

TOWN OF SHARON, VT RSMS PAVED ROAD EVALUATION AUGUST 2017



Howe Hill Road (5/31/2017)

<u>Total Miles of Paved Roads</u>				
Maintenance Type	State Paved Class 1	Town Paved Class 2	Town Paved Class 3	Paved Roads Class 1, 2, 3
No Maintenance	0	2.37	0.00	2.37 (22%)
Routine	0	1.13	0.00	1.13 (11%)
Preventative	0	2.79	0.00	2.79 (26%)
Rehabilitate	0	0.66	0.31	0.97 (9%)
Reconstruct	0	2.96	0.41	3.37 (32%)
Total Miles	0 miles	9.91 miles	0.72 miles	10.63 miles

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Road Surface Management System (RSMS)

The field evaluation of the Town of Sharon's paved roads was completed on May 3, 2017 by Everett Hammond, PE (Hammond Engineering) with the assistance of Tim Higgins (Sharon Highway Foreman). Road Surface Management System (RSMS) is a management system for roads provided by the Maine Local Roads Center. RSMS 2010 version provides a condition survey of all roads based on data from roughness and road condition and ranks the roads in order of traffic volume and importance. This data is utilized to provide a recommended Annual Paving Budget and a long term Capital Plan for the Town's paved roads. If applied correctly, this plan can be used to apply timely, cost effective road improvements for paved roads. This RSMS evaluation is a snapshot in time of the condition of the Town of Sharon's roads which may need to be adjusted over time to reflect unexpected pavement changes.

According to the University of New Hampshire technology transfer Center the goal of a Road Surface Management Plan should be the following:

- **Maximize Return on Investment (ROI) for each dollar spent on road maintenance**
- **Maintain highest possible town-wide road quality**
- **Create a transparent, systematic and non-biased methodology for road repairs**
- **Generate long term budgetary estimates and work plans**

Developing the Road Surface Management System involved the following steps:

1 Data Collection:

The following data was collected and utilized in the RSMS Program:

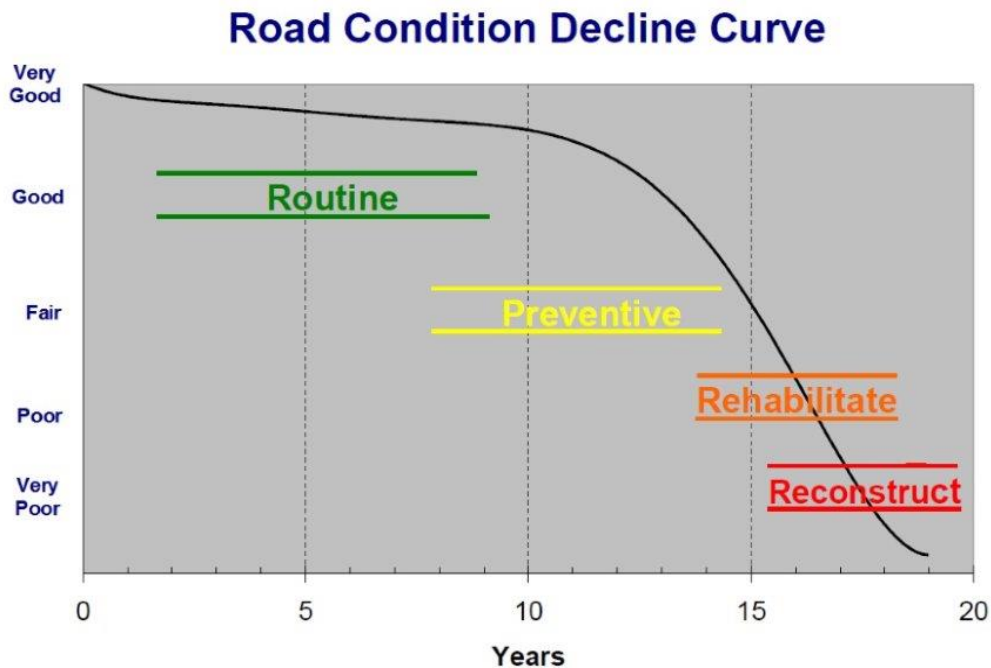
- **Roughness:** Roughness is used as an importance in calculating the condition assessments. This is based on the severity and extent for each road.
- **Road Condition:** Road condition has many factors that determine its level of importance. This consists of alligator cracks, longitudinal/transverse cracks, edge cracks, rutting and drainage. This is also based on the severity and extent for each road.
- **Traffic Volume:** The program uses traffic volume when establishing the priorities of repairs within each repair strategy. The traffic volumes were estimated by Everett Hammond and based on the Classification of the roads.
- **Importance:** The RSMS 2010 version utilizes road importance as an additional factor when establishing the priorities of repairs within each repair strategy. This is one area where local officials can offer their input.

2 Inventory Results – Paved Roads:

A list of the results from the RSMS of this data is attached. The basis of the rating system on the older version of RSMS was based on Pavement Condition Index (PCI). That program would use the roughness and the condition of the road to compute the PCI Index. The PCI is based on a scale of 0-100 with 0 being the worst and 100 being the best. This 2010 version of RSMS does not utilize the PCI index as it was found that Towns were concentrating their efforts on the worst roads with less emphasis on the roads that should be preserved. The new version of RSMS uses the following categories:

- No Maintenance (very good)
- Routine (good)
- Preventative (fair)
- Rehabilitate (poor)
- Reconstruct (very poor)

The average condition for Sharon’s paved roads is in Preventative (fair) condition, however this is misleading as the roads in No Maintenance (very good) status offset the roads in Reconstruct (very poor) status.



The above chart is from the Maine RSMS Program. The TIME element on the above chart will vary greatly from road to road depending on how well it was initially constructed.

3 Repair Strategies – Paved Roads:

There are many road repair strategies used on Town Highways. In general, the better the condition of the road results in a lower cost repair strategy. The following repair strategies have been used in the attached Capital Plan.

- **No Maintenance:** No work is required (generally newly surfaced roads)
- **Routine Maintenance:** This is the most cost effective use of funds and includes ditching, cleaning culverts and patching.
- **Preventative:** This strategy includes crack filling, chip seals, shimming, overlays or a combination of these depending on the nature of the road surface.
- **Rehabilitate:** This strategy generally includes milling/shimming/overlaying or reclamation of the existing pavement followed by a minimum of 4” of new

pavement. It is important to review the existing base material prior to any type of rehabilitation, as an undesirable base will not adequately support a reclaim project even if stabilized with cement, asphalt or chloride. In some cases the road may require preservation of the road such as a shim or shim/chip seal in order to buy time for a complete rehabilitation.

- **Reconstruct:** This includes the complete excavation of the existing pavement and inadequate base material, installation of new drain pipes and underdrains where appropriate, installation of fabric as needed, 1.5' to 2' of new gravel base (depending on the road) and new pavement (2.5" minimum base, 1.5" minimum top). Some of the heavier travelled roads may require up to 2.5' of base and 5" to 6" of pavement.
- **Defer:** It is important to recognize when a road has gone beyond the point of rehabilitation than it should be classified as a candidate for Reconstruction. There are cases where capital funds can be saved on this type of road by simply deferring maintenance until the road has reached the end of its useful life. Deferring can free up Capital funding for use on other roads. If selected appropriately deferred roads can save money by preventing overlays and reclamations on roads subject to failure. Deferring a road needing Capital Improvements may require a shim or shim and chip seal to hold the road in place long enough to obtain funding for Capital Improvements, however once a shim is completed it is important to get another 10 years +/- prior to reconstructing.

4 **Repair Concepts:**

According to the Chart from the Maine Local Roads Center on the previous page, it is more cost effective to take care of the good roads than to address the poor or failed roads. For this reason it is imperative to preserve the GOOD roads (Preventative Category) with chip seals and or pavement overlays prior to the significant drop in condition.

According to the University of New Hampshire technology transfer the guiding principals of a Road Surface Management Plan should be as follows:

- **Use money as efficiently as possible**
- **Make repair decisions based on road surveys**
- **Avoid "worst first" methodology"**
- **Avoid arbitrary repair selection**
- **Prepare multi – year road maintenance plan**

The strategy used in this RSMS preserves the good roads first prior to starting on Capital Improvements. The essential part of this plan is to avoid "WORST FIRST".

5 **Pavement Management, Rehabilitation and Reconstruction techniques and cost**

estimates: There are many techniques to choose from with a wide range of cost for each technique. The following list contains costs in 2017 dollars based on the RSMS road width program of 20':

- **Defer to Reconstruction (defer):** Cost = cost of patching/year
- **Reclaim pavement, revert to gravel:** \$20,000/mile
- **Chip seal (cs) with 3/8" washed stone:** \$34,000/mile

- Chip Seal (cs 10%) 3/8" washed stone with 10% rubber added: \$45,000/mile
- Chip Seal (cs 20%) 3/8" washed stone with 20% rubber added: \$60,000/mile
- Shim (s) based on an average thickness of 1/2": \$30,000/mile
- Shimlay (sl) used as a 1" avg. shim without an overlay: \$60,000/mile
- Overlay (o) based on a thickness of 1": \$60,000/mile
- Overlay (o) based on a thickness of 1.25": \$75,000/mile
- Overlay (o) based on a thickness of 1.5": \$90,000/mile
- Mill (m) based on 2" depth: \$30,000/mile
- Shim/chip seal (s/cs): \$64,000/mile
- Shim/chip seal (s/cs 10% rubber): \$75,000/mile
- Shim/chip seal (s/cs 20% rubber): \$90,000/mile
- Shim/overlay (s/o) 1/2" shim, 1" overlay: \$90,000/mile
- Mill/shim/overlay (m/s/o) 2" mill, 1/2" shim, 1.5" overlay: \$150,000/mile (plus adjust. Structures)
- Reclamation (reclaim): \$300,000/mile (minor ditching, reclaim, grade, compact, traffic control, 4" mix)
- Reclaim, stabilize base (reclaim, stabilize): \$350,000/mile
- Reclaim, add 6" gravel (reclaim, 6" gravel): \$400,000/mile
- Reclaim (reclaim, 6" gravel, stabilize): add 6" gravel, stabilize: \$450,000/mile
- Reclamation (reclaim +): \$400,000/mile (includes ditching, reclaim, tree removal, traffic control, new culverts, 4" mix)
- Reclaim, add 12" gravel, 4" pavement: \$500,000/mile
- Reconstruction-100% contracted (rebuild): \$1,000,000/mile plus design, oversight and desired contingency (depending on aggregate source and excavation depth)

NOTE 1: For paved roads wider than 20', the program calculates the additional gravels and pavement.

