Canandaigua-Farmington Consolidated Water District

1216 McMahon Road
Victor, NY 14564

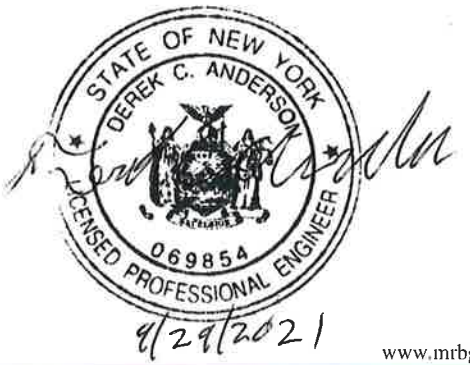
ENGINEERING REPORT

for the

BRICKYARD ROAD TANK AND TRANSMISSION MAIN IMPROVEMENTS

June 2020

MRB Group Project No. 0610.19002.000



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I. INTRODUCTION

Town of Farmington (Town) operates the Canandaigua-Farmington Consolidated Water District (CFWD) in the Towns of Canandaigua and Farmington (PWS ID NY3401151). The CFWD's Brickyard Road tank is locked out of the distribution system only providing hydraulic benefit during peak and fire demands. Being locked out of the system creates two concerns. First, pressures in the area can fluctuate by over 17.4 psi (40-feet). Second, tank water quality steadily degrades creating a potential for poor quality water being introduced into the system during peak and fire demands.

In order to address these concerns, the project includes replacing the tank with a taller elevated tank, and constructing a dedicated transmission main. The project provides system pressure equalization, additional storage for fire demands, and improves tank water quality by promoting flow through and mixing in the tank.

II. BACKGROUND

A. LOCATION

CFWD includes three hydraulic grade zones. Zone 1 is the area south of Canandaigua-Farmington Town Line (CFTL) Road, west of County Road 8 and south of County Road 41. East of County Road 8, Zone 2 is the area between CFTL Road and County Road 41, and west of County Road 28. Zone 3 is generally the area north of County Road 41.

Figure 1 (Appendix A) shows the CFWD and portions of adjacent water systems. Figure 2 (Appendix B) shows the location of the Brickyard Road tank and transmission main improvements, which are located in Zone 1. Figure 3 (Appendix C) is a site plan showing the location of the proposed tank and the existing storage tank. The existing tank will be removed once the new tank is in service. Alternate locations for the tank were not considered because space is available on the existing site, and because there are no other areas within the CFWD of similar or greater surface elevations than the existing site.

B. GEOLOGICAL CONDITIONS

A geotechnical report[1] prepared by Terracon for the Brickyard Road tank site identifies properties of below-grade conditions and offers recommendations for foundation design. As noted in the geotechnical report, "The project is located in Ontario County and within the Erie-Ontario Lowlands physiographic province. The soil deposits within this province generally consist of glacially-derived deposits, such as glacial till (i.e. terminal moraines and ground moraine), granular deposits (i.e. kame, glacial outwash, and beach ridges) and glacio-lacustrine deposits (i.e. varved silts, clay, and fine sand deposits). The Surficial Geologic Map of New York maps soils as glacial till. The Bedrock Geologic Map of New York maps the bedrock as shale of the Skaneateles Formation (Middle Devonian age)."[1]

The geotechnical investigation included three borings advanced to over 30-feet deep with highly weathered shale encountered at 23-feet to 25.5-feet. Materials encountered included topsoil, silt, silty clay with gravel, silt, highly weathered shale and shale. One location encountered a small amount of fill material near the surface. None of the borings encountered groundwater.

C. ENVIRONMENTAL CONDITIONS

1. Surface Water Features

Padelford Brook crosses Brickyard Road approximately 2,100 feet north of the tank site and will be crossed by the proposed transmission main. DOH and DEC guidelines will be followed for stream crossings.

2. Environmental Resources

Environmental mapping of the area indicates wetland CG-11 follows Padelford Brook and extends roughly 540 feet to the north and 680 feet to the south along Brickyard Road. Wetland CG-11 was previously disturbed for construction of Brickyard Road and an existing water main. The proposed transmission main will run parallel to Brickyard Road inside the existing right-of-way, DEC guidelines will be followed for work within and adjacent to wetlands.

[1] *Geotechnical Engineering Report, Elevated Water Storage Tank, Town of Canandaigua, New York* (Terracon Consultants-NY, Inc. Rochester, NY, May 29, 2020)

The project is in the area of a principle aquifer however the project does not draw water from the aquifer. The comparatively shallow depth of the water main will not encroach on the aquifer.

The existing tank and water main along Brickyard Road are located within the Town of Canandaigua Padelford Brook Greenway, an area created by the Town of Canandaigua in 2015 that is identified as being agriculturally significant. The area includes designated agricultural district, ONTA001. An existing water main on Brickyard Road already crosses and provides water to parcels along Brickyard Road within agricultural district ONTA001. The transmission main included in the project does not change the availability of public water within the agricultural district.

No adverse environmental impacts were identified during the State Environmental Quality Review Act (SEQR) review for the Project. SEQR was completed June 13, 2017 when the Town Board determined by Resolution that the project will not have any significant adverse impact on the environment.

