



Dewatering BMPs & Brown Water Management

2013 North Dakota Water and Pollution Control Conference
North Dakota Department of Health
Ramada Doublewood, Bismarck ND
March 26, 2013
Dwayne Stenlund, MSc, CPESC
Resource Professionals Alliance

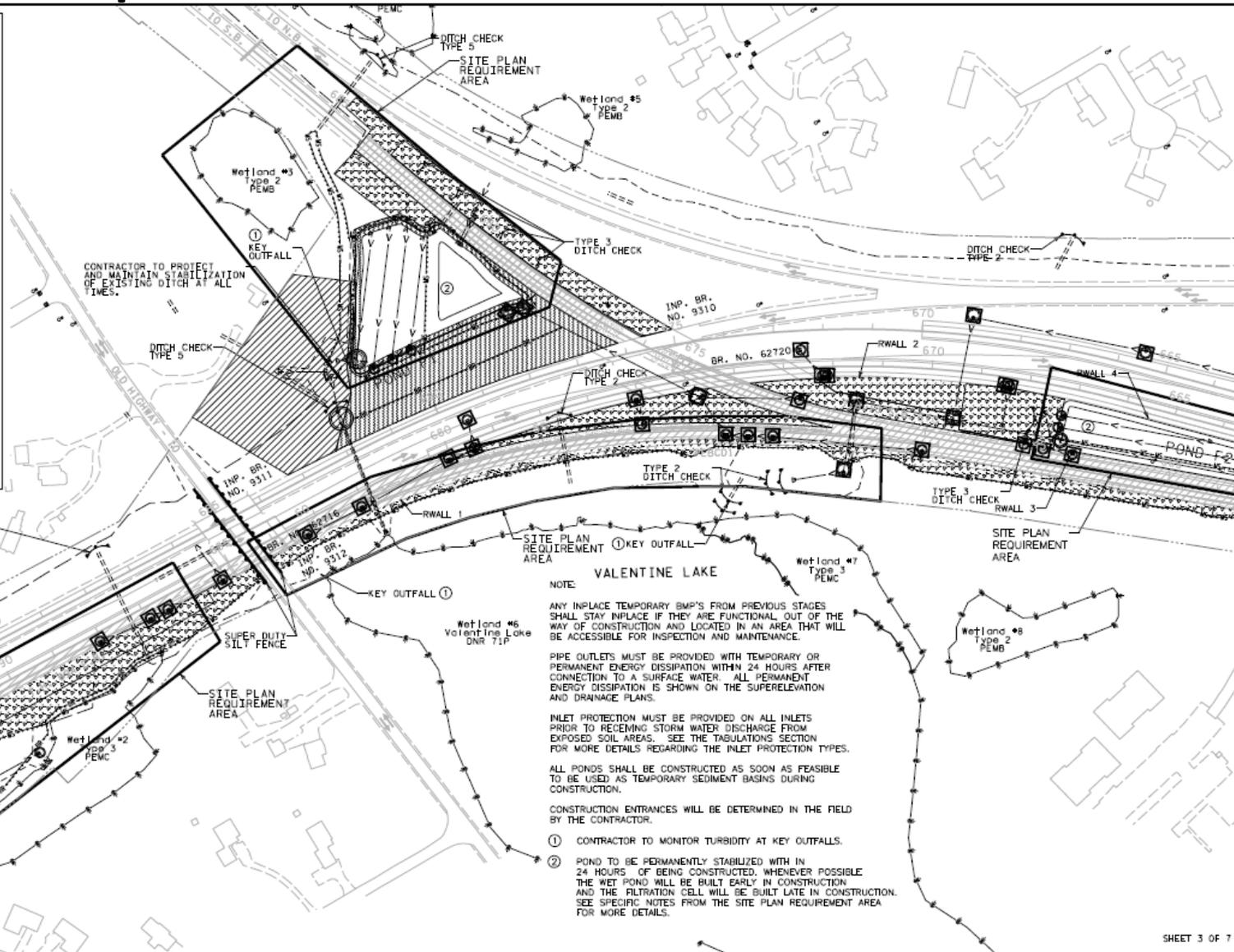
Why brown water management

- Deliver Phase III of EPA permit
- Facilitate and speed up structure installation
- Improve stability and outcome of structure
- Protect receiving waters
- Reclamation and reutilization of water
- Leadership stays ahead of regulators to protect clean water rather than having to follow practices/regulations that don't work

Capture and Infiltration

STAGE 2 LEGEND

-  PERMANENT CONSTRUCTION
-  TEMPORARY CONSTRUCTION
-  CONSTRUCTION ENTRANCE
-  TEMPORARY STABILIZATION
EROSION CONTROL BLANKET CAT. 3
SEED MIX 150
-  TEMPORARY STABILIZATION
TYPE 1 STRAW MULCH
TEMPORARY SEED MIX 100 OR 110
-  TEMPORARY STABILIZATION
EROSION CONTROL BLANKET CAT. 3
SEED MIX 100 OR 110
-  RAPID STABILIZATION METHOD 3
TEMPORARY SEED MIX 100 OR 110
-  MACHINE SLICED SILT FENCE
-  FILTER LOG TYPE STRAW BIOROLL
-  HEAVY DUTY SILT FENCE
-  SUPER DUTY SILT FENCE
-  FLOATING SILT CURTAIN
-  INPLACE PAVEMENT
-  TRAFFIC FLOW
-  RIGHT OF WAY
-  CONSTRUCTION LIMITS
-  CONSTRUCT DRAINAGE STRUCTURE
-  INPLACE DRAINAGE STRUCTURE
-  INLET PROTECTION
-  LINEAR SEDIMENT TRAP



SHEET 3 OF 7

NO.	DATE	APPR.	REVISION

DESIGNED BY: JC	DATE: 8/29/2011	PROJECT: 1079	PROJECT NO: 7763-10010
APPROVED BY: JC	DATE: 8/29/2011	PROJECT: 1079	PROJECT NO: 7763-10010
DRAWN BY: AJP		PROJECT NO: 7763-10010	



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MINNESOTA DEPT. OF TRANSP.
T.H. 694 AND SNELLING AVENUE
SP 6285-135

TEMPORARY EROSION CONTROL - STAGE 2	SHEET 24 OF 59
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THIN SNOW SIGNALS DRY SUMMER

• Western officials fear water shortages are ahead.

By JACK HEALY • New York Times

DENVER — After enduring last summer's destructive drought, farmers, ranchers and officials across the parched Western states had hoped that plentiful winter snows would replenish the ground and refill their rivers, breaking the grip of one of the worst dry spells in U.S. history. No such luck.

Lakes are half full and mountain snows are thin, omens of another summer of drought and wildfire. Complicating matters, many of the worst-hit states have even less water on hand than a year ago, raising the specter of shortages and rationing that could inflict another year of losses on struggling farms.

Reservoir levels have fallen in Arizona, Colorado, New Mexico and Nevada. The soil is drier than normal. And while a few recent snowstorms have cheered skiers, the snowpack is so thin in parts of Colorado that the government has declared an "extreme drought" around the ski havens of Vail and Aspen.

"We're worse off than we were a year ago," said Brian Fuchs, a climatologist at the National Drought Mitigation Center.

This week's blizzard brought a measure of relief to the Plains when it dumped more than a foot of snow. But it did not change the basic calculus in the drought-scarred West. Ranchers are straining to find hay — it is scarce and expensive — to feed cattle. And farmers are fretting about whether they will



Mountains are blanketed with thin snow near Idaho Springs, Colo. The snowpack in the state was just 72 percent of average as of Feb. 1, which means less water to dampen hillsides and mountains vulnerable to fire and less water for farmers and ranchers.

MATTHEW STAVER • New York Times

"It's approaching a critical situation," said Mike Hungenberg, who grows carrots and cabbage on a 3,000-acre farm in Colorado. There is so little water available this year, he said, that he may scale back his planting by a third. "A year ago we went into the spring season with most of the reservoirs full. This year, you're going in with basically everything empty."

whom now end phone calls by saying, "Pray for snow" — do have some hope. An especially wet spring could still spare the Western plains and mountains. But forecasts are murky: They predict warmer weather and less precipitation across the West over the next three months but say the Midwest could see more rain than usual.

Water experts get more nervous with each passing

time," said Andy Pineda of the Northern Colorado Water Conservancy District. "We only have a month or two, and we are so far behind it's going to take storms of epic amounts just to get us back to what we would think of as normal."

Parts of Montana, the Pacific Northwest and Utah have benefited from a snowy winter. But across Colorado, the snowpack was just 72 percent of average

water to dampen hillsides and mountains vulnerable to fire, less water for farms to use on early season crops and less to fill lakes and reservoirs that ultimately trickle down into millions of taps across the state.

Farmer Eldon Ackerman said he had water supplies for only about one-third of his fields. Without rain, he said he might have to let 1,000 acres lie fallow this year. "There isn't

Twins seek to get stronger up the middle

OSCARS PREVIEW

'GOLDEN OLDIES' PRIMED TO WIN BIG



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StarTribune

Sunday

FEBRUARY 24, 2013

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33°/19°
Warm enough to melt
Some sun today, too. B12

Budget ax could cost Minnesota 16,000 jobs

• Without deal, lost income and business would cut deep.

By KEVIN DIAZ
kevin.diaz@startribune.com

WASHINGTON - Massive federal spending cuts slated to begin Friday could cost Minnesota \$117 million in grants and aid, wipe out hundreds of millions more in lost business and contracts, and put an estimated 16,000 Minnesotans out of work, with the loss of \$821 million in personal income.

Flight towers at regional airports in Anoka, St. Cloud, Eden Prairie and Crystal could be forced to close. Furloughs of meat

★ STAR TRIBUNE EXCLUSIVE

MAYO'S GOAL: FULL FACE-LIFT FOR CITY

The world-renowned clinic is central to Rochester's identity. Mayo wants to spend \$585 million to draw the two tighter



★ STAR TRIBUNE EXCLUSIVE

MINNESOTA DRAINING ITS SUPPLIES OF WATER

• Nature can't keep up with demand, prompting disputes in some cities.

By JOSEPHINE MARCOTTY
marcott@startribune.com

It didn't take Daniel Damm long to figure out why the water from his faucets suddenly turned black. His well was running dry because the turkey farm up the road near Willmar had sucked down the local aquifer.

In Hibbing, where one of three city wells has dried up, local officials have quietly asked the state to help resolve a water dispute with a taconite company that is one of the town's biggest employers.

And along the shores of White Bear Lake, homeowners found their wells

Land of lakes is depleting its water supplies

◀ WATER FROM A1

"It's scary," said Dennis Healy, who runs the Pipestone Rural Water System in southwest Minnesota. "The time is coming that there is going to have to be some rationing."

In the short term, that means farmers and businesses may have to share water with competitors, or even leave the state. Eventually, homeowners may face higher water bills and routine watering bans.

The prolonged drought that scorched Minnesota last summer is not to blame, but it provides a glimpse into how climate change, with its weather extremes, could make matters even worse. From now on droughts may be more severe. And then when it rains, it often rains so hard that much of the water runs off the land before it can soak into the ground.

In Minnesota, how the rain falls and the snow melts is crucial because virtually all the state's water comes from the sky. Over the centuries, water accumulated below the surface, slowly seeping into the ground and the aquifers that store many billions of gallons between grains of sand and fissures in the rock. Today that groundwater and the aquifers supply most of the homes, ethanol plants, millions of irrigated acres, swimming pools and golf courses across the state.

Rising demand

It all works fine as long as water is not used faster than the rain and snow can replace it. But now rising demand — from farm irrigation, a growing



BRIAN PETERSON • brianp@startribune.com

The number of irrigated acres in Minnesota has risen with the price of food and commodities.

The water cycle springs a leak

Minnesota is a headwater state, meaning that virtually all its water originates with rain or snow. The cycle was largely self-sustaining, providing Minnesota with abundant water in its lakes as well as in the ground and deep aquifers. But now it is springing "leaks" because urban, industrial and agricultural demands are using water, and then sending it out of the state faster than it can be replenished by nature.

1 Rain and snow provide water that is stored as groundwater and in deep aquifers. It is used by plants and trees and lost through evaporation, down rivers and by the slow migration of

2 In urban areas, humans have altered that cycle with hard surfaces like roofs

not well designed for holding water underground. Healy, of the Pipestone Rural Water System, has had to tell badly needed businesses to find somewhere else to set up shop because the rural water system couldn't give them enough water — including a large dairy operation that recently took 15 jobs to South Dakota.

"In the last year or so we've had a lot more requests from people whose wells are failing," he said. "People are hauling water."

The demands of agriculture are especially worrisome, he said. Pattern tiling, which drains precipitation off agricultural fields and into ditches, is on the rise, he said.

"While I understand the need and benefit, the idea of discharging that water into the nearest stream and rushing it to the Gulf of Mexico as fast as we can does not make much sense to me," he said.

High-capacity irrigation wells are also sprouting all over central and western Minnesota. In 2010, only 2 to 3 percent of the state's cropland was irrigated, but that alone used 29 percent of water pumped out of Minnesota's ground that year. But in 2012, the state received nearly 200 irrigation permit requests, with another 200 expected this year — two to three times the norm, DNR officials said.

Alan Peterson, head of the Minnesota Irrigators Association and a farmer near Clear Lake, said irrigation is a better form of crop insurance than crop insurance. Lately, the number of irrigated acres in Minnesota has risen steadily

The state is also being asked to resolve much bigger problems. This year, the city of Hibbing finally asked the DNR to weigh in on its ongoing dispute with Hibbing Taconite. For years, the company has been draining the water that collects in one of its massive pits in order to get to the ore that's below — and then sending the water into a nearby river and eventually Lake Superior. But a side effect is to lower the area's entire water table; now the level of the aquifer is low enough that one of the city's primary wells has dried up. The other two are running at capacity, said Gary Myers, general manager of the Hibbing Public Utilities Commission.

He said the city has found a new water source in a different aquifer, but it's 2½ miles away from town, adding considerably to the \$1.2 million cost. Now the question is who should pay.

"That's an awful lot for us," Healy said. "But it's hard to put pressure on them."

Officials at Hibbing Taconite declined to comment but said in a statement that negotiations are underway.

Train wreck?

DNR water officials say it's time for local communities to start making decisions on water, rather than the state, because the current rates of use are not sustainable.

