City of Boiling Spring Lakes
Board of Commissioners Public Works
Workshop Meeting
January 28, 2016
City Hall – 6:30 p.m.

PLEASE TURN OFF CELL PHONES

Please note ~ audio recording of meetings are available on our website Under Minutes and Agendas tab

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1. **Call to Order ~ Mayor Craig Caster**

Mayor Caster called the workshop to order at 6:30 p.m.

2. **Attendance ~ in attendance at the meeting were**

Mayor Craig Caster
Commissioner Mary Stilwell
Commissioner David Crawford
City Manager Jeff Repp
Commissioner Mark Stewart
Commissioner David Putnam
City Engineer Bill Murphy
City Clerk Jane McMinn

3. **Workshop Introduction ~ City Manager Repp**

The Graph is hereby incorporated by reference and made a part of these minutes.

City Manager Repp provided the Board with a handout summarizing where we are with Powell Bill Revenue, Powell Bill Expenses and FY 2016 Street Paving Budget. As you know the city received approximately $303,000.00 in the 2015 FY in Powell Bill Funding. Powell Bill funds are distributed from a share of the gas tax received each year by the State and distributed among municipalities by 75% of population and 25% by certified road mileage for public transportation. As our population numbers increase the Powell Bill funding distribution amounts will go up.

City Manager Repp explained the expenses on the graph showing how we spend those funds for debt service, non-paving capital, operating expenses, new paving and street surfacing. Additionally Manager Repp explained the difference between new paving and street surfacing. Street surfacing is essentially the purchasing of stone material which is purchased by public works and spread on streets like the orphan roads which the city has taken over. New paving is strictly new paving whether on current unpaved or paved roads. Manager Repp stated last year was the first time since I have been here that we actually repaved a road within the city. The city had formed a list of roads to be paved from a bond issue that was done approximately 10 years ago. As you can see on the graph the roads listed are the last ones that remain on the original list. During the FY 2016 budget process the Board asked that the city engineer provide a recommendation to

the commissioners before a decision was made on which roads would be paved in the 2016 budget year.

4. Presentation ~ City Engineer Bill Murphy

City Engineer Murphy explained the first portion of the presentation workshop will cover pavement management and the second portion of the workshop cover drainage issues.

The presentation is here by incorporated by reference and made a part of these minutes.

City Engineer Murphy discussed a Five Year Plan with three different options. 1.) pave our existing gravel roads; 2.) paved road maintenance; or 3.) a combination of both. A new road begins to deteriorate after approximately five years. Roads deteriorate from sunlight and oxidation which causes degrading. After five years, proper maintenance of our existing roads will extend their life. City Engineer Murphy explained the two processes that can be used to extend the life of our existing high traveled roads. One process of maintenance is Slurry Seal which is a mixture of asphalt, emulsion, water and mineral fillers which is mixed and placed on the road by using a single machine. This is an effective prevention which seals and water proofs the surface correcting minor defects. The next method is called Micro-surfacing which is a high-performance of slurry seal which is a quick cure with a high durability on high traffic pavements.

City Engineer Murphy continued on with examples of costs for both taking into account distance, square yards and cost per square yard depending on which method would be best for the preservation of the existing road. Our primary roads to consider for preservation are Fifty Lakes, South Shore, Eden Dr. and Alton Lennon.

City Engineer Murphy went on to explain the cost of pavement replacement. Full Depth Reconstruction which is essentially tearing up the existing road and starting with either a stone sub-base and paving or grinding and mixing a sub-base with cement.

City Engineer Murphy's recommendations for repair of the major roads within the city are:

- Eden Rd. repair ~ full depth reclamation
- Alton-Lennon and Fifty Lakes east of the tracks ~ slurry seal; and
- South Shore Rd. ~ preserved by slurry seal

City Engineer Murphy gave four approaches the city could take:

- No change ~ continue to use Powell Bill funds for paving
- Maintenance focus ~ using Powell Bill money in the next 5 years exclusively for fixing the existing primary connector roads
- Combination approach ~ split funds for paving existing gravel roads and maintenance; and

- Finance approach ~ use some amount of Powell Bill funds to pay off a bond to make significant improvements.

Review of options and financing see presentation pages 20, 21 and 22.

5. Drainage Issues ~ City Engineer Murphy

City Engineer Murphy reviewed the direction of water flow in the area of Holly/Redwood/Crabapple Roads as shown on the presentation.

City Engineer Murphy reviewed the GIS (Geographic Information System) map and explained the way water tends to move in the area of Walnut and Redwood where our pump station is located. Sungate Engineering's approach is to add a series of ditches and pipes giving us the gravity method which would allow the water to move gradually into the swale along the railroad tracks. City Engineer Murphy stated with the gravity method the area will drain during smaller rain events, however during larger storm events localized flooding may still occur. Estimated costs would be $11,000.00. Commissioner Stewart commented that this should be considered maintenance and that the City should go ahead with the replacement of the pump. The Board agreed with this action.

City Engineer Murphy explained the a second option for Holly Road other than the gravity method proposed by Sungate would be to create a basin and install a pump to our existing pump station located at Walnut Road, the station currently pumps 135 gpm (gallons per minute). With the upgrade, pumping would be increased to 400 gpm. Estimated cost would be $43,000.00.

Review of financing slides pages 21 and 22

The Board discussed the issues presented by the City Engineer and options to assist with eliminating the water. The Board also pointed out that spring is coming with most likely additional rain, this work can be paid through our Powell Bill funding.

All Board members were in agreement that we cannot wait a long time to do something, the city needs to see how much we can afford at this time to help alleviate the flooding on the roads.

CITY OF BOILING SPRING LAKES OFFICIAL SEAL NC

6. Adjourn ~

The Public Works Workshop was adjourned at 8:15 p.m.

Craig M Caster

Craig Caster, Mayor

ATTEST:

Jane McMinn

Jane McMinn, City Clerk

March 1, 2016

Date

PUBLIC WORKS WORKSHOP

JANUARY 28, 2016

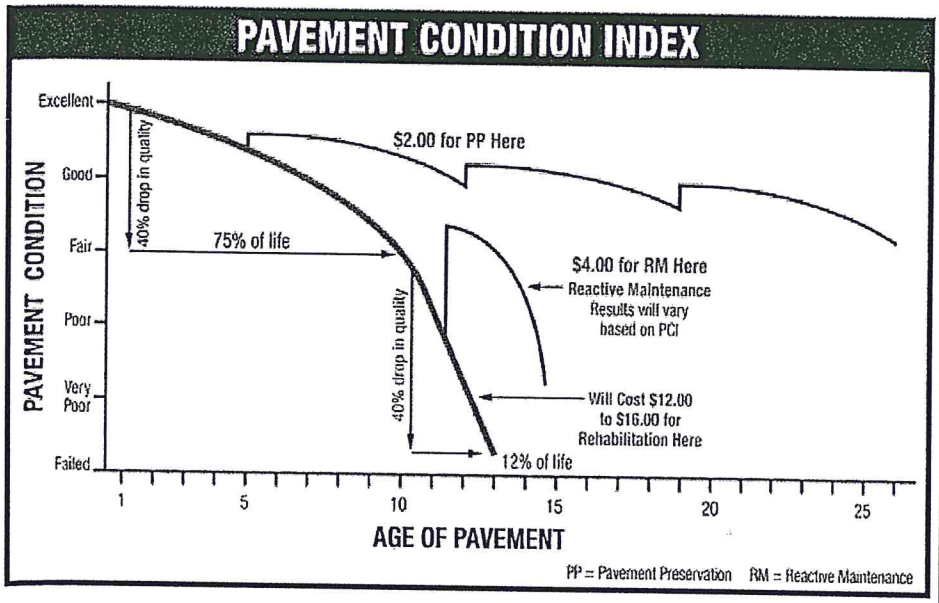
Topics:

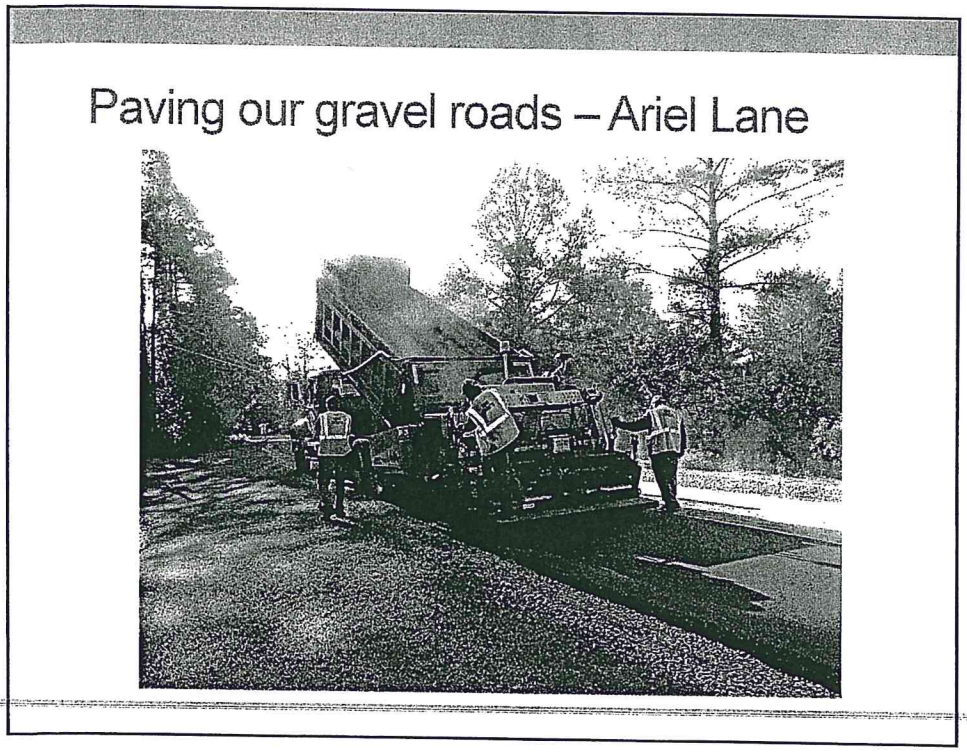
1. Pavement Management
2. Drainage issues

Options and Recommendations for Paving Activities in BSL

A Five Year Plan

1. **Pave our existing gravel roads -** using Powell Bill money as we have in the past.
2. **Pavement Maintenance** - so we don't lose our primary roads
3. **Combination** – using some funds for new paving and some for maintenance


PAVEMENT CONDITION INDEX
Excellent
Good
Fair
Poor
Very Poor
Failed
PAVEMENT CONDITION
40% drop in quality
75% of life
$2.00 for PP Here
$4.00 for RM Here
Reactive Maintenance
Results will vary
based on PCI
40% drop in quality
Will Cost $12.00
to $16.00 for
Rehabilitation Here
12% of life
1
5
10
15
20
25
AGE OF PAVEMENT
PP = Pavement Preservation RM = Reactive Maintenance


Paving our gravel roads – Ariel Lane

Engineer's Estimate for LRP Target Roads

City Engineer's Estimate

For paving roadway sections that are identified in the Powell Bill estimate for 2016

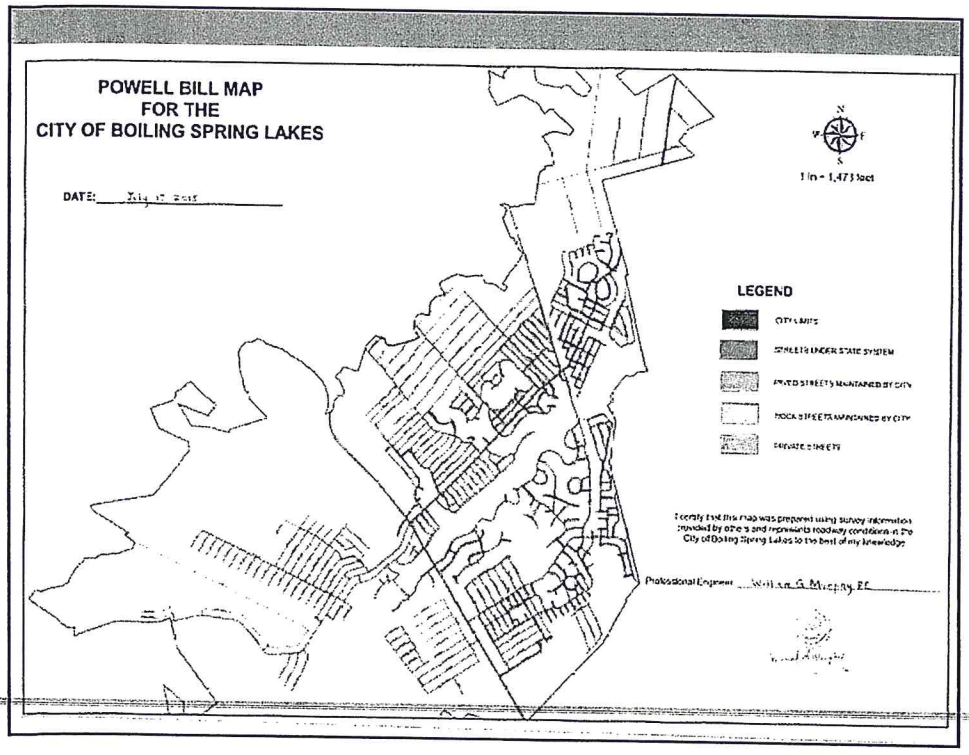
Road name	section description	Lineal footage	Area based on width of 18 ft sq ft.	sq yds.	Paving Cost	subbase material (tons)	subbase cost	Painting cost	Total Cost
Cardinal	Fifty Lakes to Springdale	1,400	25,200	2,800	$47,600	1015.0	$26,390	$700	$74,690
Chapel Hill	BS Rd. to Pinehurst	325	5,850	650	$11,050	235.6	$6,126	$163	$17,339
Pinehurst	Chapel Hill to Greenville	725	13,050	1,450	$24,650	525.6	$13,666	$363	$38,679
Washington	Charlestown to south end	800	14,400	1,600	$27,200	580.0	$15,080	$400	$42,680
Hickory	Maple to Grace	280	5,040	560	$9,520	203.0	$5,278	140.0	$14,938
Heron	Springdale to the east end	400	7,200	800	$13,600	290.0	$7,540	200.0	$21,340
Crystal	Greenmoss to Woodhaven	350	6,300	700	$11,900	253.8	$6,598	175.0	$18,673
	Notes: Based on the assumption that DPW installs the stone subbase for the roads				145,520				$228,338

