3/19/14
Consultant's Resp. to DEQ's comments on WTP upgrade

Flint WTP Improvements – Phase II, Segments I, II and III

Responses to MDEQ Review Comments dated 3/19/2014

Segment I – Initial Watermain Cut-in

1. Detail 2, Sheet C-504, "Air Release & Access Manhole," shows a 2" corp stop for air release. These are intended to be manual air release valves for exhausting air upon initial filling of the pipeline or after maintenance has been performed and refilling the pipeline. The manhole structure will be checked periodically and pumped out with a portable sump pump as part of the normal plant maintenance program.

Segment 1 – Rehabilitation

1. Raw Water Piping
   a. Maintain back up supply from Genesee County during interim operation at C.S. #2. Installation of the 42" raw water piping has been delayed until the KWA project is closer to being ready to supply water to the City. This will allow the City to maintain the backup supply from Genesee County during interim operation.
   b. The crossing of the new 42" steel pipe over the existing 54" concrete pipe is shown in plan on drawing sheet C5-101, with Detail 5, Sheet C5-501 showing how the 42-inch line will be supported. As shown on Detail 5, Sheet C5-501, the new 42-inch line will have concrete pipe cradles constructed on either side of the existing 54" pipe, maintaining a minimum clearance of 12" on either side of the 54" pipe. Pipe loads from the 42" line will then be transferred to the pipe cradles and into the soil, and not the 54" pipe. The 6" clearance between the two pipes will be backfilled with CLSM material as it will be impossible to compact typical granular bedding material under the 42" pipe.
   c. Detail 2, Sheet C5-505, "Air Release & Access Manhole," shows a 2" corp stop for air release. These are intended to be manual air release valves for exhausting air upon initial filling of the pipeline or after maintenance has been performed and refilling the pipeline. The manhole structure will be checked periodically and pumped out with a portable sump pump as part of the normal plant maintenance program.
   d. See attached color coded yard piping diagram.

2. Midpoint Chlorination
   a. Four (4) new scales will be provided for monitoring chlorine usage from ton containers. Scales shall be as manufactured by Scaletron Industries Ltd. with a load range of 0 to 4000 lbs.
   b. The City has not been able to determine that the chlorine scrubber is a requirement of any applicable code. At this time, the City will not be installing the chlorine scrubber shown on the design drawings and will rely on the existing ventilation system to exhaust air from the Chlorine Storage Room.
   c. The existing ventilation in the Chlorine Storage Room was tested to have a capacity of 18.3 air changes per hour, or 0.305 air changes per minute. Therefore, one room volume air

change would take approximately 3.3 minutes with the current ventilation system. See attached test results. Due to the size of the existing Chlorine Storage Room, a ventilation system of 1 air change per minute is not practical. While the existing ventilation system capacity is less than 1 air change per minute, it appears to be in compliance with 10 State Standards as lesser rates may be considered in cases where 1 air change per minute is not appropriate due to the size of the room.

d. WTP staff will identify and inspect all proposed and existing piping and conduit wall penetrations in the Chlorine Storage Room and seal as necessary to prevent gas leakage into other parts of Pump Station No. 4.
e. Existing floor drains in the Chlorine Storage Room were for condensate from the old chlorine evaporator system. These drains will no longer be used and will be plugged by WTP staff.
f. WTP staff will attach new door sweeps with better seals at existing doors as required.
g. WTP staff will extend existing ventilation intake ductwork to finished floor level with 90-degree bends.
h. Per Addendum No. 1, an Anti-siphon / Back Pressure Valve and additional ball valve shall be added just prior to the trough wall penetration. The anti-siphon / back pressure valve shall be PVC and designed for use with chlorine systems. The valve shall be a LMI #35856, Walchem E90422, or engineer approved equivalent. The valve shall be installed between the two ball valves to allow for isolation during servicing. The valve shall be located above the high water level in the trough. The Contractor shall install a 1" drain line from the relief port to the finished floor elevation of the pipe gallery.

