Facility Plan

Village of South Glens Falls
Water Plant

Village of South Glens Falls
Saratoga County, New York

Original Submission: August 5, 2008
Revision No. 1: September 10, 2008
Revision No. 2: July 29, 2009

THE Chazen COMPANIES®

Engineers / Surveyors
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Prepared for:

Village of South Glens Falls
46 Saratoga Avenue
South Glens Falls, NY 12803

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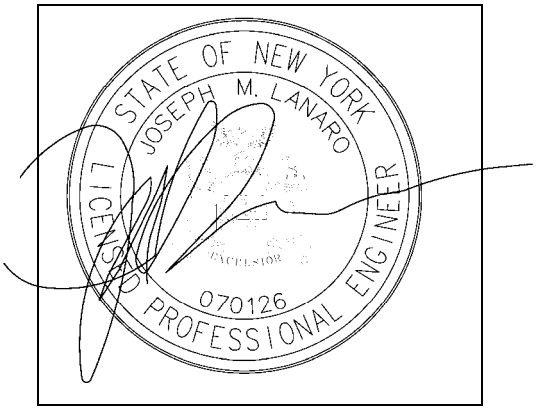

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1.0 INTRODUCTION

1.1 Overview

The water source that supplies the Village of South Glens Falls with its drinking water supply is groundwater, which is collected by a series of subsurface infiltration structures. The New York State Department of Health (NYSDOH) has classified the Village of South Glens Falls water supply as ground water under the direct influence of surface water (GWUDI). The water supply system must therefore comply with the Surface Water Treatment Rule by installing filtration, replacing the existing source with adequate groundwater sources, or purchasing adequately treated water from an adjacent public water supply by June 30, 2009. The Chazen Companies (TCC) has provided the Village with two alternatives for compliance, sand filtration and microfiltration. After review the alternatives, the Village decided to pursue a microfiltration treatment system.

The purpose of this Facility Plan is to summarize the logic for selection of a filtration system and the components of the other system improvements to the Village of South Glens Falls Water Treatment Plant and subsequent design efforts. Furthermore, the facility plan serves as the basis for approval from the NYSDOH for the proposed treatment plant improvements as well as support requests by the Village to funding agencies to potentially offset the cost of the improvements.

Data for this Facility Plan are derived from on-site evaluations, review of previous studies and water system drawings and communications with Village operating personnel.

1.2 Site Background

The Village of South Glens Falls is located in northeastern Saratoga County, New York, between Saratoga Springs and Lake George, approximately 40 miles north of Albany. The northern Village boundary is the Hudson River. The water supply site is near Beach Road in the western portion of the Village. Appendix A contains a site location map for reference.

1.3 Site Soils and Groundwater

The United States Department of Agriculture (USDA) Soil Conservation Service (SCS) Soil Survey for Saratoga County was reviewed and provided surficial soil conditions for the subject site. The SCS identified the presence of OeE (Oakville and Windsor soils, 25 to 35 percent slopes), and WnA (Windsor loamy sand, nearly level) and WnB (Windsor loamy sand, undulating) series soil types within the subject site. A soil survey map is provided as Appendix B.

Table 1 - USDA Soil Data

SOIL	HYDROLOGIC GROUP	SLOPE (%)	SOIL PROFILE		DEPTH TO WATER TABLE (FT)	DEPTH TO BEDROCK (FT)
			DEPTH (IN)	USDA TEXTURE		
OeE	A	25-35	0-2	Moderatly decomposed organics	>6	>6
			2-25	Loamy Sand		
			25-72	Sand		
WnA	A	0-3	0-2	Moderatly decomposed organics	>6	>6
			2-25	Loamy Sand		
			25-72	Loamy Sand		
WnB	A	3-8	0-2	Moderatly decomposed organics	>6	>6
			2-25	Loamy Sand		
			25-72	Loamy Sand		

The Soil Conservation Service defines the soil groups as follows:

- Type A Soils: Soils having a high infiltration rate and low runoff potential when thoroughly wet. These soils consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a moderate rate of water transmission.

- Type B Soils: Soils having a moderate infiltration rate when thoroughly wet and consists mainly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately course textures. These soils have a moderate rate of water transmission.

- Type C Soils: Soils having a low infiltration rate when thoroughly wet and consists chiefly of soils with a layer that impedes downward movement of water and soils with moderately fine-to-fine texture. These soils have a low rate of water transmission.

- Type D Soils: Soils having a very low infiltration rate and high runoff potential when thoroughly wet. These soils consist chiefly of clays that have high shrink-swell potential, soils that have a permanent high water table, soils that have a clay pan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very low rate of water transmission.

1.4 Existing Topography

The subject site is moderately sloping ranging from 0% to 35%. According to a topographic survey completed by TCC in February 2007, site elevations range from approximately 274 feet above mean sea level (MSL) at the west side of the site to 291 feet MSL along the east side of the site. The site generally slopes down from the east to the west toward the Hudson River, which is along the western boundary of the subject site.

1.5 Wetlands

A review of NYSDEC and USFWS NWI wetland mapping revealed no mapped State or Federally regulated wetlands within the limits of the building expansion. However, mapping revealed USFWS NWI wetlands immediately adjacent to the project site. No NYSDEC wetlands have been mapped in the

vicinity of the project site. A discussion of an on-site wetlands evaluation was performed by TCC is discussed in Section 6.1 of this report. A water features map depicting mapped wetlands is provided as Appendix C.

1.6 Surface Waters and Flood Plains

According to the National Flood Insurance Program Flood Insurance Rate Map (FIRM), Village of South Glens Falls, New York, Community Panel Number 195 of 693, the subject site lies within Flood Zone X, an area determined to be outside 500-year floodplain.

Stormwater runoff from the site flows westerly to the Hudson River. The Hudson River is classified by the NYSDEC as a Class "B" water.

2.0 DESCRIPTION OF EXISTING WATER FACILITIES

2.1 Overview

The community water system at the Village of South Glens Falls consists of a groundwater supply source under the direct influence of surface water, a water treatment plant with high lift pumps, a finished water storage tank and an extensive water distribution system. There are also three groundwater wells used to supplement demands during the summer months.

The Village of South Glens Falls water supply has reportedly been utilized since the early 1900's with the latest improvements completed in 2007 which included upgrades at the infiltration structures. The Village water supply consists of a series of twenty (20) spring water infiltration structures and three (3) groundwater wells, a 0.6 million gallon (MG) spring water upper reservoir, and a 1.5-MG raw water lower reservoir. The spring water infiltration structure are located in the southeast corner of the Village, at the base of a steep hillside, above the flood plain of the Hudson River.

Spring water collected in the infiltration structure is conveyed by gravity to the 0.6-MG uncovered concrete upper reservoir via the main collection pipe. From the upper reservoir, spring water flows by gravity to the lower reservoir. The lower reservoir is an uncovered unlined earthen impoundment with a storage capacity of approximately 1.5 MG. The water level in the lower reservoir is controlled by a dam structure with a spillway to safely convey excess inflow to the backwaters of the nearby Hudson River.

Raw water from the lower reservoir is drawn into the 1-story water treatment plant by the high lift pumps where it is treated and disinfected and ultimately pumped to the existing 1.0 MG elevated finished water storage tank. The storage tank "floats" on the system and supplies potable water to the entire community by gravity.

A submersible pump in each of the three (3) groundwater wells conveys raw water from the well field directly to the lower reservoir or to the water treatment plant. Currently two (2) of these groundwater wells are not connected to the potable water system and a blank spool piece has been inserted in this water line.

A more detailed description of the existing water supply system is provided below.

2.2 Water Source

The existing system currently relies on twenty (20) infiltration structures and three (3) supplemental wells as a source of groundwater to serve the Village and Fenimore Water Districts. The infiltration structures are reinforced, pre-cast circular concrete cylinders with several small perforations around the lower circumference. The base of the structures are gravel. The depth from the top of the structure to the base ranges from 4.2-feet to 6.7-feet. Access to each structure is provided by a waterproof cast iron manhole frame and cover, 24-inches in diameter. The top of the structures are generally a few inches above the surrounding ground surface. The infiltration structures yield approximately 850,000 gallons per day (gpd).

The well system has a combined yield of approximately 860 gallons per minute (gpm) and is used to supplement the infiltration structures in the summer months and during times of peak demand. However, the Village water system operator has indicated that the three (3) groundwater wells have not been used in several years because of the higher cost to treat this water due to the presence of high level of hydrogen sulfide (H_2S). In addition, the operator indicated that Village water demands in recent years have been satisfactorily met with the spring water source alone.

A map of the overall site showing the location of the wells, upper and lower reservoirs and water treatment plant is attached in Appendix D.

2.3 Water Demand

The Village water system has approximately 1,530 service connections providing water to approximately 3,700 residents. The Village also sells water to the Fenimore Water District. The Fenimore Water District supplies water to approximately 450 individuals through 98 service connections. The Village water system has an average demand of 0.6-MGD and a peak demand of 1.2-MGD. The total water production for the year 2007 was 217,030,000-gallons. This information is based on the Village of South Glens Falls and Fenimore Water District *Annual Drinking Water Quality Report for 2007.*

2.3 Current User Costs

Residential users within the Village are charged a flat rate for their water which is not metered. The combined flat rate for water and sewer for 2007 was $302.00 which is paid bi-annually at $73.50 for water and $77.50 for sewer. The proportioned share for water on an annual basis is $147.00.

Commercial users are metered and are charged a flat rate of $73.50 bi-annually, plus $1.35 for every 1,000 gallons consumed over 45,000 gallons.

Residential users outside of the Village and within the Town of Moreau are metered and are charged $2.25 for every 1,000 gallons consumed.

2.4 Raw Water Quality

As noted in the Village of South Glens Falls and Fenimore Water District *Annual Drinking Water Quality Report for 2007,* the NYSDOH had rated the source water from the twenty (20) infiltration structures and three (3) wells as having an elevated susceptibility to microbial contamination, nitrates and industrial contaminants. The water supply sources were also determined to be Groundwater under the Direct

Influence of Surface Waters (GWUDI) by NYSDOH in letters of determination dated July 12, 2006 and February 4, 2008 which are included in Appendix E for reference.

2.5 Overview of Water Treatment Process

Spring Water Source:

Spring water collected in the lower reservoir is drawn by gravity into the 62,000-gal water clear well located under the existing plant by the action its two (2) respective high lift pumps. Prior to entering the clear well, the raw water is disinfected by injection of chlorine gas into the 16-inch diameter inlet pipe. The clear well is constructed with internal baffles to provide adequate disinfection contact time.

Groundwater Source:

Submersible pumps in each of the three (3) groundwater wells conveys raw water to the 62,000-gal well water clear well located under the existing plant. Prior to entering the clear well, the raw water is directed to the induced draft aerator and then superchlorinated to remove and oxidize excess hydrogen sulfide (H_2S) present in the groundwater. The excess chlorine is then destroyed by addition of sodium metabisulfite directly into the clear well. Well water is then pumped into a clear well where well water and spring water are chlorinated before being pumped into the distribution system and the 1.0-MG storage tank.

High Lift Pumps:

Four (4) high lift pumps, two (2) pumps per clearwell, draw treated spring or well water from the clear well and deliver it to the water transmission system and the 1.0 MG elevated water storage tank. The high-lift pumps are equipped with VFD (variable frequency drive) controllers and are each capable of delivering approximately 450-gpm to the storage tank at a total dynamic head of 225-feet.

2.6 Description of Existing Water Treatment Plant

The existing water treatment building is a single story masonry structure 46-feet in length by 24-feet in width (1,100-sf gross area) with a single sloped gabled roof. Based on record drawings provided by the Village, the building is resting on a reinforced concrete structural slab constructed atop the buried 120,000-gal reinforced concrete clear well. The underground clear well is a 2-compartment basin with a central dividing wall with overall dimensions of 46'L x 46'W x 11'D. Each clear well has a hatch and ladder for maintenance access. The building occupies the south half-section of the clear well with the remaining section of structural slab being exposed.

The existing building has a small office, a laboratory work bench, a pump room, a chlorine gas room and a restroom. The plant is also equipped with the necessary control panels for the automated operation of the pumping and treatment equipment.

The building is currently serviced with electric power through a utility pole mounted transformer located approximately 25-feet from the southeast corner of the building. The main electrical distribution panel located inside building is rated for 800A at 208Volts, 3-phase supplied via underground electrical service feed from the utility pole. The building is heated with two (2) ceiling mounted unit heaters with hot water supplied by a diesel oil powered burner.

A 75 kW on-site standby generator provides emergency power to the facility to permit continuous operation of the plant during power outages. During power outages, the generator is operated manually and does not have an automatic transfer switch.

2.7 Water Supply and Treatment Facilities Site

The well field, upper and lower reservoirs and the water treatment facility are secured by a chain link fence with locking gates. The plant is accessible via a paved driveway with parking.

2.8 Water Distribution System

The primary water distribution network consists of 16, 14, 12, 8 and 6-inch lined and unlined, cast and ductile iron pipes as well as pressure rated PVC pipes. The secondary water distribution system consists mainly of smaller pipelines of various materials with diameter ranging from ¾-inch to 4-inch.

2.9 Distribution Storage Facilities

Potable water is pumped to and stored in the 1.0-MG welded steel pedestal column spherical elevated water storage tank located at 46 Saratoga Avenue in the Village. This storage tank provides an adequate reserve to meet anticipated domestic water demand and fire protection needs. The total tank height is approximately 146-feet about existing ground level.

2.10 Operation and Control System

The control system operates the high lift pumps, the well pumps, and the chlorine gas chlorinators. In automatic mode, the operation of the high lift pumps is controlled by the water levels in the 1.0 MG elevated water storage tank. A telephone communication link between the tank and the plant relays water level information in real-time to the control system.

When the water level in the tank reaches the low water condition set point, the control system will activate the lead high lift pump to fill the tank. The high lift pump will continue to operate until the water level in the tank has reached the “pump off” set elevation. If the water level continues to drop in the tank after activation of the first high lift pump because of sustained water demand in the system, the control panel will activate the second high lift pump. The two (2) high lift pumps will then continue to operate until the water level in the tank has reached the set elevation. At this point, the control system will de-activate the high lift pump(s).

The high lift pumps alternate in sequence at the end of each pumping cycle. In the event of pump failure or that lead pump fails to start, the control panel will activate the next pump in sequence.

3.0 PROPOSED FACILITY IMPROVEMENTS

3.1 Proposed Modifications to the Treatment Process

In accordance with the EPA’s Surface Water Treatment Rule, all surface water systems or ground water under the direct influence of surface water systems are required to achieve 99.9% (3-log) removal/inactivation of *cryptosporidium parvum* and *giardia lambia* cysts, and 99.99% (4-log) removal/inactivation of enteric viruses through removal (filtration) and/or inactivation (disinfection). Minimum treatment for ground water sources directly influenced by surface water shall be filtration and

disinfection, approved by the State in accordance with section 5-1.22 of Subpart 5.1 of the New York State Sanitary Code (10NYCRR 5-1, New York State Code of Rules and Regulations, Title 10, Subpart 5-1, Public Water Supplies).

The proposed modifications to the water treatment process will consist of the installation of a packaged cartridge filter system. The proposed cartridge filter system as detailed below meet or exceed the 3-log (99.9%) removal requirements described in National Sanitation Foundation (NSF) Standard 53 for cyst sized particles. Disinfection will be provided in addition to cartridge filtration to meet the 4-log (99.99%) virus removal requirement.

3.1.1 Description of Proposed Filtration System

The proposed 3-step cartridge filtration system will consist of two (2) trains of cartridge filters installed in parallel. Each train will have a twenty (20) micron roughing filter, a five (5) micron intermediate filter followed by a one (1) micron absolute final filter for the removal of Cryptosporidium and giardia cysts. The water will be filtered by passage through the 20-µm nominal pore size roughing filter, the 5-µm nominal pore size filter and the 1-µm absolute pore size filter.

Each train is rated to treat up to 1,040-gpm at maximum working pressure of 150-psi. Therefore, the proposed filtration system will be able to handle the maximum plant output flow of 900-gpm with one of the trains out of service for maintenance. This will facilitate the uninterrupted operation and maintenance of the filtration system.

The filter housings and cartridges will be manufactured by Parker Hannafin Process Advanced Filtration Inc.. Each 20 micron roughing filter unit will consist of a stainless steel Fulflo S filter vessel model S52-4-8F holding fifty-two (52) 40-inch Avasan cartridges model AVS20M-40-TX. Each 5 micron intermediate filter unit will consist of a stainless steel Fulflo S filter vessel model S52-4-8F holding fifty-two (52) 40-inch Avasan cartridges model AVS20M-40-TX. Each 1 micron final filter unit will consist of a stainless steel Fulflo S filter vessel model S52-4-8F holding fifty-two (52) Glass-Mate cartridges model PMG010-40-FNTX.

The Parker Hannifin Fulflo S filter vessel and cartridges are NSF/ANSI Standard 61 certified for use in drinking water system.

The cartridge filtration system will be provided with the following:

- pre- and post-filtration water sample taps for each train;
- pressure gauges will be provided to record pre- and post-filter water pressures;
- valves to isolate each train for service and maintenance purposes while allowing other trains to be remain operational;
- combined filter effluent sampling tap; and
- continuous on-line laser nephelometers FilterTrak 660sc by Hach placed on the individual filter train effluent lines to monitor individual filter performance
- continuous on-line turbidimeter model 1720E by Hach placed on both the combined filter influent line and the combined filter effluent line to check filter performance.

Pre-filter chlorination is recommended to preclude the potential growth of algae or bacteria on the filters. The existing chlorine gas chlorination system with its injection port prior to the clear well will ensure that chlorinated water is fed through the cartridge filtration system thereby reducing or eliminating the potential for biological growth.

A process flow diagram showing the proposed cartridge filtration system is provided in Appendix M. Equipment information and specifications for the proposed Parker-Hannifin filter vessels and cartridges are attached in Appendix F. Equipment information for the proposed chlorine analyzer and turbidimeters are provided in Appendix G.

3.1.2 Operation & Maintenance

According to the manufacturer Parker Hannifin the Avasan cartridges (20µm and 5µm) are not reusable. The Glass-Mate cartridges (1 µm absolute) are also not reusable. The operator will replace and discard the spent cartridges. At a minimum, the cartridges shall be changed every six months.

The actual life span of the cartridge filters depends greatly on the quality of the water being filtered. The operator will determine the frequency at which the filters need to be replaced based on actual filter performance once the filtration system is in place and operational. TCC recommends that the operator records the pressure differential through the filter housing when flow is initiated through new filter cartridges and change the filter cartridges when the pressure differential through the filter housing increases by more than 10-psi from the initial pressure differential. Pressure will be monitored on the inlet and outlet of each filter housing, a decrease in performance of any individual house will require all of the respective filter cartridges to be replaced. Filter cartridges would also require replacement if the finished water turbidity performance fails. A platform walkway has been proposed to allow for maintenance access to the filter vessels, specifically for top access and cartridge replacement. An adequate supply of spare filter cartridges shall be maintained on location at the water treatment plant.

The process flow diagram included in the appendices notes that the operator can choose either to draw water from the 0.6-MG upper reservoir or the 1.5-MG lower reservoir. Water from the lower reservoir may prove to be more difficult to filter due to the possible presence of biological and inorganic particles. This would result in more frequent replacement of the micron filters. The operator's experience will ultimately determine which reservoir raw water will be drawn from.

3.1.3 Controls/Instrumentation

The operation of the water treatment plant will remain unchanged after the construction of the proposed improvements. The high lift pumps will continue to operate based on water levels in the elevated water storage tank. A second injection point is proposed from the existing chlorine gas chlorination system where chlorine will be added to finished water prior to exiting the facility. A continuous chlorine analyzer is also proposed to monitor chlorine levels of the finished water.

As a minimum, the NYSDOH requires the installation of turbidimeters to continuously monitor the quality of both the individual and the combined filter effluent. A turbidimeter will also monitor the quality of the filter influent. The turbidimeters will be configured to send an alarm to notify the operator when the turbidity in the combined filter effluent reaches a pre-set value. This will inform operator of a potential issue with the filtration system.

The spent sample from the turbidimeters and chlorine analyzer is proposed to be directed to the facility's waste drain. The Village is currently considering options to either expand the facility's existing on-site septic tank system or divert wastewater from the facility to the municipal sanitary sewer system to accommodate the additional flows.

3.1.4 Process Piping

Proposed piping will consist of ductile iron pipe (DIP) class 52, cement-lined conforming to AWWA/ANSI C151/A21.51. Ductile iron and gray iron fittings will conform to AWWA C110/ANSI A21.10 and AWWA C153/ANSI A21.53. Joining of pipes and fittings installed above grade shall be accomplished through properly restrained flanged connections. Joining of pipes and fittings installed below grade (buried service) shall be accomplished through properly restrained mechanical joint connections. All piping shall be adequately secured and supported. Union fittings shall be provided at convenient and practical locations to allow disassembly and removal of equipments and appurtenances. The proposed piping will include isolation valves, water sample taps, pressure gauges and all associated appurtenances.

