Road Funding Analysis Committee Report

October 27, 2008

Road Funding Analysis Committee Charge

- ***The Charge to the Committee***
- To look at the lifetime cost of rebuilding, repairing and maintaining the road system
- To take into consideration all aspects of cost, including impact on other projects within the town, i.e. Capital Improvement Plan (CIP)
- To develop a plan for road reconstruction to be performed with minimum impact on routine required road maintenance
- To develop the most cost-effective strategy
- To recommend a funding mechanism that will accomplish the above
- To recommend potential changes in the town road specifications to the Amherst Planning Board in order to avoid future maintenance problems
- To anticipate creation of a viable road infrastructure within the twenty-year timeframe
- To develop a strategy to inform the public of the final decision

Road Funding Analysis Committee Members

Jay Dinkel, Chairman
Tom Grella, Selectman
John Siemienowicz, Ways and Means
Jim Sickler, Road Commission
Bill Overholt, Citizen
Liz Overholt, Citizen
Bruce Berry, DPW Director
Gary MacGuire, Town Administrator

The Research Process

Research was separated into three general areas

- Road Conditions
- Funding and Finance
- Public Information

Most of the work was done in small subcommittees or by individual members

- Studied 2006 Road Surface Management System (RSMS) updated in 2008 and DPW Road Surface Management Plan (RSMP)
- Bruce Berry provided local budget, anticipated costs and overview of industry data
- Researched other towns' road budgets, strategies
- Discussed road maintenance issues with private contractors
- Met with State of NH DOT representative
- Reviewed trends in road repair and new techniques
- Analyzed historical costs of road repair
- Met as a group ten times beginning May15th

History

- 1806 - President Jefferson authorized construction of first road (not paved) - from Cumberland to Wheeling in Virginia
- Road construction just happened
  - Dirt, gravel, "corduroy" logs or planks (where wet) were the early roadbeds: the snow was rolled in the winter
  - When paving began in the 1920s there were no standards
  - Standards in Amherst for new roads were written by the road commissioners and adopted by voters at a special town meeting in the 1970s

- Road Agent in Amherst elected until 1990 when it became an appointed position
- Recent road history in Amherst - budget under-funded and money used for other highway budget items so we fell behind
- Amherst population
  1960 - 2,000
  2008 - 13,900

Length

- USA - four million miles of roads
- Amherst has 122 miles or 244 lane miles of roads
  - About eight miles or 16 lane miles are dirt
  - The total does not include the state owned roads like 122, 101 and 101A

Road Age

- Newer roads - i.e., Jasper Valley, Flume, Souhegan Woods were built to planning & zoning specifications
  - Though road standards have not been changed since the 1970s, the planning board determines specifications with each development
- Older roads without standards - Boston Post, Corduroy, Merrimack, Old Manchester, Lyndeborough, and others

Other

- Effect of good roads in winter
  - easier to plow
  - less wear to the vehicles
- Amherst is NOT unique - other towns across the country have fallen behind in both maintenance and reconstruction and are working on solutions

Certainties

- Traffic volume will increase
- Cost to maintain/reconstruct roads will increase
- Without proper road care, roads will deteriorate at a more rapid pace

Road Surface Management System (RSMS)

Selected method to store and analyze data (and develop a database)

- Inventory the network
- Assess road surface conditions
- Develop maintenance and repair alternatives
- Weigh/prioritize repairs

RSMS Prioritizing Factors

- Volume
- Roughness
- Road Condition

Benefits of RSMS

- Efficient use of limited resources
- Substantiate results
- Quantify condition of network
- Communicate results effectively
- Better understanding of overall situation
- Better support data
- More accurate and accessible information

Road Reconstruction

- Rebuild
- Reclaim (less extensive than rebuild)

Brimstone Hill Road

Amherst Street

A “Bad” Section of Road

Christian Hill - 2005

Reconstruction Requirements

- 22.9 miles require Reclaim or Rebuild per RSMS Report compiled summer 2008
  - Roads needing reconstruction may be in sections not the entire length
  - Estimate reconstruction at four to five miles per year
  - Hire an engineer when needed to assist in determining scope of work

