Application for Project Development Review

LIFETIME FITNESS

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

Submitted by Life Time Fitness, Inc.
October 8, 2013

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Table of Contents

Tab 1:
Project Information Form and Signature Page

General application information for the Applicant and project:

Name of Applicant:	Life Time Fitness, Inc.
Address of Applicant:	2902 Corporate Place Chanhassen, MN 55317
Contact information for Applicant:	Name: Scott Ferguson Title: Development Manager Phone: (952) 229-7284 Email: sferguson2@lifetimefitness.com
Owner (if other than the Applicant):	Westwood Marketplace Holdings LLC.
	Name: John E. Twohig, Esq. Title: Attorney for the Owner Phone: (617) 482-1776 Email: jtwohig@goulstonstorrs.com Name: Paul S. Cincotta Title: Project Manager Phone: (617) 243-7841 E-Mail: pcincotta@nedevelopment.com
Description of project site:	Approximately 7.9 acres of land within Development Area C, as shown on the Master Development Plan approved at the Special Town Meeting on May 6, 2013, 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 a three-story building measuring approximately 60 feet in height with approximately 125,643 square feet of floor area for use as a Life Time Fitness center. The center will include fitness, training, and sports uses, an indoor and outdoor swimming pool, and related uses including parking, all as more fully set forth in the Narrative Statement behind Tab 2.
Description of proposed parking:	Approximately 568 parking spaces adjacent to the building with access to and from Harvard Street. Bicycle racks for approximately 16 bicycles will also be provided near the front of the building.
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 125,643 square feet of construction x $0.05 = $6,282.15.

Signature of the Applicant:

LIFE TIME FITNESS, INC.

Name: SCOTT FERGUSON
Title: DEVELOPMENT MANAGER

Date: October 8, 2013

TAB 2:
Narrative Statement

As indicated above, the project is located within Development Area C as shown on the Master Development Plan approved at the Special Town Meeting on May 6, 2013. The Master Development Plan shows a building and parking field in this location, and various reports submitted to the Town in connection with the Master Development Plan (including a traffic impact study and supplemental memoranda) describe and analyze impacts of the building in this location.

As described in more detail below, we believe the project is consistent with the Master Development Plan, these reports and memoranda, 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 below summarizes this information and the Project's compliance with the design and performance standards set forth in Section 9.8.11 of the Zoning Bylaw.

A. Overview of the Project

1. Project Description

As indicated above, the project consists of development of a three-story building measuring approximately 60 feet in height, with approximately 125,643 square feet of floor area, on a parcel measuring approximately 7.9 acres. This parcel will be created by recorded subdivision plan on or about the date construction of the building commences.

The project will include a wide range of fitness uses to serve the needs of the community. More specifically, the building will provide fitness, sports, and recreational programs and activities including, without limitation, weight-lifting equipment; running and aerobic exercise equipment; game courts; indoor and outdoor swimming pools; chiropractic, physical therapy, and message services; day camps; wellness assessment; and fitness classes and programs. Accessory structures and uses will include indoor and outdoor playgrounds; indoor and outdoor sale of food and beverages; retail sale of health- and fitness-related items; salons; child activity centers; nutritional centers; saunas, steam rooms, whirlpool baths, spas, showers, lockers and similar uses; water slides; membership sale offices and preview centers; and other customary and incidental fitness center uses. The floor plans listed behind Tab 6 show the proposed layout of the space.

The project includes approximately 568 parking spaces and other appurtenant exterior improvements including a pedestrian walkway linking the Life Time Fitness development to the pedestrian circulation system for University Station, native and adapted drought-tolerant trees and other landscaping, and lighting.

2. Architectural Design

The design and architecture of the building is intended to complement the overall design and planning work for University Station and create an interesting, attractive anchor at the southern side of the project site.

The design has evolved to ensure consistency with the University Station project and safety and emergency services considerations. For example, a driveway is now included along the eastern side of the building to facilitate access for emergency response vehicles to the rear of the building (as well as access to the loading and trash management areas). The applicant has coordinated with the Fire Chief on the driveway design and provided information on turning movements along this driveway to the Fire Chief. In addition, the applicant has added a landscaped "divider island" on the western side of the parking area to enhance the appearance of the site, maximize pervious area and shade trees in the parking area, and provide a connection between this site and the rest of the University Station project.

Other architectural features and planning objectives for the building are summarized as follows:

- *Exterior materials:* Limestone and brick will be the primary materials on each elevation of the building. The building will be topped with colored architectural precast concrete at the parapet walls. The majority of window and door openings will be aluminum storefront with spandrel panels at key locations of glazing. Public-facing facades will be accented with sun shades and trellises at the ground plane.

- *Façade treatment:* The façade will be designed to receive two different colors of brick—a field color and accent color—and divided by pilasters projecting from the building at regular intervals. Limestone at the ground plane will be capped by a precast stone sill and the parapet walls will be accented with steps in the parapet cap made of precast concrete.

- *Relationship among structures and components:* The facility entrance is set along the main axis of the Master Development Plan area. The exterior pool is planned for the west side of the main building with a small bistro building in the southwest corner of the pool deck. The trash enclosure and other supporting components to the back-of-house operations of the building are in the southeast corner of the site.

- *Detailing:* Windows are punched openings in the brick veneer and accented with precast stone sills. Pilasters are limestone and accented with wall-mounted fixtures. Halo-lit, stainless steel signage is located at each façade and scaled to be viewable from off-site.

- *Rooftop:* The rooftop of the building will be a white TPO (thermoplastic polyolefin) roofing membrane.

B. Technical Information and Reports

1. Traffic Impacts

The Life Time Fitness center is located at the building known as Retail Building R on the Master Development Plan. Retail Building R is located on the west side of University Avenue between Canton Street and Harvard Street (currently known and numbered as 40-46 Harvard Street). Vehicles access this building by a driveway which intersects the south side of Harvard Street approximately 500 feet west of University Avenue.

As part of the University Station planning process, a traffic impact study and several memoranda addressing issues 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 traffic mitigation program for the project. Specifically, these documents estimated peak hour traffic generated by 610,000 square feet of shopping center space within the project, including Retail Building R, using Land Use Code 820 (Shopping Center) from the Institute of Transportation Engineers' publication *Trip Generation*, 8th Edition, 2008. Non-merchandising facilities such as health clubs and recreational facilities are considered a part of a shopping center and treated under the same Land Use Code 820. Accordingly, the mitigation program developed for University Station, including the design of the University Avenue corridor, considered traffic generated by the proposed Life Time Fitness Center.

The Life Time Fitness center driveway intersects Harvard Street approximately 500 feet west of University Avenue opposite a driveway serving the core retail development area. As reported in a memorandum to the Planning Board submitted on April 11, 2013, the vehicle queue on Harvard Street approaching University Avenue is not expected to extend more than 120 feet during the weekday or Saturday peak hours and would not block this driveway.

In conclusion, the impact analysis and mitigation program described in the November 2012 TIS considered the proposed health club facility as an integral part of the Project and no further traffic analysis is warranted.

2. Utilities

- *Water Usage:* The Life Time Fitness center will receive water from the Dedham-Westwood Water District's main water service system located in Harvard Street. An eight-inch water service will connect to an existing eight-inch main located in Harvard Street and will extend into the project site. A fire loop will be provided around the perimeter of the building in order to provide adequate fire protection and fire hydrant locations. Final hydrant locations will be coordinated with the Fire Chief. The 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 45,000 gallons per day allocated to the Life Time Fitness building. As the design of the Life Time Fitness building has advanced, water demands are anticipated to be approximately 35,000 gallons per day. Water Sense (or equivalent) fixtures will be used as outlined in the April 26,

2013 Sustainability Memorandum. With the use of the Water Sense fixtures and the anticipated reduction in water demands, the Life Time Fitness center water usage plan is consistent with the Master Development Plan.

- *Wastewater Generation:* The Life Time Fitness building will discharge wastewater to the eight-inch sewer main located within Harvard Street. The Master Development Plan anticipated up to 45,000 gallons per day of wastewater to be generated by the Life Time Fitness use. Actual wastewater generation is anticipated to be 35,000 gallons per day, less than previously estimated, resulting in a lower wastewater impact. Wastewater will be discharged by an eight-inch service lateral with a minimum slope of 0.7%. Resulting pipe velocity is anticipated to be 1.88 feet per second. As required by the Wastewater Operations and Maintenance Manual, the sewer service will be video inspected for the first two years to confirm that the sewer service is operating in a satisfactory manner.

- *Electrical Service:* Electrical service will be provided by NStar from Harvard Street by means of an underground ductbank. The transformer is anticipated to be located along the east side or behind the Life Time Fitness building (subject to NStar approval) and will not be visible from Harvard Street, and will be adequately screened from abutting properties consistent with Master Development Plan requirements.

- *Gas service:* Gas service will be provided by NStar from its main line in Harvard Street. Actual gas pressure requirements will be determined once the gas distribution system and mechanical equipment design is complete within the building.

- *Telephone and Cable Service:* Telephone service will be provided by Verizon from Harvard Street by means of an underground duct bank. This arrangement is consistent with the Master Development Plan. Life Time Fitness maintains a national contract with Direct TV, therefore cable service will not be required.

3. Stormwater Management

The stormwater management system for the Life Time Fitness center is consistent with the system approved as part of the Master Development Plan review process. Minor modifications to the overall stormwater management system were made to accommodate the Life Time Fitness development program. The impervious area associated with the Life Time Fitness site is consistent with the Master Development Plan approval: The Master Development Plan assumed that 83% of the Life Time Fitness site would be impervious cover, whereas the plans included with this application assume 84%.

Slight adjustments were made to the geometry of the surface stormwater detention basin/wetland system (Basin 30P). The basin footprint was refined with the evolution of the formal building design and site layout configuration.

Stormwater from the Life Time Fitness rooftop is still collected in a series of roof drains and directed to a subsurface infiltration basin (Basin 27P) located along the northwest property boundary. Surface runoff generated from the parking areas and associated landscaping is also

collected, treated, and conveyed to Basin 27P. Runoff from paved surfaces is still directed to a proprietary stormwater quality unit prior to discharge into the infiltration basin.

Basin 27P remains designed as a GeoStorage infiltration system, the details of which were included with the Master Development Plan approval and are also included with this application. The outlet for this basin is directed to the forebay of surface basin 30P.

The adjustments do not have any appreciable impact on the overall hydrologic function of the site or the pre and post development runoff characteristics for this point of analysis (POA 1). A comparison of the pre and post development peak rates of runoff for POA 1 from the current proposal to the Master Development Plan is included in Table 1 below. Table 2 compares the existing and proposed runoff volumes contributing to POA 1 in the current configuration to the one approved with the Master Development Plan. Consistent with the Master Development Plan approval, no increase in the peak rate or volume of runoff is anticipated.

Table 1 – Comparison of Pre/Post Development Peak Runoff Rates

Point of Analysis	2-Year Storm			10-Year Storm			25-Year Storm			100-Year Storm		
	Pre (cfs)	Post (cfs)	Δ	Pre (cfs)	Post (cfs)	Δ	Pre (cfs)	Post (cfs)	Δ	Pre (cfs)	Post (cfs)	Δ
POA 1 (Masterplan)	55.00	24.89	-30.11	94.83	45.36	-49.47	121.91	63.28	-58.63	147.36	91.76	-55.60
POA 1 (Current Proposal)	55.00	25.31	-29.69	94.83	45.64	-49.19	121.91	63.31	-58.60	147.36	91.55	-55.81

Table 2 - Comparison of Pre/Post Development Runoff Volumes

Point of Analysis	2-Year Storm			10-Year Storm			25-Year Storm			100-Year Storm		
	Pre (ac-ft)	Post (ac-ft)	Δ	Pre (ac-ft)	Post (ac-ft)	Δ	Pre (ac-ft)	Post (ac-ft)	Δ	Pre (ac-ft)	Post (ac-ft)	Δ
POA 1 (Masterplan)	8.465	5.628	-2.837	14.909	11.802	-3.107	19.365	16.349	-3.016	25.259	22.681	-2.578
POA 1 (Current Proposal)	8.465	5.688	-2.777	14.909	11.888	-3.021	19.365	16.452	-2.913	25.259	22.799	-2.460

Calculations demonstrating the above results are attached to this application behind Tab 5. As shown above, the Stormwater Management system is in conformance with the approved Master Development Plan documents and further stormwater mitigation is not warranted.

4. Water Quality

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 a Stormceptor sized to remove 75% TSS prior to

discharging into an infiltration practice. 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 Stormwater Master Plan.

In addition to the stormwater quality measures discussed above, the project intends to provide emergency power by using a liquid petroleum powered emergency generator. The emergency generator has been designed with accordance with Section 9.3.7.5 of the Westwood Zoning By-law.

5. Landscape Architecture

The landscaping for the project site is consistent with the approved Master Development Plan:

- The current plan now shows an internal, landscaped "divider island" whereas the Master Development Plan did not.
- The pedestrian sidewalk on the northern façade of the building has been expanded and upgraded to include more specialty pavement and outdoor café-style seating.
- The total quantity of proposed shade, ornamental, and evergreen trees on the current plan is within five percent of what was proposed on the Master Development Plan.
- The on-center spacing of parking lot trees has remained the same.
- Much greater detail in plant species has been developed for the site, as shown on the plant schedule on the drawings included with this application.
- The southern side of the site has retained the proposed mix of deciduous and evergreen tree screening.
- The proposed dumpster area has been adequately screened with evergreen trees.

6. Site Lighting

Site lighting for the project has been designed in accordance with the Site Lighting plans dated April 17, 2013. Minimum and maximum light levels are within the acceptable ranges as well as the Uniformity Ratio.

LED site lighting will be considered as an alternative to traditional metal halide fixtures. A determination will be made once actually pricing is received from contractors. Should LED lighting be chosen, designs will ensure that the light temperature is consistent with the overall University Station development.

7. Sustainability and Greenhouse Gas Strategies and Initiatives

The Town of Westwood has adopted the Massachusetts Stretch Building Code. By adhering to the Stretch Code, the project will result in energy conservation of 20% or more as compared to current baseline building code requirements. In addition, the applicant has embarked on an aggressive strategy to build and operate facilities that are environmentally responsible. The entire development team, including LEED-certified architects, engineers, and construction personnel, strive to incorporate high-efficiency and eco-friendly features into buildings during the design and construction phase and during building operations. Specific strategies and initiatives include the following:

Site Strategies

- *Alternate transportation:* The applicant includes bicycle storage and changing rooms at all its facilities.

- *Heat island reduction:* Use of a highly-reflective, light-colored roofing membrane reduces heat islands and minimizes impacts on the microclimate. High albedo concrete pavers will be used for the pool deck.

- *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.

Water Efficiency

- *Water use reduction:* The applicant pursues several strategies to reduce water consumption by more than 20% compared to baseline building code requirements. By using high efficiency, low-flow plumbing fixtures the applicant is able to significantly reduce water use.

- *Sensible landscaping practices:* By using drought-tolerant, indigenous plantings as well as drip irrigation systems and "smart" irrigation controls the applicant is able to significantly reduce water consumption used in landscaping.

Energy Conservation

- *Enhanced construction administration of MEP building systems:* The applicant's team of mechanical and electrical engineers perform a series of 12 in-depth field inspections during construction to verify that the project's energy related systems are installed and calibrated to perform according to the project's requirements.

- *Refrigerant management:* To help reduce stratospheric ozone depletion the applicant has a policy of zero-use of chlorofluorocarbon (CFC) based refrigerants in building heating, ventilating, air conditioning, and refrigeration systems.

- *Optimization of energy performance:* The applicant's design team uses a sophisticated computer-simulated energy modeling software to achieve increasing levels of energy performance to reduce the environmental and economic impacts associated with excessive energy use. By using strategies such as high-efficiency light fixtures, occupant and daylight sensors to control lighting, high-efficiency HVAC units, and Energy Recovery units with air-to-air heat exchangers, the applicant is able to improve energy performance by over 20% compared to baseline standards.

- *Energy performance verification:* The applicant's design team continues to monitor buildings after opening to verify that the mechanical and electrical systems are operating efficiently and using as little energy as possible. The control systems are inspected.

Building Materials and Resources

- *Construction and post-consumer waste management:* The applicant recycles discarded construction materials whenever feasible, and is continually adjusting building designs in order to minimize waste creation during construction. In addition, buildings feature recycling programs that help minimize the flow of trash into landfills and incinerators.

- *Recycled content:* Many of the materials incorporated into the applicant's buildings are made of recycled materials. For example, in 2009 the applicant switched to eco-friendly, sustainably-produced carpet tiles.

- *Regional materials:* Many building materials are regionally manufactured to help reduce the environmental impact resulting from transportation and to help support the use of local resources. Local concrete, which comprises over 20 percent of the applicant's buildings, is used for structural systems and in the pavers on pool decks and sidewalk surfaces.

- *Rapidly renewable materials:* To help reduce the use and depletion of finite raw materials the applicant has replaced many interior finishes with rapidly renewable materials that are typically harvested within a 10-year cycle. Examples include the use of bamboo flooring in the yoga studios, membership activities area, advanced training area and the stretching area.

Indoor Air Quality

- *Increased ventilation:* Life Time Fitness facilities are designed to ensure a generous flow of fresh air into the buildings. All buildings have an indoor air quality management plan.

- *Low-emitting materials:* By embracing lower VOC (Volatile Organic Compound) building materials and products (paints, carpeting, glues, cleaners, etc.), the applicant is able to minimize VOC off-gassing and maintain a safer, more pleasant experience for members.

8. Air Quality and Noise Impacts

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

Similarly, noise impacts from the project are consistent with Master Development Plan. Mechanicals for the building will be insulated in accordance with Noise Study assumptions, and unloading of delivery trucks will not occur between 12:00 AM and 4:00 AM. In addition, the outdoor pool will not open before 5am or stay open past 10pm, and family swimming hours will be limited to 10am to 8pm.

9. Additional Information

The narrative above and attachments include information required by the Rules and Regulations including drainage calculations, a traffic analysis, 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 governmental subsidy arrangements.

- *Construction Schedule:* Subject to receipt of necessary permits and approvals, the applicant anticipates commencing construction of the project in March of 2014. The construction period will likely be approximately 12 months, with completion in March of 2015. The foregoing is subject to change based on field conditions and other unforeseen circumstances.

- *Fill Removal Calculations:* The project will not require removal of any fill from the site. In order to achieve final grades, some soil materials will be moved onto the site from areas directly adjacent to the site.

C. Compliance with Design and Performance Standards

As described above and shown on the attached plans, and summarized briefly in this Section C, the applicant believes the Project complies with the design and performance standards set forth in Section 9.8.11 of the Zoning Bylaw:

- *Building Design:* As described in Section A(2) above, the project will create an interesting, attractive anchor at the southern side of the site. Exterior walls will include a combination of materials including limestone, brick, and colored precast concrete, and include a variety of additional architectural features and materials including sun shades and steel trellises. As shown on the elevations included behind Tab 6, the building

facades contain a variety of materials, windows, and articulations to enhance the interest and appearance of the building. The design is intended to complement the overall design and planning work for the University Station project.

- *Visual Mitigation and Screening of Infrastructural Elements:* Infrastructure and service areas have been carefully located to minimize visual and other impacts. The driveway along the eastern side of the building will facilitate access to back-of-house operations; a trash enclosure and other support areas are located at the southeast corner of the building. The dumpster will be screened with evergreen trees, and the electrical transformer will be screened from abutting properties.

- *Utilities:* The plans listed behind Tab 6 include a utility plan that shows service lines leading to the building. As described in Section B(2), water will be provided from the Dedham-Westwood Water District's main water service system in Harvard Street, and wastewater will be discharged to the main line located in Harvard Street. Electrical, telephone, and cable service will be provided by means of underground duct banks.

- *Land Uses and Common Areas:* The project includes areas for pedestrians (and bicycle riders) around the front of the building and a sidewalk to enable pedestrians to travel to common areas and open spaces within the University Station project.

- *Street Design:* As shown on the plans, the building has frontage on Harvard Street, and interior parking areas have been designed to provide sufficient area for driving, turning, and maneuvering. As indicated in Section A(2), the applicant has coordinated with the Fire Chief on the driveway design and provided information on turning movements along this driveway to the Fire Chief.

- *Circulation, Traffic Impact & Public Street Access:* As described in more detail in Section B(1), the project is consistent with the traffic impact study and supporting materials submitted to the Town and its traffic peer review consultant. These materials formed the basis for traffic improvements and mitigation measures to be provided for the University Station project to ensure that roadways can accommodate traffic from the project, including the Life Time Fitness building.

- *Public Safety:* The project includes adequate water supply distribution, storage, and access for fire protection. As stated in Section B(2), a fire loop will be provided around the perimeter of the building, and as described in Section A(2) the applicant has coordinated with the Fire Chief on the driveway design and included a driveway along the eastern side of the building to facilitate access for emergency response vehicles.

- *Stormwater Management:* Section B(3) contains detailed information the Project's stormwater management system, which is consistent with the system approved as part of the Master Development Plan review process. Stormwater from the roof top and runoff generated from the parking and landscaped areas are directed to a subsurface infiltration basin. This application includes drainage calculations behind Tab 5.

- *Outdoor Lighting:* The plans listed behind Tab 6 include a lighting plan with detailed information on outdoor lighting. The lighting plan has been designed in accordance with the Site Lighting plans dated April 17, 2013.

- *Mixed Uses and Activities:* The Project provides a full range of fitness, sports, and exercise opportunities for the community and is intended to complement the range of uses envisioned for the University Station project, including commercial, residential, and office uses.

- *Energy Efficiency:* As described in more detail in Section B(7), the applicant has adopted numerous strategies to improve the energy efficiency of its buildings, including in-depth field inspections by mechanical and electrical engineers, elimination of CFC-based refrigerants in building systems, use of high-efficiency light fixtures and sensors, use of high-efficiency HVAC units, and energy performance monitoring.

- *Sustainability:* As described in more detail in Section B(7), the applicant has also adopted numerous strategies to preserve natural resources, including an aggressive recycling program, use of regional materials during construction, and use of rapidly renewable materials.

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

- *Air Quality, Noise, Vibration, Etc.:* Air quality, noise, and vibration impacts are consistent with those described in the Master Development Plan. The applicant has adopted strategies to minimize such impacts, including insulation of mechanical equipment for the building and limitations on times when delivery trucks will unload.

- *Construction Solid Waste Management:* The applicant and/or its contractor will make arrangements for disposal of tree stumps and 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 by more than 20% compared to code requirements. Such

strategies include use of high efficiency, low-flow plumbing fixtures, "smart" irrigation controls, and other sensible landscaping practices.

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.

Note that parcel boundaries for the Life Time Fitness site are generally shown on the Master Development Plan and have been further refined during the planning process. The parcel boundaries creating a 7.9-acre lot will be established by recording a plan on or about the date construction commences.

Development Feature	Existing Pre-Development Conditions	Requirement in Zoning Bylaw	Proposed for PDR Development
Total PDR Development area and individual lot area	No separate Life Time Fitness parcel	Minimum lot area 15,000 sq. ft.	7.9 acres
Lot frontage	No separate Life Time Fitness parcel	50 feet	436.5
Lot width	No separate Life Time Fitness parcel	None	454.6
Yard setbacks	N/A; parcel not developed	None	Front yard 481.6 feet Side yard 64 feet Rear yard 26.4 feet *(measured from the primary building; an accessory building will have front, side, and rear yard setbacks of 633.9, 9.4, and 18.4 feet, respectively)*
Building height	N/A; parcel not developed	60 feet (subject to footnotes in Sec. 9.8.7.1)	60 feet
Area designated as permanent open space	N/A; parcel not developed	26 acres district-wide	1.2 acres
Area and percentage of non-wetland lot area	N/A; no separate Life Time Fitness parcel	None	7.9 acres, or 100%
Area and percentage building coverage	N/A; parcel not developed	None	47,022 square feet, or 13.6%

Area and percentage of impervious surface	N/A; parcel not developed	104 acres (80%) district-wide	6.7 acres, or 84%
Landscaped area	N/A; parcel not developed	None	1.2 acres
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	0.37
Number of bedrooms per dwelling unit	N/A; parcel not developed	N/A for commercial use	N/A
Number of dwelling units and dwelling unit density per acre	N/A; parcel not developed	N/A for commercial use	N/A
Number of Affordable Housing units, as defined in Section 2.0 of the Zoning Bylaw	N/A; parcel not developed	N/A for commercial use	N/A
Number of Moderate Income Housing units, as defined in Section 2.0 of the Zoning Bylaw	N/A; parcel not developed	N/A for commercial use	N/A
Number of dwelling units restricted or intended for senior housing	N/A; parcel not developed	N/A for commercial use	N/A
Number of parking spaces, including designated handicapped spaces	N/A; parcel not developed	6,020 district-wide	568 spaces, including 12 handicap spaces
Number of bicycle parking spaces, including bicycle racks, storage containers, and interior accommodations	N/A; parcel not developed	Not specified	Racks to be provided near the building entrance for 16 bicycles
Number of loading bays	N/A; parcel not developed	Must be adequate for uses with more than 10,000 s.f. of floor area	Loading will be accommodated on the east side of the building
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 – *see attached*
- Order of Conditions from the Westwood Conservation Commission – *see attached (University Station plans to be provided to the Conservation Commission)*

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

The Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Deval L. Patrick
GOVERNOR

Timothy P. Murray
LIEUTENANT GOVERNOR

Richard K. Sullivan Jr.
SECRETARY

Tel: (617) 626-1000
Fax: (617) 626-1181
http://www.mass.gov/envir

August 16, 2013

CERTIFICATE OF THE SECRETARY OF ENERGY AND ENVIRONMENTAL AFFAIRS
ON THE
NOTICE OF PROJECT CHANGE

PROJECT NAME	: University Station (formerly Westwood Station)
PROJECT MUNICIPALITY	: Westwood
PROJECT WATERSHED	: Boston Harbor
EEA NUMBER	: 13826
PROJECT PROPONENT	: Westwood Marketplace Holdings LLC
DATE NOTICED IN MONITOR	: July 10, 2013

Pursuant to the Massachusetts Environmental Policy Act (MEPA) (G.L.c.30, ss. 61-62I) and Section 11.10 of the MEPA regulations (301 CMR 11.00), I have reviewed the Notice of Project Change (NPC) and hereby determine that this project **does not require** the preparation of an Environmental Impact Report (EIR).

Project History

An Expanded Environmental Notification Form (EENF) was filed for this project in June 2006 with a request for the preparation of a Single EIR. The request for a Single EIR was denied and a scope for a Draft EIR (DEIR) was issued on September 29, 2006. The Proponent prepared and filed a DEIR in January 2007 that was determined to adequately and properly comply with MEPA and its regulations. A scope for a Final EIR (FEIR) was issued on April 6, 2007. The FEIR was submitted in September 2007 and found to adequately and properly comply with MEPA and its regulations in a MEPA Certificate dated on November 1, 2007. The MEPA review process was completed by the former developer for the project, Cabot, Cabot & Forbes

(CCF). Subsequent to completion of MEPA review, CCF obtained an Order of Conditions and completed permitting with the Town of Westwood and State Agencies. CCF commenced work, including (i) site clearing, (ii) demolition of existing structures and improvements on the property; and (iii) commencement of a new arterial boulevard to be known as Westwood Station Boulevard. According to the NPC, CCF eventually determined the previously approved project was not economically feasible due to changes in the economic climate in 2008-2009.

The Proponent acquired the property in April 2012 and has performed substantial site stabilization, utility improvements, clearing, and demolition consistent with the existing approvals. The Proponent has also worked with local officials and State Agencies to refine the previously approved project into the new proposed development plan. The Town of Westwood, through Town Meeting, adopted a new section to the Westwood Zoning Bylaw entitled, "University Avenue Mixed Use District (UAMUD). This overlay district regulates the development and operation of the project. The Town of Westwood also approved a Master Development Plan for the project that established parameters such as building heights, uses, etc. The Proponent has entered into a Development Agreement with the Town of Westwood and a Cooperation Agreement with the Town of Canton.

Previously Reviewed Project

As described in the FEIR, the previous project (the Prior Project) and phasing plan were as follows:

- Phase 1 included approximately 657,000 gross square feet (gsf) of residential space (495 units), 1.348 million gsf of retail/restaurant space, 230,000 gsf of hotel space (328 rooms), 125,000 gsf of general office space, 50,000 gsf of utility space, 33,000 gsf of fitness space, and 12,000 gsf of public safety/community space. Total development in Phase 1 was approximately 2.455 million gsf.
- Phases 2 and 3 included approximately 675,000 gsf of residential space (505 units) and 1.383 million gsf of general office space. The total development area in Phases 2 and 3 was approximately 2.058 million gsf.

The Prior Project was located on a 141-acre project site, with 19.6 acres of new impervious area proposed (for a site total of 99.9 acres). Overall building area was 4.513 gsf, with up to 1,000 housing units, with maximum building heights ranging from 70 to 120 feet.[1] Wetland resource area impacts were estimated at 2,670 sf of Bordering Vegetated Wetlands (BVW) and 504 linear feet (lf) of inland Bank. Unadjusted average daily vehicle trips (adt) on a weekday were estimated at 65,496, while unadjusted Saturday adt were estimated at 78,004.[2] The Prior Project included 12,116 shared parking spaces, primarily in structured facilities, with access to the site provided from the Blue Hill Drive/University Avenue interchange on Route 128 and from Canton Street/Dedham Street via a proposed new exit ramp onto Dedham Street from Interstate 95 (I-95) northbound. Based upon MassDEP Title 5 water usage and wastewater generation rates, the Prior Project required 502,050 gallons per day (GPD) to meet domestic

[1] Maximum building height was restricted to no higher than elevation 178.5 above North American Vertical Datum of 1988 (NAVD88).
[2] These numbers are consistent with the trip generation methodology approved by the Massachusetts Department of Transportation (MassDOT) for the NPC. The 2007 FEIR presented 54,232 weekday adt and 57,842 adt on Saturday based on 2007 FEIR trip generation methodology.

water demand and would generate 452,551 gpd of wastewater. The Prior Project also included the construction of a new arterial roadway (Westwood Station Boulevard) to serve as an alternative access route.

Currently Proposed Project

The Current Project is in the same location as the Prior Project with a slightly reduced development area totaling approximately 130 acres. An 11-acre parcel (consisting of the State Street Bank property at 105 Rosemont Road) has been excluded from the Current Project area. The Current Project includes development of approximately 2.1 million gsf in multiple buildings. Specifically the Current Project includes:

i. Approximately 750,000 gsf of retail/service or restaurant/entertainment uses;
ii. Approximately 325,000 gsf of office or research and development (R&D) space;
iii. Approximately 650 residential units;
iv. A hotel with approximately 160 rooms; and
v. An assisted living/memory care facility with approximately 100 units.

The Current Project will create 6.5 acres of new impervious area, have no direct wetland resource area impacts, and will limit building heights to between 60 and 80 feet.[3] Unadjusted weekday traffic is estimated at 43,515 adt, with unadjusted Saturday traffic estimated at 58,298 adt. Approximately 5,596 parking spaces will be provided in a combination of structured and surface parking. Potable water demand and wastewater generation are projected at 255,720 gpd, each. The Current Project does not include the construction of Westwood Station Boulevard. Instead, the Proponent will reconstruct, widen, and signalize University Avenue as a median divided boulevard-like frontage road with coordinated signals to improve traffic flow. Local access to and from the project site will be primarily along Blue Hill Drive, University Avenue, and Canton Street. Traffic improvements are detailed later in the traffic and transportation section of this Certificate. The Current Project also includes approximately 14 acres of open space with public access, pathways for pedestrian use, and landscaping and other design features. The project site is located near the southern portion of the Neponset River Reservation and the western portion of the Blue Hills Reservation. The project site is also proximate to the Fowl Meadow Area of Critical Environmental Concern (ACEC).

The Current Project is proposed in various development areas. These "Core Development Areas" are described as follows:

Core Development Area 1 – consisting of typical shopping center uses, this area includes primary anchor retail tenants separated by common public gathering spaces, a variety of small, medium, and large-scale retail, office and service uses, and restaurant and entertainment uses. Surface parking is provided.

[3] Maximum building height was restricted to no higher than elevation 178.5 above North American Vertical Datum of 1988 (NAVD88).

Core Development Area 2 – consisting of a mixture of uses, this area includes a small retail component together with a rental residential development containing two buildings with a total of 330 units and an associated parking garage.

Core Development Areas 3 and 4– these smaller development areas will include restaurant and entertainment uses, potentially including both sit down and over-the-counter service restaurants.

Four additional "Development Areas" are proposed as part of the Current Project. According to the NPC, subject to market demand and leasing opportunities, an office/R&D development is proposed just north of Core Development Area 1 (Development Area A). South of University Avenue, a mixed-use, transit-oriented, village-like development with residential uses, including an assisted living/memory care facility, structured parking, and a hotel integrated with retail/service and restaurant/entertainment uses and office/R&D (Development Area B) is proposed at the northeast end closest to the Massachusetts Bay Transportation Authority (MBTA) commuter rail station. Primarily retail/commercial/fitness uses are allowed at the southeastern end of the Project Site (Development Areas C and D).

Jurisdiction and Permitting

This project was subject to MEPA review and the preparation of a mandatory EIR because it requires State Agency Actions and will create ten (10) or more acres of impervious area (301 CMR 11.03(1)(a)(2)), generate 3,000 or more new adt on roadways providing access to a single location (301 CMR 11.03(6)(a)(6)) and includes the construction of 1,000 or more new parking spaces at a single location (301 CMR 11.03(6)(a)(7)). The project will require a Vehicular Access Permit, Traffic Signal Permit and an Approval for Construction on Former Railroad Land from MassDOT (formerly the Executive Office of Transportation and Construction (EOTC)). The project will also require an Amended Sewer Extension/Connection Permit and potentially an Air Quality Permit (under 310 CMR 7.00) for heating boilers and emergency generators from the Massachusetts Department of Environmental Protection (MassDEP). The project may require an 8(m) Permit from the Massachusetts Water Resources Authority (MWRA). The project will require a Construction General Permit under the National Pollutant Discharge Elimination System (NPDES) program from the United States Environmental Protection Agency (EPA). An Order of Conditions has been issued by the Westwood Conservation Commission and remains in effect.

Because the project may seek Financial Assistance from the Commonwealth in the form of Infrastructure Investments Incentive Program (I-Cubed) funding, MEPA jurisdiction is broad in scope. Therefore, MEPA jurisdiction extends to all aspects of the project that are likely, directly or indirectly, to cause Damage to the Environment as defined in the MEPA regulations.

Review of the NPC

General

The NPC included a project history and description of the Prior Project and the Current Project, including a comparison of project impacts in tabular format, associated site plans, and a discussion of the significance of the proposed project change. The Current Project is substantially smaller in scope that the Prior Project and therefore will generally result in less environmental impacts. The NPC demonstrated that the Current Project will not result in any new significant environmental impacts beyond those documented and analyzed in the original MEPA filings. The NPC discussed the ongoing outreach conducted for the project with MassDOT, MBTA, the Dedham-Westwood Water District (DWWD), the Neponset River Watershed Association (NWRA), the Massachusetts Department of Conservation and Recreation (DCR), and the Massachusetts Department of Energy Resources (DOER).

Traffic and Transportation

The NPC included a Traffic Impact Study (TIS) prepared in accordance with Executive Office of Energy and Environmental Affairs (EEA)/MassDOT Guidelines for Environmental Impact Report /Environmental Impact Statement Traffic Impact Assessments. The TIS was also prepared in consultation with the Towns of Westwood, Canton, Norwood and Dedham, MassDOT, the Central Transportation Planning Staff (CTPS) of the Boston Metropolitan Planning Agency (Boston MPO), and the MBTA. The TIS provided an updated transportation analysis based upon the proposed project changes and allowed for a comparison of traffic impacts between the Prior Project and the Current Project using identical projection methodologies.

The TIS described existing conditions in the study area (expanded at the request of MassDOT, Westwood and Canton since the 2007 FEIR), data collection efforts, public transportation options, and motor vehicle crash data. An analysis of MassDOT crash rate data indicated that five intersections in Westwood, three in Canton, and one in Norwood have crash rates that exceed the MassDOT Statewide or District crash rates. Future traffic conditions were projected to both 2017 and 2022 in an effort to coincide the regional traffic infrastructure improvements planned by MassDOT – some of which are expected to be complete by 2017 while others will not be completed until 2022. Traffic volumes in the 2017 No-Build and 2022 No-Build Conditions include existing traffic reassigned to account for the changes in roadway network connections, new traffic resulting from general traffic growth in the study area, and background traffic growth related to known foreseeable development projects, including, in some instances, reoccupation of existing vacant buildings.

The 2017 and 2022 Build Conditions reflect all traffic from the respective No-Build Conditions plus project-related traffic volumes. Project-related traffic characteristics were developed following the methodology pre-approved by MassDOT and using trip generation rates from the Institute of Transportation Engineers (ITE). Adjustments were applied to the base ITE-trip generation calculations to account for travel mode selection, internal trips, pass-by trips and diverted linked trips. The TIS concluded that adjusted traffic trips on a typical weekday

generated by the project will be 33,700 adt, while on Saturday the project will generate an estimated 46,900 adt. The NPC included a table comparing projected trip generations, by use, in the Prior Project and the Current Project. Overall weekday and Saturday traffic trips, as well as trips during the AM, PM and Saturday peak hours, are all lower in the Current Project than the Prior Project. For comparative purposes and clarity, the NPC also included a table comparing projected trip generation between the 2007 FEIR and the Current Project using the TIS methodology from the 2007 FEIR, which used different ITE land use codes and aggressive credits when adjusting trips to reflect mode share, pass-by and internal trips.

The TIS included a traffic operations analysis for the study area intersections, rotaries, and ramp junctions under 2012 Existing, 2017 and 2022 No-Build, and 2017 and 2022 Build traffic volume conditions. The addition of traffic to the study area from the Current Project will result in the degradation from level-of-service (LOS) D or better to LOS E/F conditions at eight out of 40 locations under 2017 Build Condition and at ten locations under the 2022 Build Condition. Specific mitigation measures to address LOS and safety concerns at study area intersections are included in the mitigation portion of this Certificate. The NPC included conceptual design plans of proposed on-site and off-site transportation improvements showing that they are generally consistent with a Complete Streets design approach and provide adequate and safe accommodation for all roadway users, including pedestrians, bicyclists and public transit riders.

Concurrent with the development of the Current Project, MassDOT is proposing two key projects that will assist in the mitigation of site-generated traffic. These two projects are:

- I-95/University Avenue/Blue Hill Drive – modifications to this interchange will be conducted as part of the I-95/I-93 Interchange Improvement Project in Canton. The initial phase of the project will reconstruct the I-95 southbound off-ramp to Blue Hill Drive to improve safety, lengthen queue storage, and increase capacity by re-aligning the ramp and extending its terminus to the University Avenue/Green Lodge Street intersection. The improvements would include site access improvements to the 400 Blue Hill Drive property as well as the Route 128 Commuter Rail Station and Parking Garage entrances;
- Canton Street/University Avenue - improvements to this intersection are also proposed as part of the I-95/I-93 Interchange Improvement Project in Canton. This project consists of geometric improvements and the addition of exclusive turn lanes. This project is listed on the Boston MPO's Transportation Improvement Plan (TIP) for the 2014 federal fiscal year.

