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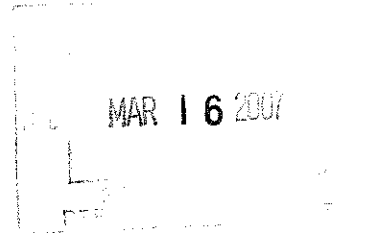
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March 13, 2007

City of Rochester Hills  
1000 Rochester Hills Dr.  
Rochester Hills, Michigan 48309-3033

Attention: Mr. Paul Davis, P.E.  
City Engineer



HRC Job No. 20050147.29

Re: Michelson PS Study  
E. Ferry Drain & John R Improvements

Dear Mr. Davis:

We have completed our review of the existing Michelson Street Sanitary Sewage Pumping Station. Our study is based on a series of meetings, information provided by City staff and our preliminary site visit. As you're aware, the existing pumping station is located within the identified flood plain and is an obstruction for the proposed E. Ferry Drain. The purpose of this report is to summarize problems with the existing pumping station and to provide details supporting the addition of this station replacement to the scope of the E. Ferry Drain and John R. Improvements project.

The following details our analysis:

**GENERAL**

The Michelson Pumping Station was constructed in 1978. Typically the useful service life of a pumping station is 20-25 years for the electrical/mechanical component and 40-50 years for the structural component. As a result, the pumps, motors, valves and controls at the Michelson station currently exceed their normally expected life cycle, while the piping, wet well and valve chamber are nearing the end of their expected life.

The reported 100-year floodplain elevation at the confluence of the McIntyre Drain and Ferry (Gibson) Drain is approximately 697 (NGVD). The existing wet well and valve chamber are located within the floodplain at approximately an elevation of 692, which makes them vulnerable to flooding events and failures. A flood event that results in an overflow of sanitary sewage would be a violation of State Law and subject to enforcement action by the Michigan Department of Environmental Quality (MDEQ). In addition, the location of the existing station is in conflict with the proposed E. Ferry Drain that is planned to provide for future storm water drainage needs. At a minimum, the existing 10-inch force main from the station and a portion of the downstream 15-inch gravity sewer must be relocated to accommodate the future 60-inch storm drain. Pending MDEQ review of the E. Ferry Drain improvement project, it may also be necessary to provide storm water treatment facilities (i.e. settling basin, forebay, etc.) for the final permitting and approval of the project. The existing location of the pumping station and valve chamber

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could readily be utilized to accommodate an end treatment facility. There is an economy of scale cost savings that would be incurred should the replacement of the pumping station be included with the large scale E. Ferry Drain and John R Improvement Project. In addition, any modification or rehabilitation of the existing equipment must be completed in a manner that allows the pumping station to stay in continuous operation. Constructing a new facility would allow the existing facility to remain in operation until the new facility is complete, at which time flows would be redirected to the new station and the old station would be abandoned.

Based on the above reasons, it is apparent that replacement of the Michelson Pump Station in conjunction with the E. Ferry Drain and John R Improvement Project would be cost effective and warranted. The remaining sections of this evaluation describe the recommendations for replacing the pumping station including the proposed facilities, the sequence of construction, a preliminary site plan, and an opinion of probable construction cost.

### **SITE PLAN**

A Site Plan of the Michelson Street Pumping Station site is attached as Exhibit A. This plan is based on the topographical survey completed as part of the E. Ferry Drain and John R Improvement Project and shows the proposed 60-inch storm drain and new 8-inch sanitary sewer. The new 8-inch sanitary sewer was required in order to pick up service leads from properties located along the south side of Michelson due to the interference resulting from the new E. Ferry Drain. Also included on the plan are the approximate floodplain limits and two (2) potential new locations for the proposed pumping station. As shown, a significant portion of the site is in the floodplain and a fill/excavation soils balance will be required to properly locate the new pumping station. In addition, a number of interferences will require coordination and potential relocation including:

- pump station
- valve chamber
- influent sewers
- natural gas main
- underground electrical service (exact location unknown)
- electrical generator
- electrical panel and gear
- electrical transformer
- underground electrical service
- antenna tower

For the purposes of this report the proposed pumping station is shown on the east side of the site adjacent to the paved driveway. Construction would require two new manholes and approximately 50 feet of new sewer. When the pumping station is ready for operation existing flows would be re-routed and the old sewers would be bulkheaded and abandoned. Ultimately the final pumping station relocation would be decided during the design process.

