
Town of Lincoln
Department of Public Works



PAVING PLAN

June 2007

Town of Lincoln
Department of Public Works

Mission Statement

“Lincoln's roads are historic in their alignment and design character, and increased vehicular traffic has caused them to deteriorate.

Improvements designed to address current issues must achieve a balance between the multiple requirements of transportation,

community linkage,
environmental quality,

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Study Purpose and
Methodology

•**Purpose**

- To Inventory the Current Conditions of Lincoln's Roadways, and present ideas to repair the roadway infrastructure.

•**Methodology**

- 2007 Visual Inspection
- 1997 "Roadway Management Study" and "Roadway Design Guidelines" by Engineering Firm VHB
 - Data Collected in 1996
 - Uses Pavement Condition Index (PCI) to evaluate Pavement Conditions
 - PCI calculated by a weighted formula based on the severity and extent of 9 major pavement distresses.
 - Potholing, alligating, distortion, rutting, block cracking, longitudinal cracking, polished aggregate, surface wear, and shoving.

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Lincoln Roadway Design
Sensitivities



- Cultural Preservation
- Historical Preservation
- Open Space Consideration
- Multi-modal Consideration

- Balance of Town Culture with Engineering Considerations

- Stonewalls
- Trees
- Aesthetic Roadside Treatments
- Keep Impervious Surface to a minimum



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Where Do We Currently Stand?

Current Road Survey
Shows

- **Secondary Roads:** Basically in good condition.
- **Neighborhood Roads:** Vary from being in very good condition to requiring reconstruction.
- **Primary Roads:** Many in poor condition. Different levels of work required to rebuild the roads.

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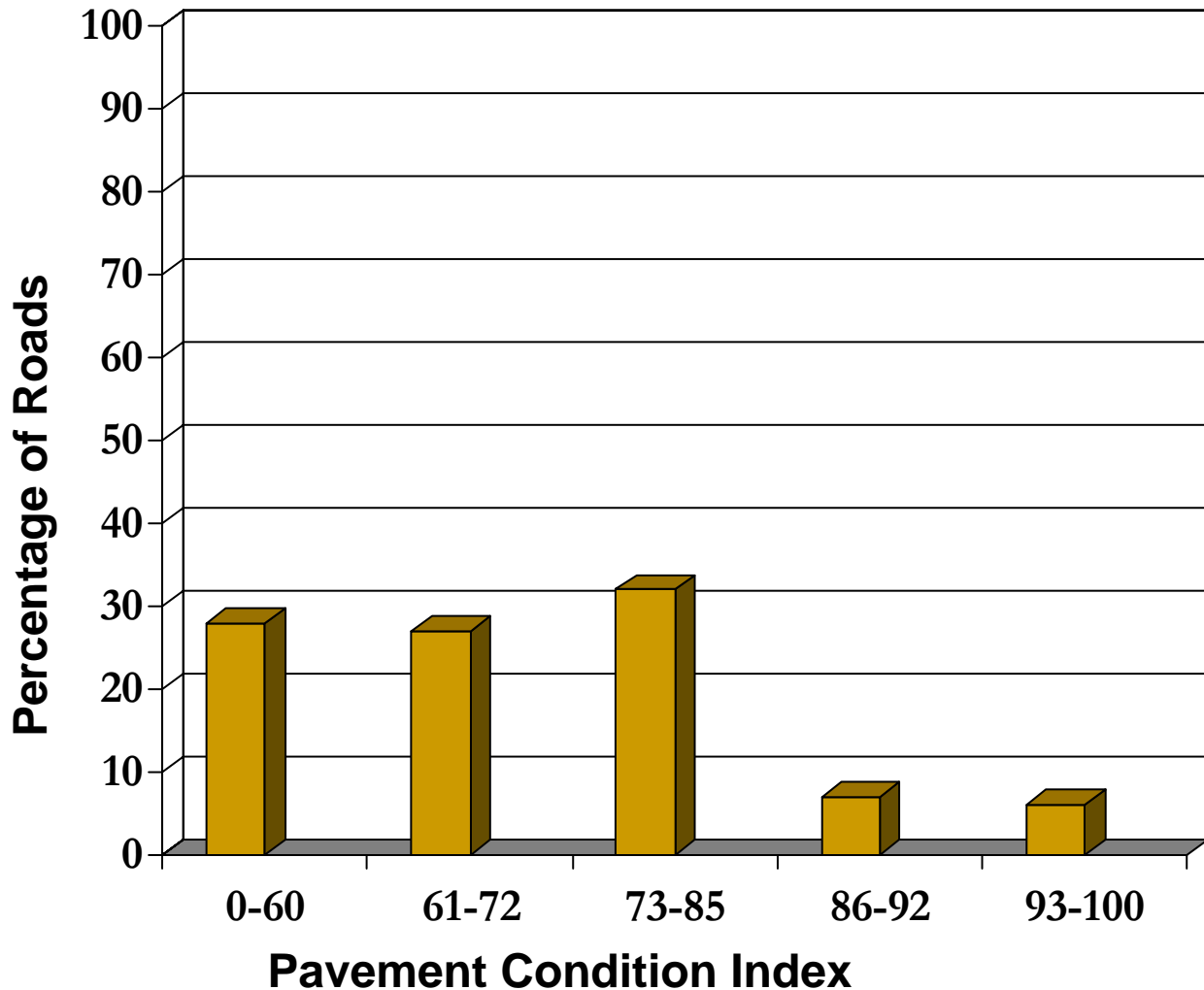
NORMAL PAVEMENT DETERIORATION Rating(%) vs. Time (years)

