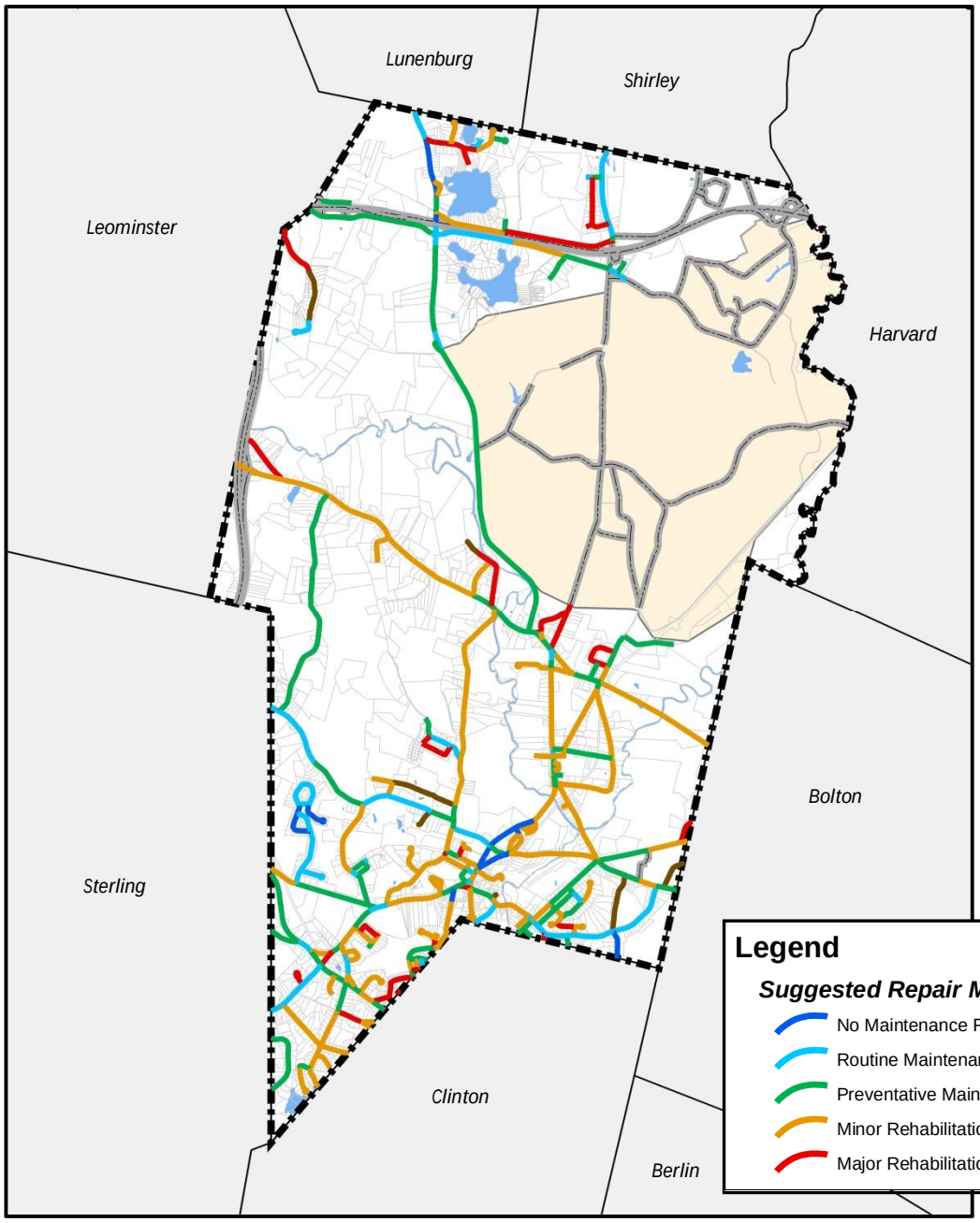
Pavement Management Summary

Date: April 19, 2019
Date of Inspections: September 2018



Town of Lancaster, Massachusetts

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Introduction

Background

The Town of Lancaster retained BETA Group, Inc. (BETA) to develop a Pavement Management Program (PMP) for its Town maintained roadways. This comprehensive study was undertaken with the goal of establishing an extensive database of roadway surface conditions in order to produce a prioritized list of improvements. The PMP is a planning tool intended to provide the foundation to manage the Town's roadway resources by combining professional engineering metrics with local institutional knowledge. These efforts will result in the creation of a dynamic Capital Improvement Plan for the Town's roadway network.

