UNIVERSITY STATION PHASE 2 LLC
c/o New England Development
75 Park Plaza
Boston, Massachusetts 02116

December 1, 2017

Planning Board
Town of Westwood
50 Carby Street
Westwood, MA 02090
Attention: Abigail McCabe, Town Planner

Office of the Town Clerk
580 High Street
Westwood, MA 02090
Attention: Dottie Powers, Town Clerk

Re: Application for Project Development Review and Special Permit
Portion of Development Area B
University Avenue Mixed Use District (**UAMUD**) – Westwood, Massachusetts

Dear Planning Board and Town Clerk Powers:

On behalf of Pulte Homes of New England, LLC (the "**Applicant**"), we are pleased to submit the enclosed application (the "**Application**") to the Planning Board in connection with our proposal to construct a new residential project (the "**Project**") within the UAMUD. This submission is an exciting step in the ongoing development of a vibrant, mixed-use community at University Station.

As described in the attached Application, the Project consists of the construction of two new residential condominium buildings and related parking and other site-improvements within a portion of Development Area B, as shown on the Modified Master Development Plan prepared by Tetra Tech dated November 22, 2016 (the "**Modified Master Development Plan**"). With this Application, which is submitted pursuant to Section 17.2 of the UAMUD Rules and Regulations, the Applicant respectfully requests that the Board issue the following approvals for the Project: (1) a Special Permit pursuant to Section 9.7.5.4 of the Town of Westwood (the "**Zoning Bylaw**") to allow 100 new homes, in excess of the 350 dwelling units already existing within the UAMUD, and (2) a Project Development Review (**PDR**) approval pursuant to Section 9.7.12.2.2 of the Zoning Bylaw.

The enclosed Application addresses the applicable requirements set forth in the Zoning Bylaw and the UAMUD Rules and Regulations. As detailed in the Application, the Project meets all applicable criteria for the grant of a Special Permit and issuance of a PDR Approval.

In accordance with the UAMUD Rules and Regulations and subsequent conversations with Town Planner, Abigail McCabe, we are submitting one copy of this Application to the Town Clerk, and 15 copies of the Application to the Planning Board. A complete electronic copy of the Application has been submitted via email to Town Planner McCabe. The enclosed Application includes:

- Project Information Form, which provides a summary of basic information about the Project and the Applicant;
- Narrative Statement describing the criteria for issuance of a Special Permit and PDR approval and how the Project meets such criteria;
- List of discretionary permits required to construct the Project;
- Technical Report updating the drainage calculations for the Project;
- Current occupancy rate data within the UAMUD; and
- Plans showing the Project.

In addition to the enclosures listed above, in accordance with Section 5.4 of the UAMUD Rules and Regulations, also included with this submission are the following Project Plan copies, as referenced in Tab 7 of this Application: Eight (8) 24" x 36" copies and seven (7) 11" x 17" copies of the Project Plans.

We are pleased to support this Application and support the continued development of University Station through construction of this Project. We look forward to reviewing this Application with Town staff and with the Planning Board at its next available meeting. In the meantime, please feel free to contact us using the contact information on the attached Project Information Form if you have any questions or need any additional information.

Thank you.

Yours sincerely,

UNIVERSITY STATION PHASE 2 LLC

By: _____
Paul S. Cincotta

Application for Project Development Review and Special Permit

HAWTHORNE AT UNIVERSITY STATION

Development Area B of the University Station project
within the University Avenue Mixed Use District

Submitted by Pulte Homes of New England, LLC.

December 1, 2017

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Tab 1:
Project Information Form and Signature Page

General application information for the Applicant and project:

Name of Applicant:	Pulte Homes of New England, LLC
Address of Applicant:	115 Flanders Road, Suite 200 Westborough, MA 01581
Contact information for Applicant:	Name: Mark Mastroianni Title: Manager of Land Entitlements Phone: (508) 621-0876 Email: mark.mastroianni@pulte.com
Owner (if other than the Applicant):	University Station Phase 2 LLC
	Name: Paul S. Cincotta Title: Project Manager Phone: (617) 243-7841 E-Mail: pcincotta@nedevelopment.com Name: Brian W. Dugdale, Esq. Title: Attorney for the Owner Phone: (617) 574-6532 Email: bdugdale@goulstonstorrs.com
Description of project site:	Approximately 2.7 acres of land within Development Area B, as shown on the Modified Master Development Plan approved by the Planning Board on April 11, 2017, within the University Avenue Mixed Use District. The project site will be created by recorded plan on or about the date construction commences.
Description of proposed development:	Construction of two four-story condominium buildings measuring approximately 53 feet in height with approximately 73,184 square feet each. Each condominium building will include 23 one bedroom and 27 two bedroom condominium

	units, for a total of 100 units, located above a single level of covered parking. Each building will provide 5 affordable units, for a total of 10 affordable units in this Project, evenly split between one and two bedroom units. The building and site design characteristics are more fully described in the Narrative Statement behind Tab 2.
Description of proposed parking:	Approximately 100 covered parking spaces located beneath the condominium buildings and 80 new surface parking spaces (An additional 8 parking spaces will be provided for Bridges, in replacement of existing parking spaces along Bridges Drive) adjacent to the buildings with access to and from University Avenue via "Bridges Drive", a shared driveway.
Waivers from Rules and Regulations requested:	None
Supporting application materials	Please see the foregoing Table of Contents and narrative statement and plans provided with this application.
Application fee:	Calculated as 146,368 square feet of construction x $0.05 = $7,318.40.

Signature of the Applicant:

Pulte Homes of New England, LLC

Name: Mark Mastroianni
Title: Manager of Land Entitlements

Date: 11/30, 2017

Tab 2:
Narrative Statement

The Applicant proposes to construct two new residential buildings that will collectively include 100 new homes, together with parking and other site improvements, on approximately 2.7 acres of land (the "**Project Site**") within the University Avenue Mixed Use District (the "**UAMUD**"). The Project Site is located within a portion of Development Area B, as shown on the Master Development Plan approved at the Special Town Meeting on May 6, 2013, as modified by the Modified Master Development Plan approved by the Planning Board on April 11, 2017 (as so modified, the "**Modified Master Development Plan**"). The Modified Master Development Plan shows two residential condominium buildings with covered parking and a parking field in this location, and various reports submitted to the Town in connection with the Modified Master Development Plan (including a traffic impact study and supplemental memoranda) describe and analyze impacts of the building in this location. The Project, as further described below, will require a Special Permit under Section 9.7.4.5.4 of the Westwood Zoning Bylaw (the "**Zoning Bylaw**") for construction of dwelling units in excess of the 350 units already existing within the UAMUD, and a Project Development Review Approval ("**PDR Approval**") under Section 9.7.12.2.2 of the Zoning Bylaw.

As described in more detail below, the Project is consistent with the Modified Master Development Plan and the zoning and general planning principles for University Station. Parts A and B below provide a Project overview, technical information and reports on traffic, utilities, and other Project features, and additional information required by the Rules and Regulations of the University Avenue Mixed Use District. Part C addresses how the Project meets the requisite criteria for issuance of a Special Permit, given its substantial benefits to the Town of Westwood (the "**Town**"). Part D summarizes this information and the Project's compliance with the design and performance standards set forth in Section 9.7.11 of the Zoning Bylaw.

A. Overview of the Project

1. Project Description

As indicated above, the Project consists of development of two four-story residential condominium buildings measuring approximately 53 feet in height, providing 50 dwelling units each, on a parcel measuring approximately 2.7 acres (the "**Project**"). This parcel will be created by "Approval Not Required" plan to be recorded prior to commencement of construction.

The proposed Project includes the construction of two new residential buildings, each four-stories in height and containing 50 residential units (the "**Buildings**"). Within each Building, there will be 23 one-bedroom units and 27 two-bedroom units. There will not be any three bedroom units. Each Building will provide five units designated as affordable, which will be dispersed evenly among the one and two-bedroom units in accordance with applicable

requirements of the Town and the Department of Housing and Community Development ("**DHCD**"). Floor plans are included at Tab 7.

Each Building will be located above a single level of covered parking for approximately 50 vehicles. An additional 80 surface parking spaces (8 additional spaces will be provided and used by the Bridges memory care facility, in replacement of existing parking spaces along Bridges Drive) will be located adjacent to the Buildings. The Project includes landscaping and other site improvements that have been designed to integrate the Project into the larger University Station environment. A new pedestrian walkway will link the Buildings to the pedestrian circulation system for University Station, which will be enhanced with native and adapted drought-tolerant trees and other landscaping, and lighting.

The proposed residential use is allowed within Development Area B, subject to issuance of the Special Permit described herein. As shown on the approved Modified Master Development Plan, the Project Site in particular is designated and well suited for residential development given its easy access to public transportation, retail, restaurants, a fitness center, open space and the other amenities that University Station provides.

In addition to the centrally located, onsite open space, the Project will abut and have access to the "Linear Park" to be constructed as part of the Brigham and Women's medical office building enabling package approved by the Planning Board on May 23, 2017 (the "**Brigham Enabling Package**"). The Project will also include pedestrian connections to the nearby Wellhead Park adjacent to the Bridges Assisted Living facility and the Gateway Park.

2. Architectural Design

The design and architecture of the two Buildings is intended to integrate the design elements used throughout the University Station Development. Other architectural features and planning objectives for the Buildings are summarized as follows:

- *Exterior Materials:* Each elevation will boast a variety of materials. Stone veneer will create a strong visual base for the Buildings. HardiePlank lap siding will be provided in a variety of colors to enhance the appearance of the Buildings. Azek Trim components will also be incorporated into the design to further enhance the variety of the exterior materials.

- *Façade Treatment:* The façade will be designed to receive stone veneer at the base, with HardiePlank lap siding in varying colors above. The façade will achieve further architectural diversity by providing recessed balconies with powder coated aluminum railings, projecting bay windows, and covered entrances. Visibility of the two Buildings has been considered in treating all facades equally to provide attractive views of both Buildings from the Master Development Plan area, as well as from the adjacent railway traffic.

- *Detailing:* The Buildings have been designed to have no blank walls. Large, full view, contemporary windows are designed to maximize the natural light into the residential units. All window openings in the stone material will be spanned by a header. Heavier

materials such as the stone veneer have been located below the lighter HardiePlank material with the change in material occurring along a horizontal line. The Building entrances are designed with a contemporary overhang feature.

- *Rooftop:* The roof has been designed with a flat roof design consistent with the other buildings at University Station. Roof material is an EPD rubber roof membrane, white in color which will lighten the mechanical load on the Buildings.

B. Technical Information and Reports

1. Traffic Impacts

The Project Site is situated along the north side of Bridges Drive, in approximately the same location and massing as two residential buildings depicted on the Modified Master Development Plan. As detailed in the application materials submitted in connection with the approval of the Modified Master Development Plan, these two Buildings were planned to include approximately 100 dwelling units. Vehicles will have access to the Project Site via Bridges Drive, which intersects the east side of University Avenue opposite the north drive to the Phase I retail area.

As part of the University Station planning process, a Traffic Impact Study dated November 2012 (the "**November 2012 TIS**"), and supporting memoranda addressing comments raised by the Town's traffic peer review consultant were submitted to and approved by the Town. These documents included detailed traffic impact analyses and a comprehensive transportation improvement program, the elements of which are designed to accommodate the Project within the confines of the transportation infrastructure. These documents included peak hour traffic volume projections and analyses for up to 300 residential units for the UAMUD as a whole, including an estimated 100 residential units at the location of the Project Site. Subsequent to that analysis, Vanasse and Associates issued an letter report dated January 19, 2017 (the "**2017 Traffic Update**"), which was filed with the Planning Board in connection with its approval of the Modified Master Development Plan on April 11, 2017. The 2017 Traffic Update identified a reduced development program within Development Area B, reducing the residential development to 100 units. As currently proposed, the Project will contain 100 units, consistent with the 2017 Traffic Update. The Project will not alter the service levels on University Avenue or at the intersections shown on the Modified Master Development Plan. The entrances to and from Development Area B will continue to function as planned. Therefore, no further traffic analysis is warranted.

2. Utilities

- *Water Usage:* The condominium will receive water from the Dedham-Westwood Water District's main water service system located in University Avenue. An eight-inch water main loop will be created by connecting to an eight inch water main that is under construction along the east side of the Brigham and Women's medical office building.

The Project will complete the construction of the water main loop by making a connection to an eight-inch water main in Bridges Drive. Each Building will require a four-inch domestic service and a six-inch fire service. Final hydrant locations will be coordinated with the Fire Department. The Modified Master Development Plan anticipated 251,354 gallons per day of water demand (as noted in the approved Water Budget Report last revised April 18, 2013), with 34,430 gallons per day allocated to residential uses within Development Area B. Water demands are currently anticipated to be approximately 16,940 gallons per day. Water Sense (or equivalent) fixtures will be used as outlined in the April 26, 2013, Sustainability Memorandum filed with the Town in connection with the approval of the Master Development Plan. With the use of the Water Sense fixtures and the anticipated reduction in water demands, the projected water usage of the Project is consistent with the Modified Master Development Plan.

- *Wastewater Generation*[1]*:* The Buildings will discharge wastewater to the eight-inch sewer main that is in Bridges Drive. The Master Development Plan anticipated up to 34,430 gallons per day of wastewater to be generated by residential uses in Development Area B. Actual wastewater generation is anticipated to be 16,940 gallons per day, less than previously estimated, resulting in a lower wastewater impact. Wastewater will be discharged by six-inch service laterals with a minimum slope of 1%.

- *Electrical Service:* Electrical service will be provided by Eversource from University Avenue by means of an underground ductbank in Bridges Drive. The transformers are anticipated to be located along the north side of each Building (subject to Eversource's approval) and will not be visible from University Avenue; the transformers will be adequately screened, consistent with the Modified Master Development Plan requirements.

- *Gas service:* Gas service will be provided by Eversource from its main line in Bridges Drive. Gas load and pressure requirements have been provided to Eversource.

- *Telephone and Cable Service:* Telephone cable service will be provided by Verizon and Comcast from University Avenue by means of an underground duct bank in Bridges Drive. This arrangement is consistent with the Modified Master Development Plan.

3. Stormwater Management

The stormwater management system for the Project (the "**Stormwater Management System**") is consistent with the system approved as part of the Modified Master Development Plan review process.

Stormwater from the Buildings' rooftops will be collected in a series of roof drains. The majority of the stormwater will be directed through the drains to a "Stormtech" subsurface infiltration basin (Basin 61P) located along the north property boundary. Two of the downspouts on the garage side of each building will tie into the existing drainage system located in Bridges

[1] The Project will be located in the Water Resource Protection Overlay District ("**WRPOD**"), and as such must meet the requirement to be connected to public sewer in Section 9.7.5.2.9 of the Zoning Bylaw; as noted herein, the Project will be connected to public sewer in compliance with this Section.

Drive, and flow to a separate infiltration system. Surface runoff generated from the parking areas and associated landscaping is also collected, treated, and conveyed to Basin 61P, with exception of the southern end of the Project Site, which slopes towards Bridges Drive. All runoff from paved surfaces is directed to a proprietary stormwater quality unit prior to discharge into the infiltration basin.

Basin 61P is designed as a Stormtech infiltration system, the details of which are included with the included with this Application, including, without limitation, the Grading and Drainage Plan (Sheet 5) included at Tab 7 (the "**Drainage and Utility Plan**"). As shown on the Drainage and Utility Plan, the outlet for this basin is directed to an eighteen inch (18") HDPE pipe that was constructed as part of the Linear Park and ultimately outlets to Point of Analysis (POA) 4.

Calculations submitted with this Application are an update to the calculations for POA 4 that were recently submitted in connection with the Modified Master Development Plan Approval. The calculations have been updated to reflect the Project Site layout and recently completed soil testing. The calculations that are attached document that the Stormwater Management System continues to meet the requirements of the Modified Master Development Plan in terms of groundwater recharge (the first 2" from all storm events) while being sized adequately to pass up to a 100-year storm event. Calculations demonstrating the above results are attached to this Application behind Tab 5. The Stormwater Management System is in conformance with the approved Modified Master Development Plan documents and further stormwater mitigation is not warranted for the Project.

4. Water Quality[2]

The Stormwater Management System has been designed in accordance with the "Critical Areas" standards in the Massachusetts Department of Environmental Protection Stormwater Management Policy. Specifically, all stormwater collected from pavement areas will be routed through deep sump hooded catch basins and Stormceptors sized to remove 75% TSS prior to discharging into an infiltration system. Infiltration practices are also highly recommended for use in critical areas, and the Project has incorporated infiltration measures into the proposed design, consistent with the Modified Master Development Plan.

In addition to the stormwater quality measures discussed above, the Buildings do not include provisions for any generators associated with providing emergency power.

5. Landscape Architecture

The proposed landscape plan for the Project is designed to be consistent and compatible with adjacent uses at University Station, including the Bridges assisted living Project. The density of plantings is consistent with the adjacent Bridges parcel, thus blending the Project to create a seamless and uniform environment. Particular attention has also been paid with respect to the design of other site landscaping items such as signage, lighting, fencing, and entry signage.

[2] As part of the WROPD, the Project must meet the requirements of Drainage under Section 9.7.5.2.4 of the Zoning Bylaw, which provides that all drainage must meet the standards in the Massachusetts Department of Environmental Protection Stormwater Management Policy for "Critical Areas"; the Project meets these standards.

The proposed recycling enclosure and transformer areas have been adequately screened with either fencing and/or trees and shrubs. Drought tolerant, native material will be used so that irrigation needs for this Project are minimized.

6. Site Lighting

Site lighting for the project has been designed with lighting practices appropriate for a residential community that reduce light pollution and conserve energy, while maintaining reasonable nighttime safety and security as required per Section 9.7.11.9 of the Zoning Bylaw. All exterior lighting fixtures will be LED and will include hoods and shields so that the design is efficient, minimizes light pollution, and trespass. The lighting design plan includes all of the information required per Section 6.10 of the UAMUD Rules and Regulations.

7. Sustainability and Greenhouse Gas Strategies and Initiatives

The Town has adopted the Massachusetts Stretch Building Code (the "Stretch Code"). By adhering to the Stretch Code, the Project will result in a significant level of energy conservation. In addition, the Applicant has committed to significant energy efficient measures in its building design. Specific strategies and initiatives include the following:

Site Strategies

- *Heat island reduction:* Use of a light-colored roofing membrane reduces heat islands and minimizes impacts on the microclimate.

- *Pollution prevention during construction:* To minimize the amount of construction debris that enters streams and waterways and to protect the environment from pollution, the Applicant will adhere to the requirements of the U.S. EPA Stormwater Construction General Permit.

- *Impervious area reduction:* The Project will provide underground parking areas, which will minimize the amount of impervious area required for the Project in order to provide the necessary parking.

- *Reuse of existing site and infrastructure:* The Project entails the reuse of an underutilized site and will utilize existing water and sewer infrastructure.

- *Pedestrian friendly:* The Project is designed to include internal sidewalks which will connect to nearby parks, restaurants, shops and public transit facilities.

