

ENGINEER'S REPORT

for the

**EVALUATION OF ALTERNATIVE
POTABLE WATER SUPPLY
VILLAGE OF ALDEN, NEW YORK**

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1.0 INTRODUCTION

Nussbaumer & Clarke Inc. (Nussbaumer) has been retained by the Village of Alden (Village) to assist the Village in conducting an evaluation of alternative potable water supplies. Due to the drought conditions during the summer of 2016, the Village implemented a temporary emergency interconnection with Erie County Water Authority (ECWA) for several months during the summer of 2016. Given that the drought-like conditions may continue, the Village would like to evaluate options to establish a permanent interconnection with ECWA, as well as the addition of an additional Village well site.

The Village currently owns and operates its own potable water system (system). The system includes four groundwater well sites, a one million gallon ground storage tank, and related pipes and appurtenances. Water from Well Sites 1 and 2 are treated with chlorine and a corrosion inhibitor and pumped to the system. Water from Well Sites 3 and 4 is combined, treated for iron, manganese and hydrogen sulfide with chlorine and corrosion inhibitor addition prior to being pumped to the system. The Village's water system map is included in **Appendix A**.

Typically, the wells operate for a portion of the day in order to meet system demands. However, drought conditions experienced during the summer of 2016 required extended operation of the wells and resulted in an unusually low well recovery rate. It became necessary to consider options for an emergency supply of potable water to ensure Village water demand could safely be met and allow for additional well recovery time. The Village met with ECWA and Nussbaumer during July 2016 to develop a plan for and implement a temporary emergency interconnection on Exchange Street to supplement the Village water supply.

The temporary emergency interconnection with ECWA was installed and successfully supplemented the Village water supply to meet Village water demands from July to October 2016. The temporary interconnection was removed in November. The Village would like to evaluate options to establish a permanent interconnection with ECWA. The evaluation, summarized in this report, includes potential permanent interconnection locations, potential construction costs and a comparative water rate analysis. The potential permanent interconnection was evaluated for use ranging from supplemental to full supply. An option to install an additional well is also included.

2.0 EXISTING CONDITIONS

2.1 Village Water Supply

2.1.1 Water Usage

2.1.1.1 Population

As detailed in the 2010 Census data, the Village has an estimated population of 2,605 people. Significant changes in population are not anticipated as no new development is proposed. However, there is a sizeable area of undeveloped property in the southwest quadrant of the Village that has been identified by the Village's Master Plan for future development. The Village's 2015 Comprehensive Plan states that there has been a 0.5% population increase from 1970 to 2000 and projects similar growth in the coming years.

2.1.1.2 Daily Demand

The Village of Alden current average and maximum day system demands are 246,000 gallons and 439,000 gallons, respectively. The maximum annual average and peak demands were selected from the past six years rather than the overall average values in order to best represent actual peak conditions experienced.

The daily demands are based on water production data from 2011 to 2016 provided by the Village. The daily demand is based on total water production from all four well sites. A summary of average and peak water production from 2011 to 2016 is provided in Table 2-1. The 2016 values include water purchased from ECWA. Detailed daily well production data from 2008 to 2016 is presented in in **Appendix B**.

Table 2-1. Village of Alden Water Production

Year	Avg. Daily Production gpd	Peak Month Production gpd	Max. Day Production gpd
2011	215,371	242,627	321,300
2012	212,069	268,958	374,900
2013	198,277	211,784	293,400
2014	246,198	271,890	438,500
2015	228,764	272,687	385,700
2016	210,345	233,503	302,600
Average	218,504	250,242	352,733
Maximum	246,198	272,687	438,500

The Village's four wells are used to meet daily demands. Typically, the well pumps are operated from 10 to 12 hours every day. However, during the drought conditions in 2016, the pumps operated 24 hours every day to satisfy demands. The temporary emergency interconnection with ECWA supplemented the wells by approximately 25% during July to October 2016. A summary of the pumping rates and operating times under typical conditions and drought conditions is provided in Table 2-2.

Table 2-2. Historical Well Pump Data

Condition	Parameter	Well Site 1	Well Site 2	Well Site 3*	Well Site 4*	Total
Typical (2011-2015)	Design Rate (gpm)	100	163	210	210	683
	Pumping Rate (gpm)	40	84	88	118	330
	Avg. Daily Operating Time (hr)	16	10-12	10-12	10-12	-
	Avg. Daily Production (gpd)	38,500	55,600	88,300	77,800	230,200
Drought (July-Oct. 2016)	Pumping Rate (gpm)	15	20	80	15	130
	Avg. Daily Operating Time (hr)	24	24	24	24	-
	Avg. Daily Production (gpd)	21,700	28,700	115,600	21,600	187,600

* In March 2013, Well Site 3 was redeveloped to improve flow from the well. Afterwards flow from Well Sites 3 and 4 were combined, so only one flow measurement totalizing production from both sites is available after March 2013. Therefore, Well Site 4 parameters in the table are based on the typical condition from 2011 to March 2013, reflecting known individual well production. Well Site 3 parameters are based on the typical condition of flows from March 2013 to 2015 after redevelopment. Average daily production was calculated using the combined production of Well Sites 3 and 4 less the average flow rate from Well Site 4 prior to the discontinuation of individual well flow monitoring.

2.1.1.3 Water Loss

The Village's water demand was determined using water production data rather than water consumption data. Because the Village's system experiences water loss, water consumption data does not accurately represent how much water would be needed to meet daily demand. In the Village's system, there is approximately 26.6% of unmetered water loss as summarized in Table 2-3. (Typical water loss values range from 10 to 30%; the World Bank recommends non-revenue water losses of less than 25%.) Because of water loss, the Village would purchase more water from the ECWA than it actually sells. It would be necessary for the Village to charge a higher water rate than the ECWA rate in order to account for the system water loss.

Table 2-3. Water Loss Analysis

Year	Total Production gal	Metered Consumption gal	Unmetered Water Loss gal	Unmetered Water Loss %
2011	78,610,300	61,771,567	16,838,733	21.4
2012	77,617,200	62,758,749	14,858,451	19.1
2013	72,371,100	58,790,571	13,580,529	18.8
2014	89,862,300	55,802,061	34,060,239	37.9
2015	83,498,800	56,059,290	27,439,510	32.9
Total	401,959,700	295,182,238	106,777,462	26.6
Annual Average	80,391,940	59,036,448	21,355,492	26.6
Daily Average	220,252	161,744	58,508	26.6

2.1.1.4 Flow Requirements

The design average and maximum daily demands for the Village are 271,000 gallons and 482,000 gallons, respectively. Refer to Table 2-1. The design average and maximum daily demand are based on the 2011-2016 demands increased by 10% to allow for future growth.

The recommended fire flow for the Village is 1,000 gpm for two hours, or 120,000 gallons, according to the ISO Guide for Determination of Needed Fire Flow. However, the Village typically operates the one million gallon storage tank to provide water reserve for fire flow demands. Therefore, the maximum design demand utilized in sizing the emergency interconnection will be based on only maximum day demand.

The Village may anticipate a maximum demand of 482,000 gallons per day, or 335 gallons per minute, assuming maximum daily demand. Typically, the Village is capable of meeting this demand with its one million gallon storage tank and four wells. However, during drought conditions, the Village well capacity has been limited to approximately 187,000 gallons per day. The deficit could therefore be as high as 295,000 gallons per day in the future once the usable tank storage volume has been consumed.

2.1.2 Water Rate

The Village's water rate structure (effective August 2017) is summarized in Table 2-4. A majority of Village customers utilize 5/8" x 3/4" meters and are charged \$5.00 per 1000 gallons with no minimum consumption. Meters 1" and larger are also charged \$5.00 per 1,000 gallons but have a minimum usage amount. In addition, all customers are charged a quarterly charge of \$22.00 for capital improvements.

Table 2-4. Village of Alden Water Rate Structure

Meter Size (in)	Price per 1000 gallons	Quarterly Min. Charge	Allowance per Quarter (gal)
5/8	\$5.00	-	-
3/4	\$5.00	-	-
1	\$5.00	\$105.00	21,000
1-1/2	\$5.00	\$195.00	39,000
2	\$5.00	\$315.00	63,000
3	\$5.00	\$600.00	120,000
4	\$5.00	\$990.00	198,000

In addition, the Village charges a fee for private fire hydrants and fire protection systems as shown in Table 2-5 below.

Table 2-5. Village of Alden Private Fire Protection Fee

Connection Size (in)	Annual Charge
2	\$108.00
3	\$174.00
4	\$216.00
6	\$396.00
8	\$648.00

The current annual marginal cost of production, based on power, testing, repair, and chemical costs for treatment, is \$54,200 per the Village's 2016-2017 Budget Appropriations for the Water Fund and input from Village personnel. This corresponds to \$0.68 per 1,000 gallons produced.

2.1.3 Temporary Emergency Interconnection

On August 8, 2016, a temporary emergency interconnection was installed between the Village and ECWA systems. The connection was along Exchange Street near the Village line between an existing 2-inch blow-off at the dead-end of an 8-inch ECWA waterline and an existing Village fire hydrant approximately 100 feet away. The connection utilized fire hose above grade and included a 2-inch water meter and backflow assembly provided by ECWA.

The temporary emergency interconnection on Exchange Street is in the ECWA Marilla pressure zone. The Village purchased supplemental water for three months at a continuous rate of approximately 35 gpm, or about 50,000 gpd ($\pm 25\%$ of the Village's water supply). The Village purchased a total of 4,032,000 gallons during the three-month duration at a cost of \$13,026.

2.2 ECWA Water Supply

ECWA offers several types of service agreements to provide potable water to municipalities. The Village is interested in Bulk Sale. This provides two options: supplemental supply or sole supply. The service agreements are described below, including ECWA requirements of the Village for implementation and the ECWA rate structure.

2.2.1 Bulk Sale

Under the bulk sale agreement, ECWA would provide water to the Village. The Village would be responsible for its water system operations, including system maintenance, meter readings, billing, customer service, and capital improvements.

The Village would be required to extend its system to interconnect with ECWA and install a master meter pit. ECWA will furnish, install and maintain a meter and meter couplings to record the quantity of water to be used for billing. All other associated costs of the interconnection, except for the meter, would be incurred by the Village. The Village would supply the necessary piping, fittings, valves, and pipe couplings for the meter pit. In addition, the Village is required to have a NYSDOH approved backflow prevention program.

Under the bulk sale agreement, the Village may choose to supplement their existing water supply or use ECWA water as their sole supply.