As noted in the mitigation section of this Certificate and the draft Section 61 Findings, the Proponent has committed to implement these projects, or portions thereof, should these MassDOT projects not advance in accordance with the expected construction periods represented in the NPC. As necessary, the Proponent will provide design and permitting assistance, fund, or construct these improvements (or portions thereof) in coordination with MassDOT. This commitment will ensure that the Current Project will be appropriately mitigated given the constraints of the roadway network prior to occupancy, and includes restrictions on project development until appropriate infrastructure improvements are in place.

MassDOT is also planning improvements along the Dedham Street Corridor as part of the I-95/I-93 Interchange Improvement Project. These improvements include the construction of the I-95 northbound off-ramp to Dedham Street, widening the Dedham Street Corridor from two to four lanes between its interchange with I-95 and University Avenue, the reconstruction of the bridges over the Neponset River and the MBTA railroad tracks, traffic signalization and geometric improvements at several intersections, and provision of bicycle and pedestrian accommodations. These planned improvements are not expected to be implemented prior to the initial site occupancy of the University Station project. The NPC included an analysis demonstrating that the Dedham Street Corridor can accommodate the full development program with the completion of only the Canton Street/University Avenue intersection reconstruction project, as currently planned by MassDOT. However, MassDOT continues to have concerns about traffic operations in conjunction with peak construction activities during the I-95/I-93 Interchange Project. Therefore, the Proponent will commit to a comprehensive mitigation program for the Dedham Street Corridor upon implementation of the first project phase (600,000 gsf retail and 350 residential units). The Proponent will work with MassDOT to establish the monitoring protocol and the Proponent should commit to delay occupancy of project elements beyond the a MassDOT-established threshold until such a time that the MassDOT Dedham Street Improvements are implemented or appropriate interim mitigation measures are committed to and implemented by the Proponent. I expect that the results of this monitoring effort and any Proponent-related improvements will be coordinated between MassDOT, the Proponent and the Towns of Westwood and Canton.

As noted by MassDOT, the Proponent will be required to complete a Road Safety Audit (RSA) for each State highway location where safety improvements are proposed. The RSA will help the Proponent further assess safety conditions and provide the opportunity to incorporate both MassDOT and community concerns prior to the implementation of any improvements. As recommended by MassDOT, I urge the Proponent to also complete an RDA for local intersections improved in conjunction with the project.

The study area is served by several forms of public transportation including MBTA Commuter Rail Service, MBTA bus service, Amtrak inter-city rail service, and shuttle services administered by the Neponset Valley Transportation Management Association (NVTMA). The TIS concluded that sufficient capacity is afforded in the overall transit system to accommodate the projected increase in ridership associated with the project.

The Current Project also includes a series of pedestrian and bicycle improvements. Pedestrian improvements include the construction of sidewalk and pedestrian promenade areas within the project site, lighting enhancements, Americans with Disabilities Act (ADA) accessibility measures, construction of crosswalks and pedestrian warning signs in accordance with the Manual on Uniform Traffic Control Devices (MUTCD), upgrades to pedestrian traffic signal equipment and pedestrian phase timing at signalized intersections, and connections to the MBTA's Westwood/Route 128 Station from the project site by way of the Green Lodge Street underpass alignment. Bicycle improvements include installation of bicycle racks throughout the project site, installation of bicycle detection systems at modified or new signalized intersections, accommodation of bicycle travel in a shared travelled-way configuration on site driveways, circulating roadways, and between Harvard Street and Canton Street. Ample, convenient and

secure bicycle storage should be provided, particularly at the residential, retail and office locations. A proposed multi-use path located parallel to University Avenue between Blue Hill Drive and Harvard Street will allow for bicycle accommodations. An off-road bi-modal facility between Harvard Street and Canton Street will be constructed at full build out of the project to connect pedestrians and bicyclists to the west of the project site and Canton Street. The Proponent will also coordinate with the MBTA to construct a bicycle parking facility within the Westwood/Route 128 Station parking garage and to purchase and install a "Pedal 'n' Park" bicycle parking/sharing kiosk at an appropriate location outside the MBTA commuter rail station.

The TIS identified components of the proposed Transportation Demand Management (TDM) program. Specific measures proposed for implementation are described in the Mitigation section of this Certificate. I strongly encourage the Proponent to review comments from MassDEP and the Metropolitan Area Planning Council (MAPC) regarding the implementation of additional TDM measure beyond those identified in the NPC to further enhance opportunities for alternative modes of travel. The Proponent should set specific mode share goals for the project based upon the TIS and Commonwealth mode shift goals. The Proponent should use monitoring data to confirm that these goals have been achieved. If mode shares allocations are not consistent with those modeled in the TIS, the Proponent should re-evaluate the content and implementation of the TDM program and modify it accordingly to improve use of alternative modes of transportation.

The Proponent has also committed to provide $2.1 million to the Town of Westwood for the implementation of traffic calming measures to reduce vehicle travel speeds and neighborhood cut-through traffic. The Proponent will collect pre- and post-development traffic volume and speed data to assist in this effort. The Proponent will also provide $250,000 to the Town of Westwood to engage consultants to study and design alternative intersection alignments on Canton Street, including at its intersection with University Avenue, for consideration and potential implementation by MassDOT as part of future Dedham Street Corridor Improvements. Finally, the Proponent will conduct traffic monitoring at three intersections in Canton to be commenced upon initial occupancy of the Current Project and completed annually thereafter for a period of two years after project completion.

Parking

The Current Project includes 5,596 spaces; approximately 3,550 spaces are located in the vicinity of the project's retail establishments, 160 are located in the vicinity of the hotel, 976 are located in the vicinity of the office buildings, and 910 are located near the residential buildings. With the exception of handicapped and residential spaces, parking is not anticipated to be assigned to various buildings. The UAMUD does not establish specific parking requirements by land use. According to the NPC, the retail parking spaces were provided at a rate of 4.7 spaces per 1,000 gsf, office use spaces were provided at a rate of 1 space per 333 gsf, and residential spaces were provided at a rate of 1.6 spaces per unit. While the NPC states that these numbers are below industry standards, they appear relatively high given the opportunity for shared parking. I encourage the Proponent to continue to evaluate the amount of parking proposed on-site to provide a reasonable, but not overly excessive amount of parking. I also encourage the

Proponent to consider charging a parking fee, as excessive free parking can limit the success of a quality TDM program. The Proponent should review comments from MassDEP and MAPC regarding additional parking management opportunities associated with the project.

Air Quality

The NPC did not include an updated air quality mesoscale analysis because the projected traffic volumes are essentially the same or lower in the Current Project. According to the NPC, the overall average daily traffic volumes for the Current Project are less than those of the Prior Project, and therefore, the mesoscale air quality analysis presented in conjunction with the Prior Project remains a conservative estimate of air quality impacts associated with the current development proposal. All fuel combustion equipment for heating and emergency electrical power installed as part of the project will be installed under the MassDEP Environmental Results Program (ERP). The Proponent must comply with Massachusetts Idling Regulations (310 CMR 7.11) and Rideshare Regulations (310 CMR 7.16).

The Proponent conducted a noise study to determine whether the operation of the project will comply with MassDEP Noise Policy. While the project is exempt from the Westwood Zoning Bylaw noise limits, the Proponent compared acoustic modeling results for the roof-top mechanical equipment and loading dock areas to the local noise limits for information purposes. The NPC described the noise study methodology, identified Noise Sensitive Areas (NSAs) and potential sources of noise (ambient, stationary, vehicle traffic, and service and loading). A separate roadway noise impact analysis was performed for the Current Project, building on data from analysis performed in conjunction with the Prior Project. The Proponent will implement a series of mitigation measures (described in the Mitigation section of this Certificate) to ensure compliance with the MassDEP Noise Policy, including the construction of a 12-foot high wood sound barrier and use of low-noise HVAC units on the two office buildings and three residential buildings.

Greenhouse Gas Emissions

The NPC included a GHG analysis consistent with the MEPA GHG Policy. The Policy requires projects to quantify carbon dioxide (CO_2) emissions and identify measures to avoid, minimize or mitigate such emissions. The analysis quantifies the direct and indirect CO_2 emissions associated with the project's energy use (stationary sources) and transportation-related emissions (mobile sources). The GHG analysis evaluated CO_2 emissions for two alternatives as required by the Policy including 1) a Base Case corresponding to the 8th Edition of the Massachusetts Building Code (780 CMR, 8th Edition (2010)) and 2) a Preferred Alternative that meets the Stretch Energy Code as adopted by the Town of Westwood. The analysis used eQUEST modeling software to perform the GHG analysis. To facilitate the modeling process of the conceptual design, the GHG analysis aggregated similar sized buildings of the same use, resulting in the evaluation of nine building groups. As described in the NPC, five buildings or groups of buildings over 100,000 gsf in size were analyzed for compliance under Section 501.1.1 of the Stretch Energy Code using the Appendix G3 methodology; there are Retail J (Target), Retail K (Wegman's Supermarket), Retail R, the Hotel, and a group of four residential buildings A1, A2, B and C. For other groups of buildings, the GHG analysis assumed the prescriptive

option of the Stretch Energy Code (Section 501.1.4) in modeling energy use. Mobile GHG emissions were estimated using the projected traffic volumes, vehicle miles traveled (VMT) data from the traffic study area roadway network and MOBILE6.2 CO_2 emission factors. Potential project-related mobile GHG emissions were compared between the 2022 No-Build Condition, the 2022 Build Condition (includes roadway mitigation measures), and the 2022 Build Condition with Mitigation (i.e., TDM measures).

I note that the Town of Westwood is a designated Green Community. As such, the Town has adopted the Commonwealth of Massachusetts' Stretch Energy Code requirement of 20 percent better than American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 90.1-2007. The Stretch Code requires modeling of base and proposed cases based on the methodology as is defined in ASHRAE 90.1.2007-Appendix G. Achieving compliance with the Stretch Code requires that the project achieve a minimum 20 percent overall reduction in annual energy use; therefore, the percentages of energy use may differ from overall GHG emissions reductions. Overall, the GHG analysis concludes that the project will exceed the energy use reduction requirements of the Stretch Energy Code.

Direct stationary source CO_2 emissions included those emissions from the facility itself, such as boilers, heaters, and internal combustion engines. Indirect stationary source CO_2 emissions were derived from the consumption of electricity, heat or other cooling from off-site sources, such as electrical utility or district heating and cooling systems. Mobile CO_2 emissions included those emissions associated with vehicle use by employees, vendors, customers and others.

The NPC included a summary of modeling inputs (e.g., R-values, U-values, efficiencies, lighting power density, etc.) for energy efficiency measures modeled in eQUEST such as equipment, walls, ceilings, windows, lighting, HVAC units, etc. for both the Base Case and Preferred Alternative based upon the conceptual design. The NPC described design mitigation measures modeled in the GHG analysis and proposed for adoption by the Proponent to meet the Stretch Energy Code requirements. The NPC also described a series of qualitative GHG reduction measures that are not easily quantified using the approved modeling software. These include encouragement and allocation of space for recycling and where practical, sourcing environmentally friendly building materials. A summary of proposed mitigation measures is included in the Mitigation section of this Certificate.

The NPC identified three categories of building efficiency measures that are still under consideration by the Proponent. These measures include:

- Use of water source heat pumps in the multi-story residential buildings;
- Installation of solar thermal hot water panels on the residential buildings; and
- Installation of third-party solar photovoltaic (PV) systems on retail buildings J and K (Target and Wegman's).

The GHG analysis included an assessment of installation of both an owner-installed and a third-party-installed, 200 kilowatt (kW) PV system installed in a single block on a commercial building roof. The Proponent used recent comparable installation cost data from the Massachusetts Clean Energy Center (MassCEC) website. A 200-kW system would generate 206,528 kWh per year, equating to a reduction of 85.5 tpy of GHG emissions. The GHG analysis presented modeling assumptions for each scenario and determined that with a simple payback period of 8 years, the project was not financially feasible at this time. While the Proponent has agreed to set aside space on the roof of the two large commercial buildings as "solar ready", I strongly encourage the Proponent to re-evaluate the feasibility of a third-party system, as other similar facilities (e.g., WalMart) have undertaken initiatives to install PV systems with favorable returns on investment. The project would also lend itself to the installation of PV-canopies over the large areas of parking associated with the proposed commercial uses. As recommended by MassDEP, the Proponent should continue to explore the feasibility of renewable energy sources on-site or the purchase of green power. I encourage the Proponent to consider disposal of food waste at a regional anerobic digester facility, when such a regional facility becomes available, proximate to the project site.

Total estimated stationary source GHG emissions for the Current Project, are estimated at 13,006 tpy, a 3,320.6 tpy reduction from the Base Case total of 16,237 tpy (a 19.9 percent overall project reduction). Given the conceptual nature of the modeled buildings, I strongly encourage the Proponent to continue to explore ways to reduce energy consumption through the adoption of higher-efficiency core and shell improvements, HVAC systems, and equipment with reduced plug loads. The MassDEP comment letter also identified additional energy savings opportunities associated with the proposed parking structures. The Proponent should consider these recommendations prior to advancing project design.

As noted in the NPC, the Proponent in some instances will build spaces with full heating, ventilation, and air conditioning (HVAC) systems and lighting while in other cases, the Proponent will construct core and shell space in which tenants will fit-out the mechanical systems and lighting according to their needs. To ensure that future tenant fit-out incorporates energy efficient mechanicals and lighting, etc., the Proponent will develop a Tenant Manual (to be provided upon executing a lease) to assist in selecting measure that comply with Stretch Energy Code requirements. The NPC included a draft outline of this Tenant Manual. I encourage the Proponent to provide technical or financial assistance as necessary to ensure that tenants select measures consistent with the Tenant Manual and go beyond the minimum energy savings required in the Stretch Energy Code. The Proponent should consider recommendations from MassDEP regarding content of the Tenant Manual to ensure its overall effectiveness.

Mobile source emissions were analyzed using the U.S. EPA MOBILE 6.2 Mobile Source Emission Factor Model. Project area CO_2 emissions in the 2022 No-Build Condition are estimated at 7,159.3 tons per year (tpy). The 2022 Build Condition is estimated to increase CO_2 attributable to project-related traffic by 6,515 tpy from the 2022 No-Build Condition. The 2022 Build Condition with TDM Mitigation is projected to reduce CO_2 emissions by 325.7 tpy (or 6.6 percent), for a project total of 6,189.3 tpy attributable to project-related traffic. The GHG analysis did not provide a separate calculation of CO_2 emissions reductions associated with the

proposed roadway improvements. However these improvements to roadway operations are expected to reduce congestion and idling time, thereby reducing emissions as well.

Total estimated GHG emissions for the proposed Preferred Alternative - indirect and direct emissions attributable to stationary sources and indirect emissions attributable to mobile sources - are estimated at 19,195.3 tpy, a 3,556.3 tpy reduction from the Base Case total of 22,751.6 tpy (a 15.6 percent overall project reduction).

Following completion of construction for each phase, the Proponent shall file with the MEPA Office a certification signed by an appropriate professional (e.g. engineer, architect, general contractor) indicating that mitigation measures listed in the NPC have been implemented. The certification should be supported by as-built plans. For those measures that are operational in nature (i.e. TDM, recycling), the Proponent should provide an updated plan identifying the measures, the schedule for implementation, and how progress toward achieving these measures will be obtained. Collectively, the mitigation measures for the project as a whole shall include all of the GHG emissions mitigation measures outlined in the NPC, or equivalent measures that are designed to achieve the overall GHG emissions reductions presented in the NPC.

Wetlands and Stormwater

The Current Project will not directly impact State-regulated wetland resource areas. According to the NPC, work resulting in direct alteration of 2,670 sf of BVW and 504 linear feet of Bank, as well as construction of a 9,418-sf wetland replication area, described in the FEIR has been completed under Order of Conditions No. 338-0422 by the previous owner. The Current Project will aim to protect all remaining wetland resource areas, preserve previously built mitigation areas, and/or incorporate such features into expanded areas created under the approved stormwater management plan.

The Current Project will exceed the requirements of the MassDEP Stormwater Management Regulations (SMR). The NPC described how the project will be designed to meet the ten standards of the SMR and identified Best Management Practices (BMPs) selected to treat both stormwater runoff quality and quantity. Stormwater management controls were developed for the 2-, 10-, 25- and 100-year 24-hour storm event, with system recharge design capable of capturing and recharging all runoff associated with more common precipitation events (two inches or less). Proposed stormwater BMPs include: sub-surface infiltration galleries, Stormtech infiltration systems, water quality structures, rain gardens, deep sump hooded catch basins, sediment forebays, riprap spillways, and extended dry and wet detention basins. These BMPs will meet the standards for treatment of areas classified as Land Uses with Higher Potential Pollutant Loads (LUHPPLs). The Proponent should review and modify the stormwater management plan to ensure that treatment of total suspended solids (TSS) can meet the performance standards in the SMR. Modifications to selected BMPs, particularly water quality units, may be necessary. The Proponent will also implement a Stormwater Operation and Maintenance Plan (O&M Plan).

The NPC identified specific BMPs designed to mitigate stormwater runoff in areas near the DWWD Municipal wells and associated Zone I and Zone II Wellhead protection areas. No infiltration structures will be located within 400 feet of any wellhead and only clean roof runoff will be infiltrated in Zone II areas immediately adjacent to the Zone I. As indicated by MassDEP, the Proponent should submit detailed plans to the DWWD in order to verify that all BMPs are appropriately located.

The Proponent should review and implement MassDEP's recommendations regarding work within the Zone I wellhead protection areas around the DWWD White Lodge Well. These recommendations include reducing and minimizing activities within the Zone I, avoiding the use of fertilizers, herbicides and hydroseeding, and using signage to indicate the environmental sensitivity of the wellhead protection area. The Proponent should review guidance provided by MassDEP regarding stormwater management components necessary to meet Critical Area Standard 6 of the SMR, measures to avoid, minimize, and mitigate impacts to the Zone II Groundwater Resource Protection District, and registration of BMPs and Class V wells subject to the Underground Injection Control (UIC) regulations (310 CMR 27.05(2)(c).

Water and Wastewater

The NPC included revised water demand and wastewater generation estimates based upon the new development program. The NPC included plans depicting the location of existing water and sewer mains, as well at the location of proposed water and wastewater connections. Water will be supplied by the DWWD White Lodge Water Treatment Plant located on University Avenue adjacent to the project site. Water demand for the project, based upon unadjusted MassDEP Title 5 rates is 255,720 gpd. The Proponent has committed to the use of WaterSense (or equivalent) fixtures, which will result in a 20 percent water savings. The water demand estimates in the NPC do not reflect this credit. The Proponent will also meet all terms agreed to under the Prior Project with regard to construction of new water mains in accordance with DWWD requirements and the construction of a high service/low service pressure-reducing valve pit allowing redundancy in supply between the systems. Finally, as part of the Current Project, the Proponent will replace 2,380 linear feet of water main within University Avenue that was originally installed in the 1950s and 1960's.

The NPC included a summary of estimated MassDEP Title 5 sewer design flows for the Current Project by use type and size. The Current Project is expected to generate a daily flow of 255,720 gpd. The Proponent will pay a sewer connection fee to the Town of Westwood and work with the Town to line approximately 2,500 linear feet of existing sewer in University Avenue to the point of connection with the MWRA trunk sewer.

As noted in the MassDEP and MWRA comment letters, the project must comply with MassDEP's *Policy Managing Infiltration and Inflow in MWRA Community Sewer Systems.* The Proponent intends to amend the Sewer Connection/Extension Permit issued by MassDEP in 2008 for the Prior Project. I expect that, at a minimum, the Proponent will provide the same commitments to fund or directly construct infiltration and inflow (I/I) improvement projects within the hydraulically connected sewer system. The Proponent should work with the Town of Westwood to identify specific I/I abatement projects or, if none are currently identified,

contribute to an I/I fund, to be used for future I/I mitigation projects. The Proponent will be required to construct watertight sewers and manholes in the Zone I and Zone II aquifer areas as required in MassDEP's Policy *Review of Sewer Line/Water Supply Protection* (Policy BRP/DWM/WS/P03-1).

The NPC also provide an updated water budget to assess the project's overall impacts on water resources in the local aquifer and the Neponset River. The analysis considered the interaction between water consumption, average annual rainfall, infiltration from pervious surfaces, building roofs and parking areas directed to subsurface recharge systems, surface runoff, evapotranspiration, and evaporation. The updated water budget was recalculated with a pre-demolition condition of the project site, minus the 105 Rosemont parcel. The pre-demolition condition water budget calculations estimated a surplus of 10.55 million gallons per year to support the groundwater base flow of the Neponset River. The post-construction water budget evaluated the impacts of the Current Project with consideration for proposed infiltration and water conservation measures. The water budget for the Current Project estimated a surplus of 26.06 million gallons per year, exceeding the pre-demolition condition by 15.51 million gallons per year, and further enhancing base flow to the Neponset River.

Construction Period

The project must comply with the Solid Waste and Air Pollution Control regulations, pursuant to M.G.L. c.40, s.54. The Proponent should prepare and implement a Construction Waste Management (CWM) Plan for each component of construction. Materials to be salvaged, recycled, and disposed should be identified in the CWM plan, along with methods to facilitate and promote salvage and recycling over disposal, if feasible. I encourage the Proponent to set salvage and recycling goals in the CWM Plan to gauge overall success of waste diversion. The CWM Plan should also identify potential reuse applications for asphalt, brick or concrete (ABC) to limit disposal at approved facilities.

The project will require the preparation of a Stormwater Pollution Prevention Plan (SWPPP) in accordance with the NPDES CGP. Erosion and sedimentation controls should be implemented throughout the project site to reduce potential impact to wetland resource areas and Zone I and Zone II areas associated with DWWD wells. The Proponent will require contractors to comply with the requirements of the Clean Air Construction Initiative. All construction activities should be undertaken in compliance with the conditions of all State and local permits.

Mitigation/Draft Section 61 Findings

The NPC included a description of the proposed mitigation package and public benefits for the Current Project, adjusted to be commensurate to the current size and design of the project. The draft Section 61 Findings included in the NPC are intended to address all mitigation and public benefits associated with the Current Project and supersede any list or discussion in prior MEPA filings. The following is a summary of mitigation measures; given the extent and complexity of these measures (particularly those associated with traffic and transportation improvements), readers should reference the text of the NPC, or the subsequent final Section 61 Findings for the comprehensive list of measures.

General

- The Proponent will provide the DCR, upon the issuance of the first Building Permit for the Project for vertical construction, an amount equal to $325,000 to be utilized for the construction, by DCR, of the recreational improvements, including a new canoe access, additional signage and related materials, support for Blue Hill Trails mapping, connectivity to DCR-owned land and such other items as DCR may designate. A portion of the funds (estimated to be $80,000) will be used to fund an endowment for the maintenance of the canoe access.

Traffic and Transportation

- University Avenue:
  - University Avenue will be reconstructed from approximately Canton Street to Blue Hill Drive/Green Lodge Street to meet the MassDOT improvement projects at either end of the corridor. As part of the design of the Project and the University Avenue improvements, Harvard Street will be reconstructed in its current location, and Rosemont Road will be relocated approximately 750 feet to the north of its current alignment to form a new intersection with University Avenue.
  - Approximately 5,200 feet of University Avenue will be reconstructed as a tree-lined, median divided boulevard following a "Complete Streets" design approach with a typical five lane cross-section, with two through lanes at each intersection and left and right turn lanes at the Project site driveways. Sidewalks along both sides of the street, crosswalks and pedestrian accommodations at signalized intersections, and a system of connective walking pathways are an integral part of the design for University Avenue.

- Project site access points will be provided and constructed as follows:

  - A re-located Rosemont Road which provides a connection to existing and Project site related residential buildings and office buildings located on Rosemont Road and Marymont Avenue;
  - A driveway located opposite re-located Rosemont Road for residential, office and retail uses;

- North Project Site Drive – located approximately 750 feet south of re-located Rosemont Road and on the west side of University Avenue. This drive occupies the same right-of-way as the existing Rosemont Road and is a major access for the larger retail and grocery store components of the Project;
- A driveway, located opposite North Site Drive, which services residential and office development, east of University Avenue;
- South Site Drive – located approximately 900 feet south of North Project Site Drive and will serve as the primary driveway to the retail components of the Project;
- A driveway, located opposite South Project Site Drive, servicing a small retail module of the Project; and
- Harvard Street, approximately 1,300 feet south of South Project Site Drive, an existing roadway which provides a connection to existing and Project site related office buildings located off Rosemont Road, NStar Way and Marymont Road, as well as to retail components of the Project.

These seven roads and/or driveways will form four intersections, all under traffic signal control. These intersections are:

- Re-located Rosemont Road/Project Site Drive/University Avenue
- North Project Site Drive/Project Site Drive/University Avenue
- South Project Site Drive/Project Site Drive/University Avenue
- Harvard Street/University Avenue.

Proposed traffic signals at re-located Rosemont Road, the North Project Site Drive and the South Project Site Drive will be coordinated with the new traffic signals at the University Avenue intersections at the Blue Hill Drive ramps and the MBTA Garage Driveway. The Proponent will work with MassDOT to implement Adaptive Signal Control Technology (ASCT) for these five coordinated intersections.

- I-95/University Avenue/Blue Hill Drive (proposed by MassDOT):
  - Re-align the ramps to eliminate the unsignalized intersection with Blue Hill Drive at the terminus of the existing ramp;
  - Terminate Blue Hill Drive as a cul-de-sac west of the new ramp alignment;
  - Extend the length of ramps to the intersection of University Avenue and Green Lodge Street and increase the radii of the horizontal curves for drivers coming off I-95 to provide a safer transition to the local roadway network;
  - Reconstruct the signalized intersection of the Blue Hill Drive ramps with University Avenue/Green Lodge Street to provide appropriate lane arrangement and capacities to support redevelopment at the Project Site;
  - Reconfigure the existing commercial driveways on the north side of the existing Blue Hill Drive west of University Avenue (future Blue Hill Drive on-ramp) to limit traffic access/egress to right-in/right-out operations only; and
  - Construct a new driveway on University Avenue opposite the MBTA Westwood Station Driveway to service the existing commercial parcel on the north side of Blue Hill Drive.

The intersection of the Blue Hill Drive ramps at University Avenue will be reconstructed/widened to provide the following approach geometrics:

- Blue Hill Drive Eastbound - exclusive left turn lane, through lane and a channelized right turn lane;
- Green Lodge Street Westbound - exclusive left turn lane and a shared through/right lane;
- University Avenue Southbound - exclusive left turn lane, two through lanes and a shared through/right lane; and
- University Avenue Northbound – two exclusive left turn lanes and a shared through/right lane.

Construction of the MassDOT I-95/University Avenue/Blue Hill Drive interchange improvement project is anticipated to begin in September 2014 and require two construction seasons. Thus, the improvements assumed for the 2017 Build Condition analyses are expected to be complete by fall 2016. If this schedule is not met by MassDOT, the Proponent will coordinate with MassDOT in order to ensure that the construction of the I-95/University Avenue/Blue Hill Drive interchange project will be staged so that the necessary infrastructure to support the expected first sequence of the Project (expected by March 2015 and including approximately 450,000 gross square feet of retail/grocery/restaurant space and 350 apartment units) is complete.

The initial infrastructure components of the I-95/University Avenue/Blue Hill Drive interchange project necessary to support the first sequence of the Project include the following:

- Blue Hill Drive terminated in a cul-de-sac west of the I-95 off-ramp.
- Removal of the current I-95 off-Ramp/Blue Hill Drive intersection so vehicles exiting I-95 southbound progress unimpeded to the traffic signal at University Avenue; and
- Signal timing modifications at the University Avenue/Blue Hill Drive intersection.

It is expected that these initial elements of the I-95/University Avenue/Blue Hill Drive interchange project can be completed prior to the opening of the first sequence of the Project. The Project Proponent will continue to coordinate with the MassDOT to expedite the improvements at the I-95/University Avenue/Blue Hill Drive interchange. Should the balance of the overall MassDOT I-95/University Avenue/Blue Hill Drive interchange improvement project not advance, the Proponent will, as necessary, provide design and permitting assistance, fund, or construct these improvements (or portions thereof) in coordination with MassDOT to complete the full I-95/University Avenue/Blue Hill Drive interchange improvements prior to advancement of the Project beyond the first sequence of development (unless the Proponent demonstrates to MassDOT's satisfaction that additional portions of the Project can be accommodated by the initial infrastructure components described above), subject to receipt of all necessary rights, permits, approvals and land transfers.

- Canton Street/University Avenue (Proposed by MassDOT)
    - Canton Street Westbound – Provision of an exclusive left turn lane, a through lane and a channelized right turn lane;
    - Canton Street Eastbound – Provision of an exclusive left turn lane, a through lane and share through/right lane;
    - University Avenue Northbound – Provision of an exclusive left turn lane, a through lane and an exclusive right turn lane; and
    - University Avenue Southbound – Provision of two exclusive left turn lanes and a shared through/right lane.

  It is anticipated that the Canton Street/University Avenue improvements will require one construction season to complete and will be commensurate with the first sequence of development for the Project such that interim improvements will not be required at this intersection. The Proponent has been and will continue to coordinate with MassDOT to ensure that the defined improvements are completed at the Canton Street/University Avenue intersection to support the Project. Should the MassDOT Canton Street/University Avenue improvements not be completed commensurate with the first sequence of development for the Project, the Proponent will, as necessary and in coordination with MassDOT, provide design and permitting assistance, fund, or construct these improvements (or portions thereof) the defined improvements subject to receipt of all necessary rights, permits, approvals and land transfers.

- Off-Site Improvements – the Proponent will design, construct or implement a number of traffic intersection improvements to improve traffic operations, improve safety, and monitor the success of such improvements. A summary of these improvements is provided below. Further detail of each improvement project, schedules for construction and project cost is included in the draft Section 61 Findings provided in the NPC:
    - I-95/Route 128 University Avenue Ramps (Dedham) – Design and construct safety improvements;
    - Route 1A/Everett Street/Clapboardtree Street (Westwood) – Design and construct safety improvements, design and implement optimal traffic signal timing plan, prepare PS&E design for capacity improvements including new travel lanes and traffic signal improvements;
    - Nahatan Street/Clapboardtree Street (Westwood) – Perform traffic monitoring and design and construct safety improvements;
    - East Street Rotary (Westwood) – design and construct safety improvements;
    - Dedham Street/Washington Street (Canton) – design and construct a Dedham Street right-turn lane within the public right-of-way and implement an optimal traffic signal timing plan;
    - Route 138/Washington Street (Canton) – design and construct improvements;
    - Route 138/Randolph Street (Canton) – design and construct improvements, restripe the Route 138 approaches to provide exclusive left-turn lanes, and implement an optimal traffic signal timing plan concurrent with pedestrian phasing;

- Route 138/Green Lodge Street (Canton) – monitor intersection and conduct a follow-on traffic signal warrant analysis after project full build out and occupation and prepare PS&E for intersection improvements and traffic signal if warranted;
- Dedham Street/Shawmut Road (Canton) – design and construct a right-turn lane on Shawmut Road within the public right-of-way;
- Dedham Street/Elm Street (Canton) - monitor intersection and conduct a follow-on traffic signal warrant analysis after project full build out and occupation and prepare PS&E for intersection improvements and traffic signal if warranted;
- Neponset Street/Chapman Street (Canton) – implement an optimal traffic signal timing plan;
- Washington Street/Chapman Street (Canton) – perform traffic monitoring and if signalization is warranted and desired by the Town, prepare PS&E for intersection improvements including a traffic signal;
- Route 1/Everett Street/University Avenue (Norwood) – design and construct safety improvements, design and implement an optimal traffic signal timing plan, and prepare a PS&E for capacity improvements including new travel lanes and traffic signal improvements; and
- Neponset Circle (Norwood) - design and construct safety improvements.

- The Proponent will provide $2.1 million to the Town of Westwood for the design and implementation of traffic calming measures in order to reduce vehicle travel speeds and neighborhood cut-through traffic and will assist the Town in this effort by collecting pre and post-development traffic volume and speed data along specific roadways where traffic calming measures are to be advanced by the Town.

- The Proponent will provide $250,000 to the Town of Westwood to engage consultants to study and design alternative intersection alignments on Canton Street, including at its intersection with University Avenue, for consideration and potential implementation by MassDOT as part of the future Dedham Street Corridor Improvements.

- The Proponent will conduct traffic monitoring during the weekday morning, weekday afternoon and Saturday mid-day peak hours at the following intersections in Canton:
  - Washington Street/Chapman Street;
  - Route 138/Green Lodge Street; and
  - Dedham Street/Elm Street.

  The details of the traffic monitoring program will be developed in consultation with Town officials, and will be completed by a Professional Engineer in accordance with industry standards. The results of the annual monitoring program will be documented in reports provided to the Town of Canton. The monitoring program will commence upon initial occupancy of the Project and will be completed annually thereafter for a period of 2-years after Project completion.

- Sidewalks and pedestrian promenade areas will be provided within the Project site that will connect to the planned sidewalk infrastructure along University Avenue.

- Lighting will be provided within the Project site, around building perimeters and along University Avenue.

- Full handicapped access will be provided within the Project site and along proposed internal circulating roadways, including ramps for barrier-free access where appropriate; pedestrian crosswalks, pushbuttons and phasing will be provided at all signalized intersections constructed or modified in conjunction with the Project where sidewalks and crosswalks are provided; and crosswalks and associated pedestrian crossing warning signs will be installed at and in advance of pedestrian crossing locations as appropriate, and will be designed and installed in accordance with the MUTCD.

- The pedestrian traffic signal equipment (pushbuttons and indications) will be reviewed and upgraded/replaced at the signalized study area intersections in order to meet current design standards for accessibility where such accommodations are currently afforded.

- Pedestrian phase timing will be reviewed and adjusted as may be necessary to meet current MUTCD design standards at all signalized intersections within the study area where such accommodations are present.

- Upon advancing Development Area B (located within the Project site and opposite the Westwood/Route 128 Station), the Proponent will construct a pedestrian connection between the Project site and the Westwood/Route 128 Station by way of the Green Lodge Street underpass alignment. Construction will be coordinated with the MBTA. In order to facilitate this connection, the Proponent will design and construct the required modifications to the access doors and lobby of the station.

- The Project will include the installation of bicycle racks that will be appropriately located proximate to building entrances and site driveways and circulating roadways within the Project site will provide sufficient width to accommodate bicycle travel in a shared travelled-way configuration.

- All traffic signals to be constructed or physically modified in conjunction with the Project will include bicycle detection and associated signs and pavement markings, if and to the extent feasible and appropriate.

- Bicycle accommodations will be afforded by way of a multi-use path to be constructed parallel to University Avenue from Relocated Rosemont Road to Harvard Street. On-road bicycle accommodations between Harvard Street and Canton Street will be afforded in a shared travelled-way condition so designated by "sharrow" pavement markings along both sides of University Avenue.

- An off-road facility between Harvard Street and Canton Street will be constructed at full-build out of the Project.

- The Proponent will construct a bicycle parking facility within the Westwood/Route 128 Station parking garage and purchase and install a "Pedal 'n' Park" bicycle parking/sharing kiosk at an appropriate location outside of the station. The Proponent will coordinate construction with the MBTA.

- Implementation of a TDM program including the following elements:

  - Assigning a transportation coordinator and joining the NVTMA;
  - Working with the NVTMA to develop an informational packet of commuting alternatives to be made available to employees and guests of the hotel;
  - Encouraging employers to implement flexible work hours;
  - Providing designated parking spaces for carpool or vanpools;
  - Installing secure bicycle racks at specific locations that are convenient to users;
  - Encouraging the use of public transit and provide information regarding schedules;
  - Providing on-site sale of Charlie cards;
  - Participating in the MBTA Corporate Pass Program to the extent practical and as allowable pursuant to commercial tenant lease requirements;
  - Encouraging employees to participate in MassRIDES' NuRide program;
  - Encouraging major employers to offer a "Guaranteed Ride Home" to all employees that commute to the Project by means other than private automobile;
  - Promoting the use of public transportation to hotel guests in website based materials including links to the appropriate homepages of the MBTA and MassRIDES;
  - Providing a periodic newsletter or bulletin concerning commuting options; and
  - Pursuing a potential utilization of the NVRTA's existing RailLink shuttle service.

Air Quality

- The Proponent will implement the following air quality mitigation measures in conjunction with the project:
    - Installation of Low-noise HVAC units at two office buildings (Office A and B) closest to NSA 1 and three residential buildings (Residential A1, A2 and B) closest to NSA 3;
    - Use of sealed loading docks for all loading docks in the Project. Rubber gaskets will be provided at all seal connections to further address noise from unloading activities;
    - Use of rubber mats on docking plates;
    - Use of natural rock and earth barriers at the rear of the loading docks to block sound propagation toward residential areas; and
    - Construction of a 12-foot high wood sound barrier along the Blue Hill Drive ramp west of Whitewood Road, to complement the existing 8-foot sound barrier.

Greenhouse Gas Emissions

Stationary source GHG emissions for the Current Project, are estimated at 13,006 tpy, a 3,320.6 tpy reduction from the Base Case total of 16,237 tpy (a 19.9 percent overall project reduction). Mobile source emissions from the 2022 Build Condition with TDM Mitigation is projected to reduce CO_2 emissions by 325.7 tpy (or 6.6 percent), for a project total of 6,189.3 tpy attributable to project-related traffic. Total estimated GHG emissions for the proposed Preferred Alternative - indirect and direct emissions attributable to stationary sources and indirect emissions attributable to mobile sources - are estimated at 19,195.3 tpy, a 3,556.3 tpy reduction from the Base Case total of 22,751.6 tpy. Overall, the Preferred Alternative achieves a 15.6 percent overall reduction in GHG emissions compared to the Base Case.

