

A photograph of a cracked asphalt road with text overlaid. The road is grey and shows significant cracking and wear. The text is centered and reads: "Estimating Costs of Resurfacing Town Roads in Sugar Hill".

Estimating Costs of Resurfacing Town Roads in Sugar Hill

Sugar Hill Roads Committee

January 2025

Paving Priorities

- Repair storm damage as necessary
- Repair sections with the worst ride quality or most deteriorated pavement
- Pave enough sections each year to maintain or improve average ride quality and road condition
- Consider grinding the existing surface and adding gravel to the base of roads before resurfacing roads that were originally paved over a poor base
- Consider converting gravel roads into paved roads in order to reduce problems during mud season and to reduce annual maintenance costs

Pavement Life

- Pavement life depends upon the nature of the pavement and the terrain.
 - A two inches of hot mix may only last about 8 years on segments with poor base, sharp curves, or steep hills.
 - The same two inches of hot mix may last more than 15 years on straight, level segments with good base.
 - For our town roads, average pavement life for a two-inch coat is about 10 years.
- Storm damage is a major factor.
- Long roads are generally repaved in sections over several years.
- Heavy trucks cause much more damage than automobiles.

Measuring Road Roughness and Ride Quality

- Goal: residents and visitors should be able to drive over most town roads at the speed limit in comfort
 - Method: drive along each road at 30 mph and document the quality of the ride:
 - Smooth (0)
 - Some areas with minor bumps (10)
 - Noticeably bumpy, but not a problem (20)
 - Some rough spots (30)
 - Continued rough spots (40)
 - Necessary to slow below 30 mph (50)
 - Necessary to slow below 20 mph (60)
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- The diagram uses three colored brackets to group the list items into three categories:
- OK (0-20)**: Includes Smooth (0), Some areas with minor bumps (10), and Noticeably bumpy, but not a problem (20).
 - BUMPY (30-40)**: Includes Some rough spots (30) and Continued rough spots (40).
 - SLOW (40 - 60)**: Includes Necessary to slow below 30 mph (50) and Necessary to slow below 20 mph (60).

Measuring Pavement Condition

- Take photo every tenth of mile
- Using photos, evaluate five characteristics of road condition:
 - Longitudinal cracks (length, depth, and proportion of surface)
 - Alligator cracking (length, depth, and proportion of surface)
 - Surface peeling (multiple layers, repeated filling of potholes, worn surface)
 - Potholes (number and size)
 - Edge disintegration
- Calculate average condition (numeric)
- Define average condition: excellent, good, ok, poor, very poor

Determining the Segments Most in Need of Resurfacing based Upon Ride Quality and Pavement Condition

Overall Assessment	Ride Quality	Pavement Condition
Very Poor	Slow (50+)	Any condition
	Any roughness	Very Poor (>30)
	Always Bumpy (>40)	Poor (>20)
Poor	Always Bumpy (>40)	OK (<20)
	Any roughness	Poor (>25)
	Bumps (>30)	Very Poor (>30)
OK	OK (<30)	OK (<25)

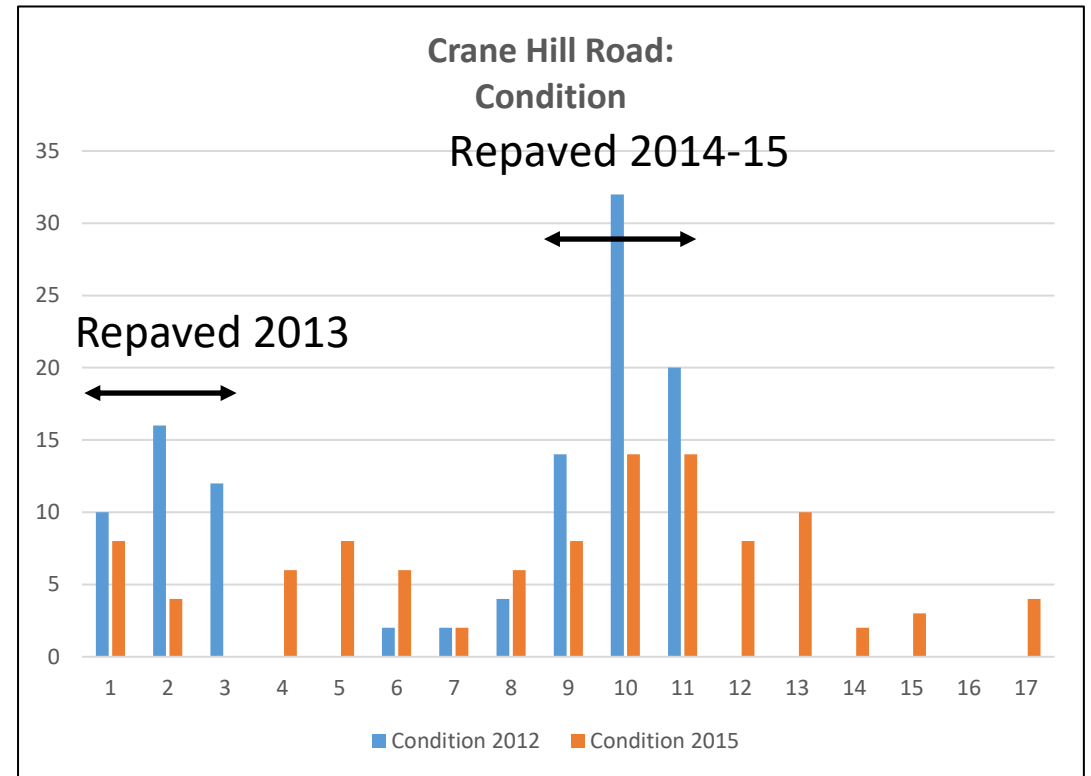
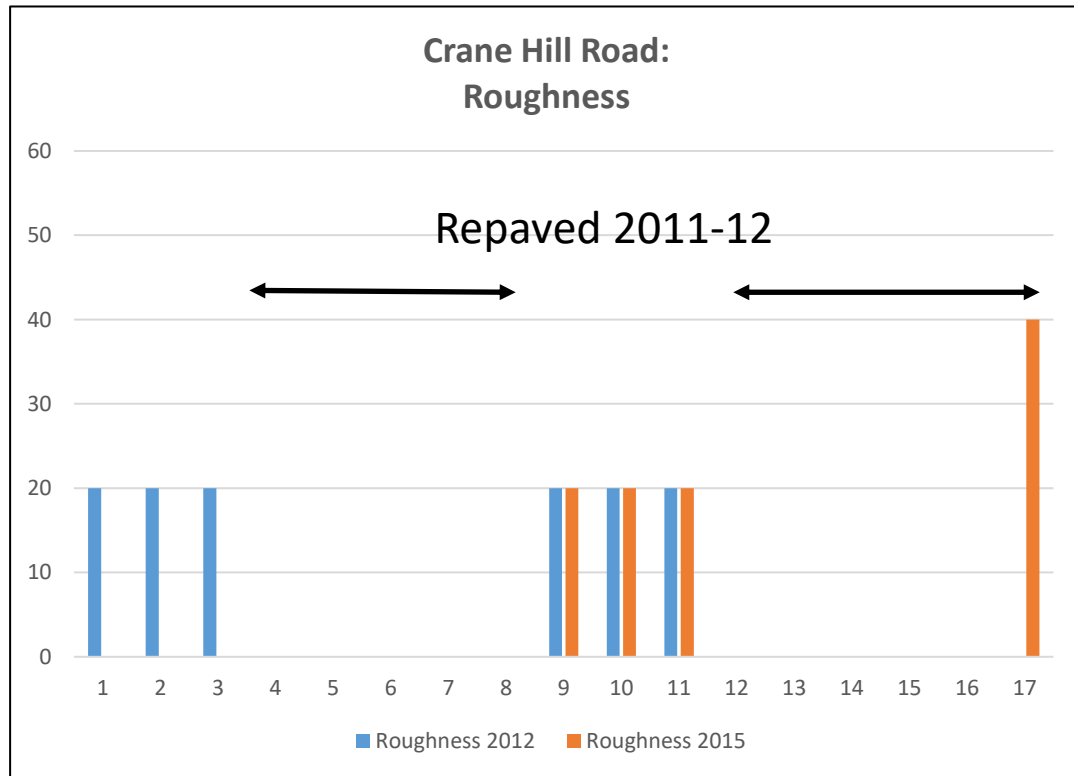
For details concerning these measures, see "Assessing Condition of Town Roads in Sugar Hill" (a powerpoint presentation of the Sugar Hill Road Committee).

