

# Inventory and Assessment of Road Surfaces

July 29

# 2013

UNH Technology Transfer Center Field Staff performed Road Inventory and Condition Assessment. Inventory and Assessments were entered into Road Surface Management System (RSMS) software for analysis, prioritization, and generation of repair strategy. Repair strategies and a 10-year budget plan have been prepared in partnership with the town and presented within this report.

Town of  
Wentworth, NH



## Table of Contents

Problem Statement.....	2
Solution: Road Surface Management System.....	2
Identification of Sections .....	3
Road Condition Rating .....	3
Section II: Prioritizing Wentworth’s Road Repair Needs .....	4
Priority Setting Factors.....	4
Priorities of Wentworth’s Roads.....	5
Section III: Selection of Repair Alternatives.....	5
Inadequate Road Bases.....	5
Repair Alternatives.....	6
Assigning Specific Repairs .....	7
Section IV: Conclusion – A Capital Improvements Account.....	8
Appendix A: Road Inventory and Condition Survey.....	10
Appendix B: Condition Index and Repairs Ordered by Priority .....	13
Appendix C: Town Maps .....	15
Appendix D: Budget Overview .....	17
Appendix E: Repairs and Cost by Year .....	19
Appendix F: Repairs & Costs by Road .....	30

## **Problem Statement**

Paved and aggregate roads require routine and preventative maintenance, which should be done before they require rehabilitation or reconstruction. Approximately 93% of town-maintained roads in Wentworth, NH (also referred to as the Town) warrant some type of maintenance or repair at this time. Furthermore, 100% of the Town's road network is recommended for upgrades over the next ten years. Current capital improvements and road maintenance budgets are inadequate to meet these needs. The Town's roads are deteriorating more rapidly than the Highway Department can maintain and reconstruct them. The Town recognizes this problem and is seeking to create a long-term work and budget plan to restore the roads.

## **Solution: Road Surface Management System**

Wentworth agreed to engage, through the University of New Hampshire Technology Transfer Center (UNH T<sup>2</sup>), in road inventory data collection, identification of pavement conditions, and operation of Road Surface Management System (RSMS) software. A team of civil engineers from the University performed the road condition survey and analysis.

The team performed the following tasks using UNH T<sup>2</sup>'s RSMS data collection protocols and software:

1. Inventoried the road system, dividing the roads into sections as appropriate
2. Determined and documented the conditions of the each section
3. Prioritized maintenance and repair requirements
4. Chose maintenance or repair methods appropriate to each condition category
5. Determined unit costs of these maintenance and repair methods
6. Elected a maintenance or repair method for each road section
7. Established long-term work and budget plans

The survey team developed an inventory of road conditions for all town-maintained roads based on a list of roads derived from NHDOT centerline shapefiles and reviewed by Wentworth. Factors were determined for establishing priorities and repair treatment cost estimates. The data was entered into the RSMS program, which developed a prioritized list of maintenance and repair recommendations. This information is contained in the following reports. Working from RSMS reports, town officials can prepare a detailed comprehensive long-term work and budget plan.

Sections 1 through 3 of this report describe how RSMS was applied to Wentworth. Section 4 provides a conclusion of the study. Appendices contain reports that summarize the data and serve as a basis for the conclusion.

## Section I: Road Network Inventory and Condition Survey

### Identification of Sections

The survey team identified road sections based on changes in road geometry, pavement condition, and traffic volume. 39 sections were defined for the 32 miles of roads assessed. The sections are listed in Appendix A along with each section's Condition Index (CI).

### Road Condition Rating

Rating the condition of all road sections is based on a process similar to common informal practice. Local highway personnel rely heavily on visual inspections and experience to schedule maintenance activities. One problem with the informal approach is that experience is very difficult to transfer from one person to another. It also can be difficult to objectively explain maintenance decisions to local governing bodies. RSMS applies a comprehensive condition rating technique based on sound engineering and management practices. These techniques enable the user to draw objective, consistent, and easy-to-explain conclusions.

Researchers and practitioners have developed several pavement condition rating techniques based on visual inspection. A road section is inspected, and the severity and extent of surface distresses are recorded. RSMS has two sets of road condition distresses, one for paved roads and another for unpaved surfaces. The RSMS distress characteristics for paved roads include:

#### Paved Roads Distresses

- Longitudinal/transverse cracking
- Alligator cracking
- Edge cracking
- Patching/potholes
- Drainage
- Roughness
- Rutting

Experience with RSMS has shown that users can accurately determine conditions from a vehicle, with closer inspection where necessary. The survey team used RSMS software to enter the road condition information for each section.

Additionally, unpaved roads were also assessed by the field crew. The RSMS distress characteristics for paved roads include:

#### Unpaved Roads Distresses

- Loose Aggregate
- Corrugation (wash-boarding)
- Potholes
- Cross Section
- Excessive Dust
- Drainage
- Rutting

Appendix A also contains a summary of results from the Road Condition Survey. Based on the road rating information, RSMS assigned every road section to one of five repair strategies. These are used to determine repair alternatives appropriate for each particular road section.

## Section II: Prioritizing Wentworth's Road Repair Needs

### Priority Setting Factors

The most important product of a road management system is a prioritized list of every road section that requires repairs and the costs of those repairs. Such a list enables town officials to make budget decisions based on sound technical and management principles, and to prepare plans for accomplishment of the needed repairs. RSMS can produce three separate prioritized lists, one each for paved and unpaved roads, and a third for all roads. This report regards all town-maintained roads. The priorities are determined based on a set of factors, listed, and discussed below:

- Repair Strategy
- Drainage
- Traffic
- Importance
- Road Conditions
- Road Roughness

All too frequently, municipal officials set priorities by the “worst first” approach; they give the most deteriorated roads the highest priorities. Such roads are also the most expensive to repair, which commits a large amount of town funds to only a few roads. Inadequate funds remain to accomplish the relatively inexpensive preventative and routine maintenance. These roads have low to moderate deterioration and can have their useful lives extended significantly at a lower cost.

Clearly, road condition is just one factor that local road managers must consider. Other factors to be considered are:

- Repair Strategy Ranking – Repair strategies are described in the next section.
- Drainage – Evaluated as Good, Fair, or Poor during the condition survey.
- Traffic – The volume of heavily loaded vehicles that normally use the road. The most traveled roads are given the highest value (5), least traveled given the lowest (1), and all other roads evaluated relative to these ratings.
- Importance – The importance of the road to the town, by whatever criteria town officials wish to apply. The most important roads are given the highest value (4), least important given the lowest (1), and all other roads evaluated relative to these ratings.
- Condition – The maximum value of the condition ratings determined during the condition survey (Described in Section 1)
- Roughness – Evaluated as Smooth, Rough, or Very Rough during the condition survey.

## Priorities of Wentworth's Roads

The survey team entered the data described above into the RSMS software program. The priority list of roads, with applicable repair alternatives, is shown in Appendix B. The UNH team generated this report and selected the best repair for each alternative.

## Section III: Selection of Repair Alternatives

### Inadequate Road Bases

Many local roads in New Hampshire were established in the 18<sup>th</sup> and 19<sup>th</sup> centuries. Some of these were built as “horse and buggy paths” and widened over time. Today, they have become primary arteries in contemporary road networks. Most local roads were in place by 1920. Although mileage has been added to these roads (due to new subdivisions, etc.) newer roads tend to have less traffic than older ones. Roads established before 1920 were earth or aggregate surfaced. As traffic volumes grew, people got tired of having to drive on muddy, soft roads. This created a large demand to pave the roads.

Beginning early in this century and continuing through the early 1960's, paving of local roads accelerated as a number of highway improvement programs attempted to “get the farmer out of the mud.” Even during this period many roads were built poorly. Of greatest importance was the failure to provide different gradations for base and surface aggregates.

Silt and clay “fines” in surface aggregate hold the road surface together by keeping gravel from lolling around under wheel loads. These particles, which are essential for unpaved roads, are inadequate bases for paved roads. Moisture in the base cannot escape through the impervious pavement layer on top. If the pores between load-bearing aggregate bases become clogged with silt or clay, water cannot drain through the sides of the road. The base material stays soft and wet during the spring and fall seasons when groundwater and precipitation find their way into the base, especially through surface cracks. With a high water content base supporting it, the road surface flexes more under vehicle loads. Much like repeatedly bending a paperclip, the more the road flexes the faster it will break. In winter, a wet base material is susceptible to freezing and heaving, which further accelerates roadway deterioration.

In haste to pave their road networks, state and local agencies paved over many miles of surface aggregate. Even if they replaced the base with properly graded aggregate, it was often too thin to support modern heavy vehicles. Today many of these roads need reconstruction to replace the base material. The survey team relied on the local officials to consider this information when selecting maintenance and repair alternatives.

## Repair Alternatives

RSMS allows an unlimited number of repair alternatives, which are grouped into five categories.

1. Deferred Maintenance: No action required. The road section is in very good condition.
2. Routine Maintenance: For paved roads, sealing cracks and patching potholes for specific small areas. For unpaved roads, filling small areas and grading the roadway. For both road surface types, routine maintenance should include cleaning ditches and culverts.

Crack sealing, patching, spot re-graveling, ditch and culvert cleaning, and mowing of shoulders and adjacent areas are essential to get the intended service life from a section of pavement. Routine maintenance therefore has the highest value in the RSMS priority setting procedure.

Routine maintenance can usually be performed by the town's road crew, and should be included in the town's annual budget. Roads requiring routine maintenance are slowly but surely deteriorating. Adequate funds should be made available consistently across annual budgets to ensure that roads in good condition remain so.

Unpaved roads are more prone to deterioration due to traffic and weather. For this reason, routine maintenance on unpaved roads is done multiple times in a year to keep the road condition at an acceptable level. All unpaved roads are subject to annual maintenance which is incorporated into the maintenance budget of the roads.

3. Preventive Maintenance: For paved roads, coating of the surface and chip seals of thin (1 ½ inch) overlays are used to prevent or slow further deterioration. For unpaved roads this includes shaping and grading the road surface, as well as adding minor amounts of material as necessary.

Preventative maintenance is performed on roads that are in sufficiently good condition and require inexpensive repair to extend road life. In the RSMS priority setting procedure, preventive maintenance has the second highest value and should receive a high priority in annual funding of highway budgets. Much of the work is within the highway department's capability with the exception of chip seals that are usually performed by contractors. The town should plan to accomplish all preventive maintenance within annual operations budgets.

