



October 12, 2017

Michael Kulesza – Chairman
Town of Norfolk – Zoning Board of Appeals (ZBA)
One Liberty Lane
Norfolk, MA 02056

Re: Norfolk, MA – The Village at Norfolk
Comprehensive Plan – Final Peer Review

Dear Mr. Kulesza:

BETA Group, Inc. (BETA) has completed its final peer review of the preliminary design for the referenced project, based on the following materials prepared by Outback Engineering, Inc. unless otherwise noted:

- 'The Village at Norfolk – A Residential Development in Norfolk, Massachusetts' Site Plan Set, sheets 4, 5, 7, 8, 10, revision date August 14, 2017
- 'The Village at Norfolk – A Residential Development in Norfolk, Massachusetts' Site Plan Set, sheets 4, 5, 7, revision date September 12, 2017
- 'The Village at Norfolk – A Residential Development in Norfolk, Massachusetts' Site Plan Set, sheets 4, 5, 8, revision date October 5, 2017
- Supplemental Drainage Report entitled 'The Village at Norfolk', dated August 14, 2017 and revised September 12, 2017.
- Summary ground Water Mounding Report prepared by D'Amore Associates Inc. dated September 8, 2017
- Supplemental groundwater mounding information dated prepared by D'Amore Associates Inc. dated October 5, 2017
- Responses to Comments for Traffic Peer Review, prepared by Green International Affiliates, Inc. dated August 14, 2017
- Cut/Fill analysis prepared by Outback Engineering, dated October 5, 2017
- Topsoil estimate prepared by Outback Engineering, dated October 5, 2017.
- Response to Hill law memo, dated October 5, 2017

The preceding items have been reviewed in the contexts of the following documents:

- Norfolk 'Rules & Regulations for Subdivision of Land & Site Plan Approval,' amended September 16, 2010 (referred to as the Subdivision/Site Plan Regulations)
- Norfolk 'Zoning Bylaws with Amendments Through May 2014' (referred to as the Zoning Bylaws)
- The Massachusetts Stormwater Handbook

Unresolved comments/recommendations from the previous reviews are reproduced below, along with the applicant's responses to same (items resolved through previous reviews are not reproduced herein, unless design elements pertinent to them have changed). New comments on the revised preliminary design are then provided, following the previous comments/recommendations.

In general, previous comments have been adequately addressed and the design has been modified appropriately. Any additional information can be provided in the final design plan set to be submitted.

Since this is a review of what have been presented as revised preliminary design materials, our comments are limited to the current information and level of detail provided by the applicant. Further review of the final design materials will be performed at such time as those materials are provided.

The plans have been revised to reflect discussions at the workshop held on June 5, 2017. The design still includes 32 total units. The revisions include:

- Two (2) units have been removed from the front of the site by Rockwood Road.
- Three (3) units have been removed from the southerly side of the cul-de-sac roadway.
- Two (2) – three (3) unit buildings have been added.
- The length of the cul-de-sac roadway has been reduced.

The revised site layout allows for more open space and reduces the overall building massing. We note that as with the previous design, much of the “open space” is occupied by stormwater systems and septic systems.

General – 10/12/2017

- The Applicant has requested a waiver from Subdivision Rules and Regulations *Section 5.2.3. Earth Removal*. In order to assist the Board in reviewing this request, the Applicant has provided earthwork estimates for the project. The estimate shows that 12,873 cubic yards of fill are required. This estimate seems reasonable, but conservative, for the site as currently designed. The estimate does not account for material from the excavation for subsurface drainage and septic systems or for roadways, sidewalks, etc. Therefore, the required volume of fill will likely be somewhat less than the estimate.
- The Applicant has requested a waiver from Subdivision Rules and Regulations *5.10. Loaming and Seeding*. The waiver is requested to allow removal of topsoil from the site. The Applicant has provided an estimate that 9,290 cubic yards of topsoil are available on site. Approximately 3,900 cubic yards of topsoil are required for the site. Therefore, approximately, 5,390 cubic yards of topsoil are proposed to be taken off site. This estimate seems reasonable for the site as currently designed.
- As requested at the September 20, 2017 ZBA meeting, the plans have been revised to show vertical granite curb for sidewalks adjacent to the roadway.

