

Town of Chichester

2013 Report of the Road Advisory Committee

Road Advisory Committee

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Chichester Road Network

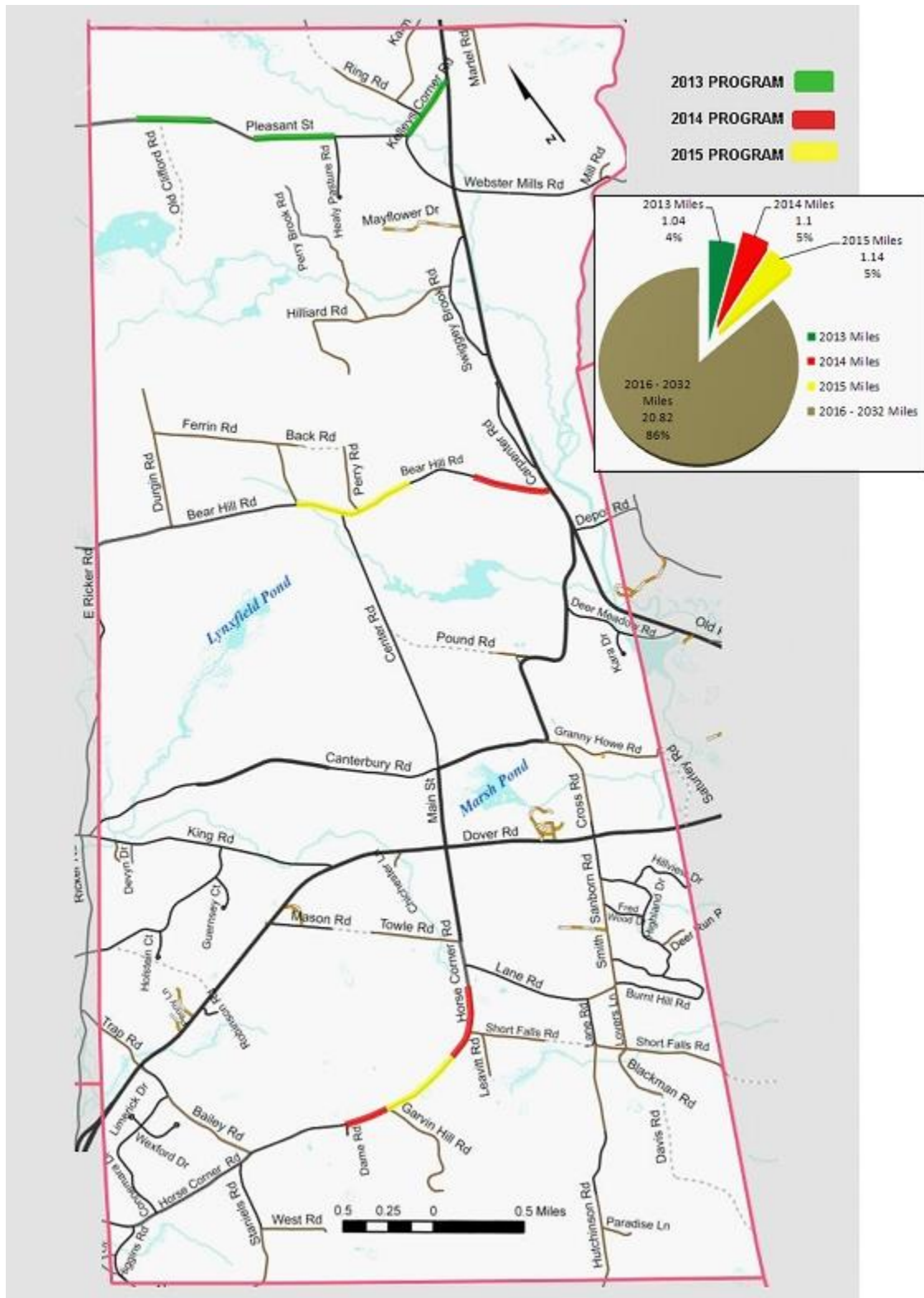


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Executive Summary

The Chichester Road Advisory Committee has worked very hard in 2013 to update its comprehensive Road Management Plan for the town.

The committee's charter currently states that its primary responsibility *"shall be to develop a written Road Management Plan, or update annually any existing Road Management Plan, for the Town of Chichester. The Road Management Plan shall include short-term and long-term repair goals, and shall also identify, develop "best estimate" project costs, prioritize, and establish a schedule for any future roadway reconstruction projects or major repair/upgrading projects."*

The committee of ten members has met often and also worked in teams assessing road conditions throughout town. This information was then entered into a Road Surface Management System (RSMS), which allowed the Committee to further assess the immediate and long-term needs for road repair.

There are 38.1 miles of roads in Chichester that the town is responsible for maintaining. There are 75 paved road segments totaling 24.2 miles and there are 31 gravel road segments totaling 13.9 miles. The average segment is 1/3 mile.

Maintaining paved roads is a complicated process. With an estimated average life of a paved road being 20 years, the town needs to repave 1.2 miles per year to maintain existing conditions on average. At Town Meeting in March 2013 the voters agreed to the first year of such a plan based on the work of this committee. Prior to that decision, the town unfortunately had been doing much less. Existing paved roads were on a 60-70 year repaving cycle. The result was that our paved roads had been deteriorating.

Without regular maintenance and repair, a road's condition that is only fair will quickly deteriorate to poor and need major reconstruction. Unfortunately, as the committee has pointed out, many paved roads in Chichester are already in poor condition and simple maintenance will no longer be cost effective.

The goal of this Committee's plan is to bring all the roads in town to an average or better condition and keep them in this condition for the average 20 year life span. To do this the town will need to significantly improve 1.2 miles of paved roads every year. When a road deteriorates beyond needing preventative maintenance during a 20 year life span it becomes more costly to bring it back to an average condition.

At current costs, the committee estimates that the work to reconstruct and pave 1.2 miles per year is approximately \$384,190.

The committee and Road Agent have created a detailed inventory of roads, road segments, and their conditions, importance, and traffic counts. The Road Agent now uses the computer database (RSMS) to maintain this information. The committee has prepared a plan to maintain and improve the conditions of our paved roads that includes reconstruction of the highest priority segments during the next 2 years.

2014: The committee recommends three road reconstruction projects for completion. These include two segments of the ten town-maintained segments of Horse Corner Road and one segment of Bear Hill Road. These three segments total 1.128 miles. The cost is estimated to be \$362,512.

2015: The committee recommends three road reconstruction projects for completion. These include two segments of Bear Hill Road and one segment of Horse Corner Road. These three segments total 1.148 miles. The cost is estimated to be \$379,969 (in current dollars).

2016 to 2032: The committee recommends that 1.2 miles of paved road reconstruction be completed in each of the subsequent years of the 20 year plan. The committee will make recommendations for specific segments only after completing surveys of road conditions within 12 months of the time work is to be done. Costs in future years will be dependent primarily on the cost of asphalt which can fluctuate considerably. We suggest that our cost estimate of \$375,000 per mile be adjusted by 3% annually to make long-term projections.

It is now up to the citizens of Chichester to decide. Will the town continue to implement our 20 year plan? With guidance from this committee, the Capital Improvement Program Committee, the Budget Committee, and the Board of Selectmen, ultimately the voters at town meeting will be asked to decide how much money will be invested in our paved roads. The Road Advisory Committee urges all voters to understand the tradeoff we face between deteriorating road conditions and a willingness to pay for system-wide repair and upgrading.

Details can be found in the following sections of this report.

1. Introduction

1.A: Legal Basis

The Road Advisory Committee was originally established by a vote of the townspeople at the Chichester Town Meeting held on March 19, 2005. The original warrant article read as follows; *“To see if the town will vote to direct the Selectmen to establish a committee of not less than 7 citizens plus the road agent to prepare a written long term proposal for roads to be delivered to the Selectmen at a public meeting no later than the last week in October 2005”*.

By virtue of the specific language of the warrant article, the article did not call for an annual report or for a continuing committee. Subsequently, the Committee’s charter was amended and updated on February 15, 2011, under the authority of the Board of Selectmen. The changes made to the original charter were; 1) to make this Committee a permanent ‘standing’ committee, 2) minor changes in the membership structure of the Committee, 3) to require an annual ‘Road Management Plan’, and 4) updating the Mission Statement of the original Charter to more accurately define the Committee’s responsibilities so as to work more in concert with the Town’s Capital Improvement Committee.

1.B: Mission of the Committee

The Committee proposed amendments to its Mission Statement last year which were approved by the Board of Selectmen on October 9th, 2012. The first amendment eliminated the constraining time frames on the required short term and long term goals (three years and ten years respectively) which will now provide the Committee the ability to best determine, from year to year, what the Town’s short term and long term time frames should be to meet specific goals

The second amendment eliminated all references in the charter requiring the Committee to determine “maintenance” needs and goals. The Committee recognizes that maintenance work done by the Town’s Highway Department is primarily minor roadwork repairs and upkeep and is day-to-day type of activity funded directly out of the Department’s operating budget and should not be a charge of this Committee to oversee. The Committee believes firmly that the original intent of the establishing warrant article in 2005 was for a committee to assist the Road Agent in the planning of major roadwork projects and establishing short term and long term goals to accomplish the major project work.