3. Floodplain Considerations

Portions of the transmission main along Brickyard Road cross FEMA Zone A in the vicinity of Padelford Brook. Zone A is defined as areas subject to inundation by the 1-percent-annual-chance flood event. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown.[2] DOH and DEC guidelines will be followed for work within FEMA Zone A.

D. Ownership of Service Area

Town of Farmington owns and operates the CFWD facilities in the Town of Farmington, and, under an Agreement, operates the CFWD in the Town of Canandaigua. Town of Canandaigua owns the CFWD facilities in the Town of Canandaigua. Ownership and operation of the project facilities will be in accordance with the existing Agreement between the two Towns.

[2] *FIRM, Flood Insurance Rate Map, Town of Canandaigua, New York, Ontario County, Panel 5 of 25, Community Panel No. 360598 0005 C* (Flood Emergency Management Agency, Revised March 3, 1987.

E. EXISTING FACILITIES AND PRESENT CONDITIONS

In general the water system is well maintained and in good condition consistent with the age of the infrastructure. CFWD routinely repairs water main breaks as they occur in the system.

CFWD is gravity fed from the City of Canandaigua. The capacity of the distribution system is a function of water level in the City reservoirs, system demands and condition of water mains. Analysis of the system determined that in general the condition of the mains is consistent with their age and material of construction. Older cast iron pipes appear to offer some resistance to flow due to sedimentation and scale in the pipes. Based on water system operator experience and observation, newer PVC and older transite pipe (asbestos cement) tend to resist scale and have better flow characteristics.

An existing 10-inch water main on Brickyard Road was installed when the tank was constructed in the 1960's. The water main is in poor condition needing frequent repairs; it has reached the end of its useful life. Its replacement and upgrade is necessary for proper system operation.

An inspection[3] of the Brickyard Road tank found that it is in fair condition with localized areas of heavy corrosion. The inspection recommended replacement or repair of the tank. Originally built in the 1960's, the tank has been re-coated twice; the tank is nearing the end of its useful life.

F. POPULATION TRENDS

CFWD encompasses the Town of Canandaigua north of the City and Canandaigua, and the Town of Farmington. CFWD also supplies the Town and Village of Manchester. Table II.1 summarizes the estimated population served in the CFWD, and Town and Village of Manchester for 2019 as stated in the 2019 Annual Water Quality Report for the CFWD[4]. Population estimates for years 2020 through 2050 are based Genesee / Finger Lakes Regional Planning Council (GFLRPC)[5] population percentage growth estimates for the

[3] *Steel Potable Water Reservoir Inspection Report (ROV)* (Liquid Engineering Corporation, July 29, 2015)
[4] *Annual Drinking Water Quality Report for 2019, Canandaigua-Farmington Water District, Manchester Village and Town Water Districts* (CFWD, May 220)
[5] *Regional Population Forecasts, County, City and Village Projections for the Genesee-Finger Lakes Region out to year 2050* (Genesee/Finger Lakes Regional Planning Council, May 2013)

Town of Farmington and the Town and Village of Manchester. The total increase in population from year 2019 to 2050 is approximately 5.23%.

Table II.1: Population Estimates

	CFWD		Town of Manchester WDs		Combined	
Year	Population	Growth	Population	Growth	Population	Growth
12/31/2019	12,000		1,470		13,470	
12/31/2020	12,066	0.55%	1,484	0.97%	13,550	0.59%
12/31/2030	12,343	2.30%	1,542	3.90%	13,885	2.47%
12/31/2040	12,582	1.94%	1,592	3.26%	14,174	2.08%
12/31/2050	12,794	1.69%	1,636	2.79%	14,430	1.81%

G. WATER USE

1. Exiting Water Use

CFWD obtains its water from the City of Canandaigua. As stated in the 2019 Annual Water Quality Report:

The Canandaigua-Farmington water system serves over 12,000 people through 4,559 service connections. The total water purchased for the year in 2019 was 653,365,000 gallons with an average day of 1.791 million gallons per day. The maximum day in 2019 was 2.464 million gallons. The amount of water delivered to customers was 574,906,000 gallons for the year with 673,300 gallons distributed though fire hydrant meter rentals. This leaves unaccountable water total of 77,786,000 gallons for the year. Approximately 20% of the unaccountable water was used to flush water mains and hydrants, and for fighting fires and fire protection. Approximately 10% was due to water main leakage. This leaves an unaccountable total of 54,450,000 million gallons, which is 8.33% of the total water purchased for 2019.

The Canandaigua-Farmington Consolidated Water District sells water to the Town and Village of Manchester.

The Village of Manchester services a population of 1,709 through 501 service connections. The total water purchased in 2019 was 41.609 million gallons. The daily average to the distribution system was 113,997 gallons per day. The single highest day was 232,000 gallons. The amount of water sold to customers was 38.974 million

gallons. Approximately 250,000 gallons of water was used to flush water mains and hydrants, fighting fires, etc. Water loss due to water main breaks 375,000. There was one water main break in 2019, on Pratt Road. This leaves an unaccounted total of 2.011 million gallons, which is 4.0% of the total purchased.

