

# Edward T.T. Chiang, P.E., Ph.D.

8 Alice Drive, Wayland, MA 01778

June 10, 2020

Mr. Vincent J. Roy  
Director of Operations  
Sudbury Water District  
100 Raymond Road, PO Box 111  
Sudbury, MA 01776

RE: Cold Brook Crossing Project

Dear Vincent:

As directed, I have reviewed the Stormwater Management Report for Cold Brook Crossing Project, prepared by Civil Design Group, LLC, dated March 11, 2020. The following are my findings and comments and preliminary recommendations.

1. Most stormwater management studies are for the determination of possibility of flooding issue, but this project, its purpose should be the ground water pollution protection issue, due to the project site is so closed to the Town of concord and the Sudbury Water District water supply wells.
2. The report indicates that the water quality control shall depend on the WQU, but no detail design of the WQU. Water quality parameters for stormwater comprise a long list and are classified in many ways, but the important items can impact groundwater are: nutrients, metals, chemical, biological, toxic, nontoxic, and others. The proposed WQU may capable to meet the U.S. Water Pollution Control Acts which specify the restoration and maintenance of the chemical, physical, and biological integrity of the nation's water to meet the act's interim fishable and swimmable numeric goals but not to the drinking water quality. Assume this is the feasible treatment can be accepted, the question is the capacity of WQU that what is the quantity (rate of flow) of water can pass it?
3. The capacity of WQU should be determined for each proposed WQU. Too large of water quantity passing through a WQU, it may not be able to control the water quality for it design for. For example: On system #1, refer to plan, only one WQU was proposed. It shall be located at DMH-55. The peak flow passing through is 23.89 cfs. With 24 inch diameter pipe, the flow velocity, assume pipe flow full, is 7.6 ft per sec. This velocity is much higher than erosion velocity. Flow at this velocity goes into a DMH. It will become turbulence and WQU can not function as it should.
4. The results from the Auto CAD computer program analysis have some problem. I can accept that the total flow quantity reduction when two pipe joint together at a DMH, its outflow is less than the sum of two inflows, which may due to the time of concentration varies thus the two peak flow are not occur at the time, but I can not accept the flow rate reduction when flow passing through a DMH with no outlet. It is against the principle of hydraulics. This only can happy if the piping system has leak. For example: System #1, Line 5 has flow rate of 11.71 cfs but the down stream Line 4 only has flow of 11.49 cfs, a

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1.88% flow reduction. Same as Line 12 to Line 11, flow reduced from 7.54 cfs to 7.27 cfs, 3.58% flow reduction. There are so many un-reasonable flow reductions. Flow reduction may not impact the water quality issue, but it may cause problem for sizing the leaching facility or detention/retention basin and cause overflow problem.

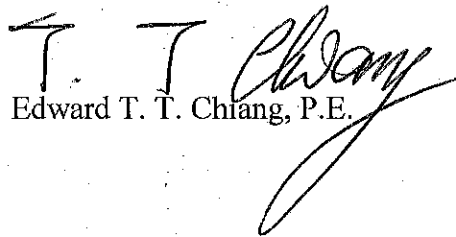
### Recommendation:

It is recommended that assume WQU does meet the treatment for water quality purpose, more WQU should be installed in the system. The reason is to avoid turbulence flow passing the WQUs.

