Noble County Highway Department

Transportation Asset Management - Highways

2016 Road Rehabilitation and Maintenance Plan

Prepared by: Zachary S. Smith, P.E.

Date: April 25, 2016

1118 E. Main St.
Albion, IN 46701
260-636-2124
zsmith@nobleco.us

Table of Contents

2016 Road Rehabilitation and Maintenance Plan .....

Purpose 1

Road Condition 1

Road Priority 2

Population Density 3

Transportation Plan 4

Priorization 4

Drainage 5

Right of Way 5

Repair Methods 6-8

2016 Road Projects 9

Estimated Service Life 9

Cost Estimates 14

Summary 14

List of Figures and Tables .....

Figure 1 - 2016 County Wide Road Rating Map 2

Figure 2 - County Wide Road Priority Map 3

Figure 3 - County Residential Roads Map 4

Figure 4 - In-house Crack Seal 6

Figure 5 - Contractor Crack Seal 6

Figure 6 - Unconfined Compression 8

Figure 7 - Remaining Estimated Service Life 9

Table 1 - 2016 Road Improvement Projects 10-11

Table 2 - Road Repair Cost 12

Table 4 - Average Road Repair Cost per Condition Rating 13

Table 5 - Additional Service Life Calculations 13

Appendices .....

2016 Roadway Asset Management - 5 Year Projection ..... Appendix A

Pavement Treatment Summary ..... Appendix B

Subdivision Scoping Report ..... Appendix C

Purpose

This document was developed in conjunction with the *Road Evaluation Report* as a budgetary tool to prioritize pavement rehabilitation and maintenance projects based on lifecycle cost to maximize the annual road budget. This plan provides an engineering method to determine pavement rehabilitation needs, detailed cost estimate of those needs and prioritization of projects within the entire system. This document provides both an annual plan and a five year projection for road improvements. The projected plan documents the Noble County Highway's intent in both scope and timeline; however, the scope of work is subject to change based on available road dollars and is not guaranteed. Additionally, changes may be made to the plan when either beneficial or necessary.

Several road factors are considered when developing the road plan. The following are a list of road factors used to develop a balanced road improvement plan.

Road Condition

The road condition value is based on the rating from the Road Evaluation Report. Road rating values are based on the PASER scale.

A roadway given the rating of “1” represents a roadway that has complete structural failure. The pavement surface with this rating displays excessive surface distress and loss of structural integrity; the roadway surface is failed and needs total reconstruction. A rating of “9” indicates the pavement surface is in excellent condition, displaying no visible signs of distress, and having a quality rating of new construction. A rating of "10" is used as a placeholder for new roads, while a rating of "0" is used to designate gravel roads.

Roads with PASER ratings of 8-9 (Excellent - Very Good) require routine maintenance such as: ditch cleaning, shoulder grading and minor patching or sealing to prevent drainage and environmental issues.

Roads with PASER ratings of 6-7 (Good) require preservation applications, such as crack sealing, surface sealing or pavement rejuvenation. These applications address minor deficiencies and provide additional protection at a fraction of the cost of reconstruction. Preservation techniques are the most cost effective treatments to extend the surface life of roadways.

Roads with PASER ratings of 4-5 (Fair) require rehabilitation, such as patching, wedging or webbing of hot mix asphalt (HMA) combined with a complete surface seal, such as a double chip and seal or HMA overlay. The purpose of rehabilitation is to address minor structural issues and seal the roadway before it requires major reconstruction. Rehabilitation is more costly then preservation, but considerable more cost effective then reconstruction.

Roads with PASER ratings of 1-3 (Poor - Failed) require structural improvements, such as partial depth reconstruction (PDR), full depth reclamation (FDR) or reconstruction. These methods are the least cost effective approach, but are required to regain structural integrity. See *Figure 1 - County Wide Road Rating Map* for a complete inventory of road condition data.