The Town of Manchester Water Districts services a population of 1470 through 574 service connections. The total water purchased in 2019 was 64,081,900[6] million gallons. The daily average to the distribution system was 198,726 gallons per day. The single highest day was 376,000 gallons in April 2019. The amount of water sold to customers was 48,382,833 gallons. Zero gallons were lost due to water main breaks. Approximately 490,000 gallons of water was used to flush water mains, hydrants and fight fires.

Table II.2: Existing Water Demand

Service Area	Avg. Day (MGD)	Max. Day (MGD)
CFWD	1.791	2.464
Town of Manchester	0.199	0.376
CFWD + Town of Manchester[7]	1.990	2.737
Village of Manchester[8]	0.113	0.232

The estimated peak hour demand for the CFWD plus the Town of Manchester, based on the populations stated in the Annual Water Quality Report[4], is approximately 3,576 gpm.

2. Future Water Use

Table II.3 summarizes estimated year 2050 water demands based on a projected population increases from 2020 to 2050. The estimated peak hour on maximum day demand for the CFWD plus the Town of Manchester is approximately 4,074 gpm.

[6] The stated average day demand for the Town of Manchester is greater than the stated annual supply for 365 days. The higher 198,726 gallons per day was utilized in this review as a more conservative estimate.
[7] CFWD+Town of Manchester Max. Day based on the CFWD max ratio of 1.38 for 2019. Max Day values are not additive due to different ratio per town and because the max day may not have occurred on the same day.
[8] Village of Manchester not included in total since it purchases water on an intermittent basis.

Table II.3: Estimated Year 2050 Water Demand

Service Area	Avg. Day (MGD)	Max. Day (MGD)
CFWD	1.878	2.584
Town of Manchester	0.215	0.407
CFWD + Town	2.094	2.880
Village of Manchester[9]	0.113	0.232

H. FLOW REQUIREMENTS

A hydraulic analysis of the CFWD was performed to evaluate pressures and available hydrant design flows. The analysis was limited to Zone 1 since pressures in Zones 2 and 3 are controlled by interconnecting pressure control valves. Analysis results for hydraulic Zone 1 are included in Appendix D for existing conditions. Appendix E contains results for proposed conditions once the project is complete.

Results indicate that the system meets the pressure requirements of the *Recommended Standards for Water Works* (RSWW) 8.2.1. Comparing existing to proposed conditions indicate that the proposed water storage tank helps equalize Zone 1 system pressures. Under existing conditions, pressures in Zone 1 vary by 9.2 psi to 17.3 psi throughout the day. Once the tank is on line, pressures are anticipated to vary by 9.6 psi to 12.1 psi throughout the day.

Hydrant design flow is defined as the flow available at a junction when the minimum system pressure is 20 psi. Anticipated hydrant design flows in Zone 1 increase by 105% to over 200% depending on location relative to the proposed Brickyard Road tank.

ISO needed fire flows within the CFWD remain unchanged because the project does not modify the service area.

[9] Population estimates for the Village of Manchester show a steady decline through year 2050. Estimated water demand remains unchanged as a more conservative approach. Village of Manchester not included in total since it purchases water on an intermittent basis.

I. SOURCE OF SUPPLY AND TREATMENT

CFWD obtains its water from the City of Canandaigua. The project does not change the source of supply. CFWD is responsible for monitoring water quality within its distribution system. The City of Canandaigua obtains its water from Canandaigua Lake and provides treatment at its water treatment plant located at 3772 County Road 16.

III. DESIGN CONSIDERATIONS

A. PROPOSED PROJECT

The project replaces the existing Brickyard Road tank with elevated storage including transmission main and related valve vaults. The proposed project includes the following:

1. 2.0 MG elevated storage tank.
2. 16-inch inlet and outlet lines to the tank
3. 16-inch transmission main from Yerkes Road to the tank site.
4. Altitude valve on the inlet line that protects the tank from overflow.
5. Check valve on the inlet line that directs flow into the pipe.
6. Check valve on the outlet line that directs flow away from the tank.
7. Flow meter on the outlet line that measures flow from the tank. The meter will provide rate of flow in the event a chemical feed system is needed in the future for water quality control.
8. Check valve between tank outlet and inlet that allows flow out of the inlet pipe to supply peak and fire demands south of the tank.
9. 16-inch transmission main from the tank site to CFTL Road.
10. Check valve in a vault on Purdy Road that allows flow from the transmission line to Zone 1 to supplement peak and fire demands north of the tank in Zone 1.
11. Pressure reducing valve in a vault at CFTL Road that reduces pressure from the tank to the pressure to Zone 2.
12. Adjust the existing control valves between the hydraulic grade zones to favor flow through the new tank.

