

**PINEVIEW LAKE DRAIN #1397  
IMPROVEMENTS**

Part of Sections 26 and 27, T5N-R5E  
Argentine Township  
Genesee County  
Michigan

**PRELIMINARY ENGINEERING REPORT ( PHASE I )**

October 2007  
**Rev January 2008**

Prepared For-

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## TABLE OF CONTENTS

<u>DESCRIPTION</u>	<u>PAGE</u>
Location Map.....	1
Summary.....	2
Detailed Description of Problem.....	3
Solutions.....	3
Existing Land Use.....	4
Hydrology.....	5
Peak Flow Computations.....	6
Hydraulics.....	6
Alternative A, Discussion and Cost.....	7
Alternative B, Discussion and Cost.....	8
Recommendation.....	8
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Exhibit A – Aerial Photo.....	9
Exhibit B - Pineview Lake Estates No. 2 Plat Map .....	10
Exhibit C - Drainage Basin Map for Alternate Route A.....	11
Exhibit D - Plan View Schematic for Alternate Route A.....	12
Exhibit E - Profile for Alternate Route A.....	13
Exhibit F - Node Report for Alternate Route A.....	14
Exhibit G - Pipe Report for Alternate Route A.....	15
Exhibit H - Detailed Cost Estimate for Alternate Route A.....	16
Exhibit I - Drainage Basin Map For Alternate Route B.....	17
Exhibit J - Plan View Schematic for Alternate Route B.....	18
Exhibit K - Profile for Alternate Route B.....	19
Exhibit L - Node Report for Alternate Route B.....	20
Exhibit M - Pipe Report for Alternate Route B.....	21
Exhibit N - Detailed Cost Estimate for Alternate Route B.....	22



## SUMMARY

The purpose of this report is to identify the causes of the periodic flooding in the vicinity of the rear of lots 62, 63, 64 and 72 of PINEVIEW LAKE ESTATES NO.2, being house numbers #8530, #9063, #9075 and #8529 Pineview Lake Drive in Sections 26 & 27, T5N-R5E, Argentine Township, Genesee County, Michigan (see site location map)<sup>1</sup> and to recommend solutions to eliminate flooding.

A petition was submitted by residents to the Genesee County Drain Commissions office, subsequently, a Board of Determination Meeting<sup>2</sup> was held for the **Pineview Lake Drain #1397**, on August 22, 2006, at the Argentine Township hall. Fifteen area residents were present at the meeting and numerous pictures showing flooding in the rear and side yards of #8530, #9063, #9075 and #8529 were presented. This flooding is in a relatively small low area that does not have adequate slope to allow positive drainage. Comments were also made regarding the water smelling like sewage. It was the opinion of several of the residents that a drain is needed. Following Public comment and discussion among board members, a motion was made, seconded and passed, establishing the need for a drain.

Based on our field observations, discussions with residents and comments made at the public hearing there are 3 issues that need to be addressed.

1. The cause and extent of the flooding.
2. The ability of the downstream drains to accommodate the required additional flows.
3. The most economical way to eliminate the flooding while keeping the downstream impact to a minimum.

Comments regarding Septic System failure and the smell of sewage are not addressed in this report and should be addressed by Genesee County Health Department; however, no smell of sewage or any other signs of septic system failure was observed during our site review.

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1. See Location Map on Sheet 1

2. See ExhibitA, Board of Determination Meeting Minutes

### **DETAILED DISCUSSION OF PROBLEM:**

The area subject to flooding is a relatively small, low area (less than ¼ acre) and appears to be confined to the SE corner of #9075, the NE corner of #9063 and the NW corner of #8530. The sump pump lead from #9063 (mentioned at the public hearing) has been rerouted, and now discharges near the NW of #9063. The sump pump lead and downspouts from #8530 have been piped to a swale along the North line of #8521. Consequently these pipes no longer contribute to the flooding. However there is still .87 acres that drains to this low area. When the water gets to an elevation of about 865 it flows over land to the swale along the North line of #8521. From there it flows East along this swale to the curb of the East loop of Pineview Lake Drive, from there it flows North along the gutter of this curb about 160 feet to a catch basin. From the catch basin it flows East in a 12" concrete pipe in the rear of #8512, and #8490, 243 feet and outlets on the ground. From the end of the 12" pipe the flow meanders over land approximately 210 feet to an existing swale that flows North into a large wetland. Even though there is a recorded drain easement, there is no defined drainage course for the overland flow.

### **SOLUTIONS:**

There are three possible solutions, to resolve this flooding problem. The third solution would require numerous easements and the removal of many mature trees. This solution is not discussed in detail here due to the fact that an economical viable alternative exist.

Alternative A (See Exhibit C, Drainage Basin Map) would be to install a catch basin at the NE corner of #9063 and construct a 233 feet of 12" pipe along the North line of #8530 and #8521 to a new catch basin at the NE corner of #8521. There is an existing platted drain easement 10.0 feet each side of this lot line. From this second catch basin a 12" pipe would be installed in the Pineview Lake Drive right of way running North to an existing catch basin in front of #8541. Downstream from the existing catch basin is a 12" concrete pipe, which will not accommodate the additional flow, so the pipe will have to be replaced. The catch basin in front of #8541 is a 2 foot diameter structure and will have to be replaced with a 4.0 foot diameter structure. The 12" pipe under the road will also have to be removed and replaced with a 15" pipe, the 12" pipe, running easterly along the North line of #8512 and #8490 is too small and will have to be replaced with an 18" pipe. From the end of this new 18" pipe, approximately 220 feet of open ditch will need to be installed and extended Easterly to an existing ditch that flows Northerly to a large wetland.

Alternative B (See Exhibit I, Drainage Basin Map) would be to construct a catch basin at the NE corner of #9063 and to install a 12" pipe Westerly 136.0 feet to a manhole at the NW corner of #9063. From this man hole, a 12" pipe would be constructed to an existing catch basin that is be West of the NW corner of #9085. The existing 12" pipe to the West has enough capacity to accommodate the additional flow. Alternative route "B" would require an easement from #9075 and/or #9063.