The mission statement of the Committee currently states that its primary responsibility *“shall be to develop a written Road Management Plan, or update annually any existing Road Management Plan, for the Town of Chichester. The Road Management Plan shall include short-term and long-term repair goals, and shall also identify, develop “best estimate” project costs, prioritize, and establish a schedule for any future roadway reconstruction projects or major repair/upgrading projects.”*

“The Committee is established to cooperatively promote better road repairs by assisting the Road Agent, Selectmen, Budget Committee, and Capital Improvement Program Committee (CIP) with the evaluation, planning, and scheduling of road work.”

It should be noted that following the change of the Charter this year, which removed the oversight and planning of roadway maintenance work, the Road Agent will be reporting on the yearly maintenance

accomplishments in the Road Agent's report which is included in the annual Town Report. Previously, roadway maintenance accomplishments were reported in the Committee's annual report.

1.C: Committee Membership

The Committee's Charter establishes its membership as consisting of "a minimum of seven (7) members, the Road Agent and one Selectman who shall serve as an ex-officio member of the Committee. The five appointed members shall be appointed by the Board of Selectmen. All appointed members of the Committee shall be residents of the Town of Chichester. It is expected that at least one of the appointed members would have either engineering experience in roadway design/construction or field experience in roadway construction and/or project management."

The current members of the Committee are: Jeff Jordon (Selectman Ex-Officio); Terry McCormack (Chairman); Stan Brehm; David Dobson; Tom Jameson; Richard Millette; Doug Hall; Allen Mayville, Jr.; John Amsden; Philip Hitchcock; Jim Plunkett (Road Agent).

2. Road Surface Management System

2.A: Establishment of Road Segments

The Road Surface Management System software from the Maine Local Roads Center is now in daily use by the Road Agent and helps organize information about Chichester's town roads and budget money for their rehabilitation and maintenance.

One of the first things that had to be done was to divide longer roads into segments based on road condition and/or logical locations. This is necessary to ensure that conditions and needs of one segment of road are not implied to be the same over the entire length of that road. Endpoints of segments may be shifted in one direction or another. Longer segments may be further subdivided. Short adjoining segments with similar conditions may be combined. These changes may be made during the year to reflect changing conditions.

The Road Agent and Committee have considered how best to use in 2014 the same amount of funding voted by the town for road reconstruction in 2013. To accomplish this and to reflect differences in conditions, a small number of road segments have been changed.

2.B: Inventory of Roads

Table 1 on the following pages contains the inventory of town-maintained road segments in Chichester as of December 3, 2013. This inventory shows a total length of 38.1 miles, broken into 106 town maintained road segments.

75 segments are paved and total 24.2 miles while 31 segments are gravel and total 13.9 miles.

This inventory does not include roads in Chichester that are owned and maintained by the State or roads that are privately owned and maintained.

This table contains important information about each road segment. Each segment has an importance ranking from low to high and also has a traffic ranking from low to high. Based on field inspection of actual roadway conditions, a computation in the RSMS software suggests the type of work required to correct deficiencies in that segment's surface.

Each entry in the Surface and Drainage columns of Table 2 also contains a number from 2 through 10. This number represents a calculated combination of the "Traffic" and "Importance" characteristics. A "-10" designates a road segment that is most urgent because it has high traffic and importance ratings. On the other hand, a "-2" designates a road segment with the lowest possible traffic and importance ratings. Numbers 3 through 9 are intermediate.

Table 1

Inventory of Chichester Maintained Road Segments from RSMS									12/3/2013
Road Name	Seg	From	To	Surface	Length	Importance	Traffic	Surface	Drainage
Back Rd	1	Ferrin Rd	Mailbox#15	Gravel	0.140	low	low	Routine-2	Good-2
Bailey Rd	1	US Route 4	Connemara Dr	Paved	0.230	medium	low-med	No Maint-5	Good-5
Bailey Rd	2	Connemara Dr	Horse Corner Rd	Gravel	0.520	medium	low	Routine-4	Poor-4
Bear Hill Rd	1	NH Route 28	#23 pl west	Paved	0.434	high	med-high	Rehabilitate-9	Good-9
Bear Hill Rd	2	#23 pl west	#86 Bear Hill	Paved	0.380	high	med-high	Preventive-9	Poor-9
Bear Hill Rd	3	#86 Bear Hill	Center Road	Paved	0.423	high	med-high	Rehabilitate-9	Good-9
Bear Hill Rd	4	Center Rd	Ferrin Rd	Paved	0.255	med-high	med-high	Preventive-8	Good-8
Bear Hill Rd	5	Ferrin Rd	Brown cemetery	Paved	0.360	med-high	medium	No Maint-7	Good-7
Bear Hill Rd	6	Brown cemetery	#255 Bear hill	Paved	0.420	med-high	medium	No Maint-7	Good-7
Bear Hill Rd	7	#255 Bear hill	Loudon Town Line	Paved	0.211	med-high	medium	No Maint-7	Good-7
Blackman Rd	1	Short Falls Rd	To end of roadway	Gravel	0.400	low	low	Routine-2	Good-2
Burnt Hill Rd	1	Lovers Ln	# 68 Burnt Hill	Paved	0.400	medium	low-med	Routine-5	Good-5
Burnt Hill Rd	2	#68 Burnt hill	Highland Drive	Paved	0.300	medium	low-med	Preventive-5	Good-5
Burnt Hill Rd	3	Highland Dr	Smith Sanborn Rd	Paved	0.290	medium	low-med	Rehabilitate-5	Good-5
Canterbury Rd	1	Main St	House # 66	Paved	0.635	high	medium	No Maint-8	Good-8
Canterbury Rd	3	House # 142	Loudon TL	Paved	0.580	high	high	Rehabilitate-10	Good-10
Carpenter Rd	1	Route 28	#49 Carpenter rd	Paved	0.240	low	low	No Maint-2	Good-2
Carpenter Rd	2	#49 Carpenter rd	Route 28	Paved	0.240	low	low	No Survey-2	No Survey-2
Center Rd	1	Bear Hill Rd	Canterbury Rd	Paved	1.520	high	medium	Routine-8	Good-8
Chichester Ln	1	US Route 4	End Chichester Ln	Gravel	0.090	low	low	Routine-2	Poor-2
Connemara Dr	1	Bailey Rd	#40 Connamara	Paved	0.420	low-med	low	Routine-3	Good-3
Connemara Dr	2	#40 Connamara	Horse Corner Rd	Paved	0.400	low-med	medium	No Maint-5	Good-5
Cross Rd	1	US Route 4	House #50	Paved	0.085	medium	low	No Maint-4	Good-4
Cross Rd	2	House #50	Granny Howe Rd	Gravel	0.472	medium	medium	Routine-6	Good-6
Dame Rd	1	Horse Corner Rd	End Dame Rd	Paved	0.059	low	low	No Maint-2	Good-2
Deer Meadow Rd	1	Main St	Epsom TL	Paved	0.434	medium	low-med	Preventive-5	Good-5
Deer Run Rd	1	Highland Dr	End of Deer Run Rd	Gravel	0.151	low	low	Routine-2	Good-2
Depot St	1	Route 28	Epsom TL	Paved	0.214	low-med	high	No Maint-7	Good-7
Dewyn Dr	1	King Rd	End Dewyn Dr	Gravel	0.136	low	low	Routine-2	Poor-2
Durgin Rd	1	Bear Hill Rd	End of Durgin Rd	Gravel	0.757	medium	low	Routine-4	Good-4
East Ricker Rd	1	Bear Hill Rd	#256	Paved	0.410	med-high	medium	Rehabilitate-7	Poor-7
East Ricker Rd	2	House #256	Loudon TL	Paved	0.270	med-high	medium	No Maint-7	Good-7
Ferrin Rd	1	Durgin Rd	Bear Hill Rd	Gravel	1.050	low-med	low-med	Routine-4	Good-4
Fred Wood Dr	1	Highland Dr	Smith Sanbord Rd	Paved	0.226	low	low	Preventive-2	Good-2
Garvin Hill Rd	1	Horse Corner Rd	End Garvin Hill Rd	Gravel	0.720	low	low	Routine-2	Poor-2

Table 1 (continued)