4. Rehabilitation: Major repairs of the road surface such as an asphalt overlay after surface preparation for a paved road, adding major amounts of gravel to unpaved roads, or re-grading, reshaping, and compacting them.

Rehabilitation is more expensive than routine or preventive maintenance, but less expensive than reconstruction. For paved roads, contractors usually perform rehabilitation repairs. Municipalities should fund them through a Capital Improvements Program (CIP). Large amounts of gravel required for unpaved roads may also be funded through a CIP. Before town officials

attempt to fund these out of annual budgets, they should consider the impact on routine and preventive maintenance. It is much less expensive in the long run to keep good roads in good condition than to let them deteriorate to where they need rehabilitation. On the other hand, roads needing rehabilitation are rapidly deteriorating and will become much worse quickly without adequate funding.

5. Reconstruction: Excavation of the road base, the replacement and often the addition of aggregate, and new paved surface or new wearing surface gravel.

The road including its sub-base has deteriorated to such an extent that the base must be replaced or stabilized. Such conditions are usually caused by too long a period of inadequate maintenance, and by poor subsurface drainage. In the latter conditions, appropriate repair and/or new construction of ditches and culverts should be included in the project.

Reconstruction is so costly that it can absorb a large portion, if not all, of a municipality's annual budget, and therefore allow too small a budget for routine and preventative maintenance. Their accomplishment, therefore, will also best be funded with a CIP.

### **Assigning Specific Repairs**

The RSMS program provides a set of repair alternatives consistent with the repair strategy for each road section's drainage and condition. Appendix C is the maintenance summary of road conditions for Wentworth's road sections. UNH T<sup>2</sup> reviewed these alternatives with the town, and entered any modifications into the program. They also reviewed unit costs for each alternative considering whether the municipality would accomplish a particular repair by contract, with its own labor and equipment, or by a combination of contract and "in-house" labor.

The survey team recommended that the town select the repair for each road section that would make the condition satisfactory. Compromises, if necessary, should be made with continued consideration of the long-term effects.

Rehabilitation and reconstruction alternatives are more complex and involve large amounts of money to implement. Choosing the best repair treatment for roads requiring these strategies often requires knowledge of the road base.

The selected repairs are shown in Appendix E. The road sections are listed in priority order per recommendations of UNH T<sup>2</sup>.



## Section IV: Conclusion – A Capital Improvements Account

To implement the RSMS results, the town budget should be separated into two accounts: an Operations Road Maintenance account for routine and preventive maintenance, and a Capital Improvements account for rehabilitation and reconstruction. Annual budgets should be adequate to accomplish all drainage, routine, and preventative maintenance for several years. The estimated Operations Road Maintenance budget is approximately \$66,000 annually. A Budget Summary has been prepared and is presented in Appendix D.

A Capital Improvements budget requires a special commitment from town officials and citizens who attend town meetings. It should enable completion within a specified period of all rehabilitation and reconstruction for both paved and unpaved roads. The plan should specify which rehabilitation and reconstruction projects will be done each year. Usual CIP periods range from three to six years.

A summary of the projected annual costs per UNH T<sup>2</sup> recommendations is presented in the tables below.

**Table 1: Capital and Operations Budget Projections**

Year	Operations Road Maintenance <sup>1</sup>	Capital Improvements <sup>2</sup>	Total Budget
1	\$82,473.78	Prior to CI Period	\$82,473.78
2	\$76,317.45	Prior to CI Period	\$76,317.45
3	\$43,624.45	\$40,740.88	\$84,365.33
4	\$43,767.23	\$57,819.28	\$101,586.51
5	\$48,764.98	64624.75907	\$113,389.74
6	\$93,245.47	Post CI Period	\$93,245.47
7	\$76,350.96	Post CI Period	\$76,350.96
8	\$73,951.07	Post CI Period	\$73,951.07
9	\$64,441.26	Post CI Period	\$64,441.26
10	\$58,999.99	Post CI Period	\$58,999.99

<sup>1</sup> Including Patching, Crack Sealing, Surface Coats, Reshaping, and Regrading

<sup>2</sup> Including Full Rebuild/Replace and Overlays

**Table 2: Network Condition Index by Year**

<b>Year</b>	<b>Pavement Condition Index Without Repairs</b>	<b>Pavement Condition Index With Repairs</b>	<b>Projected Annual Budget</b>
<b>0</b>	74.86	<b>74.86</b>	N/A
<b>1</b>	74.86	<b>88.03</b>	<b>\$82,473.78</b>
<b>2</b>	71.86	<b>91.40</b>	<b>\$76,317.45</b>
<b>3</b>	68.99	<b>93.36</b>	<b>\$84,365.33</b>
<b>4</b>	66.23	<b>93.22</b>	<b>\$101,586.51</b>
<b>5</b>	63.58	<b>93.68</b>	<b>\$113,389.74</b>
<b>6</b>	61.04	<b>93.34</b>	<b>\$93,245.47</b>
<b>7</b>	58.59	<b>92.30</b>	<b>\$76,350.96</b>
<b>8</b>	56.25	<b>91.52</b>	<b>\$73,951.07</b>
<b>9</b>	54	<b>91.49</b>	<b>\$64,441.26</b>
<b>10</b>	51.84	<b>90.60</b>	<b>\$58,999.99</b>

# Appendix A: Road Inventory and Condition Survey

Table 3: Asphalt Roads Inventory as of Survey Date

Road Section Name	Length	Survey Date	Alligator Cracks (1/8in)	Edge Cracking (12/24in)	Longitudinal / Transverse Cracks (1/4in)	Patching / Potholes	Roughness
<b>Buffalo Rd - 1</b>	11119	6/28/2013	High Sev/Low Ext	Med Sev/Med Ext	Med Sev/Med Ext	3 - High (30+% / 1-+ per 100ft)	3 - Rough
<b>Goves Ln</b>	3754	6/28/2013	Med Sev/Med Ext	High Sev/Low Ext	High Sev/Med Ext	2 - Medium (10-30% / <10 per 100ft)	3 - Rough
<b>Red Oak Hill Rd</b>	3398	6/28/2013	Med Sev/High Ext	Low Sev/Low Ext	Low Sev/High Ext	2 - Medium (10-30% / <10 per 100ft)	2 - Somewhat Rough
<b>Ellsworth Hill Rd - 1</b>	3215	6/28/2013	Med Sev/High Ext	Low Sev/High Ext	Low Sev/High Ext	2 - Medium (10-30% / <10 per 100ft)	2 - Somewhat Rough
<b>Wentworth Village Rd</b>	1179	6/28/2013	Med Sev/High Ext	Med Sev/High Ext	Med Sev/High Ext	2 - Medium (10-30% / <10 per 100ft)	2 - Somewhat Rough
<b>Atwell Hill Rd - 1</b>	5123	6/28/2013	None	None	None	0 - None	1 - Smooth
<b>East Side Rd</b>	13793	6/28/2013	Low Sev/High Ext	Med Sev/Med Ext	High Sev/Low Ext	2 - Medium (10-30% / <10 per 100ft)	2 - Somewhat Rough
<b>Lookaway Ln</b>	1886	6/28/2013	Low Sev/Low Ext	Low Sev/High Ext	Low Sev/High Ext	0 - None	1 - Smooth
<b>Browns Ln</b>	950	6/28/2013	High Sev/High Ext	High Sev/High Ext	High Sev/High Ext	2 - Medium (10-30% / <10 per 100ft)	3 - Rough
<b>Saunders Hill Rd - 1</b>	571	6/28/2013	None	None	Low Sev/Low Ext	0 - None	1 - Smooth
<b>North Dorchester Rd - 1</b>	8776	6/28/2013	Med Sev/Low Ext	Med Sev/Low Ext	Med Sev/Low Ext	2 - Medium (10-30% / <10 per 100ft)	2 - Somewhat Rough
<b>North Dorchester Rd - 4</b>	3369	6/28/2013	Low Sev/Low Ext	Low Sev/Low Ext	Low Sev/Low Ext	0 - None	1 - Smooth
<b>North Dorchester Rd - 3</b>	3289	6/28/2013	High Sev/Low Ext	Med Sev/High Ext	Med Sev/High Ext	2 - Medium (10-30% / <10 per 100ft)	3 - Rough
<b>North Dorchester Rd - 2</b>	2171	6/28/2013	Low Sev/Low Ext	Low Sev/Med Ext	Low Sev/Low Ext	1 - Low (<10% / 5 per 100ft)	1 - Smooth
<b>Turner Rd - 1</b>	2181	6/28/2013	Low Sev/Med Ext	Med Sev/Med Ext	Med Sev/Low Ext	1 - Low (<10% / 5 per 100ft)	2 - Somewhat Rough