Civil/Site Initial Review Comments

- 1) The roadway alignment and geometry are not shown on the plans.

Initial Review Recommendation: The Proposed roadway alignment and geometry (including radius and lengths) should be shown on the plans to allow for an evaluation of access, circulation and safety.



Applicant's Response: A Layout Plan has been added to the plan set, showing additional roadway geometry and centerline alignment with stationing.

BETA 2: Revisions partially acceptable; additional roadway geometric information for at least the centerline alignment (curve data, PC/PT locations, tangent bearings and lengths) should be provided.

Applicant's Response 2: The final site design post-permit will include a Layout Plan with additional roadway geometry as requested (centerline curve data, PC/PT, tangent bearings and lengths).

BETA 3: We shall reserve comment until such time as the referenced information is provided in the final site design. No additional information submitted as part of the 4th review.

- 2) The proposed roadway width of 22 feet is less than the Town of Norfolk Street standard. Two-way travel will be impacted by on street parking or stalled vehicles.

Initial Review Recommendation: *The Rules and Regulations for Subdivision of Land and Site Plan Approval - Appendix D specifies a pavement width of 24'. BETA defers to the board if a waiver from this guidance is required.*

Applicant's Response: The project is proposing a 22' wide paved roadway with Cape Cod berms which will provide adequate access and turning movements. As indicated by BETA, a waiver from the town's required 24' roadway has been requested.

BETA 2: We have received and reviewed the truck turning analysis prepared by Green International. The analysis used a forty (40) foot long non-articulated ladder truck, and modeled the turning movements in both directions at each intersection of development, as well as through the cul-de-sac. Based on the sketches provided, the evaluated ladder truck will be able to negotiate all of the roadways without leaving the roadways, albeit with encroachments into opposing lanes in most cases. However, this is not unusual for developments such as this one, and it does not appear that the provision of twenty-four (24) foot wide roadways would alleviate the encroachments. Therefore, provided that on-street parking restrictions are applied to the development to ensure access for emergency vehicles, we support the waiver request for twenty-two (22) foot wide roadways.

Applicant's Response 2: BETA believes a waiver from the town's required 24' roadway to allow 22' wide road is appropriate; no further response necessary.

BETA 3: Response satisfactory, to the extent that the roadway geometry/reduced width will work if no on-street parking is allowed. Applicant should definitively state and demonstrate that on-street parking restrictions shall be applied to the roadways within the development.

- 3) The radius of the roadway, combined with the 22' pavement width, will likely require larger vehicles to use the full pavement width when negotiating the curve at the southern end of the development. Emergency vehicles may have difficulty passing traffic in this location.

Initial Review Recommendation: *It is suggested that the applicant provide a truck turning analysis for review.*

Applicant's Response: A truck turning analysis shall be provided by the applicant's traffic consultant, Green International, during final design, to ensure that emergency vehicles have sufficient maneuvering space.

BETA 2: Refer to item 2 above.

Applicant's Response 2: Refer to response #2 relative to truck turning movements; no additional response necessary.

BETA 3: Response satisfactory; item resolved.

- 4) The dimensions of the parking spaces have not been shown on the plans.

Initial Review Recommendation: Please verify that all spaces are at least 9' x 18'. It is also suggested that the number of spaces be added to the plans for clarity.

Applicant's Response: A total of 149 parking spaces with minimum dimension of 9'x18', including garages and driveways, have been provided. See Sheet 1 for a summary table.

BETA 2: Revisions acceptable; item resolved.

Applicant's Response 2: The revised plans provide 143 total parking spaces which is more than adequate to support the 32 proposed homes. No further response necessary.

BETA 3: While the total number of parking spaces has been reduced from the originally proposed 149 to the currently proposed 143, the new number is still significantly more than the required parking total of forty-eight (48) spaces. Revisions acceptable; item resolved.

- 6) Although there is no obligation to meet ADA, pedestrian accessibility within the development is an important design element.

Initial Review Recommendations:

- Consider providing sidewalks on one of the project roadways in addition to the interior walkways.
- Consider relocating the walkway between units 12 and 13 to provide a better alignment for pedestrians coming from units 1 through 5 to the "Village Green".
- Consider sidewalk connection to the "Village Green" from units 6 through 8.
- Provide curb ramps at all roadways.
- Provide curb ramp at the Gazebo parking area.
- Provide minimum 5' sidewalk/walkway widths at a maximum 5% slope.

