

Town of Chichester

2012 Report of the Road Advisory Committee

December 19, 2012

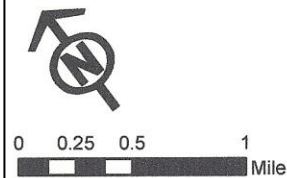
Road Advisory Committee

Doug Hall (Chairman) John Amsden, Stan Brehm, Richard DeBold (Selectman ex-officio),
Dave Dobson, Tom Jameson, Alan Mayville, Jr., Terry McCormack, Richard Millette,
Jim Plunkett (Road Agent)

Town of Chichester, NH



Road Network



Legend

Road Ownership:

- State
- Municipal
- Municipal (Unmaintained)
- Private
- Town Boundary

Data Sources: Political boundaries from NH GRANIT; 2011 roads data from NH Department of Transportation with updates from the Chichester Road Advisory Committee.

This map is intended for planning purposes only. Map produced in November 2011 by CNHRPC for the Chichester Road Advisory Committee.

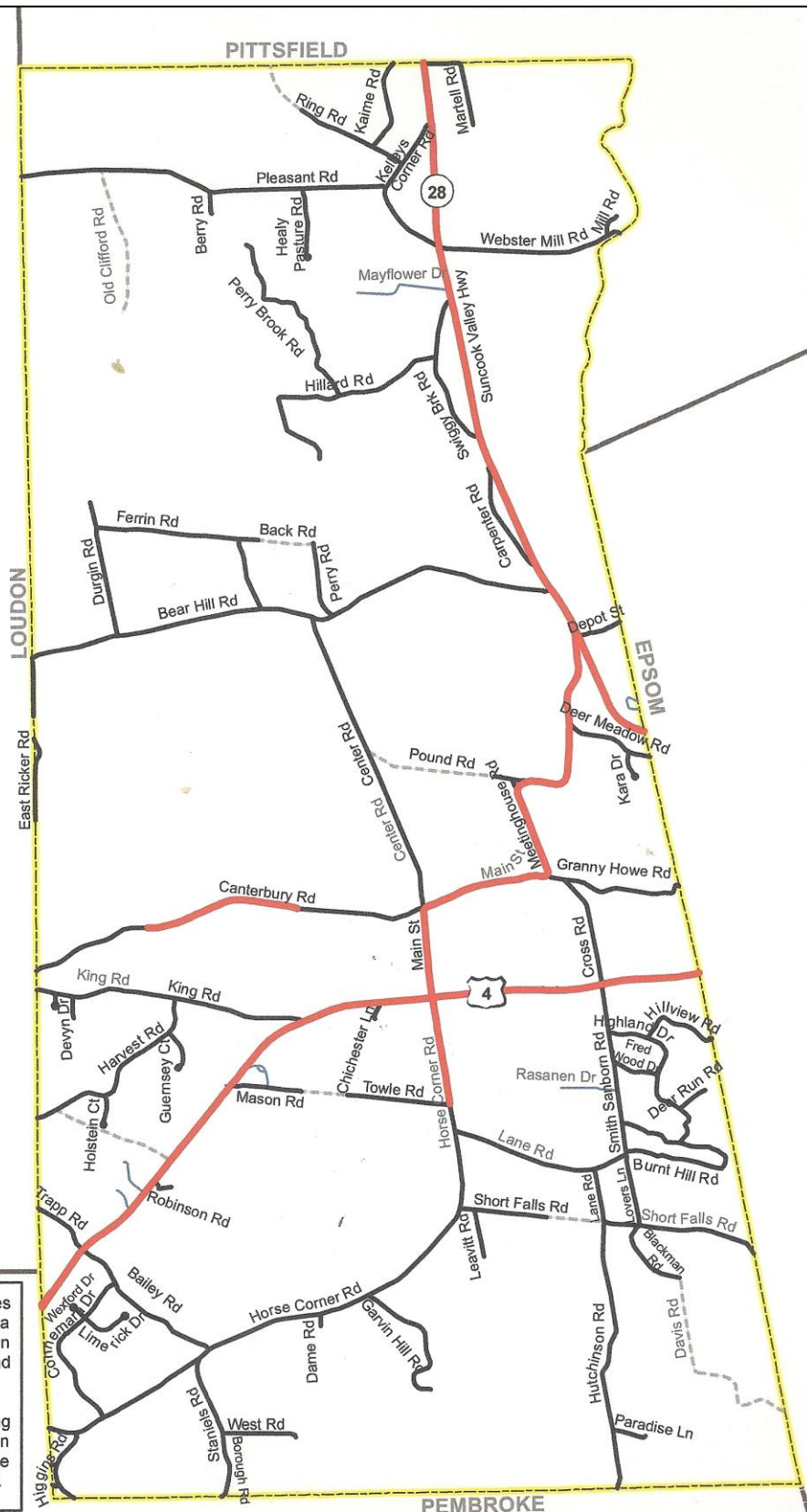


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Executive Summary

The Chichester Road Advisory Committee has worked very hard in 2012 to develop a 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 74 paved road segments totaling 24.1 miles and there are 32 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 would need to repave 1.1 miles per year to maintain existing conditions on average. The town unfortunately has been doing much less than that each year. The result is that our paved roads have 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, 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 1.1 miles of paved roads every year. When a road deteriorates beyond needing preventative maintenance during the 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 1.1 miles per year is approximately \$375,000. If the town spends only \$100,000 per year on such projects, it will take at least 70 years before all paved roads can be addressed.

The Committee has created a detailed inventory of roads, road segments, and their conditions, importance, and traffic counts. The Road Agent now uses RSMS to maintain this information. The Committee has prepared a plan to maintain and improve the conditions of our paved roads that includes repairs to highest priority segments during the next 4 years.

2013: The Committee recommends four reconstruction projects for completion. These are two segments of Pleasant Street and two segments of Kelly Corner Road, totaling 1.24 miles. The cost is estimated to be \$373,000.

2014: The Committee recommends three projects for completion. These include five segments of the nine segments of Horse Corner Road totaling 1.43 miles. The cost is estimated to be between \$320,000 and \$480,000.

2015: The Committee recommends four projects for completion. These are four of the seven segments of Bear Hill Road totaling 1.47 miles. The cost is estimated to be between \$320,000 and \$480,000.

