

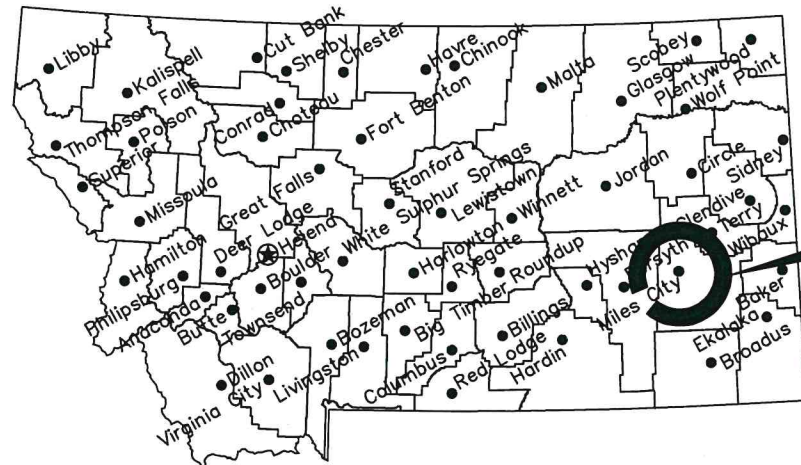
MONTANA FISH, WILDLIFE & PARKS

Miles City Fish Hatchery

Pond Liner Replacement Project

near Miles City, MT

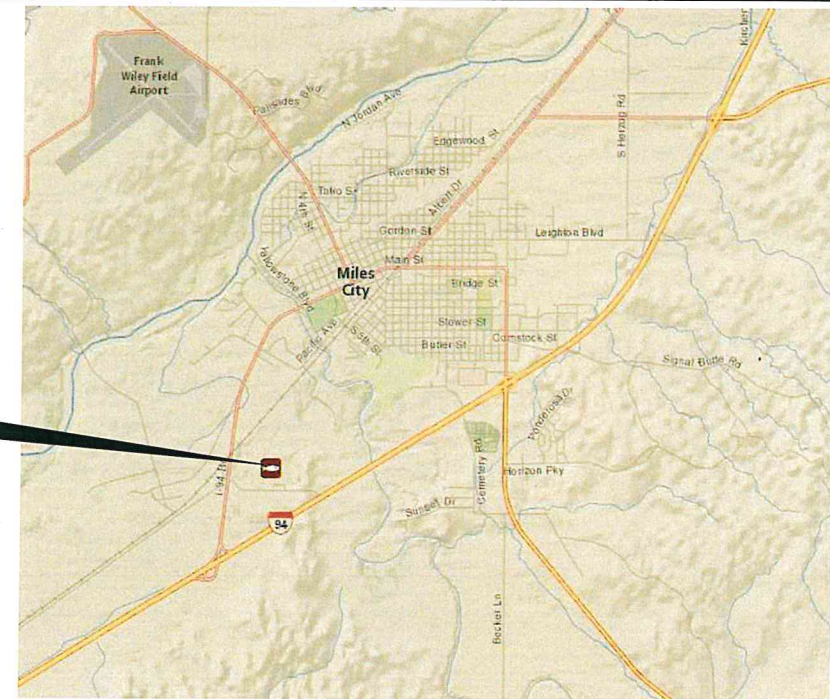
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Location Map

No Scale

Project Location



Vicinity Map

No Scale

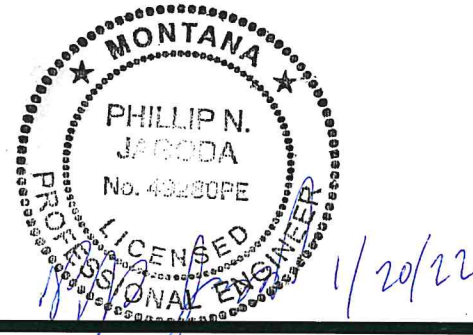
North



MONTANA FISH, WILDLIFE AND PARKS
DESIGN AND CONSTRUCTION

MAILING ADDRESS: PO BOX 200701
HELENA, MT 59620-0701
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HELENA, MT 59601



DRAWING INDEX

Sheet Number	Sheet Title	Sheet Number	Sheet Title	Sheet Number	Sheet Title
1	COVER SHEET	6	RESERVOIRS SITE PLAN	11	DETAIL SHEET V
2	OVERALL SITE PLAN	7	LINER DETAILS I		
3	SITE PLAN - NW PONDS	8	LINER DETAILS II		
4	SITE PLAN - NE PONDS	9	LINER DETAILS III		
5	SITE PLAN - SE PONDS	10	LINER DETAILS IV		

APPROVED BY: P. Jagoda
DATE: 12/17/21

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DATE: _____

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DATE: _____

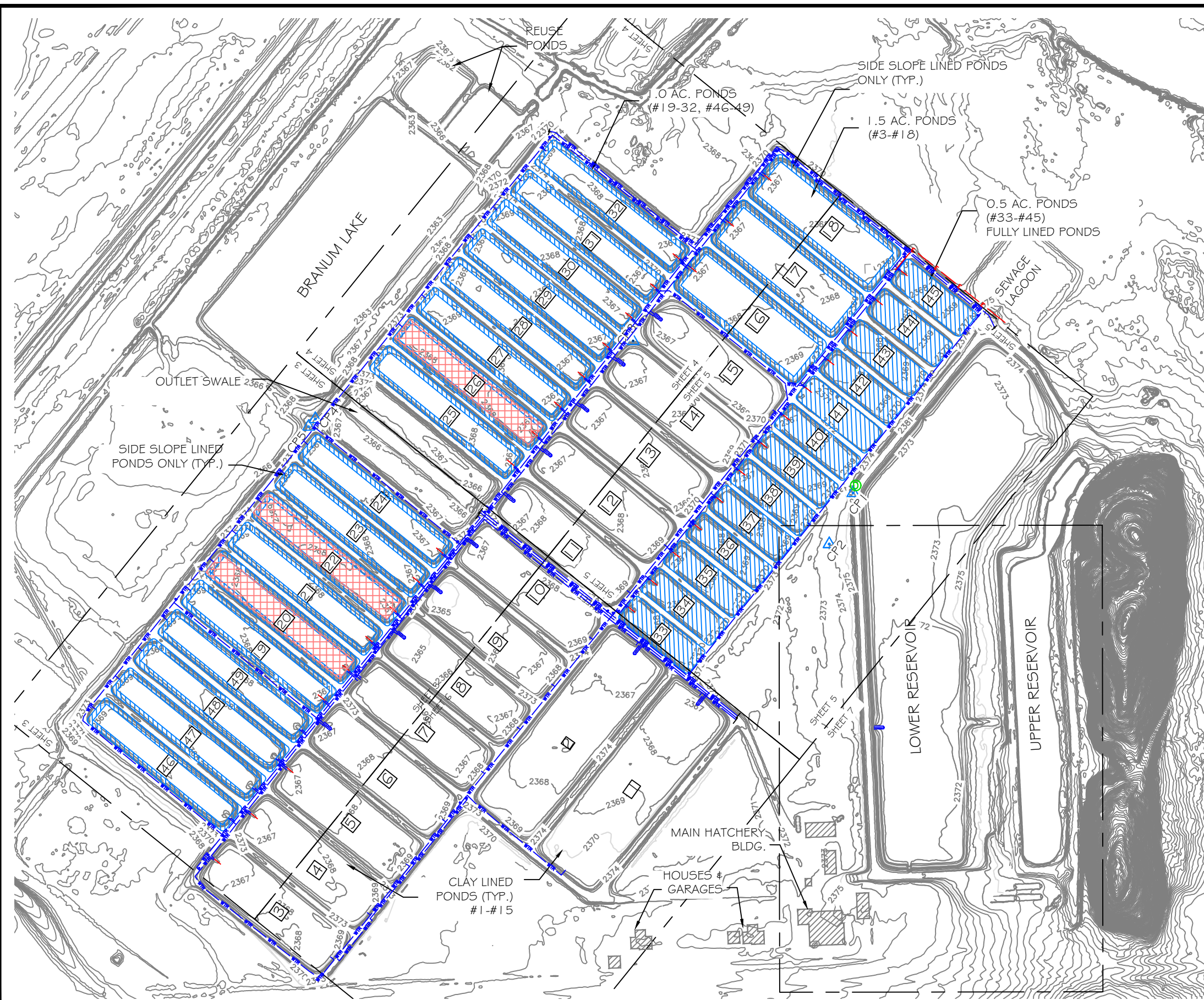


MONTANA FISH, WILDLIFE & PARKS

156

Cover Sheet
Miles City Fish Hatchery - Pond Liner Replacement Project

SHEET: 1 of 11



- NOTES:
1. TOPOGRAPHIC SURVEY DATA WAS PROVIDED DIGITALLY BY THE MONTANA STATE LIBRARY - LIDAR FOR MONTANA. PROJECT COORDINATE SYSTEM IS BASED ON MONTANA STATE PLANE, VERTICAL DATUM IS NAVD88 (U.S. SURVEY FOOT), AND HORIZONTAL DATUM IS NAD83 (INTERNATIONAL FOOT).
 2. SUPPLEMENTAL SITE SURVEY DATA WAS OBTAINED BY MONTANA FISH, WILDLIFE & PARKS ON 9/21/21 FOR PONDS 41-45 AND OTHER MISCELLANEOUS FEATURES ON THE PROPERTY.
 3. LOCATION OF HOUSES, GARAGES AND OTHER STRUCTURES ARE APPROXIMATE ONLY AND BASED ON AERIAL PHOTOGRAPHY.
 4. LOCATIONS OF UNDERGROUND WATER LINES ARE APPROXIMATE ONLY & BASED ON BEST AVAILABLE INFORMATION. UNDERGROUND ELECTRIC AND COMMUNICATIONS ARE ALSO PRESENT, CONTRACTOR RESPONSIBLE FOR ANY DAMAGE TO UNDERGROUND UTILITIES AND ANY LOCATION SERVICES.
 5. MULTIPLE CONTRACTORS WILL BE PRESENT AT THE PROJECT SITE DURING CONSTRUCTION WHICH WILL REQUIRE COORDINATION BETWEEN ALL INVOLVED PARTIES. THE KETTLE REPLACEMENT WORK IS SHOWN ON THESE DRAWINGS FOR COORDINATION EFFORTS ONLY, THE KETTLE WORK WILL BE ON A SEPARATE CONTRACT.

