Waukesha County 2018 Stormwater Conference
March, 2018

Meeting WisDOT TMDL & TSS Reduction Goals

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Parks and Land Use
Land Resources

Meeting Wisconsin Department of Transportation TMDL and TSS Reduction Goals

We will cover . . .

1. **How the Wisconsin urban highway system pollutant loading reduction requirements are met**
2. **How WisDOT is meeting it's TMDL Load Reduction Requirement**

What are the pollutant reduction goals?

WisDOT Jurisdictional Highways

1. **WisDOT TRANS 401 & TS4 Permit Pollutant Load Reduction Requirements**
   - 20% for existing state highways within
   - 40% for state highways within urban areas
   - 80% for new highway construction
2. **TMDL Load Reduction Requirement**
   - Drainage basin requirements for TS4s
   - Jurisdictional highway load allocations and reductions calculated from pro-rated sub-basin reaches
   - Addressed on a project by project basis

What is WisDOT TRANS 401?

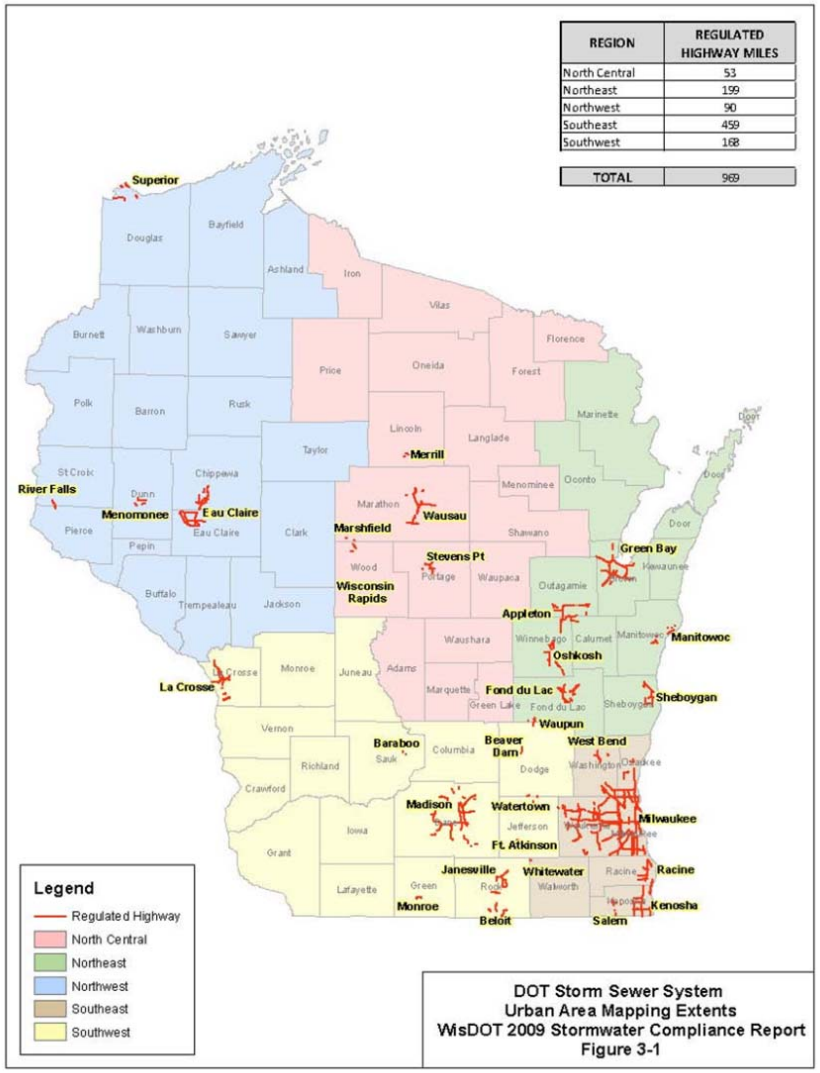
State of Wisconsin Administrative Code

- **Provides erosion/sediment control & stormwater management procedures & standards for construction project carried out & supervised by WisDOT**
- **Will be updated as functional equivalent of WDNR administrative code NR 151 for all other land disturbing construction projects within Wisconsin**
- **Identifies requirements for project erosion control plan**
- **Identifies requirements for contractor to implement erosion control plan**
- **Identifies post-construction standards for total suspended solids, peak discharge, and infiltration**

What is the Transportation Separate Storm Sewer System Permit (TS4)?

- WisDOT equivalent to MS4 Permit
- Per State Statute, will be implemented on or before June 30, 2018
- Sets standards for stormwater runoff treatment prior to discharge to Waters of the State
- Applies to WisDOT jurisdictional highways within MS4 municipal boundaries

Wisconsin DOT Rule Pollutant Load Reduction Requirements

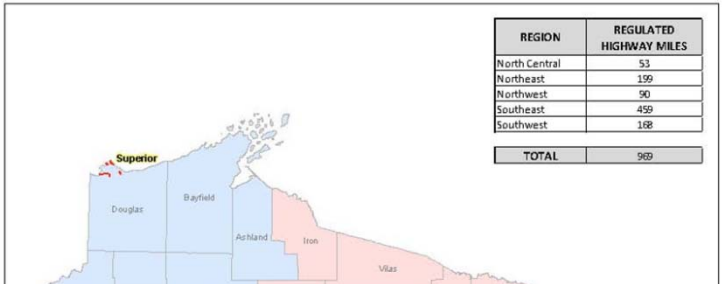


1. Define and map urban area highway network

REGION	REGULATED HIGHWAY MILES
North Central	53
Northeast	199
Northwest	90
Southeast	459
Southwest	168