2.2.1.1 Supplemental Water Supply

Under a supplemental agreement, ECWA would bill the Village on a monthly basis. Depending on the size of the meter, a minimum monthly commodity charge, monthly infrastructure investment charge and monthly allowance would be applicable (refer to Table 2-7). Any water usage above the monthly allowance would be billed according to the current ECWA rate schedule, effective January 1, 2017, for meter sizes 1 ¼" and greater as provided in Table 2-6. Meters are read and billed monthly to the nearest thousand gallons.

Table 2-6. ECWA 2017 Commodity Rate (ECWA Tariff, 13.01.C)

Meter Size (in)	Price per 1000 gallons
≥ 1-1/4	\$2.48

Table 2-7. ECWA 2017 Minimum Charges (ECWA Tariff, 13.01.C)

Meter Size (in)	Monthly Allowance (gal)	Monthly Commodity Charge (\$)	Monthly Infrastructure Investment Charge (\$)	Monthly Min. Charge (\$)
1-1/4	9,000	22.32	8.46	30.78
1-1/2	13,000	32.24	8.46	40.70
2	21,000	52.08	13.53	65.61
3	40,000	99.20	25.37	124.57
4	66,000	163.68	42.29	205.97
6	130,000	322.40	84.57	406.97
8	210,000	520.80	135.30	656.10
10	300,000	744.00	194.50	938.50
12	410,000	1,016.80	363.62	1,380.42
20	940,000	2,331.20	1,564.92	3,896.12
24	1,280,000	3,174.40	3,160.28	6,334.68

Note: Monthly minimum charge and allowance are one third of the quarterly minimum charge and allowance.

In addition to the minimum charge provided by the ECWA rate schedule, there is another minimum monthly payment applicable to purchase of supplemental water supply. The minimum monthly payment is the payment calculated for the amount of water used assuming that the minimum water used each month is at least 50% of the maximum amount of water used during any one of the preceding 24 months (ECWA Tariff, 2.16).

2.2.1.2 Sole Water Supply

Under a sole water supply agreement, ECWA would bill the Village on a monthly basis. Depending on the size of the meter, a minimum monthly charge and monthly allowance would be

applicable (refer to Table 2-7). Any water usage above the quarterly allowance would be billed according to the current ECWA rate schedule provided in Table 2-6. Meters are read and billed monthly to the nearest thousand gallons.

2.2.2 Potential Interconnection Locations

2.2.2.1 Exchange Street

ECWA operates an 8-inch diameter waterline along Exchange Street in the Town of Alden which ends in a 2-inch blow-off in front of House No. 845 near the Alden Village line. The temporary emergency interconnection at this location operated for a duration of three months at a continuous flow rate of 35 gpm. At this location, the ECWA system is served by the Marilla pressure zone.

Nussbaumer met with ECWA and it was determined that interconnection at this location is acceptable for supplemental supply. However, sole water supply from ECWA was not recommended at this location.

2.2.2.2 Broadway

ECWA operates an 8-inch diameter waterline along Broadway in the Town of Alden which ends in a 2-inch blow-off in front of House No. 12812 near the Alden Village line. At this location, the ECWA system is served by the Broadway/Sandridge pressure zone.

Nussbaumer met with ECWA and it was determined that interconnection at this location is preferred for sole water supply.

2.2.2.3 West Main Street

ECWA operates an 8-inch diameter waterline along West Main Street in the Town of Alden which ends in a 2-inch blow-off in front of the Town of Alden Highway Department near the Alden Village line. At this location, the ECWA system is served by the Broadway/Sandridge pressure zone.

A schematic comparing the elevations of the Village storage tank to the Marilla and Sandridge storage tanks in the ECWA system is included in Figure 2.1. Typically, the Village operates its storage tank from approximately El. 986.5 and El. 990.5 within one half of a foot of the overflow (El. 991). The ECWA operates the Sandridge tank between approximately El. 967 and El. 977. The Marilla tank is typically operated between El. 1100 and El. 1125 during the non-summer months and El. 1088 and El. 1125 during the summer.

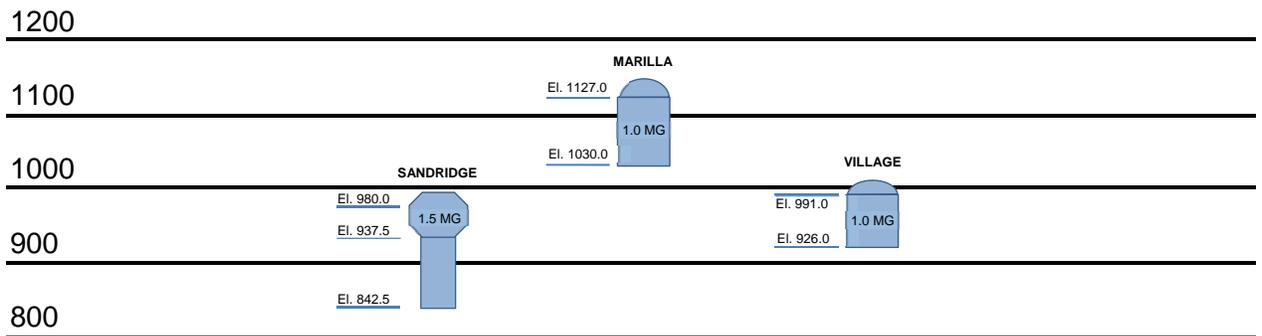


Figure 2-1. Water Storage Tank Elevation Schematic

3.0 ADDITIONAL WELL

Consideration has also been given to the addition of another Village owned and operated well. The additional well would likely be installed on an adjacent Village owned property near Well Site 1. Because the additional well would serve as a supplemental source to existing water supply, the need for increased capacity at the existing treatment facilities is not anticipated. Iron, manganese, and hydrogen sulfide are not a concern in groundwater at Well Site 1; therefore existing treatment facilities would be adequate to treat the new supply from the additional well.

The estimated cost of construction for an additional well is approximately \$500,000. This includes well drilling and development, construction of a structure to house the well, a submersible well pump, and piping to the existing treatment facilities. A detailed cost estimate is included in **Appendix D**. An additional well may result in increased operation and maintenance costs, such as power costs for pumping.

The projected capital cost of \$500,000 for construction of an additional well is estimated to result in a rate increase of \$0.31 per 1,000 gallons. This estimated rate increase is based upon a 40-year payback period with two percent interest compounded annually.

However, well capacity cannot be guaranteed prior to drilling. Well performance cannot be guaranteed in drought conditions, especially as the additional well would likely draw from the same aquifer as existing Village wells. Therefore, development of an additional well is not recommended as the well may not provide adequate supplemental supply during a drought. Interconnection with the ECWA, on the other hand, would provide reliable water supply during drought conditions as shown in the summer months of 2016.

4.0 INTERCONNECTION OPTIONS

Per the meeting with ECWA, the interconnection at Exchange Street was determined to be preferable for supplemental supply. Broadway was preferable for sole supply. Multiple interconnections were recommended for redundancy; Exchange Street and Broadway were considered.

4.1 Supplemental Supply: Interconnection at Exchange Street

Should the Village choose to establish a permanent connection with the ECWA intended for use as a supplemental supply, installation of a master meter pit at Exchange Street is recommended. Pressures at this location are anticipated to be adequate to supply water to the Village's tank without the need for booster pumps (refer to Figure 2-1), and so the ECWA standard meter vault detail is recommended without revision. The ECWA standard meter vault detail is included in **Appendix C**.

A 3-inch Neptune meter (ECWA standard) was selected to meet the design maximum daily demand of 335 gpm. While the Village would not typically use the meter at this flow rate, the meter should be capable of meeting the Village's full water demand in case of an emergency. At maximum day demand, the 3-inch meter is anticipated to operate at 335 gpm with a pressure loss of about 10 psi, or about 23 feet of head. This is not a concern because the ECWA operating pressure at exchange Street is approximately 50 psi higher than the Village. When supplementing

Village demand, the meter is anticipated to operate at approximately 35 gpm with negligible pressure loss.

4.2 Sole Supply: Interconnection at Broadway & Exchange Street

Should the Village choose to establish a permanent connection with the ECWA intended for use as the Village's sole supply and abandon use of the Village's wells, installation of master meter pits at both Broadway and Exchange Street is recommended. The ECWA raised concerns that the Marilla pressure zone might not be adequate for sole supply; therefore, interconnection at Broadway is preferred by the ECWA. However, in a sole supply scenario, system redundancy with two interconnections is recommended.

Pressures at Broadway are not anticipated to be adequate to supply water to the Village's tank without the need for booster pumps (refer to Figure 2-1), and so the ECWA standard meter vault detail requires revision to include an inline booster pump accommodated by a larger vault size.

A 4-inch Neptune meter was selected to meet the design maximum daily demand of 335 gpm with minor pressure loss. At maximum day demand, the 4-inch meter is anticipated to operate at 335 gpm with a pressure loss of less than one psi, or less than 2 feet of head. At average daily demand, the meter is anticipated to operate at approximately 190 gpm with negligible pressure loss.

5.0 COST OF CONSTRUCTION

5.1 Interconnection at Exchange Street

The estimated cost of construction for permanent interconnection at Exchange Street is \$80,000. This includes construction of the meter vault and all associated piping, valves, and appurtenances, including an 8-inch ductile iron pipe (D.I.P.) bypass line and an 8-inch D.I.P. waterline from the existing Village and ECWA systems to the interconnection/meter vault. The meter vault was sized per the ECWA standard meter vault detail (refer to **Appendix C**) for a 3-inch meter. A detailed cost estimate is included in **Appendix D**.

5.2 Interconnection at Broadway

The estimated cost of construction for permanent interconnection at Broadway is \$100,000. This includes construction of the meter vault and all associated piping, valves, inline booster pump, and appurtenances, including an 8-inch ductile iron pipe (D.I.P.) bypass line and an 8-inch D.I.P. waterline from the existing Village and ECWA systems to the interconnection/meter vault. The meter vault was sized per the ECWA standard meter vault detail (refer to **Appendix C**) for a 4-inch meter. A detailed cost estimate is included in **Appendix D**. The cost estimate does not include the cost to purchase and install a second inline booster pump or SCADA system. However, the Village is advised to consider purchasing a second pump as a spare unit to maintain system operation should the first pump require maintenance. Integration of the meter pit with the Village's SCADA system is also recommended in order to monitor pump and meter operation.

