



Brandon Comprehensive Water System Study

September 2013
SEI No. 0113



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COMPREHENSIVE WATER SYSTEM PLAN
FOR
THE
CITY OF BRANDON

September 2013

SEI No. 0113

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.

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INTRODUCTION

PURPOSE OF STUDY

The City of Brandon contacted Stockwell Engineers, Inc. (SEI) to investigate their water system. The City would like to make improvements to the water source, water distribution and water storage. In addition, they need to make plans for a future water treatment plant. This study identifies the deficiencies that the water system has based on the Criteria for Design of Public Water Supply Facilities in South Dakota and presents options to fix these deficiencies.

SCOPE OF STUDY

The scope of the agreement between the City of Brandon and SEI is as follows:

- 1) Provide existing maps, plans, relevant information, existing static and residual fire hydrant flow tests, existing water rates, water fund financial records and latest Drinking Water System Evaluation.
- 2) Provide data on existing and future conditions of the City including land use, growth trends and population estimates.
- 3) Provide data on existing water main.
- 4) Complete a general population analysis.
- 5) Evaluate water distribution system to determine water loss, average day demand, peak day demand, peak hour demand, per capita usage, valve and hydrant spacing. Model the system to determine pressure, fire flow and extended period simulation. Examine existing water storage and provide recommendations. Examine existing water supply and provide recommendations. Provide triggers for water supply, water treatment and storage based on demand. Create a map illustrating existing system and proposed improvements.
- 6) Outline need for improvements.
- 7) Make recommendations for improvements to meet future growth requirements. Recommend future trunk water mains, water supply, water treatment and water storage.
- 8) Prepare "Engineers Estimate" of probable construction cost for the Project.
- 9) Present "draft" study at Council meeting.
- 10) Address Client's comments.
- 11) Submit final study to the Client.

COMMUNITY INFORMATION

GENERAL

The City of Brandon is a Class 1 municipality located in eastern Minnehaha County on Interstate 90. Minnehaha County is located in southeastern South Dakota. The City is Governed by a Mayor and six member Council. The City has a City Administrator, Finance Officer and Public Works Director that oversee the day-to-day activities. Brandon was incorporated as a city on July 31, 1973. The City encompasses an area of approximately 3,331 acres. The land uses range from low density residential to commercial and industrial properties.

FINANCIAL STATISTICS

Based on the 2000 Census, Brandon has a median household income of \$58,421 compared to the state average of \$35,282. The 2000 Census also reported that 2.5% of the families in Brandon had incomes below the poverty level compared to the state average of 9.3%.

POPULATION STATISTICS

Based on the 2010 census, Brandon has a population of 8,785. The City has shown strong growth since being incorporated in 1973. Most other communities in South Dakota have seen a decline in recent years. However, Brandon's close proximity to Sioux Falls creates a unique opportunity for people to work in Sioux Falls and live in Brandon. The 2010 census indicated that 7.8% of the people living in Brandon were over the age of 65 compared to 14.3% for the State of South Dakota. It is anticipated that the population will continue to increase due to Brandon's location and their low percentage of people over 65. The population for 2013 was based on the average housing unit size and the number of housing units added since the 2010 census. The projected populations through 2027 were obtained from the Brandon Comprehensive Plan that was prepared by the South Eastern Council of Governments (SECOG). A copy of the plan is located in Appendix C. Stockwell Engineers estimated the 2033 population.

Table 1 Population Statistics

Year	Population
1980	2,589
1990	3,543
2000	5,693
2010	8,785
2013	9,088
2017 (proj)	10,734
2022 (proj)	12,217
2027 (proj)	13,700
2033 (proj)	15,700

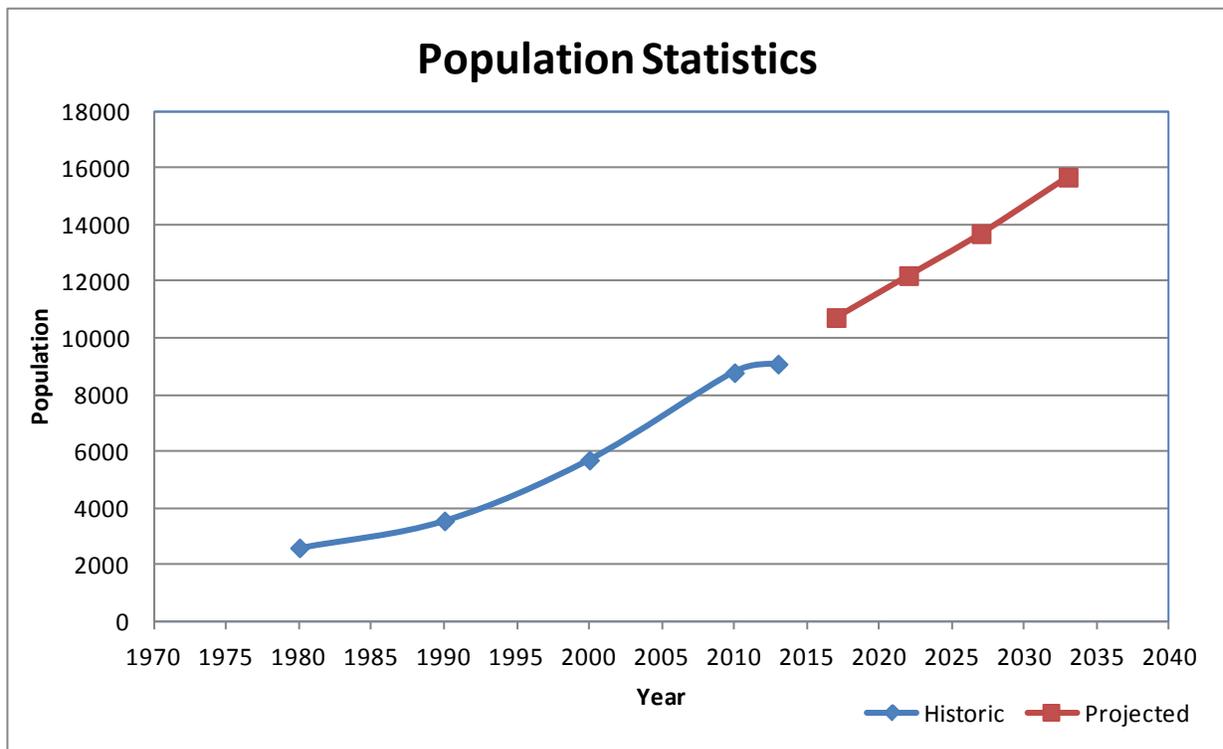


Figure 1 Population Statistics

WATER SYSTEM

GENERAL SYSTEM INFORMATION

The current system consists of 60 miles of polyvinyl chloride (PVC) pipe and asbestos cement pipe (ACP) distribution lines, three active wells, one active water tower, a ground storage reservoir and a water treatment plant. There are currently 2,580 residential and 476 commercial user users connected to the system with an estimated 214,000 ft of service line.

The City also provides water to the Village of Corson which consists of 26 customers. The existing system is shown in Figure 2.

WATER USAGE

A review of the City's water production and billed water records for the last seven years was completed. This review was completed to determine water loss, per capita water demand and to compare how precipitation affects water usage. This data can also be used to determine if Brandon has an adequate water supply and if the water towers are sized properly. The precipitation data was obtained from the National Weather Service, Sioux Falls location.

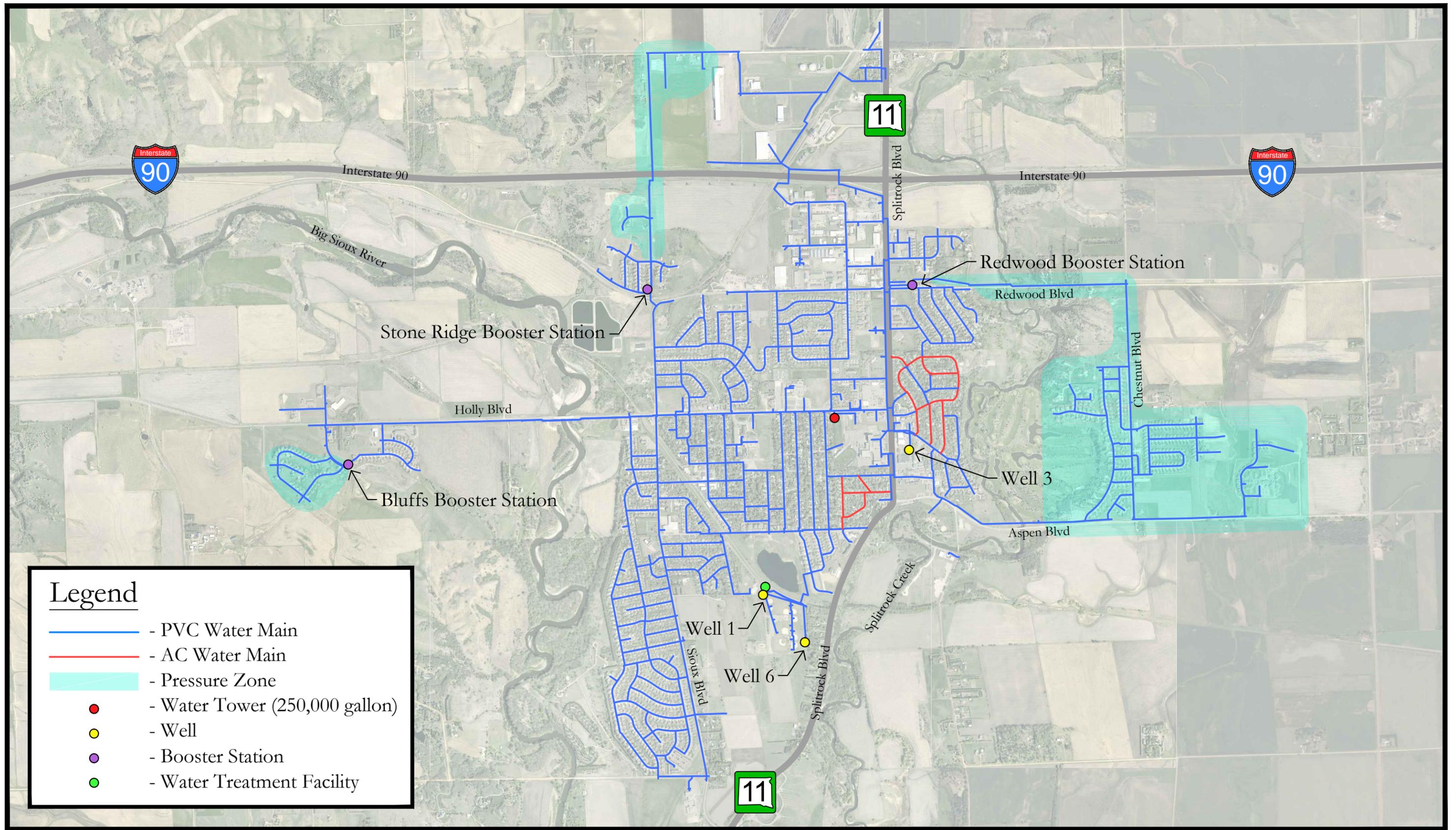


Figure 2 | Existing Water System

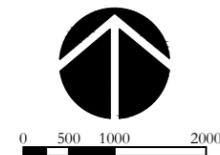


Table 2 Water Usage

2006					2007					
Month	Produced (gal)	Produced (gpcpd)	Billed (gal)	Billed (gpcpd)	Month	Produced (gal)	Produced (gpcpd)	Billed (gal)	Billed (gpcpd)	Precip (in)
January	16,492,000	70		0	January	17,861,000	73	18,016,490	74	0.45
February	14,682,000	69		0	February	15,858,000	72	15,550,565	71	1.29
March	16,481,000	70		0	March	17,420,000	72	14,871,403	61	4.97
April	17,641,000	78	15,691,628	69	April	17,767,000	75	17,466,760	74	1.93
May	27,694,000	118	22,156,960	95	May	27,865,000	114	23,136,289	95	2.63
June	36,316,000	160	36,171,890	160	June	33,359,000	142	29,961,124	127	3.98
July	45,028,000	192	50,244,858	215	July	44,878,000	184	49,718,925	204	0.32
August	31,978,000	137	37,394,891	160	August	31,312,000	129	35,739,420	147	6.18
September	23,354,000	103	25,904,829	114	September	25,040,000	106	23,080,685	98	2.27
October	19,963,000	85	18,730,117	80	October	19,790,000	81	20,408,225	84	5.98
November	16,881,000	75	15,742,983	70	November	17,920,000	76	15,739,440	67	0.04
December	17,343,000	74	14,925,392	64	December	18,018,000	74	15,161,795	62	1.3
Total	283,853,000		236,963,548		Total	287,088,000		278,851,121		31.3
Average Day	777,679		861,686		Average Day	786,542		763,976		
Average (gpcpd)		103		114	Average (gpcpd)		100		97	
Water Loss					Water Loss				3%	

Table 2 Water Usage (Continued)

2008						2009					
Month	Produced (gal)	Produced (gpcpd)	Billed (gal)	Billed (gpcpd)	Precip (in)	Month	Produced (gal)	Produced (gpcpd)	Billed (gal)	Billed (gpcpd)	Precip (in)
January	18,139,000	72	17,443,395	69	0.23	January	21,678,000	83	18,095,580	69	0.32
February	17,508,000	74	16,846,135	71	0.57	February	20,315,000	86	15,710,415	66	0.41
March	19,015,000	75	15,452,800	61	1.34	March	21,974,000	84	15,329,310	58	1.31
April	18,814,000	77	17,299,930	71	2.68	April	21,421,000	84	17,911,265	70	1.95
May	22,631,000	89	16,897,110	67	3.34	May	33,930,000	129	20,128,595	77	1.43
June	32,071,000	131	28,227,050	115	3.95	June	36,437,300	143	34,198,320	134	3.07
July	43,120,000	170	39,300,945	155	2.52	July	39,225,700	149	27,342,985	104	3.71
August	39,879,000	158	35,488,470	140	1.91	August	38,167,300	145	36,942,415	141	1.93
September	30,134,000	123	31,572,700	129	1.78	September	31,047,000	122	29,107,455	114	1.21
October	21,435,000	85	21,765,745	86	5.44	October	21,163,000	81	17,108,235	65	5.52
November	19,028,000	78	16,065,500	66	1.01	November	20,028,000	79	18,268,960	72	0.17
December	19,380,000	77	15,813,875	62	0.7	December	20,509,000	78	15,472,680	59	2.03
Total	301,154,000		272,173,655		25.5	Total	325,895,300		265,616,215		23.1
Average Day	822,825		743,644			Average Day	892,864		727,716		
Average (gpcpd)		101		91		Average (gpcpd)		105		86	
Water Loss				10%		Water Loss				17%	

Table 2 Water Usage (Continued)

2010						2011					
Month	Produced (gal)	Produced (gpcpd)	Billed (gal)	Billed (gpcpd)	Precip (in)	Month	Produced (gal)	Produced (gpcpd)	Billed (gal)	Billed (gpcpd)	Precip (in)
January	21,227,700	78	15,554,310	57	1.25	January	22,977,000	83	16,506,265	60	1.17
February	18,692,000	76	16,217,500	66	1.29	February	21,059,000	85	18,440,285	74	0.95
March	21,061,000	77	15,301,450	56	1.02	March	21,726,000	79	15,263,235	55	0.74
April	22,300,000	85	19,052,620	72	2.65	April	20,492,000	77	17,093,560	64	3.09
May	30,704,000	113	19,281,585	71	2.03	May	23,421,000	85	18,685,530	68	5.42
June	29,366,300	111	27,973,455	106	7.83	June	27,657,000	104	22,216,807	83	4.26
July	34,895,000	128	27,505,270	101	8.55	July	46,701,000	170	35,157,425	128	5.76
August	33,220,000	122	24,302,660	89	6.26	August	43,495,000	158	37,080,232	135	1.4
September	26,601,000	101	24,925,267	95	4.46	September	36,069,000	135	34,478,974	129	0.2
October	25,319,000	93	18,686,675	69	0.91	October	26,042,000	95	24,889,570	90	0.63
November	21,600,500	82	16,482,820	63	0.47	November	20,541,000	77	17,674,269	66	0.04
December	22,383,000	82	17,568,022	65	1.54	December	21,511,000	78	15,633,443	57	0.62
Total	307,369,500		242,851,634		38.3	Total	331,691,000		273,119,595		24.3
Average Day	842,108		665,347			Average Day	908,742		748,273		
Average (gpcpd)		96		76		Average (gpcpd)		102		84	
Water Loss				20%		Water Loss				17%	

Table 2 Water Usage (Continued)

2012					
Month	Produced (gal)	Produced (gpcpd)	Billed (gal)	Billed (gpcpd)	Precip (in)
January	21,442,000	77	18,594,461	67	0.75
February	19,878,000	76	16,603,309	64	2.43
March	22,319,000	80	15,468,402	56	0.77
April	25,867,000	96	21,071,753	78	2.4
May	31,181,000	112	26,431,513	95	4.6
June	47,812,000	177	29,929,617	111	0.74
July	60,724,300	218	53,490,786	192	0.24
August	44,373,000	159	40,400,728	145	1.75
September	42,186,000	156	36,374,702	135	1.14
October	28,651,000	103	28,154,793	101	0.86
November	21,495,000	80	18,487,089	69	0.35
December	22,352,000	80	16,418,454	59	1.31
Total	388,280,300		321,425,607		17.3
Average Day	1,060,875		878,212		
Average (gpcpd)		118		98	
Water Loss				17%	
Average Water Produced per Year -				317,904,443	
Average Water Billed per Year -				275,672,971	
Average Water Produced per Day -				870,234	
Average Water Billed per Day -				769,836	
Average Water Produced per Capita per Day -				104	
Average Water Billed per Capita per Day -				92	
Average Water Loss -				14%	
Maximum Produced Month -				60,724,300	

Table 2 indicates the average water produced per capita per day (gpcpd) is 104 and the average water billed is 92 gpcpd. The Water Distribution Systems Handbook by Mays states typical domestic usage for South Dakota is 81 gpcpd. For purposes of this study a per capita usage of 104 will be utilized. The table also shows the average water loss is 14%. The City should try to keep the water loss below 15%. Water loss causes the City to incur the expense of producing the water but the City doesn't receive any revenue from the water sales. The reasons for water loss are leaks, fire hydrant flushing, non-metered locations and old inaccurate water meters. All locations are currently metered in the City.

FUTURE WATER USAGE

The City of Brandon has shown steady growth over the past several decades and it is projected that this growth will continue due to the City's close proximity to Sioux Falls. The projected population will be utilized to determine the future water demand. The peak day needs to be calculated to determine the future water demand. Mays states the U.S. range of maximum day to average day is 1.5-3.5:1. It is our recommendation that the peaking factor shall not be less than 2.8 to account for dry periods during the summer with high water usage. Based on the current water usage of 104 gpcpd and the projected 2033 population of 15,700 a future water usage of 4,604,496 gpd ($104 \times 15,700 \times 2.8$) can be assumed. This value can be used to determine water source and storage capacity.

WATER SOURCE

The City has a total of eight wells. However, only wells 1, 3 and 6 are operational. Well one is located just south of the water plant and provides 10% of the water supply. Well three is located behind Dairy Queen and is only used in an emergency because it pumps directly into the system. Well six is located southeast of the water treatment plant and provides 90% of the water supply. Wells 2, 4 and 5 have the pumps pulled because the production was so low. These wells should be capped and abandoned because their production is too low. The City of Brandon also bought a well from the City of Sioux Falls. This well is not connected to the system. The location of the active wells are shown in Figure 2. The City has three water right permits for these wells allowing them to pump 583 gpm from the Big Sioux South Aquifer and 2,617 gpm from the Split Rock Creek Aquifer. A copy of the current water rights are located in Appendix B. The City is also permitted for future use of 1,227.7 acre-feet from the Big Sioux South aquifer and 2,148.4 acre-feet from the Split Rock Creek aquifer. Additional information about the wells is shown in the following tables. Copies of water samples taken during the study are shown in Appendix D.



Figure 3 Well One



Figure 4 Well Three



Figure 5 Well Six

Table 3 Well Information

Well	Year Built	Casing Dia (in)	Depth (ft)	Flow (gpm)	Aquifer	Water Right #	Diversion Rate (gpm)
1	1971	10	48	170	Big Sioux:South	5868-3	233
2	1971	8	50	65	Big Sioux:South	5868-3	
3	1964	12	222	625	Split Rock Creek	5868-3	624
4	1980	10	52	160	Big Sioux:South	5869-3	350
5	1976	10	56	125	Big Sioux:South	5869-3	
6	1999	10	275	2,000	Split Rock Creek	6156-3	1,993
SF				1,500	Split Rock Creek		
Test Well				1,500	Split Rock Creek		

Mays states that the source of supply should be capable of meeting the maximum day system demand. He also states that it is good practice to consider standby capabilities in the source of supply. The water records indicate the average day produced by the active wells is 870,234 gpd. The calculated future peak day demand is 4,604,496 gpd. Current flow tests of the wells indicate that well 1 produces 175 gpm, well 3 produces 700 gpm and well 6 produces 1,400 gpm. If all three

wells ran all day they would produce 3,276,000 gpd (2,275 gpm x 60 x 24). However, this is not adequate to meet the peak day demand. In addition the City's water supply would be in a state of emergency if well six was ever out of service because they could only supply 1,260,000 gpd (875 gpm x 60 x 24). Discussions with the South Dakota Geological Survey indicated the reason the production for well six has decreased is because the well is being over pumped. The high pumping rate is pulling fines towards the well and plugs the screen with sand. The wells do have back-up power from the water plant or from portable generators.

Table 4 Well Water Quality

Well	Date	Chloride Cl (mg/L)	Hardness (mg/L)	Flouride F (mg/L)	Iron Fe (mg/L)	Manganese Mn (mg/L)	Nitrate NO3 (mg/L)	Total Solids TDS (mg/L)
1	7/2/2013	69	379	0.28	0.06	0.06	7	484
3	7/2/2013	9	350	2.3	2.74	0.18	0.2	466
6	7/2/2013	4	412	0.54	1.88	0.37	0.2	540

The water from the Big Sioux South Aquifer and Split Rock Creek Aquifer is considered hard based on the following chart. The hardness is measured in milligrams per liter (mg/L).

<u>Hardness (mg/L)</u>	<u>Classification</u>
0-17	Soft
17-60	Slightly Hard
61-120	Moderately Hard
121-180	Hard
Over 180	Very Hard

WATER TREATMENT

The City's water treatment plant is located in Aspen Park and was constructed in 1998. The plant is designed to treat iron and manganese. Wells one and six pump directly to the treatment plant. The Aspen Park wells were designed to pump directly into the clear well and bypass the water treatment plant to supplement the supply during peak demand. The four Aspen Park wells have a higher level of nitrate but a lower level of iron or manganese because they pump out of the Big Sioux South aquifer compared to the Split Rock Creek Aquifer. The treated water is then stored in a 500,000 gallon clear well until three high service pumps are used to fill the water tower. The capacity of the plant is 2,000 gpm or 2,880,000 gpd. Therefore, the treatment plant does not have adequate capacity to provide the future peak day demand of 4,604,496 gpd. High service pump one

can pump 1,200 gpm, pump two 1,700 gpm and pump three 1,700 gpm or 6,624,000 gpd from the clear well.

The scope of this study only includes recommendations for the location of the treatment plant and the type of treatment process that is best suited for the type of water that the wells supply. A detailed cost estimate is not included with this study.



Figure 6 Water Treatment Plant

WATER STORAGE

The City currently has two elevated and one underground storage tanks. There is an elevated multilegged 250,000 gallon tank on Holly Blvd next to the High School. This tank was built in 1971 and is 128.5 feet to the high water level and 100 feet to the low water level. The City also has a 50,000 single pedestal on the east side in the County Club Heights addition that is 58 feet to the low water level and 80 feet to the high water level. This tank was built in 1995 but is no longer in service because the area around the tank developed and the tank couldn't provide adequate

pressure. The third storage tank is a 500,000 gallon underground storage tank at the water treatment plant. This tank was built when the water treatment plant was built in 1998 and stores treated water before it is pumped into the system. The tanks are not on a scheduled maintenance program at this time. The entire elevated 250,000 gallon tank was sand blasted and painted in the spring of 2013.



Figure 7 Existing Water Tower

Water storage ensures the reliability of supply, maintains pressure, equalizes pumping and treatment rates, reduces the size of transmissions lines, improves operational flexibility and efficiency and provides fire protection. There are several methods for determining the correct water storage size. Mays states that water storage should be based on summing equalization storage, fire storage and emergency storage.

Equalization storage allows the source and pumping facilities to operate at a predetermined rate. Mays states that the equalization volume of a system with a constant pumping rate should be 10% - 25% of the maximum daily demand. The future water usage section determined the peaking factor for the maximum day to average day demand was in the middle of the range. Therefore, 20% will be used for the equalization volume. This results in an equalization storage of 916,295 gallons (4,604,496 gpd x .199).

Fire storage is utilized to fight fires. The International Standards Organization (ISO) recommends a fire flow of 1,500 gpm for residential areas and 3,500 gpm in other habitation areas. This typically occurs in the business district of a city. The required fire storage to fight a two hour fire in the business district is 420,000 gallons (3,500 x 2 x 60).

Emergency storage is based on the judgment about the perceived vulnerability of the utility's water supply. Typically the average day demand is used to determine the emergency storage volume. The future average day demand is 1,632,800 gallons (15,700 x 104 gpcpd).

Mays recommends the volume of effective storage is the sum of equalization storage plus the larger of fire or emergency storage. Therefore, the total effective or elevated storage for the City of Brandon is 2,549,095 gallons (916,295 + 1,632,800). The current elevated storage volume of 250,000 gallons is not adequate.

DISTRIBUTION SYSTEM

The core of Brandon's water distribution system was originally asbestos cement pipe (ACP). Since then most of the system has been replaced with polyvinyl chloride (PVC) pipe. In addition, the City has experienced a large amount of growth and all these new areas have been constructed with PVC. A summary of all the water main in the City is shown below.

Table 5 Water Mains

Water Main Dia (in)	Pipe Type	Length (ft)
4	PVC	661
6	PVC	87,039
8	PVC	146,102
10	PVC	13,667
12	PVC	41,013
16	PVC	15,175
4	ACP	2,460
6	ACP	9,463
Total =		315,580

Having old ACP in the distribution system presents two problems. First, the water main is brittle. Natural shifts in the ground from the freeze thaw cycle and fluctuating groundwater levels can cause breaks. Second, the roughness coefficient of the interior of the pipe is higher than PVC. This roughness increases over time reducing the capacity of the ACP. ACP also had the potential health risk with asbestos when the water main breaks or is repaired. The City does experience a break every other year with the ACP water mains.

The distribution system currently has several dead-ends. The 10 States Standards recommend dead ends be minimized to increase reliability of service and reduce head loss. The SD DENR also recommends looping dead-ends to minimize taste and odor and to reduce mineral buildup. Dead ends also increase retention time of the water which decrease disinfection. Dead ends should be equipped with means to provide adequate flushing.

HYDRANTS

There are currently 441 fire hydrants connected to the water system. The 10 States Standards recommends that all fire hydrant leads be located on lines a minimum of six-inch in diameter unless the hydrant is used for flushing. The DENR also recommends that hydrants be spaced at distances no greater than 600 feet depending on the area being served. It is recommended the City should try and exercise the hydrants on an annual basis.

WATER METERS

The City currently has Neptune radio read water meters that are less than 13 years old. Typically water meters lose their accuracy over time and read low. The accuracy of the meter decreases even faster if they are not installed horizontally. The internal parts of the meter wear and low water usage from leaks are not measured. The community has the expense of producing the water but they don't receive the revenue. The City currently has all locations metered to account for total water usage. Meters should be checked for accuracy once they reach 10 years of age. It should be noted that Brandon's meters have not been checked for accuracy.

WATER SYSTEM ON-SITE EVALUATION

On April 20, 2010 the SD DENR completed an on-site evaluation of the water system. A copy of the inspection is located in Appendix A. The inspection provided the following requirements:

- The seals on well six and well two are not intact and can allow contamination to enter the wells. (The City has already addressed this requirement)
- The system may need a discharge permit when flushing hydrants.

The inspection provided the following recommendations:

- Secondary containment should be added for the chemical vessels at well 3.
- All valves in the system should be inspected as part of a preventive maintenance program.

HYDRAULIC MODEL

A hydraulic model was completed for Brandon's water distribution system. The program used for the hydraulic model was WaterCAD version V8i. The existing pipe size, type, age, water storage, water pressure information and number of customers was inputted into the model. Three simulations were completed to determine the system pressure, fire flow and extended period simulation (EPS). SEI and City staff completed fire flow testing on hydrants throughout the system. Static pressure, residual pressure and fire flow results were used to calibrate the model to field conditions.

PRESSURES FOR EXISTING SYSTEM

There are minimum pressures that should be provided in a water distribution system. If these minimum pressures are not provided then the customers can experience flow reductions when more than one faucet is running. In addition, a system can provide too much pressure. Mays states that a minimum of 30 psi should be provided for the consumer. However, based on previous experience a minimum pressure of 40 psi is recommended. The Uniform Plumbing Code requires the pressure not to exceed 80 psi at the customers connection. Recommended pressures from Mays are shown in the table below.

Table 6 Typical Service Pressure Criteria

<u>Condition</u>	<u>Service Pressure Criteria (psi)</u>
Maximum Pressure	65-75
Minimum pressure during maximum day	30-40
Minimum pressure during peak hour	25-35
Minimum pressure during fires	20

The pressure analysis is completed using the peak hour flows. Typically a system can have adequate pressure during the winter when water usage is low. However, during the summer when water usage is high pipe velocities increase and therefore the head loss in the pipe also increase reducing the pressures for the consumer. Mays states that the peak hour to average day ratio is 2.0-7.0:1. It is our opinion that the peak hour ratio should be 5.3.

Typically water usage is limited during the night. The peak hour demand is calculated by multiplying the population by the average per capita produced by the peak hour ratio and dividing by 16 hours in a day and 60 minutes per hour. The current peak hour demand for Brandon is determined to be 5,264 gpm ($104 \text{ gpcpd} \times 9,088 \times 5.3 / 16 / 60$). The future peak hour demand for Brandon is determined to be 9,093 gpm ($104 \text{ gpcpd} \times 15,700 \times 5.3 / 16 / 60$). This peak hour flow will be used for the pressure model with the tank set at half full. The mid elevation of the tanks is 1479.00 above sea level.

An aerial photograph was used to input the approximate location of Brandon's customers. Individual node demands were added for the larger customers. The existing and future pressures in Brandon's water distribution system are shown in the following figures. The existing model determined that approximately half the system has pressures that are above the recommended minimum of 40 psi. The future model determined that almost all the operating pressures in the existing system are below the recommended minimum of 40 psi. This is caused by the large demand placed on the system and the lack of larger water mains that keep pipe velocities and pressure lose down.

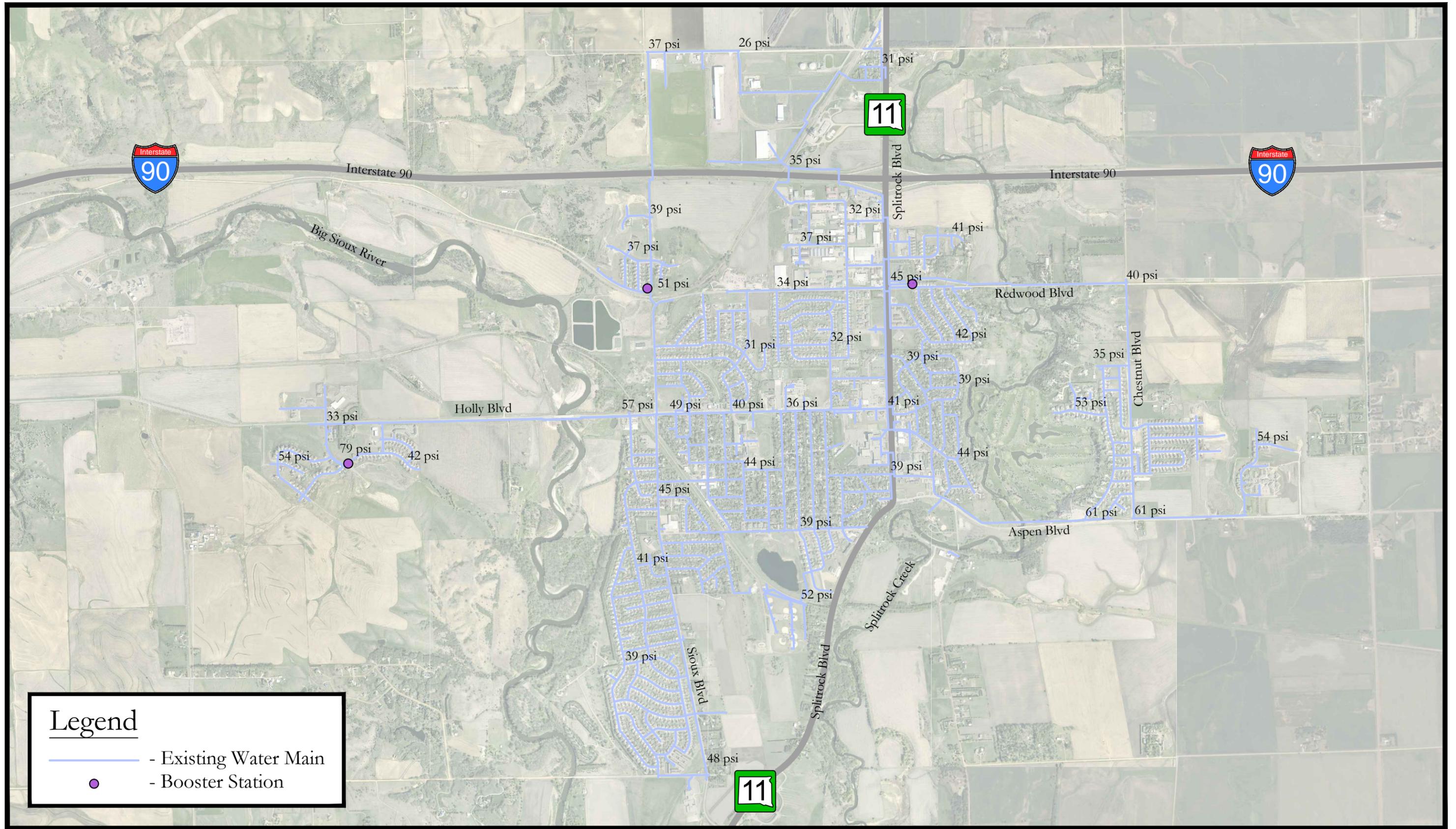
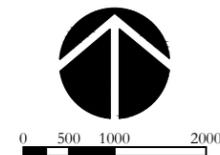


Figure 8 | Existing System Pressure



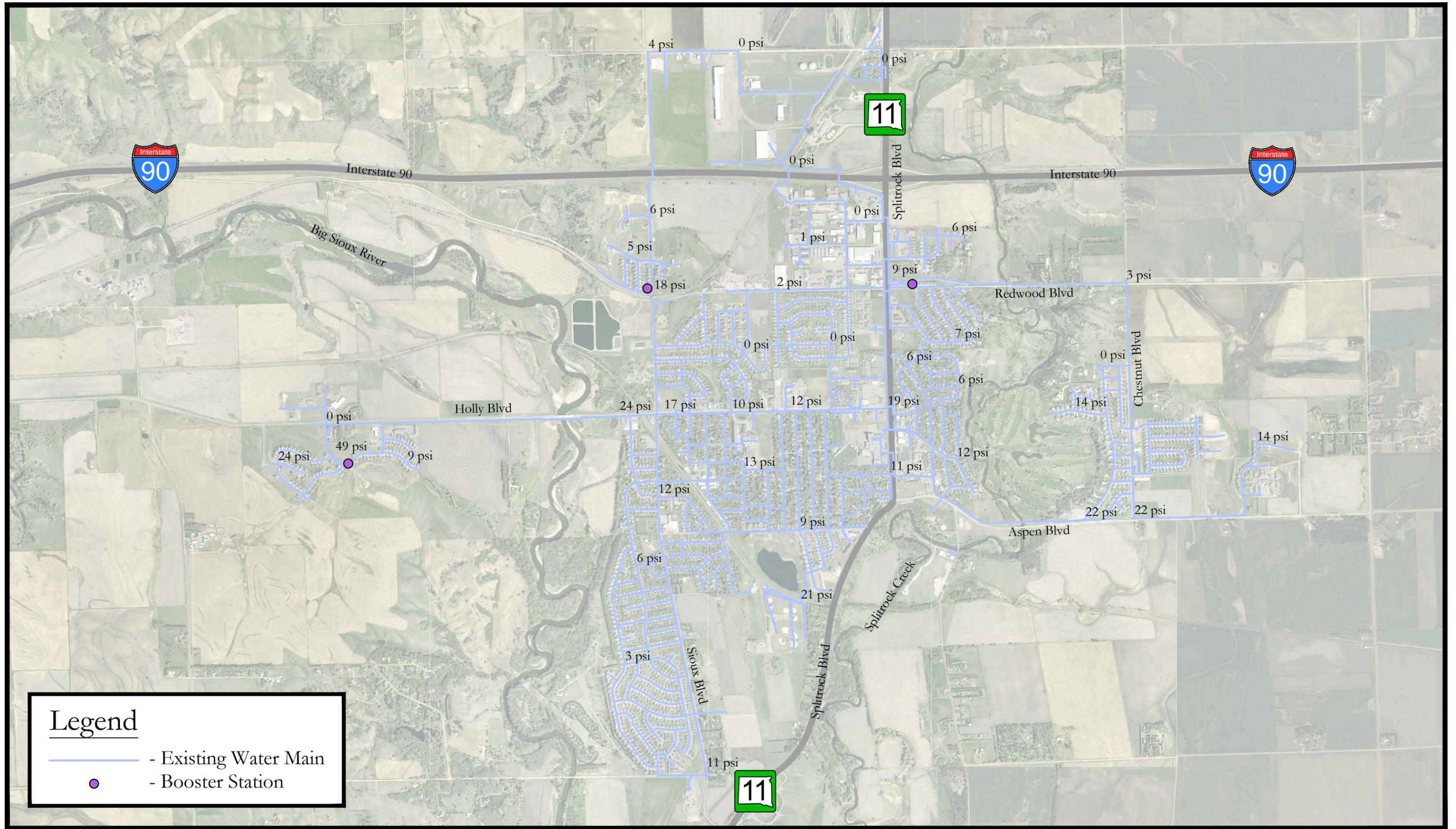
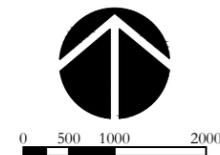


Figure 9 | Existing System Future Pressure



FIRE FLOWS FOR EXISTING SYSTEM

The fire flow model will be completed using the peak day demand. The historic peak day demand is 2,550 gpm (2,448,000 gpd / 16 / 60). The future peak day demand flow is determined to be 4,796 gpm (4,604,496 gpd / 16 / 60). Individual node demands were added for larger customers. This peak day demand flow will be used for the fire flow model with the tank set at half full. The mid elevation of the tanks is 1479.00 above sea level. The minimum residual pressure according to Mays will be set at 20 psi.

The International Standards Organization (ISO) establishes minimum fire flow requirements. For one- and two-family dwellings not exceeding two stories in height, ISO uses the following needed fire flows:

Table 7 ISO Minimum Fire Flow

<u>Distance Between Buildings</u>	<u>Needed Fire Flow</u>
More than 100 feet	500 gpm
31 to 100 feet	750 gpm
11 to 30 feet	1,000 gpm
10 feet or less	1,500 gpm

ISO also recommends a minimum fire flow of 3,500 gpm in other habitation areas. The existing analysis determined that all of the residential areas have flows above 1,500 gpm except for the area around Country Club Ave. The existing model also shows that there are no flows above 3,500 gpm.

The future analysis determined the minimum fire flow of 500 gpm is provided throughout most the system except for the north side of the City. All the residential areas have less than 1,500 gpm and there are no areas over 3,500 gpm. This can be expected due to the existing pipe size and lack of looping. The fire flow analysis are shown in the following figures.

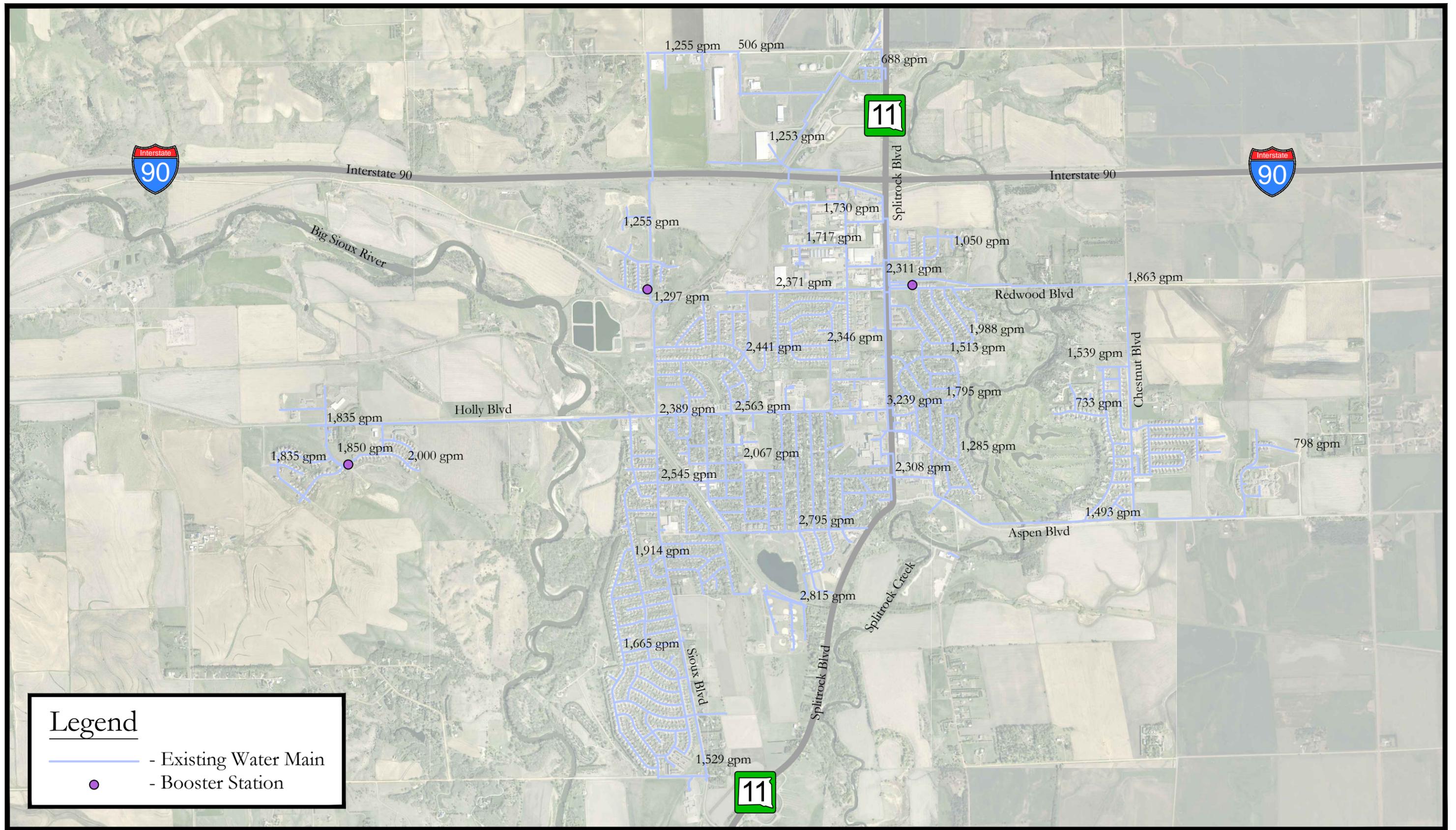
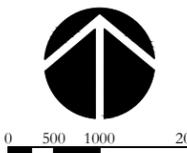


Figure 10 | Existing Fire Flow



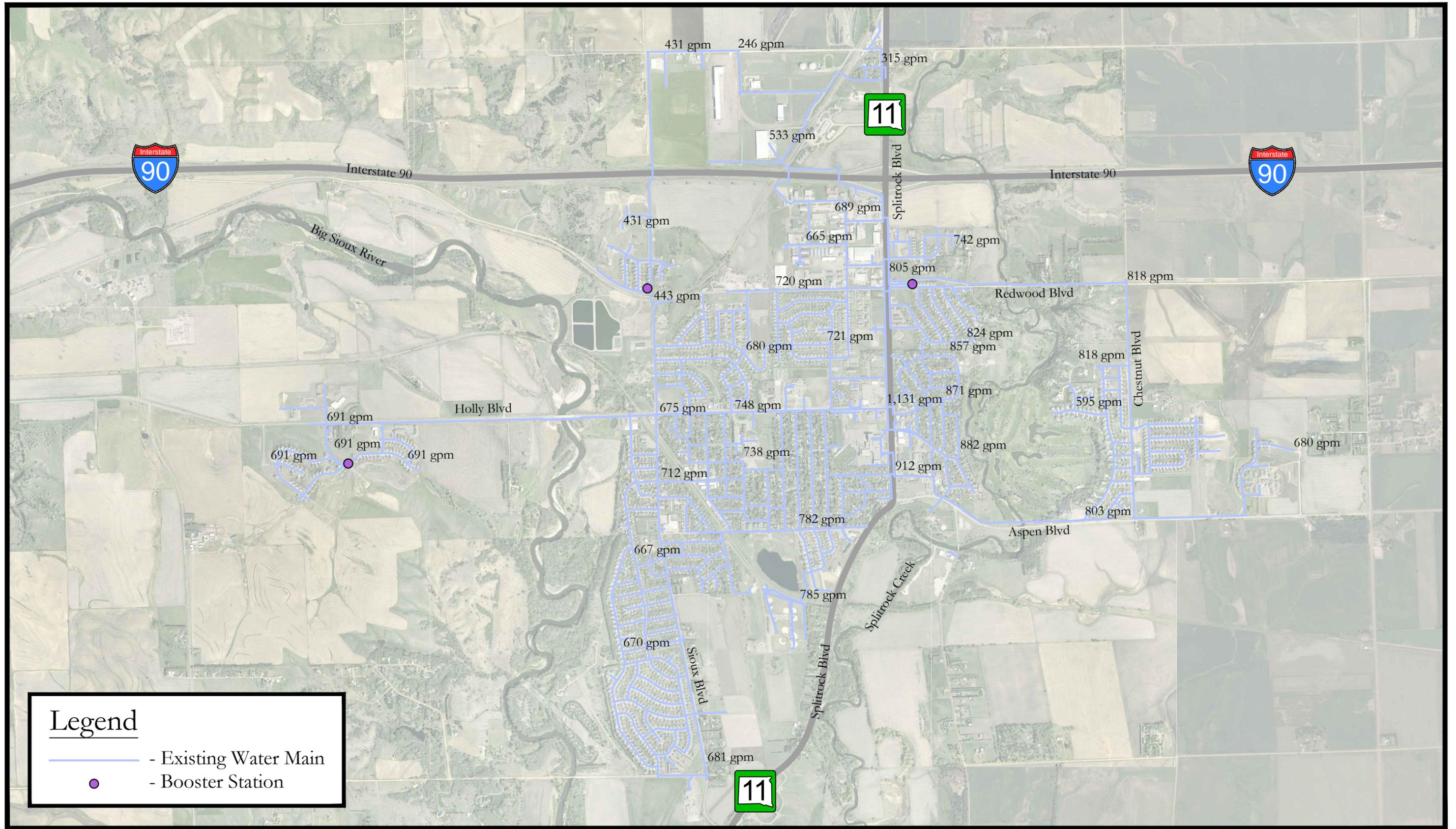
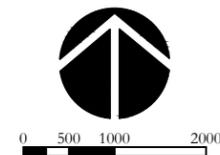


Figure 11 | Existing System Future Fire Flow



EXTENDED PERIOD SIMULATION (EPS)

An EPS provides an analysis of the water system over time compared to the pressure and fire flow simulation that is only a snapshot of the system. Typically a 24-hour period is used for the simulation. This type of simulation allows you to model tanks filling and draining, pumps turning on and off throughout the system in response to varying demand conditions. The demand curve shown below is inputted into the model to simulate higher water usage in the morning, at lunch and in the evening.

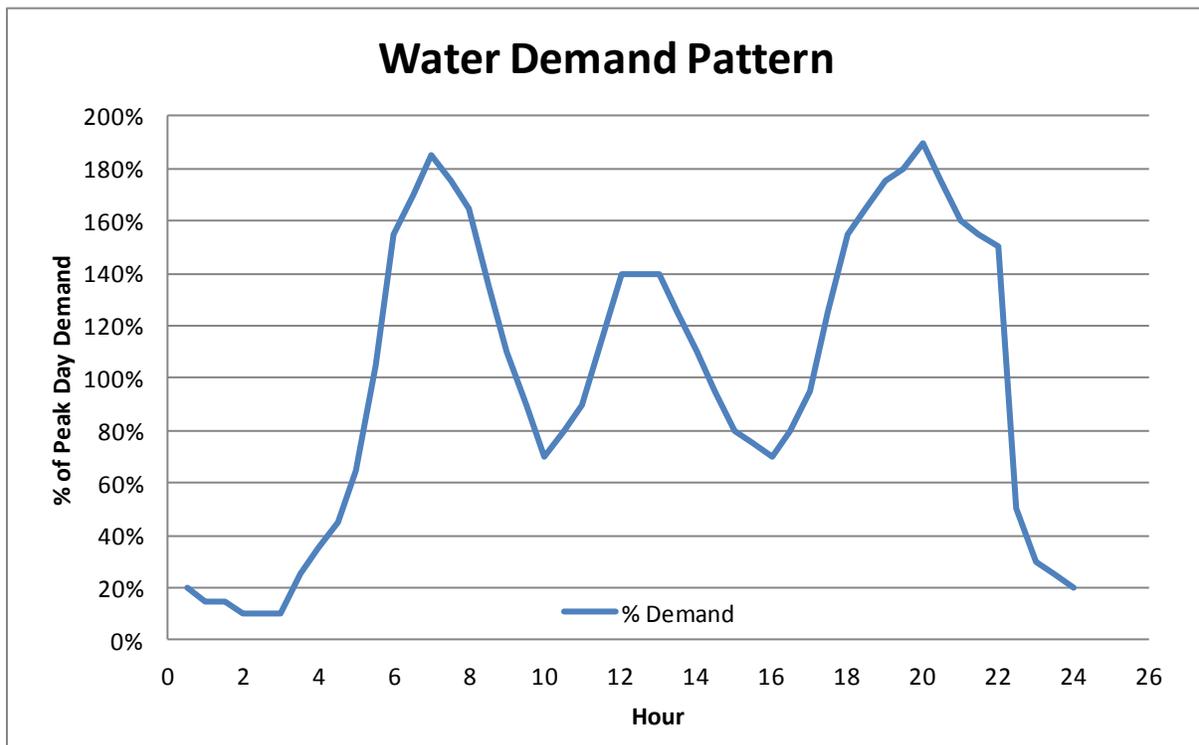


Figure 12 System Demand Curve

The simulation will start at the beginning of the day with all the storage tanks full. The EPS is run for the current and future peak day demand.

