

The Future of Our Roads

Preserving Lifestyle Benefits of Asphalt Roads
within Towns Budget

D. Rippe

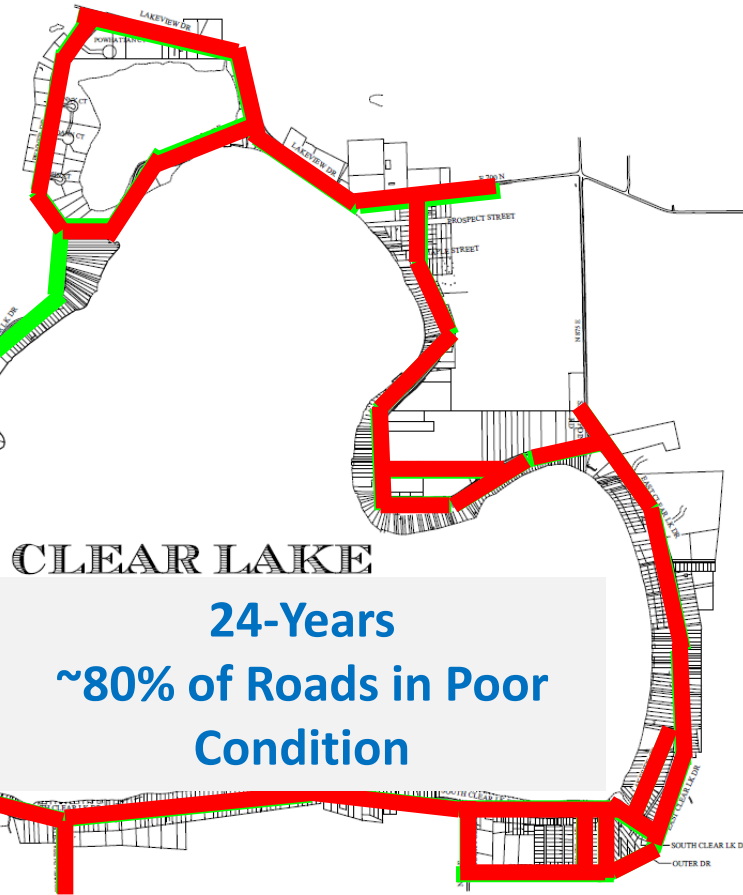
February 13, 2023

Asphalt Roads: A Critical Element To Our Community's Lifestyle

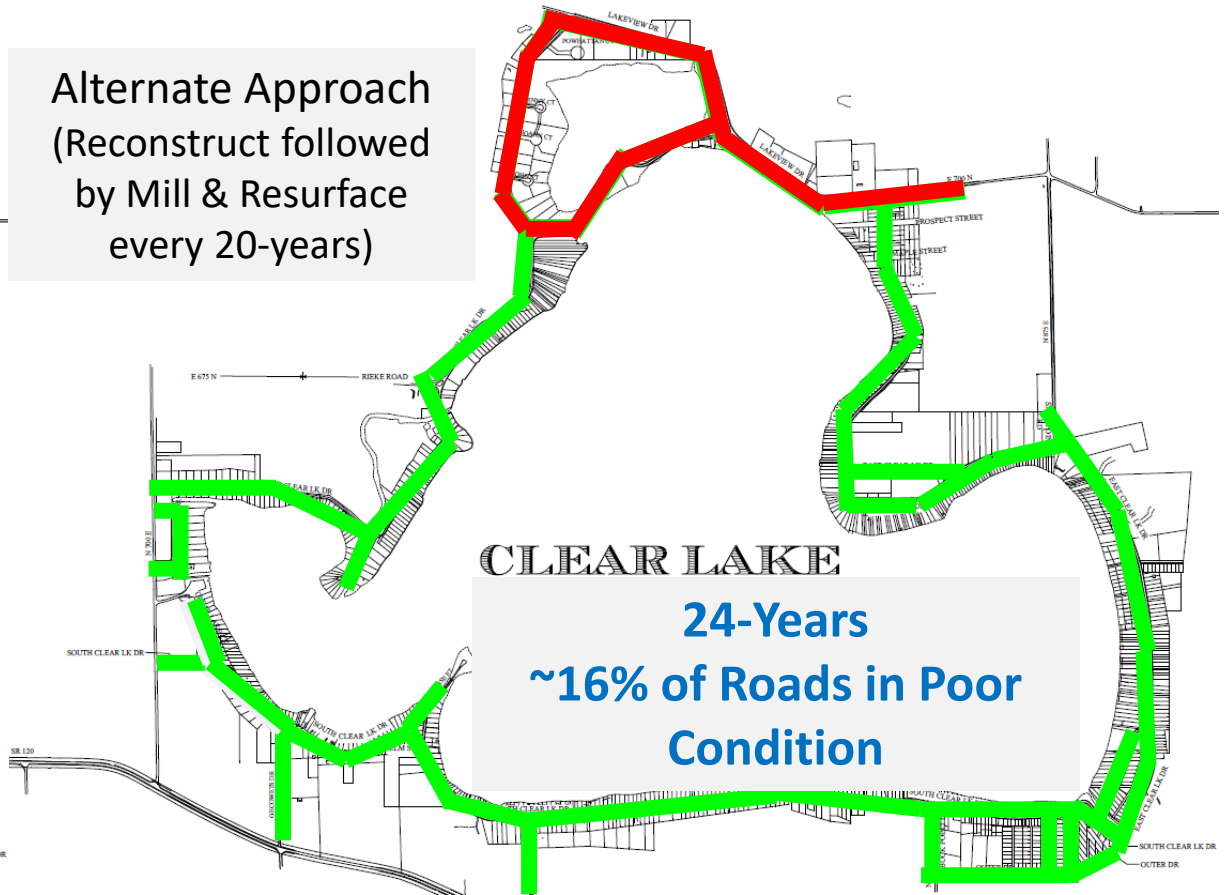
- Lifestyle benefits
 - Physical well being: Walking, Jogging, Biking, Skateboarding, In-line Skating, Golf Carting, Strollers, etc.
 - Safe and smooth access for residential passenger vehicles and handicap/mobility equipment
 - Facilitates property improvements: Construction, landscaping, lawns, gardens, etc.
 - Enables access of critical services: Emergency, sanitation, town maintenance, and home delivery
 - Improves property value