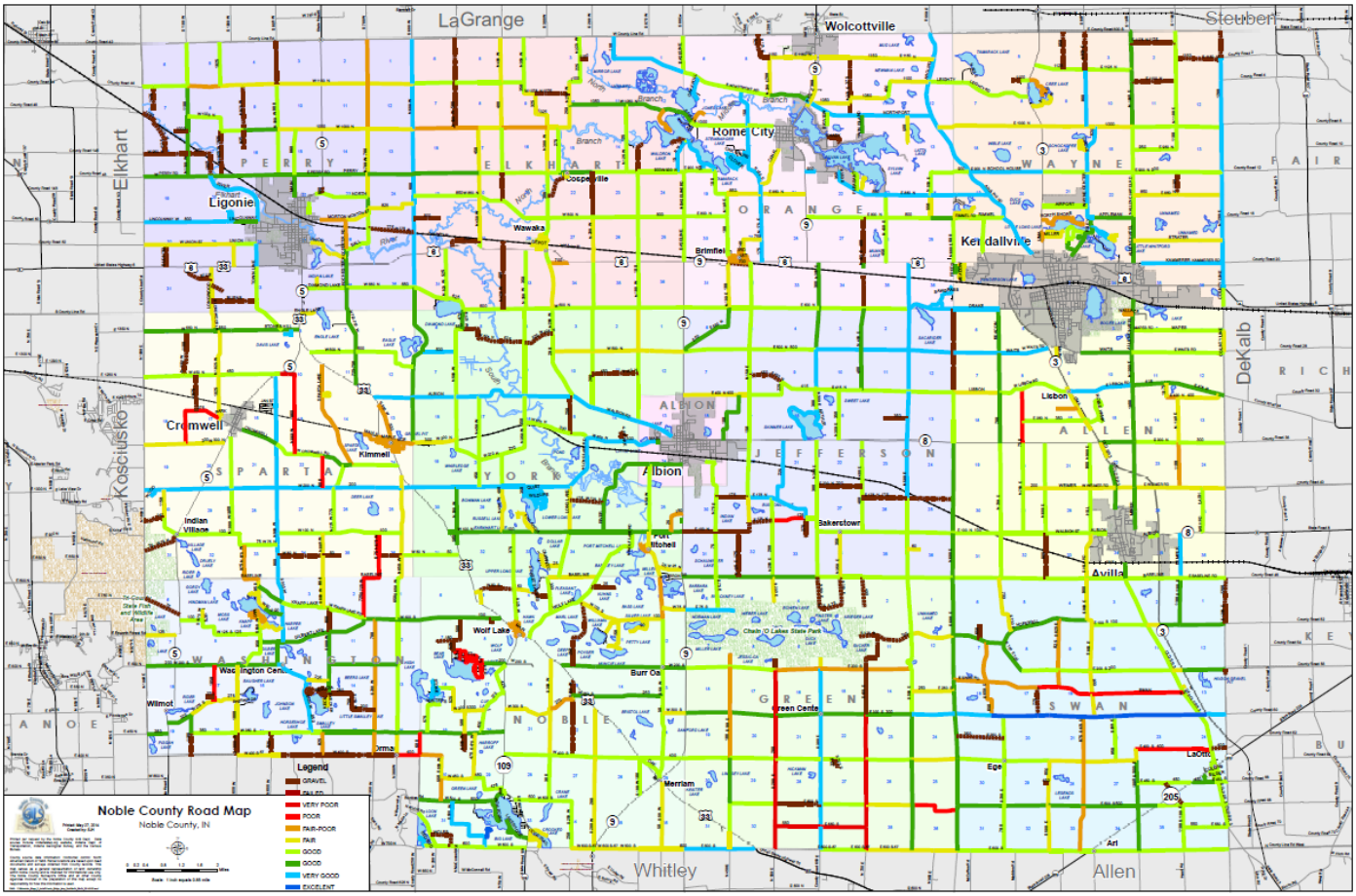

Figure 1 - 2016 County Wide Road Rating Map

Road Priority (Traffic)

The Noble County road network consists of over 800 center-line miles of paved and gravel roads. This network does not include State Routes, city streets located inside incorporated cities and private roads. The roads in the network have four different functional classifications, Primary Roads, Secondary Roads, Local Roads and Town/Subdivision/Lake Roads.

Primary Roads consist of about 19.6% of road system. These roads carry highest volumes of traffic and provide connection between State Routes and Cities/Towns. The Average Annual Daily Traffic (AADT) on primary roads is 500+ vehicles per day (VPD.)

Secondary Roads consist of about 6.2% of road system. These roads carry moderate volume of traffic and provide connection between primary roads. The AADT on secondary roads is between 200-500 VPD.

See *Figure 2 - County Wide Priority Map* for a complete inventory of road priorities.