2016: The Committee recommends three projects be completed. These include one segment of Canterbury Road and one segment of King Road. One additional project is unspecified as the Committee expects to review the conditions of all roads many times before 2016 and feels that the third project can best be identified closer to that year. The two specified segments total 1.07 miles. The Committee suggests an additional 0.3 miles of an unspecified segment also be completed in 2016 for a total of 1.37 miles. The cost is estimated to be between \$304,000 and \$456,000.

Once the Committee's four year plan to reconstruct 5.5 miles of roads in the 2013-2016 period has been completed, 18.5 miles of paved roads will remain to be upgraded in the next 16 years to complete a 20 year cycle. This is 1.1 miles per year. The Committee recommends \$375,000 per year (in current dollars) be budgeted for major road capital improvement projects of as yet unspecified paved road segments for each of the years beginning in 2017.

Will the average condition of our roads be allowed to continue to deteriorate?

Do we want to maintain their current condition, or do we desire to improve our roads over the next decade and longer?

It is now up to the citizens of Chichester to decide. With guidance from this Committee's plan, 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 this 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: Richard DeBold (Selectman Ex-Officio); Doug Hall (Chairman); Stan Brehm; David Dobson; Tom Jameson; Richard Millette; Terry McCormack; Allen Mayville, Jr.; John Amsden; Jim Plunkett (Road Agent).

2. Road Surface Management System

2.A: Establishment of Road Segments

Last year the Committee's report discussed the acquisition and first use of the Road Surface Management System software from the Maine Local Roads Center. That software is now in daily use by the Road Agent and helps organize information about Chichester's town roads. One of the first things that must be done is to divide longer roads into segments.

Longer roads are divided 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.

During 2012 the Road Agent and Committee further divided Chichester roads into more segments. Last year the Committee reported 92 segments. The Highway Department now identifies 106 road segments.

2.B: Inventory of Roads

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

74 segments are paved and total 24.2 miles while 32 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								12/10/2012	
Road Name	Seg	From	To	Surface	Length	Importance	Traffic	Surface	Drainage
Back Rd	1	Ferrin Rd	Mailbox#15	Gravel	0.14	low	low	Routine-2	Good-2
Bailey Rd	1	US Route 4	Connemara Dr	Paved	0.23	medium	low-med	No Maint-5	Good-5
Bailey Rd	2	Connemara Dr	Horse Corner Rd	Gravel	0.52	medium	low	Routine-4	Poor-4
Bear Hill Rd	1	NH Route 28	#23 pl west	Paved	0.43	high	high	Rehabilitate-10	Good-10
Bear Hill Rd	2	#23 pl west	#86 Bear Hill	Paved	0.38	high	high	Rehabilitate-10	Poor-10
Bear Hill Rd	3	#86 Bear Hill	Center Road	Paved	0.42	high	high	Rehabilitate-10	Good-10
Bear Hill Rd	4	Center Rd	Ferrin Rd	Paved	0.23	med-high	med-high	Rehabilitate-8	Poor-8
Bear Hill Rd	5	Ferrin Rd	Brown cemetery	Paved	0.36	med-high	med-high	No Survey-8	No Survey-8
Bear Hill Rd	6	Brown cemetery	#255 Bear hill	Paved	0.42	med-high	med-high	No Survey-8	No Survey-8
Bear Hill Rd	7	#255 Bear hill	Loudon Town Line	Paved	0.21	med-high	med-high	No Survey-8	No Survey-8
Berry Rd		Pleasant Rd	End of Berry	Gravel	0.06	low	low	Routine-2	Good-2
Blackman Rd		Short Falls Rd	To end of roadway	Gravel	0.40	low	low	Routine-2	Good-2
Burnt Hill Rd	1	Lovers Ln	# 68 Burnt Hill	Paved	0.40	medium	low-med	Preventive-5	Good-5
Burnt Hill Rd	2	#68 Burnt hill	Highland Drive	Paved	0.30	medium	low-med	Rehabilitate-5	Good-5
Burnt Hill Rd	3	Highland Dr	Smith Sanborn Rd	Paved	0.29	medium	low-med	No Survey-5	No Survey-5
Canterbury Rd	1	Main St	House # 66	Paved	0.64	high	high	Preventive-10	Good-10
Canterbury Rd	3	House # 142	Loudon TL	Paved	0.58	high	high	Rehabilitate-10	Good-10
Carpenter Rd	1	Route 28	#49 Carpenter rd	Paved	0.24	low	low	No Maint-2	Good-2
Carpenter Rd	2	#49 Carpenter rd	Route 28	Paved	0.24	low	low	No Survey-2	No Survey-2
Center Rd		Bear Hill Rd	Canterbury Rd	Paved	1.52	high	medium	No Maint-8	Good-8
Chichester Ln		US Route 4	End Chichester Ln	Gravel	0.09	low	low	Routine-2	Poor-2
Connemara Dr	1	Bailey Rd	#40 Connamara	Paved	0.42	low-med	low	Routine-3	Good-3
Connemara Dr	2	#40 Connamara	Horse Corner Rd	Paved	0.40	low-med	medium	No Survey-5	No Survey-5
Cross Rd	1	US Route 4	House #50	Paved	0.09	medium	low	No Maint-4	Good-4
Cross Rd	2	House #50	Granny Howe Rd	Gravel	0.47	medium	medium	Routine-6	Good-6
Dame Rd		Horse Corner Rd	End Dame Rd	Paved	0.06	low	low	No Maint-2	Good-2
Deer Meadow Rd		Main St	Epsom TL	Paved	0.43	medium	low-med	Preventive-5	Good-5
Deer Run Rd		Highland Dr	End of Deer Run Rd	Gravel	0.15	low	low	Routine-2	Good-2
Depot St		Route 28	Epsom TL	Paved	0.21	low-med	high	No Maint-7	Good-7
Deyn Dr		King Rd	End Deyn Dr	Gravel	0.14	low	low	Routine-2	Poor-2
Durgin Rd		Bear Hill Rd	End of Durgin Rd	Gravel	0.76	medium	low	Routine-4	Good-4
East Ricker Rd	1	Bear Hill Rd	#256	Paved	0.41	med-high	medium	Rehabilitate-7	Poor-7
East Ricker Rd	2	House #256	Loudon TL	Paved	0.27	med-high	medium	Rehabilitate-7	Poor-7
Ferrin Rd		Durgin Rd	Bear Hill Rd	Gravel	1.05	low-med	low-med	Routine-4	Good-4
Fred Wood Dr		Highland Dr	Smith Sanbord Rd	Paved	0.23	low	low	Preventive-2	Poor-2
Garvin Hill Rd		Horse Corner Rd	End Garvin Hill Rd	Gravel	0.72	low	low	Routine-2	Poor-2