Applicant's Response: Many of the sidewalk suggestions have been incorporated into the revised plans, in particular:

- a. Sidewalks have been relocated along the entry road and dead end road at the back of site.
- b. As discussed during the meeting, additional survey detail along Rockwood Road was performed. Based on this survey, the applicant may construct a sidewalk along the west side of Rockwood

Road that would connect to the existing concrete sidewalk on the north side of the railroad tracks, or a crosswalk may be provided between the entry road to the existing sidewalk on the east side of Rockwood.

- c. Handicapped accessible ramps shall be provided at appropriate locations, to be shown on final site plans.

BETA 2: Revisions acceptable to the extent that they have been developed; we shall reserve comment on the final locations & designs for the Rockwood Road sidewalk and ADA ramps pending submission and review of those materials.

Applicant's Response 2: As noted by BETA, the plans show a sufficient sidewalk network which may be further detailed in the final site design.

BETA 3: No change; we shall reserve comment until final designs are submitted.

- 7) The Design Approach Narrative discusses the proximity of the development to the Town Center via an existing sidewalk on Rockwood Road. However, the existing sidewalk is located on the opposite side of Rockwood Road. No crosswalk is indicated on the plans.

Initial Review Recommendation: Show a proposed crosswalk location on Rockwood Road to allow for evaluation of sight distance and safety of the crossing.

Applicant's Response: See response 6.b. regarding possible crosswalk at entry road intersection with Rockwood.

BETA 2: Refer to item 6 above.

Applicant's Response 2: See response 6.

BETA 3: It appears that the proposed sidewalk will be installed along the west side of Rockwood Road; therefore, no crosswalk to the sidewalk on the east side of the road will be warranted. Revisions acceptable; item resolved.

- 8) The road serving Units 23-32 is a dead end with no turn around.

Initial Review Recommendation: Provisions for allowing vehicles to turnaround should be provided.

Applicant's Response: A cul-de-sac meeting town subdivision/site plan regulations has been added at back of site.

BETA 2: Refer to item 3 above.

Applicant's Response 2: With the reconfigured homestyles and locations, the cul de sac was shortened from the prior plan set.

BETA 3: The revised cul-de-sac roadway is now 377' long, which is less than the maximum allowable cul-de-sac length per the Subdivision Regulations. However, given that the development has only one

(1) point of egress, the Town measures the total length of the cul-de-sac from the intersection at Rockwood Road. By that measurement, the cul-de-sac still exceeds the maximum allowable length, if no secondary means of egress from the development is provided.

The applicant may consider developing a secondary controlled-access path (e.g. across the Town parcel west of the development, to Boardman Street), and coordinate same with the Town. There are a number of proven, readily available geosynthetic products that may be used to reinforce unpaved, intermittent use paths to provide adequate support for vehicles without requiring the development of a traditional roadway/driveway.

Based on information presented at the September 20, 2017 ZBA meeting, our understanding is that a secondary emergency access will not be provided.

The Applicant has requested a waiver for cul-de-sac length from *Section 4.14.9.1. Cul-De-Sacs* of the Subdivision Rules and Regulations.

- 9) The Design Approach Narrative discusses roadway and site lighting, but no lighting is shown on the plans.

Initial Review Recommendation: The proposed location for lighting should be shown to allow evaluation of potential light spillage onto adjacent property.

Applicant's Response: A site lighting plan will be provided under separate cover from T. Ryan Associates.

BETA 2: The site lighting plan has been received, and will be reviewed separately as stated previously. See landscape architecture review comments dated May 19, 2017.

Applicant's Response 2: The site lighting plan was provided to the Board previously.

BETA 3: This item will be addressed in the Landscape Architecture review. A separate landscape review memo dated October 12, 2017 has been provided to the Board.

- 11) It appears that the proposed retaining wall adjacent to the MBTA corridor will require access to the MBTA right of way to construct.

Initial Review Recommendation: Clarify if access to the MBTA right of way is needed or adjust the location of the wall.

Applicant's Response: The applicant has filed for license from the MBTA to perform construction work within the rail right of way to construct the retaining wall. If a license is not obtained, the wall may be setback to provide sufficient workspace.

