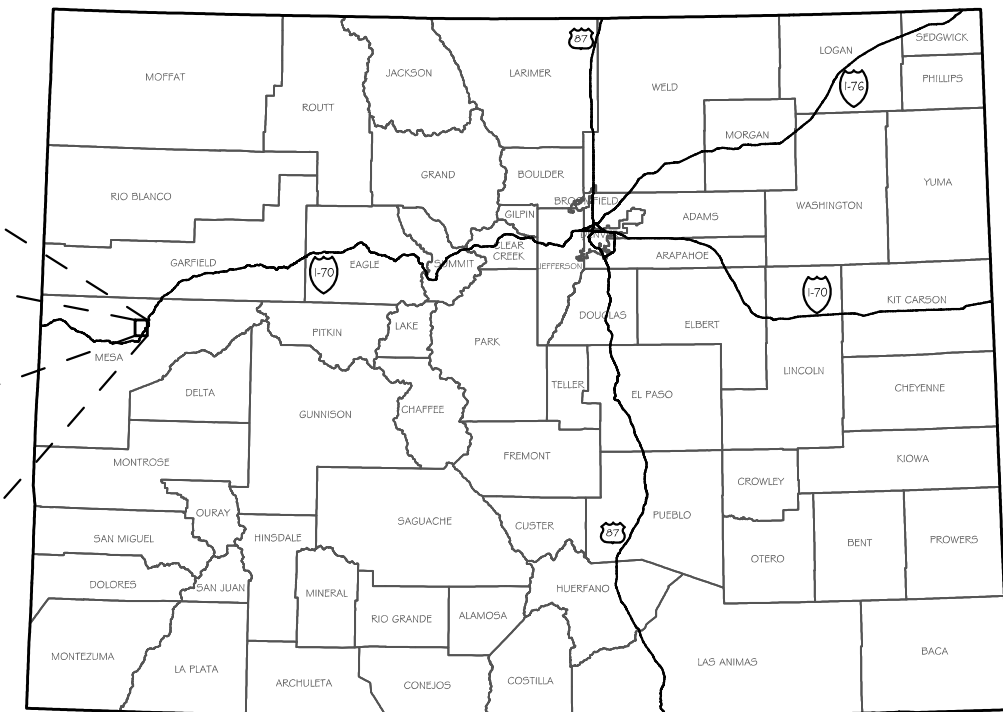
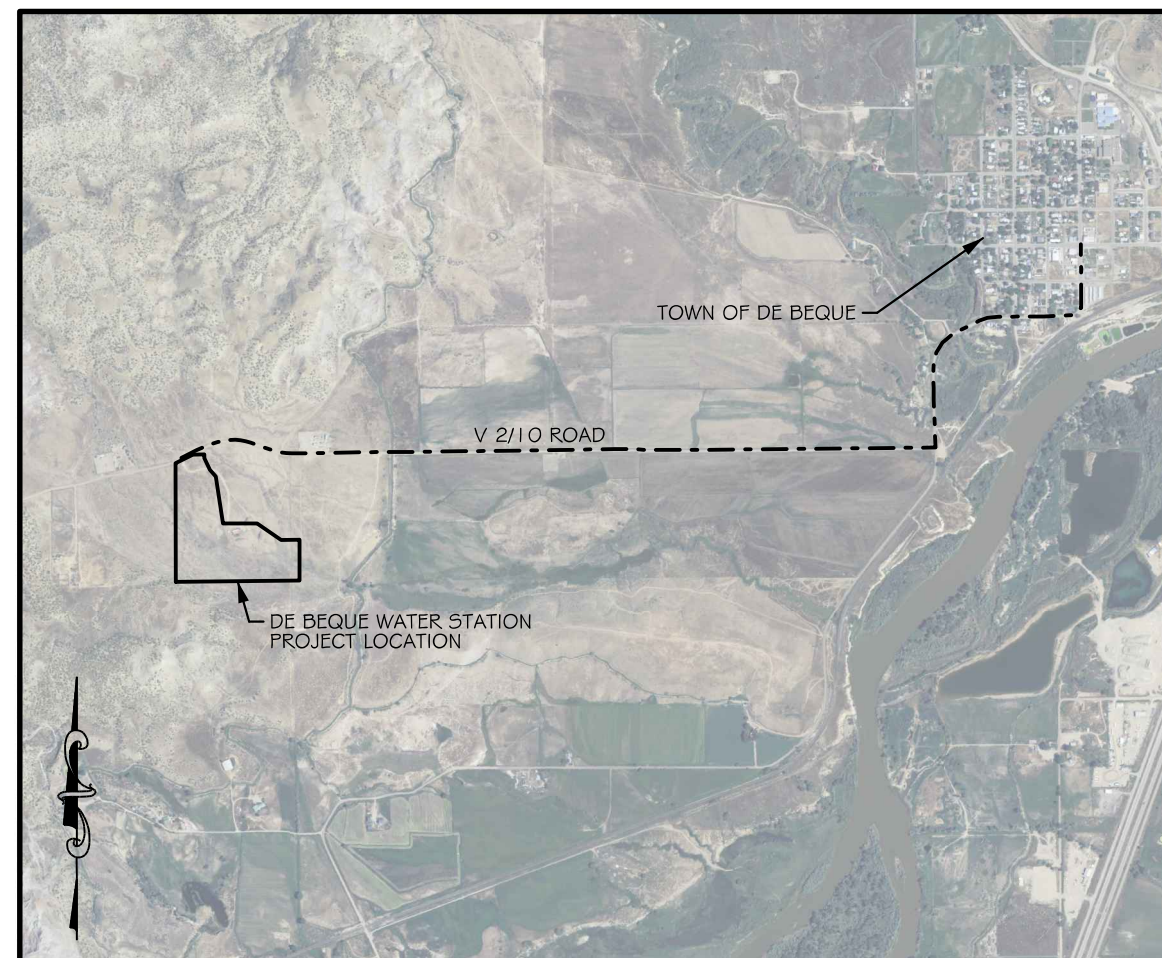




DE BEQUE WATER STATION PRODUCED WATER REUSE FACILITY - POND 3

LOCATED IN SECTION 29, T. 8 S., R. 97 W. 6TH P.M.,
MESA COUNTY, COLORADO
WATER DIVISION 5 - COLORADO RIVER BASIN
WATER DISTRICT 72 - LOWER COLORADO RIVER
SUBMITTED: MARCH 2015



STATE OF COLORADO



Providing Quality Services to the Rocky Mountain Region Since 1980



DE BEQUE WATER STATION - POND 3

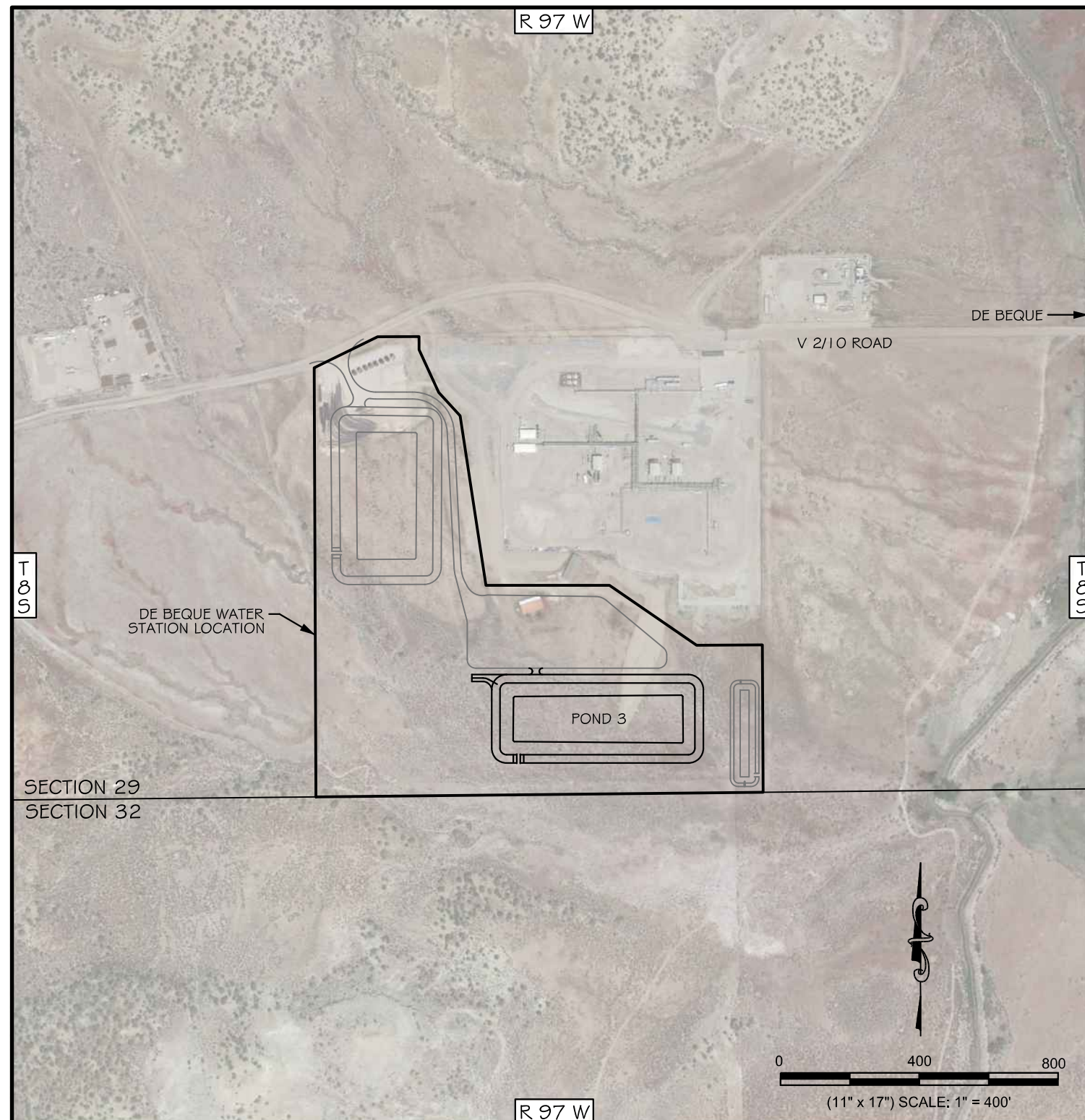
COLORADO DIVISION OF WATER RESOURCES DAMID 700109

LOCATED IN SECTION 29, T. 8 S., R. 97 W. 6TH P.M.,

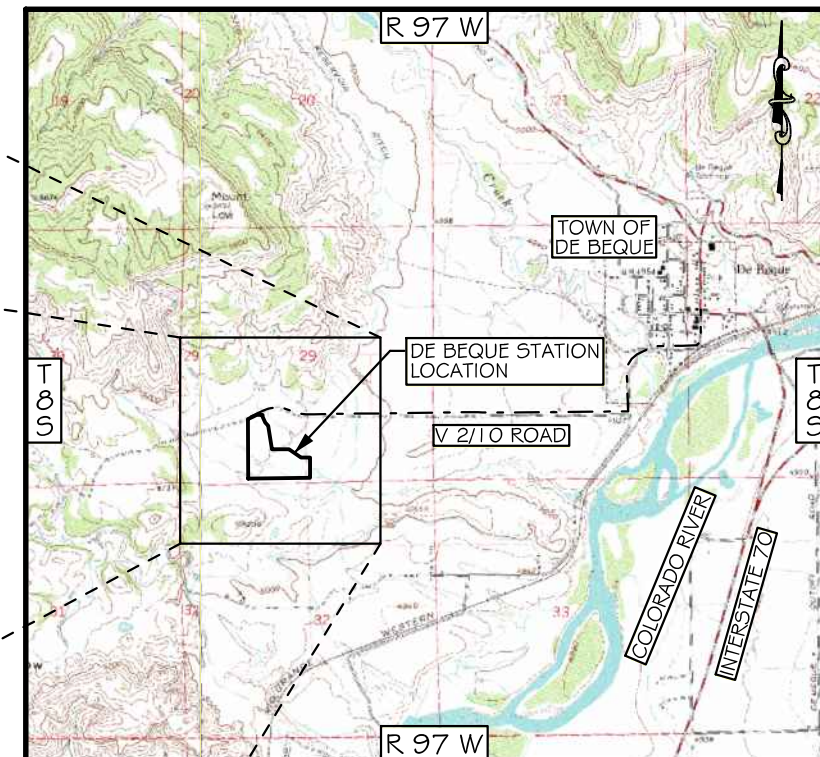
MESA COUNTY, COLORADO

WATER DIVISION 5 - COLORADO RIVER BASIN

WATER DISTRICT 72 - LOWER COLORADO RIVER



LOCATION MAP



VICINITY MAP



CERTIFICATE OF ENGINEER

I, SHAWN T. HIGLEY, HEREBY STATE THAT THESE CONSTRUCTION DRAWINGS WERE DESIGNED BY MYSELF OR UNDER MY DIRECT SUPERVISION AND THAT THEY REPRESENT THE CONDITIONS DESCRIBED IN THE ACCOMPANYING FACILITY DESIGN WHICH IS PROVIDED TO MEET THE REQUIREMENTS OF THE COLORADO STATE ENGINEER'S OFFICE AS WELL AS THE COLORADO OIL AND GAS CONSERVATION COMMISSION AND THEIR ACCOMPANYING REGULATIONS.

SHAWN T. HIGLEY, COLORADO P.E. NO. 47398

APPROVED ON THE _____ DAY OF _____ 2015.

WILLIAM T. MCCORMICK III, DAM SAFETY BRANCH CHIEF
CO PE NO. 29127

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CONSTRUCTION
FILE NUMBER

C-2031

DE BEQUE WATER STATION
POND 3

Title Sheet

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3/19/2015

DSGN	DATE	CKD
DDP	08/14	STH
REV	DATE	CKD
DDP	02/15	STH
MMZ	03/15	STH
JOB # 2013-134		

ABBREVIATIONS

@	AT	DIA	DIAMETER	INT	INTERIOR	SQ IN	SQUARE INCH
AB	ANCHOR BOLT, AGGREGATE BASE	DIAG	DIAGONAL	JB	JUNCTION BOX	SST	STAINLESS STEEL
ABDN	ABANDON	DIM	DIMENSION	JT	JOINT	STA	STATION
ABV	ABOVE	DIMJ	DUCTILE-IRON MECHANICAL JOINT	LBS	POUNDS	STD	STANDARD
AC	ASPHALTIC CONCRETE, ASBESTOS CEMENT	DIR	DIRECTION	LF	LINEAR FEET	STL	STEEL
ADD	ADDITIONAL	DN	DOWN	LONG	LONGITUDINAL	STRUCT	STRUCTURE
ADJ	ADJACENT, ADJUST	DR	DOOR	LT	LEFT	SYM	SYMMETRICAL
ADPTR	ADAPTER	DWG	DRAWING	LVL	LEVEL	T#B	TOP AND BOTTOM
AFF	ABOVE FINISHED FLOOR	EA	EACH	MAT	MATERIAL	TB	THRUST BACK
ANCH	ANCHOR	EF	EACH FACE, EXHAUST FAN	MAX	MAXIMUM	TBC	TOP BACK OF CURVE
ALUM	ALUMINUM	EL, ELEV	ELEVATION	MECH	MECHANICAL	TEL	TELEPHONE
ALT	ALTERNATE	ELB	ELBOW	MFD	MANUFACTURED	TF	TOP FACE
ANG	ANGLE	ELEC	ELECTRIC, ELECTRICAL	MFR	MANUFACTURE, MANUFACTURER	TEMP	TEMPORARY
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE	ENCL	ENCLOSE	MH	MANHOLE	THK	THICK
APPROX	APPROXIMATE	ENGR	ENGINEER	MIN	MINIMUM	THRU	THROUGH
APVD	APPROVED	EP	EDGE OF PAVEMENT	MISC	MISCELLANEOUS	T.O.	TOP OF
ARCH	ARCHITECTURE, ARCHITECTURAL	EQL	EQUAL, EQUALLY	MJ	MECHANICAL JOINT	T.P.	OUTSIDE TOP OF PIPE
ASPH	ASPHALT	EQL SP	EQUALLY SPACED	MPWSS	MONTANA PUBLIC WORKS STANDARD SPECIFICATIONS	TOC	TOP OF CONCRETE, TOP OF CURB
ASSEM	ASSEMBLY	EQUIP	EQUIPMENT			TYP	TYPICAL
AVG	AVERAGE	EQUIV	EQUIVALENT	NIC	NOT IN CONTRACT	UBC	UNIFORM BUILDING CODE
BD	BOARD	EVC	END VERTICAL CURVE	NO, #	NUMBER	UG	UNDERGROUND
BFV	BUTTERFLY VALVE	EW	EACH WAY	NOM	NOMINAL	ULT	ULTIMATE
BF	BOTTOM FACE	EXC	EXCAVATE	NTS	NOT TO SCALE	UTIL	UTILITY
BH	BOREHOLE	EXP	EXPANSION	OC	ON CENTER	V	VALVE
BLDG	BUILDING	EXP JT	EXPANSION JOINT	OD	OUTSIDE DIAMETER	VB	VALVE BOX
BLK	BLOCK	EXST	EXISTING	OF	OUTSIDE FACE	VERT	VERTICAL
BLW	BELOW	EXT	EXTENSION, EXTERIOR	OHP	OVERHEAD POWER	VOL	VOLUME
BM	BENCHMARK	F	FLANGE	OPNG	OPENING	VRFY	VERIFY
BMP	STORMWATER BEST MANAGEMENT PRACTICES	FAB	FABRICATE	OPT	OPTIONAL	W	WIDTH
BOT	BOTTOM	FB	FLAT BAR, FACE BRICK	PC	POINT OF CURVE	WJ	WITH
BRG	BEARING	FC	FLEXIBLE COUPLING	PEN	PENETRATION	W/O	WITHOUT
BRKT	BRACKET	FCA	FLANGE COUPLING ADAPTER	PERP	PERPENDICULAR	WL, W	WATERLINE
BTWN	BETWEEN	FD	FLOOR DRAIN	PH	PIPE HANGER	WM	WIRE MESH, WATER MAIN
BV	BALL VALVE	FDN	FOUNDATION	PI	POINT OF INTERSECTION	WS	WATERSTOP, WATER SURFACE
BVC	BEGIN VERTICAL CURVE	FES	FLARED END SECTION	PJF	PREMOLDED JOINT FILLER	WSTL	WELDED STEEL, WROUGHT STEEL
CFs	CUBIC FEET PER SECOND	FET	FLARED END TERMINAL	PL	PROPERTY LINE	WT	WEIGHT
CHAN	CHANNEL	FF	FINISHED FLOOR	PLYWD	PLYWOOD	WTR	WATER
CHK	CHECK	FG	FINISH GRADE	PNL	PANEL	WV	WATER VALVE
CI	CAST IRON	FH	FIRE HYDRANT	POT	POINT OF TANGENT	WWF	WELDED WIRE FABRIC
CIMJ	CAST-IRON PIPE MECHANICAL JOINT	FL	FLOOR, FLOW	PRCST	PRECAST	WWM	WELDED WIRE MESH
CIP	CAST-IRON PIPE FLANGED JOINT	FLEX	FLEXIBLE	PREFAB	PREFABRICATED	YD	YARD
CIPC	CAST-IN-PLACE CONCRETE	FLG	FLANGE	PRELIM	PRELIMINARY		
CIRC	CIRCULAR	FLL	FLOW LINE	PREP	PREPARE, PREPARATION		
CJ	CONSTRUCTION JOINT, CONTROL JOINT	FIN	FINISH	PROP	PROPERTY		
C	CENTERLINE	FLR	FLOOR	PRV	PRESSURE REDUCING VALVE		
CLDI	CEMENT LINED DUCTILE IRON	FOC	FACE OF CONCRETE	PS	PIPE SUPPORT		
CLG	CEILING	FSTL	FABRICATED STEEL	PT	POINT, POINT OF TANGENCY		
CLR	CLEAR, CLEARANCE	FT	FOOT, FEET	PVC	POLYVINYL CHLORIDE		
CMP	CORRUGATED METAL PIPE	FTG	FOOTING, FITTING	PVMT	PAVEMENT		
CMU	CONCRETE MASONRY UNITS	F TO F	FACE TO FACE	PWR	OVERHEAD POWERLINES		
CO	CLEANOUT	GA	GAGE, GAUGE	RAD	RADIUS		
COL	COLUMN	GAL	GALLON	RC	REINFORCED CONCRETE		
COMB	COMBINATION	GALV	GALVANIZED	RCP	REINFORCED CONCRETE PIPE		
CONC	CONCRETE OR CONCENTRIC	GALVS	GALVANIZED STEEL	RD	ROAD, ROOF DRAIN		
CONN	CONNECT, CONNECTION	GND	GOUND	RDCR	REDUCER		
CONST	CONSTRUCTION	GPM	GALLONS PER MINUTE	REBAR	REINFORCEMENT BAR		
CONT	CONTINUE, CONTINUED, CONTINUOUS	GRTG	GRATING	REF	REFERENCE		
CONTR	CONTRACTOR	GSKT	GASKET	REINF	REINFORCE		
COORD	COORDINATE	GSP	GALVANIZED STEEL PIPE	RELOC	RELOCATE, RELOCATION		
CORR	CORRUGATED	GVL	GRAVEL	REQD	REQUIRED		
CP	CONTROL POINT	HDW	HARDWARE	RST	REINFORCING STEEL		
CPLG	COUPLING	HORIZ	HORIZONTAL	RT	RIGHT		
CSP	CORRUGATED STEEL PIPE	HP	HORSEPOWER	R/W	RIGHT-OF-WAY		
C TO C	CENTER TO CENTER	HT	HEIGHT, HEAT TRACE	SAN	SANITARY SEWAR		
CTR	CENTER	HVAC	HEATING, VENTILATING, AND AIR CONDITIONING	SCHED	SCHEDULE		
CTSK	COUNTERSINK	HWY	HIGHWAY	SDWK	SIDEWALK		
CU	CUBIC	HYD	HYDRANT	SEC	SECTION		
CU FT	CUBIC FEET	ID	INSIDE DIAMETER	SHT	SHEET		
CU IN	CUBIC INCH	INV	INVERT ELEVATION	SIM	SIMILAR		
CULV	CULVERT	IF	INSIDE FACE	SLP	SLOPE		
CU YD	CUBIC YARD	IN.	INCH	SP	SPACE, SPACED		
D	DRAIN	INFL	INFLUENT	SPEC	SPECIFICATION		
DBA	DEFORMED BAR ANCHOR	INSTL	INSTALL, INSTALLATION	SPRT	SUPPORT		
DBL	DOUBLE	INSTR	INSTRUMENT	SQ	SQUARE		
DET	DETAIL	INSUL	INSULATE	SQ FT	SQUARE FOOT		
DI	DUCTILE IRON, DRAIN INLET						

- NOTES:
- FOR ABBREVIATIONS NOT LISTED, SEE "ABBREVIATIONS FOR USE ON DRAWINGS AND TEXT", PUBLISHED BY THE AMERICAN NATIONAL STANDARDS INSTITUTE INC. (ANSI) OR CONTACT THE ENGINEER.
 - THIS IS A STANDARD ABBREVIATION LIST. THEREFORE, NOT ALL ABBREVIATIONS ARE USED ON THE PLANS.
 - ADDITIONAL ABBREVIATIONS FOR SPECIALIZED WORK DIVISIONS (INSTRUMENTATION AND CONTROL, ELECTRICAL, ETC.) ARE SHOWN ON OTHER LEGEND SHEETS, AS APPLICABLE.