Table 1 (continued)

Inventory of Chichester Maintained Road Segments from RSMS									12/10/2012
Road Name	Seg	From	To	Surface	Length	Importance	Traffic	Surface	Drainage
Granny Howe Rd		Main St	Epsom TL	Gravel	0.69	low	low	Routine-2	Good-2
Guernsey Ct		Harvest Rd	End Guernsey Ct	Paved	0.24	low	low	No Maint-2	Good-2
Harvest Rd	1	King Rd	Guernsey Ct	Paved	0.16	low-med	med-high	No Maint-6	Good-6
Harvest Rd	2	Guernsey Ct	Holstein Ct	Paved	0.41	low-med	med-high	No Survey-6	No Survey-6
Harvest Rd	3	Holstein Ct	Loudon TL	Paved	0.31	low-med	med-high	No Survey-6	No Survey-6
Healy Pasture Rd		Pleasant Rd	End of Healy Past.	Paved	0.38	low	low	No Maint-2	Good-2
Higgins Rd		Horse Corner Rd	Pembroke TL	Paved	0.39	medium	medium	Routine-6	Poor-6
Highland Dr	1	Smith Sanbord Rd	Fredwood drive	Paved	0.40	medium	medium	No Maint-6	Good-6
Highland Dr	2	Fredwood drive	Burnt Hill Rd	Paved	0.39	medium	medium	No Survey-6	No Survey-6
Hilliard Rd		Swiggey Brook Rd	End of Hilliard Rd	Gravel	1.21	low	low-med	Routine-3	Good-3
Hillview Dr	1	Smith Sanborn Rd	Epsom TL	Paved	0.42	low	low	Preventive-2	Good-2
Holstein Ct		Harvest Rd	End Holstein Ct	Paved	0.19	low	low	No Maint-2	Good-2
Horse Corner Rd	1	Pembroke TL	Connemara Dr	Paved	0.24	high	high	Preventive-10	Good-10
Horse Corner Rd	2	Connemara Dr	#296 Horse corner	Paved	0.36	high	high	Preventive-10	Good-10
Horse Corner Rd	3	#296 Horse corner	Bailey Rd	Paved	0.32	high	high	Preventive-10	Good-10
Horse Corner Rd	4	Bailey Rd	#239 Horse corner	Paved	0.22	high	high	Routine-10	Good-10
Horse Corner Rd	5	#239 Horse corner	Dame Rd	Paved	0.33	high	high	Routine-10	Good-10
Horse Corner Rd	6	Dame Rd	Garvin Hill Rd	Paved	0.25	high	high	No Maint-10	Good-10
Horse Corner Rd	7	Garvin Hill Rd	#141 horse cr	Paved	0.32	high	high	No Survey-10	No Survey-10
Horse Corner Rd	8	#141 horse cr	Leavitt Rd	Paved	0.30	high	high	Preventive-10	Good-10
Horse Corner Rd	9	Leavitt Rd	Towle Rd	Paved	0.52	high	high	Preventive-10	Poor-10
Hutchinson Rd	1	Short Falls Rd	House #48	Gravel	0.49	med-high	medium	Routine-7	Good-7
Hutchinson Rd	2	House #48	House #91	Paved	0.37	med-high	med-high	Routine-8	Good-8
Hutchinson Rd	3	House #91	Pembroke TL	Gravel	0.47	med-high	low-med	Routine-6	Good-6
Kaime Rd		Ring Rd	Pittsfield TL	Gravel	0.57	low	low	Routine-2	Good-2
Kara Dr		Deer Meadow Rd	End of Kara Dr	Paved	0.17	low	low	No Maint-2	Good-2
Kellys Corner Rd	1	NH Route 28	House #13	Paved	0.22	medium	medium	No Maint-6	Good-6
Kellys Corner Rd	2	House #13	Pleasant St	Paved	0.13	medium	medium	Rehabilitate-6	Poor-6
Kellys Corner Rd	3	Pleasant St	Ring Rd	Paved	0.16	medium	medium	Rehabilitate-6	Good-6
Kellys Corner Rd	4	Ring Rd	NH Route 28	Paved	0.24	medium	medium	Rehabilitate-6	Good-6
King Rd	1	Loudon TL	House #114	Paved	0.25	high	high	Preventive-10	Good-10
King Rd	2	House #114	Harvest Rd	Paved	0.44	high	high	Preventive-10	Good-10
King Rd	4	#26 culvert	Route 4	Paved	0.24	high	high	No Survey-10	No Survey-10
King Road	3	Harvest Rd	Culvert at#26	Paved	0.40	high	high	Routine-10	Good-10
Lane Rd	1	Horse Corner Rd	House #32	Paved	0.30	medium	high	No Maint-8	Good-8
Lane Rd	2	House #32	Smith sanborn Rd	Paved	0.49	medium	med-high	No Maint-7	Good-7
Lane Rd	3	Smith Sanborn Rd	Hutchinson Rd	Paved	0.25	med-high	low-med	No Maint-6	Good-6

Table 1 (continued)

