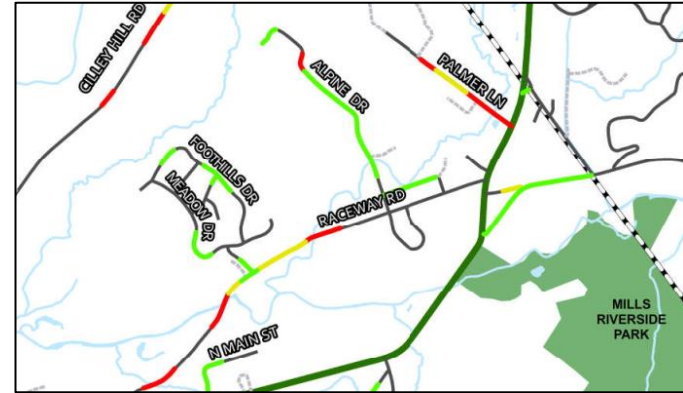


Jericho MRGP Improvement Plan

Project Tasks

1. Review Road Erosion Inventory Data and MRGP Status
2. Develop Town Specific Prioritization Criteria
3. Customize Unit Costs to Town of Jericho
4. Identify/Review Town Funding Constraints
5. Apply Unit Costs to Non-Conforming Segments
6. Develop 10-Year MRGP Improvement Plan

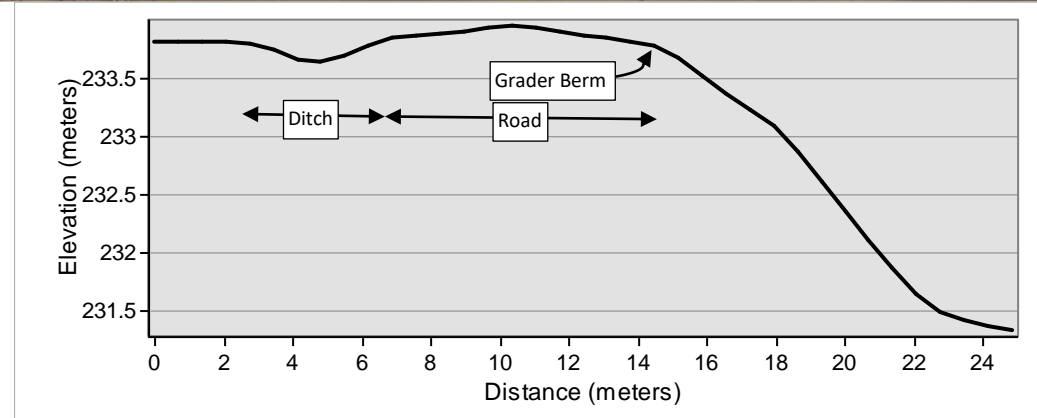


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Review Road Erosion Inventory Data and MRGP Status

- Translation of variables to costs
 - 2016 CCRPC REI Data
 - 50% Berm = Remove 100-meters grader berm on a 100-meter segment
- Drainage vs. berm work needed updates

