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Erosion Control, Vegetation Management and Stormwater Management on the I-39/90 Corridor Project

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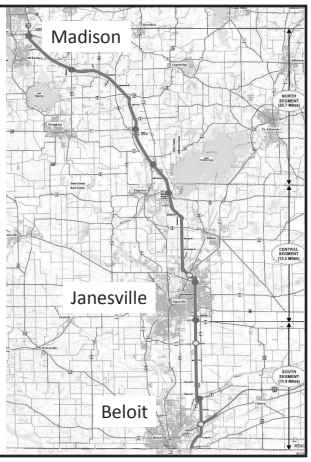
We will cover –

- Brief Project Overview
- Erosion Control Practices
- Vegetation Management along the Corridor
- Stormwater Management

In fulfillment of DNR TS4 Permit WI-S066800-2, Section 2.1.5.

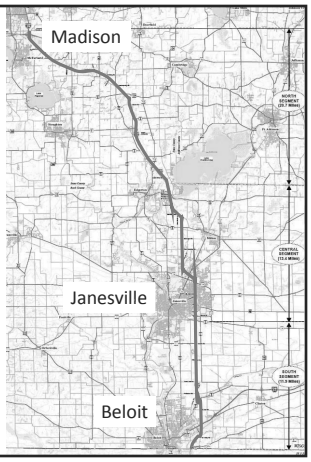
Corridor Statistics

- Beltline Interchange in Madison to State Line at Beloit
  - Three Segments
- 2019 ADT – 53,600
- 2040 ADT – 65,000
- Percent Truck Traffic – 28%
- Expanding from Four Lanes to Six or Eight Lanes
- Eleven Interchanges, Three of which are Diverging Diamond



Corridor Statistics

- 100 New Bridges
- 5 Major Creek Crossings
- 19+ Miles Reconstructed Alternative Routes
- Estimated $1.2 Billion
- Work Began in 2012
- Construction Complete in 2022
- Contracts Completed in 2023
- Vegetation Management Complete in 2025



Erosion Control on the I-39/90 Corridor Project

- Erosion Control Fun Facts
  - 48 separate construction projects
  - Select Sites (waste and borrow sites)
    - 93 Commercial
    - 124 Private
  - Three temporary concrete batch plants
  - 5+ culvert bypass channels
  - 10+ Dewatering systems
  - All projects required to have Soil Stabilizer Type B (Soil Stabilizing Polymer)
- Practices
  - Organic Fiber Matrix Mulch
  - Slope Interruption Compost Tubes
  - Upslope Tracking
  - Two-Cell Dewatering System

Organic Fiber Matrix Mulch

Organic Fiber Matrix Mulch, Item SPV.0005.514.

A Description
This special provision describes furnishing and placing native seed mixes using a hyd[illegible] as shown on the plans.

B Materials
B.1 Organic Fiber Matrix Mulch
Provide OFM meeting the following characteristics and requirements.
(1) Premixed formulation
(2) Contains a minimum of 80% organic material that may be derived from com[illegible]
(3) Phyto-sanitized to eliminate potential pathogens and weed seeds.
(4) Contains one or more of the following: humus, enzymes, vitamins, natural su[illegible]
(5) Contains zero ecotoxicity as per EPA 2021.0 in 48 hours.
(6) Passes EPA 703 Metal Limits.
(7) Passes 40 CFR 503 Class A for pathogen reduction.
(8) pH: 5.5 to 8.5 according to ASTM D 1293.
(9) Water Holding Capacity: 400% minimum according to ASTM D 7367.
(10) Vegetation Establishment: 600% minimum according to ASTM D 7322.
(11) Moisture Content: 10% minimum and 40% maximum according to ASTM D 7[illegible]

B.2 Native Seed Mix

Soil Stabilizer Type A will be paid for separately.