Stationary Sources

- Construction of a higher efficiency building envelope with R-25 roof insulation;
- Use of energy efficient windows with double pane, low-e glass, with lower U-values (0.35). Window glass areas for retail and office buildings as a percentage of wall area will be lower than the eQUEST model default values of 46 percent and 53 percent, respectively;
- Use of Demand Control Ventilation (DCV) will be used in all retail buildings except for the Supermarket, which will have dehumidification coils on HVAC units;
- Use of Energy Recovery Ventilation (ERV) in residential buildings;
- Use of higher efficiency HVAC cooling systems including Energy-STAR rated HVAC units with energy efficiency ratings (EER) ten percent above code. The Target EER will be 12 percent more efficient than Code;
- Use of higher-efficiency HVAC heating systems that are five percent more efficient than Code. Space heating boilers will achieve a minimum thermal efficiency of 90 percent;
- HVAC supply ducts will be sealed, leak tested and insulated;

- Use of Energy Management Systems (EMS) to track and control energy use;
- Use of higher efficiency interior lighting with a light power density (LPD) at least ten percent below Code for the retail, office, and public spaces in all buildings. The Tenant Manual will recommend an LPD of at least ten percent below Code;
- Use of a high-efficiency refrigeration system in the supermarket capable of achieving a 25 percent energy saving though the use of: low-speed, high-efficiency fan motors; variable speed compressors; refrigerated display cases with low-energy anti-condensate heaters; vertical doors for frozen foods and dairy products; and LED lights for glass door cases;
- Use of refrigeration equipment in the Hotel and Retail Buildings J and R that reduce electrical loads by 15 percent below Code;
- Use of occupancy controls for lighting in restrooms, offices, and unoccupied storage rooms;
- Use of Energy-STAR appliances in residential units and laundry rooms;
- Use of energy efficient metal halide, or light emitting diode (LED), fixtures for exterior parking areas, with LED lights used for pedestrian walkways/sidewalks and bicycle paths; and
- Commissioning of building systems.

Mobile Sources

- Mobile source GHG reduction measures are outlined in the traffic and transportation mitigation section of this Certificate and include intersection improvements and implementation of a TDM program.

General

- A self-certification will be provided to the MEPA office following completion of construction for each construction phase signed by an appropriate professional (e.g. civil engineer, traffic engineer, architect, general contractor) indicating that all of the GHG mitigation measures, or equivalent measures that are designed to collectively achieve the proposed stationary source GHG emission reduction committed to in the NPC, have been incorporated into the project.

Wetlands and Stormwater

- Work will be conducted on site in accordance with the conditions set for the current Order of Conditions issued for the project.

- The project will exceed the requirements of the MassDEP SMR, with stormwater management controls capable of treating runoff associated with the 2-, 10-, 25- and 100-year 24-hour storm event.

- Proposed stormwater BMPs include: sub-surface infiltration galleries, Stormtech infiltration systems, water quality structures, rain gardens, deep sump hooded catch basins, sediment forebays, riprap spillways, and extended dry and wet detention basins. These BMPs will meet the standards for treatment of areas classified as LUHPPLs.

- BMPs will be installed that are designed to mitigate stormwater runoff in areas near the DWWD Municipal wells and associated Zone I and Zone II Wellhead protection areas. No infiltration structures will be located within 400 feet of any wellhead and only clean roof runoff will be infiltrated in Zone II areas immediately adjacent to the Zone I.

- The Proponent will implement a Stormwater O&M Plan.

Water and Wastewater

- The Proponent will install WaterSense® fixtures (or equivalent) as a water conservation measure to reduce water consumption rates by 20 percent.

- The Proponent will replace approximately 2,800 feet of water main within University Avenue.

- The use of water conservation fixtures and groundwater recharge BMPs will result in a post-construction water budget surplus of 26.06 million gallons per year, exceeding the pre-demolition condition by 15.51 million gallons per year, and further enhancing base flow to the Neponset River.

- The Proponent will work with the Town to line approximately 2,500 linear feet of existing sewer in University Avenue to the point of connection with MWRA trunk sewer.

Construction Period

- The project will comply with the Solid Waste and Air Pollution Control regulations, pursuant to M.G.L. c.40, s.54.

- The Proponent will prepare a SWPPP in accordance with the NPDES CGP. Erosion and sedimentation controls will be implemented throughout the project site to reduce potential impact to wetland resource areas and Zone I and Zone II areas associated with DWWD wells.

- The Proponent will require contractors to comply with the requirements of the Clean Air Construction Initiative.

Conclusion

The NPC has sufficiently defined the nature and general elements of the project for the purposes of MEPA review. I am satisfied that any outstanding issues can be addressed by the Proponent during State permitting or in direct consultation with the Towns of Westwood, Canton and Norwood, as appropriate. Based on review of the NPC and comments received, and in consultation with State Agencies, I have determined that no further MEPA review is required.

August 16, 2013
Date

Richard K. Sullivan Jr.

Comments received:

08/02/2013	Town of Norwood
08/02/2013	Town of Westwood Planning Board
08/09/2013	Massachusetts Department of Conservation and Recreation
08/09/2013	Massachusetts Department of Environmental Protection – NERO
08/09/2013	Massachusetts Water Resource Authority
08/09/2013	Massachusetts Department of Transportation
08/09/2013	Robert Messina
08/09/2013	Massachusetts Area Planning Council
08/09/2013	Town of Westwood Board of Selectmen
08/14/2013	Town of Canton Board of Selectmen

RKS/HSJ/hsj

Bk 25212 P101 #108671
10-05-2007 @ 10:51a

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 5 – Order of Conditions

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

DEP File Number:
338-0422
Provided by DEP

A. General Information

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.

From:

Westwood Conservation Commission
Conservation Commission

RECEIVED AND RECORDED
NORFOLK COUNTY
REGISTRY OF DEEDS
DEDHAM, MA
CERTIFY
William P O'Donnell
WILLIAM P. O'DONNELL, REGISTER

This issuance is for (check one):

☒ Order of Conditions

☐ Amended Order of Conditions

To: Applicant:

Jay Doherty - Cabot, Cabot and Forbes
Name
125 Summer Street
Mailing Address
Boston | MA | 02110
City/Town | State | Zip Code

Property Owner (if different from applicant):

Name
Mailing Address
City/Town | State | Zip Code

1. Project Location:

University Ave. Westwood Station
Street Address
Westwood
City/Town
see attached list
Assessors Map/Plat Number
see attached list
Parcel/Lot Number

2. Property recorded at the Registry of Deeds for:

Norfolk
County
see attached list
Book
Page
Certificate (if registered land)

3. Dates:

January 29, 2007
Date Notice of Intent Filed
June 13, 2007
Date Public Hearing Closed
6/28/07
Date of Issuance

4. Final Approved Plans and Other Documents (attach additional plan references as needed):

Notice of Intent Plans - Westwood Station, University Avenue, Westwood MA
Title
1/29/07 rev. 6/13/07

5. Final Plans and Documents Signed and Stamped by:

Richard A Moore PE# 28704
Name

6. Total Fee:

$3,350.00
(from Appendix B: Wetland Fee Transmittal Form)

RETURN TO:
CLAUDIA FIORE
WILMER HALE
60 STATE ST
BOSTON, MA 02109 (1087)

ATTACHMENT # 1 to WPA Form 3 – Notice of Intent

NAME OF APPLICANT (Item 2)	PROPERTY ADDRESS/ LOCATION (Item 1a)	OWNER OF RECORD (Item 3)	MAILING ADDRESS OF OWNERS OF RECORD (Item 3c)	DEED (Item 3)	ASSESSORS MAP AND PARCEL (Item 4)	STATUS OF APPLICANT
CFRI/Doherty 22 Marymount Avenue, LLC	22 Marymount Avenue, Westwood, MA	CFRI/Doherty 22 Marymount Avenue, LLC	c/o Cabot, Cabot & Forbes, 125 Summer Street, Boston, MA 02110	Book 22250, Page 154	33/13 ✓	Owner
CFRI/Doherty Blue Hill Drive, L.L.C.	505 Blue Hill Drive, Westwood, MA	CFRI/Doherty Blue Hill Drive, L.L.C.	Same as above	Certificate of Title 170401, Reg. Bk. 853, Pg. 1 – see Notice of Withdrawal from Registered Land filed as Document 1130006 and in recorded Book 24839 Page 1; and recorded Book 22518, Page 264	33/6 ✓	Owner
CFRI/Doherty 213 Whitewood Road, LLC	213 Whitewood Road, Westwood, MA	CFRI/Doherty 213 Whitewood Road, LLC	Same as above	Certificate of Title 170830, Reg. Bk. 855, Pg. 30 – see Notice of Withdrawal from Registered Land filed as Document 1130008 and in recorded Book 24839 Page 51; and recorded Book 22755, Page 362 and 364	33/20 ✓	Owner
CFRI/Doherty 75 University Avenue, LLC	75 University Avenue, Westwood, MA	CFRI/Doherty 213 Whitewood Road, LLC	Same as above	Certificate of Title 170480, Reg. Bk. 853, Pg. 80 – see Notice of Withdrawal from Registered Land filed as Document 1130011 and in recorded Book 24839 Page 21; and recorded Book 22566, Page 86	33/19 ✓	Owner

NAME OF APPLICANT (Item 2)	PROPERTY ADDRESS/ LOCATION (Item 1a)	OWNER OF RECORD (Item 3)	MAILING ADDRESS OF OWNERS OF RECORD (Item 3d)	DEED (Item 8)	ASSESSORS MAP AND PARCEL (Item 7)	STATUS OF APPLICANT
CFRI/Doherty 105 Rosemont Road, LLC	105 Rosemont Road, Westwood, MA	CFRI/Doherty 105 Rosemont Road, LLC	Same as above	Book 22566, Page 166	33/17 & 33/18 Met Life	Owner
CFRI/Doherty 50 Rosemont Road, LLC	50 Rosemont Road, Westwood, MA	CFRI/Doherty 50 Rosemont Road, LLC	Same as above	Book 22566, Page 111	33/16 ✓	Owner
CFRI/Doherty 145 University Avenue, LLC	145 University Avenue, Westwood, MA	CFRI/Doherty 145 University Avenue, LLC	Same as above	Certificate of Title 170293 Reg. Bk. 852, Pg. 52 80 – see Notice of Withdrawal from Registered Land filed as Document 1130012 and in recorded Book 24839 Page 25; and recorded Book 22462, Page 230	33/15 ✓	Owner
CFRI/Doherty 165 University Avenue, LLC	165 University Avenue, Westwood, MA	CFRI/Doherty 165 University Avenue, LLC	Same as above	Certificate of Title 170294, Reg. Bk. 852, Pg. 94 and 80 – see Notice of Withdrawal from Registered Land filed as Document 1130015 and in recorded Book 24839 Page 39; and recorded Book 22462, Page 237	33/12 ✓	Owner

NAME OF APPLICANT (Item 2)	PROPERTY ADDRESS/ LOCATION (Item 1a)	OWNER OF RECORD (Item 3)	MAILING ADDRESS OF OWNERS OF RECORD (Item 3d)	DEED (Item 8)	ASSESSORS MAP AND PARCEL (Item 2b)	STATUS OF APPLICANT
CFRI/Doherty 47 Harvard Street, LLC	47 Harvard Street, Westwood, MA	CFRI/Doherty 47 Harvard Street, LLC	Same as above	Certificate of Title 170292, Reg. Bk. 852, Pg. 92 80 – see Notice of Withdrawal from Registered Land filed as Document 1130010 and in recorded Book 24839 Page 17	33/17 ✓	Owner
CFRI/Doherty 201 University Avenue, LLC	201 University Avenue, Westwood, MA	CFRI/Doherty 201 University Avenue, LLC	Same as above	Certificate of Title 171618, Reg. Bk. 859, Pg. 18 – see Notice of Withdrawal from Registered Land filed as Document 1130010 and in recorded Book 24839 Page 43	33/11 ✓	Owner
CFRI/Doherty 245 University Avenue, LLC	245 University Avenue, Westwood, MA	CFRI/Doherty 245 University Avenue, LLC	Same as above	Certificate of Title 171381, Reg. Bk. 857, Pg. 181 – see Notice of Withdrawal from Registered Land filed as Document 1130017 and in recorded Book 24839 Page 47 Book 24875, Page 299*	37/20 ✓ 37/19 ✓	Owner
CFRI/Doherty 35 Harvard Street, LLC	35 Harvard Street, Westwood, MA	CFRI/Doherty 35 Harvard Street, LLC	Same as above	Certificate of Title 170443– see Notice of Withdrawal from Registered Land filed as Document 1130008 and in recorded Book 23839 Page 9; Reg. Bk. 853, Pg. 43	37/18 ✓	Owner

NAME OF APPLICANT (Item 2)	PROPERTY ADDRESS/ LOCATION (Item 1a)	OWNER OF RECORD (Item 3)	MAILING ADDRESS OF OWNERS OF RECORD (Item 3d)	DEED (Item 8)	ASSESSORS MAP AND PARCEL (Item 7)	STATUS OF APPLICANT
CFRI/Doherty 730 Canton Street, LLC	700 Canton Street, Westwood, MA	CFRI/Doherty 730 Canton Street, LLC	Same as above	Certificate of Title 170838, Reg. Book 855, Pg. 38 and recorded Book 22760 Page 183– see Notice of Withdrawal from Registered Land filed as Document 1130008 and in recorded Book 24839 Page 47; and in recorded Book 23839 Page 9	37/10 ✓	Owner
CFRI/Doherty 40-46 Harvard Street, LLC	40-46 Harvard Street, Westwood, MA	CFRI/Doherty 40-46 Harvard Street, LLC	Same as above	Certificate of Title 171437, Reg. Bk. 858, Pg. 37– see Notice of Withdrawal from Registered Land filed as Document 1130009 and in recorded Book 24839 Page 13; Book 24875, Page 293*	37/16 ✓	Owner

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NAME OF APPLICANT (Item 2)	PROPERTY ADDRESS/ LOCATION (Item 1a)	OWNER OF RECORD (Item 3)	MAILING ADDRESS OF OWNERS OF RECORD (Item 3d)	DEED (Item 8)	ASSESSORS MAP AND PARCEL (Item 1)	STATUS OF APPLICANT
CFRI/Doherty 160 University Avenue, LLC, authorized agent/prospective purchaser	160 University Avenue, Westwood, MA	MIB, Inc./MIB Group, Inc.	160 University Avenue, Westwood, MA 02090, Attention: Jonathan W. Sager, General Counsel, Property Owner Telephone: (617) 751-6332	Certificate of Title 110534, Reg. Bk. 553, Pg. 134 – see Notice of Withdrawal from Registered Land filed as Document 1130014 and in recorded Book 24839 Page 35	33/8 ✓	authorized agent/ prospective purchaser
CFRI/Doherty 160 University Avenue, LLC, authorized agent/prospective purchaser	Land off of University Avenue, Westwood, MA	MIB Group, Inc.	160 University Avenue, Westwood, MA 02090, Attention: Jonathan W. Sager, General Counsel, Property Owner Telephone: (617) 751-6332	Certificate of Title 109542, Reg. Bk. 548, Pg. 142 – see Notice of Withdrawal from Registered Land filed as Document 1130013 and in recorded Book 24839 Page 29	33/9 ✓	authorized agent/ prospective purchaser
CFRI/Doherty 160 University Avenue, LLC	Land off of University Avenue, Westwood, MA	CFRI/Doherty 160 University Avenue, LLC	c/o Cabot, Cabot & Forbes, 125 Summer Street, Boston, MA 02110	Book 24875, Page 296*	none	owner

* successor in title to CC&F Investment Company Limited Partnership

The parcels listed below are the only parcels in this filing where work regulated under the state Wetlands Protection Act, M.G.L. 130, Section 30 and the Westwood Wetlands Protection Bylaw will occur:

NAME OF APPLICANT (Item 2)	PROPERTY ADDRESS/ LOCATION (Item 1a)	OWNER OF RECORD (Item 3)	MAILING ADDRESS OF OWNERS OF RECORD (Item 3d)	DEED (Item 8)	ASSESSORS' MAP AND PARCEL (Item 7)	STATUS OF APPLICANT
CFRI/Doherty Blue Hill Drive, L.L.C.	505 Blue Hill Drive, Westwood, MA	CFRI/Doherty Blue Hill Drive, L.L.C.	Same as above	Certificate of Title 170401, Reg. Bk. 853, Pg. 1 – see Notice of Withdrawal from Registered Land filed as Document 1130006 and in recorded Book 24839 Page 1; and recorded Book 22518, Page 264	33/6 ✓	Owner
CFRI/Doherty 213 Whitewood Road, LLC	213 Whitewood Road, Westwood, MA	CFRI/Doherty 213 Whitewood Road, LLC	Same as above	Certificate of Title 170830, Reg. Bk. 855, Pg. 30 – see Notice of Withdrawal from Registered Land filed as Document 1130008 and in recorded Book 24839 Page 51; and recorded Book 22755, Page 362 and 364	33/20 ✓	Owner
CFRI/Doherty 75 University Avenue, LLC	75 University Avenue, Westwood, MA	CFRI/Doherty 213 Whitewood Road, LLC	Same as above	Certificate of Title 170480, Reg. Bk. 853, Pg. 80 – see Notice of Withdrawal from Registered Land filed as Document 1130011 and in recorded Book 24839 Page 21; and recorded Book 22566, Page 86	33/19 ✓	Owner

NAME OF APPLICANT (Item 2)	PROPERTY ADDRESS/ LOCATION (Item 1a)	OWNER OF RECORD (Item 3)	MAILING ADDRESS OF OWNERS OF RECORD (Item 3d)	DEED (Item 8)	ASSESSORS MAP AND PARCEL (Item 9)	STATUS OF APPLICANT
CFRI/Doherty 160 University Avenue, LLC, authorized agent/prospective purchaser	160 University Avenue, Westwood, MA	MIB, Inc./MIB Group, Inc.	160 University Avenue, Westwood, MA 02090, Attention: Jonathan W. Sager, General Counsel, Property Owner Telephone: (617) 751-6332	Certificate of Title 110534, Reg. Bk. 553, Pg. 134 – see Notice of Withdrawal from Registered Land filed as Document 1130014 and in recorded Book 24839 Page 35	33/8 ✓	authorized agent/ prospective purchaser
CFRI/Doherty 160 University Avenue, LLC, authorized agent/prospective purchaser	Land off of University Avenue, Westwood, MA	MIB Group, Inc.	160 University Avenue, Westwood, MA 02090, Attention: Jonathan W. Sager, General Counsel, Property Owner Telephone: (617) 751-6332	Certificate of Title 109542, Reg. Bk. 548, Pg. 142 – see Notice of Withdrawal from Registered Land filed as Document 1130013 and in recorded Book 24839 Page 29	33/9 ✓	authorized agent/ prospective purchaser

The identification of any other parcels in this application (and inclusion of information about those parcels) where work will be performed as part of the project is not and shot not be construed to be an acknowledgement of any fact or jurisdiction.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 5 – Order of Conditions

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

DEP File Number:
338-0422
Provided by DEP

B. Findings

Findings pursuant to the Massachusetts Wetlands Protection Act:

Following the review of the above-referenced Notice of Intent and based on the information provided in this application and presented at the public hearing, this Commission finds that the areas in which work is proposed is significant to the following interests of the Wetlands Protection Act. Check all that apply:

☒ Public Water Supply	☐ Land Containing Shellfish	☒ Prevention of Pollution
☒ Private Water Supply	☒ Fisheries	☒ Protection of Wildlife Habitat
☒ Groundwater Supply	☒ Storm Damage Prevention	☒ Flood Control

Furthermore, this Commission hereby finds the project, as proposed, is: (check one of the following boxes)

Approved subject to:

☒ the following conditions which are necessary, in accordance with the performance standards set forth in the wetlands regulations, to protect those interests checked above. This Commission orders that all work shall be performed in accordance with the Notice of Intent referenced above, the following General Conditions, and any other special conditions attached to this Order. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, these conditions shall control.

Denied because:

☐ the proposed work cannot be conditioned to meet the performance standards set forth in the wetland regulations to protect those interests checked above. Therefore, work on this project may not go forward unless and until a new Notice of Intent is submitted which provides measures which are adequate to protect these interests, and a final Order of Conditions is issued.

☐ the information submitted by the applicant is not sufficient to describe the site, the work, or the effect of the work on the interests identified in the Wetlands Protection Act. Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides sufficient information and includes measures which are adequate to protect the Act's interests, and a final Order of Conditions is issued. A description of the specific information which is lacking and why it is necessary is attached to this Order as per 310 CMR 10.05(6)(c).

General Conditions (only applicable to approved projects)

1. Failure to comply with all conditions stated herein, and with all related statutes and other regulatory measures, shall be deemed cause to revoke or modify this Order.
2. The Order does not grant any property rights or any exclusive privileges; it does not authorize any injury to private property or invasion of private rights.
3. This Order does not relieve the permittee or any other person of the necessity of complying with all other applicable federal, state, or local statutes, ordinances, bylaws, or regulations.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
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B. Findings (cont.)

4. The work authorized hereunder shall be completed within three years from the date of this Order unless either of the following apply:
   a. the work is a maintenance dredging project as provided for in the Act; or
   b. the time for completion has been extended to a specified date more than three years, but less than five years, from the date of issuance. If this Order is intended to be valid for more than three years, the extension date and the special circumstances warranting the extended time period are set forth as a special condition in this Order.

5. This Order may be extended by the issuing authority for one or more periods of up to three years each upon application to the issuing authority at least 30 days prior to the expiration date of the Order.

6. Any fill used in connection with this project shall be clean fill. Any fill shall contain no trash, refuse, rubbish, or debris, including but not limited to lumber, bricks, plaster, wire, lath, paper, cardboard, pipe, tires, ashes, refrigerators, motor vehicles, or parts of any of the foregoing.

7. This Order is not final until all administrative appeal periods from this Order have elapsed, or if such an appeal has been taken, until all proceedings before the Department have been completed.

8. No work shall be undertaken until the Order has become final and then has been recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land upon which the proposed work is to be done. In the case of the registered land, the Final Order shall also be noted on the Land Court Certificate of Title of the owner of the land upon which the proposed work is done. The recording information shall be submitted to this Conservation Commission on the form at the end of this Order, which form must be stamped by the Registry of Deeds, prior to the commencement of work.

9. A sign shall be displayed at the site not less then two square feet or more than three square feet in size bearing the words,

   "Massachusetts Department of Environmental Protection" [or, "MA DEP"]

   "File Number 338-0422"

10. Where the Department of Environmental Protection is requested to issue a Superseding Order, the Conservation Commission shall be a party to all agency proceedings and hearings before DEP.

11. Upon completion of the work described herein, the applicant shall submit a Request for Certificate of Compliance (WPA Form 8A) to the Conservation Commission.

12. The work shall conform to the plans and special conditions referenced in this order.

13. Any change to the plans identified in Condition #12 above shall require the applicant to inquire of the Conservation Commission in writing whether the change is significant enough to require the filing of a new Notice of Intent.

14. The Agent or members of the Conservation Commission and the Department of Environmental Protection shall have the right to enter and inspect the area subject to this Order at reasonable hours to evaluate compliance with the conditions stated in this Order, and may require the submittal of any data deemed necessary by the Conservation Commission or Department for that evaluation.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
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B. Findings (cont.)

15. This Order of Conditions shall apply to any successor in interest or successor in control of the property subject to this Order and to any contractor or other person performing work conditioned by this Order.

16. Prior to the start of work, and if the project involves work adjacent to a Bordering Vegetated Wetland, the boundary of the wetland in the vicinity of the proposed work area shall be marked by wooden stakes or flagging. Once in place, the wetland boundary markers shall be maintained until a Certificate of Compliance has been issued by the Conservation Commission.

17. All sedimentation barriers shall be maintained in good repair until all disturbed areas have been fully stabilized with vegetation or other means. At no time shall sediments be deposited in a wetland or water body. During construction, the applicant or his/her designee shall inspect the erosion controls on a daily basis and shall remove accumulated sediments as needed. The applicant shall immediately control any erosion problems that occur at the site and shall also immediately notify the Conservation Commission, which reserves the right to require additional erosion and/or damage prevention controls it may deem necessary. Sedimentation barriers shall serve as the limit of work unless another limit of work line has been approved by this Order.

Special Conditions (use additional paper, if necessary):

The Conditions issued under Article 18, Westwood Wetlands Protection Bylaw are cited as Special Conditions to this State Order under M.G.L. c. 131, s. 40. See Accompanying Document.

Findings as to municipal bylaw or ordinance

Furthermore, the Westwood Conservation Commission hereby finds (check one that applies):
Conservation Commission

☐ that the proposed work cannot be conditioned to meet the standards set forth in a municipal ordinance or bylaw specifically:

Name — Municipal Ordinance or Bylaw

Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides measures which are adequate to meet these standards, and a final Order of Conditions is issued.

☒ that the following additional conditions are necessary to comply with a municipal ordinance or bylaw, specifically:

Weswood Wetlands Protection Bylaw — Article 18
Name — Municipal Ordinance or Bylaw

The Commission orders that all work shall be performed in accordance with the said additional conditions and with the Notice of Intent referenced above. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, the conditions shall control.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 5 – Order of Conditions

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

DEP File Number:
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Provided by DEP

B. Findings (cont.)

Additional conditions relating to municipal ordinance or bylaw:

The Conditions issued under Article 18, Westwood Wetlands Protection Bylaw are cited as Special Conditions for this State Order under M.G.L. c. 131, s. 40.

This Order is valid for three years, unless otherwise specified as a special condition pursuant to General Conditions #4, from the date of issuance.

June 28, 2007 expires June 28, 2010 for Westwood Station
Date

This Order must be signed by a majority of the Conservation Commission. The Order must be mailed by certified mail (return receipt requested) or hand delivered to the applicant. A copy also must be mailed or hand delivered at the same time to the appropriate Department of Environmental Protection Regional Office (see Appendix A) and the property owner (if different from applicant).

Signatures:

On 13th day
Day

Of June, 2007
Month and Year

before me personally appeared

The above signitors

to me known to be the person described in and who executed the foregoing instrument and acknowledged that he/she executed the same as his/her free act and deed.

Notary Public

4/14/2011
My Commission Expires

KARON SKINNER CATRONE
Notary Public
Commonwealth of Massachusetts
My Commission Expires
APRIL 14, 2011

This Order is issued to the applicant as follows:

☒ by hand delivery on

6/28/07
Date

☒ by certified mail, return receipt requested, on

Date

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 5 – Order of Conditions

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

DEP File Number:

338-0422
Provided by DEP

C. Appeals

The applicant, the owner, any person aggrieved by this Order, any owner of land abutting the land subject to this Order, or any ten residents of the city or town in which such land is located, are hereby notified of their right to request the appropriate DEP Regional Office to issue a Superseding Order of Conditions. The request must be made by certified mail or hand delivery to the Department, with the appropriate filing fee and a completed Appendix E: Request of Departmental Action Fee Transmittal Form, as provided in 310 CMR 10.03(7) within ten business days from the date of issuance of this Order. A copy of the request shall at the same time be sent by certified mail or hand delivery to the Conservation Commission and to the applicant, if he/she is not the appellant.

The request shall state clearly and concisely the objections to the Order which is being appealed and how the Order does not contribute to the protection of the interests identified in the Massachusetts Wetlands Protection Act, (M.G.L. c. 131, § 40) and is inconsistent with the wetlands regulations (310 CMR 10.00). To the extent that the Order is based on a municipal ordinance or bylaw, and not on the Massachusetts Wetlands Protection Act or regulations, the Department has no appellate jurisdiction.

D. Recording Information

This Order of Conditions must be recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land subject to the Order. In the case of registered land, this Order shall also be noted on the Land Court Certificate of Title of the owner of the land subject to the Order of Conditions. The recording information on Page 7 of Form 5 shall be submitted to the Conservation Commission listed below.

Westwood
Conservation Commission

Bk 25212 P114 #108672
10-05-2007 @ 10:51a

TOWN OF WES'
Commonwealth of Massachusetts

CONSERVATION COMMISSION

Order of Conditions
Westwood Wetlands Protection Bylaw, Article 18

Article 18, File Number 338-0422

From:
Westwood Conservation Commission

To: Applicant:
Jay Doherty – Cabot, Cabot and Forbes of New England, Inc.
125 Summer Street
Boston, MA 02110

Project Location:
Westwood Station, University Ave.
Westwood, MA 02090
Map see attached list Lot see attached list

Property Owner if different from applicant:

Westwoood, MA 02090

Property Recorded at the Registry of Deeds for:
Norfolk County Book see attached list Page Cert.

Approved Plans:
Notice of Intent Plans Westwood Station, University Ave. Westwood, MA
Date: January 29, 2007 (Revised June 13, 2007
Stamped and signed by: Richard A. Moore PE# 28704

Date Issued:
June 28, 2007

Westwood Conservation Commission
50 Carby Street
Westwood, MA 02090

phone: (781) 251-2580
Fax: (781) 461-6837

(20F2)

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ATTACHMENT # 1 to WPA Form 3 – Notice of Intent

NAME OF APPLICANT (Item 2)	PROPERTY ADDRESS/ LOCATION (Item 1a)	OWNER OF RECORD (Item 3)	MAILING ADDRESS OF OWNERS OF RECORD (Item 3d)	DEED (Item 8)	ASSESSORS MAP AND PARCEL (Item 7)	STATUS OF APPLICANT
CFRI/Doherty 22 Marymount Avenue, LLC	22 Marymount Avenue, Westwood, MA	CFRI/Doherty 22 Marymount Avenue, LLC	c/o Cabot, Cabot & Forbes, 125 Summer Street, Boston, MA 02110	Book 22250, Page 154	33/13 ✓	Owner
CFRI/Doherty Blue Hill Drive, L.L.C.	505 Blue Hill Drive, Westwood, MA	CFRI/Doherty Blue Hill Drive, L.L.C.	Same as above	Certificate of Title 170401, Reg. Bk. 853, Pg. 1 – see Notice of Withdrawal from Registered Land filed as Document 1130006 and in recorded Book 24839 Page 1; and recorded Book 22518, Page 264	33/6 ✓	Owner
CFRI/Doherty 213 Whitewood Road, LLC	213 Whitewood Road, Westwood, MA	CFRI/Doherty 213 Whitewood Road, LLC	Same as above	Certificate of Title 170830, Reg. Bk. 855, Pg. 30 – see Notice of Withdrawal from Registered Land filed as Document 1130008 and in recorded Book 24839 Page 51; and recorded Book 22755, Page 362 and 364	33/20 ✓	Owner
CFRI/Doherty 75 University Avenue, LLC	75 University Avenue, Westwood, MA	CFRI/Doherty 213 Whitewood Road, LLC	Same as above	Certificate of Title 170480, Reg. Bk. 853, Pg. 80 – see Notice of Withdrawal from Registered Land filed as Document 1130011 and in recorded Book 24839 Page 21; and recorded Book 22566, Page 86	33/19 ✓	Owner

NAME OF APPLICANT (Item 2)	PROPERTY ADDRESS/ LOCATION (Item 1a)	OWNER OF RECORD (Item 3)	MAILING ADDRESS OF OWNERS OF RECORD (Item 3d)	DEED (Item 8)	ASSESSORS MAP AND PARCEL (Item 7)	STATUS OF APPLICANT
CFRI/Doherty 105 Rosemont Road, LLC	105 Rosemont Road, Westwood, MA	CFRI/Doherty 105 Rosemont Road, LLC	Same as above	Book 22566, Page 166	33/17 & 33/18	Owner
CFRI/Doherty 50 Rosemont Road, LLC	50 Rosemont Road, Westwood, MA	CFRI/Doherty 50 Rosemont Road, LLC	Same as above	Book 22566, Page 111	33/16 ✓	Owner
CFRI/Doherty 145 University Avenue, LLC	145 University Avenue, Westwood, MA	CFRI/Doherty 145 University Avenue, LLC	Same as above	Certificate of Title 170293 Reg. Bk. 852, Pg. 52 80 – see Notice of Withdrawal from Registered Land filed as Document 1130012 and in recorded Book 24839 Page 25; and recorded Book 22462, Page 230	33/15 ✓	Owner
CFRI/Doherty 165 University Avenue, LLC	165 University Avenue, Westwood, MA	CFRI/Doherty 165 University Avenue, LLC	Same as above	Certificate of Title 170294, Reg. Bk. 852, Pg. 94 and 80 – see Notice of Withdrawal from Registered Land filed as Document 1130015 and in recorded Book 24839 Page 39; and recorded Book 22462, Page 237	33/12 ✓	Owner

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NAME OF APPLICANT (Item 2)	PROPERTY ADDRESS/ LOCATION (Item 1a)	OWNER OF RECORD (Item 3)	MAILING ADDRESS OF OWNERS OF RECORD (Item 3d)	DEED (Item 8)	ASSESSORS MAP AND PARCEL (Item 7)	STATUS OF APPLICANT
CFRI/Doherty 47 Harvard Street, LLC	47 Harvard Street, Westwood, MA	CFRI/Doherty 47 Harvard Street, LLC	Same as above	Certificate of Title 170292, Reg. Bk. 852, Pg. 92 80 – see Notice of Withdrawal from Registered Land filed as Document 1130010 and in recorded Book 24839 Page 17	33/17 DWD	Owner
CFRI/Doherty 201 University Avenue, LLC	201 University Avenue, Westwood, MA	CFRI/Doherty 201 University Avenue, LLC	Same as above	Certificate of Title 171618, Reg. Bk. 859, Pg. 18 – see Notice of Withdrawal from Registered Land filed as Document 1130010 and in recorded Book 24839 Page 43	33/11 ✓	Owner
CFRI/Doherty 245 University Avenue, LLC	245 University Avenue, Westwood, MA	CFRI/Doherty 245 University Avenue, LLC	Same as above	Certificate of Title 171381, Reg. Bk. 857, Pg. 181 – see Notice of Withdrawal from Registered Land filed as Document 1130017 and in recorded Book 24839 Page 47 Book 24875, Page 299*	37/20 ✓ 37/19 ✓	Owner
CFRI/Doherty 35 Harvard Street, LLC	35 Harvard Street, Westwood, MA	CFRI/Doherty 35 Harvard Street, LLC	Same as above	Certificate of Title 170443– see Notice of Withdrawal from Registered Land filed as Document 1130008 and in recorded Book 23839 Page 9; Reg. Bk. 853, Pg. 43	37/18 ✓	Owner

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NAME OF APPLICANT (Item 2)	PROPERTY ADDRESS/ LOCATION (Item 1a)	OWNER OF RECORD (Item 3)	MAILING ADDRESS OF OWNERS OF RECORD (Item 3d)	DEED (Item 8)	ASSESSORS MAP AND PARCEL (Item 7)	STATUS OF APPLICANT
CFRI/Doherty 730 Canton Street, LLC	700 Canton Street, Westwood, MA	CFRI/Doherty 730 Canton Street, LLC	Same as above	Certificate of Title 170838, Reg. Book 855, Pg. 38 and recorded Book 22760 Page 183– see Notice of Withdrawal from Registered Land filed as Document 1130008 and in recorded Book 24839 Page 47; and in recorded Book 23839 Page 9	37/10 ✓	Owner
CFRI/Doherty 40-46 Harvard Street, LLC	40-46 Harvard Street, Westwood, MA	CFRI/Doherty 40-46 Harvard Street, LLC	Same as above	Certificate of Title 171437, Reg. Bk. 858, Pg. 37– see Notice of Withdrawal from Registered Land filed as Document 1130009 and in recorded Book 24839 Page 13; Book 24875, Page 293*	37/16 ✓	Owner

NAME OF APPLICANT (Item 2)	PROPERTY ADDRESS/ LOCATION (Item 1a)	OWNER OF RECORD (Item 3)	MAILING ADDRESS OF OWNERS OF RECORD (Item 3d)	DEED (Item 8)	ASSESSORS MAP AND PARCEL (Item 7)	STATUS OF APPLICANT
CFRI/Doherty 160 University Avenue, LLC, authorized agent/prospective purchaser	160 University Avenue, Westwood, MA	MIB, Inc./MIB Group, Inc.	160 University Avenue, Westwood, MA 02090, Attention: Jonathan W. Sager, General Counsel, Property Owner Telephone: (617) 751-6332	Certificate of Title 110534, Reg. Bk. 553, Pg. 134 – see Notice of Withdrawal from Registered Land filed as Document 1130014 and in recorded Book 24839 Page 35	33/8	authorized agent/ prospective purchaser
CFRI/Doherty 160 University Avenue, LLC, authorized agent/prospective purchaser	Land off of University Avenue, Westwood, MA	MIB Group, Inc.	160 University Avenue, Westwood, MA 02090, Attention: Jonathan W. Sager, General Counsel, Property Owner Telephone: (617) 751-6332	Certificate of Title 109542, Reg. Bk. 548, Pg. 142 – see Notice of Withdrawal from Registered Land filed as Document 1130013 and in recorded Book 24839 Page 29	33/9	authorized agent/ prospective purchaser
CFRI/Doherty 160 University Avenue, LLC	Land off of University Avenue, Westwood, MA	CFRI/Doherty 160 University Avenue, LLC	c/o Cabot, Cabot & Forbes, 125 Summer Street, Boston, MA 02110	Book 24875, Page 296*	none	owner

* successor in title to CC&F Investment Company Limited Partnership

The parcels listed below are the only parcels in this filing where work regulated under the state Wetlands Protection Act, M.G.L. 130, Section 30 and the Westwood Wetlands Protection Bylaw will occur:

NAME OF APPLICANT (Item 2)	PROPERTY ADDRESS/ LOCATION (Item 1a)	OWNER OF RECORD (Item 3)	MAILING ADDRESS OF OWNERS OF RECORD (Item 3d)	DEED (Item 8)	ASSESSORS MAP AND PARCEL (Item 7)	STATUS OF APPLICANT
CFRI/Doherty Blue Hill Drive, L.L.C.	505 Blue Hill Drive, Westwood, MA	CFRI/Doherty Blue Hill Drive, L.L.C.	Same as above	Certificate of Title 170401, Reg. Bk. 853, Pg. 1 – see Notice of Withdrawal from Registered Land filed as Document 1130006 and in recorded Book 24839 Page 1; and recorded Book 22518, Page 264	33/6	Owner
CFRI/Doherty 213 Whitewood Road, LLC	213 Whitewood Road, Westwood, MA	CFRI/Doherty 213 Whitewood Road, LLC	Same as above	Certificate of Title 170830, Reg. Bk. 855, Pg. 30 – see Notice of Withdrawal from Registered Land filed as Document 1130008 and in recorded Book 24839 Page 51; and recorded Book 22755, Page 362 and 364	33/20	Owner
CFRI/Doherty 75 University Avenue, LLC	75 University Avenue, Westwood, MA	CFRI/Doherty 213 Whitewood Road, LLC	Same as above	Certificate of Title 170480, Reg. Bk. 853, Pg. 80 – see Notice of Withdrawal from Registered Land filed as Document 1130011 and in recorded Book 24839 Page 21; and recorded Book 22566, Page 86	33/19	Owner

NAME OF APPLICANT (Item 2)	PROPERTY ADDRESS/ LOCATION (Item 1a)	OWNER OF RECORD (Item 3)	MAILING ADDRESS OF OWNERS OF RECORD (Item 3d)	DEED (Item 8)	ASSESSORS MAP AND PARCEL (Item 7)	STATUS OF APPLICANT
CFRI/Doherty 160 University Avenue, LLC, authorized agent/prospective purchaser	160 University Avenue, Westwood, MA	MIB, Inc./MIB Group, Inc.	160 University Avenue, Westwood, MA 02090, Attention: Jonathan W. Sager, General Counsel, Property Owner Telephone: (617) 751-6332	Certificate of Title 110534, Reg. Bk. 553, Pg. 134 – see Notice of Withdrawal from Registered Land filed as Document 1130014 and in recorded Book 24839 Page 35	33/8	authorized agent/ prospective purchaser
CFRI/Doherty 160 University Avenue, LLC, authorized agent/prospective purchaser	Land off of University Avenue, Westwood, MA	MIB Group, Inc.	160 University Avenue, Westwood, MA 02090, Attention: Jonathan W. Sager, General Counsel, Property Owner Telephone: (617) 751-6332	Certificate of Title 109542, Reg. Bk. 548, Pg. 142 – see Notice of Withdrawal from Registered Land filed as Document 1130013 and in recorded Book 24839 Page 29	33/9	authorized agent/ prospective purchaser

The identification of any other parcels in this application (and inclusion of information about those parcels) where work will be performed as part of the project is not and shot not be construed to be an acknowledgement of any fact or jurisdiction.

