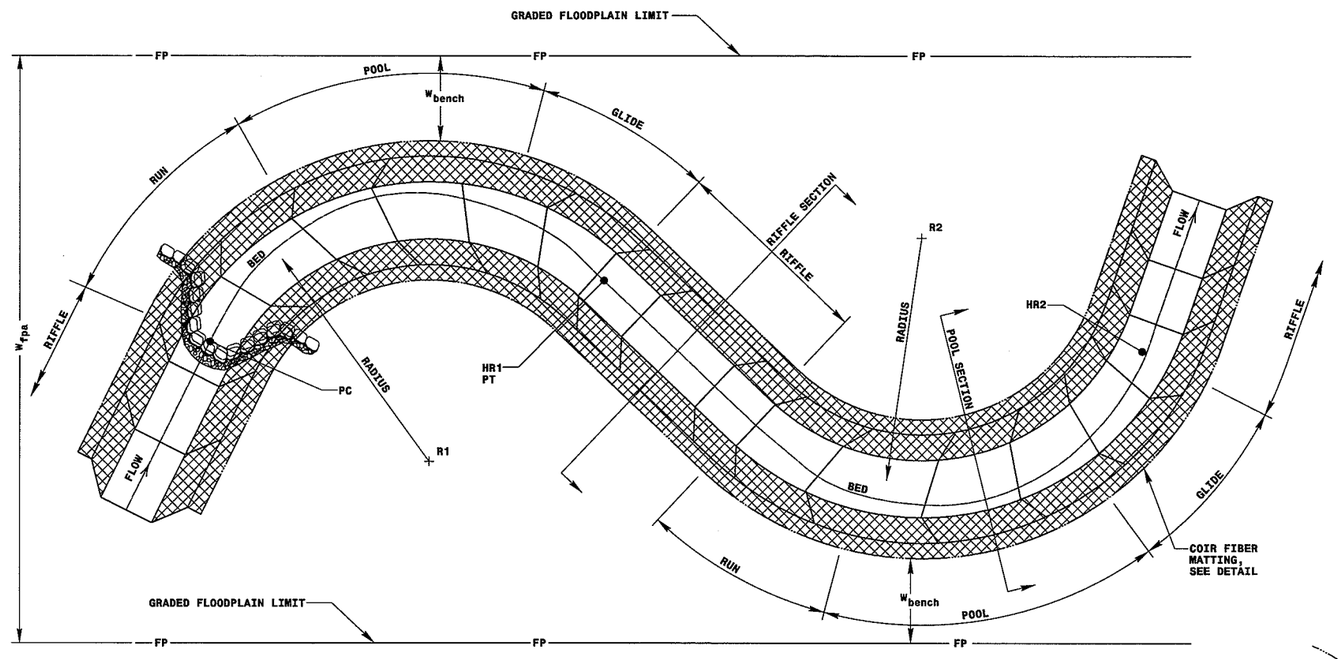
PROJECT REFERENCE NO.	SHEET NO.
U2525B	OSM-2

PROJECT ENGINEER

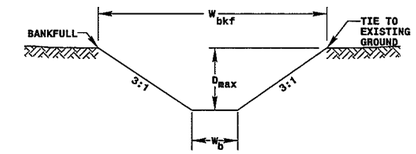
APPROVED BY:

DATE:

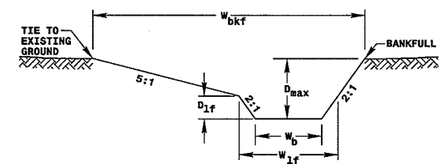
U-2525B
ON-SITE MITIGATION
GUILFORD COUNTY



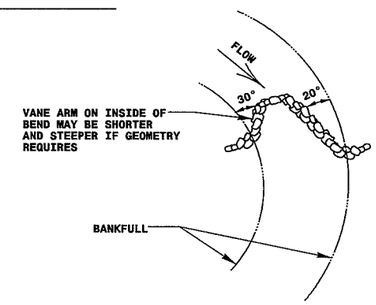
TYPICAL PLAN



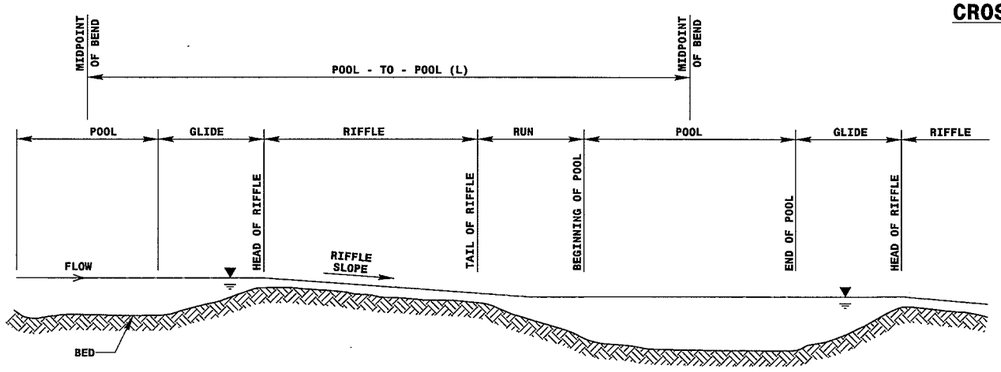
TYPICAL RIFFLE



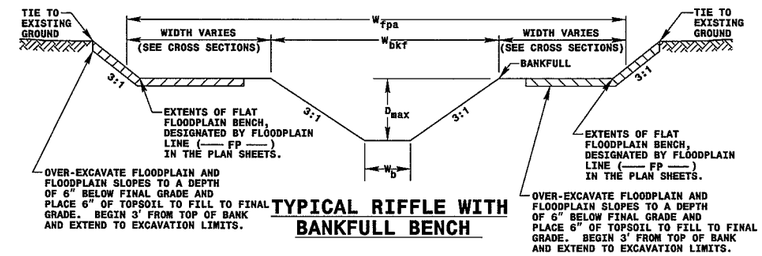
TYPICAL POOL



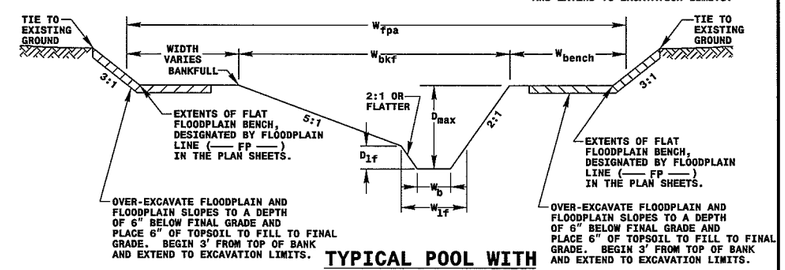
CROSS VANE CONSTRUCTION IN MEANDER-BEND PLAN VIEW



TYPICAL PROFILE



TYPICAL RIFFLE WITH BANKFULL BENCH



TYPICAL POOL WITH BANKFULL BENCH

NOTES:
1. THE COORDINATES FOR EACH CENTER OF RADIUS (EX. "R1","R2") AND EACH HEAD OF RIFFLE (EX. "HR1", "HR2") ARE INDICATED ON THE PLAN SHEETS.

W_{bkf} = BANKFULL WIDTH
D_{max} = MAXIMUM DEPTH
W_b = BOTTOM WIDTH
W_{fpa} = FLOOD PRONE AREA WIDTH
W_{lf} = LOW FLOW WIDTH
D_{lf} = LOW FLOW DEPTH

CROSS-SECTION DIMENSIONS (IN FEET)

		RIFFLE				POOL							
SITE	REACH	W_{bkf}	D_{max}	W_b	W_{fpa}	W_{bkf}	W_{lf}	D_{lf}	D_{max}	W_b	W_{fpa}	W_{bench}	Width/Depth Ratio
SITE 2	Sta. 200+00 - Sta. 205+00	7.2	0.8	2.4	SEE CROSS SECTIONS	9.8	3.4	0.6	1.4	1.0	SEE CROSS SECTIONS	3.5 MIN.	13.5
SITE 2	Sta. 205+00 - Sta. 213+07	7.6	0.8	2.8	SEE CROSS SECTIONS	10.2	3.8	0.7	1.5	1.0	SEE CROSS SECTIONS	3.5 MIN.	13.9
SITE 4	Sta. 400+00 - Sta. 403+86	12.7	1.4	4.3	SEE CROSS SECTIONS	15.8	4.6	0.9	2.5	1.0	SEE CROSS SECTIONS	6.0 MIN.	13.6
SITE 5	Sta. 500+00 - Sta. 503+22	13.7	1.4	5.3	SEE CROSS SECTIONS	17.0	5.8	1.2	2.6	1.4	SEE CROSS SECTIONS	6.5 MIN.	14.1

CHANNEL TYPICAL DETAIL

NOT TO SCALE

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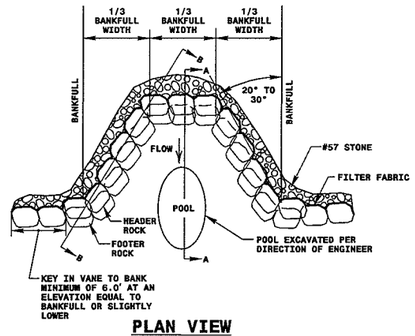
U2525B	OSM-2A

PROJECT ENGINEER

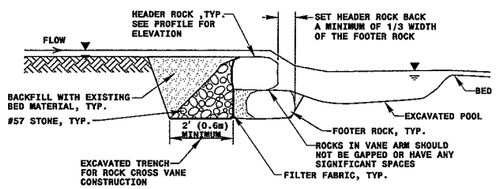
APPROVED BY:

DATE:

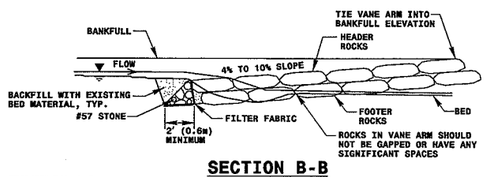
U-2525B
ON-SITE MITIGATION
GUILFORD COUNTY



PLAN VIEW



SECTION A-A



SECTION B-B

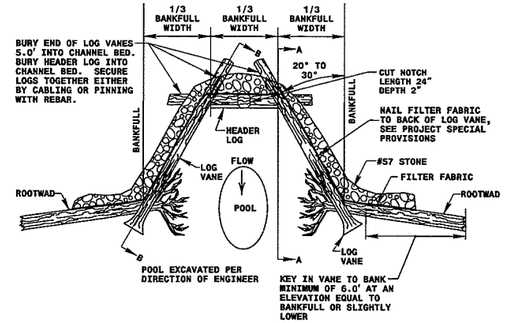
BOULDER SIZE DATA CHART			
REACH	BOULDER DIMENSIONS		
	HEIGHT	WIDTH	LENGTH
SITE 2 REACH 1	2'	3'	4'
SITE 2 REACH 2	2'	3'	4'
SITE 4	2'	3'	4'
SITE 5	2'	3'	4'

NOTE: THESE DIMENSIONS SPECIFY THE MINIMUM BOULDER SIZE

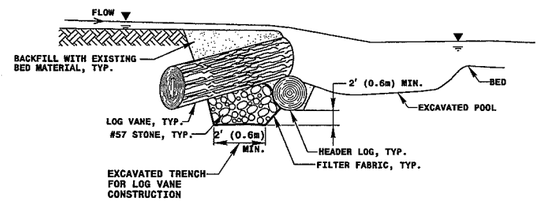
NOTES:
1. DEEPEST PART OF POOL TO BE IN LINE WITH WHERE VANE ARM TIES INTO BANKFULL.
2. DO NOT EXCAVATE POOL TOO CLOSE TO FOOTER BOULDERS.
3. CLASS "A" STONE CAN BE USED TO REDUCE VOIDS BETWEEN HEADERS AND FOOTERS.
4. COMPACT BACKFILL TO EXTENT POSSIBLE OR AT THE DIRECTION OF THE ENGINEER.
5. POOL DEPTH SHOULD BE 2 TO 3 TIMES BANKFULL DEPTH.

ROCK CROSS VANE DETAIL

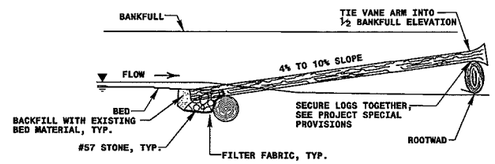
NOT TO SCALE



PLAN VIEW



SECTION A-A

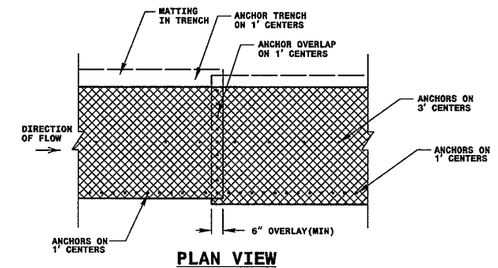


SECTION B-B

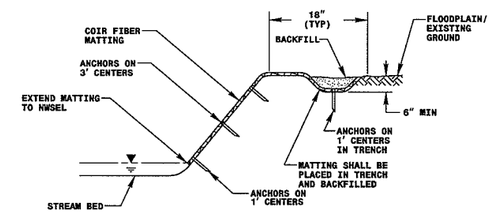
NOTES:
1. DEEPEST PART OF POOL TO BE IN LINE WITH WHERE VANE ARM TIES INTO BANKFULL.
2. DO NOT EXCAVATE POOL TOO CLOSE TO FOOTER BOULDERS.
3. CLASS "A" STONE CAN BE USED TO REDUCE VOIDS BETWEEN HEADERS AND FOOTERS.
4. COMPACT BACKFILL TO EXTENT POSSIBLE OR AT THE DIRECTION OF THE ENGINEER.
5. POOL DEPTH SHOULD BE 2 TO 3 TIMES BANKFULL DEPTH.

LOG CROSS VANE DETAIL

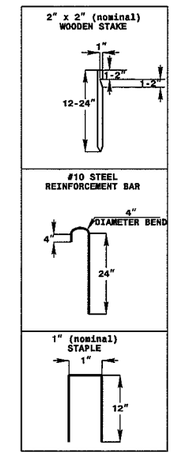
NOT TO SCALE



PLAN VIEW



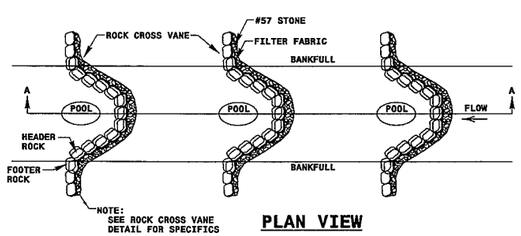
TYPICAL CROSS SECTION



ANCHOR OPTIONS

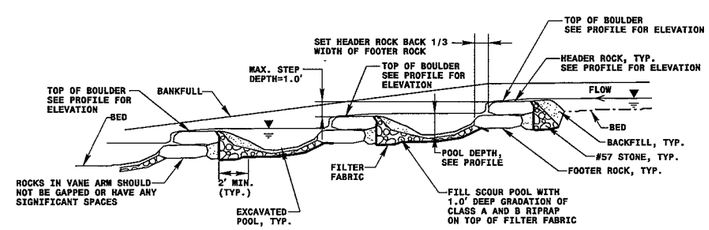
COIR FIBER MATTING DETAIL

NOT TO SCALE



PLAN VIEW

NOTES:
1. STEPS TO BE SHORT, FREQUENT, AND CLOSELY SPACED.
2. POOL SPACING SHALL BE INVERSELY PROPORTIONAL TO STREAM SLOPE. SEE CHANNEL PROFILE FOR SPACING AND ELEVATIONS
3. ADEQUATE NUMBER OF FOOTER BOULDERS TO BE USED IN ORDER TO HOLD UP THE BOULDERS AT HEAD OF STEPS DURING HIGH ENERGY/HIGH FLOW EVENTS.
4. MINIMUM BOULDER SIZE=30"



SECTION A-A

STORMWATER STEP POOL PROTECTION STRUCTURE

NOT TO SCALE

PREPARED IN THE OFFICE OF:
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NC LICENSE F-0102

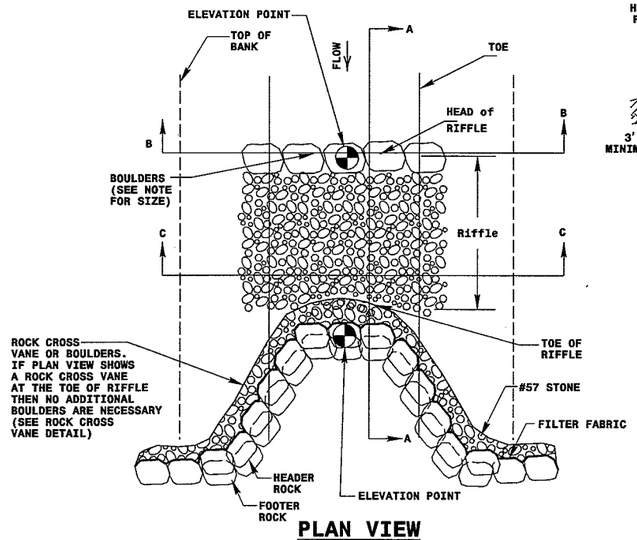
U-2525B
ON-SITE MITIGATION
GUILFORD COUNTY

PROJECT REFERENCE NO.	SHEET NO.
U2525B	OSM-2B

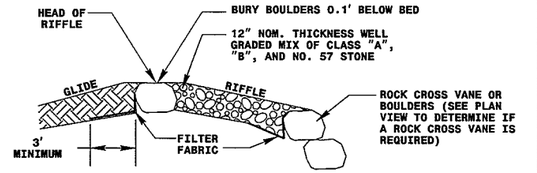
PROJECT ENGINEER

APPROVED BY:

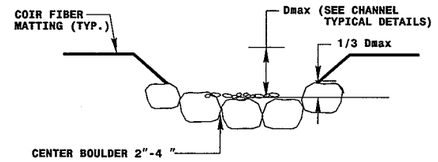
DATE:



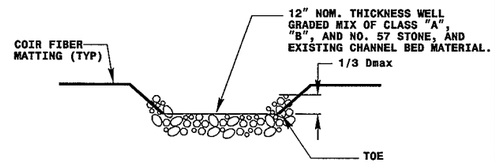
PLAN VIEW



SECTION A-A



SECTION B-B

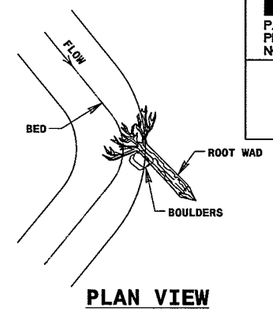


SECTION C-C

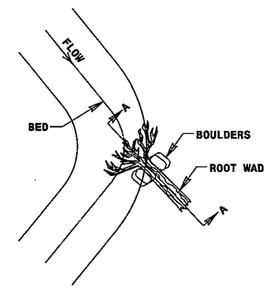
NOTE:
1. BOULDERS SHOULD BE NATIVE STONES OR SHOT ROCK, ANGULAR AND OBLONG, WITH AN AXIS APPROXIMATELY 4'Lx3'Wx2'D.
2. NOT ALL CONSTRUCTED RIFFLES REQUIRE A ROCK CROSS VANE ON THE TOE OF RIFFLE.
3. IF NO ROCK CROSS VANE IS PROPOSED AT THE TOE OF RIFFLE, INSTALL BOULDERS AT THE TOE OF RIFFLE TO SECURE CONSTRUCTED RIFFLE MATERIAL.

CONSTRUCTED RIFFLE DETAIL

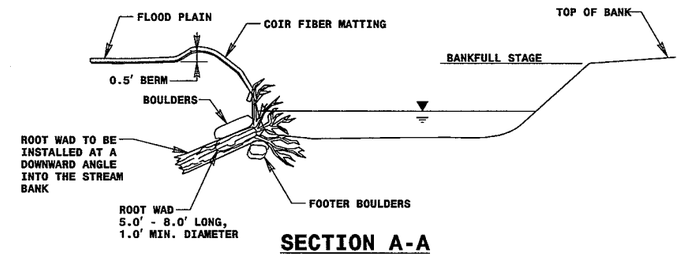
NOT TO SCALE



PLAN VIEW
DRIVE POINT METHOD



PLAN VIEW
TRENCHING METHOD



SECTION A-A

NOTES:

ORIENT ROOT WADS SO THAT THE STREAM FLOW MEETS THE ROOT WAD STRAIGHT ON, DEFLECTING THE WATER AWAY FROM THE BANK.

METHODS OF INSTALLATION:

DRIVE POINT METHOD:

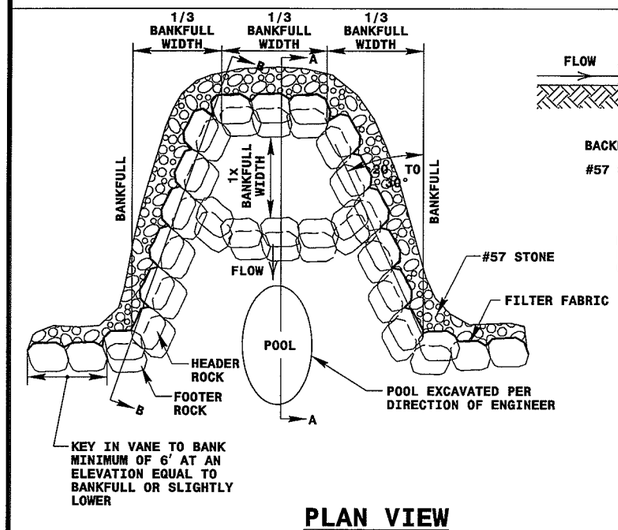
SHARPEN THE END OF THE LOG BEFORE "DRIVING" AT A DOWNWARD ANGLE INTO THE BANK. BOULDER SHOULD BE PLACED ON EACH SIDE OF THE ROOT WAD TO PIN IT IN PLACE. THE BOULDERS SHALL BE APPROXIMATELY 2' X 3' X 4'. ONE-THIRD OF THE ROOT WAD SHOULD REMAIN BELOW NORMAL BASE FLOW CONDITIONS.