BETA and Town Staff will work together to identify goals with regard to roadway network condition. Based on these discussions, it is clear that the Town is committed in maintaining and improving its roadway network. This could only be achieved by preserving and maintaining the existing infrastructure to the greatest extent possible.

Pavement Management Approach

Pavement management is based on the theory of predicting roadway deterioration over time. This theory allows pavement managers to perform timely maintenance to the roadway system, extending the roadway's life in order to avoid more costly and extensive structural repairs. A key aspect of pavement management, as illustrated by the Pavement Deterioration Curve, is the recognition that roadways deteriorate in an accelerated fashion at particular times in the roadway lifecycle. Understanding this concept allows opportune decisions that yield the most cost-effective results.

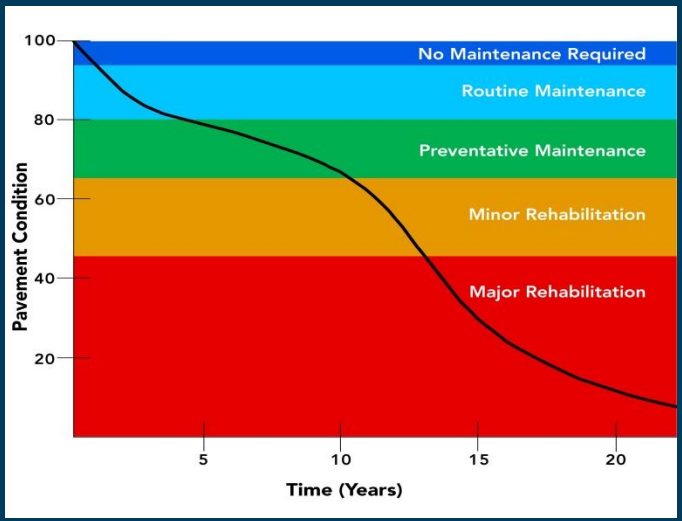
Implementing a PMP involves identification of the road network, evaluation of its surface conditions, and specification of its maintenance practices and associated repair costs. Roadway condition data is compiled to facilitate the calculation of a Road Surface Rating (RSR) for each street segment. This range includes a possible low value of 0 for a road characterized by a high severity of distress, and a possible maximum value of 100 for a road with no visible defects. Ultimately, the RSR value allows each roadway segment to be placed into a planning level repair category.

Roadway Survey

The roadway survey in Lancaster, consisting of paved, Town accepted roadways, was completed in the Fall of 2018. A total of 63.26 miles of roadway were inspected by BETA's field team. The collection effort focused on the primary categories of roadway data including roadway length, width, segment start/end points, surface type, and pavement condition.

BETA's field inspection team, consisting of a trained pavement inspector and an assistant, conducted all inspections. The inventory was accomplished by driving each roadway segment and making visual observations of the different types of distresses for each segment. The severity and extent of each distress type was assessed and then recorded in the program following industry standards to calculate each respective RSR value. Additional roadway elements including curbing, sidewalks, striping, roadway width, and pavement material were also assessed as part of this inspection process and recorded in the database.

Pavement Deterioration Curve



Summary of Findings

Upon completion of the survey, the overall RSR for Lancaster's accepted public roadway network was 66.02. The overall RSR represents a benchmark for performance measuring of the Town's pavement management program moving forward. If the overall RSR were to drop in the years to come, this would be a sign that the program needs to be adjusted or funding for the program may need to be increased.