3. High Service Pump
   a. The new 16" pump control ball valve for HSP #1 replaces the existing pump control ball valve in kind and will operate in the same manner as the existing valve. The valve will act like a check valve upon emergency shutdown of the pump through the use of a hydraulic cylinder actuator that will automatically close the valve. The cylinder actuator uses hydraulic water system pressure to supply the energy required to close the valve.
   b. The existing HSP #1 is rated for 25 MGD at 185' TDH. The proposed replacement HSP #1 is rated for 15 MGD at 185' TDH, matching the head condition of the existing pump.
   c. Results from the City's hydraulic model were used to develop system curves for max day and average day, which were used to confirm pump selection. The proposed HSP #1 will operate on a VFD which can be adjusted during operation to meet various duty points depending on demand.

4. LOX/LIN Storage
   a. Nitrogen usage is calculated based on 2.5 % of the oxygen usage:

      2,833 ppd O_2 x 0.025 = 71 ppd N_2

5. Electrical Improvements
   a. The operation of the pumps is contained within a single switchgear at Pump Station No. 4. However, there will be a dual feed coming into the main plant switchgear that will supply redundant power to the plant, including Pump Station No. 4. There will also be two breakers

at the main plant switchgear that feed two different breakers at Pump Station No. 4. Therefore, any one point of failure will not take the system down.

Flint WTP Improvements
Phase II
Segments I-III
MDEQ Comments
March 19 , 2014

Segment 1 - Cut –in Piping

The detail shows air-release manholes with corp. stops? How will the air release operation be executed? Means to drain the manhole?

Written response needed.....

Segment 1 – WTP Rehab

1. **Raw Water Piping – Maintain back-up supply from Gen Co. during interim operation at C.S. #2. Sheet C5-102**

   54X42 cross (Sheet C5-501 & C5-101) only 6-inches – Support?

   Air-release manhole – same as Cut-in piping

   Current yard piping diagram?

Written response needed on the first 3 items. Yard piping diagram will be a work in progress.

2. **Mid-Point CL2 - Basis of design provided**

   - **Scale – use existing or proposed? If poposed - type, capacity**
   - **Scrubber?**
   - **Room air-exchange rate ?**
   - **Pipe penetrations – discuss protective seal**
   - **Floor drains – discuss**
   - **Door sweep - discuss**
   - **Scrubber piping – lower intake**

- **Check valve/anti-siphon at influent channel - include in final**

3. **High Service Pump**

   Will mechanical ball valve operate like a check valve in event of unexpected pump shut-down?

   TDH of current pump and proposed pump?
   Conformance of proposed pump TDH with system head curve?

   Written response needed.....

4. **LOX/LN Storage**

   Piping configuration clarified
   The LN calculation (71 ppd) is not clear. Is there a % concentration or transfer efficiency?

5. **Electrical improvements**

   Are operation of the pumps being split with the MCC or are multiple MCCs being provided?

   Written response needed.....

3. High Service Pump

   Will mechanical ball valve operate like a check valve in event of unexpected pump shut-down?

   TDH of current pump and proposed pump?
   Conformance of proposed pump TDH with system head curve?

4. LOX/LN Storage

   LOX & LN piping clarification – Sheet D2-102 & D2-601
   BOD for storage
   Ozone was designed at 4.0 mg/l max dose @ 36 MGD (Sec. 3.5 WTP BOD)

   Ozone max dose at 18.0 MGD is 650 Lbs/day

   How many GPD does this equate to?

5. Electrical improvements

   Are operation of the pumps being split with the MCC or are multiple MCCs being provided?

Flint WTP Improvements
Phase II
Segments I-III
MDEQ Comments
February 27, 2014

Segment 1 - Cut –in Piping

The detail shows air-release manholes with corp. stops? How will the air release operation be executed? Means to drain the manhole?

Segment 1 – WTP Rehab

1. **Raw Water Piping – Maintain back-up supply from Gen Co. during interim operation at C.S. #2. Sheet C5-102**