#### **TRIBUTARY AREAS:**

For the purpose of this report, drainage basin maps for the alternative solutions<sup>1, 2</sup> were prepared. These maps are based on the following: field observation, a recent survey by Delta Land Surveying & Engineering, Inc., current tax maps, the recorded plat of Pineview Lake Estates and Pineview Lake Estates No.2, as built construction plans for Pineview Lake Estates and satellite imagery. The total of all tributary areas is less than 300 acres.

#### **EXISTING LAND USE, GROUND COVER AND SOILS:**

The existing land use for all tributary areas is ½ acre wooded single-family subdivision lots. The soils in the tributary area belong to the Conover loam soil series. This series consist of somewhat poorly drained, nearly level undulating soils on till plains. The seasonal high water level may be as little as 1 to 2 feet below the surface.(Soil Survey of Genesee County Michigan map sheet #49). Conover loam belongs to the Soil Conservation Services Hydrological Soil group "C". Soils having a slow infiltration rate when thoroughly wetted and consisting chiefly of soils with a layer that impede downward movement of water or soils with moderately fine-to-fine texture." The Conover series is consistent with comments at the public meeting regarding high water table.

## HYDROLOGY:

The Genesee County Drain Commissioners Office allows the use of the rational method for determining peak 10-year flows where the tributary area is less than 300 acres. The rational was used for this preliminary report and for estimating peak flows and pipe sizes.

The rational method formula is  
"Q=CIA"

Where: "Q" is the design flow in CFS.

"A" is the tributary area in acres.

"i<sub>10</sub>" is the rainfall intensity for a ten year storm in inch per hour.

"T" is the time of concentration in minutes

"C" is the weighted composite Run-off from the contributing upstream area.

The Areas "A" and sub areas were determined from site observation and field survey.

The rainfall intensity "i<sub>10</sub>" is determined from the Genesee County Drain Commission charts for a 10 year storm and is approximated by the formula:

$$i_{10}=116.37/(T+23.30)$$

The rational method takes into consideration numerous site variables including slope, land use, ground cover, antecedent rainfall, soils and other sub area characteristics. The accuracy of the rational method is directly proportionate to the Engineers knowledge and experience in determining C-values and times of concentrations.

## PEAK FLOW COMPUTATIONS:

The tributary areas were analyzed and peak flows were calculated using the rational method. A run off coefficient "C" of 0.45 feet was used for all upland areas. This value is consistent with areas of ½ acre platted lots in wooded settings. This value takes into consideration the paved streets, paved driveways, rooftops and other hard surface areas typically seen in this type of land use.

To determine the time of concentration and rainfall intensity the following was used:

1. The overland slope was determined to be 0.4%
2. The ground cover is consistent with "short grass pasture & lawns"
3. The initial time of concentration was determined by Genesee County Drain Commission approved formulas and charts. This time in all cases was less than the 30 minute minimum; subsequently 30 minutes was used.
4. Time of travel in pipes was added to the initial time of concentration to determine subsequent times of concentration.
5. Rainfall intensity for the 10-year design storm was used (total tributary area is less than 300 acres).
6. The rainfall intensities "i" was then computed using the formula  $i_{10} = 166.37 / (T_c + 23.30)$ .

## HYDRAULICS:

To determine pipe and channel flows the computer software StormCAD, by Haestad Methods was used. This software makes use of Manning's Equation, which takes into consideration slope, pipe or channel conditions and pipe or channel geometry.

Manning's formula is:

$$Q = 1.486 \times a \times R^{2/3} \times S^{1/2} / n$$

Where:

1.486 is the conversion factor for English units

"a" is the flow area of the pipe or channel

R is the Hydraulic radius defined as  $a/p$  where "a" is the flow area and "p" is the wetted perimeter of the pipe or channel

"n" is the Manning coefficient of friction

"s" is the slope of the pipe or channel in feet/foot

The StormCAD program also computes the hydraulic grade line and shows it graphically on the profiles<sup>4</sup> for easy analysis of the results.



**SOLUTIONS:**

**Alternative A**

Alternative A follows the route and course of existing easements all the way to an acceptable outlet. It appears that the original developer provided for drainage from the flooding area along this route.<sup>1</sup> An easement is shown on Pineview Lake Estates No.2 plat map<sup>2</sup>. This route would begin by constructing a new catch basin at the low point in the area of flooding, which is the NW corner of #8530 (lot 62) and run Easterly along the North line of #8530 and #8521 (lots 62 & 61) thence Northeasterly in the right of way of the East loop of Pineview Lake Drive to an existing catch basin; thence Easterly along the route of an existing 12" pipe along the North line of #8512, #8490 (lots 32 & 31); thence Northeasterly to an existing open ditch. The existing 12" pipe from catch basin no.4 in front of #8541 Easterly to the NE corner of #8490 was evaluated with the additional flow from the flooding area, and determined to be inadequate, as can be seen in the computer output for Alternate A base profile<sup>3</sup>, pipe table<sup>4</sup> and node report.<sup>5</sup> The combined peak flow would require that pipe No.4 be increased to a 15" and that pipe No.5 and No.6 be increased to a 18" as a result catch basin No.4 and catch basin No.5 would also have to be replaced.

The one big advantage of Alternate A is that there is an existing 20 foot drain for the entire length of the proposed improvements. This Alternate would also provide enclosed drainage for areas that currently run over the curb and probably create ice hazards in the road during the winter months. A third advantage is that #9063, #8530 and #8531 would have an outlet for both their sump pump lines and their roof drainage.

