Hennepin County Sunset Drive Reconstruction (CSAH 51)

Hennepin County Project #: 2182000

Watershed Permit Narrative

2025

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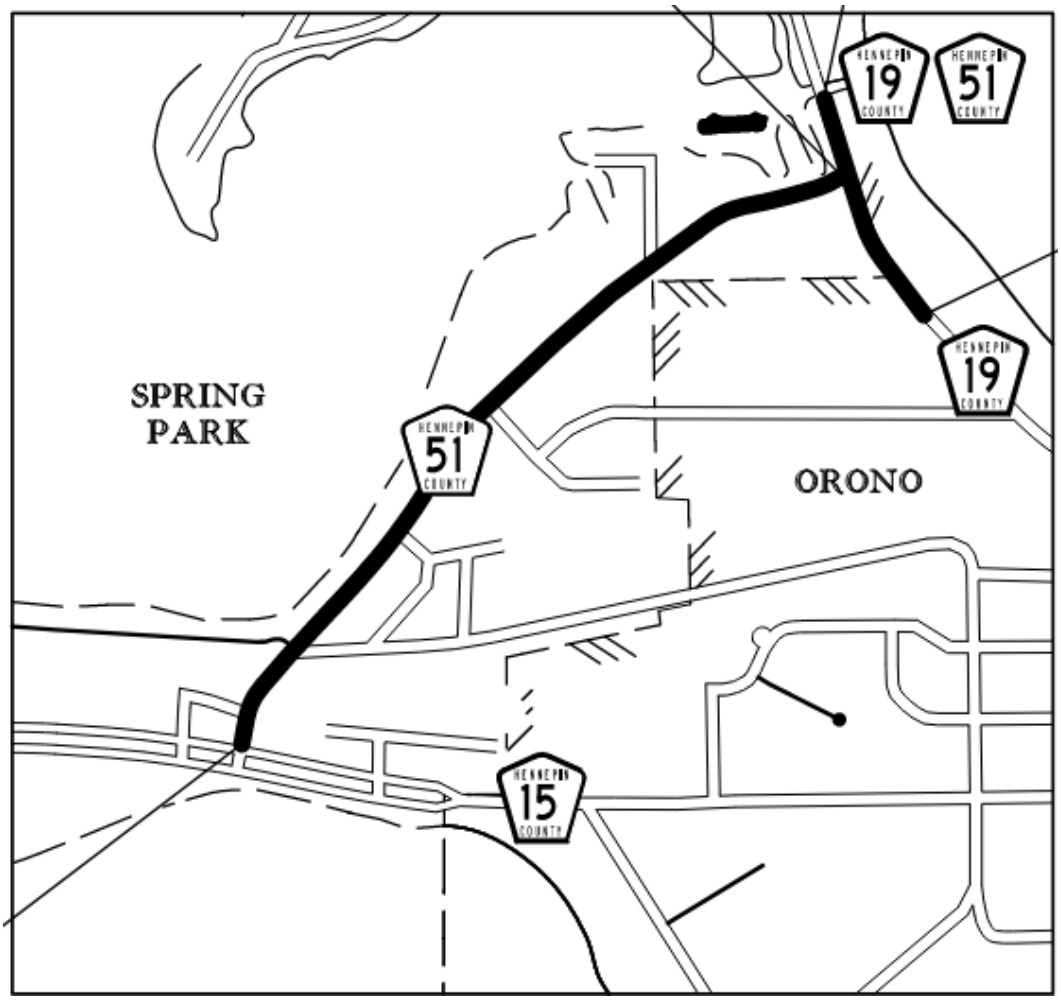
Contents