Table 4: Unpaved Roads Inventory as of Survey Date

Road Section Name	Length	Survey Date	Corrugations	Cross Section	Dust Control	Loose Aggregate	Potholes
<b>Pond Brook Rd</b>	2169	6/28/2013	Low Sev/Low Ext	1 - High crown / no ponding	1 - Low dust	Low Sev/Low Ext	Low Sev/Low Ext
<b>Turner Rd - 2</b>	3998	6/28/2013	None	2 - Medium crown / minor ponding	1 - Low dust	Low Sev/High Ext	Low Sev/Low Ext
<b>Cape Moonshine Rd</b>	12357	6/28/2013	Low Sev/High Ext	2 - Medium crown / minor ponding	1 - Low dust	Low Sev/High Ext	None
<b>Currier Hill Rd</b>	1619	6/28/2013	Low Sev/Low Ext	1 - High crown / no ponding	1 - Low dust	Low Sev/High Ext	None
<b>Beech Hill Rd</b>	7821	6/28/2013	None	1 - High crown / no ponding	1 - Low dust	Med Sev/High Ext	Low Sev/Low Ext
<b>Nichols Hill Rd</b>	5115	6/28/2013	Low Sev/Low Ext	2 - Medium crown / minor ponding	1 - Low dust	Med Sev/High Ext	None
<b>Auguste Rd</b>	2625	6/28/2013	None	2 - Medium crown / minor ponding	1 - Low dust	Low Sev/High Ext	None
<b>Rowentown Rd</b>	11705	6/28/2013	Low Sev/Low Ext	1 - High crown / no ponding	1 - Low dust	Low Sev/High Ext	Med Sev/Low Ext
<b>Vlk Mountain Rd</b>	3424	6/28/2013	Low Sev/Low Ext	1 - High crown / no ponding	1 - Low dust	High Sev/Low Ext	Low Sev/Low Ext
<b>Zoe Rd</b>	2278	6/28/2013	None	2 - Medium crown / minor ponding	1 - Low dust	Low Sev/High Ext	None
<b>Dufour Rd</b>	1270	6/28/2013	None	2 - Medium crown / minor ponding	1 - Low dust	Low Sev/Med Ext	None
<b>Evans Rd</b>	870	6/28/2013	Low Sev/Low Ext	2 - Medium crown / minor ponding	1 - Low dust	Low Sev/Low Ext	Low Sev/Low Ext
<b>Thayer Mountain Rd</b>	3712	6/28/2013	Low Sev/Low Ext	2 - Medium crown / minor ponding	1 - Low dust	Med Sev/Low Ext	None
<b>Cross Rd</b>	3646	6/28/2013	None	1 - High crown / no ponding	1 - Low dust	Low Sev/Low Ext	None
<b>Hilltop Rd</b>	1651	6/28/2013	Low Sev/Low Ext	1 - High crown / no ponding	1 - Low dust	Med Sev/Med Ext	None
<b>Cheever Rd</b>	6473	6/28/2013	Low Sev/High Ext	2 - Medium crown / minor ponding	1 - Low dust	Med Sev/Low Ext	Low Sev/Low Ext
<b>Camp Victory Rd</b>	1105	6/28/2013	Low Sev/Low Ext	2 - Medium crown / minor ponding	1 - Low dust	Med Sev/Med Ext	Low Sev/Low Ext
<b>Ephraim Page Rd</b>	829	6/28/2013	None	2 - Medium crown / minor ponding	1 - Low dust	Low Sev/Low Ext	None
<b>Frescoln Rd</b>	5403	6/28/2013	Low Sev/Low Ext	2 - Medium crown / minor ponding	1 - Low dust	Low Sev/Med Ext	Low Sev/Low Ext
<b>Libbey Rd</b>	1253	6/28/2013	Low Sev/Low Ext	1 - High crown / no ponding	1 - Low dust	Low Sev/Med Ext	Low Sev/High Ext
<b>Saunders Hill Rd - 2</b>	2087	6/28/2013	Low Sev/Med Ext	2 - Medium crown / minor ponding	1 - Low dust	Low Sev/Low Ext	None
<b>Atwell Hill Rd - 2</b>	12776	6/28/2013	Med Sev/Med Ext	2 - Medium crown / minor ponding	1 - Low dust	Low Sev/High Ext	Low Sev/Low Ext
<b>Ellsworth Hill Rd - 2</b>	6185	6/28/2013	Low Sev/Low Ext	2 - Medium crown / minor ponding	1 - Low dust	Med Sev/Med Ext	Low Sev/Low Ext
<b>Buffalo Rd - 2</b>	5475	6/28/2013	None	1 - High crown / no ponding	1 - Low dust	Low Sev/Low Ext	None

**Appendix B: Condition Index and Repairs Ordered by Priority**

**Table 5: Condition Index and Repairs by Priority**

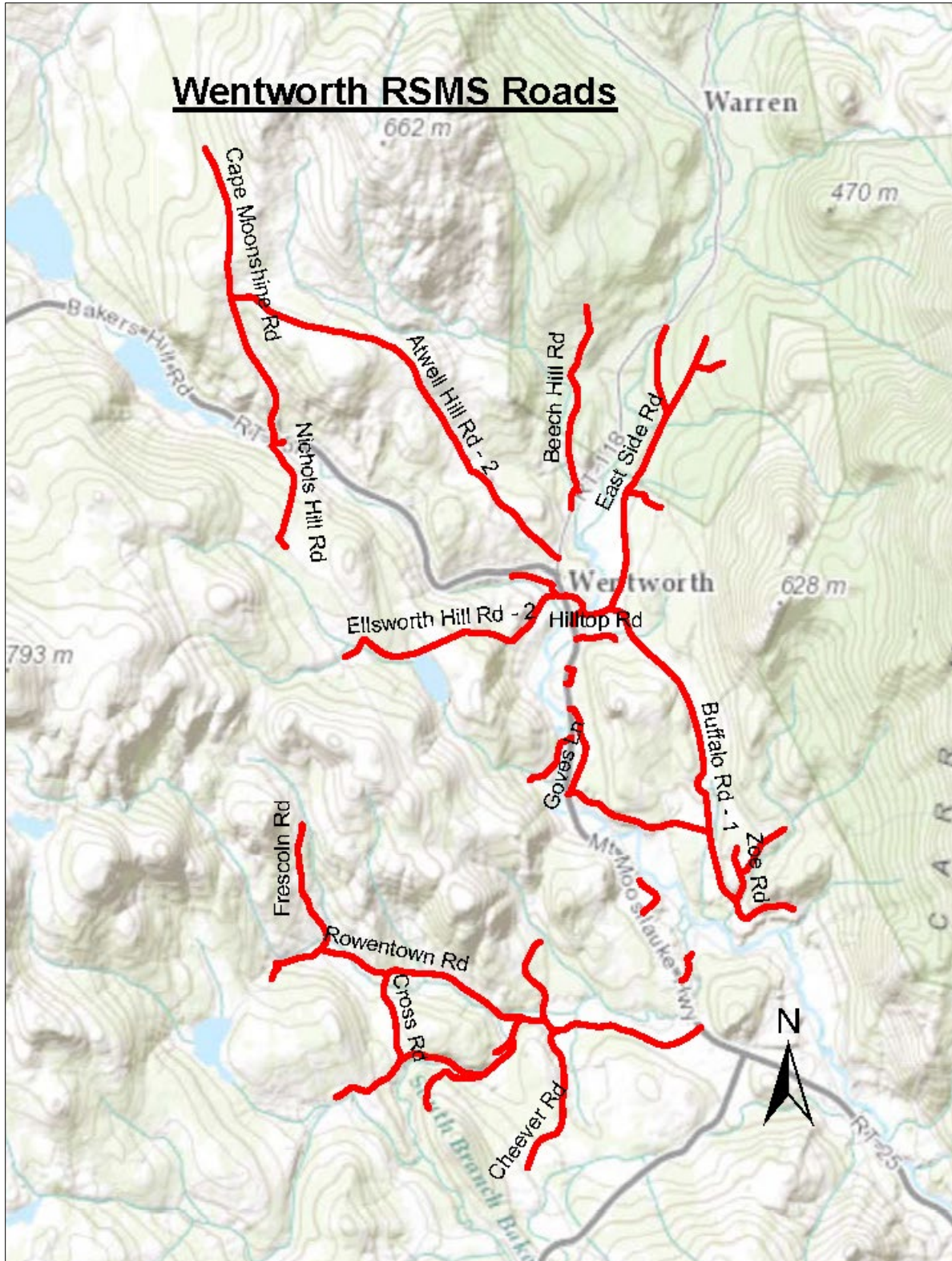
Priority	Current CI	Year 10 CI	Road Name	Length	Repair Category
1,250	72	96	North Dorchester Rd - 1	8776	Crack Seal
1,250	89	73.58	North Dorchester Rd - 2	2171	Patch
1,200	74	100	Cape Moonshine Rd	12357	Reshape Minor Material
1,000	75	100	Cheever Rd	6473	Reshape Minor Material
1,000	63	91	East Side Rd	13793	Surface Coat
1,000	78	100	Ellsworth Hill Rd - 2	6185	Reshape Minor Material
900	82	100	Auguste Rd	2625	Reshape Minor Material
900	81	100	Frescoln Rd	5403	Reshape Minor Material
900	72	75	Turner Rd - 1	2181	Surface Coat
900	80	100	Turner Rd - 2	3998	Reshape Minor Material
900	82	100	Zoe Rd	2278	Reshape Minor Material
700	78	100	Camp Victory Rd	1105	Reshape Minor Material
700	85	100	Dufour Rd	1270	Reshape Minor Material
700	88	100	Ephraim Page Rd	829	Reshape Minor Material
700	84	100	Evans Rd	870	Reshape Minor Material
700	82	90.72	Lookaway Ln	1886	Surface Coat
700	77	100	Nichols Hill Rd	5115	Reshape Minor Material
700	51	88.44	North Dorchester Rd - 3	3289	Overlay
700	83	100	Rowentown Rd	11705	Grade Major Material
700	83	100	Saunders Hill Rd - 2	2087	Reshape Minor Material
700	83	100	Thayer Mountain Rd	3712	Reshape Minor Material
650	48	85.42	Buffalo Rd - 1	11119	Overlay
650	96	100	Buffalo Rd - 2	5475	Grade Major Material
600	72	100	Atwell Hill Rd - 2	12776	Grade Major Material
600	85	100	Beech Hill Rd	7821	Grade Major Material
600	96	100	Cross Rd	3646	Grade Major Material
600	94	62	North Dorchester Rd - 4	3369	Satisfactory
550	54	90.36	Goves Ln	3754	Overlay
550	88	100	Hilltop Rd	1651	Grade Major Material
500	88	100	Currier Hill Rd	1619	Grade Major Material
450	100	66	Atwell Hill Rd - 1	5123	Satisfactory
450	83	100	Libbey Rd	1253	Grade Major Material
450	92	100	Pond Brook Rd	2169	Grade Major Material
450	86	100	Vlk Mountain Rd	3424	Grade Major Material
375	66	69	Red Oak Hill Rd	3398	Rebuild/Replace
350	60	68.67	Ellsworth Hill Rd - 1	3215	Rebuild/Replace
350	54	60	Wentworth Village Rd	1179	Rebuild/Replace
275	39	51.28	Browns Ln	950	Rebuild/Replace
225	98	65	Saunders Hill Rd - 1	571	Satisfactory