CONSTRUCTION
FILE NUMBER

C-203 I

DE BEQUE WATER STATION
POND 3

SHEET
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JOB # 2013-134

GENERAL CONSTRUCTION NOTES:

- 1) UNLESS SPECIFICALLY SHOWN ON THE DRAWINGS OR REFERENCED IN THE SPECIFICATIONS, ALL WORK WILL CONFORM TO THE STATE OF COLORADO RULES AND REGULATIONS FOR DAM SAFETY AND DAM CONSTRUCTION (LATEST ADOPTED EDITION), THE COLORADO DEPARTMENT OF TRANSPORTATION (CDOT) STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION (LATEST ADOPTED EDITION), AND THE COLORADO OIL AND GAS CONSERVATION COMMISSION RULES (LATEST ADOPTED EDITION).
- 2) THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL PERMITS REQUIRED FOR CONSTRUCTION ACTIVITIES INCLUDING BUT NOT LIMITED TO A STORM WATER DISCHARGE PERMIT AS REQUIRED BY THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT.
- 3) THE CONTRACTOR SHALL NOTIFY ONE CALL @ 1-800-922-1987 OR 811 FOR ON SITE UTILITY LOCATION. ALL EXISTING UTILITIES SHALL BE MARKED BEFORE DIGGING.
- 4) THE CONTRACTOR SHALL MAINTAIN SERVICE OF ALL EXISTING UTILITIES. IF SAID SERVICE IS DAMAGED, THE CONTRACTOR SHALL IMMEDIATELY REPAIR THE DAMAGE AT THE CONTRACTOR'S EXPENSE.
- 5) THE CONTRACTOR SHALL FIELD VERIFY THE EXISTENCE, LOCATION, DEPTH, SIZE, LINE, AND GRADE OF EXISTING UTILITIES PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO THE EXISTING FACILITIES DUE TO FAILURE TO LOCATE OR PROVIDE PROPER PROTECTION WHEN LOCATION IS KNOWN.
- 6) ALL QUANTITIES SHOWN IN THESE PLANS ARE FOR INFORMATIONAL PURPOSES ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING ACTUAL QUANTITIES.
- 7) THE CONTRACTOR IS RESPONSIBLE FOR CONTROLLING DUST AND EROSION DURING CONSTRUCTION. AREAS SHALL BE WATERED TO CONTROL DUST AS NEEDED OR WHEN ORDERED BY THE ENGINEER. EROSION SHALL BE CONTROLLED IN ACCORDANCE WITH COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT REGULATIONS AND CDOT STANDARD SPECIFICATIONS SECTION 208. THIS PROGRAM SHALL INCLUDE THE PLACEMENT OF SILT FENCE, STRAW WADDLES, AND VEHICLE MUD TRACK OUT PREVENTION MEASURES WHERE NECESSARY TO PREVENT MUD AND DEBRIS FROM LEAVING THE PROJECT SITE DURING STORM WATER RUNOFF EVENTS, AND/OR ON CONSTRUCTION VEHICLE TIRES. THE CONTRACTOR SHALL MAINTAIN A CURRENT STORM WATER POLLUTION PREVENTION PLAN ON SITE.
- 8) ALL DISTURBED AREAS SHALL BE TOPSOILED AND SEEDED BY THE CONTRACTOR IN ACCORDANCE WITH CDOT STANDARD SPECIFICATIONS SECTION 207 AND 212, THESE PLANS AND SPECIFICATIONS.
- 9) THE CONTRACTOR SHALL REFERENCE ALL SURVEY MONUMENTS, PUBLIC LAND CORNERS AND PRIVATE PROPERTY CORNERS PRIOR TO BEGINNING CONSTRUCTION. ANY MONUMENTS DISTURBED OR OBLITERATED DURING CONSTRUCTION MUST BE REPLACED BY A LICENSED LAND SURVEYOR AT THE CONTRACTOR'S EXPENSE.
- 10) EXCAVATION, BACKFILL, AND COMPACTION SHALL BE PERFORMED IN ACCORDANCE WITH CDOT STANDARD SPECIFICATIONS SECTION 203 AND 206, RULES AND REGULATIONS FOR DAM SAFETY AND DAM CONSTRUCTION SECTION 5.9.4.3.2, AS WELL AS THESE PLANS AND SPECIFICATIONS.
- 11) THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE PROJECT SITE IN A SAFE CONDITION DURING ALL CONSTRUCTION WORK ON THE PROJECT SITE.
- 12) ALL PROFILES REPRESENTING EXISTING GROUND OR GRAVEL ARE DEPICTED WITH A DASHED LINE ALONG THE ALIGNMENTS INDICATED ON THE PLANS. ELEVATIONS ARE EXISTING GRADE ELEVATIONS.
- 13) THE THREE CONSTRUCTED MONITORING WELLS SHOWN ON THESE PLANS SHALL REMAIN UNDISTURBED DURING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE TO THESE WELLS.
- 14) ELECTRICAL CONDUITS AND WIRING NEEDED FOR VALVE AUTOMATION IS NOT SHOWN ON THESE PLANS. THE CONTRACTOR IS RESPONSIBLE FOR INSTALLING THESE CONDUITS AND WIRES IN ACCORDANCE WITH THE ELECTRICAL PLANS.
- 15) SEE DE BEQUE STATION GEOTECHNICAL REPORT (SUBMITTED SEPARATELY) FOR LOCATION AND DEPTHS OF BORE HOLES AND CORRESPONDING BORE LOGS.

CULVERT CONSTRUCTION NOTES:

- 1) THE CONTRACTOR SHALL PROVIDE AND INSTALL CORRUGATED STEEL CULVERTS (CMP) IN ACCORDANCE WITH CDOT STANDARD SPECIFICATIONS SECTION 603 AND THESE PLANS AND SPECIFICATIONS. CMP CULVERTS SHALL BE CORRUGATED STEEL PIPE (MINIMUM 16 GAUGE). THE CONTRACTOR MAY USE ANOTHER CULVERT MATERIAL OF EQUIVALENT STRENGTH THAT IS APPROVED BY THE ENGINEER.
- 2) CULVERT BEDDING SHALL BE TYPE 1 MEETING THE REQUIREMENTS OF THESE PLANS AND SPECIFICATIONS.
- 3) THE CONTRACTOR SHALL BE RESPONSIBLE FOR TRENCH SAFETY AND SHALL MAINTAIN TRENCH CONDITIONS IN ACCORDANCE WITH ALL OSHA REQUIREMENTS FOR TRENCHING AND EXCAVATION.

WATER CONSTRUCTION NOTES:

- 1) ALL PRODUCED AND RAW WATER MAINS SHALL BE INSTALLED WITH A MINIMUM COVER OF 6.0 FEET FROM TOP OF PIPE TO FINISHED GRADE.
- 2) ALL VALVES SHALL OPEN CLOCKWISE.
- 3) ALL FITTINGS INCLUDING BENDS GREATER THAN 11.25 DEGREES, TEES AND PLUGS SHALL BE THRUST BLOCKED OR MECHANICALLY RESTRAINED AS INDICATED IN THESE PLANS. SEE THRUST BLOCK DETAIL SHEET FOR ADDITIONAL DETAILS AND NOTES.
- 4) ALL JOINT FITTINGS SHALL BE WELDED STAINLESS STEEL AND PROVIDED WITH THRUST BLOCKS AS SPECIFIED.
- 5) THE CONTRACTOR SHALL ACHIEVE HORIZONTAL AND VERTICAL DEFLECTION WITH STANDARD MECHANICAL JOINTS AND/OR FIELD FABRICATED JOINTS TO ACHIEVE THE DESIRED DEFLECTION. ALL FITTINGS SHALL BE INSTALLED PER THE PIPE MANUFACTURER'S SPECIFICATIONS.
- 6) WHEN CONNECTING TO EXISTING PIPELINES, ADDITIONAL JOINTS MAY BE NEEDED THAT ARE NOT SHOWN ON THESE PLANS TO OBTAIN A PROPER CONNECTION. THE CONTRACTOR SHALL FIELD VERIFY THE LOCATION AND ELEVATION OF ALL EXISTING PIPELINES PRIOR TO CONSTRUCTION.
- 7) ALL STUB OUTS SHALL BE MARKED WITH A WOOD OR STEEL POST AT THE END OF THE STUB OUT IN ORDER TO FACILITATE FUTURE CONNECTIONS.
- 8) ALL WATER PIPELINE SHALL BE SCHEDULE 40 CARBON STEEL. SEE PLAN AND PROFILE SHEETS FOR PIPE SCHEDULE AND SIZES. ALL PIPES SHALL BE FUSION BOND EPOXY 14-16 MIL EXTERNALLY COATED. ALL PIPE SHALL BE WELDED IN ACCORDANCE TO ASME B31.3.

ROAD CONSTRUCTION NOTES:

- 1) ALL AGGREGATE SURFACING MATERIAL SHALL BE CLASS 5 MEETING THE REQUIREMENTS OF CDOT STANDARD SPECIFICATION SECTIONS 304 AND 703.03. AGGREGATE SURFACING MATERIAL SHALL MEET THE GRADATION REQUIREMENTS SHOWN IN THE TABLE BELOW.
- 2) ALL SUB BASE MATERIAL SHALL BE CLASS 2 MEETING THE REQUIREMENTS OF CDOT STANDARD SPECIFICATION SECTIONS 304 AND 703.03. SUB BASE MATERIAL SHALL MEET THE GRADATION REQUIREMENTS SHOWN IN THE TABLE BELOW.
- 3) THE CONTRACTOR IS RESPONSIBLE FOR TRAFFIC CONTROL ON THIS PROJECT. A PORTION OF THE WORK WILL BE IMPROVING THE APPROACH ONTO COUNTY ROAD V 2/10 ALONG WITH CROSSING THE V 2/10 ROAD WITH A PROPOSED PRODUCED WATER MAIN.

AGGREGATE SURFACING MATERIAL

GRADATION LIMITS	
SIEVE SIZE	JOB MIX GRADATION TARGET BAND
2 INCH	100
1 INCH	95 - 100
NO. 4	30 - 70
NO. 200	3 - 15

SUB BASE MATERIAL

GRADATION LIMITS	
SIEVE SIZE	JOB MIX GRADATION TARGET BAND
4 INCH	100
3 INCH	95 - 100
NO. 200	3 - 15

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DDP	09/14			DDP	02/15							

DE BEQUE WATER STATION
POND 3

Construction Notes

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GRADING			
ITEM	QUANTITY	UNIT	REMARKS
EXCAVATION ¹	17,800	CY	
COMPACTED FILL	42,500	CY	INCLUDES 5% SHRINKAGE
ADDITIONAL FILL	24,700	CY	FROM POND 1 EXCESS STOCKPILE
EXCAVATION WILL NOT BE A PAY ITEM AS THE COMPACTED FILL PAY ITEM WILL INCLUDE EXCAVATING, HAULING, AND COMPACTING MATERIAL. ADDITIONAL MATERIAL NEEDED FOR EMBANKMENT WILL BE OBTAINED FROM THE POND 1 EXCESS CUT STOCKPILE.			

TOPSOIL AND REVEGETATION			
ITEM	QUANTITY	UNIT	REMARKS
TOPSOIL SALVAGING AND PLACING	4,100	CY	ASSUMES 6" OF TOPSOIL
TURF REINFORCEMENT MAT	120	SY	
SEEDING	1.6	ACRES	

SURFACING			
ITEM	QUANTITY	UNIT	REMARKS
AGGREGATE SURFACING	185	CY	3" THICKNESS
SUB BASE MATERIAL	370	CY	6" THICKNESS

CULVERTS			
ITEM	QUANTITY	UNIT	REMARKS
POND 2/POND 3 DITCH ¹	116	FT	12" Ø CULVERT
THIS CULVERT IS ONLY NEEDED IF POND 2 IS CONSTRUCTED PRIOR TO POND 3.			

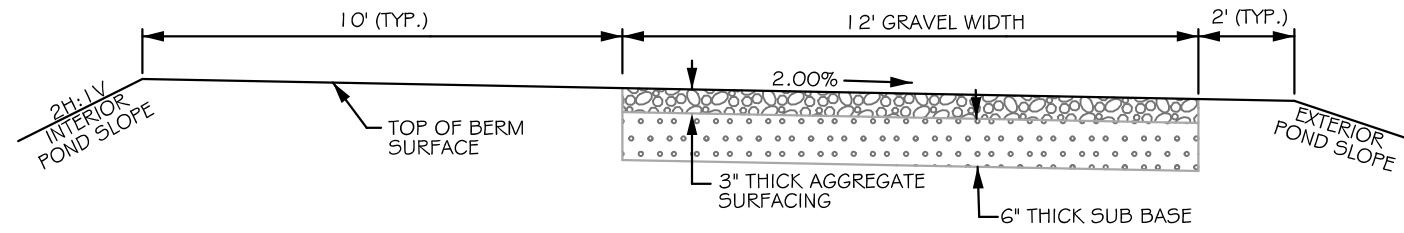
POND APPURTENANCES			
ITEM	QUANTITY	UNIT	REMARKS
6" Ø SCH. 80 PVC LEAK DETECTION PIPE	43	FT	
60 MIL HDPE PRIMARY LINER	129,694	SQ FT	OWNER SUPPLIED
200-MIL GEONET	129,694	SQ FT	OWNER SUPPLIED
40 MIL HDPE SECONDARY LINER	129,694	SQ FT	OWNER SUPPLIED
GEOCOMPOSITE CLAY LINER	129,694	SQ FT	OWNER SUPPLIED
FLOATING PROTECTION TILES	107,105	SQ FT	OWNER SUPPLIED
SPILLWAY TRASHRACK	10	FT	

PIPING			
ITEM	QUANTITY	UNIT	REMARKS
10" Ø STEEL PIPELINE	180	FT	PRODUCED WATER SUPPLY
PRESSURE TRANSDUCER	1	EACH	

MISCELLANEOUS ITEMS			
ITEM	QUANTITY	UNIT	REMARKS
CONCRETE BOLLARDS	6	EACH	
CONCRETE SPLASH PADS	1	EACH	



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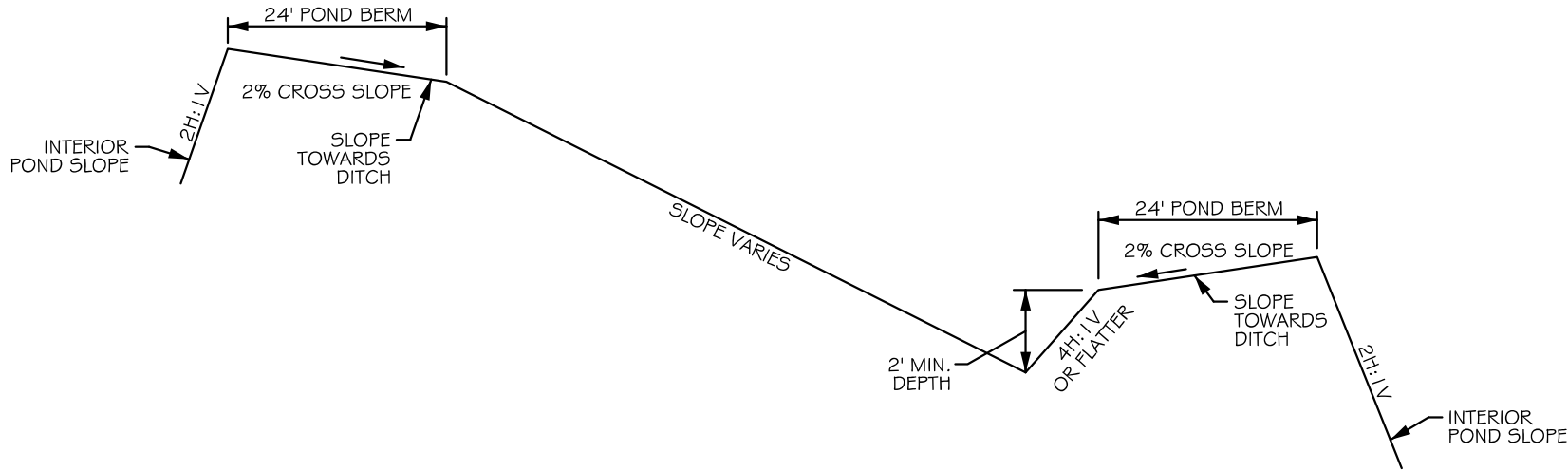


TYPICAL #1 MAINTENANCE ROAD

NOT TO SCALE

NOTES:

- 1) TYPICAL SECTION #2 (MAINTENANCE ROAD) APPLIES TO MAINTENANCE ROADS LOCATED ON TOP OF BERMS SURROUNDING PONDS.
- 2) SEE CROSS SECTION SHEETS FOR ACTUAL SLOPE GRADES.
- 3) ALL INTERIOR POND SLOPES ARE 2H:1V.



TYPICAL #2 BERM DRAINAGE DITCH

NOT TO SCALE

NOTE:

- 1) CONSTRUCT BERM DRAINAGE DITCHES TO DRAIN TO EXTERIOR DITCHES.
- 2) THIS TYPICAL SECTION WILL ONLY BE NEEDED IF POND 2 IS CONSTRUCTED PRIOR TO POND 3.

