

Inventory and Assessment of Road Surfaces

May 18

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Road Inventory and Condition Assessment were performed by Axiomatic, LLC. Inventory and Assessments were collected with a windshield condition survey. Conditions were used to establish repair strategies. Repair strategy and 10 year budget plans have been generated in partnership with the town and are presented within this report.

Hampton
Falls, NH

Axiomatic

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Solution: Road Surface Management System

Hampton Falls has engaged Axiomatic, LLC of Portsmouth New Hampshire to conduct a pavement condition survey and develop a 10 year maintenance strategy. A survey team of civil engineers performed the road condition survey and analysis.

The team performed the following steps:

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 created an inventory of road conditions for all locally maintained roads in a GIS database available through the NHDOT/GRANIT. Repair priority weighting was determined using town-supplied traffic and importance factors. The data was entered into a road surface management application, which generated a prioritized list of maintenance and repair recommendations which has been presented in this report. From this report, town officials can prepare a detailed, comprehensive long-term work and budget plan.

Sections 1, 2, and 3 of this report describe the pavement condition survey procedures used in Hampton Falls. Section 4 provides the conclusions reached as a result of the survey and analysis. The 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 Road Sections

The survey team identified road sections based on changes in road geometry, pavement condition, and traffic volume. 67 sections were defined for the 24.99 miles of paved roads. The sections are listed in Appendix A, along with their condition index. Only locally-maintained roads were included in this study. Unpaved roads have a separate collection system which includes a different set of attributes.

Road Condition Rating

Traditional condition rating of road sections is based on the informal practices typically used by local highway personnel. These practices rely heavily on visual inspections and personal experience to classify pavement condition and schedule maintenance activities. There are several drawbacks to this type of approach; it can be very difficult to properly transfer experience-based knowledge from one person to another and, as a consequence of this, document and objectively explain maintenance decisions to local governing bodies.

This pavement condition assessment and road surface management decision model addresses these issues through a comprehensive condition rating technique based on engineering and management practices. These techniques enable the user to draw objective, consistent, and easy to explain conclusions. In addition, 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. The Road Surface Management Process 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 has shown that users can accurately determine conditions from a vehicle, with closer inspection where necessary. The survey team has driven all locally-maintained roads within the town and assessed conditions for each segment.

Appendix A also contains a summary of results from the Road Condition Survey. Based on the road rating information, the Road Surface Management application assigned every road section to one of five repair strategies. As discussed in the next section, these are used to determine repair alternatives appropriate for each particular road section.

Section II: Prioritizing Hampton Falls 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 projected costs of those repairs. Such a list enables town officials to make budget decisions based on engineering and management principles, and to prepare plans for accomplishment of the needed repairs. The priorities are determined based on a set of factors, listed and discussed below:

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

Frequently, municipal officials set priorities by the “worst first” approach; they assign the most deteriorated roads the highest priorities. These roads are also the most expensive to repair, and as a result, this approach commits a large amount of town funds to a limited number of roads within the town network. This often results in inadequate funds to accomplish the relatively inexpensive preventative and routine maintenance for other road sections having low to moderate deterioration which can have their useful lives extended significantly at a lower cost.

Road condition is one of several factors that local road managers must consider. Other factors include:

- Repair Strategy Ranking: Repair strategies are described in the next section.
- Drainage: Subjectively evaluated as good, fair, or poor during the condition survey.
- Traffic: The volume and heavily-loaded vehicles that normally use the road. The most traveled roads are given the highest value (5) and least traveled the lowest (1) with others evaluated relative to these roads.
- 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 (5) and the least important the lowest (1) with others evaluated relative to these roads.
- Condition: The maximum value of the condition ratings determined during the condition survey as described in Section 1.
- Roughness: Subjectively evaluated as smooth, rough, or very rough during the condition survey.

Priorities of Roads within the Network

The survey team entered the data described above into the Road Surface Management program. The priority list of roads, with applicable repair alternatives, is shown in Appendix B.

Section III: Selection of Repair Alternatives

Inadequate Road Bases

Many local roads in New Hampshire were established in the 18th and 19th centuries. Some of these were initially established as single-track paths, intended for horses, and widened over time to accommodate new types of traffic. Today, they have become primary arteries in contemporary road networks. The majority of these networks were established by the early 20th century. Although mileage has been added to these networks (due to new subdivisions, etc.), newer additions to the road network tend to see less traffic than the older, established routes. Roads established before 1920 were earth or aggregate-surfaced. As traffic volumes increased, the road surfaces deteriorated and demand for paved surfaces grew. From the early 20th century and continuing through the 1960's, the progress of paving of local roads accelerated with the establishment of highway improvement programs. Despite the drive to improve the quality of the local road network during this period, many roads were poorly designed and poorly constructed. Of greatest importance was the failure to provide different gradations for base and surface aggregates.

Silt and clay "fines" in surface aggregate maintain the integrity of the surface of unpaved roads by keeping gravel from shifting 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 and, 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 saturated and soft during the spring and fall 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 greatly accelerates roadway deterioration.

