Design Consultants, Inc.

Civil Engineering
Transportation/Traffic
Water/Wastewater
Geotechnical
Land Surveying
Environmental
Planning

March 20, 2018

Town of North Reading
Town Planner/Community Planning Administrator
c/o Danielle McKnight, AICP
235 North Street
North Reading, MA 01864

RE: Peer Review
Definitive Subdivision Application
77 Elm Street
North Reading, MA

Dear Ms. McKnight:

DESIGN CONSULTANTS, INC. (DCI) has performed a review of the Application for Approval of a Definitive Plan, prepared by LJR Engineering, Inc., which includes.

1. Stormwater Analysis, 77 Elm Street, Definitive Subdivision, North Reading, Massachusetts, prepared by Williams & Sparages, dated January 17, 2019.
2. Definitive Subdivision plan set prepared by Williams & Sparages, dated January 17, 2019.

This review is limited to the material submitted and reviews the plan set and stormwater management.

The plan set has been reviewed relative to the requirements set forth in Chapter 350 of the North Reading Code, Subdivision of Land (the Bylaw).

The stormwater management has been reviewed relative to the respective Standards contained within the Massachusetts Stormwater Handbook (the Handbook) and the Town of North Reading Stormwater Management Rules and Regulations (the Regulations).

CHAPTER 350 SUBDIVISION OF LAND

§350-13. Definitive Plan

1. B. Contents (2)(i) – This section requires that all easements requires that easement purpose be stated.

2. B. Contents (2)(l) –This section requires that all elevations are to be referred to US Coast and Geodetic Survey. The current standard is North American Vertical Datum of 1988 (NAVD 88). The elevations on the Plans are on an assumed datum. A note on Sheet 4 of 8 – Definitive Plan & Profile Road A indicates that the site is on an assumed Datum, and provides an adjustment to NAVD88. Recommendation: DCI recommends that the Plans be updated to NAVD88, so in the future, accurate information will be available in the event maintenance is required.

§350-14. Streets

1. E. Dead End Streets 3. – The Applicant has request a waiver from this Section which requires that dead end streets be no more than 500- feet long without a looped water line. The street length as proposed is 538.90-feet. It would be possible to loop the waterline by extending it 300± feet to Fairview Street. It appears that the extension would be in the buffer zone of an isolated wetland and may require rock excavation. However, based on our review, it appears that the additional 38.90-feet of roadway is needed to meet the minimum lot dimensional and area requirements. The waiver request does not provide any justification and appears to be based on not constructing an additional 300± feet of water line to provide the required loop.

§350-25. C. Drainage

1. (5) The applicant has requested a waiver from the requirement the reinforced concrete pipe (RCP) be granted. In lieu of RCP, the Applicant is requesting the use of HDPE, Sch. 40 PVC or ductile iron. DCI recommends that dual wall HDPE pipe conforming to AASHTO M294 Type S or Type SP be used for pipes 12-inches or greater in interior diameter, and that ductile iron pipe be used for diameters less than 12-inches.

2. (7) Standard Design for drainage. (b) Closed system – conduit drainage (1) - The Engineer has not calculated design capacities documenting that the stormwater collection system can handle the 25-year storm.

3. (7) Standard Design for Drainage. (d) – The Engineer has not demonstrated the discharge velocities from outlets will not cause erosion or scour.

4. (7) Standard Design for Drainage. (f) – SWMA -1, SWMA-2 and SWMA-3 discharge flow through the spillway way for the 25-year storm event. These SWMAs should be designed to meet the intent of this requirement.