Road Name	Seg	From	To	Surface	Length	Importance	Traffic	Surface	Drainage
Granny Howe Rd	1	Main St	Epsom TL	Gravel	0.691	low	low	Routine-2	Good-2
Guernsey Ct	1	Harvest Rd	End Guernsey Ct	Paved	0.243	low	low	No Maint-2	Good-2
Harvest Rd	1	King Rd	Guernsey Ct	Paved	0.160	low-med	med-high	No Maint-6	Good-6
Harvest Rd	2	Guernsey Ct	Holstein Ct	Paved	0.410	low-med	med-high	No Maint-6	Good-6
Harvest Rd	3	Holstein Ct	Loudon TL	Paved	0.310	low-med	med-high	No Maint-6	Good-6
Healy Pasture Rd	1	Pleasant Rd	End of Healy Past.	Paved	0.380	low	low	No Maint-2	Good-2
Higgins Rd	1	Horse Corner Rd	Pembroke TL	Paved	0.389	medium	medium	No Maint-6	Good-6
Highland Dr	1	Smith Sanbord Rd	Fredwood drive	Paved	0.400	medium	medium	No Maint-6	Good-6
Highland Dr	2	Fredwood drive	Burnt Hill Rd	Paved	0.390	medium	medium	No Maint-6	Good-6
Hilliard Rd	1	Swiggey Brook Rd	End of Hilliard Rd	Gravel	1.206	low	low-med	Routine-3	Good-3
Hillview Dr	1	Smith Sanborn Rd	Epsom TL	Paved	0.419	low	low	Preventive-2	Good-2
Holstein Ct	1	Harvest Rd	End Holstein Ct	Paved	0.194	low	low	Routine-2	Good-2
Horse Corner Rd	1	Higgins Road	Pembroke town Line	Paved	0.050	low	low	No Survey-2	No Survey-2
Horse Corner Rd	2	Higgins Rd	Connemara Dr	Paved	0.170	high	high	No Maint-10	Good-10
Horse Corner Rd	3	Connemara Dr	#296 Horse corner	Paved	0.360	high	high	Preventive-10	Poor-10
Horse Corner Rd	4	#296 Horse corner	Bailey Rd	Paved	0.320	high	high	Preventive-10	Good-10
Horse Corner Rd	5	Bailey Rd	#239 Horse corner	Paved	0.220	high	high	No Maint-10	Good-10
Horse Corner Rd	6	#239 Horse corner	Dame Rd	Paved	0.330	high	high	Preventive-10	Good-10
Horse Corner Rd	7	Dame Rd	Garvin Hill Rd	Paved	0.251	high	high	Reconstruct-10	Good-10
Horse Corner Rd	8	#125 Horse Corner	Garvin Hill Rd	Paved	0.470	high	high	No Maint-10	Good-10
Horse Corner Rd	9	#79 Horse corner	#125 Horse Corner	Paved	0.443	high	high	Rehabilitate-10	Good-10
Horse Corner Rd	10	#79 Horse corner	Towle Rd	Paved	0.220	high	high	No Maint-10	Good-10
Hutchinson Rd	1	Short Falls Rd	House #48	Gravel	0.490	med-high	medium	Reconstruct-7	Good-7
Hutchinson Rd	2	House #48	House #91	Paved	0.368	med-high	med-high	Preventive-8	Good-8
Hutchinson Rd	3	House #91	Pembroke TL	Gravel	0.468	med-high	low-med	Reconstruct-6	Good-6
Kaime Rd	1	Ring Rd	Pittsfield TL	Gravel	0.570	low	low	Reconstruct-2	Good-2
Kara Dr	1	Deer Meadow Rd	End of Kara Dr	Paved	0.174	low	low	No Maint-2	Good-2
Kellys Corner Rd	1	NH Route 28	House #13	Paved	0.220	medium	medium	Preventive-6	Good-6
Kellys Corner Rd	2	House #13	Pleasant St	Paved	0.130	medium	medium	Routine-6	Good-6
Kellys Corner Rd	3	Pleasant St	Ring Rd	Paved	0.160	medium	medium	No Maint-6	Good-6
Kellys Corner Rd	4	Ring Rd	NH Route 28	Paved	0.241	medium	medium	No Maint-6	Good-6
King Rd	1	Loudon TL	House #114	Paved	0.250	high	high	Routine-10	Good-10
King Rd	2	House #114	Harvest Rd	Paved	0.435	high	high	Preventive-10	Good-10
King Rd	4	#26 culvert	Route 4	Paved	0.240	high	high	Routine-10	Good-10
King Road	3	Harvest Rd	Culvert at#26	Paved	0.396	high	high	No Maint-10	Good-10

Table 1 (continued)

Road Name	Seg	From	To	Surface	Length	Importance	Traffic	Surface	Drainage
Lane Rd	1	Horse Corner Rd	House #32	Paved	0.300	medium	high	No Maint-8	Good-8
Lane Rd	2	House #32	Smith sanborn Rd	Paved	0.490	medium	med-high	No Maint-7	Good-7
Lane Rd	3	Smith Sanborn Rd	Hutchinson Rd	Paved	0.250	med-high	low-med	No Maint-6	Good-6
Leavitt Rd	1	Horse Corner Rd	End of Leavitt Rd	Gravel	0.302	low	low	Reconstruct-2	Good-2
Limerick Dr	1	Connemara Dr	End of Limerick Dr	Paved	0.100	low	low	No Maint-2	Good-2
Lovers Ln	1	Short Falls Rd	Smith Sanborn Rd	Gravel	0.350	low-med	low	Reconstruct-3	Good-3
Martel Rd	1	Route 28	End of Martel Rd	Gravel	0.480	low	low	Routine-2	Good-2
Mason Rd	1	US Route 4	End of Mason Rd	Paved	0.340	low	low	No Maint-2	Good-2
Meeting House Rd	1	Main St	Pound Rd	Paved	0.060	low	low	No Maint-2	Good-2
Mill Rd	1	Webster Mills Rd	End of Mill Rd	Gravel	0.100	low	low	Routine-2	Good-2
Paradise Ln	1	Hutchinson Rd	End of Paradise	Gravel	0.170	low	low	Routine-2	Good-2
Perry Brook Rd	1	Hillard Rd	End of Perry Brook	Gravel	0.430	low	low	Routine-2	Good-2
Perry Rd	1	Bear Hill Rd	End of Perry Rd	Gravel	0.340	low	low	Routine-2	Good-2
Pleasant St	1	Kellys Corner Rd	Healy Pasture Rd	Paved	0.400	high	med-high	No Maint-9	Good-9
Pleasant St	2	Healy Pasture Rd	Berry Rd	Paved	0.420	high	med-high	No Maint-9	Good-9
Pleasant St	3	Berry Rd	#117 Trailer Park	Paved	0.220	high	med-high	Routine-9	Good-9
Pleasant St	4	#117 Trailer Park	#161 Pleasant St	Paved	0.419	high	med-high	No Maint-9	Good-9
Pleasant St	5	#161 Pleasant St	Loudon TL	Paved	0.220	high	med-high	Routine-9	Good-9
Pound Rd	1	Main St	End non-maintained	Gravel	0.220	low	low	Routine-2	Good-2
Ring Rd	1	Kellys Corner Rd	Kaime Rd	Paved	0.168	low	low	Routine-2	Good-2
Ring Rd	2	Kaime Rd	End of Ring Rd	Gravel	0.357	low	low	Routine-2	Good-2
Robinson Rd	1	US Route 4	End of Robinson Rd	Paved	0.104	low	low	No Maint-2	Good-2
Short Falls Rd	1	Leavitt Rd	House #61	Gravel	0.345	low	low	Routine-2	Good-2
Short Falls Rd	2	Lane Rd	Epsom TL	Gravel	0.770	low-med	low	Routine-3	Good-3
Smith Sanborn Rd	1	Lane Rd Int	Highland Dr	Gravel	0.668	medium	medium	Routine-6	Good-6
Smith Sanborn Rd	2	Highland Dr	US Route 4	Paved	0.230	medium	medium	No Maint-6	Good-6
Staniels Rd	1	Horse Corner Rd	West Rd	Paved	0.370	med-high	low-med	No Maint-6	Good-6
Staniels Rd	2	West Rd	Pembroke TL	Gravel	0.320	med-high	low-med	Routine-6	Good-6
Swiggy Brook Rd	1	South of Stream	NH Route 28	Paved	0.330	medium	low-med	Preventive-5	Good-5
Swiggy Brook Rd	2	North of Stream	NH Route 28	Paved	0.420	medium	low-med	Preventive-5	Good-5
Towle Rd		Horse Corner Rd	End Towle Rd	Gravel	0.450	low	low	Reconstruct-2	Good-2
Trap Rd	1	US Route 4	Loudon TL	Gravel	0.314	low	low	Routine-2	Good-2
Webster Mills Rd	1	NH Route 28	House # 131	Paved	0.295	medium	med-high	No Maint-7	Good-7
Webster Mills Rd	2	House #131	Pittsfield TL	Paved	0.604	medium	med-high	No Maint-7	Good-7
West Rd	1	Staniels Rd	End West Rd	Gravel	0.380	low	low	Routine-2	Good-2
Wexford Dr	1	Connemara Dr	End Wexford Dr	Paved	0.290	low	low	No Maint-2	Good-2

2.C: Road Conditions

There are seven types of observable conditions that are recorded during onsite inspection: (1) rutting, (2) potholes and patching (3) roughness, (4) alligator cracking, (5) edge cracking, (6) transverse and longitudinal cracking, and (7) roadside drainage. If any condition exists at all it is then rated for both its severity and its extent. Severity can be rated low, medium, or high. Extent is also rated low, medium, or high.