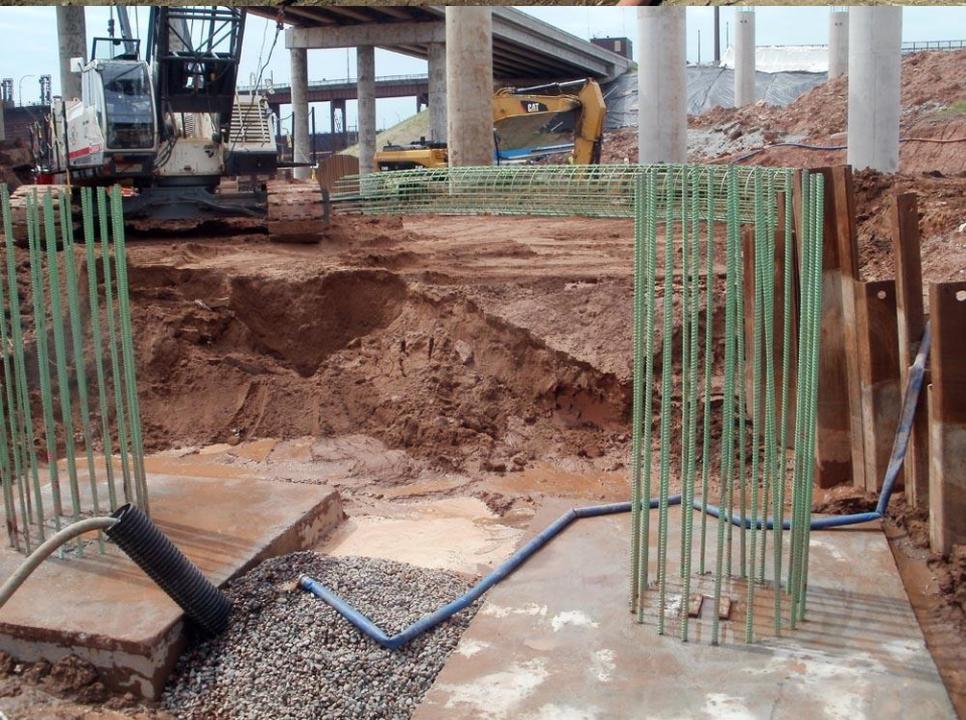
"If you fail to make a choice, then at some point the aquifer will do that for you," said Jason Moeckel, a water manager for the DNR.

This year the DNR will ask one or two water-strapped

Excavation Dewatering



Structure dewatering



Jack pit dewatering



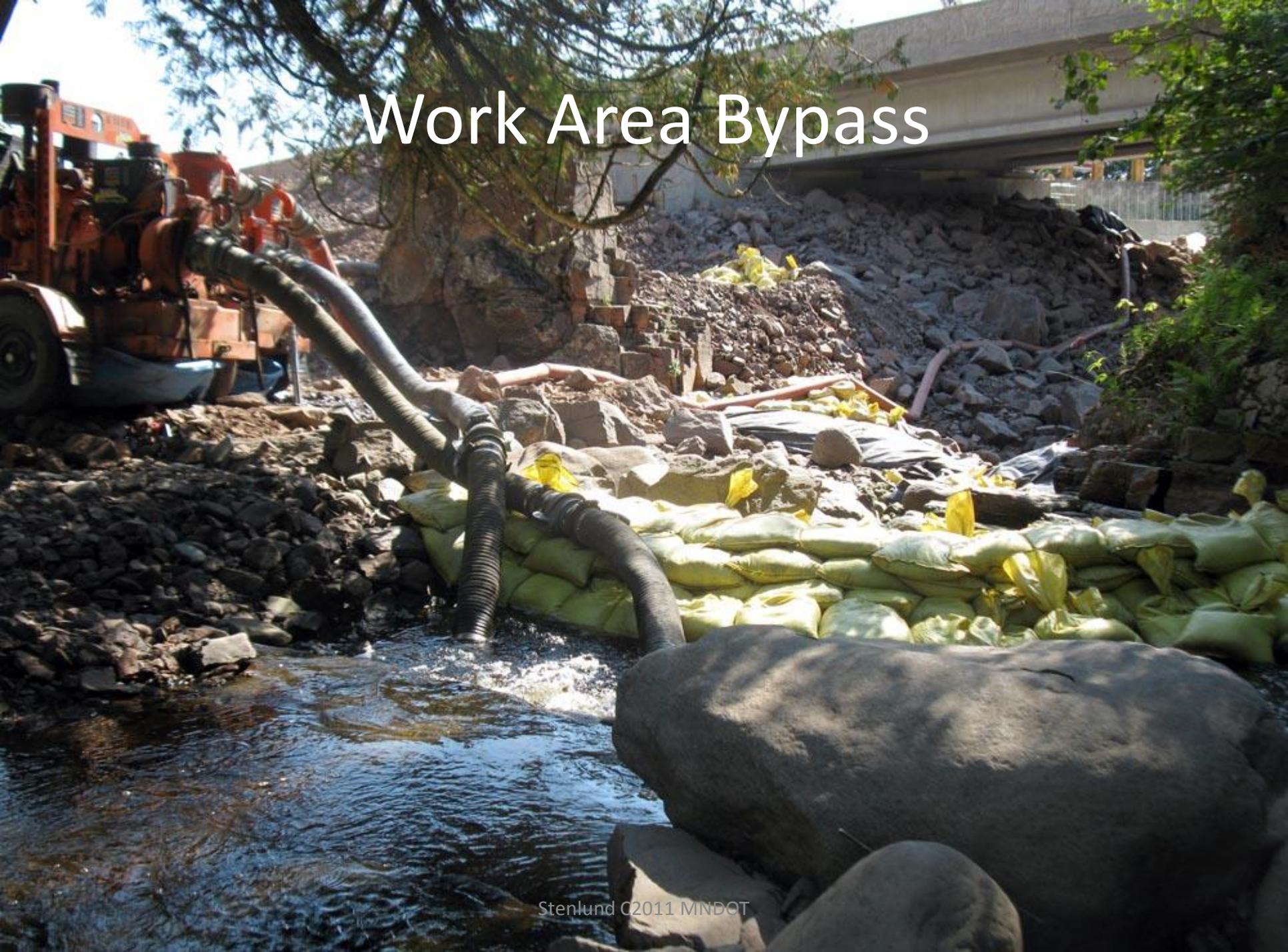
Barge Dewatering



Pond Maintenance Dewatering



Work Area Bypass



Emergency Dewatering



Discharge Requirements: Testing/Verification of Discharge



Equipment comes clean, leaves clean

- Decontamination protocol
 - Drain all water, allow to dry prior to reuse





Current and Future Practice/Management

- Construct ponds, basins, traps
- Use lift stations, treatment dumpsters, tanks
- Surface water skimming/removals
- Passive treatment systems (+/- chemicals)
 - Pond baffles
 - Ditches
 - Tanks
- Active treatment systems (w/ chemicals)
 - Chitosan Enhanced Sand Filtration
 - PAM

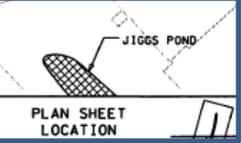
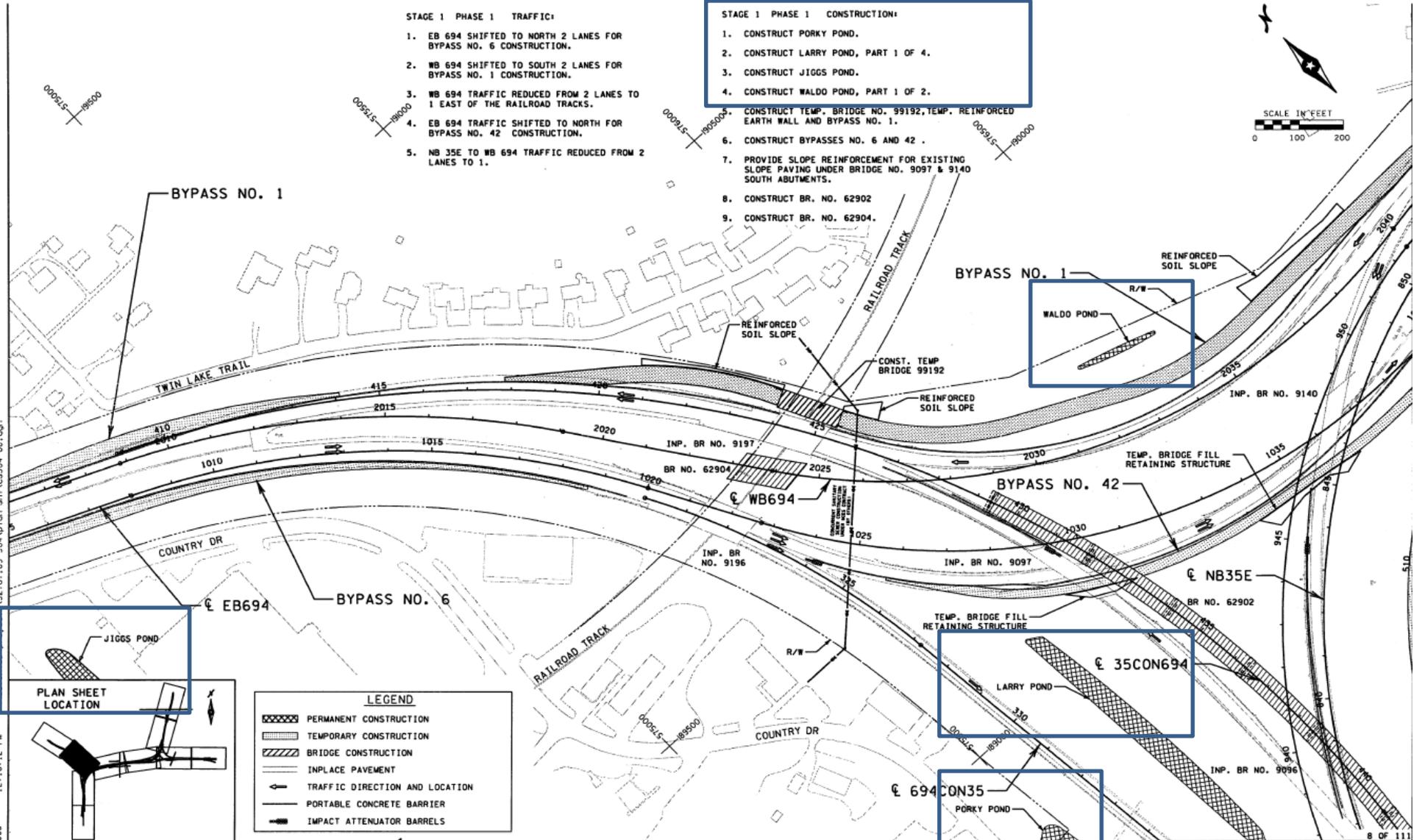
Sediment Trap Construction Schedule

STAGE 1 PHASE 1 TRAFFIC:

1. EB 694 SHIFTED TO NORTH 2 LANES FOR BYPASS NO. 6 CONSTRUCTION.
2. WB 694 SHIFTED TO SOUTH 2 LANES FOR BYPASS NO. 1 CONSTRUCTION.
3. NB 694 TRAFFIC REDUCED FROM 2 LANES TO 1 EAST OF THE RAILROAD TRACKS.
4. EB 694 TRAFFIC SHIFTED TO NORTH FOR BYPASS NO. 42 CONSTRUCTION.
5. NB 35E TO WB 694 TRAFFIC REDUCED FROM 2 LANES TO 1.

STAGE 1 PHASE 1 CONSTRUCTION:

1. CONSTRUCT PORKY POND.
2. CONSTRUCT LARRY POND, PART 1 OF 4.
3. CONSTRUCT JIGGS POND.
4. CONSTRUCT WALDO POND, PART 1 OF 2.
5. CONSTRUCT TEMP. BRIDGE NO. 99192, TEMP. REINFORCED EARTH WALL AND BYPASS NO. 1.
6. CONSTRUCT BYPASSES NO. 6 AND 42.
7. PROVIDE SLOPE REINFORCEMENT FOR EXISTING SLOPE PAVING UNDER BRIDGE NO. 9097 & 9140 SOUTH ABUTMENTS.
8. CONSTRUCT BR. NO. 62902
9. CONSTRUCT BR. NO. 62904.



LEGEND	
	PERMANENT CONSTRUCTION
	TEMPORARY CONSTRUCTION
	BRIDGE CONSTRUCTION
	INPLACE PAVEMENT
	TRAFFIC DIRECTION AND LOCATION
	PORTABLE CONCRETE BARRIER
	IMPACT ATTENUATOR BARRELS

DRAWN BY: JTV
 CHECKED BY: PJM
 I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
 SIGNATURE: *[Signature]*
 PRINTED NAME: AVEDIS TOGHAMADJIAN
 DATE: MAY 27 2005 LIC. NO. 40917



MINNESOTA DEPARTMENT OF TRANSPORTATION
 STATE PROJECT NO. 6280-304 (T.H. 35E)



STAGING PLANS
 STAGE 1 PHASE 1
 8 OF 111
 207
 1992

STAGE 1A CONSTRUCTION

1. REMOVE NORTHERLY PORTION OF INPLACE BRIDGE NO. 9312 OVER OLD HIGHWAY 10 AND CONSTRUCT AS MUCH AS POSSIBLE OF NEW BRIDGE NO. 62717.
2. CONSTRUCT THE NORTHERN HALF OF BRIDGE NO. 62052.
3. BEGIN CONSTRUCTION OF BRIDGE NO. 62720.
4. CONSTRUCT T.H. 694 E.B. STATION 660+00 (APPROX.) TO STATION 680+40 (APPROX.).
5. CONSTRUCT T.H. 694 E.B. INSIDE LANE, STATION 685+22 (APPROX.) TO STATION 695+47.
6. CONSTRUCT THE T.H. 694 W.B. ADD LANE AND INSIDE SHOULDER STATION 613+00 TO 633+44 (APPROX.).
7. CONSTRUCT T.H. 694 W.B. STATION 633+44 (APPROX.) TO STATION 642+00 (APPROX.).
8. CONSTRUCT T.H. 694 W.B. STATION 644+00 (APPROX.) TO STATION 670+00 (APPROX.).
9. CONSTRUCT RETAINING WALL 2 AND RETAINING WALL 4.
10. RECONSTRUCT T.H. 694 E.B. OUTSIDE SHOULDER STATION 576+60 TO STATION 581+60.
11. CONSTRUCT BYPASS NO.'S 2, 3, 4, 5, 6, 7, 11, 12 AND 13
12. WITH THE REMOVAL OF BRIDGE NO.9311 AND 9312, ANY DAMAG SHALL BE TEMPORARILY REPAIRED WITH BITUMINOUS PATCHING
13. REMOVE CONTAMINATED MATERIAL FROM PROJECT. FOR LOCATIO
14. CONSTRUCT PONDS P0, F0, P2 AND P5.
15. CONSTRUCT STEEL SHEET PILING (TEMPORARY) SHOWN ON SHEE