3.1.5 Clear Well Modifications

At present, the Village is only using half of the existing underground clear well. Modifications to the clear well will be made to allow for the entire 120,000-gal to be used. An opening in the concrete dividing wall will be made to allow untreated water to flow freely between the 2-compartment basin. Utilization of the entire underground clear well will allow for increased disinfection contact time. The existing air stripper will also be removed.

3.1.6 Disinfection Contact Time

The New York State Department of Health grants log removal credits for selected proven filtration systems. Log credit removal varies depending on the type of treatment process (such as conventional, direct, or alternative filtration). The proposed cartridge filtration system consists of a pressure cartridge filtration which meets or exceeds the 3-log (99.9%) removal requirements described in National Sanitation Foundation (NSF) Standard 53 for cyst sized particles. The NYSDOH will grant a 2.5-log removal credit for a properly operated filtration system of this type. Therefore, the remaining 1-log inactivation requirements for cyst reduction must be achieved by disinfection.

TCC performed a contact time (CT) analysis, assuming the entire 120,000-gal clear well was being utilized to obtain the required disinfection. The evaluation shows scenarios based on three (3) pH conditions and also varying free chlorine levels. Contact time (CT) requirements for 3-log Crypto/Giardia removals are pH dependent; i.e. lower pH's have lower CT requirements for given Cl_2 levels and temperature conditions whereas higher pH's have higher CT requirements. CT requirements for 4-log virus removal are not pH dependent for the pH 6-10 range. The water plant has no data log on the pH of the raw or finished water, therefore, three pH conditions have been assumed (pH 7.0, pH 7.5 and pH 8.0). All analyses are based on a maximum peak flow of 1.50 MGD (1,041 gpm) and lowest water temperature of 4°C. The calculations also show varying levels of free chlorine. Presently, the operator maintains 0.9-1.0 mg/L free chlorine residual in the clear well. The analysis for using two clear wells with 1.0 mg/L Cl_2 residual indicates that chlorination alone would meet 3-log removal requirements for pH 7.0 and pH 7.5 conditions, but less than 3.0 for pH 8.0 (or higher) Four log-virus removal would be met for all conditions. It has been assumed the proposed Parker filters will be granted the 2.5 log removal credit and the resulting total log inactivation credits for the three assumed pH conditions are as follows:

Table 2 – Log Removal

pH	Free Cl2 (mg/L)	Log Inactivation 3x's $CT_{calc}/CT_{99.9}$	Total Log Inactivation Chlorination + Filter
7.0	1.0	1.04	1.04 + 2.5 = 3.54
7.5	1.0	0.86	0.86 + 2.5 = 3.36
8.0	1.0	0.72	0.72 = 2.5 = 3.22

Additional CT calculations have been provided in Appendix H.

3.1.7 Testing and Disinfection

Upon substantial completion of all underground water pipes, or at times when it is prudent to conduct performance testing, all pipes shall be pressure tested and leakage tested in accordance with AWWA Standard C600 *"Standard for Installation of Ductile-Iron Water Mains and their Appurtenances"* and/or AWWA Standard C605 "*Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water*" (latest edition).

All new water mains shall be disinfected in accordance with AWWA Standard C651 *"Standard for Disinfection of Water Mains"* (latest edition). The tablet method of disinfection is not acceptable.

All treatment plant plumbing and components shall be disinfected in accordance with AWWA Standard C653 *"Standard for Disinfection of Water Treatment Plants"* (latest edition).

3.2 General Exterior Site Improvements

3.2.1 Site Layout and Grading

Expansion of the existing water treatment plant building will be necessary to accommodate the proposed cartridge filtration system. It is anticipated that a 1,000-square foot (SF) addition to the existing 1,100-SF building will be required. The building addition will be constructed atop the exposed roof section of the underground clear well. The exterior walls of the proposed building addition will rest on the clear well exterior and interior dividing walls. The building addition will be constructed to resemble the existing plant's structure and exterior finish.

3.2.2 Exterior Utilities

The existing propane tank resting near the northeast corner of the exposed clear well will require relocation to construct the building addition. The combined filter effluent line from the cartridge filtration system will exit the planned building addition through the clear well exterior wall and connect to the

existing 16-inch diameter water distribution main near the southeast corner of the existing plant. As discussed in Section 3.1.3, options for sanitary sewer improvements are currently being evaluated by the Village. A new exterior back-up power supply generator is being proposed adjacent to the treatment plant building. No other significant exterior utility improvements are anticipated as a result of the proposed building expansion and cartridge filtration system.

4.0 WATER SUPPLY ALTERNATIVES

TCC investigated several water supply alternatives for the Village in addition to the expansion of the water treatment plant. The water supply alternatives identified and correlating construction and annual costs are provided in the sections below.

4.1 Connection to Town of Queensbury Water System

Connection to the Town of Queensbury will be at the intersection of Main Street and Richardson Street and will require the construction of approximately 1,825-LF of trenched ductile iron water main, as well as 350-LF of directional drilled water main beneath the Hudson River. The proposed water main will tie into the Village water distribution system at the intersection of Feeder Dam Road and Tanglewood Drive.

Infrastructure Construction Costs: $1,529,650
Engineering, Design & Permitting: $80,000
Annual Supply Fees: $226,153

4.2 Connection to Glens Falls Water System – Directional Drill Beneath Hudson River

Connection to the City of Glens Falls by directional drilling includes approximately 200-LF of trenched ductile iron water main as well as 1,150-LF of directional drilled water main beneath the Hudson River. The proposed water main will tie into the City of Glens Falls water system on Pruyn's Island Drive and connect to the existing Village Water Treatment Plant.

Infrastructure Construction Costs: $764,604
Engineering, Design & Permitting: $100,000
Annual Supply Fees: $271,770

4.3 Connection to the City of Glens Falls Water System – Route 9 Bridge Crossing

Connection to the City of Glens Falls by crossing the Route 9 Bridge will include approximately 4,200-LF of trenched ductile iron water main as well as the 800-LF bridge crossing. The proposed water main will tie into the City of Glens Falls water system at the inter Pruyn's Island Drive and connect to the existing Village Water Treatment Plant.

Infrastructure Construction Costs: $1,139,520
Engineering, Design & Permitting: $145,000
Annual Supply Fees: $235,160

4.4 Connection to Saratoga County Water District - Town of Moreau Transmission

Connection to the Town of Moreau water district to obtain water service from the Saratoga County Water District will take place at the intersection of Washington Road and Feeder Dam Road in the Village of South Glens Falls.

Infrastructure Construction Costs: $41,938
Engineering, Design & Permitting: $10,000
Annual Supply Fees: $490,891

5.0 PHASING

The entire site is expected to be advanced as a single phase.

6.0 KEY ISSUES

6.1 Regulated Wetlands

TCC completed an on-site evaluation consistent with the Corps of Engineers Wetland Delineation Manual (1987) to determine the presence and/or absence of regulated wetlands on the project site. TCC did locate unmapped US Army Corp of Engineer's wetlands within the site, however these wetlands are not within the area of proposed work. Therefore, it is not anticipated that any temporary or permanent wetland impacts will result from the proposed improvements.

6.2 State Environmental Quality Review Act (SEQRA)

The project includes an addition to an existing building structure with ancillary site improvements which in reviewing 6 NYCRR Part 617, Section 617.5 (c) (7) of the State Environmental Quality Review would qualify the project to be considered a Type 2 Action. However, due to potential funding sources the proposed activity has been treated as a Type 1 Action with Coordinated Review. A long form Environmental Assessment Form (EAF) has been prepared and submitted to the Village Board of Trustees.

In order to satisfy the statutory requirements under SEQRA, the Village Board of Trustees must passed a resolution stating the same. No further action under SEQRA is anticipated. A copy of the Long Form EAF and draft SEQRA resolution are included in Appendix I for reference and use by the Village Board. These documents must be reviewed by the Village's legal counsel for concurrence and comment.

6.3 Project Permits / Approvals

As part of this project the following agency approvals will be necessary:

- NYSDOH – Approval of Plans for Public Water Supply Improvements:

  Since this is a modification to a "public water treatment facility", the plans and application will need to be submitted to the NYSDOH for review and approval. Detailed plans and specifications and application will be required. TCC will be responsible for submitting the documents prepared by the consultants and coordinating with NYSDOH during the review process.

Additional project and/or agency approvals may be necessary which will depend upon further clarification from the Village or agency responses discussed earlier in this section which are as follows:

- NYSDEC & United Stated Department of Fish and Wildlife (USFW) – Threatened and Endangered Species

Documentation from the NYSDEC dated March 30, 2009 has been included in Appendix J.

- New York State Office of Parks Recreation and Historic Preservation (SHPO) – Cultural Resources

An end of field letter will be required from SHPO prior to considering any DEC and ACOE permit(s) for activities associated with this project. A SHPO "sign off" letter, dated March 4, 2009, has also been included in Appendix K.

- Local Planning & Building Permit Approval

The project resides within the Village of South Glens Falls, Saratoga County. Typically for any project within this, or any municipality, a site plan review and approval would be necessary as well as submission of building plans for issuance of a building permit. However, considering this is a municipal project, it is likely it would be exempt from local approval.

7.0 OPINION OF PROBABLE COST

Preliminary project budgets have been developed for the construction of improvements to the water treatment plant. The budget was developed anticipating construction by competitive bid and utilizing posted wage rates for construction in accordance with NYS Municipal Law.

The cost opinions are based upon our understanding of the project. Subsequent changes in the project scope or time frame may change project costs. Since there is no control over the costs of labor and materials or competitive bidding and market conditions, the opinion of probable construction costs is made on the basis of past experience and limited available data. These opinions represent our best judgment as a consultant familiar with the construction industry. However, there is no guarantee that proposals, bids or construction costs will not vary from the opinion of probable costs.

An Opinion of Probable Construction Cost dated June 25, 2009 has been provided in Appendix L and is summarized on the following page:

Construction Costs (Direct Costs):	
General Construction	$1,100,000
Electrical	$65,000
Mechanical	$25,000
Plumbing	$45,000
Total Construction Cost	$1,235,000
Indirect Costs:	
Survey/Engineering/Environmental	$200,000
Construction Management	$56,000
Construction Inspection	$31,000
Bond Counsel/Legal	$19,000
Total Indirect Costs	$310,000
Total Estimated Project Cost	**$1,545,000**

8.0 FUNDING SOURCES

Funding sources for the potential service areas have been evaluated. The funding sources described are those which have funded similar projects historically. Funding will provide financial assistance for the expansion of the WTP and infrastructure improvements. Several viable funding sources have been identified below.

8.1 Drinking Water State Revolving Fund Program

The Drinking Water State Revolving Fund Program (DWSRF) is a program providing grants to states by the U.S. Environment Protection Agency (EPA). The New York State Environmental Facilities Corporation (EFC) provides low interest rate financing for drinking water projects including upgrades, treatment facilities, storage facilities, transmission and consolidation of water supplies.

Drinking water projects will be reviewed to determine eligibility for funding and scored based on the established project priority ranking system. Drinking water systems that are eligible for project funding are community water systems, both municipally and privately owned, and non-profit, non-community water systems. Available funding includes the following;

1. Short-Term Financing - Short-term interest free financing, of up to three years in duration, is available to recipients that are developing projects eligible for long-term DWSRF financing. Short-term financing is limited to projects that are eligible to be funded from the current Project Readiness List.

2. Leveraged Financing - Leveraged Financing are DWSRF financings funded from bond proceeds. Bonds issued to finance DWSRF financing will be secured by federal and state match dollars deposited to and held in program financing indentures as security on behalf of certain series of DWSRF bonds. Leveraged Financing will receive an interest subsidy from either earnings received from a dedicated reserve allocation equal to one-third of the financing amount or from

other program assets. Other program assets or investment earnings from the reserve allocation will provide an interest subsidy to the recipients, thereby reducing the net interest rate on the financing.

3. Regular Reduced Rate Direct Financing - Regular Reduced Rate Direct Financing will be made available to recipients not eligible for Leveraged Financing. Recipients determined by the EFC to be non-investment grade or which have submitted small financing requests may receive Direct Financing.

4. Emergency Financing - Emergency financing allows for the immediate financing of emergency situations at eligible public water systems and is only available to water supply systems for emergency repairs when no other funding source is available to the system. The determination of when an emergency exists would be made by the NYSDOH.

5. SRF Guarantee Program - The SRF guarantee program provides eligible financing recipients with project scores below the subsidy funding line on the Project Readiness List access to the public market(s) at preferred interest rates. For projects that qualify for subsidy assistance, a guarantee will be available to extend repayment terms beyond the previous DWSRF limit of 20 years from project completion.

In order to be considered for DWSRF financing, applicants must complete two major steps. The first is the submission of a pre-application to the DOH including a description of the project, which is used to rank and list projects on the Intended Use Plan (IUP). This is followed by a complete formal financing application package submitted to the EFC.

It is likely that the total amount of requests for DWSRF financing during any IUP period will be greater than the amount of program dollars available. An eligible project that is not funded initially will be included in the next IUP unless the applicant has withdrawn the project.

9.0 ANNUAL USER COST ANALYSIS

9.1 Construction Bonding Cost

The construction of the improvements to the Village's WTP will require the issuance of bond anticipation notes to finance the project cost of $1,575,000. The Village has no existing water debt. Three potential scenarios for project financing are presented on Table 8.3 on the following page:

Scenario No. 1 – No Grant Assistance and Conventional Funding

Scenario No. 1 assumes that the construction bonding cost of $1,575,000 will be financed. The "Level Debt Payment Method" is used to calculate the annual payments which would be made for 30 years at a 5% interest rate. The resulting annual capital cost is $102,456.

Scenario No. 2 – No Grant Assistance and Subsidized Funding

Scenario No. 2 assumes that the construction bonding cost of $1,575,000 will be financed. The "Level Debt Payment Method" is used to calculate the annual payments which would be made for 30 years at a 0% interest rate, assuming that a subsidized interest rate would be available from the NYS Drinking Water State Revolving Fund. The resulting annual capital cost is $52,500.

Scenario No. 3 – Partial Project Grant Assistance and Subsidized Funding

Scenario No. 3 assumes that 50% of the construction cost will be funded through grant monies and the remaining construction bonding cost of $787,500 would be the amount financed. The "Level Debt Payment Method" is used to calculate the annual payments which would be made for 30 years at a 0% interest rate. The resulting annual capital cost is $26,250.

9.2 Operation and Maintenance

As discussed in Section 2.3 residential customers currently pay $73.50 bi-annually ($147.00 annually) for water. Commercial customers are charged a flat rate of $73.50 bi-annually plus $1.35 for every 1,000 gallons consumed over 45,000 gallons. These charges are assumed to include reserve, administrative and billing costs

Assuming cartridge chances every 6 months, at minimum, the improvements to the WTP will increase the annual operation and maintenance costs by approximately $40,000. This includes the costs for the replacement of the Avasan and Glass-Mate filter cartridges according to the minimum replacement recommendations. Dividing this additional O&M cost among the Village's 1,530 service connections results in an annual increase of approximately $26.00 per connection for a total annual service fee of $173.00 for water.

It is not anticipated that any additional reserve amounts will be needed annually to provide for replacement of short-lived assets.

9.3 Annual User Cost Summary

The annual user cost to the Village users is determined by combining the debt retirement for the construction of the WTP improvements, adding that to the Village's anticipated annual operation and maintenance costs. The three annual user cost scenarios for the typical single family home are summarized below:

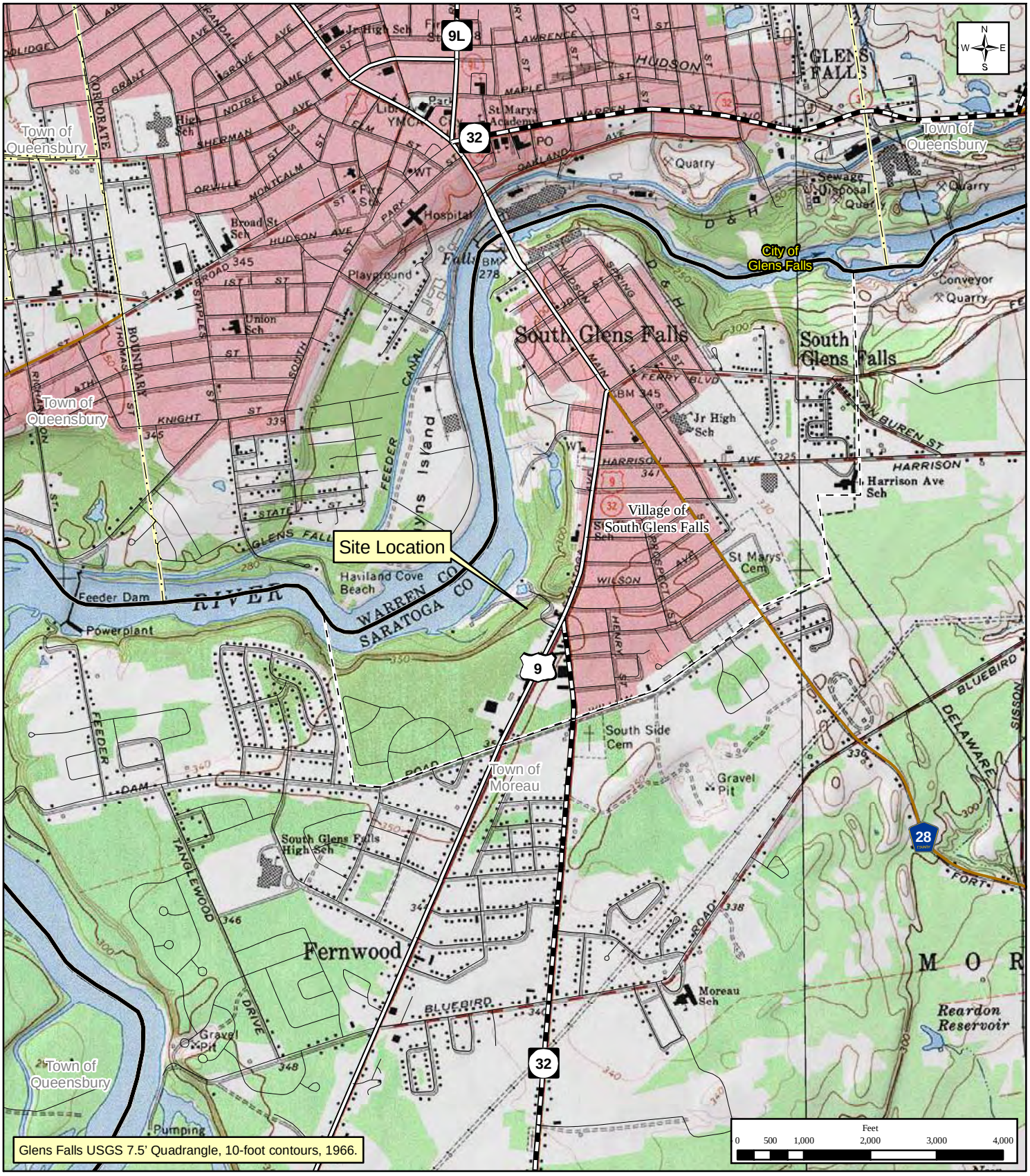
Table 3
Estimated Annual User Cost – Typical Single Family Home

	Scenario No. 1	**Scenario No. 2**	**Scenario No. 3**
	No Grant Assistance/ Conventional Financing	**No Grant Assistance/ Subsidized Financing**	**Partial Project Grant/ Subsidized Financing**
Annual Capital Cost	$102,456	$52,500	$26,250
Number of Village Service Connections	1,530	1,530	1,530
Annual Debt Service Cost per Connection	$67	$34	$17
Annual Operation and Maintenance	$173	$173	$173
Estimated Annual Cost	$240	$207	$190

10.0 CONCLUSION

Following water sampling the NYSDOH determined the Village of South Glens Falls water supply to be GWUDI. The Village has decided to proceed with the addition of a cartridge filtration system to the existing water treatment plant to provide sufficient filtration and disinfection of their drinking waters. It is anticipated that construction of the water treatment plant improvements will be completed by December 31, 2010.

