



ENGINEERING SUCCESS **TOGETHER**

September 11, 2014

Ms. Alison Steinfeld
Planning Director
Town of Brookline
333 Washington Street
Brookline, MA 02445

Subject: The Residences of South Brookline – Comprehensive Permit Application
Civil/Stormwater Management Review

Dear Ms. Steinfeld:

As requested by the Town of Brookline, BETA Group, Inc. (BETA) has reviewed the above referenced project. This letter is provided to outline our findings, comments and recommendations regarding the general civil engineering and stormwater management issues.

BASIS OF REVIEW

The following documents were received by BETA and will form the basis of the site/civil and stormwater engineering review. In addition, BETA performed site visits on March 4 and March 18, 2014 to walk the site, take pictures, and identify potential issues.

- The Residences of South Brookline Comprehensive Permit Application, Chestnut Hill Realty dated November 26, 2013 by Stantec Planning and Landscape Architecture, PC, Boston, MA
- The Residences of South Brookline Comprehensive Permit Application, Chestnut Hill Realty Exhibit Packet dated November 26, 2013 by Stantec Planning and Landscape Architecture, PC, Boston, MA
- Comprehensive Permit Plans for: The Residences of South Brookline, Brookline, MA dated November 26, 2013, revised to August 22, 2014 by Stantec Planning and Landscape Architecture, PC, Boston, MA
- Stormwater Report The Residences of South Brookline, Brookline, Massachusetts dated September 30, 2013, revised to August 22, 2014 by Stantec Planning and Landscape Architecture, PC, Boston, MA
- Resident Responses to March 27, 2014 Drainage Issues Survey
- Supplemental materials provided by Stantec Planning and Landscape Architecture, PC, Boston, MA via email on September 9, 2014 including:
 - Revised Comprehensive Permit Plans (partial set – 10 sheets)
 - Revised Operation and Maintenance Plan
 - Revised Stormwater Report (partial)
 - Sketch Plan showing approximate location of new sidewalks in vicinity of Building 10
 - Geotechnical Data Report for Hancock Village Boston/Brookline, Massachusetts, dated October 2008, prepared by Pare Corporation, Foxboro, Massachusetts

BETA GROUP, INC.

315 Norwood Park South, 2nd Floor, Norwood, MA 02062
P: 781.255.1982 | F: 781.255.1974 | W: www.BETA-Inc.com



SUMMARY OF OUTSTANDING ISSUES

1. Provide a more direct route to the front of Building 7 from the parking area north of Building 10. The Current configuration will require pedestrians to cross driveway multiple times. (P3)
2. Relocate handicapped spaces as necessary for tenants. (P6)
3. Consider installing traffic calming measures on the west lot due to the length of the drive. (P7)
4. Remove ledge to a minimum of 4 feet below the Stormtank systems. (SW23)
5. Include a breakdown of the estimate for the maintenance of individual components as part of the O&M documents. (SW38)
6. Provide a lighting plan that shows no light spillage onto adjacent properties. (L17)
7. Provide detail for Bioretention Area indicating material types and depths. (SW41)

RECOMMENDED CONDITIONS

1. Coordinate truck routes with Town officials prior to construction. Also, document condition of existing pavement structure before and after construction. (D2)
2. Provide Town with phasing plans prior to construction. (D3)
3. Provide blasting plan to Town prior to construction. (D4)
4. Provide SWPPP to Town for review prior to construction. (SW27)
5. Provide Town with anticipated construction sequence prior to construction. (SW34)
6. Conduct sampling for sewer contamination at the locations requested by the Town and provide repairs on the development property to the satisfaction of the Town Engineer. (SW40)
7. Coordinate with the Town to confirm ample water flow and pressure exists for the development. (U1)
8. Provide an as-built plan showing all utility information and submit for record. (U4)
9. Provide the Board with correspondence from Massachusetts Historical Commission. (E1)

INTRODUCTION

The proposed Hancock Village 40B Residential Development project expands the existing Hancock Village, which currently includes 789 residential apartment units, to a total of 981 [973] residential apartment units (an increase in 192 [184] units). The site is located on the east and west side of Independence Drive between Beverly Road to the north and Brookline Town line to the south. The existing on site parking is also proposed to increase from 1,073 spaces to 1,415 [1,441] spaces, an increase of 342 [368] parking spaces.

Three separate roadways will provide access to the new units. The access points will include the West Site Driveway, an existing, but unused curb cut on the west side of Independence Drive (providing access to 36 [20] units). This curb cut is located approximately 200 feet south of Beverly Street. The East Site Driveway will provide access to 12 units. It is located at an existing, but unused curb cut on the east side of Independence Drive approximately 250 feet south of the West Site Driveway (and approximately 125 feet north of Gerry Road). Asheville Road to the east of the site will provide access to the remaining 144 [152] units.

EXISTING CONDITIONS

The project is located on four lots totaling 8.6± acres within the open space of the Hancock Village that includes 789 residential apartment units, 1,073 parking spaces, utility services, and other amenities. These lots generally vary from 75 to 150 feet in width and are located along the northeast edge of the existing development in sections zoned for Single Family (S-7). There is also a larger section within the Apartment House District (M 0.5).

PROPOSED DEVELOPMENT

The lots are to be developed by constructing 12 [9] new multi-unit residential buildings (76 [44] units) and surface parking lots. Also, a new 4 [5] story (116 [140] units) apartment building with a 2 level parking garage below is proposed in an area of existing rock outcropping interior to the Village site. The site will be served by new access roads, stormwater management facilities, lighting, landscaping and utilities.

COMMENTS

Based upon the site visits and review of the aforementioned documents, BETA offers the following findings and comments:

General

- G1. Existing contour, drainage and utility information is difficult to read on proposed plans. Provide supplemental existing conditions plans at appropriate scale. *Stantec: We have included reprinted existing condition plans. Proposed conditions plans now more clearly show existing contour, drainage and utility information, and we note that we have added the proposed lease lot line, as well as highlighted existing trees.* BETA: Plans provided – issue resolved.

Site Demolition, Earthwork and Site Preparation

The project proposes to clear some large trees and excavate significant quantities of earth and rock (roughly estimated to be greater than 20,000 cubic yards) in proximity to inhabited buildings, access drives and active parking areas.