STAGE 2 CONSTRUCTION

1. REMOVE REMAINING PORTION OF INPLACE BRIDGE NO. 9312 AND COMPLETE CONSTRUCTION OF BRIDGE NO. 62717.
2. REMOVE INPLACE BRIDGE NO. 9301 AND CONSTRUCT THE SOUTHERN
3. REMOVE INPLACE BRIDGE NO. 9447 AND CONSTRUCT BRIDGE NO. 6;
4. REMOVE THE INSIDE PORTION OF THE T.H. 694 E.B. INPLACE BR AT ISLAND LAKE AND CONSTRUCT THE NEW INSIDE PORTION OF BR
5. REMOVE INPLACE BRIDGE NO. 9302 AND COMPLETE T.H. 694 E.B. STATION 630+50 (APPROX.) TO STATION 660+00 (APPROX.).
6. COMPLETE T.H. 694 E.B. STATION 680+14 (APPROX.) TO STATION 695+47.
7. CONSTRUCT PEB01 STATION 49+18 (APPROX.) TO 57+00 (APPROX.).
8. CONSTRUCT ALL OF T.H. 10 S.B. TO T.H. 51 EXCEPT STATION 675+25 (APPROX.) TO STATION 677+00 (APPROX.).
9. MILL INPLACE PAVEMENT T.H. 10 S.B. STATION 675+25 TO 677+00 TO MATCH PROPOSED NEW CONSTRUCTION ELEVATIONS.
10. CONSTRUCT HAMLIN AVENUE N.B. AND S.B. FROM THE SOUTHERN END TO STATION 45+00 (APPROX.).
11. CONSTRUCT THE SOUTH LOOP AND NORTH LOOP.
12. CONSTRUCT RETAINING WALLS 1, 3 AND 5.
13. CONSTRUCT BYPASSES 8 AND 9 (FILLING INPLACE T.H. 694 MEDIAN).
14. CONSTRUCT TRAFFIC SIGNAL AT HAMLIN AND CO. RD F INTERCHANGE.
15. CONSTRUCT TEMPORARY WIDENING ALONG PEB01 ROAD RIGHT STATION 49+30 TO 56+98.
16. CONSTRUCT PONDS P1, F1, F2, AND P4.

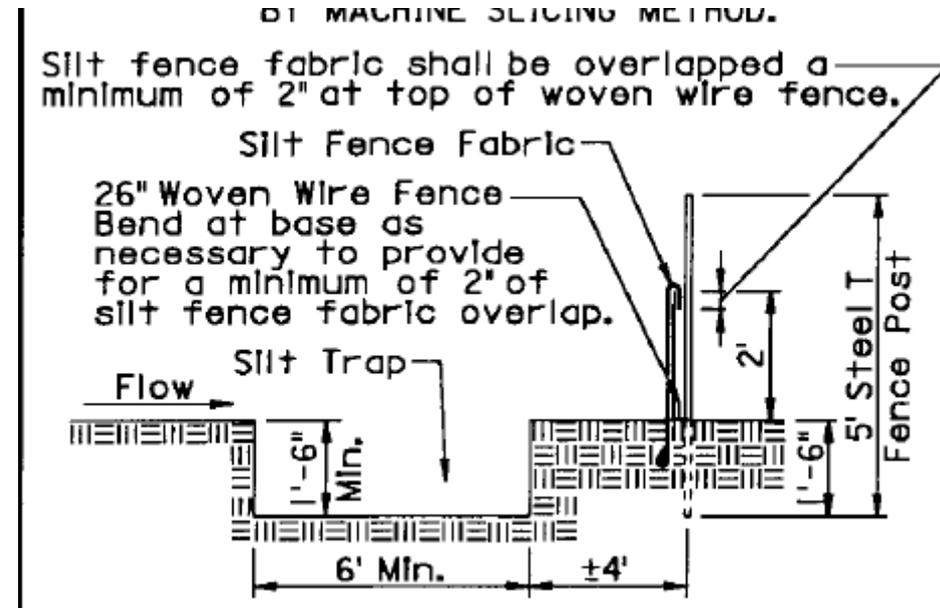
Plan Defined Pond Schedule

STAGE 3 CONSTRUCTION

1. REMOVE INPLACE BRIDGE NO. 9311 AND CONSTRUCT BRIDGE NO. 62716.
2. REMOVE INPLACE BRIDGE NO. 9310 AND CONSTRUCT BRIDGE NO. 62719.
3. REMOVE INPLACE BRIDGE NO. 9448.
4. MILL AND OVERLAY THE EXISTING T.H. 694 W.B. THRU LANE AT LEXINGTON AVENUE, UNDER TRAFFIC.
5. CONSTRUCT T.H. 694 W.B. STATION 626+55 (APPROX.) TO PNB10 ROADWAY.
6. CONSTRUCT ALL OF LEXINGTON AVE. ON RAMP EXCEPT FOR CURB & GUTTER AND CONCRETE RAISED MEDIAN ALONG T.H. 694 W.B. STATION 627+49 (APPROX.) TO END OF NOSE.
7. CONSTRUCT PNB10 AND EXIT TO T.H. 10 N.B.
8. CONSTRUCT REMAINING PORTION OF THE NORTH LOOP.
9. REMOVE REMAINING PORTION OF INPLACE BRIDGE NO. 9209 AND COMPLETE CONSTRUCTION OF SOUTHERN HALF OF BRIDGE NO. 62724 AT ISLAND LAKE.
10. RECONSTRUCT OLD HIGHWAY 10 UNDER BRIDGE NO. 62716 AND 62717 AFTER ALL BRIDGE WORK HAS BEEN COMPLETED, UNDER TRAFFIC.
11. CONSTRUCT BYPASS NO. 10.
12. COMPLETE 694 W.B. CONSTRUCTION STATION 670+00 TO 709+04.
13. CONSTRUCT POND P6.

Sediment Traps

- 5/10 acres to a point discharge
- Linear trap (Ditch) systems
- Grade locations for dead storage
- Salvage/harvest storm water



Sizing and design considerations

A minimum storage volume of 134 cubic yards per acre of exposed soil drained is required for basins and traps. Traps and basins are designed so that flow paths through the trap or basin are as long as possible, to promote greater settling of soil particles. Sediment basin length must be twice the width or more if possible—the longer the flow path through the basin, the better.



Temporarily stabilized, direct storm
water discharge from bridge

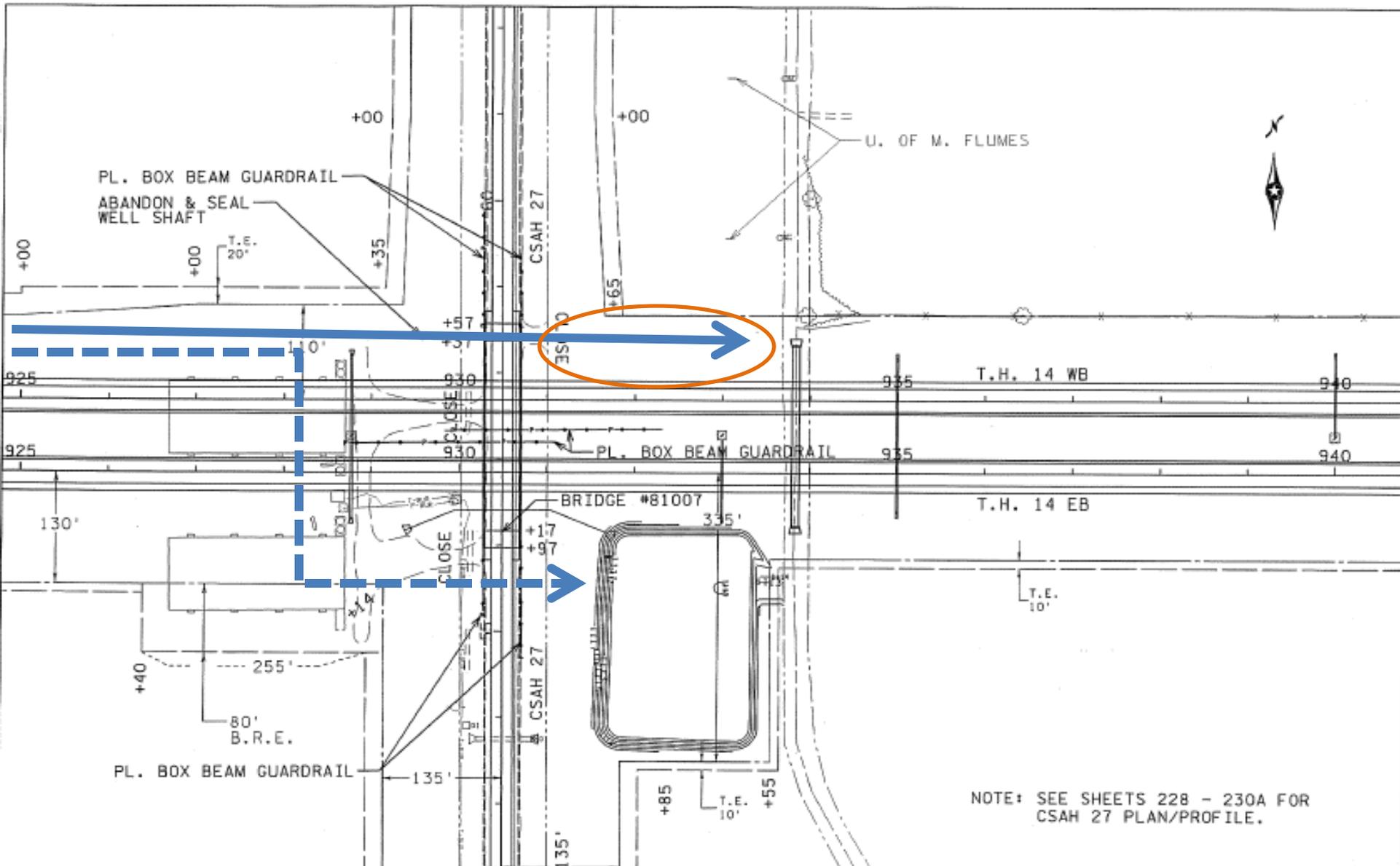


Build Traps. Early.

- Trap Sediments
- 3600/1800 cu ft per acre drainage
- 1 inch of area bounce



Needed temporary routing or additional basin





E3. Details and Location Tabulation

STORM WATER POLLUTION PREVENTION PLAN NARRATIVE

PROJECT LOCATION AND DESCRIPTION OF WORK

THE PROJECT IS LOCATED ON C.S.A.H. 35 BETWEEN 75' WEST OF OKLAHOMA AVENUE WITHIN THE CITY LIMITS OF ADRIAN AND 75' EAST OF THE INTERSECTION OF C.S.A.H. 13 AND C.S.A.H. 35.

- REMOVAL OF EXISTING CONCRETE AND BITUMINOUS PAVEMENT
- REMOVAL AND REPLACEMENT OF ALL INPLACE DRAINAGE STRUCTURES
- COMPLETE GRADING OF THE PROJECT
- STORM SEWER, CURB AND GUTTER WITHIN THE CITY OF ADRIAN
- BITUMINOUS PAVING AND AGGREGATE SHOULDERS FOR THE ENTIRE LENGTH OF THE PROJECT

SITE MAP

THE SITE MAP OF THE PROJECT IS LOCATED ON SHEET 1 OF 65 SHEETS. THE UNITED STATES GEOLOGICAL SURVEY, 7.5 MINUTE QUADRANGLE MAPS AND SOILS MAPS MAY BE VIEWED AT THE NOBLES COUNTY PUBLIC WORKS OFFICE.

ENVIRONMENTAL SENSITIVE AREAS

WETLANDS TYPE 1 AS DESCRIBED BY THE NOBLES COUNTY SOIL AND WATER CONSERVATION DISTRICT.

THE FOLLOWING RECOGNIZED AREAS:

- SECTION 18, T102N-R42W; STA. 10+40 LEFT
- SECTION 17, T102N-R42W; STA. 94+43 LEFT
- SECTION 17, T102N-R42W; STA. 106+00 LEFT
- SECTION 17, T102N-R42W; STA. 150+00 LEFT
- SECTION 17, T102N-R42W; STA. 297+50 RIGHT

SURFACE WATERS AS IDENTIFIED ON THE U.S.G.S. 7.5' QUADRANGLE MAP, LOCATED WITH 1/2 MILE OF THE PROJECT:

- SECTION 18, T102N-R42W; STA. 10+40, CENTERLINE CROSSING
- SECTION 16/21, T102N-R42W; STA. 111+99, CENTERLINE CROSSING
- SECTION 16/21, T102N-R42W; STA. 159+93, CENTERLINE CROSSING
- SECTION 15/22, T102N-R42W; STA. 178+83, CENTERLINE CROSSING
- SECTION 14/23, T102N-R42W; STA. 246+91, CENTERLINE CROSSING
- SECTION 13/24, T102N-R42W; STA. 275+00, CENTERLINE CROSSING
- SECTION 13/24, T102N-R42W; STA. 297+42, CENTERLINE CROSSING

THERE ARE NO OUTSTANDING RESOURCE VALUE WATERS (ORVW's) WITHIN THE PROJECT LIMITS. THERE ARE NO IMPAIRED WATERS (TOTAL MAXIMUM DAILY LOAD WATERS TMDL) WITHIN ONE-HALF MILE OF THE PROJECT LIMITS.

LISTED ENDANGERED OR THREATENED SPECIES

TOPEKA SHINER (NOTROPIS TOPEKA) HABITAT HAS BEEN IDENTIFIED AT STA. 10+40. SULLIVAN'S MILKWEED (ASCLEPIAS SULLIVANTII) IS PRESENT BETWEEN STA. 26+50 - 50' RT. TO STA. 118+00 - 50' RT. THE SLOPE AND DITCH WORK IN THIS AREA SHALL BE LIMITED WITHIN THE EXISTING RIGHT-OF-WAY.

DRAINAGE COMPUTATIONS

THE DRAINAGE COMPUTATIONS USED IN DETERMINING THE STRUCTURE SIZE ARE KEPT ON FILE AT THE OFFICE OF THE NOBLES COUNTY PUBLIC WORKS.