TOTAL	969

WisDOT Pollutant Load Reduction Requirements



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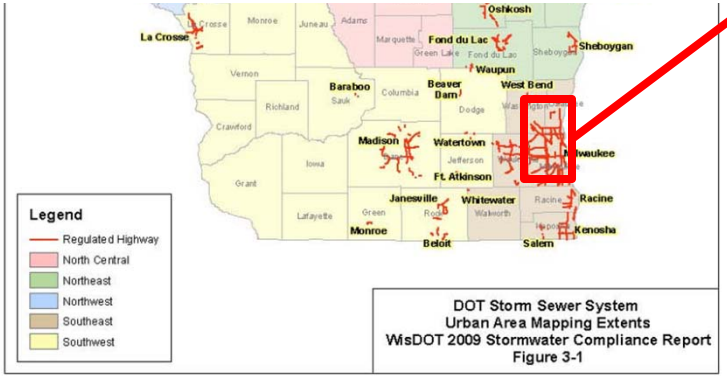
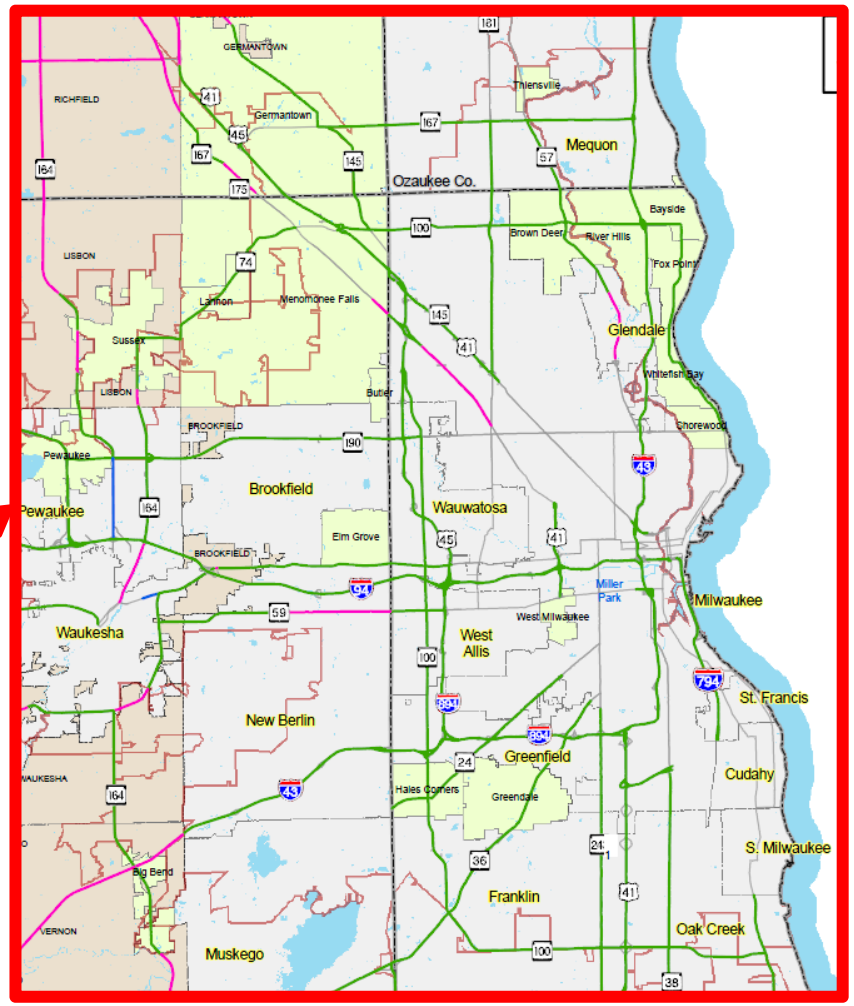
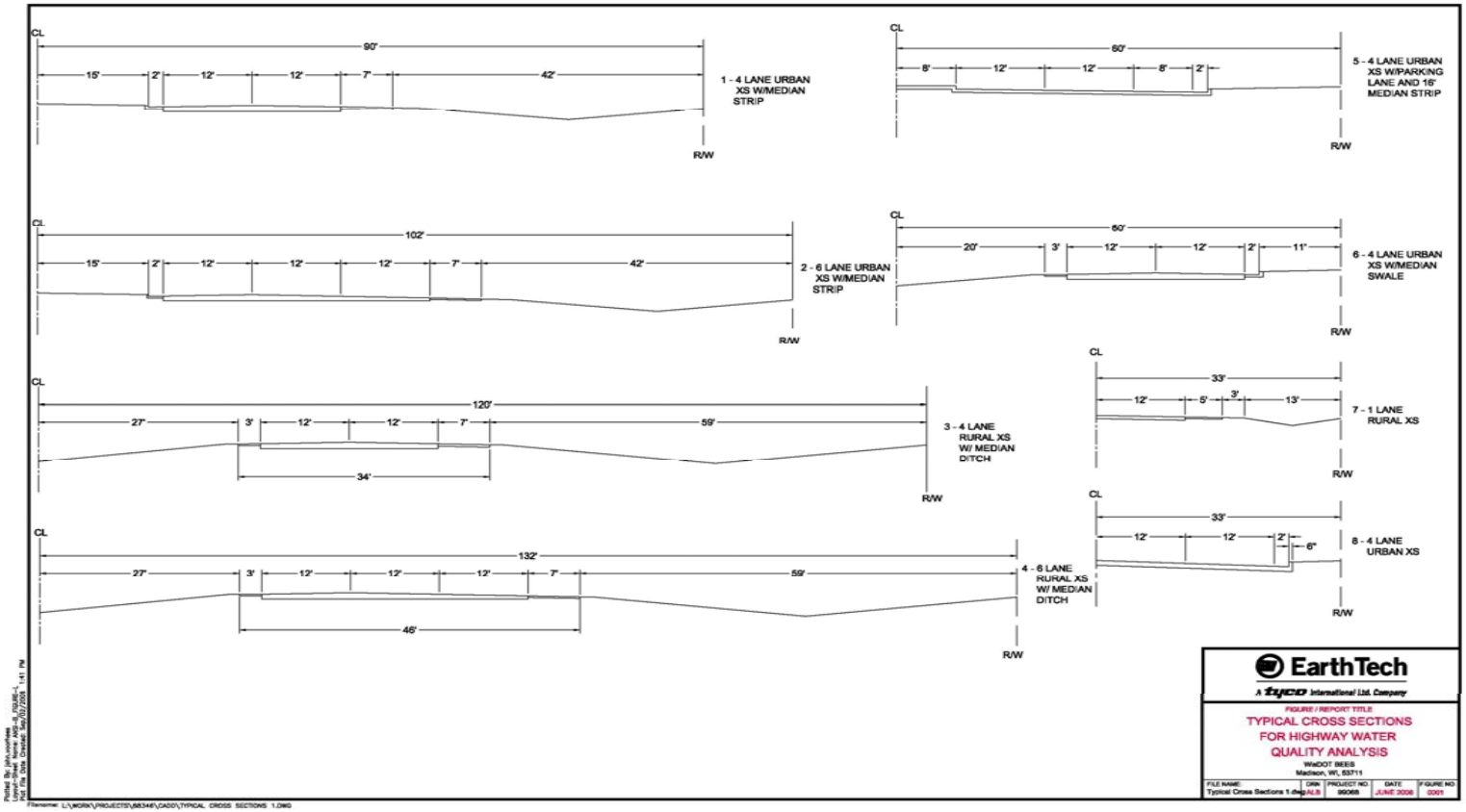