Water Efficiency

- *Water use reduction:* The Applicant pursues several strategies to reduce water consumption. By using high efficiency, low-flow plumbing fixtures meeting the "water sense" certification, the Applicant is able to significantly reduce water use.

- *Energy STAR rated appliances:* The Applicant proposes to further reduce water consumption by providing Energy STAR rated dishwashers and laundry washing machines.

- *Sensible landscaping practices:* By using drought-tolerant, indigenous plantings as well as "smart" irrigation controls, the Applicant is able to significantly reduce water consumption used for landscaping purposes.

Energy Conservation Construction Techniques

- *Insulation:* Effective insulation will create a tight building envelope.

- *"Low E" Windows:* The Project's windows will be energy efficient and incorporate window glazing.

- *Sealed Building Envelope:* The Applicant will conduct an inspection for comprehensive air sealing of building envelope to minimize air leakage.

- *Sealed Ductwork:* The Applicant will seal and leak check all supply air ductwork.

- *HVAC:* Properly sized, energy efficient heating, cooling, and ventilation equipment will be installed.

- *Energy STAR Lighting:* The Project will include Energy STAR qualified lighting with a minimum of 80% CFL or LED lighting.

- *Efficient Water Heaters:* The Project will incorporate high efficiency, tankless water heaters.

Building Materials and Resources

- *Construction and post-consumer waste management:* The condominium association that will be created to manage the Buildings will establish a recycling program that will minimize the flow of trash into landfills and incinerators. The recycling enclosure will be sized appropriately to accommodate the necessary recycling containers.

- *Recycled content:* The Applicant proposes the use of building materials with recycled content such as oriented strand board (OSB).

- *Engineered product:* The Applicant proposes resource efficient designs using engineered wood products with advanced framing techniques such as open web floor trusses, PSL posts, LSL beams, and LPI floor joists.

Indoor Air Quality

- *Passive House:* The Buildings will be designed using the passive house modeling approach which provides superb indoor air quality.

- *Low-emitting materials:* The Applicant will specify and provide lower VOC (Volatile Organic Compound) building materials and products (paints, adhesives, cleaners, etc.) where feasible, in order to minimize VOC off-gassing and maintain a safer, more pleasant experience for residents.

8. Air Quality and Noise Impacts

Air quality for the Project is consistent with the Modified Master Development Plan. Projected vehicle trips are consistent with the approved trip generations associated with the Modified Master Development Plan as described above, and additional air quality impacts will not be created by the Project.

Similarly, noise impacts from the Project are consistent with Modified Master Development Plan. Heating and cooling mechanicals for the residential units are located in insulated enclosed closets on the units balconies, and unloading of moving trucks and pick up of recycling and refuse will be limited to hours appropriate for residential uses (but at no time between the hours of 10:00 PM and 6:00 AM).

9. Additional Information

The narrative above and attachments include information required by the Rules and Regulations, including drainage calculations, plans, and other materials. This section briefly provides additional technical information required by the Rules and Regulations and not otherwise addressed herein.

- *Subsidy Agreements:* The Project does not include any new governmental subsidy arrangements. As detailed in the Fiscal Impact Memorandum Update included at Tab 6, the University Station Development Agreement dated May 7, 2013, included mitigation contributions from the Developer that have exceeded the realized fiscal impacts to the Town; therefore, no additional contributions are required under the Zoning Bylaw.

- *Construction Schedule:* Subject to receipt of necessary permits and approvals, the Applicant anticipates commencing construction of the Project in the spring of 2018. The construction period will likely be approximately 18 months, with completion projected by the end of 2019.

- *Fill Removal Calculations:* The Owner is providing the Applicant with a balanced pad-ready building site. The Project will not require removal of any fill from the Project Site. In order to achieve final grades, some select soil materials will be imported for parking lot base course.

C. Compliance with the Special Permit Requirement

As noted above, under Section 9.7.4.5.4 of the Zoning Bylaw, the Applicant respectfully requests a Special Permit from the Planning Board for development of dwelling units in excess

of the initial 350 dwelling units allowed as of right. No Special Permit for such additional residential development may be approved by the Planning Board until at least sixty percent (60%) of the initial 350 dwelling units are occupied; the initial 350 dwelling units at University Station are more than 60% occupied at this point, as shown on the information provided in the Fiscal Report included at Tab 6. The Planning Board may issue a Special Permit for development of dwelling units in excess of 350 units if, in its written determination, the adverse effects of the Project will not outweigh the beneficial impacts to the Town or neighborhood, in view of the particular characteristics of the site and of the proposal in relation to that site (Section 9.7.4.5.4(b)). To make this determination, the Planning Board must make specific findings, each of which is addressed below:

a. The residential use is integrated with the surrounding uses and provides appropriate access to public transportation infrastructure.

The Buildings are situated along the north side of Bridges Drive. Vehicles access these buildings by Bridges Drive, which intersects the east side of University Avenue opposite the north drive to the Phase 1 retail area. The Project Site provides convenient vehicular and pedestrian access to the Route 128 MBTA Station, which provides both commuter rail and Amtrak passenger service. The Buildings have been designed to integrate with the nearby Brigham and Women's medical facility and Bridges memory care facility, all of which are set back from the commercially-oriented uses along University Avenue. The circulation system to and through the Project Site will provide the Building's residents with pedestrian-friendly connections to the amenities at University Station.

b. The residential use is part of, supports, or complements a predominantly nonresidential project component.

Under Section 9.7.1 of the Zoning Bylaw, the purpose of the UAMUD is to "promote a mix of complementary land uses." The Project will be an exciting step towards complementing the predominantly retail and other nonresidential project components that currently exist within the UAMUD. From the Project Site, residents will have easy access to the medical facility currently under construction within Development Area B, open space located throughout the University Station development, and the Life Time Fitness health facilities located in Development Area C. Because of the carefully planned, mixed-use elements of the University Station development, the Project's residents will have opportunities to access jobs, retail shopping, restaurants, health care facilities, a first-class fitness center, open space amenities, and public transportation, without having to use a vehicle.

c. The dwelling units diversify housing choices within the UAMUD project area and the community.

The Project will diversify housing choices in the UAMUD project and the community as a whole by adding 46 one-bedroom and 54 two-bedroom condominium units to the Town. Currently, the Town's housing stock as a whole is predominated by detached single family residences, which are priced at market rate. At University Station, the only existing residential units are apartments for rent. The Project will add an array of owner-occupied condominium

units, with convenient access to public transportation and other amenities. Ten percent (10%) of the Project's dwelling will be designated Affordable Units as defined in Section 2 of the Zoning Bylaw.

d. The overall UAMUD project, including the proposed residential component, still results in net fiscal benefits to the Town, and the proponent has adequately mitigated any adverse fiscal impacts.

The UAMUD project as a whole results in net fiscal benefits to the Town at present, and the Project will only serve to increase these net fiscal benefits by providing substantially increased property tax revenue and indirectly further increasing tax revenue through patronage at retail businesses within University Station and the Town as a whole. Any adverse fiscal impacts that would be of concern, such as the addition of students to the Town's school system, are minimized by the type of units included in the Project, which only include one and two-bedroom condominium units. As detailed in the Fiscal Impact Memorandum Update included at Tab 6, the UAMUD project will remain fiscally beneficial to the Town as a result of the Project, and such benefits exceed the estimates originally projected in connection with the approval of the Master Development Plan in 2013.

e. The residential use adequately accommodates and addresses traffic flow and safety, is adequately serviced by utilities and public services, and does not pose unacceptable or unmitigated impacts on the environment.

Any additional stress on traffic flow and utilities is properly mitigated as detailed in Sections B above, and D below. As detailed in Section B(1), vehicles will access the Buildings by Bridges Drive, which intersects the east side of University Avenue opposite north drive to the core retail area. The Project will not alter the service levels on University Avenue or at the intersections shown on the Modified Master Development Plan, and the entrances to Development Area B will continue to function in accordance with the current plans.

The plans listed behind Tab 7 include a utility plan that shows service lines leading to each of the Buildings. Water will be provided from the Dedham-Westwood Water District's main water service system in University Avenue and looped between the infrastructure constructed within Bridges Drive and infrastructure currently under construction along the east side of the Brigham and Women's medical office building. Wastewater will be discharged to the main line located in Bridges Drive. Electrical, telephone, and cable service will be provided by means of underground duct banks in Bridges Drive. Section B(3) contains information about the Project's Stormwater Management System, which is consistent with the system approved as part of the Modified Master Development Plan review process, and Tab 5 contains updated drainage calculations.

As described above in Sections B and D, the Project will take substantial measures to mitigate any environmental impacts, and by adhering to the Stretch Code, the project will result in significant levels of energy conservation. These environmental measures include heat island reduction, pollution prevention during construction, reduction in expected water use, sensible

landscaping practices, use of energy efficient HVAC heating and cooling systems, and use of low-emitting and regional materials in construction, all as further detailed above.

f. The residential use meets the affordable housing requirements of Section 9.7.4.5.3 of the Zoning Bylaw.

Under Section 9.7.4.5.3 of the Zoning Bylaw, a minimum of ten percent (10%) of total dwelling units in excess of the 350 dwelling units allowed by right must be Affordable Housing (hereinafter defined) units and remain affordable in perpetuity. Affordable Housing means dwelling units available at a cost of no more than thirty percent (30%) of gross household income to households at or below eighty percent (80%) of the Boston PMSA median income (Section 9.7.4.5.3). The Project will comply with this requirement and provide ten percent (10%) Affordable Units. The Applicant, the Town, and the DHCD will work with one another to enter into a binding agreement providing for continued affordability of the units within the Project.

D. Compliance with Design and Performance Standards

As described above and shown on the attached plans, and summarized briefly in this Section D, the Applicant believes the Project complies with the design and performance standards set forth in Section 9.7.11 of the Zoning Bylaw:

- *Building Design:* As described in Section A(2) above, the Project will provide attractive for-sale residential condominium Buildings to the University Station Development that will integrate well with the other buildings. The exterior facade will include a combination of materials including stone veneer, Hardie Plank lap siding in a variety of colors, and AZEK trim. There are additional architectural accents to enhance the interest of the Buildings, and with visibility from the adjacent railway and other Development Projects at University Station, all four sides of the Buildings have been designed to provide attractive views. The design is intended to compliment the overall aesthetic of University Station.

- *Visual Mitigation and Screening of Infrastructural Elements:* Project infrastructure has been carefully located to minimize visual and other impacts. The driveway along the eastern side of the Buildings will facilitate access to a recycling enclosure that is located at the northeast corner of the Project Site.

- *Utilities:* The plans listed behind Tab 7 include a utility plan that shows service lines leading to each of the Buildings. As described in Section B(2), water will be provided and looped from the Dedham-Westwood Water District's main water service system in University Avenue and infrastructure constructed within Bridges Drive and infrastructure currently under construction along the east side of the Brigham and Women's medical office building. Wastewater will be discharged to the main line located in Bridges Drive. Electrical, telephone, and cable service will be provided by means of underground duct banks in Bridges Drive.

- *Land Uses and Common Areas:* The Project includes adequate sidewalks for pedestrian connectivity from each of the Buildings. Sidewalks will enable pedestrians to travel to and from Linear Park and then ultimately on to the train station, the Phase I retail and residential areas, and open spaces within University Station.

- *Street Design:* No new streets are shown as part of the Project. As shown on the plans, the Buildings are accessed from University Avenue via Bridges Drive. Interior parking areas have been designed to provide sufficient area for driving, turning, and maneuvering. Information on turning movements associated with the Project Site for various Westwood Fire Department apparatus was previously provided and was presented as part of the Modified Master Development Plan process.

- *Circulation, Traffic Impact & Public Street Access:* As described in more detail in Section B(1), the Project is consistent with the Modified Master Development Plan and with the November 2012 TIS and the 2017 Traffic Update. These materials formed the basis for traffic improvements and mitigation measures to be provided for the University Station development to ensure that roadways can accommodate traffic from the Project, including the residential use.

- *Public Safety:* The Project includes adequate water supply distribution, storage, and access for fire protection. As stated in Section B(2), fire hydrants shall be located as required by the Fire Department.

- *Stormwater Management:* Section B(3) contains information regarding the Stormwater Management System, which is consistent with the system approved as part of the Modified Master Development Plan review process. Stormwater from the roof top and runoff generated from the parking and landscaped areas are directed to subsurface infiltration basins. This Application includes drainage calculations behind Tab 5.

- *Outdoor Lighting:* The plans listed behind Tab 7 include a lighting plan with detailed information on outdoor lighting as per Section 6.10 of the UAMUD Rules and Regulations. Site lighting for the project has been designed with lighting practices appropriate for a residential community that reduce light pollution and conserve energy, while maintaining reasonable nighttime safety and security as required per Section 9.7.11.9 of the Zoning Bylaw. All exterior lighting fixtures will be LED and will include hoods and shields so that the design is efficient, minimizes light pollution, and trespass.

- *Mixed Uses and Activities:* The Project provides residential units and is intended to complement the range of uses envisioned for the University Station development, including commercial, residential, and office uses.

- *Energy Efficiency:* As described in more detail in Section B(7), the Applicant has recognized the requirements of the Stretch Energy Code and intends to meet or exceed these requirements through various strategies to achieve a high level of building energy efficiency.

- *Sustainability:* As described in more detail in Section B(7), the Applicant has also adopted strategies to preserve natural resources, including a recycling program once units are occupied, and using certain materials with recycled content, where feasible, during construction.

- *Public Gathering Areas:* As indicated above, the Project includes areas for pedestrians to travel from the Project Site to public gathering areas and other open spaces included within the University Station project.

- *Air Quality, Noise, Vibration, Etc.:* Air quality, noise, and vibration impacts are consistent with those described in the Modified Master Development Plan. The Applicant has adopted strategies to minimize such impacts, including locating the unit heating and cooling mechanical equipment within insulated enclosed closets and limitations on times when moving trucks will unload.

- *Construction Solid Waste Management:* The Applicant and/or its contractor will make arrangements for disposal of construction debris, and for appropriate storage, screening, and securing of such materials prior to removal.

- *Water Quality:* As described in Section B(4), the Applicant has designed the Stormwater Management System in accordance with the "Critical Areas" standard of MassDEP's Stormwater Management Policy. The system includes infiltration measures as well as collection and routing of stormwater to remove 75% TSS prior to discharge.

- *Spill Prevention and Response:* The Applicant will operate in accordance with relevant sections of the Operations and Maintenance Plan developed for the University Station project. The Operations and Maintenance Plan includes an Emergency Response and Spill Containment Plan which identifies measures for preventing and responding to potential releases, discharges, and spills of oil or hazardous materials.

- *Water Efficiency:* As described in Section B(7), the Applicant pursues several strategies to reduce water consumption. Such strategies include use of high efficiency, low-flow plumbing fixtures and appliances, "smart" irrigation controls, and other sensible landscaping practices.

E. Conclusion

The Project complies with the requirements for granting a Special Permit for dwelling units in excess of 350 units under Section 9.7.4.5.4, in that the adverse effects of the Project will not outweigh the beneficial impacts to the Town or neighborhood, in view of the diversified housing stock, increased fiscal benefits, and promotion of mixed land uses that will be provided

as a result of the new condominium units. The Project, as proposed, also meets the PDR Approval requirements in that it is consistent with the Modified Master Development Plan, conforms to the Design and Performance Standards under the Zoning Bylaw and will result in net fiscal benefits to the Town, while promoting a complementary mix of land uses within the UAMUD. As such, the Applicant respectfully requests the Planning Board grant its requests for (1) a Special Permit for dwelling units in excess of 350 units under Section 9.7.4.5.4 of the Zoning Bylaw and (2) PDR Approval of the condominium under Section 9.7.12.2.2.

Tab 3:
Table of Development Data

Pursuant to Section 6.11 of the Rules and Regulations for the University Avenue Mixed Use District, the following table summarizes development data for the Project.

The Project Site, totaling approximately 2.7 acres, is depicted on the project plans and will be established by recording an ANR Plan prior to construction commencement.

Development Feature	Existing Pre-Development Conditions	Requirement in Zoning Bylaw	Proposed for PDR Development
Total PDR Development area and individual lot area	No separate condominium parcel	Minimum lot area 15,000 square feet	2.745 acres
Lot frontage	No separate condominium parcel	50 feet	50 feet
Lot width	No separate condominium parcel	None	15 feet
Yard setbacks	N/A; parcel not developed	None	Front yard 358.2 feet Side yard 4.3 feet Rear yard 58.2 feet
Building height	N/A; parcel not developed	80 feet (subject to footnotes in Sec. 9.7.7.1)	53 feet
Area designated as permanent open space	N/A; parcel not developed	26 acres district-wide	N/A
Area and percentage of non-wetland lot area	N/A; No separate condominium parcel	None	2.745 acres, or 100%
Area and percentage building coverage	N/A; parcel not developed	None	Approximately 40,000 square feet, or 33.5%
Area and percentage of impervious surface	N/A; parcel not developed	104 acres (80%) district-wide	2.0 acres, or 72.9%
Landscaped area	N/A; parcel not developed	None	0.745 acres or 27.1%
Gross floor area, net floor area, and Floor Area Ratio (FAR) of non-residential buildings	N/A; parcel not developed	2.1 million square feet, equivalent to an 1.0 FAR, district-wide	N/A

Number of bedrooms per dwelling unit	N/A; parcel not developed	None	1 and 2 bedroom units
Number of dwelling units and dwelling unit density per acre	N/A; parcel not developed	None	100 units and 36.43 units per acre
Number of Affordable Housing units, as defined in Section 2.0 of the Zoning Bylaw	N/A; parcel not developed	A minimum of ten percent (10%) of total dwelling units in excess of the 350 dwelling units allowed by right	10% (10 affordable housing units)
Number of Moderate Income Housing units, as defined in Section 2.0 of the Zoning Bylaw	N/A; parcel not developed	None	N/A
Number of dwelling units restricted or intended for senior housing	N/A; parcel not developed	None	N/A
Number of parking spaces, including designated handicapped spaces	N/A; parcel not developed	6,020 district-wide	180 spaces, 5 spaces of which are handicap spaces (8 additional spaces will be provided for the nearby Bridges memory care facility)
Number of bicycle parking spaces, including bicycle racks, storage containers, and interior accommodations	N/A; parcel not developed	Not specified	2 Bicycle Racks (6 bikes per rack) to be provided within each building for a total of 24 bicycles
Number of loading bays	N/A; parcel not developed	Must be adequate for uses with more than 10,000 square feet of floor area	N/A
Length of streets and ways	N/A; parcel not developed	Not specified	No new streets; see plans re interior driving areas

Tab 4:
List of Required Permits and Copies of Permits Obtained

Permits Obtained:

- Town Meeting approval of Zoning Bylaw Section 9.8 – *on file with Town Clerk*
- Town Meeting approval of University Avenue Mixed Use District Master Development Plan – *on file with Town Clerk*
- Development Agreement with the Town of Westwood – *on file with the Town Clerk*
- MEPA Certificate from the Secretary of Energy and Environmental Affairs – *on file with the Town Clerk*
- Order of Conditions from the Westwood Conservation Commission – *on file with the Town Clerk*

Permits To Be Obtained:

- Water, sewer and similar connection permits, building permit and customary construction-related permits from the Building Department, Department of Public Works, and other agencies
- NPDES general permit coverage
- Special Permit for Residential Units above 350
- PDR Approval for Pulte 100-unit Residential Project

Tab 5:
Drainage Calculations

TETRA TECH

MEMO

To:	Mark Mastroianni, Pulte Homes of New England, LLC
Cc:	
From:	Nathan H. Cheal, PE
Date:	December 1, 2017
Subject:	Hawthorne at University Station – Drainage Summary

The Stormwater memorandum has been drafted in support of the PDR and Special Permit application for the proposed Hawthorne at University Station, a 100 unit residential condominium development. As part of the Enabling Package for the Brigham's medical office, Tetra Tech prepared drainage calculations for Point of Analysis 4, which included an infiltration system located on the site of the proposed condominium development. Tetra Tech has further updated the drainage calculations to include specific sizing of the Stormtech infiltration system on the condominium site. This memorandum provides a summary demonstrating compliance with Stormwater Management and consistency with the commitments of the Master Plan.

