Compost Adventures

Organic Materials Utilization for Construction Activities that Protect US Waters

Using Compost to Improve Stormwater Management & Erosion Control on Roadsides

Roundtable & Living Field Demonstrations

Retzer Nature Center, Waukesha WI

EPA Region 5

September 13, 2007

Dwayne Stenlund, MSc., CPESC, CPRM

Minnesota Department of Transportation

Outline

- History, MnDOT Utilization
- Specifications/Project & CADD Details, State Statutes
  - *MNDOT 3890*
  - State Statute 7035
- Projects
- Future Needs

MnDOT History

- Standard Specifications for Construction
  - **1988**: 1st occurrence in Spec book
    - 1991: Supplement January 2
    - 1994: Supplement May 2
  - **1995:**
  - 1996: Assigned to solve compost problems
  - **2000:**
  - **2005:** Current

1988

- 3890 Established two Grade Types
  - Grade 1: use in **turf establishment**, nutrient rich type derived from the decomposition of poultry or animal manures with a texture similar to a highly organic soil.
    - Min/Max of: Moisture content, CN ratio, TN, Available P, Soluble K
  - Grade 2: use in **landscape planting medium**, humus rich type derived from the decomposition of leaves and yard wastes or animal and poultry manure with a texture similar to shredded peat
    - Max of moisture content, CN ratio, pH
  - Testing by U of M for P, K, Kjeldahl N, ASTM D2016 oven drying method

1991 supplement

- Required aerobic decomposition, with lack of odor or heat generation, no pathogenic bacteria or weed seeds and free of plastic debris, stones, sand, glass, and other extraneous matter.
- Will not accept sewage sludge
- Must be registered for sale with the Dept of Agriculture and meet MPCA requirements for contaminates.
- Defined ammonium N and soluble salts in Grade 2 compost
- Allowed the right to bioassay test material
- Required the contractor to submit source of material 30 days prior to delivery
- Required certificate of compliance as per 1603

1994 supplement

- Required compost to be delivered in an air-dried condition
- Allowed commercial fortification of Grade 1 to meet nutrient specifications
- No longer allowed manure or animal wastes in Grade 2
- Certified test results to both Project Engineer and Agricultural Engineer (Office of Environmental Services)

1995

- Moisture content by mass
- pp. 989-991

2000

- Aerobic decomposition of organic wastes
- Define end point composting process
  - Loss on ignition
  - Solvita test
  - No smell, reheating, identifiable materials
  - PFRP
  - Process verify fecal coliform, salmonella spp.
- Allow up to 3% ‘foreign’ particles
- Biosolids acceptable under certain conditions
- Identifies State Statutes 7035/7045 and Federal Regulations Title 40, section 503 requirements (metals, Hg, hazardous wastes), soils reference values (hazard index, quotients, cancer risk levels)
- No pesticides levels that affect plants and animals existing in soils
- At time of delivery, must be in a condition safe for human exposure to dusts during handling
- Material requirements: OM, CN ratios, NPK ratios, pH, moisture, BD, inerts, soluble salts, germination tests, screened particle size, contaminates
- Added Grade 3
- Established an approved Vendor List
- Equivalent testing procedures of the U of M

SOLVITA®
BY WOODS END® RESEARCH
P.O. Box 297 • Mt. Vernon, ME 04352

COMPOST MATURITY
CARBON - DIOXIDE TEST
(paddle "C")
- please see instructions for use -

10/12/05
7 - 11 pm
62°F

SOLVITA®
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P.O. Box 297 • Mt. Vernon, ME 04352

COMPOST MATURITY
AMMONIA TEST
(paddle "A")
- please see instructions for use -

2005 Details

- 2571 Plant Installation
- 2573 Storm Water Management
- 3890 Compost Material
- 3897 Filter Log, Type Compost
  - *Filter Log, Type Wood Chip*
  - *Filter Log, Type Metal Trap*

- Special Provisions
  - Designer Soils
    - Raingardens (10-20%)
    - Wetlands (100%)
    - Planting cells (33%)
    - Rooting soils (50%)
    - RSS wall fills (variable)
  - Erosion control
    - Blankets
    - Grouts
  - Storm Water Quality
    - Diversion Berms,
    - Filter logs
    - Retrofitting
  - Log/bag Walls

(2105) TOPSOIL BORROW - MODIFIED

- *A blend of three products*

S-26 This work consists of placing and cultivating topsoil in accordance the appropriate Mn/DOT Standard Specifications, the Plans, and the following:

S-26.1 Topsoil Borrow-Modified (LV) shall consist of a mixture of **1/3 Premium Topsoil Borrow** adhering to the requirements Mn/DOT 3877.2C and **1/3 Grade 2 Compost** adhering to the requirements of Mn/DOT 3890 and **1/3 Sand** adhering to the requirements of Mn/DOT 3149.2(k), blended on a volume basis. The mixture must be blended before being spread on the worksite. A sample shall be submitted to the Engineer for approval before the material is brought to the worksite.

S-26.2 Unload and store all materials in a manner so as to protect until placed.

S-26.3 Place six inches (6”) of soil and deep cultivate into the existing subgrade to a minimum of 300 mm (12 inches). Operations shall not result in soil compaction due to excessively wet soil conditions (field capacity or wetter) or improper methods. To minimize soil compaction, the Contractor shall use a spading machine to loosen and till the soil.

S-26.4 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

The select topsoil borrow modified will be measured by the Cubic Yard (LV) of soil furnished and installed as specified, and measured by loose volume. Payment will be made under Item 2105.607 (Topsoil Borrow Modified (LV)) at the Contract Bid Price per cubic yard (LV), which will be compensation in full for delivering, placing, and all costs involved.


CAT

3897Filter Logs

3897.1 SCOPE

This specification covers filter logs used for slowing and filtering storm water runoff, and other water encountered on the Project.

3897.2 REQUIREMENTS

Filter logs shall conform to the requirements of the following types, as specified in the Contract.

C Type Compost Log

Compost Log shall consist of a blend of 30-40% weed free compost as per 3890 Grade 2 and 60-70% partially decomposed wood chips. The compost/wood blend material shall pass a 51 mm (**2 inches**) sieve with a minimum of 70% retained on the 10 mm (**3/8 inch**) sieve, in accordance with TMECC 02.02-B, "Sample Sieving for Aggregate Size Classification". The compost/wood chip blend shall be pneumatically shot into a geotextile cylindrical bag. The geotextile bag shall consist of a knitted material with openings of 10 mm (**3/8 inches**) and contain the compost/wood chip material while not limiting water infiltration. The encased compost shall form a cylindrical log that is a maximum of 55 m **(180 feet)** and approximately 200 mm **(8 inches)** in diameter.

2573.540 Filter Log, Type (1) *meter (**linear foot**)*

S-xxx (2575) Compost Grouting

This work shall consist of **furnishing and injecting** a water permeable compost erosion control system into riprap to remove soil particles from water moving off site into adjacent waterways or storm water drainage systems and to facilitate the establishment of vegetative cover in accordance with the applicable Mn/DOT Standard Specifications and the following:

S-xxx.2 INSTALLATION

Compost used for grouting shall be pneumatically applied with blower equipment in a non-compacted layer to fill voids of riprap, fractured bedrock or other hard armor to a minimum of 2 inches depth, or as directed by the Project Engineer.

Compost Grout application for erosion control will be integrated with a sediment control program, and may be applied in concert with Compost Logs or other sediment control methods shown in the plan. The Compost Grout may be used to blend in the riprap or compost log edges to the existing slope grade. Approximately three quarters of the riprap void depth shall have the fertilizer application, with the remaining one-forth topdress lift to have the seed, at rates per acre indicated in the plan.

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Compost Grout Cont.

Contractor will supply ample evidence showing this amount of material has been effectively placed (i.e., truck load tickets).

Contractor is required to be a certified Filtrexx Installer as determined by Filtrexx International, LLC (440-926-8041). Certification shall be considered current if appropriate identification is shown during time of bid or at time of application.

The following contractors are considered certified installers:
Windscapes Express blower Service, Dave Johnson 651-455-3993
Valley Creek, Wendi Bertelson 651-458-0778
Quickscapes, Pete Ven Housen 262-742-2006
MnLand, Mark Jefferies 952-446-1740

S-xxx.3 MEASUREMENT AND PAYMENT

Compost Grouting will be measured by the area furnished and acceptably installed. Payment will be made under Item 2575.604 (Compost Grouting) at the Contract bid price per square meter [**square yard**], which shall be compensation in full for all labor, materials, equipment and other incidentals necessary to complete the work as specified, including the cost of maintenance if specified in the plan. The provisions of Mn/DOT 1903 are modified to the extent that the **Department will not make a price adjustment in the event of increased or decreased quantities**.

Testing Reality

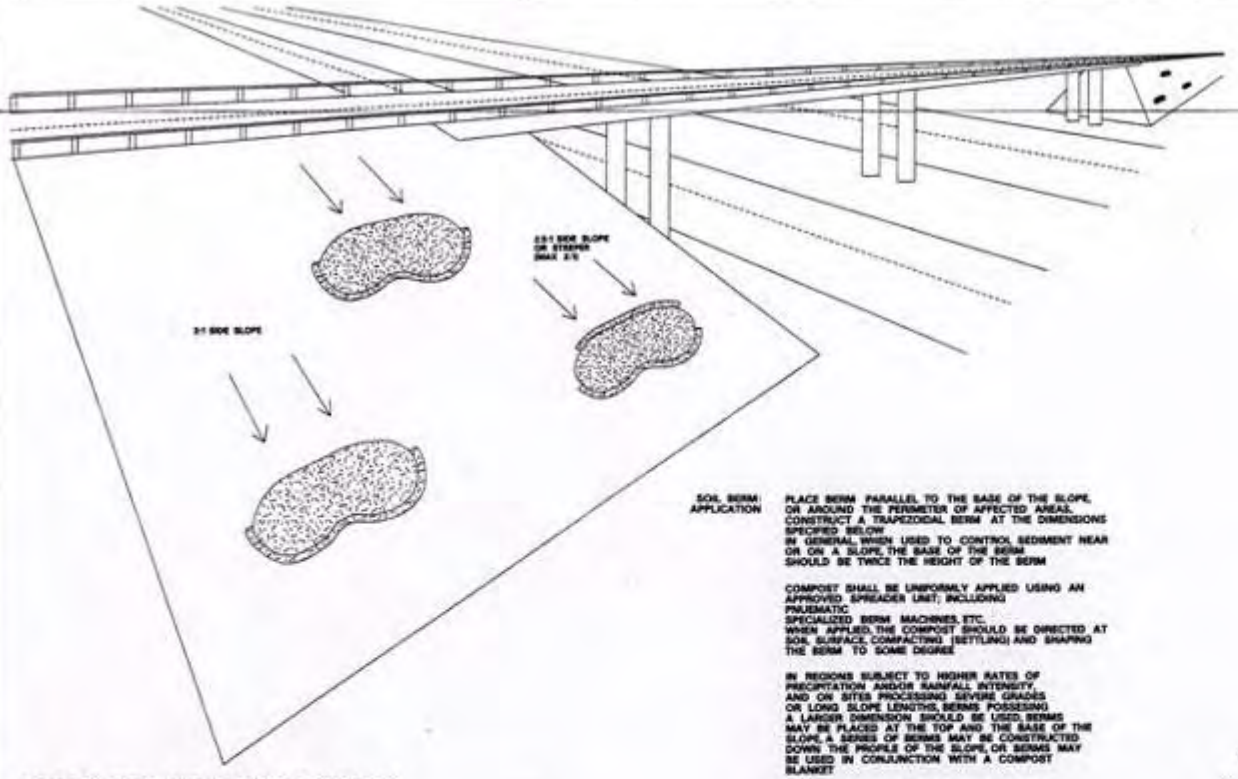
Table 2. Example Compost Blanket Depths for Various Rainfall Rates

Annual Rainfall/ Flow Rate	Total Precipitation (Rainfall Erosivity Index)	Compost Blanket Depth (Vegetated Surface)	Compost Blanket Depth (Unvegetated Surface)
Low	1 – 25 in. (20 – 90)	½ – ¾ in. (12.5 – 19 mm)	1 in. – 1½ in. (25 – 37.5 mm)
Average	26 – 50 in. (91 – 200)	¾ – 1 in. (19 – 25 mm)	1½ in – 2 in. (37 – 50 mm)
High	>51 in. (>201)	1 – **2 in**. (25 – 50 mm)	2 – 4 in. (50 – 100 mm)

Alexander, 2003

Erosion Control Compost Blanket

Planting Bed control



COMPOST BERM AND BLANKET APPLICATION

SIDE VIEW COMPOST BERM AND BLANKET

SOIL BERM APPLICATION

PLACE BERM PARALLEL TO THE BASE OF THE SLOPE, OR AROUND THE PERIMETER OF AFFECTED AREAS. CONSTRUCT A TRAPEZOIDAL BERM AT THE DIMENSIONS SPECIFIED BELOW
IN GENERAL, WHEN USED TO CONTROL SEDIMENT NEAR OR ON A SLOPE, THE BASE OF THE BERM SHOULD BE TWICE THE HEIGHT OF THE BERM

COMPOST SHALL BE UNIFORMLY APPLIED USING AN APPROVED SPREADER UNIT; INCLUDING PNUEMATIC
SPECIALIZED BERM MACHINES, ETC.
WHEN APPLIED, THE COMPOST SHOULD BE DIRECTED AT SOIL SURFACE, COMPACTING (SETTLING) AND SHAPING THE BERM TO SOME DEGREE

IN REGIONS SUBJECT TO HIGHER RATES OF PRECIPITATION AND/OR RAINFALL INTENSITY, AND ON SITES PROCESSING SEVERE GRADES OR LONG SLOPE LENGTHS, BERMS POSSESSING A LARGER DIMENSION SHOULD BE USED. BERMS MAY BE PLACED AT THE TOP AND THE BASE OF THE SLOPE, A SERIES OF BERMS MAY BE CONSTRUCTED DOWN THE PROFILE OF THE SLOPE, OR BERMS MAY BE USED IN CONJUNCTION WITH A COMPOST BLANKET

ON HIGHLY UNSTABLE SOILS USE COMPOST IN CONJUNCTION WITH APPROPRIATE STRUCTURAL MEASURES
IF USED IN CONJUNCTION WITH A SILT FENCE, THE SILT FENCE FABRIC SHOULD BE LAID ON THE SOIL SURFACE WITH THE LIP FACING THE SLOPE
THE COMPOST
FILTER BERM SHOULD BE CONSTRUCTED AT THE BASE OF THE SEDIMENT FENCE (DOWNHILL SIDE) AND OVER THE ENTIRE FENCE FABRIC LIP

SEEDING THE BERM MAY BE DONE, IF DESIRED, IN CONJUNCTION WITH PNEUMATIC BLOWING, OR FOLLOWING BERM CONSTRUCTION WITH A HYDRAULIC SEEDING UNIT

COMPOST BERMS SHALL BE BUILT AT THE FOLLOWING DIMENSIONS:

RAINFALL/FLOW RATE	DIMENSIONS FOR THE COMPOST FILTER BERM (HEIGHT x WIDTH)
LOW	1'x2' to 1.5'x3'
AVERAGE	1'x2' to 1.5'x3'
HIGH	1'x2' to 2'x4'

COMPOST BERM DIMENSIONS SHOULD BE MODIFIED BASED ON SPECIFIC SITE AND CLIMATIC CONDITIONS, AS WELL AS PARTICULAR PROJECT RELATED REQUIREMENTS

GENERAL NOTES

SEE SPECIAL PROVISIONS FOR SPECIFIC PROJECT REQUIREMENTS.