In haste to pave their road network, state and local agencies paved over many miles of surface aggregate. In the limited number of cases where efforts were made to replace 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

Repair Alternatives are divided into 5 alternatives:

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 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.

3. Preventive Maintenance: For paved roads, coating of the surface; chip seals of thin (1 ½ inch) overlays; to prevent or slow further deterioration. For unpaved roads, shaping and grading the road surface, 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 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. Usually an asphalt overlay after surface preparation for a paved road; adding major amounts of gravel to unpaved roads, and reggrading, 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 subbase 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 amount of a municipality's annual budget, and therefore allow too small a budget for routine and preventative maintenance. Their accomplishment, therefore, will best be funded from a capital improvements program.

Assigning Specific Repairs

A set of repair alternatives consistent with the repair strategy for each road section's conditions are presented in the road surface management application. Axiomatic Pavement management specialists select the least cost maintenance alternative. Appendix C is the maintenance summary of road conditions for Hampton Falls' road sections.

The selected repairs are shown in Appendix E. The road sections are listed in priority order for paved locally maintained roads.

Section IV: Conclusion – Routine Maintenance & Capital Improvements

To implement the results, the town should consider routine maintenance and capital improvements. The Estimated repair costs are summarized in table 1 below. A Budget Summary is presented in Appendix C

Table 1: Capital and Operations Budget Projections

Year	Operations Road Maintenance ¹	Capital Improvements ²	Total Budget
1	\$76,476	\$108,890	\$185,366
2	\$40,982	\$174,878	\$215,862
3	\$36,292	\$227,262	\$263,554
4	\$96,893	\$0	\$96,893
5	\$105,444	\$0	\$105,444
6	\$164,341	\$0	\$164,341
7	\$85,398	\$0	\$85,398
8	\$101,499	\$0	\$101,499
9	\$112,343	\$0	\$112,343
10	\$169,972	\$0	\$169,972

Table 2: Condition Index by Year

Year	Pavement Condition Index Before Repairs	Pavement Condition Index After Repairs	Budget
0	89.50	89.50	N/A
1	85.92	90.26	\$185,366
2	82.48	90.11	\$215,862
3	79.18	88.23	\$263,554
4	76.02	87.17	\$96,893
5	72.98	88.46	\$105,444
6	70.06	88.34	\$164,341
7	67.25	86.65	\$85,398
8	64.56	86.01	\$101,499
9	61.98	86.02	\$112,343
10	59.50	85.44	\$169,972

¹ Including Patching, Crack Sealing & Surface Coats

² Including Rebuild/Replace and Overlays

Appendix A: Road Inventory and Condition Survey

Road Section Name	Length (feet)	Alligator Cracks	Edge Cracking	Longitudinal & Transverse Cracks	Patching & Potholes	Roughness
Alexis Ln	3929	Low Sev/Low Ext	Low Sev/Low Ext	Low Sev/High Ext	1 - Low (<10% / 5 per 100ft)	2 - Somewhat Rough
Applewood Dr	412	None	None	Low Sev/Low Ext	0 - None	1 - Smooth
Avery Ridge Rd	773	None	None	None	0 - None	1 - Smooth
Baldwin Place	589	None	Low Sev/Low Ext	Low Sev/Med Ext	1 - Low (<10% / 5 per 100ft)	2 - Somewhat Rough
Batchelder Rd	1052	None	None	None	0 - None	1 - Smooth
Birch Rd	589	Low Sev/Low Ext	None	None	0 - None	1 - Smooth
Blakes Ln	1209	Med Sev/Med Ext	Low Sev/Low Ext	None	0 - None	2 - Somewhat Rough
Brimmer Ln	3177	Low Sev/High Ext	Low Sev/Low Ext	Med Sev/Low Ext	1 - Low (<10% / 5 per 100ft)	2 - Somewhat Rough
Brown Rd	1805	Low Sev/Low Ext	Low Sev/Low Ext	None	0 - None	1 - Smooth
Brown Rd - 1	7588	Low Sev/Low Ext	None	None	0 - None	1 - Smooth
Chrystal Dr - 1	581	High Sev/Low Ext	Low Sev/Low Ext	Low Sev/Low Ext	0 - None	2 - Somewhat Rough
Chrystal Dr - 2	753	Low Sev/Low Ext	None	None	0 - None	1 - Smooth
Chrystal Dr - 3	3173	High Sev/Low Ext	Low Sev/Low Ext	Med Sev/Med Ext	1 - Low (<10% / 5 per 100ft)	2 - Somewhat Rough
Cider Hill Rd	590	None	None	None	0 - None	1 - Smooth
Coach Ln	3247	Low Sev/Low Ext	Low Sev/Low Ext	Low Sev/Low Ext	0 - None	2 - Somewhat Rough
Coburn Woods Rd	687	None	None	None	0 - None	1 - Smooth
Crank Rd - 2	1915	None	None	None	0 - None	1 - Smooth
Crank Rd - 1	3734	Med Sev/Med Ext	Low Sev/Med Ext	Low Sev/Low Ext	1 - Low (<10% / 5 per 100ft)	3 - Rough
Crestview Dr	507	None	Low Sev/Low Ext	Low Sev/Low Ext	0 - None	1 - Smooth
Curtis Rd	2608	Med Sev/Low Ext	Low Sev/Low Ext	None	0 - None	2 - Somewhat Rough
Depot Rd	3823	Low Sev/Low Ext	Low Sev/Med Ext	None	1 - Low (<10% / 5 per 100ft)	1 - Smooth
Dodge Rd	1458	Low Sev/Low Ext	Low Sev/Low Ext	Med Sev/Med Ext	2 - Medium (10-30% / <10 per 100ft)	2 - Somewhat Rough
Drinkwater Rd	15676	Med Sev/Med Ext	Low Sev/Low Ext	Low Sev/Low Ext	3 - High (30+% / 1+ per 100ft)	2 - Somewhat Rough
Elton Ln	684	None	None	Low Sev/Low Ext	0 - None	1 - Smooth
Evergreen Dr	1869	Low Sev/High Ext	Low Sev/Low Ext	Low Sev/Med Ext	1 - Low (<10% / 5 per 100ft)	2 - Somewhat Rough
Fieldstone Ln	1133	None	None	None	0 - None	1 - Smooth
Frying Pan Ln	2308	Low Sev/Med Ext	Low Sev/Low Ext	None	1 - Low (<10% / 5 per 100ft)	2 - Somewhat Rough
Glenwood Dr	1259	Low Sev/Low Ext	None	None	0 - None	1 - Smooth
Goodwin Rd - 1	970	Med Sev/Med Ext	Low Sev/Low Ext	None	0 - None	2 - Somewhat Rough
Goodwin Rd - 2	1853	Low Sev/Low Ext	Low Sev/Low Ext	None	0 - None	1 - Smooth
Gov Powell Dr	903	None	Low Sev/Low Ext	Low Sev/Low Ext	0 - None	1 - Smooth
Hardy Rd	700	None	None	None	0 - None	1 - Smooth
Hillcrest Dr	1207	Low Sev/Low Ext	None	Med Sev/Med Ext	1 - Low (<10% / 5 per 100ft)	2 - Somewhat Rough
Janvrin Ln	429	None	Low Sev/Low Ext	Low Sev/Low Ext	0 - None	1 - Smooth