(source: American Public Works Association)



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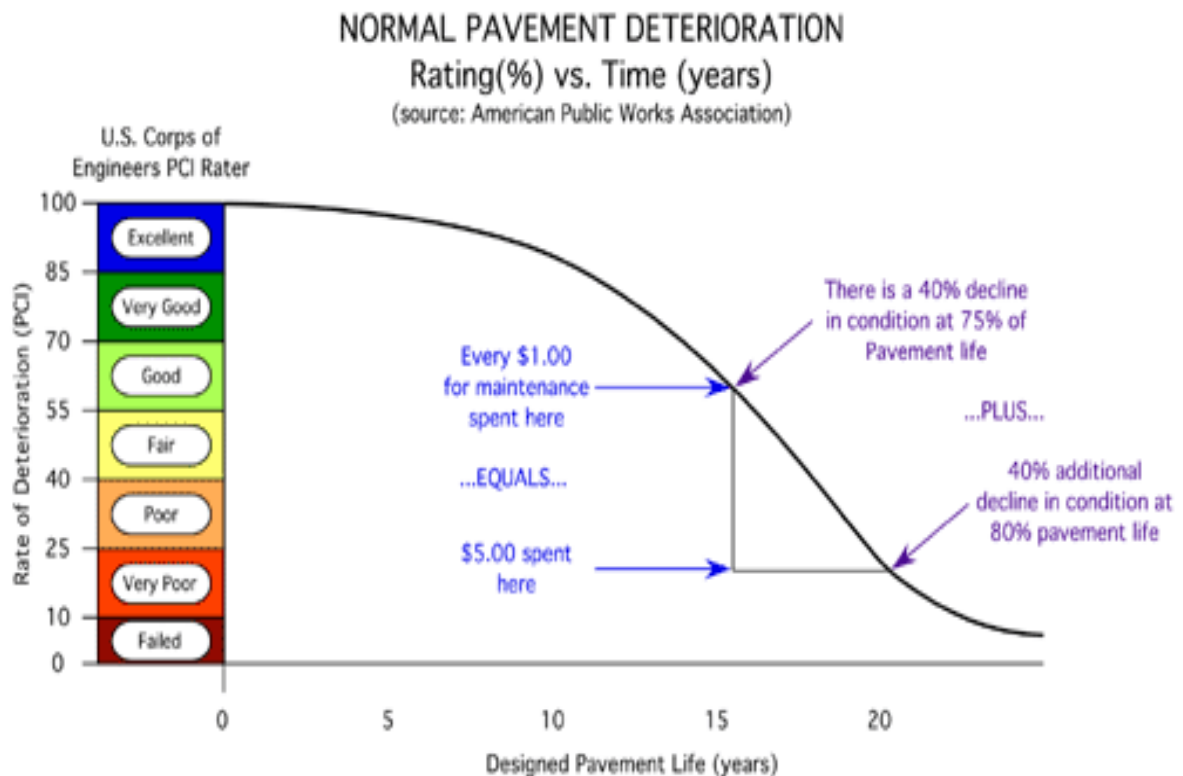
1997 Town of Lincoln Pavement Condition Index

Source: 1997 VHB Roadway Management Study

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Based on a recent visual inspection of the major Roadways in Lincoln, an Estimated PCI of 40-50 Exists.



