

SPRAGUE DRAIN #0513 EXTENSION
PART OF SECTION 35, T7N-R5E, CITY OF SWARTZ CREEK
GENESEE COUNTY, MICHIGAN

PRELIMINARY DESIGN REPORT
AND
COST ESTIMATE

PHASE I

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-PREPARED FOR-

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SUMMARY

The purpose of this report is to develop a solution to drainage problems presently occurring within the Sprague Drain Drainage District. The study area is located in the vicinity of Sports Creek Raceway and Burkeshire Pointe Apartments, between I-69 and Miller Road, in the South ½ of Section 35, T7N-R5E, and City of Swartz Creek.

Presently there is a drainage problem on the south side of Sports Creek Raceway for the Burkeshire Pointe apartments and the proposed Gateway Manor development. Neither of the two developments have a secure or sufficient storm water outlet across the property of the Sports Creek Raceway. There are two existing storm water conduits (located at Point A and Point B on the 'Drainage Area Map') which allow surface water to flow onto and across the Sports Creek property, but neither route lies within a recorded drainage easement. Furthermore, the capacity of those drains are not sufficient to handle the design overflow rates of the two developments.

In the existing Burkeshire Pointe apartments, storm water runoff is currently collected in a detention basin on the north side of the site which outlets to the north through a 24" corrugated plastic pipe north of apartment building number 6, this being Point A on the enclosed plan. The drainage at Point A crosses a small ditch along the property line and enters a 15" corrugated metal pipe on the Sports Creek Raceway property. A down stream manhole connection could not be found therefore the slope and capacity of the 15" pipe is currently unknown.

Similarly, the proposed Gateway Manor property does not have a secure outlet for their storm water runoff. The Sports Creek Raceway has constructed a berm along its south (adjacent) property line (adjacent to the Gateway Manor property). Said berm has breaks in it to allow the existing undeveloped flow to pass through. On the north side of said berm there is a small ditch which directs the existing drainage to a 27" concrete pipe which flows under the parking lot and into the existing detention basin for the raceway. There is also a 24" concrete pipe at point B on the enclosed plan that discharges water onto the raceway property, the source of this 24" is unknown at this time. On the far west end of the Sports Creek Raceway property there is a shallow ditch which collects surface drainage in that vicinity and directs it toward the Sprague Drain. The ditch spreads out and disappears in the low ground on the Swartz Creek Estates property.

In the design of Sports Creek Raceway the engineer has included storm drainage pipes to accept the existing undeveloped runoff from the properties to the south. Said pipes were not designed to except developed runoff or the point type discharge of storm water that is typical of a detention basin outlet.

Per the direction of Genesee County Drain Commissioners office only one alternative was developed to resolve the drainage problems. The proposed solution is discussed in detail later in this report. When constructed in addition to appropriately sized detention facilities, the proposed drainage system will provide a secure and sufficient storm water outlet for the existing Burkeshire Pointe Apartments, the proposed Gateway Manor development, and for those adjacent parcels dependant upon the same outlets.

DRAINAGE AREA MAP

For the analysis, a drainage area map was prepared showing the tributary areas. The Map is based upon aerial photogrammetry supplied by the Genesee County Drain Commission, tax parcel and zoning information from Genesee County Equalization, existing as-built drawings of public record, and current survey data by Kraft Engineering. From the map, it can be seen that a total of 58.43 acres will be served by the proposed drainage system.

Of the total 58.43 acres; 25.42 acres will be collected at structure DS-1 and 33.01 acres to be collected at structure DS-5. Burkeshire Pointe Apartments property to contribute 21.94 acres, Gateway Manor properties to contribute 30.08 acres, the remaining 6.41 acres contributed by upslope areas.

ESTIMATED PEAK FLOWS

The proposed drainage system was analyzed and designed using Rational Method runoff estimates, and standard pipe routing calculations. Three peak flow estimates were calculated based upon pre-existing flows, and potential 100-year overflows at either of the two main detention basins. The proposed system is therefore sized in each pipe run to accommodate the greatest likely peak flows within the enclosed drainage system.

