FACILITY PLAN

for the

WATER SYSTEM

IN

ALEXANDRIA, SOUTH DAKOTA

PROJECT #14893

JUNE 2018

SPN & Associates
ENGINEERS-PLANNERS- SURVEYORS
2100 NORTH SANBORN BLVD, P.O. BOX 398
MITCHELL, SOUTH DAKOTA 57301
PHONE 605-996-7761 FAX 605-996-0015

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I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of South Dakota.

By _____
Camden A. Hofer, P.E.

Registration No. SD #8322

Date 6-8-18

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 8322
CAMDEN A. HOFER
SOUTH DAKOTA

SCHMUCKER, PAUL, NOHR & ASSOCIATES
CONSULTING ENGINEERS - SURVEYORS
2100 NORTH SANBORN BLVD., PO BOX 398
MITCHELL, SOUTH DAKOTA 57301

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1 INTRODUCTION

1.1 PURPOSE

The City of Alexandria has contracted with the engineering firm of Schmucker Paul Nohr and Associates (SPN) to complete an investigation of its existing water system. The intent of this study is to identify and quantify problems that exist within this system.

The results of the study are presented in this Facility Plan. The Facility Plan contains information with which the City Council of Alexandria can make cost-effective decisions. The City Council will, after appropriate public input, determine what its best options are to make any needed improvements that are identified in the Facility Plan. As loan and grant funding will most likely be desired to make the improvements that are recommended herein, the identified project(s) will need to be placed on the State Water Plan. This Facility Plan will be a valuable tool for the community to utilize in its efforts to pursue the funding necessary to make needed public improvements.

1.2 SCOPE

The scope of the study authorized by the City Council includes the following work to be performed by SPN and Associates:

1) SPN will consult with the Client to define and clarify the Client's requirements for the Project and data that is available for SPN's use in the completion of the Project. Specifically, the Client shall provide to SPN records of water production and/or water purchased; water sales records; and a layout of the existing water distribution system. At a minimum, water production/purchase and sales records should cover the years 2012 through 2017.
2) SPN will advise the Client as to the necessity of the Client providing or obtaining from others data or services of the types not specifically authorized herein. If authorized by the Client, SPN will provide or assist the Client in procuring such services and act as the Client's representative in connection with any such services.
3) SPN will identify and analyze requirements of governmental authorities having jurisdiction to approve the design of the Project and participate in consultations with such authorities.

4) SPN will complete an analysis of the existing water supply system relating to source capacity, treatment, quantity, and quality, compliance with existing and proposed drinking water standards and will evaluate the system's ability to meet current and future needs.

5) SPN will complete an analysis of the existing water distribution system relating to storage, piping, metering; identify the age of system components, water losses in the system, evaluation of current water pressures and fire flow capacities; and will evaluate the system's ability to meet current and future needs.

6) SPN will assist in the identification of current and potential future areas of development in and adjacent to the Client's service area. SPN will meet with representatives of the Client to identify the areas of development.

7) SPN will provide a general economic analysis of the Client's requirements applicable to various alternatives for the correction of identified deficiencies.

8) SPN will provide a written report, with maps and sketches, setting forth the findings and recommendations of the Preliminary Study, provide ten (10) copies of said report to the Client and meet with the Client to review said report.

9) SPN will assist the Client in the presentation of the findings and recommendations of the Preliminary Study at not more than one (1) public hearing. SPN shall not be held responsible for rejection of the findings and recommendations of the Preliminary Study by the general public.

10) SPN will assist the Client in the preparation of an application for inclusion on the State Intended Use Plan and State Water Plan and, at no cost to the Client, represent the Client at one meeting of the State Board of Water and Natural Resources. SPN shall not be responsible for failure of the Client to be listed on the State Water Plan.

1.3 AUTHORIZATION

The studies reported herein were performed pursuant to the provisions of a letter agreement between the City of Alexandria and SPN & Associates, Inc. dated July 20, 2017.

2 COMMUNITY DESCRIPTION

2.1 GENERAL INFORMATION

Alexandria is located in central Hanson County, South Dakota, approximately 12 miles east of Mitchell, the regional trade center for the area. It is located on SD Highway 262, south of Interstate Highway 90 approximately one-quarter mile. The location of Alexandria is shown in Figure 2.1. The City of Alexandria was established as a city in 1885. The City has an aldermanic type of government consisting of a mayor, finance officer, and six-member council. The City has a full-time utility manager that maintains the water system. The City purchases its water from Hanson Rural Water System.

Hanson County is in southeastern South Dakota. It has a total surface area of approximately 320,000 acres. Communities located within the county include Emery, Farmer, Fulton, and Alexandria, the county seat. General livestock and farming are the main sources of income in the county.

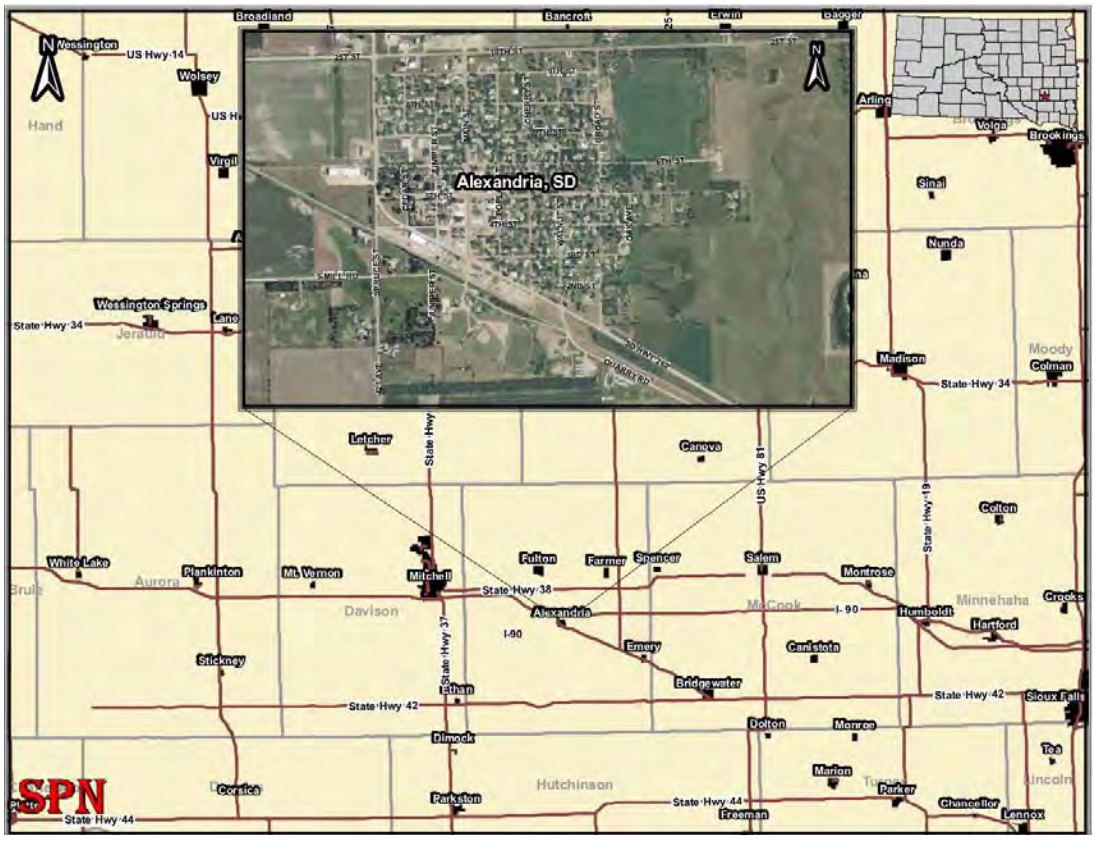


Figure 2.1-1: Location Map

2.2 POPULATION CHARACTERISTICS

Alexandria's population is 615 according to the 2010 census. The most recent Census Bureau data available at the time of this report indicated that Alexandria's median age was 37.5 years as compared to the state's median age of 36.9. At the time census data was gathered, 12.8 percent of its population was the age of 65 and over. In comparison, the state's population that is 65 and over is 14.3 percent.

Data from census information indicates that the community's median household income of $53,125 was higher than the state's median household income of $52,078. At the time the census data was gathered, about 9.1 percent of the people living in the community had incomes at or below the poverty level.

2.3 POPULATION PROJECTIONS

The 2010 Census Bureau data shows the population for Alexandria to be 615. The City of Alexandria has indicated that the current population is estimated to be 672. Figure 2.3-1 indicates the historic population provided by the Census Bureau. As shown by the historical data, the population peaked in 1920 and 1940 but has declined overall until 1990 after which the population rebounded. The decline from 1940 to 1990 is typical for rural communities such as Alexandria. This can be accredited to the number and size of the farming families decreasing and the large population of elderly people. Since 1990, however, the City has shown a steadily increasing population. This population growth is expected to continue through 2040. For purposes of this study, the 2040 projected population of 802 will be utilized for estimating the future water use.

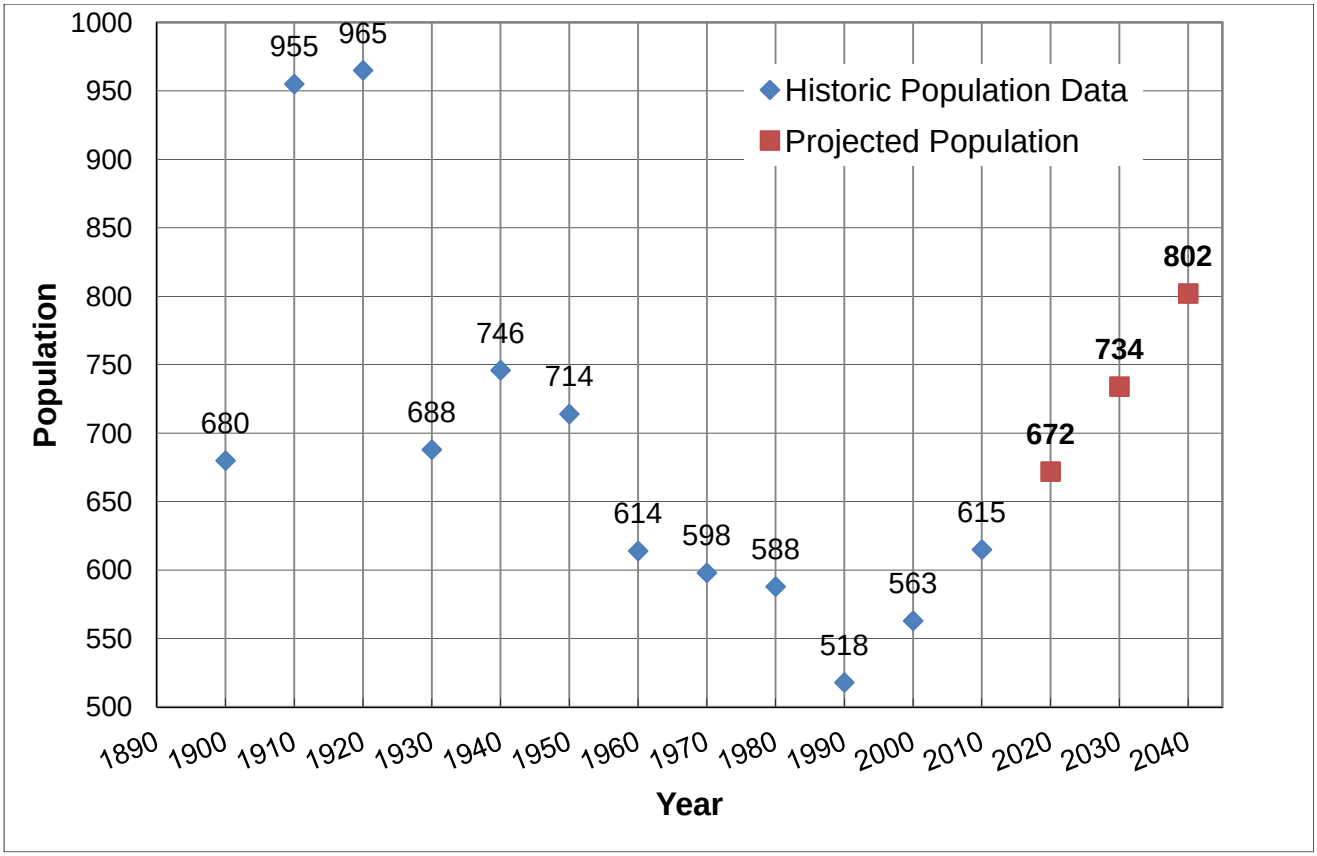


Figure 2.3-1: Historic Population

2.4 TOPOGRAPHY / CLIMATE

The majority of Hanson County is in the James River Valley. The topography of the Hanson County area can best be characterized as gently undulating landscape except for the hilly to steep breaks adjacent to the James River. The James River and its tributaries drain most of Hanson County. The elevation in the county ranges from less than 1,200 feet above mean sea level in the James River Basin to 1,400 feet or more above mean sea level in the northeast.

The area's climate is generally described as a continental climate. Winters are relatively long and cold while summers are fair and hot. Normal annual precipitation for the area is about 23 inches. Approximately 74 percent (17 inches) of the total precipitation generally occurs between April and September. Precipitation received from November through March is generally in the form of snowfall.

The temperature ranges from an average daily temperature of 15^{o} F in the winter to an average daily of 70^{o} F in the summer. However, temperatures have been as low as -30^{o} F and have exceeded 109^{o} F.

2.5 ENVIRONMENTAL REVIEW INFORMATION

As part of the environmental assessment requirement for the facility planning process, the project sponsor is required to contact various state and federal agencies. Environmental assessment letters will be sent to the following agencies. A copy of the letter requesting comments will be included in Appendix A along with the associated comment letters and future related correspondence.

2.5.1 Historic and Archaeological Sites

Upon completion of an application for funding through one or more various funding agencies, a letter will be sent to the funding agency describing the proposed project location and construction activities as well as a general description of the existing conditions as found within the project limits. An internet search for historic properties in the area was completed on arcgis.sd.gov. The results can be seen in Figure 2.5.1-1. Although a number of eligible sites are identified below, none of these sites are listed on the national register. These structures, with the exception of the Alexandria Water Tower, should not be affected by any proposed work by the City of Alexandria since work will be planned within City rights-of-way.

1. Farmers Alliance Elevator – 301 Main Street
2. Alexandria School Auditorium – 511 Main Street
3. St. Mary of Mercy Catholic Church – 221 5th Street
4. Commercial Building – 531 Main Street
5. House – 640 4th Street
6. House – 6th Street and Cherry Street
7. Alexandria Water Tower – 435 Poplar Street

Figure 2.5.1-1: Historical Places Search Results

2.5.2 Floodplains and Wetlands

The US Fish and Wildlife Service, the US Army Corps of Engineers and the South Dakota Department of Game, Fish and Parks were contacted for input related to the proposed improvements. No floodplains or wetlands in the area are expected to be involved in the project. The Federal Emergency Management Agency (FEMA) website was searched for a flood hazard evaluation. The flood hazard map for Alexandria is shown in Figure 2.5.2-1.

Figure 2.5.2-1: Flood Hazard Map from FEMA

A wetland map was created on the US Fish and Wildlife website for Alexandria and is shown in Figure 2.5.2-2. No impact on wetlands is expected due to this project since the work is planned in City rights-of-way.

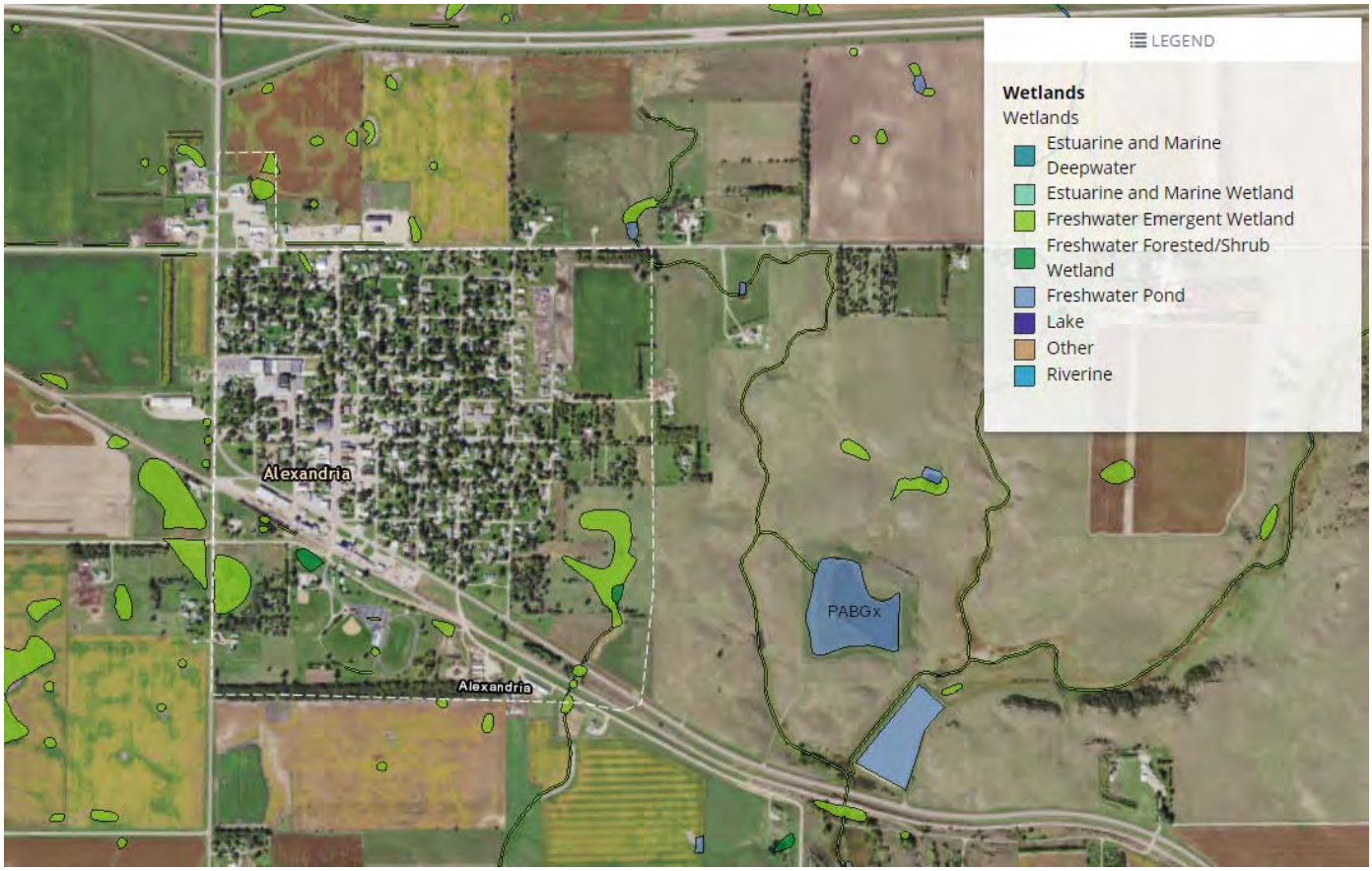


Figure 2.5.2-2: Wetland Map

2.5.3 Agricultural Lands

The U.S. Department of Agriculture State Soil Scientist was contacted for the purpose of soliciting input on the proposed improvements. No impact on agricultural lands is expected due to this project.

2.5.4 Wild and Scenic Rivers

Research indicates that there are no designated wild and scenic rivers in the area. Therefore, the proposed improvements will have no impact on this resource.

2.5.5 Water Quality and Quantity

The South Dakota Department of Environment and Natural Resources was contacted for input on the proposed improvements. No effect on water quality and quantity is expected due to the project.

2.5.6 Endangered Species and Critical Habitat

The U.S. Fish and Wildlife Service and the South Dakota Department of Game, Fish and Parks were contacted for the purpose of soliciting input related to potential impacts on endangered species and critical habitat which might result from construction of the proposed improvements. According to the U.S. Fish and Wildlife Service website the following species are listed as threatened or endangered in the Alexandria area: Whooping Crane, Red Knot, Topeka Shiner, and Northern Long-Eared Bat. No impact on these or other species is expected due to this project.

2.6 DIRECT AND INDIRECT IMPACTS

Negative environmental impacts which may be expected during a project of this nature include, but are not necessarily limited to, soil erosion, noise pollution, traffic obstruction, and increased surface runoff due to trench dewatering operations. However, such impacts are temporary and will not significantly affect the environment over the long term.

Positive environmental impacts include enhanced human health and safety and more efficient delivery of municipal water. Such impacts are of long-term value to the residents of Alexandria and Hanson County.

2.7 MITIGATION ADVERSE IMPACTS

Adverse impacts will be minimized to the greatest extent possible by the implementation of accepted cautionary measures. Temporary and permanent erosion control will be included in construction contracts. Appropriate permits will be secured prior to the discharge of any trench dewatering or storm waters, and protection of public health, safety and welfare will be incorporated into the specifications and contract documents. Additionally, should any permanent adverse impacts result from the project, mitigating measures will be followed to the satisfaction of the appropriate review agency.

3 EVALUATION OF EXISTING WATER SYSTEM

3.1 GENERAL INFORMATION

The City of Alexandria currently provides water service to approximately 315 connections within the City. Figure 3.1-1 shows the existing water distribution system. The City of Alexandria purchases its water from the Hanson Rural Water System. The City's water system was inspected by the South Dakota Department of Environment and Natural Resources (SD DENR) in August 2014. A copy of the water system evaluation is included in Appendix B. The most resent drinking water quality report can be seen in Appendix C.