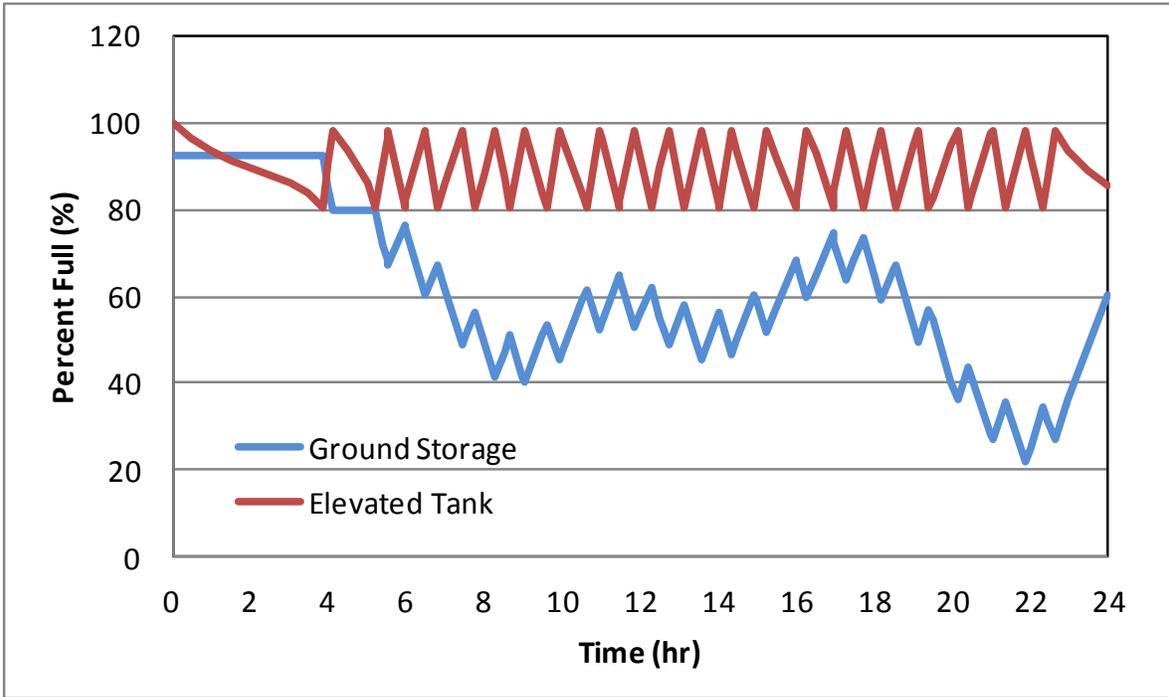


Figure 13 Existing System EPS

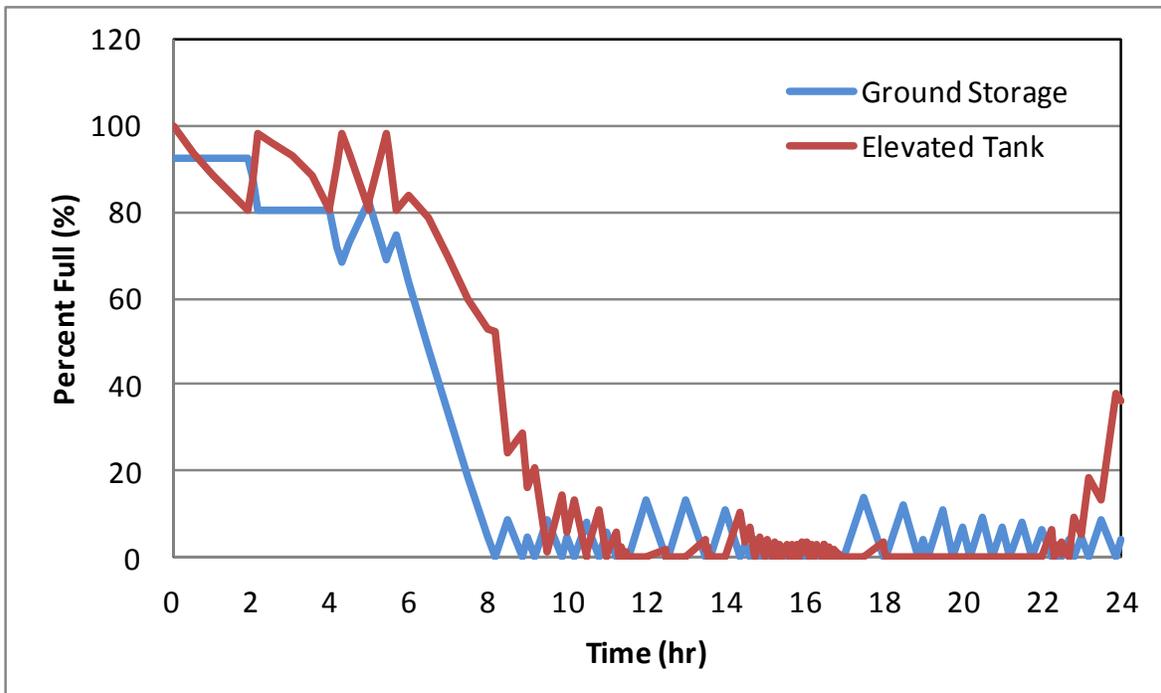


Figure 14 Existing System Future EPS

DEVELOPMENT OF ALTERNATIVES

GENERAL ALTERNATIVE INFORMATION

Each of the following alternatives includes an estimate of the total project cost. Included in the total project cost are the construction cost, contingencies, legal and administration, engineering and testing. It should be noted that these are only estimates and by no means a guarantee of the actual construction costs. Actual field measurements will be taken during the design phase to complete a more accurate estimate. Contract prices can be affected by project location, contractor work load, project size, contract time and the time of year that the project is built. These estimates should be updated on a yearly basis to reflect current industry conditions.

EQUIVALENT UNIFORM ANNUAL COST

When choosing the most cost effective solution to a problem, you have to consider the initial cost and the long term cost. The alternative with the cheapest initial cost may not be the cheapest alternative when operation and maintenance cost are taken into account. The capital cost and equivalent uniform annual cost (EUAC) are both provided for all of the alternatives. The EUAC is evaluated over 20 years and an interest rate of 3.0% to provide the long term costs. The salvage value at the end of 20 years will be 0% or 60%. The EUAC will provide the owner with the best long term solution.

WATER SOURCE ALTERNATIVES

The following alternatives were developed to correct the deficiencies listed below:

- 1) The wells do not have enough capacity to meet the peak day demand.
- 2) The Aspen Park wells should be properly abandoned.
- 3) Well six is being over pumped.

SOURCE ALTERNATIVE 1: DO NOTHING

The first source alternative is the "do nothing" alternative. This alternative is not considered acceptable because the current well capacity does not meet the peak day demand.

SOURCE ALTERNATIVE 2: NEW WELLS

Source Alternative 2 proposes the City construct a new well into the Split Rock Creek aquifer and two wells into the Big Sioux aquifer to provide adequate water supply to meet the peak day demand. This recommendation also includes a well transmission line be constructed between the new wells and the water treatment plant. Rehabilitation of well six is proposed as part of this

alternative after the new wells are online. The production at well six is 70% of when it was built. The rehabilitation of well six includes new well piping and a new well building with a flow meter, variable frequency drive and a supervisory control and data acquisition (SCADA) system. SCADA allows the remote monitoring of several facilities at one location. It is also recommended that a level transducer be included in all new wells to monitor static and residual water levels in the aquifer.

The location of the proposed Split Rock Creek well is located in the following figure. The South Dakota Geological Survey was contacted about the location of the new well in the Split Rock Creek aquifer. The two best locations are the Sioux Falls well and the proposed location. It is also beneficial to keep the wells in the Split Rock Creek aquifer as far apart as possible to limit the intrusion. The anticipated production from the new well is 1,500 gpm. After well six is rehabilitated it is recommended that it not be pumped over 1,500 gpm. It is important for the longevity of the well and the aquifer that the wells are not over pumped. The combination of well six and the new well would provide 4,320,000 gpd (3,000 x 60 x 24). The City has current and future permits for the Split Rock Creek aquifer of 5,685,791 gpd.

The approximate locations of the Big Sioux wells are shown in the following figure. The South Dakota Geological Survey has limited data about the Big Sioux aquifer. Test drilling would have to be completed to determine the location with the thickest gravel and sand pack. The anticipated production from each well would be 300 - 500 gpm. Two wells producing 300 gpm each would provide 864,000 gpd (600 x 60 x 24). The City has current and future permits for the Big Sioux aquifer of 1,936,228 gpd. The combination of the new Big Sioux wells and the Split Rock Creek wells would provide enough volume to meet the peak day demand. The City will need to blend water from both aquifers in order to have adequate volume and because of the nitrate levels in the Big Sioux aquifer.

It is recommended in the future that the City irrigate with raw water from the well transmission line. This will reduce the amount of water they need to treat in the summer time when demand is high. Aspen Park could be irrigated off the well transmission line. The cost estimate and EUAC for this alternative are shown on the following page.

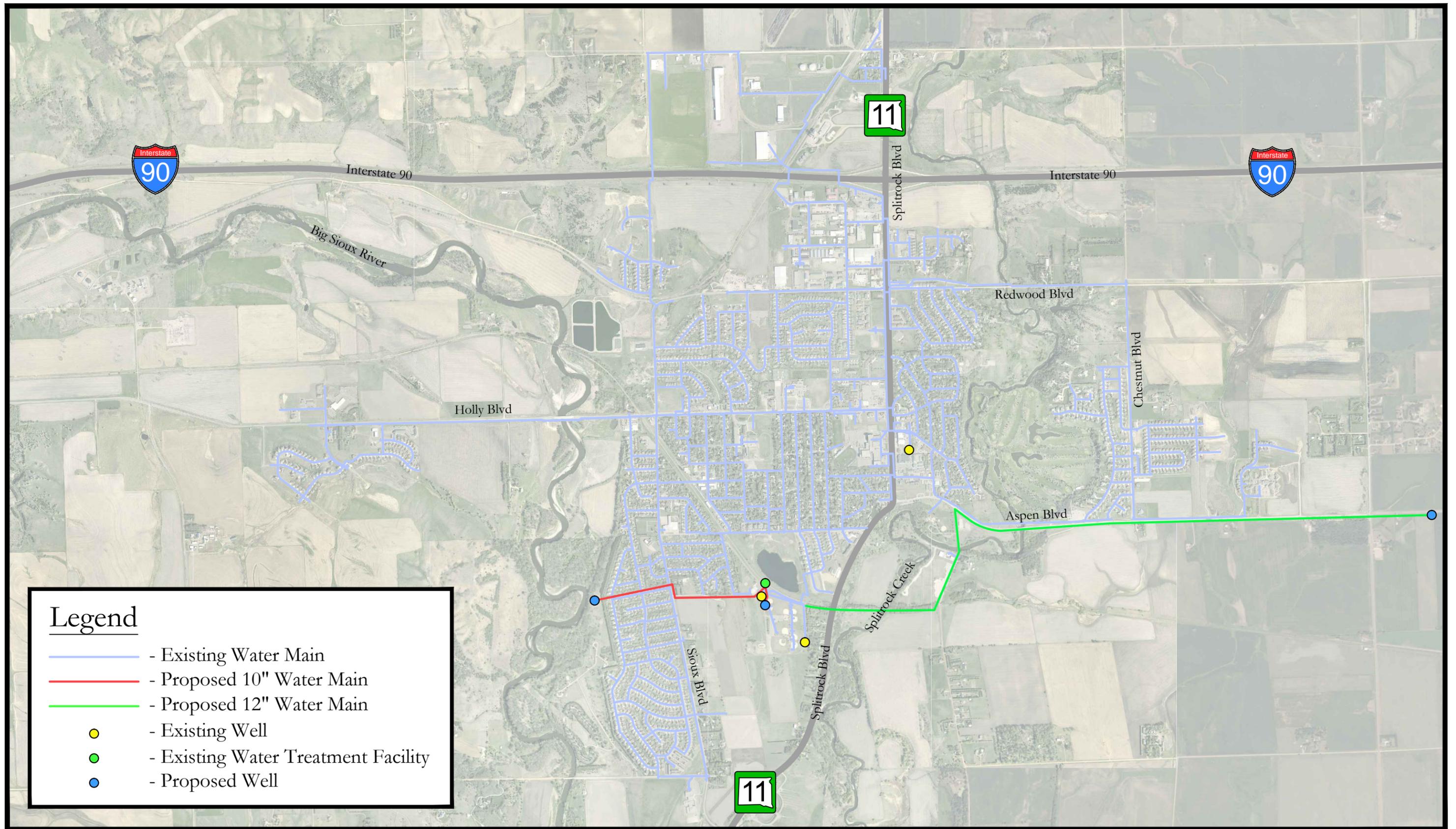
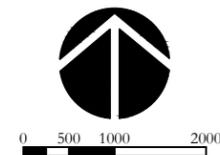


Figure 15 | Source Alternative 2



DEVELOPMENT OF ALTERNATIVES

Table 8 Cost Estimate for Source Alternative 2

Item No.	Description	Quantity	Unit	Unit Price	Price
1	Mobilization	1	LS	\$226,000.00	\$226,000.00
2	Well Abandonment	5	EA	\$4,000.00	\$20,000.00
3	Well Exploration	1	LS	\$50,000.00	\$50,000.00
4	Rehab Well #6	1	LS	\$75,000.00	\$75,000.00
5	Shallow Well Construction	2	EA	\$80,000.00	\$160,000.00
6	Deep Well Construction	1	EA	\$120,000.00	\$120,000.00
7	Well House Assembly	4	EA	\$15,000.00	\$60,000.00
8	Vertical Turbine Pump, Furnish	2	EA	\$40,000.00	\$80,000.00
9	Vertical Turbine Pump, Furnish	1	EA	\$50,000.00	\$50,000.00
10	Pump Control Systems, Furnish	4	EA	\$25,000.00	\$100,000.00
11	Well Pump & Control Systems, Install	3	EA	\$10,000.00	\$30,000.00
12	SCADA System	4	EA	\$5,000.00	\$20,000.00
13	Well House (Arch, Elec, Mech & Structural)	4	EA	\$80,000.00	\$320,000.00
14	Seeding, Fertilizing & Mulching	67,500	SY	\$1.50	\$101,250.00
15	Aggregate Base Course (12")	3,900	TN	\$15.00	\$58,500.00
16	Asphalt Concrete Composite (4")	1,400	TN	\$75.00	\$105,000.00
17	6" C900 Water Main	40	LF	\$23.00	\$920.00
18	10" C900 Water Main	4,200	LF	\$28.00	\$117,600.00
19	12" C900 Water Main	16,000	LF	\$32.00	\$512,000.00
20	HWY & River Crossings	630	LF	\$300.00	\$189,000.00
21	Water Main Bedding Material	19,610	LF	\$3.00	\$58,830.00
22	6" MJ Gate Valve w/Box	4	EA	\$950.00	\$3,800.00
23	12" MJ Gate Valve w/Box	1	EA	\$2,500.00	\$2,500.00
24	10" x 6" MJ Tee	2	EA	\$300.00	\$600.00
25	10" x 10" MJ Tee	1	EA	\$350.00	\$350.00
26	12" x 6" MJ Tee	2	EA	\$400.00	\$800.00
27	16" x 10" MJ Tee	1	EA	\$800.00	\$800.00
28	16" x 12" MJ Tee	1	EA	\$900.00	\$900.00
29	10" MJ Bend	2	EA	\$300.00	\$600.00
30	12" MJ Bend	2	EA	\$350.00	\$700.00
31	6" MJ Restraints	16	EA	\$75.00	\$1,200.00
32	10" MJ Restraints	12	EA	\$110.00	\$1,320.00
33	12" MJ Restraints	12	EA	\$125.00	\$1,500.00
34	16" MJ Restraints	4	EA	\$250.00	\$1,000.00
35	Fire Hydrant	4	EA	\$2,800.00	\$11,200.00
36	Cut & Tie to Existing Watermain	2	EA	\$750.00	\$1,500.00
				Subtotal	\$2,482,870.00
				Contingencies (15%)	\$373,000.00
				Total Estimated Construction Costs	\$2,855,870.00
				ENGINEERING	\$395,000.00
				LAND PURCHASE	\$20,000.00
				LEGAL, ADMINISTRATION & TESTING (4%)	\$115,000.00
				TOTAL ESTIMATED PROJECT COST	\$3,385,870.00

DEVELOPMENT OF ALTERNATIVES

Table 9 EUAC for Source Alternative 2

Capital Cost				
Description	Price	Salvage Value	Present Worth of Salvage Value	Net Present Worth
Mobilization	\$226,000.00	\$0.00	\$0.00	\$226,000.00
Well Abandonment	\$20,000.00	\$0.00	\$0.00	\$20,000.00
Well Exploration	\$50,000.00	\$0.00	\$0.00	\$50,000.00
Rehab Well #6	\$75,000.00	\$45,000.00	\$24,915.41	\$50,084.59
Shallow Well Construction	\$160,000.00	\$96,000.00	\$53,152.87	\$106,847.13
Deep Well Construction	\$120,000.00	\$72,000.00	\$39,864.65	\$80,135.35
Well House Assembly	\$60,000.00	\$36,000.00	\$19,932.33	\$40,067.67
Vertical Turbine Pump, Furnish	\$80,000.00	\$48,000.00	\$26,576.44	\$53,423.56
Vertical Turbine Pump, Furnish	\$50,000.00	\$30,000.00	\$16,610.27	\$33,389.73
Pump Control Systems, Furnish	\$100,000.00	\$60,000.00	\$33,220.55	\$66,779.45
Well Pump & Control Systems, Install	\$30,000.00	\$0.00	\$0.00	\$30,000.00
SCADA System	\$20,000.00	\$12,000.00	\$6,644.11	\$13,355.89
Well House (Arch, Elec, Mech & Structural)	\$320,000.00	\$192,000.00	\$106,305.74	\$213,694.26
Seeding, Fertilizing & Mulching	\$101,250.00	\$0.00	\$0.00	\$101,250.00
Aggregate Base Course (12")	\$58,500.00	\$35,100.00	\$19,434.02	\$39,065.98
Asphalt Concrete Composite (4")	\$105,000.00	\$63,000.00	\$34,881.57	\$70,118.43
6" C900 Water Main	\$920.00	\$552.00	\$305.63	\$614.37
10" C900 Water Main	\$117,600.00	\$70,560.00	\$39,067.36	\$78,532.64
12" C900 Water Main	\$512,000.00	\$307,200.00	\$170,089.19	\$341,910.81
HWY & River Crossings	\$189,000.00	\$113,400.00	\$62,786.83	\$126,213.17
Water Main Bedding Material	\$58,830.00	\$0.00	\$0.00	\$58,830.00
6" MJ Gate Valve w/Box	\$3,800.00	\$2,280.00	\$1,262.38	\$2,537.62
12" MJ Gate Valve w/Box	\$2,500.00	\$1,500.00	\$830.51	\$1,669.49
10" x 6" MJ Tee	\$600.00	\$360.00	\$199.32	\$400.68
10" x 10" MJ Tee	\$350.00	\$210.00	\$116.27	\$233.73
12" x 6" MJ Tee	\$800.00	\$480.00	\$265.76	\$534.24
16" x 10" MJ Tee	\$800.00	\$480.00	\$265.76	\$534.24
16" x 12" MJ Tee	\$900.00	\$540.00	\$298.98	\$601.02
10" MJ Bend	\$600.00	\$360.00	\$199.32	\$400.68
12" MJ Bend	\$700.00	\$420.00	\$232.54	\$467.46
6" MJ Restraints	\$1,200.00	\$720.00	\$398.65	\$801.35
10" MJ Restraints	\$1,320.00	\$792.00	\$438.51	\$881.49
12" MJ Restraints	\$1,500.00	\$900.00	\$498.31	\$1,001.69
16" MJ Restraints	\$1,000.00	\$600.00	\$332.21	\$667.79
Fire Hydrant	\$11,200.00	\$6,720.00	\$3,720.70	\$7,479.30
Cut & Tie to Existing Watermain	\$1,500.00	\$0.00	\$0.00	\$1,500.00
Land Purchase	\$20,000.00	\$20,000.00	\$11,073.52	\$8,926.48
Remaining Capital Costs	\$883,000.00	\$0.00	\$0.00	\$883,000.00
Total Construction Cost	\$3,385,870.00	\$1,217,174.00	\$673,919.73	\$2,711,950.27
Annual Operation and Maintenance Cost				
Description	Annual Cost			Net Present Worth
Equipment	\$2,000.00			\$29,754.95
Supplies	\$1,000.00			\$14,877.47
Utilities	\$10,000.00			\$148,774.75
Labor	\$3,000.00			\$44,632.42
Total Annual Cost	\$16,000.00			\$238,039.60
			Total Net Present Worth	\$2,949,989.87
			EUAC	\$198,285.66

WATER TREATMENT

The following alternatives were developed to correct the deficiencies listed below:

- 1) The water treatment plant does not have the capacity to meet the peak day demand.

TREATMENT ALTERNATIVE 1: DO NOTHING

The first treatment alternative is the "Do Nothing" alternative. This alternative is not considered acceptable because the current water treatment plant does not meet the peak day demand.

TREATMENT ALTERNATIVE 2: NEW WATER TREATMENT PLANT

Treatment Alternative 2 proposes the City build a new water treatment plant. The plant should be located in Aspen Park adjacent to the existing water treatment plant. The current plant has a capacity of 2,880,000 gpd and the new plant should have the same capacity. The design life of a water treatment plant should extend beyond 20 years and the larger capacity will allow for a higher population and longer design life.

The City needs to be involved with the selection of the treatment process in the new plant. There are three treatment process alternatives for the new plant. The first option is oxidation of iron and manganese, filtration, disinfection and fluoridation which is the same process as the current plant. This process doesn't soften the water or remove nitrate, sulfate or organic carbon. The second option is aeration, lime softening, filtration, disinfection and fluoridation. This process would soften the water but produces a sludge byproduct that would need to be stored and disposed of. Nitrate and sulfate would not be removed with this process. The treated water from the new plant could be blended with the existing plant before flowing into the system. The third option is aeration, oxidation, filtration and nanofiltration or reverse osmosis. This process would soften the water and remove most ions. However, the byproduct is a concentrated stream that is 20-25% of the water flowing through the membranes. This concentrated stream could be discharged to a stream with DENR approval or to the sanitary sewer. The treated water from the new plant could be blended with the existing plant before flowing into the system.

The City should also make upgrades to the existing plant after the new plant is online. The existing plant has not been upgraded since it was built in 1998. It is recommended that the City continue to utilize the existing plant because it is still functioning adequately and the loan will be paid off in 2015.

A new water treatment plant similar to the existing one could cost approximately \$8,400,000 and adding lime softening could add approximately \$3,000,000. A nanofiltration or reverse osmosis water treatment plant could cost approximately \$11,600,000. A more in depth study should be

completed to determine a detailed cost estimate and determine the upgrades necessary at the existing plant.

WATER STORAGE

The following alternatives were developed to correct the deficiencies listed below:

- 1) The system does not have adequate elevated storage.
- 2) The system does not have adequate pressure.
- 3) The system does not have adequate fire flows.
- 4) The City should reduce the number of pressure zones with new elevated storage.

STORAGE ALTERNATIVE 1: DO NOTHING

The first storage alternative is the "Do Nothing" alternative. This alternative is not considered acceptable because it will not provide adequate storage.

STORAGE ALTERNATIVE 2: NEW WATER TOWERS

Storage Alternative 2 proposes a new 1,250,000 gallon water tower be built on the west and east sides of the community. The existing booster stations and pressure reducing valve could be eliminated once these water towers were constructed. The proposed low water elevation of the tanks is 1546.00. These water towers would increase the pressure in the system, improve fire flow and provide adequate storage to offset the peak day demand. There are only two locations that have pressures below the recommended 40 psi compared to the entire existing system being below 40 psi. There are only a couple residential locations with fire flows below 1,500 gpm compared to the entire existing system being below 1,500 gpm. In addition, the business districts and industrial areas show a drastic increase in fire flows. The location of the proposed towers are shown in the following figure. There are water mains included in the estimate to connect the proposed towers to the existing distribution system. This alternative recommends the City purchase two acres at each site to allow room for construction and future maintenance of the tanks. The cost estimate for this alternative is shown in the following table.

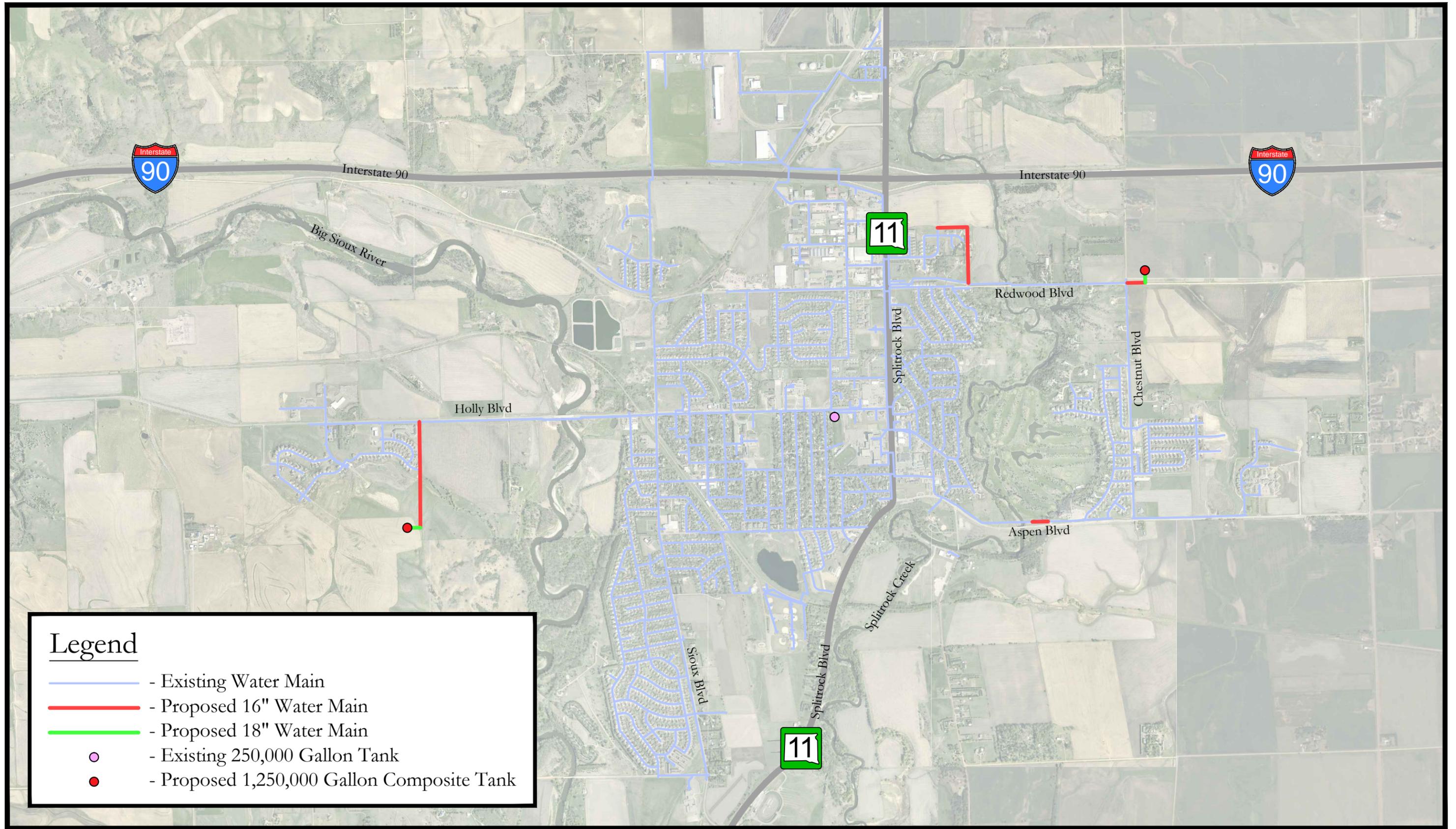
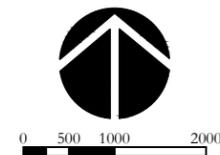


Figure 16 | Storage Alternative 2



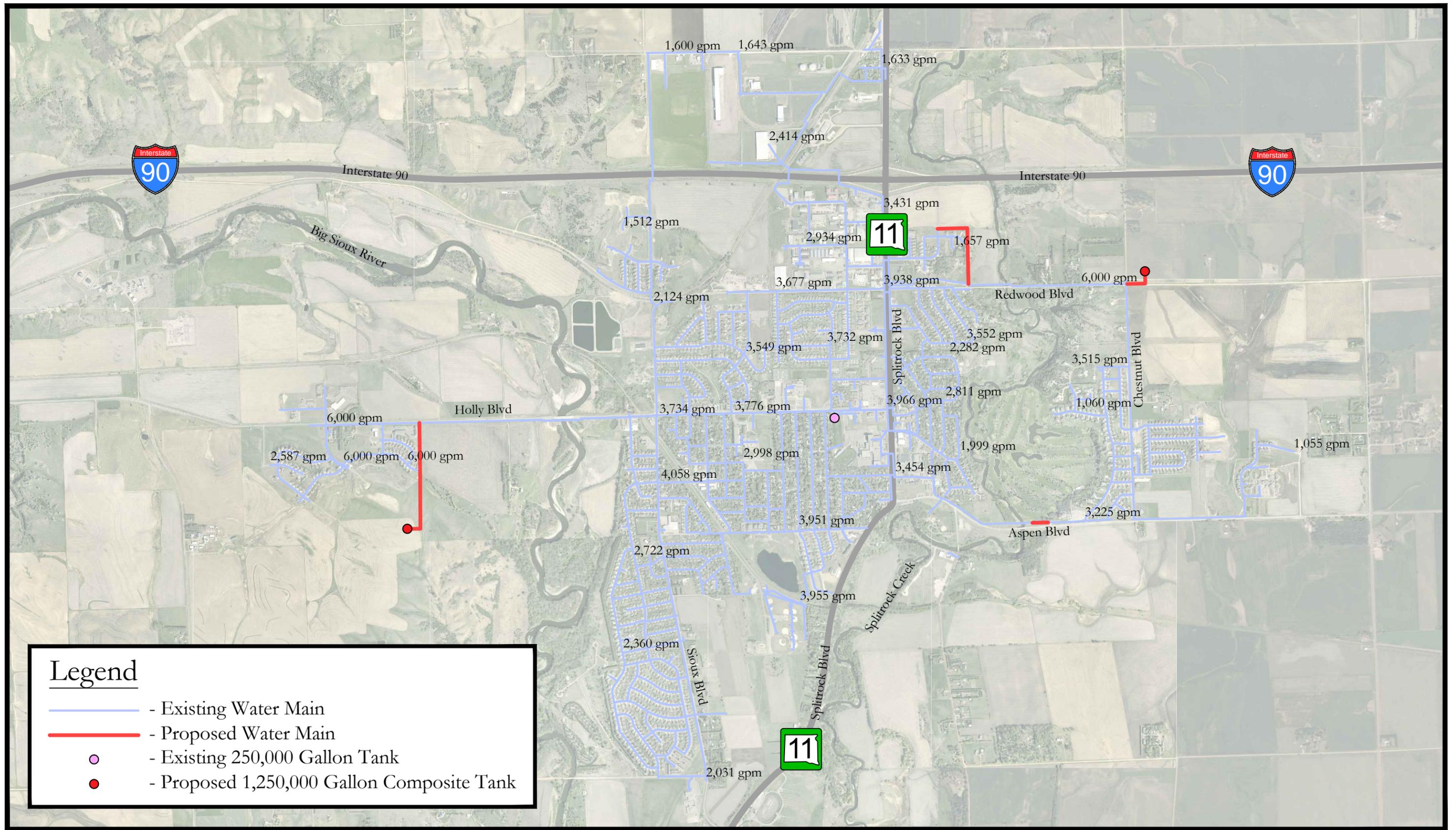
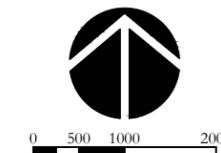


Figure 18 | Storage Alternative 2 Fire Flow



DEVELOPMENT OF ALTERNATIVES

Table 10 Cost Estimate for Storage Alternative 2

Item No.	Description	Quantity	Unit	Unit Price	Price
1	Mobilization	1	LS	\$465,000.00	\$465,000.00
2	Remove & Dispose of Existing Tank	1	LS	\$30,000.00	\$30,000.00
3	1,250,000 Gallon Composite Tank	2	EA	\$1,500,000.00	\$3,000,000.00
4	Tank Foundation	2	EA	\$350,000.00	\$700,000.00
5	Control Room	2	EA	\$130,000.00	\$260,000.00
6	SCADA System	2	EA	\$5,000.00	\$10,000.00
7	Altitude Control Valve	1	EA	\$30,000.00	\$30,000.00
8	Electrical Wiring	2	EA	\$20,000.00	\$40,000.00
9	Floor Drain and Line	2	EA	\$6,000.00	\$12,000.00
10	Chain Link Fence	2,400	FT	\$25.00	\$60,000.00
11	Salvage & Replace Topsoil	7,000	CY	\$5.00	\$35,000.00
12	Unclassified Excavation	700	CY	\$5.00	\$3,500.00
13	Aggregate Base Course (8")	1,400	TN	\$15.00	\$21,000.00
14	Seed, Fertilize & Mulch	41,500	SY	\$1.50	\$62,250.00
15	6" C900 Water Main	20	LF	\$23.00	\$460.00
16	16" C905 Water Main	4,900	FT	\$50.00	\$245,000.00
17	18" C905 Water Main	600	FT	\$63.00	\$37,800.00
18	Water Main Bedding Material	5,520	FT	\$4.00	\$22,080.00
19	6" MJ Gate Valve w/Box	2	EA	\$950.00	\$1,900.00
20	16" MJ Gate Valve w/Box	4	EA	\$8,500.00	\$34,000.00
21	16" x 12" MJ Tee	1	EA	\$900.00	\$900.00
22	16" x 16" MJ Tee	1	EA	\$1,000.00	\$1,000.00
23	18" x 6" MJ Tee	2	EA	\$1,000.00	\$2,000.00
24	18" x 16" MJ Reducer	1	EA	\$450.00	\$450.00
25	16" MJ Plug	2	EA	\$350.00	\$700.00
26	6" MJ Restraints	8	EA	\$75.00	\$600.00
27	12" MJ Restraints	1	EA	\$125.00	\$125.00
28	16" MJ Restraints	14	EA	\$250.00	\$3,500.00
29	18" MJ Restraints	5	EA	\$300.00	\$1,500.00
30	Fire Hydrant	2	EA	\$2,800.00	\$5,600.00
31	Cut & Tie to Existing Watermain	8	EA	\$750.00	\$6,000.00
32	Bypass Booster Stations	3	EA	\$5,000.00	\$15,000.00
33	Erosion Control	1	LS	\$2,000.00	\$2,000.00
34	Traffic Control	1	LS	\$1,000.00	\$1,000.00
				Subtotal	\$5,110,365.00
				Contingencies (15%)	\$767,000.00
				Total Estimated Construction Costs	\$5,877,365.00
				ENGINEERING	\$776,000.00
				LAND PURCHASE	\$83,000.00
				LEGAL, ADMINISTRATION & TESTING (4%)	\$236,000.00
				TOTAL ESTIMATED PROJECT COST	\$6,972,365.00

DEVELOPMENT OF ALTERNATIVES

Table 11 EUAC for Storage Alternative 2

Capital Cost				
Description	Price	Salvage Value	Present Worth of Salvage Value	Net Present Worth
Mobilization	\$465,000.00	\$0.00	\$0.00	\$465,000.00
Remove & Dispose of Existing Tank	\$30,000.00	\$0.00	\$0.00	\$30,000.00
1,250,000 Gallon Composite Tank	\$3,000,000.00	\$1,800,000.00	\$996,616.36	\$2,003,383.64
Tank Foundation	\$700,000.00	\$420,000.00	\$232,543.82	\$467,456.18
Control Room	\$260,000.00	\$156,000.00	\$86,373.42	\$173,626.58
SCADA System	\$10,000.00	\$6,000.00	\$3,322.05	\$6,677.95
Altitude Control Valve	\$30,000.00	\$18,000.00	\$9,966.16	\$20,033.84
Electrical Wiring	\$40,000.00	\$24,000.00	\$13,288.22	\$26,711.78
Floor Drain and Line	\$12,000.00	\$7,200.00	\$3,986.47	\$8,013.53
Chain Link Fence	\$60,000.00	\$36,000.00	\$19,932.33	\$40,067.67
Salvage & Replace Topsoil	\$35,000.00	\$0.00	\$0.00	\$35,000.00
Unclassified Excavation	\$3,500.00	\$0.00	\$0.00	\$3,500.00
Aggregate Base Course (8")	\$21,000.00	\$12,600.00	\$6,976.31	\$14,023.69
Seed, Fertilize & Mulch	\$62,250.00	\$0.00	\$0.00	\$62,250.00
6" C900 Water Main	\$460.00	\$276.00	\$152.81	\$307.19
16" C905 Water Main	\$245,000.00	\$147,000.00	\$81,390.34	\$163,609.66
18" C905 Water Main	\$37,800.00	\$22,680.00	\$12,557.37	\$25,242.63
Water Main Bedding Material	\$22,080.00	\$0.00	\$0.00	\$22,080.00
6" MJ Gate Valve w/Box	\$1,900.00	\$1,140.00	\$631.19	\$1,268.81
16" MJ Gate Valve w/Box	\$34,000.00	\$20,400.00	\$11,294.99	\$22,705.01
16" x 12" MJ Tee	\$900.00	\$540.00	\$298.98	\$601.02
16" x 16" MJ Tee	\$1,000.00	\$600.00	\$332.21	\$667.79
18" x 6" MJ Tee	\$2,000.00	\$1,200.00	\$664.41	\$1,335.59
18" x 16" MJ Reducer	\$450.00	\$270.00	\$149.49	\$300.51
16" MJ Plug	\$700.00	\$420.00	\$232.54	\$467.46
6" MJ Restraints	\$600.00	\$360.00	\$199.32	\$400.68
12" MJ Restraints	\$125.00	\$75.00	\$41.53	\$83.47
16" MJ Restraints	\$3,500.00	\$2,100.00	\$1,162.72	\$2,337.28
18" MJ Restraints	\$1,500.00	\$900.00	\$498.31	\$1,001.69
Fire Hydrant	\$5,600.00	\$3,360.00	\$1,860.35	\$3,739.65
Cut & Tie to Existing Watermain	\$6,000.00	\$0.00	\$0.00	\$6,000.00
Bypass Booster Stations	\$15,000.00	\$9,000.00	\$4,983.08	\$10,016.92
Erosion Control	\$2,000.00	\$0.00	\$0.00	\$2,000.00
Traffic Control	\$1,000.00	\$0.00	\$0.00	\$1,000.00
Land Purchase	\$83,000.00	\$83,000.00	\$45,955.09	\$37,044.91
Remaining Capital Costs	\$1,779,000.00	\$0.00	\$0.00	\$1,779,000.00
Total Construction Cost	\$6,972,365.00	\$2,773,121.00	\$1,535,409.86	\$5,436,955.14
Annual Operation and Maintenance Cost				
Description	Annual Cost			Net Present Worth
Equipment	\$500.00			\$7,438.74
Supplies	\$500.00			\$7,438.74
Utilities	\$1,000.00			\$14,877.47
Painting	\$7,500.00			\$111,581.06
Labor	\$1,000.00			\$14,877.47
Total Annual Cost	\$10,500.00			\$156,213.49
			Total Net Present Worth	\$5,593,168.62
			EUAC	\$375,948.79

WATER DISTRIBUTION ALTERNATIVES

The following are the negative characteristics that were discussed in the Water Distribution Section.

- 1) The ACP has outlived its useful life expectancy.
- 2) Larger trunk mains need to be installed for looping to reduce pressure loss.
- 3) There are bottlenecks with the existing trunk main sizes.

DISTRIBUTION ALTERNATIVE 1: DO NOTHING

The first distribution alternative is the "Do Nothing" alternative. This alternative is not considered acceptable because it will not address the negative characteristics.

DISTRIBUTION ALTERNATIVE 2: REPLACE ACP

Distribution Alternative 2 proposes the replacement of all the ACP water mains in the City. As discussed previously, the ACP water mains are brittle and break. In addition, the flow capacity is reduced as these pipes age. The water mains will be replaced with PVC that will reduce the frequency of breaks, reduce the head loss and increase the flow capacity. In addition, new pipe is required because the proposed storage alternatives will drastically increase the pressure and increase the potential for breaks with the old ACP.

The proposed pressures and fire flows stay the same because the remainder of the system is still the major reason for the reduced pressures and fire flows. This area will show larger improvement once the rest of the system upgrades are completed. The locations of the proposed improvements are shown on the following page.

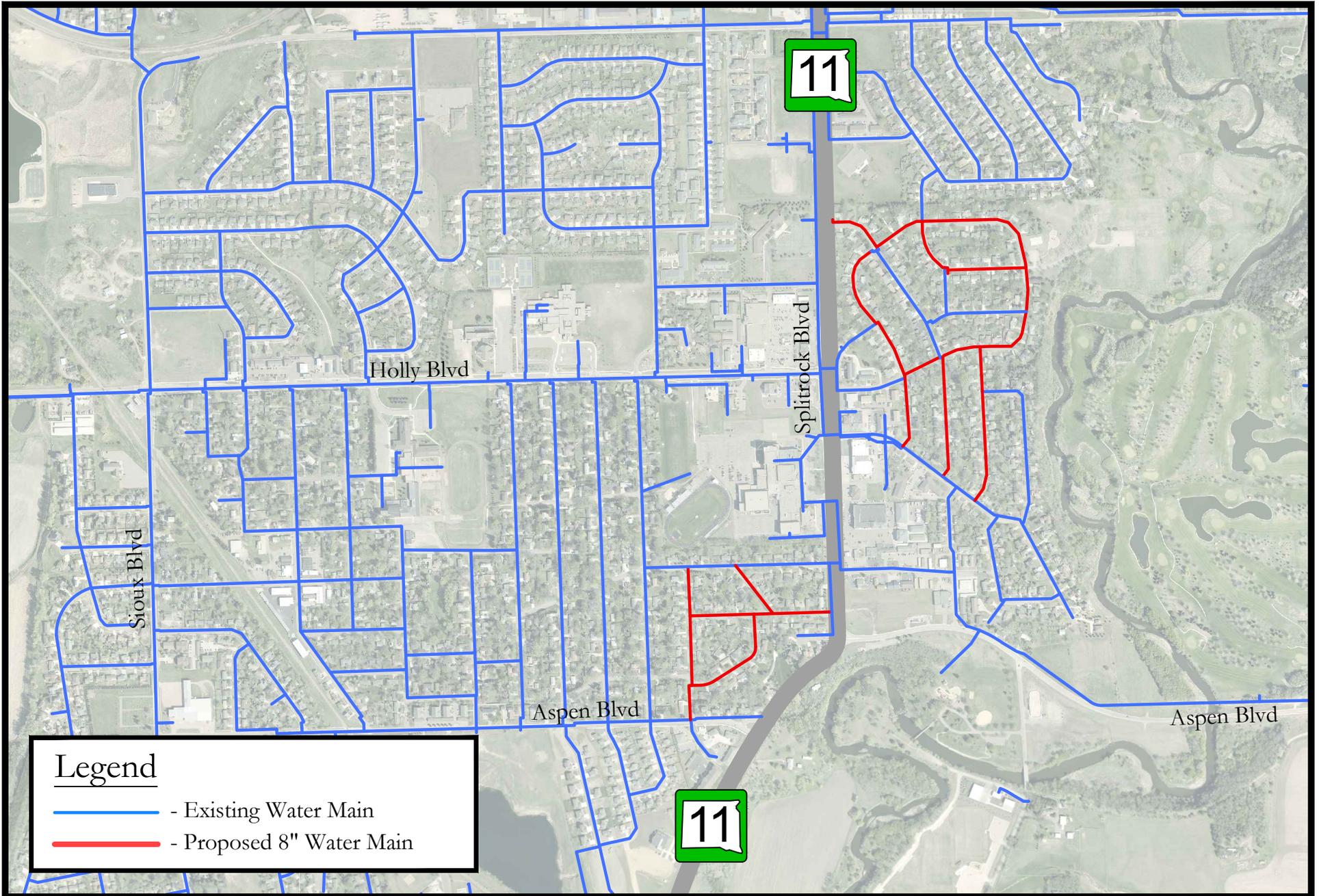
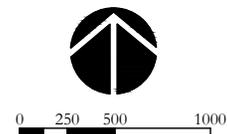


Figure 19 | Distribution Alternative 2



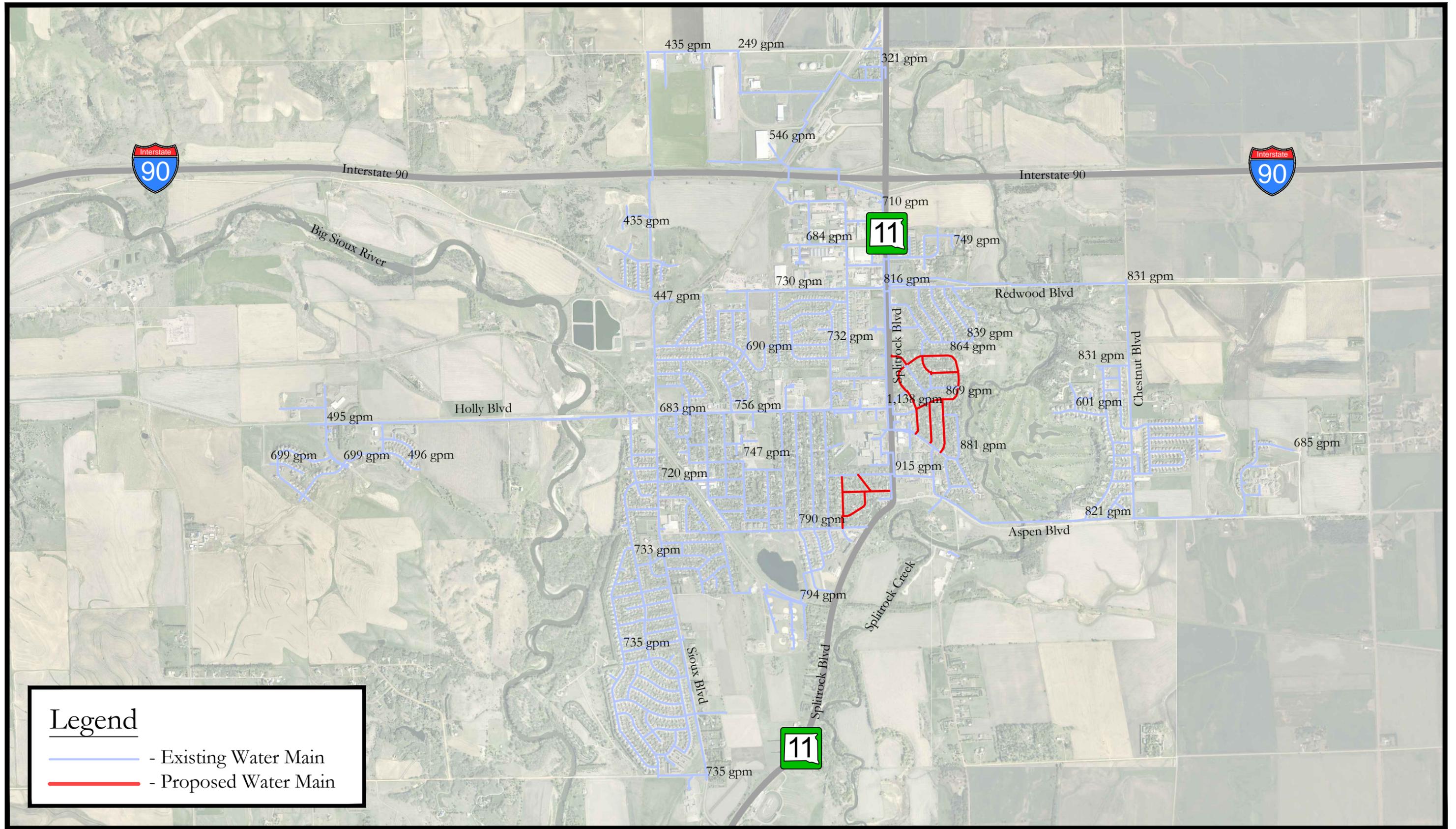
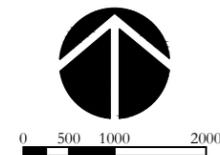


Figure 21 | Distribution Alternative 2 Fire Flow Analysis



DEVELOPMENT OF ALTERNATIVES

Table 12 Cost Estimate for Distribution Alternative 2

Item No.	Description	Quantity	Unit	Unit Price	Price
1	Mobilization	1	LS	\$172,000.00	\$172,000.00
2	Clearing	1	LS	\$2,000.00	\$2,000.00
3	Remove Water Main	110	LF	\$10.00	\$1,100.00
4	Saw Cut Existing Surface	12,800	LF	\$5.00	\$64,000.00
5	Unclassified Excavation	9,340	CY	\$6.00	\$56,040.00
6	Scarify & Recompact Subgrade	21,000	SY	\$1.50	\$31,500.00
7	Salvage & Replace Topsoil	10,300	CY	\$5.00	\$51,500.00
8	Aggregate Base Course (12")	13,800	TN	\$15.00	\$207,000.00
9	Asphalt Concrete Composite (4")	4,900	TN	\$75.00	\$367,500.00
10	Remove & Replace Concrete C&G	1,760	LF	\$25.00	\$44,000.00
11	Valve Box Adjustment	62	EA	\$150.00	\$9,300.00
12	Seed, Fertilize & Mulch	61,700	SY	\$1.50	\$92,550.00
13	8" C900 Water Main	12,000	LF	\$25.00	\$300,000.00
14	6" C900 Water Main	600	LF	\$23.00	\$13,800.00
15	Water Main Bedding Material	12,600	LF	\$3.00	\$37,800.00
16	8" MJ Gate Valve w/Box	40	EA	\$1,300.00	\$52,000.00
17	6" MJ Gate Valve w/Box	22	EA	\$950.00	\$20,900.00
18	8" MJ Cross	1	EA	\$500.00	\$500.00
19	8" x 8" MJ Tee	17	EA	\$450.00	\$7,650.00
20	8" x 6" MJ Tee	17	EA	\$300.00	\$5,100.00
21	8" x 6" MJ Reducer	8	EA	\$325.00	\$2,600.00
22	8" MJ Restraints	177	EA	\$100.00	\$17,700.00
23	6" MJ Restraints	69	EA	\$75.00	\$5,175.00
24	Fire Hydrant	17	EA	\$2,800.00	\$47,600.00
25	Cut & Tie to Existing Watermain	11	EA	\$750.00	\$8,250.00
26	8" x 1" Tapping Saddle	176	EA	\$250.00	\$44,000.00
27	1" Corporation Stop	176	EA	\$125.00	\$22,000.00
28	1" PE Service Line	5,900	LF	\$18.00	\$106,200.00
29	Bore Service Line	2,950	LF	\$10.00	\$29,500.00
30	1" Curb Stop w/Box	176	EA	\$300.00	\$52,800.00
31	Erosion Control	1	LS	\$5,000.00	\$5,000.00
32	Traffic Control	1	LS	\$5,000.00	\$5,000.00
				Subtotal	\$1,882,065.00
				Contingencies (15%)	\$283,000.00
				Total Estimated Construction Costs	\$2,165,065.00
				ENGINEERING	\$308,000.00
				LEGAL, ADMINISTRATION & TESTING (4%)	\$87,000.00
				TOTAL ESTIMATED PROJECT COST	\$2,560,065.00

DEVELOPMENT OF ALTERNATIVES

Table 13 EUAC for Distribution Alternative 2

Capital Cost				
Description	Price	Salvage Value	Present Worth of Salvage Value	Net Present Worth
Mobilization	\$172,000.00	\$0.00	\$0.00	\$172,000.00
Clearing	\$2,000.00	\$0.00	\$0.00	\$2,000.00
Remove Water Main	\$1,100.00	\$0.00	\$0.00	\$1,100.00
Saw Cut Existing Surface	\$64,000.00	\$0.00	\$0.00	\$64,000.00
Unclassified Excavation	\$56,040.00	\$0.00	\$0.00	\$56,040.00
Scarify & Recompact Subgrade	\$31,500.00	\$0.00	\$0.00	\$31,500.00
Salvage & Replace Topsoil	\$51,500.00	\$0.00	\$0.00	\$51,500.00
Aggregate Base Course (12")	\$207,000.00	\$124,200.00	\$68,766.53	\$138,233.47
Asphalt Concrete Composite (4")	\$367,500.00	\$220,500.00	\$122,085.50	\$245,414.50
Remove & Replace Concrete C&G	\$44,000.00	\$26,400.00	\$14,617.04	\$29,382.96
Valve Box Adjustment	\$9,300.00	\$0.00	\$0.00	\$9,300.00
Seed, Fertilize & Mulch	\$92,550.00	\$0.00	\$0.00	\$92,550.00
8" C900 Water Main	\$300,000.00	\$180,000.00	\$99,661.64	\$200,338.36
6" C900 Water Main	\$13,800.00	\$8,280.00	\$4,584.44	\$9,215.56
Water Main Bedding Material	\$37,800.00	\$0.00	\$0.00	\$37,800.00
8" MJ Gate Valve w/Box	\$52,000.00	\$31,200.00	\$17,274.68	\$34,725.32
6" MJ Gate Valve w/Box	\$20,900.00	\$12,540.00	\$6,943.09	\$13,956.91
8" MJ Cross	\$500.00	\$300.00	\$166.10	\$333.90
8" x 8" MJ Tee	\$7,650.00	\$4,590.00	\$2,541.37	\$5,108.63
8" x 6" MJ Tee	\$5,100.00	\$3,060.00	\$1,694.25	\$3,405.75
8" x 6" MJ Reducer	\$2,600.00	\$1,560.00	\$863.73	\$1,736.27
8" MJ Restraints	\$17,700.00	\$10,620.00	\$5,880.04	\$11,819.96
6" MJ Restraints	\$5,175.00	\$3,105.00	\$1,719.16	\$3,455.84
Fire Hydrant	\$47,600.00	\$28,560.00	\$15,812.98	\$31,787.02
Cut & Tie to Existing Watermain	\$8,250.00	\$0.00	\$0.00	\$8,250.00
8" x 1" Tapping Saddle	\$44,000.00	\$26,400.00	\$14,617.04	\$29,382.96
1" Corporation Stop	\$22,000.00	\$13,200.00	\$7,308.52	\$14,691.48
1" PE Service Line	\$106,200.00	\$63,720.00	\$35,280.22	\$70,919.78
Bore Service Line	\$29,500.00	\$0.00	\$0.00	\$29,500.00
1" Curb Stop w/Box	\$52,800.00	\$31,680.00	\$17,540.45	\$35,259.55
Erosion Control	\$5,000.00	\$0.00	\$0.00	\$5,000.00
Traffic Control	\$5,000.00	\$0.00	\$0.00	\$5,000.00
Remaining Capital Costs	\$678,000.00	\$0.00	\$0.00	\$678,000.00
Total Construction Cost	\$2,560,065.00	\$789,915.00	\$437,356.78	\$2,122,708.22
Annual Operation and Maintenance Cost				
Description	Annual Cost			Net Present Worth
Equipment	\$250.00			\$3,719.37
Supplies	\$100.00			\$1,487.75
Utilities	\$0.00			\$0.00
Labor	\$500.00			\$7,438.74
Total Annual Cost	\$850.00			\$12,645.85
			Total Net Present Worth	\$2,135,354.07
			EUAC	\$143,529.33

DISTRIBUTION ALTERNATIVE 3: LOOP EXISTING

Distribution Alternative 3 proposes looping be completed to improve the operation of the system. It is recommended pipe velocities stay below five feet per second because pressure loss increases drastically once this velocity is exceeded. The City's Design Standards require 16-inch diameter water main in a one-mile grid and 12-inch diameter water main in a one-half mile grid. These pipe sizes should be followed to keep the system pipe velocities down. There are existing trunk mains that need to be upsized because they are creating a bottlenecks. In addition, there are new trunk mains that need to be installed for looping to reduce pressure loss and increase flow capacity. These new mains will also loop some dead-ends in the system. As discussed previously, dead-ends increase retention time and reduce disinfection. Looping will increase water movement and decrease head loss. The proposed pressures and fire flows increase throughout the system but are still below the recommended minimums. The new water mains will reduced head loss with the larger PVC pipe. The pressure and fire flow will show a more drastic increase when the new towers are constructed. The locations of the proposed improvements are shown in the following figure.