Examples of Road Quality and Deterioration Rates for Sugar Hill Roads

- Crane Hill Road: since this entire road was resurfaced twice in the past 15 years, it provides a good example of deterioration rates.
- Pearl Lake Road: good example of increased deterioration on sharp curves and steep hills.
- Lovers Lane: good example of the variable conditions along a long road that is resurfaced in sections over several years.

Crane Hill Road 2012-2015:

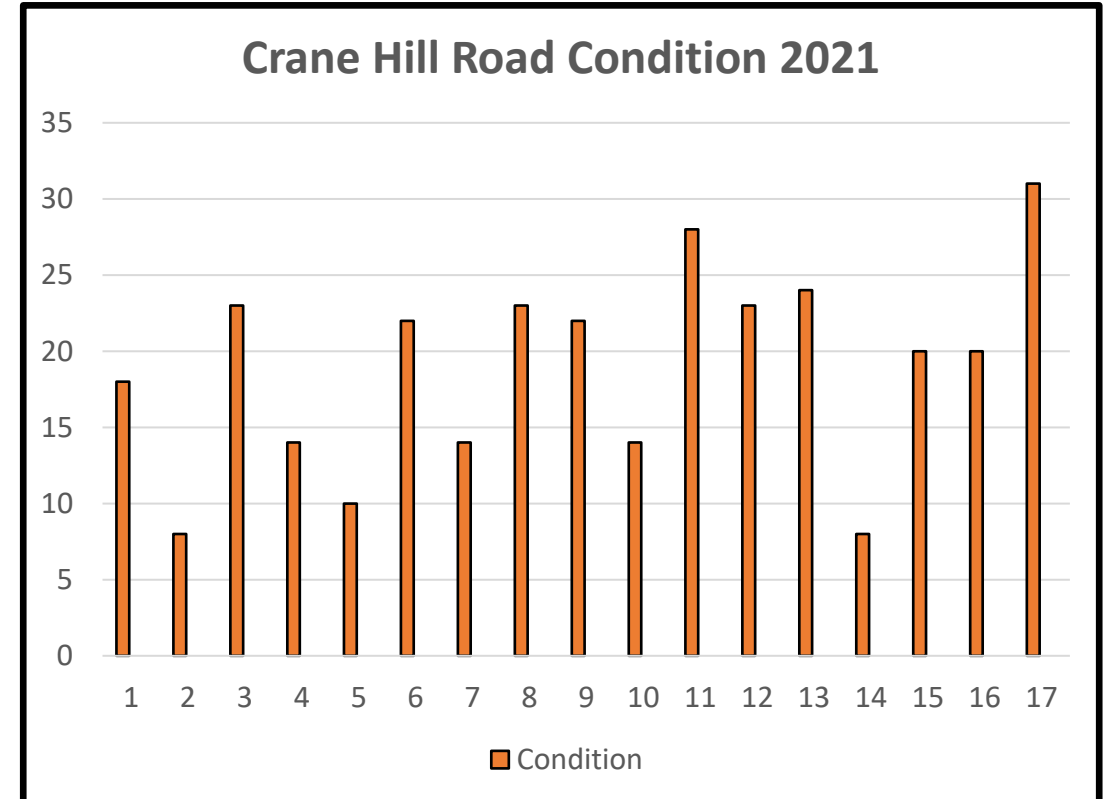
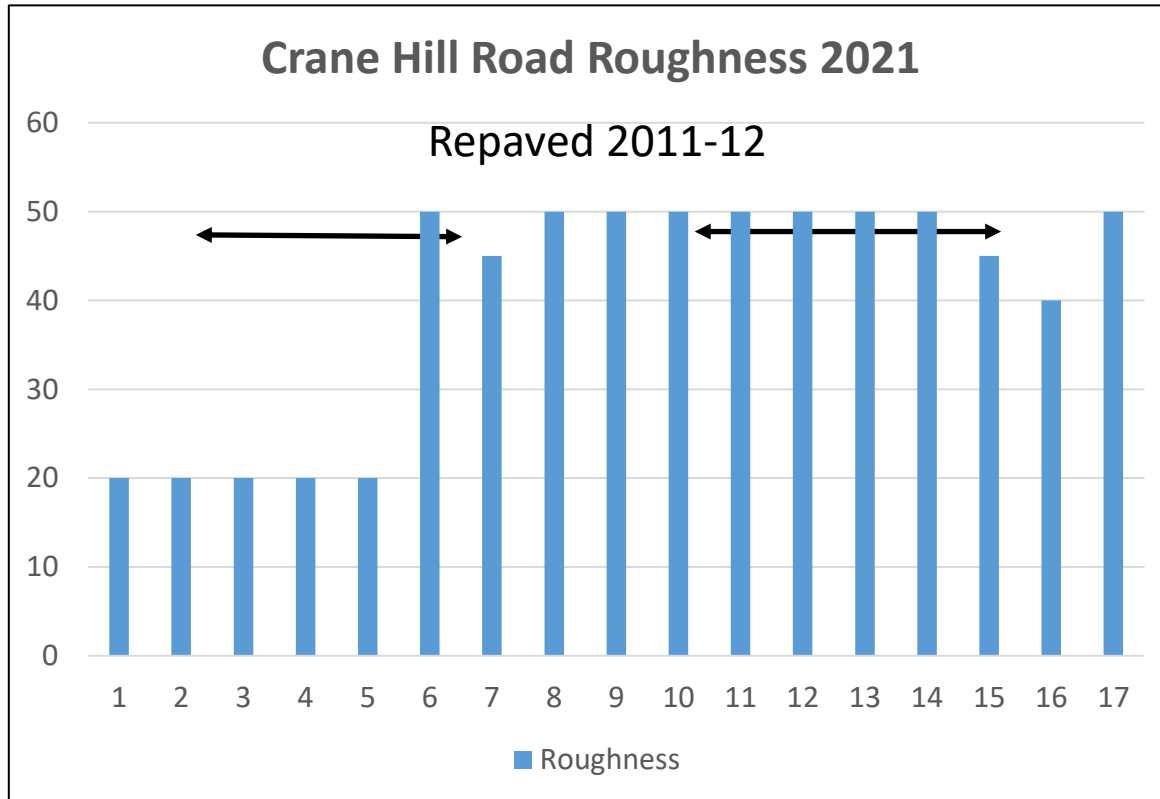
This road was completely repaved between 2011 and 2015 and again between 2022 and 2024. Pavement life was 8-13 years.