Road Section Name	Length (feet)	Alligator Cracks	Edge Cracking	Longitudinal & Transverse Cracks	Patching & Potholes	Roughness
King St	2962	Low Sev/Low Ext	None	Low Sev/Med Ext	0 - None	1 - Smooth
Linden Rd	7140	None	None	None	0 - None	1 - Smooth
Maple Rd	332	None	Low Sev/Med Ext	None	0 - None	1 - Smooth
Marsh Ln	1131	Low Sev/Low Ext	None	Low Sev/Low Ext	0 - None	1 - Smooth
Marston Rd	2541	None	None	None	0 - None	1 - Smooth
Marthas Ct	1385	None	Low Sev/Low Ext	Low Sev/High Ext	0 - None	2 - Somewhat Rough
McAllister Ln	358	None	None	None	0 - None	1 - Smooth
Meadow Ln	1131	None	Low Sev/Low Ext	None	0 - None	1 - Smooth
Merchant Rd	753	Low Sev/Low Ext	Low Sev/Low Ext	None	0 - None	1 - Smooth
Merrill Rd	708	Med Sev/Med Ext	Low Sev/Low Ext	None	0 - None	2 - Somewhat Rough
Mill Lane Rd	2396	Low Sev/Low Ext	Low Sev/Low Ext	Low Sev/Med Ext	1 - Low (<10% / 5 per 100ft)	1 - Smooth
Nason Rd	1622	Low Sev/Med Ext	None	None	0 - None	1 - Smooth
Nason Rd	5557	High Sev/Med Ext	Low Sev/Low Ext	Low Sev/Low Ext	3 - High (30+% / 1-+ per 100ft)	2 - Somewhat Rough
Oak Dr	1331	Low Sev/Med Ext	Low Sev/Low Ext	Low Sev/Low Ext	0 - None	1 - Smooth
Old Stage Rd	3802	Low Sev/Low Ext	Low Sev/Low Ext	Med Sev/Med Ext	1 - Low (<10% / 5 per 100ft)	2 - Somewhat Rough
Orchard Dr	1015	Low Sev/Low Ext	Low Sev/Low Ext	Low Sev/Med Ext	0 - None	1 - Smooth
Parsonage Rd	1440	Low Sev/Low Ext	Low Sev/Low Ext	Low Sev/Low Ext	0 - None	1 - Smooth
Pelton way	277	None	None	None	0 - None	1 - Smooth
Penhollow Ln	601	None	Low Sev/Low Ext	Low Sev/Low Ext	1 - Low (<10% / 5 per 100ft)	1 - Smooth
Prescott Ln	2725	Low Sev/Low Ext	Low Sev/Med Ext	Med Sev/Med Ext	1 - Low (<10% / 5 per 100ft)	2 - Somewhat Rough
River Rd	1789	Low Sev/Med Ext	Low Sev/Low Ext	Low Sev/Med Ext	0 - None	1 - Smooth
Sanborn Rd	5100	Low Sev/High Ext	Low Sev/Low Ext	Low Sev/Low Ext	0 - None	1 - Smooth
Stard Rd	2133	Low Sev/Med Ext	Low Sev/Low Ext	Low Sev/Low Ext	1 - Low (<10% / 5 per 100ft)	2 - Somewhat Rough
Starvish Ln	943	None	None	None	0 - None	1 - Smooth
Surrey Ln	818	Low Sev/Low Ext	None	Med Sev/Med Ext	1 - Low (<10% / 5 per 100ft)	2 - Somewhat Rough
Swain Dr	992	None	None	None	0 - None	1 - Smooth
Taylor River Rd	1007	None	None	None	0 - None	1 - Smooth
Toppan Ln	940	Low Sev/Med Ext	None	None	1 - Low (<10% / 5 per 100ft)	1 - Smooth
Towle Rd	1251	Low Sev/Low Ext	None	Low Sev/Low Ext	0 - None	1 - Smooth
Victoria Dr	2419	Med Sev/Med Ext	Med Sev/Med Ext	Low Sev/Low Ext	1 - Low (<10% / 5 per 100ft)	2 - Somewhat Rough
Wadleigh Ln	620	None	None	None	0 - None	1 - Smooth
Whittier Dr	705	Low Sev/Low Ext	None	Low Sev/Med Ext	0 - None	1 - Smooth
Woodlawn Rd	883	None	None	None	0 - None	1 - Smooth