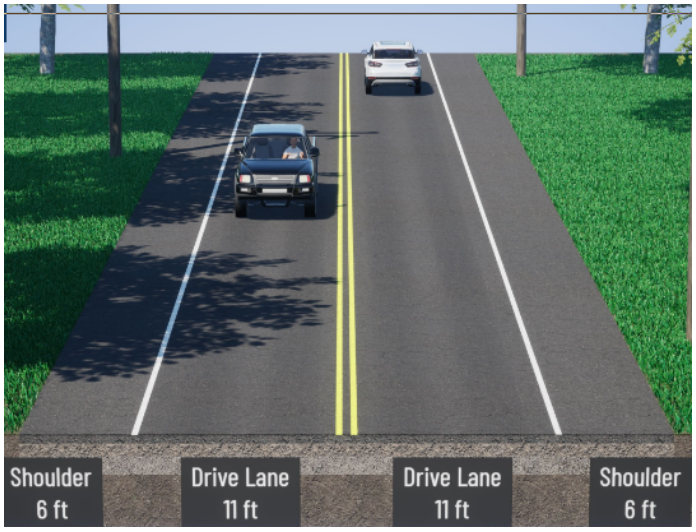
Location & Introduction

Hennepin County has proposed to reconstruct approximately 0.70 miles of the CSAH 51 (Sunset Drive) roadway, from the intersection of CSAH 15 (Shoreline Drive) to CSAH 19 (Shadywood Road) in the City of Spring Park. Hennepin County also proposes a mill and overlay on approximately 700' of CSAH 19 (Shadywood Road) at the intersection of CSAH 51 (Sunset Drive). The project is in Minnehaha Creek Watershed District (MCWD).

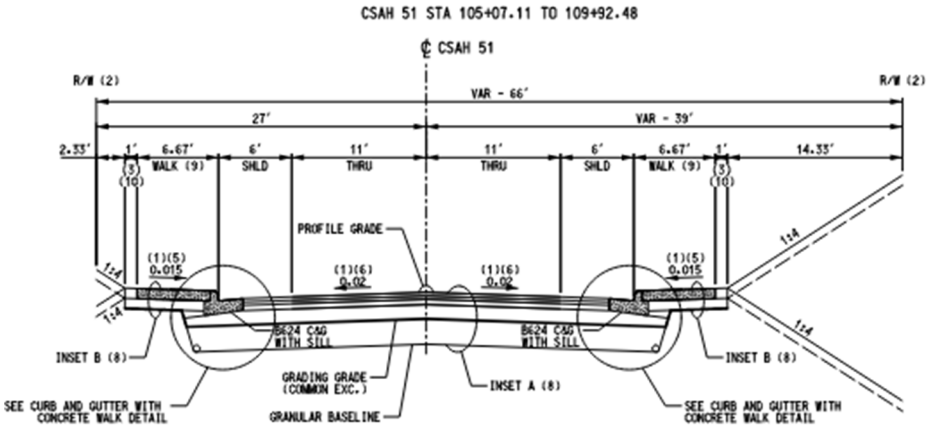
The project will see the reconstruction of the roadway, existing sidewalks, and storm sewer infrastructure. A sidewalk is proposed to be added along the east side of CSAH 51 from the Dakota Rail Regional Trail to the intersection of CSAH 19 and along the west side of CSAH 51 from the Dakota Rail Regional Trail to the post office. Hennepin County proposes to add curb and gutter and storm sewer to much of the project that does not currently have any.

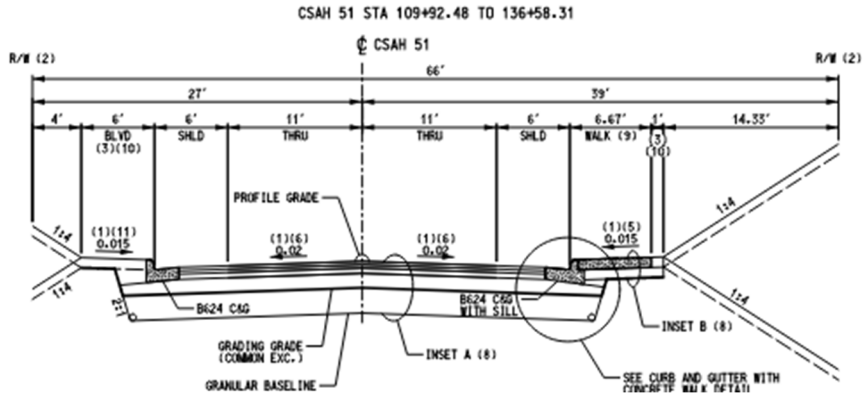


Existing Typical Section



Proposed Typical Section





Existing Drainage Patterns

The existing drainage patterns can be seen in Appendix A. CSAH 51 within the project limits generally drains to five outfalls.