Stormwater Management Standards

Standard 1: No New Untreated Discharges

No point discharges of untreated stormwater to resource areas are proposed. Stormwater quality controls remain consistent with Master Plan and includes street sweeping, deep-sump, hooded catch basins, and water quality structures.

Standard 2: Peak Rate Attenuation

Stormwater runoff from the previously approved Bridges site and the proposed residential condominium buildings, the future office/retail and the proposed park discharge to Point of Analysis 4. This outlet consists of a 36 inch culvert that connects to a 48" drain that flows to the north and discharges to wetland system associated with the Neponset River.

An updated hydrologic analysis for the Point of Analysis 4 has been provided, which demonstrates that there will be no increase in peak run-off discharge rates to Point of Analysis 4 for the 2-, 10-, 25-, or 100-year storms.

Point of Analysis	2-Year Storm (cfs)			10-Year Storm (cfs)			25-Year Storm (cfs)			100-Year Storm (cfs)		
	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ
POA4	32.03	3.23	-28.80	52.90	22.04	-30.86	66.66	40.16	-26.50	74.64	54.39	-20.25

*cfs = cubic feet per second

Marlborough Technology Park
100 Nickerson Road, Marlborough, MA 01752
Tel 508.786.2200 Fax 508.786.2201 tetratech.com

Standard 3: Recharge

Consistent with the Master Plan, all the roof runoff discharges into subsurface infiltration systems. Also, the surface runoff from parking areas will be directed to infiltration systems. The on-site infiltration system has been designed to infiltrate all runoff generated from the 2 inch storm event. A copy of these calculations are attached to this memorandum. Also calculations have been provided to demonstrate that the recharge system has adequate capacity to handle all design storm events.

Infiltration rates in the design calculations for the Stormtech system (Pond 61P) are based on permeability tests and recommended infiltration design rates provided by the Geotechnical Engineer in their report entitled "Stormwater Infiltration Report, University Station, Westwood, Massachusetts" dated October 16, 2017. A copy of the report is attached.

Standard 4: Water Quality

Best Management Practices (BMPs) will be used to provide water quality, consistent with the Master Plan. The following BMPs will be provided: roadway and parking lot sweeping, deep sump, hooded catch basins, and water quality structures sized to remove at least 75% TSS. All stormwater runoff from surface parking areas will be routed to a Stormceptor prior to discharging to infiltration systems. Water quality calculations are attached.

Standard 5: Land Uses with Higher Potential Pollutant Loads (LUHPPLs)

The University Station project is classified as a use that will generate higher pollutant loads and is subject to the requirements of Standard 5, including pretreatment of stormwater. In accordance with these standards, the stormwater management system has been designed to achieve a TSS removal rate of greater than 80% which exceeds the rate required under the MADEP Stormwater Management Policy.

Consistent with MADEP Stormwater Management Standards, the Stormceptor water quality structures proposed as part of the stormwater management system have been sized to treat the equivalent flow rate for the 1" water quality volume. Please refer to the attached water quality calculations for Stormceptor sizing.

Standard 6: Critical Areas

A stormwater infiltration system is proposed within the Zone II wellhead protection area, which is a critical area as defined by MADEP. The MADEP Stormwater Management Policy sets forth certain requirements and specific BMP's that should be considered for projects within a Zone II. The University Station project adheres to the requirements for a project within a critical area by utilizing specific strategies and BMP's which are described in the March 2013 Stormwater Management Report. Specifically a subsurface infiltration system has been provided to recharge clean, roof runoff as well as pre-treated parking lot runoff.

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

Although this project is a mix of new development and redevelopment, the stormwater management system has been designed to meet the all the standards for a new development.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

Construction will disturb more than 1 acre of land and therefore will be covered by a NPDES Construction General Permit.

Standard 9: Operation and Maintenance Plan

The Operations and Maintenance (O&M) Plan will be provided under separate cover and shall conform to the approved Operation and Maintenance Plan developed for University Station.

Standard 10: Prohibition of Illicit Discharges

The Stormwater Management System has been designed such that prior to stormwater runoff discharging from the site, it is treated through a series of best management practices. To the Engineer's knowledge, there are no known or designed non-stormwater discharges that are or will be connected to the stormwater collection system that would convey pollutants directly to groundwater or surface waters.

Storm Drain Pipe System

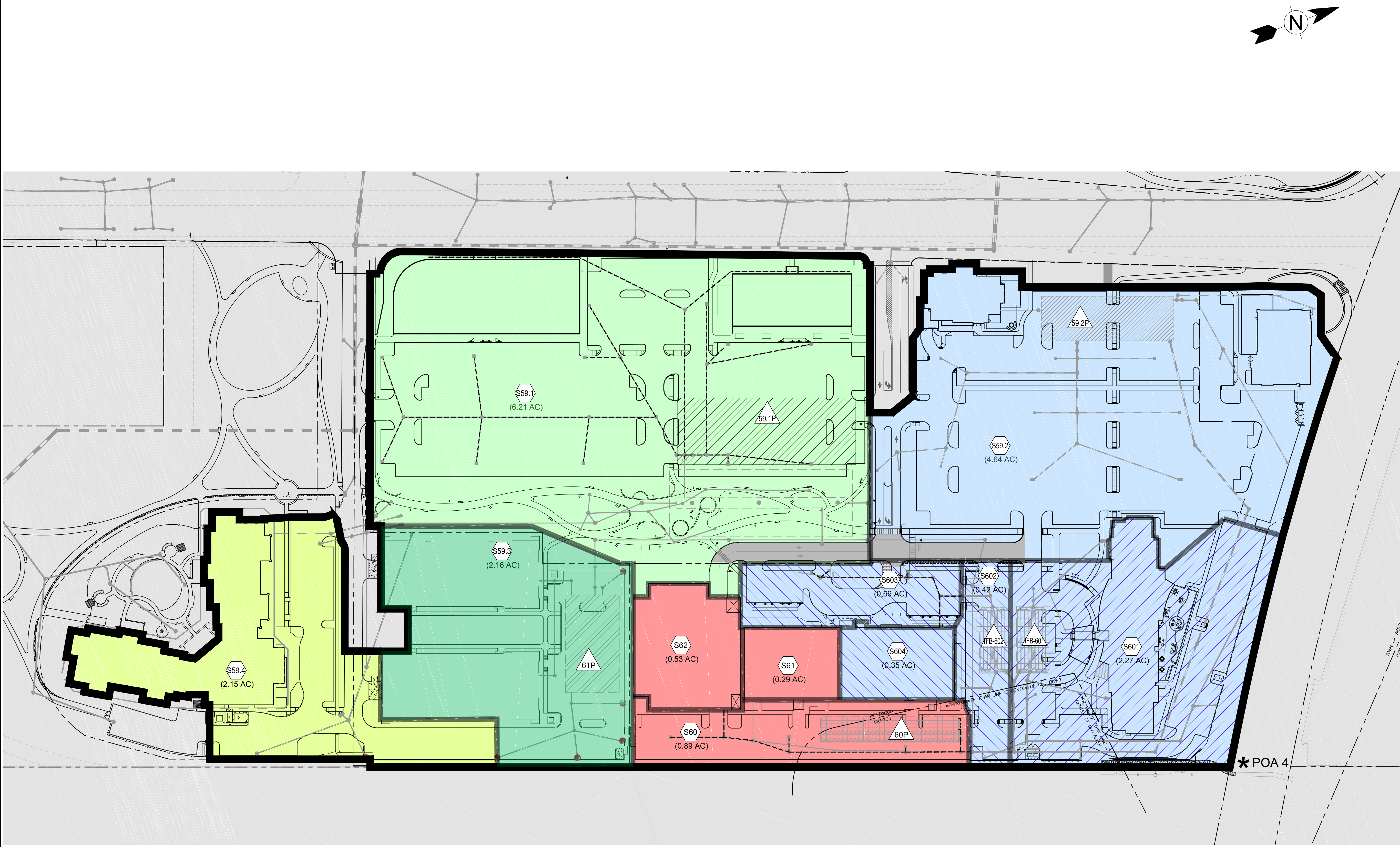
The proposed storm drainage collection system has been designed for a twenty five (25) year storm frequency utilizing the Rational Method and Manning's Equation. Please refer to the attached rational method pipe sizing work sheet.

The stormwater management plan for the Hawthorne at University Station is consistent with both water quantity and quality commitments of the approved Master Plan, and has been designed to be in compliance with the DEP Stormwater Management Policy. If you have any further questions or comments, please do not hesitate to call me at 508-786-2331.

Attachments:
HydroCAD Reports
Permeability Test Results
Rational Method Pipe Sizing Worksheet
Water Quality and Groundwater Recharge Calculations

P:\4241\143-4241-18001\DOCS\REPORTS\DRAINAGE\HAWTHORNE STORMWATER MEMO.DOCX

HydroCAD Report



TETRA TECH

www.tetratech.com

100 Nickerson Road
Marlborough, MA 01752
PHONE: (508) 786-2200 FAX: (508) 786-2201

MARK	DATE	DESCRIPTION	BY

Client: Pulte Homes of New England, LLC
Proj. Loc.: University Avenue, Westwood, MA

University Station - University Avenue
Phase II Master Plan

Phase II Master Site Watershed Plan

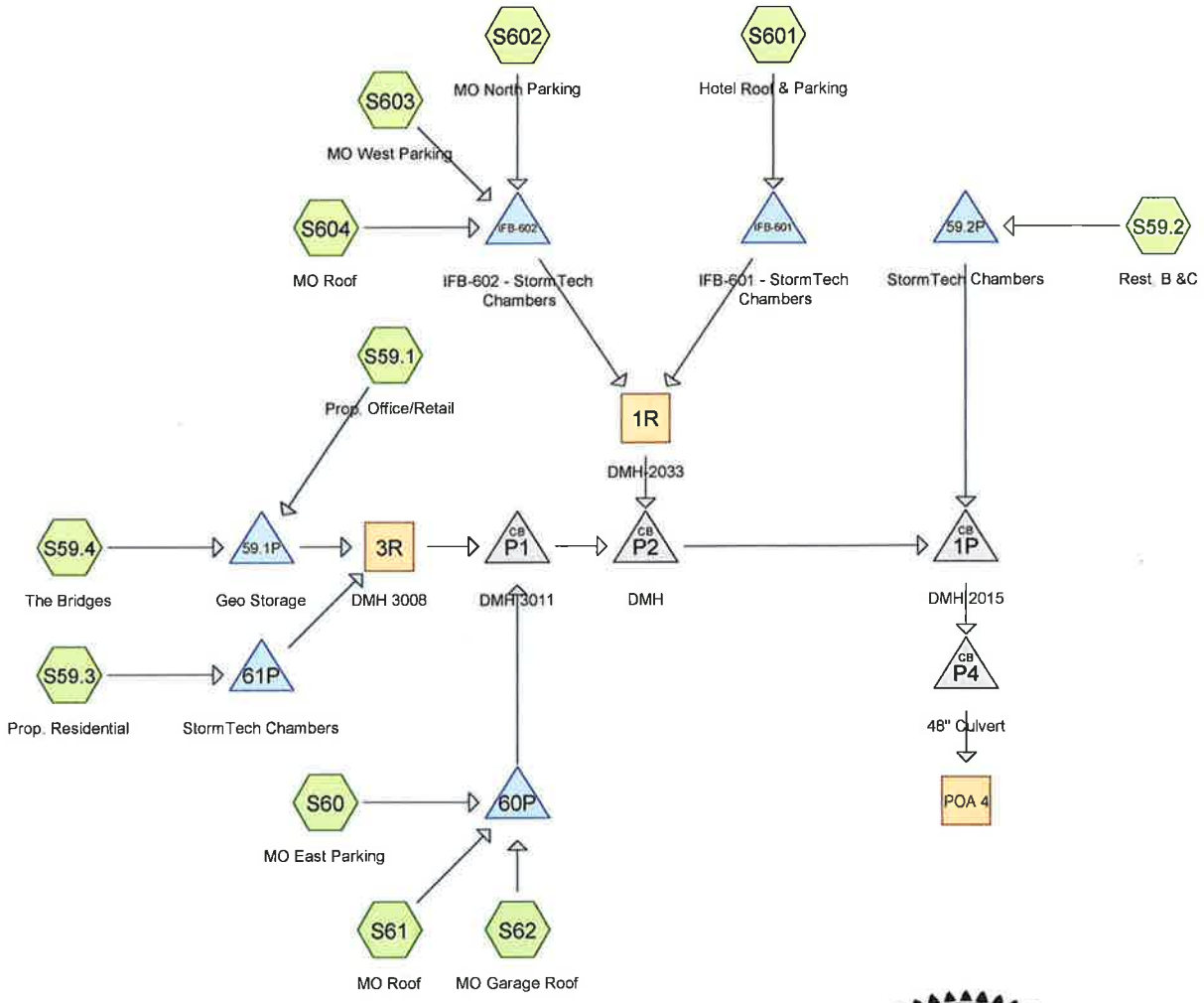
Project No.:	143-4241-18001
Designed By:	CDH
Drawn By:	CDH
Checked By:	NHC

C-901

Sheet of

Bar Measures 1 inch

11/28/2017 12:37:44 PM - P:\4241\143-4241-18001\CAD\SHEETFILES\C-901 WATERSHED PLAN.DWG - CHEAL, NATE



Subcat Reach Pond Link

Routing Diagram for Proposed Conditions POA 4 - Updated 20171201
Prepared by Tetra Tech Inc., Printed 11/28/2017
HydroCAD® 10.00-14 s/n 01603 © 2015 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
3.967	39	>75% Grass cover, Good, HSG A (S59.1, S59.2, S59.3, S59.4, S601, S602)
0.288	80	>75% Grass cover, Good, HSG D (S60, S603)
10.608	98	Paved parking, HSG A (S59.1, S59.2, S59.3, S59.4, S601, S602)
1.196	98	Paved parking, HSG D (S60, S603)
0.461	98	Roof (S601)
2.811	98	Roofs, HSG A (S59.1, S59.2, S59.3, S59.4)
1.158	98	Roofs, HSG D (S604, S61, S62)
20.489	**86**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
17.386	HSG A	S59.1, S59.2, S59.3, S59.4, S601, S602
0.000	HSG B	
0.000	HSG C	
2.642	HSG D	S60, S603, S604, S61, S62
0.461	Other	S601
20.489		**TOTAL AREA**

Time span=0.00-20.00 hrs, dt=0.01 hrs, 2001 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment S59.1: Prop. Office/Retail Runoff Area=6.212 ac 74.53% Impervious Runoff Depth>1.49"
Tc=5.0 min CN=83 Runoff=12.13 cfs 0.774 af

Subcatchment S59.2: Rest. B &C Runoff Area=4.637 ac 84.02% Impervious Runoff Depth>1.95"
Tc=5.0 min CN=89 Runoff=11.65 cfs 0.755 af

Subcatchment S59.3: Prop. Residential Runoff Area=2.160 ac 72.69% Impervious Runoff Depth>1.43"
Tc=5.0 min CN=82 Runoff=4.02 cfs 0.257 af

Subcatchment S59.4: The Bridges Runoff Area=2.152 ac 81.69% Impervious Runoff Depth>1.79"
Tc=5.0 min CN=87 Runoff=5.00 cfs 0.321 af

Subcatchment S60: MO East Parking Runoff Area=0.892 ac 78.92% Impervious Runoff Depth>2.41"
Tc=5.0 min CN=94 Runoff=2.64 cfs 0.179 af

Subcatchment S601: Hotel Roof & Parking Runoff Area=2.266 ac 73.57% Impervious Runoff Depth>1.43"
Tc=5.0 min CN=82 Runoff=4.22 cfs 0.269 af

Subcatchment S602: MO North Parking Runoff Area=0.420 ac 85.48% Impervious Runoff Depth>1.95"
Tc=5.0 min CN=89 Runoff=1.06 cfs 0.068 af

Subcatchment S603: MO West Parking Runoff Area=0.592 ac 83.11% Impervious Runoff Depth>2.51"
Tc=5.0 min CN=95 Runoff=1.80 cfs 0.124 af

Subcatchment S604: MO Roof Runoff Area=0.344 ac 100.00% Impervious Runoff Depth>2.83"
Tc=5.0 min CN=98 Runoff=1.11 cfs 0.081 af

Subcatchment S61: MO Roof Runoff Area=0.287 ac 100.00% Impervious Runoff Depth>2.83"
Tc=5.0 min CN=98 Runoff=0.92 cfs 0.068 af

Subcatchment S62: MO Garage Roof Runoff Area=0.527 ac 100.00% Impervious Runoff Depth>2.83"
Tc=5.0 min CN=98 Runoff=1.70 cfs 0.124 af

Reach 1R: DMH-2033 Avg. Flow Depth=0.24' Max Vel=5.15 fps Inflow=1.09 cfs 0.126 af
24.0" Round Pipe n=0.011 L=94.0' S=0.0183 '/' Capacity=36.17 cfs Outflow=1.09 cfs 0.126 af

Reach 3R: DMH 3008 Avg. Flow Depth=0.39' Max Vel=3.36 fps Inflow=1.48 cfs 0.130 af
24.0" Round Pipe n=0.011 L=445.0' S=0.0042 '/' Capacity=17.28 cfs Outflow=1.47 cfs 0.130 af

Reach POA 4: Inflow=3.23 cfs 0.383 af
Outflow=3.23 cfs 0.383 af

Pond 1P: DMH 2015 Peak Elev=41.94' Inflow=3.23 cfs 0.383 af
36.0" Round Culvert n=0.014 L=30.0' S=0.0033 '/' Outflow=3.23 cfs 0.383 af

Pond 59.1P: Geo Storage Peak Elev=48.61' Storage=17,202 cf Inflow=17.13 cfs 1.095 af
Discarded=1.55 cfs 0.964 af Primary=1.48 cfs 0.130 af Outflow=3.03 cfs 1.094 af