This road was almost entirely repaved over several consecutive work seasons. The final tenth of a mile was severely damaged during the 2014-2015 winter. The road was nearly all in excellent condition in October 2015.

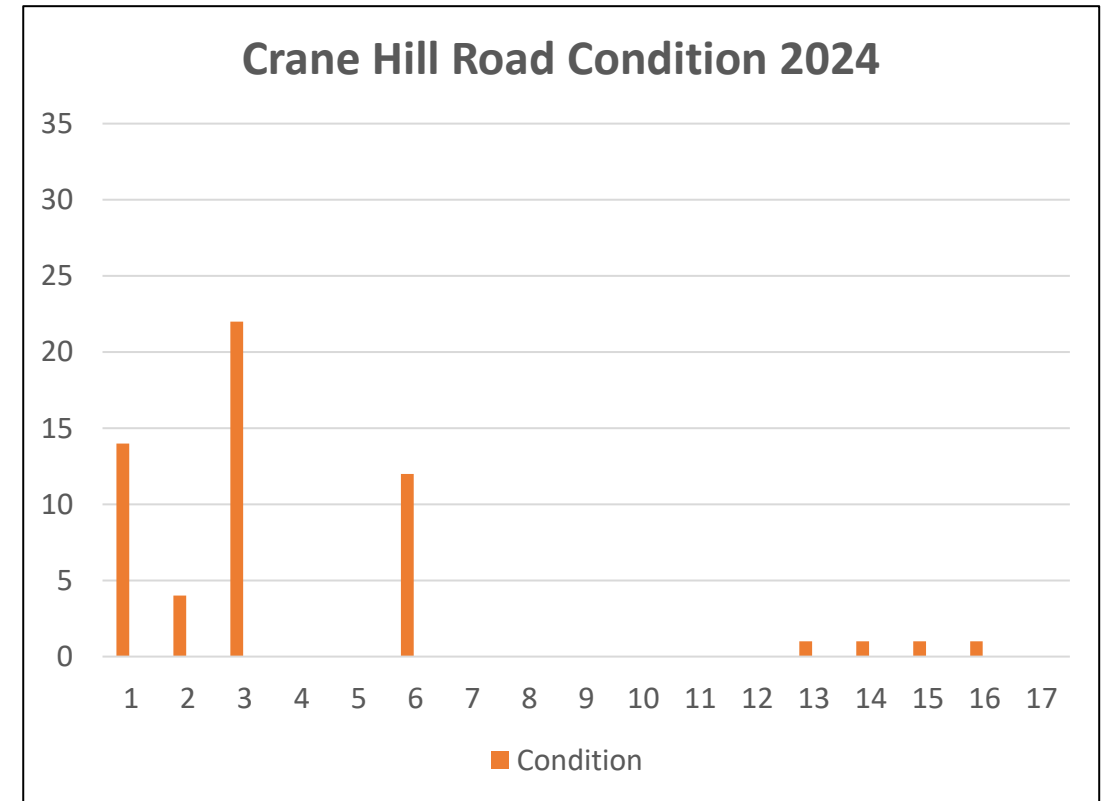
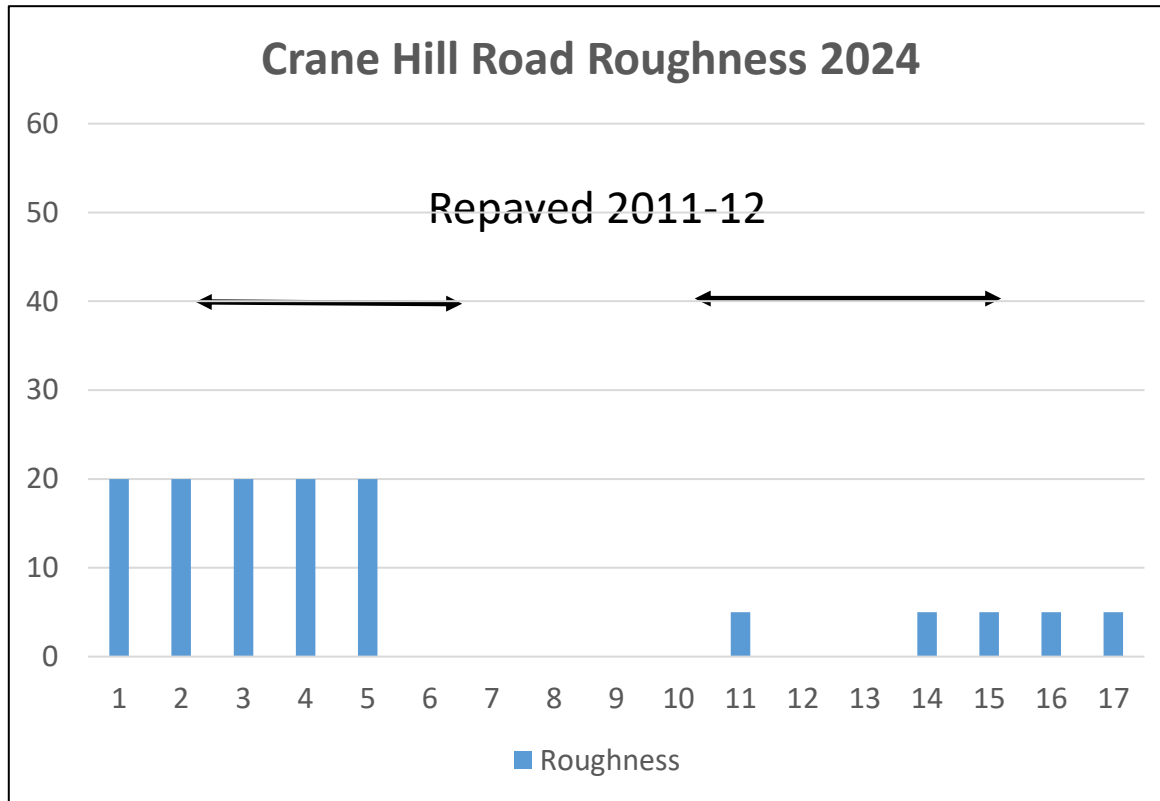
Crane Hill Road 2021:

By 2021, after eight to ten years, the hilly sections were very rough and in poor condition.