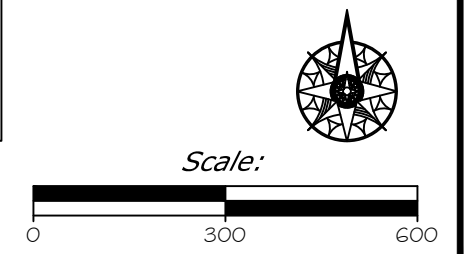
SUMMARY OF WORK	POND LOCATIONS	QUANTITY
FULLY LINED POND REPLACEMENT	#33-45	13
SLOPE LINED POND REPLACEMENT	#16-32, #46-49	21
SLOPE LINED POND MAINT. GRADING	#20, 22, 26	3

NOTE: N.I.C. = NOT IN CONTRACT

LEGEND

EXISTING FEATURES	
CONTROL POINT	
EDGE OF ROAD	
BARBED WIRE FENCE	
EX. CONTOUR	
TREE	
GEOMEMBRANE LINER	
POND GRADING	
NEW KETTLE (N.I.C.)	
KETTLE CENTER WALL VERT. EXTENSION (N.I.C.)	
U.G. WATERLINE	

Desc.	Northing	Easting	Elev.
CP1	799922.7854	2886351.3550	2381.4780
CP2	799777.6616	2886283.6537	2373.7539
CP3	800354.4732	2885726.5366	2374.3247
CP4	800132.7427	2884824.3810	2374.1591
CP5	800111.1682	2884805.1218	2374.0133



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P. Jagoda CHECKED BY:	12/17/21 DATE:	APPROVED BY: DATE:	APPROVED BY: DATE:



Overall Site Plan

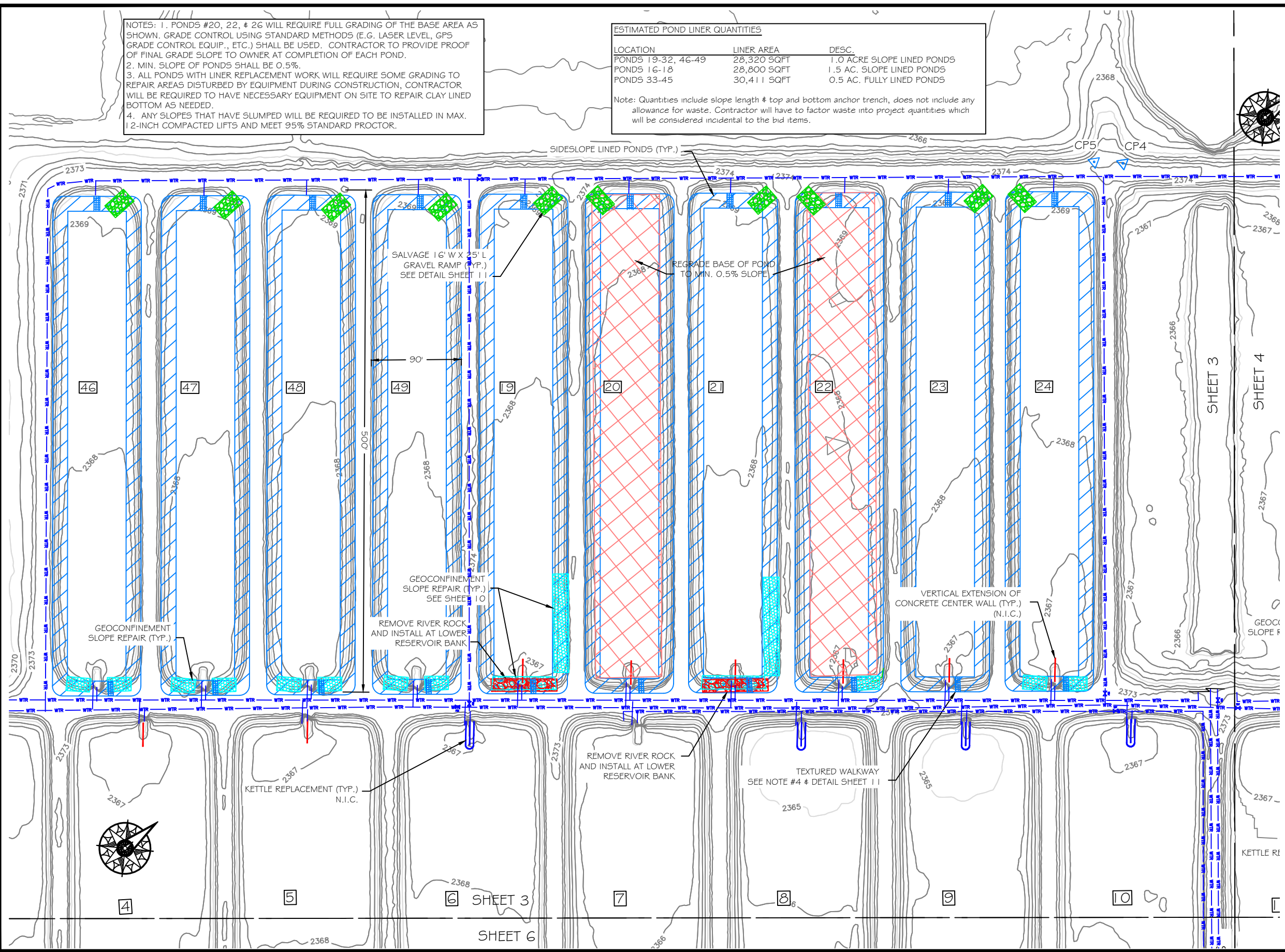
Miles City Fish Hatchery - Pond Liner Replacement Project

NOTES: 1. PONDS #20, 22, & 26 WILL REQUIRE FULL GRADING OF THE BASE AREA AS SHOWN. GRADE CONTROL USING STANDARD METHODS (E.G. LASER LEVEL, GPS GRADE CONTROL EQUIP., ETC.) SHALL BE USED. CONTRACTOR TO PROVIDE PROOF OF FINAL GRADE SLOPE TO OWNER AT COMPLETION OF EACH POND.
 2. MIN. SLOPE OF PONDS SHALL BE 0.5%.
 3. ALL PONDS WITH LINER REPLACEMENT WORK WILL REQUIRE SOME GRADING TO REPAIR AREAS DISTURBED BY EQUIPMENT DURING CONSTRUCTION. CONTRACTOR WILL BE REQUIRED TO HAVE NECESSARY EQUIPMENT ON SITE TO REPAIR CLAY LINED BOTTOM AS NEEDED.
 4. ANY SLOPES THAT HAVE SLUMPED WILL BE REQUIRED TO BE INSTALLED IN MAX. 1/2-INCH COMPACTED LIFTS AND MEET 95% STANDARD PROCTOR.

ESTIMATED POND LINER QUANTITIES		
LOCATION	LINER AREA	DESC.
PONDS 19-32, 46-49	28,320 SQFT	1.0 ACRE SLOPE LINED PONDS
PONDS 16-18	28,800 SQFT	1.5 AC. SLOPE LINED PONDS
PONDS 33-45	30,411 SQFT	0.5 AC. FULLY LINED PONDS

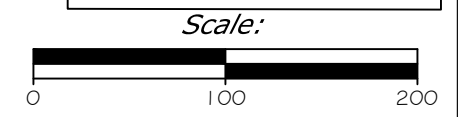
Note: Quantities include slope length & top and bottom anchor trench, does not include any allowance for waste. Contractor will have to factor waste into project quantities which will be considered incidental to the bid items.

- NOTES:
- MULTIPLE CONTRACTORS WILL BE PRESENT AT THE PROJECT SITE DURING CONSTRUCTION WHICH WILL REQUIRE COORDINATION BETWEEN ALL INVOLVED PARTIES. THE KETTLE REPAIR & REPLACEMENT WORK IS SHOWN ON THESE DRAWINGS FOR COORDINATION EFFORTS ONLY, THE KETTLE WORK WILL BE ON A SEPARATE CONTRACT.
 - CONTRACTOR SHOULD ANTICIPATE THAT PONDS WILL REQUIRE SOME TIME TO FULLY DRAIN AND DRY OUT. CONTRACTOR WILL NEED TO REMOVE LINER FROM PONDS AND SEQUENCE WORK PROPERLY TO ALLOW UNDERLYING SOILS AMPLE TIME TO DRY OUT AND PERFORM SUBGRADE MAINTENANCE AS NECESSARY BEFORE INSTALLING NEW LINER.
 - SEE SHEET 10 FOR GEOCONFINEMENT SLOPE REPAIR DETAILS AND ESTIMATED QUANTITIES.
 - TEXTURED WALKWAYS SHALL BE INSTALLED AT KETTLE END OF POND (4' WIDE) & AT THE SHALLOW END OF POND (6' WIDE), FOR EVERY SLOPE LINED AND FULLY LINED POND.
 - LOCATIONS OF UNDERGROUND WATER LINES ARE APPROXIMATE ONLY & BASED ON BEST AVAILABLE INFORMATION. UNDERGROUND ELECTRIC AND COMMUNICATIONS ARE ALSO PRESENT, CONTRACTOR RESPONSIBLE FOR ANY DAMAGE TO UNDERGROUND UTILITIES AND ANY LOCATION SERVICES.



NOTE: N.I.C. = NOT IN CONTRACT

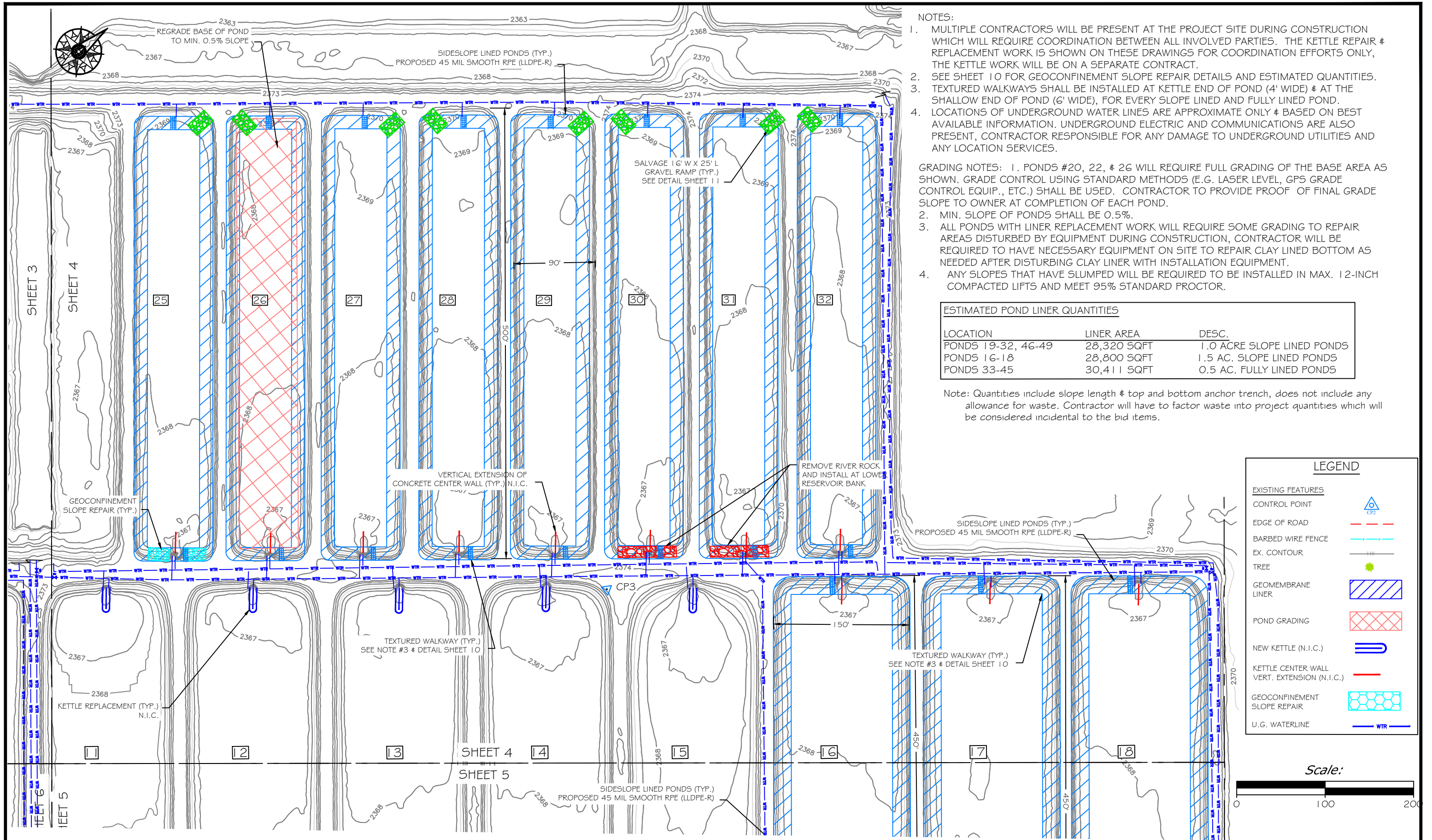
LEGEND	
EXISTING FEATURES	
CONTROL POINT	
EDGE OF ROAD	
BARBED WIRE FENCE	
EX. CONTOUR	
TREE	
GEOMEMBRANE LINER	
POND GRADING	
NEW KETTLE (N.I.C.)	
KETTLE CENTER WALL VERT. EXTENSION (N.I.C.)	
GEOCONFINEMENT SLOPE REPAIR	
U.G. WATERLINE	