MPCA 24 HOUR EMERGENCY NOTIFICATION: (507) 537-7146 (MARSHALL) TOLL FREE (800) 422-0798

TIMING FOR BMP PLACEMENT

THE EROSION PREVENTION AND SEDIMENT CONTROL BMP'S SHALL BE INSTALLED AS NECESSARY TO MINIMIZE THE EROSION FROM THE DISTURBED AREAS. THE INTENT OF THE BMP PLACEMENT IS TO CAPTURE AND CONTAIN ANY SEDIMENT THAT MAY BE CREATED BY THE ONGOING CONSTRUCTION ACTIVITIES. THE BMP'S PLACEMENT MAY BE ADJUSTED AS DEEMED NECESSARY TO MAXIMIZE THE POSITIVE EFFECT OF THE SEDIMENT CONTROL. NOBLES COUNTY PUBLIC WORKS RECOGNIZES THE NEED TO MEET THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT PART V, CONSTRUCTION ACTIVITY REQUIREMENTS.

LAND FEATURE CHANGES

TOTAL PROJECT AREA DISTURBED:	143.5 ACRES
TOTAL EXISTING IMPERVIOUS SURFACE AREA:	33.6 ACRES
TOTAL EXISTING PERVIOUS SURFACE AREA:	109.8 ACRES
TOTAL PROPOSED IMPERVIOUS SURFACE AREA:	34.2 ACRES
TOTAL PROPOSED PERVIOUS SURFACE AREA:	109.9 ACRES

PROJECT CONTACTS

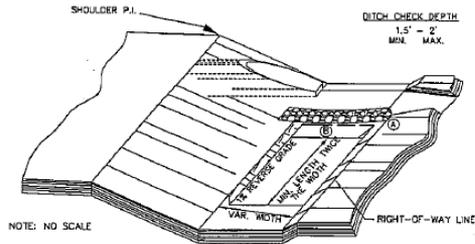
THE NOBLES COUNTY PUBLIC WORKS DIRECTOR IS RESPONSIBLE FOR THE IMPLEMENTATION OF THE SWPPP.

NOBLES COUNTY PUBLIC WORKS DIRECTOR

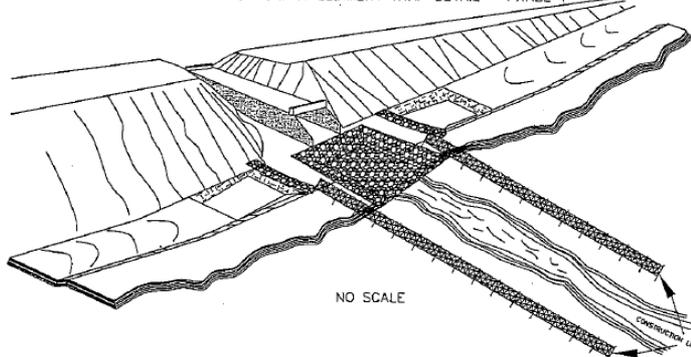
STEPHEN P. SCHNIEDER
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WORTHINGTON, MN 56187

PHONE: (507) 376-3109
FAX: (507) 372-6346
E-MAIL: SCSCHNIEDER@CO.NOBLES.MN.US

TEMPORARY SEDIMENT TRAP DETAIL - PHASE 1

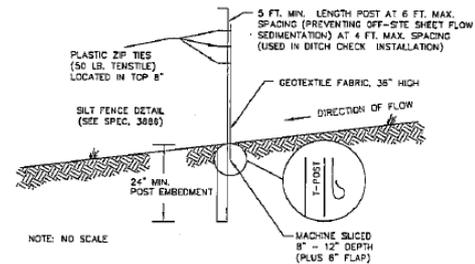


TEMPORARY SEDIMENT TRAP DETAIL - PHASE 1



LOCATION FOR PLACEMENT OF THE EROSION CONTROL DEVICES MAY BE FOUND ON SHEET 7 OF 65 SHEETS.

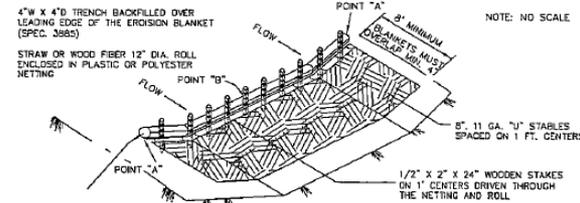
PLACEMENT OF PLANNED SILT FENCE, TYPE MACHINE SLICED



NOTE: NO SCALE

PLACEMENT OF THE SILT FENCE, TYPE MACHINE SLICED IS NOTED ON EROSION CONTROL SHEET OF THE PLAN. THIS QUANTITY ALSO INCLUDES AN ADDITIONAL 240 LIN. FT. TO BE USED AS REQUIRED DURING THE CONSTRUCTION OF THE PROJECT.

PLACEMENT OF TEMPORARY DITCH CHECK, 12\"/>



NOTE: NO SCALE

PLACEMENT OF TEMPORARY DITCH CHECK, 12\"/>

THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE FOLLOWING MAINTENANCE OF THE SEDIMENT TRAPS.

- WHEN THE SEDIMENT TRAP HAS SEDIMENT FILL OF MORE THAN 50% OF ITS STORAGE CAPACITY THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVAL OF THE SEDIMENT TO THE DESIGN SPECIFICATIONS.
- INSPECT FOR DAMAGE OR PROBLEMS IMMEDIATELY FOLLOWING RAINSTORMS. SEDIMENT TRAP REMOVAL IS TO BE INCIDENTAL TO ITEM 2573.602 TEMPORARY SEDIMENT TRAP. NO DIRECT COMPENSATION WILL BE MADE THEREFOR.

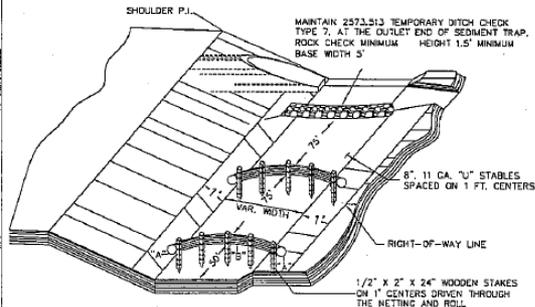
IMMEDIATELY FOLLOWING THE REMOVAL OF THE SEDIMENT TRAP, CONSTRUCT EROSION CONTROL BLANKET AS DESCRIBED IN THE PHASE 2 DETAIL.

TEMPORARY DITCH CHECK TYPE 7, AND ROCK CHECK TO BE BUILT ON THE INLET END OF THE CULVERTS ALSO.

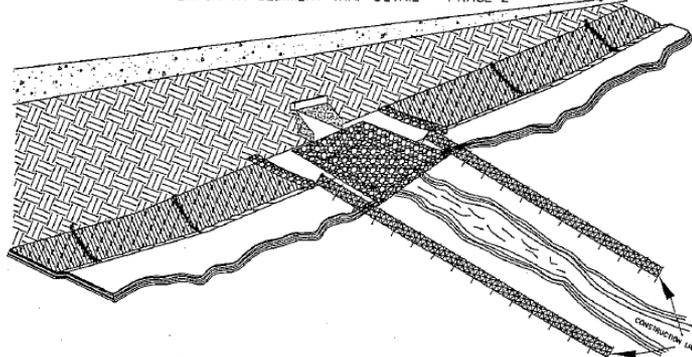
SHOULD THE NEED FOR Dewatering BY PUMPING METHOD BE USED, THE CONTRACTOR SHALL BE REQUIRED TO CREATE A RIP-RAP FILLED BASIN THAT WILL ACCEPT THE PUMPED WATER AND NOT CREATE EROSION OR DISTURBANCE OF SOILS BEFORE THE WATER IS ALLOWED BACK INTO THE DOWNSTREAM CHANNEL.

THE INLET END OF THE PUMPING OPERATIONS SHALL USE A 1/8\"/>

TEMPORARY SEDIMENT TRAP DETAIL - PHASE 2



TEMPORARY SEDIMENT TRAP DETAIL - PHASE 2



POINT \"A\" IS TO BE A MIN. OF 6\"/>

THE EROSION CONTROL BLANKET UNDER THE BIOROLL IS TO BE A TYPE 3 TO PAID FOR AS BID ITEM 2575.525.

THE BIOROLLS ARE TO BE PLACED AT 75' INTERVALS FROM THE TEMPORARY DITCH CHECK PLACEMENT OF PHASE 1. PLACEMENT OF THE REQUIRED EROSION BLANKET IS TO BE A MIN. OF 1' ABOVE THE DITCH BOTTOM.

PLACEMENT OF THE EROSION BLANKET FOR PHASE 2 IS TO BEGIN ON THE UPSTREAM SIDE OF THE PHASE 1 TEMPORARY DITCH CHECK, AND TO CONTINUE 200' UPSTREAM (AWAY FROM CULVERT)

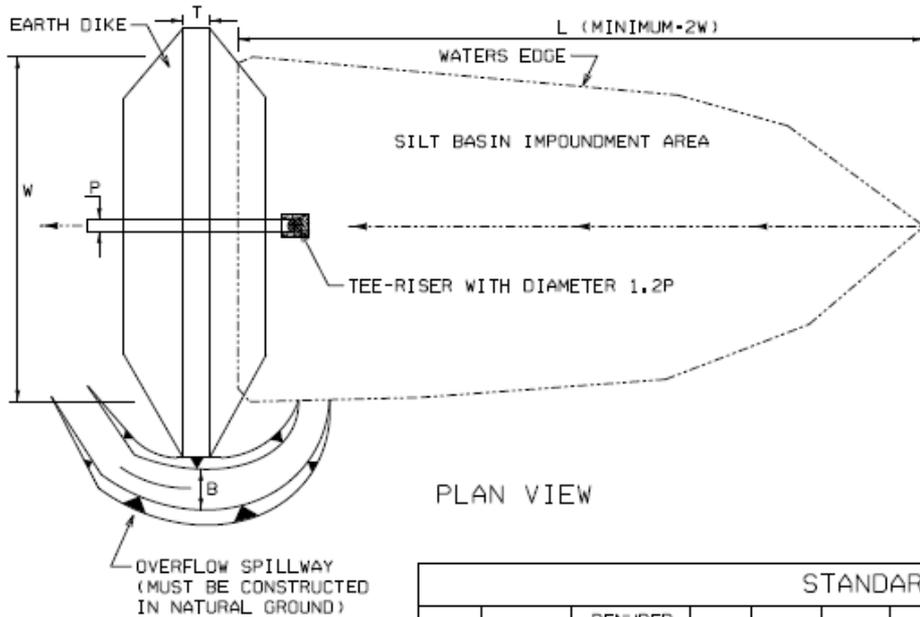
CERTIFIED BY *Stephen P. Schnieder* REG. NO. 15068 DATE: NOVEMBER 27, 2008
PROFESSIONAL ENGINEER

S.P. 53-635-21

SHEET NO. 6 OF 65 SHEETS



Temporary Sediment Ditch Trap



NOTES:

1. CLEAN OUT BASIN WHEN SEDIMENT VOLUME REACHES 50% OF STORAGE VOLUME.
2. MINIMUM SURFACE AREA AND MINIMUM VOLUME ARE MEASURED BELOW THE TOP OF PRINCIPAL SPILLWAY (TOP OF RISER).
3. ALL DIMENSIONS OF BASIN WILL NOT REQUIRE CONSTRUCTION TO NEAT LINES.
4. THE EARTH DIKE MAY BE CONSTRUCTED ALONG ONE OR MORE SIDES. EXCAVATION MAY BE REQUIRED TO PROVIDE MINIMUM SURFACE AREA AND/OR MINIMUM STORAGE VOLUME.
5. CONSTRUCT THE DIKE OF MATERIAL SUITABLE FOR AND MEETING ROADWAY EMBANKMENT SPECIFICATIONS.
6. TO FACILITATE DETERMINATION OF MAINTENANCE CLEANOUT REQUIREMENT, PLACE A MARKER IN THE BASIN INDICATING 50% VOLUME LEVEL.
7. THE MINIMUM RISER PIPE DIAMETER IS 1.2 TIMES THE BARREL PIPE DIAMETER.

STANDARD BASIN DIMENSIONS

P	D.A. (MAX)	DENUDED AREA (MAX)	H	T (MIN)	D'	E	F	B (MIN)	X (MIN)	Y (MIN)	X1 (MIN)	Y1 (MIN)	SURFACE AREA (MIN)	STORAGE VOLUME (MIN)
IN.	AC	AC	FT.	FT.	FT.	FT.	FT.	FT.	FT.	FT.	FT.	FT.	FT.' ²	YD.' ³
15	3.0	2.0	1.0	6.0	6.0	4.0	1.0	3.0	2.7	1.0	2.5	1.0	1050	200
18	4.5	3.0	1.0	6.0	6.5	4.5	1.0	4.0	3.5	1.0	3.2	1.0	1400	300
24	9.0	6.0	1.0	6.0	8.0	6.0	1.0	8.0	5.5	1.0	5.0	1.0	2810	600
30	16.0	10.0	1.0	6.0	9.5	7.0	1.5	8.0	7.6	1.0	6.9	1.0	4560	1000

* SHALL NOT EXCEED 12'

REVISION DATE:
01-07-2011

STANDARD SHEET NO.
XXXX.XX
STANDARD APPROVED
MONTH 07, YEAR
STATE PROJ. NO.