Criteria for new pavement selection

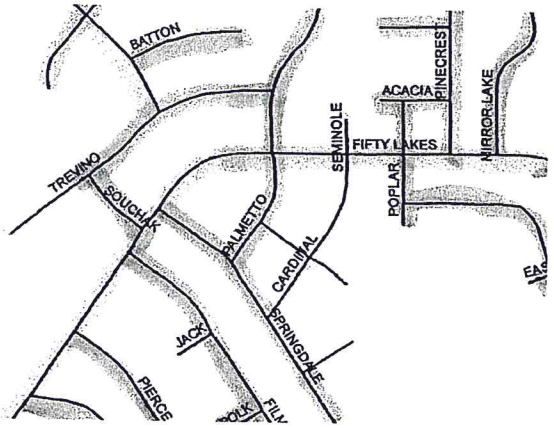
- Population density
- Traffic flow connectivity
- Cost
- Other circumstances

Population Density

Road	Length LF	# homes	Density (units/L)	Ranking by Density	New Cost Estimates
Cardinal –Fifty Lakes to Springdale	1,400	9	0.0064	6th	$74,690
Chapel Hill – Boiling Spring to Pinehurst	325	3	0.0092	3rd	$17,339
Pinehurst – Chapel Hill to Greenville	725	7	0.0096	2nd	$38,679
Washington – Charlestown to the south end	800	7	0.0087	4th	$42,680
Hickory – Maple to Grace	280	4	0.0143	1st	$14,938
Heron – Springdale to the east end	400	3	0.0075	5th	$21,340
Crystal – Greenmoss to Woodhaven	350	2	0.0057	7th	$18,673



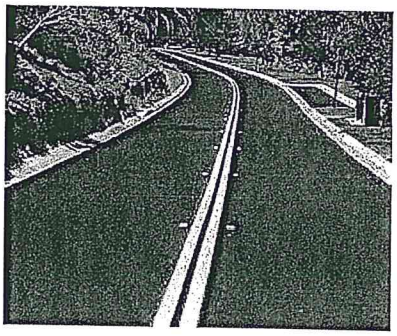
Example of traffic flow connectivity



Other Criteria for Prioritization

- Older vs. newer developed area
- Excessive dust
- School bus routes
- Special circumstances, such as handicap/wheelchair access

Pavement Preservation Techniques



Crack Sealing

Estimated Life Extension
(years)

Surface Treatment	Good Condition (PCI=80)	Fair Condition (PCI=60)	Poor Condition (PCI=40)
Crack Sealing	5 - 6	2 - 4	N/A
Fog Seal	2 - 4	1 - 3	1 - 2
Chip Seal	5 - 7	3 - 5	1 - 3
Slurry Seal	5 - 7	3 - 5	1 - 3
Micro-surfacing	6 - 8	5 - 7	2 - 4
Thin HMA	6 - 8	4 - 6	2 - 4

Cost Comparisons

Treatment	Cost/ SY	Cost/ LM
Crack Seal	$0.50/LF	N/A
Fog Seal	$1.03	$6,647
Chip Seal	$2.21	$14,262
Slurry	$2.53	$16,327
Micro	$2.66	$17,166
Thin HMA	$4.00-$6.00	$25,813-$38,720

Slurry Seal

Slurry Seal is a mixture of fine dense-graded aggregate, asphalt emulsion, water, and mineral fillers. The components are mixed and placed on the road using a single machine.

Slurry seals are effective preventive maintenance applications that **seal and waterproof the surface while correcting minor defects** and improving skid resistance and appearance. The thin surface is an excellent choice for city streets and airports

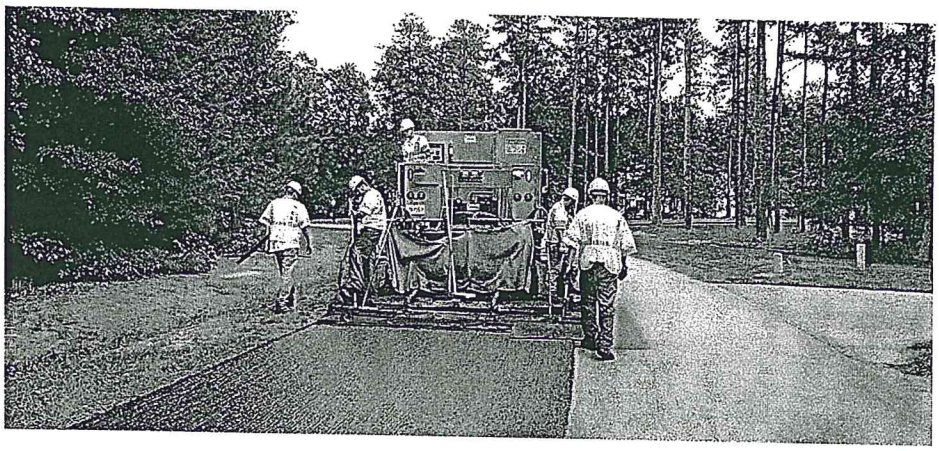
Slurry Seal

Slurry Seal is an extremely cost effective pavement maintenance tool. Properly designed and applied, Slurry Seal will replace lost surface fines, fill in slight surface imperfections and provide you with a uniform, freshly paved look for your street or parking lot.

Other distinct advantages include:

- a durable, all-weather, dust-free, non-bleeding surface traffic-ready just hours after application
- black color and texture in a single pass that fills cracks and voids and covers patched areas
- an extremely cost effective solution for preserving oxidized and worn pavements
- skid resistance and road handling characteristics

Slurry Seal



Micro-surfacing

Micro-surfacing is a high-performance slurry seal, formulated with polymers and chemistry for a very quick cure and traffic return, as well as durability on high traffic pavements.