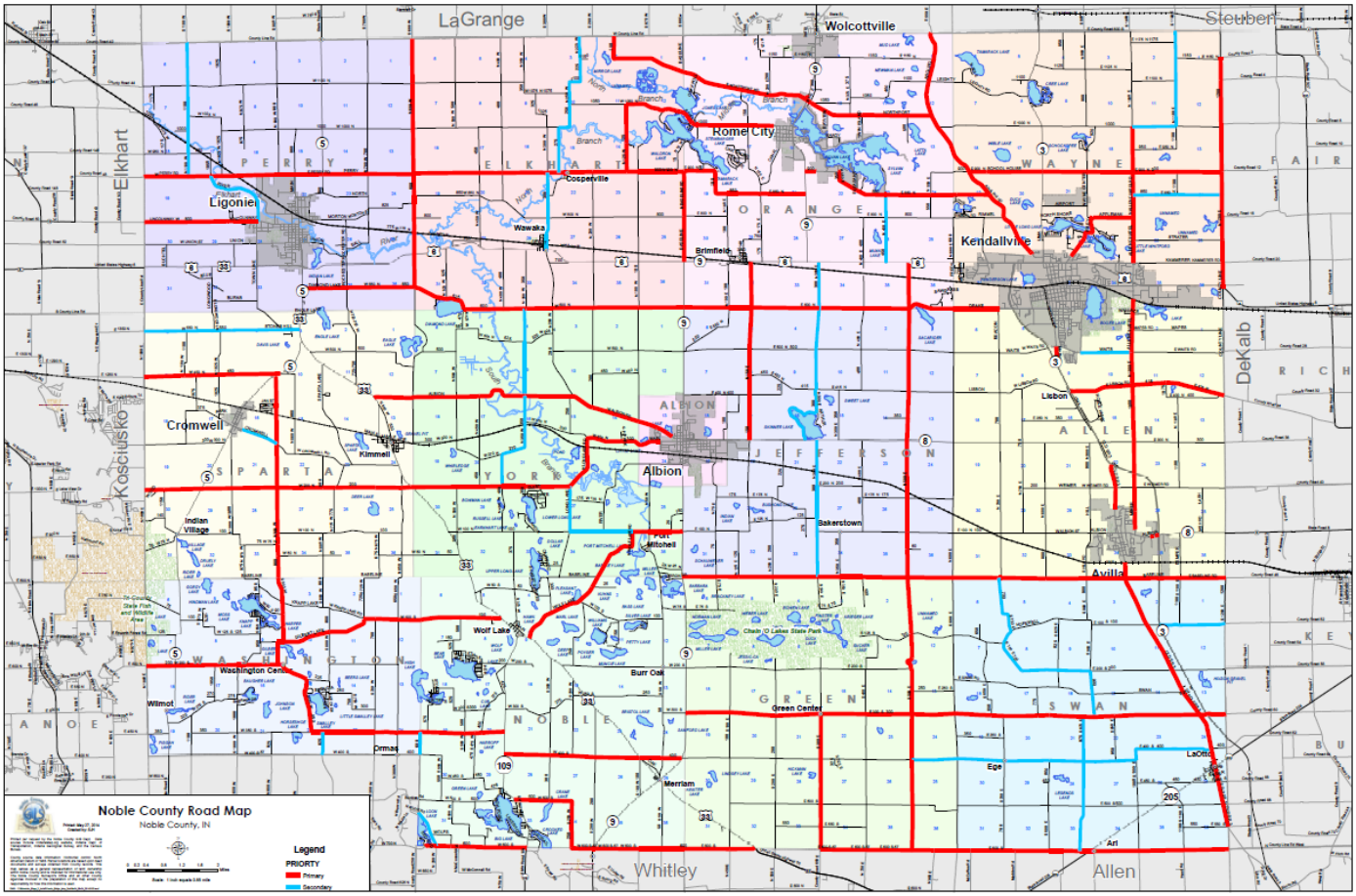

Figure 2 - County Wide Road Priority Map

Local Roads comprise of 67% of the county road network and generally consist of the north-south, east-west "grid network" of roads. These roads carry low volume of traffic. The AADT on these roads is less than 200 VPD. The remaining 7.2% are located in unincorporated Towns, Subdivisions and around the numerous county lakes. These roads carry low volume of traffic. The AADT on these roads is less than 200 VPD.

<u>Population Density</u>

Although, town, subdivision, lake and local residential roads are not high priority roads, they are important to the safety and well being of the public that utilizes them for residential activities

Residential roads are urban districts as defined by the Indiana Code that are built up with structures devoted to business, industry, or dwelling houses situated at intervals of less than two hundred (200) feet for a distance of at least one-fourth mile.

See *Figure 3 - County Residential Roads Map* for a complete inventory of residential roads.