B. DESIGN CRITERIA

In addition to the requirement of the *RSWW* (2018 edition), the project is designed in accordance with

- AWWA D107 Standard for Composite Elevated Tanks for Water Storage
- AWWA D102 Standard for Painting Steel Water Storage Tanks
- AWWA C652 Standard for Disinfection of Water Storage Facilities
- ASCE 7 Minimum Design Loads for Buildings and Other Structures
- ACI 301 Standard Specifications for Structural Concrete
- ACI 305 Hot Weather Concreting
- ACI 306 Cold Weather Concreting
- ACI 318 Building Code Requirements for Structural Concrete
- NSF 61 Drinking Water System Components
- OSHA Occupational Safety and Health Standards
- SSPC-PA1 Paint Application Specification
- FAA Requirements for navigable airspace.

IV. FINISHED WATER STORAGE

The proposed storage tank has a 2 million gallon capacity sized to provide storage for the CFWD service area including the Town of Manchester. The tank is a composite design that consists of a welded steel elevated storage tank supported on a concrete structure, foundation, and accessories. The welded steel tank will have dome roof, straight sides, a cone bottom, and a six-foot diameter access tube to the roof. Space is provide inside the concrete column for control valves and related instrumentation.

As discussed in Section I.A, CFWD includes three hydraulic grade zones. The proposed tank is located in Zone 1 (generally the area between the City of Canandaigua and Canandaigua-Farmington Town Line Road). Located in Zone 3 is the CFWD Bowerman Road tank. Review of the system determined that this tank is also locked out of the system, potentially only providing flow during peak demands. Pressure reducing valves between adjacent hydraulic grade zones regulate pressures in Zone 3. Town of Manchester purchases water from CFWD through metered connections to Zone 3 on NYS Route 96 and on Fox Road. For these reasons, system demands in the CFWD and Town of Manchester are included in the tank sizing calculations.

The Village of Manchester has its own storage tank that operates based on level through a control valve on NYS Route 96. The Village of Manchester tank provides the daily flow and storage requirements for the Village. For these reasons, the tank sizing calculations for the proposed tank consider the Village of Manchester as an intermittent demand in addition to the combined CFWD and Town of Manchester peak demand.

A. SOURCE

Tank sizing guidance[10] considers reliability of the source of supply. The source of supply is the City of Canandaigua water treatment plant on West Lake Road. The water treatment plant is a reliable source of supply since it includes multiple treatment trains, emergency power, and 12-million gallons of storage, which is more than three times average daily production and double the maximum day production in 2019.

B. SUPPLY

City of Canandaigua sells water to the CFWD through meters along North Street at Brickyard Road, Midlakes Drive and Macedon Road. Town of Canandaigua sells City water to the CFWD through a meter on Andrews Road. The City operates two transmission mains (conduits) that convey water from the water treatment plant to the City. The first conduit is 16-inch diameter on West Lake Road that generally serves the southern portion of the City. The second conduit is 30-inch diameter that runs cross lots from the water plant reservoirs to the City at the intersection of West Street and Parrish Street. This conduit then reduces to 24-inch running along West Street, Bristol Street, Thad Chapin Street, North Pear Street, and North Street past Brickyard Road. Though it contains intermittent connections to the distribution system along its length, in general, the second conduit supplies the City from the north.

Tank sizing guidance also considers supply capacity and reliability. In particular, for continuous flow tanks such as the Brickyard Road tank, the guidance allows a reduction in needed Equalization Storage (ES), Standby Storage (SB), and Fire Suppression Storage (FSS). The reduction is based on the capacity of the supply conduits with the largest out of service.

[10] *Water System Design Manual* (Washington State Department of Health, DOH Pub 331-123, Rev. October 2019)

Analysis of the water distribution system determined that the four meters can supply approximately 7,400 gpm at 45 psi residual at the City limits with both conduits in service. The supply capacity decreases to approximately 2,260 gpm when only the first conduit is in service. The reduced capacity is due to the head loss through the City of Canandaigua distribution system. Therefore, for tank sizing purposes, the supply capacity from the City of Canandaigua to CFWD is limited to 2,260 gpm.

C. SIZING

Appendix F includes an analysis of needed storage, existing available storage, and proposed storage. Also included are definitions of the various storage components.

1. Operating Storage

Operating storage (OS) is the volume between tank high and low operating levels. The proposed Brickyard Road tank will float on the distribution system with operating storage (OS) being a function of annual and daily water use patterns, and the levels in the City of Canandaigua reservoirs.

Pressure readings taken at the Brickyard Road tank site between May 16, 2019 and June 2, 2020 indicate that the existing hydraulic grade (HGL) typically varies between elevations 934.2 and 968.4 (59.3 psi to 74.2 psi). Located in Zone 1 is a significant industrial user that tests its fire pumps on a weekly basis. Pressure readings indicate that during the tests, the HGL at the site can drop to 927.5 feet (56.4 psi). During the period of record, a significant water break occurred on one of the days the industry tested its fire pumps. On this day, the pressure at the tank site dropped to 24.6 psi (HGL 853.5).

The hydraulic model of the distribution system was balanced to closely approximate pressures measured at the tank site on the maximum, minimum, and a representative average day supplied by the City of Canandaigua. The City of Canandaigua fills its reservoirs with constant speed pumps, only turning off the pumps when the reservoirs are near full. The City has observed that reservoir level can vary by seven feet, between elevation 966 and 973 (level 30-feet and 37-feet). Depending on system demands, this variation can occur over a single day or multiple days. During summer droughts, the City has observed levels below 20-feet before the pumps start to refill the reservoirs.