FOR USE WITH SLOPES 1:10 TO 1:2 VERTICAL TO HORIZONTAL, WITH SHEETFLOW DRAINAGE PATTERNS

USE COMPOST AS DESCRIBED BY SPEC 3890

SOIL BLANKET APPLICATION

SCARIFY SLOPES AND REMOVE LARGE CLODS, ROCKS, STUMPS, ROOTS LARGER THAN 12" IN DIAMETER AND DEBRIS ON SLOPES WHERE VEGETATION ISTO BE ESTABLISHED
SOIL PREPARATION STEP MAY BE ELIMINATED WHERE APPROVED BY THE LANDSCAPE ARCHITECT/DESIGNER, OR WHERE SEEDING AND PLANTING IS NOT PLANNED
WHERE PRACTICAL, TRACK (COMPACT) SLOPE USING A BULLDOZER BEFORE APPLYING COMPOST AS A SURFACE MULCH

COMPOST SHALL BE UNIFORMLY APPLIED USING AN APPROVED SPREADER UNIT; INCLUDING BULLDOZERS, PNUEMATIC BLOWERS, SIDE DISCHARGE MANURE SPREADERS, ETC.
TRACK (COMPACT) THE COMPOST LAYER USING A BULLDOZER, OR OTHER APPROPRIATE EQUIPMENT, WHERE PRACTICAL
ALTERNATIVELY, APPLY COMPOST USING A PNEUMATIC (BLOWER) UNIT, OR OTHER UNIT THAT PROPELS THE PRODUCT, PROJECT COMPOST DIRECTLY AT SOIL SURFACE, THEREBY PREVENTING WATER FROM MOVING BETWEEN THE SOIL-COMPOST INTERFACE
WATER THOROUGHLY TO IMPROVE SETTLING
APPLY COMPOST LAYER APPROXIMATELY 3 FEET OVER THE TOP OF THE SLOPE, OR OVERLAP IT INTO EXISTING VEGETATION

IN REGIONS SUBJECT TO HIGHER RATES OF PRECIPITATION AND/OR RAINFALL INTENSITY, AND ON SITES PROCESSING SEVERE GRADES OR LONG SLOPE LENGTHS, THE COMPOST BLANKET MAY BE USED IN CONJUNCTION WITH A COMPOST FILTER BERM
THE FILTER BERM SHOULD BE APPROXIMATELY 1 FOOT HIGH, BY 2 FEET WIDE, AND MAY BE PLACED AT THE TOP OR BASE (OR BOTH) OF THE SLOPE

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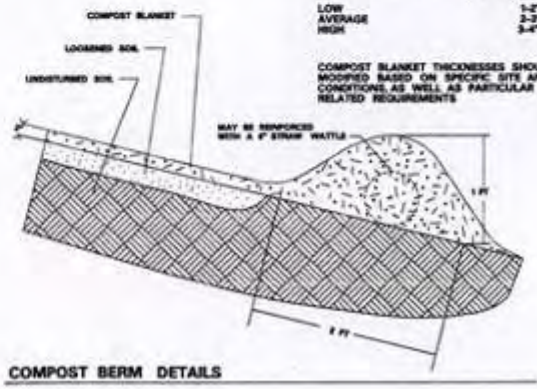
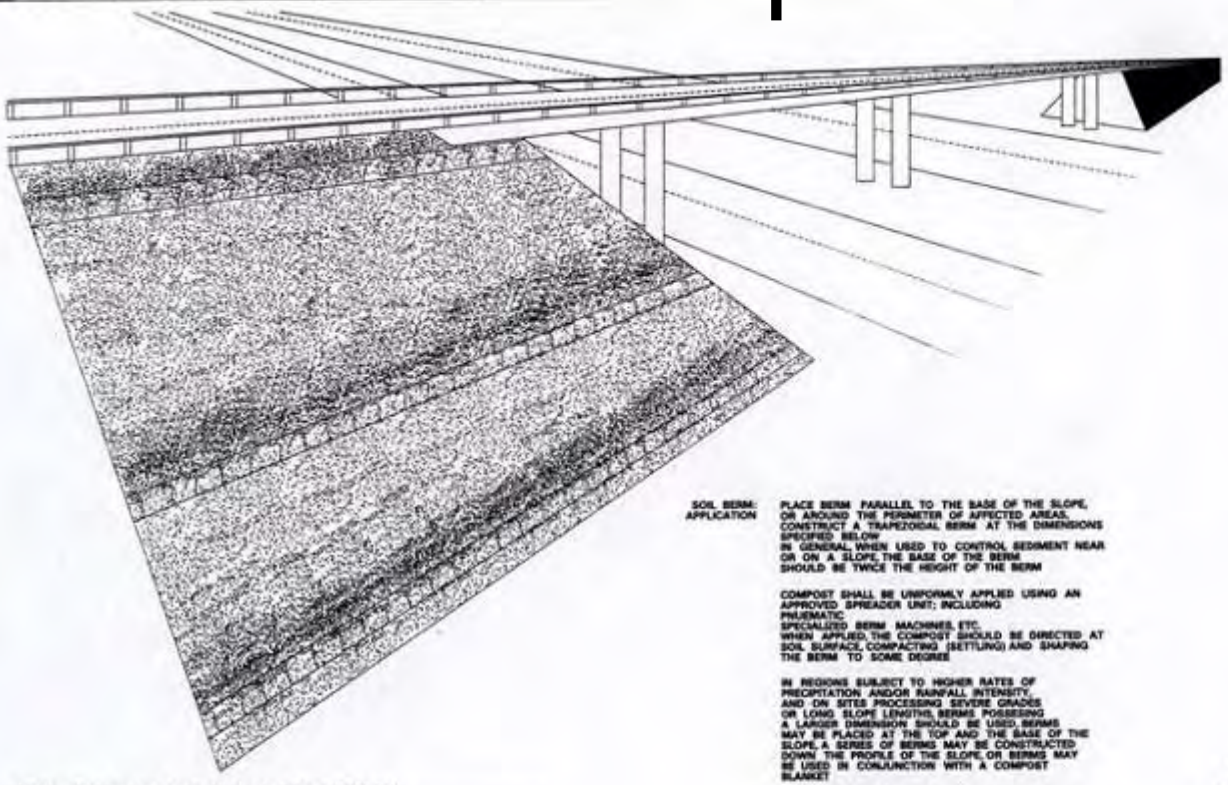


COMPOST BERM DETAILS

DRAFT – NOT YET APPROVED	DATE: 01-16-2002	PROJECT MANAGER: T. CARROLL	DRAWN BY: D. BLAKELY	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION OFFICE OF ENVIRONMENTAL SERVICES LANDSCAPE UNIT TRANSPORTATION BUILDING ST. PAUL, MINNESOTA 55155-1899	STANDARD COMPOST BLANKET AND BERM FOR EROSION AND SEDIMENT CONTROL
			CHECKED BY: T. CARROLL		STATE PROJECT NO. XXXX-XX (T.H. XXX) / SHEET X OF XX SHEETS

Slope Control



COMPOST BERM AND BLANKET APPLICATION

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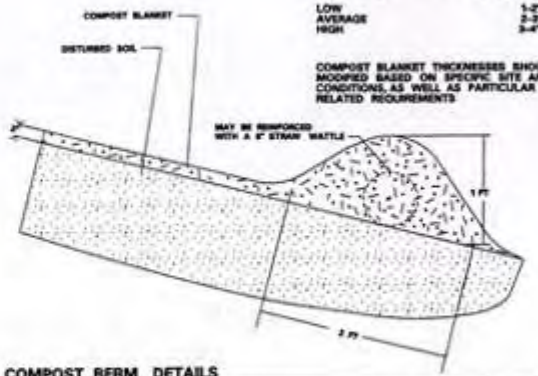


COMPOST BERM DETAILS

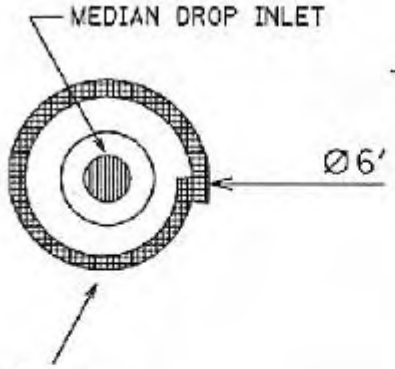
DRAFT – NOT YET APPROVED	DATE: 01-16-2002	PROJECT MANAGER	DESIGNED BY: D. BLAKELY	CHECKED BY: L. HOLM

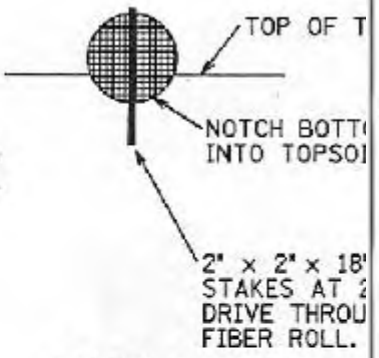
STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION
OFFICE OF ENVIRONMENTAL SERVICES
EROSION CONTROL UNIT
TRANSPORTATION BUILDING
ST. PAUL, MINNESOTA 55155-1899

STANDARD COMPOST BLANKET AND BERM FOR EROSION AND SEDIMENT CONTROL

STATE PROJECT NO. XXXX-XX (T.H. XXX) | SHEET X OF XX SHEETS

Rock Log
Compost Log





BIOROLL ANCHOR
AS PER SPEC. 3889

BIOROLL AT STRUCTURE
PLAN VIEW

BIOROLL INLET PROTI
PAYMENT AS BIOROLL (LIN FT).

L9000 20-JAN-2005
L.D.O. NO. DATE

STATE PROJ. NO. 8103-47

TEMPORARY DITCH CHECK, TYPE SNAKE BAG DETAIL

SEE EROSION CONTROL PLAN FOR PLACEMENT LOCATIONS

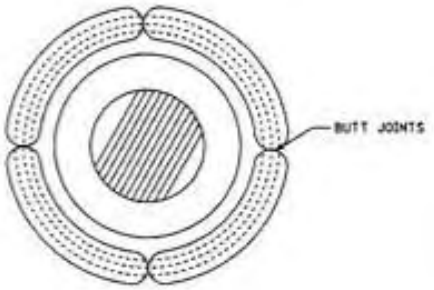
FILL SNAKE BAG WITH 45 LBS. OF OPEN GRADED AGGREGATE CONSISTING OF SOUND, DURABLE PARTICLES OF CRUSHED QUARRY ROCK OR GRAVEL CONFORMING TO THE FOLLOWING GRADATION.

GRADATION	
SIEVE SIZE	PERCENT PASSING
1 1/2 INCH	100
1 INCH	95-100
3/4 INCH	65-95
3/8 INCH	50-65
NO. 4	10-35
NO. 10	3-20
NO. 40	0-8
NO. 200	0-3

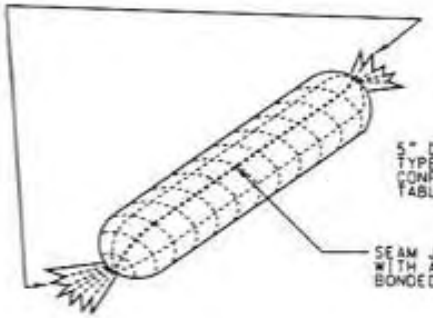
NOTE: CRUSHED CONCRETE OR BITUMINOUS SHALL NOT BE USED FOR OPEN GRADED AGGREGATE.

PAYMENT SHALL INCLUDE ALL MATERIALS, FILLING OF BAG, PLACEMENT, MAINTENANCE, & REMOVAL. 80% OF BID PRICE SHALL BE PAID UPON PROPER PLACEMENT WITH THE FINAL 20% PAID UPON REMOVAL.

INLET PROTECTION WITH SNAKE BAG



ENDS SECURELY CLOSED TO PREVENT LOSS OF OPEN GRADED AGGREGATE FILL. SECURED WITH 50 PSI. ZIP TIE.

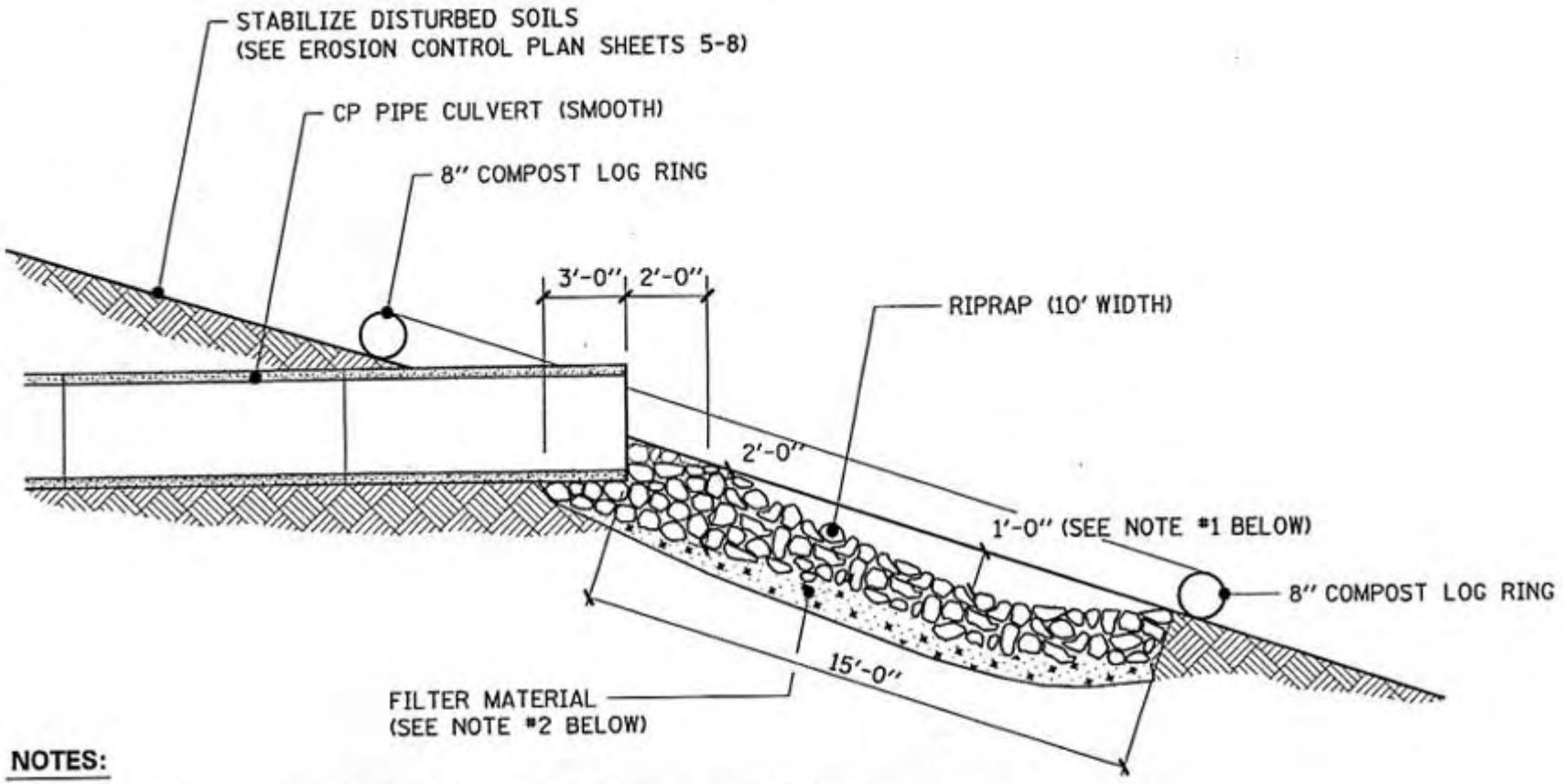


DETAILS

DATE: 12-23-03

S.P. 4310-45 (T.H. 212) SHEET 19 OF 119 SHEETS

Culvert End Protection



NOTES:

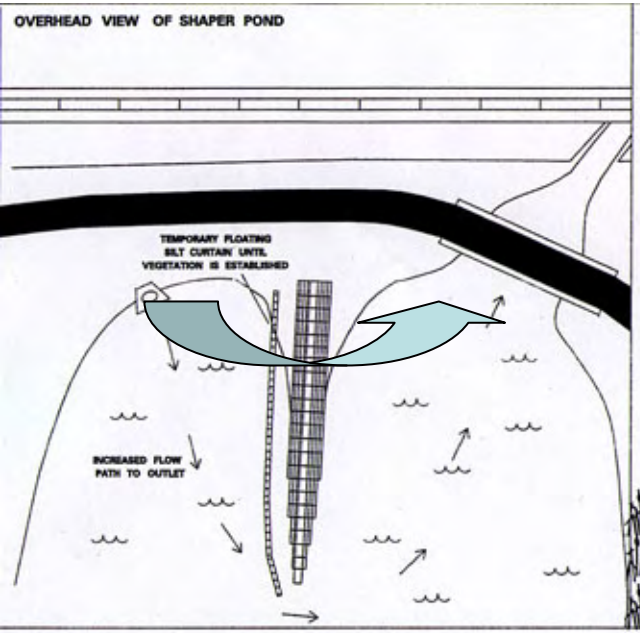
1. IF GEOTEXTILE FABRIC IS USED, IT SHOULD COVER THE AREA OF THE RIPRAP AND EXTEND UNDER THE CULVERT BY 3 FEET.
2. FOR TOP VIEW OF THE PLAN, SEE STANDARD PLATE NO. 3133.