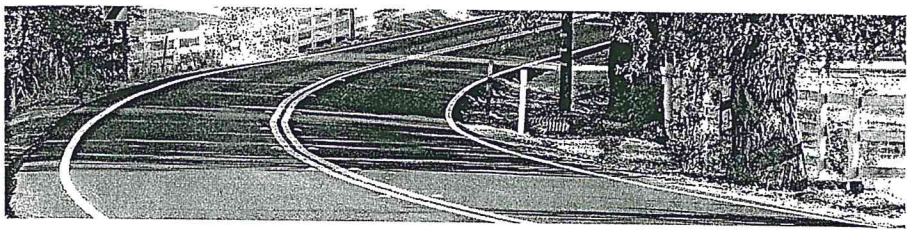
Since micro-surfacing cures quickly, it can be placed thicker than slurry seals and used to fill ruts and for minor re-profiling. These seals can be placed on both asphalt and concrete pavements.

Micro Surfacing

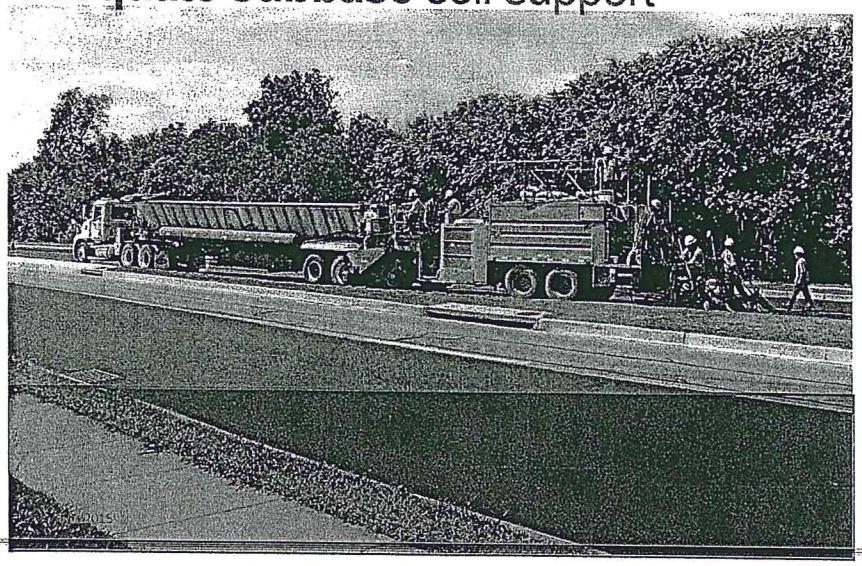
Micro surfacing is one of the toughest and most versatile pavement surface treatments available. **While conventional slurry seal is used as an economical treatment for sealing and extending the service of roads, micro surfacing has many added capabilities.**

Because of its advanced additives, micro surfacing can be applied in a broad range of temperatures and weather conditions. It is particularly suitable for night applications on heavy-traffic streets, highways, and airfields.

Micro surfacing sets extremely quickly and solves and prevents a variety of pavement problems. Micro surfacing dramatically increases the life of pavement when used as part of a preventive maintenance system.



Microsurfacing – works well on roads with **adequate subbase** soil support



What do these treatments cost?

- **Use Fifty Lakes as an example for Slurry Seal**
  - Distance from SR87 to railroad tracks = 8,200 LF
  - Area = (8,200x 18)/9 = 16,400 sq yards
  - Use $3.00 per sq yard = $49,200
- **Assume more preparation necessary if Micro Surfacing is applied over similar distance**
  - dig and replace badly cracked areas, say $15,000
  - Crack sealing required, say another $6,000
  - Use $3.50 per sq yard = $57,400
  - Assume about $78,000 for micro surfacing

Uses: Slurry & Micro

For slurry seal and micro surfacing applications to perform well, they must be placed on sound existing pavements.

- Preventive Maintenance
  - Seals the surface
  - Seals small cracks and voids reducing water infiltration
  - Prevents further weathering of the underlying pavement (oxidation/aging)
- Corrective Maintenance
  - Restores surface texture and improves surface friction
  - Corrects minor raveling and light flushing
  - Micro Surfacing
    - Leveling
    - Rut filling

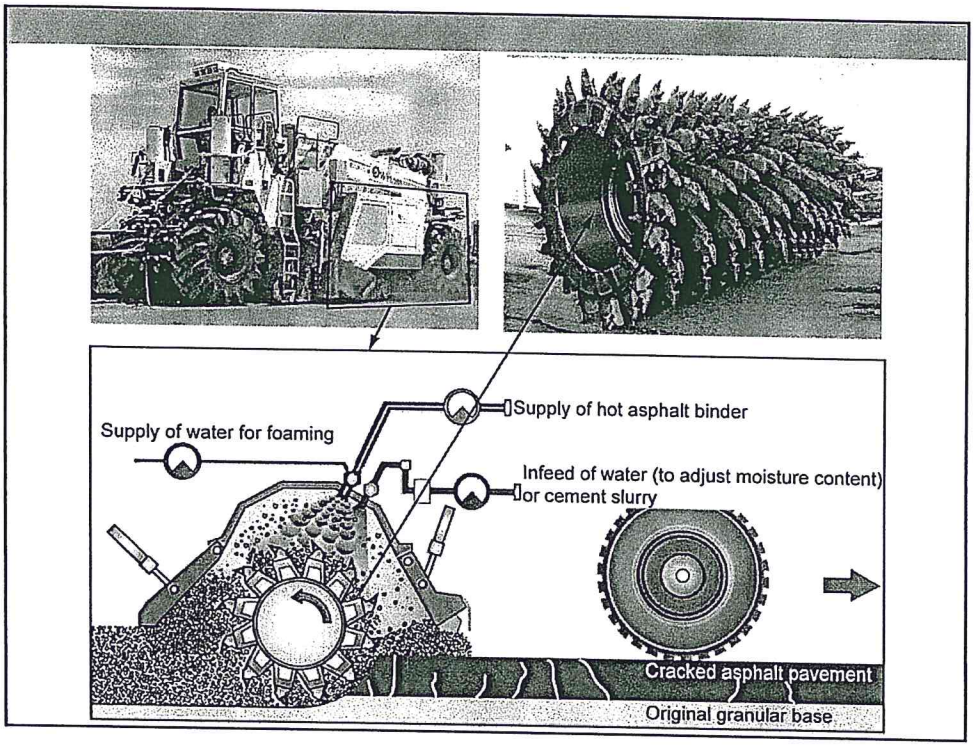
But what about many of our roads with inadequate base soils ?