In order to balance the model, it was necessary to model the City reservoirs at the lower end of the normal operating range. Based on this, it is understood that the conditions utilized to balance the model may not represent the full HGL range between potential low and high HGL. In order to estimate the probable high and low HGL, additional model scenarios were run; one during maximum day demands with the City reservoirs low, and one during minimum day demands with City reservoirs high.

Results of these scenarios estimate an overall operating range in the tank between HGL 940.3 feet and 964.8 feet. The low HGL is higher than existing and demonstrates the buffering effect of the tank on system pressures. The high HGL is approximately 3.5-feet lower than existing and is due to flow being directed through the tank resulting in head loss (pressure loss) in the supply lines to the tank that are greater than existing. Because the existing tank is locked out of the system, there is less flow and head loss in the supply lines.

The estimated daily operating range of the tank is from approximately 5-feet to 6.5-feet. As previously stated, the upper and lower limits of the operating range are a function of daily and annual system demand patterns, and the operating level of the City reservoirs. Based on model results, the anticipated overall operating range of the tank is 24.8 feet throughout the year. These ranges are within the maximum variation allowed by RSWW Section 7.3.1. of 30-feet. Table IV.1 summarizes the estimated operating storage of the tank based on upper and lower HGL range and estimated annual variation.

Table IV.1: Estimated Operating Storage

	Lower	Upper	Annual Level	Annual HGL
Estimated High Level (ft)	26.14	44.07	44.07	964.77
Estimated Low Level (ft)	19.56	38.93	19.56	940.26
Operating Range (ft)	6.58	5.14	24.51	
Operating Storage (OS) (gal)	336,000	261,000	1,245,000	

Review of existing pressures measured at the tank site indicate that on very rare occasions (<1% of the data), the HGL at the site approached the City reservoir high level. This condition would only happen during extremely low system demands.

The proposed tank provides 1,245,000 gallons of OS and includes an altitude valve to protect from overflow. Design overflow level is 46 feet (elevation is 965.8 feet), which provides approximately 1.0 feet of freeboard above the estimated high water level elevation of 964.8 feet. The proposed tank has a head range (depth from bottom to overflow) of 45-feet. Based on this, the bottom of the tank is elevation 919.8 feet.

2. Equalization Storage

Equalization storage (ES) is the volume between tank low operating level and the level needed to maintain a working pressure of 35 psi in the distribution system. Because the tank floats on the distribution system, available ES in the proposed tank changes as a function of system demands and the level in the City reservoirs. Based on these factors, available ES ranges from 710,000 gallons while OS is at its lower range, to 1,694,000 gallons while OS is at its upper range.

Recommended needed ES for continuously supplied tanks is between 10% and 25% of maximum day demand. The guidance also allows reducing ES by the supply capacity. Because the maximum day demand of the CFWD, including the Town of Manchester, is less than the supply capacity of a single City conduit, the needed ES for the tank is 0 gallons. Without considering supply, needed ES ranges from 273,000 gallons to 684,000 gallons. Available ES of the proposed tank is greater than needed ES so it complies with the design guidance.

Because the tank is elevated storage, the base of the tank constrains ES since its elevation is above the level needed to provide a working pressure of 35 psi in the distribution system. As with the existing tank that is locked out of the system, minimum working pressures in the CFWD will remain above 35 psi when the new tank is off line for service.

3. Standby Storage

Standby storage (SB) is the volume between the level needed to provide a working pressure of 35 psi throughout the distribution system and the level needed to provide 20 psi at all point in the distribution system under all demands. For system with multiply supply sources, standby storage is a function of maximum day demand and the lowest supply capacity. As with ES, the supply capacity of a single conduit is greater than the maximum day demand of the system so ES is 0 gallons.

Because the tank is elevated storage, the base of the tank constrains SB since its elevation is above the level needed to provide a working pressure of 35 psi in the distribution system. As with the existing tank that is locked out of the system, the system provides greater than 20 psi during peak hour and fire flow conditions within the CFWD when the new tank is off line for service.

4. Fire Suppression Storage

Fire suppression storage (FSS) is the amount of storage available between tank low operating level and the level needed to maintain 20 psi at all points in the system. For the Brickyard Road tank it is the volume between the lowest estimated water level and the bottom of the tank. As previously discussed, the bottom of the elevated tank is above the level needed to maintain 35 psi system working pressure. Tank sizing guidance allows overlap between storage components for ES plus SB, and FSS

FSS is based on needed community fire flow established by ISO or the local Fire Marshal, daily system demands, supply rate to neighboring communities, and supply capacity. Considering these factors, the needed FSS for the tank is 613,000 gallons, the proposed tank provides 710,000 gallons.

5. Dead Storage

Dead storage is the volume below the level needed to maintain 20 psi in the distribution system and the bottom of the tank. Because the bottom of the tank is above the level needed to maintain 35 psi in the distribution system, the proposed tank has no dead storage.