- D1. Provide earthwork calculation to determine earth and rock removal and the number of truck trips necessary. *Stantec: We have performed earthwork calculations for the project, and based on those calculations estimate that the project will include 48,000 cubic yards of cut and 17,580 cubic yards of fill, resulting in net export from the site of approximately 30,420 cubic yards. The majority of the rock excavation on site will be in the vicinity of Building 10, and is anticipated to be approximately 34,000 cubic yards. We anticipate that the rock excavation operation will have a 2 month duration, with the overall earthwork operation occurring over a 6-8 month period, with an average of 6-9 trucks exporting material from the site per day over that period.* BETA: Information provided – issue resolved.
- D2. Provide a truck route plan and document current conditions of roads to be used and verify that these roadway pavement structures will be able to handle the high number of heavy trucks during the construction. *Stantec: At this point in time no contractor has been selected to do the earthwork. As a result, it is not possible to speculate on a specific truck route or as to where any excess material will be brought from the site. A more detailed truck route plan can be reviewed with the Brookline DPW and Police Department before construction starts. It has been our experience that a construction management plan is not required at this stage of a comprehensive permit process.*

Truck traffic is not allowed on the VFW Parkway, all truck traffic will leave thru the roundabout at Putterham Circle. We note that the intent during construction will be to utilize as much material from areas of cut in areas of fill, and to manage truck traffic on site to the extent possible, with a crossing at Independence Drive, to transport material from the cut areas on the east side of the site to the fill areas on the west side of the site. BETA: Recommend a Condition that truck routes are coordinated with Town officials prior to construction. The condition of pavement structures should be documented along truck routes before and after construction operations to ensure construction traffic does not adversely impact the performance of the pavement.

- D3. Provide phasing plans for earthwork and construction to provide and maintain access to existing parking lots and buildings. *Stantec: Phasing plans will be developed by the site contractor when one is selected for the work. Those plans will be provided to the Town at that time.* BETA: Recommend a Condition to provide Town with phasing plans prior to commencement of construction.
- D4. Provide blasting plan for building 13 [currently 10] including methods to protect buildings, residents, pedestrians and vehicles and coordinated with utility owners. *Stantec: A blasting plan will be prepared by the site contractor. A blasting plan is required by state regulations prior to blasting. When a site contractor is engaged, and that plan is prepared, it will be provided to the Town. All blasting activities will comply with applicable legal requirements.* BETA: Recommend Condition to provide blasting plan to Town prior to commencement of construction.

Site Plans and Details

- S1. Existing exercise stations were observed within the development area. Indicate if and or where these will be relocated. *Stantec: The existing exercise stations will be removed and stockpiled. After construction they will be field located at appropriate locations.* BETA: Information provided – issue resolved.
- S2. Provide the location and detail of trash and recycling storage areas and schedule for disposal. *Stantec: A detail for a trash enclosure has been included on detail sheet #L803. A location for this area has been indicated on sheet L301. Existing trash enclosures are shown on drawing #L203. The Owner will evaluate revised schedules for pick up of trash and recyclables with their vendors to accommodate the additional units.* BETA: A detail and location for trash and recycling storage have been provided – issue resolved.

Site Access, Parking & Loading:

West Site driveway is a new dead end road off Independence Drive which provides access to 36 [20] units (68 [70] parking spaces), is 920± feet in length, 20 [23] feet wide and incorporates a turn-around area near the end. East Site driveway is a new dead end road off Independence Drive which provides access to 12 units (27 [44] parking spaces), is 350± feet in length, ~~varies 24 to 20 feet wide~~ [and 23 feet wide]. Asheville Road currently provides access to an unknown number of existing units with 181 parking spaces. The proposed development proposes adding 144 [152] units with another 234 [202] parking spaces for a total of 415 [383] off Asheville Road. The plan includes walkways throughout the new development areas.

- P1. Provide additional ingress/egress for emergency access to Building 13 [currently 10] and residents to the south and west of Building 13 [currently 10] and/or provide documentation from the Fire and Police Departments confirming their acceptance of the design. *Stantec: We have met with the fire chief and while no formal documentation was provided by him, the new layout was not objected to*

by him as long as we made all of the internal driveways a minimum of 23' in width and added the cul-de-sac at the end of the west driveway. The Town's Planning Director was in attendance at the meeting. BETA: Design revised in accordance with Fire Chief's recommendations – issue dismissed.

- P2. Re-grade Asheville Road from Building No. 10 [currently 7] to the access drive to the lower parking level in Building 13 [currently 10] to reduce 10+% profile grade and 10% cross slope. *Stantec: Revised plans are provided. The site driveway from garage entrance to Building 10 to the east is graded at 10%. This grade matches the existing, and is necessary to meet grades at the limits of the paving.* BETA: Steep cross slope has been removed and fewer cars are directed over 10% grade than in previous design – issue dismissed.
- P3. Provide information on how parking will be accommodated and indicate the pedestrian route from buildings to parking areas – see especially Building 10 [currently 7]. *Stantec: As shown on the revised drawings dated July 11, 2014 [revised to August 22, 2014], all buildings are connected via walkways to parking areas.* BETA: The Proponent has provided a supplementary sketch showing additional walks from the Parking area north of Building 10 to Asheville Road and the front of the Building. Recommend also providing a more direct route to the front of Building 7 from this parking area. Current configuration will require pedestrians to cross driveway multiple times.
- P4. Existing parking area between Buildings 13 [currently 10] and 11 [currently 8] is currently designated as visitor parking; will this be maintained as such or relocated? *Stantec: This will be maintained.* BETA: Information provided – issue resolved.
- P5. Recommend walkways be provided from parking areas to rear doors at Buildings 7-10 [currently buildings 6-7] and 12 [currently 9]. *Stantec: Where appropriate, we have added walkways.* BETA: Design revised – issue resolved.
- P6. Consider adding a walk from the handicap space in the lot between Buildings 3 [currently 2] and 4 [building relocated] that connects to the walk in front of Building 4 [building relocated]. *Stantec: All accessible spaces have a clear and accessible path to the nearby buildings.* BETA: There are no handicapped spaces in close proximity to Buildings 2, 3, or 9. The Proponent has indicated that accessible spaces are shown schematically and will be adjusted as required for tenants.
- P7. Consider installing traffic calming measures on the west lot due to the length of the drive.

