



Water, Wastewater and Stormwater Specialists

March 16, 2021

Mr. Fran Zarette, P.E.
Smart Growth Design, LLC
625 South Street
Shrewsbury, MA 01545

Re: The Pointe at Hills Farm Development, Shrewsbury, Massachusetts
Water Hydraulics Evaluation Update

Dear Fran:

As requested, Onsite Engineering has reviewed the previous water reports and correspondence related to The Pointe at Hills Farm development and re-evaluated the water system hydraulics based on revised water demand estimates related to the reduced build-out schedule for the project. Based on information provided by your office, the previous Phase 1 residential development, will now consist of a commercial development (warehouse/office) to be developed by others and, as such, is not included in this update. The Phase 2 portion of the project will remain a residential housing development located at 526 Hartford Turnpike Road, consisting of a total of 92 dwelling units within a series of 3-story buildings.

The estimated water demand associated with the development, based on an estimated sewer use of 141 gallons per unit (as identified in the "New Sewer Service Evaluation" by AECOM dated August 2015), is 12,972 gallons per day (gpd). The proposed water main for the project is proposed to loop through the property connecting on Hartford Turnpike (Route 20) and Stoney Hill Road, and would be served by the Town of Shrewsbury's reduced high pressure service area (RHPSA). This update provides a summary of the capacity of the Town of Shrewsbury water system to provide municipal water to the 92 units of The Pointe at Hills Farm development.

HYDRANT FLOW TESTS

Three (3) hydrant flow tests were conducted by Onsite Engineering personnel with the assistance of Shrewsbury Water Department staff on February 3, 2016. The locations of the hydrants are shown on Figure 1 and results are summarized below:

Test 1 – Stoney Hill Road near Phase 1 entrance. Water flow occurred at 9:08 am.

The flowing hydrant was located approximately 300 feet off Hartford Turnpike at the west entrance to Stoney Hill Road. The estimated ground elevation at the flow hydrant is 421 feet. The residual hydrant was located at 131 Stoney Hill Road at an estimated elevation of 403 feet. The static pressure of the residual hydrant was 78 psi. Both hydrants are located off an 8-inch diameter polyvinyl chloride (PVC) main installed in approximately 1995 and are designated within the low pressure service area (LPSA). The flow recorded was 856 gpm at a residual pressure of 50 psi. The equivalent estimated flow at 20 psi is 1,270 gpm.

RECEIVED
TOWN CLERK'S OFFICE
2021 APR -1 PM 2:52
SHREWSBURY, MASS

Test 2 – Stoney Hill Road near Phase 2 entrance. Water flow occurred at 9:53 am.

The flowing hydrant was located at 5 Stoney Hill Road approximately 400 feet off Hartford Turnpike at the east entrance to Stoney Hill Road. The estimated ground elevation at the flow hydrant is 499 feet. The residual hydrant was located at the intersection of Stoney Hill Road and Pheasant Hill Road at an estimated elevation of 480 feet. The static pressure of the residual hydrant was 82 psi. Both hydrants are located off an 8-inch diameter PVC main installed in approximately 1995 and are designated within the RHPSA. The flow recorded was 950 gpm at a residual pressure of 47 psi. The equivalent estimated flow at 20 psi is 1,294 gpm.

Test 3 – 464/525 Hartford Turnpike (Route 20). Water flow occurred at 10:38 am.

The flowing hydrant was located at 464 Hartford Turnpike in front of YRC Freight and is the last hydrant located in the reduced high pressure service area (RPHSA). The estimated ground elevation at the flow hydrant is 496 feet. The residual hydrant was located at 525 Hartford Turnpike (near the intersection with Stoney Hill Road) at an estimated elevation of 514 feet. The static pressure of the residual hydrant was 68 psi. Both hydrants are located off a 12-inch diameter vinyl lined asbestos concrete (AC) main located on Hartford Turnpike and are designated within the RHPSA. The flow recorded was 1,151 gpm at a residual pressure of 46 psi. The equivalent estimated flow at 20 psi is 1,755 gpm.

