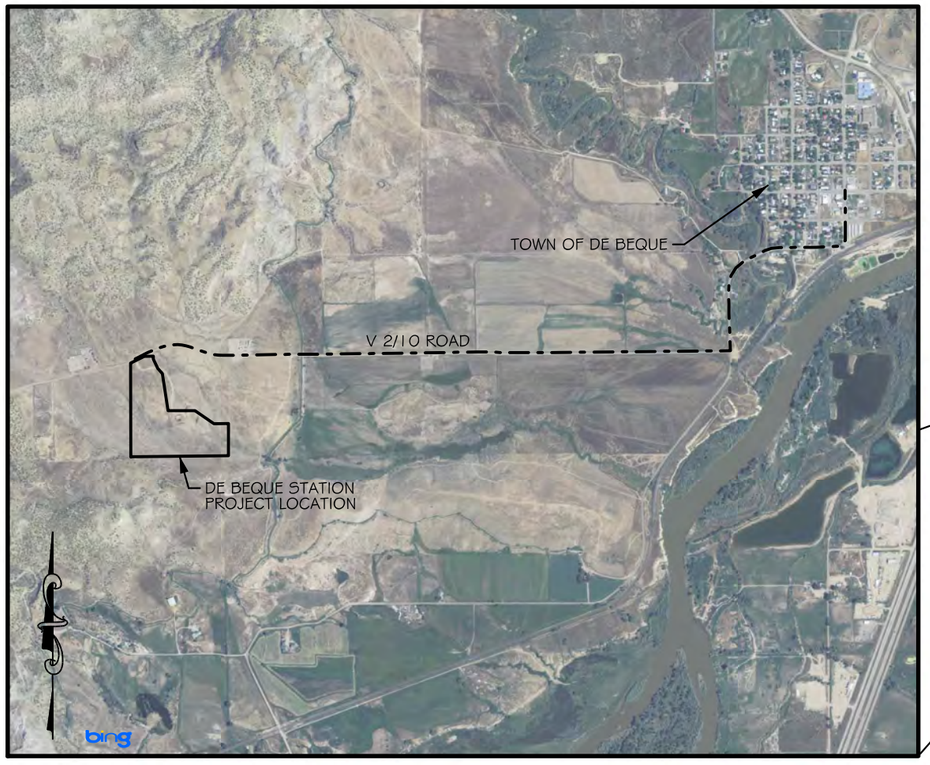
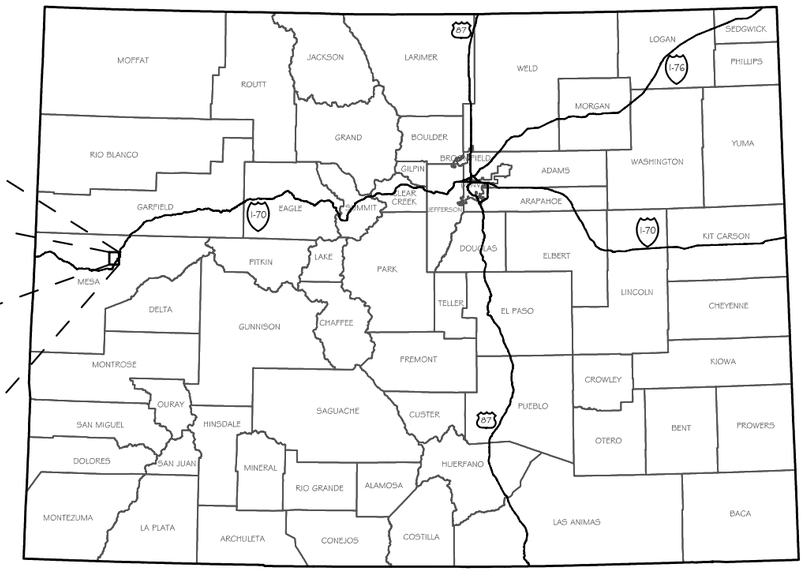
Black Hills Exploration & Production
A Black Hills Corporation Enterprise

DE BEQUE STATION
PRODUCED WATER REUSE FACILITY - POND 1

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: JULY 2014 FOR COGCC REVIEW





STATE OF COLORADO

WWC ENGINEERING

Providing Quality Services to the Rocky Mountain Region Since 1980

DE BEQUE STATION - POND 1

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MESA COUNTY, COLORADO
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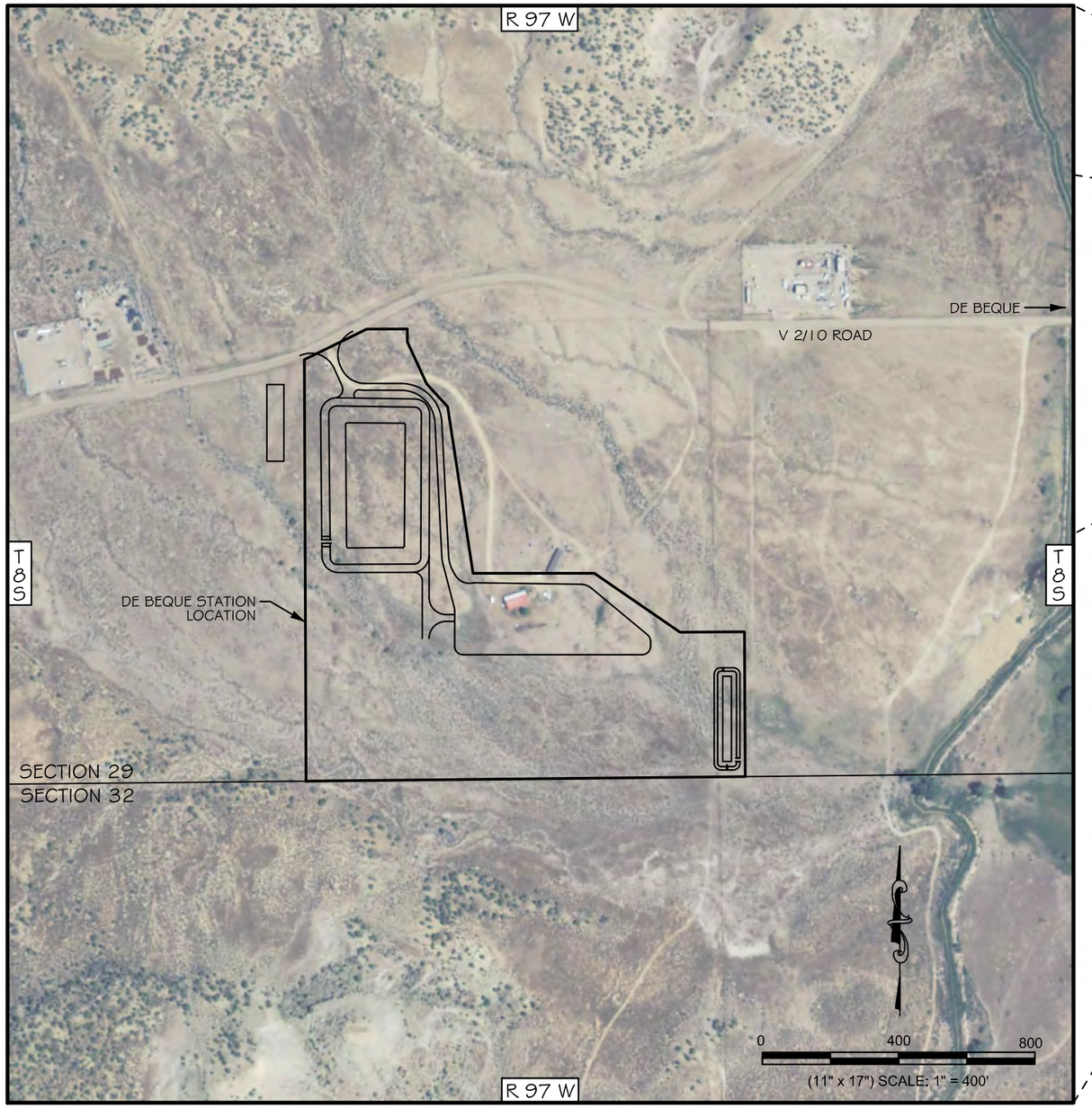
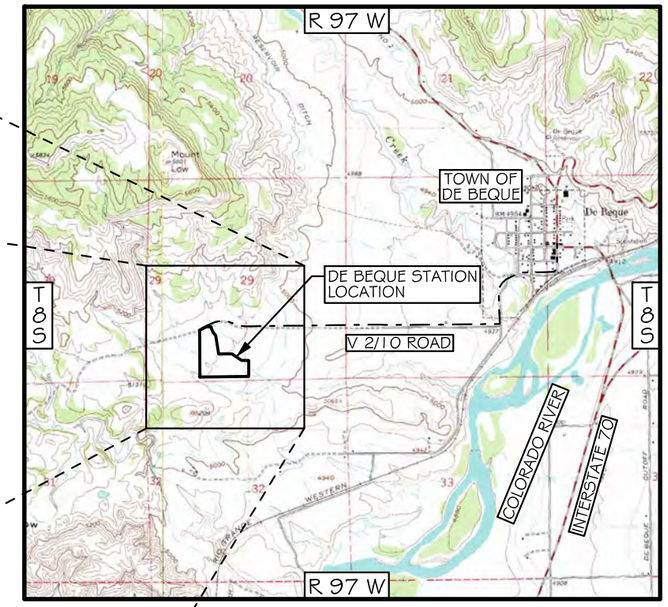


LOCATION MAP



VICINITY MAP

0 4,000 8,000
(11" x 17") SCALE: 1" = 4,000'

PROJECT CONTACTS

BLACK HILLS OPERATIONS MANAGER
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HIGH DESERT SURVEYING
MR. JEFF FLETCHER, P.L.S. - (970) 254-8649
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BRANCH MANAGER

WWC ENGINEERING
MR. KEVIN GRABINSKI, P.E. - (406) 443-3962
PROJECT MANAGER

COLORADO LICENSED
SHAWN T. HIGLEY
47398
PROFESSIONAL ENGINEER
7/3/14

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 AND ITS ACCOMPANYING REGULATIONS.

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DATE	06/14	DATE
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DE BEQUE STATION
POND 1

Title Sheet

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INDEX OF SHEETS

PROJECT LEGEND

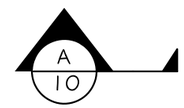
PLAN FEATURES

- EDGE OF ROAD
- ROAD CENTERLINE
- FENCE
- GAS — UNDERGROUND GAS
- PWR — OVERHEAD POWER
- DRAINAGE FLOW LINE
- GRAVEL ROAD SURFACE
- EXISTING GROUND CONTOUR
- PROPOSED GROUND CONTOUR
- CULVERT
- PRODUCED WATER PIPE
- RAW WATER PIPE

LINER ELEMENTS

- PRIMARY LINER
- GEONET
- SECONDARY LINER
- GEOCOMPOSITE CLAY LINER

DRAWING NOTATION



INDICATES CROSS SECTION LOCATION. "A" REFERS TO THE CROSS SECTION DESIGNATION. "10" REFERS TO THE SHEET NUMBER WHERE THE SECTION IS CUT OR SHOWN.

INDICATES DETAIL LOCATION. "1" REFERS TO THE DETAIL DESIGNATION. "12" REFERS TO THE SHEET NUMBER WHERE THE DETAIL IS INDICATED OR SHOWN.

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DE BEQUE STATION
POND 1

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ABBREVIATIONS

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

NOTES:

1. 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.
2. THIS IS A STANDARD ABBREVIATION LIST. THEREFORE, NOT ALL ABBREVIATIONS ARE USED ON THE PLANS.
3. ADDITIONAL ABBREVIATIONS FOR SPECIALIZED WORK DIVISIONS (INSTRUMENTATION AND CONTROL, ELECTRICAL, ETC.) ARE SHOWN ON OTHER LEGEND SHEETS, AS APPLICABLE.
4. MONTANA PUBLIC WORKS STANDARD SPECIFICATIONS, LATEST EDITION.

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DE BEQUE STATION
POND 1

Abbreviations

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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.

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).

2) CULVERT BEDDING SHALL BE CLASS 1 MEETING THE REQUIREMENTS OF CDOT STANDARD SPECIFICATION SECTION 703.03.

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) THE CONTRACTOR SHALL PROVIDE CATHODIC PROTECTION FOR ALL WATER MAIN PIPE, VALVES, AND FITTINGS.

7) 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.

8) ALL PIPES WITH A BURY DEPTH LESS THAN 6' SHALL REQUIRE INSULATION TO PREVENT FREEZING.

9) 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.

10) ALL WATER PIPELINE SHALL BE SCHEDULE 40 OR SCHEDULE 80 CARBON STEEL. SEE PLAN AND PROFILE SHEETS FOR PIPE SCHEDULE AND SIZES. ALL PIPES SHALL BE FUSION BOND EPOXY 14-16 MIL EXTERNALLY COATED. PIPE SHALL BE INTERNALLY COATED WITH CORVEL GREEN. 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 SHOW 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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DE BEQUE STATION
POND 1

Construction Notes

SHEET
4

GRADING

ITEM	VOLUME		REMARKS
	CUBIC YDS	CUBIC YDS	
	EXCAVATION	COMPACTED FILL	
POND 1 GRADING (1)	28,100	41,500 (2)	COMPACTED FILL INCLUDES 5% SHRINKAGE
EARTHEN BERM		7,900 (2)	COMPACTED FILL INCLUDES 5% SHRINKAGE
TOTAL	28,100	49,400	

(1) POND 1 GRADING INCLUDES LAY DOWN YARD, DETENTION POND AND PROPOSED DITCHES.
(2) COMPACTED FILL VOLUMES INCLUDE EXCAVATING, HAULING, AND COMPACTING MATERIAL.

TOPSOIL AND REVEGETATION

ITEM	QUANTITY			REMARKS
	CUBIC YDS	ACRES	SQ. YARDS	
TOPSOIL SALVAGING AND PLACING (1)	4,400			ASSUMES 3" OF TOPSOIL
SEEDING		3.5		
TURF REINFORCEMENT MAT			2,361	
CLEARING AND GRUBBING		23		

(1) TOPSOIL SHALL BE STRIPPED, STOCKPILED AND THEN PLACED ON THE BERM SLOPES BEFORE SEEDING.

SURFACING

ITEM	QUANTITY		REMARKS
	CUBIC YDS	SY	
AGGREGATE SURFACING	1,331		3" THICKNESS
SUB BASE MATERIAL	2,661		6" THICKNESS
D_{50}= 6" RIPRAP	9		15" THICKNESS SPILLWAY DISCHARGE

CULVERTS

LOCATION	QUANTITY	REMARKS
	LENGTH (FT)	
TRUCK ACCESS ROAD	75	12" Ø CMP CULVERT

POND APPURTENANCES

ITEM	QUANTITY		REMARKS
	LINEAR FEET	SQUARE FEET	
6" Ø SCH 80 PVC LEAK DETECTION PIPE	52		
60-MIL HDPE PRIMARY LINER		135,370	
200-MIL GEONET		135,370	
40-MIL HDPE SECONDARY LINER		135,370	
GEOCOMPOSITE CLAY LINER		135,370	
HEXPROTECT TILES		112,946	
SPILLWAY TRASHRACK	10		

FENCING

ITEM	QUANTITY		REMARKS
	LINEAR FEET	EACH	
FENCING REMOVAL	1,487		EXISTING 4 STRAND BARB WIRE
7' CHAIN LINK FENCE	3,405		
AUTOMATED SECURITY GATE	24		
WILDLIFE ESCAPE RAMP		1	

PIPING

ITEM	QUANTITY		REMARKS
	LINEAR FEET	EACH	
16" Ø STEEL PIPELINE	1,815		RAW WATER SUPPLY
10" Ø STEEL PIPELINE	603		PRODUCED WATER SUPPLY
8" Ø STEEL PIPELINE	3,293		PRODUCED WATER SUPPLY
4" Ø STEEL PIPELINE	10		RAW WATER SUPPLY
CONCRETE VAULT		1	
FLOW METER		1	16" ELECTROMAGNETIC
AUTOMATED BUTTERFLY VALVE		1	16" ELECTRICAL VALVE
PRESSURE TRANSDUCER		1	
AUTOMATED CHECK/DRAIN VALVES		2	(1) 16" AND (1) 10" VALVE

MISCELLANEOUS ITEMS

ITEM	QUANTITY		REMARKS
	LINEAR FEET	EACH	
CONCRETE BOLLARDS		10	RAW WATER SUPPLY
CONCRETE SPLASH PADS		2	

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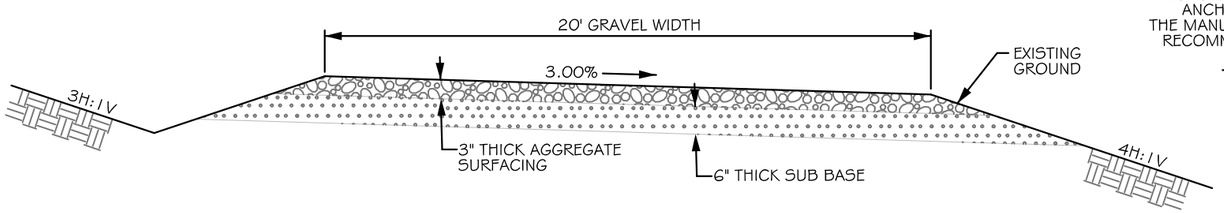
DE BEQUE STATION
POND 1
Quantities

SHEET
5



TYPICAL #1 ACCESS ROAD

NOT TO SCALE

NOTES:

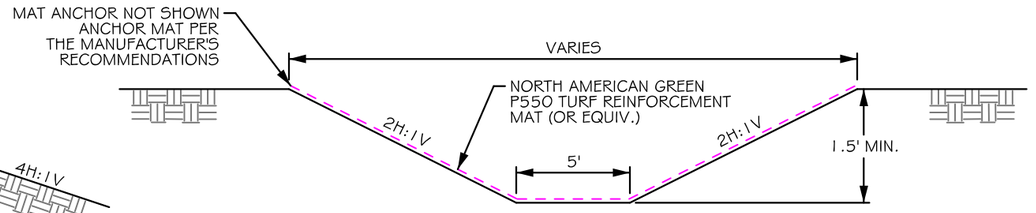
1) TYPICAL SECTION #1 APPLIES TO ALL ACCESS ROADS EXCLUDING MAINTENANCE ROADS LOCATED ON TOP OF BERMS SURROUNDING PONDS.

2) COVER ALL DISTURBED AREAS WITH 3" TOPSOIL AND REVEGETATE WITH APPROVED GRASS SPECIES.

3) CUT AND FILL SLOPES OF 4H:1V OR FLATTER ARE TYPICAL SLOPES. SEE CROSS SECTION SHEETS FOR ACTUAL SLOPE GRADES.

4) 3% CROSS SLOPE SHALL BE AWAY FROM PONDS AND TOWARD CONSTRUCTED DRAINAGE DITCHES EXCEPT AS NOTED ON THE ROAD PLAN AND PROFILE SHEET.

5) APPLY MAGNESIUM CHLORIDE TO THE GRAVELED SURFACE OF THE ACCESS ROAD TO PREVENT DUST.



TYPICAL #3 DRAINAGE DITCH

NOT TO SCALE

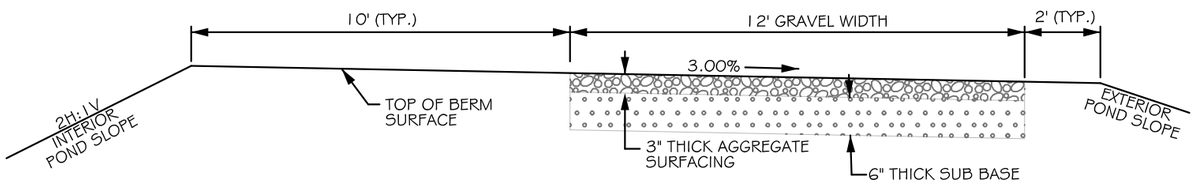
NOTES:

1) TYPICAL SECTION #3 APPLIES TO WEST DRAINAGE DITCH.

2) DITCH BOTTOM AND SIDE SLOPES SHALL BE SEEDED WITH APPROVED GRASS SPECIES PRIOR TO APPLICATION OF TURF REINFORCEMENT MAT.

3) NORTH AMERICAN GREEN P550 PERMANENT TURF REINFORCEMENT MAT (OR EQUIV.) SHALL COVER DITCH BOTTOMS AND EXTEND UP THE SIDE SLOPES TO A HEIGHT OF 3 FEET ABOVE DITCH BOTTOM OR TO THE TOP OF THE DITCH, WHICHEVER IS LESS. INSTALL TURF MAT PER THE MANUFACTURER'S RECOMMENDATIONS.

4) ALL DITCH CUT AND FILL SLOPES OF 2H:1V OR FLATTER ARE TYPICAL SLOPES.



TYPICAL #2 MAINTENANCE ROAD

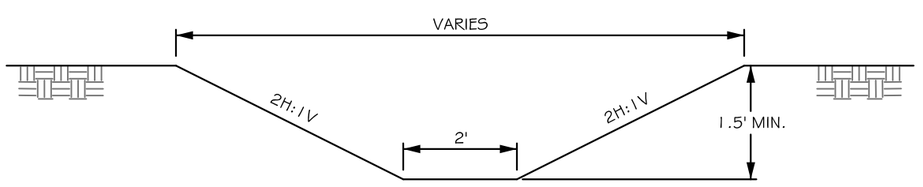
NOT TO SCALE

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 #4 DRAINAGE DITCH

NOT TO SCALE

NOTES:

1) TYPICAL SECTION #4 APPLIES TO THE NORTH AND SOUTH DRAINAGE DITCH.

2) DITCH BOTTOM AND SIDE SLOPES SHALL BE REVEGETATED WITH APPROVED GRASS SPECIES.

3) ALL DITCH CUT AND FILL SLOPES OF 2H:1V OR FLATTER ARE TYPICAL SLOPES.

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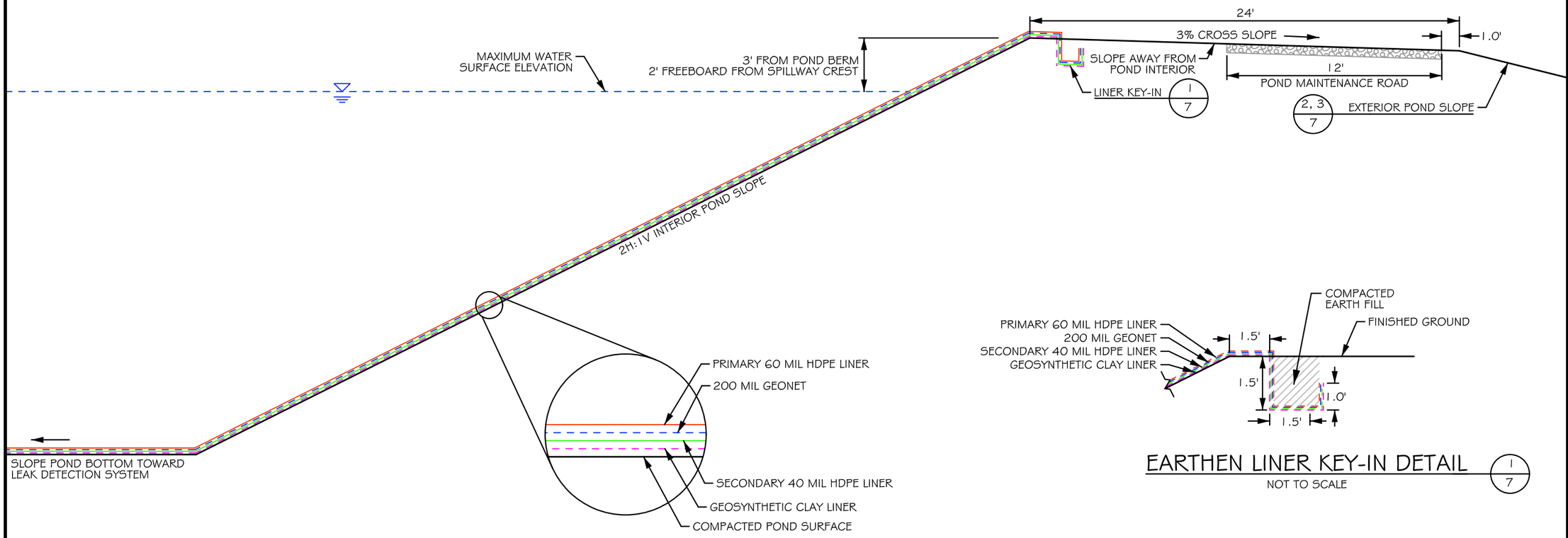
DE BEQUE STATION
POND 1

Typical Sections

SHEET
6

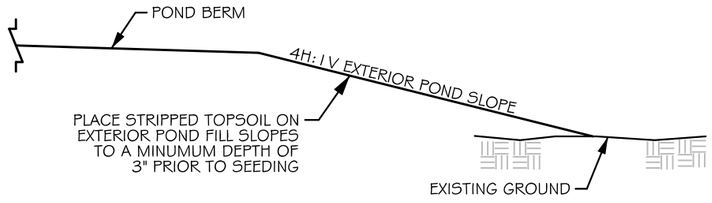


POND 1 TYPICAL SECTION

NOT TO SCALE

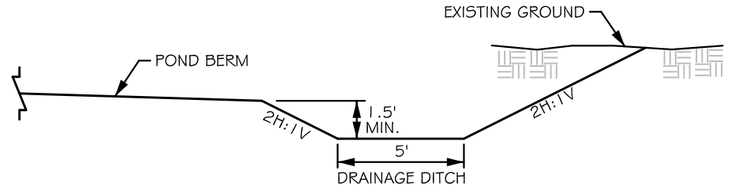
EARTHEN LINER KEY-IN DETAIL 1/7

NOT TO SCALE



EXTERIOR POND FILL SECTION 2/7

NOT TO SCALE



EXTERIOR POND CUT SECTION 3/7

NOT TO SCALE

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DE BEQUE STATION
POND 1

Typical Sections

SHEET
7

V 2/10 ROAD

EXISTING GAS MAIN
(TO BE CONVERTED TO
PRODUCED WATER MAIN)

EXISTING 20'
UTILITY EASEMENT

EXISTING 16" Ø
STEEL PIPELINE

EXISTING OVERHEAD
POWER

EXISTING 8" Ø
STEEL PIPELINE

EXISTING MONITORING WELL
(DO NOT DISTURB)

EXISTING 24" Ø
CMP CULVERT
(TO BE REMOVED)

EXISTING COMPRESSOR
STATION BY
SUMMIT MIDSTREAM PARTNERS

EXISTING UNDERGROUND
WATER TANK
(TO BE REMOVED)

EXISTING MODULAR HOME
(TO BE RELOCATED)

EXISTING FENCE
(CONSTRUCTED BY SUMMIT,
TO REMAIN IN PLACE)

EXISTING UNDERGROUND
PROPANE TANK
(TO BE REMOVED)

EXISTING BARN
(TO BE REMOVED)

EXISTING FENCE
(TO BE REMOVED)

EXISTING TOPSOIL STOCKPILE
APPROX. 3,200 CUBIC YARDS
(TO BE RELOCATED BY SUMMIT)

EXISTING FENCE
(TO BE REMOVED)

EXISTING MONITORING WELL
(DO NOT DISTURB)

EXISTING MONITORING WELL
(DO NOT DISTURB)

NOTE:

EXISTING TOPSOIL STOCKPILE TO BE RELOCATED BY SUMMIT PRIOR TO CONSTRUCTION STARTING ON POND 1.

0 200 400

(11" x 17") SCALE: 1" = 200'
CONTOUR INVTERVAL = 1'

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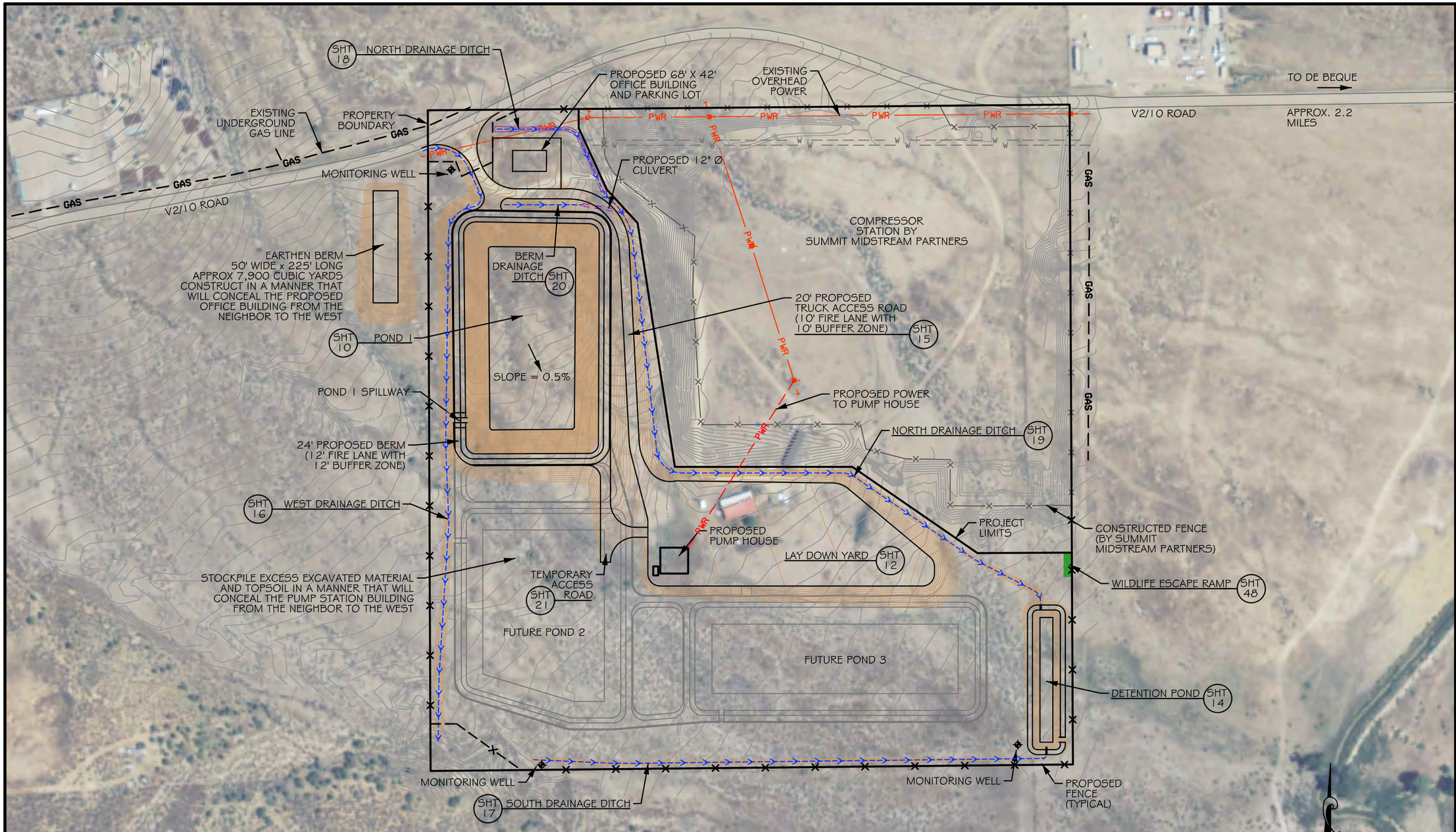
DE BEQUE STATION
POND 1

Existing Conditions and Demolition Plan

SHEET
8



POND DESIGN ELEMENTS

	POND 1	FUTURE POND 2	FUTURE 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 AREA ①	112,946 SQ FT	112,176 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 DEPTH ②	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	14.02 FT	16.80 FT
DAM SIZE/JURISDICTION	NON-JURISDICTIONAL ③	MINOR JURISDICTIONAL ④	MINOR JURISDICTIONAL ④

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

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DE BEQUE STATION POND 1

Proposed Facility Layout

SHEET 9

NORTH DRAINAGE DITCH

SLOPE BERM AT 3% AWAY FROM POND (TYP.)

