

Memo

To: Mr. David Hale, Omni Properties, LLC
From: Susan Hunnewell, P.E.
CC: Ray Willis, P.E.
Date: December 16, 2020
Re: 55 Summer Street, Walpole – Water System Design Considerations



We have reviewed the proposed water system information provided to us regarding the Cedar Crossing Apartments and Cedar Edge Condominiums to be located at 55 Summer Street in Walpole, MA. Information reviewed for the site includes GIS mapping; a presentation site plan (with a revision date of 12/10/2020 providing a new emergency access); site plans from May 2020; hydrant flow test data; and pertinent correspondence from the Town of Walpole Board of Sewer & Water Commissioners (WBSWC). Based on our review of this information we have prepared this memorandum regarding the proposed water system design for the development.

Water Main Looping Considerations

In the most recent correspondence from the WBSWC (memo dated November 5, 2020), the Board identifies that the water system must be looped, states that the "proposed internal loop back to Summer Street is unacceptable and not effective", and requires that an alternate loop be provided. This looping requirement is in reference to Amendment #13 of the WBSWC Rules and Regulations, which states that "any water main extension shall, at a minimum extend to the end of lot frontage however it shall not exceed 750 feet in length without being looped." Compliance with Amendment #13 is further evaluated below.

In general, Amendment #13 of the WBSWC Rules and Regulations is aligned with general waterworks practice and the preference to loop water mains to prevent dead-ends whenever possible. However, unlike most regulatory entities, Amendment #13 does not recognize that looping to an offsite location may not always be possible. In contrast, Section 9.3 of the MassDEP Guidelines for Public Water Systems, which pertains to water system design standards, states that "dead-ends shall be minimized by looping of all mains whenever practical" and goes on to say that if looping is not possible, dead-ends should be equipped with a means to provide adequate flushing. Neither the WBSWC nor the Guidelines specifically define what looping is, but within the waterworks industry a looped water system is generally defined as consisting of connected pipe loops throughout the area to be served providing several pathways that water can follow from the source to the consumer.

The water system for the development consists of a network of 8-inch diameter pipes and generally provides multiple pathways of flow to the different areas within the development, thereby satisfying the definition of a looped water system. In addition, the most recent site plan revision dated December 10, 2020, provides a new grading, drainage and utility easement through an abutting parcel (87 Summer Street), connecting Driveway E to Summer Street. This new connection replaces the internal loop that included two connections at the intersection of the main access road (Road A) and Summer Street. In addition, the large internal loop connecting Driveway C to Driveway D and back to Road A remains in place. This overall layout with an internal loop, as well as looping back to Summer Street through Driveway E, provides system reliability/redundancy allowing water to be fed to most locations from at least two directions. The looped water mains will also allow a greater capacity for fire protection as flow can flow through multiple pipes thereby reducing head losses through the piping. Overall, it is our opinion that the developer has presented the best practical water main configuration for the site, has provided a water system that complies with MassDEP Guidelines, and has provided a layout that satisfies the definition of a water main loop thereby conforming to Amendment #13.

Water Quality Considerations

The looped water system, as designed, will minimize water quality issues normally associated with dead-end mains. In addition, hydrants are provided throughout the development, including at any internal dead-ends, addressing the Guideline requirement that dead-ends be equipped with a means to provide adequate flushing of the water mains (i.e., a minimum velocity of at least 2.5 feet per second). Although a complete hydraulic evaluation is beyond the scope of this analysis, preliminary calculations indicate that 1,000 gpm at 20 psi is available at all hydrants within the development, exceeding the minimum flow (of 400 gpm) required to achieve an adequate flushing velocity of 2.5 fps through the 8-inch diameter mains. These calculations are based on the hydrant flow test data sheet, ground elevations within the development, estimated lengths of 8-inch water main, and basic hydraulics.

Dead-End Considerations

While the above discussion points regarding looping pertain to the water main connections on Summer Street and the large internal loop, it is recognized that several dead-ends within the development are proposed including to Proposed Driveway B, at the end of Proposed Driveway C beyond Building 1, and to the northern cul-de-sac provided at the end of Driveway E on the western side of the property. Each of these dead-ends was reviewed for compliance with the portion of Amendment #13 that stipulates a maximum dead-end length of 750 feet. Driveway B is approximately 150 feet in length, and Driveway C beyond Building 1 (extending from the looped section by the clubhouse) is approximately 450 feet in length – both in compliance with Amendment #13. The length of the dead end water main extending to the northern Driveway E cul-de-sac (unit numbers 37 through 48) starting at its intersection with Driveway A is 426 feet – also in compliance with Amendment #13. The length of this dead-end has been substantially reduced (from 800 feet to 426 feet) as a result of the proponent's successful efforts to secure a utility easement through the southern Driveway E cul-de-sac to Summer Street. It is also noted that hydrants are provided at the end of all dead-ends or cul-de-sacs in accordance with best engineering practices and preliminary calculations indicate that sufficient flushing velocity is available to maintain the water quality at each of these dead-ends.

Estimated Water Demand

It is our understanding that the Town has requested estimated water usage for the proposed development for planning purposes. Based on information provided by Omni Properties, LLC, the project consists of 300 residential units and 547 bedrooms as summarized on Table 1. Estimated water demands for the development were calculated based on Title 5 design flows, or 110 gallons/bedroom, as would be required if the project was to develop their own public water supply. Using this criteria, the estimated maximum day water usage for the project is 60,170 gallons. In reality, Title 5 flows represent the maximum day water demand versus the average day demand, which is typically between 50% and 60% of the Title 5 sewer design estimates. Therefore, the average day demand for the development is estimated at 36,102 gpd. It should be noted that these flow estimates should account for water use within the proposed clubhouse that will be used by residents of the development.

Table 1
Unit Count and Associated Title 5 Design Flow
55 Summer Street – Walpole, Massachusetts

No. of Bedrooms	Apartment	Townhome	Single Family	Total Beds	Title 5 Design Flow (gallons)
Studio	6			6	660
1 Bed	108			108	11,880
2 Bed	78	26	21	250	27,500
3 Bed		26	35	183	20,130
Total	192	52	56	547	60,170
	300 Total Residential Units				

Conclusions

In conclusion, the water system design for the proposed development conforms to both MassDEP Guidelines and Amendment #13 of the WBSWC Rules and Regulations. In addition, the design as proposed is sufficiently redundant, will minimize water quality issues, and complies with MassDEP generally accepted water system design practices. Preliminary calculations also indicate that hydraulically, sufficient water flow and pressure can be provided to all hydrants in the system to achieve a suitable flushing velocity and maintain a flow in excess of 1,000 gpm at 20 psi.

In our experience, these preliminary calculations should be sufficient for approval at this stage of the project. If a more comprehensive hydraulic evaluation is desired, we propose that it be completed during the construction plan drawing phase and prior to the application for building permits. During the next phase of design, construction level drawings for fire protection will be developed for review and approval by the Water Department and the Fire Chief. The fire protection drawings will be based on estimated fire needs for the individual buildings and different areas of the development. During the next phase of design, details for the connections on Summer Street will also be produced with valving and connection points as required by the Town to allow for isolation of mains and minimum disruption of the existing water system.