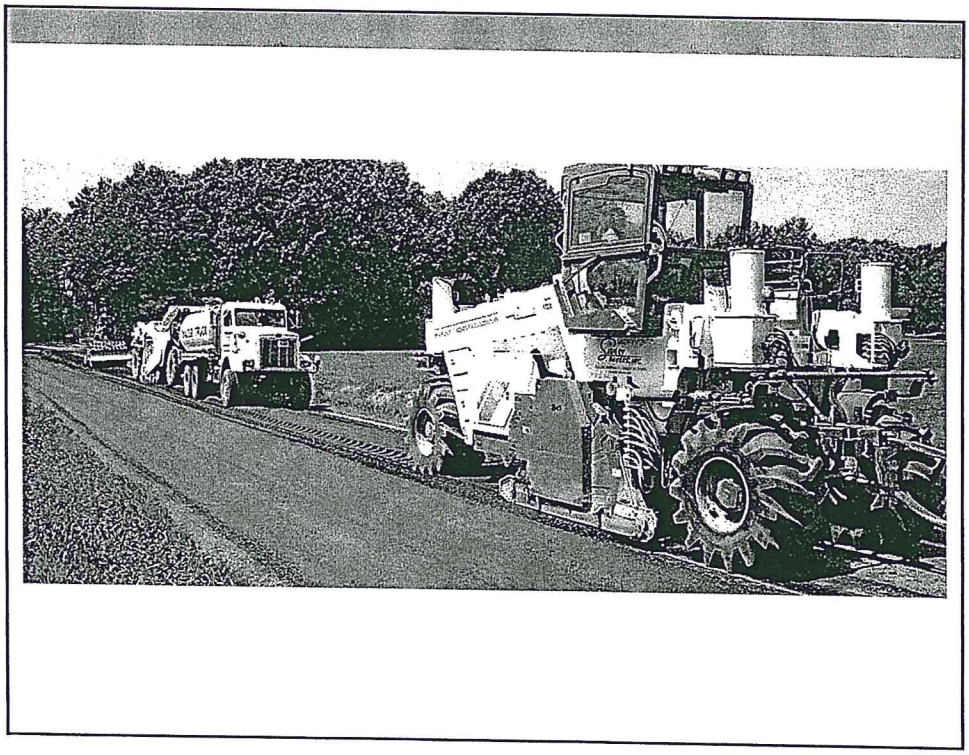
- Surface maintenance techniques will not be effective for long term performance.
- **Eden Road** is a prime example.
- Full depth reconstruction would involve complete removal and replacement of existing pavement and subsoils.
- An alternative is "**Full Depth Reclamation with Cement**"

Eden Road

Full-Depth Reclamation with Cement

- Existing asphalt is ground up and mixed with underlying soils to a predetermined depth (10").
- The mixed asphalt and old base becomes the new subbase soils for pavement.
- Cement (4-5% by volume) is added to improve the strength and conditions of subbase mix.
- **No need to remove existing pavement and subsoils**
- **No need to import new subbase gravels**.


Supply of water for foaming
Supply of hot asphalt binder
Infeed of water (to adjust moisture content)
or cement slurry
Cracked asphalt pavement
Original granular base



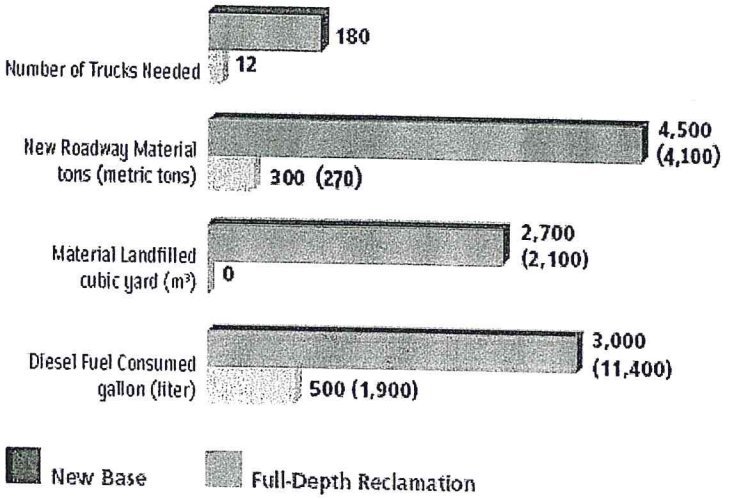
Cost Comparison between methods for pavement replacement

- **Full Depth Reconstruction**
  - Stone subbase placed by Public Works an additional $4/sq yd. (not including labor)
  - The cost of paving (materials and labor) approximately $17/sq yd
  - Break up and removal of existing asphalt (trucking cost) $5/sq yd
  - We pay about $26 /sq yd
  - Not including our labor and use of Public Works Equipment
- **Full Depth Reclamation with Cement**
  - Grinding and mixing with cement about $9/sq yd
  - Paving as above (by separate contractor) $17/ sq yd.
  - Total for Reclamation about $26/sq yd

Energy Use and Materials

Full-Depth Reclamation vs. New Base

ENVIRONMENTAL BENEFITS

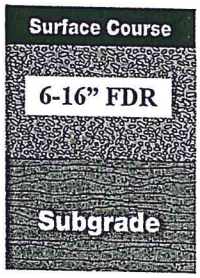


Based on 1 mile (1.6 km) of 24-foot (7.3-m)-wide 2-lane road, 6-inch (150-mm) base

Portland Cement Association

- Willing to conduct an educational session for BSL on the method and its advantages
- Describes this as a proven technique used extensively
- Recent projects in the Southeast support the estimate of $9 or less per square yard
- The result: a road that will last for many years

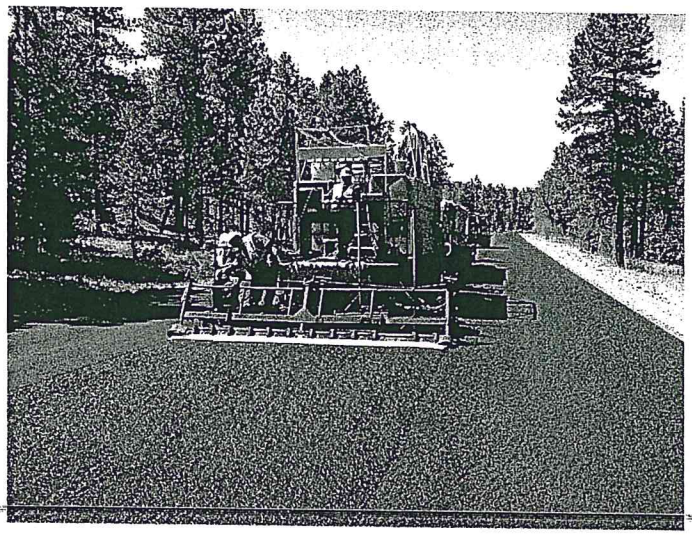
Full Depth Reclamation



For General Consideration

- The Powell Bill Funds that are set aside for paving this year = $135,000
- Possibility of future large development along Fifty Lakes Rd. could stress the pavements with heavy truck traffic.
- **Our Primary City Roads** are considered to be:
  - Fifty Lakes,
  - South Shore
  - Eden Dr. and Alton Lennon Dr.