US1DOCS 6354668v4

FINDINGS

The Commission has reviewed the Notice of Intent plans and has held a Public Hearing on the Project. Based on the information available to the Commission at this time, the Commission has determined that the area on which the proposed work is to be done is significant to the following values set forth in Article 18, Westwood Wetlands Protection Bylaw (check as appropriate).

X Public water supply	X Flood control	_ Fisheries
X Private water supply	X Storm damage prevention	X Wildlife habitat
X Groundwater supply and quality	X Prevention of pollution	X Erosion and sediment control

Furthermore, this Commission finds that the project is approved and that:

1. The site contains the following resource areas subject to protection under the Act and the Local Bylaw, Article 18:Bank, Bordering Vegetated Wetlands, Bordering Land Subject to Flooding, Land under Waterbody, and Riverfront Area. The project meets performance standards under 310 CMR 10.55(4), 310 CMR 10.56(4), and 310 CMR 10.57(4) respectively.

2. The following conditions which are deemed necessary to protect the interests identified above. This Commission orders that all work shall conform to the approved Notice of Intent plan referenced above, to the General Conditions defined under the State Wetlands Protection Act, and to the special conditions attached to this Order. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, these conditions shall take precedence.

Standard Conditions

1. This Order of Conditions (herein referred to as Order) applies to the Applicant. The term "Applicant" as used in this Order shall refer to the owner, any successor in interest or successor in control of the property referenced in the Notice of Intent, supporting documents and this Order. The Westwood Conservation Commission (herein referred to as the Commission) shall be notified in writing within 30 days of any transfer in title to the Land or any change in contractor or developers before the Certificate of Compliance is issued. The notice shall include the name, address, and telephone numbers of the new owner or new contractor or developer, as well as a statement made under the penalties of perjury that the new owner or new contractor or developer has been provided with a copy of this Order.
2. This Order shall be included in all construction contracts with contractors and subcontractors dealing with the work proposed.
3. A copy of this Order of Conditions and applicable plans shall be provided to each company doing work on the site and shall be available on the site at all times during construction.
4. Members of the Commission and/or their designated representatives, shall, at reasonable times, have the right to enter upon and inspect the premises to evaluate compliance with this Order.
5. This Order authorizes only the activity described on the approved plan(s) and approved documents

referenced in this Order. Any other or additional activity in areas within the jurisdiction of the Commission will require separate review and approval by the Commission or its agent.

6. The Commission will engage a qualified Environmental Monitor, to oversee project activities as they relate to wetland resource areas, associated buffer zones, sediment and erosion control, stormwater management, LID, groundwater recharge/infiltration and other aspects of the work. The Environmental Monitor will provide a report of the construction activity to the Commission, which will include photographs, progress, future activities and any outstanding issues. The Applicant shall pay for the Environmental Monitor's services.
7. The Applicant or owner shall be liable for any non-compliance with the Conditions of this Order or with any Condition that may survive the issuance of a Certificate of Compliance. The Commission may assess appropriate penalties for non-compliance with the Order and surviving conditions. This may include a $300.00 per violation/per day non-criminal penalty issued under the Westwood Wetlands Protection Bylaw, Article 18.

Pre-Construction Requirements

8. All work shall conform to the following plans, specifications, operation and maintenance plans, associated supplementary materials and special conditions defined in this Order.
    - Notice of Intent Plans January 29, 2007, revised through June 13, 2007
    - Notice of Intent, January 29, 2007
    - Notice of Intent Supplement, May 18, 2007
    - Storm Water Facilities O & M Plan, June 6, 2007
    - Emergency Response & Contingency Plans, June 6, 2007
    - Snow & Ice Removal Operations Plan, June 6, 2007
    - Stormwater Pollution Prevention Plan (SWPPP), June 6, 2007
    - Wetland Replication Plan, May 3, 2007
9. No work shall commence on site until the following conditions are met.
    a. All administrative appeal periods have elapsed or if such administrative appeal has been taken, until all proceedings before DEP have been completed.
    a) The Applicant records the approved plan and the Order at the Registry of Deeds and provides a copy of the recorded plan and Order, stamped by the Norfolk County Registry of Deeds to the Commission.
    b) The D.E.P. sign is placed in a visible location on the site in accordance with State General Condition #9 and remain visible until the Commission issues a Certificate of Compliance. The sign shall be weather proof, no less than 2 square feet or greater than three square feet in size with language as described in State General Condition #9. The sign shall be mounted on a wooden or metal post acceptable to the commission.
    c) The Applicant informs the Commission and Environmental Monitor, in writing, of the names, addresses, and business telephone numbers of each person responsible for supervising the project and for onsite compliance with this Order and his/her alternate. The Environmental Monitor in turn will provide his contact information to the Applicant.

d) The Applicant installs erosion and sediment control measures at the locations shown on the plan referenced in the Order or as directed by the Environmental Monitor in the field. Only vegetation directly in the path of the erosion control works shall be removed at this time.

e) A limit of work line shall be staked in the field by means of a four foot high fluorescent orange snow fencing supported eight foot on center with standard weight metal agricultural fence posts. The limit of work shall be placed as indicated on the approved plan or as may be determined by the Commission or their agent in the field. Workers shall be informed that no construction activity beyond that conditioned herein is to occur beyond this line at any time.

f) The Applicant shall notify the Commission in writing of the Applicant's desire to have the erosion control works and limit of work flagging inspected by the Commission or Environmental Monitor.

g) The Applicant shall receive written approval of the erosion control installation from the Commission or Environmental Monitor.

h) The Applicant shall arrange a pre-construction meeting between the Applicant, the General Contractor's site superintendent, and the Commission and/or Environmental Monitor. The purpose of this meeting is to review all aspects of the Order, in detail. The Project Supervisor in charge of day-to-day operations on site shall read and sign each page of a copy of the recorded Order. The purpose of this exercise is to insure that each and every Condition has been read and is understood. Questions relative to the meaning or intent of any Condition shall be clarified during the pre-construction meeting. At this meeting, the Applicant shall provide a sequential outline and schedule of the work included in Phase.

i) The Applicant shall submit electronic copies of ALL plans to be used by the Town of Westwood's Information Systems Department. Submissions will be used in conjunction with the town's current GIS system. For submission, CAD drawings (.dwg) preferably georeference to match the GIS. Projection should be in "real world" rather than just x,y. The projection to be submitted shall be the Massachusetts State Plane, NAD 83 feet. If additional clarification is needed, the Applicant is advised to contact Westwood Information Systems Department.

Only after the Applicant has satisfied the procedural requirements above shall the Applicant be allowed to begin construction.

Erosion Control and Pollution Prevention Measures

10. The Applicant and construction contractor shall furnish the Commission with copies of the following, relative to compliance with the EPA Construction General Permit

    a. The Notice of Intent submitted to the EPA for coverage under the Construction General Permit,

    b. EPA Active Project Notification

    c. Any revisions to the SWPPP

    d. The Notice of Termination (NOT), when filed with EPA.

11. All erosion and sediment control measures and orange snow fence shall be maintained in good condition at all times. Deteriorated erosion and sediment control measures shall be replaced as required, to maintain effectiveness. The Commission and/or Environmental Monitor reserve the right to require additional erosion and sediment controls and/or damage prevention control at any

time they are deemed appropriate. At no time shall any sediment be deposited in the wetland except as authorized in this Order.

12. Catch basins shall be equipped with Silt Sacks with performance standards equal to or greater then ACF Environmental Model # SIL T02X02 High Visibility Yellow. Silt Sacks must be color yellow and inspected and cleaned periodically no less than one time per month.

13. During all phases of construction, disturbed or exposed soil surfaces shall be brought to final finished grade and stabilized according to the approved SWPPP.

14. Standard Condition #6 of the State General Order of Conditions relating to the use of clean fill is modified to prohibit the presence of asphalt in any fill used on site.

15. No erosion control measures shall be removed or relocated until such removal or relocation is allowed by the Commission or Environmental Monitor, or if a Certificate of Compliance issues for the work conditioned herein, whichever comes first.

16. Dewatering of excavation shall be accomplished in the manner described by the attached sedimentation basin design to preclude the discharge of turbid water or sediment into any wetland or undisturbed buffer. The Commission and/or Environmental Monitor must inspect the sedimentation basin prior to use on site to insure compliance with this condition. (See Attachment "A")

17. No materials excavated from any area on the site shall be dumped into any Resource Area or Buffer Zone thereto.

18. During construction of the project, there shall be no discharge of fuel, oil, or other pollutants onto any part of the site. The Applicant shall take all reasonable precautions to prevent the release of pollutants by ignorance, accident, or vandalism. In the event there is a spill on the site, the Applicant shall immediately notify the Westwood Fire Department, the Commission and the Board of Health.

19. All construction materials, earth stockpiles, landscaping materials, slurry pits, waste products, refuse, debris, stumps, slash, or excavation materials may only be stockpiled or collected in areas as shown and labeled on the approved plan(s), or if no such areas are shown it must be placed or stored outside all resource areas and associated buffer zones under cover and surrounded by a double row of silt socks to prevent contact with rain water.

20. No material of any kind may be buried, placed or dispersed in areas within the jurisdiction of the Commission by activities that are the subject of this Order, except as are expressly permitted by this Order or the plans approved herein.

21. There shall be no underground storage of fuel or other hazardous substance in areas within the jurisdiction of the Commission unless written approval from the Commission and/or Environmental Monitor has been received in advance.

22. No trash dumpsters will be allowed within 100 feet of areas subject to protection under the Massachusetts Wetlands Protection Act or the Town's Bylaw.

23. Equipment fuel storage and refueling operations shall be situated in an upland area at a horizontal distance greater than 100 feet from the boundaries of the wetland resource areas and of the Riverfront Area.

24. Daily street sweepings beginning on or before the conclusion of the required pre-construction meeting shall be done on the following roadways. a) University Avenue from Blue Hill Drive to Canton St. b) Blue Hill Drive from Whitewood Road to University Avenue. c) Canton Street 200

feet proximal to the intersection of University Ave. d) Additional roadways that need daily sweeping, as required by the Commission's Agent or its representative. Copies of invoices, verifying the daily street sweepings shall be submitted to the Commission on a frequency of no less than 30 days. The daily street sweeping schedule can be reduced, amended, or stopped upon written acknowledgement by the Commission and/or Environmental Monitor.

25. The Applicant shall designate an Erosion Control Monitor to oversee the placement of supplemental erosion controls in an event of an emergency, and to conduct regular inspection, maintenance or replacement of erosion and sedimentation control devices. The Erosion Control Monitor must be accessible to the Commission and its agent by phone any time including evenings and weekends. This person shall be given authority by the Applicant to stop construction as it is related to sediment and erosion control.

26. An adequate stockpile of erosion control materials shall be on site at all times for emergency or routine replacement and shall include materials to repair or replace silt fences, silt sock, erosion control blankets, stone riprap, filter berms or any other devices planned for use during construction.

27. The Commission reserves the right to impose additional conditions on portions of this project to mitigate any impacts which could result from site erosion, or any noticeable degradation of surface water quality discharging from the site.

28. The area of construction shall remain in a stable condition at the close of each construction day. Erosion controls should be inspected at this time, and repaired, reinforced or replaced as necessary.

29. Subsequent to seeding, disturbed areas will be covered with a salt hay mulch, erosion control blanket or netting, or other suitable material in order to provide an adequate surface protection until seed germination. Preference should be given to erosion control netting with biodegradable stitching.

30. Cement trucks shall not be washed out in any wetland resource or buffer zone area, or into any drainage system. Any deposit of cement or concrete products into a buffer zone or wetland resource area shall be immediately removed.

31. A truck demudding apron(s) shall be installed as shown on the NOI Plans and on any other construction site access drive to prevent sediment from being tracked off site with heavy equipment and entering roadway street drainage. It shall measure a minimum of 60' in length, and no less that 30' in width. The apron shall be graded back onto the site and use a minimum of 2" stone.

Site Specific Conditions

32. Catch basins shall have a stencil, permanent plaque or catch basin marker, with a design approved by the Commission and/or Environmental Monitor. If a stencil is selected, it shall have a profile of a fish or duck, no less than 18 inches in length. The wildlife emblem shall be placed no less than 1 foot from the center arc of the catch basin grate and no greater than 2 feet from the center of the arc. The wording, "DON'T DUMP NEPONSET RIVER", no less than 3 inches in height shall be incorporated into the stencil. Permanent plaques or catch basin markers shall have similar wording and be approved by the Commission and/or Environmental Monitor prior to final design and placement. In the same year that the spot grades are verified for the detention basins, these stencils, plaques or markers will be replaced if necessary. A copy of the invoices for this activity will be submitted with the annual maintenance report to the Commission.

33. The Commission and/or Environmental Monitor shall witness the installation of critical BMP elements prior to backfill. Critical elements are considered to be the Stormceptor units, catch

basins, recharge (infiltration) systems, rain gardens, permeable pavers, and the foundation drainage systems as described in the approved plans and approved documents. The Environmental Monitor shall include a detailed account of these inspections with his/her monthly report to the Commission.

34. A planting scheme of (2) -2" DBH caliber trees for every 900 square feet of disturbance within the buffer zone shall be completed prior to requesting a Certificate of Compliance from the Conservation Commission.

35. All dumpsters shall comply with the Westwood Board of Health regulations for this site, including but not limited to provision of impervious surfaces with catchment systems for ALL dumpsters.

36. A foundation plan shall be submitted prior to the start of any framing or structural steel installation. The plan shall include the location of the wetland resource areas, the distance between the foundation and the wetland resource areas, foundation drainage systems, and any proximal stormwater management systems if in place at that time.

37. No substitutes for the Stormceptor units and other BMP elements represented on the approved plans shall be allowed without the express consent of the Commission. For the purpose of this condition, "substitute" includes any change of manufacturer, model, size, or functional feature of the device as depicted in the NOI plans and other submittals.

38. The Applicant shall notify the Commission and/or Environmental Monitor immediately upon discovery of any matter related to this Order that may affect any wetland resource area or buffer zone within the jurisdiction of the Commission in a manner not anticipated or addressed in this Order.

39. Site grading and construction shall be scheduled to avoid periods of high groundwater. Once begun, grading and construction shall move uninterrupted to completion to avoid erosion and siltation of the wetlands.

40. All equipment shall be inspected regularly for leaks. Any leaking hydraulic lines, cylinders or any other components shall be fixed immediately.

41. Upon beginning of work, the Project Supervisor and/or Environmental Professional shall submit to the Commission and/or Environmental Monitor written progress reports monthly. Progress reports shall indicate what work has been done in wetland resource areas, associated buffer zones and mitigation areas; Low Impact Development features and any work associated with the stormwater management and recharge systems. This report shall also discuss what work is anticipated to be done over the next reporting period. The reports shall also address the current condition of erosion and sedimentation controls; describe any erosion and sedimentation control repair and/or replacement; and describe any erosion or sedimentation problems and mitigation measures implemented.

42. All construction equipment shall be operated, parked, and maintained so as to limit alterations of wetlands and buffer zones to those areas clearly identified on the approved plans and demarcated in the field by the flagging and construction barriers installed pursuant to Condition #9f. No equipment is to enter or cross wetland resource areas at any time unless the location of disturbance is marked on the approved plans referenced in this Order and flagged in the field.

43. Compensatory flood storage shall be constructed prior to any filling of land subject to flooding.

44. Grading shall be accomplished so that runoff be directed as indicated on the approved plan.

45. The seed stock to be used to restore disturbed areas shall complement or contain native flora and be of proven value to local wildlife at all times.

46. Riprap material shall be clean and free of trash, tree stumps, roots, and other deleterious material at all times.

47. The four outlet pipes to the Neponset River identified in the project plans shall be identified and visibly marked in the field with fluorescent paint or other appropriate method so that they can be readily found at all times.

Wetland Replication

48. All wetland replication and resource area mitigation work (including inland stream creation) shall conform to the Wetland Replication Plan dated May 3, 2007 and all related supplementary submittals and plans.

49. The Commission and/or Environmental Monitor shall be given 48 hours notice prior to the beginning of construction of the mitigation areas. The Commission and/or Environmental Monitor must meet with the construction engineer and the Applicant's Wetlands Specialist to discuss requirements and to ensure compliance with all special conditions.

50. All work involving preparation and construction of the resource area mitigation areas shall be overseen by a Wetlands Specialist who will be on-site while the work is being performed. The Wetlands Specialist shall submit written status reports to the Commission and/or Environmental Monitor at the start of work on all mitigation areas and weekly through to the completion and final stabilization of all mitigation sites.

51. The Applicant will submit to the Commission and/or Environmental Monitor project monitoring reports for all mitigation areas at the conclusion of the mitigation work and at the end of each of the first five growing seasons. Reports will be prepared according to the approved Wetland Replication Plan documents referenced in Condition #48.

52. Following construction of mitigation areas and prior to other work on the site, the wetland specialist shall certify to the Commission that the area has been constructed in compliance with the Order of Condition. Such certification shall be accompanied by a plan showing the limits of the replication area and final grades as surveyed by a licensed land surveyor, which meet grades shown on the plans approved in this Order of Conditions.

53. Following completion of each mitigation area, the associated buffer zone will be identified and clearly marked so as to avoid future resource area impact from ongoing project activities.

54. Any unauthorized damage caused as a direct result of this project to any wetland resource areas shall be the responsibility of the Applicant and/or owner of the premises to repair, restore and/or replace. Sedimentation or erosion into these areas shall be considered damage to wetland resource areas. If sediment reaches these areas the Commission and/or Environmental Monitor shall be contacted and a plan for abatement of the problem and proposed restoration/mitigation measures shall be submitted for approval and implementation.

55. The Commission and/or Environmental Monitor reserves the right to impose additional conditions on portions of this project to mitigate any unapproved impacts which could result from wetland alteration or replication activities.

56. The Applicant is committed to a student participation program related to the Wetland Replication aspects of the work as described in Appendix I of the Applicant's May 18, 2007 Notice of Intent

Supplement. Details of the program shall be negotiated between the Applicant and the program leader.

Continuing Conditions

57. Erosion and sediment control measures and pollution prevention measures shall be implemented, maintained, inspected, and repaired in accordance with the plans and the Stormwater Pollution Prevention Plan (SWPPP) filed with the Notice of Intent. Any proposed modification to the SWPPP must be submitted in writing to the Commission for approval.

58. Detention Basins, rain gardens, and other stormwater management surface basins: As a Continuing Order of these Conditions, even after a Certificate of Compliance has been issued, the following requirements shall be the responsibility of the land owner:

    a. The as-built plan for these basins submitted with the Request for a Certificate of Compliance, or Partial Certificate of Compliance, shall include a minimum of three spot grades in the lowest elevation of each of the basins.

    b. Every five years, spot grades shall be surveyed and submitted to the Commission via Certified Mail for review with the annual maintenance report.

    c. If the elevation of the bottom of the basin increases more than 4 inches, or in the opinion of the Town Engineer the sedimentation has compromised the effectiveness of the basin, the basin shall be cleaned and restored to the elevation shown on the approved plan.

59. As a continuing condition of this Order, even after a Certificate of Compliance is issued, a yearly report, sent by certified mail shall be submitted to the Commission by December 31st of each year. The report shall include a tabular-form maintenance schedule that shall list each Stormwater Management System element, the type of maintenance or inspection accomplished, the date of completion, and the cost to complete. The yearly report shall also include copies of invoices for work performed in connection with maintenance of the Stormwater Management System. The Commission shall provide the Applicant or the Applicant's Successor(s), as the case may be, with an example of the required tabular form maintenance schedule.

60. The Commission or their representative shall be notified 72 hours prior to maintenance of any stormwater management system elements to observe the amounts of sediment that have accumulated in the system. This condition shall remain in perpetuity.

61. No landscaped area on any location on the site shall be fertilized without first having received written acceptance from the Commission of both the type and application rate and frequency of application of materials proposed to be used. The use of any inorganic fertilizer containing ammonium nitrate and ammonium phosphate is prohibited. Any fertilizer to be considered by the Commission must be limited to the use of slow release organic fertilizers only. This condition is being imposed to maintain water quality in the Neponset River as well as the public water supply. This condition shall survive the issuance of a Certificate of Compliance.

62. As a continuing condition of this Order, even after a Certificate of Compliance is issued, the use of herbicides and pesticides is prohibited. This condition is being imposed to maintain water quality in the Neponset River as well as the public water supply.

63. As a continuing condition of this Order, even after a Certificate of Compliance is issued, no activity, except routine maintenance and landscaping, is permitted within the buffer zone of the existing or replicated wetland resource areas including the removal or cutting of vegetation.

64. As a continuing condition of this Order, even after a Certificate of Compliance is issued, only calcium chloride or other non-sodium based equivalent product approved by the Commission shall be used as a de-icing agent.

65. Stabilized slopes shall be maintained as designed and constructed by the property owner of record, whether "bioengineered" or mechanically-stabilized slopes.

66. Dumping Prohibited: There shall be no dumping of leaves, grass clippings, brush, or other debris into jurisdictional resource areas or buffer zones. This condition shall survive the expiration of this Order, and shall be included as a continuing condition in perpetuity on the Certificate of Compliance.

67. Prior to the issuance of a Certificate of Compliance and upon the sale of the property to subsequent owners, the new owner shall provide a letter to the Commission acknowledging that he/she understands the wetland restrictions bound to its property. A copy of this letter shall accompany the written request for a Certificate of Compliance. This shall be an ongoing condition and shall be recorded in the deed and on subsequent deeds.

68. In the event that groundwater or unsuitable soil material is encountered during the installation of the infiltration structures, rain gardens, or permeable pavers rendering the approved design infeasible, the Applicant shall contact the Commission and/or Environmental Monitor immediately to discuss alternative designs/solutions.

Operation & Maintenance

69. The following party is identified in the Stormwater Facilities Operation and Maintenance Plan dated June 6, 2007 on file with the Commission, as being the owner of the stormwater capture, storage, and treatment Best Management Practices: Cabot, Cabot & Forbes. The following party is identified in the Stormwater Facilities Operation and Maintenance Plan dated June 6, 2007 on file with the Commission, as being responsible for ongoing operation and maintenance of the stormwater capture, storage, and treatment Best Management Practices: Cabot, Cabot & Forbes. Said owner and responsible party shall operate and maintain the stormwater capture, storage, and treatment Best Management Practices in strict accordance with the referenced Operations and Maintenance Plan. If the stormwater capture, storage and treatment structures are not maintained in accordance with the Operations and Maintenance Plan, such failure shall constitute noncompliance with the Certificate of Compliance and the owner and responsible party may be subject to fines and other administrative penalties per day of noncompliance.

70. All stormwater management practices shall be maintained as specified in the Operation and Maintenance Plan submitted with the Notice of Intent and incorporated in the Order. This condition shall be noted on the Certificate of Compliance and shall continue in perpetuity.

71. The owner and responsible party identified in the Operation and Maintenance Plan shall maintain a copy of the Operation and Maintenance Plan and Emergency Response and Contingency Plan at the following location: on-site. The owner and responsible party identified in the Operation and Maintenance Plan and Emergency Response and Contingency Plan shall permit public inspection of these documents and associated records at reasonable times by the Commission.

72. The owner and responsible party identified in the Emergency Response and Contingency Plan and the Operation and Maintenance Plan shall update the emergency contact list specified in these documents, including telephone numbers, addresses and/or email addresses, at least once a year after issuance of this Certificate of Compliance, and submit a copy to the Commission.

73. The owner and responsible party identified in the Operation and Maintenance Plan shall conduct training sessions specified for staff responsible for the ongoing operation and maintenance of the stormwater capture, storage, and treatment Best Management Practices in accordance with the schedule specified in the Operations and Maintenance Plan, but no less than at least one training session per year for maintenance staff. Copies of the training records shall be submitted to the Commission along with the required Maintenance Reports on or before December 31st of each year.

74. The owner and responsible party identified in the Emergency Response and Contingency Plan shall conduct trainings specified for staff responsible for emergency management and response in accordance with the schedule specified in the Emergency Response and Contingency Plan, but no less than one training session per year.

75. The Commission shall have reasonable access to all structural Best Management Practices constructed to capture, store, and treat stormwater, to ensure ongoing maintenance. The access shall be located on the approved plans dated June 13, 2007 prepared by Tetra Tech Rizzo, and on file with the Commission.

76. The Owner and responsible party for maintenance identified in the Operations and Maintenance Plan dated June 6, 2007 on file with the Commission, and/or successors shall be responsible for regular monitoring and cleaning out sumps, sediment traps, and other related stormwater capture, storage and treatment facilities as specified in the Operations and Maintenance Plan at the inspection and cleaning frequencies specified therein. This condition shall run in perpetuity and shall represent an ongoing condition in the Certificate of Compliance. All excavated sediments shall be removed from the site and disposed of according to MassDEP regulations. Excavated materials may be taken to a lined or unlined permitted solid waste sanitary landfill, subject to requirements in 310 CMR 19.00. If there is reason to believe that sediment and residuals from a structural BMP may be contaminated, (i.e. in the event of a spill), the material should be tested and properly disposed in accordance with DEP regulations, policies, and guidance. Reuse and disposal of street sweepings is discussed in Policy #BWP-94-092. Materials containing free draining liquids are prohibited from landfills. Records of disposal, including date inspected, cleaned, and volume of material removed shall be maintained by the Applicant and/or successors and shall be made available to the Commission or the MassDEP upon request.

77. Drainage channels, water quality swales, extended detention basins and other vegetated stormwater treatment Best Management Practices shall be mowed to the height and frequency specified in the Operations and Maintenance Plan. All mowed vegetation and debris shall be removed during mowing. Any accumulated sediment and debris shall be removed in accordance with the schedule specified in the Operation and Maintenance Plan.

78. Snow Removal – Snow removal shall be conducted in accordance with the Snow & Ice Removal Operations Plan filed with the NOI. Snow shall be managed as described in the Snow and Ice Removal Plan dated June 6, 2007 on file with the Commission. Snow shall not be plowed into vegetated wetlands, banks, coastal beaches, or Land Under Water. Snow piles shall not be placed atop catch basin inlets, in drainage channels, water quality swales, extended detention basins, wet retention basins, infiltration basins, infiltration trenches, and similar structural Best Management Practices. Snow shall be disposed of in accordance with the Massachusetts Department of Environmental Protection Snow Disposal Guidance. Storage or management of snow not in compliance with the DEP Snow Disposal Guidance shall be considered noncompliance with the Certificate of Compliance. Open water disposal of snow is strictly prohibited unless otherwise approved in an emergency by both the Commission and the Massachusetts Department of

Environmental Protection. Sediments shall be removed from snow storage areas in the early spring.

79. Recharge Structures: The infiltration basin, trench, dry well, infiltration chambers, infiltration galleys, rain gardens, permeable pavements, or other recharge structures shall be inspected after every large rainfall to ensure that it is functioning properly for one year after issuance of this Certificate. Thereafter, the inspection shall be conducted at the frequency specified in the Operations and Maintenance Plan, but in no case less than once per year after that.

80. Recharge Structures: Grass clippings, leaves and sediments are to be removed from the surface of the infiltration basin, trench, dry well, or rain garden on a regular basis. If water ponding occurs at the surface, the infiltration surface should be inspected for surface clogging. If surface clogging exists, the topsoil or first layer of aggregate must be removed and replaced. If ponding occurs in the trench, basin, well or rain garden, then all filter media, stone aggregate and/or filter fabric and sediments must be removed and replaced as required to restore the infiltration function.

81. Detention Structures: Inspections of all structures designed to control stormwater discharge rates (detention basins, extended detention basins, wet retention basins, underground detention chambers, and any other structure built for purposes of attenuating the peak rate of runoff) shall include an assessment of the hydraulic control structures for these devices, to ensure that the outlets are functional and providing the intended stormwater detention function. Corrective action shall be immediately initiated following any inspection that indicates loss of outlet control function or design conveyance capacity.

82. Illicit Discharges: There shall be no cross-connections between the stormwater management system and any wastewater system. Only stormwater shall be directed to the structural stormwater best management practices. Other discharges, such as sewerage, wastewater, including wastewater containing soap or sudsing agents, shall be directed to a sewerage system or approved subsurface treatment system, and not to any structural stormwater best management practices.

83. Catch basins shall be inspected and cleaned in accordance with the schedule specified in the Operations and Maintenance Plan. At the request of the Commission or at least yearly, the Owner and Responsible Party in the Operations and Maintenance Plan shall provide to the Commission written confirmation that the inspection and cleaning were conducted. This condition shall be noted on the Certificate of Compliance and shall continue in perpetuity.

84. The Owner(s), Responsible Party identified in the Operations and Maintenance Plan, their successors and assignees shall maintain all culverts, stream crossing structures, stormwater capture, storage, and treatment structures, including, but not limited to, catch basin inlets, sediment traps, retention and detention basins, constructed wetlands, outlet structures, and other elements of drainage systems, unless put into an easement to the Town of Westwood in order to avoid blockages and siltation which might cause failure of the system and/or detrimental impacts to on-site or off-site wetland resource areas, and shall maintain the integrity of vegetative cover on the site.

85. Vegetated Portions of BMPs shall be re-seeded, replanted, and mowed in accordance with the schedule specified in the Operations and Maintenance Plan.

86. Pretreatment devices shall be maintained in accordance with the schedule specified in the Operations and Maintenance Plan.

87. Devices installed to provide for shut down and containment shall be inspected in accordance with the schedule specified in the Operations and Maintenance Plan, but in no case less than once per

year, and repaired as necessary. Copies of said inspections shall be submitted to the Commission on or before December 31st of each year.

88. Commission members, the Environmental Monitor, staff, their designees, and Department of Environmental Protection staff shall have the right to enter onto said property to ensure compliance with the ongoing conditions contained within this Certificate of Compliance.

Changes in Plans

89. Significant changes to the approved plans that may impact wetland resource areas, associated buffer zones, sediment and erosion control, stormwater management, LID, and groundwater recharge/infiltration require formal action by the Commission allowing the change. The Applicant must submit a written request to the Commission to make a determination of significance for each change. The request should include an evaluation of the changes by the Environmental Monitor that will assist the Commission in making the determination. If the Commission determines by a majority vote that the changes are significant to wetland resources, the Commission may require a new public hearing, at the expense of the Applicant, to amend the Order, or if necessary, issue a new Order.

90. If the proposed change is determined to be significant, no work involving the change(s) shall be done until a new or amended Order of Conditions has been issued and all appeal periods have expired. It is the responsibility of the Applicant to make sure that all changes accepted by, or required by, the Commission are reflected in the plans held by other Town departments.

91. The Commission reserves the right to amend this Order after a legally advertised public hearing if plans or circumstances are changed or if new conditions or information so warrant.

Requirements for a Certificate of Compliance

92. Upon completion of work covered by this Order, the Applicant shall request in writing that a Certificate of Compliance be issued. The written request shall be accompanied by a statement from a Professional Engineer registered in the State of Massachusetts that all work allowed or required by this Order has been satisfactorily completed. Such request shall also be accompanied by an as-built plan prepared, stamped and signed by a registered P.E. and Land Surveyor.

93. A Partial Certificate of Compliance will be issued when the roadway construction is complete, the drainage system is complete, the utilities are complete, the Stormwater Management System construction is complete, the stormwater management system is cleaned and stabilized, and all the roadway related BMPs, including but not limited to deep sump catch basins, detention basins, Stormceptor units, infiltration areas, rain gardens, permeable pavers, and grass swales are fully functional.

94. Upon completion of construction and final soil stabilization, the Applicant shall submit the following to the Commission to request a Certificate or a partial Certificate of Compliance (COC):

    a. A Completed Request for a Certificate of Compliance form (WPA Form 8A or other form if required by the Commission at the time of request).

    b. A letter from a Registered Professional Engineer certifying compliance of the property with this Order of Conditions, and detailing any deviations that exist, and their potential effect on the project. A statement that the work is in "substantial compliance" with no detailing of the deviations shall not be accepted.

An "As-Built" plan signed and stamped by a Registered Professional Engineer and Land Surveyor showing post-construction conditions within all areas under the jurisdiction of the Massachusetts Wetlands Protection

Continuing Conditions

95. As a continuing order of these conditions, even after a Certificate of Compliance is issued, no activity is permitted within the no-disturb buffer to the existing wetland including, but not limited to, the removal or cutting of vegetation.

96. As a continuing order of these conditions, if within two (2) years from the issuance of a Certificate of Compliance erosion is evident on any slopes, mitigating measures satisfactory to the Westwood Conservation Commission shall be taken.

97. As a continuing order of these conditions, even after a Certificate of Compliance is issued, no by-products of landscaping may be placed within the no disturbance buffer zone, in the wetland area or flood plain.

Site Specific Conditions for Westwood Station

See above conditions.

Commission Signatures:

On 13th day Of June, 2007
Day

before me personally appeared

The above signitors

to me known to be the person described in and who executed the foregoing instrument and acknowledged that he/she executed the same as his/her free act and deed.

Notary Public

April 14, 2011
My Commission Expires

KARON SKINNER CATRONE
Notary Public
Commonwealth of Massachusetts
My Commission Expires
APRIL 14, 2011

This Order is issued to the applicant as follows:

☒ by hand delivery on 6/28/07

☐ by certified mail, return receipt requested, on

ATTACHMENT "A"

TOWN OF WESTWOOD

Commonwealth of Massachusetts

CONSERVATION COMMISSION

DEWATERING ACTIVITIES

During excavation activities for installation of the utilities, it may become necessary to dewater the trench in the instance that high groundwater or saturated soil is present. Dewatering is often necessary in wetlands or near stream banks to expose the ditch line and provide drier workspace. Discharges should be conveyed to filter bags in well-vegetated areas outside of the wetlands. The filter bags should be placed within haybale corrals when discharging in especially sensitive areas, such as near streambanks or wetlands.

FILTER BAGS AND HAYBALE CONTAINMENT AREA

- Where: Use filter bags for discharge when it is necessary to dewater the trench or excavation in order to provide a drier workspace. Dewatering sites should be located in well-vegetated areas within approved work areas.
- If practicable, Discharges should be located outside of wetlands and over 100 feet from a streambank or waterbody.
- If a well-vegetated area is not available, or if the discharge will be within 100 feet of a wetland or waterbody, discharge to a filter bag and a haybale containment structure.

INSTALLATION:

- Pump should be placed in a containment structure, such as a plastic, child sized pool to avoid any fuel leaks to the wetlands or waterways.
- Properly place the discharge hose into a pre-manufactured, geotextile filter bag per the manufacturer's instructions.
- Place the filter bag in a well-vegetated area outside of a wetland area and over 100 feet from a waterbody if practicable.
- The intake hose should be elevated off the trench bottom, and a sump should be created with clean rock in order to avoid pumping additional sediment.
- If the water must be discharged within 100 feet of a wetland or waterbody, a haybale corral should be built around the filter bag.
- Stake a double vertical line of haybales in an "L " or "U" shape on the down gradient sides of the bag. This will further filter the discharge water.

ATTACHMENT A

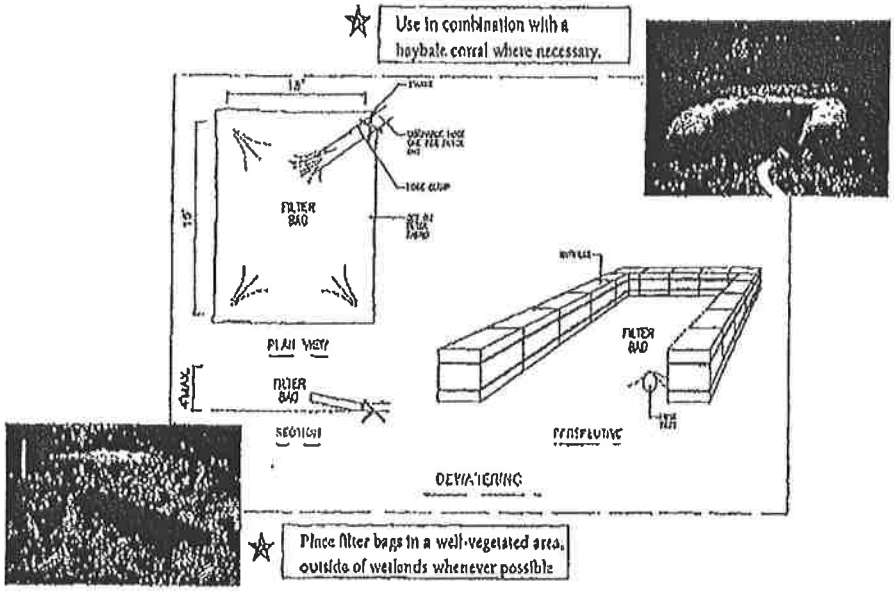
MAINTENANCE:

- If the pump requires refueling, it should be done within the plastic containment structure or over 100 feet from the wetland or waterbody.
- The pump should be manned at all times. The filter bag should be checked regularly during pumping activities to ensure that it is not reaching its holding capacity.
- If the bag appears to be nearing its limits, dewatering should cease until more water has filtered out and the bag can be replaced.
- Used filter bags and the trapped sediment they hold, must be disposed of in the proper manner.