The south limits to the Dakota Rail Regional Trail drain south to existing storm sewer and outfalls to Lake Minnetonka – Upper Lake.

The project area from the Dakota Rail Regional Trail to Northern Avenue drains to existing storm sewer and outfalls east along Northern Avenue into a basin.

The project area from Northern Avenue to the Post Office drains to a local low point on CSAH 51 approximately 265' northeast of Northern Avenue. The west half of CSAH 51 drains overland to Lake Minnetonka – West Arm. The east half of CSAH 51 drains to existing storm sewer and outfalls north of the Post Office to Lake Minnetonka – West Arm. This storm sewer outlet is in poor condition and has shifted and has some reverse grade in the pipe.

The project area from the Post Office to approximately 325' southwest of Dickson Avenue drains to a local low point on CSAH 51 approximately 250' southwest of Park Lane. Some area drains through storm sewer or overland to Lake Minnetonka – West Arm. Some drains overland to Thor Thompson Park where it moves through a hydrodynamic separator and outfalls between 3950 Sunset Drive and 3940 Sunset Drive to a constructed channel to Lake Minnetonka – West Arm. This channel is in poor shape and regularly is blocked by sediment and ice dams during the spring melt which has a negative impact on adjacent property owners.

The project area from approximately 325' southwest of Dickson Avenue to CSAH 19 (Shadywood Road) drains to a local low point on CSAH 51 approximately 325' southwest of CSAH 19 (Shadywood Road). The west half of CSAH 51 typically drains overland to Lake Minnetonka – West Arm. The east half of CSAH 51 drains overland to a culvert inlet and then outfalls to Lake Minnetonka – West Arm. This storm sewer outfall is in poor condition.

Proposed Drainage Patterns

The proposed drainage patterns can be seen in Appendix A.

The proposed drainage for the south approximately 400' of the project will essentially match existing drainage patterns and will tie into an existing storm sewer that outfalls to Lake Minnetonka – Upper Lake.

The proposed drainage from the Dakota Rail Regional Trail to Northern Avenue drains to storm sewer and ties into existing storm sewer that outfalls east along Northern Avenue into a basin. This is very similar to the existing conditions.

The project area from Northern Avenue to approximately 325' southwest of Dickson Avenue will drain via storm sewer to a new pipe outlet. The existing outfalls at the post office and Thor Thompson Park will be combined into one at publicly owned Rockvam Road, approximately 90' north of Mapleton Avenue. Lack of existing drainage easement allowed buildings to be constructed too close to the two existing outfall pipes. Acquiring the proper rights would be very costly due to building impacts. Relocation of the two outfalls to the public access saves cost and provides better access for maintenance. This will allow the abandonment of the storm sewer near the post office and the elimination of much of the City and County flow to the Thor Thompson Park channel outfall.

The project area from approximately 325' southwest of Dickson Avenue to CSAH 19 (Shadywood Road) will be converted to an urban section with concrete curb and gutter. The existing outfall at Lord Fletchers

is proposed to be relocated north to a location within public ownership closer to the park parking lot near CSAH 19.

Project Disturbance and Impervious

Anticipated Impervious, Reconstructed, and Disturbed Area Within Project Limits

	Area (SQ FT)	Area (AC)
Disturbed Area	315,632	7.246
Post-Construction Impervious Area	270,511	6.210
Pre-Construction Impervious Area	262,510	6.026
New Impervious Area	**8,001**	**0.184**
Total New & Fully Reconstructed Impervious	**233,697**	**5.365**
Total Mill and Overlay	36,814	0.845

Watershed District Requirements

Stormwater Management Rule

This project is projected to add less than 10,000 sq ft of new impervious surface. The applicable requirement from Table 2 from the MCWD Stormwater Management Rule is shown below. The project will trigger volume control.