Appendix B: Repair Categories in Priority Order

PRIORITY	Condition Index	UID	Road Section Name	Length (Feet)	Repair Category
600	83	28	Frying Pan Ln	2308	Surface Coat
600	95	19	Nason Rd	1622	Surface Coat
600	80	29	Hillcrest Dr	1207	Surface Coat
600	82	39	Marthas Ct	1385	Surface Coat
600	91	62	Oak Dr	1331	Surface Coat
600	78	11	Alexis Ln	3929	Surface Coat
600	81	8	Stard Rd	2133	Surface Coat
600	75	18	Brimmer Ln	3177	Surface Coat
600	93	53	Toppan Ln	940	Surface Coat
600	80	38	Surrey Ln	818	Surface Coat
600	78	41	Old Stage Rd	3802	Surface Coat
600	72	73	Chrystal Dr -3	3173	Surface Coat
600	88	51	Sanborn Rd	5100	Surface Coat
600	75	59	Evergreen Dr	1869	Surface Coat
600	88	9	River Rd	1789	Surface Coat
600	75	6	Prescott Ln	2725	Surface Coat
500	100	61	Cider Hill Rd	590	Patch - Future
500	100	13	Starvish Ln	943	Patch - Future
500	94	21	Parsonage Rd	1440	Patch - Future
500	100	48	Coburn Woods Rd	687	Patch - Future
500	100	25	Fieldstone Ln	1133	Patch - Future
500	98	49	Birch Rd	589	Patch - Future
500	93	22	Whittier Dr	705	Patch - Future
500	96	37	Gov Powell Dr	903	Patch - Future
500	89	24	Mill Lane Rd	2396	Patch - Future
500	100	1	Crank Rd - 2	1915	Patch - Future
500	100	70	Pelton way	277	Patch - Future
500	80	71	Chrystal Dr - 1	581	Patch
500	91	2	Depot Rd	3823	Patch - Future
500	86	60	Coach Ln	3247	Patch - Future
500	98	7	Meadow Ln	1131	Patch - Future
500	98	20	Glenwood Dr	1259	Patch - Future
500	100	30	Woodlawn Rd	883	Patch - Future
500	95	34	Maple Rd	332	Patch - Future
500	96	40	Crestview Dr	507	Patch - Future
500	96	56	Janvrin Ln	429	Patch - Future
500	96	54	Marsh Ln	1131	Patch - Future
500	96	33	Brown Rd	1805	Patch - Future
500	100	15	Batchelder Rd	1052	Patch - Future
500	100	23	Avery Ridge Rd	773	Patch - Future
500	96	42	Towle Rd	1251	Patch - Future
500	100	45	Marston Rd	2541	Patch - Future
500	100	63	Swain Dr	992	Patch - Future
500	100	12	Taylor River Rd	1007	Patch - Future
500	85	35	Curtis Rd	2608	Patch - Future
500	98	31	Applewood Dr	412	Patch - Future
500	100	36	McAllister Ln	358	Patch - Future
500	98	50	Brown Rd - 1	7588	Patch - Future