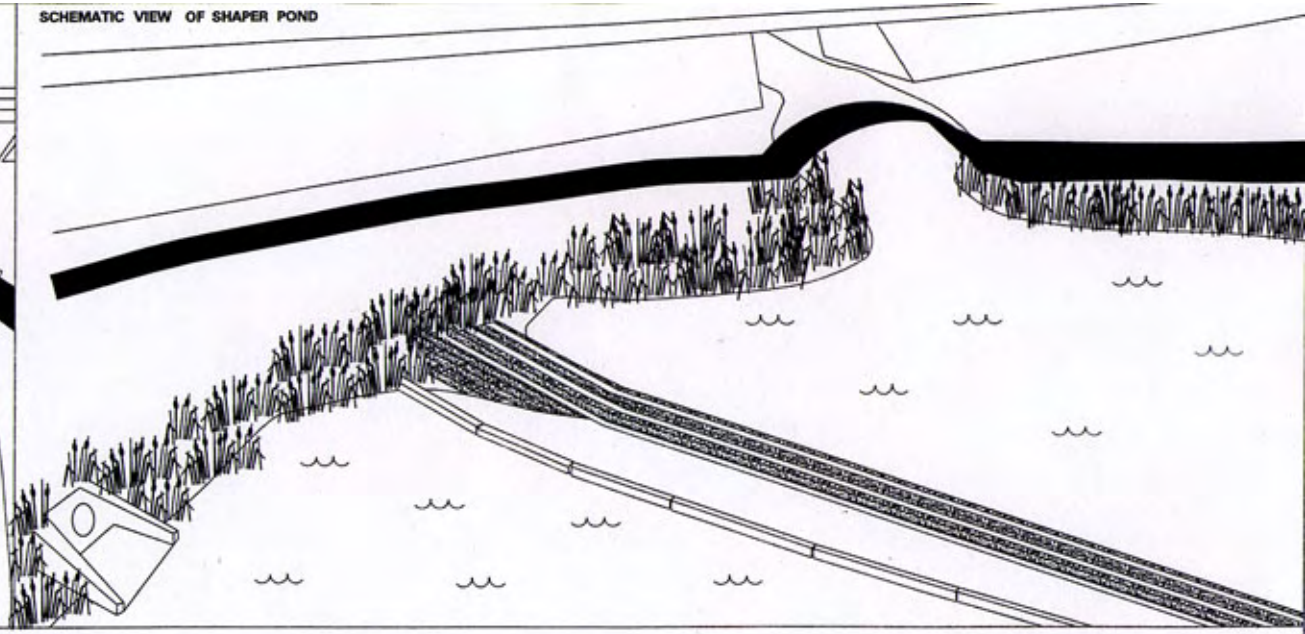
1/30 **RIPRAP (AT CP OUTLET)** (THIS DETAIL REPLACES STANDARD PLATE NO. 3133 SECTION A-A.)

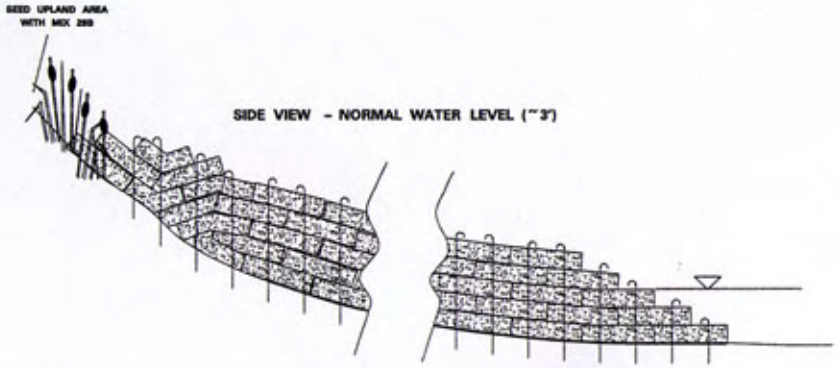
0 2' 4' 8'

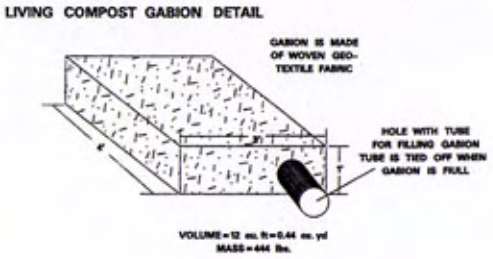

WindScapes

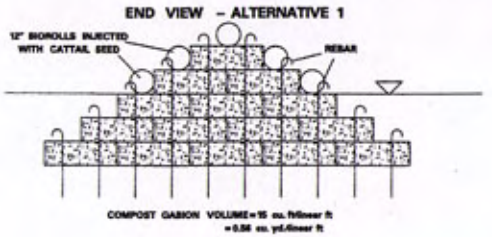
Compost Gabion

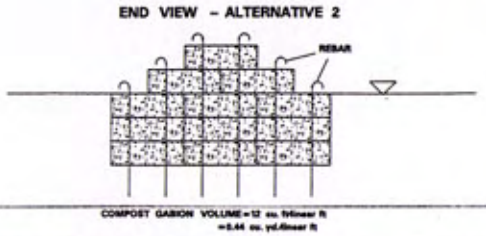












DRAFT – NOT YET APPROVED	DATE 02-12-2002	PROJECT MANAGER N/A	DRAWN BY D. Blakely CHECKED BY D. Stenlund	DATE ____ REG. NO. ____ PROFESSIONAL ENGINEER ____ LICENSED PROFESSIONAL ENGINEER	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION OFFICE OF ENVIRONMENTAL SERVICES EROSION CONTROL UNIT TRANSPORTATION BUILDING ST. PAUL, MINNESOTA 55155-1899	SHAPER POND LIVING COMPOST GABION PLAN – GOLDEN VALLEY, MN STATE PROJECT NO. xxxx-xxx (T.H.xx) | SHEET x OF xx SHEETS

Organics and Chemical Amendment Utilization

- Slash Mulches and Fugitive Dust Control
- Specialty products for storm water flow control
- Muck salvage
- Life-blood for Sod

Slash Mulch w/ Gorilla Snot

Raingarden mulch

Dewatering Filtration


Metal Trap Log

Concrete Floc Log

Muck Salvage

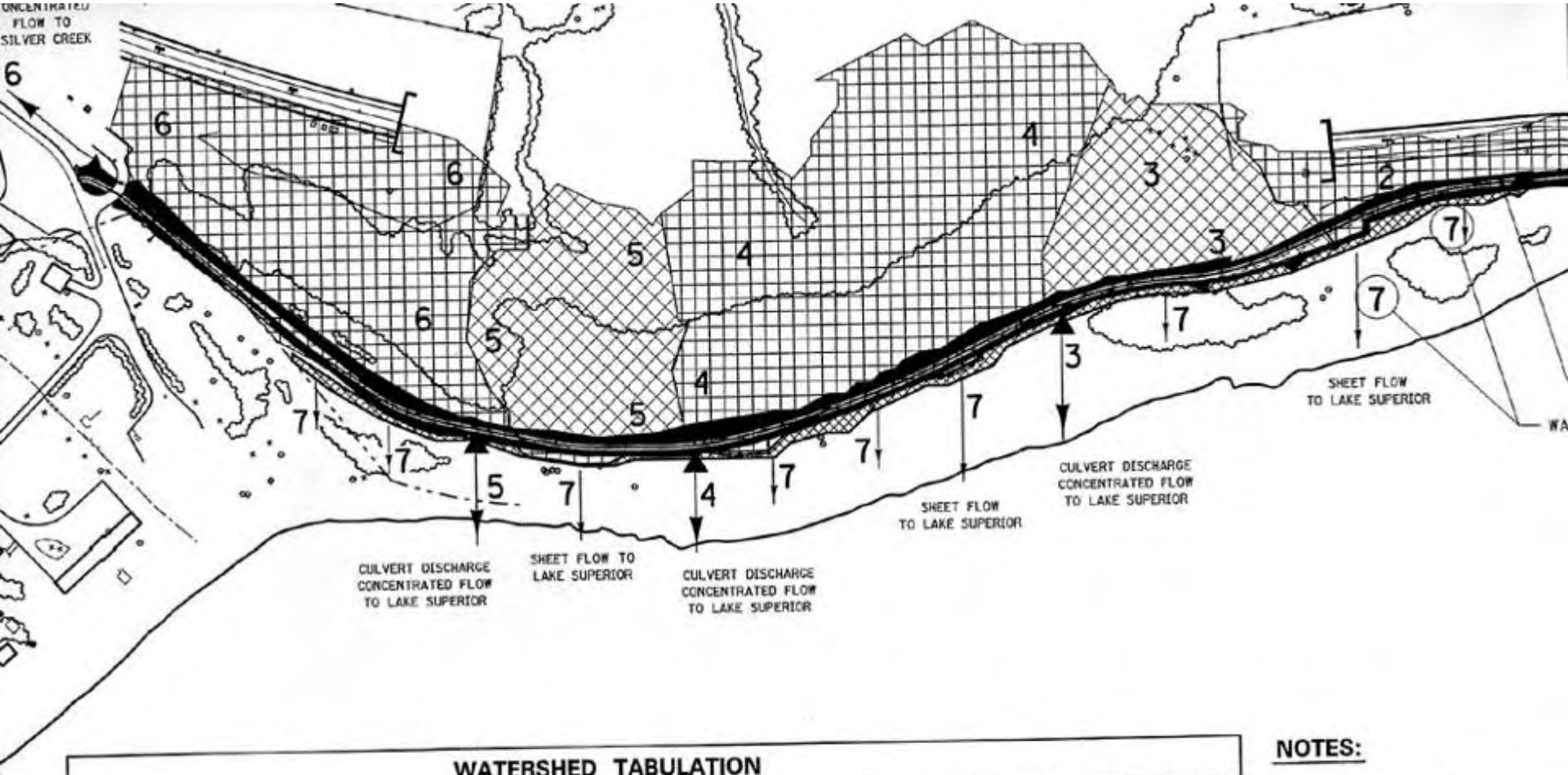

Sidewalk Sodding?

Selected Project Examples

- TH 61, Erosion Control & Storm Water Quality Program
- TH13 Steep slope restoration
- TH316 Shoulder repairs
- TH3 Rooting soils, native plant community
- Cottage Grove Park & Ride Rain Gardens
- TH36 Wetland Mitigation Construction
- Landscape rooting soils
- Storm Water Retrofits

Silver Creek Cliff Trail Project


Peregrine falcon nesting area
Historic viewshed
Special water of the state
Rare and threatened plants



WATERSHED TABULATION

AREA	SURFACE AREA TOTAL	DISTURBED AREA	FLOW TYPE	RECEIVED BY	AREA	S.Y.	AC.	RAPID STABILIZATION METHOD 3	4	5
1	23,630 S.F.	7,285 S.F.	CONCENTRATED	LAKE SUPERIOR	1	809	0.17	X	X①③	X
2	81,497 S.F.	28,678 S.F.	CONCENTRATED	LAKE SUPERIOR	2	3186	0.66	X③④		X③
3	81771 S.F.	5,458 S.F.	CONCENTRATED	LAKE SUPERIOR	3	606	0.13		X①③	X
4	247,193 S.F.	7,744 S.F.	CONCENTRATED	LAKE SUPERIOR	4	860	0.18		X①③	X
5	92,824 S.F.	4,682 S.F.	CONCENTRATED	LAKE SUPERIOR	5	520	0.11		X①③	X
6	190,447 S.F.	12,190 S.F.	CONCENTRATED	SILVER CLIFF CREEK	6	1354	0.28		X①③	X
7		6,660 S.F.	SHEET FLOW	LAKE SUPERIOR	7③	740	0.15		X①②③	

NOTES:

① ALL SLOPES AND DISTURBED AR
MUST BE STABILIZED 200' UPST

② ALL POSITIVE SLOPES TO LAKE
PROGRESSIVELY WORKING THE A

③ 1/6 ACRE INCREMENTS WITHIN
EXPOSED SOILS - 7 DAYS

④ ALL TOPSOIL STOCKPILES WILL

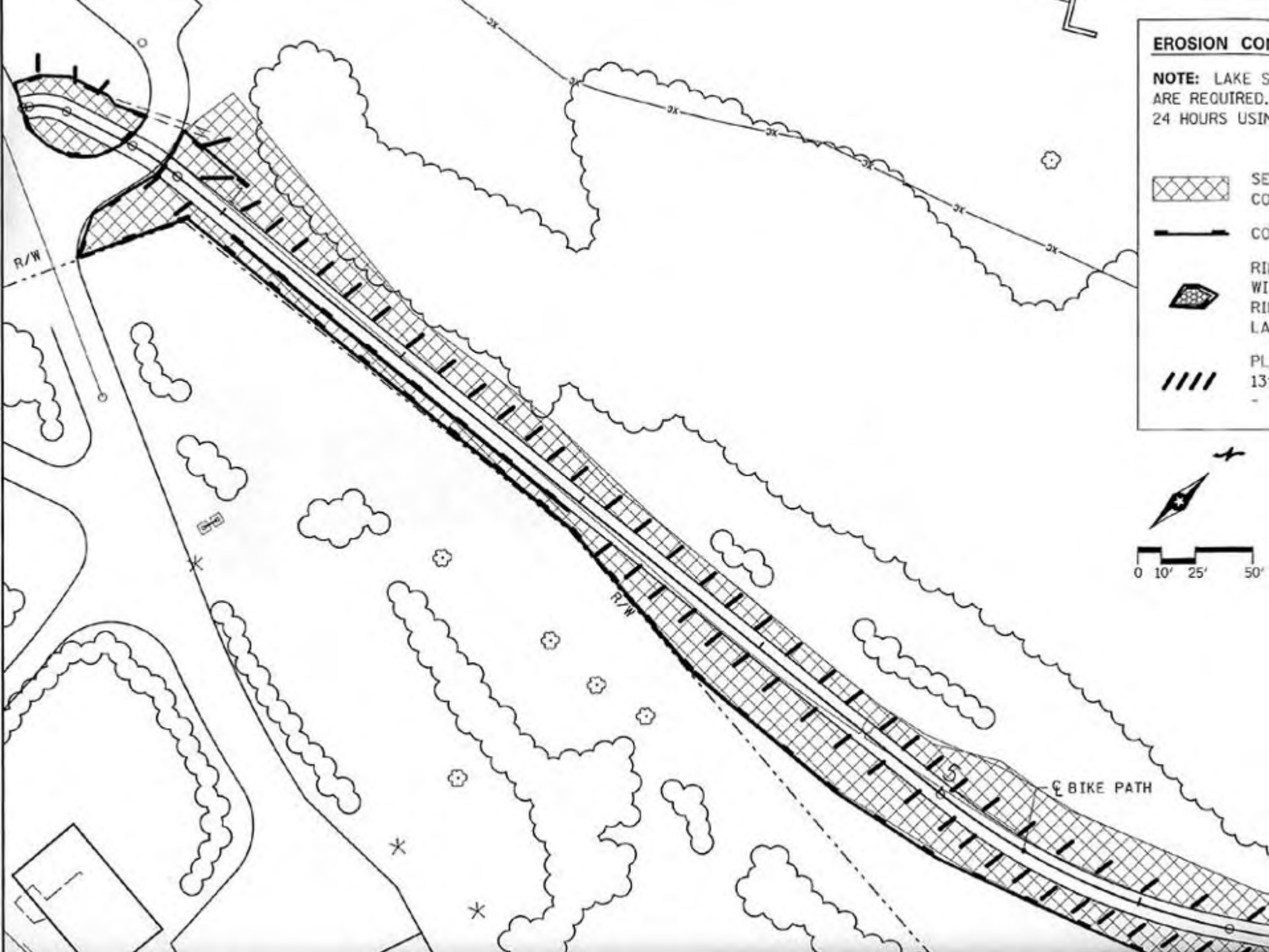
FILE NAME	DATE	PROJECT MANAGER
CAE\W2KS004\I:\sitedevelopment\mn\pr]\class4\silvercl\finals\silvercliff.004	04-MAR-2004 17:13	D. OBERNOLTE

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL LANDSCAPE ARCHITECT UNDER THE LAWS OF THE STATE OF MINNESOTA.
DATE 02-03-03 LIC. NO. 19383

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION
OFFICE OF TECHNICAL SUPPORT
SITE DEVELOPMENT MS608
TRANSPORTATION BUILDING
ST. PAUL, MINNESOTA 55155-1899

SILVER CREEK

STATE PROJ. NO.