Pond 59.2P: StormTech Chambers Peak Elev=49.05' Storage=15,113 cf Inflow=11.65 cfs 0.755 af
Discarded=0.70 cfs 0.575 af Primary=0.23 cfs 0.018 af Outflow=0.93 cfs 0.593 af

Pond 60P: Peak Elev=48.67' Storage=7,198 cf Inflow=5.26 cfs 0.371 af
Discarded=0.14 cfs 0.157 af Primary=0.89 cfs 0.108 af Outflow=1.03 cfs 0.266 af

Pond 61P: StormTech Chambers Peak Elev=51.83' Storage=3,658 cf Inflow=4.02 cfs 0.257 af
Discarded=0.58 cfs 0.257 af Primary=0.00 cfs 0.000 af Outflow=0.58 cfs 0.257 af

Pond IFB-601: IFB-601 - StormTech Chambers Peak Elev=49.47' Storage=7,401 cf Inflow=4.22 cfs 0.269 af
Discarded=0.07 cfs 0.062 af Primary=0.20 cfs 0.042 af Outflow=0.27 cfs 0.103 af

Pond IFB-602: IFB-602 - StormTech Chambers Peak Elev=49.31' Storage=5,722 cf Inflow=3.96 cfs 0.273 af
Discarded=0.06 cfs 0.069 af Primary=1.09 cfs 0.085 af Outflow=1.15 cfs 0.153 af

Pond P1: DMH 3011 Peak Elev=46.62' Inflow=2.34 cfs 0.239 af
24.0" Round Culvert n=0.011 L=57.0' S=0.0040 '/' Outflow=2.34 cfs 0.239 af

Pond P2: DMH Peak Elev=46.35' Inflow=3.23 cfs 0.365 af
24.0" Round Culvert n=0.011 L=190.0' S=0.0052 '/' Outflow=3.23 cfs 0.365 af

Pond P4: 48" Culvert Peak Elev=39.39' Inflow=3.23 cfs 0.383 af
48.0" Round Culvert w/ 24.0" inside fill n=0.014 L=100.0' S=0.0020 '/' Outflow=3.23 cfs 0.383 af

Total Runoff Area = 20.489 ac Runoff Volume = 3.020 af Average Runoff Depth = 1.77"
20.77% Pervious = 4.255 ac 79.23% Impervious = 16.234 ac

Time span=0.00-20.00 hrs, dt=0.01 hrs, 2001 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment S59.1: Prop. Office/Retail Runoff Area=6.212 ac 74.53% Impervious Runoff Depth>2.63"
Tc=5.0 min CN=83 Runoff=21.21 cfs 1.364 af

Subcatchment S59.2: Rest. B &C Runoff Area=4.637 ac 84.02% Impervious Runoff Depth>3.20"
Tc=5.0 min CN=89 Runoff=18.64 cfs 1.236 af

Subcatchment S59.3: Prop. Residential Runoff Area=2.160 ac 72.69% Impervious Runoff Depth>2.55"
Tc=5.0 min CN=82 Runoff=7.15 cfs 0.458 af

Subcatchment S59.4: The Bridges Runoff Area=2.152 ac 81.69% Impervious Runoff Depth>3.00"
Tc=5.0 min CN=87 Runoff=8.23 cfs 0.539 af

Subcatchment S60: MO East Parking Runoff Area=0.892 ac 78.92% Impervious Runoff Depth>3.71"
Tc=5.0 min CN=94 Runoff=3.96 cfs 0.276 af

Subcatchment S601: Hotel Roof & Parking Runoff Area=2.266 ac 73.57% Impervious Runoff Depth>2.55"
Tc=5.0 min CN=82 Runoff=7.50 cfs 0.481 af

Subcatchment S602: MO North Parking Runoff Area=0.420 ac 85.48% Impervious Runoff Depth>3.20"
Tc=5.0 min CN=89 Runoff=1.69 cfs 0.112 af

Subcatchment S603: MO West Parking Runoff Area=0.592 ac 83.11% Impervious Runoff Depth>3.82"
Tc=5.0 min CN=95 Runoff=2.67 cfs 0.189 af

Subcatchment S604: MO Roof Runoff Area=0.344 ac 100.00% Impervious Runoff Depth>4.16"
Tc=5.0 min CN=98 Runoff=1.60 cfs 0.119 af

Subcatchment S61: MO Roof Runoff Area=0.287 ac 100.00% Impervious Runoff Depth>4.16"
Tc=5.0 min CN=98 Runoff=1.34 cfs 0.100 af

Subcatchment S62: MO Garage Roof Runoff Area=0.527 ac 100.00% Impervious Runoff Depth>4.16"
Tc=5.0 min CN=98 Runoff=2.45 cfs 0.183 af

Reach 1R: DMH-2033 Avg. Flow Depth=0.58' Max Vel=8.75 fps Inflow=6.59 cfs 0.466 af
24.0" Round Pipe n=0.011 L=94.0' S=0.0183 '/' Capacity=36.17 cfs Outflow=6.59 cfs 0.466 af

Reach 3R: DMH 3008 Avg. Flow Depth=0.87' Max Vel=5.18 fps Inflow=6.85 cfs 0.649 af
24.0" Round Pipe n=0.011 L=445.0' S=0.0042 '/' Capacity=17.28 cfs Outflow=6.84 cfs 0.649 af

Reach POA 4: Inflow=22.04 cfs 1.745 af
Outflow=22.04 cfs 1.745 af

Pond 1P: DMH 2015 Peak Elev=43.58' Inflow=22.04 cfs 1.745 af
36.0" Round Culvert n=0.014 L=30.0' S=0.0033 '/' Outflow=22.04 cfs 1.745 af

Pond 59.1P: Geo Storage Peak Elev=49.58' Storage=27,479 cf Inflow=29.44 cfs 1.903 af
Discarded=1.58 cfs 1.253 af Primary=6.85 cfs 0.649 af Outflow=8.43 cfs 1.902 af

Pond 59.2P: StormTech Chambers Peak Elev=49.50' Storage=18,267 cf Inflow=18.64 cfs 1.236 af
Discarded=0.71 cfs 0.647 af Primary=6.92 cfs 0.361 af Outflow=7.62 cfs 1.008 af

Pond 60P: Peak Elev=49.14' Storage=9,338 cf Inflow=7.76 cfs 0.558 af
Discarded=0.14 cfs 0.175 af Primary=2.97 cfs 0.269 af Outflow=3.11 cfs 0.444 af

Pond 61P: StormTech Chambers Peak Elev=52.60' Storage=8,389 cf Inflow=7.15 cfs 0.458 af
Discarded=0.58 cfs 0.452 af Primary=0.00 cfs 0.000 af Outflow=0.59 cfs 0.452 af

Pond IFB-601: IFB-601 - StormTech Chambers Peak Elev=49.83' Storage=8,250 cf Inflow=7.50 cfs 0.481 af
Discarded=0.07 cfs 0.070 af Primary=3.32 cfs 0.244 af Outflow=3.39 cfs 0.314 af

Pond IFB-602: IFB-602 - StormTech Chambers Peak Elev=49.64' Storage=6,441 cf Inflow=5.96 cfs 0.420 af
Discarded=0.06 cfs 0.077 af Primary=4.85 cfs 0.223 af Outflow=4.91 cfs 0.299 af

Pond P1: DMH 3011 Peak Elev=47.97' Inflow=9.55 cfs 0.918 af
24.0" Round Culvert n=0.011 L=57.0' S=0.0040 '/' Outflow=9.55 cfs 0.918 af

Pond P2: DMH Peak Elev=47.60' Inflow=15.12 cfs 1.384 af
24.0" Round Culvert n=0.011 L=190.0' S=0.0052 '/' Outflow=15.12 cfs 1.384 af

Pond P4: 48" Culvert Peak Elev=40.80' Inflow=22.04 cfs 1.745 af
48.0" Round Culvert w/ 24.0" inside fill n=0.014 L=100.0' S=0.0020 '/' Outflow=22.04 cfs 1.745 af

Total Runoff Area = 20.489 ac Runoff Volume = 5.056 af Average Runoff Depth = 2.96"
20.77% Pervious = 4.255 ac 79.23% Impervious = 16.234 ac

Time span=0.00-20.00 hrs, dt=0.01 hrs, 2001 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment S59.1: Prop. Office/Retail Runoff Area=6.212 ac 74.53% Impervious Runoff Depth>3.41"
Tc=5.0 min CN=83 Runoff=27.19 cfs 1.765 af

Subcatchment S59.2: Rest. B &C Runoff Area=4.637 ac 84.02% Impervious Runoff Depth>4.02"
Tc=5.0 min CN=89 Runoff=23.13 cfs 1.553 af

Subcatchment S59.3: Prop. Residential Runoff Area=2.160 ac 72.69% Impervious Runoff Depth>3.31"
Tc=5.0 min CN=82 Runoff=9.22 cfs 0.596 af

Subcatchment S59.4: The Bridges Runoff Area=2.152 ac 81.69% Impervious Runoff Depth>3.81"
Tc=5.0 min CN=87 Runoff=10.32 cfs 0.683 af

Subcatchment S60: MO East Parking Runoff Area=0.892 ac 78.92% Impervious Runoff Depth>4.56"
Tc=5.0 min CN=94 Runoff=4.81 cfs 0.339 af

Subcatchment S601: Hotel Roof & Parking Runoff Area=2.266 ac 73.57% Impervious Runoff Depth>3.31"
Tc=5.0 min CN=82 Runoff=9.67 cfs 0.625 af

Subcatchment S602: MO North Parking Runoff Area=0.420 ac 85.48% Impervious Runoff Depth>4.02"
Tc=5.0 min CN=89 Runoff=2.09 cfs 0.141 af

Subcatchment S603: MO West Parking Runoff Area=0.592 ac 83.11% Impervious Runoff Depth>4.68"
Tc=5.0 min CN=95 Runoff=3.23 cfs 0.231 af

Subcatchment S604: MO Roof Runoff Area=0.344 ac 100.00% Impervious Runoff Depth>5.02"
Tc=5.0 min CN=98 Runoff=1.92 cfs 0.144 af

Subcatchment S61: MO Roof Runoff Area=0.287 ac 100.00% Impervious Runoff Depth>5.02"
Tc=5.0 min CN=98 Runoff=1.60 cfs 0.120 af

Subcatchment S62: MO Garage Roof Runoff Area=0.527 ac 100.00% Impervious Runoff Depth>5.02"
Tc=5.0 min CN=98 Runoff=2.94 cfs 0.221 af

Reach 1R: DMH-2033 Avg. Flow Depth=0.88' Max Vel=10.85 fps Inflow=14.38 cfs 0.697 af
24.0" Round Pipe n=0.011 L=94.0' S=0.0183 '/' Capacity=36.17 cfs Outflow=14.38 cfs 0.697 af

Reach 3R: DMH 3008 Avg. Flow Depth=1.07' Max Vel=5.66 fps Inflow=9.69 cfs 1.087 af
24.0" Round Pipe n=0.011 L=445.0' S=0.0042 '/' Capacity=17.28 cfs Outflow=9.68 cfs 1.087 af

Reach POA 4: Inflow=40.16 cfs 2.813 af
Outflow=40.16 cfs 2.813 af

Pond 1P: DMH 2015 Peak Elev=44.97' Inflow=40.16 cfs 2.813 af
36.0" Round Culvert n=0.014 L=30.0' S=0.0033 '/' Outflow=40.16 cfs 2.813 af

Pond 59.1P: Geo Storage Peak Elev=50.30' Storage=35,151 cf Inflow=37.50 cfs 2.448 af
Discarded=1.61 cfs 1.366 af Primary=9.57 cfs 1.042 af Outflow=11.18 cfs 2.409 af

Pond 59.2P: StormTech Chambers Peak Elev=49.82' Storage=20,070 cf Inflow=23.13 cfs 1.553 af
Discarded=0.71 cfs 0.686 af Primary=14.27 cfs 0.609 af Outflow=14.98 cfs 1.296 af

Pond 60P: Peak Elev=49.82' Storage=11,849 cf Inflow=9.35 cfs 0.680 af
Discarded=0.14 cfs 0.184 af Primary=6.91 cfs 0.420 af Outflow=7.06 cfs 0.562 af

Pond 61P: StormTech Chambers Peak Elev=53.10' Storage=11,210 cf Inflow=9.22 cfs 0.596 af
Discarded=0.59 cfs 0.478 af Primary=0.29 cfs 0.045 af Outflow=0.88 cfs 0.523 af

Pond IFB-601: IFB-601 - StormTech Chambers Peak Elev=50.12' Storage=8,777 cf Inflow=9.67 cfs 0.625 af
Discarded=0.08 cfs 0.074 af Primary=7.92 cfs 0.383 af Outflow=7.99 cfs 0.457 af

Pond IFB-602: IFB-602 - StormTech Chambers Peak Elev=49.76' Storage=6,652 cf Inflow=7.24 cfs 0.515 af
Discarded=0.06 cfs 0.080 af Primary=6.67 cfs 0.314 af Outflow=6.73 cfs 0.394 af

Pond P1: DMH 3011 Peak Elev=50.69' Inflow=16.26 cfs 1.507 af
24.0" Round Culvert n=0.011 L=57.0' S=0.0040 '/' Outflow=16.26 cfs 1.507 af

Pond P2: DMH Peak Elev=49.94' Inflow=25.89 cfs 2.204 af
24.0" Round Culvert n=0.011 L=190.0' S=0.0052 '/' Outflow=25.89 cfs 2.204 af

Pond P4: 48" Culvert Peak Elev=42.35' Inflow=40.16 cfs 2.813 af
48.0" Round Culvert w/ 24.0" inside fill n=0.014 L=100.0' S=0.0020 '/' Outflow=40.16 cfs 2.813 af

Total Runoff Area = 20.489 ac Runoff Volume = 6.418 af Average Runoff Depth = 3.76"
20.77% Pervious = 4.255 ac 79.23% Impervious = 16.234 ac

Summary for Subcatchment S59.1: Prop. Office/Retail

Runoff = 27.19 cfs @ 12.07 hrs, Volume= 1.765 af, Depth> 3.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.829	98	Roofs, HSG A
1.582	39	>75% Grass cover, Good, HSG A
3.801	98	Paved parking, HSG A
6.212	83	Weighted Average
1.582		25.47% Pervious Area
4.630		74.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S59.2: Rest. B &C

Runoff = 23.13 cfs @ 12.07 hrs, Volume= 1.553 af, Depth> 4.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
3.563	98	Paved parking, HSG A
0.333	98	Roofs, HSG A
0.741	39	>75% Grass cover, Good, HSG A
4.637	89	Weighted Average
0.741		15.98% Pervious Area
3.896		84.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S59.3: Prop. Residential

Runoff = 9.22 cfs @ 12.07 hrs, Volume= 0.596 af, Depth> 3.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.870	98	Roofs, HSG A
0.590	39	>75% Grass cover, Good, HSG A
0.700	98	Paved parking, HSG A
2.160	82	Weighted Average
0.590		27.31% Pervious Area
1.570		72.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S59.4: The Bridges

Runoff = 10.32 cfs @ 12.07 hrs, Volume= 0.683 af, Depth> 3.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.979	98	Paved parking, HSG A
0.779	98	Roofs, HSG A
0.394	39	>75% Grass cover, Good, HSG A
2.152	87	Weighted Average
0.394		18.31% Pervious Area
1.758		81.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S60: MO East Parking

Runoff = 4.81 cfs @ 12.07 hrs, Volume= 0.339 af, Depth> 4.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.704	98	Paved parking, HSG D
0.188	80	>75% Grass cover, Good, HSG D
0.892	94	Weighted Average
0.188		21.08% Pervious Area
0.704		78.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Direct**

Summary for Subcatchment S601: Hotel Roof & Parking

Runoff = 9.67 cfs @ 12.07 hrs, Volume= 0.625 af, Depth> 3.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (ac)	CN	Description
	1.206	98	Paved parking, HSG A
	0.599	39	>75% Grass cover, Good, HSG A
*	0.461	98	Roof
	2.266	82	Weighted Average
	0.599		26.43% Pervious Area
	1.667		73.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S602: MO North Parking

Runoff = 2.09 cfs @ 12.07 hrs, Volume= 0.141 af, Depth> 4.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.359	98	Paved parking, HSG A
0.061	39	>75% Grass cover, Good, HSG A
0.420	89	Weighted Average
0.061		14.52% Pervious Area
0.359		85.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S603: MO West Parking

Runoff = 3.23 cfs @ 12.07 hrs, Volume= 0.231 af, Depth> 4.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.492	98	Paved parking, HSG D
0.100	80	>75% Grass cover, Good, HSG D
0.592	95	Weighted Average
0.100		16.89% Pervious Area
0.492		83.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Direct**

Summary for Subcatchment S604: MO Roof

Runoff = 1.92 cfs @ 12.07 hrs, Volume= 0.144 af, Depth> 5.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.344	98	Roofs, HSG D
0.000	80	>75% Grass cover, Good, HSG D
0.344	98	Weighted Average
0.344		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Direct**

Summary for Subcatchment S61: MO Roof

Runoff = 1.60 cfs @ 12.07 hrs, Volume= 0.120 af, Depth> 5.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.287	98	Roofs, HSG D
0.287		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Direct**

Summary for Subcatchment S62: MO Garage Roof

Runoff = 2.94 cfs @ 12.07 hrs, Volume= 0.221 af, Depth> 5.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.527	98	Roofs, HSG D
0.527		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Direct**

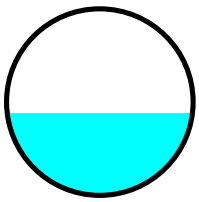
Summary for Reach 1R: DMH-2033

Inflow Area = 3.622 ac, 79.02% Impervious, Inflow Depth > 2.31" for 25-Year event
Inflow = 14.38 cfs @ 12.12 hrs, Volume= 0.697 af
Outflow = 14.38 cfs @ 12.12 hrs, Volume= 0.697 af, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 10.85 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.25 fps, Avg. Travel Time= 0.4 min

Peak Storage= 125 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.88'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 36.17 cfs

24.0" Round Pipe
n= 0.011
Length= 94.0' Slope= 0.0183 '/'
Inlet Invert= 47.28', Outlet Invert= 45.56'



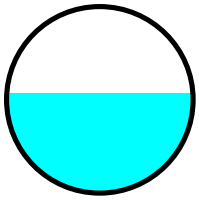
Summary for Reach 3R: DMH 3008

Inflow Area = 10.524 ac, 75.62% Impervious, Inflow Depth = 1.24" for 25-Year event
Inflow = 9.69 cfs @ 12.41 hrs, Volume= 1.087 af
Outflow = 9.68 cfs @ 12.43 hrs, Volume= 1.087 af, Atten= 0%, Lag= 1.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 5.66 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 2.74 fps, Avg. Travel Time= 2.7 min