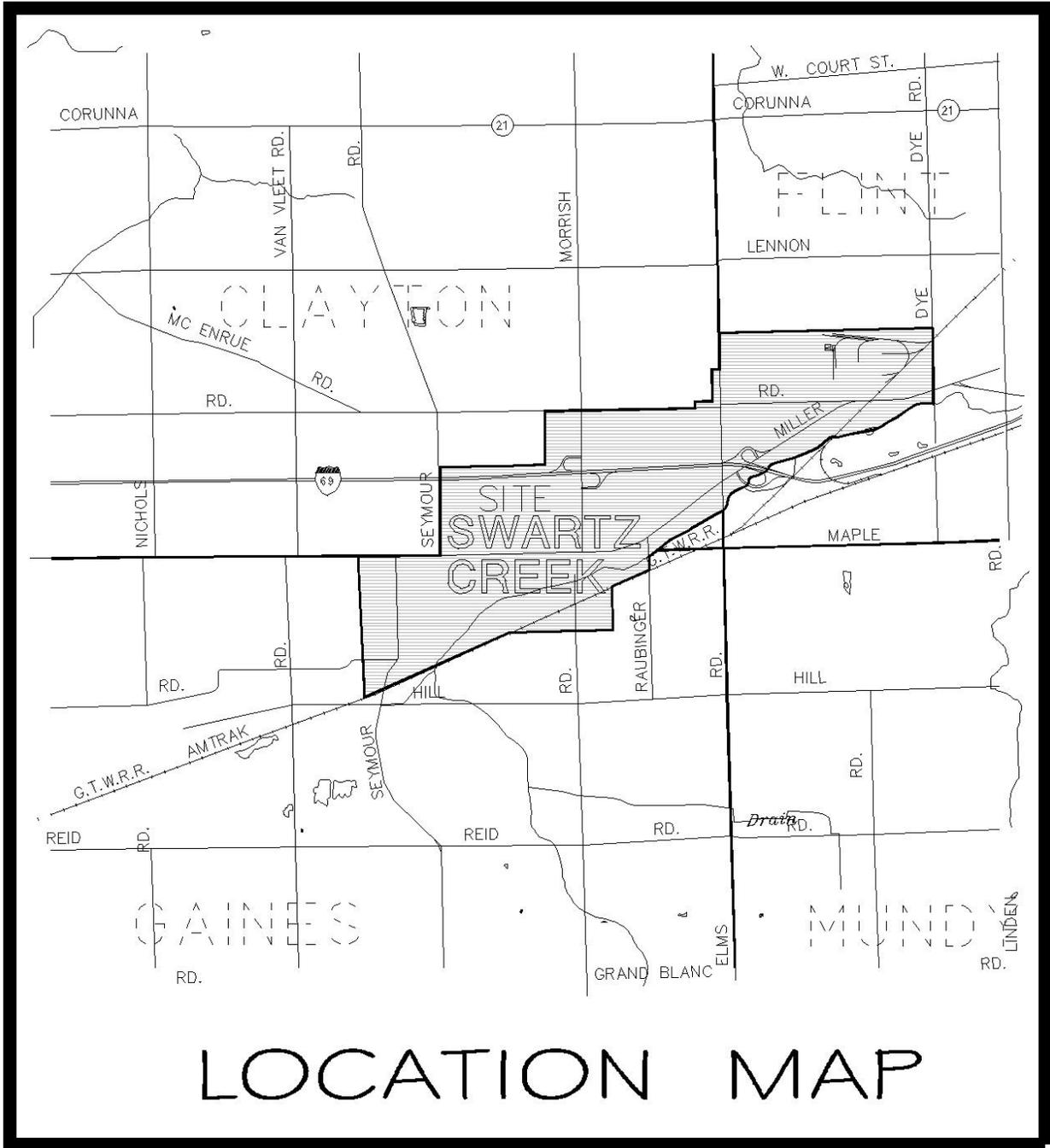
1. The first design was for a 10 year storm frequency under agricultural conditions. The combined flow generated by these two areas is estimated to be 27 cfs. at the outlet.
2. The second design assumed an overflow of the Burkeshire Pointe detention basin during a 100 year storm thus releasing 22.4 cfs and the Gateway Manor was outletting at the controlled rate of 0.2 cfs/acre or 6.6 cfs. for a peak design flow of 29.0 cfs.
3. The third design assumed that Gateway Manor had a detention pond failure during a 100 year storm thus releasing 29.6 cfs and that Burkeshire Pointe was outletting at the controlled rate of 0.2 cfs/acre or 5.08 cfs., for a peak design flow of 34.7 cfs.