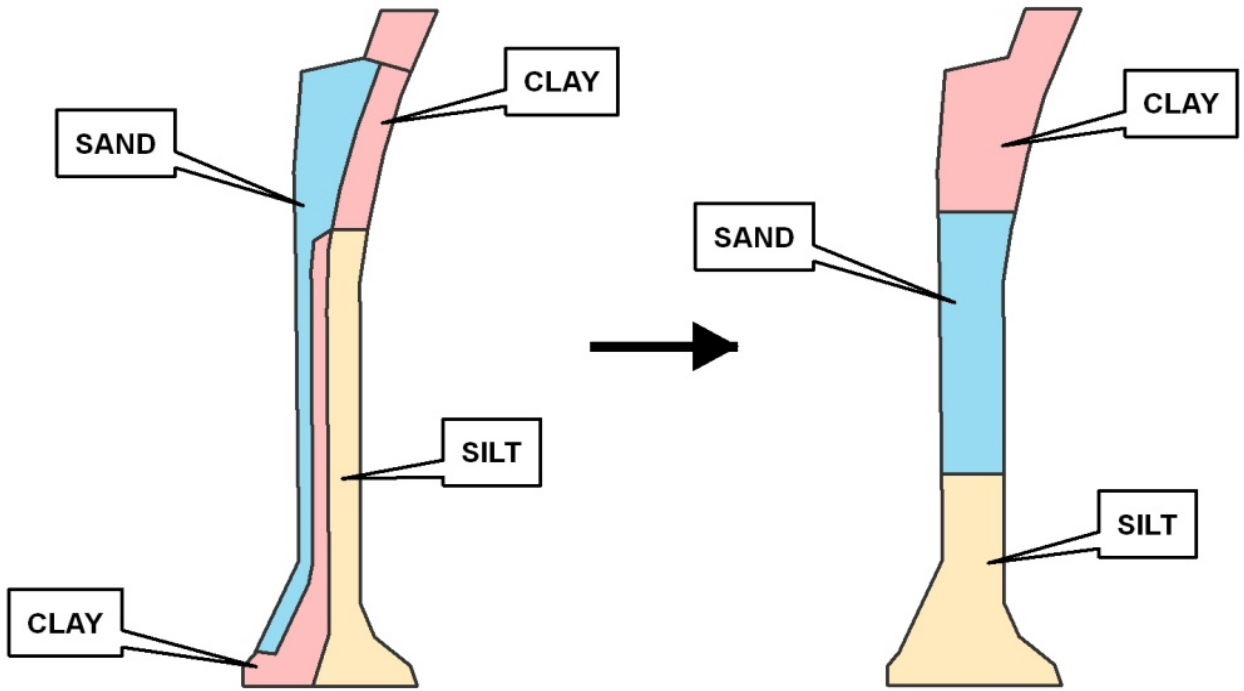
WisDOT Pollutant Load Reduction Requirements

2. Collect mapping data to define highway
   - Right-of-Way
   - Slopes
   - Soils
   - Cross Sections



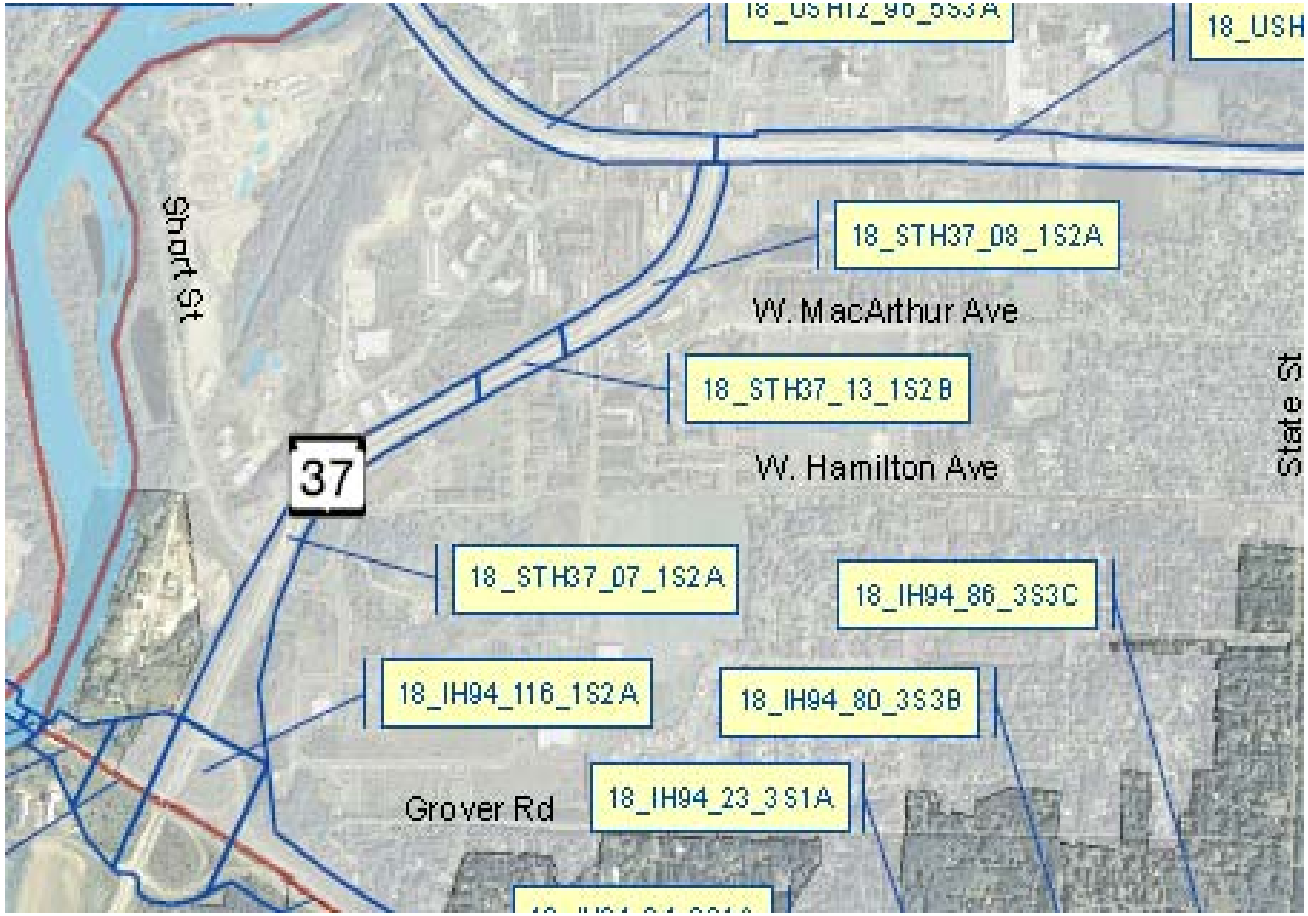
WisDOT Pollutant Load Reduction Requirements