PRIORITY	Condition Index	UID	Road Section Name	Length (Feet)	Repair Category
500	100	68	Wadleigh Ln	620	Patch – Future
500	100	69	Hardy Rd	700	Patch – Future
500	98	72	Chrystal Dr - 2	753	Patch – Future
500	96	75	Goodwin Rd - 2	1853	Patch – Future
500	100	14	Linden Rd	7140	Patch – Future
500	91	16	Orchard Dr	1015	Patch – Future
500	83	44	Baldwin Place	589	Patch – Future
500	94	3	Penhollow Ln	601	Patch – Future
500	98	46	Elton Ln	684	Patch – Future
500	93	17	King St	2962	Patch – Future
500	96	5	Merchant Rd	753	Patch – Future
400	53	64	Frying Pan Ln	262	Grade Major Material
400	63	26	Nason Rd	5557	Overlay
400	82	74	Goodwin Rd - 1	970	Overlay
400	82	57	Merrill Rd	708	Overlay
400	72	55	Victoria Dr	2419	Overlay
400	82	65	Blakes Ln	1209	Overlay
400	69	43	Crank Rd -1	3734	Overlay
400	66	4	Drinkwater Rd	15676	Overlay
250	75	58	Dodge Rd	1458	Rebuild
600	83	28	Frying Pan Ln	2308	Surface Coat
600	95	19	Nason Rd	1622	Surface Coat
600	80	29	Hillcrest Dr	1207	Surface Coat
600	82	39	Marthas Ct	1385	Surface Coat
600	91	62	Oak Dr	1331	Surface Coat
600	78	11	Alexis Ln	3929	Surface Coat
600	81	8	Stard Rd	2133	Surface Coat

Appendix C: Repairs Ordered by Year (Years 1-6)

Table 3: Repairs for Year 1

Road Name	Repair	Cost
Prescott Ln	Ditch, fill/seal cracks	\$1,860
Stard Rd	Ditch, fill/seal cracks	\$1,456
River Rd	Ditch, fill/seal cracks	\$1,221
Alexis Ln	Ditch, fill/seal cracks	\$2,682
Brimmer Ln	Chip seal, Double	\$25,686
Nason Rd	1.5in HMA overlay	\$61,343
Frying Pan Ln	Ditch, fill/seal cracks	\$1,575
Hillcrest Dr	Ditch, fill/seal cracks	\$824
Curtis Rd	Hot Mix Patch	\$9,584
Surrey Ln	Chip seal, Double	\$11,337
Marthas Ct	Ditch, fill/seal cracks	\$945
Old Stage Rd	Ditch, fill/seal cracks	\$2,595
Baldwin Place	Hot Mix Patch	\$3,711
Victoria Dr	2in HMA overlay	\$47,548
Evergreen Dr	Ditch, fill/seal cracks	\$1,276
Frying Pan Ln	Add major gravel, regrade	\$5,898
Chrystal Dr - 1	Hot Mix Patch	\$3,660
Chrystal Dr -3	Ditch, fill/seal cracks	\$2,166
Total:		\$ 185,366

Table 4: Year 2 Repairs

Road Name	Repair	Cost
Mill Lane Rd	Hot Mix Patch	\$15,850
Crank Rd -1	1.5in HMA overlay	\$48,089
Sanborn Rd	Ditch, fill/seal cracks	\$3,655
Merrill Rd	1.5in HMA overlay	\$8,206
Dodge Rd	Recondition surface/base	\$106,091
Coach Ln	Hot Mix Patch	\$21,479
Goodwin Rd - 1	1.5in HMA overlay	\$12,492
Total:		\$ 215,862

Table 5: Year 3 Repairs

Road Name	Repair	Cost
Depot Rd	Hot Mix Patch	\$17,702
Drinkwater Rd	1.5in HMA overlay	\$211,979
Orchard Dr	Hot Mix Patch	\$7,050
Oak Dr	Ditch, fill/seal cracks	\$1,002
Frying Pan Ln	Add major gravel, regrade	\$6,503
Blakes Ln	2in HMA overlay	\$15,283
Chrystal Dr - 1	Hot Mix Patch	\$4,035
Total:		\$ 263,554

Table 6: Year 4 Repairs

Road Name	Repair	Cost
Alexis Ln	Ditch, fill/seal cracks	\$3,104
Parsonage Rd	Hot Mix Patch	\$7,876
Whittier Dr	Hot Mix Patch	\$5,142
Maple Rd	Hot Mix Patch	\$2,018
Curtis Rd	Hot Mix Patch	\$11,095
Crestview Dr	Hot Mix Patch	\$3,389
Old Stage Rd	Ditch, fill/seal cracks	\$3,004
Towle Rd	Hot Mix Patch	\$7,603
Baldwin Place	Hot Mix Patch	\$4,296
Brown Rd - 1	Hot Mix Patch	\$46,116
Toppan Ln	Ditch, fill/seal cracks	\$743
Alexis Ln	Ditch, fill/seal cracks	\$3,104
Parsonage Rd	Hot Mix Patch	\$7,876
Total:		\$ 96,893