- Special provision
- Applied on eroded steep bridge embankment with native seed
- Successful slope stabilization

July 2022

Slope Interruption Compost Tubes

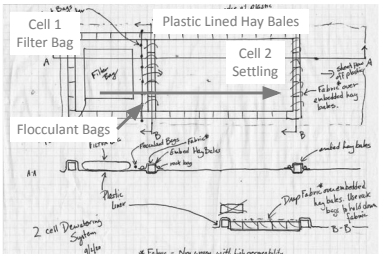
- Plan requirement on some steep/long slopes
- Applied with Soil Stabilizer Type A

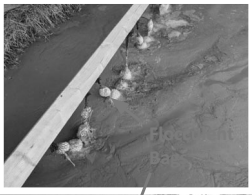
Upslope Tracking

- Special provision, incidental
- Applied to slopes longer than 30 ft.
- Caltrans demonstrated significant TSS reductions (30%-60%)

Two-Cell Dewatering System

- Required due to proximity to Spring Brook
- Treats bridge pier pumped water
- Amendment to ECIP
- Materials hauled to landfill when dewatering complete





The I-39/90 Corridor Project provided us with numerous opportunities to try different erosion control practices

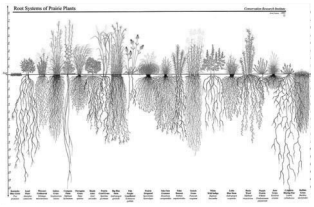
We thank Field Staff, Corridor Upper Management and the DNR who supported our efforts

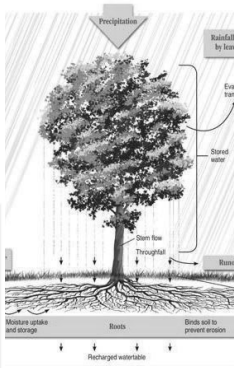
Vegetation Management on the I-39/90 Corridor Project

Incorporating Native Vegetation Planting Using Pre-Approved Contractors

We will cover –

- Why we are doing the work
- Planting extents along the corridor
- Project contracting
- Plan/Spec development
- Construction oversight
- Lessons Learned

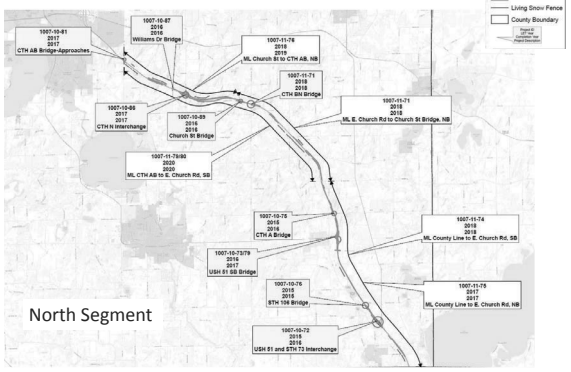




Why Do Vegetation Management?

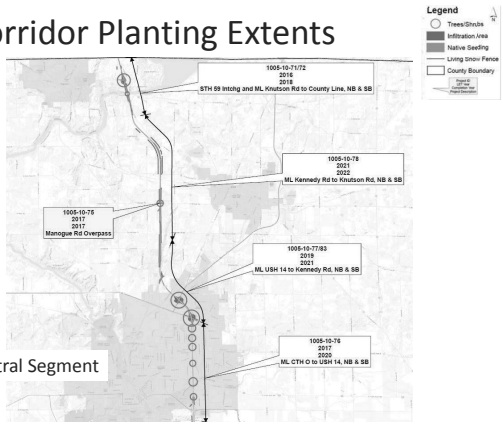
- Environmental Stewardship and Document Requirements for Mitigation – Bats, Pollinators and Re-Establishment
- Safety (LSF on N-S Road, Clear Zone)
- Slope Stability using Native Vegetation/Erosion Control
- Drainage System Requires Infiltration to Function
- Corridor Restoration
- Maintenance Cost Savings
- Aesthetics

Corridor Planting Extents



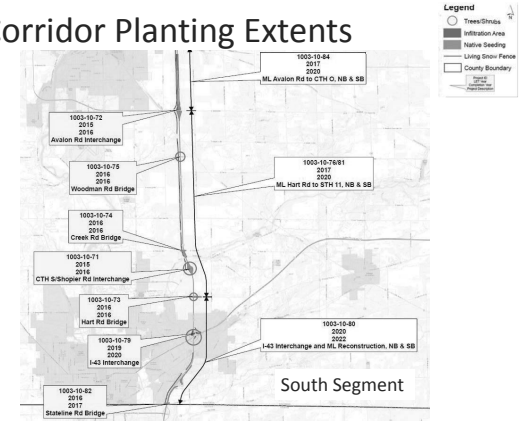
North Segment

Corridor Planting Extents



Central Segment

Corridor Planting Extents



South Segment

Tasks

1. Develop list of Pre-Qualified Contractors
2. Incorporate vegetation management into project plan sets
3. Include care cycles for each project
   a. First year included in project
   b. Continue with care cycles using work orders managed by Central Office
      - Second year for trees and shrubs
      - Second and third years for native seeding