The total estimated cost for Alternate A<sup>6</sup>, not including land cost or financing is as follows:

Estimated Construction Cost-----	\$96,579.00
Estimated Surveying, Engineering and Construction-----	\$21,100.00
Total Estimated project Cost-----	\$117,679.00

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1. See Exhibit C, Drainage Basin Map for Alternate Route A  
2. See Exhibit O, Pineview Lake Estates No.2 plat map.  
3. See Exhibit E, Profile for Alternate Route A  
4. See Exhibit G, Pipe Report for Alternate Route A  
5. See Exhibit F, Node Report for Alternate Route A  
6. See Exhibit H, Detailed Cost Estimate for Alternate Route A

**Alternative B:**

Alternative B would be to construct a catch basin at the NE corner of #9063 and to install a 12" pipe Westerly 136.0 feet to a manhole at the NW corner of #9063 from this man hole a 12" pipe would be constructed to an existing catch basin West of the NW corner of #9085. The existing 12" pipe to the West has enough capacity to accommodate the additional flow.<sup>1, 2, 3</sup> Alternative route "B" would require an easement from #9075 and/or #9063. This route is about 1/2 the length of Alternate "A" and will impact fewer properties and remove fewer trees. One of the disadvantages of following this route is that an easement will be needed from the NE corner of #9063 West to the road right of way. This could be over #9063 and/or #9075. The total estimated cost for Alternative B<sup>4</sup>, not including land cost or financing is as follows:

Estimated Construction Cost-----	\$41,578.00
Estimated Surveying, Engineering and Construction Staking Cost-----	\$17,600.00
Total Estimated Project Cost-----	\$59,178.00

**RECOMMENDATION:**

We recommend the Alternative B solution for two key reasons: First, there is a considerable cost savings, (\$58,501). Second, the route for Alternative B is much shorter than the route for Alternative A; therefore fewer properties are impacted by construction, less land is disturbed and fewer trees will need to be removed.

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1. See Exhibit K, Profile for Alternate Route B  
2. See Exhibit M, Pipe Report for Alternate Route B  
3. See Exhibit L Node Report for Alternate Route B  
4. See Exhibit N, Detailed Cost Estimate for Alternate B

# **Exhibits**

Pages 9-22

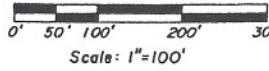
# GENESEE COUNTY DRAIN 1397

PINEVIEW LAKE DRIVE  
LINDEN, MICHIGAN



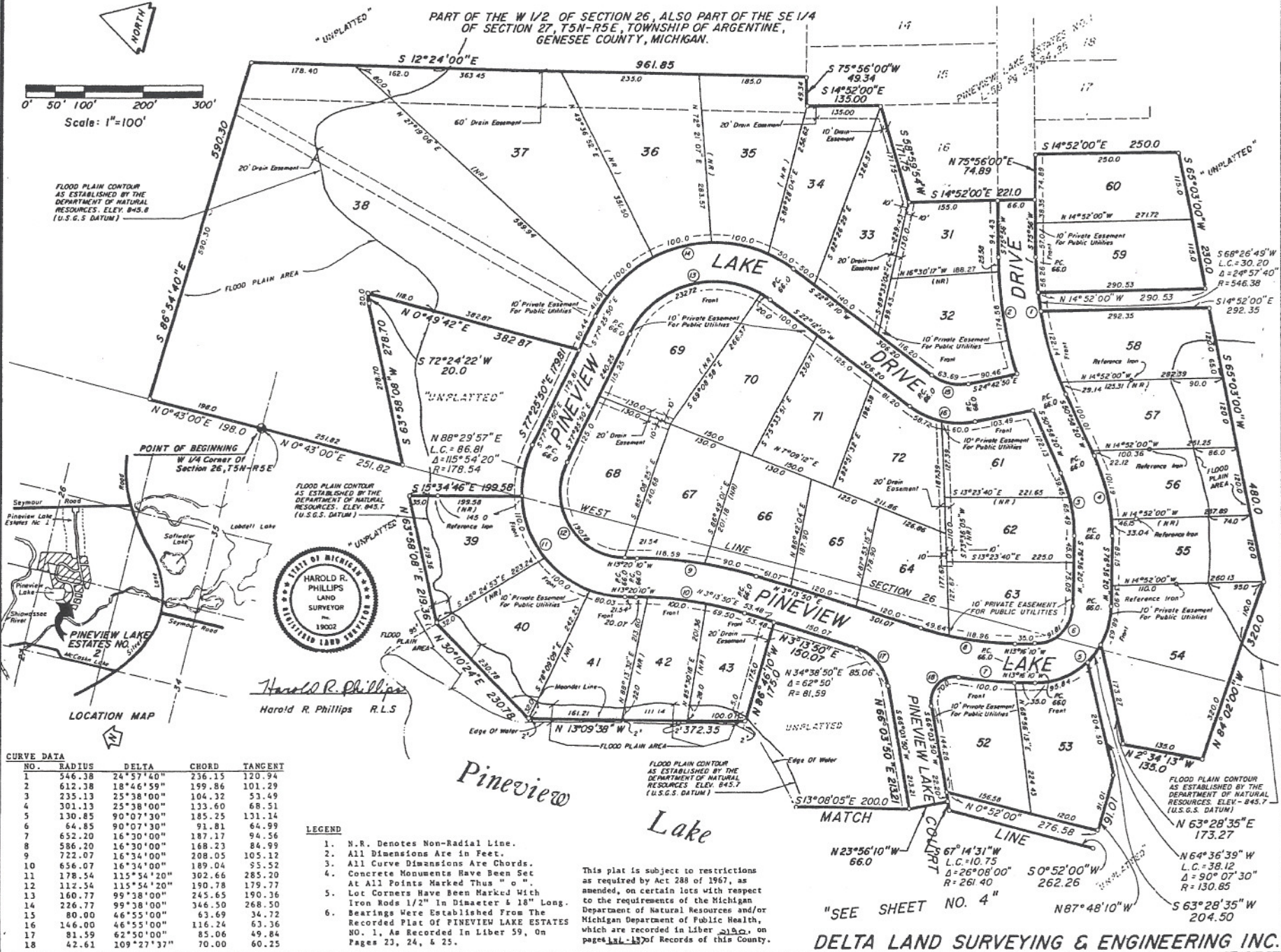
Exhibit A  
(9)

# PINEVIEW LAKE ESTATES NO. 2



FLOOD PLAIN CONTOUR AS ESTABLISHED BY THE DEPARTMENT OF NATURAL RESOURCES, ELEV. 845.8 (U.S.G.S. DATUM)

PART OF THE W 1/2 OF SECTION 26, ALSO PART OF THE SE 1/4 OF SECTION 27, T5N-R5E, TOWNSHIP OF ARGENTINE, GENESEE COUNTY, MICHIGAN.