Reclaim

- Grind excess road surface and remove
- Repair drainage structures as needed
- Reclaim *(rototill)* 12 to 18 inches of asphalt and base creating a new base
- Roll the new road base
- Apply base asphalt surface
- Apply top coat asphalt
- Repair berms/ditching as needed
- Paint road lines

Rebuild

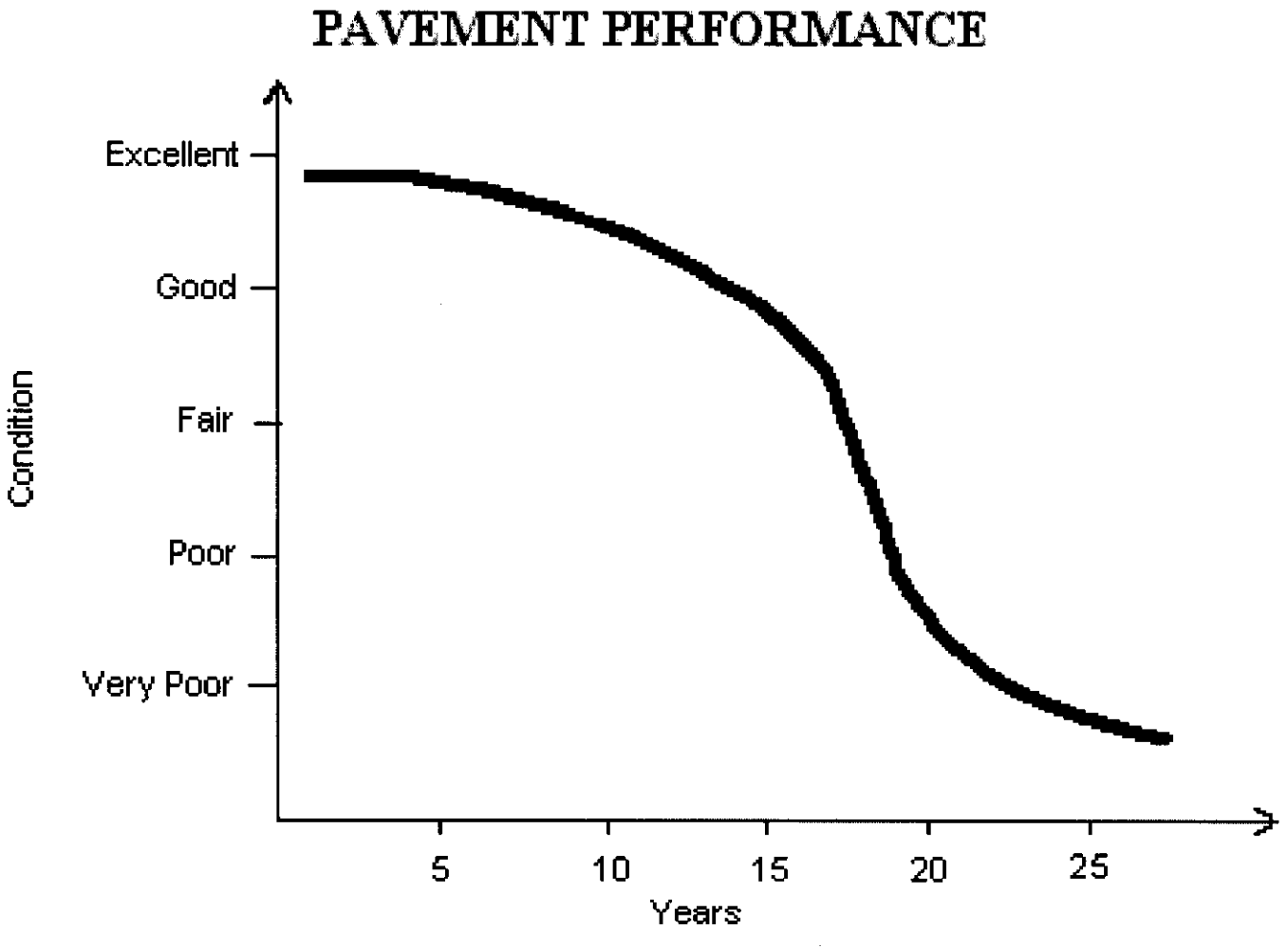
- Remove up to three feet of existing road surface and base
- Rebuild drainage structures
- Bring in proper base material
- Roll the base
- Install fabric to strengthen road base (optional)