Peak Storage= 762 cf @ 12.43 hrs
Average Depth at Peak Storage= 1.07'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 17.28 cfs

24.0" Round Pipe
n= 0.011
Length= 445.0' Slope= 0.0042 '/'
Inlet Invert= 47.65', Outlet Invert= 45.79'



Summary for Reach POA 4:

Inflow Area = 20.489 ac, 79.23% Impervious, Inflow Depth > 1.65" for 25-Year event
Inflow = 40.16 cfs @ 12.16 hrs, Volume= 2.813 af
Outflow = 40.16 cfs @ 12.16 hrs, Volume= 2.813 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs / 2

Summary for Pond 1P: DMH 2015

Inflow Area = 20.489 ac, 79.23% Impervious, Inflow Depth > 1.65" for 25-Year event
Inflow = 40.16 cfs @ 12.16 hrs, Volume= 2.813 af
Outflow = 40.16 cfs @ 12.16 hrs, Volume= 2.813 af, Atten= 0%, Lag= 0.0 min
Primary = 40.16 cfs @ 12.16 hrs, Volume= 2.813 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 44.97' @ 12.16 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	41.07'	**36.0" Round Culvert** L= 30.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 41.07' / 40.97' S= 0.0033 '/' Cc= 0.900 n= 0.014, Flow Area= 7.07 sf

Primary OutFlow Max=39.79 cfs @ 12.16 hrs HW=44.93' TW=42.32' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 39.79 cfs @ 5.69 fps)

Summary for Pond 59.1P: Geo Storage

Inflow Area = 8.364 ac, 76.37% Impervious, Inflow Depth > 3.51" for 25-Year event
Inflow = 37.50 cfs @ 12.07 hrs, Volume= 2.448 af
Outflow = 11.18 cfs @ 12.40 hrs, Volume= 2.409 af, Atten= 70%, Lag= 19.4 min
Discarded = 1.61 cfs @ 12.40 hrs, Volume= 1.366 af
Primary = 9.57 cfs @ 12.40 hrs, Volume= 1.042 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 50.30' @ 12.40 hrs Surf.Area= 21,600 sf Storage= 35,151 cf

Plug-Flow detention time= 66.3 min calculated for 2.409 af (98% of inflow)
Center-of-Mass det. time= 59.8 min (832.8 - 773.1)

Volume	Invert	Avail.Storage	Storage Description
#1	47.00'	18,480 cf	**Custom Stage Data (Prismatic)** Listed below Inside #2
#2	47.00'	40,128 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
			118,800 cf Overall - 18,480 cf Embedded = 100,320 cf x 40.0% Voids
		58,608 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
47.00	3,360	0	0
48.00	3,360	3,360	3,360
49.00	3,360	3,360	6,720
50.00	3,360	3,360	10,080
51.00	3,360	3,360	13,440
52.00	3,360	3,360	16,800
52.50	3,360	1,680	18,480

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
47.00	21,600	0	0
48.00	21,600	21,600	21,600
49.00	21,600	21,600	43,200
50.00	21,600	21,600	64,800
51.00	21,600	21,600	86,400
52.00	21,600	21,600	108,000
52.50	21,600	10,800	118,800

Device	Routing	Invert	Outlet Devices
#1	Discarded	47.00'	**3.000 in/hr Exfiltration over Surface area**
			Conductivity to Groundwater Elevation = 0.00' Phase-In= 0.01'
#2	Primary	48.00'	**18.0" Round Culvert** L= 78.0' Ke= 0.500
			Inlet / Outlet Invert= 48.00' / 47.65' S= 0.0045 '/' Cc= 0.900
			n= 0.011, Flow Area= 1.77 sf

Discarded OutFlow Max=1.61 cfs @ 12.40 hrs HW=50.30' (Free Discharge)
└**1=Exfiltration** (Controls 1.61 cfs)

Primary OutFlow Max=9.57 cfs @ 12.40 hrs HW=50.30' TW=48.72' (Dynamic Tailwater)
└**2=Culvert** (Barrel Controls 9.57 cfs @ 5.42 fps)

Summary for Pond 59.2P: StormTech Chambers

Inflow Area = 4.637 ac, 84.02% Impervious, Inflow Depth > 4.02" for 25-Year event
Inflow = 23.13 cfs @ 12.07 hrs, Volume= 1.553 af
Outflow = 14.98 cfs @ 12.16 hrs, Volume= 1.296 af, Atten= 35%, Lag= 5.1 min
Discarded = 0.71 cfs @ 12.16 hrs, Volume= 0.686 af
Primary = 14.27 cfs @ 12.16 hrs, Volume= 0.609 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 49.82' @ 12.16 hrs Surf.Area= 10,529 sf Storage= 20,070 cf

Plug-Flow detention time= 90.2 min calculated for 1.296 af (83% of inflow)

Center-of-Mass det. time= 42.7 min (802.6 - 759.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	47.00'	9,259 cf	**177.25'W x 59.40'L x 3.50'H Field A** 36,850 cf Overall - 13,703 cf Embedded = 23,147 cf x 40.0% Voids
#2A	47.50'	13,703 cf	**StormTech SC-740** x 296 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 37 rows
		22,962 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	47.50'	**24.0" Round Culvert** L= 615.0' Ke= 0.500 Inlet / Outlet Invert= 47.50' / 41.07' S= 0.0105 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	49.00'	**6.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Discarded	47.00'	**2.750 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00' Phase-In= 0.01'

Discarded OutFlow Max=0.71 cfs @ 12.16 hrs HW=49.82' (Free Discharge)
└**3=Exfiltration** (Controls 0.71 cfs)

Primary OutFlow Max=14.25 cfs @ 12.16 hrs HW=49.82' TW=44.82' (Dynamic Tailwater)
└**1=Culvert** (Passes 14.25 cfs of 17.40 cfs potential flow)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 14.25 cfs @ 2.97 fps)

Summary for Pond 60P:

Inflow Area = 1.706 ac, 88.98% Impervious, Inflow Depth > 4.78" for 25-Year event
Inflow = 9.35 cfs @ 12.07 hrs, Volume= 0.680 af
Outflow = 7.06 cfs @ 12.26 hrs, Volume= 0.562 af, Atten= 25%, Lag= 11.4 min
Discarded = 0.14 cfs @ 8.57 hrs, Volume= 0.184 af
Primary = 6.91 cfs @ 12.26 hrs, Volume= 0.420 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 49.82' @ 12.26 hrs Surf.Area= 6,077 sf Storage= 11,849 cf

Plug-Flow detention time= 95.4 min calculated for 0.561 af (83% of inflow)
Center-of-Mass det. time= 44.2 min (774.0 - 729.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	47.00'	5,156 cf	**32.75'W x 185.56'L x 3.50'H Field A** 21,270 cf Overall - 8,381 cf Embedded = 12,889 cf x 40.0% Voids
#2A	47.50'	8,381 cf	**ADS_StormTech SC-740** x 182 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 7 rows
#3	47.00'	1 cf	**4.00'D x 11.00'H Vertical Cone/Cylinder (OCS)** x 0.01 -Impervious
		13,538 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	48.20'	**18.0" Round Culvert** L= 10.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 48.20' / 48.10' S= 0.0100 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	48.20'	**6.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Discarded	47.00'	**1.020 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.14 cfs @ 8.57 hrs HW=47.11' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=0.00 cfs @ 12.26 hrs HW=49.82' TW=50.43' (Dynamic Tailwater)
└**1=Culvert** (Controls 0.00 cfs)
└**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 61P: StormTech Chambers

Inflow Area = 2.160 ac, 72.69% Impervious, Inflow Depth > 3.31" for 25-Year event
Inflow = 9.22 cfs @ 12.07 hrs, Volume= 0.596 af
Outflow = 0.88 cfs @ 12.94 hrs, Volume= 0.523 af, Atten= 90%, Lag= 52.0 min
Discarded = 0.59 cfs @ 12.94 hrs, Volume= 0.478 af
Primary = 0.29 cfs @ 12.94 hrs, Volume= 0.045 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 53.10' @ 12.94 hrs Surf.Area= 7,640 sf Storage= 11,210 cf

Plug-Flow detention time= 150.6 min calculated for 0.523 af (88% of inflow)
Center-of-Mass det. time= 112.4 min (890.7 - 778.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	51.00'	6,713 cf	**58.50'W x 130.60'L x 3.50'H Field A** 26,740 cf Overall - 9,957 cf Embedded = 16,783 cf x 40.0% Voids
#2A	51.50'	9,957 cf	**StormTech SC-740** x 216 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 12 rows
		16,670 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	51.54'	**18.0" Round Culvert** L= 455.0' Ke= 0.500 Inlet / Outlet Invert= 51.54' / 47.95' S= 0.0079 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Discarded	51.00'	**3.200 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00' Phase-In= 0.01'
#3	Device 1	52.50'	**45.0 deg Sharp-Crested Vee/Trap Weir** Cv= 2.56 (C= 3.20)

Discarded OutFlow Max=0.59 cfs @ 12.94 hrs HW=53.10' (Free Discharge)
└**2=Exfiltration** (Controls 0.59 cfs)

Primary OutFlow Max=0.29 cfs @ 12.94 hrs HW=53.10' TW=48.52' (Dynamic Tailwater)
└**1=Culvert** (Passes 0.29 cfs of 7.64 cfs potential flow)
└**3=Sharp-Crested Vee/Trap Weir** (Weir Controls 0.29 cfs @ 1.98 fps)

Summary for Pond IFB-601: IFB-601 - StormTech Chambers

Inflow Area = 2.266 ac, 73.57% Impervious, Inflow Depth > 3.31" for 25-Year event
Inflow = 9.67 cfs @ 12.07 hrs, Volume= 0.625 af
Outflow = 7.99 cfs @ 12.13 hrs, Volume= 0.457 af, Atten= 17%, Lag= 3.1 min
Discarded = 0.08 cfs @ 12.13 hrs, Volume= 0.074 af
Primary = 7.92 cfs @ 12.13 hrs, Volume= 0.383 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 50.12' @ 12.13 hrs Surf.Area= 4,341 sf Storage= 8,777 cf

Plug-Flow detention time= 100.3 min calculated for 0.457 af (73% of inflow)
Center-of-Mass det. time= 37.4 min (815.7 - 778.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	47.00'	3,841 cf	**53.75'W x 80.76'L x 3.50'H Field A** 15,193 cf Overall - 5,590 cf Embedded = 9,603 cf x 40.0% Voids
#2A	47.50'	5,590 cf	**StormTech SC-740** x 121 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 11 rows
		9,431 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	47.00'	**24.0" Round Culvert** L= 16.0' Ke= 0.500 Inlet / Outlet Invert= 47.00' / 46.84' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 3.14 sf
#2	Device 1	49.40'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Discarded	47.00'	**0.700 in/hr Crushed Stone over Surface area** Conductivity to Groundwater Elevation = 0.00' Phase-In= 0.01'

Discarded OutFlow Max=0.08 cfs @ 12.13 hrs HW=50.12' (Free Discharge)
└**3=Crushed Stone** (Controls 0.08 cfs)

Primary OutFlow Max=7.89 cfs @ 12.13 hrs HW=50.12' TW=48.15' (Dynamic Tailwater)
└**1=Culvert** (Passes 7.89 cfs of 21.22 cfs potential flow)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 7.89 cfs @ 2.73 fps)

Summary for Pond IFB-602: IFB-602 - StormTech Chambers

Inflow Area = 1.356 ac, 88.13% Impervious, Inflow Depth > 4.56" for 25-Year event
Inflow = 7.24 cfs @ 12.07 hrs, Volume= 0.515 af
Outflow = 6.73 cfs @ 12.10 hrs, Volume= 0.394 af, Atten= 7%, Lag= 1.8 min
Discarded = 0.06 cfs @ 12.10 hrs, Volume= 0.080 af
Primary = 6.67 cfs @ 12.10 hrs, Volume= 0.314 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 49.76' @ 12.10 hrs Surf.Area= 3,574 sf Storage= 6,652 cf

Plug-Flow detention time= 96.9 min calculated for 0.394 af (77% of inflow)
Center-of-Mass det. time= 35.9 min (773.8 - 737.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	47.00'	3,174 cf	**44.25'W x 80.76'L x 3.50'H Field A** 12,508 cf Overall - 4,574 cf Embedded = 7,934 cf x 40.0% Voids
#2A	47.50'	4,574 cf	**StormTech SC-740** x 99 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 9 rows
		7,747 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	47.50'	**24.0" Round Culvert** L= 22.0' Ke= 0.500 Inlet / Outlet Invert= 47.50' / 47.28' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 3.14 sf
#2	Device 1	49.10'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Discarded	47.00'	**0.700 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00' Phase-In= 0.01'

Discarded OutFlow Max=0.06 cfs @ 12.10 hrs HW=49.76' (Free Discharge)
└**3=Exfiltration** (Controls 0.06 cfs)

Primary OutFlow Max=6.67 cfs @ 12.10 hrs HW=49.76' TW=48.13' (Dynamic Tailwater)
└**1=Culvert** (Passes 6.67 cfs of 15.79 cfs potential flow)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 6.67 cfs @ 2.54 fps)

Summary for Pond P1: DMH 3011

Inflow Area = 12.230 ac, 77.48% Impervious, Inflow Depth > 1.48" for 25-Year event
Inflow = 16.26 cfs @ 12.35 hrs, Volume= 1.507 af
Outflow = 16.26 cfs @ 12.35 hrs, Volume= 1.507 af, Atten= 0%, Lag= 0.0 min
Primary = 16.26 cfs @ 12.35 hrs, Volume= 1.507 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 50.69' @ 12.16 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	45.79'	**24.0" Round Culvert** L= 57.0' Ke= 0.500 Inlet / Outlet Invert= 45.79' / 45.56' S= 0.0040 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=11.29 cfs @ 12.35 hrs HW=49.55' TW=48.99' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 11.29 cfs @ 3.59 fps)

Summary for Pond P2: DMH

Inflow Area = 15.852 ac, 77.83% Impervious, Inflow Depth > 1.67" for 25-Year event
Inflow = 25.89 cfs @ 12.16 hrs, Volume= 2.204 af
Outflow = 25.89 cfs @ 12.16 hrs, Volume= 2.204 af, Atten= 0%, Lag= 0.0 min
Primary = 25.89 cfs @ 12.16 hrs, Volume= 2.204 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 49.94' @ 12.16 hrs
Flood Elev= 57.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	45.56'	**24.0" Round Culvert** L= 190.0' Ke= 0.500 Inlet / Outlet Invert= 45.56' / 44.57' S= 0.0052 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=25.48 cfs @ 12.16 hrs HW=49.84' TW=44.93' (Dynamic Tailwater)
↑**1=Culvert** (Barrel Controls 25.48 cfs @ 8.11 fps)

Summary for Pond P4: 48" Culvert

Inflow Area = 20.489 ac, 79.23% Impervious, Inflow Depth > 1.65" for 25-Year event
Inflow = 40.16 cfs @ 12.16 hrs, Volume= 2.813 af
Outflow = 40.16 cfs @ 12.16 hrs, Volume= 2.813 af, Atten= 0%, Lag= 0.0 min
Primary = 40.16 cfs @ 12.16 hrs, Volume= 2.813 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 42.35' @ 12.16 hrs
Flood Elev= 57.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	38.90'	**48.0" Round Culvert w/ 24.0" inside fill** L= 100.0' Ke= 0.500 Inlet / Outlet Invert= 36.90' / 36.70' S= 0.0020 '/' Cc= 0.900 n= 0.014, Flow Area= 6.28 sf

Primary OutFlow Max=39.71 cfs @ 12.16 hrs HW=42.32' TW=0.00' (Dynamic Tailwater)
↑**1=Culvert** (Barrel Controls 39.71 cfs @ 6.32 fps)

Time span=0.00-20.00 hrs, dt=0.01 hrs, 2001 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment S59.1: Prop. Office/Retail Runoff Area=6.212 ac 74.53% Impervious Runoff Depth>4.42"
Tc=5.0 min CN=83 Runoff=34.88 cfs 2.290 af

Subcatchment S59.2: Rest. B &C Runoff Area=4.637 ac 84.02% Impervious Runoff Depth>5.08"
Tc=5.0 min CN=89 Runoff=28.82 cfs 1.964 af

Subcatchment S59.3: Prop. Residential Runoff Area=2.160 ac 72.69% Impervious Runoff Depth>4.32"
Tc=5.0 min CN=82 Runoff=11.89 cfs 0.777 af

Subcatchment S59.4: The Bridges Runoff Area=2.152 ac 81.69% Impervious Runoff Depth>4.86"
Tc=5.0 min CN=87 Runoff=12.98 cfs 0.872 af

Subcatchment S60: MO East Parking Runoff Area=0.892 ac 78.92% Impervious Runoff Depth>5.65"
Tc=5.0 min CN=94 Runoff=5.88 cfs 0.420 af

Subcatchment S601: Hotel Roof & Parking Runoff Area=2.266 ac 73.57% Impervious Runoff Depth>4.32"
Tc=5.0 min CN=82 Runoff=12.47 cfs 0.815 af

Subcatchment S602: MO North Parking Runoff Area=0.420 ac 85.48% Impervious Runoff Depth>5.08"
Tc=5.0 min CN=89 Runoff=2.61 cfs 0.178 af

Subcatchment S603: MO West Parking Runoff Area=0.592 ac 83.11% Impervious Runoff Depth>5.77"
Tc=5.0 min CN=95 Runoff=3.93 cfs 0.285 af

Subcatchment S604: MO Roof Runoff Area=0.344 ac 100.00% Impervious Runoff Depth>6.12"
Tc=5.0 min CN=98 Runoff=2.32 cfs 0.175 af

Subcatchment S61: MO Roof Runoff Area=0.287 ac 100.00% Impervious Runoff Depth>6.12"
Tc=5.0 min CN=98 Runoff=1.94 cfs 0.146 af

Subcatchment S62: MO Garage Roof Runoff Area=0.527 ac 100.00% Impervious Runoff Depth>6.12"
Tc=5.0 min CN=98 Runoff=3.56 cfs 0.269 af

Reach 1R: DMH-2033 Avg. Flow Depth=1.07' Max Vel=11.83 fps Inflow=20.19 cfs 1.000 af
24.0" Round Pipe n=0.011 L=94.0' S=0.0183 '/' Capacity=36.17 cfs Outflow=20.19 cfs 1.000 af

Reach 3R: DMH 3008 Avg. Flow Depth=1.37' Max Vel=6.13 fps Inflow=14.10 cfs 1.755 af
24.0" Round Pipe n=0.011 L=445.0' S=0.0042 '/' Capacity=17.28 cfs Outflow=14.10 cfs 1.755 af

Reach POA 4: Inflow=54.39 cfs 4.286 af
Outflow=54.39 cfs 4.286 af

Pond 1P: DMH 2015 Peak Elev=48.23' Inflow=54.39 cfs 4.286 af
36.0" Round Culvert n=0.014 L=30.0' S=0.0033 '/' Outflow=54.39 cfs 4.286 af