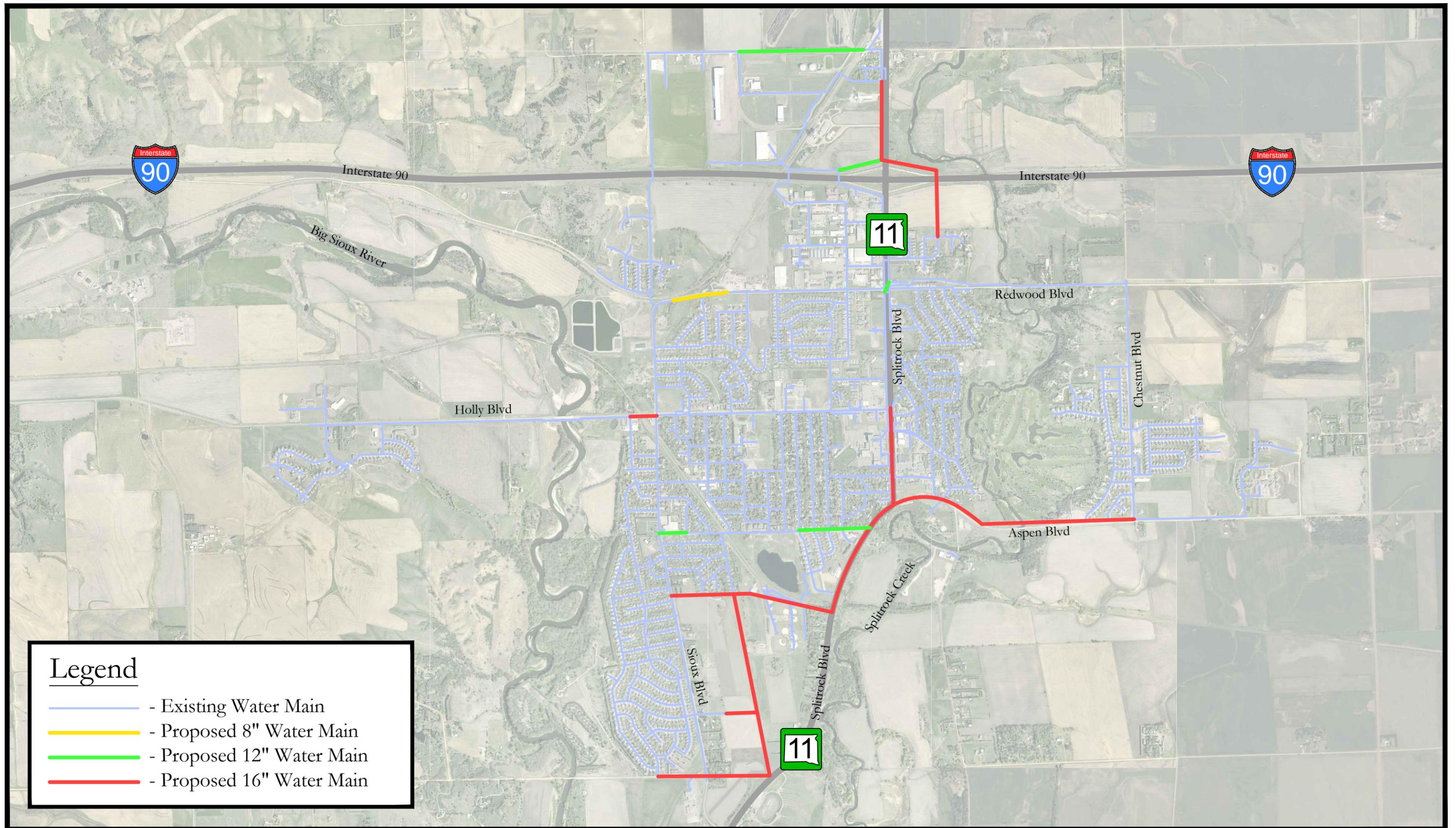
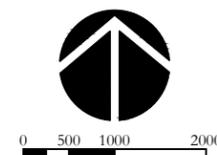


Figure 22 | Distribution Alternative 3



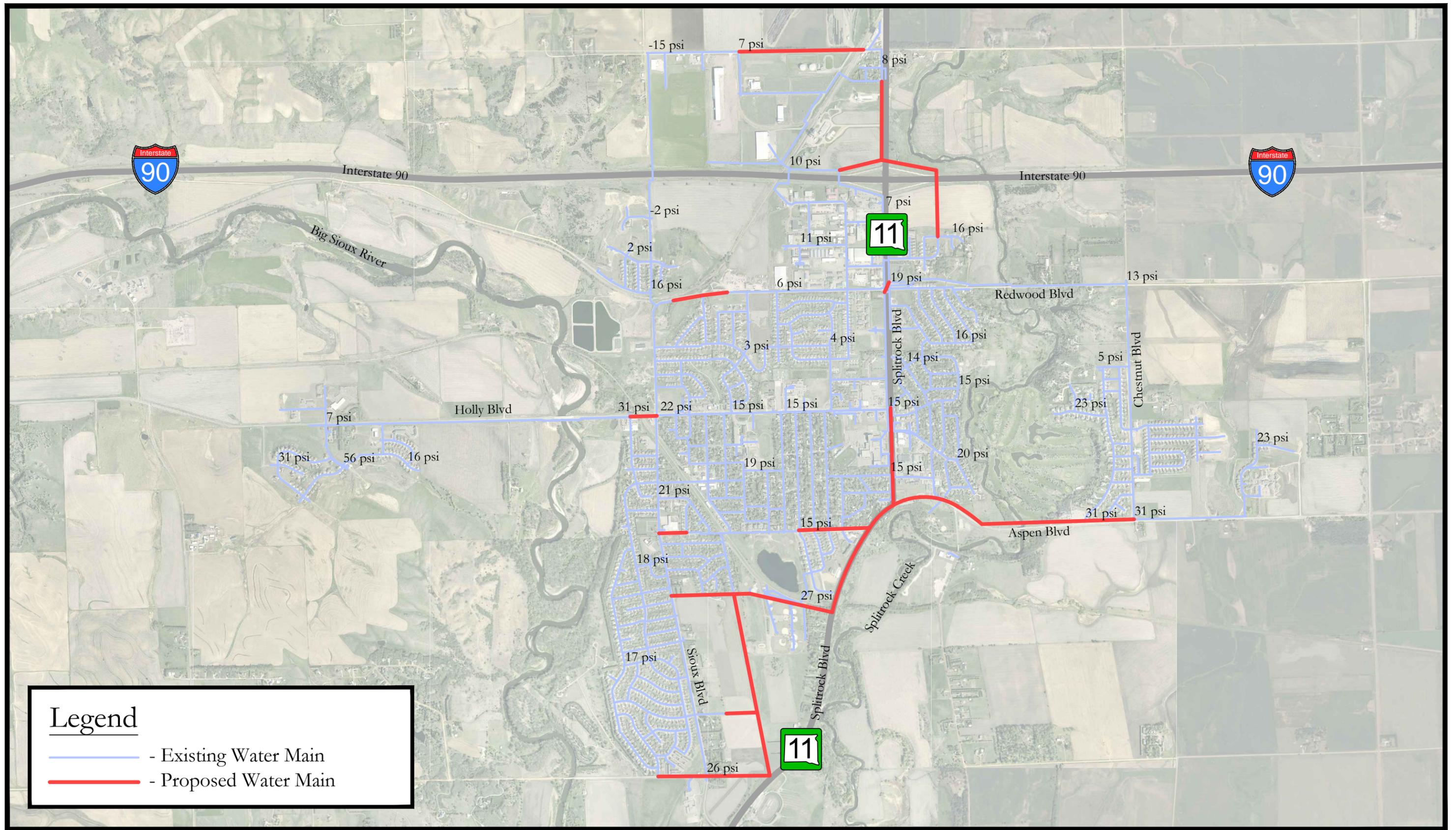
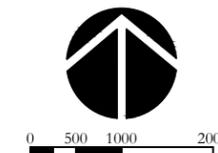


Figure 23 | Distribution Alternative 3 Pressure Analysis



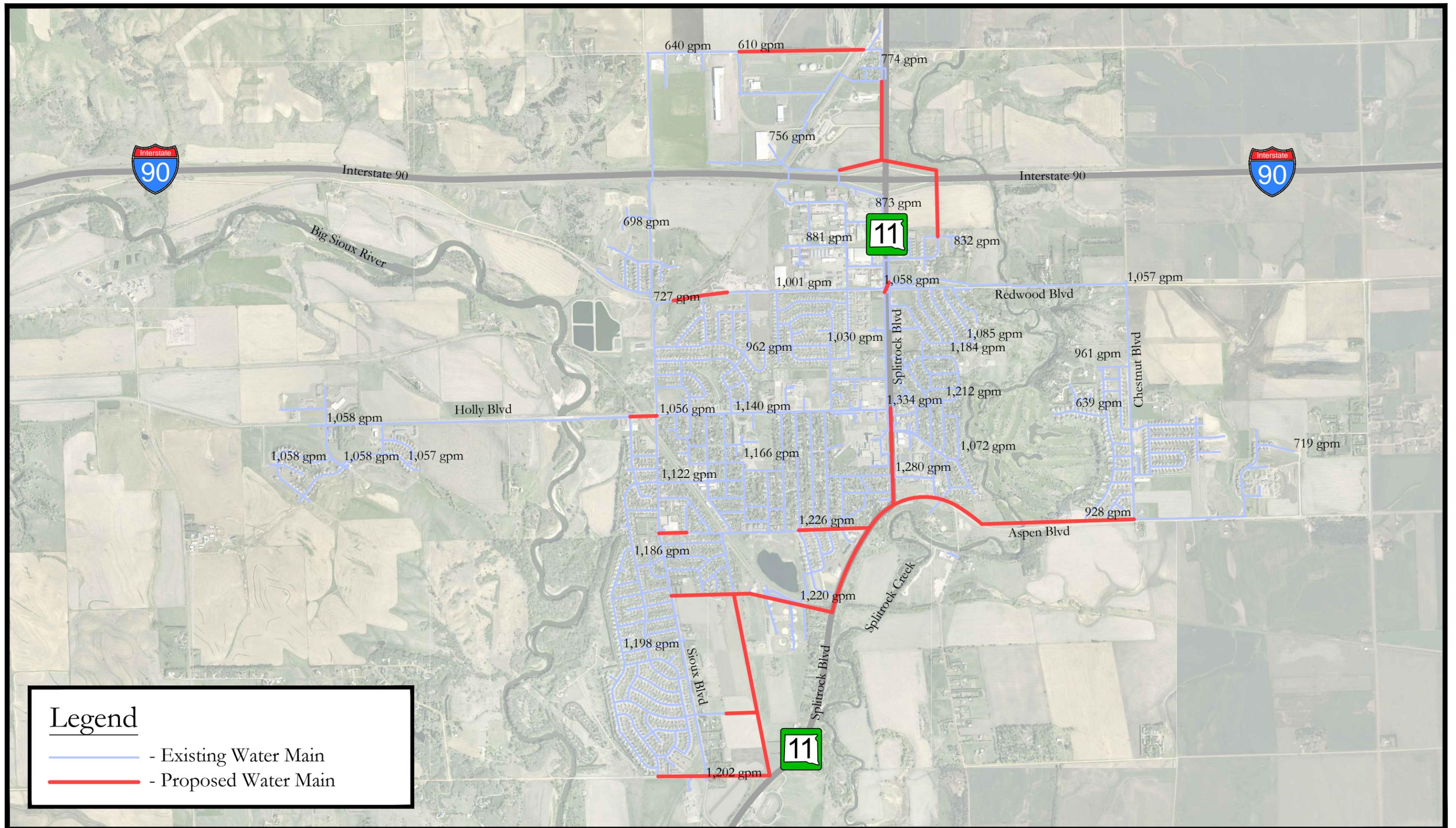
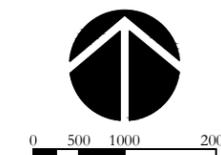


Figure 24 | Distribution Alternative 3 Fire Flow Analysis



DEVELOPMENT OF ALTERNATIVES

Table 14 Cost Estimate for Distribution Alternative 3

Item No.	Description	Quantity	Unit	Unit Price	Price
1	Mobilization	1	LS	\$368,000.00	\$368,000.00
2	Clearing	1	LS	\$10,000.00	\$10,000.00
3	Remove Water Main	470	LF	\$10.00	\$4,700.00
4	Saw Cut Existing Surface	12,800	LF	\$5.00	\$64,000.00
5	Unclassified Excavation	8,910	CY	\$6.00	\$53,460.00
6	Scarify & Recompact Subgrade	20,100	SY	\$1.50	\$30,150.00
7	Salvage & Replace Topsoil	12,300	CY	\$5.00	\$61,500.00
8	Aggregate Base Course (12")	13,200	TN	\$15.00	\$198,000.00
9	Asphalt Concrete Composite (4")	2,100	TN	\$75.00	\$157,500.00
10	Concrete Surfacing	11,300	SY	\$50.00	\$565,000.00
11	Remove & Replace Concrete C&G	120	LF	\$25.00	\$3,000.00
12	Valve Box Adjustment	66	EA	\$150.00	\$9,900.00
13	Seed, Fertilize & Mulch	72,500	SY	\$1.50	\$108,750.00
14	Interstate, River & RR Crossings	500	LF	\$300.00	\$150,000.00
15	16" C905 Water Main	25,400	LF	\$50.00	\$1,270,000.00
16	12" C900 Water Main	6,500	LF	\$32.00	\$208,000.00
17	10" C900 Water Main	50	LF	\$28.00	\$1,400.00
18	8" C900 Water Main	2,000	LF	\$25.00	\$50,000.00
19	6" C900 Water Main	1,500	LF	\$23.00	\$34,500.00
20	Water Main Bedding Material	35,450	LF	\$4.00	\$141,800.00
21	16" MJ Gate Valve w/Box	15	EA	\$8,500.00	\$127,500.00
22	12" MJ Gate Valve w/Box	6	EA	\$2,500.00	\$15,000.00
23	10" MJ Gate Valve w/Box	1	EA	\$1,800.00	\$1,800.00
24	8" MJ Gate Valve w/Box	1	EA	\$1,300.00	\$1,300.00
25	6" MJ Gate Valve w/Box	43	EA	\$950.00	\$40,850.00
26	8" MJ Fitting	6	EA	\$400.00	\$2,400.00
27	10" MJ Fitting	1	EA	\$500.00	\$500.00
28	12" MJ Fitting	7	EA	\$750.00	\$5,250.00
29	16" MJ Fitting	70	EA	\$900.00	\$63,000.00
30	16" MJ Restraints	240	EA	\$250.00	\$60,000.00
31	12" MJ Restraints	33	EA	\$125.00	\$4,125.00
32	10" MJ Restraints	5	EA	\$110.00	\$550.00
33	8" MJ Restraints	20	EA	\$100.00	\$2,000.00
34	6" MJ Restraints	129	EA	\$75.00	\$9,675.00
35	Fire Hydrant	43	EA	\$2,800.00	\$120,400.00
36	Cut & Tie to Existing Watermain	47	EA	\$750.00	\$35,250.00
37	12" x 1" Tapping Saddle	7	EA	\$350.00	\$2,450.00
38	16" x 1" Tapping Saddle	5	EA	\$475.00	\$2,375.00
39	1" Corporation Stop	12	EA	\$125.00	\$1,500.00
40	1" PE Service Line	400	LF	\$18.00	\$7,200.00
41	Bore Service Line	200	LF	\$10.00	\$2,000.00
42	1" Curb Stop w/Box	12	EA	\$300.00	\$3,600.00
43	Erosion Control	1	LS	\$20,000.00	\$20,000.00
44	Traffic Control	1	LS	\$20,000.00	\$20,000.00
Subtotal					\$4,038,385.00
Contingencies (15%)					\$606,000.00
Total Estimated Construction Costs					\$4,644,385.00
ENGINEERING					\$621,000.00
LEGAL, ADMINISTRATION & TESTING (4%)					\$186,000.00
TOTAL ESTIMATED PROJECT COST					\$5,451,385.00

DEVELOPMENT OF ALTERNATIVES

Table 15 EUAC for Distribution Alternative 3

Capital Cost		Salvage	Present Worth	Net Present
Description	Price	Value	of Salvage Value	Worth
Mobilization	\$368,000.00	\$0.00	\$0.00	\$368,000.00
Clearing	\$10,000.00	\$0.00	\$0.00	\$10,000.00
Remove Water Main	\$4,700.00	\$0.00	\$0.00	\$4,700.00
Saw Cut Existing Surface	\$64,000.00	\$0.00	\$0.00	\$64,000.00
Unclassified Excavation	\$53,460.00	\$0.00	\$0.00	\$53,460.00
Scarify & Recompact Subgrade	\$30,150.00	\$0.00	\$0.00	\$30,150.00
Salvage & Replace Topsoil	\$61,500.00	\$0.00	\$0.00	\$61,500.00
Aggregate Base Course (12")	\$198,000.00	\$118,800.00	\$65,776.68	\$132,223.32
Asphalt Concrete Composite (4")	\$157,500.00	\$94,500.00	\$52,322.36	\$105,177.64
Concrete Surfacing	\$565,000.00	\$339,000.00	\$187,696.08	\$377,303.92
Remove & Replace Concrete C&G	\$3,000.00	\$1,800.00	\$996.62	\$2,003.38
Valve Box Adjustment	\$9,900.00	\$0.00	\$0.00	\$9,900.00
Seed, Fertilize & Mulch	\$108,750.00	\$0.00	\$0.00	\$108,750.00
Interstate, River & RR Crossings	\$150,000.00	\$90,000.00	\$49,830.82	\$100,169.18
16" C905 Water Main	\$1,270,000.00	\$762,000.00	\$421,900.92	\$848,099.08
12" C900 Water Main	\$208,000.00	\$124,800.00	\$69,098.73	\$138,901.27
10" C900 Water Main	\$1,400.00	\$840.00	\$465.09	\$934.91
8" C900 Water Main	\$50,000.00	\$30,000.00	\$16,610.27	\$33,389.73
6" C900 Water Main	\$34,500.00	\$20,700.00	\$11,461.09	\$23,038.91
Water Main Bedding Material	\$141,800.00	\$0.00	\$0.00	\$141,800.00
16" MJ Gate Valve w/Box	\$127,500.00	\$76,500.00	\$42,356.20	\$85,143.80
12" MJ Gate Valve w/Box	\$15,000.00	\$9,000.00	\$4,983.08	\$10,016.92
10" MJ Gate Valve w/Box	\$1,800.00	\$1,080.00	\$597.97	\$1,202.03
8" MJ Gate Valve w/Box	\$1,300.00	\$780.00	\$431.87	\$868.13
6" MJ Gate Valve w/Box	\$40,850.00	\$24,510.00	\$13,570.59	\$27,279.41
8" MJ Fitting	\$2,400.00	\$1,440.00	\$797.29	\$1,602.71
10" MJ Fitting	\$500.00	\$300.00	\$166.10	\$333.90
12" MJ Fitting	\$5,250.00	\$3,150.00	\$1,744.08	\$3,505.92
16" MJ Fitting	\$63,000.00	\$37,800.00	\$20,928.94	\$42,071.06
16" MJ Restraints	\$60,000.00	\$36,000.00	\$19,932.33	\$40,067.67
12" MJ Restraints	\$4,125.00	\$2,475.00	\$1,370.35	\$2,754.65
10" MJ Restraints	\$550.00	\$330.00	\$182.71	\$367.29
8" MJ Restraints	\$2,000.00	\$1,200.00	\$664.41	\$1,335.59
6" MJ Restraints	\$9,675.00	\$5,805.00	\$3,214.09	\$6,460.91
Fire Hydrant	\$120,400.00	\$72,240.00	\$39,997.54	\$80,402.46
Cut & Tie to Existing Watermain	\$35,250.00	\$0.00	\$0.00	\$35,250.00
12" x 1" Tapping Saddle	\$2,450.00	\$1,470.00	\$813.90	\$1,636.10
16" x 1" Tapping Saddle	\$2,375.00	\$1,425.00	\$788.99	\$1,586.01
1" Corporation Stop	\$1,500.00	\$900.00	\$498.31	\$1,001.69
1" PE Service Line	\$7,200.00	\$4,320.00	\$2,391.88	\$4,808.12
Bore Service Line	\$2,000.00	\$0.00	\$0.00	\$2,000.00
1" Curb Stop w/Box	\$3,600.00	\$2,160.00	\$1,195.94	\$2,404.06
Erosion Control	\$20,000.00	\$0.00	\$0.00	\$20,000.00
Traffic Control	\$20,000.00	\$0.00	\$0.00	\$20,000.00
Remaining Capital Costs	\$1,413,000.00	\$0.00	\$0.00	\$1,413,000.00
Total Construction Cost	\$5,451,385.00	\$1,865,325.00	\$1,032,785.23	\$4,418,599.77
Annual Operation and Maintenance Cost				
Description	Annual Cost			Net Present Worth
Equipment	\$1,000.00			\$14,877.47
Supplies	\$750.00			\$11,158.11
Utilities	\$0.00			\$0.00
Labor	\$2,000.00			\$29,754.95
Total Annual Cost	\$3,750.00			\$55,790.53
			Total Net Present Worth	\$4,474,390.30
			EUAC	\$300,749.31

DISTRIBUTION ALTERNATIVE 4: FUTURE LOOPS

Distribution System Alternative 4 is a master plan for future loops that follow the design standards. These future loops cover the future growth areas that SECOG identified. The loop lines are shown for schematic purposes and can be adjusted when the developments are constructed. Larger lines are needed to provide higher fire flows and reduce head loss as the City grows. It also allows future high end users to develop in these areas. Cost estimates have not been provided for this alternative because it is possible that developers will install these mains and the City will reimburse the developer for the upsizing. The proposed pressures and fire flows are shown in conjunction with the proposed future tanks. There are two areas to the southwest and northeast that are below the recommended minimum of 40 psi. The City should be cognoscente of these low pressure areas as they develop and plan accordingly. It is assumed that the tanks will be in operation before these areas develop. The locations of the future loops are shown on the following page.

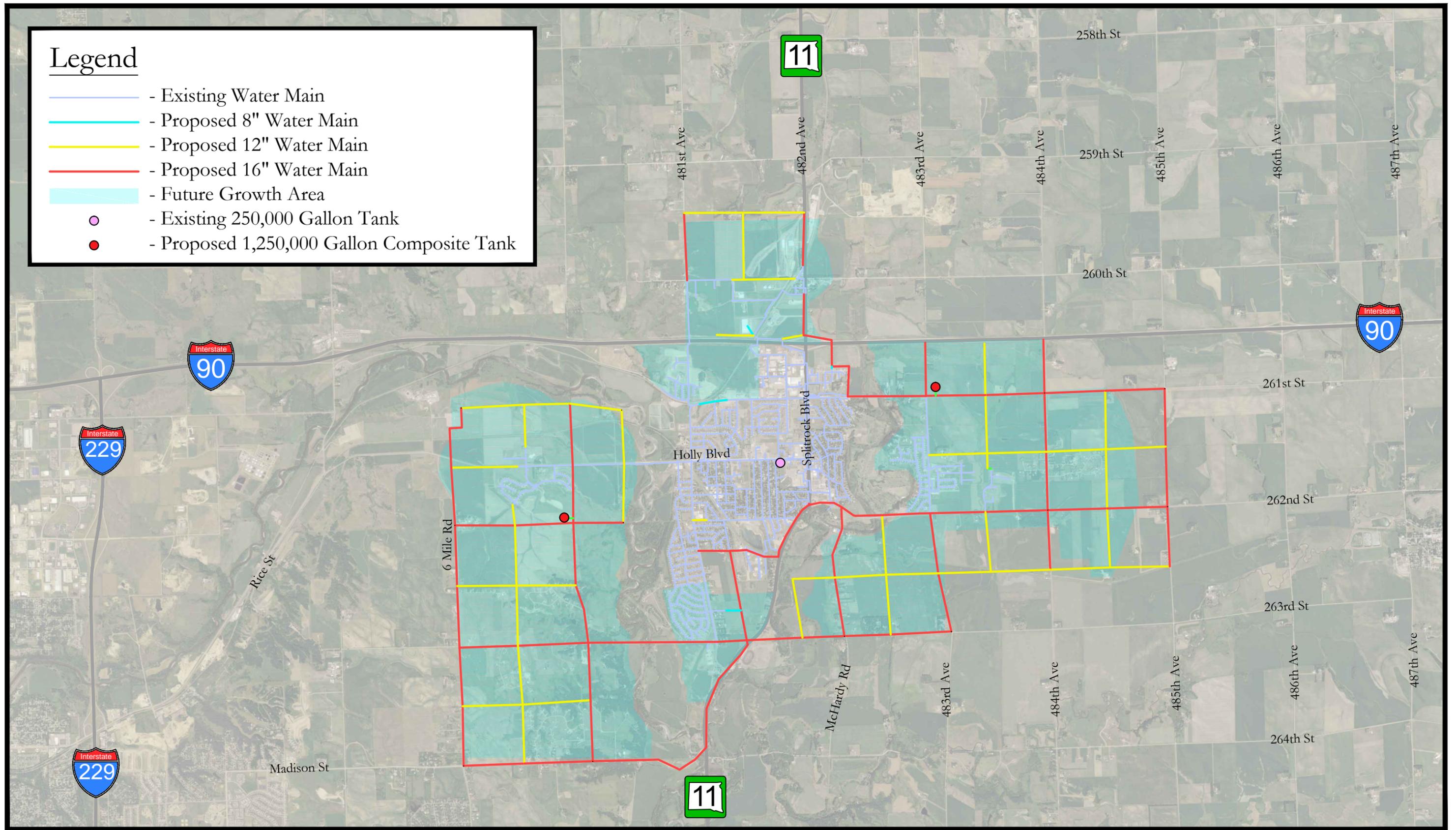
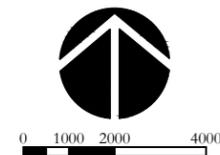


Figure 25 | Distribution Alternative 4



Legend

- - Existing Water Main
- - Proposed Water Main
- - Existing 250,000 Gallon Tank
- - Proposed 1,250,000 Gallon Composite Tank

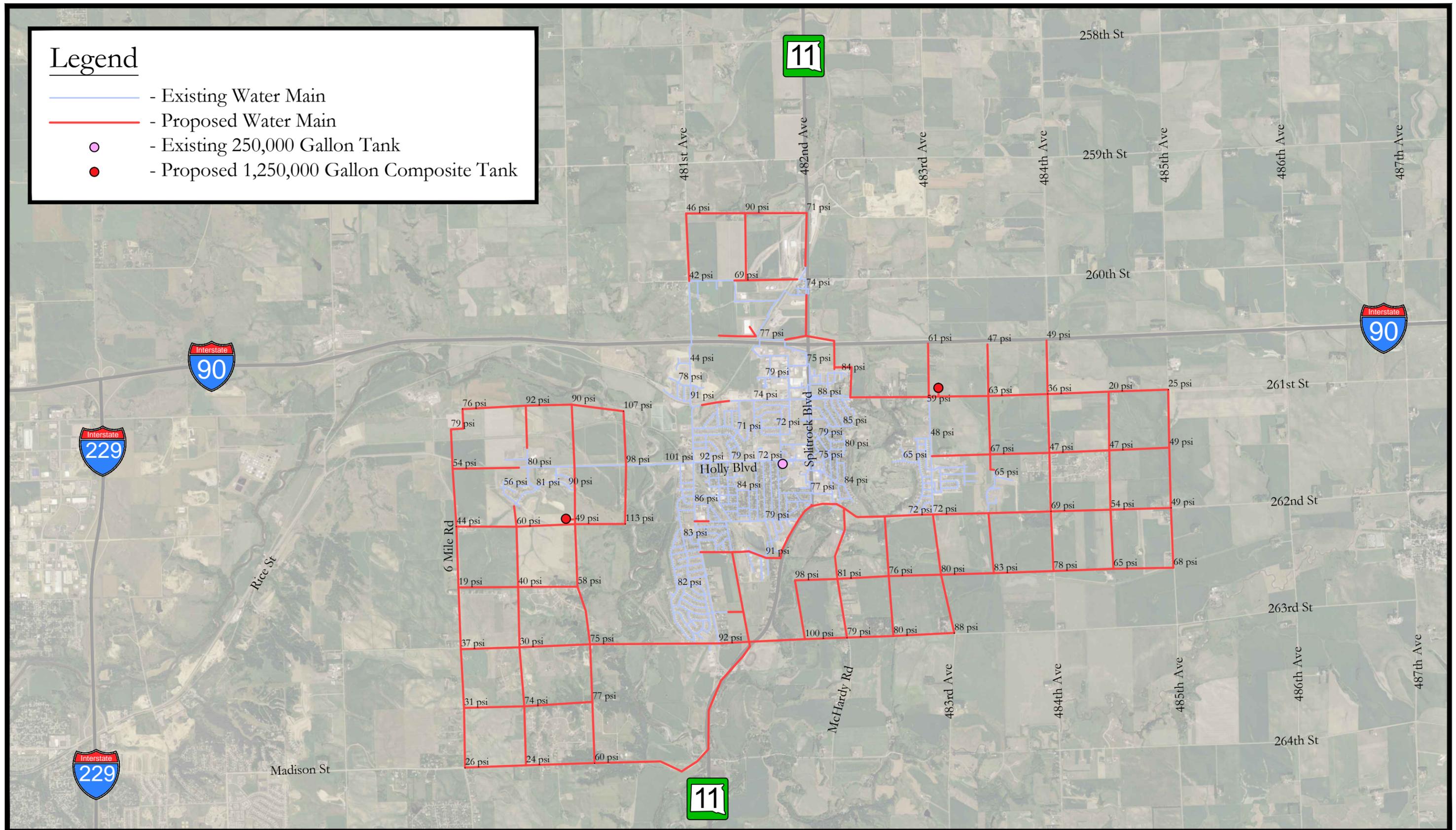
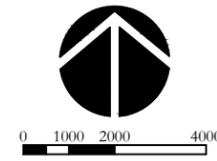


Figure 26 | Distribution Alternative 4 & Storage Alternate 2 Pressure Analysis



Legend

- - Existing Water Main
- - Proposed Water Main
- - Existing 250,000 Gallon Tank
- - Proposed 1,250,000 Gallon Composite Tank

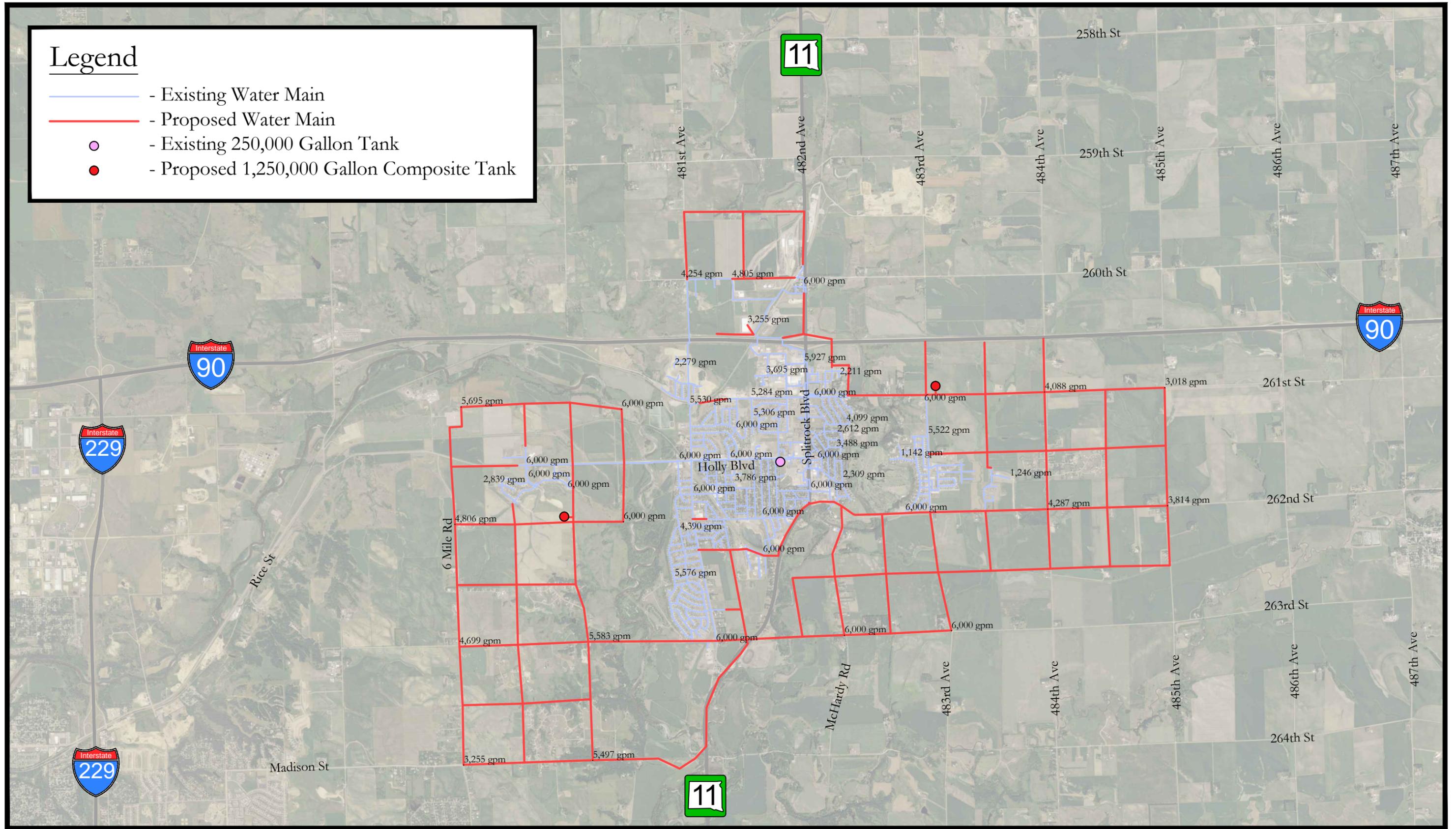
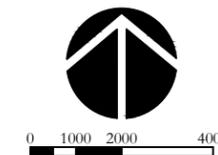


Figure 27 | Distribution Alternative 4 & Storage Alternate 2 Fire Flow Analysis



IMPLEMENTATION OF ALTERNATIVES

WATER SOURCE

Source Alternative 1 "Do Nothing" is not recommended because it will not provide adequate water supply for the City.

Source Alternative 2 "New Wells" is recommended because the City needs additional well capacity and the trigger has been met because the peak day demand cannot be supplied. This alternative should be implemented immediately because the City's water supply is in a state of emergency.

WATER TREATMENT

Treatment Alternative 1 "Do Nothing" is recommended at this time. The existing water treatment plant is meeting the City's current demand.

Treatment Alternative 2 "New Water Treatment Plant" is not recommended at this time. The City should monitor their demand in the summer. The City should implement this alternative once the summer usage approaches 80% of the current plant capacity or 2,304,000 gpd on a regular basis. The process of building a water treatment plant will take at least two years and this will give the City time before the maximum capacity of the plant is exceeded. The City can also implement watering restrictions to keep the summer usage down while the new plant is under construction. The addition of the second water treatment plant will provide the City enough treated water to meet the peak day demand.

WATER STORAGE

Storage Alternative 1 "Do Nothing" is not recommended because it will not provide adequate water storage.

Storage Alternative 2 "New Water Towers" is recommended because the City needs additional water storage. The calculations show the need for additional storage and therefore the trigger has been met. The new water towers will provide adequate storage and will help offset the demand during the day. They will also increase the pressure and fire flows throughout the system.

WATER DISTRIBUTION

Distribution Alternative 1 "Do Nothing" is not recommended because it will not address any of the problems with the ACP, the low pressure and fire flows and lack of large diameter loop lines.

IMPLEMENTATION OF ALTERNATIVES

Distribution Alternative 2 "Replace ACP" is recommended because the ACP has outlived its useful life expectancy. This alternative will replace all the ACP with PVC pipe. The PVC pipe will reduce the number of breaks, increase pipe capacity and reduce head loss. The City has already started to rehabilitate this area as part of the Sylvan Circle improvements. The replacement of the ACP should be incorporated into these plans.

Distribution Alternative 3 "Loop Existing" is recommended. The existing mains are undersized and have increased pressure loss. This alternative will eliminate bottlenecks and provide larger truck mains that are needed. The new PVC pipe will increase pressure and fire flows throughout the system.

Distribution Alternative 4 "Future Loops" should be followed as the City expands. Future developer plans should include these loops required by the City Design Standards.

COST RECOVERY

Cost recovery is not included in any of these cost estimates. Development will drive the time and amount of cost recovery that the City receives. There are areas shown in the Future Loops Alternative that the City will be able to assess a cost recovery. It is anticipated that the City will incur these costs and it could take several years before these areas develop.

IMPACT ON THE OWNER'S BUDGET

There are several Alternatives the City needs to implement. Due to budget constraints and priority the following Alternatives should be implemented immediately. The following figure shows the combined recommendation.

Table 16 Recommended Alternatives

Source Alternative 2 "New Wells":	\$3,385,870.00
Distribution Alternative 3 "Loop Existing":	\$5,451,385.00
Storage Alternative 2 "New Water Towers":	\$6,972,365.00
Combined Project Cost	\$15,809,620.00

The City of Brandon provided SEI their water revenue and expenses for the last two years. SEI evaluated the budget and the cost of the recommended alternatives to determine how Brandon could fund the project. Based on Brandon's current revenue and expenses, they will have to obtain grant and loan dollars from various funding agencies to finance the project. The loan is based on an

IMPLEMENTATION OF ALTERNATIVES

interest rate of 3.0% over 20 years. The owner's water fees will be used to make the loan payments. The current monthly water rate is a minimum of \$7.21 plus \$4.22 per thousand. The monthly bill for a 5,000 gallon user is \$28.31. The proposed pressure, proposed fire flow and EPS for the combined alternative is shown in the following figures.

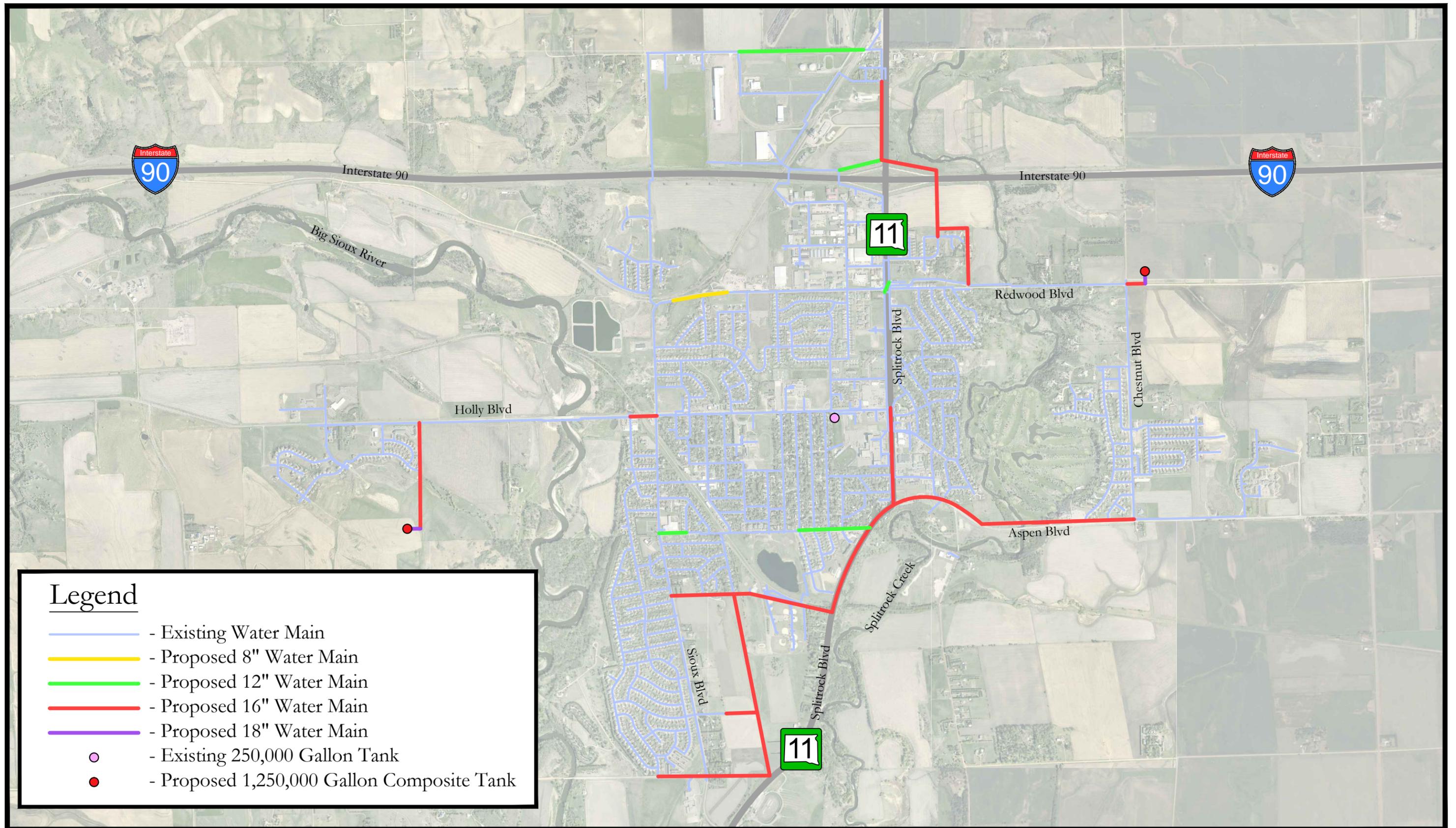
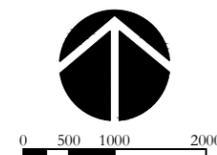
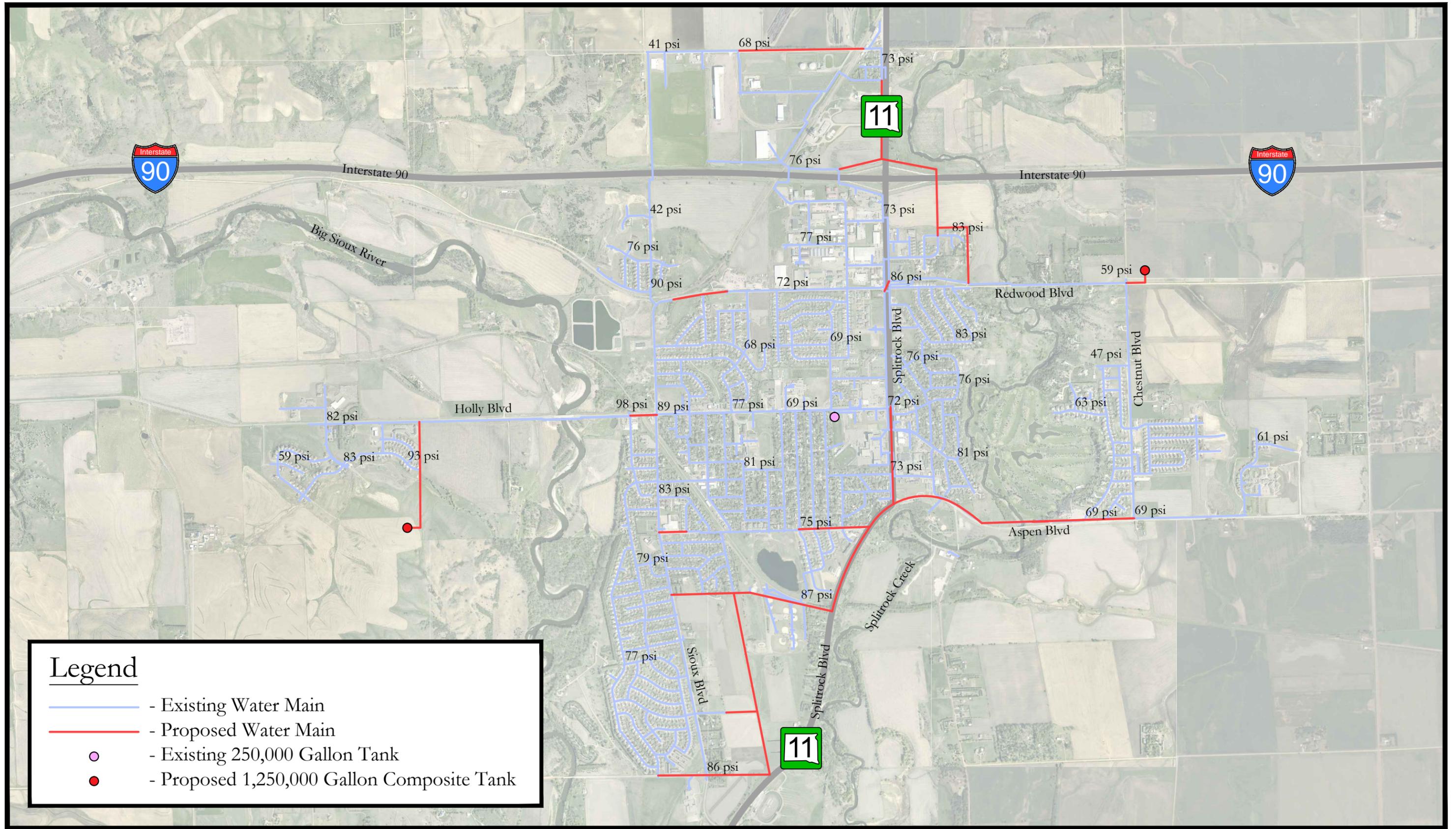


Figure 28 | Combined Alternatives

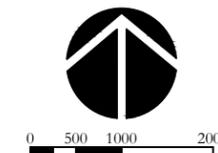




Legend

- - Existing Water Main
- - Proposed Water Main
- - Existing 250,000 Gallon Tank
- - Proposed 1,250,000 Gallon Composite Tank

Figure 29 | Combined Alternatives Pressure Analysis



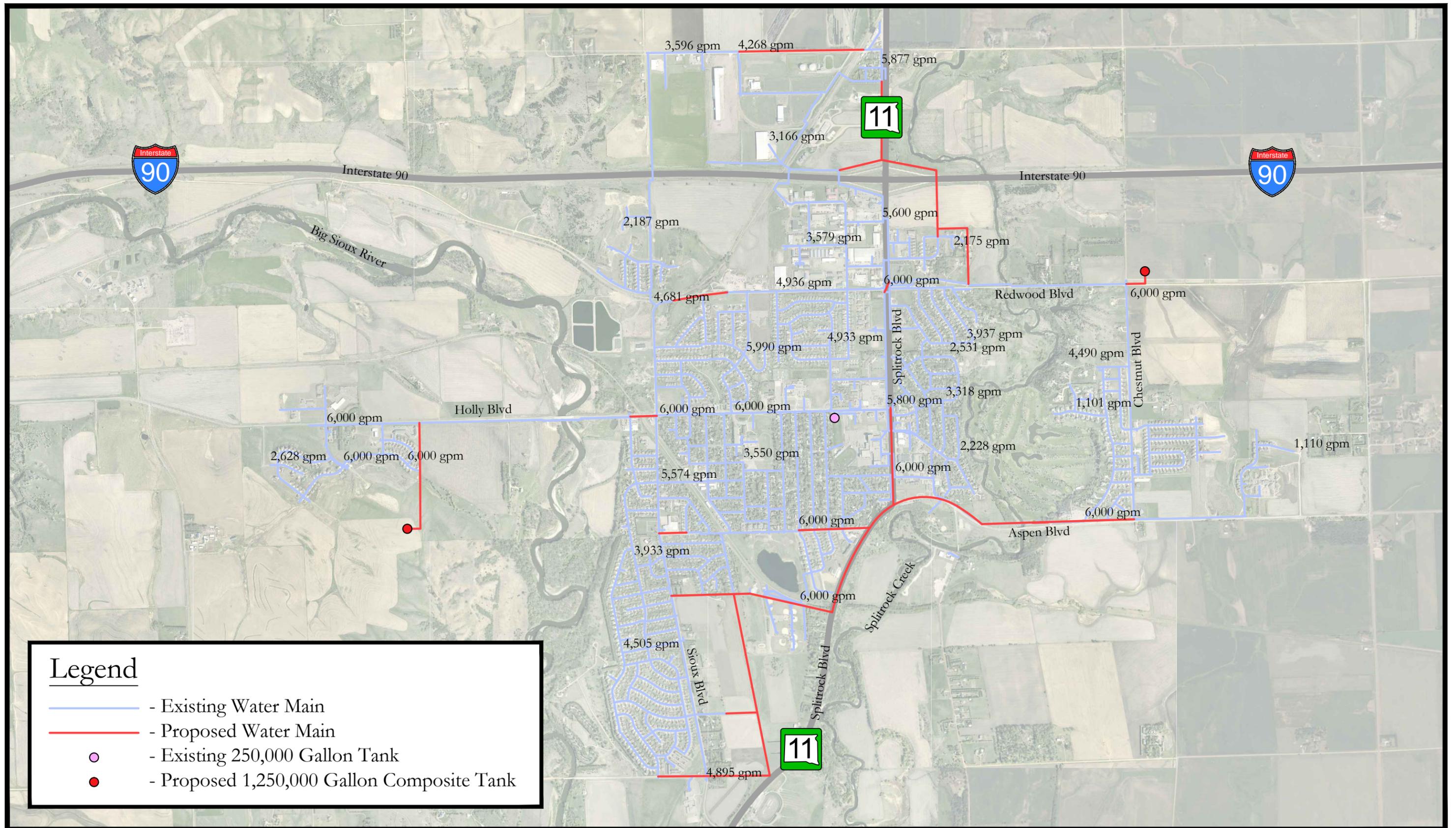
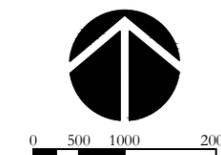


Figure 30 | Combined Alternatives Fire Flow



An EPS was run for the combined alternatives. The figure below shows the two towers draining and filling for a day. The figure shows the two towers fill and drain differently. That is because they are different distances from the water plant and there is more pressure loss in one direction. In addition, the system demand is higher for the east side tank compared to the west side tank. It is anticipated that an altitude control valve will be needed at one of the towers to fully utilize the storage capacity of each tower.

