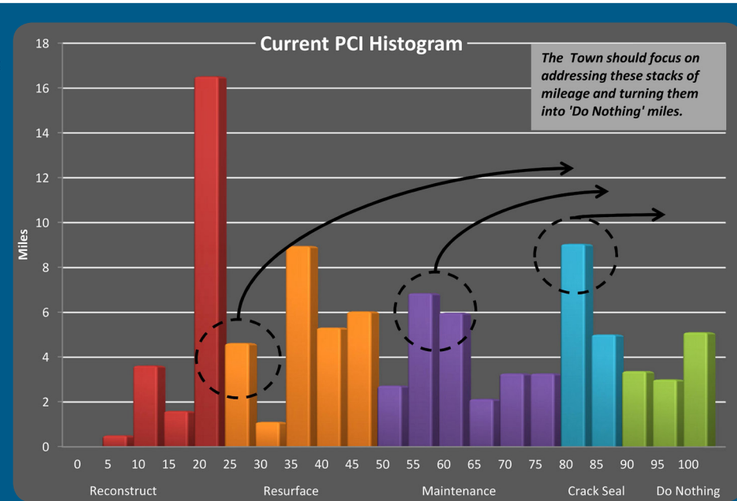
CONCLUDING REMARKS

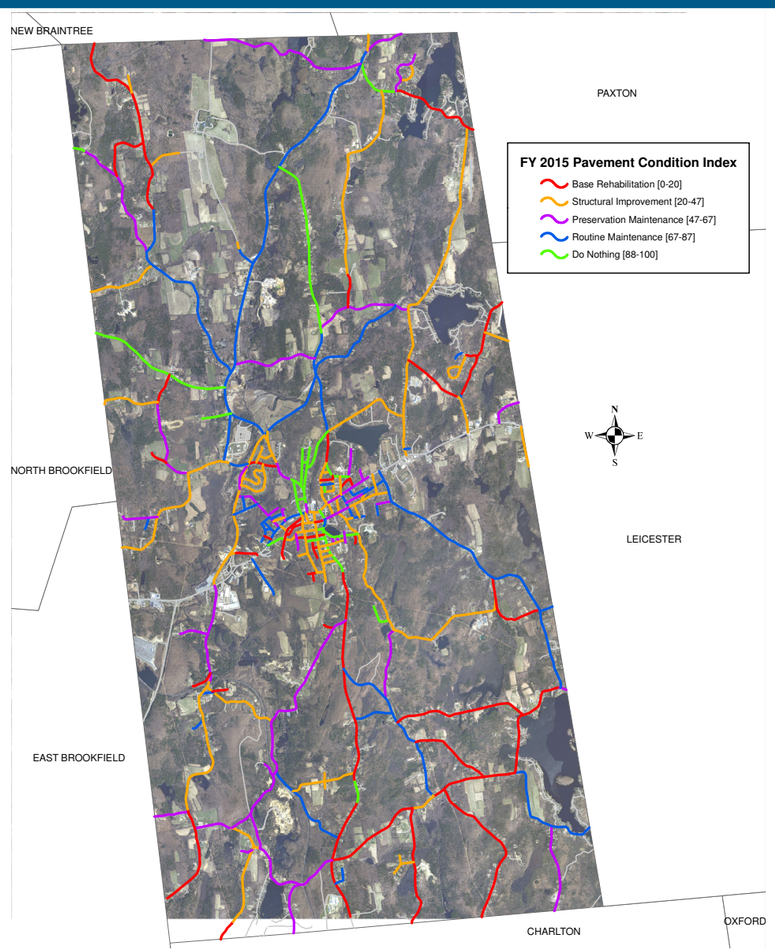
The Town of Spencer is at a critical time for its pavement management network. The backlog is escalating to unsustainable levels as more miles of the network get placed into more expensive treatment bands annually. The Town needs to be proactive and address the situation by sufficiently funding the network and selecting the optimal treatments and streets.