First Task – Develop Approved List of Pre-Qualified Sub-Contractors

- Woody Vegetation and Native Seeding
- Contacted 430 firms statewide
  - 350 Landscape Companies
  - 80 Erosion Control Contractors
- Evaluated 11 Submittals Using Experience Criteria
  - Selected 7 Native Seeding Firms
  - Selected 6 Woody Vegetation Planting Firms
- Criteria
  - Company project experience
    - Scale/Scope similar to WisDOT projects
    - Available equipment
  - Qualified herbicide applicators
  - Staff experience, work history and education

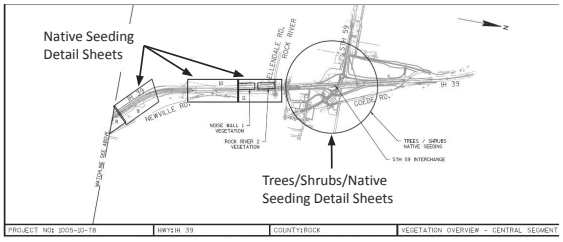
Second Task – Incorporate Vegetation Management Plans and Specs into Corridor Highway Project Plans

- Landscape design document
- Integrate vegetation into corridor plans
- Native seed plant guide

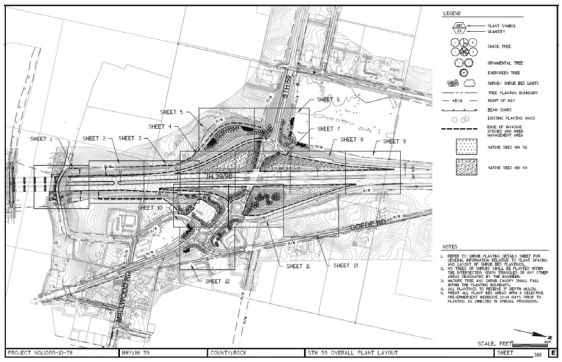
Tree and Shrub Facts

- 24 Tree Species Planted
- 799 Evergreen Trees
- 3743 Deciduous Trees
- 8 Shrub Species Planted
- 934 Evergreen Shrubs
- 5960 Deciduous Shrubs
- Eastern Red Cedar and Bur Oak Were Hard to Establish

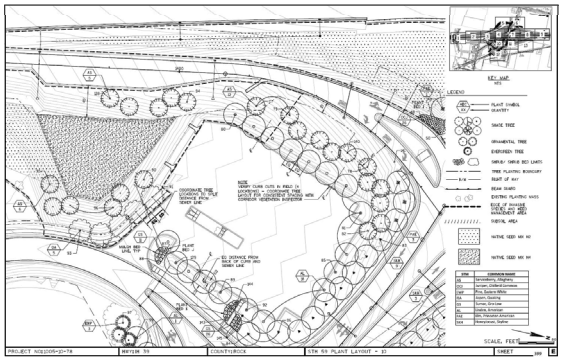
Vegetation Management Plans - Overview Sheet