Inventory of Chichester Maintained Road Segments from RSMS									12/10/2012
Road Name	Seg	From	To	Surface	Length	Importance	Traffic	Surface	Drainage
Leavitt Rd		Horse Corner Rd	End of Leavitt Rd	Gravel	0.30	low	low	Routine-2	Good-2
Limerick Dr		Connemara Dr	End of Limerick Dr	Paved	0.10	low	low	No Maint-2	Good-2
Lovers Ln		Short Falls Rd	Smith Sanborn Rd	Gravel	0.35	low-med	low	Routine-3	Good-3
Martel Rd		Route 28	End of Martel Rd	Gravel	0.48	low	low	Routine-2	Good-2
Mason Rd		US Route 4	End of Mason Rd	Paved	0.34	low	low	No Maint-2	Good-2
Meeting House Rd		Main St	Pound Rd	Paved	0.06	low	low	No Maint-2	Good-2
Mill Rd		Webster Mills Rd	End of Mill Rd	Gravel	0.10	low	low	Routine-2	Good-2
Paradise Ln		Hutchinson Rd	End of Paradise	Gravel	0.17	low	low	Routine-2	Poor-2
Perry Brook Rd		Hillard Rd	End of Perry Brook	Gravel	0.43	low	low	Routine-2	Good-2
Perry Rd		Bear Hill Rd	End of Perry Rd	Gravel	0.34	low	low	Routine-2	Poor-2
Pleasant St	1	Kellys Corner Rd	Healy Pasture Rd	Paved	0.40	high	med-high	No Maint-9	Good-9
Pleasant St	2	Healy Pasture Rd	Berry Rd	Paved	0.42	high	med-high	Rehabilitate-9	Good-9
Pleasant St	3	Berry Rd	#117 Trailer Park	Paved	0.22	high	med-high	No Survey-9	No Survey-9
Pleasant St	4	#117 Trailer Park	#161 Pleasant St	Paved	0.42	high	med-high	Rehabilitate-9	Good-9
Pleasant St	5	#161 Pleasant St	Loudon TL	Paved	0.22	high	med-high	Routine-9	Good-9
Pound Rd		Main St	End non-maintained	Gravel	0.22	low	low	Routine-2	Good-2
Ring Rd	1	Kellys Corner Rd	Kaime Rd	Paved	0.17	low	low	Routine-2	Good-2
Ring Rd	2	Kaime Rd	End of Ring Rd	Gravel	0.36	low	low	Routine-2	Good-2
Robinson Rd		US Route 4	End of Robinson Rd	Paved	0.10	low	low	No Maint-2	Good-2
Short Falls Rd	1	Leavitt Rd	House #61	Gravel	0.35	low	low	Routine-2	Good-2
Short Falls Rd	2	Lane Rd	Epsom TL	Gravel	0.77	low-med	low	Routine-3	Good-3
Smith Sanborn Rd	1	Lane Rd Int	Highland Dr	Gravel	0.67	medium	medium	Routine-6	Good-6
Smith Sanborn Rd	2	Highland Dr	US Route 4	Paved	0.23	medium	medium	Rehabilitate-6	Poor-6
Staniels Rd	1	Horse Corner Rd	West Rd	Paved	0.37	med-high	low-med	No Maint-6	Poor-6
Staniels Rd	2	West Rd	Pembroke TL	Gravel	0.32	med-high	low-med	Routine-6	Poor-6
Swiggy Brook Rd	1	South of Stream	NH Route 28	Paved	0.33	medium	low-med	Rehabilitate-5	Good-5
Swiggy Brook Rd	2	North of Stream	NH Route 28	Paved	0.42	medium	low-med	Rehabilitate-5	Good-5
Towle Rd		Horse Corner Rd	End Towle Rd	Gravel	0.45	low	low	Routine-2	Good-2
Trap Rd		US Route 4	Loudon TL	Gravel	0.31	low	low	Routine-2	Good-2
Webster Mills Rd	1	NH Route 28	House # 131	Paved	0.30	medium	med-high	Rehabilitate-7	Poor-7
Webster Mills Rd	2	House #131	Pittsfield TL	Paved	0.60	medium	med-high	No Maint-7	Good-7
West Rd		Staniels Rd	End West Rd	Gravel	0.38	low	low	Routine-2	Good-2
Wexford Dr		Connemara Dr	End Wexford Dr	Paved	0.29	low	low	No Maint-2	Good-2
			Total mileage:		38.13				

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, 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 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.

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 Using PWS RSMS Software, Bob Strobel, University of New Hampshire Technology Transfer Center, December 2011)

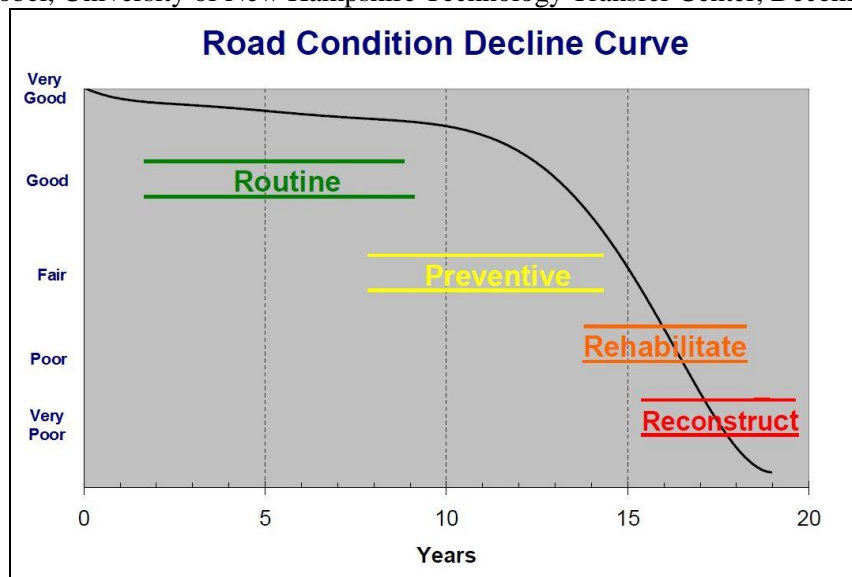
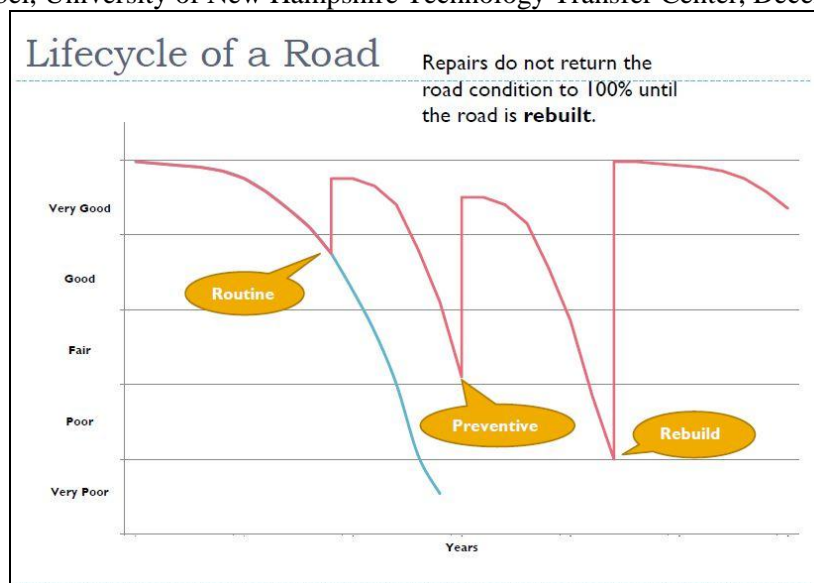


Figure 2

(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. Rehabilitation of the poorest roads by adding another surface on top of the existing one is a poor investment if the subsurface problems of water and stability are not first addressed.