The funding analyses herein illustrate that existing funding levels need to be increased in order to sustain expected pavement deterioration. The figure shows a breakdown of the pavement network in 5 PCI point increments. It is interesting to note that the largest accumulation of mileage in the network falls between PCI values of 15 and 20. This shows the level of deficiency in the budget as many of these miles should have been resurfaced in previous years. In order to progress and improve the network, the Town needs to address segments which are on the cusp of requiring more expensive treatments.



The three regions circled on the chart highlight areas where the Town should be spending their money from a pavement management standpoint. It is essential to establish an annual maintenance program in order to keep the network healthy and in balance.

With the network approaching "poor" conditions and an already substantial accumulation of mileage dedicated to Base Rehabilitation, FST recommends that at a minimum, the Town should strive to follow the "Aggressive" funding approach to stabilize the network promptly before the backlog becomes unsustainable.

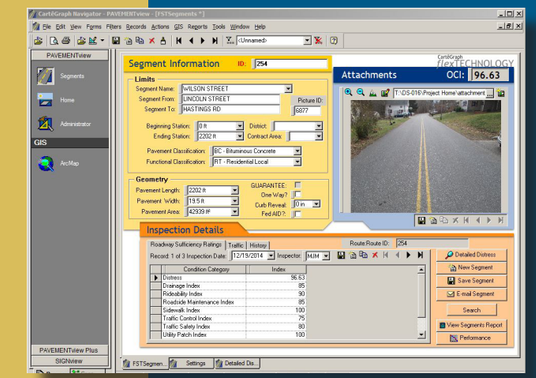


FST 100 YEARS

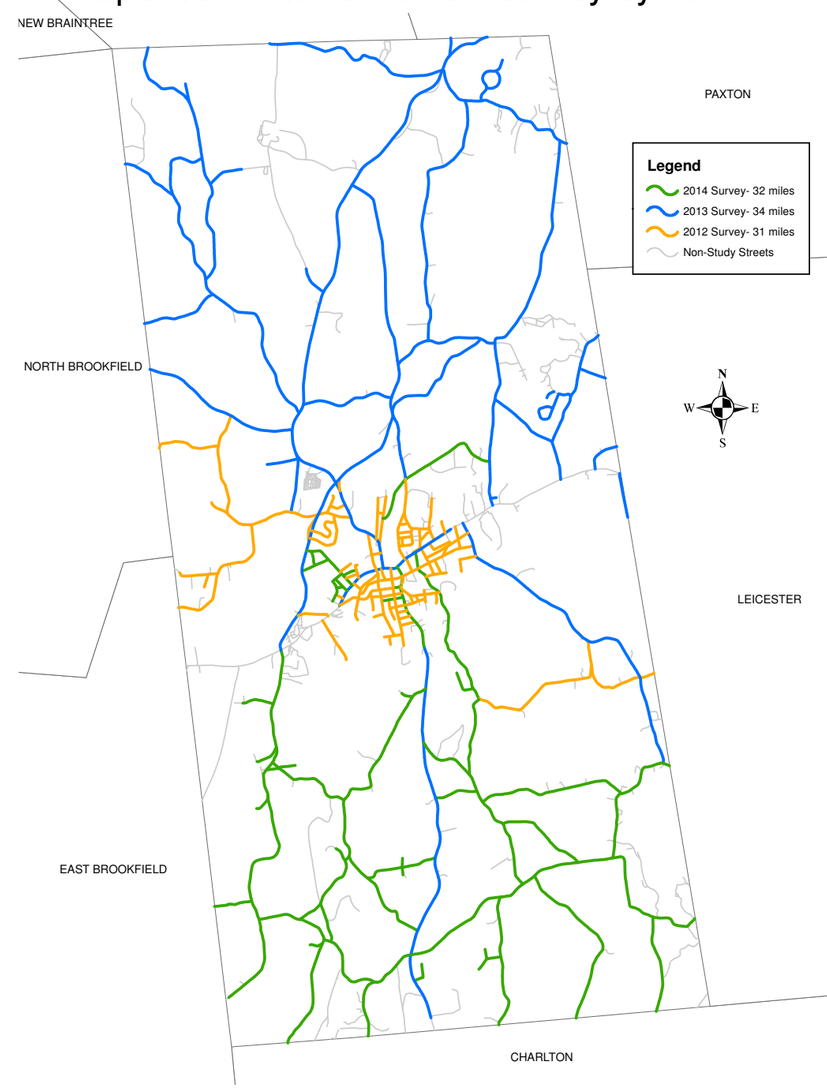
FAY, SPOFFORD & THORNDIKE