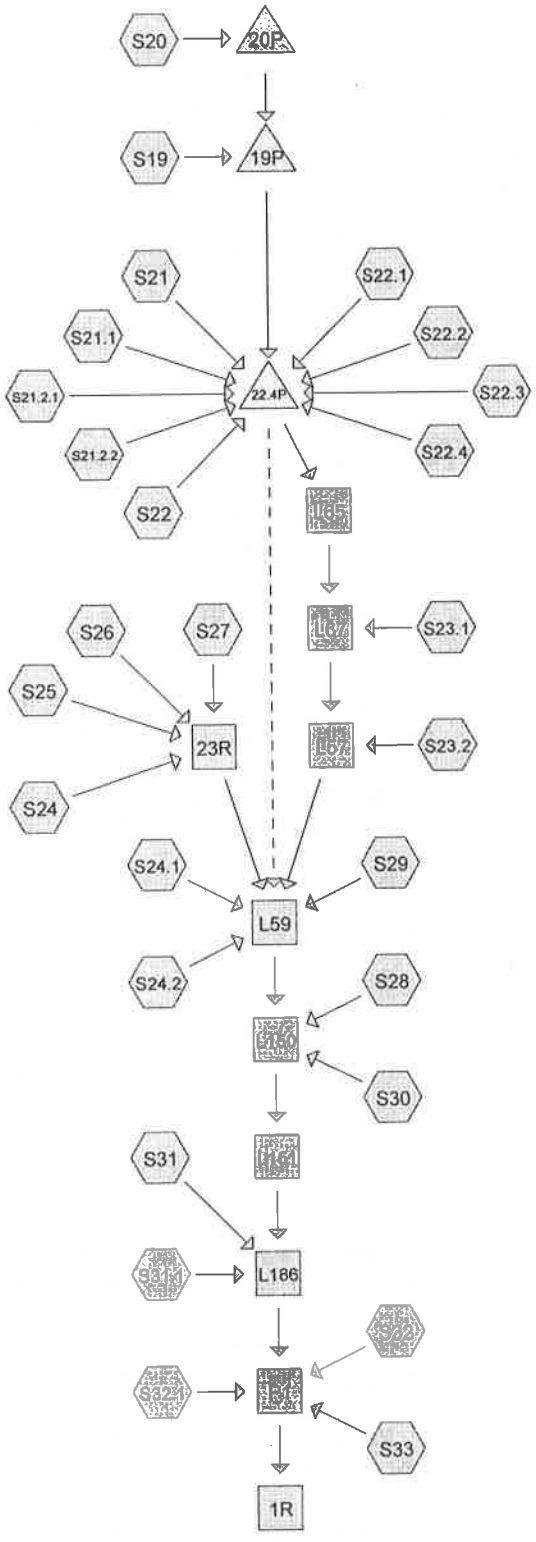
REMEMBER

Under no circumstances should trench water, or other forms of turbid water, be directly discharged onto exposed soil or into any wetland or waterbody. The Conservation Agent must inspect the dewatering system prior to use.

DEWATERING ACTIVITIES



Tab 5:
Drainage Calculations



Subcat Reach Pond Link

Routing Diagram for 3659-12003C-Existing Conditions POA 1-01
Prepared by {enter your company name here}, Printed 3/19/2013
HydroCAD® 10.00 s/n 00983 © 2012 HydroCAD Software Solutions LLC

Time span=0.00-20.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentS19: Runoff Area=25.787 ac 18.30% Impervious Runoff Depth>0.53"
Flow Length=1,620' Tc=11.2 min CN=65 Runoff=11.63 cfs 1.143 af

SubcatchmentS20: Runoff Area=2.640 ac 100.00% Impervious Runoff Depth>2.83"
Tc=5.0 min CN=98 Runoff=8.25 cfs 0.622 af

SubcatchmentS21: Runoff Area=5.370 ac 63.69% Impervious Runoff Depth>1.29"
Flow Length=1,904' Tc=12.7 min CN=80 Runoff=6.93 cfs 0.578 af

SubcatchmentS21.1: Runoff Area=1.730 ac 26.59% Impervious Runoff Depth>0.42"
Flow Length=530' Tc=13.6 min CN=62 Runoff=0.51 cfs 0.061 af

SubcatchmentS21.2.1: Runoff Area=0.107 ac 100.00% Impervious Runoff Depth>2.83"
Tc=5.0 min CN=98 Runoff=0.33 cfs 0.025 af

SubcatchmentS21.2.2: Runoff Area=1.133 ac 3.80% Impervious Runoff Depth>0.12"
Flow Length=752' Tc=10.9 min CN=51 Runoff=0.04 cfs 0.011 af

SubcatchmentS22: Runoff Area=3.230 ac 73.07% Impervious Runoff Depth>2.04"
Tc=5.0 min CN=90 Runoff=8.17 cfs 0.549 af

SubcatchmentS22.1: Runoff Area=3.014 ac 68.94% Impervious Runoff Depth>1.64"
Tc=5.0 min CN=85 Runoff=6.22 cfs 0.412 af

SubcatchmentS22.2: Runoff Area=2.223 ac 75.75% Impervious Runoff Depth>1.95"
Tc=5.0 min CN=89 Runoff=5.42 cfs 0.362 af

SubcatchmentS22.3: Runoff Area=1.151 ac 77.85% Impervious Runoff Depth>1.79"
Tc=5.0 min CN=87 Runoff=2.58 cfs 0.172 af

SubcatchmentS22.4: Runoff Area=4.963 ac 0.00% Impervious Runoff Depth>0.19"
Tc=5.0 min CN=54 Runoff=0.42 cfs 0.077 af

SubcatchmentS23.1: Runoff Area=2.670 ac 49.44% Impervious Runoff Depth>0.89"
Flow Length=1,129' Tc=11.4 min CN=73 Runoff=2.38 cfs 0.198 af

SubcatchmentS23.2: Runoff Area=1.450 ac 38.62% Impervious Runoff Depth>0.65"
Flow Length=955' Tc=14.4 min CN=68 Runoff=0.80 cfs 0.079 af

SubcatchmentS24: Runoff Area=2.660 ac 95.86% Impervious Runoff Depth>2.61"
Flow Length=1,232' Tc=8.4 min CN=96 Runoff=7.27 cfs 0.578 af

SubcatchmentS24.1: Runoff Area=2.330 ac 67.38% Impervious Runoff Depth>1.42"
Flow Length=1,769' Tc=10.5 min CN=82 Runoff=3.56 cfs 0.276 af

SubcatchmentS24.2: Runoff Area=1.300 ac 0.00% Impervious Runoff Depth>0.08"
Flow Length=1,421' Tc=9.4 min CN=49 Runoff=0.02 cfs 0.009 af

Subcatchment S25: Runoff Area=2.050 ac 82.93% Impervious Runoff Depth>2.04"
Flow Length=608' Tc=6.5 min CN=90 Runoff=4.98 cfs 0.348 af

Subcatchment S26: Runoff Area=1.770 ac 41.24% Impervious Runoff Depth>0.70"
Flow Length=447' Tc=7.8 min CN=69 Runoff=1.29 cfs 0.103 af

Subcatchment S27: Runoff Area=3.680 ac 93.21% Impervious Runoff Depth>2.50"
Flow Length=1,055' Tc=13.3 min CN=95 Runoff=8.51 cfs 0.768 af

Subcatchment S28: Runoff Area=8.848 ac 68.07% Impervious Runoff Depth>1.87"
Flow Length=1,367' Tc=13.3 min CN=88 Runoff=16.21 cfs 1.377 af

Subcatchment S29: Runoff Area=3.757 ac 0.00% Impervious Runoff Depth>0.10"
Flow Length=325' Tc=6.7 min CN=50 Runoff=0.09 cfs 0.032 af

Subcatchment S30: Runoff Area=4.820 ac 38.26% Impervious Runoff Depth>0.65"
Flow Length=1,003' Tc=17.7 min CN=68 Runoff=2.48 cfs 0.263 af

Subcatchment S31: Runoff Area=3.920 ac 0.00% Impervious Runoff Depth>0.07"
Flow Length=758' Tc=9.6 min CN=48 Runoff=0.05 cfs 0.022 af

Subcatchment S31.1: Runoff Area=0.923 ac 37.59% Impervious Runoff Depth>1.42"
Flow Length=711' Tc=8.9 min CN=82 Runoff=1.47 cfs 0.110 af

Subcatchment S32: Runoff Area=1.450 ac 50.34% Impervious Runoff Depth>0.95"
Tc=5.0 min CN=74 Runoff=1.68 cfs 0.114 af

Subcatchment S32.1: Runoff Area=2.720 ac 90.81% Impervious Runoff Depth>2.31"
Tc=5.0 min CN=93 Runoff=7.60 cfs 0.524 af

Subcatchment S33: Runoff Area=0.820 ac 0.00% Impervious Runoff Depth>0.08"
Tc=5.0 min CN=49 Runoff=0.01 cfs 0.006 af

Reach 1R: Point of Analysis 1 Inflow=55.00 cfs 8.465 af
Outflow=55.00 cfs 8.465 af

Reach 23R: Avg. Flow Depth=1.58' Max Vel=5.53 fps Inflow=20.91 cfs 1.798 af
36.0" Round Pipe n=0.014 L=310.0' S=0.0038 '/' Capacity=38.21 cfs Outflow=20.57 cfs 1.796 af

Reach L150: Avg. Flow Depth=1.39' Max Vel=3.31 fps Inflow=52.09 cfs 7.731 af
n=0.030 L=136.0' S=0.0043 '/' Capacity=654.46 cfs Outflow=51.89 cfs 7.723 af

Reach L151: Avg. Flow Depth=1.31' Max Vel=5.45 fps Inflow=51.89 cfs 7.723 af
n=0.030 L=155.0' S=0.0148 '/' Capacity=2,128.99 cfs Outflow=51.73 cfs 7.717 af

Reach L186: Avg. Flow Depth=1.97' Max Vel=2.65 fps Inflow=52.56 cfs 7.849 af
n=0.030 L=340.0' S=0.0020 '/' Capacity=279.47 cfs Outflow=51.84 cfs 7.822 af

Reach L57: Avg. Flow Depth=1.73' Max Vel=4.43 fps Inflow=18.72 cfs 4.026 af
36.0" Round Pipe n=0.014 L=446.0' S=0.0023 '/' Capacity=29.62 cfs Outflow=18.71 cfs 4.016 af

Reach L59: Avg. Flow Depth=1.99' Max Vel=1.87 fps Inflow=38.37 cfs 6.128 af
n=0.030 L=430.0' S=0.0010 '/' Capacity=84.11 cfs Outflow=37.00 cfs 6.092 af

Reach L65: Avg. Flow Depth=0.58' Max Vel=19.45 fps Inflow=16.79 cfs 3.751 af
30.0" Round Pipe n=0.014 L=104.0' S=0.1394 '/' Capacity=142.22 cfs Outflow=16.79 cfs 3.750 af

Reach L67: Avg. Flow Depth=0.86' Max Vel=9.10 fps Inflow=18.07 cfs 3.949 af
48.0" Round Pipe n=0.014 L=185.0' S=0.0178 '/' Capacity=178.14 cfs Outflow=18.07 cfs 3.947 af

Reach P1: Avg. Flow Depth=0.64' Max Vel=7.15 fps Inflow=55.05 cfs 8.467 af
n=0.030 L=46.0' S=0.0435 '/' Capacity=407.83 cfs Outflow=55.00 cfs 8.465 af

Pond 19P: Peak Elev=139.25' Storage=1,699 cf Inflow=19.62 cfs 1.763 af
Primary=10.02 cfs 1.587 af Secondary=7.86 cfs 0.173 af Outflow=17.88 cfs 1.760 af

Pond 20P: Peak Elev=167.55' Storage=2,838 cf Inflow=8.25 cfs 0.622 af
24.0" Round Culvert n=0.014 L=293.0' S=0.0819 '/' Outflow=11.03 cfs 0.620 af

Pond 22.4P: Peak Elev=73.98' Storage=35,246 cf Inflow=37.38 cfs 3.834 af
Primary=16.79 cfs 3.751 af Secondary=0.00 cfs 0.000 af Outflow=16.79 cfs 3.751 af

Time span=0.00-20.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentS19: Runoff Area=25.787 ac 18.30% Impervious Runoff Depth>1.26"
Flow Length=1,620' Tc=11.2 min CN=65 Runoff=32.68 cfs 2.716 af

SubcatchmentS20: Runoff Area=2.640 ac 100.00% Impervious Runoff Depth>4.16"
Tc=5.0 min CN=98 Runoff=11.95 cfs 0.916 af

SubcatchmentS21: Runoff Area=5.370 ac 63.69% Impervious Runoff Depth>2.37"
Flow Length=1,904' Tc=12.7 min CN=80 Runoff=12.76 cfs 1.060 af

SubcatchmentS21.1: Runoff Area=1.730 ac 26.59% Impervious Runoff Depth>1.08"
Flow Length=530' Tc=13.6 min CN=62 Runoff=1.69 cfs 0.155 af

SubcatchmentS21.2.1: Runoff Area=0.107 ac 100.00% Impervious Runoff Depth>4.16"
Tc=5.0 min CN=98 Runoff=0.48 cfs 0.037 af

SubcatchmentS21.2.2: Runoff Area=1.133 ac 3.80% Impervious Runoff Depth>0.51"
Flow Length=752' Tc=10.9 min CN=51 Runoff=0.37 cfs 0.048 af

SubcatchmentS22: Runoff Area=3.230 ac 73.07% Impervious Runoff Depth>3.30"
Tc=5.0 min CN=90 Runoff=12.90 cfs 0.888 af

SubcatchmentS22.1: Runoff Area=3.014 ac 68.94% Impervious Runoff Depth>2.82"
Tc=5.0 min CN=85 Runoff=10.59 cfs 0.708 af

SubcatchmentS22.2: Runoff Area=2.223 ac 75.75% Impervious Runoff Depth>3.20"
Tc=5.0 min CN=89 Runoff=8.67 cfs 0.593 af

SubcatchmentS22.3: Runoff Area=1.151 ac 77.85% Impervious Runoff Depth>3.01"
Tc=5.0 min CN=87 Runoff=4.27 cfs 0.288 af

SubcatchmentS22.4: Runoff Area=4.963 ac 0.00% Impervious Runoff Depth>0.65"
Tc=5.0 min CN=54 Runoff=3.09 cfs 0.268 af

SubcatchmentS23.1: Runoff Area=2.670 ac 49.44% Impervious Runoff Depth>1.82"
Flow Length=1,129' Tc=11.4 min CN=73 Runoff=5.05 cfs 0.404 af

SubcatchmentS23.2: Runoff Area=1.450 ac 38.62% Impervious Runoff Depth>1.46"
Flow Length=955' Tc=14.4 min CN=68 Runoff=1.99 cfs 0.176 af

SubcatchmentS24: Runoff Area=2.660 ac 95.86% Impervious Runoff Depth>3.93"
Flow Length=1,232' Tc=8.4 min CN=96 Runoff=10.69 cfs 0.872 af

SubcatchmentS24.1: Runoff Area=2.330 ac 67.38% Impervious Runoff Depth>2.54"
Flow Length=1,769' Tc=10.5 min CN=82 Runoff=6.34 cfs 0.494 af

SubcatchmentS24.2: Runoff Area=1.300 ac 0.00% Impervious Runoff Depth>0.42"
Flow Length=1,421' Tc=9.4 min CN=49 Runoff=0.31 cfs 0.046 af

Subcatchment S25: Runoff Area=2.050 ac 82.93% Impervious Runoff Depth>3.30"
Flow Length=608' Tc=6.5 min CN=90 Runoff=7.86 cfs 0.563 af

Subcatchment S26: Runoff Area=1.770 ac 41.24% Impervious Runoff Depth>1.53"
Flow Length=447' Tc=7.8 min CN=69 Runoff=3.11 cfs 0.226 af

Subcatchment S27: Runoff Area=3.680 ac 93.21% Impervious Runoff Depth>3.82"
Flow Length=1,055' Tc=13.3 min CN=95 Runoff=12.65 cfs 1.171 af

Subcatchment S28: Runoff Area=8.848 ac 68.07% Impervious Runoff Depth>3.09"
Flow Length=1,367' Tc=13.3 min CN=88 Runoff=26.35 cfs 2.281 af

Subcatchment S29: Runoff Area=3.757 ac 0.00% Impervious Runoff Depth>0.46"
Flow Length=325' Tc=6.7 min CN=50 Runoff=1.18 cfs 0.145 af

Subcatchment S30: Runoff Area=4.820 ac 38.26% Impervious Runoff Depth>1.46"
Flow Length=1,003' Tc=17.7 min CN=68 Runoff=6.10 cfs 0.585 af

Subcatchment S31: Runoff Area=3.920 ac 0.00% Impervious Runoff Depth>0.38"
Flow Length=758' Tc=9.6 min CN=48 Runoff=0.81 cfs 0.124 af

Subcatchment S31.1: Runoff Area=0.923 ac 37.59% Impervious Runoff Depth>2.54"
Flow Length=711' Tc=8.9 min CN=82 Runoff=2.61 cfs 0.196 af

Subcatchment S32: Runoff Area=1.450 ac 50.34% Impervious Runoff Depth>1.90"
Tc=5.0 min CN=74 Runoff=3.46 cfs 0.229 af

Subcatchment S32.1: Runoff Area=2.720 ac 90.81% Impervious Runoff Depth>3.61"
Tc=5.0 min CN=93 Runoff=11.54 cfs 0.818 af

Subcatchment S33: Runoff Area=0.820 ac 0.00% Impervious Runoff Depth>0.42"
Tc=5.0 min CN=49 Runoff=0.22 cfs 0.029 af

Reach 1R: Point of Analysis 1 Inflow=94.83 cfs 14.909 af
Outflow=94.83 cfs 14.909 af

Reach 23R: Avg. Flow Depth=2.13' Max Vel=6.07 fps Inflow=32.80 cfs 2.832 af
36.0" Round Pipe n=0.014 L=310.0' S=0.0038 '/' Capacity=38.21 cfs Outflow=32.01 cfs 2.829 af

Reach L150: Avg. Flow Depth=1.86' Max Vel=3.88 fps Inflow=89.44 cfs 13.574 af
n=0.030 L=136.0' S=0.0043 '/' Capacity=654.46 cfs Outflow=88.93 cfs 13.561 af

Reach L151: Avg. Flow Depth=1.71' Max Vel=6.28 fps Inflow=88.93 cfs 13.561 af
n=0.030 L=155.0' S=0.0148 '/' Capacity=2,128.99 cfs Outflow=88.19 cfs 13.553 af

Reach L186: Avg. Flow Depth=2.61' Max Vel=3.08 fps Inflow=90.55 cfs 13.873 af
n=0.030 L=340.0' S=0.0020 '/' Capacity=279.47 cfs Outflow=89.30 cfs 13.836 af

Reach L57: Avg. Flow Depth=2.21' Max Vel=4.74 fps Inflow=26.37 cfs 7.261 af
36.0" Round Pipe n=0.014 L=446.0' S=0.0023 '/' Capacity=29.62 cfs Outflow=26.30 cfs 7.246 af

Reach L59: Avg. Flow Depth=2.56' Max Vel=2.14 fps Inflow=63.16 cfs 10.759 af
n=0.030 L=430.0' S=0.0010 '/' Capacity=84.11 cfs Outflow=60.44 cfs 10.707 af

Reach L65: Avg. Flow Depth=0.66' Max Vel=20.96 fps Inflow=21.75 cfs 6.685 af
30.0" Round Pipe n=0.014 L=104.0' S=0.1394 '/' Capacity=142.22 cfs Outflow=21.75 cfs 6.684 af

Reach L67: Avg. Flow Depth=1.00' Max Vel=9.94 fps Inflow=24.44 cfs 7.088 af
48.0" Round Pipe n=0.014 L=185.0' S=0.0178 '/' Capacity=178.14 cfs Outflow=24.42 cfs 7.085 af

Reach P1: Avg. Flow Depth=0.90' Max Vel=8.77 fps Inflow=94.91 cfs 14.912 af
n=0.030 L=46.0' S=0.0435 '/' Capacity=407.83 cfs Outflow=94.83 cfs 14.909 af

Pond 19P: Peak Elev=139.58' Storage=2,472 cf Inflow=41.25 cfs 3.629 af
Primary=13.36 cfs 2.755 af Secondary=27.14 cfs 0.869 af Outflow=40.50 cfs 3.624 af

Pond 20P: Peak Elev=167.70' Storage=2,838 cf Inflow=11.95 cfs 0.916 af
24.0" Round Culvert n=0.014 L=293.0' S=0.0819 '/' Outflow=12.67 cfs 0.912 af

Pond 22.4P: Peak Elev=75.40' Storage=70,734 cf Inflow=63.12 cfs 6.800 af
Primary=21.75 cfs 6.685 af Secondary=0.00 cfs 0.000 af Outflow=21.75 cfs 6.685 af

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
19.484	49	50-75% Grass cover, Fair, HSG A (S21, S21.1, S21.2.2, S22.1, S22.2, S22.3, S22.4, S23.1, S23.2, S24, S24.1, S24.2, S25, S26, S27, S28, S29, S30, S31.1, S32, S32.1, S33)
5.184	69	50-75% Grass cover, Fair, HSG B (S22, S22.1, S22.2, S22.3, S22.4, S28, S29, S30, S31.1)
0.158	79	50-75% Grass cover, Fair, HSG C (S31.1)
29.481	98	Paved parking, HSG A (S19, S21, S21.1, S21.2.1, S21.2.2, S22, S22.1, S22.2, S22.3, S23.1, S23.2, S24, S24.1, S25, S26, S27, S28, S30, S31.1, S32, S32.1)
12.201	98	Roofs, HSG A (S19, S20, S24, S24.1, S25, S27, S28, S30, S32.1)
4.148	36	Woods, Fair, HSG A (S22.4, S29, S31, S31.1)
3.715	60	Woods, Fair, HSG B (S22.4, S29, S31, S31.1)
1.078	73	Woods, Fair, HSG C (S31, S31.1)
11.180	43	Woods/grass comb., Fair, HSG A (S19)
0.637	65	Woods/grass comb., Fair, HSG B (S19)
9.250	76	Woods/grass comb., Fair, HSG C (S19)
96.516	**73**	**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
19.484	5.184	0.158	0.000	0.000	24.826	50-75% Grass cover, Fair	S21, S21.1, S21.2.2, S22, S22.1, S22.2, S22.3, S22.4, S23.1, S23.2, S24, S24.1, S24.2, S25, S26, S27, S28, S29, S30, S31.1, S32, S32.1, S33
29.481	0.000	0.000	0.000	0.000	29.481	Paved parking	S19, S21, S21.1, S21.2.1, S21.2.2, S22, S22.1, S22.2, S22.3, S23.1, S23.2, S24, S24.1, S25, S26, S27, S28, S30, S31.1, S32, S32.1

Ground Covers (all nodes) (continued)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
12.201	0.000	0.000	0.000	0.000	12.201	Roofs	S19, S20, S24, S24.1, S25, S27, S28, S30, S32.1
4.148	3.715	1.078	0.000	0.000	8.941	Woods, Fair	S22.4, S29, S31, S31.1
11.180	0.637	9.250	0.000	0.000	21.067	Woods/grass comb., Fair	S19
76.494	**9.536**	**10.486**	**0.000**	**0.000**	**96.516**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	S19	0.00	0.00	1,420.0	0.0200	0.014	24.0	0.0	0.0
2	S21	0.00	0.00	1,215.0	0.0300	0.014	24.0	0.0	0.0
3	S21	0.00	0.00	240.0	0.0969	0.014	30.0	0.0	0.0
4	S21.1	0.00	0.00	140.0	0.1015	0.014	30.0	0.0	0.0
5	S21.2.2	0.00	0.00	90.0	0.0070	0.014	12.0	0.0	0.0
6	S23.1	0.00	0.00	24.0	0.0330	0.014	12.0	0.0	0.0
7	S23.2	0.00	0.00	105.0	0.0050	0.014	12.0	0.0	0.0
8	S24	0.00	0.00	70.0	0.0050	0.014	12.0	0.0	0.0
9	S24	0.00	0.00	190.0	0.0030	0.014	30.0	0.0	0.0
10	S24	0.00	0.00	760.0	0.0028	0.014	36.0	0.0	0.0
11	S24.1	0.00	0.00	447.0	0.0250	0.014	12.0	0.0	0.0
12	S24.1	0.00	0.00	953.0	0.0038	0.014	30.0	0.0	0.0
13	S24.2	0.00	0.00	986.0	0.0040	0.014	30.0	0.0	0.0
14	S25	0.00	0.00	106.0	0.0160	0.010	6.0	0.0	0.0
15	S25	0.00	0.00	380.0	0.0003	0.014	36.0	0.0	0.0
16	S26	0.00	0.00	95.0	0.0200	0.025	8.0	0.0	0.0
17	S26	0.00	0.00	110.0	0.0010	0.014	36.0	0.0	0.0
18	S27	0.00	0.00	70.0	0.0050	0.014	15.0	0.0	0.0
19	S27	0.00	0.00	707.0	0.0007	0.014	21.0	0.0	0.0
20	S28	0.00	0.00	160.0	0.0087	0.014	12.0	0.0	0.0
21	S28	0.00	0.00	247.0	0.0146	0.014	18.0	0.0	0.0
22	S28	0.00	0.00	225.0	0.1800	0.025	24.0	0.0	0.0
23	S31.1	0.00	0.00	15.0	0.0330	0.014	12.0	0.0	0.0
24	S31.1	0.00	0.00	235.0	0.0801	0.014	36.0	0.0	0.0
25	23R	47.50	46.32	310.0	0.0038	0.014	36.0	0.0	0.0
26	L57	47.30	46.28	446.0	0.0023	0.014	36.0	0.0	0.0
27	L65	71.00	56.50	104.0	0.1394	0.014	30.0	0.0	0.0
28	L67	50.70	47.40	185.0	0.0178	0.014	48.0	0.0	0.0
29	19P	137.80	105.30	612.0	0.0531	0.014	24.0	0.0	0.0
30	20P	166.00	142.00	293.0	0.0819	0.014	24.0	0.0	0.0
31	22.4P	71.00	70.99	1.0	0.0100	0.005	21.0	0.0	0.0

Time span=0.00-20.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentS19: Runoff Area=25.787 ac 18.30% Impervious Runoff Depth>1.82"
Flow Length=1,620' Tc=11.2 min CN=65 Runoff=48.54 cfs 3.920 af

SubcatchmentS20: Runoff Area=2.640 ac 100.00% Impervious Runoff Depth>5.02"
Tc=5.0 min CN=98 Runoff=14.31 cfs 1.105 af

SubcatchmentS21: Runoff Area=5.370 ac 63.69% Impervious Runoff Depth>3.11"
Flow Length=1,904' Tc=12.7 min CN=80 Runoff=16.68 cfs 1.393 af

SubcatchmentS21.1: Runoff Area=1.730 ac 26.59% Impervious Runoff Depth>1.60"
Flow Length=530' Tc=13.6 min CN=62 Runoff=2.61 cfs 0.230 af

SubcatchmentS21.2.1: Runoff Area=0.107 ac 100.00% Impervious Runoff Depth>5.02"
Tc=5.0 min CN=98 Runoff=0.58 cfs 0.045 af

SubcatchmentS21.2.2: Runoff Area=1.133 ac 3.80% Impervious Runoff Depth>0.86"
Flow Length=752' Tc=10.9 min CN=51 Runoff=0.80 cfs 0.081 af

SubcatchmentS22: Runoff Area=3.230 ac 73.07% Impervious Runoff Depth>4.13"
Tc=5.0 min CN=90 Runoff=15.92 cfs 1.111 af

SubcatchmentS22.1: Runoff Area=3.014 ac 68.94% Impervious Runoff Depth>3.61"
Tc=5.0 min CN=85 Runoff=13.42 cfs 0.906 af

SubcatchmentS22.2: Runoff Area=2.223 ac 75.75% Impervious Runoff Depth>4.02"
Tc=5.0 min CN=89 Runoff=10.76 cfs 0.745 af

SubcatchmentS22.3: Runoff Area=1.151 ac 77.85% Impervious Runoff Depth>3.81"
Tc=5.0 min CN=87 Runoff=5.36 cfs 0.366 af

SubcatchmentS22.4: Runoff Area=4.963 ac 0.00% Impervious Runoff Depth>1.05"
Tc=5.0 min CN=54 Runoff=5.75 cfs 0.433 af

SubcatchmentS23.1: Runoff Area=2.670 ac 49.44% Impervious Runoff Depth>2.48"
Flow Length=1,129' Tc=11.4 min CN=73 Runoff=6.94 cfs 0.552 af

SubcatchmentS23.2: Runoff Area=1.450 ac 38.62% Impervious Runoff Depth>2.06"
Flow Length=955' Tc=14.4 min CN=68 Runoff=2.85 cfs 0.249 af

SubcatchmentS24: Runoff Area=2.660 ac 95.86% Impervious Runoff Depth>4.79"
Flow Length=1,232' Tc=8.4 min CN=96 Runoff=12.88 cfs 1.061 af

SubcatchmentS24.1: Runoff Area=2.330 ac 67.38% Impervious Runoff Depth>3.31"
Flow Length=1,769' Tc=10.5 min CN=82 Runoff=8.18 cfs 0.642 af

SubcatchmentS24.2: Runoff Area=1.300 ac 0.00% Impervious Runoff Depth>0.74"
Flow Length=1,421' Tc=9.4 min CN=49 Runoff=0.77 cfs 0.080 af

Subcatchment S25: Runoff Area=2.050 ac 82.93% Impervious Runoff Depth>4.13"
Flow Length=608' Tc=6.5 min CN=90 Runoff=9.71 cfs 0.705 af

Subcatchment S26: Runoff Area=1.770 ac 41.24% Impervious Runoff Depth>2.15"
Flow Length=447' Tc=7.8 min CN=69 Runoff=4.41 cfs 0.317 af

Subcatchment S27: Runoff Area=3.680 ac 93.21% Impervious Runoff Depth>4.67"
Flow Length=1,055' Tc=13.3 min CN=95 Runoff=15.28 cfs 1.431 af

Subcatchment S28: Runoff Area=8.848 ac 68.07% Impervious Runoff Depth>3.91"
Flow Length=1,367' Tc=13.3 min CN=88 Runoff=32.88 cfs 2.881 af

Subcatchment S29: Runoff Area=3.757 ac 0.00% Impervious Runoff Depth>0.80"
Flow Length=325' Tc=6.7 min CN=50 Runoff=2.71 cfs 0.251 af

Subcatchment S30: Runoff Area=4.820 ac 38.26% Impervious Runoff Depth>2.06"
Flow Length=1,003' Tc=17.7 min CN=68 Runoff=8.75 cfs 0.826 af

Subcatchment S31: Runoff Area=3.920 ac 0.00% Impervious Runoff Depth>0.68"
Flow Length=758' Tc=9.6 min CN=48 Runoff=1.99 cfs 0.224 af

Subcatchment S31.1: Runoff Area=0.923 ac 37.59% Impervious Runoff Depth>3.31"
Flow Length=711' Tc=8.9 min CN=82 Runoff=3.37 cfs 0.254 af

Subcatchment S32: Runoff Area=1.450 ac 50.34% Impervious Runoff Depth>2.57"
Tc=5.0 min CN=74 Runoff=4.71 cfs 0.311 af

Subcatchment S32.1: Runoff Area=2.720 ac 90.81% Impervious Runoff Depth>4.45"
Tc=5.0 min CN=93 Runoff=14.05 cfs 1.009 af

Subcatchment S33: Runoff Area=0.820 ac 0.00% Impervious Runoff Depth>0.74"
Tc=5.0 min CN=49 Runoff=0.57 cfs 0.051 af

Reach 1R: Point of Analysis 1 Inflow=121.91 cfs 19.365 af
Outflow=121.91 cfs 19.365 af

Reach 23R: Avg. Flow Depth=2.60' Max Vel=6.16 fps Inflow=40.44 cfs 3.514 af
36.0" Round Pipe n=0.014 L=310.0' S=0.0038 '/' Capacity=38.21 cfs Outflow=39.34 cfs 3.511 af

Reach L150: Avg. Flow Depth=2.11' Max Vel=4.15 fps Inflow=113.68 cfs 17.586 af
n=0.030 L=136.0' S=0.0043 '/' Capacity=654.46 cfs Outflow=113.09 cfs 17.572 af

Reach L151: Avg. Flow Depth=1.92' Max Vel=6.70 fps Inflow=113.09 cfs 17.572 af
n=0.030 L=155.0' S=0.0148 '/' Capacity=2,128.99 cfs Outflow=112.56 cfs 17.562 af

Reach L186: Avg. Flow Depth=2.95' Max Vel=3.29 fps Inflow=116.46 cfs 18.040 af
n=0.030 L=340.0' S=0.0020 '/' Capacity=279.47 cfs Outflow=114.66 cfs 17.996 af

Reach L57: Avg. Flow Depth=2.62' Max Vel=4.78 fps Inflow=31.34 cfs 9.475 af
36.0" Round Pipe n=0.014 L=446.0' S=0.0023 '/' Capacity=29.62 cfs Outflow=30.97 cfs 9.457 af

Reach L59: Avg. Flow Depth=2.86' Max Vel=2.27 fps Inflow=78.58 cfs 13.940 af
n=0.030 L=430.0' S=0.0010 '/' Capacity=84.11 cfs Outflow=76.04 cfs 13.879 af

Reach L65: Avg. Flow Depth=0.70' Max Vel=21.64 fps Inflow=24.35 cfs 8.679 af
30.0" Round Pipe n=0.014 L=104.0' S=0.1394 '/' Capacity=142.22 cfs Outflow=24.35 cfs 8.678 af

Reach L67: Avg. Flow Depth=1.08' Max Vel=10.38 fps Inflow=28.51 cfs 9.230 af
48.0" Round Pipe n=0.014 L=185.0' S=0.0178 '/' Capacity=178.14 cfs Outflow=28.49 cfs 9.226 af

Reach P1: Avg. Flow Depth=1.06' Max Vel=9.61 fps Inflow=122.02 cfs 19.367 af
n=0.030 L=46.0' S=0.0435 '/' Capacity=407.83 cfs Outflow=121.91 cfs 19.365 af

Pond 19P: Peak Elev=139.79' Storage=3,065 cf Inflow=57.93 cfs 5.020 af
Primary=15.07 cfs 3.505 af Secondary=42.74 cfs 1.510 af Outflow=57.81 cfs 5.014 af

Pond 20P: Peak Elev=167.88' Storage=2,838 cf Inflow=14.31 cfs 1.105 af
24.0" Round Culvert n=0.014 L=293.0' S=0.0819 '/' Outflow=14.34 cfs 1.101 af

Pond 22.4P: Peak Elev=76.30' Storage=97,365 cf Inflow=80.68 cfs 8.815 af
Primary=24.35 cfs 8.679 af Secondary=0.00 cfs 0.000 af Outflow=24.35 cfs 8.679 af

Total Runoff Area = 96.516 ac Runoff Volume = 21.178 af Average Runoff Depth = 2.63"
56.81% Pervious = 54.834 ac 43.19% Impervious = 41.682 ac

Summary for Subcatchment S19:

Runoff = 48.54 cfs @ 12.17 hrs, Volume= 3.920 af, Depth> 1.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
11.180	43	Woods/grass comb., Fair, HSG A
0.637	65	Woods/grass comb., Fair, HSG B
9.250	76	Woods/grass comb., Fair, HSG C
3.215	98	Paved parking, HSG A
1.505	98	Roofs, HSG A
25.787	65	Weighted Average
21.067		81.70% Pervious Area
4.720		18.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	100	0.0300	0.20		**Sheet Flow, Sheet** Grass: Short n= 0.150 P2= 3.20"
2.5	1,420	0.0200	9.46	29.71	**Pipe Channel, Pipe** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.014
0.4	100	0.0600	3.94		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
11.2	1,620	Total			

Summary for Subcatchment S20:

Runoff = 14.31 cfs @ 12.07 hrs, Volume= 1.105 af, Depth> 5.02"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
2.640	98	Roofs, HSG A
2.640		100.00% Impervious Area

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

Summary for Subcatchment S21:

Runoff = 16.68 cfs @ 12.18 hrs, Volume= 1.393 af, Depth> 3.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
1.950	49	50-75% Grass cover, Fair, HSG A
3.420	98	Paved parking, HSG A
5.370	80	Weighted Average
1.950		36.31% Pervious Area
3.420		63.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	61	0.0660	0.11		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.20"
1.8	388	0.0310	3.57		**Shallow Concentrated Flow, Shallow Conc** Paved Kv= 20.3 fps
1.7	1,215	0.0300	11.58	36.38	**Pipe Channel, 24" Pipe** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.014
0.2	240	0.0969	24.15	118.56	**Pipe Channel, 24" Pipe** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.014
12.7	1,904	Total			

Summary for Subcatchment S21.1:

Runoff = 2.61 cfs @ 12.21 hrs, Volume= 0.230 af, Depth> 1.60"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
1.270	49	50-75% Grass cover, Fair, HSG A
0.460	98	Paved parking, HSG A
1.730	62	Weighted Average
1.270		73.41% Pervious Area
0.460		26.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	100	0.0800	0.14		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.20"
1.2	290	0.0614	3.99		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
0.1	140	0.1015	24.72	121.34	**Pipe Channel, 30" RCP** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.014
13.6	530	Total			

Summary for Subcatchment S21.2.1:

Runoff = 0.58 cfs @ 12.07 hrs, Volume= 0.045 af, Depth> 5.02"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.107	98	Paved parking, HSG A
0.107		100.00% Impervious Area

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

Summary for Subcatchment S21.2.2:

Runoff = 0.80 cfs @ 12.20 hrs, Volume= 0.081 af, Depth> 0.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
1.090	49	50-75% Grass cover, Fair, HSG A
0.043	98	Paved parking, HSG A
1.133	51	Weighted Average
1.090		96.20% Pervious Area
0.043		3.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	100	0.0300	0.20		**Sheet Flow, Sheet** Grass: Short n= 0.150 P2= 3.20"
1.8	442	0.0660	4.14		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
0.4	120	0.0670	5.25		**Shallow Concentrated Flow, Shallow Conc** Paved Kv= 20.3 fps
0.4	90	0.0070	3.52	2.77	**Pipe Channel, 12" RCP** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.014
10.9	752	Total			

Summary for Subcatchment S22:

Runoff = 15.92 cfs @ 12.07 hrs, Volume= 1.111 af, Depth> 4.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.870	69	50-75% Grass cover, Fair, HSG B
2.360	98	Paved parking, HSG A
3.230	90	Weighted Average
0.870		26.93% Pervious Area
2.360		73.07% Impervious Area

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

Summary for Subcatchment S22.1:

Runoff = 13.42 cfs @ 12.07 hrs, Volume= 0.906 af, Depth> 3.61"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.611	49	50-75% Grass cover, Fair, HSG A
0.325	69	50-75% Grass cover, Fair, HSG B
2.078	98	Paved parking, HSG A
3.014	85	Weighted Average
0.936		31.06% Pervious Area
2.078		68.94% Impervious Area

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

Summary for Subcatchment S22.2:

Runoff = 10.76 cfs @ 12.07 hrs, Volume= 0.745 af, Depth> 4.02"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.167	49	50-75% Grass cover, Fair, HSG A
0.372	69	50-75% Grass cover, Fair, HSG B
1.684	98	Paved parking, HSG A
2.223	89	Weighted Average
0.539		24.25% Pervious Area
1.684		75.75% Impervious Area

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

Summary for Subcatchment S22.3:

Runoff = 5.36 cfs @ 12.07 hrs, Volume= 0.366 af, Depth> 3.81"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.237	49	50-75% Grass cover, Fair, HSG A
0.018	69	50-75% Grass cover, Fair, HSG B
0.896	98	Paved parking, HSG A
1.151	87	Weighted Average
0.255		22.15% Pervious Area
0.896		77.85% Impervious Area

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

Summary for Subcatchment S22.4:

Runoff = 5.75 cfs @ 12.10 hrs, Volume= 0.433 af, Depth> 1.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
2.633	49	50-75% Grass cover, Fair, HSG A
1.097	69	50-75% Grass cover, Fair, HSG B
0.374	36	Woods, Fair, HSG A
0.859	60	Woods, Fair, HSG B
4.963	54	Weighted Average
4.963		100.00% Pervious Area

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

Summary for Subcatchment S23.1:

Runoff = 6.94 cfs @ 12.16 hrs, Volume= 0.552 af, Depth> 2.48"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
1.350	49	50-75% Grass cover, Fair, HSG A
1.320	98	Paved parking, HSG A
2.670	73	Weighted Average
1.350		50.56% Pervious Area
1.320		49.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.1	100	0.1800	0.41		**Sheet Flow, Sheet** Grass: Short n= 0.150 P2= 3.20"
4.6	300	0.0046	1.09		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
2.6	705	0.0480	4.45		**Shallow Concentrated Flow, Shallow Conc** Paved Kv= 20.3 fps
0.1	24	0.0330	7.65	6.01	**Pipe Channel, 12" RCP** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.014
11.4	1,129	Total			

Summary for Subcatchment S23.2:

Runoff = 2.85 cfs @ 12.21 hrs, Volume= 0.249 af, Depth> 2.06"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.890	49	50-75% Grass cover, Fair, HSG A
0.560	98	Paved parking, HSG A
1.450	68	Weighted Average
0.890		61.38% Pervious Area
0.560		38.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	100	0.1825	0.19		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.20"
3.2	360	0.0139	1.90		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
1.7	390	0.0374	3.93		**Shallow Concentrated Flow, Shallow Conc** Paved Kv= 20.3 fps
0.6	105	0.0050	2.98	2.34	**Pipe Channel, 12" RCP** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.014
14.4	955	Total			

Summary for Subcatchment S24:

Runoff = 12.88 cfs @ 12.11 hrs, Volume= 1.061 af, Depth> 4.79"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.110	49	50-75% Grass cover, Fair, HSG A
0.774	98	Paved parking, HSG A
1.776	98	Roofs, HSG A
2.660	96	Weighted Average
0.110		4.14% Pervious Area
2.550		95.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	100	0.0025	0.60		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.20"
1.8	112	0.0025	1.02		**Shallow Concentrated Flow, Shallow Conc** Paved Kv= 20.3 fps
0.4	70	0.0050	2.98	2.34	**Pipe Channel, 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.014
0.7	190	0.0030	4.25	20.86	**Pipe Channel, 30"** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.014
2.7	760	0.0028	4.64	32.77	**Pipe Channel, 36"** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.014
8.4	1,232	Total			

Summary for Subcatchment S24.1:

Runoff = 8.18 cfs @ 12.15 hrs, Volume= 0.642 af, Depth> 3.31"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.760	49	50-75% Grass cover, Fair, HSG A
1.227	98	Paved parking, HSG A
0.343	98	Roofs, HSG A
2.330	82	Weighted Average
0.760		32.62% Pervious Area
1.570		67.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	100	0.1300	0.36		**Sheet Flow, Sheet** Grass: Short n= 0.150 P2= 3.20"
1.0	153	0.0260	2.60		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
0.5	116	0.0430	4.21		**Shallow Concentrated Flow, Shallow Conc** Paved Kv= 20.3 fps
1.1	447	0.0250	6.66	5.23	**Pipe Channel, 12" RCP** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.014
3.3	953	0.0038	4.78	23.48	**Pipe Channel, 30" RCP** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.014
10.5	1,769	Total			

Summary for Subcatchment S24.2:

Runoff = 0.77 cfs @ 12.17 hrs, Volume= 0.080 af, Depth> 0.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
1.300	49	50-75% Grass cover, Fair, HSG A
1.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.04		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.20"
4.5	335	0.0060	1.25		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
3.3	986	0.0040	4.91	24.09	**Pipe Channel, 30" RCP** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.014
9.4	1,421	Total			

Summary for Subcatchment S25:

Runoff = 9.71 cfs @ 12.09 hrs, Volume= 0.705 af, Depth> 4.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.350	49	50-75% Grass cover, Fair, HSG A
1.181	98	Paved parking, HSG A
0.519	98	Roofs, HSG A
2.050	90	Weighted Average
0.350		17.07% Pervious Area
1.700		82.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	100	0.0070	0.90		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.20"
0.1	22	0.0480	4.45		**Shallow Concentrated Flow, Shallow Conc** Paved Kv= 20.3 fps
0.4	106	0.0160	4.70	0.92	**Pipe Channel, 6" PVC** 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13' n= 0.010 PVC, smooth interior
4.2	380	0.0003	1.52	10.73	**Pipe Channel, 36"** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.014
6.5	608	Total			

Summary for Subcatchment S26:

Runoff = 4.41 cfs @ 12.12 hrs, Volume= 0.317 af, Depth> 2.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
1.040	49	50-75% Grass cover, Fair, HSG A
0.730	98	Paved parking, HSG A
1.770	69	Weighted Average
1.040		58.76% Pervious Area
0.730		41.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	100	0.2000	0.29		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 3.20"
0.8	142	0.0377	3.13		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
0.6	95	0.0200	2.55	0.89	**Pipe Channel, 8" Metal** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.025
0.7	110	0.0010	2.77	19.59	**Pipe Channel, 36" RCP** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.014
7.8	447	Total			

Summary for Subcatchment S27:

Runoff = 15.28 cfs @ 12.18 hrs, Volume= 1.431 af, Depth> 4.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.250	49	50-75% Grass cover, Fair, HSG A
1.890	98	Paved parking, HSG A
1.540	98	Roofs, HSG A
3.680	95	Weighted Average
0.250		6.79% Pervious Area
3.430		93.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	100	0.0025	0.60		**Sheet Flow, Sheet** Smooth surfaces n= 0.011 P2= 3.20"
2.9	178	0.0025	1.02		**Shallow Concentrated Flow, Shallow Conc** Paved Kv= 20.3 fps
0.3	70	0.0050	3.46	4.24	**Pipe Channel, 15" RCP** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.014
7.3	707	0.0007	1.62	3.89	**Pipe Channel, 21" RCP** 21.0" Round Area= 2.4 sf Perim= 5.5' r= 0.44' n= 0.014
13.3	1,055	Total			

Summary for Subcatchment S28:

Runoff = 32.88 cfs @ 12.18 hrs, Volume= 2.881 af, Depth> 3.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.542	49	50-75% Grass cover, Fair, HSG A
2.283	69	50-75% Grass cover, Fair, HSG B
4.720	98	Paved parking, HSG A
1.303	98	Roofs, HSG A
8.848	88	Weighted Average
2.825		31.93% Pervious Area
6.023		68.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	100	0.1400	0.17		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.20"
0.2	67	0.2090	7.36		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
1.7	568	0.0742	5.53		**Shallow Concentrated Flow, Shallow Conc** Paved Kv= 20.3 fps
0.7	160	0.0087	3.93	3.09	**Pipe Channel, 12" RCP** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.014
0.6	247	0.0146	6.67	11.79	**Pipe Channel, 18" RCP** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.014
0.2	225	0.1800	15.89	49.91	**Pipe Channel, 24" CMP** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
13.3	1,367	Total			

Summary for Subcatchment S29:

Runoff = 2.71 cfs @ 12.13 hrs, Volume= 0.251 af, Depth> 0.80"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.336	49	50-75% Grass cover, Fair, HSG A
0.035	69	50-75% Grass cover, Fair, HSG B
1.398	36	Woods, Fair, HSG A
1.988	60	Woods, Fair, HSG B
3.757	50	Weighted Average
3.757		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	100	0.4500	0.27		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	225	0.2300	7.72		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
6.7	325	Total			

Summary for Subcatchment S30:

Runoff = 8.75 cfs @ 12.26 hrs, Volume= 0.826 af, Depth> 2.06"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
2.802	49	50-75% Grass cover, Fair, HSG A
0.174	69	50-75% Grass cover, Fair, HSG B
0.744	98	Paved parking, HSG A
1.100	98	Roofs, HSG A
4.820	68	Weighted Average
2.976		61.74% Pervious Area
1.844		38.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	100	0.2300	0.21		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.20"
7.3	708	0.0100	1.61		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
2.3	195	0.0050	1.44		**Shallow Concentrated Flow, Shallow Conc** Paved Kv= 20.3 fps
17.7	1,003	Total			

Summary for Subcatchment S31:

Runoff = 1.99 cfs @ 12.19 hrs, Volume= 0.224 af, Depth> 0.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
2.341	36	Woods, Fair, HSG A
0.852	60	Woods, Fair, HSG B
0.727	73	Woods, Fair, HSG C
3.920	48	Weighted Average
3.920		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	100	0.2900	0.23		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.20"
2.2	658	0.0970	5.01		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
9.6	758	Total			

Summary for Subcatchment S31.1:

Runoff = 3.37 cfs @ 12.13 hrs, Volume= 0.254 af, Depth> 3.31"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.035	36	Woods, Fair, HSG A
0.016	60	Woods, Fair, HSG B
0.351	73	Woods, Fair, HSG C
0.006	49	50-75% Grass cover, Fair, HSG A
0.010	69	50-75% Grass cover, Fair, HSG B
0.158	79	50-75% Grass cover, Fair, HSG C
0.347	98	Paved parking, HSG A
0.923	82	Weighted Average
0.576		62.41% Pervious Area
0.347		37.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	100	0.2800	0.22		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.20"
0.2	57	0.1400	6.02		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
1.0	304	0.0660	5.22		**Shallow Concentrated Flow, Shallow Conc** Paved Kv= 20.3 fps
0.0	15	0.0330	7.65	6.01	**Pipe Channel, 12" RCP** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.014
0.2	235	0.0801	24.80	175.29	**Pipe Channel, 36" RCP** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.014
8.9	711	Total			

Summary for Subcatchment S32:

Runoff = 4.71 cfs @ 12.08 hrs, Volume= 0.311 af, Depth> 2.57"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.720	49	50-75% Grass cover, Fair, HSG A
0.730	98	Paved parking, HSG A
1.450	74	Weighted Average
0.720		49.66% Pervious Area
0.730		50.34% Impervious Area

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

Summary for Subcatchment S32.1:

Runoff = 14.05 cfs @ 12.07 hrs, Volume= 1.009 af, Depth> 4.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.250	49	50-75% Grass cover, Fair, HSG A
0.995	98	Paved parking, HSG A
1.475	98	Roofs, HSG A
2.720	93	Weighted Average
0.250		9.19% Pervious Area
2.470		90.81% Impervious Area

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

Summary for Subcatchment S33:

Runoff = 0.57 cfs @ 12.11 hrs, Volume= 0.051 af, Depth> 0.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.820	49	50-75% Grass cover, Fair, HSG A
0.820		100.00% Pervious Area

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

Summary for Reach 1R: Point of Analysis 1

Inflow Area = 96.516 ac, 43.19% Impervious, Inflow Depth > 2.41" for 25-Year event
Inflow = 121.91 cfs @ 12.32 hrs, Volume= 19.365 af
Outflow = 121.91 cfs @ 12.32 hrs, Volume= 19.365 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Summary for Reach 23R:

Inflow Area = 10.160 ac, 82.78% Impervious, Inflow Depth > 4.15" for 25-Year event
Inflow = 40.44 cfs @ 12.12 hrs, Volume= 3.514 af
Outflow = 39.34 cfs @ 12.16 hrs, Volume= 3.511 af, Atten= 3%, Lag= 1.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.16 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 2.42 fps, Avg. Travel Time= 2.1 min

Peak Storage= 2,017 cf @ 12.14 hrs
Average Depth at Peak Storage= 2.60'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 38.21 cfs

36.0" Round Pipe
n= 0.014
Length= 310.0' Slope= 0.0038 '/'
Inlet Invert= 47.50', Outlet Invert= 46.32'

Summary for Reach L150:

Inflow Area = 86.683 ac, 43.99% Impervious, Inflow Depth > 2.43" for 25-Year event
Inflow = 113.68 cfs @ 12.24 hrs, Volume= 17.586 af
Outflow = 113.09 cfs @ 12.26 hrs, Volume= 17.572 af, Atten= 1%, Lag= 1.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.15 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.58 fps, Avg. Travel Time= 1.4 min

Peak Storage= 3,727 cf @ 12.25 hrs
Average Depth at Peak Storage= 2.11'
Bank-Full Depth= 5.00' Flow Area= 98.8 sf, Capacity= 654.46 cfs

8.00' x 5.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 1.7 '/' Top Width= 31.50'
Length= 136.0' Slope= 0.0043 '/'
Inlet Invert= 48.58', Outlet Invert= 48.00'

Summary for Reach L151:

Inflow Area = 86.683 ac, 43.99% Impervious, Inflow Depth > 2.43" for 25-Year event
Inflow = 113.09 cfs @ 12.26 hrs, Volume= 17.572 af
Outflow = 112.56 cfs @ 12.27 hrs, Volume= 17.562 af, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.70 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 2.79 fps, Avg. Travel Time= 0.9 min

Peak Storage= 2,615 cf @ 12.26 hrs
Average Depth at Peak Storage= 1.92'
Bank-Full Depth= 7.00' Flow Area= 150.5 sf, Capacity= 2,128.99 cfs

4.00' x 7.00' deep channel, n= 0.030
Side Slope Z-value= 2.0 3.0 '/' Top Width= 39.00'
Length= 155.0' Slope= 0.0148 '/'
Inlet Invert= 48.00', Outlet Invert= 45.71'

Summary for Reach L186:

Inflow Area = 91.526 ac, 42.04% Impervious, Inflow Depth > 2.37" for 25-Year event
Inflow = 116.46 cfs @ 12.27 hrs, Volume= 18.040 af
Outflow = 114.66 cfs @ 12.32 hrs, Volume= 17.996 af, Atten= 2%, Lag= 3.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.29 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 1.31 fps, Avg. Travel Time= 4.3 min

Peak Storage= 11,937 cf @ 12.29 hrs
Average Depth at Peak Storage= 2.95'
Bank-Full Depth= 4.50' Flow Area= 67.5 sf, Capacity= 279.47 cfs

6.00' x 4.50' deep channel, n= 0.030
Side Slope Z-value= 2.0 '/' Top Width= 24.00'
Length= 340.0' Slope= 0.0020 '/'
Inlet Invert= 45.71', Outlet Invert= 45.04'

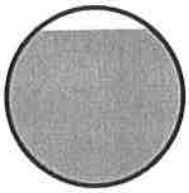
Summary for Reach L57:

Inflow Area = 55.468 ac, 36.58% Impervious, Inflow Depth > 2.05" for 25-Year event
Inflow = 31.34 cfs @ 12.22 hrs, Volume= 9.475 af
Outflow = 30.97 cfs @ 12.29 hrs, Volume= 9.457 af, Atten= 1%, Lag= 4.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.78 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 2.47 fps, Avg. Travel Time= 3.0 min

Peak Storage= 2,922 cf @ 12.26 hrs
Average Depth at Peak Storage= 2.62'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 29.62 cfs

36.0" Round Pipe
n= 0.014
Length= 446.0' Slope= 0.0023 '/'
Inlet Invert= 47.30', Outlet Invert= 46.28'



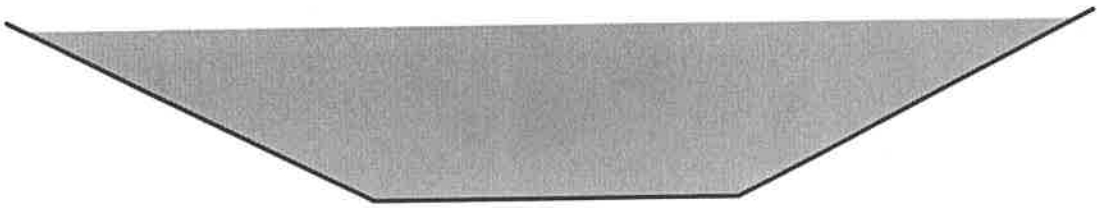
Summary for Reach L59:

Inflow Area = 73.015 ac, 41.45% Impervious, Inflow Depth > 2.29" for 25-Year event
Inflow = 78.58 cfs @ 12.17 hrs, Volume= 13.940 af
Outflow = 76.04 cfs @ 12.27 hrs, Volume= 13.879 af, Atten= 3%, Lag= 5.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.27 fps, Min. Travel Time= 3.2 min
Avg. Velocity = 0.95 fps, Avg. Travel Time= 7.6 min

Peak Storage= 14,398 cf @ 12.21 hrs
Average Depth at Peak Storage= 2.86'
Bank-Full Depth= 3.00' Flow Area= 36.0 sf, Capacity= 84.11 cfs

6.00' x 3.00' deep channel, n= 0.030
Side Slope Z-value= 2.0 '/' Top Width= 18.00'
Length= 430.0' Slope= 0.0010 '/'
Inlet Invert= 49.00', Outlet Invert= 48.58'



Summary for Reach L65:

Inflow Area = 51.348 ac, 35.85% Impervious, Inflow Depth > 2.03" for 25-Year event
Inflow = 24.35 cfs @ 12.60 hrs, Volume= 8.679 af
Outflow = 24.35 cfs @ 12.60 hrs, Volume= 8.678 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 21.64 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 10.87 fps, Avg. Travel Time= 0.2 min

Peak Storage= 117 cf @ 12.60 hrs
Average Depth at Peak Storage= 0.70'
Bank-Full Depth= 2.50' Flow Area= 4.9 sf, Capacity= 142.22 cfs

30.0" Round Pipe
n= 0.014
Length= 104.0' Slope= 0.1394 '/'
Inlet Invert= 71.00', Outlet Invert= 56.50'

Summary for Reach L67:

Inflow Area = 54.018 ac, 36.52% Impervious, Inflow Depth > 2.05" for 25-Year event
Inflow = 28.51 cfs @ 12.21 hrs, Volume= 9.230 af
Outflow = 28.49 cfs @ 12.22 hrs, Volume= 9.226 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 10.38 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 5.04 fps, Avg. Travel Time= 0.6 min

Peak Storage= 508 cf @ 12.22 hrs
Average Depth at Peak Storage= 1.08'
Bank-Full Depth= 4.00' Flow Area= 12.6 sf, Capacity= 178.14 cfs

48.0" Round Pipe
n= 0.014
Length= 185.0' Slope= 0.0178 '/'
Inlet Invert= 50.70', Outlet Invert= 47.40'

Summary for Reach P1:

Inflow Area = 96.516 ac, 43.19% Impervious, Inflow Depth > 2.41" for 25-Year event
Inflow = 122.02 cfs @ 12.32 hrs, Volume= 19.367 af
Outflow = 121.91 cfs @ 12.32 hrs, Volume= 19.365 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.61 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.22 fps, Avg. Travel Time= 0.2 min

Peak Storage= 584 cf @ 12.32 hrs
Average Depth at Peak Storage= 1.06'
Bank-Full Depth= 2.33' Flow Area= 28.0 sf, Capacity= 407.83 cfs

12.00' x 2.33' deep channel, n= 0.030
Length= 46.0' Slope= 0.0435 '/'
Inlet Invert= 43.00', Outlet Invert= 41.00'

Summary for Pond 19P:

Inflow Area = 28.427 ac, 25.89% Impervious, Inflow Depth > 2.12" for 25-Year event
Inflow = 57.93 cfs @ 12.15 hrs, Volume= 5.020 af
Outflow = 57.81 cfs @ 12.16 hrs, Volume= 5.014 af, Atten= 0%, Lag= 0.6 min
Primary = 15.07 cfs @ 12.16 hrs, Volume= 3.505 af
Secondary = 42.74 cfs @ 12.16 hrs, Volume= 1.510 af

Routing by Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 139.79' @ 12.16 hrs Surf.Area= 2,906 sf Storage= 3,065 cf

Plug-Flow detention time= 2.0 min calculated for 5.002 af (100% of inflow)
Center-of-Mass det. time= 1.5 min (799.1 - 797.6)

Volume	Invert	Avail.Storage	Storage Description
#1	137.80'	30,987 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
137.80	174	0	0
138.30	860	259	259
138.80	1,546	602	860
139.30	2,232	945	1,805
139.80	2,919	1,288	3,092
140.30	3,605	1,631	4,723
140.80	4,291	1,974	6,697
141.30	4,977	2,317	9,014
141.80	5,663	2,660	11,674
148.00	567	19,313	30,987

Device	Routing	Invert	Outlet Devices
#1	Primary	137.80'	**24.0" Round Culvert** L= 612.0' Ke= 0.500 Inlet / Outlet Invert= 137.80' / 105.30' S= 0.0531 '/' Cc= 0.900 n= 0.014, Flow Area= 3.14 sf
#2	Secondary	139.00'	**23.0' long x 18.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=15.04 cfs @ 12.16 hrs HW=139.78' (Free Discharge)
└**1=Culvert** (Inlet Controls 15.04 cfs @ 4.79 fps)

Secondary OutFlow Max=42.19 cfs @ 12.16 hrs HW=139.78' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 42.19 cfs @ 2.34 fps)

Summary for Pond 20P:

Inflow Area = 2.640 ac,100.00% Impervious, Inflow Depth > 5.02" for 25-Year event
Inflow = 14.31 cfs @ 12.07 hrs, Volume= 1.105 af
Outflow = 14.34 cfs @ 12.07 hrs, Volume= 1.101 af, Atten= 0%, Lag= 0.0 min
Primary = 14.34 cfs @ 12.07 hrs, Volume= 1.101 af

Routing by Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 167.88' @ 12.07 hrs Surf.Area= 4,356 sf Storage= 2,838 cf

Plug-Flow detention time= 11.5 min calculated for 1.098 af (99% of inflow)
Center-of-Mass det. time= 9.8 min (728.1 - 718.4)

Volume	Invert	Avail.Storage	Storage Description
#1	166.00'	2,838 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
166.00	0	0	0
166.25	2,875	359	359
166.50	3,790	833	1,193
166.75	4,225	1,002	2,194
166.90	4,356	644	2,838

Device	Routing	Invert	Outlet Devices
#1	Primary	166.00'	**24.0" Round Culvert** L= 293.0' Ke= 0.500 Inlet / Outlet Invert= 166.00' / 142.00' S= 0.0819 '/' Cc= 0.900 n= 0.014, Flow Area= 3.14 sf

Primary OutFlow Max=13.81 cfs @ 12.07 hrs HW=167.82' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 13.81 cfs @ 4.60 fps)

Summary for Pond 22.4P:

Inflow Area = 51.348 ac, 35.85% Impervious, Inflow Depth > 2.06" for 25-Year event
Inflow = 80.68 cfs @ 12.10 hrs, Volume= 8.815 af
Outflow = 24.35 cfs @ 12.60 hrs, Volume= 8.679 af, Atten= 70%, Lag= 30.1 min
Primary = 24.35 cfs @ 12.60 hrs, Volume= 8.679 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 76.30' @ 12.60 hrs Surf.Area= 31,659 sf Storage= 97,365 cf

Plug-Flow detention time= 44.3 min calculated for 8.658 af (98% of inflow)
Center-of-Mass det. time= 38.3 min (836.4 - 798.0)

Volume	Invert	Avail.Storage	Storage Description
#1	71.00'	233,786 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
71.00	5,227	0	0
71.25	5,793	1,378	1,378
71.50	6,360	1,519	2,897
71.75	6,926	1,661	4,557
72.00	7,492	1,802	6,360
72.25	9,295	2,098	8,458
72.50	11,097	2,549	11,007
72.75	12,899	3,000	14,007
73.00	14,702	3,450	17,457
73.25	16,504	3,901	21,357
73.50	18,306	4,351	25,709
73.75	20,108	4,802	30,510
74.00	21,911	5,252	35,763
74.25	22,983	5,612	41,375
74.50	24,056	5,880	47,254
74.75	25,129	6,148	53,403
75.00	26,201	6,416	59,819
75.25	27,274	6,684	66,503
75.50	28,347	6,953	73,456
75.75	29,419	7,221	80,677
76.00	30,492	7,489	88,165
76.25	31,478	7,746	95,912
76.50	32,463	7,993	103,904
76.75	33,449	8,239	112,143
77.00	34,434	8,485	120,629
77.25	35,420	8,732	129,360
77.50	36,405	8,978	138,339
77.75	37,391	9,225	147,563
78.00	38,376	9,471	157,034
79.00	38,376	38,376	195,410
80.00	38,376	38,376	233,786

Device	Routing	Invert	Outlet Devices
#1	Secondary	79.00'	**12.0' long x 37.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#2	Primary	71.00'	**21.0" Round Culvert** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 71.00' / 70.99' S= 0.0100 '/' Cc= 0.900 n= 0.005, Flow Area= 2.41 sf

Primary OutFlow Max=24.35 cfs @ 12.60 hrs HW=76.30' (Free Discharge)
└**2=Culvert** (Inlet Controls 24.35 cfs @ 10.12 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=71.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Time span=0.00-20.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentS19: Runoff Area=25.787 ac 18.30% Impervious Runoff Depth>2.61"
Flow Length=1,620' Tc=11.2 min CN=65 Runoff=70.52 cfs 5.608 af

SubcatchmentS20: Runoff Area=2.640 ac 100.00% Impervious Runoff Depth>6.12"
Tc=5.0 min CN=98 Runoff=17.33 cfs 1.347 af

SubcatchmentS21: Runoff Area=5.370 ac 63.69% Impervious Runoff Depth>4.10"
Flow Length=1,904' Tc=12.7 min CN=80 Runoff=21.90 cfs 1.834 af

SubcatchmentS21.1: Runoff Area=1.730 ac 26.59% Impervious Runoff Depth>2.33"
Flow Length=530' Tc=13.6 min CN=62 Runoff=3.91 cfs 0.336 af

SubcatchmentS21.2.1: Runoff Area=0.107 ac 100.00% Impervious Runoff Depth>6.12"
Tc=5.0 min CN=98 Runoff=0.70 cfs 0.055 af

SubcatchmentS21.2.2: Runoff Area=1.133 ac 3.80% Impervious Runoff Depth>1.40"
Flow Length=752' Tc=10.9 min CN=51 Runoff=1.50 cfs 0.132 af

SubcatchmentS22: Runoff Area=3.230 ac 73.07% Impervious Runoff Depth>5.20"
Tc=5.0 min CN=90 Runoff=19.76 cfs 1.399 af

SubcatchmentS22.1: Runoff Area=3.014 ac 68.94% Impervious Runoff Depth>4.64"
Tc=5.0 min CN=85 Runoff=17.05 cfs 1.166 af

SubcatchmentS22.2: Runoff Area=2.223 ac 75.75% Impervious Runoff Depth>5.08"
Tc=5.0 min CN=89 Runoff=13.42 cfs 0.942 af

SubcatchmentS22.3: Runoff Area=1.151 ac 77.85% Impervious Runoff Depth>4.86"
Tc=5.0 min CN=87 Runoff=6.74 cfs 0.466 af

SubcatchmentS22.4: Runoff Area=4.963 ac 0.00% Impervious Runoff Depth>1.65"
Tc=5.0 min CN=54 Runoff=9.71 cfs 0.680 af

SubcatchmentS23.1: Runoff Area=2.670 ac 49.44% Impervious Runoff Depth>3.38"
Flow Length=1,129' Tc=11.4 min CN=73 Runoff=9.46 cfs 0.752 af

SubcatchmentS23.2: Runoff Area=1.450 ac 38.62% Impervious Runoff Depth>2.89"
Flow Length=955' Tc=14.4 min CN=68 Runoff=4.04 cfs 0.349 af

SubcatchmentS24: Runoff Area=2.660 ac 95.86% Impervious Runoff Depth>5.88"
Flow Length=1,232' Tc=8.4 min CN=96 Runoff=15.66 cfs 1.304 af

SubcatchmentS24.1: Runoff Area=2.330 ac 67.38% Impervious Runoff Depth>4.31"
Flow Length=1,769' Tc=10.5 min CN=82 Runoff=10.55 cfs 0.837 af

SubcatchmentS24.2: Runoff Area=1.300 ac 0.00% Impervious Runoff Depth>1.24"
Flow Length=1,421' Tc=9.4 min CN=49 Runoff=1.54 cfs 0.135 af

Subcatchment S25: Runoff Area=2.050 ac 82.93% Impervious Runoff Depth>5.19"
Flow Length=608' Tc=6.5 min CN=90 Runoff=12.04 cfs 0.887 af

Subcatchment S26: Runoff Area=1.770 ac 41.24% Impervious Runoff Depth>2.99"
Flow Length=447' Tc=7.8 min CN=69 Runoff=6.19 cfs 0.441 af

Subcatchment S27: Runoff Area=3.680 ac 93.21% Impervious Runoff Depth>5.76"
Flow Length=1,055' Tc=13.3 min CN=95 Runoff=18.63 cfs 1.766 af

Subcatchment S28: Runoff Area=8.848 ac 68.07% Impervious Runoff Depth>4.96"
Flow Length=1,367' Tc=13.3 min CN=88 Runoff=41.20 cfs 3.659 af

Subcatchment S29: Runoff Area=3.757 ac 0.00% Impervious Runoff Depth>1.32"
Flow Length=325' Tc=6.7 min CN=50 Runoff=5.30 cfs 0.414 af

Subcatchment S30: Runoff Area=4.820 ac 38.26% Impervious Runoff Depth>2.89"
Flow Length=1,003' Tc=17.7 min CN=68 Runoff=12.39 cfs 1.159 af

Subcatchment S31: Runoff Area=3.920 ac 0.00% Impervious Runoff Depth>1.17"
Flow Length=758' Tc=9.6 min CN=48 Runoff=4.21 cfs 0.381 af

Subcatchment S31.1: Runoff Area=0.923 ac 37.59% Impervious Runoff Depth>4.31"
Flow Length=711' Tc=8.9 min CN=82 Runoff=4.38 cfs 0.332 af

Subcatchment S32: Runoff Area=1.450 ac 50.34% Impervious Runoff Depth>3.49"
Tc=5.0 min CN=74 Runoff=6.36 cfs 0.422 af

Subcatchment S32.1: Runoff Area=2.720 ac 90.81% Impervious Runoff Depth>5.54"
Tc=5.0 min CN=93 Runoff=17.24 cfs 1.255 af

Subcatchment S33: Runoff Area=0.820 ac 0.00% Impervious Runoff Depth>1.25"
Tc=5.0 min CN=49 Runoff=1.12 cfs 0.085 af

Reach 1R: Point of Analysis 1 Inflow=147.36 cfs 25.259 af
Outflow=147.36 cfs 25.259 af

Reach 23R: Avg. Flow Depth=3.00' Max Vel=6.16 fps Inflow=50.27 cfs 4.398 af
36.0" Round Pipe n=0.014 L=310.0' S=0.0038 '/' Capacity=38.21 cfs Outflow=40.75 cfs 4.394 af

Reach L150: Avg. Flow Depth=2.31' Max Vel=4.34 fps Inflow=134.74 cfs 22.867 af
n=0.030 L=136.0' S=0.0043 '/' Capacity=654.46 cfs Outflow=133.26 cfs 22.851 af

Reach L151: Avg. Flow Depth=2.07' Max Vel=7.00 fps Inflow=133.26 cfs 22.851 af
n=0.030 L=155.0' S=0.0148 '/' Capacity=2,128.99 cfs Outflow=132.93 cfs 22.839 af

Reach L186: Avg. Flow Depth=3.23' Max Vel=3.45 fps Inflow=139.33 cfs 23.552 af
n=0.030 L=340.0' S=0.0020 '/' Capacity=279.47 cfs Outflow=137.56 cfs 23.500 af

Reach L57: Avg. Flow Depth=3.00' Max Vel=4.77 fps Inflow=37.38 cfs 12.366 af
36.0" Round Pipe n=0.014 L=446.0' S=0.0023 '/' Capacity=29.62 cfs Outflow=30.62 cfs 12.343 af

Reach L59: Avg. Flow Depth=2.99' Max Vel=2.33 fps Inflow=85.20 cfs 18.123 af
n=0.030 L=430.0' S=0.0010 '/' Capacity=84.11 cfs Outflow=83.45 cfs 18.050 af

Reach L65: Avg. Flow Depth=0.74' Max Vel=22.34 fps Inflow=27.20 cfs 11.270 af
30.0" Round Pipe n=0.014 L=104.0' S=0.1394 '/' Capacity=142.22 cfs Outflow=27.20 cfs 11.269 af

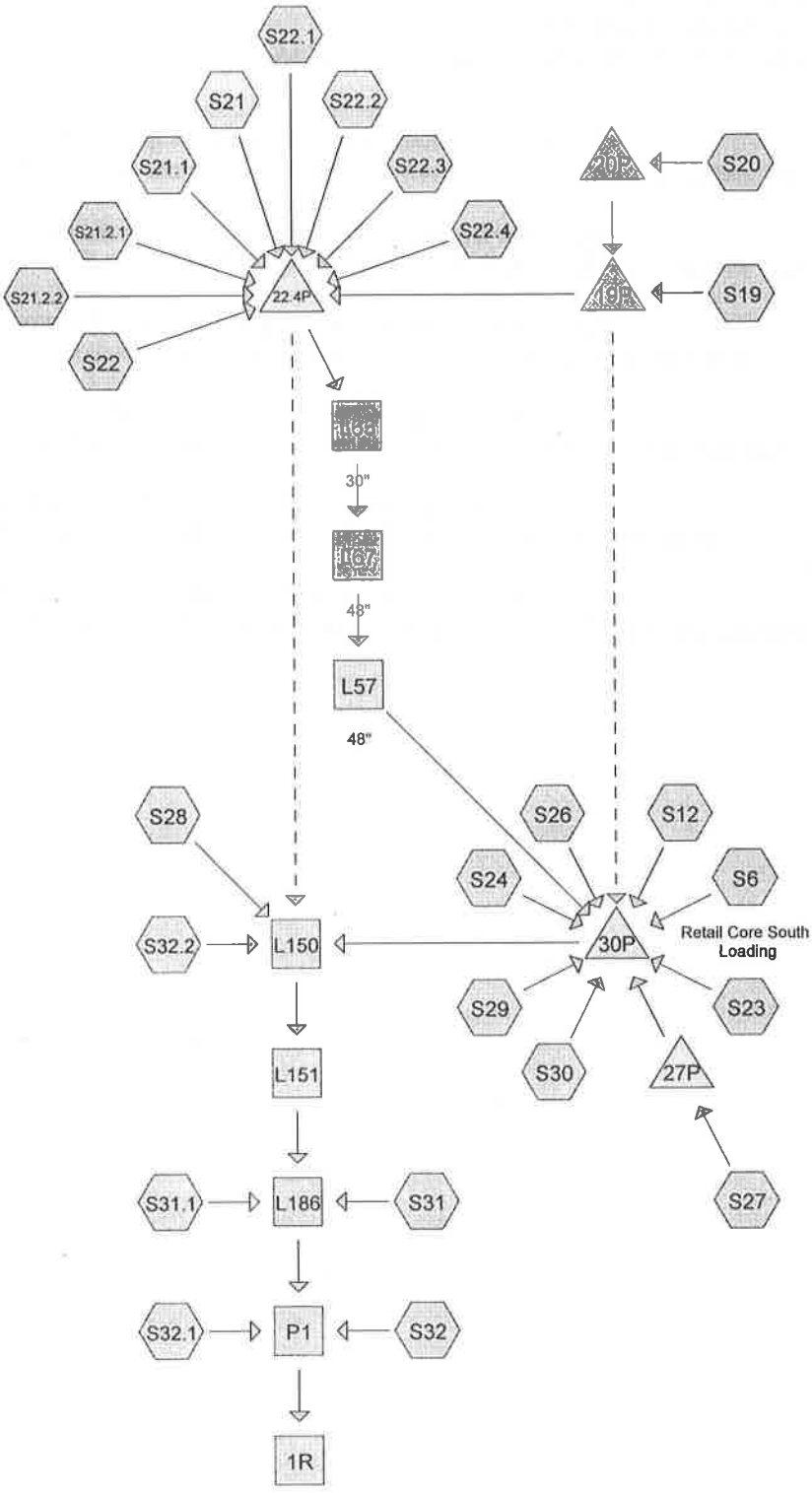
Reach L67: Avg. Flow Depth=1.17' Max Vel=10.87 fps Inflow=33.36 cfs 12.021 af
48.0" Round Pipe n=0.014 L=185.0' S=0.0178 '/' Capacity=178.14 cfs Outflow=33.34 cfs 12.017 af

Reach P1: Avg. Flow Depth=1.19' Max Vel=10.29 fps Inflow=147.44 cfs 25.262 af
n=0.030 L=46.0' S=0.0435 '/' Capacity=407.83 cfs Outflow=147.36 cfs 25.259 af

Pond 19P: Peak Elev=140.05' Storage=3,861 cf Inflow=80.44 cfs 6.950 af
Primary=16.90 cfs 4.420 af Secondary=65.04 cfs 2.522 af Outflow=81.94 cfs 6.942 af

Pond 20P: Peak Elev=168.43' Storage=2,838 cf Inflow=17.33 cfs 1.347 af
24.0" Round Culvert n=0.014 L=293.0' S=0.0819 '/' Outflow=18.24 cfs 1.342 af

Pond 22.4P: Peak Elev=77.39' Storage=134,436 cf Inflow=103.37 cfs 11.430 af
Primary=27.20 cfs 11.270 af Secondary=0.00 cfs 0.000 af Outflow=27.20 cfs 11.270 af



Subcat Reach Pond Link

Routing Diagram for 3659-12003C-Proposed Conditions POA 1-01
Prepared by {enter your company name here}, Printed 9/24/2013

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
10.667	49	50-75% Grass cover, Fair, HSG A (S21, S21.1, S21.2.1, S21.2.2, S22.1, S22.2, S22.3, S22.4, S23, S26, S28, S29, S31.1, S32, S32.1, S32.2, S6)
6.860	69	50-75% Grass cover, Fair, HSG B (S22, S22.1, S22.2, S22.3, S22.4, S26, S28, S29, S31.1)
0.158	79	50-75% Grass cover, Fair, HSG C (S31.1)
5.426	39	>75% Grass cover, Good, HSG A (S23, S24, S26, S27, S30, S32.1, S6)
32.508	98	Paved parking, HSG A (S12, S19, S21, S21.1, S21.2.1, S22, S22.1, S22.2, S22.3, S23, S24, S27, S28, S31.1, S32, S32.1, S32.2, S6)
9.300	98	Roofs, HSG A (S12, S19, S20, S27, S28, S32.1, S32.2)
3.011	36	Woods, Fair, HSG A (S22.4, S31, S31.1)
2.048	60	Woods, Fair, HSG B (S22.4, S31, S31.1)
1.078	73	Woods, Fair, HSG C (S31, S31.1)
15.515	43	Woods/grass comb., Fair, HSG A (S12, S19)
0.637	65	Woods/grass comb., Fair, HSG B (S19)
9.250	76	Woods/grass comb., Fair, HSG C (S19)
96.458	**73**	**TOTAL AREA**