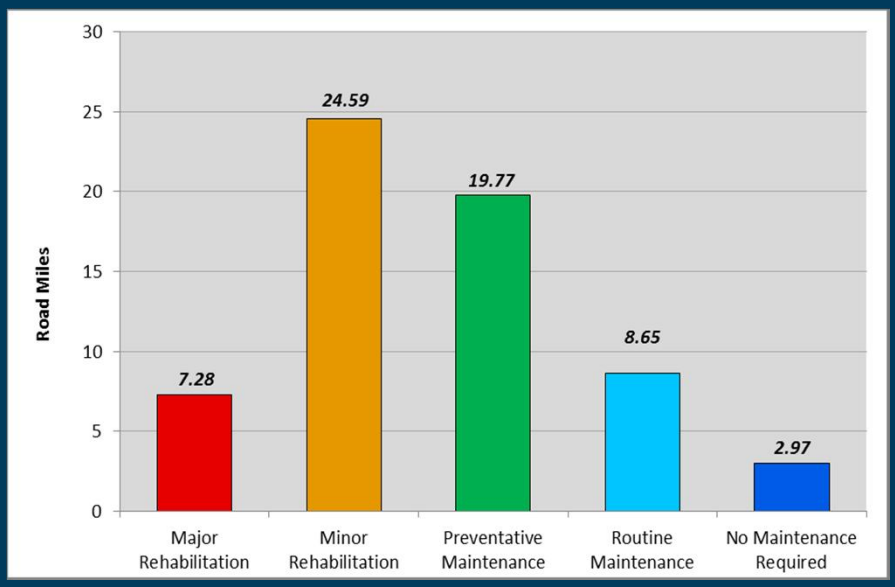
Repair strategies and associated unit costs were defined (as shown below) to develop the Backlog Summary. This summarizes both the mileage of roadway within each suggested repair method as well as the estimated cost based on unit prices for each repair method. The current backlog summary for the Town's public roadway network is approximately $10.85 Million. This budgetary dollar figure represents the funding necessary if the Town were to perform all required maintenance for the Town's road network within the next year.

66.02

CURRENT TOWN NETWORK
ROADWAY SURFACE RATING (RSR)
(September 2018)

Repair Method	RSR Range	Unit Price (sy)
Major Rehabilitation	0-45	$40.00
Minor Rehabilitation	45-65	$14.00
Preventative Maintenance	65-80	$6.00
Routine Maintenance	80-94	$0.50
No Maintenance Required	94-100	$0.00

RSR Breakdown by Mileage



Backlog Summary

Repair Method	Length (Miles)	Square Yards	Percent Repair	Estimated Cost
Major Rehabilitation	7.28	95,433	11.51%	$3,817,315
Minor Rehabilitation	24.59	356,903	38.87%	$4,996,638
Preventative Maintenance	19.77	328,878	31.25%	$1,973,269
Routine Maintenance	8.65	129,017	13.68%	$64,508
No Maintenance Required	2.97	49,688	4.70%	$0
Total	63.26	913794..30	100%	$10,851,730

Capital Planning & Concluding Remarks

A series of Cost Benefit Value (CBV) analyses were generated to serve as a tool to prioritize potential roadway projects for inclusion in a multi-year Capital Improvement Plan (CIP). The development of a CIP will assist the Town in improving its network rating over time.

A 5-year forecast model was run to demonstrate how the network-level RSR for paved roadways would fluctuate over time under different funding scenarios. The model suggests that the Town secure approximately $560K annually to maintain the current rating. However if the Town secures at least $750K annually, the Network RSR is projected to approach 68.

The PMP provides decision makers with a picture of existing roadway conditions, a cost estimate to protect those paved roadways in good condition, and a recommended strategy to meet the Town's goals and objectives.