BETA 2: We shall reserve comment until such time as either the access rights are secured or the design is modified to allow sufficient work space outside of the MBTA corridor. Also see landscape architecture review comments regarding other proposed retaining walls.

Applicant's Response 2: With the revised layout, the proposed road along the railway was setback further from the property line by approximately 2 ft. The applicant continues to seek a license from the MBTA to perform construction work within the rail right of way to construct the retaining wall. If a license is not obtained, the wall may be setback to provide sufficient workspace.

BETA 3: We shall reserve comment until such time as this item is resolved and any additional information relative thereto is provided in the final site design.

- 12) The Design Approach Narrative discusses using an irrigation well in conjunction with other sustainable irrigation practices. The proposed location for the well is not shown.

Initial Review Recommendation: Show the proposed well on the plans to allow for an evaluation of any impacts.

Applicant's Response: An irrigation well is now shown on site plans near the gazebo.

BETA 2: We suggest that the well also be depicted on sheets 4 and 5 (Utility and Grading & Drainage Plans, respectively), and that any/all applicable distances and setback requirements from other existing or proposed features (septic systems, infiltration systems, buildings, property lines) be shown.

Applicant's Response 2: The irrigation well is now also shown on the Grading plan.

BETA 3: The irrigation well has been added to the Utility and Grading & Drainage plans, but applicable distances/setback requirements from existing and/or proposed features are not depicted. The applicant should identify said setbacks and demonstrate that they are met by the proposed well location. Note that the irrigation well location relative to the proposed septic systems will also be evaluated by the Board of Health, as part of their review of the septic system designs.

9/20/2017 – An offset of 74' to the reserve area for SAS #5 has been shown on the Utility Plan. Since this is not a potable water well this offset should be acceptable. This should be confirmed by the Board of Health review of the septic systems.

- 14) Water services and sewer services are missing from the plans.

Initial Review Recommendation: The locations of the water and sewer services for each unit should be shown on the plans.

Applicant's Response: A Utility Plan has been added to the plan set, showing water and sewer services more clearly.

BETA 2: The addition of the separate Utility Plan depicting water and sewer services is acceptable; however, those utility lines are extremely light and difficult to discern on that plan sheet. We suggest that the lines depicting the utilities be darkened on the Utility Plan for better legibility.

Applicant's Response 2: Final site plans shall ensure that water lines, sewer services, and other utilities are clearly shown.

BETA 3: The proposed water and sanitary sewer elements have been color coded in the revised .pdf's. Revisions acceptable; item resolved.

16) Documentation has not been provided showing the water demand requirements from the units.

Initial Review Recommendation: The applicant should provide a demand analysis to verify that the proposed water main will have sufficient capacity for the residential use and associated fire demand.

Applicant's Response: Water Demand Estimate Of 4,298 gallons per day (average day demand) is shown on Sheet 1, based on calculations listed in EPG's comment letter with 154 gallons per day per residence.

BETA 2: The addition of the water demand information to Sheet 1 is acceptable; we shall defer to EGP to evaluate the suitability of the proposed water system design to meet the anticipated water demand.

Applicant's Response 2: No further response necessary.

BETA 3: The applicant should provide documentation from EGP that the proposed water system will meet the anticipated water demand for the development.

9-20-2017 - Documentation from EGP has been received – Item resolved.

17) The work shown on the plans approaches the property line at multiple locations. For example, the proposed retaining wall along the MBTA Commuter Rail property is shown all the way up to the property line. It does not seem feasible to construct the work in this area without a temporary easement from the adjacent landowner.

Initial Review Recommendation: Consider moving the proposed work away from the property line or obtaining temporary easements.

Applicant's Response: Work shall be performed on applicant/owner's property only, except where necessary for installation of utilities in Rockwood Road and as may be licensed by the MBTA (see response #11 also).

BETA 2: Revisions acceptable; item partially resolved pending resolution of MBTA license request.

Applicant's Response 2: No further response necessary.

BETA 3: Refer to Item 11.

Preliminary Drainage Report & Stormwater Management Design – Initial Review Comments

19) Section 3.0: Summary of Drainage Calculations – This section states the following:

'...the site is near the downtown area and a general drainage study was conducted by a consultant for the town in 2010 showing sufficient capacity in drainage facilities.'