## Appendix C: Town Maps



# Roads Assessed and Analyzed Using RSMS

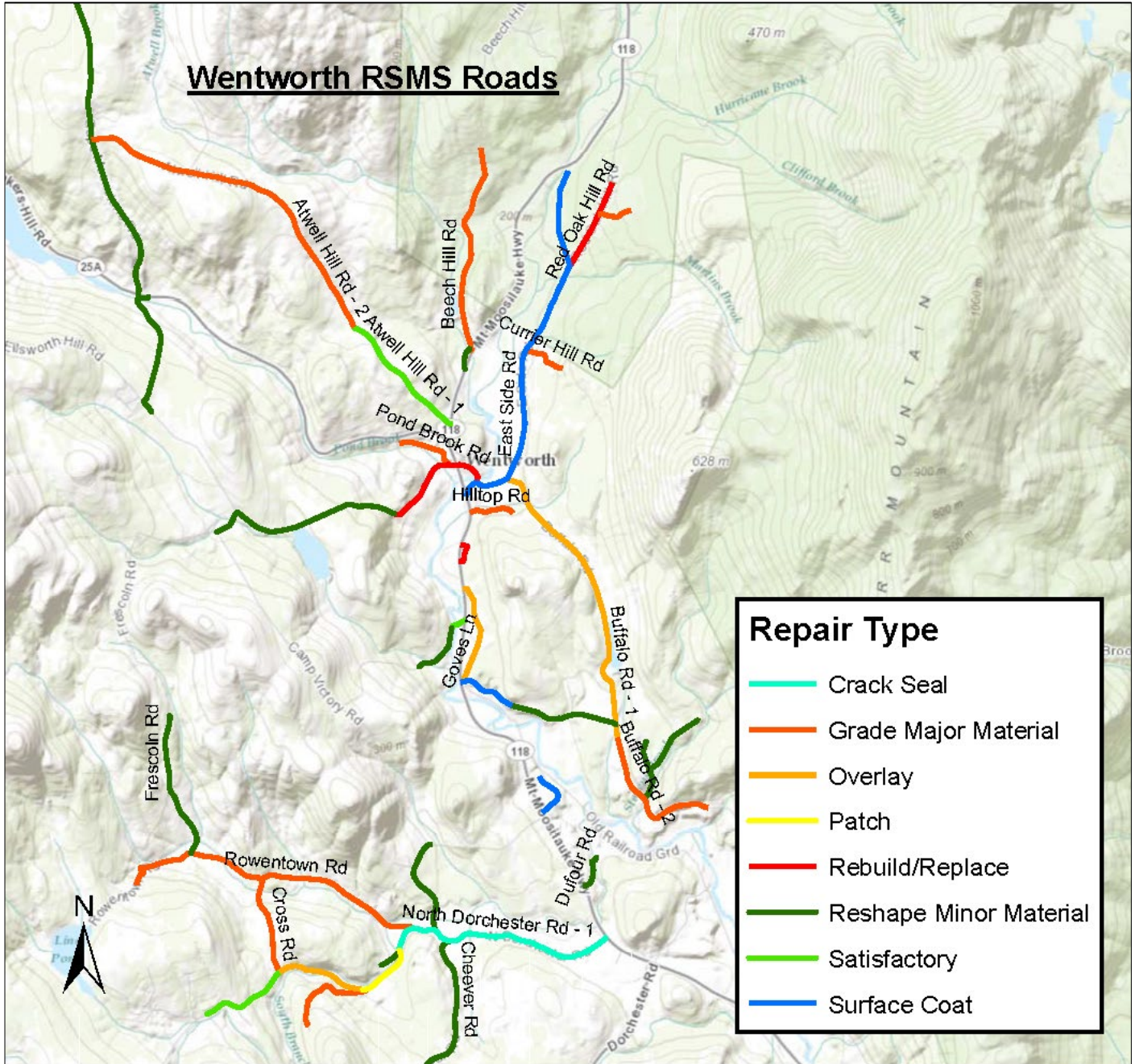
## Town of Wentworth, NH



# Recommended Repairs by Category

## Town of Wentworth, NH

### Appendix D: Budget Overview



## Annual Cost by Repair Category

The annual costs of repairs groupd by repair category. Note that the costs shown reflect the sum of the repairs selected for each asset individually regardless of if they are recommended or not.

RSMS - Total Budget

Repair Category	Cost Yr 1	2	3	4	5	6	7	8	9	10
Crack Seal		\$0.00	\$0.00	\$0.00	\$0.00	\$5,292.08	\$0.00	\$0.00	\$0.00	\$6,432.56
Grade Major Material	\$12,346.69	\$12,964.03	\$24,948.07	\$14,749.57	\$21,002.09	\$15,757.86	\$28,344.03	\$19,527.70	\$25,505.09	\$28,284.44
Overlay	\$40,914.06	\$45,354.86	\$0.00	\$0.00	\$0.00	\$52,217.86	\$27,030.36	\$32,397.97	\$0.00	\$0.00
Patch	\$0.00	\$0.00	\$0.00	\$0.00	\$6,927.31	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Rebuild/Replace	\$0.00	\$0.00	\$40,740.88	\$57,819.28	\$64,624.76	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Reshape Minor Material	\$15,653.03	\$16,435.69	\$17,257.47	\$18,120.34	\$19,026.36	\$19,977.68	\$20,976.56	\$22,025.39	\$23,126.66	\$24,282.99
Satisfactory	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Surface Coat	\$9,413.51	\$1,562.88	\$1,418.90	\$10,897.32	\$1,809.23	\$0.00	\$0.00	\$0.00	\$15,809.51	\$0.00
<b>Total</b>	<b>82,473.78</b>	<b>76,317.45</b>	<b>84,365.33</b>	<b>101,586.51</b>	<b>113,389.74</b>	<b>93,245.47</b>	<b>76,350.96</b>	<b>73,951.07</b>	<b>64,441.26</b>	<b>58,999.99</b>

# Appendix E: Repairs and Cost by Year

**Table 6: Repairs for Year 1**

Year 1		
Road Name	Repair	Cost
Atwell Hill Rd - 2	Minor Reshape Annual Maintenance	\$3,219.47
Auguste Rd	Minor Reshape Annual Maintenance	\$992.39
Beech Hill Rd	Minor Reshape Annual Maintenance	\$1,478.23
Buffalo Rd - 1	1.5in HMA overlay	\$40,914.06
Buffalo Rd - 2	Minor Reshape Annual Maintenance	\$1,379.61
Camp Victory Rd	Minor Reshape Annual Maintenance	\$278.52
Cape Moonshine Rd	Minor Reshape Annual Maintenance	\$3,113.87
Cheever Rd	Minor Reshape Annual Maintenance	\$2,038.87
Cross Rd	Minor Reshape Annual Maintenance	\$918.77
Currier Hill Rd	Minor Reshape Annual Maintenance	\$306.04
Dufour Rd	Minor Reshape Annual Maintenance	\$239.99
East Side Rd	Ditch, fill/seal cracks	\$9,413.51
Ellsworth Hill Rd - 2	Minor Reshape Annual Maintenance	\$1,558.50
Ephraim Page Rd	Minor Reshape Annual Maintenance	\$208.85
Evans Rd	Minor Reshape Annual Maintenance	\$219.12
Frescoln Rd	Minor Reshape Annual Maintenance	\$1,701.90
Hilltop Rd	Minor Reshape Annual Maintenance	\$311.95
Libbey Rd	Minor Reshape Annual Maintenance	\$236.72
Nichols Hill Rd	Minor Reshape Annual Maintenance	\$1,611.33
North Dorchester Rd - 1	Fill/seal cracks	\$4,146.48
Pond Brook Rd	Minor Reshape Annual Maintenance	\$683.35
Rowentown Rd	Minor Reshape Annual Maintenance	\$2,949.69
Saunders Hill Rd - 2	Minor Reshape Annual Maintenance	\$525.91
Thayer Mountain Rd	Minor Reshape Annual Maintenance	\$1,169.19
Turner Rd - 2	Minor Reshape Annual Maintenance	\$1,133.50
Vlk Mountain Rd	Minor Reshape Annual Maintenance	\$862.85
Zoe Rd	Minor Reshape Annual Maintenance	\$861.10
<b>Total Cost for Year 1:</b>		<b>\$82,473.78</b>

**Table 7: Year 2 Repairs**

Year 2		
Road Name	Repair	Cost
Atwell Hill Rd - 2	Minor Reshape Annual Maintenance	\$3,380.45
Auguste Rd	Minor Reshape Annual Maintenance	\$1,042.01
Beech Hill Rd	Minor Reshape Annual Maintenance	\$1,552.14
Buffalo Rd - 2	Minor Reshape Annual Maintenance	\$1,448.59
Camp Victory Rd	Minor Reshape Annual Maintenance	\$292.45
Cape Moonshine Rd	Minor Reshape Annual Maintenance	\$3,269.56
Cheever Rd	Minor Reshape Annual Maintenance	\$2,140.81
Cross Rd	Minor Reshape Annual Maintenance	\$964.71
Currier Hill Rd	Minor Reshape Annual Maintenance	\$321.34
Dufour Rd	Minor Reshape Annual Maintenance	\$251.99
Ellsworth Hill Rd - 2	Minor Reshape Annual Maintenance	\$1,636.43
Ephraim Page Rd	Minor Reshape Annual Maintenance	\$219.29
Evans Rd	Minor Reshape Annual Maintenance	\$230.08
Frescoln Rd	Minor Reshape Annual Maintenance	\$1,787.00
Goves Ln	1.5in HMA overlay	\$24,175.86
Hilltop Rd	Minor Reshape Annual Maintenance	\$327.55
Libbey Rd	Minor Reshape Annual Maintenance	\$248.56
Nichols Hill Rd	Minor Reshape Annual Maintenance	\$1,691.89
North Dorchester Rd - 3	1.5in HMA overlay	\$21,178.99
Pond Brook Rd	Minor Reshape Annual Maintenance	\$717.52
Rowentown Rd	Minor Reshape Annual Maintenance	\$3,097.18
Saunders Hill Rd - 2	Minor Reshape Annual Maintenance	\$552.20
Thayer Mountain Rd	Minor Reshape Annual Maintenance	\$1,227.65
Turner Rd - 1	Ditch, fill/seal cracks	\$1,562.88
Turner Rd - 2	Minor Reshape Annual Maintenance	\$1,190.17
Vlk Mountain Rd	Minor Reshape Annual Maintenance	\$905.99
Zoe Rd	Minor Reshape Annual Maintenance	\$904.15
<b>Total Cost for Year 2:</b>		<b>\$76,317.45</b>