EROSION CO
NOTE: LAKE S
ARE REQUIRED.
24 HOURS USIN
SE
CO
CO
RI
WI
RI
LA
PL
13
0 10' 25' 50'
R/W
R/W
℄ BIKE PATH

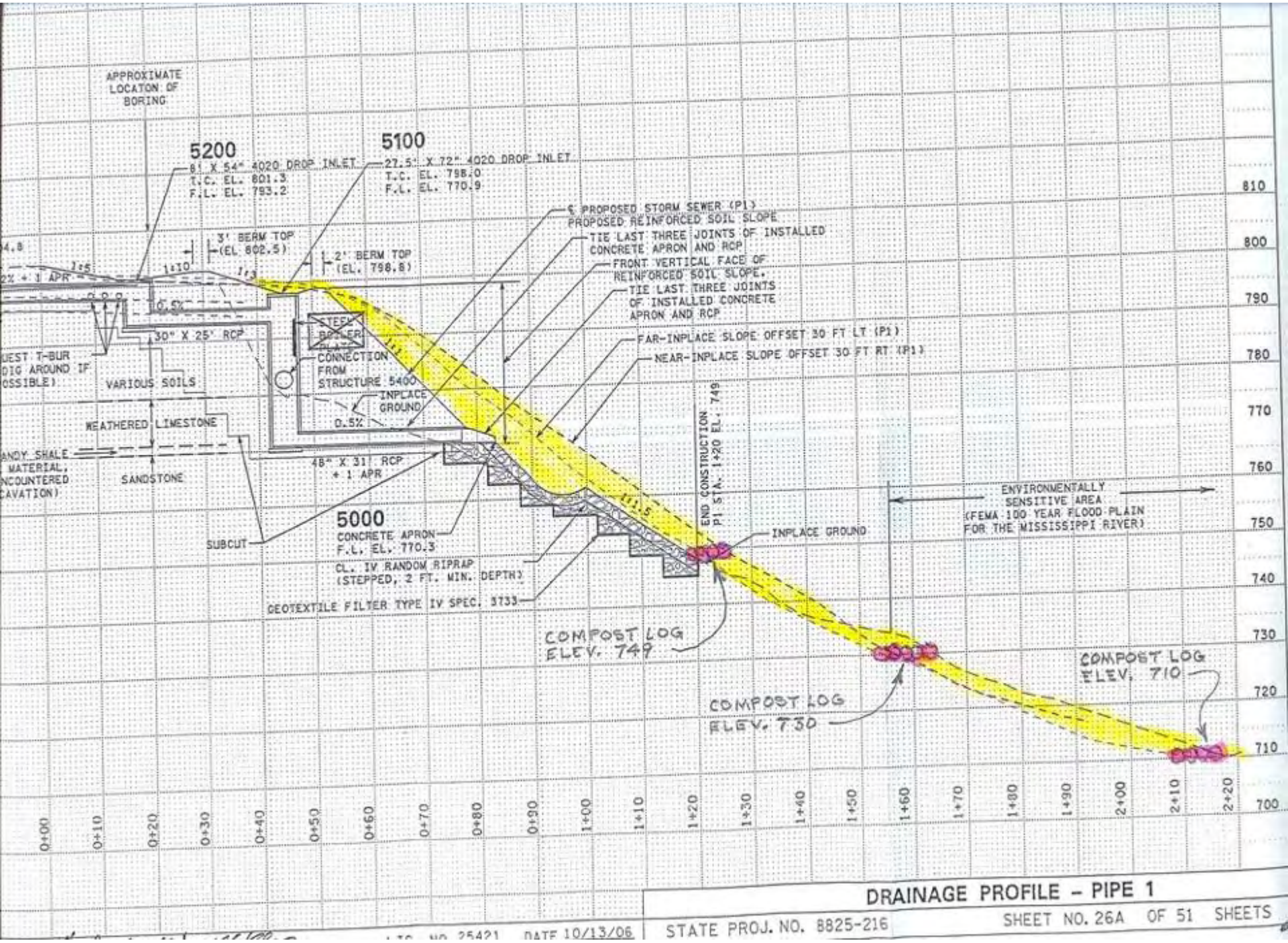

Wind
Scapes
651-
455-3005
• Mulcher
• Compost
• Seeding


WindScape


TBM
1


July 13, 2006

Fall 2006 TH13 Slope Failure Reconstruction

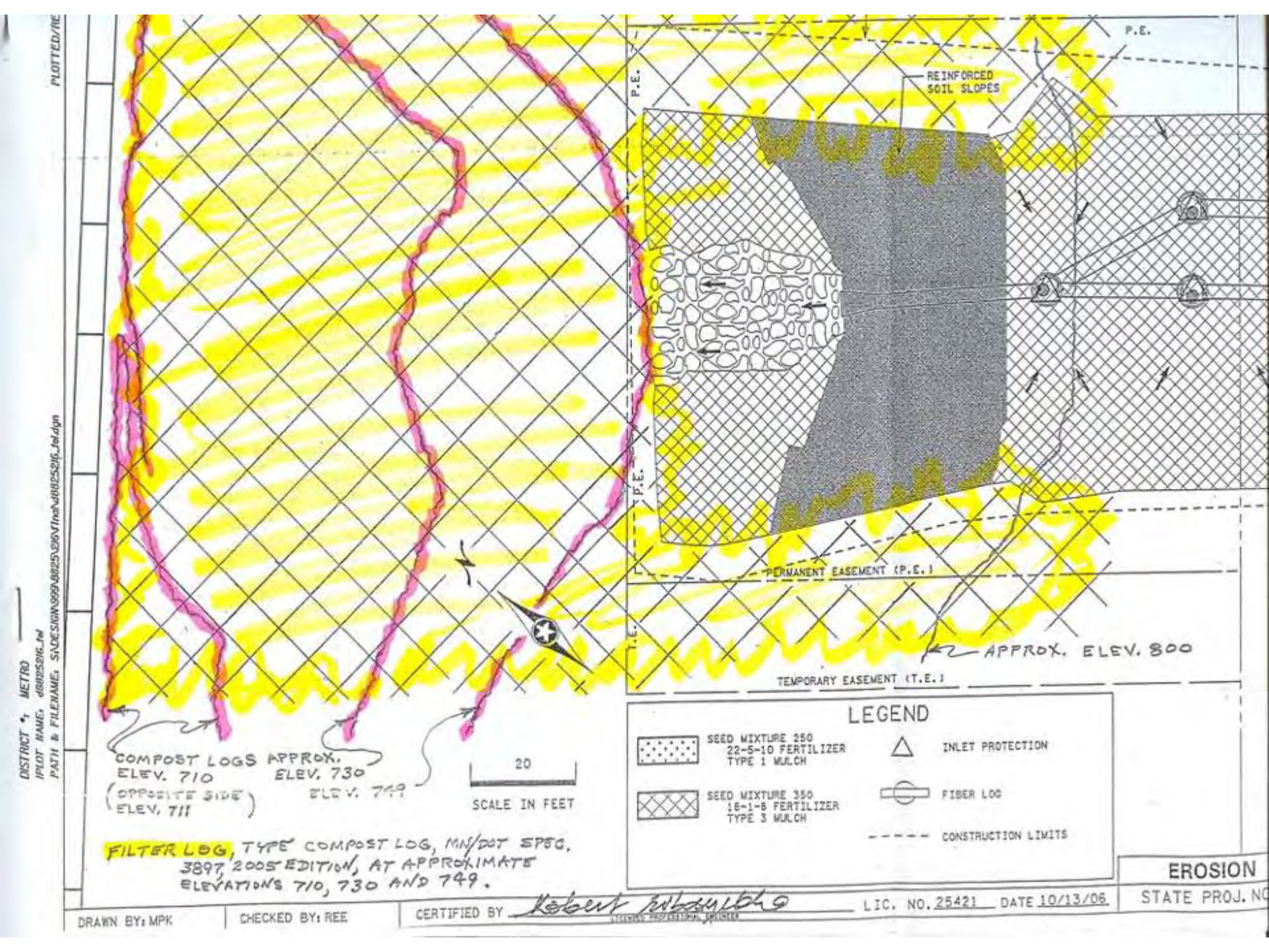


DRAINAGE PROFILE – PIPE 1

STATE PROJ. NO. 8825-216

SHEET NO. 26A OF 51 SHEETS

DATE 10/13/06


P.E.
REINFORCED SOIL SLOPES
P.E.
P.E.
P.E.
PERMANENT EASEMENT (P.E.)
T.E.
APPROX. ELEV. 800
TEMPORARY EASEMENT (T.E.)
COMPOST LOGS APPROX. ELEV. 710
(OPPOSITE SIDE ELEV. 711)
APPROX. ELEV. 730
ELEV. 749
20
SCALE IN FEET
LEGEND
SEED MIXTURE 250 22-5-10 FERTILIZER TYPE 1 MULCH
SEED MIXTURE 350 18-1-8 FERTILIZER TYPE 3 MULCH
INLET PROTECTION
FIBER LOG
CONSTRUCTION LIMITS
FILTER LOG, TYPE COMPOST LOG, MN/DOT SPEC. 3897, 2005 EDITION, AT APPROXIMATE ELEVATIONS 710, 730 AND 749.
EROSION
STATE PROJ. NO
DRAWN BY: MPK
CHECKED BY: REE
CERTIFIED BY Robert E. Beyerlein
LIC. NO. 25421 DATE 10/13/06
DISTRICT *; METRO
IPLOT NAME; d8825816_fel
PATH & FILENAME; S:\DESIGN\99\8825\26\Final\d8825826_fel.dgn
PLOTTED/RE

May 11 2007 Installation


May 17


May 25, really, really rained

TH41 Bridge Reconstruction


TH100 Construction

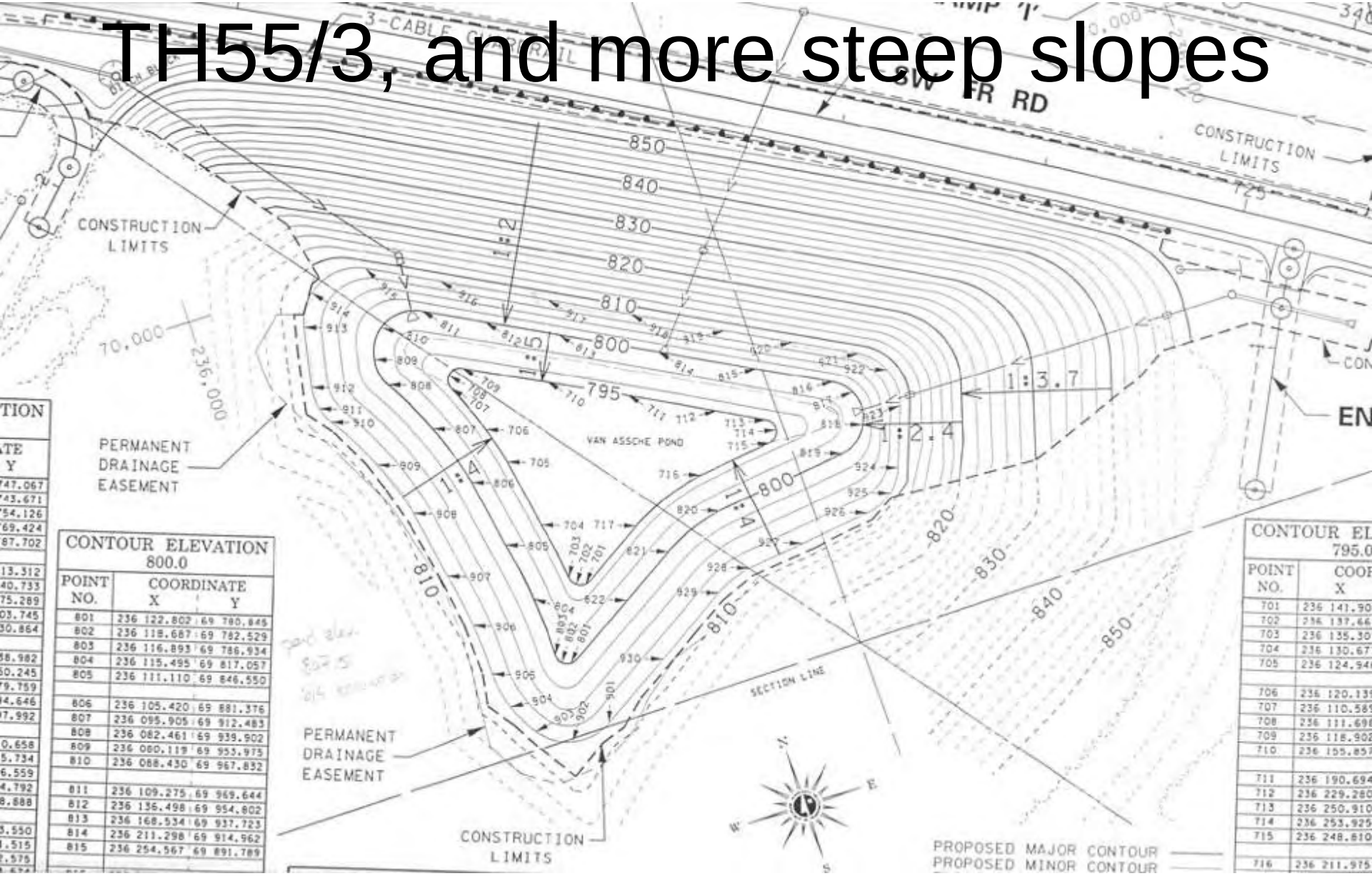
TH316 Shoulder Repairs

316
317+20
318+70
320+00
321+00
323+00
150'
130'
200'
compost/seed
(150')(8') = 1200ft²
compost/seed
(130')(8') = 1040ft²
DITCH BLOCK WITH 0.1/3 RIPRAP 8' WIDE
compost/seed
(200')(6') = 1200ft²
1' DITCH BLOCK — 317+20
1' DITCH BLOCK — 318+70
1' ROCK CHECK 320+00
1' ROCK CHECK 322+50
HIGH PT 323+25
1' DITCH BLOCK — 324+20
CONSTRUCTION LIMIT
R/W
5153
5154
5155
5156
315
320
5159
5160
5157
5158
5161
5162
R/W
1' DITCH BLOCK
1' DITCH BLOCK
CONSTRUCTION LIMIT
BRIDGE NO. 19X04
1' ROCK CHECK
1' DITCH BLOCK
320+00 ROCK CHECK
300'
compost/seed:
(300')(4') = 1200ft²
323+00
① NOTE:
INSTALL ROCK CHECKS AT SAME TIME AS BOX CULVERTS


