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ENGINEERING REPORT  
FOR  
**WHITAKER ROAD DRAIN**



FOR  
JEFFREY WRIGHT  
GENESEE COUNTY DRAIN COMMISSIONER

Prepared By:  
SPICER GROUP, INC.  
SAGINAW, MICHIGAN  
June 2005



Project I.D. Number 109292.04

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PRELIMINARY ONLY

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- A. Location Map
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- C. 11x17 Set of Plans
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## **Background**

This report outlines alternative approaches to address problems connected with storm water runoff flowing across Whitaker Road. Whitaker Road is located in Section 32 of Fenton Township, Genesee County, between Owen Road to Harp Road.

The topography in the area of Whitaker Road is rolling hills and lakes. The road is currently a gravel road with steep grades and the road sags through a valley. There is up 100 feet of vertical drop in this section of road and road grades approach up to 9% slope.

At the low point in road, storm water runoff from a 208-acre watershed collects and flows across the road into Pine Lake. The majority of storm water is conveyed to the low point in the road through two primary waterways. The first being a natural waterway that traverses through a wooded park area, the second is storm water being conveyed in the gravel road down the steep grades.

Storm water flowing over the road has led to excessive erosion of the gravel road and sediment being transported into Pine Lake. The result is significant road safety issues, ongoing maintenance and repair expenses, and negative impacts to the environment and lake water quality. Erosion gullies up to 2 feet deep and significant potholes in the road have been observed. Currently, emergency service vehicles are restricted from using Whitaker Road.

Local residents approached Fenton Township about resolving these ongoing problems. The Fenton Township Board asked the Genesee County Drain Commissioner to establish a new county drainage district and complete a preliminary study to identify improvement alternatives to address the existing problems. The Drain Commissioner asked Spicer Group and Wetland Coastal Recourse to assist his office with this study and report.

## **Watershed Characteristics**

The watershed is the land that contributes storm water to the low point along Whitaker Road. The watershed is 208 acres and consists of rolling open and wooded land, wetlands, residential, agricultural, and public park areas. Storm water runoff from this watershed discharges into Pine Lake through a culvert at the low point along Whitaker Road and by flowing over the road during moderate and large storm events. Pine Lake is developed with residential housing and the lake has many recreational uses.

Land adjacent to the Whitaker Road includes residential housing, upland wooded parkland, low-lying wetland, and Pine Lake.

Wetlands are along both sides of the road in the low-lying valley area. The wetlands on the west side of the road are considered low quality. The Genesee County Parks and Recreation Commission owns the land on which the wetlands are located (Linden County Park). The wetlands along the east side of the road are considered to be good quality wetlands.

## Identified Problems

Erosion is occurring as a result of storm water over Whitaker Road between Owen Road and Harp Road. The erosion is a direct result of two (2) sources. The first source is storm water runoff in the road along the steep grades, and the second is the runoff from a natural drainage swale discharging onto the road. Both sources are causing erosion problems, deteriorating the condition of the gravel road, and transporting sediment into wetlands and Pine Lake.

Safety along Whitaker Road is a major concern for landowners, Fenton Township, and the Genesee County Road Commission. The road does not meet county standards and the road is gravel and has experienced continual erosion. See Appendix B for photos showing the continual erosion and maintenance problems occurring on Whitaker Road.

The road has been closed in the past. There is a liability issue with leaving the road in such poor condition as it is. There have been reported accidents along the road. Currently, due to the poor conditions, the fire department and school buses are restricted from using Whitaker Road.

## Alternatives Evaluated

Spicer Group, Inc and Wetland Coastal Recourses were directed to complete a preliminary engineering study to identify possible solutions to the identified problems. The engineering study consisted of the following items:

- A topographical survey of Whitaker Road between Owen and Harp Roads.
- Delineation of the watershed upstream of the low-lying area in Whitaker Road.
- Identification of a route for a drain that could potentially be established as a county drain.
- Completion of a wetland inventory and delineation.
- Completion of hydrological, hydraulic, and storm water detention calculations.
- Development of alternatives to address existing problems.
- Preparation of cost estimates for alternatives.
- Presentation of results and report.

Other than do nothing, two alternatives were evaluated. The first alternative is to reconstruct Whitaker Road to an all-season road with adequate storm water drainage, including the installation of storm sewers in areas with steep grades. This is Alternative No. 1 and is outlined in Table 1 below. The second alternative is to abandon portions of Whitaker Road, construct cul-de-sacs, install erosion control measures along the abandoned portion of Whitaker Road, topsoil, and seed. This is Alternative No. 2 and is also outlined in Table 1 below. Both alternatives include wetland mitigation.

**Table 1 - Alternatives Analyzed**

Alternative #1 <u>Construct New Roadway</u>	Alternative #2 <u>Abandon Roadway in Low Area</u>
<ul style="list-style-type: none"><li>• Pave road</li><li>• Install storm sewer and road drainage</li><li>• Provide detention for 100-year storm</li><li>• Provide sedimentation/polishing basin</li><li>• Wetland mitigation</li></ul>	<ul style="list-style-type: none"><li>• Cul-de-sacs required</li><li>• Turn road into drainage greenway</li><li>• Install soil erosion fabric</li><li>• Capture first flush</li><li>• Wetland mitigation</li></ul>

Preliminary plans for Alternative No. 1 were developed based on the results of the survey information gathered. A set of 11x17 plans is included in Appendix C of the report.