TITLE:
STANDARD PLAN FOR
RISER BASIN

- SHEET OF SHEETS







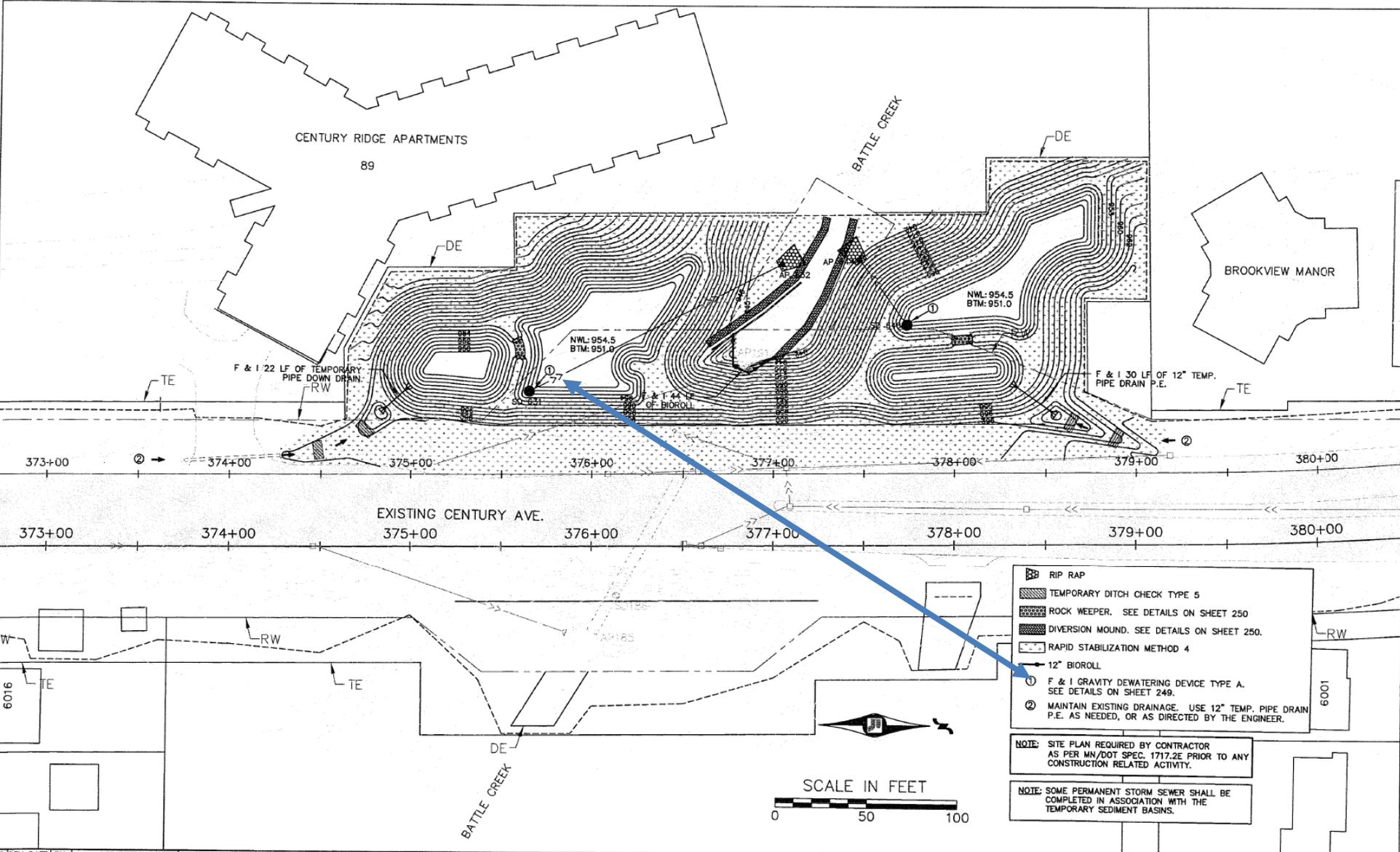








Dewatering Riser



REV-DATE	BY:	DESCRIPTION
XX-XX-XX	XX	

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
 SIGNED: *[Signature]*
 REG NO: 26511 DATE: May 13, 2008

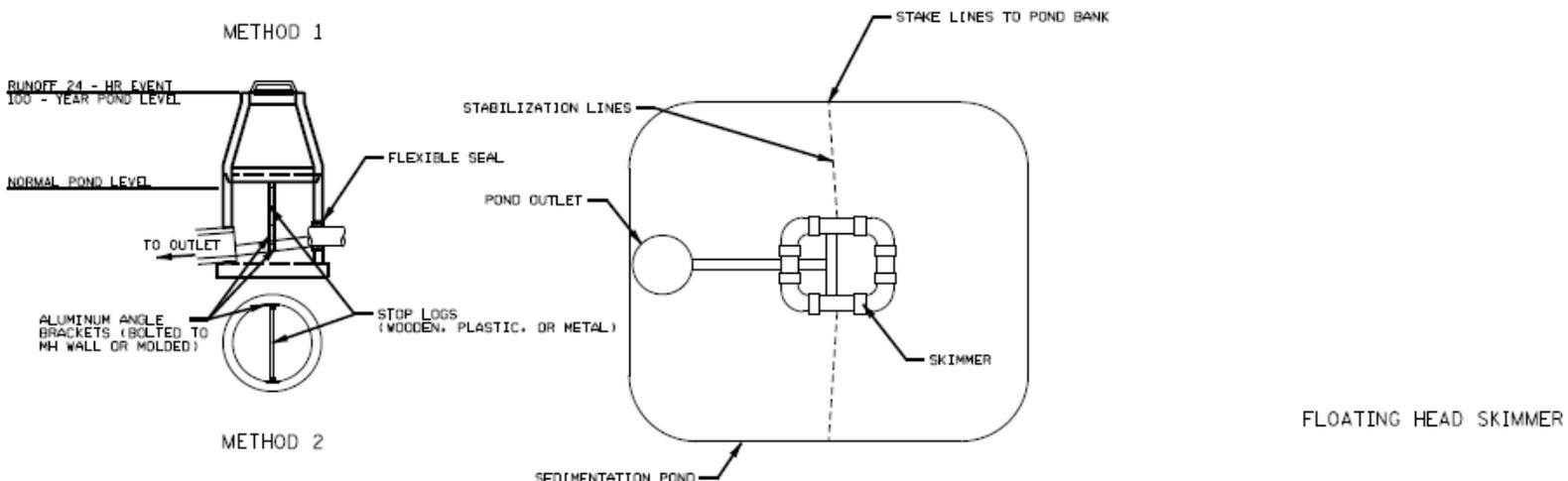
CENTURY AVENUE

S.P.62-672-04 CTB
 S.P.82-625-02 CTB
 S.A.P.82-616-16 CTB



BATTLE CREEK TEMPORARY SEDIMENT BASIN
 Sheet No. 237 of 315 Sheets

Temporary Sediment Control. Floatation Head Skimmer



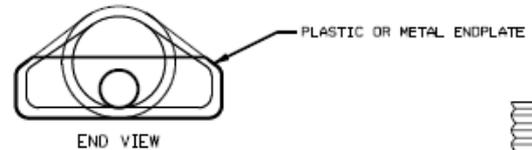
NOTES:

SIZE (DIA) INCHES	MAX CAPACITY	
	CFS	AC-FT/DAY
2	0.04	0.075
2.5	0.06	0.126
3	0.10	0.195
4	0.21	0.419
5	0.38	0.754
6	0.60	1.180

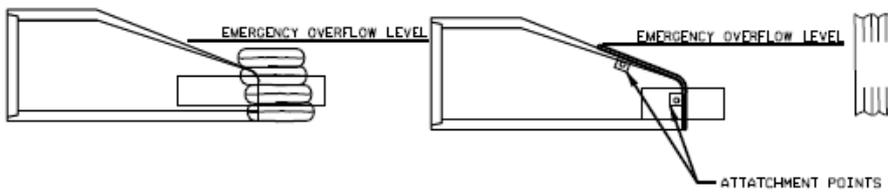
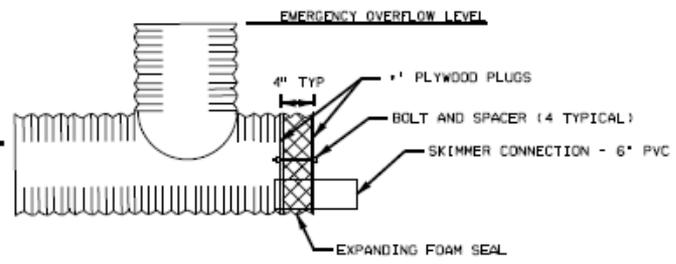
SANDBAG INSTALLATION



PLATE INSTALLATION



CMP INSTALLATION



Floating Head Skimmer





Pump Head Float





Lift Station Treatment System







What is Turbidity?

- Loss of water clarity due to suspended particles
- Measurement of turbidity is a key test of water quality during construction water discharge
- Suspended sediments affect many factors of water benefits



Monitoring Protocols

How Dirty is Dirty?

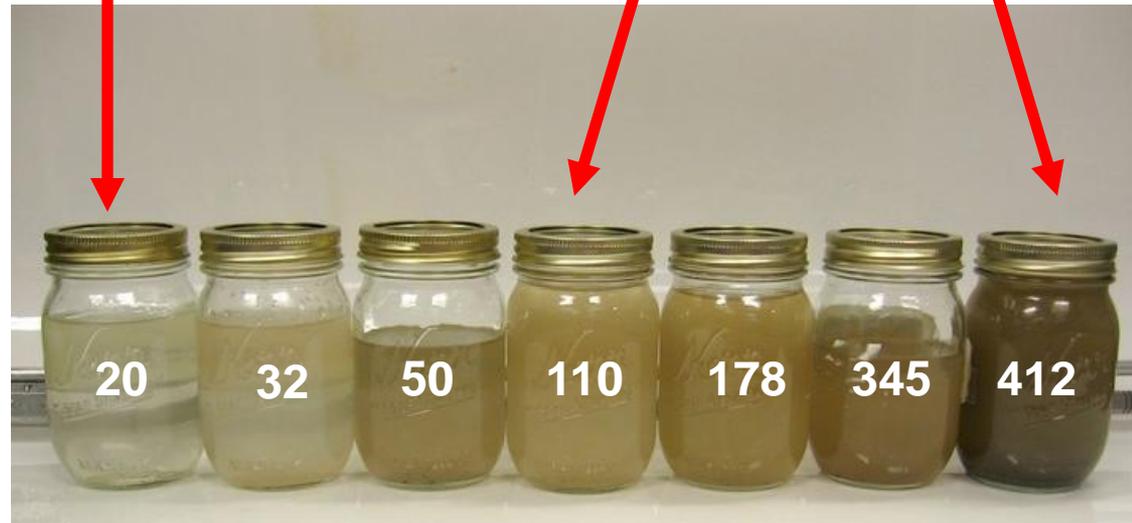
- Any discharge causing a “nuisance condition.”

Rule of thumb*:

- A discharge within 50 NTUs of the receiving water will not cause a nuisance condition

Imaginary Hills Creek
baseline water clarity

Nuisance
Condition:
(Violation)



*Not a regulatory standard. State/local regulations may have stricter definition.

• Data collection Monitoring Requirements

- Rate of pumping
- Turbidity Goal
 - Special/Impaired: 25ntu above receiving water, not to exceed 75 ntu
 - Regular water: 50 ntu above receiving water, not to exceed 125ntu
- pH
 - Range 6.1 to 8.5
- Time period
 - Hourly
- Forms
- Automated datalogging systems

Was water quality sampling part of this inspection? YES NO

If yes, record results below (attach separate sheet, if necessary):

Parameter:	Method (circle one)	Result	Units
Turbidity	tube, meter, laboratory		NTU (cm, if tube used)
pH	paper, kit, meter		pH standard units

Dewater field Checklist

- Obtain/Develop acceptable Site Plan
- Verify contractor qualifications
- Verify aquatic organism areas of concern
- Pre-filter (if possible)
- Provide a stable treatment flow path
- Provide exit scour control
- Provide secondary containment for potential leaks of chemicals used for pumping and flocculation
- Provide method for visual or mechanical assessment of performance
- Inspect final receiving water/location of discharge
- Prepare cleaning/decontamination protocols



Site Management Plan Requirement Area



Where to measure

- Treatment train stages
- Pump hose outfalls
- Upstream
- Downstream

WETLAND NO. 3

ENVIRONMENTALLY SENSITIVE AREA

③ PLACE RIPRAP TO ELEVATION 808.0. SEE GRADING SITE "A" ON SHEET NO. 227 AND TABULATION ON SHEET NO. 29.

BR NO 62716

BR NO 62717

BA24 C&G

PSB10

LOW POINT
580+83.26
EL. 886.24

NWL 882.0
POND P1

BOTTOM 882.0

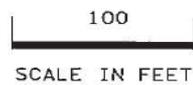
PC94WB1

RWALL 1
HIGH POINT
55+70.21
EL. 914.69

② PLACE CLASS 1 EROSION STABILIZATION MAT TO 2' ABOVE PROPOSED DITCH BOTTOM FROM APRON TO APRON. SEE GRADING SITE B ON SHEET NO. 227 AND TABULATION ON SHEET NO. 29.

ENVIRONMENTALLY SENSITIVE AREA

VALENTINE LAKE
WETLAND NO. 6



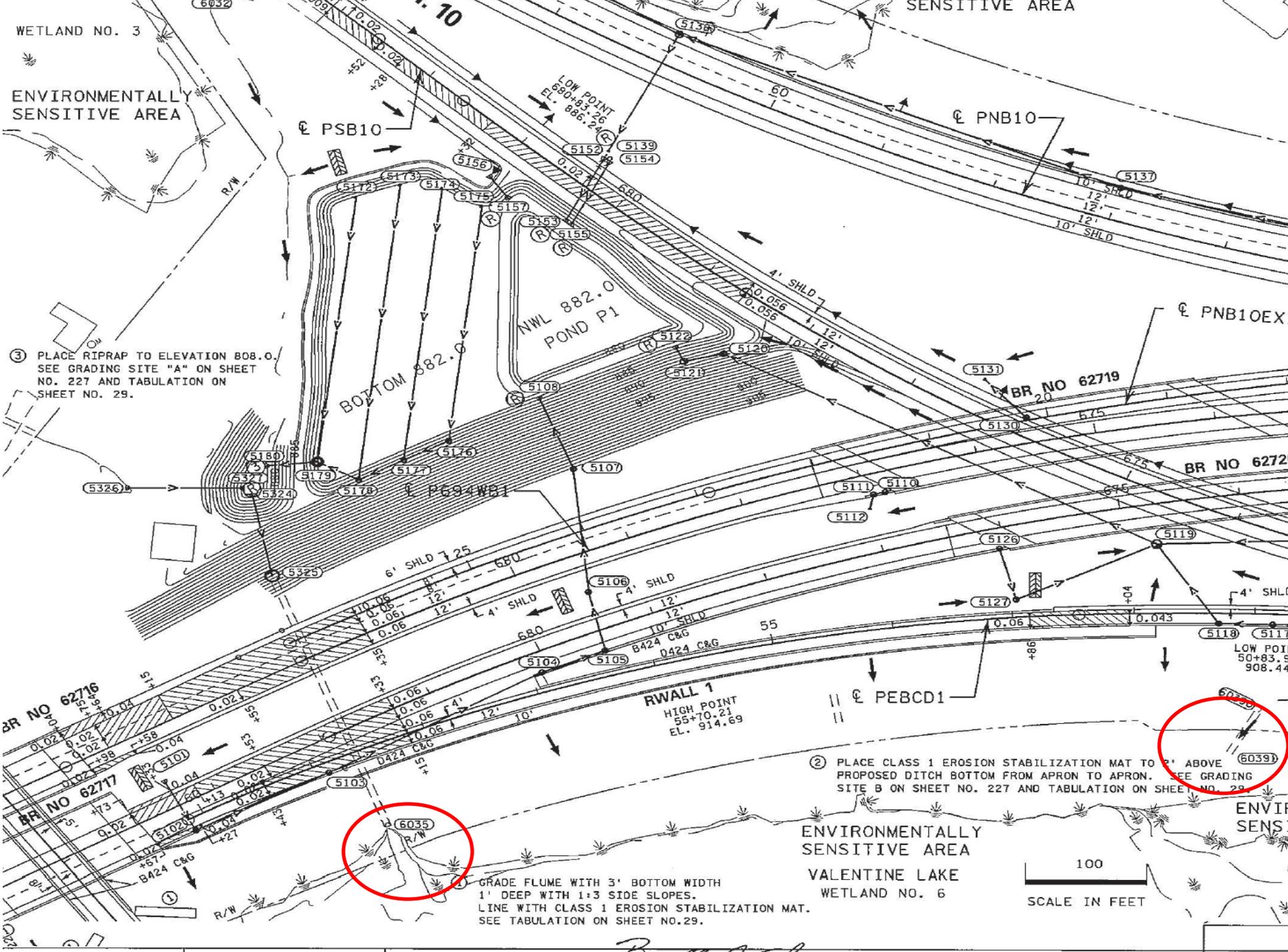
SCALE IN FEET



GRADE FLUME WITH 3' BOTTOM WIDTH
1' DEEP WITH 1:3 SIDE SLOPES.
LINE WITH CLASS 1 EROSION STABILIZATION MAT.
SEE TABULATION ON SHEET NO. 29.