For example, a particular road segment might be categorized this way:

- 1) Rutting: low severity and low extent
- 2) Potholes and patching: none
- 3) Roughness: low severity and low extent
- 4) Alligator cracking: high severity and medium extent
- 5) Edge cracking: medium severity and high extent
- 6) Transverse and longitudinal cracking: low severity and low extent
- 7) Road side drainage: medium severity and low extent

The RSMS software has a built-in computation that combines all of the information on observable conditions and produces two recommendations for consideration. One is a simple statement of roadside drainage as either “poor” or “good.” The more complicated recommendation is the type of maintenance or repair that would most benefit the road segment. There are five such categories.

1. No Maintenance:

No action required. The road segment 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.

3. Preventive Maintenance:

For paved roads, shimming and or 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.

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, or regrading, reshaping, and compacting them.

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.

It is important to understand the life cycle of a road surface. When a paved road has been well designed and constructed it has a life of approximately 20-25 years. Figures 1 and 2 show the deterioration of a theoretical road segment over time.

Figure 1

(Source: Road Surface Management Software, Bob Strobel, University of New Hampshire Technology Transfer Center, December 2011)

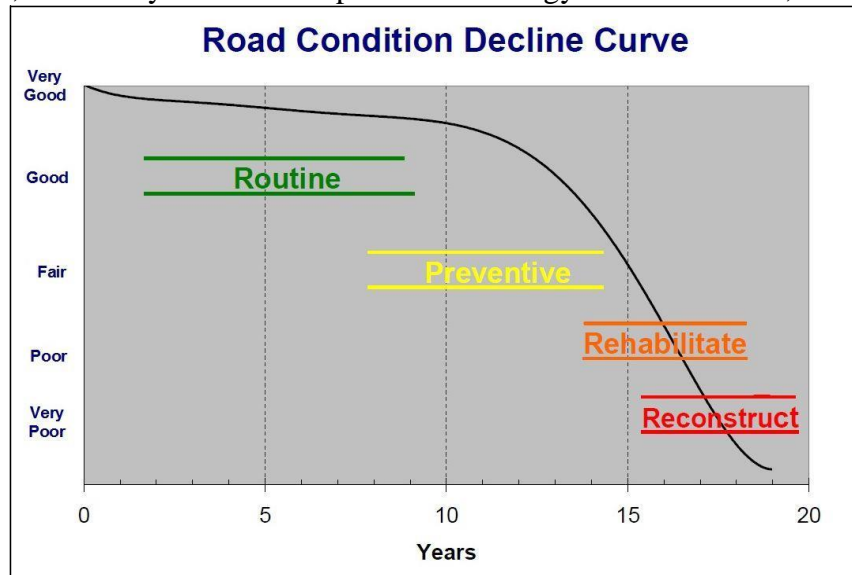
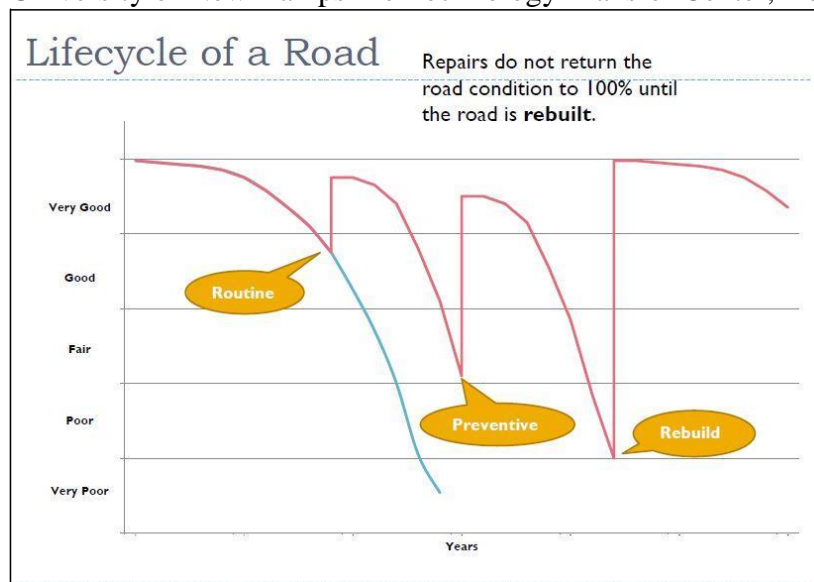


Figure 2

(Source: Road Surface Management Using PWS RSMS Software, Bob Strobel, University of New Hampshire Technology Transfer Center, December 2011)



If the original construction of a road segment did not include adequate sub-base work, removal of ledge and rocks, crushed stone base, provision for adequate drainage including culverts and crown, then the life may be much shorter. Many of Chichester's oldest paved roads were created by simply laying asphalt on top of old dirt and gravel surfaces. For this reason, many miles of roads show considerable deterioration after only a few years.

For each of the town's road segments, Table 1 displays the suggested need for maintenance or repair as determined by the RSMS computation. This is based on surface observations only and does not take into consideration knowledge of what lies below the surface. The Committee then considered these results, traffic volume, segment importance to the town, and knowledge of subsurface conditions to prioritize which road segments most needed attention and what kind of work should be done. Specific recommendations for the years 2013-2016 are included in Section 6 of this report.

2.D: Use for Budgeting and Reporting

The RSMS software allows the Road Agent to record Highway Department expenses for maintenance and repair of each road segment. Over time, a history of work on each segment will be built up. This will allow recognition of deteriorating conditions as more maintenance is required from year to year. Until adoption of the RSMS system in 2012, the Department's records of the history of its work was spotty at best and often limited to the tenure of a particular Road Agent. Other than major rehabilitation and reconstruction projects, there was no allocation of maintenance costs to particular roadways.

The software also allows the Road Agent to build an operating budget based on projected maintenance costs of each road segment. The Road Agent has begun to use the system for this purpose and, with the Board of Selectmen, will be able to compare budgeted maintenance against actual costs, not just for the department as a whole, but for maintenance of each road segment.

Table 2 is an example page from a lengthy RSMS report that illustrates the entries for 2013. This will assist the Highway Department plan, budget, and monitor its work. It will also assist the Budget Committee in annual budget preparation and the Board of Selectmen in budgeting and fiscal analysis.

Table 2

Sample RSMS financial report on road work on Chichester roads in 2013								11/4/2013
Year	From	To	Length	Recommended Repair	Other	Budget	Actual	
Bailey Rd - 1 (Paved)								
2013	US Route 4	Connemara Dr	0.23		Crack seal	\$1,500	\$850	
Bailey Rd - 2 (Gravel)								
2013	Connemara Dr	Horse Corner Rd	0.52	Routine grading		\$1,300	\$1,165	
2013				Ditching		\$2,000	\$2,700	
2013					Crack sealing	\$0	\$0	
Blackman Rd - 1 (Gravel)								
2013	Short Falls Rd	To end of roadway	0.40	Add gravel (up to 4")		\$1,200	\$1,565	
2013				Spot grading/blading		\$567	\$1,162	
Canterbury Rd - 1 (Paved)								
2013	Main St	House # 66	0.64	Shim with 1" overlay		\$70,000	\$66,753	
2013					shoulder gravel	\$0	\$975	
Center Rd - 1 (Paved)								
2013	Bear Hill Rd	Canterbury Rd	1.52	Crack seal		\$7,600	\$3,500	
Cross Rd - 2 (Gravel)								
2013	House #50	Granny Howe Rd	0.47	Routine grading		\$850	\$1,410	
2013					catch basin	\$1,500	\$1,478	
Garvin Hill Rd - 1 (Gravel)								
2013	Horse Corner Rd	End Garvin Hill Rd	0.72	Spot grading/blading		\$570	\$1,275	
2013				Culverts		\$2,000	\$2,410	
Granny Howe Rd - 1 (Gravel)								
2013	Main St	Epsom TL	0.69	Routine grading		\$850	\$1,100	
Hilliard Rd - 1 (Gravel)								
2013	Swiggey Brook	End of Hilliard Rd	1.21	Routine grading		\$560	\$165	
2013				Add gravel (up to 4")		\$3,685	\$2,806	
Hutchinson Rd - 1 (Gravel)								
2013	Short Falls Rd	House #48	0.49		spot grading	\$1,200	\$1,084	
2013					spot gravel	\$850	\$675	
Hutchinson Rd - 3 (Gravel)								
2013	House #91	Pembroke TL	0.47		add 4" spot	\$1,285	\$1,057	
Kaime Rd - 1 (Gravel)								
2013	Ring Rd	Pittsfield TL	0.57			\$560	\$1,108	
Kellys Corner Rd - 3 (Paved)								
2013	Pleasant St	Ring Rd	0.16		rehab	\$42,000	\$42,000	
2013					repair bridge	\$0	\$1,766	
Kellys Corner Rd - 4 (Paved)								
2013	Ring Road	NH Route 28	0.24	rebuild		\$52,583	\$52,583	
Lovers Ln - 1 (Gravel)								
2013	Short Falls Rd	Smith Sanborn Rd	0.35		spot grade	\$530	\$345	
Martel Rd - 1 (Gravel)								
2013	Route 28	End of Martel Rd	0.48	Add gravel (up to 4")		\$2,670	\$2,938	
Mill Rd - 1 (Gravel)								
2013	Webster Mills Rd	End of Mill Rd	0.10	Add gravel (up to 4")		\$460	\$1,148	
Paradise Ln - 1 (Gravel)								
2013	Hutchinson Rd	End of Paradise	0.17	Add gravel (up to 4")		\$2,500	\$2,456	
Perry Brook Rd - 1 (Gravel)								
2013	Hilliard Rd	End of Perry Brook	0.43	Add gravel (up to 4")		\$2,000	\$2,267	
Pound Rd - 1 (Gravel)								
2013	Main St	End non-	0.22	Routine grading		\$1,100	\$1,075	