3. From mapping data, define highway drainage basins within WisDOT jurisdictional Right-of-Way
4. Subdivide by highway cross section type, slope and soil type
5. Transform basin areas into areas representing separate highway length segments



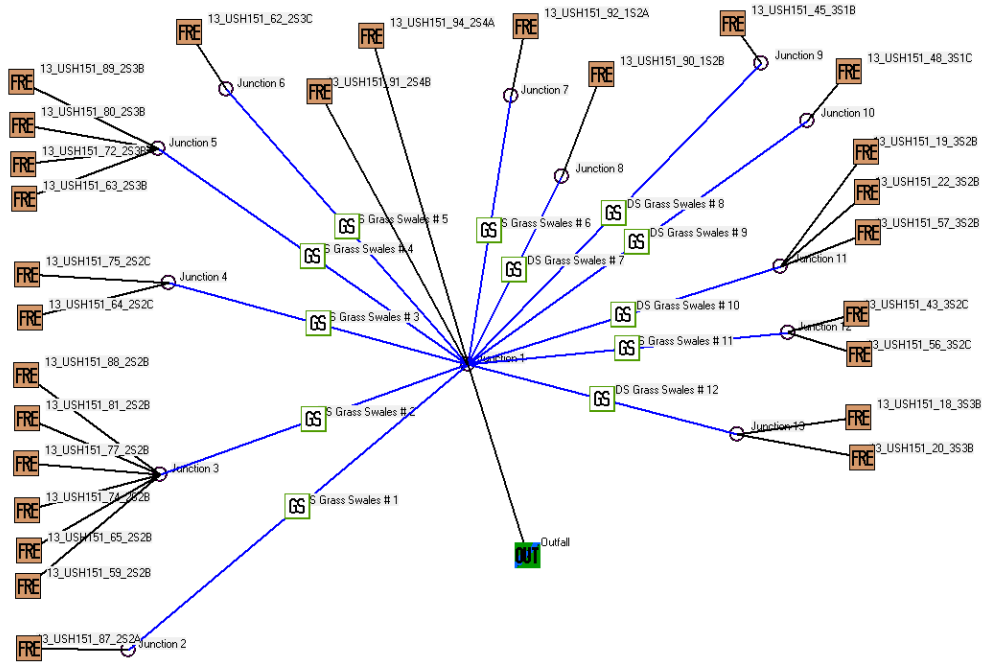
WisDOT Pollutant Load Reduction Requirements

Using GIS software, the segmentation provides basin mapping like this . . .



WisDOT Pollutant Load Reduction Requirements

6. Convert GIS mapping data into WinSLAMM Land Use data tables
7. Import basin data into WinSLAMM
8. Create basin networks and add grass swales
9. Run model for each basin network



Outfall Output Summary

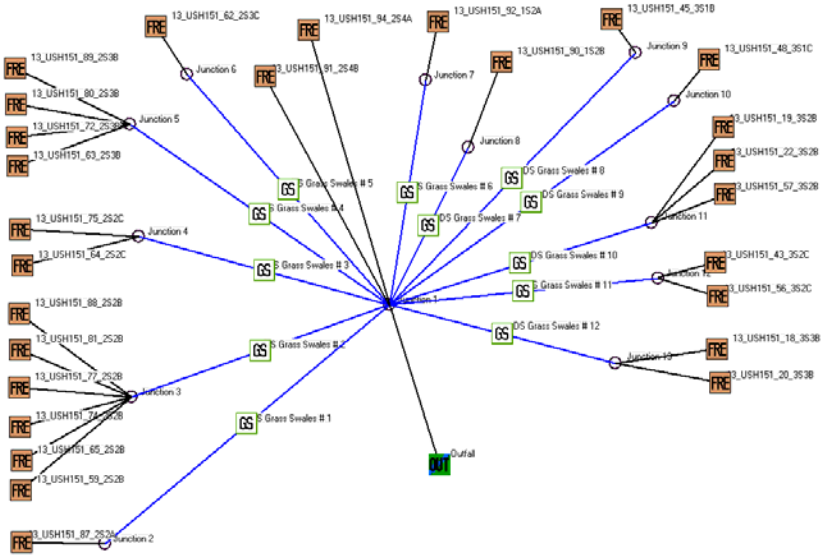
	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	803607		0.20	221.8	11128	
Outfall Total with Controls	136773	82.98 %	0.03	191.5	1635	85.31 %
Current File Output: Annualized Total After Outfall Controls	138673	Years in Model Run:	0.99		1658	