New and Reconstructed Impervious Area	Net Increase in Impervious Area	Requirement
< 1 acre	10,000 sf - 1 acre	Volume from net added impervious surface, Rate
≥ 1 acre	< 10,000 sf	Volume equal to the larger of: one inch of volume from new impervious surface OR 0.5 inches of volume from new impervious and reconstructed impervious surface
	≥ 10,000 sf	Volume equal to the larger of: one inch of volume from new impervious surface OR 0.5 inches of volume from new impervious and reconstructed impervious surface, Rate

Volume Control

Following is the required volume reduction. The 0.5-inch water quality depth governs due to the lower amount of new impervious.

Required Volume Reduction (MCWD Permit)

	Impervious Area (SQ FT)	Water Quality Depth (IN)	Water Quality Volume Required (CU FT)	Volume Reduction Required (AC FT)
New and Fully Reconstructed Impervious	233,697	0.5	9,737	0.224
New Impervious	8,001	1.0	667	0.015

Appendix B shows the existing and proposed impervious surface areas.

MCWD rules require that volume reduction practices must be used to meet the volume control requirements. MCWD rules prohibit infiltration in certain circumstances. Following are the items on this project where an infiltration practice is prohibited.

- **The area receives discharge from a vehicle fueling and maintenance area.**
  - Rockvam Boat Yards is located adjacent to CSAH 51 and performs boat maintenance.
- **The separation between the bottom of the infiltration system and the elevation of seasonally saturated soils or the top of bedrock is less than three feet.**
  - The groundwater elevation discovered by soil borings was anywhere from 8 ft to 12 ft in depth. The ordinary high water level of Lake Minnetonka is 929.6 in NAVD 88.
  - Underground infiltration systems that Hennepin County has installed on previous projects has had a 6' separation between the finished ground and the bottom of the rock infiltration layer. To meet the three feet separation rule, all areas where the finished ground is within 9 feet of ground water elevation must be excluded. Due to close proximity to Lake Minnetonka, the ground water elevation could fluctuate.
- **Soils are predominately Hydrologic Soil Group D or otherwise unreliable for infiltration.**
  - All soil borings show type D soils.

All soil borings show Hydrologic Soil Group D so the entire project area is prohibited to infiltrate per MPCA and MCWD guidance.

The cost of property is also prohibitive in this area for a project of this size. Due to the factors outlined above, Hennepin County has elected to use filtration to meet the requirements. Due to available space and water table constraints, underground MTD Jellyfish filters paired with Contech CDS hydrodynamic separators (HDS) will be used to meet the treatment requirements.

The Contech Jellyfish MTD is a cartridge membrane filtration system. Water passes through the membranes and the membranes provide filtration. According to the Minnesota MPCA Stormwater Manual, the Jellyfish can be credited with 56% TP and 80% TSS removal. Maintenance consists of yearly inspections, sump sediment vacs, and cartridge rinsing. The cartridges will need to be replaced every 5 to

7 years. Some information about the Jellyfish MTD and the CDS Hydrodynamic Separator is included in Appendix F.

The approach used consists of sizing the Jellyfish MTDs to treat the flow rate produced by a storm event depth that created a runoff amount greater to the required volume reduction. A water quality event of 1.1 inches chosen for this. There are four locations identified as feasible for a Jellyfish MTD. They are placed in areas that allow the outlet pipe to be above the water table while maximizing the drainage area to the devices. They also must be placed in a location that is accessible to maintenance equipment. The locations and their drainage areas are shown in Appendix C.

Following is a summary of the Jellyfish MTD proposed to be installed with this project as well as its upstream hydrodynamic separator size.

Jellyfish MTD Water Quality Treatment

Filter ID	Filter Location	Peak Flow Rate for 1.1 Inch Water Quality Event (CFS)	Size of Jellyfish MTD	Filter Cartridges Required	Volume Treated in 1.1 Inch Water Quality Event (AC-FT)	Hydrodynamic Separator Diameter (FT)
1	Spring Lane	0.32	48" Manhole	2	0.019	4
2	Rockvam	0.37	6'x4' Bypass Vault	4	0.022	4
3	Park Lane	1.93	8'X6' Bypass Vault	12	0.126	6
4	Lord Fletchers	1.25	8'X6' Bypass Vault	11	0.078	5
				Total:	**0.245**	

The project drainage area was modeled in MIDS to show the decrease in phosphorous and total suspended solids (TSS) loading on the downstream water bodies. Following are tables showing the phosphorous and TSS loading from the area that drains to the construction limits. The drainage area to Thor Thompson Park is excluded since there is an existing City hydro dynamic separator unit present that runoff passes through when it leaves the park. The area that drains to the wetland south of CSAH 51 and west of Shadywood road is also excluded. See the MIDS output in Appendix D.