6. Head Space

Head space is the volume between high operating level and tank overflow elevation. As previously stated the tank is design to provide 1.2-feet of freeboard during high opening levels. Because the HGL at the tank changed throughout the years based on system demands and supply patterns, the HS volume ranges from 48,000 gallons to over 957,000 gallons. These volumes are not usable for system demands since they represent the air space above high operating levels.

7. Storage Summary

Appendix F contains a summary of the available and needed storage components for the existing and proposed Brickyard Road tank. The design of the proposed 2 MG elevated storage tank provides the estimated needed storage through year 2050. It is important to note that while the tank provides the needed storage that, depending on system demands, the tank may operate at approximately half its total storage volume between 20 feet and 26 feet. This is accounted for in the design of the tank.

D. PROTECTION FROM CONTAMINATION

The proposed tank will have watertight roofs. Vents and access hatches will exclude birds, animals, insects, and excessive dust. The tank will be design to allow the future installation of antenna without damage to the tank.

E. SECURITY

The existing tank site includes security fences that will remain in place for the new tank. Access to the tank support column is protected by locked doors, fitted with alarms. Access to the tank is only possible from inside the support column.

F. STORED WATER AGE

The proposed tank will include a mixing system to completely mix tank contents. Model results estimate that, based on average daily demands, water age in the tank ranges from 103.5 hours to 114.1 hours. Water age is relative to the source of supply being the City of Canandaigua reservoirs.

Estimated water age in the tank fill line ranges from 13.1 hours to 113.1 hours, and water age in the outlet line ranges from 103.5 hours to 120.9[11]. Comparing water age in the inlet line to the outlet line indicates that water age added by the tank ranges from zero (0) hours to 106.6 hours. Because the tank floats on the system, variations in water age are due to daily use patterns and flow through the tank.

[11] Maximum and minimum water age in the inlet and outlet lines do not occur at the same line. For example, when the age of the outlet water is 120.9 hours, the age of the inlet water is 14.3 hours indicating that the tank adds 106.6 hours to the water age.

G. OVERFLOW

A 12-inch overflow pipe sized to permit waste of water in excess of the estimated maximum filling rate of 810 gpm will be internal to the elevated tank support column. The end of the pipe will terminate 12 to 24 inches above grade outside the support column and be covered with a 24 mesh screen. An insertion style rubber check valve will be included in the overflow line and located inside the support column for freeze protection.

H. ACCESS

One 24-inch x 36-inch painter's access manhole/ventilation louver opening will be provided giving access to the exterior painters rail located at the top of the concrete support structure. This opening will have a removable aluminum rainproof louver with bird screen to provide ventilation for the concrete support structure. The louver will be accessible from the walkway.

One 30-inch diameter tank bottom manhole shall be provided in the tank floor with access by ladder from an internal walkway.

Two 30-inch diameter steel hatches will be supplied. One at the top of the access tube with spring assist, chain, hook, and inside handle. The other adjacent to the access tube for entry into the tank and will have a handle and hasp. The hatch openings will have a curb four inches high and the cover will have a downward overlap of two inches.

One 24-inch diameter flanged exhaust hatch will be supplied, located adjacent to the access tube and so constructed that an exhaust fan may be connected for ventilation during painting.

One 24-inch diameter painter's access manhole will be provided adjacent to each interior painters rail giving access from the roof. The 24-inch diameter exhaust hatch may be positioned to serve as one of these access manholes.

I. VENTS

An aluminum pressure-vacuum vent near the center of the roof will be provided. The vent is sized to handle pressure differential caused by water entering or leaving the tank at a maximum rate. The estimated maximum inlet rate is 810 gpm, and the estimated maximum

withdrawal rate is 855 gpm. The withdrawal can increase to rate 2,600 gpm during a fire demand. The open area of the overflow is not considered as a venting area. The vent will have insect screens and be designed to relieve pressure or vacuum in the event the screen frosts over or is otherwise clogged and be easily dismantled for cleaning. The pressure-vacuum vent may be mounted on the exhaust hatch.

J. ROOF AND SIDEWALL

The roof and sidewalls will be watertight with no openings except properly constructed vents, manholes, overflows, risers, drains, pump mountings, control ports, or piping for inflow and outflow.

K. CONSTRUCTION MATERIALS

The tank will be welded steel designed in accordance with AWWA D107. The support column will be concrete designed in accordance with AWWA D107 and ACI 318 as modified by the tank manufacturer's specifications.

L. SAFETY

Access Ladders and platforms will be designed in accordance with OSHA standards.

M. FREEZING

The water storage tank and support column will be designed to provide freeze protection for riser pipes, overflows, and vents. A mixing system will provide freeze protection for tank contents. Materials in contact with potable water will meet ANSI/NSF Standard 61.

N. PAINTING

Tank painting and paint testing will be in accordance with AWWA D102, the Steel Structures Painting Council Specification SSPC-PA1, and the tank manufacturer's specifications. Materials in contact with potable water will be ANSI/NSF 61 approved.

O. DISINFECTION

Before being placed into service, the tank will be disinfected and tested in accordance with AWWA C652.