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A Black Hills Corporation Enterprise

2350 G Road, Suite 101
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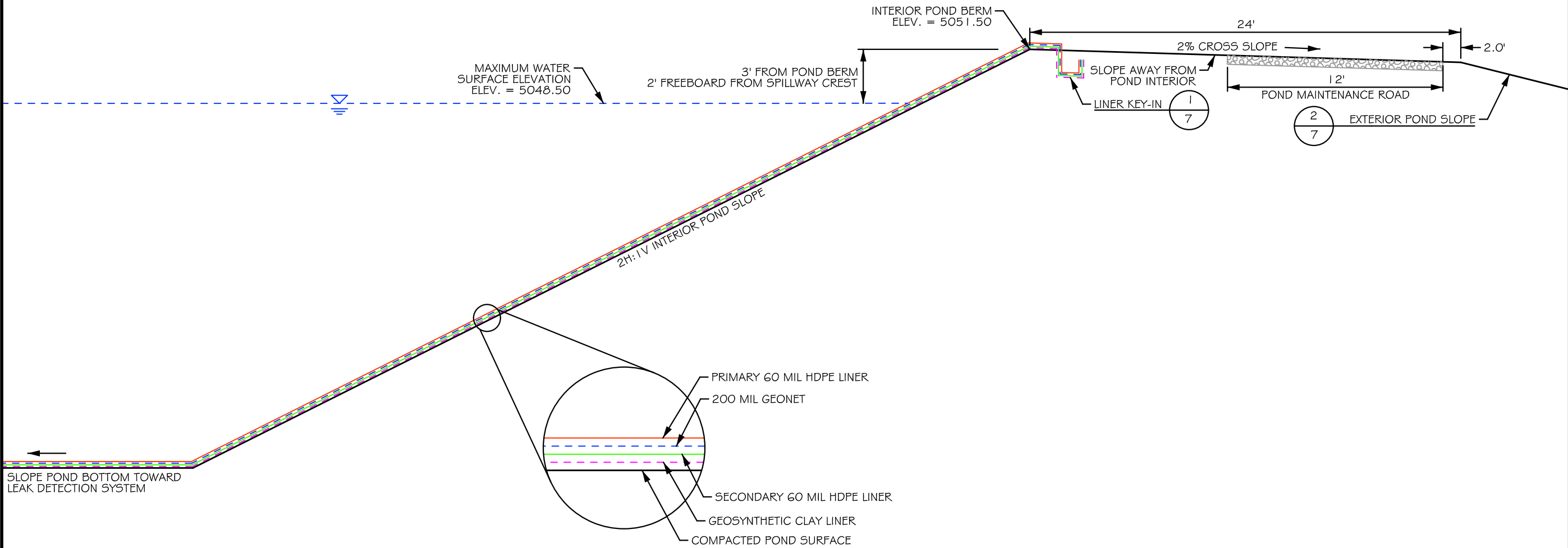
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DE BEQUE WATER STATION
POND 3
Typical Sections

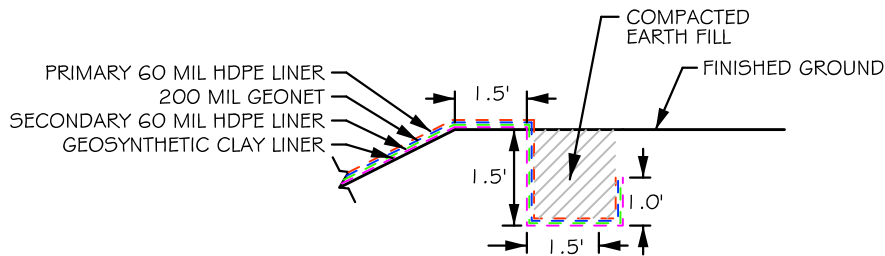
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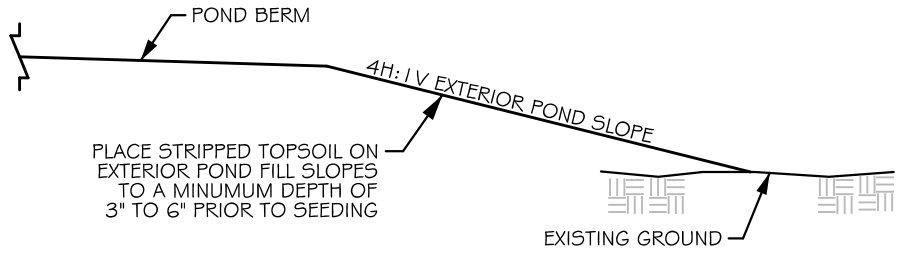
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DDP	09/14	STH
REV	DATE	CKD
DDP	02/15	STH
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JOB # 2013-134		



POND 3 TYPICAL SECTION
NOT TO SCALE



SYNTHETIC LINER KEY-IN DETAIL
NOT TO SCALE



EXTERIOR POND FILL SECTION
NOT TO SCALE

CONSTRUCTION
FILE NUMBER
C-203 I

DE BEQUE WATER STATION
POND 3
Typical Sections

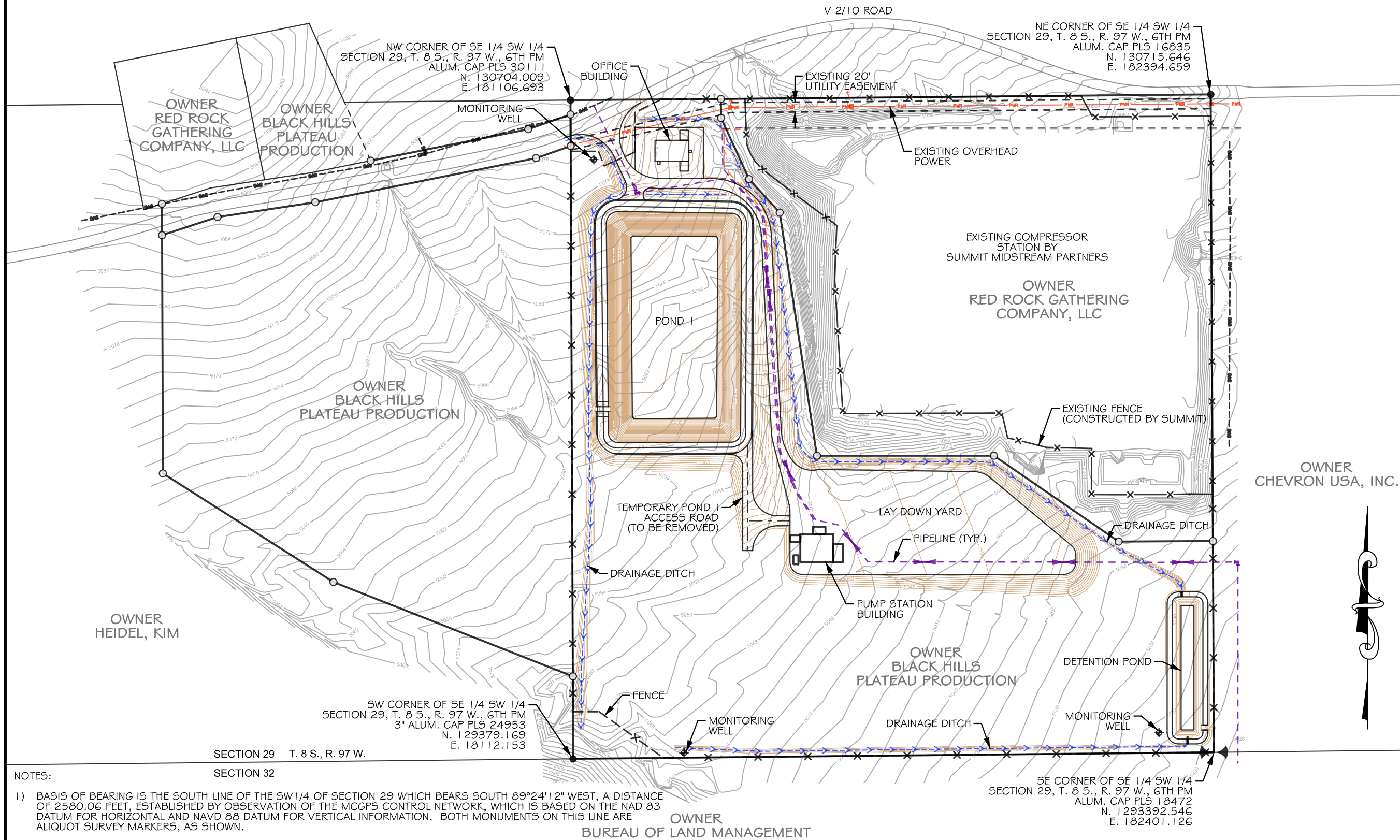
SHEET
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DSGN	DATE	CKD
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DDP	02/15	STH
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A Black Hills Corporation Energy Unit
2350 G Road, Suite 101
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NOTES:

- 1) BASIS OF BEARING IS THE SOUTH LINE OF THE SW 1/4 OF SECTION 29 WHICH BEARS SOUTH 89°24'12" WEST, A DISTANCE OF 2580.06 FEET, ESTABLISHED BY OBSERVATION OF THE MCGPS CONTROL NETWORK, WHICH IS BASED ON THE NAD 83 DATUM FOR HORIZONTAL AND NAVD 88 DATUM FOR VERTICAL INFORMATION. BOTH MONUMENTS ON THIS LINE ARE ALIQUOT SURVEY MARKERS, AS SHOWN.
- 2) ALL UNITS SHOWN IN THIS PLAN SET ARE IN U.S. SURVEY FEET.
- 3) THE TOPOGRAPHIC AND BOUNDARY SURVEY PERFORMED FOR THIS PROJECT WAS COMPLETED BY HIGH DESERT SURVEYING.
- 4) ALL EXISTING MONITORING WELLS ARE TO BE PRESERVED.
- 5) THE COORDINATES WERE DERIVED FROM THE THE MCGPS CONTROL NETWORK, WHICH IS BASED ON THE NAD 83 DATUM FOR HORIZONTAL AND NAVD 88 DATUM FOR VERTICAL INFORMATION. ALL SURVEY WORK PERFORMED IN MESA COUNTY IS SUPPOSED TO BE BASED ON THE MESA COUNTY SURVEY INFORMATION MANAGEMENT SYSTEM (SIMS). THESE ARE INDIVIDUAL CARTESIAN COORDINATE SYSTEMS BASED UPON THE LOCAL CORS WHICH IS THE MCGPS CONTROL NETWORK.



CONSTRUCTION
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C-2031

DE BEQUE WATER STATION
POND 3
Existing Conditions and Survey Control

SHEET
8 OF 28

DSGN	DATE	CKD
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DDP	02/15	STH

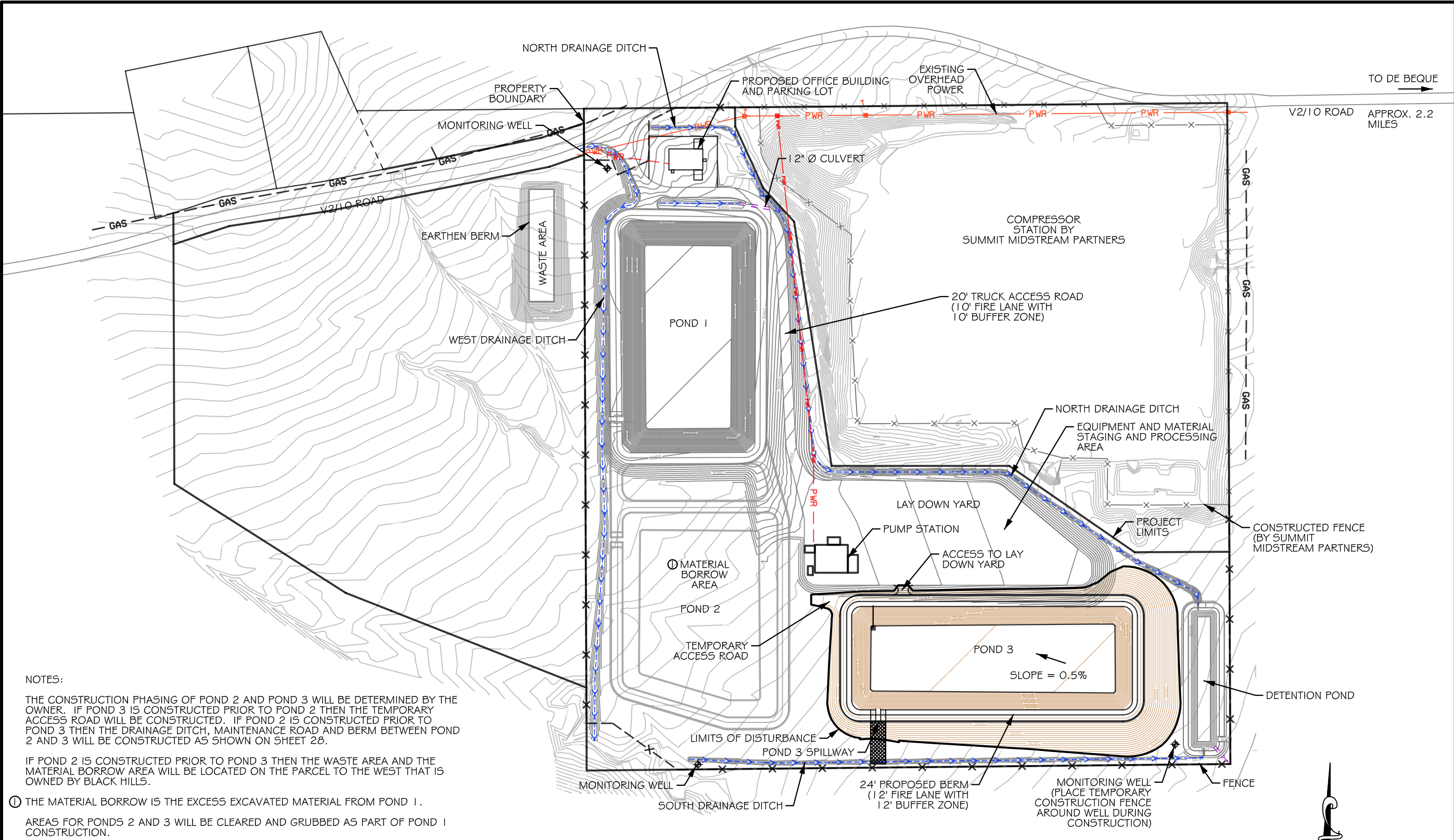
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NOTES:

THE CONSTRUCTION PHASING OF POND 2 AND POND 3 WILL BE DETERMINED BY THE OWNER. IF POND 3 IS CONSTRUCTED PRIOR TO POND 2 THEN THE TEMPORARY ACCESS ROAD WILL BE CONSTRUCTED. IF POND 2 IS CONSTRUCTED PRIOR TO POND 3 THEN THE DRAINAGE DITCH, MAINTENANCE ROAD AND BERM BETWEEN POND 2 AND 3 WILL BE CONSTRUCTED AS SHOWN ON SHEET 28.

IF POND 2 IS CONSTRUCTED PRIOR TO POND 3 THEN THE WASTE AREA AND THE MATERIAL BORROW AREA WILL BE LOCATED ON THE PARCEL TO THE WEST THAT IS OWNED BY BLACK HILLS.

① THE MATERIAL BORROW IS THE EXCESS EXCAVATED MATERIAL FROM POND 1.

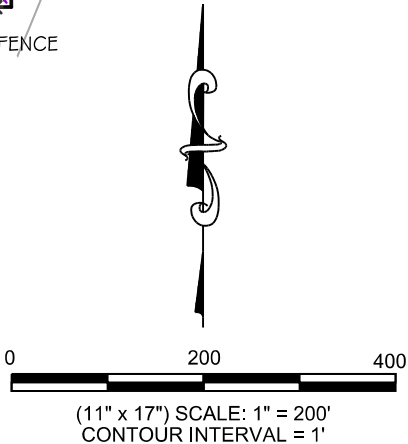
AREAS FOR PONDS 2 AND 3 WILL BE CLEARED AND GRUBBED AS PART OF POND 1 CONSTRUCTION.

POND DESIGN ELEMENTS

	POND 1	POND 2	POND 3
BOTTOM DIMENSIONS	176.2 FT x 370.2 FT	244 FT x 344 FT	494 FT x 139 FT
MAXIMUM WATER STORAGE VOLUME	40.3 AC-FT	31.2 AC-FT	30.0 AC-FT
WATER SURFACE AREA①	112,520 SQ FT	111,839 SQ FT	107,105 SQ FT
MAXIMUM WATER STORAGE DEPTH	21.3 FT	15.4 FT	16.5 FT
FREEBOARD DEPTH	2'	2'	2'
SPILLWAY DEPTH	1'	1'	1'
TOTAL POND DEPTH②	24.3 FT	18.4 FT	19.5 FT
LOWEST NATURAL GROUND ELEVATION AT BERM CL	5053.60	5045.78	5033.70
SPILLWAY CREST ELEVATION	5063.57	5059.80	5050.50
HEIGHT FROM SPILLWAY CREST TO NATURAL GROUND	9.97 FT	14.01 FT	16.79 FT
DAM SIZE/JURISDICTION	NON-JURISDICTIONAL③	MINOR JURISDICTIONAL④	MINOR JURISDICTIONAL④

- ① SURFACE AREA AT MAXIMUM STORAGE VOLUME LEVEL
- ② TOTAL POND DEPTH = MAXIMUM WATER STORAGE DEPTH + FREEBOARD DEPTH + SPILLWAY DEPTH (DEPTH FROM TOP OF BERM TO LOWEST CORNER OF POND BOTTOM)
- ③ RESERVOIR WITH A CAPACITY OF LESS THAN 100 ACRE-FEET, A SURFACE AREA OF LESS THAN 20 ACRES AND A HEIGHT LESS THAN 10 FEET.
- ④ RESERVOIR WITH A CAPACITY OF LESS THAN 100 ACRE-FEET, A SURFACE AREA OF LESS THAN 20 ACRES AND A HEIGHT LESS THAN 20 FEET.

ALL PONDS HAVE THE FOLLOWING DESIGN ELEMENTS:
2H: 1V INTERIOR SLOPES
3H: 1V EXTERIOR CUT SLOPES
4H: 1V EXTERIOR FILL SLOPES



CONSTRUCTION
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C-2031

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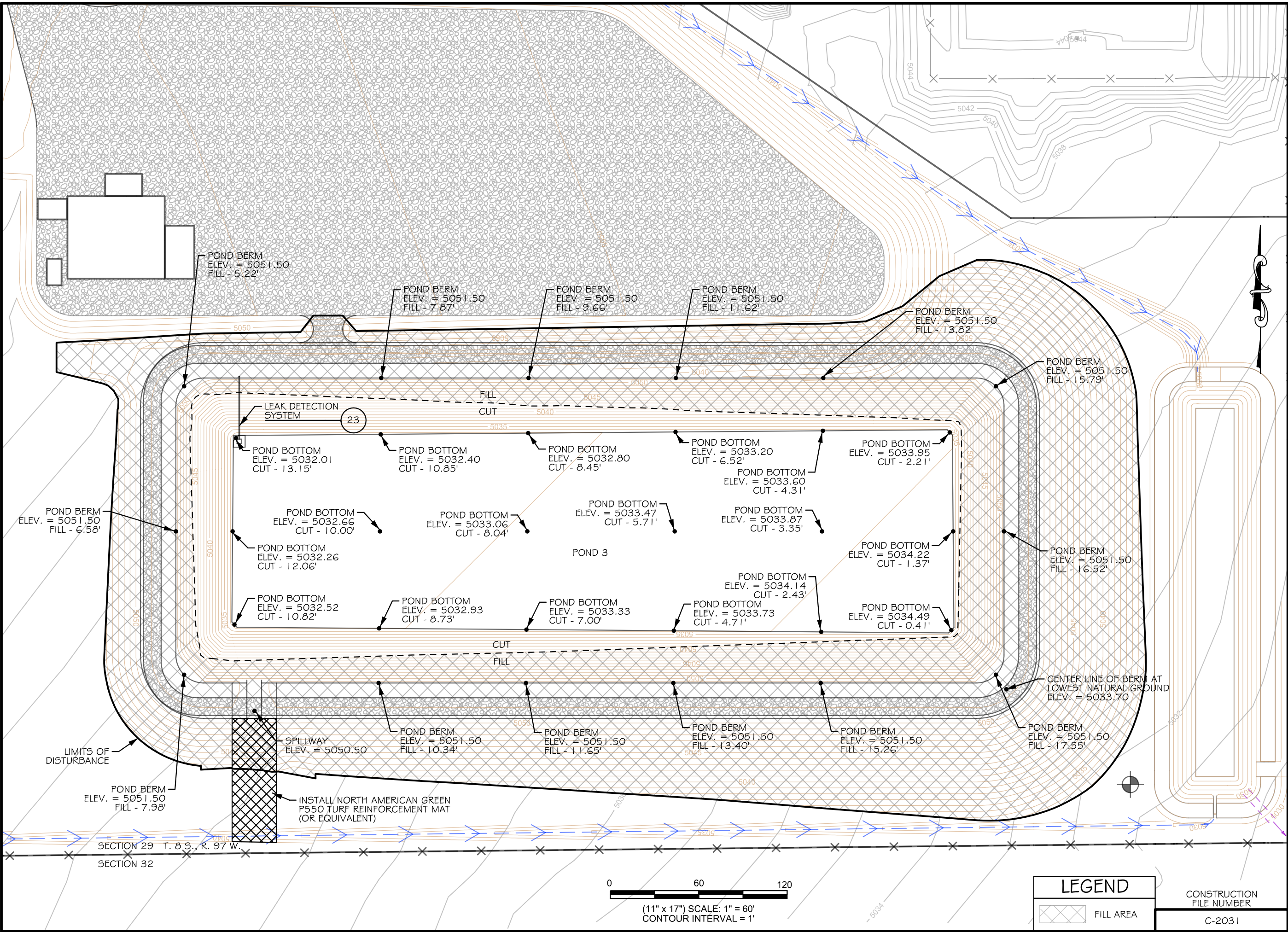
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MMZ	03/15		
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DE BEQUE WATER STATION
POND 3