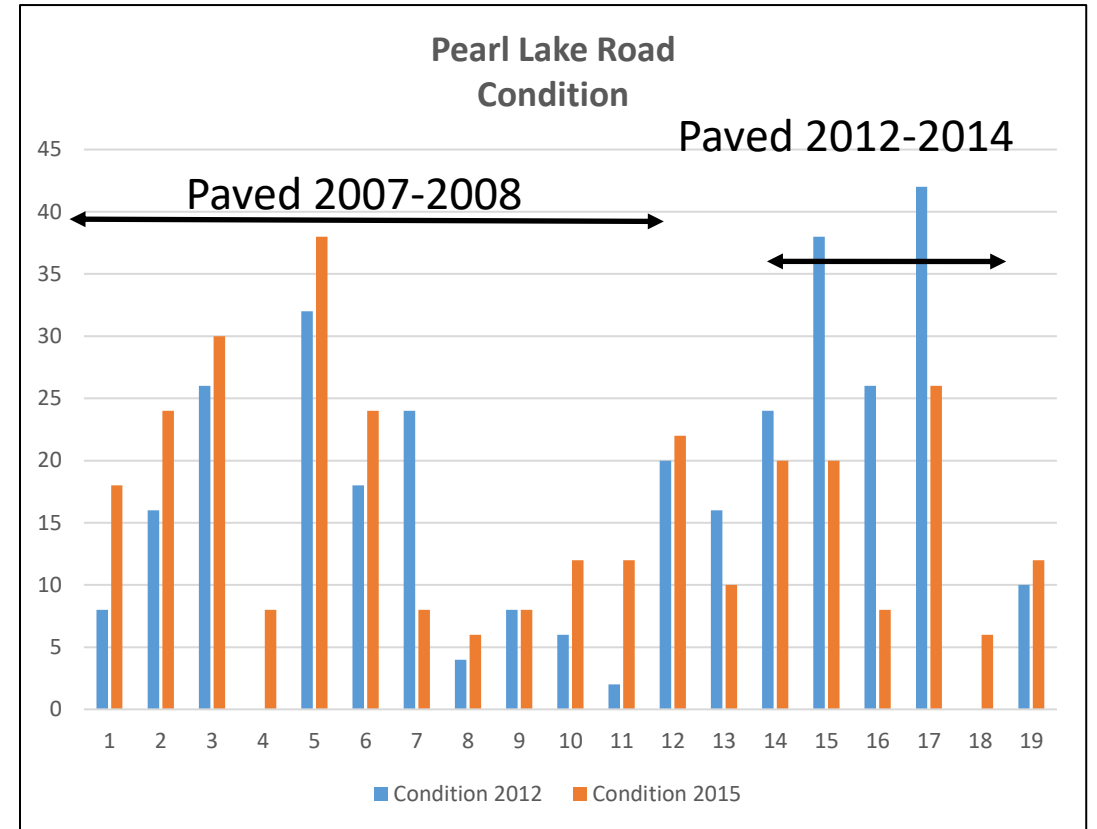
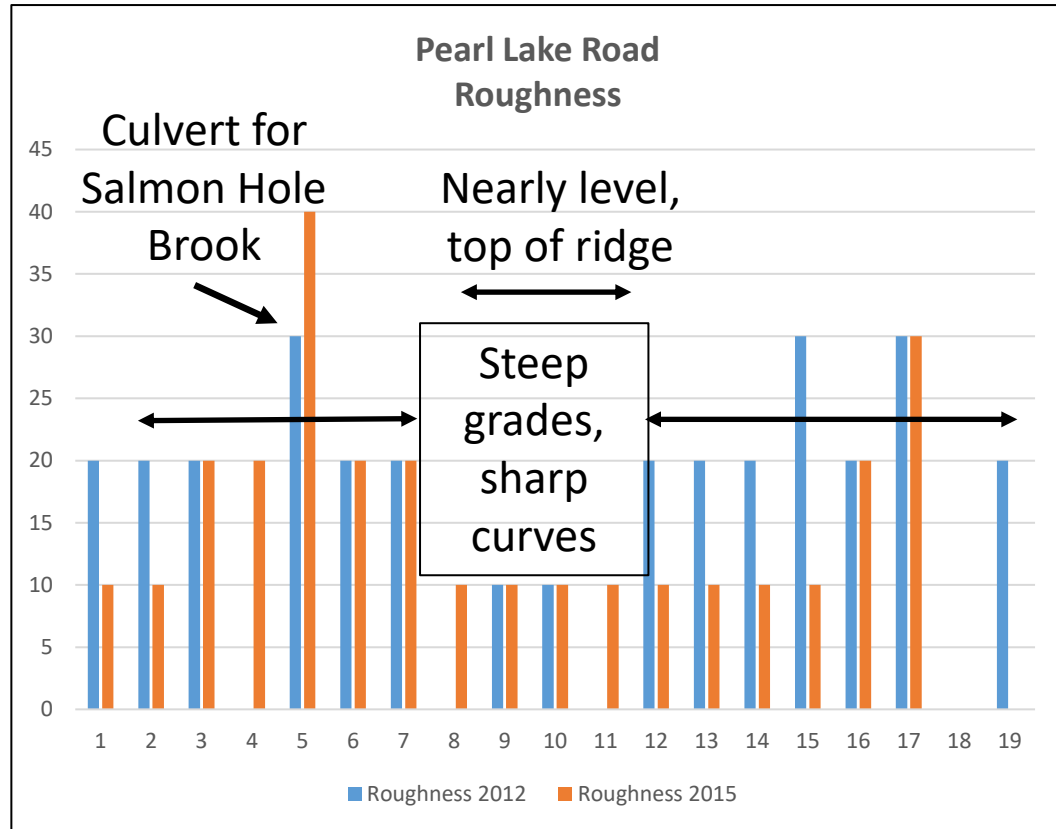


Crane Hill Road: 2024

Segments 6-17 were paved with hot mix in 2022. Segments 4 and 5 and half of segments 1-3 were paved with hot mix in 2024.