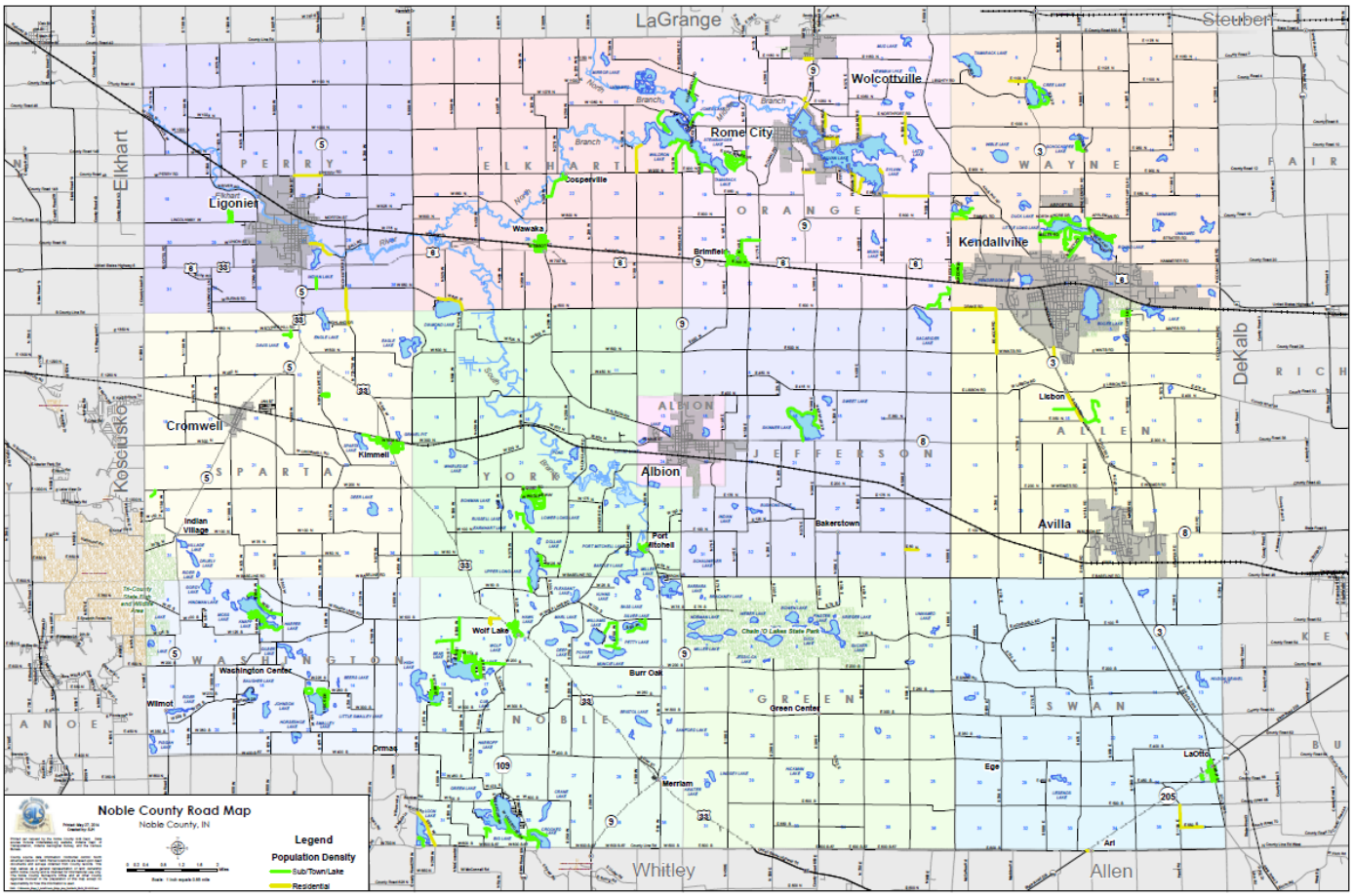

Figure 3 - County Residential Roads Map

Transportation Plan

The rate at which pavement deteriorates depends on its environment, traffic loading, original construction quality and interim maintenance. Even using the best engineering methods, there are still many unknowns that prevent pavement management from being an exact science. However, this can be counteracted with historical data, consistent inspection and minor annual adjustment to the long term plan. These adjustments to the transportation plan are based on the difference between actual and projected pavement deterioration.

Priorization

Managing the maintenance and rehabilitation with a limited budget while balancing all of these road factors is a challenging task. The most transparent way to prioritize road projects is through clearly stated goals and a long-term plan to meet those goals. The following is a list of the annual goals:

1. *Reconstruction* - Complete 8-10 miles of in-house reconstruction per year. The method of reconstruction utilized by Noble County Highway provides a considerable cost savings over traditional reconstruction methods, but is constrained by the amount of hours in-house staff has available each year. At 8-10 miles, all roads rated poor (1-3) will be reconstructed in the next 5 years.

2. *Subdivisions* - Historically, Town/Subdivision/Lake roads have not been maintained or improved on a long-term planning schedule. As a result, a majority of these roads are rated Fair-Poor to Fair (4-5) and declining. The current plan is to leverage special distribution funds against local road and bridge matching grant funds to make major improvements (up to $1,000,000 annually) in these area. The five year plan has every subdivision rated less than good (7) receiving either rehabilitation or preservation application in the next five years.

3. *Primary Roads* - Maintaining our primary roads in good condition is paramount to the connectivity and safety of the highway system. Our goal is to keep all primary roads at a rating of 6 or better with an average rating of 7.00. Currently 96.8% of our primary roads are rated at a 6 or better with an average rating 6.95.

4. *Preservation* - The main goal of the county highway is to stretch the road repairs dollars as far as possible. The most cost effective way to extend the service life of a road is through preservation treatments. Our goal is to perform preservation treatments on approximately 10% (80+ miles) of the Noble County Highway network annually.