- Apply base asphalt surface
- Rebuild shoulders/ditching/rip rap
- Apply top coat asphalt
- Paint road lines and re-install signage

Remaining Service Life (RSL)

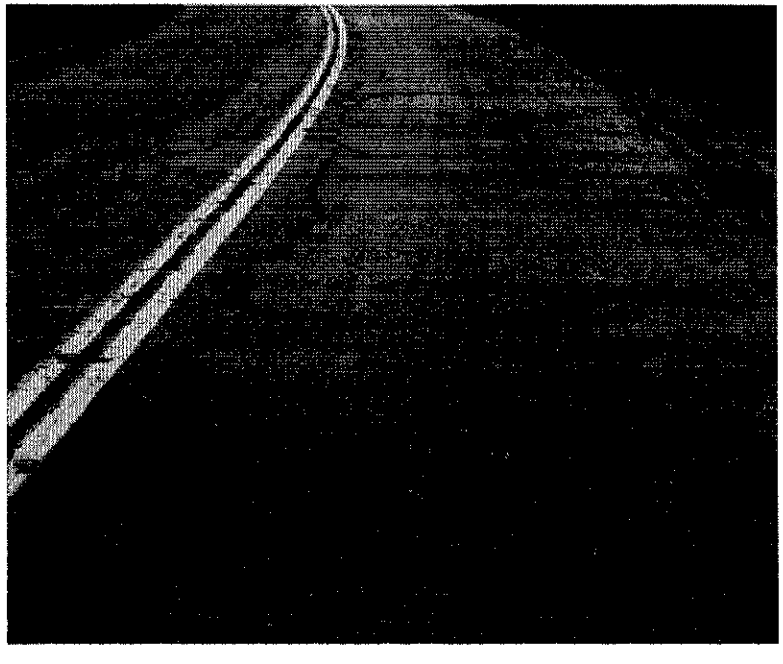
A Pavement Management Tool

Remaining Service Life