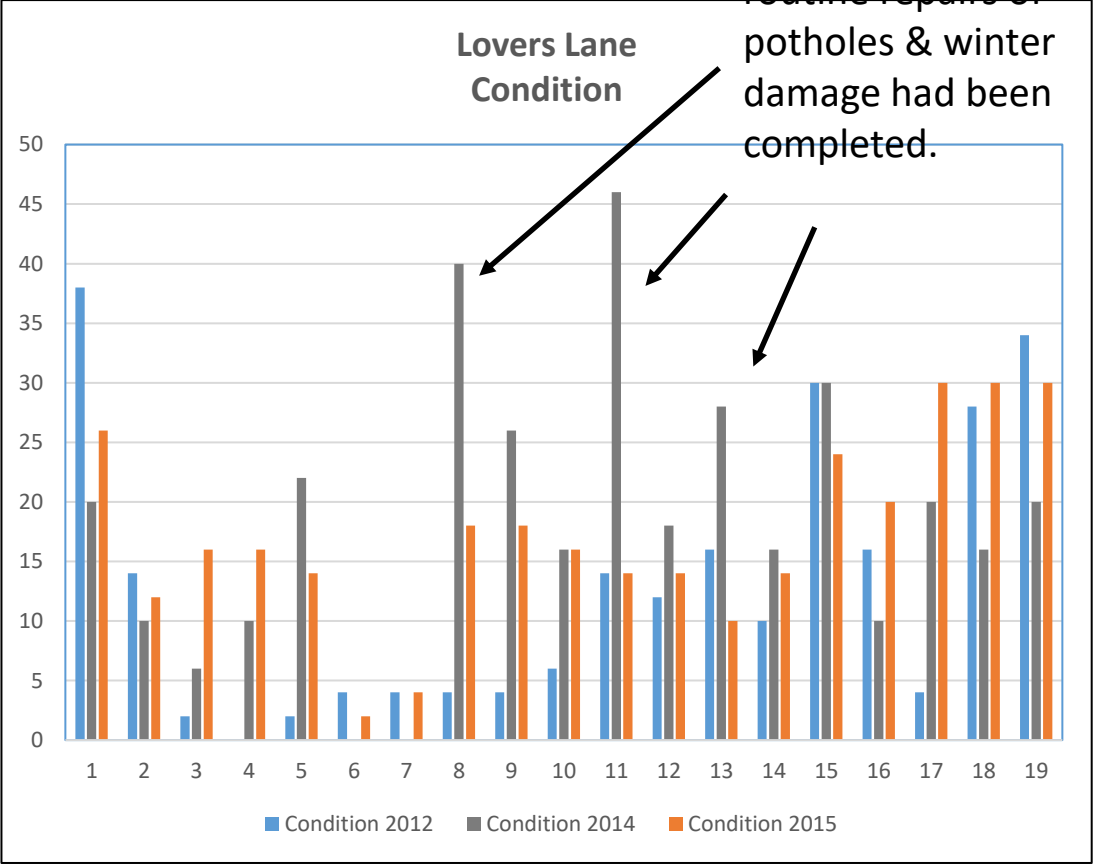
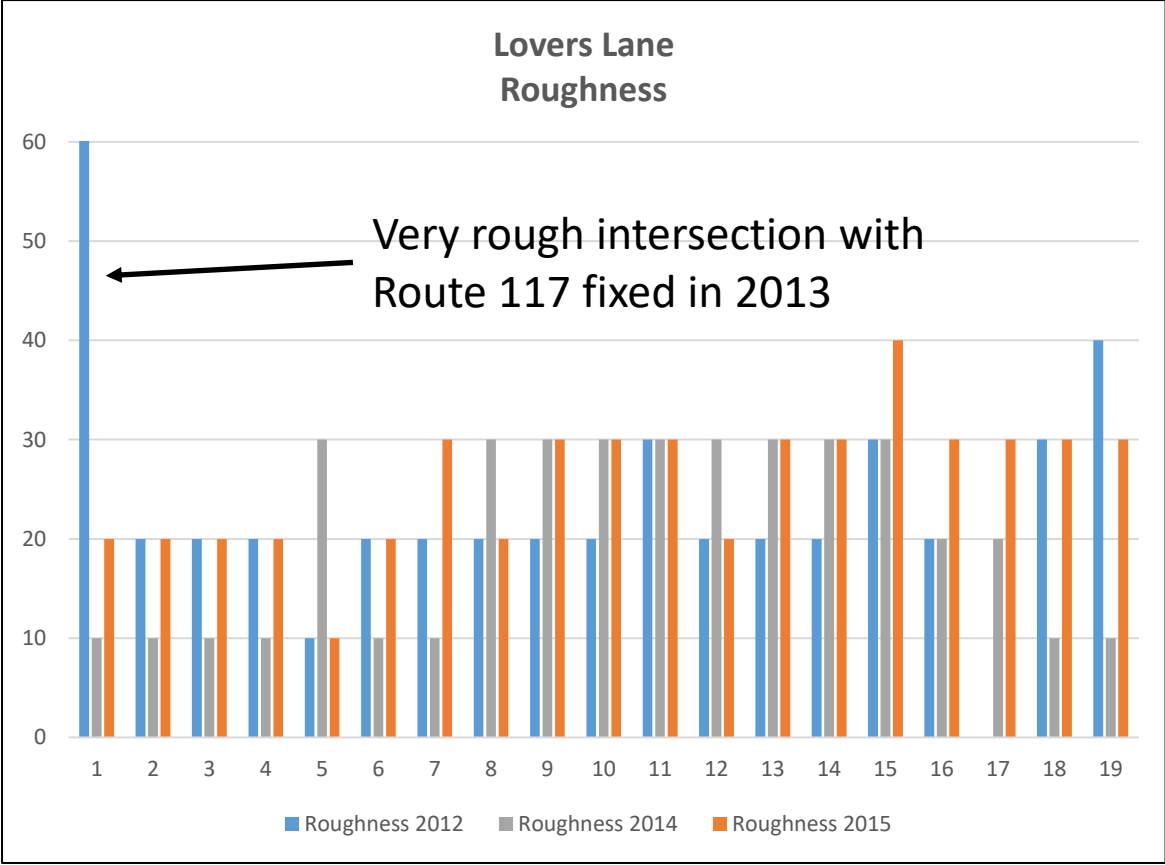
Pearl Lake Road 2012-2015: Deterioration is greater on curves and hills.



Drainage is a large problem on the hilly portions of this road. The rest of Pearl Lake Road has been converted to gravel by Sugar Hill (0.2 miles) and Lisbon (approx. 2 miles)

Lovers Lane 2012-2015: Roughness and condition vary along our longest roads, which are resurfaced in sections over several years.