**CURVE DATA**

NO.	RADIUS	DELTA	CHORD	TANGENT
1	546.38	24°57'40"	236.15	120.94
2	612.38	18°46'59"	199.86	101.29
3	235.13	25°38'00"	104.32	53.49
4	301.13	25°38'00"	133.60	68.51
5	130.85	90°07'30"	185.25	131.14
6	64.85	90°07'30"	91.81	64.99
7	652.20	16°30'00"	187.17	94.56
8	586.20	16°30'00"	168.23	84.99
9	722.07	16°34'00"	208.05	105.12
10	656.07	16°34'00"	189.04	95.52
11	178.54	115°54'20"	302.66	285.20
12	112.54	115°54'20"	190.78	179.77
13	160.77	99°38'00"	245.65	190.36
14	226.77	99°38'00"	346.50	268.50
15	80.00	46°55'00"	63.69	34.72
16	146.00	46°55'00"	116.24	63.36
17	81.59	62°50'00"	85.06	49.84
18	42.61	109°27'33"	70.00	60.25



Harold R. Phillips  
Harold R. Phillips R.L.S.

- LEGEND**
1. N.R. Denotes Non-Radial Line.
  2. All Dimensions Are in Feet.
  3. All Curve Dimensions Are Chords.
  4. Concrete Monuments Have Been Set At All Points Marked Thus "o".
  5. Lot Corners Have Been Marked With Iron Rods 1/2" In Diameter & 18" Long. Bearings Were Established From The Recorded Plat of PINEVIEW LAKE ESTATES NO. 1, As Recorded in Liber 59, On Pages 23, 24, & 25.
  6. Flood Plain Contour As Established From The Department of Natural Resources ELEV. 845.7 (U.S.G.S. DATUM)

This plat is subject to restrictions as required by Act 288 of 1967, as amended, on certain lots with respect to the requirements of the Michigan Department of Natural Resources and/or Michigan Department of Public Health, which are recorded in Liber 2130, on pages 131-137 of Records of this County.

"SEE SHEET NO. 4"  
DELTA LAND SURVEYING & ENGINEERING INC.

EXHIBIT B  
(10)





PLANVIEW SCHEMATIC  
FOR  
ALTERNATE ROUTE A

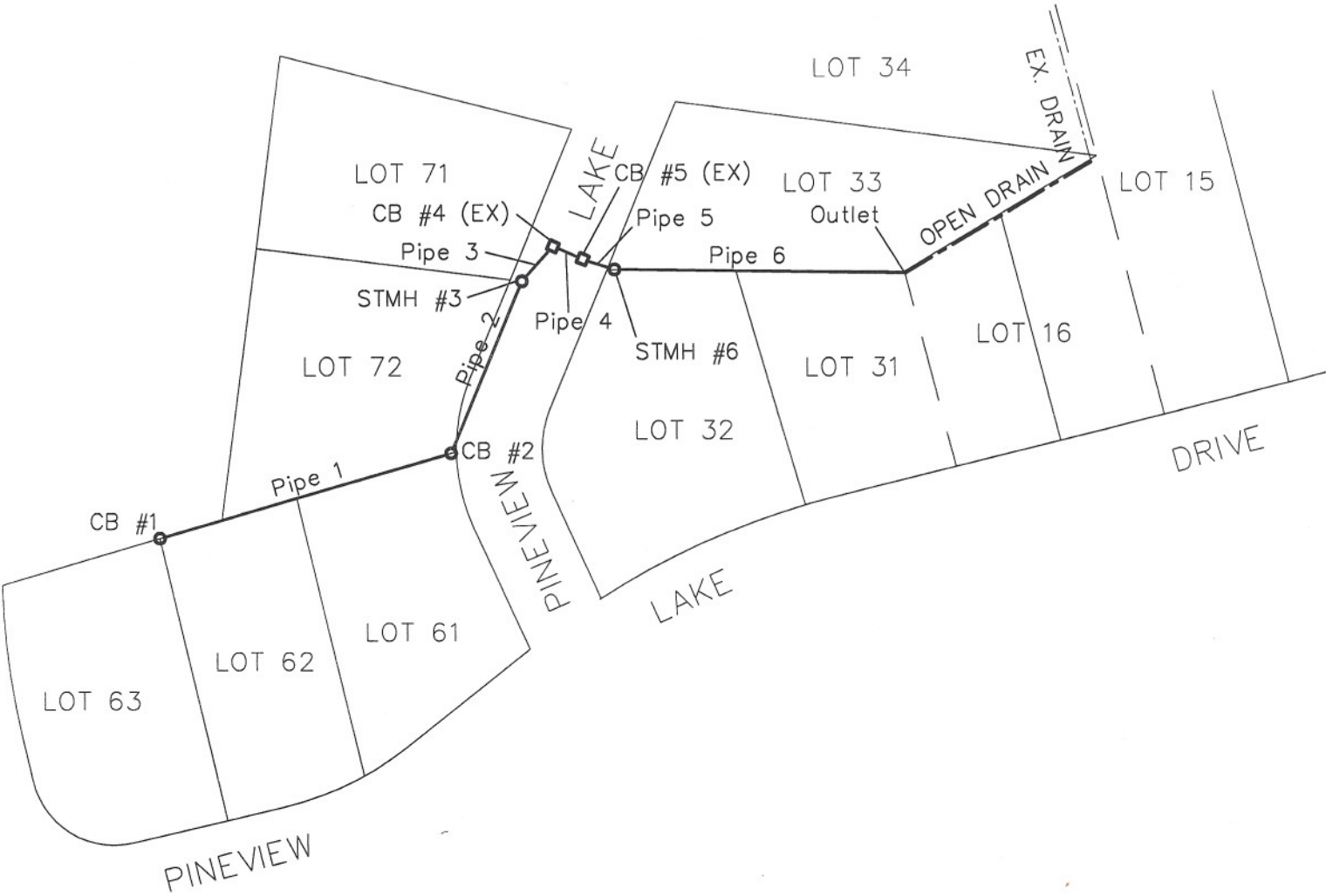
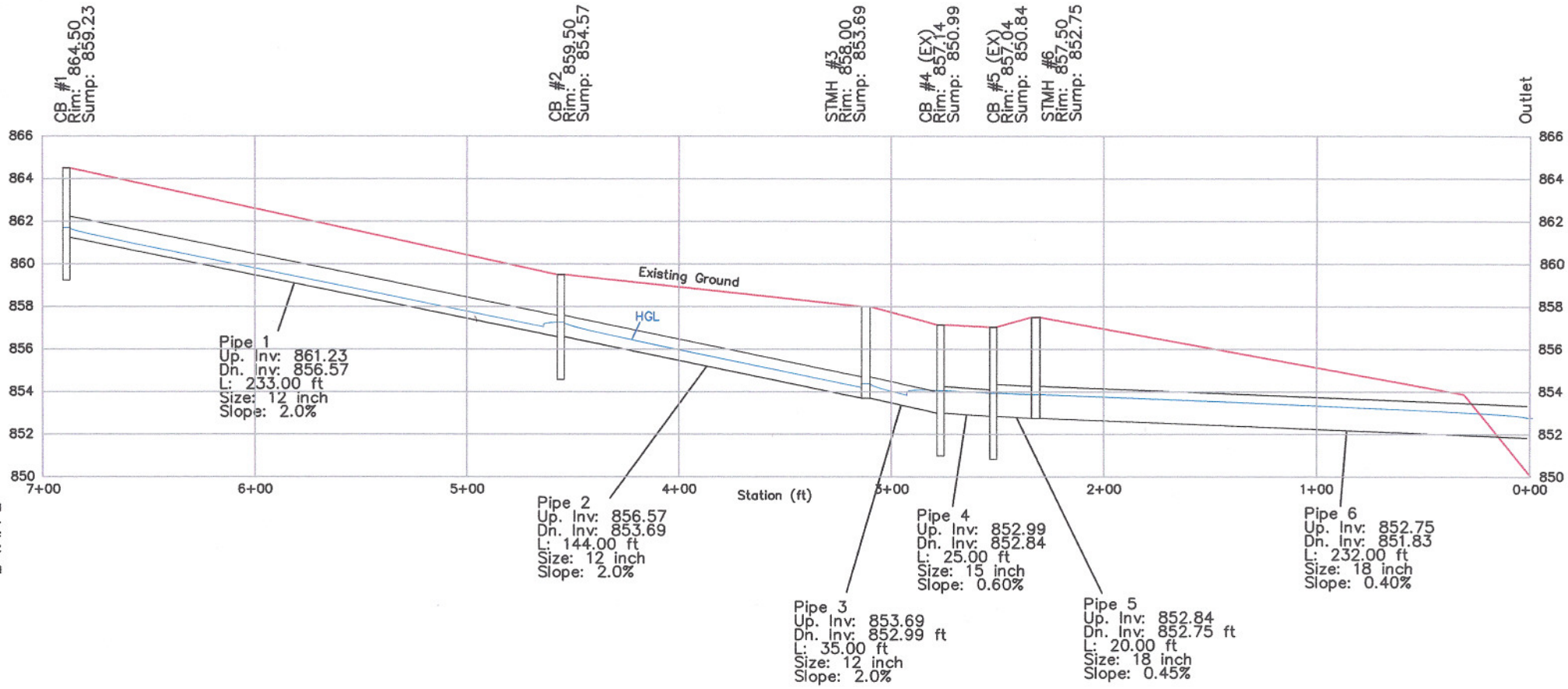