CENTER LINE OF BERM AT LOWEST NATURAL GROUND ELEV. = 5053.60

16" Ø STEEL PIPELINE FOR RAW WATER (SHT 27)

10" Ø STEEL PIPELINE FOR PRODUCED WATER (SHT 33)

LEAK DETECTION PIPING (SHT 38)

POND BERM ELEV. = 5064.57 FILL - 10.29'

5'

POND BOTTOM ELEV. = 5041.71 CUT - 23.57'

POND BERM ELEV. = 5066.22 FILL - 2.25'

LEAK DETECTION SUMP

POND BOTTOM ELEV. = 5040.33 CUT - 16.21'

5.1'

SLOPE = 0.5%

POND 1

169.4'

POND BOTTOM ELEV. = 5042.37 CUT - 27.15'

367.4'

POND BOTTOM ELEV. = 5040.97 CUT - 18.98'

5'

POND BERM ELEV. = 5067.18 CUT - 4.56'

12' WIDE GRAVEL ACCESS ROAD

WEST DRAINAGE DITCH

SPILLWAY ELEV. = 5063.57 (SHT 39)

POND BERM ELEV. = 5065.51 FILL - 5.47'

PROPERTY LINE

0 50 100

(11" x 17") SCALE: 1" = 50'
CONTOUR INVTERVAL = 1'

POND 1 ELEVATION-STORAGE TABLE

ELEVATION	CAPACITY (CUBIC YDS)	CAPACITY (AC-FT)	CUMULATIVE CAPACITY (AC-FT)
5040.33	0	0.000	0.000
5041.33	426.163	0.264	0.264
5042.33	1925.045	1.193	1.457
5043.33	2452.175	1.520	2.977
5044.33	2533.841	1.571	4.548
5045.33	2616.601	1.622	6.170
5046.33	2700.475	1.674	7.844
5047.33	2785.464	1.727	9.570
5048.33	2871.566	1.780	11.350
5049.33	2958.782	1.834	13.184
5050.33	3047.112	1.889	15.073
5051.33	3136.550	1.944	17.017
5052.33	3227.111	2.000	19.017
5053.33	3318.781	2.057	21.074
5054.33	3411.564	2.115	23.189
5055.33	3505.461	2.173	25.362
5056.33	3600.471	2.232	27.593
5057.33	3696.595	2.291	29.885
5058.33	3793.834	2.352	32.236
5059.33	3892.186	2.413	34.649
5060.33	3991.652	2.474	37.123
5061.33	4092.229	2.537	39.659
5061.57	997.225	0.618	40.277
5062.57	4218.491	2.615	42.892
5063.57	4321.561	2.679	45.571
5064.57	4426.116	2.743	48.314

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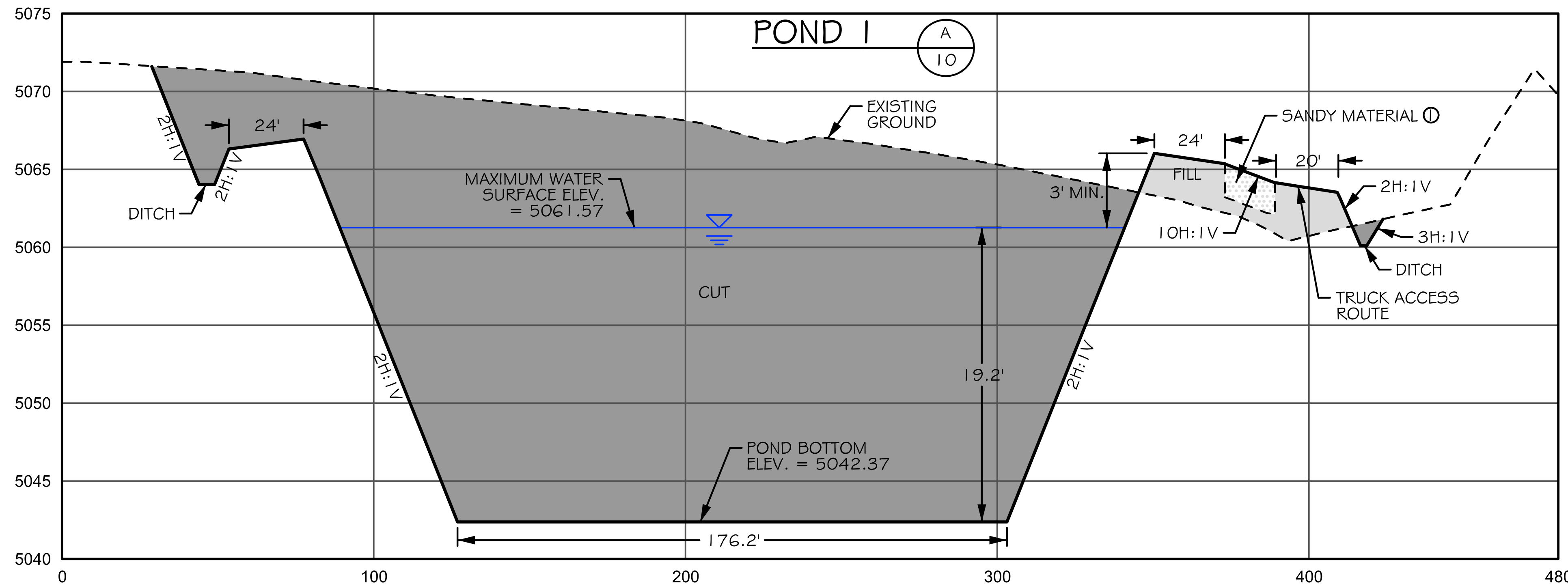
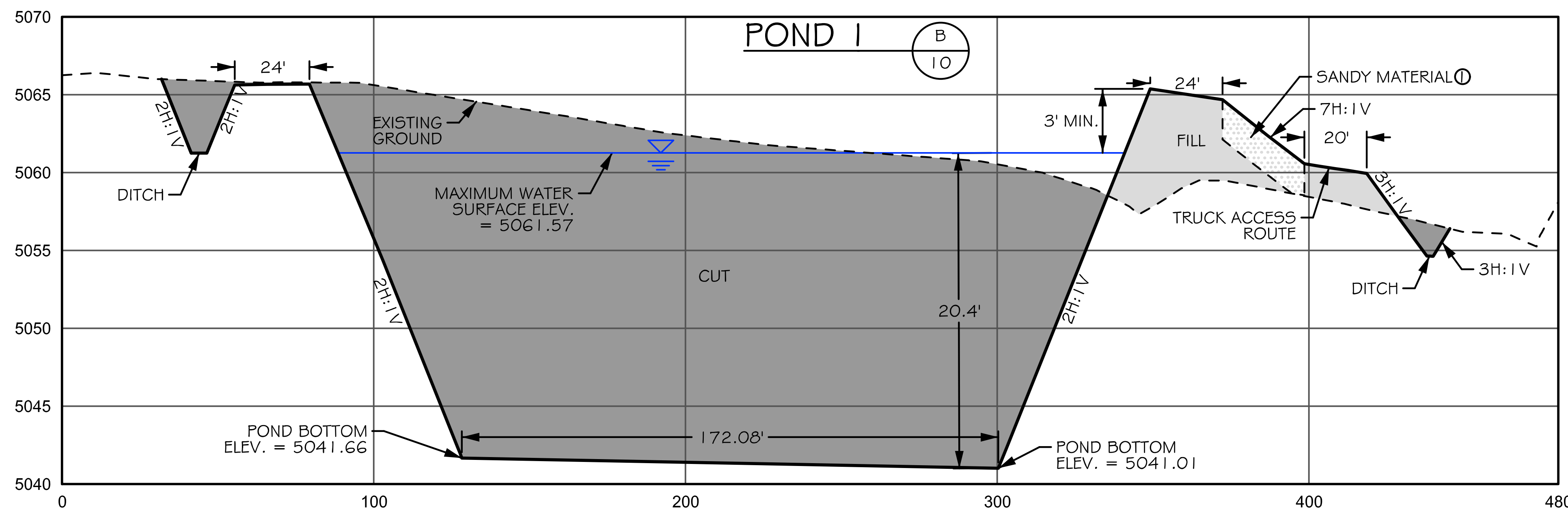
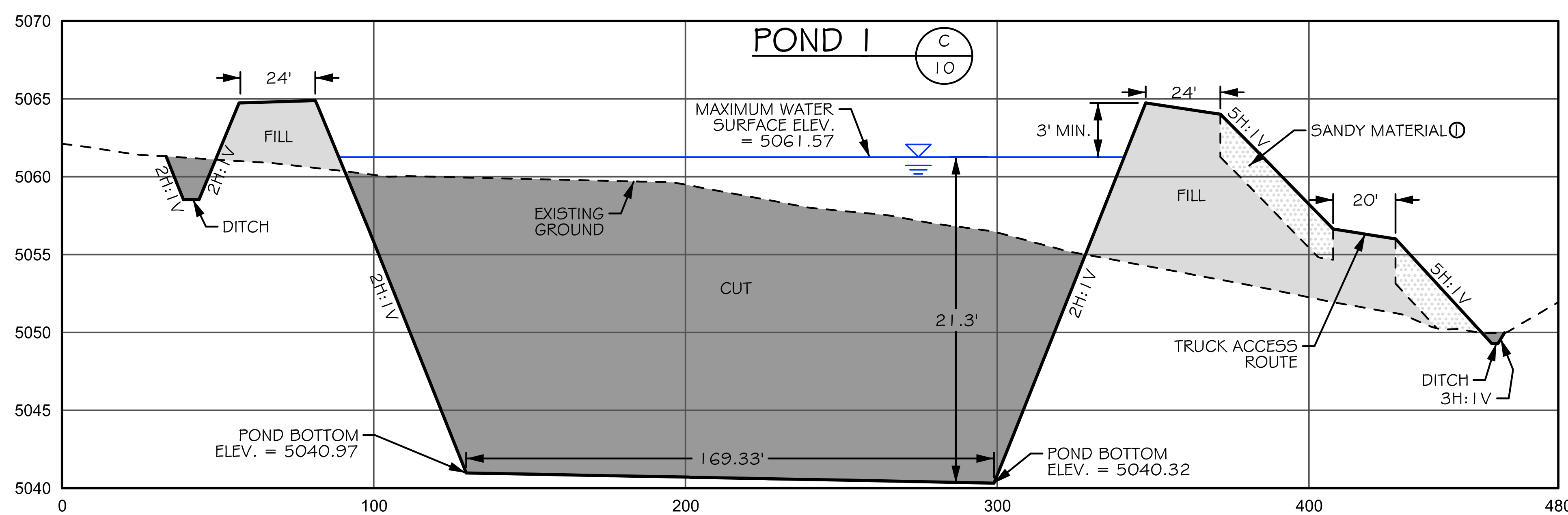
DE BEQUE STATION
POND 1

Pond 1 Plan View

SHEET
10







NOTE

1. ANY SANDY MATERIAL ENCOUNTERED DURING EXCAVATION SHALL BE PLACED ON THE EXTERIOR FILL SLOPES OF THE POND BERMS. CLAY SOIL SHALL BE USED TO CONSTRUCT THE INTERIOR SLOPES OF THE POND BERMS.

0 50 100

(11" x 17") HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 10'

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DE BEQUE STATION

Pond 1 Cross Sections

SHEET
11

SHT 19 NORTH DRAINAGE DITCH

311.09'

R 50'

LAY DOWN YARD
ELEV. = 5052.13
FILL - 3.30'

R 50'

LAY DOWN YARD
ELEV. = 5048.87
FILL - 3.32'

R 50'

LAY DOWN YARD
ELEV. = 5052.50
FILL - 2.65'

213.73'

LAY DOWN YARD

103.01'

PROPOSED
PUMP HOUSE

SLOPE = 1.0%

R 25'

LAY DOWN YARD
ELEV. = 5047.88
FILL - 10.42'

LAY DOWN YARD
ELEV. = 5052.93
FILL - 4.35'

R 25'

525.15'

R 25'

D
13

E
13

F
13

FUTURE POND 3

0 50 100

(11" x 17") SCALE: 1" = 50'
CONTOUR INVTERVAL = 1'

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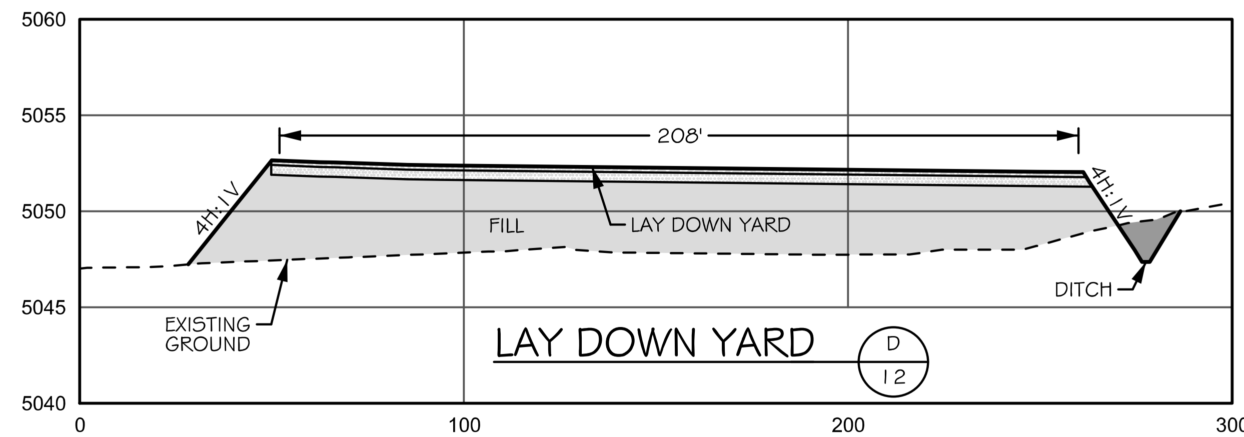
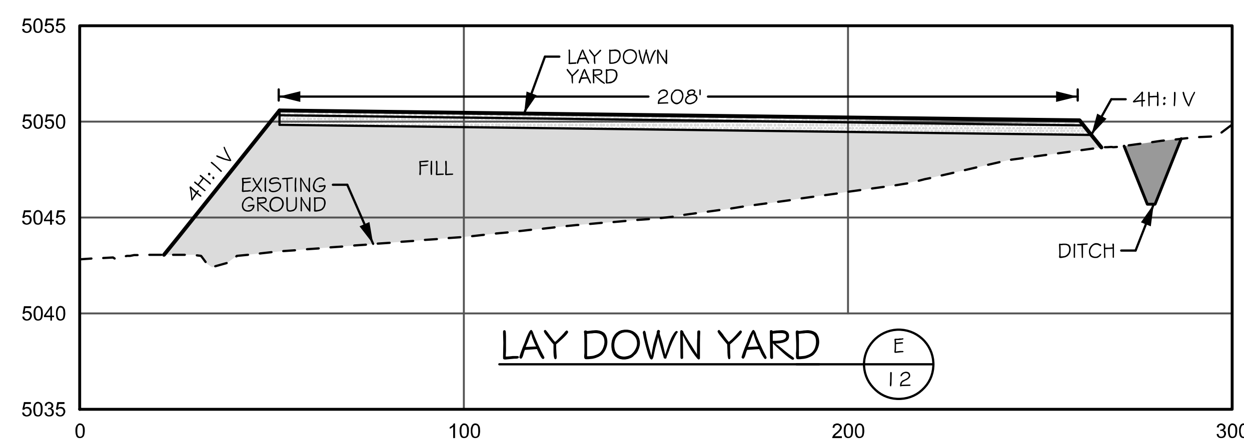
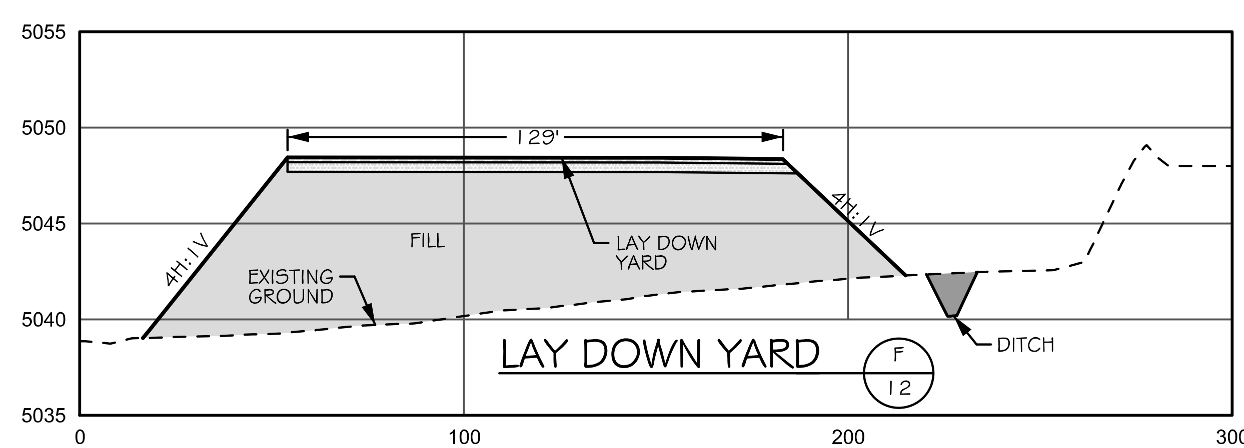
DE BEQUE STATION
POND 1

Lay Down Yard
Plan View

SHEET
12







0 50 100

(11" x 17") HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 12'

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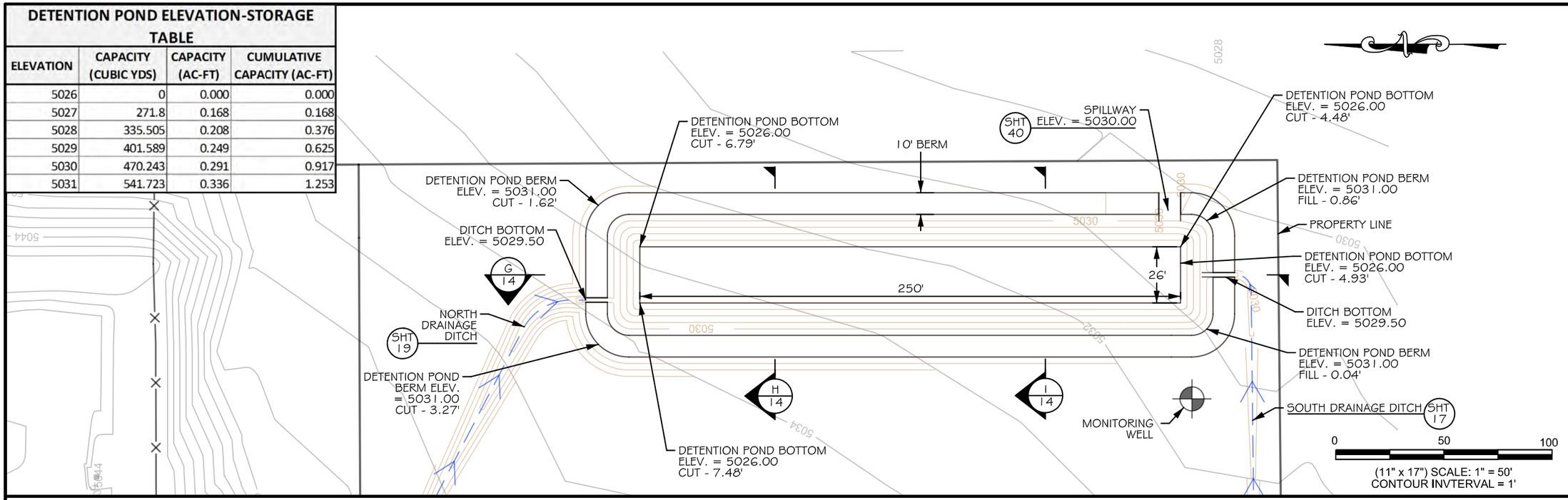
DE BEQUE STATION POND 1

Lay Down Yard Cross Sections

SHEET
13

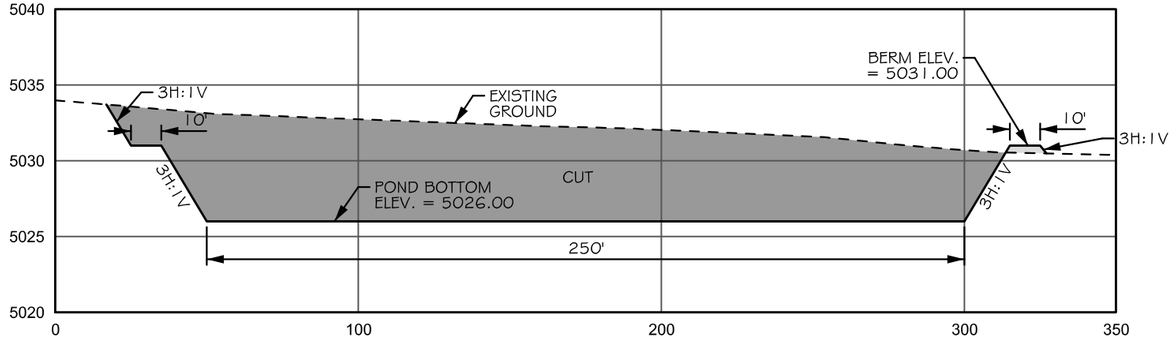
DETENTION POND ELEVATION-STORAGE TABLE

ELEVATION	CAPACITY (CUBIC YDS)	CAPACITY (AC-FT)	CUMULATIVE CAPACITY (AC-FT)
5026	0	0.000	0.000
5027	271.8	0.168	0.168
5028	335.505	0.208	0.376
5029	401.589	0.249	0.625
5030	470.243	0.291	0.917
5031	541.723	0.336	1.253

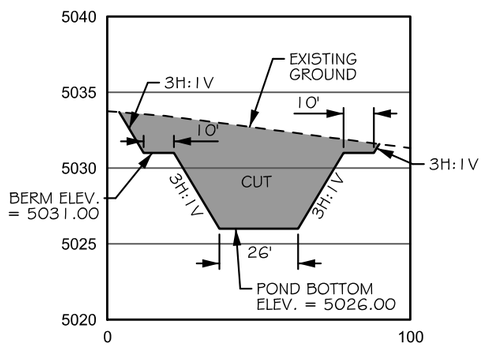


NOTE:

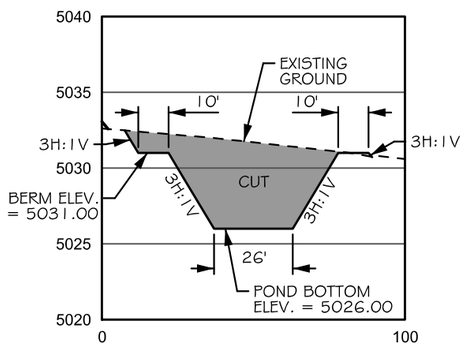
DETENTION POND IS DESIGNED TO RETAIN THE ENTIRE 0.722 ACRE-FEET OF WATER FROM THE 100-YEAR, 24-HOUR PRECIPITATION EVENT.



DETENTION POND SECTION G 14



DETENTION POND SECTION H 14



DETENTION POND SECTION I 14

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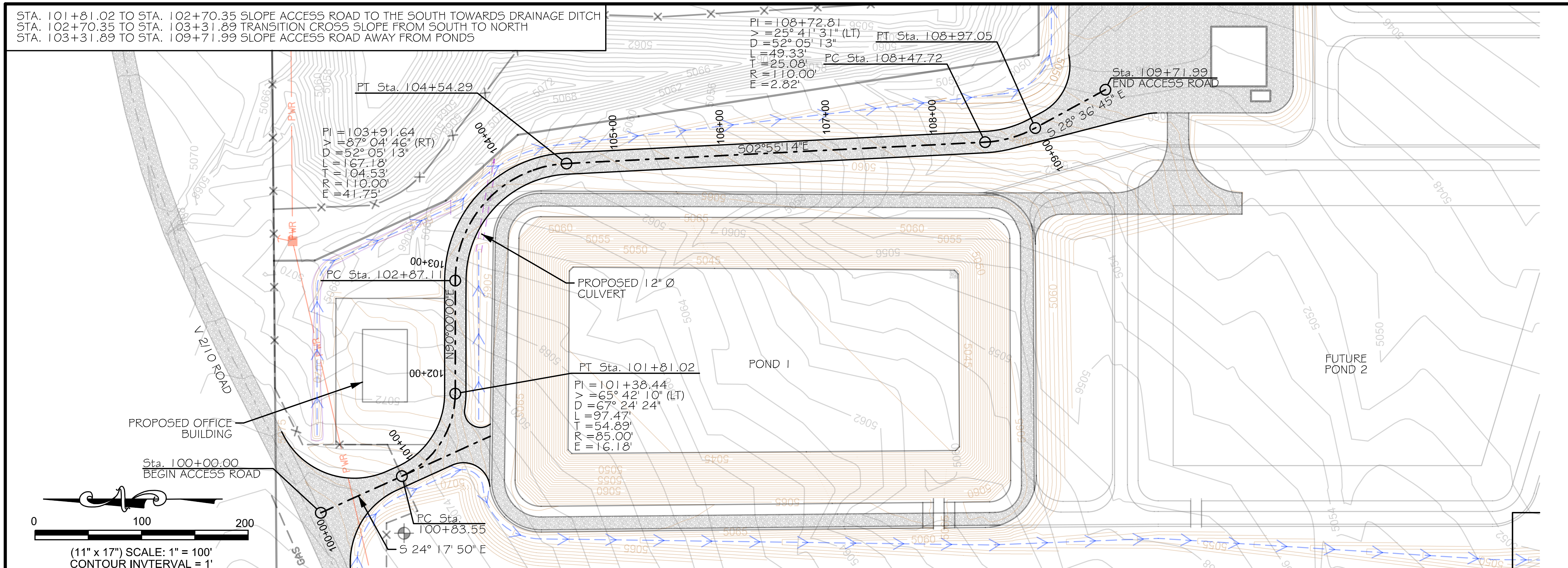
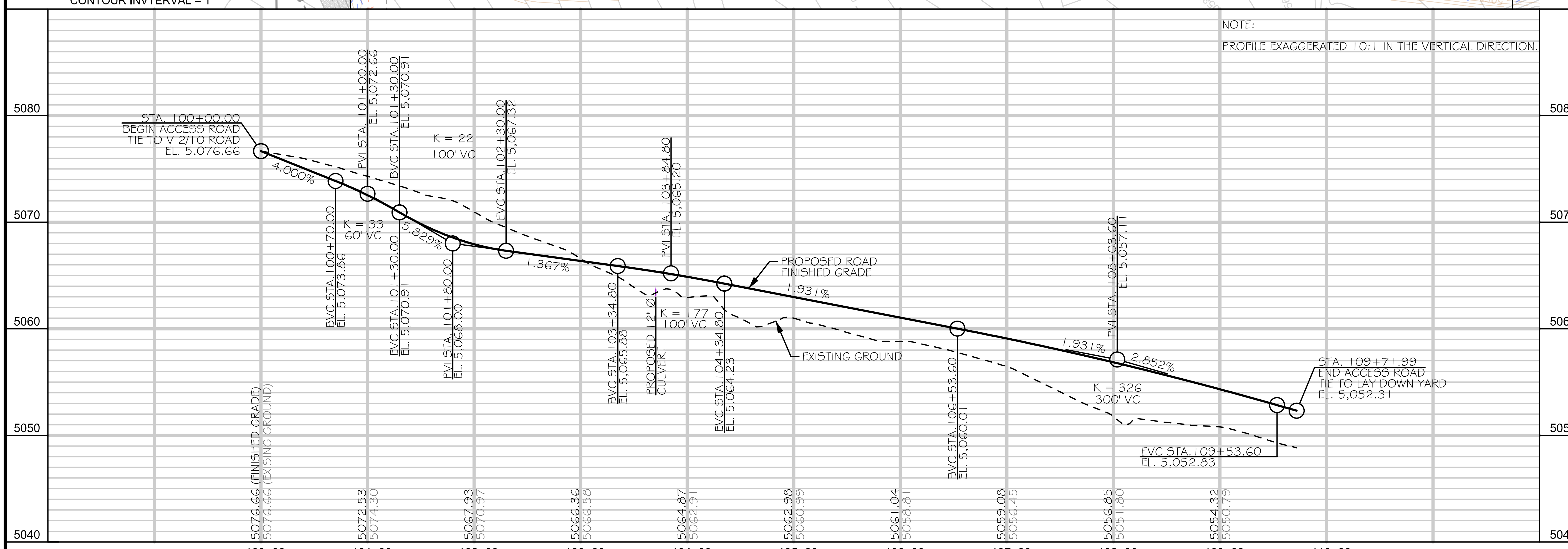
DE BEQUE STATION POND 1

Detention Pond Plan View and Cross Sections

SHEET 14


STA. 101+81.02 TO STA. 102+70.35 SLOPE ACCESS ROAD TO THE SOUTH TOWARDS DRAINAGE DITCH
STA. 102+70.35 TO STA. 103+31.89 TRANSITION CROSS SLOPE FROM SOUTH TO NORTH
STA. 103+31.89 TO STA. 109+71.99 SLOPE ACCESS ROAD AWAY FROM PONDS
PI =108+72.81
Δ =25° 41' 31" (LT)
D =52° 05' 13"
L =49.33'
T =25.08'
R =110.00'
E =2.82'
PT Sta. 108+97.05
PC Sta. 108+47.72
Sta. 109+71.99
END ACCESS ROAD
S 28° 36' 45" E
PT Sta. 104+54.29
PI =103+91.64
Δ =87° 04' 46" (RT)
D =52° 05' 13"
L =167.18'
T =104.53'
R =110.00'
E =41.75'
S02°55'14"E
PC Sta. 102+87.11
N00°00'00"E
PROPOSED 12" Ø CULVERT
PT Sta. 101+81.02
PI =101+38.44
Δ =65° 42' 10" (LT)
D =67° 24' 24"
L =97.47'
T =54.89'
R =85.00'
E =16.18'
POND 1
FUTURE POND 2
V 2/10 ROAD
PROPOSED OFFICE BUILDING
Sta. 100+00.00
BEGIN ACCESS ROAD
PC Sta. 100+83.55
S 24° 17' 50" E
0 100 200
(11" x 17") SCALE: 1" = 100'
CONTOUR INVTERVAL = 1'


NOTE:
PROFILE EXAGGERATED 10:1 IN THE VERTICAL DIRECTION.
STA. 100+00.00
BEGIN ACCESS ROAD
TIE TO V 2/10 ROAD
EL. 5,076.66
4.000%
BVC STA 100+70.00
EL. 5,073.86
K = 33
60' VC
PVI STA. 101+00.00
EL. 5,072.66
BVC STA 101+30.00
EL. 5,070.91
EVC STA 101+30.00
EL. 5,070.91
5.829%
K = 22
100' VC
PVI STA. 101+80.00
EL. 5,068.00
EVC STA 102+30.00
EL. 5,067.32
1.367%
BVC STA. 103+34.80
EL. 5,065.88
PROPOSED 12" Ø CULVERT
K = 177
100' VC
PVI STA. 103+84.80
EL. 5,065.20
EVC STA 104+34.80
EL. 5,064.23
PROPOSED ROAD FINISHED GRADE
1.931%
EXISTING GROUND
BVC STA. 106+53.60
EL. 5,060.01
1.931%
PVI STA. 108+03.60
EL. 5,057.11
2.852%
K = 326
300' VC
EVC STA. 109+53.60
EL. 5,052.83
STA. 109+71.99
END ACCESS ROAD
TIE TO LAY DOWN YARD
EL. 5,052.31
5076.66 (FINISHED GRADE)
5076.66 (EXISING GROUND)
5072.53
5074.30
5067.93
5070.97
5066.36
5066.58
5064.87
5062.91
5062.98
5060.99
5061.04
5058.81
5059.08
5056.45
5056.85
5051.80
5054.32
5050.79
5080 5070 5060 5050 5040
100+00 101+00 102+00 103+00 104+00 105+00 106+00 107+00 108+00 109+00 110+00

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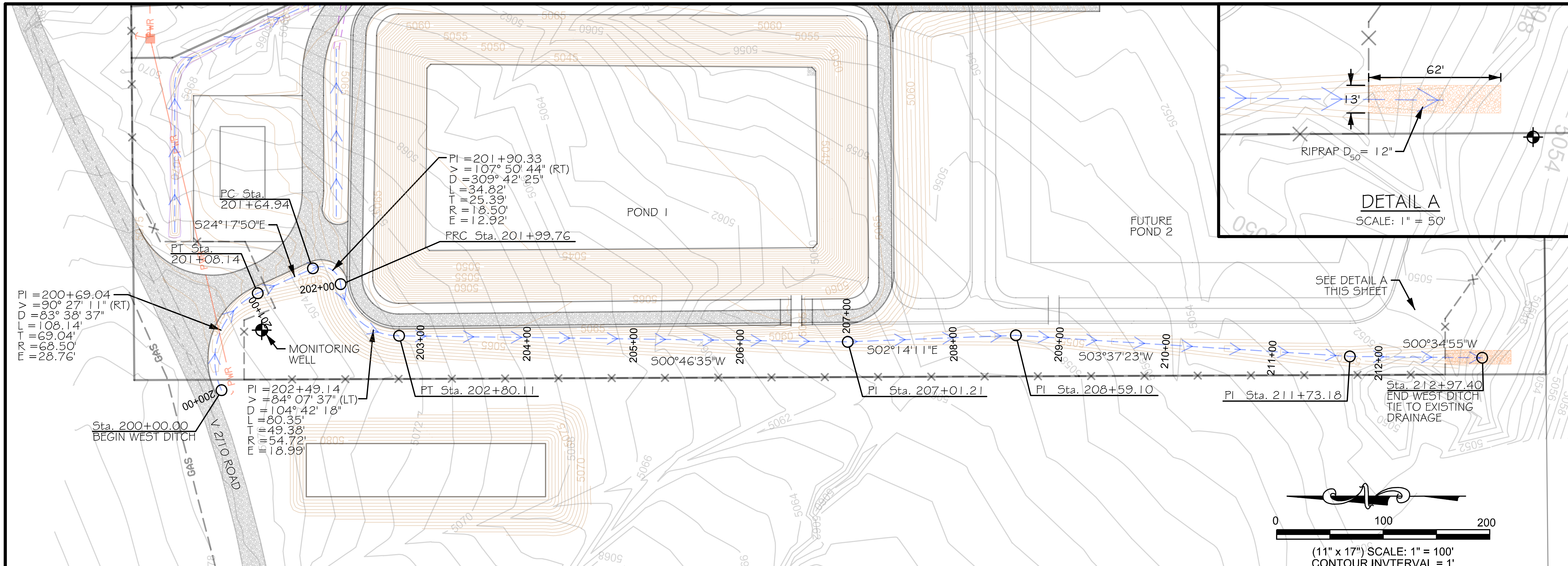
DDP	06/14	STH
REV	DATE	CKD

JOB # 2013-134

DE BEQUE STATION POND 1

Truck Access Road Plan and Profile

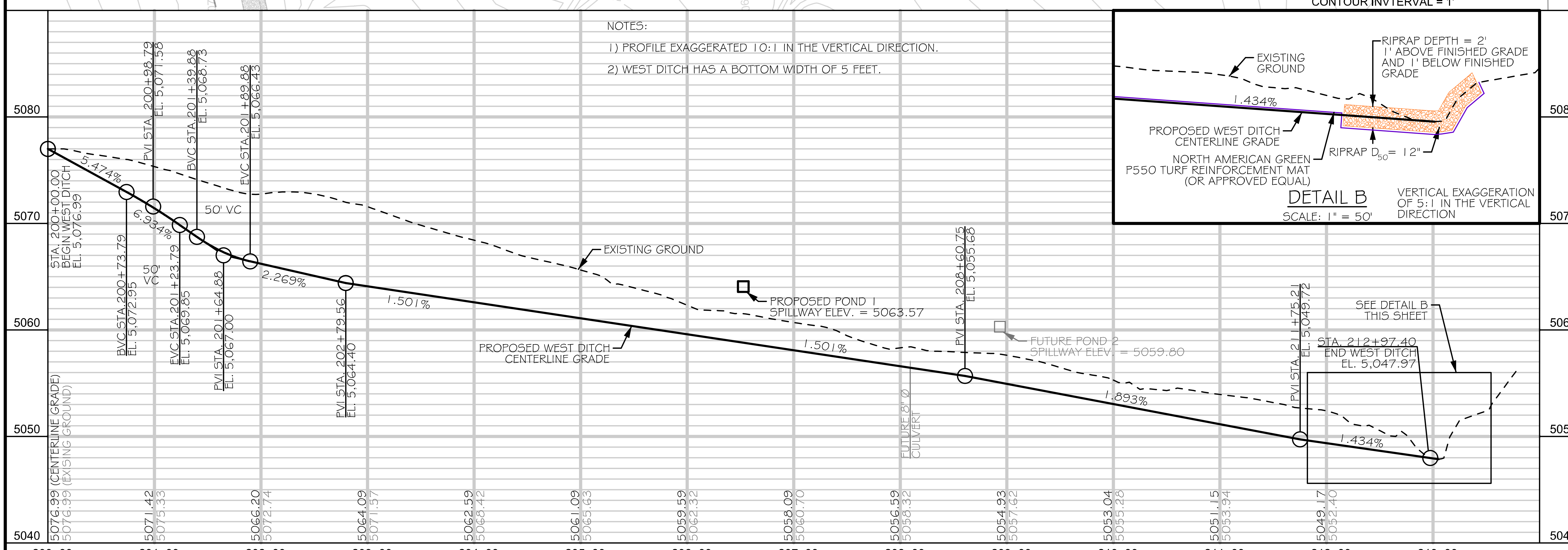
SHEET 15



NOTES:

1) PROFILE EXAGGERATED 10:1 IN THE VERTICAL DIRECTION.