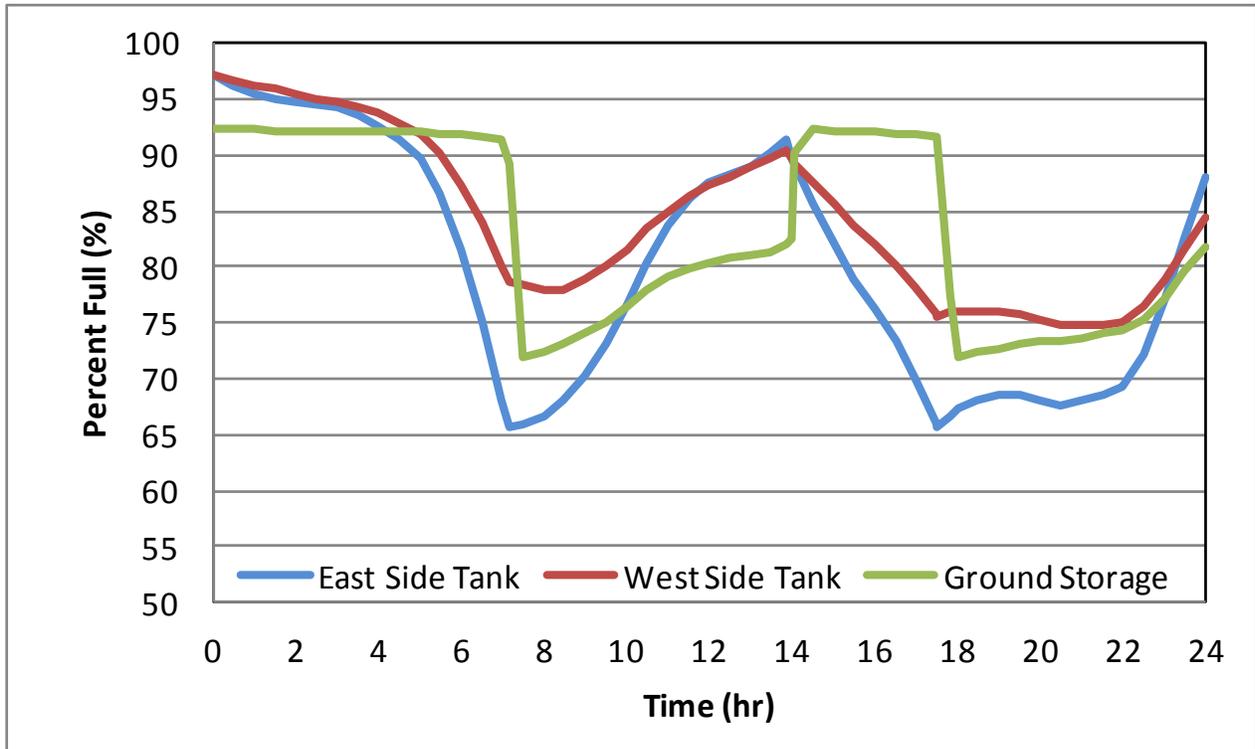


Figure 31 Combined Alternatives EPS

Table 17 Funding Proposed Improvements

Revenue	\$1,690,070.58
Expenses	\$648,468.13
Current Debt Payment	\$254,350.14
Net Cash From Operations	\$787,252.31
New Loan Payment	\$1,062,654.80
Debt Reserves (10%)	\$106,265.48
Net Water Fund Balance	-\$381,667.96
Monthly Rate Increase	\$11.00
Number of Customers	3,056
Annual Revenue Generated	\$403,392.00
Water Fund Balance After Increase	\$21,724.04

The above table shows that Brandon would have to increase their water rates to fund the project. The City will try to obtain grant dollars to reduce the loan amount. In order to be eligible for grant dollars the DENR has required a minimum monthly water rate of \$25 for 5,000 gallons. Brandon currently meets this requirement. The City should also consider raising their rates annually by 3%. This will keep up with the cost of inflation and reduce a bigger jump in rates to complete any future projects.

The potential project grant/loan percentages and how those amounts affect user rates are shown in the following table.

Table 18 Potential Grant/Loan Amounts

Grant/Loan	40/60	30/70	20/80	10/90	0/100
Expenses	\$648,468	\$648,468	\$648,468	\$648,468	\$648,468
Current Debt	\$254,350	\$254,350	\$254,350	\$254,350	\$254,350
Project Cost	\$15,809,620	\$15,809,620	\$15,809,620	\$15,809,620	\$15,809,620
Grant Amount	\$6,323,848	\$4,742,886	\$3,161,924	\$1,580,962	\$0
Loan Amount	\$9,485,772	\$11,066,734	\$12,647,696	\$14,228,658	\$15,809,620
Annual Loan Payment	\$637,593	\$743,858	\$850,124	\$956,389	\$1,062,655
Debt Reserves	\$63,759	\$74,386	\$85,012	\$95,639	\$106,265
Total Annual Cost	\$1,604,170	\$1,721,062	\$1,837,954	\$1,954,847	\$2,071,739
Revenue	\$1,690,071	\$1,690,071	\$1,690,071	\$1,690,071	\$1,690,071
Balance After Project	\$85,900	-\$30,992	-\$147,884	-\$264,776	-\$381,668
Minimum Rate Increase	\$0.00	\$0.85	\$4.03	\$7.22	\$10.41
Current Rate (5,000 gal)	\$28.31	\$28.31	\$28.31	\$28.31	\$28.31
Proposed Monthly Rate	\$28.31	\$29.16	\$32.34	\$35.53	\$38.72

SEI has completed rate analysis for the City of Brandon over the last several years. It is recommended that the City include the proposed improvements in the next rate analysis to verify the potential rate increases. The above calculations are very cursory and do not include any increase in customers or retirement of debt. The rate analysis is more in depth and will give a more accurate depiction of the impact on rates.

ENVIRONMENTAL EVALUATION

Funding agencies will require an environmental review to be completed for the proposed improvements before funding can be obtained. SEI will request comments on the proposed improvements prior to construction from various agencies. These comments will be provided to the funding agencies.

VIEWS OF THE PUBLIC AND CONCERNED INTEREST GROUPS

The City of Brandon will hold a public hearing to discuss the proposed improvements with residents that are affected by the project. Brandon will work with SEI to schedule this meeting and keep minutes of the meeting. These minutes will be provided to the funding agencies.

SELECTED PLAN, DESCRIPTION AND IMPLEMENTATION ARRANGEMENTS

SELECTED PLAN, DESCRIPTION AND IMPLEMENTATION ARRANGEMENTS

JUSTIFICATION AND DESCRIPTION OF SELECTED PLAN

This Comprehensive Study identified several deficiencies with the water system that do not meet current SD Design Criteria Standards. The recommended alternatives will bring the system into compliance and provide an improved system to adequately handle growth.

DESIGN OF SELECTED PLAN

The alternatives will be designed by the City of Brandon's engineer. All construction plans and specifications will be reviewed and approved by the SD DENR. All state bid laws will be followed for the bidding process.

LAND ACQUISITION

Land acquisition, temporary construction easements and permanent easements will be necessary for the proposed improvements. Land acquisition costs have been included in the estimates. All easements will be obtained before construction is started.

IMPLEMENTATION SCHEDULE

The City should implement the recommended improvements as soon as possible. Funding applications should be submitted for the first round of DENR funding in 2014. Construction would take place in 2015 if DENR funding is involved. The well improvements need to be constructed in 2014.

REFERENCES

Health Research Inc., (2012). *Recommended Standards for Water Works*, Albany, New York

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

Ned, Hwang, Robert Houghtalen., (1996). *Fundamentals of Hydraulic Engineering Systems*, (Upper Saddle River, NJ: Prentice-Hall, Inc.), pp.

National Weather Service Forecast Office, Sioux Falls, SD, 3 June 2013

<http://www.nws.noaa.gov/climate/index.php?wfo=fsd>.

South Dakota Department of Environment and Natural Resources, (July 1979). *Criteria for Design of Public Water Supply Facilities in South Dakota*, Albany, New York

South Eastern Council of Governments, (2007). *Brandon Comprehensive Plan*, Brandon, South Dakota

Appendix A
Drinking Water System Evaluation

SURVEYS

2010

Brandon

Building a Better Future

CITY OF BRANDON

301 Main Avenue
P.O. Box 95
Brandon, SD 57005
Telephone (605) 582-6515
FAX (605) 582-6831

Randy Hilding,

This letter is being sent to inform you of the repairs made to our wells. The repair list came from the recent evaluation of our water system. The electrical conduits at Wells # 2 & 5 have been replaced with new ones & we also installed some new plugs & bolts where they were needed. We have also installed some containment at the # 3 Well. Thank you for your recommendations.

06-17-2010

Rollie Hoeke
Director of Public Works
Brandon, SD 57005
605-582-2273 office
605 582 7103 fax



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
denr.sd.gov

May 13, 2010

LARRY BEESLEY
MAYOR OF BRANDON
PO BOX 95
BRANDON SD 57005

Re: Brandon Public Water System On-Site Evaluation (EPA ID # 0048)

Mayor Beesley:

The Department of Environment and Natural Resources (DENR) performed an on-site evaluation of your drinking water system on April 20, 2010. Based on the information obtained during that evaluation, the following **significant deficiency** has been identified in the Brandon water system:

1. The seals on Well #6 and Well #2 are not intact and can allow contamination to enter the wells. In particular, the electrical conduits leading into Well #6 and Well #2 are split and no longer provide a protective seal for the wells.

The identification of any significant deficiencies requires the following actions:

- **Within 30 days** of this notification, you must contact DENR to discuss possible remedies to the deficiencies.
- **Within 120 days** of this notification, you must either complete the corrective action necessary to remedy the deficiency and notify DENR in writing of this fact or be on an approved corrective action plan.

Failure to meet these requirements will result in a violation and may subject your system to a fine and other monetary penalties in addition to coming under an administrative order to correct the deficiency.

Requirements

The following requirements are submitted in an effort to bring the Brandon water system into compliance with current state and federal regulations.

1. Your system may need a discharge permit when flushing hydrants, if not discharged to the sanitary sewer, and when you empty/flush out your reservoirs if this water might reach waters of the State. This permit is required since you chlorinate your system on a continuous basis or periodically add chlorine to your reservoir or well and flush the chlorinated water to waste. Contact Anthony Mueske with the Surface Water Quality Program at 605-773-5085 for more information.

Recommendations and Comments

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

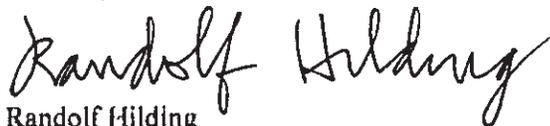
1. So leaks and spills do not cause an accident or damage equipment, secondary containment should be provided for the chemical vessels used to store chemical solutions at Well #3. This could be as simple as setting the chemical vessel inside a larger container.
2. All valves in the system should be inspected as part of a preventive maintenance program. An inspection should include examining the condition of the valve box, operating the valve several times, and lubricating where required. Gate valves should be cycled between the full-open and full-closed position once every two years. Some valves may need less exercise; manufacturers' guidelines should be followed. Valve records should be kept to aid in planning, operation and maintenance, and locating.
3. 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 Rural Water Association at 5009 West 12th Street, Sioux Falls 57106, (605) 336-7219.

Please acknowledge by letter or email that you have received this report and indicate the actions taken in response to the recommendations. The on-site evaluation report is also attached along with lab analysis of a water sample from Well #1 taken during the inspection.

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 (605) 336-7219 or write the South Dakota Rural Water Association at 5009 West 12th Street - Suite 5, Sioux Falls, SD 57106.

If you have questions or comments concerning this on-site evaluation, please call me at (605) 773-3754.

Sincerely,



Randolf Hilding
Drinking Water Program
randy.hilding@state.sd.us

cc: Rollie Hoeke, Acting Public Works Director
Drinking Water Program, Pierre

Enclosures

South Dakota Department of Environment and Natural Resources
Drinking Water Program
Public Water System On-Site Evaluation Report

System Name: Brandon
 Address: PO Box 95
Brandon, SD 57005

EPA ID #: 0048

County: Minnehaha

Person Contacted: Rollie Hoeke and Donovan Carpenter
 Address: 205 East Elm Street
Brandon, SD 57005

Work phone: (605)582-2273
 Home phone: _____
 Cell phone: (605)351-6464
 Fax: _____
 E-mail: rhoeke@cityofbrandon.org

Inspected By: Randy Hilding

Date of Inspection: 4/20/10 (mm/dd/yy)

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

Population: Total Population Served: 8,190 System Population: 8,190

Number of Service Connections: 2,949 Susceptibility to contamination of water source: moderate

Sources of Water: Water data from year: 2009

Own Source(s):	<u>Well #6 Well #1 Well #3</u>	Total produced:	<u>301,612,000</u>	% of total:	<u>100.0%</u>
Bulk Supplier:	_____	Total purchased:	_____	% of total:	<u>0%</u>
Contracted flow rate?:	_____	Total Annual Use:	<u>301,612,000</u>		<u>100.0%</u>

Water Sold to: _____
 (bulk connections only) _____

How much water can this system supply? 1950 (maximum flow rate, gpm)
 What major factor limits system's ability to supply water? _____

- | | | | | | |
|-------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---|
| yes | no | n/a | unk | note | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 Is there an up-to-date map or schematic of system? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2 Is the system capable of meeting demand at all times (excluding fire flow)? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3 Is good housekeeping evident throughout the system? |

Comments: Corson water system to be taken over in summer 2010. Mains and services to be replaced.

Water Usage

yes no n/a unk notr

4 Are all customers metered?

5 If not, what entities are not metered?

6 Total gallons billed: 265616215

7 Calculated water loss: 11.9%

yes no n/a unk notr

8 Peak month and amount used Jul 36337000 gallons

9 Does the system track unaccounted-for water?

Comments:

Water Sources

City of Brandon

EPA ID: 0048

Name	Year Built	Diameter (in)	Depth (ft)	GPM	Status	ID
#1	1971	8	50	180	Emergency	1
#2	1971	8	50	65	Emergency	2
#5	1976	10	52	185	Emergency	3
#4	1980	10	52	190	Emergency	4
#6	1999	18	270	1800	Permanent	10
#3	1964	12	222	725	Emergency	12

Name	Water Right #	Aquifer	Location Description	ID
#1	1804-3	BIG SIOUX AQ.	South of Water Plant (920 Aspen Park Drive)	1
#2	1804-3	BIG SIOUX AQ.	South of Water Plant (920 Aspen Park Drive)	2
#5	4885-3	BIG SIOUX AQ.	South of Water Plant (920 Aspen Park Drive)	3
#4	4885-3	BIG SIOUX AQ.	South of Water Plant (920 Aspen Park Drive)	4
#6	6027-3	SPLIT ROCK CREEK	South of Water Plant (920 Aspen Park Drive)	10
#3	5296-3	SIOUX QUARTZITE	280 S Split Rock (behind Dairy Queen)	12

yes no n/a unk note

- | | | | | | | |
|-------------------------------------|-------------------------------------|--------------------------|--------------------------|-------------------------------------|--|---|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | 1 Has a Source Water Protection Plan been developed?
Date: <u>02-Mar</u> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | 2 Is the wellhead/pumphouse protected from unauthorized personnel? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | 3 Are there any sources of contamination within 1/4 mile? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | | 4 Are pesticides, herbicides, fertilizers applied in the area of the well(s)? |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | 5 Is a pressure gauge provided at each source? |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | 6 Is a sample tap provided for raw water? |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | 7 Can flow be measured from each well? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | 8 Is the well house(s) kept clean, in good repair and not used to store hazardous material? |

Comments: 4. Most wells are in Aspen Park. Chemical application necessary to maintain park.
SIGNIFICANT DEFICIENCY: Electrical conduits into Well #6 and Well #2 are both split
and can allow contamination to enter the well.

Water Treatment

City of Brandon

EPA ID: 0048

General Items

- | yes | no | n/a | unk | note | |
|-------------------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|--|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 Is there continuous online water quality measurements taken?
If so, what? (pH, turbidity, chlorine, etc.)
<u>Free chlorine residual leaving plant with Cl-17 Chlorine Analyzer</u> |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2 Can the treatment process be interrupted by power outages? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3 Is backup electrical power available? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4 Are treatment units designed to be taken out of service without interruption to operations? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 Is routine maintenance and good housekeeping evident? |

Chlorination

- | yes | no | n/a | unk | note | |
|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|-------------------------------------|---|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 Is continuous disinfection provided? |
| | | | | | 2 Type of chemical used: <u>gas</u> |
| <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3 Is there an anti-siphon valve on the feed pump? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4 Is there adequate spill containment? |
| | | | | | 5 Gas chlorination features: |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 Separate room? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 7 Positive mechanical ventilation? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 8 Restraints for all cylinders? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 9 Self-contained air pack present? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 10 Scale present? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 11 Observation window? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 12 Automatic leak detectors? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 13 Chlorine safety plan? |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 14 Other chemicals stored in room? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 15 Is ammonia used to form chloramines? |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 16 Is an alternate method of disinfection used? |

Describe: _____

Comments: 9. No air pack at Well #3 wellhouse with chlorine room.
12. No automatic detector at Well #3, just ammonia.
15. Natural ammonia in water has potential to form chloramine. Breakpoint chlorination is practiced to burn away chloramines.

Aeration

yes no n/a unk note

- 1 Is aeration provided?
2 What type of aeration is provided? induced draft

Comments: Detention tank follows aeration.
Chlorine and potassium permanganate added following aeration and before
detention tank. Detention tank inspected annually.

Filtration

yes no n/a unk note

- 1 Is filtration provided?
2 What type: Four-cell gravity. Greensand and anthracite.
3 Do records indicate that adequate filtration is being done?
4 Filtration area: 672 sq ft @ 2.98 gpm/sq ft
5 Maximum flow rate: 2000 gpm
6 Backwash frequency: 1-2 cells a day
7 How determined? 20-hour run time per cell or head loss

Comments: Filtered water is chlorinated prior to storage at water plant
Backwash reclaim water returned post-aeration. Backwash solids pumped
to sanitary sewer.

Fluoridation

yes no n/a unk note

- 1 Is fluoridation provided?
2 Type of chemical used? hydrofluosilic acid
3 Is there an anti-siphon valve on the feed pump?
4 Is there adequate spill containment?
5 Do records indicate consistent, acceptable levels are maintained?

Comments: _____

Stabilization (pH adjustment, corrosion control, softening, etc.)

yes no n/a unk note

- 1 Does the water require stabilization?
2 Are pH and alkalinity adjusted? (via soda ash, lime, caustic soda, carbon dioxide, sulfuric acid, etc.) How? _____
3 Is the water softened as part of this treatment process? Describe: _____
4 Are corrosion inhibitors or sequestering agents used? Describe: C-9 zinc orthophosphate (corrosion) and C-5 polyphosphate (sequestering)
5 Are polymers used for something other than described previously? Aquahawk 957 added to waste backwash water as coagulant.

Comments: _____

Distribution System

City of Brandon

EPA ID: 0048

Main sizes and types: Mostly 6-in, 8-in, and 10-in PVC. Some 12-in and 16-in PVC. Some 4-in and 6-in AC transite.

- | yes | no | n/a | unk | note | |
|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|-------------------------------------|---|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 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? <u>55-75</u> psi |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3 Are there areas with chronic low pressure problems? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4 Is an adequate map (shows valve locations, line sizes, etc) of the distribution system maintained? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 Is there a main flushing program? If yes, how often? <u>annual</u> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 6 Are all dead-end water mains equipped with a means to flush? |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 7 Any plans to eliminate dead-ends (via looping of mains, etc.)? |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 8 Are valves exercised regularly? If yes, how often? _____ |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 9 Are there fire hydrants on mains less than 6 inches in diameter? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 10 Does the system disinfect after pipe repairs or new pipe installation? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 11 Is the location and nature of each repair documented? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 12 Does the system utilize a conservation program at any time? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 13 Is the system adequately protected from freezing? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 14 Are water and sewer mains separated by a horizontal distance of 10 feet or greater? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 15 Is there a cross connection control program? |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 16 Are audits conducted to check for cross connections in the system? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 17 Are backflow preventers installed on all consumer connections? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 18 Is the bulk water loading station designed with back flow prevention and appropriate air gap device to prevent contamination? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 19 Does the system contain any pressure reducing valves? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 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? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 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?
<u>7 times a month</u> |

Comments (please indicate the question number): 6. Most dead ends are cul-de-sacs.

8. City has valve exerciser. 12. Voluntary odd/even conservation program.

19. Distribution system has 4 pressure zones and 3 booster stations.

Facilities Equipment

City of Brandon

EPA ID: 0048

yes	no	n/a	unk	note	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1 Are any pumps used in the system? If so, describe: <u>3 100 HP high service pumps in water plant - one has VFD. 3 booster stations with 3 25 HP high service pumps each - all with VFD. Submersible pumps in wells.</u> <u>2 backwash recycle pumps and one backwash solids pump</u>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2 Are backup pumps available?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3 Is any equipment located in a pit?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4 Do you have contacts with contractors and equipment vendors to assure prompt service and spare parts availability?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5 Do you use a qualified pump contractor to inspect pump equipment?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6 Is food grade lubrication used in all water facilities equipment?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7 Is backup power available in the event of a power loss?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	8 Is equipment protected from unauthorized entry or vandalism?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	9 Are the facilities and equipment subject to weather related problems?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 Is there a floor drain? Where does it drain to? <u>sanitary sewer</u>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	11 Is there adequate spill containment in chemical room?

Comments (please indicate the question number): _____

Distribution system has 4 pressure zones.

11. Secondary containment needed for C-5 and caustic soda at Well #3.

Monitoring/Reporting - Entry Point

City of Brandon

EPA ID: 0048

SAMPLING

Entry point: Treat Plt - Well #6 Only

	Chemical	Sampling Frequency	Waivers	Taken Last	Due Next	Notes
1	Inorganic Chemicals					
	A. Antimony	Every nine years	Yes	Dec-02		
	B. Arsenic	Every nine years	Yes	Nov-05		
	C. Barium	Every nine years	Yes	Dec-02		
	D. Beryllium	Every nine years	Yes	Dec-02		
	E. Cadmium	Every nine years	Yes	Dec-02		
	F. Chromium	Every nine years	Yes	Dec-02		
	G. Cyanide		Yes			State-wide waiver
	H. Fluoride		No			This system fluoridates
	I. Mercury	Every nine years	Yes	Dec-02		
	J. Nickel	Every nine years	Yes	Dec-02		
	K. Selenium	Every nine years	Yes	Dec-02		
	L. Thallium	Every nine years	Yes	Dec-02		
2	Radiological Chemicals	Triennially	N/A			
3	VOC Chemicals	Every six years	Yes	Nov-05		Groundwater Waiver
4	SOC Chemicals					
	A. Method 515.1	Not Required	Yes			
	B. Method 524	Not Required	Yes			
	C. Method 525	Not Required	Yes			
	D. Method 531.1	Not Required	Yes			
	E. Method 547	Not Required	Yes			
	F. Method 548	Not Required	Yes			
	G. Method 549	Not Required	Yes			
5	Nitrate	Annually	N/A	Aug-09		
6	Nitrite	Triennially	N/A	Aug-09		

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

Monitoring/Reporting - Distribution

City of Brandon

EPA ID: 0048

yes no n/a unk note

- 1 Are the following sampling site plans up to date?
- Bacteriological
 - Lead and copper
 - 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: Hach DR500 for most analyses.

HQ40D for pH. Hach Digital Titrator for hardness and alkalinity.

Hach DR850 for distribution system testing.

yes no n/a unk note

- 5 Are up to date reagents present?

Tests and frequency performed by operator: _____

Daily = chlorine residuals, pH, iron, and manganese. Bi-weekly = alkalinity and phosphate. Occasionally = hardness, ammonia, and copper.

Survey test results: _____

Bacteriological Monitoring

Bacteriological sampling and analysis: April 1, 2009 to April 1, 2010

- A Samples submitted: 108
- B Samples required: Nine Samples Each Month.
- C Survey samples: 0
- D Safe samples: 108
- 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 19, 2008
- B Samples required: 20
- C Sampling Frequency: Triennially
- D Date Due Next: 2011
- E Lead - 90% Level: 1.3 Action Level - 15 ug/l
- F Copper 90% Level: 0.72 Action Level - 1.3 mg/l

Disinfectant Residual Monitoring

Residual sampling and analysis: 04/01/09 to 04/01/10

- A Samples taken: 111
- B Samples required: 108 (same as TCR)
- C Residual measured: Free chlorine: 0.47 mg/L
Chloramines: _____ mg/L
- D RAA Residual: 0.47 mg/L

Comments: _____

Managerial Capacity

City of Brandon

EPA ID: 0048

Certification Level of Water System: Distribution: II Treatment: II

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 | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 Does the water system have a governing body? <u>council</u> |
| | | | | | (city council, housing association, district, etc.) |
| | | | | | 2 How often does the governing body meet to review water system data? |
| | | | | | <u>semi-monthly</u> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3 Are all personnel that make water quality and quantity decisions certified? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 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
Donovan Carpenter (1611)	II	II	II	I			
Jimmie Fjerestad (1961)	I	II		II			
Rollie Hoeke (719)	II	III	II	III			
Dale Kerber (2656)		II		II			
Brad Top							
Cory Carlson							

- | | | | | | |
|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|--|
| yes | no | n/a | unk | note | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5 Do you feel you have received adequate training? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6 Is the number of people adequate to operate the water system? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 7 Do you maintain records to document compliance (up to 10 years)? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 8 Does the system have a written Emergency Response Plan? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 9 Does the system have operations and/or maintenance manuals? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 10 Do you know what to do in the event of a violation? |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 11 Have there been any MCL violations or compliance orders for the system in the last 12 months? |
| <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 12 If so, is there a compliance plan? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 13 Is someone responsible for emergency operations, communications and customer relations? Who? <u>Rollie Hoeke</u> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 14 Are routine operation and maintenance records kept? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 15 Is the system aware of all required sampling for the year? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 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? PWD Wayne Fletcher retired. Rolie Hoeke is acting PWD.
- 23 Have the recommendations from the previous survey been addressed?

Comments (please indicate the question number): _____

Financial Capacity

City of Brandon

EPA ID: 0048

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

Comments (please indicate the question number): _____

10. \$7.00 minimum includes 2000 gal. 2001-6000 gal @ \$2.60/1000 gal.

6001 gal and above = \$3.10/1000 gal.

Violations

City of Brandon

EPA ID: 0048

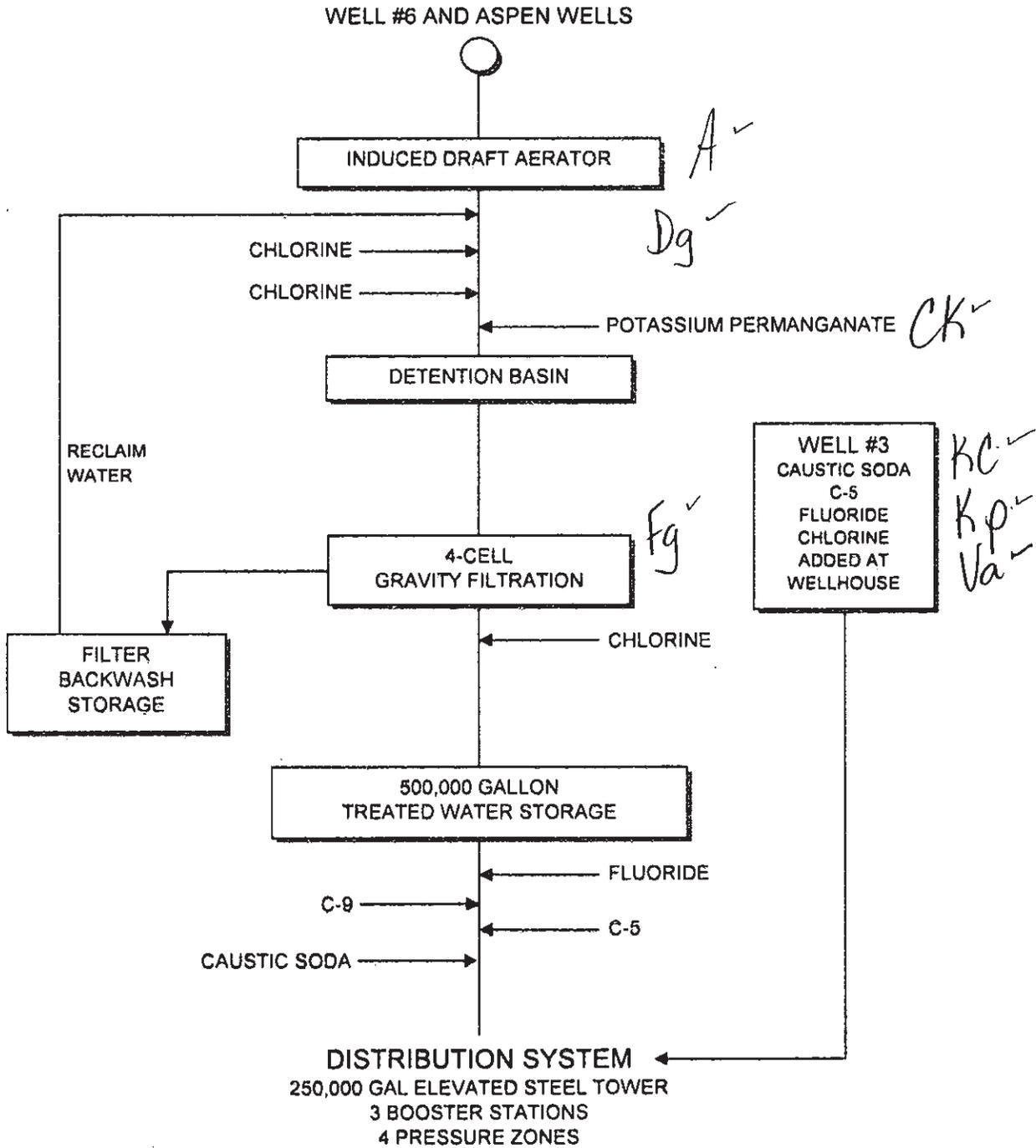
Violations From April 1, 2007 To April 1, 2010

Violation Type	Parameter	Date	Duration (Months)
No Violations			

Drawing/Flow Schematic

City of Brandon

EPA ID: 0048





DIVISION OF ADMINISTRATION
Public Health Laboratory

615 East Fourth Street
Pierre, South Dakota 57501-1700
605/773-3368 FAX: 605/773-6129
www.state.sd.us/doh/lab/index.htm

* Page 1 of 2*
Date: 5/3/2010

Submitter copy to:

DENR-ODW/PWSS-5112
FOSS BUILDING
523 E CAPITOL
PIERRE, SD 57501

Spec #: E10EC001836
Subm #:
Lab: ENV CHEMISTRY
Tel #: (605) 773-3368

Source
BRANDON/CITY WATER

Date Rcvd: 4/21/2010
Time Rcvd: 0945
Date Coll: 4/20/2010
Time Coll: 1530
Spec Type: WATER
Coll By: R HILDING
Site Location: WELL #1

Source Name WELL #1
Source Sampled: WELL
Source: WELL
Tap Location: WELL #1
Type of Sample: RAW
medium water

OR

Final Results

Table with 3 columns: Parameter, Value, and Limit. Includes items like Nitrate (5.8 mg/L), Fluoride (0.24 mg/L), Chloride (57 mg/L), Iron, Total (<0.03 mg/L), Manganese (<0.02 mg/L), Sulfate (39.8 mg/L), SOLIDS, TOTAL DISS. Standard Method 2540C (441 mg/L), PH (7.57 pH UNITS), EPA Method 150.1 Alkalinity-M (267 mg/L), Alkalinity-P (0 mg/L), Bicarbonate (326 mg/L), Carbonate (0 mg/L), Conductivity (780 umho/cm), Calcium (93.9 mg/L), Magnesium (27.4 mg/L), SM3111B Hardness (calc) (347 mg/L), Langlier Index (0.43), Sodium (24.4 mg/L), Potassium (3.3 mg/L), Nitrite (<0.02 mg/L).

(continued)



**DIVISION OF
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Submitter copy to:

* Page 2 of 2*
Date: 5/3/2010

DENR-ODW/PWSS-5112
FOSS BUILDING
523 E CAPITOL
PIERRE, SD 57501

Spec #: E10EC001836
Subm #:
Lab: ENV CHEMISTRY
Tel #: (605)773-3368

Source
BRANDON/CITY WATER

Ammonia
EPA Method 350.2/350.3

<0.05 mg/L

Specimen Comments:
%error = 0.8/3.9

SIGNIFICANT DEFICIENCIES UNDER THE GROUNDWATER RULE

The Groundwater Rule (GWR) came into effect on December 1, 2009. This rule applies to any water system with its own groundwater (GW) sources and any system served by another ground water system such as a rural water system. **(It does NOT apply to surface water systems and their consecutive systems.)**

A major feature of the GWR requires water systems to correct **significant deficiencies** in a timely manner following notification by the Department of Environment and Natural Resources (DENR).

Significant deficiencies include, but are not limited to, defects in design, operation, or maintenance, or a failure or malfunction of the sources, treatment, storage, or distribution system that the State determines to be causing, or have potential for causing, the introduction of contamination into the water delivered to consumers.

After a deficiency is identified, the following actions must take place:

- DENR must notify the water system in writing within 30 days of the determination of the deficiency
- The water system must consult with DENR within 30 days of the notification as to possible remedies
- Within 120 days of the notification, the deficiency must be corrected or an enforceable timetable be in place for its correction

Failure to consult within 30 days or correct within 120 days or to have a timetable in place within the 120 days or failure to follow the timetable are violations of the Safe Drinking Water Act.

To allow systems to correct these deficiencies before a mandated schedule is necessary, DENR is providing notification of the specific significant deficiencies that are pertinent to all GW systems. Other deficiencies not described below may be determined by DENR to be significant on a case-by-case basis. Also note that deficiencies can be determined at any time-not only during inspections. **The specific significant deficiencies pertinent to all groundwater systems are-**

- **Source-Well casing** is improperly sealed. (This could include an unscreened vent, vent opening that faces upward, unsealed openings for the electrical conduit or drawdown air tube, etc.).
- **Treatment System**-The water system is not in compliance with applicable 4-log microbiological treatment technique that has been specifically required for your system under the GWR. NOTE: **At this time**, no system in South Dakota has been required to treat to a 4-log level under the GWR and this deficiency does not apply to any system now. There are two systems that have chosen to treat to a 4 log inactivation level.
- **Distribution System**-Repeated/frequent violations or sample detections of fecal indicators in your monthly micro sampling under the Total Coliform Rule (TCR) to the point where a system is considered a Pre-Significant Non-Complier (PSNC) under the TCR. See NOTE for criteria for PSNC.

- **Finished Storage/Reservoir**-Lack of a screen on any vents or overflows to prevent the entrance of birds, insects, other contamination sources, etc. into finished water storage.
- **Pumps**-Inadequate pump capacity resulting in negative or low pressures that can possibly allow contaminated water into the distribution system.
- **Monitoring/Reporting**-The system does not have a TCR sampling plan, plan needs to be updated, or plan is not being followed (routine sample sites are to be rotated when submitting your monthly micro samples). All designated sites must be used at least once per calendar year, and no one site can be used for more than 50% of your routine samples.
- **System Management/Operation**-Compliance monitoring records are not maintained as required. *Please see Table 1 as to necessary records.*
- **Operator Certification Compliance**-The operator in direct responsible charge is not certified at the level required by State for water distribution and/or water treatment.

If any of the above deficiencies apply to your system, we would urge you to get these corrected so that they do not become an enforceable deficiency and possible violation.

TABLE 1: REQUIRED COMPLIANCE RECORDS

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

NOTE: Pre-Significant Non-complier (PSNC) for monthly samplers: (1) Three or more combined Maximum Contaminant Level (MCL) or major repeat monitoring/reporting (M/R) violations within a year; or (2) Five combined MCL or major routine or major repeat M/R violations within a year.

Pre-Significant Non-complier (PSNC) for quarterly samplers: Two or more combined MCL or major routine or major repeat M/R violations within a year.

Major M/R violation means none of the required samples were taken or reported.

Minor M/R violation means some, but not all, of the required samples were taken or reported.

**Appendix B
Water Rights**

WATER PERMIT NO. 5868-3

Phone: 605 582-6515

Name of Applicant: City of Brandon

Post Office Address: PO Box 95, Brandon SD 57005

Amount of Water Claimed: add'l 0.07 cfs Total Acres: NA

Source of Water Supply: groundwater - Split Rock Creek Aquifer

Water to be used for: municipal County: Minnehaha

Location: _____

PRIORITY _____ Date Received: 6-8-95 Fee: \$50.00

Corrected Application Received: _____ Period of Annual Use: Jan 1 - Dec 31

Remarks: Well No. 3 is authorized by License No. 1804-3, Permit Nos. 5296-3 and 5395-3 for a combined diversion rate of 1.32 cfs. This application increase the diversion rate 0.07 cfs, for a total diversion rate of 1.39 cfs (625 gpm)

Diversion Point: NW 1/4 SW 1/4 Sec 35-T102N-R48W

Land to be Irrigated: _____

T102N	34	35	36
		Well No. 3	
T101N	3	2	1

Well Log: Driller: Grimshaw Drilling Licensed: YES NO

Depth of Well: 222 feet REMARKS: _____

Type of Map: topo Prepared By: Lynn Beck Reviewed and the Number

Assigned on: 6-8-95 By: Karen Schlaak

SOUTH DAKOTA
WATER PERMIT NO. 5868-3

Date of first receipt of application June 8, 1995.

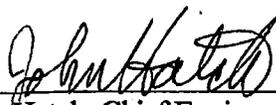
The Chief Engineer, on behalf of the Water Management Board, issues Water Permit No. 5868-3 to the City of Brandon, PO Box 95, Brandon SD 57005 authorizing the construction of the water use system and the placing of water to beneficial use subject to the following limitations, conditions and qualifications:

1. Water Permit No. 5868-3 appropriates 0.07 cubic feet of water per second (cfs) by increasing the diversion rate authorized by Water Right No. 1804-3 and Water Permit Nos. 5296-3 and 5395-3. Water Right No. 1804-3 and Water Permit Nos. 5296-3 and 5395-3, combined, appropriates 1.32 cfs from the City of Brandon's Well No. 3 (Split Rock Creek Aquifer) 222 feet deep located in the NW 1/4 SW 1/4 Section 35-T102N-R48W. This permit increases the water appropriation of Well No. 3, from 1.32 cfs to 1.39 cfs.
2. The water appropriated shall be used for the purpose of supplying water for the City of Brandon and may not exceed the amount of water needed for beneficial use for municipal use purposes.
3. The water is to be used during the following described annual period: January 1 - December 31
4. The date of approval of Permit No. 5868-3 is September 5, 1995.
5. The date from which applicant may claim right is June 8, 1995.
6. Water rights obtained in compliance with the laws of the State of South Dakota may not be unlawfully impaired by this appropriation.

QUALIFICATION

The well approved under this Permit will be located near domestic wells and other wells which may obtain water from the same aquifer. The well owner under this Permit shall control his withdrawals so there is not a reduction of needed water supplies in adequate domestic wells or in adequate wells having prior water rights.

WATER MANAGEMENT BOARD

By: 
John Hatch, Chief Engineer
Water Rights Program
Department of Environment and Natural Resources

DEC 18 1995

date



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181

April 17, 1995

Dennis Olson
Finance Officer
Brandon City Hall
P.O. Box 95
Brandon, SD 57005

Dear Mr. Olson:

This letter concerns the water permits held by the city of Brandon, the status of those permits, and information needed to license the permits. There are corrections and additions that require new applications. New applications are needed to get the city permitted for all of its water use.

Please find enclosed partially completed application forms, a map and instruction sheet. The application involves well number four with a diversion rate of 0.36 cubic feet per second (cfs), which is not authorized under any of the cities present permits. Also needing application is an additional diversion of 0.14 cfs from well number five. The waters applied for under this new application can come out of the future use permit 4002-3 and retain a priority date of September 12, 1977.

Future use permit 4002-3 reserves 902 acre feet of water in Section 34-T102N-R48W and Section 3-T101N-R48W. This new application would take 217 acre feet from the future use permit.

Application must also be made for an additional 0.07 cfs from city well number three. License 1804-3 and Permit Numbers 5296-3 and 5395-3 appropriate a combined 1.32 cfs (594 gpm) from well number three. The well has a maximum pumping rate of 1.39 cfs (625 gpm); an additional 0.07 cfs needs application. These waters come from the Split Rock Creek Aquifer and do not fall under Future Use Permit 4002-3.

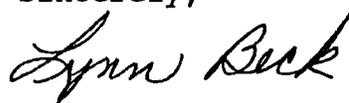
Below is a listing of the City of Brandon's water rights:

1. License 1804-3 appropriates 1.2 cubic feet of water per minute (cfs) from wells number 1, 2 and 3 with a priority date of January 25, 1971.
2. Future Use Permit No. 4002-3 reserves 902 acre feet of water from Section 34-T102N-R48W and Section 3-T101N-R48W with a priority date of September 12, 1977.
3. License 4434-3 appropriates 0.43 cfs (194 gpm) from two wells and 20.5 acre feet of storage used to irrigate the Municipal Golf Course.
4. Water Permit No. 4885-3 appropriates 0.28 cfs (126 gpm) from well number 5, with a priority date of April 20, 1982.
5. Water Permit No. 5296-3 appropriates an additional 0.33 cfs (150 gpm) for well number 3, with a priority date of March 22, 1989.
6. Water Permit No. 5395-3 appropriates an additional 0.43 cfs (194 gpm) from well number 3, with a priority date of March 8, 1990. A combined total of 1.32 cfs.
7. Water Permit No. 5507-3 appropriates 0.05 cfs (22.5 gpm) from a well at the Municipal Golf Course for the clubhouse with a priority date of January 28, 1991.

Once the Water Rights Division receives the applications, the licensing process can continue. If there is no opposition to the applications after they have been advertised, the permits can be licensed. After payment of the licensing and inspection fee, as per item number 7 on the instruction sheet, a Water License will be issued.

If you have any questions, please feel free to contact me.

Sincerely,



Lynn Beck
Natural Resources Engineer III
Water Rights Division, DENR
(605) 773-3352

encls

c Steve Brockmueller
Stockwell Engineers, Inc.
1621 S. Minnesota Ave.
Sioux Falls, SD 57105

File No.

**Water Rights Division
File Documentation**

NAME OF PERSON OR FILE: City of Brandon

ADDRESS: Brandon SD COUNTY: MA

DATE: 6-8-95 TELEPHONE:

RE: Filing fee

COMMENTS:

The City of Brandon submitted a check for \$375.00 with the two applications dealing with Well nos 3, 4, & 5. The fee was receipted as follows:

Application No. 5868-3 = \$ 50.00
(Well no. 3)

Application No. 5869-3 = \$225.00
(Well no 4 & 5)

License fee for each = \$ 50.00
\$ 50.00

\$375.00

Karen Schlaak
Karen Schlaak
Environmental Scientist

REPORT ON WATER PERMIT APPLICATION NO. 5868-3

for the City of Brandon

July 25, 1995

Application No. 5868-3 proposes to appropriate 0.07 cfs (32 gpm) by increasing the diversion rate authorized by Water Rights No. 1804-3 and Water Permit Nos. 5296-3 and 5395-3. Water Right No. 1804-3 and Water Permit Nos. 5296-3 and 5395-3, combined, appropriate 1.32 cfs from City Well # 3 which is approximately 222 feet deep and located in the NW 1/4 SW 1/4 of section 35, T102N R48W in Minnehaha County. This application proposes to increase the water appropriation of Well # 3 from 1.32 to 1.39 cfs.

AQUIFER - SPLIT ROCK CREEK (SRKC)

The Split Rock Creek aquifer is a buried sand and sandstone with interbedded thick layers of siltstone, shale and claystone. The aquifer is confined and under artesian conditions. The aquifer underlies 139 square miles and contains an estimated 855,000 acre feet of water in storage in Minnehaha County (Lindgren, 1992). The aquifer is overlain by glacial till and underlain by the Sioux Quartzite. Ground water movement is from east to west toward the Big Sioux River in the area of this application.

The Water Rights Program monitors 11 observation wells completed into the Split Rock Creek aquifer in southeastern Minnehaha County. One of these wells MA-87E is located about 1 mile northwest of this application. Water levels for the Split Rock aquifer do show the effects of climatic conditions. That is, rising water levels during wet years and gradually declining water levels during dry years. In general, the water level record indicates that the aquifer is capable of sustaining additional withdrawals (Water Rights, 1995).

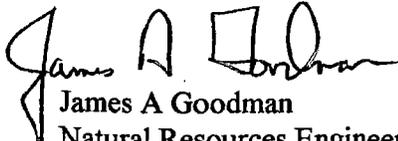
REVIEW OF EXISTING WATER PERMITS/RIGHTS

There are no other water permits/rights from the Split Rock Creek aquifer in this immediate area. The well for this application is located about 1/2 mile west of Water Permit No. 5507-3 which is also held by the City of Brandon. Interference is not expected to be a concern.

CONCLUSIONS

1. Water is available from the Split Rock Creek aquifer.
2. The aquifer is confined and under artesian conditions in this area. Drawdown will result from pumping. Interference is not expected to be a concern.
3. This relatively small increase in pumping rate is the result of an inspection which found that the City was pumping at a greater rate than was permitted. Approval of this application will allow the licensing of Brandon's water rights to reflect the system "as built".

4. Information on City Well No. 3 is not sufficient to determine if the well is constructed in accordance with SD Well Construction Standards.