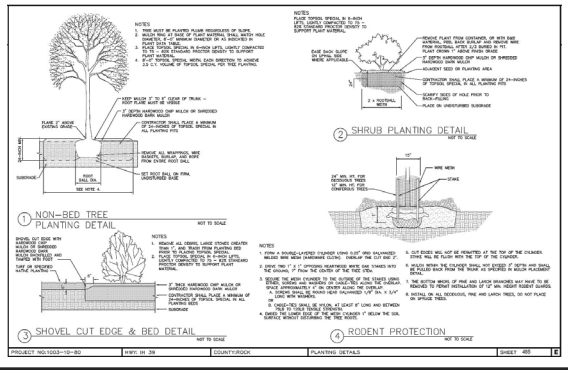
Overall Plant Layout Sheet



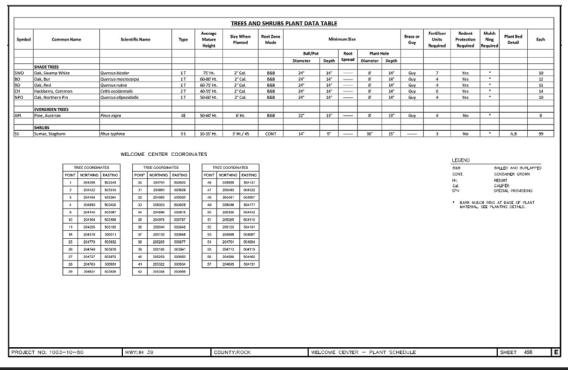
Plant Layout Detail Sheet



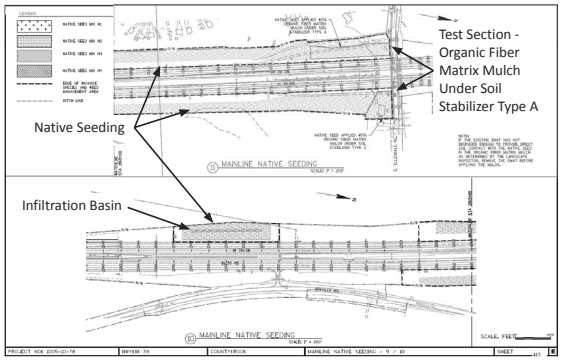
Planting Detail Sheet



Planting Schedule Sheet



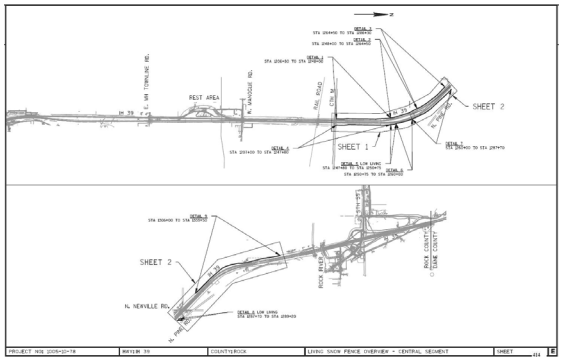
Native Seeding Detail Sheet



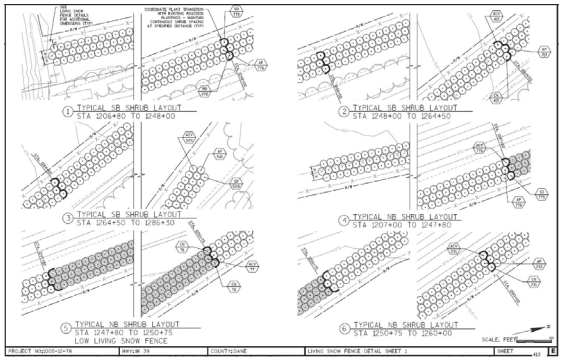
Living Snow Fence

- DNR Involvement and Bare Root Shrub Availability
- Design and Planning is Crucial
- Approximately 70,000 Shrubs Planted and Approximately 10 Native Varieties
- Weather Plays Into Success and Failures
- Maintenance – Herbicides, Mowing, Hand Weeding

Living Snow Fence Overview Sheet



Living Snow Fence Detail Sheet



Vegetation Management Specs

1. Standard Spec Modifications to existing DOT spec
2. New Special Provisions
   a. Topsoil Special
   b. Compost
   c. Subsoiling
   d. Native Seeding Mixes
   e. Native Seed Surveillance and Care Cycles
   f. Pre-Planting Vegetation Treatment

Standard Spec Modifications

1. Incorporated MnDOT Concepts into WisDOT Standard Plant Materials Specs
2. Pre-qualified contractors to verify expertise
3. Provided more detail regarding plant quality and installation
4. Introduced Competency Testing
5. Provided more complete direction regarding care cycle performance
6. Introduced inspection forms to document installation and maintenance
   a. Herbicide Application
   b. Tree and Shrub Scouting Report
   c. Native Seed Scouting Report
   d. Final Assessment of Native Plantings worksheet
   e. Native Plant Survey worksheet for final site assessments

New Special Provisions

1. Topsoil Special
   a. Added defining components
   b. Changed units to CY from SY
2. Compost
   a. Based upon WDNR Compost Standard
3. Subsoiling
   a. Two step process – deep till and mixing
   b. Required multiple passes
4. Native Seeding Mixes
   a. Defined four mix types, depending upon soil and moisture conditions
   b. Includes both Forbes and Grasses, about 35 species
5. Native Seed Surveillance and Care Cycles
   a. Describe specific care options (mowing, weeding, herbicide)
   b. Provide performance standards
   c. Requires specific documentation
   d. Requires seed bed preparation including herbicide application as a separate special

Third Task - Include construction oversight and care cycles for each project

1. Provide Corridor Vegetation Inspector for project oversight and inspection
2. Year 1 growing season care cycles in projects to close out projects in a timely manner
3. Continue with care cycles using work orders managed by Central Office
   - Year 2 for trees and shrubs
   - Year 2 and 3 for native seeding

