



June 3, 2022

Mr. Geoff Engler  
SLV School Street, LLC  
257 Hillside Avenue  
Needham, MA 02494

Subject: Hydraulic Review of Proposed School Street Development  
T&H No. 7199

Dear Mr. Engler:

As requested, Tata & Howard, Inc. has performed a hydraulic review of the proposed water distribution system infrastructure of the proposed School Street development located on School Street, across from Atwater Avenue. The project includes one multi-family residential building and parking garage with 136 total units. Based on the Utility Plans prepared by Allen & Major Associates, Inc. dated July 16, 2021, and information provided by the Developer, the building includes one three story building with a buried parking garage with a total of 136 one, two, and three bedroom apartments. As part of this review, we have reviewed the Utility Plans and Grading & Drainage Plans, prepared by Allen & Major Associates, Inc. both dated July 16, 2021. It should be noted that the evaluation was completed using the proposed piping configurations in the July 2021 plans. A potential booster pump station to serve the proposed building was not included in the evaluation.

The review includes an evaluation of the proposed water service in relation to the existing water distribution system. This evaluation utilizes the Town of Manchester-by-the-Sea's hydraulic model to evaluate projected static pressures and available fire flow in the proposed development. The planned water main improvements on School Street were also updated in the hydraulic model, as the project is anticipated to be completed before the proposed development. Two flow tests were conducted in the vicinity of the proposed development on May 12, 2022 and were used to confirm existing conditions. The results of the flow tests are presented in Table No. 1. The flow test locations are shown on Figure No. 1.

#### **Determination of Flow**

The estimate of water usage for the proposed development was provided by Allen & Major Associates, Inc. There are 232 bedrooms proposed with an average day demand of 25,520 gallons per day (gpd), or 17.7 gallons per minute (gpm).

Typically, the highest observed maximum daily demand (MDD) to ADD ratio is used to predict future MDD. According to the demand summary completed in the 2018 Capital Efficiency Plan based on the Town's Annual Statistical Reports from 2013 to 2016, the highest MDD/ADD ratio occurred in 2016. The 2016 MDD/ADD ratio of 3.20 was used to estimate the MDD for the proposed development. Using this factor and the ADD of 25,520 gpd, the estimated MDD at the proposed development is 81,664 gpd. The estimated ADD and MDD does not include water usage associated with irrigation. If the proponent plans to use water for any irrigation purposes, the proponent should provide the information on anticipated irrigation usage to further evaluate the estimated demands in comparison to the available supply.

The peak hour demand of the proposed development was estimated with a peaking factor of six times the average day demand, a total of approximately 106 gpm. These flows were added to the maximum day demand (MDD) for the existing system of approximately 1.4 million gallons per day, or approximately 970 gpm.

#### **Site Plans**

Based on the preliminary water main configuration presented by the proponent in the Site Plans, we offer the following comments and recommendations.

1. In general, fire hydrants should be placed at an interval of approximately 500 feet and isolation valves at an interval of 1,000 feet, in accordance with standard waterworks practice. Currently, the fire hydrants and isolation valves are not placed to meet these intervals. Final hydrant locations should be approved by the Manchester-by-the-Sea Water and Fire Departments. We recommend installing valves at intervals of 1,000 feet to allow for isolated shutdowns, if necessary, in the future.
2. The proposed pipe material and diameter are not provided. All proposed pipe should be a minimum of 8-inch diameter and be Class 52 cement lined ductile iron pipe.

#### **Hydraulic Evaluation**

Tata & Howard conducted hydraulic simulations using the model of the existing Manchester-by-the-Sea water distribution system. The model was updated to include approximately 3,700 linear feet of new 8-inch diameter water main on School Street from the existing distribution system main near the Essex County Club driveway to driveway of the proposed development and approximately 1,750 linear feet of 8-inch diameter water main within the new development. The 3,700 feet of water main on school street includes replacement of approximately 1,350 linear feet of existing 6-inch diameter main on School Street. This evaluation also incorporates the ongoing cleaning and lining project on School Street from the Central Street intersection to the Essex County Club driveway. According to the Grading and Drainage Plan, the maximum ground elevation in the new development is approximately 124 feet above mean sea level (MSL). This

location is where the proposed water service is shown entering the building. The ground elevation on School Street at the proposed driveway is approximately 51 feet above MSL. The static pressures at these two locations are shown on Figure No. 1.

The model simulation was completed using the existing MDD for the Manchester-by-the-Sea system with the additional estimated demand from the proposed development. The Moses Hill Standpipe was set at a hydraulic grade line elevation of approximately 262 feet above MSL, and the Water Treatment Plant was online. The results of the simulations show that the static pressure at the connection to the proposed building (ground elevation 124 feet above MSL) under MDD conditions is approximately 57 pounds per square inch (psi). The static pressure on School Street at the proposed driveway is approximately 90 psi. The Massachusetts Department of Environmental Protection (MassDEP) published Guidelines for Public Water Systems recommend a minimum pressure of 35 psi at ground level under average day, maximum day, and peak hour demand condition. For mains or individual service lines where static pressure is above 100 psi, it is recommended that pressure reducing devices be utilized.

The developer has submitted a needed fire flow of 1,000 gpm at 20 psi. The 2014 ISO Guidelines for Determination of Needed Fire Flow states that where evidence is available from local fire or building officials to document the installation, approval, testing, and maintenance of the sprinkler system as defined in Chapter 6 of the NFPA Standard, the needed fire flow shall be the greater of the demand at the base of the sprinkler system riser or 1,000 gpm at 20 psi.