TRENCHING METHOD:

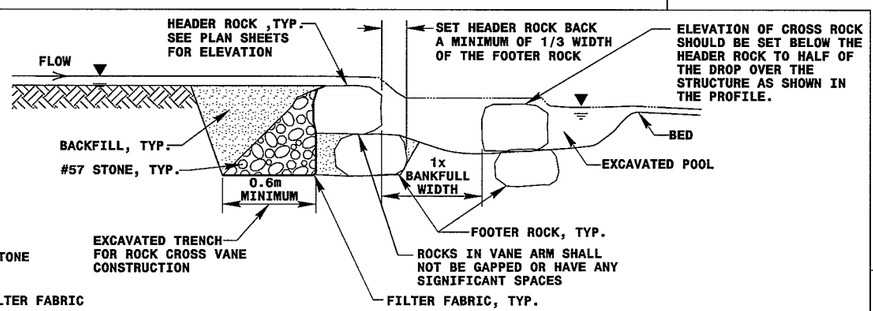
IF THE ROOT WAD CANNOT BE DRIVEN INTO THE BANK OR THE BANK NEEDS TO BE RECONSTRUCTED, THE TRENCHING METHOD SHOULD BE USED. THIS METHOD REQUIRES THAT A TRENCH BE EXCAVATED FOR THE LOG PORTION OF THE ROOT WAD. IN THIS CASE, FOOTER BOUDERS SHOULD BE INSTALLED UNDERNEATH THE ROOT WAD IN A TRENCH EXCAVATED PARALLEL TO THE BANK AND WELL BELOW THE STREAM BED. BOULDERS SHOULD BE PLACED ON EACH SIDE OF THE ROOTWAD TO PIN IT IN PLACE. THE BOULDERS SHOULD BE APPROXIMATELY 2' X 3' X 4'. ONE-THIRD OF THE ROOT WAD SHOULD REMAIN BELOW NORMAL BASE FLOW CONDITIONS.

ROOT WAD DETAIL

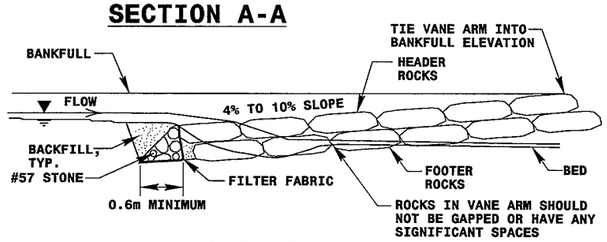
NOT TO SCALE



PLAN VIEW



SECTION A-A



SECTION B-B

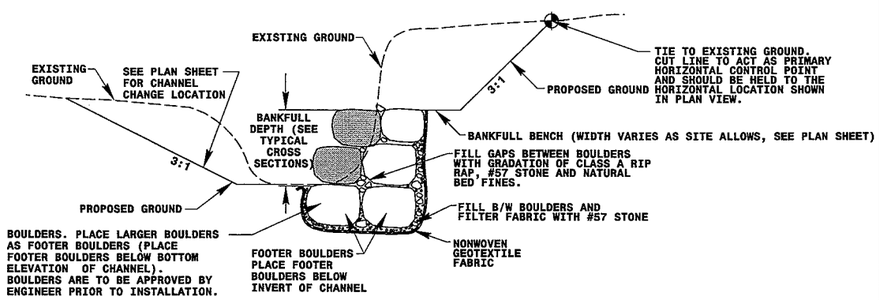
BOULDER SIZE DATA CHART			
	BOULDER DIMENSIONS		
REACH	HEIGHT	WIDTH	LENGTH
SITE 2 REACH 1	2'	3'	4'
SITE 2 REACH 2	2'	3'	4'
SITE 4	2'	3'	4'
SITE 5	2'	3'	4'

NOTE: THESE DIMENSIONS SPECIFY THE MINIMUM BOULDER SIZE

NOTES:
1. DEEPEST PART OF POOL TO BE IN LINE WITH WHERE VANE ARM TIES INTO BANKFULL.
2. DO NOT EXCAVATE POOL TOO CLOSE TO FOOTER BOULDERS.
3. CLASS "A" STONE CAN BE USED TO REDUCE VOIDS BETWEEN HEADERS AND FOOTERS.
4. COMPACT BANKFULL TO EXTENT POSSIBLE OR AT THE DIRECTION OF THE ENGINEER.
5. POOL DEPTH SHOULD BE 2 TO 3 TIMES BANKFULL DEPTH.

ROCK A VANE DETAIL

NOT TO SCALE



BOULDER TOE PROTECTION

NOT TO SCALE

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PHONE: (919) 677-2000 FAX: (919) 677-2050
NC LICENSE F-0102

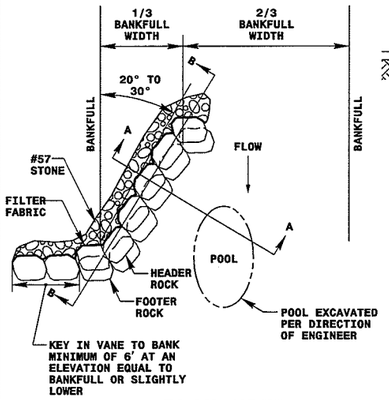
PROJECT REFERENCE NO.	SHEET NO.
U2525B	OSM-2C

PROJECT ENGINEER

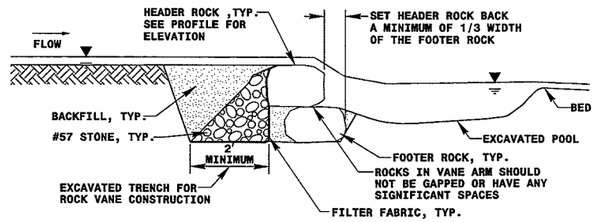
APPROVED BY:

DATE:

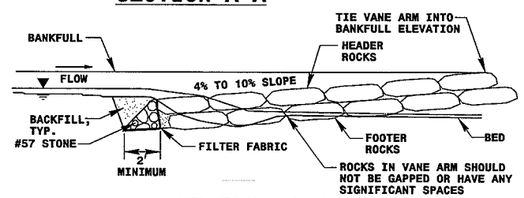
U-2525B
ON-SITE MITIGATION
GUILFORD COUNTY



PLAN VIEW



SECTION A-A



SECTION B-B

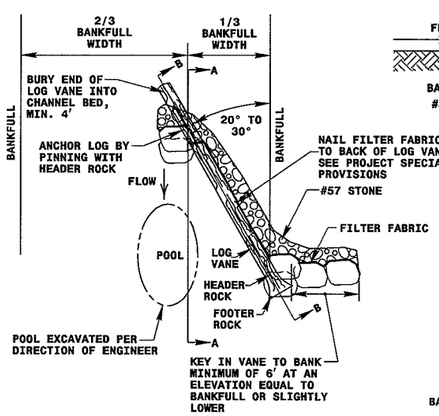
BOULDER SIZE DATA CHART			
REACH	BOULDER DIMENSIONS		
	HEIGHT	WIDTH	LENGTH
SITE 2 REACH 1	2'	3'	4'
SITE 2 REACH 2	2'	3'	4'
SITE 4	2'	3'	4'
SITE 5	2'	3'	4'

NOTE: THESE DIMENSIONS SPECIFY THE MINIMUM BOULDER SIZE

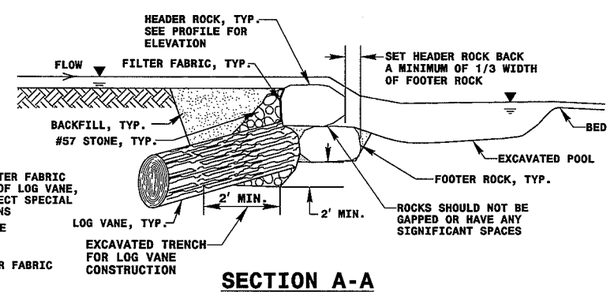
NOTES:
1. DEEPEST PART OF POOL TO BE IN LINE WITH WHERE VANE ARM TIES INTO BANKFULL.
2. DO NOT EXCAVATE POOL TOO CLOSE TO FOOTER BOULDERS.
3. CLASS "A" STONE CAN BE USED TO REDUCE VOIDS BETWEEN HEADERS AND FOOTERS.
4. COMPACT BACKFILL TO EXTENT POSSIBLE OR AT THE DIRECTION OF THE ENGINEER.
5. POOL DEPTH SHOULD BE 2 TO 3 TIMES BANKFULL DEPTH.

ROCK VANE DETAIL

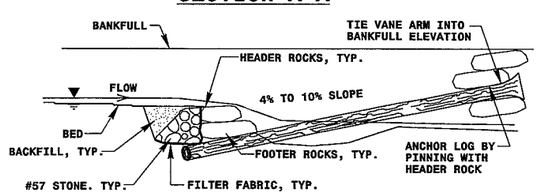
NOT TO SCALE



PLAN VIEW



SECTION A-A



SECTION B-B

BOULDER SIZE DATA CHART			
REACH	BOULDER DIMENSIONS		
	HEIGHT	WIDTH	LENGTH
SITE 2 REACH 1	2'	3'	4'
SITE 2 REACH 2	2'	3'	4'
SITE 4	2'	3'	4'
SITE 5	2'	3'	4'

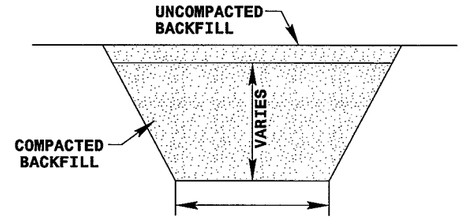
NOTE: THESE DIMENSIONS SPECIFY THE MINIMUM BOULDER SIZE

NOTES:
1. DEEPEST PART OF POOL TO BE IN LINE WITH WHERE VANE ARM TIES INTO BANKFULL.
2. DO NOT EXCAVATE POOL TOO CLOSE TO FOOTER BOULDERS.
3. CLASS "A" STONE CAN BE USED TO REDUCE VOIDS BETWEEN HEADERS AND FOOTERS.
4. COMPACT BACKFILL TO EXTENT POSSIBLE OR AT THE DIRECTION OF THE ENGINEER.
5. POOL DEPTH SHOULD BE 2 TO 3 TIMES BANKFULL DEPTH.

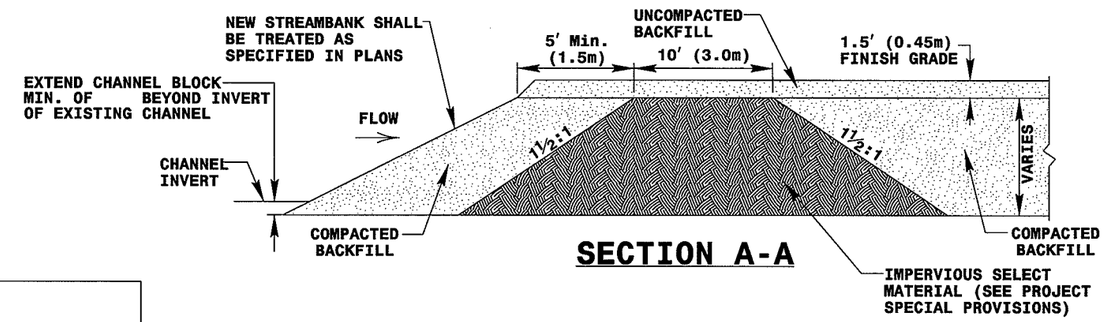
LOG VANE DETAIL

NOT TO SCALE

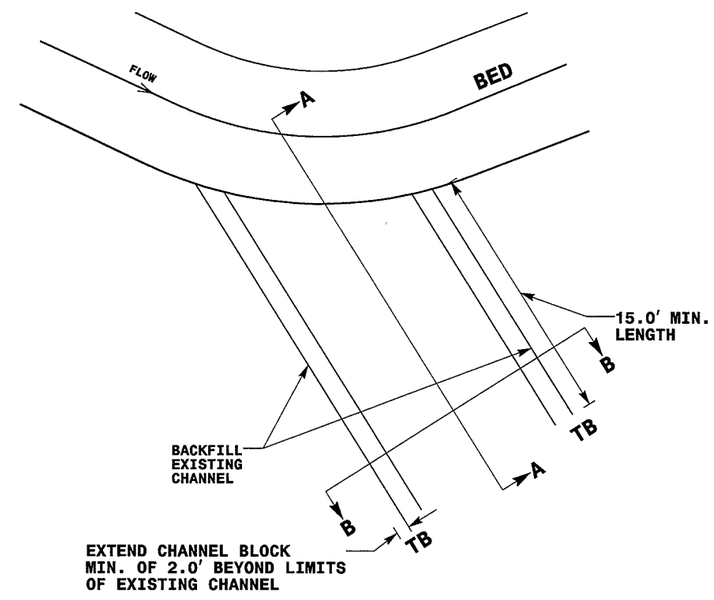
NOTES:
1) CHANNEL BLOCK SHALL BE INSTALLED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS.
2) BLOCK SHOULD BE INSTALLED AT THE INTERFACE BETWEEN EXISTING CHANNEL AND PROPOSED CHANNEL.
3) BOTTOM OF BLOCK SHOULD BE A MINIMUM OF 2.0' BELOW THE INVERT OF THE EXISTING CHANNEL.
4) BLOCK SHOULD EXTEND A MINIMUM OF 2.0' BEYOND THE LIMITS OF THE EXISTING STREAM CHANNEL.
5) INSTALL EROSION CONTROL MATTING AND SEED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS IMMEDIATELY AFTER GRADING.
6) COMPACT BACKFILL TO EXTENT POSSIBLE OR AT THE DIRECTION OF THE ENGINEER.



SECTION B-B



SECTION A-A



PLAN VIEW

STREAM PLUG

NOT TO SCALE

PREPARED IN THE OFFICE OF:
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NC LICENSE F-0102

PROJECT REFERENCE NO.	SHEET NO.
U2525B	OSM-2D

PROJECT ENGINEER

APPROVED BY:

DATE:

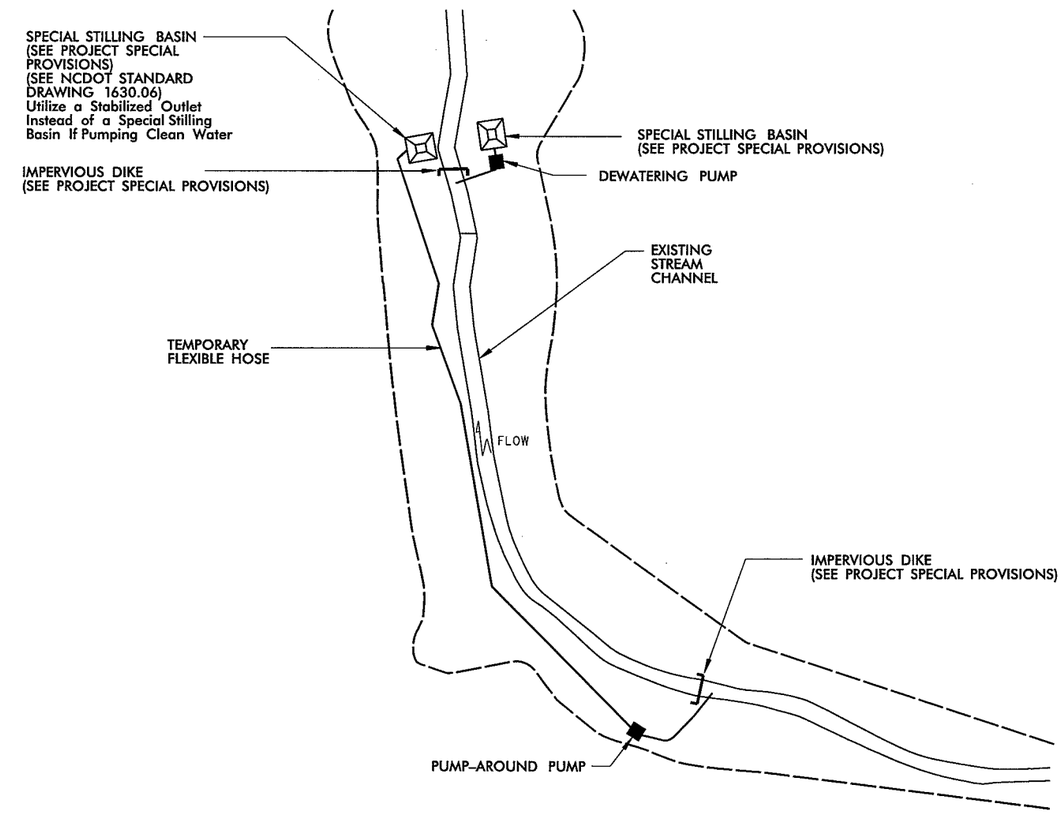
U-2525B
ON-SITE MITIGATION
GUILFORD COUNTY

NOTES:
1) All excavation shall be performed in only dry or isolated sections of channel.
2) Impervious dikes are to be used to isolate work from stream flow when necessary.
3) All graded areas shall be stabilized within 24 hours.
4) Maintenance of stream flow operations shall be incidental to the work. This includes polyethylene sheeting, diversion pipes, pumps and hoses.
5) Pumps and hoses shall be of sufficicient size to dewater the work area.

SEQUENCE OF CONSTRUCTION FOR PUMP AROUND OPERATION

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 BACKFILL. STABILIZE DISTURBED AREA WITH SEED AND MULCH.

EXAMPLE OF PUMP-AROUND OPERATION



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NC LICENSE F-0102

U-2525B
ON-SITE MITIGATION
GUILFORD COUNTY

PROJECT REFERENCE NO.	SHEET NO.
U2525B	OSM-2E

PROJECT ENGINEER

APPROVED BY:

DATE:

VARIABLES	Reference Reach Tributary to Riddicks Creek (KHA)	Reference Reach Riddicks Creek (KHA)	Reference Reach Triburary to Lake Jeanette (NCDOT)	Reference Reach Tributary to Rich Fork (KHA)	Existing Site 2 Reach 1	Regional Curves Piedmont Rural/Rosgen Reference Values	Site 2 Reach 1 Design Reach	Existing Site 2 Reach 2	Regional Curves Piedmont Rural/Rosgen Reference Values	Site 2 Reach 2 Design Reach
STATION	–	–	–	–	–	–	200+00 to 205+00	–	–	205+00 to 213+07
1. Stream Type (Rosgen)	C5	E5	E5	B4	Incised B5	C/E	B5	Incised B5	C/E	B5
2. Drainage Area (sq. mile)	0.18	0.07	0.15	1.12	0.08	0.08	0.08	0.10	0.10	0.10
3. Bankfull Width	Mean: 7.9	Mean: 6.6	Mean: 12.0	Mean: 15.2	Mean: 7.8	Mean: 4.1	Mean: 7.2	Mean: 5.0	Mean: 4.3	Mean: 7.6
(W_{bkf})	Range: – –	Range: 5.7 7.5	Range: 12.0 13.5	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –
4. Bankfull Mean	Mean: 0.6	Mean: 0.8	Mean: 1.6	Mean: 1.2	Mean: 0.7	Mean: 0.7	Mean: 0.5	Mean: 1.0	Mean: 0.7	Mean: 0.5
depth (d_{bkf})	Range: – –	Range: 0.7 0.8	Range: 1.4 1.7	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –
5. Width/Depth Ratio	Mean: 13.5	Mean: 8.7	Mean: 8.4	Mean: 12.7	Mean: 11.0	Mean: 6.0	Mean: 13.5	Mean: 5.2	Mean: 6.1	Mean: 13.9
(W_{bkf}/d_{bkf})	Range: – –	Range: 8.2 9.2	Range: 7.1 9.6	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –
6. Bankfull cross-sectional	Mean: 4.6	Mean: 5.1	Mean: 19.4	Mean: 19.0	Mean: 5.5	Mean: 4.0	Mean: 3.8	Mean: 4.8	Mean: 4.3	Mean: 4.2
Area (Abkf)	Range: – –	Range: 4.0 6.1	Range: 18.8 20.0	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –
7. Bankfull Mean Velocity	Mean: Not Reported	Mean: Not Reported	Mean: 5.6	Mean: 5.1	Mean: 3.4	Mean: 3.8	Mean: 4.9	Mean: 4.0	Mean: 3.8	Mean: 4.6
(V_{bkf})	Range: – –	Range: – –	Range: 5.2 6.2	Range: – –	Range: 3.1 3.8	Range: – –	Range: – –	Range: 3.6 4.5	Range: – –	Range: – –
8. Bankfull Discharge, cfs	Mean: Not Reported	Mean: Not Reported	Mean: 109.3	Mean: 96.9	Mean: 18.6	Mean: 15.0	Mean: 18.6	Mean: 19.1	Mean: 16.4	Mean: 19.1
(Q_{bkf})	Range: – –	Range: – –	Range: 100.7 119.6	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –
9. Bankfull Maximum Depth	Mean: 1.0	Mean: 1.5	Mean: 2.9	Mean: 1.9	Mean: 0.9	Mean: –	Mean: 0.8	Mean: 1.3	Mean: –	Mean: 0.8
(d_{bmax})	Range: – –	Range: 1.3 1.6	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –
10. Max d_{max}/d_{bkf}	Mean: 1.7	Mean: 2.0	Mean: 2.4	Mean: 1.6	Mean: 1.3	Mean: 1.4	Mean: 1.5	Mean: 1.3	Mean: 1.4	Mean: 1.5
ratio	Range: – –	Range: 1.9 2.0	Range: – –	Range: – –	Range: – –	Range: 1.2 1.5	Range: – –	Range: – –	Range: 1.2 1.5	Range: – –
11. Low Bank Height to max	Mean: 1.0	Mean: 1.3	Mean: Not Reported	Mean: 1.1	Mean: 2.7	Mean: –	Mean: 1.0	Mean: 3.4	Mean: –	Mean: 1.0
d_{bkf} ratio	Range: – –	Range: 1.20 2.50	Range: – –	Range: – –	Range: 2.46 2.93	Range: – –	Range: – –	Range: 3.30 3.42	Range: – –	Range: – –
12. Width of Flood Prone	Mean: 36.0	Mean: 27.4	Mean: 49.0	Mean: 23.3	Mean: 12.0	Mean: –	Mean: 14.0	Mean: 8.1	Mean: –	Mean: 12.0
Area (W_{fpa})	Range: – –	Range: 20.0 34.0	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –
13. Entrenchment Ratio	Mean: 4.6	Mean: 4.2	Mean: 4.4	Mean: 1.5	Mean: 1.5	Mean: –	Mean: 1.9	Mean: 1.6	Mean: –	Mean: 1.6
(W_{fpa}/W_{bkf})	Range: – –	Range: 3.5 4.6	Range: 4.1 4.7	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –
14. Meander Length	Mean: 80.5	Mean: 32.0	Mean: 22.0	Mean: –	Mean: 27.9	Mean: –	Mean: 63.0	Mean: 42.3	Mean: –	Mean: 65.0
(L_m)	Range: 64.0 97.0	Range: 25.0 45.0	Range: 22.0 69.0	Range: – –	Range: 13.2 51.1	Range: – –	Range: 50.4 75.6	Range: 14.2 72.8	Range: – –	Range: 52.0 78.0
15. Ratio of Meander Length to	Mean: 10.2	Mean: 4.8	Mean: 1.8	Mean: –	Mean: 3.6	Mean: 11.5	Mean: 8.8	Mean: 8.5	Mean: 11.5	Mean: 8.6
Bankfull Width (L_m/W_{bkf})	Range: 8.1 12.3	Range: 3.8 6.8	Range: 1.8 5.8	Range: – –	Range: 1.7 6.5	Range: 9.0 14.0	Range: 7.0 10.5	Range: 2.9 14.7	Range: 9.0 14.0	Range: 6.8 10.3
16. Radius of Curvature	Mean: 13.4	Mean: 11.3	Mean: 7.3	Mean: –	Mean: 10.9	Mean: –	Mean: 17.3	Mean: 9.4	Mean: –	Mean: 17.9
(R_c)	Range: 8.5 22.0	Range: 5.7 18.8	Range: 7.3 17.3	Range: – –	Range: 7.1 17.1	Range: – –	Range: 15.8 18.9	Range: 5.0 16.0	Range: – –	Range: 16.3 19.5
17. Ratio of Radius of Curvature	Mean: 1.7	Mean: 1.7	Mean: 0.6	Mean: –	Mean: 1.4	Mean: 2.8	Mean: 2.4	Mean: 1.9	Mean: 2.8	Mean: 2.4
to Bankfull Width (R_c/W_{bkf})	Range: 1.1 2.8	Range: 0.9 2.8	Range: 0.6 1.4	Range: – –	Range: 0.9 2.2	Range: 2.5 3.0	Range: 2.2 2.6	Range: 1.0 3.2	Range: 2.5 3.0	Range: 2.1 2.6
18. Belt Width	Mean: 34.0	Mean: 15.8	Mean: 45.0	Mean: –	Mean: 12.2	Mean: –	Mean: 12.9	Mean: 18.5	Mean: –	Mean: 22.8
(W_{blt})	Range: – –	Range: 10.5 22.0	Range: – –	Range: – –	Range: 8.1 25.2	Range: – –	Range: 11.3 14.5	Range: 9.0 40.7	Range: – –	Range: 16.3 29.3
19. Meander Width Ratio	Mean: 4.3	Mean: 2.4	Mean: 3.8	Mean: –	Mean: 1.6	Mean: 4.0	Mean: 1.8	Mean: 3.7	Mean: 4.0	Mean: 3.0
(W_{blt}/W_{bkf})	Range: – –	Range: 1.6 3.3	Range: – –	Range: – –	Range: 1.0 3.2	Range: 3.0 5.0	Range: 1.6 2.0	Range: 1.8 8.2	Range: 3.0 5.0	Range: 2.1 3.9
20. Sinuosity (k)	Mean: 1.30	Mean: 1.40	Mean: Not Reported	Mean: 1.07	Mean: 1.15	Mean: –	Mean: 1.07	Mean: 1.19	Mean: –	Mean: 1.06
(Stream Length / Valley Length)	Range: – –	Range: – –	Range: – –	Range: – –	Range:	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –
21. Valley Slope (S_{valley})	Mean: 0.0022	Mean: 0.0130	Mean: Not Reported	Mean: 0.0168	Mean: 0.0174	Mean: –	Mean: 0.0110	Mean: 0.0171	Mean: –	Mean: 0.0199
(ft/ft)	Range: – –	Range: – –	Range: – –	Range: – –	Range:	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –
22. Average Stream Slope	Mean: 0.0017	Mean: 0.0093	Mean: 0.0033	Mean: 0.0157	Mean: 0.0151	Mean: –	Mean: 0.0103	Mean: 0.0144	Mean: –	Mean: 0.0187
(S_{avg}) = (S_{valley}/k)	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –
23. Riffle Slope	Mean: 0.0049	Mean: 0.0540	Mean: Not Reported	Mean: 0.0522	Mean: 0.0446	Mean: –	Mean: 0.0151	Mean: 0.0203	Mean: –	Mean: 0.0328
(S_{riff})	Range: 0.0000 0.0257	Range: 0.0100 0.0800	Range: – –	Range: 0.0077 0.0961	Range: 0.0189 0.0640	Range: – –	Range: 0.0086 0.0215	Range: 0.0067 0.0303	Range: – –	Range: 0.0281 0.0374
24. Ratio of Riffle Slope to Avg.	Mean: 2.9	Mean: 5.8	Mean: –	Mean: 3.3	Mean: 2.9	Mean: 1.8	Mean: 1.5	Mean: 1.4	Mean: 1.8	Mean: 1.8
Slope (S_{riffle}/S_{avg})	Range: 0.0 15.3	Range: 0.6 4.5	Range: – –	Range: – –	Range: 1.1 4.2	Range: 1.5 2.0	Range: 0.8 2.1	Range: 0.5 2.1	Range: 1.5 2.0	Range: 1.5 2.0
25. Pool Slope	Mean: 0.0002	Mean: 0.0024	Mean: Not Reported	Mean: 0.0032	Mean: 0.0111	Mean: –	Mean: 0.0001	Mean: 0.0040	Mean: –	Mean: 0.000
(S_{pool})	Range: 0.0000 0.0007	Range: 0.0000 0.0100	Range: – –	Range: 0.0009 0.0065	Range: 0.0067 0.0165	Range: – –	Range: 0.0001 0.0001	Range: 0.0027 0.0056	Range: – –	Range: 0.0000 0.0019
26. Ratio of Pool Slope to Avg.	Mean: 0.1	Mean: 0.3	Mean: –	Mean: 0.2	Mean: 0.7	Mean: 0.0	Mean: 0.0	Mean: 0.3	Mean: 0.0	Mean: 0.0
Slope (S_{pool}/S_{avg})	Range: 0.0 0.4	Range: 0.0 0.6	Range: – –	Range: 0.1 0.4	Range: 0.4 1.1	Range: 0.0 0.1	Range: 0.0 0.0	Range: 0.2 0.4	Range: 0.0 0.1	Range: 0.0 0.1
27. Maximum Pool	Mean: 2.0	Mean: 2.0	Mean: 3.1	Mean: 3.0	Mean: 1.9	Mean: –	Mean: 1.4	Mean: 1.8	Mean: –	Mean: 1.5
Depth (d_{pool})	Range: – –	Range: – –	Range: – –	Range: 2.3 3.9	Range: 1.6 2.1	Range: – –	Range: – –	Range: 1.6 2.2	Range: – –	Range: – –
28. Ratio of Pool Depth to Avg.	Mean: 3.4	Mean: 2.3	Mean: 2.0	Mean: 2.5	Mean: 2.6	Mean: 3.0	Mean: 2.6	Mean: 1.9	Mean: 3.0	Mean: 2.7
Depth (d_{pool}/d_{bkf})	Range: – –	Range: – –	Range: – –	Range: 1.9167 3.2833	Range: 2.2 3.0	Range: 2.5 3.5	Range: – –	Range: 1.6 2.3	Range: 2.5 3.5	Range: – –
29. Pool Width	Mean: 11.5	Mean: 8.1	Mean: 19.6	Mean: 16.3	Mean: 6.7	Mean: –	Mean: 9.8	Mean: 5.4	Mean: –	Mean: 10.2
(W_{pool})	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –
30. Ratio of Pool Width to	Mean: 1.5	Mean: 1.2	Mean: 1.6	Mean: 1.1	Mean: 0.9	Mean: 1.5	Mean: 1.4	Mean: 1.1	Mean: 1.5	Mean: 1.3
Bankfull Width (W_{pool}/W_{bkf})	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: 1.3 1.7	Range: – –	Range: – –	Range: 1.3 1.7	Range: – –
31. Pool Area	Mean: Not Reported	Mean: Not Reported	Mean: 27.0	Mean: 22.7	Mean: 5.5	Mean: –	Mean: 6.6	Mean: 5.6	Mean: –	Mean: 7.3
(A_{pool})	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –
32. Ratio of Pool Area to	Mean: –	Mean: –	Mean: 1.4	Mean: 1.2	Mean: 1.0	Mean: –	Mean: 1.7	Mean: 1.2	Mean: –	Mean: 1.8
Bankfull Area (A_{pool}/A_{bkf})	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –	Range: – –
33. Pool to Pool Spacing	Mean: 38.3	Mean: 22.9	Mean: Not Reported	Mean: 33.1	Mean: 20.0	Mean: –	Mean: 31.5	Mean: 28.8	Mean: –	Mean: 32.5
(p - p)	Range: 18 76	Range: 6 48	Range: – –	Range: 20 52	Range: 12.6 27.7	Range: – –	Range: 25.2 37.8	Range: 24.0 33.7	Range: – –	Range: 29.3 42.3
34. Ratio of Pool to Pool Spacing	Mean: 4.8	Mean: 3.5	Mean: –	Mean: 2.2	2.6	Mean: 4.5	Mean: 4.4	Mean: 5.8	Mean: 4.5	Mean: 4.3
to Bankfull Width (p-p/Wbkf)	Range: 2.3 9.9	Range: 1.1 7.3	Range: – –	Range: 1.3 3.4	Range: 1.6 3.5	Range: 4.0 5.0	Range: 3.5 5.3	Range: 4.8 6.8	Range: 4.0 5.0	Range: 3.9 5.6

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NC LICENSE F-0102

PROJECT REFERENCE NO.	SHEET NO.
U2525B	OSM-2F

PROJECT ENGINEER

APPROVED BY:

DATE:

U-2525B ON-SITE MITIGATION GUILFORD COUNTY

VARIABLES	Reference Reach Tributary to Riddicks Creek (KHA)	Reference Reach Riddicks Creek (KHA)	Reference Reach Triburary to Lake Jeanette (NCDOT)	Reference Reach Tributary to Rich Fork (KHA)	Existing Site 4	Regional Curves Piedmont Rural/Rosgen Reference Values	Site 4 Design Reach	Existing Site 5	Regional Curves Piedmont Rural/Rosgen Reference Values	Site 5 Design Reach
STATION	–	–	–	–	–	–	400+00 to 403+86	–	–	500+00 to 503+22
1. Stream Type (Rosgen)	C5	E5	E5	B4	Incised B5	C/E	C5	E5	C/E	C5
2. Drainage Area (sq. mile)	0.18	0.07	0.15	1.12	0.57	0.57	0.57	0.51	0.51	0.51
3. Bankfull Width (W_{bkf})	Mean: 7.9 Range: – –	Mean: 6.6 Range: 5.7 7.5	Mean: 12.0 Range: 12.0 13.5	Mean: 15.2 Range: – –	Mean: 8.9 Range: – –	Mean: 9.3 Range: – –	Mean: 12.7 Range: – –	Mean: 11.8 Range: – –	Mean: 8.9 Range: – –	Mean: 13.7 Range: – –
4. Bankfull Mean depth (d_{bkf})	Mean: 0.6 Range: – –	Mean: 0.8 Range: 0.7 0.8	Mean: 1.6 Range: 1.4 1.7	Mean: 1.2 Range: – –	Mean: 1.3 Range: – –	Mean: 1.3 Range: – –	Mean: 0.9 Range: – –	Mean: 1.1 Range: – –	Mean: 1.2 Range: – –	Mean: 1.0 Range: – –
5. Width/Depth Ratio (W_{bkf}/d_{bkf})	Mean: 13.5 Range: – –	Mean: 8.7 Range: 8.2 9.2	Mean: 8.4 Range: 7.1 9.6	Mean: 12.7 Range: – –	Mean: 6.6 Range: – –	Mean: 7.5 Range: – –	Mean: 13.6 Range: – –	Mean: 10.4 Range: – –	Mean: 7.4 Range: – –	Mean: 14.1 Range: – –
6. Bankfull cross-sectional Area (Abkf)	Mean: 4.6 Range: – –	Mean: 5.1 Range: 4.0 6.1	Mean: 19.4 Range: 18.8 20.0	Mean: 19.0 Range: – –	Mean: 11.9 Range: – –	Mean: 14.6 Range: – –	Mean: 11.9 Range: – –	Mean: 13.3 Range: – –	Mean: 13.6 Range: – –	Mean: 13.3 Range: – –
7. Bankfull Mean Velocity (V_{bkf})	Mean: Not Reported Range: – –	Mean: Not Reported Range: – –	Mean: 5.6 Range: 5.2 6.2	Mean: 5.1 Range: – –	Mean: 2.1 Range: 1.9 2.3	Mean: 4.1 Range: – –	Mean: 2.1 Range: – –	Mean: 4.3 Range: 3.9 4.8	Mean: 4.0 Range: – –	Mean: 4.3 Range: – –
8. Bankfull Discharge, cfs (Q_{bkf})	Mean: Not Reported Range: – –	Mean: Not Reported Range: – –	Mean: 109.3 Range: 100.7 119.6	Mean: 96.9 Range: – –	Mean: 24.5 Range: – –	Mean: 59.4 Range: – –	Mean: 24.5 Range: – –	Mean: 56.5 Range:	Mean: 54.8 Range: – –	Mean: 56.5 Range: – –
9. Bankfull Maximum Depth (d_{max})	Mean: 1.0 Range: – –	Mean: 1.5 Range: 1.3 1.6	Mean: 2.9 Range: – –	Mean: 1.9 Range: – –	Mean: 2.1 Range: – –	Mean: – Range: – –	Mean: 1.4 Range: – –	Mean: 1.6 Range: – –	Mean: – Range: – –	Mean: 1.4 Range: – –
10. Max d_{max}/d_{bkf} ratio	Mean: 1.7 Range: – –	Mean: 2.0 Range: 1.9 2.0	Mean: 2.4 Range: – –	Mean: 1.6 Range: – –	Mean: 1.5 Range: – –	Mean: 1.4 Range: 1.2 1.5	Mean: 1.5 Range: – –	Mean: 1.4 Range: – –	Mean: 1.4 Range: 1.2 1.5	Mean: 1.4 Range: – –
11. Low Bank Height to max d_{bkf} ratio	Mean: 1.0 Range: – –	Mean: 1.3 Range: 1.20 2.50	Mean: Not Reported Range: – –	Mean: 1.1 Range: – –	Mean: 3.1 Range: 2.86 3.19	Mean: – Range: – –	Mean: 1.0 Range: – –	Mean: 2.5 Range: 2.42 2.52	Mean: – Range: – –	Mean: 1.0 Range: – –
12. Width of Flood Prone Area (W_{fpa})	Mean: 36.0 Range: – –	Mean: 27.4 Range: 20.0 34.0	Mean: 49.0 Range: – –	Mean: 23.3 Range: – –	Mean: 15.1 Range: – –	Mean: – Range: – –	Mean: 80.0 Range: – –	Mean: 147.0 Range: – –	Mean: – Range: – –	Mean: 147.0 Range: – –
13. Entrenchment Ratio (W_{fpa}/W_{bkf})	Mean: 4.6 Range: – –	Mean: 4.2 Range: 3.5 4.6	Mean: 4.4 Range: 4.1 4.7	Mean: 1.5 Range: – –	Mean: 1.7 Range: – –	Mean: – Range: – –	Mean: 6.3 Range: – –	Mean: 12.5 Range: – –	Mean: – Range: – –	Mean: 10.7 Range: – –
14. Meander Length (L_m)	Mean: 80.5 Range: 64.0 97.0	Mean: 32.0 Range: 25.0 45.0	Mean: 22.0 Range: 22.0 69.0	Mean: – Range: – –	Mean: 44.7 Range: 25.7 58.3	Mean: – Range: – –	Mean: 122.0 Range: 97.6 146.4	Mean: 85.2 Range: 27.5 138.0	Mean: – Range: – –	Mean: 126.0 Range: 100.8 151.2
15. Ratio of Meander Length to Bankfull Width (L_m/W_{bkf})	Mean: 10.2 Range: 8.1 12.3	Mean: 4.8 Range: 3.8 6.8	Mean: 1.8 Range: 1.8 5.8	Mean: – Range: – –	Mean: 5.0 Range: 2.9 6.6	Mean: 11.5 Range: 9.0 14.0	Mean: 9.6 Range: 7.7 11.5	Mean: 7.2 Range: 2.3 11.7	Mean: 11.5 Range: 9.0 14.0	Mean: 9.2 Range: 7.4 11.0
16. Radius of Curvature (R_c)	Mean: 13.4 Range: 8.5 22.0	Mean: 11.3 Range: 5.7 18.8	Mean: 7.3 Range: 7.3 17.3	Mean: – Range: – –	Mean: 33.6 Range: 12.0 63.0	Mean: – Range: – –	Mean: 33.6 Range: 30.5 36.6	Mean: 29.6 Range: 6.0 71.0	Mean: – Range: – –	Mean: 34.7 Range: 31.5 37.8
17. Ratio of Radius of Curvature to Bankfull Width (R_c/W_{bkf})	Mean: 1.7 Range: 1.1 2.8	Mean: 1.7 Range: 0.9 2.8	Mean: 0.6 Range: 0.6 1.4	Mean: – Range: – –	Mean: 3.8 Range: 1.3 7.1	Mean: 2.8 Range: 2.5 3.0	Mean: 2.6 Range: 2.4 2.9	Mean: 2.5 Range: 0.5 6.0	Mean: 2.8 Range: 2.5 3.0	Mean: 2.5 Range: 2.3 2.8
18. Belt Width (W_{blt})	Mean: 34.0 Range: – –	Mean: 15.8 Range: 10.5 22.0	Mean: 45.0 Range: – –	Mean: – Range: – –	Mean: 12.3 Range: 7.4 17.7	Mean: – Range: – –	Mean: 42.7 Range: 30.5 54.9	Mean: 33.5 Range: 17.6 53.2	Mean: – Range: – –	Mean: 36.4 Range: 24.6 48.2
19. Meander Width Ratio (W_{blt}/W_{bkf})	Mean: 4.3 Range: – –	Mean: 2.4 Range: 1.6 3.3	Mean: 3.8 Range: – –	Mean: – Range: – –	Mean: 1.4 Range: 0.8 2.0	Mean: 4.0 Range: 3.0 5.0	Mean: 3.4 Range: 2.4 4.3	Mean: 2.8 Range: 1.5 4.5	Mean: 4.0 Range: 3.0 5.0	Mean: 2.7 Range: 1.8 3.5
20. Sinuosity (k) (Stream Length / Valley Length)	Mean: 1.30 Range: – –	Mean: 1.40 Range: – –	Mean: Not Reported Range: – –	Mean: 1.07 Range: – –	Mean: 1.22 Range: – –	Mean: – Range: – –	Mean: 1.08 Range: – –	Mean: 1.16 Range: – –	Mean: – Range: – –	Mean: 1.13 Range: – –
21. Valley Slope (S_{valley}) (ft/ft)	Mean: 0.0022 Range: – –	Mean: 0.0130 Range: – –	Mean: Not Reported Range: – –	Mean: 0.0168 Range: – –	Mean: 0.0029 Range: – –	Mean: – Range: – –	Mean: 0.0050 Range: – –	Mean: 0.0131 Range: – –	Mean: – Range: – –	Mean: 0.0118 Range: – –
22. Average Stream Slope (S_{avg}) = (S_{valley}/k)	Mean: 0.0017 Range: – –	Mean: 0.0093 Range: – –	Mean: 0.0033 Range: – –	Mean: 0.0157 Range: – –	Mean: 0.0024 Range: – –	Mean: – Range: – –	Mean: 0.0046 Range: – –	Mean: 0.0113 Range: – –	Mean: – Range: – –	Mean: 0.0105 Range: – –
23. Riffle Slope (S_{riff})	Mean: 0.0049 Range: 0.0000 0.0257	Mean: 0.0540 Range: 0.0100 0.0800	Mean: Not Reported Range: – –	Mean: 0.0522 Range: 0.0077 0.0961	Mean: 0.0360 Range: 0.0129 0.0774	Mean: – Range: – –	Mean: 0.0081 Range: 0.0069 0.0092	Mean: 0.0277 Range: 0.0236 0.0395	Mean: – Range: – –	Mean: 0.0183 Range: 0.0157 0.0210
24. Ratio of Riffle Slope to Avg. Slope (S_{riffle}/S_{avg})	Mean: 2.9 Range: 0.0 15.3	Mean: 5.8 Range: 0.6 4.5	Mean: – Range: – –	Mean: 3.3 Range: – –	Mean: 15.8 Range: 5.3 32.1	Mean: 1.8 Range: 1.5 2.0	Mean: 1.8 Range: 1.5 2.0	Mean: 2.5 Range: 2.1 3.5	Mean: 1.8 Range: 1.5 2.0	Mean: 1.8 Range: 1.5 2.0
25. Pool Slope (S_{pool})	Mean: 0.0002 Range: 0.0000 0.0007	Mean: 0.0024 Range: 0.0000 0.0100	Mean: Not Reported Range: – –	Mean: 0.0032 Range: 0.0009 0.0065	Mean: 0.0073 Range: 0.0061 0.0080	Mean: – Range: – –	Mean: 0.000 Range: 0.0000 0.0005	Mean: 0.0012 Range: 0.0057 0.0017	Mean: – Range: – –	Mean: 0.000 Range: 0.0000 0.0010
26. Ratio of Pool Slope to Avg. Slope (S_{pool}/S_{avg})	Mean: 0.1 Range: 0.0 0.4	Mean: 0.3 Range: 0.0 0.6	Mean: – Range: – –	Mean: 0.2 Range: 0.1 0.4	Mean: 3.0 Range: 2.5 3.3	Mean: 0.0 Range: 0.0 0.1	Mean: 0.0 Range: 0.0 0.1	Mean: 0.1 Range: 0.5 0.1	Mean: 0.0 Range: 0.0 0.1	Mean: 0.0 Range: 0.0 0.1
27. Maximum Pool Depth (d_{pool})	Mean: 2.0 Range: – –	Mean: 2.0 Range: – –	Mean: 3.1 Range: – –	Mean: 3.0 Range: 2.3 3.9	Mean: 2.7 Range: 2.5 2.8	Mean: – Range: – –	Mean: 2.6 Range: – –	Mean: 2.3 Range: 1.9 2.6	Mean: – Range: – –	Mean: 2.6 Range: – –
28. Ratio of Pool Depth to Avg. Depth (d_{pool}/d_{bkf})	Mean: 3.4 Range: – –	Mean: 2.3 Range: – –	Mean: 2.0 Range: – –	Mean: 2.5 Range: 1.9167 3.2833	Mean: 2.0 Range: 1.9 2.1	Mean: 3.0 Range: 2.5 3.5	Mean: 2.8 Range: – –	Mean: 2.1 Range: 1.7 2.3	Mean: 3.0 Range: 2.5 3.5	Mean: 2.7 Range: – –
29. Pool Width (W_{pool})	Mean: 11.5 Range: – –	Mean: 8.1 Range: – –	Mean: 19.6 Range: – –	Mean: 16.3 Range: – –	Mean: 13.3 Range: – –	Mean: – Range: – –	Mean: 17.0 Range: – –	Mean: 11.8 Range: – –	Mean: – Range: – –	Mean: 16.0 Range: – –
30. Ratio of Pool Width to Bankfull Width (W_{pool}/W_{bkf})	Mean: 1.5 Range: – –	Mean: 1.2 Range: – –	Mean: 1.6 Range: – –	Mean: 1.1 Range: – –	Mean: 1.5 Range: – –	Mean: 1.5 Range: 1.3 1.7	Mean: 1.3 Range: – –	Mean: 1.0 Range: – –	Mean: 1.5 Range: 1.3 1.7	Mean: 1.2 Range: – –
31. Pool Area (A_{pool})	Mean: Not Reported Range: – –	Mean: Not Reported Range: – –	Mean: 27.0 Range: – –	Mean: 22.7 Range: – –	Mean: 28.4 Range: – –	Mean: – Range: – –	Mean: 20.0 Range: – –	Mean: 13.3 Range: – –	Mean: – Range: – –	Mean: 20.1 Range: – –
32. Ratio of Pool Area to Bankfull Area (A_{pool}/A_{bkf})	Mean: – Range: – –	Mean: – Range: – –	Mean: 1.4 Range: – –	Mean: 1.2 Range: – –	Mean: 2.4 Range: – –	Mean: – Range: – –	Mean: 1.7 Range: – –	Mean: 1.0 Range: – –	Mean: – Range: – –	Mean: 1.5 Range: – –
33. Pool to Pool Spacing (p - p)	Mean: 38.3 Range: 16 78	Mean: 22.9 Range: 8 48	Mean: Not Reported Range: – –	Mean: 33.1 Range: 20 52	Mean: 24.4 Range: 23.7 25.2	Mean: – Range: – –	Mean: 70.2 Range: 54.9 85.4	Mean: 32.7 Range: 21.3 50.8	Mean: – Range: – –	Mean: 72.5 Range: 56.7 88.2
34. Ratio of Pool to Pool Spacing to Bankfull Width (p-p/Wbkf)	Mean: 4.8 Range: 2.3 9.9	Mean: 3.5 Range: 1.1 7.3	Mean: – Range: – –	Mean: 2.2 Range: 1.3 3.4	Mean: 2.7 Range: 2.7 2.8	Mean: 6.0 Range: 5.0 7.0	Mean: 5.5 Range: 4.3 6.7	Mean: 2.8 Range: 1.8 4.3	Mean: 6.0 Range: 5.0 7.0	Mean: 5.3 Range: 4.1 6.4

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NC LICENSE F-0102

PROJECT REFERENCE NO.	SHEET NO.
U2525B	OSM-3

PROJECT ENGINEER

APPROVED BY:

DATE:

U-2525B
ON-SITE MITIGATION
GUILFORD COUNTY

SUMMARY OF QUANTITIES

DESCRIPTION	SECTION	QUANTITIY	UNIT	ITEM DESCRIPTION
0000400000-N	SP	1	LS	CONSTRUCTION SURVEYING FOR MITIGATION
0043000000-N	SP	1	LS	GRADING FOR MITIGATION
1077000000-M	1610	700	TON	#57 STONE
3656000000-M	1042	1,250	SY	FILTER FABRIC FOR DRAINAGE
3651000000-M	SP	1,150	TON	BOULDER
3642000000-M	SP	60	TON	PLAIN RIP RAP, CLASS A
3649000000-M	SP	50	TON	PLAIN RIP RAP, CLASS B
6133000000-N	SP	1	LS	DIVERSION PUMPING FOR MITIGATION
6133000000-N	SP	6	EA	LOGS
6133000000-N	SP	2	EA	ROOTWADS

SUMMARY OF EARTHWORK FOR MITIGATION

LOCATION	MITIGATION UNCLASSIFIED EXCAV. (CU.YD.)	MITIGATION EMBANKMENT	MITIGATION BORROW (CU.YD.)	MITIGATION WASTE (CU.YD.)
SITE 2	7,304	785	0	6,519
SITE 4	1,369	235	0	1,134
SITE 5	1,810	31	0	1,779
SUBTOTAL	10,483	1,051	0	9,432

APPROXIMATE QUANTITIES ONLY, MITIGATION UNCLASSIFIED EXCAVATION, MITIGATION BORROW EXCAVATION, MITIGATION FINE GRADING AND MITIGATION CLEARING AND GRUBBING WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR "GRADING FOR MITIGATION".