ENVIRONMENTALLY SENSITIVE AREA



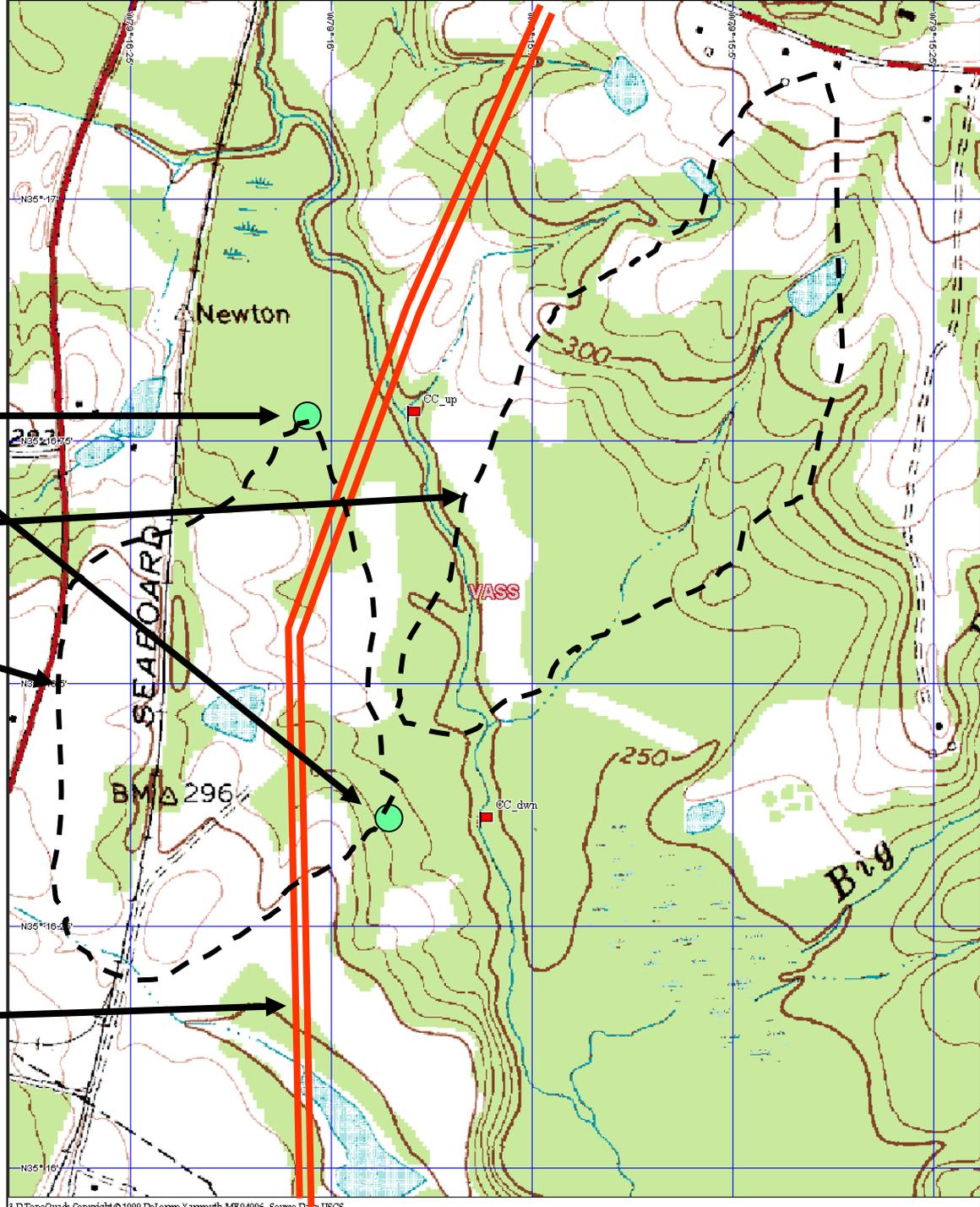
Crane Creek

Monitoring sites

Trib from NE

Land from West

Highway 1 bypass



Upstream

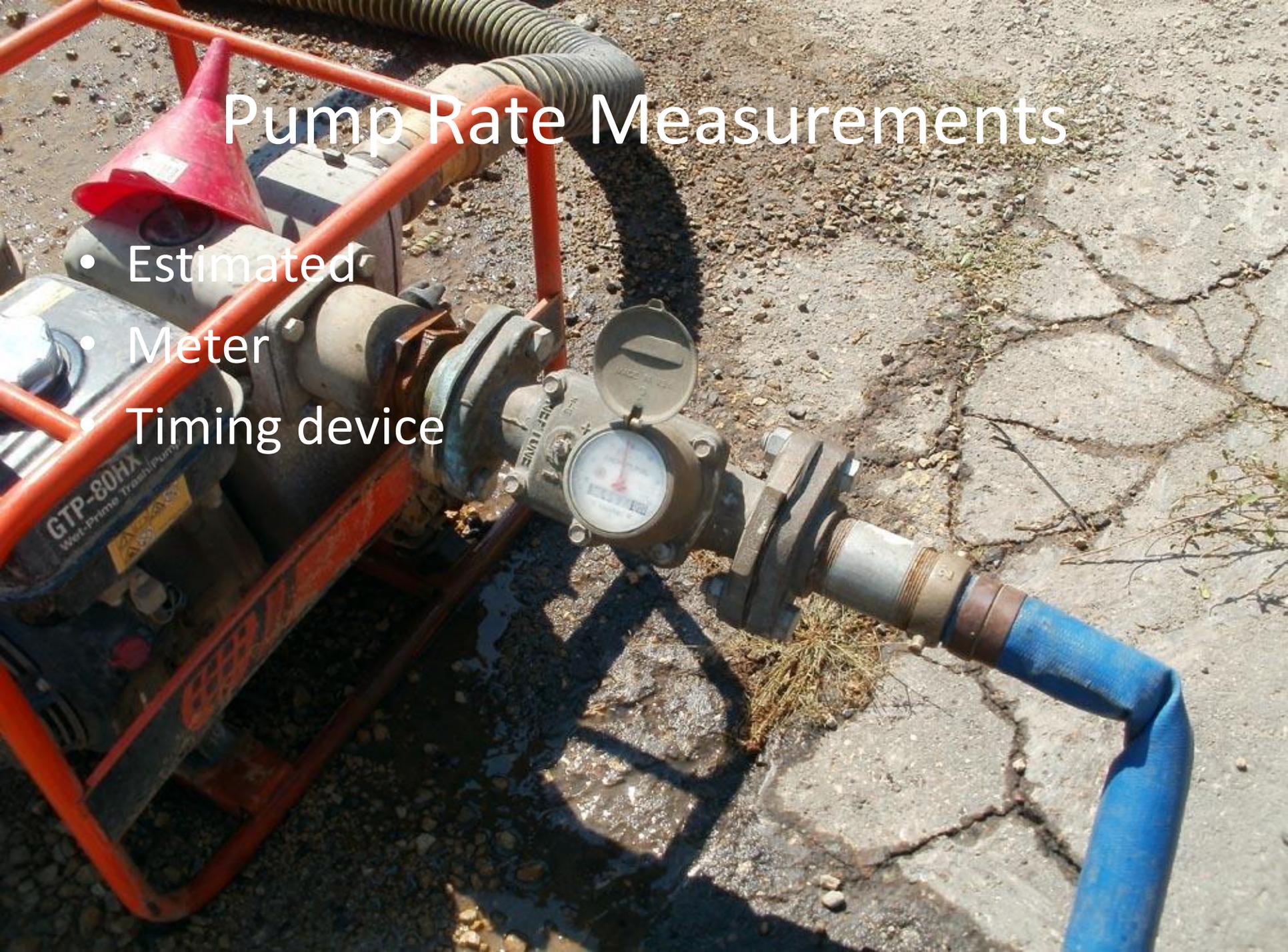


Downstream/Outfall



Pump Rate Measurements

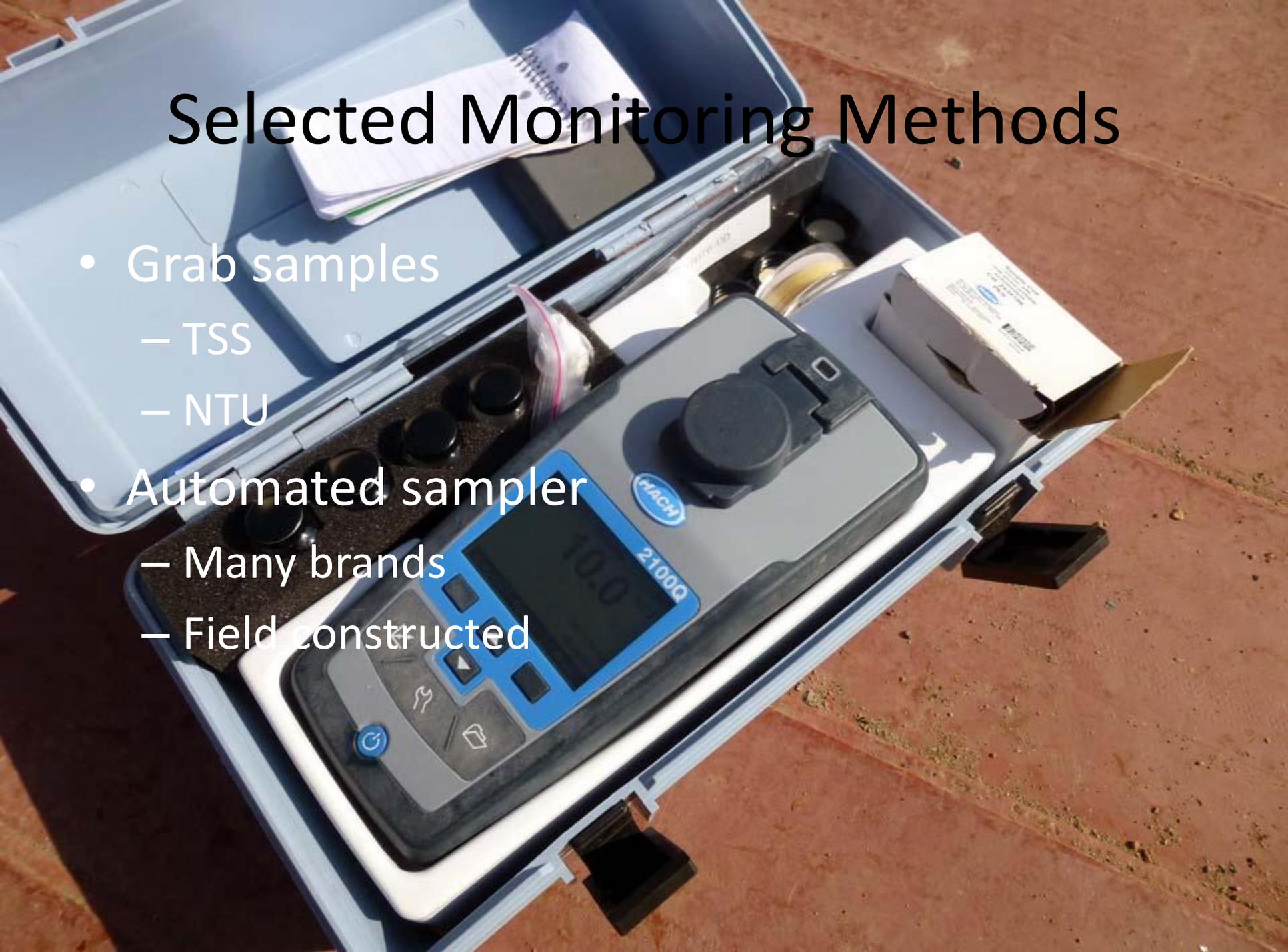
- Estimated
- Meter
- Timing device





Selected Monitoring Methods

- Grab samples
 - TSS
 - NTU
- Automated sampler
 - Many brands
 - Field constructed



