

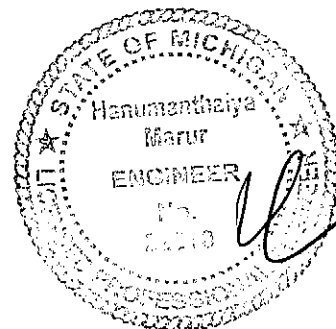
ROOT DRAIN, LINCOLN PARK BRANCH OF #1696  
SECTION 18 T8N R6E, MT. MORRIS, GENESEE COUNTY

**PRELIMINARY REPORT**

PREPARED FOR:  
GENESEE COUNTY DRAIN COMMISSIONER  
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Revised on 12/5/2013

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I.

**DETAILS OF EXISTING DRAINAGE SYSTEM**

## **I. EXISTING DRAINAGE SYSTEM**

### **Location of Project**

The proposed drain is a branch of Root Drain located in the South East corner of section 18 T8N R6E, between Clovis Street and Coldwater Road in Mt. Morris Township, Genesee County, Michigan. See enclosed map for details.

### **Details & Surveys of Existing Drainage System**

Existing drainage system is open shallow swale, runs on the rear side of properties located on the South side of Clovis Road and the rear side properties located on the North side of Coldwater Road. The existing swale has no catch basin, drainage flows on the surface westward to the existing root drain on the East side of Elms Road. The existing root drain runs south to north. The existing swale system along the rear of properties is not functional with no catch basin or no defined drainage course. The details of existing drainage system are shown on the plan see exhibit #1 and exhibit #2. Since there is no well defined drainage course, during heavy rains 10 years and above, the drainage flow will accumulate on the rear of the properties, parcels 8 & 9 on the south side of Clovis Road and cause flooding on the back yard of site 8 & 9. The existing root drain, just on the east side of Elms Road is deep and the drainage flows generally in the proposed District can be drained by gravity with underground drainage system and catch basins. The elevation and location of root drain is capable of providing an outlet for this area to drain into the existing root drain by gravity thru underground system.

We have computed the drainage flows and are shown on map sheet 10a and 10b. The details of drainage flows for 10 years, 25 years and 100 years are shown on the map. There is no adequate and safe space for detention and retention storage. There for, we have not considered detention as a solution to solve the existing flooding problem.

In summary there is approximately about 35 to 40 acres of drainage area generating about 23 CFS for 10 year storm, about 28 CFS for 25 years storm and about 32 CFS for 100 years storm. Our preliminary designs are limited to for 10 years storm as per county guidelines.

II.  
ANALYSIS OF ADEQUACY OF EXISITING SYSTEM

## **II. ANALYSIS OF ADEQUACY OF THE SYSTEM**

The existing drainage system is surface flow drainage with no proper grading of the course with high spots and low spots. Since there is no designated or graded drainage course, the drainage flow will stagnate and accumulate at the low spots, when it rains heavily. Since the area does not have proper graded slopes to drain into the outlet to the root drain, it is causing a flooding problem in the low areas. Presently the low areas are in the rear of the properties, house number 6511, 6491, 6471 and 6479 Clevis Rd.

There seems to be a field tile system, which we cannot determine the size or location. Its location should be field determined and videoed to determine the functionality of the existing tile system.

**III.**  
**PROPOSED IMPROVEMENTS**

### **III. PROPOSED IMPROVEMENTS**

In order to prevent flooding, which occurs for the lack of adequate functioning storm sewer system. The proposed closed drain will be designed for 10 year storm, run off as shown on Exhibit attached. Storm frequency is chosen per county guidelines, the county guidelines are 10 year frequency up to 300 acres. 25 year frequency from 300 acres to 1280 acres and 100 year frequency for acres above 1280 acres. The drainage area in this improvement is about 35 acres; therefore we have chosen 10 year frequency for the design improvements to prevent flooding.

#### **OPTION # 1**

We are proposing to open a shallow ditch from station 17+95 to station 25+65 about 770' and there after a closed pipe system to the intersection of the root drain, to provide optional solution. It requires at least 20' wide easement for the entire length of the drainage area.