Stormwater Management System

The proposed stormwater management system is designed to mitigate impacts from an increase in impervious area through a combination of structural practices including porous pavement, hydrodynamic separators, and subsurface infiltration/storage areas. The proposed project includes constructing 4.7 acres of roof and pavement areas. Stormwater is proposed to be captured on-site and slowly discharged to existing closed drainage systems. Some stormwater will ultimately be discharged to the D. Blakely Hoar Sanctuary; however, the project is located outside the limits of regulated resource areas and the jurisdiction of the Brookline Conservation Commission.

NRCS mapped soils in the project area consist of Newport-Urban land complex rated in Hydrologic Soil Group (HSG) C and unrated soils consisting of Charlton-Hollis-Urban land complex and Udorthents, wet substratum. Supplemental boring information indicates the presence of sandy clay loam throughout the site and is consistent with an HSG rating of C, soils having a low infiltration rate. Exposed ledge is visible on portions of the site and was also noted on the boring logs. Monitoring wells indicate high ground water in some areas.

In order to help identify existing drainage problems within proximity of the proposed project the Town has sent a drainage survey to residents in the area. Results from the survey will be made available to the proponent and BETA following the initial public hearing and will not be discussed during said hearing.

SW1. Provide signature and stamp of Registered Professional Engineer on Stormwater Checklist. *Stantec: Revised Stormwater Report includes signature and stamp of Registered Professional Engineer.* BETA: Signature and stamp provided – issue resolved.

SW2. Porous pavements are not optimal in locations of low-permeability soils, high bedrock, high ground water, and steep grades. The design incorporates a conservative approach by assuming no infiltration beneath the porous pavement and utilizes it primarily as a storage and filtration system. Document the following:

a) Provide information on why a conventional pavement and stormwater management system cannot be utilized. *Stantec: In conjunction with changes to the site plans that have resulted from working sessions between the Applicant and the Town of Brookline, the approach to the stormwater management design has been revised so that conventional pavement and stormwater management systems are utilized for the majority of the project. Porous pavement is still proposed for one parking area behind #18-44 Thornton Road.* BETA: Design revised to eliminate majority of porous pavement and redundant treatment provided – issue dismissed.

b) Previous porous pavement projects utilized and maintained by proponent or designed by Engineer - sites with similar design constraints preferred. *Stantec: The proponent has not utilized porous pavement at its existing properties. Stantec has designed porous pavement at several locations, including the following:*

- Temple Beth Elohim, Wellesley, MA
- NewBridge on the Charles, Dedham, MA
- Dolan Recreation Center, Dedham, MA

BETA: Information provided and redundant stormwater treatment system provided for reduced porous pavement area – issue dismissed.

c) How pavement system will be protected during construction. *Stantec: Applicant will prepare phasing plans as the construction schedule is developed. Vehicle traffic over areas of proposed porous pavement will be limited until porous pavement is placed.* BETA: Information provided – issue resolved.

d) How abutters, Town stormwater systems and down-gradient wetland resources will be protected if the system were to fail. *Stantec: The revised site plans and stormwater management design includes one porous pavement parking area behind #18-44 Thornton Road. In the event that the porous asphalt in this area was to fail, conventional stormwater management BMPs are also provided for redundancy. In that event, stormwater will be collected in catch basins with deep sumps and hoods (CB3 and CB4), and will be routed through a Water Quality Inlet (DMH-9, WQI-6) to remove pollutants. WQI-6 has been sized assuming that the porous pavement is draining to it for a conservative approach.* BETA: Design revised – issue resolved.

e) Accommodations for repair or replacement of pavement in kind upon end of useful life (15 to 20 years). *Stantec: Repairs will be completed as part of any other maintenance operation at Hancock Village, including pavement repairs, overlays, etc.* BETA: The project has been redesigned to include only a small portion of porous pavement. A revised Operations and

Maintenance Plan has been provided, which indicated the replacement of this area in kind – issue resolved.

- f) Provide specification for performance graded asphalt binder for porous pavement. *Stantec: The design of the porous pavement will be based on specifications developed by the University of New Hampshire's Stormwater Center. A copy of those specifications is attached for reference.* BETA: Information provided – issue resolved.
 - g) Indicate the minimum grade for porous asphalt where the steep slopes detail will be used. *Stantec: Detail 3/L801 has been modified to clarify that it is intended to be used on all slopes.* BETA: Information provided – issue resolved.
 - h) Ensure porous pavement asphalt details are consistent in regards to wording and symbols, where applicable. *Stantec: The description of porous asphalt pavement is consistent on all drawings and details.* BETA: Detail revised – issue resolved.
 - i) Provide impermeable barrier at intersection of porous pavement and Independence Drive to prevent saturation of roadway subgrade. *Stantec: Impermeable barrier (Miller #MBE40M) is detailed at the intersection of porous pavement and Asheville Road.* BETA: Detail provided for impermeable barrier – issue resolved.
 - j) Porous pavement is proposed as close as 20 feet of down gradient residences. Provide details for how migration of stormwater to said residences will be prevented. *Stantec: The revised site and stormwater management design no longer includes porous pavement within 20' of any residences. The minimum setback between porous pavement and any residential structure is 30 feet. It is noted that this is in excess of DEP's Stormwater Management Handbook recommendations for a 10' setback to slab foundations and 20' setback to cellar foundations.* BETA: Design revised and information provided – issue resolved.
 - k) How design will avoid frost heave and damage of pavements from standing water, particularly in areas of subsurface check dams on steep slopes. *Stantec: The total depth of the porous asphalt pavement is 31". That depth will consist of crushed stone, which is not subject to frost heaving. The 31" depth to subgrade is sufficient to prevent heaving or limit any potential for heaving to the extent that no damage to pavement or curbing is expected.* BETA: Information provided – issue resolved.
- SW3. Provide flow arrows on all proposed drainage lines. *Stantec: Flow lines have been added to drainage lines on the Drainage Plans (L505-L507).* BETA: Flow lines provided – issue resolved.
- SW4. Revise low point catchbasins and catchbasins located at intersections to be double grate basins. *Stantec: The revised plans have catch basins at low points in only two locations. At one of those locations, at CB-1, the flow to the catch basins is only 0.5 cfs during a 25-year storm, and we feel that a double catch basin is not warranted. The second location is at CB-6. At that location, the catch basins is a Stormceptor 450i water quality unit, and so a double catch basin is not needed. The flow to that structure during a 25-year storm event is estimated to be 2.3 cfs, a double catch basin is not warranted.* BETA: Calculated flows at low points can be effectively captured by single grate basins – issue dismissed.
- SW5. Revise all structure to structure drainage connections to be a minimum of 12 inches (excluding detention systems) to minimize clogging potential. *Stantec: Where warranted by hydraulic calculations, 12" pipe sizes have been provided.* BETA: The use of stormwater treatment chambers will minimize the potential for clogging – issue dismissed.