Recommendations for Pavement Maintenance



Eden Road

- Eden Rd. is in the worst condition due to very poor base soils, and therefore the **obvious candidate for reclamation**
- The distance of Eden Rd. between Fifty Lakes Rd. to Lisa Rd. is roughly 4,800 LF
- Area of this entire road length = (4,800x 18)/ 9 = 9,600 sq yd
- Reclaiming the entire length would cost approximately $250,000

Eden and Alton-Lennon Roads

- **Eden Road**
  - Reclamation of 4,800 LF estimated at $250,000
  - Could be phased, but this may increase overall cost
- **Alton Lennon**
  - In good shape but starting to experience cracking.
  - Slurry seal recommended for 4,000 LF at $25,000

Fifty Lakes

- **Fifty Lakes (West of Tracks)**
  - Could be micro-surfaced to extend for 5-7 more years from SR87 to Railroad, including 8,200 LF @ about $50,000- $75,000.
  - However, surface approach will not correct base problems and alligator cracking.
  - Long term solution would require reclamation @ $425,000
  - Could consider delaying if development along north side of Fifty Lakes Rd is considered probable in the near future
- **Fifty Lakes (East of Tracks)**
  - This section from Railroad to SR 133 is in better condition from former overlay. Should be slurry sealed 3,800 LF @ $26,600

South Shore Rd.

- **South Shore**
  - Total length approximately 10,800 LF
  - Width and edge conditions cannot be repaired by seal techniques
  - Worse section western 4,500 LF impacted by truck traffic
  - Reclamation of the western 4,500 LF would cost $234,000
  - Remaining section east of the golf course would cost $328,000
  - Total reclamation approximately $560,000

Alternative Strategies for Pavement Management

Four approaches

- **No change** – keep using Powell Bill money for paving our existing gravel roads, until the primary connector roads fail and require replacement
- **Maintenance focus** - Use Powell Bill money in the next 5 years exclusively for fixing the existing primary connector roads
- **Combination approach** – split funds for paving existing gravel roads and maintenance
- **Finance approach** – Use some amount of Powell Bill funds to pay off a bond to make significant improvements

Option 2 – No new road paving

Road	Technique	2016	2017	2018	2019	2020
Eden Rd	Reclamation		$250,000			
Alton-Lennon Dr.	Slurry	$25,000				
Fifty Lakes EAST	Slurry	$26,600				
Fifty Lakes WEST	Micro Surface	$75,000				
South Shore	Reclamation			$234,000	$328,000	
NEW ROADS		$0				
	Totals	$126,600	$250,000	$234,000	$328,000	$0

Option 3 – Combination

Road	Technique	2016	2017	2018	2019	2020
Eden Rd	Reclamation		$250,000			
Alton-Lennon Dr.	Slurry	$25,000				
Fifty Lakes EAST	Slurry	$26,600				
Fifty Lakes WEST	Micro Surface			$75,000		
South Shore	Reclamation				$234,000	$328,000
NEW ROADS		$98,400		$75,000		
	Totals	$150,000	$250,000	$150,000	$234,000	$328,000

Option 4 – Finance the Repairs

- **Powell Bill Funds** - Slurry seal Alton-Lennon and Fifty Lakes East in 2016, and pave some new roads as per Option 3.

- **Finance Repairs** - Fix the major roads with Full Depth Reclamation to create a long term performance solution. This could be bonded as "one" construction project for greatest cost efficiency. The project amount should include:

Eden Rd.	$250,000
Fifty Lakes (west of the rail)	$425,000
South Shore Rd.	$560,000
Project Total	$1,235,000

Cost of Financing

To approximate the cost, with **no downpayment,** the following monthly payments are estimated:

Term of Loan	Interest rate	Monthly cost	Annual Cost	Interest rate	Monthly cost	Annual Cost
10 years	3.6%	$12,270	$147,240	4%	$12,504	$150,048
20 years	3.6%	$7,226	$86,712	4%	$7,483	$89,796

Use of Powell Bill Funds

- Road maintenance does qualify for Powell Bill funding, so **Powell Bill funds could be used to make the loan payments.**
- If financing was obtained for only the **10 year term:**
  - Our entire annual Powell Bill set aside for paving would be needed to satisfy the loan ($147,000 per year).
- If financing were obtained for a **20 year term**:
  - About $48,000 of the Powell Bill funds could be used each year for paving existing gravel roads, after the loan payments are satisfied ($135,000 - $87,000).

Hybrid Options

- Bond some smaller amount to repair just one or more of the "primary" collector rds., leaving more Powell Bill funds available for new road construction.

Assume 10 years at 3.6%				Assumes $135,000 set aside for paving
Road	**Bond Amount**	**Monthly Cost**	**Annual Cost**	**Available yearly for new road paving**
Eden Rd.	$250,000	$2,483	$29,796	$105,204
Fifty Lakes (west)	$425,000	$4,222	$50,664	$84,336
South Shore Rd.	$560,000	$5,564	$66,768	$68,232

Guideline comments

- Eden Rd. should be repaired by full depth reclamation or reconstruction as no surface treatment would be appropriate
- Alton-Lennon and Fifty Lakes east of the tracks should be slurry sealed to preserve the surfaces
- South Shore Road's surface could be preserved by slurry seal, but this would not fix the width or edge conditions
- If we were able to secure a 20 yr. loan, all three primary roads could be reconstructed and $48,000 still available each year for paving existing gravel roads.

PAVING QUESTIONS?

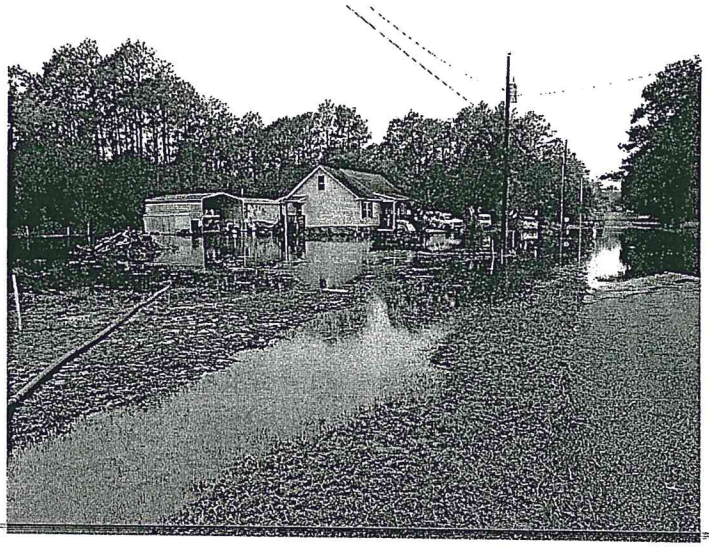
DRAINAGE ISSUES

Locations:

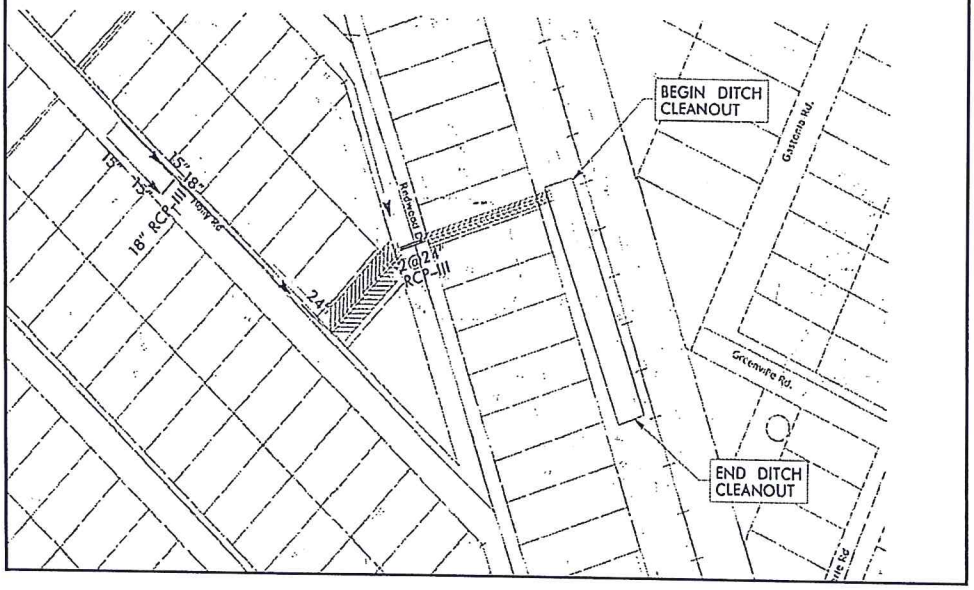
1. Holly/Redwood/Crabapple
2. Walnut Rd. pump station upgrade

Holly/Redwood/Crabapple

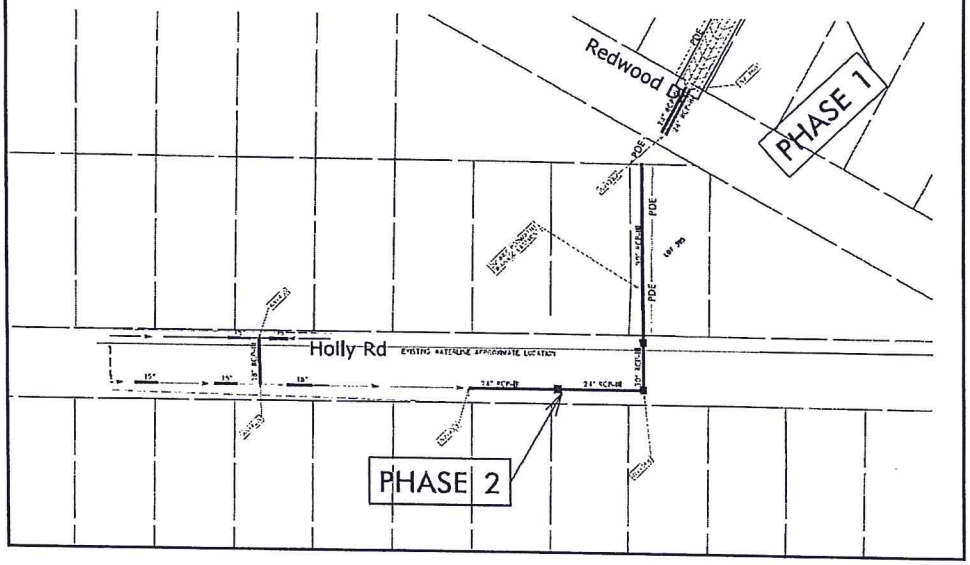
Options for Improvement



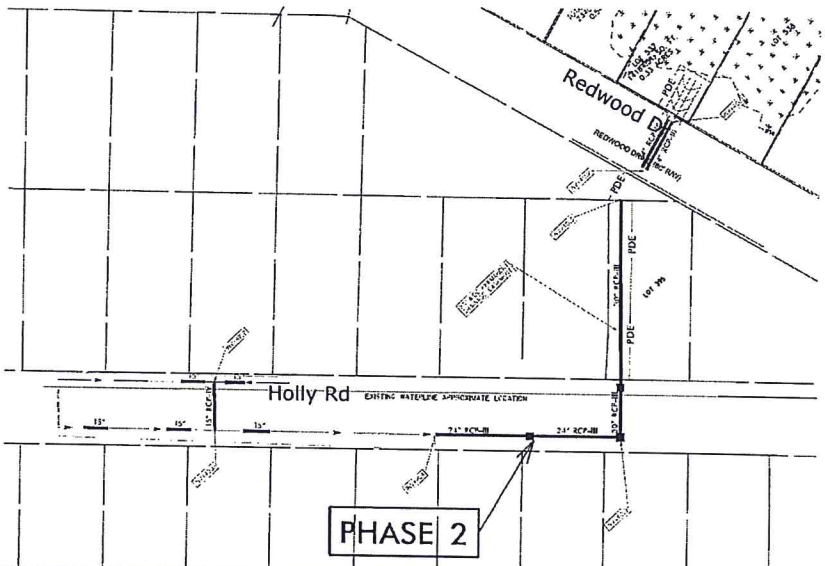
Sungate's Original Approach



Revised approach to minimize property impacts



New concept to minimize wetland impact



Preliminary cost estimate

Below are rough preliminary opinion of probable construction costs for Alternative 4A:

Construction Cost	$80,000
Contingency (20%)	$16,000
Easement Acquisition	$15,000
Engineering Fee	$25,640
Total	$136,640