Appendix A:
Site Location Map



THE Chazen COMPANIES

ENGINEERS/SURVEYORS
PLANNERS
ENVIRONMENTAL SCIENTISTS
LANDSCAPE ARCHITECTS

Dutchess County Office:
21 Fox Street, Poughkeepsie, NY 12601
Phone: (845) 454-3980

Orange County Office:
356 Meadow Avenue, Newburgh, NY 12550
Phone: (845) 567-1133

Capital District Office:
547 River Street, Troy, NY 12180
Phone: (518) 273-0055

Glens Falls Office:
100 Glen Street, Glens Falls, NY 12801
Phone: (518) 812-0513

New London Office:
914 Hartford Turnpike Waterford, CT. 06385
Phone: (860) 440-2690

Village of South Glens Falls Water Plant

Appendix A:
Site Location Map

Beach Road / U.S. 9
Village of South Glens Falls
Saratoga County, New York

Drawn:	CLC
Date:	06/03/2008
Scale:	1:24,000
Project:	30639.01
Figure:	Appendix A

Map Document: (R:\3\30600-30699\30639.01\GIS\maps\30639_01_SiteLocation_8x11.mxd)
6/3/2008 – 11:49:11 AM

Appendix B:
Soil Survey Map

THE Chazen COMPANIES

ENGINEERS/SURVEYORS
PLANNERS
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Dutchess County Office:
21 Fox Street, Poughkeepsie, NY 12601
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New London Office:
914 Hartford Turnpike Waterford, CT. 06385
Phone: (860) 440-2690

Village of South Glens Falls Water Plant

Appendix B: Soil Survey Map

Beach Road / U.S. 9
Village of South Glens Falls
Saratoga County, New York

Drawn:	CLC
Date:	06/03/2008
Scale:	1:3,600
Project:	30639.01
Figure:	Appendix B

Map Document: (R:\3\30600-30699\30639.01\GIS\maps\30639_01_SoilSurveyMap_8x11.mxd)
6/3/2008 -- 1:35:48 PM

Appendix C:
Water Features Map

THE Chazen COMPANIES

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Phone: (860) 440-2690

Village of South Glens Falls Water Plant

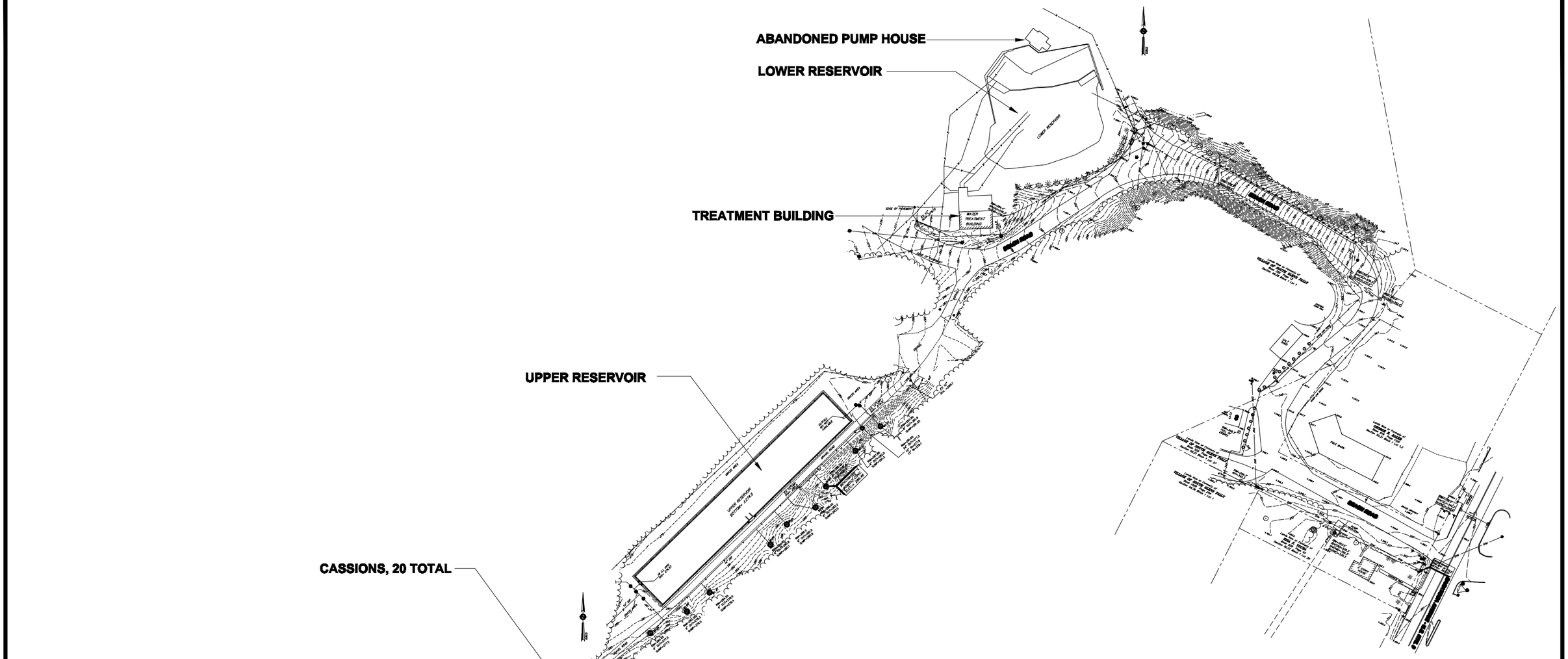
Appendix C:
Water Features Map

Beach Road / U.S. 9
Village of South Glens Falls
Saratoga County, New York

Drawn:	CLC
Date:	06/03/2008
Scale:	1:3,600
Project:	30639.01
Figure:	Appendix C

Map Document: (R:\3\30600-30699\30639.01\GIS\maps\30639_01_WaterFeaturesMap_8x11.mxd)
6/3/2008 -- 1:52:48 PM

Appendix D:
Water Supply Site Map



THE Chazen COMPANIES®
Engineers/Surveyors
Planners
Environmental Scientists
Landscape Architects

CHAZEN ENGINEERING, LAND SURVEYING & LANDSCAPE ARCHITECTURE CO., P.C.

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Glens Falls, N.Y. 12801
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Connecticut:
914 Hartford Turnpike
Waterford, CT. 06385
Phone:(860) 440-2690

rev.	date	description

VILLAGE OF SOUTH GLENS FALLS WATER TREATMENT PLANT IMPROVEMENTS

EXISTING WATER SUPPLY SITE PLAN

VILLAGE OF SOUTH GLENS FALLS, SARATOGA COUNTY, NEW YORK

drawn	checked
EDT	
date	scale
	AS NOTED
project no.	
30639.01	
sheet no.	
S1	
2 OF 9	

Drawing Name: S:\ENGINEERING\30600-30699\30639_01 ENGINEERING\Facility Plan Dwgs\ES1_30639-01_SITE.dwg
Xref's Attached: XTB_30639-01_H24x36; XSURV_BASE_30639_01
Date Printed: Aug 06, 2008, 11:14am

XXXXX

Appendix E:
NYSDOH Correspondence

STATE OF NEW YORK
DEPARTMENT OF HEALTH
Glens Falls District Office
77 Mohican Street, Glens Falls NY 12801 (518)793-3893 Fax (518) 793-0427

Antonia C. Novello, M.D., M.P.H., Dr.P.H.
Commissioner

Dennis P. Whalen
Executive Deputy Commissioner

July 12, 2006

Mayor & Village Board
South Glens Falls Village
P.O. Box 1210
South Glens Falls, NY 12803

RE: Groundwater Under the Direct Influence of Surface Water (GWUDI)
South Glens Falls (V)
PWSID # NY4600170

Dear Mayor & Village Board:

Upon completion of GWUDI testing, your springs have been determined to be Ground Water Under the Direct Influence of Surface Water. Sources that have been found to be GWUDI must comply with the Surface Water Treatment Rule (SWTR) within 18 months of the New York State Department of Health's decision. Compliance can be achieved by installing filtration, replacing the existing source with adequate groundwater sources, or purchasing adequately treated water from an adjacent public water supply.

An evaluation of your compliance and funding options must be performed. A preliminary proposal outlining your compliance option must be submitted to this Department by April 30, 2007. The deadline for construction is December 31, 2007. Final design plans must be reviewed and approved by this Department prior to construction. While the SWTR requires compliance within 18 months, the Department recognizes that unforeseen design, funding, and construction delays may warrant extensions to deadlines.

It is recommended that you submit a preliminary application for the State Revolving Fund (SRF) by the next deadline which is August 11, 2006. The preliminary application does not have to be prepared by an engineer, although it is recommended. With the deadline so close, a submittal with rough estimates is acceptable. The Department will work with you later to get more accurate application information. You can contact Mr. William Gilday at the Bureau of Water Supply Protection at 518-402-7650 for more information regarding the SRF. A copy of the application is enclosed.

In addition the following requirements must be met:

A. Until compliance with the SWTR is achieved Public Notification must be performed calendar quarterly. Enclosed is a public notification packet that describes the requirements for Tier 2 notification and specific language that must be included for SWTR compliance. Your first round of public notification must be completed by September 30, 2006.

B. Adjustments to your monitoring schedule are required as follows. An updated schedule is enclosed.
   1. Disinfection Byproduct Samples are required yearly.
   2. IOC samples are required yearly.

Please review the above information and call me at 518-793-3893 if you have any questions. Thank you for your time and ongoing efforts to provide safe drinking water to your residents.

Sincerely,

Lisa Paganin
Assistant Sanitary Engineer

Enclosures

STATE OF NEW YORK
DEPARTMENT OF HEALTH

Glens Falls District Office
77 Mohican Street Glens Falls, New York 12801 (518) 793-3893 Fax (518) 793-0427

Richard F. Daines, M.D.
Commissioner

Wendy E. Saunders
Chief of Staff

December 31, 2007

Mr. G. David Knowles, PE, LS
Senior Project Manager
The Chazen Companies
100 Glen Street, Suite 3C
Glens Falls, NY 12801

RE: Village of South Glens Falls Water Supply Evaluation
Engineer: The Chazen Companies (Fax: 518-812-2205; Tel: 518-812-0513)
PWSID # NY4500170
Saratoga County, NY

Dear Mr. Knowles:

The NYSDOH Glens Falls District Office (GFDO) has reviewed the following two (2) engineering documents concerning the Village of South Glens Falls Water Supply Evaluation:

1. "Village of South Glens Falls MPA Testing Results Summary – TCC Project # 30639.00". Analytical Services, Inc. (ASI), Williston, VT. September 2007.

2. " Engineer's Report for Village of South Glens Falls Water Supply Evaluation – Village of South Glens Fall, Saratoga County, NY". The Chazen Companies (TCC), Glens Falls, NY. December 2006.

On behalf of the NYSDOH-GFDO, I am providing a historical review and my professional comments below for consideration and actions by the Village of South Glens Falls and The Chazen Companies (TCC).

1. At the request of NYSDOH-GFDO, the Village of South Glens Falls collected Microscopic Particulate Analysis (MPA) samples from 7 of 20 infiltration structures during May 2006. Since the MPA Risk Rating ranged from Low to

High, as shown in the attachment, NYSDOH-GFDO determined in 2006 that the water source was Ground Water Under the Direct Influence of Surface Water (GWUDI). However, NYSDOH-GFDO did allow the Village to improve its water supply system in order to attempt lifting the GWUDI determination.

2. TCC was retained by the Village to conduct certain water supply improvements outlined in the above Engineer's Report (December 2006). After the improvements described within the Engineer's Report were complete, additional MPA testing was done by ASI to evaluate the success of the improvements.

3. The testing results performed by ASI in May and September 2007 are attached in this letter. Since the MPA Risk Rating of additional testing still ranged from Low to High, the 2007 MPA tests were unsatisfactory. It is the NYSDOH-GFDO's decision that the existing GWUDI determination for the Village's source water can not be lifted at this time.

4. It is the NYSDOH-GFDO's requirement that the Village may either (a) comply with the SWTR by installing filtration facilities, replace the existing water source with adequate groundwater sources, or purchase adequately treated water from an adjacent public water supply; or (b) search for other alternatives (i.e. physical improvements to the existing well water collection system as stated in your Engineer's Report) for improving the MPA test results, all within 18 months from today's decision.

5. If the Village chooses to comply with the SWTR by installing the Federal and the State approved filtration facilities, then coverage of your existing raw water reservoir would not be absolutely required, although it would be recommended. The Village would still be required to have a fence, an entrance gate, and bird wires, etc. for raw water quality protection under this situation.

6. If the Village chooses to further improve the existing well water collection system, and eventually the existing GWUDI determination could be lifted due to future satisfactory MPA results, your existing open raw water reservoir would have to be totally covered for having a true groundwater treatment system.

7. An evaluation of the Village's compliance and funding options would need to be performed by the Village. Final design plans must be submitted to the GFDO for review and approval prior to construction.

8. While this Department requires compliance within 18 months, this Department also recognizes that unforeseen design, funding, and construction delays may warrant extensions to deadlines.

9. Please review the above information and provide written notification to NYSDOH-GFDO by **March 31, 2008**, regarding the Village's decision to (a) comply with the SWTR without further MPA analysis, or (b) search for other alternatives (i.e. physical improvements to the existing well water collection system) for improving the MPA test results

If you have any questions, you may call Tom Suozzo (PE), or me at the 518-793-3893 for project discussions.

Very truly yours,

Lawrence K. Wang, PE
Senior Sanitary Engineer

CC:
Mayor & Village Board, Village Hall, PO Box 1210, South Glens Falls, NY 12803
Ms. Anita M. Gabalski, NYSDOH
Mr. Tom Suozzo and Mr. Mike Hallock, NYSDOH (electronically)
Ms. Sherry Gibson, NYSDOH (electronically)
Ms. Kristen Sayers, NYSDOH (electronically)

File: P/Data/Larry/GWUDI Review-SouthGlensFallsVillage-TCC-12-31-07

Village of South Glens Falls
MPA Testing Results Summary
TCC Project #30639.00

May 2006 Testing Results			
Spring Number	Date Sampled	MPA Risk Total	MPA Risk Rating
#2	May-06	15	Moderate
#5	May-06	15	Moderate
#8	May-06	5	Low
#11	May-06	21	High
#14	May-06	10	Moderate
#17	May-06	9	Low
#20	May-06	5	Low

May 2007 Testing Results			
Spring Number	Date Sampled	MPA Risk Total	MPA Risk Rating
#2	5/21/2007	15	Moderate
#4	5/21/2007	10	Moderate
#6	5/23/2007	10	Moderate
#8	5/22/2007	10	Moderate
#10	5/24/2007	1	Low
#12	5/24/2007	12	Moderate
#14	5/28/2007	1	Low
#16	5/28/2007	9	Low
#18	5/29/2007	0	Low
#20	5/29/2007	0	Low

September 2007 Testing Results			
Spring Number	Date Sampled	MPA Risk Total	MPA Risk Rating
#1	9/5/2007	14	Moderate
#3	9/6/2007	12	Moderate
#5	9/6/2007	14	Moderate
#7	9/10/2007	14	Moderate
#9	9/10/2007	14	Moderate
#11	9/11/2007	14	Moderate
#13	9/11/2007	14	Moderate
#15	9/12/2007	27	High
#17	9/12/2007	14	Moderate
#19	9/13/2007	14	Moderate

STATE OF NEW YORK
DEPARTMENT OF HEALTH

Glens Falls District Office
77 Mohican Street Glens Falls, New York 12801 (518) 793-3893 Fax (518) 793-0427

Richard F. Daines, M.D.
Commissioner

Wendy E. Saunders
Chief of Staff

February 4, 2008

Mr. G. David Knowles, PE, LS
Senior Project Manager
The Chazen Companies
100 Glen Street, Suite 3C
Glens Falls, NY 12801

RE: Village of South Glens Falls Water Supply Evaluation
Engineer: The Chazen Companies (Fax: 518-812-2205; Tel: 518-812-0513)
PWSID # NY4500170
Saratoga County, NY

Dear Mr. Knowles:

The NYSDOH Glens Falls District Office (GFDO) would like to acknowledge receipt of your letter addressed to our Tom Suozzo (PE), and dated January 28, 2008.

It is our understanding that you have received our NYSDOH-GFDO letter dated December 31, 2007, in which the Village of South Glens Falls was given several choices for complying with the New York Sanitary Codes on drinking water. **As the date of this correspondence, the Village's water source is considered to be GWUDI (i.e. ground water under directly influence of surface water)**

Once a groundwater source is transmitted by either gravity or pumping to an open raw water reservoir, the groundwater source becomes a surface water source. In turn, the Village must comply with the SWTR (i.e. Surface Water Treatment Rules) by installing adequate filtration and disinfection facilities within 18 months from December 31, 2007. No further water sampling for MPA (i.e. Microscopic Particulate Analysis) will be necessary.

It is also our understanding that the Village of Glens Falls would like to further improve the existing well water collection system/method, hoping that eventually the existing GWUDI determination could be lifted due to future satisfactory MPA results.

The following are the determinations of the NYSDOH-GFDO:

1. the Department's GWUDI determination on the groundwater of the Village of South Glens Falls will not be lifted regardless of the future MPA results, if the un-covered raw water reservoir remains to be "uncovered", and is still in service.

2. the Department's GWUDI determination on the groundwater of the Village of South Glens Falls could be lifted if the future MPA results would be negative, and the existing (uncovered) raw water reservoir would be either by-passed or covered.

Please review the above Department's ruling and provide written notification to our Glens Falls Office by March 31, 2008, regarding the Village's decision to (a) comply with the SWTR with installation of adequate filtration and disinfection facilities, or (b) conduct two more MPAs (one in May 2008 and one in mid-August 2008) and cover (or by-pass) the raw water reservoir.

If you have any questions, you may call me at the 518-793-3893 for more project discussions.

Very truly yours,

Lawrence K. Wang, PE
Senior Sanitary Engineer

CC:
Mayor & Village Board, Village Hall, PO Box 1210, South Glens Falls, NY 12803
Ms. Anita M. Gabalski, NYSDOH
Mr. Tom Suozzo and Mr. Mike Hallock, NYSDOH (electronically)
Ms. Sherry Gibson, NYSDOH (electronically)
Ms. Kristen Sayers, NYSDOH (electronically)

File: P/Data/Larry/GWUDI Review-SouthGlensFallsVillage-TCC-2-4-08

Appendix F:
Parker-Hannifin Equipment Specifications

Fulflo® S Filter Vessels

Fulflo® S Series ASME Code Filter Vessels

Fulflo® S Series Multi-Cartridge Filter Vessels meet a broad range of liquid and gas applications for flow rates up to 2,040 gpm (7,720 lpm). All details of design, materials, construction and workmanship of the S vessel series conform to ASME code.
The S Vessel Series accommodates double-open-end (DOE) or single-open-end (SOE) filter cartridges in 10 in, 20 in, 30 in and 40 in equivalents.

Benefits

- Built in accordance with ASME boiler and pressure vessel code
- Available in 150 psi (10.3 bar) and 300 psi (20.7 bar) designs
- Non-code design and construction (parallel to code standards) available
- Mechanical coverlifts standard on most models
- S85 and S102 feature hydraulic coverlifts (available on all models as an option)
- Dual purpose cartridge seats for use with double open end and 2-222 O-ring single open end cartridges
- Buna-N O-ring closure seal provides positive cover sealing.
- Viton* elastomer, neoprene, ethylene propylene rubber and fluoropolymer elastomer O-rings are also available for temperatures up to 500°F (261°C)
- All S models feature swing bolts with closures for quick cleaning and servicing
- Accepts double-open-end (DOE) or single-open-end (SOE) cartridges

Applications

- Liquid
- Gas
- Food & Beverage
- Chemical Processes
- Petrochemical
- Paints & Coatings
- Industrial

Fulflo® S Filter Vessels

150 psi (10.3 bar) Design Specifications

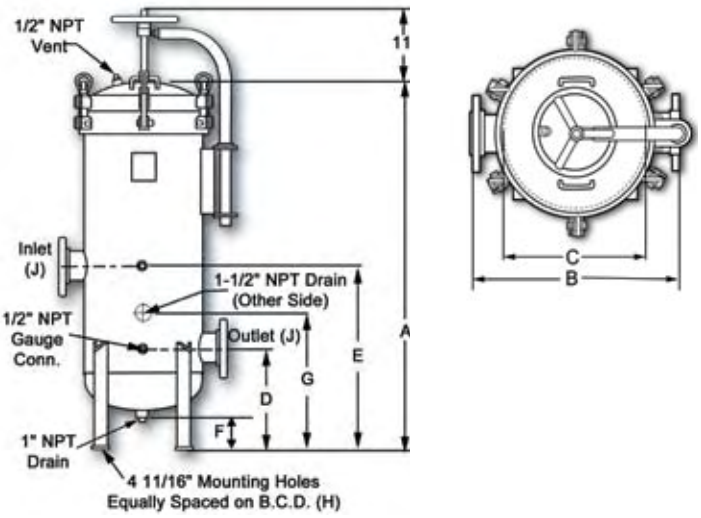
No. & Model	Length of Cartridges (in)	Maximum Flow (gpm)	Dimensions A†	B	C	D	E	F	G	H	Shipping J††	Weight (lbs)
S25-3-4F	(25) 30	375	55.88	26.00	18.06	15.50	28	5	20.44	17.76	4	515
S25-4-6F	(25) 40	500	69.75	26.00	18.06	16.50	31	5	22.25	17.76	6	540
S35-3-4F	(35) 30	525	58.19	29.25	20.06	16.50	31	5	22.56	19.77	4	640
S35-3-6F	(35) 30	525	58.19	29.25	20.06	16.50	31	5	22.56	19.77	6	645
S35-4-6F	(35) 40	700	68.25	29.25	20.06	16.50	31	5	22.56	19.77	6	695
S40-3-6F	(40) 30	600	60.25	30.75	22.06	18.00	32	5	23.31	21.70	6	810
S52-3-4F	(52) 30	780	63.69	33.38	24.06	20.50	34	5	27.56	23.72	4	855
S52-3-6F	(52) 30	780	63,69	33.38	24.06	20.50	34	5	27.56	23.72	6	865
S52-4-8F	(52) 40	1040	73.69	33.38	24.06	20.50	34	5	27.56	23.72	6	900
S85-3-8F	(85) 30	1275	67.25	39.75	30.06	24.00	40	6	31.50	29.81	8	1170
S85-4-8F	(85) 40	1700	73.63	39.75	30.06	24.00	40	6	31.50	29.81	8	1200
S102-3-8F	(102) 30	1530	68.63	42.25	32.06	23.63	41.25	6	31.69	31.81	8	1450
S102-4-8F	(102) 40	2040	79.94	42.25	32.06	23.63	41.25	6	31.69	31.81	8	1600

† Add 5 in to this dimension for hydraulic coverlift.
†† Inlet and outlet size standard ASA flanges.