Proposed Facility Layout

SHEET
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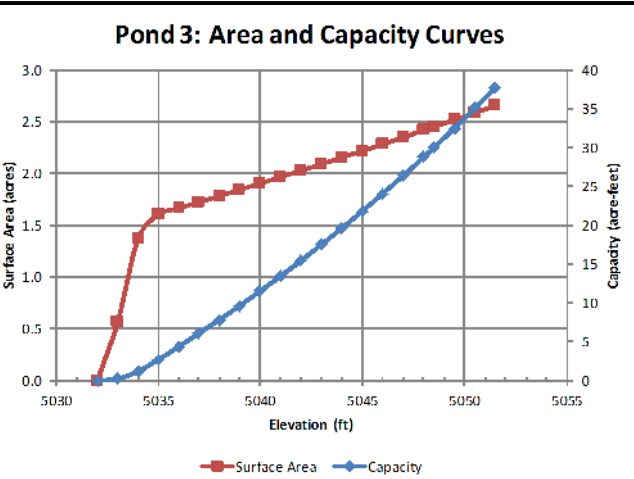
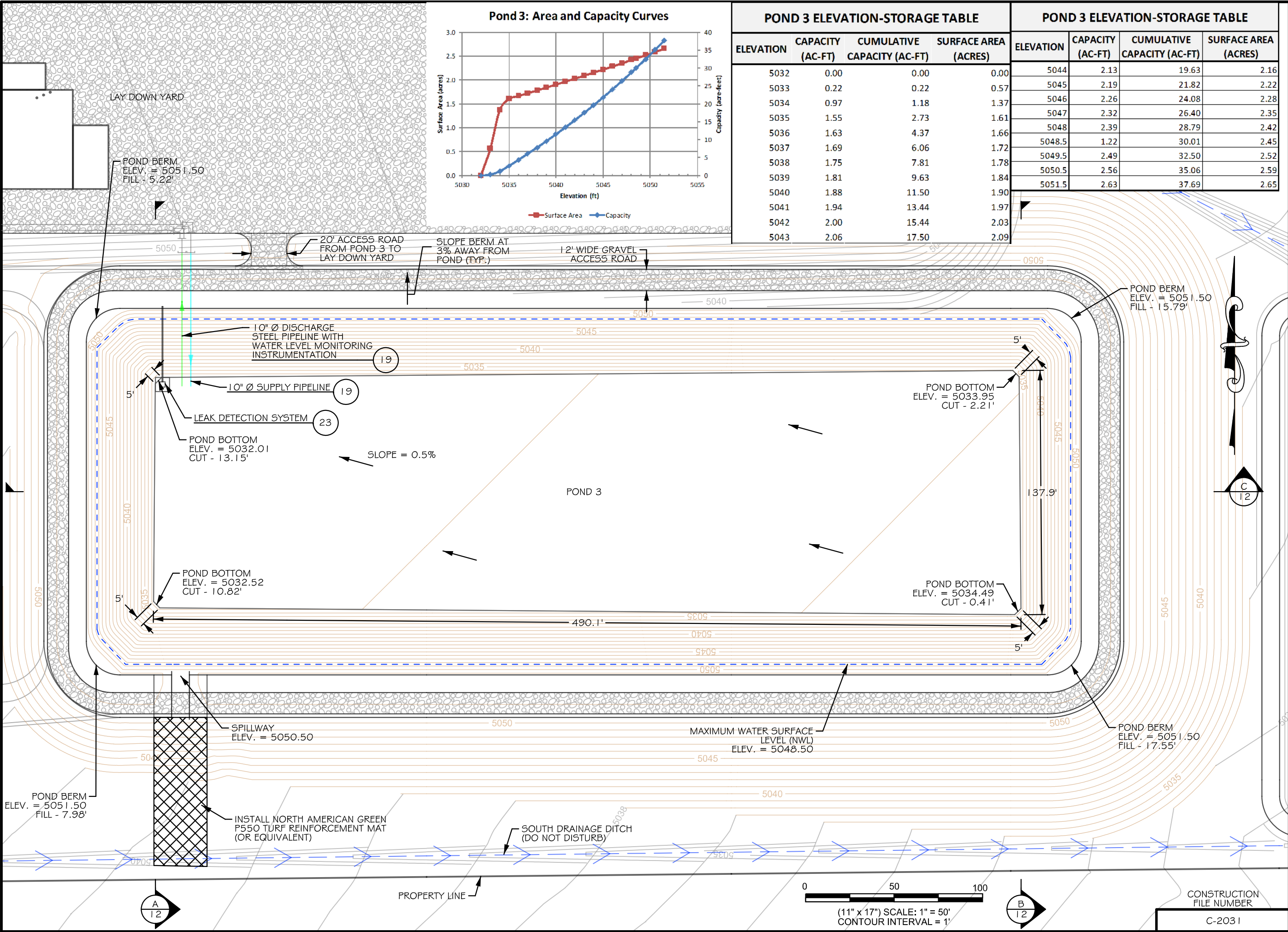
DE BEQUE WATER STATION
POND 3
Excavation Plan

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CONSTRUCTION
FILE NUMBER
C-2031

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FILE PATH: K:\Hill\BLACK HILLS\13134 - DE BEQUE STATION\ENGINEERING PLANS\DEBEQUE COLORADO
3/19/2015



POND 3 ELEVATION-STORAGE TABLE			
ELEVATION	CAPACITY (AC-FT)	CUMULATIVE CAPACITY (AC-FT)	SURFACE AREA (ACRES)
5032	0.00	0.00	0.00
5033	0.22	0.22	0.57
5034	0.97	1.18	1.37
5035	1.55	2.73	1.61
5036	1.63	4.37	1.66
5037	1.69	6.06	1.72
5038	1.75	7.81	1.78
5039	1.81	9.63	1.84
5040	1.88	11.50	1.90
5041	1.94	13.44	1.97
5042	2.00	15.44	2.03
5043	2.06	17.50	2.09

POND 3 ELEVATION-STORAGE TABLE			
ELEVATION	CAPACITY (AC-FT)	CUMULATIVE CAPACITY (AC-FT)	SURFACE AREA (ACRES)
5044	2.13	19.63	2.16
5045	2.19	21.82	2.22
5046	2.26	24.08	2.28
5047	2.32	26.40	2.35
5048	2.39	28.79	2.42
5048.5	1.22	30.01	2.45
5049.5	2.49	32.50	2.52
5050.5	2.56	35.06	2.59
5051.5	2.63	37.69	2.65

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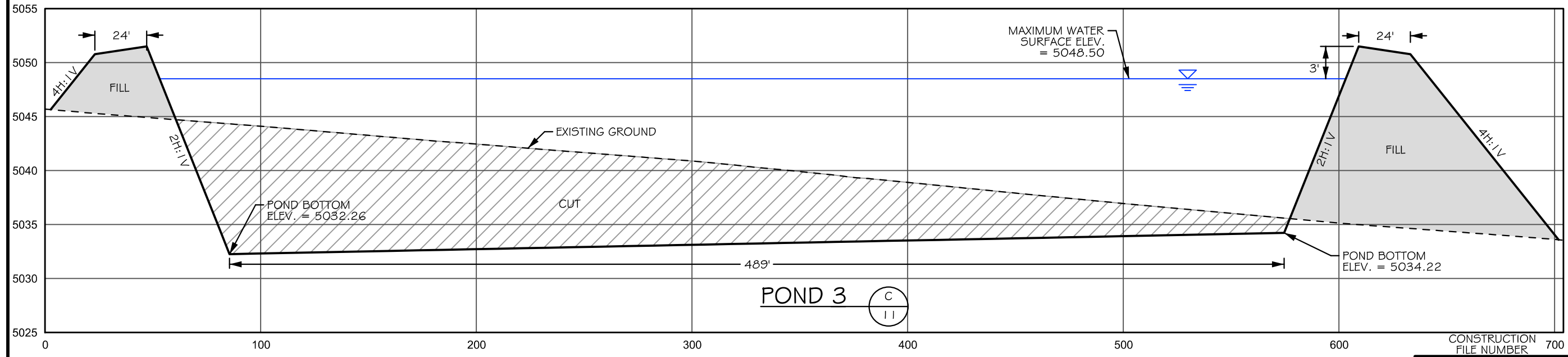
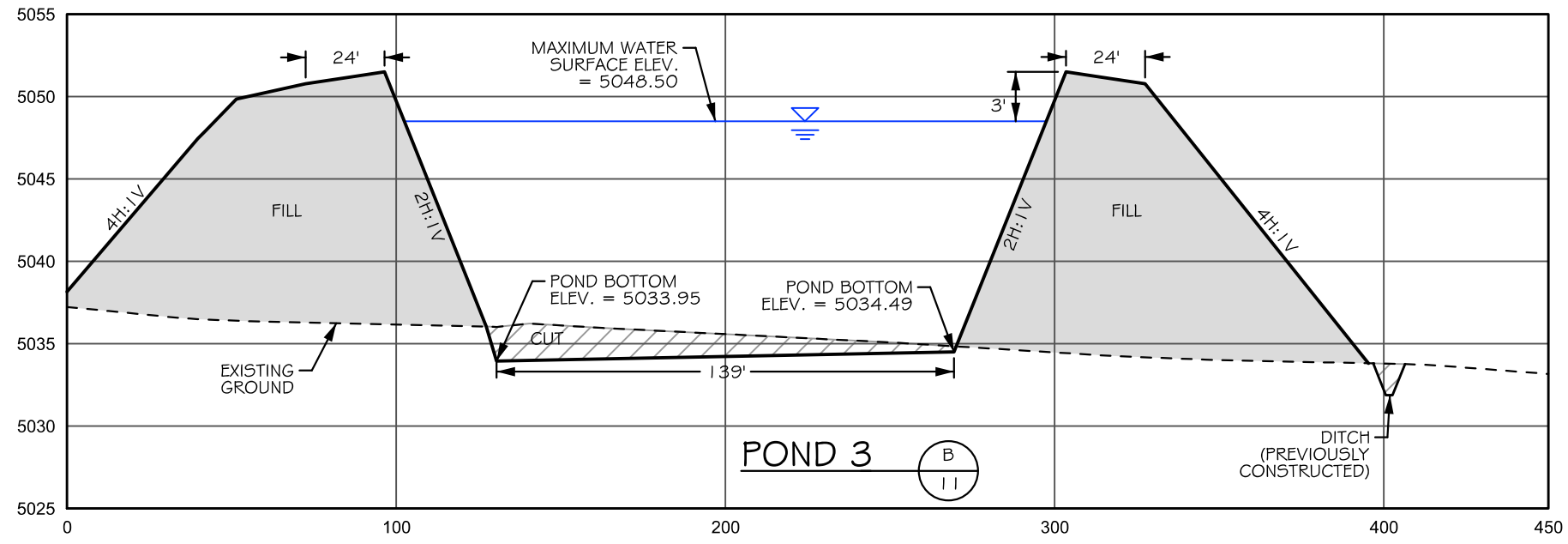
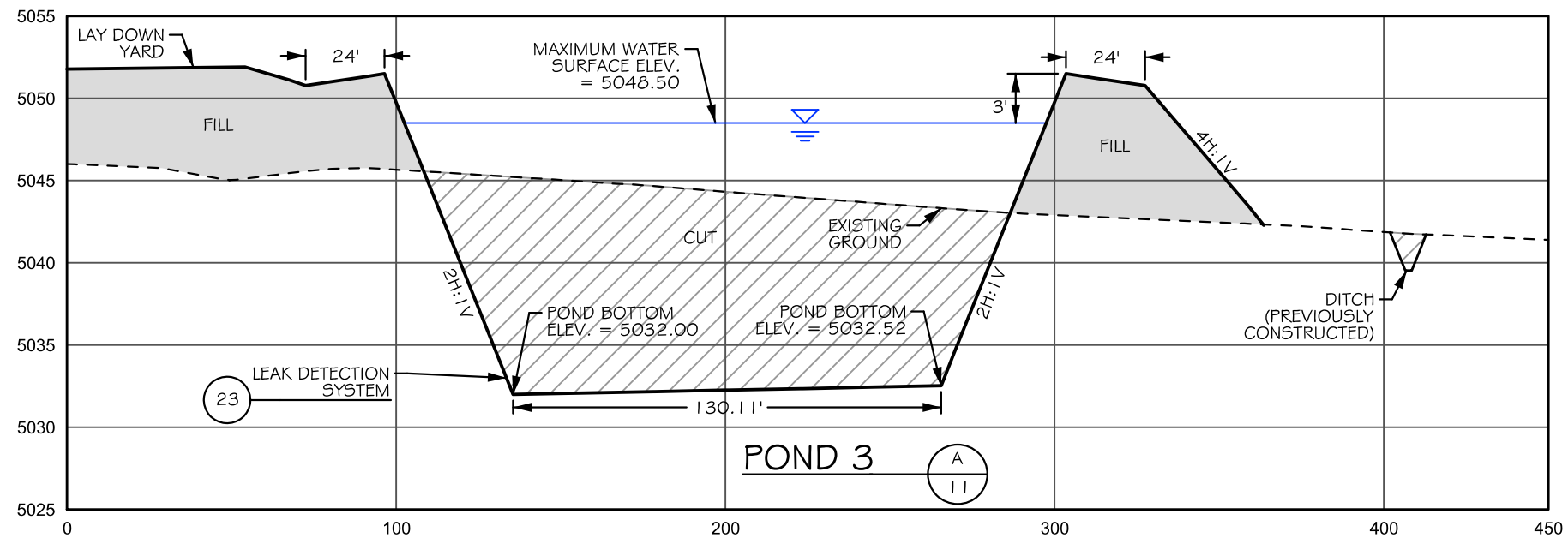
JOB # 2013-134

DE BEQUE WATER STATION
POND 3

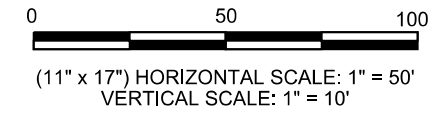
Plan View

SHEET
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CONSTRUCTION FILE NUMBER
C-2031



NOTE:
WATER SURFACE LEVEL (NWL) WILL VARY
WITH THE DEMAND FOR WATER AT
OFF-SITE WELL LOCATIONS.



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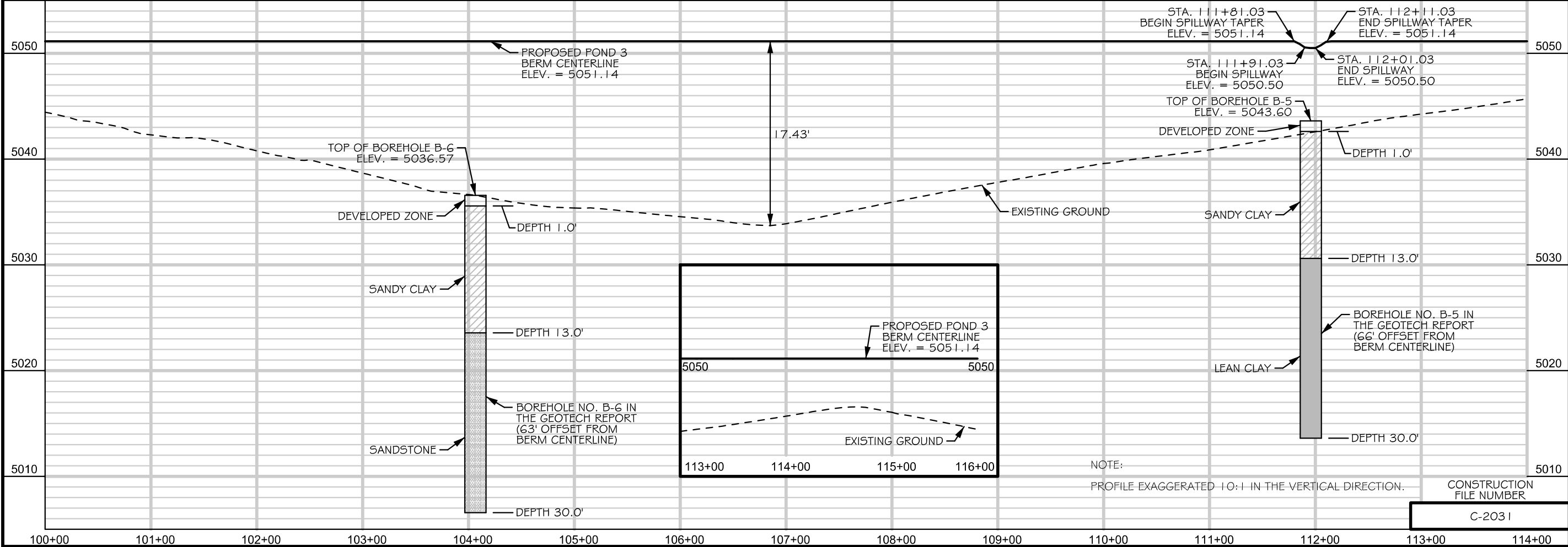
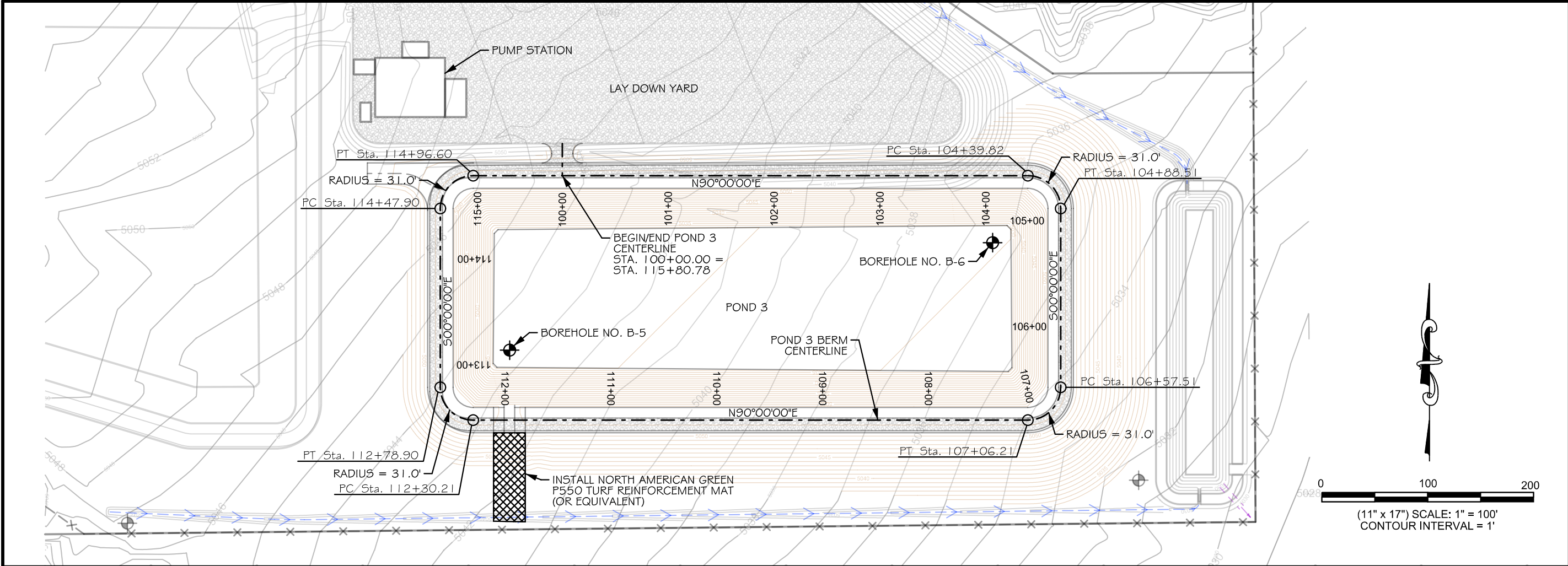
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DE BEQUE WATER STATION
POND 3