As we are proposing a combination of open ditches and closed pipes on an optimal basis to provide a solution to the flooding, the existing drain course, which is about 35' south of the, Clovis Rd property lines and we are proposing new drain at about 80' south of the Clovis Rd property line following the existing drainage course with a ditch of about 770' and then closed pipe 18" to 30" to the existing root drain. See enclosed map for details. (Exhibit #1)

We have chosen this location as there are low spots along this course based on field levels and verifications.

#### **OPTION # 2**

We are proposing an open shallow swale from station 13+20 down to 7+00, and then closed pipes to meet existing root drain. There is an existing shallow swale course from high point, station 13+20 to station 25+05. See enclosed Exhibit #2.

We have chosen the location of proposed CB #4, as we checked the field, it is the lowest point and it is about 80 L.F. from the south and north property lines accordingly.



**IV.**  
**PRELIMINARY DESIGNS**

#### **IV. PRELIMINARY DESIGNS**

The system is designed on a preliminary basis, based on our field surveys and the records that we collected from the township office, Genesee County Drain Commissioner's office and the Genesee County GIS Department.

The details are attached with the report.

**Lincoln Branch of Root Drain # 1696**  
**Drainage Computations**  
**By Section**

For details see attached Preliminary plan. Exhibit # 2

**Option # 2**

**10 YEAR STORM**

<u>Section #</u>	<u>CB#</u>	<u>Drainage Area (A CALC)</u>	<u>"A" Cumulative</u>	<u>Coef C</u>	<u>Intensity of Rainfall (1/(10yr)T=30)</u>	<u>Drainage Flow</u>	<u>Cumulative Flow (cfc)</u>	<u>Prop Drainage System</u>	<u>"L"</u>	<u>Slope</u>
1	4	29.00	29.00	0.20	3.00	18.4	18.4	24"	386'	0.10%
2	3	3.98	32.98	0.20	3.00	2.64	20.04	24"	299'	0.50%
3	2	1.86	34.84	0.20	3.00	1.12	21.16	30"	109'	0.50%
4	1	4.00	38.84	0.20	3.00	2.4	23.56	30"	205'	0.25%

770' Existing Shallow Swale  
620' Existing Graded Swale

**25 YEAR STORM**

<u>Section #</u>	<u>CB#</u>	<u>Drainage Area (A CALC)</u>	<u>"A" Com</u>	<u>Coef C</u>	<u>Intensity of Rainfall</u>	<u>Drainage Flow</u>	<u>Cumulative Flow (cfc)</u>	<u>Prop Drainage System</u>	<u>"L"</u>	<u>Slope</u>
1	4	29.00	29.00	0.20	3.5	20.16	20.16			
2	3	3.98	32.98	0.20	3.5	3.06	23.22			
3	2	1.86	34.84	0.20	3.5	1.29	24.51			
4	1	4.00	38.84	0.20	3.5	2.78	27.59			

\* Project is Limited to 10 year storm, as per county guide lines

**100 YEAR STORM**

<u>Section #</u>	<u>CB#</u>	<u>Drainage Area (A CALC)</u>	<u>"A" Com</u>	<u>Coef C</u>	<u>Intensity of Rainfall (1(10yr)T=30</u>	<u>Drainage Flow</u>	<u>Cumulative Flow (cfs)</u>	<u>Prop Drainage System</u>	<u>"L"</u>	<u>Slope</u>
1	4	29.00	29.00	0.20	3.8	23.18	23.78			
2	3	3.98	32.98	0.20	3.8	3.32	27.10			
3	2	1.86	34.84	0.20	3.8	1.41	28.51			
4	1	4.00	38.84	0.20	3.8	3.02	31.53			

\* Project is limited to 10 year storm, as per county guide lines

## Lincoln Branch of Root Drain # 1696 Drainage Computations

### By Section

For details see attached Preliminary plan. Exhibit # 1

#### Option # 1

#### 10 YEAR STORM

Section #	CB#	Drainage Area (A) (A.CALC)	"A" Cumulative	Coef C	Intensity of Rainfall (1/(10yr) <sup>1.3</sup> )=3.0	Drainage Flow	Cumulative Flow (cfs)	Prop Drainage System	"L"	Slope
1	7	14.63	14.63	0.20	3.00	8.78	8.78	18"	400'	0.10%
2	6	5.52	20.15	0.20	3.00	3.31	12.09	18"	299'	0.50%
3	5	4.37	24.52	0.20	3.00	2.62	14.71	24"	296'	0.50%
4	4	4.48	29.00	0.20	3.00	2.69	17.40	24"	386'	0.25%
5	3	3.98	32.98	0.20	3.00	2.64	20.04	24"	109'	0.30%
6	2	1.86	34.84	0.20	3.00	1.12	21.16	30"	205'	0.30%
7	1	4	38.84	0.20	3.00	2.4	23.56	Open Ditch	770'	0.35%
										0.10%