FY 2015

Pavement Management Summary



Spencer Road Condition Survey by Year



Prepared For:

LOOK TO THE FUTURE SPENCER INCORPORATED IN 1753 MASSACHUSETTS

Town of Spencer
Office of Utilities and Facilities

Steven J. Tyler, P.E.
Superintendent

Prepared By:

FST 100 YEARS

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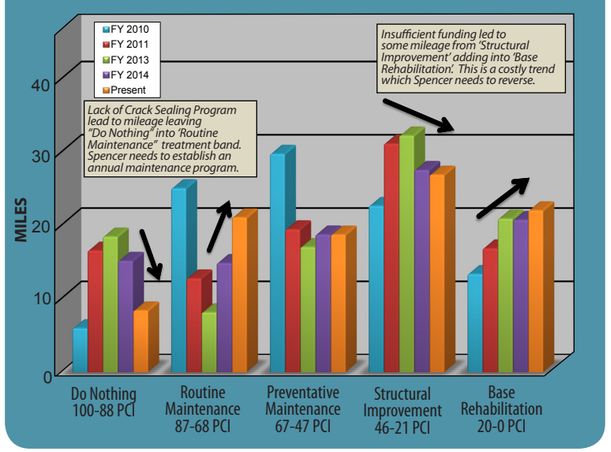
March 2015

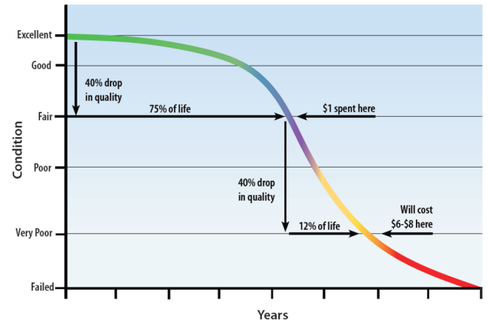
EXISTING CONDITIONS

Spencer's roadway network is comprised of 5.3 state highway miles, 8.2 private road miles, and 97.3 public miles. Since 2009 Fay, Spofford & Thorndike (FST) has worked with the Town implementing and updating its Pavement Management System. In January of 2015, FST completed a 33% re-survey of the Town's public roadway network, determined today's average road network Pavement Condition Index (PCI), roadway repair backlog, and investigated future funding scenarios. FST identified 220 pavement segments and determined the Town's average road network PCI in February 2015 was a 50.8, placing Spencer's typical road conditions in the bottom of the Preventive Maintenance treatment band (PCI range from 47 to 67), as seen to the right. This PCI average value represents a roadway in "fair" condition which is rapidly approaching "poor" condition.