6.0 WATER RATE ANALYSIS

The Village's current water budget (2016-2017) indicates that the Village spends \$434,550 annually, including debt service and capital reserve deposit. The Village recovers this cost by charging customers \$5.00 per 1,000 gallons and the \$22.00 quarterly capital charge (rates effective August 2017).

Installation of an interconnection with the ECWA will include upfront capital costs as described in the preceding section. In addition to the capital costs, the Village would purchase water from the ECWA according to the ECWA rate schedule.

For a supplemental / emergency supply, interconnection at Exchange Street through a 3-inch meter is recommended. The Village is advised to operate the interconnection to use the 40,000 gallon allowance each month, as the monthly minimum charge will apply with or without usage. At a flow rate of 35 gpm, the Village would only need to open the connection for less than one day each month.

However, the Village is advised that a new minimum monthly payment may be applied if the Village's usage of the 3-inch interconnection in any one month exceeds 80,000 gallons under Section 2.16 of the ECWA Tariff. The minimum monthly payment is the payment calculated for the amount of water used assuming that the minimum water used each month is at least 50% of the maximum amount of water used during any one of the preceding 24 months. Therefore, half of the Village's maximum monthly usage will be charged for the following two years if the Village uses more than 80,000 gallons (of which 50% is 40,000 gallons, which correlates to the applicable monthly minimum per Table 2-6) in any one month. During summer drought conditions in 2016, the Village purchased approximately 50,000 gallons per day on a continual basis for three months. If the Village were to use the permanent interconnection in this same manner, a new monthly minimum payment would be calculated based on 50% of 1,550,000 gallons for the maximum month, and a minimum monthly commodity charge of \$1,922 would apply. Monthly minimum payments for the next two years would be \$1,947, for an annual total of approximately \$23,400.

For sole supply, interconnection at Broadway and Exchange Street is recommended for redundancy. Interconnection at Exchange Street is recommended as described above in the supplemental supply scenario. Interconnection at Broadway is recommended through a 4-inch meter with an inline booster pump. The Village would purchase all water from the ECWA and abandon use of their well sites and treatment system. The Village would save the cost of Village water production, which includes chemical costs (chlorine and corrosion inhibitor), power costs, and some maintenance and testing costs used to operate the well pumps. However, other operating and maintenance costs, including personnel costs, would remain.

A summarized cost comparison of the interconnection options is provided in Table 6-1, with description of the three scenarios in the following paragraphs.

Table 6-1. Summary of Interconnection Costs (Bulk Purchase)

	Supplemental Supply (Minimal Use): Interconnection at Exchange St.	Supplemental Supply (25%): Interconnection at Exchange St.	Sole Supply: Interconnection at Broadway & Exchange St.
Capital Cost	\$80,000	\$80,000	\$180,000
ECWA Water Rate per 1000 gal	\$2.48	\$2.48	\$2.48
Annual Water Usage	480,000 gallons ¹	20,000,000 gallons ²	80,000,000 gallons ³
Annual Cost to Purchase ECWA Water⁴	\$1,500	\$49,900	\$199,200
Additional Annual Costs	N/A	N/A	Pumping Cost: \$1,000 Corrosion Inhibitor ⁵ : \$3,500
Total Additional Annual Cost	\$1,500	\$49,900	\$203,700
Annual Savings	Negligible	\$13,500	\$54,200 (Chemical & Power Cost - Wells)
Water Rate Increase⁶	ECWA Water: + \$0.02 Capital: + \$0.05 Total: + \$0.07	ECWA Water: + \$0.61 Capital: + \$0.05 Total: + \$0.66	ECWA Water: + \$2.53 Capital: + \$0.11 Total: + \$2.64
Est. Village Water Rate per 1000 gal⁷	\$5.07	\$5.66	\$7.64

¹ Based on ECWA monthly allowance of 40,000 gallons.

² Based on 25% of the average daily demand of 218,500 gallons.

³ Based on average daily demand of 218,500 gallons.

⁴ Includes monthly infrastructure investment charge for applicable meter size.

⁵ The ECWA does not feed corrosion inhibitor to their system, but rather uses a higher pH of approximately 8. The Village may need to add corrosion inhibitor to the water purchased from ECWA. The anticipated cost is included in this summary, but the proposed interconnection meter vault does not include a corrosion inhibitor feed system.

⁶ Rate increase due to ECWA water purchase is based on the annual cost to purchase water less the money saved on operations. Rate increase due to capital is based on a 40-year payback period with 2% interest compounded annually. All rates assume the average daily metered consumption of 162,000 gpd.

⁷ Based on the Village water rate of \$5.00 per 1,000 gallons effective August 2017. The quarterly capital surcharge of \$22 would still apply in all scenarios to cover the cost of existing debt services.

Purchase from the ECWA for minimal supplemental supply translates to an effective rate, which is exclusive of capital cost, of \$3.11 per 1,000 gallons. The effective rate to purchase water is higher than the ECWA commodity rate due to the infrastructure investment charge. Purchase from the ECWA for supplemental supply of 25% translates to an effective rate of \$2.50 per 1,000 gallons. Purchase from the ECWA for sole supply translates to an effective rate of \$2.49 per 1,000 gallons. Two monthly infrastructure investment charges (one for each interconnection) would apply. The total cost of sole supply, including additional electrical and chemical costs, is \$2.55 per 1,000 gallons. These rates correspond to the Village's cost of production of \$0.68 per 1,000 gallons.

7.0 SUMMARY & RECOMMENDATION

Due to the drought conditions in 2016, decreased well yields in the Village led to the need for a supplemental water supply. The temporary emergency interconnection with the ECWA on Exchange Street proved effective to supplement the Village's water supply without adverse impact to the ECWA system. While the Village's cost of production is significantly less than the cost to purchase water from the ECWA, the availability of a supplemental supply is still desirable.

Several options were considered as an alternate water supply to the Village: supplemental supply from ECWA, sole water supply from ECWA, and an additional Village well.

The cost implications for supplemental supply from ECWA are reasonable with either minimal water use or purchase of 25% of the Village's supply. The increase to Village water rates for the capital costs to construct the Exchange Street interconnection is anticipated to be \$0.05 per 1,000 gallons. The cost to purchase ECWA water would increase Village water rates by \$0.02 to \$0.61 per 1,000 gallons depending upon actual usage.

Purchase of ECWA water for sole supply, though, is anticipated to result in a significant increase of Village water rates by \$2.64 per 1,000 gallons. This is predominately due to the increased cost to purchase water at the ECWA rate of \$2.48, which is far greater than the Village's current cost of production of \$0.68 per 1,000 gallons. Sole supply is therefore not recommended at this time.

An additional Village well was also considered. However, well capacity and performance cannot be guaranteed prior to drilling. Development of an additional well is not recommended as the well may not provide adequate supplemental supply during a drought.

The installation of a permanent interconnection at Exchange Street using a 3-inch meter for supplemental and emergency supply is recommended. The interconnection at Exchange Street is recommended to serve as the primary source of supplemental supply from ECWA, as there is adequate pressure without additional pumping. The Village would have an established connection capable of supplying full water demands if needed. The estimated construction cost for the interconnection is \$80,000.

A second interconnection is recommended for consideration should the Village choose to purchase water from ECWA. The second connection would provide redundancy and additional capacity. The interconnection at Broadway is recommended for this purpose. A 4-inch meter and an inline booster pump would be required, increasing the estimated cost of construction to \$100,000. The total estimated probable construction cost for both interconnections is \$180,000.