The rural water point of connection is in the center of the City next to the ground storage tank and water tower. The City has a 74,000-gallon ground storage tank that is filled from Hanson Rural Water. The City then pumps the water from this ground storage tank to the 50,000-gallon elevated steel tank. This elevated tank provides the water pressure and storage for the City. The City of Alexandria has a well that is located in the booster station building that according to the water operator is no longer operable.

3.2 WATER DEMAND

To evaluate the City of Alexandria's potential to meet the needs of the future, a review of past water usage records was completed. The process used to estimate future water demand included a determination of the current average per capita demand. Records of billed water usage from August 2011 through 2017 were utilized to create Table 3.2-1. It should be noted that there were no available records for November 2013 and November 2017. There are no available records for November 2017 due to maintenance on the City's water tower.

WATER MAP
CITY OF
ALEXANDRIA

SCALE: 1" = 400'

LEGEND

- 2" WATER MAIN
- 4" WATER MAIN
- 6" WATER MAIN
- 6" WATER MAIN 2016
- 8" WATER MAIN
- GATE VALVE
- FIRE HYDRANT
- PVC PIPE
- CIP PIPE

NO. 16 HIGHWAY

U.S.

NINTH STREET

EIGHTH STREET

SEVENTH STREET

SIXTH STREET

FIFTH STREET

FOURTH STREET

THIRD STREET

SECOND STREET

FIRST STREET

SPRUCE STREET

CEDAR STREET

JUNIPER STREET

MAIN STREET

POPLAR STREET

CHERRY STREET

WALNUT STREET

BROAD STREET

OAK STREET

PINE STREET

MULBERRY STREET

CHESTNUT STREET

COURT HOUSE

School

School

Shut Off to School

2" PVC

3/4" Service

3/4" Copper

Booster Station

Water Tower

Water Storage Tank

RAILWAY STREET

Figure 3.1.–1
Existing Water Distribution System

SPN & Associates
Engineers, Planners and Surveyors
2100 North Sanborn Blvd. - P.O. Box 398 Mitchell, South Dakota 57301
Phone: (605) 996-7761 Fax: (605) 996-0015

Table 3.2-1: Water Use Records

Month	2011 Purchased (Gal)	Billed (Gal)	Unacc. for %	Purchased (gpcpd)	Precip. (in)
January					0.22
February					0.36
March					0.50
April					5.48
May					4.37
June					3.35
July					2.28
August	1,958,000	1,875,210	4%	94	1.86
September	1,822,000	1,786,630	2%	90	0.28
October	1,489,000	1,407,731	5%	71	0.94
November	1,307,000	1,200,560	8%	65	0.00
December	1,189,000	967,100	19%	57	0.34
Total	7,765,000	7,237,231			19.98
Average Day	50,752	47,302			
Average (gpcpd)	76	70			
Average Unacc %	7.7%				

Month	2012 Purchased (Gal)	Billed (Gal)	Unacc. for %	Purchased (gpcpd)	Precip. (in)
January	1,202,000	1,066,662	11%	58	0.72
February	1,166,000	1,021,172	12%	60	4.19
March	1,110,600	979,800	12%	53	0.30
April	1,528,000	1,061,240	31%	76	4.43
May	1,465,000	1,087,950	26%	70	5.59
June	2,001,000	1,768,800	12%	99	1.63
July	2,497,000	2,572,785	-3%	120	0.24
August	2,367,000	2,533,560	-7%	114	1.66
September	1,905,000	1,994,900	-5%	94	1.25
October	1,568,000	1,682,710	-7%	75	0.78
November	1,271,000	1,116,320	12%	63	0.03
December	1,294,000	1,003,010	22%	62	1.39
Total	19,374,600	17,888,909			22.21
Average Day	52,936	48,877			
Average (gpcpd)	79	73			
Average Unacc %	9.7%				

Table 3.2-1, Continued

Month	2013 Purchased (Gal)	Billed (Gal)	Unacc. for %	Purchased (gpcpd)	Precip. (in)
January	1,294,000	1,000,603	23%	62	0.07
February	1,486,000	1,260,785	15%	79	1.19
March	1,214,000	863,798	29%	58	1.02
April	1,264,000	970,710	23%	63	1.85
May	1,759,000	1,121,038	36%	84	5.62
June	1,562,000	1,467,497	6%	77	2.63
July	2,137,000	1,480,180	31%	103	2.69
August	1,909,000	1,721,982	10%	92	2.41
September	2,189,000	1,784,400	18%	109	2.21
October	1,605,000	1,243,370	23%	77	3.57
November					0.35
December	1,391,000	986,240	29%	67	0.02
Total	17,810,000	13,900,603			23.63
Average Day	53,164	41,494			
Average (gpcpd)	79	62			
Average Unacc %	22.1%				

Month	2014 Purchased (Gal)	Billed (Gal)	Unacc. for %	Purchased (gpcpd)	Precip. (in)
January	1,414,000	1,104,340	22%	68	0.00
February	1,504,000	1,146,070	24%	80	0.15
March	1,299,000	933,850	28%	62	0.98
April	1,449,000	996,600	31%	72	0.90
May	1,488,000	1,225,430	18%	71	2.78
June	2,013,000	1,578,630	22%	100	6.42
July	1,879,000	1,455,230	23%	90	1.20
August	2,312,000	1,901,250	18%	111	3.17
September	1,917,000	1,326,000	31%	95	2.97
October	1,578,000	1,090,900	31%	76	0.89
November	1,615,000	1,157,400	28%	80	0.76
December	1,558,000	814,150	48%	75	1.85
Total	20,026,000	14,729,850			22.07
Average Day	54,866	40,356			
Average (gpcpd)	82	60			
Average Unacc %	26.9%				

Table 3.2-1, Continued

Month	2015 Purchased (Gal)	Billed (Gal)	Unacc. for %	Purchased (gpcpd)	Precip. (in)
January	1,554,000	1,132,040	27%	75	0.42
February	1,454,000	1,112,060	24%	77	0.17
March	1,564,000	891,460	43%	75	0.10
April	1,643,000	1,211,762	26%	81	1.06
May	1,964,000	1,599,000	19%	94	3.76
June	1,851,000	1,325,365	28%	92	4.01
July	1,916,000	1,317,335	31%	92	5.04
August	2,675,000	1,313,850	51%	128	3.89
September	2,201,000	1,716,400	22%	109	1.88
October	1,715,000	1,256,349	27%	82	2.08
November	1,344,000	1,222,395	9%	67	0.97
December	1,225,000	966,000	21%	59	1.11
Total	21,106,000	15,064,016			24.49
Average Day	57,825	41,271			
Average (gpcpd)	86	61			
Average Unacc %	27.3%				

Month	2016 Purchased (Gal)	Billed (Gal)	Unacc. for %	Purchased (gpcpd)	Precip. (in)
January	1,344,000	1,173,433	13%	65	0.36
February	1,290,000	930,250	28%	66	0.37
March	1,075,000	848,751	21%	52	1.56
April	1,250,000	1,326,855	-6%	62	3.36
May	1,217,000	1,005,264	17%	58	5.92
June	1,819,000	1,532,447	16%	90	0.86
July	2,646,000	2,173,421	18%	127	2.45
August	2,348,000	2,223,392	5%	113	1.11
September	1,779,000	1,554,834	13%	88	3.61
October	1,283,000	1,101,200	14%	62	2.60
November	1,259,000	1,151,377	9%	62	0.16
December	1,154,000	1,026,578	11%	55	0.78
Total	18,464,000	16,047,802			23.14
Average Day	50,586	43,967			
Average (gpcpd)	75	65			
Average Unacc %	13.2%				

Table 3.2-1, Continued

Month	2017 Purchased (Gal)	Billed (Gal)	Unacc. for %	Purchased (gpcpd)	Precip. (in)
January	1,216,000	1,219,435	0%	58	0.94
February	1,402,000	1,218,535	13%	75	0.41
March	1,175,000	998,199	15%	56	0.23
April	1,262,000	1,114,702	12%	63	1.77
May	1,297,000	1,147,787	12%	62	4.49
June	1,913,000	1,800,777	6%	95	0.75
July	2,395,000	2,206,964	8%	115	1.83
August	2,185,000	2,199,241	-1%	105	3.04
September	1,604,000	1,239,143	23%	80	3.30
October	1,358,000	1,385,301	-2%	65	2.78
November					0.05
December	1,129,000	960,043	15%	54	0.93
Total	16,936,000	15,490,127			20.52
Average Day	50,555	46,239			
Average (gpcpd)	75	69			
Average Unacc %	9.1%				

Average Water Purchased Per Year =	19,743,000	Gal
Average Water Billed Per Year =	15,933,000	Gal
Average Per Capita Usage (Based on Purchased Water) =	76.5	gpcpd
Average Per Capita Usage (Based on Billed Water) =	63.8	gpcpd
Average Percentage of Unaccounted-for Water =	19.3%	
Maximum Purchased per Month =	2,675,000	Gal
Average Day Purchased =	51,400	Gal
Average Day Billed =	44,200	Gal

The sources and methods used to develop the information presented in Table 3.2-1 are described by the following:

- The quantity of water purchased for the City is based on the Hanson Rural Water's meter records provided by the City of Alexandria.
- The quantity of water billed to the users of the system per month is based on meter records provided by the City of Alexandria.
- The percentage of unaccounted-for water is calculated by the ratio of difference in water billed to the water purchased.
- Monthly precipitation data was obtained from the National Centers for Environmental Information website from the nearest station which is in Alexandria, South Dakota.
- The per capita per day water usage for each month is calculated by dividing the total water purchased or billed by the City's current total population of 672 and the days per month.
- The average daily water purchased and billed for each year was calculated by dividing the sum of the water for each month by the days in that period.
- The per capita per day usage purchased and billed for each year is calculated by dividing the annual average day water by the total population.
- The percentage of un accounted-for water per year is calculated by dividing the difference between the total purchased and total billed by the total billed amount.

Based on the available water records presented in Table 3.2-1 the maximum water purchase occurred in August 2015 with a per capita water production of 128 gallons per capita per day (gpcpd). However, it should be noted that this high usage is probably the result of a main break or similar cause of water loss with a water loss of 51% for the month. July 2016 was the next highest at 127 gpcpd. It should be noted that above-average precipitation during summer months typically lessens the increase in water usage just as below-normal precipitation typically magnifies the increase in water usage. The average per capita water volume purchased for the period of record was determined to be approximately 76.5 gpcpd. This water use is below the generally accepted range of 100 to 125 gpcpd typical for smaller communities in South Dakota.

3.2.1 Water Loss

An analysis of the water usage data over the period of record from August 2011 through 2017 indicates that the City of Alexandria purchased an average of approximately 19.7 million gallons per year (mgy). Of this amount, approximately 15.9 mgy was billed or accounted for through household, business or City meters. This indicates an average loss rate of 19.3 percent.

The typical reasons for losses in the system are leaks, slow or malfunctioning meters, firefighting and water used at non-metered locations. The identified non-metered uses in the system are the City park, fire hydrant flushing, fire fighting and other typical minor uses. These water uses are important; however, the water should be metered where feasible. Most of the residential water meters are approximately one to two years old. Most of the meters throughout the City were replaced with either a 5/8-inch by 3/4-inch Hersey Model 420 or a one-inch Hersey Model 452. There is one two inch Kamstrup water meter. The meters are automatically read with a drive-by radio read system.

When considering the expense of purchasing water, the financial loss of water that is unaccounted for becomes apparent. As a result, it is important that unaccounted-for water loss be limited to a level less than the generally accepted loss of 15 percent. Although there is a six-year average of 19.3 percent water loss per year, the average water loss for the past two years since the installation of new water meters is 11 percent which is acceptable.

It is interesting to note the variability of the monthly water loss rate for August, September and October in 2017. Most likely the unusual variability is due to the timing of reading the main water meter that measures the flow from rural water. When the main meter is read at a much different time than the residential meters, error is introduced in the water loss calculation for the month.

3.3 PROJECTION OF WATER DEMAND

Future water demand projections are the basis for establishing the water distribution system capacity and storage. These projections are based on historical data of per capita water flows and population projections to determine peak day and peak hour demands to ensure that the

system is capable of meeting the future demands of the City. As shown in Section 2.3, the population of Alexandria is showing a growing trend. For this reason, the system will be evaluated with the current total population equivalent of 672 and a design population of 802 for determining future water demands.

To meet the peak day water usage that may occur in the future, a peaking factor is determined. Small cities usually have a maximum day peaking factor of 2.0 to 3.0 times the annual average day usage (Mays, 2000). Our experiences have shown that cities the size of Alexandria have a peaking factor that ranges from 2.0 to 3.5, which is greater than typically published values because the demand characteristics of small cities have larger variations than the more steady demand of larger cities.

Daily water records for water usage are not available for accurate analysis. The peaking factor can be estimated by first determining the average day of the peak water month. Although the peak month for the period of available record was on August 2015, this was due to a water main leak and will not be used for this evaluation. The next highest monthly water use occurred in July 2016 at approximately 85,355 gpd (2,646,000/ 31). Based on our experience the variation of the peak day to the average day of the peak month is typically a ratio of 1.1 to 1.5. Using 1.3 as the ratio would result in a peak day of 110,960 gpd and a peaking factor of the peak day to average day of 2.16 (110,960 gpd / 51,400 gpd).

The monthly water supply records used in this evaluation cover a relatively short period which may not be sufficient to determine the magnitude of variation between very dry and wet years. As a result, the likelihood of observing the worst-case condition is not very probable in such a short period of record. Considering the relatively moderate variation in flows it is our opinion that a moderate peak day to average day ratio should be established. We recommend the use of 2.5 for a peak day to average day ratio which is in the middle of the typical range for small communities. The peaking factor should account for very dry weather and high use periods. This factor will be used throughout the remainder of the report for the calculation of the peak day water demand.

It must be noted at this point that an attempt has been made to determine design flow parameters as accurately as possible but if any error is to be made in the selection, it must be on the high side to ensure an adequate supply of water for the City throughout the design period. Utilizing the projected populations from Section 2, the average day flow of 76.5 gpcpd and ratio of peak day flow to annual average day flow of 2.5, the design average day and peak day usages were calculated and are presented in Table 3.3-1.

Table 3.3-1: Estimated Water Requirements

Year	Projected Population [a]	Annual Average Day gpd [b]	Annual Average Day gpm [c]	Annual Peak Day gpd [d]	Annual Peak Day gpm [c]
2018	672	51,400	36	128,500	89
2020	672	51,400	36	128,500	89
2025	703	53,800	37	134,500	93
2030	734	56,200	39	140,500	98
2035	768	58,800	41	147,000	102
2040	802	61,400	43	153,500	107

a) Based on population projections shown in Figure 2.3-1

b) Calculated by multiplying the projected population by an average day flow of 76.5 gpcpd

c) The flow in gpm was calculated using a 24-hour day

d) Calculated by multiplying the annual average day by the annual average peak day to annual average day flow of 2.5

3.4 WATER SOURCE

3.4.1 Rural Water

The City began using rural water in 1981 from the Hanson Rural Water System (HRWS). HRWS currently has a four-inch pipe on East Fifth Street that connects to the City's distribution system at the tank site. HRWS has its own meter pit located east of the City which it utilizes to bill the City. The City does not have access to HRWS's meter pit. The City has its own meter located in the booster station that is used to check HRWS's amount. The City pays a minimum charge of $885 with a water rate of $3.40 per 1,000 gallons delivered.

Alexandria has a contract with the HRWS for a peak flow rate of 110 gpm or 158,000 gallons per day. This available flow rate exceeds the calculated peak day flow rate of 128,500 gpd, but the estimated future peak day demand of 153,500 gpd approaches the contracted amount. The City needs to remain aware of this projected usage and contract amount especially if there is an

increase in development within the City. The pressure provided by HRWS at the point of connection can be as much as 90 psi but can have large fluctuations that does not make it a reliable source for pressure. The City, however, utilizes this pressure on a temporary basis to supply the distribution system when the water tower is down for maintenance.

3.4.2 Wells

The City currently has one well that is located in the booster station. The well can be seen in Figure 3.4.2-1. After the installment of rural water, the well was used as a back-up source. However, the well is no longer operable. According to the water operator, this well has not been operable for the past five years. Available records indicate that the well was constructed in 1958, has a depth of 435 feet, and had a pumping capacity of 75 gpm. According to the water operator, the water quality from the well is very hard, with many residences installing water softeners because of the hardness.

Figure 3.4.2-1: City's Well (No Longer Operable)

3.5 STORAGE

3.5.1 Ground Storage Tank

Water received from the HRWS is stored in a 74,000-gallon glass-lined steel bolted ground storage tank. According to available information the tank was built in 1997. The ground storage tank is located near the City shop on the southwest of the Fifth Street and Poplar Street intersection. The City periodically hires a specialist to clean and inspect the ground storage tank. The last inspection was completed by Maguire Iron in 2015 and indicated that both the exterior and interior coatings were in fair condition. The inspection records provided by Maguire Iron can be seen in Appendix D. The inspection records received, however, do not indicate that the cathodic protection of the storage tank was inspected. It is recommended that the City checks the status of the tank's cathodic protection system.

The ground storage tank can be seen in Figure 3.5.1-1. The water level in the ground storage tank is controlled by pressure transducers through a control panel located in the booster station that was recently installed. According to the Utility Manager, a hail storm created dents in the roof, one of which caused a hole in the roof. Silicone was placed in these dents to prevent further damage. A new screen is required in the overflow outlet. There is no safety cable for fall protection; however, this is not necessary when there is a cage around the ladder.

Figure 3.5.1-1: Ground Storage Tank

3.5.2 50,000-Gallon Water Tower

The City currently has a 50,000-gallon multi-legged elevated water storage reservoir connected to the distribution system. Views of parts of the water tower are shown in the following figures. Water from the ground storage tank is pumped to the water tower to supply the pressure for the City. The tower's water level is controlled by pressure transducers through a control panel in the booster station building that was recently installed.

The water tower was constructed in 1922. The water tower is considered quite old but seems to be structurally sound. The concrete footings to which the legs and riser are connected to are showing signs of severe spalling.

The City periodically hires a specialist to clean and inspect the water tower. The last inspection was completed by Maguire Iron in 2016. Views of the interior of the water tower at the time of the last inspection are shown in Figure 3.5.2-1. It is unknown when the interior coatings were applied. The inspection records and the photographs indicate that the interior coatings require some repair. Since the photographs were taken, a new riser pipe was installed in 2017 through the large diameter wet riser pipe. This allowed the maintenance and repair required inside the large riser pipe to be omitted. A new bowl was constructed at the top of the large riser pipe to seal it from the tank area. It is reported that the new bowl surface requires coating since the repair was done in cold weather when a proper coating application was not possible. A circulating pump was installed with the replacement of the riser pipe to prevent freezing of the riser pipe. The circulating pump is housed in a building at the base of the water tower.

The exterior of the tank walls and roof were recoated in 2009. The access, ladders, and vents are consistent with the current standards required by the Occupational Health and Safety Administration (OSHA).

Figure 3.5.2-1: Water Tower Interior (Courtesy of Maguire Iron)

Figure 3.5.2-2: Water Tower Exterior

3.5.3 Sizing Criteria

Water storage establishes the pressure for the distribution system; provides a means for equalizing operating pressures during high demand periods; provides emergency storage to temporarily offset the effects of downtime for pump repairs, pipeline repairs and power outages; and provides water for fire protection. It should be noted that the water from the 74,000-gallon ground storage tank must be pumped into the distribution system to be used; therefore, the storage volume is considered dead storage and, as such, is not considered as part of the storage requirements of the distribution system.

There is not a defined method for determining the volume of elevated storage for water distribution systems. Standards such as the Ten State Standards say that if fire flow is to be provided, the flow guidelines established by the International Standards Organization (ISO) should be met. Thus, at 2,000 gpm, a two-hour fire event requires 240,000 gallons. The City's current storage capacity of 50,000 gallons is not adequate for this degree of fire protection.

Equalization and emergency storage are the other factors in determining the volume of water required or desired. Equalization storage is required to supply the varying demands throughout each day. Figure 3.5.3-1 illustrates a typical variation of water demand over a peak day. During those times that the water usage is shown to be over 100 percent of the supply rate, the system's storage must provide the additional water to meet the demands. Storage for equalization with a constant rural water supply typically ranges from 10 to 25 percent of the peak day water demand (Mays 2000). The higher end of the range is for communities with high ratios of average day to peak day water usage. Since the selected peak day to average day ratio for Alexandria is on the mid-range of 2.0 to 3.5, the value of 17.5 percent is selected for the desired equalization storage. The current peak day water demand is 128,500 gallons which results in an equalization storage volume of approximately 22,500 gallons. The projected peak day water demand is 153,500 gallons which results in an equalization storage volume of approximately 26,860 gallons.

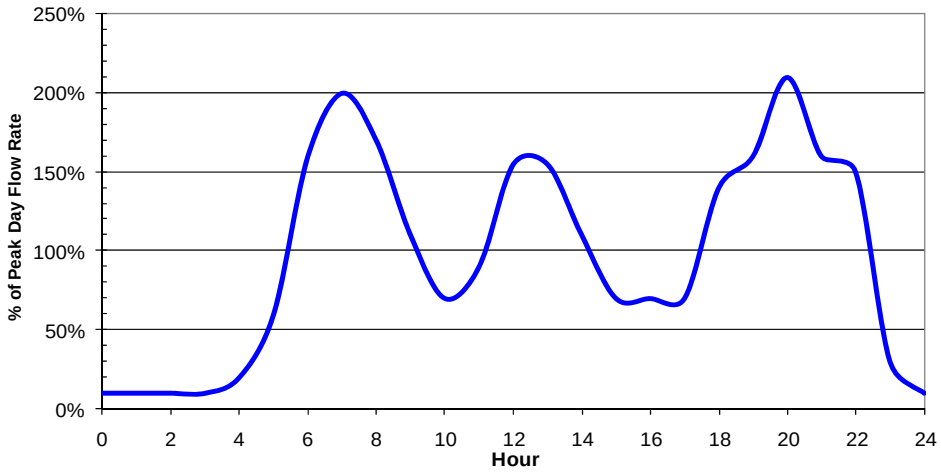


Figure 3.5.3-1: Water Demand Pattern Used in Model

Emergency storage is essentially the storage that a community feels comfortable with based on the reliability of the power supply and its water system in general. Emergency storage equal to the average day usage is commonly used for the emergency storage volume and is utilized in this report. The current average day water demand was found to be 51,400 gpd. The projected average day water demand was calculated to be 61,400 gpd.