Maximum Operating Conditions

Material of Construction	Maximum Operating Pressure (psi at 250°F) †	Maximum Design Temperature
Carbon Steel	*150 psi (10.3 bar)*	*500°F (260°C)*
Carbon Steel	*300 psi (20.7 bar)*	*500°F (260°C)*
304 Stainless Steel	*150 psi (10.3 bar)*	*300°F (150°C)*
304 Stainless Steel	*300 psi (20.7 bar)*	*300°F (150°C)*
316 Stainless Steel	*150 psi (10.3 bar)*	*400°F (204°C)*
316 Stainless Steel	*300 psi (20.7 bar)*	*400°F (204°C)*

† Operating temperature limited by standard gasket material and exterior paint.



Ordering Information

Material	Design Series	Number of Columns		Cartridge Length (in)		Inlet/Outlet Flange Size	Coverlift Option
No Symbol = Carbon Steel 4 = 304 Stainless Steel 6 = 316 Stainless Steel	HS = High Pressure CS = Non-Code	25 35 40 52 85 102	—	3 30 4 = 40	—	4F = 4 in Flange 6F = 6 in Flange 8F = 8 in Flange	K1= Mechanical K2 = Hydraulic

Specifications are subject to change without notification.
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C-1321

AVASAN™ Filter Cartridges

High Purity Melt Blown Depth Cartridges

Avasan™ (AVS) cartridges are manufactured with a proprietary melt blown manufacturing process using a specially formulated polypropylene polymer. This formulation provides a uniquely graded density filter cartridge designed for high purity applications. The fiber matrix of the cartridge has been engineered to provide structural integrity throughout the long service life of the cartridge and the finish-free construction provides optimum fluid purity and eliminates foaming. Avasan's inherent fluid compatibility properties plus graded density make it the economical filter choice for high clarity requirements.

Benefits

- Continuous bonding of fibers throughout the filter matrix ensures non-fiber releasing construction
- Superior inter-layer bonding provides true three dimensional filtration and a construction that does not compress with increasing pressure
- Pure polypropylene construction
- Finish-free construction provides optimum fluid purity and eliminates foaming
- Graded density construction provides built-in prefiltration and longer life
- All materials biosafe in accordance with USP Class VI-121°C Plastic Test
- All materials listed as acceptable for potable and edible contact according to CFR Title 21
- Parker Process Filtration Division is an ISO9000:2000 Certified Division

Applications

- DI Water
- RO Prefiltration
- Potable Water
- Plating Solutions
- Chemical Processing Fluids

Parker

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AVASAN™ Filter Cartridges

Specifications

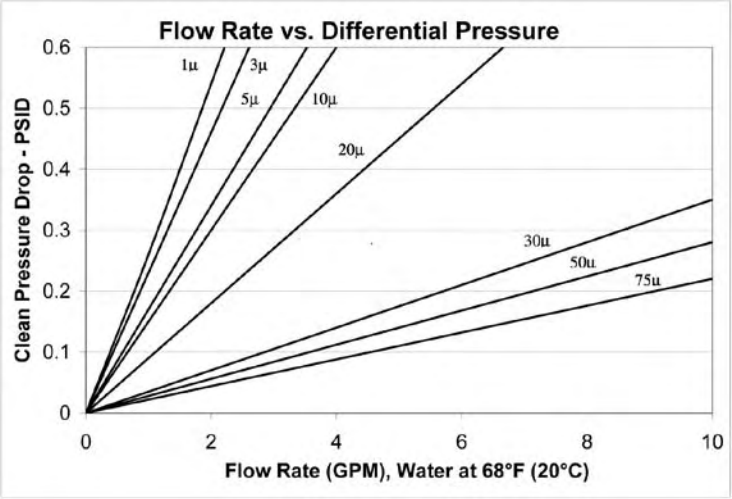
Materials of Construction:
Filter Medium
100% melt blown polypropylene
End Caps/Adapters (optional)
Various; refer to Ordering Information
Seal Options
Various; refer to Ordering Information

- All materials of construction are FDA listed as acceptable for potable and edible liquid contact according to CFR Title 21.
- Pending Certifications: NSF - Materials only

Maximum Recommended Operating Conditions:
Temperature:
@ 50 psid (3.45 bar): 80°F (27°C)
@ 25 psid (1.72 bar): 140°F (60°C)
Flow Rate:
5 gpm (18.9 lpm) per 10" length
Recommended Maximum:
Change Out ΔP: 35 psi (2.4 bar)

Dimensions (Nominal):
1-1/16 in. (27mm) ID x 2-7/16 in. (62mm) OD (max.)
4, 10, 20, 30, and 40 in. continuous nominal lengths

Nominal Filtration Ratings (90%) :
1µm, 3µm, 5µm, 10µm, 20µm, 30µm, 50µm and 75µm



Flow rate is per 10" cartridge. For liquids other than water, multiply the pressure drop by the fluid viscosity in centipose.

Ordering Information

AVS — [ ] — [ ] — [ ] — [ ] — [ ]

Cartridge Code	Micrometer Rating (µm)	Filter Medium	Nominal Length (in)	End Cap Configuration	Seal Material
AVS = AVS Cartridge	1 3 5 10 20 30 50 75	M = FDA Grade Polypropylene	Code = in = mm 4 = 4 = 102 9.75 = 9.75 = 248 10 = 10 = 254 19.5 = 19.5 = 495 20 = 20 = 508 29.25 = 29.25 = 743 30 = 30 = 762 40 = 40 = 1016	None = DOE (w/o gaskets) DO = Double open end (DOE) LL = 120 O-Ring both ends** LR = 120 O-Ring/Recessed** OB = Std. Open End/Polypro spring closed end PR = 213 O-Ring/Recessed** SC = 226 O-Ring/Flat SF = 226 O-Ring/Fin TC = 222 O-Ring/Flat TF = 222 O-Ring/Fin TX = 222 O-Ring/Flex Fin XA = DOW w/Extended Core XB = Ext. Core Open End Polypro spring closed end	None = Omit P = Poly Foam Gaskets w/Collars (DO only) E = EPR N = Buna-N S = Silicone (O-Ring only) T = PFA Encapsulated Viton* (222, 226 O-Ring Only) V = Viton* W = Poly Foam Gaskets without Collars (DO only)

**Available only in 9-3/4" (9-4) and 19-1/2" (19-4) lengths.

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ENGINEERING YOUR SUCCESS.

Glass-Mate™ Cartridges

Absolute and economical filtration with pleated microfiberglass cartridges

Parker's Glass-Mate™ cartridges offer an economical choice for absolute-rated efficiency, high flow rate capability and long service life. A wide variety of construction components, end fittings and seal options make this product line ideal for prefiltration and point-of-use filtration for many industrial applications.

Glass-Mate cartridges are available in 0.45, 1, 2, 3, 5, 10, 20 and 40µm absolute-rated pore sizes.

Benefits

- Absolute-rated media provides reliable removal efficincy
- Thermal bonding eliminates particle bypass
- Laminated media/support layer maximizes flow capacity and media utilization and minimizes media migration
- Variety of construction/seal options for increased compatibility
- End fitting options provide competitive housing retrofit capability
- All FDA listed components biosafe per USP Class V1-121°C Plastic Tests allows filtration of edible and potable liquids
- High surface area yields high flow rate, low differential pressure
- Non-fiber-releasing media with minimal extractables provides high purity filtrate

Applications

- Chemicals
- Coatings
- Water
- R.O. prefiltration

Glass-Mate™ Cartridges

SPECIFICATIONS

Materials of Construction:
Filter Medium: Borosilicate microfiber-glass with acrylic binder
Support/Drainage Layers: Spunbonded polyester; laminated on the down-stream side

Recommended Operating Conditions:
Maximum Temperatures
Glass Filled Polypropylene
200°F @ 35ΔP (93°C/2.4 bar)
Polyester
140°F @ 35ΔP (60°C/2.4 bar)
Stainless Steel
275°F @ 35ΔP (135°C/2.4 bar)
Changeout Differential Pressure
35 psi (2.4 bar)
Maximum Flow Rate
10 gpm per 10 in length
(38 lpm/254 mm)
Design Flow Rate
2.5 gpm per 10 in length
(9.5 lpm/254 mm)

Effective Filtration Area:
5 ft^2/10 in (0.46 m^2/254 mm) minimum

Maximum Differential Pressure:
Glass-Filled Polypropylene
90 psi @ 75°F (6.2 bar/24°C)
Polyester
70 psi @ 75°F (4.8 bar/24°C)

Biological Safety/Product Purity:
Meets USP XXIV Class VI safety requirements for plastics
All components FDA listed per CFR, Title 21
Non-fiber releasing per FDA

Sterilization/Sanitization:
Hot water ("F" construction):
180°F (82°C) for 30 minutes at maximum 15 psid (1 bar).
In-Line Steam/Autoclave
("F" construction with stainless steel sleeve) 60 minutes at 255°F (140°C) at 2 psid (0.14 bar) maximum pressure.

GlassMate Flow Factor (psid/gpm @ 1 cks)

Rating (µm)	Flow Factor
0.45	.108
1	.102
2	.095
3	.090
5	.072
10	.060
20	.042
40	.018

Flow Rate and Pressure Drop Formulas

$$\text{Flow Rate (gpm)} = \frac{\text{Clean } \Delta P \times \text{Length Factor}}{\text{Viscosity} \times \text{Flow Factor}}$$

$$\text{Clean } \Delta P = \frac{\text{Flow Rate} \times \text{Viscosity} \times \text{Flow Factor}}{\text{Length Factor}}$$

Notes:

1. Clean ΔP is PSI differential at start.
2. Viscosity is centistokes. Use Conversion Tables for other units.
3. Flow Factor is ΔP/GPM at 1 cks for 10 in (or single).
4. Length Factors convert flow or ΔP from 10 in (single length) to required cartridge length.

■ **Liquid Particle Retention Ratings (µm)@ Removal Efficiency of:**

Cartridge	ß = 5000 Absolute	ß = 1000 99.9%	ß = 100 99%	ß = 20 95%	ß = 10 90%
PMG004	0.45	0.3	<0.1	<0.1	<0.1
PMG010	1.0	0.6	0.2	<0.1	<0.1
PMG020	2.0	1.2	0.4	0.2	0.1
PMG030	3.0	1.8	0.6	0.3	0.2
PMG050	5	3	1.3	0.5	0.4
PMG100	10	7	3.5	1.6	1.2
PMG200	20	16	8	4	2.5
PMG400	40	32	20	11	8

Glass-Mate™ Cartridges

Ordering Information

PMG □ — □ □ — □ □

Particle Removal Rating	
CODE	(µm)
002	0.2
004	0.45
010	1.0
020	2.0
050	5.0
100	10
200	20
400	40

Nominal Length	
CODE	LENGTH (mm)
9	9 5/8" (244)
10	9 13/16" (249)
19	19 5/8" (498)
20	19 15/16" (506)
29	29 1/4" (743)
30	30 1/16" (764)
39	39" (991)
40	40" (1016)

Support Construction	
CODE	DESCRIPTION
F	Glass Filled Polypropylene (core only)
P	Polyester

Seal Material	
CODE	DESCRIPTION
P	Polyethylene Foam (DOE Gasket Only)
E	EPR
N	Buna-N
S	Silicone
V	Viton*
X	No Seal Material

End Cap Configuration	
CODE	DESCRIPTION
AR	020 O-ring/Recessed Cap
DO	Double Open End (DOE)
DX	DOE With Core Extender
LL**	120 O-ring/Recessed Cap
LR**	120 O-ring/Recessed Cap
OB	Std. open end / Polypro Spring Closed End
PR**	213 O-ring/Recessed Cap
SC	226 O-ring/Flat Cap
SF	226 O-ring/Fin
TC	222 O-ring/Flat Cap
TF	222 O-ring/Fin
TX	222 O-ring/Flex Fin
XB	Ext. core open end/ Polypro Spring Closed End
SSC	S.S. Inserted 226 O-ring/Closed
SSF	S.S. Inserted 226 O-ring/Fin
STC	S.S. Inserted 222 O-ring/Closed
STF	S.S. Inserted 226 O-ring/Fin

** Available only in 9 5/8" (-9) and 19 5/8" (-19 lengths)

Special Options	
CODE	DESCRIPTION
Z6	Individual Poly Bag only
Z15	Individual Poly Bag 15/ctn. (20", 30", 40") (PXD only)
Z30	Individual Poly bag 30/ctn. (10")

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SPEC-C2041-Rev. A 01/08

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Appendix G:
Hach Equipment Specifications

CL17 Chlorine Analyzer

The Hach CL17 Chlorine Analyzer uses fast, reliable, and economical DPD chemistry for up to 30 days of unattended operation. No electrodes and minimal use of reagents means low operating costs.

Features and Benefits

Reliable and Economical Chlorine Analysis

The Hach CL17 Chlorine Analyzer uses colorimetric DPD chemistry to continuously monitor water for free or total residual chlorine. This CL17 is a dependable and economical alternative to instruments that rely on costly electrodes or complex procedures. The analysis method is unaffected by even large swings of pH and measurements are more accurate and precise than those of other systems.

Manual or Automatic Feed Pump Control

Both an alarm for manual chlorine feed control and a 4-20 mA output for automatic control of chlorine feed pumps is available in the CL17 Analyzer. When set for manual control, the instrument notifies the operator of out-of-limit chlorine levels for manual intervention in the disinfection process as needed. For automatic control of chlorine feed pumps, the CL17 can use one of two methods:

1. **On-Off Control** turns the feed pumps on when chlorine levels fall too low for disinfection and off when levels rise above a pre-set limit.
2. **Proportional Control** adjusts the amount of chlorine in proportion to the strength of the CL17's output signal.

Simple Maintenance

Routine maintenance can typically be performed in 15 minutes per month because the sample cell and reaction chamber are easy to clean and the case provides quick access. (Difficult samples may require more frequent cleaning.) The CL17 is also equipped with self-testing diagnostics.

Method of Analysis

Free Residual Chlorine—The CL17 Chlorine Analyzer uses an aqueous buffered colorimetric indicator—N,N-diethylpphenylenediamine (DPD)—to determine levels of chlorine. DPD turns a magenta color in response to the amount of free residual chlorine (as hypochlorous acid or hypochlorite ion). The reaction takes place at a buffered pH of 6.3 to 6.6.

Total Residual Chlorine—To measures total residual chlorine (free residual chlorine plus mono-, di- and trichloramines) an additional reagent is used. By adding potassium iodide to the sample, chloramines in the sample oxidize iodide to iodine, which then oxidizes the DPD indicator to the magenta color at a buffered pH of 5.1.

Applications

Drinking Water—The CL17 Chlorine Analyzer can be used in finished water where residual chlorine levels must be maintained during distribution. It can also be used to monitor raw water to facilitate preoxidation, disinfection, and control of taste and odor problems.

Wastewater—Large tubing and fittings and a Self-Cleaning By-Pass Y-Strainer Kit for the CL17 ensures continuous operation without clogging.

Industrial—The CL17 can be used to monitor disinfection and prevent biological build-up in applications that involve chemical or industrial processes (feed water), heating and cooling water, or food and beverage applications. It is also useful in systems that use reverse osmosis, to protect expensive cellulose acetate membranes.

Specifications*

Range
0 to 5 mg/L free or total residual chlorine

Accuracy
±5% or ±0.035 mg/L as CL_2, whichever is greater

Precision
±5% or 0.005 mg/L as CL_2, whichever is greater

Minimum Detection Limit
0.035 mg/L

Cycle Time
2.5 minutes

Inlet Pressure to Instrument
1 to 5 psig (1.5 psig is optimum)

Inlet Pressure to Sample Conditioning
1.5 to 75 psig

Air Purge (optional)
0.1 cfm instrument quality air at 20 psig maximum

Sample Flow
200 to 500 mL per minute minimum required

Sample Temperature
5 to 40°C (41 to 104°F)

Operating Temperature
5 to 40°C (41 to 104°F)

Operating Humidity
90% at 40°C (90% at 104°F) maximum

Interferences
Other oxidizing agents such as bromide, chlorine dioxide, permanganate and ozone will cause a positive interference. Hexavalent chromium will cause a positive interference:
1 mg/L Cr^{6+} = approximately 0.02 mg/L as Cl_2.
Hardness must not exceed 1,000 mg/L as $CaCO_3$.

Recorder Outputs
One 4-20 mA with an output span programmable over any portion of the 0 to 5 mg/L range, 130 V isolation from earth ground, 500 ohm maximum

One isolated recorder output, 4–20 mA (can be adjusted to 0–20 mA), recommended load impedance 3.6 to 500 ohms. Optional AquaTrend® Network interface

Alarm Relay Outputs
Two alarms selectable for sample concentration alarm, analyzer system warning, or analyzer system shut-down alarm. Each is equipped with an SPDT relay with contacts rated for 5A resistive load at 230 Vac.

Sample Inlet Connection
1/4-inch OD polyethylene tube, quick-disconnect fitting

Drain Connection
1/2-inch ID flexible hose, hose barb

Air Purge (optional)
1/4-inch OD tube, quick-disconnect fitting, 0.1 cfm instrument quality air at 20 psig maximum

Certification
CE approved
ETL listed to UL 1262
ETL certified to CSA 22.2 No. 142

Enclosure
ABS plastic, two clear polycarbonate windows,
IP62-rated with the gasketed door latched

Mounting
Wall mount

Display
LCD, 3-digit measurement readout and six-character alphanumeric scrolling text line

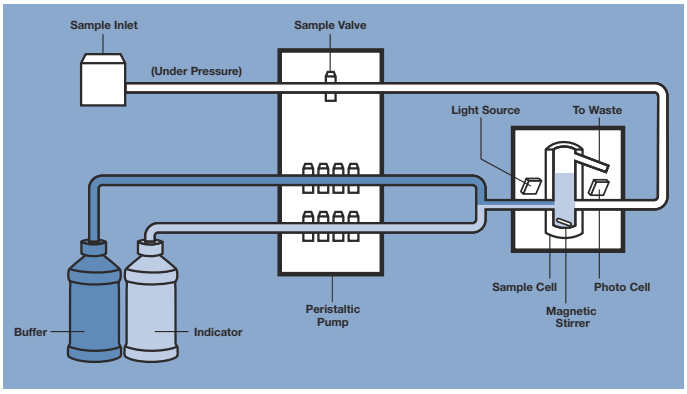
Light Source
Class 1 LED (light emitting diode) with a peak wavelength of 520 nm;
50,000 hours estimated minimum life

Power
100 to 115/230 Vac, 50/60 Hz (switch selectable), 95 VA maximum, 2.5 Amp fuse

Dimensions
34.3 x 41.9 x 19.1 cm
(13.5 x 16.5 x 7.5 in.)

Shipping Weight
11.3 kg (25 lbs.)

**Specifications subject to change without notice.*



Principle of Operation

The CL17 Chlorine Analyzer has three operating components:

- *A linear peristaltic pump to precisely control the volume of incoming samples and reagents.*
- *A colorimeter with seal-free, solid-state mixing system that includes a self-cleaning stir bar.*
- *One-month supply of reagents (indicator and buffer)*

A zero reference point is established with the first sample in the cycle by measuring blank absorbance. (This compensates for the sample's color intensity and turbidity before the chlorine measurement is made.) Then, indicator and buffer reagents are added to the sample while a magnetic stirrer mixes the solution and the sample changes color. A compact colorimeter then measures the light transmitted through the sample. The measured color intensity is compared to a reference standard. Finally, the sample cell is flushed with new sample so that the cycle can repeat itself every 2.5 minutes.

