INSITE
ENGINEERING, SURVEYING & LANDSCAPE ARCHITECTURE, P.C.

WATER ENGINEERING REPORT

For

Artis Senior Living of Tarrytown, LLC
Village of Tarrytown, New York

January 30, 2019

Prepared By

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3 Garrett Place
Carmel, New York 10512

1.0 INTRODUCTION

Artis Senior Living of Tarrytown is proposing to construct a two story, 64 bed Alzheimer's and Dementia Care facility, with associated parking and other appurtenances at 153 White Plains Road. Access to the site is provided via the existing driveway servicing the adjoining 155 White Plains Road parcel. The proposed building is to be served by public water and public sewer.

The subject 4.6-acre property is in the OB Zone and is identified as Tax Map #1.201-121-5.12. The lot is currently vacant, except for a P-1, micropool extended detention pond. This pond was constructed under a previously approved project SWPPP for the porous pavement parking lot on the 155 White Plains Road parcel. The micropool extended detention pond and porous pavement parking lot (located on the 155 White Plains Road parcel) were constructed from 2014 to 2015.

The subject parcel is in within the Tarrytown Water District. In 2007 a Site Plan Approval was issued for the construction of a 60,000 s.f. office building on the subject property. Assuming a hydraulic loading rate of 0.08 gpd/s.f. the previously approved office building would have anticipated a Design Maximum Daily Wastewater Flow Rate of 4,800 gpd.

2.0 PROJECT DESIGN MAXIMUM DAILY FLOW AND ANTICIPATED FLOW

The design maximum daily flow for the proposed project, will be calculating used two methods. The first is based on the hydraulic loading rates given in the New York State Department of Environmental Conservation (NYSDEC) publication *Design Standards for Intermediate Sized Wastewater Treatment Works – 2014* (DEC 2014). The second will be based on utilizing the American Water Works Association (AWWA) *Manual of Water Supply Practices M-22 (M-22)* simultaneous probable fixture unit count method. The following table calculates the maximum daily domestic demand / flow rate in gallons per day (gpd) that will be used for design in the proposed project.

Table 1: Project Design Maximum Daily Flow Rate

Proposed Use	Hydraulic Loading Rate	Design Maximum Daily Domestic Flow (gpd)
64 – One Bedroom Apartments	110 gpd/dwelling	7,040
45 – Employees Per Day	12 gpd/employee	540
Total		**7,580**

Utilizing the Design Maximum Daily Flow, the peak hourly flow is calculated using a peaking factor that is based on the population of the subject project. A peaking factor of four will be used for the project based on Figure 1 from *Recommended Standards for Wastewater Facilities*.

Peak Hourly Flow utilizing DEC 2014

7,580 gpd ÷ (16 hr/day) ÷ (60 min/hr) = 7.9 gallons per minute (gpm)

Peak Hourly Flow = 7.9 gpm x 4.1 = 32.4 gpm

Utilizing the American Water Works Association (AWWA) *Manual of Water Supply Practices M-22,* a peak instantaneous demand of 60 gpm was calculated based upon a simultaneous probable fixture count of 898. In order to determine the peak instantaneous flow rate, the plumbing fixtures in the building are combined to determine a fixture unit count. The fixture unit count is then used to determine the probable demand, which is utilized as the peak instantaneous flow rate for design purposes. See attached tables, charts and graphs for the detailed calculations of the peak instantaneous flow rate.

The above flow calculations only include domestic flow demands and does not include an allocation for an irrigation system. Artis Senior Living of Tarrytown intends to install an irrigation system and at the time of this reports preparation did not have an irrigation system demand. An irrigation system analysis from a similar Artis Senior Living project was calculated to be 30 gpm at 70 psi.

The requirements for fire sprinkler system were still being generated and will be provided by other members of the design team. Upon receipt of the flows, they will be provided to the Village for inclusion in their Village wide model. Upon completion of the modeling an analysis of Artis impacts on the Village system, if any, will be provided.