3. Highway Projects Completed in 2013

This year the combination of the highway department and an outside contractor (DBU Construction) reconstructed four road segments that the Committee had recommended in our 2012 report. The segments are as follows:

- a. DBU Construction reconstructed approximately .4 miles of Kelly Corner Road. The work included replacing culverts, reclaiming the roadway, adding gravels and cloth and paving Kelly Corner Road segments #3 and #4.
- b. DBU Construction also reconstructed approximately .42 miles of Pleasant Street. The work included replacing multiple culverts, reclaiming the roadway, adding gravels and cloth and paving section #2 of Pleasant Street.
- c. The Highway Department reconstructed approximately .22 miles of Pleasant Street. This work included replacing culverts, reclaiming the roadway, adding gravel and cloth and paving Pleasant Street section #5.

These projects were completed within budget and on time while completing normal roadway maintenance. The Road Agent will report on the yearly maintenance accomplishments in the Road Agents' report which will be included in the 2013 Town Report.

4. Traffic on Chichester Roads

Traffic is an important consideration in planning and prioritizing major highway projects. The Committee has asked the Road Agent and the Central New Hampshire Regional Planning Commission to increase the number of traffic counts being conducted on town roads. During 2013 counters were placed at many locations in town.

Average daily traffic volume is an important measure for understanding how a road segment is being used. Simple counts have been collected for many years. Those allow the Committee to understand whether volume has been generally increasing, decreasing, or remaining constant. Table 3 displays the history of average daily traffic volume at different locations in town.

It is important to realize that counts can vary greatly from day to day and from season to season. The Committee has asked that counters be in place for a full 24 hours/7 days and that an average daily count be calculated. Even this averaging can be affected by singular events such as a major road race at Loudon Speedway, diversion of Route 4 traffic onto Horse Corner Road, and temporary problems on feeder roads. For this reason, sometimes subjective understanding leads one to ignore a particular count.

Table 3

History of traffic counts on Chichester road segments													11/21/2013
All counts on this sheet are average vehicles per day													
Road Name	Location of counter	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Bailey Rd	Horse Corner intersection												165
Bailey Rd	Route 4 intersection	191			1,105		570						209
Bailey Rd	At # 28 Bailey rd											58	
Bear Hill Rd	Loudon town line					539					454	650	458
Bear Hill Rd	Route 28 intersection				643	685	593					797	
Burnt Hill Rd													76
Canterbury Rd	Loudon town line	627				520					529		525
Canterbury Rd	Main St intersection									809		1,262	614
Canterbury Rd	East of Center Rd										442		
Center Rd	Bear Hill Rd intersection										433		
Center Rd	Main St intersection	544	1,046		431	445						638	
Connemara Dr	Bailey Rd intersection											197	
Cross Rd	Route 4 intersection	149					165					146	215
Deer Meadow Rd													367
Depot St	At the bridge	462		590			420			501		993	
Fredwood Dr	Smith Sanborn Rd intersection											64	
Fredwood Dr	Highland Dr intersection											19	
Harvest Rd													168
Horse Corner Rd	Route 4 intersection	1,170				1,076				703	1,329	1,189	
Horse Corner Rd	Lane Rd intersection	937										1,060	
Horse Corner Rd	Above Lane Rd											592	906
Horse Corner Rd	east of Bailey Road											955	
Horse Corner Rd	Pembroke town line	784				937				1,230	1,130	1,212	
Hutchinson Rd	Pembroke town line											238	
Hutchinson Rd	Lane Rd Intersection	268					238				407		
Kelly's Corner Rd	Over Sanborn Brook	629		620			521			488			458
King Rd	Loudon town line										1,165	1,072	
King Rd	Route 4 intersection	1,140				531	978					1,164	
King Rd	At # 26 King Rd										1,231		
Lane Rd	Horse Corner Rd intersection											1,350	
Lane Rd	Hutchinson Rd intersection											407	
Pleasant St	Loudon town line												567
Pleasant St	Kelly's Corner Rd intersec	786			454	824	734				833	756	882
Smith Sanborn Rd	Route 4 intersection		466		441	496	373				434	267	
Smith Sanborn Rd	Lane Rd Intersection		261								407		
Staniels Rd	Pembroke town line										262		
Staniels Rd	Horse Corner Rd intersection										241	603	209
Swiggy Brook Rd	Over Perry Brook		200	240			240			237			
Webster Mills Rd	Route 28 Intersection				595		619				669		691
Webster Mills Rd	Over Suncook River	520		550			600			606	676		
US Route 4	Mason Rd intersection		13,175										
Main St	East of Canterbury Rd	6,400		7,000			7,100			8,111			
Main St	At Sander's Brook	6,200		6,600			9,000			7,422			
Main St	US Route 4 intersection		7,581								8,569		

In 2012 the Committee established five categories for summarizing traffic counts in RSMS.

Table 4

Traffic Category in RSMS	Average daily vehicle count
Low	0-199
Low-Medium	200-399
Medium	400-599
Medium-High	600-799
High	800 or more

These categories can be found for each road segment in Table 1. On segments where actual counts have not been made by mechanical counters, the Road Agent has estimated the category based on his knowledge, the counts on connecting segments, and other factors.

The count of vehicles is not the only traffic measure that is important in considering road use. Type of traffic and speed are also important. Beginning in 2012, the Committee asked the Central New Hampshire Regional Planning Commission to collect data that includes vehicle type and speed.

For example, over a full week (May 29-June 4), the counter on Horse Corner Road north of the intersection with Lane Road recorded the following number of vehicles by type:

Table 5

Vehicle Type	Count
Motorcycles	419
Cars	3,641
Pickups and vans	1,492
Buses	32
3-6 axle trucks	255
Unable to determine	505
TOTAL	6,344

The speed of each vehicle in each direction was also recorded.

Table 6

Speed	Northbound	Southbound
0-20 mph	51	33
21-30 mph	1,370	1,076
31-40 mph	1,445	1,693
41-50 mph	318	330
51+ mph	20	8
TOTAL	3,204	3,140

These are only summary tables. The raw data includes a count for each hour of each day by type, speed, and direction.

This is only the second year of Chichester's collection of this more detailed information. The Committee expects it will be helpful in future years and will supplement the raw traffic counts in significant ways. The Committee also expects to conduct vehicle counts in 2014 on road segments for which even basic counts have not previously been made.

5. Two Year Plan: Recommended Capital Projects & Budgets

To determine which of the 75 paved road segments in Chichester are most in need of reconstruction and major repair, the committee has taken three general factors into consideration in setting priorities among road segments (1) observable conditions, (2) road importance, and (3) traffic. Traffic includes not just a measure of average daily traffic volume, but also an understanding of the type of vehicles using the segment. Importance includes whether the road connects to other towns and whether poor conditions could impact public safety vehicles. As described above, the committee assesses seven observable conditions: rutting, potholes and patching, roughness, alligator cracking, edge cracking, transverse and longitudinal cracking, and roadside drainage. Each observable condition is rated for both severity and extent.

Combining the various factors is a mixture of science and art. Not everyone will agree with how to weigh traffic against current conditions, etc. Different people viewing the same information will create different sets of suggested priorities. That is why the committee believes it is important for a group of townspeople to review current information and recommend priorities. Ten individuals participated in the Committee's process this year. The members represent different experiences and skills. Some have technical qualifications related to highway work or construction. As a group committee members have discussed many road segments and have come to a conclusion. This conclusion was approved by an 8-1 vote by the full committee, with one member absent.

The committee recommends that three paved road segments be reconstructed in 2014 and another three segments be reconstructed in 2015. These segments total 2.3 miles (of the town's 24.2 miles of paved roads). The committee estimates these projects can continue to be completed for \$362,512 in 2014 and \$379,969 in 2015 as shown in Table 7. This compares to the \$373,000 that was approved by voters at Town Meeting in 2013.