Table 7: Year 5 Repairs

Road Name	Repair	Cost
Penhollow Ln	Hot Mix Patch	\$4,602
Merchant Rd	Hot Mix Patch	\$5,286
Prescott Ln	Ditch, fill/seal cracks	\$2,261
Meadow Ln	Hot Mix Patch	\$6,496
Stard Rd	Ditch, fill/seal cracks	\$1,770
King St	Hot Mix Patch	\$15,121
Nason Rd	Ditch, fill/seal cracks	\$1,346
Glenwood Dr	Hot Mix Patch	\$8,838
Frying Pan Ln	Ditch, fill/seal cracks	\$1,915
Applewood Dr	Hot Mix Patch	\$3,155
Brown Rd	Hot Mix Patch	\$11,518
Gov Powell Dr	Hot Mix Patch	\$6,915
Marthas Ct	Ditch, fill/seal cracks	\$1,149
Elton Ln	Hot Mix Patch	\$4,801
Birch Rd	Hot Mix Patch	\$4,510
Marsh Ln	Hot Mix Patch	\$3,609
Janvrin Ln	Hot Mix Patch	\$3,011
Evergreen Dr	Ditch, fill/seal cracks	\$1,550
Chrystal Dr - 2	Hot Mix Patch	\$5,766
Goodwin Rd - 2	Hot Mix Patch	\$11,825
Total:		\$ 105,444

Table 8: Year 6 Repairs

Road Name	Repair	Cost
Crank Rd - 2	Hot Mix Patch	\$12,831
Starvish Ln	Hot Mix Patch	\$7,582
Linden Rd	Hot Mix Patch	\$57,410
Batchelder Rd	Hot Mix Patch	\$8,459
Avery Ridge Rd	Hot Mix Patch	\$6,215
Hillcrest Dr	Ditch, fill/seal cracks	\$1,051
Woodlawn Rd	Hot Mix Patch	\$6,508
McAllister Ln	Hot Mix Patch	\$2,879
Coburn Woods Rd	Hot Mix Patch	\$5,524
Coach Ln	Hot Mix Patch	\$26,108
Cider Hill Rd	Hot Mix Patch	\$4,744
Swain Dr	Hot Mix Patch	\$7,976
Wadleigh Ln	Hot Mix Patch	\$4,985
Hardy Rd	Hot Mix Patch	\$5,628
Pelton way	Hot Mix Patch	\$1,769
Total:		\$ 164,341

Appendix D: Repairs & Costs by Road

Asset Repairs and Cost Grouped By Asset

UID	Road_Section_Name	End_Milepost	From_Street	To_Street
Year	Repair			Cost
64	Frying Pan Ln	0		
1	Add major gravel, regrade			\$5,898.14
3	Add major gravel, regrade			\$6,502.70
8	Add major gravel, regrade			\$8,299.28
			Total Cost:	\$20,700.13
28	Frying Pan Ln	0		
1	Ditch, fill/seal cracks			\$1,575.21
5	Ditch, fill/seal cracks			\$1,914.68
			Total Cost:	\$3,489.89
19	Nason Rd	0		
5	Ditch, fill/seal cracks			\$1,345.58
			Total Cost:	\$1,345.58
26	Nason Rd	0		
1	1.5in HMA overlay			\$61,342.51
			Total Cost:	\$61,342.51
61	Cider Hill Rd	0		
6	Hot Mix Patch			\$4,743.94
10	Hot Mix Patch			\$5,766.29
			Total Cost:	\$10,510.23
29	Hillcrest Dr	0		
1	Ditch, fill/seal cracks			\$823.78
6	Ditch, fill/seal cracks			\$1,051.37
			Total Cost:	\$1,875.15

UID	Road_Section_Name	End_Milepost	From_Street	To_Street
	Year	Repair		Cost
13		Starvish Ln	0	
	6	Hot Mix Patch		\$7,582.26
			Total Cost:	\$7,582.26
21		Parsonage Rd	0	
	4	Hot Mix Patch		\$7,876.48
	8	Hot Mix Patch		\$9,573.91
			Total Cost:	\$17,450.39
48		Coburn Woods Rd	0	
	6	Hot Mix Patch		\$5,523.87
	10	Hot Mix Patch		\$6,714.30
			Total Cost:	\$12,238.18
39		Marthas Ct	0	
	1	Ditch, fill/seal cracks		\$945.26
	5	Ditch, fill/seal cracks		\$1,148.97
			Total Cost:	\$2,094.23
25		Fieldstone Ln	0	
	7	Hot Mix Patch		\$9,565.47
			Total Cost:	\$9,565.47
62		Oak Dr	0	
	3	Ditch, fill/seal cracks		\$1,001.52
			Total Cost:	\$1,001.52
49		Birch Rd	0	
	5	Hot Mix Patch		\$4,510.38
	9	Hot Mix Patch		\$5,482.39
			Total Cost:	\$9,992.77

UID	Road_Section_Name	End_Milepost	From_Street	To_Street
	Year	Repair		Cost
11		Alexis Ln		0
	1	Ditch, fill/seal cracks		\$2,681.54
	4	Ditch, fill/seal cracks		\$3,104.22
	10	Ditch, fill/seal cracks		\$4,159.95
		Total Cost:		\$9,945.72
22		Whittier Dr		0
	4	Hot Mix Patch		\$5,141.59
	9	Hot Mix Patch		\$6,562.12
		Total Cost:		\$11,703.71
37		Gov Powell Dr		0
	5	Hot Mix Patch		\$6,914.89
	9	Hot Mix Patch		\$8,405.10
		Total Cost:		\$15,319.99
24		Mill Lane Rd		0
	2	Hot Mix Patch		\$15,849.54
	7	Hot Mix Patch		\$20,228.48
		Total Cost:		\$36,078.02
1		Crank Rd - 2		0
	6	Hot Mix Patch		\$12,831.42
	10	Hot Mix Patch		\$15,596.67
		Total Cost:		\$28,428.08
70		Pelton way		0
	6	Hot Mix Patch		\$1,768.93
	10	Hot Mix Patch		\$2,150.14
		Total Cost:		\$3,919.07