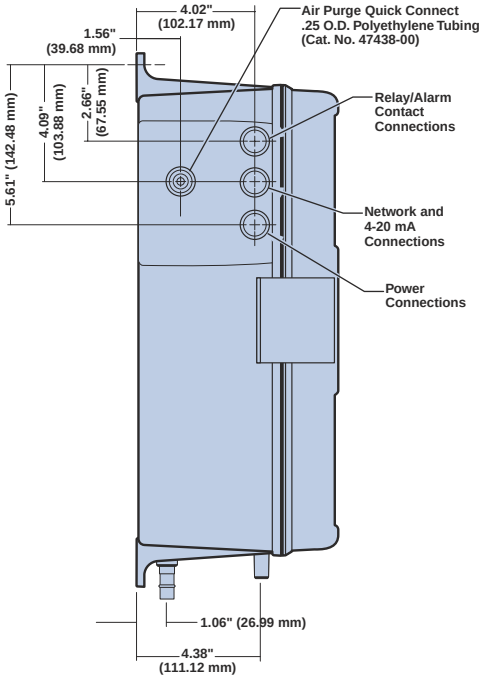
Engineering Specifications

1. The chlorine analyzer shall employ a DPD colorimetric method of measurement using DPD indicator and a buffer solution.
2. The analyzer shall be capable of measuring free or total residual chlorine by changing the indicator and buffer solutions.
3. A measurement shall be taken every 2.5 minutes and results displayed by a three digit LCD readout in the range of 0 to 5 mg/L.
4. The analyzer shall be designed for 30-days unattended operation and use only 473 mL of each reagent per month.
5. The analyzer shall operate with an LED light source with a peak wavelength of 510 nm.
6. The instrument shall measure a sample blank before each sample measurement to provide automatic zero reference to compensate for sample color and turbidity and changes in light intensity due to voltage fluctuations or light source aging.
7. The instrument shall provide a minimum detection limit of 0.035 mg/L or better, precision better than ± 5% or 0.005 mg/L as Cl_2, and accuracy better than ± 5% or 0.035 mg/L as Cl_2.
8. The analyzer shall be microprocessor-controlled and provide a 4-20 mA recorder output as well as 2 alarms.
9. Each alarm shall be user-selectable for sample concentration alarms (high or low), analyzer system warnings, or analyzer system shut-down alarms.
10. The sample concentration alarms shall be fully adjustable through the entire range.
11. The system warning shall activate for minor variations in analyzer performance.
12. A system alarm shall activate for major variations in analyzer performance and it shall shut down the analyzer until corrective action is taken.
13. The microprocessor shall provide self-diagnostic functions accessible through an alphanumeric, menu-driven keyboard.
14. Two SPDT normally open/normally closed dry contact relays rated at 5A resistive load at 230 Vac shall be provided.
15. Recorder outputs shall be a 4-20 mA.

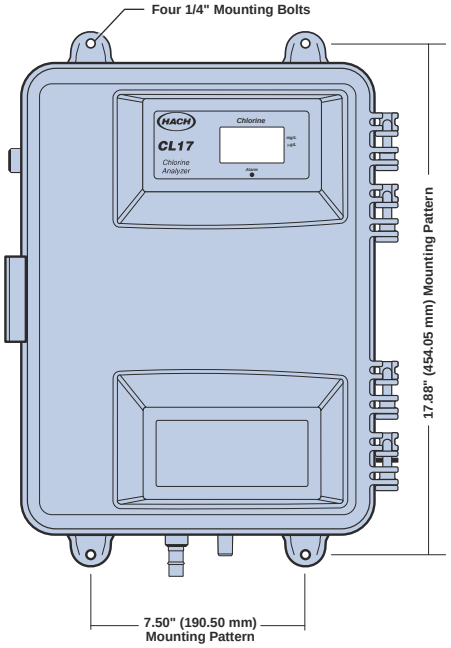
Dimensions

The CL17 is designed to be wall-mounted with four 1/4-inch screws. Adequate clearance must be left at the sides and bottom of the case for plumbing and electrical connections. The sample inlet connection is 1/4-inch quick-disconnect fitting and the drain connection is 1/2-inch I.D. flexible hose. Electrical connections are inside the instrument case. Holes for three 1/2-inch conduit fittings are provided.

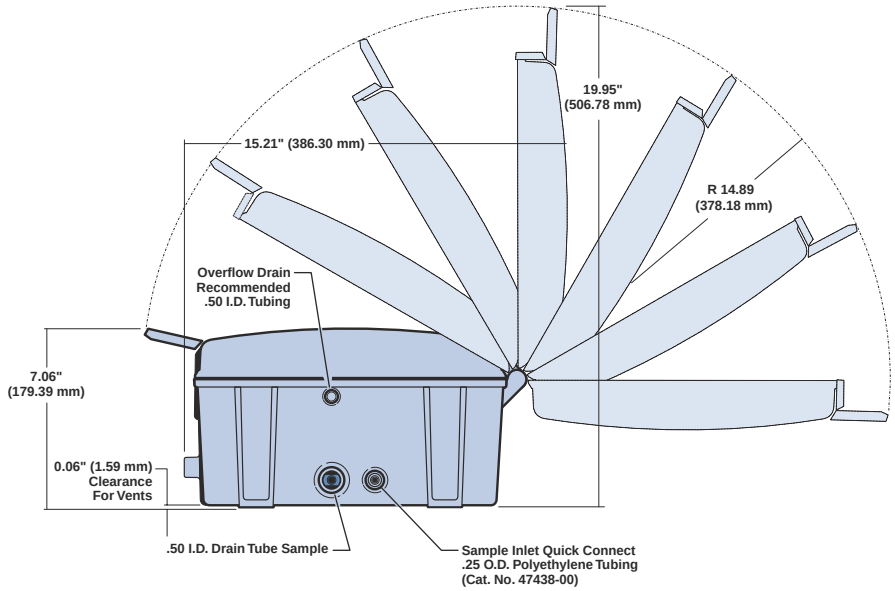
SIDE VIEW



FRONT VIEW



BOTTOM VIEW



16. Recorder span minimum and maximum values shall be operator programmable at the menu-driven keypad over the entire operating range.
17. The chlorine analyzer shall be housed in an IP-62 rated, ABS plastic enclosure designed for wall mounting.
18. The enclosure shall have two clear polycarbonate windows for viewing the measurement readout and reagent levels.
19. Power requirements shall be 100-115/230 Vac, 50/60 Hz, switch selectable, 95 VA maximum.
20. The instrument shall be the Model CL17 Chlorine Analyzer, manufactured by Hach Company.

Ordering Information

Hach CL17 Chlorine Analyzers are shipped with a one-month supply of reagents, maintenance kit, installation kit, and manual. (The power cord is ordered separately.)

54400-01 Model CL17 Free Residual Chlorine Analyzer

54400-02 Model CL17 Total Residual Chlorine Analyzer

54400-03 Model CL17 Free Residual Chlorine Analyzer with AquaTrend® Network Capability

54400-04 Model CL17 Total Residual Chlorine Analyzer with AquaTrend® Network Capability

Accessories

54488-00 Power Cord, 125V, 10A, 1.83 m (6 ft.)

54489-00 Power Cord, 230V, 10A, 1.83 m (6 ft.), continental European plug

54443-00 Maintenance Kit, 1 year, includes tubing, caps, funnel, and fittings

54443-01 Maintenance Kit with preassembled tubing, 1 year, includes tubing, caps, funnel, and fittings

46436-00 Flow Meter with 1/4-inch OD tubing

44278-00 Serial I/O Kit

54490-00 CL17 CAL/Verification Kit

Reagents

Reagent sets include all three of the required reagents [DPD indicator powder (added to indicator solution), indicator and buffer solutions] is sufficient for a 30-day operating period.

25569-00 Reagent Set, CL17 free chlorine

25570-00 Reagent Set, CL17 total chlorine

22972-55 DPD Indicator Powder (free and total)

23140-11 Free Chlorine Indicator Solution, 473 mL

23141-11 Free Chlorine Buffer Solution, 473 mL

22634-11 Total Chlorine Indicator Solution, 473 mL

22635-11 Total Chlorine Buffer Solution, 473 mL

28359-00 Calibration Refill Kit

Lit. No. 1626
XXXX Printed in U.S.A.

At Hach, it's about learning from our customers and providing the right answers. It's more than ensuring the quality of water—it's about ensuring the quality of life. When it comes to the things that touch our lives...

Keep it pure.

Make it simple.

Be right.

For current price information, technical support, and ordering assistance, contact the Hach office or distributor serving your area.

In the United States, contact:

HACH COMPANY World Headquarters
P.O. Box 389
Loveland, Colorado 80539-0389
U.S.A.
Telephone: 800-227-4224
Fax: 970-669-2932
E-mail: orders@hach.com
www.hach.com

U.S. exporters and customers in Canada, Latin America, sub-Saharan Africa, Asia, and Australia/New Zealand, contact:

HACH COMPANY World Headquarters
P.O. Box 389
Loveland, Colorado 80539-0389
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E-mail: info@hach-lange.de
www.hach-lange.com

HACH®

Be Right™

FilterTrak 660™ sc Laser Nephelometer

The Hach FilterTrak 660 sc Laser Nephelometer uses USEPA-approved Hach Method #10133 to monitor turbidity, with sub-micron sensitivity to detect particles smaller than 0.1 µm.

Features and Benefits

Lowest Limit of Detection in the Market

The Hach FilterTrak 660 sc Laser Nephelometer has the ability to detect a 0.3 mNTU or 0.0003 NTU change in turbidity, providing operators with confidence in their turbidity measurement.

Using advanced laser optics and signal processing, the instrument detects increased concentrations of submicron-sized particles that are a precursor to larger particles. This allows for early filter deterioration detection that meets or exceeds that of particle counters—all with the day-to-day convenience, simplicity, and reliability of a Hach turbidimeter. Operators can detect impending filter breakthrough, delineate filter ripening, and maximize effective filter run time.

Meets All USEPA Filter Monitoring Requirements

The FilterTrak sensor uses U.S. Environmental Protection Agency (USEPA) approved Hach FilterTrak Method #10133, the method specified in the USEPA LT2 draft guidance manual for compliance monitoring of membrane filters. The sensor meets all regulatory requirements for individual filter and combined effluent monitoring.

Monitor, Optimize, and Report

USEPA method compliance means that treatment plants with conventional or membrane filtration can monitor and optimize, as well as report, using this single technology.

Compatible with Hach Multi-Sensor, Multi-Parameter Digital Controllers

The FilterTrak sensor can be used with Hach's new sc100 or sc1000 Digital Controllers. The sc100 controller accepts up to two sensors. The sc1000 accepts up to eight sensors. Multiple controllers can be networked to accommodate many more sensors and parameters, reducing the cost per measuring point. Just plug in any Hach "plug and play" digital sensor and it's ready to use without software configuration. "Plug and play" connectivity means there's no complicated wiring or set up. The FilterTrak 660 sc Laser Nephelometer controller system now can manage 18 different digital sensors.

The NEW Verification Quick Check is a dry method that verifies calibration to below 0.1 NTU (100 mNTU).

DW PW

DW = drinking water WW = wastewater municipal **PW = pure water / power**
IW = industrial water **E = environmental** C = collections **FB = food and beverage**

HACH®

Be Right™

Specifications*

USEPA Method
Designed to comply with USEPA approved method 10133 for regulatory compliance reporting

Method of Detection
Nephelometric light scatter at 90 degrees relative to incident monochromatic light beam at 660 nm

Light Source
Class 1 laser product; with embedded 10 mW, 660 nm, Class 3B laser source (complies with 21 CFR 1040.10 and 1040.11. FDA Laser Accession No. 9911570)

Range
0.000 to 5000 milli-Nephelometric Turbidity Units (mNTU)
(0 to 5.0 NTU)
Note: 1000 mNTU = 1.000 NTU

Accuracy
(Defined according to ISO 15839)
From 0 to 1000 mNTU: ±3% of reading or ±5 mNTU, whichever is greater
From 1000 to 5000 mNTU: ±2% of reading

Displayed Resolution
0.001 mNTU up to 9.999 mNTU;
0.01 mNTU from 10.00 to 99.99 mNTU;
0.1 mNTU from 100.0 to 999.9 mNTU;
1 mNTU from 1000 to 5000 mNTU

Repeatability
(Defined according to ISO 15839)
Better than ±1.0% of reading at 24 mNTU; ±1.0% of reading at 800 mNTU; and ±1.0% of reading at 5000 mNTU as RSD (or as coefficient of variation)

Lowest Expected Reading
5 mNTU using deionized, reverse osmosis water, based on statistical averages from three instruments

Limit of Detection (LOD)
(Defined according to ISO 15839)
Less than 0.3 mNTU

Measurement Frequency
One reading per second

Verification of Calibration Method
StablCal, stabilized formazin

Sample Flow Rate
100 to 750 mL/min (1.6 to 11.9 gal/hour)

Operating Temperature
0 to 40°C (32 to 104°F)

Operating Humidity
5 to 99% non-condensing

Sample Temperature
0 to 50°C (32 to 122°F)

Storage Temperature
-20 to 60°C (-4 to 140°F)

Signal Average Time
User selectable from 0, 6, 30, 60, 90 seconds; default 90 seconds

Recorder Outputs
Two selectable for 0-20 mA or 4-20 mA; output span programmable over any portion of the 0 to 5500 mNTU range

Alarms
Three set-point alarms, each equipped with an SPDT relay with unpowered contacts rated for 5A resistive load at 230 Vac

Digital Communication
Network Card Compatible
MODBUS® RS-485, MODBUS® RS-232,
LonWorks Protocol (optional)
Wireless Communication
IR Port to download into a handheld Personal Digital Assistant (PDA) or laptop computer via MODBUS®

Power Requirements
10.8 to 13.5 Vdc, 1.5 VA

Sensor Cabling
Sensor to controller: 2 m (6.6 ft.)
Optional extension cables available in 7.6, 15.2, or 30.5 m (25, 50, or 100 ft.). Maximum total length: 100 m (328 ft.)

Fittings
Sample Inlet: 1/4-inch NPT female, 1/4-inch compression fitting (provided)
Drain: 1/2-inch NPT female, 1/2-inch hose barb (provided), clear drain tubing is recommended

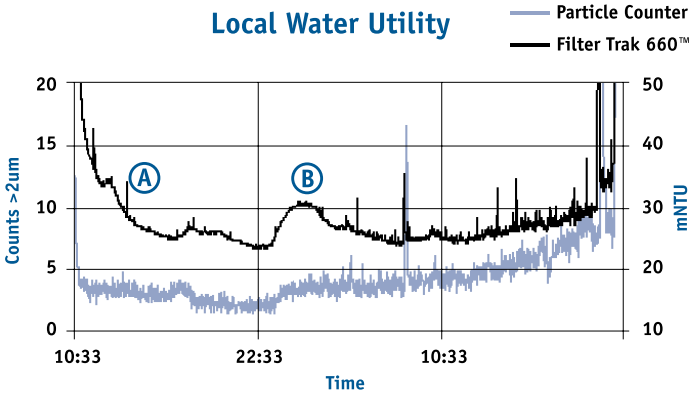
Mounting
Wall and floor stand

Dimensions
Nephelometer body and cap 25.4 x 30.5 x 40.6 cm
(10 x 12 x 16 in.)

Shipping Weight
Approximately 7.7 kg (16.9 lbs.)

Certifications
Safety:
Listed by ETL to UL 61010A-1: Certified by ETL to CSA C22.2 No. 1010.1: CE certified by Hach Company to EN 61010-1
Immunity:
CE certified by Hach Company to EN61326 (industrial levels)
Emissions:
Class A: EN 61326, CISPR 11, FCC Part 15, Canadian Interference-Causing Equipment Regulation ICES-003

**Specifications subject to change without notice.*



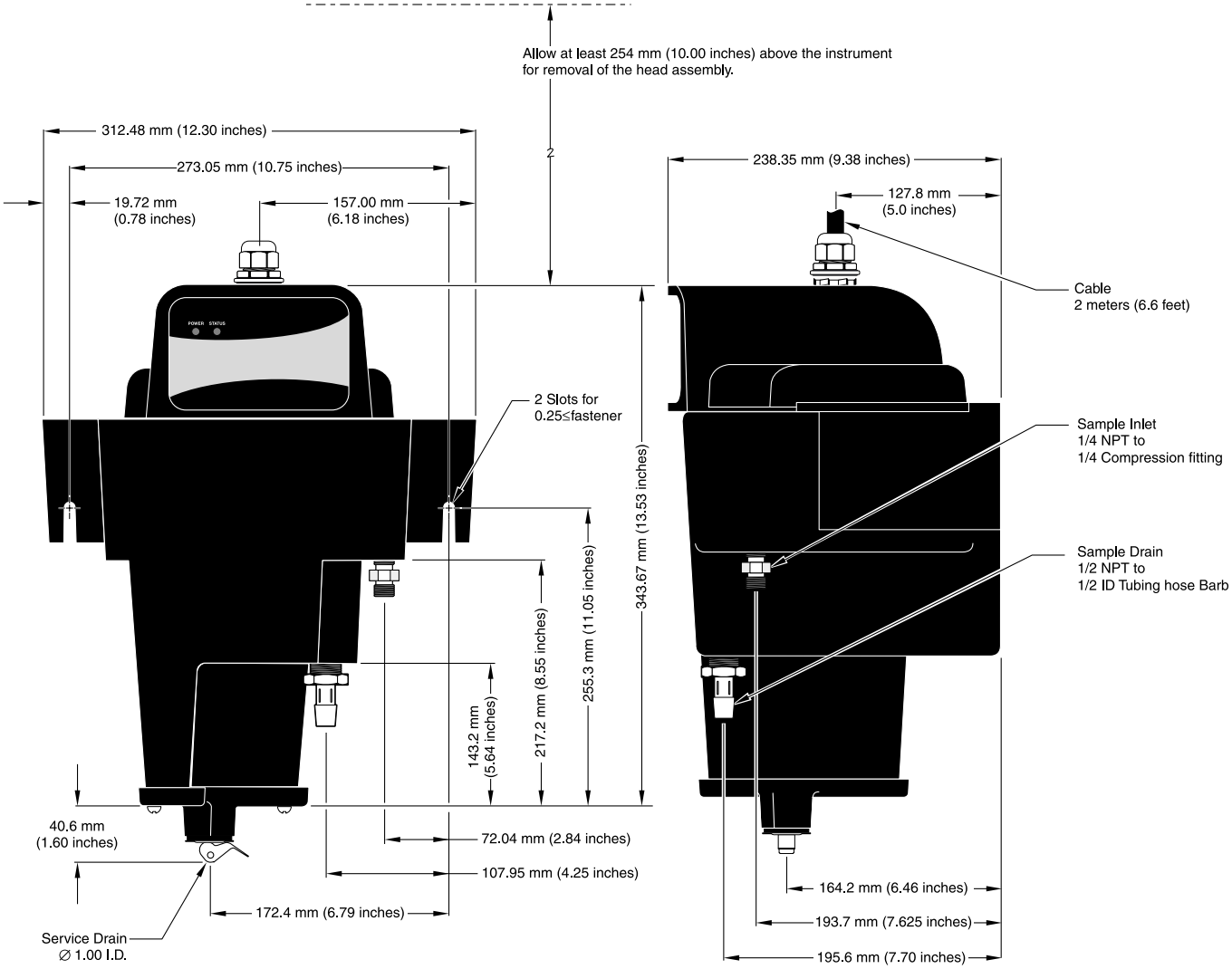
Superior Filter Management

The sensitivity of the FilterTrak 660 sc Laser Nephelometer improves filter management throughout the filter run. The graph shows simultaneous measurements from a FilterTrak nephelometer and a particle counter in a water plant. During the ripening process (A), the FilterTrak nephelometer provided a more revealing profile of actual filter performance. It also recorded a filter event (B) that the particle counter was unable to detect.

The FilterTrak 660 sc is more sensitive than a particle counter with the convenience of a turbidimeter.

Dimensions

The FilterTrak 660 sc Laser Nephelometer includes two slots designed for 1/4-inch fasteners for wall mounting. A 1/4-inch NPT compression fitting is provided for the inlet connection, and a 1/2-inch hose barb is provided for the drain connection. The nephelometer can also be mounted on a floor stand.