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P. Jagoda CHECKED BY:	xx/xx/xx DATE:	APPROVED BY:	DATE:	APPROVED BY:	DATE:



Ponds 3 - 10, 19 - 24, & 46 - 49
 Miles City Fish Hatchery - Pond Liner Replacement Project



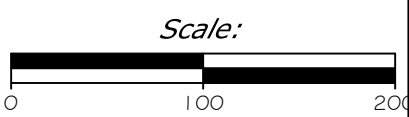
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- GRADING NOTES:
1. PONDS #20, 22, & 26 WILL REQUIRE FULL GRADING OF THE BASE AREA AS SHOWN. GRADE CONTROL USING STANDARD METHODS (E.G. LASER LEVEL, GPS GRADE CONTROL EQUIP., ETC.) SHALL BE USED. CONTRACTOR TO PROVIDE PROOF OF FINAL GRADE SLOPE TO OWNER AT COMPLETION OF EACH POND.
 2. MIN. SLOPE OF PONDS SHALL BE 0.5%.
 3. ALL PONDS WITH LINER REPLACEMENT WORK WILL REQUIRE SOME GRADING TO REPAIR AREAS DISTURBED BY EQUIPMENT DURING CONSTRUCTION, CONTRACTOR WILL BE REQUIRED TO HAVE NECESSARY EQUIPMENT ON SITE TO REPAIR CLAY LINED BOTTOM AS NEEDED AFTER DISTURBING CLAY LINER WITH INSTALLATION EQUIPMENT.
 4. ANY SLOPES THAT HAVE SLUMPED WILL BE REQUIRED TO BE INSTALLED IN MAX. 12-INCH COMPACTED LIFTS AND MEET 95% STANDARD PROCTOR.

ESTIMATED POND LINER QUANTITIES		
LOCATION	LINER AREA	DESC.
PONDS 19-32, 46-49	28,320 SQFT	1.0 ACRE SLOPE LINED PONDS
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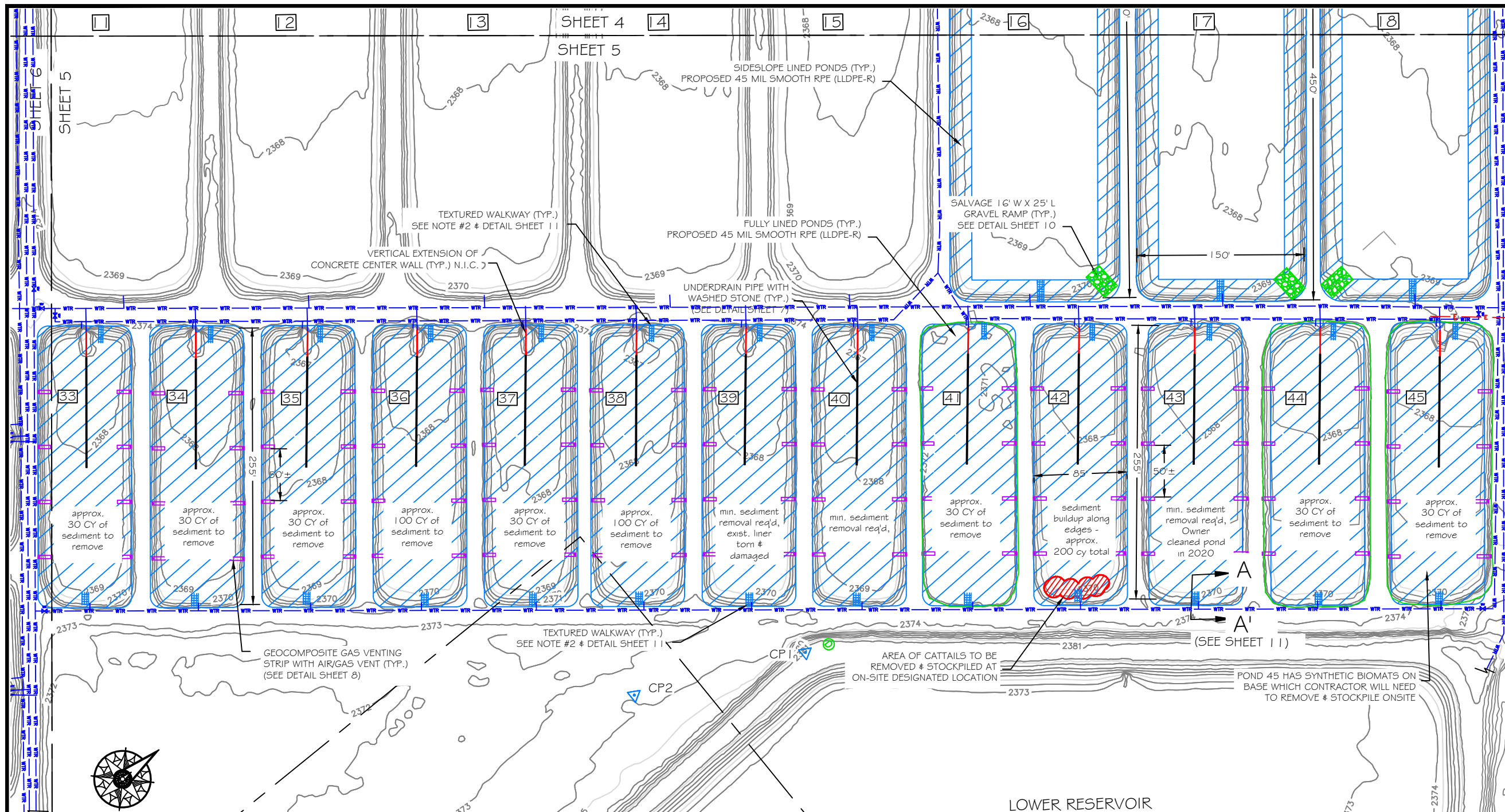
Note: Quantities include slope length & top and bottom anchor trench, does not include any allowance for waste. Contractor will have to factor waste into project quantities which will be considered incidental to the bid items.

LEGEND	
EXISTING FEATURES	
CONTROL POINT	
EDGE OF ROAD	
BARBED WIRE FENCE	
EX. CONTOUR	
TREE	
GEOMEMBRANE LINER	
POND GRADING	
NEW KETTLE (N.I.C.)	
KETTLE CENTER WALL VERT. EXTENSION (N.I.C.)	
GEOCONFINEMENT SLOPE REPAIR	
U.G. WATERLINE	



P. Jagoda DRAWN BY:	12/17/21 DATE:	REVISOR BY:	DATE:	APPROVED BY:	DATE:
P. Jagoda CHECKED BY:	12/17/21 DATE:	APPROVED BY:	DATE:	APPROVED BY:	DATE:





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LEGEND

EXISTING FEATURES

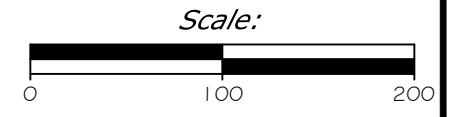
- CONTROL POINT
- EDGE OF ROAD
- BARBED WIRE FENCE
- EX. CONTOUR
- TREE
- GEOMEMBRANE LINER
- POND GRADING
- NEW KETTLE (N.I.C.)
- KETTLE CENTER WALL VERT. EXTENSION (N.I.C.)
- GEOCONFINEMENT SLOPE REPAIR
- U.G. WATERLINE

- GRADING NOTES:
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 4. PONDS 33-45 WILL REQUIRE SEDIMENT REMOVAL PRIOR TO REMOVING & DISPOSING OF EXISTING LINER. SEDIMENT CAN BE STOCKPILED AT OWNER DESIGNATED AREA ON-SITE.
 5. FULLY LINED PONDS (#33-45) WILL REQUIRE GRADING & PROOF ROLLING OF SUBGRADE PRIOR TO INSTALLATION OF LINER.
 6. ANY SLOPES THAT HAVE SLUMPED WILL BE REQUIRED TO BE INSTALLED IN MAX. 12-INCH COMPACTED LIFTS AND MEET 95% STANDARD PROCTOR.

ESTIMATED POND LINER QUANTITIES

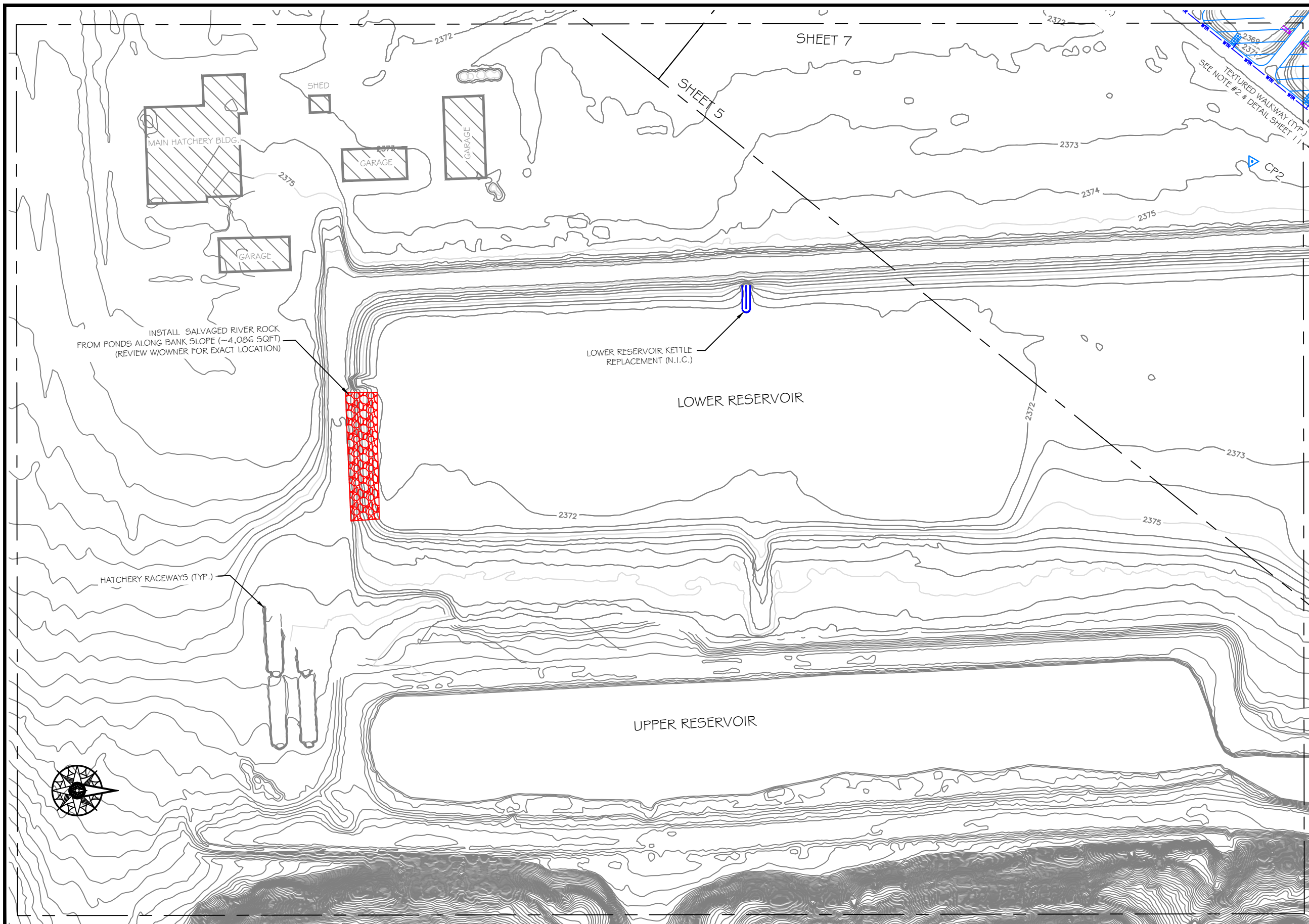
LOCATION	LINER AREA	DESC.
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PONDS 33-45	30,411 SQFT	0.5 AC. FULLY LINED PONDS

