



ANDERSON, ECKSTEIN AND WESTRICK, INC.

51301 Schoenherr Road, Shelby Township, Michigan 48315
Civil Engineers • Surveyors • Architects 586-726-1234

October 3, 2011

Mr. Matthew Tepper
City of Grosse Pointe Farms
90 Kerby Road
Grosse Pointe Farms, Michigan 48236-9984

Reference: Kerby Road Pump Station
City of Grosse Pointe Farms
AEW Project No. 0156-0009

Dear Mr. Tepper:

The City of Grosse Pointe Farms (GPF) requested that Anderson, Eckstein and Westrick, Inc. (AEW) provide GPF's with a cursory review of the pump station equipment and design. This review was to include the identification of any noticeable deficiencies and a conclusion as to the condition of the pump station. On Friday, September 23, 2011, James Rabine, P.E., William Edwards, P.E. and I visited the Kerby Road Pump Station. Mr. Dan Chauvin and you were present during our visit to answer questions and provide us with a tour of the pump station. A summary of our findings are as follows:

Summary of Existing Pump Station

Based upon information obtained from Mr. Chauvin and our review of the construction plans, it is our understanding that the original pump station was constructed in 1930 and included six pumps as follows:

| Pump Number | Capacity (Gallons per minute) |
|-------------|-------------------------------|
| 1 | 2000 |
| 2 | 2000 |
| 3 | 5400 |
| 4 | 10,800 |
| 5 | 33,750 |
| 6 | 45,000 |



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In 1947/48, an addition was constructed on the west side of the building to facilitate two additional pumps as follows:

| Pump Number | Capacity (Gallons per minute) |
|-------------|-------------------------------|
| 7 | 75,000 |
| 8 | 75,000 |

In 1994, upgrades were made to the control panel and bubbler system.

Based upon our discussions with Mr. Chauvin and yourself, it is our understanding that this pump station handles all of the combined sewer flow in GPF west of Ridge Road along with the entire sanitary sewer flow from the city. Please note that this review did not include a review of the sewer systems that feed the pump station. Based upon the original construction plans, two combined sewer lines (one 6'-6" diameter and one 6'-0" diameter) discharge into the pump station. All of the pumps discharge into an outlet chamber located on the south side of the pump station which then, in turn, discharges into the Fox Creek through an 11'-6" x 16'-6" Arch pipe. The primary control is based on wet well elevation. The deeper the water in the wet well, the more pumps and larger capacity pumps are activated.

It was raining during our visit and pumps 1 through 3 were running under normal operations. In an effort to run all pumps, Mr. Chauvin shut off all pumps and allowed the wet well to fill up enough to individually run the remainder of the pumps (4 through 8). Due to low flow volumes, the pumps were only run for very short durations. All pumps seemed to run smoothly and no unusual vibrations were detected while the pumps were running. Some minor brush noise and arcing were noticed on the motor for pump 6 which can be corrected with minor adjustments. We also noticed a significant leak in the packing on pump 3 which should also be repaired.

Existing Electrical System

The pumping station is currently serviced from a Detroit Edison substation that provides two 4800V lines from two different transformers. This information was confirmed by Lee Southworth of DECO Primary Services.

Both lines are active at all times and provide the normal power to the pumping station. In addition, a permanent generator, owned by NEXTEL, is connected to the pumping station that supplies emergency power to the DPW Department, pumping station control systems and pumps 1, 2, and 3 in the event of a power interruption.



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During our visit, we simulated power loss, tripping the circuit breakers and verified each of the breakers and sequencing operated properly.

Line 32T was interrupted and the station tie breaker closed, transferring the loads over to the second incoming line 191T and started the generator to power all control functions. This operated properly. The 32T line was restored and line 191T was interrupted, again the tie breaker closed transferring the loads to line 32T. The generator does not come on when line 191T is lost because the controls are powered from the line 32T side.

The switchgear for the substation was installed in 1994 and is in good physical condition and was being tested while we were on-site. The breaker testing is scheduled for October 17 through 19, 2011.

All of the pump motor starters are older than the switchgear and do not appear to have been tested recently. The starters for pumps 5, 6, 7, and 8 do not get much use, but should be maintained on a regular schedule.

The pump motors are old but very well constructed, and should serve for many more years, if maintained.