UID	Road_Section_Name	End_Milepost	From_Street	To_Street
	Year	Repair		Cost
71		Chrystal Dr - 1		0
	1	Hot Mix Patch		\$3,660.30
	3	Hot Mix Patch		\$4,035.48
	6	Hot Mix Patch		\$4,671.57
	10	Hot Mix Patch		\$5,678.33
			Total Cost:	\$18,045.68
74		Goodwin Rd - 1		0
	2	1.5in HMA overlay		\$12,492.22
			Total Cost:	\$12,492.22
8		Stard Rd		0
	1	Ditch, fill/seal cracks		\$1,455.77
	5	Ditch, fill/seal cracks		\$1,769.50
	9	Ditch, fill/seal cracks		\$2,150.84
			Total Cost:	\$5,376.11
58		Dodge Rd		0
	2	Recondition surface/base		\$106,091.37
			Total Cost:	\$106,091.37
18		Brimmer Ln		0
	1	Chip seal, Double		\$25,686.05
	7	Ditch, fill/seal cracks		\$2,905.73
			Total Cost:	\$28,591.78
2		Depot Rd		0
	3	Hot Mix Patch		\$17,702.40
	8	Hot Mix Patch		\$22,593.25
			Total Cost:	\$40,295.65

UID	Road_Section_Name	End_Milepost	From_Street	To_Street
	Year	Repair		Cost
60		Coach Ln	0	
	2	Hot Mix Patch		\$21,478.91
	6	Hot Mix Patch		\$26,107.74
	10	Hot Mix Patch		\$31,734.13
			Total Cost:	\$79,320.77
57		Merrill Rd	0	
	2	1.5in HMA overlay		\$8,206.23
			Total Cost:	\$8,206.23
7		Meadow Ln	0	
	5	Hot Mix Patch		\$6,495.64
	9	Hot Mix Patch		\$7,895.49
			Total Cost:	\$14,391.12
20		Glenwood Dr	0	
	5	Hot Mix Patch		\$8,837.61
	9	Hot Mix Patch		\$10,742.17
			Total Cost:	\$19,579.78
30		Woodlawn Rd	0	
	6	Hot Mix Patch		\$6,508.17
	9	Hot Mix Patch		\$7,534.03
			Total Cost:	\$14,042.20
34		Maple Rd	0	
	4	Hot Mix Patch		\$2,017.74
	8	Hot Mix Patch		\$2,452.58
			Total Cost:	\$4,470.32

UID	Road_Section_Name	End_Milepost	From_Street	To_Street
	Year	Repair		Cost
40		Crestview Dr	0	
	4	Hot Mix Patch		\$3,389.44
	8	Hot Mix Patch		\$4,119.88
			Total Cost:	\$7,509.32
56		Janvrin Ln	0	
	5	Hot Mix Patch		\$3,011.39
	9	Hot Mix Patch		\$3,660.36
			Total Cost:	\$6,671.75
54		Marsh Ln	0	
	5	Hot Mix Patch		\$3,608.69
	8	Hot Mix Patch		\$4,177.51
			Total Cost:	\$7,786.19
33		Brown Rd	0	
	5	Hot Mix Patch		\$11,518.44
	9	Hot Mix Patch		\$14,000.74
			Total Cost:	\$25,519.18
15		Batchelder Rd	0	
	6	Hot Mix Patch		\$8,458.68
	10	Hot Mix Patch		\$10,281.58
			Total Cost:	\$18,740.27
53		Toppan Ln	0	
	4	Ditch, fill/seal cracks		\$742.67
	10	Ditch, fill/seal cracks		\$995.25
			Total Cost:	\$1,737.93

UID	Road_Section_Name	End_Milepost	From_Street	To_Street
	Year	Repair		Cost
23		Avery Ridge Rd		0
	6	Hot Mix Patch		\$6,215.36
	10	Hot Mix Patch		\$7,554.81
			Total Cost:	\$13,770.18
42		Towle Rd		0
	4	Hot Mix Patch		\$7,602.99
	7	Hot Mix Patch		\$8,801.41
			Total Cost:	\$16,404.40
45		Marston Rd		0
	7	Hot Mix Patch		\$21,452.65
			Total Cost:	\$21,452.65
63		Swain Dr		0
	6	Hot Mix Patch		\$7,976.25
			Total Cost:	\$7,976.25
12		Taylor River Rd		0
	7	Hot Mix Patch		\$9,210.18
			Total Cost:	\$9,210.18
38		Surrey Ln		0
	1	Chip seal, Double		\$11,337.48
	8	Ditch, fill/seal cracks		\$785.56
			Total Cost:	\$12,123.04
55		Victoria Dr		0
	1	2in HMA overlay		\$47,547.86
			Total Cost:	\$47,547.86
65		Blakes Ln		0
	3	2in HMA overlay		\$15,283.29
			Total Cost:	\$15,283.29