Exhibit E  
(13)



PROFILE FOR  
ALTERNATE ROUTE A



## Drain #1397

### Alternate A Node Report

Label	Area (acres)	Inlet C	Inlet CA (acres)	Time of Concentration (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	System CA (acres)	System Flow Time (min)	System Intensity (in/hr)	System Rational Flow (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	HGL In (ft)	HGL Out (ft)
CB #1	0.87	0.45	0.39	30.00	3.12	1.23	0.39	30.00	3.12	1.23	1.23	864.50	864.50	861.70	861.70
CB #2	0.99	0.45	0.45	30.00	3.12	1.40	0.84	31.40	3.04	2.57	2.57	859.50	859.50	857.26	857.26
STMH #3							0.84	31.84	3.02	2.55	2.55	858.00	858.00	854.37	854.37
CB #4 (EX)	1.70	0.45	0.77	30.00	3.12	2.41	1.60	31.99	3.01	4.86	4.86	857.14	857.14	854.05	854.05
CB #5 (EX)	0.83	0.45	0.37	30.00	3.12	1.18	1.98	32.09	3.00	5.98	5.98	857.04	857.04	853.94	853.94
STMH #6							1.98	32.16	3.00	5.97	5.97	857.50	857.50	853.87	853.87
Outlet							1.98	32.99	2.96	5.88	5.88	853.33	853.33	852.77	852.77

Exhibit F  
(14)

## Drain #1397

### Alternate A Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Inlet CA (acres)	System CA (acres)	System I (in/hr)	Total System Flow (cfs)	Length (ft)	Pipe Slope (%)	Pipe Size (in)	Mannings n	Full Capacity (cfs)
Pipe 1	CB #1	CB #2	0.87	0.45	0.39	0.39	3.12	1.23	233.00	2.00	12	0.013	5.04
Pipe 2	CB #2	STMH #3	0.99	0.45	0.45	0.84	3.04	2.57	144.00	2.00	12	0.013	5.04
Pipe 3	STMH #3	CB #4 (EX)	N/A	N/A	N/A	0.84	3.02	2.55	35.00	2.00	12	0.013	5.04
Pipe 4	CB #4 (EX)	CB #5 (EX)	1.70	0.45	0.77	1.60	3.01	4.86	25.00	0.60	15	0.013	5.00
Pipe 5	CB #5 (EX)	STMH #6	0.83	0.45	0.37	1.98	3.00	5.98	20.00	0.45	18	0.013	7.05
Pipe 6	STMH #6	Outlet	N/A	N/A	N/A	1.98	3.00	5.97	232.00	0.40	18	0.013	6.61