Initial Review Recommendation: *The applicant should provide any relevant excerpts from the referenced drainage study along with the final design documentation to support this statement.*

Applicant's Response: The project site plans have been revised to eliminate any connections to the town's drainage system at the back of the site. All stormwater runoff shall be controlled onsite such that there is no increase in offsite runoff rates. Refer to revised Drainage Report and site plans for new stormwater system layout and calculations. Where no stormwater discharges are proposed to connect to the town's drainage basin, no excerpts from the 2010 Town drainage study by Coler & Colantonio are included.

BETA 2: *Revisions acceptable; item resolved.*

Applicant's Response 2: Supplemental drainage calculations for the post-development condition based on the revised layout with reduced impervious area and additional greenspace is attached. No further response necessary.

BETA 3: Revisions acceptable; item resolved.

- 20) HydroCAD Stormwater analysis – Watershed Curve Numbers – The preliminary stormwater analysis assumes all previous areas (Fair grass cover, Good grass cover, and Woods/grass combination) to be underlain by hydrologic soil group (HSG) "A" soils, with corresponding curve numbers (CN's). However, the USDA soil map provided in the report indicates that a significant portion of the site is underlain by Canton fine sandy loams (420B), which are classified as HSG "B" soils; these soils are generally less permissive than HSG A soils, and have correspondingly higher CN's. Test pits (TP's) 1, 2, 4 and 8 support the USDA soil map, with loamy sands located beneath the B-horizon soils (in contrast with the generally more permissive coarse sands discovered in the other test holes).

Initial Review Recommendation: *The applicant should depict the soil type boundaries on the post-development drainage map, and modify the assumed CN's in the HydroCAD model to reflect the underlying soils/HSG's in the proposed pervious areas.*

Applicant's Response: Watershed curve numbers have been revised in the new Drainage Report utilizing both A and B Hydrologic Soil Groups. Both Pre-development and Post-Development calculations and watershed maps are now provided also.

BETA 2: *Revisions acceptable; item resolved.*

Applicant's Response 2: Supplemental drainage calculations for the post-development condition based on the revised layout with reduced impervious area and additional greenspace is attached. No further response necessary.

BETA 3: Revisions acceptable; item resolved.

- 21) HydroCAD Stormwater analysis – Leaching Chamber Exfiltration Rates – The preliminary stormwater analysis assumes an exfiltration rate of 8.27 in/hour for all five (5) of the proposed leaching chamber (LC) beds; this is the prescriptive Rawls rate for HSG A soils. However, as stated previously, a significant

portion of the site is underlain by HSG B soils, and it appears (based on the USDA soil map and T.P.'s 1, 2 and 4) that LC's 1, 2 and 5 are located in the HSG B soils.

Initial Review Recommendation: The applicant should use the Rawls rate of 2.41 in/hour for loamy sand for any LC beds located in HSG B soils.

Applicant's Response: Appropriate Rawls Rates based on actual soil types found at the newly excavated test pits are now used in the drainage calculations for each leaching bed system.

BETA 2: We concur with the assumed rates for all but two (2) of the proposed LC's:

LC 3 (Reference Test Pit 16) – The assumed exfiltration rate of 8.27 in/hr is appropriate for HSG A (loamy sand/sand/gravel) soils; the proposed bottom of stone for this system will be at elevation 197.5, which is within the B-horizon sandy loam observed in TP 16. We suggest the 2.41 in/hr exfiltration rate for HSG B (sandy loams) be used instead, and the 4" outflow culvert be modified as needed to accommodate the resultant increase in the 100-year storm elevation.

LC 4 (Reference Test Pit 18) – The assumed exfiltration rate of 8.27 in/hr is appropriate for HSG A (loamy sand/sand/gravel) soils; the proposed bottom of stone for this system will be at elevation 199.0, which is within the B-horizon sandy loam observed in TP 18. We suggest the 2.41 in/hr exfiltration rate for HSG B (sandy loams) be used instead, and the 12" outflow culvert be modified as needed to accommodate the resultant increase in the 100-year storm elevation.