Note: Quantities include slope length & top and bottom anchor trench, does not include any allowance for waste. Contractor will have to factor waste into project quantities which will be considered incidental to bid items.



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P. Jagoda CHECKED BY:	12/17/21 DATE:	APPROVED BY:	DATE:	APPROVED BY:	DATE:





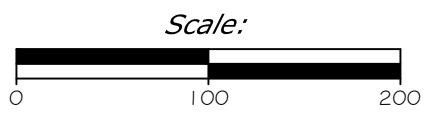
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INSTALL SALVAGED RIVER ROCK FROM PONDS ALONG BANK SLOPE (~4,086 SQFT) (REVIEW W/OWNER FOR EXACT LOCATION)

LOWER RESERVOIR KETTLE REPLACEMENT (N.I.C.)

LOWER RESERVOIR

UPPER RESERVOIR

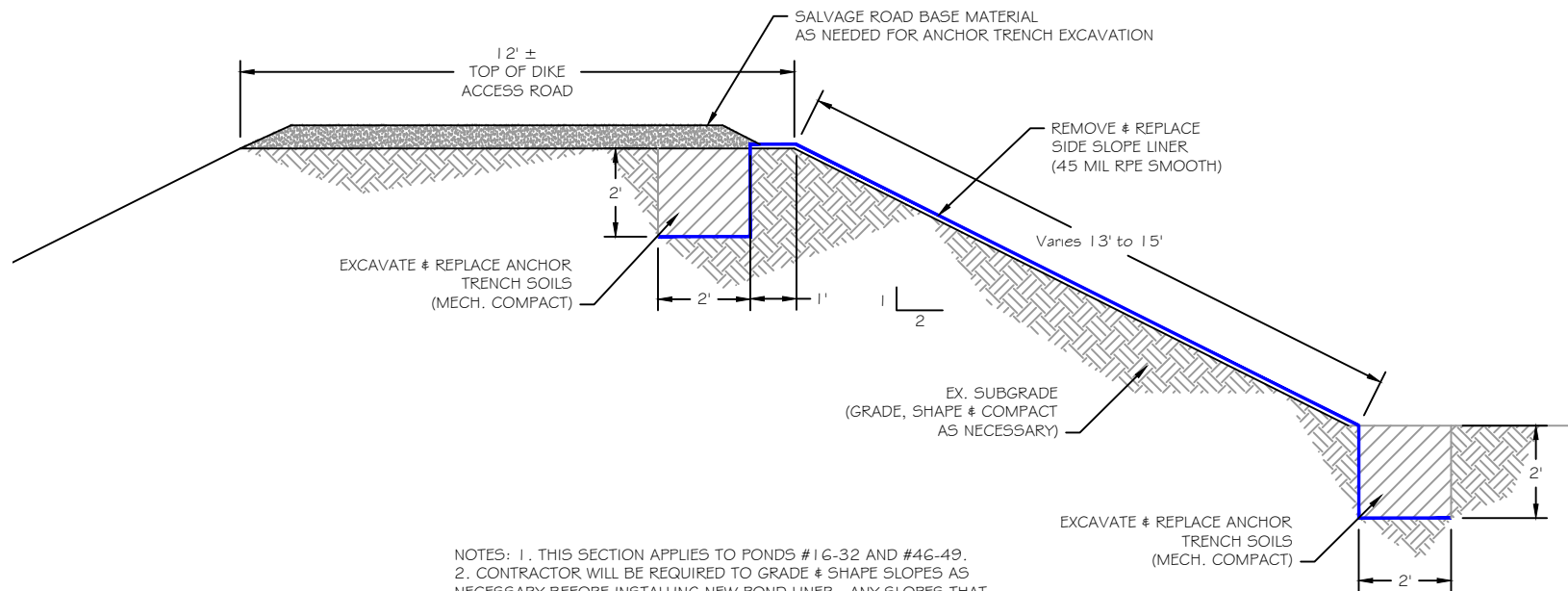


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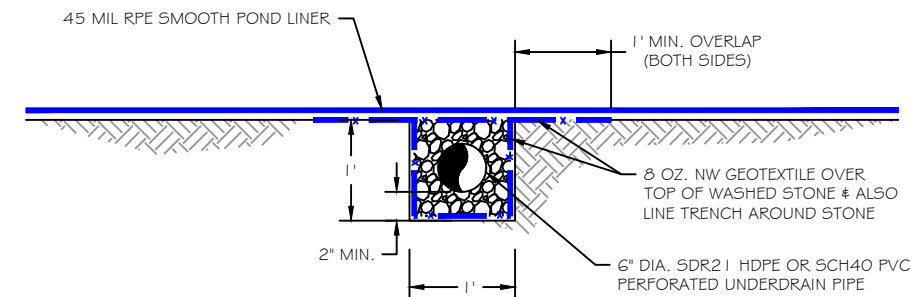
Lower & Upper Reservoirs

Miles City Fish Hatchery - Pond Liner Replacement Project



NOTES: 1. THIS SECTION APPLIES TO PONDS #16-32 AND #46-49.
 2. CONTRACTOR WILL BE REQUIRED TO GRADE & SHAPE SLOPES AS NECESSARY BEFORE INSTALLING NEW POND LINER. ANY SLOPES THAT HAVE SLUMPED WILL BE REQUIRED TO BE INSTALLED IN MAX. 12-INCH COMPACTED LIFTS AND MEET 95% STANDARD PROCTOR.

SIDE SLOPE LINED POND SECTION
 SCALE: 1"=4'

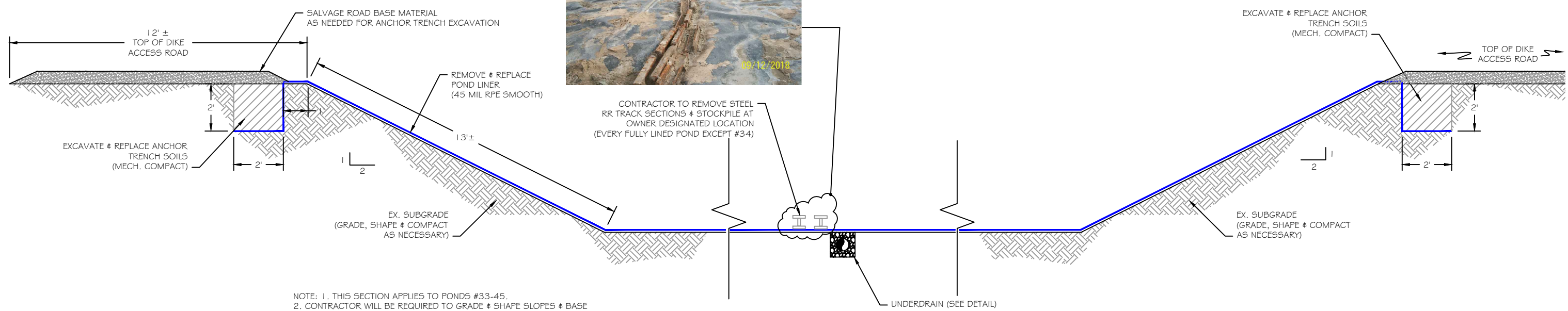


NOTES:
 1. UNDERDRAIN STONE TO BE A 2" WASHED STONE.
 2. THIS DETAIL TO BE USED FOR THE FULLY LINED PONDS (#33-45).
 3. SEE SHEET 11 FOR UNDERDRAIN PIPE CONNECTION INTO KETTLE.
 4. PERFORATIONS TO 1/2" dia. @ 45° EVERY 4-INCHES, STAGGERED, AROUND ENTIRE PERIMETER OF PIPE.

UNDERDRAIN DETAIL
 SCALE: 1"=2'



CONTRACTOR TO REMOVE STEEL RR TRACK SECTIONS & STOCKPILE AT OWNER DESIGNATED LOCATION (EVERY FULLY LINED POND EXCEPT #34)



NOTE: 1. THIS SECTION APPLIES TO PONDS #33-45.
 2. CONTRACTOR WILL BE REQUIRED TO GRADE & SHAPE SLOPES & BASE AREA AS NECESSARY BEFORE INSTALLING NEW POND LINER. ANY SLOPES THAT HAVE SLUMPED WILL BE REQUIRED TO BE INSTALLED IN MAX. 12-INCH COMPACTED LIFTS AND MEET 95% STANDARD PROCTOR.