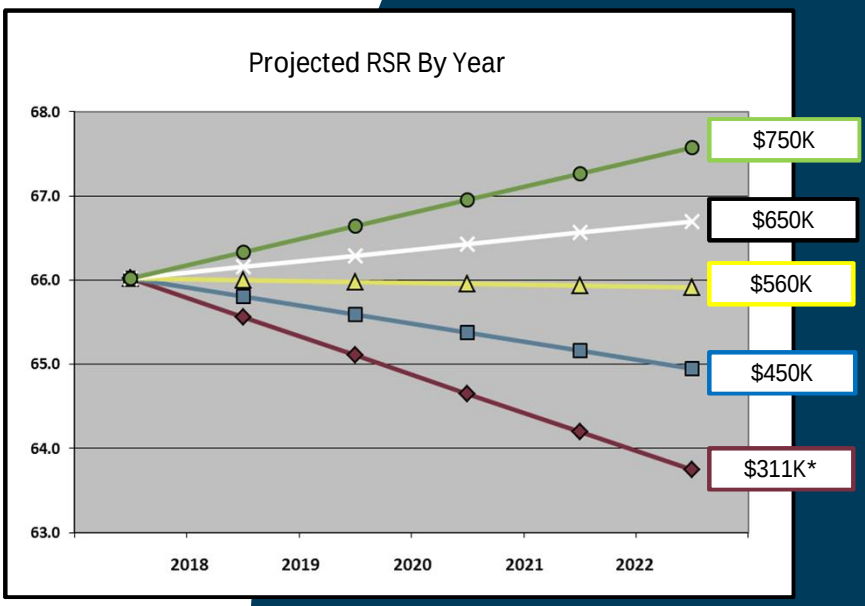
Program Maintenance

To best manage and update the Town's PMP database, the following practices are suggested:

- Post all annual roadway improvements into the database. Both the pavement condition rating and repair history information should be entered.
- Add any new roadway network descriptions to the database as soon as the Town accepts the roadways.
- Update repair method unit costs annually to provide accurate work plan forecasts.
- Assign one or more individuals to oversee system upkeep and to request annual pavement condition updates.
- Review developments in pavement technology that might offer a more cost effective alternative to pavement maintenance or rehabilitation over the pavement's life cycle.

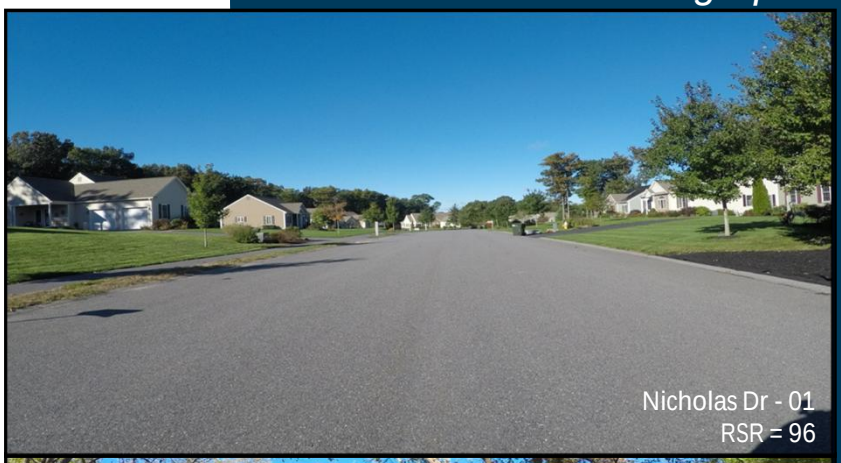
The Pavement Management Program will serve as a valuable instrument to the Town and facilitate a progressive approach to managing roadway infrastructure.

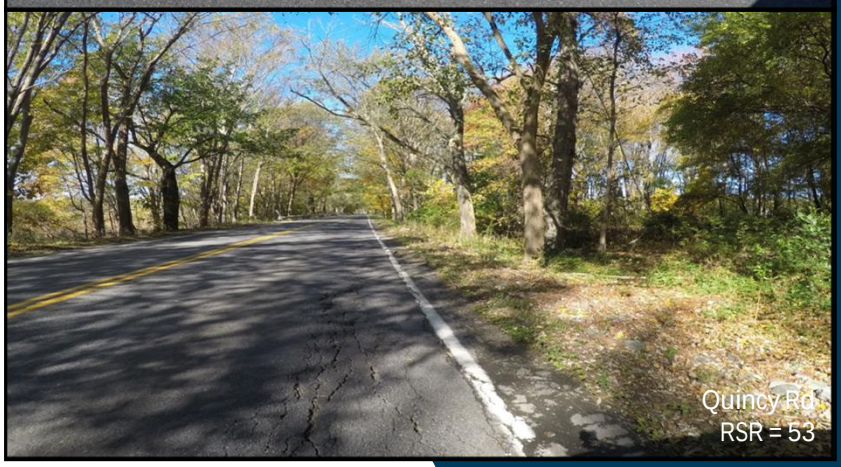
Forecast Model



*Denotes FY19 Ch. 90 Allotment

Representative Photographs





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