2) WEST DITCH HAS A BOTTOM WIDTH OF 5 FEET.



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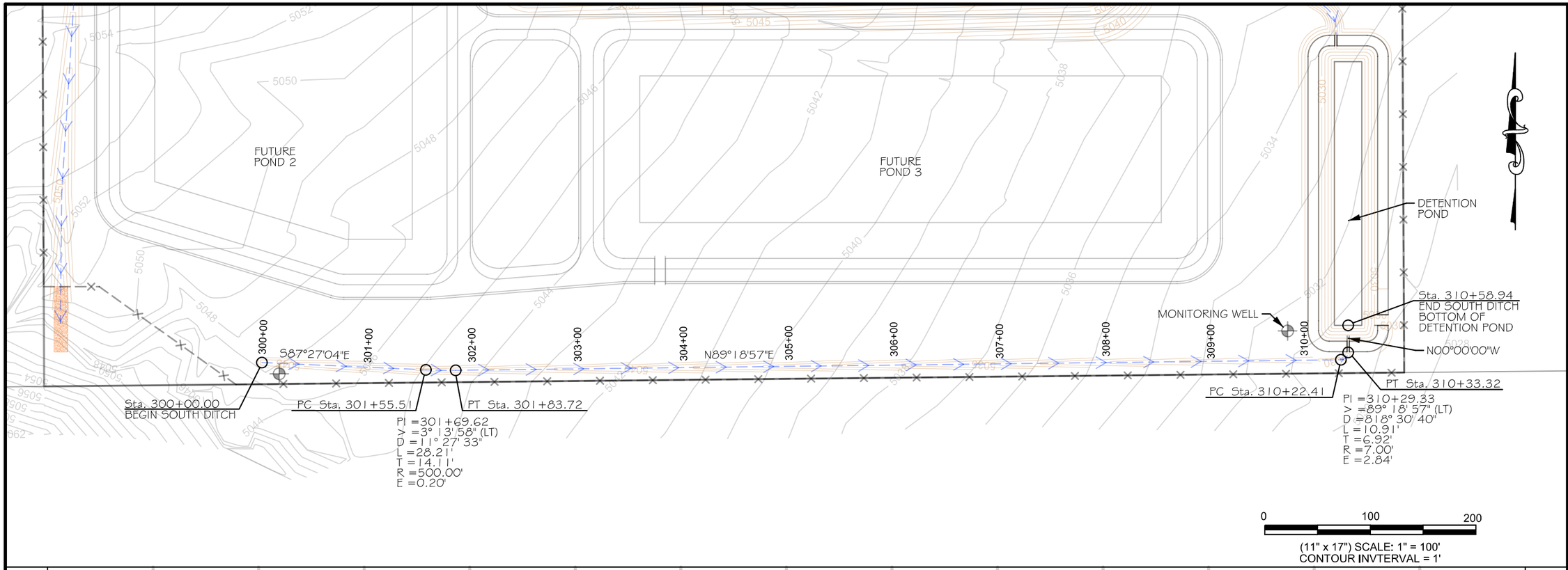
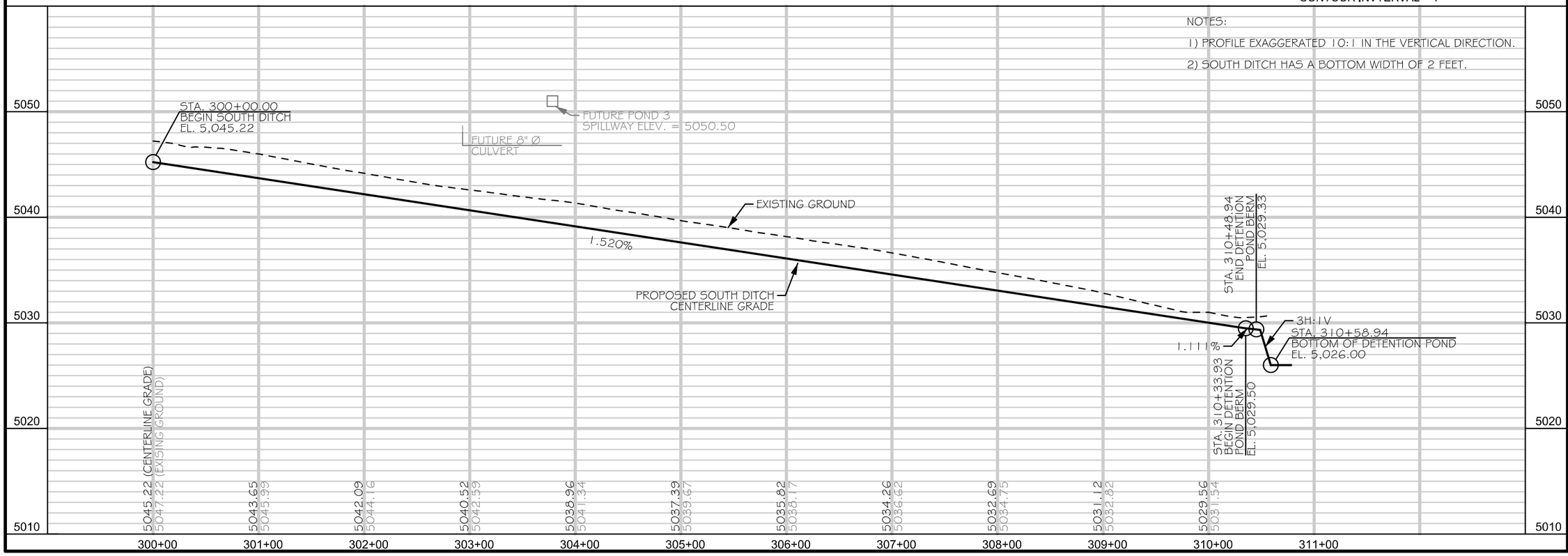
DE BEQUE STATION POND 1

West Drainage Ditch Plan and Profile

SHEET 16





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7/3/2014

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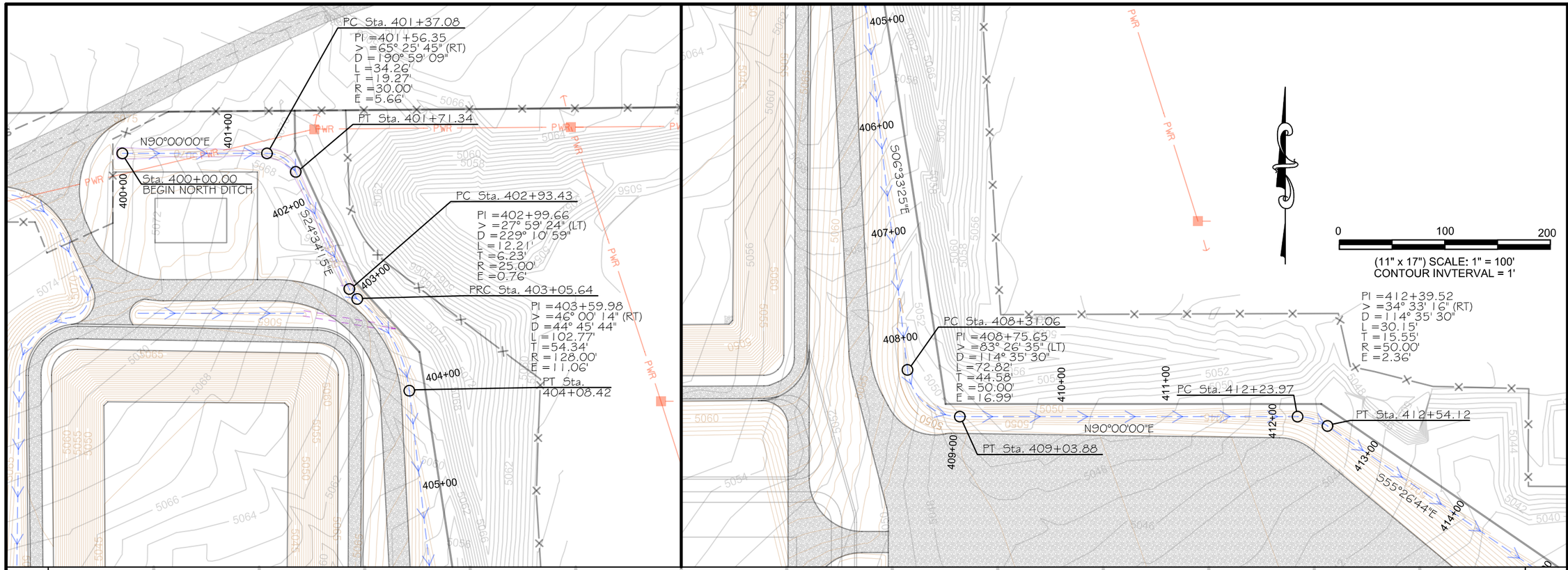
REV		DATE		CKD	

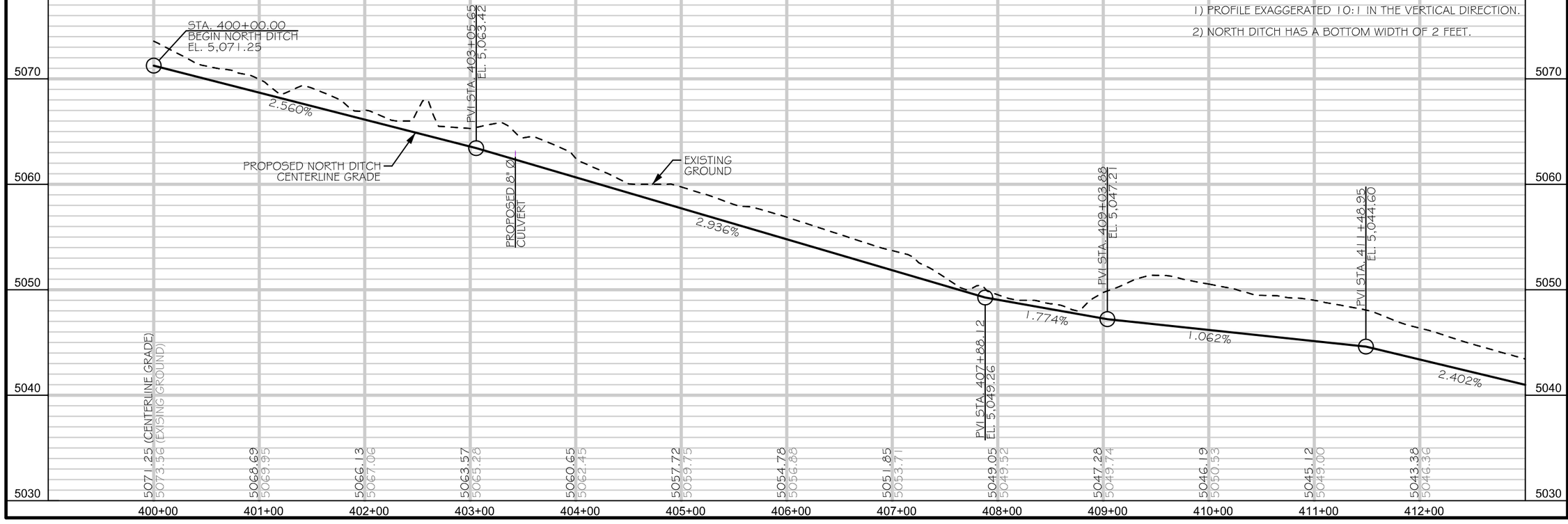
JOB # 2013-134

DE BEQUE STATION
POND 1

South Drainage Ditch
Plan and Profile

SHEET
17





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DSGN	DATE	CKD
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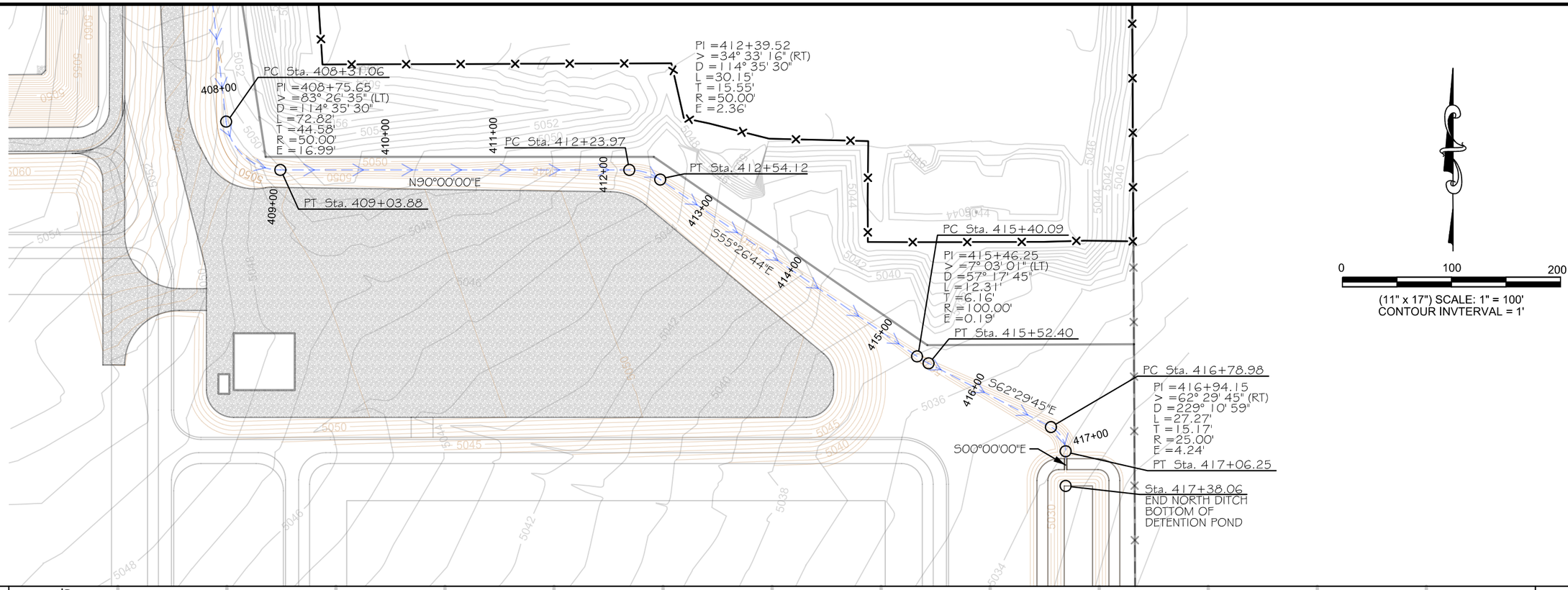
REV	DATE	CKD

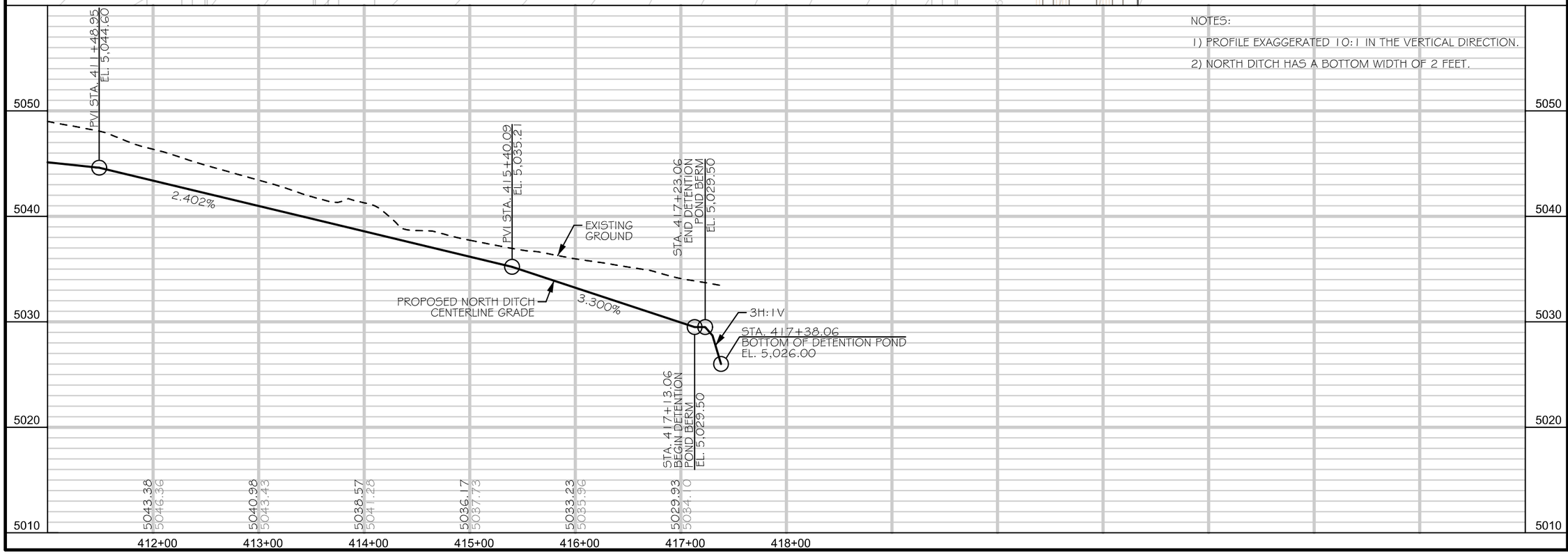
JOB # 2013-134

DE BEQUE STATION
POND 1

North Drainage Ditch
Plan and Profile

SHEET
18





NOTES:

1) PROFILE EXAGGERATED 10:1 IN THE VERTICAL DIRECTION.

2) NORTH DITCH HAS A BOTTOM WIDTH OF 2 FEET.

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DE BEQUE STATION
POND 1

North Drainage Ditch
Plan and Profile

SHEET
19

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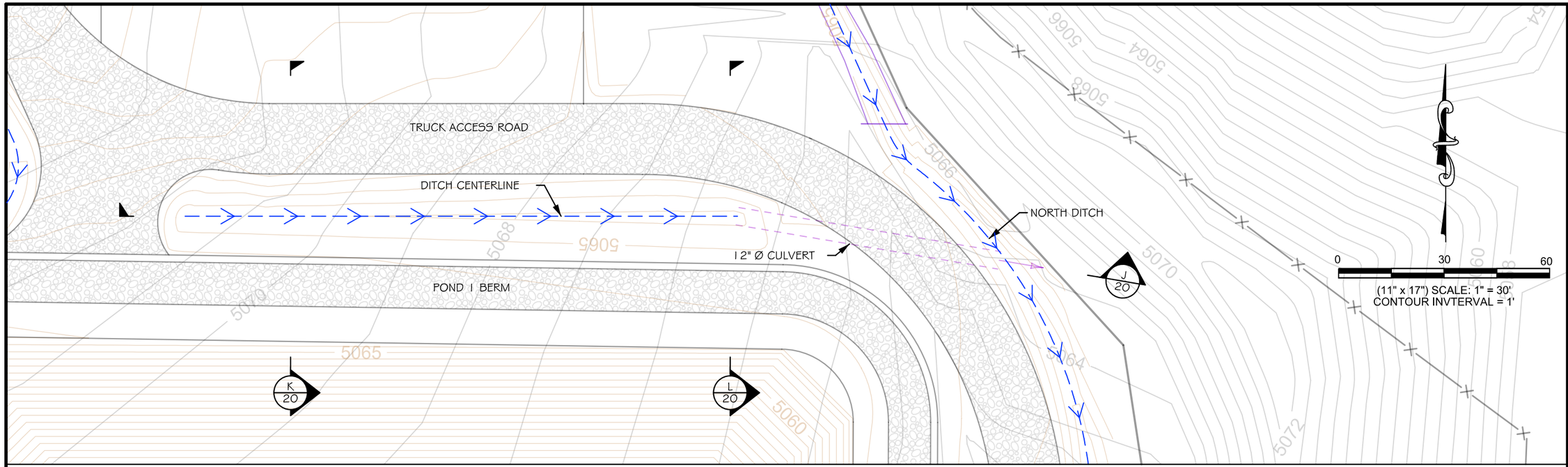
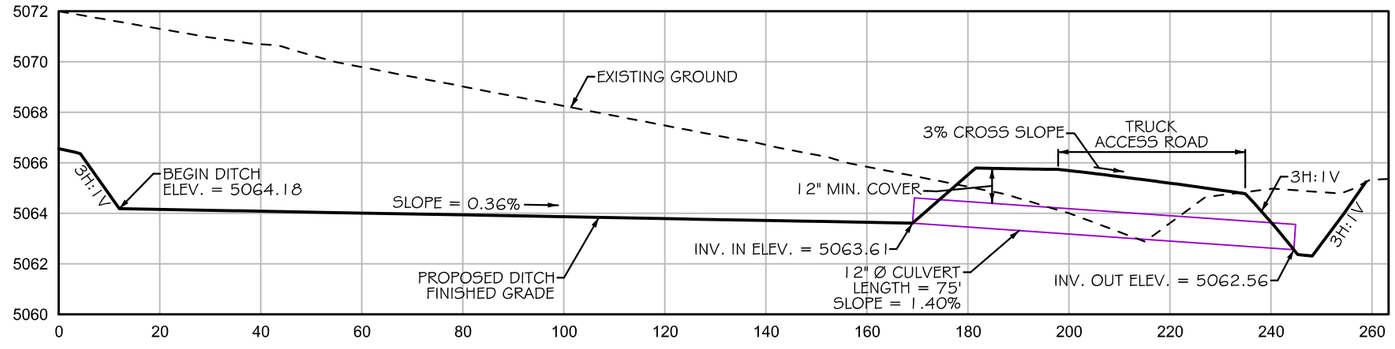
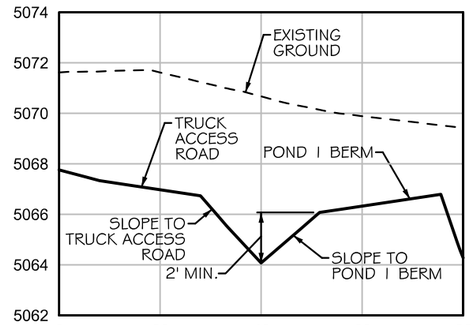




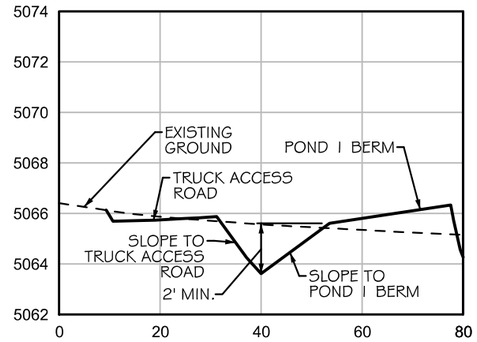
POND 1 DRAINAGE DITCH PROFILE

J
20



POND 1 DRAINAGE DITCH SECTION

K
20



POND 1 DRAINAGE DITCH SECTION

L
20

NOTES:

1) SECTIONS EXAGGERATED 5:1 IN THE VERTICAL DIRECTION.

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DSGN	DDP	REV
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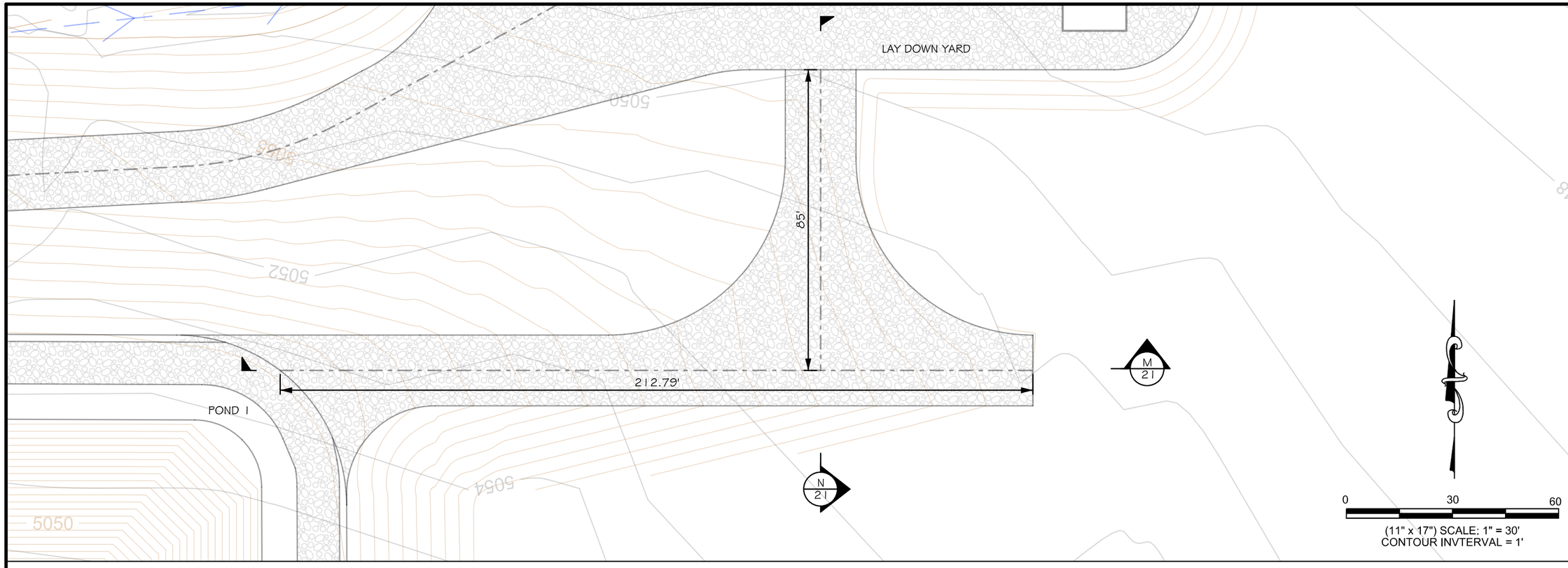
CKD	STH	CKD

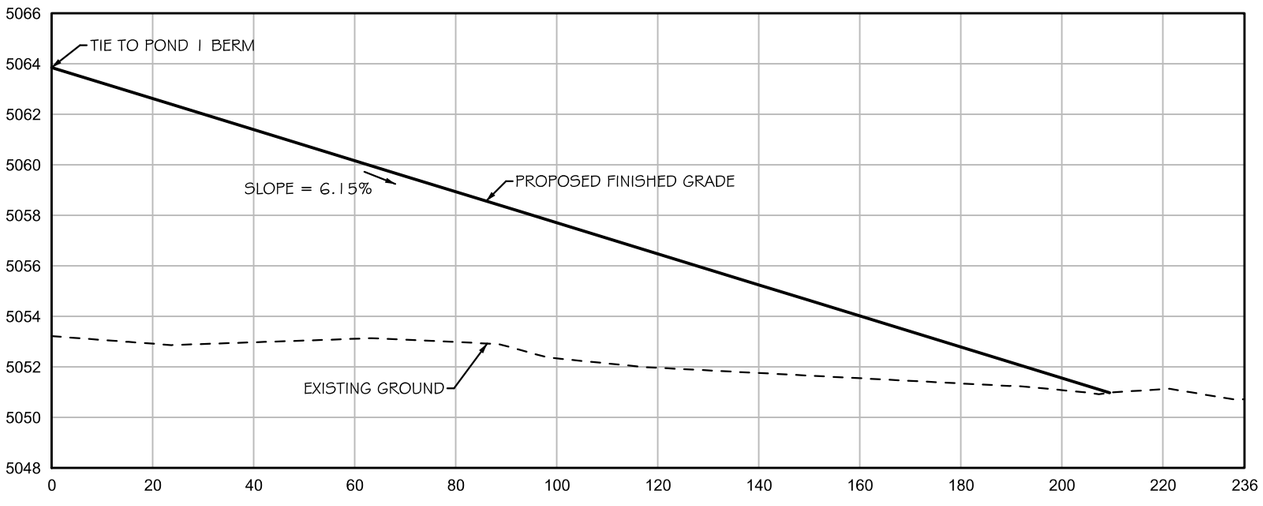
JOB # 2013-134

DE BEQUE STATION
POND 1

Pond 1 Drainage Ditch
Plan and Profile

SHEET
20

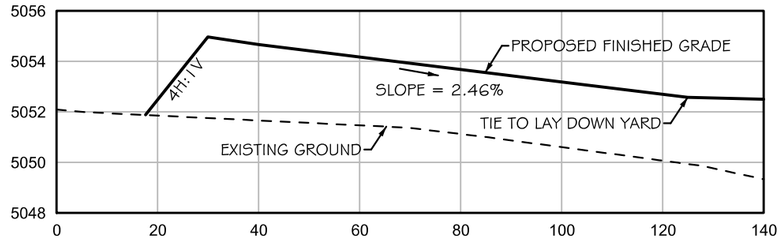




TEMPORARY ACCESS ROAD M 21

NOTES:

1) SECTIONS EXAGGERATED 5:1 IN THE VERTICAL DIRECTION.
2) DUE TO THE TEMPORARY NATURE OF THIS ACCESS ROAD, NO AGGREGATE ROAD SURFACING SHALL BE PLACED ON ROAD SURFACE. THE ROAD WILL BE CONSTRUCTED ENTIRELY OF NATIVE FILL MATERIAL.