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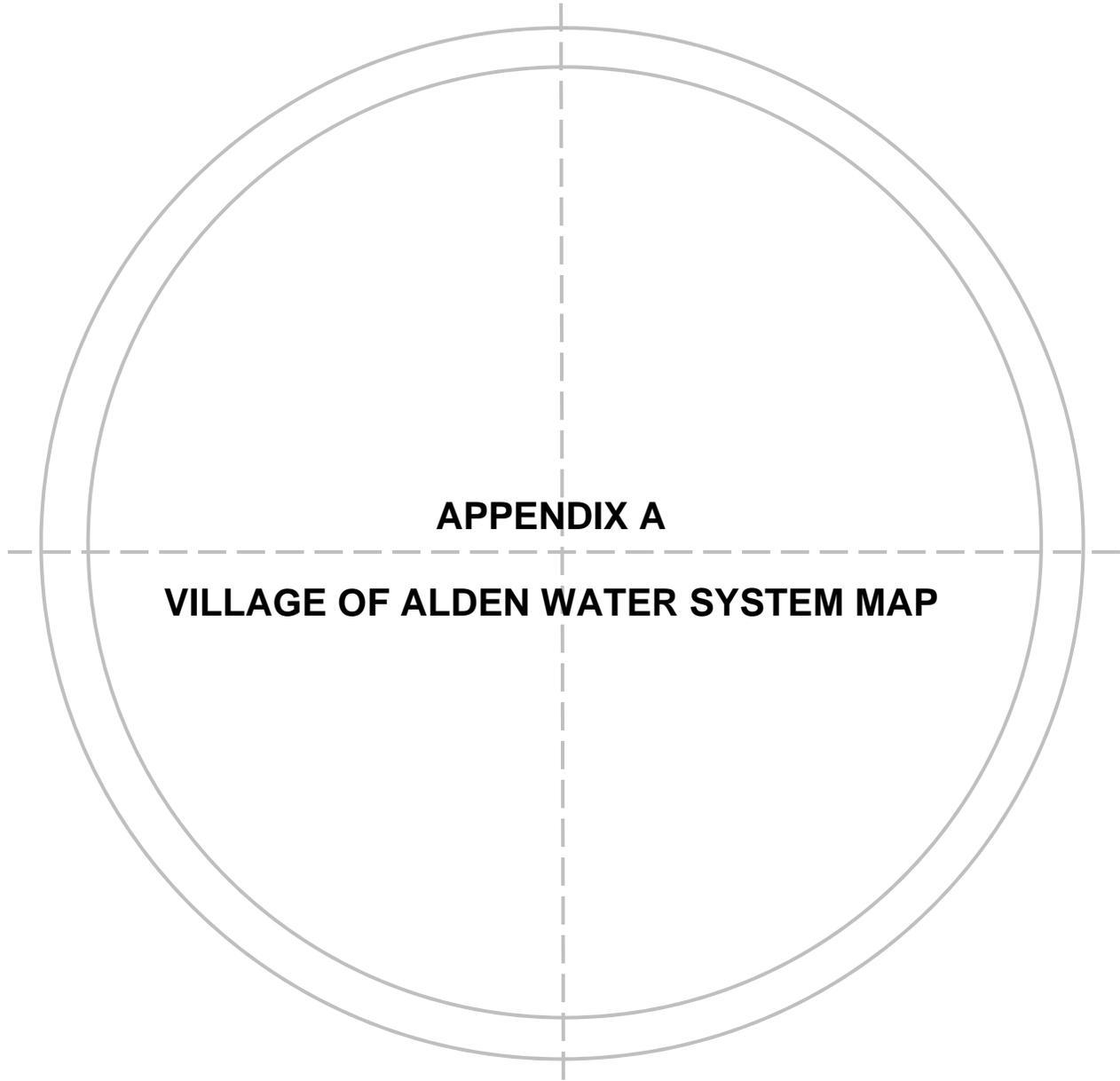
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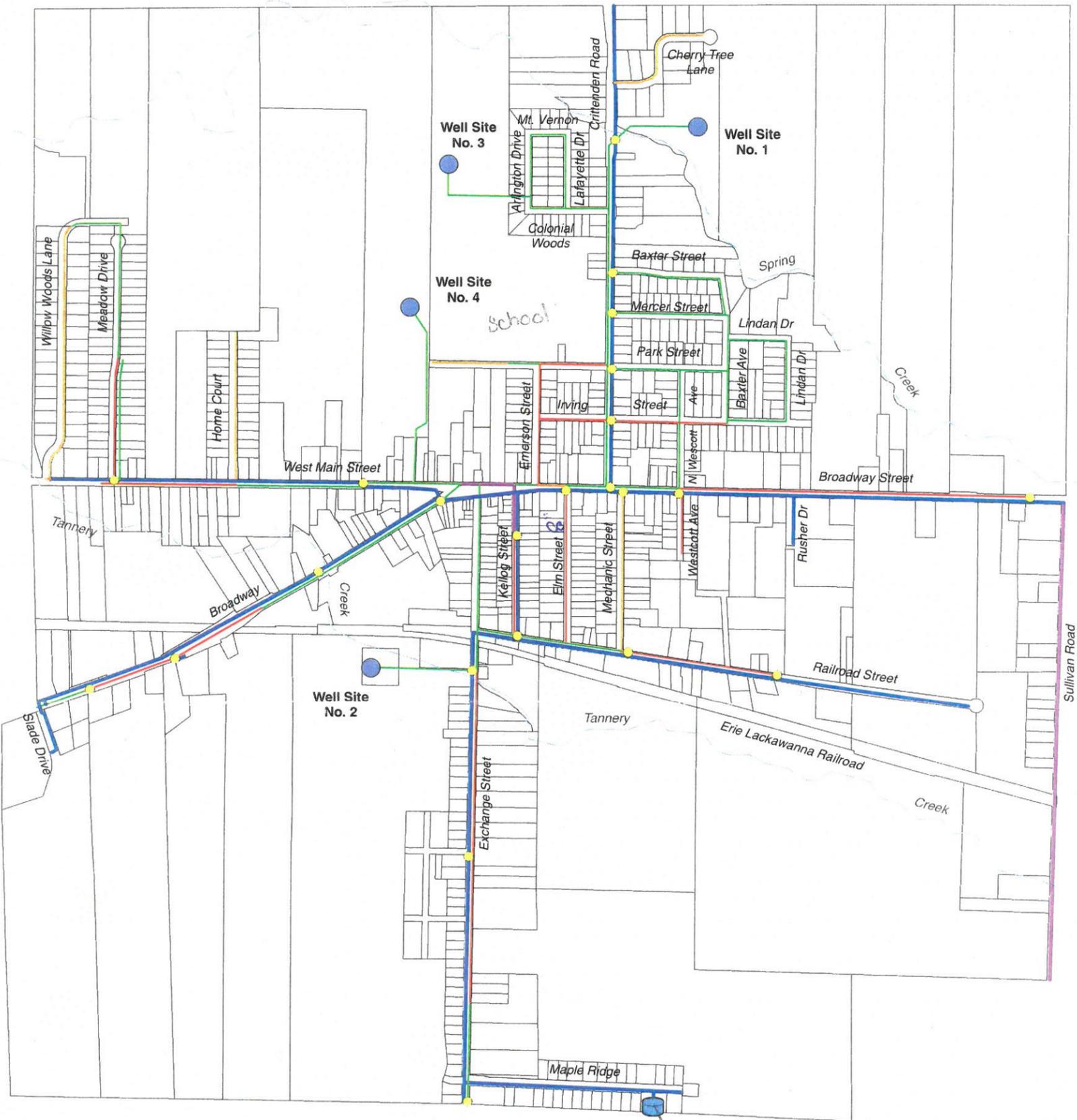
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Village of Alden Water System Evaluation. CRA Infrastructure & Engineering, Inc. November 2007.





Legend

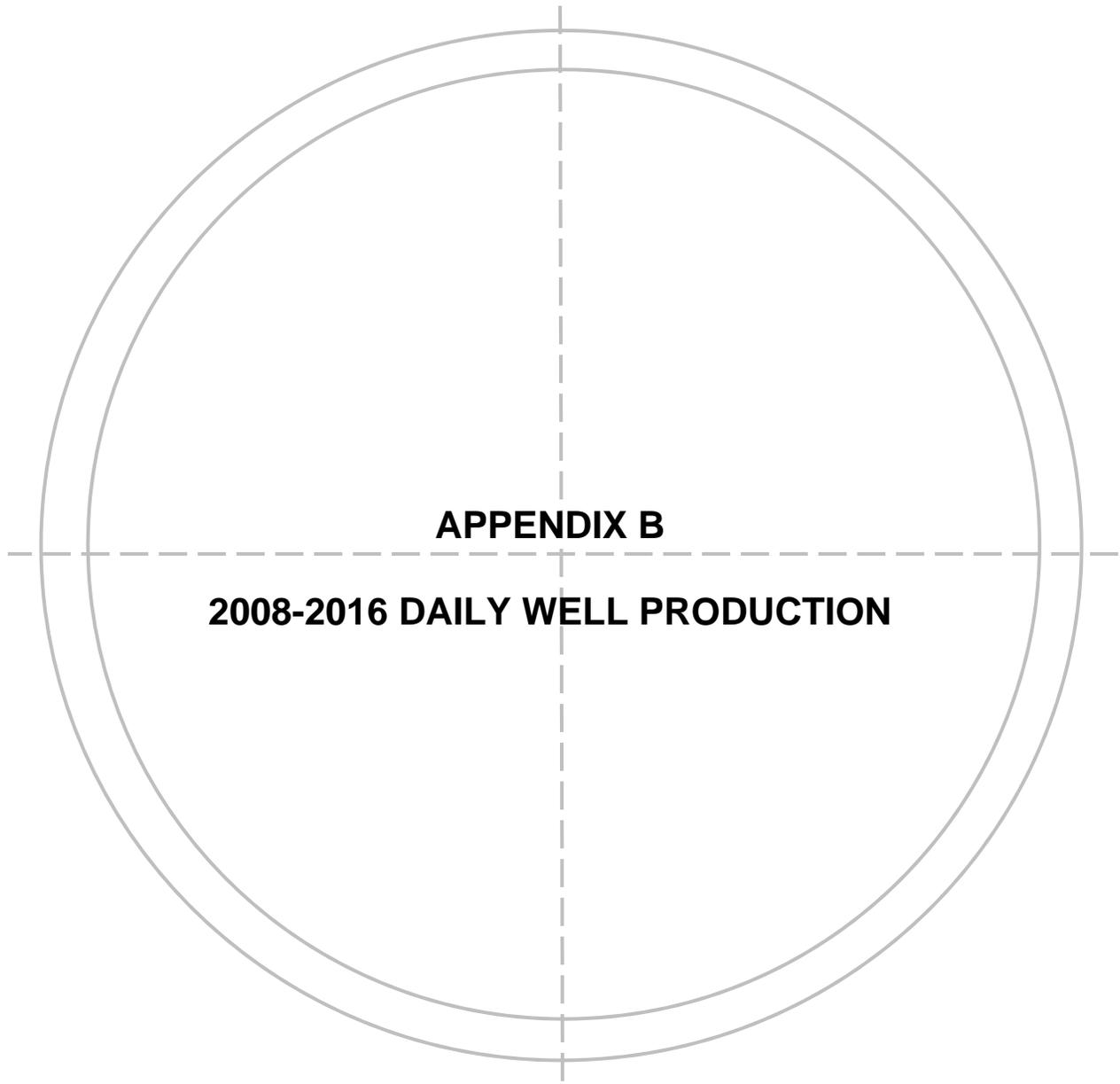
- 12" Watermain
- 10" Watermain
- 8" Watermain
- 6" Watermain
- 4" Watermain
- Well Site
- Interconnection
- Streams
- Land Parcels