### **PUMPING STATION**

The pumping station would consist of a below grade precast concrete wet well with three (3) submersible explosion-proof 11 HP sewage pumps, level sensors, and above grade controls. The pump wet well chamber would be constructed from 10-foot diameter reinforced precast concrete pipe. The pipe chamber

would extend approximately 30 feet below grade. For maintenance purposes each of the submersible pumps would be removable through a hatch in the top concrete slab of the structure, eliminating the need for personnel to enter a confined space.

### **VALVE CHAMBER**

A new valve chamber would be located adjacent to the pumping station. Each pump discharge pipe would be furnished with a check valve and an isolation plug valve. The three pump discharges would be combined into a header and would flow through a magnetic flow meter to measure the flow. The chamber would also be furnished with an emergency connection so that in the event of a pumping station problem, the station could be by-passed by using temporary pumps installed in the upstream manholes. These pumps could then discharge to the emergency connection on the force main. This connection would be isolated from the station. The chamber would normally be a below grade concrete structure but because of the tight site limitations and potential impact to the existing floodplain an above grade structure would also be evaluated during the design process.

### **FORCE MAIN**

The existing pumping station discharges via a 10-inch force main to a 15-inch gravity sewer located under the driveway at the northeast corner of the site. The 15-inch sanitary sewer continues east until it combines with a 24-inch sanitary line from Bendelow and continues east in a 36-inch sewer to John R Road. Due to conflicts with the proposed East Ferry Drain, a new force main that extends the discharge from the pumping station directly to the 36-inch gravity sewer is necessary. This additional 300' of force main may also impact the operation of the existing pumping station and is further justification to simply replace the existing station.

### **SEQUENCE OF CONSTRUCTION**

Basically the sequence of construction will entail the construction and start-up of the new facilities, then the abandonment/demolition of the existing facilities and ultimately final surface restoration. However, the final completion of construction including the means and methods are up to the contractor's discretion. It is estimated that the entire construction process for the new facilities would require 4-8 weeks. Pending the ultimate use of the site for storm water treatment facility needs, the demolition/abandonment of the existing facilities will likely include a combination of "in-place abandonment" and "removal and disposal" procedures.

### **ENGINEER'S OPINION OF PROBABLE COST**

The total estimated construction cost to replace the existing Michelson Street Pumping Station is \$241,000, including a 10 percent contingency. Using an estimated 25 percent for engineering and construction administration a total project cost budget of \$301,000 is recommended. An itemized breakdown of this cost is included in the following table:


*Preliminary Estimated Unit Costs*

<u>Unit/Item Description</u>	<u>Unit Cost</u>
• Site Work: excavation, bracing, backfill	\$25,000
• Wet well concrete structure	\$35,000
• Valve chamber structure	\$20,000
• Pumping system package: pumps and level controls	\$45,000
• Manhole structures (2)	\$16,000
• Influent sewer (50')	\$3,000
• Mechanical work, piping, and valves	\$25,000
• Flow meter	\$6,000
• Electrical work	\$20,000
• Forcemain (400')	\$14,000
• Site restoration and landscaping	\$5,000
• Demolition	<u>\$5,000</u>
<b>Construction Sub-Total</b>	<b>\$219,000</b>
Contingencies (10%)	\$22,000
<b>Total Estimated Construction Cost</b>	<b>\$241,000</b>
Engineering (25%)	<u>\$60,000</u>
<b>Total Estimated Project Cost</b>	<b>\$301,000</b>

If you have any questions or require any additional information, please contact the undersigned.

Very truly yours,

HUBBELL, ROTH & CLARK, INC.



John C. Shovlin, P.E.  
Senior Project Engineer

DWM/js  
Attachment

pc: Rochester Hills; R. Moore  
HRC; W. Alix, C. Christeson, D. Mitchell, File