Nursery Stock

- Nursery Visits
- Plant Availability
- Delivery and Inspections
- Native Species
- Plant Species Diversity
- Evergreen and Deciduous

Soils

- Variety of Soil Types, some good but mostly bad
- High pH and Low Organic Content
- Modified Planting Mix During Project
- Compost
- BioChar
- Fertilizer
- Need for Soil Testing
- Compacted Soils



Installation

- Inspect Plant
- Plant High
- Remove top third of wire and burlap
- Fertilize
- Amend soil
- Water

Native Seed Installation Techniques

- Drill Seed Where Slopes Allowed
- Broadcast Utilizing Erosion Control Mat. Not great to reseed over.
- Broadcast Into Existing Thatch
- Pro-ganic's and Miloganite
- Late Fall / Early Winter In General

Native Pollinator Friendly

- 616 Acres Planted to Prairie
- 9250 pounds of seeds
- 4 Seed Mixes Were Used
- About 35 Species
- Installed on back slopes to avoid salt contamination

Lessons Learned So Far

- Add Signs to Prevent Unwanted Mowing
- County Staff Mowing Coordination
- Add Living Snow Fence Care Cycles and Planting Process
- Highway Access
- Plant Location Field Adjustments
- Planting on Steep Slopes
- Lead Times for Tree/Shrub/Native Seed Availability and Substitutions
- Soils are Variable
- Acknowledgment of Vegetation Management Team

Stormwater Management on the I-39/90 Corridor Project

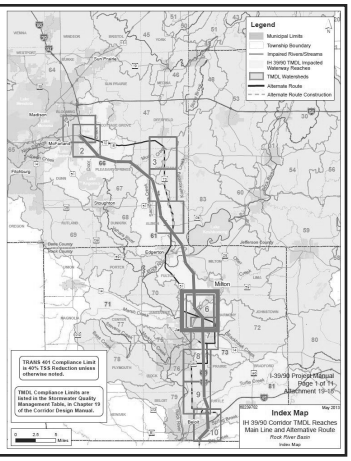
39/90 IMPROVING a gateway to Wisconsin

We will cover –

- TMDL Requirements
- Training
- Infiltration Basins for Peak Flow Control
  - Extent
  - Subsoiling
  - Native Seeding
  - Maintenance
- Stormwater Control Practices
  - Infiltration swales and basins
  - Filter strips
  - Detention ponds

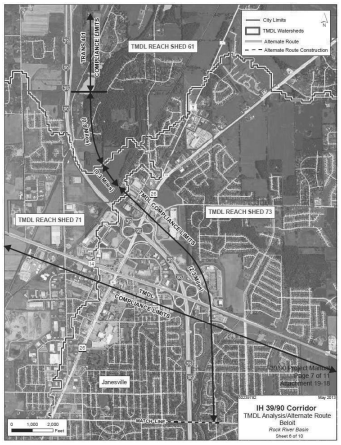
Lower Rock River TMDL

MS4	Reach Shed Number	% TP Reduction	% TSS Reduction
Madison	66	70.4%	72.2%
Janesville	61	N/A	40.0%
Janesville	71	57.6%	64.3%
Janesville	73	80.9%	77.5%
Janesville /Beloit	76/79	85.3%	67.9%
Beloit	81	39.3%	40.0%



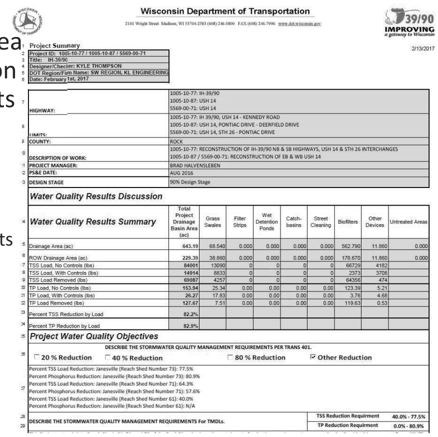
Janesville Area TSS Reduction Requirements

MS4	Reach Shed Num-ber	% TP Reduc-tion	% TSS Reduc-t ion
Madison	66	70.4%	72.2%
Janesville	61	N/A	40.0%
Janesville	71	57.6%	64.3%
Janesville	73	80.9%	77.5%
Janesville /Beloit	76/79	85.3%	67.9%
Beloit	81	39.3%	40.0%



