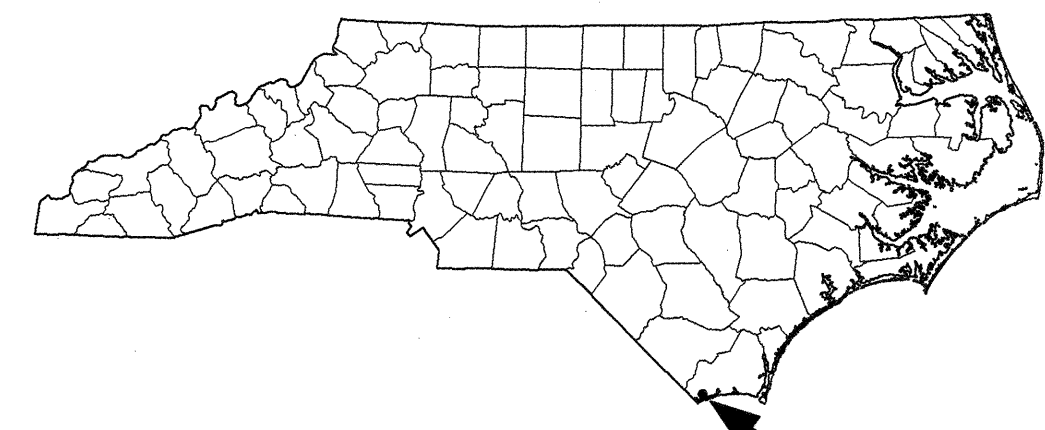


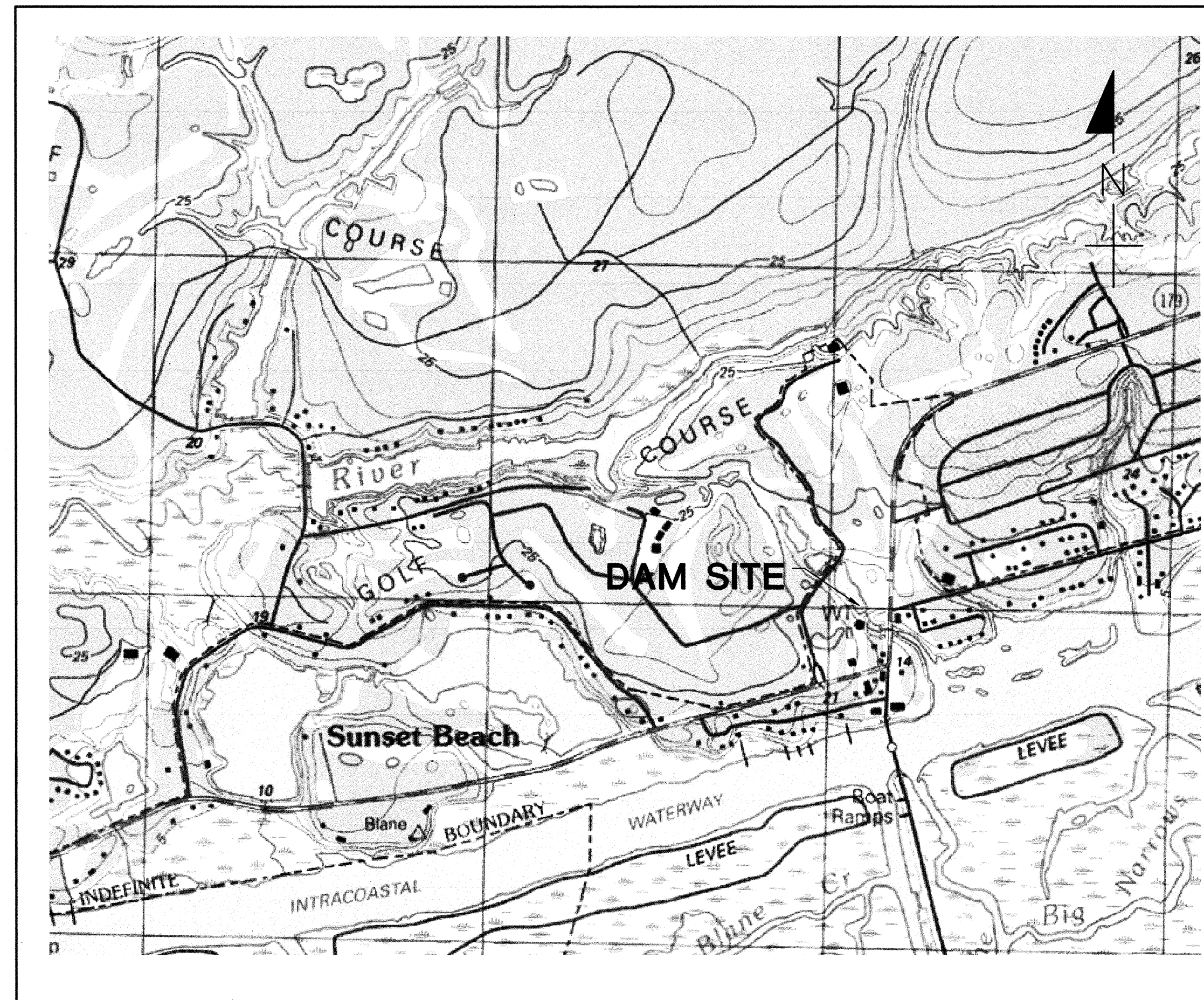
B-0682 SUNSET BEACH DAM BRUNSWICK COUNTY, NORTH CAROLINA

PREPARED FOR
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
BY
SCHNABEL ENGINEERING

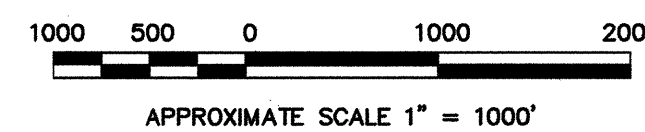


SITE LOCATION

SITE LOCATION MAP



SITE VICINITY MAP



INDEX OF DRAWINGS

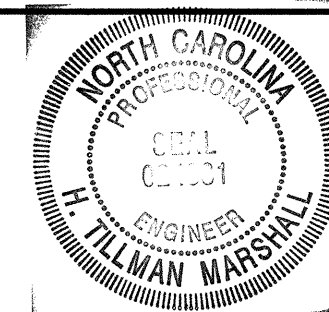
D-1	.....	COVER SHEET
D-2	.....	EXISTING SITE AND DEWATERING PLAN
D-3	.....	PROPOSED SITE PLAN
D-4	.....	PROPOSED DAM PLAN AND PROFILE
D-5	.....	PRINCIPAL SPILLWAY PLAN AND SECTION
D-6	.....	TRASHGUARD AND ANTI-VORTEX COVER
D-7	.....	SEDIMENT BASIN DETAILS
D-8	.....	SEDIMENT BASIN DETAILS
D-9	.....	PLAN, PROFILE AND CROSS SECTIONS - ϕ OF DAM
D-10	.....	CROSS SECTIONS - ϕ OF DAM

PROJECT DESCRIPTION

THIS PROJECT CONSISTS OF THE DESIGN OF ONE DAM IN BRUNSWICK COUNTY, NORTH CAROLINA.

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	2	ADDRESS NCDOT DESIGN COMMENTS	1-24-07
	1	ADDRESS NCDOT DESIGN COMMENTS	12-11-06
	REV.	DESCRIPTION	DATE



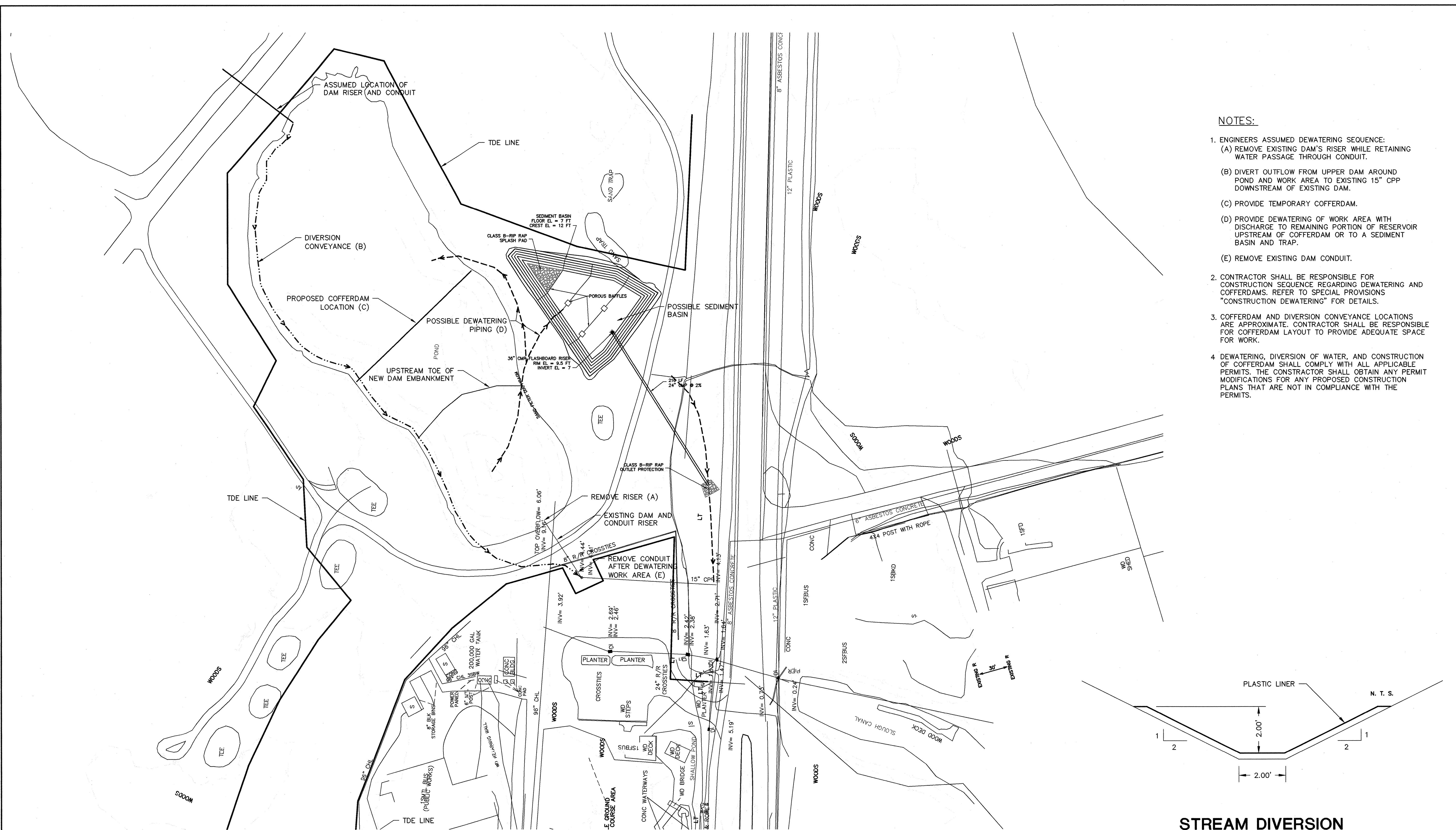
DESIGNED BY: HTM
DRAWN BY: KFL/PK
CHECKED BY: HTM
H. TILLMAN MARSHALL, P.E.
DATE: 4-17-07
NC PROFESSIONAL ENGINEER NUMBER 024831

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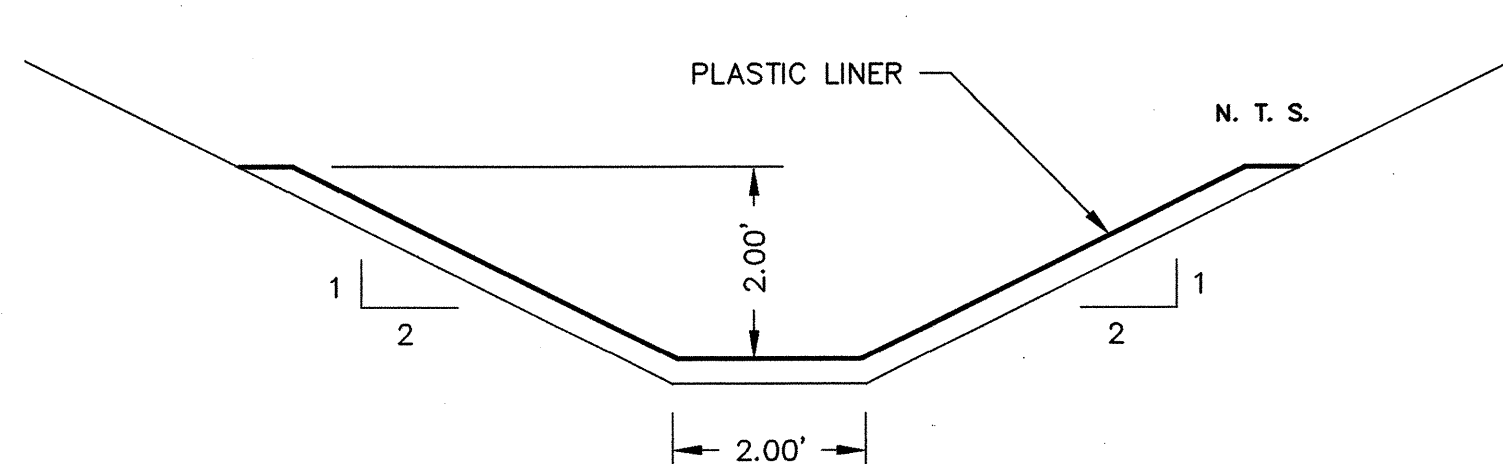
B-0682 SUNSET BEACH DAM
BRUNSWICK COUNTY, NORTH CAROLINA
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05210014.02

COVER SHEET

SCALE: AS SHOWN	DATE: 4/13/07	DRAWING NO. D-1	SHEET 1 OF 1
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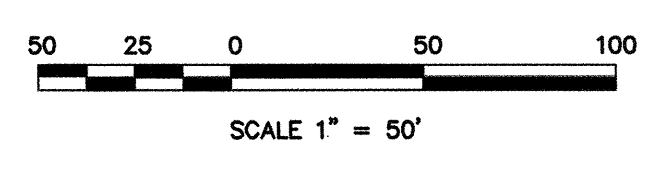


- NOTES:**
- ENGINEERS ASSUMED DEWATERING SEQUENCE:
 (A) REMOVE EXISTING DAM'S RISER WHILE RETAINING WATER PASSAGE THROUGH CONDUIT.
 (B) DIVERT OUTFLOW FROM UPPER DAM AROUND POND AND WORK AREA TO EXISTING 15" CPP DOWNSTREAM OF EXISTING DAM.
 (C) PROVIDE TEMPORARY COFFERDAM.
 (D) PROVIDE DEWATERING OF WORK AREA WITH DISCHARGE TO REMAINING PORTION OF RESERVOIR UPSTREAM OF COFFERDAM OR TO A SEDIMENT BASIN AND TRAP.
 (E) REMOVE EXISTING DAM CONDUIT.
 - CONTRACTOR SHALL BE RESPONSIBLE FOR CONSTRUCTION SEQUENCE REGARDING DEWATERING AND COFFERDAMS. REFER TO SPECIAL PROVISIONS "CONSTRUCTION DEWATERING" FOR DETAILS.
 - COFFERDAM AND DIVERSION CONVEYANCE LOCATIONS ARE APPROXIMATE. CONTRACTOR SHALL BE RESPONSIBLE FOR COFFERDAM LAYOUT TO PROVIDE ADEQUATE SPACE FOR WORK.
 - DEWATERING, DIVERSION OF WATER, AND CONSTRUCTION OF COFFERDAM SHALL COMPLY WITH ALL APPLICABLE PERMITS. THE CONTRACTOR SHALL OBTAIN ANY PERMIT MODIFICATIONS FOR ANY PROPOSED CONSTRUCTION PLANS THAT ARE NOT IN COMPLIANCE WITH THE PERMITS.