Pollutant	Concen-tration - No Controls	Concen-tration - With Controls	Concen-tration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	221.8	191.5	mg/L	11128	1635	lbs	85.31 %
Particulate Phosphorus	0.9233	0.8337	mg/L	46.32	7.118	lbs	84.63 %
Filterable Phosphorus	0.5422	0.5715	mg/L	27.20	4.880	lbs	82.06 %

WisDOT Pollutant Load Reduction Requirements

Summarize data by Transportation Region, County and Highway

Data and mapping available to highway designers for individual project water quality analyses



Southeast Region											
			Base Condition			Grass Swale			Percent Reduction		
County Name	Miles Mapped	Total Highway Source Area (ac)	Runoff Volume (cf)	Particulate Solids Yield (lbs)	Total Phosphorus	Runoff Volume (cf)	Particulate Solids Yield (lbs)	Total Phosphorus	Runoff Volume (%)	Particulate Solids Yield (%)	Total Phosphorus (%)
Kenosha	45.1	1,161	57,230,837	598,753	2,682	49,419,440	471,242	2,226	13.6%	21.3%	17.0%
Milwaukee	160	4,843	241,018,897	2,478,772	11,099	221,995,158	2,155,204	9,924	7.9%	13.1%	10.6%
Ozaukee	27.8	675.8	33,497,000	359,715	1,824	22,984,000	210,801	1,131	31.4%	41.4%	38.0%
Racine	23.9	399	26,103,000	238,214	785	24,768,000	213,894	717	5.1%	10.2%	8.7%
Washington	22.5	701	29,757,000	345,949	1,730	18,357,409	178,298	1,013	38.3%	48.5%	41.5%
Waukesha	145.3	4028.5	196,855,664	2,072,323	10,878	139,924,852	1,268,183	7,144	28.9%	38.8%	34.3%
Total	***424.7***	***11,808***	***584,462,398***	***6,093,726***	***28,999***	***477,448,859***	***4,497,622***	***22,154***	***18.3%***	***26.2%***	***23.6%***

Regional & Statewide Summary

- Runoff Volume
- Particulate Solids Yield
- Total Phosphorus Reduction

Region	Miles Mapped	Total Highway Source Area (ac)	Runoff Volume (%)	Particulate Solids Yield (%)	Total Phosphorus (%)
Northeast Region	240	7,997	33%	43%	37%
North Central Region	55	1,937	43%	53%	45%
Northwest Region	86	3,434	60%	66%	63%
Southeast Region	425	11,808	18%	26%	23%
Southwest Region	146	5,452	36%	43%	37%
Total	***951***	***30,628***	***28%***	***36%***	***32%***

TMDL Reduction Determination for a Highway System

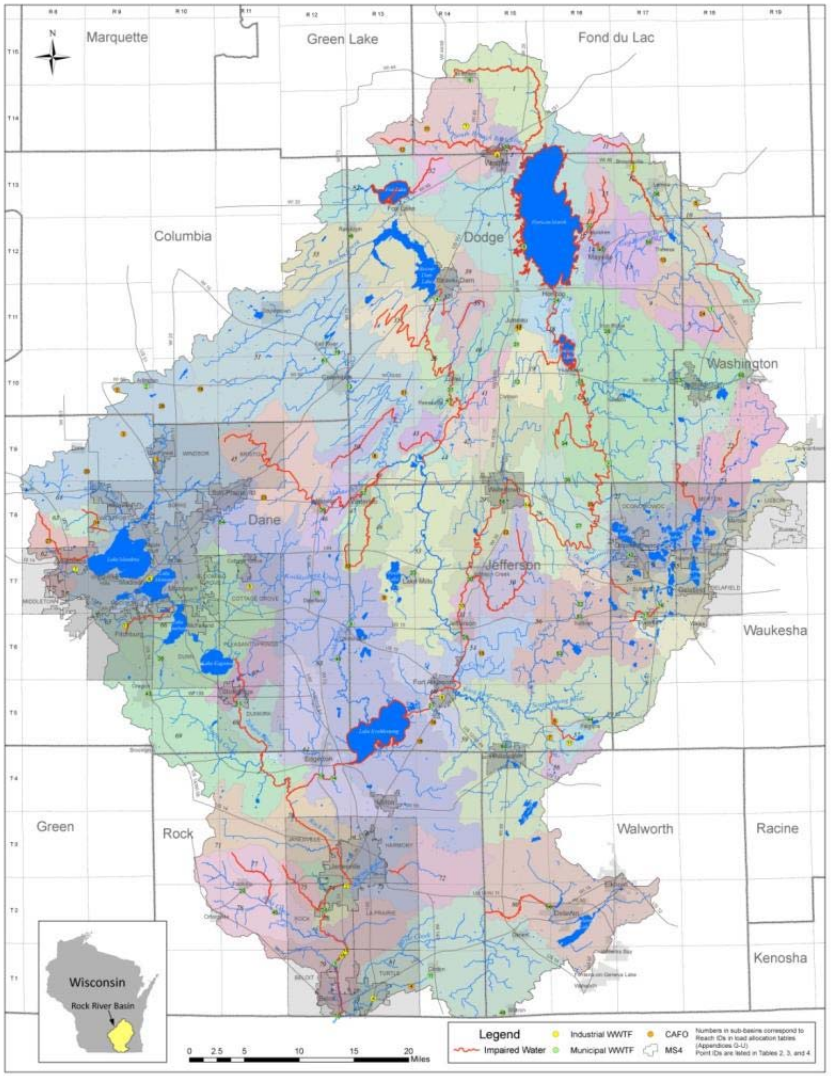
WisDOT TMDLs Within MS4 Communities

River Basin	Approved TMDL	TMDL In Development	Pollutants of Concern
Rock River – 3,750 square miles	X		TSS, Phosphorus
Lower Fox River & Green Bay – 641 square miles	X		TSS, Phosphorus
Milwaukee River – 850 square miles		X	TSS, Phosphorus, Fecal Coliform
Upper Fox & Wolf River – 5,780 square miles		X	TSS, Phosphorus
Wisconsin River – 9,156 square miles		X	Phosphorus