Engineering Specifications

1. The sensor shall be a laser nephelometer.
2. The laser nephelometer shall be a continuous-reading, on-line instrument.
3. The range shall be 0.000 to 5000 milli-Nephelometric Turbidity Units (mNTU) (0 to 5.0 NTU).
4. The light source shall be a 660 nm laser diode with a closed loop intensity control.
5. The accuracy shall be ±3% of reading or ±5 mNTU, which ever is greater, from 0 to 1000 mNTU and ±2% of the reading from 1000 to 5000 mNTU.
6. The displayed resolution shall be 0.001 mNTU up to 9.999 mNTU, 0.01 mNTU from 10.00 to 99.99 mNTU, 0.1 mNTU from 100.0 to 999.9 mNTU, and 1 mNTU from 1000 to 5000 mNTU.
7. The repeatability shall be better than ±1.0% of reading at 24 mNTU and ±1.0% of reading at 800 mNTU and 1.0% of reading at 5000 mNTU as RSD (or coefficient of variation).
8. Optical components shall be mounted in a sealed head assembly that can be removed easily for calibration, without disturbing sample flow.
9. The nephelometer body shall be constructed of corrosion-resistant polystyrene, and shall include an internal bubble trap to vent entrained air from the sample stream.
10. The nephelometer shall offer the choice of Formazin-based calibration/verification (100 to 5000 mNTU).
11. User selectable signal averaging, bubble rejection, alarm and recorder output hold, and self-test diagnostics shall be provided.
12. The instrument shall contain a secondary derivative parameter for assessing sample baseline variability as a precursor to a particle spike relative standard deviation (RSD).
13. The instrument shall be the Hach FilterTrak 660 sc Laser Nephelometer.

Ordering Information

FT660 sc Laser Nephelometer Systems

Single-Sensor System

6016400 Sensor assembly with sc100 controller

Network Add-on Sensor

6016000 Sensor assembly only

System with Digital Communication

6016401 Sensor assembly with sc100 controller with RS-485 output

6016402 Sensor assembly with sc100 controller with RS-232 output

6016403 Sensor assembly with sc100 controller with LonWorks output

Does not include power cords.

Optional Accessories

5448800 Power Cord with strain relief, 125 Vac

5448900 Power Cord with strain relief, 230 Vac

Sensor Extension Cables

To be used only between sensor and sc100 controller.

5796000 7.6 m (25 ft.)

5796100 15.2 m (50 ft.)

5796200 30.5 m (100 ft.)

Standard cable length 10 m (33 ft.)
Maximum total length 100 m (328 ft.)

Calibration Materials

5236400 Calibration Kit, 1 L; includes calibration body and funnel

2788453 StablCal® Calibration Standard, certified, 800 mNTU, 1 L

Wet Verification Standards

2723353 StablCal® Verification Standard, certified, 100 mNTU, 1 L

2697953 StablCal® Verification Standard, certified, 300 mNTU, 1 L

2698053 StablCal® Verification Standard, certified, 500 mNTU, 1 L

2877553 StablCal® Verification Standard, certified, 5000 mNTU, 1 L

Dry Verification Standard

6735500 Verification Quick Check, secondary standard

To complete your turbidity measurement system, choose the sc100 or the sc1000 controller...

Model sc100 Controller

(see Lit. #2463)

LXV401.52.00002 sc100 Controller Standard
LXV401.52.01002 sc100 Controller with RS-232 MODBUS®
LXV401.52.02002 sc100 Controller with RS-485 MODBUS®

Model sc1000 Controller

(see Lit. #2403)

LXV402.99.00002 sc1000 Display Module
LXV400.99.1R572 sc1000 Probe Module, 4 sensors, 4 mA Out, 4 mA In, 4 Relays, 110-230V
LXV400.99.1B572 sc1000 Probe Module, 4 sensors, 4 mA Out, 4 mA In, 4 Relays, RS-485 (MODBUS), 110-230V
LXV400.99.1F572 sc1000 Probe Module, 4 sensors, 4 mA Out, 4 mA In, 4 Relays, PROFIBUS DP, 110-230V
LXV400.99.1R582 sc1000 Probe Module, 6 sensors, 4 mA Out, 4 mA In, 4 Relays, 110-230V

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At Hach, it's about learning from our customers and providing the right answers. It's more than ensuring the quality of water—it's about ensuring the quality of life. When it comes to the things that touch our lives...

Keep it pure.

Make it simple.

Be right.

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HACH®

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1720E Low Range Turbidimeter

The Model 1720E Low Range Turbidimeter is the newest is a long line of successful Hach turbidimeters—from the unsurpassed world leader in turbidity measurement.

Features and Benefits

USEPA Reporting

The 1720E Low Range Turbidimeter applies the instrument design and meets performance criteria established by the U.S. Environmental Protection Agency (USEPA) in Method 180.1, making it suitable for regulatory reporting.

Accuracy

Continuously flowing sample flows through the patented* bubble removal system, which vents entrained air from the sample stream and eliminates the most significant interference in low level turbidity measurement. The 1720E Turbidimeter is not affected by variations in flow and pressure.

Nephelometric Measurement

Incandescent light directed from the sensor head assembly down into the turbidimeter body is scattered by suspended particles in the sample. The sensor's submerged photocell detects light scattered at 90° from the incident beam. Sample enters the center column of the turbidimeter, rises into the measuring chamber and spills over the weir into the drain port. This configuration results in an optical flat surface free of turbulence.

Simplicity

A simplified two-module design includes the sensor and the controller interface. The controller accepts two turbidity sensors—adding a second 1720E sensor makes a system with two complete turbidimeters. Connections are simple plug & play.

Data Collection and Display

The 1720E Turbidimeter uses the sc100 Controller to receive data from up to two sensors. A built-in data logger collects turbidity measurement at user selectable intervals (1-15 minutes), along with calibration and verification points, alarm history, and instrument setup changes for 6 months. Communications using MODBUS®/RS485, MODBUS®/RS232, LonWorks® protocols or the wireless IR port are available. The sc100 Controller is also compatible with AquaTrend® Networks. Local display, recall, graphing, and trending in CSV format make chart recorders redundant.

Experience

The 1720E Turbidimeter reflects 45 years of Hach leadership in turbidity measurement science. Hach has the largest turbidimeter installation base in the world. And, Hach offers a two-year warranty on the 1720E.

**U.S. patent 5,831,727*

Fast Calibration and Verification

Calibration and verification can be performed without loss of sample flow using the ICE-PIC™ Calibration/Verification Module. One-point calibration with prepared StablCal™ Stabilized Formazin Solution eliminates the errors of user-prepared formazin suspension dilution. Features of the ICE-PIC Module include:

- *Calibrate or verify the performance of each sensor in less than one minute*
- *Factory calibrated and provided with a certificate of accuracy.*
- *Cost effective, one-time investment. No consumables are needed.*
- *Small, lightweight design can be used for spot verification in the facility.*
- *Available in 20 and 1.0 NTU.*

DW PW IW

DW = drinking water *WW = wastewater municipal* ***PW = pure water / power***
IW = industrial water ***E = environmental*** *C = collections* ***FB = food and beverage***

HACH®

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Specifications*

Range
0.001-100 Nephelometric Turbidity Units (NTU)

Accuracy
(Defined according to ISO 15839.)
±2% of reading or ±0.015 NTU (whichever is greater) from 0 to 40 NTU; ±5% of reading from 40 to 100 NTU

Displayed Resolution
0.0001 NTU up to 9.9999 NTU; 0.001 NTU from 10.000 to 99.999 NTU

Repeatability
(Defined according to ISO 15839.)
Better than ±1.0% of reading or ±0.002 NTU, whichever is greater

Response Time
Initial response in 1 minute, 15 seconds for a full-scale step change

Signal Average Time
User selectable from 6, 30, 60, 90 seconds; default 30 seconds

Sample Temperature
0 to 50°C (32 to 122°F)

Sample Flow Required
200 to 750 mL/minute (3.1 to 11.9 gal/hour)

Operating Temperature
Single sensor system:
0 to 50°C (32 to 122°F)
Two sensor system:
0 to 40°C (32 to 104°F)

Operating Humidity
5 to 95% non-condensing

Storage Temperature
-20 to 60°C (-4 to 140°F)

Power Requirements
100-230 Vac, 50/60 Hz, auto selecting; 40 VA

Sample Inlet Fitting
1/4" NPT female, 1/4" compression fitting (provided)

Drain Fitting
1/2" NPT female, 1/2" hose barb (provided)

Recorder Outputs
Two selectable for 0-20 mA or 4-20 mA; output span programmable over any portion of the 0-100 NTU range; built into the sc100 Controller

Alarms
Three set-point alarms, each equipped with an SPDT relay with unpowered contacts rated 5A resistive load at 230 Vac; built into the sc100 Controller

Enclosure
NEMA-4X (indoor)/IP66 Controller

Digital Communication
Network card compatible; MODBUS®/RS485, MODBUS/RS232, LonWorks® protocol (optional)

Wireless Communication
IR Port on the sc100 Controller to download into a handheld Personal Digital Assistant (PDA), or laptop computer via MODBUS®

Compliance
Standard Methods 2130B, USEPA 180.1, Hach Method 8195

Certifications
Safety:
Listed by ETL to UL 61010A-1: Certified by ETL to CSA C22.2 No. 1010.1: CE certified by Hach Company to EN 61010-1

Immunity:
CE certified by Hach Company to EN61326 (industrial levels)

Emissions:
Class A: EN 61326, CISPR 11, FCC Part 15, Canadian Interference-Causing Equipment Regulation ICES-003

Mounting
Turbidimeter body and head assembly: wall and floor stand

sc100 Controller:
wall, pole, panel, and floor stand

Dimensions
Turbidimeter body and cap:
25.4 x 30.5 x 40.6 cm (10 x 12 x 16 in.)

sc100 Controller:
14.4 X 14.4 X 15.0 cm
(5.67 x 5.67 x 5.91 in.)

Shipping Weight
1720E Turbidimeter and sc100 Controller:
6.12 kg (13.5 lbs.)

1720E Turbidimeter:
4.54 kg (10 lbs.)

**Specifications subject to change without notice.*

Engineering Specifications

1. The turbidimeter shall be a microprocessor-based, continuous-reading, on-line nephelometric instrument
2. The turbidity monitoring system shall include one or two turbidimeter(s) and one interface unit.
3. The turbidimeter shall measure turbidity in the range of 0.001-100 NTU
4. Accuracy shall be ±2% of reading or ±0.015 NTU (whichever is greater) from 0 to 40 NTU; ±5% of reading from 40 to 100 NTU
5. Displayed resolution shall be 0.0001 NTU from 0 to 9.999 NTU and 0.001 NTU from 10.000 to 9.999 NTU.
6. Repeatability shall be better than ±1.0% of reading or ±0.002 NTU (whichever is greater).
7. The turbidimeter shall meet all design and performance criteria specified by USEPA method 180.1.
8. Light shall be directed through the surface of the sample and the detector shall be immersed in the sample, eliminating glass windows and flow cells.
9. Optical components shall be mounted in a sealed head assembly that can be removed for calibration/ service without disturbing sample flow.
10. The turbidimeter body shall be constructed of corrosion-resistant polystyrene.
11. An internal bubble removal system shall be included to vent entrained air from the sample stream.
12. Calibration of the turbidimeter shall be either formazin-based (20 or 1 NTU) or instrument comparison-based calibration method.
13. User selectable signal averaging, bubble removal, alarm and recorder output hold, and self-test diagnostics shall be provided.
14. Connections between the turbidimeter(s) and the controller shall be “plug and play.”
15. All turbidimeters installed on a network shall have the option for MODBUS/RS232, MODBUS/RS485, LonWorks serial input/output capability for two-way communication to a computer or a have a wireless downloading capability through the IR Port located on the interface unit to download and print realtime turbidity data, calibration history, and current set points in a CSV format.
16. The Interface unit shall allow operators to control sensor and interface functions with menu-driven software and shall provide data logging of measurement data from up to two turbidimeters for 15 minutes, 1 hour, 24 hours, 30 days, or 180 days.
17. The interface unit shall be able to transfer data to a computer or printer via direct MODBUS communications or directly into a Personal Digital Assistant (PDA) via a wireless IR Port.
18. The interface unit shall have a built-in data logger with the capacity to store data on 15-minute intervals for up to 6 months with two sensors per controller.
19. The interface unit shall include two analog outputs and 3 unpowered SPDT alarm contacts.

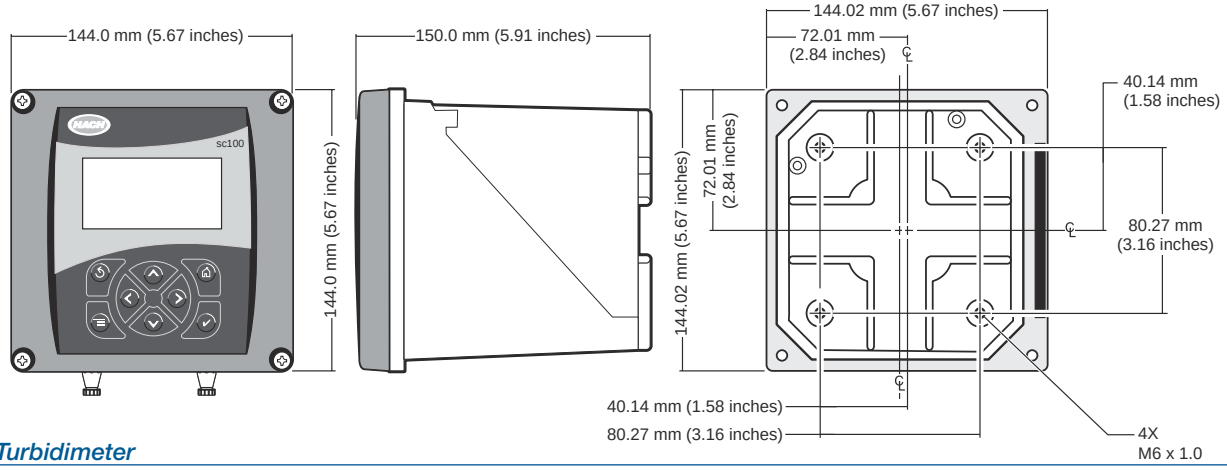
Engineering Specifications *continued*

20. The interface unit shall be housed in a NEMA-4X (indoor) industrial metal/plastic enclosure.
21. The DC power supply shall be housed in the interface unit
22. The DC power supply shall automatically accept input in the range of 100 to 230 Vac, 50/60 Hz.
23. All system components shall be ETL listed to UL 61010A-1, certified to CSA C22.2 No. 1010.1, and CE certified by manufacturer to EN 61010-1.
24. All system components shall be CE certified by the manufacturer to EN 61326 (industrial levels) for immunity and emissions, Class A.
25. All system components shall meet FCC Part 15 for North America and Canadian Interference-Causing Equipment Regulation ICES-003, and CISPR 11 Class A levels for rest of the world.
26. The turbidimeter shall be Hach Company Model 1720E Low Range Turbidimeter with sc100 Controller.

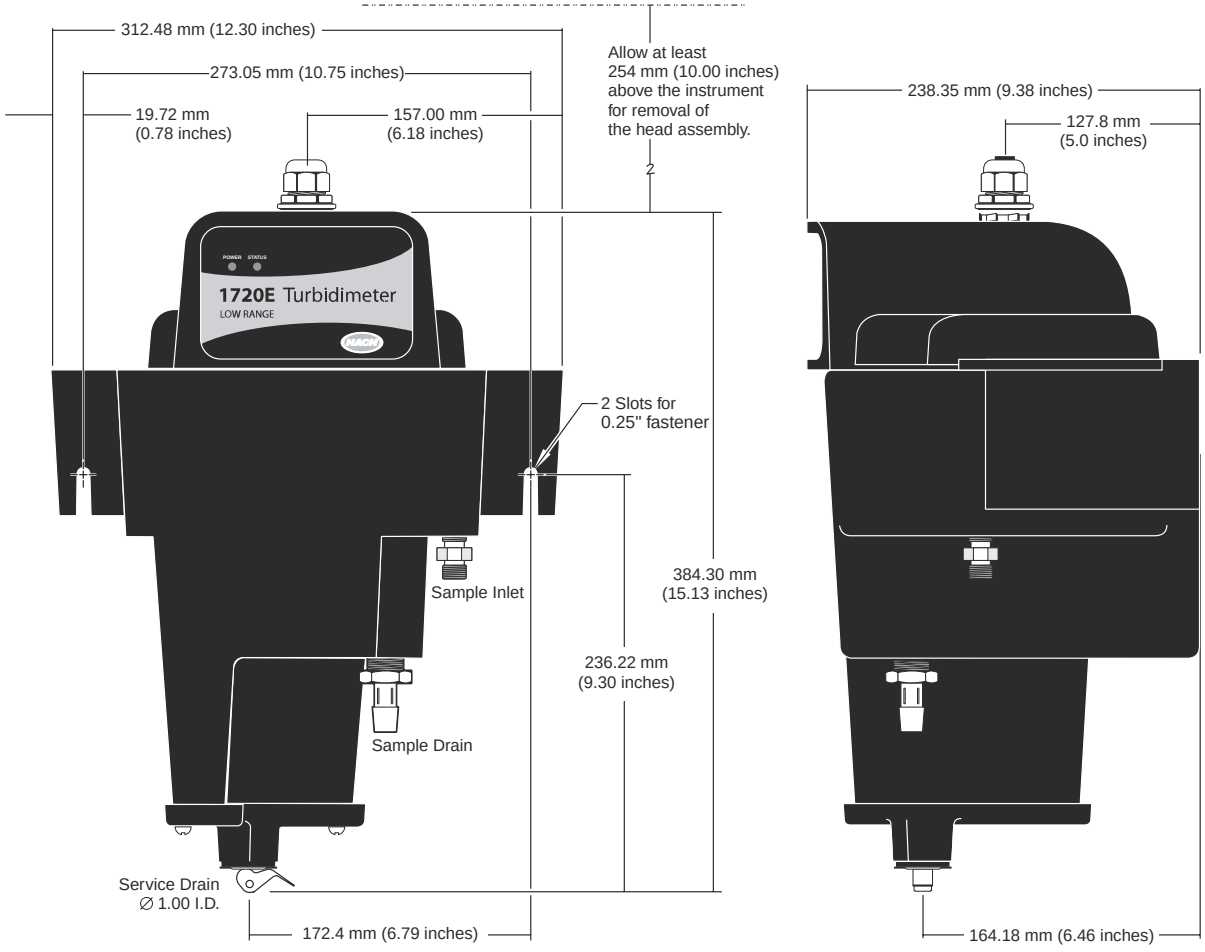
Dimensions

The sc100 controller unit can be installed on a pole, wall, panel or a floor stand. The 1720E turbidimeter can be installed on a wall or a floor stand. No tools are needed to connect the controller unit to the turbidimeter. The distance between the two units can be a maximum of 9.62 m (31.6 ft) with the use of an extension cable.

sc100 Controller



1720E Turbidimeter



Ordering Information

1720E Turbidimeter

60101-00 1720E Turbidimeter with sc100 Controller
60101-01 1720E Turbidimeter, sensor only

1720E with DigitalDirect Communications

60101-02 1720E/sc100 with MODBUS/RS485 output
60101-03 1720E/sc100 with MODBUS/RS232 output
60101-04 1720E/sc100 with LonWorks output

Cables

57960-00 Extension Cable, 7.7 m (25 ft.)
46306-00 Power Cord w/ strain relief, 125 Vac
46308-00 Power Cord w/ strain relief, 230 Vac, European-style plug

Note: Power cables must be ordered separately.

Accessories

57432-00 Floor Stand

Calibration Supplies

ICE-PIC Calibration/Verification Module / 1720E:

52250-00 20 NTU Module
52215-00 1 NTU Module

StablCal Comparative Calibration Standards

26601-53 20.0 NTU, 1 L each (Calibration Cylinder, P/N 44153-00, must be ordered separately.)

StablCal Verification Standards

26979-53 0.3 NTU, 1 L each
26980-53 0.5 NTU, 1 L each
27233-53 0.1 NTU, 1 L each
26598-53 1.0 NTU, 1 L each
27463-53 40.0 NTU, 1 L each

Formazin Calibration Standards

44156-00 Formazin Calibration Kit for user-prepared calibration (includes 500 mL of 4000 NTU Formazin, TenSette® Pipet, and calibration cylinder)
2461-49 Formazin Primary Standard, 4000 NTU, 500 mL (replacement for P/N 44156-00)
44153-00 Calibration Cylinder, 1 L

To complete your turbidity measurement system, choose the sc100 or the sc1000 controller...

Model sc100 Controller

(see Lit. #2463)

LXV401.52.00002 sc100 Controller Standard
LXV401.52.01002 sc100 Controller with RS-232 MODBUS®
LXV401.52.02002 sc100 Controller with RS-485 MODBUS®

Model sc1000 Controller

(see Lit. #2403)

LXV402.99.00002 sc1000 Display Module
LXV400.99.1R572 sc1000 Probe Module, 4 sensors, 4 mA Out, 4 mA In, 4 Relays, 110-230V
LXV400.99.1B572 sc1000 Probe Module, 4 sensors, 4 mA Out, 4 mA In, 4 Relays, RS-485 (MODBUS), 110-230V
LXV400.99.1F572 sc1000 Probe Module, 4 sensors, 4 mA Out, 4 mA In, 4 Relays, PROFIBUS DP, 110-230V
LXV400.99.1R582 sc1000 Probe Module, 6 sensors, 4 mA Out, 4 mA In, 4 Relays, 110-230V

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At Hach, it's about learning from our customers and providing the right answers. It's more than ensuring the quality of water—it's about ensuring the quality of life. When it comes to the things that touch our lives...