TEMPORARY ACCESS ROAD N 21

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PEN TABLE PATH: 7/3/2014

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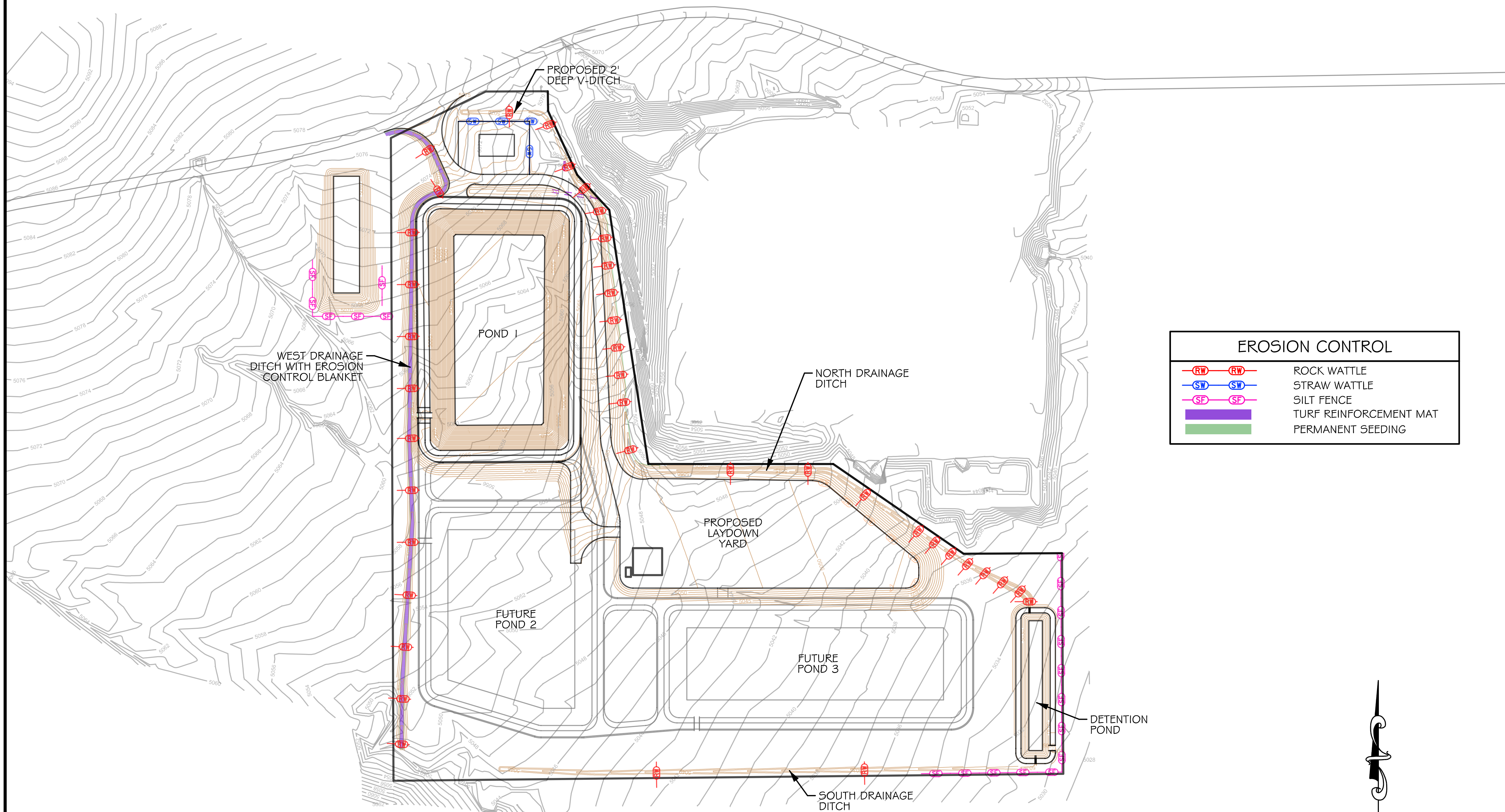
DE BEQUE STATION
POND 1

Temporary Access Road
Plan and Profile

SHEET
21



EROSION CONTROL

RW	ROCK WATTLE
SW	STRAW WATTLE
SF	SILT FENCE
(purple)	TURF REINFORCEMENT MAT
(green)	PERMANENT SEEDING

0 200 400

(11" x 17") SCALE: 1" = 200'
CONTOUR INVTERVAL = 1'

PRELIMINARY

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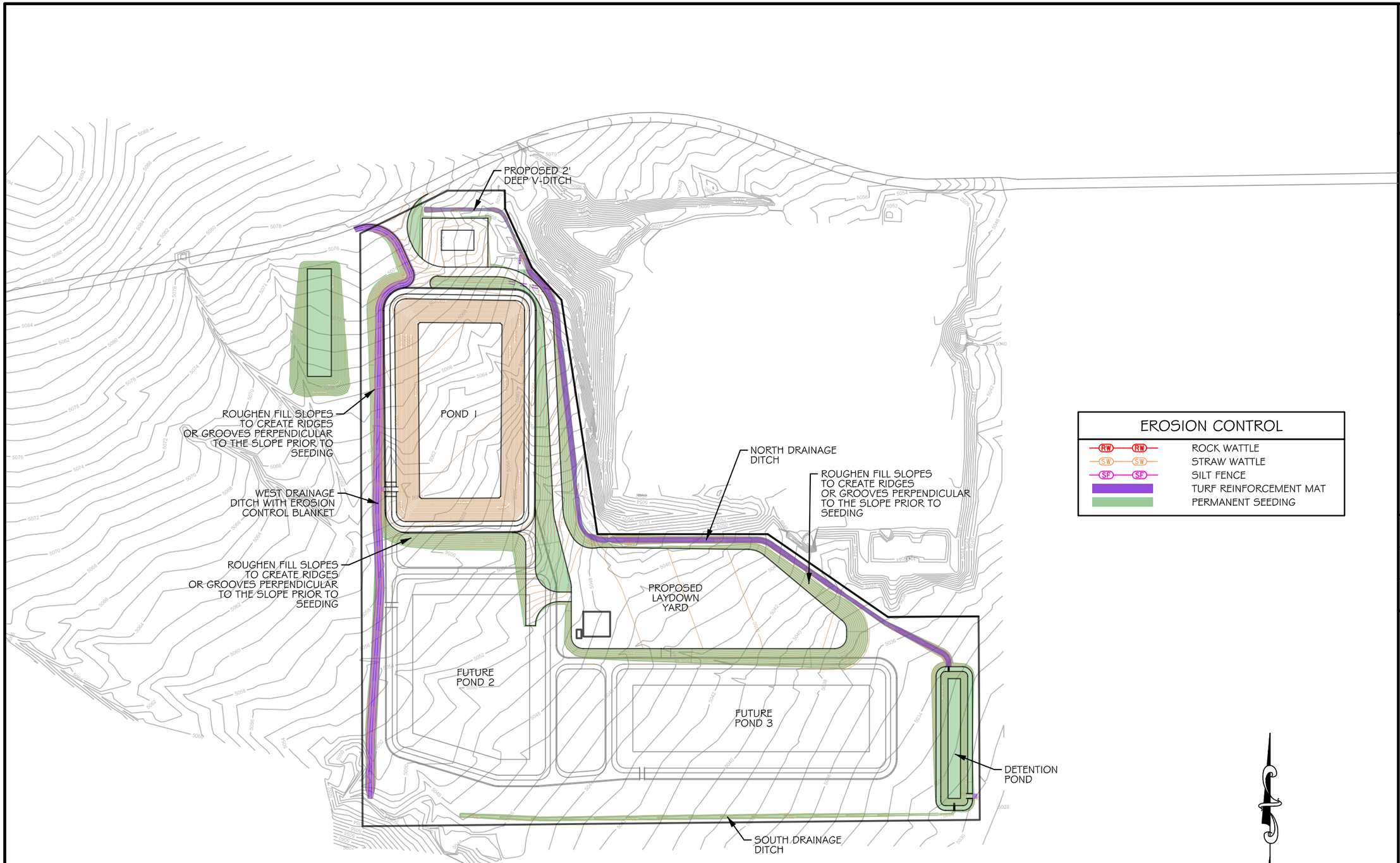
DE BEQUE STATION POND 1

Interim Erosion Control Plan

SHEET 22



EROSION CONTROL

- ROCK WATTLE
- STRAW WATTLE
- SILT FENCE
- TURF REINFORCEMENT MAT
- PERMANENT SEEDING

0 200 400

(11" x 17") SCALE: 1" = 200'
CONTOUR INVTERVAL = 1'

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DSGN	DDP
DATE	06/14
CKD	STH

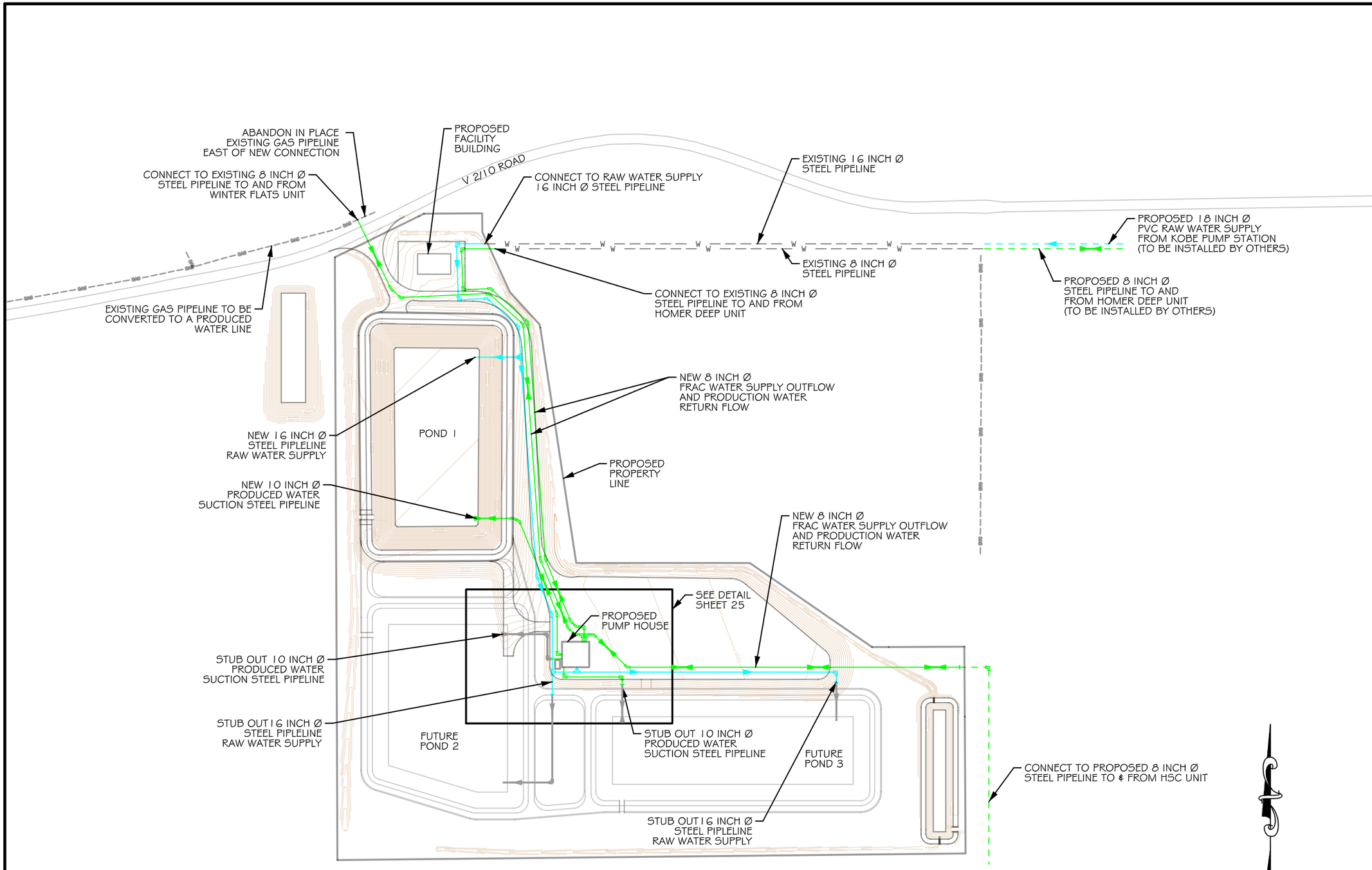
REV	DATE	CKD

JOB # 2013-134

DE BEQUE STATION POND 1

Permanent Erosion Control Plan

SHEET
23



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7/3/2014

DSGN	DATE	CKD
MBJ	06/14	STH

REV	DATE	CKD
TAS	5/14/14	STH

JOB # 2013-134

DE BEQUE STATION
POND 1

Flow Schematic

SHEET
24

NEW 8 INCH Ø
STEEL PIPELINE
TO & FROM HOMER DEEP

NEW 8 INCH Ø
STEEL PIPELINE
TO & FROM WINTER FLATS

NEW 10 INCH Ø
STEEL SUCTION
PIPELINE

STUB OUT 10 INCH Ø
PRODUCED WATER SUCTION
STEEL PIPELINE

PROPOSED
PUMP
HOUSE

TRANSFORMER
PAD

4" RAW WATER
TO PUMP HOUSE

NEW 8 INCH Ø
STEEL PIPELINE
TO & FROM HSC UNIT

NEW 16 INCH Ø
STEEL RAW WATER
SUPPLY PIPELINE

STUB OUT 16 INCH Ø STEEL
RAW WATER SUPPLY PIPELINE

16" x 16" x 4" TEE

STUB OUT 10 INCH Ø
PRODUCED WATER SUCTION
STEEL PIPELINE

5050

50

0 30 60

(11" x 17") SCALE: 1" = 30'
CONTOUR INVTERVAL = 1'

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DE BEQUE STATION
POND 1

Flow Schematic Pump House Detail

SHEET
25

PEN TABLE PATH: K:\Admin\BLACK HILLS\13134 - DE BEQUE STATION\ENGINEERING PLANS\DEBEQUE.CO.CTB.tbl
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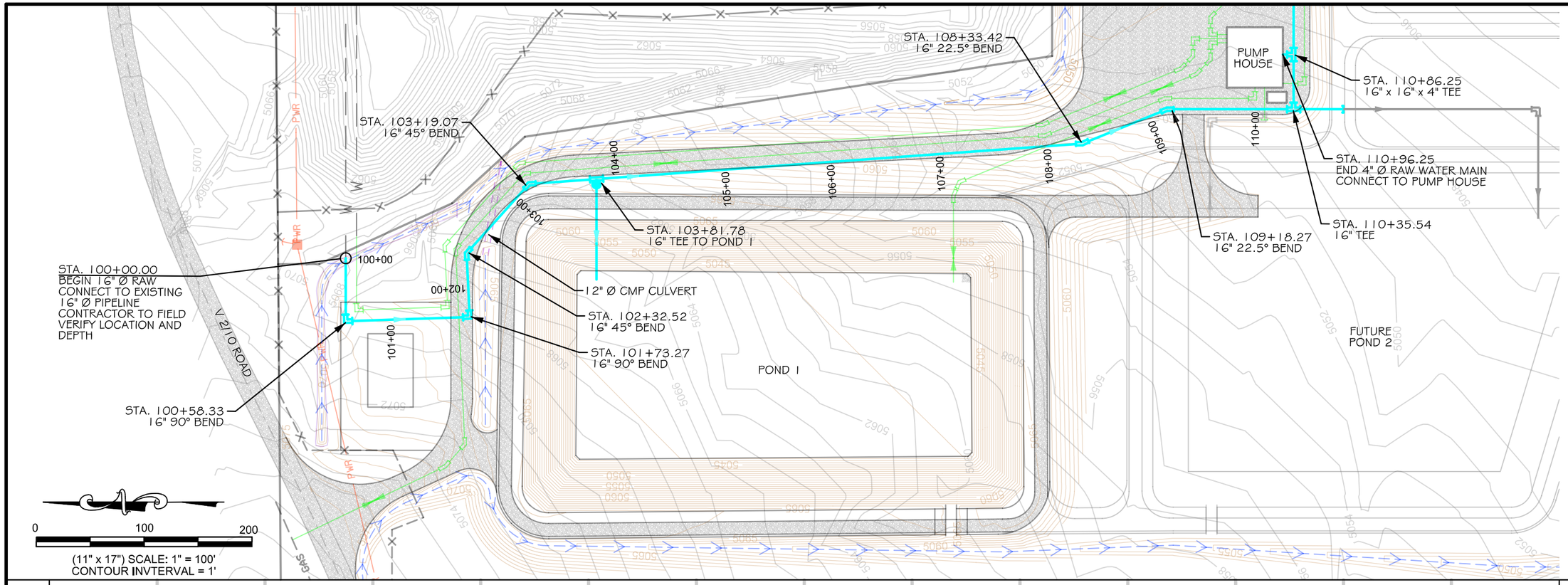

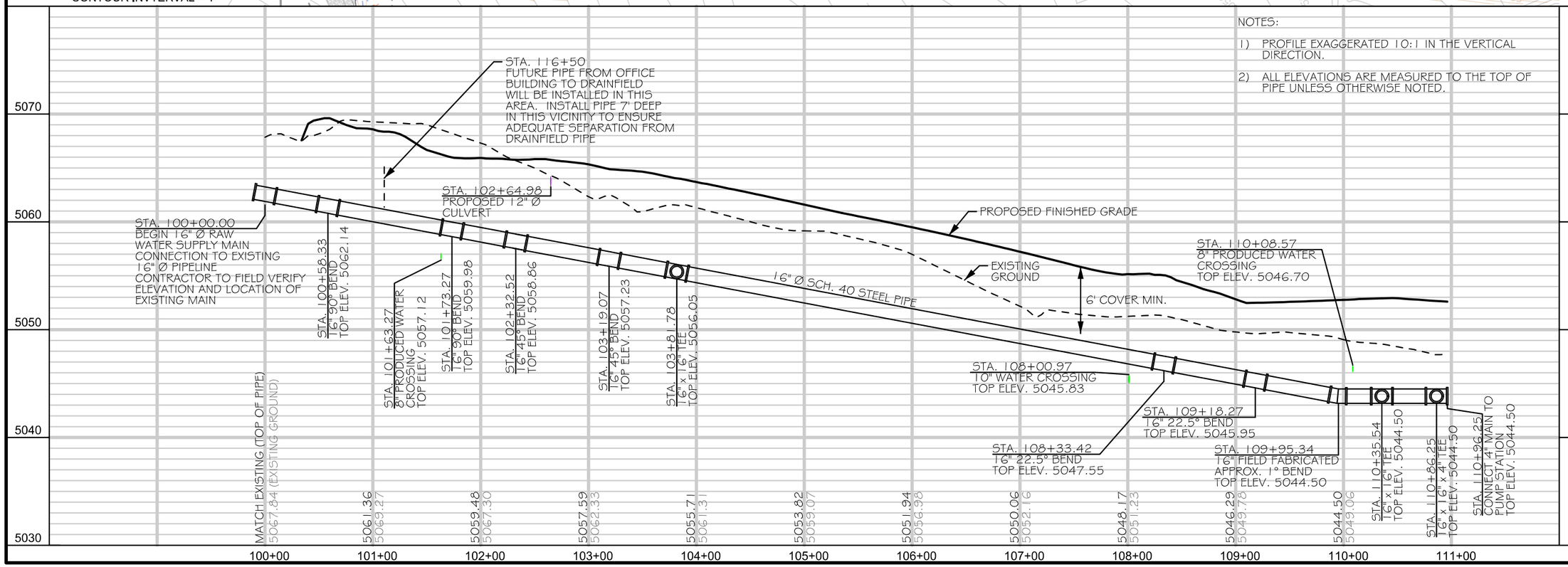

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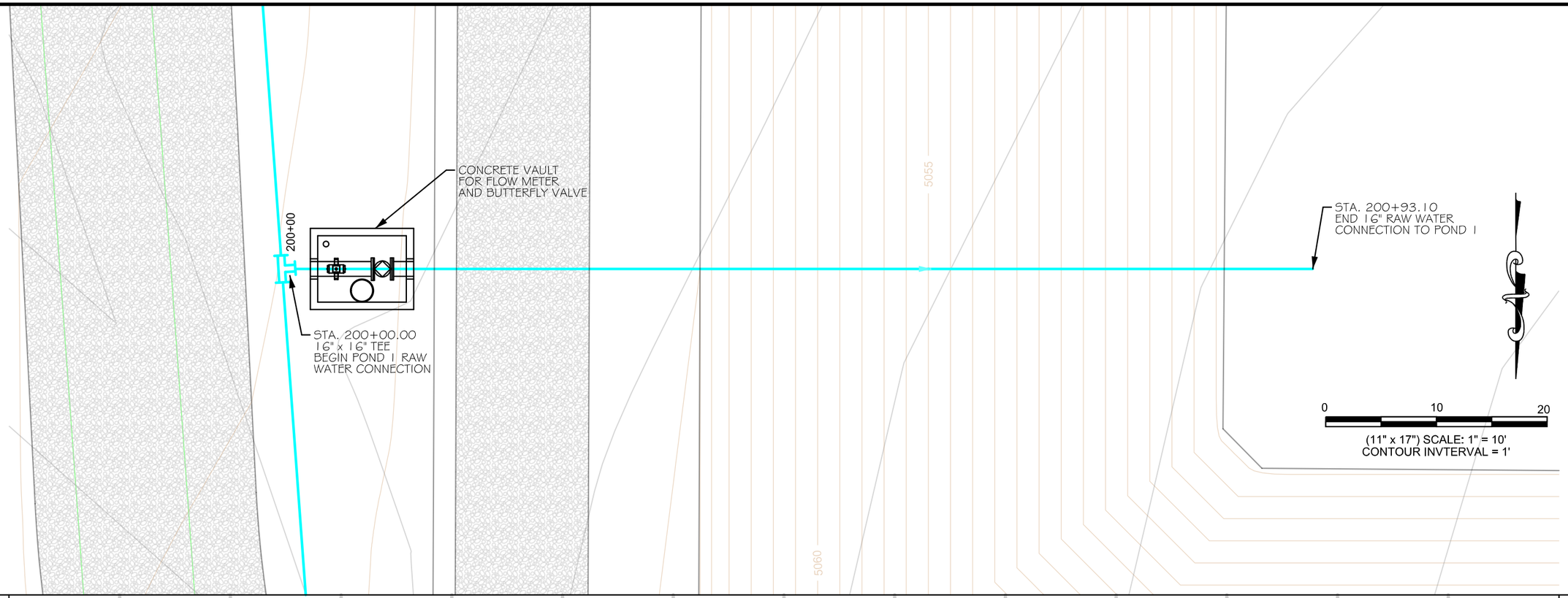
DE BEQUE STATION POND 1

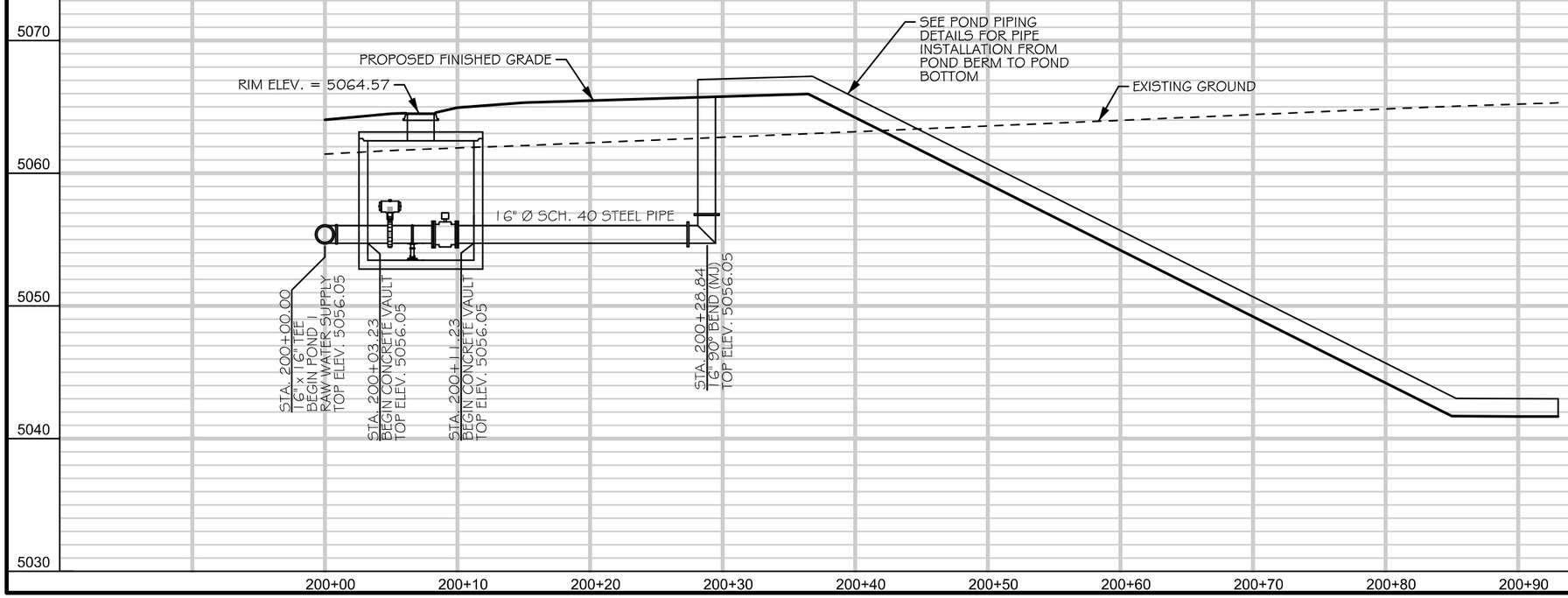
Raw Water Main Plan and Profile

SHEET 26



NOTES:

1) ALL ELEVATIONS ARE MEASURED TO THE TOP OF PIPE UNLESS OTHERWISE NOTED.



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DSGN	DATE	CKD
DDP	06/14	STH
REV	DATE	CKD

JOB # 2013-134

DE BEQUE STATION
POND 1

Pond 1 Raw Water
Main Connection Plan and Profile

SHEET
27

PEN TABLE PATH: K:\Admin\BLACK HILLS\13134 - DE BEQUE STATION\ENGINEERING PLANS\DEBEQUE.COLOR.tbl
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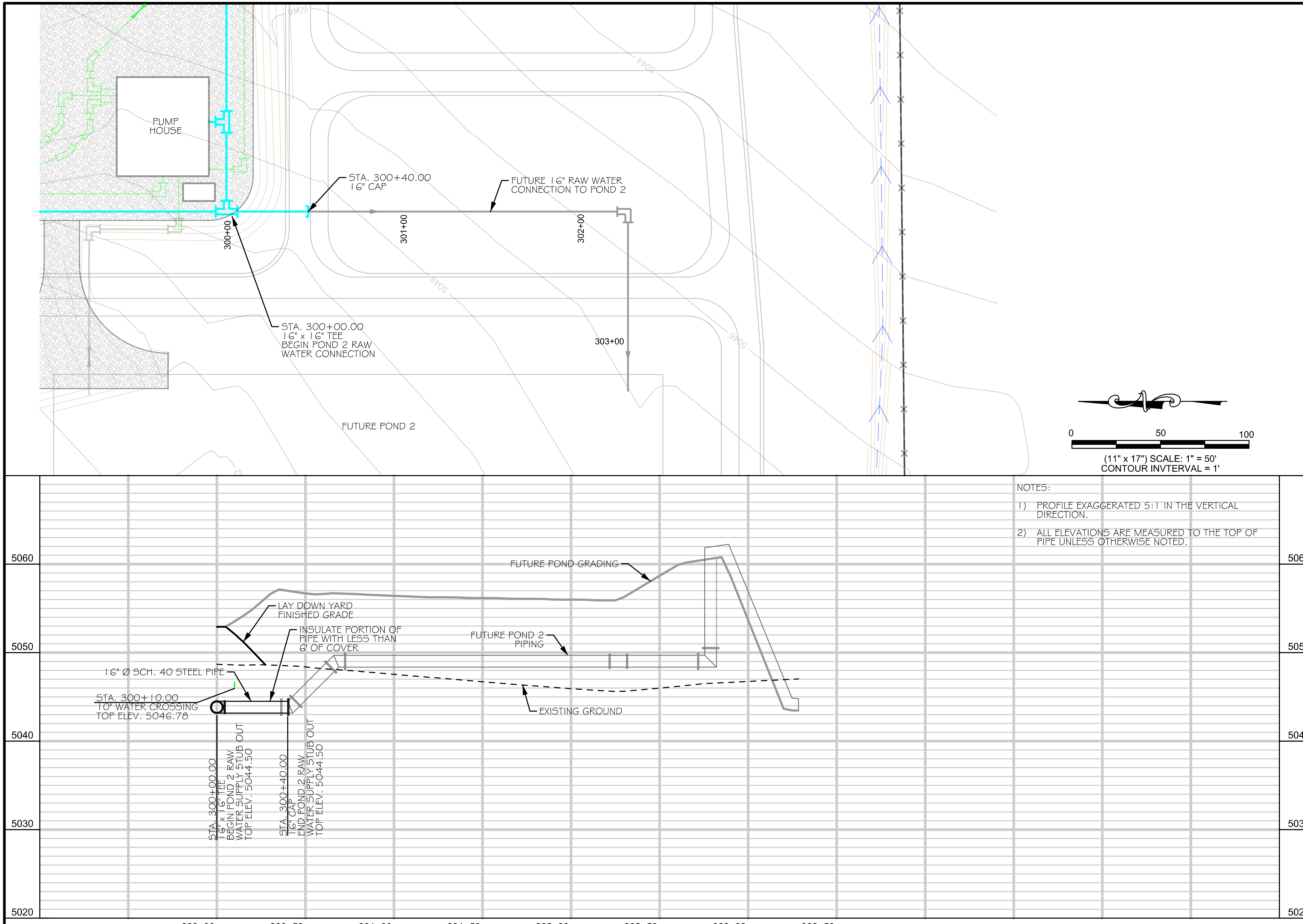
PUMP HOUSE
STA. 300+40.00
16" CAP
FUTURE 16" RAW WATER CONNECTION TO POND 2
300+00
301+00
302+00
303+00
STA. 300+00.00
16" x 16" TEE
BEGIN POND 2 RAW WATER CONNECTION
FUTURE POND 2
0
50
100
(11" x 17") SCALE: 1" = 50'
CONTOUR INVTERVAL = 1'
NOTES:
1) PROFILE EXAGGERATED 5:1 IN THE VERTICAL DIRECTION.
2) ALL ELEVATIONS ARE MEASURED TO THE TOP OF PIPE UNLESS OTHERWISE NOTED.
5060
5050
5040
5030
5020
FUTURE POND GRADING
LAY DOWN YARD FINISHED GRADE
INSULATE PORTION OF PIPE WITH LESS THAN 6' OF COVER
FUTURE POND 2 PIPING
16" Ø SCH. 40 STEEL PIPE
STA. 300+10.00
10" WATER CROSSING
TOP ELEV. 5046.78
EXISTING GROUND
STA. 300+00.00
16" x 16" TEE
BEGIN POND 2 RAW WATER SUPPLY STUB OUT
TOP ELEV. 5044.50
STA. 300+40.00
16" CAP
END POND 2 RAW WATER SUPPLY STUB OUT
TOP ELEV. 5044.50
300+00
300+50
301+00
301+50
302+00
302+50
303+00
303+50

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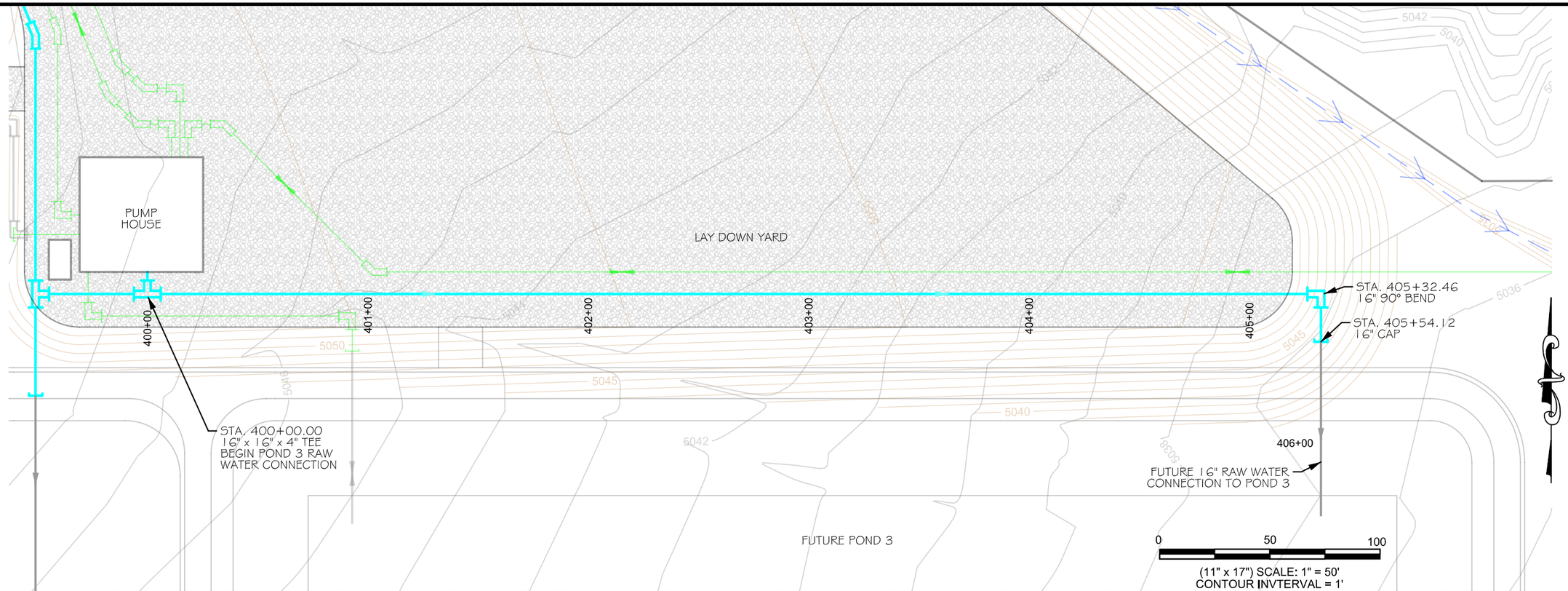
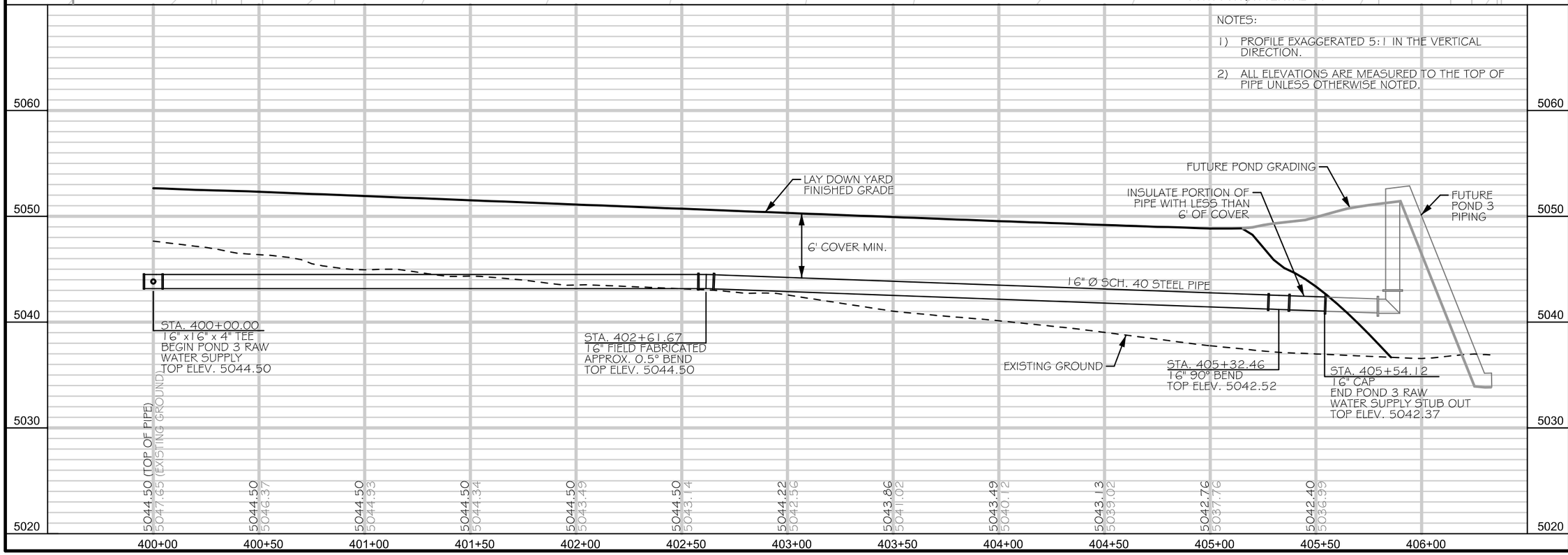
DE BEQUE STATION
POND 1