TMDL Reduction Determination for a Highway System

Rock River Basin

- 3,750 square miles
- 62 listed waters for TSS, TP, or both
- 101 TMDLs
- 49 MS4s
- 76 permitted WWTFs
  - 15 industrial,
  - 61 municipal
- 27 CAFO's



From: TMDLs for Total Phosphorus and Total Suspended Solids in the Rock River Basin - July 2011

Rock River TMDL Analysis Components

Loading Analysis consisted of four components:

1. *Agricultural Runoff* (cropland, manure spreading, and other rural lands) - SWAT modeling
2. *CAFOs* - assume 0 load
3. *WWTFs* (public & private) – Permit Limits
4. *MS4s* ← WisDOT Urban Highways
   a) Unit Loads based on WinSLAMM (NR216) results
   b) TMDL "base" = 40% TSS control
   c) Waste Load Allocation based upon the capacity of the receiving waters in each reach shed to absorb the Phosphorus and Sediment discharged in stormwater runoff

WisDOT goal – To only discharge pollutants in DOT stormwater runoff equal to the adjacent MS4 Corridor Waste Load Allocation

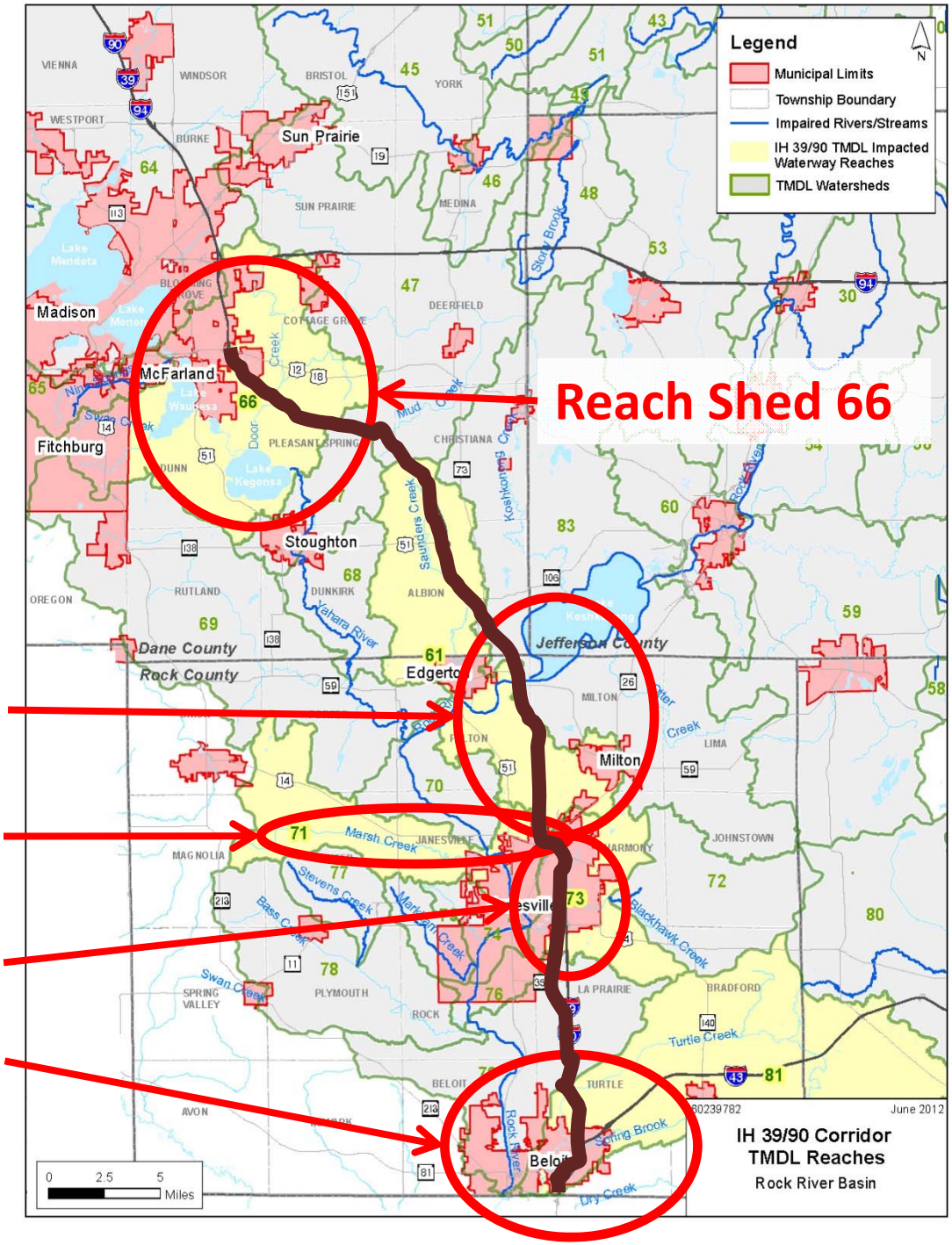
I-39/90 Corridor TMDL Reaches

Reach Shed 61

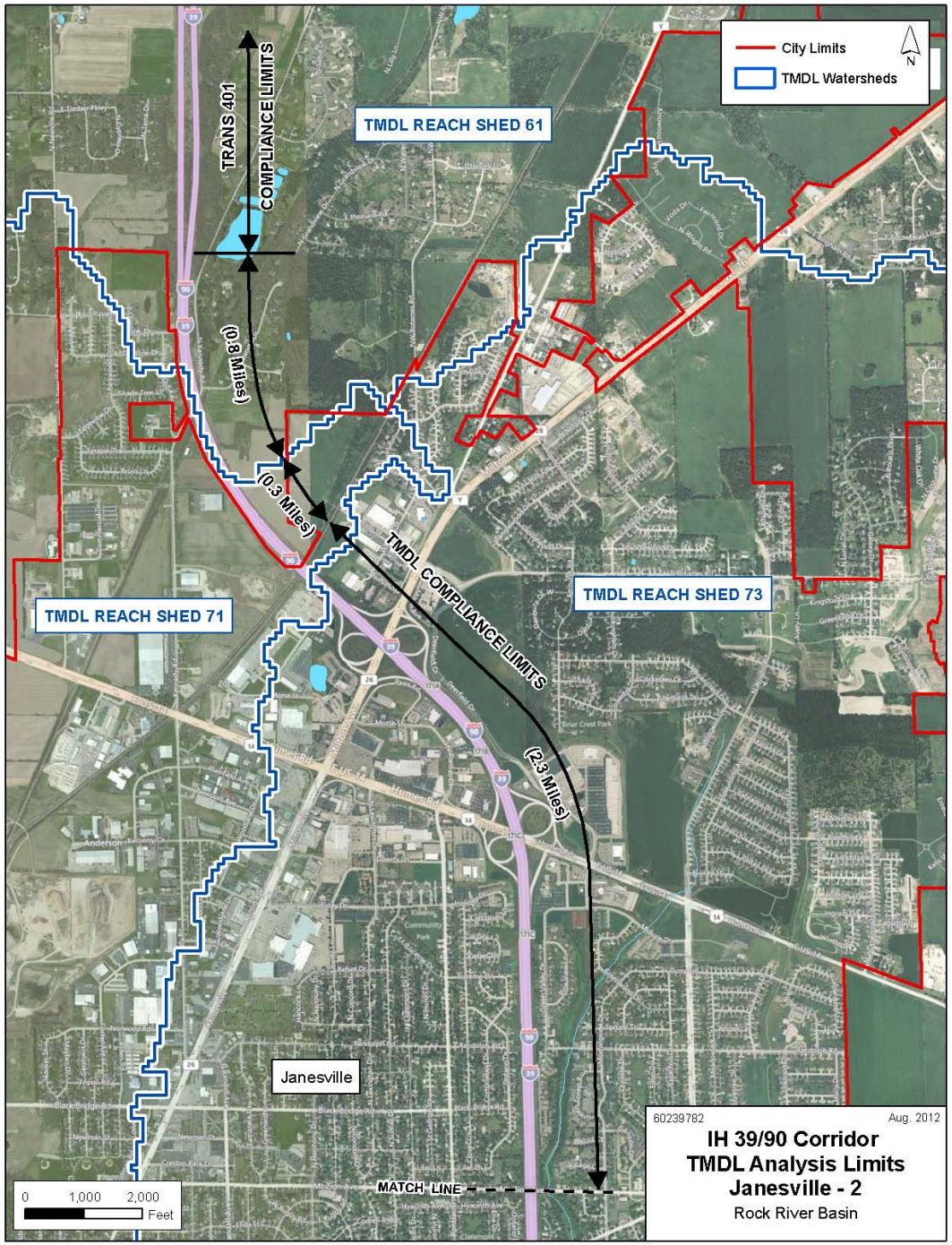
Reach Shed 71

Reach Shed 73

Reach Shed 81



Janesville North



Corridor TMDL Area TSS and TP Reduction Requirements