James A Goodman
Natural Resources Engineer

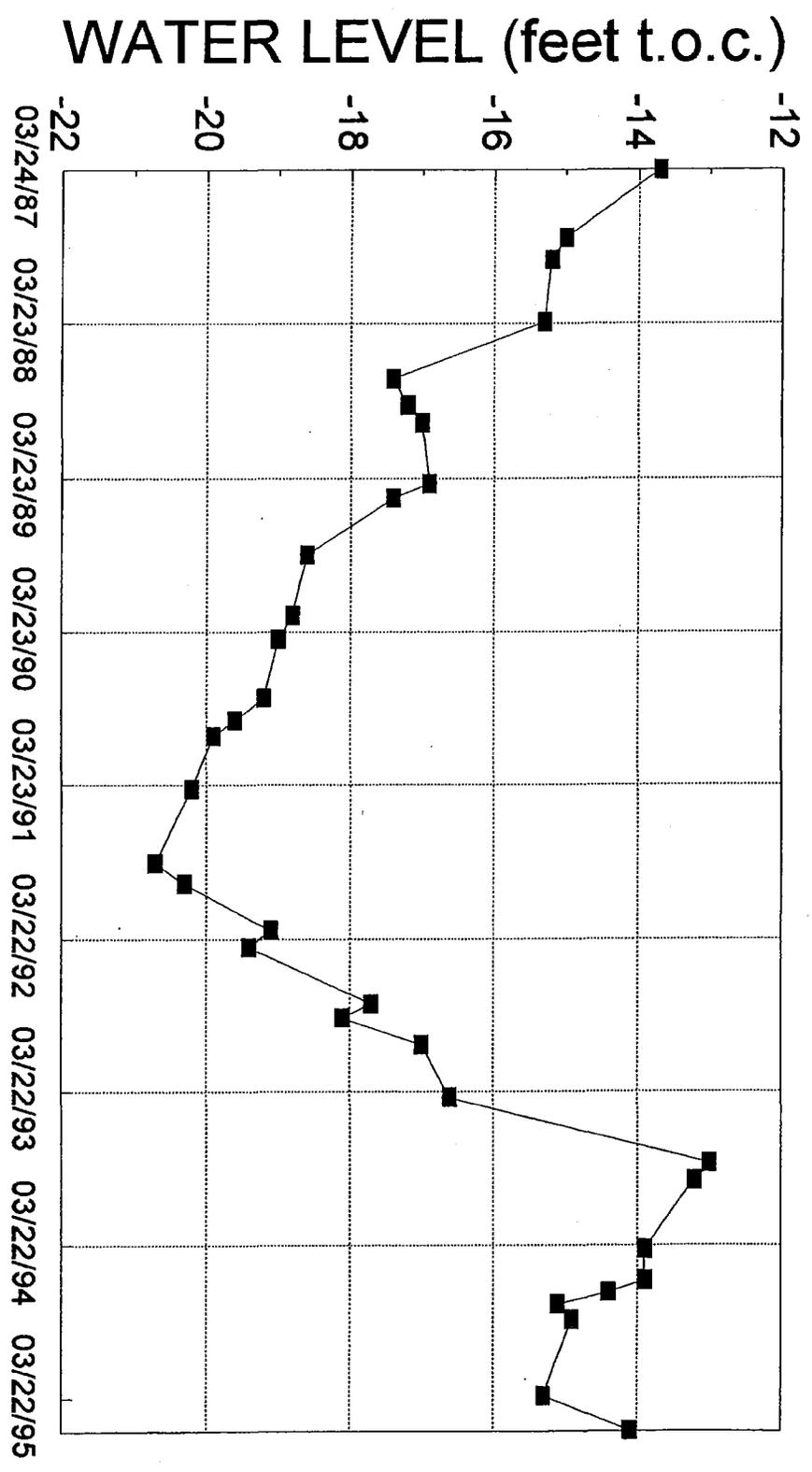
BIBLIOGRAPHY

Lindgren, R.L., C.A. Niehus, 1992, Water Resources of Minnehaha County, South Dakota, USGS WRI 91-4101, USGS, Huron, SD, 57350.

Water Rights, 1995, Unpublished Observation Well Records for Minnehaha County, SD DENR, Environmental Services Division, Water Rights Program, Pierre, SD, 57501.

WATER RIGHTS OBSERVATION WELL

MA-87E



**RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT
APPLICATION NO. 5868-3, City of Brandon**

Pursuant to SDCL 46-2A-2, the following is the recommendation of the Chief Engineer, Water Rights Program, Department of Environment and Natural Resources concerning Water Permit Application No. 5868-3, City of Brandon, c/o Mayor Dennis Kleinvachter, PO Box 95, Brandon, SD 57005.

The Chief Engineer is recommending APPROVAL of Application No. 5868-3 because 1) there is reasonable probability that there is unappropriated water available for the applicant's proposed use, 2) the proposed diversion can be developed without unlawful impairment of existing rights, 3) the proposed use is a beneficial use and 4) in the public interest with the following qualification:

The well approved under this Permit will be located near domestic wells and other wells which may obtain water from the same aquifer. The well owner under this Permit shall control his withdrawals so there is not a reduction of needed water supplies in adequate domestic wells or in adequate wells having prior water rights.

See report on application for additional information.

John 
JOHN HATCH, Chief Engineer
June 26, 1995



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181

**NOTE: TO BE SURE OF PUBLICATION ON
THE CORRECT DATES, CONTACT
THE NEWSPAPER RIGHT AWAY.**

August 10, 1995

Dennis Kleinvachter, Mayor
PO Box 95
Brandon, SD 57005

Dear Mr. Kleinvachter:

Water Permit Application Nos. 5868-3 and 5869-3 for municipal use have been examined and found to comply with the South Dakota Water Laws and applicable rules. A notice of hearing has been sent to the Publisher of the Argus Leader printed at Sioux Falls, SD (Ph # 605-331-2200). For your information, a copy of the notice, the recommendations of the Chief Engineer and reports on the applications are enclosed. Please review the notice prior to publication and notify this office, if you have any corrections or questions.

Be sure to contact the above newspaper to authorize publication of your Notice of Hearing and to arrange for payment. Early contact with the paper can eliminate delays. The publisher has been instructed to publish your notice once each week for two consecutive weeks with the last publication to occur twenty days before the board meeting. The newspaper has been instructed to send us the Proof of Publication. We must receive Proof of Publication before action can be taken on the applications.

Sincerely,

Eric Gronlund /KS

Eric Gronlund
Natural Resources Engineer
605 773-3352

enclosures

NOTE: If you plan to contest any part of the Chief Engineer's recommendations, you must file a petition pursuant to the procedures outlined in the attached notice of hearing. The Water Management Board will then consider your concerns during a hearing on the applications.



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181

August 10, 1995

Argus Leader
PO Box 5034
Sioux Falls, SD 57117-5034

ATTENTION: Legal Department

Enclosed is a Notice of Hearing on Application Nos. 5868-3 and 5869-3 to be published twice. Please publish the first notice on August 18, 1995, with the second publication 7 days later.

The APPLICANT MUST VERIFY TO YOU THAT THE NOTICE IS TO BE PUBLISHED, before you make the first publication. Please BILL the APPLICANT for the cost of publication. The APPLICANT is City of Brandon, c/o Mayor Dennis Kleinvachter, PO Box 95, Brandon, SD 57005 (Ph # 605-582-6515).

A copy of BOTH publications must be SENT to the WATER RIGHTS PROGRAM. IMMEDIATELY return the FIRST publication with the FIRST Transmittal form on the bottom of this page. The first copy is needed to check the publication for errors so any corrections can be made in the second publication. Publication errors can invalidate the public notice and cause the applicant costly delays.

Please be sure the SECOND publication is returned IMMEDIATELY with the enclosed Proof of Publication form. DO NOT WAIT until the end of the month or the billing cycle. No action may be taken on the permit applications until proof of publication has been received.

Sincerely,

Eric Gronlund
Natural Resources Engineer
605 773-3352

enclosures

-----CUT HERE-----

FIRST TRANSMITTAL NOTICE

TO: Eric Gronlund
Water Rights Program
Joe Foss Building
Pierre SD 57501-3181

No. _____

Date _____

We are in receipt of your letter of _____ enclosing Notice of Hearing to Appropriate Water by Application No. _____ which was first published in our issue of _____. ENCLOSED IS A COPY OF THIS FIRST PUBLICATION.

Name

Newspaper

Instruction to Newspaper - Publish first Notice on August 18, 1995, with the second publication 7 days later. The applicant is responsible for payment.

NOTICE OF APPLICATION NOS. 5868-3 and 5869-3 to Appropriate Water

Notice is given that the City of Brandon, PO Box 95, Brandon, SD 57005 has filed applications for two water permits.

Application No. 5868-3 proposes to appropriate 0.07 cubic feet of water per second (cfs) by increasing the diversion rate authorized by Water Right No. 1804-3 and Water Permit Nos. 5296-3 and 5395-3. Water Right No. 1804-3 and Water Permit Nos. 5296-3 and 5395-3, combined, appropriate 1.32 cfs from the City of Brandon's Well No. 3 (Split Rock Creek Aquifer) 222 feet deep located in the NW 1/4 SW 1/4 Section 35-T102N-R48W. This application proposes to increase the water appropriation of Well No. 3 from 1.32 cfs to 1.39 cfs.

Application No. 5869-3 proposes to appropriate 0.50 cfs. Water Permit No. 4885-3 appropriates 0.28 cfs from the City of Brandon's Well No. 5. This application proposes to increase the water appropriation from Well No. 5 from 0.28 cfs to 0.42 cfs. This application also requests an additional diversion point to appropriate 0.36 cfs from Well No. 4. Well Nos. 4 and 5 (Big Sioux South Aquifer) 52 and 56 feet deep are located in the SE 1/4 NW 1/4 Section 3-T101N-R48W and propose a combined appropriation of 0.50 cfs (217 acre-feet of water annually). This water was appropriated and reserved by Future Use Permit No. 4002-3. This water will be used to supply the City of Brandon.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application Nos. 5868-3 and 5869-3 because 1) unappropriated water is available, 2) existing rights will not be unlawfully impaired, 3) it is a beneficial use of water, and 4) it is in the public interest. In accordance with SDCL 46-2A-23, the chief engineer will act on the applications, as recommended, unless a petition is filed opposing the applications or the applicant files a petition contesting the chief engineer's recommendations. If a petition opposing the applications or contesting the recommendations is filed, then a hearing will be scheduled and the Water Management Board will consider the applications. Notice of the hearing will be given to the applicant and any person filing a petition.

Any person interested in opposing or supporting these applications or recommendations must file a written petition with BOTH the applicant and chief engineer. The applicant must file a petition if contesting the chief engineer's recommendations. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E Capitol, Pierre SD 57501 (605 773-3352)" and the applicant's mailing address is given above. A petition filed by either an interested person or the applicant must be filed by September 5, 1995.

The petition may be informal, but must include a statement describing the petitioner's interest in the applications, the petitioner's reasons for opposing or supporting the applications, and the signature and mailing address of the petitioner or the petitioner's legal counsel, if legal counsel is obtained. Contact Eric Gronlund at the above Water Rights Program address to request copies of information pertaining to these applications. Nettie H. Myers, Secretary, Department of Environment and Natural Resources.

PROOF OF PUBLICATION

STATE OF SOUTH DAKOTA)
County of Minnehaha) SS

I, D. Reicher

certify that the attached printed Notice was
taken from the Argus Leader

printed and published in Sioux Falls

County of Minnehaha and State of

South Dakota. The notice was published in
the newspaper on the following two dates:

Friday, August 18, 1995

Friday, August 25, 1995

Cost of Printing: 103.37

D. Reicher
(Signature) *NR*

Assistant Controller
(Title)

8/25/95
(Date Signed)



NOTICE OF APPLICATION
NOS. 5868-3 and 5869-3
to Appropriate Water

Notice is given that the City of
Brandon, PO Box 95, Brandon, SD
57005 has filed applications for two
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Application No. 5868-3 proposes
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water per second (cfs) by in-
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ized by Water Right No. 1804-3
and Water Permit Nos. 5296-3 and
5395-3. Water Right No. 1804-3 and
Water Permit Nos. 5296-3 and
5395-3, combined, appropriate 1.32
cfs from the City of Brandon's Well
No. 3 (Split Rock Creek Aquifer)
222 feet deep located in the NW 1/4
SW 1/4 Section 35-T102N-R48W.

This application proposes to in-
crease the water appropriation of
Well No. 3 from 1.32 cfs to 1.39 cfs.

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to appropriate 0.50 cfs. Water
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0.28 cfs from the City of Brandon's
Well No. 5. This application pro-
poses to increase the water appro-
priation from Well No. 5 from 0.28
cfs to 0.42 cfs. This application also
requests an additional diversion
point to appropriate 0.36 cfs from
Well No. 4. Well Nos. 4 and 5 (Big
Sioux South Aquifer) 52 and 56 feet
deep are located in the SE 1/4 NW
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be used to supply the City of
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Pursuant to SDCL 46-2A-2, the
Chief Engineer recommends AP-
PROVAL of Application Nos. 5868-3
and 58769-3 because 1) unappro-
priated water is available, 2) ex-
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applicant must file a petition if
contesting the chief engineer's rec-
ommendations. The Chief Engi-
neer's address is "Water Rights
Program, Foss Building, 523 E
Capitol, Pierre, SD 57501 (605
773-3352)" and the applicant's
mailing address is given above. A
petition filed by either an interested
person or the applicant must be
filed by September 5, 1995.

The petition may be informal, but
must include a statement de-
scribing the petitioner's interest in
the applications, the petitioner's
reasons for opposing or supporting
the applications, and the signature
and mailing address of the peti-
tioner or the petitioner's legal
counsel, if legal counsel is ob-
tained. Contact Eric Gronlund at
the above Water Rights Program
address to request copies of infor-
mation pertaining to these applica-
tions.

Nettie H. Myers, Secretary
Department of Environment
and Natural Resources.
6371 Aug. 18, 25, 1995

COMMENTS: This report is based on an inspection by Greg Johnston done in July 1992. The additional 0.07 cfs from well #3 is covered under new permit no. 5868-3. The additional diversion is from the waters of the Spilt Rock Creek Aquifer and has a priority date of June 8, 1995.



Lynn Beck
Lynn Beck
Natural Resources Engineer
DENR, Water Rights Division

Permit No. 5296-3 and 5395-3
Big Sioux River - Water District

Report Of Examination Of Works And/Or Application of Water To Beneficial Use

TO: Chief Engineer, Division of Water Rights, DENR, Foss Bldg., Pierre, SD 57501

I have this day made a thorough examination of the water use system constructed by the City of Brandon of P.O. Box 38, Brandon, SD 57005 holder of Permit Nos. 5296-3 and 5396-3 also License No. 1804-3, bearing the priority of March 22, 1989, March 8, 1990 and January 25, 1971 authorizing the diversion of an additional 0.33 and 0.43 (total authorized diversion for well #3 is 1.32 cfs) cu. ft. per second from well #3 of the waters of Split Rock Creek Aquifer for municipal purposes, in Minnehaha County. Under License 1804-3 wells #1, 2 and 3 are authorized for a combined diversion of 1.2 cfs. Well #1 and 2 for 0.64 cfs from the water of the Big Sioux - South Aquifer and well #3 for 0.56 cfs from the Split Rock Creek Aquifer.

I have to report on the conditions of the same as follows:

A. Works used to divert the water:

Well #1 - 48 feet deep, 32 feet of 10 inch steel casing and 16 feet of stainless steel screen. The well has a pumping rate of 170 gpm and a 20 hp Franklin motor.

Well #2 - 50 feet deep, 37.5 feet of 8 inch steel casing and 12.5 feet of stainless steel screen. The well has a Ground Fos pump, model no. SP-16-2 with a pumping rate of 65 gpm and a 2 hp Franklin motor.

Well #3 - 222 feet deep, 182 feet of 12 inch steel casing and 40 feet of stainless steel screen. The well has a Crown pump, model no. 8L-600 FTD with a pumping rate of 625 gpm and a 75 hp Franklin motor.

B. Works used to transport water to place of use:

Distribution system for Brandon's municipal water supply.

C. Works used to apply water to beneficial use:

Municipal water supply.

The system is in the following condition good. The point of diversion is located well #1 - 1460 feet N and 600 feet W and well #2 - 1150 feet N and 600 feet W from the center of Section 3-T101N-R48W and well #3 - 1750 feet N and 430 feet E of the SW corner of Section 35-T102N-R48W. The works are capable of diverting and conveying to the place of use 1.39 well #3 and 0.56 wells #1 and 2 cu. ft. per second of water which is to be used for a municipal water supply.

The license should be issued for 1.39 cfs from the Split Rock Creek Aquifer for well #3 and a combined 0.52 cfs from the Big Sioux Aquifer for wells #1 and 2.

Applicable permit qualifications have been complied with: Yes No

Exceptions to compliance are: none

Date: 4-13-95

REPORT ON INSPECTION OF PERMIT NO. 5296-3 and 5395-3

DATE: 7-92

Other permit(s) associated with the project: License 1804-3

DIVERSION POINT LEGAL LOCATION: Well #1 - 1460' N and 600' W and well #2 - 1150' N and 600' W from the center of Section 3-T101N-R48W. Well #3 - 1740⁵' N and 430' E of the SW corner of Section 35-T102N-R48W.

WELL INFORMATION:

- 1) Well Drilling Firm: Well #1 - Thorpe Well Company; well #2 and #3 - Minnehaha Waters, Inc.
- 2) No. of Wells 3
- 3) Depth(s) well #1 - 48; well #2 - 50; well #3 - 222 feet
- 4) Well log is available Y
- 5) Comment: Well #1, 2 and 3 are licensed under 1804-3. Additional diversion for well #3 is permitted under 5296-3 and 5395-3.

Casing: Well #1

- 1) Diameter 10 inches
- 2) Length 32 feet
- 3) Type steel

Screen:

- 1) Type stainless steel
- 2) Length 16 feet
- 3) Static water level 20 feet

Pump:

- 1) Make
- 2) Model
- 3) Size
- 4) Capacity 170 (pumping rate) GPM

Motor:

- 1) Make Franklin
- 2) Model No.
- 3) Horsepower rating 20 hp

Casing: Well #2

- 1) Diameter 8 inches
- 2) Length 37.5 feet
- 3) Type steel

Screen:

- 1) Type stainless steel
- 2) Length 12.5 feet
- 3) Static water level 20 feet

Pump:

- 1) Make Ground Fos
- 2) Model SP-16-2
- 3) Size
- 4) Capacity 65 (pumping rate) GPM

Motor:

- 1) Make Franklin
- 2) Model No.
- 3) Horsepower rating 2 hp

Casing: Well #3

- 1) Diameter 12 inches
- 2) Length 182 feet
- 3) Type steel

Screen:

- 1) Type stainless steel
- 2) Length 40 feet
- 3) Static water level 50 feet

Pump:

- 1) Make Crown
- 2) Model 8L-600 FTD
- 3) Size
- 4) Capacity 625 (pumping rate) GPM

Motor:

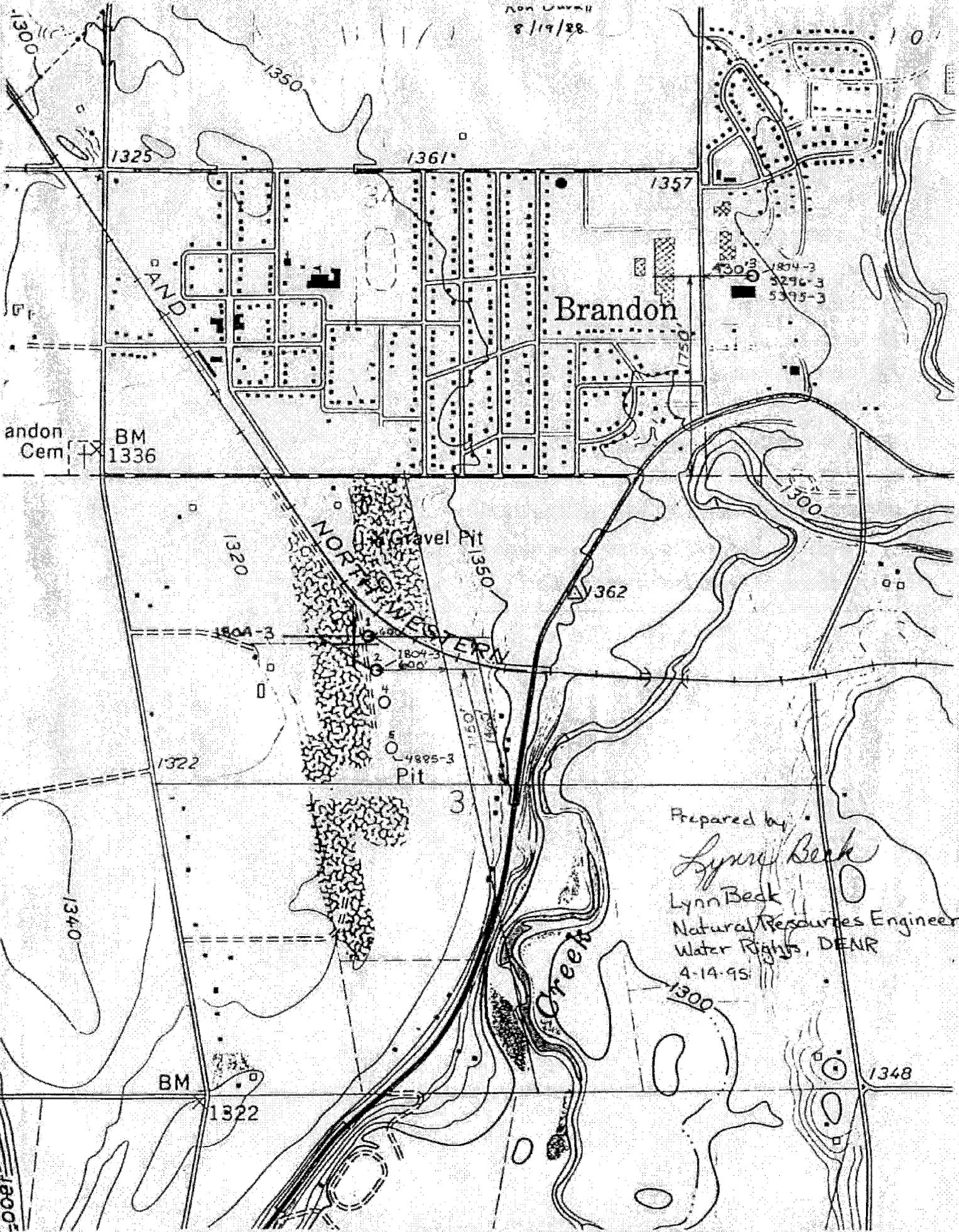
- 1) Make Franklin
- 2) Model No.
- 3) Horsepower rating 75 hp

SYSTEM TYPE: Municipal water supply.

PERMIT QUALIFICATIONS AND REGULATIONS:

- 1) Special qualifications to permit being abided by Y
- 2) All structures, wells and lands on map Y

Don Linnell
8/19/88



Prepared by
Lynn Beck
 Lynn Beck
 Natural Resources Engineer
 Water Rights, DEAR
 4-14-95

STATE OF SOUTH DAKOTA

WATER LICENSE NO. 5868-3

(1) The City of Brandon, PO Box 95, Brandon SD 57005 made Application No. 5868-3, June 8, 1995 for a water permit to appropriate an additional 0.07 cubic feet of water per second (cfs) from groundwater (one well), Minnehaha County, South Dakota for municipal use purposes. Permit No. 5868-3, with a priority date of June 8, 1995 was approved September 5, 1995 and issued to the applicant for diversion of water with construction of the described water supply system completed and the application to beneficial use of said water completed.

Water Permit No. 5868-3 increased the diversion rate of Well #3 authorized by Water Right No. 1804-3 and Water Permit Nos. 5296-3 and 5395-3 from 1.32 cfs to 1.39 cfs. Water Right No. 1804-3 and Water Permit Nos. 5296-3 and 5395-3, combined, appropriate 1.32 cfs from the City of Brandon's Well No. 3 (Split Rock Creek Aquifer) 22 feet deep located in the NW 1/4 SW 1/4 Section 35-T102N-R48W. Water Right No. 1804-3 also authorizes 0.64 cfs from Well Nos. 1 & 2 (Big Sioux -South Aquifer). The applicable portions of Water Right No. 1804-3 and Water Permit Nos. 5296-3 and 5395-3 have been incorporated into this license.

(2) It is certified that the applicant has complied with the provisions of South Dakota State Law relating to completion of the construction of the water supply system and is entitled to divert 1.39 cfs (Split Rock Creek Aquifer) and 0.52 cfs (Big Sioux South Aquifer) for beneficial use. The location of the diversion points are Well #1 - 1460 feet north and 600 feet west (NE 1/4 NW 1/4) and Well #2 - 1150 feet north and 600 feet west (SE 1/4 NW 1/4) both from the center of Section 3-T101N-R48W and Well #3 - 1750 feet north and 430 feet east (NW 1/4 SW 1/4) of the southwest corner of Section 35-T102N-R48W

(3) The applicant has complied with the provisions of South Dakota State Law relating to the application of water to beneficial use.

(4) Pursuant to South Dakota Water Law 46-5-30.1 the City of Brandon, PO Box 95, Brandon SD 57005 the holder and/or owner of Incorporated Water Permit No. 5868-3 issued a license to appropriate water, the right to use 1.91 cubic feet of water per second from groundwater (three wells) from the location specified in (2) of this license for municipal use purposes. The priority dates are as follows: Well Nos. #1 & #2 - 0.52 cfs (January 25, 1971); Well #3 - 0.56 cfs (January 1, 1971); 0.33 cfs (March 22, 1989); 0.43 cfs (March 8, 1990); and 0.07 cfs (June 8, 1995). This license is subject to any limitations or qualifications listed in Incorporated Water Permit No. 5868-3 and subject to South Dakota State Law.

John Hatch

JOHN HATCH, Chief Engineer
Water Rights Program
Department of Environment and Natural Resources

DEC 18 1995

date





**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181

DEC 18 1995

Dennis Olson, Finance Officer
City of Brandon
PO Box 95
Brandon SD 57005

Dear Mr. Olson:

Enclosed are Water Permit and Water License Nos. 5868-3 and 5869-3, as well as receipts assessed for the inspections and issuance of the licenses. Water License Nos. 5868-3 and 5869-3 are the final documents which complete the process of obtaining water rights.

The applicable portions of Water Right No. 1804-3 and Water Permit Nos. 5296-3 and 5395-3 have been incorporated into Water License No. 5868-3. The applicable portions of Water Right No. 4885-3 have been incorporated into Water License No. 5869-3.

For your information SDCL 46-6-27 requires that if the owner of an existing well, such as the wells authorized by the above permits, constructs a replacement well and does not plan to use the old well, the old well is considered abandoned and must be plugged. Also, any well that is being used or is not considered abandoned must be valved and controlled, if flowing, or sealed and capped so that no leaking occurs either underground or at the surface.

As long as the City of Brandon uses the water beneficially, as stated in the Water Licenses, the State Water Laws provide that you have a continuing right to use the water. If you have any questions, please contact our office.

Very truly yours,

JOHN HATCH, Chief Engineer
Water Rights Program
605 773-3352

enclosures

WATER PERMIT NO. 5869-3

Phone: 605 582-6515

Name of Applicant: City of Brandon

Post Office Address: PO Box 95, Brandon SD 57005

Amount of Water Claimed: 0.50 cfs Total Acres: NA

Source of Water Supply: groundwater - Big Sioux South Aquifer

Water to be used for: municipal County: Minnehaha

Location: _____

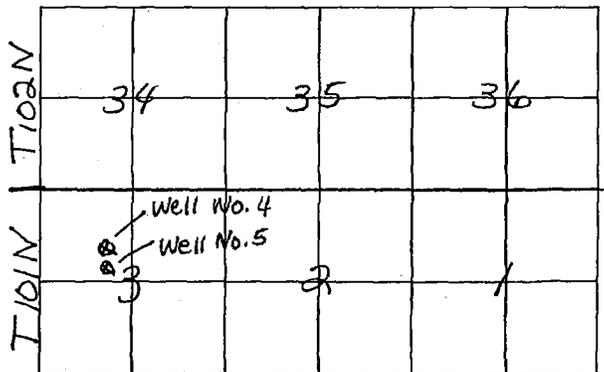
PRIORITY Date Received: 6-8-95 Fee: \$225.00

Corrected Application Received: _____ Period of Annual Use: Jan 1 - Dec 31

Remarks: Well No. 5 is authorized by Permit No. 4885-3. This application increases the diversion rate 0.14 cfs and adds Well No. 4 with a diversion rate of 0.36 for a total of 0.50 cfs all to be withdrawn from Future Use Permit No. 4002-3

Diversion Point: SE 1/4 NW 1/4 Sec 3-T101N-R48W

Land to be Irrigated: _____



Well Log: Driller: Sioux Well Drilling & Thorpe Well Drilling Licensed: YES NO

Depth of Well: 52 and 56 feet REMARKS: _____

Type of Map: topo Prepared By: Lynn Beck Reviewed and the Number

Assigned on: 6-8-95 By: Karen Schlaak

FORM 2: Application for uses other than irrigation

(type or print)



Mail to: Water Rights Division Joe Foss Building 523 E Capitol Pierre SD 57501-3181 605 773-3352

No. 5869-3 Hydrologic Unit 10170203 Basin Sioux River Newspaper Argus Leader, PO Box 5034, SF 57117 (office use only)

Application For Permit To Appropriate Water Within The State Of South Dakota

Check use of water:

- X Municipal Suburban Housing Recreational Institutional Rural Water System Commercial Fish & Wildlife Geothermal Heat Domestic Industrial Other (over 18 gpm)

Type of Application: New Vested Right (Use predates Mar 2, 1955) Future Use Reservation X Place to Beneficial Use Water Reserved by Future Use Permit No. 4002-3 Amendment/Correction to Permit No.

Description of amendment/correction: (i.e. change diversion point(s), add diversion point(s), change use, etc.) Add a diversion point known as well #4 with a diversion of 0.36 cfs or 160 gpm. Additional diversion of 0.14 cfs or 64 gpm for well #5.

1. Name of Applicant City of Brandon Phone (605) 582-6515 (check one) X Owner Tenant/lessee Mailing Address P.O. Box 95 Brandon State SD 57005 (Street, RR, or Box) (City) (Zip Code)

2. Amount of water claimed 0.50 *CFS or 225 **GPM 217 ***AF (*Cubic Feet per Second) (**Gallons per Minute) (***)Acre Feet - storage capacity of dam/dugout or annual use if applicable)

3. Source of water supply Big Sioux South Aquifer

4. Location of point of diversion (example - 3 wells in SW1/4 NE1/4 section 12-T104N-R53W) Well #4 - 850' N and 600' W from the center of Sec. 3-T101N-R48W. Well #5 - 450' N and 600' W from the center of Sec. 3-T101N-R48W. (SE1/4 NW1/4) County Minnehaha

5. County or counties where water will be used Minnehaha

6. Annual period during which water is to be used Jan. 1 - Dec. 31

7. Give a description of the project. When available include any preliminary engineering report or other reports or information that will help explain the project. (Attach sheet if more space is needed)

Attachments: Attach Form 2A if diversion is from a well or dugout, or if storage of water is proposed. Attach map and any other technical information. (see instructions)

STATE OF SOUTH DAKOTA)

County of Minnehaha) SS

I, City of Brandon, the applicant, certify that I have read this application, have examined the attached map and that the matters stated are true and that I intend, and am able to complete the necessary construction.

Signed [Signature] Notary Public

Subscribed and sworn to before me this 24th day of May 1995

[Signature] Notary Public

Commission Expires 1-26-96

Attachment to FORM 2: Application for uses other than irrigation

The City of Brandon's well no. 4 is not authorized under Brandon's current permits and license. This application is to authorize well no. 4 and to appropriate 0.36 cfs from this well.

The City of Brandon's well no. 5 is authorized under Permit No. 4885-3 for 0.28 cfs. This application is also for an additional appropriation of 0.14 cfs from well no. 5 bringing the maximum diversion rate from 0.28 cfs to 0.42 cfs.

This application is to place to beneficial use 0.50 cubic feet per second or 217 acre feet of water from Future Use Permit No. 4002-3.



**SOUTH DAKOTA
WATER PERMIT NO. 5869-3**

Date of first receipt of application June 8, 1995.

The Chief Engineer, on behalf of the Water Management Board, issues Water Permit No. 5869-3 to the City of Brandon, PO Box 95, Brandon SD 57005 authorizing the construction of the water use system and the placing of water to beneficial use subject to the following limitations, conditions and qualifications:

1. Water Permit No. 5869-3 appropriates 0.50 cubic feet of water per second (cfs). Water Permit No. 4885-3 appropriates 0.28 cfs from the City of Brandon's Well No. 5. This permit increases the water appropriation from Well No. 5 from 0.28 cfs to 0.42 cfs. This permit also authorizes an additional diversion point (known as Well No. 4) to appropriate 0.36 cfs. Well Nos. 4 and 5 (Big Sioux South Aquifer) 52 and 56 feet deep are located in the SE 1/4 NW 1/4 Section 3-T101N-R48W and authorize a combined appropriation of 0.50 cfs (217 acre-feet of water annually). This water was appropriated and reserved by Future Use Permit No. 4002-3.
2. The water appropriated shall be used for the purpose of supplying water to the City of Brandon and may not exceed the amount of water needed for beneficial use for municipal use purposes.
3. The water is to be used during the following described annual period: January 1 - December 31
4. The date of approval of Permit No. 5869-3 is September 5, 1995.
5. The date from which applicant may claim right is September 12, 1977 (established under Future Use Permit No. 4002-3).
6. Water rights obtained in compliance with the laws of the State of South Dakota may not be unlawfully impaired by this appropriation.

QUALIFICATION

The wells approved under this Permit will be located near domestic wells and other wells which may obtain water from the same aquifer. The well owner under this Permit shall control his withdrawals so there is not a reduction of needed water supplies in adequate domestic wells or in adequate wells having prior water rights.

WATER MANAGEMENT BOARD

By: 
John Hatch, Chief Engineer
Water Rights Program
Department of Environment and Natural Resources

DEC 18 1995

date





**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE SOUTH DAKOTA 57501-3181

May 15, 1992

Dennis E. Olson, Finance Officer
City of Brandon
P.O. Box 95
Brandon, SD 57005

Dear Mr. Olson:

As requested, pursuant to South Dakota Well Construction Standard 74:02:04:21, the City of Brandon is authorized to construct a test well into the Split Rock Creek Aquifer, in the SW 1/4 NE 1/4 Sec. 3, T101N-R48W, Minnehaha County, prior to approval of a water permit. The test well must be constructed in accordance with the South Dakota Well Construction Standards. Any test holes that are abandoned must be plugged pursuant to the South Dakota Well Construction Standards.

If you have further questions, please feel free to contact me.

Very truly yours,

James A. Goodman, P.E.
Natural Resources Engineer
for JOHN HATCH, Chief Engineer
Water Rights Division
(605) 773-3352

CITY OF BRANDON

FROM THE OFFICE OF:

Dennis E. Olson
Municipal Finance Officer

Mr. John Hatch
Chief Engineer
Division of Water Rights
Department of Environment & Natural Resources
Pierre, SD 57501-3181



5-4-92

RE: Test Well, Brandon, SD

Dear Mr. Hatch;

Pursuant to ARSD 74:02:09:21, the City of Brandon is hereby requesting permission to construct a test well prior to approval of a test well permit. The proposed test well will be in the Splitrock Aquifer and will be located in the SW 1/4 NE 1/4, Section 3, T101, in the City of Brandon

Sincerely,

A handwritten signature in cursive script that reads "Dennis E. Olson".

Dennis E. Olson
Municipal Finance Officer



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181

April 17, 1995

Dennis Olson
Finance Officer
Brandon City Hall
P.O. Box 95
Brandon, SD 57005

Dear Mr. Olson:

This letter concerns the water permits held by the city of Brandon, the status of those permits, and information needed to license the permits. There are corrections and additions that require new applications. New applications are needed to get the city permitted for all of its water use.

Please find enclosed partially completed application forms, a map and instruction sheet. The application involves well number four with a diversion rate of 0.36 cubic feet per second (cfs), which is not authorized under any of the cities present permits. Also needing application is an additional diversion of 0.14 cfs from well number five. The waters applied for under this new application can come out of the future use permit 4002-3 and retain a priority date of September 12, 1977.

Future use permit 4002-3 reserves 902 acre feet of water in Section 34-T102N-R48W and Section 3-T101N-R48W. This new application would take 217 acre feet from the future use permit.

Application must also be made for an additional 0.07 cfs from city well number three. License 1804-3 and Permit Numbers 5296-3 and 5395-3 appropriate a combined 1.32 cfs (594 gpm) from well number three. The well has a maximum pumping rate of 1.39 cfs (625 gpm); an additional 0.07 cfs needs application. These waters come from the Split Rock Creek Aquifer and do not fall under Future Use Permit 4002-3.

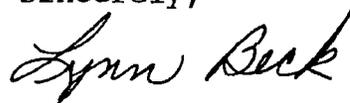
Below is a listing of the City of Brandon's water rights:

1. License 1804-3 appropriates 1.2 cubic feet of water per minute (cfs) from wells number 1, 2 and 3 with a priority date of January 25, 1971.
2. Future Use Permit No. 4002-3 reserves 902 acre feet of water from Section 34-T102N-R48W and Section 3-T101N-R48W with a priority date of September 12, 1977.
3. License 4434-3 appropriates 0.43 cfs (194 gpm) from two wells and 20.5 acre feet of storage used to irrigate the Municipal Golf Course.
4. Water Permit No. 4885-3 appropriates 0.28 cfs (126 gpm) from well number 5, with a priority date of April 20, 1982.
5. Water Permit No. 5296-3 appropriates an additional 0.33 cfs (150 gpm) for well number 3, with a priority date of March 22, 1989.
6. Water Permit No. 5395-3 appropriates an additional 0.43 cfs (194 gpm) from well number 3, with a priority date of March 8, 1990. A combined total of 1.32 cfs.
7. Water Permit No. 5507-3 appropriates 0.05 cfs (22.5 gpm) from a well at the Municipal Golf Course for the clubhouse with a priority date of January 28, 1991.

Once the Water Rights Division receives the applications, the licensing process can continue. If there is no opposition to the applications after they have been advertised, the permits can be licensed. After payment of the licensing and inspection fee, as per item number 7 on the instruction sheet, a Water License will be issued.

If you have any questions, please feel free to contact me.

Sincerely,



Lynn Beck
Natural Resources Engineer III
Water Rights Division, DENR
(605) 773-3352

encls

c Steve Brockmueller
Stockwell Engineers, Inc.
1621 S. Minnesota Ave.
Sioux Falls, SD 57105

RECEIPT

414519

Division of Water Rights

South Dakota Department of Environment and Natural Resources

Pierre, June 8, 19 95

RECEIVED OF City of Brandon, Brandon, SD 57006

the following amount in fees for services rendered as provided for by law:

Fee for Application for Permit No. _____ to Appropriate Water, to construct and to put water to beneficial use _____	
Fee for Application for Permit No. _____ to Appropriate Water, for Future Use _____	
Fee to retain Future Use Permit No. _____ after period of seven years.	
Fee for Inspecting Constructed Works, confirming beneficial use and issuing Water License No. <u>2269-3</u>	50 00
Fee for Filing Transfer Form _____	
Fee for Filing Extension Request _____	
Fee for _____	

Total	50 00
(Any Other Work Provided by Law)	

By [Signature]
Chief Engineer

File No.

**Water Rights Division
File Documentation**

NAME OF PERSON OR FILE: City of Brandon

ADDRESS: Brandon SD COUNTY: MA

DATE: 6-8-95 TELEPHONE:

RE: Filing fee

COMMENTS:

The City of Brandon submitted a check for \$375.00 with the two applications dealing with Well nos 3, 4, & 5. The fee was receipted as follows:

Application No. 5868-3 = \$ 50.00
(Well no. 3)

Application No. 5869-3 = \$225.00
(Well no 4 & 5)

License fee for each = \$ 50.00
\$ 50.00

\$375.00

Karen Schlaak

Karen Schlaak
Environmental Scientist

REPORT ON WATER PERMIT APPLICATION NO. 5869-3
for the City of Brandon
July 3, 1995

Application No. 5869-3 proposes to appropriate 0.50 cfs (225 gpm) from two existing wells. Water Permit No. 4885-3 appropriates 0.28 cfs from City Well # 5. This application proposes to increase the water appropriation from Well # 5 from 0.28 cfs to 0.42 cfs. This application also requests an additional diversion point to appropriate 0.36 cfs from Well # 4. Well # 4 and # 5 are 52 and 56 feet respectively and are located in the SE 1/4 NW 1/4 of section 3, T101N R48W in Minnehaha County. The combined appropriation will total 217 acre feet annually for municipal purposes by the City of Brandon. This water was appropriated and reserved by Future Use Permit No. 4002-3.

AQUIFER - BIG SIOUX SOUTH (BS-S)

The aquifer is a mostly unconfined glacial outwash (sand and gravel) which is under water table conditions. According to the Minnehaha County Study the wells for this application are located in the Brandon aquifer which is hydraulically connected to the Beaver Creek, Four Mile Creek and Big Sioux aquifers. For purposes of this report all of the minor aquifers have been included in the Big Sioux South aquifer system. The aquifer underlies 17, 200 acres (Hedges, 1982) and conservatively contains 50,000 acre feet of water in storage (Lindgren, 1992). The storage figure listed ignores the storage in the Big Sioux aquifer portion which is equivalent to the Big Sioux South.

The Water Rights Program monitors two observation wells, MA-75A and MA-75C, which are completed into the Big Sioux South aquifer and located within 1 mile of this application. Water levels for these wells show good response to climatic conditions, that is, rising water levels during wet years and gradually declining water levels during dry years. In general, the water level record indicates that the aquifer is capable of sustaining additional withdrawals (Water Rights, 1995).

REVIEW OF EXISTING WATER PERMITS/RIGHTS

The only other nearby permitted wells are for the City of Brandon. The two wells for this application are approximately 400 feet apart. Interference will occur. That is drawdown caused by pumping will extend to the other well. This is not expected to be adverse or cause any problems. The city has been using these wells for years with no apparent problems. This application was made to reflect the "as built" system for the City of Brandon.

CONCLUSIONS

1. Water is available from the Big Sioux South aquifer.
2. The aquifer is unconfined and under water table conditions in this area. Interference is not expected to be a concern. The City of Brandon has been using these wells with no apparent problems.

3. Information indicates that these wells were constructed in accordance with SD Well Construction Standards.
4. This application was made to reflect the actual system as built by the City of Brandon and approval of the application will allow licensing of Brandon's water system..


James A Goodman
Natural Resources Engineer

BIBLIOGRAPHY

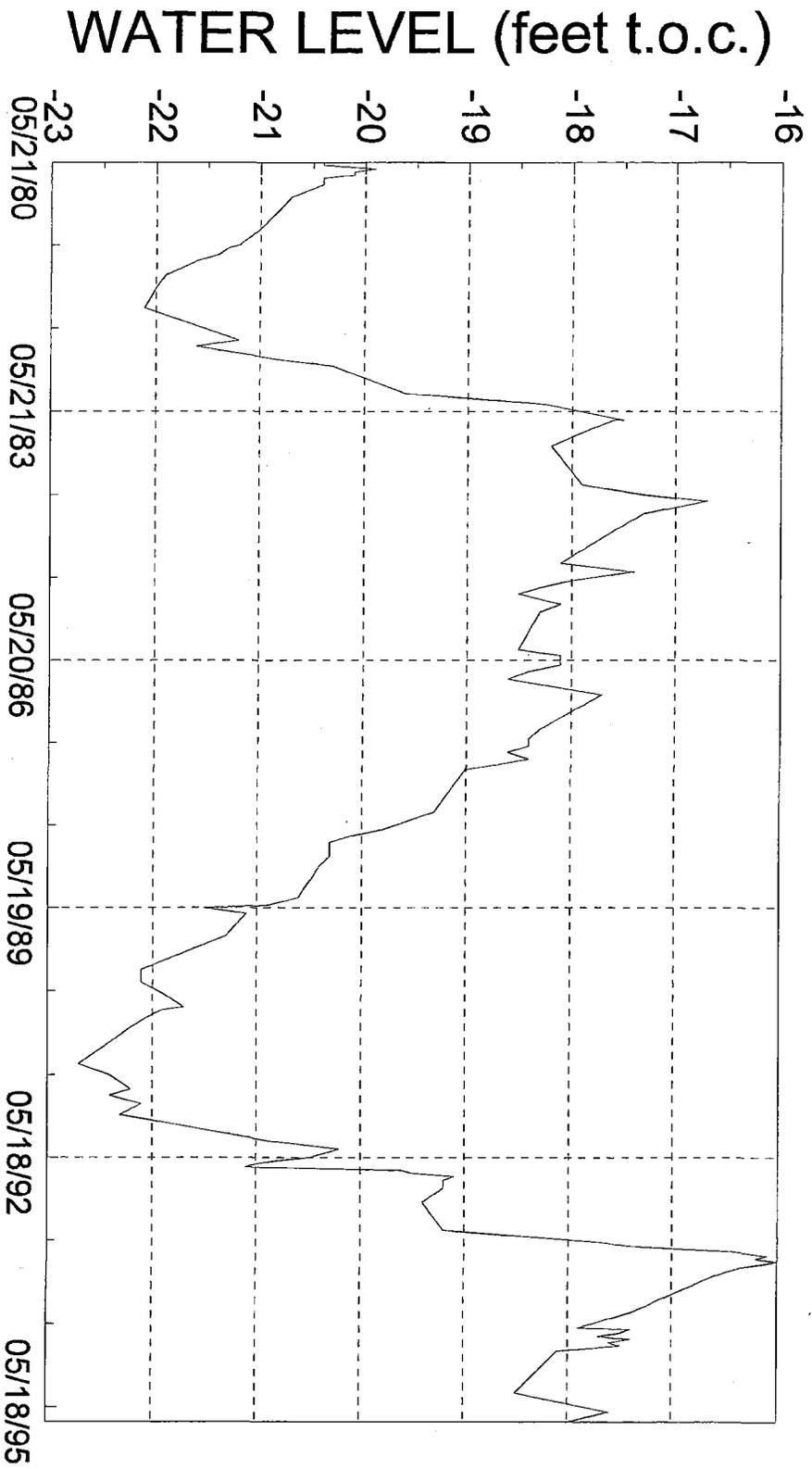
Hedges, L.S., etal, 1982, Evaluation of Ground-Water Resources South Dakota and Upper Big Sioux River, South Dakota and Iowa, for US Army Corps of Engineers, SD DENR, SDGS, Vermillion, SD, 57069.

Lindgren, R.L., C.A. Niehus, 1992, Water Resources of Minnehaha County, South Dakota, USGS WRI 91-4101, USGS, Huron, SD, 57350.

Water Rights, 1995, Unpublished Observation Well Data for Minnehaha County, SD DENR, Environmental Services Division, Water Rights Program, Pierre, SD, 57501.

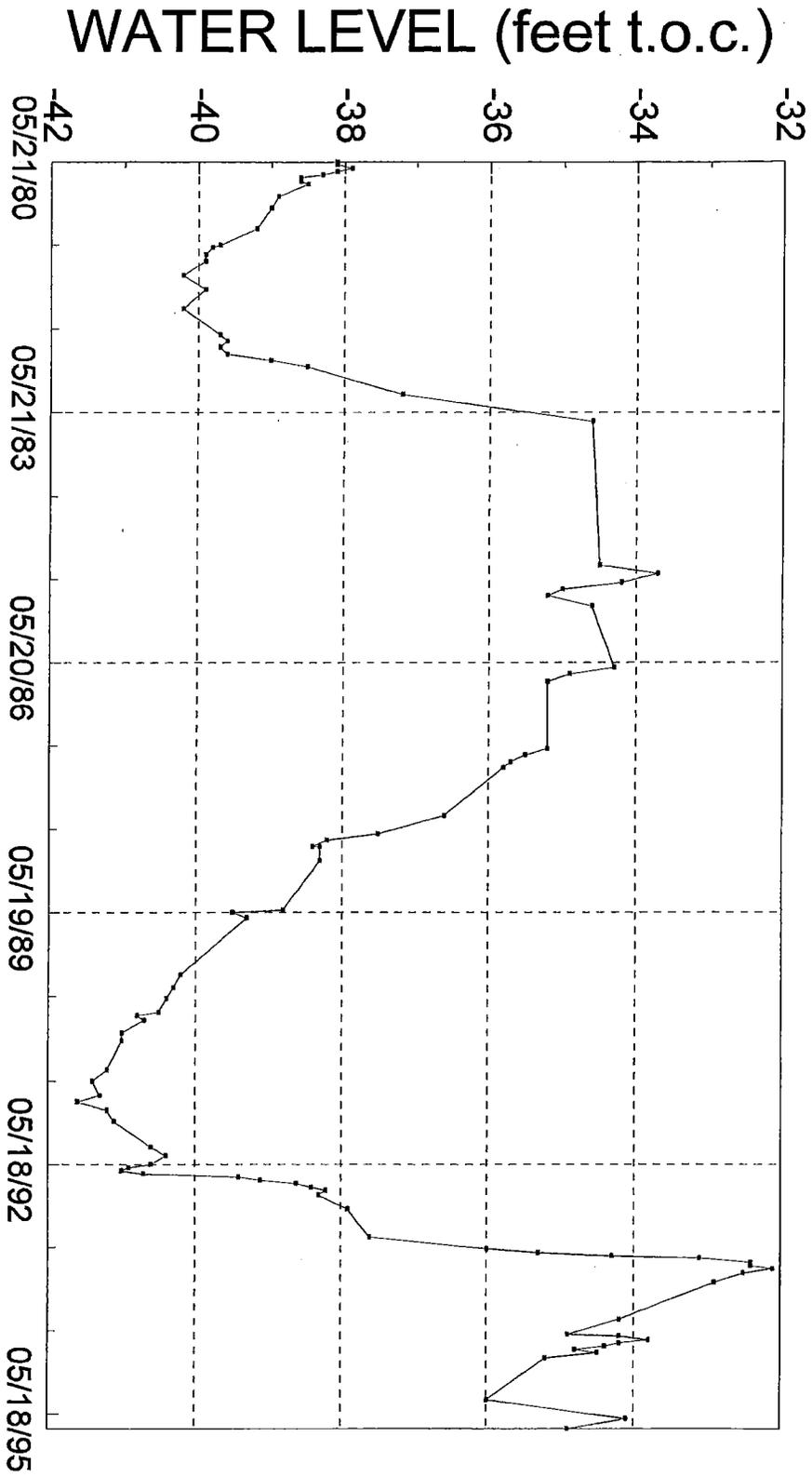
WATER RIGHTS OBSERVATION WELL

MA-75A



WATER RIGHTS OBSERVATION WELL

MA-75C



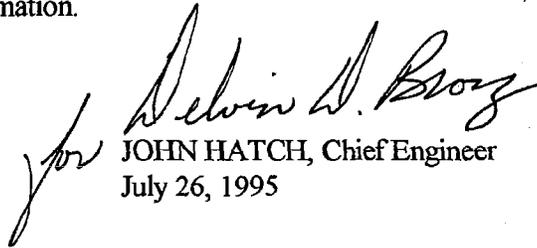
**RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT
APPLICATION NO. 5869-3, City of Brandon**

Pursuant to SDCL 46-2A-2, the following is the recommendation of the Chief Engineer, Water Rights Program, Department of Environment and Natural Resources concerning Water Permit Application No. 5869-3, City of Brandon, c/o Mayor Dennis Kleinvachter, PO Box 95, Brandon, SD 57005.