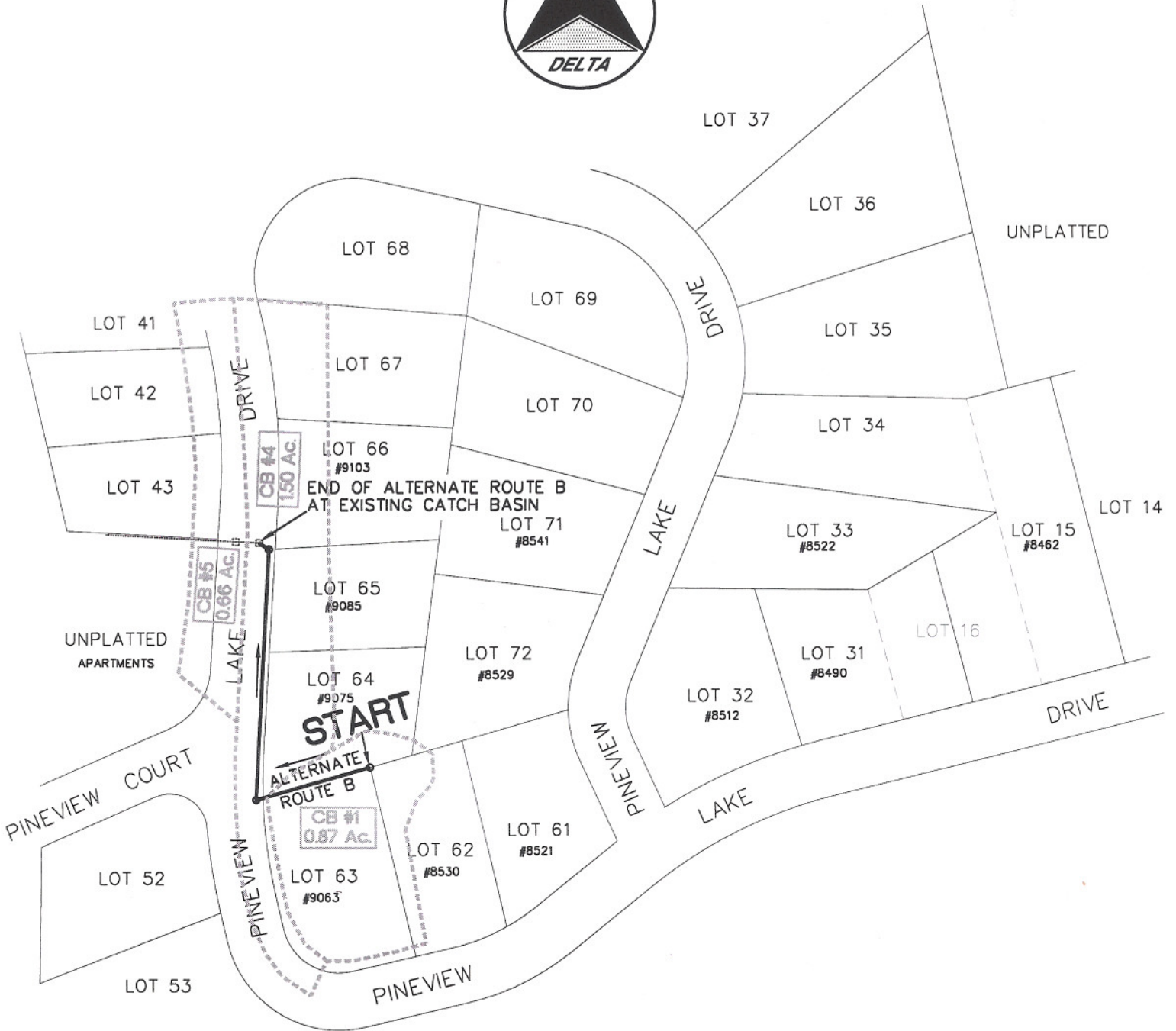
Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Rim Elevation (ft)	Downstream Rim Elevation (ft)	HGL In (ft)	HGL Out (ft)	Velocity Out (ft/s)
861.23	856.57	864.50	859.50	861.70	857.26	2.14
856.57	853.69	859.50	858.00	857.26	854.20	6.44
853.69	852.99	858.00	857.14	854.37	854.05	3.24
852.99	852.84	857.14	857.04	854.05	853.94	4.26
852.84	852.75	857.04	857.50	853.94	853.87	4.24
852.75	851.83	857.50	853.33	853.87	852.77	5.10

Exhibit G  
(15)

Estimated Cost  
for  
Alternate A

ITEM	Quantity	Unit	Unit Cost	Total
12" Storm Drain, C76-III RCP, TD1	412	FT	\$35	\$14,420
15" Storm Drain, C76-IV RCP, TD2	25	FT	\$50	\$1,250
18" Storm Drain, C76-III RCP, TD1	245	FT	\$50	\$12,250
4' Dia Storm Drain Structure	5	EA	\$2,000	\$10,000
Drain Structure Castings	2000	LBS	\$2	\$4,000
18" RCP End Section with Bar Grate	1	EA	\$300	\$300
Plain Rip-Rap	10	SYD	\$30	\$300
BIT. County Road Surface Replacement	1	EA	\$2,000	\$2,000
Conc. Drive Surface Replacement	1	EA	\$2,000	\$2,000
Selective Clearing & Grubbing	897	FT	\$15	\$13,455
Machine Grading	897	FT	\$2	\$1,794
Restricted Open Ditch Grading (2 ft. Bottom)	165	FT	\$16	\$2,640
4" Topsoil Surface	2000	SYD	\$4	\$8,000
Class A Seeding (@200LBS/ACRE)	85	LBS	\$4	\$340
Chemical Fertilizer (@ 240LBS/ACRE)	100	LBS	\$6	\$600
Mulch (@ 2 TONS/ACRE)	1	TON	\$1,500	\$1,500
Soil Erosion Control Measures	1	LSUM	\$500	\$500
Landscape Restoration and Tree Planting	15	EA	\$500	\$7,500
Row 6' Tall Cedars	15	EA	\$150	\$2,250
Wood Privacy Fence	90	LF	\$30	\$2,700
Subtotal				\$87,799
Contingency @ 10%				\$8,780
Net Estimated Construction Cost				\$96,579
Estimated Preliminary Engineering	1	LSUM		\$4,600
Estimated Final Engineering	1	LSUM		\$8,000
Estimated Construction Surveying & Engineering	1	LSUM		\$8,500
Estimated Engineering Total				\$21,100
Total Estimated Project Cost				\$117,679
Note: All Costs Are Furnished and Installed				
Right-of-Way and Easement Costs not Included				