MS4 Municipality	Reach Shed Number	TMDL Section of Corridor Length in Reach Shed (mi)	TRANS 401 Section of Corridor Length in Reach Shed (mi)	Percent Total Phosphorus Load Reduction	Percent TSS Load Reduction	Notes
Janesville	61	0.86	13.71	N/A	40.0 %	No added TMDL reductions required beyond TRANS 401
Madison	66	1.50	4.34	70.4 %	76.9 %	May be combined with non-MS4 area in reach shed
Janesville	71	0.35	0.00	59.5 %	71.0 %	No non-MS4 area in reach shed
Janesville	73	4.70	0.89	80.2 %	82.8 %	May be combined with non-MS4 area in reach shed
Beloit	81	3.23	2.05	47.3 %	40.5 %	May be combined with non-MS4 area in reach shed

To Achieve these Percent Reductions WisDOT will -

1. Primarily rely on practices like filter strips, grass swales and biofiltration fields
2. Use enhanced and engineered soils to increase TSS reduction where appropriate
3. Share credits within Reach Sheds by achieving reductions greater than 40% in TS4 areas
4. If required load reductions prove unfeasible, work with DNR on alternatives without affecting project schedules

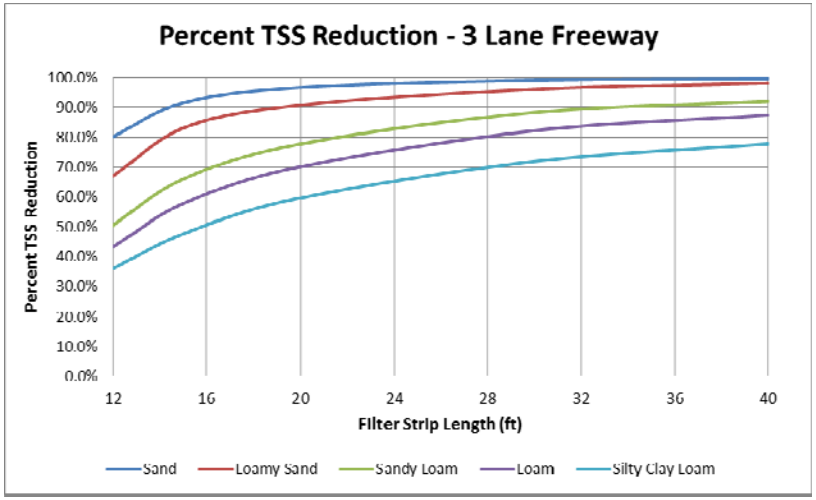
Highway Project TMDL Analysis Process

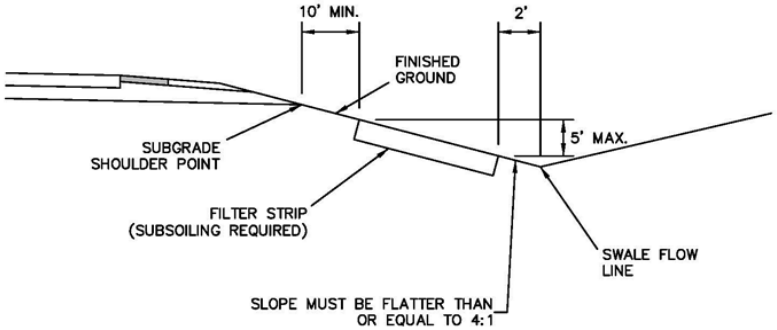
- Each project engineer designs roadways with standard drainage practices
- Areas with more right-of-way, such as interchanges, include infiltration fields
- Designers calculate the load reductions from practices using either unit area loads or modeling