Time span=0.00-20.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentS12: Runoff Area=218,468 sf 13.56% Impervious Runoff Depth>0.10"
Flow Length=2,838' Tc=14.6 min CN=50 Runoff=0.10 cfs 0.042 af

SubcatchmentS19: Runoff Area=25.787 ac 18.30% Impervious Runoff Depth>0.53"
Flow Length=1,620' Tc=11.2 min CN=65 Runoff=11.63 cfs 1.143 af

SubcatchmentS20: Runoff Area=2.640 ac 100.00% Impervious Runoff Depth>2.83"
Tc=5.0 min CN=98 Runoff=8.25 cfs 0.622 af

SubcatchmentS21: Runoff Area=240,167 sf 65.02% Impervious Runoff Depth>1.36"
Flow Length=1,904' Tc=12.4 min CN=81 Runoff=7.55 cfs 0.623 af

SubcatchmentS21.1: Runoff Area=48,374 sf 22.82% Impervious Runoff Depth>0.35"
Flow Length=410' Tc=11.6 min CN=60 Runoff=0.25 cfs 0.033 af

SubcatchmentS21.2.1: Runoff Area=4,514 sf 76.74% Impervious Runoff Depth>1.79"
Tc=5.0 min CN=87 Runoff=0.23 cfs 0.015 af

SubcatchmentS21.2.2: Runoff Area=14,095 sf 0.00% Impervious Runoff Depth>0.08"
Flow Length=325' Tc=5.4 min CN=49 Runoff=0.00 cfs 0.002 af

SubcatchmentS22: Runoff Area=3.230 ac 73.07% Impervious Runoff Depth>2.04"
Tc=5.0 min CN=90 Runoff=8.17 cfs 0.549 af

SubcatchmentS22.1: Runoff Area=3.014 ac 68.94% Impervious Runoff Depth>1.64"
Tc=5.0 min CN=85 Runoff=6.22 cfs 0.412 af

SubcatchmentS22.2: Runoff Area=2.223 ac 75.75% Impervious Runoff Depth>1.95"
Tc=5.0 min CN=89 Runoff=5.42 cfs 0.362 af

SubcatchmentS22.3: Runoff Area=1.151 ac 77.85% Impervious Runoff Depth>1.79"
Tc=5.0 min CN=87 Runoff=2.58 cfs 0.172 af

SubcatchmentS22.4: Runoff Area=4.963 ac 0.00% Impervious Runoff Depth>0.19"
Tc=5.0 min CN=54 Runoff=0.42 cfs 0.077 af

SubcatchmentS23: Runoff Area=195,810 sf 67.56% Impervious Runoff Depth>1.23"
Flow Length=2,025' Tc=12.4 min CN=79 Runoff=5.55 cfs 0.460 af

SubcatchmentS24: Runoff Area=29,970 sf 86.82% Impervious Runoff Depth>2.04"
Tc=5.0 min CN=90 Runoff=1.74 cfs 0.117 af

SubcatchmentS26: Runoff Area=52,110 sf 0.00% Impervious Runoff Depth>0.12"
Tc=5.0 min CN=51 Runoff=0.04 cfs 0.012 af

SubcatchmentS27: Runoff Area=313,278 sf 92.69% Impervious Runoff Depth>2.41"
Tc=5.0 min CN=94 Runoff=20.67 cfs 1.443 af

Subcatchment S28: Runoff Area=8.848 ac 68.07% Impervious Runoff Depth>1.87"
Flow Length=1,367' Tc=13.3 min CN=88 Runoff=16.21 cfs 1.377 af

Subcatchment S29: Runoff Area=103,868 sf 0.00% Impervious Runoff Depth>0.42"
Flow Length=325' Tc=6.7 min CN=62 Runoff=0.85 cfs 0.084 af

Subcatchment S30: Runoff Area=96,516 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=39 Runoff=0.00 cfs 0.000 af

Subcatchment S31: Runoff Area=196,098 sf 0.00% Impervious Runoff Depth>0.07"
Flow Length=758' Tc=9.6 min CN=48 Runoff=0.05 cfs 0.025 af

Subcatchment S31.1: Runoff Area=0.923 ac 37.59% Impervious Runoff Depth>1.42"
Flow Length=711' Tc=8.9 min CN=82 Runoff=1.47 cfs 0.110 af

Subcatchment S32: Runoff Area=1.450 ac 50.34% Impervious Runoff Depth>0.95"
Tc=5.0 min CN=74 Runoff=1.68 cfs 0.114 af

Subcatchment S32.1: Runoff Area=139,588 sf 72.06% Impervious Runoff Depth>1.50"
Tc=5.0 min CN=83 Runoff=6.04 cfs 0.399 af

Subcatchment S32.2: Runoff Area=92,794 sf 83.53% Impervious Runoff Depth>2.04"
Tc=5.0 min CN=90 Runoff=5.39 cfs 0.362 af

Subcatchment S6: Retail Core South Runoff Area=93,849 sf 62.37% Impervious Runoff Depth>1.11"
Flow Length=926' Tc=10.2 min CN=77 Runoff=2.55 cfs 0.199 af

Reach 1R: Point of Analysis 1 Inflow=25.31 cfs 5.688 af
Outflow=25.31 cfs 5.688 af

Reach L150: Avg. Flow Depth=0.82' Max Vel=2.46 fps Inflow=19.98 cfs 5.076 af
n=0.030 L=136.0' S=0.0043 '/' Capacity=654.46 cfs Outflow=19.97 cfs 5.068 af

Reach L151: Avg. Flow Depth=0.80' Max Vel=4.16 fps Inflow=19.97 cfs 5.068 af
n=0.030 L=155.0' S=0.0148 '/' Capacity=2,128.99 cfs Outflow=19.89 cfs 5.064 af

Reach L186: Avg. Flow Depth=1.21' Max Vel=2.04 fps Inflow=21.34 cfs 5.199 af
n=0.030 L=340.0' S=0.0020 '/' Capacity=279.47 cfs Outflow=20.88 cfs 5.176 af

Reach L57: 48" Avg. Flow Depth=1.21' Max Vel=5.28 fps Inflow=16.85 cfs 3.749 af
48.0" Round Pipe n=0.014 L=446.0' S=0.0041 '/' Capacity=85.21 cfs Outflow=16.84 cfs 3.743 af

Reach L65: 30" Avg. Flow Depth=0.58' Max Vel=19.47 fps Inflow=16.84 cfs 3.751 af
30.0" Round Pipe n=0.014 L=104.0' S=0.1394 '/' Capacity=142.22 cfs Outflow=16.85 cfs 3.751 af

Reach L67: 48" Avg. Flow Depth=0.98' Max Vel=7.05 fps Inflow=16.85 cfs 3.751 af
48.0" Round Pipe n=0.014 L=185.0' S=0.0092 '/' Capacity=127.86 cfs Outflow=16.85 cfs 3.749 af

Reach P1: Avg. Flow Depth=0.40' Max Vel=5.33 fps Inflow=25.31 cfs 5.689 af
n=0.030 L=46.0' S=0.0435 '/' Capacity=407.83 cfs Outflow=25.31 cfs 5.688 af

Pond 19P: Peak Elev=139.25' Storage=1,701 cf Inflow=19.62 cfs 1.763 af
Primary=10.03 cfs 1.588 af Secondary=7.86 cfs 0.172 af Outflow=17.90 cfs 1.760 af

Pond 20P: Peak Elev=167.55' Storage=2,838 cf Inflow=8.25 cfs 0.622 af
24.0" Round Culvert n=0.014 L=293.0' S=0.0819 '/' Outflow=11.03 cfs 0.620 af

Pond 22.4P: Peak Elev=73.99' Storage=35,555 cf Inflow=37.83 cfs 3.833 af
Primary=16.84 cfs 3.751 af Secondary=0.00 cfs 0.000 af Outflow=16.84 cfs 3.751 af

Pond 27P: Peak Elev=50.55' Storage=20,210 cf Inflow=20.67 cfs 1.443 af
Discarded=2.49 cfs 1.390 af Primary=1.99 cfs 0.056 af Outflow=4.48 cfs 1.445 af

Pond 30P: Peak Elev=50.78' Storage=106,738 cf Inflow=30.46 cfs 4.886 af
Primary=7.96 cfs 3.337 af Tertiary=0.00 cfs 0.000 af Outflow=7.96 cfs 3.337 af

Total Runoff Area = 96.458 ac Runoff Volume = 8.756 af Average Runoff Depth = 1.09"
56.66% Pervious = 54.649 ac 43.34% Impervious = 41.809 ac

Time span=0.00-20.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentS12: Runoff Area=218,468 sf 13.56% Impervious Runoff Depth>0.46"
Flow Length=2,838' Tc=14.6 min CN=50 Runoff=1.33 cfs 0.193 af

SubcatchmentS19: Runoff Area=25.787 ac 18.30% Impervious Runoff Depth>1.26"
Flow Length=1,620' Tc=11.2 min CN=65 Runoff=32.68 cfs 2.716 af

SubcatchmentS20: Runoff Area=2.640 ac 100.00% Impervious Runoff Depth>4.16"
Tc=5.0 min CN=98 Runoff=11.95 cfs 0.916 af

SubcatchmentS21: Runoff Area=240,167 sf 65.02% Impervious Runoff Depth>2.46"
Flow Length=1,904' Tc=12.4 min CN=81 Runoff=13.75 cfs 1.128 af

SubcatchmentS21.1: Runoff Area=48,374 sf 22.82% Impervious Runoff Depth>0.96"
Flow Length=410' Tc=11.6 min CN=60 Runoff=0.98 cfs 0.089 af

SubcatchmentS21.2.1: Runoff Area=4,514 sf 76.74% Impervious Runoff Depth>3.01"
Tc=5.0 min CN=87 Runoff=0.38 cfs 0.026 af

SubcatchmentS21.2.2: Runoff Area=14,095 sf 0.00% Impervious Runoff Depth>0.42"
Flow Length=325' Tc=5.4 min CN=49 Runoff=0.09 cfs 0.011 af

SubcatchmentS22: Runoff Area=3.230 ac 73.07% Impervious Runoff Depth>3.30"
Tc=5.0 min CN=90 Runoff=12.90 cfs 0.888 af

SubcatchmentS22.1: Runoff Area=3.014 ac 68.94% Impervious Runoff Depth>2.82"
Tc=5.0 min CN=85 Runoff=10.59 cfs 0.708 af

SubcatchmentS22.2: Runoff Area=2.223 ac 75.75% Impervious Runoff Depth>3.20"
Tc=5.0 min CN=89 Runoff=8.67 cfs 0.593 af

SubcatchmentS22.3: Runoff Area=1.151 ac 77.85% Impervious Runoff Depth>3.01"
Tc=5.0 min CN=87 Runoff=4.27 cfs 0.288 af

SubcatchmentS22.4: Runoff Area=4.963 ac 0.00% Impervious Runoff Depth>0.65"
Tc=5.0 min CN=54 Runoff=3.09 cfs 0.268 af

SubcatchmentS23: Runoff Area=195,810 sf 67.56% Impervious Runoff Depth>2.29"
Flow Length=2,025' Tc=12.4 min CN=79 Runoff=10.46 cfs 0.856 af

SubcatchmentS24: Runoff Area=29,970 sf 86.82% Impervious Runoff Depth>3.30"
Tc=5.0 min CN=90 Runoff=2.75 cfs 0.189 af

SubcatchmentS26: Runoff Area=52,110 sf 0.00% Impervious Runoff Depth>0.51"
Tc=5.0 min CN=51 Runoff=0.48 cfs 0.051 af

SubcatchmentS27: Runoff Area=313,278 sf 92.69% Impervious Runoff Depth>3.72"
Tc=5.0 min CN=94 Runoff=31.04 cfs 2.227 af

Subcatchment S28: Runoff Area=8.848 ac 68.07% Impervious Runoff Depth>3.09"
Flow Length=1,367' Tc=13.3 min CN=88 Runoff=26.35 cfs 2.281 af

Subcatchment S29: Runoff Area=103,868 sf 0.00% Impervious Runoff Depth>1.08"
Flow Length=325' Tc=6.7 min CN=62 Runoff=2.89 cfs 0.215 af

Subcatchment S30: Runoff Area=96,516 sf 0.00% Impervious Runoff Depth>0.10"
Tc=5.0 min CN=39 Runoff=0.04 cfs 0.018 af

Subcatchment S31: Runoff Area=196,098 sf 0.00% Impervious Runoff Depth>0.38"
Flow Length=758' Tc=9.6 min CN=48 Runoff=0.93 cfs 0.143 af

Subcatchment S31.1: Runoff Area=0.923 ac 37.59% Impervious Runoff Depth>2.54"
Flow Length=711' Tc=8.9 min CN=82 Runoff=2.61 cfs 0.196 af

Subcatchment S32: Runoff Area=1.450 ac 50.34% Impervious Runoff Depth>1.90"
Tc=5.0 min CN=74 Runoff=3.46 cfs 0.229 af

Subcatchment S32.1: Runoff Area=139,588 sf 72.06% Impervious Runoff Depth>2.64"
Tc=5.0 min CN=83 Runoff=10.55 cfs 0.704 af

Subcatchment S32.2: Runoff Area=92,794 sf 83.53% Impervious Runoff Depth>3.30"
Tc=5.0 min CN=90 Runoff=8.51 cfs 0.586 af

Subcatchment S6: Retail Core South Runoff Area=93,849 sf 62.37% Impervious Runoff Depth>2.13"
Flow Length=926' Tc=10.2 min CN=77 Runoff=4.96 cfs 0.382 af

Reach 1R: Point of Analysis 1 Inflow=45.64 cfs 11.888 af
Outflow=45.64 cfs 11.888 af

Reach L150: Avg. Flow Depth=1.13' Max Vel=2.95 fps Inflow=35.60 cfs 10.667 af
n=0.030 L=136.0' S=0.0043 '/' Capacity=654.46 cfs Outflow=35.60 cfs 10.657 af

Reach L151: Avg. Flow Depth=1.08' Max Vel=4.91 fps Inflow=35.60 cfs 10.657 af
n=0.030 L=155.0' S=0.0148 '/' Capacity=2,128.99 cfs Outflow=35.60 cfs 10.650 af

Reach L186: Avg. Flow Depth=1.68' Max Vel=2.43 fps Inflow=38.57 cfs 10.989 af
n=0.030 L=340.0' S=0.0020 '/' Capacity=279.47 cfs Outflow=38.28 cfs 10.957 af

Reach L57: 48" Avg. Flow Depth=1.38' Max Vel=5.67 fps Inflow=21.72 cfs 6.638 af
48.0" Round Pipe n=0.014 L=446.0' S=0.0041 '/' Capacity=85.21 cfs Outflow=21.72 cfs 6.630 af

Reach L65: 30" Avg. Flow Depth=0.66' Max Vel=20.95 fps Inflow=21.72 cfs 6.641 af
30.0" Round Pipe n=0.014 L=104.0' S=0.1394 '/' Capacity=142.22 cfs Outflow=21.71 cfs 6.641 af

Reach L67: 48" Avg. Flow Depth=1.12' Max Vel=7.58 fps Inflow=21.71 cfs 6.641 af
48.0" Round Pipe n=0.014 L=185.0' S=0.0092 '/' Capacity=127.86 cfs Outflow=21.72 cfs 6.638 af

Reach P1: Avg. Flow Depth=0.57' Max Vel=6.68 fps Inflow=45.64 cfs 11.890 af
n=0.030 L=46.0' S=0.0435 '/' Capacity=407.83 cfs Outflow=45.64 cfs 11.888 af

Pond 19P: Peak Elev=139.58' Storage=2,473 cf Inflow=41.24 cfs 3.629 af
Primary=13.38 cfs 2.757 af Secondary=27.14 cfs 0.867 af Outflow=40.52 cfs 3.624 af

Pond 20P: Peak Elev=167.70' Storage=2,838 cf Inflow=11.95 cfs 0.916 af
24.0" Round Culvert n=0.014 L=293.0' S=0.0819 '/' Outflow=12.67 cfs 0.912 af

Pond 22.4P: Peak Elev=75.39' Storage=70,429 cf Inflow=63.49 cfs 6.756 af
Primary=21.72 cfs 6.641 af Secondary=0.00 cfs 0.000 af Outflow=21.72 cfs 6.641 af

Pond 27P: Peak Elev=51.53' Storage=25,796 cf Inflow=31.04 cfs 2.227 af
Discarded=2.54 cfs 1.927 af Primary=11.85 cfs 0.300 af Outflow=14.38 cfs 2.227 af

Pond 30P: Peak Elev=51.68' Storage=166,052 cf Inflow=76.33 cfs 9.700 af
Primary=20.68 cfs 7.800 af Tertiary=0.00 cfs 0.000 af Outflow=20.68 cfs 7.800 af

Total Runoff Area = 96.458 ac Runoff Volume = 15.899 af Average Runoff Depth = 1.98"
56.66% Pervious = 54.649 ac 43.34% Impervious = 41.809 ac

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
10.667	49	50-75% Grass cover, Fair, HSG A (S21, S21.1, S21.2.1, S21.2.2, S22.1, S22.2, S22.3, S22.4, S23, S26, S28, S29, S31.1, S32, S32.1, S32.2, S6)
6.860	69	50-75% Grass cover, Fair, HSG B (S22, S22.1, S22.2, S22.3, S22.4, S26, S28, S29, S31.1)
0.158	79	50-75% Grass cover, Fair, HSG C (S31.1)
5.426	39	>75% Grass cover, Good, HSG A (S23, S24, S26, S27, S30, S32.1, S6)
32.508	98	Paved parking, HSG A (S12, S19, S21, S21.1, S21.2.1, S22, S22.1, S22.2, S22.3, S23, S24, S27, S28, S31.1, S32, S32.1, S32.2, S6)
9.300	98	Roofs, HSG A (S12, S19, S20, S27, S28, S32.1, S32.2)
3.011	36	Woods, Fair, HSG A (S22.4, S31, S31.1)
2.048	60	Woods, Fair, HSG B (S22.4, S31, S31.1)
1.078	73	Woods, Fair, HSG C (S31, S31.1)
15.515	43	Woods/grass comb., Fair, HSG A (S12, S19)
0.637	65	Woods/grass comb., Fair, HSG B (S19)
9.250	76	Woods/grass comb., Fair, HSG C (S19)
96.458	**73**	**TOTAL AREA**

Time span=0.00-20.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentS12: Runoff Area=218,468 sf 13.56% Impervious Runoff Depth>0.80"
Flow Length=2,838' Tc=14.6 min CN=50 Runoff=2.90 cfs 0.333 af

SubcatchmentS19: Runoff Area=25.787 ac 18.30% Impervious Runoff Depth>1.82"
Flow Length=1,620' Tc=11.2 min CN=65 Runoff=48.54 cfs 3.920 af

SubcatchmentS20: Runoff Area=2.640 ac 100.00% Impervious Runoff Depth>5.02"
Tc=5.0 min CN=98 Runoff=14.31 cfs 1.105 af

SubcatchmentS21: Runoff Area=240,167 sf 65.02% Impervious Runoff Depth>3.21"
Flow Length=1,904' Tc=12.4 min CN=81 Runoff=17.86 cfs 1.474 af

SubcatchmentS21.1: Runoff Area=48,374 sf 22.82% Impervious Runoff Depth>1.45"
Flow Length=410' Tc=11.6 min CN=60 Runoff=1.57 cfs 0.134 af

SubcatchmentS21.2.1: Runoff Area=4,514 sf 76.74% Impervious Runoff Depth>3.81"
Tc=5.0 min CN=87 Runoff=0.48 cfs 0.033 af

SubcatchmentS21.2.2: Runoff Area=14,095 sf 0.00% Impervious Runoff Depth>0.74"
Flow Length=325' Tc=5.4 min CN=49 Runoff=0.22 cfs 0.020 af

SubcatchmentS22: Runoff Area=3.230 ac 73.07% Impervious Runoff Depth>4.13"
Tc=5.0 min CN=90 Runoff=15.92 cfs 1.111 af

SubcatchmentS22.1: Runoff Area=3.014 ac 68.94% Impervious Runoff Depth>3.61"
Tc=5.0 min CN=85 Runoff=13.42 cfs 0.906 af

SubcatchmentS22.2: Runoff Area=2.223 ac 75.75% Impervious Runoff Depth>4.02"
Tc=5.0 min CN=89 Runoff=10.76 cfs 0.745 af

SubcatchmentS22.3: Runoff Area=1.151 ac 77.85% Impervious Runoff Depth>3.81"
Tc=5.0 min CN=87 Runoff=5.36 cfs 0.366 af

SubcatchmentS22.4: Runoff Area=4.963 ac 0.00% Impervious Runoff Depth>1.05"
Tc=5.0 min CN=54 Runoff=5.75 cfs 0.433 af

SubcatchmentS23: Runoff Area=195,810 sf 67.56% Impervious Runoff Depth>3.02"
Flow Length=2,025' Tc=12.4 min CN=79 Runoff=13.77 cfs 1.131 af

SubcatchmentS24: Runoff Area=29,970 sf 86.82% Impervious Runoff Depth>4.13"
Tc=5.0 min CN=90 Runoff=3.39 cfs 0.237 af

SubcatchmentS26: Runoff Area=52,110 sf 0.00% Impervious Runoff Depth>0.86"
Tc=5.0 min CN=51 Runoff=1.05 cfs 0.086 af

SubcatchmentS27: Runoff Area=313,278 sf 92.69% Impervious Runoff Depth>4.56"
Tc=5.0 min CN=94 Runoff=37.64 cfs 2.736 af

Subcatchment S28: Runoff Area=8.848 ac 68.07% Impervious Runoff Depth>3.91"
Flow Length=1,367' Tc=13.3 min CN=88 Runoff=32.88 cfs 2.881 af

Subcatchment S29: Runoff Area=103,868 sf 0.00% Impervious Runoff Depth>1.60"
Flow Length=325' Tc=6.7 min CN=62 Runoff=4.47 cfs 0.318 af

Subcatchment S30: Runoff Area=96,516 sf 0.00% Impervious Runoff Depth>0.26"
Tc=5.0 min CN=39 Runoff=0.22 cfs 0.047 af

Subcatchment S31: Runoff Area=196,098 sf 0.00% Impervious Runoff Depth>0.68"
Flow Length=758' Tc=9.6 min CN=48 Runoff=2.28 cfs 0.257 af

Subcatchment S31.1: Runoff Area=0.923 ac 37.59% Impervious Runoff Depth>3.31"
Flow Length=711' Tc=8.9 min CN=82 Runoff=3.37 cfs 0.254 af

Subcatchment S32: Runoff Area=1.450 ac 50.34% Impervious Runoff Depth>2.57"
Tc=5.0 min CN=74 Runoff=4.71 cfs 0.311 af

Subcatchment S32.1: Runoff Area=139,588 sf 72.06% Impervious Runoff Depth>3.41"
Tc=5.0 min CN=83 Runoff=13.60 cfs 0.911 af

Subcatchment S32.2: Runoff Area=92,794 sf 83.53% Impervious Runoff Depth>4.13"
Tc=5.0 min CN=90 Runoff=10.50 cfs 0.733 af

Subcatchment S6: Retail Core South Runoff Area=93,849 sf 62.37% Impervious Runoff Depth>2.84"
Flow Length=926' Tc=10.2 min CN=77 Runoff=6.61 cfs 0.509 af

Reach 1R: Point of Analysis 1 Inflow=63.31 cfs 16.452 af
Outflow=63.31 cfs 16.452 af

Reach L150: Avg. Flow Depth=1.36' Max Vel=3.27 fps Inflow=49.83 cfs 14.777 af
n=0.030 L=136.0' S=0.0043 '/' Capacity=654.46 cfs Outflow=49.83 cfs 14.765 af

Reach L151: Avg. Flow Depth=1.28' Max Vel=5.38 fps Inflow=49.83 cfs 14.765 af
n=0.030 L=155.0' S=0.0148 '/' Capacity=2,128.99 cfs Outflow=49.82 cfs 14.757 af

Reach L186: Avg. Flow Depth=2.01' Max Vel=2.68 fps Inflow=54.63 cfs 15.268 af
n=0.030 L=340.0' S=0.0020 '/' Capacity=279.47 cfs Outflow=54.17 cfs 15.232 af

Reach L57: 48" Avg. Flow Depth=1.46' Max Vel=5.84 fps Inflow=24.26 cfs 8.593 af
48.0" Round Pipe n=0.014 L=446.0' S=0.0041 '/' Capacity=85.21 cfs Outflow=24.26 cfs 8.583 af

Reach L65: 30" Avg. Flow Depth=0.70' Max Vel=21.62 fps Inflow=24.26 cfs 8.596 af
30.0" Round Pipe n=0.014 L=104.0' S=0.1394 '/' Capacity=142.22 cfs Outflow=24.26 cfs 8.596 af

Reach L67: 48" Avg. Flow Depth=1.18' Max Vel=7.83 fps Inflow=24.26 cfs 8.596 af
48.0" Round Pipe n=0.014 L=185.0' S=0.0092 '/' Capacity=127.86 cfs Outflow=24.26 cfs 8.593 af

Reach P1: Avg. Flow Depth=0.70' Max Vel=7.55 fps Inflow=63.30 cfs 16.454 af
n=0.030 L=46.0' S=0.0435 '/' Capacity=407.83 cfs Outflow=63.31 cfs 16.452 af

Pond 19P: Peak Elev=139.79' Storage=3,065 cf Inflow=57.93 cfs 5.020 af
Primary=15.09 cfs 3.508 af Secondary=42.73 cfs 1.507 af Outflow=57.82 cfs 5.014 af

Pond 20P: Peak Elev=167.88' Storage=2,838 cf Inflow=14.31 cfs 1.105 af
24.0" Round Culvert n=0.014 L=293.0' S=0.0819 '/' Outflow=14.34 cfs 1.101 af

Pond 22.4P: Peak Elev=76.26' Storage=96,282 cf Inflow=80.82 cfs 8.730 af
Primary=24.26 cfs 8.596 af Secondary=0.00 cfs 0.000 af Outflow=24.26 cfs 8.596 af

Pond 27P: Peak Elev=52.21' Storage=29,701 cf Inflow=37.64 cfs 2.736 af
Discarded=2.57 cfs 2.235 af Primary=20.03 cfs 0.502 af Outflow=22.58 cfs 2.736 af

Pond 30P: Peak Elev=52.21' Storage=202,751 cf Inflow=113.02 cfs 13.253 af
Primary=31.42 cfs 11.163 af Tertiary=0.00 cfs 0.000 af Outflow=31.42 cfs 11.163 af

Total Runoff Area = 96.458 ac Runoff Volume = 20.990 af Average Runoff Depth = 2.61"
56.66% Pervious = 54.649 ac 43.34% Impervious = 41.809 ac

Summary for Subcatchment S12:

Runoff = 2.90 cfs @ 12.27 hrs, Volume= 0.333 af, Depth> 0.80"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
188,847	43	Woods/grass comb., Fair, HSG A
22,303	98	Paved parking, HSG A
7,318	98	Roofs, HSG A
218,468	50	Weighted Average
188,847		86.44% Pervious Area
29,621		13.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	100	0.0200	0.17		**Sheet Flow, Sheet** Grass: Short n= 0.150 P2= 3.20"
2.6	727	0.0830	4.64		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
0.4	258	0.0430	10.14	12.44	**Pipe Channel, 15" RCP** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.014
0.1	44	0.0205	7.90	13.97	**Pipe Channel, 18" RCP** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.014
1.7	1,709	0.0257	17.02	213.83	**Pipe Channel, 48" RCP** 48.0" Round Area= 12.6 sf Perim= 12.6' r= 1.00' n= 0.014
14.6	2,838	Total			

Summary for Subcatchment S19:

Runoff = 48.54 cfs @ 12.17 hrs, Volume= 3.920 af, Depth> 1.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
11.180	43	Woods/grass comb., Fair, HSG A
0.637	65	Woods/grass comb., Fair, HSG B
9.250	76	Woods/grass comb., Fair, HSG C
3.215	98	Paved parking, HSG A
1.505	98	Roofs, HSG A
25.787	65	Weighted Average
21.067		81.70% Pervious Area
4.720		18.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	100	0.0300	0.20		**Sheet Flow, Sheet** Grass: Short n= 0.150 P2= 3.20"
2.5	1,420	0.0200	9.46	29.71	**Pipe Channel, Pipe** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.014
0.4	100	0.0600	3.94		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
11.2	1,620	Total			

Summary for Subcatchment S20:

Runoff = 14.31 cfs @ 12.07 hrs, Volume= 1.105 af, Depth> 5.02"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
2.640	98	Roofs, HSG A
2.640		100.00% Impervious Area

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

Summary for Subcatchment S21:

Runoff = 17.86 cfs @ 12.17 hrs, Volume= 1.474 af, Depth> 3.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
84,005	49	50-75% Grass cover, Fair, HSG A
156,162	98	Paved parking, HSG A
240,167	81	Weighted Average
84,005		34.98% Pervious Area
156,162		65.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	61	0.0660	0.11		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.20"
1.8	388	0.0310	3.57		**Shallow Concentrated Flow, Shallow Conc** Paved Kv= 20.3 fps
1.5	1,215	0.0300	13.51	42.45	**Pipe Channel, 24" Pipe** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.1	240	0.0969	28.18	138.32	**Pipe Channel, 24" Pipe** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.012
12.4	1,904	Total			

Summary for Subcatchment S21.1:

Runoff = 1.57 cfs @ 12.18 hrs, Volume= 0.134 af, Depth> 1.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
37,334	49	50-75% Grass cover, Fair, HSG A
11,040	98	Paved parking, HSG A
48,374	60	Weighted Average
37,334		77.18% Pervious Area
11,040		22.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.9	100	0.1100	0.15		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
0.6	170	0.0865	4.74		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	140	0.1015	24.72	121.34	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.014
11.6	410	Total			

Summary for Subcatchment S21.2.1:

Runoff = 0.48 cfs @ 12.07 hrs, Volume= 0.033 af, Depth> 3.81"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
1,050	49	50-75% Grass cover, Fair, HSG A
3,464	98	Paved parking, HSG A
4,514	87	Weighted Average
1,050		23.26% Pervious Area
3,464		76.74% Impervious Area

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

Summary for Subcatchment S21.2.2:

Runoff = 0.22 cfs @ 12.11 hrs, Volume= 0.020 af, Depth> 0.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
14,095	49	50-75% Grass cover, Fair, HSG A
14,095		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	100	0.1200	0.35		**Sheet Flow, Sheet** Grass: Short n= 0.150 P2= 3.20"
0.4	118	0.0932	4.92		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
0.1	30	0.0890	6.06		**Shallow Concentrated Flow, Shallow Conc** Paved Kv= 20.3 fps
0.1	77	0.0837	12.19	9.57	**Pipe Channel, 12" RCP** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.014
5.4	325	Total			

Summary for Subcatchment S22:

Runoff = 15.92 cfs @ 12.07 hrs, Volume= 1.111 af, Depth> 4.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.870	69	50-75% Grass cover, Fair, HSG B
2.360	98	Paved parking, HSG A
3.230	90	Weighted Average
0.870		26.93% Pervious Area
2.360		73.07% Impervious Area

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

Summary for Subcatchment S22.1:

Runoff = 13.42 cfs @ 12.07 hrs, Volume= 0.906 af, Depth> 3.61"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.611	49	50-75% Grass cover, Fair, HSG A
0.325	69	50-75% Grass cover, Fair, HSG B
2.078	98	Paved parking, HSG A
3.014	85	Weighted Average
0.936		31.06% Pervious Area
2.078		68.94% Impervious Area

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

Summary for Subcatchment S22.2:

Runoff = 10.76 cfs @ 12.07 hrs, Volume= 0.745 af, Depth> 4.02"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.167	49	50-75% Grass cover, Fair, HSG A
0.372	69	50-75% Grass cover, Fair, HSG B
1.684	98	Paved parking, HSG A
2.223	89	Weighted Average
0.539		24.25% Pervious Area
1.684		75.75% Impervious Area

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

Summary for Subcatchment S22.3:

Runoff = 5.36 cfs @ 12.07 hrs, Volume= 0.366 af, Depth> 3.81"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.237	49	50-75% Grass cover, Fair, HSG A
0.018	69	50-75% Grass cover, Fair, HSG B
0.896	98	Paved parking, HSG A
1.151	87	Weighted Average
0.255		22.15% Pervious Area
0.896		77.85% Impervious Area

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

Summary for Subcatchment S22.4:

Runoff = 5.75 cfs @ 12.10 hrs, Volume= 0.433 af, Depth> 1.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
2.633	49	50-75% Grass cover, Fair, HSG A
1.097	69	50-75% Grass cover, Fair, HSG B
0.374	36	Woods, Fair, HSG A
0.859	60	Woods, Fair, HSG B
4.963	54	Weighted Average
4.963		100.00% Pervious Area

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

Summary for Subcatchment S23:

Runoff = 13.77 cfs @ 12.17 hrs, Volume= 1.131 af, Depth> 3.02"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
3,207	49	50-75% Grass cover, Fair, HSG A
60,307	39	>75% Grass cover, Good, HSG A
132,296	98	Paved parking, HSG A
195,810	79	Weighted Average
63,514		32.44% Pervious Area
132,296		67.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	100	0.0250	0.19		**Sheet Flow, Sheet** Grass: Short n= 0.150 P2= 3.20"
0.9	156	0.0350	3.01		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
0.8	174	0.0360	3.85		**Shallow Concentrated Flow, Shallow Conc** Paved Kv= 20.3 fps
0.2	40	0.0050	4.03	4.95	**Pipe Channel, 15" HDPE** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012
1.5	1,555	0.0200	17.51	220.07	**Pipe Channel, 48" HDPE** 48.0" Round Area= 12.6 sf Perim= 12.6' r= 1.00' n= 0.012
12.4	2,025	Total			

Summary for Subcatchment S24:

Runoff = 3.39 cfs @ 12.07 hrs, Volume= 0.237 af, Depth> 4.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
3,951	39	>75% Grass cover, Good, HSG A
26,019	98	Paved parking, HSG A
29,970	90	Weighted Average
3,951		13.18% Pervious Area
26,019		86.82% Impervious Area

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

Summary for Subcatchment S26:

Runoff = 1.05 cfs @ 12.10 hrs, Volume= 0.086 af, Depth> 0.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
12,314	39	>75% Grass cover, Good, HSG A
27,383	49	50-75% Grass cover, Fair, HSG A
12,413	69	50-75% Grass cover, Fair, HSG B
52,110	51	Weighted Average
52,110		100.00% Pervious Area

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

Summary for Subcatchment S27:

Runoff = 37.64 cfs @ 12.07 hrs, Volume= 2.736 af, Depth> 4.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
22,916	39	>75% Grass cover, Good, HSG A
243,339	98	Paved parking, HSG A
47,023	98	Roofs, HSG A
313,278	94	Weighted Average
22,916		7.31% Pervious Area
290,362		92.69% Impervious Area

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

Summary for Subcatchment S28:

Runoff = 32.88 cfs @ 12.18 hrs, Volume= 2.881 af, Depth> 3.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.542	49	50-75% Grass cover, Fair, HSG A
2.283	69	50-75% Grass cover, Fair, HSG B
4.704	98	Paved parking, HSG A
1.319	98	Roofs, HSG A
8.848	88	Weighted Average
2.825		31.93% Pervious Area
6.023		68.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	100	0.1400	0.17		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.20"
0.2	67	0.2090	7.36		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
1.7	568	0.0742	5.53		**Shallow Concentrated Flow, Shallow Conc** Paved Kv= 20.3 fps
0.7	160	0.0087	3.93	3.09	**Pipe Channel, 12" RCP** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.014
0.6	247	0.0146	6.67	11.79	**Pipe Channel, 18" RCP** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.014
0.2	225	0.1800	15.89	49.91	**Pipe Channel, 24" CMP** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal
13.3	1,367	Total			

Summary for Subcatchment S29:

Runoff = 4.47 cfs @ 12.11 hrs, Volume= 0.318 af, Depth> 1.60"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
34,191	49	50-75% Grass cover, Fair, HSG A
69,677	69	50-75% Grass cover, Fair, HSG B
103,868	62	Weighted Average
103,868		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	100	0.4500	0.27		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	225	0.2300	7.72		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
6.7	325	Total			

Summary for Subcatchment S30:

Runoff = 0.22 cfs @ 12.38 hrs, Volume= 0.047 af, Depth> 0.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
96,516	39	>75% Grass cover, Good, HSG A
96,516		100.00% Pervious Area

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

Summary for Subcatchment S31:

Runoff = 2.28 cfs @ 12.19 hrs, Volume= 0.257 af, Depth> 0.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
113,326	36	Woods, Fair, HSG A
51,112	60	Woods, Fair, HSG B
31,660	73	Woods, Fair, HSG C
196,098	48	Weighted Average
196,098		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	100	0.2900	0.23		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.20"
2.2	658	0.0970	5.01		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
9.6	758	Total			

Summary for Subcatchment S31.1:

Runoff = 3.37 cfs @ 12.13 hrs, Volume= 0.254 af, Depth> 3.31"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.035	36	Woods, Fair, HSG A
0.016	60	Woods, Fair, HSG B
0.351	73	Woods, Fair, HSG C
0.006	49	50-75% Grass cover, Fair, HSG A
0.010	69	50-75% Grass cover, Fair, HSG B
0.158	79	50-75% Grass cover, Fair, HSG C
0.347	98	Paved parking, HSG A
0.923	82	Weighted Average
0.576		62.41% Pervious Area
0.347		37.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	100	0.2800	0.22		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.20"
0.2	57	0.1400	6.02		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
1.0	304	0.0660	5.22		**Shallow Concentrated Flow, Shallow Conc** Paved Kv= 20.3 fps
0.0	15	0.0330	7.65	6.01	**Pipe Channel, 12" RCP** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.014
0.2	235	0.0801	24.80	175.29	**Pipe Channel, 36" RCP** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.014
8.9	711	Total			

Summary for Subcatchment S32:

Runoff = 4.71 cfs @ 12.08 hrs, Volume= 0.311 af, Depth> 2.57"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (ac)	CN	Description
0.720	49	50-75% Grass cover, Fair, HSG A
0.730	98	Paved parking, HSG A
1.450	74	Weighted Average
0.720		49.66% Pervious Area
0.730		50.34% Impervious Area

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

Summary for Subcatchment S32.1:

Runoff = 13.60 cfs @ 12.07 hrs, Volume= 0.911 af, Depth> 3.41"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
20,061	39	>75% Grass cover, Good, HSG A
18,940	49	50-75% Grass cover, Fair, HSG A
35,818	98	Paved parking, HSG A
64,769	98	Roofs, HSG A
139,588	83	Weighted Average
39,001		27.94% Pervious Area
100,587		72.06% Impervious Area

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

Summary for Subcatchment S32.2:

Runoff = 10.50 cfs @ 12.07 hrs, Volume= 0.733 af, Depth> 4.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
15,280	49	50-75% Grass cover, Fair, HSG A
29,518	98	Paved parking, HSG A
47,996	98	Roofs, HSG A
92,794	90	Weighted Average
15,280		16.47% Pervious Area
77,514		83.53% Impervious Area

