

**PRELIMINARY
STORMWATER MANAGEMENT
COMPUTATIONS**

**BROOKHAVEN AT LEXINGTON
NORTH BUILDING AND COMMONS EXPANSION
LEXINGTON, MA**

Date: DECEMBER 28, 2015

Project No. 151067

Prepared By: **Goldsmith, Prest & Ringwall, Inc.**
Ayer, MA

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Section 1

Introduction and Methodology

Introduction and Methodology

Regulatory Requirements and Design Intent

This narrative is intended to accompany the stormwater management report for the Brookhaven at Lexington North Building and Commons Expansion project. Included in this report are calculations that support engineering design as required by the MassDEP Stormwater Management Handbook and applicable Town of Lexington Rules and Regulations. Site specific information is presented under two scenarios, “pre-development” and “post-development” conditions, so that potential impacts due to the project can be identified, quantified and, as necessary, mitigated.

The final design intent seeks to meet the following interrelated goals:

1. Limit stormwater runoff rates for the 2, 10, 25, and 100-year storms to existing (predevelopment) levels;
2. Provide adequate drainage for new surfaces;
3. Provide a cost-effective engineering solution that addresses regulatory as well as real-world constraints.

Existing Site Description

The subject site consists of approximately 26 acres of developed land for the Brookhaven at Lexington facility, plus an adjacent 6.1 ± acres of formerly developed, currently vacant property located on Property Map 5, Parcels 19C, 20 & 21A.

The existing Brookhaven property was last expanded in 2003, and according to the Drainage Report by the engineer of record, all stormwater controls were in accordance with the Massachusetts DEP Policy which were later adopted as Standards. Therefore the controls on the existing site are considered to be adequate.

The new lands to be developed are located north of the existing Brookhaven development. This land is steep and wooded to the north, flattening towards wetlands to the south and east and tying to its Waltham Street frontage to the west. Chester Brook is an intermittent stream with bordering wetlands that flows from east to west across the southern fringe of these lands.

Soil mapping by the Natural Resources Conservation Service shown on MASS GIS for this site indicate soils are predominantly Narragansett-Hollis-rock outcrop complex on slopes from 3 to 25%, Freetown muck on 0 to 1% slopes and Narragansett silt loam on slopes varying from 8% to 15%. Soils are characterized as hydraulic group B or D soils.

Project Description

The proposed project is to construct a new independent living facility on the lands north of Chester Brook, making a single vehicular and pedestrian connection to the existing Brookhaven facility, as well as expanding the existing Commons facilities at Brookhaven. The North Building (for independent living) includes an integral underground parking garage that is partially exposed above grade at the northwest and northeast corners. Some surface parking will also be provided near the North Building.

An emergency fire access lane will be installed north of the North Building, with a hammerhead-type turnaround for fire trucks and emergency vehicles. An "Entrance Only" emergency/fire access entrance from Waltham Street will be provided at the northwest corner of the property by reconstructing a former driveway entrance and moving a utility pole.

The North Building will be connected to the existing Brookhaven facility via a raised roadway bounded by mechanically stabilized earth walls (MSE walls). An arch span culvert is proposed to support the roadway crossing over an existing culvert in Chester Brook without disturbing the culvert or the adjacent wetlands. The MSE walls and the arch span culvert are measures proposed to minimize wetland and buffer encroachments.

New utility service connections for water, sewer, natural gas, electricity and telecommunications will be tapped in the Waltham Street right-of-way and brought to the west end of the North Building. Potable water service to the North Building will be tapped into the 10" water main in Waltham Street at the northwest corner of the property and will be connected to the water main being relocated with the Commons Expansion to provide a looped water system. A telecommunications duct bank will also connect the North Building to the Commons Expansion.

Other work associated with the project includes realignment of the Commons Road access aisle adjacent to the Commons Expansion, reconfiguration of existing parking areas, as well as utility relocations for water, sewer, natural gas, electrical, telecommunications and drainage. New electrical transformers and emergency generators will be set at both the North Building and the Commons Expansion.

The northern properties are also being rezoned, and afterwards will be considered as one with the existing Brookhaven facility. Due to the location of Chester Brook between the two parts of Brookhaven's development, drainage is being initially evaluated separately.