The average daily demand / flow was estimated from water use data obtained from two existing Artis Senior Living Facilities over a period of one year. The average daily demand from real flow data is useful for water system operators as it provides another way to analyze the proposed project's impacts to the water system. It is also used to assess impacts to the receiving wastewater treatment plant as their SPDES permit flows are based on a 30-day average flow. The data illustrated an average daily demand per bed ranging from 89 to 104 gpd/bed for an average population of 42 beds and 63 beds respectively. This water use data while cited in gpd/bed, includes the total flow used at the site by both employees and visitors as well as irrigation. The irrigation demand can account for an excess of 25% of the metered flows. Based on removal of irrigation flows the actual per bed flow is estimated at 66 to 78 gpd / bed. The irrigation flow was removed in order to determine what will be tributary to the project's average daily wastewater demand. Based on actual flow data the project is anticipated to generate 4,224 to 4,992 gpd of domestic water demand / wastewater flow.

Although the anticipated flows (average daily demand / flow) for the project are lower than the design maximum daily flows, the design maximum daily flows are used for the design of the system. This provides an additional factor of safety in the proposed design

The above flows will be provided to the Village to include in the Village wide model of their water system. As the project demands were just provided to the Village the results were not readily available at the time of this report's preparation. The results of the Village modeling will be included in subsequent Water Engineering Reports.

3.0 PROPOSED WATER SERVICE CONNECTIONS

The Village has been requested to update their modeling contemplating the effect of the water service connections to Martling Avenue or White Plains Road. Based on the results of the modeling and discussions with the Village the water service will be run to one of those two locations. Also, it is understood the Village is currently undertaking improvements to the Marling Avenue water main. Based on the timing of those improvements in relation to the project timing, the project water service connection will be coordinated with the Village initiated improvements.

Recommended Standards for Water Works (RSWW) provides minimum pressure requirements for distribution systems. For domestic water use a minimum pressure of 35 psi at the highest service connection is required and 20 psi must be maintained at the highest service connection during fire flow conditions. Based on the results of the Village modeling the onsite water service connection will be sized to provide these domestic flow and pressure.

The proposed water service is anticipated to be constructed of Class 52 DIP. Typically, Artis facilities are supplied by a 6" DIP service line. This service line will be a combined service line for domestic and fire use. An irrigation system will also be constructed onsite. The irrigation system will be contracted by Artis as a design build system. The final design will be coordinated with the Village water department prior to construction.

Restrained joint connections will be provided at all pipe bends through the use of Mega-lug fittings, or approved equal. In addition, thrust blocks will be provided at all bends. Upon completion of the water service installation pressure testing and disinfection will be performed in accordance with AWWA standards. Details for the construction, testing and disinfection of the proposed watermain / water service line have been provided on the project drawings.

TABLE 4.3
Plumbing Fixture Value

Fixture Type	Fixture Value Based on 35 psi at Meter Outlet
Bathtub	8
Bedpan washers	10
Combination sink and tray	3
Dental unit	1
Dental lavatory	2
Drinking fountain (cooler)	1
Drinking fountain (public)	2
Kitchen sink: 1/2-in. connection	3
3/4-in. connection	7
Lavatory: 3/8-in. connection	2
1/2-in. connection	4
Laundry tray: 1/2-in. connection	3
3/4-in. connection	7
Shower head (shower only)	4
Service sink: 1/2-in. connection	3
3/4-in. connection	7
Urinal: Pedestal flush valve	35
Wall or stall	12
Trough (2-ft unit)	2
Wash sink (each set of faucets)	4
Water closet: Flush valve	35
Tank type	3
Dishwasher: 1/2-in. connection	4
3/4-in. connection	10
Washing machine: 1/2-in. connection	5
3/4-in. connection	12
1-in. connection	25
Hose connections (wash down): 1/2-in.	6
3/4-in.	10
Hose (50-ft length—wash down): 1/2-in.	6
5/8 in.	9
3/4 in.	12

value of a number of units by simply multiplying the single value times the number of fixtures in the customer's use to get a total value. The list of plumbing items in Table 4.3 represents those most commonly used; however, the estimator will eventually encounter special equipment that will need to be evaluated. Since the fixture flow requirements in gallons per minute and the fixture values are the same in Table 4.3, the engineer can list the demand in gallons per minute for the special equipment, along with the other fixtures, to obtain one total.