PCI Distribution in Miles by Treatment Band for Previous 5 Years Monitored



Pavement Deterioration Curve



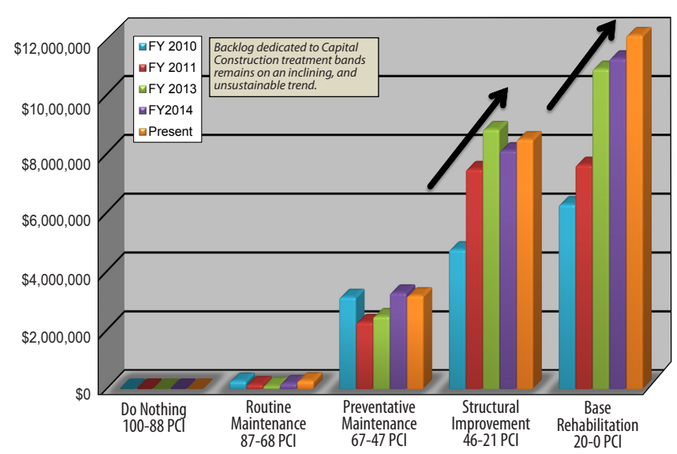
(PCI) Treatment Band Ranges[1]

DO NOTHING PCI Band #1(100 – 88 PCI)	**Excellent Condition** - in need of no immediate maintenance.
ROUTINE MAINTENANCE PCI Band #2 (87 - 68 PCI)	**Good Condition** - may be in need of crack sealing or minor localized repair.
PREVENTIVE MAINTENANCE PCI Band #3 (67 - 47 PCI)	**Fair Condition** - pavement surface in need of surface sealing or thin overlay.
STRUCTURAL IMPROVEMENT PCI Band #4 (46 - 21 PCI)	**Poor Condition** - pavement structure in need of additional thickness to resist traffic loading.
BASE REHABILITATION PCI Band #5 (20 - 0 PCI)	**Failed Condition** - in need of full depth reconstruction/reclamation.

[1] The PCI ranges given in this table are general averages. The actual treatment band threshold numbers depend on pavement surface type and functional classification.

Current Backlog of Outstanding Repairs ($23,900,279)

The backlog is defined as the cost of repairing all the roads within one year and bringing the average PCI to a near perfect 100. Backlog is a "snapshot" or relative measure of outstanding repair work. The backlog not only represents how far behind the Spencer roadway network is in terms of its present physical condition, but also its cost value serves as a benchmark to measure the impact of various funding scenarios. The current backlog offers a basis for comparison to future and/or past year's backlog(s). Backlog dollars represent the pavement structure only; it does not include related repair cost for drainage, sidewalk, curbing, signals, or signs. Spencer's backlog as of February 2015 is $23,900,279. The figure to the right summarizes the backlog repair costs by PCI treatment bands for the last five surveyed years, showing an overwhelming trend increase in the capital construction category.



BUDGET ANALYSIS

The analysis software of the PMS is where financial determinations and projections are made. Consideration is given to the required budget, by repair type, based on the supplied information from meetings with the Town and FST, for overall desired roadway network conditions. Various scenarios were analyzed to measure the effects of alternative funding levels and to determine the funding needed to avoid deteriorating pavement conditions. Today's backlog cost and future funding scenarios are based on Spencer's current unit bid prices for roadway construction and projected liquid asphalt prices.

The funding scenarios are for the costs of the existing roadway pavement only do not include costs for sidewalks, utilities, stormwater, drainage, sidewalks, safety enhancements, widening, signage, pavement markings, bridges, culverts, or survey, ROW, design, permitting and engineering. Depending upon the roadway segment the added costs for these additional work items could increase the total costs actually required to rehabilitate a particular roadway segment by 20-30% or more. Therefore, whichever pavement management budget scenario is selected the total dollars invested should be adjusted to account for these additional roadway rehabilitation related costs.