Pond 2 Raw Water Main Connection Plan and Profile

SHEET
28





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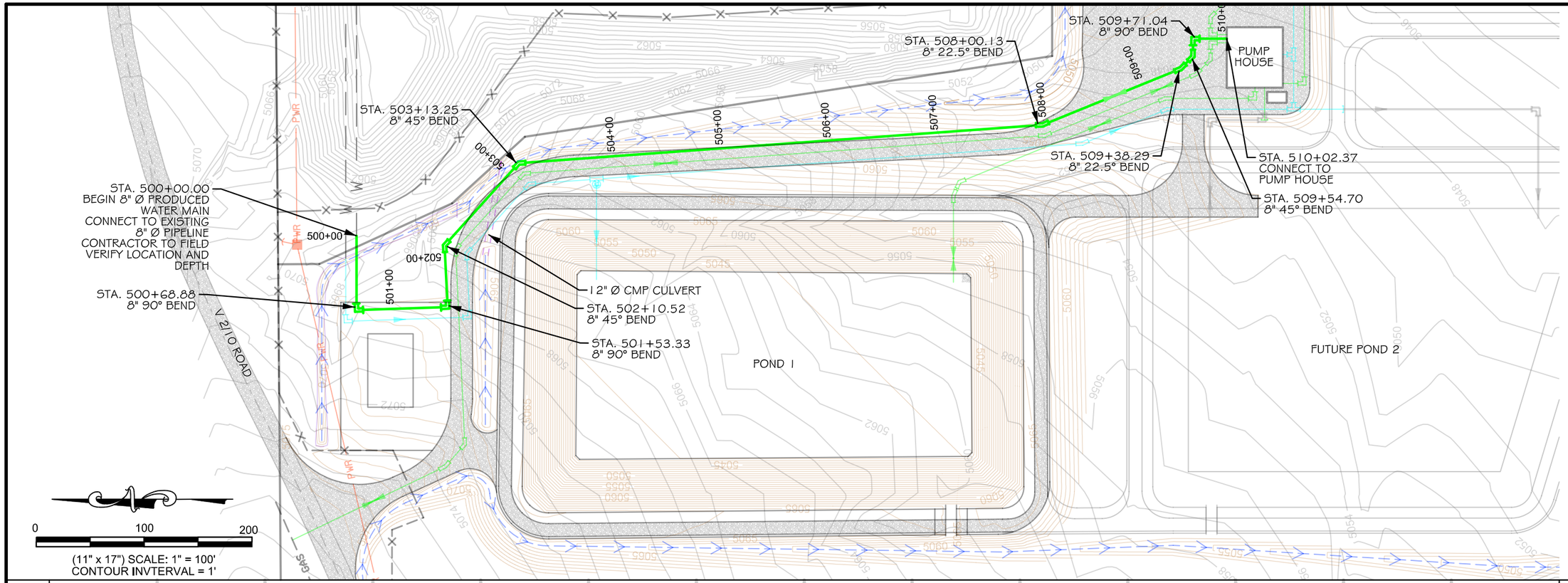
DATE	
CKD	

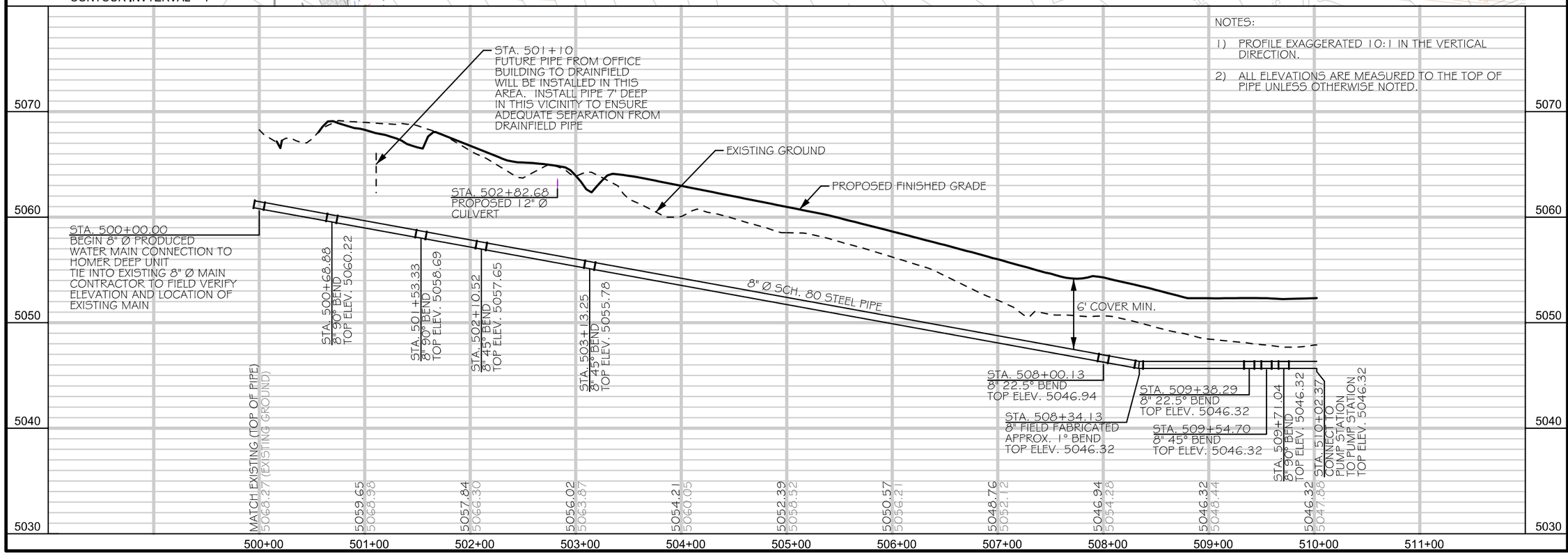
JOB # 2013-134

DE BEQUE STATION
POND 1

Pond 3 Raw Water
Main Connection Plan and Profile

SHEET
29





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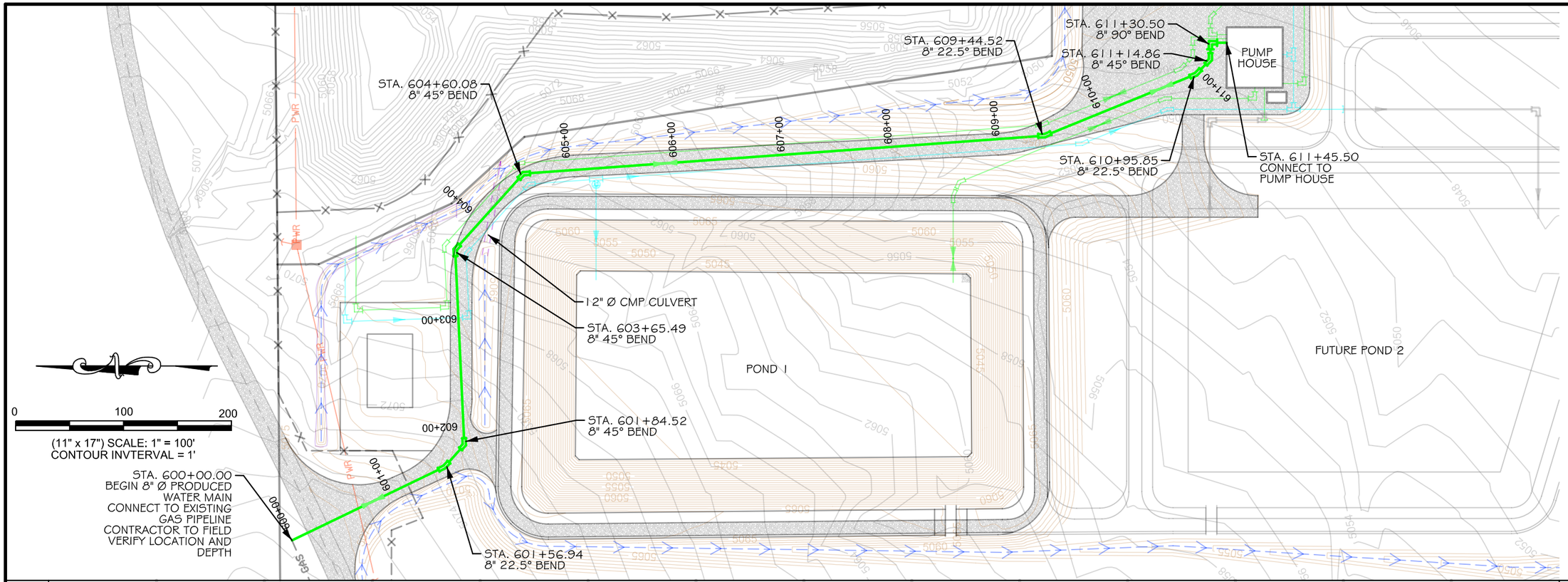
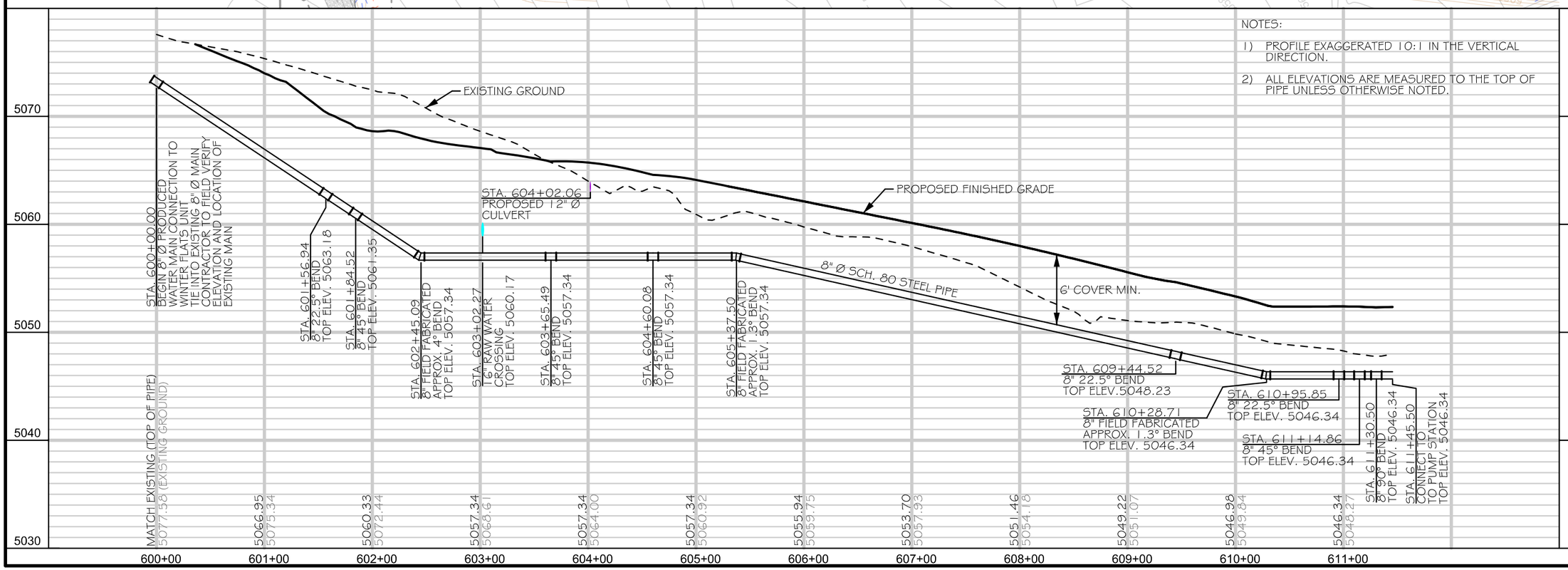
DE BEQUE STATION POND 1

Homer Deep Produced Water Main Plan and Profile

SHEET 30





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DATE	06/14	DATE
CKD	STH	CKD

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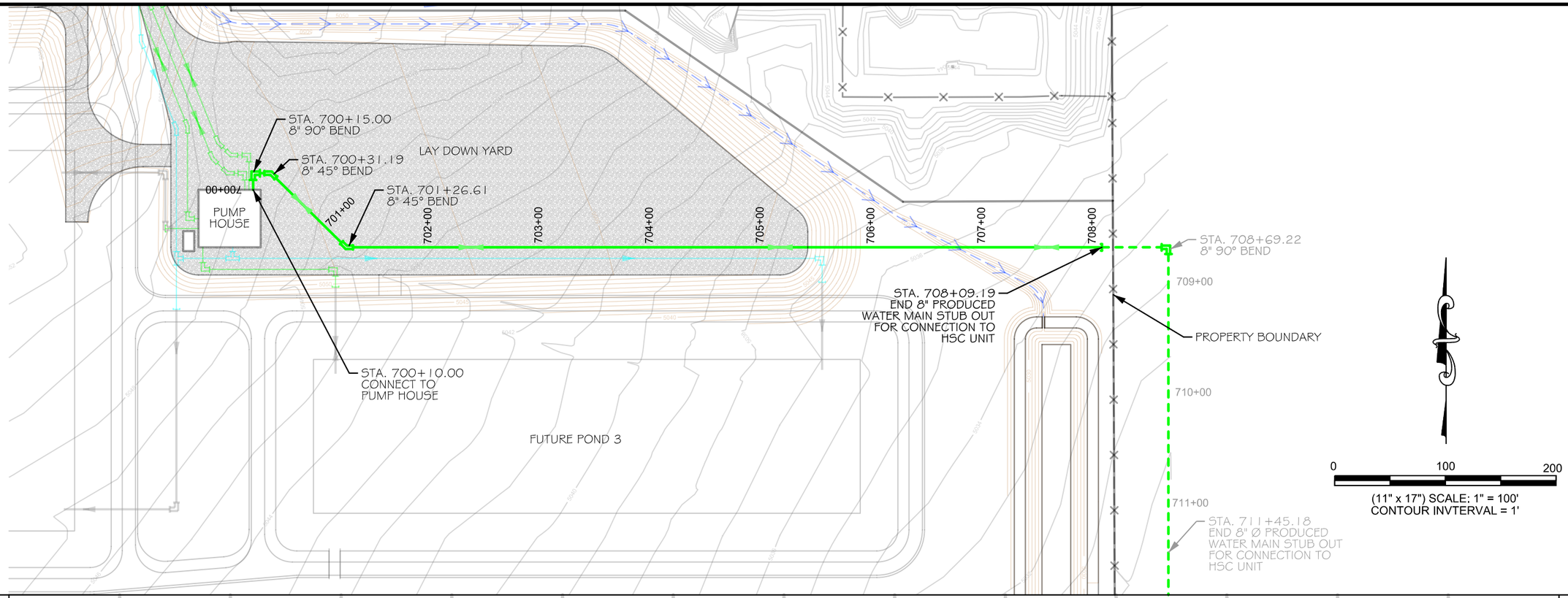
DE BEQUE STATION POND 1

Winter Flats Produced Water Main Plan and Profile

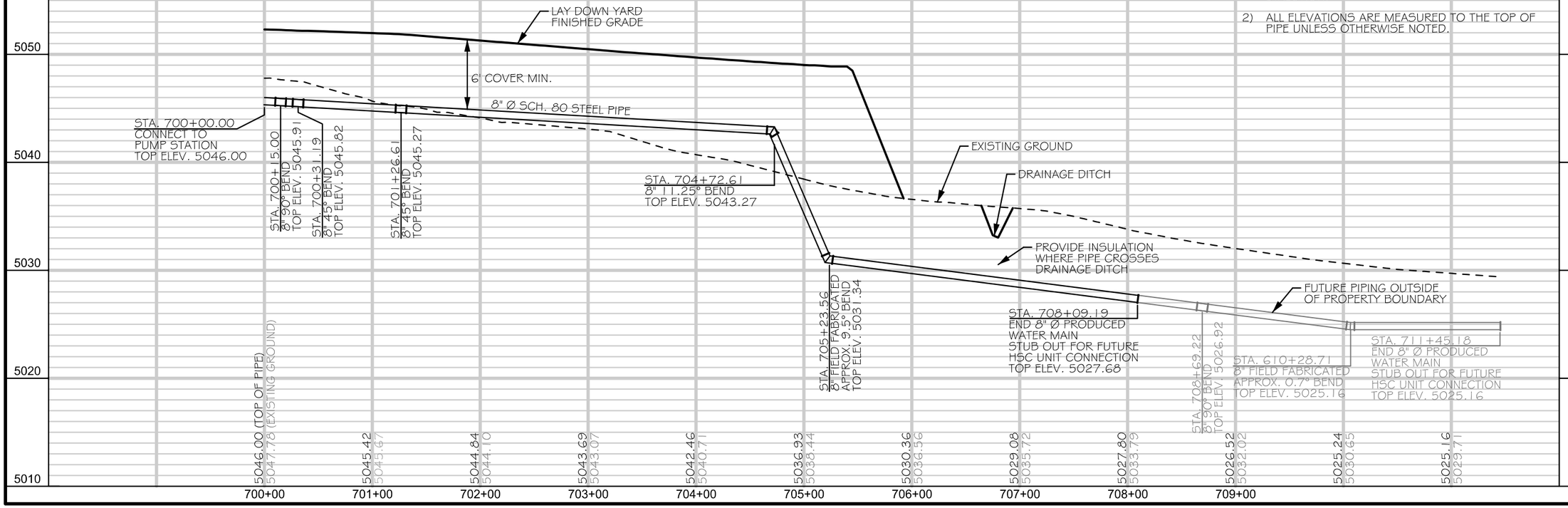
SHEET 31



NOTES:

1) PROFILE EXAGGERATED 10:1 IN THE VERTICAL DIRECTION.

2) ALL ELEVATIONS ARE MEASURED TO THE TOP OF PIPE UNLESS OTHERWISE NOTED.



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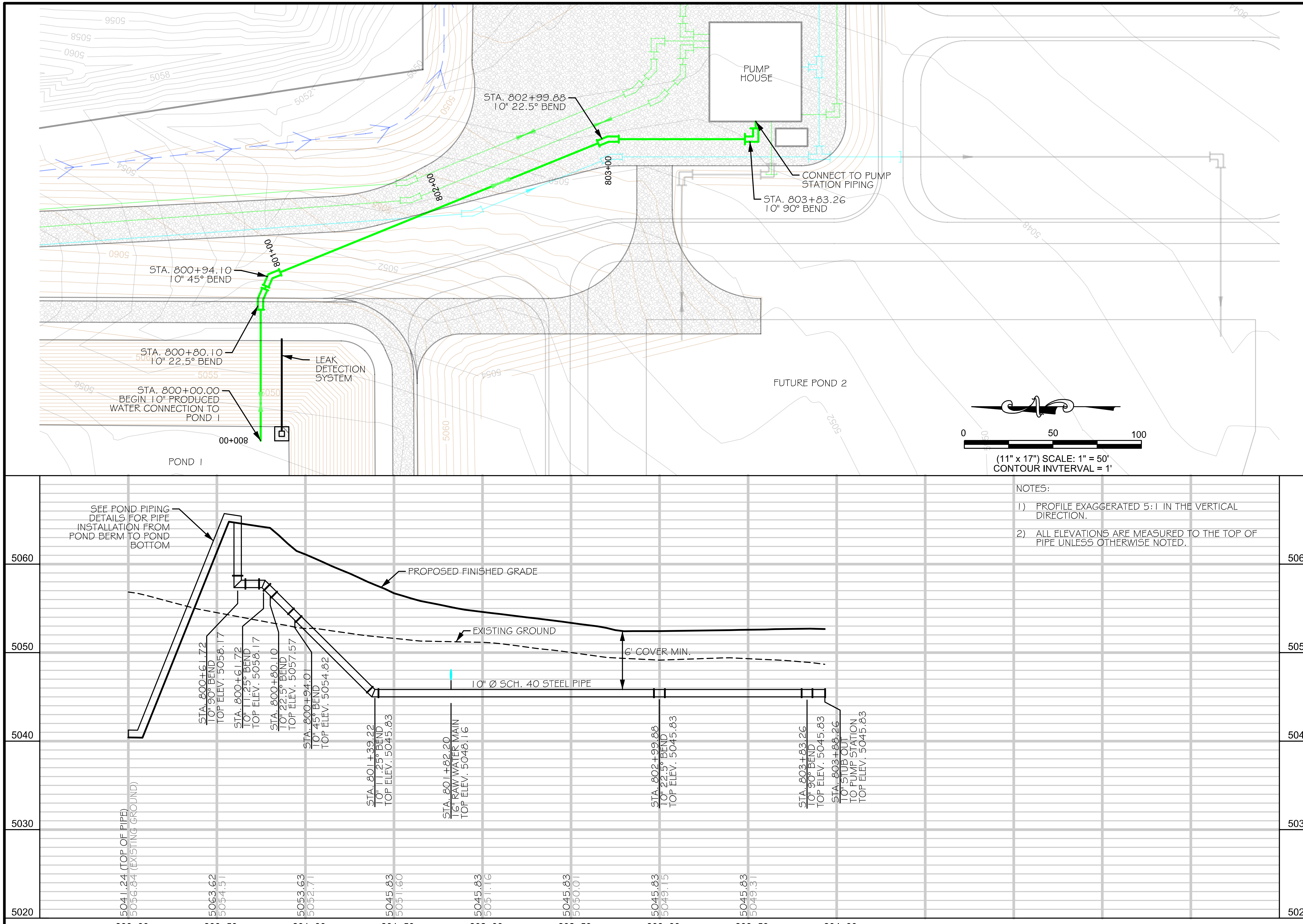
REV	DATE	CKD

JOB # 2013-134

DE BEQUE STATION
POND 1
HSC Unit Produced Water Main
Plan and Profile

SHEET
32



NOTES:

1) PROFILE EXAGGERATED 5:1 IN THE VERTICAL DIRECTION.

2) ALL ELEVATIONS ARE MEASURED TO THE TOP OF PIPE UNLESS OTHERWISE NOTED.

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REV	DATE	CKD

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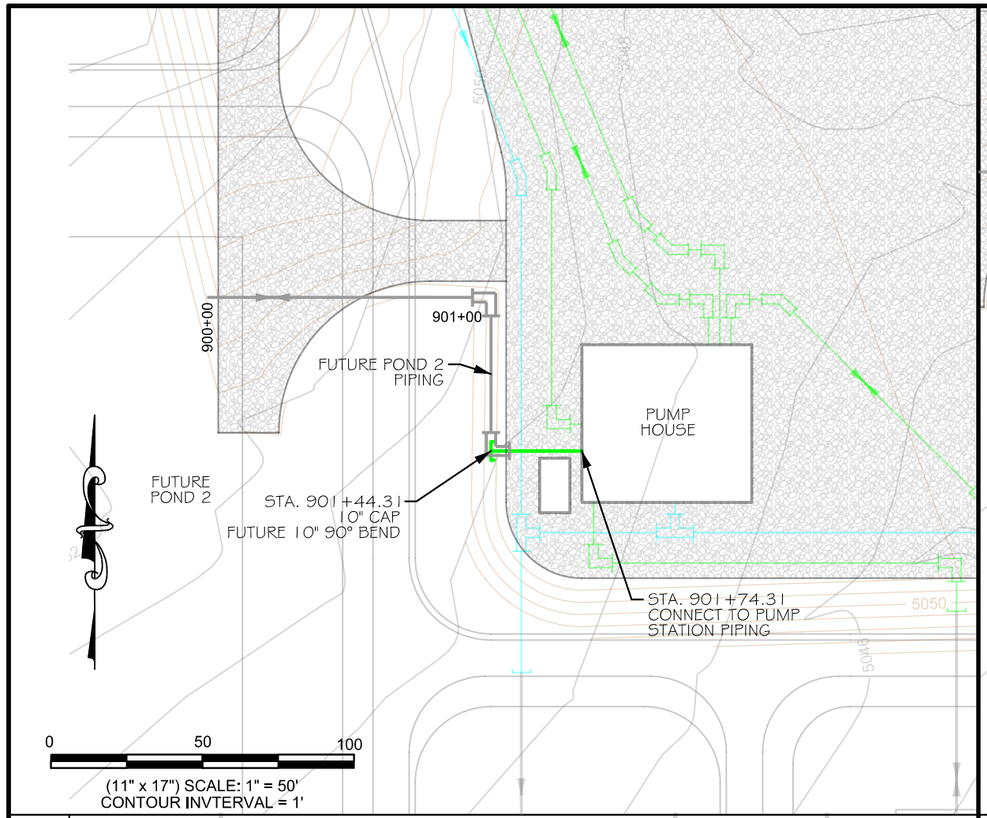
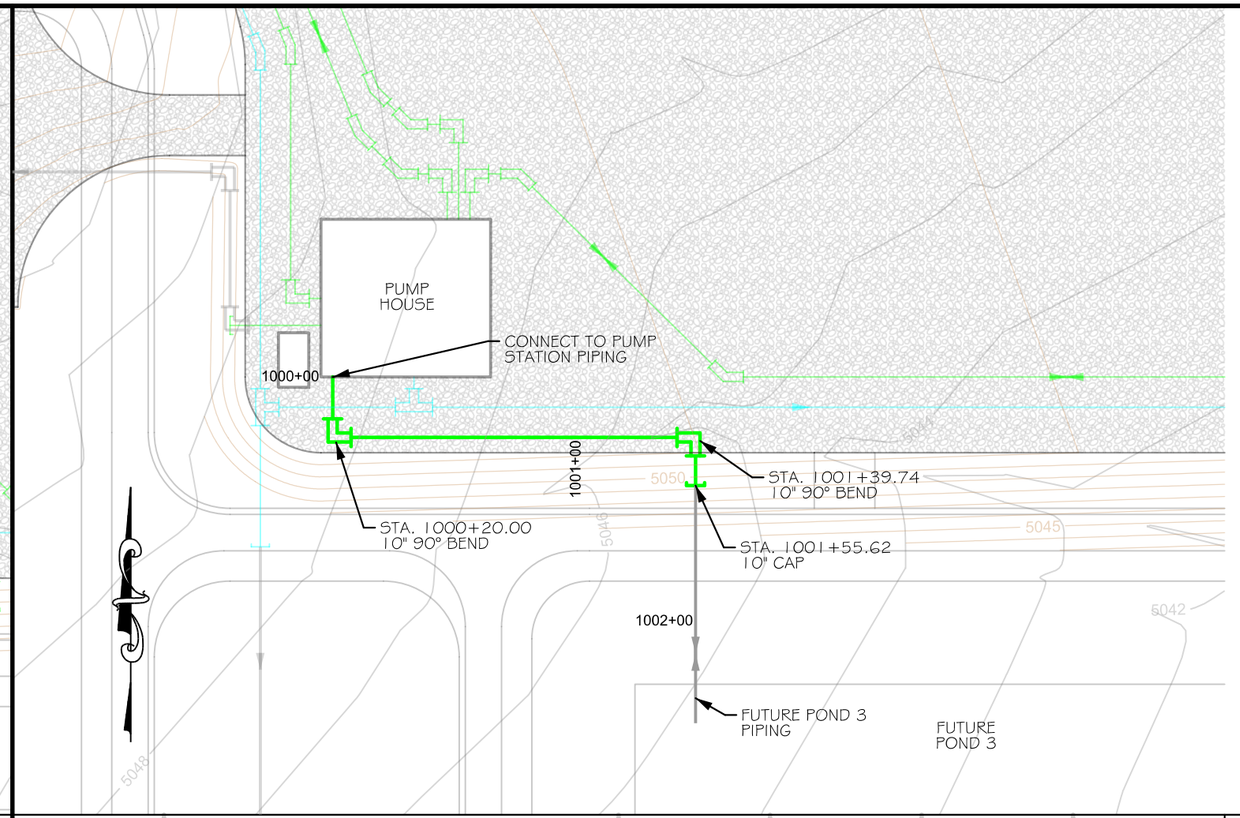
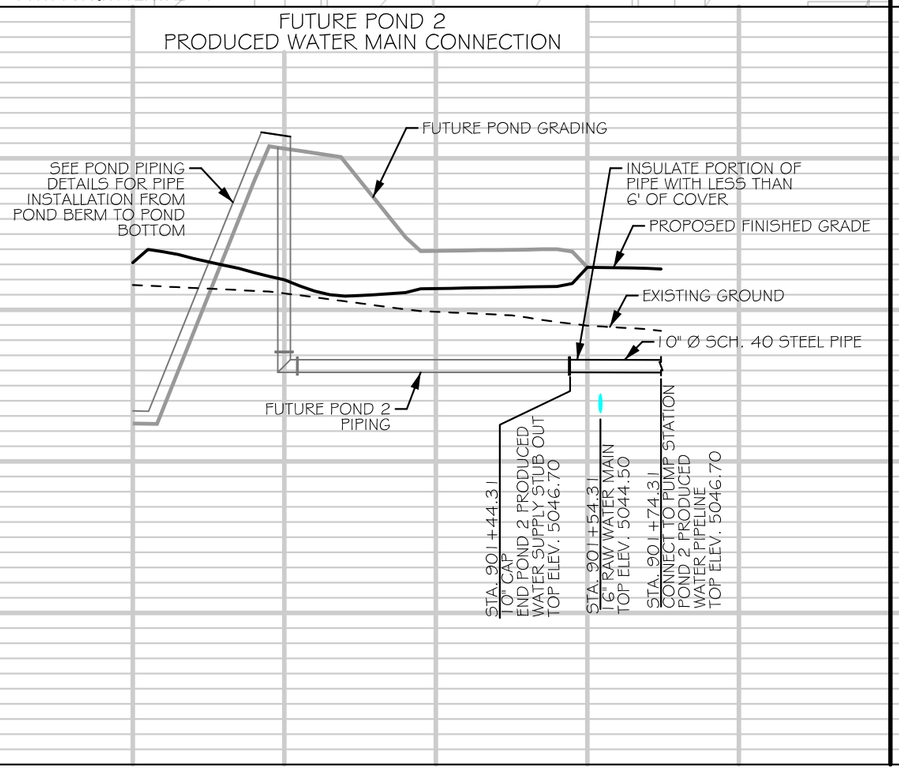
DE BEQUE STATION POND 1

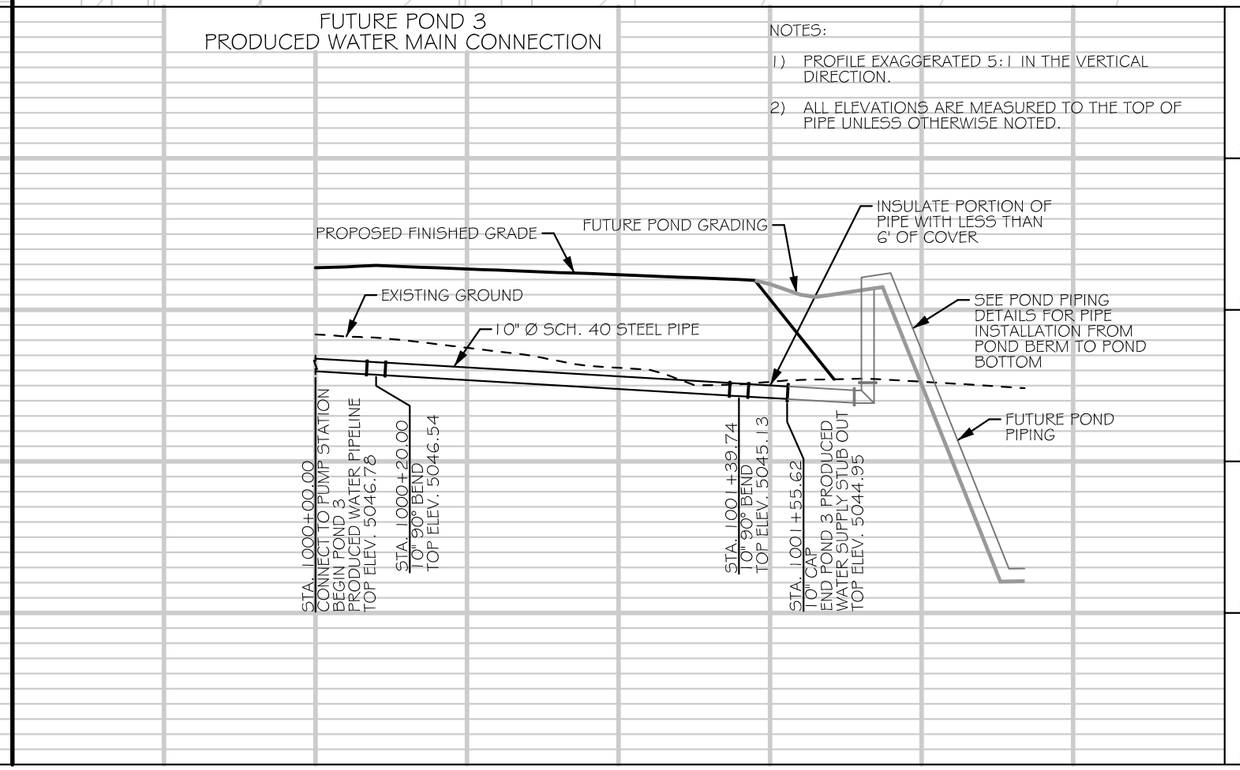
Pond 1 Produced Water Main Connection Plan and Profile

SHEET 33









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REV	DATE	CKD

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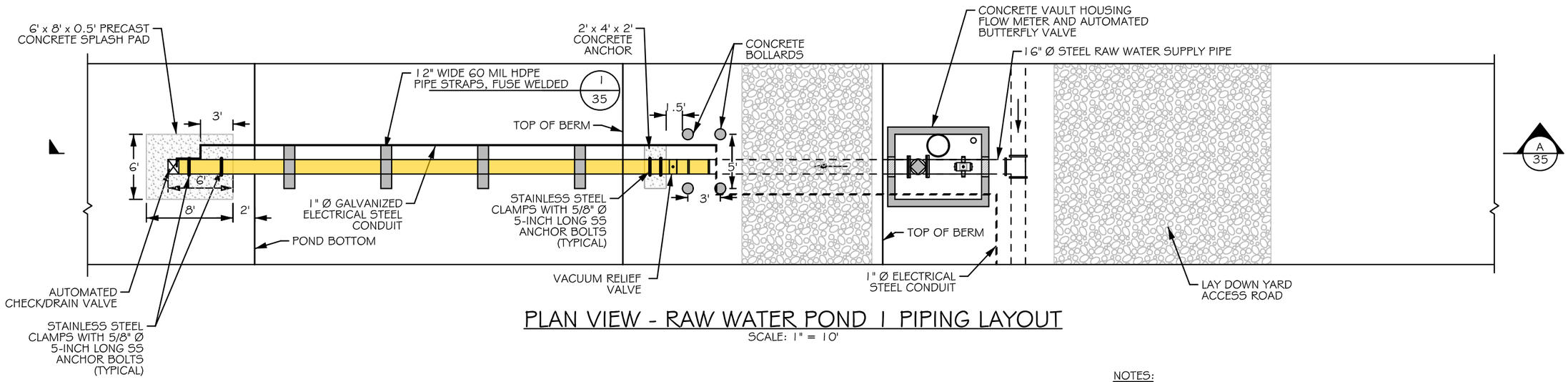
DE BEQUE STATION
POND 1

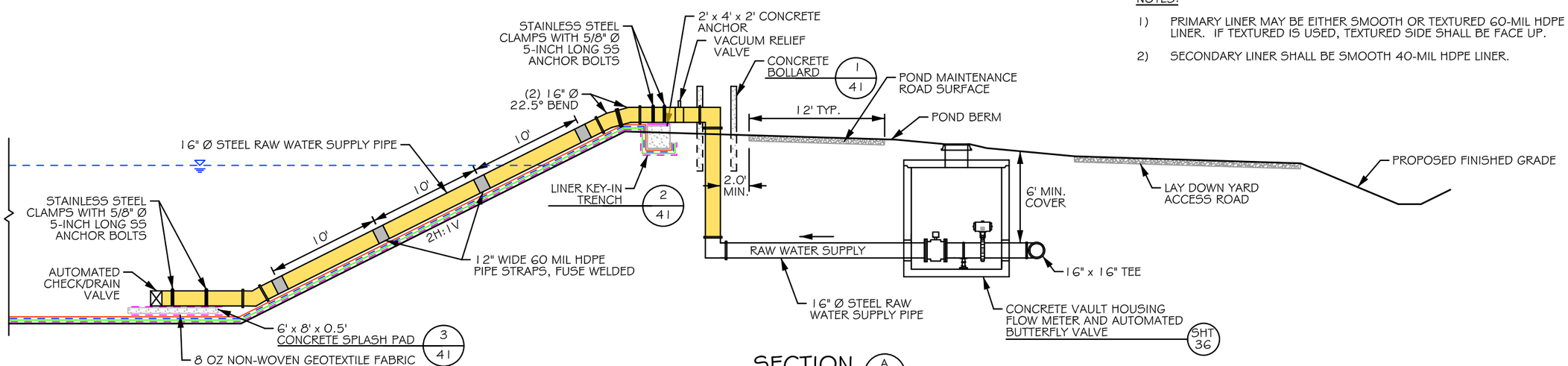
Pond 2 and Pond 3 Produced Water Main Connection Plan and Profile

SHEET
34



PLAN VIEW - RAW WATER POND 1 PIPING LAYOUT

SCALE: 1" = 10'

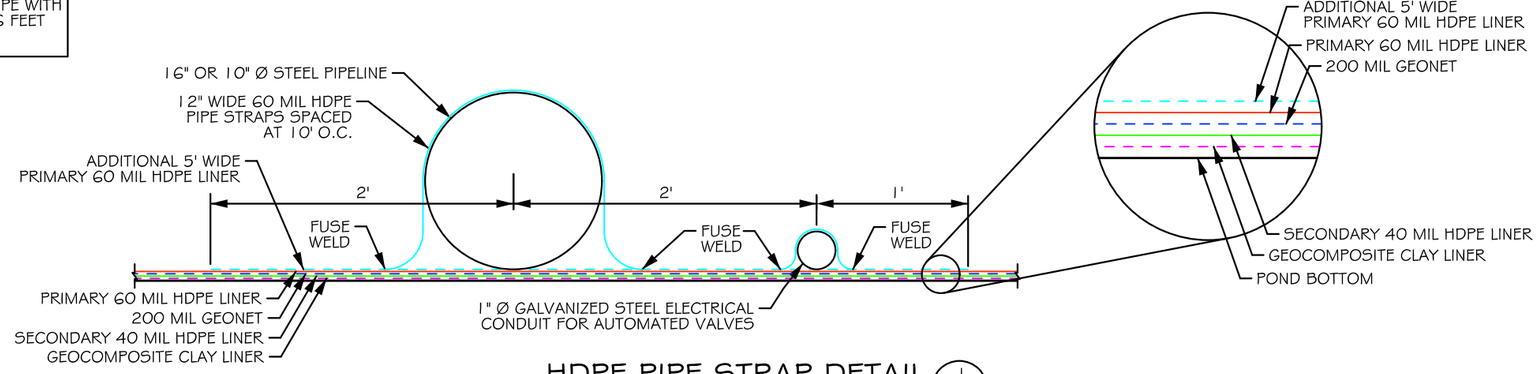


SECTION A/35

SCALE: 1" = 10'

LEGEND

WRAP EXPOSED PIPE AND PIPE WITH A BURY DEPTH LESS THAN 6 FEET WITH INSULATION



HDPE PIPE STRAP DETAIL 1/35

SCALE: 1" = 1'

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 40-MIL HDPE LINER.