Cross Sections

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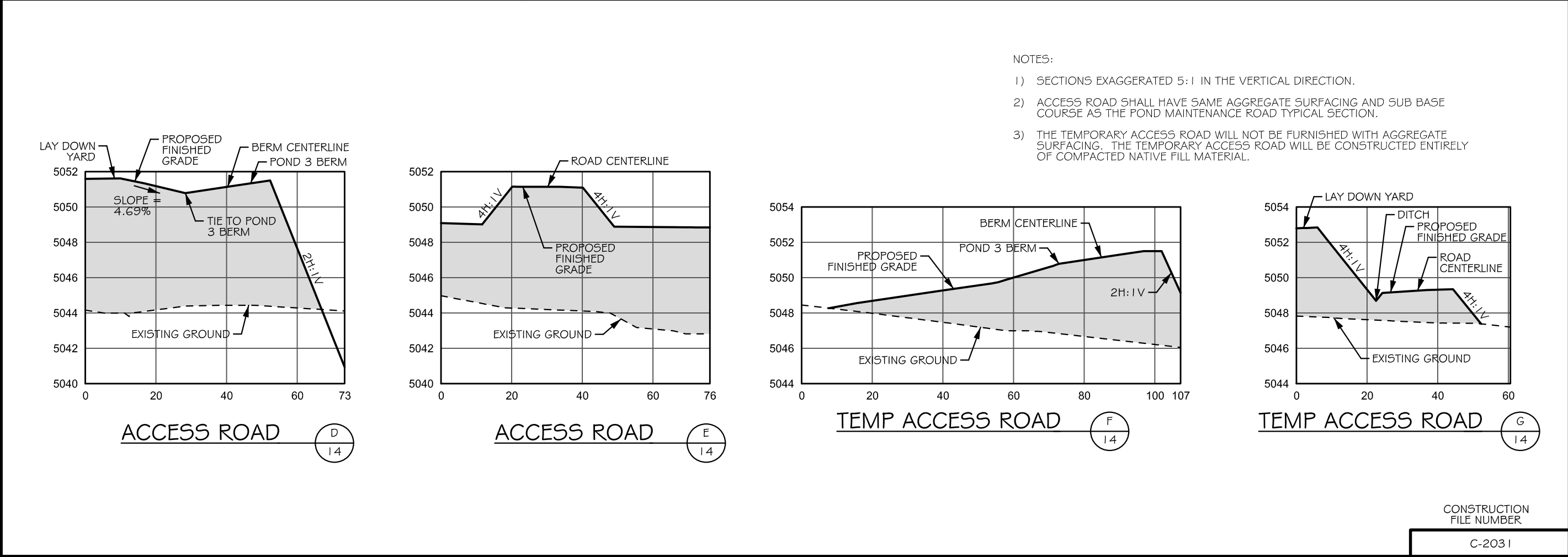
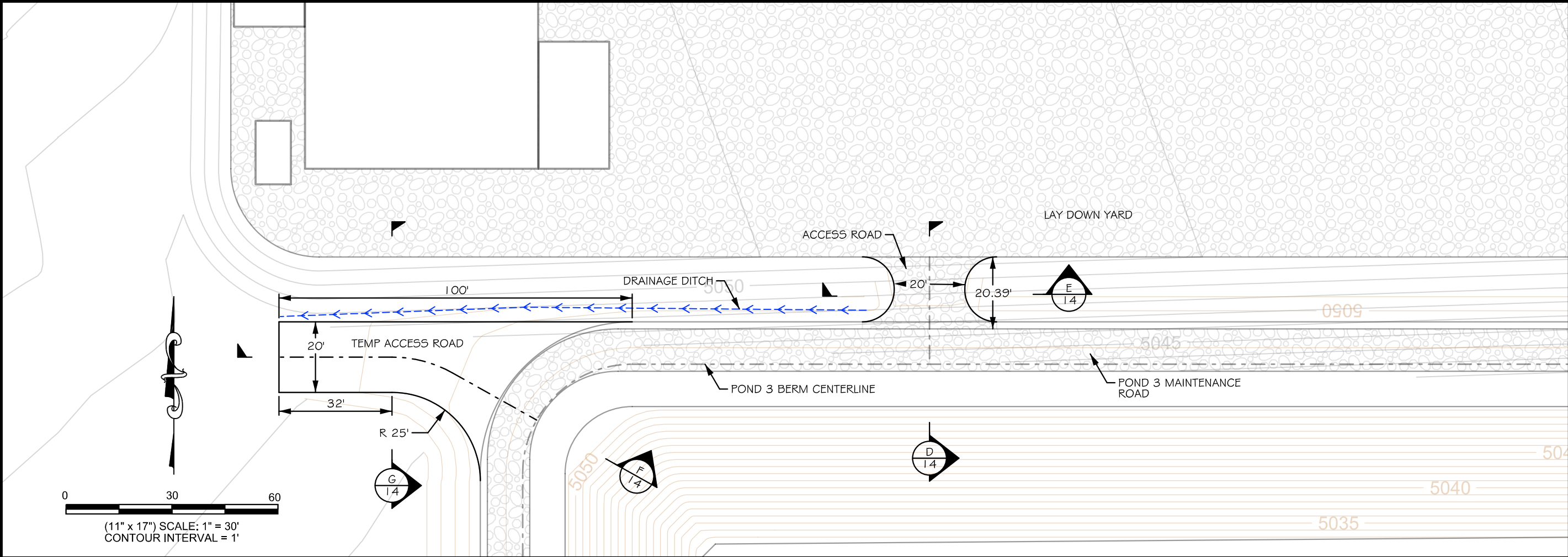
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DE BEQUE WATER STATION
POND 3
Pond Berm Centerline
Plan and Profile

SHEET
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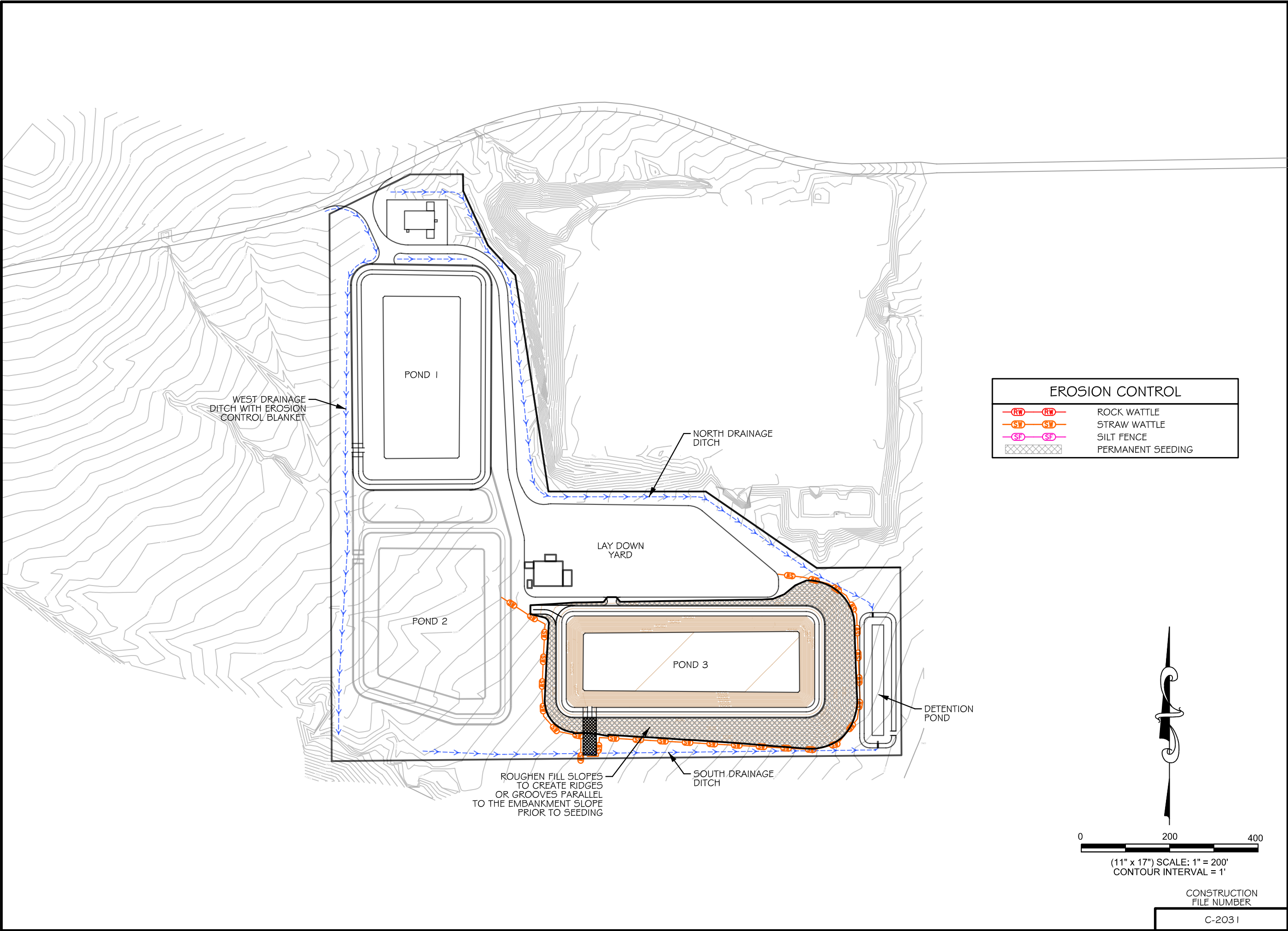
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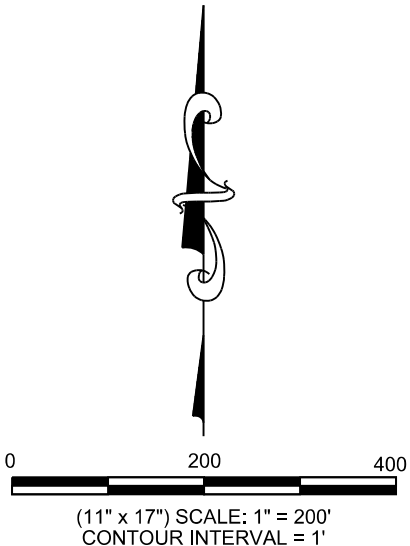
DE BEQUE WATER STATION
POND 3
Temporary Access Road
Plan and Profile

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CONSTRUCTION
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EROSION CONTROL			
		ROCK WATTLE	
		STRAW WATTLE	
		SILT FENCE	
		PERMANENT SEEDING	



CONSTRUCTION
FILE NUMBER
C-203 I

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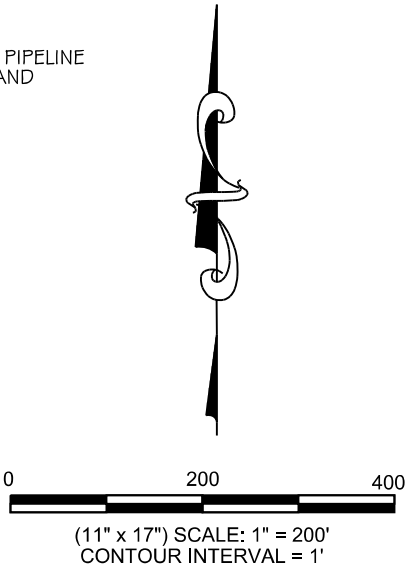
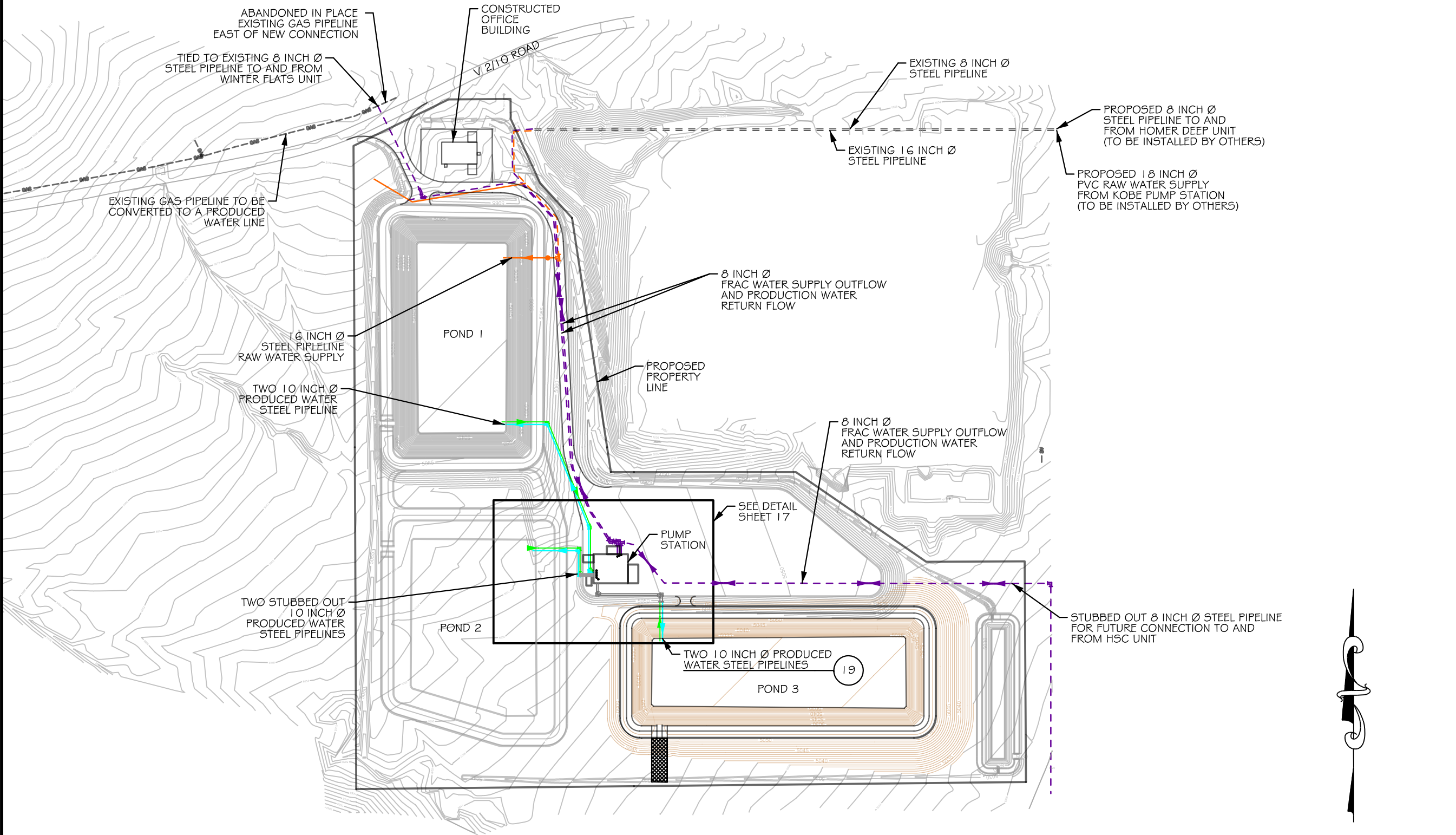
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DE BEQUE WATER STATION
POND 3

Erosion Control Plan



CONSTRUCTION
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C-203 I

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DDP	09/14	STH
REV	DATE	CKD
DDP	02/15	STH
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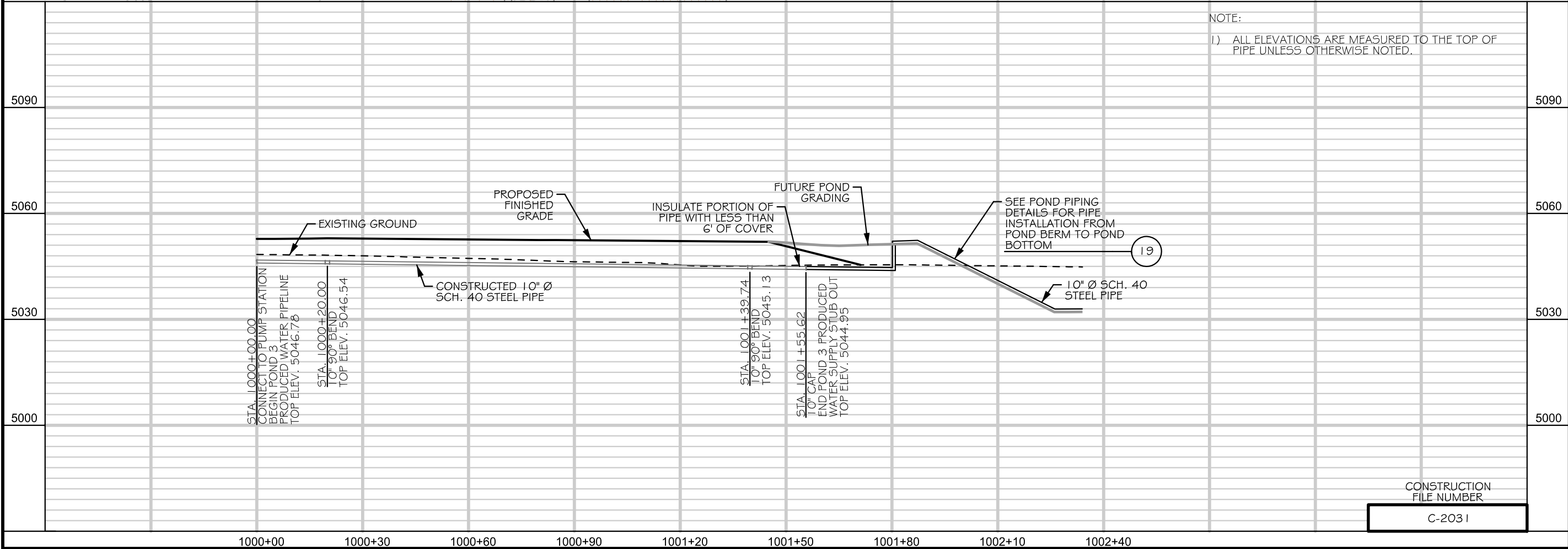
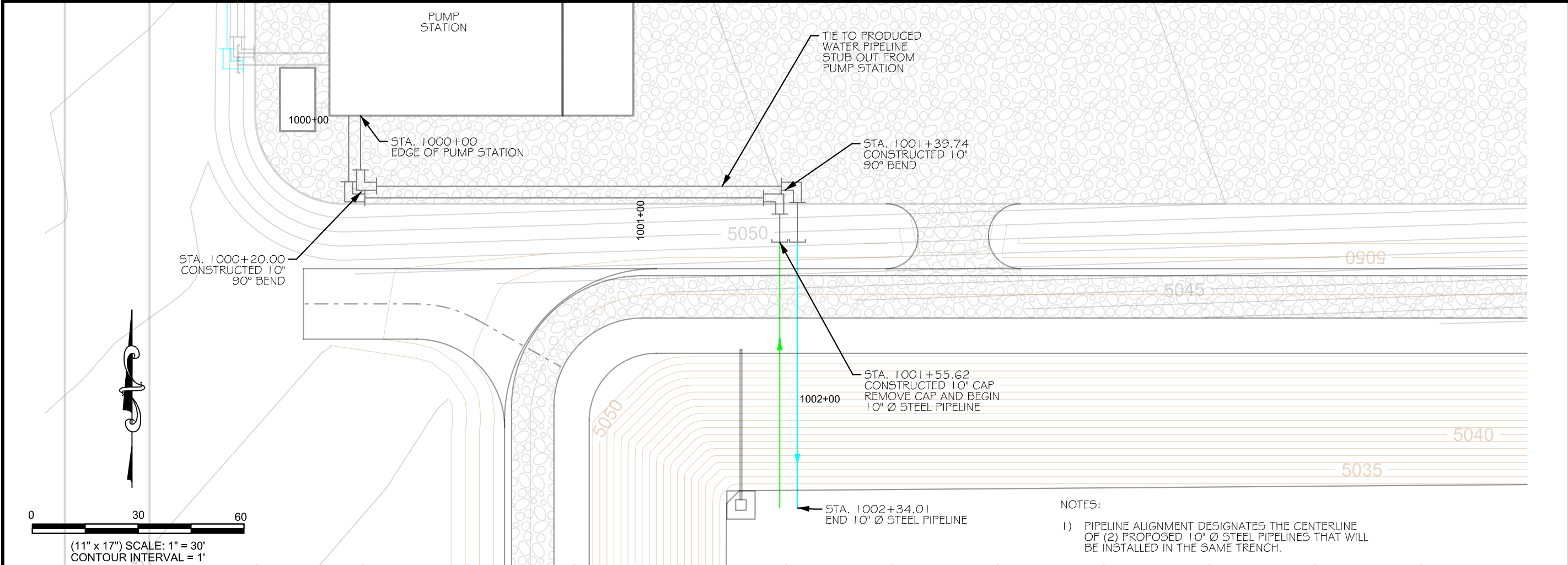
DE BEQUE WATER STATION
POND 3
Overall Pipeline Layout

SHEET
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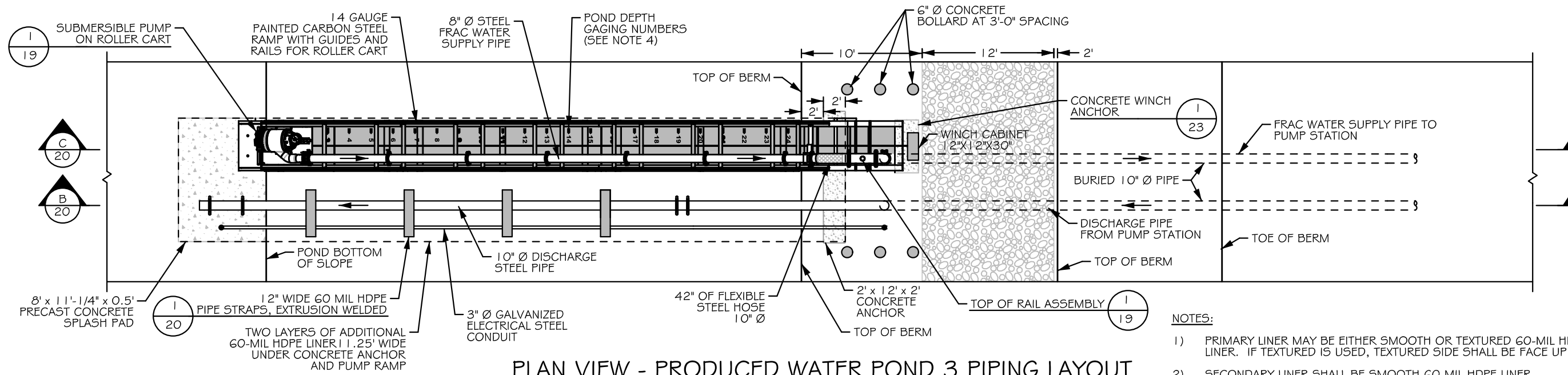
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DE BEQUE WATER STATION
POND 3