- SW6. Grade all access driveways to direct stormwater towards catchbasins and curb lines. *Stantec: Grading plans have been revised to direct flows towards catchbasins and curb lines.* BETA: Design revised – issue resolved.
- SW7. The function of drainage segment CB10 to DMH17 is unclear. Flow is captured at the down gradient portion of Asheville Road and directed through 300± feet of pipe (up to 9.5± feet deep) to a single dead end leaching basin. When the system fills, stormwater flow will be directed onto Russett Road. Provide design calculations for this system. Also, clarify if DMH17 is intended to function as a manhole or “leaching catch basin.” *Stantec: This comment is not applicable at this point due to the revised stormwater management design.* BETA: Design revised – issue dismissed.
- SW8. Proposed grading for build-out conditions will alter existing drainage paths near the property lines of abutting residences on Russett Road and Beverly Road. Provide additional area drains at locations that may trap water against abutting residences. Locations of concern include the area behind proposed Buildings 2 [building removed] and 9 [building removed] and the bottom of slope along Building 5/6 [currently 4] and 11/12 [currently 9] parking areas. *Stantec: Additional area drains have been added/provided as suggested. On the west side of Independence Drive, along Russett Road, four area drains are located to accept flow from abutting properties and offgrading from the proposed project. On the north side of Asheville Road, area drains AD9 and AD10 are provided to collect flow prior to discharge to abutting properties, and on the south side of Asheville Road, AD11 is provided also to accept collect flow prior to discharge to abutting properties.* BETA: Location of area drains and the addition of a shallow subdrain north of Building 1 will alleviate concerns of trapping water against abutting residences – issue resolved.
- SW9. Proposed grading for subcatchment area PR-4B appears to direct flow towards down gradient properties. Revise grading and provide additional detail as necessary to direct stormwater to closed drainage system. *Stantec: A label has been added to clarify the use of an existing paved swale adjacent to subcatchment PR-4B that will direct runoff into the proposed drainage system (CB7, WQI-10).* BETA: Label provided – issue resolved.
- SW10. Provide spot grade on Grading Plan for catchbasin CB5 to indicate catchbasin is at low point. *Stantec: A spot grade has been added to all low points.* BETA: Low point spot grades provided – issue resolved.
- SW11. Proposed cover over outlet pipe from CB4 is approximately 1.4 feet. Include provisions for protecting drainage pipe with shallow cover throughout project. *Stantec: Ductile Iron Pipe will be provided for all catch basins with less than two feet (2') of cover.* BETA: Ductile iron pipe provided – issue resolved.
- SW12. Provide details for foundation drains, area drains, and roof drain connections to porous pavement reservoirs. *Stantec: This comment is no longer pertinent, as the design has changed and connections from foundation drains, area drains and roof drains to porous asphalt pavement are no longer part of the design.* BETA: Detail for area drain provided – issue resolved.
- SW13. Provide dimensions, locations of access/inspections ports, and outlet invert information for infiltration basins P-4A and P4-D on drainage plans. *Stantec: A detail sheet, Drawing No. L807, has been added that details dimensions, locations of inspection ports, and inlet/outlet pipe sizes and dimensions.* BETA: Information provided – issue resolved.

Massachusetts Stormwater Management Standards:

The project is located outside resource areas that would require strict adherence to the Massachusetts Department of Environmental Protection Stormwater Management Standards; however, this is the standard by which if fully met projects are generally acceptable in terms of impacts to adjacent or down gradient properties. Therefore the project was reviewed for compliance with the 10 standards and relative compliance provided by the submitted documentation.

No untreated stormwater (Standard Number 1): *No new stormwater conveyances (e.g., outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.*

The project proposes to treat stormwater on site and discharge to existing drainage systems and does not propose any new untreated conveyances to wetland resources - complies with standard.

Post-development peak discharge rates (Standard Number 2): *Stormwater management systems must be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.*

The calculations provided with this design indicate that there will not be an increase in the peak rate of runoff from this site as a result of this project. Subsurface storage/infiltration areas were modeled with a conservative approach and assume no exfiltration. Compliance with this standard should be re-evaluated upon addressing other comments that impact the design or calculations.

SW14. Provide backup calculations for Times of Concentration (TOC). Overland flows across grassed surfaces in larger (>2 acres) subwatersheds may be greater than modeled 6 minutes. *Stantec: As the inclusion of impervious surfaces reduces TOC, 6 minutes is a conservative minimum for proposed conditions. TOC has been calculated for existing conditions subcatchments with areas greater than two acres. Where less than 6 minutes was calculated for TOC, a minimum of 6 minutes was utilized. A minimum of 6 minutes was used for all proposed conditions subcatchments, a conservative assumption.* BETA: Information provided – issue resolved.

SW15. Provide full size watershed plans with legible existing and proposed contour information and indicate TOC flow paths on watershed plans. *Stantec: Full size watershed plans are provided at a scale of 1"=40'. Time of concentration flow paths are indicated for those existing conditions watersheds larger than two acres.* BETA: Information provided – issue resolved.

SW16. Provide hydraulic analysis (rational method) for proposed drainage systems. Conduit tables indicating size, slope, velocity, capacity, and flow rate should be included. Also provide profile of systems with hydraulic grade lines. Note that DMH-18 indicates two 12-inch lines draining to a proposed 10-inch line. *Stantec: A hydraulic analysis (Pipe Calculations) is included as Appendix M of the revised Stormwater Report. Also included in Appendix M are profiles with hydraulic grade lines for select portions of the drainage system. Profiles were drawn for those portions of the drainage system conveying significant amounts of the site's stormwater flows. We note that the pipe calculations were completed for a 25-year storm event, and that for a conservative analysis of hydraulic grade lines, the following conservative assumptions were made:*

- *100-year storm flows from Subsurface Detention/Infiltration systems were utilized.*
- *Tailwater elevations at Subsurface Detention/Infiltration systems were assumed to be 100-year storm peak elevations.*
- *Tailwater elevations at existing drainage systems were assumed to be the crown of the existing pipe.*

We further note that DMH-18 is longer shown as previously designed.