The total required water storage for a community is generally considered to be the equalization storage plus the larger of fire or emergency storage (Mays 2000). The current total storage generally considered as needed for Alexandria would then be 262,500 gallons (22,500 + 240,000) and the projected storage would then be 266,860 gallons (26,860 + 240,000). However, funding agencies currently do not consider fire protection an eligible expense. Therefore, the total water storage evaluated for this report is the emergency storage plus the equalization storage. The total storage of at least **73,900 gallons** (22,500 + 51,400) is recommended to meet the current needs. The design total storage is then calculated to be **88,260 gallons** (26,860 + 61,400). The current available storage is 50,000 gallons and is not adequate to meet the recommended storage requirements.

3.6 BOOSTER STATION

The booster station building is shown in Figure 3.6-1. The booster station building is in good condition, although space is limited. The booster station, in its current set-up, was constructed in 1996. The piping within the booster station seems to be in good condition. The Utility Manager is planning to replace two seals on valves in the booster station that began leaking this winter.

Rural water enters the building through a four-inch line on the north side of the building. Once entering the building, the rural water is then typically used to fill the ground storage tank, although there is by-pass piping that allows rural water to directly supply the distribution system. As discussed earlier, the contracted maximum flow rate is 110 gpm. The rural water supply valve is regulated by the water level in the ground storage tank. The recently installed pressure transducer measures the water level in the ground storage tank for the signal to control the rural water supply valve.

Water from the ground storage tank is then typically pumped into the water tower and distribution system. The City utilizes one 25-horsepower (HP) pump in the booster station that has a capacity of 500 gpm and a total dynamic head of 126 feet. The City has a back-up diesel engine-driven pump connected in the booster station that is utilized in case of emergencies. The Utility Manager has stated, however, that this pump is no longer operable and not a reliable back-up source. The back-up pump can be seen in Figure 3.6-1. If an emergency would arise, the City has a spare 25-HP pump identical to the pump that is currently used. The Utility Manager has stated that it is desired to eliminate the diesel engine-driven pump and install the spare 25-HP pump permanently in its place. The installation of the pump would meet the design criterion that requires a booster station to meet the water demand with the largest pump out of service.

Figure 3.6-1: Booster Station

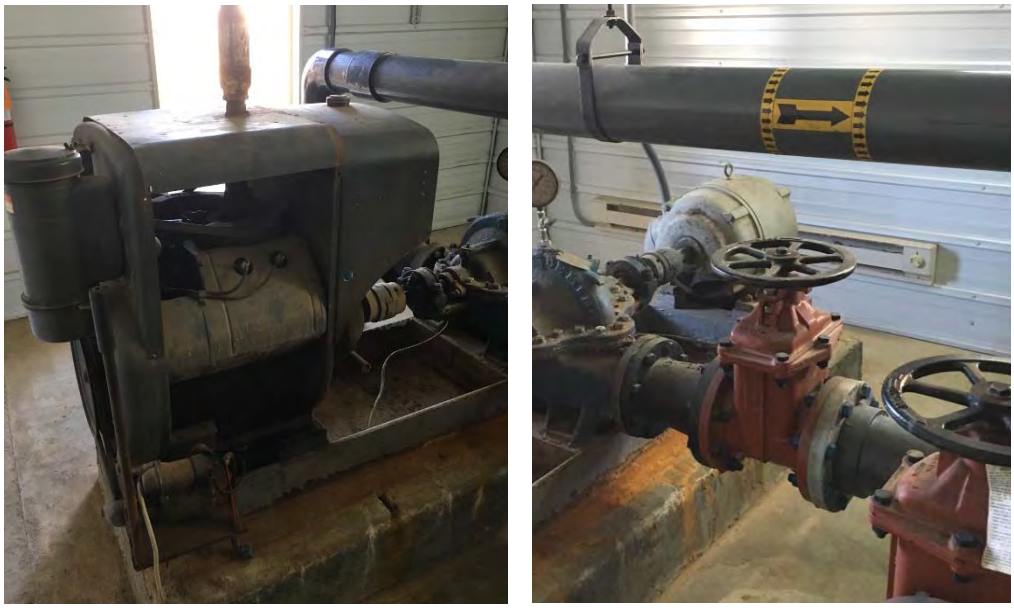


Figure 3.6-1, Continued: Booster Station

The pump is controlled by a recently installed pressure transducer that measures the water level in the water tower. Currently, the operator has the pump start once the pressure reaches 53.0 pounds per square inch (psi) and the pump stops once it reaches 55.5 psi. This corresponds to a water fluctuation of 4.6 feet in the water tower. According to the Utility Manager, the pump typically turns on three to four times a day.

The booster station has a portable generator that is stored in the City Shop that is adjacent to the booster station. The portable generator can be hooked up to a panel outside of the booster station. The City currently only has one generator that is used between the City's lift station and booster station. It is desired to get an automatic standby generator for the City's lift station so the portable generator can be allotted to just the booster station.

3.7 DISTRIBUTION SYSTEM

According to available information the types and sizes of water main used throughout the distribution system are shown previously in Figure 3.1-1. In 1989 and 1991 major water main projects were implemented which replaced most of the City's distribution system with six-inch or eight-inch PVC pipe. The City's water main piping consists mainly of polyvinyl chloride (PVC) pipe with a relatively small amount of cast iron pipe (CIP). It is believed the CIP is from the City's original system. The approximate total length of each size and type of pipe in the water distribution system is listed below.

Table 3.6-1: Approximate Pipe Length

Pipe Size	Pipe Type	Length, Ft
2-inch	PVC	3,500
4-inch	PVC	400
6-inch	CIP	1,100
6-inch	PVC	28,000
8-inch	PVC	3,700
	Total	36,700

Approximately three percent of the distribution system is composed of CIP. Typically, the inside of a cast iron pipe will corrode and build up scale over time reducing the inside diameter and capacity of the pipe. The build-up increases the roughness of the pipe which also reduces the capacity of the pipe.

The cast iron pipe has generally outlived its useful life and may begin to break more frequently because the pipe generally becomes more brittle over time. The Utility Manager has indicated that the frequency of water main breaks has not been a serious issue at this time. Most of the leaks that do occur are on water services rather than on the water main.

Alexandria's main-line distribution system composed of pipe larger than two inches in diameter currently has nine dead ends. Fire hydrants are located at six of these dead ends to properly flush and maintain water quality. The remaining three of these dead ends are stubbed out for future development and will be extended as the water mains are installed further into the development areas. Without looping and multi-directional flow of water in the distribution system, water is

supplied, for the most part, through a long single pipeline. In this type of distribution system, total water usage decreases the closer one gets toward the ends of the lines. This results in decreased movement of water in the pipe and the possibility of exceptionally long retention times of the water in various segments of the pipe. Long retention times in a pipe can have a detrimental effect on the quality of the water in the pipe such as:

- A decrease in the disinfection levels in the water;
- An increase in the potential for the formation of carcinogenic disinfection process by-products; and
- An increased potential for the formation of biological growth.

3.7.1 Hydrants and Valves

Figure 3.1-1 shows the current sizes of the City's distribution system piping. Based on information provided by the City there are approximately 56 fire hydrants. According to the Utility Manager, all of the fire hydrants are inspected and flushed annually and believed to be in working condition.

The Recommended Standards for Water Works by the Committee of the Great Lakes has indicated in Section 8.4.3 that the hydrant lead shall be at least six inches in diameter for firefighting purposes. According to construction records of the 1991 Water Distribution Improvement Project, there are five existing hydrants that were connected to four-inch water mains. The Recommended Standards for Water Works also indicate that fire hydrants have at least one 4½-inch pumper nozzle and two 2½ inch nozzles. Records indicate that the City has 12 fire hydrants that are not equipped with a pumper nozzle. It is recommended that these issues be addressed when the fire hydrants reach the end of their useful life span and need to be replaced.

There are approximately 69 main-line water valves which the Utility Manager indicated are working properly. The City has a valve exercising program in which they exercise each valve annually. The spacing and locations of the valves appear to be sufficient to adequately maintain water service to the users of the system when portions of the system are taken offline due to maintenance or pipe repair.

3.7.2 Hydraulic Evaluation

A hydraulic evaluation of the water system was conducted using the KY Pipe 2018 hydraulic computer model. This model utilizes the Hazen-Williams formula and commonly accepted friction factors for the pipeline material being considered to calculate head loss due to pipe friction and resulting flows and pressures. Two types of hydraulic analyses were performed with the hydraulic program to evaluate the City of Alexandria's distribution system. The first type is a general system analysis which provides a snapshot of the system at the set parameters. The second type is a fire flow analysis which predicts the fire flow from selected fire hydrants. All analyses were utilized to obtain a representation of the existing distribution system and to allow accurate recommendations to be made that will improve the existing conditions.

Any hydraulic evaluation can find the existing water system to be inadequate by simply making the requirements very stringent. In the same manner, generally all systems are adequate to meet the average day demands. Deficiencies in a system are typically not apparent until system demands increase to provide the peak day or peak hour flows. The reason for this is that the flow rate in a pipeline significantly affects the downstream pressures. The friction loss, or the pressure loss, in a pipe is a function of the square of the velocity. Therefore, as the flow rate and corresponding velocity in a pipe increase, the resulting friction increases exponentially. As a result, it is common practice to evaluate the overall system deficiencies in a distribution system based on peak hour and peak day flows.

It should be noted at this point that the hydraulic modeling provided is theoretical. The hydraulic model should not be considered completely accurate due to the complex variables involved in the calculations. The exact age or internal surface condition of the water mains is unknown which introduces a degree of error since the pipeline capacity is directly related to its interior roughness which is also related to its age.

3.7.3 Modeled Flow Rates

The total water demand for the City is modeled by distributing demands throughout the water distribution model to simulate the metered connections. The water use demand is spread throughout the hydraulic model based on the density of housing and other connections. Two sets of modeled system demands are created to place different loading conditions on the model:

- **Peak Hour Demand**

  Mays states that the peak hour to average day flow ratio typically ranges from 2.0 to 7.0:1. It is our opinion that the peak hour to average day ratio should be modeled as 5.25. This number was calculated by multiplying the highest usage in Figure 3.5.3-1 of 210 percent by the estimated peak day to average day ratio of 2.5. Therefore, the total modeled peak hour flow rate is estimated to be 187 gpm (672 people x 76.5 gpcpd x 5.25 / 1,440 minutes per day). This flow will be utilized in the general analysis with the water tower set at mid-level to evaluate the distribution system's hydraulic capacity to maintain adequate water pressure during this high-use period.

  The water use demand is placed on the hydraulic model in two categories for this application. First, a point demand of 40 gpm will be placed on the athletic facilities south of the City to simulate the watering of the facilities, as well as a demand of 20 gpm at the school. Secondly, the residential demands are placed throughout the model based on the density of housing and other connections. The peak hour demand will place 0.403 gpm per connection ((187 gpm - 60 gpm)/ 315 connections) on the hydraulic model.

- **Peak Day Demand**

  The peak day demand in the models was set to approximately 128,500 gpd (672 people x 76.5 gpcpd x 2.5) or 89 gpm based on the estimated water use projection discussed previously. This flow will be used in the fire flow analysis with the water tower set five feet below the overflow level to evaluate potential fire flows. A point demand of 20 gpm will be placed on the athletic facilities south of the City to simulate watering, as well as a demand of 10 gpm at the school. The peak day demand will place 0.187 gpm per connection ((89 gpm - 30 gpm) / 315 connections) on the hydraulic model.

3.7.4 Pressure Analysis

To check the water system for low-pressure problems, hydraulic models are created using the following assumptions:

- The peak hour demand is placed on the model according to Section 3.7.3.
- The operating elevation of the water tower is set to the mid-tank level.
- The rural water supply and distribution pumps are off so the water tower supplies all of the water demand.

Section 7.3.1 of the Recommended Standards for Water Works by the Committee of the Great Lakes recommends a minimum working pressure of 35 psi with a normal working pressure of 60 to 80 psi. The *AWWA Distribution System Handbook* by Mays states that low operating pressures of less than 30 psi can result in annoying reductions in water flow when more than one water-using device is in service. The minimum desired pressure by many residents is 40 psi as that pressure is typically required to properly operate lawn sprinkler systems. Based on the references above, the recommended pressures for services are shown in Table 3.7.4-1.

Table 3.7.4-1: Recommended Pressures

Condition	Service Pressure Criteria (psi)
Maximum Pressure	60-80
Minimum Pressure During Peak Day	40
Minimum Pressure During Peak Hour	35
Minimum Pressure During Fire Flow	20

Figure 3.7.4-1 indicates that all of the peak operating pressures in the community are above the minimum recommended pressure of 35 psi. However, it is seen that the area south of the railroad tracks has pressures that are near the minimum pressure. This is a result of the existing two-inch line underneath the railroad having a velocity of 5.0 feet per second which is above the recommended maximum velocity of three feet per second. The velocities throughout the City can be seen in Figure 3.7.4-1. The rest of the velocities throughout the City would be considered low and thus have little effect on the pressures.

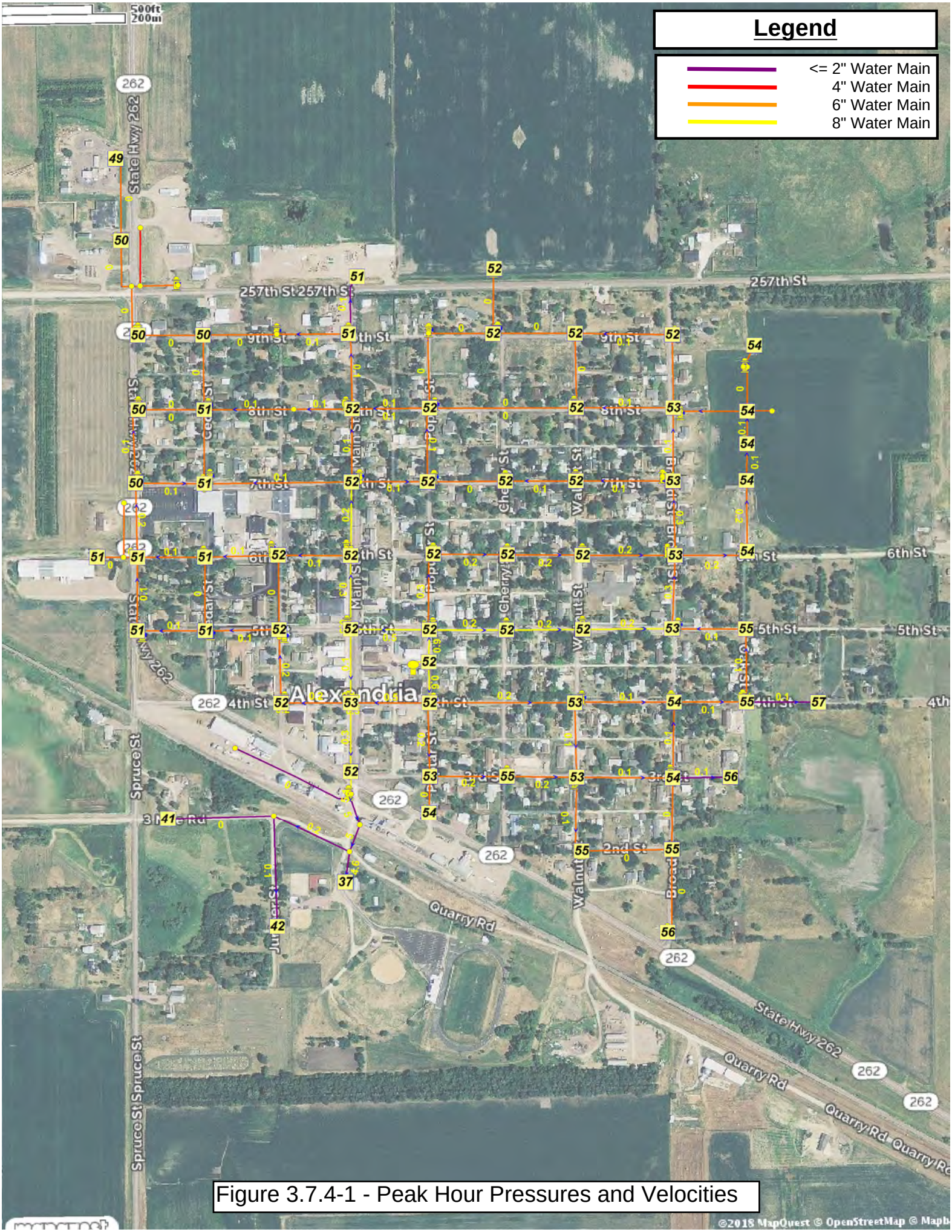


Figure 3.7.4-1 - Peak Hour Pressures and Velocities

3.7.5 Fire Flow Simulation

In order to check the water system for low fire flow problems, hydraulic models are created using the following assumptions:

- The peak day demand is placed on the model according to Section 3.7.3.
- The operating level of the water tower is set to the mid-tank level.
- The rural water supply and well pumps are off so the water tower supplies all of the water demand.
- The fire flow is limited to what flow the system can deliver while maintaining a minimum of 20 psi.

Main pipelines are to deliver the needed fire flow to each hydrant in accordance with the ISO guidelines. The ISO guidelines are based on a number of variables including size of structure, construction material, occupancy, exposure and connections to other structures. For one- and two-family dwellings not exceeding two stories in height, the following fire flows are required:

Distance Between Buildings	Fire Flow Requirement
Over 100 feet	500 gpm
31 to 100 feet	750 gpm
11 to 30 feet	1,000 gpm
10 feet or less	1,500 gpm

As for the business district, the needed fire flow would be variable for each structure, depending on construction and materials. For complete accuracy an inspection and analysis of each structure would be required. Rather than performing these inspections and analyses, a minimum needed fire flow of 2,000 gpm is assumed for business and school areas.

The fire flows that are estimated from the model are shown in Figure 3.7.5-1. As can be seen, the fire flows around the City are greater than the minimum required by ISO.

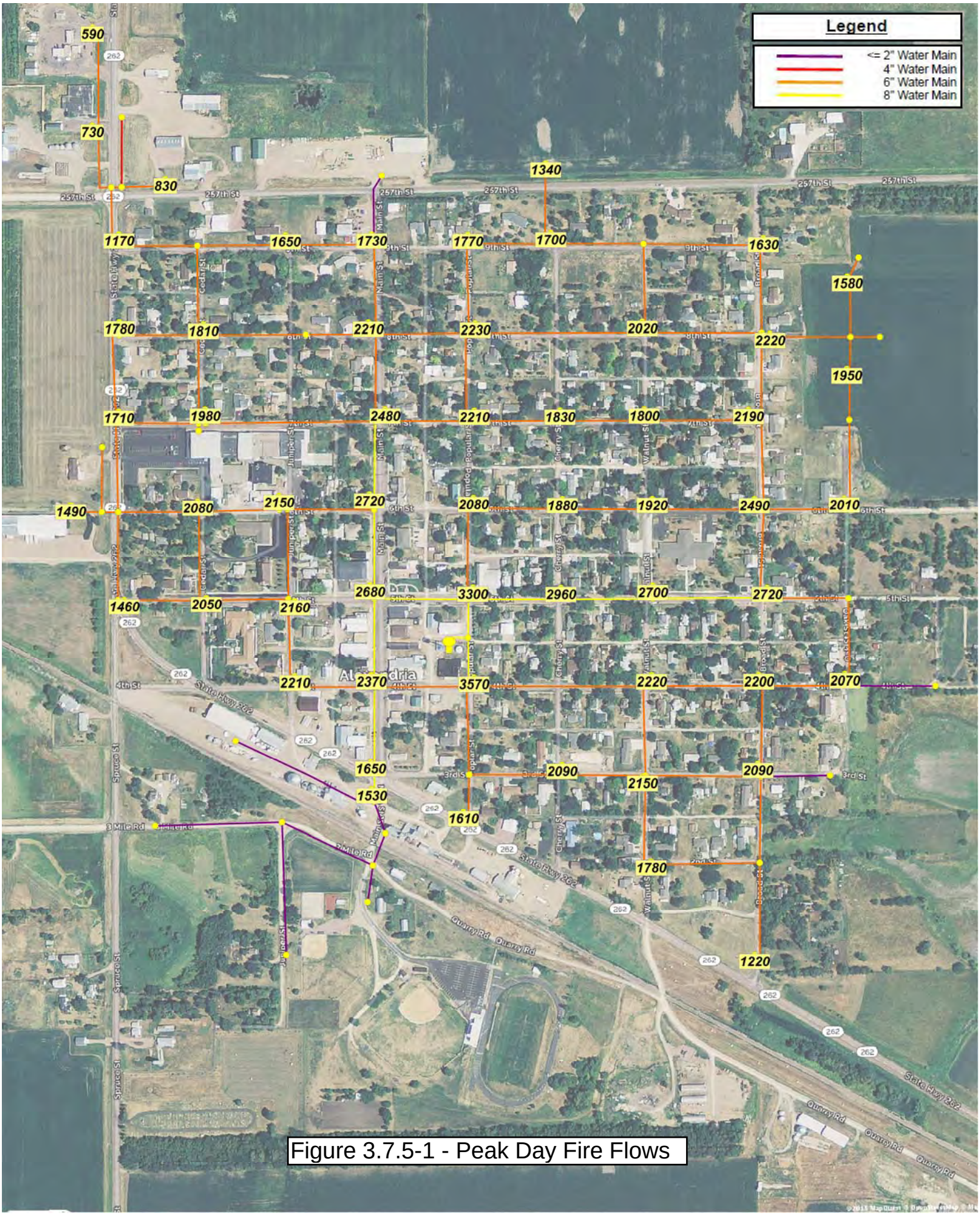


Figure 3.7.5-1 - Peak Day Fire Flows

3.8 FUTURE CONDITIONS

Information related to project need and the planning area is found in Section 3.1 of this report. Specific information on population projections is found in Section 2.3. For purposes of this report and study, the projected population of 802 in 2040 is used. No significant change in commercial or industrial water uses are anticipated at this time but are a possibility. Because of the expected population growth within the City, there are areas of expected residential expansion within the City. The areas of development as indicated by City representatives are east of Broad Street between Sixth Street and Ninth Street and west of Spruce Street between Sixth Street and Ninth Street.