TSS Monitoring



ISCO

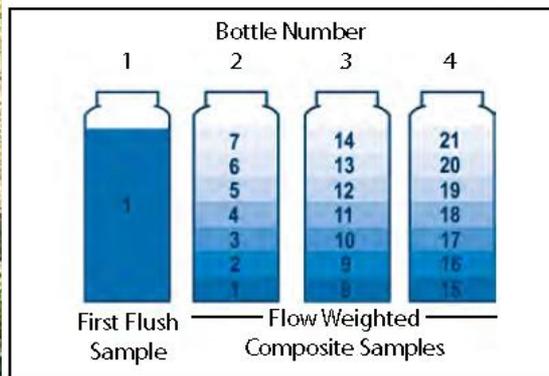


Figure C

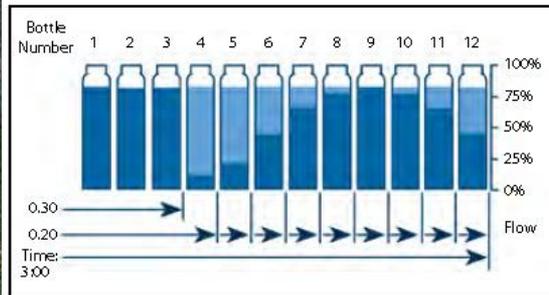
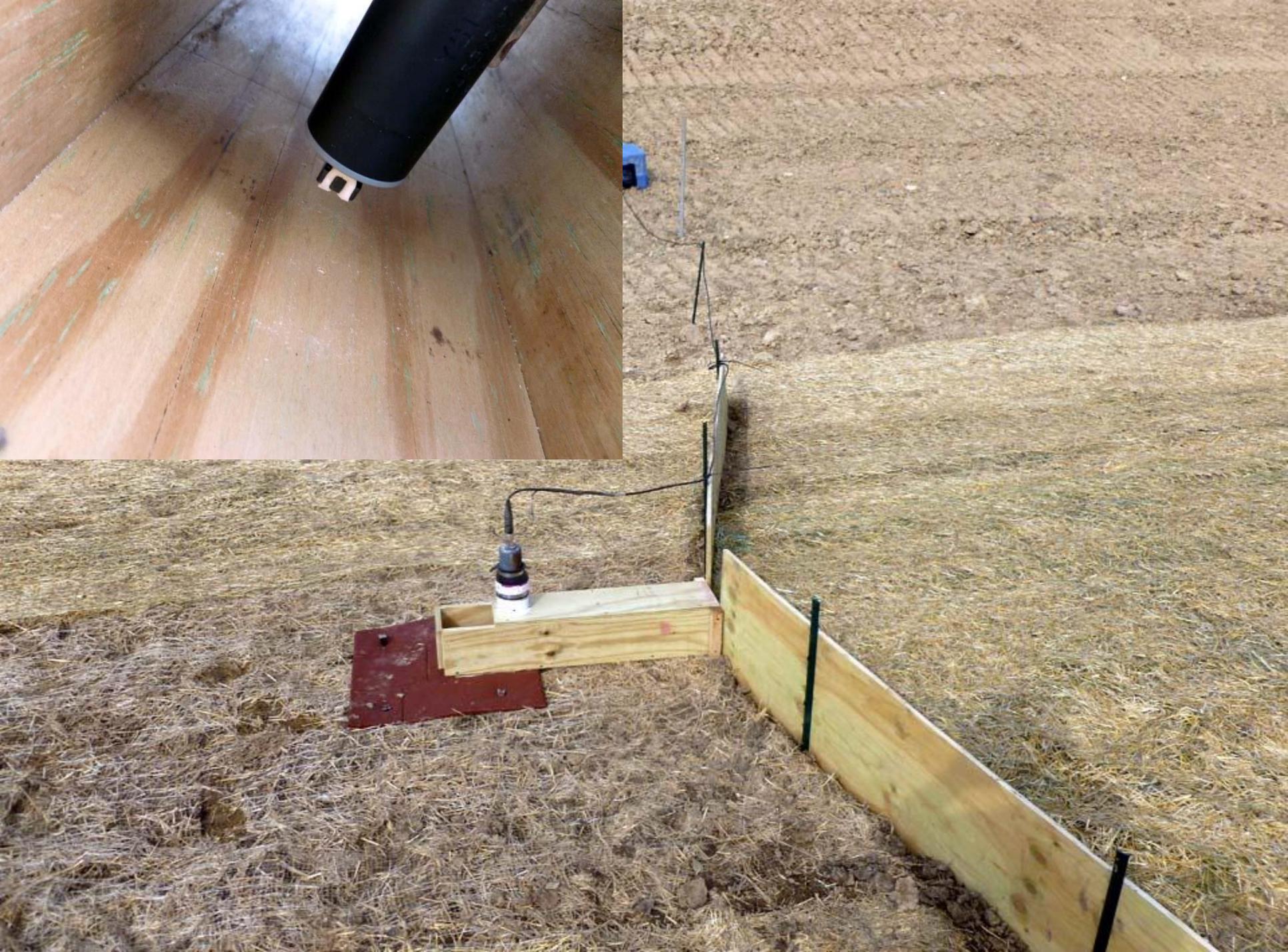


Figure D

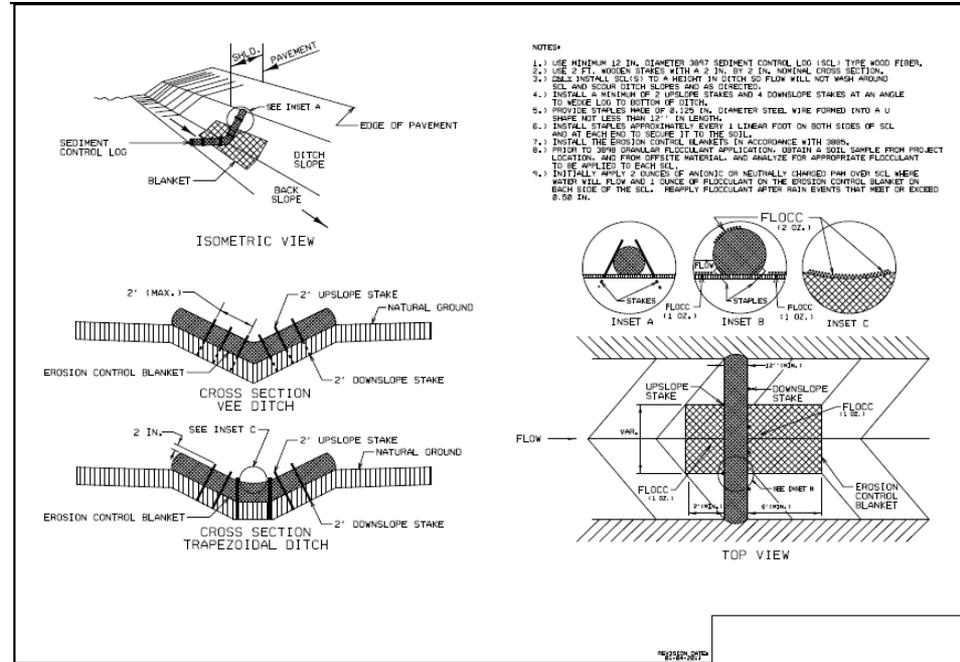




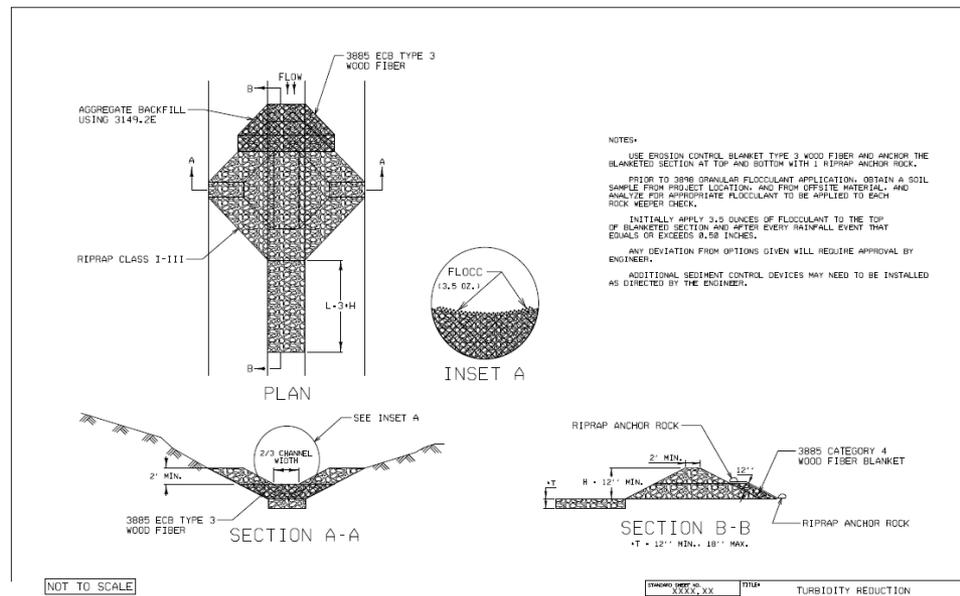


Turbidity Reduction.

- *Temporary Filter Log Weeper System & Granular Flocculent*



- *Temporary Rock Weeper System and Granular Flocculent*



NOT TO SCALE



Passive Treatment Ditch

- Wood fiber blanket, or coir net
- Sprinkle 3.5 oz. of soil matched PAM on the top, lower portion of matting section
- Re-apply after a 0.5" rain event, if needed.



Active Dewatering/Pumping BMPs

- Kiddy pools, plastic liners
- Filter inlet screens
- Floating skimmers
- Flocculent injectors
 - Residual detection
- CO2 Sparging injection
- Dewatering bags
- Dumpsters, tanks
- Pond baffles
- Pressure filters
- Scour control rock, plastic, geotextile, culvert end, etc.
- Monitoring technology

Secondary Containment





Critter death prevention





Pretreatment: Slotted riser and rock



Scour Control

- Riprap
- Plastic/geotextile
- Plywood
- Water fountain risers

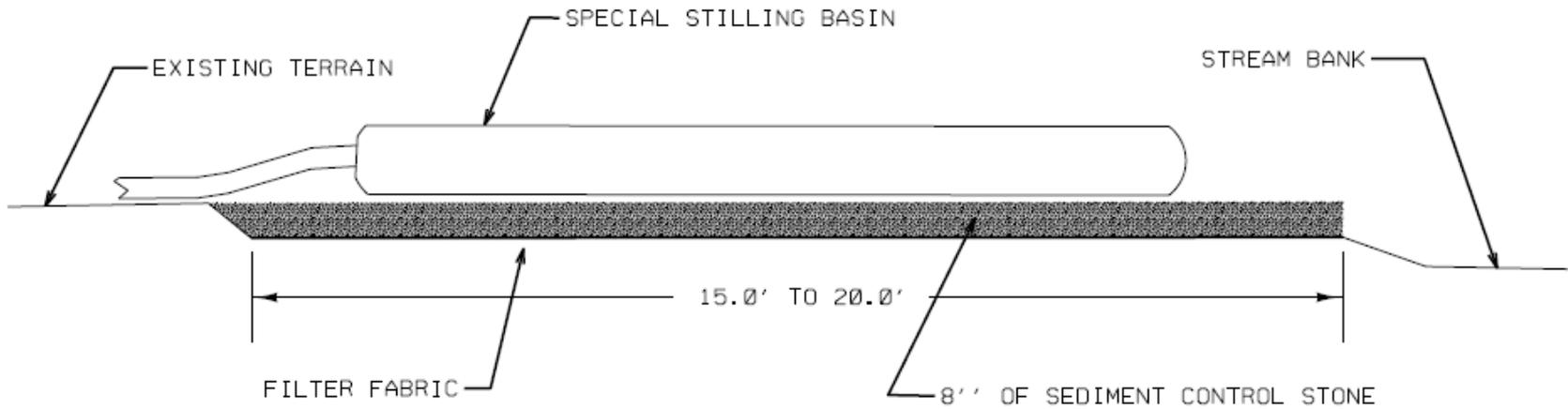
- Contractor ingenuity



Turbidity Reduction. *Dewatering Bag*

PUMP SIZE (IN)	PUMP FLOW RATE (GPM)	BAG VOLUME (CUFT)
1.5	90 - 120	1600
2	90 - 300	3200
3	300 - 800	6400
4	400 - 1300	12800
6	400 - 1800	19200