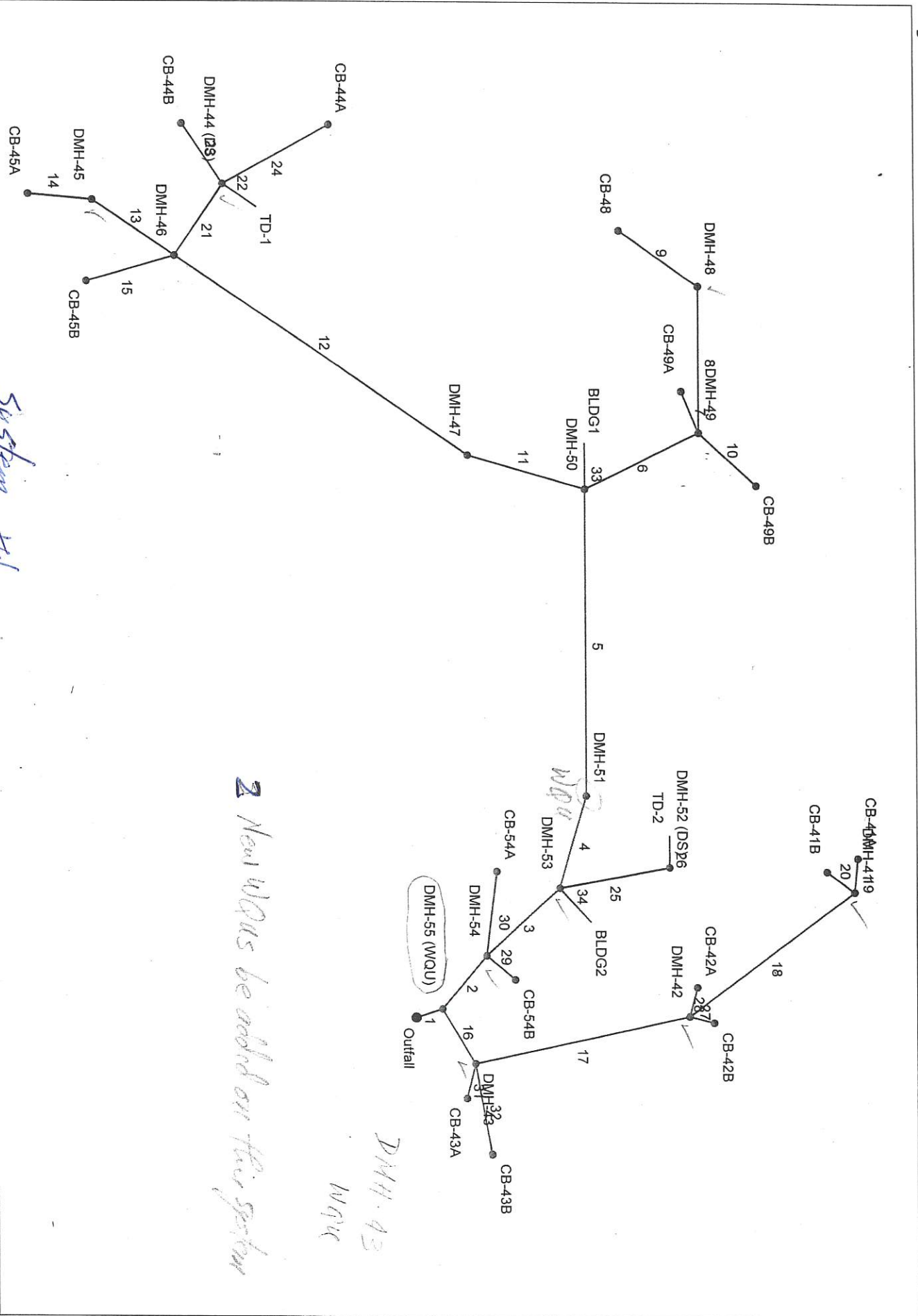
1. Each WQU should sized based on inflow and make sure the passing through velocity is in the range of design standard.
2. On system #1 (Refer the plan) add two WQUs, one at DMH-51 the other at DMH-43.
3. On System #2 also add two WQUs, one at DMH-7 the other at DMH-13
4. System #3 is fine with the proposed one WQU.
5. System #4 is confusing. The plan and the computer calculation sheet are not mach. Based on computer sheets, flow from DMH-40 goes to SIS-7 and CB-SIS-7A also goes to SIS-7. That means the outfall is SIS-7.
6. System #5 need to add one WQU at DMH-33.

Should you have any question, please call me. I will be happy to come to meet with you to discuss this issue. I did not review the wastewater treatment facility design. It should wait till the final construction plan was completed.