BETA: Provided calculations indicate pipes have been properly sized to convey flows from the 25-year storm event – issue resolved.

SW17. Stormwater calculations include two feet of gravel storage beneath porous pavement. Porous pavement detail shows only one foot of storage. Revise stormwater calculations to reflect construction detail. Note that one foot of storage volume will be exceeded for 10 and 100 year storm events. *Stantec: Porous Pavement detail has been revised to provide 2' of gravel storage beneath porous pavement.* BETA: Detail revised – issue resolved.

SW18. Grading plans indicate porous pavement will be installed on grade, whereas HydroCAD model assumes porous pavement storage areas are on a level surface. Actual storage areas will be much smaller than modeled due to flow towards low points. Revise model to reflect actual storage volumes or provide appropriate methods to keep stormwater distributed across system before outflow. *Stantec: The inclusion of check dams in the porous pavement profile is intended to slow the flow through the crushed stone beneath the pavement to promote infiltration. Water will be stored behind the check dams so that the storage that is included in the HydroCAD model is reasonably approximated.* BETA: Information provided – issue resolved.

Recharge to groundwater (Standard Number 3): *Loss of annual recharge to groundwater should be minimized through the use of infiltration measures to maximum extent practicable.*

Plans indicate that stormwater from rooftops and parking areas will be directed to subsurface storage/infiltration areas including reservoirs beneath porous pavement and StormTanks. For sites comprised solely of C and D rated soils the Massachusetts Stormwater Management Standards states that proponents are required to infiltrate the required recharge volume only to the maximum extent practicable. The proponent has used a conservative approach for calculating groundwater recharge requirements by stating that site soils are rated in HSG B (soils having a moderate infiltration rate). The storage/infiltration areas have been sized to provide a recharge volume greater than that required.

SW19. Although using a conservative approach for calculating recharge requirements is welcomed the proponent should clarify how the results of the subsurface investigation were used to determine a HSG rating of B. *Stantec: The rationale for utilizing a HSG rating of B is discussed in Section 2.2 of the Stormwater Report.* BETA: Discussion provided – issue resolved.

SW20. Provide boring log information for all borings indicated on Roadway and Parking Profiles (B and C series). *Stantec: The geotechnical report prepared by Pare Corporation is included as an Appendix to the Stormwater Report. That report includes boring logs for the B and C series of borings.* BETA: The geotechnical portion of the report has been provided in a separate email to BETA dated September 9, 2014 – issue resolved.

SW21. The project proposes significant removal of ledge within a dense residential area. Submit a report prepared by a geotechnical engineer or hydro geologist which outlines the potential impacts to groundwater as a result of the proposed project. *Stantec: Stantec geotechnical engineers have reviewed the project plans, and note that bedrock removal and foundation construction with foundations drains will lower groundwater elevations in the vicinity of Building 10 (formerly Building 13). It is further noted that the local lowering of groundwater elevations should have no detrimental impact on surrounding buildings.* BETA: Information provided – issue resolved.

SW22. Estimated seasonal high groundwater appears to be based upon monitoring well readings from a single day in January 2013. These readings do not account for seasonal fluctuation or preceding rainfall events (or lack thereof). Conduct test pits at storage/infiltration areas to determine high

groundwater elevations via the presence of redox features. Identifying redox features is MassDEP's primary recommended method for determining seasonal high groundwater elevations. If redox features are not present, measured groundwater elevations must be adjusted using nearby groundwater wells monitored by the USGS. *Stantec: To address concerns that monitoring well readings were based on a single day in January, 2013, additional readings were taken on April 29th, 2014. On average, it was found that groundwater elevations were approximately 10" higher in April, 2014 than they were in January, 2013. This difference in the readings did not require significant changes to the design of drainage systems on the east side of Independence Drive, but on the west side of Independence Drive grades were raised to provide a minimum 2' separation from the measured groundwater elevations, considered to be representative of seasonal high groundwater elevation. That data is included in Section 2.2.1 of the revised Stormwater Report.* BETA: USGS monitoring wells indicate groundwater levels approximately at seasonal highs during the April 29th measurements. BETA concurs that the measured values are representative of seasonal high groundwater elevations in the area – issue resolved.

SW23. Ledge is located in proximity to the bottoms of the proposed StormTank systems (as close as two feet). Provide assurance that the StormTank system will be able to drain down (empty) between rainfall events. *Stantec: Drawdown calculations are provided within the Stormwater Report. The highest provided drawdown time is 35.82 hours at subsurface basin P-4A, lower than the maximum allowable drawdown time of 72 hours.* BETA: Provided profiles indicate that ledge will be removed 2 feet below the bottoms of the Stormtanks. Provide a minimum of 4 feet of ledge removal below the Stormtank systems.

80% TSS Removal (Standard Number 4): *For new development, stormwater management systems must be designed to remove 80% of the annual load of Total Suspended Solids.*

Proposed stormwater treatment consists of porous pavement filtration, Stormceptor hydrodynamic separators, and subsurface detention/infiltration basins. The stated TSS removal rate for the project ranges from 80% to 96%.

SW24. High failure rates have been associated with the use of porous pavement and there is concern that pollutant loads discharging from the site may increase over time. Provide redundant treatment such as placing Stormceptors at down gradient portions of the new drainage system or at select locations of the existing drainage system. Redundant BMPs should provide an 80% TSS treatment for an impervious area equivalent to the proposed porous pavement. *Stantec: A Stormceptor (DMH9 – WQI-6) has been added to the site) to provide treatment to porous pavement areas in case of failure. The Stormceptor was sized for the area draining to it from TD4 as well as from CB3 and CB4, under the assumption that the porous asphalt pavement were impervious.* BETA: Design revised – issue resolved.

SW25. Revise location of Stormceptor from CB6 to DMH3 to provide redundant treatment of stormwater from porous parking area. *Stantec: This comment is no longer valid due to the revised drainage design.* BETA: Design revised – issue dismissed.