For both alternatives, improvements were divided into categories as follows:

- Drainage Improvements
- Road Improvements
- Wetland Enhancement
- Recreational Enhancements

## **Drainage Improvements**

Drainage improvements for both alternatives were designed to address the erosion, sediment transport, and flooding problems.

The following items summarize the drainages improvements consider for Alternative No.1 (construct new road).

- Install approximately 3,000 linear feet of storm sewer ranging in size from 12" to 15" diameter concrete pipe. Storm sewer would be installed in sections of Whitaker Road that have steep grades.
- Improve approximately 8,500 linear feet of roadside open drains. Roadside drains would be constructed in the sections of Whitaker Road that have flatter grades.
- Replace driveway culverts to proper grade and size for positive drainage.
- Construct a new wetland control structure that detains storm water on the west side of the road in the natural wetlands. Storm water would be detained to reduce peak discharges rates and sediment transport into Pine Lake.
- Implement wetland and detention basin improvements through the construction of a polishing basin. This is designed to allow the suspended particles to settle out before entering the wetlands and Pine Lake.

The following items summarize the drainages improvements consider for Alternative No.2 (abandon road).

- Improve approximately 3,500 linear feet of roadside open drains.
- Construct and install a new wetland control structure underneath the road. This is designed as a means for the storm water that collects on the west side of the road in the natural wetlands area to be able to drain into Pine Lake.
- Implement wetland and detention basin improvements through the construction of a polishing basin. This is designed to allow the suspended particles to settle out before entering the wetlands and Pine Lake.
- Construct and install soil erosion and prevention measures and controls between the two cul-de-sacs. This includes removal of gravel road, placement of topsoil, seeding and mulching, installation of soil erosions fabrics and blankets, placement and construction of riprap spillways, check dams, and etc.

In Alternative No. 1 all drainage improvements correlate with the reconstruction of Whitaker Road into an all-season road from Owen Road to Harp Road. In Alternative No. 2 the proposed drainage improvements would occur along the portion of Whitaker Road that is between the cul-de-sacs. It is important to note that the cul-de-sac construction and associated costs were not identified as part of the limits for Alternative No. 2.

Table 2 also summarizes the drainage improvements evaluated.

<b>Table 2 – Drainage Improvements</b>	
Alternative #1 <u>Construct New Roadway</u>	Alternative #2 <u>Abandon Roadway in Low Area</u>
<ul style="list-style-type: none"> <li>• New storm sewer – 3,000 feet</li> <li>• Open ditches – 8,500 feet</li> <li>• Replacing driveway culverts</li> <li>• New wetland control structure under road</li> <li>• Wetland/detention improvements</li> </ul>	<ul style="list-style-type: none"> <li>• No storm sewer</li> <li>• Open ditches – 3,500 feet</li> <li>• New wetland control structure under road</li> <li>• Wetland/detention improvements</li> <li>• Soil erosion controls and measures</li> </ul>

## Road Improvements

A summary of the proposed road improvements for both alternatives can be seen below in Table 3 where a more detailed description is listed below.

Alternative No. 1 includes reconstructing Whitaker Road from Owen Road to Harp Road into an all-season, two-lane road designed to Genesee County Road Commission standards. This road would be a paved road with approximately 5,100 linear feet of curb and gutter. An embankment, (approximately 13,000 cu. yds.), would be constructed at the bottom of the hill to elevate the road in flood prone areas and to provide a control structure for the 100-year storm detention area located on the west side of the road.

Alternative No. 2 includes abandoning a portion of Whitaker Road where the road is not needed to access residential homes. Where home access ends along Whitaker Road, it is proposed that cul-de-sacs would be constructed. At this point, it was identified to Spicer Group that the Genesee County Road Commission would construct cul-de-sacs and perform road maintenance to Whitaker Road. This would occur on both the northern and southern portions of the road.

Alternative No. 2 also includes construction of an embankment, (approximately 8,500 cu. yds.) in the low-lying area. This will provide the required storage on the west side of the road for the first flush volume. The first flush volume is the amount of storage, in volume, that was calculated to capture one half inch of rainfall volume over the watershed per the Genesee County Drain Commissioner's standards.

When the road is to be abandoned, the existing road surface will be obliterated and a greenway will be constructed and installed. This is where the drainage improvements and road improvements are directly related, such that where Whitaker Road is abandoned it will be seeded and mulched, topsoil placed, installation of both temporary and permanent soil erosions fabrics and blankets, placement and construction of riprap spillways and check dams, and etc.