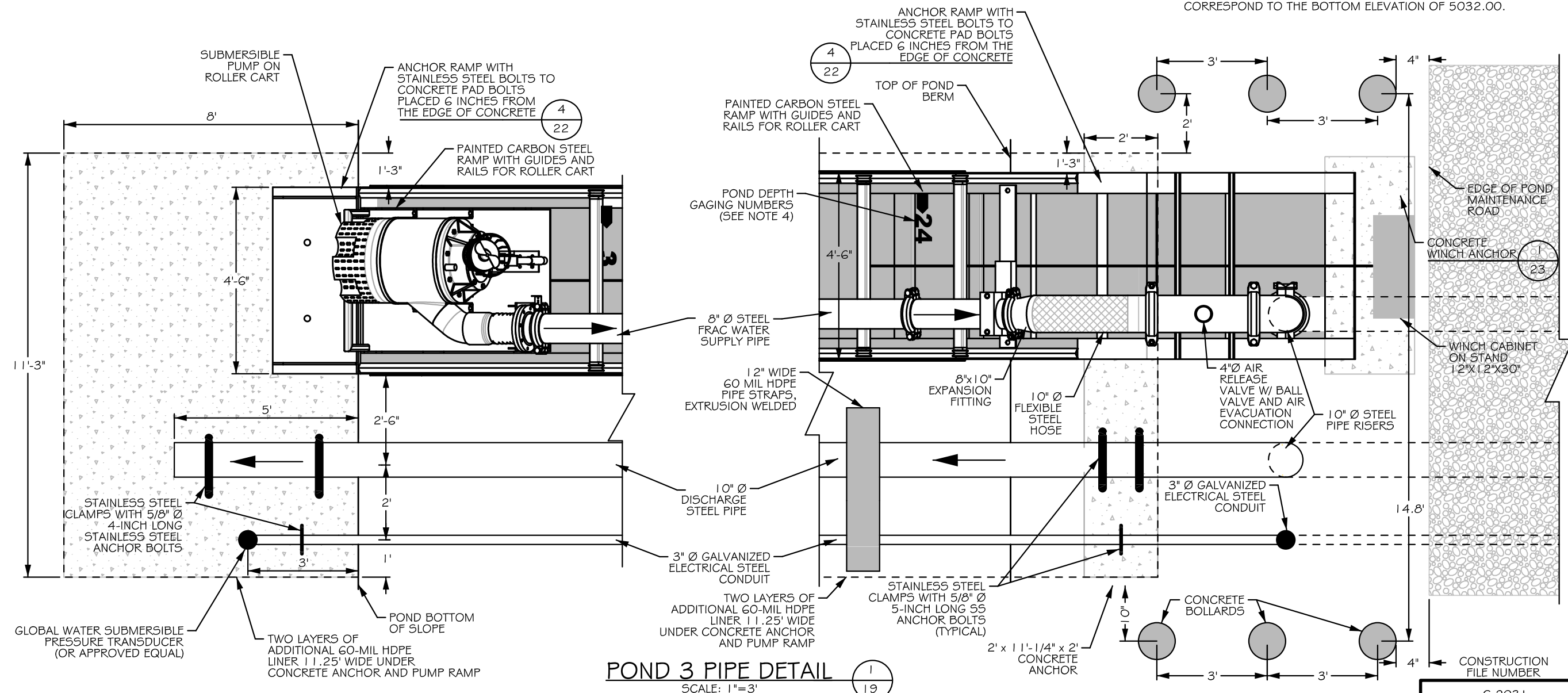
Produced Water
Main Connection Plan and Profile

SHEET
18 OF 28



NOTES:

- 1) PRIMARY LINER MAY BE EITHER SMOOTH OR TEXTURED 60-MIL HDPE LINER. IF TEXTURED IS USED, TEXTURED SIDE SHALL BE FACE UP.
- 2) SECONDARY LINER SHALL BE SMOOTH 60-MIL HDPE LINER.
- 3) PIPES NEED TO BE DRAINED FOR EXPOSED SECTIONS IN WINTER TO PREVENT FREEZING WHEN NOT FRACING WELLS.
- 4) POND DEPTH STAFF GAGES SHALL BE ENAMELED IRON AND SECURELY MOUNTED TO THE SUBMERSIBLE PUMP RAMP. THE "0" DEPTH SHALL CORRESPOND TO THE BOTTOM ELEVATION OF 5032.00.



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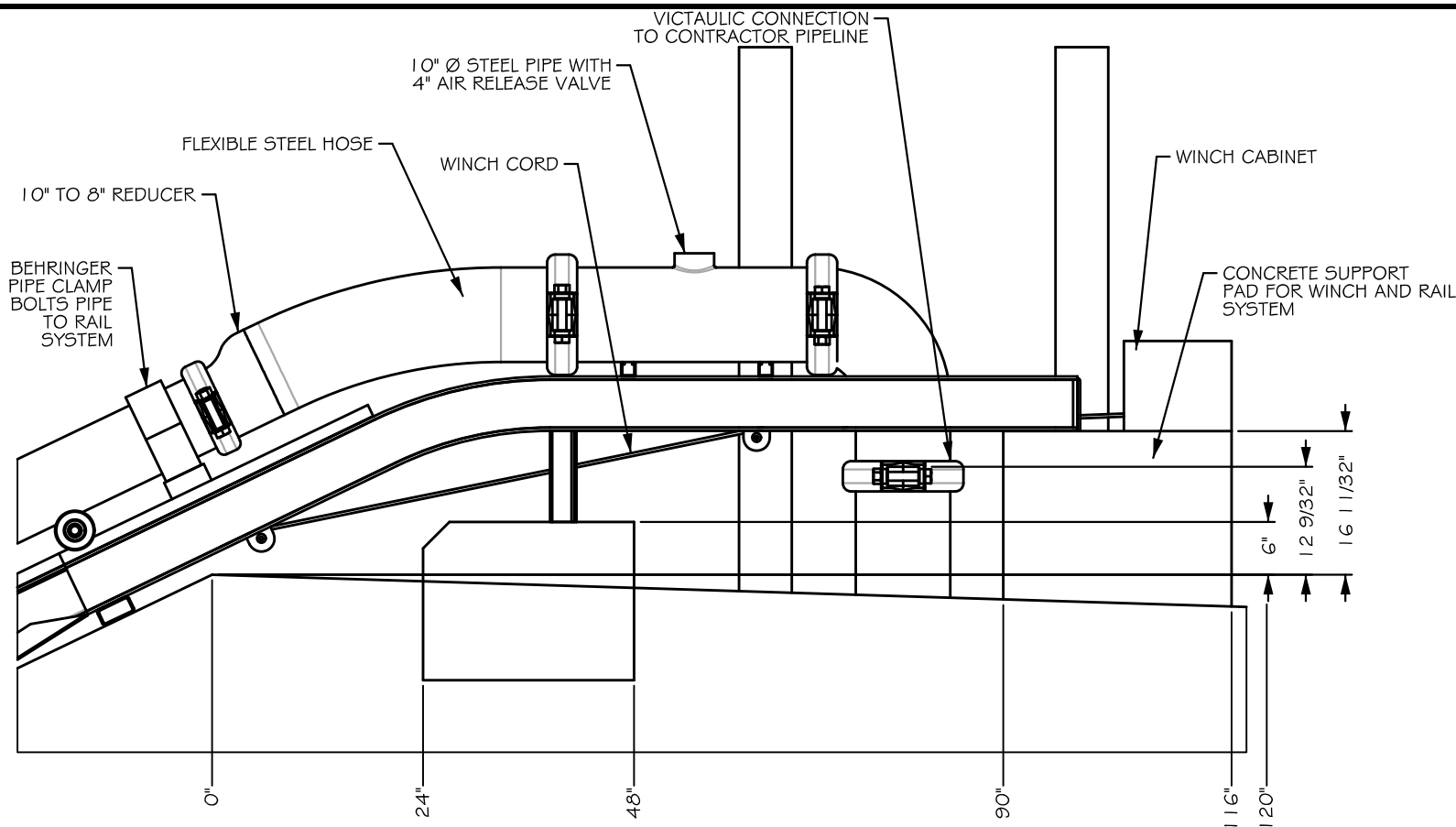
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DE BEQUE WATER STATION
POND 3

Produced Water Pond Piping Details

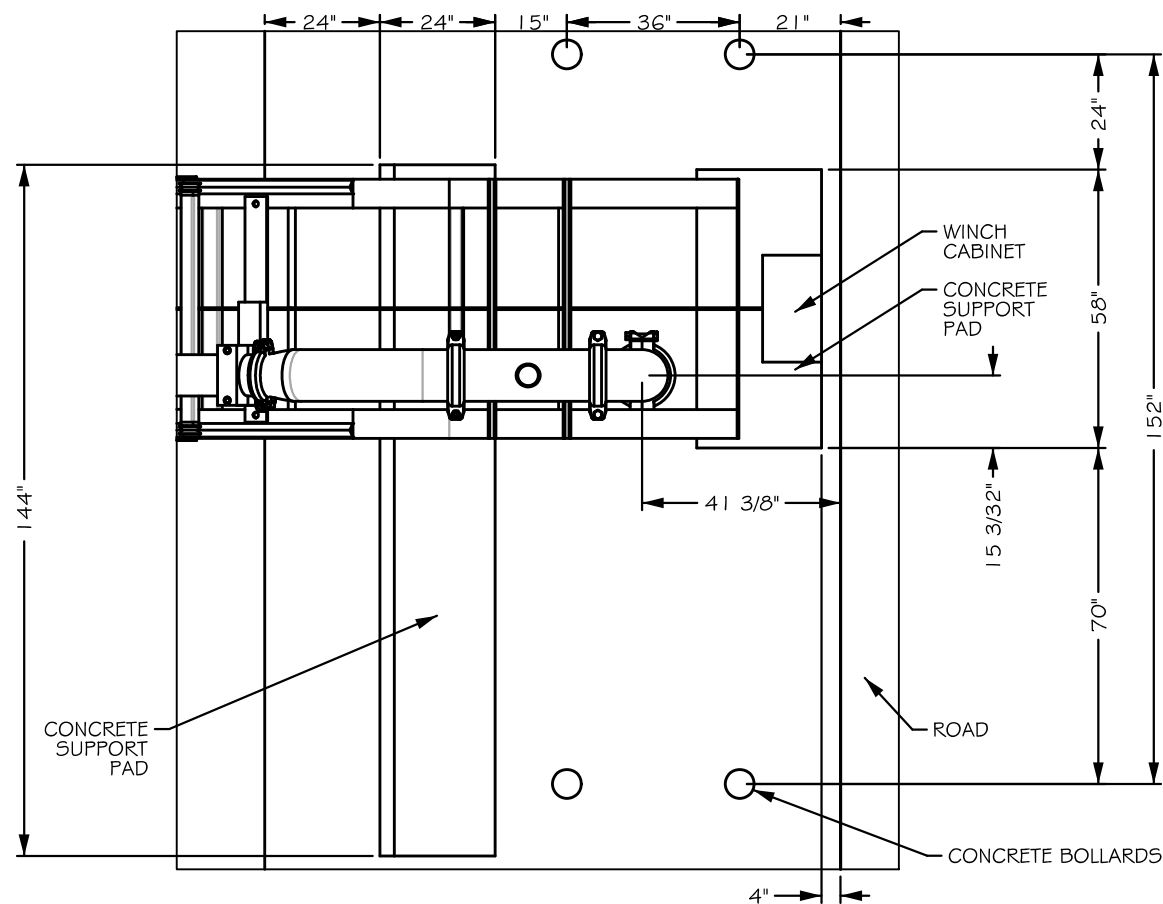
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19 OF 28

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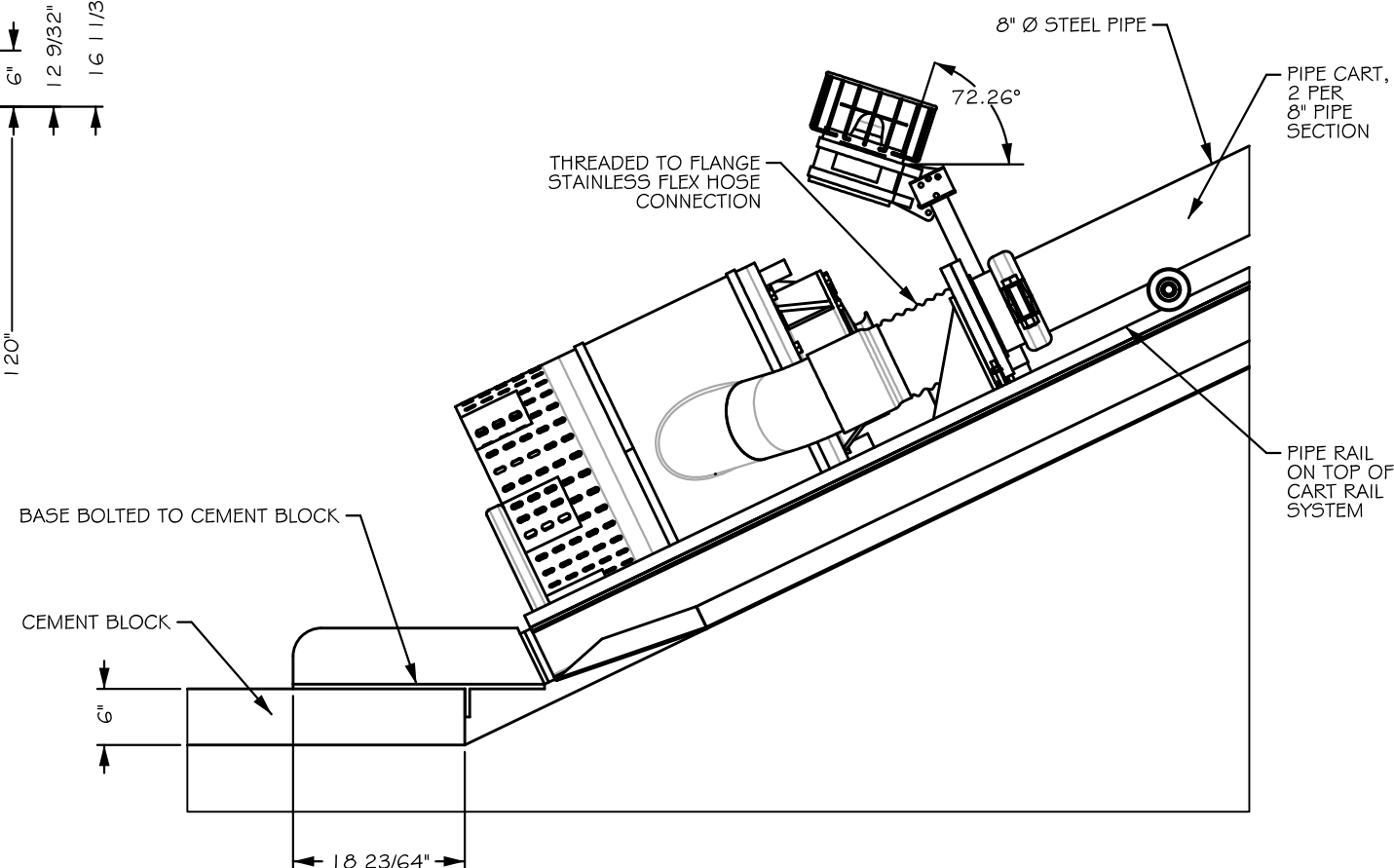
TOP RAIL ASSEMBLY SIDE VIEW

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TOP RAIL ASSEMBLY TOP VIEW

NOT TO SCALE



BOTTOM RAIL ASSEMBLY

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CONSTRUCTION FILE NUMBER C-2031	
SIZE B	WORK ORDER NO. 10591
SCALE: 1:500 WEIGHT: -	REV 1
SHEET 3 OF 8	

DE BEQUE WATER STATION
POND 3
Produced Water Pond Piping Details

SHEET
21 OF 28

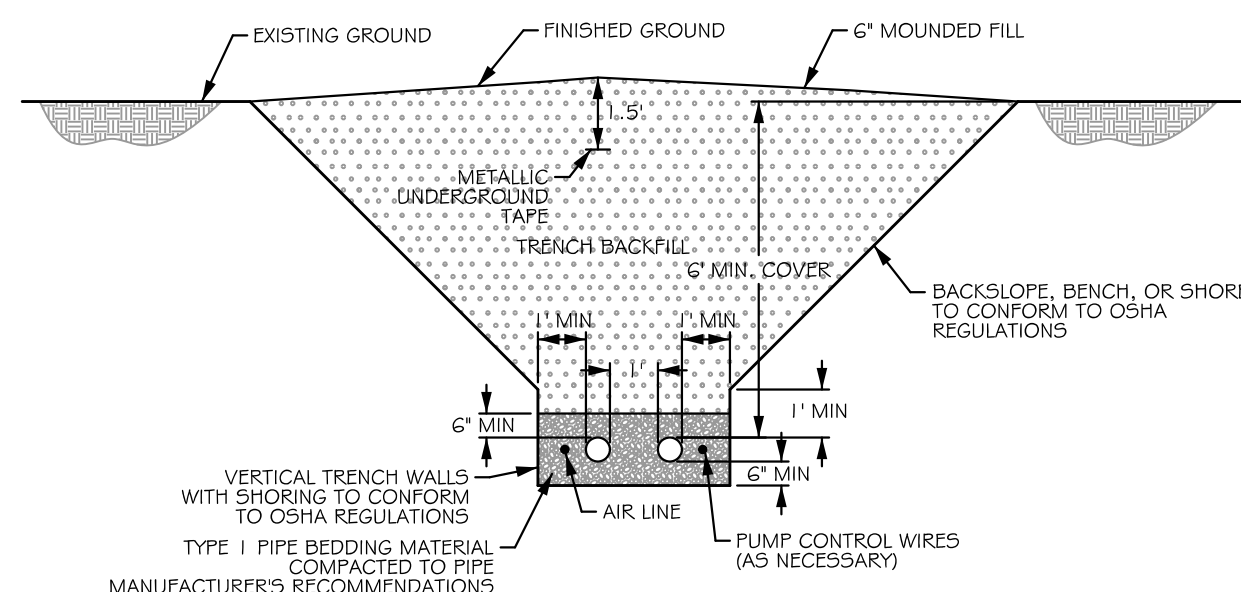
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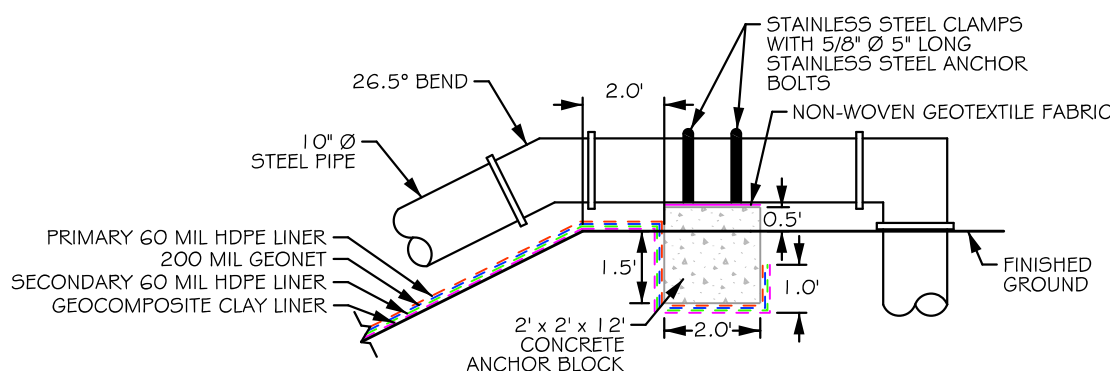
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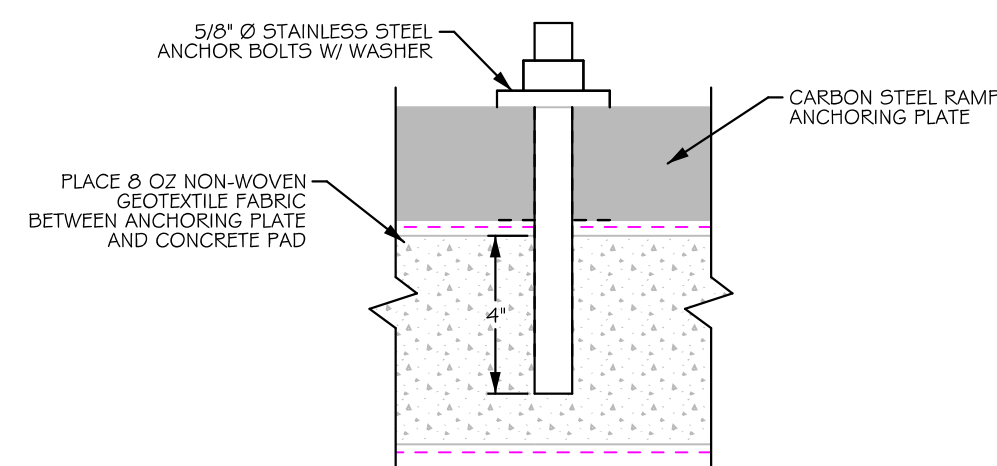
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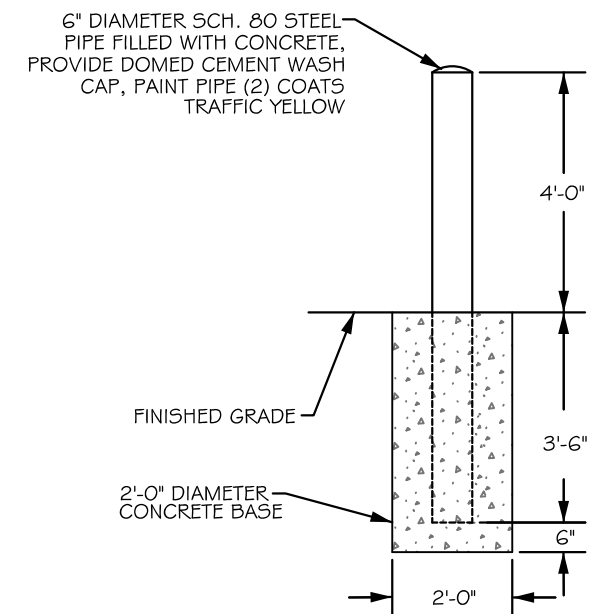
PIPE TRENCH DETAIL - DUAL PIPE TYPICAL 6/20
(11x17) SCALE: 1" = 4'