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 last year, 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 Highway Department has begun to use the system for this purpose. He and 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 actual figures that are now available. In future years both budget and actual data will be available. 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

Financial Summary by Road											
Chichester											
Staniels Rd - 2 (Gravel)											
	<u>Year</u>	<u>From</u>	<u>To</u>	<u>Length</u>	<u>Recommended Repair</u>			<u>Other</u>			<u>Actual</u>
2011		West Rd	Pembroke TL	0.32	Routine grading						850
2011					Spot grading/blading						350
2011					Add gravel (up to 4")						1,400
2012					Ditching						1,850
2012					Routine grading						900
											5,350
Towle Rd (Gravel)											
	<u>Year</u>	<u>From</u>	<u>To</u>	<u>Length</u>	<u>Recommended Repair</u>			<u>Other</u>			<u>Actual</u>
2011		Horse Corner Rd	End Towle Rd	0.45	Routine grading						450
2011					Spot grading/blading						300
2012					Spot grading/blading						350
											1,100
Trap Rd (Gravel)											
	<u>Year</u>	<u>From</u>	<u>To</u>	<u>Length</u>	<u>Recommended Repair</u>			<u>Other</u>			<u>Actual</u>
2011		US Route 4	Loudon TL	0.31	Routine grading						450
2011					Spot grading/blading						350
2012					Routine grading						500
											1,300
Webster Mills Rd - 2 (Paved)											
	<u>Year</u>	<u>From</u>	<u>To</u>	<u>Length</u>	<u>Recommended Repair</u>			<u>Other</u>			<u>Actual</u>
2011		House #131	Pittsfield TL	0.60				repair culvert 18"rm/rp			1,400
											1,400
West Rd (Gravel)											
	<u>Year</u>	<u>From</u>	<u>To</u>	<u>Length</u>	<u>Recommended Repair</u>			<u>Other</u>			<u>Actual</u>
2011		Staniels Rd	End West Rd	0.38				labor for 2 men for 2			6,000
2011					Add gravel (up to 4")			topped roadway			309
2011								add three new			1,800
2012					Spot grading/blading						450
											8,559

3. Highway Projects Completed in 2012

The Highway Department completed several major projects while continuing normal road maintenance.

- a. The Department reconstructed approximately 800 feet of Cross Road. The work included installation of culvert pipes and the reconstruction of headwalls.
- b. The Department rebuilt 1,000 feet of Bailey Road. This included clearing brush and trees for better line of sight. Also, reestablishing ditch lines and drainage culverts, additional gravels installed and regrading of the roadway surface.
- c. The Department also completed the remaining 2,200 feet of Lane Road. This included reclaiming the existing pavement, grading the reclaimed asphalt and paving the 2,200 feet of roadway.
- d. The Department rebuilt 2,300 feet of Ricker Road. The work was very involved as a considerable amount of ledge was removed. The roadway was also realigned to increase the line of sight. Gravels were installed properly to increase this road segment's integrity and condition.

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.

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 2012 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												
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
Bailey Rd	Route 4 intersection	191			1,105		570					
Bailey Rd	At # 28 Bailey rd											58
Bear Hill Rd	Loudon town line					539					454	650
Bear Hill Rd	Route 28 intersection				643	685	593					797
Canterbury Rd	Loudon town line	627				520					529	
Canterbury Rd	Main St intersection									809		1,262
Canterbury Rd	East of Center Rd										442	
Center Rd	Bear Hill Rd intersection										433	
Center Rd	North of Main St	544	1,046		431	445						638
Connemara Dr	Bailey Rd intersection											197
Cross Rd	Route 4 intersection	149					165					146
Cross Rd	Main St intersection											
Depot St	At the bridge	462		590			420			501		993
Fredwood Dr	Smith Sanborn Rd intersection											64
Fredwood Dr	Highland Dr intersection											19
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
Horse Corner Rd	Staniels Rd intersection											
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		
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	Kelly's Corner Rd intersection	786			454	824	734				833	756
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
Swiggly Brook Rd	Over Perry Brook		200	240			240			237		
Webster Mills Rd	Route 28 Intersection				595		619				669	
Webster Mills Rd	Over Suncook River	520		550			600			606	676	

The Committee has 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 this year, the Committee asked the Central New Hampshire Regional Planning Commission to collect data that includes vehicle type and speed.

For example, over four weekdays, the counter on Bear Hill Road at the Loudon town line recorded the following number of vehicles by type:

Table 5

Vehicle Type	Count
Motorcycles	2
Cars	804
Pickups and vans	407
Buses	7
Single unit trucks	127
Trailer trucks	8
Unknown	35

The speed of each vehicle was also recorded.

Table 6

Speed	Count
0-20 mph	38
21-30 mph	298
31-40 mph	886
41-50 mph	160
51+ mph	8

While this is Chichester's first attempt to collect this type of data, 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 2013 on road segments for which even basic counts have not previously been made.

5. Four Year Plan: Recommended Capital Projects & Budgets

To determine which of the 74 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 voted by the full committee.

The committee recommends that sixteen paved road segments be reconstructed in the four years 2013 through 2016. These segments total 5.5 miles (of the town's 24.1 miles of paved roads). The committee estimates that the cost of these projects (in current dollars) is between \$1.4 million and \$1.8 million. The summary of these projects is displayed in Table 7.