EXISTING SITE PLAN

STREAM DIVERSION



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	REV.	DESCRIPTION	DATE



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H. TILLMAN MARSHALL, P.E.		
<i>H. Tillman Marshall</i>		DATE: 4-13-07
NC PROFESSIONAL ENGINEER NUMBER 024831		

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EXISTING SITE AND DEWATERING PLAN			
SCALE: AS SHOWN	DATE: 4/13/07	DRAWING NO. D-2	SHEET 1 OF 1

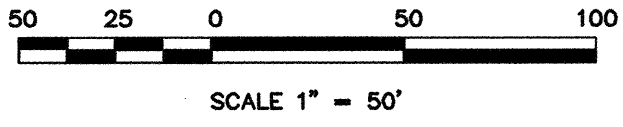
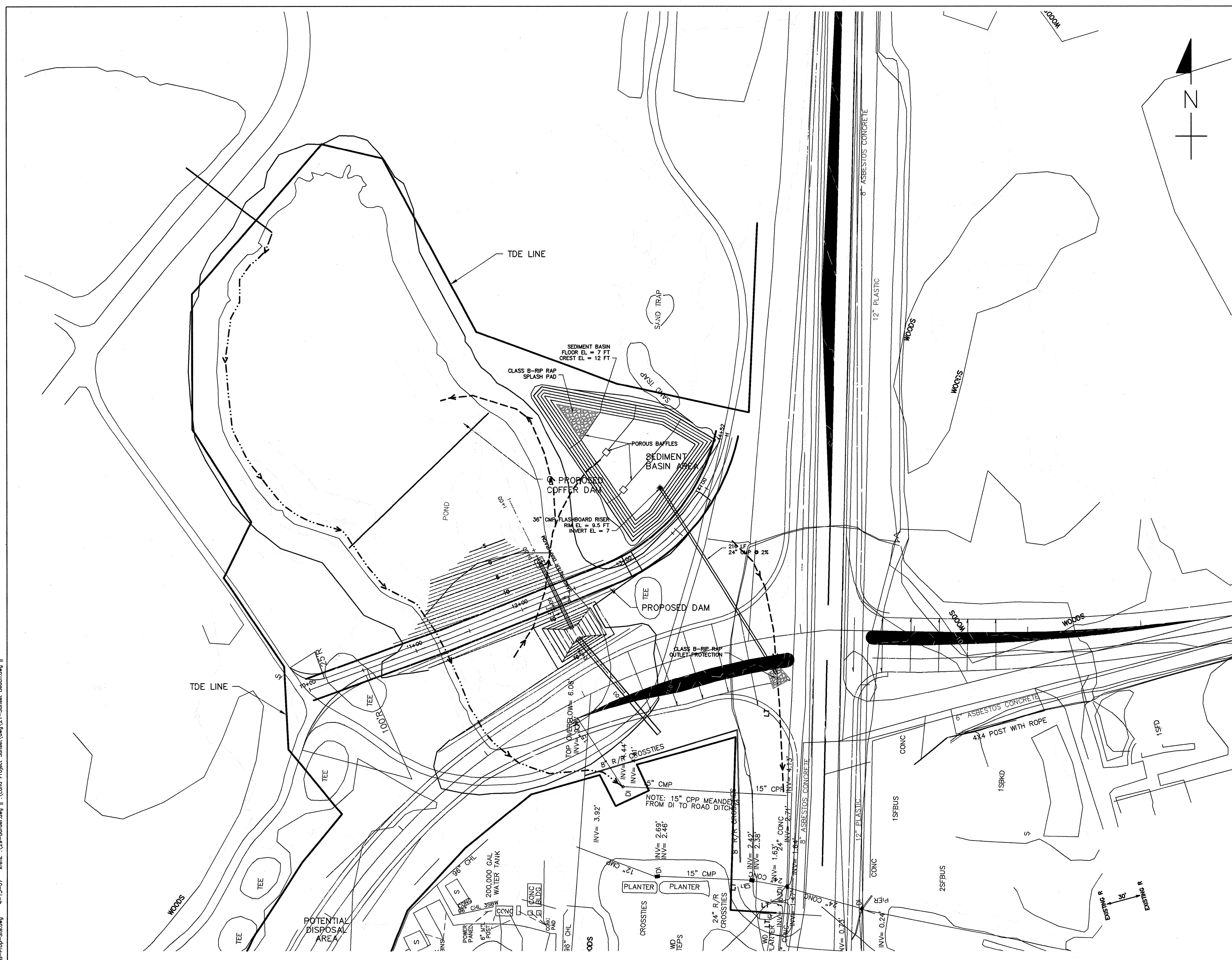
**BILL OF MATERIALS
SUNSET BEACH DAM CONSTRUCTION**

ITEM	DESCRIPTION	UNIT	QUANTITY
1	DAM CONSTRUCTION DEWATERING	LS	1
2	SILT FENCE	LF	530
3	UNCLASSIFIED EXCAVATION	CY	1,250
4	SEEDING AND MULCH	ACRE	2
5	36-INCH CORRUGATED METAL PIPE	LF	2.5
6	24-INCH CORRUGATED METAL PIPE	LF	216
7	FINE AGGREGATE FILTER DIAPHRAGM w\ PVC PIPE	CY	31
8	CLASS B ROCK RIP RAP	TON	240
9	FILTER FABRIC UNDER OUTLET PROTECTION	SY	345
10	SILT EXCAVATION FROM SEDIMENT BASIN	CY	60
11	TEMPORARY SEEDING	LB	150
12	TEMPORARY MULCHING	ACRE	2
13	FERTILIZER FOR TEMPORARY SEEDING	TON	0.5
14	ABC STONE	TON	3,920
15	CONCRETE CLASS AA	CY	14
16	12-INCH CAST IRON GATE	EA	1
17	48-INCH PRECAST MANHOLE	EA	1
18	42-INCH RCP	LF	112
19	30-INCH RCP	LF	64
20	TRASH RACK 30" X 30"	EA	1
21	TRASH GUARD w\ ANTI-VORTEX COVER	EA	1
22	DAM EMBANKMENT EARTHFILL	CY	6,490

NOTE: BILL OF MATERIALS REPRESENTS ESTIMATED QUANTITIES PROVIDED FOR THE CONVENIENCE OF THE CONTRACTOR. THESE ITEMS DO NOT REPRESENT PAY ITEMS OR QUANTITIES FOR PAYMENT. MEASUREMENT AND PAYMENT WILL BE DICTATED STRICTLY BY THE CONTRACT SPECIFICATIONS AND SPECIAL PROVISIONS.

ANTICIPATED CONSTRUCTION SEQUENCE:

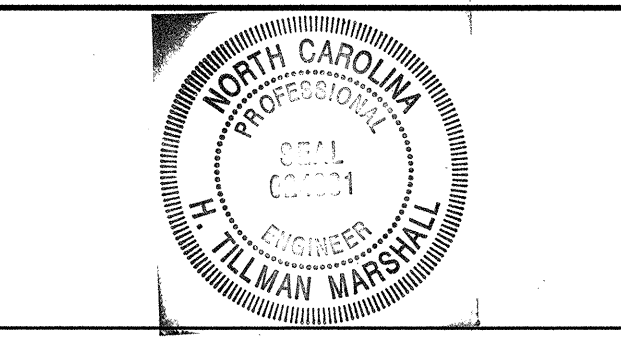
1. INSTALL SOIL EROSION AND SEDIMENT CONTROL MEASURES IN CONJUNCTION WITH PROJECT MOBILIZATION. INSTALL SEDIMENT BASIN, RISER, AND OUTLET CONDUIT AS SHOWN. PROVIDE ADDITIONAL DEVICES AS SHOWN OR AS REQUIRED BY THE CONDITIONS OF THE PERMIT.
2. DEWATER THE EXISTING IMPOUNDMENT AND INSTALL COFFERDAM AND CONTROL OF WATER DEVICES IN ACCORDANCE WITH PROJECT SPECIFICATIONS, SPECIAL PROVISIONS, AND DEWATERING SEQUENCE SHOWN ON SHEET D-2.
3. PLACE AND COMPACT ABC STONE TO THE LIMITS SHOWN IN THE PLANS AND TO THE REQUIREMENTS OF THE SPECIAL PROVISION.
4. SEDIMENT LADEN WATER CREATED DURING PLACEMENT OF THE ABC STONE SHALL NOT BE DISCHARGED TO DOWNSTREAM AREAS. AT A MINIMUM, THIS WATER SHALL BE PUMPED INTO THE SEDIMENT BASIN PRIOR TO DISCHARGE.
5. PLACE AND COMPACT EMBANKMENT DAM EARTH FILL IN ACCORDANCE WITH SPECIFICATIONS UP TO ELEVATION FOR PROPOSED PRIMARY SPILLWAY BASE SLAB AND OUTLET CONDUIT.
6. PLACE CAST-IN-PLACE CONCRETE FOR BASE SLAB, INSTALL RCP OUTLET CONDUIT, AND CONCRETE CRADLE.
7. SET PRECAST MANHOLE, INSTALL GATE, AND CONSTRUCT AND INSTALL TRASH RACK.
8. PLACE REMAINING EMBANKMENT DAM EARTHFILL AFTER CONCRETE HAS CURED IN ACCORDANCE WITH SPECIFIED DURATIONS FOR CRADLED CONDUITS.
9. INSTALL ROCK RIP RAP PLUNGE POOL.
10. PERFORM EXCAVATION AND GRADING ASSOCIATED WITH EMERGENCY SPILLWAY.
11. PLACE AND COMPACT ABC STONE ALONG PROPOSED GOLF CART PATH.
12. PLACE AND COMPACT ASPHALT PAVING FOR GOLF CART PATH.
13. PLACE TOPSOIL, LIME, FERTILIZER, SEED AND MULCH AS SPECIFIED FOR FINAL STABILIZATION.
14. REMOVE COFFERDAM AND OTHER CONTROL OF WATER DEVICES
15. REMOVE SOIL EROSION AND SEDIMENT CONTROL DEVICES FOLLOWING PERMANENT TURF ESTABLISHMENT.



PROPOSED SITE PLAN

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1	ADDRESS NCDOT DESIGN COMMENTS	12-11-06



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H. TILLMAN MARSHALL, P.E.		
<i>H. Tillman Marshall</i> DATE: 4-13-07		
NC PROFESSIONAL ENGINEER NUMBER 024831		

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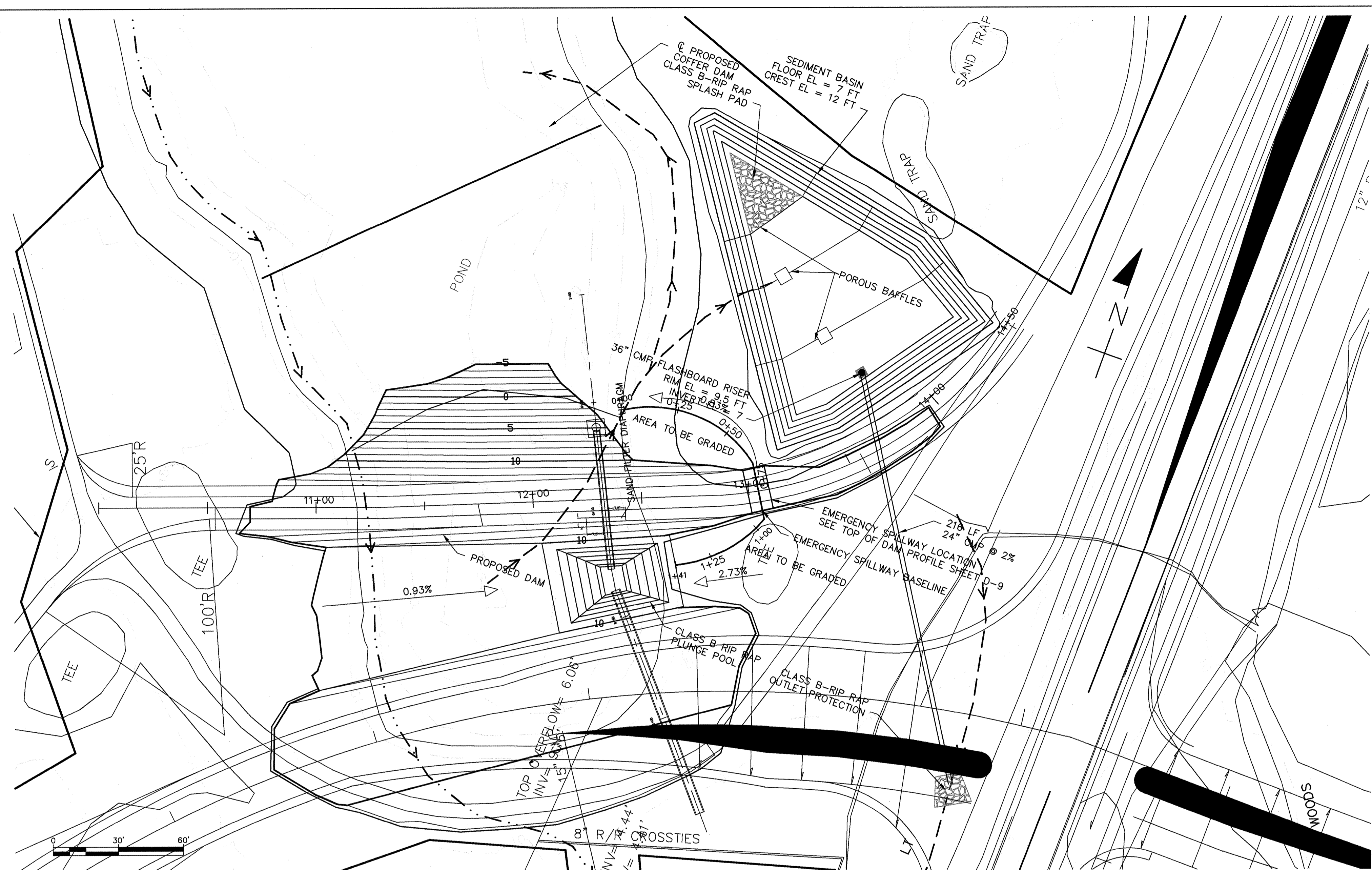
**B-0682 SUNSET BEACH DAM
BRUNSWICK COUNTY, NORTH CAROLINA
N.C. DEPARTMENT OF TRANSPORTATION**

**SCHNABEL PROJECT NUMBER
05210014.02**

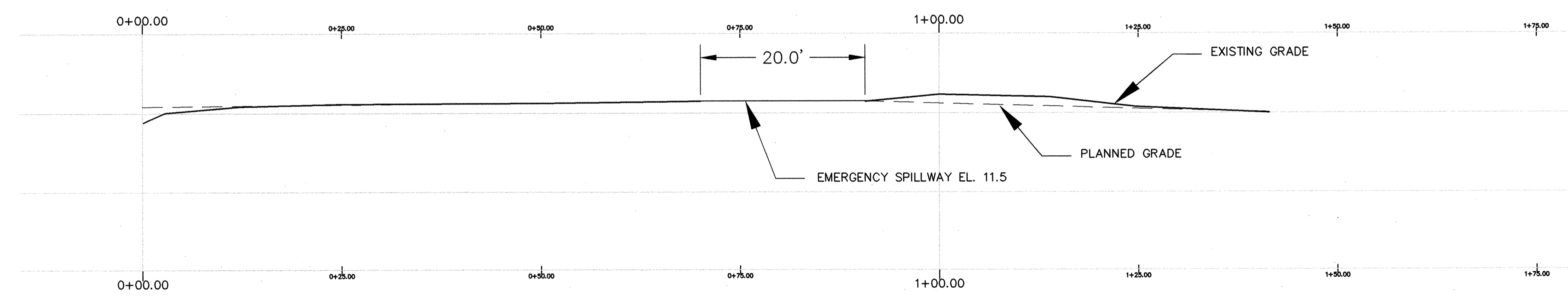
PROPOSED SITE PLAN			
SCALE: AS SHOWN	DATE: 4/13/07	DRAWING NO. D-3	SHEET 1 OF 1

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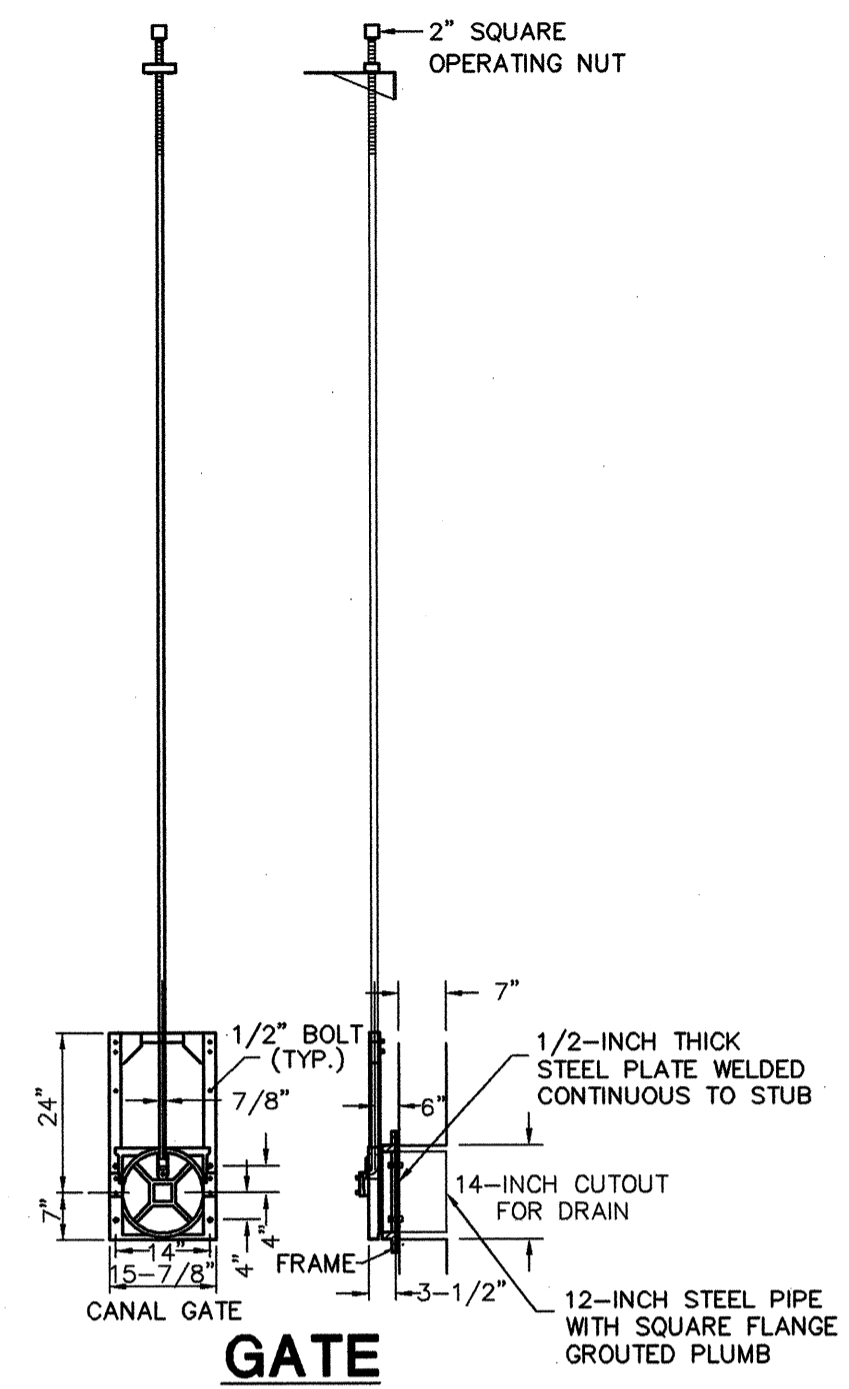
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PROPOSED PLAN