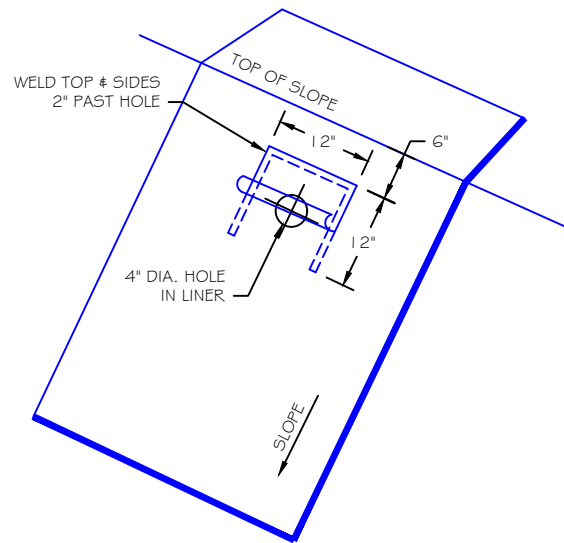
FULLY LINED POND SECTION
 SCALE: 1"=4'

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P. Jagoda CHECKED BY:	12/17/21 DATE:	APPROVED BY:	DATE:	APPROVED BY:	DATE:



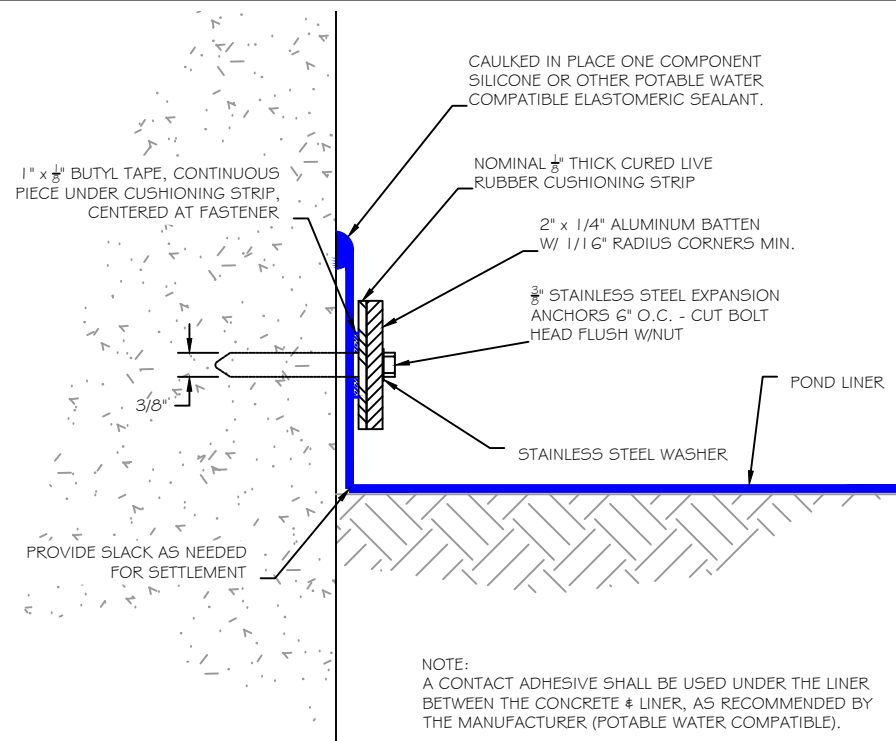
**MONTANA FISH,
 WILDLIFE & PARKS**

Liner Details I
 Miles City Fish Hatchery - Pond Liner Replacement Project



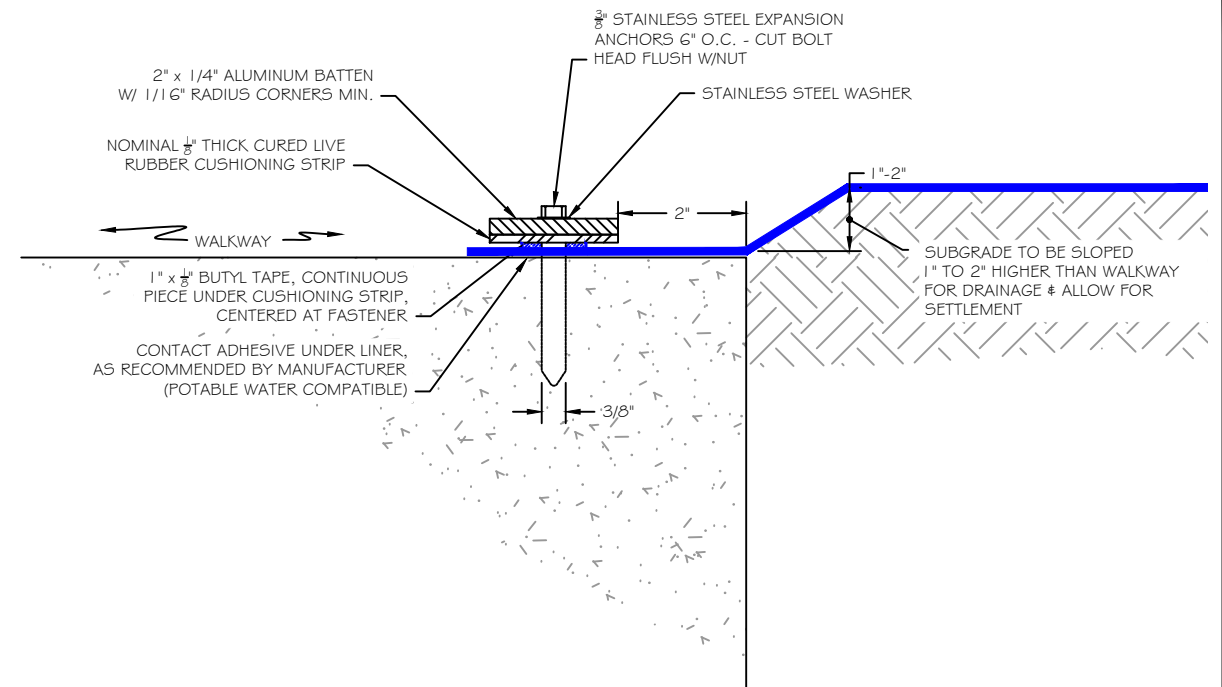
AIR VENT DETAIL

SCALE: 1"=2'



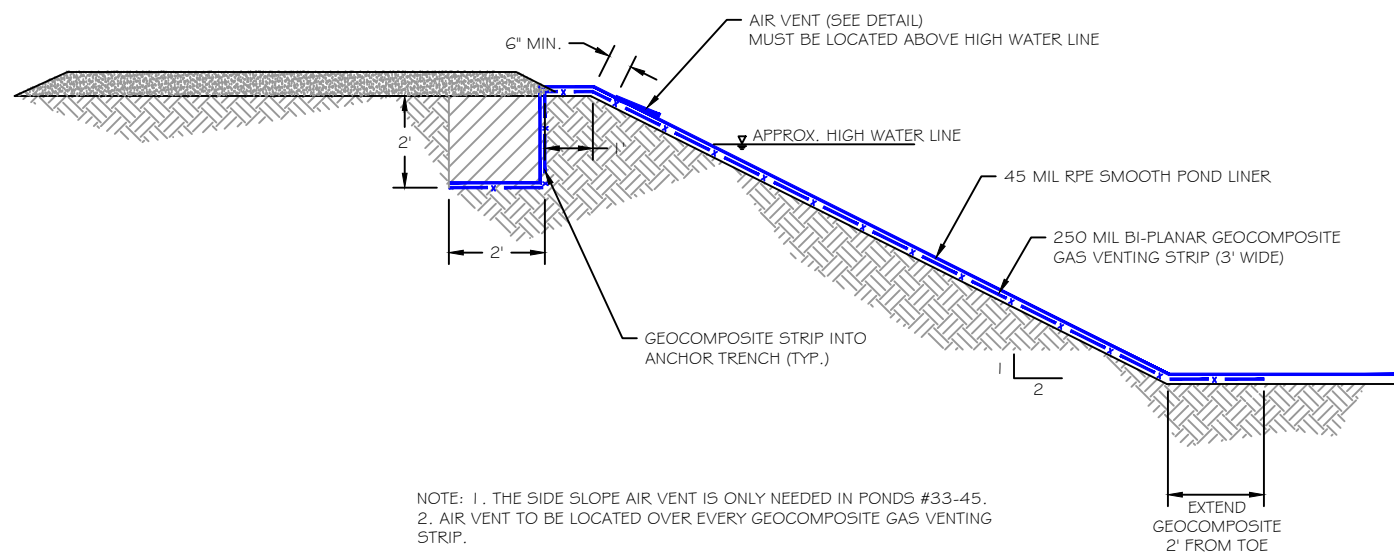
VERTICAL LINER ATTACHMENT AT KETTLE STEPS

N.T.S.



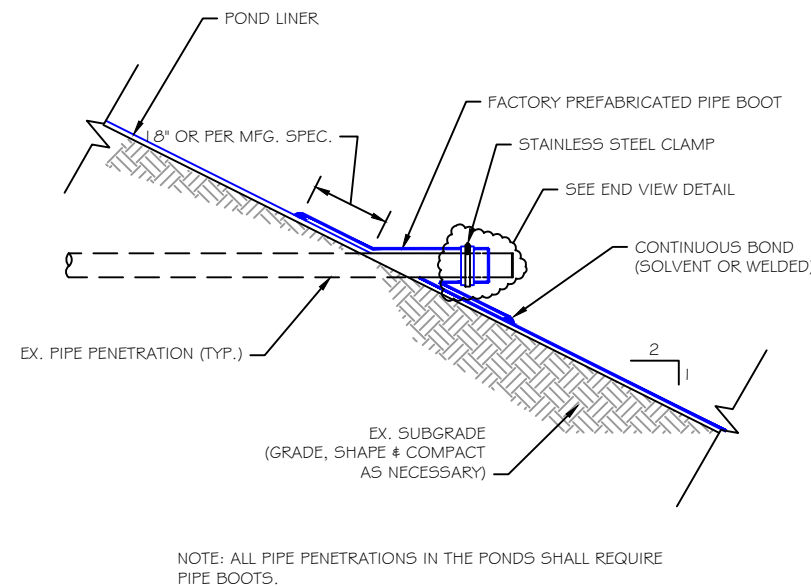
LINER ATTACHMENT AT KETTLE WALKWAY

N.T.S.



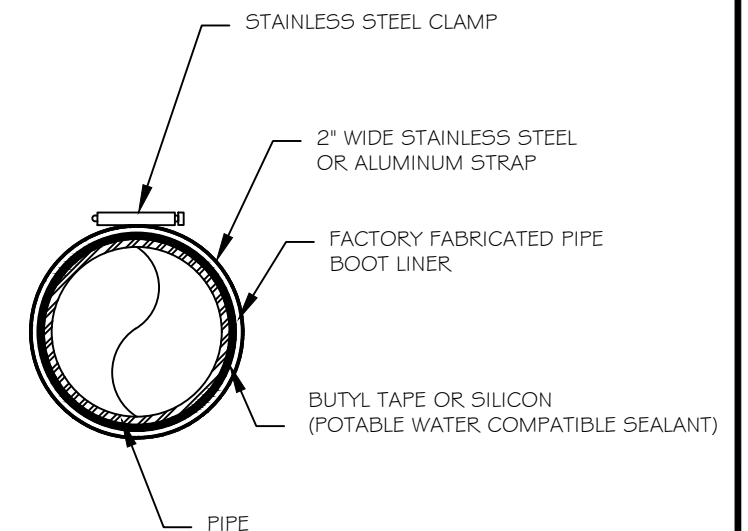
LINER AIR VENT SECTION VIEW

SCALE: 1"=4'



PIPE PENETRATION DETAIL

SCALE: 1"=4'



END VIEW

P. Jagoda 12/17/21
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P. Jagoda 12/17/21
CHECKED BY: DATE:

REVISED BY: DATE:
APPROVED BY: DATE:

APPROVED BY: DATE:
APPROVED BY: DATE:

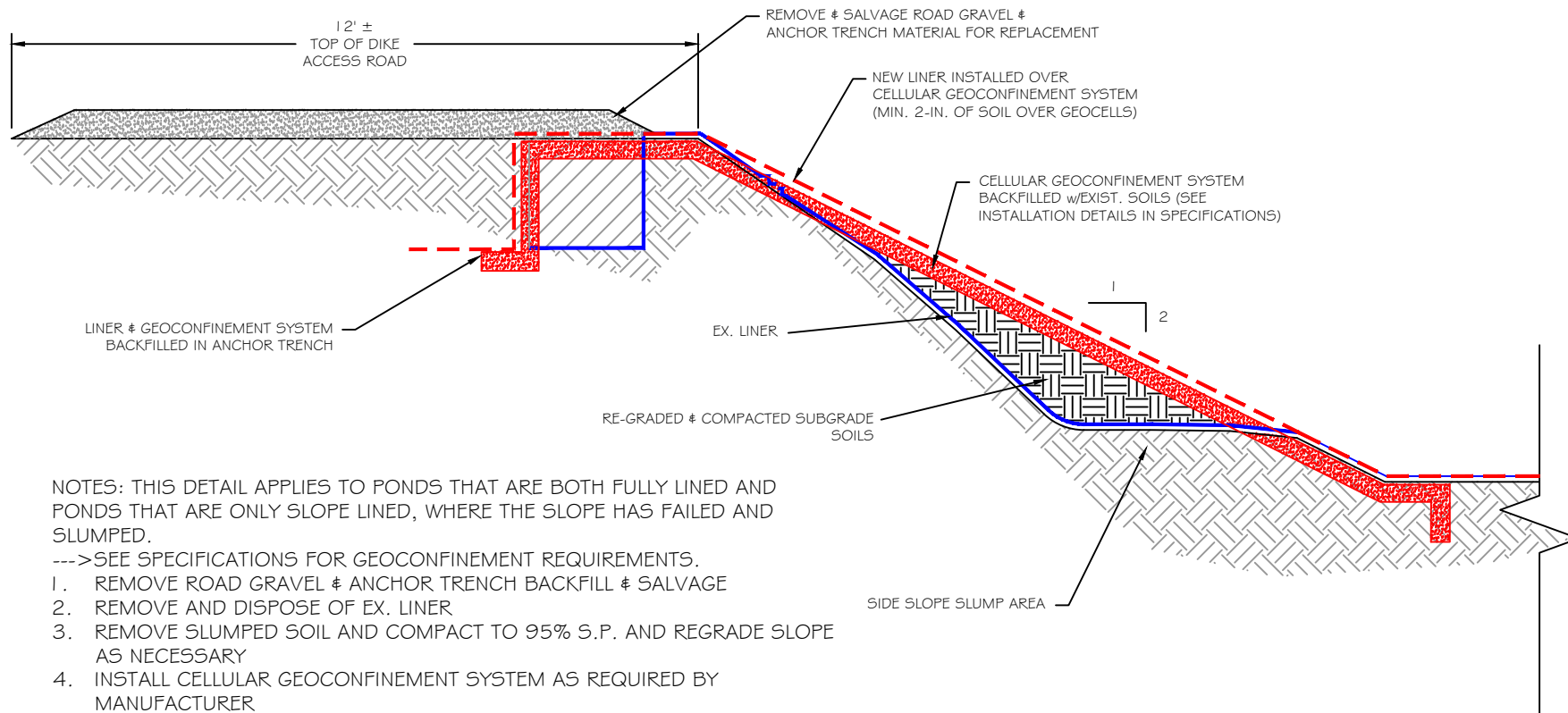


**MONTANA FISH,
WILDLIFE & PARKS**

163

Liner Details II
Miles City Fish Hatchery - Pond Liner Replacement Project

SHEET: 8 of 11



- NOTES:
1. THE GEOCONFINEMENT SYSTEM SHALL BE INSTALLED AS DETAILED BELOW.
 2. AN EQUIVALENT MATERIAL MAY BE USED WITH PRIOR APPROVAL FROM OWNER, CONTRACTOR MUST SUBMIT FOR REVIEW & APPROVAL.
 3. THE GEOWEB INFILL SHALL BE ON-SITE SOIL MATERIALS CONSISTING OF USCS CLASSIFICATION CH (FAT CLAY W/SANDS) TO CL SOILS (LEAN CLAY W/SANDS)
 4. CONTRACTOR TO CONSULT WITH MANUFACTURER FOR FULL INSTALLATION REQUIREMENTS.
 5. OVERFILL THE GEOWEB GEOCONFINEMENT CELLS BY A MINIMUM OF 2-INCHES TO ALLOW FOR SETTLEMENT AND PROTECTION OF THE OVERLYING POND LINER.
 6. SEE SPECIFICATIONS FOR ALL REQUIREMENTS.

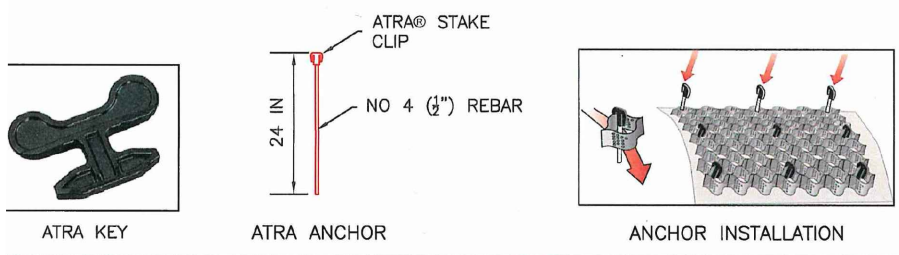
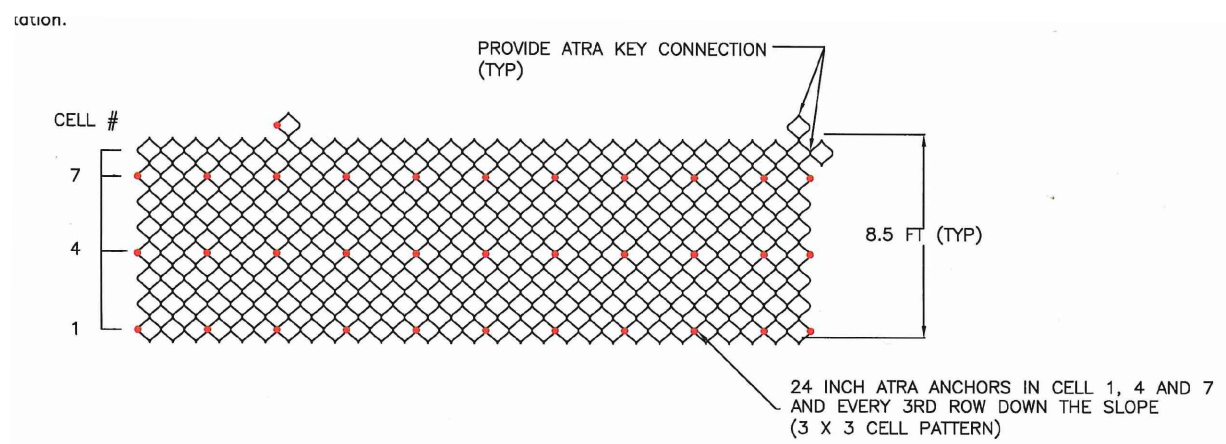
ESTIMATED GEOCONFINEMENT SLOPE REPAIR QUANTITIES		
LOCATION	APPROX. DIMENSIONS	LOCATION
POND 19	72' W x 16' L	BOTH SIDES OF KETTLE
POND 19	100' W x 16' L	NE SLOPE, LOW END
POND 21	66' W x 18' L	BOTH SIDES OF KETTLE
POND 21	100' W x 18' L	NE SLOPE, LOW END
POND 22	20' W x 18' L	EAST SIDE OF KETTLE
POND 24	50' W x 18' L	BOTH SIDES OF KETTLE
POND 25	50' W x 18' L	BOTH SIDES OF KETTLE
POND 46	50' W x 18' L	BOTH SIDES OF KETTLE
POND 47	50' W x 18' L	BOTH SIDES OF KETTLE
POND 48	50' W x 18' L	BOTH SIDES OF KETTLE
POND 49	50' W x 18' L	BOTH SIDES OF KETTLE
TOTAL	11,500 SQFT	

Notes: Slope lengths include anchor trench length needed at top of slope.

- NOTES: THIS DETAIL APPLIES TO PONDS THAT ARE BOTH FULLY LINED AND PONDS THAT ARE ONLY SLOPE LINED, WHERE THE SLOPE HAS FAILED AND SLUMPED.
- >SEE SPECIFICATIONS FOR GEOCONFINEMENT REQUIREMENTS.
1. REMOVE ROAD GRAVEL & ANCHOR TRENCH BACKFILL & SALVAGE
 2. REMOVE AND DISPOSE OF EX. LINER
 3. REMOVE SLUMPED SOIL AND COMPACT TO 95% S.P. AND REGRADE SLOPE AS NECESSARY
 4. INSTALL CELLULAR GEOCONFINEMENT SYSTEM AS REQUIRED BY MANUFACTURER
 5. BACKFILL CELLS WITH EXISTING ONSITE SOILS AS RECOMMENDED
 6. REINSTALL ROAD GRAVEL AND BACKFILL ANCHOR TRENCH

SLUMP REPAIR DETAIL

SCALE: 1"=3'

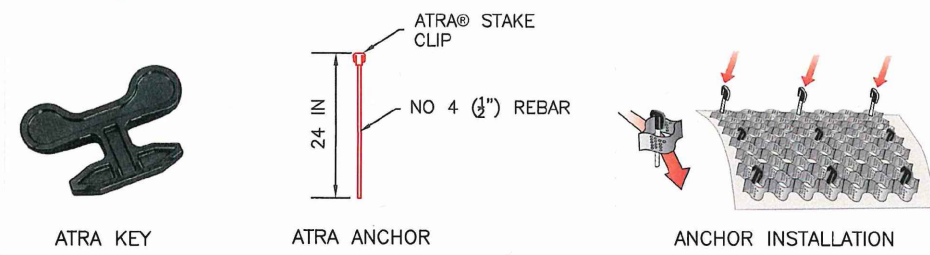
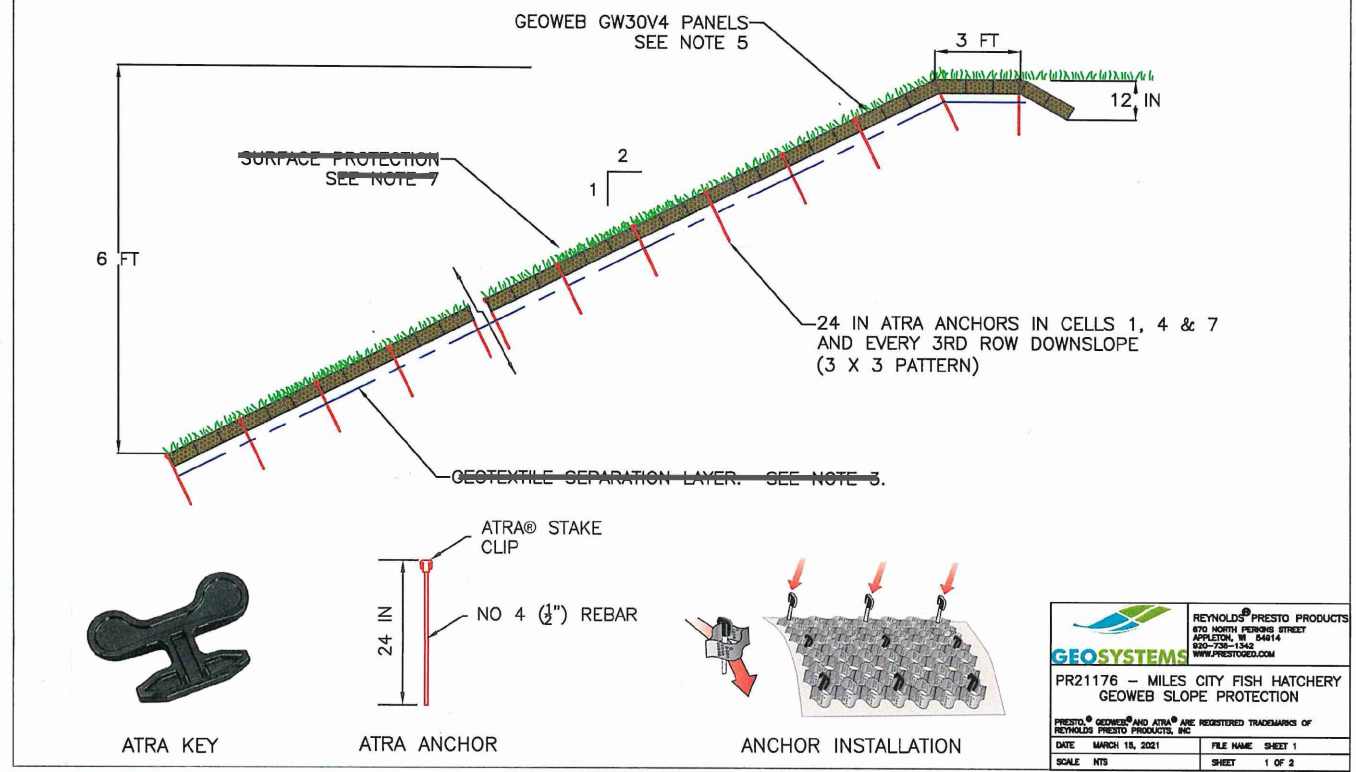