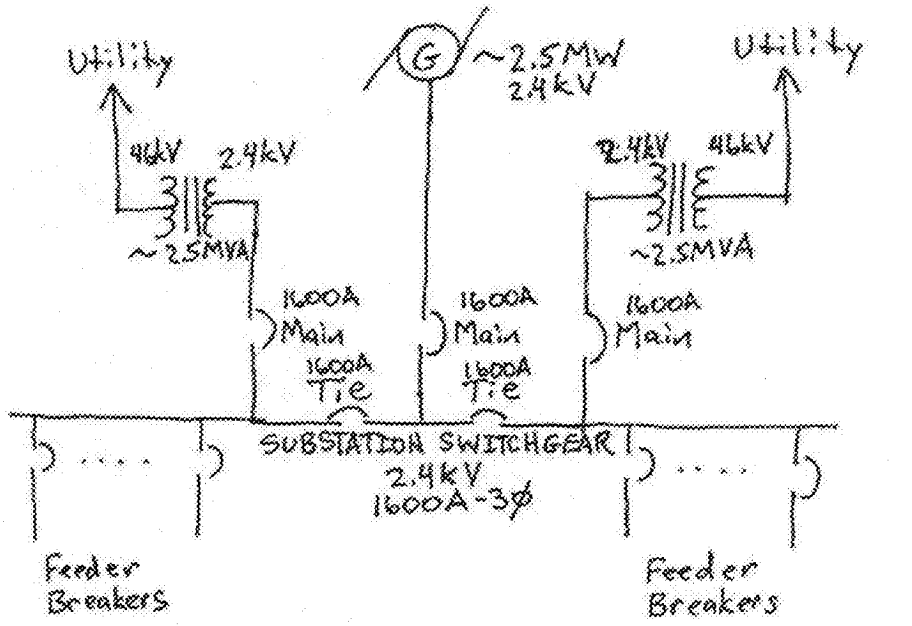
   54X42 cross (Sheet C5-501 & C5-101) only 6-inches – Support?

   Air-release manhole – same as Cut-in piping

   Current yard piping diagram?

2. **Mid-Point CL2 - Basis of design needed**

   - **Application rate (both mid-pt & post for CT)**
   - **CL2 gas max dosage LBs/Day**
   - **Scale – type, capacity**
   - **Rotometer (lbs/day)**
   - **Vacc reg, injector, educator (size)**
   - **Scrubber capacity**
   - **Room air-exchange rate**
   - **Pipe penetrations – Sheet C-103 – linkseal – gas resistant?**
   - **Floor drains**
   - **Door sweep**
   - **Safety features – obs window, fan, lights, switches, panic bar**
   - **Scrubber piping – lower intake**
   - **Check valve/anti-siphon at influent channel**



Flint WTP - Preliminary One-Line Diagram

10/23/13
Electrical
Agenda

Would you please review and provide any comments that you may have.

Thanks Warren

J. Warren Green, PE
Director of Engineering

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Prysby, Mike (DEQ)

From: Green, Warren <jwgreen@lan-inc.com>
Sent: Wednesday, October 23, 2013 3:41 PM
To: Prysby, Mike (DEQ)
Cc: 'Brent Wright'
Subject: City of Flint

Mike

As you know, the Flint Water Plant (FWP) currently uses 2400V as primary power throughout the facility. All of the power feeders in the plant site are 5kV rated and it appears the existing switchgear is also rated at 5kV. Most of the major electrical improvements installed during Phase I were dual voltage (2400/4160) equipment in anticipation of the plant power being changed to 4160V in the future. However, this voltage conversion is not needed for the phase of work.

The current sub-station has two 2.5 MVA transformers running in parallel for a total capacity 5 MVA. These old transformers are not equipped with cooling fans. Based on the evaluation performed during the Phase II study, which was completed in 2003, the full connected load to these transformers is estimated to be 6.97 MVA while the estimated power load at 36-mgd is 4.22 MVA. Based on these estimates there is sufficient power for the plant with both sub-station transformers in service. Even though the transformers are owned by Consumers Energy, it could take weeks to replace one of these main transformers in the event of a unit failure, which will result in reduced treatment and pumping capacity. The sub-station switchgear was installed in 1960 and is antiquated and difficult to maintain.

Since the 2003 study, Flint's maximum day water demand has decreased to approximately 20-mgd, which has correspondingly reduced the estimated power load. At this time it is believed that two 2.0 to 2.5 MW transformers will be required to power the FWP to meet maximum day demand and one transformer will meet average day demand under emergency conditions. We are proposing to construct a new substation with two – 2.0 to 2.5 MW pad mounted transformers, along with substation switch gear, interconnected with one 2.0 to 2.5 MW intermittent duty diesel generator as shown below. This arrangement will allow the generator to backup either transformer to cover maximum day demands should one of the transformers or transformer feeds drop off line and to provide sufficient generation capacity to meet average day demands.