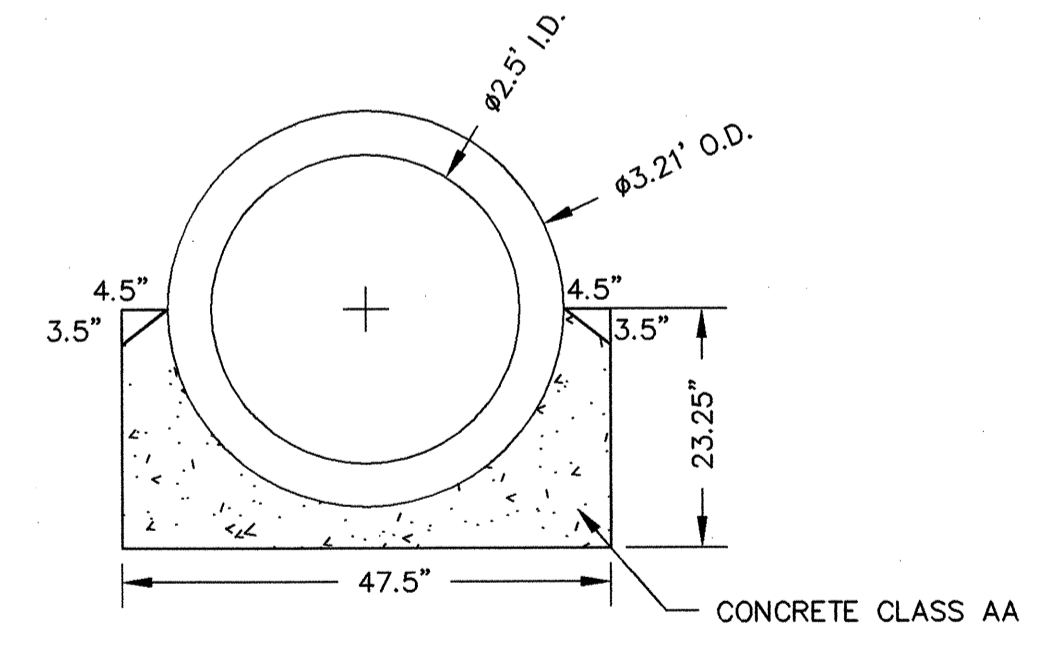
EMERGENCY SPILLWAY PROFILE



GATE
SCALE: 1"=2'

NOTES:

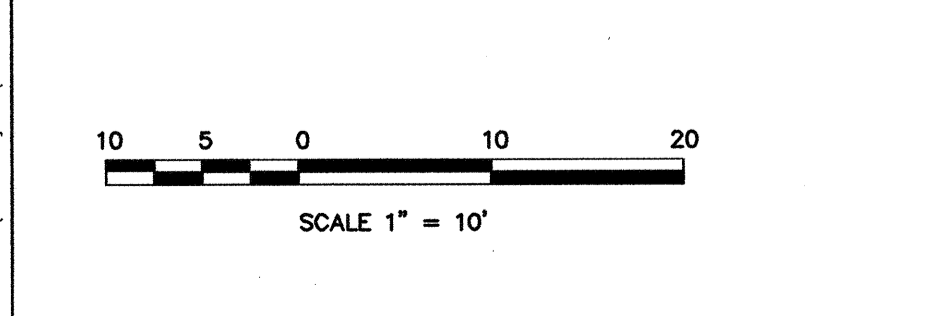
- GATE SHALL BE 12-INCH DIAMETER, CAST IRON CANAL GATE, FLATBACK, WITH BRONZE SEAT FACINGS, FLAT SQUARE BOTTOM SLIDE, GALVANIZED STEEL FRAME, STAINLESS STEEL RISING STEM, STAINLESS STEEL ANCHOR BOLTS, AND STANDARD SHOPCOAT PAINT, OR EQUIVALENT AS APPROVED BY THE ENGINEER.
- PROVIDE A 2-INCH SQUARE OPERATING NUT AND A 3-FOOT LENGTH TEE WRENCH TO OPERATE THE GATE.



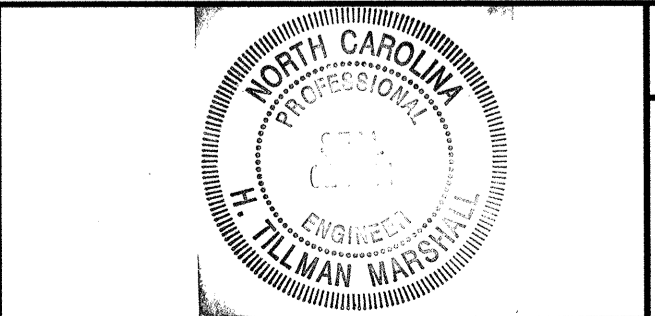
DETAIL OF 30" PIPE & CONCRETE CRADLE

NOT TO SCALE

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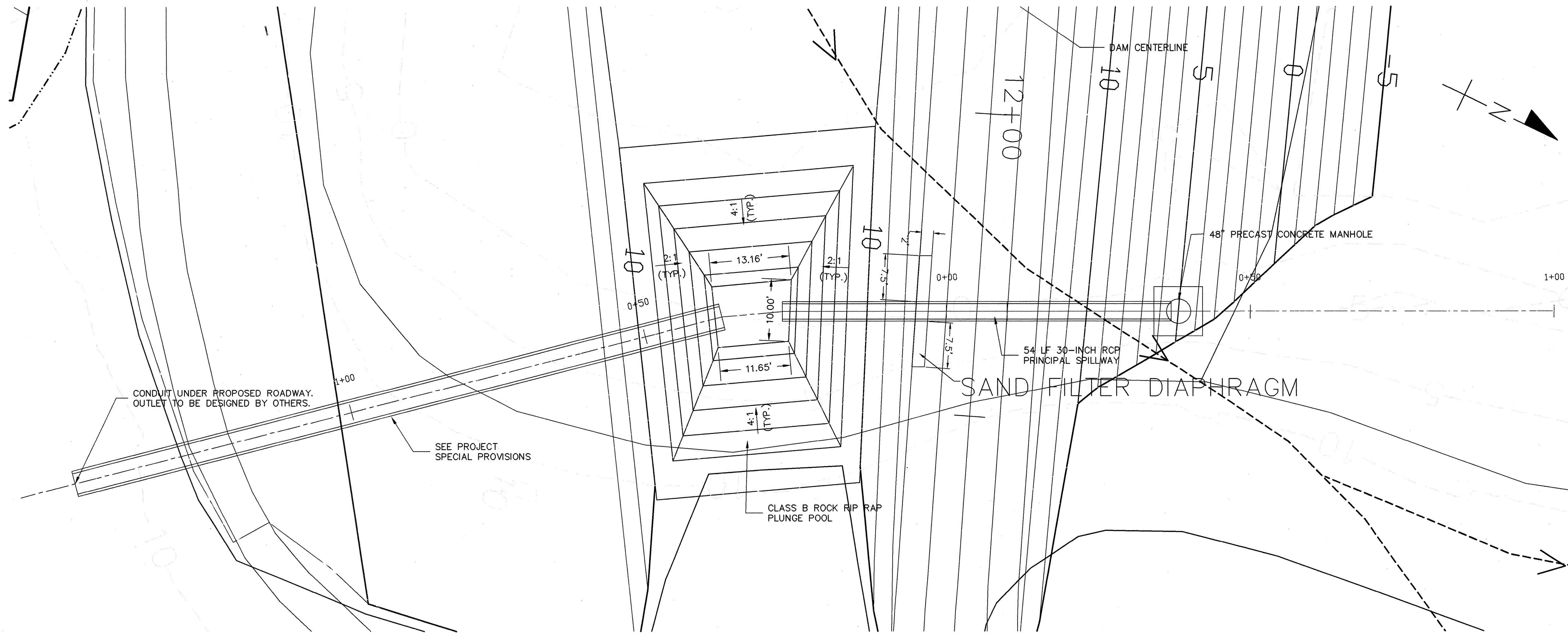
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H. TILLMAN MARSHALL, P.E.		
<i>H. Tillman Marshall</i>		DATE: 4-13-07
NC PROFESSIONAL ENGINEER NUMBER 024831		

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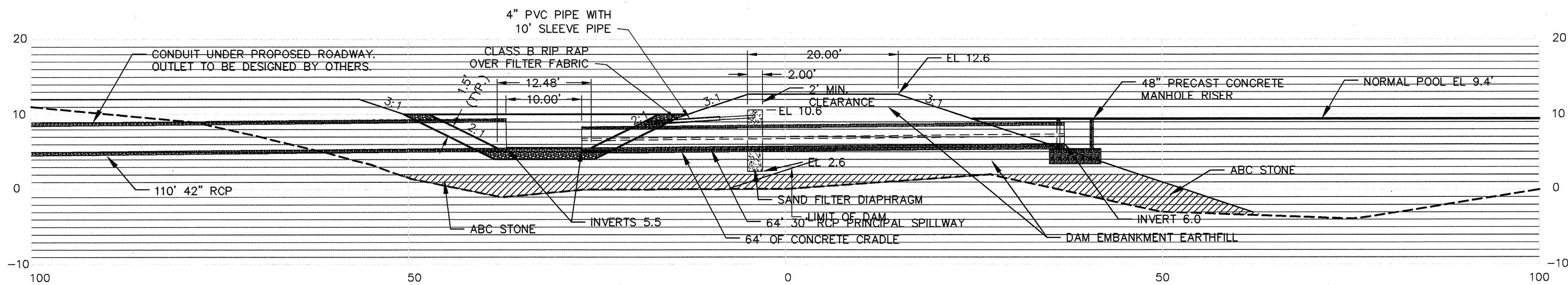
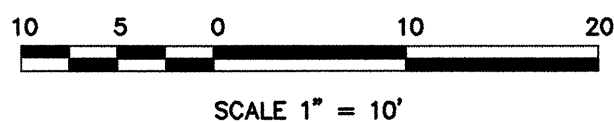
B-0682 SUNSET BEACH DAM
 BRUNSWICK COUNTY, NORTH CAROLINA
 N.C. DEPARTMENT OF TRANSPORTATION

SCHNABEL PROJECT NUMBER
 05210014.02

PROPOSED DAM PLAN AND PROFILE			
SCALE: AS SHOWN	DATE: 4/13/07	DRAWING NO. D-4	SHEET 1 OF 1

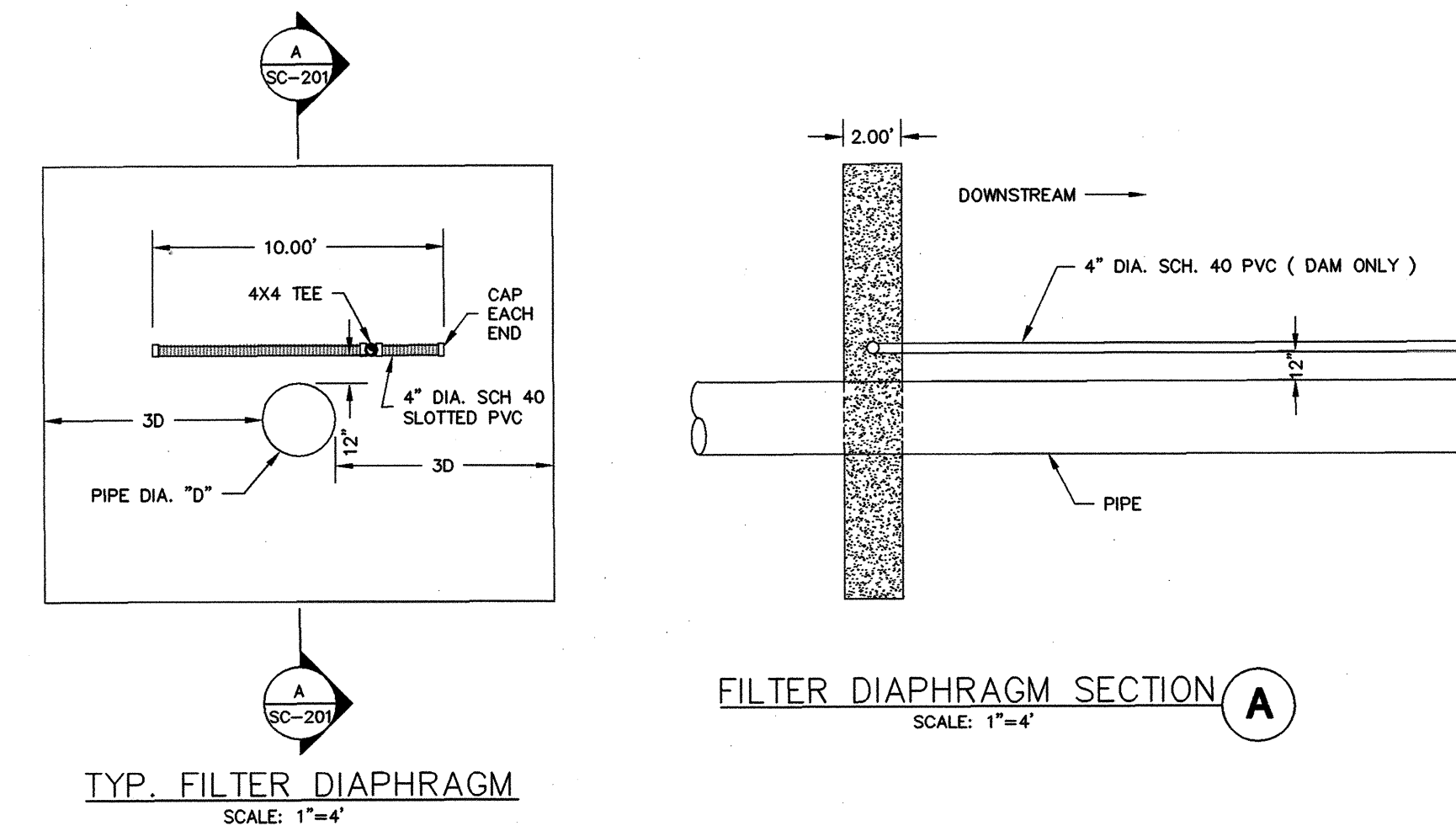


PRINCIPAL SPILLWAY PLAN VIEW



CROSS SECTION OF PRINCIPAL SPILLWAY

SCALE 1"=10'



TYP. FILTER DIAPHRAGM
SCALE: 1"=4'

FILTER DIAPHRAGM SECTION A
SCALE: 1"=4'

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1	ADDRESS NCDOT DESIGN COMMENTS	12-11-06



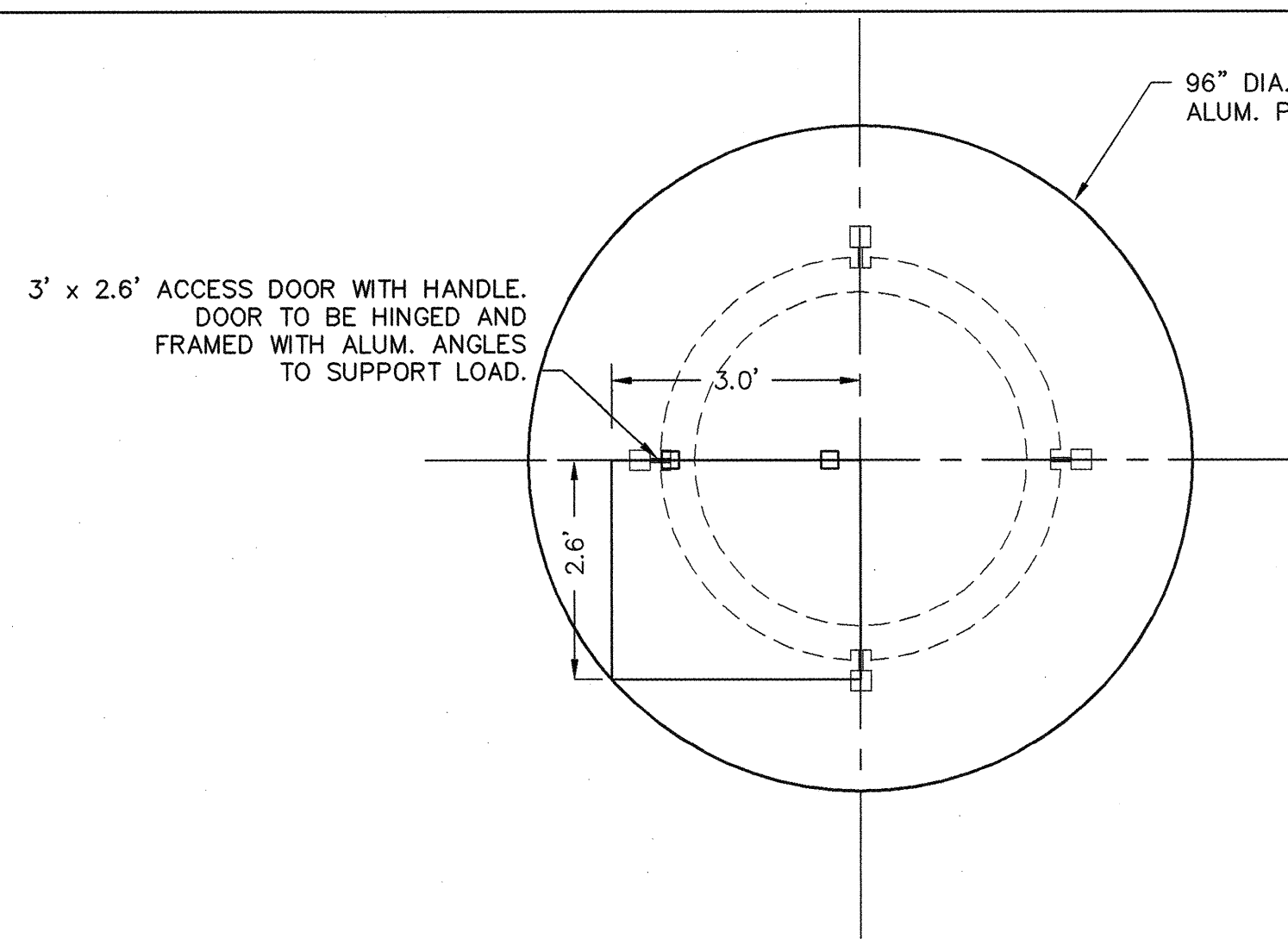
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H. TILLMAN MARSHALL, P.E.
DATE: 4-13-07
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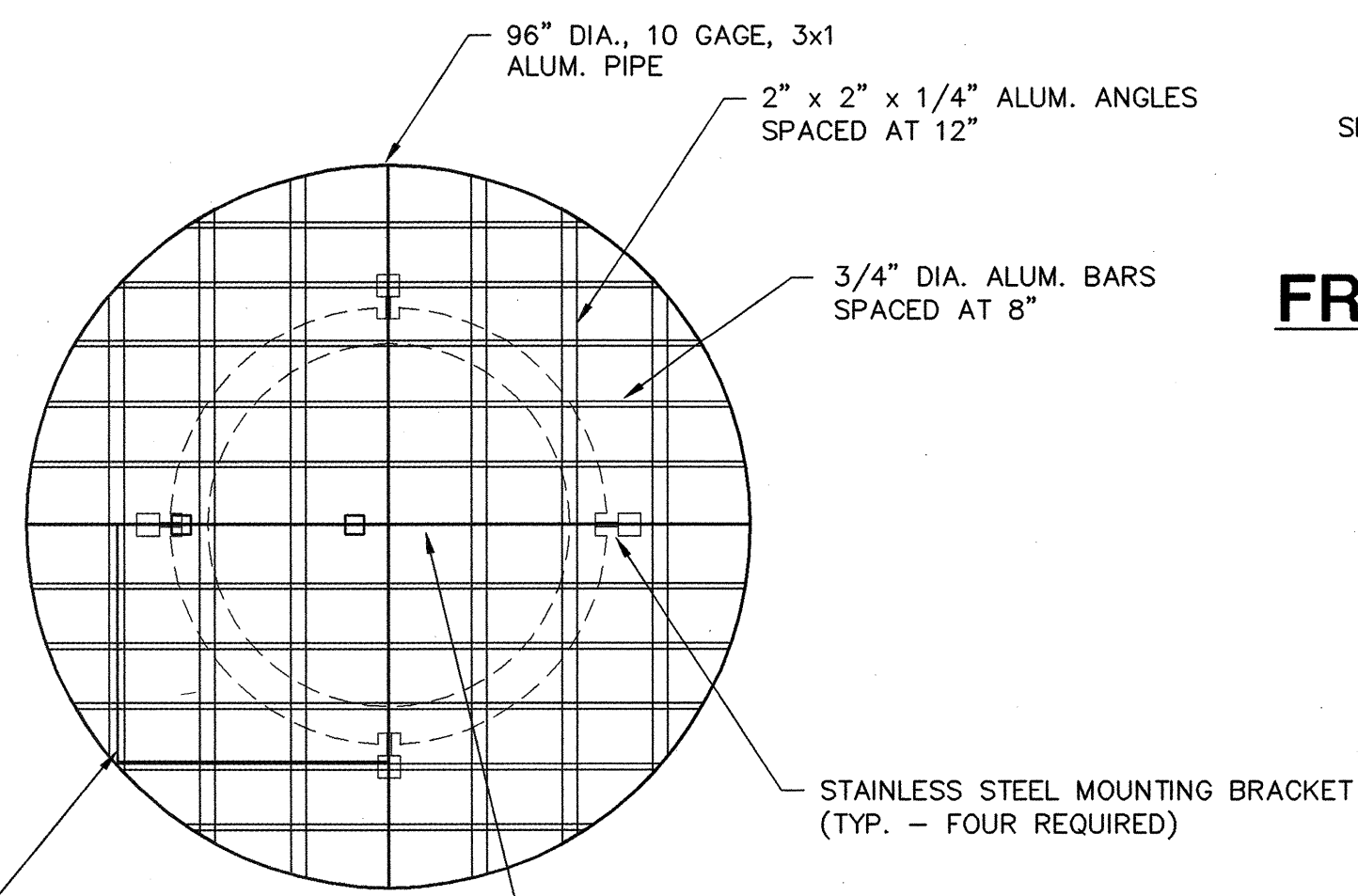
PRINCIPAL SPILLWAY PLAN AND CROSS SECTION			
SCALE: AS SHOWN	DATE: 4/13/07	DRAWING NO. D-5	SHEET 1 OF 1

