

May 1, 2020

Newburyport Planning Board
City Hall
60 Pleasant Street
Newburyport MA 01950

Re: Special Permit Application 20 Henry Graf Junior Road Newburyport MA

Dear Board Members:

I have reviewed the

- Revised Site Development Plans for 20 Henry Graf Junior Road dated rev 4/29/20
- Drainage Calculations and Stormwater Management Report Revised 4/29/20
- McKenzie Engineering Group letter to the Planning Board of 4/30/20

The plans and drainage analysis have been revised and all of my comments have been addressed. I recommend the engineering plans and drainage calculations and the Stormwater Management Plan be approved. However, there are two issues that I need to address.

The engineer states on page 3 of the letter to the Board that “test pits will be conducted within the boundary of Detention Pond #2 during construction to confirm groundwater assumptions”. It should be a condition of approval that if the results of the testing show that the detention pond needs to be raised that the revised plans be submitted to the City for review and approval prior to continuing construction.

As I have consistently noted when reviewing drainage analyses, times of concentration for the drainage analysis should be calculated using the modeling within the program and not to use direct input of 6 minutes for small areas. (The time of concentration is the time it takes water from the farthest point in the water shed to reach the design point.) The engineer’s response to my comments, on pages 4 and 5 of the response letter, refers to TR-55 issued by the NRCS and Mass DEP Hydrology Handbook for Conservation Commissioners to justify direct input of a 6-minute time of concentration. The MassDEP Hydrology Handbook incorporates TR-55 as part of the text and therefore what appears to be two independent references is only one reference: TR-55. TR-55 was issued in 1986 and was a simplification of TR-20 so calculations could be done by hand and as stated in TR-55

TR-55 is actually based on TR-20, and was developed at a time when computer software was not readily available to most designers and reviewers. The method has some limitations, especially for sizing detention facilities with low discharge rates or multiple outlets. Therefore, it should not be used for the final design of detention systems, including their final sizing.

PGC Engineering PLLC

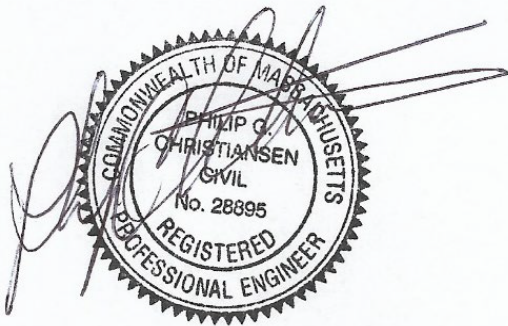
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Considering that statement it is evident that TR-55 should not be used to defend direct input of time of concentration because times of concentration directly affect the sizing of detention facilities. Additionally, TR-20 is available on the NRCS website in its latest form as WinTR-20 and in its presentation materials says times of concentration can be calculated down to 0.01 hours or .6 minutes.

If a computer model is being used it should be used to the fullest of its capabilities and not modified to accommodate outdated information presented in 1986 “when computer software was not readily available to most designers”. HydroCAD, which was developed from TR-20 has the capabilities to calculate times of concentration precisely and those capabilities should be used.

Notwithstanding the above I am accepting the drainage analysis because in the case at hand the study area is less than 2 acres in size and therefore generates a small discharge volume and rate and there is a minimum of one foot of free board in each detention pond to accommodate any error in the calculations. Additionally the design engineer who has stamped these plans and who is ultimately responsible for its design has rerun the model in a dynamic mode as I requested rather than an independent mode as originally designed thus improving on the accuracy of the results.

Very truly yours,



Philip G. Christiansen P.E.