Drainage, recharge and water quality facilities for the North Building are provided in new sediment forebays, rooftop recharge chambers and a proposed retention basin. Modifications to stormwater facilities for the Commons Expansion will include reconstruction and expansion of a large ADS rooftop infiltration facility, refurbishing the existing detention basin near Chester Brook, and a few proprietary stormwater manhole separators such as Vortechs or Stormceptor systems as needed for .

Hydrologic and Hydraulic Computation Methodology

Runoff rates and volumes were computed using the Soil Conservation Service TR-55 Method entitled "Urban Hydrology for Small Watersheds". The following 24-hour rainfall events were analyzed:

Frequency (years): 2, 10, 25, and 100

The land for the North Building is naturally broken into three sub-watershed drainage divides by the existing topography, and the Commons Expansion as two sub-watersheds. The sub-watersheds combine in such a way as to make three analysis points (AP-1, AP-2, AP-3) convenient for evaluating both pre-developed and post-developed peak discharge rates for the design storm frequencies using Hydro-CAD version 10.00-14. The hydraulic and hydrologic model accounted for proposed changes to land cover, time of concentration and the proposed stormwater improvements.

Conclusion

This report represents an initial summary of existing and proposed stormwater measures at the Brookhaven at Lexington, North Building and Commons Expansion project. The placement and capacity of various stormwater measures described and tabulated provide adequate volume and land area for final stormwater engineering that is compliant with MassDEP Stormwater Management Standards.

**Stormwater Management Standard 3
GROUNDWATER RECHARGE**

NORTH BUILDING
BROOKHAVEN NORTH BUILDING
LEXINGTON, MA

Project No. 151067

Parameter	Unit	Quantity	Remarks
Predevelopment soils, composite hydrologic group		B	
Required runoff depth to recharge*	IN	0.25	A=0.40; B=0.25; C=0.10; D=waived * Weighted average
Watershed area	AC	4.14	
Predevelopment impervious area	AC	0.04	
Predevelopment pervious area	AC	4.10	
Rooftop impervious area added	AC	0.54	
Other impervious area added	AC	1.12	
Total impervious area added	AC	1.66	

**REQUIRED RUNOFF VOLUME
TO RECHARGE**

VOLUME PROVIDED BY:

Rooftop	AC-FT	0.011
	CF	486
Other impervious area	AC-FT	0.023
	CF	1,016
Total	AC-FT	0.035
	CF	1,503

DESIGN VOLUME PROVIDED	CF	1,175
		1,200
		5,000
Total	CF	7,375
	AC-FT	0.169

Forebays
Roof Recharge Areas
Retention Basin #1



DRAWING ISSUED FOR:

- LOCATION
- CONCEPT PLAN
- PERMIT
- CONSTRUCTION
- RECORD

PROPOSED CONCEPTS SHOWN ON THIS DRAWING ARE FOR INFORMATION ONLY. THE FINAL DESIGN AND CONSTRUCTION SHALL BE DETERMINED BY THE ENGINEER AND SHALL BE SUBJECT TO THE REQUIREMENTS OF THE LOCAL AND STATE REGULATORY AGENCIES.