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Historic Paving Resources*:

Public Works Operating Budget: \$13,000/ Year

•Pot Hole Repair

• **State Chapter 90 Funds:**

(Based on Population and
Roadway Miles)

AVERAGE YEARLY

(1994 through 2007) =

\$183,000

*Lincoln Currently Maintains Approximately 51 Miles of
Roads and 10.5 Miles of paved pathways.

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Why Now?



- Quality of Life For Lincoln Residents
- Roadway Life Expectancy
 - Well Below Life Cycle Curve
- Maintenance
 - Public Works Staff Time
- Liability Issues

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Typical Yearly Public Works Expenditures
For Pavement Maintenance

• Spring

• 4 Men * 4 Weeks * 40 Hrs./week = 640 Hours

• 3 Men * 2 Weeks * 40 Hrs./week = 240 Hours

Total = 880 Hours * \$23/Hr = **\$20,240**

• Fall

• 4 Men * 4 Weeks * 40 Hrs./week = 640 Hours

• 3 Men * 2 Weeks * 40 Hrs./week = 240 Hours

Total = 880 Hours * \$23/Hr = **\$20,240**

• Winter (Cold Mix Repair)

• 2 Men * 4 Weeks * 40 Hrs./week = 320 Hours

320 Hours * \$23/Hr = **\$7,360**

• Materials

\$15,000

• Traffic Control

\$6,000

TOTAL

\$70,000+/- YR

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Roadway Condition Summary

The historical resources, Chapter 90 funding and the DPW operating budget, used toward roadway maintenance has not been sufficient to adequately maintain the Towns roadway network.

Although many residential streets and secondary roadways have been maintained, additional resources need to be applied to improve the network.

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Roadways Recently Completed

Roadway	Classification	Action	Year
Codman Road	Secondary	Scarify & Pave	2006
Mill Street	Secondary	Shim & Overlay	2005
Lexington Road (North)	Secondary	Shim & Overlay	2005
Tower Road (South of Route 117)	Secondary	Shim & Overlay	2006
Sandy Pond Road (Between TL and Baker Bridge)	Secondary	Reconstruction	2001
Tower Road (Section north of Route 117)	Secondary	Shim & Overlay	2007
Lincoln Road (South of Route 117)	Secondary	Shim & Overlay	2004
Old Sudbury Road	Secondary	Shim & Overlay (2004) Chip Seal (2005)	2004 & 2005
Tower Road (North of Route 117)	Secondary	In-House Overlay	2000
Pierce Hill Road	Secondary	Shim & Overlay	2005
Weston Road (Between Silver Hill and TL)	Secondary	Shim & Overlay	2004
Silver Hill Road	Secondary	Shim & Overlay	2004

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Roadways Recently Completed (Cont.)

Roadway	Classification	Action	Year
Winter Street	Secondary	Shim & Overlay	2004
Page Road	Secondary	Shim & Overlay	2005
Old County Road	Secondary	Shim & Overlay	2004
Lexington Road (South)	Secondary	Shim & Overlay	2004
Old Farm Road	Local	Shim & Overlay	2005
Blueberry Lane	Local	Shim & Overlay	2005
Grasshopper Lane	Local	Shim & Overlay	2005
Old Winter Street	Local	Shim & Overlay	2004
Cedar Road	Local	Shim & Overlay	2007
Bedford Lane	Local	Shim & Overlay	2007
Tabor Hill Road	Local	Shim & Overlay	2006
Silver Birch Lane	Local	Shim & Overlay	2005
Old Concord Road (Partial)	Local	Shim & Overlay	2007
Ballfield Road	Local / School	Shim & Overlay	2005
Macintosh Lane	Local	Shim & Overlay	2006
Giles Road	Local	Shim & Overlay	2004
Acorn Lane	Local	Shim & Overlay	2005
Pine Ridge Road	Local	Shim & Overlay	2004

Total = Approximately 17.4 miles / \$ 2.1 Million Chapter 90 Funds

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Roadway Improvement Listing

• **Primary Roads**

- Trapelo Road
- South Great Road (Route 117)
- Concord Road (Route 126)
- Bedford Road
- Lincoln Road