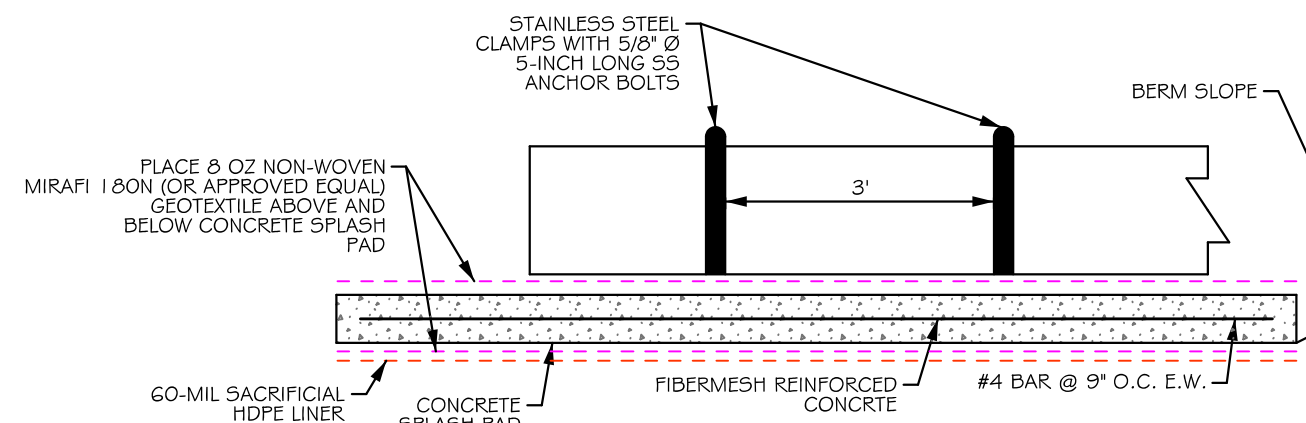
CONCRETE LINER KEY-IN DETAIL 2/20
NOT TO SCALE



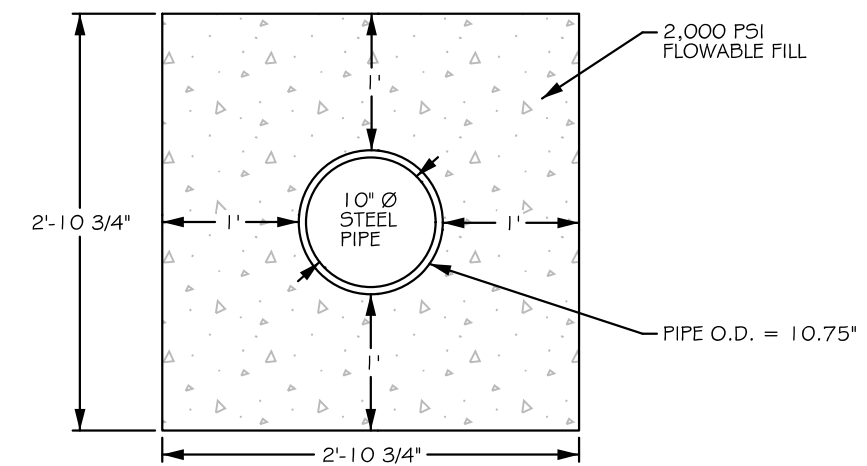
ANCHOR BOLT 4/19
NOT TO SCALE



CONCRETE BOLLARD 1/20
NOT TO SCALE



CONCRETE SPLASH PAD 3/20
NOT TO SCALE



FLOWABLE FILL ENCASED STEEL PIPE 5/20
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REV	DATE	CKD	STH
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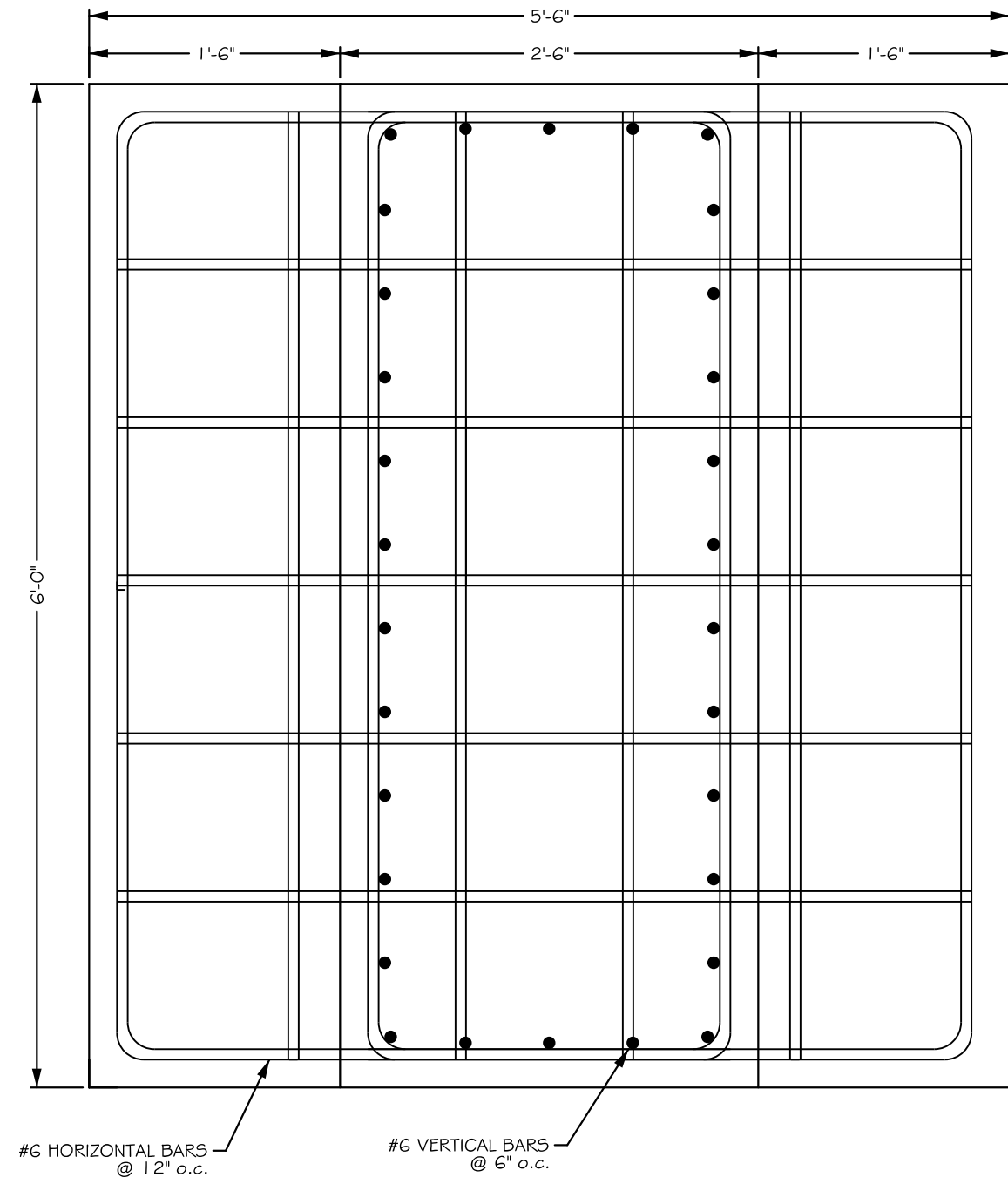
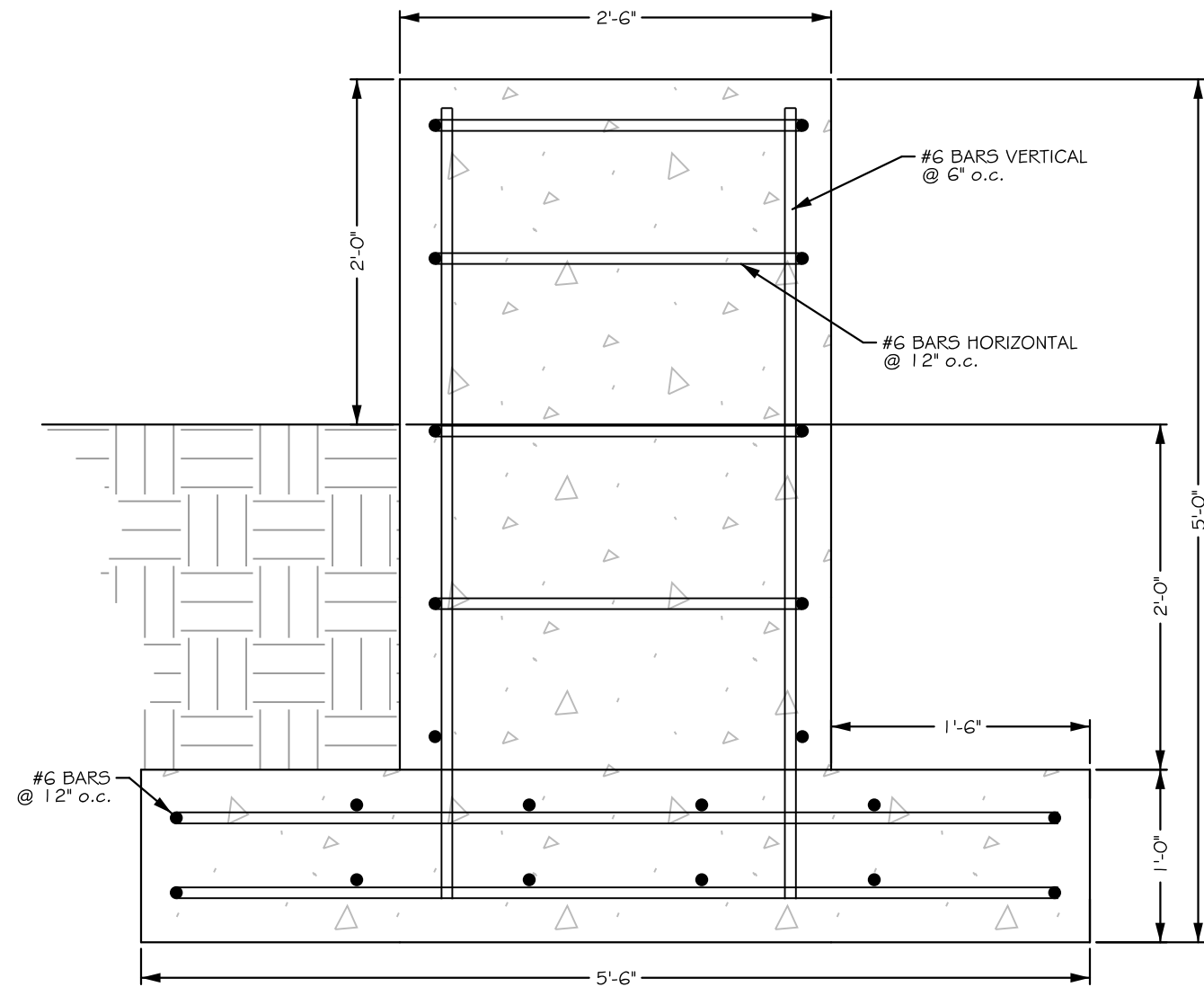
DE BEQUE WATER STATION
POND 3

Pond Details

SHEET
22 OF 28

CONSTRUCTION
FILE NUMBER

C-203 I



CONCRETE WINCH PAD
SCALE: 1" = 1'

1
19

CONSTRUCTION
FILE NUMBER

C-2031

DE BEQUE WATER STATION
POND 3

Concrete Winch Anchor Detail

SHEET
23 OF 28

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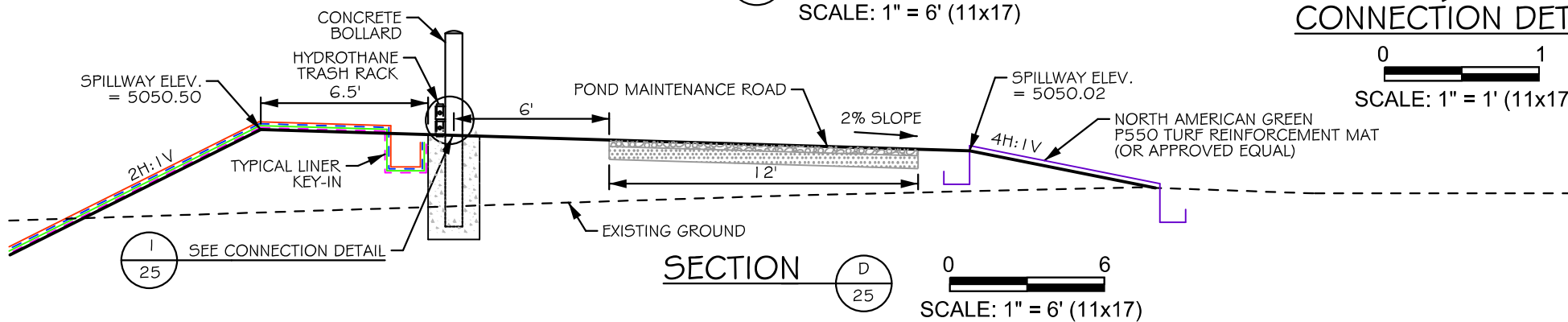
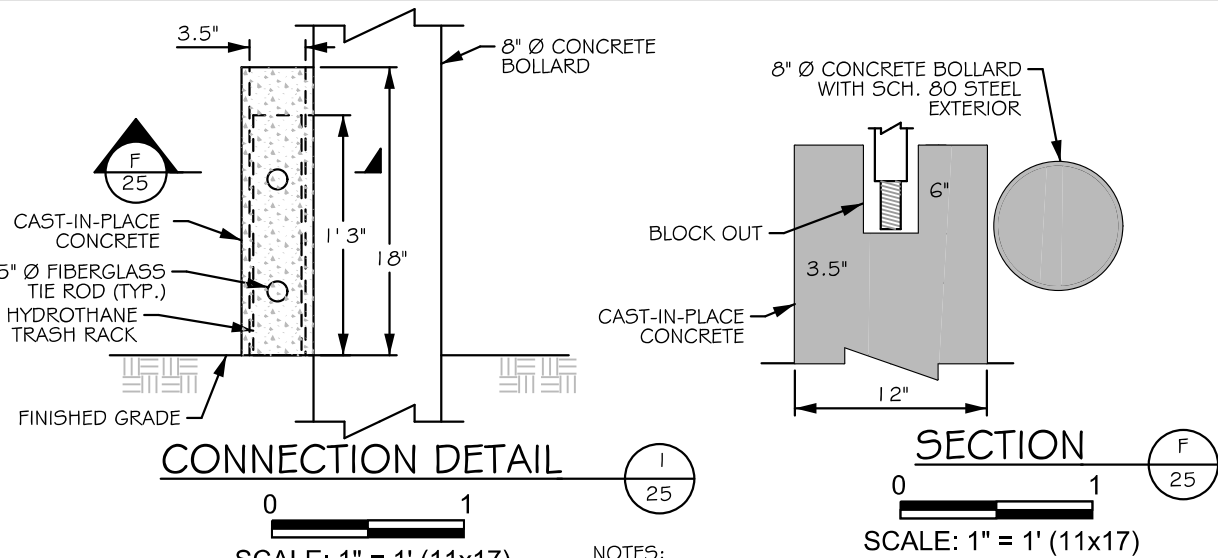
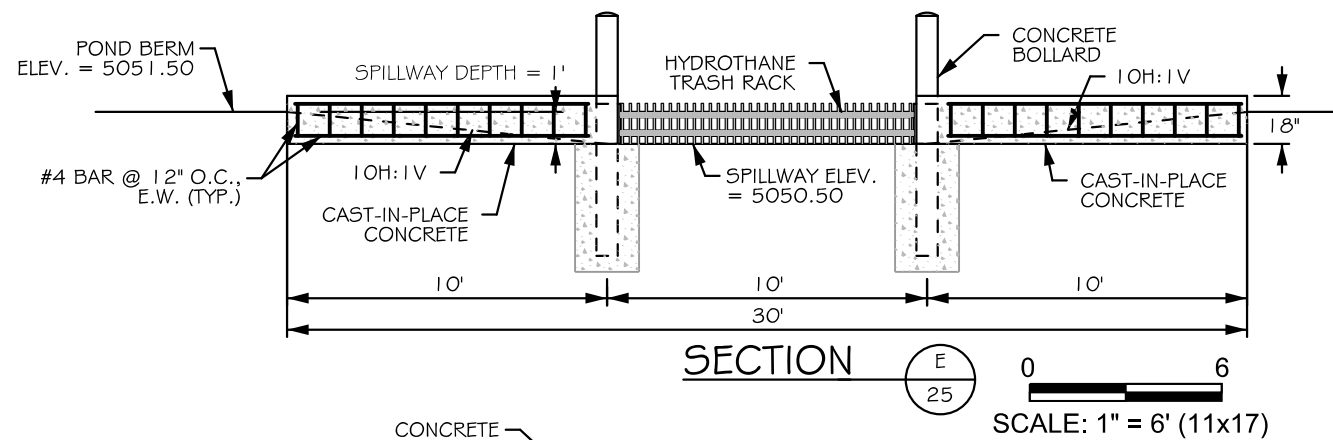
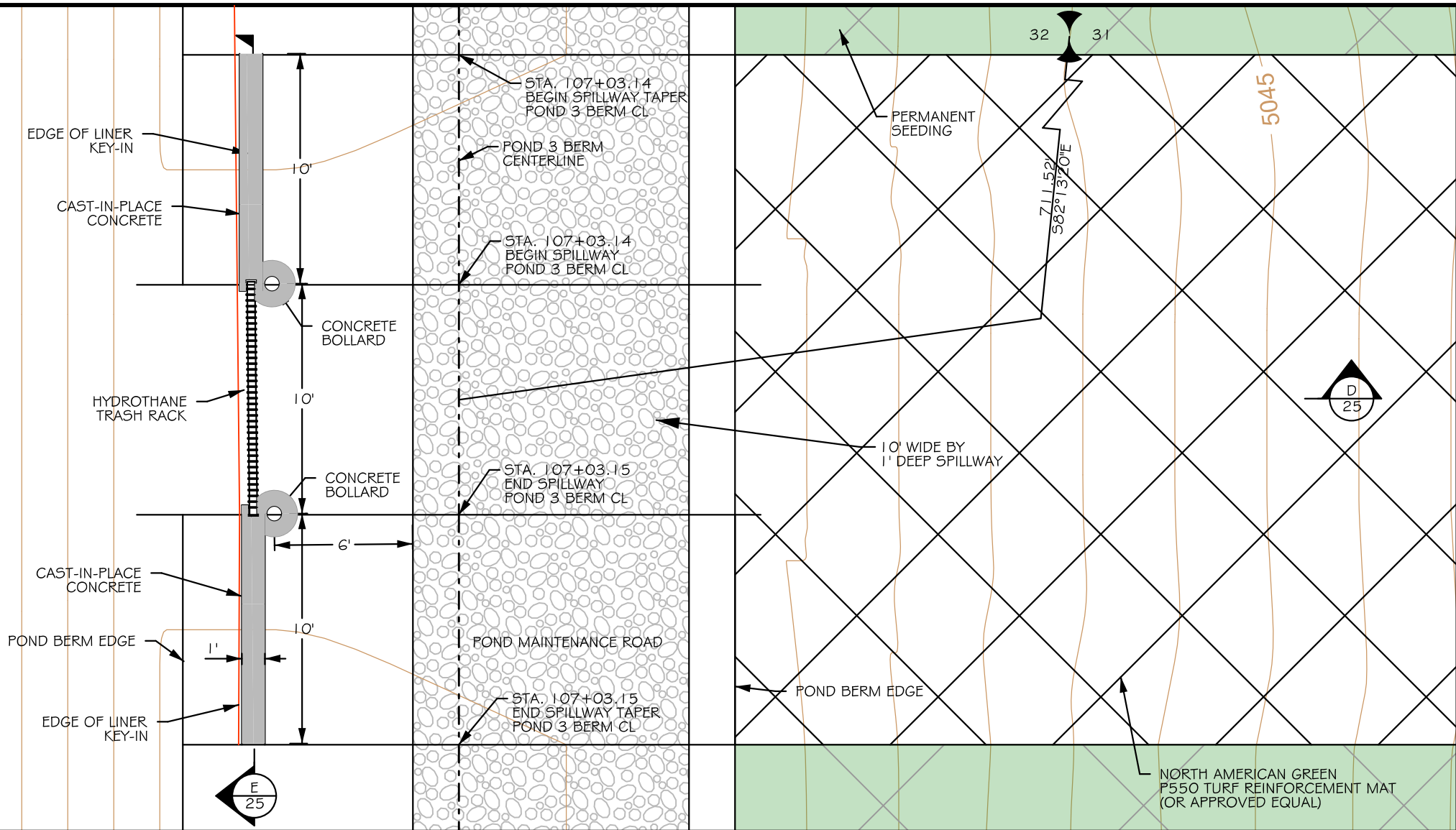
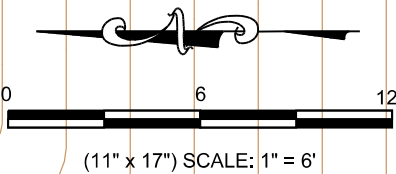
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3/19/2015 FILE PATH: K:\Hillman\BLACK HILLS\13134 - DE BEQUE STATION\DPOND 3\Pond 3 Engineering Plans (Working Set) 11x17.dgn

POND 3 SPILLWAY ELEVATION-
DISCHARGE TABLE

ELEVATION	DISCHARGE (CFS)
5050.5	0
5050.7	3.91
5050.9	12.08
5051.1	23.15
5051.3	36.50
5051.5	51.72



- NOTES:
- 1) INSTALL HYDROTHANE NON-METALLIC TRASH RACK (OR ENGINEER APPROVED EQUAL) PER MANUFACTURER'S RECOMMENDATION.
 - 2) APPLY CONNECTION DETAIL TO BOTH ENDS OF THE TRASH RACK.
 - 3) BLOCK OUT FOR TRASH RACK SHALL BE SIZED AND CONSTRUCTED TO BE ABLE TO SLIDE THE TRASH RACK VERTICALLY IN THE BLOCK OUT GROOVE. THIS WILL ALLOW THE TRASH RACK TO BE EASILY REMOVED IN THE FUTURE FOR CLEANING AND MAINTENANCE.