§350-25. D. 260

1. As there are roadway cuts up to 16 feet on this project *the Engineer should evaluate the need for roadway sub-drains on this project. Test pits and/or borings should be completed to document the estimated seasonal high groundwater table. In the event that sub-drains are required the drainage system will need to include flows from the sub-drains.*

§350-27. Curbs and Berms

1. Sheet 5 of 8 shows curbing through the driveway cuts. Also the topographical lines in the driveway cuts are indicative of curbing. *The Engineer should revise the drawings to reflect the driveways. At least two driveways are shown over 20-feet in width. These width should be reduced to minimize run-off.*

§350-32. Streetlights

1. Street light locations are not shown.

§350-33. Maintenance of improvements

1. The Operation and Maintenance Plan indicates that 77 Elm Street LLC will be responsible for the stormwater system maintenance. While the catch basins will be in the street and become the Town's responsibility, it is recommended that a homeowner's association be formed to maintain stormwater infrastructure outside of the easements. That being said, the oil/water separator connected to SWMA-3 should be moved out of the right of way and into the drainage easement.

Schedule A

1. The detail on Sheet 4 of 8 should be modified to indicate that drainage pipe will be dual walled HDPE.

2. The Engineer should indicate were the pipe cover is less than 3-feet and provide calculations documenting the cover is adequate.

Schedule F

1. The Engineer should provide calculations indicating the stormwater drainage system pipes are designed for a 25-year storm, and the minimum velocity in the pipes is greater than 5 feet per second for the 5-year event and less than 25-feet per second for the 25-year event.

Schedule G

1. Provide a detail on the drawing that conforms to the Town of North Readings Standard as shown in Schedule G.

STORMWATER MANAGEMENT RULES AND REGULATIONS

Section 4 - Stormwater Management Permit

G. Operation and Maintenance Plan

The Operation and Maintenance Plan requires easements to be "sufficient in location and extent to carry out the required maintenance". Stormwater Management Area No. 2 (SWMA-2) is located in the southwest portion of the Subdivision. A 20-foot wide drainage easement is provided along the property line between Lot Nos. 5 and 6 which contains a 12-inch storm drain. A retaining wall is located 130± feet from the cul-de-sac property line with a manhole set back slightly behind the wall. The storm drain exits through the retaining wall. At this location the retaining wall is 15± feet tall. SWMA-2 is located at the base of the wall. At this location the wall is at least 20-feet tall. There is no access through a drainage easement to access the pipe at the base of the wall, or SWMA-2. *The Engineer should provide access for a vehicle to SWMA-2 in order to facilitate maintenance and inspections.*

In addition, Vol. 2 Ch.2 of Massachusetts Stormwater Handbook (SW Handbook) requires access in the basin design. The area at the top of the basin must provide unimpeded vehicular access around the entire basin perimeter. The access area shall be no less than 15 feet. The easements and property lines shown do not provide this minimum 15-feet of access around the infiltration basins. *The Engineer should provide the required access for maintenance vehicles around SWMA-1, SWMA-2, SWMA-4 and SWMA-5.*

DPW Site Plan Review Checklist

The Engineer has provided a plan called Topographic Road Plan A (Plan) which attempts to show all the information required by the following Stormwater Permit requirements. This plan contains a lot of information, is difficult to read and does not meet the Plan requirements of the Checklist.

4. Exiting Condition Plan

Exiting Conditions Plan not provided. Elevations are not referenced to NAVD 88. *The plan should be provided separately and updated so that all elevations are in NAVD 88.*

The Plan is not tied into the Massachusetts State Plan Coordinate System.

5. Demolition and Erosion Control Plan

A Demolition and Erosion Control Plan has not been provided. *The Engineer should provide the Demolition and Erosion Control Plan as required.*

Anti-tracking BMP (i.e. stabilized construction entrance) are not shown

6. Construction Layout Plan

A Construction Layout Plan has not been provided. *The Engineer should provide the Construction Layout Plan as required.*

There is no sign schedule.

There are no pavement markings. It appears a minimum a cross walk and stop line are required.

Snow storage areas are not included.

7. Grading and Drainage Plan

The Topographic Road Plan appears to have been prepared to meet the requirements of the Grading and Drainage Plan.

Stockpile areas not shown.

8. Utility Plans

A Utility Plan has not been provided. *The Engineer should provide the Utility Plan as required.*

Water services are not shown.

Electric, cable and phone are not shown.

Transformer locations are not shown.