<b>Table 3 – Road Improvements</b>	
Alternative #1 <u>Construct New Roadway</u>	Alternative #2 <u>Abandon Roadway in Low Area</u>
<ul style="list-style-type: none"> <li>• 2 lane asphalt road</li> <li>• Curb and gutter (5,100 ft.) in steep sections</li> <li>• 8,500 feet of road ditch and 700 feet of culverts</li> <li>• Construct embankment (13,000 cu. Yds.)</li> <li>• Guardrail along raised embankment (1,500 ft.)</li> </ul>	<ul style="list-style-type: none"> <li>• Abandon road not needed for home access</li> <li>• Cul-de-sac's and improvements by Road Commission</li> <li>• Strip, grade, topsoil, and seed the abandoned roadway</li> <li>• Permanent erosion control fabric</li> <li>• Riprap protection</li> </ul>

## **Wetland Enhancements**

Wetland mitigation in accordance with MDEQ requirements will be required for both alternatives evaluated, as both will be impacting wetland areas along Whitaker Road. Alternative No. 1 will impact more wetland area than Alternative No. 2, due to the amount of disturbed earth necessary to reconstruct Whitaker Road verses abandoning it.

In addition to wetland mitigation, the wetland quality enhancements have been evaluated. The existing wetlands have been categorized as low quality with respect to habitat and ecological aspects. Wetland enhancements considered in this study include ground contouring to create pools, installation of emergent wetland habitat structures, and planting of scrub-shrub and forested wetland planting.

The goal of wetland enhancements is to promote wildlife habitat and filtering and detaining of storm water.

## Recreational Enhancements

Recreational enhancements could easily be completed as part of this project if construction activities are ongoing in the area. The recreational enhancements would consist of a gravel parking lot, 1/3 of a mile of handicap accessible nature trail, three (3) pocket parks, wildlife viewing platform, and 750 feet of split rail fencing. The general location of recreations enhancements considered is shown on Sheet 2 in Appendix C.

## Preliminary Estimate of Costs

Preliminary estimates of costs were generated for both alternatives and are shown in Appendix D. The estimates of cost are based on unit bid prices of recently bid projects of similar size and related project experience.

For Alternative No. 1, the preliminary estimate of cost is as follows:



For Alternative No. 2, the preliminary estimate of cost is as follows:



Note: This does not include improvements to road to remain or construction of cul-de-sacs.

The preliminary estimates of cost for recreational enhancements is as follows:



## Funding Considerations

Funding and financing on this project will have to come from various sources. For the recreational and some of the wetland enhancements, there may be state and federal grants available to offset a portion of the cost.

For road and drainage improvements, funding from local units of government and landowners should be anticipated and include Fenton Township, Pine Lake Association, Whitaker Road Drain Drainage District, and Genesee County.



With respect to the Whitaker Road Drain Drainage District, the Genesee County Drain Commissioner must be petitioned for drainage improvements. Upon receiving a petition, a Board of Determination meeting must be conducted and that Board must decide if it is necessary to move forward with a project, based on testimony and evidence of problems presented by the constituents of the Whitaker Road Drainage District.

If a project is found necessary, the Drain Commissioner could move forward with drainage improvements and assess the cost of those improvements to the drainage district. The Drain Commissioner could not assess the cost of road improvements, water quality improvements to Pine Lake, wetland enhancements, or recreation enhancements. Fenton Township, County Road Commission, County Parks Commission, grants, Pine Lake Association, or any combination thereof must fund the improvements.