DESC.	STATION	NORTHING	EASTING	ELEV.	RADIUS	DESC.	STATION	NORTHING	EASTING	ELEV.	RADIUS	DESC.	STATION	NORTHING	EASTING	ELEV.	RADIUS
HR16	204+56.3	856586.17	1794087.12	733.77		HR25	207+48.2	856337.99	1794206.44	728.58		HR34	210+17.7	856094.49	1794249.29	721.32	
RCV8	204+78.9	856570.54	1794103.38	733.34		TR12	207+60.4	856325.83	1794207.22	728.40		RCV15	210+35.8	856076.88	1794253.80	721.45	
R16		856559.01	1794092.29		16	R25		856327.28	1794229.97		22.8	R34		856072.04	1794234.91		19.5
HR17	204+90.7	856560.00	1794108.25	733.14		HR26	207+78.8	856309.86	1794215.27	728.43		HR35	210+51.9	856061.51	1794251.32	721.15	
TR8	205+11.2	856539.54	1794109.53	732.88		RAV2	207+95.9	856298.80	1794228.37	728.09		TR14	210+66.7	856049.04	1794243.32	721.03	
R17		856540.54	1794125.50		16	R26		856283.90	1794218.78		19.5	R35		856038.51	1794259.74		19.5
HR18	205+17.6	856533.46	1794111.15	732.88		HR27	208+11.7	856285.15	1794235.24	727.29		HR36	210+82.7	856033.67	1794240.85	721.03	
RAV1	205+43.0	856510.62	1794122.41	732.43		RCV12	208+19.0	856277.82	1794235.71	727.20		RCV16	211+01.0	856015.89	1794245.40	720.56	
R18		856503.11	1794107.17		17	R27		856278.84	1794255.19		19.5	R36		856011.05	1794226.51		19.5
HR19	205+53.2	856500.79	1794124.01	731.42		HR28	208+29.5	856268.01	1794238.97	726.70		HR37	211+17.1	856000.52	1794242.92	720.27	
RCV9	205+82.7	856470.99	179411.92	730.91		RAV3	208+42.3	856257.30	1794246.12	726.46		TR15	211+31.5	855988.39	1794235.14	720.15	
R19		856468.34	1794139.23		19.5	R28		856246.86	1794229.65		19.5	R37		855977.86	1794251.56		19.5
HR20	206+05.4	856451.94	1794128.69	730.53		HR29	208+59.6	856240.72	1794248.16	725.46		HR38	211+47.5	855973.03	1794232.67	720.15	
TR9	206+16.1	856445.73	1794137.44	730.44		RAV4	208+74.3	856226.79	1794243.53	725.31		RCV17	211+65.8	855955.27	1794237.21	719.68	
R20		856428.60	1794125.30		21	R29		856220.65	1794262.04		19.5	R38		855950.43	1794218.32		19.5
HR21	206+26.5	856437.87	1794144.14	730.44		HR30	208+92.0	856209.82	1794245.83	724.31		HR39	211+81.8	855939.91	1794234.74	719.49	
TR10	206+44.2	856422.05	1794151.92	730.05		RAV5	209+04.2	856199.71	1794252.57	724.25		TR16	211+96.5	855927.59	1794226.83	719.26	
R21		856430.66	1794169.42		19.5	R30		856188.88	1794236.36		19.5	R39		855917.06	1794243.25		19.5
HR22	206+56.5	856413.49	1794160.53	730.05		HR31	209+21.9	856182.74	1794254.87	723.25		HR40	212+12.5	855912.22	1794224.36	719.26	
TR11	206+72.7	856403.94	1794173.54	729.67		RCV13	209+35.6	856169.75	1794250.55	723.14		RCV18	212+30.7	855894.57	1794228.88	718.80	
R22		856388.22	1794162.00		19.5	R31		856163.57	1794269.06		19.5	R40		855889.73	1794209.99		19.5
HR23	206+86.7	856392.45	1794181.04	729.67		HR32	209+53.3	856152.74	1794252.83	722.64		HR41	212+44.4	855881.20	1794227.52	718.60	
RCV10	207+07.3	856372.31	1794185.51	729.24		RCV14	209+64.9	856143.13	1794259.23	722.42		RCV19	212+52.8	855873.67	1794223.86	718.50	
R23		856376.54	1794204.54		19.5	R32		856132.33	1794243.02		19.5	R41		855865.14	1794241.40		19.5
HR24	207+16.6	856364.03	1794189.58	729.04		HR33	209+87.5	856121.80	1794259.43	722.12		HR42	212+75.7	855852.24	1794226.78	718.10	
RCV11	207+35.9	856349.27	1794201.94	728.88		TR13	210+01.7	856109.86	1794251.77	721.92		TIE IN	213+07.2	855828.61	1794247.62	718.00	
R24		856336.69	1794187.05		19.5	R33		856099.33	1794268.18		19.5						

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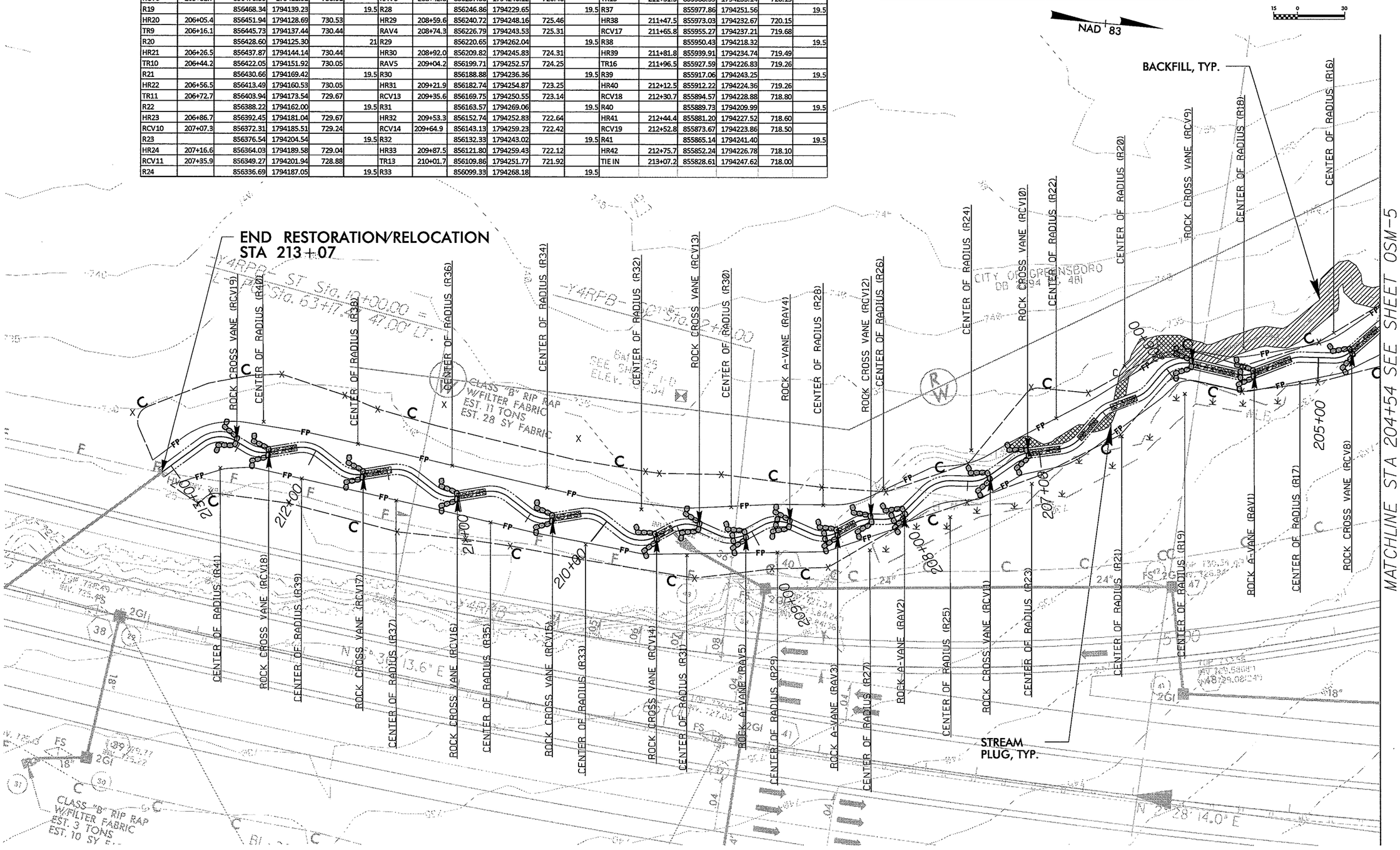
PROJECT REFERENCE NO.	SHEET NO.
U2525B	OSM-4

PROJECT ENGINEER

APPROVED BY:

DATE:

SITE 2



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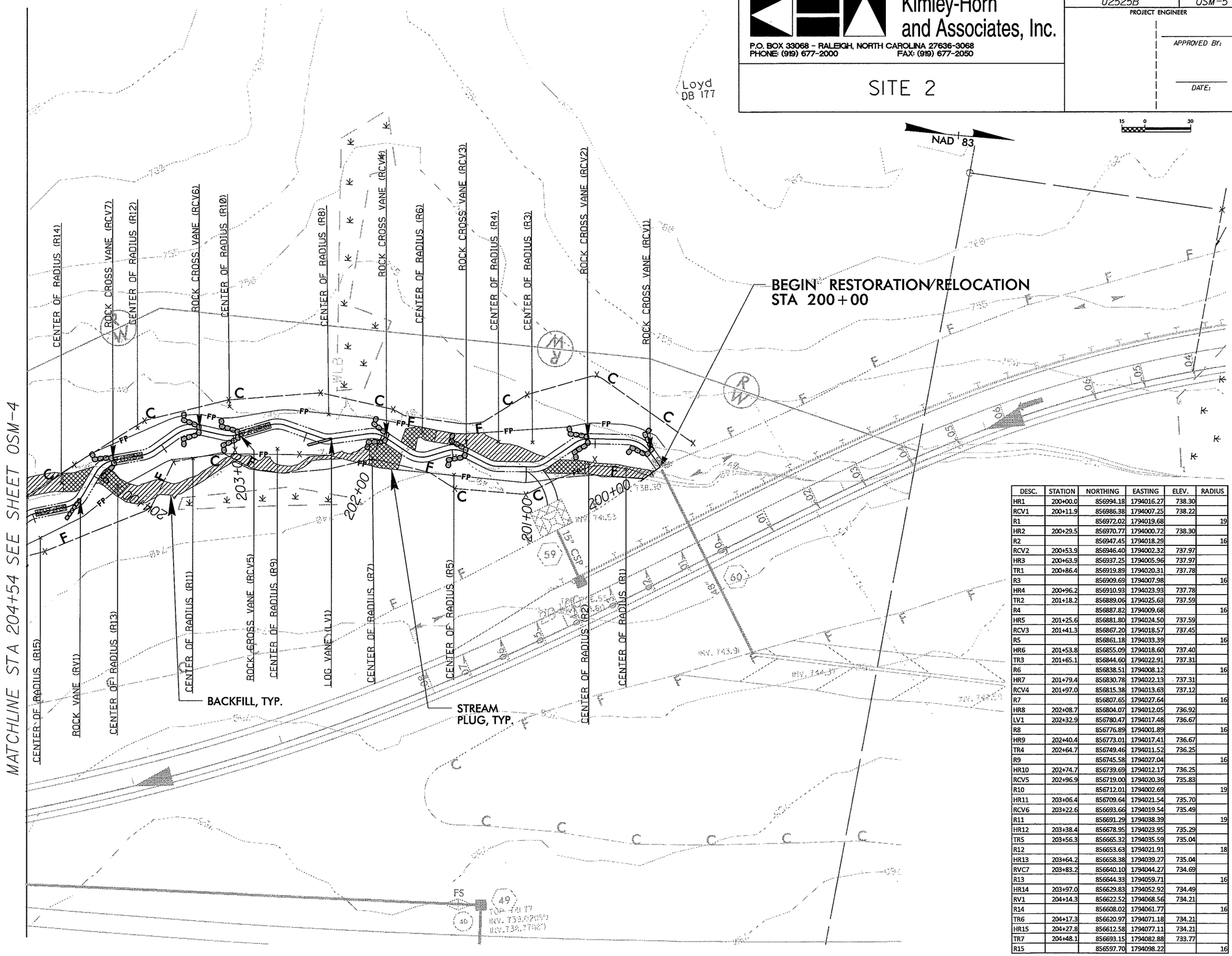
PROJECT REFERENCE NO.	SHEET NO.
U2525B	OSM-5

PROJECT ENGINEER

APPROVED BY:

DATE:

SITE 2



DESC.	STATION	NORTHING	EASTING	ELEV.	RADIUS
HR1	200+00.0	856994.18	1794016.27	738.30	
RCV1	200+11.9	856986.38	1794007.25	738.22	
R1		856972.02	1794019.68		19
HR2	200+29.5	856970.77	1794000.72	738.30	
R2		856947.45	1794018.29		16
RCV2	200+53.9	856946.40	1794002.32	737.97	
HR3	200+63.9	856937.25	1794005.96	737.97	
TR1	200+86.4	856919.89	1794020.31	737.78	
R3		856909.69	1794007.98		16
HR4	200+96.2	856910.93	1794023.93	737.78	
TR2	201+18.2	856889.06	1794025.63	737.59	
R4		856887.82	1794009.68		16
HR5	201+25.6	856881.80	1794024.50	737.59	
RCV3	201+41.3	856867.20	1794018.57	737.45	
R5		856861.18	1794033.39		16
HR6	201+53.8	856855.09	1794018.60	737.40	
TR3	201+65.1	856844.60	1794022.91	737.31	
R6		856838.51	1794008.12		16
HR7	201+79.4	856830.78	1794022.13	737.31	
RCV4	201+97.0	856815.38	1794013.63	737.12	
R7		856807.65	1794027.64		16
HR8	202+08.7	856804.07	1794012.05	736.92	
LV1	202+32.9	856780.47	1794017.48	736.67	
R8		856776.89	1794001.89		16
HR9	202+40.4	856773.01	1794017.41	736.67	
TR4	202+64.7	856749.46	1794011.52	736.25	
R9		856745.58	1794027.04		16
HR10	202+74.7	856739.69	1794012.17	736.25	
RCV5	202+96.9	856719.00	1794020.36	735.83	
R10		856712.01	1794002.69		19
HR11	203+06.4	856709.64	1794021.54	735.70	
RCV6	203+22.6	856693.66	1794019.54	735.49	
R11		856691.29	1794038.39		19
HR12	203+38.4	856678.95	1794023.95	735.29	
TR5	203+56.3	856665.32	1794035.59	735.04	
R12		856653.63	1794021.91		18
HR13	203+64.2	856658.38	1794039.27	735.04	
RVC7	203+83.2	856640.10	1794044.27	734.69	
R13		856644.33	1794059.71		16
HR14	203+97.0	856629.83	1794052.92	734.49	
RV1	204+14.3	856622.52	1794068.56	734.21	
R14		856608.02	1794061.77		16
TR6	204+17.3	856620.97	1794071.18	734.21	
HR15	204+27.8	856612.58	1794077.11	734.21	
TR7	204+48.1	856693.15	1794082.88	733.77	
R15		856597.70	1794098.22		16

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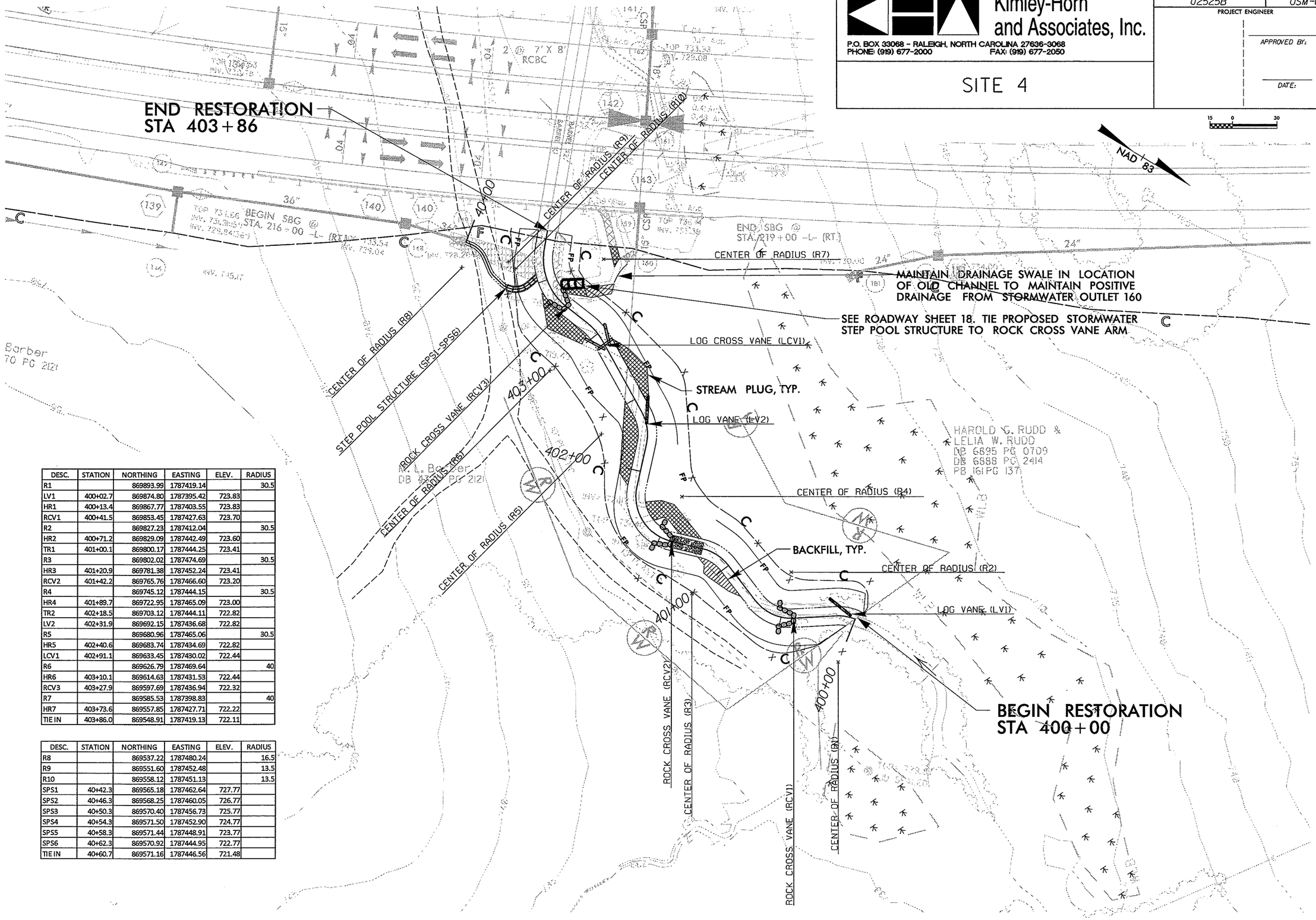
PROJECT REFERENCE NO.	SHEET NO.
U2525B	OSM-6

PROJECT ENGINEER

APPROVED BY:

DATE:

SITE 4



DESC.	STATION	NORTHING	EASTING	ELEV.	RADIUS
R1		869893.99	1787419.14		30.5
LV1	400+02.7	869874.80	1787395.42	723.83	
HR1	400+13.4	869867.77	1787403.55	723.83	
RCV1	400+41.5	869853.45	1787427.63	723.70	
R2		869827.23	1787412.04		30.5
HR2	400+71.2	869829.09	1787442.49	723.60	
TR1	401+00.1	869800.17	1787444.25	723.41	
R3		869802.02	1787474.69		30.5
HR3	401+20.9	869781.38	1787452.24	723.41	
RCV2	401+42.2	869765.76	1787466.60	723.20	
R4		869745.12	1787444.15		30.5
HR4	401+89.7	869722.95	1787465.09	723.00	
TR2	402+18.5	869703.12	1787444.11	722.82	
LV2	402+31.9	869692.15	1787436.68	722.82	
R5		869680.96	1787465.06		30.5
HR5	402+40.6	869683.74	1787434.69	722.82	
LCV1	402+91.1	869633.45	1787430.02	722.44	
R6		869626.79	1787469.64		40
HR6	403+10.1	869614.63	1787431.53	722.44	
RCV3	403+27.9	869597.69	1787436.94	722.32	
R7		869585.53	1787398.83		40
HR7	403+73.6	869557.85	1787427.71	722.22	
TIE IN	403+86.0	869548.91	1787419.13	722.11	

DESC.	STATION	NORTHING	EASTING	ELEV.	RADIUS
R8		869537.22	1787480.24		16.5
R9		869551.60	1787452.48		13.5
R10		869558.12	1787451.13		13.5
SPS1	40+42.3	869565.18	1787462.64	727.77	
SPS2	40+46.3	869568.25	1787460.05	726.77	
SPS3	40+50.3	869570.40	1787456.73	725.77	
SPS4	40+54.3	869571.50	1787452.90	724.77	
SPS5	40+58.3	869571.44	1787448.91	723.77	
SPS6	40+62.3	869570.92	1787444.95	722.77	
TIE IN	40+60.7	869571.16	1787446.56	721.48	

DESC.	STATION	NORTHING	EASTING	ELEV.	RADIUS
HR1	500+00.0	870989.41	1785058.05	734.69	
RAV1	500+27.9	870961.72	1785058.07	734.66	
R1	500+27.7	870961.75	1785095.87		37.8
HR2	500+58.7	870934.09	1785070.11	734.44	
RCV1	500+88.6	870913.68	1785092.02	734.04	
R2	501+18.8	870941.34	1785117.79		37.8
HR3	501+18.8	870903.58	1785119.62	733.79	
RCV2	501+42.1	870904.71	1785142.86	733.49	
R3	501+42.1	870866.95	1785144.69		37.8
HR4	501+79.5	870889.21	1785175.24	732.99	
RCV3	502+05.5	870868.20	1785190.56	732.85	
R4	502+32.7	870890.46	1785221.11		37.8
HR5	502+32.7	870853.59	1785212.76	732.35	
RAV2	502+64.7	870846.52	1785244.01	732.24	
R5	502+64.7	870809.65	1785235.66		37.8
HR6	503+01.9	870823.09	1785270.99	731.74	
R6	503+21.6	870791.21	1785242.68		37.8
TIE IN	503+62.0	870764.74	1785278.27	731.25	

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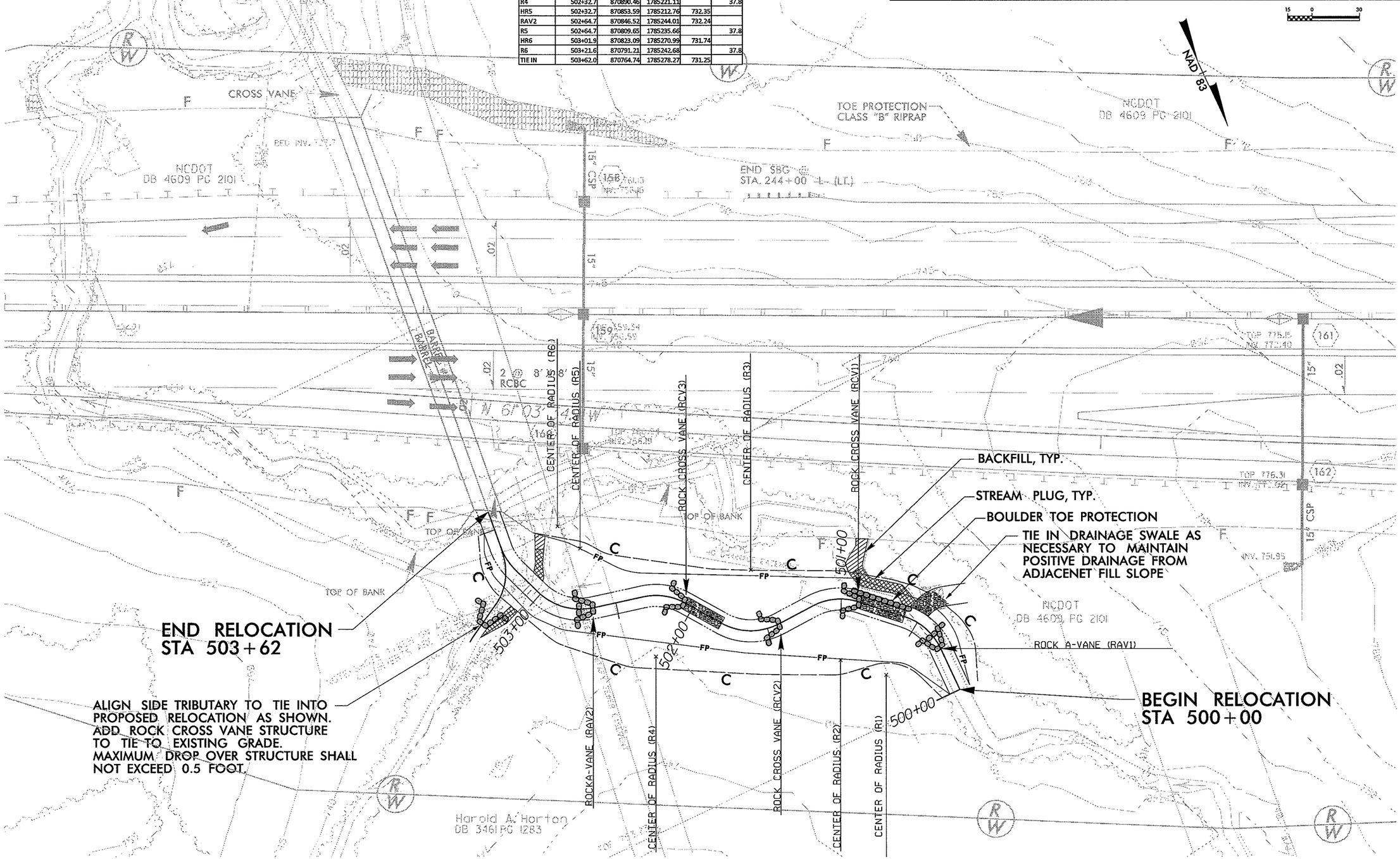
PROJECT REFERENCE NO.	SHEET NO.
U2525B	OSM-7

PROJECT ENGINEER

APPROVED BY:

DATE:

SITE 5



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NC LICENSE F-0102

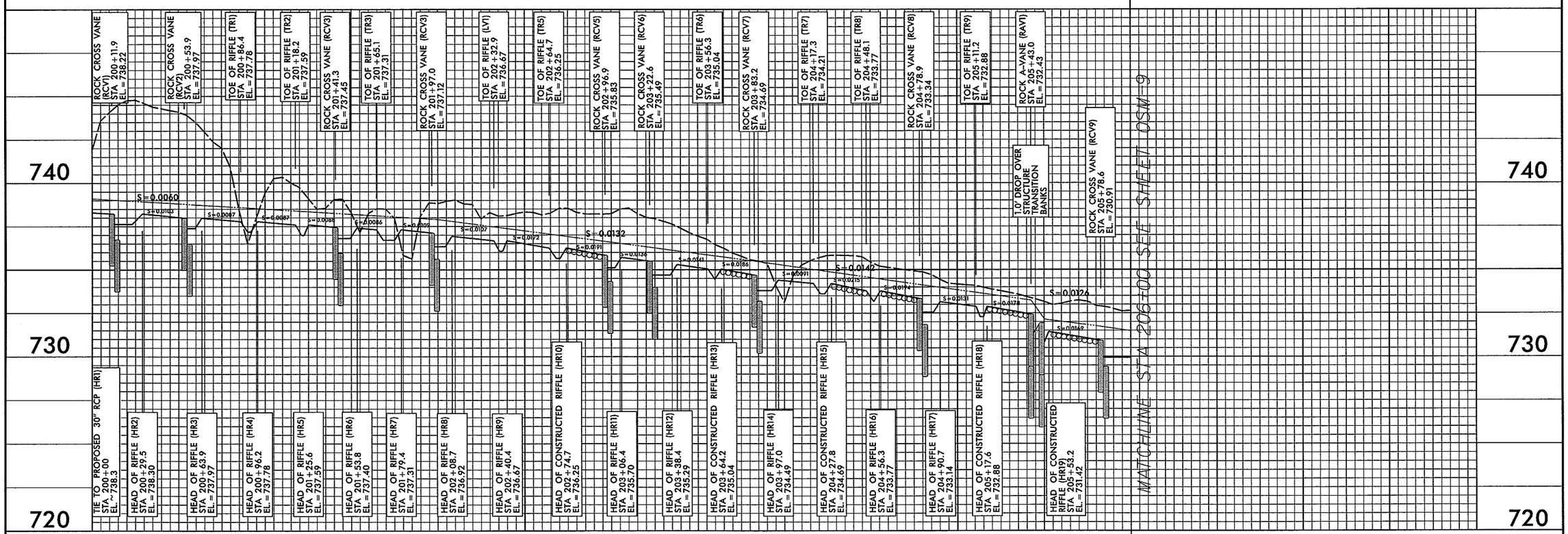
PROJECT REFERENCE NO.	SHEET NO.
U2525B	OSM-8

PROJECT ENGINEER

APPROVED BY:

DATE:

SITE 2 PROFILE



LEGEND

- EXISTING GROUND ELEVATION
- PROPOSED GROUND ELEVATION
- PROPOSED BANKFULL
- PROPOSED LOG SILL
- PROPOSED LOG CROSS VANE
- CONSTRUCTED RIFFLE
- PROPOSED ROCK CROSS VANE
- PROPOSED ROCK A-VANE

15 0 30 HORIZONTAL

1.5 0 3 VERTICAL

PREPARED IN THE OFFICE OF:
Kimley-Horn and Associates, Inc.
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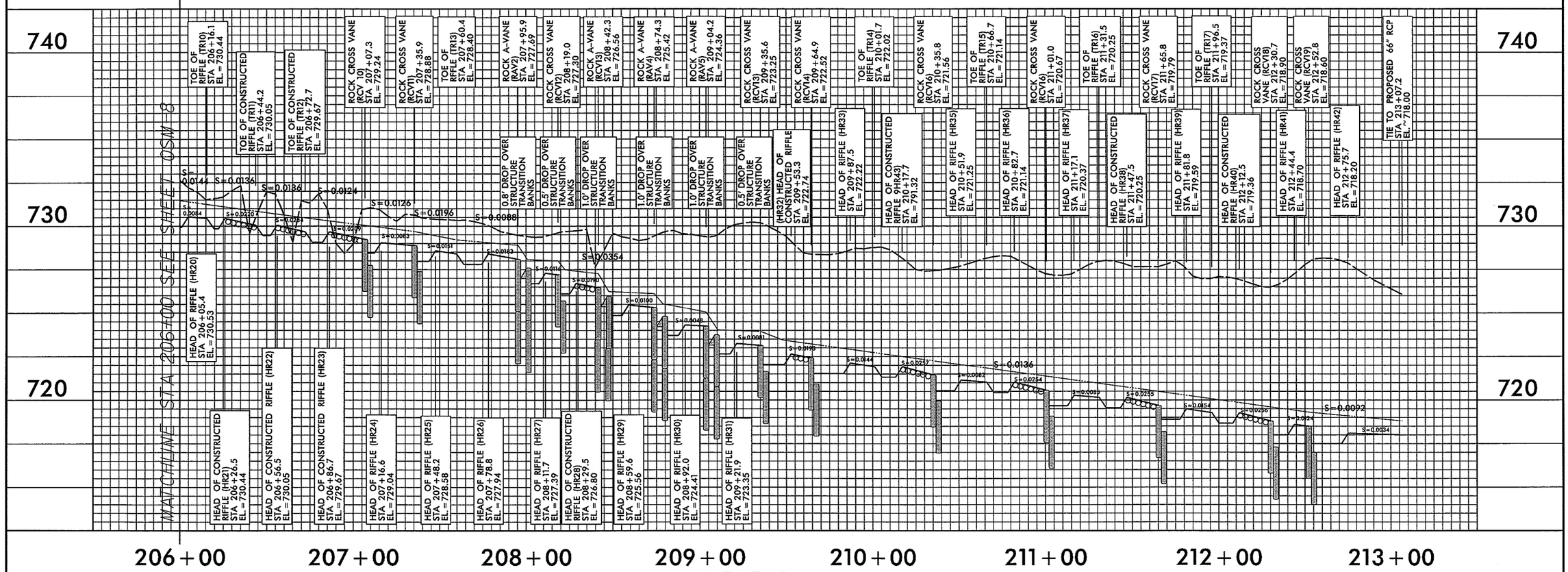
PROJECT REFERENCE NO.	SHEET NO.
U2525B	OSM-9

PROJECT ENGINEER

APPROVED BY:

DATE:

SITE 2 PROFILE



LEGEND

EXISTING GROUND ELEVATION

PROPOSED GROUND ELEVATION

PROPOSED BANKFULL

PROPOSED LOG SILL

PROPOSED LOG CROSS VANE

CONSTRUCTED RIFFLE

PROPOSED ROCK CROSS VANE

PROPOSED ROCK A-VANE

15 0 30 HORIZONTAL

1.5 0 3 VERTICAL

PREPARED IN THE OFFICE OF:
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NC LICENSE F-0102

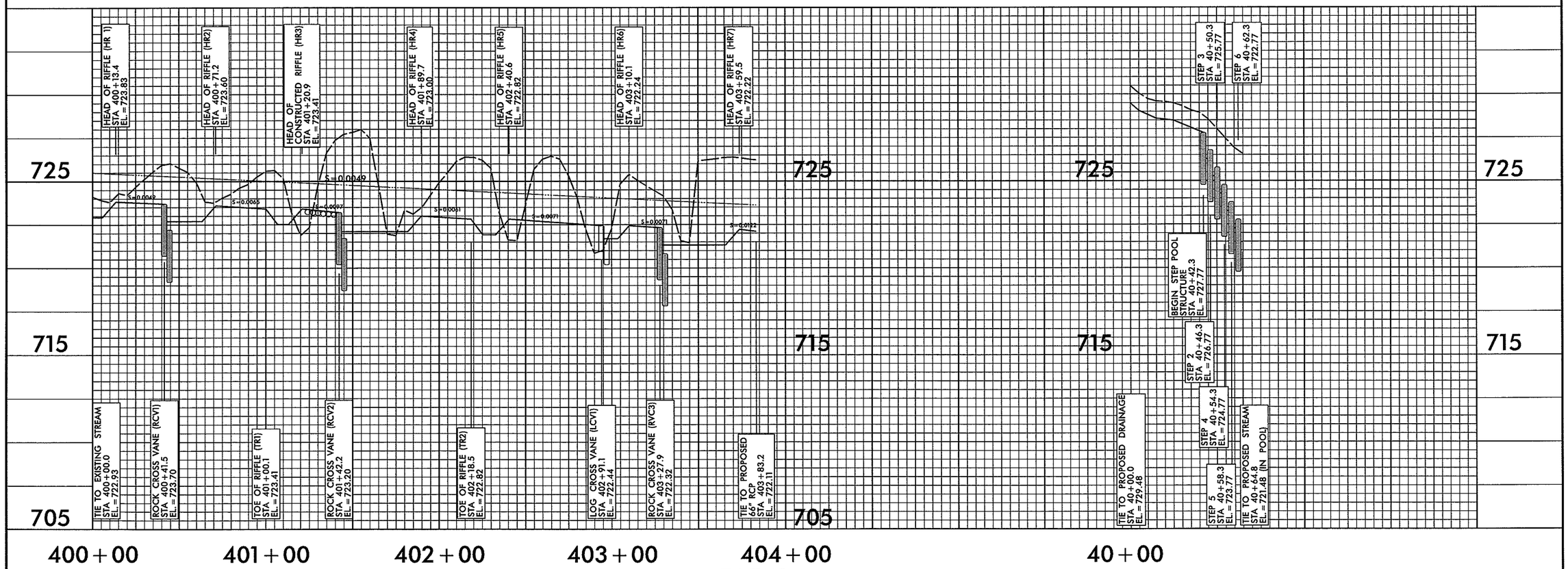
PROJECT REFERENCE NO.	SHEET NO.
U2525B	OSM-10

PROJECT ENGINEER

APPROVED BY:

DATE:

SITE 4 PROFILE



SITE 4 TRIBUTARY

LEGEND

- EXISTING GROUND ELEVATION
- PROPOSED GROUND ELEVATION
- PROPOSED BANKFULL
- PROPOSED LOG SILL
- PROPOSED LOG CROSS VANE
- CONSTRUCTED RIFFLE
- PROPOSED ROCK CROSS VANE
- PROPOSED ROCK A-VANE
- PROPOSED STEP POOL STRUCTURE

15 0 30 HORIZONTAL

1.5 0 3 VERTICAL

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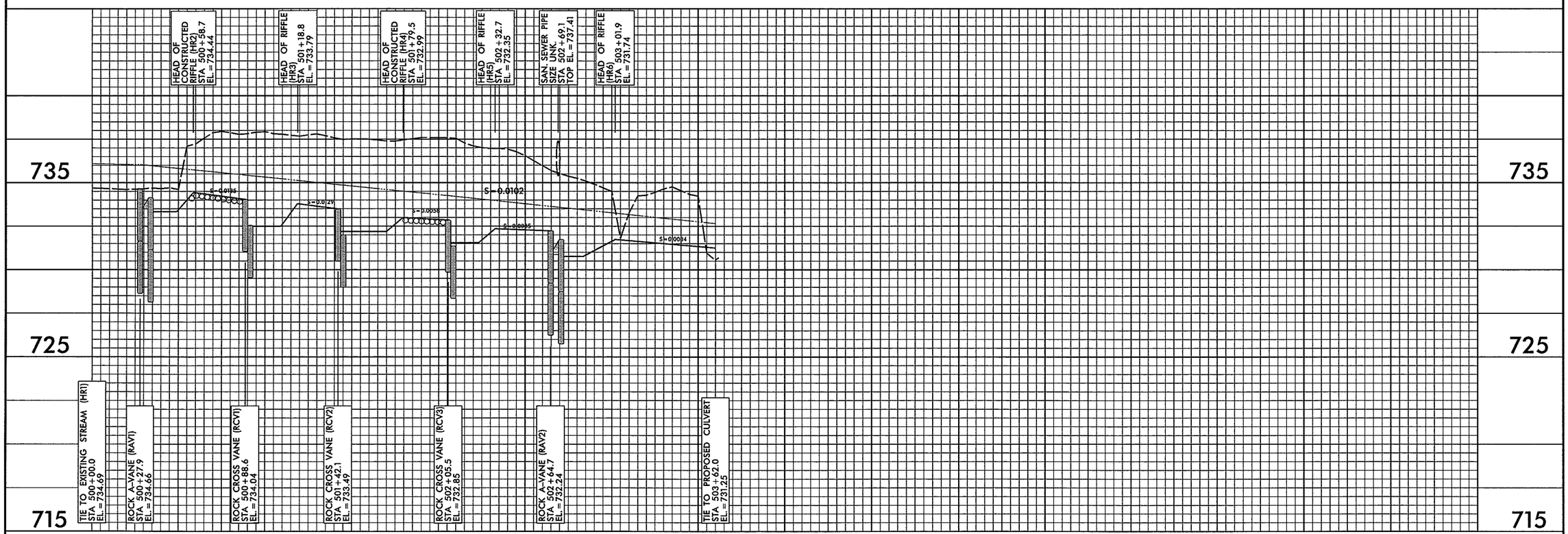
PROJECT REFERENCE NO.	SHEET NO.
U2525B	OSM-11

PROJECT ENGINEER

APPROVED BY:

DATE:

SITE 5 PROFILE



LEGEND

EXISTING GROUND ELEVATION

PROPOSED GROUND ELEVATION

PROPOSED BANKFULL

PROPOSED LOG SILL

PROPOSED LOG CROSS VANE

CONSTRUCTED RIFFLE

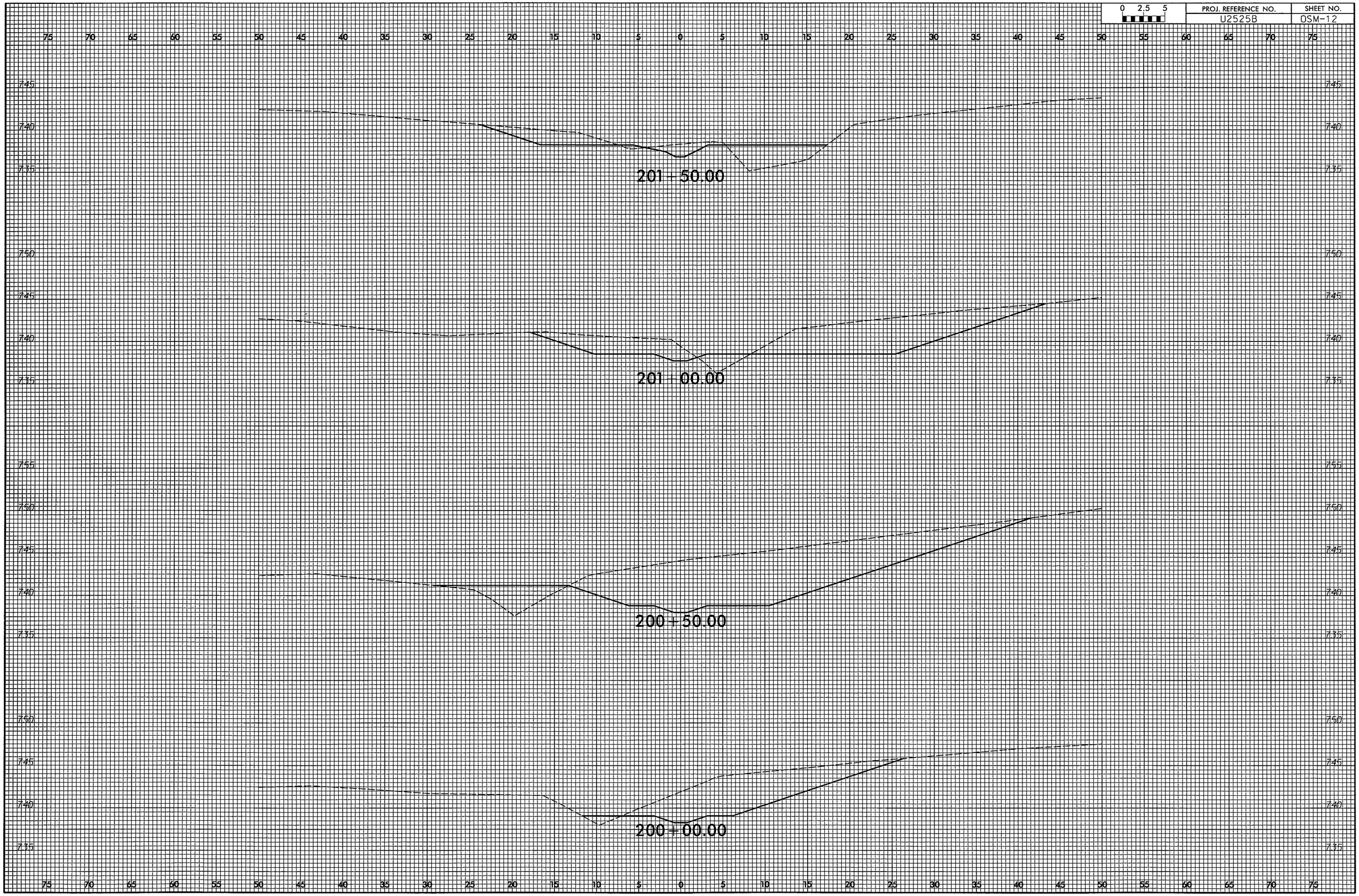
PROPOSED ROCK CROSS VANE

PROPOSED ROCK A-VANE

15 0 30 HORIZONTAL

1.5 0 3 VERTICAL

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U2525B	OSM-12



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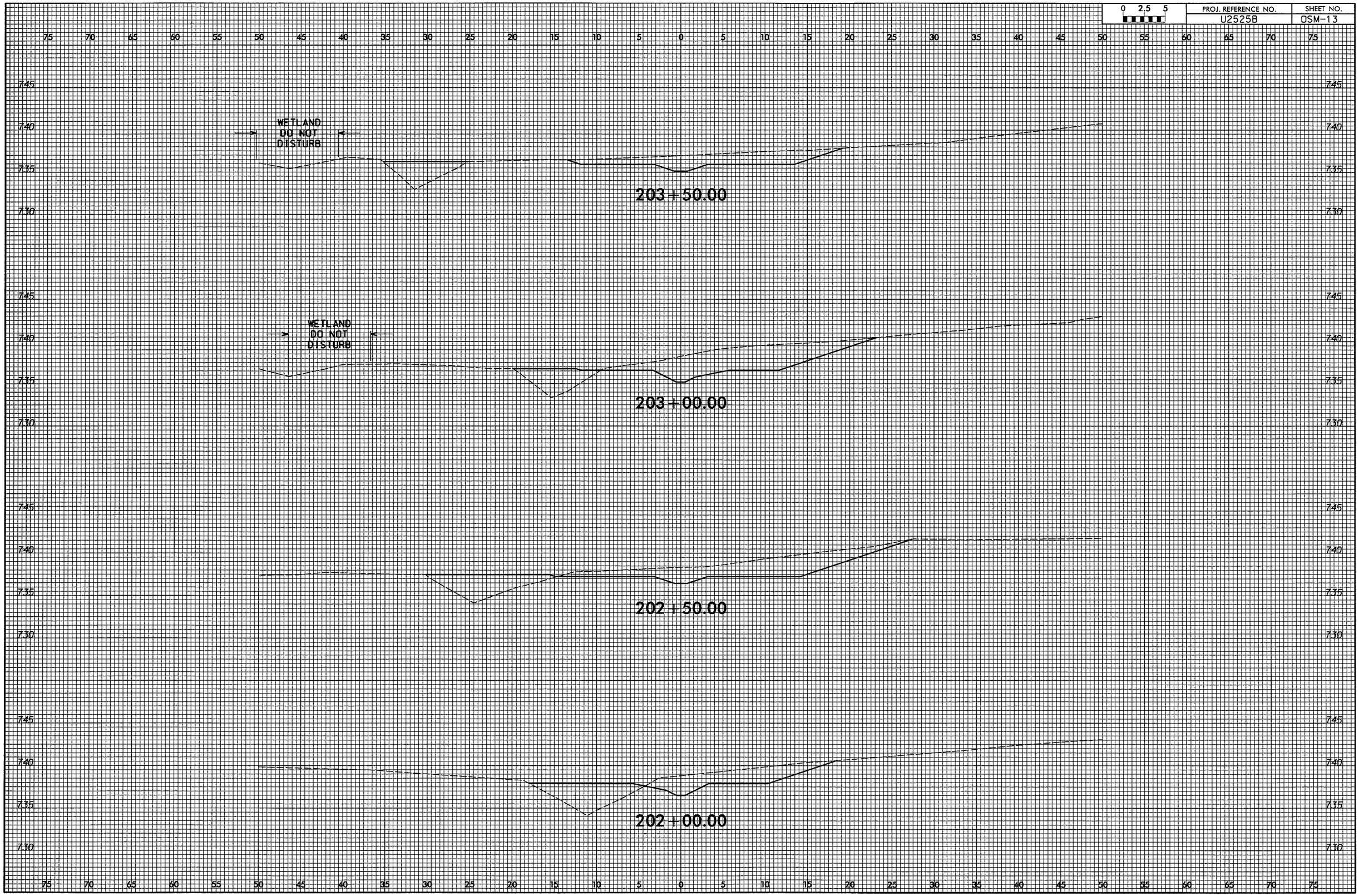

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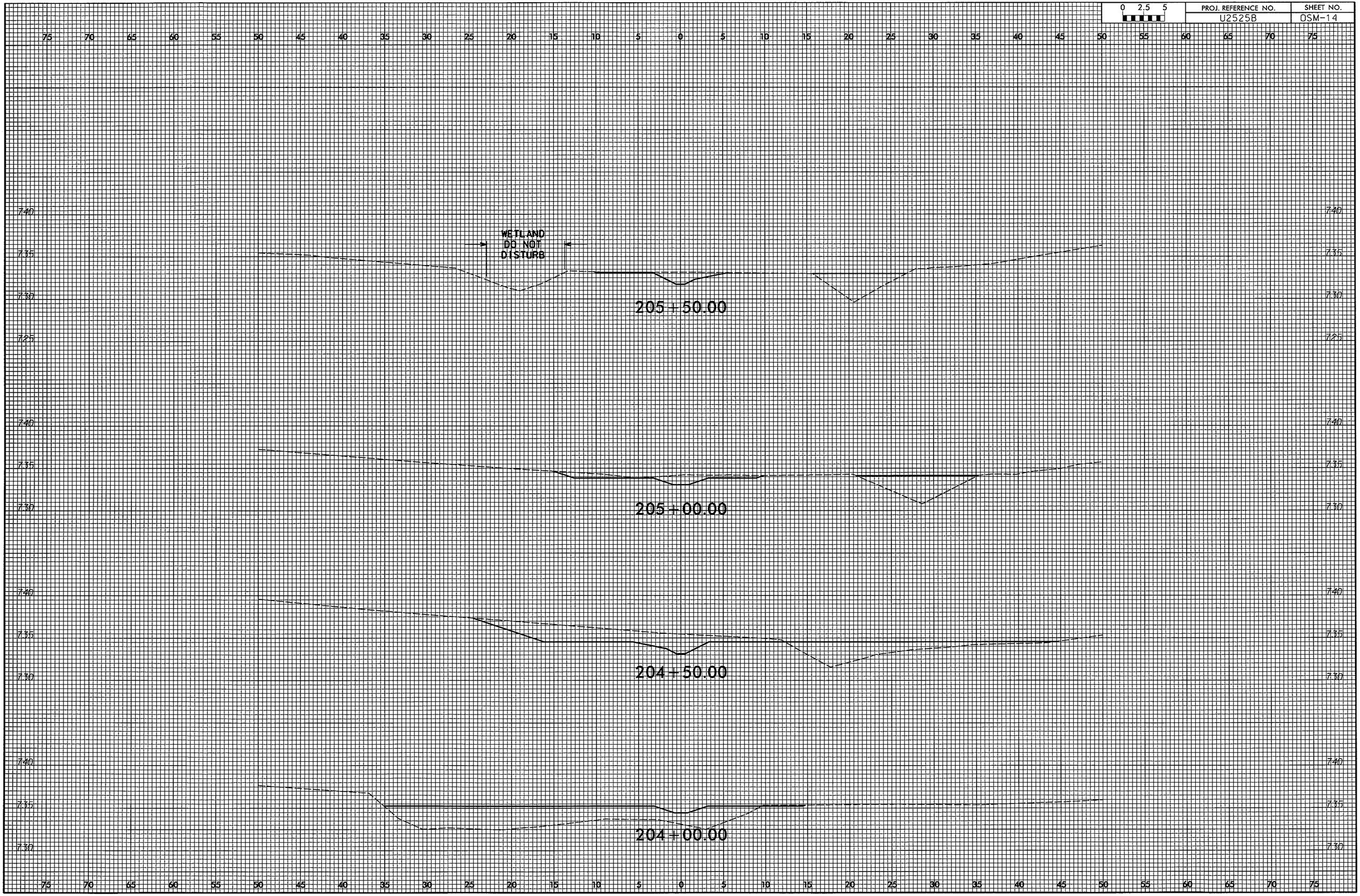

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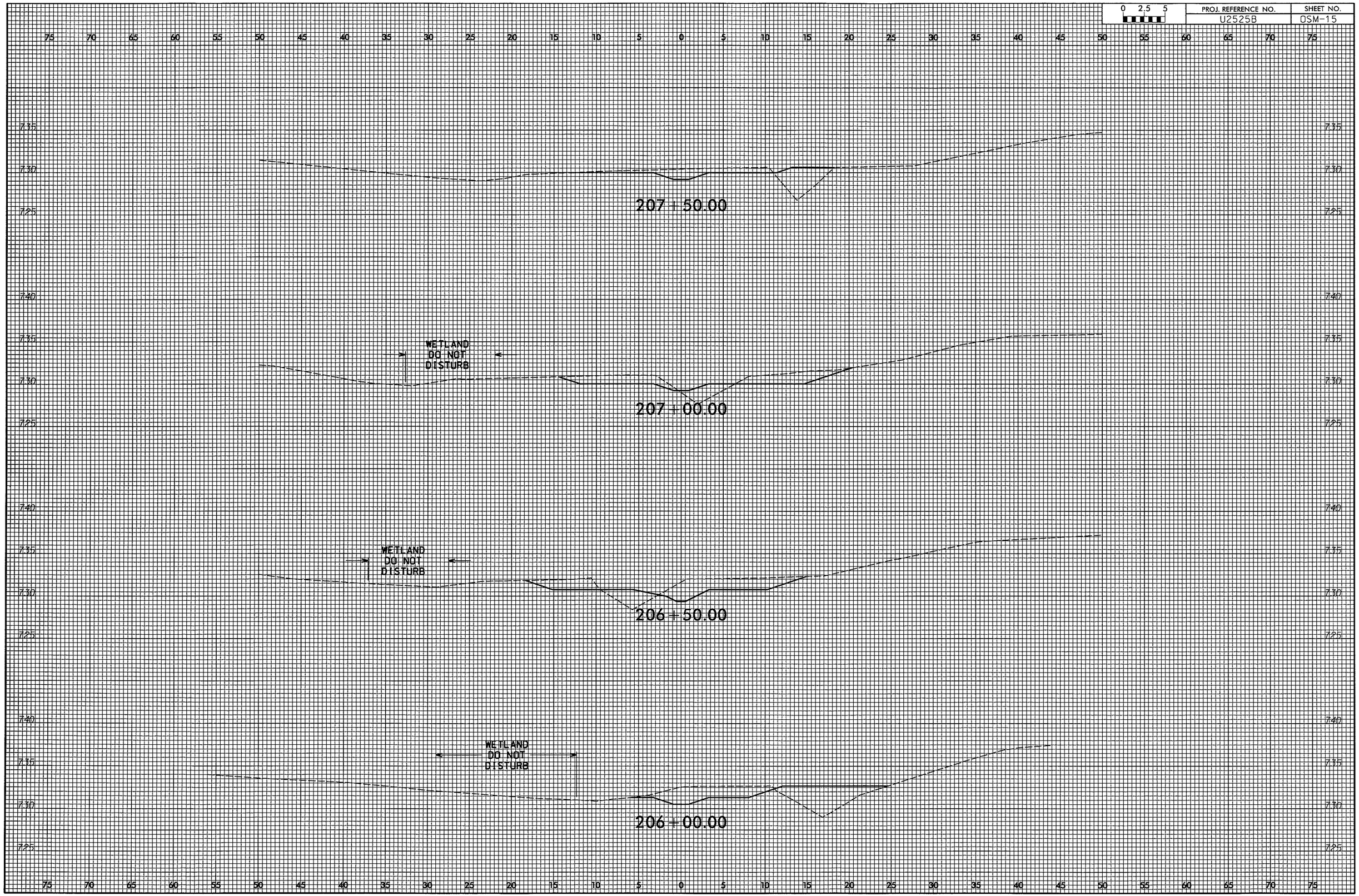

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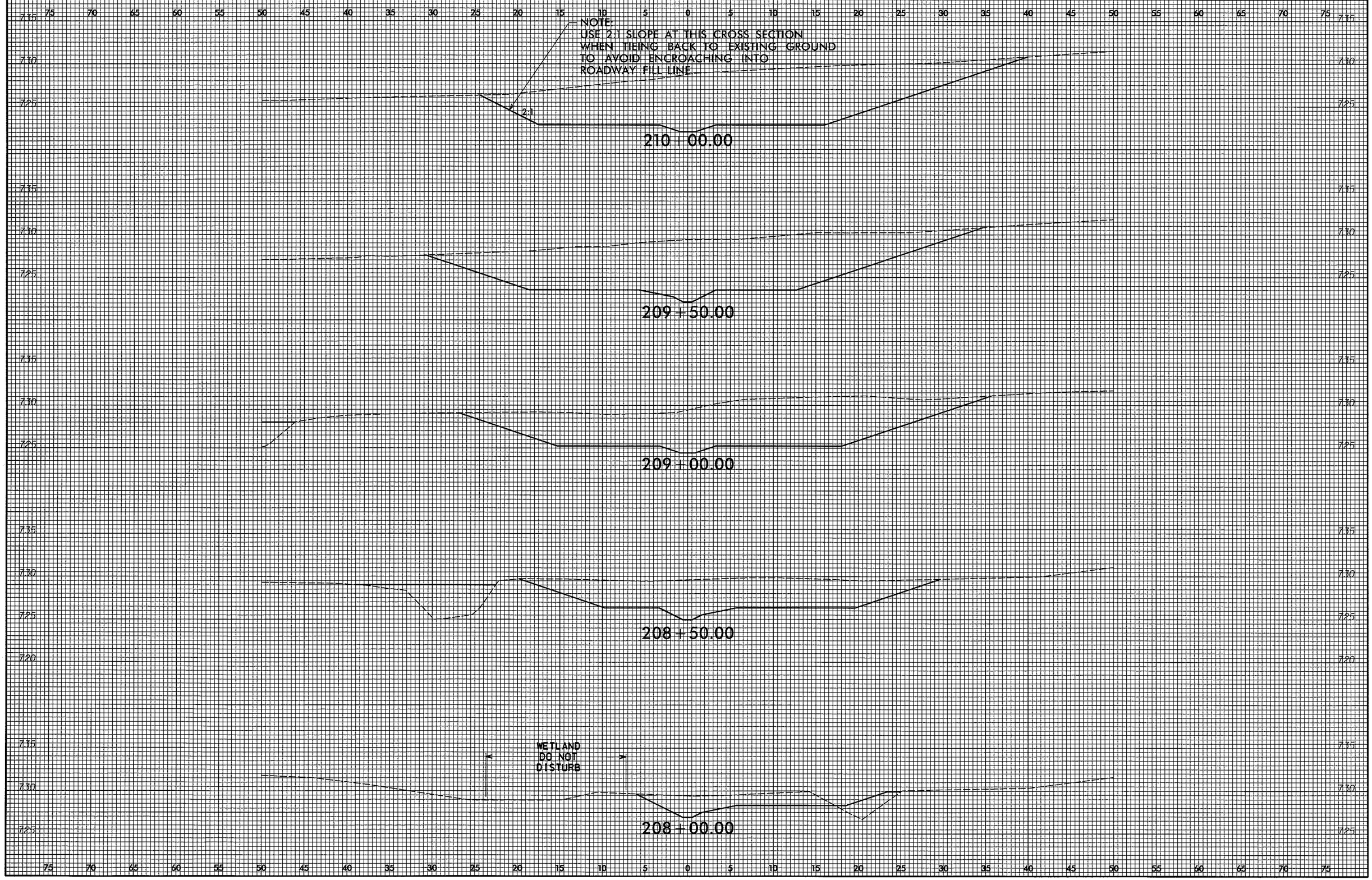
	U2525B	DSM-16



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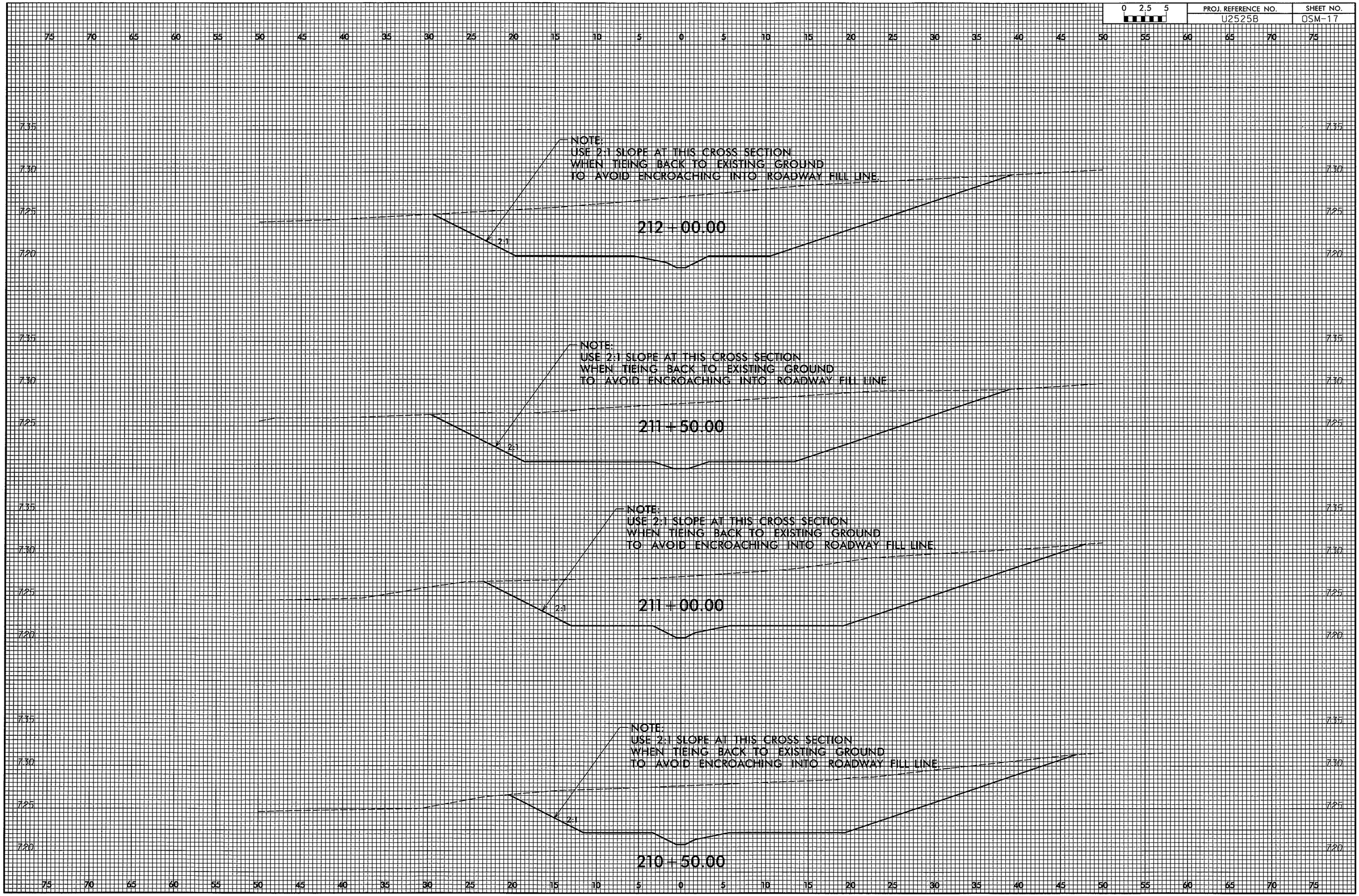
	U2525B	OSM-17



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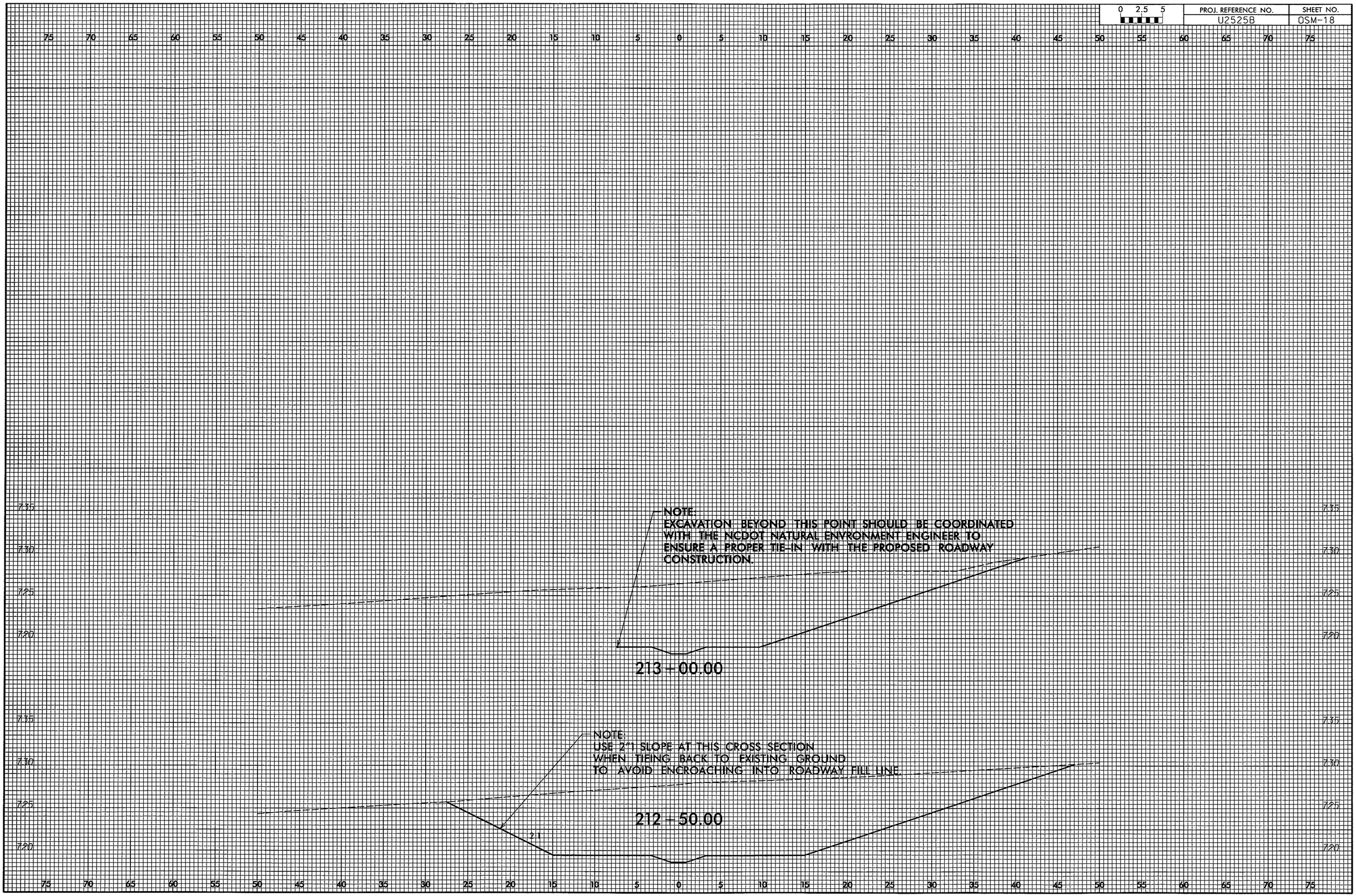