9. Landscape Plan

A Landscape Plan has not been provided. *The Engineer should provide the Landscape Plan.*

Appendix C – Stormwater Management Plan

E. Stormwater Report

1. **Peak Flow Attenuation**
   (a) The Engineer has not verified the capacity or structural condition of the Town's drain to allow the proposed discharge.
   (b) During development conditions have not been evaluated.
   (g) The Stormwater Management Plan does not evaluate the 5-year and 50-year storm events as required by the Subdivision Regulations.
   (h) The HydroCAD® analysis does not use the peak rainfall as modified by the Cornell Atlas.
   (k) The Infiltration flows should not be subtracted from the post development flow.

2. **Recharge**
   (a) Test pits are not shown in any of the five stormwater recharge areas. The regulations require three (3) test pits per recharge area.
   (b) Seasonal high groundwater and bedrock depths are not shown.

(c) The soil type and saturate hydraulic conductivity have not been determined.
  (1) The three tests pits have not been performed.
  (2) Laboratory soil textural analysis has not been performed.
(f) The hydraulic profiles have not been provided.
(g) Roof runoff has not been recharged for all the buildings.
(h) Test pits locations have not been provided.

3. Water Quality

1. BMP Design
   (1) Proposed SWMA-1 has no pretreatment. The infiltration trench shown is not a pre-treatment device for an infiltration basin.
   (2) SWMA-1, SWMA-2, SWMA-4 and SWMA-5 are infiltrations basins. The SW Handbook requires that "After the basin floor is shaped, place soil additives on the basin floor to amend the soil. The soil additives shall include compost, properly aged to kill any seed stock contained within the compost. Do not put biosolids in the compost. Mix native soils that were excavated from the A or B horizons to create the basin with the compost, and then scarify the native materials and compost into the parent material using a chisel plow or rotary device to a depth of 12 inches. Immediately after constructing the basin, stabilize its bottom and side slopes with a dense turf of water-tolerant grass. Use low-maintenance, rapidly germinating grasses, such as fescues. The selected grasses must be capable of surviving in both wet and dry conditions. Do not use sod, which can prevent roots from directly contacting the underlying soil. During the first two months, inspect the newly established vegetation several times to determine if any remedial actions (e.g., reseeding, irrigating) are necessary". *These requirements should be added to the drawings.*
   (3) The SW Handbook requires that each infiltration basin should have a monitoring well.
2. Hydraulic profiles are not provided.

4. General Design & Plan Requirements

(f) The 6-inch overflow pipe shall be a minimum of 10-inches in diameter.
(j) See previous comments.
(l) Provide structural calculations for pipes with less than 4-feet of cover. All pipes are located in the roadway or drainage easements and shall be designed for HS-20 loading.
(m) See previous comment.
(n) Provide calculations that demonstrate the piping has been designed for the 25-year storm.

F. Plans

1. 2. Plan Notes – General Notes and Erosion Control and Dewatering Notes that are typical for Sub-Division Plans are missing.

2. 3. Nonstructural Storm Water Management Strategies – The Applicant and its Engineer have not discussed nonstructural management strategies or Low Impact Development (LID) / Green Infrastructure in the Stormwater Report or other documents. The proposed project appears to disturb 90% of the site. Significant earthmoving with cuts up to 18-feet and fills over 20-feet. No attempt was made to meet this item, or the LID requirements in other places.

APPENDIX D – EROSION AND SEDIMENT CONTROL

1. In general, the erosion and sediment control consists of a silt fence around the entire site. There is no stabilized construction entrance, provisions for stockpile protection and stabilization have not been provided, and there is no provision to prevent erosion at all. *The Engineer should provide a Stormwater Pollution Prevention Plan as required by Appendix D, which not only addressed the US EPA's Construction General Permit requirements, but also includes all 21 guidelines in Appendix D.*

APPENDIX E – OPERATION AND MAINTENANCE PLAN

A. Operation and Maintenance Plan Requirements

1. (4.) - An estimated operations and maintenance budget and anticipated source of funding is not included.