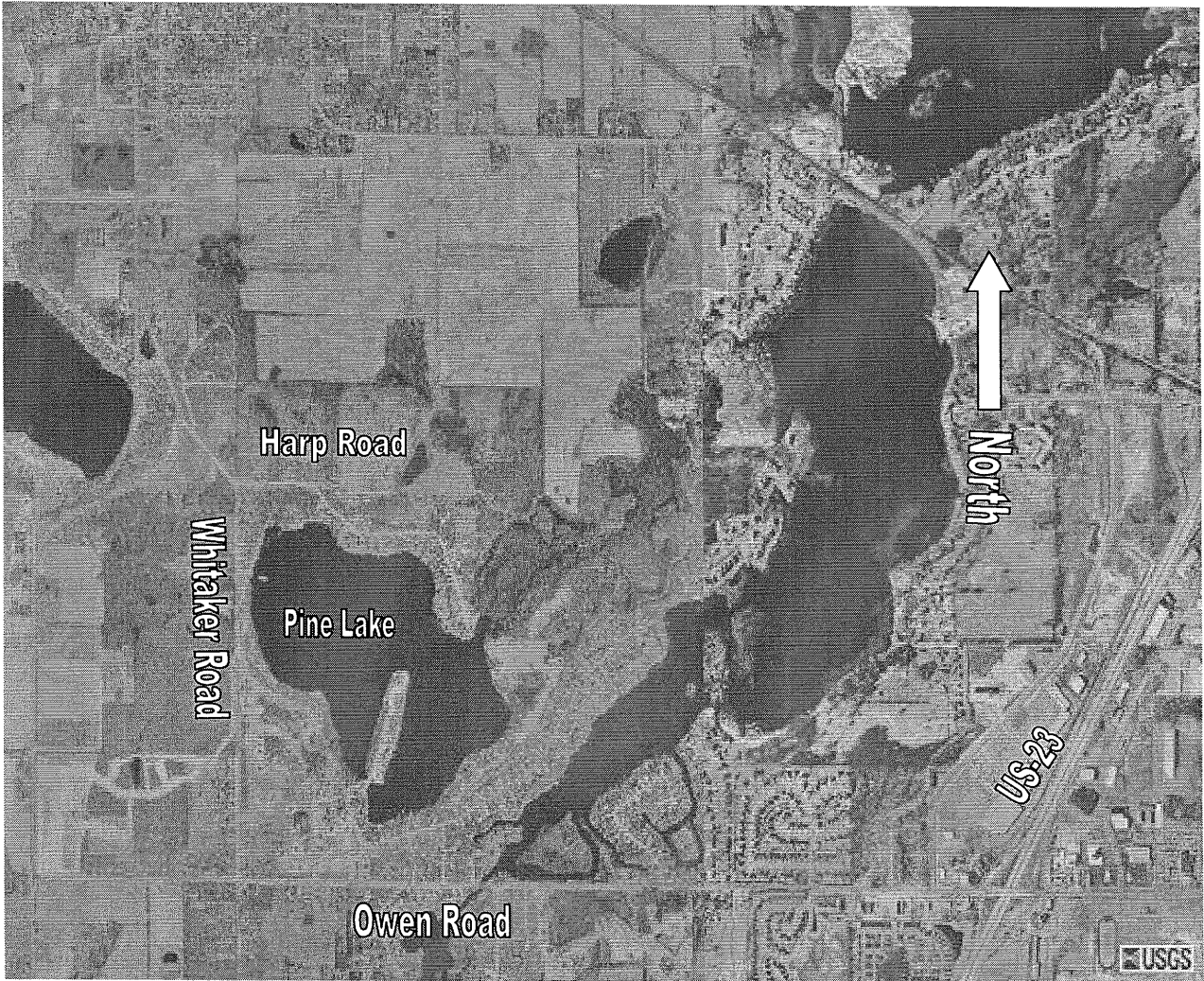
## **Recommendation**

It is our recommendation that action be taken to implement one of the evaluated alternatives to perform the necessary road and drainage improvements along Whitaker Road to improve the safety and storm water problems.