SW26. No stormwater treatment is proposed for new westerly access drive to Building 13 [currently 10] or portion of reconstructed Asheville Road. Suggest replacing exiting catchment in down gradient parking area with a Stormceptor unit to provide treatment of new and reconstructed pavement areas. *Stantec: This comment was discussed with BETA during our meeting held in April, and it was agreed that the drainage system in the downgradient parking area to the west of Building 10 (formerly Building 13) would not be altered. It was further agreed that treatment of stormwater*

from other existing paved areas to be reconstructed that are not currently treated, including the reconstructed portion of Asheville Road, would be treated. Within Asheville Road at the property line, TD5 has been added, which discharges to a Stormceptor (DMH13, WQI-7) In addition, we note that CB7(WQI-10) has been added to treat existing untreated pavement from a parking area between Buildings 8 and 10. BETA: The revised design will provide stormwater treatment for existing pavement areas that does not exist today. These areas exceed the pavement area of the new westerly access drive – issue dismissed.

Higher Potential Pollutant Loads (Standard Number 5): *Stormwater discharges from Land Uses with Higher Potential Pollutant Loads require the use of specific stormwater management BMPs.*

The project does not propose any uses associated with Higher Potential Pollutant Loads – not applicable.

Critical Areas (Standard Number 6): *Stormwater discharges to critical areas must utilize certain stormwater management BMPs approved for critical areas.*

This project is not located within a DEP mapped aquifer contribution zone (Zone II) or any other mapped critical area – not applicable.

Redevelopment (Standard Number 7): *Redevelopment of previously developed sites must meet the Stormwater Management Standards to the maximum extent practicable.*

This project does not meet the definition for a redevelopment project – not applicable.

Construction Period Erosion and Sediment Controls (Standard Number 8): *Erosion and sediment controls must be implemented to prevent impacts during construction or land disturbance activities.*

The proposed project will disturb greater than 1 acre in area; therefore, a notice of intent with EPA and a Stormwater Pollution Prevention Plan (SWPPP) are required. The narrative indicates a SWPPP will be submitted prior to the start of construction; however, a general description and details of erosions controls are included. The project proposes erosion control barrier around the down-gradient perimeters of the site consisting of hay bales and silt fence. Catchbasin inlet protection consisting of silt sacks is also proposed.

SW27. Provide draft SWPPP to Town for review and comment prior to construction. *Stantec: A SWPPP will be provided prior to construction, as required by EPA regulations.* BETA: Recommend Condition to provide to Town for review prior to construction.

SW28. Replace Catchbasin with Haybale Protection detail with silt sack detail on sheet L201. *Stantec: Detail has been replaced as suggested.* BETA: Detail revised – issue dismissed.

SW29. Detail locations of catchbasin protection. *Stantec: Locations of catch basin protection are provided on the Erosion Control plan, drawings #L201 - L203.* BETA: Information provided – issue resolved.

SW30. Add locations of temporary sediment basins. *Stantec: Given the constrained nature of the project site, temporary sediment basins are not likely to be feasible in most locations. To prevent erosion from the project site, perimeter controls and drainage structure inlet protections will be utilized. One temporary sediment basin is located in the area of the proposed Bioretention Basin. Construction Drawings for the project will require filter fabric to be placed at the bottom of the temporary basin, to be removed prior to construction of the bioretention basin, to protect the subgrade from being clogged with sediment.* BETA: Information provided – issue resolved.

SW31. Provide detail for stabilized construction entrance and indicate location on Erosion Control Plans. *Stantec: A detail has been added as suggested to Drawing L201, and the locations of the stabilized*

construction entrances are shown on Drawings –L201-L-203. BETA: Details provided – issue resolved.

SW32. Indicate location of anticipated stockpile areas on Erosion Control Plans and provide erosion controls around perimeter of stockpiles. *Stantec: Approximate locations of stockpiles are shown on Drawings L201 through L203. Final location of stockpile areas will be determined by the Contractor. BETA: Information provided – issue resolved.*

SW33. Evaluate suitability of erosion controls in areas of concentrated flow (e.g. DP-1A). *Stantec: The erosion controls proposed are typical and are anticipated to be appropriate for the proposed project. During construction, a SWPPP will be in place and the contractor will be responsible for monitoring the performance and effectiveness of all erosion controls, and to make adjustments as required. BETA: Information provided – issue resolved.*

SW34. Provide an anticipated construction sequence. Crushed stone reservoir course and porous pavement will be susceptible to clogging from construction traffic. *Stantec: An anticipated construction sequence will be developed once a contractor is engaged in the project. Upon request, the construction sequence can be provided to the Town for information. The construction sequence will include provisions to protect the crushed stone reservoir course and porous asphalt pavement during construction. Given the location of the one remaining porous asphalt pavement parking area between Asheville Road and Thornton Road, there is no other construction shown on the revised plans between those two streets and therefore it will be very easy to protect that area from construction vehicles. BETA: Recommend a Condition to provide Town with anticipated construction sequence prior to commencement of construction.*

Operations/maintenance plan (Standard Number 9): *A Long-Term Operation and Maintenance Plan shall be developed and implemented to ensure that stormwater management systems function as designed.*

An Operation and Maintenance Plan was included in the Stormwater Drainage Report which addresses general maintenance of the stormwater management system.

SW35. Indicate the name and contact information for the party responsible for operation and maintenance. *Stantec: Chestnut Hill Realty will be responsible for the operation and maintenance of the project's stormwater management systems. Their contact information is provided in the Stormwater Report. BETA: Information provided – issue resolved.*

SW36. Include provisions for the storage and handling of snow coordinated with proposed landscaping. *Stantec: Anticipated snow storage areas are shown on drawings L301 through L303 Snow that cannot be managed in available snow storage areas will be removed from the property by CHR. BETA: Information provided – issue resolved.*

SW37. Include a plan that is drawn to scale that shows the location of all stormwater BMPs and discharge points. Also, detail snow storage locations. *Stantec: A plan indicating all Stormwater BMPs and discharge points is included as part of the Long Term Operation and Maintenance Plan. Snow storage locations are shown on Drawings L301 through L303. BETA: Plan provided – issue resolved.*

SW38. Provide an estimated operations and maintenance budget. *Stantec: An estimated Operation and Maintenance budget is being developed, and will be provided under separate cover. BETA: A total estimated Operations and Maintenance budget has been provided. Recommend including a breakdown for the maintenance of individual components as part of the O&M documents.*

SW39. Include provisions for how porous pavement areas will be distinguished from conventional pavement areas during winter maintenance operations and how winter maintenance crews will be trained in the proper care of porous pavement. Consider posting warning signs at entrances to porous pavement lots restricting the use of sand. *Stantec: Warning signs will be posted at the entrance to the porous pavement parking area warning that no sanding should occur in that parking area. CHR performs their own snow management, and will train their maintenance personnel on the proper methods for snow and ice removal in the porous pavement area.* BETA: Information provided – issue resolved.