Table 7

2014			
Segment	Length (miles)	Estimated Town cost	Estimated Contracted cost
Horse Corner #7	0.251	\$77,270	\$95,019
Horse Corner #9	0.443	\$121,150	\$144,814
Bear Hill #1	0.434	\$104,368	\$122,679
TOTAL	1.128	\$302,788	\$362,512
2015			
Segment	Length (miles)	If done by town	If contracted out
Bear Hill #3	0.423	\$131,060	\$163,603
Bear Hill #4	0.255	\$73,810	\$90,857
Horse Corner #8	0.470	\$108,134	\$125,509
TOTAL	1.148	\$313,004	\$379,969

While the town could do one major project “in house,” the Highway Department is not really sufficiently staffed and does not have the equipment to do all of the work. Based on the experience of 2013, the committee has recommended that it would be better for the Road Agent and town staff to oversee the work of contractors. Also based on the experience in 2013, the committee recommends that the town issue RFPs (requests for pricing) for road work that do not include the asphalt and paving. That would be handled by a separate contractor. This will avoid having the road contractors mark up the price of asphalt and paving work above what the town would have to pay directly. The committee’s cost estimates for each of the projects on the following pages are based on an estimated contractor of 50% markup on only non-paving costs. This will potentially save about \$90,000 each year.

5.A: Recommended Projects for 2014

The Committee recommends three projects for completion during calendar year 2014. These include two segments of the ten town-maintained segments of Horse Corner Road and one of the seven segments on Bear Hill Rd.

2014 A: Horse Corner Road – Segment 7

Description: This segment includes the road surface between Dame Farm Road and Garvin Hill Road, approximately 1,350 feet long with traffic counts in the high 800’s per day. The road handles all types of large commercial vehicles and cars along with the occasional traffic detour from Route 4. Previous work that has been performed on this segment of roadway includes ditching and shimming with an overlay. R.C.P. (round culvert pipe) has not been replaced since the late 1950’s. Pothole repair and patching has taken place where needed as well as crack sealing.

The Committee’s roadway survey showed that this segment of roadway was deteriorating. Rutting of the roadway surface (collapsing of the base due to water infiltration/poor soils), cracking (material failure) and pot holes account for the majority of distresses. Medium sized rocks, ledge, and even culverts have begun to show through the asphalt surface. Inclusion of these segments is based on the importance of this road to the community as a main thoroughfare, the high volume of daily traffic it receives, and their poor surface condition.

Work assigned: The work to be performed will include, but not be limited to, the installation of 350 feet of under drain and removal of ledge (to a level so that proper base material can be added). The existing hot top will be removed, ground, and be incorporated into the sub base and a fabric membrane will be laid. (This increases the ability of a poor sub base to hold a load).

A new 4” crushed gravel layer will be installed, and compacted. Pavement will then be placed on the entire segment. All gravel and paved driveways will be blended in.

Estimated Cost: \$95,019; details on next page.

Cost Breakdown					
Road Name:	Horse Corner Road 7				
RE:	Section 7				
Project starting point:	Garvins Hill Road				
Project ending poing:	Dame Farm Road				
Work Last Done:	Paved	Shim	Seal	Other	
If 'Other', describe:					
Year work was done:	1995				
Length to be repaired, upgraded or	ft.	1,350			
Width of road base	ft.	22			
PAVING COSTS					
Thickness of base pavement:	in.	2.00			
Thickness of finish pavement:	in.	1.00			
Tons of pavement (Base):		371.3			
Tons of pavement (Finish):		185.6			
Asphalt Cost per ton (Base):		\$75			
Asphalt Cost per ton (Finish):		\$75			
Total Cost for paving:					\$ 41,766
OTHER COSTS					
		Qty	Cost Per	Total Cost	
Number of intersections:		1		\$2,000	
Number of gravel drives:		2	\$125.00	\$250	
Number of paved drives:		4	\$175.00	\$700	
Grind/replace sub-base:	sq yds	1,463	\$1.60	\$2,341	
Culverts:					
Driveway:	ft.	60	\$14.00	\$840	
Road:	ft.	200	\$14.00	\$2,800	
Headwalls Driveway and Road:	Cy	10	\$435.00	\$4,350	
Ditching:	ft.		\$3.25	\$0	
Ditch re-seeding:	SqYrd		\$1.75	\$0	
Shoulder leveling:	ft.	2700	\$0.57	\$1,539	
Underdrain:	ft.	350	\$18.75	\$6,563	
Gravel for subbase upgrades:	ton		\$5.25	\$0	
Gravel base upgrades:	ton	1100	\$8.00	\$8,800	
Comspans:	per			\$0	
Box Culverts:	sqft.		\$150.00	\$0	
Guard rails:	ft.		\$21.00	\$0	
Equipment rental:	per wk.	1	\$850.00	\$700	
Geotextile fabric n n woven):	SqYrd	3300	\$1.40	\$4,620	
Blasting/Hammer :	per hr.		\$200.00	\$0	
Total other costs:					\$ 35,502
Estimated contractor markup:	50%	Markup:		\$ 17,751	
Total Contracted Project Cost (Today):					\$ 95,019

2014 B: Horse Corner Road Segment 9

Description: This segment includes the road surface between House #125 and House #79. This segment is 2,500 feet in length with traffic counts in the high 800's. This road handles all types of large commercial vehicles and cars along with the occasional traffic detour from Route 4. Previous work that has been performed on this segment of roadway includes ditching and shimming with an overlay. The culverts in this section are all R.C.P.(round concrete pipe) and have not been replaced since the late 1950's. Pot hole patching and crack sealing has taken place where needed.

The Committee's roadway survey showed that this segment of roadway was deteriorating. Rutting of the roadway surface(collapsing of the base due to water infiltration/poor soils),cracking(material failure)and pot holes account for the majority of distresses. Medium size rocks, ledge, and even culverts have begun to show through the asphalt surface. Inclusion of these segments is based on the importance of this road to the community as a main thoroughfare, the high volume of daily traffic it receives, and its poor surface condition.

Work assigned: The work to be performed will include, but not be limited to the addition of 500 feet of under drain; the removal, grinding, and incorporation of existing hot top into the base; addition of more base material; addition of a fabric layer, to increase the ability of soils to hold a load; and pavement.

This section has had all of the necessary culvert replacement finished.

Estimated Cost: \$144,814; details on the next page.

Cost Breakdown					
Road Name:	Horse Corner Road				
RE:	Section 9				
Project starting point:	House #79				
Project ending point:	House #125				
Work Last Done:	Paved	Shim	Seal	Other	
If 'Other', describe:					
Year work was done:					
Length to be repaired, upgraded or	ft.	2,500			
Width of road base	ft.	21			
PAVING COSTS					
Thickness of base pavement:	in.	2.00			
Thickness of finish pavement:	in.	1.00			
Tons of pavement (Base):		656.3			
Tons of pavement (Finish):		328.1			
Asphalt Cost per ton (Base):		\$75			
Asphalt Cost per ton (Finish):		\$75			
Total Cost for paving:					\$ 73,828
OTHER COSTS					
		Qty	Cost Per	Total Cost	
Number of intersections:		1		\$350	
Number of gravel drives:		5	\$125.00	\$625	
Number of paved drives:		7	\$175.00	\$1,225	
Grind/replace sub-base:	sq yds	5,833	\$1.60	\$9,333	
Culverts:				\$0	
Driveway:	ft.		\$7.00	\$0	
Road:	ft.		\$8.00	\$0	
Headwalls Driveway and Road:	Cy			\$450	
Ditching:	ft.		\$3.25	\$0	
Ditch re-seeding:	SqYrd		\$1.75	\$0	
Shoulder leveling:	ft.	5000	\$0.57	\$2,850	
Underdrain:	ft.	500	\$18.75	\$9,375	
Gravel for subbase upgrades:	ton	900	\$5.25	\$4,725	
Gravel base upgrades:	ton	978	\$8.00	\$7,824	
Comspans:	per			\$0	
Box Culverts:	sqft.		\$150.00	\$0	
Guard rails:	ft.			\$0	
Equipment rental:	per wk.	2	\$1,200.00	\$2,400	
Geotextile fabric n n woven):	SqYrd	5833.33	\$1.40	\$8,167	
Blasting/Hammer :	per hr.		\$200.00	\$0	
Total other costs:					\$ 47,324
Estimated contractor markup:	50%	Markup:	\$ 23,662		
Total Contracted Project Cost (Today):					\$144,814

2014 C: Bear Hill Road - Segment 1

Description: This segment includes the road surface between Route 28 and the western property line of #23 Bear Hill Road and is 2,294 feet long. Bear Hill Road is one of six major arteries in town. As is the case of any major through road, the traffic volume has been increasing. Since 2006 the traffic count has gone from 685 cars a day to 797 cars per day. Bear Hill Road handles all types of large commercial vehicles and cars. Bear Hill is used as a cut off for the morning and evening commutes as well as daily traffic. Previous work that has been performed on this segment of roadway includes an overlay in 1997, culvert repair and shimming, pothole repair, and patching.

The Committee's roadway survey showed that this segment of roadway was deteriorating, rutting (collapsing of the base due to water infiltration/poor soils), and cracking (material failure). Pot holes at the corner (ledge under the roadway base) are significant. The inclusion of this segment is based on the importance of this road to the community as a main thoroughfare, its high volume of daily traffic, and its poor surface conditions.