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DE BEQUE STATION
POND 1

Raw Water Pond Piping Details

SHEET
35

FILE TABLE PATH: K:\Helena\BLACK HILLS\13134 - DE BEQUE STATION\ENGINEERING PLANS\DEBEQUE_COLOR.tbl
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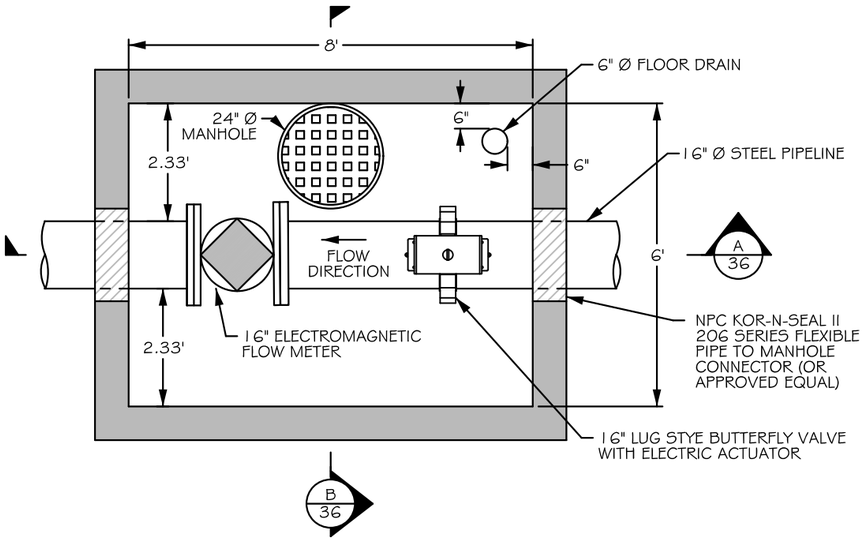
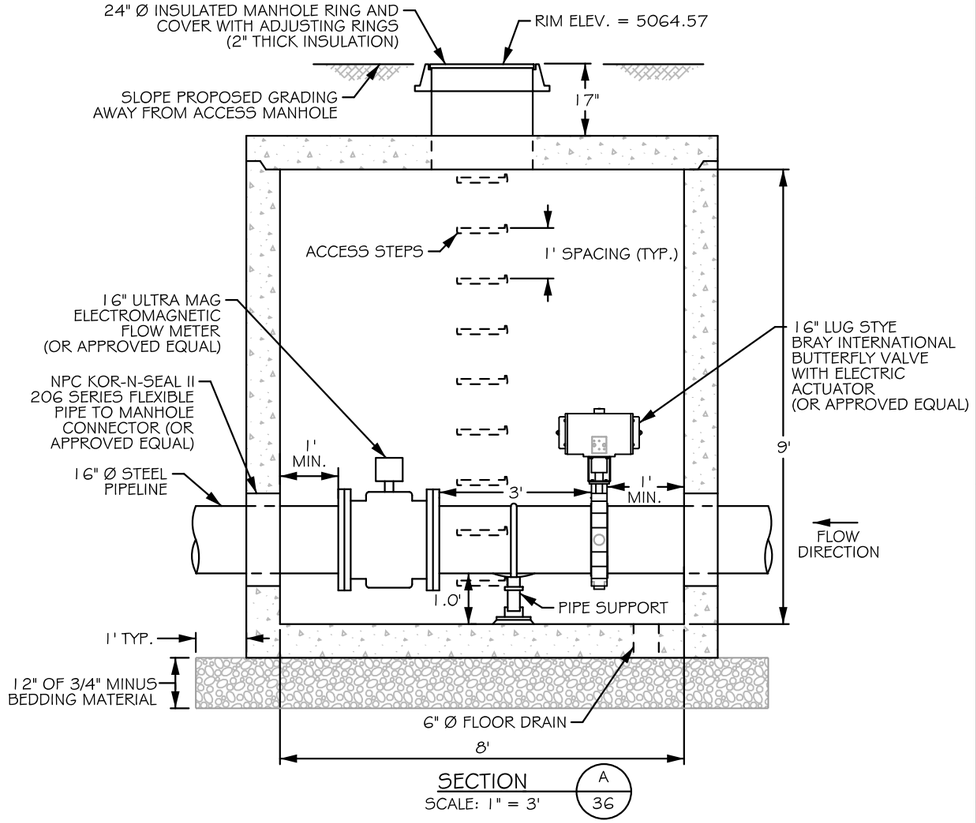


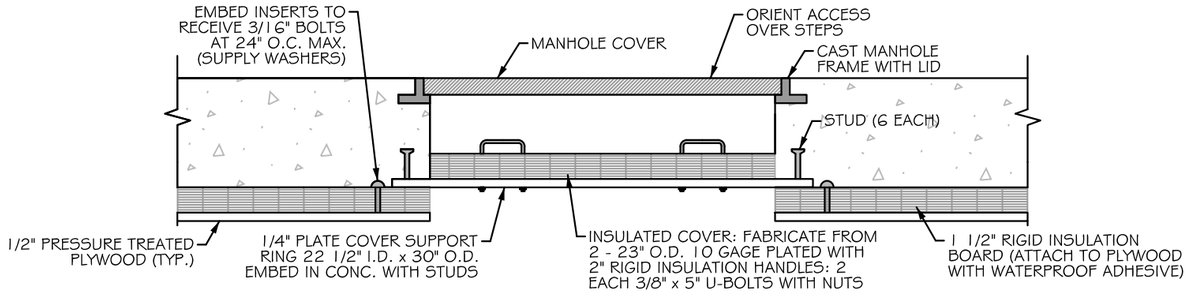
POND 1 RAW WATER MAIN VAULT

SCALE: 1" = 3'



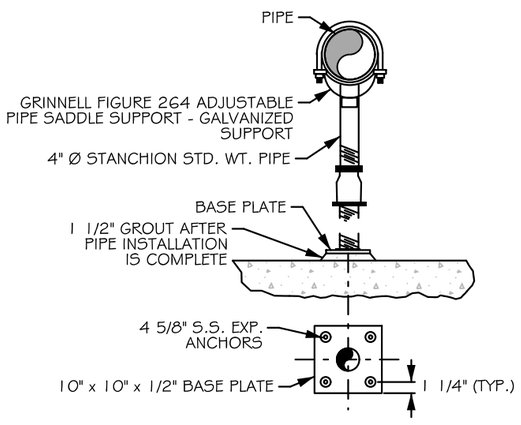
SECTION (A / 36)

SCALE: 1" = 3'



INSULATED MANHOLE LID DETAIL (X / X)

NOT TO SCALE

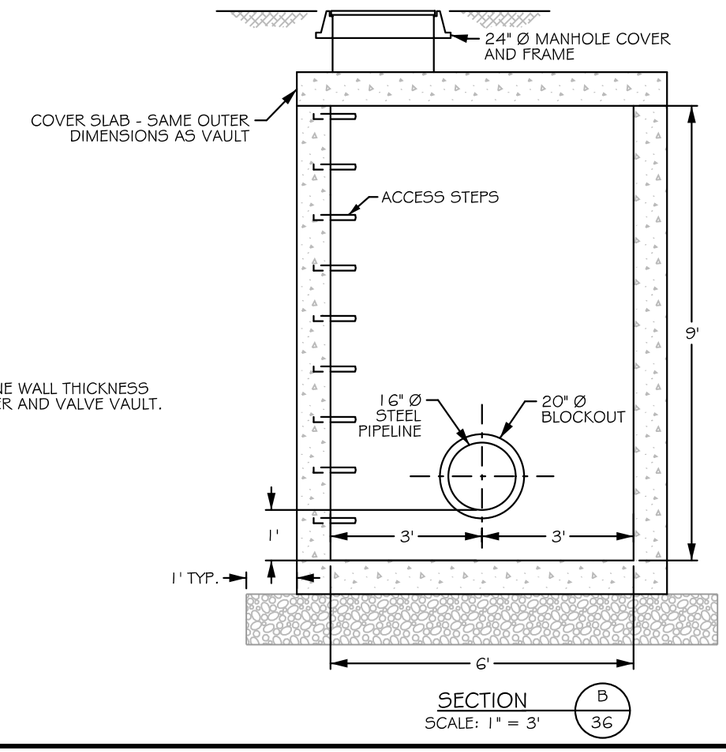


PIPE SUPPORT DETAIL

NOT TO SCALE

NOTES:

1) PRECAST MANUFACTURER TO DETERMINE WALL THICKNESS AND REBAR CONFIGURATION FOR FLOW METER AND VALVE VAULT.



SECTION (B / 36)

SCALE: 1" = 3'

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DE BEQUE STATION
POND 1

Pond 1 Raw Water
Flow Meter and Valve Vault

SHEET
36

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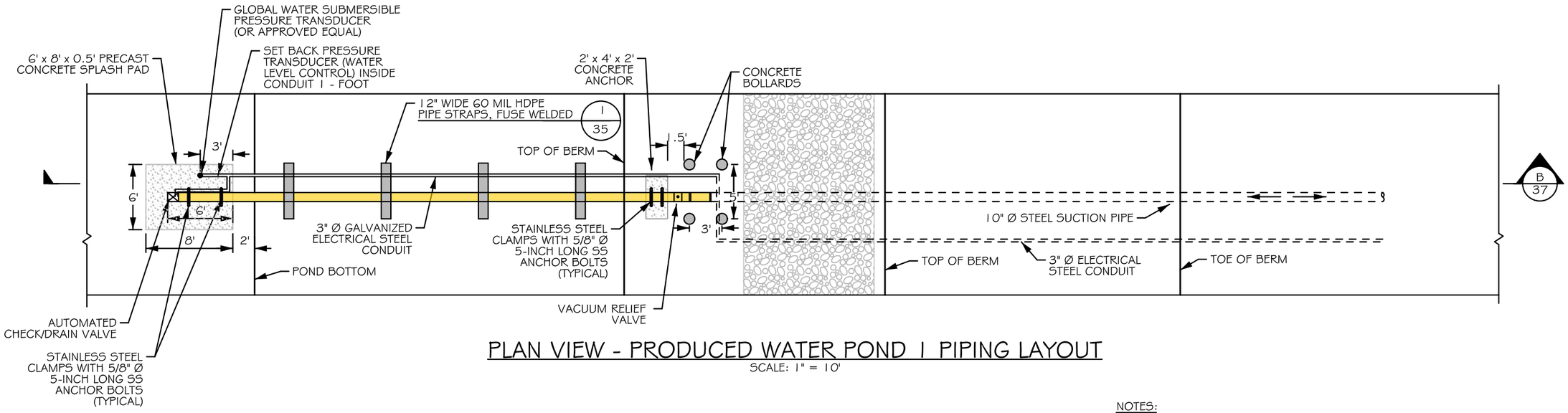


PLAN VIEW - PRODUCED WATER POND 1 PIPING LAYOUT

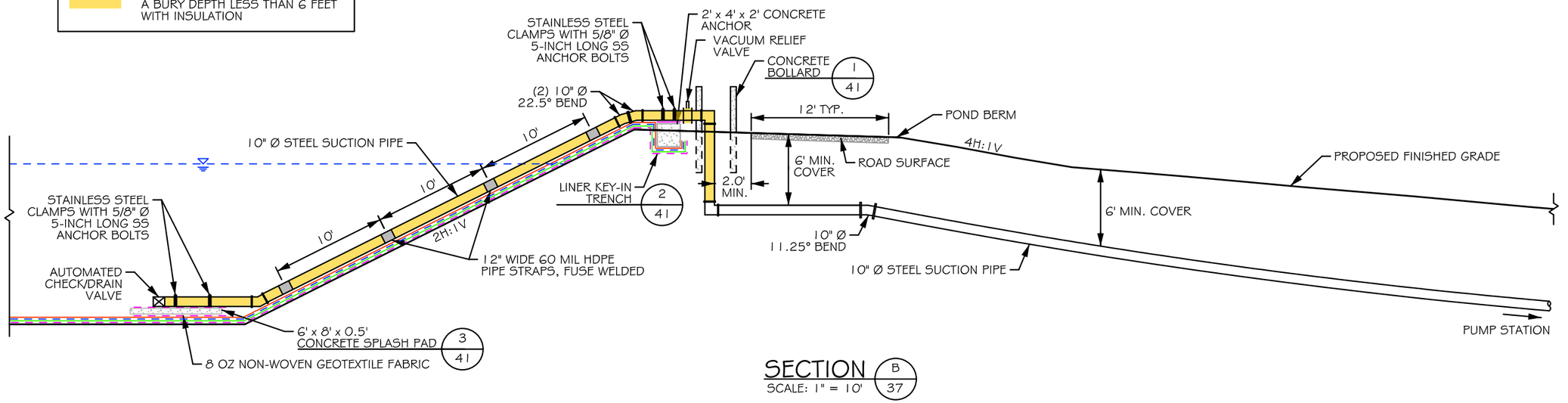
SCALE: 1" = 10'

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 40-MIL HDPE LINER.

LEGEND	
	WRAP EXPOSED PIPE AND PIPE WITH A BURY DEPTH LESS THAN 6 FEET WITH INSULATION



SECTION B / 37

SCALE: 1" = 10'

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DDP	06/14		

CKD STH CKD

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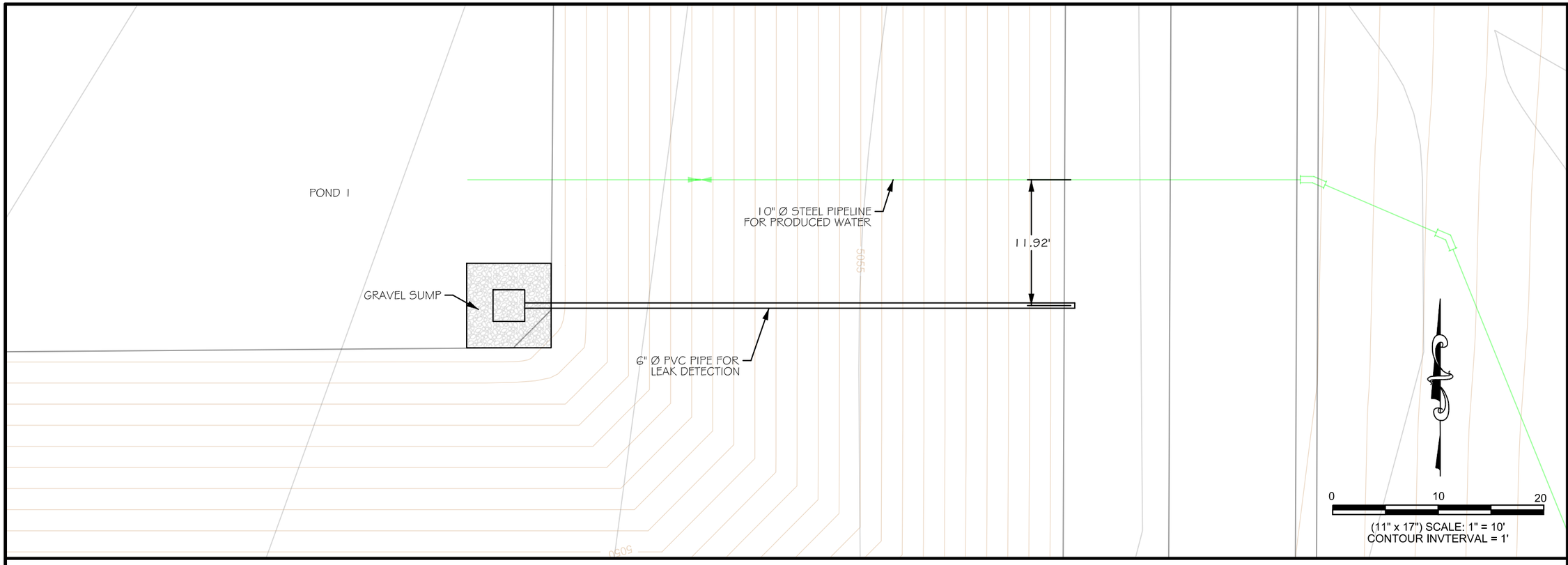
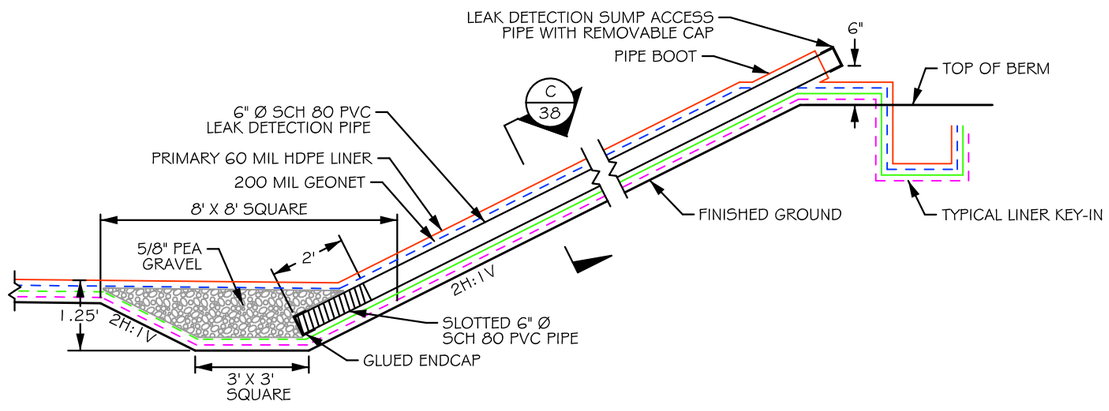
DE BEQUE STATION
POND 1

Produced Water Pond Piping Details

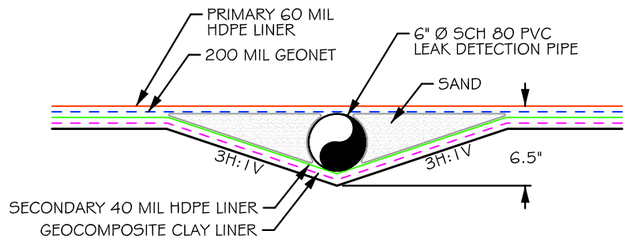
SHEET
37





SUMP DETAIL

NOT TO SCALE



SUMP ACCESS PIPE SECTION

C 38

NOT TO SCALE

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DATE	06/14
CKD	STH

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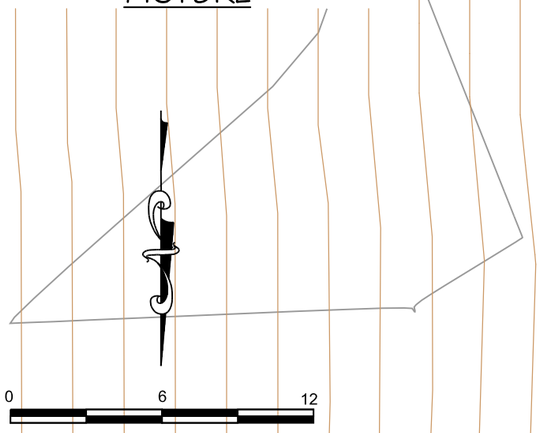
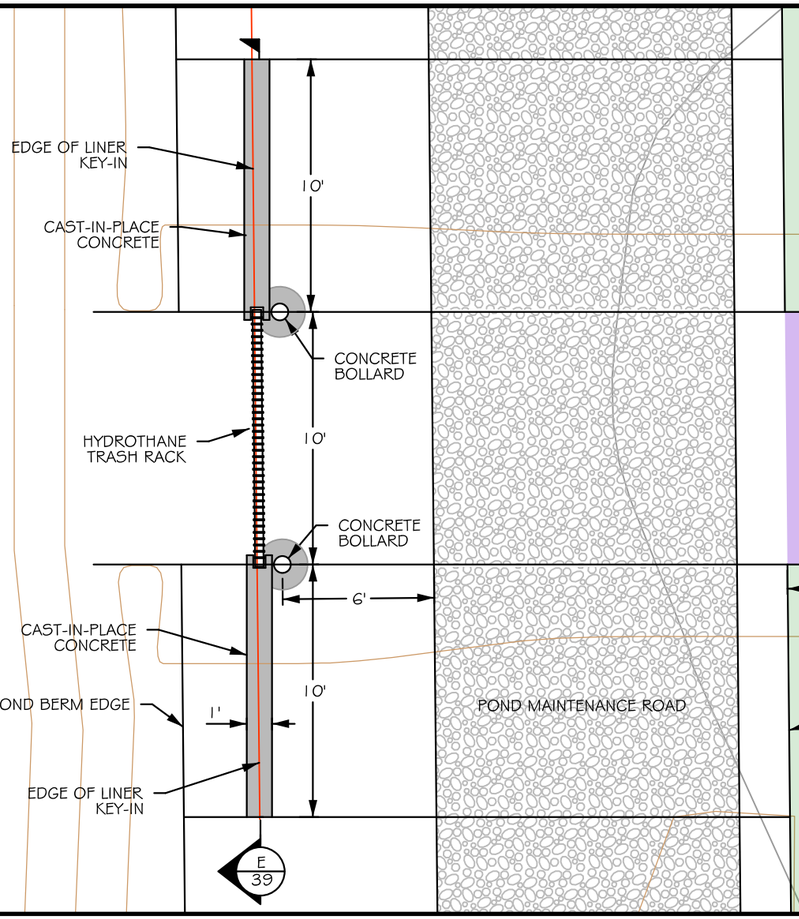
DE BEQUE STATION
POND 1

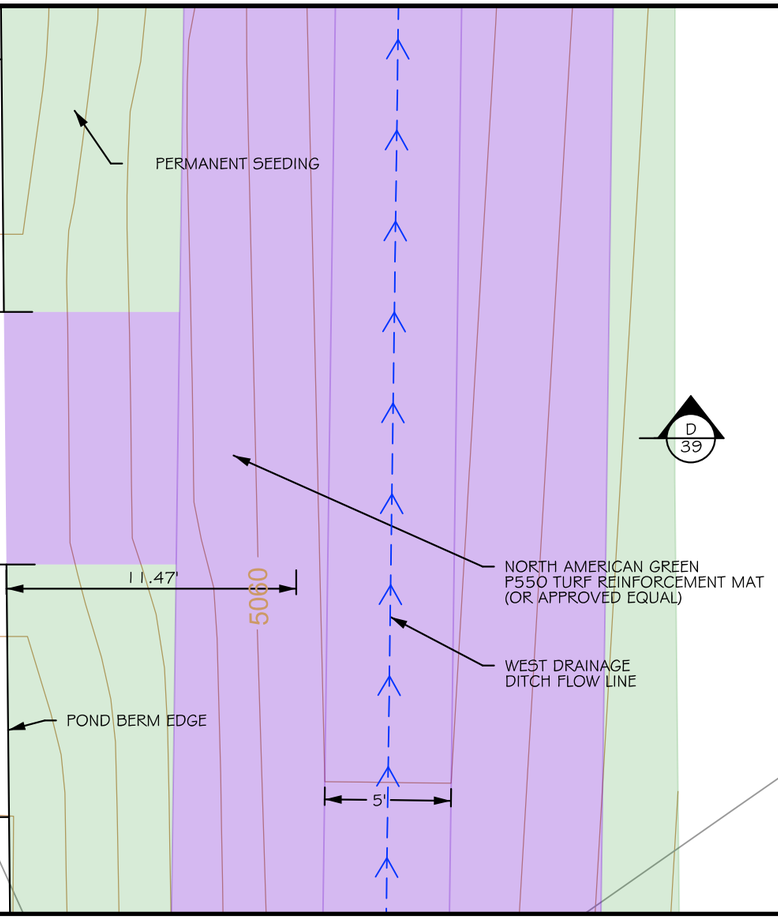
Leak Detection Details

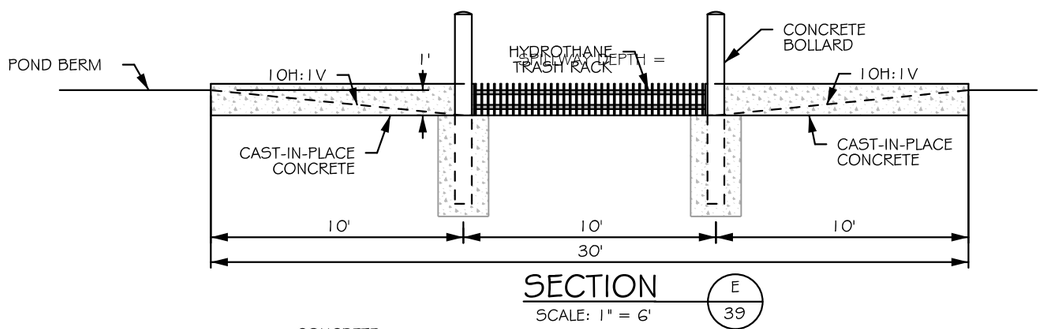
SHEET
38

HYDROTHANE TRASH RACK PICTURE

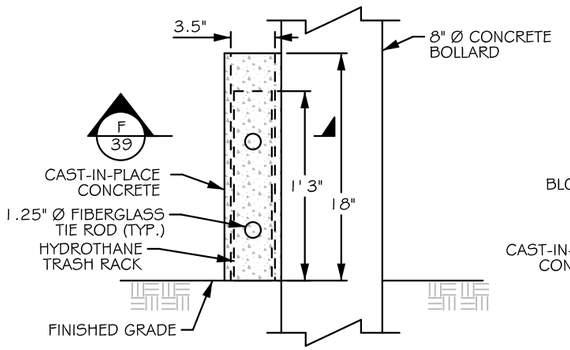




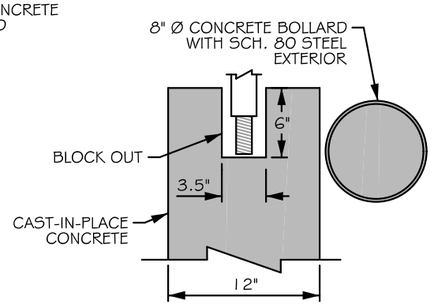




SECTION (E 39)
SCALE: 1" = 6'



CONNECTION DETAIL (I 39)
SCALE: 1" = 1'



SECTION (F 39)
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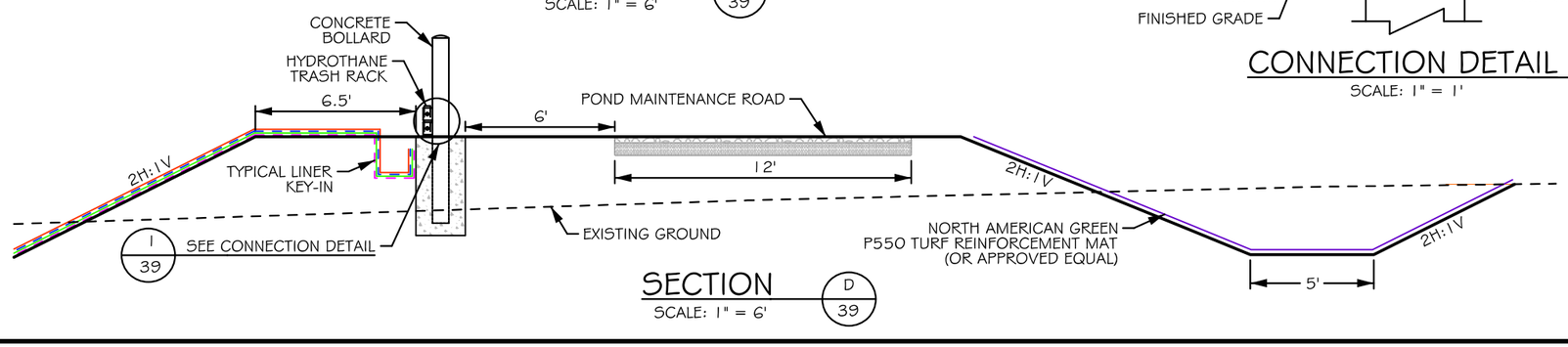

SECTION (D 39)
SCALE: 1" = 6'

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.