WindScapes
EXPRESS MULCH BLOWER
Mulches
Compost
Soil Mixes
Seeding
FILTREXx

TH494 Rill Repairs

TH55/3, and more steep slopes



50/50 Blend

I35E Lexington Ave Bridge

TH7 St Bonifacius

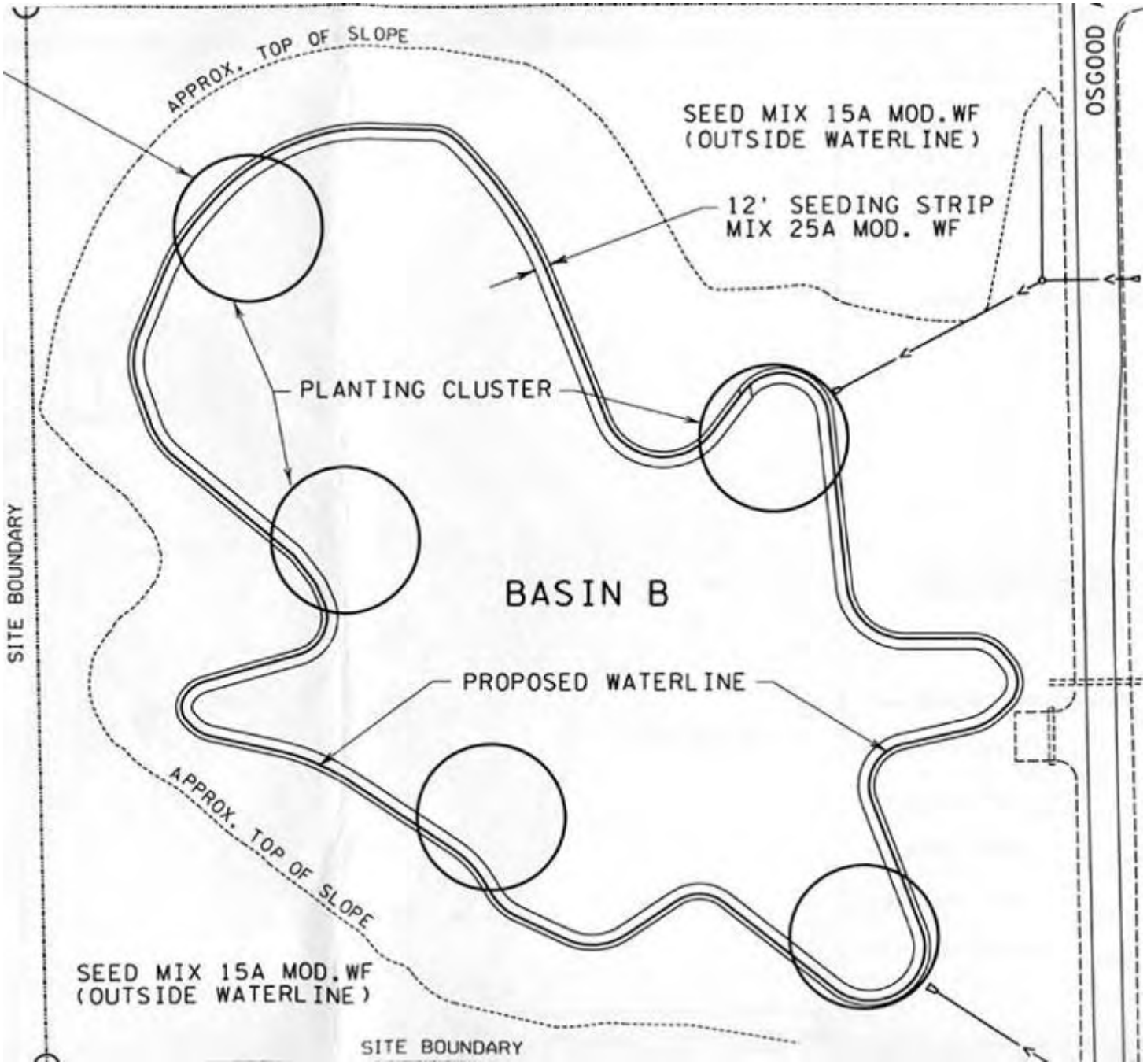
TH494 Bailey Avenue Bridge


INGERSOLL-RAND

TH61 North Shore

TH36 Bayport Wetland Construction

- Weed free start
- Five year maintenance plan
- No funding
- Must meet function and value


APPROX. TOP OF SLOPE
SEED MIX 15A MOD.WF
(OUTSIDE WATERLINE)
12' SEEDING STRIP
MIX 25A MOD. WF
OSGOOD
PLANTING CLUSTER
SITE BOUNDARY
BASIN B
PROPOSED WATERLINE
APPROX. TOP OF SLOPE
SEED MIX 15A MOD.WF
(OUTSIDE WATERLINE)
SITE BOUNDARY

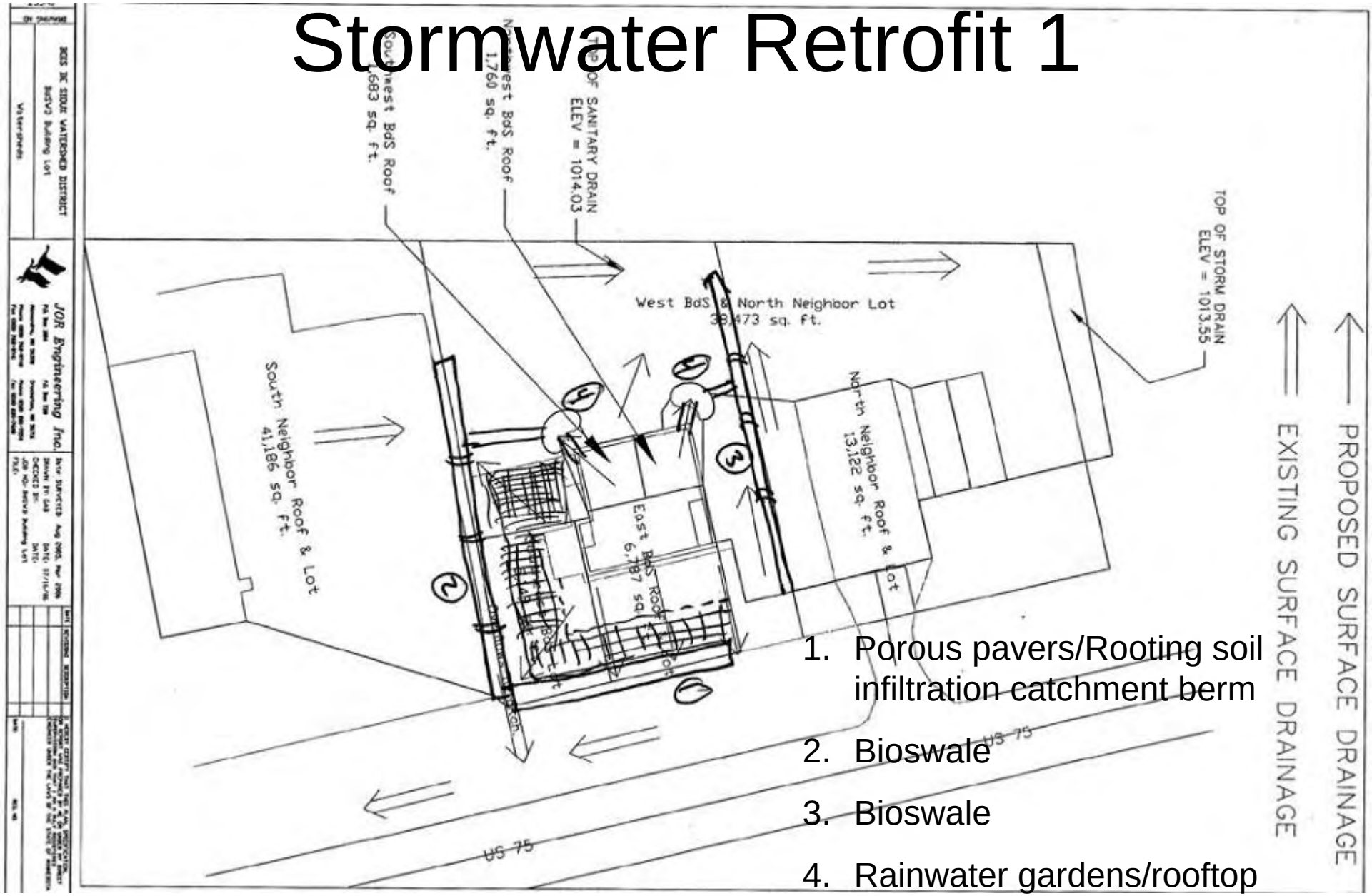
Facility Inspection, Transport issues


Mn/DOT
WETLAND CREATION
PROJECT
COMPLETION IN 2001

Retrofit Opportunities

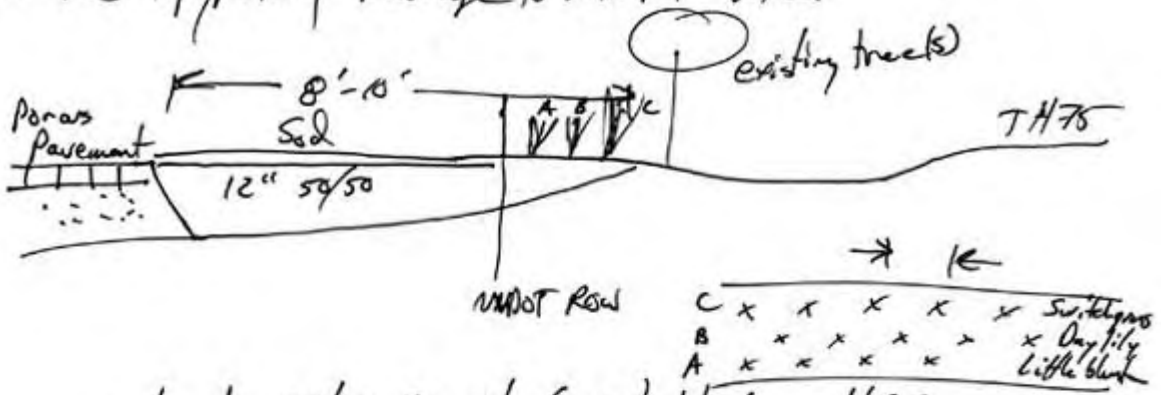
Compost Retrofit Sponges

Stormwater Retrofit 1



1. Porous pavers/Rooting soil infiltration catchment berm
2. Bioswale
3. Bioswale
4. Rainwater gardens/rooftop capture (disconnect)

① Rooftop/Parking Drainage to MNDOT Ditch

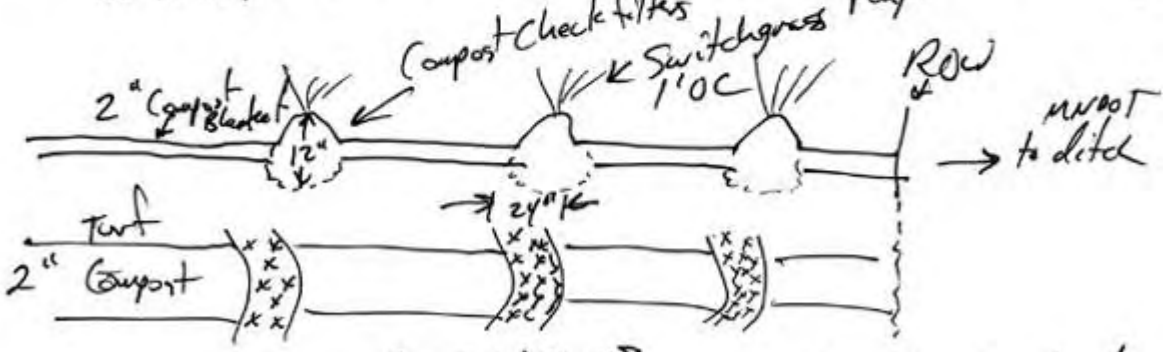


Material 50/50 Topsoil/Compost blend 1'OC

~125' x 8' x ~10"

30 yds³ Compost/Topsoil will treat 5000 gallons H2O

② South Side Drainage to MNDOT Ditch
Grass buffer bioswale w/ treatment check filters (to wetland perimeter)

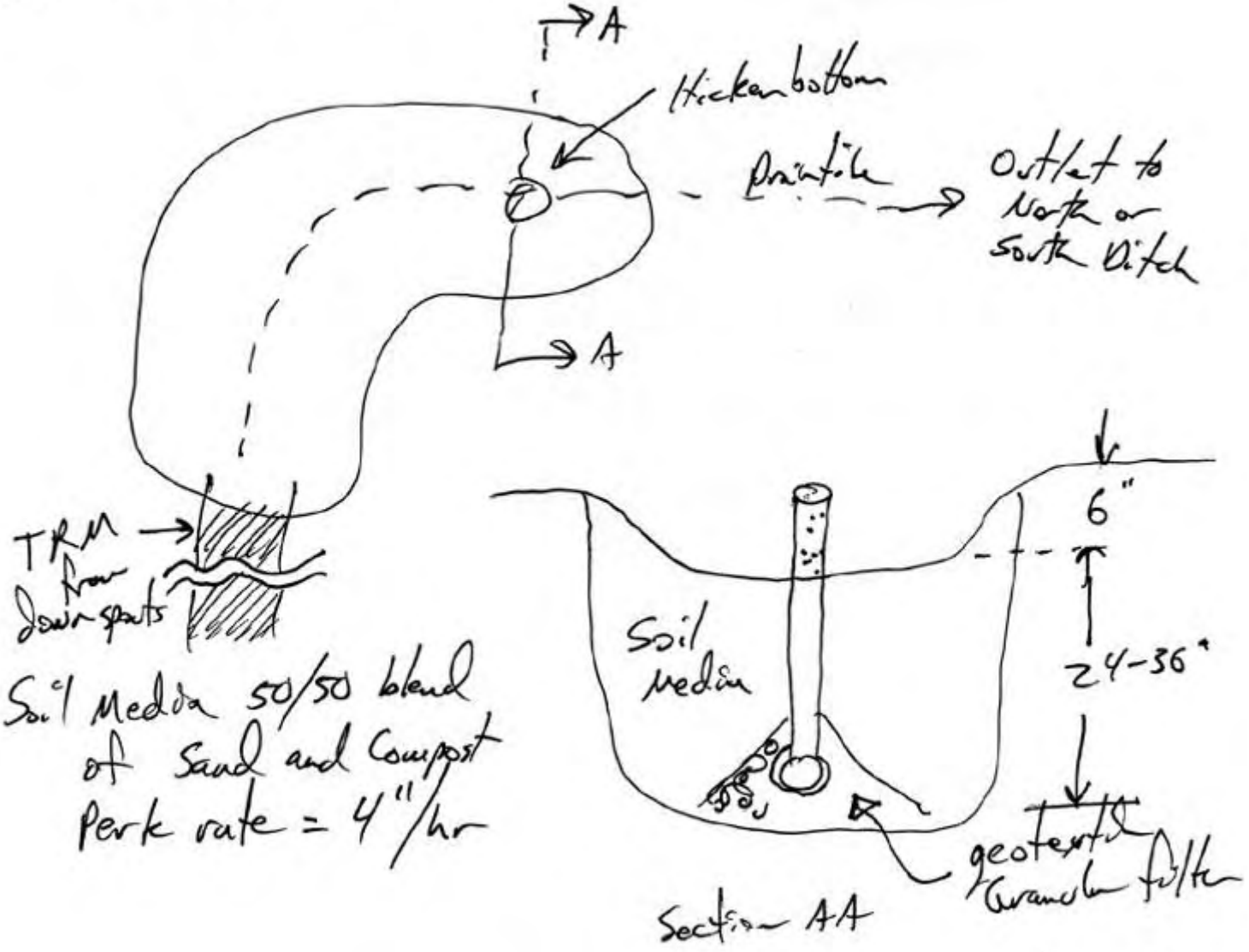


12 yd³ for bioswale => 1300 gallons H2O treatment

2 yd³ for Check filters => 238 gallons " "