C:\2005\Projects\05210014.02 (Sunset Beach Dam)\02-58-Principal Spillway.dwg 4-13-07 xref: \\20-58-Principal Spillway.dwg 4-13-07 xref: \\20-58-Principal Spillway.dwg 4-13-07 xref: \\20-58-Principal Spillway.dwg 4-13-07

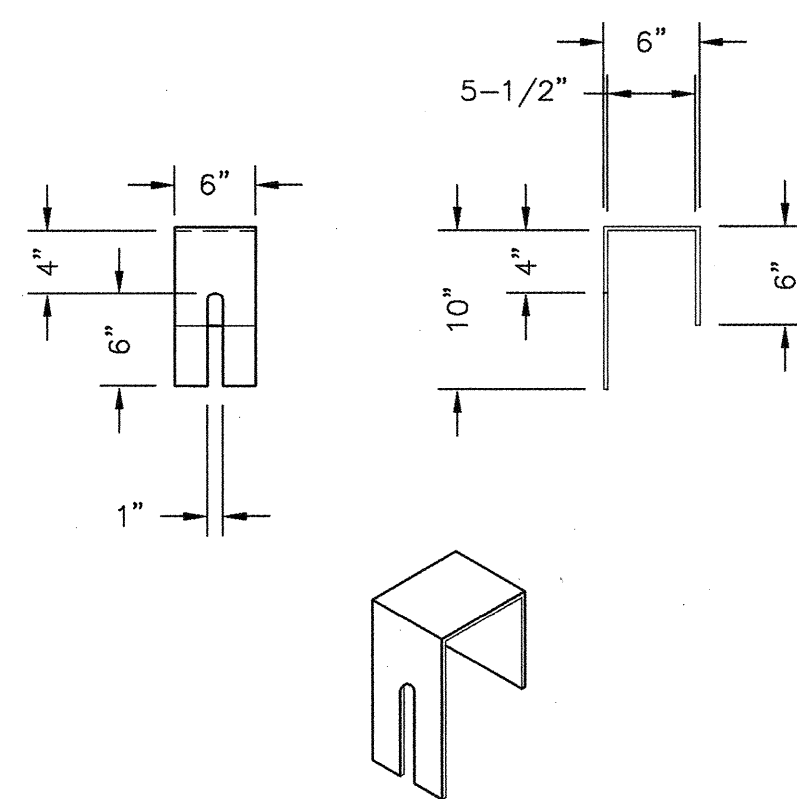


COVER DETAIL

SCALE: 1"=2'

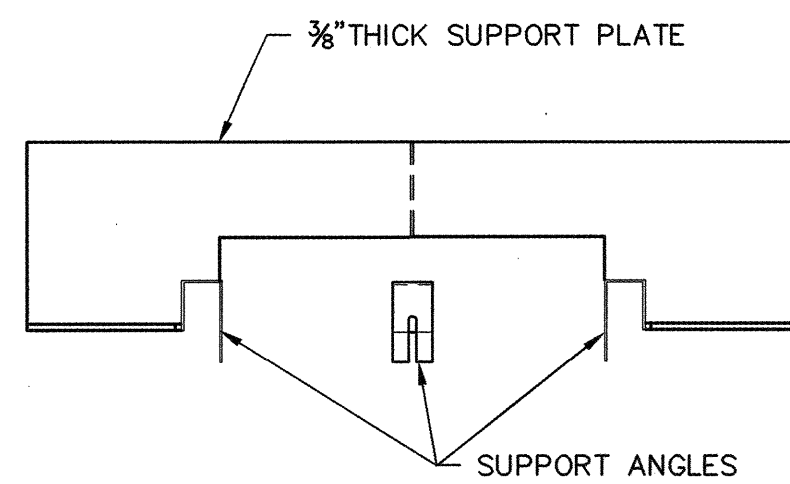


PLAN



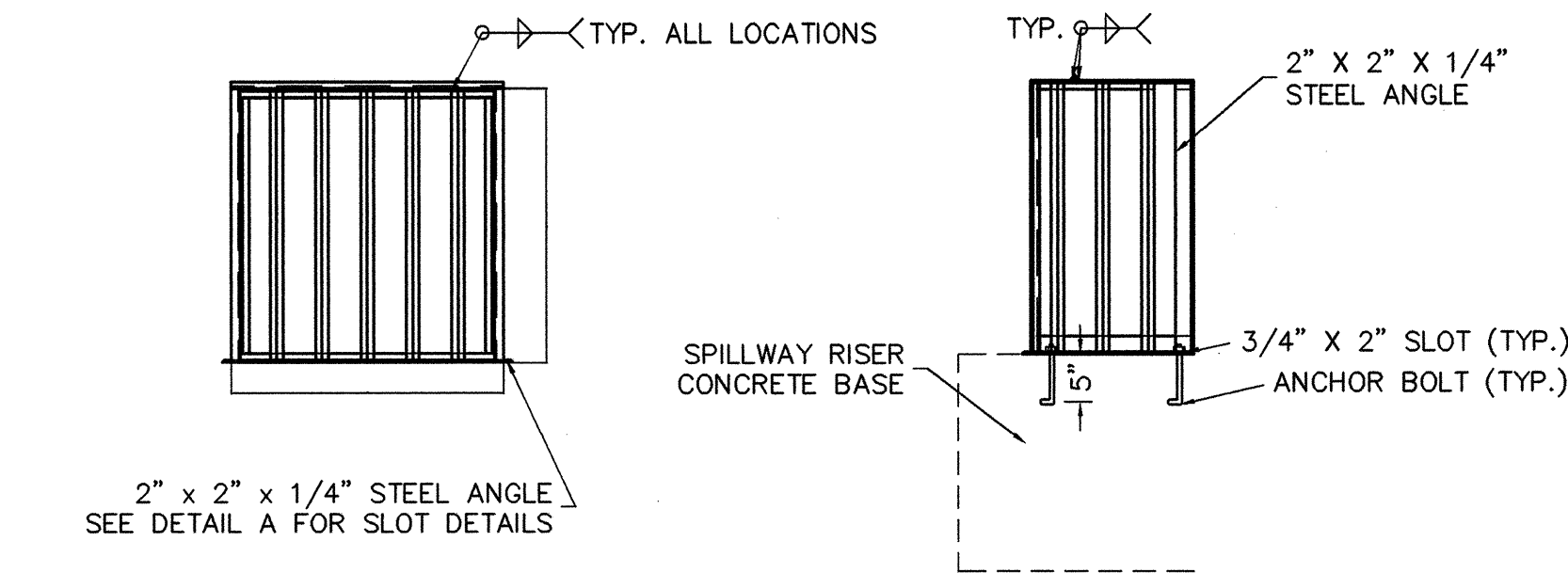
MOUNTING BRACKETS

SCALE: 1"=1'



SUPPORT PLATES

SCALE: 1"=2'

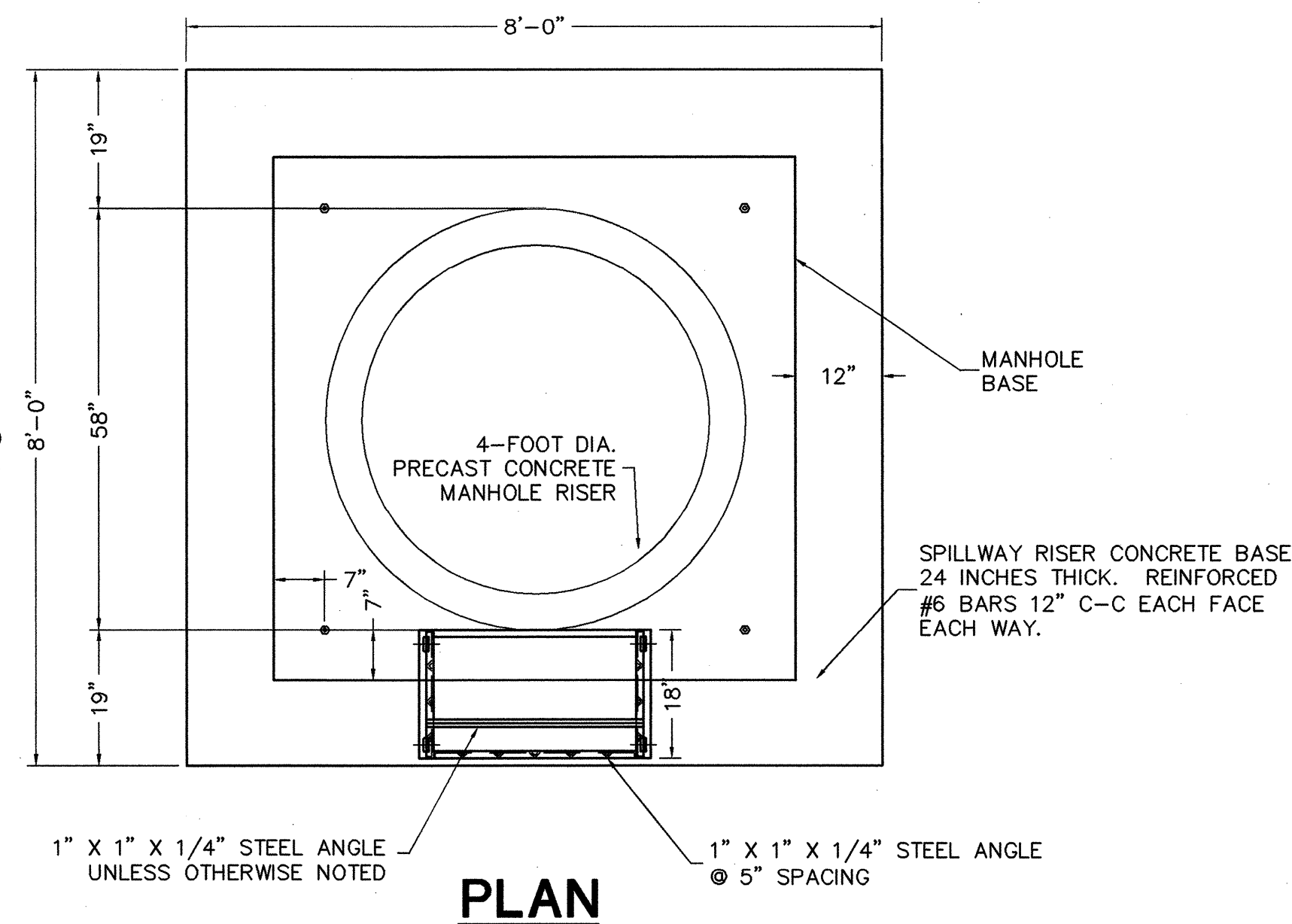


FRONT ELEVATION

SIDE ELEVATION

NOTE:

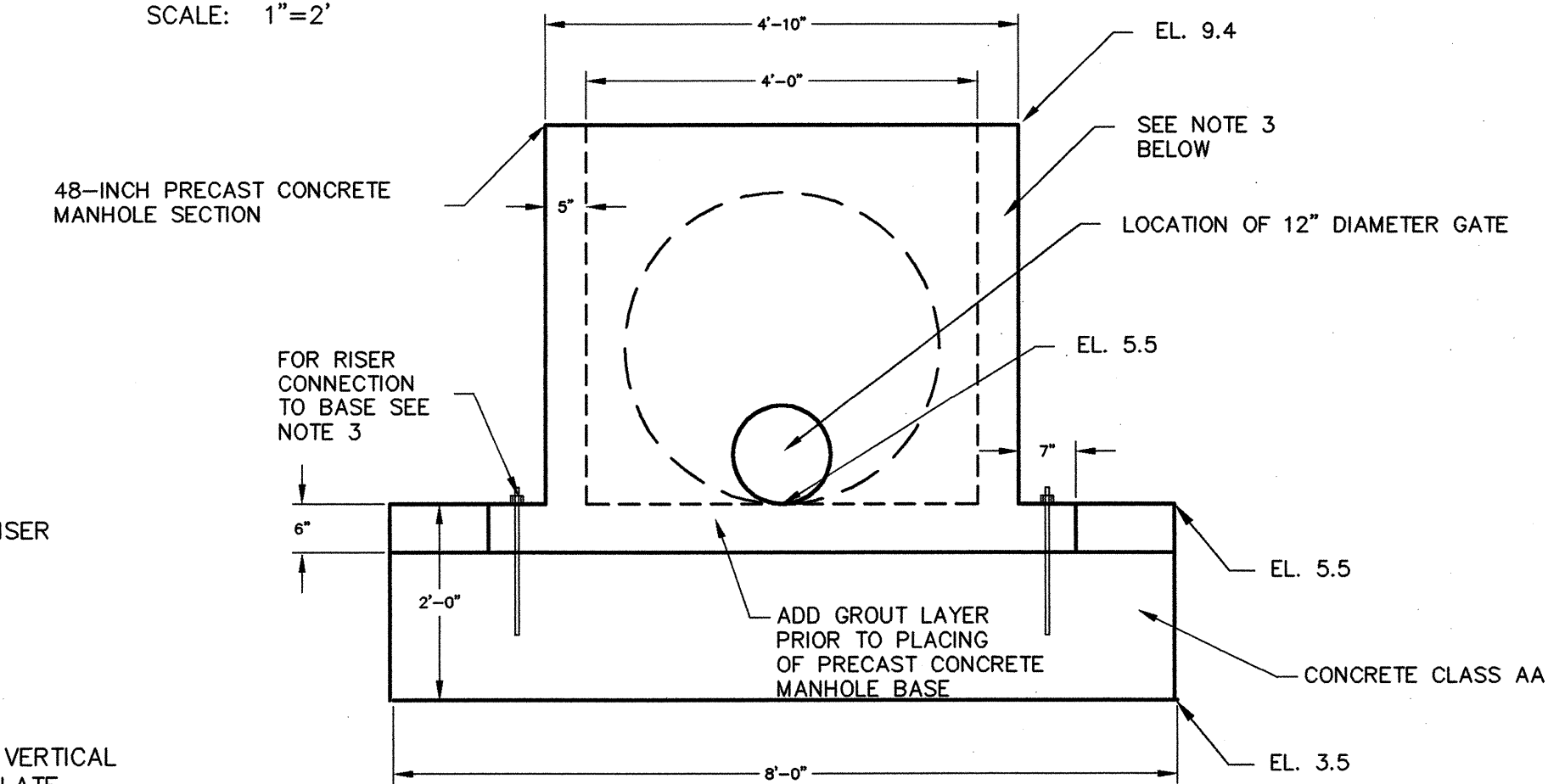
CONTRACTOR SHALL PROVIDE SHOP FABRICATION DRAWINGS WITH DETAILS FOR REVIEW AND APPROVAL. UNLESS OTHERWISE APPROVED, ENTIRE TRASH RACK SHALL BE GALVANIZED AFTER FABRICATION IS COMPLETED.