Work assigned: The work to be performed will include, but not be limited to, the installation of 400 feet of underdrain, replacement of one roadway culvert with DOT-approved headwalls, and removal of ledge at corner (to a level so that proper base material can be added). The existing hot top will be removed, ground, and be incorporated into the sub base and a fabric membrane will be laid. (This increases the ability of a poor sub base to hold a load).

A new 4" crushed gravel layer will be installed, and compacted. Pavement will then be placed on the entire segment. All gravel and paved driveways will be blended in.

Estimated Cost: \$122,679; details on next page

Cost Breakdown					
Road Name:	Bear Hill Road 1				
RE:	Section 1				
Project starting point:	Route 28				
Project ending point:	West of house #23 prop line				
Work Last Done:	Paved	Shim	Seal	Other	
If 'Other', describe:					
Year work was done:	1997				
Length to be repaired, upgraded or	ft.	2,294			
Width of road base	ft.	21			
PAVING COSTS					
Thickness of base pavement:	in.	2.00			
Thickness of finish pavement:	in.	1.00			
Tons of pavement (Base):		602.2			
Tons of pavement (Finish):		301.1			
Asphalt Cost per ton (Base):		\$75			
Asphalt Cost per ton (Finish):		\$75			
Total Cost for paving:					\$ 67,745
OTHER COSTS					
		Qty	Cost Per	Total Cost	
Number of intersections:				\$0	
Number of gravel drives:		4	\$125.00	\$500	
Number of paved drives:		2	\$175.00	\$350	
Grind/replace sub-base:	sq yds	5,353	\$1.60	\$8,564	
Culverts:		1	\$1,000.00	\$1,000	
Driveway:	ft.		\$7.00	\$0	
Road:	ft.	40	\$8.00	\$320	
Headwalls Driveway and Road:	Cy			\$1,500	
Ditching:	ft.		\$3.25	\$0	
Ditch re-seeding:	SqYrd		\$1.75	\$0	
Shoulder leveling:	ft.	4588	\$0.57	\$2,615	
Underdrain:	ft.	400	\$18.75	\$7,500	
Gravel for subbase upgrades:	ton		\$5.25	\$0	
Gravel base upgrades:	ton	760	\$8.00	\$6,080	
Comspans:	per			\$0	
Box Culverts:	sqft.		\$150.00	\$0	
Guard rails:	ft.			\$0	
Equipment rental:	per wk.	700	\$1.00	\$700	
Geotextile fabric n n woven):	SqYrd	5352.67	\$1.40	\$7,494	
Blasting/Hammer :	per hr.		\$200.00	\$0	
Total other costs:					\$ 36,623
Estimated contractor markup:	50%	Markup:	\$ 18,312		
Total Contracted Project Cost (Today):					\$122,679

5.B: Recommended Projects for 2015

2015 A: Bear Hill Road - Segment 3

Description: This segment includes the road surface between house #86 and Center Road and is 2,234 feet long. In many spots the saturated sub base has lost integrity. Along this stretch the numerous springs and ledge outcrops that weep water lead to many road problems. This segment of Bear Hill handles 650+ cars per day and is one of the busiest roads in town. The previous work that has been performed on this segment of roadway includes an overlay in 1997, culvert repair and shimming, pothole repair and patching.

The Committee's roadway survey showed that this segment of roadway was deteriorating. Rutting (collapsing of the base due to water infiltration/poor soils), to cracking (material failure) and pot holes (ledge under the roadway base) are significant. The inclusion of this road is based on the importance of this road to the community as a main thoroughfare, its high volume of daily traffic, and its poor surface conditions.

Work assigned: The work to be performed will include, but not be limited to, the installation of 1,200 feet of underdrain, 1,500 feet of ditch line establishment, removal of ledge (to a level so that proper base material can be added). The existing hot top will be removed, ground, and be incorporated into the sub base and a fabric membrane will be laid. (This increases the ability of a poor sub base to hold a load).

A new 4" crushed gravel layer will be installed, and compacted. Pavement will then be placed on the entire segment. All gravel and paved driveways will be blended in.

Estimated Cost: \$163,603; details on next page

Cost Breakdown					
Road Name:	Bear Hill Road 3				
RE:	Section 3				
Project starting point:	#86 Bear Hill Road				
Project ending point:	Center Road				
Work Last Done:	Paved	Shim	Seal	Other	
If 'Other', describe:					
Year work was done:	1997				
Length to be repaired, upgraded or	ft.	2,234			
Width of road base	ft.	21			
PAVING COSTS					
Thickness of base pavement:	in.	2.00			
Thickness of finish pavement:	in.	1.00			
Tons of pavement (Base):		586.4			
Tons of pavement (Finish):		293.2			
Asphalt Cost per ton (Base):		\$ 75			
Asphalt Cost per ton (Finish):		\$ 75			
Total Cost for paving:					\$ 65,973
OTHER COSTS					
		Qty	Cost Per	Total Cost	
Number of intersections:		2		\$700	
Number of gravel drives:		2	\$125.00	\$250	
Number of paved drives:		3	\$175.00	\$525	
Grind/replace sub-base:	sq yds	5,213	\$1.60	\$8,340	
Culverts:				\$0	
Driveway:	ft.		\$14.00	\$0	
Road:	ft.		\$14.00	\$0	
Headwalls Driveway and Road:	Cy				
Ditching:	ft.	1500	\$3.25	\$4,875	
Ditch re-seeding:	SqYrd		\$1.75	\$0	
Shoulder leveling:	ft.	4468	\$0.57	\$2,547	
Underdrain:	ft.	1200	\$18.75	\$22,500	
Gravel for subbase upgrades:	ton		\$5.25	\$0	
Gravel base upgrades:	cuyrds	1244	\$8.00	\$9,952	
Comspans:	per			\$0	
Box Culverts:	sqft.		\$150.00	\$0	
Guard rails:	ft.			\$0	
Equipment rental:	per wk.	2	\$850.00	\$1,700	
Geotextile fabric n n woven):	SqYrd	5212.67	\$1.40	\$7,298	
Blasting/Hammer :	per hr.	32	\$200.00	\$6,400	
Total other costs:					\$ 65,087
Estimated contractor markup:	50%	Markup:		\$ 32,543	
Total Contracted Project Cost (Today):					\$163,603

2015 B: Bear Hill Road - Segment 4

Description: This segment includes the road surface between Center Road and Ferrin Road and is 1,345 feet long. In many spots the saturated sub base has lost integrity. The base of this segment of roadway was built years ago in an active stream bed and consists of a bony fill containing large and small boulders with a clay type soil. As with the other segments of Bear Hill Road, this segment handles 650+ cars per day. The previous work that has been performed on this segment of roadway includes an overlay in 1997, culvert repair and shimming, pothole repair and patching.

The Committee's roadway survey showed that this segment of roadway was deteriorating. Rutting (collapsing of the base due to water infiltration/poor soils), to cracking (material failure) and pot holes (ledge under the roadway base) are significant. This segment has large rocks starting to move through the hot top and the two RCP culverts are in need of replacement. The drainage is poor throughout the lower portion of this segment. The inclusion of this road is based on the importance of this road to the community. It is main thoroughfare, has a high volume of daily traffic, and has poor surface conditions.

Work assigned: The work to be performed will include, but not be limited to the installation of 600 feet of underdrain. The existing hot top will be removed, ground, and be incorporated into the sub base and a fabric membrane will be laid. (This increases the ability of a poor sub base to hold a load).

A new 4" crushed gravel layer will be installed, and compacted. Pavement will then be placed on the entire segment. All gravel and paved driveways will be blended in.

Estimated Cost: \$90,857; details on next page

Cost Breakdown					
Road Name:	Bear Hill Road 4				
RE:	Section 4				
Project starting point:	Center Road				
Project ending point:	Ferrin Road				
Work Last Done:	Paved	Shim	Seal	Other	
If 'Other', describe:					
Year work was done:	1997				
Length to be repaired, upgraded or	ft.	1,345			
Width of road base	ft.	21			
PAVING COSTS					
Thickness of base pavement:	in.	2.00			
Thickness of finish pavement:	in.	1.00			
Tons of pavement (Base):	353.1				
Tons of pavement (Finish):	176.5				
Asphalt Cost per ton (Base):	\$ 75				
Asphalt Cost per ton (Finish):	\$ 75				
Total Cost for paving:					\$ 39,720
OTHER COSTS					
		Qty	Cost Per	Total Cost	
Number of intersections:				\$0	
Number of gravel drives:			\$125	\$0	
Number of paved drives:		1	\$175	\$175	
Grind/replace sub-base:	sq yds	3,138	\$2	\$5,021	
Culverts:				\$0	
Driveway:	ft.		\$7	\$0	
Road:	ft.	85	\$35	\$2,975	
Headwalls Driveway and Road:	Cy			\$2,500	
Ditching:	ft.		\$3	\$0	
Ditch re-seeding:	SqYrd		\$2	\$0	
Shoulder leveling:	ft.	2690	\$1	\$1,533	
Underdrain:	ft.	600	\$19	\$11,250	
Gravel for subbase upgrades:	ton		\$5	\$0	
Gravel base upgrades:	ton	1046	\$8	\$8,368	
Comspans:	per			\$0	
Box Culverts:	sqft.		\$150	\$0	
Guard rails:	ft.			\$0	
Equipment rental:	per wk.	1	\$700	\$700	
Geotextile fabric n n woven):	SqYrd	3138.33	\$1	\$1,569	
Blasting/Hammer :	per hr.		\$200	\$0	
Total other costs:					\$ 34,092
Estimated contractor markup:		50%	Markup:	\$ 17,046	
Total Contracted Project Cost (Today):					\$ 90,857

2015 C: Horse Corner Road - Segment 8

Description: This segment includes the road surface between Garvin Hill Road and house #125 on Horse Corner Road. It is 2,485 feet long with traffic counts in the high 800's per day. The road handles all types of large commercial vehicles and cars along with the occasional traffic detour from Route 4. Previous work that has been performed on this section of roadway includes ditching and shimming with an overlay. This section of roadway has one existing culvert pipe which dates back to the early 1950's. Pothole repair and patching has taken place where needed as well as crack sealing.