NOTE 2: Costs based on the following unit prices:

- Asphalt placed: \$80/TON
- Milling: \$1.00/SY to \$2.50/SY (price depends on the depth)
- Reclaim only (no pavement): \$1.00/SY to \$2.00/SY
- Chip Seal (traditional): \$2.50/SY (20,000 SY minimum)
- Chip Seal (10% rubber): \$3.50/SY (20,000 SY minimum)
- Chip Seal (20% rubber): \$4.50/SY (20,000 SY minimum)

6 Basics of a Good Road: From Vermont Local Roads Fact Sheet (1984 – updated 2009):

- Get water away from the road
- Build on a firm foundation
 - “A highway wears from the top, but it falls apart from the bottom.”
 - “The road base determines the service life of a road.”
 - “If adequate support does not exist, the road will rapidly deteriorate.”
 - “A good road requires a suitable foundation which in turn requires stable material.”
- Use the best soils possible
 - “In deciding what is affordable, towns should consider the long-term consequences of using lower quality material.”

“Using inferior base materials may require excessive maintenance during the roads life and perhaps costly rehabilitation before paving.”

“The adage <pay me now or pay me later> applies to road building.”

- Compact soils well
 - Design for winter maintenance
 - Design for traffic loads and volumes
 - Pave only those roads that are ready
- “Some towns make the mistake of paving a road that is not properly prepared.”
- Build from the bottom up
- “A road that has a poor base and poor drainage cannot be adequately improved with a top dressing of gravel and new pavement.”
- “It may be necessary in some cases to dig out the old road, put in new material and build up the road in layers.”
- Protect your investment
 - Keep good records

A Vermont Local Roads article printed in December 2011 titled “Pay now or later: Tips for saving dollars for the long haul” points out the following:

- **“Spending money before rapid depreciation is money well spent”**
- **“Providing good foundations is good road management”**
- **“Cheaper is not always better”**
- **“It may mean the Town does not accomplish all it wants to”**

7 Annual Pavement Maintenance Budget

The Town of Sharon’s average Annual Pavement Maintenance Budget should be a minimum of \$120,000 to preserve the roads in their present state. This will not improve the condition of the roads in Reconstruction category or Rehabilitation category. This represents an average of \$11,000/mile of paved roads in the 2017 budget.

- 10.63 miles x \$11,000/mile = \$117,000/year (USE \$120,000)

In order to improve on the condition it is recommended that the Town of Sharon increase funding to the level identified in Option 1, Option 2 or Option 3 described below. The driving force behind this is the condition of Howe Hill Road (sections 1-4), Broad Brook Road (sections 2 and 3) and Fay Brook Road.

Annual Paving Budget: In order to improve on the conditions of the Paved Roads I have identified 3 paving capital plan options over the next 15 years. Prior to moving forward on any Capital Plan Option, it is important that the existing roads be preserved to prevent them from deteriorating to rehabilitation or reconstruction status while the bond is being paid off. The 3 options are described in further detail in the Capital Plan.

8 Capital Plan (see attached):

In order to address the reconstruction of Broad Brook Road, Fay Brook Road and Howe Hill Road a Road Construction Bond will need to be considered. The amount of the bond will be depend when the bond is considered and should be backed by an updated construction cost at that time. The following Capital Plan options were considered as part of this evaluation:

1. Option 1A: Fay Brook Road reconstruction in 2024 (FY 2025). Budget increases at a rate of \$25,000/year to \$200,000 in FY2023, then increases at a rate of \$10,000/year until FY2033.
2. Option 1B: Fay Brook Road reconstruction in 2024 (FY 2025). Budget increases at a rate of \$25,000/year to \$300,000 in FY2027, then increases at a rate of \$10,000/year until FY2032.
3. Option 2: Howe Hill Road Phase 3 (section 4) reconstruction in 2023 (FY 2024). Budget increases at a rate of \$25,000/year to \$200,000 in FY2023, then increases at a rate of \$10,000/year until FY2028.
4. Option 3: Broad Brook Road reconstruction in 2024 (FY 2025). Budget increases at a rate of \$25,000/year to \$200,000 in FY2023, then increases at a rate of \$10,000/year until FY2033.

Capital Reconstruction work should not be completed at the sacrifice of the roads in Town that are in Preventative or Routine maintenance status. Failure to address these roads in a timely manner will result in deterioration of the good roads to rehabilitation or reconstruction status while the bond is being paid off.

Paved Road Recommendations

- Beginning in FY2019, provide a minimum funding of \$100,000 for Pavement Management.
- The gravel base should be verified prior to any Rehabilitation Project to ensure there is adequate support. Quimby Mountain Road (section 1 and 2) is an example of where test pits may determine whether reclamation will be sufficient or full depth reconstruction is required. Quimby Mountain Road should be reclaimed, however due to the extent of work required on Howe Hill Road, Broad Brook Road and Fay Brook Road, Quimby Mountain Road could be preserved using a 2" overlay and chip seal (10%rubber). This preservation is similar to the work performed on River Road (section 2) in 2015.
- The existing base and subgrade should be tested by a soils engineer prior to any Capital Improvement (reconstruction) Project to ensure the proper design of the new gravel base. This is very important, as if an additional 6" of gravel is recommended this is the time to do it as the additional cost will be minimal compared to the cost of rebuilding the road. Prior to bonding for any work on Howe Hill Road, Broad Brook Road and Fay Brook Road, a more in depth analysis should be completed on the engineers cost estimate. All three roads will not need to be assessed at the same time as the Capital work will be completed over a few Capital Budget votes.
- The Capital Budget should carry over excess funds to the following years Capital Budget.
- All road material should meet the State of Vermont Specifications for Construction. **DO NOT** use gravels that that a contractor claims packs well unless it meets the State Specifications. Gravel that packs well should be a warning of high silt content which will lead to a weaker gravel base due to the trapping of moisture. Whenever possible, gravel processed from a quarry should be used as the quality tends to be more consistent than crushed bank run gravel from a natural gravel pit. This will depend on the size and consistency of the natural gravel pit being considered.

- All annual road improvements should be recorded in the Annual Town Report by the Selectboard. The Annual Town Report not only serves as a report to the tax payers but is the best source creating a log of road preservation and Capital Improvements that will be beneficial for future Road Evaluations and Capital Planning.
- The approved Capital Plan should be included in the Town Plan as it may enhance the Towns chance for future unanticipated grant opportunities.

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Hammond Engineering
Springfield, VT 05156
802-885-3872

BEAVER MEADOWS ROAD



Beaver Meadow Road: Photo taken 8/31/2017 at station 0+00.



Beaver Meadow Road: Photo taken 8/31/2017 at station 5+00.



Beaver Meadow Road: Photo taken 8/31/2017 at station 10+00.



Beaver Meadow Road: Photo taken 8/31/2017 at station 15+00.



Beaver Meadow Road: Photo taken 8/31/2017 at station 20+00.



Beaver Meadow Road: Photo taken 8/31/2017 at station 25+00.

BROAD BROOK ROAD



Broad Brook Road: Photo taken 5/31/2017 at station 0+00.



Broad Brook Road: Photo taken 5/31/2017 at station 2+50.



Broad Brook Road: Photo taken 5/31/2017 at station 5+00.



Broad Brook Road: Photo taken 5/31/2017 at station 7+50.



Broad Brook Road: Photo taken 5/31/2017 at station 10+00.



Broad Brook Road: Photo taken 5/31/2017 at station 12+50.



Broad Brook Road: Photo taken 5/31/2017 at station 15+00.

Fay Brook Road



Fay Brook Road: Photo taken 6/29/2017 at station 0+00.



Fay Brook Road: Photo taken 6/29/2017 at station 5+00.



Fay Brook Road: Photo taken 6/29/2017 at station 10+00.



Fay Brook Road: Photo taken 6/29/2017 at station 15+00.



Fay Brook Road: Photo taken 6/29/2017 at station 20+00.

Howe Hill Road



Howe Hill Road: Photo taken 5/31/2017 at station 0+00.



Howe Hill Road: Photo taken 5/31/2017 at station 5+00.



Howe Hill Road: Photo taken 5/31/2017 at station 10+00.



Howe Hill Road: Photo taken 5/31/2017 at station 15+00.



Howe Hill Road: Photo taken 5/31/2017 at station 20+00.



Howe Hill Road: Photo taken 5/31/2017 at station 25+00.



Howe Hill Road: Photo taken 5/31/2017 at station 30+00.



Howe Hill Road: Photo taken 5/31/2017 at station 35+00.



Howe Hill Road: Photo taken 5/31/2017 at station 40+00.



Howe Hill Road: Photo taken 5/31/2017 at station 45+00



Howe Hill Road: Photo taken 5/31/2017 at station 50+00.



Howe Hill Road: Photo taken 5/31/2017 at station 55+00.



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Howe Hill Road: Photo taken 5/31/2017 at station 75+00.



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Howe Hill Road: Photo taken 5/31/2017 at station 85+00.