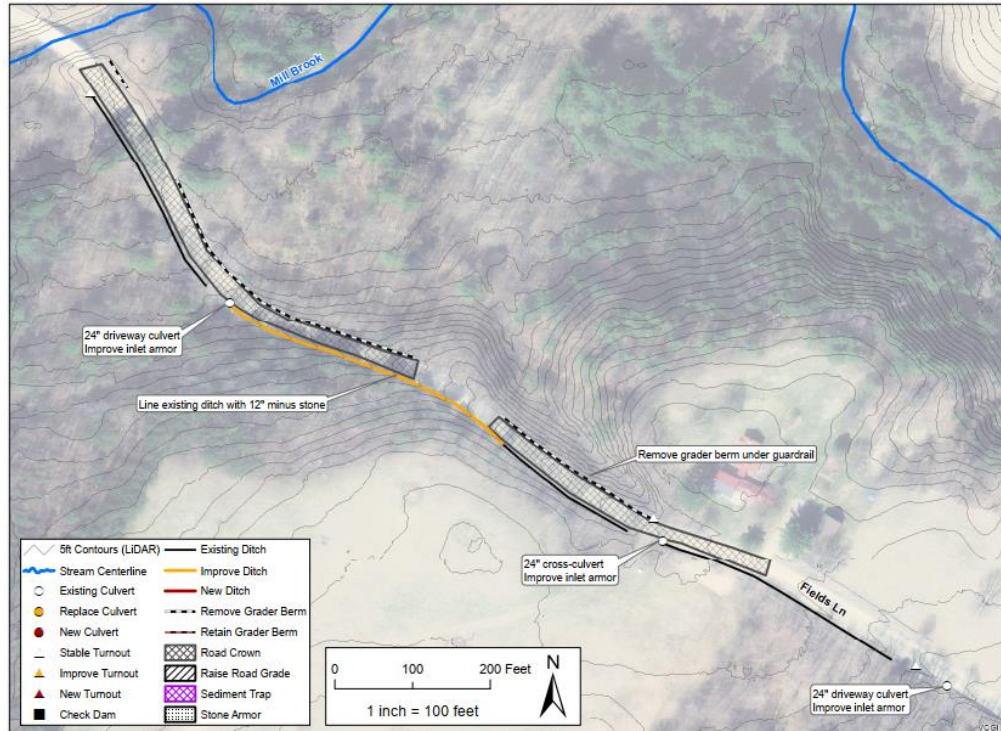


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Develop Town Specific Prioritization Criteria & Review Town Funding Constraints

- 2020 work areas provided by Town guide Year 1
- Approx. \$60,000 - \$70,000/year available for MRGP upgrades.
 - Town Budget: \$50,000/year (MRGP Specific)
 - Better Roads: \$20,000 (Approx. Every 2 Years)
 - Grant-in-Aid: \$15,000 (Approx. Every Year)
- Category D Grant: Up to \$60,000 to upgrade culverts 36" or greater.
- Concept plans may help secure grant funding.



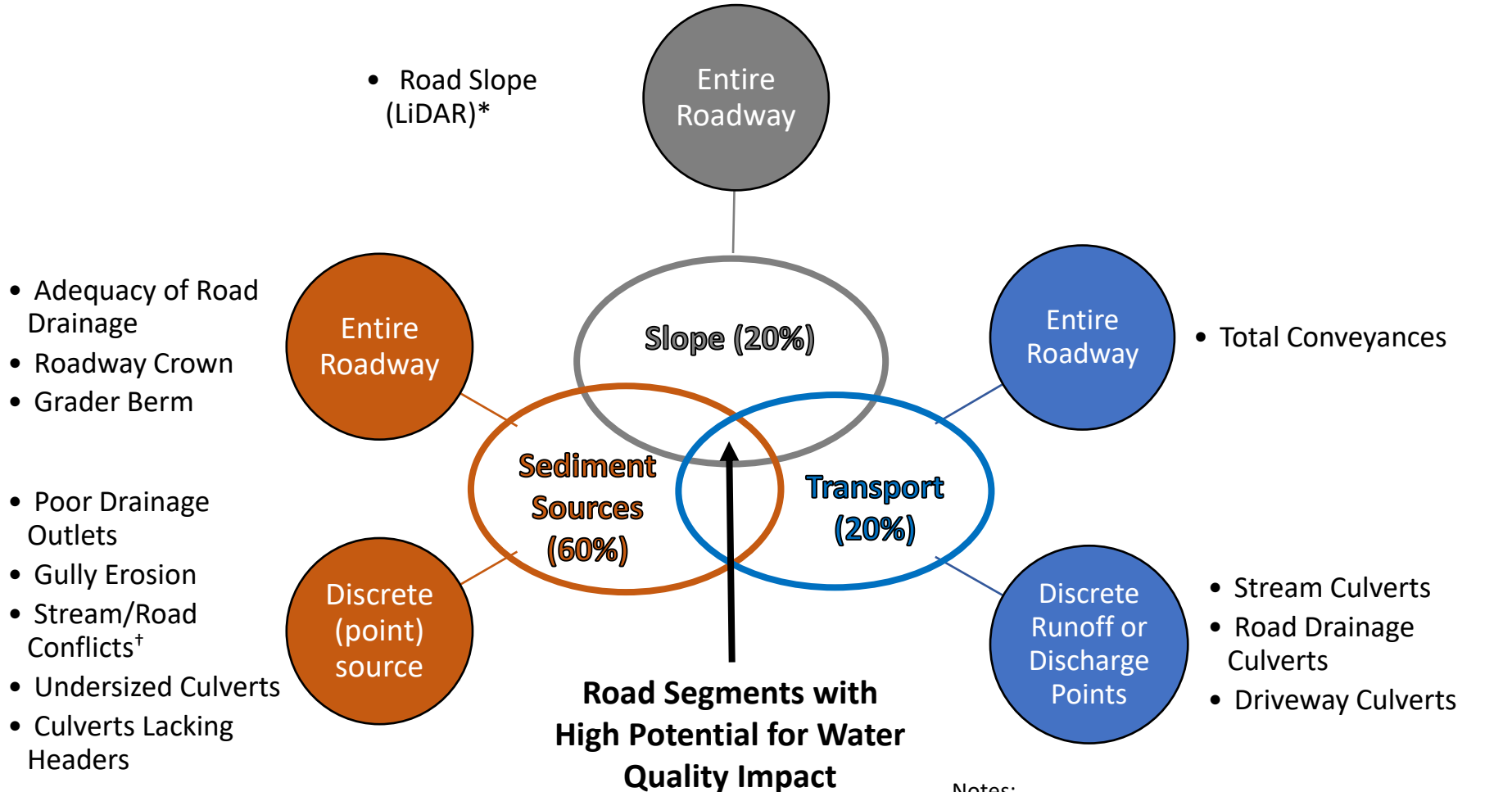
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<p>Notes: Site Visit completed by MAM on 12/01/2017</p> <p>Drawn: JHB Date: 12/15/2017</p>	<p>Concept Design Overview</p> <p>CCRPC Road Erosion Inventory</p> <p>Fields Lane Site</p> <p>Jerricho, VT</p>
<p>FL - DRAFT</p>	<p>MILONE & MACBROOM[®]</p> <p>Regional Environmental Associates, LLC</p> <p>1000 North Main Street, Suite 100 Jerricho, VT 05465</p>