Drainage

The most important feature to any road is to maintaining appropriate drainage. Before any road work is completed a drainage assessment is performed. In general, most road preservation and maintenance work only requires minor drainage maintenance. This includes cleaning of existing roadside ditches, removal of excessive sand from plowing operation and ditching and berming in areas with inadequate roadside drainage.

Several subdivisions in the county have not had proper drainage installed. In 2016, a full assessment of all subdivisions was performed on a project by project basis. This assessment is contained in *Appendix C - Subdivision Scoping Report.* This report contains a full breakdown of all drainage work for each project.

Reconstruction projects are assessed for drainage improvements. The highway department collaborates with the survey department on any regulated drains that needs highway culverts replaced or resized. Additionally, roadside ditches are established and all crossing culverts and driveway culverts are replaced as needed.

Lastly, regular drainage work is completed through the year by the highway department as needed, separate to any specific road improvement work.

Right of Way

In general, all road maintenance and rehabilitation work can be completed utilizing the existing highway right of way. A majority of county road are centered on a 40' right of way. During the limited times when additional right of way is required (mostly bridge projects or federal aid projects,) right of way is purchased following the associated guidelines and requirements.

Repair Methods

The key to effectively programming road repairs is scheduling the correct repair at the correct time. Historically, Noble County Highway Department has only been able to utilize a handful of repair methods. In an effort to maximize service life and minimize maintenance costs, the highway department has looked at new in-house reconstruction methods, as well as more effective contracted preservation methods. The following is an explanation of each repair method and how it is best utilized.

Asphalt Sealant - Asphalt sealants is a clear coat that is applied to roads in very good to excellent condition (8-9.) The sealant penetrates the top ¼" of pavement and provides an extra layer of protection from environmental effects further extending the service life before deterioration begins.

Rejuvenator - Rejuvenators are an emulsion based material that is applied to roads rated good to very good (7-8.) The rejuvenator provides a specific mix of oils and resins that are designed to penetrate oxidized (aged) pavement and restore its original properties.

Crack seal - Crack seal is the method of filling and sealing cracks within the pavement. This type of work applies to roads that are in good condition (6-7), but are beginning to crack. There are two methods of crack seal that Noble County Highway has available. The first method utilizes in-house forces and equipment. The highway department equipment is set up to use an emulsion (30% water) that is squeegeed into cracks. Sand is placed on top to prevent vehicles from tracking tar.

The second method is contracted utilizing special materials and equipment. The contracted crack seal is an asphalt binder (PG 64-22) or polymer modified asphalt binder (PG 76-22) with suspended fiber added to the heating kettle. The material is pressure injected into cracks using a special wand. *Figure 4* and *Figure 5* show each respectively. Although the contractor method is more expensive, it provides a significantly better seal and does not require highway department labor.

Figure 4 - In-house Crack Seal

Figure 5 - Contractor Crack Seal

Chip & Seal - Chip and Seal is a method of placing a uniform coat of tack on the roadway and then applying a uniform coat of stones (chips) over the tack. When done correctly, this provides a complete seal over the entire roadway width. When done incorrectly, tar bleeding or loose stones can occur. Noble County Highway Department completes all chip and seal in house using BM-90 cutback sealing asphalt and #11 stone (limestone, native stone or slag.) This work is performed on roads rated good (6.)

Slurry Seal - Slurry seal is an asphalt emulsion mixed with fine aggregate (sand) that is uniformly applied to roads rated as good (6-7.) This work replaces missing fine aggregate in existing surfaces, fills in minor cracks and increases skid resistance.

Microseal - Also known as Micro Resurfacing is an application of a polymer modified asphalt emulsion mixed with small to fine aggregate that is uniformly applied to roads rated as good (6.) The polymer allows the material to stack on itself resulting in a thin smooth asphalt overlay.

Rehabilitation

Double Chip and Seal - This work is two applications of chip and seal using a #9 stone for the first layer followed by a #11 stone for the second layer. This type of work is applied to roads rated fair to good (5-6.)

Double Microseal - This work is two applications of micro surfacing. The first layer fills in voids and ruts follow by second uniform layer resulting in a leveled smooth asphalt overlay. This type of work is applied to roads rated fair to good (5-6.)

HMA Overlay - This work consists of paving with a ~1.5" lift of Hot Mix Asphalt (HMA) surface. This type of work is applied to level roads rated fair-good to fair (4-5.)

Major Overlay - This work consists of paving with a 2"-3" lift of HMA binder or base followed by a 1.5" lift HMA surface. This type of work is applied to roads rated fair-poor (4.)

Wedge - This work consists of leveling wavy or uneven sections of roadway using an asphalt based material.

Road Fabric - This work is used to improve tensile strength between an existing road and a surface treatment.