The City has also indicated that major improvements are expected to the athletic facilities south of the City that will require additional water use. The additional water use will create a higher flow rate on the existing two-inch water main currently supplying the park. This higher flow rate will affect the pressures for the two residential connections in the area. The projected conditions for the City's water system are summarized in Table 3.8-1. The hydraulic analysis of the water distribution system under future conditions will be addressed later in the report.

Due to the importance of conserving water, money and energy, various means for reducing water usage are recommended. By using faucet aerators, reduced flush toilets, and limited flow showerheads water use can be reduced.

Table 3.8-1: Summary of Projected 2040 Conditions for the Water System

Population	802
Average Daily Water Use	61,400 gallons
Peak Daily Water Use	153,500 gallons
Recommended Minimum Water Storage Volume	88,260 gallons

4 DEVELOPMENT AND EVALUATION OF ALTERNATIVES

4.1 GENERAL

The alternatives developed for the City of Alexandria were composed to demonstrate options available to fix the identified deficiencies in the water system.

4.2 CAUTIONARY NOTES CONCERNING COST ESTIMATES

The opinions of probable cost provided with the following alternatives reflect the anticipated costs for administration, engineering design, construction, contingencies, construction observation, and other costs related to completion of the project. The costs as presented are based on an analysis and comparison of projects of similar size and scope. The actual construction and project costs will vary on an individual project basis. The actual bid cost will reflect the bidder's evaluation of construction problems, weather, soils and difficulty of work. Thus, the engineer cannot be held responsible for the accuracy of the estimates made in this report as the engineer has no control over the Contractors' bid costs.

Changes in materials, equipment and energy costs, as well as availability of other construction work at the time of the bid opening, could substantially influence actual project cost. Construction costs will also vary somewhat based on the quantity of items necessary to construct the project. The quantities and costs contained in this report are preliminary estimates based on our best judgment without field measurements. Final quantities and opinions of probable cost and final construction costs must be based upon final design.

Different funding sources have different requirements for some non-construction items. Therefore, actual costs of non-construction items should be considered tentative at this time and subject to later modifications and adjustments as current situations and funding sources dictate. Further, inasmuch as the period of construction cannot be accurately predicted, the costs as presented in this report have not been adjusted to reflect projected inflation factors. Therefore, it is important that the estimate of costs as presented be reviewed and updated periodically to reflect construction cost trends.

4.3 EQUIVALENT UNIFORM ANNUAL COST

In addition to an opinion of cost for certain alternatives discussed in this section, a breakdown of the estimated equivalent uniform annual cost (EUAC) is also given later in the report. The equivalent uniform annual cost (EUAC) not only takes the capital costs into account when evaluating the options but also looks at the salvage value of the components and the expected annual operation and maintenance costs. The result is a comparison of the alternatives on an overall basis throughout a period of 30 years. As a result, the EUAC may show that the lowest capital cost alternative is not the lowest cost alternative. This situation would occur when options have a low capital cost but high operation and maintenance costs. The terms and values utilized in performing the EUAC are given in Table 4.3-1.

The alternatives presented in this report include only one viable solution for each deficiency identified. The presented solutions would not alter the expected operation or maintenance costs. Therefore, the presented EUAC will be only a function of capital cost and will not be evaluated.

Table 4.3-1: EUAC Terminology and Values Used

Term	Definition	Value Used
Interest = I	Annual interest rate percentage	2.50-SRF
Salvage Value = SV	Value of component at end of 30-year design life	0 to 60%
Present Worth = PW	Present worth (equal to opinion of cost for that item)	Variable
Net Present Worth of Salvage Value = PW SV	Present worth of the salvage value	47.7%
Net Present Worth of Capital Costs = NPW	Present worth less the present worth of the salvage value	Variable
Net Present Worth of Annual Costs	Present worth of annual costs over the 30-year design life	20.93
Equivalent Uniform Annual Cost = EUAC	Annual cost of total present worth of capital and annual costs	4.78%
Design Period	Length of time facilities are evaluated	30 years-SRF

4.4 WATER SOURCE IMPROVEMENTS

The contracted maximum flow rate with the HRWS meets the current and future peak day usage for the City. However, the estimated future peak day is only slightly under the contract amount.

It is recommended that the City monitor their water usage to ensure an adequate supply is available for continued growth. The City's current well which is located in the booster station building is no longer operable. Consideration should be given to abandoning the well.

4.4.1 Water Source Alternative 1: Do Nothing

The first alternative for the water source improvements is to do nothing. This alternative would not address the City's well which is no longer in use and is an unneeded liability for the City. Because doing nothing would not address this issue, this alternative is not recommended.

4.4.2 Water Source Alternative 2: Well Abandonment

The City's well has not been used for many years and is not expected to be needed again. This option considers the cost which is presented in Table 4.4.2-1 to properly abandon the well. The piping and electrical in the booster station that connect to the well are also removed.

Table 4.4.2-1: Estimated Cost for Abandoning the Well

Item	Description	Quantity	Unit Cost	Total Cost
1	Mobilization	1 LS	$1,500.00	$1,500.00
2	Abandon Well	1 LS	$10,000.00	$10,000.00
3	Remove and Dispose of Piping and Electrical	1 LS	$2,500.00	$2,500.00
4	Remove Base and Level Floor	1 LS	$1,500.00	$1,500.00
5	Incidental Construction	1 LS	$1,400.00	$1,400.00
			Subtotal	$16,900.00
			Contingencies	$1,700.00
			Construction Total	$18,600.00
			Design Engineering	$3,000.00
			Bidding and Contract Documents	$2,500.00
			Construction Engineering	$4,000.00
			Legal and Administration Cost	$600.00
			Total Project Cost	$28,700.00

EUAC, Well Abandonment

a. Construction Costs

Item	Cost	SV	PW SV	NPW
Mobilization	$1,500.00			$1,500.00
Abandon Well	$10,000.00			$10,000.00
Remove and Dispose of Piping and	$2,500.00			$2,500.00
Remove Base and Level Floor	$1,500.00			$1,500.00
Remaining Project Costs	$13,200.00			$13,200.00
Total Construction Cost	$28,700.00	$0.00	$0.00	$28,700.00

b. Operation and Maintenance Costs

Item	Existing Annual Cost	Change in Annual Cost	NPW
Salaries and Wages	$28,500.00		$596,513.34
Water System Supplies	$7,100.00		$148,605.08
Water System Repairs and Maintenance	$10,000.00		$209,302.93
Utilities	$6,100.00		$127,674.78
Rural Water Use	$72,000.00		$1,506,981.07
Subtotal	$123,700.00	$0.00	$2,589,077.19

c. Equivalent Uniform Annual Cost

NPW of Construction Cost	$28,700.00
NPW of O & M Costs	$2,589,077.19
Total Net Present Worth	$2,617,777.19
Equivalent Uniform Annual Cost	**$125,071.22**

4.5 WATER STORAGE IMPROVEMENTS

The identified deficiencies of the water source are summarized below:

- The current and future storage capacity is greater than the current storage the City has available.
- A recent inspection of the interior of the water tower indicated the coatings require repair.

4.5.1 Water Storage Alternative 1: Do Nothing

The Do Nothing Alternative would not repair the coatings inside the water tower. In addition, the recommended storage capacity is greater than what is available in the existing water tower. Because doing nothing would not address these issues, this alternative is not recommended.

4.5.2 Water Storage Alternative 2: Water Tower Rehabilitation

This alternative considers the cost of sandblasting and recoating the inside surfaces of the existing water tower. The pits located in the water tower would be addressed before the tank interior is recoated. It should be noted that this alternative does not address the storage deficit the City currently has. The associated costs with this alternative are presented in Table 4.5.2-1.

Table 4.5.2-1: Estimated Cost for Water Tower Rehabilitation

Item	Description	Quantity	Unit Cost	Total Cost
1	Mobilization	1 LS	$1,100.00	$1,100.00
2	Surface Preparations	10 HR	$500.00	$5,000.00
3	Interior Coating Repair	10 HR	$500.00	$5,000.00
4	Incidental Construction	1 LS	$1,000.00	$1,000.00
			Subtotal	$12,100.00
			Contingencies	$1,300.00
			Construction Total	$13,400.00
			Design Engineering	$2,500.00
			Bidding and Contract Documents	$3,500.00
			Construction Engineering	$3,000.00
			Legal and Administration Cost	$1,000.00
			Total Project Cost	$23,400.00

EUAC, Water Tower Rehabilitation

a. Construction Costs

Item	Cost	SV	PW SV	NPW
Mobilization	$1,100.00			$1,100.00
Surface Preparations	$5,000.00			$5,000.00
Interior Coating Repair	$5,000.00			$5,000.00
Remaining Project Costs	$12,300.00			$12,300.00
Total Construction Cost	$23,400.00	$0.00	$0.00	$23,400.00

b. Operation and Maintenance Costs

Item	Existing Annual Cost	Change in Annual Cost	NPW
Salaries and Wages	$28,500.00		$596,513.34
Water System Supplies	$7,100.00		$148,605.08
Water System Repairs and Maintenance	$10,000.00		$209,302.93
Utilities	$6,100.00		$127,674.78
Rural Water Use	$72,000.00		$1,506,981.07
Subtotal	$123,700.00	$0.00	$2,589,077.19

c. Equivalent Uniform Annual Cost

NPW of Construction Cost	$23,400.00
NPW of O & M Costs	$2,589,077.19
Total Net Present Worth	$2,612,477.19
Equivalent Uniform Annual Cost	**$124,818.00**

4.5.3 Water Storage Alternative 3: New Water Tower

This alternative considers a new water tower with a 15-foot higher overflow elevation to improve pressures and fire flows. The increase of elevation corresponds to approximately 6.5 psi of additional pressure throughout the City. The recommended storage capacity for the City is a minimum of 88,260 gallons. Since small water towers are constructed in increments of 25,000 gallons, the size of the water tower is recommended to be a minimum of 100,000 gallons. Therefore, a 100,000-gallon water tower is evaluated in this alternative. The costs are presented in Table 4.5.3-1 and include the typical costs of the construction of a new water tower. For the purpose of this analysis the new water tower was placed adjacent to the existing location of the tower. If another location is selected, additional eight-inch water main will be required to the water tower.

Table 4.5.3-1: Estimated Cost for Water Tower

Item	Description	Quantity		Unit Cost	Total Cost
1	Mobilization	1	LS	$69,000.00	$69,000.00
2	100,000-Gallon Water Tower and Appurtenances	1	LS	$600,000.00	$600,000.00
3	8" PVC Water Main	200	LF	$50.00	$10,000.00
4	Control Room in Base of Water Tower	1	LS	$10,000.00	$10,000.00
5	Demolition of Existing Water Tower	1	LS	$30,000.00	$30,000.00
6	Site Work and Surfacing	1	LS	$4,000.00	$4,000.00
7	Seeding and Erosion Control	1	LS	$2,000.00	$2,000.00
8	Incidental Construction	1	LS	$33,000.00	$33,000.00
				Subtotal	$758,000.00
				Contingencies	$75,800.00
				Construction Total	$833,800.00
				Design Engineering	$52,000.00
				Land Purchase	$15,000.00
				Geotechnical Engineering	$5,000.00
				Bidding and Contract Documents	$5,000.00
				Construction Engineering	$63,000.00
				Legal and Administration Cost	$26,000.00
				Total Project Cost	$999,800.00

EUAC, New Water Tower

a. Construction Costs

Item	Cost	SV	PW SV	NPW
Mobilization	$69,000.00			$69,000.00
100,000-Gallon Water Tower and Appurtenances	$600,000.00	$300,000.00	$143,022.81	$456,977.19
8" PVC Water Main	$10,000.00	$2,500.00	$1,191.86	$8,808.14
Control Room in Base of Water Tower	$10,000.00	$2,500.00	$1,191.86	$8,808.14
Demolition of Existing Water Tower	$30,000.00			$30,000.00
Site Work and Surfacing	$4,000.00			$4,000.00
Seeding and Erosion Control	$2,000.00			
Remaining Project Costs	$274,800.00			$274,800.00
Total Construction Cost	$999,800.00	$305,000.00	$145,406.52	$577,593.48

b. Operation and Maintenance Costs

Item	Existing Annual Cost	Change in Annual Cost	NPW
Salaries and Wages	$28,500.00		$596,513.34
Water System Supplies	$7,100.00		$148,605.08
Water System Repairs and Maintenance	$10,000.00		$209,302.93
Utilities	$6,100.00		$127,674.78
Rural Water Use	$72,000.00		$1,506,981.07
Subtotal	$123,700.00	$0.00	$2,589,077.19

c. Equivalent Uniform Annual Cost

NPW of Construction Cost	$577,593.48
NPW of O & M Costs	$2,589,077.19
Total Net Present Worth	$3,166,670.67
Equivalent Uniform Annual Cost	**$151,296.05**

4.6 BOOSTER STATION IMPROVEMENTS

The booster station seems to be in good condition. Recent improvements to the controls seem to be working well with no known issues. However, the back-up diesel engine-driven pump that is in the booster station is no longer operable. The City only has one pump that is operable in the booster station, with a spare pump on hand.

4.6.1 Booster Station Alternative 1: Do Nothing

If a problem would arise with the operating pump, the City could rely on HRWS to supply the water. However, as stated earlier the pressure supplied by HRWS is highly variable with low

pressures occurring at times. As such, utilizing HRWS as pressure for the system is not desirable. In addition, the DENR requires a redundant pump be operable for emergencies. Because of this, the "Do Nothing" alternative is not recommended.

4.6.2 Booster Station Alternative 2: Booster Station Improvements

In this alternative, the diesel engine-driven pump is removed along with the concrete on which the pump and engine are located. The spare 25-HP pump that the City currently has would be installed in its place. Because of the smaller size of the new pump, the piping in the booster station could be changed to create more space. The cost estimate can be seen in Table 4.6.2-1.

Table 4.6.2-1: Cost Estimate for Booster Station Improvements

Item	Description	Quantity	Unit Cost	Total Cost
1	Mobilization	1 LS	$2,800.00	$2,800.00
2	Remove and Dispose of Engine-Driven Pump	1 LS	$5,000.00	$5,000.00
3	Remove and Dispose of Existing Concrete Base	1 LS	$1,500.00	$1,500.00
4	Install City-Furnished Pump and Related Items	1 LS	$4,000.00	$4,000.00
5	General Piping, Fittings, Valves and Related Items	1 LS	$9,000.00	$9,000.00
6	General Electrical	1 LS	$7,000.00	$7,000.00
7	Incidental Construction	1 LS	$1,300.00	$1,300.00
			Subtotal	$30,600.00
			Contingencies	$3,100.00
			Construction Total	$33,700.00
			Design Engineering	$5,000.00
			Bidding and Contract Documents	$2,500.00
			Construction Engineering	$6,000.00
			Legal and Administration Cost	$2,000.00
			Total Project Cost	$49,200.00

EUAC, Booster Station Improvements

a. Construction Costs

Item	Cost	SV	PW SV	NPW
Mobilization	$2,800.00			$2,800.00
Remove and Dispose of Engine-Driven Pump	$5,000.00			$5,000.00
Remove and Dispose of Existing Concrete Base	$1,500.00			$1,500.00
Install City-Furnished Pump and Related Items	$4,000.00	$1,000.00	$476.74	$3,523.26
General Piping, Fittings, Valves and Related Items	$9,000.00	$2,250.00	$1,072.67	$7,927.33
General Electrical	$7,000.00			$7,000.00
Remaining Project Costs	$19,900.00			$19,900.00
Total Construction Cost	$49,200.00	$3,250.00	$1,549.41	$27,750.59

b. Operation and Maintenance Costs

Item	Existing Annual Cost	Change in Annual Cost	NPW
Salaries and Wages	$28,500.00		$596,513.34
Water System Supplies	$7,100.00		$148,605.08
Water System Repairs and Maintenance	$10,000.00		$209,302.93
Utilities	$6,100.00		$127,674.78
Rural Water Use	$72,000.00		$1,506,981.07
Subtotal	$123,700.00	$0.00	$2,589,077.19

c. Equivalent Uniform Annual Cost

NPW of Construction Cost	$27,750.59
NPW of O & M Costs	$2,589,077.19
Total Net Present Worth	$2,616,827.78
Equivalent Uniform Annual Cost	**$125,025.86**

4.7 WATER DISTRIBUTION IMPROVEMENTS

The identified deficiencies of the water distribution system are summarized below:

- The City currently has identified approximately 1,100 feet of cast iron pipe that is at the end of its useful life span.
- There are nine dead ends. Fire hydrants are located at six of the dead ends. These six dead ends are not practical to loop because of their location and are, therefore, considered acceptable. The other three dead ends will be extended as development progresses.
- The small diameter water pipe to the City's athletic facilities causes low pressure to the area south of the highway. There are improvements planned that will require additional water use in this area.

4.7.1 Water Distribution Alternative 1: Do Nothing

The first alternative for water distribution system improvements is to do nothing. This alternative will not address any of the above identified deficiencies. As a result, the "Do Nothing" alternative is not considered as an acceptable alternative. An evaluation of the water distribution system with future demands is discussed in this section.

As stated in Section 3.8, there are areas of proposed residential expansion within the City. The areas of development as indicated by City representatives are east of Broad Street between Sixth Street and Ninth Street and west of Spruce Street between Sixth Street and Ninth Street. In this evaluation, water mains in the areas of future development are placed on the model in order to analyze how these new demands will affect the existing distribution system as a whole.

The proposed development areas can be seen in Figure 4.7.1-1. It should be noted that the piping layout is only provided to demonstrate the system's ability to supply water to the area. A residential demand was simulated for each lot to model the future water demand. The pressures and fire flows that can be expected as a result of the expansions can be seen in Figure 4.7.1-2 and Figure 4.7.1-3. Because the piping is preliminary and would likely be assessed to the developer, a cost estimate is not provided for this alternative. The pressures and fire flows shown in the following figures appear to be acceptable.