#### 25 YEAR STORM

Section #	CB#	Drainage Area (A.CALC)	"A" Com	Coef C	Intensity of Rainfall	Drainage Flow	Cumulative Flow (cfs)	Prop Drainage System	"L"	Slope
1	7	14.63	14.63	0.20	3.50	10.18	10.18			
2	6	5.52	20.15	0.20	3.50	3.83	14.01			
3	5	4.37	24.52	0.20	3.50	3.03	17.04			
4	4	4.48	29.00	0.20	3.50	3.12	20.16			
5	3	3.98	32.98	0.20	3.50	3.06	23.22			
6	2	1.86	34.84	0.20	3.50	1.29	24.51			
7	1	4	38.84	0.20	3.50	2.78	27.29			

\*Project is Limited to Section "4"

**100 YEAR STORM**

<u>Section #</u>	<u>CB#</u>	<u>Drainage Area (A CALC)</u>	<u>"A" Com</u>	<u>Coef C</u>	<u>Intensity of Rainfall (1(10yr)T=30</u>	<u>Drainage Flow</u>	<u>Cumulative Flow (cfc)</u>	<u>Prop Drainage System</u>	<u>"L"</u>	<u>Slope</u>
1	7	14.63	14.63	0.20	3.80	11.06	11.06			
2	6	5.52	20.15	0.20	3.80	4.17	15.23			
3	5	4.37	24.52	0.20	3.80	3.30	18.53			
4	4	4.48	29.00	0.20	3.80	3.38	21.91			
5	3	3.98	32.98	0.20	3.80	3.32	25.23			
6	2	1.86	34.84	0.20	3.80	1.41	26.64			
7	1	4	38.84	0.20	3.80	3.02	29.66			

**\* NOTE**

25 year storm generates about 16% more flow than 10 year storm.

100 year storm generates about 26% more flow than 10 year storm.

Since the Drainage area is less than 300 acres and it is only about 40 acres, we have designed the Drainage System for 10 year storm, as per County guide lines.

**V.**  
**PRELIMINARY COST ESTIMATES**

## V. PRELIMINARY COST ESTIMATES

### **Option #1**

#### **10 YEAR STORM**

770 L.F open ditch @ \$5/L.F	\$ 3850.00
699 L.F. 18" R \$25/L.F.	\$17225.00
791 L.F. 24" R \$30/L.F.	\$23730.00
205 L.F. 30" R \$35/L.F.	\$ 7175.00
7 EACH 4' DIA CB @ \$1750/EACH (INCLUDES 1EACH 10' END SECTION)	\$12250.00
CLEAN UP AND LANDSCAPING LUMP SUM(2465 L.F)	\$ <u>9860.00</u>
COST OF CONSTRUCTION	\$ 74090.00
CONSTRUCTION CONTINGENCIES	\$ <u>15910.00</u>
ESTIMATED PROJECT COST	<b>\$90,000.00</b>
*SEE ENCLOSED MAP EXHIBIT #1	

### **Option #2**

#### **10 YEAR STORM**

620 L.F. Grading/Swale @ \$7.50/L.F.	\$ 4650.00
495 L.F. 26"R \$30/L.F.	\$ 14,850.00
205 L.F. 30" R \$35/L.F	\$ 7175.00
2 EACH 4' DIA CB @ 1750	\$ 3500.00
1 EACH 5' DIA CB @ 2000	\$ 2000.00
1 EACH SPECIAL DRAINAGE STRUCTURE/WITH END SECTION	\$ 4000.00
CLEAN UP/LANDSCAPING (1320L.F.)	\$ 5000.00
COST OF CONSTRUCTION	\$ 41,175.00
CONSTRUCTION CONTINGENCIES (20%)	\$ <u>10,825.00</u>
ESTIMATED PROJECT COST	<b>\$ 52,000.00</b>
*SEE ENCLOSED MAP EXHIBIT #2	

THE ABOVE COST ESTIMATE WAS PREPARED BY H. MARUR P.E., TEE INC.