P. SAMPLING

Easily accessible smooth-nosed sampling taps will be provided to facilitate water samples for both bacteriological and chemical analysis.

V. TRANSMISSION MAIN

The transmission main along Brickyard Road is designed in accordance with *RSWW* Section 8.

A. MATERIALS

All materials including pipe, fittings, valves and fire hydrants, and those used for the rehabilitation of water mains shall conform to the latest standards issued by the ASTM, AWWA and ANSI/NSF.

B. PRESSURE AND FLOW

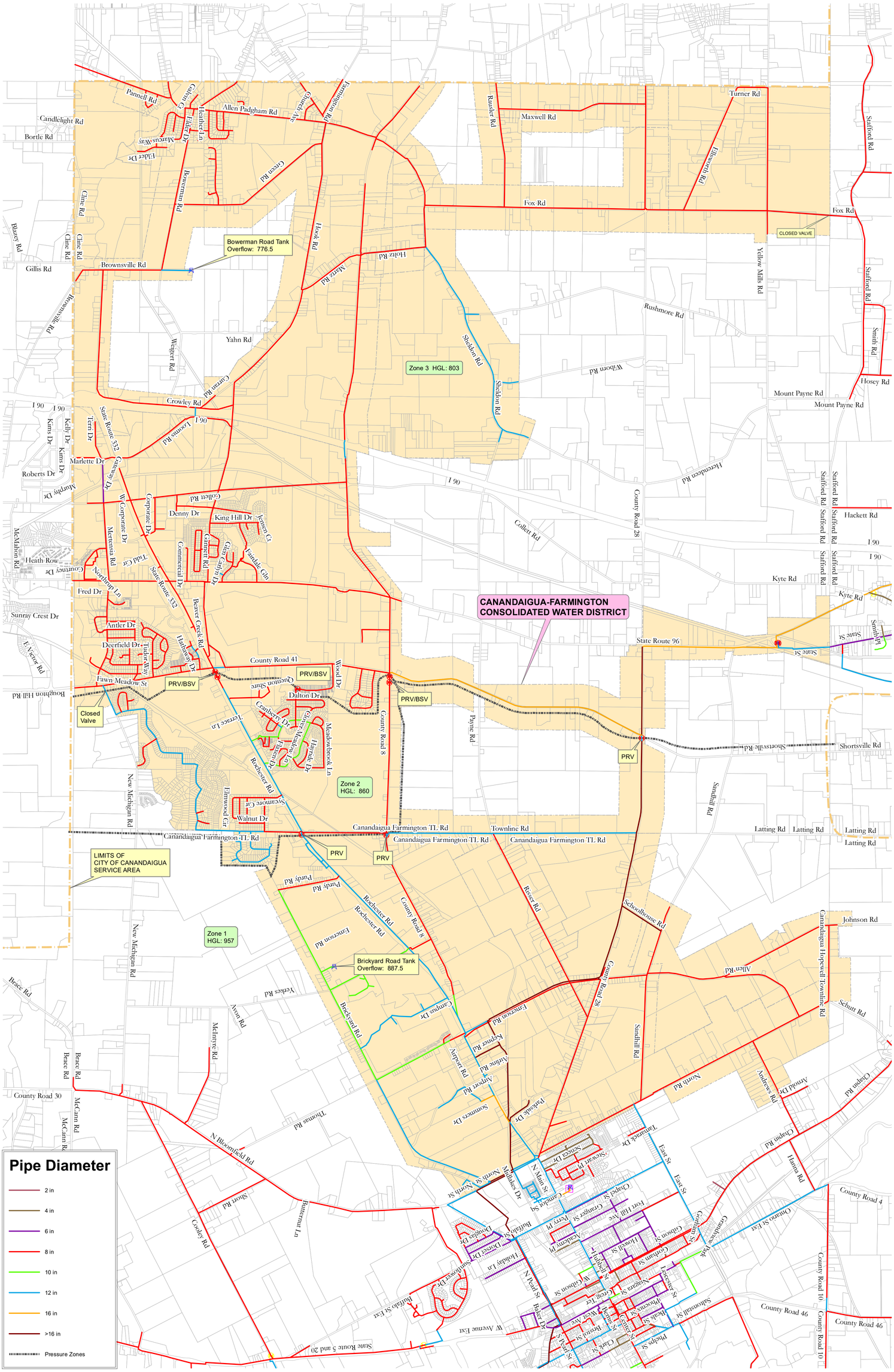
Appendix C contains pressure results for proposed conditions once the project is complete. Results show that the minimum system pressures in Zone 1 are greater than 50 psi. Hydrant Design Flows are between 1,300 gpm and 9,000 gpm depending on proximity to the tank. The results in Appendix E shows flows as high as 21,000 gpm but these location are on the 16-inch transmission main near the base of the tank. As previously discussed, Hydrant Design Flow is the flow available at a junction when the minimum system pressure is 20 psi.

VI. CONCLUSION

The project will be constructed in accordance with New York State Sub-Part 5 of the State Sanitary Code and *RSWW*. When complete the water tank will provide necessary system pressure equalization and storage needs. The proposed 2 MG composite elevated storage tank provides estimated storage needs through year 2050. Review of the distribution system demonstrates that the distribution system will provide pressure greater than 50 psi and hydrant design flows greater than 1,300 gpm.