**Table 8: Year 3 Repairs**

Year 3		
Road Name	Repair	Cost
Atwell Hill Rd - 2	Regrade Gravel	\$9,465.25
Auguste Rd	Minor Reshape Annual Maintenance	\$1,094.12
Beech Hill Rd	Minor Reshape Annual Maintenance	\$1,629.75
Browns Ln	Ditch, replace 6in base, 2in surface	\$19,252.63
Buffalo Rd - 2	Minor Reshape Annual Maintenance	\$1,521.02
Camp Victory Rd	Minor Reshape Annual Maintenance	\$307.07
Cape Moonshine Rd	Minor Reshape Annual Maintenance	\$3,433.04
Cheever Rd	Minor Reshape Annual Maintenance	\$2,247.85
Cross Rd	Minor Reshape Annual Maintenance	\$1,012.94
Currier Hill Rd	Minor Reshape Annual Maintenance	\$337.41
Dufour Rd	Minor Reshape Annual Maintenance	\$264.59
Ellsworth Hill Rd - 2	Minor Reshape Annual Maintenance	\$1,718.25
Ephraim Page Rd	Minor Reshape Annual Maintenance	\$230.26
Evans Rd	Minor Reshape Annual Maintenance	\$241.58
Frescoln Rd	Minor Reshape Annual Maintenance	\$1,876.35
Hilltop Rd	Minor Reshape Annual Maintenance	\$343.92
Libbey Rd	Minor Reshape Annual Maintenance	\$260.99
Lookaway Ln	Ditch, fill/seal cracks	\$1,418.90
Nichols Hill Rd	Minor Reshape Annual Maintenance	\$1,776.49
Pond Brook Rd	Minor Reshape Annual Maintenance	\$753.39
Rowentown Rd	Regrade Gravel	\$8,672.10
Saunders Hill Rd - 2	Minor Reshape Annual Maintenance	\$579.81
Thayer Mountain Rd	Minor Reshape Annual Maintenance	\$1,289.03
Turner Rd - 2	Minor Reshape Annual Maintenance	\$1,249.68
Vlk Mountain Rd	Minor Reshape Annual Maintenance	\$951.29
Wentworth Village Rd	Ditch, replace 6in base, 2in surface	\$21,488.25
Zoe Rd	Minor Reshape Annual Maintenance	\$949.36
<b>Total Cost for Year 3:</b>		<b>\$84,365.33</b>

**Table 9: Year 4 Repairs**

Year 4		
Road Name	Repair	Cost
Atwell Hill Rd - 2	Minor Reshape Annual Maintenance	\$3,726.94
Auguste Rd	Minor Reshape Annual Maintenance	\$1,148.82
Beech Hill Rd	Minor Reshape Annual Maintenance	\$1,711.23
Buffalo Rd - 2	Minor Reshape Annual Maintenance	\$1,597.07
Camp Victory Rd	Minor Reshape Annual Maintenance	\$322.42
Cape Moonshine Rd	Minor Reshape Annual Maintenance	\$3,604.69
Cheever Rd	Minor Reshape Annual Maintenance	\$2,360.24
Cross Rd	Minor Reshape Annual Maintenance	\$1,063.59
Currier Hill Rd	Minor Reshape Annual Maintenance	\$354.28
Dufour Rd	Minor Reshape Annual Maintenance	\$277.82
East Side Rd	Ditch, fill/seal cracks	\$10,897.32
Ellsworth Hill Rd - 2	Minor Reshape Annual Maintenance	\$1,804.16
Ephraim Page Rd	Minor Reshape Annual Maintenance	\$241.77
Evans Rd	Minor Reshape Annual Maintenance	\$253.66
Frescoln Rd	Minor Reshape Annual Maintenance	\$1,970.16
Hilltop Rd	Minor Reshape Annual Maintenance	\$361.12
Libbey Rd	Regrade Gravel	\$730.77
Nichols Hill Rd	Minor Reshape Annual Maintenance	\$1,865.31
North Dorchester Rd - 4	Defer maintenance	\$0.00
Pond Brook Rd	Minor Reshape Annual Maintenance	\$791.06
Red Oak Hill Rd	Ditch, replace 6in base, 2in surface	\$57,819.28
Rowentown Rd	Minor Reshape Annual Maintenance	\$3,414.64
Saunders Hill Rd - 2	Minor Reshape Annual Maintenance	\$608.81
Thayer Mountain Rd	Minor Reshape Annual Maintenance	\$1,353.48
Turner Rd - 2	Minor Reshape Annual Maintenance	\$1,312.17
Vlk Mountain Rd	Minor Reshape Annual Maintenance	\$998.86
Zoe Rd	Minor Reshape Annual Maintenance	\$996.83
<b>Total Cost for Year 4:</b>		<b>\$101,586.51</b>



**Table 10: Year 5 Repairs**

Year 5		
Road Name	Repair	Cost
Atwell Hill Rd - 2	Minor Reshape Annual Maintenance	\$3,913.29
Auguste Rd	Minor Reshape Annual Maintenance	\$1,206.26
Beech Hill Rd	Regrade Gravel	\$4,791.46
Buffalo Rd - 2	Minor Reshape Annual Maintenance	\$1,676.93
Camp Victory Rd	Minor Reshape Annual Maintenance	\$338.54
Cape Moonshine Rd	Minor Reshape Annual Maintenance	\$3,784.92
Cheever Rd	Minor Reshape Annual Maintenance	\$2,478.25
Cross Rd	Minor Reshape Annual Maintenance	\$1,116.77
Currier Hill Rd	Regrade Gravel	\$991.97
Dufour Rd	Minor Reshape Annual Maintenance	\$291.71
Ellsworth Hill Rd - 1	Ditch, replace 6in base, 2in surface	\$64,624.76
Ellsworth Hill Rd - 2	Minor Reshape Annual Maintenance	\$1,894.37
Ephraim Page Rd	Minor Reshape Annual Maintenance	\$253.86
Evans Rd	Minor Reshape Annual Maintenance	\$266.34
Frescoln Rd	Minor Reshape Annual Maintenance	\$2,068.67
Hilltop Rd	Regrade Gravel	\$1,011.14
Libbey Rd	Minor Reshape Annual Maintenance	\$287.74
Nichols Hill Rd	Minor Reshape Annual Maintenance	\$1,958.58
North Dorchester Rd - 2	Hot Mix Patch	\$6,927.31
Pond Brook Rd	Minor Reshape Annual Maintenance	\$830.62
Rowentown Rd	Minor Reshape Annual Maintenance	\$3,585.37
Saunders Hill Rd - 1	Defer maintenance	\$0.00
Saunders Hill Rd - 2	Minor Reshape Annual Maintenance	\$639.25
Thayer Mountain Rd	Minor Reshape Annual Maintenance	\$1,421.15
Turner Rd - 1	Ditch, fill/seal cracks	\$1,809.23
Turner Rd - 2	Minor Reshape Annual Maintenance	\$1,377.77
Vlk Mountain Rd	Regrade Gravel	\$2,796.81
Zoe Rd	Minor Reshape Annual Maintenance	\$1,046.67
<b>Total Cost for Year 5:</b>		<b>\$113,389.74</b>

**Table 11: Year 6 Repairs**

Year 6		
Road Name	Repair	Cost
Atwell Hill Rd - 1	Defer maintenance	\$0.00
Atwell Hill Rd - 2	Minor Reshape Annual Maintenance	\$4,108.96
Auguste Rd	Minor Reshape Annual Maintenance	\$1,266.58
Beech Hill Rd	Minor Reshape Annual Maintenance	\$1,886.64
Buffalo Rd - 1	1.5in HMA overlay	\$52,217.86
Buffalo Rd - 2	Minor Reshape Annual Maintenance	\$1,760.77
Camp Victory Rd	Minor Reshape Annual Maintenance	\$355.47
Cape Moonshine Rd	Minor Reshape Annual Maintenance	\$3,974.17
Cheever Rd	Minor Reshape Annual Maintenance	\$2,602.17
Cross Rd	Minor Reshape Annual Maintenance	\$1,172.61
Currier Hill Rd	Minor Reshape Annual Maintenance	\$390.59
Dufour Rd	Minor Reshape Annual Maintenance	\$306.30
Ellsworth Hill Rd - 2	Minor Reshape Annual Maintenance	\$1,989.09
Ephraim Page Rd	Minor Reshape Annual Maintenance	\$266.55
Evans Rd	Minor Reshape Annual Maintenance	\$279.66
Frescoln Rd	Minor Reshape Annual Maintenance	\$2,172.11
Hilltop Rd	Minor Reshape Annual Maintenance	\$398.14
Libbey Rd	Minor Reshape Annual Maintenance	\$302.13
Nichols Hill Rd	Minor Reshape Annual Maintenance	\$2,056.51
North Dorchester Rd - 1	Fill/seal cracks	\$6,432.56
Pond Brook Rd	Minor Reshape Annual Maintenance	\$872.15
Rowentown Rd	Minor Reshape Annual Maintenance	\$3,764.64
Saunders Hill Rd - 2	Minor Reshape Annual Maintenance	\$671.21
Thayer Mountain Rd	Minor Reshape Annual Maintenance	\$1,492.21
Turner Rd - 2	Minor Reshape Annual Maintenance	\$1,446.66
Vlk Mountain Rd	Minor Reshape Annual Maintenance	\$1,101.24
Zoe Rd	Minor Reshape Annual Maintenance	\$1,099.00
<b>Total Cost for Year 6:</b>		<b>\$94,385.95</b>