PLAN

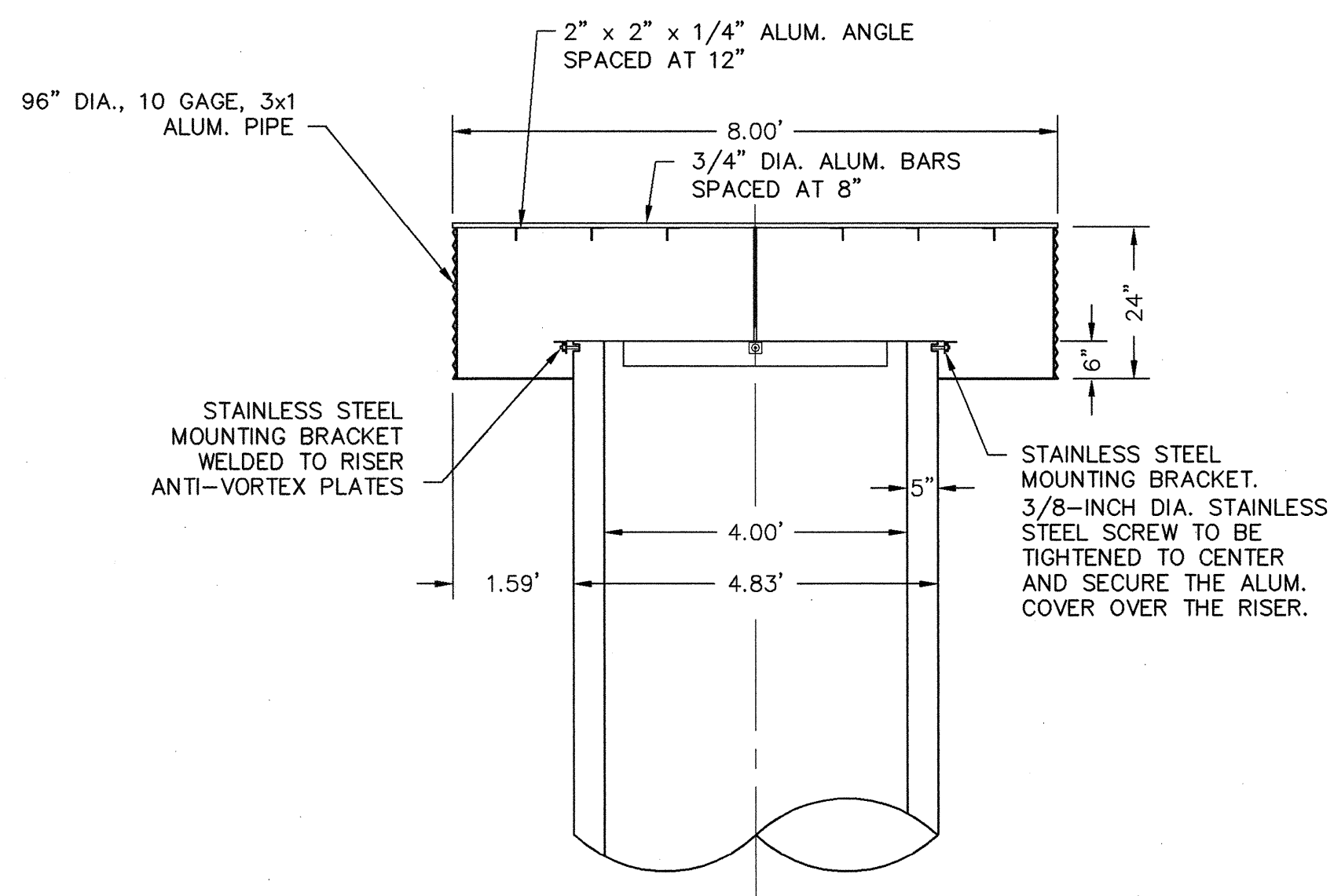
TRASH RACK

SCALE: 1"=2'



ELEVATION - RISER

SCALE: 1"=2'

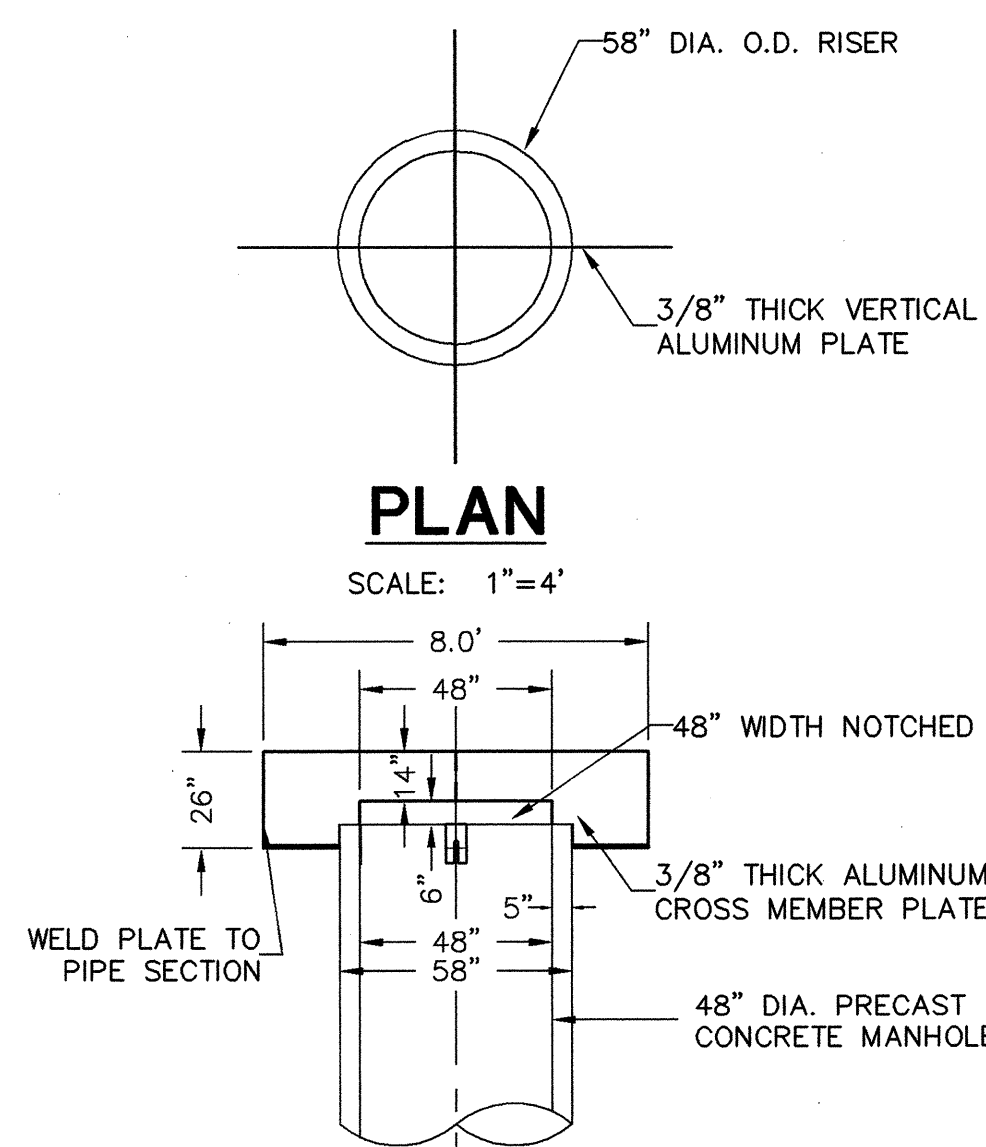


PROFILE

TRASH GUARD AND ANTI-VORTEX COVER

SCALE: 1"=2'

(CROSS SECTION THROUGH PIPE AND VERTICAL PLATE)



SUPPORT PLATE

SCALE: 1"=4'

NOTES:

- CONTRACTOR MAY PROPOSE ALTERNATE DETAILS FOR APPROVAL BY ENGINEER.
- DRILL 3/4-INCH DIA. 3-INCH DEPTH INTO RISER WALL AT EACH MOUNTING BRACKET LOCATION AND ADJUST THE SET SCREWS INTO THE OVERSIZED HOLES TO CENTER AND SECURE THE ALUMINUM COVER ON THE RISER.
- USE FOUR 1/2" DIAMETER STAINLESS STEEL BOLTS 15" LONG WITH 3" OF THREADS TO SECURE THE RISER BASE TO THE ANTI-FLOTATION SLAB. USE 4" X 4" X 3/8" STAINLESS STEEL WASHERS.
- THE MANHOLE SLAB SHOULD HAVE 1.25" DIAMETER HOLES AT SAME SPACING AS ABOVE TO ACCOMMODATE THE ANCHOR CONNECTIONS.
- SHOP DRAWINGS SHOWING ALL DETAILS SHALL BE PROVIDED TO ENGINEER FOR REVIEW AND APPROVAL. ALTERNATIVE DESIGNS MAY BE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL.

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1	ADDRESS NCDOT DESIGN COMMENTS	2-7-06



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 DRAWN BY: KFL
 CHECKED BY: HTM
 H. TILLMAN MARSHALL, P. E.
 DATE: 4-13-07
 NC PROFESSIONAL ENGINEER NUMBER 024831

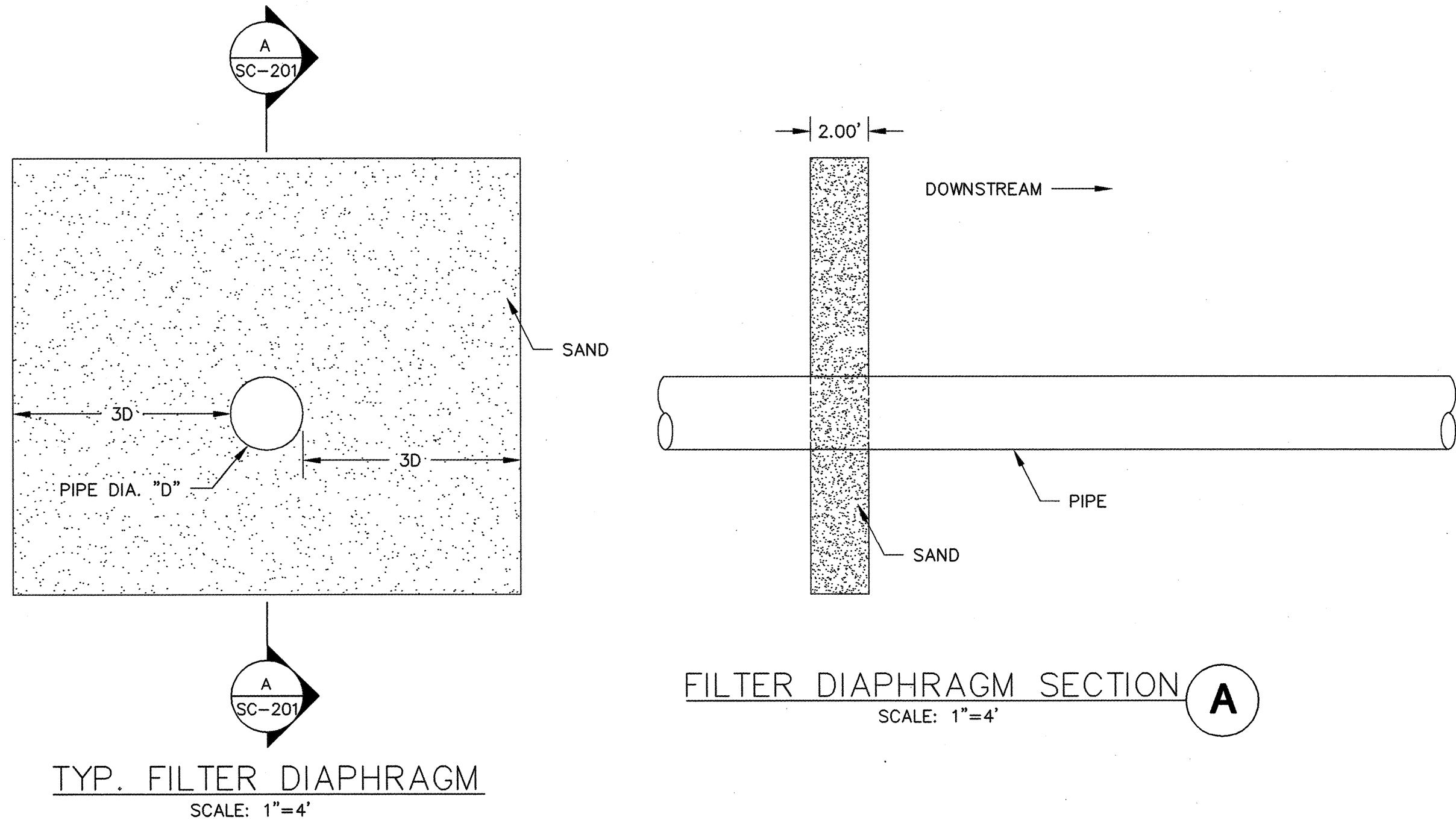


B-0682 SUNSET BEACH DAM
 BRUNSWICK COUNTY, NORTH CAROLINA
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 SCHNABEL PROJECT NUMBER 05210014-02

TRASH GUARDS AND ANTI-VORTEX COVER

SCALE:	DATE:	DRAWING NO.	SHEET
AS SHOWN	1/24/07	D-6	1 OF 1

03/2005 Projects\0210014.02 (Sunset Beach Dam)\CAD\7-SP-E & S.dwg 4-13-07
 xref: \99-Barrier.dwg 03/2005 Projects\0210014.02 (Sunset Beach Dam)\CAD\7-OUTLET PROTECTION.dwg 03/2005 Projects\0210014.02 (Sunset Beach Dam)\CAD\7-SP-E & S.dwg
 03/2005 Projects\0210014.02 (Sunset Beach Dam)\CAD\7-SP-E & S.dwg 4-13-07

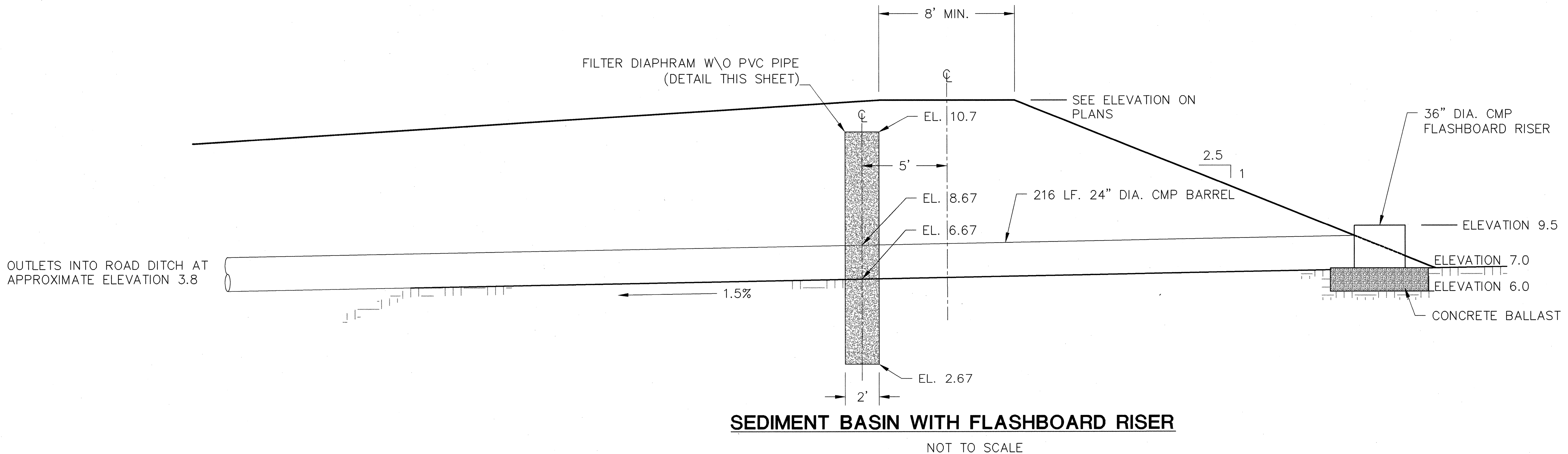
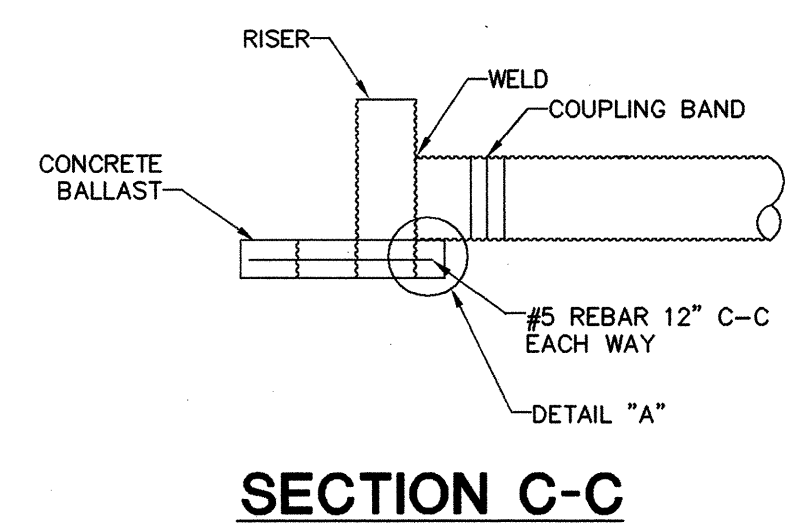
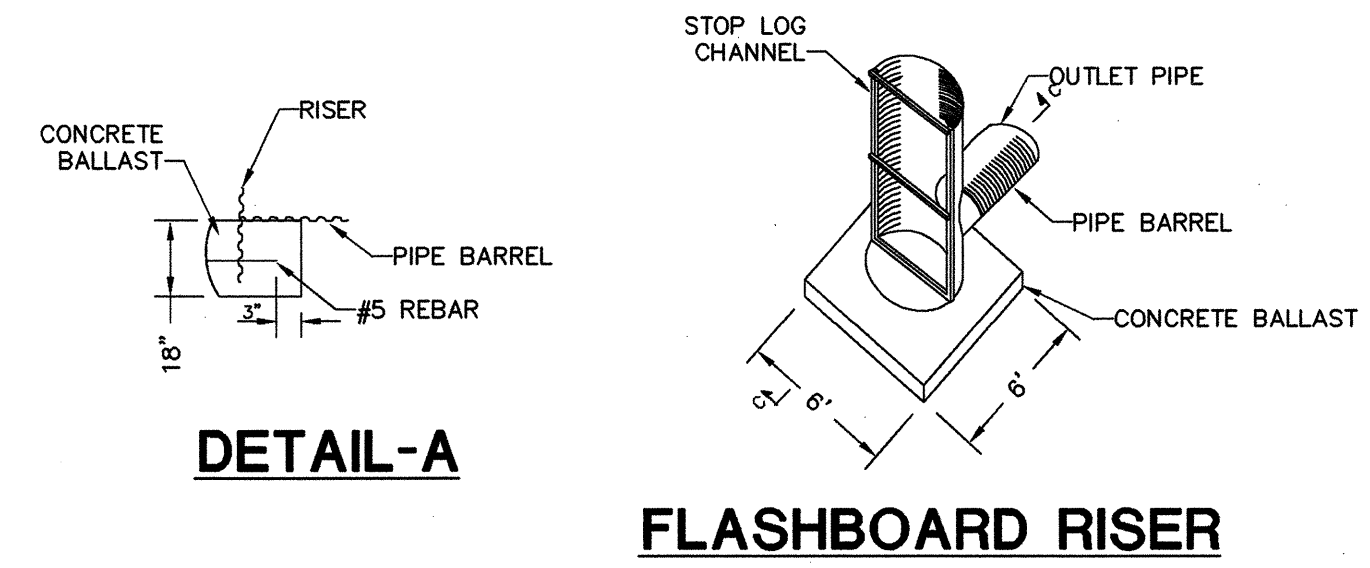