Refine Prioritization with Water Quality Impact

Road Erosion Screening Overview Hydrologically Connected Roads



Notes:

* Indicates non-REI variable calculated in GIS using LiDAR

† Stream/road bank erosion not addressed in MRGP



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MILONE &
MACBROOM

Source and Transport

Source: The roadway surface and/or right-of-way has areas of soil instability (i.e., rilling on gravel road surface, unstable ditches, gullies) that lead to sedimentation during runoff events.



Transport: The road segment has areas of direct discharge (i.e., conveyances) to adjacent or bisecting waterways.



Customize Unit Costs to Town of Jericho

Road Erosion Inventory Component		Practice	Units	Original 2016-2017 Cost Assumptions	2016-2017 Unit Cost Estimate	Inflation Adjusted Costs By Plan Year					
						2020	2021 & 2022	2023 & 2024	2025 & 2026	2027 & 2028	2029
							1.04	1.04	1.04	1.04	1.04
Road Surfaces	Crown Not Meeting Standards	Improve Road Crown	Linear Foot	Conservative labor assumption for grader/operator; no materials	\$ 5	\$ 5	\$ 5	\$ 5	\$ 5	\$ 5	\$ 5
	Grader Berm Present	Remove Grader Berm/Lower Shoulder	Linear Foot	Conservative labor assumption for grader/operator; no materials	\$ 5	\$ 5	\$ 5	\$ 5	\$ 5	\$ 5	\$ 5
Drainage	Drainage Not Meeting Standards and Slope >5%	New Stone-Lined Ditch	Linear Foot	\$16/LF of stone + \$9/LF of excavation and trucking; approx 0.5 CY/LF stone	\$ 25	\$ 25	\$ 26	\$ 27	\$ 28	\$ 29	\$ 30
	Drainage Not Meeting Standards, Slope 5-8%, and 2 or More Cross Culverts/Turnouts	New Grass-Lined Ditch	Linear Foot	\$4/LF excavation plus seed/mulch	\$ 8	\$ 8	\$ 8	\$ 8	\$ 8	\$ 8	\$ 8
	Drainage Not Meeting Standards, Slope 5-8%, and 0-1 Cross Culverts/Turnouts	New Grass-Lined Ditch with Stone Check Dams	Linear Foot	\$4/LF excavation plus seed/mulch; Check dams spaced every 12.5' with conservative labor assumption for excavator/operator and 1 CY stone per dam	N/A	\$ 12	\$ 12	\$ 12	\$ 12	\$ 12	\$ 12
	Drainage Not Meeting Standards and Slope <5	New Grass-Lined Ditch	Linear Foot	\$4/LF excavation plus seed/mulch	\$ 8	\$ 8	\$ 8	\$ 8	\$ 8	\$ 8	\$ 8
	Poor Conveyance*	Install/Improve Turnout	Each	Conservative labor assumption for excavator/operator; 2 CY stone per turnout	\$ 200	\$ 500	\$ 520	\$ 540	\$ 560	\$ 580	\$ 600
Culverts	Cross Culvert Undersized or Eroded	New/Upgrade Cross-Culvert (18" to 24")	Each	Conservative labor assumption for excavator/operator; approx. \$25/LF for culvert	\$ 1,500	\$ 1,500	\$ 1,560	\$ 1,620	\$ 1,690	\$ 1,760	\$ 1,830
	Driveway Culvert Undersized or Eroded	New/Upgrade Driveway Culvert	Each	Conservative labor assumption for excavator/operator; approx. \$25/LF for culvert	\$ 750	\$ 750	\$ 800	\$ 800	\$ 800	\$ 800	\$ 800
	Culvert Header/Outlet Erosion	Install Culvert Headwall/Armor	Each	Conservative labor assumption for excavator/operator; approx. 2-3 CY stone	\$ 300	\$ 300	\$ 310	\$ 320	\$ 330	\$ 340	\$ 350