• **Secondary Roads**

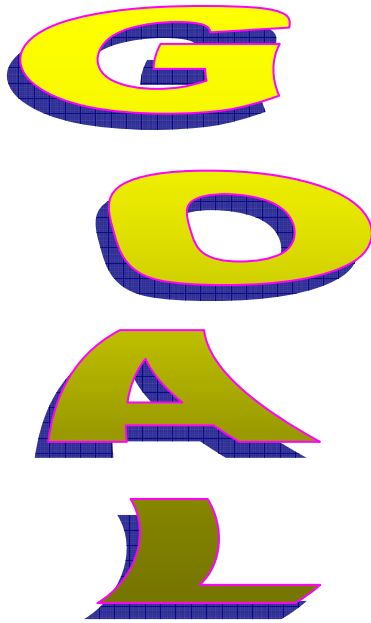
- Weston Road
- Farrar Road
- Tower Road (Between Beaver Pond Road and Route 117)
- Sandy Pond Road (Between Baker Bridge Road and Bedford Road)
- Baker Bridge Road

• **Local Roads**

- Hillside Road, Granville Road, Woodcock Lane, Conant Road Subdivision, Huntley Lane
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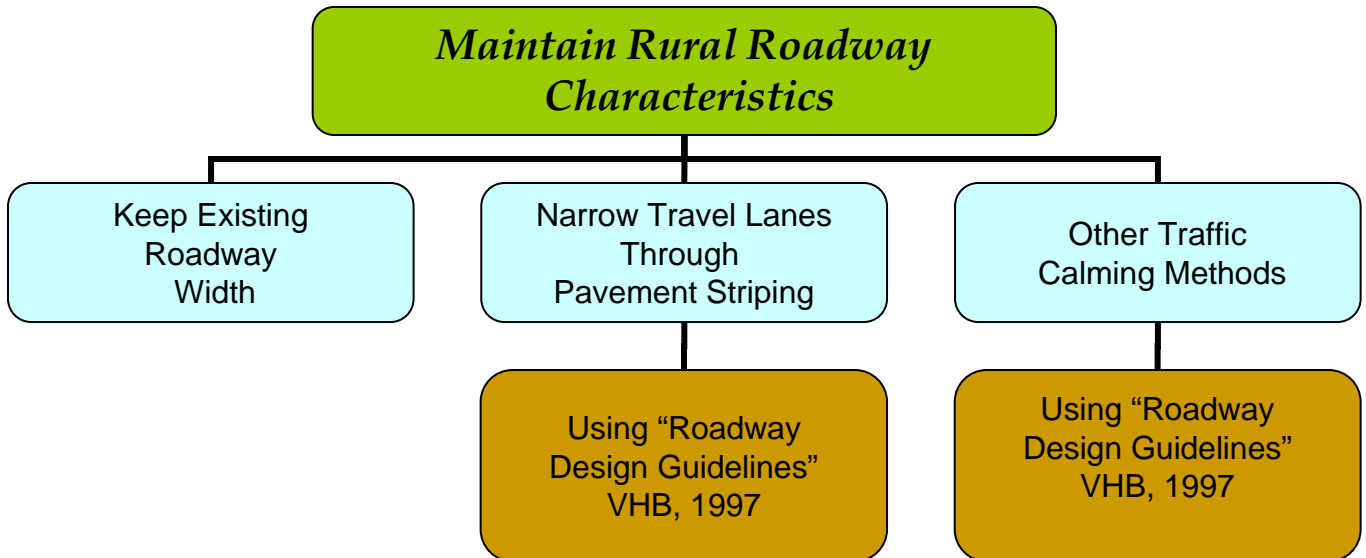
- To Maintain Lincoln's Rural, aesthetically pleasing roadway network, while providing safe, stable, properly drained roadways.

Design Sensitivities

- Community Linkage
- Community Preservation
- Quality of Life
- Environmental Quality
- Historic Preservation