SEDIMENT BASIN WITH FLASHBOARD RISER NOTES:

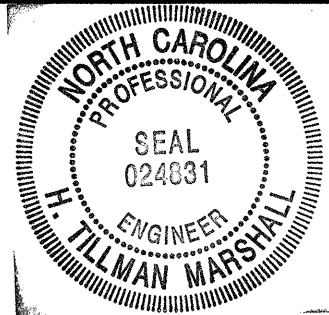
1. SITE PREPARATIONS—CLEAR, GRUB, AND STRIP TOPSOIL FROM AREAS UNDER THE EMBANKMENT TO REMOVE TREES, VEGETATION, ROOTS, AND OTHER OBJECTIONABLE MATERIAL. DELAY CLEARING THE POOL AREA UNTIL THE DAM IS COMPLETE AND THEN REMOVE BRUSH, TREES, AND OTHER OBJECTIONABLE MATERIALS TO FACILITATE SEDIMENT CLEANOUT. STOCKPILE ALL TOPSOIL OR SOIL CONTAINING ORGANIC MATTER FOR USE ON THE OUTER SHELL OF THE EMBANKMENT TO FACILITATE VEGETATIVE ESTABLISHMENT. PLACE TEMPORARY SEDIMENT CONTROL MEASURES BELOW THE BASIN AS NEEDED.
2. CONDUIT SPILLWAYS—SECURELY ATTACH THE RISER TO THE BARREL OR BARREL STUB TO MAKE A WATERTIGHT STRUCTURAL CONNECTION. SECURE ALL CONNECTIONS BETWEEN BARREL SECTIONS BY APPROVED WATERTIGHT ASSEMBLIES. PLACE THE BARREL AND RISER ON A FIRM, SMOOTH FOUNDATION OF IMPERVIOUS SOIL. DO NOT USE PERVIOUS MATERIAL SUCH AS SAND, GRAVEL, OR CRUSHED STONE AS BACKFILL AROUND THE PIPE OR ANTI-SEEP COLLARS. PLACE THE FILL MATERIAL AROUND THE PIPE SPILLWAY IN 4-INCH LAYERS, AND COMPACT IT UNDER AND AROUND THE PIPE TO AT LEAST THE SAME DENSITY AS THE ADJACENT EMBANKMENT. CARE MUST BE TAKEN NOT TO RAISE THE PIPE FROM FIRM CONTACT WITH ITS FOUNDATION WHEN COMPACTING UNDER THE PIPE HAUNCHES. PLACE A MINIMUM DEPTH OF 2 FEET OF COMPACTED BACKFILL OVER THE PIPE SPILLWAY BEFORE CROSSING IT WITH CONSTRUCTION EQUIPMENT. ANCHOR THE RISER IN PLACE BY CONCRETE OR OTHER SATISFACTORY MEANS TO PREVENT FLOTATION. IN NO CASE SHOULD THE PIPE CONDUIT BE INSTALLED BY CUTTING A TRENCH THROUGH THE DAM AFTER THE EMBANKMENT IS COMPLETE.
3. EMERGENCY SPILLWAY—NO EMERGENCY SPILLWAY IS PLANNED.
4. INLETS—DISCHARGE WATER INTO THE BASIN IN A MANNER TO PREVENT EROSION. USE DIVERSIONS WITH OUTLET PROTECTION TO DIVERT SEDIMENT-LADEN WATER TO THE UPPER END OF THE POOL AREA TO IMPROVE BASIN TRAP EFFICIENCY.
5. EROSION CONTROL—CONSTRUCT THE STRUCTURE SO THAT THE DISTURBED AREA IS MINIMIZED. DIVERT SURFACE WATER AWAY FROM BARE AREAS. COMPLETE THE EMBANKMENT BEFORE THE AREA IS CLEARED. STABILIZE THE EMERGENCY SPILLWAY EMBANKMENT AND ALL OTHER DISTURBED AREAS ABOVE THE CREST OF THE PRINCIPAL SPILLWAY IMMEDIATELY AFTER CONSTRUCTION.
6. INSTALL PORUS BAFFLES AS SHOWN ABOVE.

MAINTENANCE:

1. INSPECT TEMPORARY SEDIMENT BASINS WEEKLY AND AFTER EACH SIGNIFICANT (1/2 INCH OR GREATER) RAINFALL EVENT AND REPAIR IMMEDIATELY. REMOVE SEDIMENT AND RESTORE THE BASIN TO ITS ORIGINAL DIMENSIONS WHEN IT ACCUMULATES TO ONE-HALF THE DESIGN DEPTH. PLACE REMOVED SEDIMENT IN DESIGNATED DISPOSAL AREA.
2. CHECK THE EMBANKMENT, SPILLWAYS, AND OUTLET FOR EROSION DAMAGE, AND INSPECT THE EMBANKMENT FOR PIPING AND SETTLEMENT. MAKE ALL NECESSARY REPAIRS IMMEDIATELY. REMOVE ALL TRASH AND OTHER DEBRIS FROM THE RISER AND POOL AREA.



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REV.	DESCRIPTION	DATE
3	ADDRESS NCDOT DESIGN COMMENTS	2-5-07
2	ADDRESS NCDOT DESIGN COMMENTS	1-24-07
1	ADDRESS NCDOT DESIGN COMMENTS	12-11-06



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H. TILLMAN MARSHALL, P.E.		
DATE: 4/13/07		
NC PROFESSIONAL ENGINEER NUMBER 024831		

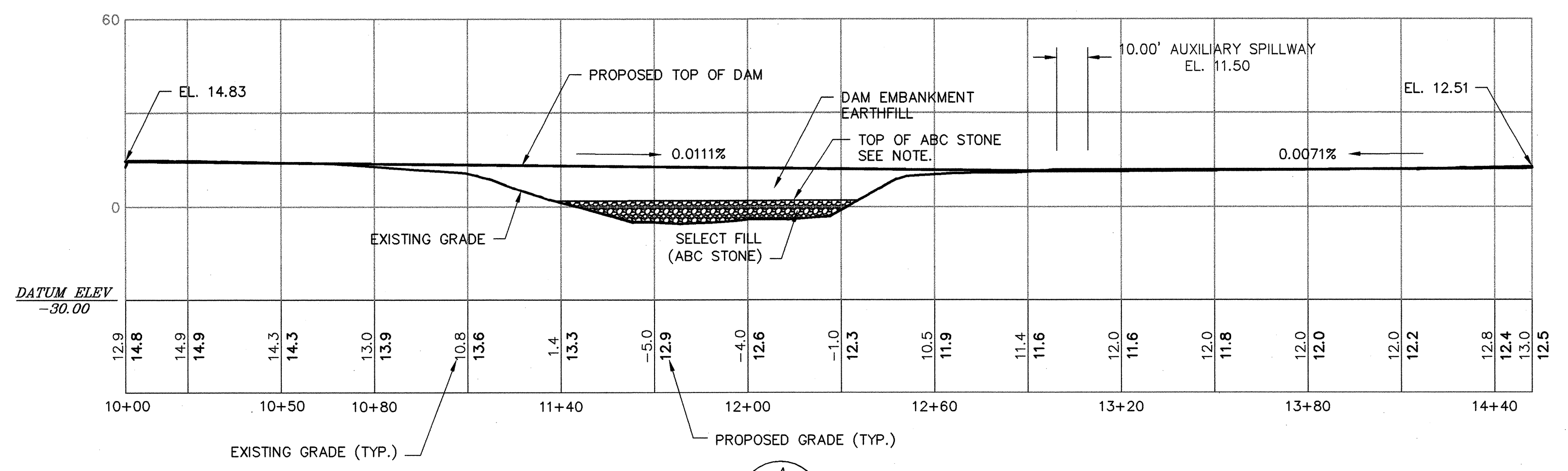
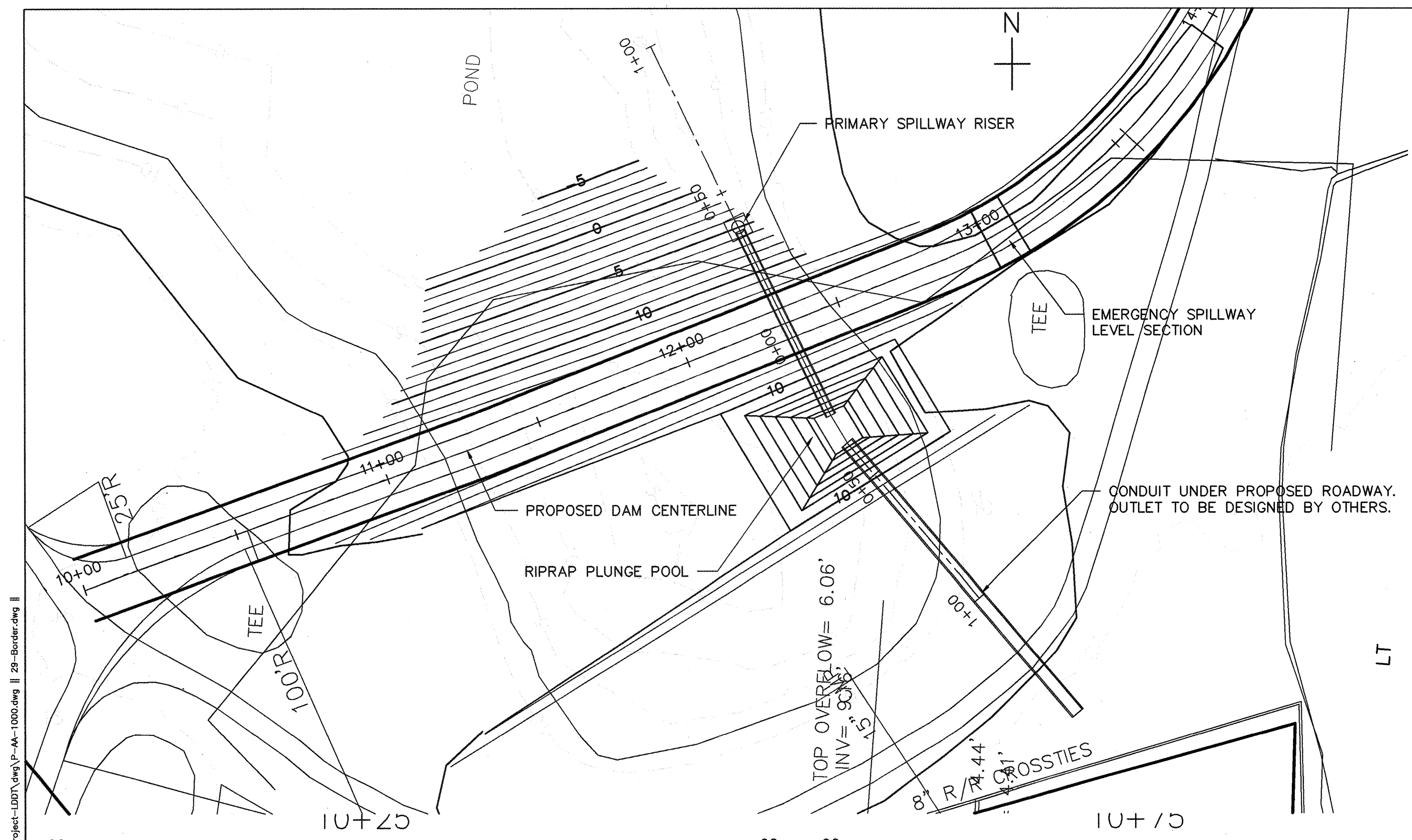
Schnabel Engineering
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B-0682 SUNSET BEACH DAM
 BRUNSWICK COUNTY, NORTH CAROLINA
 N.C. DEPARTMENT OF TRANSPORTATION

SCHNABEL PROJECT NUMBER
 05210014.02

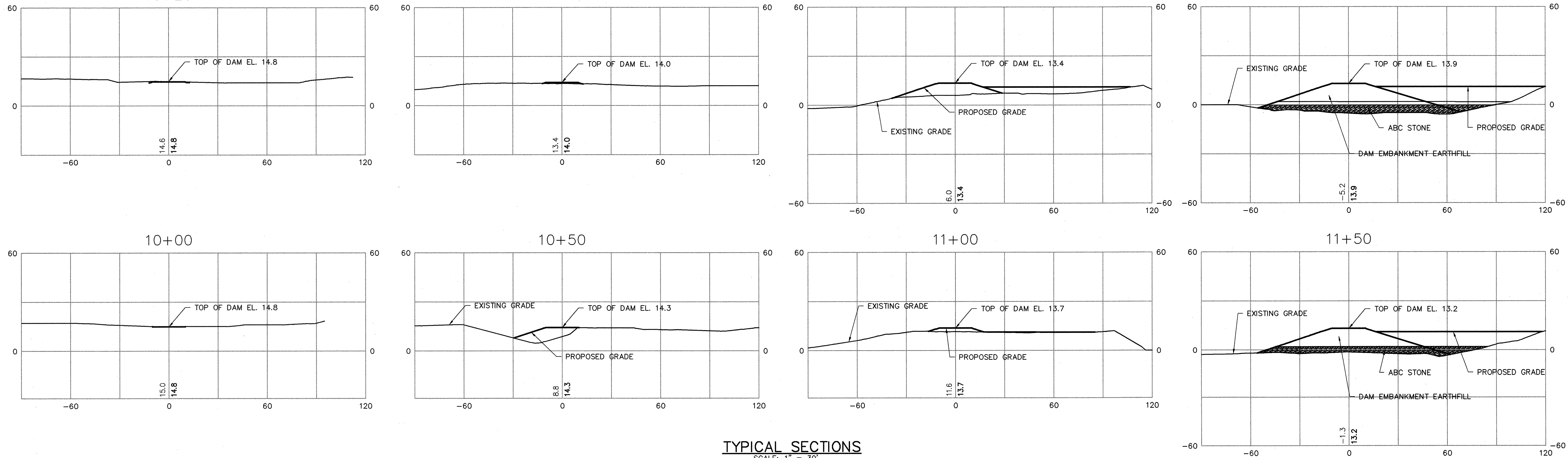
SEDIMENT BASIN DETAILS			
SCALE: AS SHOWN	DATE: 4/13/07	DRAWING NO. D-7	SHEET 1 OF 1

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SECTION A
ALONG CENTERLINE OF DAM
 SCALE: 1"=30'

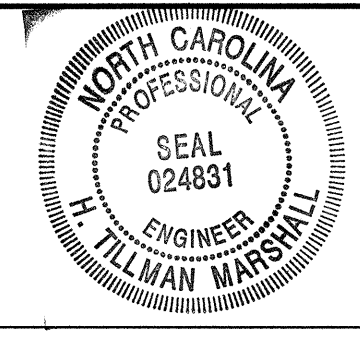
NOTE: ABC STONE SHALL BE PLACED TO A MAXIMUM ELEVATION OF +2.0.