Howe Hill Road: Photo taken 5/31/2017 at station 90+00.



Howe Hill Road: Photo taken 5/31/2017 at station 95+00.



Howe Hill Road: Photo taken 5/31/2017 at station 100+00.



Howe Hill Road: Photo taken 5/31/2017 at station 105+00.



Howe Hill Road: Photo taken 5/31/2017 at station 110+00.



Howe Hill Road: Photo taken 5/31/2017 at station 115+00.



Howe Hill Road: Photo taken 5/31/2017 at station 120+00.



Howe Hill Road: Photo taken 5/31/2017 at station 125+00.



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Howe Hill Road: Photo taken 5/31/2017 at station 135+00.



Howe Hill Road: Photo taken 5/31/2017 at station 140+00.



Howe Hill Road: Photo taken 5/31/2017 at station 143+60.

Quimby Mountain Road



Quimby Mountain Road: Photo taken 8/31/2017 at station 0+00.



Quimby Mountain Road: Photo taken 8/31/2017 at station 5+00.



Quimby Mountain Road: Photo taken 8/31/2017 at station 10+00.



Quimby Mountain Road: Photo taken 8/31/2017 at station 14+00.



Quimby Mountain Road: Photo taken 8/31/2017 at station 17+00.

River Road



River Road: Photo taken 5/11/2017 at station 10+00.



River Road: Photo taken 5/11/2017 at station 20+00.



River Road: Photo taken 5/11/2017 at station 30+00.



River Road: Photo taken 2015 during an asphalt shim (Station 33+00 to 126+10).



River Road: Photo taken 2015 during an asphalt overlay (Station 33+00 to 126+10).



River Road: Photo taken 2015 during chip sealing with 10% rubber.



River Road: Photo taken 2015 during chip sealing with 10% rubber.



River Road: Photo taken 2015 of the final 10% rubber chip seal.



River Road: Photo taken 2015 at station 40+00 (before shim, overlay, chip seal).



River Road: Photo taken 5/11/2017 at station 40+00.



River Road: Photo taken 2015 at station 50+00 (before shim, overlay, chip seal).



River Road: Photo taken 5/11/2017 at station 50+00.



River Road: Photo taken 2015 at station 60+00 (before shim, overlay, chip seal).



River Road: Photo taken 5/11/2017 at station 60+00.



River Road: Photo taken 2015 at station 70+00 (before shim, overlay, chip seal).



River Road: Photo taken 5/11/2017 at station 70+00.



River Road: Photo taken 2015 at station 80+00 (before shim, overlay, chip seal).



River Road: Photo taken 5/11/2017 at station 80+00.



River Road: Photo taken 2015 at station 90+00 (before shim, overlay, chip seal).



River Road: Photo taken 5/11/2017 at station 90+00.



River Road: Photo taken 2015 at station 100+00 (before shim, overlay, chip seal).



River Road: Photo taken 5/11/2017 at station 100+00.



River Road: Photo taken 2015 at station 110+00 (before shim, overlay, chip seal).



River Road: Photo taken 5/11/2017 at station 110+00.



River Road: Photo taken 2015 at station 120+00 (before shim, overlay, chip seal).



River Road: Photo taken 5/11/2017 at station 120+00.

Rte #132



Rte #132: Photo taken 5/3/2017 at station 212+50.



Rte #132: Photo taken 5/3/2017 at station 210+00.



Rte #132: Photo taken 5/3/2017 at station 205+00.



Rte #132: Photo taken 5/3/2017 at station 200+00.



Rte #132: Photo taken 5/3/2017 at station 195+00.



Rte #132: Photo taken 5/3/2017 at station 190+00.



Rte #132: Photo taken 5/3/2017 at station 185+00.



Rte #132: Photo taken 5/3/2017 at station 180+00.



Rte #132: Photo taken 5/3/2017 at station 175+00.



Rte #132: Photo taken 5/3/2017 at station 170+00.



Rte #132: Photo taken 5/3/2017 at station 165+00.



Rte #132: Photo taken 5/3/2017 at station 160+00.



Rte #132: Photo taken 5/3/2017 at station 155+00.



Rte #132: Photo taken 5/3/2017 at station 150+00.



Rte #132: Photo taken 5/3/2017 at station 145+00.



Rte #132: Photo taken 5/3/2017 at station 140+00.



Rte #132: Photo taken 5/3/2017 at station 135+00.



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Rte #132: Photo taken 5/3/2017 at station 90+00.



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Rte #132: Photo taken 5/3/2017 at station 10+00.



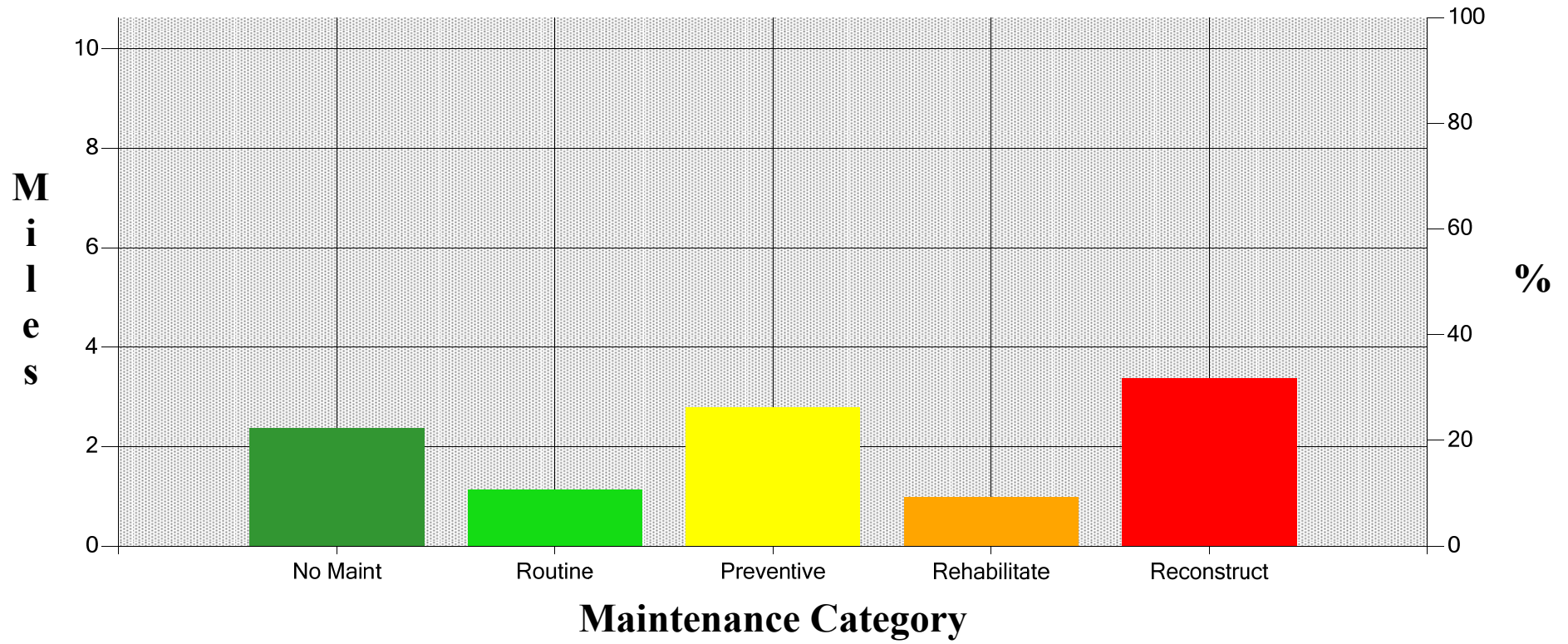
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Rte #132: Photo taken 5/3/2017 at station 0+00.

Sharon 2017 Network Overview

Paved



PAVED ROADS

Severity	Extent			Cracks	Rutting
	None: 0	low	med		
low	1	2	3	< 1/4"	< 1"
med	4	5	6	up to 3/4"	1" to 3"
high	7	8	9	> 3/4"	> 3"

Street: _____ Length: _____ Width: _____

Alligator cracks	Edge cracks	roughness
Longitudinal cracks	Patches/potholes	Rutting
NOTES:		Drainage

Street: _____ Length: _____ Width: _____

Alligator cracks	Edge cracks	roughness
Longitudinal cracks	Patches/potholes	Rutting
NOTES:		Drainage

Street: _____ Length: _____ Width: _____

Alligator cracks	Edge cracks	roughness
Longitudinal cracks	Patches/potholes	Rutting
NOTES:		Drainage

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Longitudinal cracks	Patches/potholes	Rutting
NOTES:		Drainage

Street: _____ Length: _____ Width: _____

Alligator cracks	Edge cracks	roughness
Longitudinal cracks	Patches/potholes	Rutting
NOTES:		Drainage