The Chief Engineer is recommending APPROVAL of Application No. 5869-3 because 1) there is reasonable probability that there is unappropriated water available for the applicant's proposed use, 2) the proposed diversion can be developed without unlawful impairment of existing rights, 3) the proposed use is a beneficial use and 4) in the public interest with the following qualification:

The wells approved under this Permit will be located near domestic wells and other wells which may obtain water from the same aquifer. The well owner under this Permit shall control his withdrawals so there is not a reduction of needed water supplies in adequate domestic wells or in adequate wells having prior water rights.

See report on application for additional information.

A handwritten signature in cursive script, appearing to read "John Hatch".
JOHN HATCH, Chief Engineer
July 26, 1995



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181

August 10, 1995

Argus Leader
PO Box 5034
Sioux Falls, SD 57117-5034

ATTENTION: Legal Department

Enclosed is a Notice of Hearing on Application Nos. 5868-3 and 5869-3 to be published twice. Please publish the first notice on August 18, 1995, with the second publication 7 days later.

The APPLICANT MUST VERIFY TO YOU THAT THE NOTICE IS TO BE PUBLISHED, before you make the first publication. Please BILL the APPLICANT for the cost of publication. The APPLICANT is City of Brandon, c/o Mayor Dennis Kleinvachter, PO Box 95, Brandon, SD 57005 (Ph # 605-582-6515).

A copy of BOTH publications must be SENT to the WATER RIGHTS PROGRAM. IMMEDIATELY return the FIRST publication with the FIRST Transmittal form on the bottom of this page. The first copy is needed to check the publication for errors so any corrections can be made in the second publication. Publication errors can invalidate the public notice and cause the applicant costly delays.

Please be sure the SECOND publication is returned IMMEDIATELY with the enclosed Proof of Publication form. DO NOT WAIT until the end of the month or the billing cycle. No action may be taken on the permit applications until proof of publication has been received.

Sincerely,

Eric Gronlund /KS
Eric Gronlund
Natural Resources Engineer
605 773-3352

enclosures

-----CUT HERE-----

FIRST TRANSMITTAL NOTICE

TO: Eric Gronlund
Water Rights Program
Joe Foss Building
Pierre SD 57501-3181

No. _____

Date _____

We are in receipt of your letter of _____ enclosing Notice of Hearing to Appropriate Water by Application No. _____ which was first published in our issue of _____. **ENCLOSED IS A COPY OF THIS FIRST PUBLICATION.**

Name

Newspaper



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181

**NOTE: TO BE SURE OF PUBLICATION ON
THE CORRECT DATES, CONTACT
THE NEWSPAPER RIGHT AWAY.**

August 10, 1995

Dennis Kleinvachter, Mayor
PO Box 95
Brandon, SD 57005

Dear Mr. Kleinvachter:

Water Permit Application Nos. 5868-3 and 5869-3 for municipal use have been examined and found to comply with the South Dakota Water Laws and applicable rules. A notice of hearing has been sent to the Publisher of the Argus Leader printed at Sioux Falls, SD (Ph # 605-331-2200). For your information, a copy of the notice, the recommendations of the Chief Engineer and reports on the applications are enclosed. Please review the notice prior to publication and notify this office, if you have any corrections or questions.

Be sure to contact the above newspaper to authorize publication of your Notice of Hearing and to arrange for payment. Early contact with the paper can eliminate delays. The publisher has been instructed to publish your notice once each week for two consecutive weeks with the last publication to occur twenty days before the board meeting. The newspaper has been instructed to send us the Proof of Publication. We must receive Proof of Publication before action can be taken on the applications.

Sincerely,

Eric Gronlund / ks

Eric Gronlund
Natural Resources Engineer
605 773-3352

enclosures

NOTE: If you plan to contest any part of the Chief Engineer's recommendations, you must file a petition pursuant to the procedures outlined in the attached notice of hearing. The Water Management Board will then consider your concerns during a hearing on the applications.

Instruction to Newspaper - Publish first Notice on August 18, 1995, with the second publication 7 days later. The applicant is responsible for payment.

NOTICE OF APPLICATION NOS. 5868-3 and 5869-3 to Appropriate Water

Notice is given that the City of Brandon, PO Box 95, Brandon, SD 57005 has filed applications for two water permits.

Application No. 5868-3 proposes to appropriate 0.07 cubic feet of water per second (cfs) by increasing the diversion rate authorized by Water Right No. 1804-3 and Water Permit Nos. 5296-3 and 5395-3. Water Right No. 1804-3 and Water Permit Nos. 5296-3 and 5395-3, combined, appropriate 1.32 cfs from the City of Brandon's Well No. 3 (Split Rock Creek Aquifer) 222 feet deep located in the NW 1/4 SW 1/4 Section 35-T102N-R48W. This application proposes to increase the water appropriation of Well No. 3 from 1.32 cfs to 1.39 cfs.

Application No. 5869-3 proposes to appropriate 0.50 cfs. Water Permit No. 4885-3 appropriates 0.28 cfs from the City of Brandon's Well No. 5. This application proposes to increase the water appropriation from Well No. 5 from 0.28 cfs to 0.42 cfs. This application also requests an additional diversion point to appropriate 0.36 cfs from Well No. 4. Well Nos. 4 and 5 (Big Sioux South Aquifer) 52 and 56 feet deep are located in the SE 1/4 NW 1/4 Section 3-T101N-R48W and propose a combined appropriation of 0.50 cfs (217 acre-feet of water annually). This water was appropriated and reserved by Future Use Permit No. 4002-3. This water will be used to supply the City of Brandon.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application Nos. 5868-3 and 58769-3 because 1) unappropriated water is available, 2) existing rights will not be unlawfully impaired, 3) it is a beneficial use of water, and 4) it is in the public interest. In accordance with SDCL 46-2A-23, the chief engineer will act on the applications, as recommended, unless a petition is filed opposing the applications or the applicant files a petition contesting the chief engineer's recommendations. If a petition opposing the applications or contesting the recommendations is filed, then a hearing will be scheduled and the Water Management Board will consider the applications. Notice of the hearing will be given to the applicant and any person filing a petition.

Any person interested in opposing or supporting these applications or recommendations must file a written petition with BOTH the applicant and chief engineer. The applicant must file a petition if contesting the chief engineer's recommendations. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E Capitol, Pierre SD 57501 (605 773-3352)" and the applicant's mailing address is given above. A petition filed by either an interested person or the applicant must be filed by September 5, 1995.

The petition may be informal, but must include a statement describing the petitioner's interest in the applications, the petitioner's reasons for opposing or supporting the applications, and the signature and mailing address of the petitioner or the petitioner's legal counsel, if legal counsel is obtained. Contact Eric Gronlund at the above Water Rights Program address to request copies of information pertaining to these applications. Nettie H. Myers, Secretary, Department of Environment and Natural Resources.

PROOF OF PUBLICATION

STATE OF SOUTH DAKOTA)
) SS
County of Minnehaha)



I, D. Reicher

certify that the attached printed Notice was

taken from the Argus Leader

printed and published in Sioux Falls

County of Minnehaha and State of

South Dakota. The notice was published in
the newspaper on the following two dates:

Friday, August 18, 1995

Friday, August 25, 1995

Cost of Printing: 103.37

D. Reicher
(Signature) *MR*

Assistant Controller
(Title)

8/25/95
(Date Signed)

NOTICE OF APPLICATION
NO. 888-3 and 889-3
to Appropriate Water

Notice is given that the City of Brandon, PO Box 66, Brandon, SD 57005 has filed applications for two water permits.

Application No. 888-3 proposes to appropriate 0.07 cubic feet per second (cfs) by increasing the diversion rate authorized by Water Right No. 1804-3 and Water Permit Nos. 8288-3 and 5395-3, Water Right No. 1804-3 and Water Permit Nos. 8296-3 and 5395-3, combined; appropriate 1.32 cfs from the City of Brandon's Well No. 3 (Split Rock Creek Aquifer) 222 feet deep located in the NW 1/4 SW 1/4 Section 35-T102N-R48W. This application proposes to increase the water appropriation of Well No. 3 from 1.32 cfs to 1.39 cfs.

Application No. 889-3 proposes to appropriate 0.50 cfs. Water Permit No. 4885-3 appropriates 0.28 cfs from the City of Brandon's Well No. 5. This application proposes to increase the water appropriation from Well No. 5 from 0.28 cfs to 0.42 cfs. This application also requests an additional diversion point to appropriate 0.38 cfs from Well No. 4, Well Nos. 4 and 5 (Big Sioux South Aquifer) 52 and 56 feet deep are located in the SE 1/4 NW 1/4 Section 3-T101N-R48W and propose a combined appropriation of 0.50 cfs (217 acre-feet of water annually). This water was appropriated and reserved by Future Use Permit No. 4002-3. This water will be used to supply the City of Brandon.

Pursuant to SDCL 48-2A-2, the Chief Engineer recommends APPROVAL of Application Nos. 888-3 and 889-3 because 1) unappropriated water is available, 2) existing rights will not be unlawfully impaired, 3) it is a beneficial use of water, and 4) it is in the public interest. In accordance with SDCL 48-2A-23, the chief engineer will act on the applications, as recommended, unless a petition is filed opposing the applications or the applicant files a petition contesting the chief engineer's recommendations. If a petition opposing the applications or contesting the recommendations is filed, then a hearing will be scheduled and the Water Management Board will consider the applications. Notice of the hearing will be given to the applicant and any person filing a petition.

Any person interested in opposing or supporting these applications or recommendations must file a written petition with BOTH the applicant and chief engineer. The applicant must file a petition if contesting the chief engineer's recommendations. The Chief Engineer's address is: Water Rights Program, Foss Building, 523 E Capitol, Pierre, SD 57501 (605-773-3352) and the applicant's mailing address is given above. A petition filed by either an interested person or the applicant must be filed by September 5, 1995.

The petition may be informal, but must include a statement describing the petitioner's interest in the applications, the petitioner's reasons for opposing or supporting the applications, and the signature and mailing address of the petitioner or the petitioner's legal counsel, if legal counsel is obtained. Contact Eric Gronlund at the above Water Rights Program address to request copies of information pertaining to these applications.

Nellie H. Myers, Secretary
 Department of Environment
 and Natural Resources
 8371 Aug. 18, 1995

REPORT ON INSPECTION OF PERMIT NO. 5869-3

DATE: July, 1992

Other permit(s) associated with the project: Lic. 1804-3, Permit Nos. 4885-3, 5296-3 and 5395-3

DIVERSION POINT LEGAL LOCATION: Well #4 - 850 feet N and 600 feet W from the center of Section 3-T101N-R48W.

WELL INFORMATION:

- 1) Well Drilling Firm: Thorpe Well Company
- 2) No. of Wells 1
- 3) Depth(s) 52 feet
- 4) Well log is available N
- 5) Comment:

Casing:

- 1) Diameter 10 inches
- 2) Length 37 feet
- 3) Type steel

Screen:

- 1) Type stainless steel
- 2) Length 15 feet
- 3) Static water level 20 feet

Pump:

- 1) Make Ground Fos
- 2) Model SP-45-2
- 3) Size
- 4) Capacity 160 (pumping rate) GPM

Motor:

- 1) Make Franklin
- 2) Model No.
- 3) Horsepower rating 5 hp

SYSTEM TYPE: Municipal water supply.

PERMIT QUALIFICATIONS AND REGULATIONS:

- 1) Special qualifications to permit being abided by Y
- 2) All structures, wells and lands on map Y

Permit No. 5869-3
Big Sioux River - Water District

Report Of Examination Of Works And/Or Application of Water To Beneficial Use

TO: Chief Engineer, Division of Water Rights, DENR, Foss Bldg., Pierre, SD 57501

I have this day made a thorough examination of the water use system constructed by the City of Brandon of P.O. Box 38, Brandon, SD 57005 holder of Permit No. 5869-3, bearing the priority of authorizing the diversion of 0.36 cu. ft. per second of the waters of Big Sioux-South Aquifer for municipal purposes, in Minnehaha County.

I have to report on the conditions of the same as follows:

- A. Works used to divert the water:
Well #4 - 52 feet deep, 37 feet of 10 inch steel casing and 15 feet of stainless steel screen. The well has a Ground Fos pump, model no. SP-45-2 with a pumping rate of 160 gpm and a 5 hp Franklin motor.
- B. Works used to transport water to place of use:
Distribution system for Brandon's municipal water supply.
- C. Works used to apply water to beneficial use:
Municipal water system.

The system is in the following condition good. The point of diversion is located 850 feet N and 600 feet W from the center of Section 3-T101N-R48W. The works are capable of diverting and conveying to the place of use 0.36 cu. ft. per second of water which is to be used for a municipal water supply. The license should be issued for 0.36 cfs. Applicable permit qualifications have been complied with: Yes No

Exceptions to compliance are: none Date: 4-13-95

COMMENTS: This report is based on an inspection by Greg Johnston done in July, 1992.


Lynn Beck
Natural Resources Engineer
DENR, Water Rights Division

STATE OF SOUTH DAKOTA

WATER LICENSE NO. 5869-3

(1) The City of Brandon, PO Box 95, Brandon SD 57005 made Application No. 5869-3, June 8, 1995 for a water permit to appropriate 0.50 cubic feet of water per second from groundwater (two wells), Minnehaha County, South Dakota for municipal use purposes. Permit No. 5869-3, with a priority date of September 12, 1977 was approved September 5, 1995 and issued to the applicant for diversion of water with construction of the described water supply system completed and the application to beneficial use of said water completed.

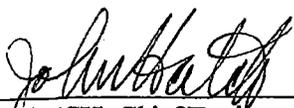
Water Permit No. 4885-3 appropriates 0.28 cfs from the City of Brandon's Well No. 5. Water Permit No. 5869-3 authorizes an increase in the water appropriation for Well No. 5 from 0.28 cfs to 0.42 cfs. No. 5869-3 also authorizes an additional diversion point (known as Well No. 4) to appropriate 0.36 cfs. Well Nos. 4 and 5 (Big Sioux Aquifer) 52 and 56 feet deep are located in the SE 1/4 NW 1/4 Section 3-T101N-R48W and authorize a combined appropriation of 0.50 cfs (217 acre-feet of water annually). This water was appropriated and reserved by Future Use Permit No. 4002-3 (priority date of September 23, 1977).

The applicable portions of Water Right No. 4885-3 have been incorporated into Water License No. 5869-3.

(2) It is certified that the applicant has complied with the provisions of South Dakota State Law relating to completion of the construction of the water supply system and is entitled to divert 0.78 cubic feet of water per second for beneficial use. The location of the diversion points are Well #4 - 850 feet north and 600 feet west from the center of Section 3; Well #5 - 450 feet north and 600 feet west from the center of Section 3: all in T101N-R48W (SE 1/4 NW 1/4).

(3) The applicant has complied with the provisions of South Dakota State Law relating to the application of water to beneficial use.

(4) Pursuant to South Dakota Water Law 46-5-30.1 the City of Brandon, PO Box 38, Brandon SD 57005 the holder and/or owner of Incorporated Water Permit No. 5869-3 is issued a license to appropriate water, the right to use 0.78 cubic feet of water per second from groundwater (two wells) with a priority date of April 20, 1982 (0.28 cfs) and September 12, 1977 (0.50 cfs) from the location specified in (2) of this license. The water to be used for the purpose of municipal use. This license is subject to any limitations or qualifications listed in Incorporated Water Permit No. 5869-3 and subject to South Dakota State Law.



JOHN HATCH, Chief Engineer
Water Rights Program
Department of Environment and Natural Resources

DEC 18 1995

date



January 17, 2001

2000 South Dakota Water Use Questionnaire

To:

Address correction requested:

CITY OF BRANDON
PO BOX 95
BRANDON SD 57005 0095

One questionnaire is being provided for each permitted water source. The following information is based on Water Permit\Right No. 5869-3. If you have other permits\righs in the same water source, also include water use under those permits\righs on this questionnaire.

Water Source: GROUNDWATER
Aquifer: BIG SIOUX
Management Unit: SOUTH

County: MINNEHAHA
Pumping Pt. Legal: SEC 03-T101N-R48W
Type of Water Use: MUNICIPAL

- 1) Please estimate your year 2000 water use from the above water source: 0 gallons
- 2) If no water use in 2000, please list the reason(s) why in the comments section.

Comments: Wells #4 & #5 under this permit have been placed on
A stand by status as a result of the new treatment plant
and the construction of well #6 in the Splitrock Creek
Aquifer.

Contact Person: Dennis E. Olson

Telephone No: 605-582-6515



Questions? Please call Mark Rath or Ron Duvall at 605 773-3352 for assistance.

Thank you for completing the 2000 water use questionnaire.

Water Rights on the Web: www.state.sd.us/denr/wr





**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181

DEC 18 1995

Dennis Olson, Finance Officer
City of Brandon
PO Box 95
Brandon SD 57005

Dear Mr. Olson:

Enclosed are Water Permit and Water License Nos. 5868-3 and 5869-3, as well as receipts assessed for the inspections and issuance of the licenses. Water License Nos. 5868-3 and 5869-3 are the final documents which complete the process of obtaining water rights.

The applicable portions of Water Right No. 1804-3 and Water Permit Nos. 5296-3 and 5395-3 have been incorporated into Water License No. 5868-3. The applicable portions of Water Right No. 4885-3 have been incorporated into Water License No. 5869-3.

For your information SDCL 46-6-27 requires that if the owner of an existing well, such as the wells authorized by the above permits, constructs a replacement well and does not plan to use the old well, the old well is considered abandoned and must be plugged. Also, any well that is being used or is not considered abandoned must be valved and controlled, if flowing, or sealed and capped so that no leaking occurs either underground or at the surface.

As long as the City of Brandon uses the water beneficially, as stated in the Water Licenses, the State Water Laws provide that you have a continuing right to use the water. If you have any questions, please contact our office.

Very truly yours,

JOHN HATCH, Chief Engineer
Water Rights Program
605 773-3352

enclosures

WATER PERMIT NO. 6156-3

Name of Applicant: City of Brandon

Address: PO Box 95, Brandon SD 57005

Phone: 605 582-6515

Amount of Water Claimed: 2.23 cfs (968 AF)

Total Acres: NA

Source of Water Supply: groundwater (one well)

Water to be used for: municipal

County: Minnehaha

Type of Waste Disposal System: NA

Location:

PRIORITY Date Received: 11-4-99

Fee: \$150

Corrected Application Received: 11-29-1999

Period of Annual Use: January 1 – December 31

Remarks: Increases the diversion rate authorized by Water Permit No. 6156-3

Diversion Point: SW ¼ NE ¼ Sec 3-T101N-R48W

Land to be Irrigated: NA

Depth of Well: 280

Well Driller: LTP Enterprise, Inc.

Remarks:

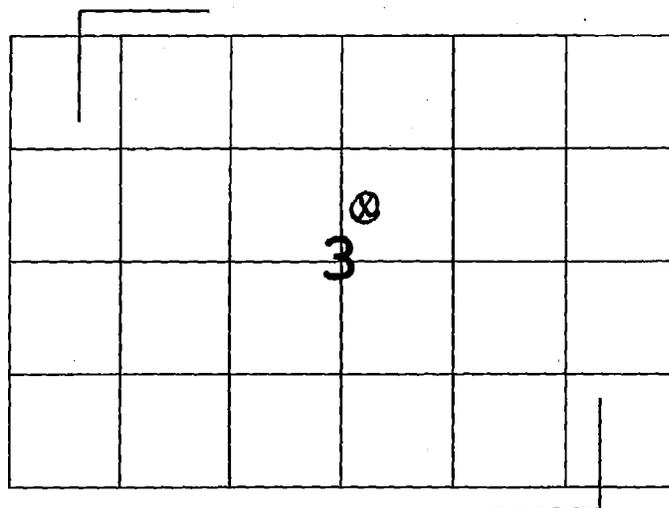
Type of Map: plat

Prepared by: Steve W Brockmueller, PE

Reviewed and the Number Assigned on: 11-29-1999

By: Karen Schlaak

Notice of Hearing - date to intervene: _____



FORM 2: Application for uses other than irrigation
(type or print)

Mail to: Water Rights Program Joe Foss Building 523 E. Capitol Pierre, SD 57501-3181 (605) 773-3352	(office use only)	
	No. <u>6156-3</u>	Hydrologic Unit <u>10170203</u>
	Basin <u>Sisau River</u>	Newspaper <u>The Argus Leader, SIOUX FALLS, SD</u>



Application For Permit To Appropriate Water Within The State Of South Dakota

Check use(s) of water:

<input checked="" type="checkbox"/> Municipal	<input type="checkbox"/> Suburban Housing	<input type="checkbox"/> Recreational	<input type="checkbox"/> Institutional
<input type="checkbox"/> Rural Water System	<input type="checkbox"/> Commercial	<input type="checkbox"/> Fish & Wildlife	<input type="checkbox"/> Geothermal Heat
<input type="checkbox"/> Domestic (over 18 gpm)	<input type="checkbox"/> Industrial	<input type="checkbox"/> Other	

Type of Application: New Vested Right (Use predates Mar 2, 1955) Future Use Reservation
 (check one) Place to Beneficial Use Water Reserved by Future Use Permit No. _____
 Amendment/Correction to Permit No. 6027-3

Description of amendment/correction: (i.e. change diversion point(s), add diversion point(s), change use, etc.)
change the rate of diversion

1. Name of Applicant City of Brandon Phone 582-6515
 (check one) Owner Tenant/lessee
 Mailing Address P.O. Box 95 Brandon State SD 57005
(223 6th St) (Street, RR. or Box) (Zip Code)

2. Amount of water claimed 4.46 *CFS or **GPM 968 ***AF
 (*Cubic Feet per Second) (**Gallons per Minute) (***)Acre Feet - storage capacity of dam/dugout or annual use if applicable

3. Source of water supply Split Rock Creek Aquifer

4. Location of point of diversion (example - 3 wells in SW1/4 NE1/4 section 12-T104N-R53W)
1 well in SW1/4 NE1/4 Sec. 3-T101N-R48W
 County Minnehaha

5. County or counties where water will be used Minnehaha

6. Annual period during which water is to be used January through December 31

7. Give a description of the project. When available include any preliminary engineering report or other reports or information that will help explain the project. (Attach sheet if more space is needed)
 This well was recently constructed in conjunction with a new water treatment plant. The well as constructed was test pumped and found to be capable of producing 2000 gpm of water and a pump capable of this flow was installed. The water treatment plant is designed to treat a flow of 2000 gpm. The City is currently throttling the valve to the reduced flow but would like to pump at the higher rate to improve efficiency.

STATE OF SOUTH DAKOTA) SS Attachments: Attach Form 2A if diversion is from a well or dugout, or if storage of water is proposed. Attach map and any other technical information. (see instructions)
 County of Minnehaha)

I, Michael G. Schultz, the applicant, certify that I have read this application, have examined the attached map and that the matters stated are true and that I intend, and am able to complete the necessary construction.

Signed Michael G. Schultz

Subscribed and sworn to before me this 1st day of November 1999

Richard E. Olson
 Notary Public

**SOUTH DAKOTA
WATER PERMIT NO. 6156-3**

Date of first receipt of application November 4, 1999.

Date of return to applicant for corrections, amendments or changes November 4, 1999.

Date of receipt of corrected application November 19, 1999.

The Chief Engineer, on behalf of the Water Management Board, issues Water Permit No. 6156-3 to City of Brandon, PO Box 95, Brandon SD 57005 authorizing the construction of the water use system and the placing of water to beneficial use subject to the following limitations, conditions and qualifications:

1. Water Permit No. 6156-3 authorizes an additional diversion rate of 2.23 cubic feet of water per second (cfs) from an existing well. Water Permit No. 6027-3 currently appropriates 2.23 cfs (968 acre-feet of water annually) from one well (Split Rock Creek Aquifer) 275 feet deep located in the SW ¼ NE ¼ Section 3-T101N-R48W. This permit authorizes increasing the diversion rate from this well to a total of 4.46 cfs without increasing the annual volume of 968 acre-feet of water.
2. The water appropriated shall be used for the purpose of supplying water for municipal use and may not exceed the amount of water needed for beneficial use.
3. The water is to be used during the following described annual period: January 1 – December 31.
4. The date of approval of Permit No. 6156-3 is February 7, 2000.
5. The date from which applicant may claim right is November 4, 1999.
6. One-fifth of the construction is to be completed on or before August 7, 2002.
7. All construction is to be completed on or before February 7, 2005.
8. Water is to be put to beneficial use on or before February 7, 2009.
9. Water rights obtained in compliance with the laws of the State of South Dakota may not be unlawfully impaired by this appropriation.

QUALIFICATIONS

1. The well approved under this Permit will be located near domestic wells and other wells which may obtain water from the same aquifer. The well owner under this Permit shall control his withdrawals so there is not a reduction of needed water supplies in adequate domestic wells or in adequate wells having prior water rights.
2. The City of Brandon shall report to the Chief Engineer annually the amount of water withdrawn each year from the Split Rock Creek Aquifer.
3. Permit Nos. 6027-3 and 6156-3, combined, authorize a total annual diversion of 968 acre feet of water annually.

WATER MANAGEMENT BOARD

By: Garland Erbele
Garland Erbele, Chief Engineer
Water Rights Program
Department of Environment and Natural Resources

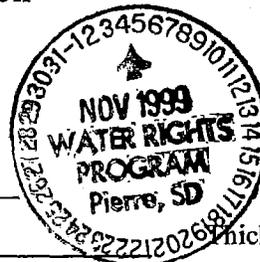
FEB 22 2000

date



Supplemental Information

(type or print in ink)



1. Well Information - Proposed Construction

- a) Drill Hole Diameter 24" Depth 215'
- b) Casing Type steel A53-906 Diameter 18" Thickness 0.375"
- c) Screen Type stainless steel Diameter 12 Thickness ±7/8"
- d) Gravel Pack natural development Length of Gravel Pack _____
- e) Depth to Top of Water Bearing Material 146'
- f) Depth to Water (ground surface to water level) 22.91'
- g) Distance to nearest existing domestic well:

	600' to shallow wells	300' to shallow wells
On applicants property	<u>in Big Sioux South</u>	On property owned by others
	Aquifer	Aquifer, 3000' to well
		in Split Rock Creek
		Aquifer

2. Wastewater Disposal System Information

- a) Type of System (i.e. septic tank, drain field) _____
- b) System Capacity (gallons) _____ Year Constructed _____
- c) Connected to the City of _____ Sanitary System _____

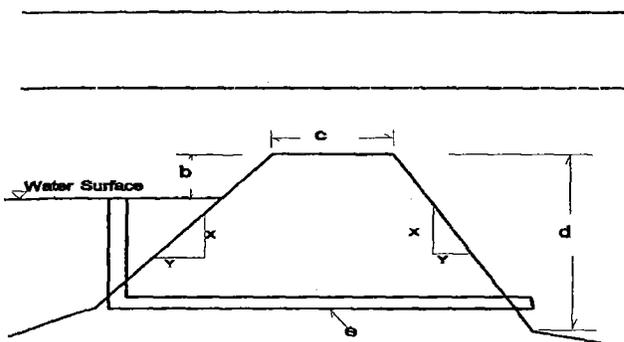
3. Dugout Information

- a) Surface Dimensions _____ Depth _____
- b) Depth to water (ground surface to water level) _____

4. Water Storage Dams

If the proposed water use system contains one or more storage dams, please furnish the information requested below for each dam. The locations of the dams need to be shown on the map submitted with the application.

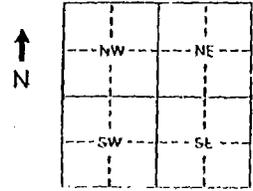
- a) If a private engineering firm or government agency was involved in the design of this dam, please give their name and address:



- b) Freeboard _____
- c) Crest Width _____
Crest Length _____
- d) Height _____
- e) Primary Outlet Capacity _____
If pipe, diameter _____
- f) Secondary Spillway Capacity _____
Spillway Width _____
- g) X & Y Slope _____
Upstream _____
Downstream _____
- h) Surface Area of Impoundment _____
- i) Storage _____ Acre Feet
- j) Drainage Area Above Dam _____ Acres



FARGO, N.D.
HUTCHINSON, MN.



Sec. _____ T. _____ R. _____

DRILLERS LOG

Drilled for City of Brandon, SD By Fargo Office _____

Location of Test Hole Legal SE SW NW SE Sec. 3 T101N R48W

South East corner of Park Test Hole No. 1-98 Well No. _____

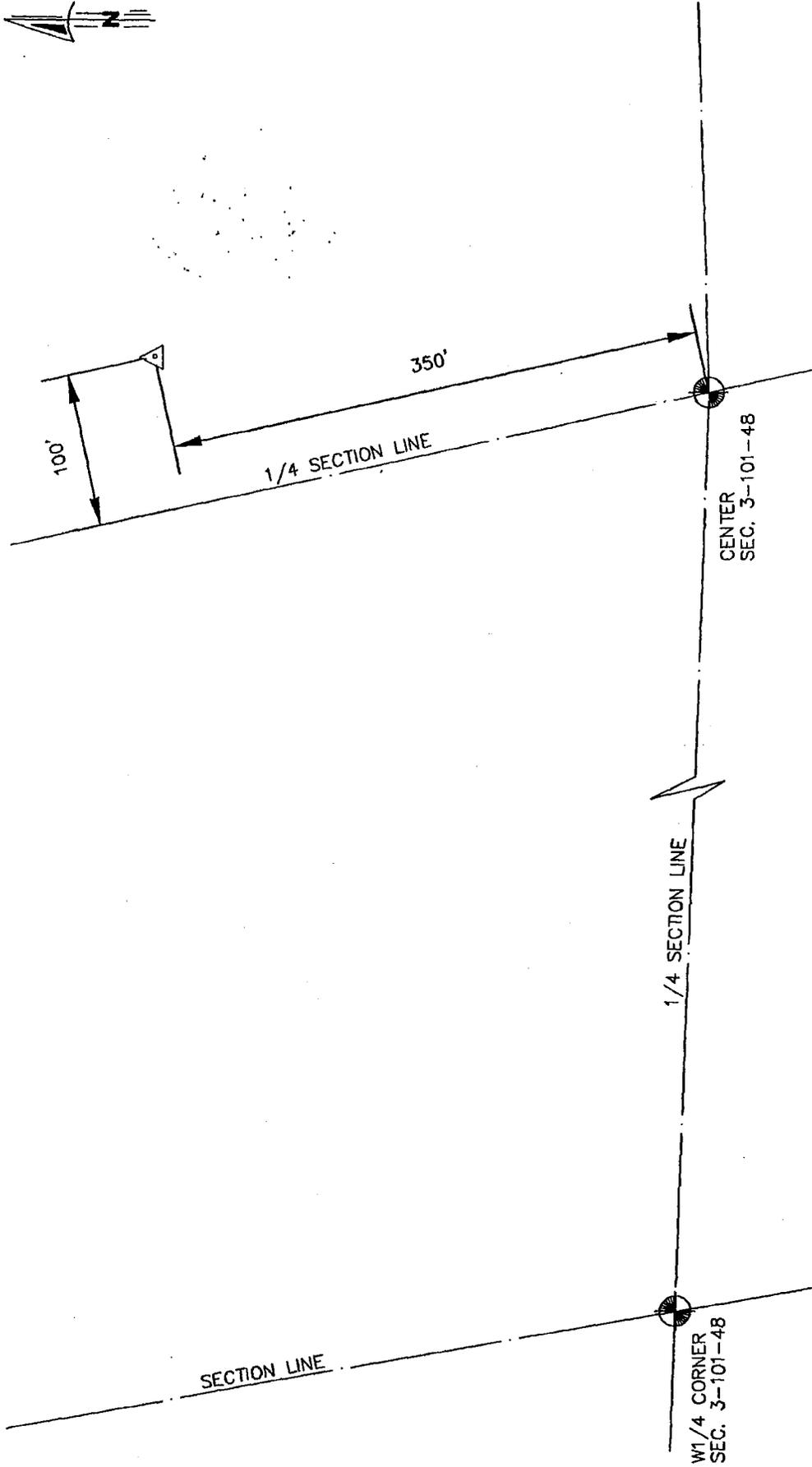
Size of test hole 6 3/4 Date started 9-1-98 Date completed 9-1-98 Total Hours _____

FORMATIONS DRILLED

TYPE OF FORMATION	COLOR OF FORMATION	STARTED AT WHAT DEPTH	ENDED AT WHAT DEPTH	THICKNESS OF FORMATION
Top Soil	Black	G.L.	4	4
Clay	Brown	4	12	8
Sand	Brown	12	15	3
Gravel	Colored	15	27	12
Rock-gravel	Colored	27	34	7
Clay (hard)	Gray	34	46	12
Sand	Colored	46	58	12
Clay w/small lenses of clay	Gray	58	75	17
Sand w/lenses of clay (poor sample)	Gray	75	89	14
Rock & Sand	Colored	89	91	2
Sand & gravel	Colored	91	96	5
Silt Stone & shale (hard)	Blk, Gray	96	124	28
Shale (Brittle)	Blk, Gray	124	145	21
Fine Sand (drilled dirty)	Gray	145	151	6
Sand (drilled fair) w/lenses of Clay	Gray	151	161	10
Sand (drilled good)	Pink Gray	161	238	77
Dirty sand & Shale	Blk; Gray, PK	238	243	5
Finer sand (drilled fair) took water	Pink	243	275	32
Shale w/small sand lenses	Gray, Blk	275	280	5



Signed Don Heitmanek Driller



WELL LOCATION
SW1/4SW1/4NE1/4 SEC. 3-T101-R48
APPLICATION FOR WATER PERMIT
CITY OF BRANDON

NOVEMBER 17, 1997

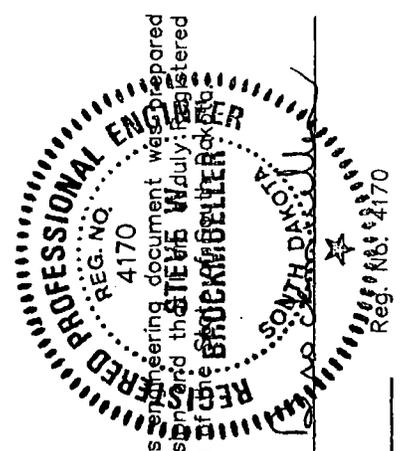
SHEET 1 OF 1

6156-3

W1/4 CORNER
 SEC. 3-101-48

1/4 SECTION LINE

SECTION LINE



I hereby certify that this engineering document was prepared under my direct supervision and that I am a duly registered Engineer under the laws of the State of South Dakota.

By: Steve W. Brockmueller
 Steve Brockmueller
 Reg. No. 4170

Date: 11-20-97

RECEIPT

Water Rights Program

South Dakota Department of Environment and Natural Resources

No 416245

Pierre, November 4, 1999

RECEIVED OF City of Brandon, Brandon, SD 57806
the following amount in fees for services rendered as provided for by law:

Fee for Application for Permit No. <u>6/56-3</u> to Appropriate Water, to construct and to put water to beneficial use _____	150 00
Fee for Application for Permit No. _____ to Appropriate Water, for Future Use _____	
Fee to retain Future Use Permit No. _____ after period of seven years.	
Fee for Inspecting Constructed Works, confirming beneficial use and issuing Water License No. _____	
Fee for Filing Transfer Form _____	
Fee for Filing Extension Request _____	
Fee for _____	

(Any Other Work Provided by Law)	150 00
Total	150 00

By 
Chief Engineer

RECEIPT

Water Rights Program

South Dakota Department of Environment and Natural Resources

NE 416269

Pierre, November 19, 1999

RECEIVED OF City of Brandon, P.O. Box 95, Brandon, SD 57005
the following amount in fees for services rendered as provided for by law:

Fee for Application for Permit No. _____ to Appropriate Water, to construct
and to put water to beneficial use _____

Fee for Application for Permit No. _____ to Appropriate Water, for Future
Use _____

Fee to retain Future Use Permit No. _____ after period of seven years.

Fee for Inspecting Constructed Works, confirming beneficial use and issuing Water
License No. 6156-3

Fee for Filing Transfer Form _____

Fee for Filing Extension Request _____

Fee for _____

50 00

(Any Other Work Provided by Law)

Total

50 00

By John Hatch
Chief Engineer

REPORT FOR
WATER PERMIT APPLICATION NO. 6156-3
CITY OF BRANDON
JANUARY 10, 1999

Water Permit Application No. 6156-3 proposes an additional diversion rate of 2.23 cubic feet of water per second (cfs) from an existing well. Water Permit No. 6027-3 currently appropriates 2.23 cfs (968 acre-feet of water annually), from one well (Split Rock Creek Aquifer), 275 feet deep, located in the SW¼ NE¼ Section 3, T101N-R48W. This application proposes to increase the diversion rate from this well to 4.46 cfs without increasing the annual volume of 968 acre-feet of water. The water is for municipal use.

AQUIFER: Split Rock Creek (SRKC)

AQUIFER CHARACTERISTICS:

The Split Rock Creek Aquifer is composed of the interbedded sand, siltstone, shale and claystone of the Cretaceous aged Split Rock Creek Formation. The Split Rock Creek Formation occurs in paleo-valleys in the Sioux Quartzite where the quartzite is deeply buried. The main body of the aquifer is located in a narrow valley approximately three to four miles wide that extends from the eastern edge of Sioux Falls into Minnesota (figure1).

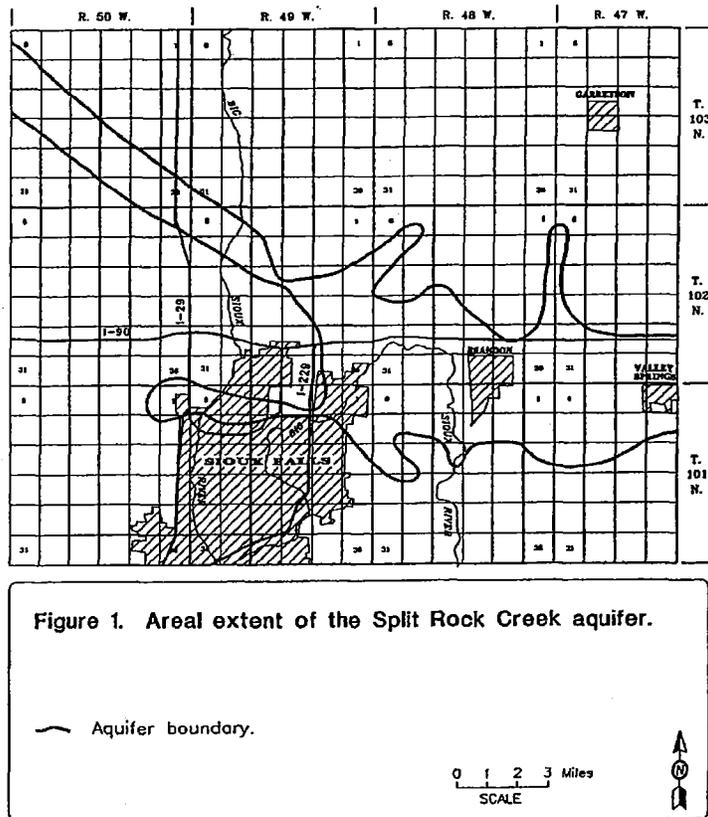


Figure 1. Areal extent of the Split Rock Creek Aquifer (modified from Pence, 1997)

The Split Rock Creek Aquifer underlies approximately 139 square miles of Minnehaha County and contains an estimated 855,000 acre-feet of recoverable water in storage in the county (Lindgren, 1992). The main portion of the Split Rock Creek Aquifer, underlies approximately 60 square miles (Pence, 1997). The saturated thickness of the Split Rock Creek Aquifer is extremely variable. Although the average cumulative thickness of the Split Rock Creek Aquifer is about 48 feet, the maximum thickness is 222 feet (Lindgren, 1992). The thickest portion of the aquifer is in the vicinity of Brandon where the aquifer thickness exceeds 200 feet. The direction of water movement in the aquifer is generally towards discharge areas along the Big Sioux River and Split Rock Creek (Lindgren, 1992). The aquifer is under confined conditions with water levels ranging from above ground surface to more than 195 feet below grade. The Water Rights Program monitors 13 observation wells completed into the Split Rock Creek Aquifer. Seven of these wells are within 3 miles of this well site and three wells (MA-87E, MA-87H, MA-87I) are within one and one-half miles of this well site see figure 2.

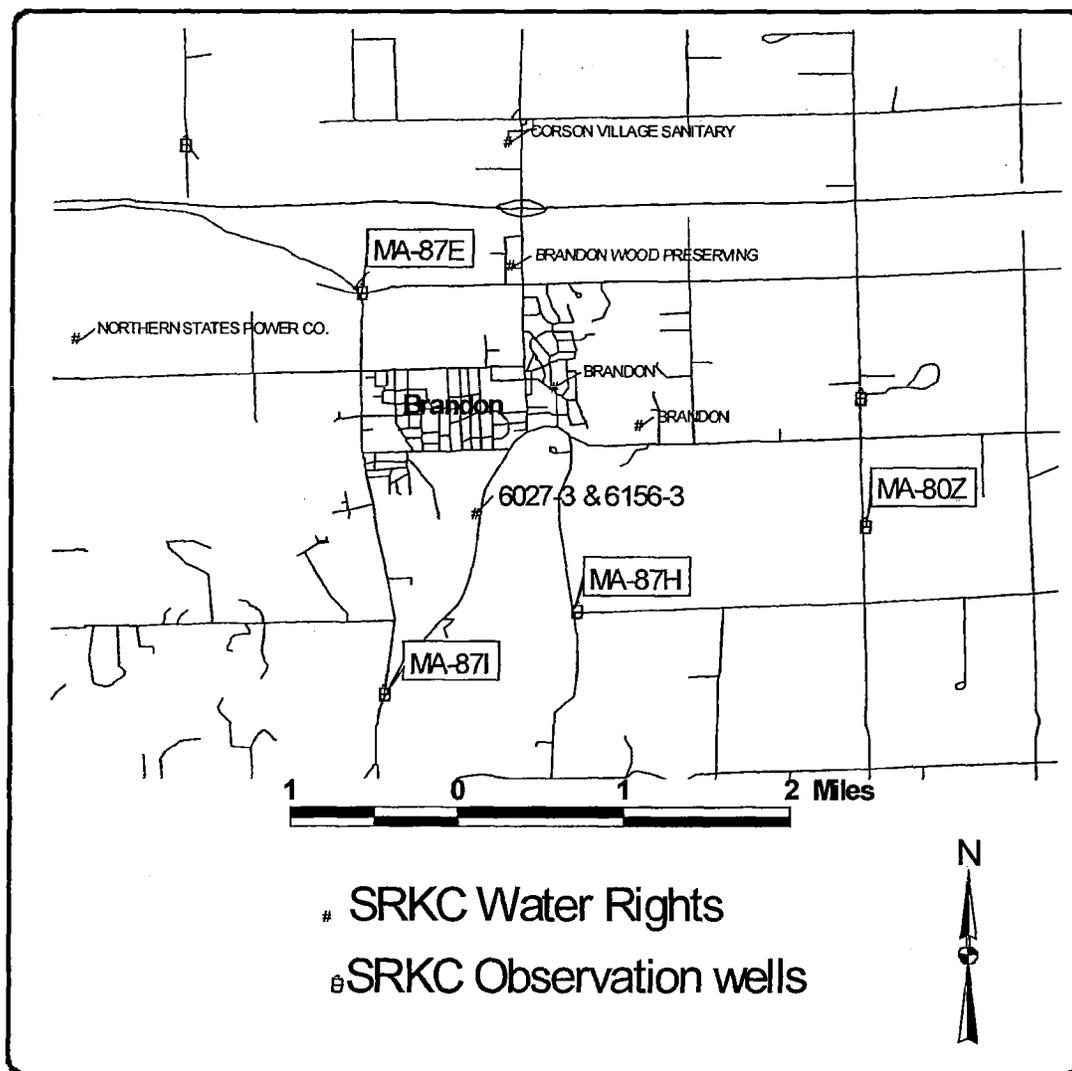


Figure 2. Vicinity Map including Water Rights' Observation Wells completed into the Split Rock Creek Aquifer and Appropriations from the Split Rock Creek Aquifer.

One of the earliest Water Right's Observation Wells completed into the Split Rock Creek Aquifer is MA-80Z. This well is located approximately two and one-half miles east of this well site (see figure 2). A hydrograph of this observation well is included (see figure 3), because of the long period of record for the well and its proximity to this permit.

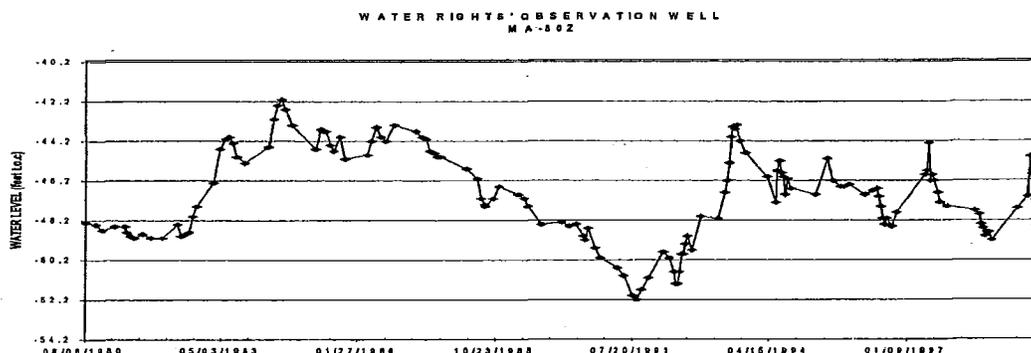


Figure 3. Hydrograph for Water Rights Observation Well MA-80Z, located approximately two and one-half miles from Brandon's well

The hydrograph is typical for Split Rock Creek Aquifer Observation wells. In general the hydrograph shows the aquifer is recharged and that the water level of the aquifer responds well to climatic conditions; that is, rising water levels during wet years (recharge) and gradually declining water levels during dry years.

Possible sources of recharge to the Split Rock Creek aquifer include 1). infiltration of precipitation falling on outcrops of Sioux Quartzite that subsequently moves along fractures in the quartzite and into the Split Rock Creek Aquifer ; 2) streamflow loss from Split Rock Creek; and 3) inflow from the Valley Springs Aquifer (Lindgren, 1992). The potentiometric surface of the aquifer suggests the main source of recharge is probably the Sioux Quartzite. The average annual recharge has not been quantified for this aquifer.

In 1995, the City of Sioux Falls, through their consultants Howard R. Green Company, conducted an aquifer test to evaluate the hydraulic properties of the aquifer, determine the production capability of the aquifer, and examine the water quality of the aquifer. This study (Pence, 1997) indicates with production wells properly designed, constructed and located the aquifer has an overall potential to yield 5 mgd" (5,610 acre-feet annually). Although recharge was not quantified, this seems to be a very conservative number (less than 1% of the estimated water in storage in the aquifer).

REVIEW OF EXISTING WATER RIGHTS:

Currently, there are 17 Water Permits/Rights appropriating water from the Split Rock Creek Aquifer representing a total appropriation of 13.052 cfs (Water Rights, 1998). Appropriative uses include municipal (8 permits/rights), (Valley Springs, Brandon, and Sioux Falls); suburban housing development (2 permits/rights); industrial (5 permits/rights); commercial (1 permit) and one permit for fire protection. In addition, there are two future use permits reserving water from the aquifer. All of the water reserved by Future Use No. 4929-3, (Corson Village Water), has been appropriated and 188 ac-feet annually remains reserved for future use by Permit No. 5444-2, (Valley Springs). The board has denied one future use appropriation from the Split Rock Creek Aquifer (No. 5084-3, East

Dakota Water Development District), basically because the District could not demonstrate a need for the appropriation. There is one permit (No. 5752-3), currently in deferred status pending legal issues associated with Brandon Wood Preserving.

The total pumpage from the aquifer is expected to be less than 1,200 acre-feet per year. The major users from the Split Rock Creek Aquifer are the City of Sioux Falls and the City of Brandon. Water use from the aquifer reported by these cities is included in Table 1.

Table 1. Reported Water Pumpage from the Split Rock Creek Aquifer

	1997	1998	1999
Sioux Falls	123,843,400 gal. ₁ (380 ac-ft)	171,565,500 gal. ₂ (526 ac-ft)	124,940,000 gal. ₂ (383 ac-ft)
Brandon	163,427,200 gal. ₃ (501 ac-ft)	129,435,450 gal. ₄ (397 ac-ft)	166,739,100 gal. ₄ (512 ac-ft)
Total	881 ac-ft	923 ac-ft	895 ac-ft

₁Stefanich, 1988; ₂Stefanich, 2000; ₃Olson, 1988, ₄Fletcher, 2000

The nearest appropriation from the Split Rock Creek Aquifer, other than the City's own wells, is Water Permit No. 5276-3, Brandon Wood Preserving. Water Permit No. 5276-3 is located approximately one and one-half miles of the well to be used to supply this permit. The status of Brandon Wood Preserving is not clear, as the company filed for Chapter 11 in Bankruptcy Court and suffered a catastrophic fire in 1999. The next nearest appropriation (Corson Village) is approximately two and one-quarter miles from this well, followed by Northern States Power at approximately two and one-half miles, see Figure 2.

Effects on Existing Water Rights:

The Split Rock Creek Aquifer is a confined aquifer, as such the water level does fluctuate when the aquifer is pumped. Drawdown at the production well can be estimated using information provided on the Well Completion Report for the well. The report indicates that the well was pumped for 8 hours at 2,210 gpm with a drawdown of 89.65 feet. A specific capacity of 24.5 gallons per minute per foot of drawdown would create a drawdown of around 82 feet at a 4.46 cfs pumping rate.

The cone of depression in a confined aquifer can extend over a relatively large area of the aquifer. For example, over 10 feet of drawdown was measured at the City of Sioux Falls' aquifer test in Brandon at an observation well 589 feet from the production well measured after three days of pumping at 260 gallons per minute (Pence, 1997).

Observation wells in the Brandon area: MA-87H, MA-87I, MA-87E and MA-80Z, may show some drawdown from the City's pumping (figures 3, 4, 5, 6). However as the hydrographs reveal, drawdown is not significant and the water levels recover to near pre-pumping levels. It should be noted that until November 1999, the City of Brandon only pumped "Well No. 3" (Fletcher, 2000) which is the northern most "Brandon" well on figure 2. Diversions by this well are authorized by Water Permit/Right Nos. 1804-3, 5295-3, 5296-3, 5868-3. The maximum diversion rate authorized for this well is 1.39 cfs (625 gpm).