Since infiltration is prohibited, Hennepin County maximized the amount of filtration that could be done cost effectively. To show some different amounts of treatment, the following situations were modeled.

- Existing Conditions
- Proposed Conditions
- Theoretical 0.5 Inch Infiltration Over New and Fully Reconstructed impervious
- Theoretical 1 Inch Filtration Over New and Fully Reconstructed Impervious
- Theoretical 2 Inch Filtration over the Impervious the Project is Currently Proposing to Capture

These options are shown in Appendix D. The 2 Inch Filtration over feasible to capture impervious is ruled out by Hennepin County as it roughly doubles water quality flows. Hennepin County is already proposing ~$500,000 in water quality devices and doubling the capacity of these would make them no longer cost-effective for the size of the project.

Downstream Phosphorous Loading (MIDS Output)

	Phosphorous Loading Before Treatment Within Drainage Area (Excluding Thor Thompson Park and Large Wetland) (lbs/yr)	MTD Phosphorous Removal (56% of TP for drainage area to MTD)	Total Drainage Area Phosphorous Loading After Treatment (Excluding Thor Thompson Park and Large Wetland) (lbs/yr)	Reduction from Existing Conditions (lbs/yr)
Pre-Construction	30.57	0.00	30.57	0.00
Post-Construction (As shown in Plans) 1.1 Inch Filtration Over Feasible Impervious	**30.80**	**3.59**	**27.21**	**3.36**
0.5 Inch Theoretical Infiltration Over New and Fully Reconstructed Impervious	30.80	7.00	23.80	6.77
1 Inch Theoretical Filtration Over New and Fully Reconstructed Impervious	30.80	2.53	28.27	2.53
2 Inch Theoretical Filtration Over Feasible Impervious (Drainage Areas Increased by 1.82 to simulate)	30.80	6.528	24.27	6.30

Downstream TSS Loading (MIDS Output)

	TSS Loading Before Treatment Within Drainage Area (Excluding Thor Thompson Park and Large Wetland) (lbs/yr)	MTD TSS Removal (80% Credit)	Total Drainage Area TSS Loading After Treatment (Excluding Thor Thompson Park and Large Wetland) (lbs/yr)	Reduction from Existing Conditions (lbs/yr)
Pre-Construction	5,553	0	5,553	0
Post-Construction (As shown in Plans) 1.1 Inch Filtration Over Feasible Impervious	**5,596**	**948**	**4,648**	**905**
0.5 Inch Theoretical Infiltration Over New and Fully Reconstructed Impervious	5,596	1,271.8	4,324	1,229
1 Inch Theoretical Filtration Over New and Fully Reconstructed Impervious	5,596	1,505	4,091	1,462
2 Inch Thoretical Filtration Over Feasible Impervious (Drainage Areas Increased by 1.82 to simulate)	5,596	1,725	3,871	1,682

Due to constraints in space, and right of way costs, Hennepin County believes that the treatment volumes, the reduction in phosphorus, and the reduction in TSS are the most feasible and cost-effective. The

reduction in phosphorous and TSS make up for the increase from added impervious and reduce loading from pre-construction conditions. The treatments proposed are also more than Hennepin County's MS4 permit obligations.

Rate Control

This project does not trigger the rate control portion of the Stormwater Management Rule.

Impact on Downgradient Waterbodies

The outlet pipe for the wetland complex south of CSAH 51 and west of Shadywood road is in poor condition. The project proposes replacing this outlet pipe with an reinforced concrete pipe and an overflow structure that will activate in the event that the outlet pipe is clogged. Below are the modeled impacts to the wetland system.