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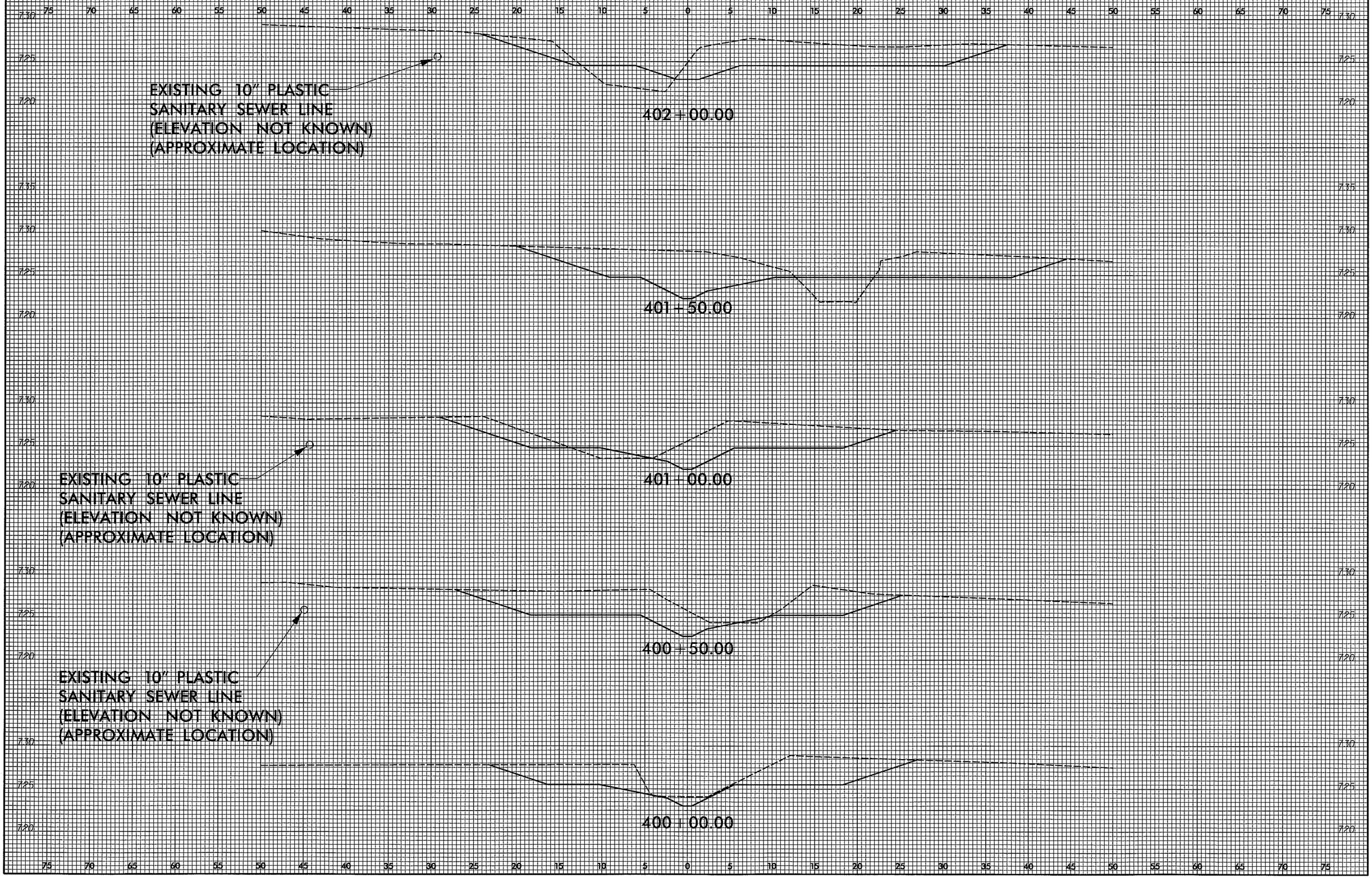

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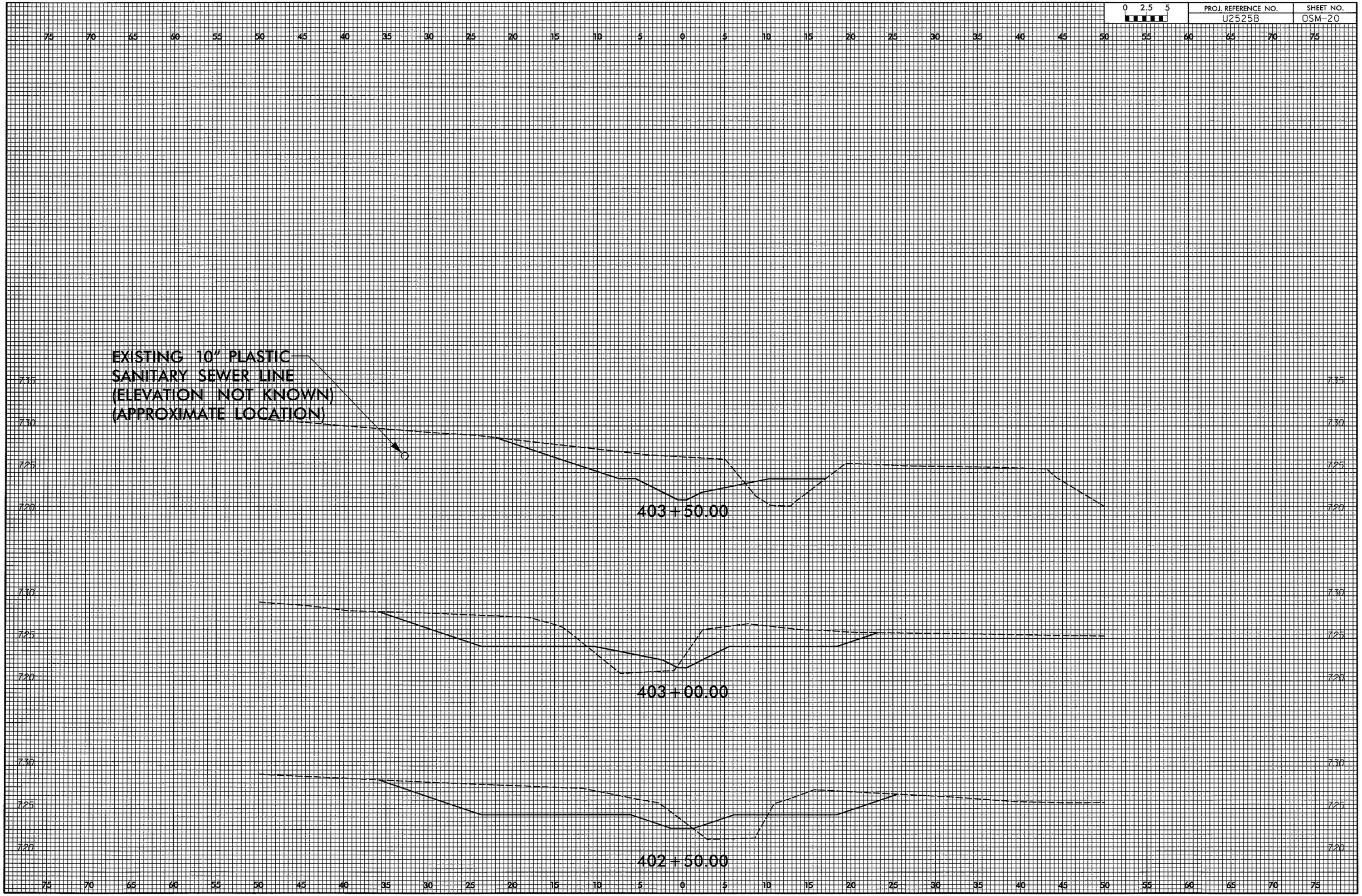
U2525B	OSM-20



8/23/99

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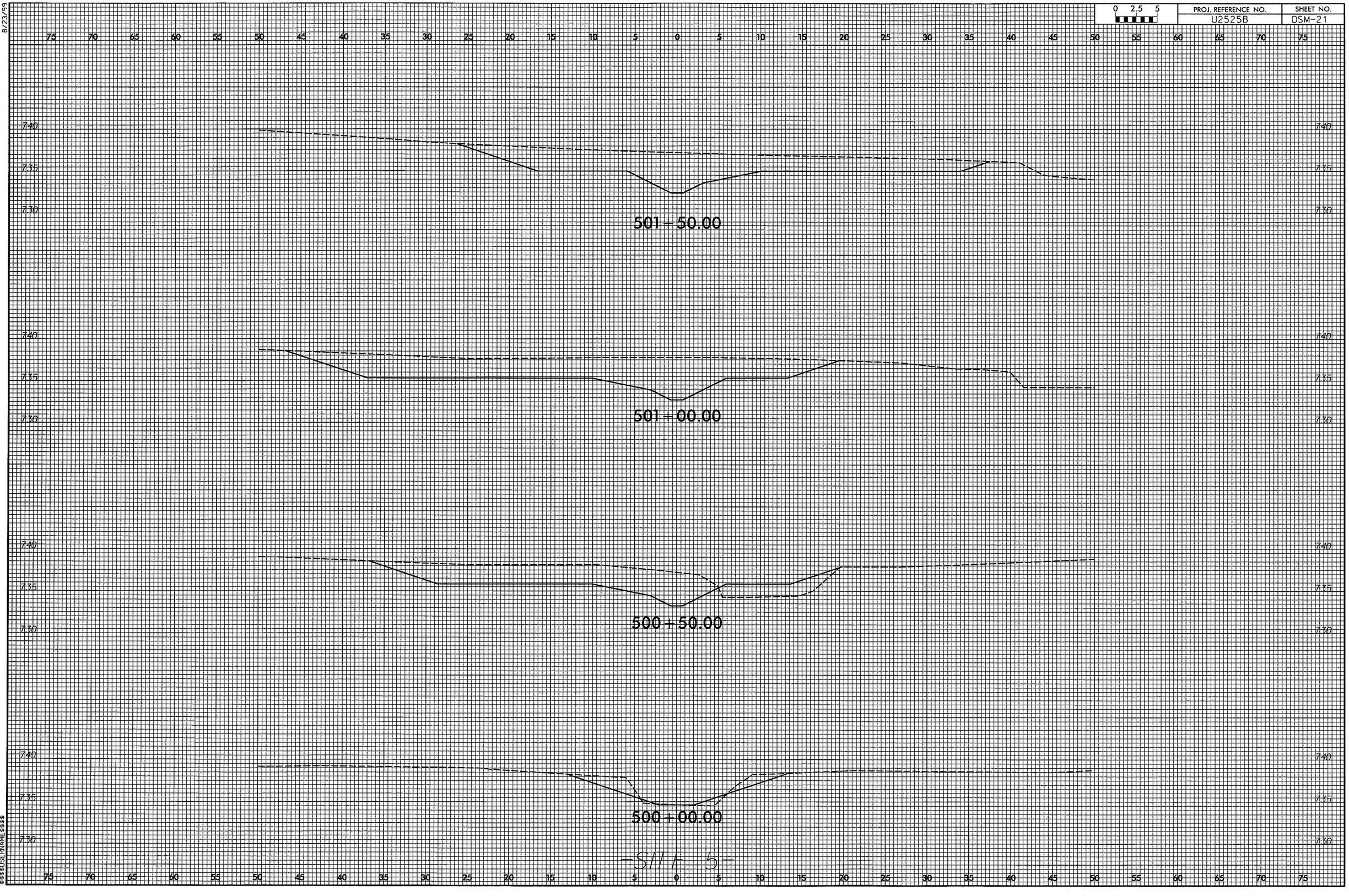

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$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$
$$$$$$USERNAME$$$$

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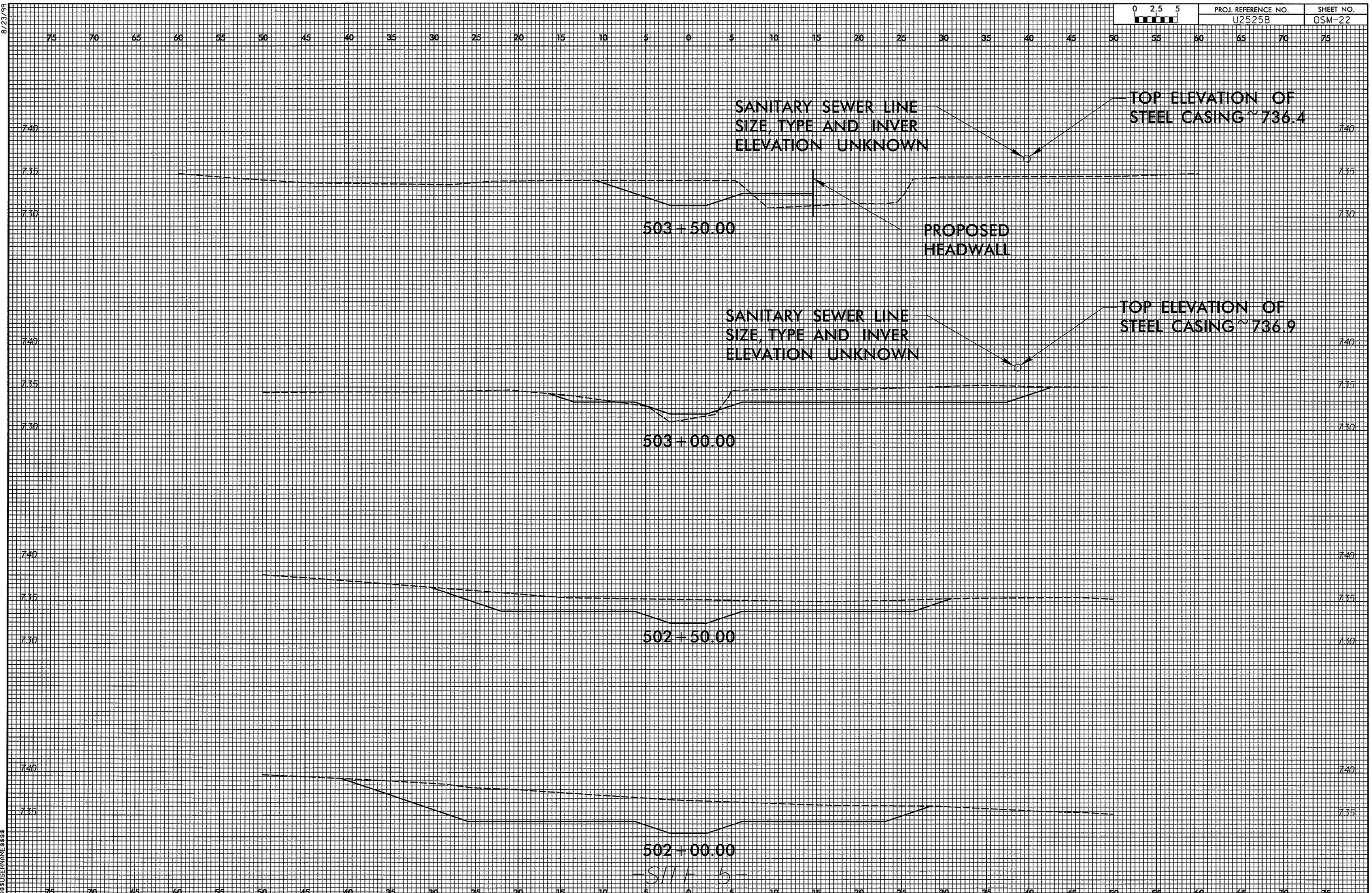

-SHT 5-

$$$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$
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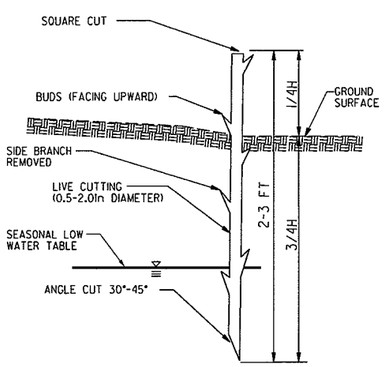
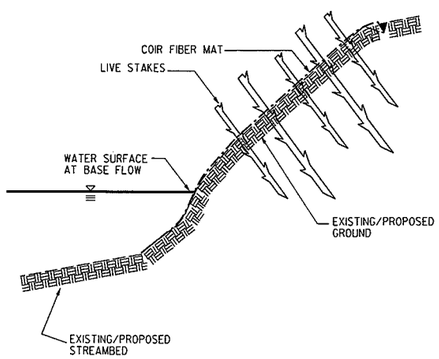
PLANTING DETAILS

LIVE STAKES PLANTING DETAIL

LIVE STAKE

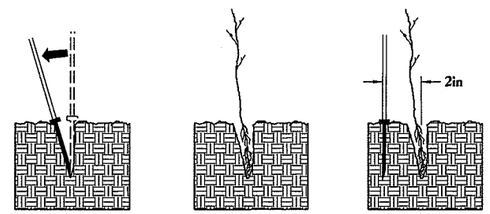




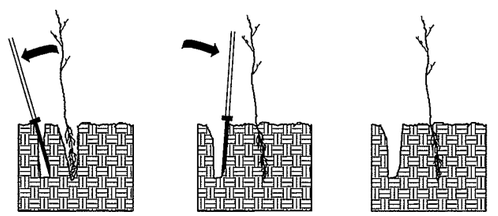
BANK STABILIZATION WITH LIVE STAKES

NOTE:
LIVE STAKES SHALL BE DRIVEN UNTIL APPROXIMATELY 3/4 OF THE LIVE STAKE LENGTH IS WITHIN THE 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 2in 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 12in long, 4in wide and 1in thick at center.

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

PREPARED IN THE OFFICE OF:
Kimley-Horn and Associates, Inc.
P.O. BOX 33068 - RALEIGH, NORTH CAROLINA 27636-3068
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NC LICENSE F-0102

PROJECT REFERENCE NO.	SHEET NO.
U2525B	RF-1

PROJECT ENGINEER

APPROVED BY:

DATE:

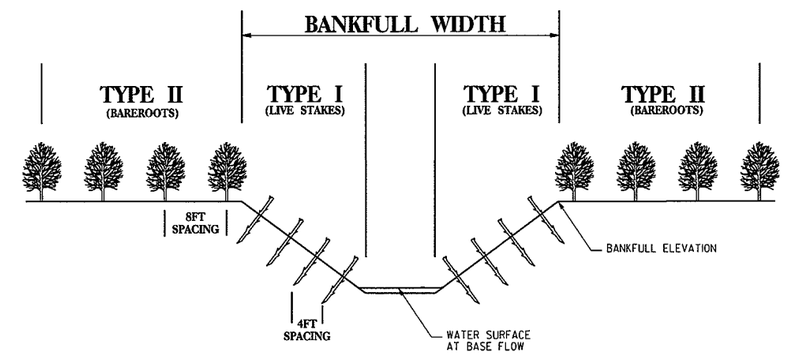
U-2525B
ON-SITE MITIGATION
GUILFORD COUNTY

☐ TYPE 1 STREAM REFORESTATION SHALL INCLUDE PLANTING LIVE STAKES ALONG THE STREAMBANK FOR BASE FLOW TO BANKFULL ELEVATION AND BE PLANTED 3FT TO 5FT ON CENTER, RANDOM SPACING, AVERAGING 4FT ON CENTER, APPROXIMATELY 2,723 PLANTS PER ACRE.

☐ TYPE 2 STREAM REFORESTATION SHALL INCLUDE PLANTING BAREROOTS IN THE RIPARIAN ZONE ABOVE BANKFULL ELEVATION AND BE PLANTED 6FT TO 10FT ON CENTER, RANDOM SPACING, AVERAGING 8FT ON CENTER, APPROXIMATELY 680 PLANTS PER ACRE.