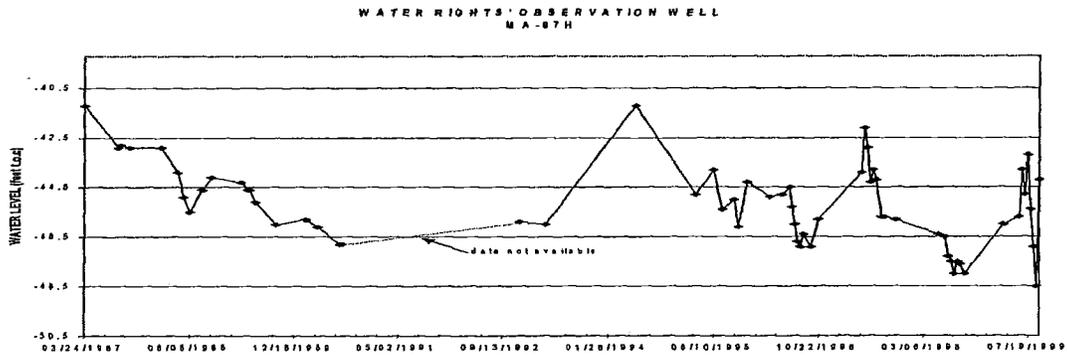


Figure 4. Hydrograph for Water Rights Observation Well MA-87H, located approximately 6,800 feet from Brandon's well

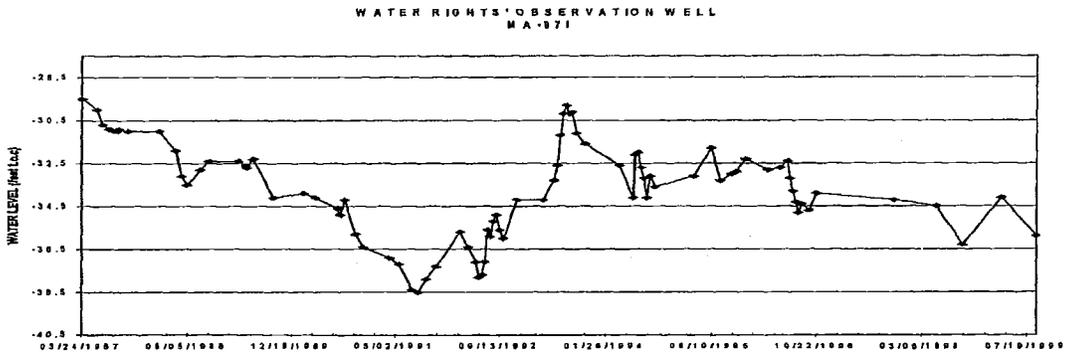


Figure 4. Hydrograph for Water Rights Observation Well MA-87I, located approximately 11,000 feet from Brandon's well

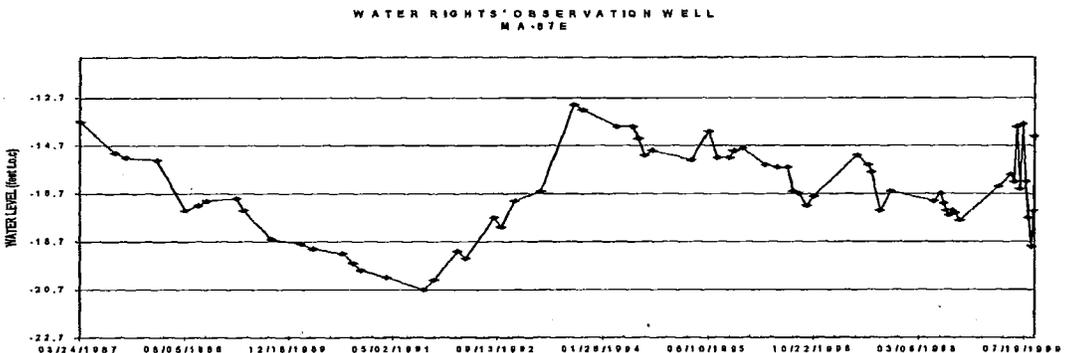


Figure 5. Hydrograph for Water Rights Observation Well MA-87E, located approximately 7,200 feet from Brandon's well

The affect this additional diversion would have on area water levels can be monitored with observation wells that are in place. Any affect the increased diversion rate proposed by this application will have on existing water rights will not be significantly. To demonstrate this, the Theis equations can be used to evaluate this appropriation. These equations are based on a number

of assumptions, some of these (e.g. the aquifer is a uniform thickness, the aquifer is infinite in areal extent, etc) are not met in the Split Rock Creek Aquifer. However, while the drawdowns predicted should not be considered absolute, the equations are useful to demonstrate the significance of increasing the diversion rate on this well.

The Theis equations are:

$$h_0 - h = \frac{114.6 Q W(u)}{T} \qquad S = \frac{T t u}{2693 r^2}$$

Where:

- $h_0 - h$ is the drawdown in feet
- Q is the well discharge (gpm)
- T is the transmissivity (gal/day/ft.)
- r is the distance to the well (feet)
- S is the storativity (dimensionless)
- t is the time since pumping began (minutes)
- $W(u)$ is a well function constant

The Brandon Pump Test done for City of Sioux Falls identified the Storativity of the Split Rock Creek Aquifer of 1.1×10^{-4} to 6.7×10^{-4} , and a Transmissivity of 1,600-1,700 ft²/day, and reported a saturated thickness of 69 feet at the site (Pence, 1997). Since

$$T = kb \text{ or } k = T/b$$

where:

- K is hydraulic conductivity (feet/day)
- b is aquifer thickness (feet)

the hydraulic conductivity at the Brandon test site (approximately one-half mile from this well) is equals 23.91 ft/day.

The completion report for well that is to be used to supply this application indicates the aquifer is approximately 130 feet thick at this site. Assuming a uniform hydraulic conductivity in this area, the transmissivity at this site would be approximately 3,108 ft²/day.

The maximum drawdown caused by a withdrawal would result from continuous pumping at the maximum diversion rate. This application proposes an increase of the diversion rate without increasing the annual volume appropriated (968 acre-feet/year). Currently, this well is permitted for a maximum diversion rate of 2.23 cfs (1000 gpm). Since continuous pumping at 2.23 cfs would take 315,142 minutes to pump 968 acre-feet, the maximum drawdown from this well under the existing permit can be predicted by solving the Theis Equation with $t = 315,142$ minutes and $Q = 1000$ gpm. At the nearest appropriation, (Water Permit No.5276-3) which is approximately one and one-half miles from this well, the maximum drawdown would be predicted to be 20.4 feet. Doubling the permitted diversion rate decreases the time required to pump the permitted annual volume by half. Solving the Theis Equations with $t = 157,571$ minutes and $Q = 2000$ gpm predicts a drawdown of 34.4 feet at a distance of one and one-half miles.

As stated earlier, the drawdowns predicted should not be considered absolute (i.e. 20 feet versus 34 feet). However, application of the Theis Equations confirms that doubling the diversion rate of this well while keeping the annual volume withdrawn constant does not significantly increase the drawdown in the area.

Although the Water Management Board must consider the impact of this additional drawdown on area wells, pursuant to SDCL 46-6-6.1, the board is not required to control large capacity wells to maintain artesian head pressure as a method of delivery. In addition SDCL 46-1-4 requires South Dakota's water resources to be put to beneficial use to the fullest extent of which they are capable.

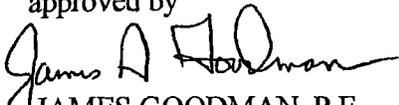
CONCLUSIONS:

1. Water Permit Application 6156-3 proposes to increase the diversion rate authorized from an existing well from 2.23 cfs to 4.46 cfs.
2. This application proposes to increase the diversion rate without increasing the annual volume of 968 acre-feet of water.
3. This permit does not appropriate additional water from the Split Rock Creek Aquifer.
4. The affect of this appropriation will be measurable, (theoretically up to 14 feet additional drawdown one and one-half miles away). This additional drawdown will not be adverse to adequate wells.



KEN BUHLER
Natural Resources Engineer

approved by



JAMES GOODMAN, P.E.
Natural Resources Engineer

REFERENCES:

Lindgren, R., and Niehus C., 1992, Water Resources of Minnehaha County, South Dakota: U.S. Geological Survey Water Resources Investigations Report 91-4101

Olson, D., 1998, Personal Communication

Fletcher, W., 2000, Personal Communication

Pence, S, 1997, Summary of The Split Rock Creek Aquifer Study, SD Geological Survey Open-File Report 87-UR, SD DENR-Geological Survey, Vermillion SD

Stefanich, T., 1998, Personal communication

Stefanich, T., 2000, Personal communication

Water Rights Program, 2000, "Observation Well Files", DENR-Water Rights Program, Joe Foss Building, Pierre, SD

Water Rights Program, 2000, "Water Permit/Right Files", DENR-Water Rights Program, Joe Foss Building, Pierre, SD



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181
www.state.sd.us/denr

August 19, 1999

Steve Brockmueller
Stockwell Engineers, Inc.
211 East 14th Street, Suite 200
Sioux Falls SD 57104-6913

Dear Mr. Brockmueller:

Last week when I was out of the office you called regarding Water Permit No. 6027-3 for the city of Brandon. The water permit currently appropriates 2.23 cubic feet of water per second (1000 gpm) from one well with an annual volume limitation of 968 acre-feet of water annually.

It is my understanding that this well is capable of producing 2000 gpm and the city intends to develop the well to produce at this quantity. However, the total use from the well will not exceed 968 acre feet of water annually authorized by Permit No. 6027-3. The question is whether additional water permitting is necessary for the greater diversion rate.

I believe a new water right permit is necessary to authorize the additional diversion rate from the well. I have enclosed a water right permit application form. The application filing fee is \$150 for an increase in the diversion rate without increasing the annual volume of 968 acre feet of water. Any application will need the public notice associated with all new water right permit applications.

Please feel free to contact me if you have any questions.

Sincerely,

A handwritten signature in cursive script that reads "Eric Gronlund".

Eric Gronlund
Water Rights Program
605 773-3352

enclosure



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181
www.state.sd.us/denr

November 4, 1999

Steve Brockmueller
Stockwell Engineers, Inc.
211 E 14th St, Suite 200
Sioux Falls SD 57104-6913

Dear Mr. Brockmueller:

Thank you for submitting the *Application for a Permit to Appropriate Water* on behalf of the City of Brandon.

We are in receipt of the \$150 application filing fee. In addition to the application filing fee, the Water Rights Program now collects the \$50 licensing fee at the time of filing. Please submit \$50 for the licensing of the water permit.

If available, please submit the well log for the recently constructed well. I have reviewed our files and can not find that we have received the well log.

If you have any questions, please contact me.

Sincerely,

Karen Schlaak
Water Rights Program
605 773-3352

c: Michael G Schultz, City of Brandon



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181
www.state.sd.us/denr

January 14, 2000

The Argus Leader
P.O. Box 5034
Sioux Falls, SD 57117-5034

ATTENTION: Legal Public Notice

Enclosed is a Notice of Hearing on Application No. 6156-3 to Appropriate Water to be published twice. Please publish the first notice on January 21, 2000, with the second publication 7 days later.

The applicant must verify to you that the notice is to be published, before you make the first publication. Please **BILL the APPLICANT for the cost of publication.** The APPLICANT is City of Brandon, %Michael G. Schultz, P.O. Box 95, Brandon, SD 57005 (Ph # (605) 582-6515).

Please send the Water Rights Program the first publication immediately. The publication is checked for accuracy so any corrections can be made in the second publication. You may use the form below or fax a copy of the first publication. Any fax should be sent to the attention of Karen Schlaak at (605) 773-4068. Publication errors can invalidate the public notice.

After the second publication, please send us an affidavit or use the enclosed Proof of Publication form. The applicant pays the cost of publication, but the Water Rights Program records require an affidavit or Proof of Publication. Delays in receiving the affidavit can be costly to the applicant.

Sincerely,

Eric Gronlund
Natural Resources Engineer
605 773-3352

enclosures

-----CU T HERE-----

No. 6156-3

TO: Eric Gronlund
Water Rights Program
Joe Foss Building
Pierre SD 57501-3181

Date _____

We are in receipt of your letter of January 14, 2000, enclosing Notice of Hearing to Appropriate Water by Application No. 6156-3 which was first published in our issue of _____ . ENCLOSED IS A COPY OF THIS FIRST PUBLICATION.

Name

Newspaper

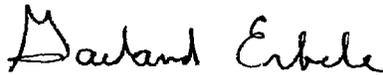
**RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT
APPLICATION NO. 6156-3, City of Brandon**

Pursuant to SDCL 46-2A-2, the following is the recommendation of the Chief Engineer, Water Rights Program, Department of Environment and Natural Resources concerning Water Permit Application No. 6156-3, City of Brandon, c/o Michael G. Schultz, P.O. Box 95, Brandon SD 57005.

The Chief Engineer is recommending APPROVAL of Application No. 6156-3 because 1) there is reasonable probability that there is unappropriated water available for the applicant's proposed use, 2) the proposed diversion can be developed without unlawful impairment of existing rights, 3) the proposed use is a beneficial use and 4) it is in the public interest with the following qualifications:

1. The well approved under this Permit will be located near domestic wells and other wells which may obtain water from the same aquifer. The well owner under this Permit shall control his withdrawals so there is not a reduction of needed water supplies in adequate domestic wells or in adequate wells having prior water rights.
2. The City of Brandon shall report to the Chief Engineer annually the amount of water withdrawn each year from the Split Rock Creek Aquifer.
3. Permit Nos. 6027-3 and 6152-3, combined, authorize a total annual diversion of 968 acre feet of water annually.

See report on application for additional information.



Garland Erbele, Chief Engineer
January 14, 2000

Instruction to Newspaper - Publish first Notice on January 21, 2000, with the second publication 7 days later. The applicant is responsible for payment.

NOTICE OF APPLICATION NO. 6156-3 to Appropriate Water

Notice is given that City of Brandon, PO Box 95, Brandon SD 57005 has filed an application for a water permit for an additional diversion rate of 2.23 cubic feet of water per second (cfs) from an existing well. Water Permit No. 6027-3 currently appropriates 2.23 cfs (968 acre-feet of water annually) from one well (Split Rock Creek Aquifer) 275 feet deep located in the SW ¼ NE ¼ Section 3-T101N-R48W. This application proposes to increase the diversion rate from this well to a total of 4.46 cfs without increasing the annual volume of 968 acre-feet of water. The water is for municipal use.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 6156-3 because 1) existing rights will not be unlawfully impaired, 2) it is a beneficial use of water, and 3) it is in the public interest. In accordance with SDCL 46-2A-23, the Chief Engineer will act on the application, as recommended, unless a petition is filed opposing the application or the applicant files a petition contesting the Chief Engineer's recommendation. If a petition opposing the application or contesting the recommendation is filed, then a hearing will be scheduled and the Water Management Board will consider the application. Notice of the hearing will be given to the applicant and any person filing a petition.

Any person interested in opposing or supporting this application or recommendation must file a written petition with BOTH the applicant and Chief Engineer. The applicant must file a petition if contesting the Chief Engineer's recommendation. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E Capitol, Pierre SD 57501 (605 773-3352)" and the applicant's mailing address is given above. A petition filed by either an interested person or the applicant must be filed by February 7, 2000.

The petition may be informal, but must include a statement describing the petitioner's interest in the application, the petitioner's reasons for opposing or supporting the application, and the signature and mailing address of the petitioner or the petitioner's legal counsel, if legal counsel is obtained. Contact Eric Gronlund at the above Water Rights Program address to request copies of information pertaining to this application. Nettie H. Myers, Secretary, Department of Environment and Natural Resources.

AFFIDAVIT OF PUBLICATION

STATE OF SOUTH DAKOTA

COUNTY OF MINNEHAHA } ss

Mary Boysen being duly sworn, says: That The Argus Leader is, and during all the times hereinafter mentioned was, a daily legal newspaper as defined by SDCL 17-2-21, as amended published at Sioux Falls, Minnehaha County, South Dakota; that affiant is and during all of said times, was an employee of the publisher of such newspaper and has personal knowledge of the facts stated in this affidavit; that the notice, order or advertisement, a printed copy of which is hereto attached, was published in said newspaper upon

SAT	, the	22	day of	JANUARY	2000,
SAT	, the	29	day of	JANUARY	2000,
	, the		day of		2000,
	, the		day of		2000,
	, the		day of		2000,
	, the		day of		2000,
	, the		day of		2000,

and that \$96.49 was charged for publishing the same including A \$5.00 affidavit fee.

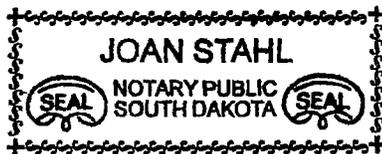
Mary Boysen

Subscribed and sworn to before me January 31, 2000,

Joan Stahl

Notary Public, South Dakota

My Commission expires June 30, 2005



State Notices

NOTICE OF APPLICATION
NO. 6156-3 to Appropriate
Water

Notice is given that City of Brandon, PO Box 95, Brandon SD 57005 has filed an application for a water permit for an additional diversion rate of 2.23 cubic feet of water per second (cfs) from an existing well. Water Permit No. 6027-3 currently appropriates 2.23 cfs (968 acre-feet of water annually) from one well (Split Rock Creek Aquifer) 275 feet deep located in the SW1/4 NE1/4 Section 3-T101N-R48W. This application proposes to increase the diversion rate from this well to a total of 4.46 cfs without increasing the annual volume of 968 acre feet of water. The water is for municipal use.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 6156-3 because 1) existing rights will not be unlawfully impaired, 2) it is a beneficial use of water, and 3) it is in the public interest. In accordance with SDCL 46-2A-23, the Chief Engineer will act on the application, as recommended, unless a petition is filed opposing the application or the applicant files a petition contesting the Chief Engineer's recommendation. If a petition opposing the application or contesting the recommendation is filed, then a hearing will be scheduled and the Water Management Board will consider the application. Notice of the hearing will be given to the applicant and any person filing a petition.

Any person interested in opposing or supporting this application or recommendation must file a written petition with BOTH the applicant and Chief Engineer. The applicant must file a petition if contesting the Chief Engineer's recommendation. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E. Capitol, Pierre SD 57501 (605 773-3352)" and the applicant's mailing address is given above. A petition filed by either an interested person or the applicant must be filed by February 7, 2000.

The petition may be informal, but must include a statement describing the petitioner's interest in the application, the petitioner's reasons for opposing or supporting the application, and the signature and mailing address of the petitioner or the petitioner's legal counsel, if legal counsel is obtained. Contact Eric Gronlund at the above Water Rights Program address to request copies of information pertaining to this application.

Nettie H. Myers,
Secretary, Department of
Environment and Natural
Resources.

1025 Jan. 22, 29, 2000





**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181
www.state.sd.us/denr

NOTE: TO BE SURE OF PUBLICATION ON
THE CORRECT DATES, CONTACT
THE NEWSPAPER RIGHT AWAY.

February 14, 2000

City of Brandon
%Michael G. Schultz
P.O. Box 95
Brandon, SD 57005

Dear Mr. Schultz:

Water Permit Application No. 6156-3 for municipal use has been examined and found to comply with the South Dakota Water Laws and applicable rules. A notice of hearing has been sent to the Publisher of the Argus leader printed at Sioux Falls, SD (Ph # (605) 331-2200). For your information, a copy of the notice, the recommendation of the Chief Engineer and a report on the application are enclosed. Please review the notice prior to publication and notify this office, if you have any corrections or questions.

Be sure to contact the above newspaper to authorize publication of your Notice of Hearing and to arrange for payment. Early contact with the paper can eliminate delays. The publisher has been instructed to publish your notice once each week for two consecutive weeks with the last publication to occur twenty days before the board meeting. The newspaper has been instructed to send us the Proof of Publication. We must receive Proof of Publication before action can be taken on the application.

Sincerely,

Eric Gronlund
Natural Resources Engineer
(605) 773-3352

enclosures

c: Steve Brockmueller, Stockwell Engineers, 211 E. 14th St., Suite 200, Sioux Falls, SD 57104-6913

NOTE: If you plan to contest any part of the Chief Engineer's recommendation, you must file a petition pursuant to the procedures outlined in the attached notice of hearing. The Water Management Board will then consider your concerns during a hearing on the application.



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181
www.state.sd.us/denr

FEB 22 2000

City of Brandon
%Michael G. Schultz
P.O. Box 95
Brandon, SD 57005

Dear Mr. Schultz:

Enclosed is Water Permit No. 6156-3 authorizing construction of your water diversion system and beneficial use of the water, not exceeding the limits as specified in the Water Permit.

Form 10, *Notice of Completion of Works and Application of Water to Beneficial Use*, is enclosed. Please return this completed form after you have finished the system and have put the water to beneficial use. An investigation can then be scheduled so the water license may be issued, thus completing the acquisition of a water right.

An informational sheet *Common Water Right Questions?* is also enclosed. This sheet is intended to answer some of the questions associated with obtaining and keeping a water right.

Sincerely,

Garland Erbele, Chief Engineer
Water Rights Program
(605) 773-3352

enclosures

**NOTICE OF COMPLETION OF WORKS AND
APPLICATION OF WATER TO BENEFICIAL USE**

Date 2-25-00

TO: Water Rights Program, DENR
523 E. Capitol
Pierre, SD 57501-3181



FROM: City of Brandon
(name)
304 Main Avenue
(address)
Brandon, SD 57005
(city, state, zip)

605-582-6769
(phone)

I have completed the construction of the water use system and I have put the water to beneficial use to the maximum extent it is going to be used.

Water Permit No. 61563 states that the water use system is to be constructed by February 7, 2005, and water is to be put to beneficial use by February 7, 2009.
(date) (date)

The water use system was completed on February 25, 2000.
(date)

Applying the water to beneficial use was completed on February 25, 2000.
(date)

You may schedule an investigation so that the water license may be issued.

Dennis E. Olson
(signature)



Permit Nos. 6027-3 & 6156-3
Big Sioux River - Water District

Report of Examination of Works and/or Application of Water to Beneficial Use

TO: Chief Engineer, Water Rights Program, DENR, Foss Bldg., Pierre SD 57501

I have this day, October 14, 200³, made a thorough examination of the water use system constructed by City of Brandon of PO Box 95, Brandon SD 57005 holder of Permit Nos. 6027-3 & 6156-3, bearing the priority of November 19, 1997 and November 4, 1999 authorizing the diversion of 2.23 and 2.23 cu. ft. per second of the waters of Split Rock Creek Aquifer for municipal purposes, in Minnehaha County.

Inspection contact & relationship to permit holder, if applicable: **Wayne Fletcher, Public Works Director (605) 582-2273**

A. Works used to divert the water:

Well Information:

- 1) Well Drilling Firm: LTP Enterprises, Inc.
- 2) No. of Wells 1
- 3) Depth(s) 275 feet
- 4) Well log is available yes
- 5) Comment: drilled in 1998

Casing:

- 1) Diameter 10 inches
- 2) Length 126 feet
- 3) Type steel

Screen:

- 1) Type stainless steel
- 2) Length 149 feet
- 3) Static water level 23 feet

Pump:

- 1) Make Goulds
- 2) Model 14RJMC2
- 3) Size 10"
- 4) Capacity 2000 GPM

Motor:

- 1) Make submersible
- 2) Model No.
- 3) Horsepower rating 100 hp

B. Works used to transport water to place of use:

- 1) Type pvc 2) Size 12 inches 3) Length 800 feet
- 1) Type pvc 2) Size 16 inches 3) Length 900 feet

C. Works used to apply water to beneficial use:

Municipal water system

D. Compliance with Permit Requirements:

- 1) Permit qualifications being abided by yes
- 2) Exceptions to compliance are: none

The system is in good condition with the point(s) of diversion located as follows: 350' N and 100' E of the center of Section 3, T101N, R48W. The works are capable of diverting and conveying to the place of use 4.44 cu. ft. per second of water which is to be used for municipal purposes. Water has been put to beneficial use to the maximum extent as follows:

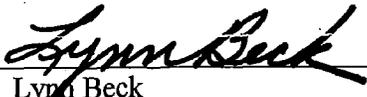
Municipal water system.

The license should be issued for 4.44 cfs.

All structures, wells and lands on map yes

Comments or other permit(s) associated with the project:

Water Right No. 6156-3 authorizes an additional diversion rate of 2.23 cfs from an existing well authorized by Water Right No. 6027-3. Water Right Nos. 6027-3 and 6156-3 should be incorporated and licensed for a combined 4.44 cfs (2,000 gpm), 2.23 cfs retains a priority date of November 19, 1997 and 2.21 cfs retains a priority date of November 4, 1999.

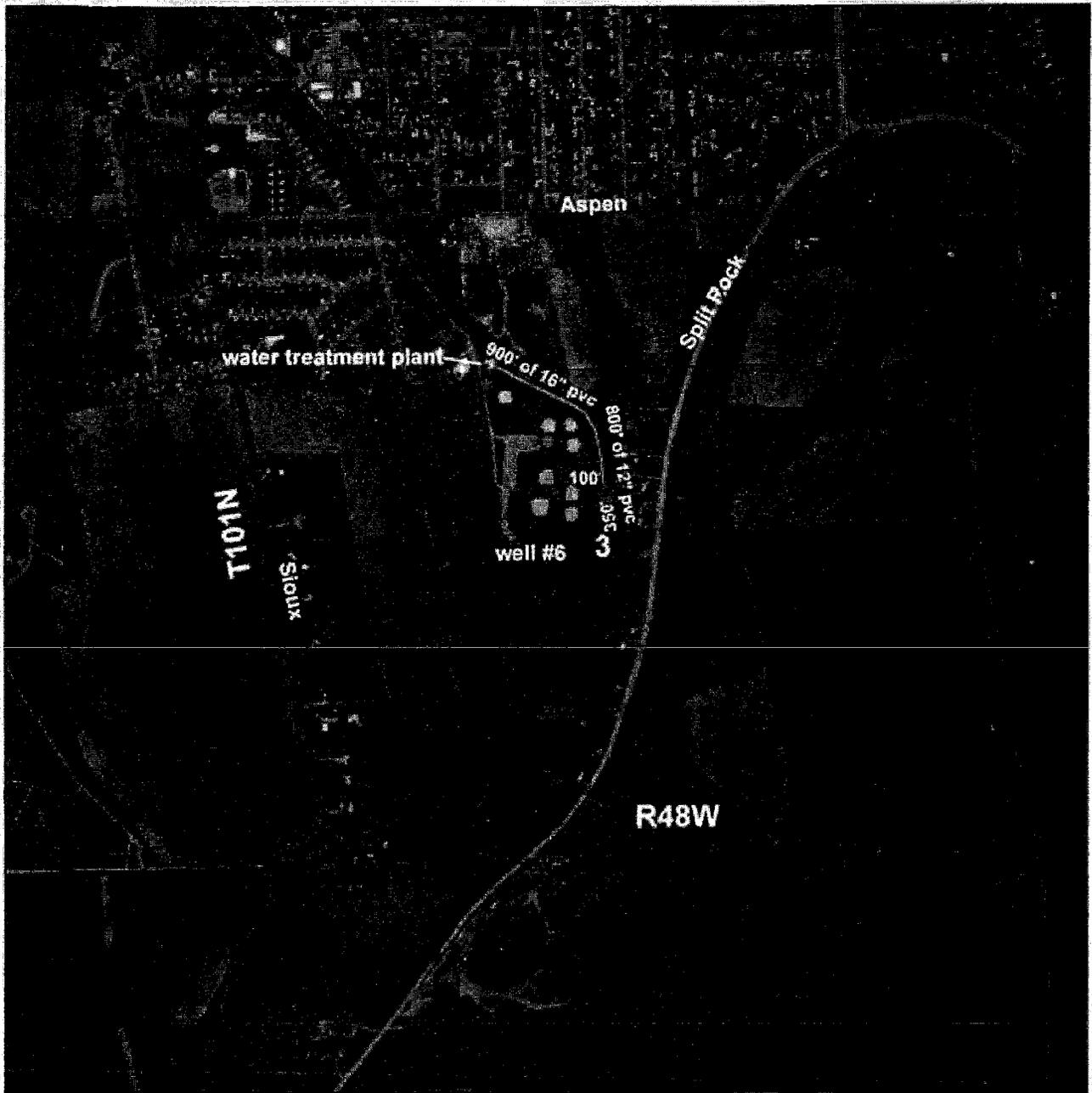


Lynn Beck

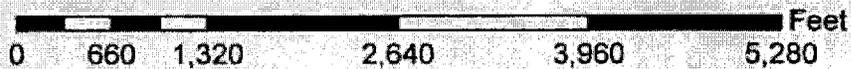
Natural Resources Engineer Specialist
DENR, Water Rights Program

Date report completed: February 25, 2004

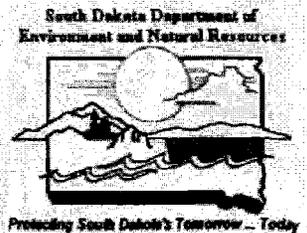
WATER RIGHT NOS. 6027-3 and 6156-3 CITY OF BRANDON



SCALE



Lynn Beck
Lynn Beck
Natural Resources Engineer Specialist
DENR, Water Rights Program
February 25, 2004



STATE OF SOUTH DAKOTA

WATER LICENSE NO. 6156-3

(1) City of Brandon, PO Box 95, Brandon SD 57005 made Application No. 6156-3, November 4, 1999 for a water permit to increase the diversion rate authorized by Water Permit No. 6027-3, Minnehaha County, South Dakota for municipal purposes. Permit No. 6156-3, with a priority date of November 4, 1999 was approved February 7, 2000 and issued to the applicant for diversion of water with construction of the described water supply system to be completed on or before February 7, 2005 and for the application to beneficial use of water on or before February 7, 2009.

Water Permit No. 6027-3, with a priority date of November 19, 1997 authorized diversion of 2.23 cubic feet of water per second (968 acre-feet annually) from 1 well. The applicable portions of No. 6027-3 have been incorporated into No. 6156-3.

(2) The water supply system has been completed and water applied to beneficial use in accordance with South Dakota State Law. Pursuant to South Dakota Codified Law 46-5-30.1, the holder and/or owner of Incorporated Water Right No. 6156-3 is issued a license, bearing priority dates of November 19, 1997 (2.23 cfs) and November 4, 1999 (2.21 cfs) to appropriate 4.44 cubic feet of water per second from groundwater (one well) for municipal purposes.

The diversion point is located: 350 feet north and 100 feet east of the center of Section 3-T101N-R48W (SW ¼ NE ¼).

(3) This license is subject to South Dakota Water Law, any limitations or conditions listed in Water Permit Nos. 6027-3 and 6156-3 including the following now applicable qualifications:

- The well approved under this Permit will be located near domestic wells and other wells which may obtain water from the same aquifer. The well owner under this Permit shall control his withdrawals so there is not a reduction of needed water supplies in adequate domestic wells or in adequate wells having prior water rights.
- The well shall be constructed by a licensed well driller and construction shall comply with Water Management Board Well Construction Rules, Chapter 74:02:04 with the well casing pressure grouted (bottom to top) from the producing formation to the surface pursuant to Section 74:02:04:28.
- The City shall report to the Chief Engineer annually the amount of water withdrawn each year from the Split Rock Creek Aquifer.
- Permit Nos. 6027-3 and 6156-3, combined, authorize a total annual diversion of 968 acre-feet of water annually.



Garland Erbe, Chief Engineer
Water Rights Program
Department of Environment and Natural Resources

MAY 10 2004

date





MAY 10 2004

**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

6156-3

City of Brandon
% Wayne Fletcher Public Works Dir
PO Box 95
Brandon SD 57005

Dear Mr. Fletcher:

Enclosed is Water License No. 6156-3. This is the final water right document completing your process of obtaining a Water Right.

As long as you use the water beneficially, as stated in the Water License, State Water Laws provide that you have a continuing right to use the water.

Sincerely,

Garland Erbele, Chief Engineer
Water Rights Program
(605) 773-3352

NOTE: The applicable portions of No. 6027-3 are incorporated into Water License No. 6156-3

enclosures

Appendix C
Comprehensive Plan

BRANDON

Comprehensive Plan 2007 - 2027

*Prepared by the South Eastern Council of Governments at the direction of
the Planning and Zoning Commission and City Council of Brandon, South Dakota*

ACKNOWLEDGMENTS

This Comprehensive Plan is a compilation of effort by many people, organizations and government entities. This document expresses the great civic pride that exists in the City of Brandon. Through the preparation and adoption of this document, the governing officials of Brandon have expressed their desire for orderly and efficient growth and development in the community and surrounding area.

City Council

Mayor: Larry Beesley
Council Members: Harry Buck, Don Hammond, Brett Karber, Dan Mostek, Steven Rubin, John Saarloos
City Administrator: Dennis E. Olson

Planning and Zoning Commission

Chairman: Chuck Parsons
Board Members: Paul Bosch, Jon Jacobson, Tim Jorgenson, Marvin Peterson, Linda Weber

The South Eastern Council of Governments prepared this document under the direction of the Brandon Planning and Zoning Commission and Brandon City Council.

RESOLUTION NO. _____

A RESOLUTION ADOPTING A COMPREHENSIVE PLAN FOR CITY OF BRANDON, AS PROVIDED FOR IN SDCL 11-6.

Whereas, Chapter 11-6-14 of South Dakota Codified Law has empowered the Planning Commission and City Council of Brandon to prepare a Comprehensive Plan for the development of the City and the surrounding area; and

Whereas, the Brandon Planning Commission has developed a Comprehensive Plan for the years 2007 - 2027, has held the required Public Hearing, and has made a recommendation for adoption of the Plan to the City Council; and

Whereas, the Brandon City Council has received the recommendation of the Planning Commission and has held the required Public Hearing; and

Whereas, the adoption of the Comprehensive Plan would enhance the responsible development of Brandon and the surrounding area.

Now therefore, be it resolved by Brandon City Council, that the Comprehensive Plan for the City of Brandon for the years 2007 through 2027 be hereby adopted and effective upon 20 days after publication of this resolution.

Adopted this _____ day of _____, 2007.

Signed: Larry Beesley
Mayor, City of Brandon

ATTEST:

Dennis Olson
City Administrator, City of Brandon

Publication Date: _____

Effective Date: _____

I. INTRODUCTION

A. PURPOSE, AUTHORIZATION AND ADOPTION

1. PURPOSE OF THE COMPREHENSIVE PLAN

There are three primary purposes of this document:

- (1) To address the planning requirements of state law while also providing a sound and logical basis for city growth management strategies; and
- (2) To provide some predictability about the potential land uses and timing of development so that both public and private sectors can make informed decisions in the area of real estate and capital investments.
- (3) To provide the Planning Commission and City Council with policies for future planning decisions and the methods and justification to control land use through the zoning and subdivision ordinance, the capital improvements program, and other enforcement controls.

2. AUTHORIZATION UNDER STATE LAW

Under 11-6-14 of South Dakota Codified Laws, the planning commission of a municipality is directed to *"propose a plan for the physical development of the municipality...[to] include the general location, character, layout and extent of community centers and neighborhood units..."*

3. DEVELOPMENT AND ADOPTION

The Brandon City Council has adopted this document in accordance with state law. In developing this Comprehensive Plan, the Brandon Planning Commission has used background research, detailed inventories and assessments, and discussion sessions at Planning Commission and City Council meetings and public hearings. It is intended to guide the City in its implementation of zoning regulations, subdivision regulations, capital improvements plans and other related policies.

4. AREA OF PLANNING JURISDICTION

The City of Brandon shall, under South Dakota statutes, have the authority to control development within the corporate limits of Brandon.

B. COMMUNITY INPUT

As a part of the comprehensive plan process, the Brandon Planning and Zoning Commission requested community input on a variety of topics over several comprehensive planning meetings. The community input serves as one source of baseline information to help form the comprehensive plan goals, policies and objectives. A list of community strengths and weaknesses was formulated from these meetings.

Strengths

1. The school system is of good quality.
2. The close proximity to Sioux Falls has allowed major residential and modest industrial growth to occur.
3. The Interstate Highway system is an asset for growth - especially I-90.
4. The Sioux Falls Regional Airport is an asset for Brandon and entire region.
5. The Burlington Northern Santa Fe Railroad is an asset for industrial growth.
6. A strong water and sewer capacity is capable of handling growth well into the future.
7. Developers have been very competent and provided a good mix of quality and affordable single-family housing.
8. The community has enjoyed residential growth and maintained a small town atmosphere. However,

continued growth is welcomed.

9. Citizens have an easy time commuting to work.
10. The business community cooperates with each other.
11. Workable and active chamber.
12. The industrial and manufacturing base of the community is fairly diverse and clean.
13. The recreation system and facilities are of good quality.
14. The city government is progressive and efficient.
15. The region has a cooperative attitude.

Weaknesses

1. Physical constraints for growth - Big Sioux River and Split Rock Creek.
2. Losing out to retail and commercial areas because of Sioux Falls.
3. Corson as an existing subdivision and the conflict with existing and potential industrial development.
4. Very few small retailer establishments.
5. Lack of a typical Main Street - no place to focus retail and commercial business.
6. No low to moderate income housing which could create a labor shortage.
7. Truck traffic on State Highway 11 and Madison Street going east of town - truckers are avoiding scales.
8. Many pedestrian and car/truck traffic conflicts - especially on State Highway 11 and 264.

II. DEMOGRAPHIC DATA

A. DEMOGRAPHIC CONDITIONS

The population of Brandon steadily increased from 1980 to 2000. Between 1990 and 2000, the population increased by 60.59%. The population growth is the result of natural increase and net in-migration. There is a natural increase when the number of births exceeds the number of deaths. A net in-migration occurs when the number of people moving into the community is larger than the number leaving.

As can be seen in Table 2, the median household income (1999 dollars) is higher than the Minnehaha County and State of South Dakota average. The median household income has a correlation to the purchasing power of a household.

The City of Brandon has one of the lowest median ages in the state. Brandon's recent growth is attributable to many young families moving to town over the past 20 years. However, the elderly population (65 and over) did increase by 2% between 1990 and 2000. This indicates as does Table 3 that the population is diversifying and will gradually become older.

Table 1. Population History (Source: U.S. Census Bureau)

	Population	% Increase/Decrease
1980	2,589	
1990	3,545	+ 36.92%
2000	5,693	+ 60.59%

Table 2. Current Demographic Statistics (Source: U.S. Census Bureau)

	Brandon	Minnehaha County	South Dakota
1990 Pop	3,545	123,809	696,004
2000 Pop	5,693	148,281	754,844
1990 – 2000 % Change	+ 60.59%	+ 19.76%	+ 8.45%
2000 Median Age	31.3	33.5	35.6
Median Household Income in 1999 (dollars)	\$58,421	\$42,566	\$35,282

Table 3. Population by Age (Source: U.S. Census Bureau)

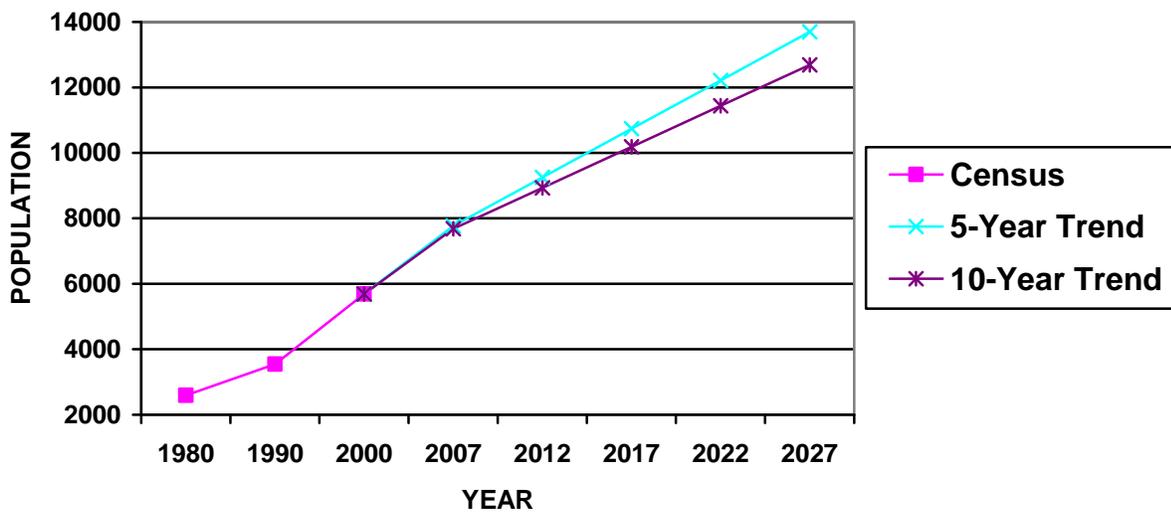
	Under 18	18-44	45-64	65 & Over	Total
1990	1,359	1,483	539	164	3,545
2000	1,962	2,361	981	389	5,693

B. POPULATION PROJECTIONS

Based upon current trends, a population projection through the study period indicates that the City of Brandon will have a population between 12,686 and 13,700 by the year 2027. The 5-year population trend concludes a population of 13,700, while the 10-year population trend concludes a population of 12,686. For purposes of land-use planning, the upper end of the population trend was utilized to ensure adequate land was reserved and planned for future development.

Table 4. Population Projections City of Brandon

	1980	1990	2000	2007	2012	2017	2022	2027
5-Year Trend	2,589	3,545	5,693	7,768	9,251	10,734	12,217	13,700
10-Year Trend	2,589	3,545	5,693	7,676	8,929	10,181	11,434	12,686



III. ENVIRONMENTAL CONSTRAINTS

A. PHYSICAL GEOGRAPHY

Brandon is located in southeastern South Dakota. The City is mostly situated between the Big Sioux River and Split Rock Creek. The landscape is primarily flat with some steep slopes near the rivers. The elevation ranges from 1,400 feet in the eastern section of the City to 1,300 feet along the rivers.

B. FLOOD HAZARDS

The City of Brandon has three major flood hazards within its area:

1. The Big Sioux River – within western boundary.
2. Split Rock Creek - within eastern Brandon.
3. Beaver Creek - south and east of Brandon.

The Federal Emergency Management Agency (FEMA) has classified a significant area adjacent to the rivers as having special flood hazard areas. All three rivers converge south of Brandon. (See **Map 1**)

C. DRAINAGE AND WETLANDS

Several small wetlands and potholes are found in the eastern sections of the City's growth areas, with the large majority being temporary in nature. Wetlands and water bodies are designated from base maps developed through the National Wetlands Inventory and other data sources. These natural resources provide a number of functions which are important to the health and welfare of the community. They provide storage for storm water, help to control flooding, provide wildlife habitat, improve water quality, and they provide recreational opportunities. (See **Map 1**)

Drainage in Brandon primarily occurs naturally. All developments either drain down street gutters or are directed by concrete drainage ways to major drainage points.

D. SOILS

While the soils in the Brandon planning area are excellent for agricultural purposes, their engineering properties present some limitations for urban development. Soil types found in many areas have severe limitations for various aspects of development including roads, streets, and dwellings with basements. These limitations are largely due to the following characteristics:

1. high clay and high water table
2. hydric soil
3. high flooding potential
4. shrink-swell
5. shallow depth to rock
6. gravel and sand pits
7. steep slopes

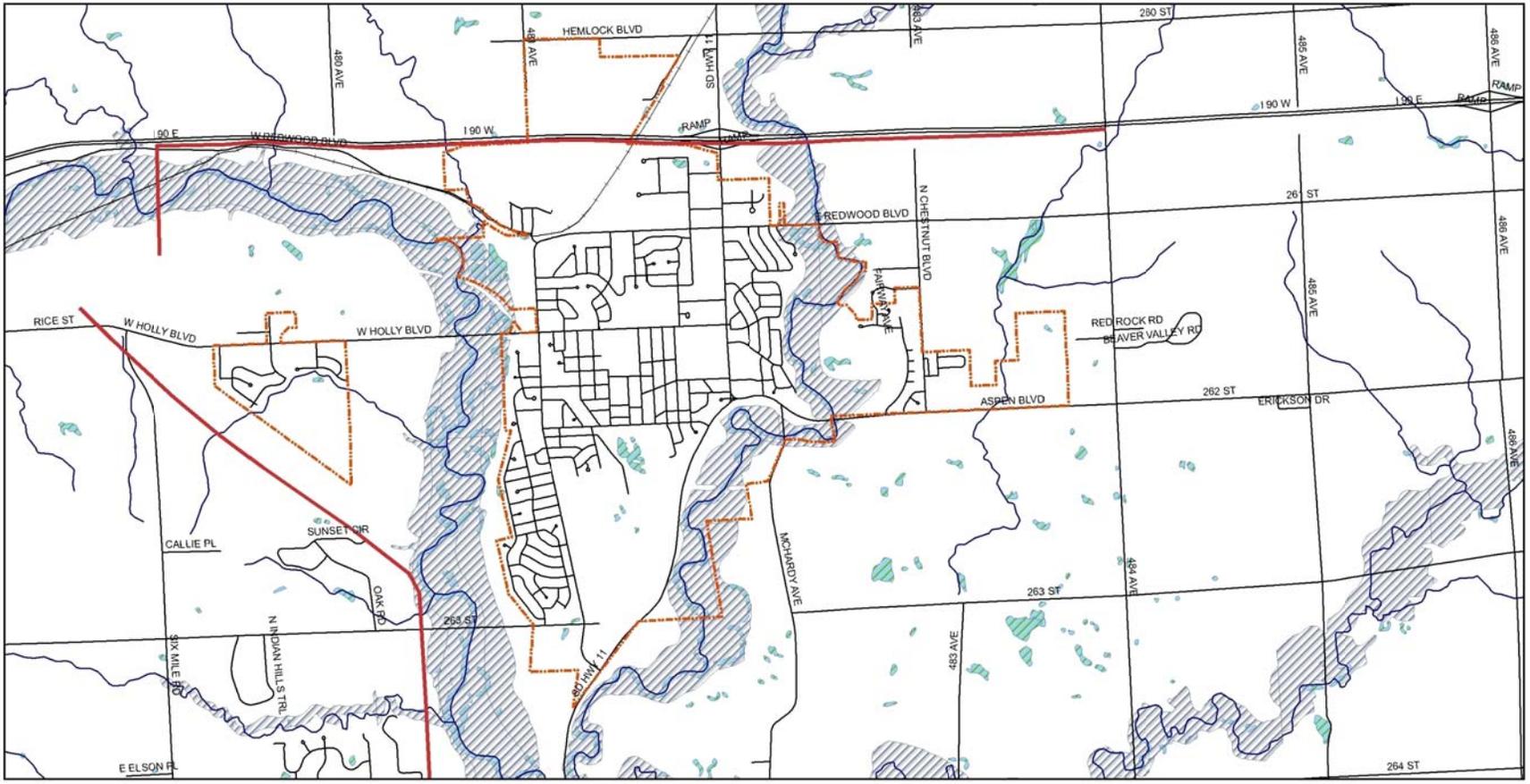
While these limitations do not rule out development, they do require compensating construction techniques and soil modification. The severe soil development limitations of the Brandon area are shown on **Map 2**.

E. ADDITIONAL ENVIRONMENTAL CONSTRAINTS

The following Xcel main electrical power lines are indicated on **Map 1**.

- *running along south side of I-90

- *running diagonally through western growth area



Legend

- 100 - Year Flood Plain
- Wetlands
- Powerlines
- Roads
- Rail
- City Limits

Map 1
ENVIRONMENTAL CONSTRAINTS
 City of Brandon

This information has been secured from sources we believe to be reliable, however, we do not guarantee the accuracy of the information contained herein. This map does not eliminate the need for an onsite investigation.
 This map was compiled by
 South Eastern Council of Governments

IV. CURRENT LAND USE PATTERNS AND CONSUMPTION PROJECTIONS

A. EVALUATION OF URBAN LAND USE IN BRANDON

To simplify preparation of this plan, land uses have been grouped into six categories for Brandon:

- (1) Industrial includes light manufacturing, warehouses and other similar uses.
- (2) Commercial includes retail businesses, offices, etc.
- (3) Single-Family Residential includes single-family, residential, duplexes, and manufactured housing.
- (4) Multi-Family Residential includes all apartments.
- (5) Institutional & Governmental includes schools, churches, government offices and similar uses.
- (6) Park & Recreation includes parks and athletic fields. Also included are areas that should be protected from development to facilitate movement of flood water and runoff. Some types of development may be appropriate for such areas, as long as the development does not dramatically increase the incidence or severity of flood or drainage problems.

A physical land use inventory was prepared by SECOG in May of 2007. A map of **current land uses** in Brandon and the planning area are included on **Map 3**.

B. CURRENT LAND USE CONSUMPTION

Land Use	Acres Consumed
Single Family	810 acres
Multi Family	36 acres
Commercial	90 acres
Institutional	231 acres
Vacant	811 acres
Industrial	156 acres
Park and Recreation	330 acres

C. FUTURE LAND USE ESTIMATES

Households and a projected demand of certain land use categories are listed in the tables below.