Section 47.2 of the Recommended Standards for Waste Water Facilities (10 State Standards) require that "Emergency pumping capability shall be accomplished by connection of the station to at least two independent utility substations, or by provision of portable or in-place internal combustion engine equipment which will generate electrical or mechanical energy, or by the provision of portable pumping equipment." These standards further state that "Such emergency standby systems shall have sufficient capacity to start up and maintain the total rated running capacity of the station." It is our understanding, based upon a phone conversation with Lee Southworth of DECO Primary Services, that the 2-4800v feeds to the pump station come from different transformers at the same substation. This does not meet the power redundancy requirements however it is our understanding that a permanent adjacent Nextel generator provides backup power for the dry weather pumps (pumps 1 thru 3), lights and control systems; a rental generator was recently installed to provide backup power for the 3 mid range pumps and the city is in the process of connecting a portable generator to provide backup power to the 2 – 75,000 gpm pumps.

The DWSD billing meter is currently not functioning. It is our understanding that the Greater Detroit Regional Sanitary Sewer (GDRSS) Flow Metering Task Force has inspected the meter and has determined that the meter will need to be replaced.



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Summary of Recommendations

During the inspection, a few recommendations were identified by the team. They include:

1. Develop and implement a permanent backup power source that meets the requirements of Section 47.2 of the Recommended Standards for Waste Water Facilities (10 State Standards).
2. Develop a Standard Operation Procedure (SOP) to manually run the mid range pumps as soon as the stable flow depth permits, turning off smaller pumps to balance the flow requirements in an attempt to draw down water levels in the incoming pipes. This will maximize available in line storage in the event that the storm surge has not yet been received. This SOP will reduce the potential for sanitary sewer overflows (SSOs) and basement flooding, while increasing the run time on the larger pumps and slightly reducing run times on the smaller pumps.
3. When any major control upgrades are made, integrate the above SOP into the automated system with logic to balance power consumption efficiency and in line storage capacity.
4. Pump 7 and 8 are currently served from one breaker in the switchgear. They should be separated with a breaker for each. There is a spare breaker in the adjacent cabinet that could be used for this purpose. This would also require an additional DC control package because the two pumps currently share one DC source for control.
5. When Pumps 7 and 8 were designed, it was decided to build an overflow weir to feed a second wet well sump. While that was likely less expensive than extending the wet well, it limits the available flow to these pumps. The potential to extend the wet well, or to connect the two sumps with large capacity pipe, should be investigated.
6. A wood ladder with some planks was noted in the wet well. It appears to be used as a catwalk to service the lights in the facility. This represents a MIOSHA violation and should be replaced with a permanent structural fiberglass or steel catwalk with proper railings to service the lights and any other equipment requiring access.
7. While the level of general maintenance is better than most facilities, the interior of the building could use wall cleaning and painting.
8. Roof repair should proceed as soon as possible to prevent a water leak above the open pump motors on the floor.
9. The pump motor starters did not appear to have been tested recently. Since the starters for pumps 5, 6, 7 and 8 do not get much use, they should be tested regularly to insure reliability.



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10. The brushes on the motor from pump 6 should be adjusted.
11. The bearings on pump 3 should be repacked to eliminate the leaking that is occurring.
12. The one line electrical drawing should be updated showing the NEXTEL generator and the current connections, transfer switch and sequence of operation. A copy should be posted in the switchgear room.
13. Follow up with DWSD to repair or replace their billing meter. If the Michigan Department of Environmental Quality becomes aware of its condition, they will also strongly encourage the repairs on an expedited basis.
14. Evaluate and possibly install secondary meters on all the pumps. These non-billing meters can be correlated (calibrated) to the billing meter over time. That will allow monitoring of each pumps output during operation and detect loss of capacity through wear. Future rehabilitation needs can be anticipated and scheduled. Once calibrated the secondary meter data may be useful in billing DWSD disputes.

While the facility is quite old, the equipment and facility appear to be well maintained and runs well. A review of the O&M records was not completed but could be if a more thorough investigation is required. The motors and electrical equipment were built to higher standards than today and the use of lower voltage on the primary pump units and starters assures their long life. The original facility and equipment were well designed for their intended permanent use.

Sincerely,

Stephen V. Pangon, PE
Executive Vice President