☐ NOTE: TYPE 1 AND TYPE 2 STREAMBANK REFORESTATION SHALL BE PAID FOR AS "STREAMBANK REFORESTATION"

STREAMBANK REFORESTATION TYPICAL



STREAMBANK REFORESTATION

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

TYPE 1			
50%	CEPHALANTHUS OCCIDENTALIS	BUTTONBUSH	2FT to 3FT LIVE STAKES
50%	CORNUS AMOMUM	SILKY DOGWOOD	2FT to 3FT LIVE STAKES
TYPE 2			
20%	LIRIODENDRON TULIPIFERA	TULIP POPLAR	12in - 18in BAREROOTS
20%	PLATANUS OCCIDENTALIS	SYCAMORE	12in - 18in BAREROOTS
20%	FRAXINUS PENNSYLVANICA	GREEN ASH	12in - 18in BAREROOTS
20%	QUERCUS PHELLOS	WILLOW OAK	12in - 18in BAREROOTS
20%	BETULA NIGRA	RIVER BIRCH	12in - 18in BAREROOTS

☐ SEE STREAM REFORESTATION PLAN SHEETS FOR AREAS TO BE PLANTED

STREAM REFORESTATION DETAIL SHEET 1 OF 2

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

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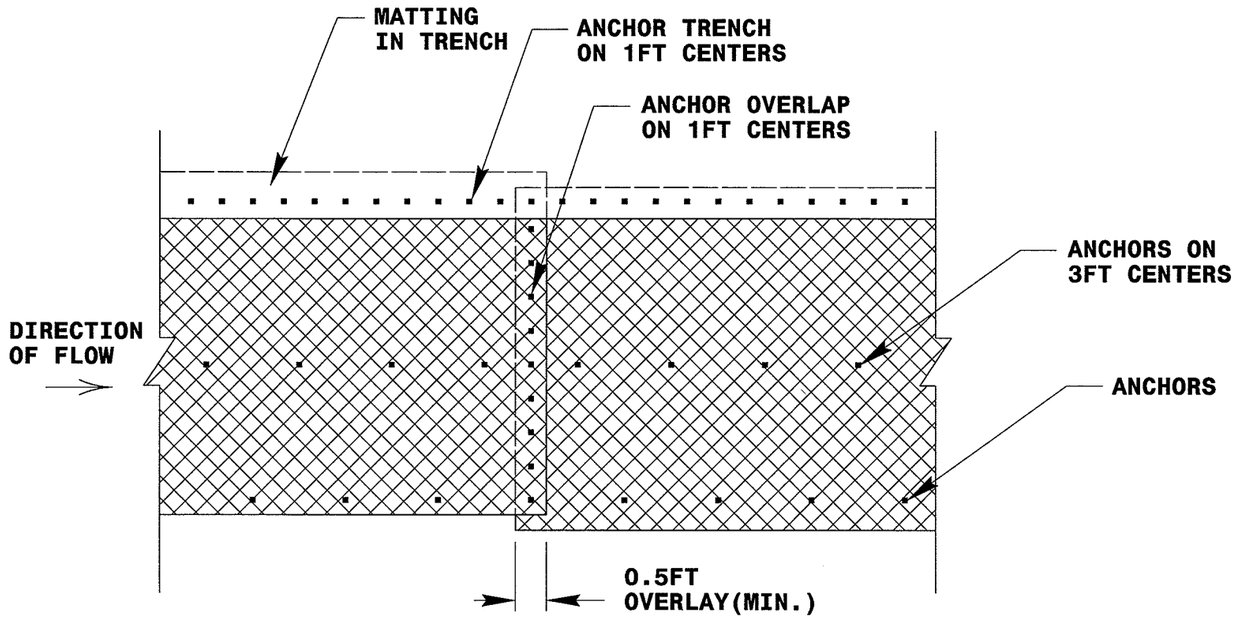
U-2525B
ON-SITE MITIGATION
GUILFORD COUNTY

PROJECT REFERENCE NO.	SHEET NO.
U2525B	RF-2

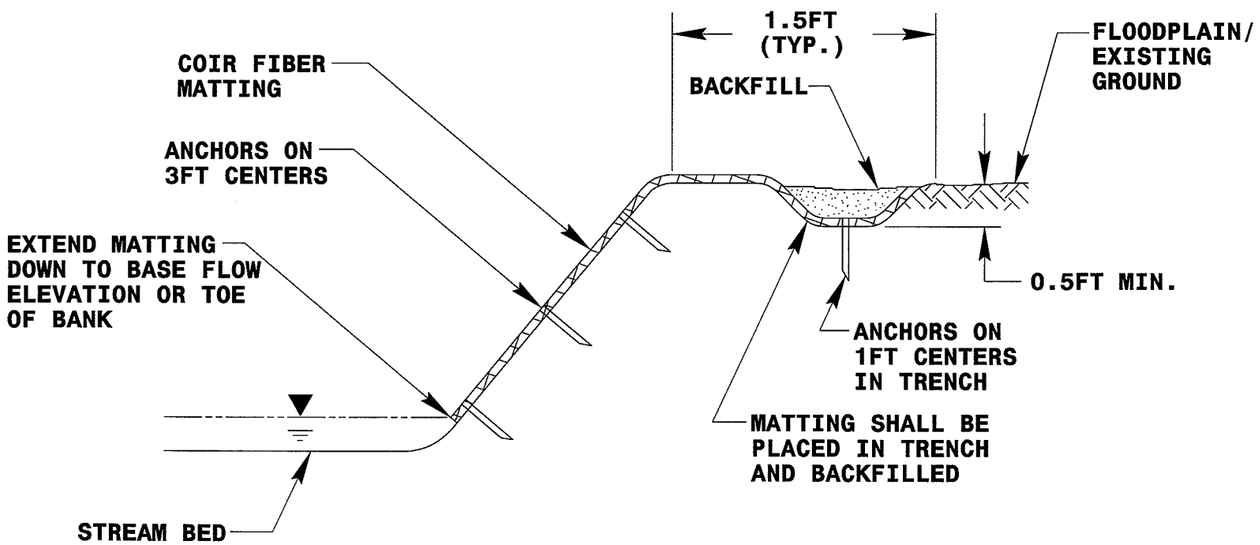
PROJECT ENGINEER

APPROVED BY:

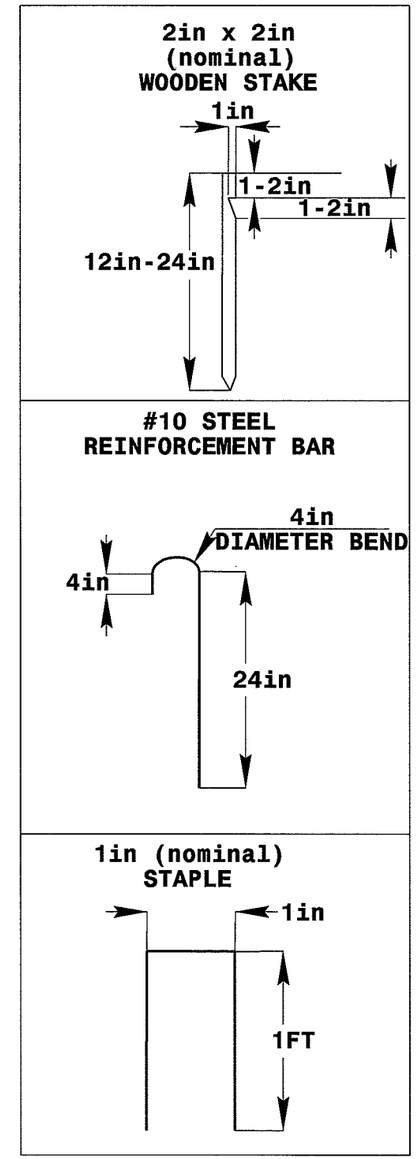
DATE:



PLAN VIEW



TYPICAL CROSS SECTION



ANCHOR OPTIONS

COIR FIBER MATTING DETAIL

NOT TO SCALE

STREAM REFORESTATION
DETAIL SHEET 2 OF 2
N.C.D.O.T.- ROADSIDE ENVIRONMENTAL UNIT

PREPARED IN THE OFFICE OF:

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PROJECT REFERENCE NO.	SHEET NO.
U2525B	RF-3

PROJECT ENGINEER

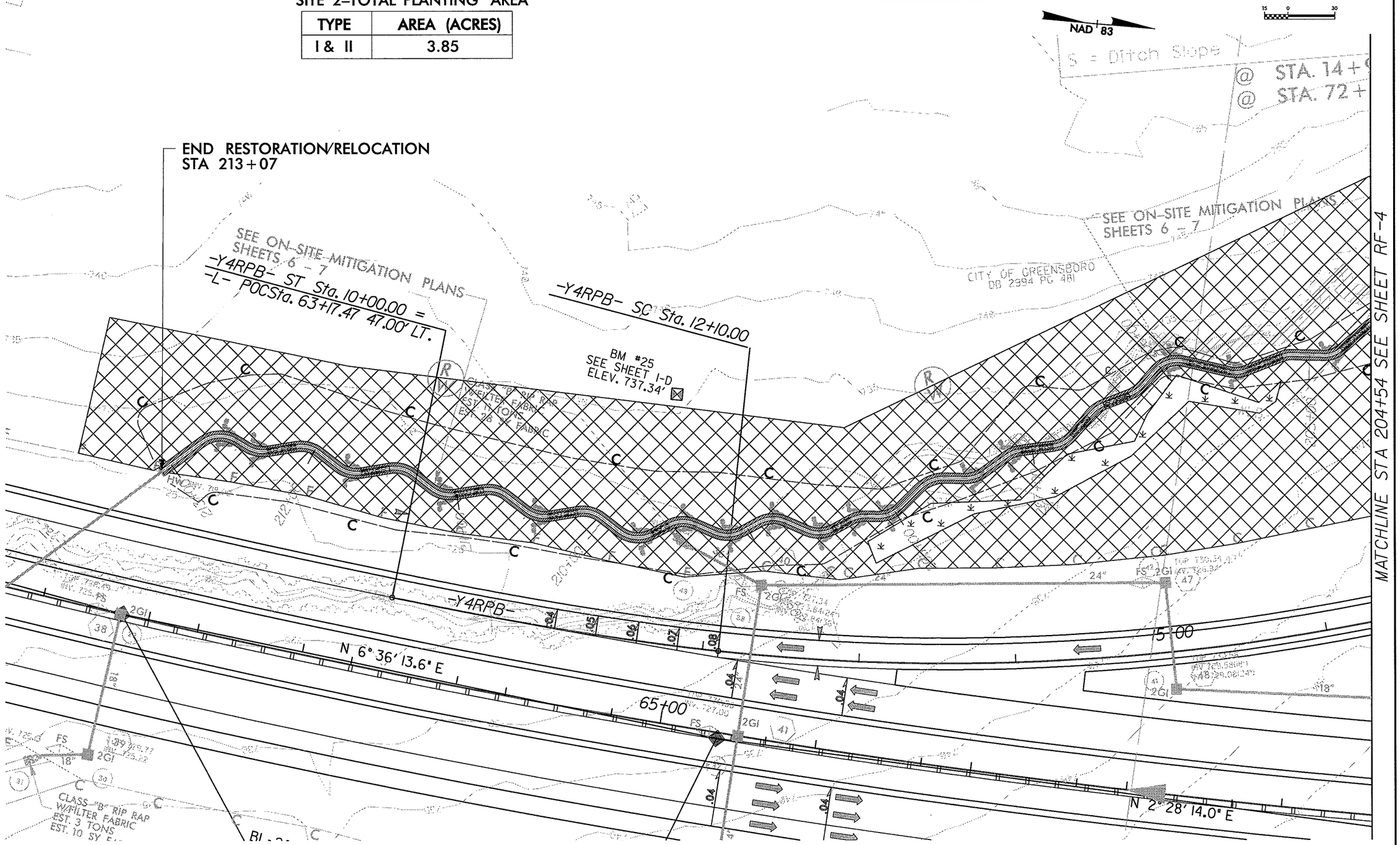
APPROVED BY:

DATE:

SITE 2 STREAM REFORESTATION

SITE 2–TOTAL PLANTING AREA

TYPE	AREA (ACRES)
I & II	3.85



SEE STREAM REFORESTATION DETAILS ON SHEET RF-1 AND RF-2, AND SPECIAL PROVISIONS.

PREPARED IN THE OFFICE OF:

Kimley-Horn and Associates, Inc.
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PHONE: (919) 677-2000 FAX: (919) 677-2050

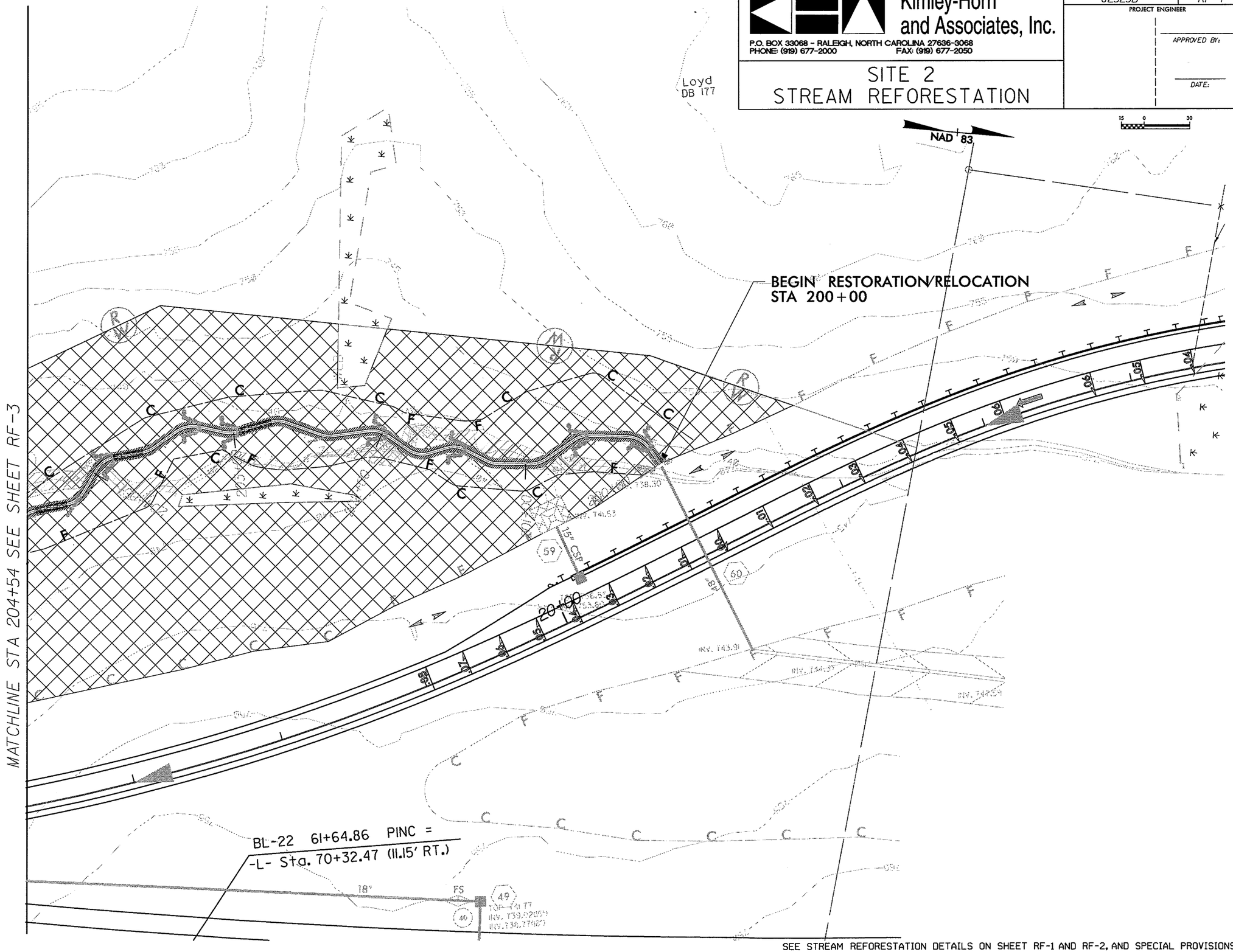
PROJECT REFERENCE NO.	SHEET NO.
U2525B	RF-4

PROJECT ENGINEER

APPROVED BY:

DATE:

SITE 2
STREAM REFORESTATION



SEE STREAM REFORESTATION DETAILS ON SHEET RF-1 AND RF-2, AND SPECIAL PROVISIONS.

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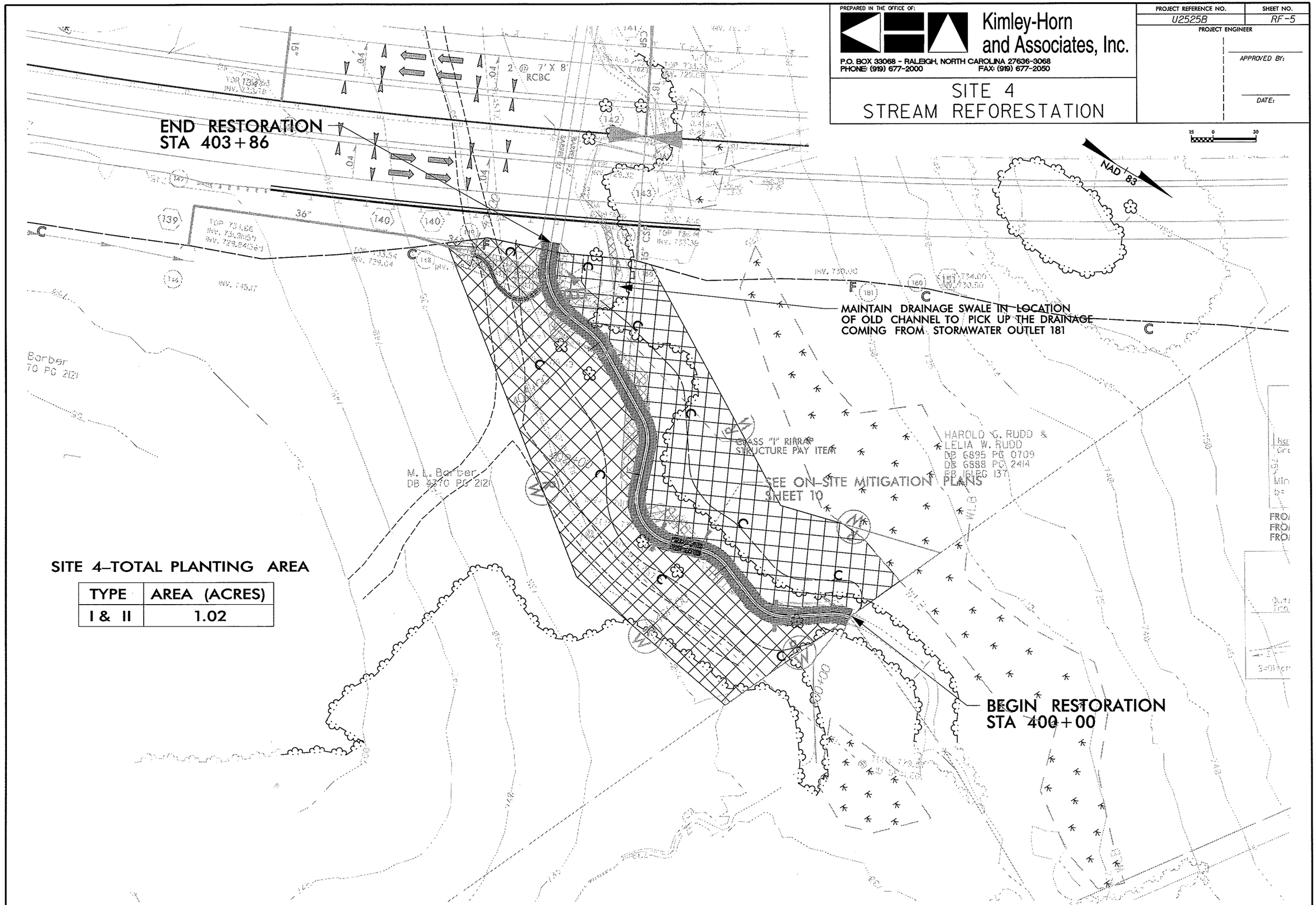
PROJECT REFERENCE NO.	SHEET NO.
U2525B	RF-5

PROJECT ENGINEER

APPROVED BY:

DATE:

SITE 4
STREAM REFORESTATION



SITE 4–TOTAL PLANTING AREA

TYPE	AREA (ACRES)
I & II	1.02

SEE STREAM REFORESTATION DETAILS ON SHEET RF-1 AND RF-2, AND SPECIAL PROVISIONS.

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PROJECT REFERENCE NO.	SHEET NO.
U2525B	RF-6

PROJECT ENGINEER

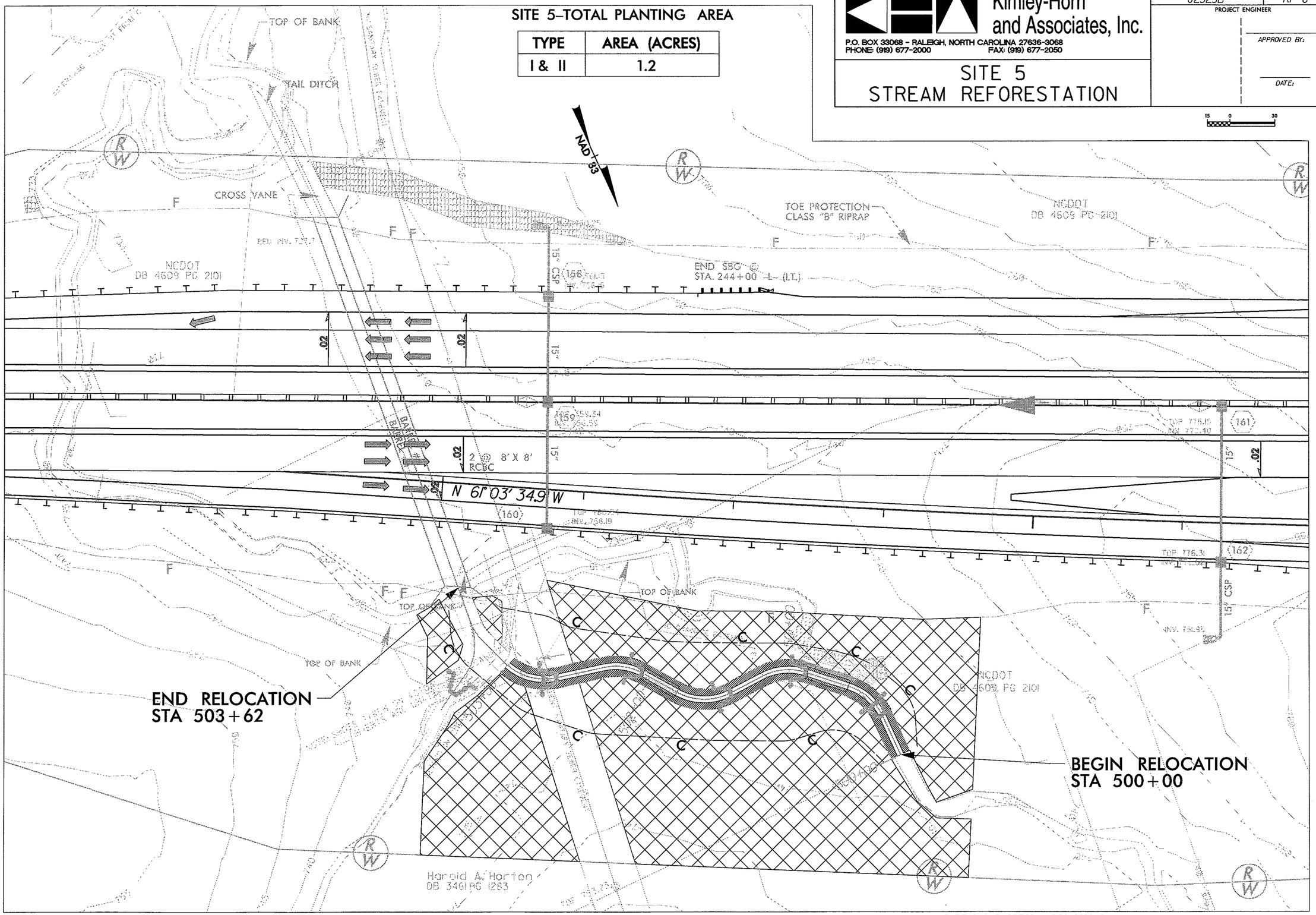
APPROVED BY:

DATE:

SITE 5 STREAM REFORESTATION

SITE 5–TOTAL PLANTING AREA

TYPE	AREA (ACRES)
I & II	1.2



SEE STREAM REFORESTATION DETAILS ON SHEET RF-1 AND RF-2, AND SPECIAL PROVISIONS.