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 GEOWEB SLOPE PROTECTION

PRESTO, GEOWEB, AND ATRA ARE REGISTERED TRADEMARKS OF REYNOLDS PRESTO PRODUCTS, INC.
 DATE: MARCH 15, 2021 FILE NAME: SHEET 2
 SCALE: NTS SHEET: 2 OF 2

- Notes:
1. This Evaluation is copyrighted and is based on the use of products manufactured by Reynolds Presto Products, Inc. All rights reserved. Any use of this Evaluation for any product other than that manufactured by Presto makes this evaluation invalid.
 2. The evaluation assumes that the slope is globally stable.
 3. If required, provide a non-woven geotextile separation layer and install in accordance with Manufacturer instructions including overlaps.
 4. The Geoweb panels shall be connected with ATRA keys at each interleaf and end to end connection.
 5. Geoweb infill shall be topsoil and sand below.
 6. Limit the drop of infill to prevent panel distortion.
 7. Provide surface protection (hydroseed, EOD or TRM) sized for hydraulic conditions to prevent soil wash out prior to establishment of vegetation.



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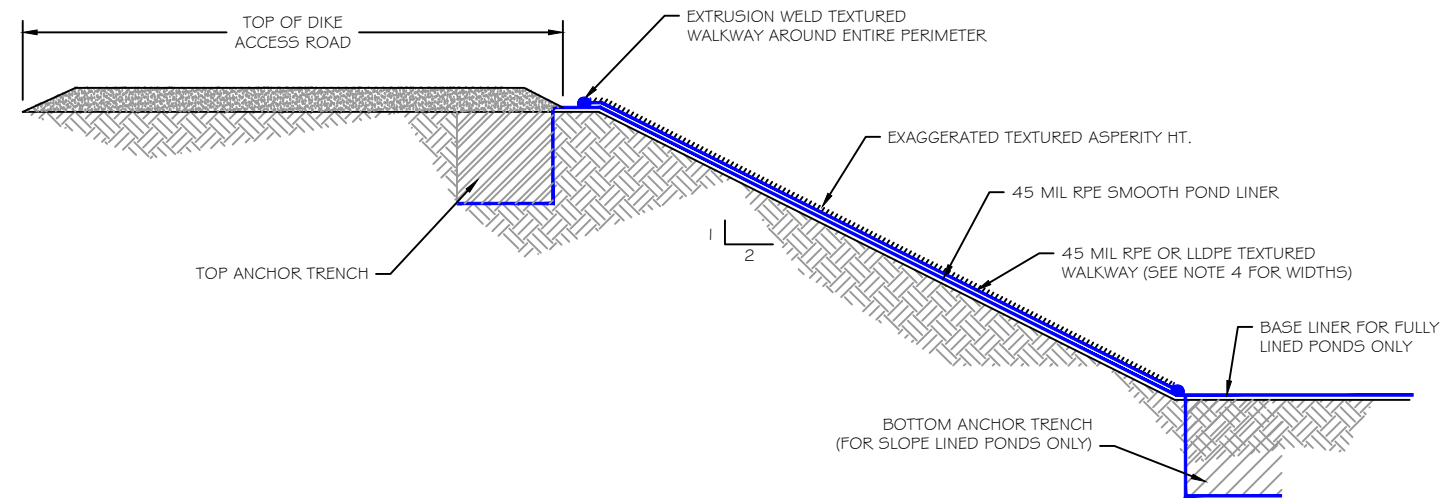
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 DATE: MARCH 15, 2021 FILE NAME: SHEET 1
 SCALE: NTS SHEET: 1 OF 2

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P. Jagoda CHECKED BY:	xx/xx/xx DATE:	APPROVED BY:	DATE:	APPROVED BY:	DATE:



Liner Details III - Sideslope Slump Repairs

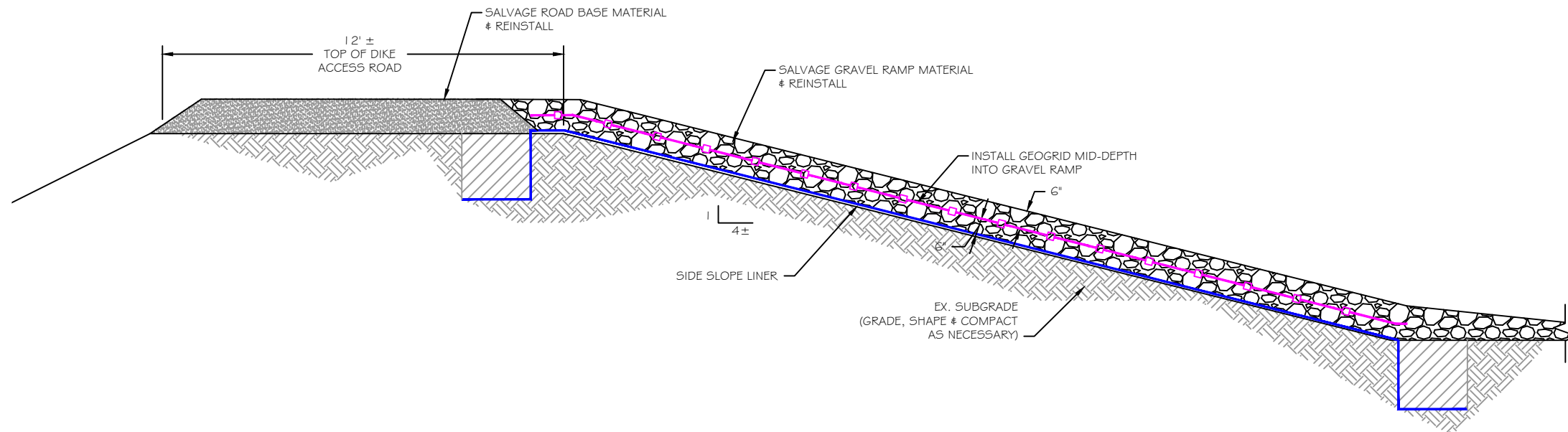
Miles City Fish Hatchery - Pond Liner Replacement Project



TEXTURED WALKWAY DETAIL

SCALE: 1"=4'

- NOTES: 1. THIS DETAIL TO BE USED FOR ALL LINED PONDS, BOTH SLOPE LINED AND FULLY LINED.
 2. A PANEL OF TEXTURED 45 MIL RPE CAN BE USED IN LIEU OF WELDING THE WALKWAY ONTO THE SMOOTH POND LINER. TEXTURED PANEL MUST BE WELDED TO ADJACENT SMOOTH PANELS AND MEET ALL SPECIFICATION REQTS FOR SEAM CONTINUITY AND INSTALLATION QC.
 3. MINIMUM ASPERITY HEIGHT OF 10 MIL REQUIRED FOR TEXTURED WALKWAYS.
 4. MIN. WALKWAY WIDTHS SHALL BE 4- FEET WIDE NEAR THE KETTLE AND 6- FEET WIDE ON THE SHALLOW END NEAR THE 3" PIPE INLET.



GRAVEL RAMP - SIDESLOPE LINED PONDS

SCALE: 1"=4'

NOTE: THIS SECTION APPLIES TO SIDE SLOPE LINED PONDS #16-32 AND #46-49. RAMPS ARE AT AN APPROX. SLOPE OF 1V:4H.

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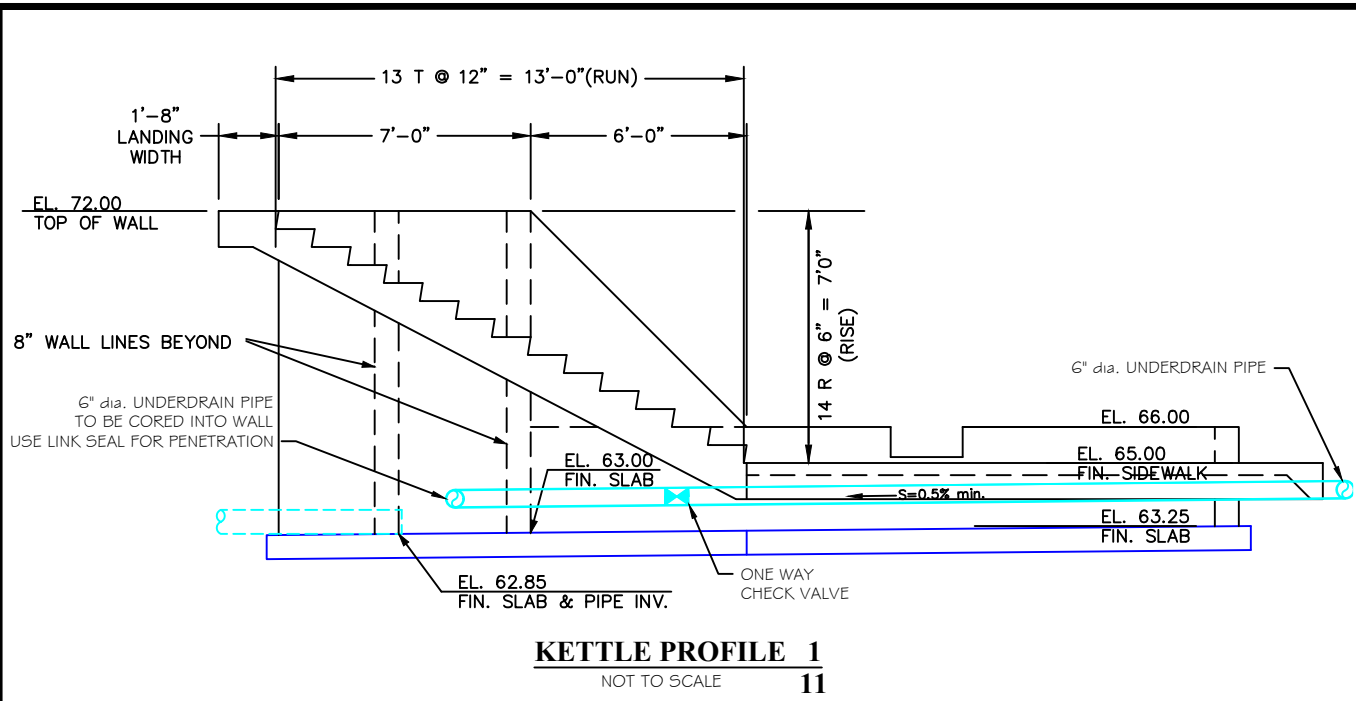