9/3/2017
12:22:38PM

Road Network Inventory Sharon 2017

<u>Road/Section Name</u>	<u>Sec</u>	<u>From Road/Section</u>	<u>To Road/Section</u>	<u>Length</u>	<u>Import</u>	<u>Traffic</u>	<u>Jurisdiction</u>	<u>Surface</u>	<u>Last Survey Date</u>
Beaver Meadows Road		Rte 132	End of pavement	0.54	medium	medium	Townway	Paved	06/18/2017
Broad Brook Road	1	River Road	100'	0.02	low-med	low-med	Townway	Paved	05/11/2017
Broad Brook Road	2	100'	Underpass	0.14	low-med	low-med	Townway	Paved	05/11/2017
Broad Brook Road	3	Underpass	End of pavement	0.10	low-med	low-med	Townway	Paved	05/11/2017
Fay Brook Road	1	Rte #14	End of pavement	0.41	medium	medium	Townway	Paved	05/11/2017
Howe Hill Road	1	River Road	0.91	0.91	low-med	low-med	Townway	Paved	06/18/2017
Howe Hill Road	2	0.91	1.40	0.49	low-med	low-med	Townway	Paved	06/18/2017
Howe Hill Road	3	1.40	1.85	0.41	low-med	low-med	Townway	Paved	06/18/2017
Howe Hill Road	4	1.81	2.72	0.91	low-med	low-med	Townway	Paved	06/18/2017
Quimby Mountain Road	1	Rte #14	I89 Underpass	0.22	low	low	Townway	Paved	06/18/2017
Quimby Mountain Road	2	I89 Underpass	End of pavement	0.09	low	low	Townway	Paved	06/18/2017
River Road	1	South side bridge	3300'	0.63	med-high	med-high	Townway	Paved	05/11/2017
River Road	2	3300'	Town Line	1.76	med-high	med-high	Townway	Paved	05/11/2017
Rte 132	1	State Limit	250'	0.05	high	high	Townway	Paved	05/11/2017
Rte 132	2	250'	3,200'	0.56	high	high	Townway	Paved	05/11/2017
Rte 132	3	3,200'	5,500'	0.44	high	high	Townway	Paved	05/11/2017
Rte 132	4	5,500'	7,000'	0.28	high	high	Townway	Paved	05/11/2017
Rte 132	5	7,000'	9,000'	0.38	high	high	Townway	Paved	05/11/2017
Rte 132	6	9,000'	12,000'	0.57	high	high	Townway	Paved	05/11/2017
Rte 132	7	12,000'	21,100'	1.73	high	high	Townway	Paved	05/11/2017
				10.63					

9/3/2017
11:29:39AM

Paved Network Inventory

By Surface Status
Sharon 2017

<u>(Prio) Road/Section Name</u>	<u>Sec</u>	<u>From Road/Section</u>	<u>To Road/Section</u>	<u>Length</u>	<u>division</u>	<u>Import</u>	<u>Traffic</u>	<u>Drainage Status</u>
No Maint								
(10) Rte 132	1	State Limit	250'	0.05	2	high	high	Good
(8) River Road	2	3300'	Town Line	1.76	2	med-high	med-high	Good
(6) Beaver Meadows Road		Rte 132	End of pavement	0.54	2	medium	medium	Good
(4) Broad Brook Road	1	River Road	100'	0.02	2	low-med	low-med	Good
				2.37				
Routine								
(10) Rte 132	2	250'	3,200'	0.56	2	high	high	Good
(10) Rte 132	6	9,000'	12,000'	0.57	2	high	high	Good
				1.13				
Preventive								
(10) Rte 132	3	3,200'	5,500'	0.44	2	high	high	Good
(10) Rte 132	7	12,000'	21,100'	1.73	2	high	high	Good
(8) River Road	1	South side bridge	3300'	0.63	2	med-high	med-high	Good
				2.79				
Rehabilitate								
(10) Rte 132	4	5,500'	7,000'	0.28	2	high	high	Good
(10) Rte 132	5	7,000'	9,000'	0.38	2	high	high	Good
(2) Quimby Mountain Road	1	Rte #14	I89 Underpass	0.22	3	low	low	Good
(2) Quimby Mountain Road	2	I89 Underpass	End of pavement	0.09	3	low	low	Good
				0.97				
Reconstruct								
(6) Fay Brook Road	1	Rte #14	End of pavement	0.41	3	medium	medium	Poor
(4) Broad Brook Road	2	100'	Underpass	0.14	2	low-med	low-med	Poor
(4) Broad Brook Road	3	Underpass	End of pavement	0.10	2	low-med	low-med	Poor
(4) Howe Hill Road	1	River Road	0.91	0.91	2	low-med	low-med	Good
(4) Howe Hill Road	2	0.91	1.40	0.49	2	low-med	low-med	Good
(4) Howe Hill Road	3	1.40	1.85	0.41	2	low-med	low-med	Good
(4) Howe Hill Road	4	1.81	2.72	0.91	2	low-med	low-med	Good
				3.37				
				10.63				

Maintenance Financial Plan

Sharon 2017

2017

<u>Road/Section Name</u>	<u>#</u>	<u>From</u>	<u>To</u>	<u>Length</u>	<u>Recommended Repair</u>	<u>Other</u>	<u>Budget</u>	<u>Actual</u>
Paved								
Beaver Meadows Road		Rte 132	End of pavement	0.54		Chip Seal	25,000	0
Fay Brook Road	1	Rte #14	End of pavement	0.41	Mill, Shim & Overlay (2" total)		67,650	0
Quimby Mountain Road	1	Rte #14	I89 Underpass	0.22	2" Base pavement, Chip Seal (10% rubber)		38,115	0
Quimby Mountain Road	2	I89 Underpass	End of pavement	0.09	2" Base pavement, Chip Seal (10% rubber)		15,593	0
River Road	1	South side brick	3300'	0.63	Shim & Chip Seal (10% rubber)		51,563	0
Rte 132	1	State Limit	250'	0.05		Chip Seal (20% r)	6,000	0
Rte 132	2	250'	3,200'	0.56		Chip Seal (20 % r)	36,000	0
Rte 132	6	9,000'	12,000'	0.57	Shim & Chip Seal (20% rubber)		61,344	0
Rte 132	3	3,200'	5,500'	0.44	Overlay & Chip Seal (1", 20% rubber)		62,784	0
Rte 132	7	12,000'	21,100'	1.73	Overlay & Chip Seal (1", 20% rubber)		248,688	0
Rte 132	4	5,500'	7,000'	0.28	Shim, Overlay, Chip Seal (2", 20%)		61,344	0
Rte 132	5	7,000'	9,000'	0.38	Shim, Overlay, Chip Seal (2", 20%)		81,864	0
Total Paved							755,945	0
Total 2017							755,945	0

2018

<u>Road/Section Name</u>	<u>#</u>	<u>From</u>	<u>To</u>	<u>Length</u>	<u>Recommended Repair</u>	<u>Other</u>	<u>Budget</u>	<u>Actual</u>
Paved								
Broad Brook Road	3	Underpass	End of pavement	0.10	Mill, Shim & Overlay (2" total)		15,450	0
Broad Brook Road	2	100'	Underpass	0.14	Mill, Shim & Overlay (2" total)		20,700	0
Howe Hill Road	1	River Road	0.91	0.91	Mill, Shim & Overlay (2" total)		163,800	0
Howe Hill Road	2	0.91	1.40	0.49	Mill, Shim & Overlay (2" total)		88,200	0
Howe Hill Road	3	1.40	1.85	0.41	Mill, Shim & Overlay (2" total)		73,800	0
Howe Hill Road	4	1.81	2.72	0.91	Mill, Shim & Overlay (2" total)		163,800	0
Total Paved							525,750	0
Total 2018							525,750	0

Maintenance Financial Plan

Sharon 2017

2029								
<u>Road/Section Name</u>	<u>#</u>	<u>From</u>	<u>To</u>	<u>Length</u>	<u>Recommended Repair</u>	<u>Other</u>	<u>Budget</u>	<u>Actual</u>
Paved								
Rte 132	1	State Limit	250'	0.05		Chip Seal (20% r)	6,000	0
Rte 132	2	250'	3,200'	0.56		Chip Seal (20% r)	36,000	0
Rte 132	3	3,200'	5,500'	0.44	Overlay & Chip Seal (1", 20% rubber)		62,784	0
Rte 132	4	5,500'	7,000'	0.28	Overlay & Chip Seal (1", 10% rubber)		35,784	0
Rte 132	5	7,000'	9,000'	0.38	Overlay & Chip Seal (1", 10% rubber)		47,754	0
Rte 132	6	9,000'	12,000'	0.57	Overlay & Chip Seal (1", 20% rubber)		81,792	0
Rte 132	7	12,000'	21,100'	1.73	Chip Seal (20% rubber)		124,344	0
Total Paved							394,458	0
Total 2029							394,458	0
							1,676,153	0

Broad Brook Road (Class 2): River Road to 1,400'				Engineers Estimate	
ITEM	Description	Quantity	Unit	Unit Cost	Total
1	Erosion Control (allowance)	1	LS	\$5,000	\$5,000
2	18" PE drain pipe	40	LF	\$60	\$2,400
3	6" PE underdrain	1000	LF	\$25	\$25,000
4	2' dia. catch basins	0	EA		\$0
5	4' dia. catch basin	0	EA		\$0
6	Headwalls (Concrete: 1' over top pipe)	1	EA	\$2,000	\$2,000
7	Headwall (Concrete base, stone top)	0	EA		\$0
8	Removal of existing drains	40	FT	\$5	\$200
9	Tree removal	1	LS	\$2,000	\$2,000
10	Ledge removal	50	CY	\$75	\$3,750
11	Boulders	25	CY	\$50	\$1,250
12	Reclaim exist pavement	2900	SY	\$2	\$5,800
13	Excavate reclaim and 6" gravel (stockpile for crushing)	800	CY	\$10	\$8,000
14	Excavation and dispose of off site	1750	CY	\$10	\$17,500
15	Excavation/place/compact on site	0	CY	\$0	\$0
16	Install Course Dense Grade (12")	2000	CY	\$41	\$82,200
17	Install Dense Grade (12")	2000	CY	\$36	\$71,040
18	Fine grade (28' x 4,800')	3500	SY	\$1	\$3,500
19	Ditching/Sloping	1	LS	\$10,000	\$10,000
20	Seed (slope Mix)	50	LBS	\$10	\$500
21	Hay Mulch (for slopes)	50	BALE	\$10	\$500
22	Rip-Rap ditch lines	40	CY	\$50	\$2,000
23	Paving (2.5 base; 1.5" top)	700	TON	\$77	\$53,900
24	Asphalt Cement Price Adjustment	1	LU	\$1	\$1
25	Density Pay Factor	1	LU	\$1	\$1
26	Chip Seal	3200	SY	\$4.50	\$14,400
27	Shoulders (dense grade)	50	CY	\$60	\$3,000
28	Driveway gravel	20	CY	\$60	\$1,200
29	Installation of sign posts w/sign	8	EA	\$200	\$1,600
30	Misc. cleanup	1	LS	\$5,000	\$5,000
31	Guard Rails	100	LF	\$26	\$2,600
32	Guard Rail anchors	4	EA	\$750	\$3,000
33	Fuel Price Adjustment	1	LU	\$1	\$1
34	Dust Control (allowance)	1	LS	\$5,000	\$5,000
35	Construction sign package	1	LS	\$3,000	\$3,000
36	Traffic Control	500	HRS	\$25	\$12,500
	Subtotal				\$347,843
	Bid, Payment, Performance Bond (3%)				\$10,435
	Contingency (10%)				\$34,784
	Engineering Design/Inspection (10%)				\$34,784
Total Engineers Estimated Project Cost					\$427,847
NOTES:	1. Caution against the use of road fabric due to grade and possible sliding.				
	2. Values above include 2' of gravel; Verify w/ test pits and subgrade analysis.				
	3. Stockpile pavement/6" gravel to be crushed for use on crushed for shoulders and other town gravel.				