CONSTRUCTION
FILE NUMBER
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DE BEQUE WATER STATION
POND 3

Spillway Detail

SHEET
25 OF 28

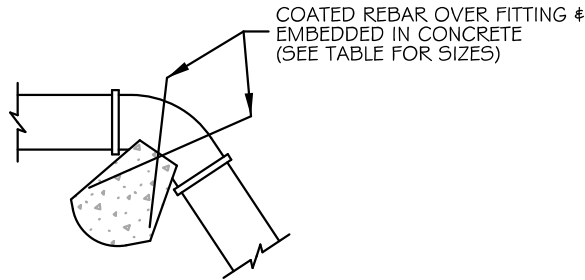
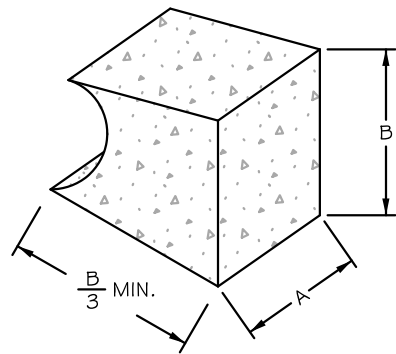
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JOB # 2013-134

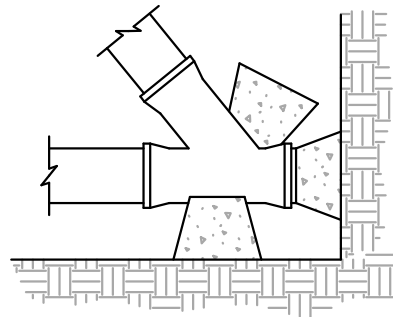
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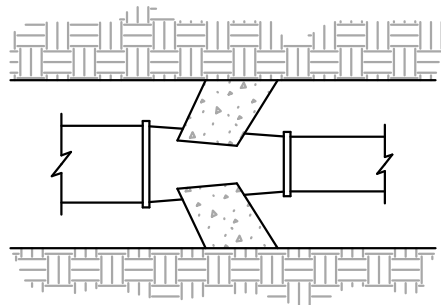
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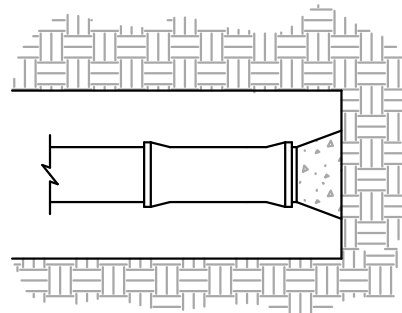
VERTICAL BEND



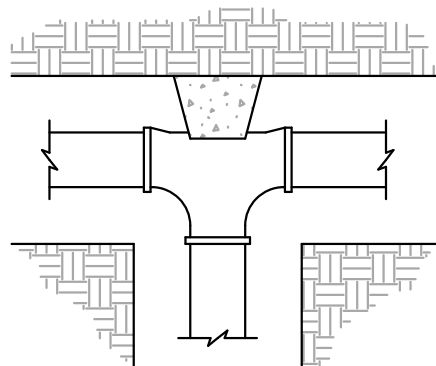
WYE



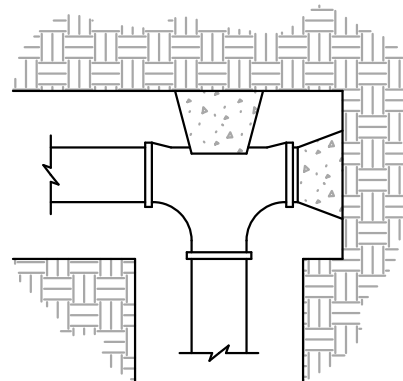
REDUCER



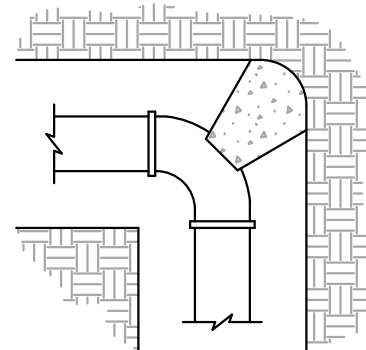
PLUG OR CAP



TEE



TEE (PLUGGED)



BEND

VERTICAL BEND REBAR			
FITTING SIZES	PRESSURE (PSI)	REBAR SIZES	EMBEDMENT
8"	1250	#8	36" ①
10"	150	#6	30"
16"	150	#8	36"

① WHEN THE 36" LENGTH EXCEEDS THE LENGTH B/3 THEN BEND THE SECTION OF REBAR THAT WOULD PROTRUDE FROM THE THRUST BLOCK, PARALLEL TO THE BEARING FACE. PROVIDE 3" OF CONCRETE COVER OVER ALL REBAR.

THRUST BLOCKING FOR WATER MAIN FITTING ASSEMBLY

NOT TO SCALE

STANDARD DIMENSIONS FOR THRUST BLOCKING															
FITTING SIZES	PRESSURE (PSI)	TEES & PLUGS		90° BEND		45° BEND & WYES		REDUCERS & 22.5° BEND		11.25° BEND		9.5° BEND		4° BEND	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B
8"	1250	6'-0"	5'-0"	6'-0"	5'-0"	4'-4"	4'-0"	3'-0"	2'-9"	2'-0"	2'-0"	2'-0"	1'-9"	1'-5"	1'-0"
10"	150	3'-4"	3'-3"	4'-0"	3'-10"	3'-0"	2'-9"	2'-2"	1'-11"	NOT NEEDED	NOT NEEDED	NOT NEEDED	NOT NEEDED	NOT NEEDED	NOT NEEDED
16"	150	6'-0"	5'-0"	6'-0"	5'-0"	6'-0"	4'-0"	4'-6"	3'-0"	NOT NEEDED	NOT NEEDED	NOT NEEDED	NOT NEEDED	NOT NEEDED	NOT NEEDED

NOTES:

- THIS TABLE IS BASED ON 150 PSI MAIN PRESSURE WITH 2000 PSF SOIL BEARING PRESSURE AND 1250 PSI WITH 3000 PSF SOIL BEARING PRESSURE.
- WRAP ALL FITTINGS WITH POLYETHYLENE.
- KEEP CONCRETE CLEAR OF JOINT AND JOINT ACCESSORIES.
- POUR THRUST BLOCKING AGAINST UNDISTURBED EARTH.
- VERTICAL BENDS HAVING DOWNWARD RESULTANT THRUST AND HORIZONTAL BENDS HAVE THE SAME THRUST BLOCK REQUIREMENTS.
- THRUST BLOCK BEARING AREA SHALL NOT BE LESS THAN 1.0 SQ. FT.
- THE 1250 PSI PRESSURE 8 INCH DIAMETER WATER MAIN WILL REQUIRE THRUST BLOCKING ON HORIZONTAL AND VERTICAL BENDS WITH A BEND OF 4° OR GREATER. BENDS LESS THAN 4° WILL NOT REQUIRE A THRUST BLOCK.

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FILE NUMBER

C-2031

DE BEQUE WATER STATION
POND 3

Thrust Block Details

SHEET
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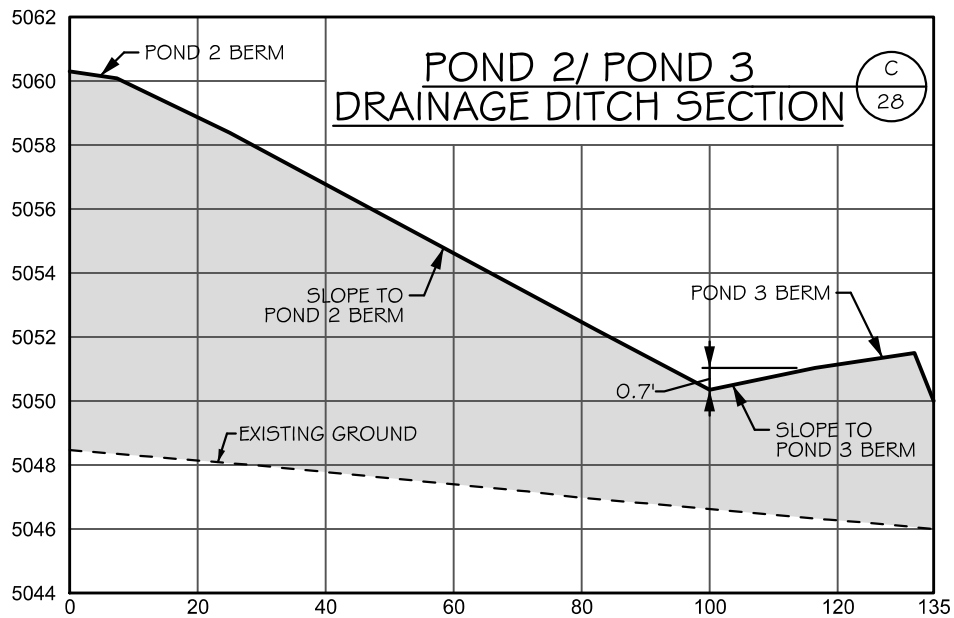
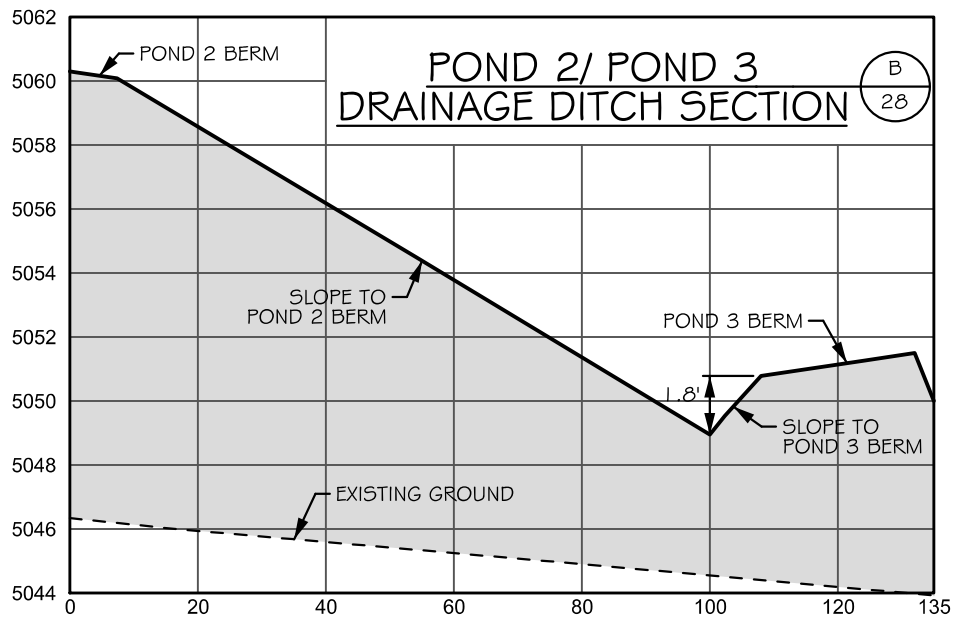
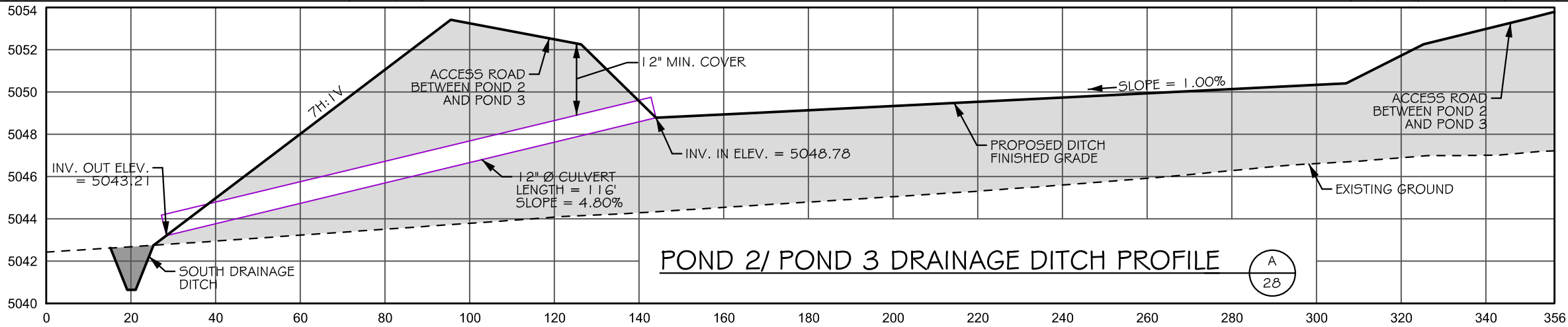
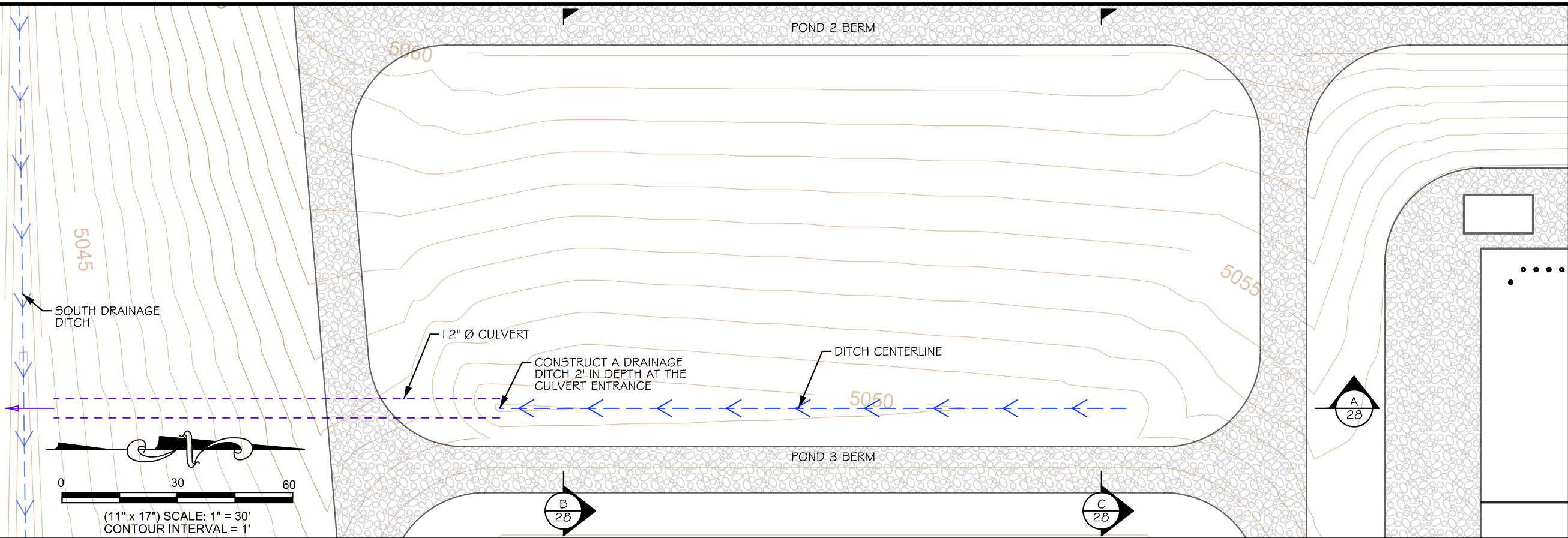
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- NOTES:
- THIS CONNECTION BERM, DITCH AND MAINTENANCE ROADS WILL BE CONSTRUCTED IF POND 3 IS CONSTRUCTED PRIOR TO POND 2. THE CONSTRUCTION PHASING OF POND 2 AND POND 3 WILL BE DETERMINED BY THE OWNER.
 - SECTIONS EXAGGERATED 5:1 IN THE VERTICAL DIRECTION.

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DE BEQUE WATER STATION
POND 3

Pond 2/Pond 3 Drainage Ditch
Plan and Profile

SHEET
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CIVIL/WATER RESOURCE ENGINEERING

WATER SUPPLY, TREATMENT AND DISTRIBUTION

- AVAILABILITY STUDIES
- DISTRIBUTION SYSTEM MODELING
- DISTRIBUTION SYSTEM DESIGN
- SURFACE & GROUNDWATER MODELING
- RISK & VULNERABILITY ANALYSIS
- PUMP STATION DESIGN
- WATER STORAGE TANK DESIGN
- MONITORING SERVICES
- DEQ PERMITTING
- WATER RIGHTS

WASTEWATER TREATMENT AND DISPOSAL

- TREATMENT SYSTEM DESIGN
- COLLECTION SYSTEM MODELING
- INFILTRATION/INFLOW ANALYSIS
- LIFT STATION DESIGN
- PROJECT FUNDING APPLICATIONS & ADMINISTRATION
- FORCE MAIN DESIGN
- MONITORING SERVICES
- DEQ PERMITTING

STORMWATER MANAGEMENT

- HYDROLOGY & HYDRAULICS MODELING
- COLLECTION SYSTEM DESIGN
- FLOODPLAIN ASSESSMENT & ADMINISTRATION
- SWPPP REPORTS & PERMITTING
- DETENTION & STORAGE DESIGN
- EROSION & SEDIMENT CONTROL
- DEQ PERMITTING
- POINT SOURCE DISCHARGE COMPLIANCE

ENVIRONMENTAL SERVICES

ENVIRONMENTAL COMPLIANCE & BEST MANAGEMENT PRACTICES
ENVIRONMENTAL IMPACT ANALYSIS & REGULATORY PERMITTING
ENVIRONMENTAL SITE ASSESSMENTS
MUNICIPAL LANDFILL DESIGN & PERMITTING
GEOMORPHOLOGIC INVESTIGATIONS
HYDROCARBON PRODUCT RECOVERY SYSTEM DESIGN
HYDROLOGIC & WATER QUALITY MONITORING
HAZARDOUS & NON-HAZARDOUS WASTE MANAGEMENT PLANNING
SITE REMEDIATION PLANNING & DESIGN
SOIL AND GROUNDWATER CLEANUP PLANS
UNDERGROUND STORAGE TANKS INVESTIGATION & REMOVAL PLANS
NEPA COMPLIANCE DOCUMENTS
ENVIRONMENTAL AUDITS
WETLAND DELINEATION & MITIGATION
MONITORING SERVICES

PLANNING SERVICES

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SUBDIVISION REGULATIONS DEVELOPMENT
SUBDIVISION REVIEWS
ZONING REGULATIONS & ADMINISTRATION
ANNEXATION POLICIES & REVIEW

GIS SERVICES

DATABASE DEVELOPMENT
MAPPING
DATA MANAGEMENT
PLANNING TOOLS

GRANT & FUNDING ASSISTANCE

PRELIMINARY ENGINEERING REPORTS
ENVIRONMENTAL CHECKLISTS
GRANT WRITING
INTERAGENCY COORDINATION

TRANSPORTATION SERVICES

TRAFFIC IMPACT STUDIES
RECONNAISSANCE REPORTS
BRIDGE HYDRAULICS, SCOUR ANALYSIS, STRUCTURE SELECTION
DESIGN OF URBAN STREETS, RURAL ROADWAYS
STREETSCAPE ENHANCEMENTS
UTILITY REPLACEMENT
BICYCLE/PEDESTRIAN PATHWAYS
PARKING FACILITIES

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