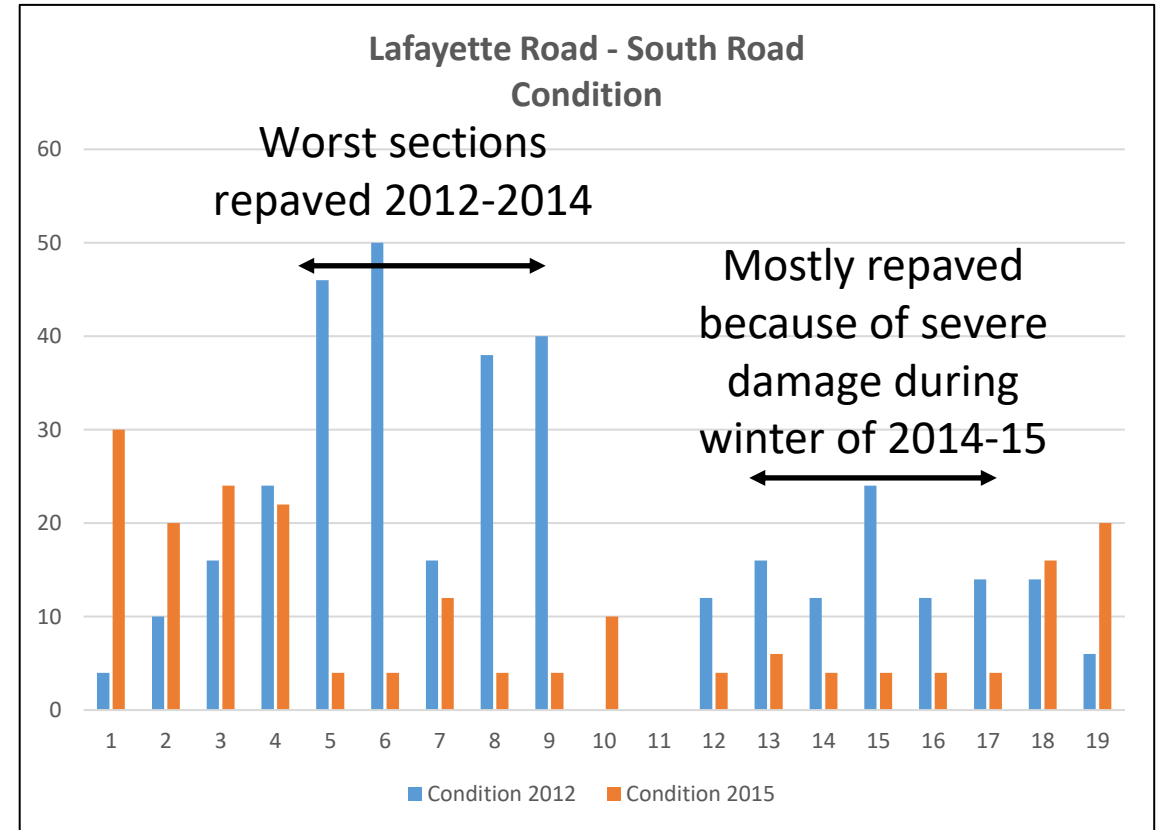
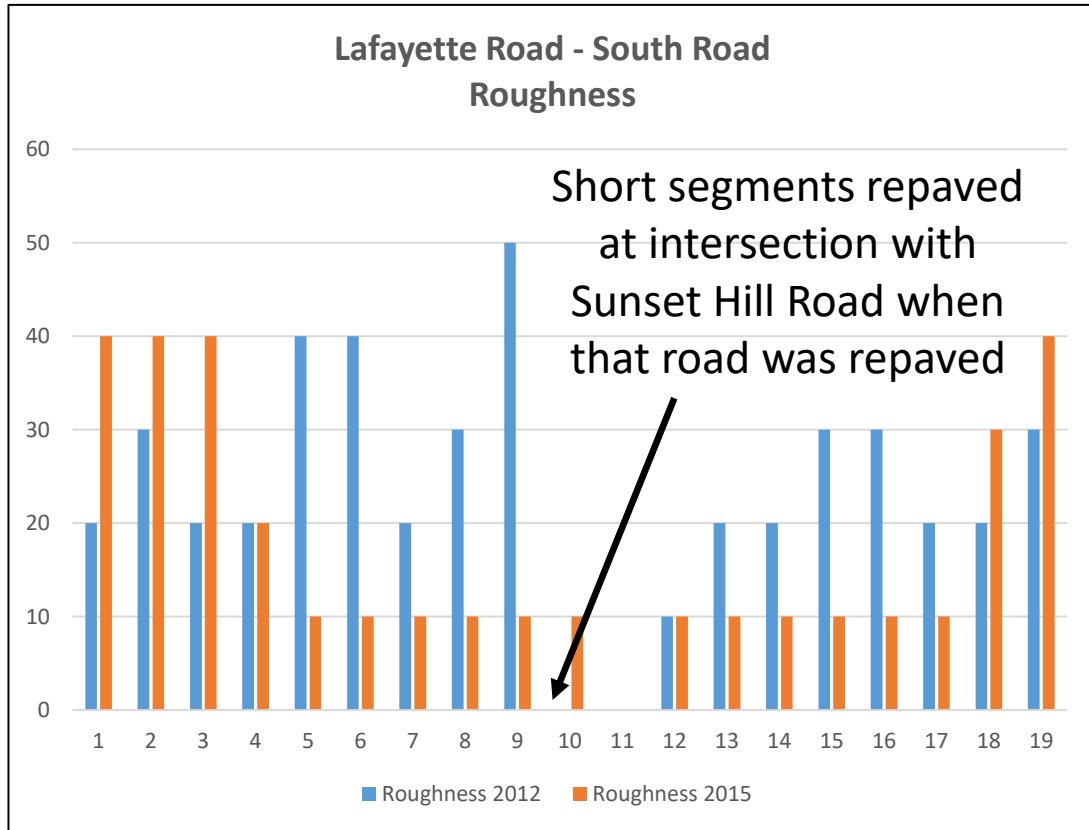
Survey for 2014 was taken in June before routine repairs of potholes & winter damage had been completed.



“Don’t fix this road; we don’t mind the roughness. If you fix it, they’ll just speed by at 50 mph.”