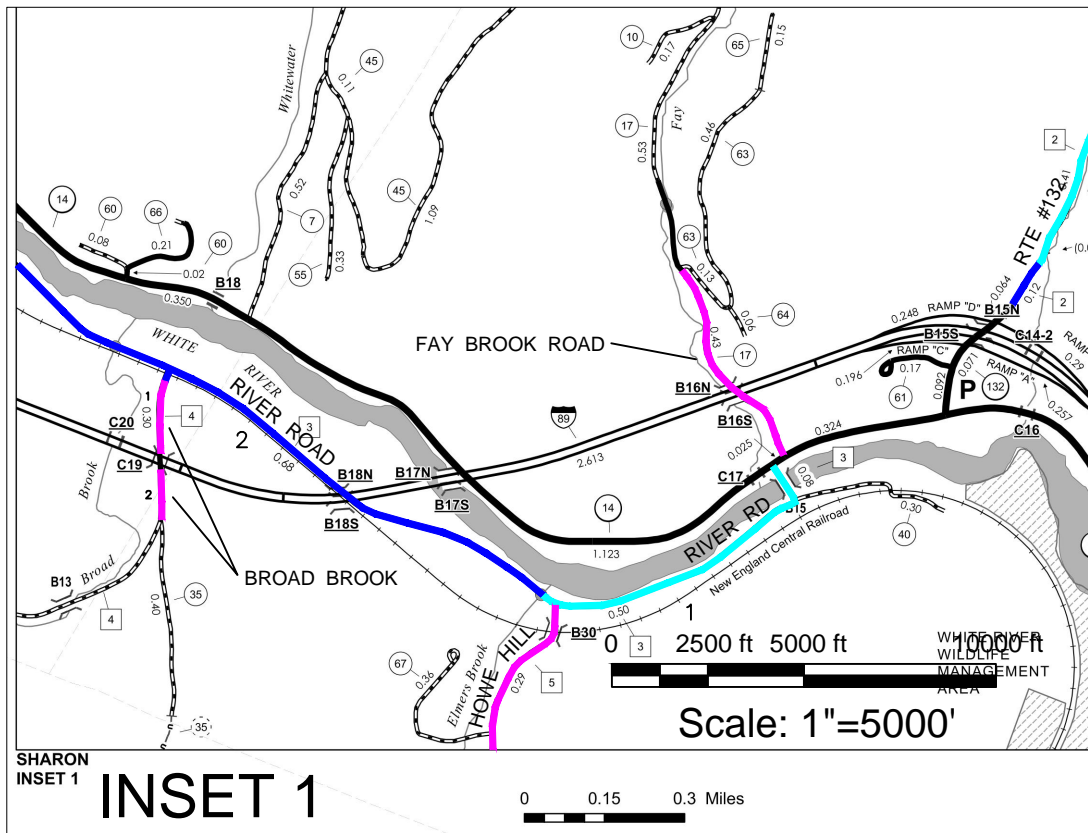
Fay Brook Road (Class 3): Rte 14 to 2,150'				Engineers Estimate	
ITEM	Description	Quantity	Unit	Unit Cost	Total
1	Erosion Control (allowance)	1	LS	\$5,000	\$5,000
2	18" PE drain pipe	320	LF	\$60	\$19,200
3	6" PE underdrain	2000	LF	\$25	\$50,000
4	2' dia. catch basins	0	EA		\$0
5	4' dia. catch basin	0	EA		\$0
6	Headwalls (Concrete: 1' over top pipe)	5	EA	\$2,000	\$10,000
7	Headwall (Concrete base, stone top)	0	EA		\$0
8	Removal of existing drains	320	FT	\$5	\$1,600
9	Tree removal	1	LS	\$5,000	\$5,000
10	Ledge removal	50	CY	\$75	\$3,750
11	Boulders	25	CY	\$50	\$1,250
12	Reclaim exist pavement	5250	SY	\$2	\$10,500
13	Excavate reclaim and 6" gravel (stockpile for crushing)	1600	CY	\$10	\$16,000
14	Excavation and dispose of off site	3100	CY	\$10	\$31,000
15	Excavation/place/compact on site	0	CY	\$0	\$0
16	Install Course Dense Grade (18")	3600	CY	\$41	\$147,960
17	Install Dense Grade (12")	3600	CY	\$36	\$127,872
18	Fine grade (28' x 4,800')	6200	SY	\$1	\$6,200
19	Ditching/Sloping	1	LS	\$10,000	\$10,000
20	Seed (slope Mix)	100	LBS	\$10	\$1,000
21	Hay Mulch (for slopes)	100	BALE	\$10	\$1,000
22	Rip-Rap ditch lines	100	CY	\$50	\$5,000
23	Paving (2.5 base; 1.5" top)	1250	TON	\$77	\$96,250
24	Asphalt Cement Price Adjustment	1	LU	\$1	\$1
25	Density Pay Factor	1	LU	\$1	\$1
26	Chip Seal	5300	SY	\$4.50	\$23,850
27	Shoulders (dense grade)	80	CY	\$60	\$4,800
28	Driveway gravel	40	CY	\$60	\$2,400
29	Installation of sign posts w/sign	12	EA	\$200	\$2,400
30	Misc. cleanup	1	LS	\$5,000	\$5,000
31	Guard Rails (under Town Contract)	0	LF	\$26	\$0
32	Guard Rail anchors	0	EA	\$750	\$0
33	Fuel Price Adjustment	1	LU	\$1	\$1
34	Dust Control (allowance)	1	LS	\$10,000	\$10,000
35	Construction sign package	1	LS	\$3,000	\$3,000
36	Traffic Control	800	HRS	\$25	\$20,000
Subtotal					\$620,035
Bid, Payment, Performance Bond (3%)					\$18,601
Contingency (10%)					\$62,004
Engineering Design/Inspection (10%)					\$62,004
Total Engineers Estimated Project Cost					\$762,643
NOTES:					
1. Caution against the use of road fabric due to grade and possible sliding.					
2. Values above include 2' of gravel for a class 3 road; Verify w/ test pits and subgrade analysis.					
3. Stockpile pavement/6" gravel to be crushed for use on crushed for shoulders and other town gravel.					

Howe Hill Rd Phase 1 (Class 2): River Road to 4,800'		Engineers Estimate			
ITEM	Description	Quantity	Unit	Unit Cost	Total
1	Erosion Control (allowance)	1	LS	\$5,000	\$5,000
2	18" PE drain pipe	40	LF	\$60	\$2,400
3	6" PE underdrain	3250	LF	\$25	\$81,250
4	2' dia. catch basins	0	EA		\$0
5	4' dia. catch basin	0	EA		\$0
6	Headwalls (Concrete: 1' over top pipe)	1	EA	\$2,000	\$2,000
7	Headwall (Concrete base, stone top)	1	EA		\$0
8	Removal of existing drains	200	FT	\$5	\$1,000
9	Tree removal	1	LS	\$20,000	\$20,000
10	Ledge removal	100	CY	\$75	\$7,500
11	Boulders	50	CY	\$50	\$2,500
12	Reclaim exist pavement	12800	SY	\$1	\$12,800
13	Excavate reclaim and 6" gravel (stockpile for crushing)	3600	CY	\$10	\$36,000
14	Excavation and dispose of off site	10000	CY	\$10	\$100,000
15	Excavation/place/compact on site	0	CY	\$0	\$0
16	Install Course Dense Grade (18")	7500	CY	\$41	\$308,250
17	Install Dense Grade (12")	5000	CY	\$36	\$177,600
18	Fine grade (28' x 4,800')	15000	SY	\$1	\$15,000
19	Ditching/Sloping	1	LS	\$20,000	\$20,000
20	Seed (slope Mix)	200	LBS	\$10	\$2,000
21	Hay Mulch (for slopes)	200	BALE	\$10	\$2,000
22	Rip-Rap ditch lines	900	CY	\$50	\$45,000
23	Paving (2.5 base; 1.5" top)	3000	TON	\$77	\$231,000
24	Asphalt Cement Price Adjustment	1	LU	\$1	\$1
25	Density Pay Factor	1	LU	\$1	\$1
26	Chip Seal	12800	SY	\$4.50	\$57,600
27	Shoulders (dense grade)	200	CY	\$60	\$12,000
28	Driveway gravel	50	CY	\$60	\$3,000
29	Installation of sign posts w/sign	12	EA	\$200	\$2,400
30	Misc. cleanup	1	LS	\$5,000	\$5,000
31	Guard Rails (under Town Contract)	1900	LF	\$26	\$49,400
32	Guard Rail anchors	6	EA	\$750	\$4,500
33	Fuel Price Adjustment	1	LU	\$1	\$1
34	Dust Control (allowance)	1	LS	\$10,000	\$10,000
35	Construction sign package	1	LS	\$3,000	\$3,000
36	Traffic Control	1200	HRS	\$25	\$30,000
Subtotal					\$1,248,203
Bid, Payment, Performance Bond (3%)					\$37,446
Contingency (10%)					\$124,820
Engineering Design/Inspection (10%)					\$124,820
Total Engineers Estimated Project Cost					\$1,535,290
NOTES:	1. Caution against the use of road fabric due to grade and possible sliding.				
	2. May get by with 2' of gravel instead of 2.5' (save \$125,000); Verify w/ test pits and subgrade analysis.				
	3. Stockpile pavement/6" gravel to be crushed for use on crushed for shoulders and other town gravel.				