1 Million Gallon Storage Tank

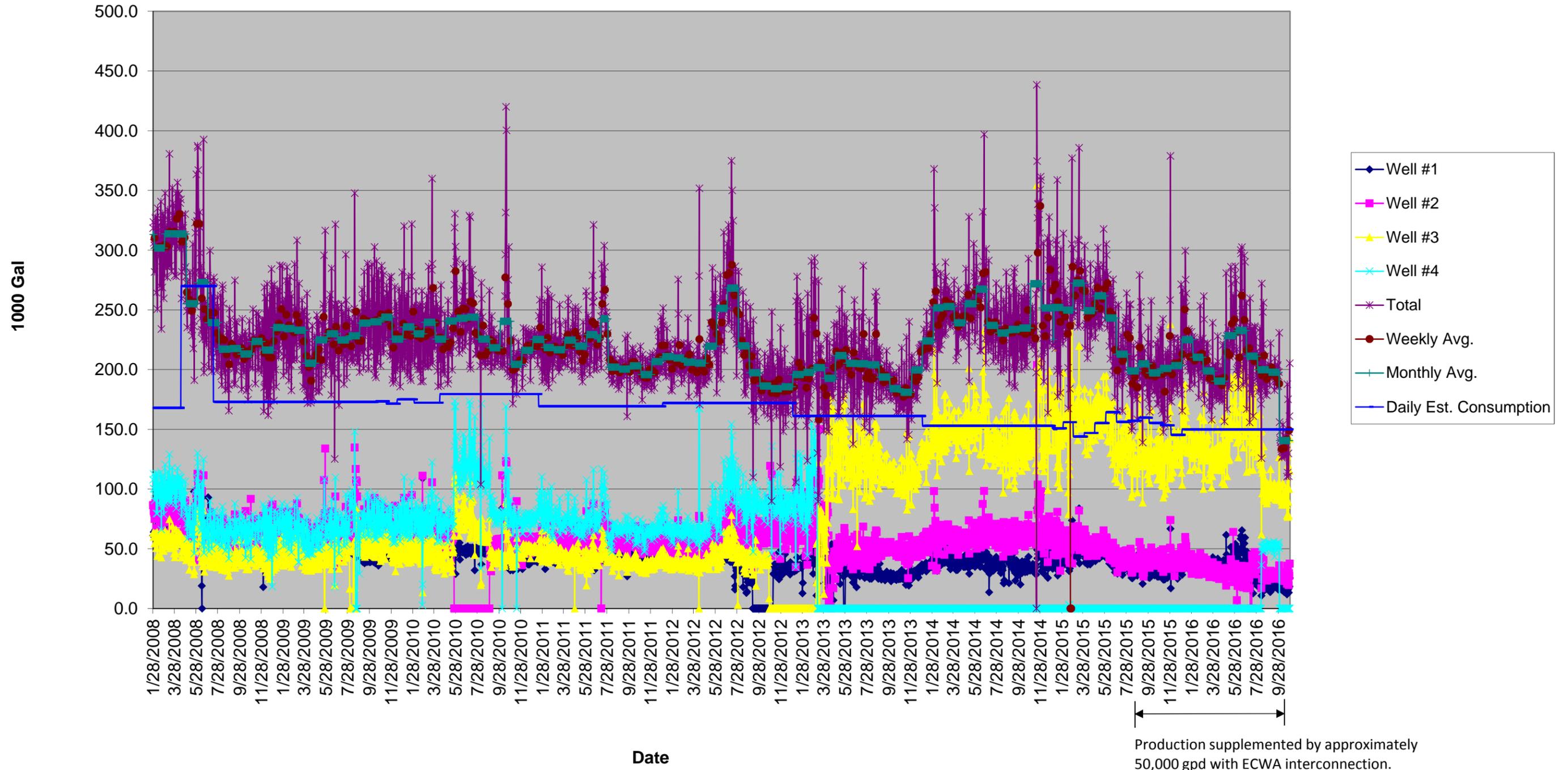


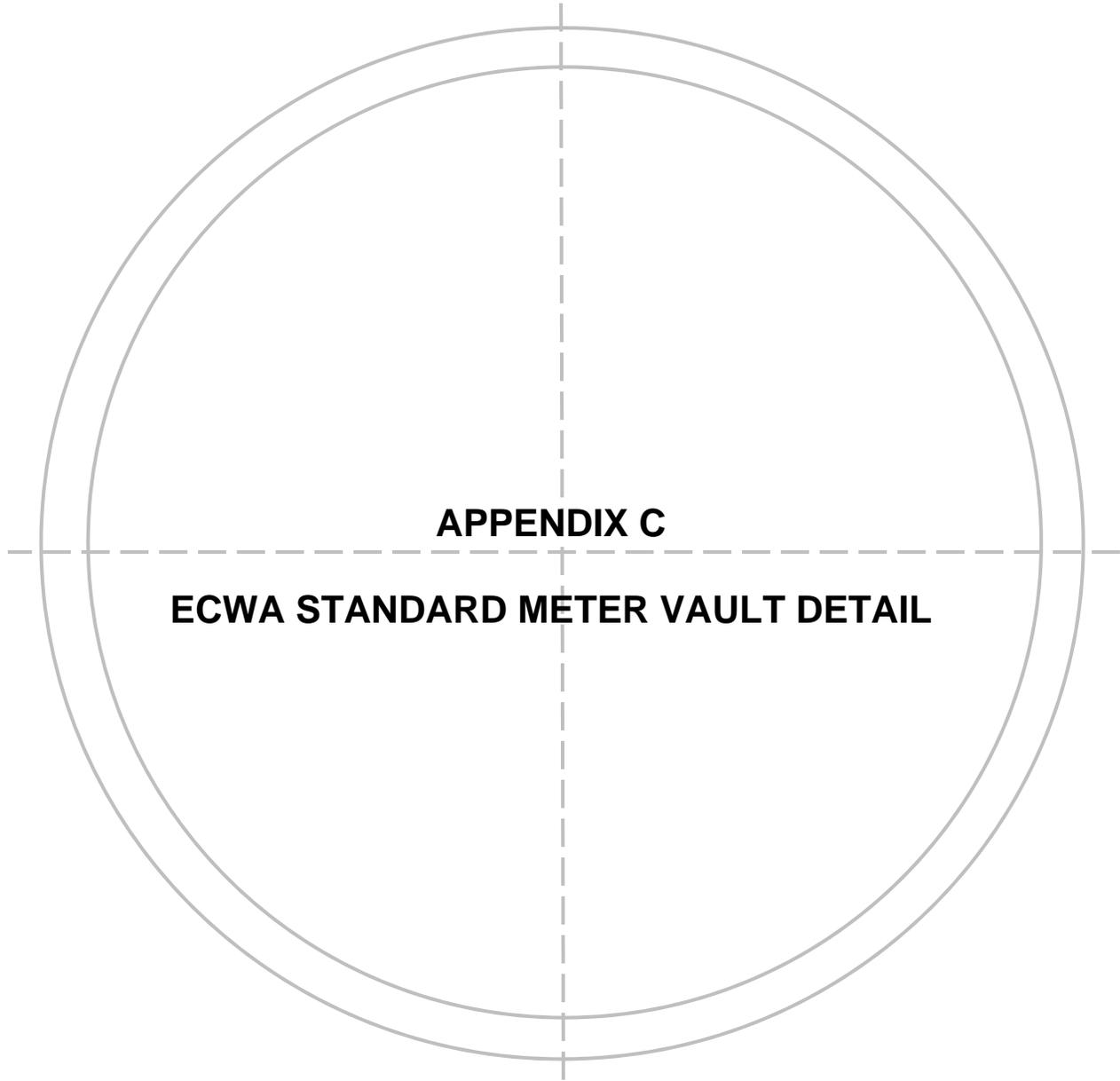
CRA Infrastructure & Engineering, Inc.

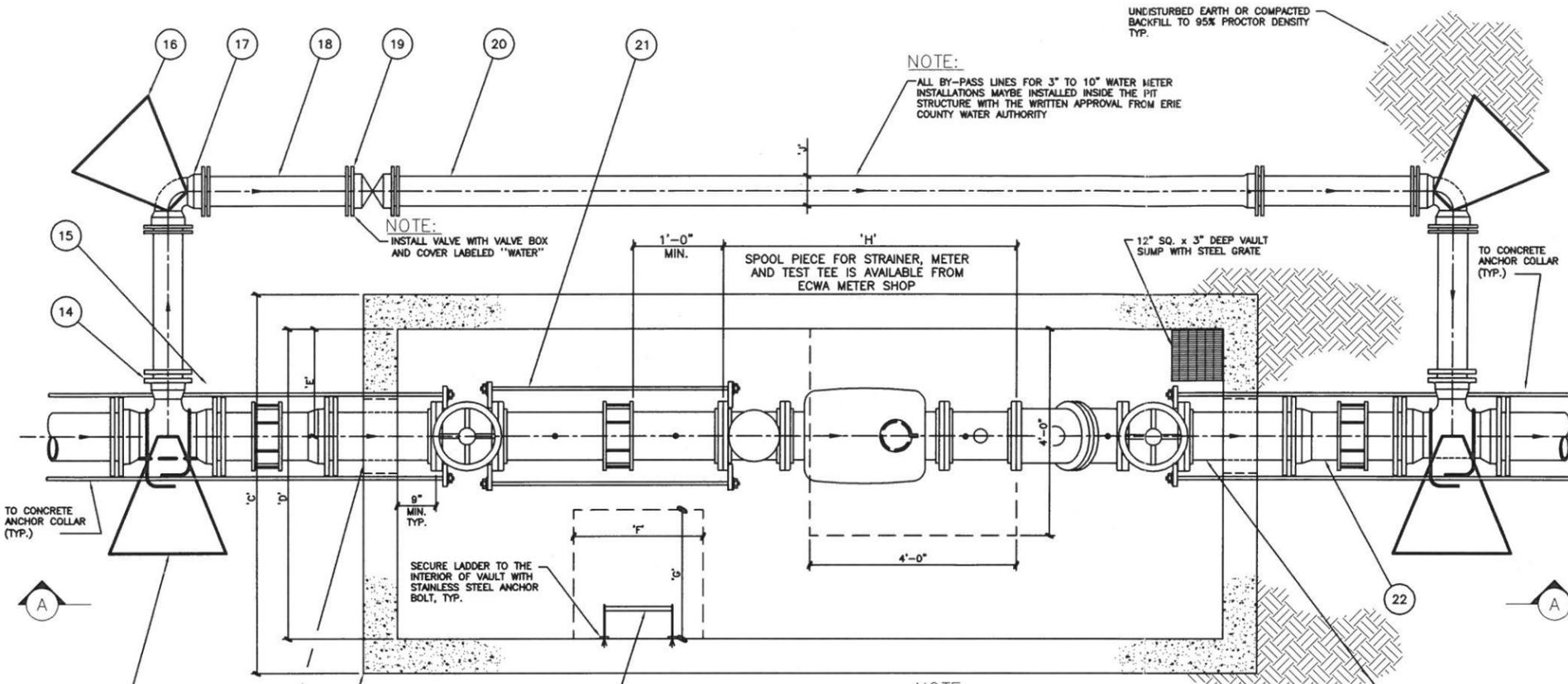
Figure No. 1
Water Treatment and Distribution System
 Village of Alden, New York
 Scale: 1" = 1000'