Increased Road Lifespan Required To Sustain Asphalt Road Surface w/o CCMG

Current Approach
(Mill & Resurface every
7-years)



Alternate Approach
(Reconstruct followed
by Mill & Resurface
every 20-years)



Will require TOCL to change its maintenance to
less expensive chip seal surface

■ PASER 10-4
■ PASER 3-1

Comparison of Road Surfaces: Chip Seal Vs. Asphalt



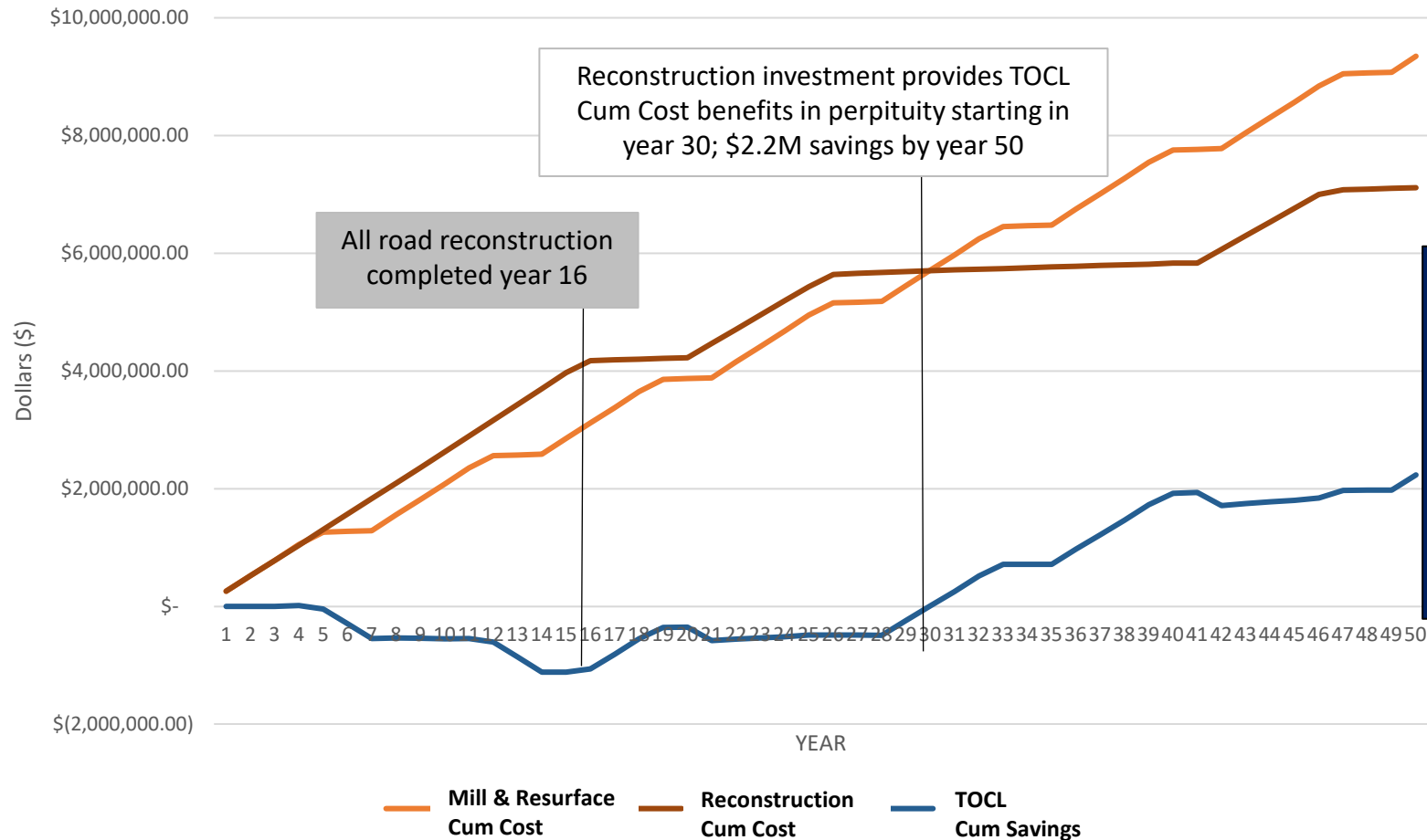
N 925 E by
Long Lake
2/12/23



Clear Lake
Cove
2/12/23

Investment in Increased Road Lifespan Also Returns Significant Long-Term Savings

TOCL Road Policy Cum Cost Comparison
Mill & Resurface (7-Yr Lifespan) vs. Reconstruction (20-Yr Lifespan)



\$2.2M Savings
 (Additional \$1.1M every 10-Yrs in perpetuity)

Road Reconstruction Requirements Starts with a Vision

- Vision Statement: Establish a network of roads which enhances the community lifestyle at the lowest overall cost
 - Lifestyle
 - Physical well being: Walking, Jogging, Biking, Skateboarding, In-line Skating, Golf Carting, Strollers, etc.
 - Safe and smooth access for residential passenger vehicles and handicap/mobility equipment
 - Facilitates property improvements: Construction, landscaping, lawns, gardens, etc.
 - Enables access of critical services: Emergency, sanitation, town maintenance, and home delivery
 - Lowest Overall Cost
 - **Use CCMG to incrementally improve road lifespan over next 16 years**
 - Engineering firms and coring samples identified premature road failure driven by lack of roadbed structure & poor drainage
 - **Maintenance costs shall be \leq Towns annual tax levy for road maintenance (~\$260K)**

Implementing the Vision via Road Requirements

Road Requirements For Enhanced Community Lifestyle at Lowest Overall Cost

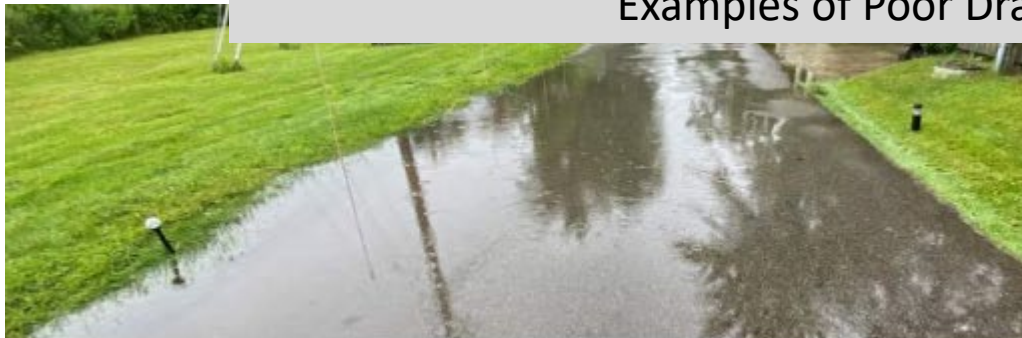
- Lifestyle: Asphalt surface
- Lowest Overall Cost: Increase lifespan (Lifespan defined in terms of PASER: Duration road condition is within a PASER of 10-3) to ensure maintenance costs will be \leq Towns annual tax levy
- Climate: Annual freeze/thaw cycles
- Drainage System (Note: more detail on slide 7):
 - Capacity: 10-year storm (1.91 in/hr)
 - Must exist within the road ROW and any discharge routed directly to the lake will be filtered
 - No standing water on road surface following storm event
 - Compliant with constraints for each road segment
 - Accounts for existing additional loads
- Structural Components:
 - Design Limit Load (DLL) based on Indiana Size and Weight Laws under Title 9 Article 20 (Maximum allowed gross weight is 80,000 lbs.) to handle weight of construction traffic
- Maintenance:
 - Annual filling minor cracks and sealcoating as necessary
 - Allow for surface mill and resurface