NO.	DATE	BY	APP.	REVISION DESCRIPTION

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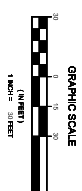
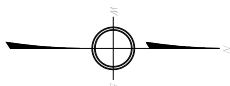
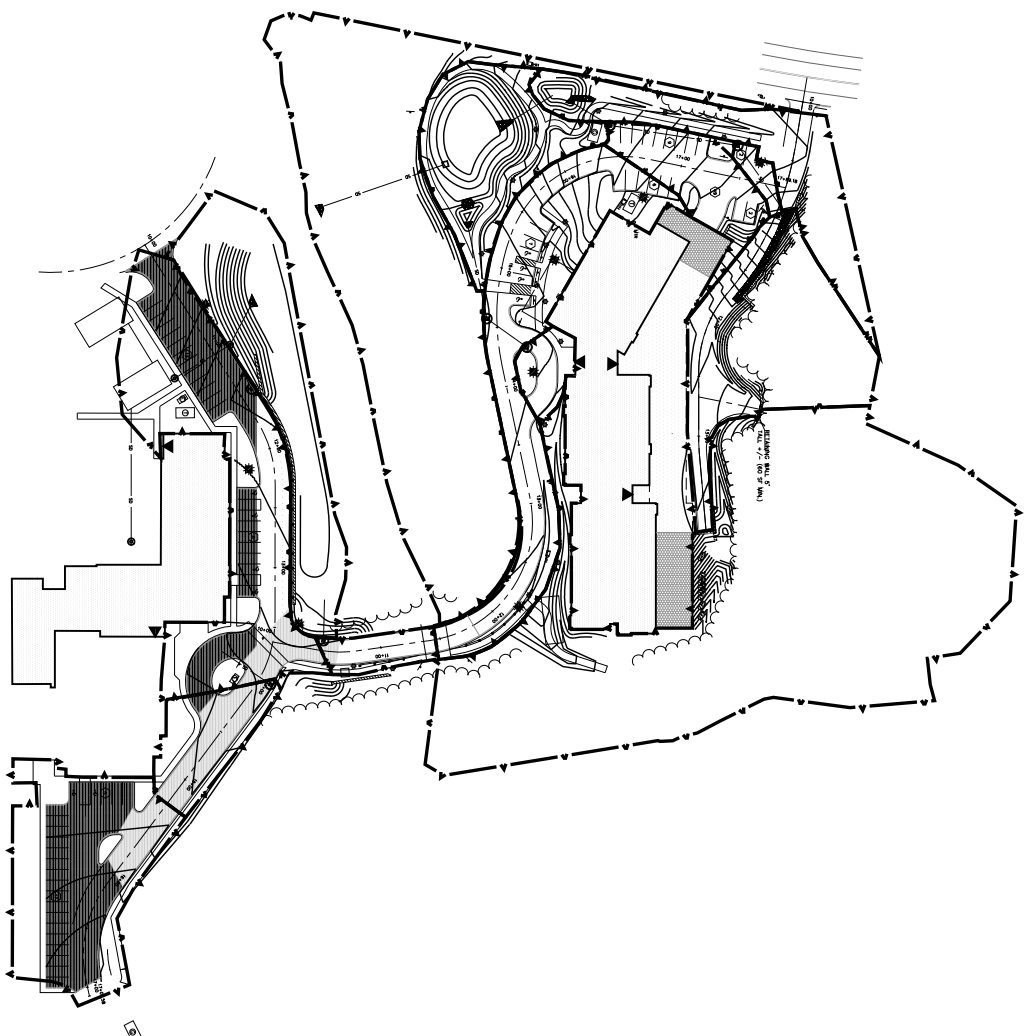
GOLDSMITH, PREST & RINGWALL, INC.
301 MAIN STREET, SUITE 301 AVON, MA 01902
TEL: 978.234.1100 FAX: 978.234.1101
WWW.GPR-INC.COM

**BROOKHAVEN AT LEXINGTON
NORTH BUILDING & COMMONS EXPANSION
EXISTING DRAINAGE MAP**

980 - 1010 WALTHAM STREET
LEXINGTON, MA

OWNER:
BROOKHAVEN AT LEXINGTON
1010 WALTHAM STREET
LEXINGTON, MA 02420

DATE: DEC. 28, 2014 JOB: 151067 SWM-1
SCALE: 1"=40'
CHK. BY: JDM



DRAWING ISSUED FOR:

- Complete
- Contract
- Permit
- Construction
- Record

NO.	DATE	BY	APP.	REVISION DESCRIPTION

GPR
Engineering Solutions
for Land & Structures

GOLDSMITH, PREST & RINGWALL, INC.
300 MAIN STREET, SUITE 301 AVENUE, MA 01432
DUBLIN, MASSACHUSETTS 01930
TEL: 978.235.8800 FAX: 978.235.8801
WWW.GPR-INC.COM