2008-2016 Daily Well Production

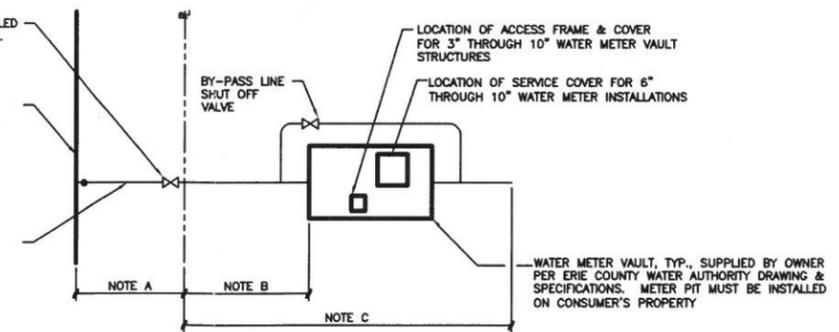
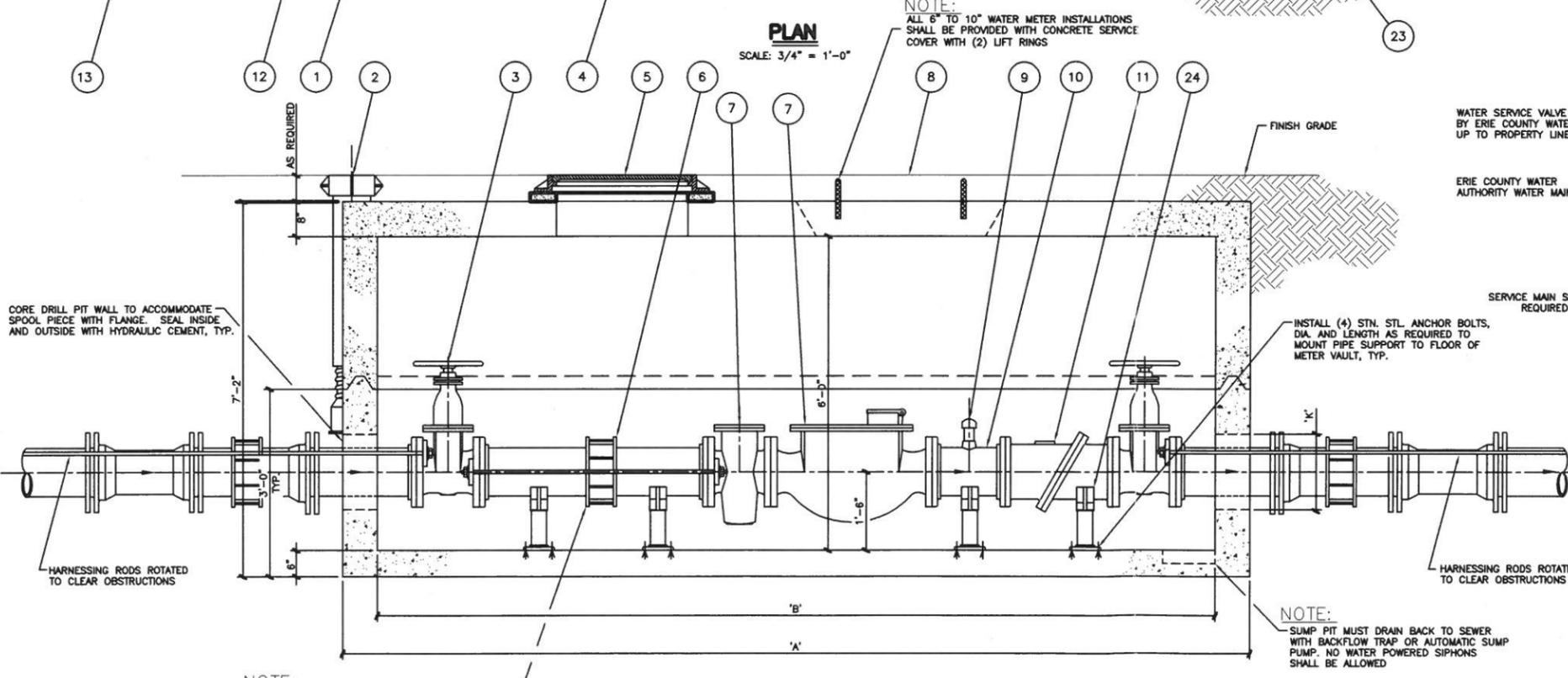






BILL OF MATERIAL				
ITEM	DESCRIPTION	QUAN.	MODEL	JT. TYPE
1	CONCRETE WATER METER VAULT, SEE DIMENSION TABULATION BELOW	1	AS REQUIRED	----
2	VALVE BOX, WITH NO. 6 BASE AND COVER LABELED "WATER"	1	----	----
3	VALVE, GATE, KENNEDY, AWWA, RESILIENT WEDGE, SIZE AS REQUIRED	2	FIG. 57 FIG. 1561	THREADED FLANGED
4	ACCESS LADDER, GALV. STEEL WITH SAFETY POST LADDER UP BY BILCO OR EQUAL	1	----	----
5	ACCESS FRAME AND COVER, NEENAH R1879B9L, DOUBLE LEAF W/2 TYPE 'C' DROP HANDLES	1	R1879B9L	----
6	SLEEVE COUPLING, D.I PIPE, DRESSER OR EQUAL (FOR 3" TO 10" METERS ONLY)	3	STYLE 36	PE x PE
7	WATER METER AND STRAINER, PROVIDED BY ERIE COUNTY WATER AUTHORITY, SIZE AS REQUIRED	1	----	FLANGED
8	CONCRETE SERVICE COVER W/(2) LIFT RINGS	1	----	----
9	PIPE CAP, 2"	1	FIG. 57	THREADED
10	TEST TEE, STEEL, PROVIDED BY ERIE COUNTY WATER AUTHORITY, SIZE AS REQUIRED	1	----	FLANGED
11	VALVE, SLANTING CHECK, BY APCO OR EQUAL, SIZE AS REQUIRED (FOR 3" TO 10" METERS ONLY)	1	MOD. 800	FLANGED
12	HYDRAULIC CEMENT SEAL	2	MOD. LS	----
13	CONCRETE THRUST BLOCK WITH STEEL REBAR ANCHORS FOR TEE, SIZE AS REQUIRED	2	----	----
14	TEE, REDUCING, D.I., SEE TABULATION BELOW	2	----	MECH. JT.
15	HARNESSE ASSEMBLY, SIZE AND LENGTH AS REQUIRED	2	----	----
16	CONCRETE THRUST BLOCK FOR 90° ELBOW, SIZE AS REQUIRED	2	----	----
17	ELBOW, 90°, D.I., SIZE AS REQUIRED	2	----	MECH. JT.
18	SPOOL PIECE, D.I., SIZE & LENGTH AS REQUIRED	2	----	PE x PE
19	VALVE, GATE, KENNEDY, RESILIENT WEDGE, SIZE AS REQUIRED INSTALL WITH ITEM #2 ABOVE	1	FIG. 571	MECH. JT.
20	BYPASS LINE FOR WATER METER VAULT, D.I. PIPE SIZE AND LENGTH AS REQUIRED	1	----	MECH. JT.
21	HARNESSE ASSEMBLY, SIZE AND LENGTH AS REQUIRED	2	----	----
22	SPOOL PIECE, D.I., WITH LOCK-FAST JOINT BY AMERICAN CAST IRON, SIZE AS REQUIRED	2	----	BELL x PE
23	SPOOL PIECE, D.I., WITH LOCK-FAST JOINT BY AMERICAN CAST IRON, SIZE AS REQUIRED	2	----	FLG x PE
24	PIPE SUPPORT, GRINNEL OR EQUAL, SIZE AS REQUIRED	4	FIG. 258	----

PIPE DIA.	VAULT DIMENSIONS									
	'A'	'B' MIN.	'C'	'D' MIN.	'E'	'F'	'G'	'H'	'J'	'K'
3"	9'-0"	7'-0"	5'-6"	4'-6"	1'-7 1/2"	2'-6"	3'-0"	2'-7"	3" D.I.	8"
4"	9'-0"	7'-0"	5'-6"	4'-6"	1'-7 1/2"	2'-6"	3'-0"	2'-9"	4" D.I.	8"
6"	11'-4"	10'-0"	6'-4"	5'-0"	1'-7 1/2"	2'-6"	3'-0"	3'-9"	4" D.I.	10"
8"	11'-4"	10'-0"	6'-4"	5'-0"	1'-7 1/2"	2'-6"	3'-0"	4'-5"	6" D.I.	12"
10"	17'-4"	16'-0"	7'-4"	6'-0"	2'-1 1/2"	2'-6"	3'-0"	5'-8"	6" D.I.	14"



GENERAL NOTES:

- MATERIALS USED; THICKNESS OF WATER METER VAULT WALLS, TYPE OF MANHOLE COVER AND FRAME, AND OTHER MISCELLANEOUS APPURTENANCES, SHALL BE GOVERNED BY ERIE COUNTY WATER AUTHORITY SPECIFICATIONS AND LOCAL TRAFFIC CONDITIONS.
- ALL DUCTILE IRON PIPE SHALL BE THICKNESS CLASS 52 UNLESS SPECIFIED OTHERWISE.
- ALL DUCTILE IRON FITTINGS SHALL BE CLASS 350 ANSI/AWWA C110/A21.01-82 UNLESS SPECIFIED OTHERWISE.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR CHECKING AND VERIFYING ALL LOCATIONS, DIMENSIONS AND ELEVATIONS SHOWN.
- ANCHORING OF PIPE TO THE CONCRETE PIT STRUCTURE SHALL NOT BE ALLOWED IN THE WATER METER PIT.
- CHECK VALVE MAY BE OMITTED WITH PRIOR APPROVAL FROM ECWA; WHEN SERVICE HAS A BACKFLOW PREVENTION DEVICE OR WHEN USING A NEPTUNE PROTECTUS III WATER METER ON A COMBINATION FIRE/DOMESTIC POTABLE WATER SERVICE

NOTE: HARNESSE SLEEVE COUPLINGS TO BE INSTALLED IN LINE FOR ALL PIPE LINES 3" TO 10" UNLESS SPECIFIED OTHERWISE

NOTE: SUMP PIT MUST DRAIN BACK TO SEWER WITH BACKFLOW TRAP OR AUTOMATIC SUMP PUMP. NO WATER POWERED SIPHONS SHALL BE ALLOWED

NOTE: ACCESS LADDER HAS BEEN OMITTED TO IMPROVE CLARITY

BEFORE YOU DRILL OR BLAST IN WESTERN OR CENTRAL NEW YORK, CALL DRG SAFELY NEW YORK 1-800-962-7952.