Reconstruction

Noble County Highway Department has developed a partial-depth reclamation process as a cost effective road reconstruction technique. This type of work is applied to roads rated failed to poor (1-3.) This process focuses on drastically improving a road's base instead of improving the surface through expensive overlays. The base is strengthened through the addition of new high quality aggregate and chemical modified using calcium chloride and lime hardening. Other reclamation processes utilize asphalt or cementitious materials; however, we have found calcium chloride to be significantly more cost effective and easier to install. The year before reconstruction, the roadside drainage (culverts / ditches) is improved to current standards.

The first step in our process is to layout additional aggregate on the roadway as seen below. Noble County Highway utilizes Duraberm, a heavy aggregate that contains natural lime (CaO) from the steel production process. Duraberm has a gradation similar to INDOT No.53 / No. 73 aggregate and is an ideal road base

material. An average of 2.5" of aggregate is tailgated over the desired roadway width and graded to a uniform cross section. During this process, the road can be widened up to 2' on each shoulder.

Next, the Duraberm is treated with Calcium Chloride (42%) at a rate of 0.5 gal per square yard. The hygroscopic and deliquescent properties of Calcium Chloride allow the base to absorb moisture from the air and resist evaporation. This results in long-term ideal moisture content which provides a denser, stronger base due to higher surface tension and retention of fine aggregates. Additionally, the moisture from the Calcium Chloride activates the lime in the Duraberm resulting in lime hardening ($CaO + H_2O > Ca(OH)_2$.)

See *Figure 5 - Triaxial Strength Data*. Noble County uses 2.5" of Duraberm per 8" of reclamation, which is ~30% blend. High percentage slag blends may have expansion issues and are not as cost effective as the 30% blend. Core samples from our 2014 and 2015 reconstruction projects are currently undergoing lab testing for unconfined compression.

Triaxial Data	Unconfined Compression	
	No Aging	28 Day
Existing Roadway	23.0 psi	46.5 psi
W/ 30% Blend	26.4 psi	80.9 psi
W/ 40% Blend	39.5 psi	85.3 psi
W/ 50% Blend	57.5 psi	90.3 psi
W/ 60% Blend	61.8 psi	96.0 psi

Figure 6 - Unconfined Compression

Next, the material is recycled into the road base at a Depth of 8" using a Bomag MPH125 Recycler. Core samples or historical data should be reviewed before recycling to ensure that the subbase is not punctured during the process. Following the recycler a Bomag BW213PD Sheepsfoot Roller is used for initial compaction.

Next, a grader sets rough grade on the road, followed by a pneumatic rubber tire roller. This is followed by another grader that sets final grade and a steel drum roller. Once final grade is set, the surface is treated with Calcium Chloride (42%) at a rate of 0.25 gal per square yard. This is to aid in the curing process and also acts as dust control by retaining fine aggregate. The road is left to cure for 28 days, while open to traffic. Following this period, any required maintenance is addressed and a surface treatment is applied. Noble County uses either a triple chip and seal with fog seal or 1.5" HMA overlay as the surface course.

2016 Road Projects

Multiple segments in similar distress are combined into projects. These projects are sorted by road factors and aligned to meet the annual goals for the current year and look ahead at a 5 year projection. See *Table 1 – 2016 Road Improvement Projects* and *Appendix A - 2016 Roadway Asset Management - 5 Year Projection*.

Estimated Service Life (ESL)

Estimated Service Life (ESL) is a conceptual metric used to manage the highway network. An engineered ESL value is assigned to each roadway segment based on its road condition rating. The service life of a road is defined as the time (in years) from new construction to when the road has deteriorated to a condition that no longer meets acceptable standards.

Using the PASER rating, the Remaining Service Life (RSL) was estimated for each road segment. *Figure 6 - Estimated Remaining Service Life* shows the relationship between PASER rating and pavement remaining service life.

The service life of a pavement can be extended through preservation treatments, rehabilitation or reconstruction. A comparison of condition ratings, repair cost and cost per additional ESL is listed in *Table 4 - Average Road Repair Cost per Rating*.