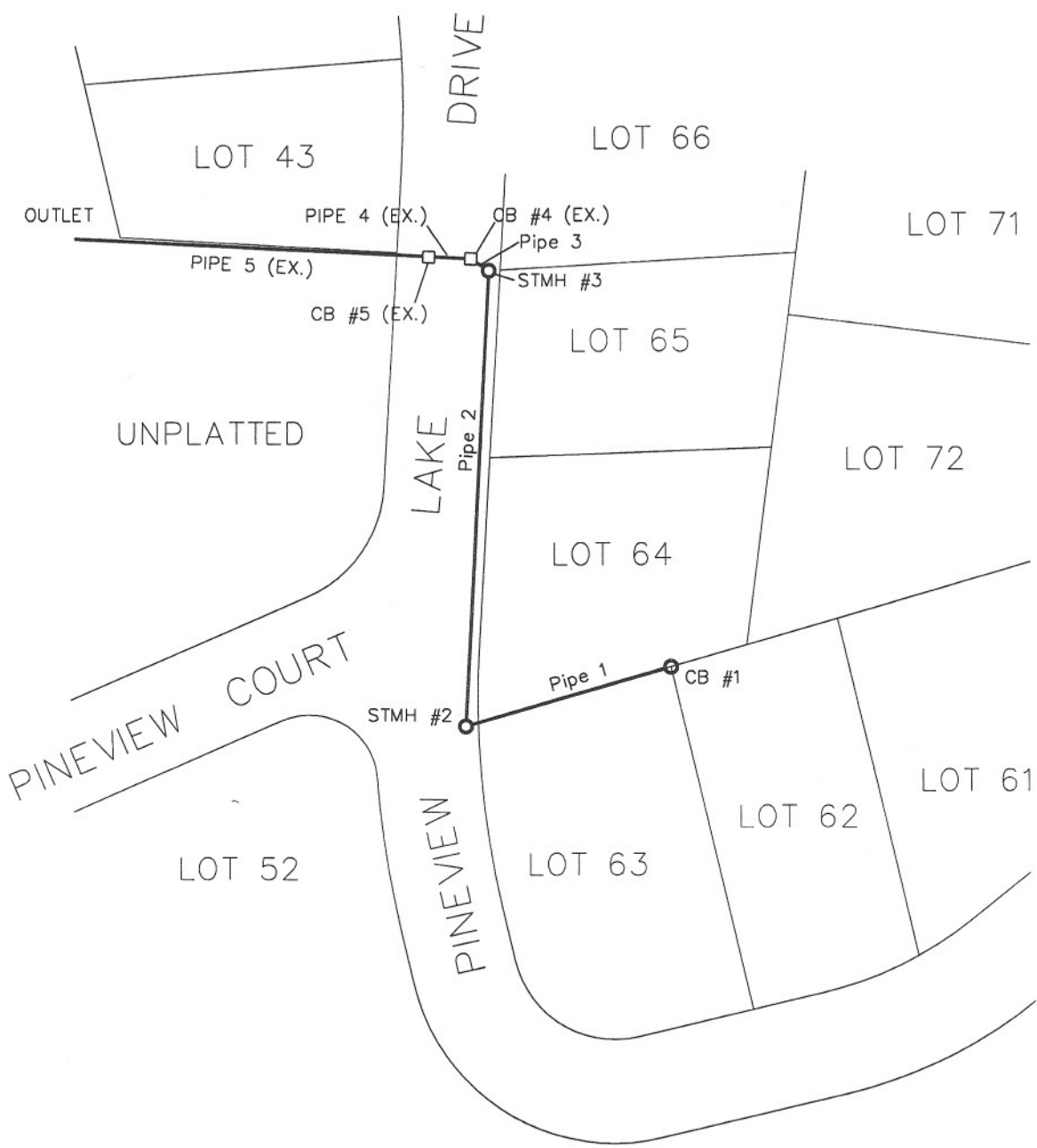


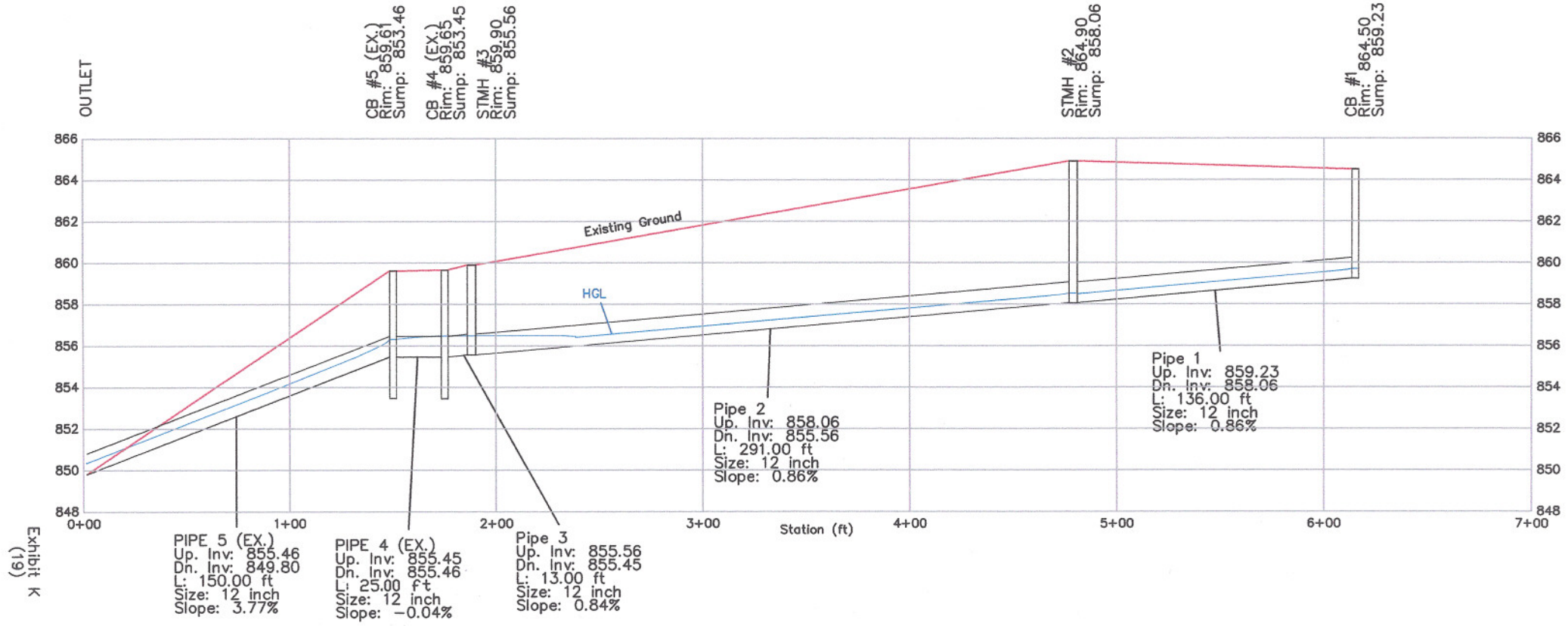


**DRAINAGE BASIN MAP  
FOR  
ALTERNATE ROUTE B**

EXHIBIT I  
(17)

# PLANVIEW SCHEMATIC FOR ALTERNATE ROUTE B





PROFILE FOR  
ALTERNATE ROUTE B

Exhibit K  
(19)

## Drain #1397

### Alternate B Node Report

Label	Area (acres)	Inlet C	Inlet CA (acres)	Time of Concentration (min)	Local Intensity (in/hr)	Local Rational Flow (cfs)	System CA (acres)	System Flow Time (min)	System Intensity (in/hr)	System Rational Flow (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	HGL In (ft)	HGL Out (ft)
CB #1	0.87	0.45	0.39	30.00	3.12	1.23	0.39	30.00	3.12	1.23	1.23	864.50	864.50	859.70	859.70
STMH #2							0.39	30.62	3.09	1.22	1.22	864.90	864.90	858.53	858.53
STMH #3							0.39	32.56	2.98	1.18	1.18	859.90	859.90	856.49	856.49
CB #4 (EX.)	1.50	0.45	0.68	30.00	3.12	2.12	1.07	32.70	2.97	3.19	3.19	859.65	859.65	856.48	856.48
CB #5 (EX.)	0.66	0.45	0.30	30.00	3.12	0.93	1.36	32.80	2.97	4.08	4.08	859.61	859.61	856.31	856.31
OUTLET							1.36	33.14	2.95	4.05	4.05	849.80	849.80	850.35	850.35

Exhibit L  
(20)



# Drian #1397

## Alternate B Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Inlet CA (acres)	System CA (acres)	System I (in/hr)	Total System Flow (cfs)	Length (ft)	Pipe Slope (%)	Pipe Size	Mannings n	Full Capacity (cfs)
Pipe 1	CB #1	STMH #2	0.87	0.45	0.39	0.39	3.12	1.23	136.00	0.86	12 inch	0.013	3.30
Pipe 2	STMH #2	STMH #3	N/A	N/A	N/A	0.39	3.09	1.22	291.00	0.86	12 inch	0.013	3.30
Pipe 3	STMH #3	CB #4 (EX.)	N/A	N/A	N/A	0.39	2.98	1.18	13.00	0.85	12 inch	0.013	3.28
PIPE 4 (EX.)	CB #4 (EX.)	CB #5 (EX.)	1.50	0.45	0.68	1.07	2.97	3.19	25.00	-0.04	12 inch	0.010	-0.93