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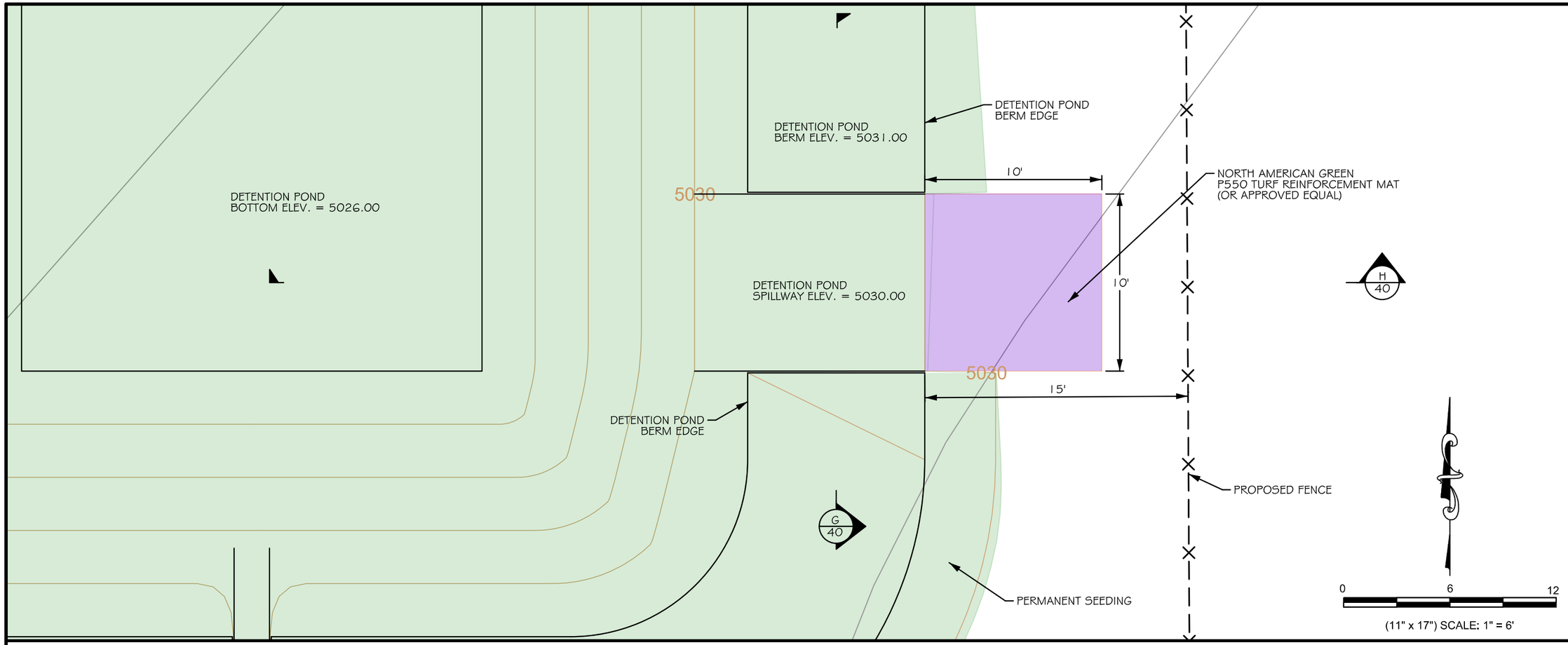
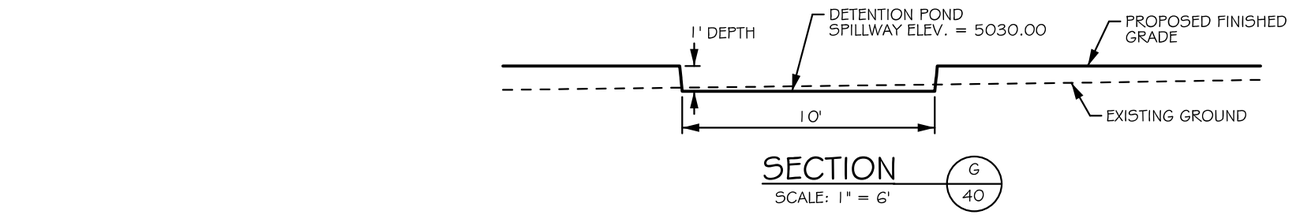
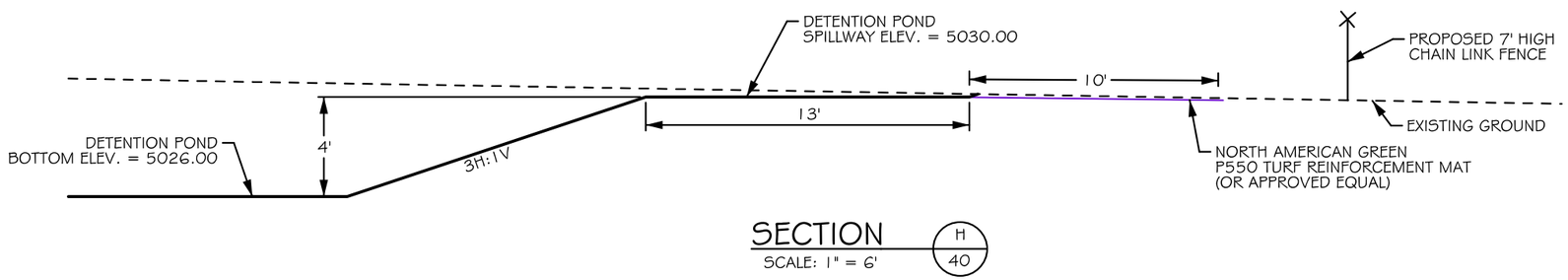
DE BEQUE STATION
POND 1

Pond 1 Spillway Detail

SHEET
39







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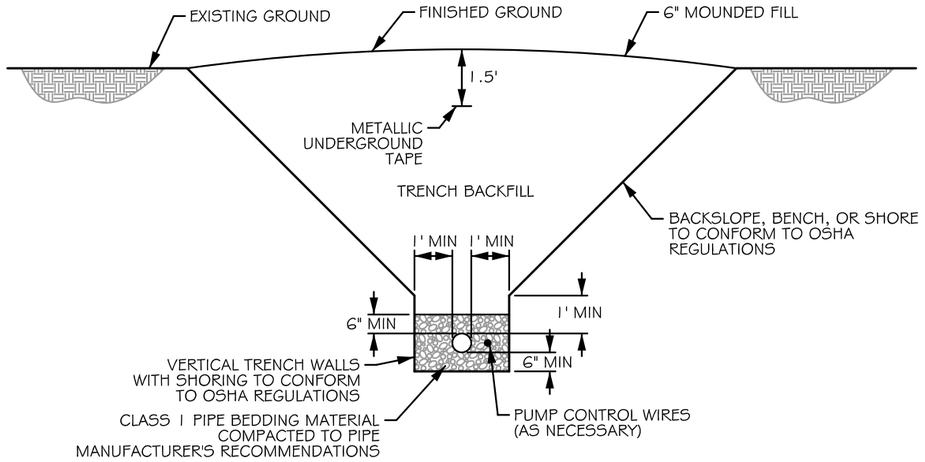
DSGN	DATE	CKD
DDP	06/14	STH
REV	DATE	CKD

JOB # 2013-134

DE BEQUE STATION
POND 1

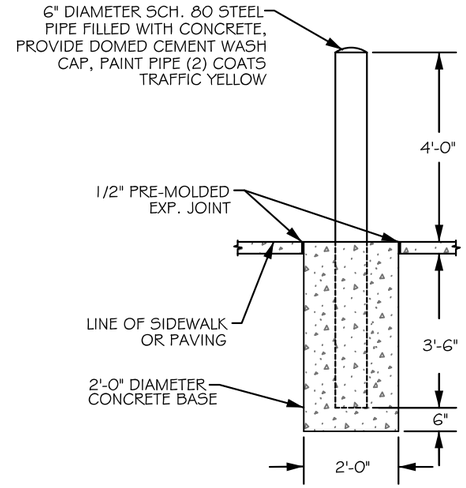
Detention Pond Spillway Detail

SHEET
40



PIPE TRENCH DETAIL - SINGLE PIPE

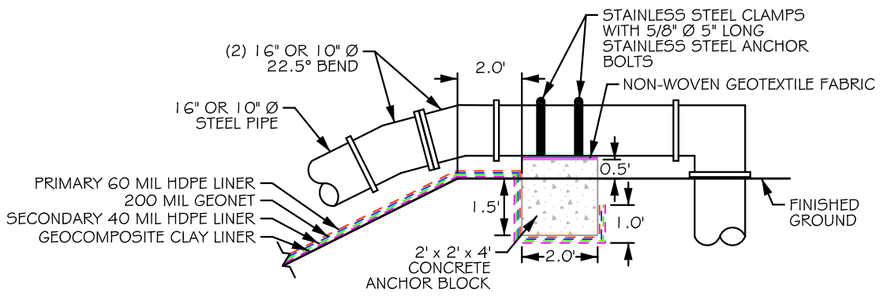
SCALE: 1" = 4'



CONCRETE BOLLARD

NOT TO SCALE

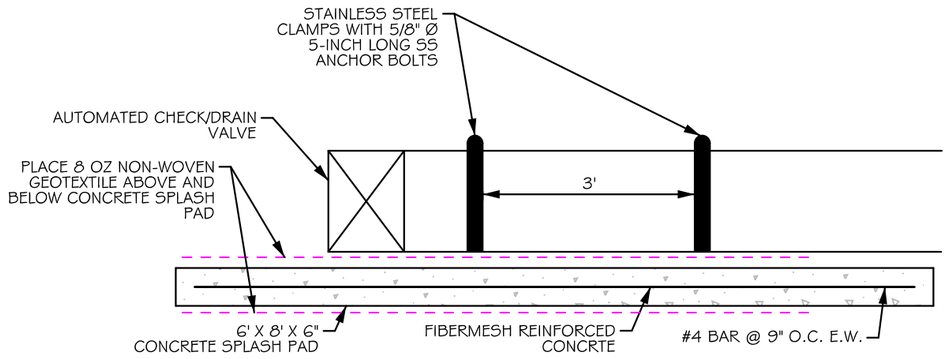
1 / 35, 37



CONCRETE LINER KEY-IN DETAIL

NOT TO SCALE

2 / 35, 37



CONCRETE SPLASH PAD

NOT TO SCALE

3 / 35, 37

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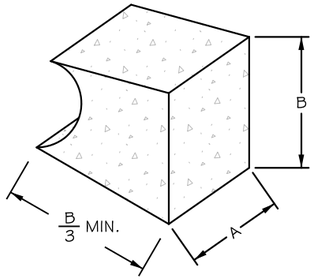
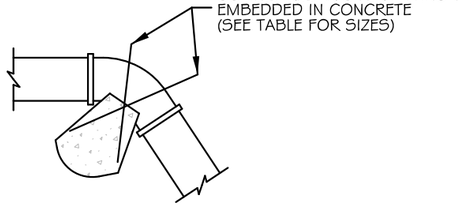
JOB # 2013-134

DE BEQUE STATION
POND 1

Miscellaneous Details

SHEET
41

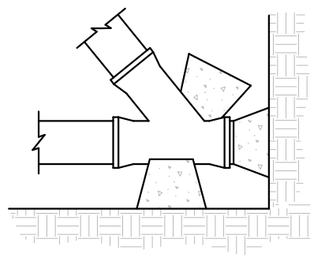




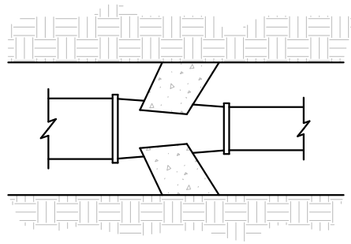
VERTICAL BEND

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

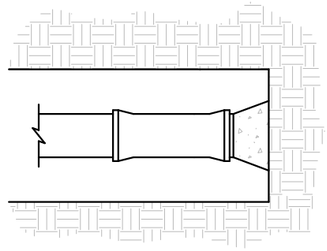
(1) WHEN THE 36" LENGTH EXCEEDS THE LENGTH B/3 THEN BEND THE SECTION OF REBAR THAT WOULD PROTRUDE FROM THE THRUST BLOCK, PARALLEL TO THE BEARING FACE. PROVIDE 3" OF CONCRETE COVER OVER ALL REBAR.



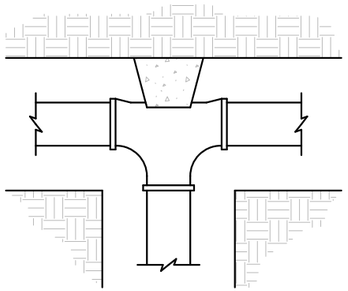
WYE



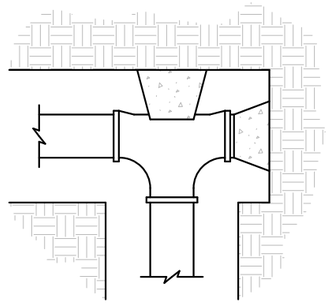
REDUCER



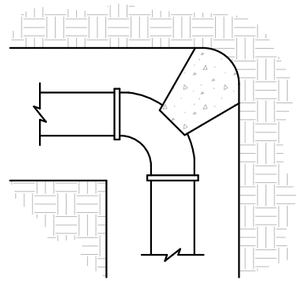
PLUG OR CAP



TEE



TEE (PLUGGED)



BEND

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:

1. THIS TABLE IS BASED ON 150 PSI MAIN PRESSURE WITH 2000 PSF SOIL BEARING PRESSURE AND 1250 PSI WITH 3000 PSF SOIL BEARING PRESSURE.
2. WRAP ALL FITTINGS WITH POLYETHYLENE.
3. KEEP CONCRETE CLEAR OF JOINT AND JOINT ACCESSORIES.
4. POUR THRUST BLOCKING AGAINST UNDISTURBED EARTH.
5. VERTICAL BENDS HAVING DOWNWARD RESULTANT THRUST AND HORIZONTAL BENDS HAVE THE SAME THRUST BLOCK REQUIREMENTS.
6. THRUST BLOCK BEARING AREA SHALL NOT BE LESS THAN 1.0 SQ FT.
7. THE CONTRACTOR SHALL PROVIDE CATHODIC PROTECTION FOR ALL WATER FITTINGS.
8. 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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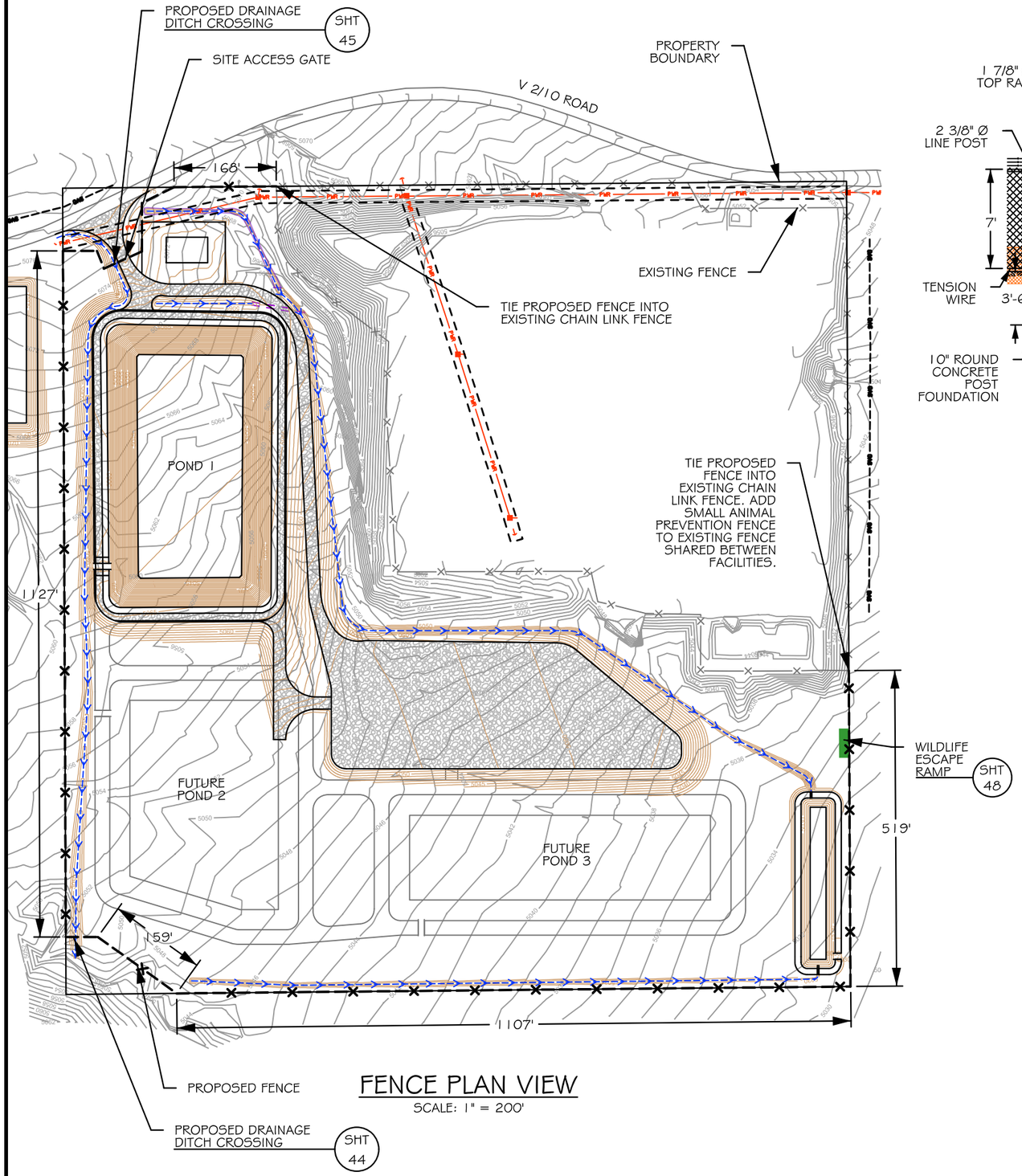
DE BEQUE STATION
POND 1

Thrust Block Details

SHEET
42

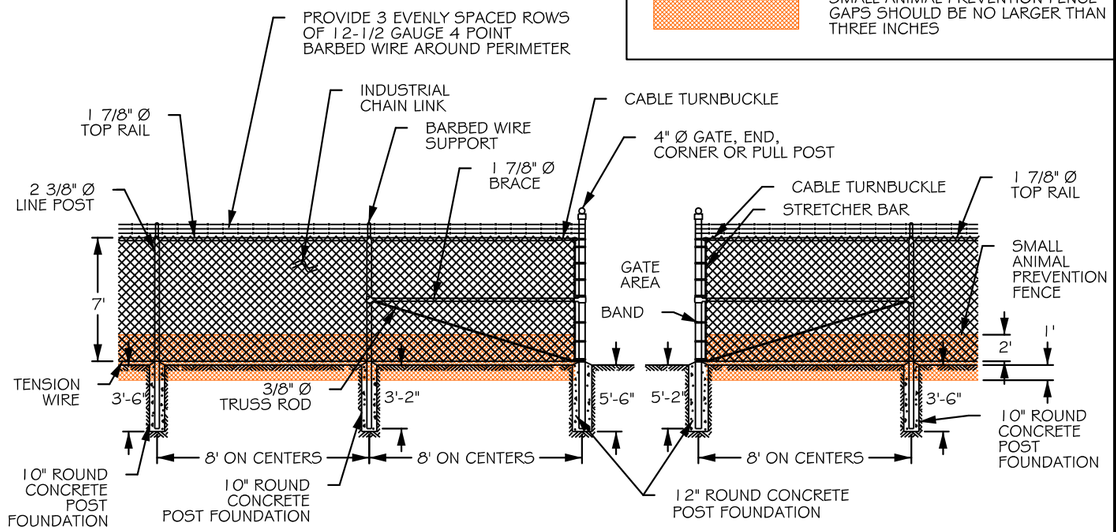


FENCE PLAN VIEW

SCALE: 1" = 200'

LEGEND

SMALL ANIMAL PREVENTION FENCE GAPS SHOULD BE NO LARGER THAN THREE INCHES

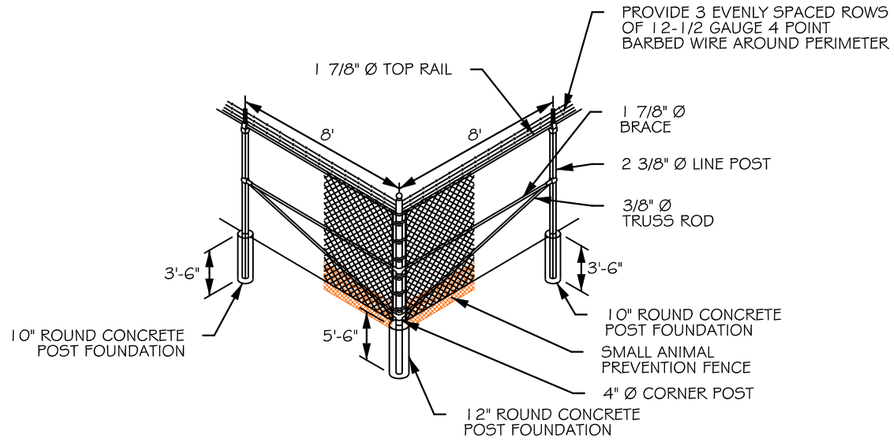


FENCE DETAIL

NO SCALE

SINGLE PANEL DETAIL

NO SCALE



DOUBLE PANEL DETAIL

NO SCALE

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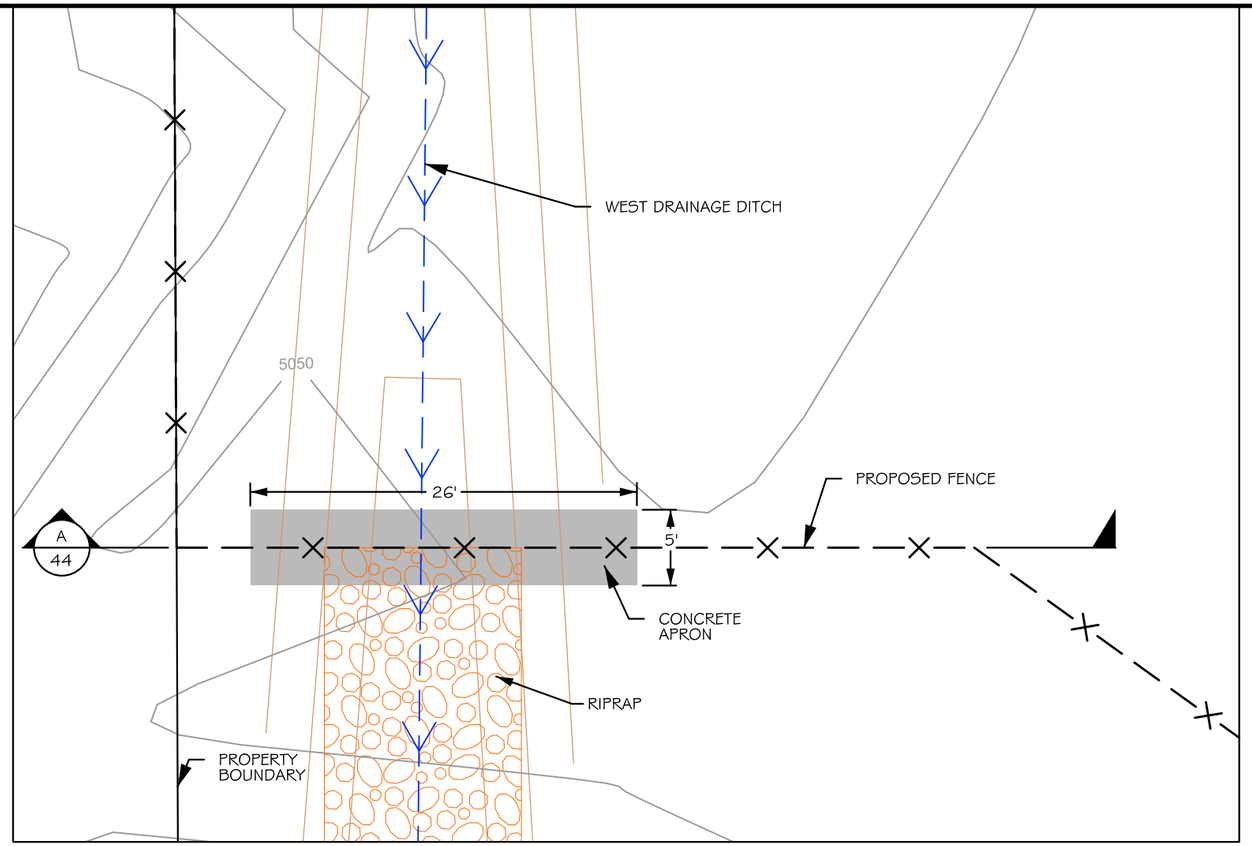
DE BEQUE STATION
POND 1

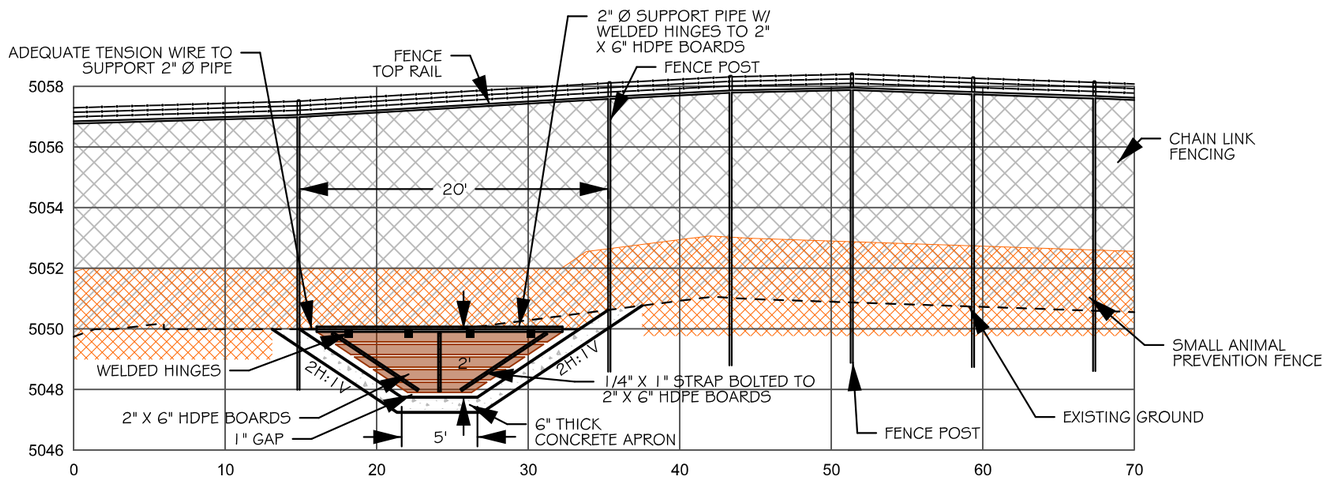
Fence Details

SHEET
43



FENCE PLAN VIEW (1 / 43)

SCALE: 1" = 10'



SECTION (A / 44)

SCALE: 1" = 10'

NOTES:

1) 2:1 VERTICAL EXAGGERATION.

2) SMALL ANIMAL PREVENTION FENCE SHALL BE BLACK STEEL 3' X 150'/ROLL CHICKEN WIRE OR ENGINEER-APPROVED EQUAL.

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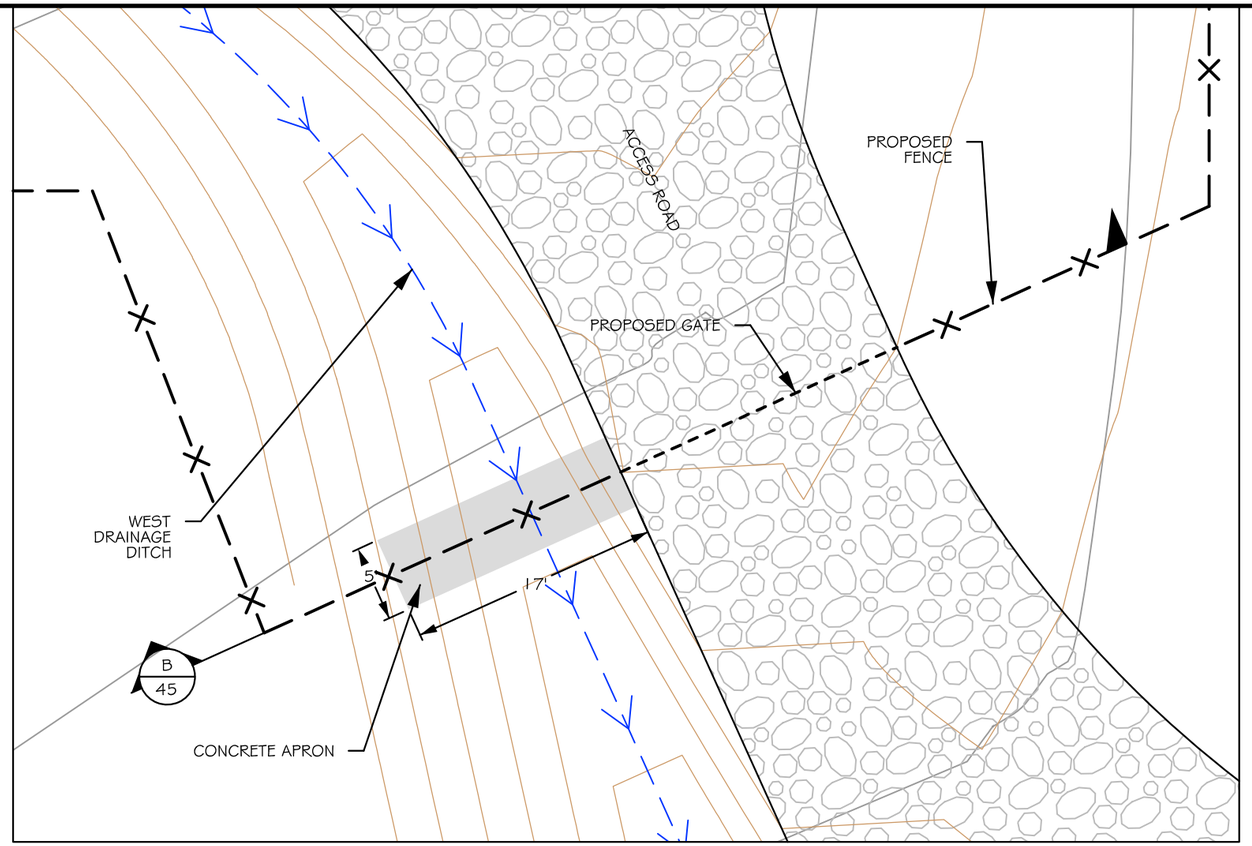
REV	DATE	CKD

JOB # 2013-134

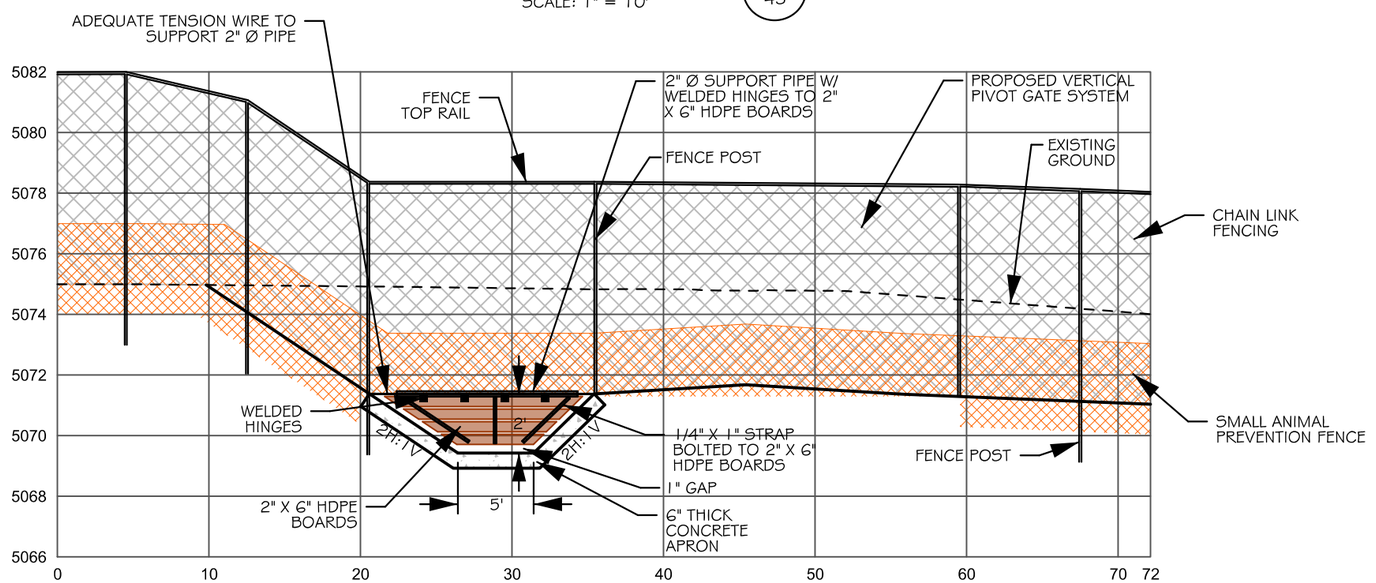
DE BEQUE STATION
POND 1

Fence Drainage Crossing Detail

SHEET
44



FENCE PLAN VIEW (2/43)
SCALE: 1" = 10'



SECTION (B/45)
SCALE: 1" = 10'

NOTES:

1) 2:1 VERTICAL EXAGGERATION.

2) SMALL ANIMAL PREVENTION FENCE SHALL BE BLACK STEEL 3' X 150'/ROLL CHICKEN WIRE OR ENGINEER-APPROVED EQUAL.