No Remaining Service Life

- The point when the only cost effective treatment alternative is reconstruction

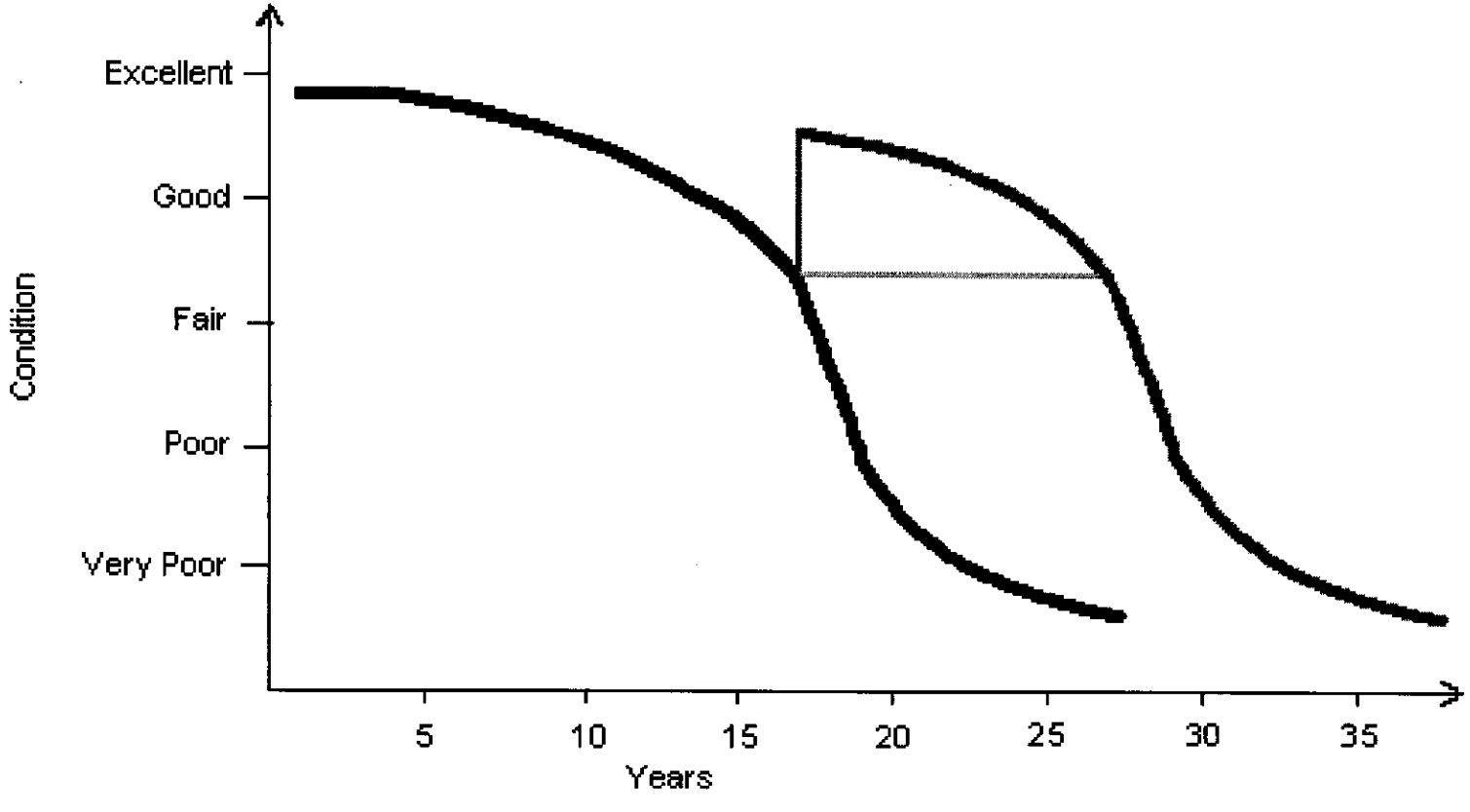


Life Extension

- The point at which the pavement returns to it's initial condition after a treatment has been applied