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CERTIFICATE NO. _____

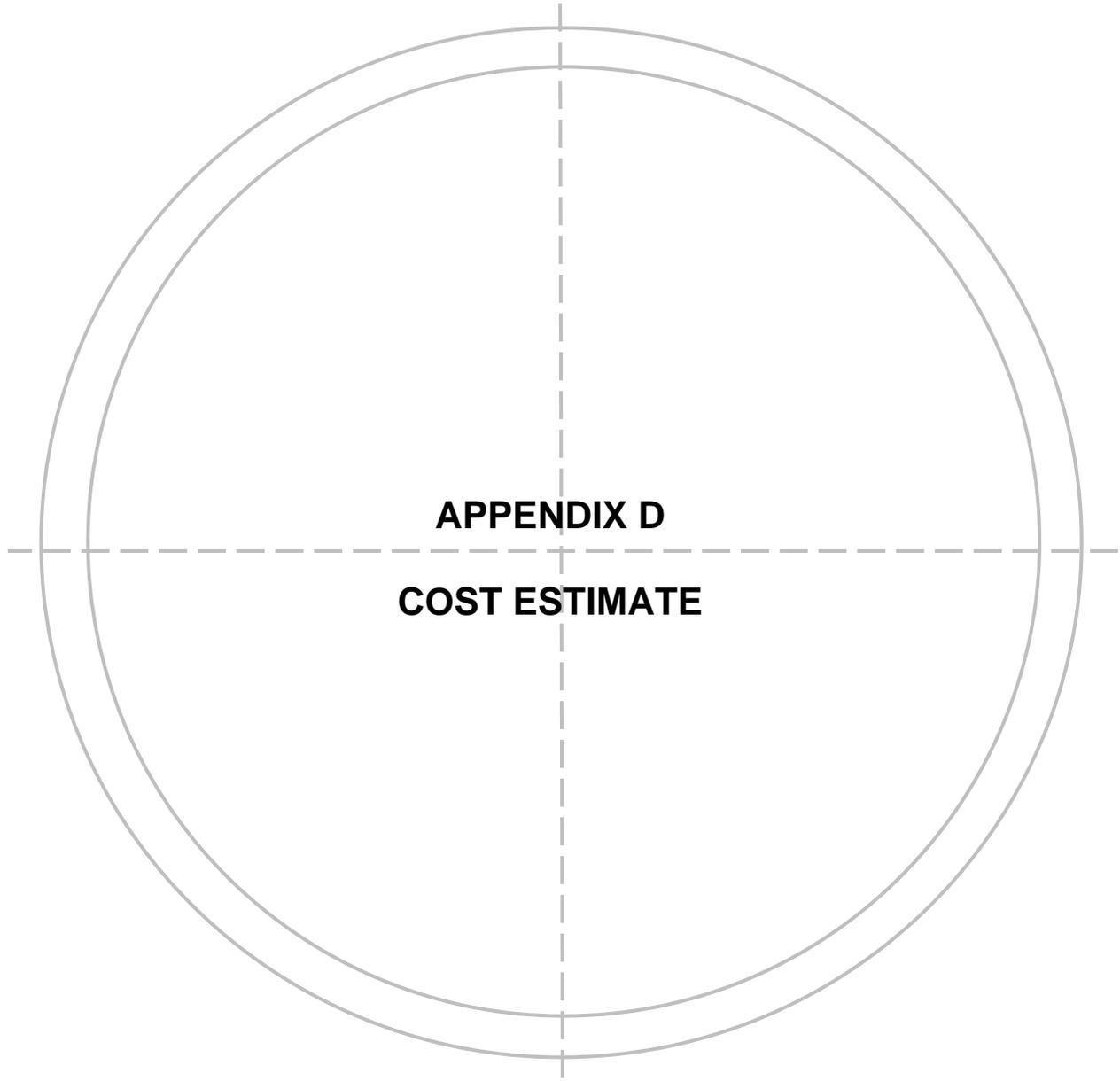
REVISIONS			DESIGNED BY: ECWA	CHECKED BY: RMR
NO.	BY	DATE	DRAWN BY: BNH	CHECKED BY: MTM
			DATE: 12/5/16	SCALE: As noted
			JOB NO. 16J1-0128	SURVEY NO. _____
				REPORT NO. _____
			DRAWING NO. X	



VILLAGE OF ALDEN
PERMANENT INTERCONNECTION
WITH ECWA

METER VAULT

SHEET NO. 1 OF 1



Village of Alden, New York Interconnection with ECWA - Exchange Street Estimate of Probable Construction Cost				Engineer's Estimate of Probable Project Cost	
Item Number	Item Description	Item Quantity	Units	Unit Price	Amount
1	Meter Vault - 3" Meter				
1.1	Precast Concrete Meter Vault (9' x 5'-6") with ladder and access cover	1	EA	\$16,000.00	\$16,000
1.2	Excavation of Soil	20	CY	\$15.00	\$300
1.3	Disposal of Excess Excavated Material	16	CY	\$5.00	\$80
1.4	Backfill w/ Excavated Material	4	CY	\$20.00	\$80
1.5	Landscape Restoration - Grading, Topsoil, and Seeding	10	CY	\$45.00	\$450
1.6	3" Resilient Wedge Gate Valve	2	EA	\$1,000.00	\$2,000
1.7	3" Slanting Check Valve	1	EA	\$5,000.00	\$5,000
1.8	8" Dia. D.I.P.	8	LF	\$100.00	\$800
1.9	3" Dia. D.I.P.	5	LF	\$80.00	\$400
1.10	8" Tee	2	EA	\$1,050.00	\$2,100
1.11	8 x 3" Reducer	2	EA	\$430.00	\$860
1.12	Sleeve Coupling	3	EA	\$600.00	\$1,800
1.13	Miscellaneous (Pipe Supports, Harness Assemblies, Pipe Cap, Thrust Blocks, etc.)	1	LS	\$1,000.00	\$1,000
	Sub - Total Bid Item No. 1				\$31,000
2	8" Bypass Line				
2.1	8" Resilient Wedge Gate Valve	1	EA	\$2,500.00	\$2,500
2.2	Valve Box	1	EA	\$500.00	\$500
2.3	8" Dia. D.I.P	30	LF	\$100.00	\$3,000
2.4	8" Dia. 90° Elbow	2	EA	\$700.00	\$1,400
2.5	Excavation of Soil	24	CY	\$15.00	\$360
2.6	Disposal of Excess Excavated Material	6	CY	\$5.00	\$30
2.7	Bedding/Pipe Zone Crushed Stone	6	CY	\$40.00	\$240
2.8	Backfill w/ Excavated Material	19	CY	\$20.00	\$380
2.9	Select Material	0	CY	\$55.00	\$0
2.10	Landscape Restoration - Grading, Topsoil, and Seeding	10	CY	\$45.00	\$450
	Sub - Total Bid Item No. 2				\$9,000

Village of Alden, New York Interconnection with ECWA - Exchange Street Estimate of Probable Construction Cost				Engineer's Estimate of Probable Project Cost	
Item Number	Item Description	Item Quantity	Units	Unit Price	Amount
3	8" Waterline				
3.1	8" Dia. D.I.P. and fittings	100	LF	\$100.00	\$10,000
3.2	Excavation of Soil	80	CY	\$15.00	\$1,200
3.3	Disposal of Excess Excavated Material	20	CY	\$5.00	\$100
3.4	Bedding/Pipe Zone Crushed Stone	20	CY	\$40.00	\$800
3.5	Backfill w/ Excavated Material	70	CY	\$20.00	\$1,400
3.6	Select Material	0	CY	\$55.00	\$0
3.7	Connection to Existing System	2	EA	\$500.00	\$1,000
3.8	Landscape Restoration - Grading, Topsoil, and Seeding	10	CY	\$45.00	\$450
	Sub - Total Bid Item No. 3				\$15,000
4	4% Mobilization/De-Mobilization	1	LS	\$2,000.00	\$2,000
				SUB - TOTAL	\$57,000
	SUB - TOTAL ESTIMATE OF PROBABLE CONSTRUCTION COST				\$57,000
	15% Engineering Services				\$9,000
	Other Expenses				\$8,000
	Contingency (10%)				\$6,000
	TOTAL ESTIMATE OF PROBABLE CONSTRUCTION COST				\$80,000

Village of Alden, New York Interconnection with ECWA - Broadway Estimate of Probable Construction Cost				Engineer's Estimate of Probable Project Cost	
Item Number	Item Description	Item Quantity	Units	Unit Price	Amount
1	Meter Vault - 4" Meter				
1.1	Inline Booster Pump	1	EA	\$18,000.00	\$18,000
1.2	Precast Concrete Meter Vault (9' x 5'-6") with ladder and access cover	1	EA	\$16,000.00	\$16,000
1.3	Excavation of Soil	20	CY	\$15.00	\$300
1.4	Disposal of Excess Excavated Material	16	CY	\$5.00	\$80
1.5	Backfill w/ Excavated Material	4	CY	\$20.00	\$80
1.6	Landscape Restoration - Grading, Topsoil, and Seeding	10	CY	\$45.00	\$450
1.7	4" Resilient Wedge Gate Valve	2	EA	\$1,000.00	\$2,000
1.8	4" Slanting Check Valve	1	EA	\$5,200.00	\$5,200
1.9	8" Dia. D.I.P.	8	LF	\$100.00	\$800
1.10	4" Dia. D.I.P.	5	LF	\$70.00	\$350
1.11	8" Tee	2	EA	\$1,050.00	\$2,100
1.12	8 x 4" Reducer	2	EA	\$450.00	\$900
1.13	Sleeve Coupling	3	EA	\$600.00	\$1,800
1.14	Miscellaneous (Pipe Supports, Harness Assemblies, Pipe Cap, Thrust Blocks, etc.)	1	LS	\$1,000.00	\$1,000
	Sub - Total Bid Item No. 1				\$50,000
2	8" Bypass Line				
2.1	8" Resilient Wedge Gate Valve	1	EA	\$2,500.00	\$2,500
2.2	Valve Box	1	EA	\$500.00	\$500
2.3	8" Dia. D.I.P	30	LF	\$100.00	\$3,000
2.4	8" Dia. 90° Elbow	2	EA	\$700.00	\$1,400
2.5	Excavation of Soil	24	CY	\$15.00	\$360
2.6	Disposal of Excess Excavated Material	6	CY	\$5.00	\$30
2.7	Bedding/Pipe Zone Crushed Stone	6	CY	\$40.00	\$240
2.8	Backfill w/ Excavated Material	19	CY	\$20.00	\$380
2.9	Select Material	0	CY	\$55.00	\$0
2.10	Landscape Restoration - Grading, Topsoil, and Seeding	10	CY	\$45.00	\$450
	Sub - Total Bid Item No. 2				\$9,000