Recommendation: Use CCMG program until all town roads have been improved

Drainage Requirements In More Detail

- Capacity: 1.91 in/hr (10-year storm event)
- Must exist within the road ROW or Road edges if no ROW exists
- Keep roadway free of standing water
- Ensure surface water falling on the roadway enters the drainage system
- Prevent ponding along roadway from seeping back onto road surface
- Underlying road structure shall dissipate moisture
- Prevent road stormwater from flooding adjacent properties
- Discharge routed directly to the lake will be filtered
- Accounts for existing additional loads

Examples of Poor Drainage on TOCL Roads



West Clear Lake Dr (Near Lakeview)



Quiet Harbor

Recommendation: Form Road Committee To Formulate Road Policy & Associated Processes

- Form a committee to create a road policy for consideration by Council by July 2023
- Suggested Committee products
 - Vision and Mission statement for TOCL roads
 - Develop road policy containing
 - Input from Subject Matter Experts (SME), Superintendent, Community, Legal, Clerk Treasurer, Zoning, others as necessary
 - Vision and Mission statements
 - Overall construction and maintenance cost
 - Sustainability assessment based on Town's budget
 - Ensure UDO stormwater management requirements apply to roads
 - Governing requirements for structural, drainage and maintenance of roads to be applied to each road project
 - History of road maintenance/replacement cost, miles, dates, locations, PASER data to further validate current lifespan estimates
 - Develop a road standard and specifications to identify a minimum set of standards, promoting consistency and uniformity of roads within the Town of Clear Lake (e.g.; WASTEWATER UTILITY STANDARDS AND SPECIFICATIONS)
 - Develop associated processes to support road policy (ex. Developing the 5,10 and 15-year plan, Selecting the right drainage approach for each road segment, Identify performance measurement against plan (Metric examples: PASER, Lifespan, Implementation schedule, cost, others?))
- Include Road Maintenance into next Comprehensive Plan survey
- Next step, assign members to begin organizing and detail planning
 - Council (1-2)
 - Resident
 - Resident
 - Engineering Firm
 - Paving Contractor

Back Up Material

Resident Feedback Influence On Requirements

- How does drainage relate to extended lifespan of road?
 - Extending our roads lifespan is a prescription of establishing the correct structural elements to support the loads imparted by construction vehicles followed by proper drainage to prevent damage from the environment
 - Reference drainage system and structural requirements on slide 6
 - DLZ and ERI engineering experience qualitatively list it as very important
- Can we use the traditional swales instead of storm sewers?
 - Yes, where we have sufficient road right of way area for swale
 - Drainage Requirement: Must exist within the road ROW or Road edges if no ROW exists
 - 10-year rain event and infiltration rate used to configure swale design where sufficient road right of way is available
 - Drainage Requirement: Capacity: 1.91 in/hr (10-year storm event)
- What environmental impact does this extensive drainage cause?
 - Drainage Requirement: Discharge routed directly to the lake will be filtered