2. (5.) – The maintenance agreement is not provided. All items from (a) to (e) should be included as well as which entity (not the Town) will be provided once the sub-division is developed. Please refer in detail to Paragraphs B. Stormwater Management Easements and C. BMPs serving multiple lots or properties. The maintenance agreement should also contain the process to implement the items required by Paragraphs D. Changes to Operation and Maintenance Plans, E. Annual Report Submittal, and E. Records.

Drawings

This portion of the review attempts not to repeat items contained in other comments.

1. Sheet 4 - The first pipe from SWMA-1 should be a minimum of 12-inches in diameter. Due to the lack of calculations evaluating the proposed pipe network the minimum size of this pipe cannot be verified.

2. Sheet 4 – A stop line and crosswalk should be provided at the intersection with Elm Street.

3. Sheet 5 – The retaining walls are over 4-feet, in locations up to 20-feet tall. A design by a Professional Engineer experienced in retaining wall design should be required. This retaining walls will also require building permits from the Building Inspector.

4. Sheet 5 – Infiltration systems are located behind the building on Lot No. 6. This systems are within the zone of influence of the retaining wall. The infiltrated stormwater is likely to add water pressure and additional lateral earth pressure from saturated soils behind the wall. It is recommended that the infiltration systems be moved.

5. Sheet 5 – Water services are not shown.

6. Sheet 5 – Electrical, cable and communications conduit, pull boxes and transformers not shown.

7. Sheet 5 – The apparent swale from the SWMA-1 outfall to SWMA-2 directs water away from SWMA-2.

8. Sheet 5 – Test pit locations not provided for SWMAs.

9. Sheet 5 – The scale of the SWMAs makes the details difficult to read. It is suggested that the SWMAs be shown at a large scale to facilitate review.

10. Sheet 6 – Town Clerk's and Engineer's certifications missing.

11. Detail Sheets – A spillway detail is not provided.

12. Detail Sheets – A level spreader detail is provided. Where will it be used?

13. Detail Sheets – A detail for the wheel chair ramp is not provided.

14. Detail Sheets – It is recommended that pipe joints and bends be mechanical joints.

15. Detail Sheets – The cultic detail for SWMA-3 shows 18-inches of stone underneath the chambers. This conflicts with the HydroCAD® model.

16. Detail Sheets – Manhole risers on all three openings of the oil/water separators should be shown to facilitate maintenance.

17. Detail Sheets – The inspection port detail should not be optional.

HydroCAD® Analysis / Stormwater Standards

1. Time of Concentration – According to the MA DEP's "Hydrology Handbook for Conservation Commissioners March 2002, page 4-20, the length of sheet flow is seldom greater than 50 feet.

2. Pipes are not included in the model. Pipe calculations are required for the 25-year storm event.

3. SWMA -2 flows to a wetland. This wetland should be another design point.

4. Infiltration basins should be modeled with a CN value of 98, as they become a pond with inflow, and infiltration is accounted for by exfiltration.

5. As previously mentioned, rainfall intensities from the Cornell Atlas should be utilized. Currently the SWMAs are grossly undersized.

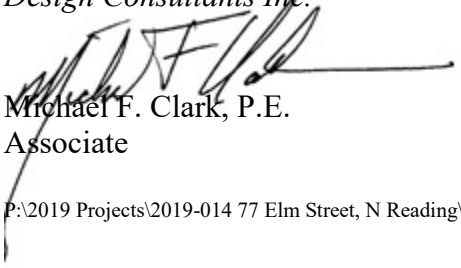
6. Stormwater Standard 3 – Absolutely no documentation has been provided that this standard has been met. The Engineer should review the requirements for documenting compliance in Volume 3 of the SW Handbook, and provided the required information.

7. Time Span needs to be increased for SWMA-2 and SWMA-3.

8. The outlet culvert from SWMA-3 does not match the inverts on the drawings. The outlet on the plan is 0.5-feet lower than that shown on the Drawings, which will result in significantly more run-off to Elm Street drainage system.

We trust that the contents of this letter satisfies your current needs. Should you have any questions, please do not hesitate to contact me at mclark@dci-ma.com or (617) 776-3350, extension 323.

Sincerely,
Design Consultants Inc.



Michael F. Clark, P.E.
Associate

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