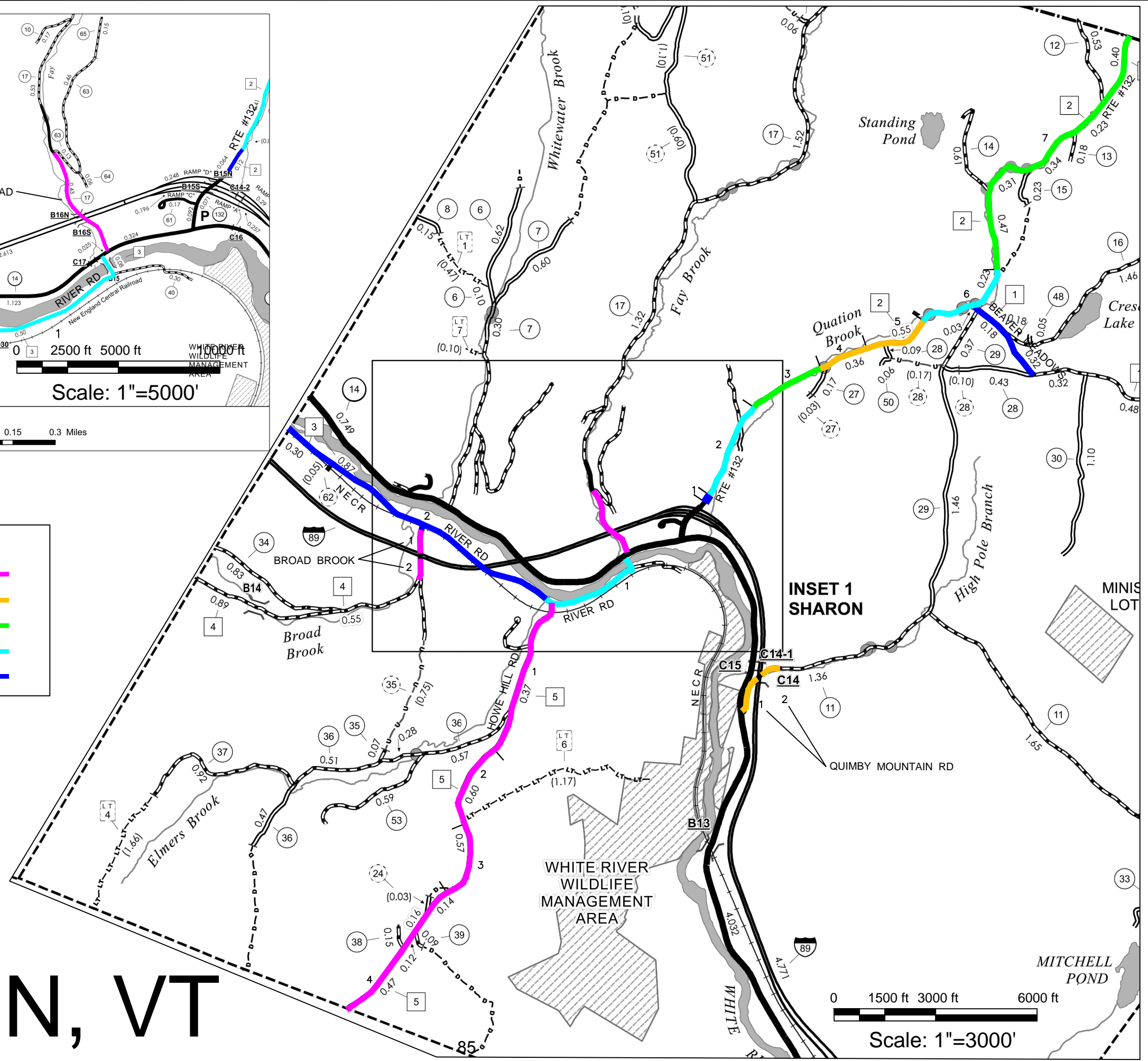
Howe Hill Rd Phase 2 (Class 2): 4,800' to 9,550' (4,750')		Engineers Estimate			
ITEM	Description	Quantity	Unit	Unit Cost	Total
1	Erosion Control (allowance)	1	LS	\$5,000	\$5,000
2	18" PE drain pipe	0	LF	\$60	\$0
3	6" PE underdrain	2000	LF	\$25	\$50,000
4	2' dia. catch basins	0	EA		\$0
5	4' dia. catch basin	0	EA		\$0
6	Headwalls (Concrete: 1' over top pipe)	1	EA	\$2,000	\$2,000
7	Headwall (Concrete base, stone top)	1	EA		\$0
8	Removal of existing drains	0	FT	\$5	\$0
9	Tree removal	1	LS	\$20,000	\$20,000
10	Ledge removal	100	CY	\$75	\$7,500
11	Boulders	50	CY	\$50	\$2,500
12	Reclaim exist pavement	12800	SY	\$1	\$12,800
13	Excavate reclaim and 6" gravel (stockpile for crushing)	3600	CY	\$10	\$36,000
14	Excavation and dispose of off site	10000	CY	\$10	\$100,000
15	Excavation/place/compact on site	0	CY	\$0	\$0
16	Install Course Dense Grade (18")	7500	CY	\$41	\$308,250
17	Install Dense Grade (12")	5000	CY	\$36	\$177,600
18	Fine grade (28' x 4,800')	15000	SY	\$1	\$15,000
19	Ditching/Sloping	1	LS	\$20,000	\$20,000
20	Seed (slope Mix)	200	LBS	\$10	\$2,000
21	Hay Mulch (for slopes)	200	BALE	\$10	\$2,000
22	Rip-Rap ditch lines	600	CY	\$50	\$30,000
23	Paving (2.5 base; 1.5" top)	3000	TON	\$77	\$231,000
24	Asphalt Cement Price Adjustment	1	LU	\$1	\$1
25	Density Pay Factor	1	LU	\$1	\$1
26	Chip Seal	12800	SY	\$4.50	\$57,600
27	Shoulders (dense grade)	200	CY	\$60	\$12,000
28	Driveway gravel	50	CY	\$60	\$3,000
29	Installation of sign posts w/sign	6	EA	\$200	\$1,200
30	Misc. cleanup	1	LS	\$5,000	\$5,000
31	Guard Rails (under Town Contract)	210	LF	\$26	\$5,460
32	Guard Rail anchors	2	EA	\$750	\$1,500
33	Fuel Price Adjustment	1	LU	\$1	\$1
34	Dust Control (allowance)	1	LS	\$10,000	\$10,000
35	Construction sign package	1	LS	\$3,000	\$3,000
36	Traffic Control	1200	HRS	\$25	\$30,000
Subtotal					\$1,150,413
Bid, Payment, Performance Bond (3%)					\$34,512
Contingency (10%)					\$115,041
Engineering Design/Inspection (10%)					\$115,041
Total Engineers Estimated Project Cost					\$1,415,008
NOTES:	1. Do not utilize road fabric due to grade and possible sliding.				
	2. May get by with 2' of gravel instead of 2.5' (save \$125,000); Verify w/ test pits and subgrade analysis.				
	3. Stockpile pavement/6" gravel to be used as crushed for shoulders and other town gravel use.				

Howe Hill Rd Phase 3 (Class 2): 9,550' to 14,360 (4,800')				Engineers Estimate	
ITEM	Description	Quantity	Unit	Unit Cost	Total
1	Erosion Control (allowance)	1	LS	\$5,000	\$5,000
2	18" PE drain pipe	170	LF	\$60	\$10,200
3	6" PE underdrain	3450	LF	\$25	\$86,250
4	2' dia. catch basins	0	EA		\$0
5	4' dia. catch basin	0	EA		\$0
6	Headwalls (Concrete: 1' over top pipe)	4	EA	\$2,000	\$8,000
7	Headwall (Concrete base, stone top)	1	EA		\$0
8	Removal of existing drains	130	FT	\$10	\$1,300
9	Tree removal	1	LS	\$10,000	\$10,000
10	Ledge removal	100	CY	\$75	\$7,500
11	Boulders	50	CY	\$50	\$2,500
12	Reclaim exist pavement	12800	SY	\$1	\$12,800
13	Excavate reclaim and 6" gravel (stockpile for crushing)	3600	CY	\$10	\$36,000
14	Excavation and dispose of off site	10000	CY	\$10	\$100,000
15	Excavation/place/compact on site	0	CY	\$0	\$0
16	Install Course Dense Grade (18")	7500	CY	\$41	\$308,250
17	Install Dense Grade (12")	5000	CY	\$36	\$177,600
18	Fine grade (28' x 4,800')	15000	SY	\$1	\$15,000
19	Ditching/Sloping	1	LS	\$20,000	\$20,000
20	Seed (slope Mix)	200	LBS	\$10	\$2,000
21	Hay Mulch (for slopes)	200	BALE	\$10	\$2,000
22	Rip-Rap ditch lines	900	CY	\$50	\$45,000
23	Paving (2.5 base; 1.5" top)	3000	TON	\$77	\$231,000
24	Asphalt Cement Price Adjustment	1	LU	\$1	\$1
25	Density Pay Factor	1	LU	\$1	\$1
26	Chip Seal	12800	SY	\$4.50	\$57,600
27	Shoulders (dense grade)	200	CY	\$60	\$12,000
28	Driveway gravel	50	CY	\$60	\$3,000
29	Installation of sign posts w/sign	6	EA	\$200	\$1,200
30	Misc. cleanup	1	LS	\$5,000	\$5,000
31	Guard Rails (under Town Contract)	1900	LF	\$26	\$49,400
32	Guard Rail anchors	6	EA	\$750	\$4,500
33	Fuel Price Adjustment	1	LU	\$1	\$1
34	Dust Control (allowance)	1	LS	\$10,000	\$10,000
35	Construction sign package	1	LS	\$3,000	\$3,000
36	Traffic Control	1200	HRS	\$25	\$30,000
Subtotal					\$1,256,103
Bid, Payment, Performance Bond (3%)					\$37,683
Contingency (10%)					\$125,610
Engineering Design/Inspection (10%)					\$125,610
Total Engineers Estimated Project Cost					\$1,545,007
NOTES:	1. Do not utilize road fabric due to grade and possible sliding.				
	2. May get by with 2' of gravel instead of 2.5' (save \$125,000); Verify w/ test pits and subgrade analysis.				
	3. Stockpile pavement/6" gravel to be used as crushed for shoulders and other town gravel use.				