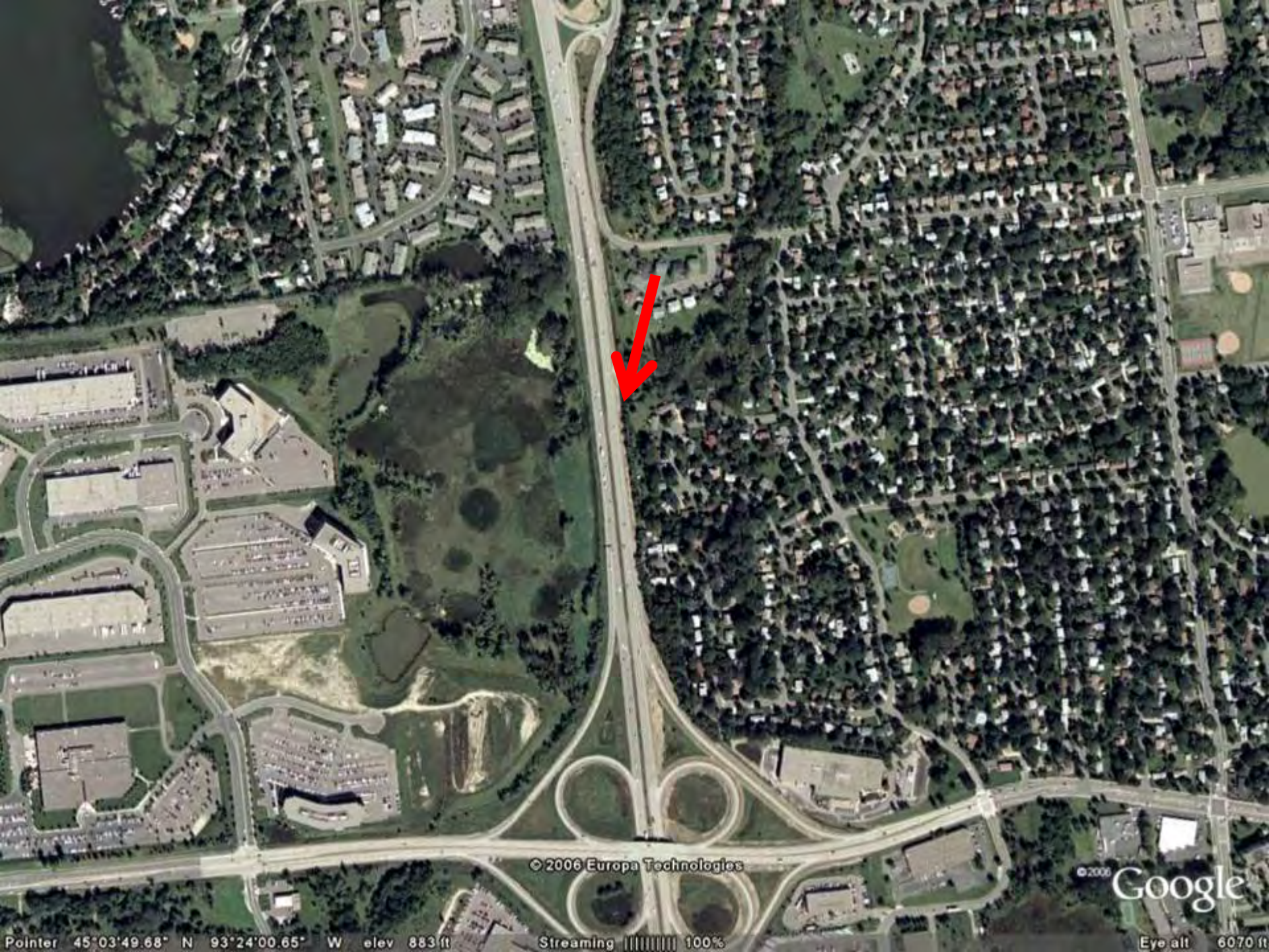
Swale Seed Mix: 328 or BWSR W2 wetmeadow

(4) Rain water Gardens



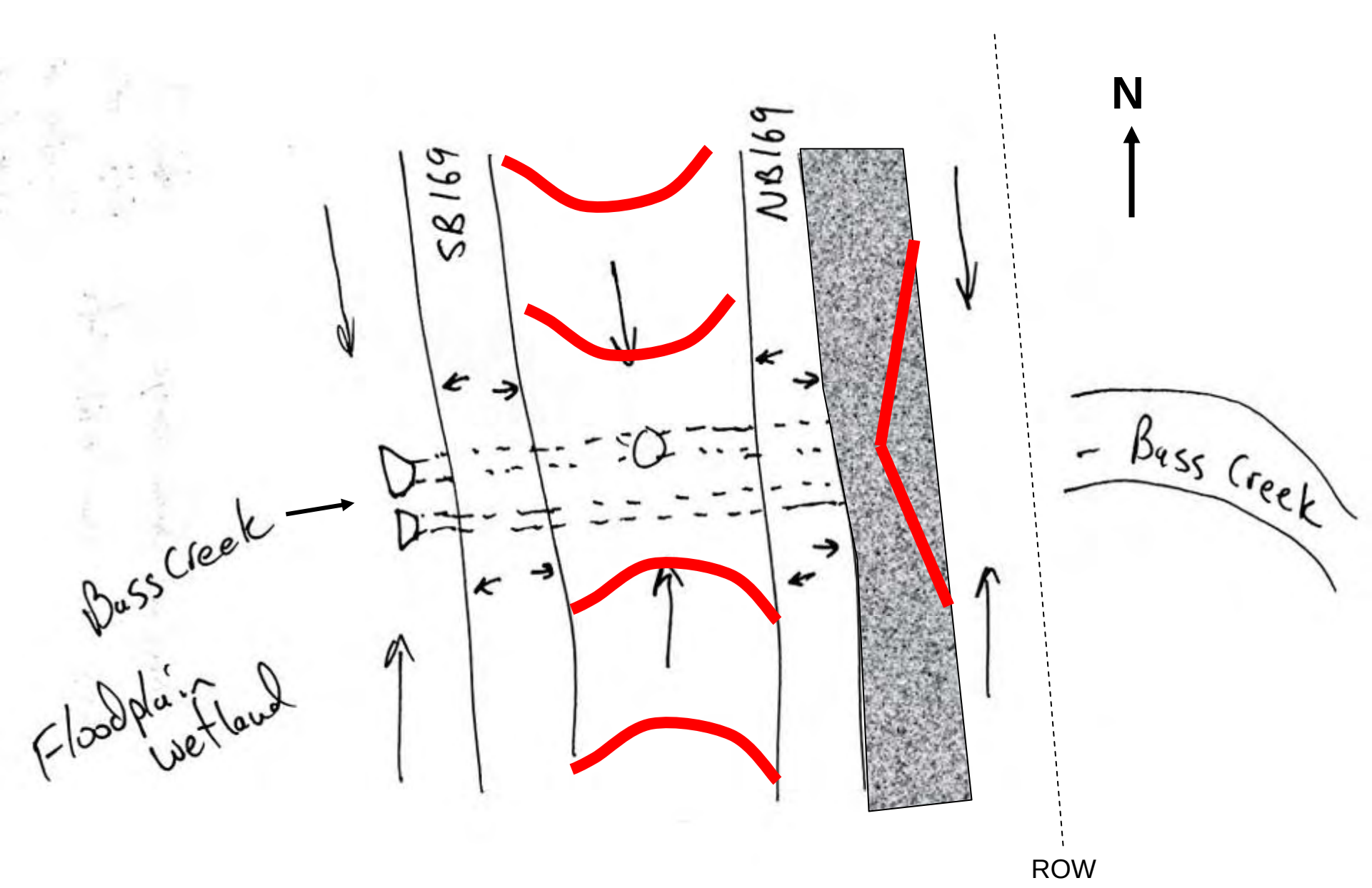
Assume 12x24' ⇒ will treat 3240 gallons H2O

Retrofit 2: Sag Point Sediment Capture


© 2006 Europa Technologies
Google
Pointer 45°03'49.68" N 93°24'00.65" W elev 883 ft
Streaming 100%
Eye alt 6070 ft

Bass Creek Stormwater Quality Retrofit

- Compost diversion chevrons
- Compost filter blankets
- Compost filter berms


N
SB169
NB169
Bass Creek
Floodplain wetland
Bass Creek
ROW

Compost Logs or Bags


Lake Rd

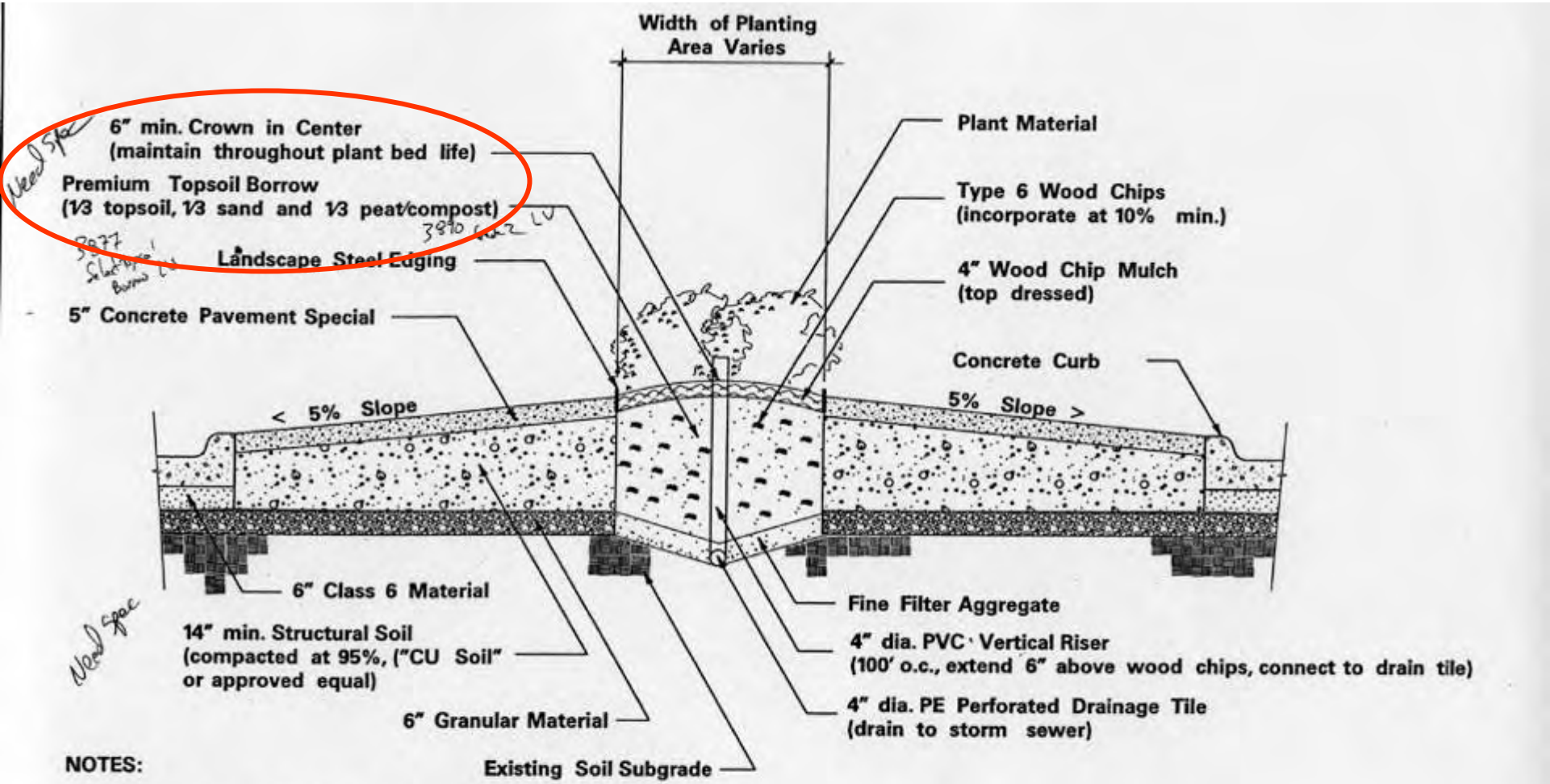

Lake Rd

Landscape Compost

- 2 to 6 inches surface applied, incorporated into12 inch original soil depth, minimum 6 ft diameter for trees, whole bed for shrubs
- Spading Machine required for incorporation

Stormwater Landscaping

Median Planting Details



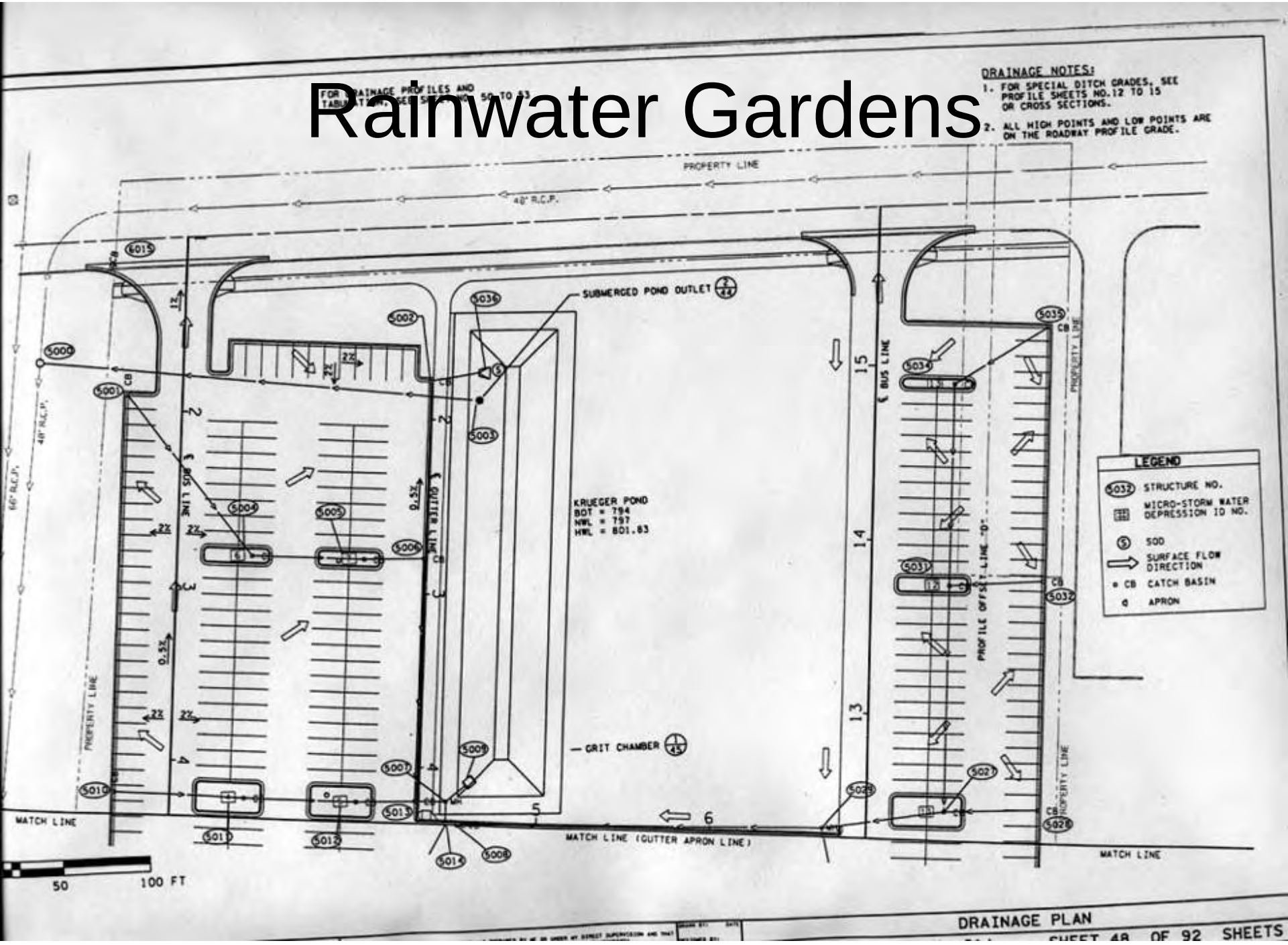
NOTES:

1. Irrigation system (tied to City water mains with meter pits) could be substituted for quick couplers per agreement with the City of Golden Valley.