Pond 59.1P: Geo Storage Peak Elev=51.29' Storage=45,707 cf Inflow=47.85 cfs 3.162 af
Discarded=1.64 cfs 1.460 af Primary=12.85 cfs 1.593 af Outflow=14.49 cfs 3.053 af

Pond 59.2P: StormTech Chambers Peak Elev=50.43' Storage=22,675 cf Inflow=28.82 cfs 1.964 af
Discarded=0.72 cfs 0.729 af Primary=19.62 cfs 0.949 af Outflow=20.34 cfs 1.677 af

Pond 60P: Peak Elev=56.83' Storage=13,538 cf Inflow=11.38 cfs 0.835 af
Discarded=0.14 cfs 0.194 af Primary=10.42 cfs 0.583 af Outflow=10.56 cfs 0.713 af

Pond 61P: StormTech Chambers Peak Elev=53.64' Storage=13,868 cf Inflow=11.89 cfs 0.777 af
Discarded=0.60 cfs 0.509 af Primary=1.47 cfs 0.162 af Outflow=2.07 cfs 0.671 af

Pond IFB-601: IFB-601 - StormTech Peak Elev=50.33' Storage=9,128 cf Inflow=12.47 cfs 0.815 af
Discarded=0.08 cfs 0.079 af Primary=11.80 cfs 0.568 af Outflow=11.87 cfs 0.647 af

Pond IFB-602: IFB-602 - StormTech Chambers Peak Elev=49.85' Storage=6,805 cf Inflow=8.87 cfs 0.638 af
Discarded=0.06 cfs 0.084 af Primary=8.40 cfs 0.432 af Outflow=8.46 cfs 0.516 af

Pond P1: DMH 3011 Peak Elev=56.28' Inflow=23.28 cfs 2.337 af
24.0" Round Culvert n=0.011 L=57.0' S=0.0040 '/' Outflow=23.28 cfs 2.337 af

Pond P2: DMH Peak Elev=55.32' Inflow=38.85 cfs 3.337 af
24.0" Round Culvert n=0.011 L=190.0' S=0.0052 '/' Outflow=38.85 cfs 3.337 af

Pond P4: 48" Culvert Peak Elev=43.73' Inflow=54.39 cfs 4.286 af
48.0" Round Culvert w/ 24.0" inside fill n=0.014 L=100.0' S=0.0020 '/' Outflow=54.39 cfs 4.286 af

Total Runoff Area = 20.489 ac Runoff Volume = 8.191 af Average Runoff Depth = 4.80"
20.77% Pervious = 4.255 ac 79.23% Impervious = 16.234 ac

Time span=0.00-20.00 hrs, dt=0.01 hrs, 2001 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment S59.1: Prop. Office/Retail Runoff Area=6.212 ac 74.53% Impervious Runoff Depth>0.65"
Tc=5.0 min CN=83 Runoff=5.15 cfs 0.336 af

Subcatchment S59.2: Rest. B &C Runoff Area=4.637 ac 84.02% Impervious Runoff Depth>0.97"
Tc=5.0 min CN=89 Runoff=5.88 cfs 0.375 af

Subcatchment S59.3: Prop. Residential Runoff Area=2.160 ac 72.69% Impervious Runoff Depth>0.60"
Tc=5.0 min CN=82 Runoff=1.65 cfs 0.109 af

Subcatchment S59.4: The Bridges Runoff Area=2.152 ac 81.69% Impervious Runoff Depth>0.85"
Tc=5.0 min CN=87 Runoff=2.39 cfs 0.153 af

Subcatchment S60: MO East Parking Runoff Area=0.892 ac 78.92% Impervious Runoff Depth>1.33"
Tc=5.0 min CN=94 Runoff=1.51 cfs 0.099 af

Subcatchment S601: Hotel Roof & Parking Runoff Area=2.266 ac 73.57% Impervious Runoff Depth>0.60"
Tc=5.0 min CN=82 Runoff=1.73 cfs 0.114 af

Subcatchment S602: MO North Parking Runoff Area=0.420 ac 85.48% Impervious Runoff Depth>0.97"
Tc=5.0 min CN=89 Runoff=0.53 cfs 0.034 af

Subcatchment S603: MO West Parking Runoff Area=0.592 ac 83.11% Impervious Runoff Depth>1.42"
Tc=5.0 min CN=95 Runoff=1.05 cfs 0.070 af

Subcatchment S604: MO Roof Runoff Area=0.344 ac 100.00% Impervious Runoff Depth>1.71"
Tc=5.0 min CN=98 Runoff=0.69 cfs 0.049 af

Subcatchment S61: MO Roof Runoff Area=0.287 ac 100.00% Impervious Runoff Depth>1.71"
Tc=5.0 min CN=98 Runoff=0.57 cfs 0.041 af

Subcatchment S62: MO Garage Roof Runoff Area=0.527 ac 100.00% Impervious Runoff Depth>1.71"
Tc=5.0 min CN=98 Runoff=1.05 cfs 0.075 af

Reach 1R: DMH-2033 Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
24.0" Round Pipe n=0.011 L=94.0' S=0.0183 '/' Capacity=36.17 cfs Outflow=0.00 cfs 0.000 af

Reach 3R: DMH 3008 Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
24.0" Round Pipe n=0.011 L=445.0' S=0.0042 '/' Capacity=17.28 cfs Outflow=0.00 cfs 0.000 af

Reach POA 4: Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond 1P: DMH 2015 Peak Elev=41.07' Inflow=0.00 cfs 0.000 af
36.0" Round Culvert n=0.014 L=30.0' S=0.0033 '/' Outflow=0.00 cfs 0.000 af

Pond 59.1P: Geo Storage Peak Elev=47.53' Storage=5,640 cf Inflow=7.54 cfs 0.489 af
Discarded=1.52 cfs 0.488 af Primary=0.00 cfs 0.000 af Outflow=1.52 cfs 0.488 af

Pond 59.2P: StormTech Chambers Peak Elev=47.93' Storage=5,937 cf Inflow=5.88 cfs 0.375 af
Discarded=0.68 cfs 0.375 af Primary=0.00 cfs 0.000 af Outflow=0.68 cfs 0.375 af

Pond 60P: Peak Elev=48.18' Storage=4,755 cf Inflow=3.13 cfs 0.215 af
Discarded=0.14 cfs 0.137 af Primary=0.00 cfs 0.000 af Outflow=0.14 cfs 0.137 af

Pond 61P: StormTech Chambers Peak Elev=51.25' Storage=755 cf Inflow=1.65 cfs 0.109 af
Discarded=0.57 cfs 0.109 af Primary=0.00 cfs 0.000 af Outflow=0.57 cfs 0.109 af

Pond IFB-601: IFB-601 - StormTech Chambers Peak Elev=48.09' Storage=2,995 cf Inflow=1.73 cfs 0.114 af
Discarded=0.07 cfs 0.052 af Primary=0.00 cfs 0.000 af Outflow=0.07 cfs 0.052 af

Pond IFB-602: IFB-602 - StormTech Chambers Peak Elev=48.74' Storage=4,276 cf Inflow=2.27 cfs 0.153 af
Discarded=0.06 cfs 0.060 af Primary=0.00 cfs 0.000 af Outflow=0.06 cfs 0.060 af

Pond P1: DMH 3011 Peak Elev=45.79' Inflow=0.00 cfs 0.000 af
24.0" Round Culvert n=0.011 L=57.0' S=0.0040 '/' Outflow=0.00 cfs 0.000 af

Pond P2: DMH Peak Elev=45.56' Inflow=0.00 cfs 0.000 af
24.0" Round Culvert n=0.011 L=190.0' S=0.0052 '/' Outflow=0.00 cfs 0.000 af

Pond P4: 48" Culvert Peak Elev=38.90' Inflow=0.00 cfs 0.000 af
48.0" Round Culvert w/ 24.0" inside fill n=0.014 L=100.0' S=0.0020 '/' Outflow=0.00 cfs 0.000 af

Total Runoff Area = 20.489 ac Runoff Volume = 1.454 af Average Runoff Depth = 0.85"
20.77% Pervious = 4.255 ac 79.23% Impervious = 16.234 ac

Permeability Test Results

SANBORN HEAD

Building Trust. Engineering Success.

STORMWATER INFILTRATION REPORT

University Station
Westwood, Massachusetts

Prepared for University Station Phase 2 LLC
File No. 2707.18
October 16, 2017

SANBORN HEAD
Building Trust. Engineering Success.

1 Technology Park Drive
Westford, MA 01886

Mr. Kurt Sjostedt P.E.
University Station Phase 2 LLC
c/o New England Development
75 Park Plaza
Boston, Massachusetts 02116

October 16, 2017
File No. 2707.18

Re: Stormwater Infiltration Data Report – 61P
University Station – Phase II Development Area
Westwood, Massachusetts

Dear Kurt:

This report transmits the subsurface information obtained from two (2) test pit explorations and field infiltration tests performed by Sanborn, Head & Associates, Inc. (Sanborn Head) on May 18, 2017 within the proposed subsurface stormwater infiltration system at 61P within the Phase II development area at University Station in Westwood, Massachusetts.

Project Description

The proposed Phase II development includes the construction of one (1) additional subsurface stormwater infiltration system below proposed parking areas identified as Basin 61P. The location of the system is shown on Figure 1 – Exploration Location Plan. According to the plan titled "Medical Office Building Enabling Plans, Grading and Drainage Plan" dated May 9, 2017 prepared by Tetra Tech, the proposed bottom of the subsurface infiltration system is elevation (El.) 51 feet for Basin 61P.

Test Pit Explorations

On May 18, 2017, Sanborn Head observed the excavation of two (2) test pits (designated as TP-SH-503 through TP-SH-504) at the approximate locations shown on Figure 1. Test pits were excavated to depths ranging between approximately 14 and 15 feet below the ground surface (bgs) by D.W. White Construction, Inc. (DWW) of Acushnet, Massachusetts. The test pits were observed and logged by Eleanor Briggs of Sanborn Head, a Soil Evaluator certified by the Commonwealth of Massachusetts.

Attachment A includes Soil Evaluator logs prepared by Sanborn Head. These logs identify the observed thickness of surface fill materials where applicable, the hydrologic soil group of natural soils observed, textural soil classifications in accordance with U.S. Natural Resources and Conservation Service (NRCS) methodologies, and field observations regarding depth to groundwater, or evidence of seasonal high groundwater table (such as redoximorphic features, or mottling), if any.

The ground surface elevations at the test pit locations were estimated by Sanborn Head by interpolation between topographic contours provided by Tetra Tech on their plan dated May 9, 2017 and are referenced to the North American Vertical Datum of 1988 (NAVD88). An attempt has been made to account for the changes in ground surface elevation due to the recent construction activity at the site; however, the ground surface elevations provided on the logs should be considered approximate.

Subsurface Conditions

Basin 61P

Within the boundaries of Basin 61P, the subsurface conditions consist of an approximately 15-foot thick layer of granular fill consisting of fine to course sand with varying amounts of gravel, silt and cobbles. At test pit locations TP-SH-503 and TP-SH-504, a 0.5-foot thick buried topsoil layer (A_b horizon on the logs) was encountered at depths extending up to 6 feet bgs (approximately El. 50 feet).

Groundwater

During the recent test pit excavation, groundwater was not observed seeping into the test pits. Further, no visual evidence of seasonal high groundwater was observed in the test pits.

Stormwater Infiltration Tests

Sanborn Head performed two (2) falling-head permeameter tests at the locations and depths noted in Table 1. The falling-head permeameter tests were completed in general accordance with ASTM D5126-90 (2004) "Standard Guide for Comparison of Field Methods for Determining Hydraulic Conductivity in the Vadose Zone". This test method is considered a "Dynamic Field" method as described in the Massachusetts Stormwater Handbook (2008) for assessing the saturated hydraulic conductivity of the soil.

The falling-head permeameter tests were performed by excavating a test pit to a prescribed depth, then making an excavation by hand to install a 4-inch diameter standpipe approximately 6 to 12 inches into the receiving layer soil. The annulus space between the outside of the standpipe and the formation soil was sealed with hydrated bentonite. The standpipe was filled with a column of water with initial heights between 16 and 24 inches. The rate of head drop was measured and recorded over time for two to three trials using a water level pressure transducer. The falling head data were analyzed using the Hvorslev (1951) Method – "Basic Time Lag, Falling Head Permeability, Flush Bottom in Uniform Soil" to estimate the measured hydraulic conductivity of the soil. The measured hydraulic conductivity from the test was taken as the average of the three trials, or the last trial, whichever was less. In accordance with the Massachusetts Stormwater Handbook (2008), the design hydraulic conductivity from a dynamic test should be 50 percent of the field measured hydraulic conductivity.

A summary table of the test results in shown in Table 1 and the falling-head permeameter test logs for each test are included in Attachment B.

Recommended Subgrade Preparation below Infiltration Chambers

It is our understanding that Tetra Tech intends to design the subsurface with the bottom of drainage stone at El. 51 feet for Basin 61P. Based on our understanding of the nature of the granular fill, we believe that infiltration in this layer is feasible provided that the subgrade consists of inorganic, granular soils. If the subgrade consists of organic soils typical of the buried topsoil described in the above-mentioned section, the unsuitable material is to be removed and replaced with drainage stone.

We trust this data report meets the current needs of the project. If you should have any questions, please call.

Very truly yours,
SANBORN, HEAD & ASSOCIATES, INC.

Luke Norton, P.E.
Senior Project Manager

Vernon R. Kokosa, P.E.
Principal/Senior Vice-President

LDN/VRK/SSS: djn

Encl. Figure 1 – Exploration Location Plan
Table 1 – Summary of Falling-Head Permeameter Test Results
Attachment A – Test Pit Logs
Attachment B – Falling-Head Permeameter Logs

P:\2700s\2707.18\Source Files\SW 61P\20171016 University Station Stormwater Infiltration Report.docx

TABLE

Table 1

Summary of Falling-Head Permeameter Test Results

Basin 61P

University Station

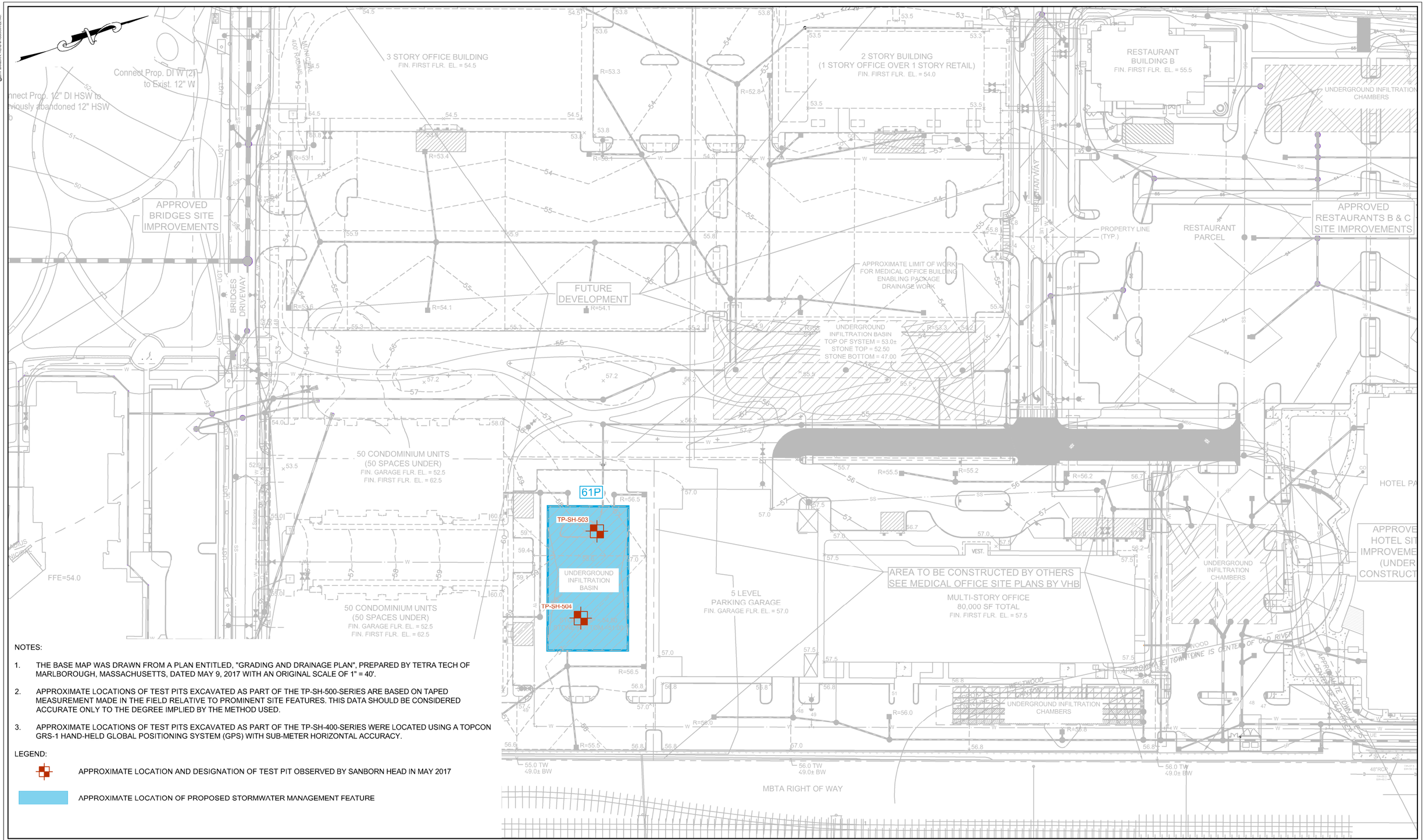
Westwood, Massachusetts

Infiltration System	**Basin 61P**	
Parameter	**TP-SH-503**	**TP-SH-504**
Approximate Ground Surface Elevation (ft)	55	55
Approximate Test Elevation (ft)	49.0	49.7
Field Measured Hydraulic Conductivity (in/hr)	3.7	9.0
Design Value Hydraulic Conductivity (in/hr)	1.9	4.5
Hydrologic Soil Group (HSG)	A	A
Average Design Hydraulic Conductivity for Basin (in/hr)	3.2	

Notes:

1. Elevations refer to the North American Vertical Datum of 1988 (NAVD88).
2. Locations of test pits and proposed basins are shown on Figure 1, Exploration Location Plan.

FIGURE



NOTES:

1. THE BASE MAP WAS DRAWN FROM A PLAN ENTITLED, "GRADING AND DRAINAGE PLAN", PREPARED BY TETRA TECH OF MARLBOROUGH, MASSACHUSETTS, DATED MAY 9, 2017 WITH AN ORIGINAL SCALE OF 1" = 40'.
2. APPROXIMATE LOCATIONS OF TEST PITS EXCAVATED AS PART OF THE TP-SH-500-SERIES ARE BASED ON TAPED MEASUREMENT MADE IN THE FIELD RELATIVE TO PROMINENT SITE FEATURES. THIS DATA SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.
3. APPROXIMATE LOCATIONS OF TEST PITS EXCAVATED AS PART OF THE TP-SH-400-SERIES WERE LOCATED USING A TOPCON GRS-1 HAND-HELD GLOBAL POSITIONING SYSTEM (GPS) WITH SUB-METER HORIZONTAL ACCURACY.

