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April 2, 2020

Review of

Drainage Calculations and Stormwater Management Report
Proposed Medical Office Site Development
20 Henry Graf Jr. Road
McKenzie Engineering Group
March 17, 2020

Plan WS-1

The approximate length of the flow paths and times of concentration contained in the calculations are as follows for each of the drainage subcatchments

Subcatchment	length of flow path	Time of Concentration
1S	290 ft	5.4 min
2S	165 ft	5 min
3S	240 ft	5 min
4S	60 ft	5 min

The only time actually calculated by use of the model was subcatchment 1S. The remaining were by direct entry. It is not reasonable that subcatchment 4S with a 60-foot-long flow path would have the same time of concentration as subcatchment 1S that have a travel length that is 5 times longer.

Actual times of concentration need to be calculated for each area as was done for area 1S. The program has the capability for such calculations and while the total volume of flow will not change for different times of concentration the peak flow rate will increase with a shorter time of concentration. It is the peak flow rate that is important in meeting Standard 2 of the Stormwater Standards.

Plan WS-2

Similarly, the same inconsistencies and direct entry of time of concentration appear in the post development analysis.

Subcatchment	length of flow path	Time of Concentration
1S	104 ft	5 min
2S	58 ft	5 min
3S	140 ft	5 min
4S	40 ft	5 min

How is it possible that flows over a smooth asphalt surface for short distances have the same time of concentration as longer flow paths over a disturbed site? Areas 1S-A and 2S-A, not listed above, have times of concentration of 5 min which is particularly long especially for 2S-A.

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The times of concentration need to be redone using the programs capabilities.

Routing Diagram for 219-180 Post2 rev

The routing diagram shows subcatchments drain directly either to the detention ponds or the design points (DP). The catch basins, defense units and piping are completely ignored. The analysis has to be redone to show the flow to each catch basin, the basins modeled as ponds, the outlet pipe modeled to convey the flow to the defense units, the defense units modeled as ponds and the defense units outlet modeled through a pipe to the detention ponds. The modeling should account for pipe entrance losses, head and tail water.

It is clear from the results of the model that was submitted that the pipes discharging into the detention ponds will have tailwater above the outlet invert which will reduce the carrying capacity of the drainpipes carrying the flow.

Detention Ponds modeling

The ponds routing was modeled by the Stor-Ind-method. When the routing of the flow is properly done as suggested above the modeling should be done by the Dynamic-Indication Method. The dynamic method treats the systems as a whole rather than independent entities and will provide a different result. I will also provide indications if the piping is too small or the catch basins will over top.

Stormwater Checklist

Standard 1

Calculations were not provided to show that scour would not occur. Therefore, the standard was not met

Standard 2

The calculations need to be redone therefore the standard is not met.

Standard 3

This standard is met to the maximum extent practicable since the parent soil on site is a clay with a low capacity to transmit water.

Standard 4

The standard is met

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Standard 5, 6 , 7

Not Applicable

Standard 8

Plan complies. Standard is met

Standard 9

Plan complies. Standard is met

Standard 10

The standard is met.