While it can do some major projects "in house," the Highway Department is not staffed and does not have the equipment to do all of the work. Based on estimates from highway contractors, the committee estimates that contracting an entire project would raise the cost of that project by about 50%. The table on the following page shows the estimated cost of each project in years 2014 through 2016 if done by the town department, or if done by a contractor supervised by the Road Agent. For 2013, the table shows the estimated cost in the warrant articles: both Pleasant Street projects being done by contractors and the Kelley's Corner Road projects being done by town labor.

Table 7

2013				
Segment	Length (miles)	Estimated Town cost	Estimated Contracted cost	
Pleasant St. #2	0.420	-	\$145,000	
Pleasant St. #4	0.419	-	\$133,500	
Kelly Corner #3	0.160	\$41,500	-	
Kelly Corner #4	0.241	\$53,000	-	
TOTAL	1.240	\$94,500	\$278,500	
2013 total for two projects by contractors and two by town:				\$373,000
2014				
Segment	Length (miles)	If done by town	If contracted out	
Horse Corner #2 & #3	0.623	\$147,000	\$220,500	
Horse Corner #4 & #5	0.561	\$109,000	\$163,500	
Horse Corner #6	0.246	\$64,000	\$96,000	
TOTAL	1.430	\$320,000	\$480,000	
2015				
Segment	Length (miles)	If done by town	If contracted out	
Bear Hill #1	0.434	\$82,000	\$123,000	
Bear Hill #2	0.380	\$83,000	\$124,500	
Bear Hill #3	0.423	\$95,000	\$142,500	
Bear Hill #4	0.230	\$60,000	\$90,000	
TOTAL	1.467	\$320,000	\$480,000	
2016				
Segment	Length (miles)	If done by town	If contracted out	
Canterbury #1	0.635	\$132,000	\$198,000	
King Rd. #2	0.435	\$105,000	\$157,500	
Unspecified segment	0.300	\$67,000	\$100,500	
TOTAL	1.370	\$304,000	\$456,000	
2014-2016 Total	4.267	\$944,000	\$1,416,000	
Note: estimates are in current 2012 dollars				

5.A: Recommended Projects for 2013

The Committee recommends four projects for completion during calendar year 2013. These include two segments of Pleasant Street and two segments of Kelly Corner Road. They total 1.24 miles.

2013.a: Pleasant Street - Segment 2

Description: This segment contains the road surface between Healy Pasture Road and the Del Lea Country Club (Berry Road) and is approximately 2,420 feet long. The roadway is a major through road between the towns of Chichester/Pittsfield and Loudon /Concord. Large commercial vehicles make up a greater than average percentage of the traffic volume. Traffic on this roadway has increased from a 454 per day in 2005 to almost 900 per day in 2011. The previous work that has been performed on this segment of roadway includes a 1997 overlay, culvert repair and shimming, pothole repair and patching. The town replaced the first segment of this roadway in 2011.

The roadway survey which was taken in the fall of 2011 showed that this segment had a high percentage of failure in the road surface. Rutting (collapsing of the base due to water infiltration/poor soils) cracking (material failure) and pot holes were at the higher end of the spectrum. The inclusion of this segment is based on the importance of this road to the community and the commercial ventures that it supports , the high volume of daily traffic it receives, and the poor condition overall of the roadway.

Work assigned: The work to be performed will include, but not be limited to, the installation of three new sections of culverts and six state DOT style headwalls and the installation of 100 feet of underdrain across from Del Lea Country Club. 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.

Estimated Cost: \$145,000 if Highway Department contracts the project out as in a proposed warrant article. Estimate for project cost if done by town staff and equipment is on the following page.

2013.b. Pleasant Street - Segment 4

Description: This segment contains the road surface between, trailer park at #117 and #161 (Dairy farm) and is approximately 2,235 feet long. The roadway again is a major through road between the towns of Chichester/Pittsfield and Loudon /Concord. Large commercial vehicles make up a greater than average percentage of the traffic volume. Traffic on this roadway has increased from a 454 per day in 2005 to almost 900 per day in 2011. The previous work that has been performed on this segment of roadway includes a 1997 overlay, culvert repair and shimming, pothole repair and patching. The town replaced the first segment of this roadway in 2011.

The roadway survey which was taken in the fall of 2011 showed that this segment had a high percentage of failure in the road surface. Rutting (collapsing of the base due to water infiltration/poor soils) cracking (material failure) and pot holes were at the higher end of the spectrum. The inclusion of this segment is based on the importance of this road to the community and the commercial ventures that it supports , the high volume of daily traffic it receives, and the poor condition overall of the roadway.

Work assigned: The work to be performed will include, but not be limited to, the installation of one new section of culvert and two state DOT style headwalls and the installation of 350 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.

Estimated Cost: \$133,500 if Highway Department contracts the project out as in a proposed warrant article. Estimate for project cost if done by town staff and equipment is on the following page.

2013.c: Kelly's Corner Road - Segment 3

Description: This segment contains the road surface between Pleasant Street and Ring Road . This segment of roadway is approximately 848 feet long. The roadway is a feeder to Pleasant Street. Large commercial vehicles make up a greater than average percentage of the traffic volume on this roadway. The traffic volume has increased to 454 vehicles per day. The previous work that has been performed on this segment of roadway includes, under drain repair (350 feet), bridge maintenance, patching pot holes, and nothing more. A culvert has been changed out on the corner of Ring Road with an additional catch basin installed (sometime between 2005 and 2009). This segment was broken out because of the bridge. The bridge will need to have asphalt on the deck removed by a different machine method and a new membrane installed. This cost is NOT a part of the estimate as of this writing.

The Committee's roadway survey showed that this segment of roadway had a high percentage of failure in the road surface. Rutting (collapsing of the base due to water infiltration/poor soils) cracking (material failure) and pot holes were at the higher end of the spectrum. The original pavement (farmers' mix) is still the driving surface on this segment. The inclusion of this road is based on the importance of this road to the community, the commercial ventures that it supports , the volume of daily traffic it receives, and the poor condition overall of the roadway.

Work assigned: The work to be performed will include, but not be limited to, the installation of 400 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: \$41,000 if done by the Highway Department as in a proposed warrant article; details on next page.

2013.d: Kelly's Corner Road - Segment 4

Description: This segment contains the road surface between Ring Road intersection and Route 28 (south bound side apron) and is approximately 1,275 feet long. The roadway is a feeder to Pleasant Street. Large commercial vehicles make up a greater than average percentage of the traffic volume. The volume on this roadway has increased to 454 per day. The previous work that has been performed on this segment of roadway includes, under drain repair (350 feet), bridge maintenance, patching pot holes and nothing more.