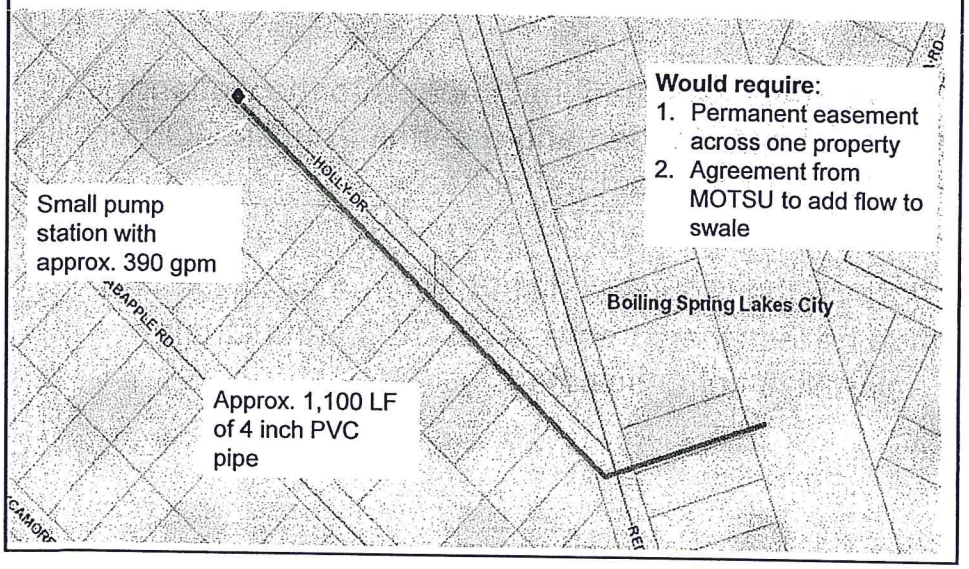
Permitting not anticipated

- "we have assumed that impacts to the wetland have been avoided and a permit from USCOE or NCDEQ-DWR is not required.
- Since the proposed disturbed area is anticipated to be less than 1 acre, a NCDEQ Land Quality permit is not anticipated."

Comment from the original Sungate Report

- "Due to the flat ditch slopes and limited elevation fall in the area, Alternative #1 will allow the area to drain during smaller rainfall events (less than 10-year recurrence interval).
- During larger storm events, localized flooding may still occur but the roads will not be overtopped."

Alternative pumping approach



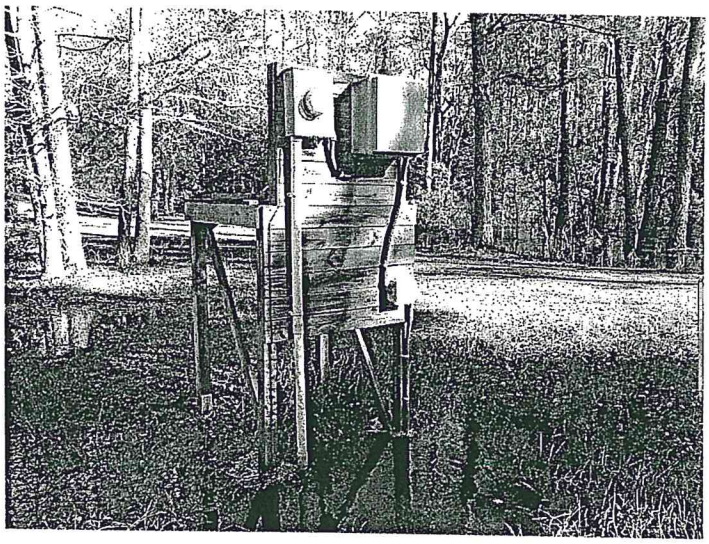
Cost estimate for pumped alternative

Estimate for Holly Rd pumped alternative

Item	Unit	Unit cost	Cost Estimate
Precast concrete basin	1	$5,000	$5,000
Top Grate	1	$300	$300
Electric Panel	1	$1,500	$1,500
Electrician's labor	6	$150	$900
6 " diameter pvc main	1100	$3	$3,300
rip rap	40	$35	$1,400
some dewatering	1	$3,000	$3,000
Easement cost	1	$15,000	$15,000
Duke Energy fee	1	$2,000	$2,000
400 gpm pump	1	$5,000	$5,000
		Total	$37,400
Contingency @15%			$5,610
		Total	$43,010

Note:
1. Assumes Public Works performs the installation, and
2. Does not show electrical demand costs

Walnut Rd. pump station upgrade

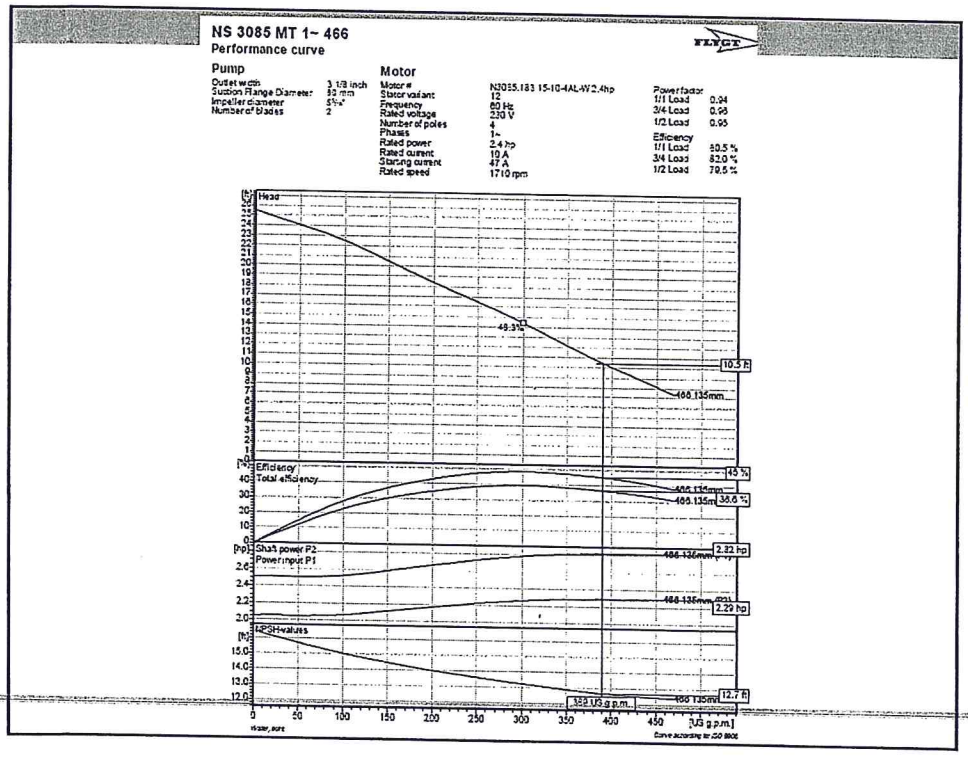


Why is this necessary?

- This intersection floods easily, even before adding the pumped component of flow from Crabapple and Holly roads
- The existing pump station is in the right place at the lowest point in the topography, but has inadequate capacity (135 gpm) or is malfunctioning

What will be involved?

- Replace the existing 135 gpm pump with a pump of approximately 390 gpm
- A bigger pump needs a bigger wetwell, so we would add a second concrete basin which will allow us to create a forebay arrangement and sediment chamber.
- Take advantage of the existing electric, single phase panel and 4-inch pipe discharge.



Cost Estimate

Item	Estimate
New Flygt Pump	$5,000
Additional basin with frame and grate	$2,500
Electrician to reconfigure panel	$500
Dewatering pump and assistance	$3,000
Total estimate	$11,000

Note: Public Works to perform the installation with dewatering assistance from Xylem/Godwin pumps

DRAINAGE QUESTIONS?