**Table 12: Year 7 Repairs**

Year 7		
Road Name	Repair	Cost
Atwell Hill Rd - 2	Regrade Gravel	\$11,505.08
Auguste Rd	Minor Reshape Annual Maintenance	\$1,329.90
Beech Hill Rd	Minor Reshape Annual Maintenance	\$1,980.97
Buffalo Rd - 2	Regrade Gravel	\$4,930.17
Camp Victory Rd	Minor Reshape Annual Maintenance	\$373.25
Cape Moonshine Rd	Minor Reshape Annual Maintenance	\$4,172.88
Cheever Rd	Minor Reshape Annual Maintenance	\$2,732.27
Cross Rd	Minor Reshape Annual Maintenance	\$1,231.24
Currier Hill Rd	Minor Reshape Annual Maintenance	\$410.12
Dufour Rd	Minor Reshape Annual Maintenance	\$321.61
Ellsworth Hill Rd - 2	Minor Reshape Annual Maintenance	\$2,088.54
Ephraim Page Rd	Minor Reshape Annual Maintenance	\$279.88
Evans Rd	Minor Reshape Annual Maintenance	\$293.64
Frescoln Rd	Minor Reshape Annual Maintenance	\$2,280.71
Hilltop Rd	Minor Reshape Annual Maintenance	\$418.04
Libbey Rd	Minor Reshape Annual Maintenance	\$317.23
Nichols Hill Rd	Minor Reshape Annual Maintenance	\$2,159.33
North Dorchester Rd - 3	1.5in HMA overlay	\$27,030.36
Pond Brook Rd	Regrade Gravel	\$2,442.01
Rowentown Rd	Minor Reshape Annual Maintenance	\$3,952.87
Saunders Hill Rd - 2	Minor Reshape Annual Maintenance	\$704.77
Thayer Mountain Rd	Minor Reshape Annual Maintenance	\$1,566.82
Turner Rd - 2	Minor Reshape Annual Maintenance	\$1,519.00
Vlk Mountain Rd	Minor Reshape Annual Maintenance	\$1,156.30
Zoe Rd	Minor Reshape Annual Maintenance	\$1,153.95
<b>Total Cost for Year 7:</b>		<b>\$76,350.96</b>

**Table 13: Year 8 Repairs**

Year 8		
Road Name	Repair	Cost
Atwell Hill Rd - 2	Minor Reshape Annual Maintenance	\$4,530.12
Auguste Rd	Minor Reshape Annual Maintenance	\$1,396.40
Beech Hill Rd	Minor Reshape Annual Maintenance	\$2,080.02
Buffalo Rd - 2	Minor Reshape Annual Maintenance	\$1,941.25
Camp Victory Rd	Minor Reshape Annual Maintenance	\$391.91
Cape Moonshine Rd	Minor Reshape Annual Maintenance	\$4,381.52
Cheever Rd	Minor Reshape Annual Maintenance	\$2,868.89
Cross Rd	Regrade Gravel	\$3,447.47
Currier Hill Rd	Minor Reshape Annual Maintenance	\$430.62
Dufour Rd	Minor Reshape Annual Maintenance	\$337.69
Ellsworth Hill Rd - 2	Minor Reshape Annual Maintenance	\$2,192.97
Ephraim Page Rd	Minor Reshape Annual Maintenance	\$293.87
Evans Rd	Minor Reshape Annual Maintenance	\$308.33
Frescoln Rd	Minor Reshape Annual Maintenance	\$2,394.75
Goves Ln	1.5in HMA overlay	\$32,397.97
Hilltop Rd	Minor Reshape Annual Maintenance	\$438.94
Libbey Rd	Minor Reshape Annual Maintenance	\$333.09
Nichols Hill Rd	Minor Reshape Annual Maintenance	\$2,267.30
Pond Brook Rd	Minor Reshape Annual Maintenance	\$961.54
Rowentown Rd	Minor Reshape Annual Maintenance	\$4,150.52
Saunders Hill Rd - 2	Minor Reshape Annual Maintenance	\$740.01
Thayer Mountain Rd	Minor Reshape Annual Maintenance	\$1,645.16
Turner Rd - 2	Minor Reshape Annual Maintenance	\$1,594.95
Vlk Mountain Rd	Minor Reshape Annual Maintenance	\$1,214.12
Zoe Rd	Minor Reshape Annual Maintenance	\$1,211.65
<b>Total Cost for Year 8:</b>		<b>\$73,951.07</b>

**Table 14: Year 9 Repairs**

Year 9		
Road Name	Repair	Cost
Atwell Hill Rd - 2	Minor Reshape Annual Maintenance	\$4,756.63
Auguste Rd	Minor Reshape Annual Maintenance	\$1,466.22
Beech Hill Rd	Minor Reshape Annual Maintenance	\$2,184.02
Buffalo Rd - 2	Minor Reshape Annual Maintenance	\$2,038.32
Camp Victory Rd	Minor Reshape Annual Maintenance	\$411.50
Cape Moonshine Rd	Minor Reshape Annual Maintenance	\$4,600.60
Cheever Rd	Minor Reshape Annual Maintenance	\$3,012.33
Cross Rd	Minor Reshape Annual Maintenance	\$1,357.44
Currier Hill Rd	Minor Reshape Annual Maintenance	\$452.16
Dufour Rd	Minor Reshape Annual Maintenance	\$354.58
East Side Rd	Ditch, fill/seal cracks	\$13,908.05
Ellsworth Hill Rd - 2	Minor Reshape Annual Maintenance	\$2,302.62
Ephraim Page Rd	Minor Reshape Annual Maintenance	\$308.56
Evans Rd	Minor Reshape Annual Maintenance	\$323.74
Frescoln Rd	Minor Reshape Annual Maintenance	\$2,514.48
Hilltop Rd	Minor Reshape Annual Maintenance	\$460.89
Libbey Rd	Minor Reshape Annual Maintenance	\$349.75
Lookaway Ln	Ditch, fill/seal cracks	\$1,901.46
Nichols Hill Rd	Minor Reshape Annual Maintenance	\$2,380.67
Pond Brook Rd	Minor Reshape Annual Maintenance	\$1,009.62
Rowentown Rd	Regrade Gravel	\$11,621.44
Saunders Hill Rd - 2	Minor Reshape Annual Maintenance	\$777.01
Thayer Mountain Rd	Minor Reshape Annual Maintenance	\$1,727.42
Turner Rd - 2	Minor Reshape Annual Maintenance	\$1,674.69
Vlk Mountain Rd	Minor Reshape Annual Maintenance	\$1,274.83
Zoe Rd	Minor Reshape Annual Maintenance	\$1,272.23
<b>Total Cost for Year 9:</b>		<b>\$64,441.26</b>

**Table 15: Year 10 Repairs**

Year 10		
Road Name	Repair	Cost
Atwell Hill Rd - 2	Regrade Gravel	\$13,318.56
Auguste Rd	Minor Reshape Annual Maintenance	\$1,539.53
Beech Hill Rd	Minor Reshape Annual Maintenance	\$2,293.22
Buffalo Rd - 2	Minor Reshape Annual Maintenance	\$2,140.23
Camp Victory Rd	Minor Reshape Annual Maintenance	\$432.08
Cape Moonshine Rd	Minor Reshape Annual Maintenance	\$4,830.63
Cheever Rd	Minor Reshape Annual Maintenance	\$3,162.95
Cross Rd	Minor Reshape Annual Maintenance	\$1,425.31
Currier Hill Rd	Minor Reshape Annual Maintenance	\$474.76
Dufour Rd	Minor Reshape Annual Maintenance	\$372.31
Ellsworth Hill Rd - 2	Minor Reshape Annual Maintenance	\$2,417.75
Ephraim Page Rd	Minor Reshape Annual Maintenance	\$323.99
Evans Rd	Minor Reshape Annual Maintenance	\$339.93
Frescoln Rd	Minor Reshape Annual Maintenance	\$2,640.21
Hilltop Rd	Regrade Gravel	\$1,290.50
Libbey Rd	Minor Reshape Annual Maintenance	\$367.24
Nichols Hill Rd	Minor Reshape Annual Maintenance	\$2,499.70
North Dorchester Rd - 1	Fill/seal cracks	\$5,292.08
Pond Brook Rd	Minor Reshape Annual Maintenance	\$1,060.10
Rowentown Rd	Minor Reshape Annual Maintenance	\$4,575.94
Saunders Hill Rd - 2	Minor Reshape Annual Maintenance	\$815.86
Thayer Mountain Rd	Minor Reshape Annual Maintenance	\$1,813.79
Turner Rd - 2	Minor Reshape Annual Maintenance	\$1,758.43
Vlk Mountain Rd	Minor Reshape Annual Maintenance	\$1,338.57
Zoe Rd	Minor Reshape Annual Maintenance	\$1,335.85
<b>Total Cost for Year 10:</b>		<b>\$57,859.51</b>

## Appendix F: Repairs & Costs by Road

**Table 16: Asset Repairs and Costs, Grouped by Asset**

UID Year	Road_Section_Name Repair	Cost	Length
<b>1</b>	<b>Buffalo Rd - 1</b>		<b>11119.1775139</b>
1	1.5in HMA overlay	\$40,914.06	
6	1.5in HMA overlay	\$52,217.86	
	<b>Total Cost:</b>	<b>\$93,131.91</b>	
<b>2</b>	<b>Pond Brook Rd</b>		<b>2169.36517244</b>
1	Minor Reshape Annual Maintenance	\$683.35	
2	Minor Reshape Annual Maintenance	\$717.52	
3	Minor Reshape Annual Maintenance	\$753.39	
4	Minor Reshape Annual Maintenance	\$791.06	
5	Minor Reshape Annual Maintenance	\$830.62	
6	Minor Reshape Annual Maintenance	\$872.15	
7	Regrade Gravel	\$2,442.01	
8	Minor Reshape Annual Maintenance	\$961.54	
9	Minor Reshape Annual Maintenance	\$1,009.62	
10	Minor Reshape Annual Maintenance	\$1,060.10	
	<b>Total Cost:</b>	<b>\$10,121.36</b>	
<b>3</b>	<b>Goves Ln</b>		<b>3754.43052835</b>
2	1.5in HMA overlay	\$24,175.86	
8	1.5in HMA overlay	\$32,397.97	
	<b>Total Cost:</b>	<b>\$56,573.83</b>	
<b>4</b>	<b>Turner Rd - 2</b>		<b>3998.23091374</b>
1	Minor Reshape Annual Maintenance	\$1,133.50	
2	Minor Reshape Annual Maintenance	\$1,190.17	
3	Minor Reshape Annual Maintenance	\$1,249.68	
4	Minor Reshape Annual Maintenance	\$1,312.17	
5	Minor Reshape Annual Maintenance	\$1,377.77	
6	Minor Reshape Annual Maintenance	\$1,446.66	
7	Minor Reshape Annual Maintenance	\$1,519.00	
8	Minor Reshape Annual Maintenance	\$1,594.95	
9	Minor Reshape Annual Maintenance	\$1,674.69	
10	Minor Reshape Annual Maintenance	\$1,758.43	
	<b>Total Cost:</b>	<b>\$14,257.02</b>	
<b>5</b>	<b>Cape Moonshine Rd</b>		<b>12356.6104802</b>
1	Minor Reshape Annual Maintenance	\$3,113.87	
2	Minor Reshape Annual Maintenance	\$3,269.56	
3	Minor Reshape Annual Maintenance	\$3,433.04	
4	Minor Reshape Annual Maintenance	\$3,604.69	
5	Minor Reshape Annual Maintenance	\$3,784.92	
6	Minor Reshape Annual Maintenance	\$3,974.17	
7	Minor Reshape Annual Maintenance	\$4,172.88	
8	Minor Reshape Annual Maintenance	\$4,381.52	
9	Minor Reshape Annual Maintenance	\$4,600.60	
10	Minor Reshape Annual Maintenance	\$4,830.63	
	<b>Total Cost:</b>	<b>\$39,165.87</b>	
<b>6</b>	<b>Red Oak Hill Rd</b>		<b>3397.71909377</b>
4	Ditch, replace 6in base, 2in surface	\$57,819.28	
	<b>Total Cost:</b>	<b>\$57,819.28</b>	