The roadway survey showed that this segment of roadway had a high percentage of failure in the road surface. Rutting (collapsing of the base due to water infiltration/poor soils) cracking (material failure) and pot holes were at the higher end of the spectrum. The original pavement (farmers' mix) is still the driving surface on this segment. The inclusion of this segment is based on its importance to the community and the commercial ventures that it supports, the high volume of daily traffic it receives, and the poor condition overall of the roadway.

Work assigned: The work to be performed will include, but not be limited to, the installation of 200 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: \$53,000 if done by the Highway Department as in a proposed warrant article; details on next page.

5.B: Recommended Projects for 2014

The Committee recommends three projects for completion during calendar year 2014. These include five segments of the nine segments of Horse Corner Road. They total 1.43 miles.

2014.a: Horse Corner Road: Segments 2&3

Description: These segments contain the road surface between Connamara Drive and Bailey Road, approximately 3,287 feet. There are three distinct features. The first, a section of approximately 700 feet in length, is built entirely through a bog. The next two sections contain a long hill and then a ledge out crop before this road segment ends. Horse Corner Road had a traffic count of 937+/- cars per day in 2006. While there has been a recorded count just to the south of Lane Road of 592 per day, the Committee believes it to be in error as other counts at other locations along the road show counts of more than 1,000 vehicles per day. The previous work that has been performed on these segments of roadway includes crack sealing, culvert repair, shimming, pothole repair and patching, under drain installation and driveway culvert repair.

The Committee's roadway survey showed that these segments of roadway have deteriorated. Rutting (collapsing of the base due to water infiltration/poor soils) just after Connamara Drive and all along the hill section, significant cracking (material failure), and pot holes at the corner (ledge under the roadway base) all impede smooth traffic flow. The inclusion of these segments is based on the importance of this road to the community as a main thoroughfare, the relatively high volume of daily traffic, and the poor condition of these particular segments.

Work assigned: The work to be performed will include, but not be limited to, the installation of 600 feet of underdrain, replacement of one roadway culvert with headwalls, 1,000 feet of ditch line establishment, 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: \$147,000 if done by the Highway Department; details on next page

2014.b: Horse Corner Road - Segments 4&5

Description: These segments contain the road surface between Bailey Road intersection and the Dame Farm Road, approximately 2,965 feet 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 these segments of roadway includes ditching and patching with a overlay. The culvert pipe (all R.C.P) 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 160 feet of underdrain, replacement of four roadway culverts with headwalls, replacement of one driveway culvert, 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.

Costs: \$109,000 if done by the Highway Department; details on next page.

2014.c: Horse Corner Road – Segment 6

Description: This segment contains the road surface between Dame Farm Road and Garvin Hill Road, approximately 1,300 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. The culvert pipe (all R.C.P.) 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 600 feet of under drain, replacement of two roadway culverts with headwalls, 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: \$64,000 if done by the Highway Department; details on next page.

5.C: Recommended Projects for 2015

The Committee recommends four projects for completion during calendar year 2015. These are four of the seven segments of Bear Hill Road. They total 1.47 miles.

2015.a: Bear Hill Road - Segment 1

Description: This segment contains the road surface between Route 28 and the western property line of #23 Bear Hill Road and is approximately 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) just after Harvest road, cracking (material failure), and 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 800 feet of underdrain, replacement of one roadway culvert with headwalls, 1000 feet of ditch line establishment, 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: \$82,000 if done by the Highway Department; details on next page

2015.b: Bear Hill Road - Segment 2

Description: This segment contains the road surface from west of mail box #23 to mail box # 86 and is approximately 2,000 feet long. Having been built on alluvial soils, the hard pan under the roadway does not allow the subsoil to drain. 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 roadway 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), 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. It is a main thoroughfare, sees 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, replacement of three roadway culverts with headwalls, 1,000 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: \$83,000; details on next page

Detail Cost Breakdown for CIP					
Road Name: Bear Hill Road					
Current Condition:					
RE:					
Status in Highway Plan:					
Project starting point: #23 PI West					
Project ending point: #86 Bear Hill Road					
Work Last Done:	Paved	Shim	Seal	Other	(Circle one)
If 'Other', describe:	1997				
Year work was done:					
Length to be repaired, upgraded or	ft.	2,000			
Width of road base	ft.	20			
Estimated project duration (8 hour	Days				
Thickness of base pavement:	in.	2.00			
Thickness of finish pavement:	in.	1.00			
Tons of pavement (Base):		500			
Tons of pavement (Finish):		250			
Asphalt Cost per ton (Base):		\$ 75.00			
Asphalt Cost per ton (Finish):		\$ 75.00			
Total Cost for paving:					\$ 56,250.00
		Qty	Cost Per	Total Cost	
Number of intersections:				0.00	
Number of gravel drives:		7	125.00	875.00	
Number of paved drives:		1	175.00	175.00	
Grind/replace sub-base:	sq yds	4,444	1.50	6,666.67	
Culverts				0.00	
Driveway:	ft.		7.00	0.00	
Road:	ft.	120	8.00	960.00	
Headwalls Driveway and Road	Cy				
Ditching:	ft.		3.25	0.00	
Ditch re-seeding:	SqYrd		1.75	0.00	
Shoulder leveling:	ft.	4000	0.57	2,280.00	
Underdrain:	ft.	600	18.75	11,250.00	
Gravel for subbase upgrades:	ton		4.27	0.00	
Gravel base upgrades:	ton	167	6.75	1,127.25	
Comspans:	per			0.00	
Box Culverts:	sqft.		150.00	0.00	
Guard rails:	ft.			0.00	
Equipment rental:	per wk.			0.00	
Geotextile fabric n/woven):	SqYrd	4444.44	0.70	3,111.11	
Blasting/Hammer :	per hr.		200.00	0.00	
Total Project Cost (Today)					\$ 82,695.03
Annual Projected Cost Escalation					3.5%
Cost Estimate Source(s):					

2015.c: Bear Hill Road - Segment 3

Description: This segment contains the road surface between mail box #86 and Center Road and is approximately 2,234 feet long. In many spots the saturated sub base has lost integrity. Along this stretch the numerous springs and ledge out crops 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 560 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: \$95,000 id done by the Highway Department; details on next page

2015.d: Bear Hill Road - Segment 4

Description: This segment contains the road surface between Center Road and Ferrin Road and is approximately 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 300 feet of underdrain, 1,300 feet of ditch line establishment, removal and replacement of two culverts with DOT approved headwalls. 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: \$60,000 if done by the Highway Department; details on next page

5.D: Recommended Projects for 2016

We recommend three projects be completed during calendar year 2016. These include one segment of Canterbury Road and one segment of King Road. One additional project is unspecified as the Committee expects to review the conditions of all roads many times before 2016 and feel that the third project can best be identified closer to that year. The two specified segments total 1.07 miles. The Committee suggests an additional 0.3 miles of an unspecified segment also be completed in 2016 for a total of 1.37 miles.