APPENDIX



LEGEND	
RECONSTRUCT	
REHABILITATE	
PREVENTATIVE	
ROUTINE	
NO MAINTENANCE	



SHARON, VT

Project No. SHARON_RSMS_MAP_2017	Scale	AS_SHOWN	Date	8/01/2017
		1/1		
		Date	Revision	

Town of Sharon, VT
 PO Box 250, Sharon, VT 05065
RSMS Paved Roads 2017
CONDITION ASSESSMENT

Hammond Engineering
 Everett T. Hammond, PE
 5 Lincoln St, Springfield, VT 05156
 Phone: (802) 376-0042

Town of Sharon, VT: OPTION 1A (\$100,000 in FY2019, increasing \$25,000/yr to 2023, then \$10,000/year until 2033)

Capital Highway Plan w/ Fay Brook Reconstruction & Howe Hill Road (Phase 3) Reconstruction

TOWN ROAD		Budget Year/ (Calendar Year)																
		Budget Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
		Calend Year	(2016)	(2017)	(2018)	(2019)	(2020)	(2021)	(2022)	(2023)	(2024)	(2025)	(2026)	(2027)	(2028)	(2029)	(2030)	(2031)
TOTAL PAVING FUND			93,850	75,000	100,000	125,000	150,000	175,000	200,000	210,000	220,000	230,000	240,000	250,000	260,000	270,000	280,000	290,000
Class 2 State Road Grant					175,000								175,000					175,000
Bond/Loan					1,000,000						900,000							2,000,000
Balance for all Paving Projects (see below)			93,850	75,000	1,275,000	125,000	150,000	175,000	200,000	210,000	1,120,000	230,000	415,000	250,000	260,000	270,000	2,455,000	290,000
PROPOSED ANNUAL PAVEMENT MANAGEMENT																		
	Miles	Cost	Actual	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed
Beaver Meadows Road	0.54	\$25,000	93,850		25,000													38,486
Broad Brook Road 1	0.02	\$1,000											1,316					
Quimby Mountain Road 1	0.22	\$38,115			38,115													58,676
Quimby Mountain Road 2	0.09	\$15,593			15,593													24,005
River Road 1	0.63	\$51,563			51,563													79,379
River Road 2	1.76	\$236,000											310,560					
Rte 132 1 & 2	0.61	\$42,000			42,000													
Rte 132 3	0.44	\$62,784			62,784													
Rte 132 4 & 5	0.66	\$143,208			143,208													
Rte 132 6	0.57	\$61,344			61,344													
Rte 132 7	1.73	\$248,688			248,688													
PROP CAPITAL PROJECTS			Miles	Cost														
Broad Brook Road 2 (\$248,000 F)	0.14	\$20,700	mill/shi/o			20,700												31,867
Broad Brook Road 3 (\$180,000 F)	0.1	\$15,450	mill/shi/o			15,450												23,785
Fay Brook Road (\$762,000 R)	0.41	\$762,000	reconstruct							927,090								
Howe Hill Road 1 (1.41 M Rec)	0.91	\$162,000	mill/shi/o			163,800												
Howe Hill Road 2 & 3(\$1.415 M)	0.9	\$162,000	mill/shi/o			162,000												
Howe Hill Road 4(\$1.545M REC)	0.91	\$162,000	mill/shi/o			163,800												2,378,457
Loan Payment (\$1M @ 4% 5 yrs)						225,000	225,000	225,000	225,000	225,000		202,000	202,000	202,000	202,000	202,000		
Bond Payment (\$2,000,000 @ 4% 10 yrs)							(5 year loan; \$1,000,000 @ 4%)					(5 year loan; \$900,000 @ 4%)						247,000
TOTAL MILES	10.64																	(10 year bond; \$2M; 4%
TOTAL PROJECT COST			93,850	0	688,295	750,750	225,000	225,000	225,000	225,000	927,090	202,000	513,876	202,000	202,000	202,000	2,634,654	247,000
CAPITAL CARRYOVERS																		
Paving Budget - Capital Projects			0	75,000	586,705	-625,750	-75,000	-50,000	-25,000	-15,000	192,910	28,000	-98,876	48,000	58,000	68,000	-179,654	43,000
Capital Balance carryover from previous year			0	0	75,000	661,705	35,955	-39,045	-89,045	-114,045	-129,045	63,865	91,865	-7,010	40,990	98,990	166,990	-12,664
Capital Balance (to carry over)			0	75,000	661,705	35,955	(39,045)	(89,045)	(114,045)	(129,045)	63,865	91,865	(7,010)	40,990	98,990	166,990	(12,664)	30,336

Projected Paved Road Increase Factors: 1 1 1 1 1.04 1.08 1.12 1.17 1.22 1.27 1.32 1.37 1.42 1.48 1.54 1.60

NOTES:

- 1) Test pits should be completed on all Capital Projects to verify quality & depth of existing base.
- 2) Projected Costs have been increased by 4%/year beginning in the year 2020. The cost increase factors are listed at the bottom of the table shown above.
- 3) Table above reflects the Calendar Year (CY) of Construction Funds Available (Budget Year = CY +1)

Town of Sharon, VT: OPTION 1B (\$100,000 in FY2019, increasing \$25,000/yr to 2027, then \$10,000/year until 2032)

Capital Highway Plan with Fay Brook Reconstruction & Howe Hill (Phase 3) Reconstruction

TOWN ROAD			Budget Year/(Calendar Year)															
		Budget Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
		Calend Year	(2016)	(2017)	(2018)	(2019)	(2020)	(2021)	(2022)	(2023)	(2024)	(2025)	(2026)	(2027)	(2028)	(2029)	(2030)	(2031)
TOTAL PAVING FUND			93,850	75,000	100,000	125,000	150,000	175,000	200,000	225,000	250,000	275,000	300,000	310,000	320,000	330,000	340,000	350,000
Class 2 State Road Grant					175,000								175,000					175,000
Bond/Loan					1,000,000						800,000							2,000,000
Balance for all Paving Projects (see below)			93,850	75,000	1,275,000	125,000	150,000	175,000	200,000	225,000	1,050,000	275,000	475,000	310,000	320,000	330,000	2,515,000	350,000
PROPOSED ANNUAL PAVEMENT MANAGEMENT																		
	Miles	Cost	Actual	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed
Beaver Meadows Road	0.54	\$25,000	93,850		25,000													38,486
Broad Brook Road 1	0.02	\$1,000											1,316					
Quimby Mountain Road 1	0.22	\$38,115			38,115													58,676
Quimby Mountain Road 2	0.09	\$15,593			15,593													24,005
River Road 1	0.63	\$51,563			51,563													79,379
River Road 2	1.76	\$236,000											310,560					
Rte 132 1 & 2	0.61	\$42,000			42,000													64,657
Rte 132 3	0.44	\$62,784			62,784													96,653
Rte 132 4 & 5	0.66	\$143,208			143,208													128,650
Rte 132 6	0.57	\$61,344			61,344													125,915
Rte 132 7	1.73	\$248,688			248,688													191,422
PROP CAPITAL PROJECTS																		
Broad Brook Road 2 (\$248,000 F)	0.14	\$20,700	mill/shi/o			20,700												33,141
Broad Brook Road 3 (\$180,000 F)	0.1	\$15,450	mill/shi/o			15,450												24,736
Fay Brook Road (\$762,000 R)	0.41	\$762,000	reconstruct								927,090							
Howe Hill Road 1 (1.41 M Rec)	0.91	\$162,000	mill/shi/o			163,800												
Howe Hill Road 2 & 3(\$1.415 M)	0.9	\$162,000	mill/shi/o			162,000												
Howe Hill Road 4(\$1.545M REC)	0.91	\$162,000	mill/shi/o			163,800												2,378,457
Loan Payment (\$1M @ 4% 5 yrs)						225,000	225,000	225,000	225,000	225,000		220,000	220,000	220,000	220,000			
Bond Payment (\$2,000,000 @ 4% 10 yrs)																		247,000
(5 year loan; \$1,000,000 @ 4%)																		
(4 year loan; \$800,000 @ 4%)																		
TOTAL MILES	10.64																	(10 year bond; \$2M; 4%
TOTAL PROJECT COST			93,850	0	688,295	750,750	225,000	225,000	225,000	225,000	927,090	220,000	531,876	220,000	220,000	0	3,186,300	304,877
CAPITAL CARRYOVERS																		
Paving Budget - Capital Projects			0	75,000	586,705	-625,750	-75,000	-50,000	-25,000	0	122,910	55,000	-56,876	90,000	100,000	330,000	-671,300	45,123
Capital Balance carryover from previous year			0	0	75,000	661,705	35,955	-39,045	-89,045	-114,045	-114,045	8,865	63,865	6,990	96,990	196,990	526,990	-144,310
Capital Balance (to carry over)			0	75,000	661,705	35,955	(39,045)	(89,045)	(114,045)	(114,045)	8,865	63,865	6,990	96,990	196,990	526,990	(144,310)	(99,187)