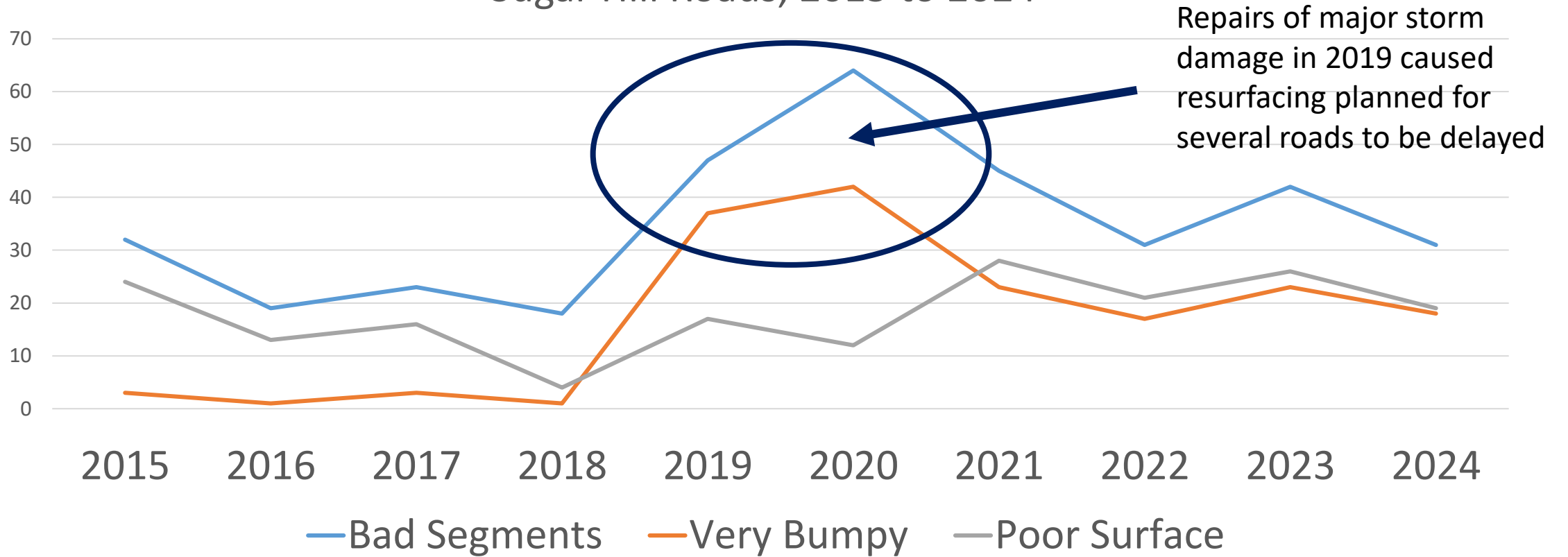
Lafayette Road and South Road 2012-2015:

Storm damage is a major factor. Despite the resurfacing in 2012-2014, Lafayette Road had to be rebuilt after the major storm in 2019.



Number of Poor and Very Poor 0.1-Mile Segments

Sugar Hill Roads, 2015 to 2024



Predicting Resurfacing Requirements for Paved Roads in Sugar Hill for 2025-2035

- Estimate surfacing life for each road segment based upon past experience
 - Estimate for specific road segment where data is sufficient
 - Estimate typical lives for other road segments
- Estimate remaining life for each road segment based upon condition in November 2024
 - Estimate remaining life for specific roads where data is sufficient
 - Estimate typical remaining life for other roads
- Use the estimates of remaining life to determine when each road segment will need to be resurfaced

Surfacing Life for Sugar Hill Roads: Selected Examples

Road	Segments	Recent Resurfacing	Prior Resurfacing	Life
Center District Road	0.4 miles	2023	Circa 2004	20+ years
Jesseman Road	0.6 miles	2024	2009-2011	13+ years
Crane Hill Road	0.9 miles from intersection with Jesseman	2022 (resurfaced with hot mix)	2012	10 years
Carpenter Road	0.5 miles	2024	2015	9 years
Easton Road	0.2 miles, steep hill between Toad Hill and Dyke Roads	2024 (resurface with hot mix)	2016	8 years
Blake Road	0.5 miles, Crane Hill end	2022	2015	7 years

Deterioration of Sugar Hill Roads:
 These examples show variation in deterioration rates
 and rapid deterioration at an intersection.

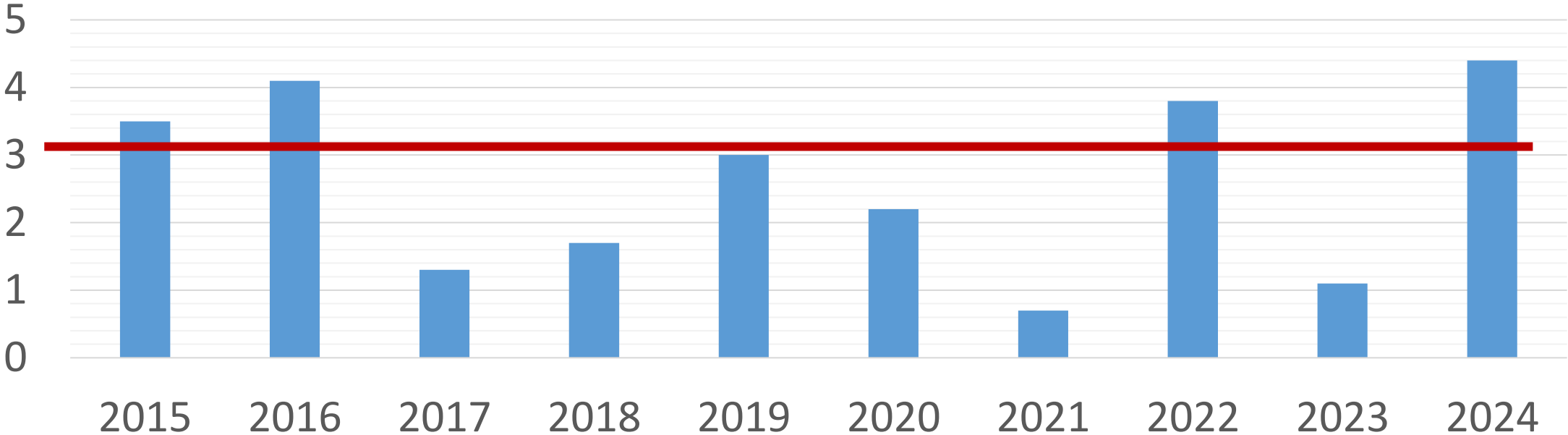
Road	Segments	Last Paved	Age of Pavement	Average Roughness	Pavement Condition
Easton Road	0.4 miles to Easton Town Line (poor base)	2018 (shim coat)	6 years	42 <i>(7 per year)</i>	16 <i>(2.7 per year)</i>
Birches Road	Entire Road (1.3 miles)	2015	9 years	32	13
Carpenter Road	0.1 mile at intersection with Birches Road	2016	8 years	25 <i>(3 per year)</i>	22 <i>(3 per year)</i>
Blake Road	0.3 miles closest to NH 117	2016-2017	8-9 years	15	12
Blake Road	0.3 miles closest to NH 117	2016-2017	8-9 years	15	12
Lafayette Road	Entire Road (1 mile)	2019 (rebuilt after storm)	5 years	12 <i>(2.4 per year)</i>	3 <i>(0.6 per year)</i>
Crane Hill Road	0.4 miles from intersection with Jesseman Road (good base)	2015	9 years	8 <i>(1 per year)</i>	8 <i>(1 per year)</i>