Applicant's Response 2: As discussed at the May 24 hearing, exfiltration rates of 8.27 in./hr. were used at LC 3 and LC4 were based on sand soils as encountered in the C horizon at TP's 16 and 18. Final plans shall further detail that the overlying A and B soil horizons will be removed and replaced with clean, permeable sand fill as necessary.

BETA 3: We shall reserve comment until final designs are submitted, including specifying the replacement of A & B horizon soils as indicated in Applicant's Response 2.

22) LC Bed Emergency Overflow – The LC bed designs do not include provisions for emergency overflow outlets.

Initial Review Recommendation: The applicant should consider providing emergency overflow outlets from each of the proposed LC beds.

Applicant's Response: Overflow outlet pipes have been added to some of the leaching beds where a practical discharge point exists. Because the site has no wetlands and only 2 offsite discharge points (to the town infiltration basin and to a concrete-lined drainage channel on the Gross property that discharges to a culvert under Rockwood Road), and because the underlying soils are generally highly permeable, the drainage system is designed to infiltrate the majority of the site runoff for a 100-year storm. As such, it is not feasible to incorporate an overflow pipe at every leaching bed without making a pipe connection to town property.

BETA 2: We acknowledge the limitations that make the provision of overflow pipes from each LC bed impractical. However, while emergency overflow outlets from the LC's are not required, the entity

responsible for long-term stormwater management of the systems should take extra precautions to ensure that the LC's do not become clogged (e.g. frequent pre-treatment structure inspections & cleaning, extra access ports/cleanouts for all LC's).

Applicant's Response 2: A detailed Operation & Maintenance Plan for the drainage system shall be incorporated into the final plan set and made part of the condominium homeowner's association documents to ensure long-term viability of the drainage system.

BETA 3: We shall reserve comment until the detailed O&M plan is submitted for review.

Preliminary Drainage Report & Stormwater Management Design – New Review Comments

23) Section 3.0: Summary of Drainage Calculations – The final paragraph of this section states:

'Final site design shall provide more details and calculations...as well as more information regarding the proposed drainage system features.'

Recommendation: *The following details, calculations and additional information should be provided in the final design:*

- *Pre-Treatment (Water Quality) Unit Models & Sizing Determinations*
- *Stormwater Collection & Conveyance System Design & Details*
 - *Catch Basin/Drain Manhole/Pre-Treatment Unit rim elevations*
 - *Drain Pipe sizing, materials & proposed invert elevations*
 - *Analysis demonstrating capture & conveyance capacity for the Design Storm*
- *Assessment of anticipated impacts on local groundwater tables that will result from septic system discharges and the infiltration of stormwater for all storms up to the 100-year event, particularly any effects on adjacent downgradient properties currently relying on septic systems for sanitary waste management.*
- *Stand-alone Operation and Maintenance (O&M) Plan for all Stormwater Management Components*

Applicant's Response 2: As noted by BETA, final site design will include additional stormwater details, such as pretreatment devices and calcs, drain pipe calcs, groundwater mounding analysis, and Operation and Maintenance Plan for all stormwater components.

BETA 3: We shall reserve comment until the referenced materials are submitted for review. Please note, we are particularly interested in the assessment of the project's effects on the groundwater hydrology and its potential impacts on the adjacent down-gradient properties.

9/2/2017 – A Groundwater Mounding Analysis has been submitted for LC-1, LC-2B, LC-3 and LC-4A. The mounding analysis was completed by D'Amore Associates, Inc. Based on the analysis, the bottom elevations of infiltration systems LC-2B, LC-3 and LC-4A have been adjusted to account for the mounding elevation.

10/12/2017 – BETA has reviewed subsequent information submitted showing the lateral extent of the anticipated ground water mound. This information was also prepared by D'Amore Associates, Inc. A review of this information indicates that the anticipated mounding will dissipate to less than 0.25 feet

without impacting adjacent properties. There is some overlap of the mounding between adjacent infiltration systems, but this overlap will not affect the elevation of the mound at the individual systems.

The appropriate information has been provided and the stormwater design adjusted accordingly. Item is resolved.