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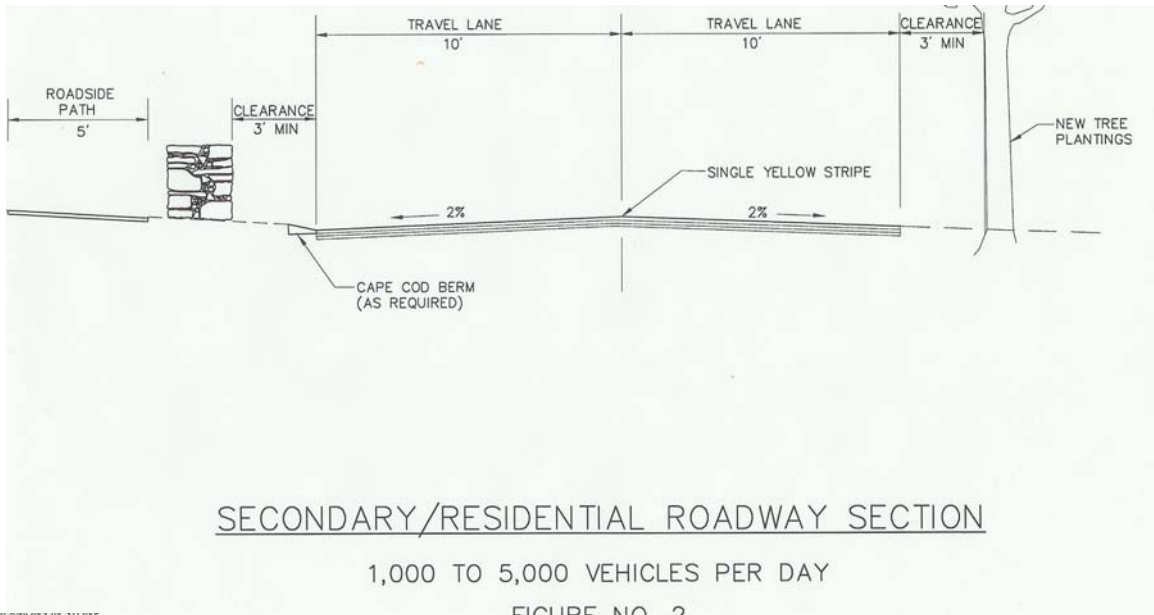
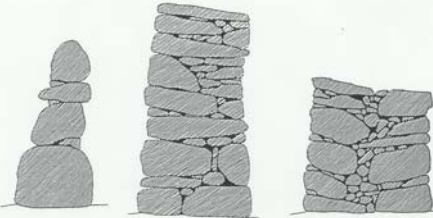


FIGURE NO. 2

biggest of those stones at the base of the wall, while another suggested saving the biggest stones for the top (to weigh down the wall) and using the small stones on the bottom (to absorb the movement of the earth). Still another advised farmers to build walls with only the very largest stones that they could dig out of the earth since a wall made of very massive blocks won't be moved



Cross sections of a few of New England's early wall types. Many farmers surrounded their fields with walls that lacked a foundation and were simply arrangements of stones, a single layer thick (left), but they put more time and energy into those walls around their barnyard and gardens. These walls might have a foundation extending down to below the frostline. The style of their construction would vary according to the type of stone available and the skill and training of the builder. A laid wall (middle), a wall in which every stone is carefully tied and chinked into place, is best made with a good proportion of large, well-shaped stones. A rubble wall (right), on the other hand, can be made with stones of every shape and size. It is built like a sandwich, with two outer layers of larger stones and a rubble or small stone filling in between.

STONE WALL DETAIL

FROM "SERMONS IN STONE"
BY SUSAN ALLPORT

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Cost Estimate

ROADWAY	ACTION	COST
Trapelo Road	Base Reconstruction, Drainage, other	\$1,200,000
Concord Road (State Route 126)	Cold Plane and Resurface, Base Reconstruction, Drainage, other	\$1,000,000
South Great Road Road (State Route 117)	Cold Plane and Resurface, Drainage, other	\$750,000
Bedford Road	Cold Plane and Resurface, Drainage, other	\$400,000
Lincoln Road	Cold Plane and Resurface, Drainage, other	\$400,000
Weston Road (Lincoln Road to Silver Hill Road)	Base Reconstruction, Drainage, other	\$400,000
Farrar Road	Base Reconstruction, Drainage, other	\$200,000
Tower Road (Between Beaver Pond Road and Route 117)	Base Reconstruction, Resurface, Drainage, other	\$400,000
Sandy Pond Road (Between Baker Bridge Road and Bedford Road)	Base Reconstruction, Drainage, other	\$300,000
Baker Bridge Road	Base Reconstruction, Drainage, other	\$500,000
Local Roads	Base Reconstruction, Drainage, other	\$1,000,000