SECTION A

LOCATION MAP

Figure 1 - Whitaker Road Location



SECTION B

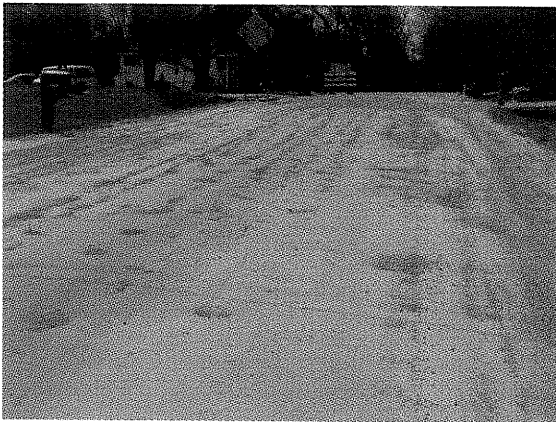
PHOTOS OF WHITAKER ROAD AND DRAIN



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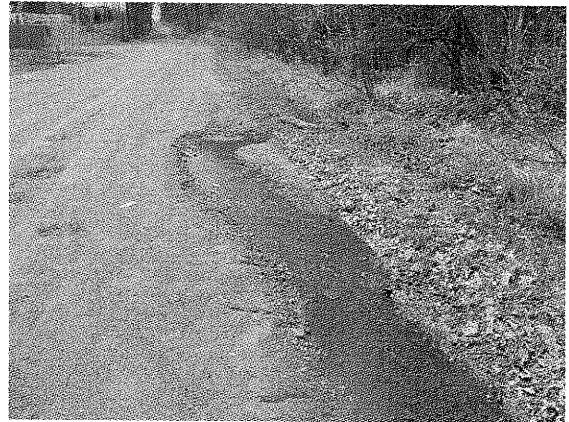
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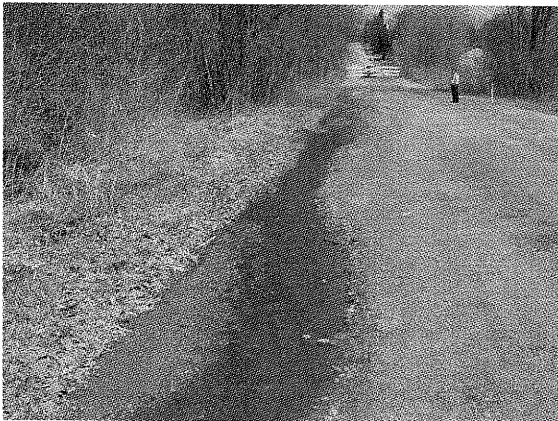
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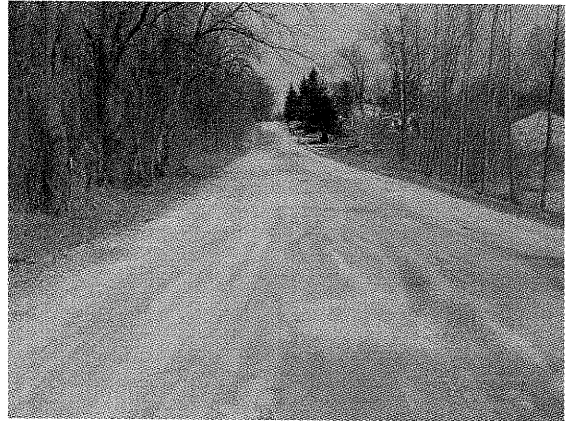
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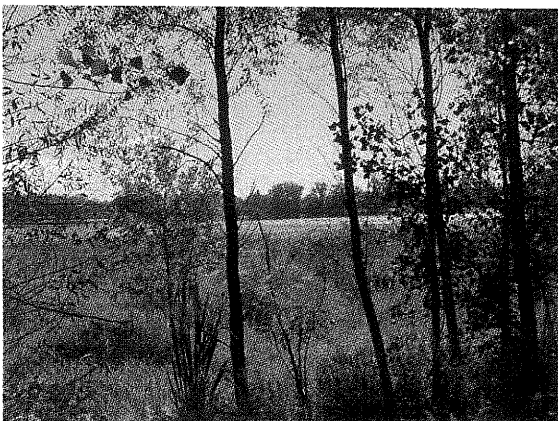
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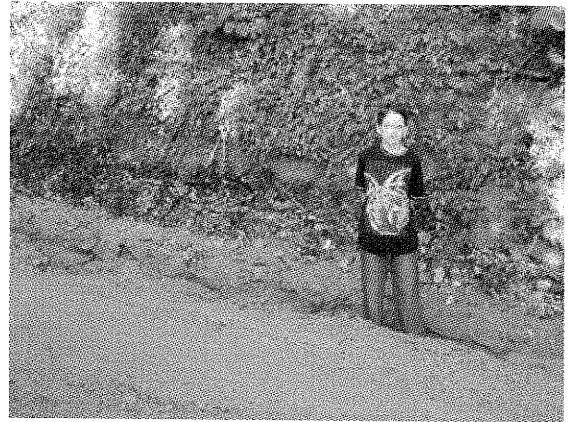
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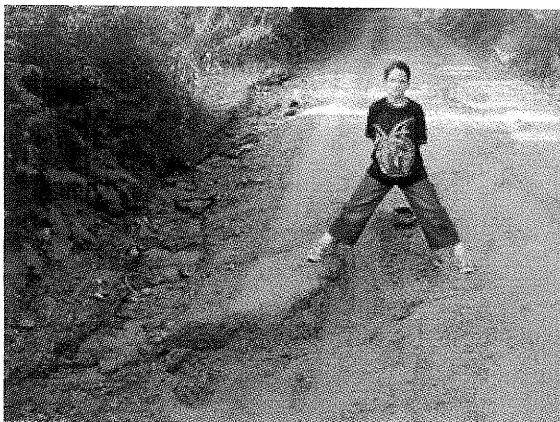
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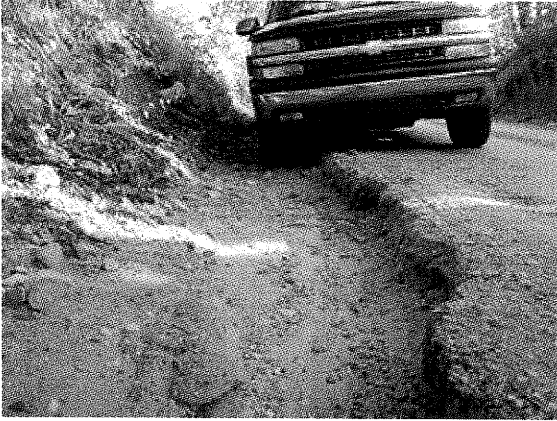
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SECTION C

11X17 SET OF PLANS FOR ALTERNATIVE 1

SECTION D

PRELIMINARY ESTIMATES OF COST

**PRELIMINARY ESTIMATE OF COST  
WHITAKER ROAD DRAIN  
BOTH ALTERNATIVES - RECREATIONAL ENHANCEMENTS  
FENTON TOWNSHIP  
GENESEE COUNTY, MICHIGAN**

Item No.	Estimated Quantity	Unit	Description	Unit Price	Amount
<b>Recreation Enhancements</b>					
1.	1	Lump Sum	Site Clearing	Lump Sum	\$10,000.00
2.	1	Lump Sum	Rough Grading	Lump Sum	\$20,000.00
3.	1,750	Lin. Ft.	8' Wide Bituminous Nature Trail (2" of Asphalt, 4" of Aggregate)	\$20.00	\$35,000.00
4.	3,750	Sq. Yds.	Nature Trail Parking Lot (3" of Asphalt, 4" Aggregate Base)	\$22.00	\$82,500.00
5.	3	Each	Pocket Parks (Includes Concrete Pad, Bench, and Signage)	\$5,000.00	\$15,000.00
6.	5	Each	Information Sign/Bollards	\$350.00	\$1,750.00
7.	10	Each	Removable Bollards	\$300.00	\$3,000.00
8.	750	Lin. Ft.	Split Rail Fence	\$8.00	\$6,000.00
9.	1	Lump Sum	Wildlife Viewing Platform	Lump Sum	<u>\$13,000.00</u>
Total Recreation Enhancements					\$186,250.00
Survey, Preliminary Design, and Final Design					\$21,000.00
Construction Administration and Staking and Material Testing					\$21,000.00
Contingencies					<u>\$22,750.00</u>
<b>TOTAL PRELIMINARY ESTIMATE OF COST</b>					<b>\$251,000.00</b>