Keep it pure.

Make it simple.

Be right.

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Appendix H:
Disinfection Contact Time Calculations

	SUMMARY OF CT EVALUATION				
	Assumptions - pH 7.0; WT=4 °C; Peak Flow = 1.5 mgd,				
	Clearwell Storage Volume = 2 @ 62,000 gal ea.				
	Baffling Factor = 0.5 (assumed)				
pH	Free Cl_2	CT_{calc}	$CT_{99.9}$	Inactivation Ratio $CT_{calc}/CT_{99.9}$	Log Inactivation = 3x's Inact. Ratio
7.0	0.75	44.64	167.51	0.266	0.799
7.0	1.00	59.52	172.42	0.345	1.036
7.0	1.25	74.40	177.49	0.419	1.258
7.0	1.50	89.28	182.72	0.489	1.466
7.0	1.75	104.16	188.12	0.554	1.661
7.0	2.00	119.04	193.69	0.615	1.844
7.0	2.25	133.92	199.43	0.671	2.014
pH	Free Cl_2	CT_{calc}	$CT_{99.9}$	Inactivation Ratio $CT_{calc}/CT_{99.9}$	Log Inactivation = 3x's Inact. Ratio
7.5	0.75	44.64	200.75	0.222	0.667
7.5	1.00	59.52	206.7147	0.288	0.864
7.5	1.25	74.4	212.873	0.350	1.049
7.5	1.50	89.28	219.2267	0.407	1.222
7.5	1.75	104.16	225.7822	0.461	1.384
7.5	2.00	119.04	232.5457	0.512	1.536
7.5	2.25	133.92	239.524	0.559	1.677
pH	Free Cl_2	CT_{calc}	$CT_{99.9}$	Inactivation Ratio $CT_{calc}/CT_{99.9}$	Log Inactivation = 3x's Inact. Ratio
8.0	0.75	44.64	241.12	0.185	0.555
8.0	1.00	59.52	248.37	0.240	0.719
8.0	1.25	74.40	255.85	0.291	0.872
8.0	1.50	89.28	263.57	0.339	1.016
8.0	1.75	104.16	271.53	0.384	1.151
8.0	2.00	119.04	279.74	0.426	1.277
8.0	2.25	133.92	288.22	0.465	1.394
VIRUSES = 4-log Removal Required					
Assume Peak Flow = 1.5 mgd, WT = 4°C					
WT (°C)	Free Cl_2	CT_{calc}	$CT_{99.99}$	Inactivation Ratio $CT_{calc}/CT_{99.9}$	Log Inactivation = 4x's Inact. Ratio
4.0	0.75	44.64	9.207	4.848	19.393
4.0	1.00	59.52	9.207	6.464	25.857
4.0	1.25	74.40	9.207	8.080	32.322
4.0	1.50	89.28	9.207	9.697	38.786
4.0	1.75	104.16	9.207	11.313	45.251
4.0	2.00	119.04	9.207	12.929	51.715
4.0	2.25	133.92	9.207	14.545	58.179

Appendix I:
State Environmental Quality Review Act (SEQRA) Documentation

Part 1 Environmental Assessment Form

Village of South Glens Falls
Water Plant

Beach Road

Village of South Glens Falls
Saratoga County, New York

May 13, 2009

THE Chazen COMPANIES

Prepared for:

Village of South Glens Falls
46 Saratoga Avenue
South Glens Falls, NY 12803

Part 1 Environmental Assessment Form

Village of South Glens Falls
Water Plant

Beach Road

Village of South Glens Falls

Saratoga County, New York

May 13, 2009

Prepared by:

The Dutchess County Office
The Chazen Companies
21 Fox Street
Poughkeepsie, New York 12601

Dutchess County	*Orange County*	*Capital District*	*North Country*
(845) 454-3980	*(845) 567-1133*	*(518) 273-0055*	*(518) 812-0513*

INTRODUCTION

The Chazen Companies
May 13, 2009

INTRODUCTION

The Village of South Glens Falls is requesting approval for the construction of an 1,100-square foot (SF) addition to their existing water treatment plant to house a new cartridge filtration treatment system. As illustrated in Figure 1, the existing water treatment plant is located on a 54-acre parcel located southeast of the Hudson River in the Village of South Glens Falls.

The water source that currently supplies the Village of South Glens Falls with its drinking water supply is groundwater. The New York State Department of Health (NYSDOH) has classified the Village of South Glens Falls water supply as ground water under the direct influence of surface water (GWUDI). To comply with the Surface Water Treatment Rule the Village has decided to install a pressure cartridge filtration treatment system.

The proposed water treatment system will provide filtration and disinfection in accordance with Section 5-1.22 of Subpart 5.1 of the New York State Sanitary Code (10NYCRR 5-1, New York State Code of Rules and Regulations, Title 10, Subpart 5-1, Public Water Supplies), and the National Sanitation Foundation (NSF) Standard 53.

An 1,100-square foot expansion of the existing 1,100-SF water treatment plant will be necessary to accommodate the proposed redundant cartridge system. The building addition will be constructed on top of the exposed roof section of the underground clear well, and will resemble the existing plant's structure and exterior finish. The exterior walls of the proposed building addition will rest on the clear well exterior and interior dividing walls.

The existing propane tank resting near the northeast corner of the exposed clear well will be relocated to construct the building addition. A 16-inch diameter DIP discharge line would be constructed outside the existing footprint of the building to connect with the transmission main to the Village. No other significant exterior utility improvements are anticipated as a result of the proposed building expansion and cartridge filtration system.

617.20
Appendix A
State Environmental Quality Review
FULL ENVIRONMENTAL ASSESSMENT FORM

Purpose: The full EAF is designed to help applicants and agencies determine, in an orderly manner, whether a project or action may be significant. The question of whether an action may be significant is not always easy to answer. Frequently, there are aspects of a project that are subjective or unmeasureable. It is also understood that those who determine significance may have little or no formal knowledge of the environment or may not be technically expert in environmental analysis. In addition, many who have knowledge in one particular area may not be aware of the broader concerns affecting the question of significance.

The full EAF is intended to provide a method whereby applicants and agencies can be assured that the determination process has been orderly, comprehensive in nature, yet flexible enough to allow introduction of information to fit a project or action.

Full EAF Components: The full EAF is comprised of three parts:

Part 1: Provides objective data and information about a given project and its site. By identifying basic project data, it assists a reviewer in the analysis that takes place in Parts 2 and 3.

Part 2: Focuses on identifying the range of possible impacts that may occur from a project or action. It provides guidance as to whether an impact is likely to be considered small to moderate or whether it is a potentially large impact. The form also identifies whether an impact can be mitigated or reduced.

Part 3: If any impact in Part 2 is identified as potentially large, then Part 3 is used to evaluate whether or not the impact is actually important.

THIS AREA FOR LEAD AGENCY USE ONLY
DETERMINATION OF SIGNIFICANCE - Type 1 and Unlisted Actions

Identify the Portions of EAF completed for this project: ■ Part 1 ☐ Part 2 ☐ Part 3

Upon review of the information recorded on this EAF (Parts 1 and 2 and 3 if appropriate), and any other supporting information, and considering both the magnitude and importance of each impact, it is reasonable determined by the lead agency that:

☐ A. The project will not result in any large and important impact(s) and, therefore, is one which will not have a significant impact on the environment, therefore **a negative declaration will be prepared**.

☐ B. Although the project could have a significant effect on the environment, there will not be a significant effect for this Unlisted Action because the mitigation measures described in PART 3 have been required, therefore **a CONDITIONED negative declaration will be prepared**.*

☐ C. The project may result in one or more large and important impacts that may have a significant impact on the environment, therefore **a positive declaration will be prepared**.

*A Conditioned Negative Declaration is only valid for Unlisted Actions.

Village of South Glens Falls Water Plant
Name of Action

Village of South Glens Falls
Name of Lead Agency

Keith W. Donohue
Print or Type Name of Responsible Officer in Lead Agency

Mayor
Title of Responsible Officer

Signature of Responsible Officer in Lead Agency

Signature of Preparer (if different from responsible officer)

Date

PART 1 - PROJECT INFORMATION
Prepared by Project Sponsor

NOTICE: This document is designed to assist in determining whether the action proposed may have a significant effect on the environment. Please complete the entire form, Parts A through E. Answers to these questions will be considered as part of the application for approval and may be subject to further verification and public review. Provide any additional information you believe will be needed to complete Parts 2 and 3.

It is expected that completion of the full EAF will be dependent on information currently available and will not involve new studies, research or investigation. If information requiring such additional work is unavailable, so indicate and specify each instance.

NAME OF ACTION *Village of South Glens Falls Water Plant Addition*		
LOCATION OF ACTION *Village of South Glens Falls*		
NAME OF APPLICANT/SPONSOR *Village of South Glens Falls*	BUSINESS TELEPHONE *518-793-1455*	
ADDRESS *48 Saratoga Avenue*		
CITY/PO *Saratoga*	STATE *NY*	ZIP CODE *12803-1210*
NAME OF OWNER (if different) *Same as Applicant*	BUSINESS TELEPHONE *Same as Applicant*	
ADDRESS *Same as Applicant*		
CITY/PO *Same as Applicant*	STATE NY	ZIP CODE *12803-1210*
DESCRIPTION OF ACTION *Construction of a 1,100+/- square foot (SF) addition to the Village of South Glens Fall's existing water treatment plant to house a new cartridge filtration treatment system.*		

PLEASE COMPLETE EACH QUESTION - INDICATE N/A IF NOT APPLICABLE.

A. SITE DESCRIPTION

Physical setting of overall project, both developed and undeveloped areas.

1. Present Land Use: ☐ Urban ☐ Industrial ☐ Commercial ☐ Residential ☐ Rural (non-farm)
   ☒ Forest ☐ Agricultural ☒ Other: Public Utility

2. Total acreage of project area: 54 ± acres[1]

APPROXIMATE ACREAGE	PRESENTLY	AFTER COMPLETION
Meadow or Brushland (Non-Agricultural)	_____ acres	_____ acres
Forested	48± acres	48± acres
Agricultural (includes orchards, cropland, pasture, etc.)	_____ acres	_____ acres
Wetland (freshwater or tidal as per Articles 24, 25 of ECL)	_____ acres	_____ acres
Water Surface Area (Includes wetlands and open water)	1± acres	1± acres
Unvegetated (rock, earth fill, gravel)	_____ acres	_____ acres
Roads, buildings and other paved surfaces	4.5± acres	4.5± acres [2]
Other (Indicate type: lawn/landscaped areas)	0.5± acres	0.5± acres

3. What is predominant soil type(s) on project site: OeE (Oakville and Windsor soils, 25 to 35 percent slopes), WnA (Windsor loamy sand, nearly level) and WnB (Windsor loamy sand, undulating) series [3]
   a. Soil drainage: ☒ Well drained 100 ±% of site[4] ☐ Moderately well drained ___% of site
   ☐ Poorly drained ____% of site

b. If any agricultural land is involved, how many acres of soil are classified within soil group 1 through 4 of the NYS Land Classification System? 0 acres (see 1 NYCRR 370).

4. Are there bedrock outcroppings on project site? ☐ Yes ☒ No
   a. What is depth to bedrock? >6 feet [3]
5. Approximate percentage of proposed project site with slopes: ☒ 0-10% 55 ±% ☒ 10-15% 5±%
   ☒ 15% or greater 40 %
6. Is project substantially contiguous to or contain a building site, or district, listed on the State or National Registers of Historic Places? ☐ Yes ☒ No [5]
7. Is project substantially contiguous to a site listed on the Register of National Natural Landmarks? ☐ Yes ☒ No [6]
8. What is the depth of the water table? >6 feet [3]
9. Is site located over a primary, principal, or sole source aquifer? ☐ Yes ☒ No [7]
10. Do hunting, fishing or shell fishing opportunities presently exist in the project area? ☐ Yes ☒ No
11. Does project site contain any species of plant or animal life that is identified as threatened or endangered? ☐ Yes ☒ No [8]
    According to: The DEC's online interactive website.
    Identify each species: No Species Identified.
12. Are there any unique or unusual land forms on the project site? (i.e. cliffs, dunes, or other geological formations) ☐ Yes ☒ No
    Describe: N/A
13. Is the project site presently used by the community or neighborhood as an open space or recreation area? If yes, explain: N/A ☐ Yes ☒ No
14. Does the present site include scenic views known to be important to the community? ☐ Yes ☒ No
15. Streams within or contiguous to the project area: Yes [9]
    a. Name of Stream and name of River to which it is tributary: Unnamed on-site stream (tributary to the Hudson River) and the Hudson River is contiguous to the project site.
16. Lakes, ponds, wetland areas within or contiguous to project area: Yes [10]
    a. Name: Wetlands mapped by the National Wetland Inventory (NWI)
    b. Size (in acres): 2.55 ± (on-site), Additional NWI wetlands located contiguous to site, along Hudson River
17. Is the site served by existing public utilities? ☒ Yes ☐ No
    a. If Yes, does sufficient capacity exist to allow connection? ☒ Yes ☐ No
    b. If Yes, will improvements be necessary to allow connection? ☐ Yes ☒ No
18. Is the site located in an agricultural district certified pursuant to Agriculture and Markets Law 25-AA, Section 303 and 304? ☐ Yes ☒ No [11]
19. Is the site located in or substantially contiguous to a Critical Environmental Area designated pursuant to Article 8 of the ECL, and 6 NYCRR 617? ☐ Yes ☒ No [12]
20. Has the site ever been used for the disposal of solid or hazardous waste? ☐ Yes ☒ No [13]

B. PROJECT DESCRIPTION

1. Physical dimensions and scale of project (fill in dimensions as appropriate)
   a. Total contiguous acreage owned or controlled by project sponsor 98 ± acres
   b. Project acreage to be developed: 0 ± acres initially; 0± acres ultimately. [14]
   c. Project acreage to remain undeveloped: 49.5 ± acres. [15]
   d. Length of project in miles: N/A (if appropriate).
   e. If the project is an expansion, indicate percent of expansion proposed: 50.1 ±%.
   f. Number of off-street parking spaces existing: N/A proposed: N/A
   g. Maximum vehicular trips generated per hour: N/A *P.M. peak* (upon project completion).

h. If residential, number and type of housing units: N/A

	One Family	Two Family	Multiple Family	Condominium
Initially	____	____	____	____
Ultimately	____	____	____	____

i. Dimensions (in feet) of largest proposed structure: 12 ± ft height; 23 ± ft width; 46 ± ft length [16]

j. Linear feet of frontage along a public thoroughfare project will occupy is: 0 ± feet

2. How much natural material (i.e. rock, earth, etc.) will be removed from the site? 0 cubic yards.

3. Will disturbed areas be reclaimed? ☐Yes ☒No
   a. If Yes, for what intended purpose is site being reclaimed? N/A
   b. Will topsoil be stockpiled for reclamation? ☐Yes ☐No
   c. Will upper subsoil be stockpiled for reclamation? ☐Yes ☐No

4. How many acres of vegetation (trees, shrubs, ground covers) will be removed from site? 0 ± acres.[17]

5. Will any mature forest (over 100 years old) or other locally important vegetation be removed from site? ☐Yes ☒No

6. If single-phase project, anticipated period of construction: 12 months (including demolition).

7. If multi-phased: N/A months
   a. Total number of phases anticipated: N/A
   b. Anticipated date of commencement of phase one: N/A
   c. Approximate completion date of final phase: N/A
   d. Is phase one functionally dependent on subsequent phases? ☐Yes ☒No

8. Will blasting occur during construction? ☐Yes ☒No[18]

9. Number of jobs generated - during construction: 10± ; after project is complete: 1 [19]

10. Number of jobs eliminated by this project: 0

11. Will project require relocation of any projects or facilities? ☐Yes ☒No
    If Yes, explain: N/A

12. Is surface liquid waste disposal involved? ☐Yes ☒ No
    a. If Yes, indicate type of waste (sewage, industrial, etc.) and amount: N/A
    Name of water body into which effluent will be discharged: N/A

13. Is subsurface liquid waste disposal involved? ☐Yes ☒No

14. Will surface area of an existing body of water increase or decrease by proposal? ☐Yes ☒No
    If Yes, explain:

15. Is project or any portion of project located in a 100-year floodplain? ☐Yes ☒No [20]

16. Will project generate solid waste? ☒Yes ☐No
    a. If Yes, what is the amount per month? 0.06 ± tons[21]
    b. If Yes, will an existing solid waste facility be used? ☒Yes ☐No
    c. If Yes, give name: Warren/Washing Co. Incinerator ; location: Hudson Falls, NY
    d. Will any wastes not go into a sewage disposal system or into a sanitary landfill? ☐Yes ☒No
    If Yes, explain: N/A

17. Will project involve the disposal of solid waste? ☐Yes ☒No
    a. If Yes, what is the anticipated rate of disposal? N/A tons/month
    b. If Yes, what is the anticipated site life? N/A Years

18. Will project use herbicides and pesticides? ☐Yes ☒No

19. Will project routinely produce odors (more than one hour per day)? ☐Yes ☒No

20. Will project produce operating noise exceeding the local ambient noise levels? ☐Yes ☒No [22]

21. Will project result in an increase in energy use? ☒Yes ☐No
    If Yes, indicate type(s): Electricity and fuel for heating, lighting and air conditioning.

22. If water supply is from wells, indicate pumping capacity: N/A gallons/minute

23. Total anticipated water usage per day: 30 ± gallons/day [23]

24. Does project involve Local, State or Federal funding? ☒Yes ☐No
If Yes, explain: Applications will be submitted by the Village of South Glens Falls to the NYS Environmental Facilities Corporation, the State Community Development Block Grant Program, and the Rural Utilities service Water and Waste Disposal Program seeking funding.

25. **Approvals Required:**

			Type	Submittal Date
~~City~~, ~~Town~~, Village, Board	☒Yes	☐No	Plan Approval	TBD
~~City, Town,~~ Village, Planning Board	☐Yes	☒No		
City, Town Zoning Board	☐Yes	☒No		
~~City~~, County Health Department	☐Yes	☒No		
Other Local Agencies	☐Yes	☒No		
Other Regional Agencies (County Planning)	☐Yes	☒No		
State Agencies				
DOH	☒Yes	☐No	Plan Approval	TBD
DEC	☒Yes	☐No	Plan Approval	TBD
DEC	☒Yes	☐No	SPDES Permit Modification	TBD
Envt. Facilities Corp.	☒Yes	☐No	Funding	TBD
SHPO	☒Yes	☐No	Approval	2-14-09
Federal Agencies	☐Yes	☒No		

C. ZONING AND PLANNING INFORMATION

1. Does proposed action involve a planning or zoning decision? ☐ Yes ☒ No
If Yes, indicate decision required:
☐zoning amendment ☐ zoning variance ☐ special use permit ☐ subdivision ☐ site plan
☐ new/revision of master plan ☐ resource management plan ☐ other

2. What is the zoning classification(s) of the site? Commercial (C)

3. What is the maximum potential development of the site if developed as permitted by the present zoning?
60% building footprint (Maximum Building Coverage)

4. What is the proposed zoning of the site? N/A

5. What is the maximum potential development of the site if developed as permitted by the proposed zoning? N/A

6. Is the proposed action consistent with the recommended uses in adopted local land use plans? ☒Yes ☐No

7. What are the predominant land uses and zoning classifications within one-quarter mile?
Uses: Community Services, Commercial, Residential, Vacant Land
Zoning: Residential (R-1), Residential (R-2), Commercial (C)

8. Is the proposed action compatible with adjoining/surrounding land uses within a quarter mile? ☒Yes ☐No

9. If the proposed action is a subdivision of land, how many lots are proposed? N/A
What is the minimum lot size proposed? N/A

10. Will proposed action require any authorization(s) for the formation of sewer or water districts? ☐Yes ☒No

11. Will proposed action create a demand for any community provided services (recreation, education, police, fire protection)? ☐Yes ☒No
a. If Yes, is existing capacity sufficient to handle projected demand? ☐Yes ☐No

12. Will proposed action result in the generation of traffic significantly above present levels? ☐Yes ☒No
a. If yes, is the existing road network adequate to handle the additional traffic? ☐Yes ☐No

D. INFORMATION DETAILS

Attach any additional information as may be needed to clarify your project. If there are or may be any adverse impacts associated with your proposal, please discuss such impacts and the measures which you propose to mitigate or avoid them.

E. VERIFICATION

I certify that the information provided here is true to the best of my knowledge.

Applicant/Sponsor Name: _____ Date: _____

Signature: _____ Title: _____

If the action is in the Coastal Area, and you are a state agency, complete the Coastal Assessment Form before proceeding with this assessment. Attach form to this document.

ENDNOTES

[1] Represents the total project area which consists of one 54-acre tax parcel.