APPENDIX A

CFWD SCHEMATIC WATER SYSTEM



0610.19002.000	PROJECT NO.	FIG. 1	SHEET NO.	MRB | group Engineering, Architecture, Surveying, P.C. 145 Culver Road, Suite 160, Rochester, New York 14620 585-381-9250 FAX 585-381-1008 www.mrbgroup.com	Drawn By: DCA Scale: 1" = 2,000' Date: June 2020 N W E S

CANANDAIGUA-FARMINGTON WATER DISTRICT
ONTARIO COUNTY, NEW YORK
EXISTING WATER SYSTEM SCHEMATIC

APPENDIX B

PROJECT LOCATION MAP

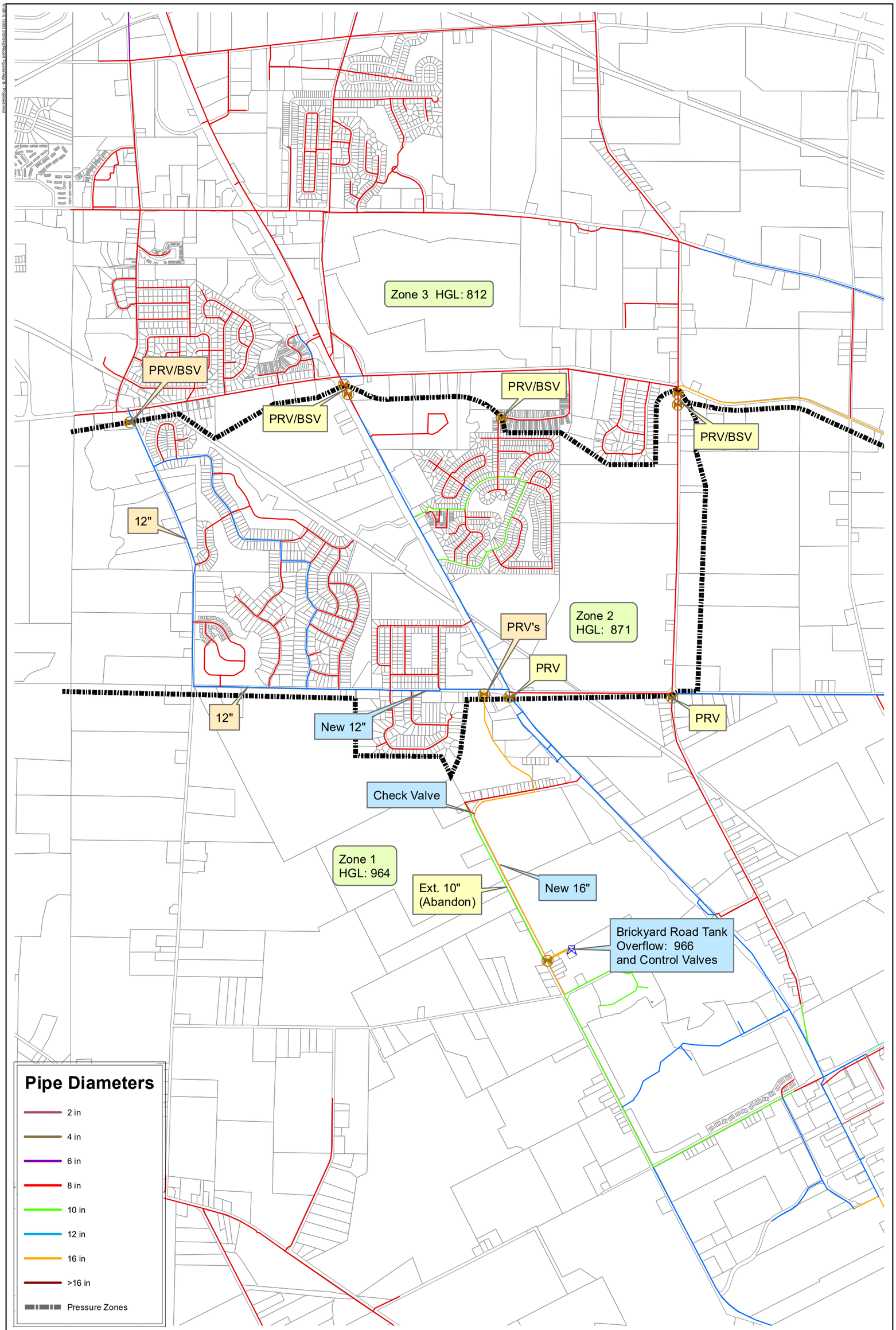


FIG. 2	SHEET NO.	0610.1900.000	PROJECT NO.

MRB | group
Engineering, Architecture, Surveying, P.C.
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www.mrbgroup.com

Drawn By:	DCA
Scale:	1" = 2,000'
Date:	JUNE 2020

N W E S

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ONTARIO COUNTY, NEW YORK

PROPOSED IMPROVEMENTS