Item No.	Estimated Quantity	Unit	Description	Unit Price	Amount
15.	2	Each	Guardrail Approach Terminal Type 2T	\$1,750.00	\$3,500.00
16.	1,450	Lin. Ft.	Guardrail Type T	\$60.00	\$87,000.00
17.	2	Each	Guardrail Departing Terminal Type T	\$600.00	\$1,200.00
18.	5,120	Lin. Ft.	Concrete Curb and Gutter	\$13.00	\$66,560.00
19.	5,120	Lin. Ft.	6" Perforated Tile With Sock (Subgrade Underdrain)	\$6.00	\$30,720.00
20.	1	Lump Sum	Traffic Control	Lump Sum	\$9,000.00
21.	1	Lump Sum	Signage and Pavement Markings	Lump Sum	\$3,000.00
22.	1	Lump Sum	Cleanup, Seeding and Restoration	Lump Sum	<u>\$15,000.00</u>
Total - Construction Cost					\$718,355.00
Survey, Preliminary Design, and Final Design					\$82,500.00
Construction Administration and Staking and Material Testing					\$82,500.00
Geotechnical Exploration					\$25,000.00
Contingencies					<u>\$91,645.00</u>
<b>TOTAL PRELIMINARY ESTIMATE OF COST</b>					<b>\$1,000,000.00</b>

**PRELIMINARY ESTIMATE OF COST  
WHITAKER ROAD DRAIN  
ALTERNATIVE #1 - DRAINAGE IMPROVEMENTS  
FENTON TOWNSHIP  
GENESEE COUNTY, MICHIGAN**

Item No.	Estimated Quantity	Unit	Description	Unit Price	Amount
<b>Storm Water Drainage and Management Improvements</b>					
1.	10	Each	3' Dia. Catch Basin	\$1,000.00	\$10,000.00
2.	14	Each	4' Dia. Concrete Manhole/Catch Basin	\$1,400.00	\$19,600.00
3.	24	Each	Castings/Grated Frame Adjustment	\$275.00	\$6,600.00
4.	840	Lin. Ft.	Reinforced Conc. 15" Pipe	\$32.00	\$26,880.00
5.	2,050	Lin. Ft.	Reinforced Conc. 12" Pipe	\$30.00	\$61,500.00
6.	10	Each	12" Reinforced Conc. Tees	\$300.00	\$3,000.00
7.	8,500	Lin. Ft.	Drainage Swale Both Sides of the Road	\$6.00	\$51,000.00
8.	708	Lin. Ft.	18" C.M.P.	\$40.00	\$28,320.00
9.	1	Lump Sum	Wetland Structure Outlet	Lump Sum	\$20,000.00
10.	200	Sq. Yds.	MDOT Plain Riprap	\$45.00	\$9,000.00
11.	40,000	Sq. Ft.	Erosion Control Fabric	\$0.75	\$30,000.00
12.	2,500	Lin. Ft.	Silt Fence	\$3.50	<u>\$8,750.00</u>
Total - Construction Cost					\$274,650.00
Survey, Preliminary Design, and Final Design					\$31,000.00
Construction Administration and Staking and Material Testing					\$31,000.00
Geotechnical Exploration					\$10,000.00
Contingencies					<u>\$25,350.00</u>
<b>TOTAL PRELIMINARY ESTIMATE OF COST</b>					<b>\$372,000.00</b>

**PRELIMINARY ESTIMATE OF COST  
WHITAKER ROAD DRAIN  
ALTERNATIVE #2 - ABANDON ROAD AND RESTORATION  
FENTON TOWNSHIP  
GENESEE COUNTY, MICHIGAN**

Item No.	Estimated Quantity	Unit	Description	Unit Price	Amount
<b><u>Road Removal and Natural Restoration and Stabilization</u></b>					
1.	3,000	Lin. Ft.	Drainage Swale	\$7.00	\$21,000.00
2.	1	Lump Sum	Wetland Outlet Structure	Lump Sum	\$20,000.00
3.	200	Sq. Yds.	MDOT Plain Riprap	\$47.00	\$9,400.00
4.	100	Sq. Yds.	Heavy Riprap	\$75.00	\$7,500.00
5.	80,000	Sq. Ft.	Erosion Control Fabric	\$0.75	\$60,000.00
6.	3,000	Lin. Ft.	Silt Fence	\$3.50	\$10,500.00
7.	15	Each	Check Dams	\$500.00	\$7,500.00
8.	1	Lump Sum	Miscellaneous Grading/Erosion Control	Lump Sum	\$15,000.00
9.	1	Lump Sum	Site Clearing	Lump Sum	\$15,000.00
10.	1	Lump Sum	Pump Station Access Drive and Grading	Lump Sum	\$20,000.00
11.	2,000	Cu. Yds.	Excavation	\$4.00	\$8,000.00
12.	8,500	Cu. Yds.	Clay Embankment CIP	\$11.00	\$93,500.00
13.	650	Lin. Ft.	6" Perforated Toe Drain	\$8.00	\$5,200.00
14.	7	Each	Sanitary Sewer Structure Adjustment	\$500.00	\$3,500.00
15.	1	Lump Sum	Traffic Control	Lump Sum	\$3,000.00
16.	1	Lump Sum	Cleanup, Seeding and Restoration	Lump Sum	\$10,000.00