**BROOKHAVEN AT LEXINGTON
NORTH BUILDING & COMMONS EXPANSION
PROPOSED DRAINAGE MAP**

**960 - 1010 WALTHAM STREET
LEXINGTON, MA**

OWNER:
BROOKHAVEN AT LEXINGTON
1010 WALTHAM STREET
LEXINGTON, MA 02421

SCALE: 1"=40'
JOB: 151067/ SWM-2
DATE: DEC. 28, 2014
CHK. BY: JDM

**Stormwater Management Standard 3
GROUNDWATER RECHARGE**

COMMONS EXPANSION
BROOKHAVEN NORTH BUILDING
LEXINGTON, MA

Project No. 151067

Parameter	Unit	Quantity	Remarks
Predevelopment soils, composite hydrologic group		B	
Required runoff depth to recharge*	IN	0.25	A=0.40; B=0.25; C=0.10; D=waived * Weighted average
Watershed area	AC	9.05	
Predevelopment impervious area	AC	4.29	
Predevelopment pervious area	AC	4.76	
Rooftop impervious area added	AC	0.22	
Other impervious area added	AC	0.11	
Total impervious area added	AC	0.33	

**REQUIRED RUNOFF VOLUME
TO RECHARGE**

VOLUME PROVIDED BY:

Rooftop	AC-FT	0.005
	CF	198
Other impervious area	AC-FT	0.002
	CF	103
Total	AC-FT	0.007
	CF	300

DESIGN VOLUME PROVIDED	CF	3,600
		2,800
Total	CF	6,400
	AC-FT	0.147

ADS Infiltration Chambers
Detention Basin as modified

**Stormwater Management Standard 4
WATER QUALITY RETENTION VOLUME**

NORTH BUILDING
BROOKHAVEN AT LEXINGTON
LEXINGTON, MA
Project No. 151067

Parameter	Unit	Quantity	Remarks
Watershed area	AC	4.14	
Predevelopment impervious area	AC	0.04	
Total impervious area added	AC	1.66	
Total impervious area	AC	1.69	
Total impervious area required for recharge	AC	1.66	
Area of Higher Potential Pollutant Load?		0	1=yes; 0=no (if yes, see note 2 below)
Runoff to Critical Area?		1	1=yes; 0=no
Runoff depth over impervious area	IN	1.0	Critical Area is Zone II

**REQUIRED WATER QUALITY
RETENTION VOLUME**

VOLUME PROVIDED BY:

AC-FT 0.138
CF 6,011

DESIGN VOLUME PROVIDED	CF	1,175	Forebays Detention Basin
		12,914	
	CF	14,089	
	AC-FT	0.323	

NOTES:

1. If watershed includes an area subject to higher potential pollutant loads, see Standard 5 for special requirements on BMP design.

**Stormwater Management Standard 4
WATER QUALITY RETENTION VOLUME**

COMMONS EXPANSION
BROOKHAVEN AT LEXINGTON
LEXINGTON, MA

Project No. 151067

Parameter	Unit	Quantity	Remarks
Watershed area	AC	9.05	
Predevelopment impervious area	AC	4.29	
Total impervious area added	AC	0.33	
Total impervious area	AC	4.62	
Total impervious area required for recharge	AC	0.33	
Area of Higher Potential Pollutant Load?		0	1=yes; 0=no (if yes, see note 2 below)
Runoff to Critical Area?		1	1=yes; 0=no
Runoff depth over impervious area	IN	1.0	Critical Area is Zone II

**REQUIRED WATER QUALITY
RETENTION VOLUME**

VOLUME PROVIDED BY:

AC-FT 0.028
CF 1,202

DESIGN VOLUME PROVIDED	CF	3,600	ADS Infiltration Chambers Detention Basin
		2,800	
	CF	6,400	
	AC-FT	0.147	

NOTES

1. If watershed includes an area subject to higher potential pollutant loads, see Standard 5 for special requirements on BMP design.

**Stormwater Management Standard 4
TSS REMOVAL**

BROOKHAVEN AT LEXINGTON
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Process Train No.	BMP Type	TSS Removal Rate	TSS Remaining at Discharge	TSS Removed at Discharge
AP1	FOREBAYS	25%	75%	25%
	RET.BASIN	80%	15%	85%
AP3	BMP1, 2, 3 (VORTECHS)	80%	20%	80%
	DET. BASIN	0%	20%	80%

ABBREVIATIONS:

TSS=total suspended solids; SS=street sweeping; DCB=deep sump catch basin; DB=detention basin; WQI=water quality inlet; WQS=water quality swale; IT=infiltration trench; IB=infiltration basin; DW=dry well; SF=sand filter; SFB=sediment forebay; DC=drainage channel; OF=organic filter