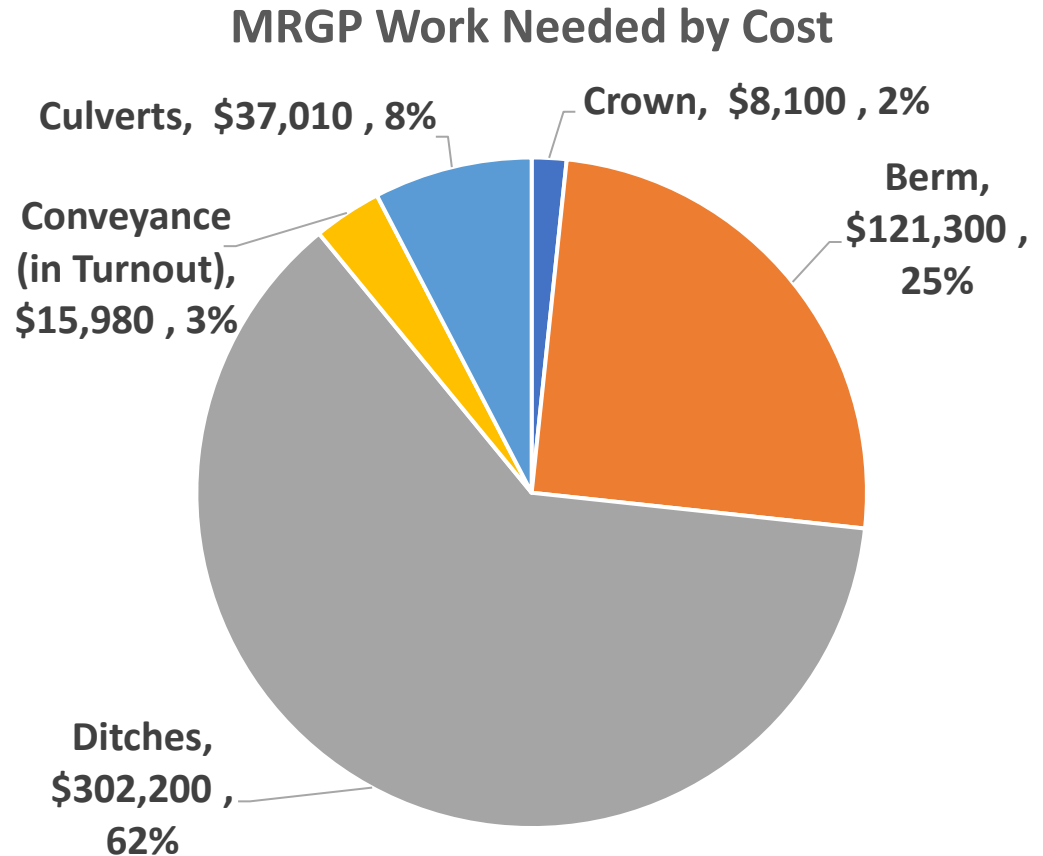


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Apply Unit Costs to Work Needed