Item No.	Estimated Quantity	Unit	Description	Unit Price	Amount
17.	9,000	Sq. Yds.	Topsoil (6" depth)	\$7.00	<u>\$63,000.00</u>
Total - Construction Cost					\$372,100.00
Survey, Preliminary Design, and Final Design					\$95,000.00
Construction Administration and Staking and Material Testing					\$55,000.00
Geotechnical Exploration					\$25,000.00
Contingencies					<u>\$52,900.00</u>
<b>TOTAL PRELIMINARY ESTIMATE OF COST</b>					<b>\$600,000.00</b>

**PRELIMINARY ESTIMATE OF COST  
WHITAKER ROAD DRAIN  
BOTH ALTERNATIVES -WETLAND IMPROVEMENTS  
FENTON TOWNSHIP  
GENESEE COUNTY, MICHIGAN**

Item No.	Estimated Quantity	Unit	Description	Unit Price	Amount
<b><u>Wetland Improvements</u></b>					
1.	1	Lump Sum	Clearing	Lump Sum	\$14,000.00
2.	1,500	Cu. Yds.	Excavation	\$7.00	\$10,500.00
3.	1.75	Acres	Lower Scrub-Shrub Wetland Plantings	\$1,250.00	\$2,187.50
4.	1.75	Acres	Upper Scrub-Shrub Wetland Plantings	\$750.00	\$1,312.50
5.	0.25	Acres	Lower Forested Wetland Plantings	\$6,500.00	\$1,625.00
6.	0.25	Acres	Upper Forested Wetland Plantings	\$5,000.00	\$1,250.00
7.	10	Each	Emergent Wetland Habitat Structures	\$250.00	\$2,500.00
8.	350	Cu. Yds.	Enhancement of Reed Canary Grass Wetland Area	\$9.00	\$3,150.00
9.	1	Lump Sum	Cleanup, Seeding, and Restoration	Lump Sum	\$5,000.00
10.	1	Lump Sum	Erosion Control Measures	Lump Sum	<u>\$5,000.00</u>
Total - Wetland Enhancements					\$46,525.00
Survey, Preliminary Design, and Final Design					\$6,000.00
Construction Administration and Staking and Material Testing					\$6,000.00
Contingencies					<u>\$5,475.00</u>
<b>TOTAL PRELIMINARY ESTIMATE OF COST</b>					<b>\$64,000.00</b>



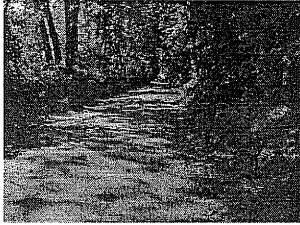
**PRELIMINARY ESTIMATE OF COST  
WHITAKER ROAD DRAIN  
BOTH ALTERNATIVES - RECREATIONAL ENHANCEMENTS  
FENTON TOWNSHIP  
GENESEE COUNTY, MICHIGAN**

Item No.	Estimated Quantity	Unit	Description	Unit Price	Amount
<b><u>Recreation Enhancements</u></b>					
1.	1	Lump Sum	Site Clearing	Lump Sum	\$10,000.00
2.	1	Lump Sum	Rough Grading	Lump Sum	\$20,000.00
3.	1,750	Lin. Ft.	8' Wide Bituminous Nature Trail (2" of Asphalt, 4" of Aggregate)	\$20.00	\$35,000.00
4.	3,750	Sq. Yds.	Nature Trail Parking Lot (3" of Asphalt, 4" Aggregate Base)	\$22.00	\$82,500.00
5.	3	Each	Pocket Parks (Includes Concrete Pad, Bench, and Signage)	\$5,000.00	\$15,000.00
6.	5	Each	Information Sign/Bollards	\$350.00	\$1,750.00
7.	10	Each	Removable Bollards	\$300.00	\$3,000.00
8.	750	Lin. Ft.	Split Rail Fence	\$8.00	\$6,000.00
9.	1	Lump Sum	Wildlife Viewing Platform	Lump Sum	<u>\$13,000.00</u>
Total Recreation Enhancements					\$186,250.00
Survey, Preliminary Design, and Final Design					\$21,000.00
Construction Administration and Staking and Material Testing					\$21,000.00
Contingencies					<u>\$22,750.00</u>
<b>TOTAL PRELIMINARY ESTIMATE OF COST</b>					<b>\$251,000.00</b>