Very truly,

  
Edward T. T. Chiang, P.E.

# Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan

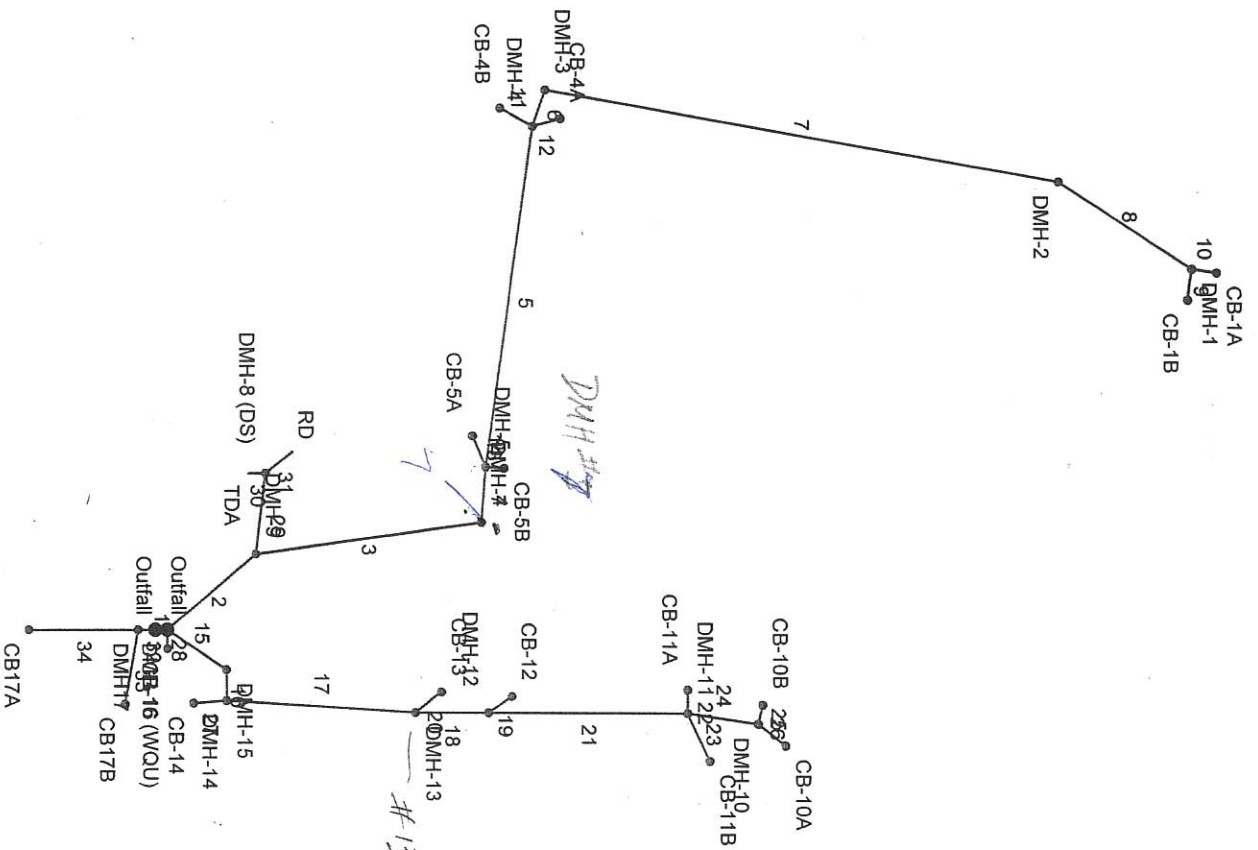


Project File: System-1Basin.stm

Number of lines: 34

Date: 3/9/2020

# Hydroflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan

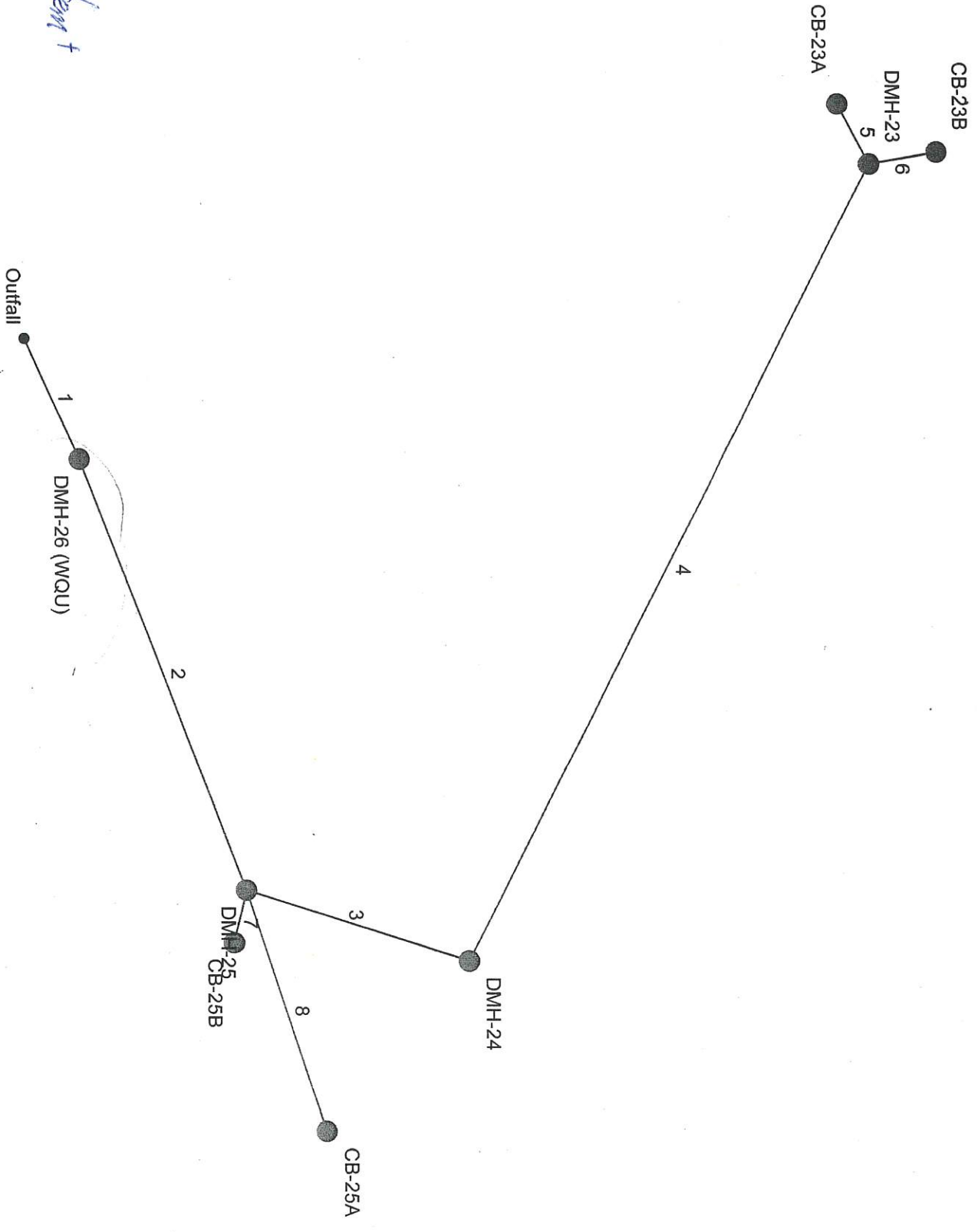


Project File: System-3SIS.stm

Number of lines: 34

Date: 3/9/2020

# Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan

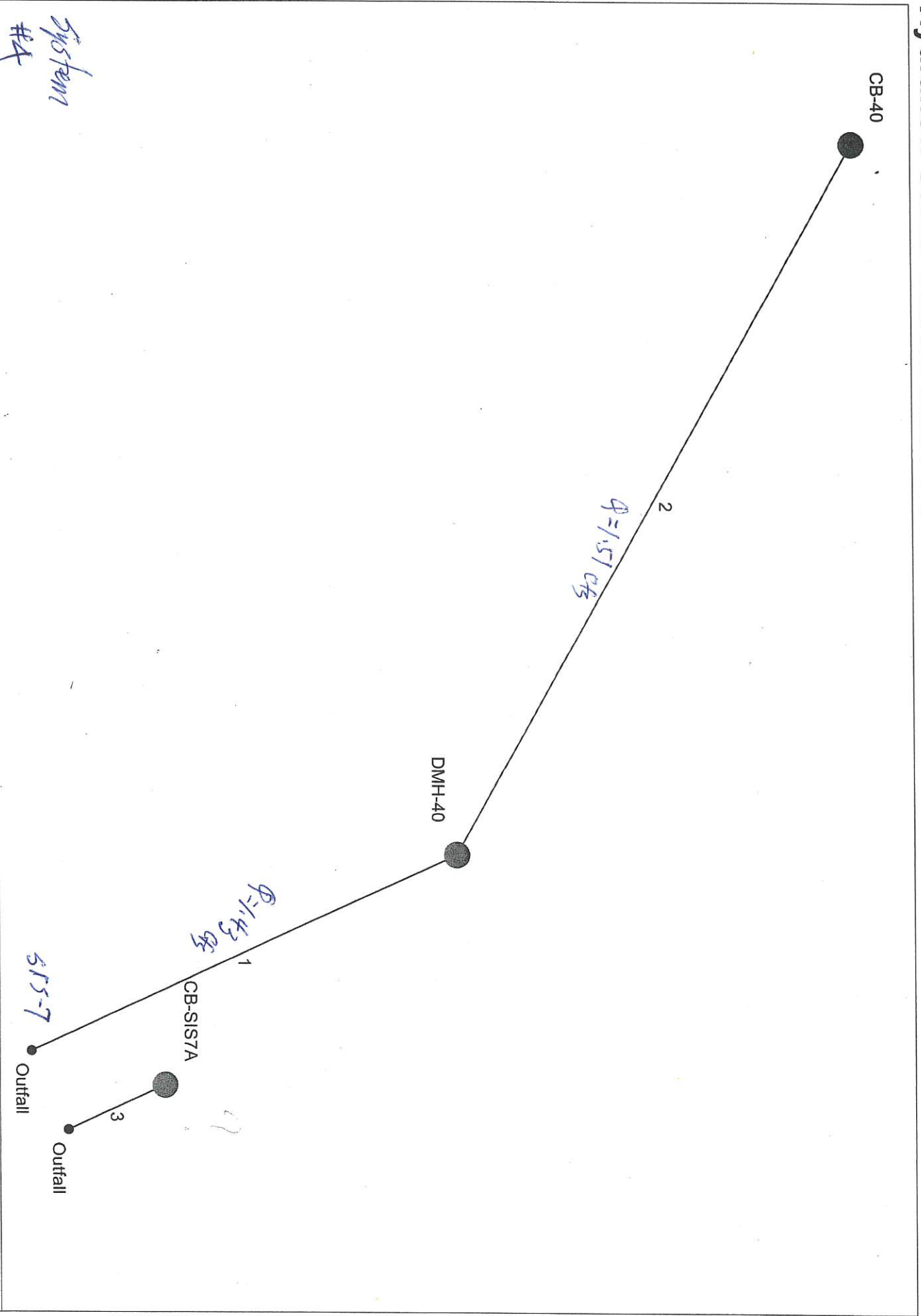


Project File: System-6SIS.stm

Number of lines: 8

Date: 3/9/2020

# Hyaraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan

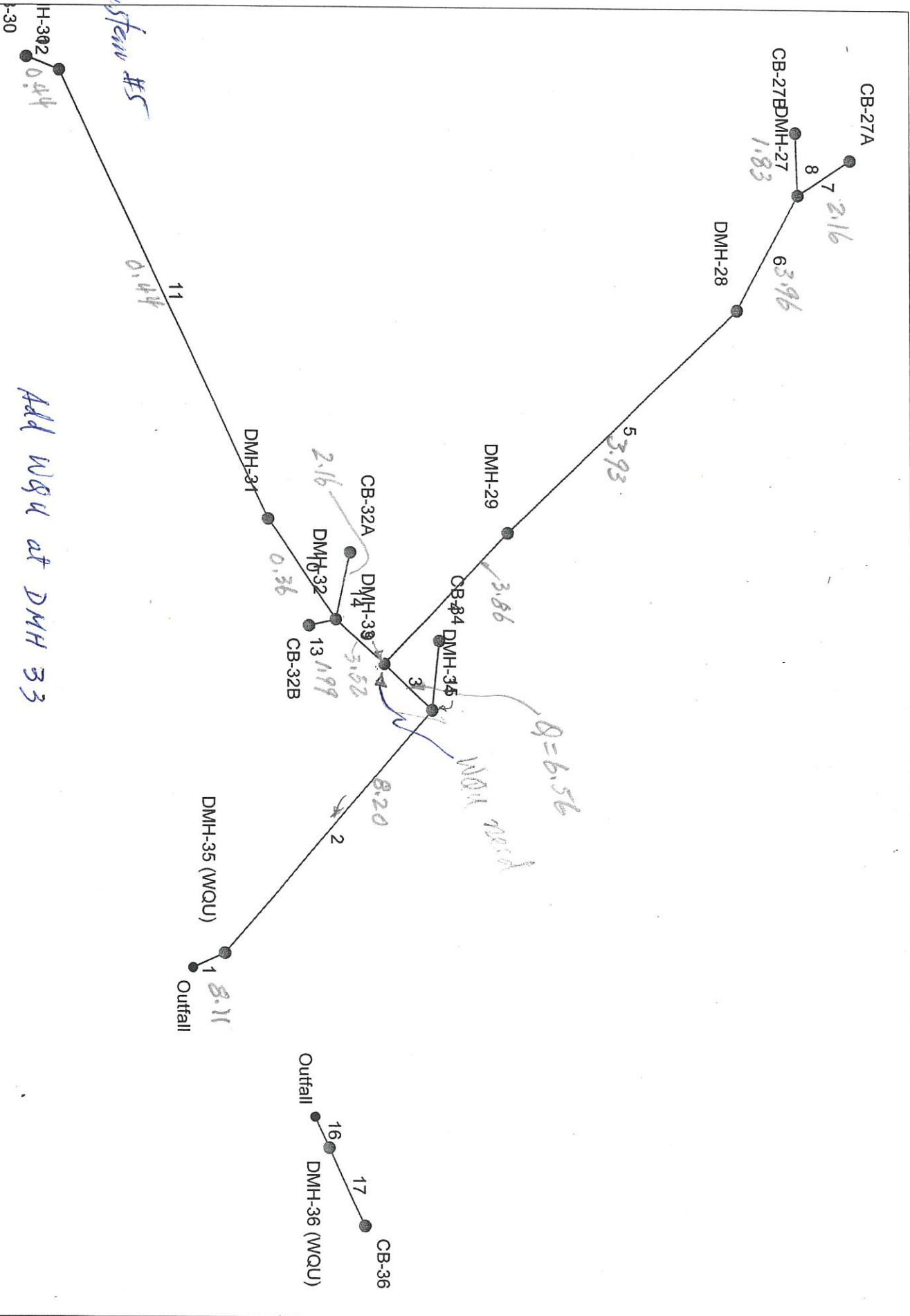


Project File: System-7SIS.stm

Number of lines: 3

Date: 3/9/2020

# Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan



Project File: System-9SIS.stm

Number of lines: 17

Date: 3/9/2020