Demand

After the fixture values have been determined, the results can be applied to a graph to obtain the customer demand in gallons per minute at 35 psi at the meter outlet. The maximum water flow of any one fixture is above the average of any one of a number of fixtures when operated in a customer's service. This is because the probability of all

Artis Senior Living of Tarrytown, LLC

White Plains Road
Village of Tarrytown, New York
November 26, 2018

Peak Instantaneous Water Use Rate

		Factor			Fixture Value
Senior Living Area (64 bed facility)	**64 Bath Sinks**	**x**	**2**	**=**	**128**
	64 Toilets	**x**	**3**	**=**	**192**
	64 Bathtubs	**x**	**8**	**=**	**512**
Common / Employee Area	**12 Service / Kitchen Sink**	**x**	**3**	**=**	**36**
	6 Toilets	**x**	**3**	**=**	**18**
	6 Bath Sinks	**x**	**2**	**=**	**12**
	Total				**898**

Fixture Value : 898
From Fig. 4.5, propable demand = 60 gpm

Using the American Water Works Association's (AWWA) Manual of Water Supply Practices Table 4.2, 4.3 and Figure 4.4, a demand of 898 fixture units yields a peak an instantaneous water demand of 60 GPM.

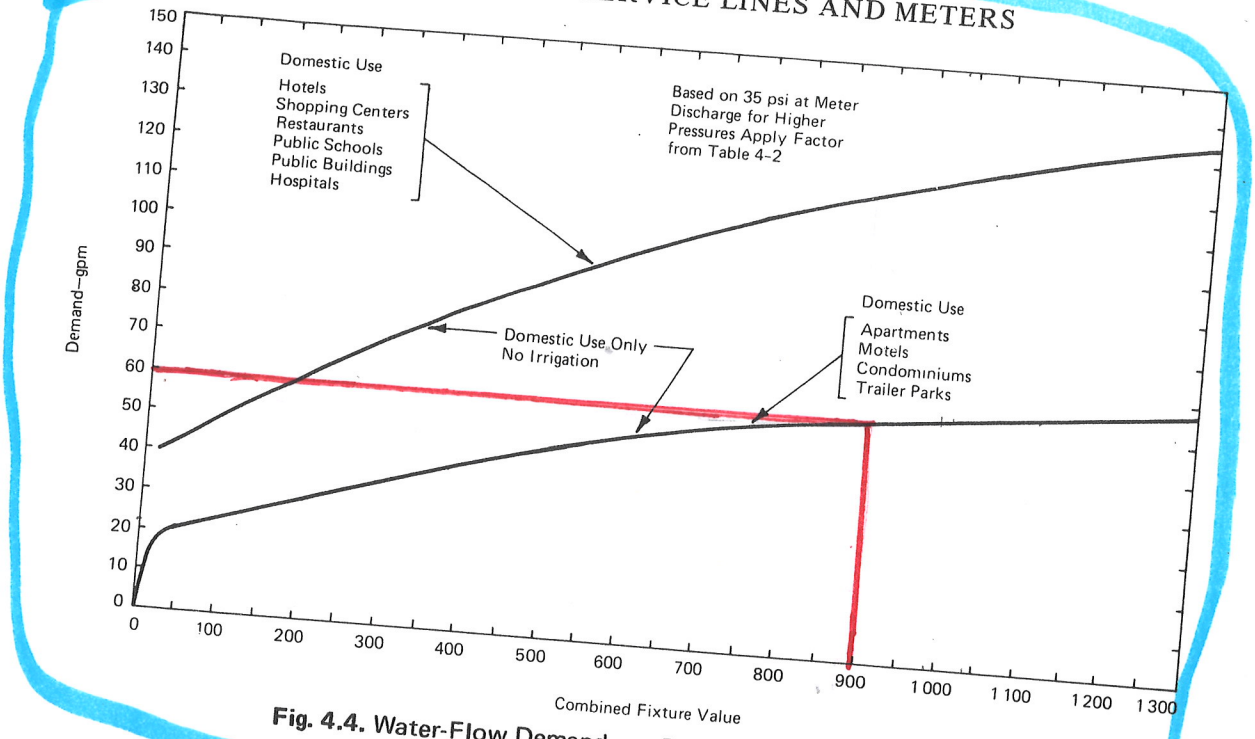

Fig. 4.4. Water-Flow Demand per Fixture Value—Low Range

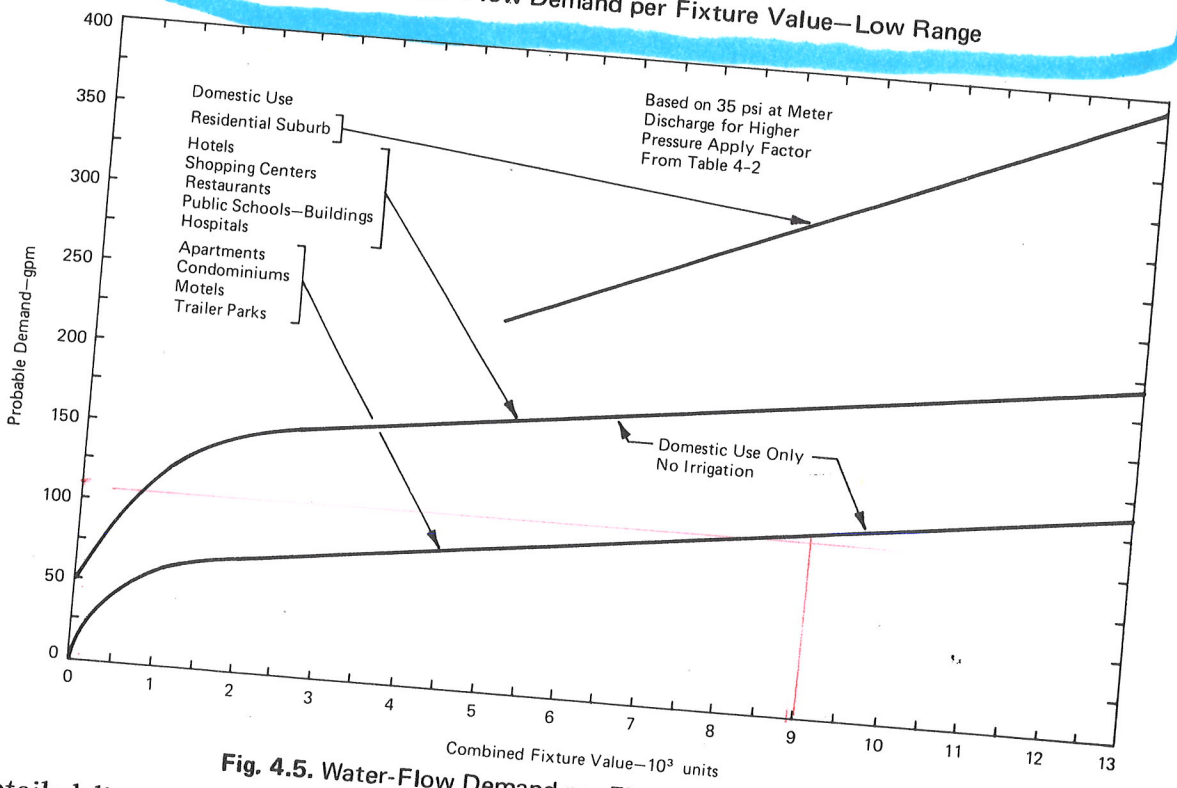

Fig. 4.5. Water-Flow Demand per Fixture Value—High Range

detailed lists of fixtures before estimates can be prepared. If the structure is in the planning stage, the mechanical engineer or architect is the best source of information, and, if construction is underway, the plumbing contractor or the building permits section of the city will have the information. Field trips by the estimator are often necessary to assist the customer as well as to properly assess the project when