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April 30, 2020

Newburyport Planning Board
Newburyport Town Hall
60 Pleasant Street
Newburyport, MA 01950

Re: Sports Medicine North Orthopedic Surgery, Inc.
C/O ConServ Group, Inc.
Special Permit Application
20 Henry Graf Junior Road, Newburyport, MA
(Assessors Parcel ID 82-2-B)

Dear Planning Board Members,

This letter is in response to Plan & Drainage Review letters dated April 2, 2020 from Phil Christiansen, P.E. of PGC Engineering PLLC on behalf of the Town of the Newburyport Planning Board.

Enclosed herewith are two (2) copies of the following:

- Plans entitled "Site Development Plans – Proposed Medical Building – 20 Henry Graf Junior Road, Newburyport, Massachusetts" prepared by McKenzie Engineering Group, Inc. (MEG) dated March 17, 2020 with a latest revision date of April 29, 2020.
- Report entitled "Drainage Calculations and Stormwater Management Report - Proposed Medical Office Site Development – 20 Henry Graf Junior Road, Newburyport, Massachusetts" prepared by MEG and dated March 17, 2020 with a latest revision date of April 29, 2020.
- Plan entitled "Proposed New Mob for Sports Medicine North, 20 Henry Graf Jr. Road, Newburyport, Massachusetts" prepared by Conserv Group, Inc. and dated April 14, 2020.
- Photometric lighting plan entitled "Photometric Study – Run 2, Medical Office Building – 20 Henry Graf Junior Road, Newburyport, MA" prepared by Speclines dated April 22, 2020 and Lighting Fixture Specifications.

The following are responses to the comments that were highlighted in the Town of Newburyport Planning Board April 2, 2020 drainage review letter that warrant further clarification (MEG responses are shown in *italics*).

Plan Review Comments:

Sheet C-1

1. The Handicap accessible ramps should be shown on the proposed 4 ft wide sidewalk on Henry Graf Jr. Road.

   Handicap accessible ramps have been shown on the proposed 4 ft. wide sidewalk on Henry Graf Jr. Road.

Sheet C-2

2. Pipe sizes, materials and lengths should be added.

   Pipe sizes, materials and lengths have been added to the plan.

3. There is a label on the southeasterly side of the parking lot for a prop. modular block retaining wall. The wall does not show and the grading in the area shows the wall isn't necessary. The engineer should clarify.

   The label has been removed from the plan.

Sheet C-3

4. A cleanout should be provided at the bend in the sewer service.

   A cleanout has been provided at the bend in the sewer service.

5. The fire service may be large enough for a taping sleeve and valve, but the domestic water service may need only a corporation stop and a shutoff at the property line to tie into the main. The actual size of services needed should be established with the Water Department and the plan modified accordingly.

   The domestic water service and fire protection service will be sized by a mechanical engineer and fire protection engineer in accordance with applicable local, state and federal regulations. All work will be coordinated with the Newburyport Water Department and construction performed in accordance with their standards. The sizes of the services with connection details will be provided on the construction plan set.

6. If the fire service is large, thrust blocks should be shown at the connection and at the bend.

   Thrust blocks with notations have been shown at the water service connections and bends.

Sheet LA-1

7. Is the intent to landscape or pave the islands in the parking lot?

   The islands in the parking lot will be landscaped, please see revised Landscaping Plan, Sheet LA-1.

Sheet ESC-1

8. Add a dewatering location.

   Temporary sedimentation basin locations and details have been added to the plan.

Sheet D-1

9. Add thrust blocks detail for block behind the tee and at the bend if required pipe size calls for it.

Thrust block details have been added to Detail Sheet D-5.

Sheet D-2

10. Add sidewalk detail for sidewalk on street.

A Bituminous Concrete Sidewalk Detail has been added to Detail Sheet D-3.

Sheet D-5

11. Add dewatering detail to plan.

Temporary sedimentation basin locations and details have been added to the plan.

Test Pit Data

12. Test pit information should be put on plan in summary form including the approximate surface elevation at the test pit and the SHGWT elevation.

The soil logs provided did not show the depth to redoximorphic features in the soil but only the depth at which water was weeping from the soil. Considering the logs show the C1 layer as clay, at a minimum the SHGWT should be assumed to be at the top of the clay layer.

Test pits should be conducted in the detention pond 2 during construction and the drainage adjusted according to the results.

TP-2 and TP-9 are in the area of Detention Pond 1.

Test pit	Surface elevation	clay layer	observed water	water elev.
TP-2	15	46”	46”	11.16
TP-9	16	36”	36”	13.0

The design elevation for the bottom of the basin is 12.2 which is lower than the estimated groundwater level as shown in TP-9.