Village of Alden, New York Interconnection with ECWA - Broadway Estimate of Probable Construction Cost				Engineer's Estimate of Probable Project Cost	
Item Number	Item Description	Item Quantity	Units	Unit Price	Amount
3	8" Waterline				
3.1	8" Dia. D.I.P. and fittings	50	LF	\$100.00	\$5,000
3.2	Excavation of Soil	40	CY	\$15.00	\$600
3.3	Disposal of Excess Excavated Material	10	CY	\$5.00	\$50
3.4	Bedding/Pipe Zone Crushed Stone	10	CY	\$40.00	\$400
3.5	Backfill w/ Excavated Material	40	CY	\$20.00	\$800
3.6	Select Material	0	CY	\$55.00	\$0
3.7	Connection to Existing System	2	EA	\$500.00	\$1,000
3.8	Landscape Restoration - Grading, Topsoil, and Seeding	10	CY	\$45.00	\$450
	Sub - Total Bid Item No. 3				\$9,000
4	4% Mobilization/De-Mobilization	1	LS	\$3,000.00	\$3,000
				SUB - TOTAL	\$71,000
	SUB - TOTAL ESTIMATE OF PROBABLE CONSTRUCTION COST				\$71,000
	15% Engineering Services				\$11,000
	Other Expenses				\$11,000
	Contingency (10%)				\$7,000
TOTAL ESTIMATE OF PROBABLE CONSTRUCTION COST					\$100,000

Village of Alden, New York Additional Well Site Estimate of Probable Construction Cost				Engineer's Estimate of Probable Project Cost	
Item Number	Item Description	Item Quantity	Units	Unit Price	Amount
1	New Additional Well				
1.1	Well Drilling & Development	1	EA	\$150,000.00	\$150,000
1.2	Submersible Pump & Installation	1	EA	\$15,000.00	\$15,000
1.3	Building Enclosure	1	EA	\$50,000.00	\$50,000
	Sub - Total Bid Item No. 1				\$215,000
2	Piping to Existing Treatment				
2.1	8" Dia. D.I.P	1,000	LF	\$100.00	\$100,000
2.2	Excavation of Soil	780	CY	\$15.00	\$11,700
2.3	Disposal of Excess Excavated Material	180	CY	\$5.00	\$900
2.4	Bedding/Pipe Zone Crushed Stone	180	CY	\$40.00	\$7,200
2.5	Backfill w/ Excavated Material	610	CY	\$20.00	\$12,200
2.6	Select Material	0	CY	\$55.00	\$0
2.7	Landscape Restoration - Grading, Topsoil, and Seeding	40	CY	\$45.00	\$1,800
	Sub - Total Bid Item No. 2				\$134,000
3	4% Mobilization/De-Mobilization	1	LS	\$14,000.00	\$14,000
				SUB - TOTAL	\$363,000
	SUB - TOTAL ESTIMATE OF PROBABLE CONSTRUCTION COST				\$363,000
	15% Engineering Services				\$55,000
	Other Expenses				\$46,000
	Contingency (10%)				\$36,000
	TOTAL ESTIMATE OF PROBABLE CONSTRUCTION COST				\$500,000

Village of Alden, New York Interconnections with ECWA Estimate of Probable Construction Cost				Engineer's Estimate of Probable Project Cost	
Item Number	Item Description	Item Quantity	Units	Unit Price	Amount
INTERCONNECTION ON EXCHANGE ST.					
1	Meter Vault - 3" Meter				
1.1	Precast Concrete Meter Vault (9' x 5'-6") with ladder and access cover	1	EA	\$16,000.00	\$16,000
1.2	Excavation of Soil	20	CY	\$15.00	\$300
1.3	Disposal of Excess Excavated Material	16	CY	\$5.00	\$80
1.4	Backfill w/ Excavated Material	4	CY	\$20.00	\$80
1.5	Landscape Restoration - Grading, Topsoil, and Seeding	10	CY	\$45.00	\$450
1.6	3" Resilient Wedge Gate Valve	2	EA	\$1,000.00	\$2,000
1.7	3" Slanting Check Valve	1	EA	\$5,000.00	\$5,000
1.8	8" Dia. D.I.P.	8	LF	\$100.00	\$800
1.9	3" Dia. D.I.P.	5	LF	\$80.00	\$400
1.10	8" Tee	2	EA	\$1,050.00	\$2,100
1.11	8 x 3" Reducer	2	EA	\$430.00	\$860
1.12	Sleeve Coupling	3	EA	\$600.00	\$1,800
1.13	Miscellaneous (Pipe Supports, Harness Assemblies, Pipe Cap, Thrust Blocks, etc.)	1	LS	\$1,000.00	\$1,000
	Sub - Total Bid Item No. 1				\$31,000
2	8" Bypass Line				
2.1	8" Resilient Wedge Gate Valve	1	EA	\$2,500.00	\$2,500
2.2	Valve Box	1	EA	\$500.00	\$500
2.3	8" Dia. D.I.P	30	LF	\$100.00	\$3,000
2.4	8" Dia. 90° Elbow	2	EA	\$700.00	\$1,400
2.5	Excavation of Soil	24	CY	\$15.00	\$360
2.6	Disposal of Excess Excavated Material	6	CY	\$5.00	\$30
2.7	Bedding/Pipe Zone Crushed Stone	6	CY	\$40.00	\$240
2.8	Backfill w/ Excavated Material	19	CY	\$20.00	\$380
2.9	Select Material	0	CY	\$55.00	\$0
2.10	Landscape Restoration - Grading, Topsoil, and Seeding	10	CY	\$45.00	\$450
	Sub - Total Bid Item No. 2				\$9,000
3	8" Waterline				
3.1	8" Dia. D.I.P. and fittings	100	LF	\$100.00	\$10,000

Village of Alden, New York Interconnections with ECWA Estimate of Probable Construction Cost					Engineer's Estimate of Probable Project Cost	
Item Number	Item Description	Item Quantity	Units	Unit Price	Amount	
3.2	Excavation of Soil	80	CY	\$15.00	\$1,200	
3.3	Disposal of Excess Excavated Material	20	CY	\$5.00	\$100	
3.4	Bedding/Pipe Zone Crushed Stone	20	CY	\$40.00	\$800	
3.5	Backfill w/ Excavated Material	70	CY	\$20.00	\$1,400	
3.6	Select Material	0	CY	\$55.00	\$0	
3.7	Connection to Existing System	2	EA	\$500.00	\$1,000	
3.8	Landscape Restoration - Grading, Topsoil, and Seeding	10	CY	\$45.00	\$450	
	Sub - Total Bid Item No. 3				\$15,000	
	INTERCONNECTION ON BROADWAY					
4	Meter Vault - 4" Meter					
4.1	Inline Booster Pump	1	EA	\$18,000.00	\$18,000	
4.2	Precast Concrete Meter Vault (9' x 5'-6") with ladder and access cover	1	EA	\$16,000.00	\$16,000	
4.3	Excavation of Soil	20	CY	\$15.00	\$300	
4.4	Disposal of Excess Excavated Material	16	CY	\$5.00	\$80	
4.5	Backfill w/ Excavated Material	4	CY	\$20.00	\$80	
4.6	Landscape Restoration - Grading, Topsoil, and Seeding	10	CY	\$45.00	\$450	
4.7	4" Resilient Wedge Gate Valve	2	EA	\$1,000.00	\$2,000	
4.8	4" Slanting Check Valve	1	EA	\$5,200.00	\$5,200	
4.9	8" Dia. D.I.P.	8	LF	\$100.00	\$800	
4.10	4" Dia. D.I.P.	5	LF	\$70.00	\$350	
4.11	8" Tee	2	EA	\$1,050.00	\$2,100	
4.12	8 x 4" Reducer	2	EA	\$450.00	\$900	
4.13	Sleeve Coupling	3	EA	\$600.00	\$1,800	
4.14	Miscellaneous (Pipe Supports, Harness Assemblies, Pipe Cap, Thrust Blocks, etc.)	1	LS	\$1,000.00	\$1,000	
	Sub - Total Bid Item No. 4				\$50,000	
5	8" Bypass Line					
5.1	8" Resilient Wedge Gate Valve	1	EA	\$2,500.00	\$2,500	
5.2	Valve Box	1	EA	\$500.00	\$500	
5.3	8" Dia. D.I.P.	30	LF	\$100.00	\$3,000	
5.4	8" Dia. 90° Elbow	2	EA	\$700.00	\$1,400	
5.5	Excavation of Soil	24	CY	\$15.00	\$360	

Village of Alden, New York Interconnections with ECWA Estimate of Probable Construction Cost					Engineer's Estimate of Probable Project Cost	
Item Number	Item Description	Item Quantity	Units	Unit Price	Amount	
5.6	Disposal of Excess Excavated Material	6	CY	\$5.00	\$30	
5.7	Bedding/Pipe Zone Crushed Stone	6	CY	\$40.00	\$240	
5.8	Backfill w/ Excavated Material	19	CY	\$20.00	\$380	
5.9	Select Material	0	CY	\$55.00	\$0	
5.10	Landscape Restoration - Grading, Topsoil, and Seeding	10	CY	\$45.00	\$450	
	Sub - Total Bid Item No. 5				\$9,000	
6	8" Waterline					
6.1	8" Dia. D.I.P. and fittings	50	LF	\$100.00	\$5,000	
6.2	Excavation of Soil	40	CY	\$15.00	\$600	
6.3	Disposal of Excess Excavated Material	10	CY	\$5.00	\$50	
6.4	Bedding/Pipe Zone Crushed Stone	10	CY	\$40.00	\$400	
6.5	Backfill w/ Excavated Material	40	CY	\$20.00	\$800	
6.6	Select Material	0	CY	\$55.00	\$0	
6.7	Connection to Existing System	2	EA	\$500.00	\$1,000	
6.8	Landscape Restoration - Grading, Topsoil, and Seeding	10	CY	\$45.00	\$450	
	Sub - Total Bid Item No. 6				\$9,000	
7	4% Mobilization/De-Mobilization	1	LS	\$5,000.00	\$5,000	
				SUB - TOTAL	\$128,000	
	SUB - TOTAL ESTIMATE OF PROBABLE CONSTRUCTION COST				\$128,000	
	15% Engineering Services				\$20,000	
	Other Expenses				\$19,000	
	Contingency (10%)				\$13,000	
	TOTAL ESTIMATE OF PROBABLE CONSTRUCTION COST				\$180,000	