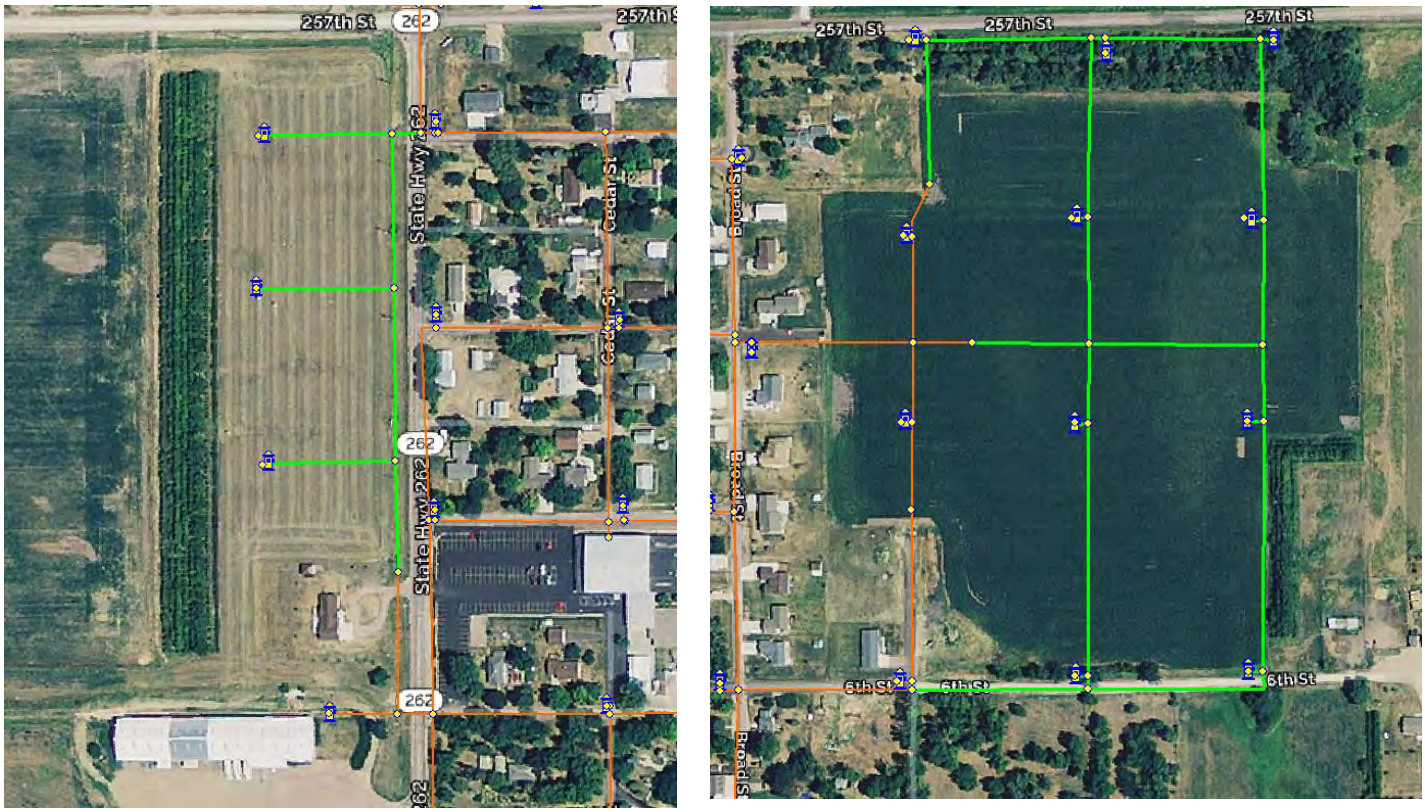


Figure 4.7.1-1: Proposed Developments (Highlighted in Green)

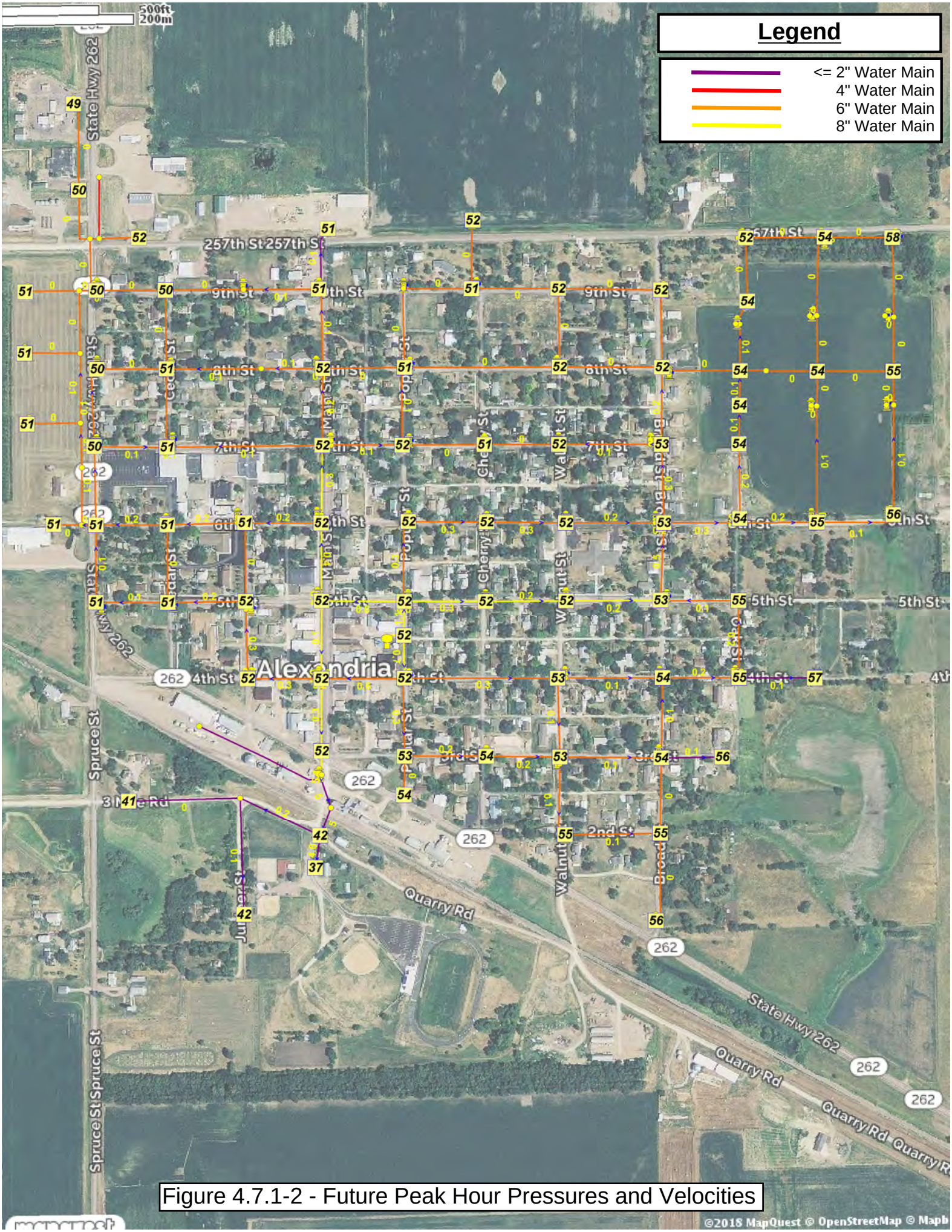


Figure 4.7.1-2 - Future Peak Hour Pressures and Velocities

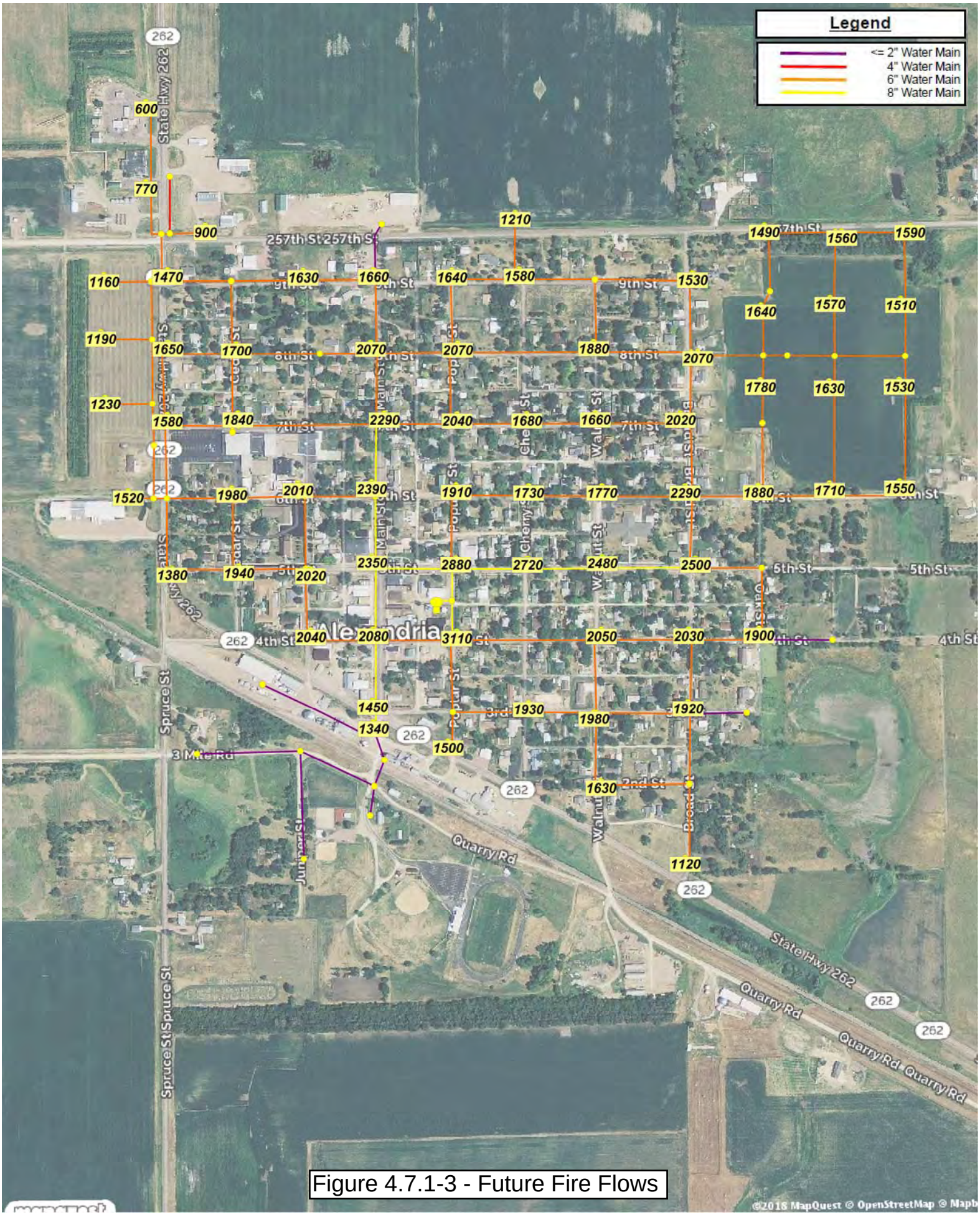


Figure 4.7.1-3 - Future Fire Flows

4.7.2 Water Distribution Alternative 2: Water Distribution Improvements

This alternative considers the replacement of the existing CIP with PVC pipe. As discussed previously when CIP is old, it becomes brittle and has a significant friction loss which reduces pressures and flow capacity. The frequency of the water main breaks is expected to increase in the future as the pipe continues to age. The pipe to be replaced is shown highlighted in green in Figure 4.7.2-1. It is proposed to bore the PVC pipe underneath Spruce Street at the 6th Street intersection and at 9th Street in order to give the proposed development two connection points for looping. The bore at 6th Street would eliminate the section of CIP in that location.

Included in this improvement is an eight-inch water main in a steel encasement underneath the railroad on the south side of the City. The proposed water main will eliminate the high velocities that are currently occurring in the two-inch water main that results in low pressure to the residential users when the City athletic facilities are watering. The proposed water main would also allow residential expansion to occur in the area.

The cost estimate for the proposed improvements is shown in Table 4.7.2-1. The pressures and fire flows that can be expected as a result of the improvements can be seen in Figure 4.7.2-2 and Figure 4.7.2-3. As can be seen, the proposed improvements increase both the pressures and fire flows in the vicinity of the improvements.

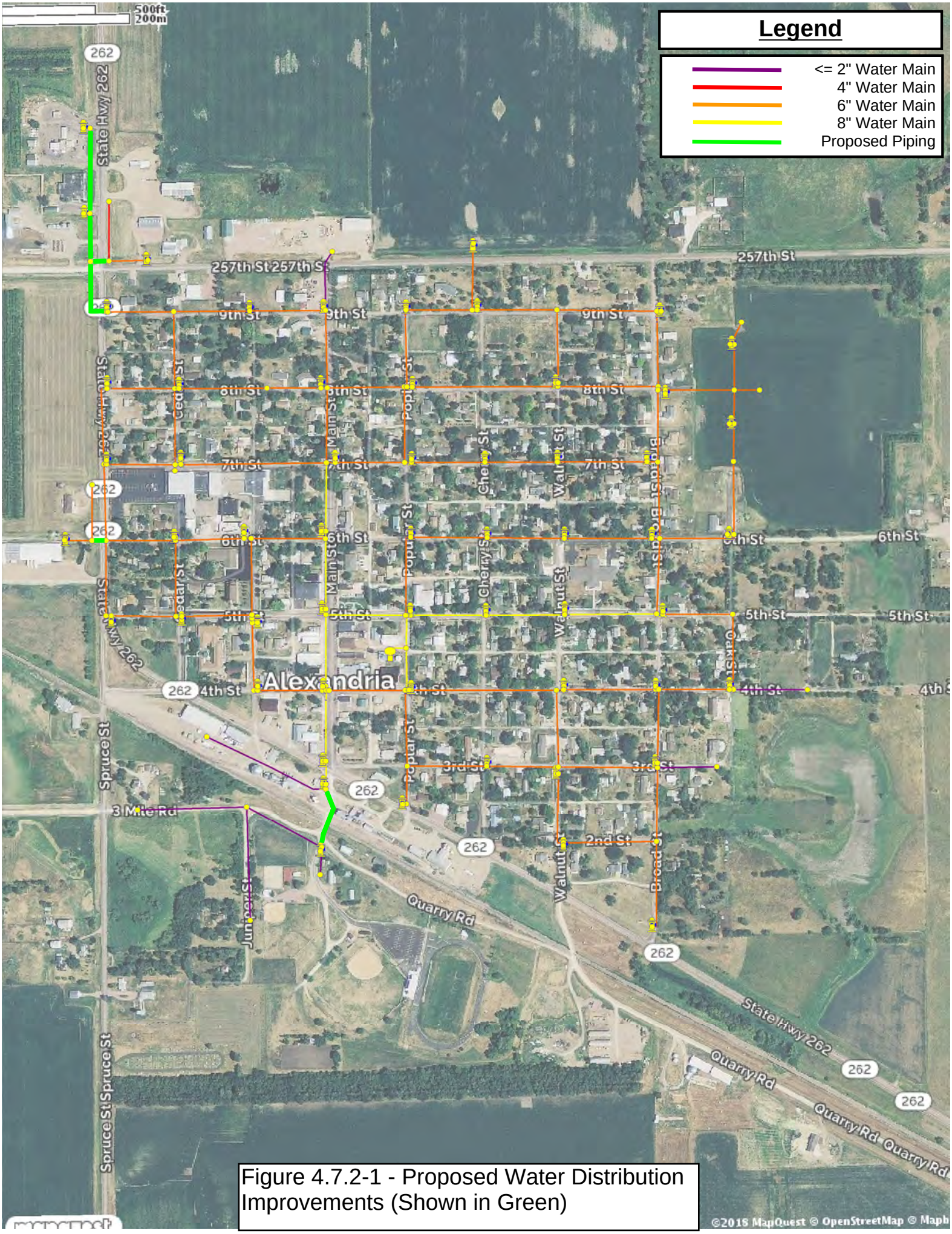


Figure 4.7.2-1 - Proposed Water Distribution Improvements (Shown in Green)

Table 4.7.2-1: Estimated Cost for Water Distribution Improvements

Item	Description	Quantity		Unit Price	Total Cost
1	Mobilization	1	LS	$26,000.00	$26,000.00
2	Pulverize and Salvage Existing Asphalt	300	SY	$3.50	$1,050.00
3	Salvage Existing Gravel	400	SY	$5.00	$2,000.00
4	Full Depth Asphalt Saw Cut	300	LF	$3.50	$1,050.00
5	Remove and Dispose of Existing Valve and Box	4	EA	$250.00	$1,000.00
6	Remove and Dispose of Existing Fire Hydrant	3	EA	$300.00	$900.00
7	6" Water Main	1,340	LF	$30.00	$40,200.00
8	8" Water Main	340	LF	$34.00	$11,560.00
9	10" Directionally Bored PVC Casing Pipe	300	LF	$90.00	$27,000.00
10	14" Steel Casing Installed by Jacking	150	LF	$460.00	$69,000.00
11	Fire Hydrant	3	EA	$3,500.00	$10,500.00
12	6" Gate Valve	9	EA	$1,300.00	$11,700.00
13	8" Gate Valve	1	EA	$1,700.00	$1,700.00
14	Miscellaneous Fittings and Connections	1	LS	$20,000.00	$20,000.00
15	1" Curb Stop w/Box	5	EA	$350.00	$1,750.00
16	2" Curb Stop w/Box	4	EA	$700.00	$2,800.00
17	1" Service Line	180	LF	$26.00	$4,680.00
18	2" Service Line	140	LF	$32.00	$4,480.00
19	Unclassified Excavation	300	CY	$5.00	$1,500.00
20	Place Recycled Asphalt	300	SY	$5.00	$1,500.00
21	Fine Grading of Base Material	300	SY	$1.00	$300.00
22	Gravel Base	300	TN	$20.00	$6,000.00
23	Asphalt Surfacing	60	TN	$130.00	$7,800.00
24	Traffic Control	1	LS	$3,000.00	$3,000.00
25	Erosion Control	1	LS	$1,000.00	$1,000.00
26	Seed and Fertilize	1,900	SY	$2.00	$3,800.00
27	Incidental Construction	1	LS	$18,900.00	$18,900.00
				Subtotal	$281,170.00
				Contingencies	$28,100.00
				Total Construction Cost	$309,270.00
				Design Engineering	$24,000.00
				Bidding Phase Engineering	$5,000.00
				Construction Engineering	$32,000.00
				Legal and Administration Cost	$6,000.00
				Total Project Cost	$376,270.00

EUAC, Water Distribution Improvements

a. Construction Costs

Item	Cost	SV	PW SV	NPW
Mobilization	$26,000.00			$26,000.00
Pulverize and Salvage Existing Asphalt	$1,050.00			$1,050.00
Salvage Existing Gravel	$2,000.00			$2,000.00
Full Depth Asphalt Saw Cut	$1,050.00			$1,050.00
Remove and Dispose of Existing Valve and Box	$1,000.00			$1,000.00
Remove and Dispose of Existing Fire	$900.00			$900.00
6" Water Main	$40,200.00	$10,050.00	$4,791.26	$35,408.74
8" Water Main	$11,560.00	$2,890.00	$1,377.79	$10,182.21
10" Directionally Bored PVC Casing Pipe	$27,000.00	$6,750.00	$3,218.01	$23,781.99
14" Steel Casing Installed by Jacking	$69,000.00	$17,250.00	$8,223.81	$60,776.19
Fire Hydrant	$10,500.00	$2,625.00	$1,251.45	$9,248.55
6" Gate Valve	$11,700.00	$2,925.00	$1,394.47	$10,305.53
8" Gate Valve	$1,700.00	$425.00	$202.62	$1,497.38
Miscellaneous Fittings and Connections	$20,000.00	$5,000.00	$2,383.71	$17,616.29
1" Curb Stop w/Box	$1,750.00	$437.50	$208.57	$1,541.43
2" Curb Stop w/Box	$2,800.00	$700.00	$333.72	$2,466.28
1" Service Line	$4,680.00	$1,170.00	$557.79	$4,122.21
2" Service Line	$4,480.00	$1,120.00	$533.95	$3,946.05
Unclassified Excavation	$1,500.00			$1,500.00
Place Recycled Asphalt	$1,500.00			$1,500.00
Fine Grading of Base Material	$300.00			$300.00
Gravel Base	$6,000.00			$6,000.00
Asphalt Surfacing	$7,800.00			$7,800.00
Traffic Control	$3,000.00			$3,000.00
Erosion Control	$1,000.00			$1,000.00
Seed and Fertilize	$3,800.00			$3,800.00
Remaining Project Costs	$114,000.00			$114,000.00
Total Construction Cost	$376,270.00	$51,342.50	$24,477.16	$351,792.84

b. Operation and Maintenance Costs

Item	Existing Annual Cost	Change in Annual Cost	NPW
Salaries and Wages	$28,500.00		$596,513.34
Water System Supplies	$7,100.00		$148,605.08
Water System Repairs and Maintenance	$10,000.00		$209,302.93
Utilities	$6,100.00		$127,674.78
Rural Water Use	$72,000.00		$1,506,981.07
Subtotal	$123,700.00	$0.00	$2,589,077.19

c. Equivalent Uniform Annual Cost

NPW of Construction Cost	$351,792.84
NPW of O & M Costs	$2,589,077.19
Total Net Present Worth	$2,940,870.03
Equivalent Uniform Annual Cost	**$140,507.83**