Janesville Area TSS Reduction Requirements

- Each project completes the stormwater report form
- Form documents project TSS and TP reductions
- All project reductions incorporated into statewide analysis



Wisconsin Department of Transportation
2101 Wright Street Madison, WI 53704-2583 (608) 246-3800 FAX (608) 246-7996 www.dot.wisconsin.gov

39/90 IMPROVING a gateway to Wisconsin

2/13/2017

Project Summary
Project ID: 1005-10-77 / 1005-10-87 / 5569-00-71
Title: IH-39/90
Designer/Checker: KYLE THOMPSON
DOT Region/Firm Name: SW REGION, KL ENGINEERING
Date: February 1st, 2017

HIGHWAY:	1005-10-77: IH-39/90 1005-10-87: USH 14 5569-00-71: USH 14
LIMITS:	1005-10-77: IH 39/90, USH 14 - KENNEDY ROAD 1005-10-87: USH 14, PONTIAC DRIVE - DEERFIELD DRIVE 5569-00-71: USH 14, STH 26 - PONTIAC DRIVE
COUNTY:	ROCK
DESCRIPTION OF WORK:	1005-10-77: RECONSTRUCTION OF IH-39/90 NB & SB HIGHWAYS, USH 14 & STH 26 INTERCHANGES 1005-10-87 / 5569-00-71: RECONSTRUCTION OF EB & WB USH 14
PROJECT MANAGER:	BRAD HALVENSLEBEN
PS&E DATE:	AUG 2016
DESIGN STAGE	90% Design Stage

Water Quality Results Discussion

Water Quality Results Summary	Total Project Drainage Basin Area (ac)	Grass Swales	Filter Strips	Wet Detention Ponds	Catch-basins	Street Cleaning	Biofilters	Other Devices	Untreated Areas
Drainage Area (ac)	643.19	68.540	0.000	0.000	0.000	0.000	562.790	11.860	0.000
ROW Drainage Area (ac)	229.39	38.860	0.000	0.000	0.000	0.000	178.670	11.860	0.000
TSS Load, No Controls (lbs)	84001	13090	0	0	0	0	66729	4182	
TSS Load, With Controls (lbs)	14914	8833	0	0	0	0	2373	3708	
TSS Load Removed (lbs)	69087	4257	0	0	0	0	64356	474	
TP Load, No Controls (lbs)	153.94	25.34	0.00	0.00	0.00	0.00	123.39	5.21	
TP Load, With Controls (lbs)	26.27	17.83	0.00	0.00	0.00	0.00	3.76	4.68	
TP Load Removed (lbs)	127.67	7.51	0.00	0.00	0.00	0.00	119.63	0.53	
Percent TSS Reduction by Load	82.2%								
Percent TP Reduction by Load	82.9%								

Project Water Quality Objectives

DESCRIBE THE STORMWATER QUALITY MANAGEMENT REQUIREMENTS PER TRANS 401.

☐ 20 % Reduction ☐ 40 % Reduction ☐ 80 % Reduction ☑ Other Reduction

Percent TSS Load Reduction: Janesville (Reach Shed Number 73): 77.5%
Percent Phosphorus Reduction: Janesville (Reach Shed Number 73): 80.9%
Percent TSS Load Reduction: Janesville (Reach Shed Number 71): 64.3%
Percent Phosphorus Reduction: Janesville (Reach Shed Number 71): 57.6%
Percent TSS Load Reduction: Janesville (Reach Shed Number 61): 40.0%
Percent Phosphorus Reduction: Janesville (Reach Shed Number 61): N/A

DESCRIBE THE STORMWATER QUALITY MANAGEMENT REQUIREMENTS For TMDLs.	TSS Reduction Requirment	40.0% - 77.5%
	TP Reduction Requirment	0.0% - 80.9%

Training

- Water Quality Design Training
- Two training sessions (2013 & 2014)
- All Design Teams invited

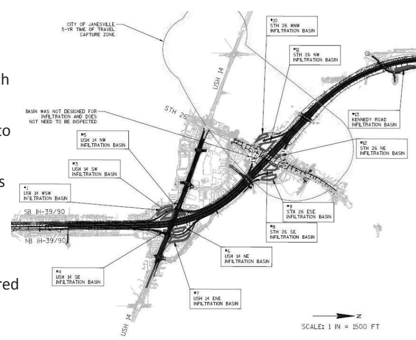
I-39/90 Corridor Water Quality Design Requirements Training