Thickness of Pavement at Core Locations

Table 1: Approximate Thickness of Pavement at Core Locations				
Street Name	Coring Number	Average Pavement Core Thickness, inches <i>(Figures 1.1 through 1.6 Show approximate Core Locations)</i>		
		Total Asphalt Pavement Thickness	Aggregate Thickness	Remarks
Quiet Harbor	PC-1	±2.4	±10.5	Brown, Sandy Gravel Product
Quiet Harbor	PC-2	±2.6	±11.25	Brown, Sandy Gravel Product
West Clear Lake Dr	PC-3	±5.1	±3	Brown, Sandy Gravel Product
West Clear Lake Dr	PC-4	±4.2	±12	Brown, Sandy Gravel Product
West Clear Lake Dr	PC-5	±7.9	±57	Brown, Fine Sand
West Clear Lake Dr	PC-6	±4.1	±14	Brown, Sandy Gravel Product
Lakeview Dr	PC-7	±4.8	±53	Brown, Fine Sand
Lakeview Dr	PC-8	±4.2	±10	Brown, Sandy Gravel Product
East Clear Lake Dr	PC-9	±2.7	±15	Brown, Sandy Gravel Product
Outer Dr	PC-10	±4	±7	Brown, Sandy Gravel Product
South Clear Lake Dr	PC-11	±3.8	±16	Brown, Sandy Gravel Product
South Clear Lake Dr	PC-12	±6	±7	Brown, Sandy Gravel Product



POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aerials](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.348 (0.310-0.392)	0.418 (0.370-0.469)	0.503 (0.444-0.565)	0.569 (0.502-0.639)	0.657 (0.577-0.735)	0.723 (0.633-0.807)	0.789 (0.689-0.881)	0.857 (0.744-0.956)	0.949 (0.817-1.06)	1.02 (0.871-1.14)
10-min	0.541 (0.481-0.610)	0.652 (0.577-0.733)	0.782 (0.691-0.878)	0.879 (0.776-0.986)	1.00 (0.882-1.12)	1.10 (0.959-1.22)	1.19 (1.04-1.33)	1.28 (1.11-1.43)	1.40 (1.20-1.56)	1.48 (1.27-1.66)
15-min	0.664 (0.590-0.747)	0.797 (0.706-0.896)	0.960 (0.848-1.08)	1.08 (0.954-1.21)	1.24 (1.09-1.39)	1.36 (1.19-1.52)	1.48 (1.29-1.65)	1.59 (1.38-1.78)	1.74 (1.50-1.94)	1.85 (1.59-2.07)
30-min	0.878 (0.781-0.989)	1.07 (0.945-1.20)	1.32 (1.16-1.48)	1.50 (1.33-1.69)	1.75 (1.54-1.96)	1.94 (1.70-2.17)	2.13 (1.86-2.38)	2.32 (2.02-2.59)	2.58 (2.22-2.88)	2.78 (2.38-3.10)
60-min	1.07 (0.953-1.21)	1.31 (1.16-1.47)	1.65 (1.46-1.85)	1.91 (1.69-2.14)	2.27 (2.00-2.54)	2.55 (2.24-2.85)	2.85 (2.49-3.18)	3.15 (2.74-3.52)	3.57 (3.07-3.98)	3.90 (3.34-4.36)
2-hr	1.26 (1.12-1.45)	1.54 (1.36-1.76)	1.95 (1.72-2.23)	2.27 (2.00-2.60)	2.72 (2.38-3.11)	3.09 (2.69-3.52)	3.48 (3.01-3.95)	3.88 (3.34-4.41)	4.46 (3.79-5.08)	4.92 (4.15-5.60)