Estimated Remaining Service Life	
Rating	**RSL**
10	20
9	17
8	14
7	11
6	9
5	6
4	4
3	2
2	1
1	0

Figure 7 - Remaining ESL

Road Name	Start point	End point	Miles	Work performed	Cost	Cum Cost
Angling Road	Kendallville	800N	1	1.5" HMA Surface	$55,746	$55,746
600S	SR9	Bridge 82	2.45	1.5" HMA Surface	$136,578	$192,324
Appleman Road	1000E	Riley Rd.	1.25	Crack seal	$6,875	$199,199
900N	1050W	SR.5	2.5	Crack seal	$13,750	$212,949
550S	1100E	Old SR3	1	Crack seal	$5,500	$218,449
900N	125W	100E	2.25	Crack seal	$12,375	$230,824
400N	150E	415N	1	Crack seal	$5,500	$236,324
415N	400N	500E	2.5	Crack seal	$13,750	$250,074
300E	600S	300S	3	Crack seal	$16,500	$266,574
500E	600S	125S	4.75	Crack seal	$26,125	$292,699
1100E	600S	500S	1	Crack seal	$5,500	$298,199
Added	Added	Added	3	Crack seal	$16,500	$314,699
300E	Arthur Dr.	415N	0.5	Crack seal	$2,750	$317,449
300E	Baseline Rd.	SR8	3	Crack seal	$16,500	$333,949
450S	Old SR3	SR205	0.8	Crack seal	$4,400	$338,349
200S	SR109	Bear Lake	0.75	Crack seal	$4,125	$342,474
500S	SR205	East Co. Line	1.8	Crack seal	$9,900	$352,374
Baseline Road	SR3	1200E	1.5	Crack seal	$8,250	$360,624
700E	SR8	600N	3	Crack seal	$16,500	$377,124
850N	1000E	1200E	2	Dbl. chip seal	$42,072	$419,196
850N	100E	SR9	1.75	Dbl. chip seal	$36,813	$456,009
400S	1000W	925W	1	Dbl. chip seal	$21,036	$477,046
275S	1100W	1000W	1.1	Dbl. chip seal	$23,140	$500,185
1150N	200E	Wolcottville limit	0.9	Dbl. chip seal	$18,933	$519,118
900E	300S	SR8	6	Dbl. chip seal	$126,217	$645,335
1000W	350S	200S	1.5	Dbl. chip seal	$31,554	$676,890
1025W	375N	550N	1.9	Dbl. chip seal	$39,969	$716,858
300W	500S	US33	3	Dbl. chip seal	$63,109	$779,967
Longwood Lane	550N	US6	1.5	Dbl. chip seal	$31,554	$811,521
825N	700W	600W	1	Dbl. chip seal	$21,036	$832,557
400W	900N	1200N	3	Dbl. chip seal	$63,109	$895,666
200W	Albion Rd	500N	1	Dbl. chip seal	$21,036	$916,702

Table 1 – 2016 Road Improvement Projects

Road Name	Start point	End point	Miles	Work performed	Cost	Cum Cost
700E	Baseline Rd.	SR8	3	Dbl. chip seal	$63,109	$979,811
200E	Northport Rd.	1150N	1	Dbl. chip seal	$21,036	$1,000,847
300S	SR109	300W	1	Dbl. chip seal	$21,036	$1,021,883
1200E	US6	Dekalb Limit	0.5	Dbl. chip seal	$10,518	$1,032,401
200W	US6	800N	1	Dbl. chip seal	$21,036	$1,053,438
Old SR3	SR3	Kendallville	0.5	Dbl. Micro Seal	$23,467	$1,076,904
Noble Hawk	Subdivision	14455	1.12	Dbl. Mirco seal	$57,820	$1,134,724
High Lake	Subdivision	8,682	0.74	Dbl. Mirco seal	$34,728	$1,169,452
Cosperville	Subdivision	4,458	0.38	Dbl. Mirco seal	$17,832	$1,187,284
Shockopee Lake	Subdivision	6,688	0.57	Dbl. Mirco seal	$26,752	$1,214,036
Terrace Hills	Subdivision	6,688	0.57	Dbl. Mirco seal	$26,752	$1,240,788
Finlandia	Subdivision	9,034	0.77	Dbl. Mirco seal	$36,136	$1,276,924
Willliams Lake	Subdivision	4,928	0.42	Dbl. Mirco seal	$19,712	$1,296,636
Muncie Lake	Subdivision	7,978	0.68	Dbl. Mirco seal	$31,912	$1,328,548
550S	200E	400E	2	Reconstruction	$113,248	$1,441,796
200E	600S	200S	4	Reconstruction	$226,496	$1,668,292
400E	600S	300S	3	Reconstruction	$169,872	$1,838,164
1000E	415N	Kville	2.5	Rejuvinator	$29,333	$1,867,498
LaOtto	Subdivision	20,416	1.74	Rejuvinator	$20,416	$1,887,914
200W	500N	US6	2	Single chip seal	$21,878	$1,909,792
600W	900N	1200N	3	Single chip seal	$32,818	$1,942,610
100E	Brimfield	850N	1.5	Single chip seal	$16,409	$1,959,018
600N	SR9	500E	5	Single chip seal	$54,696	$2,013,714
100E	US33	400S	1.75	Single chip seal	$19,144	$2,032,858
Country Home Estates	Subdivision	3226	0.25	Single Microseal	$8,800	$2,041,658
Meadow Court	Subdivision	774	0.06	Single Microseal	$2,112	$2,043,770
600S	300E	700E	4	Wedge	$20,000	$2,063,770
100S	900E	Old SR3	1.3	Wedge	$6,500	$2,070,270
600S	SR9	Bridge 82	2.45	Wedge	$12,250	$2,082,520
150E	SR8	US6	4	Wedge	$20,000	$2,102,520
Wolf Lake Rd.	US33	100N	3.9	Wedge	$19,500	$2,122,020