<b>7</b>	<b>Currier Hill Rd</b>		<b>1619.24080139</b>
1	Minor Reshape Annual Maintenance	\$306.04	
2	Minor Reshape Annual Maintenance	\$321.34	
3	Minor Reshape Annual Maintenance	\$337.41	
4	Minor Reshape Annual Maintenance	\$354.28	
5	Regrade Gravel	\$991.97	
6	Minor Reshape Annual Maintenance	\$390.59	
7	Minor Reshape Annual Maintenance	\$410.12	
8	Minor Reshape Annual Maintenance	\$430.62	
9	Minor Reshape Annual Maintenance	\$452.16	
10	Minor Reshape Annual Maintenance	\$474.76	
	<b>Total Cost:</b>	<b>\$4,469.28</b>	
<b>8</b>	<b>Ellsworth Hill Rd - 1</b>		<b>3214.93266986</b>
5	Ditch, replace 6in base, 2in surface	\$64,624.76	
	<b>Total Cost:</b>	<b>\$64,624.76</b>	
<b>9</b>	<b>Wentworth Village Rd</b>		<b>1178.5623353</b>
3	Ditch, replace 6in base, 2in surface	\$21,488.25	
	<b>Total Cost:</b>	<b>\$21,488.25</b>	
<b>10</b>	<b>Beech Hill Rd</b>		<b>7821.31545736</b>
1	Minor Reshape Annual Maintenance	\$1,478.23	
2	Minor Reshape Annual Maintenance	\$1,552.14	
3	Minor Reshape Annual Maintenance	\$1,629.75	
4	Minor Reshape Annual Maintenance	\$1,711.23	
5	Regrade Gravel	\$4,791.46	
6	Minor Reshape Annual Maintenance	\$1,886.64	
7	Minor Reshape Annual Maintenance	\$1,980.97	
8	Minor Reshape Annual Maintenance	\$2,080.02	
9	Minor Reshape Annual Maintenance	\$2,184.02	
10	Minor Reshape Annual Maintenance	\$2,293.22	
	<b>Total Cost:</b>	<b>\$21,587.66</b>	
<b>11</b>	<b>Atwell Hill Rd - 1</b>		<b>5122.68178306</b>
6	Defer maintenance	\$0.00	
	<b>Total Cost:</b>	<b>\$0.00</b>	
<b>12</b>	<b>East Side Rd</b>		<b>13792.6922006</b>
1	Ditch, fill/seal cracks	\$9,413.51	
4	Ditch, fill/seal cracks	\$10,897.32	
9	Ditch, fill/seal cracks	\$13,908.05	
	<b>Total Cost:</b>	<b>\$34,218.88</b>	
<b>13</b>	<b>Nichols Hill Rd</b>		<b>5115.32738901</b>
1	Minor Reshape Annual Maintenance	\$1,611.33	
2	Minor Reshape Annual Maintenance	\$1,691.89	
3	Minor Reshape Annual Maintenance	\$1,776.49	
4	Minor Reshape Annual Maintenance	\$1,865.31	
5	Minor Reshape Annual Maintenance	\$1,958.58	
6	Minor Reshape Annual Maintenance	\$2,056.51	
7	Minor Reshape Annual Maintenance	\$2,159.33	
8	Minor Reshape Annual Maintenance	\$2,267.30	
9	Minor Reshape Annual Maintenance	\$2,380.67	
10	Minor Reshape Annual Maintenance	\$2,499.70	
	<b>Total Cost:</b>	<b>\$20,267.11</b>	
<b>14</b>	<b>Lookaway Ln</b>		<b>1885.69359244</b>
3	Ditch, fill/seal cracks	\$1,418.90	
9	Ditch, fill/seal cracks	\$1,901.46	
	<b>Total Cost:</b>	<b>\$3,320.37</b>	

<b>15</b>	<b>Auguste Rd</b>		<b>2625.38273048</b>
1	Minor Reshape Annual Maintenance	\$992.39	
2	Minor Reshape Annual Maintenance	\$1,042.01	
3	Minor Reshape Annual Maintenance	\$1,094.12	
4	Minor Reshape Annual Maintenance	\$1,148.82	
5	Minor Reshape Annual Maintenance	\$1,206.26	
6	Minor Reshape Annual Maintenance	\$1,266.58	
7	Minor Reshape Annual Maintenance	\$1,329.90	
8	Minor Reshape Annual Maintenance	\$1,396.40	
9	Minor Reshape Annual Maintenance	\$1,466.22	
10	Minor Reshape Annual Maintenance	\$1,539.53	
	<b>Total Cost:</b>	<b>\$12,482.23</b>	
<b>16</b>	<b>Rowentown Rd</b>		<b>11705.1331866</b>
1	Minor Reshape Annual Maintenance	\$2,949.69	
2	Minor Reshape Annual Maintenance	\$3,097.18	
3	Regrade Gravel	\$8,672.10	
4	Minor Reshape Annual Maintenance	\$3,414.64	
5	Minor Reshape Annual Maintenance	\$3,585.37	
6	Minor Reshape Annual Maintenance	\$3,764.64	
7	Minor Reshape Annual Maintenance	\$3,952.87	
8	Minor Reshape Annual Maintenance	\$4,150.52	
9	Regrade Gravel	\$11,621.44	
10	Minor Reshape Annual Maintenance	\$4,575.94	
	<b>Total Cost:</b>	<b>\$49,784.39</b>	
<b>17</b>	<b>Vlk Mountain Rd</b>		<b>3424.01716244</b>
1	Minor Reshape Annual Maintenance	\$862.85	
2	Minor Reshape Annual Maintenance	\$905.99	
3	Minor Reshape Annual Maintenance	\$951.29	
4	Minor Reshape Annual Maintenance	\$998.86	
5	Regrade Gravel	\$2,796.81	
6	Minor Reshape Annual Maintenance	\$1,101.24	
7	Minor Reshape Annual Maintenance	\$1,156.30	
8	Minor Reshape Annual Maintenance	\$1,214.12	
9	Minor Reshape Annual Maintenance	\$1,274.83	
10	Minor Reshape Annual Maintenance	\$1,338.57	
	<b>Total Cost:</b>	<b>\$12,600.87</b>	
<b>18</b>	<b>Zoe Rd</b>		<b>2278.03706174</b>
1	Minor Reshape Annual Maintenance	\$861.10	
2	Minor Reshape Annual Maintenance	\$904.15	
3	Minor Reshape Annual Maintenance	\$949.36	
4	Minor Reshape Annual Maintenance	\$996.83	
5	Minor Reshape Annual Maintenance	\$1,046.67	
6	Minor Reshape Annual Maintenance	\$1,099.00	
7	Minor Reshape Annual Maintenance	\$1,153.95	
8	Minor Reshape Annual Maintenance	\$1,211.65	
9	Minor Reshape Annual Maintenance	\$1,272.23	
10	Minor Reshape Annual Maintenance	\$1,335.85	
	<b>Total Cost:</b>	<b>\$10,830.80</b>	

<b>19</b>	<b>Dufour Rd</b>		<b>1269.79611517</b>
1	Minor Reshape Annual Maintenance	\$239.99	
2	Minor Reshape Annual Maintenance	\$251.99	
3	Minor Reshape Annual Maintenance	\$264.59	
4	Minor Reshape Annual Maintenance	\$277.82	
5	Minor Reshape Annual Maintenance	\$291.71	
6	Minor Reshape Annual Maintenance	\$306.30	
7	Minor Reshape Annual Maintenance	\$321.61	
8	Minor Reshape Annual Maintenance	\$337.69	
9	Minor Reshape Annual Maintenance	\$354.58	
10	Minor Reshape Annual Maintenance	\$372.31	
	<b>Total Cost:</b>	<b>\$3,018.59</b>	
<b>20</b>	<b>Evans Rd</b>		<b>869.531079679</b>
1	Minor Reshape Annual Maintenance	\$219.12	
2	Minor Reshape Annual Maintenance	\$230.08	
3	Minor Reshape Annual Maintenance	\$241.58	
4	Minor Reshape Annual Maintenance	\$253.66	
5	Minor Reshape Annual Maintenance	\$266.34	
6	Minor Reshape Annual Maintenance	\$279.66	
7	Minor Reshape Annual Maintenance	\$293.64	
8	Minor Reshape Annual Maintenance	\$308.33	
9	Minor Reshape Annual Maintenance	\$323.74	
10	Minor Reshape Annual Maintenance	\$339.93	
	<b>Total Cost:</b>	<b>\$2,756.09</b>	
<b>21</b>	<b>Thayer Mountain Rd</b>		<b>3711.70370415</b>
1	Minor Reshape Annual Maintenance	\$1,169.19	
2	Minor Reshape Annual Maintenance	\$1,227.65	
3	Minor Reshape Annual Maintenance	\$1,289.03	
4	Minor Reshape Annual Maintenance	\$1,353.48	
5	Minor Reshape Annual Maintenance	\$1,421.15	
6	Minor Reshape Annual Maintenance	\$1,492.21	
7	Minor Reshape Annual Maintenance	\$1,566.82	
8	Minor Reshape Annual Maintenance	\$1,645.16	
9	Minor Reshape Annual Maintenance	\$1,727.42	
10	Minor Reshape Annual Maintenance	\$1,813.79	
	<b>Total Cost:</b>	<b>\$14,705.90</b>	
<b>22</b>	<b>Cross Rd</b>		<b>3645.91197858</b>
1	Minor Reshape Annual Maintenance	\$918.77	
2	Minor Reshape Annual Maintenance	\$964.71	
3	Minor Reshape Annual Maintenance	\$1,012.94	
4	Minor Reshape Annual Maintenance	\$1,063.59	
5	Minor Reshape Annual Maintenance	\$1,116.77	
6	Minor Reshape Annual Maintenance	\$1,172.61	
7	Minor Reshape Annual Maintenance	\$1,231.24	
8	Regrade Gravel	\$3,447.47	
9	Minor Reshape Annual Maintenance	\$1,357.44	
10	Minor Reshape Annual Maintenance	\$1,425.31	
	<b>Total Cost:</b>	<b>\$13,710.86</b>	