Using the Town's pavement management software, FST modeled four, five-year future funding scenarios:

Required Budget	Approximate Historical	Maintain PCI	Maintain Backlog	Proactive Approach	Aggressive Approach
FY 2016	$500,000	$1,250,000	$2,250,000	$4,000,000	$4,500,000
FY 2017	$500,000	$1,250,000	$2,250,000	$3,000,000	$4,000,000
FY 2018	$500,000	$1,000,000	$2,250,000	$2,500,000	$3,500,000
FY 2019	$500,000	$1,000,000	$2,250,000	$2,500,000	$3,500,000
FY 2020	$500,000	$1,000,000	$1,500,000	$2,500,000	$3,000,000
5 Year Total	**$2,500,000**	**$5,500,000**	**$10,500,000**	**$14,500,000**	**$18,500,000**

Each scenario, as depicted in the line charts below, results in a projected average network PCI and backlog. All scenarios incorporate a 3.5% annual inflation rate. Therefore, where the annual road appropriation appears to remain level, it in fact represents a net budget decrease due to impact of inflation. Since Spencer's overall PCI is so low, many of the budget scenarios are front-loaded to address stabilizing the network urgently.

The five-year Approximate Historical scenario, as seen by the purple line, shows the backlog increasing significantly to $36 million dollars while the network average PCI decreases to 43.8, in FY 2020. This scenario shows the Town that they need to increase the budget before network conditions turn "poor" and the backlog becomes unsustainable.

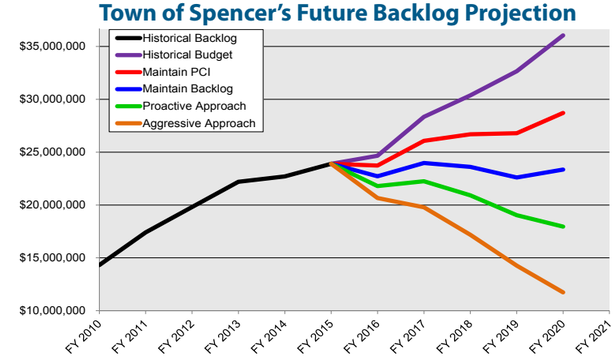
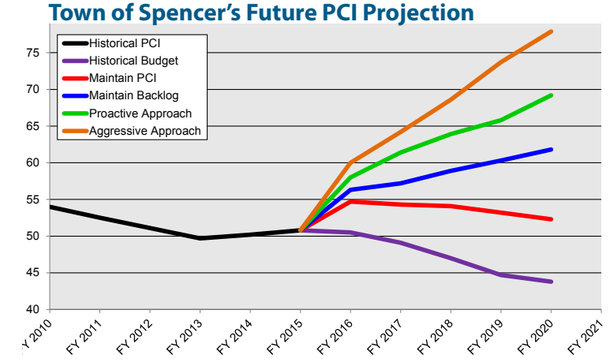
Next, a five-year 'Maintain PCI' scenario was investigated, as depicted by the red line. Here the backlog rises to $28.7 million dollars while the network average PCI slightly increases to 52.3 in FY 2019. This funding scenario focuses on finding the budget required to maintain current network conditions. Given that current conditions are on the lower end of "fair", the Town should look to improve.

FST then examined a five-year 'Maintain Backlog' scenario, as depicted by the blue line. Here the backlog remains at $23.4 million dollars while the network average PCI increases to 62.3 in FY 2020. In order for Spencer to maintain their current backlog, the Town would need to spend $10.5 million dollars over the next five years.

In an effort to improve the network conditions and better sustain the backlog, a five-year Proactive scenario was evaluated. As shown by the green line, the backlog decreases to $17.5 million dollars and the network average PCI increases to 69.2 in FY 2020. While this scenario requires spending a lot of money up front, it reverses the negative trend of increasing capital construction segments while adequately funding a sufficient maintenance program.

Lastly, an Aggressive scenario was explored to determine the budget required to bring the pavement network to very good conditions and bring the backlog down to a very manageable level. As shown by the orange line, the backlog decreases to $11.8 million dollars, as the average PCI increases to 76.7 in FY 2020. While this scenario does involve spending a considerable amount over the next 5 years, the Town would be able to reduce budget after FY 2020, as most the network would require maintenance at that point.

Town of Spencer's Future Backlog Projection



Town of Spencer's Future PCI Projection