PIPE 5 (EX.)	CB #5 (EX.)	OUTLET	0.66	0.45	0.30	1.36	2.97	4.08	150.00	3.77	12 inch	0.013	6.92

Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Rim Elevation (ft)	Downstream Rim Elevation (ft)	HGL In (ft)	HGL Out (ft)	Velocity Out (ft/s)
859.23	858.06	864.50	864.90	859.70	858.48	3.90
858.06	855.56	864.90	859.90	858.53	856.49	1.60
855.56	855.45	859.90	859.65	856.49	856.48	1.50
855.45	855.46	859.65	859.61	856.48	856.31	4.47
855.46	849.80	859.61	849.80	856.31	850.35	9.17

Exhibit M  
(21)



Estimated Cost  
for  
Alternate B

ITEM	Quantity	Unit	Unit Cost	Total
12" Storm Drain, C76-III RCP, TD1	440	FT	\$35	\$15,400
4' Dia Storm Drain Structure	3	EA	\$2,000	\$6,000
Drain Structure Castings	1640	LBS	\$2	\$3,280
Selective Clearing & Grubbing	136	FT	\$15	\$2,040
Machine Grading	515	FT	\$2	\$1,030
4" Topsoil Surface	1000	SYD	\$4	\$4,000
Class A Seeding (@200LBS/ACRE)	40	LBS	\$4	\$160
Chemical Fertilizer (@ 240LBS/ACRE)	48	LBS	\$6	\$288
Mulch (@ 2 TONS/ACRE)	0.4	TON	\$1,500	\$600
Soil Erosion Control Measures	1	LSUM	\$500	\$500
Landscape Restoration and Tree Planting	3	EA	\$500	\$1,500
Replace Gravel Drive Surface	2	EA	\$500	\$1,000
Replace Conc. Drive Surface	1	EA	\$2,000	\$2,000
Subtotal				\$37,798
Contingency @ 10%				\$3,780
Net Estimated Construction Cost				\$41,578
Estimated Preliminary Engineering	1	LSUM		\$4,600
Estimated Final Engineering	1	LSUM		\$6,500
Estimated Construction Surveying& Engineering	1	LSUM		\$6,500
Estimated Engineering Total				\$17,600
Total Estimated Project Cost				\$59,178
Note: All Costs Are Furnished and Installed				
Right-of-Way and Easement Costs not Included				