Illicit Discharges (Standard Number 10): *All illicit discharges to the stormwater management systems are prohibited.*

An Illicit Discharge Compliance Statement was included.

SW40. Several Town departments have noted sewer contamination in the stormwater system on Gerry Road. Provide a plan to investigate and eliminate contamination. *Stantec: The Owner worked with the Town in 2009 to identify and address this concern. At that time, the Owner, in coordination with the Town, excavated test pits along their existing sewer force main in Gerry Road to investigate potential leaks in the force main. During those investigations, a section of force main was found to be leaking, and the leak was repaired by installing a new section of pipe. From the point of the leak to the Independence Drive, the force main was relined. All of this work was observed by the Town of Brookline. After that work was complete, the Owner understood that the problem was solved, and has not been aware of ongoing reports of water quality issues. The Owner is committed to working with the Town to identify any other potential sources of water quality concerns, and is willing to work with the Town to accomplish this. We have begun discussions with the Town Engineer, and we agreed that the first step should be additional sampling of the drainage system upstream of the Hancock Village property, and on the property, to collect more information about the location of the source of the problem.* BETA: The Town Engineer has indicated that sampling for contamination should be performed at the following locations:

- a) The intersection of the 27" and 18" drain in Independence Drive
- b) The intersection of the 27" and 42" drain in Gerry Road
- c) At the outfall

Recommend a Condition that sampling be conducted at the locations requested by the Town and that any sewer contamination confirmed to be from the development property be repaired to the satisfaction of the Town Engineer.

SW41. Provide detail for Bioretention Area indicating material types and depths.

Utility Services

The project proposes installation of water, sewer, electric, gas, telephone, and cable services to each building.

U1. Provide projected demand and documentation, including capacity analysis and flow test data, to indicate that there is sufficient existing and proposed infrastructure for public utility services for the project. *Stantec: Capacity analysis of the existing sewer system is attached. The analysis indicates that sufficient capacity is available for the projects projected sewer flows. Flow tests have been requested from the Town of Brookline, and the results will be provided upon receipt.* BETA: Sewer

capacity analysis provided. Recommend a Condition that the Proponent coordinate with the Town to confirm ample water flow and pressure exists for the development.

- U2. Recommend revising the site design to eliminate the pump station on west site drive, or provide pump station to service Building 4 [building removed] only. *Stantec: Revisions to the site plans have included adjusted grades on the west side of Independence Drive that have allowed for the sewer system to be by gravity, and eliminating the need for a pump station.* BETA: Design revised – issue dismissed.
- U3. Provide details of pump station including location of a control panel, emergency generator and maintenance procedures. *Stantec: See previous response. Comment not applicable given revised plans.* BETA: Design revised – comment dismissed.
- U4. Provide locations, sizes and details of other proposed utility services including electric, cable and fire alarm, etc. *Stantec: Locations of electric and cable services are shown on the Composite Utility Plans, L501 through L503. The locations are shown schematically, and do not include sizes. The design of the electric and cable services will be performed in coordination with private utility companies once the project proceeds to the Construction Documents phase, after permitting is complete. The design of the fire alarm system will be coordinated with the electric and cable utility designs.* BETA: Recommend a Condition that all utility information be included on an as-built plan and submitted for record.
- U5. Recommend providing two additional fire hydrants; one adjacent to Building No. 5 [currently 4] and another at west end of Building 13 [currently 10]. *Stantec: There is an existing hydrant located 86' from Building #4, and a new hydrant is located 97' from Building #13.* BETA: Information provided and design revised – issue resolved.
- U6. Any existing utility services to be disconnected must be done at the main or manhole. *Stantec: Acknowledged.* BETA: Recommend this be included as a Condition.

Landscaping and Lighting

The project proposes to develop open space with buildings, access drives, walkways and parking areas. This will change the character of the neighborhood. The impact of this could be better mitigated by reducing the amount of clearing and/or providing a more robust landscape plan.

- L1. Planting Notes – Notes 7 and 16 refer to quantities of plant material. Quantities are not shown on the Plant Schedule or on the plans. *Stantec: Plant quantities have been added to the plans.* BETA: Plant quantities provided – issue resolved.
- L2. Plant Schedule – Maples are potentially in danger from the Asian Longhorned Beetle. Consider using another genus. *Quercus borealis* may be difficult to find; consider specifying *Quercus rubra* as a worthy replacement. *Stantec: Acknowledged* BETA: No further comment.
- L3. Add additional screening of existing driveway behind Building 6 [currently 5]. *Stantec: Additional screening has been added between Building 5 (formerly Building 6) and the existing driveway.* BETA: Additional screening provided – issue resolved.
- L4. Show additional screening between parking lot to the north of Building 7 [currently 6] so that headlights from the cars do not shine on the abutting residences to north and east. *Stantec: The entire property line abutting the neighbors rear yards will be delineated with a 6' high solid fence.* BETA: A fence for screening is provided along the property line at abutting residences and also

adjacent to some parking areas (south of Building 6 and north of Building 10). Also, evergreen trees are proposed at property lines and shrubs are proposed in proximity to the parking areas. These features should minimize impacts from headlights – issue resolved.