It is recommended that a distribution system provide a minimum pressure of 20 psi at ground level throughout the system under MDD during a fire event. Information obtained from the hydraulic model indicates that an estimated available fire flow of approximately 650 gpm is available within the proposed development while maintaining 20 psi throughout the distribution system under MDD conditions. If the 3,700 linear feet of new 8-inch diameter water main from the Essex County Club driveway to the new development was 12-inch diameter ductile iron water main, the estimated available fire flow within the development would be approximately 1,000 gpm.

Mr. Geoff Engler  
SLV School Street, LLC

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We appreciate the opportunity to assist you on this important matter. If you have any questions regarding this letter, please contact our office.

Sincerely,

TATA & HOWARD, INC.



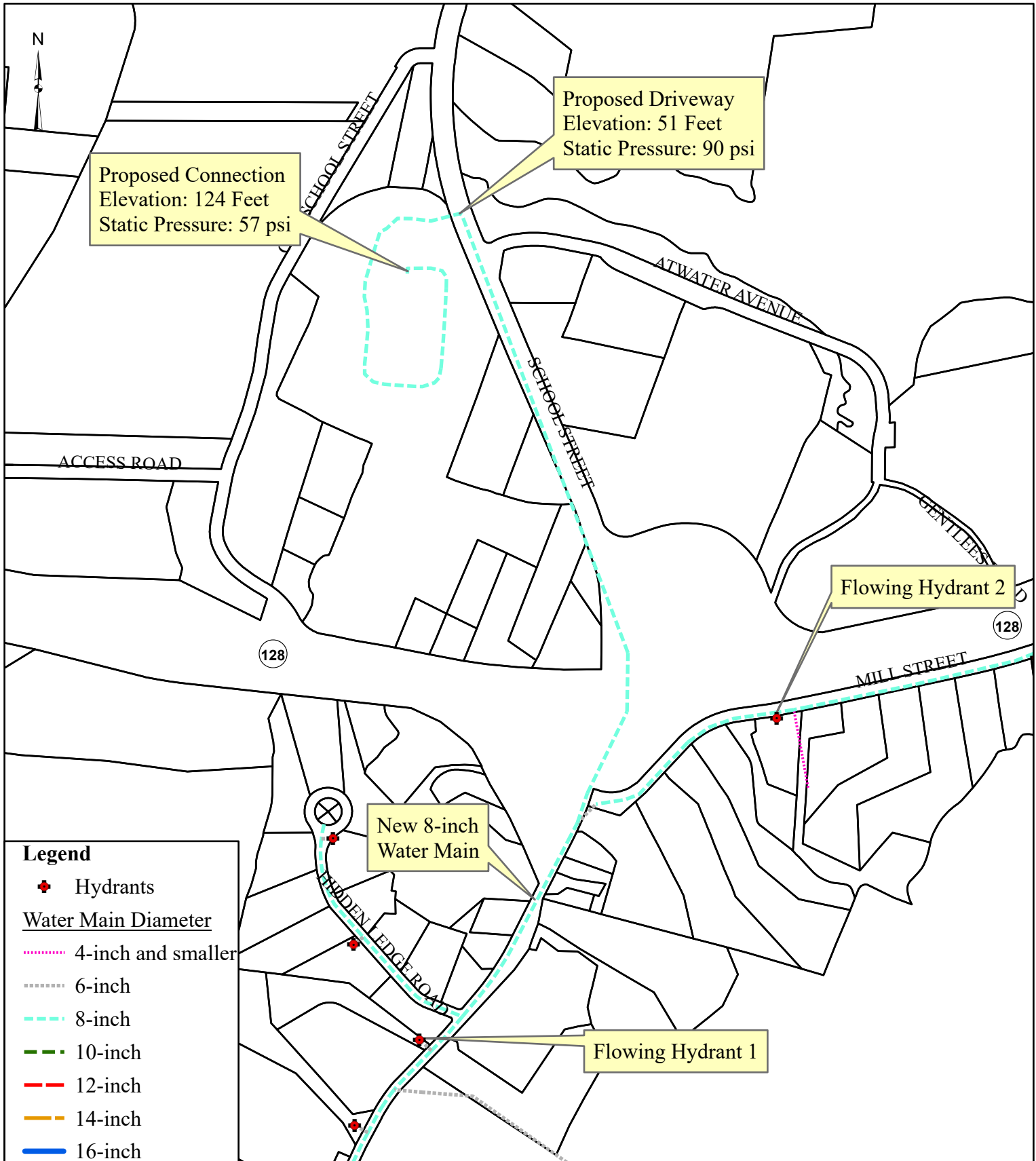
Justine M. Carroll, P.E.  
Vice President

cc: Charles Dam, MBTS

Attachments

**Table No. 1**  
**Flow Test Results (May 12, 2022)**

Location of Flowing Hydrant	Static Pressure		Residual Pressure		Estimated Available Flow at 20 psi (gpm)
	Flowing Hydrant (psi)	Residual Hydrant A (psi)	Residual Hydrant A (psi)	Observed Flow (gpm)	
School Street at Hidden Ledge Road	97	96	69	590	1,030
13-19 Mill Street	100	95	18	650	640



Proposed School Street Development  
Manchester-by-the-Sea, MA

Figure No.  
1

Date: June, 2022  
Approximate Scale: 1" = 500'