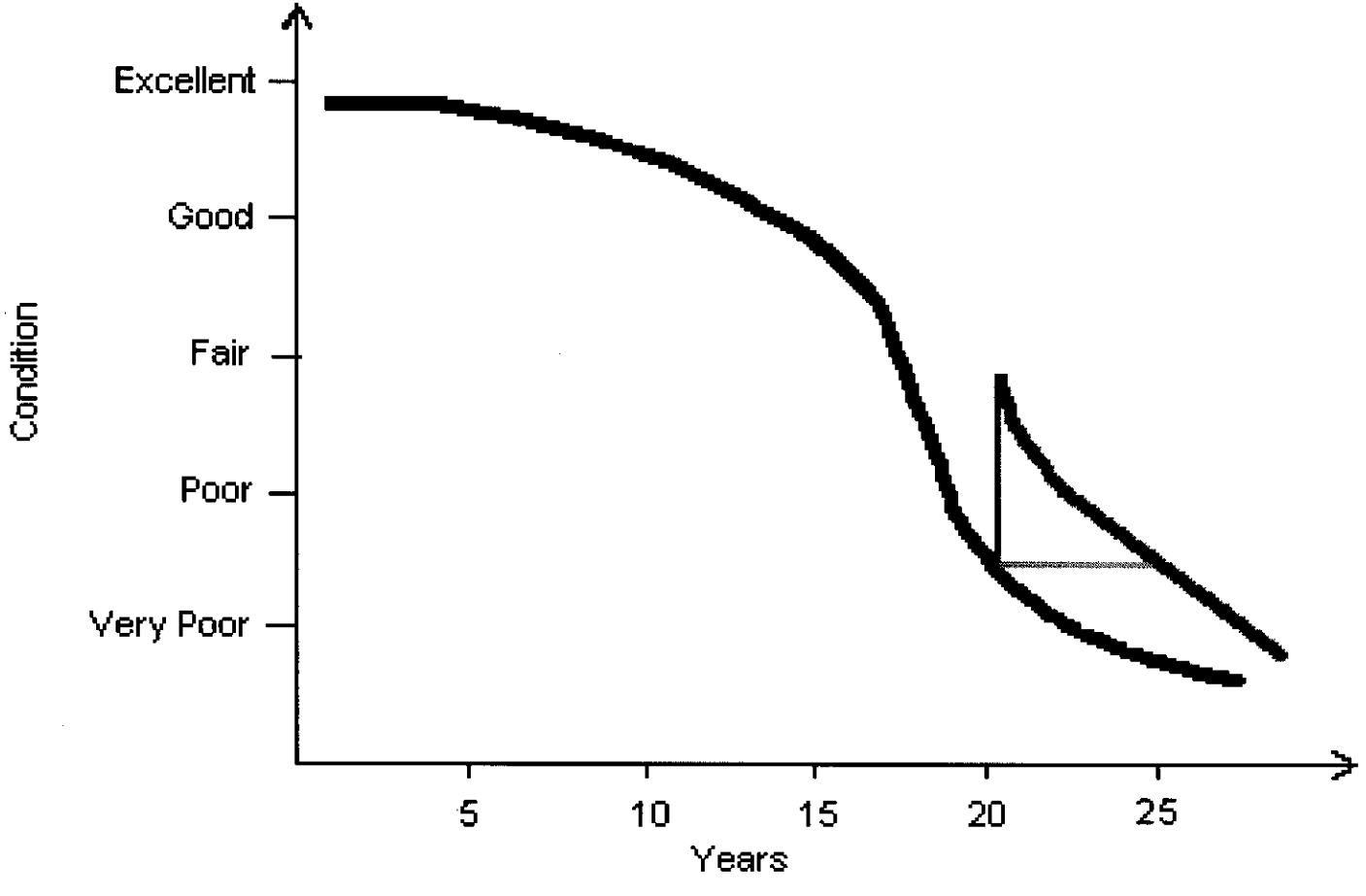
Remaining Service Life

Do maintenance early in the life of a road

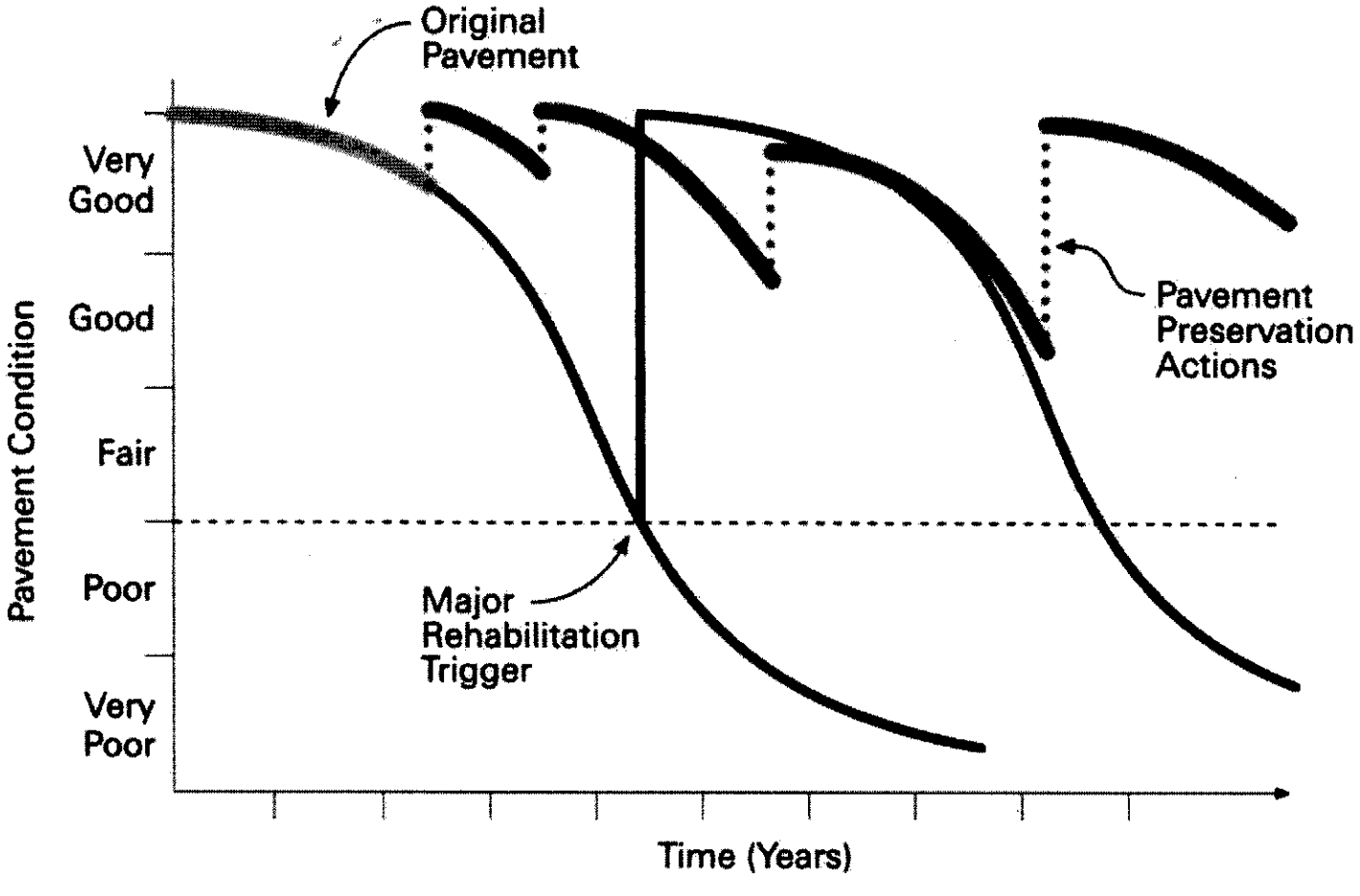


Remaining Service Life

If you wait too long, life extension is much lower



Remaining Service Life
Summary



Concept

- **Take care of the good roads**
  - With preventative maintenance (preservation)
  - Extending their life at reasonable cost
  - Do so with regular maintenance budget
- **Reconstruct the worst roads**
  - Rebuild
    - Includes rework of sub-base
  - Reclaim
    - Completely repave using existing sub-base
  - Rework drainage

Treatment & Life Expectancy

- Maintenance / Preservation
  - Crack Seal - 2 years
  - Chip Seal - 3-5 years
  - Thin Overlay- 3-5 years
  - Thick Overlay - 4-6 years
  - Minor Rehabilitation - 6-8 years
- Reconstruction - 15-20 years, average life
  - Reclaim - using old sub-base with complete new pavement
  - Rebuild - includes rework of sub-base

Treatments – Relative Cost

Crack Seal

Chip Seal

Thin overlays

Thick overlays

Minor Rehabilitation

Reclaim

Rebuild

Take care of the good roads
(maintenance & preservation)

- Normal maintenance
  - Ditching, catch basins, berms
  - Crack seal, chip seal, overlay, minor rehabilitation
- Least expensive, most effective
  - But only when the road is in good enough condition
- Result
  - Extend the time until they have to be rebuilt or reclaim …if they ever need to be

Reconstruct the Worst Roads

- Maintenance is not an economical solution
  - Frost heaves will appear the next winter
  - Cracks will develop again
  - Back to square one in a short time
- Solve the problem once by
  - Reclaiming those roads that need it
  - Rebuilding where necessary