- Approx. \$60,000 - \$70,000 is available for MRGP upgrades annually.
- Estimated total cost of work \$495,000
 - Divide into ~\$50,000/year for 10 years
 - Group by road
 - Complete Very High Priority segments by 2025
 - Use FEA water quality rank (2017) to prioritize
 - Town can mix-and-match segments on the fly



Develop 10-Year MRGP Improvement Plan

10-Year Overview

Annual Cost Summary

Year	Cost	Segments
2020	\$ 57,000	16
2021-2022	\$ 106,800	30
2023	\$ 48,300	14
2024	\$ 49,300	15
2025	\$ 46,700	15
2026	\$ 48,800	16
2027	\$ 49,300	16
2028	\$ 46,600	16
2029	\$ 42,100	17
Total	\$ 494,900	155

RDFNAME	Does Not Meet	Partially Meets	Very High Priority	Total Segments	Year	Quantity								Cost Estimate - Updated for Inflation											FEA Water Quality Prioritization Minimum Segment RankAverage Segment Rank	
						Road Surfaces		Drainage		Culverts				Road Surfaces		Drainage		Culverts				Total				
						Crown (ft)	Berm (ft)	Ditches (ft)	Conveyance (in Turnout)	Cross Culvert	Header	Outlet	Driveway Culvert	Crown	Berm	Ditches	Conveyance (in Turnout)	Cross Culvert	Header	Outlet	Driveway Culvert					
FITZSIMMONS RD	5	3		8	2020	427	558	2231	1	0	2	1	0	\$ 2,100	\$ 2,900	\$ 26,100	\$ 500	\$ -	\$ 600	\$ 300	\$ -	\$ 32,500	1	209		
MILO WHITE RD	1	1		2	2020	0	0	0	1	0	1	1	0	\$ -	\$ -	\$ -	\$ 500	\$ -	\$ 300	\$ 300	\$ -	\$ 11,100	2	78		
SKYVIEW DR	0	3		3	2020	66	0	412	0	0	0	0	0	\$ 300	\$ -	\$ 8,400	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 8,700	26	69		
VARNEY RD	0	2		2	2020	0	131	0	0	0	2	2	0	\$ -	\$ 700	\$ -	\$ -	\$ -	\$ 600	\$ 600	\$ -	\$ 1,900	116	149		
SCHILLHAMMER RD	0	1		1	2020	0	164	164	0	0	0	0	0	\$ -	\$ 800	\$ 2,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,800	223	223		
NASHVILLE RD	14	10		24	2021-2022	0	7896	3401	1	1	7	7	0	\$ -	\$ 39,500	\$ 27,000	\$ 520	\$ 1,560	\$ 2,170	\$ 2,170	\$ -	\$ 72,800	3	145		
MILO WHITE RD	3	3	1	6	2021-2022	0	722	1575	0	0	0	0	0	\$ -	\$ 3,800	\$ 30,200	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 34,000	15	50		
PALMER LN	4	2	1	6	2023	82	591	1115	5	1	2	1	0	\$ 400	\$ 3,000	\$ 8,800	\$ 2,700	\$ 1,620	\$ 640	\$ 320	\$ -	\$ 17,500	13	195		
FIELDS LN	3	5		8	2023	131	787	1444	0	0	1	2	0	\$ 600	\$ 4,000	\$ 25,300	\$ -	\$ -	\$ 320	\$ 640	\$ -	\$ 30,800	14	85		
CILLEY HILL RD	7	4	1	11	2024	131	1804	2231	6	0	2	2	0	\$ 600	\$ 9,100	\$ 32,300	\$ 3,240	\$ -	\$ 640	\$ 640	\$ -	\$ 46,500	8	164		
NEEDS NAME 604114	1	1		2	2024	0	315	0	0	0	0	0	0	\$ -	\$ 1,600	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,600	32	159		
BROWNS TRACE	2	0		2	2024	0	0	0	1	0	1	1	0	\$ -	\$ -	\$ -	\$ 540	\$ -	\$ 320	\$ 320	\$ -	\$ 1,200	47	109		
PLAINS RD	3	7		10	2025	0	2625	1575	3	0	2	1	0	\$ -	\$ 13,100	\$ 20,000	\$ 1,680	\$ -	\$ 660	\$ 330	\$ -	\$ 35,800	7	110		