SubTotal = \$5,650,000

Add Eng., Cont., Environ. (30%) \$1,850,000

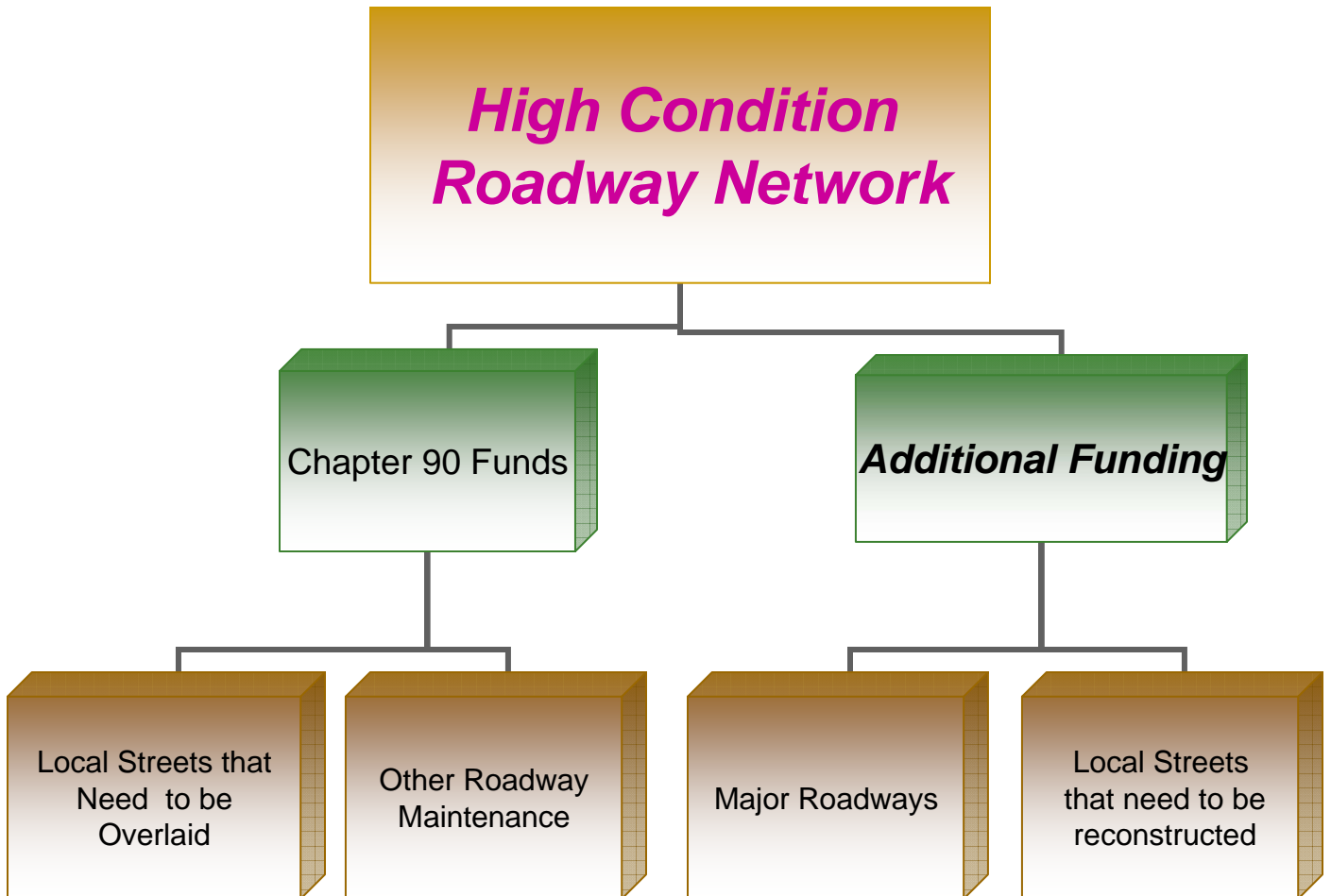
Multi-modal, Pathways \$500,000

Total **SAY = \$8.0 Million**

(Approx. 20 Miles)

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Funding Options:

Option 1

- Perform Work in one Construction Season.
 - Lincoln Roads maintained in a short period of time.
 - Disruptive, significant work done in short amount of time.
 - Quality of life issues.

Option 2

- Perform Work in two Construction Seasons.
 - Longer Construction period, but less disruption.

Option 3

- Perform work on Primary Roads Only.
 - Needed maintenance to Secondary Roads and Local Roads will be delayed.

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- Current Poor Drainage Conditions on Trapelo Road



Trapelo Road at
Tabor Hill Road



Trapelo Road at
Old County Road



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- Current Poor Drainage Conditions on Conant Road



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- Current Conditions on Trapelo Road



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- Current Conditions on State Routes 126 and 117



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- Silver Hill Road



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- Old Sudbury Road



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- Codman Road