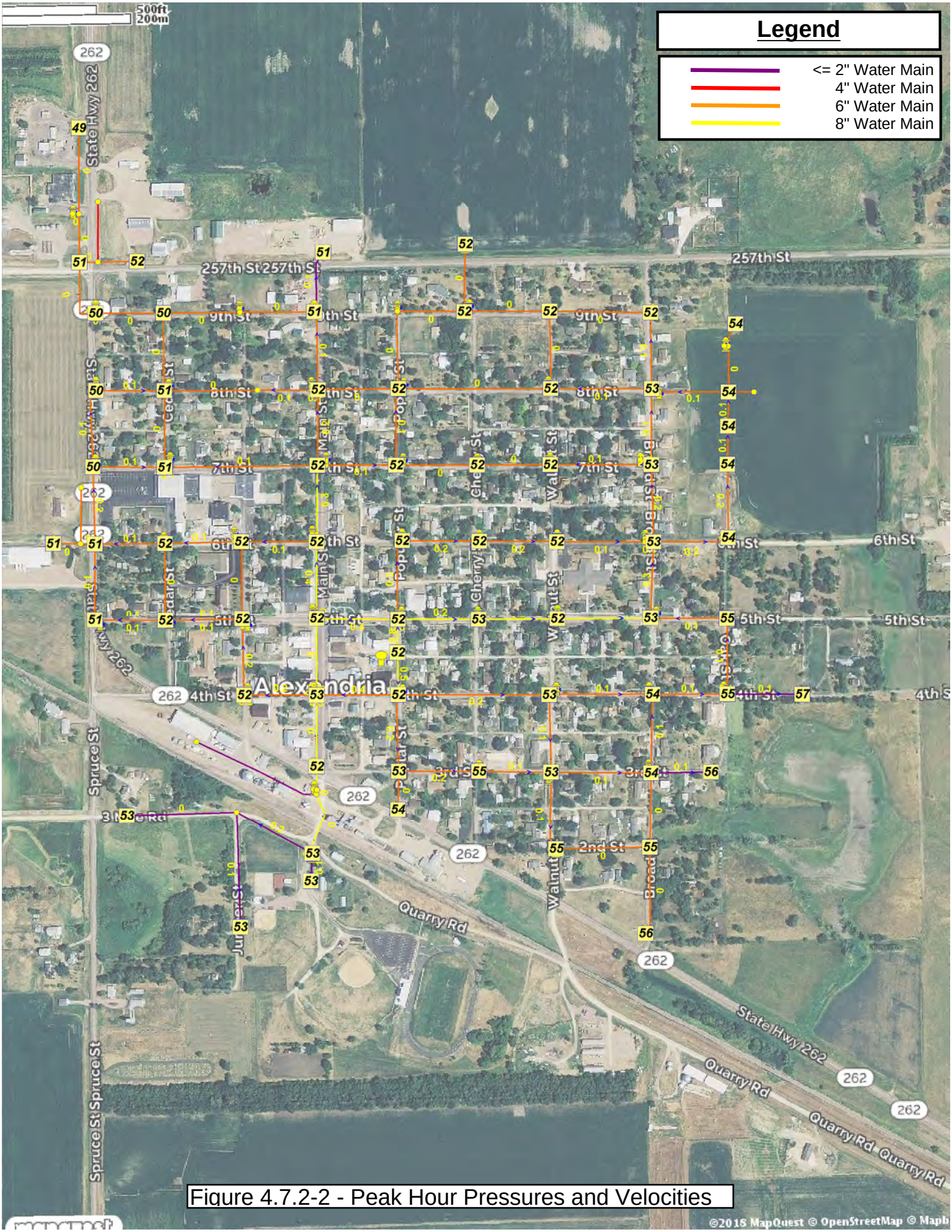


Figure 4.7.2-2 - Peak Hour Pressures and Velocities

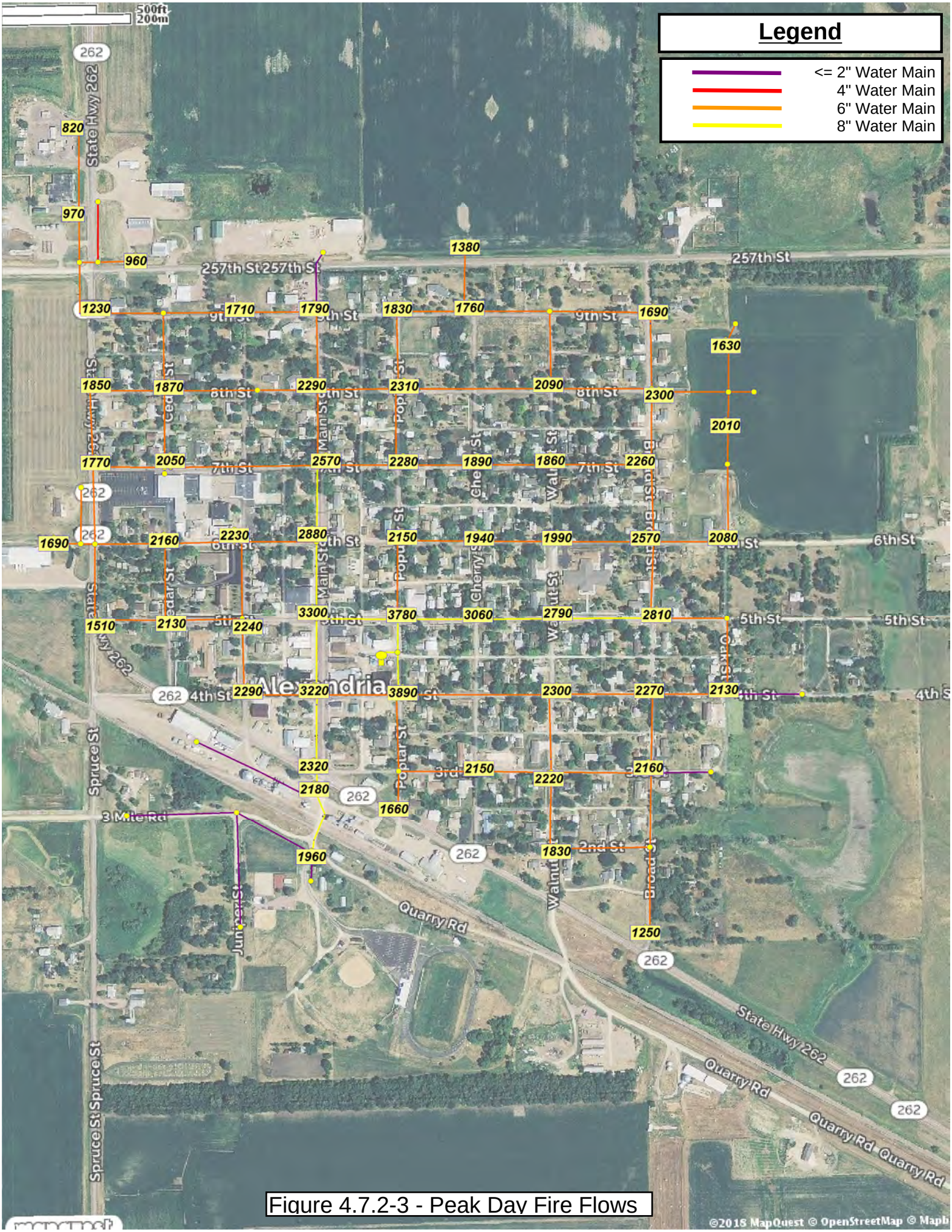


Figure 4.7.2-3 - Peak Day Fire Flows

5 SELECTION OF ALTERNATIVES

A summary of the total project costs for each of the improvement alternatives discussed in Section 4 is presented below. The recommended improvements are also tabulated in Table 5-1 and discussed below.

Table 5-1: Summary of Costs

Improvement Options	Cost	Recommended
Water Source Alternative 2: Well Abandonment	$28,700.00	$28,700.00
Water Storage Alternative 2: Water Tower Rehabilitation	$23,400.00	
Water Storage Alternative 3: New Water Tower	$999,800.00	$999,800.00
Booster Station Alternative 2: Booster Station Improvements	$49,200.00	$49,200.00
Water Distribution Alternative 2: Water Distribution Improvements	$376,270.00	$376,270.00
	Total Recommended Cost	$1,453,970.00

5.1 WATER SOURCE

Water Source Alternative 2 (Well Abandonment) is recommended to eliminate the well that is no longer operable. It is also recommended that the City negotiate with HRWS to have an increased contracted flow rate as population growth continues.

5.2 WATER STORAGE

Water Storage Alternative 2 (Water Tower Rehabilitation) does not address the storage deficit that the City is experiencing. It is our opinion that removing the old water tower from service and installing a larger one will benefit the City. Therefore, it is recommended that Alternative 3 (New Water Tower) be implemented.

5.3 BOOSTER STATION

Booster Station Alternative 2 (Booster Station Improvements) is recommended to provide the City a reliable back-up source should a problem arise with their existing pump.

5.4 WATER DISTRIBUTION

Water Distribution Alternative 2 (Water Distribution Improvements) is recommended since it would eliminate all of the CIP within the City and would also give the City the ability to properly serve the residences south of the railroad tracks while watering is occurring at the athletic facilities.

5.5 DEMONSTRATION OF FINANCIAL CAPABILITY

As part of the cost analysis of the recommended improvements, the City's ability to pay for the projects is evaluated. The total costs of the improvements are listed in Table 5-1. For the purpose of this financial evaluation, the total cost of the improvements is assumed to be eligible for a low interest loan from the State Revolving Fund. This, however, is subject to change due to decisions that must be made by the appropriate funding agencies.

The short-lived asset replacement costs associated with this project are shown in Table 5.5-1. This money should be set aside for the replacement of equipment.

Table 5.5-1: Short-Lived Asset Replacement

Expenses	Annual Cost
Exterior Water Tower Recoat	$3,000
Interior Water Tower Recoat	$2,700
Ground Storage Tank Maintenance	$3,400
Water Meters	$4,500
Booster Station Valves	$400
Booster Station Controls	$3,500
Booster Station Pumps	$900
Annual Total to Be Budgeted	$18,400

Table 5.5-2 summarizes the financial data that was supplied by the Finance Officer and is used to determine the proposed operational surplus or deficit of the Water Fund. The estimated project cost at the time of writing this report is increased by an annual inflation factor of three percent for the analysis. The proposed improvements are expected to cause an insignificant change to the annual costs of operation and maintenance.

The budgeted revenues generated from user fees for 2018 are listed in Table 5.5-2. The budget analysis indicates that the current revenue is sufficient. Once the payment for the proposed

project loan is added, there is a deficit in the budget. The new loan will require an increase in user fees. The annual loan payment for principal and interest on the total cost of the improvements is calculated based on a 30-year loan period and an interest rate of 2.25 percent. The increase in user fees will depend on the actual financing that is available.

Table 5.5-2: Operation of the Water Fund

	2018 Budget	2019 Budget
Total Cost of Improvements + 3% Inflation		$1,497,589
Revenue from User Fees	+ $133,000	+ $136,780
Other Revenue (Interest)	+ $900	+ $900
Current O & M Cost - Expenses	- $123,700	- $123,700
Short-Lived Asset Replacement	- $0	- $18,400
Current Principal and Interest Payments		- $0
Retirement of Debt Incurred with This Project		- $69,188
Debt Reserves (10% of Loan Payment)		- $6,920
Remaining Surplus	**$10,200**	**-$80,528**
Increase of User Fee		$21.50
Number of Accounts		315
Added Revenue		$81,270
Surplus After Increase in User Fee		**$742**
Current Water Fee (5,000 gallons)	$42.00	$43.00
New Water Fee		$64.50

The current water fee schedule is based on water usage. The schedule of water fees is based on a $22.50 minimum charge for the first 1,000 gallons, $5.50 per 1,000 gallons for the next 3,000 gallons, and $4.00 per 1,000 gallons after that. This amounts to a charge of $43.00 for 5,000 gallons of water use. The DENR requires a minimum water fee of $30 for 5,000 gallons of water use per month to qualify for grant and/or principal forgiveness funding consideration. The operation and maintenance costs for the Water Fund are based on the actual expenses for 2016 and 2017. These costs include the salaries and all expenses incurred during the year.

Because the financing that will be supplied by various funding agencies is unknown at this time, multiple columns of budget information are provided in Table 5.5-3 based on varying grant percentages.

Table 5.5-3: Water Rate Analysis

	0/100 loan/grant	25/75 loan/grant	50/50 loan/grant	75/25 loan/grant	100/0 loan/grant
Annual O & M	$123,700	$123,700	$123,700	$123,700	$123,700
Amount Amortized	$0	$374,397	$748,795	$1,123,192	$1,497,589
Grant Amount	$1,497,589	$1,123,192	$748,795	$374,397	$0
Annual Payment	$0	$17,297	$34,594	$51,891	$69,188
Debt Reserves	$0	$1,730	$3,460	$5,190	$6,920
Current Debt/Asset/Other Cost	$18,400	$18,400	$18,400	$18,400	$18,400
Total Annual Costs	$142,100	$161,127	$180,154	$199,181	$218,208
Annual Revenue at Current Rate	$137,680	$137,680	$137,680	$137,680	$137,680
Surplus/Deficit After Project	-$4,420	-$23,447	-$42,474	-$61,501	-$80,528
Rate Increase Due to Project	$1.25	$6.25	$11.25	$16.50	$21.50
New Water Rate	$44.25	$49.25	$54.25	$59.50	$64.50

5.6 CAPITAL FINANCING PLAN

The City of Alexandria will make applications to state and federal resources for loan and grant assistance to complete the project during the upcoming construction season.

5.7 ENVIRONMENTAL EVALUATION

The City of Alexandria has requested comments from concerned federal agencies. The correspondence related to these inquiries will be placed in Appendix A upon receipt.

5.8 VIEWS OF THE PUBLIC AND CONCERNED INTEREST GROUPS

The findings of this report will be presented to the City Council. The City will conduct a public hearing on the proposed project to meet the requirements of any applicable funding agency. Information related to the hearing will be available upon request after the completion.

5.9 DESIGN OF SELECTED PLAN

The design of the improvements to the water system will provide enhanced flexibility in operation and will be designed in accordance with the SD DENR design criteria and the accepted principles and standards for the design of the water distribution system and water storage system.

5.10 ENVIRONMENTAL IMPACTS OF SELECTED PLAN

Environmental information gathered thus far does not indicate that any state or federal agencies will have environmental concerns related to the project or its proposed construction.

5.11 ARRANGEMENT FOR IMPLEMENTATION

This report provides information to describe the proposed project and to support the decision to proceed with the improvements as quickly as possible. Final design will be completed by the City's consultant and approved by the DENR. Cost estimates have been prepared and are referenced elsewhere in this document. The project will be bid in accordance with state statutes that govern municipal corporations and will be constructed by the lowest responsible bidder.

The anticipated schedule for the progression of the project is as follows:

Task	Date
Facility Plan Submitted to Funding Agencies	May-2018
Environmental Review Completed	Jun-2018
Funding Agency Approval of Facility Plan	Jun-2018
Submit State Water Plan Application	Oct-2018
Submit Funding Application	Jan-2019
Final Funding Package Complete	Mar-2019
Begin Design	May-2019
Plans & Specifications Submitted to DENR	Oct-2019
Plans & Specifications Approved by DENR	Nov-2019
Advertisement for Bids	Dec-2019
Open Bids	Dec-2019
Award Bids	Jan-2020
Begin Construction	May-2020
Construction Complete	Nov-2020
Project Close-out	Dec-2020

5.12 LAND ACQUISITION

Land acquisition could be a possibility for certain portions of the proposed improvements discussed in this report. At the time of writing this report the land location and acquisition has not been initiated.

5.13 INTERAGENCY AGREEMENTS

No operating agreements with other agencies are needed as the City of Alexandria owns, operates and maintains its municipal water system. Loan documents will have to be executed with the appropriate lender but as Alexandria is a municipal corporation, it has the legal authority to enter into such agreements. Alexandria's attorney will advise the Council on any legal matters related to this issue.

6 REFERENCES

Committee of Great Lakes – Upper Missouri River Council of State Public Health and Environmental Managers, (1997). Recommended Standards for Water Works (Albany, NY: Health Education Services), pp.

Mays, Larry W., (2000). Water Distribution Systems Handbook, (New York, NY: McGraw Hill), pp.

Soil Conservation Service and Forest Service, in Cooperation with the South Dakota Agricultural Experiment Station. Soil Survey of Hanson and Hutchinson County South Dakota. South Dakota: National Cooperative Soil Survey, 1980.

South Dakota Department of Environment and Natural Resources, (May 1990). *Recommended Design Criteria Manual for Water Works,* Pierre, SD: Division of Environmental Regulation.

University of Kentucky Civil Engineering Department, (2000). Pipe 2000 Manual (Lexington, KY: University of Kentucky, Civil Engineering Software Center), pp.

National Centers of Environmental Information. *Climate Data Online Search, Alexandria, SD.* https://www.ncdc.noaa.gov/cdo-web/search, March 22, 2018

APPENDIX A

ENVIRONMENTAL ASSESSMENT CORRESPONDENCE

TO BE INSERTED WHEN AVAILABLE

APPENDIX B

SD DENR DRINKING WATER SYSTEM EVALUATION

DEPARTMENT OF ENVIRONMENT and NATURAL RESOURCES

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
denr.sd.gov

August 14, 2014

Re: Alexandria (EPA ID# 0062)

THE HONORABLE TIM WENANDE
MAYOR OF ALEXANDRIA
PO BOX 157
ALEXANDRIA SD 57311-0157

Dear Mayor Wendande:

Enclosed are the results of the on-site evaluation performed on the **Alexandria** public water system by Judene Holan with the Department of Environment and Natural Resources (DENR) on July 22, 2014. Requirements and recommendations are provided to assist you with maintaining compliance with state and federal regulations, improving operations, and providing public health protection. Please acknowledge that you have received this report by indicating corrective actions taken.

The contact hour requirements for renewal of water and wastewater operator certificates have increased. Beginning with the February 2010 renewal, the following contact hour requirements were put in place:

Operator with one certificate (Class I or II)	10 contact hours every three years
Operator with more than one certificate (all Class I or II)	15 contact hours every three years
Operator with more than one certificate and at least One certificate is a Class III or IV	30 contact hours every three years

Representatives of your water system are invited to attend seminars and training courses sponsored by the DENR and the South Dakota Rural Water Association. For further information, contact the South Dakota Rural Water Association at 203 Center Street West, Madison, SD 57042-2834. Phone: (605) 556-7219.

If you have questions or comments concerning this on-site evaluation, please call me at 773-4053.

Sincerely,

Judene Holan
Drinking Water Program
E-mail: judene.holan@state.sd.us
Fax #: (605) 773-5286

Cc: Greg Gross, Water Superintendent

South Dakota Department of Environment and Natural Resources

Drinking Water Program

Public Water System On-Site Evaluation Report

System Name: Alexandria
Address: PO Box 157
Alexandria, SD 57311-0157

EPA ID #: 0062

County: Hanson

Person Contacted: Greg Gross
Address: PO Box 157
Alexandria, SD 57311-0157

Work phone: (605)239-4220
Home phone:
Cell phone:
Fax: (605)239-9220
E-mail: mgcityofalec@triotel.net

Inspected By: Judene Holan

Date of Inspection: 7/22/14 (mm/dd/yy)

Type of System: (check one)
X Community Water System
Non-Transient Non-Community

Population: Total Population Served: 615

System Population: 615

Number of Service Connections: 279

Susceptibility to contamination of water source: low

Sources of Water: Water data from year: 2013

Own Source(s):		Total produced:	% of total:	0%
Bulk Supplier:	Hanson Rural Water System (0878)	Total purchased: 19,099,000	% of total:	100.0%
Contracted flow rate?: unk.		Total Annual Use: 19,099,000		100.0%

Water Sold to: n/a
(bulk connections only)

How much water can this system supply? unk. (maximum flow rate, gpm)
What major factor limits system's ability to supply water? need a bigger line coming in from rural water to supply more water

yes	no	n/a	unk	note	
☑	☐	☐	☐	☐	1 Is there an up-to-date map or schematic of system?
☑	☐	☐	☐	☐	2 Is the system capable of meeting demand at all times (excluding fire flow)?
☑	☐	☐	☐	☐	3 Is good housekeeping evident throughout the system?

Comments:
Hanson RWS is served by T-M RWS and B-Y RWS.

Water Usage

yes	no	n/a	unk	note		
☑	☐	☐	☐	☐	4 Are all customers metered?	
					5 If not, what entities are not metered?	
					6 Total gallons billed:	14874147
					7 Calculated water loss:	22.1%
yes	no	n/a	unk	note	8 Peak month and amount used	September 2,189,000 gallons
☑	☐	☐	☐	☐	9 Does the system track unaccounted-for water?	

Comments: The City may replace all the service connection meters in the future.

Water Sources

City of Alexandria EPA ID: 0062

Name	Year Built	Diameter (in)	Depth (ft)	GPM	Status	ID
#1	1914	10	380	75	Abandoned	1
#2	1958	10	435	75	Abandoned	2
HANSON RWS	1979	0	0	350	Permanent	3

Name	Water Right #	Aquifer	Location Description	ID
#1				1
#2	315-3	SIOUX QUARTZITE		2
HANSON RWS				3

yes	no	n/a	unk	note		
☐	☐	☑	☐	☐	1	Has a Source Water Protection Plan been developed? Date: _____
☐	☐	☑	☐	☐	2	Is the wellhead/pump house protected from unauthorized personnel?
☐	☐	☑	☐	☐	3	Are there any sources of contamination with 1/4 mile?
☐	☐	☑	☐	☐	4	Are pesticides, herbicides, fertilizers applied in the area of the well(s)?
☐	☐	☑	☐	☐	5	Is a pressure gauge provided at each source?
☐	☐	☑	☐	☐	6	Is a sample tap provided for raw water?
☐	☐	☑	☐	☐	7	Can flow be measured from each well?
☑	☐	☐	☐	☐	8	Is the well house(s) kept clean, in good repair and not used to store hazardous material?

Comments: _____

Storage

City of Alexandria EPA ID: 0062

Description	Service Date	Location	ID
1 Elevated Steel 85000	unk.		4
1 Ground Steel 74000	unk.		6

yes	no	n/a	unk	note		
☑	☐	☐	☐	☐	1	Is the area surrounding the ground-level storage structures graded in a manner that will prevent surface water from standing within 50 feet?
☑	☐	☐	☐	☐	2	Do overflows and drains have free fall discharges which are screened and are brought down to an elevation between 12 and 24 inches above the ground?
☑	☐	☐	☐	☐	3	Do the overflows and/or drains discharge to a splash pad or drainage inlet structure that is not connected to a storm or sanitary sewer?
☑	☐	☐	☐	☐	4	Do the storage reservoirs have a watertight roof or cover and are they sloped so that water will drain?
☑	☐	☐	☐	☐	5	Are storage structures designed so that they can be isolated from the distribution system without necessitating loss of pressure in the distribution system?
☐	☑	☐	☐	☐	6	Is leakage evident at the time of inspection?
☑	☐	☐	☐	☐	7	Are the storage structures vented?
☑	☐	☐	☐	☐	8	Are vents properly protected/screened?
☐	☑	☐	☐	☐	9	Are covers and hatches locked?
☑	☐	☐	☐	☐	10	Is there separate inlet and outlet piping?
☑	☐	☐	☐	☑	11	Does the drain allow for removal of accumulated silt?
☐	☑	☐	☐	☐	12	Are there any weather related problems (freezing, etc.)?
☑	☐	☐	☐	☐	13	Is there a control system to maintain level?
☑	☐	☐	☐	☐	14	Are there high and low level alarms?
					15	Are tanks filled automatically, manually or both? automatic
☐	☐	☐	☑	☐	16	Is there a service contract for cleaning/inspecting the tanks?
☑	☐	☐	☐	☐	17	Are the tanks disinfected after being cleaned or inspected? How? chlorine
☐	☑	☐	☐	☐	18	Are the storage structures secure from unauthorized access?
☐	☑	☐	☐	☐	19	Is the area fenced?
					20	What other steps have been taken to address security? checked daily

Comments: 11. The tower has, but unknown if the ground storage does.