PRATT RD	3	1		4	2025	262	164	525	3	0	3	3	0	\$ 1,300	\$ 800	\$ 4,200	\$ 1,680	\$ -	\$ 990	\$ 990	\$ -	\$ 10,000	27	62		
JERICHO CENTER CIR	1	0		1	2025	0	0	0	1	0	1	0	0	\$ -	\$ -	\$ -	\$ 560	\$ -	\$ 330	\$ -	\$ -	\$ 900	49	49		
LEARY RD	4	5		9	2026	0	459	2357	0	0	4	4	1	\$ -	\$ 2,400	\$ 28,600	\$ -	\$ -	\$ 1,320	\$ 1,320	\$ 750	\$ 34,500	10	204		
LAWRENCE HTS	0	2		2	2026	0	394	131	0	1	0	0	0	\$ -	\$ 2,000	\$ 1,000	\$ -	\$ 1,690	\$ -	\$ -	\$ -	\$ 4,700	30	60		
OLD PUMP RD	1	4		5	2026	0	722	591	1	0	1	1	0	\$ -	\$ 3,600	\$ 4,700	\$ 560	\$ -	\$ 330	\$ 330	\$ -	\$ 9,600	50	138		
PACKARD RD	2	8		10	2027	66	1280	1837	3	1	0	0	0	\$ 300	\$ 6,400	\$ 21,000	\$ 1,740	\$ 1,760	\$ -	\$ -	\$ -	\$ 31,200	21	101		
ORR RD	2	2		4	2027	262	591	459	0	0	1	1	0	\$ 1,300	\$ 3,000	\$ 8,300	\$ -	\$ -	\$ 340	\$ 340	\$ -	\$ 13,300	31	129		
MOUNTAIN VIEW RD	1	0		1	2027	66	131	131	0	0	2	2	0	\$ 300	\$ 700	\$ 1,000	\$ -	\$ -	\$ 680	\$ 680	\$ -	\$ 3,400	57	57		
AYERS DR	0	1		1	2027	0	0	0	0	0	2	2	0	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 680	\$ 680	\$ -	\$ 1,400	58	58		
RACEWAY RD	6	4		10	2028	0	2428	2264	2	0	2	2	0	\$ -	\$ 12,200	\$ 19,000	\$ 1,160	\$ -	\$ 680	\$ 680	\$ -	\$ 33,800	24	122		
SNIPE ISLAND RD	1	1		2	2028	0	131	0	0	0	0	0	0	\$ -	\$ 700	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 700	77	124		
TARBOX RD	1	3		4	2028	66	361	1083	0	0	2	2	0	\$ 300	\$ 1,800	\$ 8,600	\$ -	\$ -	\$ 680	\$ 680	\$ -	\$ 12,100	85	149		
ALPINE DR	1	0		1	2029	0	0	0	1	0	1	1	0	\$ -	\$ -	\$ -	\$ 600	\$ -	\$ 350	\$ 350	\$ -	\$ 1,300	61	61		
BOLGER HILL RD	0	3		3	2029	0	525	197	0	0	2	2	0	\$ -	\$ 2,700	\$ 1,600	\$ -	\$ -	\$ 700	\$ 700	\$ -	\$ 5,700	87	200		
SCHILLHAMMER RD	0	4		4	2029	0	131	410	0	0	1	1	0	\$ -	\$ 700	\$ 8,500	\$ -	\$ -	\$ 350	\$ 350	\$ -	\$ 9,900	106	190		
MORGAN RD	1	1		2	2029	66	262	262	0	1	1	1	0	\$ 300	\$ 1,400	\$ 2,000	\$ -	\$ 1,830	\$ 350	\$ 350	\$ -	\$ 6,200	112	131		
SNOWFLAKE DR	1	0		1	2029	0	0	328	0	0	0	0	0	\$ -	\$ -	\$ 2,600	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,600	197	197		
STYGLES RD	1	0		1	2029	66	131	197	0	0	1	1	0	\$ 300	\$ 700	\$ 1,600	\$ -	\$ -	\$ 350	\$ 350	\$ -	\$ 3,300	258	258		
HANLEY LN	0	4		4	2029	0	755	1181	0	0	0	0	0	\$ -	\$ 3,700	\$ 9,400	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 13,100	261	312		
DICKINSON	0	1		1	2029	0	0	0	0	0	0	0	0	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	436	436		
Total	69	86	3	155		1690	24057	26100	29	5	44	41	1	\$ 8,100	\$ 121,300	\$ 302,200	\$ 15,980	\$ 8,460	\$ 14,380	\$ 13,420	\$ 750	\$ 494,900				

Notes: Total 2020 Milo White cost estimate from Watershed Consulting Design (2018). Includes labor, equipment, materials and contingency and is anticipated to be funded through a grant.