LEGEND:

APPROXIMATE LOCATION AND DESIGNATION OF TEST PIT OBSERVED BY SANBORN HEAD IN MAY 2017

APPROXIMATE LOCATION OF PROPOSED STORMWATER MANAGEMENT FEATURE

SANBORN HEAD

GRAPHICAL SCALE
40' 20' 0' 40' 80'

NO.	DATE	DESCRIPTION	BY

DRAWN BY: D. LONG
DESIGNED BY: T. ORSZULAK
REVIEWED BY: L. NORTON
PROJECT MGR: L. NORTON
PIC: V. KOKOSA
DATE: OCTOBER 2017

HYDROGEOLOGIC ENGINEERING SERVICES
UNIVERSITY STATION
WESTWOOD, MASSACHUSETTS

PROJECT NUMBER: 2707.18

EXPLORATION LOCATION PLAN

SHEET NUMBER: 1

Attachment A

Test Pit Logs

Test Pit Logs

Site Location:	University Station	Client Name: Westwood Marketplace Holdings, LLC	Date: 5/18/2017
Site Address:	University Avenue, Westwood, MA	Logged by: E. Briggs	Time: 11:00
Project No.:	2707.17		
Ground Surface Elev. (ft):	± 55 feet		Weather : Clear, 70-90 deg F

Deep Hole Number: TP-SH-503 Location (Identify on site Plan): Basin 61P

Depth (inches)	Soil Horizon or Layer	Soil Matrix Color (Moist)	Redoximorphic Features			Soil Texture (NRCS)	Coarse Fragments (% by Volume)		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles			
0-66	Fill	10YR 5/4	--	--	--	Gravelly Cobbly Sand	20	10	Single Grain	Loose	1
66-72	A_b	10YR 4/3	--	--	--	Gravelly Loamy Sand	20	10	Massive	Friable	
72-168	Fill	2.5Y 5/4	--	--	--	Gravelly Cobbly Loamy Sand	20	20	Massive	Friable	2

Additional Notes:
1. Test pit sidewall contained ballast stone/small blastrock pieces near surface.
2. Infiltration test performed at 72 inches.

Groundwater Observed: No If Yes; Depth Weeping from Pit Face: - Standing Water in the Hole: -

Estimated Depth to Seasonal High Ground Water: >168"

Test Pit Logs

Site Location:	University Station	Client Name: Westwood Marketplace Holdings, LLC	Date: 5/18/2017
Site Address:	University Avenue, Westwood, MA	Logged by: E. Briggs	Time: 11:20
Project No.:	2707.17		
Ground Surface Elev. (ft):	± 55 feet		Weather : Clear, 70-90 deg F

Deep Hole Number: TP-SH-504 Location (Identify on site Plan): Basin 61P

Depth (inches)	Soil Horizon or Layer	Soil Matrix Color (Moist)	Redoximorphic Features			Soil Texture (NRCS)	Coarse Fragments (% by Volume)		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles			
0-60	Fill	10YR 5/4	--	--	--	Gravelly Cobbly Loamy Sand	20	10	Massive	Friable	1
60-64	A_b	10YR 4/3	--	--	--	Gravelly Loamy Sand	20	10	Massive	Friable	
64-168	Fill	2.5Y 5/4	--	--	--	Gravelly Cobbly Sand	20	20	Single Grain	Loose	2

Additional Notes:
1. Water was observed infiltrating through sidewall at approximately 12 inches in at an isolated location in the west end of test pit. Suspected perched stormwater.
2. Infiltration test performed at 64 inches.

Groundwater Observed: No If Yes; Depth Weeping from Pit Face: - Standing Water in the Hole: -

Estimated Depth to Seasonal High Ground Water: >168"

Attachment B

Falling-Head Permeameter Logs

Falling-Head Permeameter Test Log

SANBORN HEAD	Project Name: University Station	Start Date: 5/19/2017
	Project Location: Westwood, MA	Finish Date: 5/19/2017
	Project No: 2707.17	Test Performed By: W. Bizcaino

Falling-Head Permeability Test Pit Number:	TP-SH-503
Approximate Ground Surface Elev. (ft.):	55.0
Test Depth (in.):	72
Test Elev. (ft.):	49.0

	Trial 1	Trial 2	Trial 3	Trial 4	Average
Trial Hydraulic Conductivity (in/hr):	3.6	3.9			3.8
Measured Hydraulic Conductivity (in/hr):	3.8				
Design Hydraulic Conductivity (in/hr):	1.9				

Comments:
1. The trial hydraulic conductivitiy is calculated using the Hvorslev (1951) Method - "Basic Time Lag, Falling Head Permeability, Flush Bottom in Uniform Soil".
2. The measured hydraulic conductivity is calculated as the last trial hydraulic conductivity or the average hydraulic conductivity, whichever is lowest.
3. The design hydraulic conductivity for the stormwater infiltration system is required to be one half of the measured infiltration rate according to the Commonwealth of Massachusetts Stormwater Handbook (2008).

Falling-Head Permeameter Test Log

SANBORN HEAD	Project Name: University Station	Start Date: 5/19/2017
	Project Location: Westwood, MA	Finish Date: 5/19/2017
	Project No: 2707.17	Test Performed By: W. Bizcaino

Falling-Head Permeability Test Pit Number:	TP-SH-504
Approximate Ground Surface Elev. (ft.):	55.0
Test Depth (in.):	64
Test Elev. (ft.):	49.7

	Trial 1	Trial 2	Trial 3	Trial 4	Average
Trial Hydraulic Conductivity (in/hr):	12.3	9.0			10.7
Measured Hydraulic Conductivity (in/hr):	9.0				
Design Hydraulic Conductivity (in/hr):	4.5				

Comments:
1. The trial hydraulic conductivitiy is calculated using the Hvorslev (1951) Method - "Basic Time Lag, Falling Head Permeability, Flush Bottom in Uniform Soil".
2. The measured hydraulic conductivity is calculated as the last trial hydraulic conductivity or the average hydraulic conductivity, whichever is lowest.
3. The design hydraulic conductivity for the stormwater infiltration system is required to be one half of the measured infiltration rate according to the Commonwealth of Massachusetts Stormwater Handbook (2008).

Rational Method Pipe Sizing Calculations

Hawthorne at University Station
Westwood, Massachusetts
11/25/2017

Rational Pipe Sizing Calculations

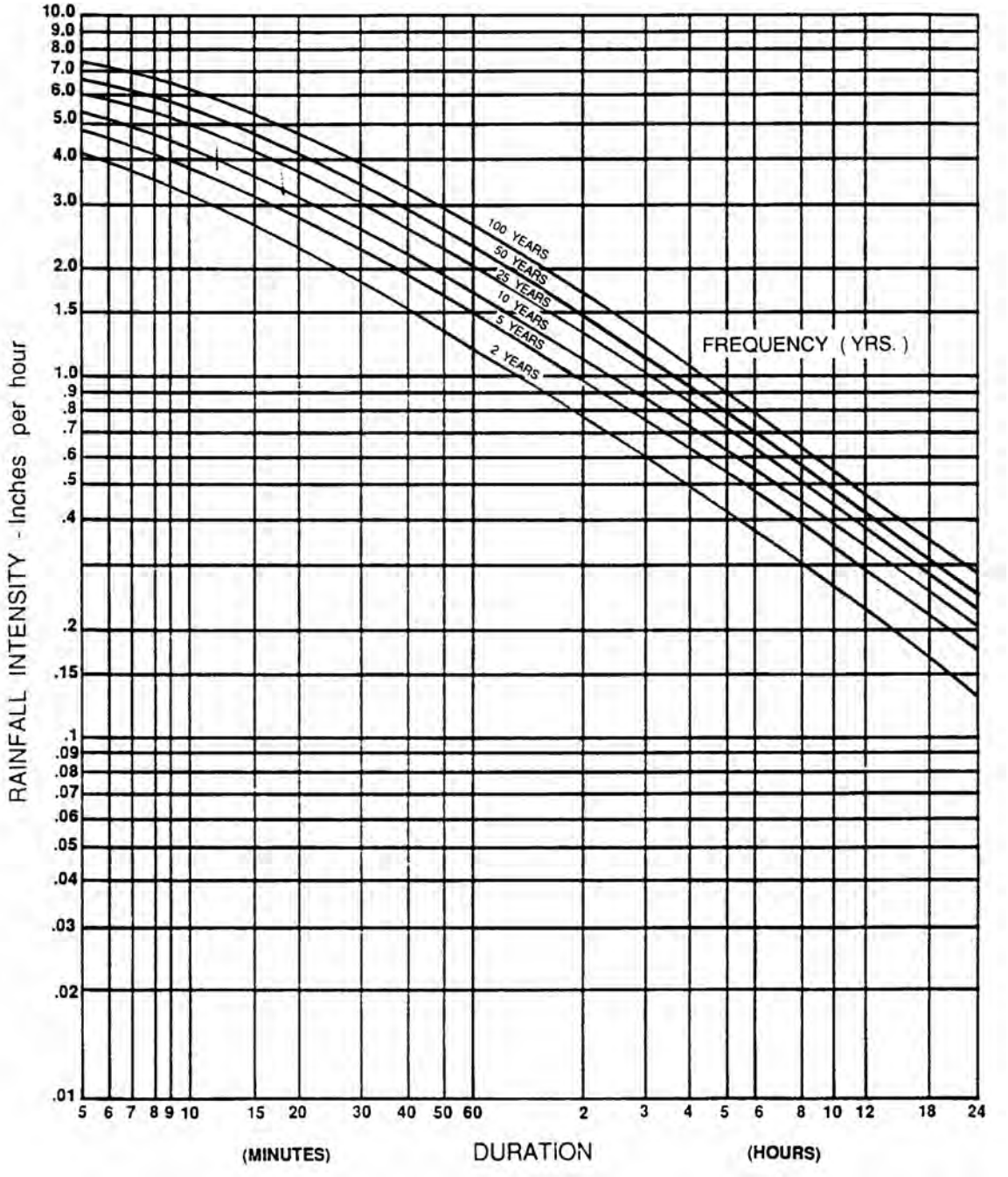
Design Period Storm: 25 Year

LOCATION		Impervious			OTHER			SUM			Q				Q	V
FROM	TO	A (Ac)	C	CA	A (Ac)	C	CA	CA	Tc (Min)	I in/hr	IxCA (cfs)	D (in)	S (ft/ft)	n	full (cfs)	full (fps)
CB 1	DMH 6	0.22	0.9	0.20	0.05	0.3	0.02	0.21	6	6.2	1.32	12	0.017	0.012	5.03	6.41
DMH 6	DMH 7	0.22	0.9	0.20	0.05	0.3	0.02	0.21	6	6.2	1.32	12	0.017	0.012	5.03	6.41
CB 2	WQU-1	0.014	0.9	0.01	0.06	0.3	0.02	0.03	6	6.2	0.19	12	0.010	0.012	3.86	4.91
CB 3	WQU-1	0.28	0.9	0.25	0.03	0.3	0.01	0.26	6	6.2	1.62	12	0.021	0.012	5.59	7.12
CB 4	WQU-1	0.18	0.9	0.16	0.05	0.3	0.02	0.18	6	6.2	1.10	12	0.020	0.012	5.46	6.95
WQU-1	ICS-1	0.47	0.9	0.43	0.14	0.3	0.04	0.47	6	6.2	2.91	12	0.020	0.012	5.46	6.95
CB 5	DMH 1	0.18	0.9	0.16	0.06	0.3	0.02	0.18	6	6.2	1.12	12	0.020	0.012	5.46	6.95
DMH 1	Stormtech	0.18	0.9	0.16	0.06	0.3	0.02	0.18	6	6.2	1.12	12	0.020	0.012	5.46	6.95
Bldg 1 - RF	DMH-3	0.22	0.9	0.20	0.00	0.3	0.00	0.20	6	6.2	1.23	10	0.008	0.012	2.12	3.89
Bldg 1 - RR	DMH-3	0.22	0.9	0.20	0.00	0.3	0.00	0.20	6	6.2	1.23	10	0.007	0.012	1.99	3.64
Bldg 2 - RF	DMH-4	0.22	0.9	0.20	0.00	0.3	0.00	0.20	6	6.2	1.23	10	0.008	0.012	2.12	3.89
DMH-4	DMH-3	0.22	0.9	0.20	0.00	0.3	0.00	0.20	6	6.2	1.23	12	0.005	0.012	2.73	3.47
YD	DMH-3	0.03	0.9	0.03	0.15	0.3	0.05	0.07	6	6.2	0.45	6	0.015	0.012	0.74	3.79
DMH-3	DMH-2	0.69	0.9	0.62	0.15	0.3	0.05	0.67	6	6.2	4.13	15	0.005	0.012	4.95	4.03
Bldg 2 - RR	DMH-5	0.22	0.9	0.20	0.00	0.3	0.00	0.20	6	6.2	1.23	10	0.006	0.012	1.84	3.37

n= 0.012 for HDPE piping; 0.013 for RCP piping

Prepared By:
Bohler Engineering
352 Turnpike Road
Southborough, MA 01772
(508) 480-9900

Exhibit 8-12
Intensity – Duration – Frequency Curve for Boston, MA



Source: TR55 - Urban Hydrology for Small Wetlands, NRCS

Water Quality and Groundwater Recharge Calculations

Tetra Tech, Inc.

Project: **Hawthorne at Univsersity Station** By: **NHC** Date: **12/1/2017**

Location: **Westwood, MA** Chkd: **NHC** Date: **12/1/2017**

Watershed Area: **59.3 Residential Area**

TSS Removal Calculation Worksheet

A BMP	B TSS Removal Rate	C Starting TSS Load*	D Amount Removed (BxC)	E Remaining Load (C-D)
Street Sweeping	0.05	1.00	0.050	0.95
Deep Sump/Hooded Catchbasins	0.25	0.95	0.238	0.71
Water Quality Structures	0.75	0.71	0.534	0.18
Subsurface Infiltration Basin	0.80	0.18	0.143	0.04

* Equals remaining load from previous BMP

Total TSS Removal = **96.4%**

Source: Volume Two: Massachusetts Stormwater Handbook, Dated January 2009
prepared by MADEP, Section VI Case studies.

Hawthorne at University Station
Stormceptor Sizing Summary
December 1, 2017

STC #	Overal Tributary Area (ac)	Tributary Impervious Area (ac)	% Impervious	TSS Removal Target	Water Quality Design Depth	Time of Concentration (hrs)	Impervious Area (sq mi)	qu	Water Quality Flow Rate (cfs)	STC Model #
CB 1	0.24	0.21	87.5%	75.0%	1"	0.1	0.00033	774	0.25	450i
WQU 1	0.52	0.43	82.7%	75.0%	1"	0.1	0.00067	774	0.52	900
CB 5	0.32	0.13	40.6%	75.0%	1"	0.1	0.00020	774	0.16	450i

PROPOSED CB-1

Brief Stormceptor Sizing Report - STC 1

Project Information & Location			
Project Name	Hawthorne at University Station	**Project Number**	5142
City	Westwood	**State/ Province**	Massachusetts
Country	United States of America	**Date**	11/9/2017
Designer Information		**EOR Information (optional)**	
Name	Nate Cheal	**Name**	
Company	Tetra Tech	**Company**	
Phone #	508-786-2331	**Phone #**	
Email	nate.cheal@tetratech.com	**Email**	

Stormwater Treatment Recommendation

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	STC 1
Target TSS Removal (%)	75
TSS Removal (%) Provided	85
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	85
STC 900	89
STC 1200	90
STC 1800	90
STC 2400	92
STC 3600	93
STC 4800	94
STC 6000	95
STC 7200	96
STC 11000	97
STC 13000	97
STC 16000	98
StormceptorMAX	Custom

Sizing Details

Drainage Area	
Total Area (acres)	0.24
Imperviousness %	88.0

Rainfall	
Station Name	BLUE HILL
State/Province	Massachusetts
Station ID #	0736
Years of Records	58
Latitude	42°12'44"N
Longitude	71°6'53"W

Water Quality Objective	
TSS Removal (%)	75.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	0.25

Up Stream Storage	
Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

Fine Distribution		
Particle Diameter (microns)	Distribution %	Specific Gravity
20.0	20.0	1.30
60.0	20.0	1.80
150.0	20.0	2.20
400.0	20.0	2.65
2000.0	20.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
http://www.imbriumsystems.com/technical-specifications

PROPOSED WATER QUALITY UNIT 1

Brief Stormceptor Sizing Report - STC 2

Project Information & Location			
Project Name	Hawthorne at University Station	**Project Number**	5142
City	Westwood	**State/ Province**	Massachusetts
Country	United States of America	**Date**	11/9/2017
Designer Information		**EOR Information (optional)**	
Name	Nate Cheal	**Name**	
Company	Tetra Tech	**Company**	
Phone #	508-786-2331	**Phone #**	
Email	nate.cheal@tetratech.com	**Email**	

Stormwater Treatment Recommendation

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	STC 2
Target TSS Removal (%)	75
TSS Removal (%) Provided	85
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	85
STC 900	91
STC 1200	91
STC 1800	91
STC 2400	93
STC 3600	93
STC 4800	95
STC 6000	95
STC 7200	96
STC 11000	97
STC 13000	97
STC 16000	98
StormceptorMAX	Custom

MULTIPLE INLETS - USE STC 900

Stormceptor®

Rinker MATERIALS™

Sizing Details

Drainage Area

Total Area (acres)	0.52
Imperviousness %	83.0

Rainfall

Station Name	BLUE HILL
State/Province	Massachusetts
Station ID #	0736
Years of Records	58
Latitude	42°12'44"N
Longitude	71°6'53"W

Water Quality Objective

TSS Removal (%)	75.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	0.52

Up Stream Storage

Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion

Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

Fine Distribution

Particle Diameter (microns)	Distribution %	Specific Gravity
20.0	20.0	1.30
60.0	20.0	1.80
150.0	20.0	2.20
400.0	20.0	2.65
2000.0	20.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
http://www.imbriumsystems.com/technical-specifications

PROPOSED CB 5

Brief Stormceptor Sizing Report - STC 3

Project Information & Location			
Project Name	Hawthorne at University Station	**Project Number**	5142
City	Westwood	**State/ Province**	Massachusetts
Country	United States of America	**Date**	11/9/2017
Designer Information		**EOR Information (optional)**	
Name	Nate Cheal	**Name**	
Company	Tetra Tech	**Company**	
Phone #	508-786-2331	**Phone #**	
Email	nate.cheal@tetratech.com	**Email**	

Stormwater Treatment Recommendation

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	STC 3
Target TSS Removal (%)	75
TSS Removal (%) Provided	92
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	92
STC 900	96
STC 1200	96
STC 1800	96
STC 2400	97
STC 3600	97
STC 4800	98
STC 6000	98
STC 7200	99
STC 11000	99
STC 13000	99
STC 16000	99
StormceptorMAX	Custom

Sizing Details

Drainage Area	
Total Area (acres)	0.32
Imperviousness %	41.0

Rainfall	
Station Name	BLUE HILL
State/Province	Massachusetts
Station ID #	0736
Years of Records	58
Latitude	42°12'44"N
Longitude	71°6'53"W

Water Quality Objective	
TSS Removal (%)	75.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	0.16

Up Stream Storage	
Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

Fine Distribution		
Particle Diameter (microns)	Distribution %	Specific Gravity
20.0	20.0	1.30
60.0	20.0	1.80
150.0	20.0	2.20
400.0	20.0	2.65
2000.0	20.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
http://www.imbriumsystems.com/technical-specifications

University Station - Hawthorne at University Station
Westwood, MA

Recharge Calculations

Required Recharge Volume[1]

Rv = F x impervious area

Where: Rv = required recharge volume (acre-feet)
F = target depth factor associated with each hydrologic soil group (inches)
Impervious Area = pavement and rooftop area on site (acres)

NRCS Hydrologic Soil Type	Approx. Soil Texture	Target Depth Factor (inches)	Impervious Area (acre)	Rv (acre-feet)	Rv (cf)
A	sand	0.60	1.57	0.079	3,419
B	loam	0.35	0.00	0.000	0
C	silty loam	0.25	0.00	0.000	0
D	clay	0.10	0.00	0.000	0
			Total =	**0.079**	**3,419**

Provided Recharge Volume[2]

Infiltration Basin	Static Storage Volume (acre-feet)	Static Storage Volume (cf)
61P	0.180	7,822
Total =	**0.180**	**7,822**

Notes:
1.) Refer to Massachusetts Stormwater Handbook Volume 3, Chapter 1, page 15 dated February 2008.
2.) Provided recharge volume is based on the Static Method, refer to Massachusetts Stormwater Handbook Volume 3, Chapter 1, page 18 dated February 2008.