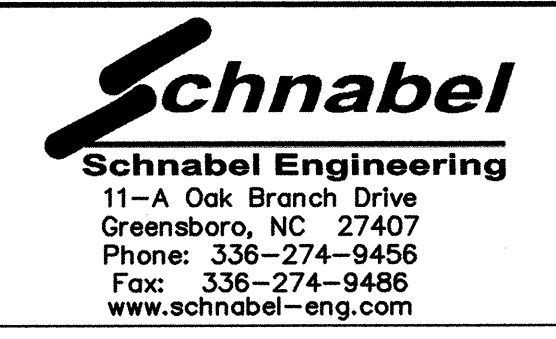
TYPICAL SECTIONS
 SCALE: 1" = 30'

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3	ADDRESS NCDOT DESIGN COMMENTS	2-5-07
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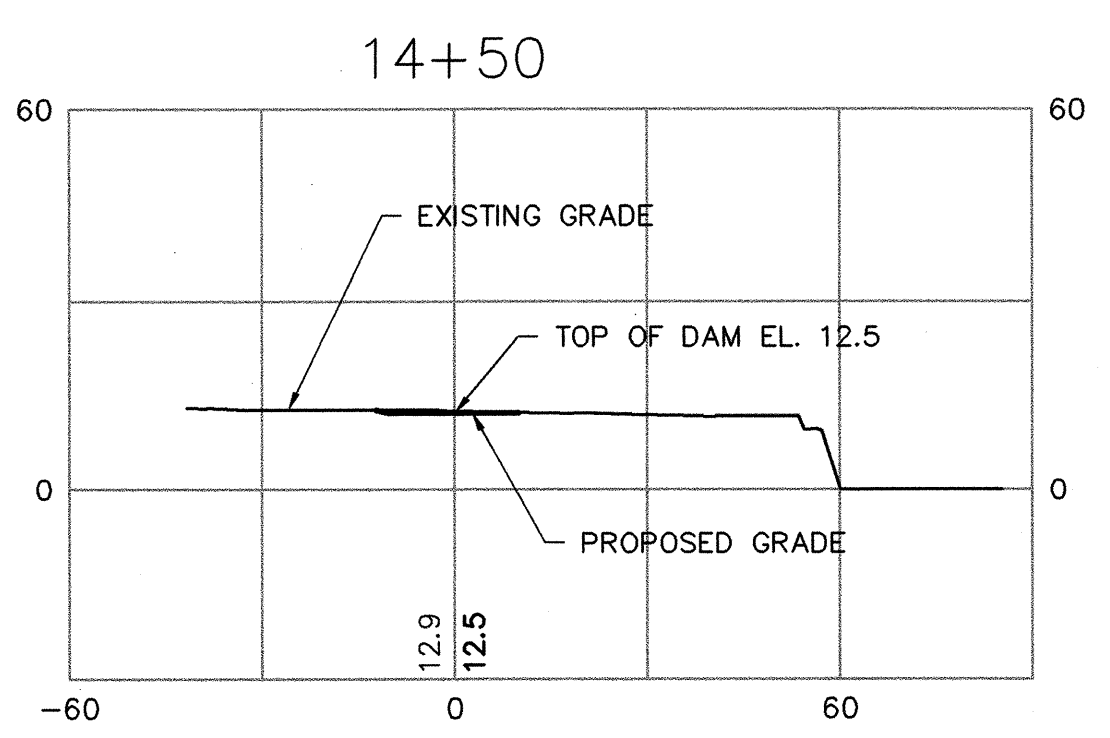
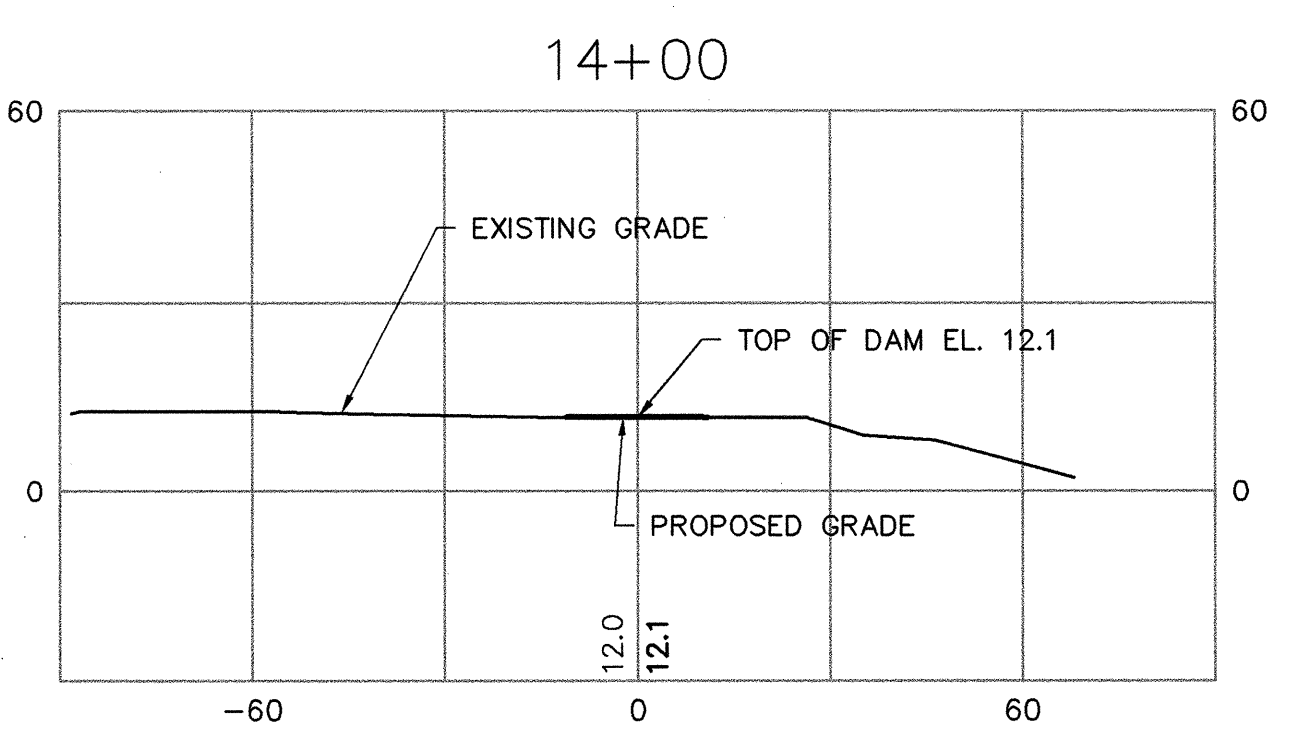
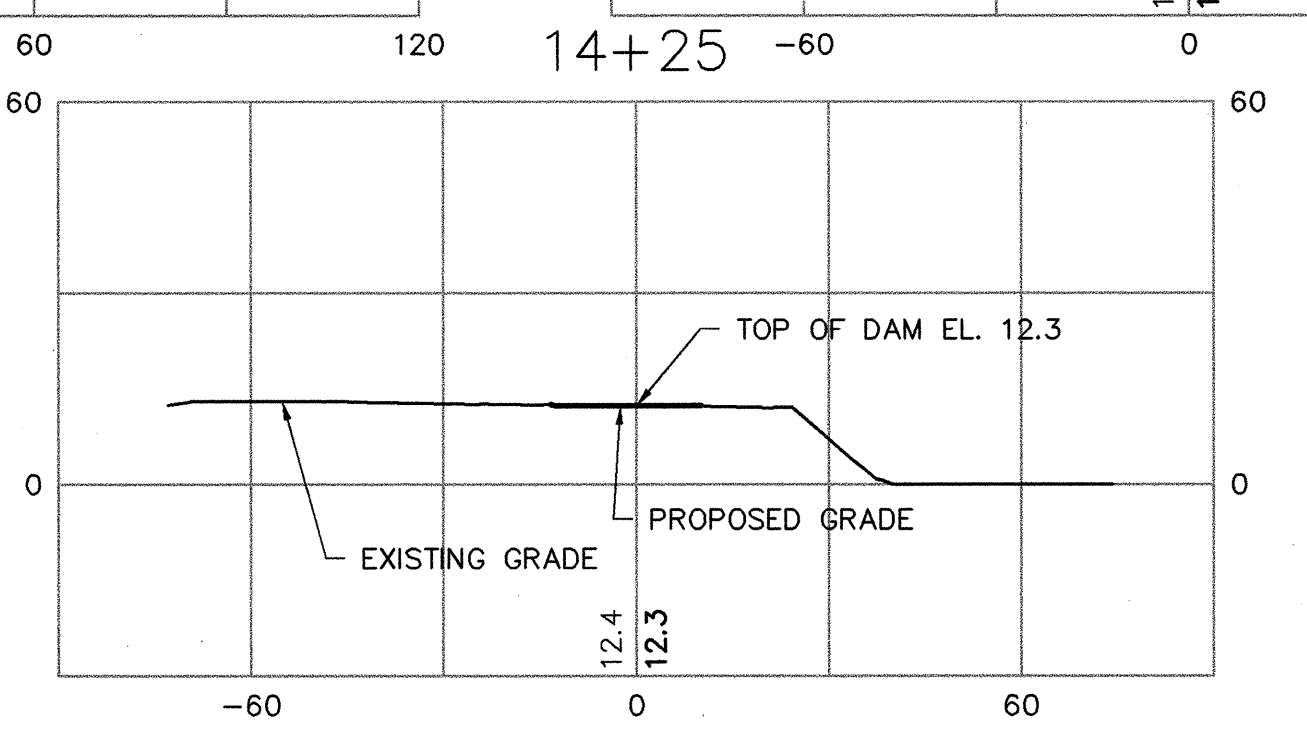
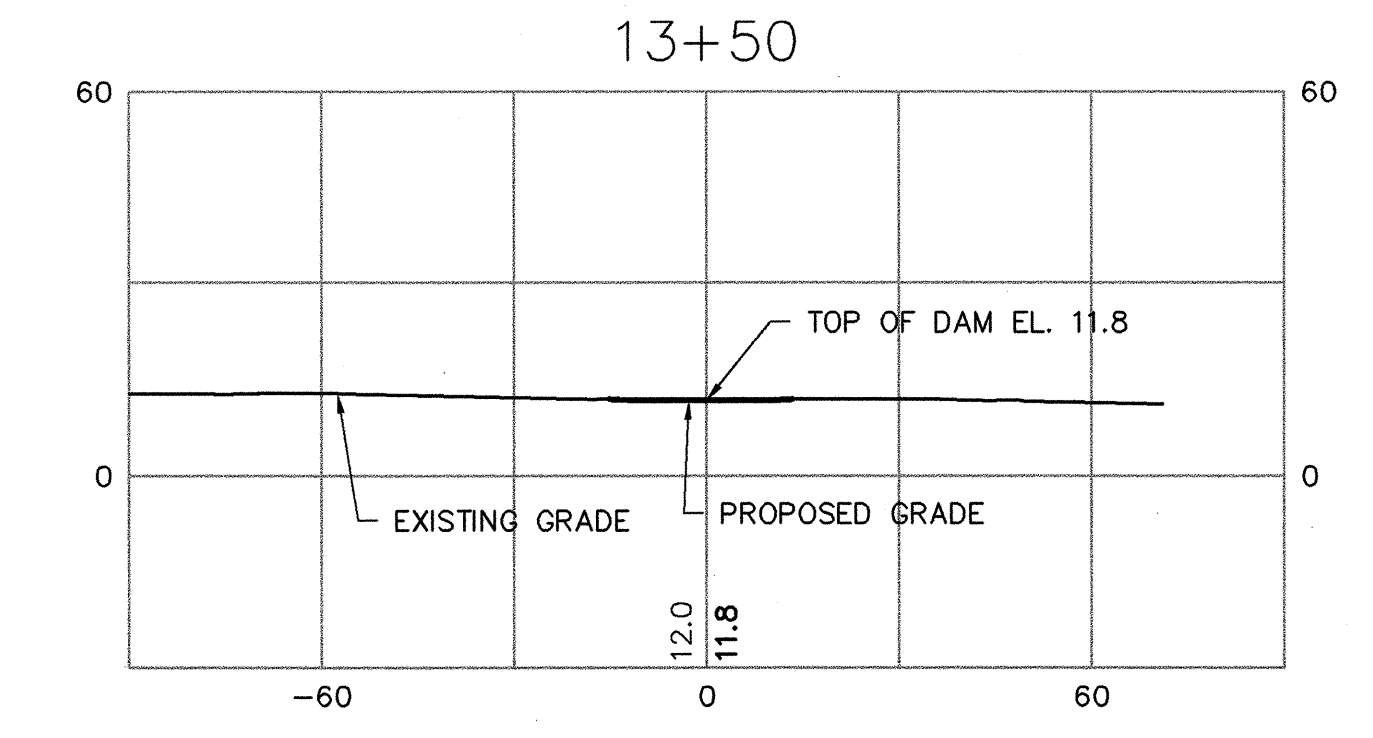
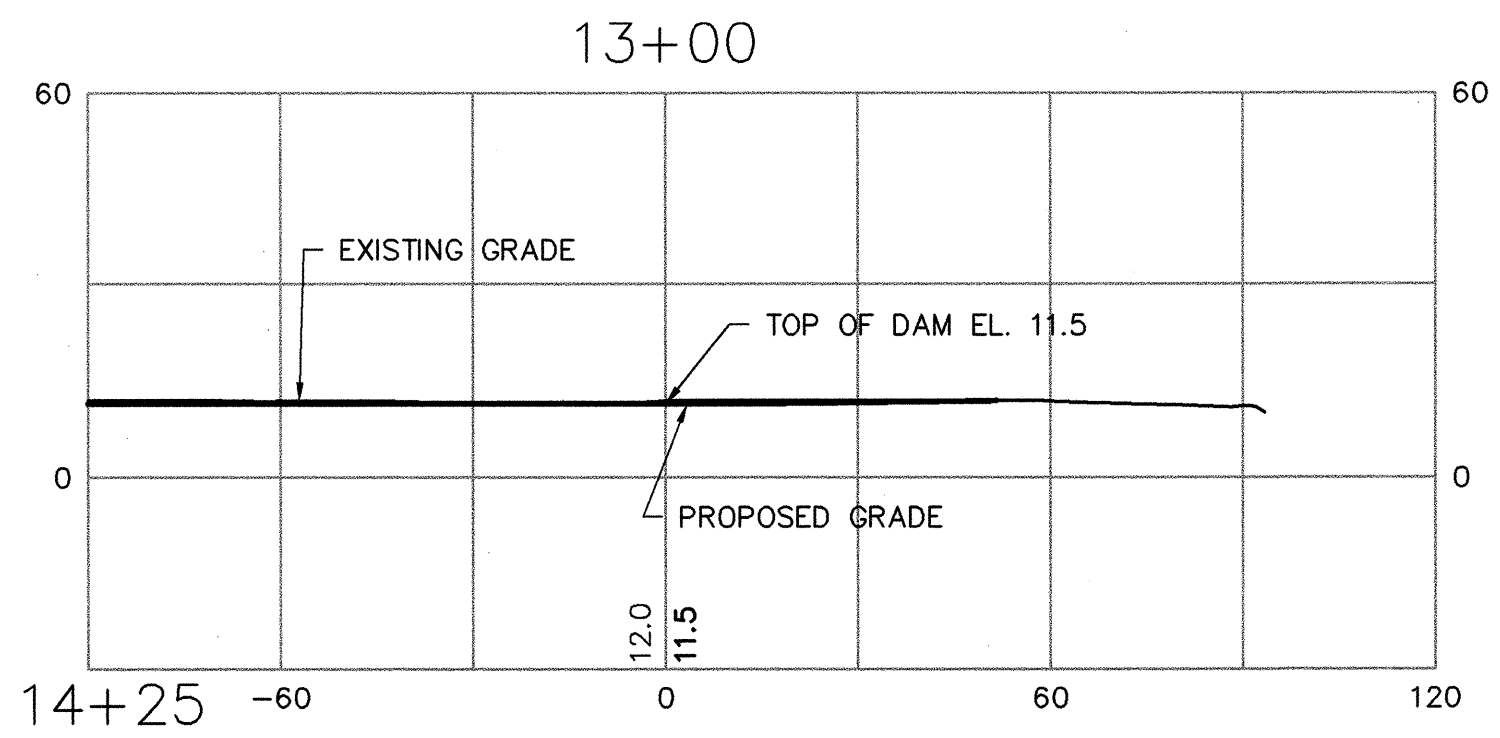
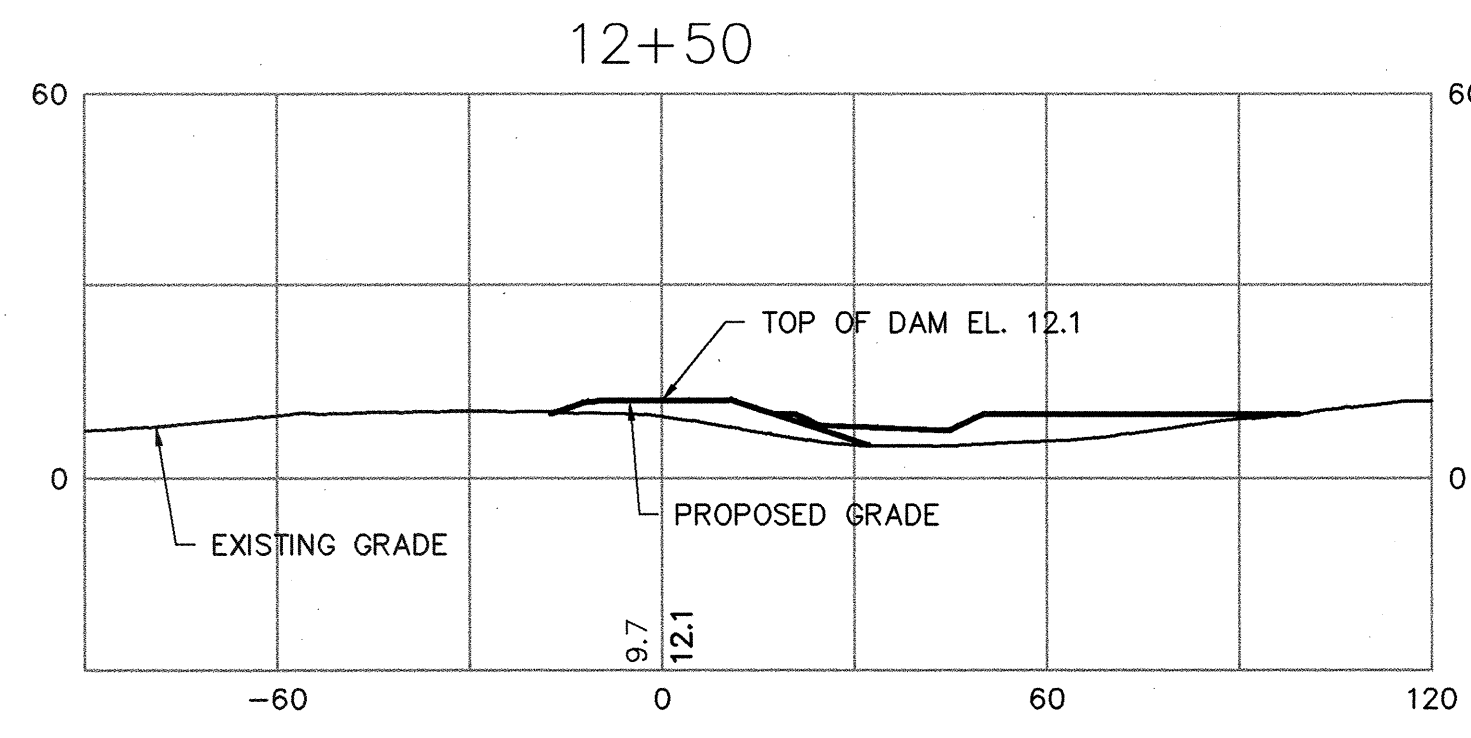
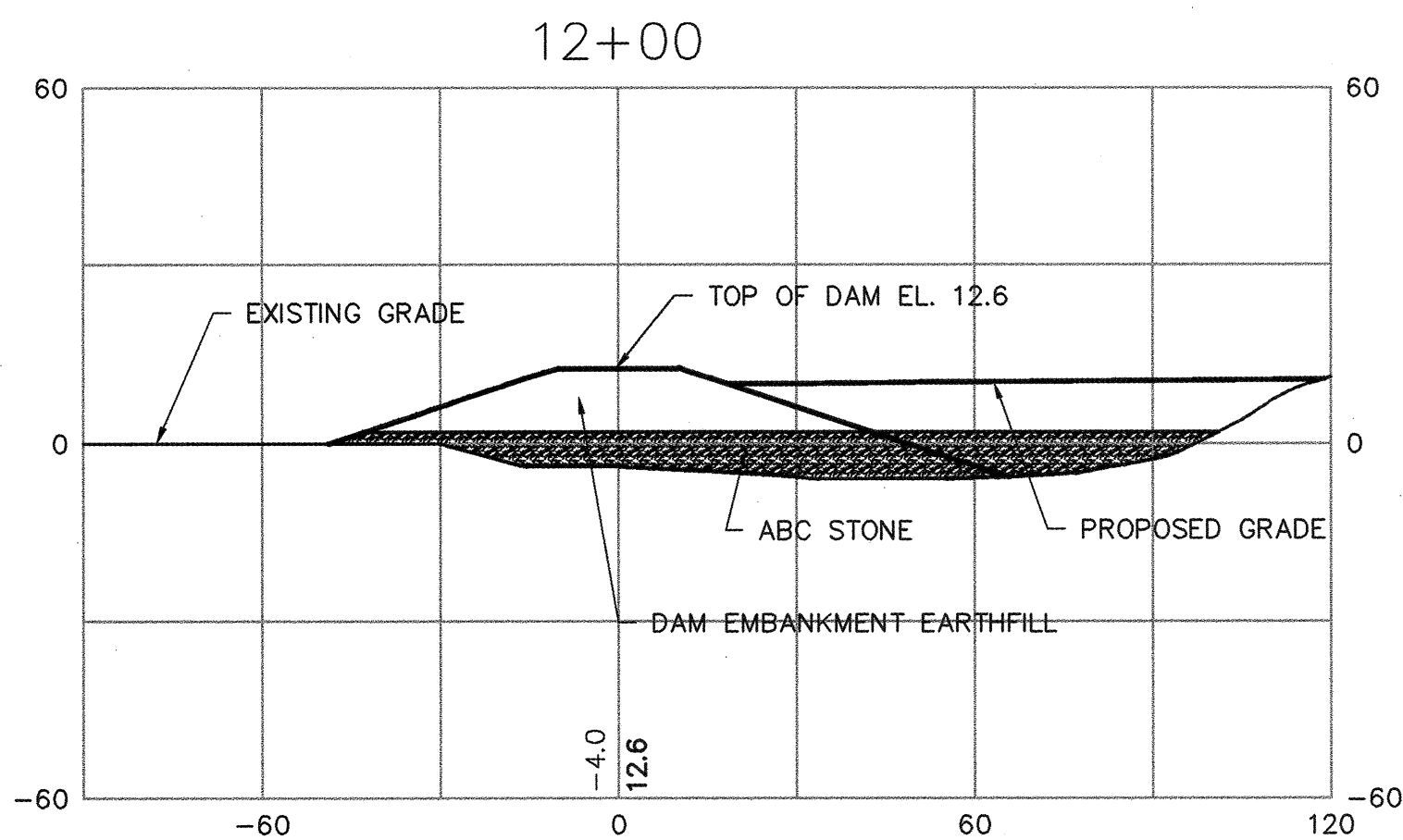
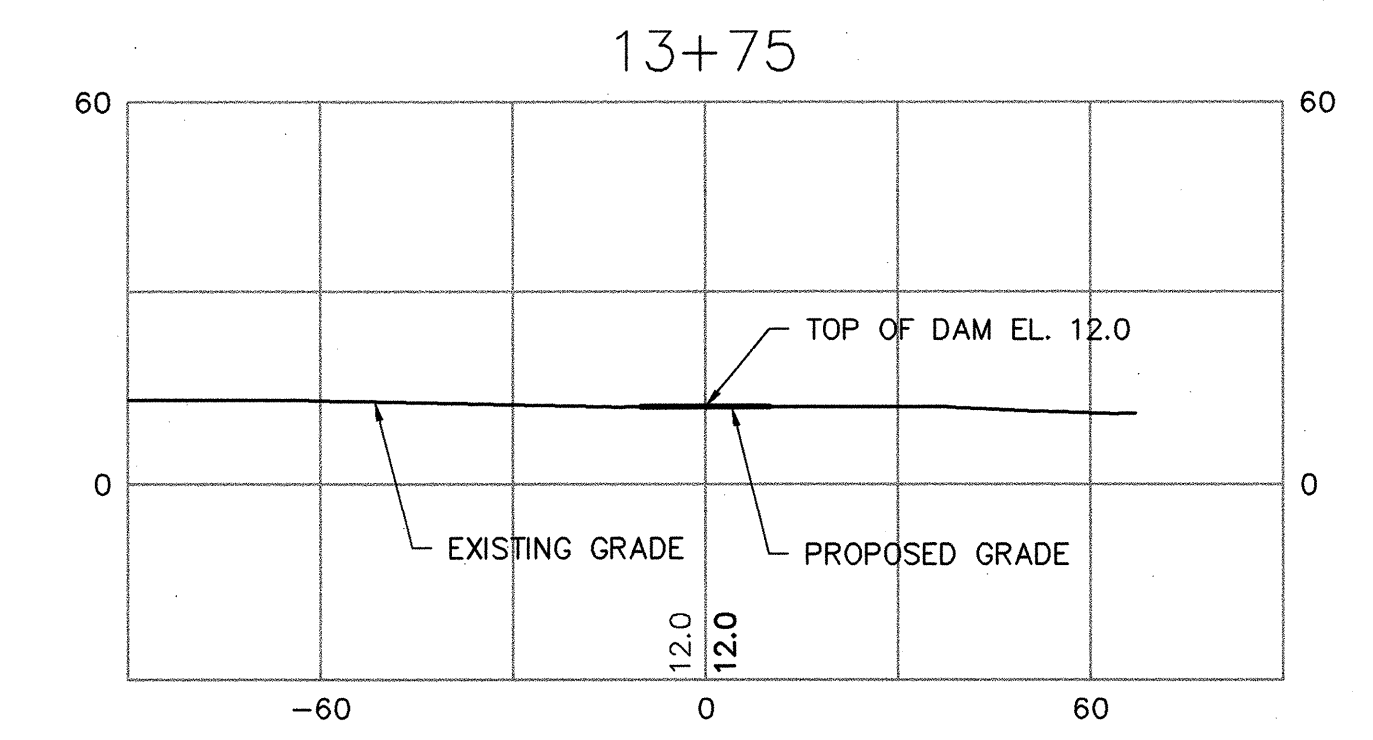
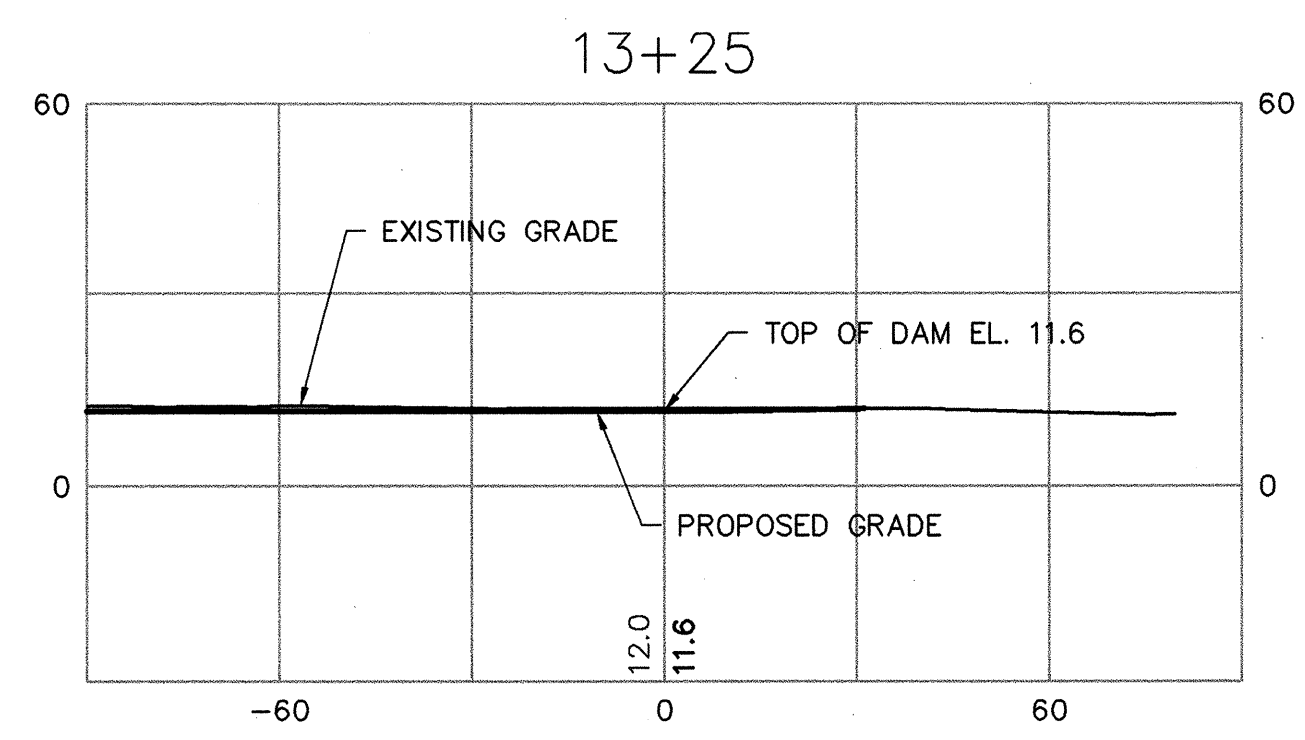
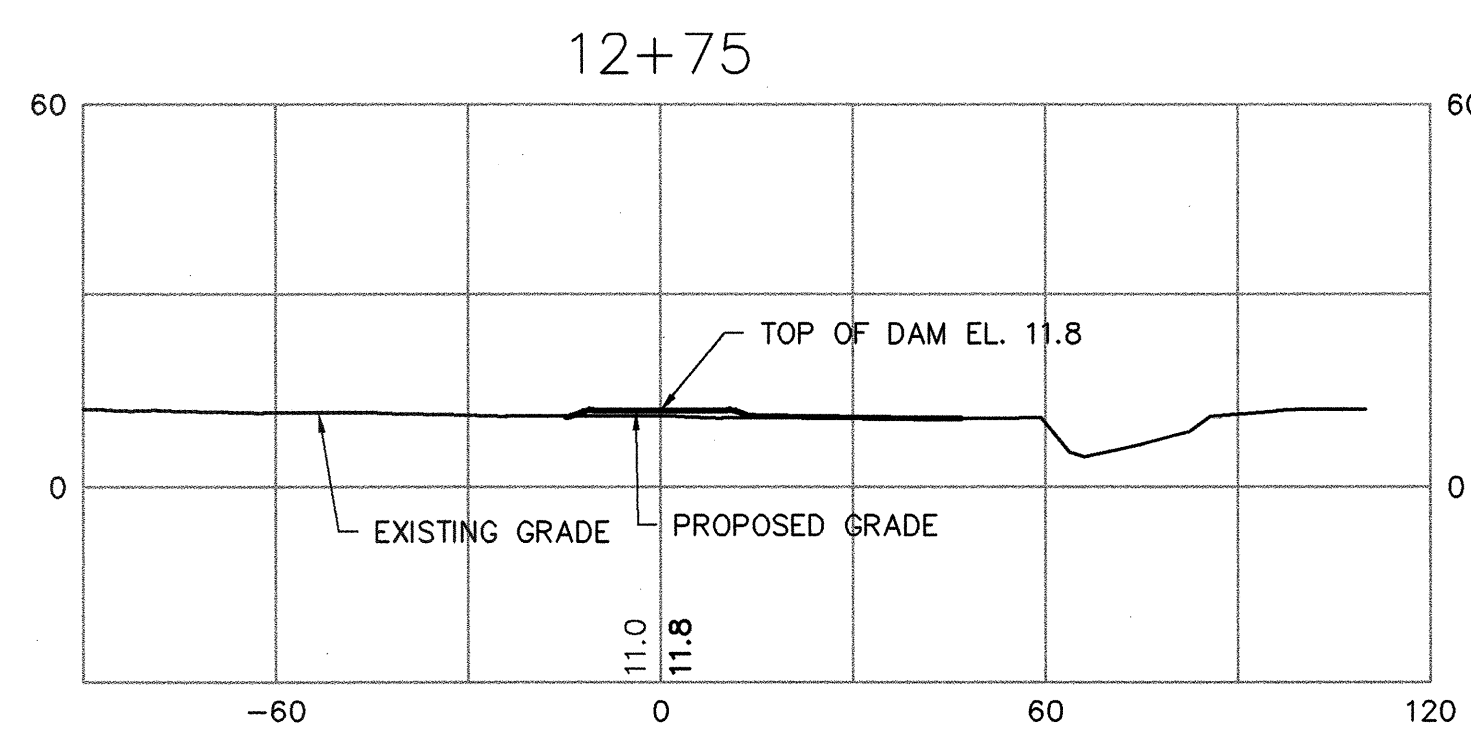
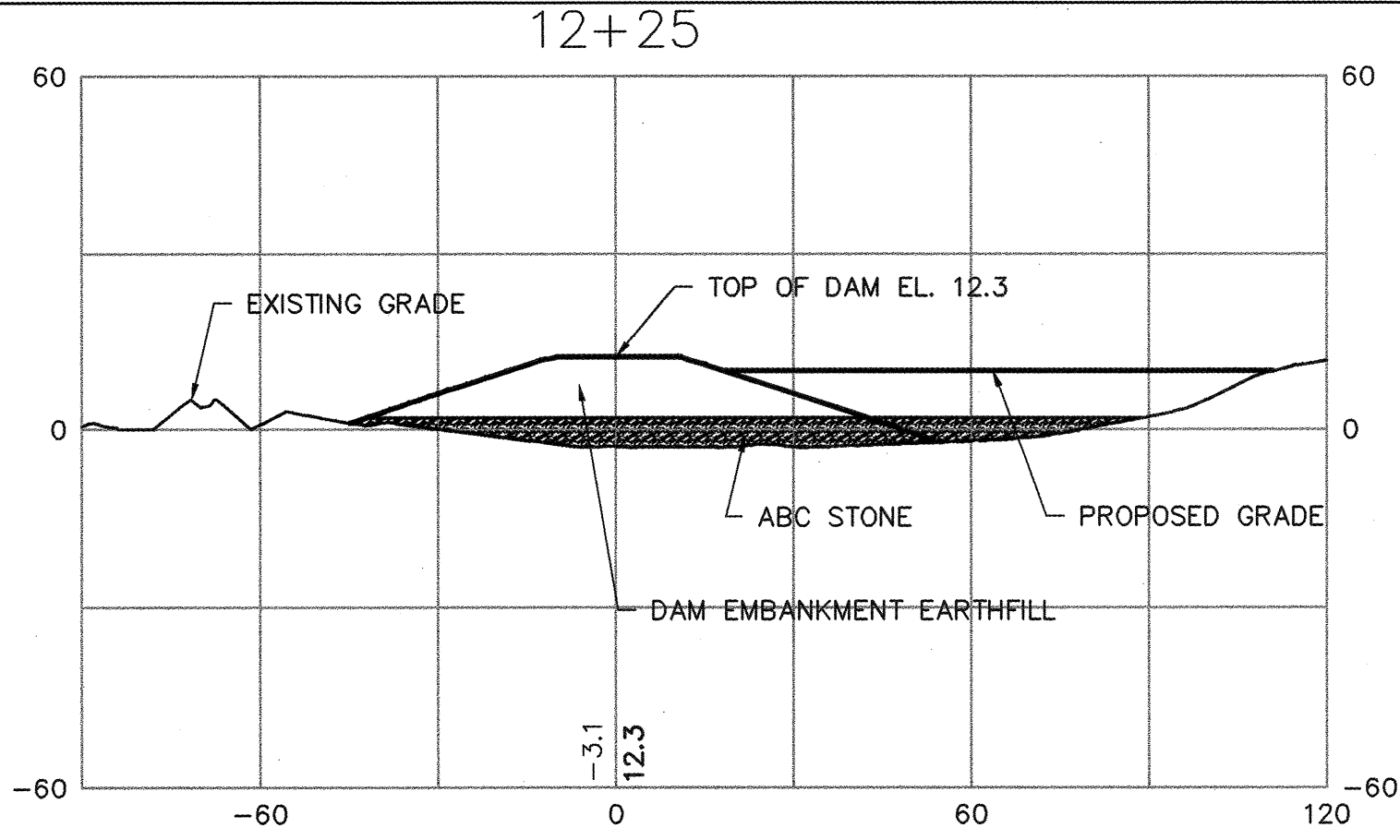
DESIGNED BY: HTM
 DRAWN BY: KFL/PK
 CHECKED BY: HTM
H. TILLMAN MARSHALL, P.E.
 DATE: 4-13-07
 NC PROFESSIONAL ENGINEER NUMBER 024831