NOTE: PROVIDE STABILIZED OUTLET TO STREAMBANK
NOT TO SCALE



STANDARD SHEET NO.
X-XXX,XXX

STANDARD APPROVED:
XX MONTH YEAR

TITLE:
TURBIDITY REDUCTION
DEWATERING BAG

REVISION DATE:
12-29-2018

STATE PROJ. NO. - SHEET NO. OF SHEETS



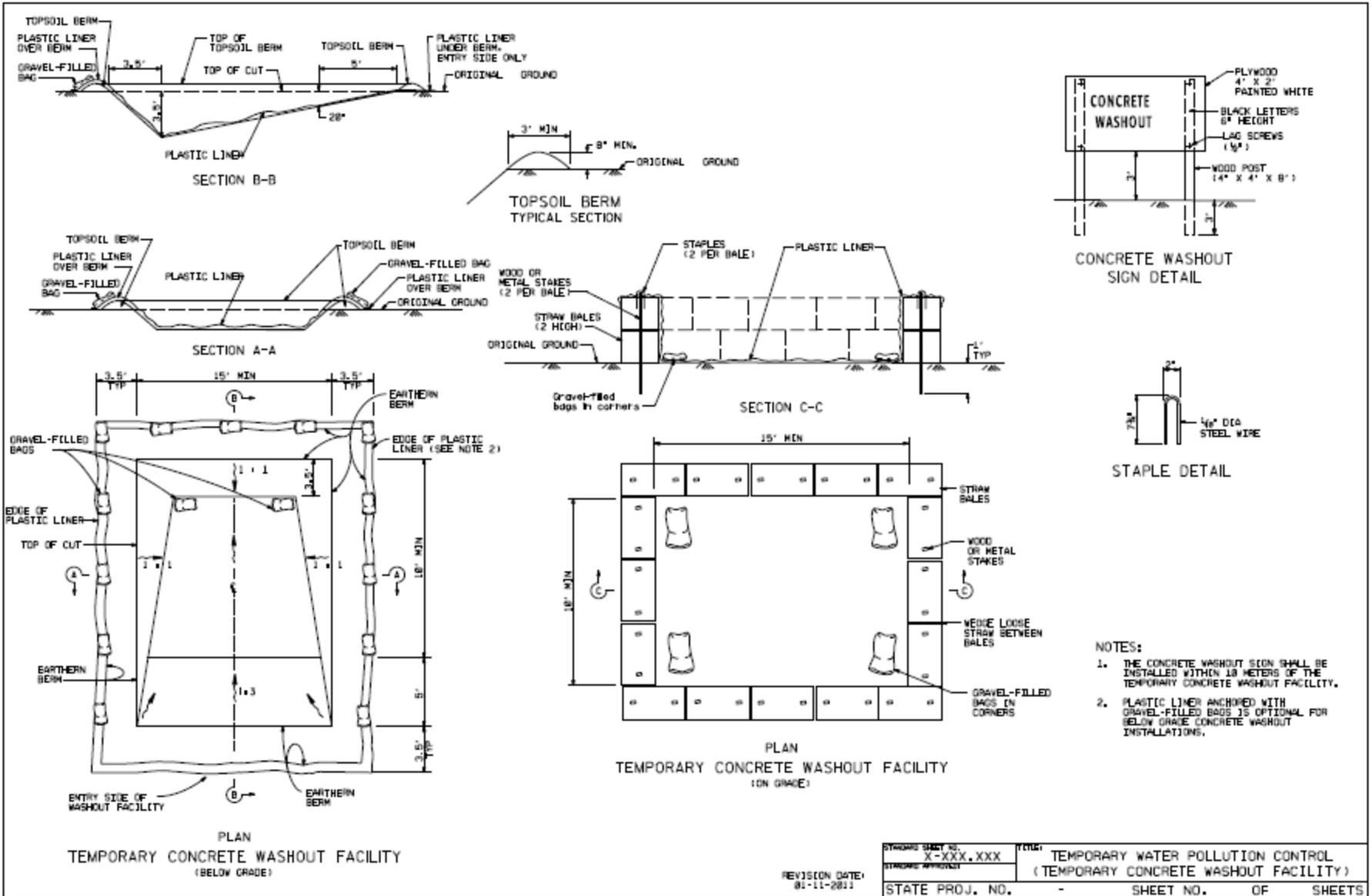


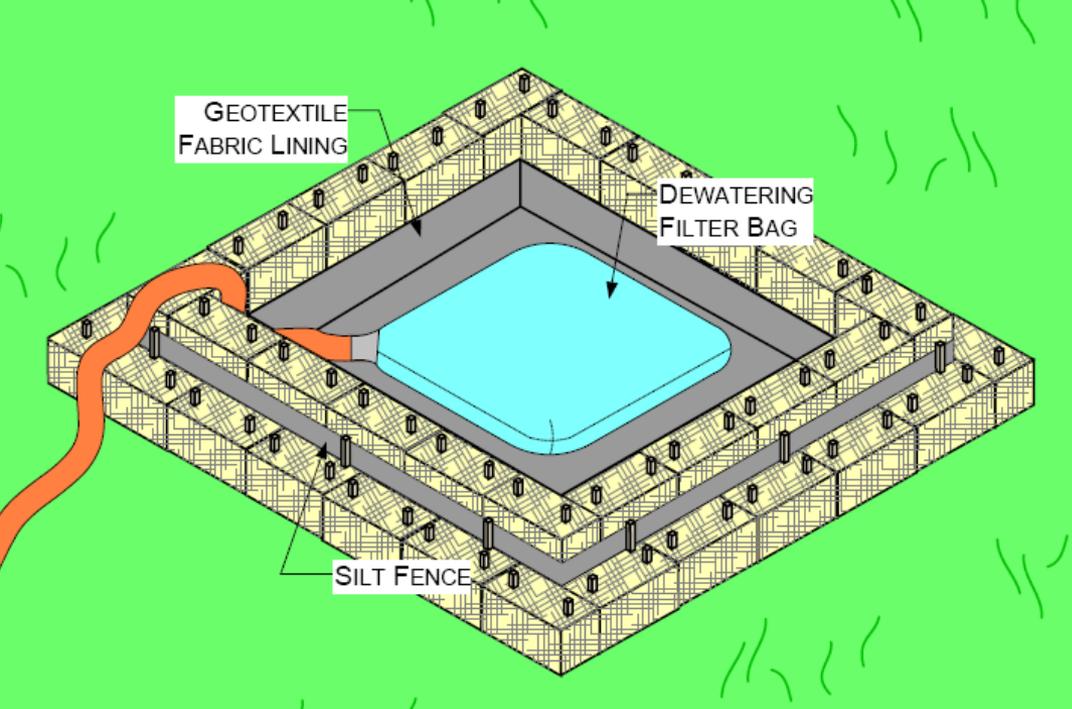
Many sizes, configurations





Temporary Water Pollution Control: Dewatering trap









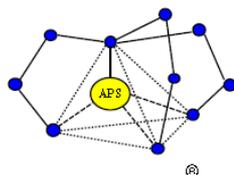


Chemical Treatment Options

- MSDS Required for any chemical used
- Natural base
 - Chitosan
 - Chitosan and pretreatment
 - Calgon
 - Corn starch
 - Cellulose
- Synthetic base
 - Poly acrylamide (PAM)

MSDS

Updated July 23, 2010



Date: 3/9/2007
Revision: 01

Material Safety Data Sheet StormKlear: Liqui-Floc 1%

Applied Polymer Systems, Inc.

Material Safety Data Sheet

1. IDENTIFICATION OF THE PRODUCT AND THE COMPANY

Product Name: APS 705 Silt Stop
Supplied: Applied Polymer Systems, Inc. Tel. 678-494-5998
519 Industrial Drive Fax. 678-494-5298
Woodstock, GA 30189 www.siltstop.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Identification of the preparation: Anionic water-soluble Co-polymer

3. HAZARD IDENTIFICATION

Aqueous solutions or powders that become wet render surfaces extremely slippery.

4. FIRST AID MEASURES

Inhalation: Move to fresh air. Use dust mask when handling.
Skin contact: Contact with wet skin could cause chapping and dryness. Wash with water and soap. In case of persistent skin irritation, consult a physician.
Eye contact: Rinse thoroughly with plenty of water, also under the eyelids; seek medical attention in case of persistent irritation.
Ingestion: Consult a physician

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media: Water, water spray, foam, carbon dioxide, dry powder.
Special fire-fighting precautions: Aqueous solutions or powders that become wet render surfaces extremely slippery.
Protective equipment for firefighters: No special equipment required.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: No special precautions required.
Methods for cleaning up: Do Not flush with water. Clean up promptly by sweeping or vacuum. Keep in suitable and closed containers for disposal. After cleaning, flush away traces with water.

7. HANDLING AND STORAGE

Handling: Avoid contact with skin and eyes. Avoid dust formation. Do not breath dust. Use dust mask during handling. Wash hands after handling.
Storage: Keep in a cool, dry place. (0-30° C)

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

Manufacturer's Name: HaloSource, Inc.
Corporate Address: 1631 220th St. SE, Suite 100, Bothell, WA 98021
Manufacturer's Telephone: (425) 881-6464 (Monday-Friday, 8AM-5PM PDT)
Emergency Telephone: 800-424-9300 Chemtrec (24 Hours)
Material/Trade/Product Name: StormKlear: Liqui-Floc 1%
Synonyms: None
Chemical Name: Chitosan Acetate
Chemical Formula: Not available
CAS No.: Not applicable
EPA Registration #: Not applicable
Product Use: Flocculates soil contamination in storm water.

SECTION 2: COMPOSITION/INFORMATION ON INGREDIENTS

CAS NO.	COMPONENT	%	OSHA HAZARDOUS ?
84-19-7	Acetic Acid	1	YES
	All other components are non-hazardous.	99	NO

NOTE: See Section 8 for permissible exposure limits.

SECTION 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Clear to pale yellow viscous liquid with a pungent vinegar odor.
May be mildly irritating to eyes. Not likely to be hazardous to skin, respiratory tract, or by ingestion.

POTENTIAL HEALTH EFFECTS

EYE: May be mildly irritating to eyes.
SKIN: Not hazardous to skin.
INHALATION: Not likely to be hazardous by inhalation.
INGESTION: Not likely to be hazardous by ingestion.

Applied Polymer Systems, Inc.
Silt Stop. Sample
APS # 702

Applied Polymer Systems, Inc.
Silt Stop. Sample
APS # 705

Applied Polymer Systems, Inc.
Silt Stop. - Sample
APS # 707

Applied Polymer Systems, Inc.
Silt Stop. Sample
APS # 712

Applied Polymer Systems, Inc.
Silt Stop. - Sample
APS # 730

Applied Polymer Systems, Inc.
Silt Stop. - Sample
APS # 740

Applied Polymer Systems, Inc.
Silt Stop. Sample
APS # 745















Liquid floc Injection





Chitosan Enhanced Sand Filtration



Residual testing



Emergency Planning

- Using site amenities
 - Undisturbed areas
 - Sandy grade
 - Adjacent landowner
- City sanitary utility







D-713

TRAIL-EZE

88 UNIVERSITY

SPACE AVAILABLE
803-680-8845

MEYER
CONTRACTING

VA
EQUIP
123456

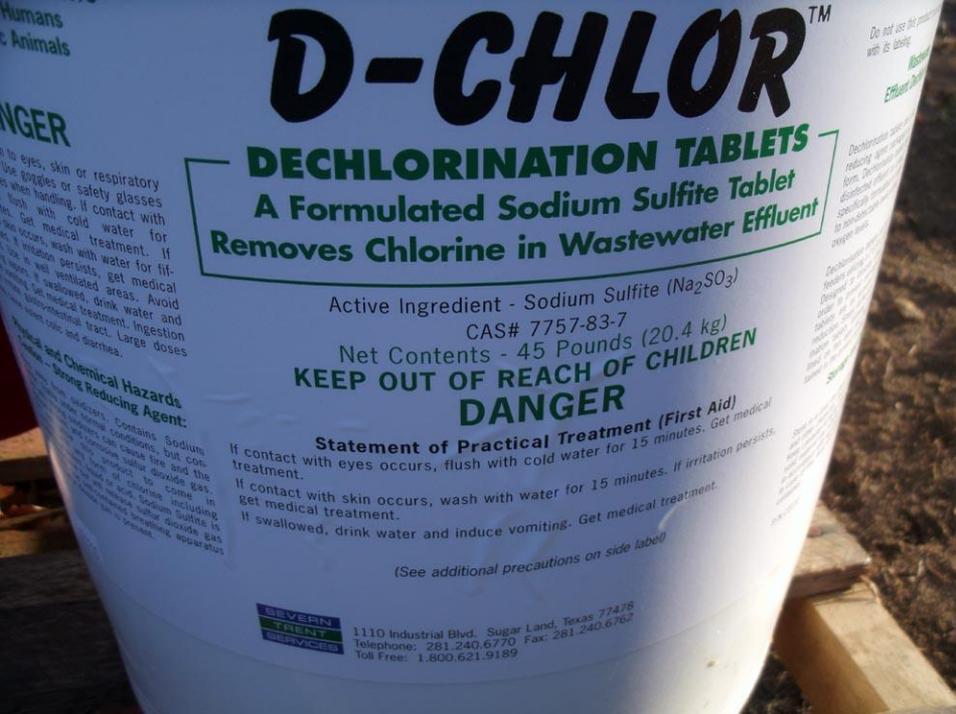






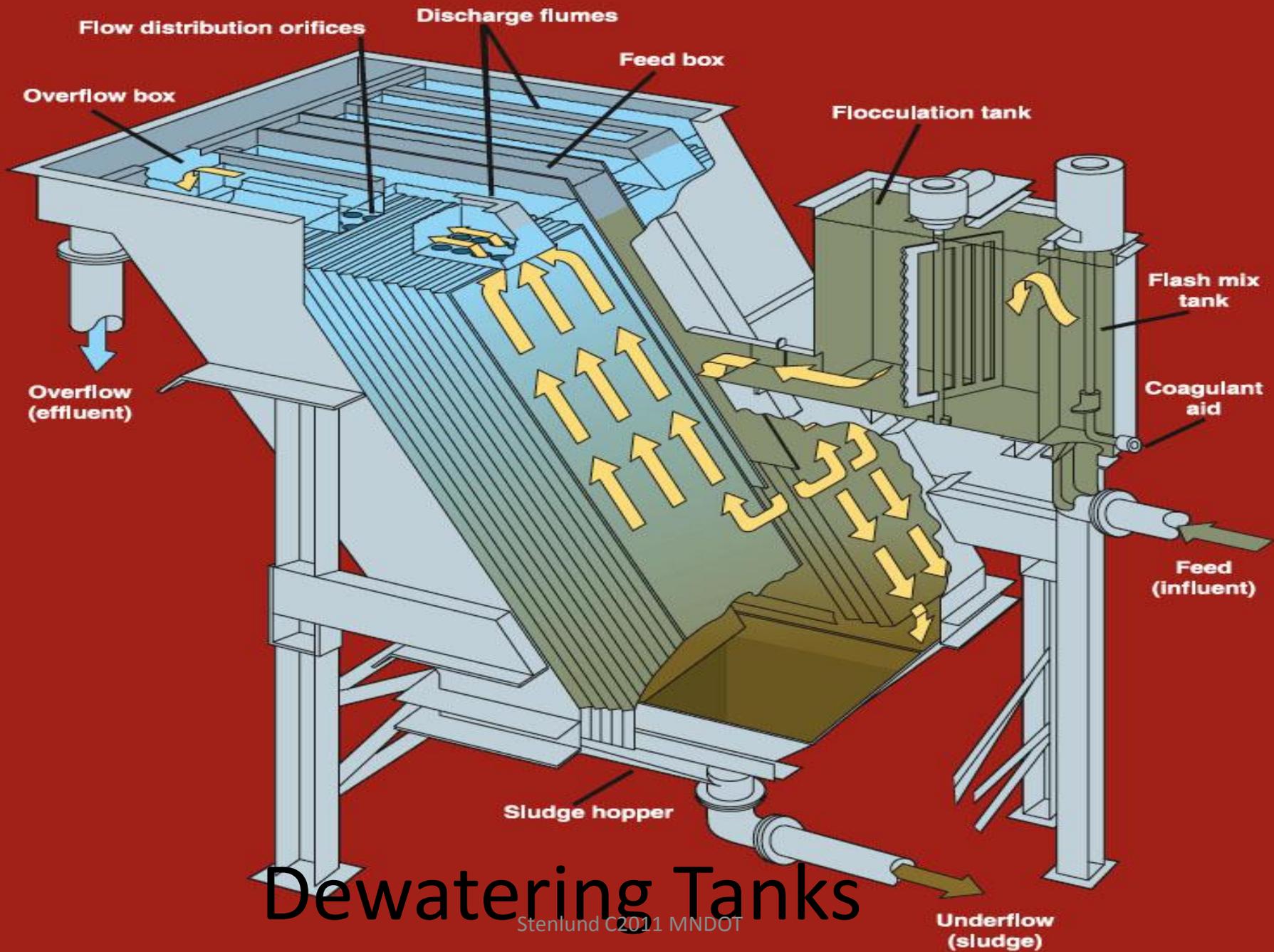






Further information

- Northern Dewatering
- Rain for Rent
- Brock White
- BioStar – Hild & Associates
- StormKlear
- Applied Polymers



Dewatering Tanks

Stenlund C2011 MNDOT



Sludge discharge



Pressurized Bag Filter



Graham Tate, 2005

Stenlund C2011 MNDOT



Cartridge Filter



(403) 571-4295

Combinations



Reverse Osmosis