The water levels in the storage tanks at the time of the flow tests as provided by the Shrewsbury Water Department are summarized on Table 1.

Table 1
Water Tank Summary
The Pointe at Hills Farm
Shrewsbury, Massachusetts

Tank/ Service Area	Tank Height (ft) Overflow Elevation	Operating Level during Hydrant Flow Tests		Hydraulic Gradeline during Hydrant Flow Tests
		9:00 AM	11:00 AM	
Oak Street (LPSA)	37.5 598 ft	25.1	22.5	583 – 585.6
Hillside Drive (LPSA)	48.5 596 ft	39.0	36.6	584.1 - 586.5
Temple Hill (RHPSA)	35.0 680 ft	28.6	28.8	673.6 – 673.8

FLOW AND PRESSURE EVALUATION

The static pressures recorded in the field correspond with the hydraulic gradelines based on the tank levels at the time of the flow tests with an allowance for pipe losses. Specifically, the hydraulic gradeline from Test 1 (in the LPSA) was 583 feet and from Tests 2 and 3 (in the RPHSA) were 669 feet and 671 feet, respectively. Calculations were also completed to estimate the static pressure at the proposed points of connection and at the highest elevation of the project site.

The results of the calculations indicate that the static pressure at the point of connection on Stoney Hill Road (elev. 499 ft) is 74 psi, the static pressure at the point of connection on Hartford Turnpike (elev. 507 ft) is estimated at 70 psi, and the static pressure at the highest ground elevation on the site (elev. 516 ft) is approximately 66 psi. Generally, the normal working pressures in a water system under static conditions should range between 60 and 80 psi, with a minimum pressure of 35 psi; therefore the calculated static pressures appear to meet this criterion.

It is our understanding that because the building plans for the project are still in the preliminary architectural design phase, a Fire Protection Engineer has not been contracted to design the automatic fire sprinkler system for the buildings. Therefore, the actual fire flow requirement is not yet known. However, in accordance with ISO's *Guide for Determination of Needed Fire Flows* (Edition 05-2008), "where residential occupancies up to and including four stories in height are protected with an automatic fire sprinkler system installed in accordance with NFPA 13R, *Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and including Four Stories in Height*, a reduction in fire flow may be appropriate." The Guide goes on to specify that a needed fire flow of 1,000 gpm at 20 psi can be used for these residential occupancies. Since the proposed building(s) design is for 3-story buildings protected with automatic fire sprinkler systems, we used a fire flow of 1,000 gpm at 20 psi for our analysis. Additional calculations were completed using the Hazen-Williams flow equation and pipe C-values reported in the Capital Efficiency Plan™ to determine if this fire flow requirement could be met.

The estimated available fire flows at the entrances to the development off Stoney Hill Road and Hartford Turnpike are 1,294 gpm at 20 psi and 1,755 gpm at 20 psi, respectively. Based on the hydrant test #3 results, the estimated available fire flow at the highest ground elevation (of 516 ft) within the development, located approximately 500 feet from the connection point on Hartford Turnpike, is 1,000 gpm at 43 psi or 1,400 gpm at 20 psi. Therefore, the 1,000 gpm at 20 psi requirement can be met in all locations.

CONCLUSIONS

Based upon our review of the water system information, the proposed layout and our re-evaluation of previous calculations, it is our opinion that The Pointe at Hills Farm development to be located at 526 Hartford Turnpike and consisting of 92 units can be adequately serviced by the Town of Shrewsbury's existing water system.

We appreciate the opportunity to work with you on this important project. If you have any questions or require additional information, please feel free to contact me directly at 978-660-2752.

Sincerely,

Onsite Engineering, Inc.



Susan Hunnewell, P.E.
Vice President – Director of Water Engineering

