

A Status Hopkinton's Roads

(Update: 1.20.20 dbh)

Hopkinton has nearly 100 miles of roads; 60 miles of paved roads and 40 miles of dirt roads.

Dan Blanchette, Director of Public Works, has documented the following information in preparation for this year's annual budget process. As of November, 2019, there are \$7,963,838 worth of road construction projects in need of funding now. These projects include:

Chip Sealing 17 paved roads at an estimated cost of	\$ 371,613
Shim and Overlay of 17 paved roads at an estimated cost of	\$1,217,252
Reclaim and Rebuild 20 paved roads at an estimated cost of	<u>\$3,733,738</u>
Total Current Road Projects	\$5,322,603
Culverts and Bridges at an estimated cost of	<u>\$2,200,000</u>
Total of identified projects (Lists attached)	\$7,522,603

To address the above list of identified projects, the current proposed 2020 budget includes the following funding:

Shimming and paving	\$ 370,000
Road and Bridge CRF warrant	100,000
Road Bond warrant	<u>\$2,200,000</u>
Total	\$2,470,000

Dan Blanchette's 2020 top priority is to rebuild the culvert on Kearsarge Street at an estimated cost of \$370,000. Without the additional funding provided by the warrants shown above, the Kearsarge culvert will consume all of the funds historically ear marked for shimming and paving. No other projects will be completed in 2020.

The second priority is the two remaining culverts on Briar Hill at an estimated cost of \$700,000. If no additional funding is provided, one culvert on Briar Hill could be rebuilt in 2021 using \$250,000 remaining from the 2016 Road Bond and \$100,000 from the shimming and paving account. The last Briar Hill culvert would then slide to 2022. If this schedule occurs, no upgrades to our roads would have been done in three years!

If the bond passes, the culvert on Kearsarge (\$370,000), the two on Briar Hill (\$700,000), the two on Bound Tree (\$460,000), and the engineering (\$30,000) for the culvert on Farrington Corner Road will be completed. The remaining \$640,000 would be available for the Tyler Bridge (\$530,000) repairs and \$110,000 for other road projects.

The current level of funding does little to address the remaining \$5,322,603 worth of current road needs shown above. Dan Blanchette's ideal scenero would be to have \$600,000 budgeted annually to address the \$5,633,838 backlog of construction work and an additional \$300,000 to maintain the roads that have been improved and are currently in good shape. At this rate of funding, Hopkinton's road system would begin to catch up in ten years. Dan estimates that

\$600,000 worth of new construction work is the maximum amount that his department can accomplish annually.

Currently there are 24 roads that are in good condition and have been either rebuilt, overlaid or chip sealed in the last 10 years. See attached list.

Road construction and the maintenance of our roads is dynamic. How and when a road is built and maintained is always cost related. If a road is constructed and maintained to best practice standards, it will be most cost effective during its life cycle. When best practice is not maintained, the long-term costs escalate.

Hopkinton is now experiencing the effects of not adequately funding the upkeep of our roads over the last several years. Highway best practice calls for preventative maintenance on a new paved road every ten years or less. This treatment is a "chip seal" which involves spraying a coat of liquid tar on the existing asphalt surface and then covering the tar with a coating of 3/8 inch stone. This treatment seals any cracks and provides a new wear surface for generally seven to eight years.

If all of our 60 miles of paved roads were brought up to good condition and only requiring the minimum maintenance of "chip sealing" every ten years, we would need to reseal six miles of paved roads yearly at a cost of \$368,000. This is the least costly approach in a best case scenario. There are currently only 17 roads involving 6.4 miles that meet this criteria. The cost per mile is \$61,290.

The second most economical treatment for maintaining roads is "shim and overlay". When the existing paved surface has cracked, delaminated and worn so much that a "chip seal" coat will not provide a proper surface, a layer of coarse asphalt is spread to level the surface. The thickness of this leveling asphalt varies from a skim coat to several inches. A 2" finish coat is then laid on top.

Currently there are 17 roads involving 11.9 miles that meet this criteria with an estimated cost of \$1,286,809. The cost per mile is \$108,135

The third and most costly road maintenance is reclaim and rebuild. This involves taking up the existing road materials, sorting through those materials to identify those which meet best practice standards, reusing the good material and adding whatever materials are required to reconstruct the road sub-base. The first step in this process and the most costly is grinding up the existing asphalt which is then later returned as part of the final layer before repaving.

Currently there are 20 roads involving 13.9 miles that meet this criteria with an estimated cost of \$3,954,771. The cost per mile is \$284,516.

The comparative costs for the three types of maintenance clearly show that when funds are available to perform "best practice" maintenance, there are great cost-per-mile savings:

Chip seal	\$ 61,290
Shim and overlay	108,135
Reclaim and rebuild	284,516

The fourth maintenance category is culverts, bridges and sidewalks.

While there are 638 culverts in Hopkinton, there are six major ones that need immediate attention. There are two on Briar Hill, one on Kearsarge, one on Farrington Corner and two on Bound Tree. The cost estimates for this culvert work is \$1,700,000. In addition, the Tyler Bridge work is estimated at \$530,000. These combined costs are \$2,230,000.

Why does this work cost so much?

The construction of a paved road includes a top surface of bituminous asphalt normally laid in two layers. The top coat is usually two inches in depth and the under layment is usually 3 inches thick. These two layers are supported by 12 to 18 inches of crushed gravel. Below the crushed gravel is pervious soil that is groomed to be free of large rocks, clay, tree roots and any other material that will expand and heave when frozen. The total depth of the road construction needs to be generally four feet in depth to avoid frost heaves when the frost depth reaches the normal winter four feet depth.