Downstream Wetland Impacts

Location	100 Year Event Bounce	Inundation Period for 2 Year Event (More than 1 Year Event)	Inundation Period for 10- and 100-Year Event	Runout Control Elevation
South of CSAH 51 and West of Shadywood Road	Existing +0.00'	Existing + 0 Days	Existing + 0 Days	No Change

MCWD also asked for some analysis on the downstream impacts to Lake Minnetonka. The total excess volume in the proposed condition for the 100 year storm event is 0.349 Acre Ft. MCWD provided the surface area of Lake Minnetonka at 931.5 which corresponds to the 100 year storm event (15,704 Acres). An instantaneous volume calculation shows a rise of 0.00002 ft which has no impact on the 100 year elevation of Lake Minnetonka. Even looking at the entire outflow volume modeled in HydroCAD of 44.164 Acre ft, there is an instantaneous rise of 0.003 ft. This project will have no impact on the water surface elevation of Lake Minnetonka.

Erosion Control Rule

This project triggers the District's Erosion Control Rule. The erosion control plan is submitted with the permit application. The project is located within one mile of an impaired water body. This means that stabilization must be completed within 7 calendar days after construction activity in that portion of the site temporarily or permanently ceases. The rapid stabilization and permanent stabilization methods are shown in the plans.

Waterbody Crossing and Structures Rule

The project triggers the waterbody crossing rule. There are currently 3 outlets to Lake Minnetonka-West Arm. The project is proposing consolidation into 2 outlets. The Waterbody Crossing and Structures Rule requires two alternative designs to show minimal impact.

- A no build option was looked at. This is infeasible. Two of the 3 outlets are in poor condition and would require replacement soon. The third outlet is in a location that requires excessive maintenance to keep clean. For these reasons, a no-build option was ruled out.

- A replace in kind option was considered. This was deemed infeasible and not cost effective due to the proximity to existing structures.

Wetland Protection Rule

The wetland mitigation process is occurring concurrently with this permit submittal.

Floodplain Alteration Rule

There is no proposed floodplain alteration.

Hennepin County MS4 Permit Requirements

This project is anticipated to exceed 1 acre of new and reconstructed impervious. This triggers the Minimum Control Measure (MCM) 5 requirements of the MS4 permit. The required water quality volume is the greater of the following:

- 1 inch over the new impervious area
- 0.5 inch over the new and fully reconstructed impervious area

Because of the amount of new impervious, the combination of new and fully reconstructed impervious is the controlling required water quality volume. The calculations and justification that these requirements are met are shown in the MCWD section of this report. The Hennepin County MS4 permit will be met using underground filtration paired with hydrodynamic separators. This is detailed in the MCWD section as well as why infiltration was not used.

Phosphorus TMDL Reduction Goals

Hennepin County has waste load reduction goals for phosphorus on West Arm Lake that this project drains to. These water bodies are shown in the table below and were identified in the Upper Minnehaha Creek Watershed TMDL. MIDS Calculator output was discussed in the MCWD section of this report. 3 of the 4 MTD capture stormwater before it reaches West Arm Lake. 0.24 lbs/yr of the phosphorous reduction is in the Upper Lake watershed. This has been deducted from the total project reduction in the table below.

Provided Phosphorus Reduction

	Watershed	Hennepin County Assigned Phosphorus Reduction Goal (lbs/yr)	Post-Construction Phosphorus Reduction (lbs/yr)
Jellyfish MTD Structures	West Arm Lake	18.00	3.1

Anticipated Design Schedule

- 100% Plans Signed – November, 2025
- Bid Advertising – November, 2025
- Bid Opening – November, 2025

Anticipated Construction Schedule

- Begin Construction – Spring 2026 (Tree removals prior to March 31st)
- Completion – 2027

List of Appendices

Appendix A: Drainage Area Maps

Appendix B: Pre & Post Construction Impervious

Appendix C: Water Quality Device Locations

Appendix D: MIDS Output

Appendix E: HydroCAD Results (Will be included in final submittal)

Appendix F: Contech MTD and CDS Information

Appendix G: Soil Borings Report

Appendix H: Plan Set

Appendix A

Appendix B

Appendix C

Appendix D

Appendix E

Appendix F

Appendix G

Appendix H