**VI.**  
**APPENDIX**

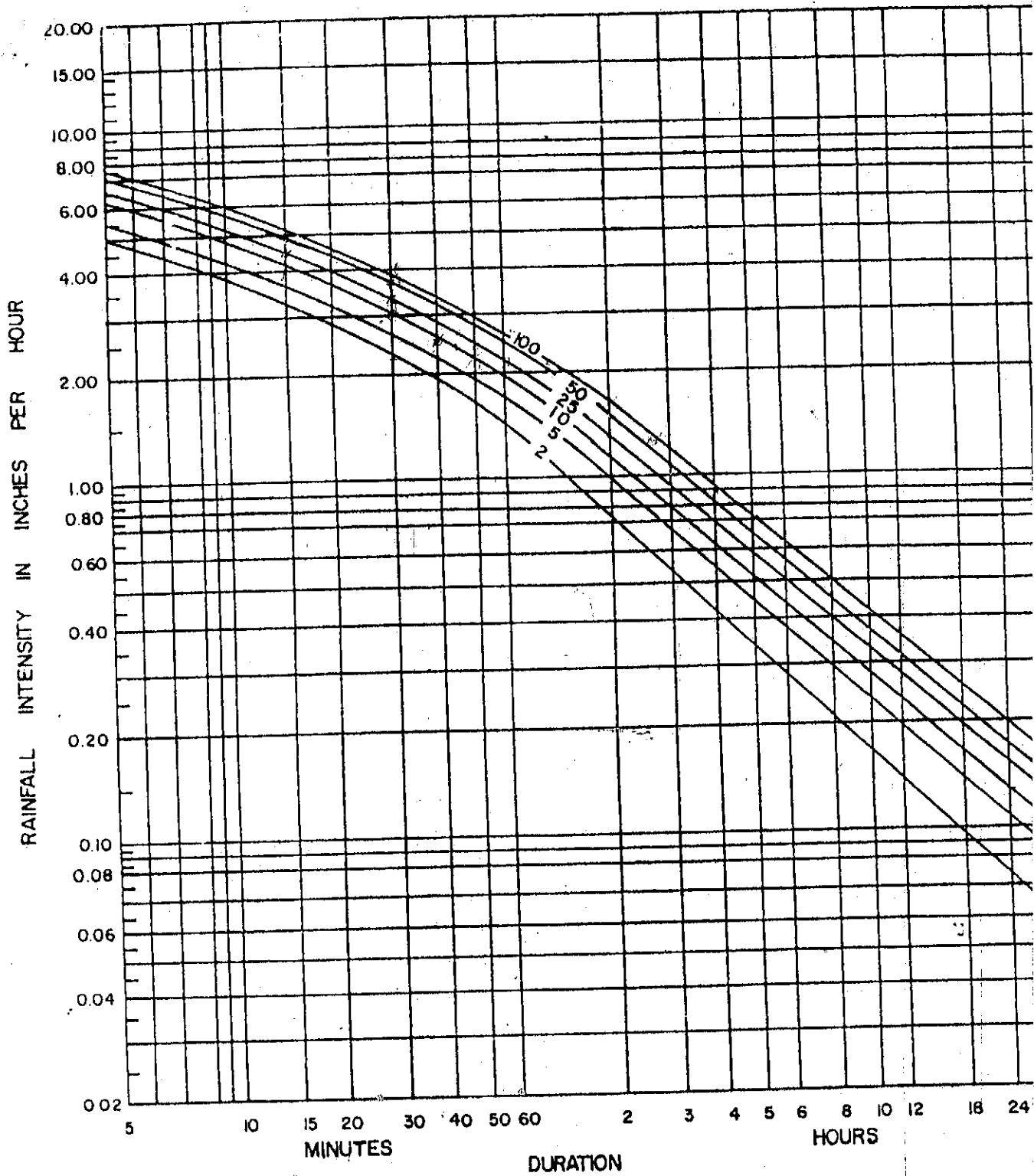
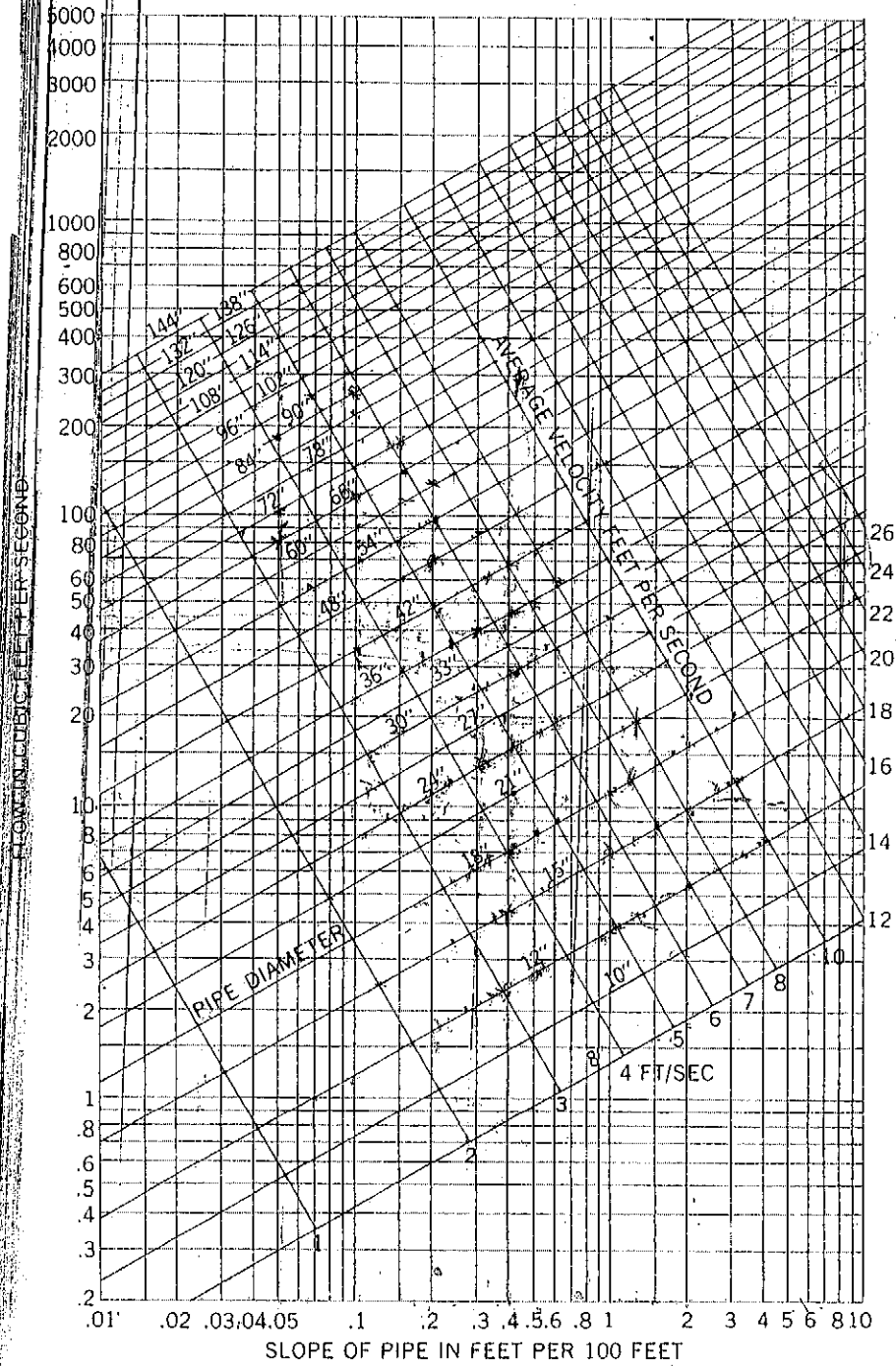


Figure 3.1 Rainfall Intensity-Duration-Frequency Curves for Flint, Michigan  
 (Source: Consoer Townsend Master Drainage Plan, 1973)

FIGURE 4

FLOW FOR CIRCULAR PIPE FLOWING FULL  
BASED ON MANNING'S EQUATION  $n=0.012$



**VII.**  
**PRELIMINARY PLAN AND EXHIBITS**