Assumptions Used to Estimate Paving Requirements for Next Ten Years

- Pavement Life for Major Roads
 - 10 years except:
 - 12 years for roads known to have good base
 - 6-8 years for segments known to have shorter life because of curves, grades, or poor base
- Pavement Life for Other Roads is based upon condition in 2024
 - Excellent: 11 years
 - Good: 8 years
 - OK: 6 years
 - Poor: 3 years
 - Very Poor: 1 year

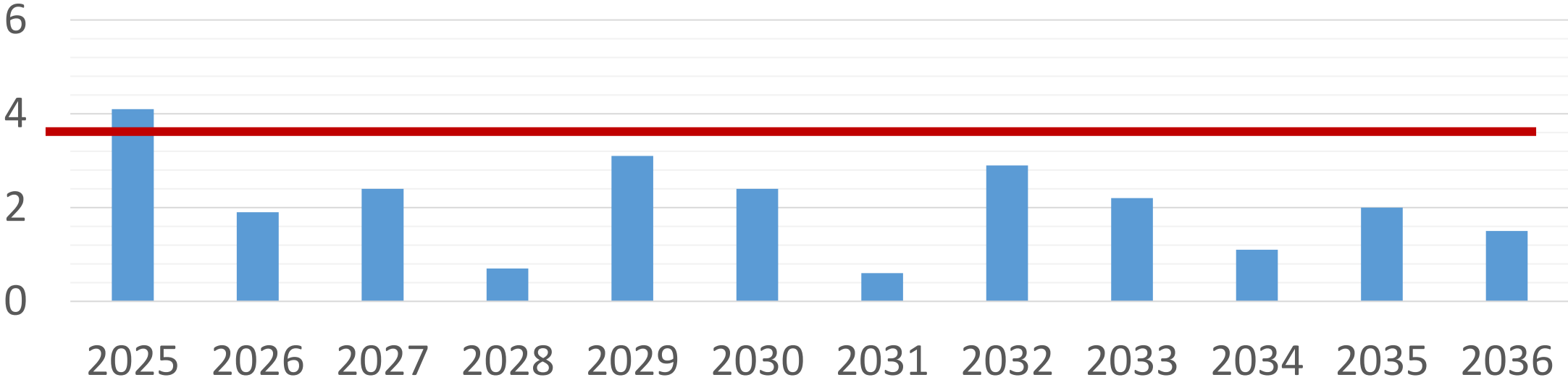
Miles of Road Paved, 2015 to 2024

Total miles paved: 26.1
Average paved: 2.6 miles/year
(including extra work to repair storm damage)



Estimated Paving Required 2025 to 2036: 24.9 miles

Average paving: 2.1 miles/year, assuming no major storm damage, no improvement in average roughness or pavement condition, and no conversion of gravel roads to paved roads



Cost of Asphalt for Resurfacing Sugar Hill Roads: Selected Examples

Road	Length and depth Resurfaced	Date of Check	Cost of Asphalt	Cost/mile
Easton Road	0.2 miles, 2"	9/12/2016	\$30,483	\$152,415
Sunset Hill Road	1 mile, 1" shim	9/12/2016	\$50,713	\$50,713
Lafayette Road	1 mile, 2" hot top	9/30/2019	\$121,445	\$121,445
Lafayette Road	1" hot top	8/10/2020	\$65,000	\$65,000

Source: Sugar Hill Quickbook reports provided to
Road Committee by Doug Glover

The Cost of Asphalt Dominates the Costs of Resurfacing

Cost of asphalt dominates costs of providing gravel to the base, as demonstrated by the costs of rebuilding Lafayette Road after extensive storm damage in 2019:

- Cost of gravel: 368 Cu. Yards @ \$12.50/cu. Yard = \$4,600
- Cost of surfacing with 2 inches of hot mix in 2019: \$121,445

The cost of asphalt includes the contractor's expenses for labor and machinery that is required:

- Contractors can resurface about 1000 feet of road per day.
- Contractor's cost for labor and equipment was \$7,000/day in 2016
- Cost for labor and equipment was therefore about \$35,000/mile in 2016

Source: Sugar Hill Quickbook reports provided to Road Committee and discussions with Doug Glover

Estimating the Cost/ton for the Asphalt Used to Resurface Lafayette Road in 2019

- Assumptions:
 - Area to be surfaced
 - Length (L) = one mile = 1760 yards
 - Width (W) = 20 feet = 6.7 yards
 - Area (A) = L x W = 11,733.3 square yards
 - Depth of surfacing (D) = 2 inches
 - Volume of asphalt required = A x D = 23,465
 - Standard conversion factor (tons/sq.yd. x inch) = 0.0575
 - Tons of asphalt required (Tons) = A x 0.0575 = 1349 tons
- Actual Cost (C) of asphalt for resurfacing Lafayette Road was \$121,445
- Unit Cost of asphalt = C/(TCA/ton) = \$90.00/ton

Spreadsheet Model for Estimating the Cost of Resurfacing

		1" 1 mile	2" 1 mile
L	Length (yards)	1760	1760
D	Depth (inches)	1	2
W	Width (yards)	6.7	6.7
L x D x W	Length x Depth	11733	23467
Tons/(s.yd x inch)	Conversion factor	0.0575	0.0575
Tons	Tons of Asphalt	675	1349
TCA/Tons	Asphalt Cost/ton	\$90.00	\$90.00
TCA	Cost of Asphalt	\$60,720	\$121,440
AC%	TCA as % of total	83.4%	91.7%
TCS	Total Cost of Surfacing	\$72,806	\$132,432

Spreadsheet Model for Estimating the Cost/Mile for Resurfacing One Mile of a 20-foot Wide Road

		1-Inch	2-Inch
Tons	Tons of Asphalt	675	1349
TCA/Tons	Asphalt Cost/ton	\$90.00	\$90.00
TCA	Cost of Asphalt	\$61 thousand	\$121 thousand
AC%	TCA as % of total	83%	92%
TCS	Total Cost of Surfacing	\$73 thousand	\$132 thousand

Average Cost of Resurfacing Sugar Hill Roads

- Miles of paved roads: 25
- Average life of pavement: 10 years
- Average miles to be paved/year: 2.5
- Average depth for pavement: 2 inches
- Contractor's cost for surfacing: \$90/ton of asphalt
- Cost per mile: \$132 thousand
- Average Cost per year: 2.5 miles x \$132,000 = \$330,000

Budgeting for Resurfacing Costs: Hypothetical Example

- Miles to be resurfaced (Road Agent's Plan): 2.5 miles
- Budgeted cost/ton for asphalt: \$90
- Cost/mile: \$132 thousand
- Budgeted expense: \$330 thousand

The budget will show how much is expected from the state, how much will be covered in the Highway Department's budget, and how much will be covered by the non-lapsing fund.

Budgeting for Resurfacing Costs: Adjustment to Changes in Costs and Workload

Use the non-lapsing fund to provide a reserve for:

- Higher than expected costs
- Higher than normal damage from storms
- Doing more work if costs or storm damage are less than normal