The committee's roadway survey showed that this section of roadway was starting to deteriorate. Rutting of the roadway surface (collapsing of the base due to water infiltration/poor soils), cracking (material failure) and a few pot holes account for the majority of distresses. Inclusion of this road in our plan is based on the importance of this road to the community. It is a main thoroughfare, receives a high volume of daily traffic, and is in poor condition.

Work assigned: The work to be performed will include but not be limited to, the installation of 40 feet of culvert pipe with DOT-approved headwalls, the removal of the existing hot top by means of grinding (these grinding materials will be incorporated into the sub base) and laying of a fabric membrane. (This increases the ability of a poor sub base to hold a load). It will also include installation of a wider shoulder on the south side of this roadway at the corner with guard rails.

A new 4" crushed gravel layer will be installed, and compacted. Pavement will then be placed on the entire segment. Driveways both paved and gravel will be blended in.

Estimated Cost: \$125,509; details on next page

Cost Breakdown					
Road Name:	Horse Corner Road 8				
RE:	Section 8				
Project starting point:	House # 125				
Project ending poing:	Garvins Hill Road				
Work Last Done:	Paved	Shim	Seal	Other	
If 'Other', describe:					
Year work was done:	1995				
Length to be repaired, upgraded or	ft.	2,485			
Width of road base	ft.	21			
PAVING COSTS					
Thickness of base pavement:	in.	2.00			
Thickness of finish pavement:	in.	1.00			
Tons of pavement (Base):		652.3			
Tons of pavement (Finish):		326.2			
Asphalt Cost per ton (Base):		\$ 75			
Asphalt Cost per ton (Finish):		\$ 75			
Total Cost for paving:					\$ 73,385
OTHER COSTS					
		Qty	Cost Per	Total Cost	
Number of intersections:				\$0	
Number of gravel drives:		4	\$125.00	\$500	
Number of paved drives:		2	\$175.00	\$350	
Grind/replace sub-base:	sq yds	5,798	\$1.50	\$8,698	
Culverts:		1	\$480.00	\$480	
Driveway:	ft.		\$7.00	\$0	
Road:	ft.	40	\$12.00	\$480	
Headwalls Driveway and Road:	Cy		\$435.00	\$870	
Ditching:	ft.		\$3.25	\$0	
Ditch re-seeding:	SqYrd		\$1.75	\$0	
Shoulder leveling:	ft.	4970	\$0.57	\$2,833	
Underdrain:	ft.	0	\$18.75	\$0	
Gravel for subbase upgrades:	ton		\$5.25	\$0	
Gravel base upgrades:	ton	1900	\$8.00	\$15,200	
Comspans:	per			\$0	
Box Culverts:	sqft.		\$150.00	\$0	
Guard rails:	ft.		\$21.00	\$0	
Equipment rental:	per wk.	700	\$1.00	\$700	
Geotextile fabric n n woven):	SqYrd	5798.33	\$0.80	\$4,639	
Blasting/Hammer :	per hr.		\$200.00	\$0	
Total other costs:					\$ 34,749
Estimated contractor markup:	50%	Markup:	\$ 17,375		
Total Contracted Project Cost (Today):					\$125,509

6. Long Range Planning

6.A: Lifespan of a Road and Its Maintenance

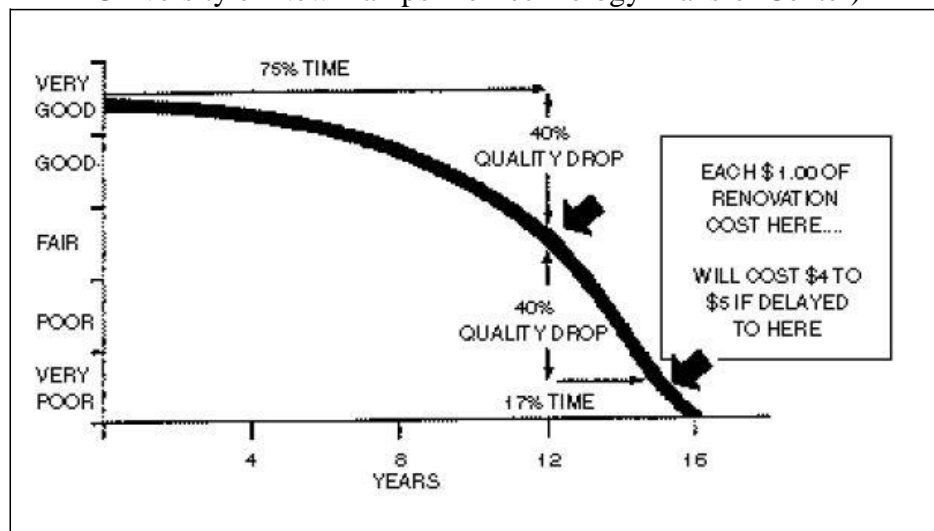
The Committee estimates that the average life span of a paved road in Chichester is 20 years. This estimate is based on input from the Maine Local Roads Center, the developer of the Road Surface Management System (RSMS), and other sources, including committee members own experiences, Factors used in developing the average life span included traffic volume, types of traffic, drainage of water, and structure of the road. The Committee emphasizes that 20 years is the average, not a prediction of the lifespan of any given road. The lifespan of some paved roads may exceed 20 years while others may need to be reconstructed sooner.

In order for a road to attain the average 20 year lifespan, there is a need for regular maintenance and repair. This will include crack sealing, pothole patching, culvert replacement, repaving of limited sections, and other work. Without this regular maintenance, the average lifespan may be much less than 20 years. Figure 3 (see below) shows how the condition of a road deteriorates over time and how early intervention and rehabilitation can cost less and extend the life of a road. The Committee supports the strategy of annual maintenance on the paved roads. However, maintenance activities are outside the purview of the Committee. Unfortunately, many paved roads in Chichester are already beyond the state where simple maintenance will be cost effective.

The goal of this Committee is to bring all the roads in town to an average or better condition and keep them in this condition for the average 20 year life span. To do this the town will need to reconstruct 1.2 miles of paved roads every year.

Figure 3

(Source: Road Surface Management System Workshop Notebook and Reference, University of New Hampshire Technology Transfer Center)



6.B: Recommendations for 2016-2032

The committee's plan to reconstruct approximately 1.2 miles of paved roads per year was accepted at the 2013 town meeting. Accordingly, approximately 1.04 miles of roads were successfully reconstructed during 2013. Section 5 of this document contains the specific recommendations for an additional 2.27 miles to be completed over the next two years (2014 and 2015).

If our recommendations are accepted, the town will have successfully reconstructed 3.4 miles of paved roads by the end of 2015. This will leave 20.8 miles of paved roads to be reconstructed in the next 17 years (2016 – 2032) to complete a 20 year cycle. This is approximately 1.2 miles per year.

The Committee does not yet propose any specific road segments for these later years. The Road Agent has made a commitment to use the Road Surface Management System (RSMS) which will use scientific criteria to identify the roads that need major improvements to keep them in average or better condition over their 20 year average life span. Regardless of which remaining segments are assessed to be most in need of work beginning in 2016, the principle remains that an average of 1.2 miles must be reconstructed per year in order to slowly improve the condition of all the paved roads in Chichester.

While the committee is not making specific recommendations at this time, the following paved road segments will be considered strongly for reconstruction in 2016 and 2017:

Horse Corner Road – Sections 2, 3, 4, & 5

Bear Hill Road – Sections 2 & 3

King Road – Section 2

Of course this is subject to change as every year we re-evaluate all roads and possible projects. Road conditions change and priorities must also inevitably change to meet the new realities.

The Committee has projected an approximate annual cost of \$384,190 (in 2013 dollars) to reconstruct 1.2 miles of paved road. The Committee also feels that an inflation factor of 3% per year should be added for budgeting purposes.