Projected Paved Road Increase Factors: 1 1 1 1 1.04 1.08 1.12 1.17 1.22 1.27 1.32 1.37 1.42 1.48 1.54 1.60

NOTES:

- 1) Test pits should be completed on all Capital Projects to verify quality & depth of existing base.
- 2) Projected Costs have been increased by 4%/year beginning in the year 2020. The cost increase factors are listed at the bottom of the table shown above.
- 3) Table above reflects the Calendar Year (CY) of Construction Funds Available (Budget Year = CY +1)

Town of Sharon, VT: OPTION 2 (\$100,000 in FY2019, increasing \$25,000/yr until 2023, then \$10,000/yr until 2028)

Capital Highway Plan with Howe Hill Reconstruction

TOWN ROAD			Budget Year/(Calendar Year)															
		Budget Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
		Calend Year	(2016)	(2017)	(2018)	(2019)	(2020)	(2021)	(2022)	(2023)	(2024)	(2025)	(2026)	(2027)	(2028)	(2029)	(2030)	(2031)
TOTAL PAVING FUND			93,850	75,000	100,000	125,000	150,000	175,000	200,000	210,000	220,000	230,000	240,000	250,000	250,000	250,000	250,000	250,000
Class 2 State Road Grant					175,000					175,000					175,000			
Bond/Loan					800,000					1,410,000								
Balance for all Paving Projects (see below)			93,850	75,000	1,075,000	125,000	150,000	175,000	200,000	1,795,000	220,000	230,000	240,000	250,000	425,000	250,000	250,000	250,000
PROPOSED ANNUAL PAVEMENT MANAGEMENT																		
	Miles	Cost	Actual	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed
Beaver Meadows Road	0.54	\$31,000	93,850							36,266								
Broad Brook Road 1	0.02	\$1,000													1,423			
Quimby Mountain Road 1	0.22	\$38,115			38,115													
Quimby Mountain Road 2	0.09	\$15,593			15,593													
River Road 1	0.63	\$51,563			51,563													
River Road 2	1.76	\$236,000													335,902			
Rte 132 1 & 2	0.61	\$42,000			42,000													67,243
Rte 132 3	0.44	\$62,784			62,784													100,519
Rte 132 4 & 5	0.66	\$143,208			143,208													128,650
Rte 132 6	0.57	\$61,344			61,344													130,952
Rte 132 7	1.73	\$248,688			248,688													199,079
PROP CAPITAL PROJECTS			Miles	Cost														
Broad Brook Road 2 (\$248,000 F)	0.14	\$20,700	mill/shi/o			20,700												
Broad Brook Road 3 (\$180,000 F)	0.1	\$15,450	mill/shi/o			15,450												
Fay Brook Road (\$762,000 R)	0.41	\$67,650	mill/shi/o										115,599					
Howe Hill Road 1 (1.41 M Rec)	0.91	\$162,000	mill/shi/o			163,800												
Howe Hill Road 2 & 3(\$1.41 M R)	0.9	\$162,000	mill/shi/o			162,000												
Howe Hill Road 4(\$1.41M REC)	0.91	\$162,000	mill/shi/o						67,492	1,579,309								
Loan Payment (\$800,000 @ 4% 4 yrs)						180,000	180,000	180,000	180,000	180,000								
Bond Payment (\$1,410,000 @ 4% 8 yrs)											174,000	174,000	174,000	174,000	174,000	174,000	174,000	174,000
TOTAL MILES			10.64															
TOTAL PROJECT COST			93,850	0	663,295	541,950	180,000	180,000	247,492	1,795,575	174,000	174,000	289,599	174,000	511,325	174,000	174,000	800,443
CAPITAL CARRYOVERS																		
Paveing Budget - Capital Projects			0	75,000	411,705	-416,950	-30,000	-5,000	-47,492	-575	46,000	56,000	-49,599	76,000	-86,325	76,000	76,000	-550,443
Capital Balance carryover from previous year			0	0	75,000	486,705	69,755	39,755	34,755	-12,737	-13,312	32,688	88,688	39,090	115,090	28,765	104,765	180,765
Capital Balance (to carry over)			0	75,000	486,705	69,755	39,755	34,755	(12,737)	(13,312)	32,688	88,688	39,090	115,090	28,765	104,765	180,765	(369,678)

Projected Paved Road Increase Factors: 1 1 1 1 1.04 1.08 1.12 1.17 1.22 1.27 1.32 1.37 1.42 1.48 1.54 1.60

NOTES:

- 1) Test pits should be completed on all Capital Projects to verify quality & depth of existing base.
- 2) Projected Budgets have been increased by 5%/year beginning in the year 2020. The cost increase factors are listed at the bottom of the table shown above.
- 3) Table above reflects the Calendar Year (CY) of Construction Funds Available (Budget Year = CY +1)

Town of Sharon, VT: OPTION 3 (\$100,000 in FY2019, increasing \$25,000/yr to 2023, then \$10,000/year until 2033)

Capital Highway Plan with Broad Brook/Fay Brook Reconstruction

TOWN ROAD			Budget Year/ (Calendar Year)															
		Budget Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
		Calend Year	(2016)	(2017)	(2018)	(2019)	(2020)	(2021)	(2022)	(2023)	(2024)	(2025)	(2026)	(2027)	(2028)	(2029)	(2030)	(2031)
TOTAL PAVING FUND			93,850	75,000	100,000	125,000	150,000	175,000	200,000	210,000	220,000	230,000	240,000	250,000	260,000	270,000	280,000	290,000
Class 2 State Road Grant					175,000					175,000					175,000			
Bond/Loan					1,000,000						300,000					1,000,000		
Balance for all Paving Projects (see below)			93,850	75,000	1,275,000	125,000	150,000	175,000	200,000	385,000	520,000	230,000	240,000	250,000	435,000	1,270,000	280,000	290,000
PROPOSED ANNUAL PAVEMENT MANAGEMENT																		
	Miles	Cost	Actual	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed
Beaver Meadows Road	0.54	\$25,000	93,850		25,000													40,026
Broad Brook Road 1	0.02	\$1,000													1,423			
Quimby Mountain Road 1	0.22	\$38,115			38,115													61,023
Quimby Mountain Road 2	0.09	\$15,593			15,593													24,965
River Road 1	0.63	\$51,563			51,563										73,390			
River Road 2	1.76	\$236,000													335,902			
Rte 132 1 & 2	0.61	\$42,000			42,000													64,657
Rte 132 3	0.44	\$62,784			62,784													96,653
Rte 132 4 & 5	0.66	\$143,208			143,208													128,650
Rte 132 6	0.57	\$61,344			61,344													125,915
Rte 132 7	1.73	\$248,688			248,688													191,422
PROP CAPITAL PROJECTS																		
Broad Brook Road 2 (\$248,000 F)	0.14	\$248,000	reconstruct								301,730							
Broad Brook Road 3 (\$180,000 F)	0.1	\$180,000	reconstruct								218,998							
Fay Brook Rd (\$762,000 R)	0.41	\$67,650	mill/shi/o			67,650									1,127,946			
Howe Hill Rd 1 (1.41 M Rec)	0.91	\$162,000	mill/shi/o			163,800												
Howe Hill Rd 2 & 3 (\$1.415 M R)	0.9	\$162,000	mill/shi/o			162,000												
Howe Hill Rd 4 (\$1.545M REC)	0.91	\$162,000	mill/shi/o			163,800												
Loan Payment (\$1M @ 4% 5 yrs)						225,000	225,000	225,000	225,000	225,000		108,000	108,000	108,000				
Bond Payment (\$1,000,000 @ 4% 10 yrs)																		275,000
TOTAL MILES			10.64															(4 year loan; \$1m; 4%)
TOTAL PROJECT COST			93,850	0	688,295	782,250	225,000	225,000	225,000	225,000	520,727	108,000	108,000	108,000	410,715	1,127,946	882,297	401,014
CAPITAL CARRYOVERS																		
Paving Budget - Capital Projects			0	75,000	586,705	-657,250	-75,000	-50,000	-25,000	160,000	-727	122,000	132,000	142,000	24,285	142,054	-602,297	-111,014
Capital Balance carryover from previous year			0	0	75,000	661,705	4,455	-70,545	-120,545	-145,545	14,455	13,728	135,728	267,728	409,728	434,012	576,066	-26,231
Capital Balance (to carry over)			0	75,000	661,705	4,455	(70,545)	(120,545)	(145,545)	14,455	13,728	135,728	267,728	409,728	434,012	576,066	(26,231)	(137,245)

Projected Paved Road Increase Factors: 1 1 1 1 1.04 1.08 1.12 1.17 1.22 1.27 1.32 1.37 1.42 1.48 1.54 1.60

NOTES:

- 1) Test pits should be completed on all Capital Projects to verify quality & depth of existing base.
- 2) Projected Costs have been increased by 4%/year beginning in the year 2020. The cost increase factors are listed at the bottom of the table shown above.
- 3) Table above reflects the Calendar Year (CY) of Construction Funds Available (Budget Year = CY +1)