Distribution System

City of Alexandria EPA ID: 0062

Main sizes and types: 6 inch and 8 inch PVC

yes	no	n/a	unk	note		
☑	☐	☐	☐	☐	1	Is the water system capable of providing sufficient water during maximum demand conditions (excluding fire flow) to maintain a minimum pressure of 20 psi within the system measured at the consumer's tap?
					2	What is normal operating pressure? 54 psi
☐	☑	☐	☐	☐	3	Are there areas with chronic low pressure problems?
☑	☐	☐	☐	☐	4	Is an adequate map (shows valve locations, line sizes, etc) of the distribution system maintained?
☐	☑	☐	☐	☐	5	Is there a main flushing program? If yes, how often?
☐	☑	☐	☐	☐	6	Are all dead-end water mains equipped with a means to flush?
☐	☐	☑	☐	☐	7	Any plans to eliminate dead-ends (via looping of mains, etc.)?
☑	☐	☑	☐	☐	8	Are valves exercised regularly? If yes, how often? usually yrly
☐	☐	☐	☑	☐	9	Are there fire hydrants on mains less than 6 inches in diameter?
☐	☑	☐	☐	☐	10	Does the system disinfect after pipe repairs or new pipe installation?
☑	☐	☐	☐	☐	11	Is the location and nature of each repair documented?
☐	☑	☐	☐	☐	12	Does the system utilize a conservation program at any time?
☑	☐	☐	☐	☐	13	Is the system adequately protected from freezing?
☑	☐	☐	☐	☐	14	Are water and sewer mains separated by a horizontal distance of 10 feet or greater?
☐	☑	☐	☐	☐	15	Is there a cross connection control program?
☐	☑	☑	☐	☐	16	Are audits conducted to check for cross connections in the system?
☐	☑	☐	☐	☑	17	Are backflow preventers installed on all consumer connections?
☑	☐	☐	☐	☐	18	Is the bulk water loading station designed with back flow prevention and appropriate air gap device to prevent contamination?
☑	☐	☐	☐	☐	19	Does the system contain any pressure reducing valves?
☑	☐	☐	☐	☐	20	For systems using chloramines, can you measure a total chlorine residual level of at least 0.5 mg/l in your distribution system at all times?
☐	☐	☑	☐	☐	21	For systems using chlorine, can you measure a free chlorine residual level of at least 0.3 mg/l in your distribution system at all times?
					22	How often do you take chlorine readings in the distribution system? total chlorine tested 1 per month

Comments (please indicate the question number): 17. Just on new construction.

Facilities Equipment

City of Alexandria EPA ID: 0062

yes	no	n/a	unk	note		
☑	☐	☐	☐	☐	1	Are any pumps used in the system? If so, describe: Pump is still in Well #2, it has not been pumped in years and has been abandon. 2 booster pumps - rotated
☑	☐	☐	☐	☑	2	Are backup pumps available?
☐	☑	☐	☐	☐	3	Is any equipment located in a pit?
☑	☐	☐	☐	☐	4	Do you have contacts with contractors and equipment vendors to assure prompt service and spare parts availability?
☐	☑	☐	☐	☐	5	Do you use a qualified pump contractor to inspect pump equipment?
☐	☑	☐	☐	☐	6	Is food grade lubrication used in all water facilities equipment?
☑	☐	☐	☐	☐	7	Is backup power available in the event of a power loss?
☑	☐	☐	☐	☐	8	Is equipment protected from unauthorized entry or vandalism?
☐	☑	☐	☐	☐	9	Are the facilities and equipment subject to weather related problems?
☐	☑	☐	☐	☐	10	Is there a floor drain? Where does it drain to?
☐	☐	☑	☐	☐	11	Is there adequate spill containment in chemical room?

Comments (please indicate the question number): 2. 1 Booster pump

Monitoring/Reporting - Distribution

City of Alexandria EPA ID: 0062

yes	no	n/a	unk	note	
					1 Are the following sampling site plans up to date?
☑	☐	☐	☐	☐	- Bacteriological
☐	☑	☐	☐	☐	- Lead and copper **Sent sample site plan**
☑	☐	☐	☐	☐	- Disinfection By Products (DBP)
☑	☐	☐	☐	☐	2 Are microbiological sampling sites (as approved by DENR) being rotated on a monthly basis for routine sampling?
☑	☐	☐	☐	☐	3 Does the system have a waiver for asbestos sampling?
					4 Which of the following records are kept regarding the system?
yes	no	n/a	unk	note	Operational Data:
☑	☐	☐	☐	☐	Flow meter readings:
☑	☐	☐	☐	☐	Electrical usage:
☐	☐	☑	☐	☐	Chemical usage:
☐	☐	☑	☐	☐	Hour meter readings:
☐	☑	☐	☐	☐	Storage or reservoir levels:
					Sampling data:
☑	☐	☐	☐	☐	- Chlorine residual testing
☑	☐	☐	☐	☐	- Bacteriological sampling
☐	☐	☑	☐	☐	- Fluoride levels
☐	☐	☑	☐	☐	- Asbestos sampling results
☑	☐	☐	☐	☐	- Lead and Copper sampling results
☑	☐	☐	☐	☐	- DBP Monitoring
					Other: _____
					Maintenance Data:
☑	☐	☐	☐	☐	Water main repairs:
☐	☑	☐	☐	☐	Main flushing dates:
☐	☑	☐	☐	☐	Valve exercising dates:
☐	☐	☐	☐	☐	Equipment service:
					Other: _____

Testing and Testing Equipment

Test kits present at system: Thermo Orion

yes	no	n/a	unk	note	
☑	☐	☐	☐	☐	5 Are up to date reagents present?

Tests and frequency performed by operator: _____

Total chlorine tested monthly

Survey test results: _____

City of Alexandria EPA ID: 0062

Bacteriological Monitoring

Bacteriological sampling and analysis: July 1, 2013 to August 1, 2014

A	Samples submitted:	16 (3 too old)
B	Samples required:	One Sample Each Month.
C	Survey samples:	0
D	Safe samples:	13
E	Unsafe samples:	0
F	Repeat samples:	0

Lead and Copper Monitoring

(These values are calculated from available data. Check correspondence for verification.)

A	Date Last Tested:	June 2, 2011	
B	Samples required:	10	
C	Sampling Frequency	Triennially	
D	Date Due Next	2014	
E	Lead - 90% Level	0.6	Action Level - 15 ug/l
F	Copper 90% Level	0.02	Action Level - 1.3 mg/l

Disinfectant Residual Monitoring

Residual sampling and analysis: July 1, 2013 to July 1, 2014

A	Samples submitted:	12	
B	Samples required:	One Sample Each Month.	
C	Last Qtr Cl Residual:	2.51	mg/l
D	Running Annual Average:	2.24	mg/l
E	Date of last DBP test:	April 21, 2014	
F	THM - Qtr Average:	8.83	ug/l
G	Haa5 - Qtr Average:	3.5	ug/l

Asbestos

A	Date of last test:	Waiver - Testing Not Required	
B	Asbestos Result:		million fibers per liter

Comments

Managerial Capacity

City of Alexandria EPA ID: 0062

Certification Level of Water System: Distribution: I Treatment: _____

Certification Levels: Very Small Water System (VSWS) Water Distribution (WD) I - IV
Small Water Treatment System (SWTS) Water Treatment (WT) I - IV

yes	no	n/a	unk	note		
☑	☐	☐	☐	☐	1	Does the water system have a governing body? (city council, housing association, district, etc.) city council
					2	How often does the governing body meet to review water system data? 1/month
☑	☐	☐	☐	☐	3	Are all personnel that make water quality and quantity decisions certified?
☑	☐	☐	☐	☐	4	Is an operator certified at the level of the system available at all times?

Operator Name and Number	Water	Distribution	WW	Collection	Pond	SWTS	VSWS
Gregory Gross (2985)		I	I		I		

yes	no	n/a	unk	note		
☑	☐	☐	☐	☑	5	Do you feel you have received adequate training?
☐	☑	☐	☐	☐	6	Is the number of people adequate to operate the water system?
☑	☐	☐	☐	☐	7	Do you maintain records to document compliance (up to 10 years)?
☐	☑	☐	☐	☐	8	Does the system have a written Emergency Response Plan?
☑	☐	☐	☐	☐	9	Does the system have operations and/or maintenance manuals?
☐	☑	☐	☐	☐	10	Do you know what to do in the event of a violation?
☐	☑	☐	☐	☐	11	Have there been any MCL violations or compliance orders for the system in the last 12 months?
☐	☑	☐	☐	☐	12	If so, is there a compliance plan?
☑	☐	☐	☐	☐	13	Is someone responsible for emergency operations, communications and customer relations? Who? Mayor or Greg
☑	☐	☐	☐	☐	14	Are routine operation and maintenance records kept?
☐	☑	☐	☐	☐	15	Is the system aware of all required sampling for the year?
☑	☐	☐	☐	☐	16	Does the system have current "as built" engineering drawings of the system facilities?
☐	☑	☐	☐	☐	17	Do you keep records of complaints and the actions taken to address each one?
					18	How many complaints do you receive on average each year? _____
					19	What is general nature of complaints (taste, odor, color, pressure)? _____
☑	☐	☐	☐	☐	20	Has the latest edition of the Consumer Confidence Report been distributed?
☑	☐	☐	☐	☐	21	Is a copy of the latest Consumer Confidence Report Available?

☑ ☐ ☐ ☐ ☐ 22 Have any changes been made since the last survey in the management, operations, personnel, budget, etc?

If so, what? Greg - Water Superintendent

☑ ☐ ☐ ☐ ☐ 23 Have the recommendations from the previous survey been addressed?

Comments (please indicate the question number): 5. Need more hands on training.

Financial Capacity

City of Alexandria EPA ID: 0062

yes	no	n/a	unk	note		
☐	☑	☐	☐	☐	1	Does the public water system have an annual budget?
☑	☐	☐	☐	☐	2	Does the water system income exceed operating expenses (including debt service)?
☐	☑	☐	☐	☐	3	Does the water system track budget performance?
☐	☑	☐	☐	☐	4	Does the water system have audited financial statements?
☐	☑	☐	☐	☐	5	Are water revenues kept in a separate account?
☐	☑	☐	☐	☐	6	Is some of the water revenue set aside in reserve funds for future capital improvement projects?
☐	☑	☐	☐	☐	7	Is there a capital improvement long range plan (up to 5 years)?
☑	☐	☐	☐	☐	8	Are the water system rates reviewed on at least an annual basis?
☐	☑	☐	☐	☐	9	Is there a plan for rate increases?
☑	☐	☐	☐	☐	10	Is the rate structure based on metered water use?
						List rates: $21.50 for the first 1,000 gal. plus $5.50 per 1000 gal. for the next** (example: $22 minimum plus $1.75/1000 gallons)
☐	☐	☐	☐	☐	11	Are there procedures in place to handle delinquent accounts?
☐	☐	☐	☐	☐	12	Are more than 5% of your customer accounts delinquent?
☐	☐	☐	☐	☐	13	Are controls available to limit over-expenditures?
☐	☐	☐	☐	☐	14	Are there purchasing procedures?
☐	☐	☐	☐	☐	15	Does the system utilize computer software (accounting or otherwise) to maintain its financial records?

Comments (please indicate the question number): **2000 gallons and after that it is $4.00 per 1000 gallons

Violations and Significant Deficiencies

City of Alexandria EPA ID: 0062

Violations From July 1, 2009 To July 1, 2014

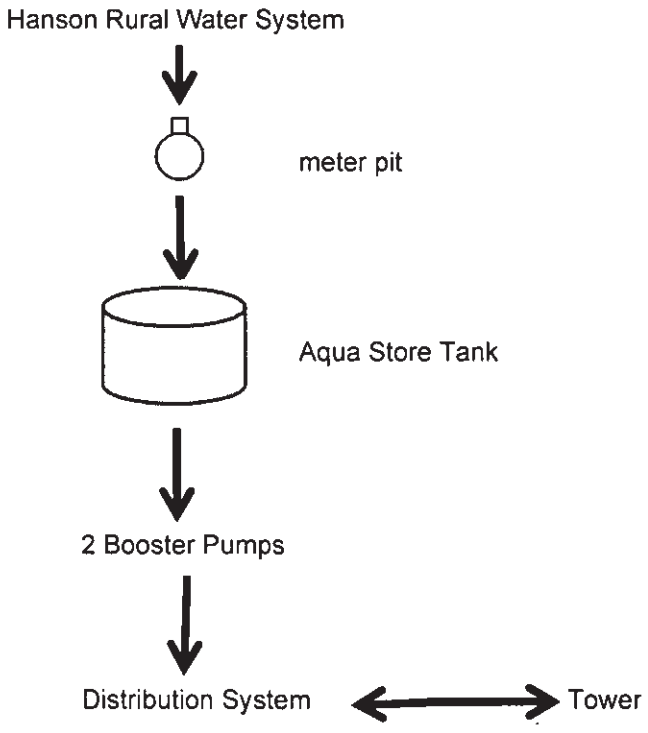
Violation Type	Parameter	Date	Status
Lack of Certified Operator	Certified Operator	02/01/2010	Reminder Notice
	DBP		Compliance Achieved

Significant Deficiency	Date Identified	Date Corrected

Drawing/Flow Schematic

City of Alexandria EPA ID: 0062

Note: Use Symbols provided to draw schematic of water system



Requirements for the Alexandria Water System:

The following are requirements that are being done or will need to be done in the future to bring your public water system into compliance with current state and federal regulations.

1. The South Dakota Drinking Water Standards require that results of compliance monitoring for coliform bacteria be kept on file for not less than five years, and results of compliance monitoring for chemical analyses be kept on file for not less than 10 years.

   Records that must be kept and the frequency:

   Actions taken by your system to correct violations – **3 years**
   Public Notices that your system issues – **3 years**
   Microbiological and turbidity analyses – **5 years**
   Chemical analyses – **10 years**
   Sanitary Surveys and written reports and summaries of surveys – **10 years**
   Public Notification Rule – **3 years**
   Consumer Confidence Rule/Report – **3 years**
   Lead and Copper Rule-Public Education activities and materials – **12 years**
   Lead and copper Rule – all associated sample analyses, corrosion control recommendations – **12 years**
   Stage 1 and 2 Disinfectants and Disinfection By-Products Rule – **10 years**

2. EPA issued the final Surface Water Rule (SWR). The objective of the rule is to reduce the risk of exposure to fecal contamination that may be present in the public water systems that use surface water sources. Provisions of the SWR include:

   - Identification of significant water system deficiencies during sanitary surveys.
   - Requiring corrective action for any system with source water fecal contamination or an identified significant deficiency.
   - Triggered source water monitoring by water systems that collect an unsafe bacteriological sample. This sampling is in addition to the repeat samples required by the Total Coliform Rule.
   - Assessment source water monitoring targeted toward high-risk systems is allowed at the option of the state.

3. The Stage 2 Disinfection By-Products Rule requires schedule 3 systems to take compliance samples prior to October 1, 2013. Compliance sampling should follow the DENR approved sampling plan that was outlined in the Initial Distribution System Evaluation (IDSE). If you have any question regarding the Stage 2

Disinfection By-Products Rule requirements, please contact Geoff Osterman with the Drinking Water Program in Pierre at (605) 773-6045.

4. Your system will need a temporary discharge permit when flushing your hydrants, if not discharged to the sanitary sewer, and when you empty/flush out the reservoir. This permit is required if you chlorinate your system on a continuous basis or periodically add chlorine to your reservoir or well and flush the chlorinated water to waste. The temporary permit application is available online at http://denr.sd.gov/des/sw/wtppermit.aspx. Contact William Marcouiller at 773-5085 with the Surface Water Quality Program for more information.

5. There are new Federal Regulations that may apply to your emergency generator(s)depending on the age of the generator, size of the generator, fuel type, etc. To find out if your generator is applicable to and in compliance with the new Federal Regulations, please submit the "General Application for Minor Sources" form and a "Generators and Fire Pumps" application form for each generator. Submit the forms along with the manufacturer's specification for each generator to the address on the "General Application for Minor Sources" form and the Air Quality Program will contact you with their findings. If you have any questions please contact the Air Quality Program at (605)773-3151. The forms are located at the following website: http://denr.sd.gov/des/aq/airpermits.aspx or additional information on the new federal regulations can be viewed at the following website: http://denr.sd.gov/des/aq/aqnews/NotificationForms1.aspx

Bacteriological Sampling and Analysis

The State Department of Environment and Natural Resources requires that all public water supplies submit water samples on a routine basis to the State Health Laboratory in Pierre or any other EPA or State certified laboratory. Bacteriological samples should be collected from the routine sample sites assigned on your sample site plan. Routine sites located throughout the distribution system will provide an indication of the water quality throughout the distribution system.

Recommendations for the Alexandria Water System:

The following recommendations are submitted to help your system improve drinking water quality and operational services for your customers.

1. Although your water system already has the required certified waterworks operator, we would like to encourage you to continue to send your operator to the various training courses that are available. This will help your operator to maintain his certification and be aware of any upcoming changes in the Safe Drinking Water Act. Contact the South Dakota Rural Water Association at 203 Center Street West/PO Box 287, Madison, SD 57042 or phone (605) 556-7219 for more information.

2. It is recommended that the total chlorine residual of the water be tested three times each week from different locations in the distribution system. A total chlorine residual of between 0.5 mg/L (ppm) and 4.0 mg/L should be detectable in the distribution system at all times. Testing information should be included in the operations records. If the residual falls below the limit, you should contact your rural water system. D-R

3. Your system had a 22.1% water loss in 2013. If a large amount of water is unaccounted for, money, and water is being wasted. Actual water leaking from the distribution system is the most significant factor in the total water loss amount. The distribution system losses can be from bad valves, holes in the water mains, overflow from the reservoir, to name just a few. Regular inspections, maintenance, and a leak detection control program can help reduce water loss in your system.

4. Your budget planning should include contributions to a reserve account to cover unexpected maintenance and/or planned future projects. It is also recommended that a capital improvement plan be developed to cover at least the next five years. The idea of capital improvement plan is to determine any needed improvements, timing, and methods for funding for the projects.

5. An emergency response plan should be developed that describes the action the water system would take in response to various major events such as a natural disaster, catastrophic incident, credible threats, and vandalism. The plan should include a personnel call list and contacts for equipment, supplies, and other resources. A written copy should be available to the system operator and appropriate board members. Review and up the plan on a regular basis.

6. The storage tanks should be inspected yearly and repaired if necessary. The tanks should be cleaned every five years. This will help prevent bacteria from growing in any sediment that may be in the bottom of the tanks. 5t-R

For technical assistance contact the Department of Environment and Natural Resources' Drinking Water Program at 523 East Capitol, Pierre, SD 57501, (605) 773-3754 or the South Dakota Association of Rural Water Systems at 203 Center Street West/PO Box 287, Madison, SD 57042 or phone (605) 556-7219. The West River Office for the South Dakota Association of Rural Water Systems is at 1140 N. Main-Suite 5, Spearfish, SD 57783. Phone: (605) 642-4031.

Even though your system is small, you should be aware that any public water system could be the target of terrorist activities or acts of vandalism. This makes protection of the water system a vital part of providing safe water for consumers. The vulnerabilities of your water system should be identified and appropriate steps should be taken to improve security. Then an emergency response plan that addresses the vulnerabilities identified in the assessment should be written. Links to a vulnerability assessment document (entitled "Security Vulnerability Self-Assessment Guide for Small Drinking

Water Systems") and EPA's emergency response plan guidance (entitled "Emergency Response Plan Guidance for Small and Medium Community Water Systems") and can be found at the Department of Environment and Natural Resource's website www:state.sd.us/denr/des/drinking/dwsecurity.htm. Your emergency response plan should address natural disasters like a tornado or flood, as well as acts of vandalism or terrorism. Although a vulnerability assessment and emergency response plan are not required for your system, we highly recommend performing these very important tasks.

SDWARN (South Dakota Water/Wastewater Agency Response Network) is a utility created and driven mutual aid/assistance program. It is a means of receiving help from and giving help to neighboring water/wastewater utilities when responding to and/or recovering from an emergency. SDWARN is an insurance policy a member utility can use when the inevitable flood, ice storm, blizzard, fire or even a human-caused event occurs and a utility needs assistance in response and recovery activities. The WARN fact sheet provides answers to questions that you may have. To become a member of South Dakota WARN, a signed mutual aid agreement must be submitted to the steering committee chairperson. The mutual aid agreement means to address the administrative and legal issues prior to an event/disaster so focus can be completely on response and recovery. When the mutual aid agreement is finalized, it must be signed as is. I encourage you to take this idea and opportunity to your utility's governing body for consideration. Membership is not a requirement but there are benefits and advantages to membership: 1) There is no membership fee. 2) A member utility has access to resources {equipment, staff, supplies} of other member utilities. 3) A member utility is not obligated to respond if called upon. 4) Response and recovery can begin immediately. 5) A member utility has access to contact people of other member utilities. 6) Help is available so a utility is not alone in response and recovery activities. Contact Barb Friedeman with DENR at 773-4052 to receive a mutual aid agreement for your consideration.

Submitted by

Judene Holan

Judene Holan
Drinking Water Program

APPENDIX C

DRINKING WATER QUALITY REPORT

You can contact us by calling
(605)239-4220 or write us at
PO Box 157
Alexandria SD 57311-0157

City of Alexandria

2017 Drinking Water Report

It's your tap water!

EPA ID: 0062

Water Quality

Last year, the City of Alexandria monitored your drinking water for possible contaminants. This brochure is a snapshot of the quality of the water that we provided last year. Included are details about where your water comes from, what it contains, and how it compares to Environmental Protection Agency (EPA) and state standards. We are committed to providing you with information because informed customers are our best allies.