Summary

- Remaining Service Life is an excellent planning tool
- A sustained preventative maintenance program will allow you to keep good roads from reaching RSL = 0
- Along with that, a concerted effort to reconstruct the worst roads will bring our roads to acceptable standards

Road Maintenance Budgets in Three Other NH Towns

	Road Mileage	Annual Budget
Amherst	122	$0.7 M*
Bedford	166	$1 M
Derry	165	$1.3 M
Goffstown	130	$2.3 M

*Increased from $0.3 M in FY2007

The Bedford Road Project

- Bedford has 166 miles of roads
- $1,000,000 annual road maintenance budget
- $40,000,000 estimated to reclaim/rebuild approximately 80 miles of failed roadway

- Utilized in-house town engineer and Vanasse Hangen Brustlin Inc (VHB) to guide the process
- CMA Engineers reviewed the projects and worked with outside road contractor

Bonding in Bedford

- Opted to split up the $40,000,000 into separate bonds
- Two bond issues passed - $12,000,000 and $8,000,000 (2005 and 2006)
  - 7-15 miles per year over a three year period were reconstructed
  - Benefitted from investment of bond proceeds
- Last year's $8,000,000 bond failed
- DPW director feels they accomplished about half of goals for reconstruction

Budget History

Year	1968	1978	1988	1998	2008
Miles of Road	87	109	114	118	122
Population	3,799	8,877	10,029	11,878	13,928
Summer maintenance	45,297	112,171	191,403	165,032	499,845*
State Funding	13,063	75,530	166,942	191,170	274,652
Winter maintenance	30,191	120,132	198,294	292,547	227,802

* Town meeting increased maintenance by $400,000

Budget Implications

Weather related maintenance is defined as

- snow and ice storms overrun
- summer storms
- flooding

Currently - weather related cost overruns are paid for out of the summer road maintenance budget

New road funding strategy - recommends road maintenance budget be used only for that purpose

- One major weather event, bad winter, bridge or road failure, e.g., could easily cause an overrun in DPW maintenance budget

- Contingency Fund was at $50,000 when the town budget was at $4,000,000
- Fund currently at $38,000; town budget over $9,000,000

- New strategy
  - Recommends that the DPW maintenance budget be used for maintenance only
  - Consider raising the contingency fund for overruns

Budget Implications

Operating Expense

- The RFAC strategy increases the summer maintenance portion of the DPW budget; it does not change other DPW operating expenses
- Required labor and machine time costs are incorporated into the road strategy numbers

Preventative Maintenance Cost Estimate

	Lane Miles	Cost/LM	Cost
Patch	37.4	125	4,675
Crack seal	49.2	4,000	196,800
Surface Coat	33.2	15,213	505,079
Overlay	68.2	76,459	5,214,504
Total	**188**		**5,921,058**
Recommended yearly budget			**1,100,000**

Recommended to be done over the next six years

Reconstruction Cost Estimate

Description	Cost per Lane Mile
Replace Base Material (As Needed)	30,507
Removal of inappropriate base material	16,800
Drainage Repair & Structures	17,200
Reclaiming, Surface Preparation	38,500
Calcium Chloride	6,688
Fabric	20,000
Hot Top/Overlay	137,500
Repaint road lines (one half of)	317
Shoulder Repair	3,500
Ditching	4,000
Rip rap in ditch	12,800
Engineering	7,670
Supervision	1,500
Approximate total per lane mile	**296,981**
Total cost (45.8 lane miles)	**13,601,751**

RFAC Recommendations

- Maintenance (preservation) - $1.1M/year
  - Increase 2009 summer maintenance budget by $400K
  - Continue in the future to adequately fund normal maintenance
  - Total equals currently budgeted maintenance funds, state aid, and the proposed new funds
- Reconstruction Payment Options
  - Bond – One $15M for 20 years
    - Bonding Authority – draw money as needed
  - Bond five separate bonds at $3M, one each year