B-0682 SUNSET BEACH DAM
 BRUNSWICK COUNTY, NORTH CAROLINA
 N.C. DEPARTMENT OF TRANSPORTATION
 SCHNABEL PROJECT NUMBER
 05210014.02

PLAN, PROFILE AND CROSS SECTIONS OF DAM			
SCALE: AS SHOWN	DATE: 4/13/07	DRAWING NO. D-9	SHEET 1 OF 1

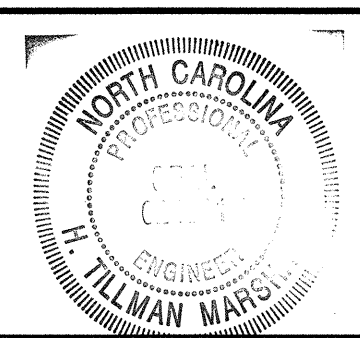
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TYPICAL SECTIONS
SCALE: 1" = 30'

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1	ADDRESS NCDOT DESIGN COMMENTS	12-11-06



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H. TILLMAN MARSHALL, P.E.		
<i>H. Tillman Marshall</i>		
DATE: 4-13-07		
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CROSS SECTIONS - ☐ OF DAM			
SCALE: AS SHOWN	DATE: 4/13/07	DRAWING NO. D-10	SHEET 1 OF 1