The detail provided on Sheet D-4 of the design plans shows the bottom of the detention pond set at 2 feet minimum above the ESHGW. If the data from TP-2 is used the bottom of basin #1 should be at elevation 13.16 and if the data from TP-9 were used the bottom of the detention pond would have to be at elevation 15.0. Both are higher than the 12.2 elevation specified.

Similarly, TP-8 is at approximately elevation 16.3. With a 48” depth to the C1 layer the ground water can be assumed to be at elevation 12.3. By the design presented in the details the bottom of detention pond #2 would have to be at elevation 14.3 rather than the 13.10 specified.

Test pits shown on the plan have been revised to show approximate existing ground surface elevations and SHGWT elevations. Soil logs did not show depth to redoximorphic features because they were not present during subsurface exploration. As noted, test pits will be conducted within the boundary of Detention Pond #2 during construction to confirm groundwater assumptions. Seasonal high groundwater in the area of TP-9 is estimated to be at elevation 12.80 as shown on

the plan. The bottom of Detention Basin #1 has been raised to elevation 13.20 in the area of TP-9. The 2-ft. minimum separation above ESHGW mentioned on Sheet D-4 has been removed as it does not apply to detention basins.

Drainage Review Comments:

Plan WS-1

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.

The United States Dept. of Agriculture (USDA) & Natural Resources Conservation Service (NRCS) Technical Release 55 (TR-55) – Urban Hydrology for Small Watersheds Manual, Chapter 3 "Time of Concentration and Travel Time" lists limitations of the simplified procedures for estimating runoff. A limitation of this procedure states "The minimum Tc used in TR-55 is 0.1 hour" or 6 minutes. Similarly, the MassDEP Hydrology Handbook for Conservation Commissioners which provides guidance on hydrologic and hydraulic data and calculations under the Massachusetts Wetlands Protection Act states that "Tc values with this method (TR-55) may range from 0.1 to 10 hours". Based on these limitations provided by State recognized methods of estimating hydrologic data, Time of Concentrations have been revised in the HydroCAD models to use the recommended 0.1 hour minimum.

Plan WS-2

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

Subcatchment	length of flow path	Time 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.

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

The United States Dept. of Agriculture (USDA) & Natural Resources Conservation Service (NRCS) Technical Release 55 (TR-55) – Urban Hydrology for Small Watersheds Manual, Chapter 3 "Time of Concentration and Travel Time" lists limitation of the simplified procedures for estimating runoff. A limitations of this procedure states "The minimum Tc used in TR-55 is 0.1 hour" or 6 minutes. Similarly the MassDEP Hydrology Handbook for Conservation Commissioners which provides guidance on hydrologic and hydraulic data and calculations under the Massachusetts Wetlands Protection Act states that "Tc values with this method (TR-55) may range from 0.1 to 10 hours". Based on these limitations provided by State recognized methods of estimating hydrologic data, Time of Concentrations have been revised in the HydroCAD models to use the recommended 0.1 hour minimum.

Routing Diagram

3. Similarly 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.

   The Drainage Analysis has been revised to model individual flows to each catch basin and first defense unit as requested.

Detention Pond Modeling

4. 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.

   The HydroCAD models have been revised to use the Dynamic-Indication method as requested.

Stormwater Checklist

5. **Standard 1**
   Calculations were not provided to show that scour would not occur. Therefore, the standard was not met

   Sediment traps were sized for proposed outlets in accordance with ASCE No. 77 – Design & Construction of Urban Stormwater Management System: Chapter 9, Section C – Scour Hole. The calculations can be found in Appendix D of the Drainage Calculations and Stormwater

Management Report. The spreadsheet shows the sediment trap sizing for Flared End Section #1, which has the highest 100-year flow (Q100) and will result in the largest stone size (d100). The minimum stone size for all sediment trap outlets on-site shall be 8 inches. Since Flared End Section #1, and all other flared end sections on-site result in a minimum stone size below the required 8 inches, they shall use the minimum 8-inch stone size. Length and widths of all sediment traps are calculated dependent on the diameter of the outlet pipe. All outlet pipes on-site are 12 inches in diameter, therefore all sediment traps shall be 9 ft. long by 8 ft. wide according to the calculations shown in the Excel Spreadsheet. Refer to the Typical Sediment Trap Detail on Sheet D-4, for sediment trap sizing of each flared-end section outlet. Sediment trap dimensions were revised accordingly on the Site Plans.

Standard 2
The calculations need to be redone therefore the standard is not met.

Hydrologic calculations have been revised as noted in the drainage review letter. Standard 2 – Peak Rate Attenuation has been met.

Standards 3 through 10
No response required.

Very truly yours,

MCKENZIE ENGINEERING GROUP, INC.

Erik Schoumaker, E.I.T.
Project Engineer

Bradley C. McKenzie, P.E.
President

CC: Newburyport Conservation Commission
Sports Medicine North Orthopedic Surgery, Inc.
Conserv Group, Inc.