<b>23</b>	<b>Hilltop Rd</b>		<b>1650.52816165</b>
1	Minor Reshape Annual Maintenance	\$311.95	
2	Minor Reshape Annual Maintenance	\$327.55	
3	Minor Reshape Annual Maintenance	\$343.92	
4	Minor Reshape Annual Maintenance	\$361.12	
5	Regrade Gravel	\$1,011.14	
6	Minor Reshape Annual Maintenance	\$398.14	
7	Minor Reshape Annual Maintenance	\$418.04	
8	Minor Reshape Annual Maintenance	\$438.94	
9	Minor Reshape Annual Maintenance	\$460.89	
10	Regrade Gravel	\$1,290.50	
	<b>Total Cost:</b>	<b>\$5,362.19</b>	
<b>24</b>	<b>Cheever Rd</b>		<b>6472.58828175</b>
1	Minor Reshape Annual Maintenance	\$2,038.87	
2	Minor Reshape Annual Maintenance	\$2,140.81	
3	Minor Reshape Annual Maintenance	\$2,247.85	
4	Minor Reshape Annual Maintenance	\$2,360.24	
5	Minor Reshape Annual Maintenance	\$2,478.25	
6	Minor Reshape Annual Maintenance	\$2,602.17	
7	Minor Reshape Annual Maintenance	\$2,732.27	
8	Minor Reshape Annual Maintenance	\$2,868.89	
9	Minor Reshape Annual Maintenance	\$3,012.33	
10	Minor Reshape Annual Maintenance	\$3,162.95	
	<b>Total Cost:</b>	<b>\$25,644.63</b>	
<b>25</b>	<b>Browns Ln</b>		<b>950.351261513</b>
3	Ditch, replace 6in base, 2in surface	\$19,252.63	
	<b>Total Cost:</b>	<b>\$19,252.63</b>	
<b>26</b>	<b>Camp Victory Rd</b>		<b>1105.24321911</b>
1	Minor Reshape Annual Maintenance	\$278.52	
2	Minor Reshape Annual Maintenance	\$292.45	
3	Minor Reshape Annual Maintenance	\$307.07	
4	Minor Reshape Annual Maintenance	\$322.42	
5	Minor Reshape Annual Maintenance	\$338.54	
6	Minor Reshape Annual Maintenance	\$355.47	
7	Minor Reshape Annual Maintenance	\$373.25	
8	Minor Reshape Annual Maintenance	\$391.91	
9	Minor Reshape Annual Maintenance	\$411.50	
10	Minor Reshape Annual Maintenance	\$432.08	
	<b>Total Cost:</b>	<b>\$3,503.21</b>	
<b>27</b>	<b>Ephraim Page Rd</b>		<b>828.76322618</b>
1	Minor Reshape Annual Maintenance	\$208.85	
2	Minor Reshape Annual Maintenance	\$219.29	
3	Minor Reshape Annual Maintenance	\$230.26	
4	Minor Reshape Annual Maintenance	\$241.77	
5	Minor Reshape Annual Maintenance	\$253.86	
6	Minor Reshape Annual Maintenance	\$266.55	
7	Minor Reshape Annual Maintenance	\$279.88	
8	Minor Reshape Annual Maintenance	\$293.87	
9	Minor Reshape Annual Maintenance	\$308.56	
10	Minor Reshape Annual Maintenance	\$323.99	
	<b>Total Cost:</b>	<b>\$2,626.87</b>	

<b>28</b>	<b>Frescoln Rd</b>		<b>5402.86458374</b>
1	Minor Reshape Annual Maintenance	\$1,701.90	
2	Minor Reshape Annual Maintenance	\$1,787.00	
3	Minor Reshape Annual Maintenance	\$1,876.35	
4	Minor Reshape Annual Maintenance	\$1,970.16	
5	Minor Reshape Annual Maintenance	\$2,068.67	
6	Minor Reshape Annual Maintenance	\$2,172.11	
7	Minor Reshape Annual Maintenance	\$2,280.71	
8	Minor Reshape Annual Maintenance	\$2,394.75	
9	Minor Reshape Annual Maintenance	\$2,514.48	
10	Minor Reshape Annual Maintenance	\$2,640.21	
	<b>Total Cost:</b>	<b>\$21,406.34</b>	
<b>29</b>	<b>Libbey Rd</b>		<b>1252.50896748</b>
1	Minor Reshape Annual Maintenance	\$236.72	
2	Minor Reshape Annual Maintenance	\$248.56	
3	Minor Reshape Annual Maintenance	\$260.99	
4	Regrade Gravel	\$730.77	
5	Minor Reshape Annual Maintenance	\$287.74	
6	Minor Reshape Annual Maintenance	\$302.13	
7	Minor Reshape Annual Maintenance	\$317.23	
8	Minor Reshape Annual Maintenance	\$333.09	
9	Minor Reshape Annual Maintenance	\$349.75	
10	Minor Reshape Annual Maintenance	\$367.24	
	<b>Total Cost:</b>	<b>\$3,434.22</b>	
<b>30</b>	<b>Saunders Hill Rd - 1</b>		<b>571.4695944</b>
5	Defer maintenance	\$0.00	
	<b>Total Cost:</b>	<b>\$0.00</b>	
<b>31</b>	<b>North Dorchester Rd - 1</b>		<b>8775.62567983</b>
1	Fill/seal cracks	\$4,146.48	
6	Fill/seal cracks	\$5,292.08	
10	Fill/seal cracks	\$6,432.56	
	<b>Total Cost:</b>	<b>\$15,871.12</b>	
<b>32</b>	<b>North Dorchester Rd - 4</b>		<b>3368.73303856</b>
4	Defer maintenance	\$0.00	
	<b>Total Cost:</b>	<b>\$0.00</b>	
<b>33</b>	<b>North Dorchester Rd - 3</b>		<b>3289.02686732</b>
2	1.5in HMA overlay	\$21,178.99	
7	1.5in HMA overlay	\$27,030.36	
	<b>Total Cost:</b>	<b>\$48,209.36</b>	
<b>34</b>	<b>North Dorchester Rd - 2</b>		<b>2171.09004691</b>
5	Hot Mix Patch	\$6,927.31	
	<b>Total Cost:</b>	<b>\$6,927.31</b>	
<b>35</b>	<b>Saunders Hill Rd - 2</b>		<b>2086.94075843</b>
1	Minor Reshape Annual Maintenance	\$525.91	
2	Minor Reshape Annual Maintenance	\$552.20	
3	Minor Reshape Annual Maintenance	\$579.81	
4	Minor Reshape Annual Maintenance	\$608.81	
5	Minor Reshape Annual Maintenance	\$639.25	
6	Minor Reshape Annual Maintenance	\$671.21	
7	Minor Reshape Annual Maintenance	\$704.77	
8	Minor Reshape Annual Maintenance	\$740.01	
9	Minor Reshape Annual Maintenance	\$777.01	
10	Minor Reshape Annual Maintenance	\$815.86	
	<b>Total Cost:</b>	<b>\$6,614.83</b>	

<b>36</b>	<b>Atwell Hill Rd - 2</b>		<b>12775.6917451</b>
1	Minor Reshape Annual Maintenance	\$3,219.47	
2	Minor Reshape Annual Maintenance	\$3,380.45	
3	Regrade Gravel	\$9,465.25	
4	Minor Reshape Annual Maintenance	\$3,726.94	
5	Minor Reshape Annual Maintenance	\$3,913.29	
6	Minor Reshape Annual Maintenance	\$4,108.96	
7	Regrade Gravel	\$11,505.08	
8	Minor Reshape Annual Maintenance	\$4,530.12	
9	Minor Reshape Annual Maintenance	\$4,756.63	
10	Regrade Gravel	\$13,318.56	
	<b>Total Cost:</b>	<b>\$61,924.76</b>	
<b>37</b>	<b>Ellsworth Hill Rd - 2</b>		<b>6184.53683951</b>
1	Minor Reshape Annual Maintenance	\$1,558.50	
2	Minor Reshape Annual Maintenance	\$1,636.43	
3	Minor Reshape Annual Maintenance	\$1,718.25	
4	Minor Reshape Annual Maintenance	\$1,804.16	
5	Minor Reshape Annual Maintenance	\$1,894.37	
6	Minor Reshape Annual Maintenance	\$1,989.09	
7	Minor Reshape Annual Maintenance	\$2,088.54	
8	Minor Reshape Annual Maintenance	\$2,192.97	
9	Minor Reshape Annual Maintenance	\$2,302.62	
10	Minor Reshape Annual Maintenance	\$2,417.75	
	<b>Total Cost:</b>	<b>\$19,602.69</b>	
<b>38</b>	<b>Turner Rd - 1</b>		<b>2180.88743547</b>
2	Ditch, fill/seal cracks	\$1,562.88	
5	Ditch, fill/seal cracks	\$1,809.23	
	<b>Total Cost:</b>	<b>\$3,372.11</b>	
<b>39</b>	<b>Buffalo Rd - 2</b>		<b>5474.65421961</b>
1	Minor Reshape Annual Maintenance	\$1,379.61	
2	Minor Reshape Annual Maintenance	\$1,448.59	
3	Minor Reshape Annual Maintenance	\$1,521.02	
4	Minor Reshape Annual Maintenance	\$1,597.07	
5	Minor Reshape Annual Maintenance	\$1,676.93	
6	Minor Reshape Annual Maintenance	\$1,760.77	
7	Regrade Gravel	\$4,930.17	
8	Minor Reshape Annual Maintenance	\$1,941.25	
9	Minor Reshape Annual Maintenance	\$2,038.32	
10	Minor Reshape Annual Maintenance	\$2,140.23	
	<b>Total Cost:</b>	<b>\$20,433.98</b>	