2. Snow plowing should direct all snow away from median.

PROJECT MANAGER MnDOT Metro Division: Beth Neuendorf MnDOT Office of Environmental: Karl Weissenborn	DATE 9-19-2001		DATE 9/17/2001	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION OFFICE OF ENVIRONMENTAL SERVICES LANDSCAPE UNIT TRANSPORTATION BUILDING ST. PAUL, MINNESOTA	DULUTH ST. MEDIAN LANDSCAPE PLAN
					STATE PROJECT NO. 2735-172 (T.H.100) SHEET 214 OF 30

Rainwater Gardens



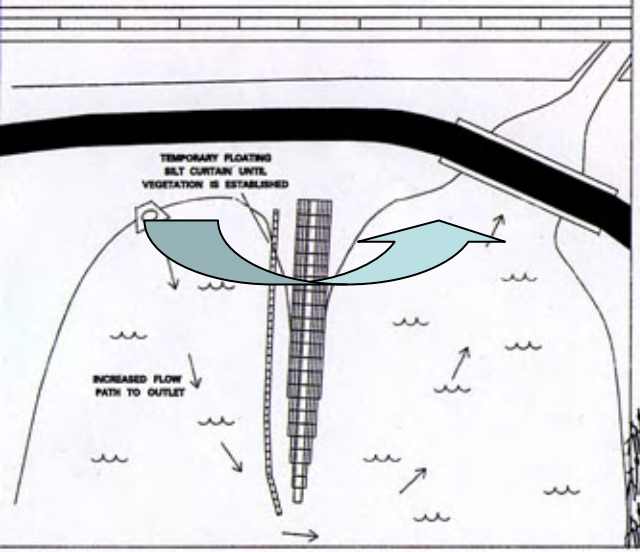
DRAINAGE PLAN

SHEET 48 OF 92 SHEETS

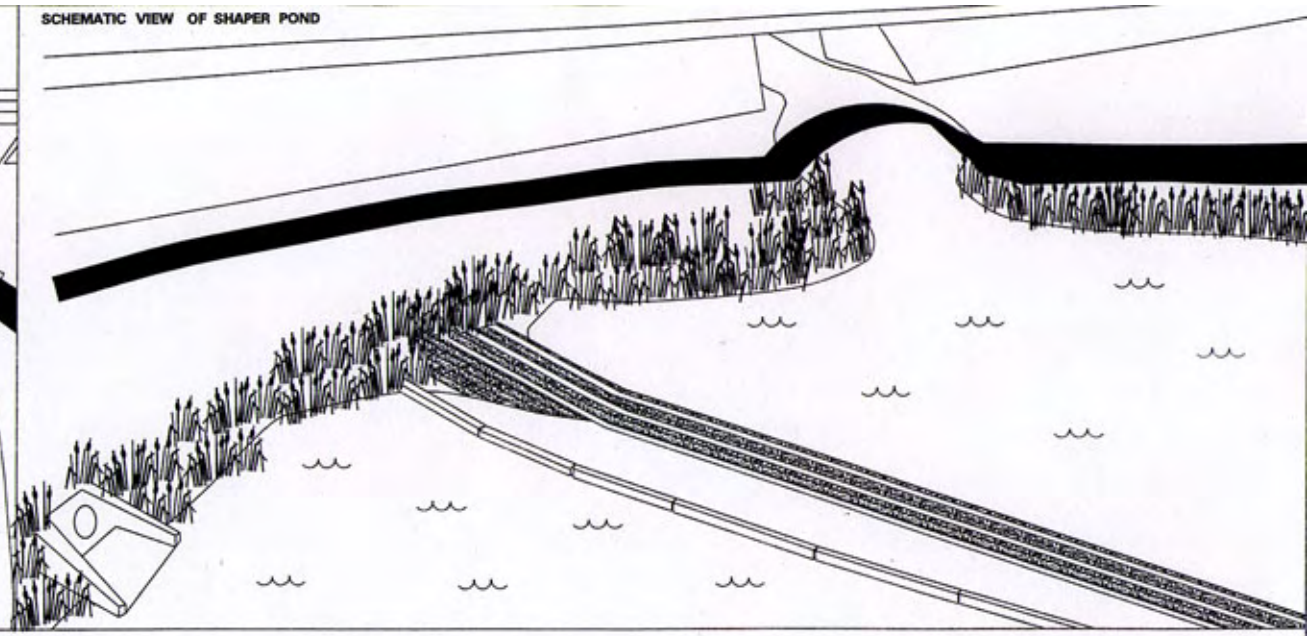
Cottage Grove Park & Ride

Storm
water
compost
gabion
living
wall
system

OVERHEAD VIEW OF SHAPER POND

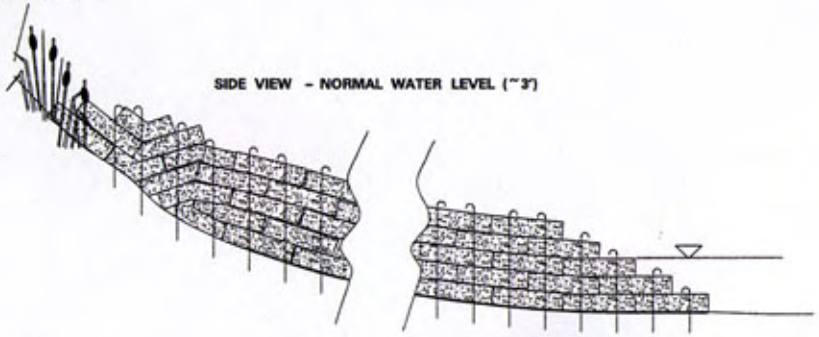


SCHEMATIC VIEW OF SHAPER POND

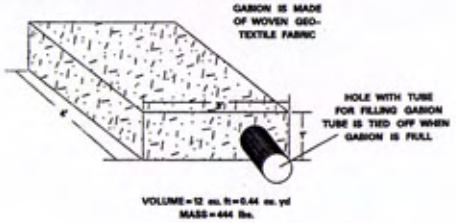


SEED UPLAND AREA
WITH MIX 259

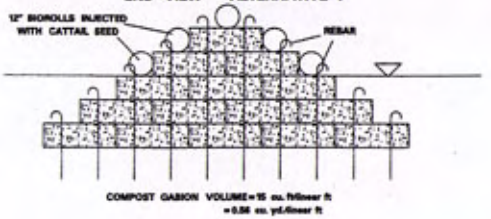
SIDE VIEW – NORMAL WATER LEVEL (~3')



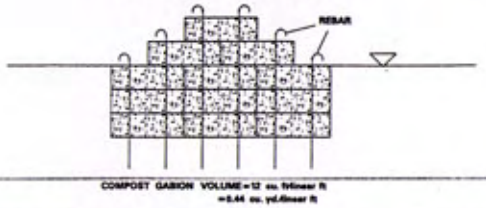
LIVING COMPOST GABION DETAIL



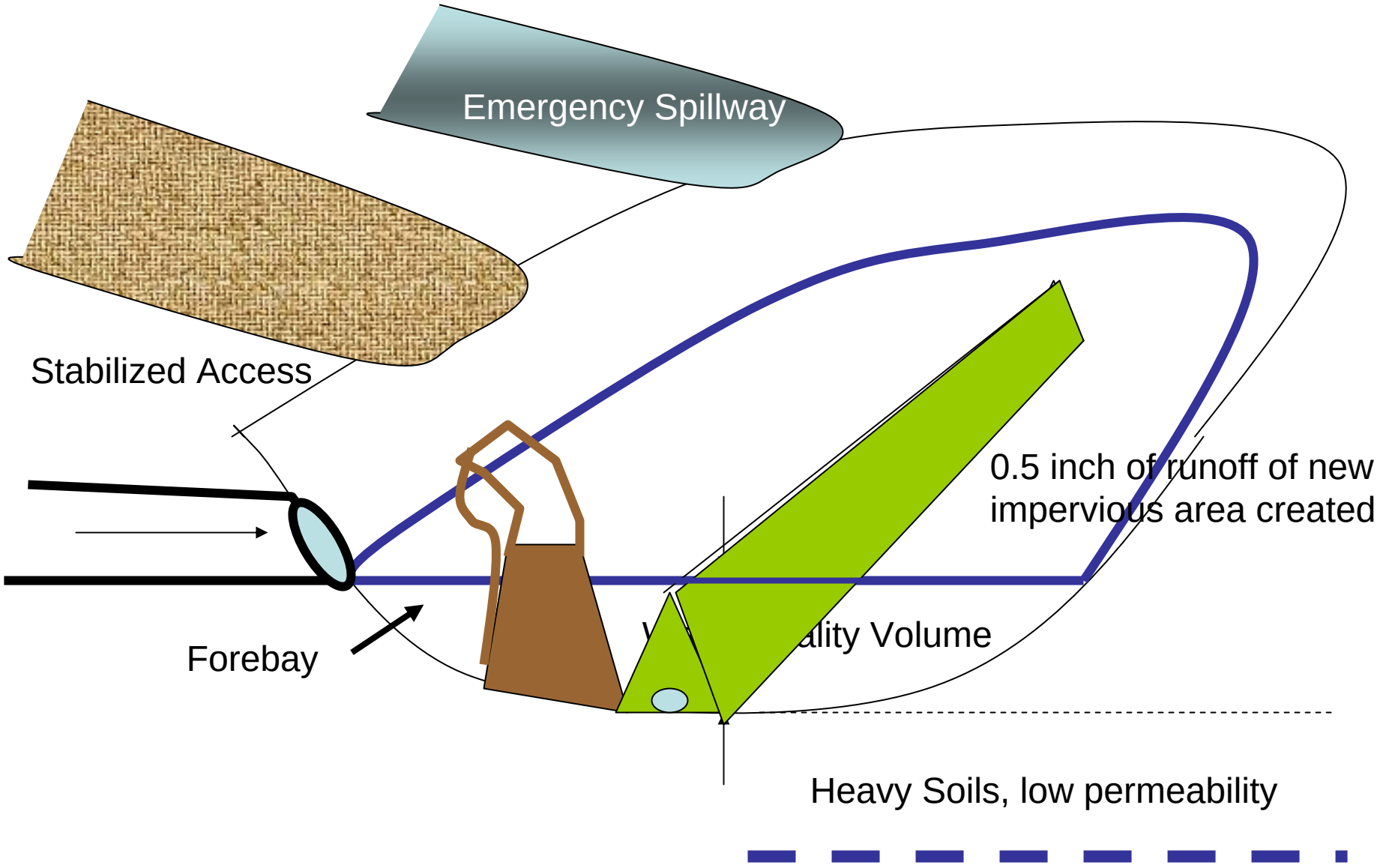
END VIEW – ALTERNATIVE 1



END VIEW – ALTERNATIVE 2



DRAFT – NOT YET APPROVED	DATE 02-12-2002	PROJECT MANAGER N/A	DRAWN BY D. Blakely CHECKED BY D. Stenlund	DATE _____ REG. NO. _____ PROFESSIONAL ENGINEER _____ LICENSED PROFESSIONAL ENGINEER	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION OFFICE OF ENVIRONMENTAL SERVICES EROSION CONTROL UNIT TRANSPORTATION BUILDING ST. PAUL, MINNESOTA 55155-1899	SHAPER POND LIVING COMPOST GABION PLAN – GOLDEN VALLEY, MN STATE PROJECT NO. xxxx-xxx (T.H.xx) | SHEET x OF xx SHEETS



2c. Filter-berm Basins

Future Today: Value Added Engineering

- Specialty Logs
  - Metal Trapping
  - Nutrient Trapping
  - Concrete slurry management
  - Living Walls
- Bioswales, living treatment systems
- Road-Kill Processing
- New methods of application

Oil Trap Logs

Rod Tyler

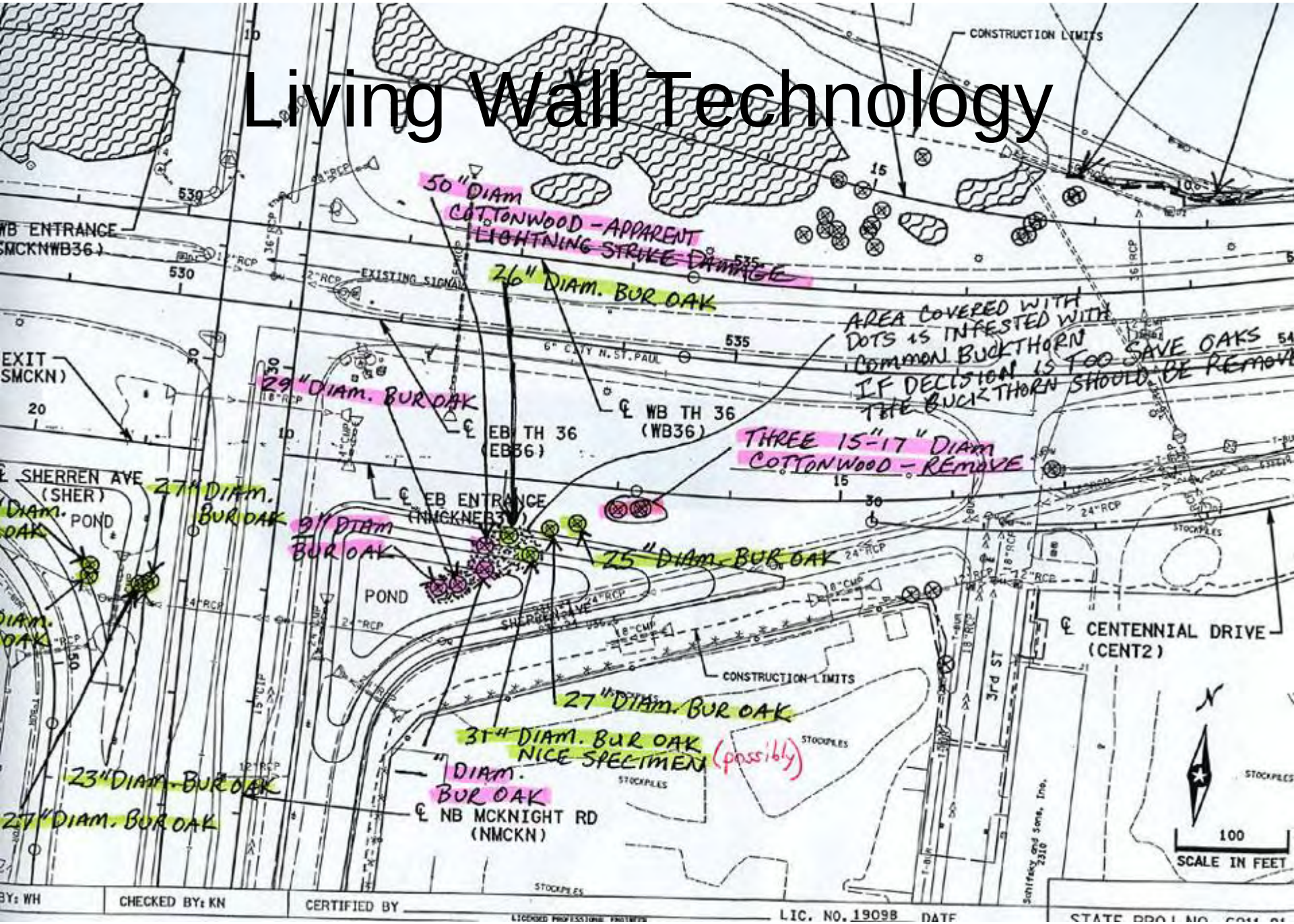

Heavy Metal Trap Log (lead, mercury, copper, nickel, zinc)