Highway Project TMDL Analysis Process

Unit Area Loads – Typically applied to roadway segments

- Pollutant loads (Total Suspended Solids and Total Phosphorus) determined from unit area values developed for highway corridors using WinSLAMM
- Pollutant load reductions determined using highway specific design charts developed from WinSLAMM model runs

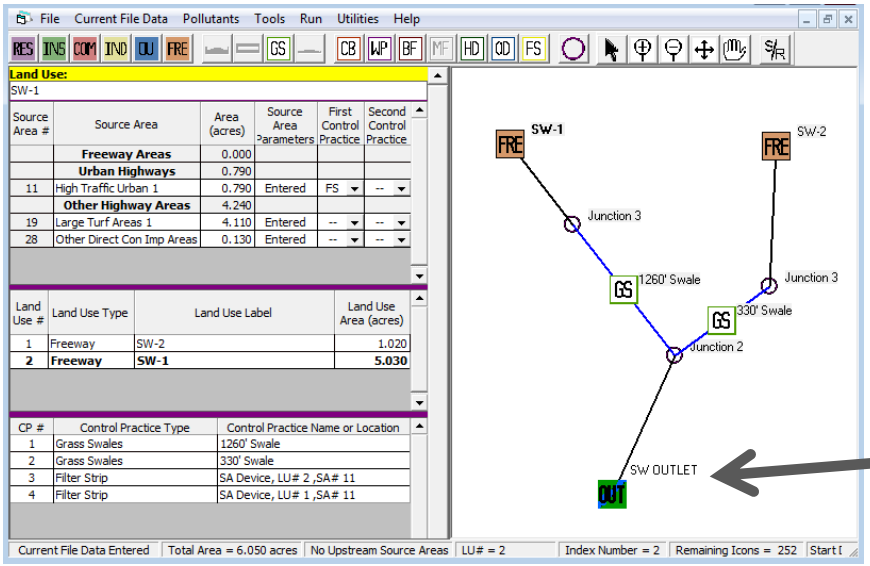


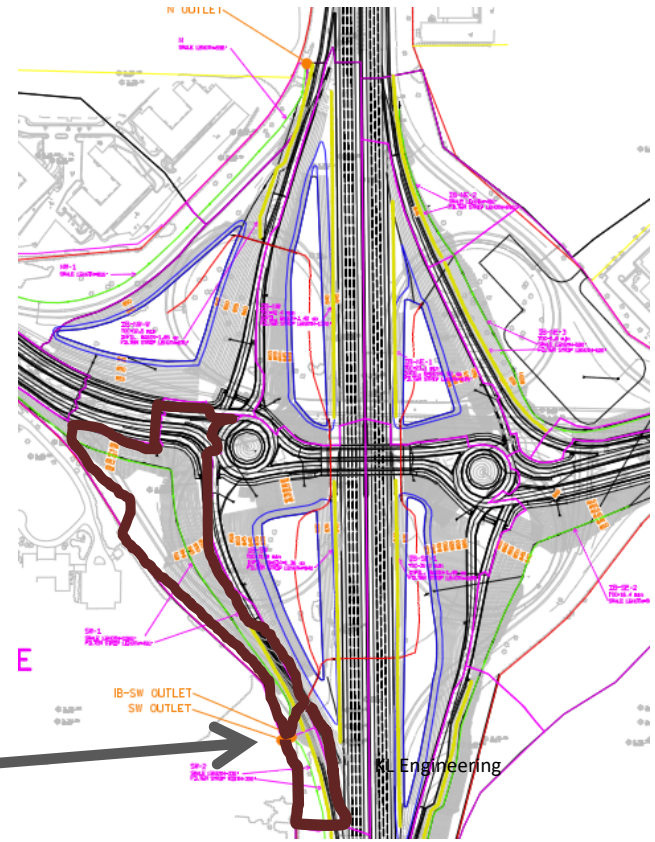


Highway Project TMDL Analysis Process

Modeling – Typically applied to interchanges

- Pollutant loads and load reductions determined from drainage network model using WinSLAMM





Highway Project TMDL Analysis Process

Load Reduction Table

- Load calculations are summarized for each project and reported to the I-39/90 Corridor Management Team
- All project load summaries are tabulated and submitted to the Wisconsin Department of Natural Resources

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)	**291.0**	9.1	23.9	0	0	0	0	228.0	30.0
ROW Drainage Area (ac)	**37.0**	9.1	23.9	0	0	0	0	0	4.0
TSS Load, No Controls (lbs)	**8841**	3501	3878	0	0	0	0	1430	31.5
TSS Load, With Controls (lbs)	**192.6**	72.3	88.8	0	0	0	0	0	31.5
TSS Load Removed (lbs)	**8648**	3429	3790	0	0	0	0	1430	0
TP Load, No Controls (lbs)	**72.7**	6.4	10.1	0	0	0	0	55.0	1.2
TP Load, With Controls (lbs)	**9.2**	3.0	5.0	0	0	0	0	0.0	1.2
TP Load Removed (lbs)	**63.5**	3.4	5.1	0	0	0	0	55.0	0
Percent TSS Reduction by Load	**97.8%**								
Percent TP Reduction by Load	**87.3%**								

Strand and Associates

Meeting Wisconsin Department of Transportation TMDL and TSS Reduction Goals

We covered . . .

1. **How the Wisconsin urban highway system pollutant loading reduction requirements are met**
2. **How WisDOT is meeting it's TMDL Load Reduction Requirement**

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Questions?