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Develop 10-Year MRGP Improvement Plan

- Annual Work Plans

				Quantity								Cost Estimate								
				Road Surfaces		Drainage		Culverts				Road Surfaces		Drainage		Culverts				Total
ID_Town_Rd	Slope	RoadType	Standards	Crown (ft)	Berm (ft)	Ditches (ft)	Conveyance (in Turnout)	Cross Culvert	Header	Outlet	Driveway Culvert	Crown	Berm	Ditches	Conveyance (in Turnout)	Cross Culvert	Header	Outlet	Driveway Culvert	
7045_Fields_Ln_10	5.9	Gravel	Partially Meets	0	0	197	0	0	0	1	0	\$ -	\$ -	\$ 1,600	\$ -	\$ -	\$ -	\$ 320	\$ -	\$ 1,900
7045_Fields_Ln_11	12.5	Gravel	Partially Meets	0	131	328	0	0	0	0	0	\$ -	\$ 700	\$ 8,900	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 9,600
7045_Fields_Ln_12	9.1	Gravel	Does Not Meet	0	0	328	0	0	0	0	0	\$ -	\$ -	\$ 8,900	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 8,900
7045_Fields_Ln_13	0.9	Gravel	Partially Meets	0	0	0	0	0	0	0	0	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
7045_Fields_Ln_14	6.7	Gravel	Does Not Meet	66	262	328	0	0	0	0	0	\$ 300	\$ 1,300	\$ 3,900	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 5,500
7045_Fields_Ln_4	4.4	Gravel	Partially Meets	0	0	131	0	0	1	1	0	\$ -	\$ -	\$ 1,000	\$ -	\$ -	\$ 320	\$ 320	\$ -	\$ 1,600
7045_Fields_Ln_5	4.2	Gravel	Does Not Meet	66	197	131	0	0	0	0	0	\$ 300	\$ 1,000	\$ 1,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,300
7045_Fields_Ln_9	5.4	Gravel	Partially Meets	0	197	0	0	0	0	0	0	\$ -	\$ 1,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,000
7045_Palmer_Ln_1	6.0	Gravel	Does Not Meet	82	0	525	0	0	0	0	0	\$ 400	\$ -	\$ 4,200	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 4,600
7045_Palmer_Ln_4	10.1	Gravel	Does Not Meet	0	0	0	1	1	1	0	0	\$ -	\$ -	\$ -	\$ 540	\$ 1,620	\$ 320	\$ -	\$ -	\$ 2,500
7045_Palmer_Ln_5	1.6	Gravel	Partially Meets	0	131	131	0	0	0	0	0	\$ -	\$ 700	\$ 1,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,700
7045_Palmer_Ln_6	0.1	Gravel	Partially Meets	0	131	0	0	0	1	1	0	\$ -	\$ 700	\$ -	\$ -	\$ -	\$ 320	\$ 320	\$ -	\$ 1,300
7045_Palmer_Ln_7	0.4	Gravel	Does Not Meet	0	328	328	0	0	0	0	0	\$ -	\$ 1,600	\$ 2,600	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 4,200
7045_Palmer_Ln_8	0.4	Gravel	Does Not Meet	0	0	131	4	0	0	0	0	\$ -	\$ -	\$ 1,000	\$ 2,160	\$ -	\$ -	\$ -	\$ -	\$ 3,200
Total				213	1378	2559	5	1	3	3	0	\$ 1,000	\$ 7,000	\$ 34,100	\$ 2,700	\$ 1,620	\$ 960	\$ 960	\$ -	\$ 48,300

- Maps
 - MRGP Compliance
 - Slope Reference Map for Ditch Materials
 - 10-Year Plan



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Implementation and Conclusions

- Ditch costs drive overall costs
- Cost assumptions conservative overall
- Planned through 2029 with 2036 MRGP compliance deadline
- Flexibility to adjust plan
 - 10-year plan may change based on highway department availability, severe weather, budget constraints, etc.
- Format of future of REI data?
 - e.g. DNM = 328'-656' drainage work, PM = 67'-327' drainage work