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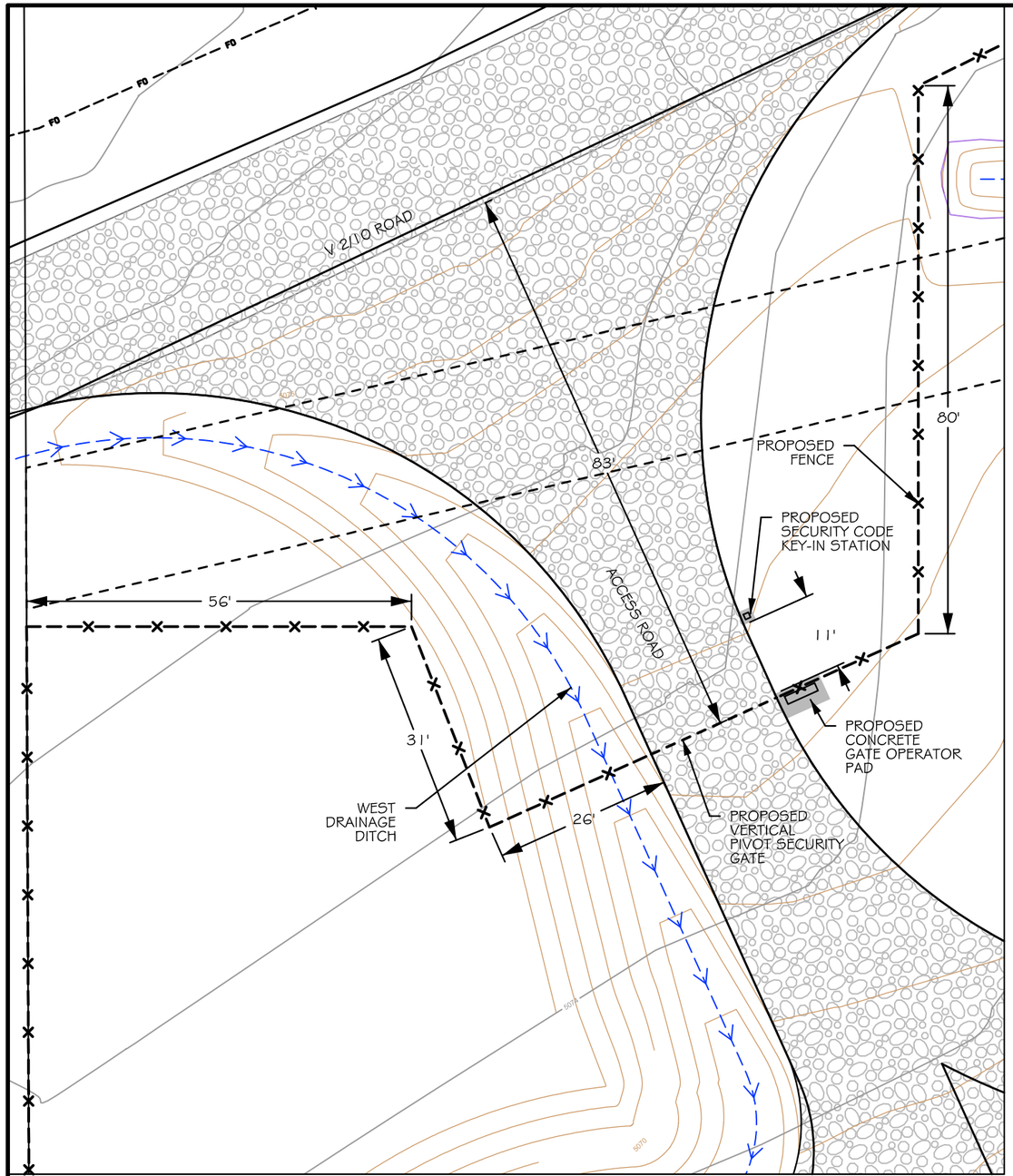
GPV	06/14	STH
REV	DATE	CKD

JOB # 2013-134

DE BEQUE STATION
POND 1

Fence Drainage Crossing Detail

SHEET
45



GATE PLAN VIEW

SCALE: 1" = 20'

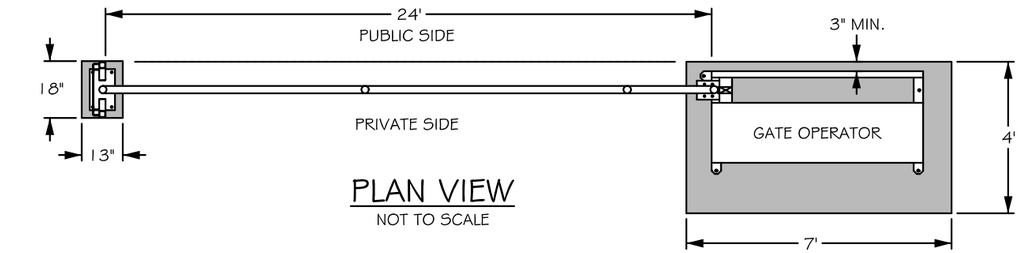
NOTES:

1) SECURITY GATE SHALL BE TYMETAL CORP. TYM-VP SECURITY GATE SYSTEM OR ENGINEER APPROVED EQUAL.

2) GATE IS LOCATED AN APPROPRIATE DISTANCE FROM THE V 2/10 COUNTY ROAD THAT ALLOWS AN AASHTO CLASSIFIED WB-67 SEMI-TRUCK TO FULLY PULL OFF THE COUNTY ROAD AND NOT PROHIBIT TRAFFIC MOVEMENTS ON THE COUNTY ROAD WHILE THE SECURITY GATE IS OPENED.

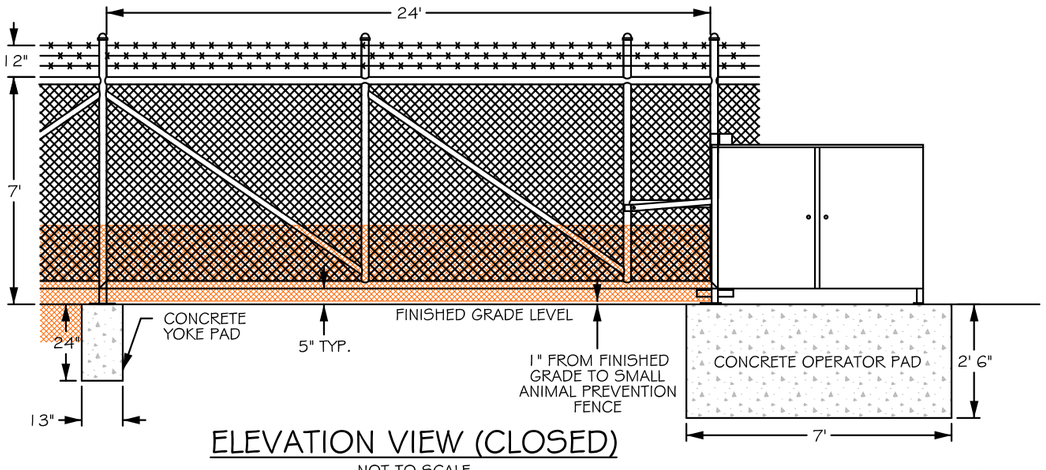
3) THE PROPOSED GATE, OPERATOR PANEL, AND ALL APPURTENANCES SHALL BE INSTALLED ACCORDING TO THE MANUFACTURER'S SPECIFICATIONS.

4) POWER FOR THE GATE SHALL COME FROM A TEMPORARY DROP BOX TO BE INSTALLED AT THE PROPOSED OFFICE BUILDING LOCATION TO THE EAST. THE POWER CONNECTION AND DROP BOX ARE NOT SHOWN ON THESE PLANS. AFTER THE OFFICE BUILDING IS CONSTRUCTED, THE POWER SUPPLY FOR THE GATE WILL BE CONNECTED TO THE BUILDING'S PERMANENT POWER SOURCE.



PLAN VIEW

NOT TO SCALE

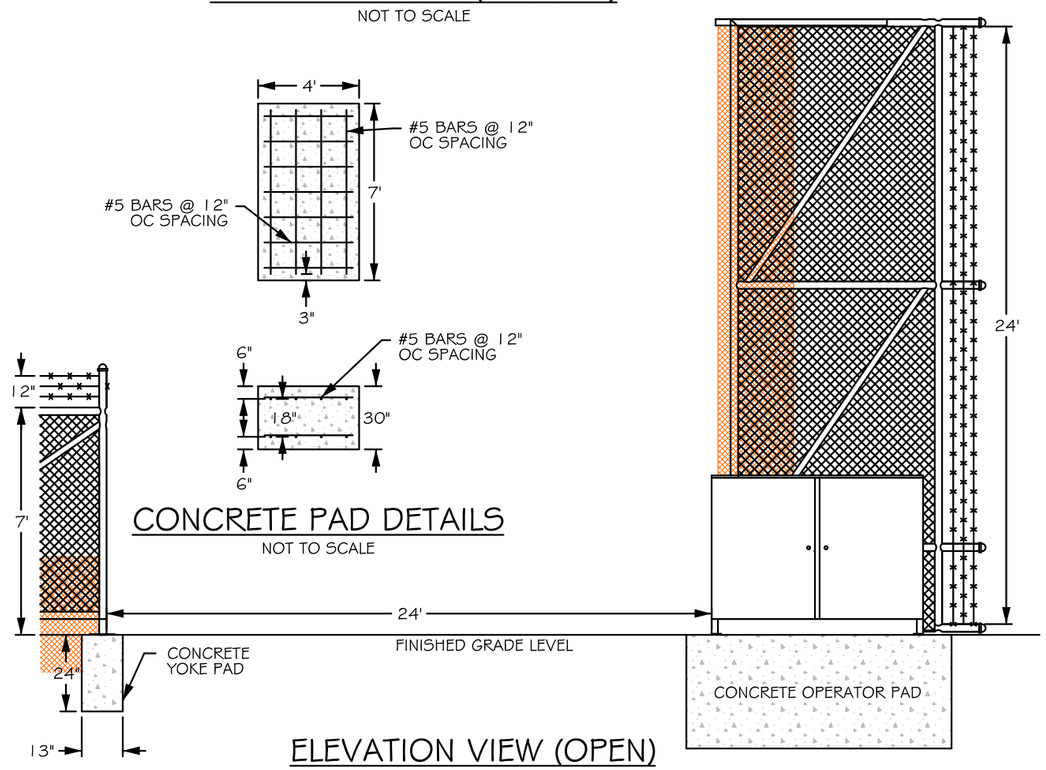


ELEVATION VIEW (CLOSED)

NOT TO SCALE

CONCRETE PAD DETAILS

NOT TO SCALE



ELEVATION VIEW (OPEN)

NOT TO SCALE

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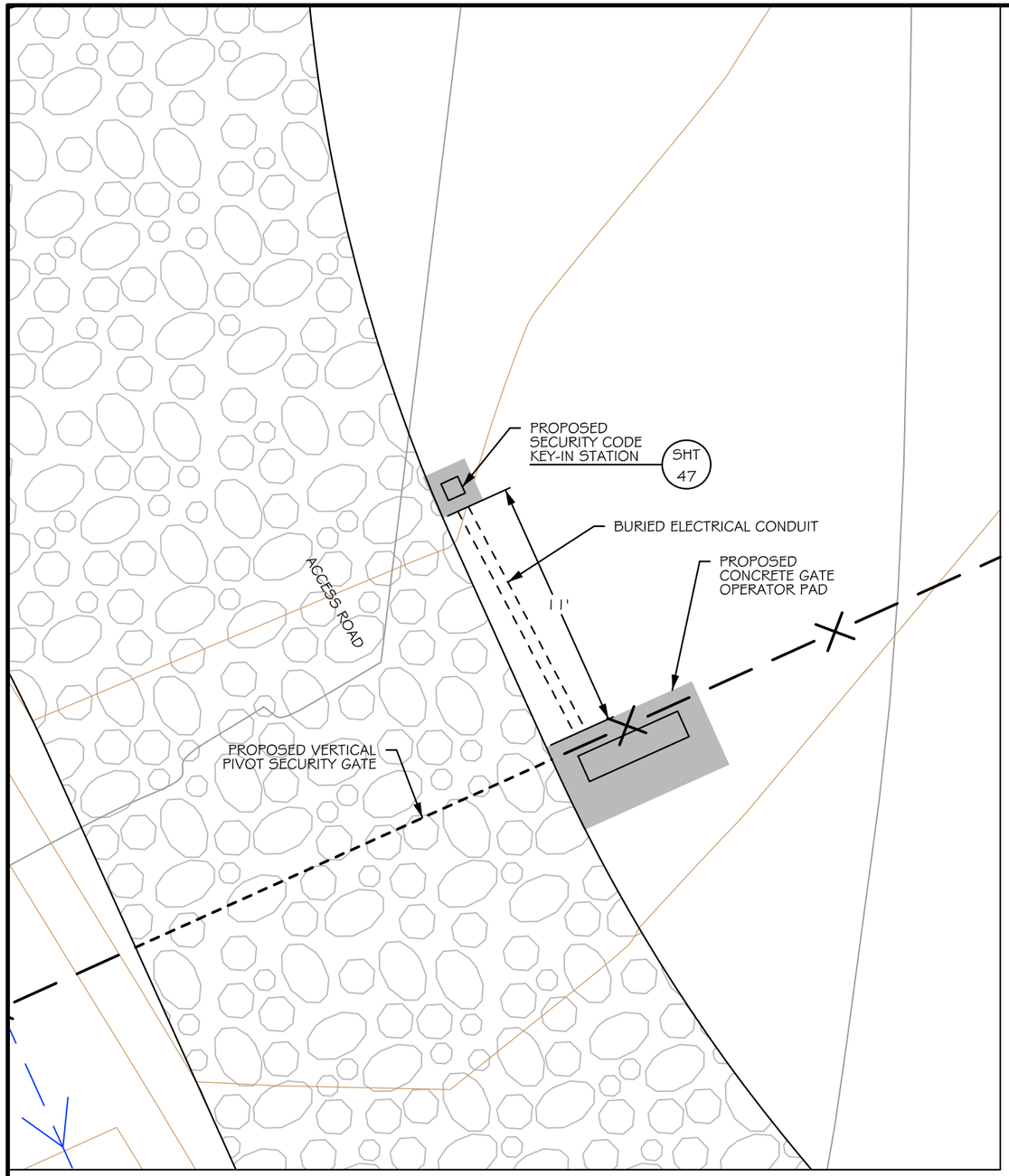
DE BEQUE STATION
POND 1

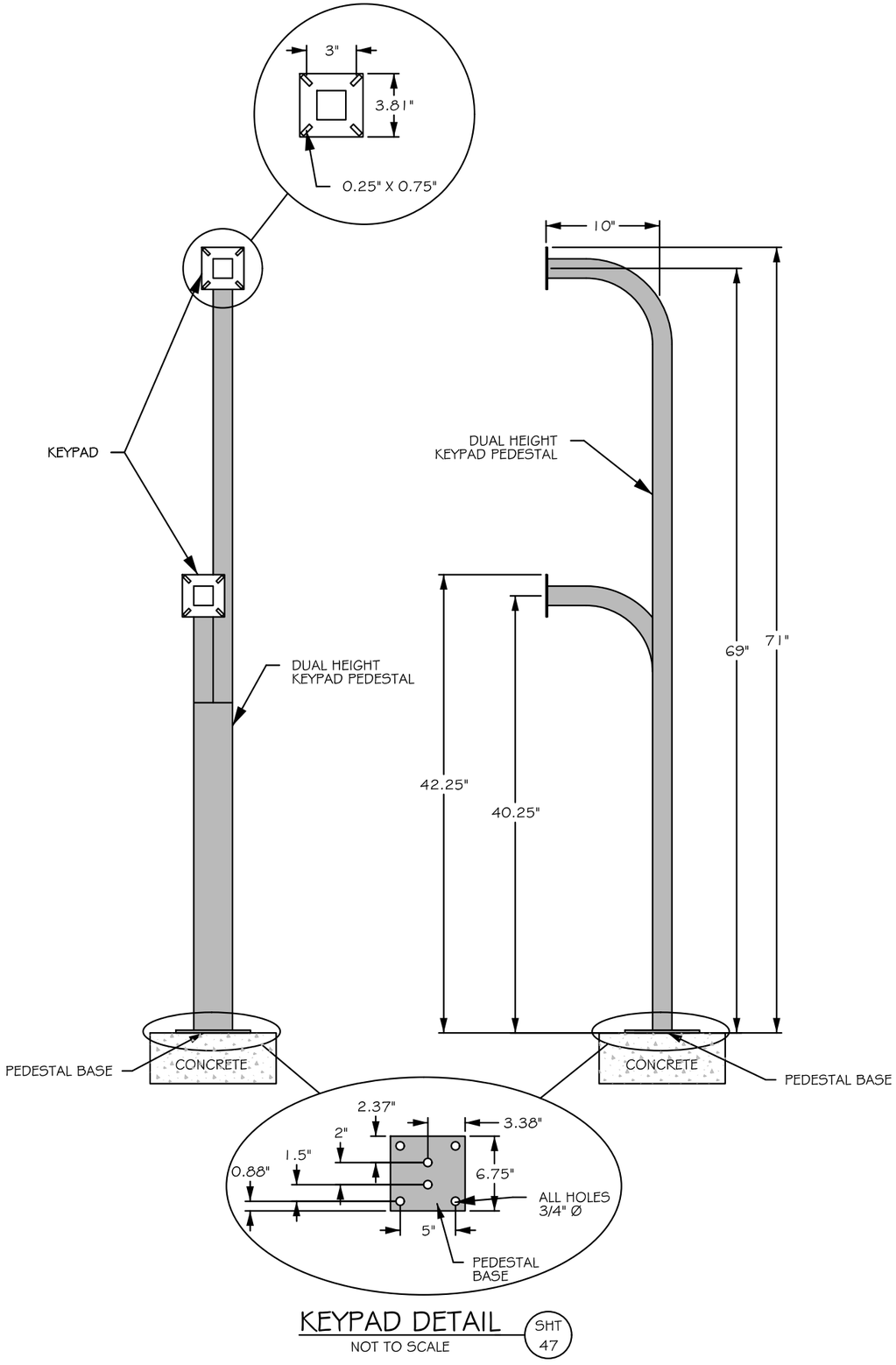
Security Gate Details

SHEET
46



KEYPAD PLAN VIEW

SCALE: 1" = 6'



KEYPAD DETAIL

NOT TO SCALE

SHT 47

NOTES:

1) KEYPAD SHALL BE AMERICAN ACCESS SYSTEMS, INC. ADVANTAGE DK DIGITAL KEYPAD OR EQUAL.
2) KEYPAD PEDESTAL SHALL BE AMERICAN ACCESS SYSTEMS, INC. 18-003 DUAL HEIGHT PEDESTAL OR EQUAL.
3) KEYPAD SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.

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DATE	06/14	CKD	
REV		DATE	

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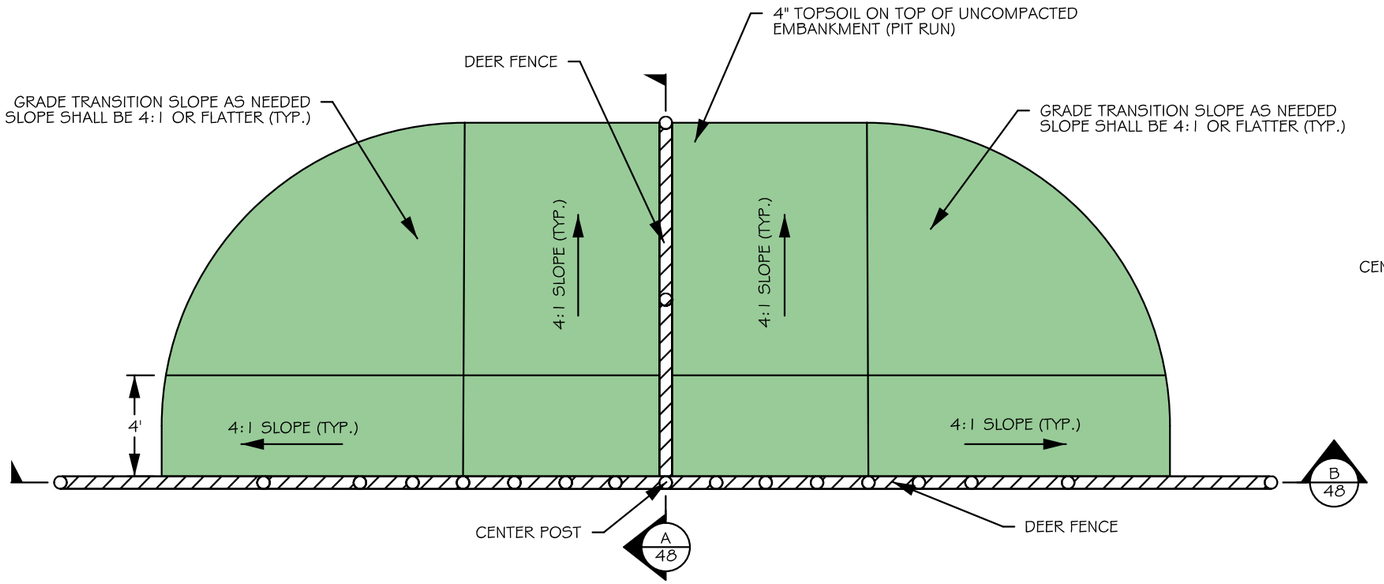
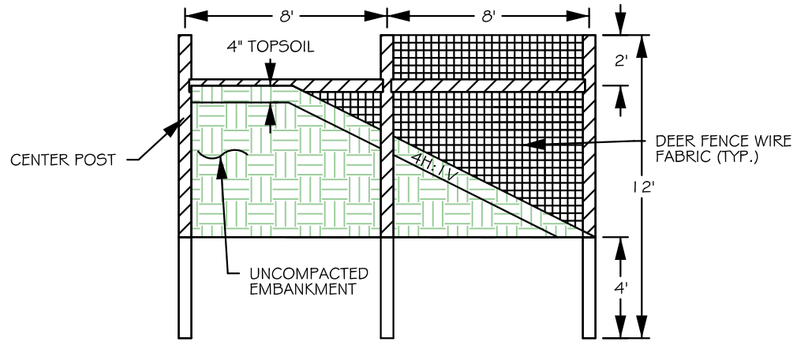
DE BEQUE STATION
POND 1

Keypad Details

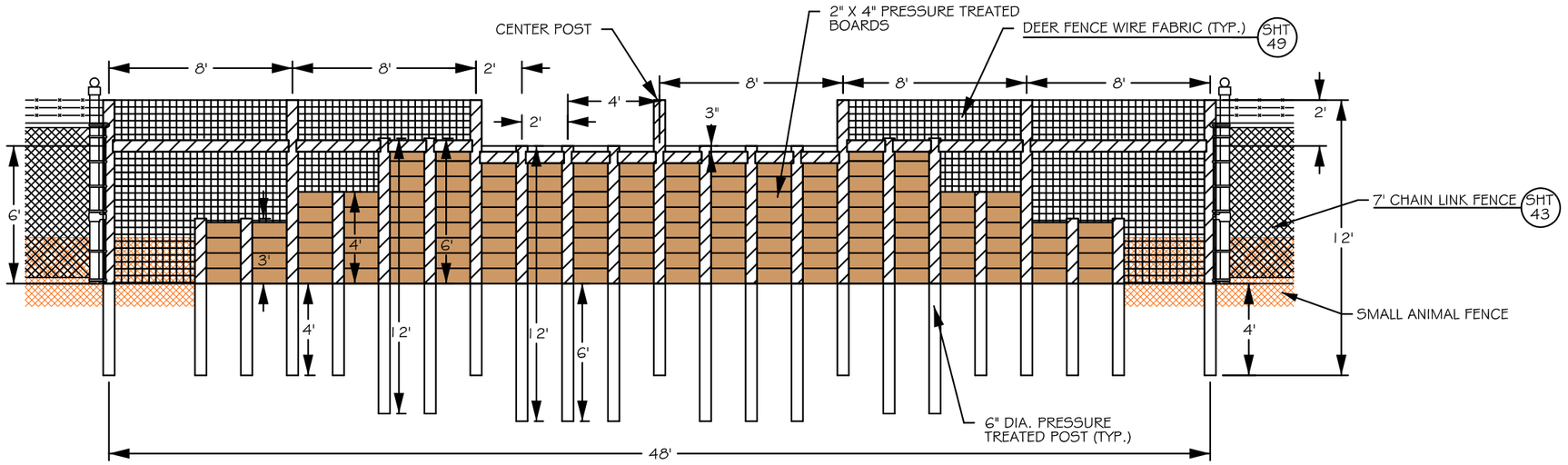
SHEET
47



PLAN VIEW
NOT TO SCALE



SECTION
NOT TO SCALE
A 48



SECTION
NOT TO SCALE
B 48

NOTES:

1) ALL MATERIALS AND CONSTRUCTION REQUIREMENTS WILL BE STATED IN SECTION 607 OF THE CDOT 2011 STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION AND M-607-4 OF THE LATEST M&S STANDARD PLANS. SHEET 48 THROUGH SHEET 50 SHOW THE M-607-4 DEER FENCE DETAILS.

2) BOARDS SHALL BE CONNECTED WITH LAG BOLTS RATHER THAN NAILS.

3) DEER FENCE WILL ONLY BE INSTALLED FOR WILDLIFE ESCAPE RAMP. THE FENCING AROUND THE PERIMETER OF THE PROJECT WILL BE 7' CHAIN LINK FENCE.

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7/3/2014

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DATE	06/14	DATE
CKD	STH	CKD

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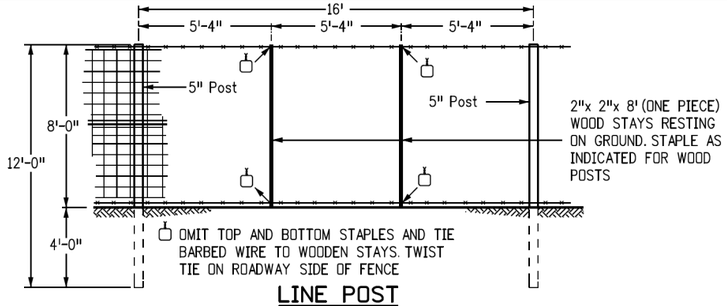
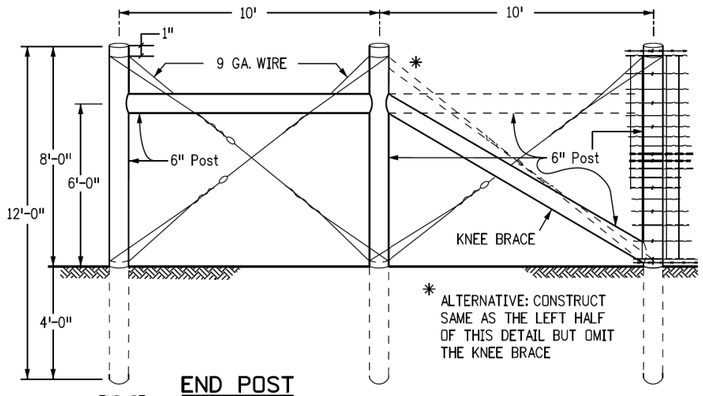
DE BEQUE STATION
POND 1

Wildlife Escape Details

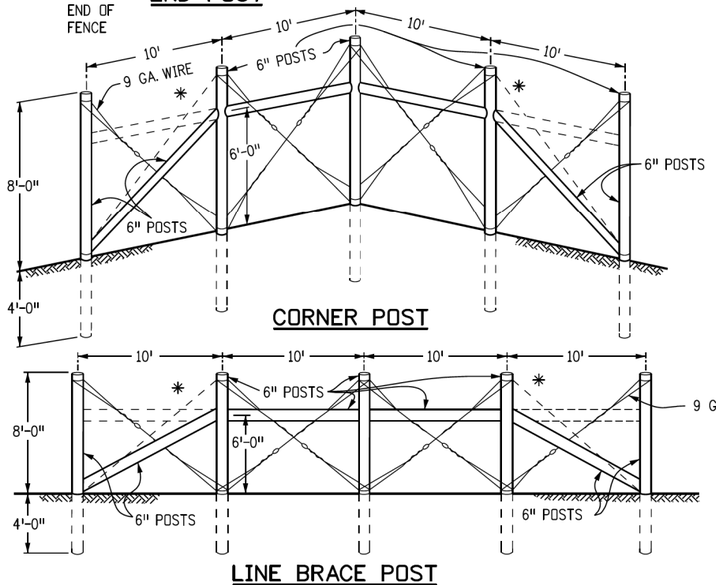
SHEET
48



LINE POST

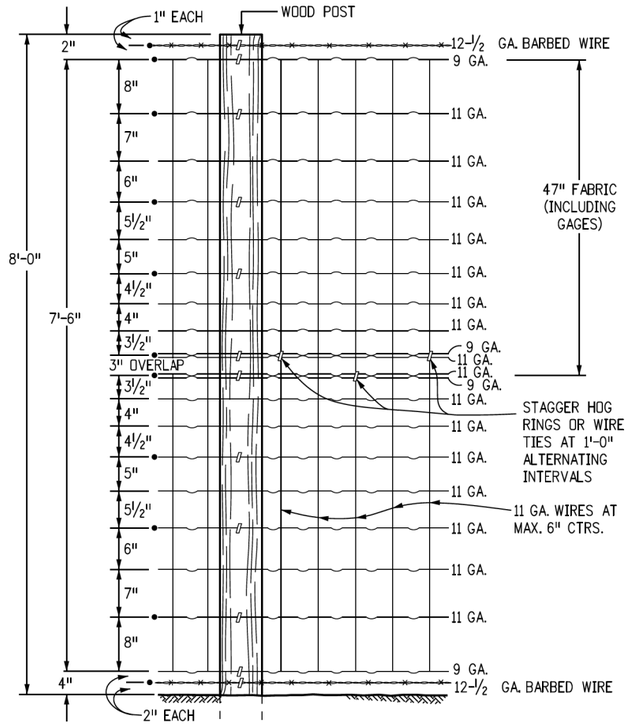


END POST



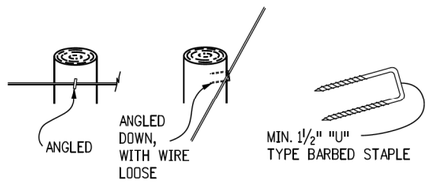
CORNER POST

LINE BRACE POST

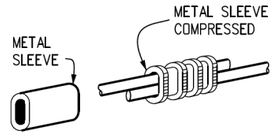


* FENCE WIRE SHALL BE STAPLED TO WOOD POSTS AND STAYS

DEER FENCE WIRE FABRIC



TYPICAL STAPLING

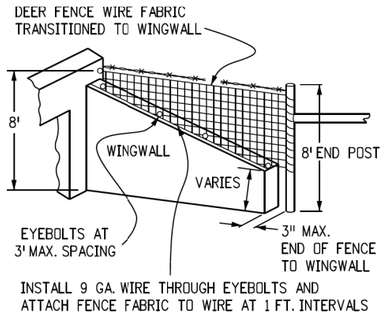


USE A SPLICING SLEEVE APPROVED BY THE ENGINEER

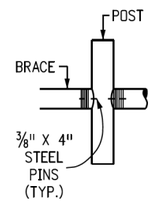
WIRE SPLICE

GENERAL NOTES

1. AT EACH LOCATION WHERE AN ELECTRIC TRANSMISSION, DISTRIBUTION OR SECONDARY LINE CROSSES A BARRIER FENCE, THE CONTRACTOR SHALL FURNISH AND INSTALL A GROUND CONFORMING TO ARTICLE 250 OF THE NATIONAL ELECTRICAL CODE. THE GROUND ROD SHALL BE A MINIMUM DIAMETER OF ½ IN. AND 8 FT. IN LENGTH, AND DRIVEN AT LEAST 7½ FT. INTO THE GROUND. THE ROD SHALL BE CONNECTED TO EACH WIRE WITH A MINIMUM AWG NO. 8 STRANDED COPPER WIRE. GROUNDING WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE WORK.
2. END POST, CORNER POST, AND LINE BRACE POST SHALL BE ASSEMBLED AND PAID FOR BY THE UNIT. ALL WORK AND MATERIAL ASSOCIATED WITH EACH ASSEMBLY SHALL BE INCLUDED IN THE UNIT PRICE FOR THAT ASSEMBLY.
3. LINE BRACE POSTS SHALL BE SPACED AT 400 FT. INTERVALS, WHERE FENCING IS CONTINUOUS AND WHERE END, CORNER AND LINE BRACE POSTS ARE NOT SPECIFIED.
4. ALL LINE POSTS SHALL BE 5 IN. MIN. DIA. AND 12 FT. LONG. ALL END, CORNER AND LINE BRACE POSTS SHALL BE 6 IN. MIN. DIA. AND 12 FT. LONG. ALL POSTS AND BRACES SHALL BE TREATED IN ACCORDANCE WITH SUBSECTION 710.07.
5. WOODEN STAYS SHALL BE UNTREATED NATIVE TIMBER. BOTTOM ENDS OF STAYS SHALL REST ON THE NATURAL GROUND AND SHALL BE WIRED AND STAPLED AS SHOWN.
6. BARBED WIRE SHALL BE DOUBLE WRAPPED AND TIED OFF AT END POSTS, CORNER POSTS AND LINE BRACE POSTS. WOVEN WIRE SHALL BE SINGLE WRAPPED AND TIED OFF. THE REST OF FENCE SHALL BE RESTARTED IN LIKE MANNER.
7. FENCE WIRE MAY BE PLACED ON EITHER THE ROAD SIDE OR THE FIELD SIDE OF POSTS, DEPENDING ON LOCAL CONDITIONS; i.e., ON CURVES, THE WIRE SHOULD BE PLACED ON THE SIDE WHICH WOULD RESULT IN THE LEAST AMOUNT OF TENSION ON THE STAPLES. THIS ALSO APPLIES WHERE WIND DRIFT OR OTHER CONDITIONS WOULD EXERT UNUSUAL PRESSURE AGAINST THE WIRE.
8. WHERE CONCRETE STRUCTURES ARE USED AS DEER PASSES, THE FENCE SHALL END AT EYEBOLTS IN WINGS OF THE STRUCTURE. EYEBOLTS IN FRESH CONCRETE SHALL BE ½ IN. ROUND BARS AND EMBEDDED A MINIMUM OF 6 IN. WITH A HOOKED OR BENT END. IN EXISTING CONCRETE, THE ½ IN. ROUND BARS SHALL BE DEFORMED AND GROUTED INTO DRILLED HOLES. EYEBOLTS SHALL HAVE A MINIMUM OF 1 IN. INSIDE EYE DIAMETER AND SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR. COST OF EYEBOLTS SHALL BE INCLUDED IN THE CONTRACT PRICE FOR FENCING.
9. WOVEN WIRE FENCE FABRIC SHALL CONFORM TO AASHTO M 279 (ASTM A 116) DESIGN NO. 1047-6-1 WITH CLASS 1 COATING.
10. STEEL BARBED WIRE SHALL CONFORM TO AASHTO M 280 (ASTM A 121) 12-½ GAGE WITH CLASS 1 COATING.
11. ALL FENCE WIRE TIES, BRACE WIRES, STAPLES AND OTHER WIRE APPURTENANCES SHALL BE GALVANIZED IN CONFORMANCE WITH AASHTO M 232.
12. DEER GATE AND TOP BRACES SHALL BE PAINTED WITH GREEN PAINT ACCORDING TO SUBSECTION 708.03 AND COLOR NO. 14109 OF FEDERAL STANDARD 595B.
13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RE-ESTABLISHING DISTURBED OR DESTROYED SURVEY MONUMENTS TO THE APPROPRIATE ACCURACY IN ACCORDANCE WITH SUBSECTION 625.08 OF THE STANDARD SPECIFICATIONS.



DEER FENCE TO WINGWALL



BORE A 3/8" X 2" HOLE IN EACH BRACE AND POST TO RECEIVE THE PINS. WRAP THE ENDS OF THE BRACES WITH SEVERAL TURNS OF 12-½ GAGE SMOOTH GALV. WIRE TO PREVENT SPLITTING. OR: NOTCH POST AND NAIL WITH 40d COMMON NAILS

CROSS BRACE DOWELING

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DEER FENCE AND GATES

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STANDARD PLAN NO.
M-607-4
Sheet No. 1 of 3

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