**MONTANA FISH,
 WILDLIFE & PARKS**

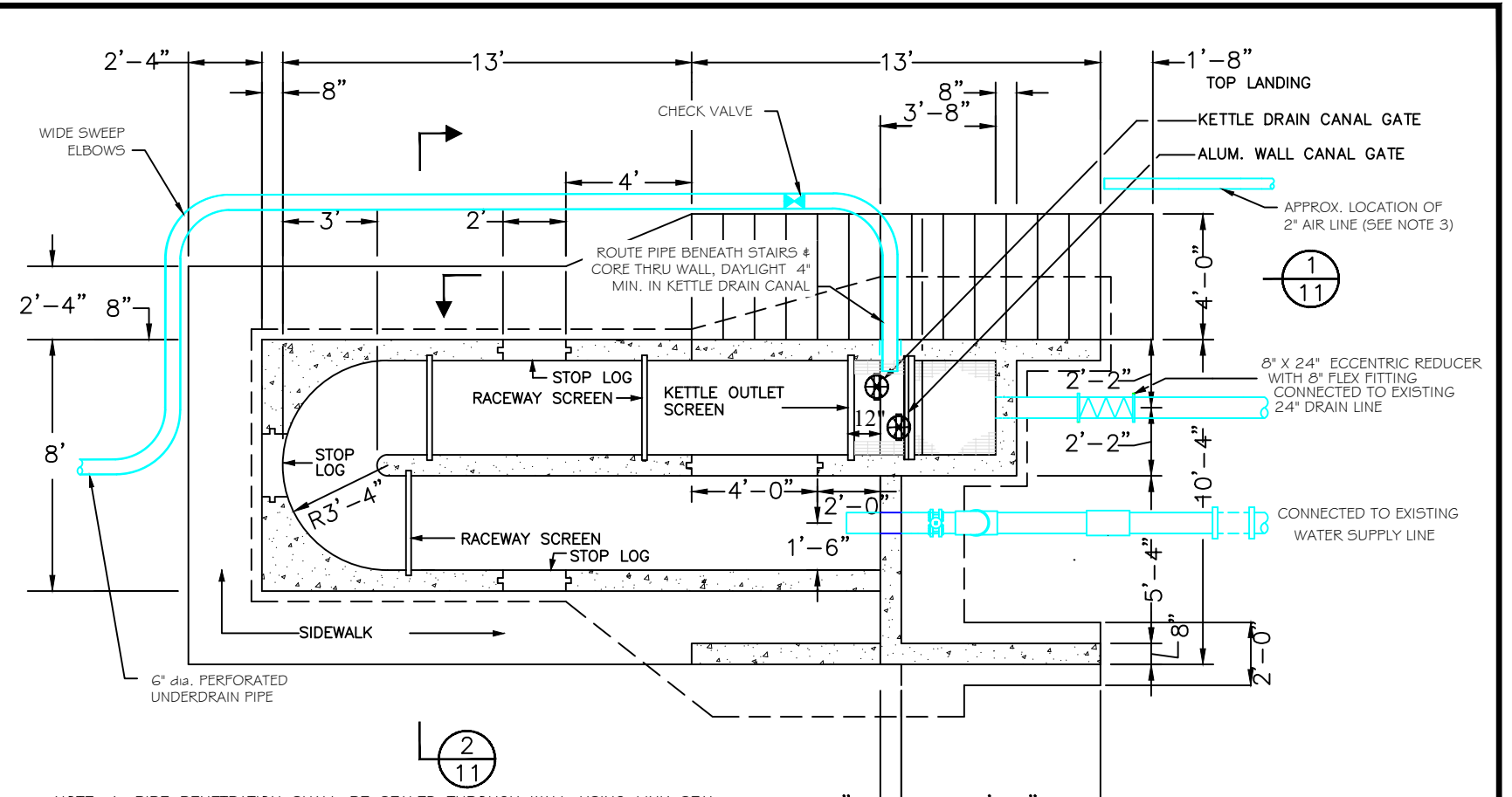
165

Liner Details IV
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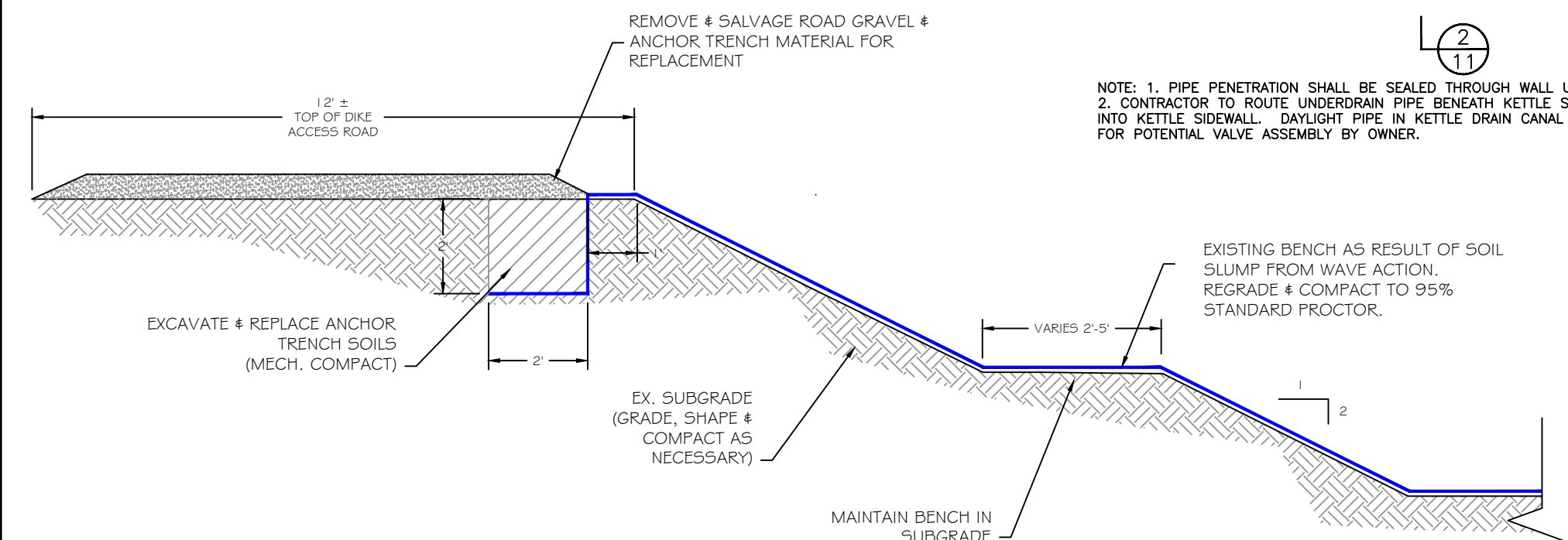
SHEET: 10
 of 11



NOTE: UNDERDRAIN PIPE TO BE INSTALLED AT MIN. 0.5%, FIELD ADJUSTMENTS MAY BE NECESSARY TO ROUTE PIPE BENEATH EX. STAIRWAY AND INTO KETTLE DRAIN CANAL.



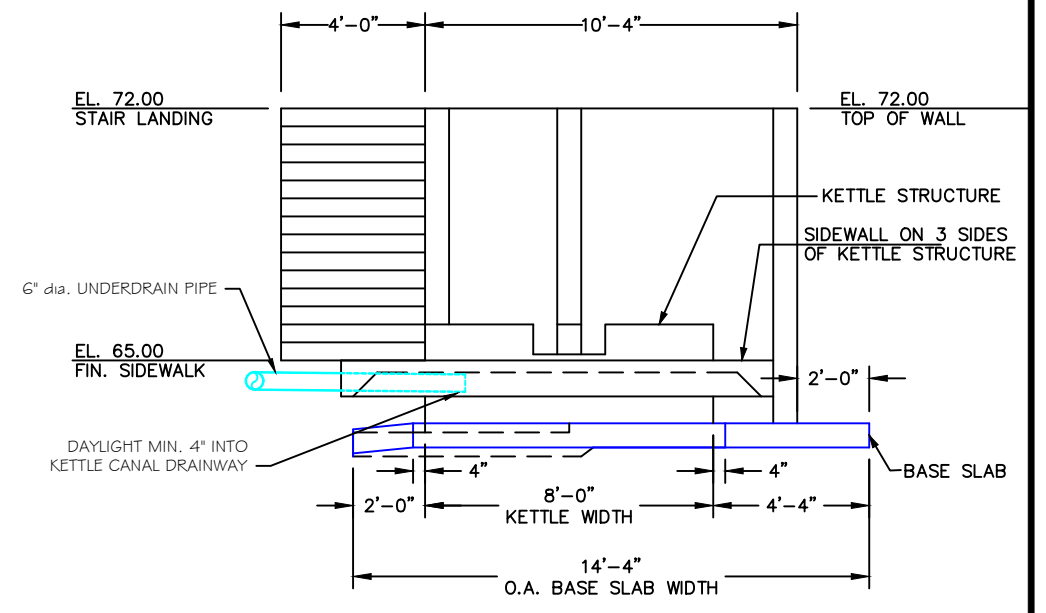
NOTE: 1. PIPE PENETRATION SHALL BE SEALED THROUGH WALL USING LINK SEAL.
2. CONTRACTOR TO ROUTE UNDERDRAIN PIPE BENEATH KETTLE STAIRWELL AND CORE INTO KETTLE SIDEWALL. DAYLIGHT PIPE IN KETTLE DRAIN CANAL MIN. OF 4-INCHES FOR POTENTIAL VALVE ASSEMBLY BY OWNER.



SECTION A-A
PONDS 31-45 SOUTH SLOPE

SCALE: 1"=3"

- NOTES:
1. THIS DETAIL APPLIES TO FULLY LINED PONDS 31-45 SOUTH END SLOPES WHERE THE SLOPE HAS SLUMPED & A NATURAL BENCH HAS FORMED FROM WAVE ACTION.
 2. REMOVE AND DISPOSE OF EX. LINER.
 3. RE-GRADE SLOPE AS NECESSARY, NATURALLY FORMED BENCH TO REMAIN, COMPACT ALL SOILS TO 95% STANDARD PROCTOR.
 4. INSTALL RPE POND LINER AS REQUIRED BY MANUFACTURER.
 5. REINSTALL ROAD GRAVEL AND BACKFILL ANCHOR TRENCH.



KETTLE SECTION 2
NOT TO SCALE

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APPROVED BY:	DATE:
APPROVED BY:	DATE:



MONTANA FISH, WILDLIFE & PARKS

Detail Sheet V
Miles City Fish Hatchery - Pond Liner Replacement Project

SHEET: 11 of 11