Table 1 – 2016 Road Improvement Projects (continued)

Road Repair Cost	
Preservation	**Cost (per mile)**
Crack Sealing (In-house)	$1,832.00
Crack Sealing (Contract)	$5,500.00
Single Chip Seal	$10,939.20
Fog Seal	$3,626.00
Asphalt Sealant	$11,733.33
Rejuvenator	$11,733.33
Slurryseal	$26,400.00
Microseal	$35,200.00
Rehabilitation	
Minor Patching / Wedging	$9,866.67
Major Patching / Wedging	$19,733.33
Road Fabric	$26,517.86
Double Microseal	$46,933.33
Double Chip Seal	$21,036.20
Triple Chip Seal	$34,731.00
HMA Overlay (1.5")	$55,746.00
Reconstruction	
Major HMA Overlay (4.0+")	$131,238.80
Partial Depth Recon. (6" Base only)	$18,267.00
Full Depth Recon. (12" Base only)	$36,534.00
Traditional Reconstruction	$236,229.00

Table 2 - Road Repair Cost

Average Road Repair Cost per Rating						
Rating	**Repair**	**Cost (per mile)**	**ESL (yrs)**	**Avg**	**Avg. Cost**	**Cost / ESL**
7 - Good	Crack Sealing (In-house)	$1,832.00	1	1	$6,353.78	$1,873.19
	Crack Sealing (Contract)	$5,496.00	2 - 4	3		
	Asphalt Sealant	$11,733.33	5 - 7	6		
6 - Good	Single Chip Seal	$10,939.20	4 - 6	5	$16,357.51	$2,418.17
	Rejuvenator	$11,733.33	4 - 7	5.5		
	Slurryseal	$26,400.00	8 - 10	9		
5 - Fair	Double Seal + Minor Patching	$36,033.00	6 - 10	8	$39,388.78	$4,532.49
	Microseal	$35,200.00	6 - 10	8		
	Double Microseal	$46,933.33	8 - 12	10		
4 - Fair	Double Seal + Major Patching	$40,769.53	6 - 10	8	$51,105.18	$5,450.26
	HMA Overlay (1.5")	$55,746.00	8 - 12	10		
	Double Micro + Minor Patching	$56,800.00	8 - 12	10		
3 - Poor	PDR + Triple Seal + Fog	$56,624.00	8 - 15	11	$93,931.40	$7,621.46
	Major HMA Overlay (4.0+")	$131,238.80	10 - 16	13		
2 - Very Poor	PDR + Road Fabric + HMA (1.5")	$100,530.86	12 - 14	13	$134,151.83	$8,801.07
	FDR + Major Overlay	$167,772.80	16 - 18	17		
1 - Failed	Traditional Reconstruction	$236,229.00	20 - 25	22.5	$278,208.00	$12,364.80

Table 3 -Average Road Repair Cost per Condition Rating

Treatment	Miles	ESL	Add Service Life (yrs)
Crack seal	33.60	4.00	134
Wedge	15.65	4.00	63
Single Chip Seal	13.25	6.00	80
Rejuvinator	4.24	7.00	30
Single Micro Seal	0.31	10.00	3
Double Chip Seal	32.15	10.00	322
Double Microseal	5.75	12.00	69
1.5" HMA Surface	3.45	12.00	41
Reconstruction	9.00	15.00	135
2016 Total			876

Table 5 -Additional Service Life Calculations

Cost Estimates

Each project is assigned the appropriate and most cost effective repair. Cost data and an ESL analysis is completed, see *Table 5 - Additional Service Life Calculations* . This results in a projected schedule of work to be used with the annual budget. The anticipated budget for 2016 is approximately $2,125,000 with $1,500,000 coming from the Highway General Fund and $625,000 coming from the Local Road and Bridge Matching Grant (LRBMG) / Special Distribution. The remaining $375,000 from the LRBMG is earmarked for local bridge projects.

Summary

In summary, this report provides an engineering method to maximize the annual road budget. Additionally, the plan provides a long-term road plan with the flexibility to refocus annually when new data is available.

The current plan will provide an additional 876 years of estimated service life at a cost of $2,125,000. This is an improvement from the 2015 Road Plan of 805 years of ESL at a cost of $1,530,000 and the 2014 Road Plan of 740 years of ESL at a cost of $1,597,000. A summary of 5 year projected work is attached as *Appendix B - Pavement Treatment Summary*.