Concrete Washout Filtrexx Filter Rings™

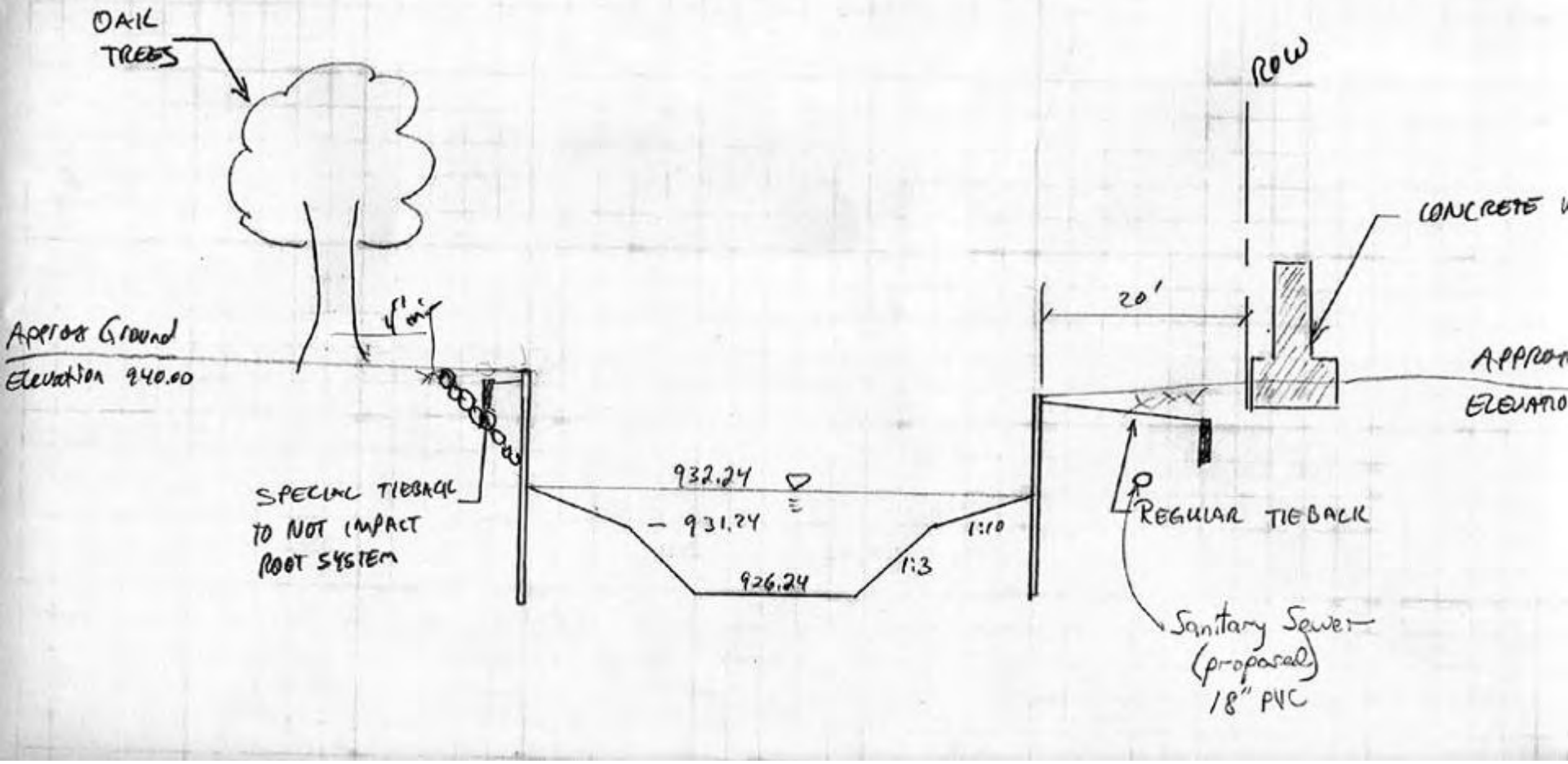
Rod Tyler 2006

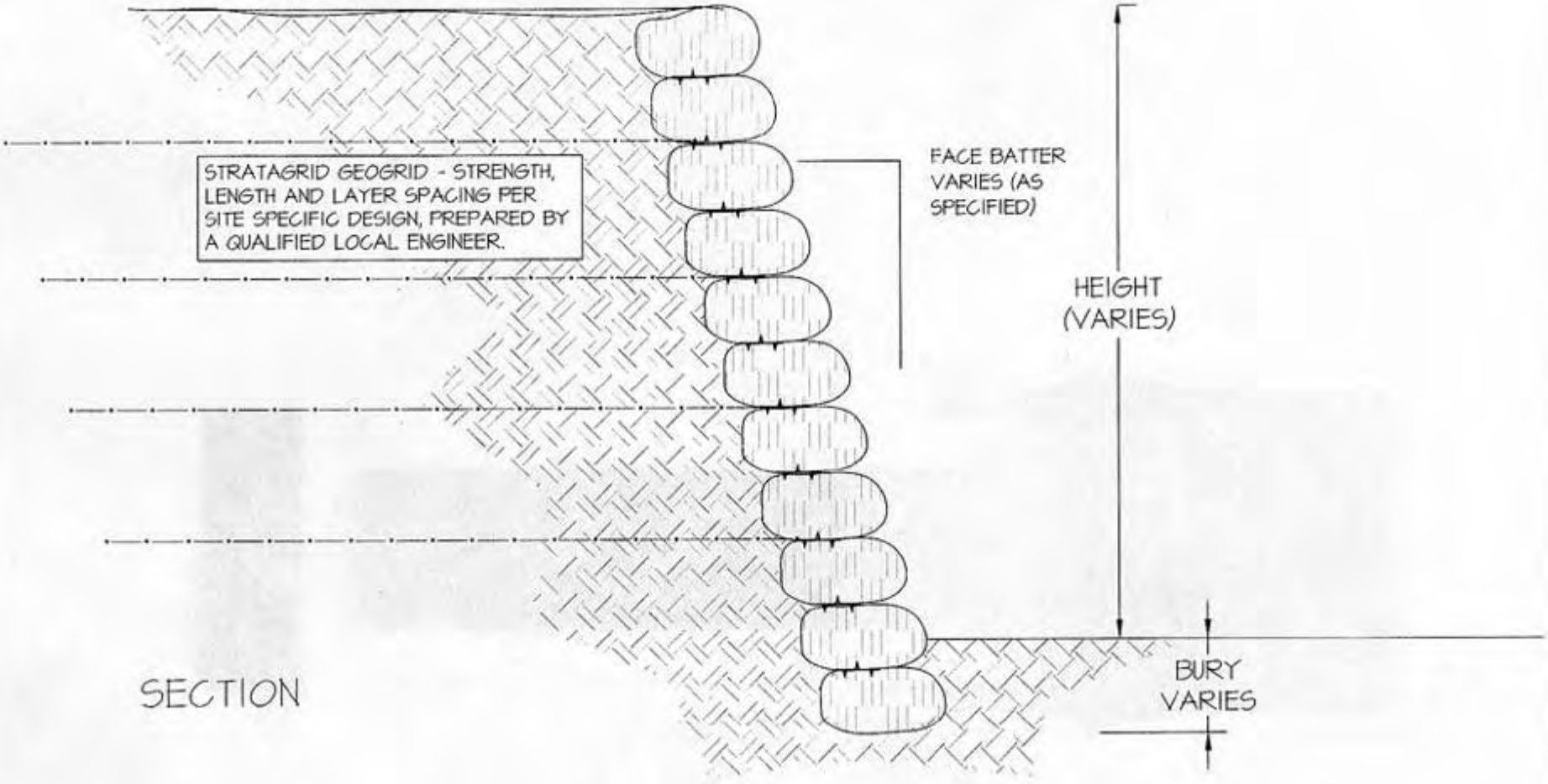
Concrete Slurry Management

Living Wall Technology



CROSS SECTION A-A





3 GEOGRID REINFORCED DELTALOK WALL; TYPICAL

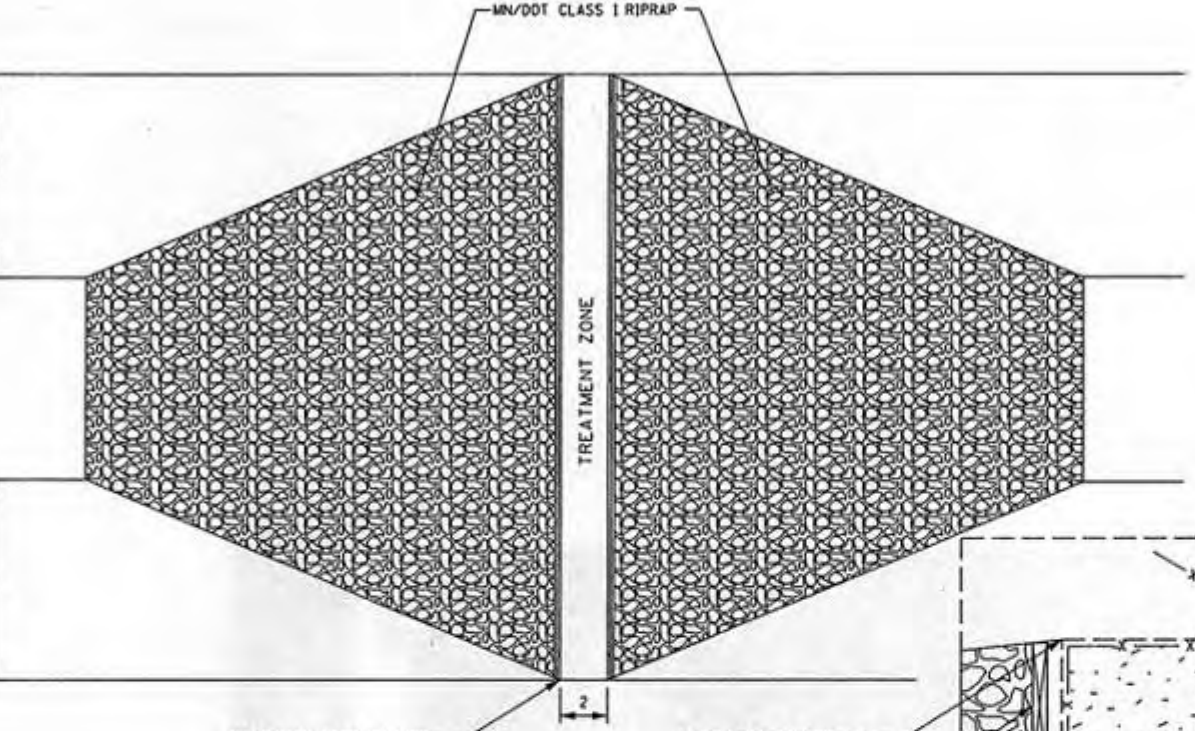
No.	Date	Revision	By
-	-	-	-

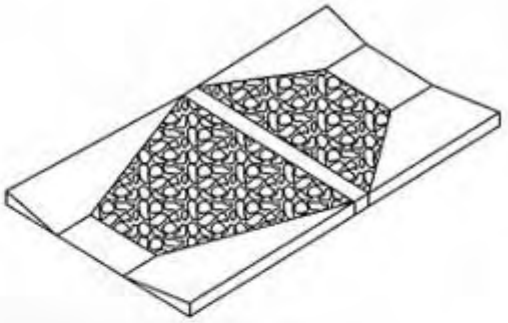
DELTALOK INC.
ECOLOGICAL ENGINEERING
For Erosion Control and Slope Stability
Deltalok Inc.
World Trade Centre
519 - 999 Canada Place
Vancouver, B.C., Canada, V6C 3E1
Tel: 604.609.9818
Fax: 604.609.9918
Toll Free: 877.335.8256

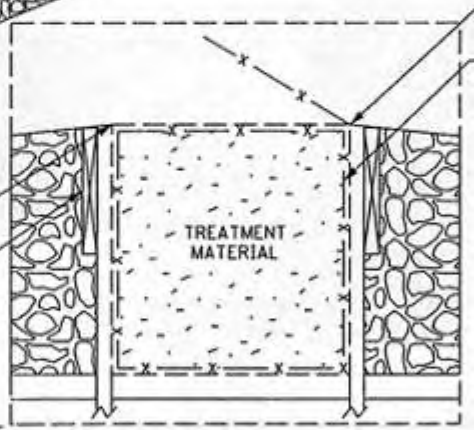
Designed by: -	PROJECT TITLE CITY, STATE	GEOGRID REINFORCED WALL	
Checked by: -			
Date: -	Scale: 3/4"=1'-0"	Proj. No: -	Drawing No: -

Ditch phytoremediation

- Reno blanket safety approaches
- Subcut 6 inches, 12 inch total height
- Replaceable media, backhoe width



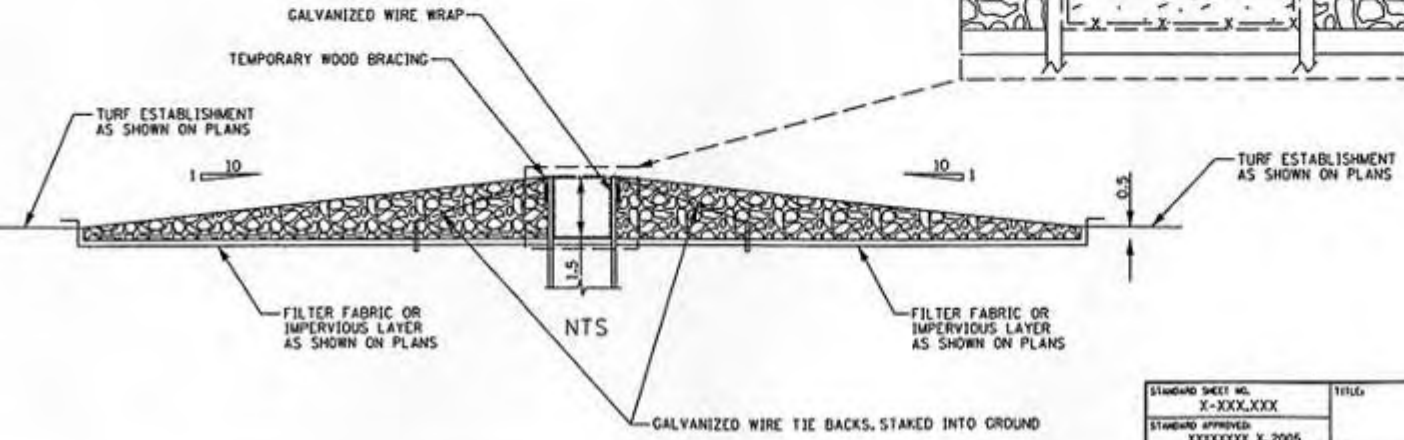




LEGEND

— — — FILTER FABRIC

—X—X— GALVANIZED WIRE FENCING



CONTAMINANT	TREATMENT MATERIAL
HEAVY MATALS	PEAT/COMPOST MIXTURE
OILS	ACTIVATED CARBON
VOC/ORGANICS	ACTIVATED CARBON
FECAL MATTER	PEAT/COMPOST MIXTURE
NITROGEN PHOSPHORUS OR POTASSIUM	COMPOST OR PEAT/COMPOST MIXTURE
SEDIMENTS	COMPOST AND FLOCULLANTS

STANDARD SHEET NO.	TITLE:
X-XXX.XXX	TEMPORARY EROSION CONTROL
STANDARD APPROVED: XXXXXXXX X, 2005	BIO DITCH CHECK
	SHEET NO. OF SHEETS


COMPOST MIXER
ROTO-MIX
ROTO-MIX


Hydrocompost of Bison manure
feedstock

No Limit to Imagination

- Landscape medium
- Lawn Medium, minimum watering
- Erosion Control
- Sediment control
- Steep slope stabilization
- Storm water quality
- Chemical management
- Wetland restoration
- Safety

Questions

- dwayne.stenlund@dot.state.mn.us
- 651-366-3625
- 612-810-9409

Sediment Basin

- Build first or concurrent to upgradient drainage discharge
- Prepare basin between rain events
  - Clean out when ½ full
  - Gravity dewater


Rod Tyler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Rod Tyler


Jay Michels

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