May 31, 2013 at Southwest Region Office, Madison

1) Introductions
2) TSS Reduction Requirements
   a) Rock River TMDL
   b) TMDL and TRANS 401 Reduction Requirements by Reach Shed
   c) Detailed Corridor Maps
3) DOT Stormwater Quality Analysis
   a) FDM Chapter 10 Sections
   b) FDM Stormwater Report (Modified)
4) Design
   a) Design Process
      i) Unit Loads and Design Charts vs. Modeling
      ii) Roadside Channels for TSS Reduction
      iii) Runoff Discharge Rate Requirement
      iv) Airport Issues
      v) Stormwater Control Practice Selection
   b) Design Example – STH 11 Racine Street Interchange (Modeling Approach)
   c) Design Example – I-39 Corridor Section (Unit Load Approach)
5) Submittals (Jenny Grimes)
   a) Submittal Content
   b) Submittal Example
   c) Schedule

Janesville Infiltration Basins for Peak Flow Control – Site Plan

- Basins included to reduce ROW requirements and protect existing drainage system
- Basins designed with up to six feet dead storage volume
- Rely on infiltration to fully drain between storms
- Sand/gravel subsoils provide sufficient infiltration capacity
- Native plant root systems used to enhance infiltration
- Maintenance required to ensure proper performance



Janesville Infiltration Basins for Peak Flow Control – Subsoiling

Prepared Subsoiling Special Provision

Subsoiling, Item SPV.0005.XXX.

A Description
This special provision describes subsoiling designated areas as shown on the plans or as directed by the engineer or Corridor Vegetation Inspector, and as hereinafter provided.

B (Vacant)

C Construction
Subsoil the designated area as shown in the plans or as directed by the Corridor Vegetation Inspector after topsoil or compost placement. Schedule a 500-square-foot test area and demonstrate competence to the Corridor Vegetation Inspector for either swale and slope subsoiling, or basin subsoiling, prior to continuing operations. The Corridor Vegetation Inspector shall identify the test area. Subsoiling shall consist of [illegible] deep tilling passes and a surface mixing pass. For the deep tilling passes, loosen subsoiled areas to a depth of 20 inches of the in-place material and placed topsoil or compost. For the surface mixing pass, loosen the subsoiled areas to a depth of 6 to 8 inches. After obtaining approval by the Corridor Vegetation Inspector that the equipment and methods are sufficient to perform the work, complete the subsoiling operation for the designated areas within the project. Work done without the [illegible] Inspector's approval will be considered as unauthorized work.

For the deep tilling passes, create subsoiling channels with a commercially available, multi-shanked implement attached to track-type equipment. There shall be a minimum of two shanks on the equipment, with each shank located behind a [illegible] is tracked. Do not pull the shanks through previous channels, but instead create multiple channels. The equipment shall be capable of exerting a penetration force necessary for the site. No disc cultivators, chisel plows, or spring-loaded equipment will be allowed. Space the grid channels 24 to 30 inches apart, depending on equipment, site conditions, and the plan. The channel depth shall be to a minimum of 20 inches.

For the surface mixing pass, use a disk chisel or coulter chisel plow with twisted points, or other approved implement, to mix the top 6 to 8 inches of the soil. Do the operation in one pass with a commercially available implement attached to track-type equipment applying no more than 5 psi of pressure or to a tractor with a minimum of two tires per axle. The equipment shall be capable of exerting a penetration force necessary for the site.

If soils are saturated, delay operations until the soil dries to field capacity or less. Field capacity is the amount of water retained in the soil after it has been saturated and allowed to drain freely.

C.1 Swale and Slope Subsoiling
Complete the deep tilling operation in three passes for [illegible] erodible slopes steeper than 6 horizontal to 1 vertical (6:1), work at right angles to the direction of surface drainage whenever practical. Follow this with a surface mixing pass parallel to the direction of ditch flow.

C.2 Basin Subsoiling
Perform the deep tilling operation in two sets of passes to form a two-directional (90°) grid. Follow this with a surface mixing pass completed in either direction.

C.3 Exceptions
Area exceptions to subsoiling include areas within the drip line of any existing trees, over utility installations within 30 inches of the surface, when trenching/drainage lines are installed, where compaction is by design (abutments, footings or inslopes steeper than 4:1), and inaccessible slopes, as approved by the Corridor Vegetation Inspector. In cases where exceptions occur, observe a minimum [illegible] the Corridor Vegetation Inspector.