2016.a: Canterbury Road- Segment 1

Description: This segment contains the road surface between the Main Street and the State-DoT-maintained segment of Canterbury Road. This segment of roadway is approximately 3,350 feet long. This is one of the oldest roads in town. Traffic seems to have increased considerably, from 800 per day in 2010 to approximately 1,200 cars a day in 2012.. The previous work that has been performed on this segment of roadway includes culvert repair and shimming, numerous overlays and patching.

The Committee's road survey indicates a large percentage of the road surface remains suitable compared with other roads in town. The patching that occurred in 2008 is now deteriorating. This deterioration is due to the shim/overlay losing its bonding capabilities with the lower surface. The inclusion of this roadway is based on the importance of this road to the community and the high volume of daily traffic it receives.

Work assigned: The work to be performed will include, but not be limited to, the installation of two drain inlets and the attached culverts and the installation of four state DOT style headwalls. 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 6'''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: \$132,000 if done by the Highway Department; details on next page

2016.b: King Road - Segment 2

Description: This segment contains the road surface between, Harvest Road and #114 King Road and is approximately 2,270 feet long. King Road is a major thoroughfare, carrying over 1,100 cars per day. It handles all types of large commercial vehicles and cars. The previous work that has been performed on this segment of roadway includes a sand oil seal in 2007/08, culvert repair and shimming, and pothole repair and patching.

The Committee's roadway survey showed that this section of roadway was deteriorating. Rutting (collapsing of the base due to water infiltration/poor soils) just after Harvest Road, cracking (material failure) and pot holes at the corner (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, the high volume of daily traffic it receives, and its poor condition.

Work assigned: The work to be performed will include, but not be limited to, the installation of 800 feet of underdrain, replacement of one roadway culvert with headwalls, 1,000 feet of ditch line establishment, 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: \$105,000 if done by the Highway Department; details on next page

6. Long Range Planning

6.A: Lifespan of a Road and Its Maintenance

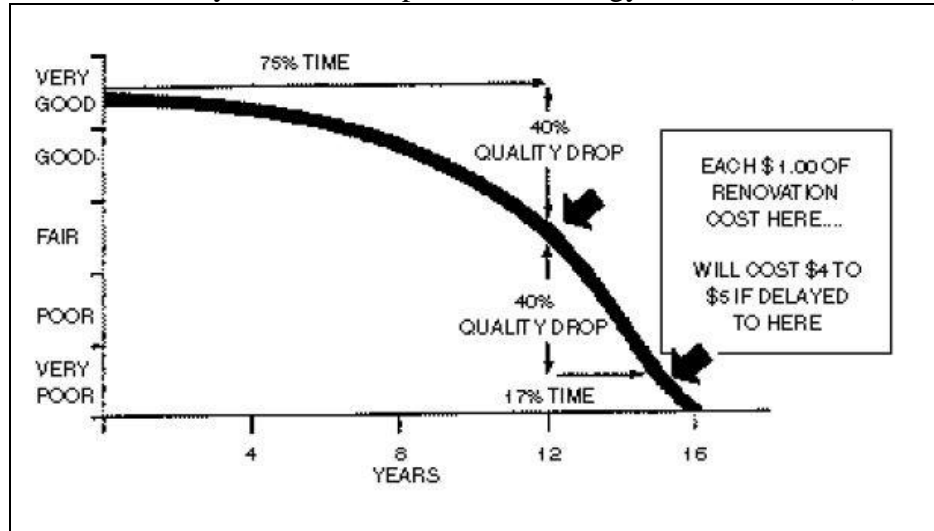
Based on input from the Maine Local Roads Center, the developer of the Road Surface Management System (RSMS), and other sources, including committee members own experiences, the Committee estimated that the average life span of a paved road in Chichester is 20 years. Factors used in developing the average 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 life of some paved roads may exceed 20 years while others may need to be reconstructed sooner.

To obtain a paved road's average 20 year lifespan, there will be 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 1 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.

Without regular maintenance and repair, a road's condition that is only fair will quickly deteriorate to poor and need major reconstruction. 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 improve 1.1 miles of paved roads every year. If a road deteriorates beyond needing preventative maintenance during the 20 year life span it becomes more costly to bring it back to average condition then if annual maintenance were done.

Figure 3
(Source: Road Surface Management System Workshop Notebook and Reference,
University of New Hampshire Technology Transfer Center)



The Committee supports the strategy of keeping roads from deteriorating to the point of needing full reconstruction before its expected 20 year life span by doing annual maintenance on them. However, maintenance activities are outside the purview of the Committee.

6.B: Recommendations for 2017-2032

Once the Committee's four year plan to reconstruct 5.5 miles of roads in the 2013-2016 period has been completed, 18.5 miles of paved roads will remain to be upgraded in the next 16 years to complete a 20 year cycle. This is 1.1 miles per year. The Committee has estimated this cost to be \$375,000 per year (calculated in current dollars). This estimate assumes an average of the cost of using town resources for some projects and the cost of contracting out work for the remaining projects. The Committee recommends \$375,000 per year be budgeted for major road capital improvement projects of as yet unspecified roads for each of the years beginning in 2017. The Committee also feels that an inflation factor of 3% per year should be used for budgeting.

The Committee does not yet propose any specific road segments for these later years. The Road Agent has committed to using 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 2017, the principle remains that an average of 1.1 miles must be reconstructed per year in order to slowly improve the condition of all the paved roads in Chichester.