3-hr	1.34 (1.19-1.55)	1.64 (1.45-1.88)	2.07 (1.82-2.37)	2.42 (2.13-2.77)	2.90 (2.54-3.32)	3.30 (2.87-3.78)	3.72 (3.22-4.25)	4.17 (3.57-4.77)	4.80 (4.07-5.50)	5.32 (4.46-6.09)
6-hr	1.60 (1.42-1.85)	1.93 (1.71-2.23)	2.44 (2.15-2.80)	2.85 (2.50-3.27)	3.44 (3.00-3.95)	3.94 (3.41-4.51)	4.47 (3.84-5.11)	5.04 (4.29-5.76)	5.87 (4.94-6.71)	6.56 (5.45-7.51)
12-hr	1.85 (1.64-2.13)	2.23 (1.98-2.56)	2.80 (2.47-3.21)	3.27 (2.88-3.75)	3.95 (3.45-4.50)	4.51 (3.92-5.14)	5.12 (4.42-5.83)	5.78 (4.94-6.57)	6.74 (5.68-7.65)	7.54 (6.28-8.55)
24-hr	2.13 (1.94-2.38)	2.56 (2.33-2.86)	3.20 (2.91-3.57)	3.71 (3.37-4.13)	4.43 (4.00-4.92)	5.03 (4.52-5.57)	5.65 (5.06-6.25)	6.31 (5.62-6.98)	7.25 (6.40-8.01)	8.01 (7.02-8.86)
2-day	2.44 (2.24-2.69)	2.92 (2.68-3.23)	3.60 (3.30-3.97)	4.15 (3.79-4.57)	4.92 (4.48-5.41)	5.54 (5.03-6.10)	6.19 (5.60-6.81)	6.87 (6.18-7.57)	7.83 (6.98-8.61)	8.60 (7.62-9.45)
3-day	2.62 (2.43-2.84)	3.13 (2.91-3.40)	3.83 (3.55-4.16)	4.38 (4.06-4.76)	5.16 (4.76-5.59)	5.78 (5.32-6.26)	6.42 (5.89-6.96)	7.09 (6.47-7.68)	8.01 (7.27-8.67)	8.73 (7.88-9.46)
4-day	2.80 (2.63-2.99)	3.34 (3.14-3.57)	4.05 (3.81-4.34)	4.62 (4.33-4.94)	5.40 (5.05-5.77)	6.02 (5.62-6.43)	6.65 (6.19-7.10)	7.30 (6.77-7.79)	8.18 (7.55-8.73)	8.87 (8.15-9.46)
7-day	3.28 (3.10-3.49)	3.91 (3.68-4.14)	4.68 (4.41-4.97)	5.29 (4.99-5.61)	6.12 (5.76-6.48)	6.77 (6.35-7.17)	7.42 (6.95-7.85)	8.09 (7.56-8.55)	8.97 (8.35-9.49)	9.64 (8.95-10.2)
10-day	3.74 (3.54-3.96)	4.42 (4.19-4.69)	5.26 (4.98-5.57)	5.92 (5.60-6.27)	6.81 (6.43-7.21)	7.51 (7.08-7.95)	8.21 (7.73-8.70)	8.91 (8.37-9.44)	9.85 (9.21-10.4)	10.6 (9.85-11.2)
20-day	5.05 (4.80-5.33)	5.95 (5.65-6.27)	6.98 (6.61-7.35)	7.80 (7.38-8.21)	8.90 (8.40-9.36)	9.75 (9.19-10.3)	10.6 (9.97-11.1)	11.5 (10.7-12.0)	12.6 (11.8-13.2)	13.5 (12.5-14.2)
30-day	6.29 (6.01-6.60)	7.38 (7.05-7.75)	8.54 (8.15-8.95)	9.43 (9.00-9.88)	10.6 (10.1-11.1)	11.5 (10.9-12.0)	12.3 (11.7-12.9)	13.2 (12.5-13.8)	14.2 (13.4-14.9)	15.0 (14.1-15.7)
45-day	8.00 (7.66-8.37)	9.37 (8.96-9.79)	10.7 (10.2-11.2)	11.8 (11.2-12.3)	13.1 (12.5-13.6)	14.1 (13.4-14.7)	15.0 (14.3-15.7)	15.9 (15.1-16.6)	17.1 (16.2-17.8)	17.9 (16.9-18.7)