C.4 Finish Grading
Upon completion of the subsoiled area, finish grade the area as described in standard spec 625.3.3, except that only light-weight equipment as approved by the Corridor Vegetation Inspector may be used. Drive no other equipment over the subsoiled area after the area has been finish-graded. Any subsoiled areas that are re-compacted shall be subsoiled and finish-graded at no expense to the department.

D Measurement
The department will measure Subsoiling by the acre of area acceptably completed.

E Payment
The department will pay for the measured quantity at the contract unit price under the following bid item:

ITEM NUMBER	DESCRIPTION	UNIT
SPV.0005.XXX	Subsoiling	Acre

Payment is full compensation for subsoiling designated areas shown on the plans or as directed by the Corridor Vegetation Inspector; and performing finished grading operations of these subsoiled areas.

(1/23/2018)

C Construction
- Test Plot
- Two Operations
  - Deep tilling
  - Surface mixing pass
- Equipment type
  - Multi-shanked tiller
  - Disk chisel or coulter chisel
- Two conditions
  - Swale and slope subsoiling
  - Basin subsoiling
- Exceptions
  - Tree drip lines
  - Over utilities
  - Where compaction is by design
- Finish Grading per spec 625.3.3

Multiple Subsoiling Passes

Subsoiling Equipment

Ripping tooth on a backhoe in an infiltration basin

Skid Steer Rototiller in an infiltration swale

Finish Grading

Native Seeding in Basins

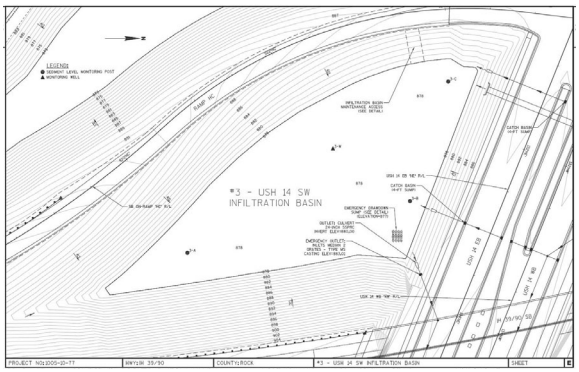
- Native plant root systems intended to maintain infiltration in the basins
- Rock sumps and staff gages
- Native seed selection intended for dry/sandy conditions
- Three years of care cycles provided after seeding

Basin Maintenance

I-39/90 Janesville Infiltration Basin Operating and Maintenance Plan

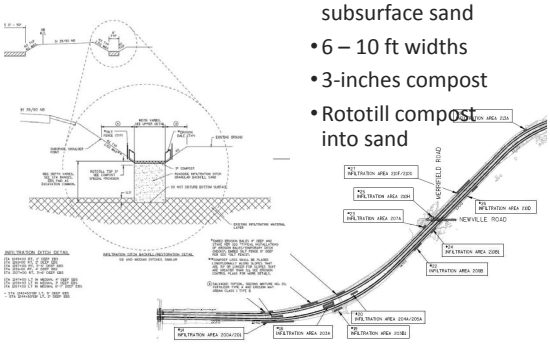
- Basin maps and locations
- Basin feature locations
  - Drawdown sumps
  - Sediment and water level monitoring posts
  - Inlets and outlets
  - Monitoring wells
- Minimum infiltration requirements
- Basin performance standards
- Inspection schedule
- Vegetation maintenance requirements
- Relevant construction specifications
- Contact and Coordination
- Prepared by KL Engineering

Example Basin Plan



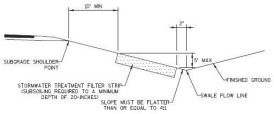
Infiltration Swales and Basins

- Multiple locations
- Sand added to meet subsurface sand
- 6 – 10 ft widths
- 3-inches compost
- Rototill compost into sand

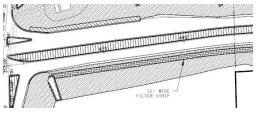


Filter Strips

- Multiple locations
- 20-inch minimum sand depth
- Topsoil per spec
- Rototill topsoil into sand



STORMWATER TREATMENT FILTER STRIP



Detention Ponds

No designed wet ponds in the corridor

- Initial concept was to promote infiltration
- Site conditions (typically rock near the surface) sometimes restricted infiltration
- Resulting basins are all vegetated

- North Segment – four dry ponds/basins
- Central Segment – eighteen dry ponds/basins
- South Segment – nine dry ponds/basins

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