Lockwood, Andrews & Newnam, Inc.
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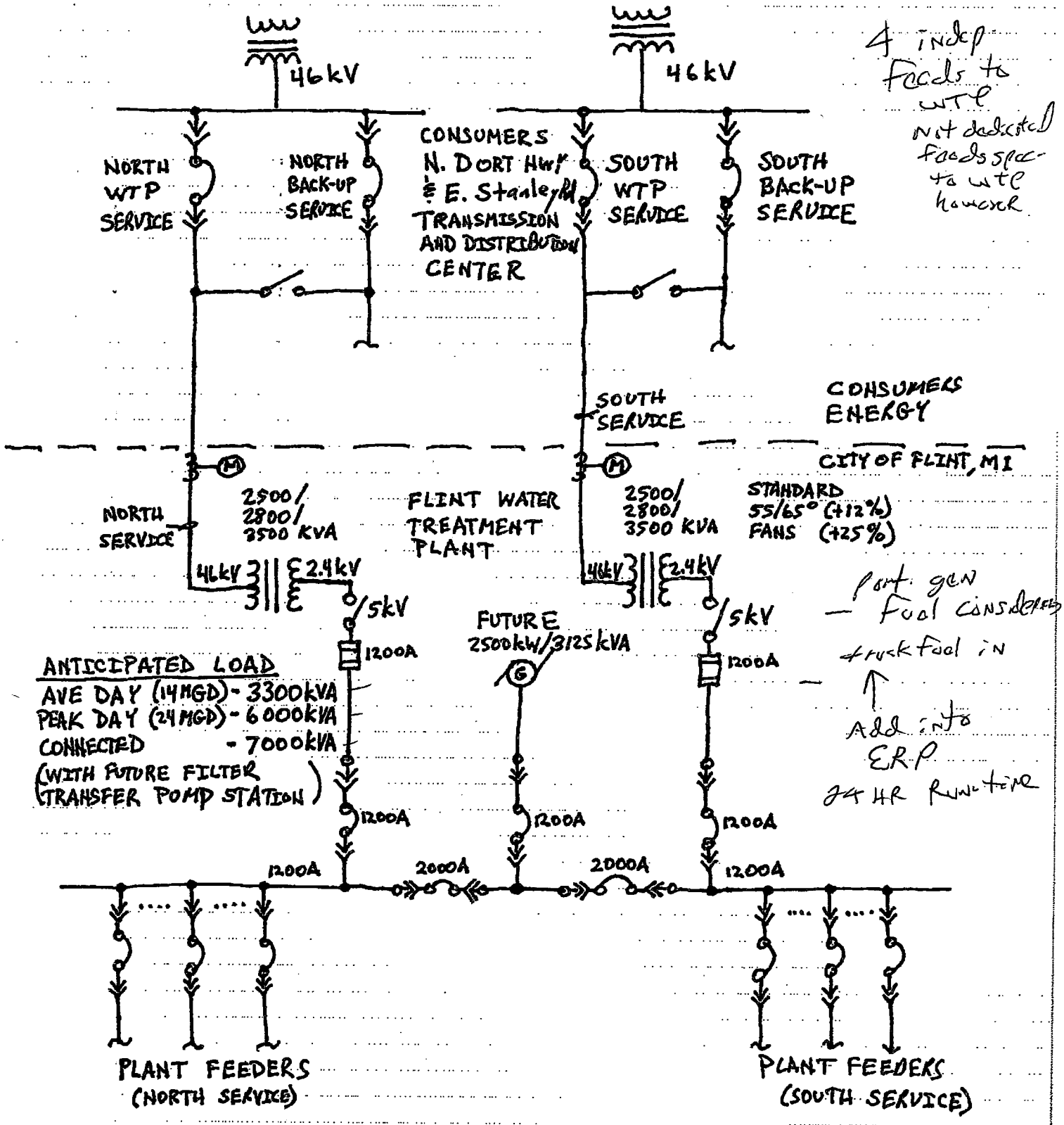
DESIGN NOTES AND COMPUTATIONS

SUBJECT: FLINT WATER TREATMENT ELECTRICAL SERVICE IMPROVEMENTS

SHEET NO. 1 OF 1



PREPARED BY Denney Howard DATE 11/4/2013 CHECKED BY Don Richards DATE 11/4/2013 130-10201-000 PROJECT NUMBER

D-005