UID	Road_Section_Name	End_Milepost	From_Street	To_Street
Year	Repair			Cost
35	Curtis Rd	0		
1	Hot Mix Patch			\$9,584.40
4	Hot Mix Patch			\$11,095.14
8	Hot Mix Patch			\$13,486.21
			Total Cost:	\$34,165.75
31	Applewood Dr	0		
5	Hot Mix Patch			\$3,154.97
8	Hot Mix Patch			\$3,652.27
			Total Cost:	\$6,807.24
36	McAllister Ln	0		
6	Hot Mix Patch			\$2,878.53
10	Hot Mix Patch			\$3,498.87
			Total Cost:	\$6,377.39
43	Crank Rd -1	0		
2	1.5in HMA overlay			\$48,088.61
			Total Cost:	\$48,088.61
41	Old Stage Rd	0		
1	Ditch, fill/seal cracks			\$2,594.87
4	Ditch, fill/seal cracks			\$3,003.88
9	Ditch, fill/seal cracks			\$3,833.80
			Total Cost:	\$9,432.54
50	Brown Rd - 1	0		
4	Hot Mix Patch			\$46,116.31
			Total Cost:	\$46,116.31

UID	Road_Section_Name	End_Milepost	From_Street	To_Street
Year	Repair			Cost
68	Wadleigh Ln	0		
6	Hot Mix Patch			\$4,985.16
10	Hot Mix Patch			\$6,059.49
			Total Cost:	\$11,044.64
69	Hardy Rd	0		
6	Hot Mix Patch			\$5,628.40
9	Hot Mix Patch			\$6,515.58
			Total Cost:	\$12,143.98
72	Chrystal Dr - 2	0		
5	Hot Mix Patch			\$5,766.24
9	Hot Mix Patch			\$7,008.90
			Total Cost:	\$12,775.14
73	Chrystal Dr -3	0		
1	Ditch, fill/seal cracks			\$2,165.57
4	Ditch, fill/seal cracks			\$2,506.92
			Total Cost:	\$4,672.49
75	Goodwin Rd - 2	0		
5	Hot Mix Patch			\$11,824.75
9	Hot Mix Patch			\$14,373.06
			Total Cost:	\$26,197.80
14	Linden Rd	0		
6	Hot Mix Patch			\$57,409.70
10	Hot Mix Patch			\$69,781.85
			Total Cost:	\$127,191.54

UID	Road_Section_Name	End_Milepost	From_Street	To_Street
	Year	Repair		Cost
51		Sanborn Rd		0
	2	Ditch, fill/seal cracks		\$3,654.79
	7	Ditch, fill/seal cracks		\$4,664.54
		Total Cost:		\$8,319.33
59		Evergreen Dr		0
	1	Ditch, fill/seal cracks		\$1,275.59
	5	Ditch, fill/seal cracks		\$1,550.49
	8	Ditch, fill/seal cracks		\$1,794.89
		Total Cost:		\$4,620.97
16		Orchard Dr		0
	3	Hot Mix Patch		\$7,049.94
	7	Hot Mix Patch		\$8,569.24
		Total Cost:		\$15,619.18
9		River Rd		0
	1	Ditch, fill/seal cracks		\$1,220.99
	8	Ditch, fill/seal cracks		\$1,718.06
		Total Cost:		\$2,939.05
44		Baldwin Place		0
	1	Hot Mix Patch		\$3,710.70
	4	Hot Mix Patch		\$4,295.60
	8	Hot Mix Patch		\$5,221.33
		Total Cost:		\$13,227.63
3		Penhollow Ln		0
	5	Hot Mix Patch		\$4,602.27
	9	Hot Mix Patch		\$5,594.09
		Total Cost:		\$10,196.36

UID	Road_Section_Name	End_Milepost	From_Street	To_Street
	Year	Repair		Cost
46		Elton Ln		0
	5	Hot Mix Patch		\$4,801.37
	9	Hot Mix Patch		\$5,836.10
			Total Cost:	\$10,637.47
17		King St		0
	5	Hot Mix Patch		\$15,121.38
	8	Hot Mix Patch		\$17,504.89
			Total Cost:	\$32,626.28
6		Prescott Ln		0
	1	Ditch, fill/seal cracks		\$1,859.81
	5	Ditch, fill/seal cracks		\$2,260.61
	9	Ditch, fill/seal cracks		\$2,747.79
			Total Cost:	\$6,868.22
5		Merchant Rd		0
	5	Hot Mix Patch		\$5,285.72
	8	Hot Mix Patch		\$6,118.88
			Total Cost:	\$11,404.60
4		Drinkwater Rd		0
	3	1.5in HMA overlay		\$211,978.82
			Total Cost:	\$211,978.82