Tax Impact of Bonding

Cost per year	Principle	Interest @4%	Total	Tax Impact per $1000	Tax Impact on $400K House
0		600,000	600,000	0.33	132
1	750,000	570,000	1,320,000	0.73	290
2	750,000	540,000	1,290,000	0.71	284
3	750,000	510,000	1,260,000	0.69	277
4	750,000	480,000	1,230,000	0.68	270
5	750,000	450,000	1,200,000	0.66	264
6	750,000	420,000	1,170,000	0.64	257
7	750,000	390,000	1,140,000	0.63	251
8	750,000	360,000	1,110,000	0.61	244
9	750,000	330,000	1,080,000	0.59	237
10	750,000	300,000	1,050,000	0.58	231
11	750,000	270,000	1,020,000	0.56	224
12	750,000	240,000	990,000	0.54	218
13	750,000	210,000	960,000	0.53	211
14	750,000	180,000	930,000	0.51	204
15	750,000	150,000	900,000	0.49	198
16	750,000	120,000	870,000	0.48	191
17	750,000	90,000	840,000	0.46	185
18	750,000	60,000	810,000	0.45	178
19	750,000	30,000	780,000	0.43	171
20	750,000	-	750,000	0.41	165

Glossary

- **Asphalt** - composit paving material
- **Base** - The layer or layers stone, sand, and gravel under the asphalt road surface.
- **Base Course** - The under-layer of asphalt, usually 2"to 4" thick, designed to carry the traffic load without distortion
- **Berm** - the road shoulder
- **Chip Seal** - asphalt binder is sprayed on the pavement by a tank truck, then immediately covered by a single layer of uniformly sized chips (aggregate). The new surface treatment is then rolled to seat the aggregate, and broomed to remove any loose chips.
- **Crack Seal** - mechanical routing, cleaning by compressed air, sealing for construction and random cracks with rubber-asphalt sealer compound designed especially to meet ASTM D3405 standards
- **Drainage structure** - Culverts, head walls, catch basins designed to move water under and away from road structure.
  - **Culvert** - pipe under the road to carry water
  - **Head Wall** - structure at the foot of the pipe to funnel water into the culvert
  - **Catch Basin** - structure to retain fast flowing water temporarily

- **Milling** - The removal of a portion of an existing "thick" asphalt surface, a strategy usually found to remove significant rutting or other major distortion of any layer before an overlay is replaced, or a particularly thick layer prior to milling
- **Patching** - Repair to pot holes, washouts, and larger areas of road surfaces damaged by weather related occurrences
- **Reconstruction - Reclaim or Rebuild**
  - **Reclaim** - The partial reconstruction of a road by using a machine that grinds, mixes, and replaces 12 to 18 inches of roadway, homogeneous mixture that will serve as a new base for paving. This is used on roads where the sub-base is good.
  - **Rebuild** - Consists of removing the old road material, including asphalt, base, and sub base, and replacing the base with new material that meets standards. Used where the sub-base materials are substandard, and where they would contribute to further deterioration of the road if left in place

- **Rip-rap** - Large stones set in a ditch or on the sides of a headwall to slow the progress of water and help prevent erosion

- **Summer Road Maintenance** - Road maintenance and repair, including drainage, ditch and berm maintenance, crack seal, chip seal, thin and thick overlay, and minor remedial work on the base (everything except winter maintenance and reconstruction)

- **Surface Course** - One or more layers of asphalt designed to accommodate the traffic load, the top layer of which resists skidding, traffic, abrasion, and the disintegrating effects of climate. Sometimes called wearing course

- **Thick Overlay** - One or more inches of top coat material applied to a road
- **Thin Overlay** - A top coat of asphalt applied at about a ½" thickness.
- **Winter Road Maintenance** - Sanding, salting and plowing during and after winter storms

- **RSMS** - Road Surface Management System
- **RSL** - Remaining Service Life
- **DPW** - Department of Public works
- **NH DOT** - New Hampshire Department of Transportation
- **RFAC** - Road Funding Analysis Committee