- 24) 100-Year Storm Pre & Post-Development Runoff Rate Summary Tables – It appears that the 0.064 cfs pre-development and 0.47 cfs Post-Development peak flow rates listed in the summary table for Design Point 4 – Flow to Existing Town Basin are incorrect. Based on the HydroCAD printouts, the proper values appear to be 0.79 cfs and 0.48 cfs, which are the peak 100-year runoff flow rate from subcatchments EDA-4 and PDA-12, respectively.

Recommendation: The applicant should revise the summary table to list the correct peak flow rates for those design points. It should be noted that the higher pre-development flow rate indicates that the proposed development will reduce the peak flow rate discharged to the existing detention basin (0.79 cfs pre reduced to 0.48 cfs post).

Applicant's Response 2: A revised summary table of peak stormwater flow rates is provided in the Supplemental Drainage Report attached.

BETA 3: Revisions acceptable; item resolved.

- 25) Existing Detention Basin Exfiltration Rate – An exfiltration rate of 12.06 in/hr has been used to model the existing detention basin in both the pre and post-development analyses. This rate does not correspond to any of the standard Rawls rates, and is appreciably higher than the 8.27 in/hr Rawls rate for HSG A soils. Use of field-determined exfiltration rates (in lieu of the prescriptive Rawls rates) is allowable in the analysis, provided that the exfiltration rate is determined by appropriate field-testing methods (e.g. double-ring infiltrometer testing); however, the drainage report does not identify the source of the 12.06 in/hr value.

Recommendation: The applicant should specifically identify and validate the source of the 12.06 cfs exfiltration rate used in the analysis of the existing detention basin.

Applicant's Response 2: We used the same exfiltration rate in the town's infiltration basin as was used by Coler & Colantonio in their 2010 town-funded drainage study (see attached excerpts from their report).

BETA 3: Response satisfactory; item resolved.

- 26) Sheet 7 – Details – The “Leaching Bed Details” table lists the total number of 330XLHD chambers for LC-#4A as 21 (three (3) rows of seven (7) units each). The HydroCAD printout lists the number of 330XLHD chambers as fourteen (14) (Pond 6P: Leaching Chamber Bed #4A).

Recommendation: The applicant should correct the number of units listed in the table to correspond to the number of units indicated in the HydroCAD analysis.

Applicant's Response 2: An expanded summary table for the proposed leaching chambers has been incorporated into the revised detail sheets, and the number of chambers for beds was revised to reflect the new calculations.

BETA 3: Revisions acceptable; item resolved.

27) Sheet 7 – Details – The “Leaching Bed Details” table lists the proposed top of stone and range of finish grade elevations for each LC system. It appears that for four (4) of the LC’s, the proposed top of stone elevation, relative to the minimum proposed finish grade elevation over the systems, will provide less than the minimum thickness called for in the respective Cultec unit details for the compacted fill layer over the top of stone and below the proposed pavement.

Leaching Chamber Bed #	Cultec Model	Top of Stone/ Min. Finished Grade Clearance (in)	Min. Required Top of Stone/Finished Grade Clearance (in)
1A	902 HD	12	28
2A	902 HD	24	28
4A	330 XLHD	9.6	14
6	280 HD	10.7	12

Note that the Minimum Required Top of Stone/Finish Grade Clearance value accounts for four (4) inches of pavement, as indicated on the Typical Roadway Cross-Section detail (Sheet 6).

Recommendation: The applicant should review the siting of the listed LC systems and the proposed finish grading to provide at least the minimum required compacted fill layer thickness for all of the proposed LC’s.

Applicant's Response 2: The elevations of all drainage leaching beds have been adjusted to reflect a minimum of 20” of cover over the crushed stone layer atop the chambers (12” gravel + 4” dense grade + 4” pavement) – see table referenced above.

BETA 3: Revisions acceptable. We note that a small portion of system 2A provides less than the required fill layer thickness for the 902HD units (2.0’ provided vs. 2.33’ required). Since the majority of the system has the required cover it is not likely that the system will be impacted by the small area with less cover. However, the entire system is located beneath the main roadway into the development. It appears that minor adjustments to the design of system 2A and/or the profile of the road could provide the minimum cover over the entire system.

BETA shall review and comment on the final plans and supporting materials when they are provided by the applicant. If you have questions about any of the preceding comments, please feel free to contact me at (401) 333-2382. Thank you for the opportunity to participate in this significant project.

Very truly yours,
BETA Group, Inc.