In addition to properly constructing the road area, ditching is the second most important consideration. Ideally the bottom of the ditch is level with the bottom of the material supporting the road, ie. four feet below the road surface. This allows surface water to drain off the road surface and away from the material supporting the road. When this is accomplished, water does not penetrate the supporting road material eliminating the freezing problem which is the main reason for frost heaves and road surface deterioration.

The third factor in road construction is culverts. The complexity of installation varies widely depending on the size required and the proximity to wet land environments. The simplest installations involve placing an 18 inch diameter culvert in a gently sloping terrain involving no wetlands and not requiring special permitting. The most complicated culvert installations involve large flows of water in wetland terrain and require State wetland permits. Large culverts are constructed of reinforced concrete and those spanning over 10 feet are classified as bridges.

The discussion above addresses our paved roads. Additional effort and funds are needed to keep our dirt roads in a satisfactory condition. Those costs will be developed at a later date.

**Town of Hopkinton
Required Treatment for Roads
November 2019**

Chip Seal cost/Yard	\$	4.50
Pavement Cost/Ton	\$	70.00 (carries throughout spreadsheet)
Relamation cost/Yd	\$	1.00

<u>CHIP SEAL</u>	Feet	<u>Cost per Road</u>
Amesbury Park	4,911	\$ 54,021
Autumn Ridge	1,150	\$ 12,650
Beech Hill	6,494	\$ 71,434
Buckingham	1,003	\$ 11,033
Carriage Lane	1,426	\$ 15,686
Clark Lane	1,584	\$ 17,424
Granite Valley	800	\$ 8,800
Hedgerose	2,957	\$ 32,527
Hopkins Green	3,379	\$ 37,169
Hutchins	2,693	\$ 29,623
Indian Ridge	1,214	\$ 13,354
Prospect	221	\$ 2,431
School Street	792	\$ 8,712
Smithfield	1,742	\$ 19,162
Watchtower	1,400	\$ 15,400
White Tail	920	\$ 10,120
Willoughby	<u>1,097</u>	\$ 12,067
TOTAL FOOTAGE	33,783	
WIDTH	22	
Square Feet	743,226	
Square Yards	82,581	
Cost per Sq Yard	<u>\$ 4.50</u>	

TOTAL COST **\$ 371,613**

SHIM & OVERLAY

	<u>Feet</u>	<u>Cost per Road</u>
Blaze Hill	739	\$ 14,339.56
Brookwood	1,807	\$ 35,063.03
Chase Farm	1,003	\$ 19,462.21
College Hill	3,168	\$ 61,471.87
Dolly Road	7,920	\$ 153,679.68
Gould Hill	5,200	\$ 100,900.80
Penacook Road	10,000	\$ 194,040.00
Stumpfield	2,000	\$ 38,808.00
Taylor	1,584	\$ 30,735.94
Upper Straw	6,636	\$ 128,764.94
Broad Cove	3,000	\$ 58,212.00
Burnham Intervale	4,066	\$ 78,896.66
Checkerberry	845	\$ 16,396.38
Country Club	1,848	\$ 35,858.59
Farrington Corner	11,405	\$ 221,302.62
Roberts Road	581	\$ 11,273.72
Turnberry	930	\$ 18,045.72
TOTAL FOOTAGE	62,732	
WIDTH	22	
Square Feet	1,380,104	
Square Yards	153,344.89	
Multplier for 2"	0.1134	
Tons of Pavement	17,389.31	
Cost/Ton	\$ 70.00	

TOTAL COST**\$ 1,217,252**

RECLAIM & REBUILD

Apple Tree	792
Cedar Street	2,165
Gould Hill	5,200
Irish Hill	2,000
Kearsarge	6,600
New Cemetery	845
South Road	7,000
Stumpfield	3,000
Riverside	1,373
Tamarack	2,059
West Hop. Bridge	475
Briar Hill	17,002
Hatfield	9,000
Kast Hill	4,277
Krzyzaniak	792
Old Stagecoach	1,000
Stonybrook	1,109
Pine Street	3,000
Rollins	3,000
Tyler Road	2,587

TOTAL FOOTAGE 73,276

WIDTH 22

Square Feet 1,612,072

Square Yards 179,119.11

Reclaim	\$ 179,119.11	\$ 1.00	\$ 179,119.11
3" Base Tons	30,468.16	\$ 70.00	\$ 2,132,771.26
2" Top Tons-yr 2	20,312.11	\$ 70.00	\$ 1,421,847.50

TOTAL COST \$ **3,733,738**

CULVERTS/BRIDGES/SIDEWALKS

Maple Street Sidewalk (estimate)		\$	100,000	
Tyler Bridge				
Engineering	30000			
Minimum of new Deck	500000	\$	530,000	
Briar Hill 2		\$	390,000	
Briar Hill 3		\$	390,000	
Kearsarge		\$	430,000	
Bound Tree Culvert 1		\$	130,000	
Bound Tree Culvert 2		\$	<u>330,000</u>	
TOTAL COST				\$ 2,300,000 2,200,000

TOTAL ALL PROJECTS \$ **7,622,603**
7,522,603

HOPKINTON ROAD CONSTRUCTION DONE DURING THE LAST 10 YEARS

Update: 1.20.20 dbh

TYPE *

Amesbury	O
Bartons Corner	R
Clark	O
Duston Road	R C
East Pencoek	O
Gage Hill	R
Galloping Hill	O
Garrison	O
Hatfield	R
Hedrose	O
High Pond	O
Hopkin's Green	O
Hutchins	R
Indian Ridge	R
Kearsarge	R
Little Frost	R
Moss	O
Old Putney	R
Pinewood	O C
Rollins	R C
Spring	R C
Stumpfield	R
Stumpfield Boat Launch	R
Sugar Hill	O

*TYPE OF CONSTRUCTION

C: Chip and Seal

O: Overlay

R: Rebuild