University Station - Hawthorne at University Station
Westwood, MA

Drawdown Calculations

Drawdown Time[1]

$$Time_{drawdown} = \frac{Rv}{(K)(Bottom\ Area)}$$

Where: $Time_{drawdown}$ = time it takes the basin to drain completely (hours)
Rv = storage volume (cubic feet)
K = saturated hydraulic conductivity[2] (inch/hour)
Bottom Area = bottom area of recharge structure (square feet)

Infiltration Basin	Rv (cf)	K (in/hr)	Bottom Area (sf)	Drawdown Time (hr)
61P	7,822	3.20	7,640	3.8

Notes:
1.) Refer to Massachusetts Stormwater Handbook Volume 3, Chapter 1, page 25 dated February 2008.
2.) Refer to Massachusetts Stormwater Handbook Volume 3, Chapter 1, page 22 dated February 2008 (Rawls Rates Table).
3.) Refer to HydroCAD® report.

Tab 6:
Fiscal Impact Memorandum Update

FOUGERE PLANNING & DEVELOPMENT Inc.

Mark J. Fougere, AICP

253 Jennison Road Milford, New Hampshire 03055
phone: 603-315-1288
email: Fougereplanning@comcast.net

Fiscal Impact Memorandum

To: Planning Board, Town of Westwood

From: Mark J. Fougere, AICP

RE: University Station – Westwood, Massachusetts
Pulte Special Permit – 100 Unit Condominium

Date: December 1, 2017

1. Introduction

Pulte Homes of New England, LLC (Pulte Homes) is proposing to construct a 100 unit residential condominium development (the "Project") comprised of 2 four-story buildings to be located within a portion of Development Area B, as shown on the approved University Station Master Development Plan. The project site will consist of approximately 2.7 acres and 180 parking spaces, with 100 of the spaces located beneath the proposed buildings. As required by applicable provisions of the University Avenue Mixed Use District (UAMUD) Zoning Bylaw, 10% of the units will be designated as "Affordable Housing"[1]. Set forth below in Table One is the anticipated breakdown of the Project's market rate and affordable units by unit type.

Table One
Condominium Unit Breakdown

Unit Type	One-Bed	Two-Bed	Totals
Market Rate	41	49	90
Affordable	5	5	10
Totals	46	54	100

[1] "Affordable Housing" is defined as dwelling units available at a cost of no more than thirty (30) percent of gross household income to households at or below eighty (80) percent of the Boston PMSA median income as most recently reported by the U.S. Housing and Urban Development (HUD), including units listed under M.G.L Chapter 40B and the State's Local Initiative Program.

In connection with the proposed Project, Fougere Planning & Development Inc. ("Fougere Planning") has prepared this Memorandum to update the University Station Fiscal Impact Study prepared by Connery Associates dated January 2013 (the "2013 Connery Report"),[2] as well as the Update Memorandum dated March 17, 2017 (the "2017 Fougere Update")[3] submitted in connection with modifications to the Master Development Plan for the University Station project approved by the Planning Board on April 11, 2017. In preparing this Memorandum, Fougere Planning discussed actual and projected impacts of the University Station development with Town staff including, Town Administrator Michael Jaillet; Director of Community and Economic Development, Nora Loughnane; Finance Director Pamela Dukeman; Personnel Director Joan Murray; and School District Director of Business and Finance Heath Petracca.

As set forth in greater detail below, this update confirms that: (i) the number of school age children (SAC) anticipated to be generated by the Project is consistent with the 2017 Fougere Update; (ii) the actual costs incurred by the Town as a result of the University Station development remain within the range anticipated in the 2013 Connery Report; and (iii) the University Station development, as constructed and as anticipated with the build-out of the Project, will continue to provide a significant net fiscal benefit to the Town in excess of the estimates made in the 2013 Connery Report.

2. Estimated Value and Property Tax Revenue

In the 2013 Connery Report, Connery Associates calculated residential housing value under the assumption that all of the proposed units would be apartments with an average per unit value of $150,000, resulting in an estimated total assessed value of $97,500,000 for the proposed 650 units. As reported in the 2017 Fougere Update, the average per unit assessment for the 350 existing apartments is $234,447, substantially higher than original estimates. In addition, it was reported that the next residential phase of the project would consist of 100 condominiums with an average assessed value of $500,000.

[2] Fiscal Impact Analysis University Station, A Mixed Use Development, January 31, 2013, Connery Associates.
[3] March 17, 2017 University Station, Westwood MA, Modified Master Development Plan – Update to Financial Analysis.

As noted above, the proposed Project will consist of a mix of one and two-bedroom units, with 10 units set aside as Affordable Housing. Given the mix of bedroom types and affordability, a range of unit values have been estimated. Once complete, it is projected that the total assessed value of the Project will be $42,825,000, generating approximately $623,960 in annual property tax revenue and $639,360 in total revenues; (see Table Two below). Although less than the estimated project value outlined the Fougere 2017 Update, these figures remain significantly higher than the $15,000,000 projected in the 2013 Connery Report.

Table Two
Condominium Unit Values

Unit Type	Number	Average Unit Price	Est. Value	2013 Connery Report
One Bed Market Rate	41	$400,000	$16,400,000	-
One Bed Affordable	5	$180,000	$900,000	-
Two Bed Market Rate	49	$500,000	$24,500,000	-
Two Bed Affordable	5	$205,000	$1,025,000	-
Total	100		$42,825,000	$15,000,000
Estimated Yearly Taxes		@ $14.57/$1,000	**$623,960**	$218,550
Vehicle Excise Taxes[4]	154	$100 per Vehicle	**$15,400**	$15,400
Total Estimated Income			**$639,360**	$233,950

3. School Enrollment

Fall enrollments in 2017 show a continued decline in the overall student population for the Westwood Public School System. As shown in Table Three below, elementary enrollment has decreased 12.61% over the last six years, with the middle school enrollments remaining stable and the high school enrollments increasing by 10.36%.

Table Three
School Enrollment Trends

	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	% Change
Elementary	1,467	1,481	1,435	1,396	1,368	1,282	**-12.61%**
Middle School	793	783	798	780	795	793	**0.00%**
High School	907	935	971	975	999	1,001	**+10.36%**
Total Enrollment	3,167	3,199	3,204	3,151	3,162	3,076	**-2.87%**

[4] 2013 Connery Report, 1.54 vehicles per unit and $100 excise tax per vehicle.

4. Municipal Costs

A. Schools

The 2013 Connery Report estimated that 55 school-age children (SAC) would reside within the 650 apartment units planned to be constructed within the UAMUD, resulting in an estimated .084 SAC per unit. This rate would net approximately 30 SAC for the initial 350 apartments. The Town's review consultant, Community Opportunities Group, Inc. (COG), authored a report dated February 6, 2013 (the "COG Report"), recommending that the School Department plan on a range of 49 – 63 students[5] (.14 to .18 SAC per unit) for the first 350 units to be constructed within the UAMUD.

The School Department's most recent enrollment census reported that 29 students presently reside within the 327 Gable units currently occupied (of the 350 units for Phase 1), which is consistent with original estimates in the 2013 Connery Report.

The same COG Report estimated that a multi-floor 1-2 bedroom condominium development would generate .055 SAC per one bedroom unit and .144 SAC per two bedroom unit. To augment this analysis, Fougere Planning researched school enrollment populations from four condominium developments in the area totaling 691 units. The results of this research found an average of .081 SAC per unit, as set forth below in Table Four.

Table Four
Comparable Condominium Units – SAC

Project	Total Units	One Beds	Two Beds	Three Beds	SAC	SAC Unit
Milton Landing	73	19	40	14	1	0.014
Village Falls Newton[6]	122	0	122	0	14	0.115
Jonathans Landing Braintree	280	56	222	2	19	0.068
South Natick Hills[7]	216	24	192	0	22	0.102
Totals	691	99	576	16	56	**0.081**

Applying the various SAC multipliers for condominium developments results is an estimated range of 8 – 10 SAC living in the Project, as shown below in Table Five. This estimate is

[5] Page 7, Community Opportunities Group, Inc., Review of Proposed University Station Development, Feb. 6, 2013.
[6] The Newton Housing Authority owns 14 units in this complex.
[7] As a 40B project, 25% of these units are set aside as affordable.

consistent with previous findings presented to the Town, including most recently in the 2017 Fougere Update.

Table Five
Estimated School Age Children

	Units	Per Unit SAC	Estimated SAC
Westwood Pulte	100		
Fougere Planning		.081	8.1
Connery Report		.084	8.4
COG Report			
46 One Beds		.055	2.53
54 Two Bed		.144	7.77
COG SAC Total			10.3

As detailed in the 2017 Fougere Update, the only increased school related costs from the University Station development reported to date has been $65,800 to provide for an additional school bus route. In speaking with the School District Director of Business and Finance Mr. Heath Petracca, he confirmed that no additional school costs have been realized. The School Department has also confirmed that the vast majority of the School Mitigation Fund has not yet been expended. Based on the 2013 Connery Report and the COG Report, pursuant to the Development Agreement dated May 7, 2013 (the "Development Agreement"), the University Station developer contributed a total of $2,250,000 to be utilized to fund capital and other improvements that may be required for the Town's public education system to accommodate sixty-three (63) new SAC that were anticipated to result from the first phase of the University Station development ("Phase 1"). Given that:

(i) Phase 1 has resulted in only 29 SAC (at 93.4% Occupancy),

(ii) There have been no additional costs incurred by the School Department other than those related to bussing,

(iii) The Project is anticipated to generate only up to 10 additional SAC, resulting in a total of 39 SAC for the University Station development as a whole; and

(iv) The University Station developer already provided funds, which remain available, to mitigate costs associated with up to 63 new SAC, **no additional**

funds are necessary to mitigate the financial impacts to the Town's School Department that are anticipated to result from the Project.

B. Other Municipal Costs

As noted in the 2013 Connery Report and in the 2017 Fougere Update, pursuant to the Development Agreement the Developer agreed to provide funds to mitigate many of the costs that were anticipated to result from the University Station development including:

- Mitigation Fund of $900,000 to: (a) defray pre-opening inspectional and training costs incurred by the Police and Fire Department, (b) fund a study or studies that may be required to address the project's impacts on the Town's existing public safety facilities and equipment, (c) defray the costs associated with acquiring additional land for municipal facilities, (d) purchase additional equipment, vehicles (it is our understanding that a new police cruiser was purchased with these funds), software or other capital items, or (e) such other costs and expenses that the Town may incur.

- Building Permit Fees Account of $2,500,000 to cover costs related to: (i) review of plans and specifications for the project to determine compliance with the Town's Zoning Bylaw and the State Building Code; (ii) the review of construction plans for and inspections of all aspects of the project, including related public infrastructure improvements; and (iii) any other costs or expensed incurred by the Town in connection with the review of plans and specifications or the inspection of the project.

In addition to costs covered by mitigation payments from the developer, the 2013 Connery Report estimated that University Station, at full buildout of approximately 2.1 million square feet, would cause the Town to incur an estimated $1,693,500 in annual costs associated with increased staff and equipment, to address the project's impacts on public safety and traffic management. Together with the developer, Fougere Planning again met with Town Officials to obtain an update of increased costs incurred by the community since the 2017 Fougere Update.

The Town Administrator confirmed that the anticipated additional emergency staff noted in the 2017 Fougere Update (two police officers and four fire fighters) have since been hired. The

following Table Six summarizes the costs estimated in the 2013 Connery Report, along with updated estimates of actual costs through October 2017.

Table Six
Comparison of 2013 Report to 2017 Estimates – Incurred Costs To Date

Department[8]	2013 Estimated Costs (Annual)	Town Estimates (as of October 2017)
Police Department	$370,000	$358,000[9]
Fire Department	$495,000	$684,000[9]
Health Department	$0	$23,000
Department of Public Works	$30,000	$30,000
School Department	$798,500	$65,800[10]
Other Administration	$0	$70,000
Total	$1,693,500	$1,230,800

5. Projected Fiscal Benefit

As reported in the 2017 Fougere Update, Phase 1 revenues realized by the Town have far exceeded original estimates by 37% or $1,684,895. As noted above in Section 2, the proposed condominium Project is estimated to have a total assessed value of $42,825,000 and generate approximately $639,360 in local revenues from property and vehicle excises taxes. **This estimated revenue is 273% greater than original estimates in 2013 of $233,950.** As set forth in Section 3, no costs are expected to result from the proposed Project that have not already been accounted for. Mitigation funds previously provided and increased Project revenues will offset the $570,000 in recent costs incurred by the community with the addition of new emergency personnel.

As highlighted in the March 2017 Fougere Fiscal Update, the ongoing development of the second phase of the University Station development will continue to provide significant positive fiscal benefits to the community, which are summarized below in Table Seven.

[8] In addition to the Departments shown in Table 3, the 2013 Report noted increased "one-time" costs that were anticipated to be incurred by the Town's Building and Assessing Departments in connection with the project. These costs were mitigated under the Development Agreement and no ongoing annual costs to these departments are anticipated to result from the project.

[9] Updated cost information provided by Finance Director Pam Dukeman, $225,000 for Police and $345,000 for Fire.

[10] The Town's Finance Director indicated additional school-related costs of approximately $149,200 associated with the project; however, as noted above, given the overall decline in student population, the project's only direct, realized costs reported by the School Superintendent to date are increased transportation costs, which are included in this Table.

Table Seven
Phase II 2017 - Anticipated Tax Revenues

2017 Under Construction	*Units/sf*	*March 2017 Update Est. R.E. Taxes*	*Current Est. R.E. Taxes*
Restaurant	7,500	$38,789	$38,789
Hotel (80,000/key)	130 rooms	$293,280	$293,280
FUTURE DEVELOPMENT PROJECTIONS			
RETAIL - Parcel F 11,000 SF	11,000	$106,554	$106,554
OFFICE - Parcel E4A 11,000 SF plus Parcel F 75,000 SF	86,000	$312,851	$312,851
OFFICE - BWH (80,000 SF @ $129/sf value, assume 25% of $5/SF tax rate)	80,000	$100,000	$100,000
RESIDENTIAL (200 units, @ $175K/unit value, $14.57 mil rate)	200 units	$509,950	$509,950
CONDO'S (100 units, @$428,250/unit value, $14.57 mil rate)	**100 units**	**$728,500**	**$623,960**
UPPER OFFICE (200,000 SF @ $129/sf value, $28.20 mil rate)	200,000	$727,560	$727,560
Sub-total		**$2,817,484**	**$2,712,944**

6. Conclusion

The construction of the proposed 100 unit condominium Project is consistent with the University Station Master Plan and will generate an estimated $639,360 in yearly tax revenue. The Project will generate approximately 8-10 additional SAC. This estimate is in line with the 2013 Connery Report and the 2017 Fougere Update, and is approximately half of the SAC anticipated in the COG Report, which were the basis for mitigation funds already provided by University Station. To date, bussing is the only school related expenses that has been documented. Additional emergency personnel have been added to address increased calls for service to the area. Although emergency costs have exceeded original estimates, other cost factors have not materialized. Existing and projected tax revenues will far exceed original estimates creating a positive fiscal benefit to the Town of Westwood.

As summarized in Table Eight, the net fiscal benefit from the University Station development project continues to exceed 2013 findings. **At build out, current estimates show that net revenues will exceed original 2013 estimates by 36%.**

Table Eight
Fiscal Summary – Full Build Out Projections

Annual	2013 Connery Report	2017 Fougere Update	Current Estimate
Revenues[11]	$7,080,000	$9,415,503[12]	$9,310,963[13]
Costs	$1,693,500	$1,950,000	$1,950,000
Net Fiscal Benefit	$5,388,000	$7,465,503	$7,360,963

[11] Includes Excise and Hotel Tax, estimates are unchanged from the 2013 Connery Report.
[12] On page 9 of the 2017 Fougere Update, the annual income from Excise and Hotel tax receipts should have noted $362,000 in revenue not $262,000.
[13] As outlined in Table 7, estimated revenues have decreased from the 2017 Fougere Update by $104,540.

Tab 7:
Project Plans

The following plans are being provided under separate cover:

- Sheet 1: Cover Sheet
- Sheet 2: General Notes Sheet
- Sheet 3: Demolition Plan
- Sheet 4: Site Plan
- Sheet 5: Grading and Drainage Plan
- Sheet 6: Utility Plan
- Sheet 7: Soil Erosion and Sediment Control Plan
- Sheet 8: Soil Erosion and Sediment Control Notes and Details Sheet
- Sheet 9: Landscape Plan
- Sheet 10: Lighting Plan
- Sheet 11: Lighting Details Sheet
- Sheet 12: Construction Details Sheet
- Sheet 13: Construction Details Sheet
- Sheet 14: Construction Details Sheet
- Sheet 15: Construction Details Sheet
- C101: General Layout Map
- Sheet 1 of 1: Partial Existing Conditions Survey
- Color Front Elevation
- Color Rear Elevation
- Color Garage Entry and End Elevations
- Exterior Materials
- Front Elevation
- Rear Elevation
- Garage Entry and End Elevations
- Garage Floor Plan
- Floor Plans
- Roof Plan