- L5. Add a couple of large evergreen trees to break up the line of smaller evergreens to the east of Building 7 [currently 6]. *Stantec: The planting plan to the east of Building 6 (formerly Building 7) along the property line is planted with no gaps.* BETA: No further comment.
- L6. Add shrubs along the line of proposed evergreen trees that are behind the proposed garages (3-7). *Stantec: The garages are no longer part of the site design. This area of the site has been redesigned to move the development further from the property line, saving existing trees and vegetation. Additional planting has been provided to supplement the existing.* BETA: Design revised – issue resolved.
- L7. Consider adding some screening between the proposed parking lot to the north of Building 12 [currently 9] and the existing buildings to the east. *Stantec: The design has been modified and clarified in the area to save existing trees and to add additional trees.* BETA: Design revised – issue resolved.
- L8. Consider adding plantings between the proposed parking that is in front of the proposed garages 3-7 and the existing building to the west. *Stantec: Garages have been removed in the revised plan. Note that the parking is several feet below the grade of the existing units. Additionally, the parking lot in this area is shorter in length than the previous version of the design, and the updated design calls for saving existing trees and adding additional planting.* BETA: Design revised – issue resolved.
- L9. Consider adding some screening between the proposed parking lot to the north of Building 12 [currently 9] and the existing buildings to the west and east. *Stantec: Acknowledged.* BETA: No further comment.
- L10. The proposed landscaping seems incomplete around Building 13 [currently 10]. It is difficult to know at this point what vegetation will remain after the rock removal is completed for this area. Screening is important between the existing buildings and this building. *Stantec: Planting layout has been revised around Building 10 (formerly Building 13) to add significantly more planting.* BETA: Design revised – issue resolved.
- L11. Detail 4 – Cast in Place Cheekwall – Consider showing posts for handrail in the cheekwall instead of the stair tread. *Stantec: We disagree with this suggestion and will maintain our existing detail, for the reason that we may want to maintain flexibility with the top of cheekwall elevation.* BETA: No further comment.
- L12. Add details showing planting of trees and shrubs on slopes. *Stantec: Details have been added to drawing #L604.* BETA: Detail provided – issue resolved.
- L13. Add detail showing planting of trees in areas with ledge. *Stantec: Details have been added to drawing #L604* BETA: Detail provided – issue resolved.
- L14. Provide information on seed / sod mix and show locations and limits on plans. *Stantec: All disturbed areas will be seeded with a general lawn seed mix.* BETA: Information provided – issue resolved.

Plans indicate 54 proposed gooseneck type light fixtures directed downward and mounted 16 feet above grade. Photometric plans indicate light levels between 0 to 2.5 lumens within the parking areas with some minor spillage onto adjacent properties.

- L15. Provide details and add to photometric plans all exterior wall mounted lights. *Stantec: Wall mounted light fixtures have not been selected for this project. The photometric impact of these lights will be too low to accurately depict on the photometric plans at this scale.* BETA: No further comment.
- L16. Recommend that lighting be provided for walkway on east side of Building 10 [currently 7] *Stantec: Building 10 from the previous set of plans has been removed. In that general area, two buildings, Buildings 7 and 8 are shown on the revised plans. A parking area is shown on the east side of those buildings. Lighting will be provided in the parking area.* BETA: Design revised – issue dismissed.
- L17. Adjust lighting to eliminate spillage onto adjacent properties. *Stantec: Lighting has been adjusted.* BETA: The Proponent has indicated a plan will be provided that shows no light spillage onto adjacent properties – issue remains outstanding.

Environmental and Cultural Impacts

The lots are located within areas that are fully developed with residential units. Review of available on-line data and maps indicate that the project is not located within proximity to wetland resource areas, stormwater critical areas, FEMA mapped 100 year flood zones, or Natural Heritage and Endangered Species Program (NHESP) mapped habitat areas for rare or endangered species. Due to the snow cover during the site visits BETA was not able to verify if a low lying area located between proposed buildings 4 [building removed] and 5 [currently 4] is a potential vernal pool. BETA's wetland scientist is scheduled to make observations and give their preliminary opinion later next week.

The project is located within the watershed of the Charles River which EPA lists as impaired for DDT, E. Coli, fish bioassessments, nutrients, PCBs, Phosphorus with TMDLs for pathogens and total phosphorus. The proposed porous pavement filtration system is a low impact development (LID) technique / best management practice (BMP) when well maintained works well to address these pollutants.

The Town indicates that Lot No. 1 may be in an area of historical significance (see 1980 Massachusetts Historical Commission Reconnaissance Survey Town Report). MassGIS indicates that the Baker School located at 205 Beverly Road and office/single family dwelling located at 12 Beverly Road are registered historical sites in proximity to the project.

- E1. Provide documentation from Massachusetts Historical Commission and Brookline Preservation Commission that the development will not adversely impact these or any other significant archaeological, historical or protected sites. *Stantec: After conclusion of the Comprehensive Permit process, the Applicant will confirm with the Mass Historical Commission to the extent that is required.* BETA: Recommend that a Condition to provide the Board with copies of correspondence on this issue.

The Health Department has expressed concern on how the project may affect potential mosquito breeding habitat on-site and in the D. Blakely Hoar Sanctuary. Although the project proposes deep sump catchbasins on-site it will also regrade and pave some low lying areas where water collects. Impacts to mosquito habitat on-site are anticipated to be minimal. BETA notes that the project will increase the volume of stormwater runoff to the D. Blakely Hoar Sanctuary, however.

Concerns Raised by Stormwater Survey and other Peer Review Consultants

- CR1. Will the development exacerbate existing flooding problems in abutter's yards and houses as outlined in surveys? BETA: BETA carefully reviewed potential impacts of the development parcel on abutting properties. Systems are designed to capture and route surface runoff to infiltration

systems and not to abutting properties. Area drains were added to the design at low points between properties to prevent ponding.

- CR2. Is there a more shallow infiltration system that will require less fill and avoid car light shining onto adjacent properties on the west lot? BETA: High groundwater elevations, the requirement to have 2 feet separation between the bottom of the system and high groundwater, the depth of the system and cover over the system sets the minimum grade. Sections are included with the plans. The system must contain a volume based on the contribution area. Based on these factors the design appears to be graded at the minimum over the system.
- CR3. Concerns about the impact of the Bioretention basin on the west lot. BETA: BETA requested that details of the materials be provided (see SW41). Along with Infiltration into soils and uptake by plants, a stone trench pipe system in the bottom should also ensure that water will drain within 72 hours of a storm event preventing habitat for mosquitoes to develop.
- CR4. Concerns of speeding in the west lot due to length and straightness of parking lot. BETA: BETA requested that the applicant consider traffic calming methods in that lot (see P7).

Please do not hesitate to contact the undersigned if you have any questions in regards to this review.

Very truly yours,
BETA Group, Inc.



Philip F Paradis, Jr., PE
Senior Project Manager



Matthew J. Crowley, PE
Project Engineer