

MEMORANDUM

TO: Mr. Peter Ditto, PE, PLS., Director of Engineering and Transportation, Town of Brookline

FROM: Deborah M. Danik, PE, CPESC, LEED AP BD+C, Nitsch Engineering
Brittney Veeck, EIT, LEED GA, Nitsch Engineering

DATE: November 18, 2016

RE: 1180 Boylston Street, Brookline, MA
Supplemental Stormwater Management Information

As requested at the Brookline Zoning Board Public hearing on November 7, 2016, Nitsch Engineering has reviewed the impacts of the proposed Project at 1180 Boylston Street on the Town's existing 12-inch drain main adjacent to the site in Boylston Street. Survey information and record information on the pipe was not readily available for this analysis and, as such, Nitsch Engineering assumed the 12-inch main has a minimum slope of 1%. The slope of the existing Boylston Street roadways surface is approximately 1.8%.

The proposed project includes the construction of a new apartment building and an underground parking garage estimated to extend approximately 25 feet below grade. The proposed parking garage covers the entire private site with access to the parking garage provided by a driveway connection to Boylston Street. There will be a slight increase in impervious area on the site due to the proposed project.

Collection and infiltration of stormwater was analyzed during the design process as part of the proposed stormwater management system. Given the proposed building design, including the underground parking garage footprint encompassing the whole site, an infiltration system is not feasible at this site due to existing groundwater elevations.

Because infiltration is not an option for the site, roof run-off from the building will be collected and detained in a stormwater storage tank located within the building. The tank will hold stormwater and slowly discharge it over time to overflow to the 12-inch drain main in Boylston Street. Stormwater run-off from the driveway above the parking garage will be collected and treated using a proprietary stormwater quality structure before discharging to the 12-inch drain main in Boylston Street. The proposed stormwater management system mitigates stormwater run-off leaving the project site, resulting in a reduction in the peak rate of stormwater run-off and improved water quality compared to the existing condition.

HYDROLOGIC ANALYSIS

Nitsch Engineering completed a hydrologic analysis of the existing project site as outlined in the Memorandum from Nitsch Engineering, dated May 25, 2016. This analysis allowed Nitsch Engineering to calculate the existing, proposed, and change in stormwater run-off volumes from the site for the 2-, 10-, 25-, and 100-year storm events (refer to Table 1). Due to the increase in impervious area on the site, the increase in run-off volume from the site in the proposed condition during the 25-year storm is 839 cubic feet (cf), or approximately 6,300 gallons.

Table 1 – Run-off Volume to Boylston Street Drainage System

Storm Event	2-year 3.2" depth	10-year 4.7" depth	25-year 5.5" depth	100-year 6.7" depth
Existing Volume (cf)	2,883	4,657	5,616	7,064
Proposed Volume (cf)	3,640	5,475	6,455	7,925
Increase in Volume (cf)	757	818	839	861

The original stormwater management design included a 602 cf or 4,500 gallon storage tank to mitigate peak run-off rates from the site. The Town of Brookline has indicated that the tank within the building should be sized to hold the increase in volume in the 25-year storm. Nitsch Engineering used the new tank size of 839 cf or approximately 6,300 gallons and performed the hydrologic analysis a second time to compute the peak rates of run-off from the site (see Table 2 for results).

Table 2 – Peak Rates of Run-off to Boylston Street Drainage System

Storm Event	2-year 3.2" depth	10-year 4.7" depth	25-year 5.5" depth	100-year 6.7" depth
Existing Peak Rate (cfs)	0.89	1.40	1.67	2.07
Proposed Peak Rate (cfs)	0.74	1.01	1.15	1.71

The project will reduce the peak rates of stormwater run-off from the site and into the Town’s 12-inch Boylston Street drain main. The 25-year storm peak run-off rate will be reduced from 1.67 cubic feet per second (cfs) to 1.15 cfs. The tank size allows for the increase in volume of the 25-year storm to be stored and released into the drainage system at a slower rate so as not to adversely affect the capacity of the main.

12-INCH MAIN CAPACITY

Nitsch Engineering analyzed the capacity of the existing 12-inch drain main in Boylston Street using the Manning’s equation and assuming a 1% slope for the main. Nitsch Engineering determined the capacity of the 12-inch main to be 3.56 cfs or 307,600 cf/day.

The existing site discharges 5,615 cf of stormwater over the course of a day during the 25-year storm event. This volume is 1.8% of the capacity of the pipe over the course of a day.

The proposed site will discharge 6,455 cf of stormwater over the course of a day during the 25-year storm event. This volume is 2.1% of the capacity of the pipe over the course of a day, or an increase of 0.3% from the existing condition. The discharge of this additional volume will be spread out over a longer timeframe than the discharge in the existing condition with the installation of the new stormwater management system and tank.