SECTION E

INFORMATIONAL MEETING POWER POINT  
PRESENTATION

## Whitaker Drain and Road Improvements Informational Meeting



June 3, 2005  
Genesee County  
Drain Commissioner

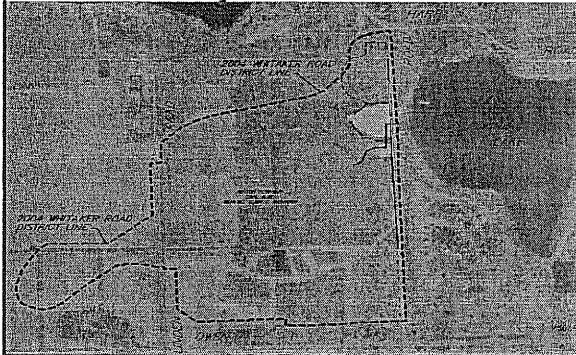


## Outline

- Project Location
- Existing Problems
- Engineering Study
- Alternatives for Improvements
- Preliminary Estimate of Costs
- Moving Forward
- Questions

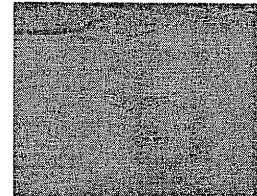


## Project Location



## Existing Problems

- Safety
- Continual erosion of the road
  - Expensive repairs
  - Limited access
- Suspended solids and sediment getting into Pine Lake
- Vehicle hazard, reported accidents
- Storm water over road



## Erosion



## Washout of the Road



## Existing Road



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## Existing Drainage



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## Engineering Study

- Topographical Survey
- Watershed District Delineation
- Wetland Delineation
- Prepare Plans Reflecting Survey
- Analyzed Two Alternatives for Improvements

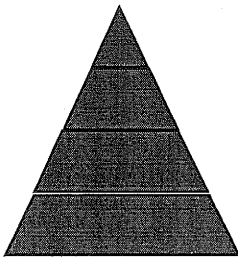
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## Alternatives Analyzed

- Alt. #1 - Road and Drainage Improvements
  - Address soil erosion and flooding
  - Paved Road with Curb
  - Storm Sewer
  - 100-yr detention
  - Wetland mitigation
- Alt. #2 - Abandon Road and Drainage Improvements
  - Address soil erosion and flooding
  - Abandon road
  - Greenway
  - Capture First Flush
  - Wetland mitigation

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## Design Approach



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## Drainage Improvements

- Alt. #1 - New Road
  - New storm sewer - 3,000 ft
  - Open Ditches- 8,500 ft
  - Replacing Culverts
  - Wetland/Detention Improvements
  - New Wetland Control Structure
- Alt. #2 - Abandon
  - No storm sewer
  - Open ditches- 3,500 ft.
  - New wetland control structure
  - Wetland/detention Improvements

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## Road Design

- Alt. #1 – New Road
  - 2 lane asphalt road
  - Curb and gutter (5,100 ft) in steep sections
  - Road ditch and culverts at top of hills
  - Construct embankment (13,000 cu. yds.)
  - Guardrail along raised embankment (1,500 feet)
- Alt. #2 – Abandon
  - Abandon Road not need for home access
  - Cul de sac's and Road Improvements by Road Comm.
  - Strip Gravel and Grade
  - Permanent erosion control fabric
  - Riprap protection
  - Topsoil and seed
  - Drainage greenway



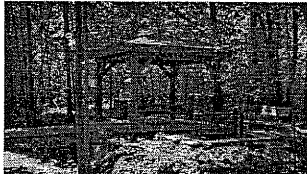
## Wetland Design

- Wetland Enhancement
  - Increase wetland area (mitigation)
  - Polishing pond
    - Settle out solids
  - Reduce flashiness of runoff into the lake
  - Emergent wetland habitat structures
  - Scrub-shrub and forested wetland plantings

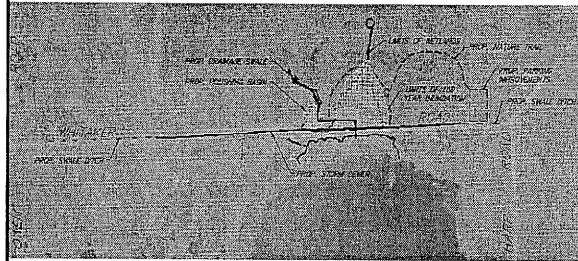


## Recreational Design

- Recreational Enhancement
  - 1/3 of a mile of handicap accessible nature trail
  - 3 pocket parks, scattered along the trail
  - Wildlife viewing platform
  - 750 linear feet of split rail fencing



## Proposed Solutions



## Preliminary Estimate of Costs

- Alternative #1 – New Road and Drainage
  - Road Improvements - \$1,000,000
  - Drainage Improvements - \$372,000
- Alternative #2 – Abandon Road and Drainage
  - Abandon Road and Drainage - \$644,000
  - Road Commission cul-de-sac's costs not included
- Wetland Enhancements - \$64,000
- Recreation Enhancements - \$252,000



## Moving Forward

- Finalize Scope of Project
- Secure Funding Sources
  - Drainage Improvements
    - Petition for county drain, special assessment
  - Roads
  - Wetlands and Recreation Enhancements
    - Grant monies



# Questions



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