Infiltration Rates by Soil Type

Hydrologic soil group	Infiltration rate (inches/hour)	Infiltration rate (centimeters/hour)	Soil textures	Corresponding Unified Soil Classification ^{Superscript text}
A	1.63 ^a	4.14	gravel sandy gravel silty gravels gravelly sands sand	GW - Well-graded gravels, fine to coarse gravel GP - Poorly graded gravel GM - Silty gravel SW - Well-graded sand, fine to coarse sand

Although a value of 1.63 inches per hour (4.14 centimeters per hour) may be used, it is **Highly recommended** that you conduct field infiltration tests or amend soils.^b See Guidance for amending soils with rapid or high infiltration rates and Determining soil infiltration rates (https://stormwater.pca.state.mn.us/index.php?title=Determining_soil_infiltration_rates).

Clear Lake Typ.

Hydrologic soil group	Infiltration rate (inches/hour)	Infiltration rate (centimeters/hour)	Soil textures	Corresponding Unified Soil Classification ^{Superscript text}
	0.8	2.03	sand loamy sand sandy loam	SP - Poorly graded sand
B	0.45	1.14	silty sands	SM - Silty sand
	0.3	0.76	loam, silt loam	MH - Elastic silt
C	0.2	0.51	Sandy clay loam, silts	ML - Silt
D	0.06	0.15	clay loam silty clay loam sandy clay silty clay clay	GC - Clayey gravel SC - Clayey sand CL - Lean clay OL - Organic silt CH - Fat clay OH - Organic clay, organic silt