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

Summary for Subcatchment S6: Retail Core South Loading

Runoff = 6.61 cfs @ 12.15 hrs, Volume= 0.509 af, Depth> 2.84"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
15,015	49	50-75% Grass cover, Fair, HSG A
20,296	39	>75% Grass cover, Good, HSG A
58,538	98	Paved parking, HSG A
93,849	77	Weighted Average
35,311		37.63% Pervious Area
58,538		62.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	75	0.1460	0.24		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 3.20"
0.2	100	0.2700	8.37		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
0.9	45	0.0010	0.84	0.16	**Pipe Channel, Underdrain** 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13' n= 0.014
4.0	706	0.0050	2.98	2.34	**Pipe Channel, 12" Pipe** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.014
10.2	926	Total			

Summary for Reach 1R: Point of Analysis 1

Inflow Area = 96.458 ac, 43.34% Impervious, Inflow Depth > 2.05" for 25-Year event
Inflow = 63.31 cfs @ 12.21 hrs, Volume= 16.452 af
Outflow = 63.31 cfs @ 12.21 hrs, Volume= 16.452 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

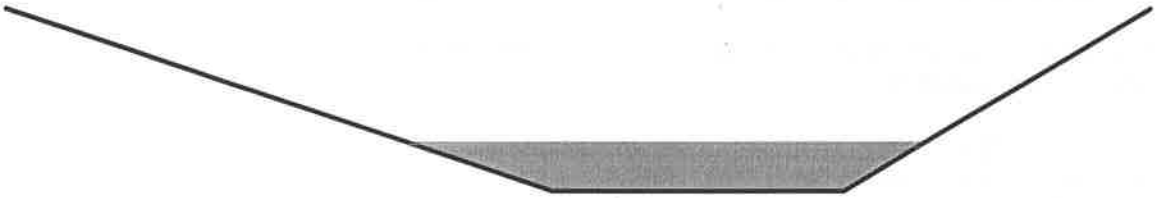
Summary for Reach L150:

Inflow Area = 86.379 ac, 44.48% Impervious, Inflow Depth > 2.05" for 25-Year event
Inflow = 49.83 cfs @ 12.21 hrs, Volume= 14.777 af
Outflow = 49.83 cfs @ 12.22 hrs, Volume= 14.765 af, Atten= 0%, Lag= 0.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.27 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.60 fps, Avg. Travel Time= 1.4 min

Peak Storage= 2,072 cf @ 12.22 hrs
Average Depth at Peak Storage= 1.36'
Bank-Full Depth= 5.00' Flow Area= 98.8 sf, Capacity= 654.46 cfs

8.00' x 5.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 1.7 '/' Top Width= 31.50'
Length= 136.0' Slope= 0.0043 '/'
Inlet Invert= 48.58', Outlet Invert= 48.00'



Summary for Reach L151:

Inflow Area = 86.379 ac, 44.48% Impervious, Inflow Depth > 2.05" for 25-Year event
Inflow = 49.83 cfs @ 12.22 hrs, Volume= 14.765 af
Outflow = 49.82 cfs @ 12.22 hrs, Volume= 14.757 af, Atten= 0%, Lag= 0.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.38 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 2.80 fps, Avg. Travel Time= 0.9 min

Peak Storage= 1,433 cf @ 12.22 hrs
Average Depth at Peak Storage= 1.28'
Bank-Full Depth= 7.00' Flow Area= 150.5 sf, Capacity= 2,128.99 cfs

4.00' x 7.00' deep channel, n= 0.030
Side Slope Z-value= 2.0 3.0 '/' Top Width= 39.00'
Length= 155.0' Slope= 0.0148 '/'
Inlet Invert= 48.00', Outlet Invert= 45.71'

Summary for Reach L186:

Inflow Area = 91.804 ac, 42.23% Impervious, Inflow Depth > 2.00" for 25-Year event
Inflow = 54.63 cfs @ 12.21 hrs, Volume= 15.268 af
Outflow = 54.17 cfs @ 12.24 hrs, Volume= 15.232 af, Atten= 1%, Lag= 1.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.68 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 1.32 fps, Avg. Travel Time= 4.3 min

Peak Storage= 6,870 cf @ 12.24 hrs
Average Depth at Peak Storage= 2.01'
Bank-Full Depth= 4.50' Flow Area= 67.5 sf, Capacity= 279.47 cfs

6.00' x 4.50' deep channel, n= 0.030
Side Slope Z-value= 2.0 '/' Top Width= 24.00'
Length= 340.0' Slope= 0.0020 '/'
Inlet Invert= 45.71', Outlet Invert= 45.04'

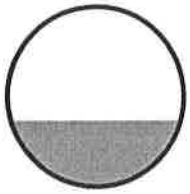
Summary for Reach L57: 48"

Inflow Area = 50.059 ac, 36.55% Impervious, Inflow Depth > 2.06" for 25-Year event
Inflow = 24.26 cfs @ 12.59 hrs, Volume= 8.593 af
Outflow = 24.26 cfs @ 12.61 hrs, Volume= 8.583 af, Atten= 0%, Lag= 1.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.84 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 3.00 fps, Avg. Travel Time= 2.5 min

Peak Storage= 1,852 cf @ 12.61 hrs
Average Depth at Peak Storage= 1.46'
Bank-Full Depth= 4.00' Flow Area= 12.6 sf, Capacity= 85.21 cfs

48.0" Round Pipe
n= 0.014
Length= 446.0' Slope= 0.0041 '/'
Inlet Invert= 49.00', Outlet Invert= 47.18'



Summary for Reach L65: 30"

Inflow Area = 50.059 ac, 36.55% Impervious, Inflow Depth > 2.06" for 25-Year event
Inflow = 24.26 cfs @ 12.59 hrs, Volume= 8.596 af
Outflow = 24.26 cfs @ 12.59 hrs, Volume= 8.596 af, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 21.62 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 11.08 fps, Avg. Travel Time= 0.2 min

Peak Storage= 117 cf @ 12.59 hrs
Average Depth at Peak Storage= 0.70'
Bank-Full Depth= 2.50' Flow Area= 4.9 sf, Capacity= 142.22 cfs

30.0" Round Pipe
n= 0.014
Length= 104.0' Slope= 0.1394 '/'
Inlet Invert= 71.00', Outlet Invert= 56.50'

Summary for Reach L67: 48"

Inflow Area = 50.059 ac, 36.55% Impervious, Inflow Depth > 2.06" for 25-Year event
Inflow = 24.26 cfs @ 12.59 hrs, Volume= 8.596 af
Outflow = 24.26 cfs @ 12.59 hrs, Volume= 8.593 af, Atten= 0%, Lag= 0.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.83 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 3.99 fps, Avg. Travel Time= 0.8 min

Peak Storage= 573 cf @ 12.59 hrs
Average Depth at Peak Storage= 1.18'
Bank-Full Depth= 4.00' Flow Area= 12.6 sf, Capacity= 127.86 cfs

48.0" Round Pipe
n= 0.014
Length= 185.0' Slope= 0.0092 '/'
Inlet Invert= 50.70', Outlet Invert= 49.00'

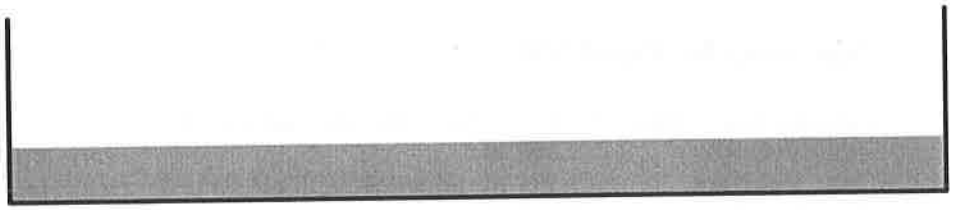
Summary for Reach P1:

Inflow Area = 96.458 ac, 43.34% Impervious, Inflow Depth > 2.05" for 25-Year event
Inflow = 63.30 cfs @ 12.21 hrs, Volume= 16.454 af
Outflow = 63.31 cfs @ 12.21 hrs, Volume= 16.452 af, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.55 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.25 fps, Avg. Travel Time= 0.2 min

Peak Storage= 385 cf @ 12.21 hrs
Average Depth at Peak Storage= 0.70'
Bank-Full Depth= 2.33' Flow Area= 28.0 sf, Capacity= 407.83 cfs

12.00' x 2.33' deep channel, n= 0.030
Length= 46.0' Slope= 0.0435 '/'
Inlet Invert= 43.00', Outlet Invert= 41.00'



Summary for Pond 19P:

Inflow Area = 28.427 ac, 25.89% Impervious, Inflow Depth > 2.12" for 25-Year event
Inflow = 57.93 cfs @ 12.15 hrs, Volume= 5.020 af
Outflow = 57.82 cfs @ 12.16 hrs, Volume= 5.014 af, Atten= 0%, Lag= 0.6 min
Primary = 15.09 cfs @ 12.16 hrs, Volume= 3.508 af
Secondary = 42.73 cfs @ 12.16 hrs, Volume= 1.507 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 139.79' @ 12.16 hrs Surf.Area= 2,906 sf Storage= 3,065 cf

Plug-Flow detention time= 2.0 min calculated for 5.014 af (100% of inflow)
Center-of-Mass det. time= 1.5 min (799.1 - 797.6)

Volume	Invert	Avail.Storage	Storage Description
#1	137.80'	30,987 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
137.80	174	0	0
138.30	860	259	259
138.80	1,546	602	860
139.30	2,232	945	1,805
139.80	2,919	1,288	3,092
140.30	3,605	1,631	4,723
140.80	4,291	1,974	6,697
141.30	4,977	2,317	9,014
141.80	5,663	2,660	11,674
148.00	567	19,313	30,987

Device	Routing	Invert	Outlet Devices
#1	Primary	137.80'	**24.0" Round Culvert** L= 612.0' Ke= 0.500 Inlet / Outlet Invert= 137.80' / 105.30' S= 0.0531 '/' Cc= 0.900 n= 0.014, Flow Area= 3.14 sf
#2	Secondary	139.00'	**23.0' long x 18.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=15.04 cfs @ 12.16 hrs HW=139.78' TW=75.22' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 15.04 cfs @ 4.79 fps)

Secondary OutFlow Max=42.19 cfs @ 12.16 hrs HW=139.78' TW=50.90' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 42.19 cfs @ 2.34 fps)

Summary for Pond 20P:

Inflow Area = 2.640 ac,100.00% Impervious, Inflow Depth > 5.02" for 25-Year event
Inflow = 14.31 cfs @ 12.07 hrs, Volume= 1.105 af
Outflow = 14.34 cfs @ 12.07 hrs, Volume= 1.101 af, Atten= 0%, Lag= 0.0 min
Primary = 14.34 cfs @ 12.07 hrs, Volume= 1.101 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 167.88' @ 12.07 hrs Surf.Area= 4,356 sf Storage= 2,838 cf

Plug-Flow detention time= 11.5 min calculated for 1.098 af (99% of inflow)
Center-of-Mass det. time= 9.8 min (728.1 - 718.4)

Volume	Invert	Avail.Storage	Storage Description
#1	166.00'	2,838 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
166.00	0	0	0
166.25	2,875	359	359
166.50	3,790	833	1,193
166.75	4,225	1,002	2,194
166.90	4,356	644	2,838

Device	Routing	Invert	Outlet Devices
#1	Primary	166.00'	**24.0" Round Culvert** L= 293.0' Ke= 0.500 Inlet / Outlet Invert= 166.00' / 142.00' S= 0.0819 '/' Cc= 0.900 n= 0.014, Flow Area= 3.14 sf

Primary OutFlow Max=13.81 cfs @ 12.07 hrs HW=167.82' TW=139.63' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 13.81 cfs @ 4.60 fps)

Summary for Pond 22.4P:

Inflow Area =	50.059 ac,	36.55% Impervious,	Inflow Depth >	2.09" for 25-Year event
Inflow =	80.82 cfs @	12.09 hrs,	Volume=	8.730 af
Outflow =	24.26 cfs @	12.59 hrs,	Volume=	8.596 af, Atten= 70%, Lag= 29.5 min
Primary =	24.26 cfs @	12.59 hrs,	Volume=	8.596 af
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 76.26' @ 12.59 hrs Surf.Area= 31,524 sf Storage= 96,282 cf

Plug-Flow detention time= 44.0 min calculated for 8.575 af (98% of inflow)
Center-of-Mass det. time= 38.1 min (835.2 - 797.2)

Volume	Invert	Avail.Storage	Storage Description
#1	71.00'	233,786 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
71.00	5,227	0	0
71.25	5,793	1,378	1,378
71.50	6,360	1,519	2,897
71.75	6,926	1,661	4,557
72.00	7,492	1,802	6,360
72.25	9,295	2,098	8,458
72.50	11,097	2,549	11,007
72.75	12,899	3,000	14,007
73.00	14,702	3,450	17,457
73.25	16,504	3,901	21,357
73.50	18,306	4,351	25,709
73.75	20,108	4,802	30,510
74.00	21,911	5,252	35,763
74.25	22,983	5,612	41,375
74.50	24,056	5,880	47,254
74.75	25,129	6,148	53,403
75.00	26,201	6,416	59,819
75.25	27,274	6,684	66,503
75.50	28,347	6,953	73,456
75.75	29,419	7,221	80,677
76.00	30,492	7,489	88,165
76.25	31,478	7,746	95,912
76.50	32,463	7,993	103,904
76.75	33,449	8,239	112,143
77.00	34,434	8,485	120,629
77.25	35,420	8,732	129,360
77.50	36,405	8,978	138,339
77.75	37,391	9,225	147,563
78.00	38,376	9,471	157,034
79.00	38,376	38,376	195,410
80.00	38,376	38,376	233,786

Device	Routing	Invert	Outlet Devices
#1	Secondary	79.00'	**12.0' long x 37.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#2	Primary	71.00'	**21.0" Round Culvert** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 71.00' / 70.99' S= 0.0100 '/' Cc= 0.900 n= 0.005, Flow Area= 2.41 sf

Primary OutFlow Max=24.25 cfs @ 12.59 hrs HW=76.26' TW=71.70' (Dynamic Tailwater)
↑**2=Culvert** (Inlet Controls 24.25 cfs @ 10.08 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=71.00' TW=48.58' (Dynamic Tailwater)
↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 27P:

Inflow Area = 7.192 ac, 92.69% Impervious, Inflow Depth > 4.56" for 25-Year event
Inflow = 37.64 cfs @ 12.07 hrs, Volume= 2.736 af
Outflow = 22.58 cfs @ 12.18 hrs, Volume= 2.736 af, Atten= 40%, Lag= 6.4 min
Discarded = 2.57 cfs @ 12.95 hrs, Volume= 2.235 af
Primary = 20.03 cfs @ 12.18 hrs, Volume= 0.502 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 52.21' @ 12.95 hrs Surf.Area= 11,100 sf Storage= 29,701 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 75.7 min (817.3 - 741.6)

Volume	Invert	Avail.Storage	Storage Description
#1	47.00'	27,300 cf	**Custom Stage Data (Prismatic)**Listed below Inside #2
#2	47.00'	46,800 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 144,300 cf Overall - 27,300 cf Embedded = 117,000 cf x 40.0% Voids
		74,100 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
47.00	2,100	0	0
48.00	2,100	2,100	2,100
49.00	2,100	2,100	4,200
50.00	2,100	2,100	6,300
51.00	2,100	2,100	8,400
52.00	2,100	2,100	10,500
53.00	2,100	2,100	12,600
54.00	2,100	2,100	14,700
60.00	2,100	12,600	27,300

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
47.00	11,100	0	0
48.00	11,100	11,100	11,100
49.00	11,100	11,100	22,200
50.00	11,100	11,100	33,300
51.00	11,100	11,100	44,400
52.00	11,100	11,100	55,500
53.00	11,100	11,100	66,600
54.00	11,100	11,100	77,700
60.00	11,100	66,600	144,300

Device	Routing	Invert	Outlet Devices
#1	Discarded	47.00'	**9.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'
#2	Primary	50.00'	**30.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=2.57 cfs @ 12.95 hrs HW=52.21' (Free Discharge)
└**1=Exfiltration** (Controls 2.57 cfs)

Primary OutFlow Max=19.29 cfs @ 12.18 hrs HW=51.95' TW=51.01' (Dynamic Tailwater)
└**2=Orifice/Grate** (Orifice Controls 19.29 cfs @ 4.69 fps)

Summary for Pond 30P:

Inflow Area = 75.401 ac, 40.61% Impervious, Inflow Depth > 2.11" for 25-Year event
Inflow = 113.02 cfs @ 12.17 hrs, Volume= 13.253 af
Outflow = 31.42 cfs @ 12.91 hrs, Volume= 11.163 af, Atten= 72%, Lag= 44.8 min
Primary = 31.42 cfs @ 12.91 hrs, Volume= 11.163 af
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 52.21' @ 12.91 hrs Surf.Area= 70,327 sf Storage= 202,751 cf

Plug-Flow detention time= 124.0 min calculated for 11.135 af (84% of inflow)
Center-of-Mass det. time= 81.4 min (896.4 - 815.0)

Volume	Invert	Avail.Storage	Storage Description
#1	49.00'	847,812 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
49.00	56,386	0	0
50.00	60,502	58,444	58,444
51.00	64,762	62,632	121,076
52.00	69,316	67,039	188,115
53.00	74,141	71,729	259,844
54.00	78,479	76,310	336,154
55.00	83,097	80,788	416,942
55.50	86,336	42,358	459,300
60.00	86,336	388,512	847,812

Device	Routing	Invert	Outlet Devices
#1	Tertiary	55.00'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Primary	49.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 3.00 3.00 5.00 Width (feet) 1.00 4.00 6.00 6.00
#3	Primary	49.00'	**5.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=31.42 cfs @ 12.91 hrs HW=52.21' TW=49.74' (Dynamic Tailwater)
├**2=Custom Weir/Orifice** (Weir Controls 30.39 cfs @ 4.76 fps)
└**3=Orifice/Grate** (Orifice Controls 1.03 cfs @ 7.57 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=49.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Time span=0.00-20.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentS12: Runoff Area=218,468 sf 13.56% Impervious Runoff Depth>1.32"
Flow Length=2,838' Tc=14.6 min CN=50 Runoff=5.50 cfs 0.550 af

SubcatchmentS19: Runoff Area=25.787 ac 18.30% Impervious Runoff Depth>2.61"
Flow Length=1,620' Tc=11.2 min CN=65 Runoff=70.52 cfs 5.608 af

SubcatchmentS20: Runoff Area=2.640 ac 100.00% Impervious Runoff Depth>6.12"
Tc=5.0 min CN=98 Runoff=17.33 cfs 1.347 af

SubcatchmentS21: Runoff Area=240,167 sf 65.02% Impervious Runoff Depth>4.20"
Flow Length=1,904' Tc=12.4 min CN=81 Runoff=23.19 cfs 1.931 af

SubcatchmentS21.1: Runoff Area=48,374 sf 22.82% Impervious Runoff Depth>2.15"
Flow Length=410' Tc=11.6 min CN=60 Runoff=2.43 cfs 0.199 af

SubcatchmentS21.2.1: Runoff Area=4,514 sf 76.74% Impervious Runoff Depth>4.86"
Tc=5.0 min CN=87 Runoff=0.61 cfs 0.042 af

SubcatchmentS21.2.2: Runoff Area=14,095 sf 0.00% Impervious Runoff Depth>1.25"
Flow Length=325' Tc=5.4 min CN=49 Runoff=0.44 cfs 0.034 af

SubcatchmentS22: Runoff Area=3.230 ac 73.07% Impervious Runoff Depth>5.20"
Tc=5.0 min CN=90 Runoff=19.76 cfs 1.399 af

SubcatchmentS22.1: Runoff Area=3.014 ac 68.94% Impervious Runoff Depth>4.64"
Tc=5.0 min CN=85 Runoff=17.05 cfs 1.166 af

SubcatchmentS22.2: Runoff Area=2.223 ac 75.75% Impervious Runoff Depth>5.08"
Tc=5.0 min CN=89 Runoff=13.42 cfs 0.942 af

SubcatchmentS22.3: Runoff Area=1.151 ac 77.85% Impervious Runoff Depth>4.86"
Tc=5.0 min CN=87 Runoff=6.74 cfs 0.466 af

SubcatchmentS22.4: Runoff Area=4.963 ac 0.00% Impervious Runoff Depth>1.65"
Tc=5.0 min CN=54 Runoff=9.71 cfs 0.680 af

SubcatchmentS23: Runoff Area=195,810 sf 67.56% Impervious Runoff Depth>3.99"
Flow Length=2,025' Tc=12.4 min CN=79 Runoff=18.08 cfs 1.496 af

SubcatchmentS24: Runoff Area=29,970 sf 86.82% Impervious Runoff Depth>5.20"
Tc=5.0 min CN=90 Runoff=4.21 cfs 0.298 af

SubcatchmentS26: Runoff Area=52,110 sf 0.00% Impervious Runoff Depth>1.40"
Tc=5.0 min CN=51 Runoff=1.92 cfs 0.140 af

SubcatchmentS27: Runoff Area=313,278 sf 92.69% Impervious Runoff Depth>5.65"
Tc=5.0 min CN=94 Runoff=46.03 cfs 3.388 af

Subcatchment S28: Runoff Area=8.848 ac 68.07% Impervious Runoff Depth>4.96"
Flow Length=1,367' Tc=13.3 min CN=88 Runoff=41.20 cfs 3.659 af

Subcatchment S29: Runoff Area=103,868 sf 0.00% Impervious Runoff Depth>2.34"
Flow Length=325' Tc=6.7 min CN=62 Runoff=6.68 cfs 0.465 af

Subcatchment S30: Runoff Area=96,516 sf 0.00% Impervious Runoff Depth>0.55"
Tc=5.0 min CN=39 Runoff=0.69 cfs 0.102 af

Subcatchment S31: Runoff Area=196,098 sf 0.00% Impervious Runoff Depth>1.17"
Flow Length=758' Tc=9.6 min CN=48 Runoff=4.84 cfs 0.438 af

Subcatchment S31.1: Runoff Area=0.923 ac 37.59% Impervious Runoff Depth>4.31"
Flow Length=711' Tc=8.9 min CN=82 Runoff=4.38 cfs 0.332 af

Subcatchment S32: Runoff Area=1.450 ac 50.34% Impervious Runoff Depth>3.49"
Tc=5.0 min CN=74 Runoff=6.36 cfs 0.422 af

Subcatchment S32.1: Runoff Area=139,588 sf 72.06% Impervious Runoff Depth>4.43"
Tc=5.0 min CN=83 Runoff=17.46 cfs 1.182 af

Subcatchment S32.2: Runoff Area=92,794 sf 83.53% Impervious Runoff Depth>5.20"
Tc=5.0 min CN=90 Runoff=13.04 cfs 0.922 af

Subcatchment S6: Retail Core South Runoff Area=93,849 sf 62.37% Impervious Runoff Depth>3.79"
Flow Length=926' Tc=10.2 min CN=77 Runoff=8.78 cfs 0.680 af

Reach 1R: Point of Analysis 1 Inflow=91.55 cfs 22.799 af
Outflow=91.55 cfs 22.799 af

Reach L150: Avg. Flow Depth=1.68' Max Vel=3.67 fps Inflow=73.81 cfs 20.493 af
n=0.030 L=136.0' S=0.0043 '/' Capacity=654.46 cfs Outflow=73.89 cfs 20.479 af

Reach L151: Avg. Flow Depth=1.56' Max Vel=5.99 fps Inflow=73.89 cfs 20.479 af
n=0.030 L=155.0' S=0.0148 '/' Capacity=2,128.99 cfs Outflow=73.96 cfs 20.470 af

Reach L186: Avg. Flow Depth=2.47' Max Vel=2.99 fps Inflow=80.84 cfs 21.240 af
n=0.030 L=340.0' S=0.0020 '/' Capacity=279.47 cfs Outflow=80.77 cfs 21.198 af

Reach L57: 48" Avg. Flow Depth=1.55' Max Vel=6.02 fps Inflow=27.04 cfs 11.123 af
48.0" Round Pipe n=0.014 L=446.0' S=0.0041 '/' Capacity=85.21 cfs Outflow=27.03 cfs 11.112 af

Reach L65: 30" Avg. Flow Depth=0.74' Max Vel=22.30 fps Inflow=27.04 cfs 11.127 af
30.0" Round Pipe n=0.014 L=104.0' S=0.1394 '/' Capacity=142.22 cfs Outflow=27.04 cfs 11.126 af

Reach L67: 48" Avg. Flow Depth=1.25' Max Vel=8.07 fps Inflow=27.04 cfs 11.126 af
48.0" Round Pipe n=0.014 L=185.0' S=0.0092 '/' Capacity=127.86 cfs Outflow=27.04 cfs 11.123 af

Reach P1: Avg. Flow Depth=0.88' Max Vel=8.66 fps Inflow=91.55 cfs 22.801 af
n=0.030 L=46.0' S=0.0435 '/' Capacity=407.83 cfs Outflow=91.55 cfs 22.799 af

Pond 19P: Peak Elev=140.05' Storage=3,862 cf Inflow=80.44 cfs 6.950 af
Primary=16.91 cfs 4.425 af Secondary=65.04 cfs 2.517 af Outflow=81.95 cfs 6.942 af

Pond 20P: Peak Elev=168.44' Storage=2,838 cf Inflow=17.33 cfs 1.347 af
24.0" Round Culvert n=0.014 L=293.0' S=0.0819 '/' Outflow=18.24 cfs 1.342 af

Pond 22.4P: Peak Elev=77.33' Storage=132,036 cf Inflow=103.08 cfs 11.285 af
Primary=27.04 cfs 11.127 af Secondary=0.00 cfs 0.000 af Outflow=27.04 cfs 11.127 af

Pond 27P: Peak Elev=52.98' Storage=34,060 cf Inflow=46.03 cfs 3.388 af
Discarded=2.61 cfs 2.463 af Primary=28.33 cfs 0.871 af Outflow=30.92 cfs 3.334 af

Pond 30P: Peak Elev=52.96' Storage=257,106 cf Inflow=158.40 cfs 18.231 af
Primary=52.89 cfs 15.912 af Tertiary=0.00 cfs 0.000 af Outflow=52.89 cfs 15.912 af

Total Runoff Area = 96.458 ac Runoff Volume = 27.888 af Average Runoff Depth = 3.47"
56.66% Pervious = 54.649 ac 43.34% Impervious = 41.809 ac

Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Inlet Drainage Area (acres)	Inlet C	Local Flow Time (min)	System CA (acres)
CB-620	55.50	55.50	52.25	0.371	0.901	5	0.334
CB-621	54.50	54.50	51.00	1.413	0.953	5	1.346
CB-622	55.10	55.10	51.85	0.262	0.792	5	0.207
CB-623	55.10	55.10	50.45	0.210	0.897	5	0.188
CB-624	54.50	54.50	50.60	1.425	0.926	5	1.319
CB-625	54.50	54.50	51.50	1.486	0.905	5	1.346
RD-600.1	57.00	57.00	53.94	0.530	0.980	5	0.520
RD-600.2	57.00	57.00	53.29	0.548	0.980	5	0.537
RD-600.3	57.00	57.00	52.26	0.978	0.980	5	0.958

Label	Elevation (Rim) (ft)	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Elevation (Invert in 1) (ft)	Elevation (Invert in 2) (ft)	Elevation (Invert in 3) (ft)	Elevation (Invert in 4) (ft)	Diameter (in)
DMH-622	54.95	54.95	50.60	51.86	51.86	51.20	50.70	(N/A)	(N/A)	60
DMH-623	55.45	55.45	50.15	51.79	51.79	50.25	50.25	51.60	(N/A)	48
DMH-624	55.05	55.05	50.35	51.70	51.70	50.45	(N/A)	(N/A)	(N/A)	48
DMH-625	54.80	54.80	49.70	51.64	51.64	49.80	51.40	49.80	(N/A)	60
DMH-626	56.05	56.05	53.50	54.26	54.26	53.60	(N/A)	(N/A)	(N/A)	48
DMH-627	56.00	56.00	52.85	53.89	53.89	52.95	52.95	(N/A)	(N/A)	48
DMH-628	56.00	56.00	51.80	53.03	53.03	51.90	51.90	(N/A)	(N/A)	48
DMH-629	55.85	55.85	50.60	51.85	51.85	50.70	(N/A)	(N/A)	(N/A)	60
DMH-630	55.90	55.90	49.90	51.15	51.15	50.00	(N/A)	(N/A)	(N/A)	60
STC-6.2	56.50	56.50	48.85	50.78	50.78	48.95	(N/A)	(N/A)	(N/A)	72

Label	Start Node	Invert (Upstream) (ft)	Stop Node	Invert (Downstream) (ft)	Diameter (in)	Upstream Inlet Area (acres)	System Drainage Area (ft²)	System CA (acres)	Length (Scaled) (ft)	Slope (ft/ft)	Flow (ft³/s)	Capacity (Full Flow) (ft³/s)	Elevation Ground (Start) (ft)	Hydraulic Grade Line (In) (ft)	Elevation Ground (Stop) (ft)	Hydraulic Grade Line (Out) (ft)	Cover (Start) (ft)	Cover (Stop) (ft)	Velocity (ft/s)
P-643	CB-621	51.00	DMH-622	50.70	18	1.413	61542.6	1.346	34	0.009	8.14	9.87	54.50	52.11	54.95	51.86	2.00	2.75	6.24
P-643A	CB-620	52.50	DMH-622	51.20	12	0.371	16146.9	0.334	258	0.005	2.02	2.53	55.50	53.18	54.95	51.86	2.00	2.75	3.58
P-644	DMH-622	50.60	DMH-623	50.25	24	(N/A)	77689.5	1.680	68	0.005	10.13	16.23	54.95	51.86	55.45	51.79	2.35	3.20	5.45
P-645	CB-622	51.85	DMH-623	51.60	12	0.262	11394.0	0.207	46	0.005	1.25	2.63	55.10	52.34	55.45	52.07	2.25	2.85	3.31
P-646	CB-623	50.45	DMH-623	50.25	12	0.210	9145.1	0.188	36	0.006	1.14	2.66	55.10	51.83	55.45	51.79	3.65	4.20	1.45
P-647	DMH-623	50.15	DMH-625	49.80	24	(N/A)	98228.5	2.076	72	0.005	12.44	15.77	55.45	51.79	54.80	51.64	3.30	3.00	5.56
P-648	CB-624	50.65	DMH-624	50.45	18	1.425	62061.1	1.319	34	0.006	7.98	8.06	54.50	51.88	55.05	51.70	2.35	3.10	5.20
P-649	DMH-624	50.35	DMH-625	49.80	24	(N/A)	62061.1	1.319	100	0.006	7.98	16.78	55.05	51.70	54.80	51.64	2.70	3.00	5.27
P-650	CB-625	51.50	DMH-625	51.40	24	1.486	64726.9	1.346	20	0.005	8.14	16.00	54.50	52.52	54.80	52.41	1.00	1.40	5.12
P-651	DMH-625	49.70	STC-6.2	48.95	30	(N/A)	225016.5	4.740	143	0.005	28.20	29.70	54.80	51.64	56.50	50.78	2.60	5.05	6.89
P-652	STC-6.2	48.85	OF-602	48.65	30	(N/A)	225016.5	4.740	40	0.005	27.89	29.00	56.50	50.78	56.97	50.45	5.15	5.82	6.73
P-653	DMH-626	53.50	DMH-627	52.95	15	(N/A)	23099.3	0.520	110	0.005	3.12	4.57	56.05	54.26	56.00	53.89	1.30	1.80	4.01
P-654	DMH-627	52.85	DMH-628	51.90	18	(N/A)	46971.1	1.057	186	0.005	6.25	7.51	56.00	53.89	56.00	53.03	1.65	2.60	4.75
P-655	DMH-628	51.80	DMH-629	50.70	24	(N/A)	89551.6	2.015	200	0.005	11.66	16.78	56.00	53.03	55.85	51.93	2.20	3.15	5.77
P-655	DB-30P	49.00	OCS-1	49.00	48	(N/A)	0.0	0.000	23	0.000	31.05	0.00	49.00	50.91	55.50	50.65	-4.00	2.50	2.47
P-656	OCS-1	49.00	FES-603	48.70	48	(N/A)	0.0	0.000	30	0.010	31.05	146.09	55.50	50.65	48.70	50.07	2.50	-4.00	9.23
P-656	DMH-629	50.60	DMH-630	50.00	24	(N/A)	89551.6	2.015	120	0.005	11.44	16.00	55.85	51.85	55.90	51.21	3.25	3.90	5.53
P-657	DMH-630	49.90	OF-603	49.35	24	(N/A)	89551.6	2.015	113	0.005	11.30	15.78	55.90	51.15	57.30	50.56	4.00	5.95	5.46
P-658	IB-27P	50.00	FES-602	49.00	30	(N/A)	0.0	0.000	107	0.009	22.47	39.65	57.05	51.61	49.00	50.35	4.55	-2.50	8.33
RL-600.1	RD-600.1	53.94	DMH-626	53.60	15	0.530	23099.3	0.520	63	0.005	3.14	4.75	57.00	54.68	56.05	54.31	1.81	1.20	4.13
RL-600.2	RD-600.2	53.29	DMH-627	52.95	15	0.548	23871.8	0.537	68	0.005	3.25	4.57	57.00	54.08	56.00	53.89	2.46	1.80	4.04
RL-600.3	RD-600.3	52.26	DMH-628	51.90	18	0.978	42580.5	0.958	72	0.005	5.79	7.43	57.00	53.27	56.00	53.03	3.24	2.60	4.65

University Station
Stormceptor Sizing Summary
September 24, 2013

STC #	Overal Tributary Area (ac)	Tributary Impervious Area (ac)	% Impervious	TSS Removal Target	Water Quality Design Depth	Time of Concentration	Impervious Area (sq mi)	qu	Water Quality Flow Rate (cfs)	STC Model #
6.2	5.165	4.618	89.4%	50.0%	1"	0.1	0.007215625	775	5.59	900 [2]

(1) Maximum straight through pipe size for STC-900 to STC-7200 is 42".
(2) Maximum straight through pipe size for STC-450 is 24".

Stormceptor®

Stormceptor Design Summary

PCSWMM for Stormceptor

Project Information

Date	9/24/2013
Project Name	University Station
Project Number	N/A
Location	STC-6.2

Designer Information

Company	N/A
Contact	N/A

Notes

N/A

Drainage Area

Total Area (ac)	5.165
Imperviousness (%)	89.4

The Stormceptor System model STC 450i achieves the water quality objective removing 56% TSS for a Fine (organics, silts and sand) particle size distribution.

Rainfall

Name	BLUE HILL
State	MA
ID	736
Years of Records	1948 to 2005
Latitude	42°12'44"N
Longitude	71°6'53"W

Water Quality Objective

TSS Removal (%)	50

Upstream Storage

Storage (ac-ft)	Discharge (cfs)
0	0

Stormceptor Sizing Summary

Stormceptor Model	TSS Removal %
STC 450i	**56**
STC 900	67
STC 1200	67
STC 1800	67
STC 2400	73
STC 3600	73
STC 4800	78
STC 6000	78
STC 7200	81
STC 11000	85
STC 13000	85
STC 16000	88

*Use of an STC 900 is required due to inlet/outlet pipe diameter.

Rinker MATERIALS™

Stormceptor®

Particle Size Distribution

Removing silt particles from runoff ensures that the majority of the pollutants, such as hydrocarbons and heavy metals that adhere to fine particles, are not discharged into our natural water courses. The table below lists the particle size distribution used to define the annual TSS removal.

Fine (organics, silts and sand)							
Particle Size µm	Distribution %	Specific Gravity	Settling Velocity ft/s	Particle Size µm	Distribution %	Specific Gravity	Settling Velocity ft/s
20	20	1.3	0.0013				
60	20	1.8	0.0051				
150	20	2.2	0.0354				
400	20	2.65	0.2123				
2000	20	2.65	0.9417				

Stormceptor Design Notes

- Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor.
- Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal.
- Only the STC 450i is adaptable to function with a catch basin inlet and/or inline pipes.
- Only the Stormceptor models STC 450i to STC 7200 may accommodate multiple inlet pipes.
- Inlet and outlet invert elevation differences are as follows:

Inlet and Outlet Pipe Invert Elevations Differences

Inlet Pipe Configuration	STC 450i	STC 900 to STC 7200	STC 11000 to STC 16000
Single inlet pipe	3 in.	1 in.	3 in.
Multiple inlet pipes	3 in.	3 in.	Only one inlet pipe.

- Design estimates are based on stable site conditions only, after construction is completed.
- Design estimates assume that the storm drain is not submerged during zero flows. For submerged applications, please contact your local Stormceptor representative.
- Design estimates may be modified for specific spills controls. Please contact your local Stormceptor representative for further assistance.
- For pricing inquiries or assistance, please contact Rinker Materials 1 (800) 909-7763 www.rinkerstormceptor.com

Rinker MATERIALS™

Tab 6:
Project Plans

The following plans are being provided under separate cover:

- Cover Sheet dated September 27, 2013
- C-101 General Layout Map dated September 27, 2013
- V-101 Existing Conditions Plan dated September 27, 2013
- C-111 Site Development Plans – Demolition Plan dated September 27, 2013
- C-121 Site Development Plans – Erosion Control Plan dated September 27, 2013
- C-131 Site Development Plans – Site Layout Plan dated September 27, 2013
- C-141 Site Development Plans – Grading & Drainage Plan dated September 27, 2013
- C-151 Site Development Plans – Utility Plan dated September 27, 2013
- C-501 Site Development Plans – Detail Sheet dated September 27, 2013
- C-502 Site Development Plans – Detail Sheet dated September 27, 2013
- C-503 Site Development Plans – Detail Sheet dated September 27, 2013
- C-504 Site Development Plans – Detail Sheet dated September 27, 2013
- C-504 Site Development Plans – Detail Sheet dated September 27, 2013
- C-505 Site Development Plans – Detail Sheet dated September 27, 2013
- C-506 Site Development Plans – Detail Sheet dated September 27, 2013
- C-507 Site Development Plans – Detail Sheet dated September 27, 2013
- L-100 Site Development Plans – Landscaping dated September 27, 2013
- L-200 Site Development Plans – Landscape Enlargements dated September 27, 2013
- L-300 Site Development Plans – Landscape Details dated September 27, 2013
- I-1 Irrigation Schematic dated September 27, 2013
- E0.2 Site Development Plans – Exterior Lighting Plan dated September 27, 2013
- E0.2A Site Development Plans – Photometric Cutsheets dated September 27, 2013
- Architectural Elevations dated September 27, 2013
- Conceptual Architectural First Floor Plans dated September 27, 2013
- Conceptual Architectural Second Floor Plans dated September 27, 2013
- Conceptual Architectural Third Floor Plans dated September 27, 2013