Water Source

We serve more than 615 customers an average of 52,000 gallons of water per day. Our water is surface water that we purchase from another water system. The state has performed an assessment of our source water and they have determined that the relative susceptibility rating for the Alexandria public water supply system is low.

For more information about your water and information on opportunities to participate in public meetings, call (605)239-4220 and ask for Jessica Bahmuller.

Additional Information

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

- *Microbial contaminants*, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
- *Inorganic contaminants*, such as salts and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.
- *Pesticides and herbicides*, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.
- *Organic chemical contaminants*, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems.
- *Radioactive contaminants*, which can be naturally-occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, EPA prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. FDA regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline (800-426-4791).

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants can be obtained by calling the Environment Protection Agency's Safe Drinking Water Hotline (800-426-4791).

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The City of Alexandria public water supply system is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at *http://www.epa.gov/safewater/lead*.

Detected Contaminants

The attached table lists all the drinking water contaminants that we detected during the 2017 calendar year. The presence of these contaminants in the water does not necessarily indicate that the water poses a health risk. Unless otherwise noted, the data presented in this table is from testing done January 1 – December 31, 2017 The state requires us to monitor for certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Some of the data, though representative of the water quality, is more than one year old.

The City of Alexandria public water system purchases 100% of their water from Hanson Rural Water System (0878).

2017 Table of Detected Contaminants For Alexandria (EPA ID 0062)

Terms and abbreviations used in this table:

** Maximum Contaminant Level Goal(MCLG): the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.*

** Maximum Contaminant Level(MCL): the highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.*

** Action Level(AL): the concentration of a contaminant which, when exceeded, triggers treatment or other requirements which a water system must follow. For Lead and Copper, 90% of the samples must be below the AL.*

** Treatment Technique(TT): A required process intended to reduce the level of a contaminant in drinking water. For turbidity, 95% of samples must be less than 0.3 NTU*

** Running Annual Average(RAA): Compliance is calculated using the running annual average of samples from designated monitoring locations.*

Units:

**MFL: million fibers per liter*

**pCi/l: picocuries per liter(a measure of radioactivity)*

**ppt: parts per trillion, or nanograms per liter*

**mrem/year: millirems per year(a measure of radiation absorbed by the body)*

**ppm: parts per million, or milligrams per liter(mg/l)*

**ppq: parts per quadrillion, or picograms per liter*

**NTU: Nephelometric Turbidity Units*

**ppb: parts per billion, or micrograms per liter(ug/l)*

**pspm: positive samples per month*

Substance	90% Level	Test Sites > Action Level	Date Tested	Highest Level Allowed (AL)	Ideal Goal	Units	Major Source of Contaminant
Copper	0.0	0	06/22/17	AL=1.3	0	ppm	Corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives.
Lead	1	0	09/29/17	AL=15	0	ppb	Corrosion of household plumbing systems; erosion of natural deposits.

Substance	Highest Level Detected	Range	Date Tested	Highest Level Allowed (MCL)	Ideal Goal (MCLG)	Units	Major Source of Contaminant
Haloacetic Acids (RAA)	17.4		08/02/17	60	0	ppb	By-product of drinking water chlorination. Results are reported as a running annual average of test results.
Haloacetic Acids (RAA) *	22.2		08/15/17	60	0	ppb	By-product of drinking water chlorination. Results are reported as a running annual average of test results.
Total trihalomethanes (RAA)	38.0		08/02/17	80	0	ppb	By-product of drinking water chlorination. Results are reported as a running annual average of test results.
Total trihalomethanes (RAA) *	37.2		08/15/17	80	0	ppb	By-product of drinking water chlorination. Results are reported as a running annual average of test results.

Please direct questions regarding this information to Mr Kyle Kampshoff with the Alexandria public water system at (605)239-4220.

*** Hanson Rural Water System (0878) test result.**

City of Alexandria Drinking Water Information

(System Information, Sampling Requirements, and Compliance Report)

2017 Certificate of Achievement Award.

Population Served: 615

System Population: 615

Certified Operator: Mr Kyle Kampshoff
PO Box 157
Alexandria, SD 57311-0157

Work Phone: (605)239-4220
Home Phone:
Cell Phone:
Fax: (605)239-9220
Email: mgcityofalec@triotel.net

Financial Contact: Ms Jessica Bahmuller
PO Box 157
Alexandria, SD 57311-0157

Work Phone: (605)239-4220
Home Phone:
Cell Phone:
Fax:
Email: mgcityofalec@triotel.net

Other Contacts: Mayor Brian Carmody
PO Box 157
Alexandria, SD 57311-0157

Work Phone:
Home Phone:
Cell Phone:
Fax:
Email:

Last Inspection: July 22, 2014

Type of System: Community

Area Served: Hanson County

Number of Service Connections: 279

Contamination Risk: low

Water Purchased From: Hanson Rural Water System (0878)

PWS Owner Type: Local Government

Service Area: Municipality

Contract Laboratory: Sioux Falls Health Laboratory

Bacteriological Monitoring

Bacteriological sampling and analysis: January 1, 2017 to January 1, 2018

A	Samples submitted:	12
B	Samples required:	One Sample Each Month.
C	Survey samples:	0
D	Safe samples:	12
E	Unsafe samples:	0
F	Repeat samples:	0
H	Groundwater Samples:	

Lead and Copper Monitoring

(These values are calculated from available data. Check correspondence for verification.)

A	Date Last Tested:	September 29, 2017	
B	Samples required:	10	
C	Sampling Frequency	Triennially	
D	Date Due Next	2017	
E	Lead - 90% Level	0.7	Action Level - 15 ug/l
F	Copper 90% Level	0.02	Action Level - 1.3 mg/l

Disinfectant Residual Monitoring

Residual sampling and analysis: January 1, 2017 to January 1, 2018

A	Samples submitted:	12	
B	Samples required:	One Sample Each Month.	
C	Last Qtr Cl Residual:	2.95	mg/l
D	Running Annual Average:	2.99	mg/l
E	Date of last DBP test:	August 2, 2017	
F	THM - Qtr Average:	38	ug/l
G	Haa5 - Qtr Average:	17.4	ug/l

Asbestos

A	Date of last test:	Waiver - Testing Not Required	
B	Asbestos Result:		million fibers per liter

Comments

Violations and Significant Deficiencies

City of Alexandria **EPA ID: 0062**

Violations From January 1, 2013 To January 1, 2018

Violation Type	Parameter	Date	Status
Lack of Certified Operator	Certified Operator	12/01/2014	Reminder Notice
	DBP		Compliance Achieved

Significant Deficiency	Date Identified	Date Corrected

EPA ID#: 0062 System Name: City of Alexandria

Sampler- Mr Kyle Kampshoff Work Phone-(605)239-4220
Title- Utilities Manager
Address- PO Box 157
Alexandria SD 57311-0157

Location- City: Alexandria County: Hanson
Service Area- Municipality
PWS Owner Type- Local Government
Water Supply Type- Purchased Surface Water Supply

Population Served- 615 Service Connections- 279

Sources for Alexandria

Source	Name	Year Built	Depth (feet)	Diameter (inches)	Availability	Type	Vulnerability	Treatment
01	#1	1914	380	0010		Groundwater	Non-Vulnerable	No Treatment
02	#2	1958	435	10		Groundwater	Non-Vulnerable	No Treatment
03	HANSON RWS	1979	0000	0000	Permanent	Purchased Surface	Non-Vulnerable	No Treatment

Date Of This Report: August 29, 2017

EPA ID#: 0062 System Name: City of Alexandria

Common Ion Data

(All chemical data are reported in milligrams per liter (mg/l) except pH and Langlier Index)

Please refer to Private Well Data for more information about these test results.

Source	Type	Date	TDS	Conductance	pH	Alk-M	Alk-P	Na	K	Ca	Mg	Fe	Mn	Cl	SO4	HCO3	CO3	Hardness	Langlier	NO3	F
01	Raw	04/07/81	2183	2444	6.98	412	0	81	14.7	380.0	117.0	3.30	0.58	18.9	1090	503	0	1430	+0.29	0.1	0.74

Source	Type	Date	TDS	Conductance	pH	Alk-M	Alk-P	Na	K	Ca	Mg	Fe	Mn	Cl	SO4	HCO3	CO3	Hardness	Langlier	NO3	F
03	Treated	07/25/84	724	1144	8.09	533	0	232	9.4	28.6	10.4	0.21	0.08	25.9	54	650	0	114	+0.43	0.1	0.00

Date Of This Report: August 29, 2017

APPENDIX D

WATER STORAGE INSPECTION REPORTS – PROVIDED BY MAGUIRE IRON

P.O. Box 1446
Sioux Falls, SD 57101
Phone (605) 334-9749
Fax (605) 334-9752

Maguire Iron, Inc.

WATER TOWER SPECIALISTS
Established 1915
New and Used Tanks
www.maguireiron.com

Inspection Report

10/08/2015

Alexandria,sd

RE: Water Storage Tank Inspection

The water storage tank was cleaned and inspected by our crew as per contract. Enclosed please find an inspection report for your file.

We would submit the following recommendations and estimates that may assist you in planning for future tank maintenance:

Interior Painting

Exterior Painting

Sanitary Upgrades

Safety Upgrades

Thank you for the opportunity of servicing your tank. Should you require any additional information or documentation, contact our offices.

Sincerely,

Rich Kemmis
Field Representative
Maguire Iron, Inc.
(605) 334-9749 office
(605) 310-7661 cell
kemmisr@maguireiron.com

1610 N. Minnesota Ave
Sioux Falls, SD 57104
Phone (605) 334-9749
Fax (605) 334-9752

Maguire Iron, Inc.

WATER TOWER SPECIALISTS
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Customer Acceptance Form

Foreman: Dylan seyler Date: 10/08/2015

The improvement work performed by Maguire Iron, Inc. for
Alexandria,sd
is hereby approved and accepted as having been performed in compliance with the agreement(s) thereto.

Brief description of work performed:
Cleanout

Did we leave a Pressure Relief Valve? ☐ Yes ☒ No

If yes, Qty: _____ x $ 750.00 = Total: $ 0.00

$750.00 will be billed to the Owner for each Pressure Relief Valves (PRV) that is left behind. After the PRV(s) is returned, we will credit the $750.00 per PRV back to the Owner: Please mail them back to our physical address at the top of this form to receive your account credit. Mark your package clearly to assure the credit goes to the proper account.

Official: Kyle kapshoop
Title: Water supt.
Phone: 605-999-4580

Signature: 

P.O. Box 1446
Sioux Falls, SD 57101
Phone (605) 334-9749
Fax (605) 334-9752

Maguire Iron, Inc.

WATER TOWER SPECIALISTS
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New and Used Tanks
www.maguireiron.com

Inspection Report

OWNER: Alexandria,sd Date: 10/08/2015 Inspection Type:

TANK INFORMATION

Tank Style: Ground Storage Tank Tank Size: 74,000 gallons Low Water Line: feet
Location/Access: 5th and poplar Fence: No Power Lines (10ft): No

FOUNDATION

Soil/Vegetation Encroachment: No Foundation Condition: Fair Grout Condition: Fair

VALVE VAULT: No Gate Valve Size: 6 " Diameter

RISER

Material: Cast/Ductile Pipe Size: 6 " Dia. Large Dia Riser: N/A Drum Diameter: ' Diameter
Belly Cat-Walk: No Frost Jacket: None Present Top Collar: No
Expansion Joint: No Re-Circ System: No Mixer System: No

OVERFLOW

Material: Steel Size: 8 " Dia. Flapper/Screen: Screen Ground Level: Yes
Cleanout Plug: No Drain Clean-Out Line: No No-Freeze Valve: No

ROOF

Type: Dome Roof Support: No Attachment: Sealed Eave Gaps: No
Steel Condition: Fair Spider Rods & Hub: No Lap Seams: Fair
Roof Hatch Lock: Unlocked Penetrations: No --> Describe:
Roof Safety Rail: Yes Antennas: No --> Describe:

TANK EXTERIOR

Coating Type: Uncertain Coating Condition: Fair Ladder: Yes
Safety Climb: No Anti-Climb: Cage Lettering/Logo: None
Describe:

TANK INTERIOR - WET

Coating Type: Uncertain Coating Condition: Fair Active Pitting: No
Ladder: No Safety Climb: No Riser Safety: None Present
Describe:

TANK INTERIOR - DRY

Coating Type: N/A Coating Condition: N/A Lighting: N/A
Ladder: N/A Safety Climb: N/A
Describe:

OSHA / AWWA INSPECTION

Ladders: Compliant Safety Climb: Non-Compliant Anti-Climb: Compliant
Roof Hatch: Compliant 2nd Access: Compliant Vent: Compliant
Riser Hatch: N/A Overflow: Compliant Railings: Compliant

SANITARY CONDITION: Compliant Amount & Type of Sediment: 1/4 mag iron line

DISINFECTION: Yes Amount of HTH Used: 1.6 lbs (AWWA Recommendation for 50,000 Gal)

INSPECTED BY: Dylan seyler **REVIEWED BY:** **DATE:** 10/08/2015

P.O. Box 1446
Sioux Falls, SD 57101
Phone (605) 334-9749
Fax (605) 334-9752

Maguire Iron, Inc.

WATER TOWER SPECIALISTS
Established 1915
New and Used Tanks
www.maguireiron.com

OSHA & AWWA Checklist for Safety and Sanitation
Potable Water Tanks and Towers

Owner: Alexandria,sd **Date:** 10/08/2015 **Leg Height:** '

Tank Size: 74,000 gallons **Tank Style:** 8 **Tank Height:** 30 '

check	Inspected Item	Standard	Actual	Comment	check Need
	Ladders:				
	Rung Size	3/4"	2"		
	Width	16"	16"		
	Step Height	12"	12"		
	Side Rails	2" x 3/8"	2"x3/8"		
	Toe Space	7"	7"		
	Roof Ladder	Secured	Yes		
	Shell Ladder	Secured	Yes		
	Leg Ladder	Required	Yes		
	Safety Climb	Required	No		
	Anti-Climb Gate	Required	Cage		
	Handrailings:				
	Height	42"	42"		
	Mid-Rail	2" x 1/4"	2"X1/4		
	Toe Board	4" x 1/4"	None		
	Pass-Through	Required	No		
	Chains	Required	No		
	Openings:				
	Roof Man Way	24"	24"		
	Second Access	24"	24"		
	Curb Height	4"	4"		
	Overhang	2"	2"		
	Vent	Size	24"		
	Screen	Frost-Proof	Yes		
	Riser Man Way	24"	N/A		
	Overflow:				
	Size		8 " Dia.		
	Screen	Required	Yes		
	To ground	12" - 24"	24"		

Owners water tank and structure have been inspected and documented for compliance with the current American Water Works Association (AWWA), Occupation Safety & Health Act (OSHA) and the appropriate State Sanitation Code for Potable Water Tanks.

Deficiencies are noted and upon request, recommendations will be made to bring the tank and structure into compliance.

Inspected by: Dylan seyler

Maguire Iron is not responsible for errors or omissions in the code, and has been dilegent in assessing the above structure to the standards applicable at the time of the inspection.

Notes for Salesman:
Would like to know about the loose anchor blots

Notes for Next Clean Out:

Foreman: Dylan seyler Date: 10/08/2015

P.O. Box 1446
Sioux Falls, SD 57101
Phone (605) 334-9749
Fax (605) 334-9752

Maguire Iron, Inc.

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Inspection Report

10/08/2015

Alexandria,sd

RE: Water Storage Tank Inspection

The water storage tank was cleaned and inspected by our crew as per contract. Enclosed please find an inspection report for your file.

We would submit the following recommendations and estimates that may assist you in planning for future tank maintenance:

Interior Painting

Exterior Painting

Sanitary Upgrades

Safety Upgrades

Thank you for the opportunity of servicing your tank. Should you require any additional information or documentation, contact our offices.

Sincerely,

Rich Kemmis
Field Representative
Maguire Iron, Inc.
(605) 334-9749 office
(605) 310-7661 cell
kemmisr@maguireiron.com

1610 N. Minnesota Ave
Sioux Falls, SD 57104
Phone (605) 334-9749
Fax (605) 334-9752

Maguire Iron, Inc.

WATER TOWER SPECIALISTS
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New and Used Tanks
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Customer Acceptance Form

Foreman: Dylan seyler Date: 10/08/2015

The improvement work performed by Maguire Iron, Inc. for
Alexandria,sd
is hereby approved and accepted as having been performed in compliance with the agreement(s) thereto.

Brief description of work performed:
Cleanout

Did we leave a Pressure Relief Valve? ☐ Yes ☐ No

If yes, Qty: _____ x $ 750.00 = Total: $ 0.00

$750.00 will be billed to the Owner for each Pressure Relief Valves (PRV) that is left behind. After the PRV(s) is returned, we will credit the $750.00 per PRV back to the Owner: Please mail them back to our physical address at the top of this form to receive your account credit. Mark your package clearly to assure the credit goes to the proper account.

Official: Kyle kapshoop
Title: Water supt.
Phone: 605-999-4580
Signature:

P.O. Box 1446
Sioux Falls, SD 57101
Phone (605) 334-9749
Fax (605) 334-9752

Maguire Iron, Inc.

WATER TOWER SPECIALISTS
Established 1915
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www.maguireiron.com

Inspection Report

OWNER: Alexandria,sd Date: 10/08/2015 Inspection Type: 0

TANK INFORMATION

Tank Style: 8 Tank Size: 74,000 gallons Low Water Line: feet
Location/Access: 5th and poplar Fence: 2 Power Lines (10ft): 2

FOUNDATION

Soil/Vegetation Encroachment: 2 Foundation Condition: 2 Grout Condition: 2

VALVE VAULT: 2 Gate Valve Size: 6 " Diameter

RISER

Material: 1 Pipe Size: 6 " Dia. Large Dia Riser: 3 Drum Diameter: ' Diameter
Belly Cat-Walk: 2 Frost Jacket: 4 Top Collar: 2
Expansion Joint: No Re-Circ System: No Mixer System: No

OVERFLOW

Material: Steel Size: 8 " Dia. Flapper/Screen: Screen Ground Level: Yes
Cleanout Plug: No Drain Clean-Out Line: No No-Freeze Valve: No

ROOF

Type: Dome Roof Support: No Attachment: Sealed Eave Gaps: No
Steel Condition: Fair Spider Rods & Hub: No Lap Seams: Fair
Roof Hatch Lock: Unlocked Penetrations: No --> Describe:
Roof Safety Rail: Yes Antennas: No --> Describe:

TANK EXTERIOR

Coating Type: Uncertain Coating Condition: Fair Ladder: Yes
Safety Climb: No Anti-Climb: Cage Lettering/Logo: None
Describe:

TANK INTERIOR - WET

Coating Type: Uncertain Coating Condition: Fair Active Pitting: No
Ladder: No Safety Climb: No Riser Safety: None Present
Describe:

TANK INTERIOR - DRY

Coating Type: N/A Coating Condition: N/A Lighting: N/A
Ladder: N/A Safety Climb: N/A
Describe:

OSHA / AWWA INSPECTION

Ladders: Compliant Safety Climb: Non-Compliant Anti-Climb: Compliant
Roof Hatch: Compliant 2nd Access: Compliant Vent: Compliant
Riser Hatch: N/A Overflow: Compliant Railings: Compliant

SANITARY CONDITION: Compliant Amount & Type of Sediment: 1/4 mag iron line

DISINFECTION: Yes Amount of HTH Used: 1.6 lbs (AWWA Recommendation for 50,000 Gal)

INSPECTED BY: Dylan seyler **REVIEWED BY:** **DATE:** 10/08/2015

P.O. Box 1446
Sioux Falls, SD 57101
Phone (605) 334-9749
Fax (605) 334-9752

Maguire Iron, Inc.

WATER TOWER SPECIALISTS
Established 1915
New and Used Tanks
www.maguireiron.com

OSHA & AWWA Checklist for Safety and Sanitation
Potable Water Tanks and Towers

Owner: Alexandria,sd **Date:** 10/08/2015 **Leg Height:**

Tank Size: 74,000 gallons **Tank Style:** 8 **Tank Height:** 30 '

check	Inspected Item	Standard	Actual	Comment	check Need
	Ladders:				
	Rung Size	3/4"	2"		
	Width	16"	16"		
	Step Height	12"	12"		
	Side Rails	2" x 3/8"	2"x3/8"		
	Toe Space	7"	7"		
	Roof Ladder	Secured	Yes		
	Shell Ladder	Secured	Yes		
	Leg Ladder	Required	Yes		
	Safety Climb	Required	No		
	Anti-Climb Gate	Required	Cage		
	Handrailings:				
	Height	42"	42"		
	Mid-Rail	2" x 1/4"	2"X1/4		
	Toe Board	4" x 1/4"	None		
	Pass-Through	Required	No		
	Chains	Required	No		
	Openings:				
	Roof Man Way	24"	24"		
	Second Access	24"	24"		
	Curb Height	4"	4"		
	Overhang	2"	2"		
	Vent	Size	24"		
	Screen	Frost-Proof	Yes		
	Riser Man Way	24"	N/A		
	Overflow:				
	Size		8 " Dia.		
	Screen	Required	Yes		
	To ground	12" - 24"	24"		

Owners water tank and structure have been inspected and documented for compliance with the current American Water Works Association (AWWA), Occupation Safety & Health Act (OSHA) and the appropriate State Sanitation Code for Potable Water Tanks.

Deficiencies are noted and upon request, recommendations will be made to bring the tank and structure into compliance.

Inspected by: Dylan seyler

Notes for Salesman:
Would like to know about the loose anchor blots

Notes for Next Clean Out:

Foreman: Dylan seyler Date: 10/08/2015