ESTIMATED COST

The estimated cost of the proposed drainage system not including the cost of land or right-of-way is as follows:*

| | | |
|---------------------------------------|---|---------------------|
| 1. Construction Cost | = | \$113,230.00 |
| 2. Engineering and Contingencies Cost | = | <u>\$ 44,807.50</u> |
| Project Cost | = | \$158,037.50 |

*Refer to Exhibit No. 1 on page 6 for details on the above cost.



LAND USE

All of the land within the drainage area is zoned residential. Present land use consists of single and multi family residential housing along Miller Road and adjacent subdivisions. The remainder of the drainage area is vacant.

SOIL TYPES

The predominant soil classification in the portion of the drainage area north of Miller Road and south of I-69 consists of Conover Loam and Brookston Loam.

The hydrologic soil groups for the above soils, as defined by the Soil Conservation services are as follows:

| <u>SOIL</u> | <u>HYDROLOGIC SOIL GROUP *</u> |
|----------------|--------------------------------|
| Conover Loam | B |
| Brookston Loam | C |

- * A (Low runoff potential) Soils having a high infiltration rate even when thoroughly wetted and consisting chiefly of deep, well to excessively drained sands or gravels.
- * B Soils having a moderate infiltration rate when thoroughly wetted and consisting chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse texture.
- * C Soils having a slow infiltration rate when thoroughly wetted and consisting chiefly of soils with a layer that impedes downward movement of water or soils with moderately fine to fine texture.
- * D (High runoff potential) Soils having a very slow infiltration rate when thoroughly wetted and consisting chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a clay pan or clay layer at or near the surface, and shallow soils over nearly impervious material.

HYDROLOGY

The rational formula ($Q=CIA$) was used to develop estimates of peak storm flows, in accordance with the design parameters of the Genesee County Drain Commissioner.

Since the drainage basin is not greater than 300 acres, the design flood frequency is ten years (10) for all facilities. The area of the drainage basin was determined with the use of 2 ft. aerial contour maps for Genesee County and site development plans and calculations provided by the Genesee County Drain Commission-Division of Surface Water Management. Rainfall intensity was determined from standard rainfall intensity-duration-frequency curves for Genesee County.-

The time of concentration is based on the summation of the inlet time plus the time of flow in the sewer or channel. A minimum initial time of concentration of sixty (60) minutes was used, as adequate time for storm flows to peak for this particular drainage basin. This was determined on the basis of the upstream detention basin design characteristics. Runoff coefficients of 0.25 and 0.40 were used for all lands within the drainage area which is characteristic of agricultural and residential land respectively.

HYDRAULICS

The required flow capacity for storm sewers and open channels was determined from the Manning formula.

$$Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$$

- where: n = roughness coefficient
- = 0.12 for concrete pipe
- = 0.35 for open channels
- A = cross-sectional area of pipe or channel
- R = hydraulic radius of pipe or channel
- S = slope of pipe or channel

RECOMMENDATION

The recommended solution to the existing drainage problem is to reconstruct the drainage structure at point A, redirecting the outlet through a proposed pipe that will run west along the north line of Burkeshire Pointe apartments and the proposed Gateway Manor property 1475 feet to the west property line of Gateway Manor and Sports Creek Raceway; then turn north and run along the west property line of Sports Creek Raceway 605 feet to the south side of the existing detention basin; at which point the pipe will outlet into the existing detention basin; the drainage will continue flowing north through the existing detention basin for 260 feet to the existing 24” detention basin outlet and the existing Sprague Drain.

The capacity of the drainage system is designed using a 100 year storm frequency over flow of the Burkeshire Pointe detention pond from DS-1 to DS-5. At DS-5 where the proposed Gateway Manor is to enter the drainage system we designed the pipe to accommodate the restricted outlet drainage from Burkeshire Pointe of 3.8 cfs and the 100 year overflow from the proposed Gateway Manor detention pond which would be approximately 31.1 cfs. The total flow would then be approximately 34.9 cfs from DS-5 to DS-6. The proposed enclosed portion of the drain will require a 20 foot easement and the open drain portion through the existing Sports Creek detention basin will require an 80 foot easement. All disturbed areas would be properly restored as part of this project.

The estimated cost for this project is \$158,037.50. See exhibit No. 1 for cost estimate, Exhibit No. 2 for storm drainage design and Exhibit No. 3 for Preliminary Plan.

sprague per map.jpg (1600x1280x24b jpeg)