[2] The proposed water plant addition will be constructed on top of the exposed roof section of the existing underground clear well; therefore, impervious surface area is not expected to increase.

[3] According to the United States Department of Agriculture (USDA) Soil Conservation Service (SCS) Soil Survey for Saratoga County the site contains the following soils:

Table 1: On-site Soils

SOIL	SLOPE (%)	SOIL PROFILE		DEPTH TO WATER TABLE (FT)	DEPTH TO BEDROCK (FT)	NYS Land Classification System
		DEPTH (IN)	USDA TEXTURE			
OeE	25-35	0-2	Moderately decomposed organics	>6	>6	8
		2-25	Loamy Sand			
		25-72	Sand			
WnA	0-3	0-2	Moderately decomposed organics	>6	>6	5
		2-25	Loamy Sand			
		25-72	Loamy Sand			
WnB	3-8	0-2	Moderately decomposed organics	>6	>6	5
		2-25	Loamy Sand			
		25-72	Loamy Sand			

Source: United States Department of Agriculture (USDA) Soil Conservation Service (SCS) Soil Survey for Saratoga County.

[4] According to the United States Department of Agriculture (USDA) Soil Conservation Service (SCS) Soil Survey for Saratoga County the on-site soils fall into Hydrologic Group A. Type A soils have a high infiltration rate and low runoff potential when thoroughly wet. These soils consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a moderate rate of water transmission.

[5] According to the National Park Service National Register of Historic Places Website Information System (www.cr.nps.gov) and the NYSOPRHP website (http://nysparks.state.ny.us /shpo/), the project site is not substantially contiguous to nor does it contain a building site, or district, listed on the State Register of Historic Places. The Glens Falls Feeder Canal is located approximately 2,400 feet (±) northwest of the site and the Park Bentley House is approximately 5,500 feet (±) northeast of the site. Additionally, the project site is within an archeologically area. The State Historic Preservation Office (SHPO) was contacted regarding this project for further review. SHPO has reviewed the project in accordance with Section 106 of the National Historic Preservation Act of 1966. SHPO's opinion is that this project will have no effect upon cultural resources nor is it eligible for inclusion in the National Registers of Historic Places. (See March 9, 2009 letter from SHPO)

[6] According to the National Park Service website (http://www1.nature.nps.gov/nnl/registry/usa_map/index.cfm).

[7] According to the U.S. Environmental Protection Agency (EPA), Region 2, website (http://www.epa.gov/region02/water/aquifer/) the project site is not located over a Soil Source Aquifer. According to the NYS Department of Environmental Conservation (DEC) website (http://www.dec.ny.gov/lands/36119.html) the project site is not located over a primary or principal aquifer.

[8] A Freedom of Information request will be forwarded to the NYSDEC for additional information regarding threatened and endangered species.

[9] According to Geographic Information System (GIS) data provided by the DEC, and the DEC's online interactive mapping site (http://www.dec.ny.gov/imsmaps/ERM/viewer.htm), a Class AA stream located in the middle of the project site flows northwest to the Hudson River. The project site is contiguous to the Class B Hudson River. Additionally, a Class AA pond is located southwest of the existing water plant.

[10] The U.S. Fish & Wildlife Service (USFWS) produces maps under the National Wetlands Inventory (NWI) program, which are useful in evaluating the presence of federally regulated wetlands. According to GIS data provided by the NWI program the site contains approximately 2.55± acres of wetlands.

On July 2, 2008 The Chazen Companies (TCC) performed an evaluation on site to determine the absence/presence of federally regulated wetlands in the immediate vicinity of the existing water plant. The wetland evaluation followed the guidelines outlined in the Corps of Engineers Wetland Delineation Manual (1987).

To the north of roadway on which the water plant is located, the immediate vicinity of the water plant is mowed lawn without any wetland vegetation. The mowed lawn showed no signs of wetland vegetation, soils, or hydrology. A cooling pond, with wetland vegetation is located to the north; additional review would be required to determine whether the lagoon would be regulated under Section 404 of the Clean Water Act or as a water of New York State under Article 15. Open water and wetland vegetation to the west of the mowed lawn was observed and shrub/emergent wetlands were noted on the east side of Beach Road.

The identified wetlands are not within the area of proposed work; therefore, it is not anticipated that any temporary or permanent wetlands impacts will result from the proposed improvements.

[11] According to GIS data of Saratoga County Agricultural Districts, derived from 2007 county tax parcel data, site is not located within or within 500 feet of a farm operation within an Agricultural District.

[12] According to the list of Critical Environmental Areas on the NYSDEC website (http://www.dec.ny.gov/public/25113.html).

[13] According to the remediation database on the NYSDEC website http://www.dec.ny.gov/cfmx/extapps/derfoil/).

[14] Represents the area of impervious surface, excluding lawn and landscaped areas. The proposed water plant addition will be constructed on top of the exposed roof section of the existing underground clear well; therefore, impervious surface area is not expected to increase.

[15] Represents the existing undeveloped area. The 54-acre site contains approximately 4.5± acres of development (roads and buildings).

[16] Represents the dimensions of the proposed water plant addition.

[17] The proposed 1000 sq. ft. (0.02 ± acre) water plant addition will be constructed atop the exposed roof section of the underground clear well; therefore, impervious surface area is not expected to increase.

[18] Blasting is not expected to be required. Any rock that is encountered during construction will be removed by mechanical methods (i.e. ripping) when possible. However, if found to be necessary, blasting will be performed in accordance with all Federal, State and local regulations.

[19] The existing water plant has one employee. The water plant addition has the potential to generate the need for one additional employee to operate the upgraded system.

[20] According to National Flood Insurance Program *Flood Insurance Rate Map, Village of South Glens Falls, New York, Community Panel No. 195* the project site is within Flood Zone X, an area determined to be outside the 500-year floodplain.

[21] According to the *Development Impact Assessment Handbook*, Urban Land Institute, 1994, an office use would generate 0.001± tons per office employee per day, Therefore, the proposed water plant addition with 2 ± employees would generate 0.002 ± pounds of solid waste per day, or 0.06± tons per month.

[22] Noise which exceeds the local ambient noise levels may occur during construction activities.

[23] According to the New York State Department of Environmental Conservation's Design Standards for Wastewater Treatment Works, 1998, an office use results in 15 gallons per day per employee of water usage; therefore, the water plant addition with 1 ± employee would use approximately 30 ± gallons of water per day.

New York State Department of Environmental Conservation
Division of Environmental Permits, Region 5
232 Golf Course Road, PO Box 220, Warrensburg, New York 12885-0220
Phone: (518) 623-1281 · **FAX:** (518) 623-3603
Website: www.dec.ny.gov

Alexander B. Grannis
Commissioner

June 16, 2009

Keith Donohue, Mayor
Village of South Glens Falls
46 Saratoga Avenue, P.O. Box 1210
South Glens Falls, NY 12803-1210

RE: Village of South Glens Falls
Proposed Water Treatment Plant Improvements - Cartridge Filtration
Village of South Glens Falls, Saratoga County
SEQR Lead Agency Coordination Response

Dear Mayor Donohue:

Thank you for your May 22, 2009 lead agency coordination for the Village of South Glens Falls Water Treatment Plant improvements, pursuant to the State Environmental Quality Review Act (SEQR).

Based on the information provided, the Department of Environmental Conservation (DEC) agrees to the South Glens Falls Village Board as SEQR lead agency for this project.

The installation of cartridge filters does not require a DEC Water Supply permit. However, I recommend that the project engineer contact Robert Streeter of our Division of Water (telephone 623-1221) to determine if a proposed discharge of treated test water to the septic system requires a State Pollutant Discharge Elimination System (SPDES) permit.

Thank you for the opportunity to comment. Please send me a copy of the Village Board's SEQR determination of significance for this project.

Sincerely,

Richard Speidel

Richard Speidel
Division of Environmental Permits

Enclosure - lead agency agreement form

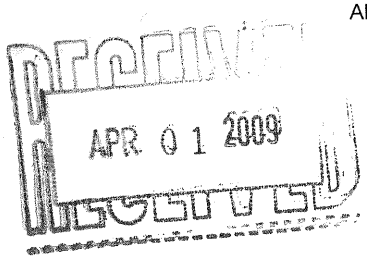
ec: David Knowles, The Chazen Companies
Robert Streeter, Division of Water

Appendix J:
NYSDEC Documentation

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Division of Fish, Wildlife & Marine Resources
New York Natural Heritage Program
625 Broadway, Albany, New York 12233-4757
Phone: (518) 402-8935 • **FAX:** (518) 402-8925

Alexander B. Grannis
Commissioner

March 30, 2009



Christa Ouderkirk
Chazen Companies
21 Fox Street
Poughkeepsie, NY 12601

Dear Ms. Ouderkirk:

In response to your recent request, we have reviewed the New York Natural Heritage Program database with respect to an Environmental Assessment for the proposed Addition to Existing Water Treatment Plant, Project 30639, site as indicated on the map you provided, located in the Village of South Glens Falls, Saratoga County.

We have no records of known occurrences of rare or state-listed animals or plants, significant natural communities, or other significant habitats, on or in the immediate vicinity of your site.

The absence of data does not necessarily mean that rare or state-listed species, natural communities or other significant habitats do not exist on or adjacent to the proposed site. Rather, our files currently do not contain any information which indicates their presence. For most sites, comprehensive field surveys have not been conducted. For these reasons, we cannot provide a definitive statement on t he presence or absence of rare or state-listed species, or of significant natural communities. This information should not be substituted for on-site surveys that may be required for environmental assessment.

Our databases are continually growing as records are added and updated. If this proposed project is still under development one year from now, we recommend that you contact us again so that we may update this response with the most current information.

This response applies only to known occurrences of rare or state-listed animals and plants, significant natural communities and other significant habitats maintained in the Natural Heritage Data bases. Your project may require additional review or permits; for information regarding other permits that may be required under state law for regulated areas or activities (e.g., regulated wetlands), please contact the appropriate NYS DEC Regional Office, Division of Environmental Permits, at the enclosed address.

Sincerely,
Tara Salerno
Tara Salerno, Information Services
NY Natural Heritage Program

Enc.
cc: Reg. 5, Wildlife Mgr.
Reg. 5, Fisheries Mgr.

Appendix K:
State Historic Preservation Office Documentation

OFFICE OF PARKS, RECREATION, HISTORIC PRESERVATION
NEW YORK STATE

New York State Office of Parks, Recreation and Historic Preservation

Historic Preservation Field Services Bureau • Peebles Island, PO Box 189, Waterford, New York 12188-0189
518-237-8643
www.nysparks.com

David A. Paterson
Governor

Carol Ash
Commissioner

March 04, 2009

David Knowles
Chazen Companies
100 Glen St.
Glens Falls, New York 12801

Re: USDA,DOH
Water Treatment Plant Improvements/near Beach Rd., near Beach Road.
SOUTH GLENS FALLS, Saratoga County
09PR00906

Dear Mr. Knowles:

Thank you for requesting the comments of the State Historic Preservation Office (SHPO). We have reviewed the project in accordance with Section 106 of the National Historic Preservation Act of 1966. These comments are those of the SHPO and relate only to Historic/Cultural resources. They do not include potential environmental impacts to New York State Parkland that may be involved in or near your project. Such impacts must be considered as part of the environmental review of the project pursuant to the National Environmental Policy Act and/or the State Environmental Quality Review Act (New York Environmental Conservation Law Article 8).

Based upon this review, it is the SHPO's opinion that your project will have No Effect upon cultural resources in or eligible for inclusion in the National Registers of Historic Places.

If further correspondence is required regarding this project, please be sure to refer to the OPRHP Project Review (PR) number noted above.

Sincerely,

Ruth L. Pierpont

Ruth L. Pierpont
Director

Appendix L:
Opinion of Probable Costs

The Chazen Companies
547 River Street
Troy, NY 12182
(518) 273-0055

OPINION OF PROBABLE CONSTRUCTION COSTS

Project No.: **30639.01**

Project:	*Client:*		*Estimator*	**E Larkin/B Sherlock**	*Date* **6/24/2009**
Village of South Glens Falls	**Village of South Glens Falls**		*Checked by:*	**D Knowles**	*Date* **6/25/2009**
Water Treatment Plant Upgrades	**Mayor Keith Donohue**		*Approved by:*	**D Knowles**	*Date* **6/25/2009**
	South Glens Falls, NY				
Location			*Trade*	**General Construction**	
Village of South Glens Falls	*Ph* **(518) 793-1455**		*Phase*	**Schematic - 60%**	
Saratoga Co, New York	*Fax* **N/A**		*Bid Type*	**Public - prevailing wage**	
			County	**Saratoga**	

DIV. 1 GENERAL CONDITIONS & ADMINISTRATION

Bonds	1.50%					$11,978.49
Contractors Supervision / Proj Mgr.	180	days	@	$710.00	per Day	$127,800.00
Permits	1.00%					$7,514.24
Insurance	2.02%					$16,131.04
Home Office Overhead	4.50%					$35,935.48
Profit	8.50%					$67,878.13
FIELD ORDER ALLOWANCE	8.00%					$63,900.00
Other Allowance (describe)						$0.00

CSI Number	Note Ref.	DESCRIPTION:	QUANTITY	UNIT	MATERIAL UNIT PRICE	MATERIAL TOTAL COST	LABOR MAN HRS /UNIT	LABOR UNIT COST or HrlyWage+T&I	LABOR TOTAL COST	TOTAL UNIT COST	MATERIAL & LABOR TOTAL COST
		Mobilization/Demobilization	1	LS		$0.00		$25,000.00	$25,000.00	$25,000.00	$25,000.00
		Roof Demolition	1	LS				$2,000.00	$2,000.00	$2,000.00	$2,000.00
		Exterior Concrete Block Wall	800	SF	$3.00	$2,400.00		$7.00	$5,600.00	$10.00	$8,000.00
		Exterior Brick Faced Concrete Wall	200	SF	$10.00	$2,000.00		$20.00	$4,000.00	$30.00	$6,000.00
		Grout Existing/New Wall Interface	25	LF	$10.00	$250.00		$20.00	$500.00	$30.00	$750.00
		Perimeter Precast Concrete Beam	90	LF	$75.00	$6,750.00		$10.00	$900.00	$85.00	$7,650.00
		Wooden Knee Wall Framing	1	LS	$2,500.00	$2,500.00		$2,500.00	$2,500.00	$5,000.00	$5,000.00
		Wooden Truss Roof Framing	2540	SF	$4.00	$10,160.00		$1.00	$2,540.00	$5.00	$12,700.00
		Misc. Rough Carpentry	1	LS	$2,000.00	$2,000.00		$1,000.00	$1,000.00	$3,000.00	$3,000.00
		Sheet Metal Siding	1050	SF	$3.00	$3,150.00		$2.00	$2,100.00	$5.00	$5,250.00
		Standing Seam Metal Roofing System	2540	SF	$14.00	$35,560.00		$2.50	$6,350.00	$16.50	$41,910.00
		Soffit & Facia Overhange	98	LF	$15.00	$1,470.00		$5.00	$490.00	$20.00	$1,960.00
		Replace Clearwell Access Hatches	3	EA	$0.00	$0.00			$0.00	$0.00	$0.00
		Cast-In-Place Concrete Opening	1	CY	$100.00	$100.00		$500.00	$500.00	$600.00	$600.00
		Remove Existing Block Wall	250	SF	$0.00	$0.00		$15.00	$3,750.00	$15.00	$3,750.00
		8" Ductile Iron Pipe	20	LF	$19.70	$394.00		$18.80	$376.00	$38.50	$770.00
		8" D.I. 45° Bend	8	EA	$368.00	$2,944.00		$254.50	$2,036.00	$622.50	$4,980.00
		8" D.I. 90° Bend	2	EA	$425.00	$850.00		$215.00	$430.00	$640.00	$1,280.00
		8" D.I. Ball Valve	4	EA	$1,200.00	$4,800.00		$280.00	$1,120.00	$1,480.00	$5,920.00
		10"x10"x8" D.I. Tee	4	EA	$1,275.00	$5,100.00		$525.00	$2,100.00	$1,800.00	$7,200.00
		10" Ductile Iron Pipe	100	LF	$26.50	$2,650.00		$30.00	$3,000.00	$56.50	$5,650.00
		10" D.I. 90° Bend	6	EA	$465.00	$2,790.00		$310.00	$1,860.00	$775.00	$4,650.00
		10" D.I. Tee	1	EA	$1,275.00	$1,275.00		$525.00	$525.00	$1,800.00	$1,800.00
		10" D.I. Ball Valve	3	EA	$1,700.00	$5,100.00		$317.00	$951.00	$2,017.00	$6,051.00
		10"x16" Reducer	2	EA	$850.00	$1,700.00		$250.00	$500.00	$1,100.00	$2,200.00
		16" Ductile Iron Pipe	20	LF	$45.50	$910.00		$46.00	$920.00	$91.50	$1,830.00
		16" D.I. 90° Bend	1	EA	$1,900.00	$1,900.00		$625.00	$625.00	$2,525.00	$2,525.00
		16" D.I. 45° Bend	2	EA	$1,200.00	$2,400.00		$550.00	$1,100.00	$1,750.00	$3,500.00
		16" D.I. Tee	1	EA	$1,875.00	$1,875.00		$825.00	$825.00	$2,700.00	$2,700.00
		Cored Hole w/ Mechanical Link Seal	1	EA	$200.00	$200.00	2	$40.00	$80.00	$280.00	$280.00
		Cut Tee into 16" D.I. Water Line	1	LS	$0.00	$0.00	4	$40.00	$160.00	$160.00	$160.00
		Excavation for Utility Installation	100	CY	$50.00	$5,000.00		$12.00	$1,200.00	$62.00	$6,200.00
		Parker Hannifin S52-4-8F	6	EA	$22,550.00	$135,300.00		$0.00	$0.00	$22,550.00	$135,300.00
		Parker Hannifin Avasan Cartridges	208	EA	$15.85	$3,296.80		$0.00	$0.00	$15.85	$3,296.80
		Parker Hannifin Glass-Mate Cartridges	104	EA	$15.85	$1,648.40		$0.00	$0.00	$15.85	$1,648.40
		Replacement Avasan Catridges	312	EA	$15.85	$4,945.20		$0.00	$0.00	$15.85	$4,945.20
		Replacement Glass-Mate Cartridges	156	EA	$15.85	$2,472.60		$0.00	$0.00	$15.85	$2,472.60
		Chlorine Analyser	1	EA	$3,500.00	$3,500.00		$0.00	$0.00	$3,500.00	$3,500.00
		Laser Nephelometer/Control Panel	2	EA	$6,000.00	$12,000.00		$0.00	$0.00	$6,000.00	$12,000.00
		Turbidimeter	2	EA	$2,000.00	$4,000.00		$0.00	$0.00	$2,000.00	$4,000.00
		Misc. Laboratory Instrumentation	1	LS	$6,000.00	$6,000.00		$0.00	$0.00	$6,000.00	$6,000.00
		Sanitary Sewer Improvements	1	LS	$10,000.00	$10,000.00		$10,000.00	$10,000.00	$20,000.00	$20,000.00
		Relocate Propane Tank	1	LS		$0.00		$5,000.00	$5,000.00	$5,000.00	$5,000.00
		Emergency generator	1	LS	$80,000.00	$80,000.00		$10,000.00	$10,000.00	$90,000.00	$90,000.00
		Existing Water Tank Painting	1	LS	$250,000.00	$250,000.00		$0.00	$0.00	$250,000.00	$250,000.00
		Sub-total				$619,391.00			$100,038		
		Design Development Contingency	11.0%			$68,133.01			$11,004		$79,137.19

Summary

General Conditions & Administraton	$267,237.37	23.66%	
Allowance	$63,900.00	5.66%	
Material Cost	$687,524.01	60.86%	
Total Labor	$111,042.18	9.83%	
Total Cost	$1,129,703.56	100.00%	**$1,130,000.00**

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Water Treatment Plant Upgrades	Mayor Keith Donohue		*Approved by:*	D Knowles	*Date* 6/25/2009
	South Glens Falls, NY				
Location					
Village of South Glens Falls	*Ph*	(518) 793-1455	*Phase*	Schematic - 60%	
Saratoga Co, New York	*Fax*	N/A			

Construction Costs	
General Construction	$1,130,000.00
Electrical	$65,000.00
Mechanical	$25,000.00
Plumbing	$45,000.00
Sub-total	$1,265,000.00
Total Estimated Construction C	$1,265,000.00

Indirect Project Costs	**%**	**Cost**
Survey/Engineering/Env		$200,000.00
Construction Management	4.50%	$57,000.00
Construction Inspection	2.50%	$32,000.00
Owner's Liability Insurance	0.00%	$0.00
Bond Counsel / Legal	1.50%	$19,000.00
Total Estimated Indirect Costs		$310,000.00

Total Project Cost	$1,575,000.00

Appendix M:
Preliminary Design Drawings