City of Brandon			
Household Projections			
	Population	Persons per Household <i>(assuming number remains constant)</i>	Households
1980	2,589	3.40	780 (actual)
1990	3,545	3.16	1,120 (actual)
2000	5,693	2.96	1,909 (actual)
2007	7,768	2.96	2,624 (projected)
2012	9,251	2.96	3,125 (projected)
2017	10,734	2.96	3,626 (projected)
2022	12,217	2.96	4,127 (projected)
2027	13,700	2.96	4,628 (projected)
		Households Added 2007 to 2027	
New Households		2,719	

Land Use Consumption Needs – Housing		
Single-family Residential	3 units per acre (low density) x 2.96 persons per household (pph) = 8.88 persons per acre (ppa) *	8.88 ppa x 2,643 acres = 23,470 additional people
Multi-family Residential	3 units per acre (low density) x 2.96 pph = 8.88 ppa **	8.88 ppa x 114 acres = 1,012 additional people

* Projections based upon low density single-family development

** Projections based upon low density multi-family development

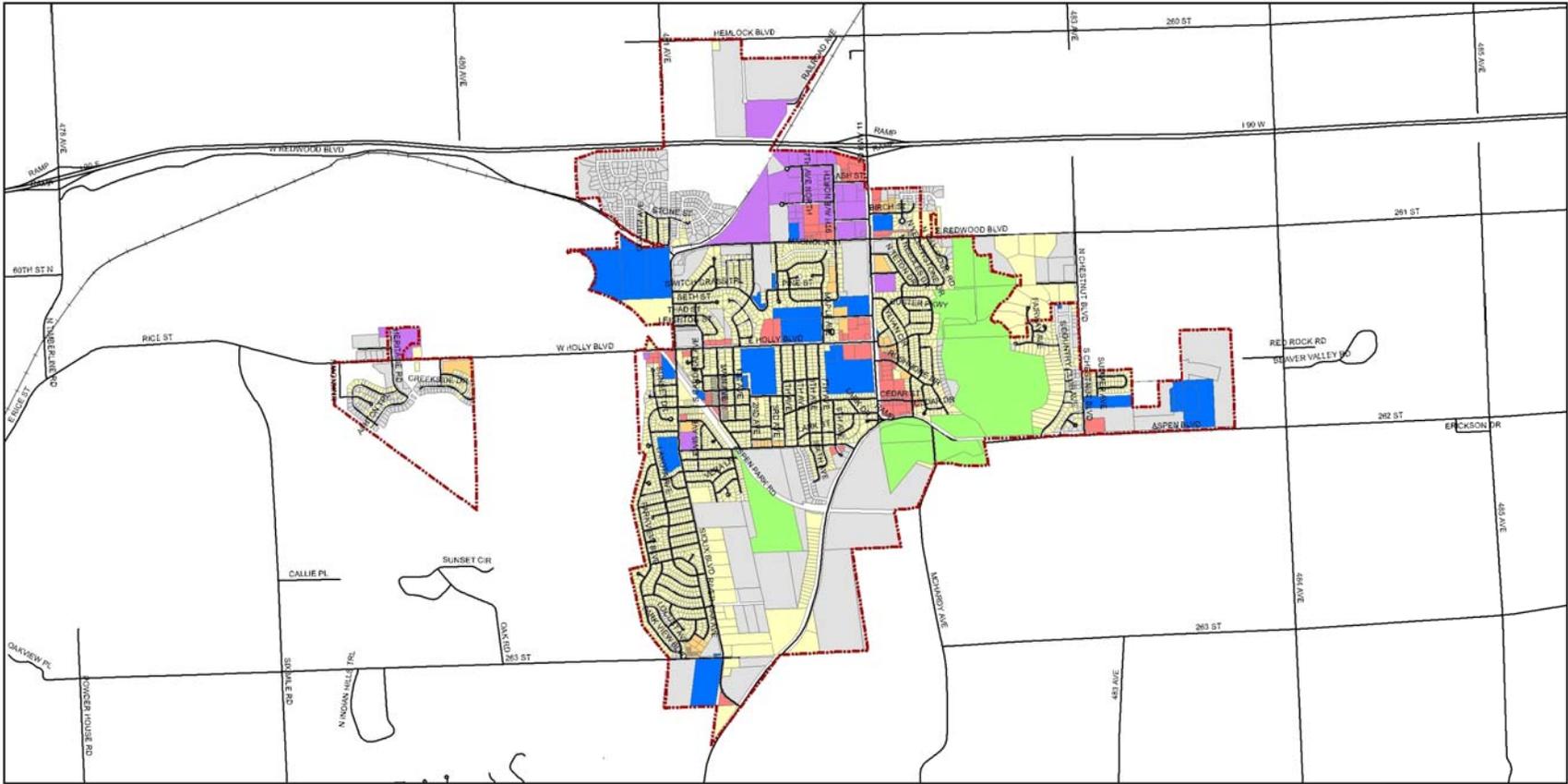
Based upon the above referenced analysis, the City of Brandon will be able to provide adequate housing through the year 2027.

Future Land Use Available

Land Use	Available Acres
Single Family	2643 acres
Multi Family	114 acres
Commercial	265 acres
Industrial	690 acres
Office/Institutional	248 acres
Park/Recreational/Greenway	1407 acres

A review of the population projections and land use consumption needs should be reviewed every five (5) years to ensure enough land is available for future land use needs.

Map 4 illustrates the future land uses. Future land uses were determined by the Brandon Planning Commission and SECOG, based on topographic features, compatibility of future and current land uses and existing infrastructure.

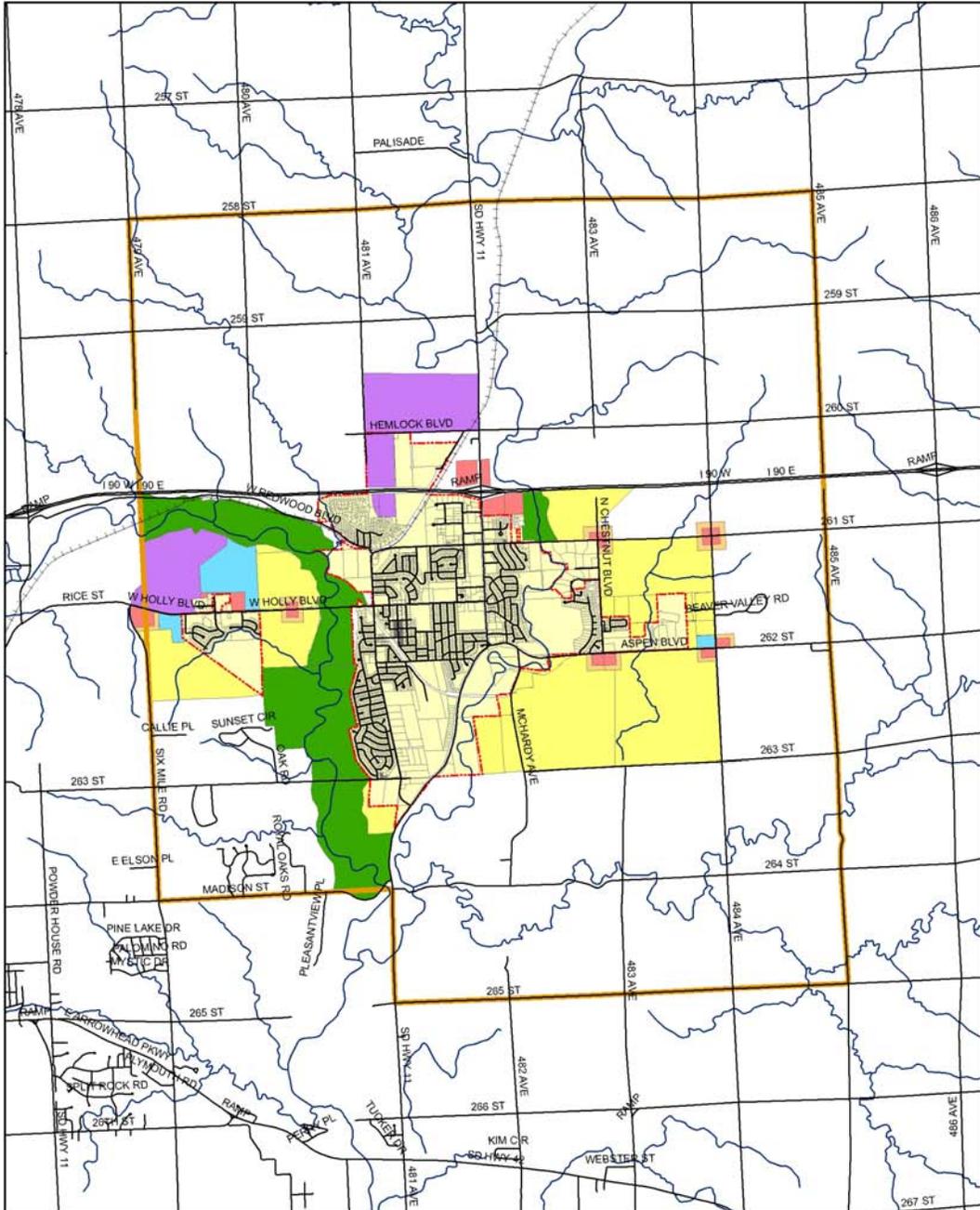


Legend

- Residential Single Family
- Residential Multiple Family
- Commercial
- Institutional
- Industrial
- Park/Recreation
- Vacant
- City Limits
- Rail
- Roads

Map 3
CURRENT LAND USE
 City of Brandon

This information has been secured from sources we believe to be reliable, however, we do not guarantee the accuracy of the information contained herein. This map does not eliminate the need for an onsite investigation. This map was compiled by South Eastern Council of Governments



Legend

Single Family Residential	Platting Jurisdiction
Multi Family Residential	City Limits
Office/Institutional	Roads
Commercial	Rail
Industrial	Creeks, Rivers & Lakes
Park/Open space	
Current Land Use	

Map 4
FUTURE LAND USE
 City of Brandon


 0 0.25 0.5 Miles

This information has been secured from sources we believe to be reliable, however, we do not guarantee the accuracy of the information contained herein. This map does not eliminate the need for an on-site investigation. This map was compiled by South Eastern Council of Governments.

V. INFRASTRUCTURE ASSESSMENT

A. TRANSPORTATION

Brandon currently has seven arterial roads within the community:

Interstate 90 is a major arterial and has become an important business and commuter highway.

Constraints: As Brandon continues to grow, additional exits may be necessary to access I-90.

SD Highway 11 is a major arterial that moves traffic through town with only a small amount of obstruction. This road was recently improved and is in excellent condition. **Constraints:** Access points currently in place are limited and should remain as such.

Holly Boulevard is a minor arterial that links the community to Sioux Falls and provides a route to the business district and schools. **Constraints:** Unfortunately, the road has a dead end in the middle of town and limits connectivity of Brandon's road system. Future traffic will only increase from Sioux Falls; thus, the road could become a bottleneck. The community should consider encouraging alternative traffic routes to relieve pressure from Holly Boulevard. The road should become a portion of an overall regional transportation study in conjunction with the City of Sioux Falls and the Metropolitan Planning Organization.

Sioux Boulevard is a minor arterial that provides an important link for residential developments and future growth areas to SD Highway 11 and Holly Boulevard. **Constraints:** Sioux Boulevard is a fairly short arterial segment and will not be improved beyond a three-lane urban section.

County Highway 264 is a minor arterial that provides a critical route for residents living across Split Rock Creek and links the community to the Valley Springs area. **Constraints:** The road needs improvements to separate pedestrian conflicts.

Chestnut Avenue is a minor north-south arterial on the City's eastern limits. **Constraints:** In the future, the road will become a minor arterial as development proceeds. Access to the road must be limited to maintain the free flow of traffic.

Park/Maple Street is a minor arterial on the City's southern edge. The road will become an important road once development proceeds through the area. The road also leads to the main entrance of the Big Sioux Recreation area. **Constraints:** The road crosses the Big Sioux River to the west and is gravel to Six-Mile Road and beyond. To create a continuous arterial link, the road must be built and/or paved from the Big Sioux River Bridge to Six-Mile Road and ideally to the new Regional Beltway slated near Powderhouse Road. Cooperation with Minnehaha County and the City of Sioux Falls will be essential to improve the road to an arterial status.

Brandon currently has two collector roads within the community:

Redwood Boulevard is a major collector on the City's north side providing a route to new residential neighborhoods. **Constraints:** The road should be improved east of the Split Rock Creek Bridge. In the future, Redwood has great potential to be an arterial route, linking the east and west sections of town. Access to Redwood Boulevard should be strictly limited to allow mobility and free flow of traffic in the future.

Aspen Boulevard is a major collector within the City's central section providing alternate connection between Sioux Boulevard and SD Highway 11. **Constraints:** The road has good mobility for a collector. The City should encourage future development to be oriented away from Aspen Boulevard due to a lack of another feasible major east-west road south of Aspen Boulevard. Work should be done to correct a drainage problem near the railroad tracks. Wide sidewalks/bike path should be allowed for appropriate separation of pedestrian and car/truck traffic.

Local Roads

Overall the local road system is in good condition. The orientation of the roads has led to some constraints. The use of cul-de-sacs and curvilinear residential roads has limited flow and the development of collector roads, especially in the east and north sections of the City.

Map 5 illustrates the major street plan.

B. WATER FACILITIES

The City of Brandon recently completed a new water treatment plant located adjacent to Aspen Park. The water capacity of the community will accommodate the projected 20 year growth.

Wells: The community wells are located in Aspen Park near the new Municipal Water Treatment Plant.

Water Towers: One water tower is located in Brandon. The water tower is located near the Brandon Valley High School.

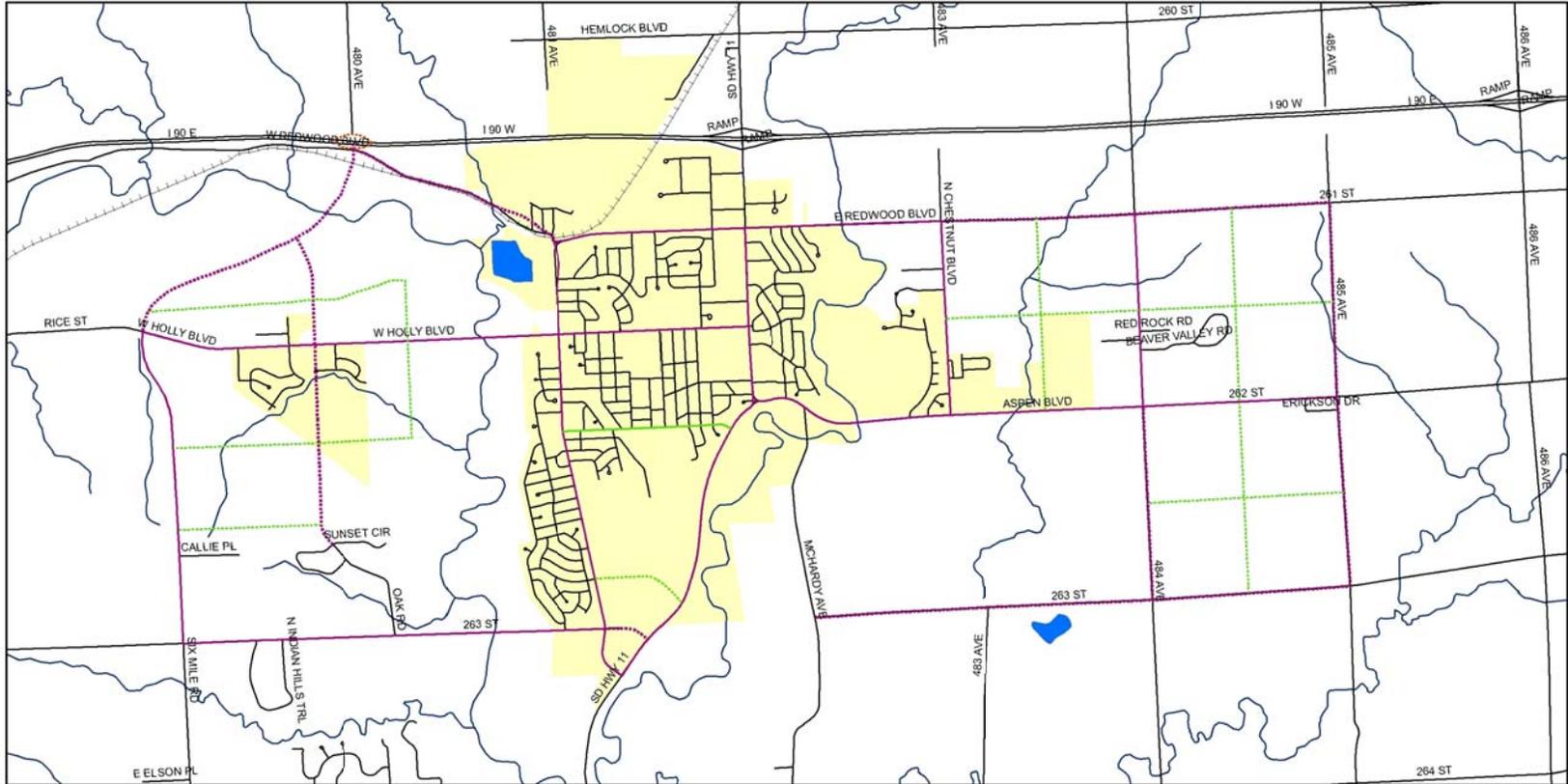
System Constraints: The water tower east of the Municipal Golf Course cannot serve additional growth. A water pumping station will need to be completed to create reliable service and growth potential to the east. Additional water towers may be needed to accommodate growth to the north, east, and west.

C. WASTEWATER FACILITIES

The wastewater system of Brandon has adequate capacity for the 20-year growth period. Treatment of the waste is pumped to the lagoons near the Big Sioux River where some effluent is treated with the lagoon system and some is pumped to the Sioux Falls Wastewater Treatment System west of Brandon.

Existing Facilities and Lift Stations: The existing lift stations are overall in good working order. However, new lift stations will be needed to open new growth areas and there is limited or no capacity to pump from one lift station to another lift station.

System Constraints: Careful study will be required to determine the best method to open new sewer basins. New main sewer trunk lines will likely be needed to open east and west growth areas. The north growth areas will also need a new trunk line leading to the wastewater facility.



<p>Legend</p> <ul style="list-style-type: none"> ARTERIAL FUTURE ARTERIAL COLLECTOR FUTURE COLLECTOR FUTURE RAMP Roads Rail Creeks, Rivers & Lakes City Limits 	<p>Map 5 MAJOR STREET PLAN City of Brandon</p>	<p>This information has been secured from sources we believe to be reliable, however, we do not guarantee the accuracy of the information contained herein. This map does not eliminate the need for an onsite investigation. This map was compiled by South Eastern Council of Governments</p>
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VI. SCHOOL PLANS AND PROJECTIONS

A. SCHOOL FACILITIES

The Brandon Valley School District maintains four (4) facilities within the Brandon City Limits including two K-5 elementary buildings, a middle school (6-8) and a high school (9-12). The district also operates a K-5 elementary school facility located in Valley Springs. The district lies entirely within Minnehaha County. The district owns two sites for future building development, one on Six-Mile Road in the Sioux Falls future growth area, and one adjacent to Robert Bennis Elementary located along Park Street in southern Brandon. The Brandon Valley School District has planned for most of its growth to occur between Brandon and Sioux Falls.

VII. PARK AND OPEN SPACE INVENTORY AND NEEDS

A. INVENTORY

<u>Name</u>	<u>Acres</u>	<u>Type</u>	<u>Comments</u>
Pioneer Park	21 acres	Community	sledding hill, playground equipment, ball field, scenic overlook, nature area, picnic area, soccer fields, basketball court, restrooms
Aspen Park	50 acres	Community	8 softball fields, 1 baseball field, swimming pool, picnic area, tennis courts, modern restrooms, playground equipment
Municipal Golf Course	146 acres	Golf Course	18-hole course
Bike trail	NA	Linear	links Big Sioux Recreation area and Aspen Park
McHardy Park	81 acres	Community	sledding, picnic area, recreational ball field, playground equipment, restrooms, lookout tower
Big Sioux Recreation Area	410 acres	State	camping, hiking, canoeing, picnicking, bike trail, archery range, modern comfort stations, playground equipment, cross-country skiing, snowmobiling
Tallgrass Park	3 acres	Neighborhood	playground equipment, parking lot, restrooms
Stone Ridge	1 acre	Neighborhood	undeveloped
The Bluffs	1 acre	Neighborhood	undeveloped

B. FUTURE NEEDS

Neighborhood parks are generally between five and ten acres in size. The effective service area of neighborhood parks is one mile, depending on location, facilities, and accessibility. School/park sites also serve as neighborhood parks and include playground equipment in addition to play fields, parking lots, and multi use paved areas for court games.

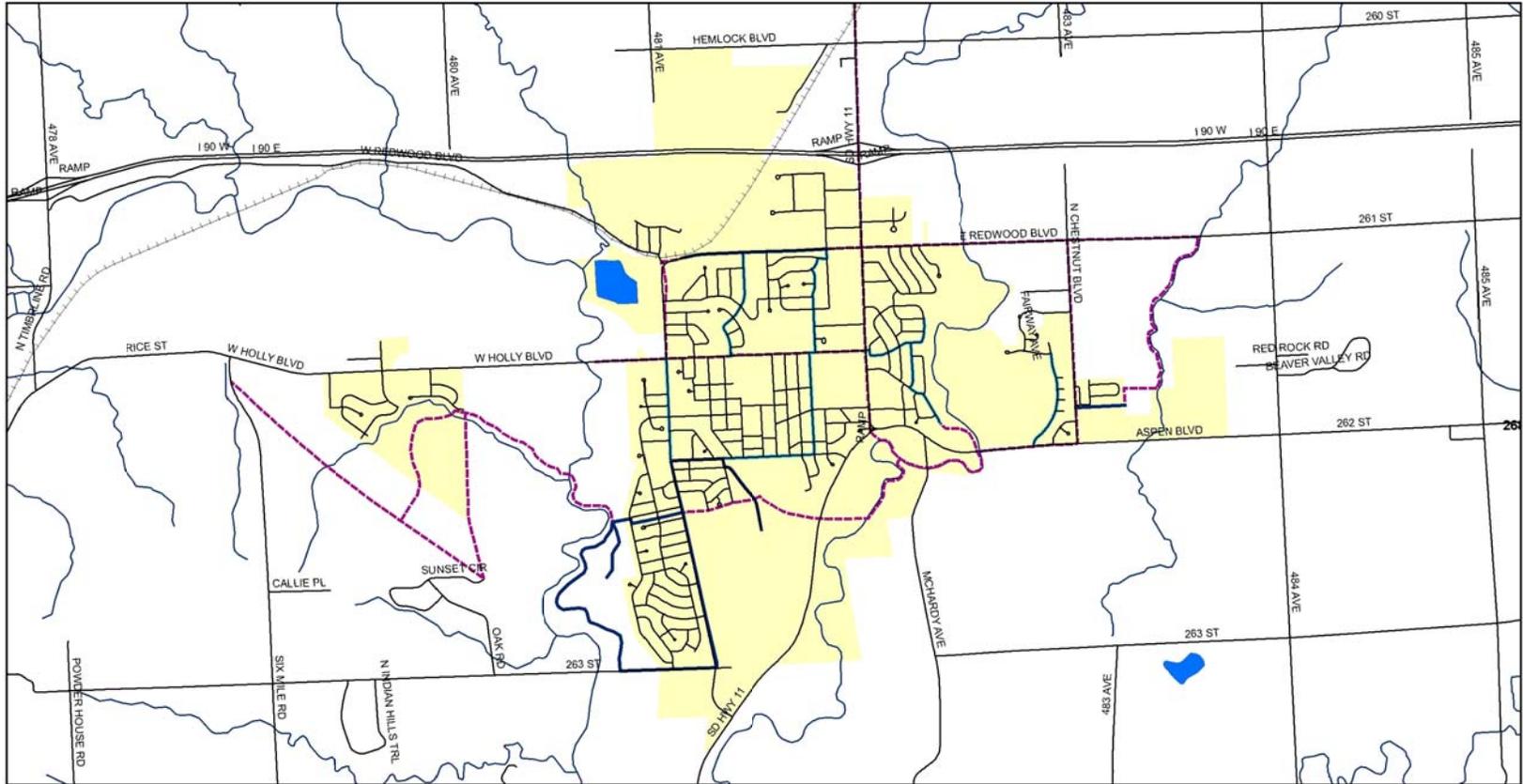
Community parks, because of their larger size, provide a much wider range of activities and facilities than neighborhood parks. The land area requirements generally range from 20 to 40 acres. Specialized facilities such as swimming pools, picnic areas, and athletic complexes can be accommodated in community parks. Community parks that should be provided include areas for passive uses, nature conservation, pools and aquatic centers, and athletic fields. Each of these four types of uses might include other uses such as neighborhood playground space, but generally larger parks will focus on one major type of activity.

Conservation and nature areas are specialized locations which preserve wildlife habitat, woodlands, and wetlands through open space development. Most commonly developed along the stream corridors and natural drainage ways are linear parks or greenways which provide a variety of recreational opportunities to adjacent neighborhoods. These activities easily accommodate the development of a bike trail system.

The parks and open spaces on the Future Land Use Map identify existing park facilities and proposed new facilities within the projected growth areas. A list of the new or expanded facilities is listed in the Capital Improvements Plan Summary on page 32. These facilities will bring nearly all residential development within the service area of both neighborhood and community parks. The specific improvements provided within each park facility should be tailored to meet the needs of the nearby population which it will primarily serve. Where feasible, proposed park sites are integrated with future elementary school sites to permit joint use of facilities. In addition, potential combinations of detention pond sites and neighborhood parks should be reviewed wherever feasible to allow more efficient land utilization and consolidation of maintenance costs.

If new parks are to be provided at a reasonable cost and in proper locations, it is essential that park land acquisition take place prior to residential development. Integration of park and school sites will likewise be feasible only if land acquisition occurs well ahead of residential development.

Expansion of the current bike trail system is proposed to continue. Future trail locations are planned along Holly and Redwood Boulevard, to the west of Brandon along the Big Sioux River and to the east of Brandon linking Aspen Park with McHardy Park. Additional designated bike routes are also proposed along major streets to provide better access to parks and the trail system. (See **Map 6**)



Legend

- Bike Route
- Current Bike Trail
- Future Bike Trail
- Roads
- Rail
- Creeks, Rivers & Lakes
- City Limits

Map 6
BIKE TRAILS
City of Brandon

This information has been secured from sources we believe to be reliable, however, we do not guarantee the accuracy of the information contained herein. This map does not eliminate the need for an onsite investigation. This map was compiled by South Eastern Council of Governments

VIII. GROWTH AREA ANALYSIS

The costs of extending water and sewer services are the primary considerations in designating future growth. However, other factors must also be considered, which includes capacity of the transportation system and environmental suitability. The following analysis is intended to provide the City of Brandon and Minnehaha County with a guide to land use decisions and direct implementation through subdivision and zoning regulations. **Map 7** illustrates all growth areas by the number indicated.

Growth Area Constraints

Area #1

1. Big Sioux and Split Rock Creek floodplains.
2. Existing development along Sioux Boulevard and SD Highway 11.
3. Sand and gravel pits.
4. Drainage between Sioux Boulevard and SD Highway 11.
5. Sewer and water are available to most of area.
6. Indian burial grounds.

Area #2

1. Water available in most of area with 2 - 15 inch water lines across river.
2. Limited area to develop beyond.
3. Need for I-90 interchange and associated arterial corridor/collectors - large cost.

Area #3

1. Need separate lift station for area.
2. A water tower is needed (Area #2 water tower will be satisfactory).
3. Significant amount of existing rural residential development.
4. Much of terrain is hilly with steep slopes.

Area #4

1. Water and sewer available.

Area #5

1. Water and sewer available.
2. Will need to upgrade existing lift station (lift station pumping to another lift station).
3. Transportation issues - Redwood Boulevard as arterial.
4. Water runs along south side of property.

Area #6

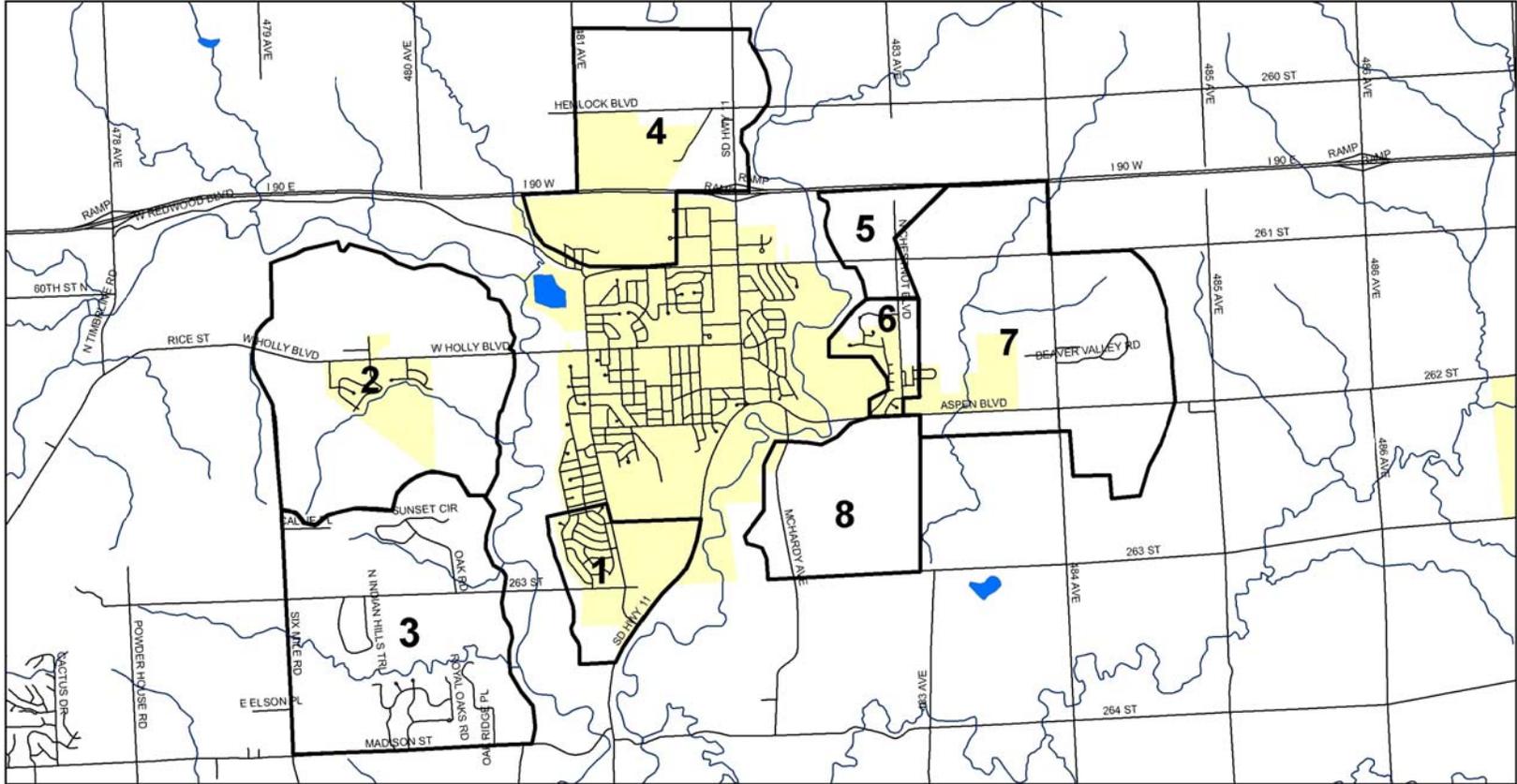
1. Water and sewer available.

Area #7

1. Need new lift station and force main (*See Stockwell Engineers Preliminary Study*).
2. A new water tower and treatment plant will be needed beyond 20 year planning period.
3. Transportation issues – Chestnut and Redwood Boulevard and other arterial options.

Area #8

1. Need to upgrade lift station.
2. Water and sewer available.
3. Sewer will need to have force main upgrade.



Legend

- Growth Areas
- Rivers, Creeks & Lakes
- Roads
- Rail
- City Limits

Map 7
GROWTH AREAS
 City of Brandon

This information has been secured from sources we believe to be reliable, however, we do not guarantee the accuracy of the information contained herein. This map does not eliminate the need for an onsite investigation. This map was compiled by South Eastern Council of Governments

IX. PLANNING POLICY FRAMEWORK

A. GROWTH MANAGEMENT AND CAPITAL IMPROVEMENTS STRATEGY

The City of Brandon details within this plan the types, locations and phasing of land uses. Growth management provides for economical provision of City services by coordinating public facility improvements with private development. To create a focus for the plan, listed below are the following growth management goals, policies, and objectives. In addition, the required capital improvements to facilitate growth and redevelopment are included, such as: streets, water, sewer, drainage, fire, police, and recreation.

Goal 1. Encourage Development and Redevelopment Within Existing City Limits Area

Objective 1 - Allow development within existing sanitary sewer basins as detailed by future land use map

Policy 1 - Sewer Basin #1 is open for development and will be developed as indicated by future land use map; except, preserve the Indian burial grounds in the southern section and wetland areas in the central section of the area.

Policy 2 - Encourage all other existing sewer basins in the city to develop as indicated by the future land use map.

Policy 3 - Develop proper drainage as the existing area develops with a mix of open space and proper site planning.

Goal 2. Direct New Growth into Designated Future Growth Areas

Objective 1 - Allow development into Growth Area #2 with regard to the following policies

Policy 1 - Continue to expand sewer services to the area through an area assessment.

Policy 2 - Continue to expand water services to the area through an area assessment and eventually construct a water tower to provide water service to southwestern sections of area.

Objective 2 - Allow development into Growth Area #4 with regard to the following policies

Policy 1 - Continue to extend sewer lines for future growth.

Policy 2 - Continue to extend water lines for future growth.

Policy 3 - Maintain area as a future industrial and office park area.

Policy 4 - Develop a tree and landscaped area on both sides of Interstate 90 as a method to soften the area's look and create an attractive gateway to the city.

Policy 5 - Encourage annexation of Corson and surrounding area for water and sewer issues.

Objective 3 - Encourage development within Growth Area #6 as detailed by future land use map

Policy 1 - Construct drainage area for existing and future growth.

Objective 4 - Encourage development within Growth Area #7 with regard to the following policies and as detailed by future land use map

Policy 1 - Continue to extend or expand sewer services to the area through an area assessment.

Policy 2 - Continue to extend or expand water services to the area through an area assessment.

Policy 3 - Construct drainage area for future development.

Objective 5 – Carefully examine growth into Growth areas #3, #5, and #8 due to high water and sewer system constraints

Goal 3. Construct and upgrade the major street system to handle new growth

Objective 1 - Construct an arterial road system to provide optimum traffic mobility

Policy 1 - Develop Redwood Boulevard into an arterial road from SD Highway 11 to 484th Avenue.

Policy 2 - Continue to develop Chestnut Avenue into an arterial section road from County Highway 264 to Redwood Boulevard.

Policy 3 - Widen Rice Street/Holly Boulevard to a 4 or 5-lane urban section from Six-Mile Road to Sioux Boulevard in a phased project and strictly limit access through shared driveways and maintain 100 foot right-of-way.

Policy 4 - Add a stop light at Sioux and Split Rock Boulevard to control projected increase in traffic.

Policy 5 - Study the overall regional transportation needs of growth area #2 including Holly Boulevard and Park Street through the Metropolitan Planning Organization process. The study should include the identification of a new I-90 interchange and associated arterial links as indicated on the Major Street Plan, improvements to current arterial systems to handle projected future traffic volumes, and access management guidelines.

Policy 6 - Investigate options to increase traffic control devices, turning lanes and a deceleration lane on Holly Boulevard at the Bluffs and Eagle Creek Development.

Objective 2 - Complete projects to enhance the safety of the transportation system

Policy 1 - Develop sidewalks in all areas of town to create safe neighborhoods by requiring developers to construct or assessing landowners at the directive of the City.

Goal 4. Improve Community Services for all residents of Brandon

Objective 1 - Improve Public Services and Buildings

Policy 1 - Complete construction of a new city government center.

Policy 2 - Complete construction of a community recreation center.

Objective 2 - Improve Park and Recreation Opportunities for Citizens

Policy 1 - Construct a bike trail from McHardy Park to the Brandon Golf Course area with the trail leading under SD 264 at the bridge to provide safe community access to the city park system.

Policy 2 - Construct a bike path along Redwood Boulevard to Pioneer Park to provide an access to bike path system for people in north residential neighborhoods.

Policy 3 - Construct additional playground equipment and a soccer complex at McHardy Park.

Policy 4 - Designate city bike routes to help provide a safe place for bike riding (See **Map 6**).

Policy 5 - Construct an extension of the bike trail from Aspen Park to McHardy Park alongside the railroad track right-of-way.

Policy 6 - Expand Aspen Park and add baseball and softball fields.

Policy 7 - Add a park area and associated bike trail in Growth Area #2 for neighborhood open space and recreational opportunities.

Policy 8 - Construct the Sioux Falls/Brandon bike path located in the growth area while also providing an area for open space and recreational needs on the north side of the Big Sioux River.

Policy 9 - Designate open space to construct a neighborhood park in Area #6.

Policy 10 - Designate open space to construct a neighborhood park in Area #2.

Policy 11 - Designate open space to construct a neighborhood park in Area #7.

Goal 5. Preserve the Function and Character of the Rural Area

Objective 1 - Encourage agriculture to remain the dominant land use activity

Policy 1 - Only agricultural uses will be allowed in the City's agricultural zones.

Objective 2 - Discourage scattered residential, commercial, or industrial development

Policy 1 - Work with Minnehaha County to ensure all proposed development within Brandon's growth areas are annexed and serviced with municipal utilities.

Goal 6. Improve Local Government

Objective 1 – Improve Communication

Policy 1 - Increase communication with the Brandon Valley School District.

Policy 2 - Increase communication with the public by holding informal public meetings and coffees.

Policy 3 - Increase communication with the city staff.

Objective 2 – Ensure financial stability of the city

Policy 1 - Establish fire and ambulance districts.

Policy 2 - Develop land development fees.

Policy 3 - Establish relationships with financial institutions.

Policy 4 - Continue to promote commercial and industrial expansion.

Policy 5 - Pursue donations through a community fund.

Objective 3 – Improve city staff management

Policy 1 - Provide adequate personnel to meet the needs of the increased workload.

Policy 2 - Provide leadership for a smooth transition of new staff.

Objective 4 – Remain current with new technologies

X. PLANNING STRATEGY

The City of Brandon has committed to shape the future of the community, to enhance economic development, and maintain a high quality of life for all citizens of the community. The following goals, objectives, and policies will guide the Planning and Zoning Commission and City Council, and are the basis for enforcement of the zoning and subdivision ordinances.

Goal 1. Ensure the Health and Safety of Citizens

Objective 1 - Separate structures for health and safety

- Policy 1 - Sideyard setbacks will comply with fire safety separation distances for residential structures and minimum requirements for commercial and industrial structures.
- Policy 2 - Ensure buildings and structures do not encroach on residential building air space.

Objective 2 - Design lots and blocks to emphasize cost efficiency and community values

- Policy 1 - Require the City's consulting engineer review the utility plans before a plat is approved.
- Policy 2 - Review the lot and block designs based upon subdivision design standards.

Objective 3 - All streets need adequate visibility at intersections and driveways

- Policy 1 - Ensure adequate visibility at intersections and driveways by ensuring that structures do not obstruct the view of intersecting traffic.

Objective 4 - Design local streets to emphasize land access and safety

- Policy 1 - Design residential streets with 66 feet right-of-ways and no more than 36 feet pavement width.

Objective 5 - Design major streets to emphasize mobility, safety, and adequate off-street parking

- Policy 1 - Implement access management guidelines as a part of the subdivision ordinance.
- Policy 2 - Maintain a policy of safe speed limits for all collectors and arterial roads. Limit the number of stop signs or stop lights to maintain an even traffic flow.
- Policy 3 - Ensure single-family developments and other low intensity uses have driveway access off local or collector streets and not off major streets. Arterial streets should have limited access.
- Policy 4 - Require development of a consistent collector street system as indicated by the Major Street Plan.
- Policy 5 - Implement SD Highway 11/Splitrock Boulevard Access Plan as prepared by the South Dakota Department of Transportation and the City of Brandon.

Goal 2. Protect Natural Resources

Objective 1 - Retain runoff with open natural drainage systems

- Policy 1 - Utilize open space such as parks or backyards to help naturally drain new developments.
- Policy 2 - Complete drainage basin plans ahead of development.

Objective 2 - Create greenways and linear open spaces within floodplain areas

- Policy 1 - Maintain the Big Sioux River and Split Rock Creek floodplains for open space, recreation areas, and bike path opportunities.
- Policy 2 - Do not allow development to encroach upon the floodplains.

Objective 3 - Design around significant wetlands

- Policy 1 - Preserve wetland areas as a part of drainage systems and park system where possible.

Objective 4 - Do not allow development on steep slopes

- Policy 1 - Do not allow development to encroach into steep slope areas of Big Sioux River and Split Rock Creek areas.

Objective 5 - Limit development in areas with poor soils and high water table

- Policy 1 - Maintain an open space area around the Brandon well fields in Aspen Park.

Goal 3. Enhance the Visual Quality of the Community

Objective 1 - Separate heavy industrial and residential uses

- Policy 1 - Create a buffer zone for transitional areas between industrial, commercial, and residential areas.
- Policy 2 - Create an office park between the industrial park and Redwood Boulevard.
- Policy 3 - Create buffer zones for the proposed commercial zones.

Objective 2 - Soften the look of all uses to enhance the community's image as an attractive place

- Policy 1 - Institute appropriate landscape regulations for all uses.
- Policy 2 - Utilize the following gateways to Brandon as a way to create community identity through community welcome signage, landscape beautification, and design criteria.
 - * I-90 and Split Rock Boulevard
 - * Sioux Boulevard and Split Rock Boulevard
 - * Holly Boulevard and Six-Mile Road

Objective 3 - Create a transition from commercial to residential areas

- Policy 1 - Require the use of berms, fences, and additional setbacks as measures to create an appropriate transition to single-family uses.

Objective 4 - Encourage the appropriate siting and concentration of uses and structures

- Policy 1 - Create a manufactured housing zoning district regulation.
- Policy 2 - Add telecommunication tower regulations to ensure their appropriate placement and mitigate negative visual features.
- Policy 3 - Allow appropriate fences that do not obscure peoples' view.
- Policy 4 - Allow signs of an appropriate size relative to the lot size and limit their numbers.
- Policy 5 - Allow accessory buildings in a rear yard location with appropriate setbacks.

XI. PLAN IMPLEMENTATION

The best possible way to implement a comprehensive plan is to utilize all of the administrative tools available in order to influence development in a positive manner. There are many tools which can be utilized, including: zoning regulations, subdivision regulations, policy plans, capital improvements plans, annexation studies, and well-rounded community involvement.

Local Governing and Advisory Boards. The key players in the implementation of a Comprehensive Plan are the Planning and Zoning Commission and the City Council. It is the duty of the governing body of Brandon to encourage progress by utilizing all of the tools available to ensure orderly growth and development can take place. With public input, the Planning and Zoning Commission and the City Council can create a balance between industry, commerce, and housing, allowing utilization of the resources available to facilitate civic improvement.

Local Regulatory Tools. Perhaps the most widely utilized administrative tools are the Zoning Ordinance and Subdivision Regulations. It is essential to revise either or both of these documents when they conflict with the Comprehensive Plan. It is especially important to create a cooperative agreement between Minnehaha County and the City of Brandon to insure the Brandon urban growth area is developed according to the Comprehensive Plan recommendations.

Annexation. If the orderly growth of Brandon is to continue over the planning period, it is essential the City continue an active annexation program. The boundaries for providing municipal services should generally coincide with the corporate limits. Areas designated by the land use plan as future growth areas of the City should be annexed in advance of major development as should existing rural subdivisions which lie adjacent to the City. This policy will assure that sufficient development land to accommodate the future growth of the urban areas is maintained.

Capital Improvements Planning. The purpose of capital improvements planning is to provide local government officials with a guide for budgeting for major improvements which will benefit the community. The City must review current infrastructure and identify and address any deficiencies prior to consideration of future development. It is the intention of the City to upgrade a portion of existing utilities and transportation routes on an annual basis. Information within the Comprehensive Plan will be utilized in constructing the Brandon capital improvement plan. On the following page is a list of major capital improvements over the 20-year study period.

Capital Improvements Summary of Needs 2007 - 2027

General

- Sidewalks along Splitrock Boulevard
- Redwood drainage repair

Police

- Garage for police behind City Hall

Water

- Construction in growth area #7 to include water booster station and water mains
- Construction of water tower to service area #2 (south of water pressure line)
- Extend water line from well #3 to water treatment plant
- Dedicated trunk line to growth area #4
- Controls from well #3 to water treatment plant
- Increase line size from the water treatment plant to 5th and Aspen
- Increase line size from the water treatment plant to Richland Park Addition

Street

- Reconstruction of Holly from Sioux Boulevard to Splitrock Boulevard and should be included in the transportation study in growth area #2
- Improve drainage at Main and Aspen
- Reconstruction of Redwood Boulevard and Chestnut Avenue and should be included in the transportation study in growth area #7
- Construction of arterial roads in growth area #2
- Construction of arterial roads in growth area #7
- Re-pave Rushmore Drive from Splitrock Boulevard to Teton Drive
- Overlay parts of Aspen Boulevard
- Construction of a 2-lane arterial from I-90 interchange to Redwood Boulevard
- I-90 Interchange, bridge and arterial extension to Six Mile Road
- Expand the turn lanes/deceleration lanes at Sandstone Avenue to Heritage Road along Holly Boulevard
- Add a stop light at the intersection of Redwood Boulevard and Splitrock Boulevard

Golf Course

- Chipping green and bunker on practice range

Parks

- Expansion of Aspen Park (McHardy Park) with additional softball and baseball fields
- Construction of additional soccer fields and playground equipment in McHardy Park
- Add lights on diamonds C & D in Aspen Park
- Bike trail from Pioneer Park to McHardy Park
- New park construction in growth area #2 south of Holly Boulevard
- Reconstruction of Aspen Park Avenue
- Big Sioux River bike trail Phase 2

- Bike trail from new area #2 park to Big Sioux Recreation area
- Pool blanket to preserve heat
- Park development around the Sweetman property on Aspen Boulevard
- Construction of a pool on the east side

APPENDIX 1

Land Use Location and Design Criteria

Residential

Low density (3 to 6 units/acre)

- *Access to local street system-avoid direct access to arterial streets
- *Convenient to neighborhood school, park, and commercial services
- *Avoid environmentally sensitive areas such as wetlands and drainage ways

Medium density (6 to 16 units/acre)

- *Access to major street system
- *Well designed transition to adjacent land uses
- *Provision of useable open space based on project size
- *Transition between low density neighborhood and major streets
- *Adjacent to neighborhood commercial center

High density (16 to 40 units/acre)

- *Adjacent to principal arterials near major commercial, institutional, or employment centers
- *Well designed transition to adjacent land use
- *Provision of viable open space based on project size

Commercial

Highway oriented and regional centers

- *Adjacent to major streets and regional highways
- *Controlled access to arterial streets
- *Quality architecture and well designed transition to adjacent uses

Community centers

- *Intersection of arterial streets and along transit routes
- *Mixed use development including office, institutional, or multifamily residences
- *Well designed transition to adjacent uses

Neighborhood retail, office, and convenience services

- *Convenient vehicular and pedestrian access to residential areas
- *Adjacent to major street intersections
- *Design compatible with surrounding uses
- *Well designed transition to adjacent uses
- *Located within residential, employment, or institutional centers

Downtown area

- *Pedestrian orientation
- *Quality urban design standards
- *Mixed uses including office, retail, institutional, cultural and entertainment
- *Orientation to green way where feasible
- *Consolidate off-street parking areas
- *Residential uses within walking distance of the Central Business District (CBD)

Industrial

General light industrial

- *Regional highway access located close to major arterial streets
- *Rail access for industrial uses requiring it
- *Buffered from residential and other adjacent land uses

- *Industrial park setting with building design and landscape amenities
- *Include office, warehousing and limited retail uses

Limited heavy industrial

- *Access to major streets
- *Well designed buffer to adjacent land uses
- *Minimize environmental impacts on surrounding properties

Mixed Use

Institutional, office, and other mixed use development

- *Convenient to intended market area
- *Vehicular access to major streets
- *Minimization of traffic impact on adjacent uses
- *Orderly expansion of institutional uses near residential areas
- *Design compatibility with adjacent uses
- *Include retail, multifamily and business-technology land uses

Appendix D
Water Sample Results



**DIVISION OF
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Public Health Laboratory

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Pierre, South Dakota 57501-1700
605/773-3368 FAX: 605/773-6129
www.state.sd.us/doh/lab/index.htm

Submitter copy to:

* Page 1 of 2*
Date: 7/12/2013

LABER, GABE-111277
600 N MAIN AVE SUITE 100
SIOUX FALLS, SD 57104

Spec #: E13EC003382
Subm #:
Lab: ENV CHEMISTRY
Tel #: (605)773-3368

Source
BRANDON/CITY WATER

Date Rcvd: 7/3/2013	Location SAMPLE TAP
Time Rcvd: 0701	Site Location: WELL #1
Date Coll: 7/2/2013	Source Sampled: WELL
Time Coll: 0945	Source: WELL
Spec Type: WATER	Tap Location: SAMPLE TAP
Coll By: DONOVAN C./GABE	Type of Sample: RAW
LABER	medium water

Final Results

Nitrate	Nitrate-N	7.0 mg/L	Limit: 10.0
Fluoride		0.28 mg/L	
Chloride		69 mg/L	
Iron, Total		0.06 mg/L	
Manganese		0.06 mg/L	
Sulfate		39.4 mg/L	
SOLIDS, TOTAL DISS.		484 mg/L	
Standard Method 2540C			
PH		7.74	pH UNITS
EPA Method 150.1			
Alkalinity-M		261 mg/L	
Alkalinity-P		0 mg/L	
Bicarbonate		318 mg/L	
Carbonate		0 mg/L	
Conductivity		818	umho/cm
Calcium		106 mg/L	
Magnesium		27.7 mg/L	
SM3111B			
Hardness (calc)		379 mg/L	
Langlier Index		0.63	
Sodium		26.1 mg/L	
Potassium		3.9 mg/L	

(continued)



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Date: 7/12/2013

LABER, GABE-111277
600 N MAIN AVE SUITE 100
SIOUX FALLS, SD 57104

Spec #: E13EC003382
Subm #:
Lab: ENV CHEMISTRY
Tel #: (605) 773-3368

Source
BRANDON/CITY WATER

Specimen Comments:
%error = 1.8/3.7



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Date: 7/12/2013

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LABER, GABE-111277
600 N MAIN AVE SUITE 100
SIOUX FALLS, SD 57104

Spec #: E13EC003383
Subm #:
Lab: ENV CHEMISTRY
Tel #: (605) 773-3368

Source
BRANDON/CITY WATER

Date Rcvd: 7/3/2013	Site Location: HYDRANT NEXT TO WELL
Time Rcvd: 0701	Source Name WELL #3
Date Coll: 7/2/2013	Source Sampled: WELL
Time Coll: 0915	Source: WELL
Spec Type: WATER	Tap Location: HYDRANT NEXT TO WELL
Coll By: DONOVAN C./GABE LABER	Type of Sample: RAW medium water
Location HYDRANT NEXT TO WELL	

Final Results

Nitrate	Nitrate-N	<0.2 mg/L	Limit: 10.0
Fluoride		2.30 mg/L	
Chloride		9 mg/L	
Iron, Total		2.74 mg/L	
Manganese		0.18 mg/L	
Sulfate		76.8 mg/L	
SOLIDS, TOTAL DISS. Standard Method 2540C		466 mg/L	
PH		7.66 pH UNITS	
EPA Method 150.1			
Alkalinity-M		307 mg/L	
Alkalinity-P		0 mg/L	
Bicarbonate		374 mg/L	
Carbonate		0 mg/L	
Conductivity		737 umho/cm	
Calcium		92.4 mg/L	
Magnesium		29.0 mg/L	
SM3111B			
Hardness (calc)		350 mg/L	
Langlier Index		0.57	
Sodium		26.9 mg/L	

(continued)



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Date: 7/12/2013

LABER, GABE-111277
600 N MAIN AVE SUITE 100
SIOUX FALLS, SD 57104

Spec #: E13EC003383
Subm #:
Lab: ENV. CHEMISTRY
Tel #: (605) 773-3368

Source
BRANDON/CITY WATER

Potassium

5.9 mg/L

Specimen Comments:
%error = 1.2/3.8



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Date: 7/12/2013

LABER, GABE-111277
600 N MAIN AVE SUITE 100
SIOUX FALLS, SD 57104

Spec #: E13EC003384
Subm #:
Lab: ENV CHEMISTRY
Tel #: (605) 773-3368

Source
BRANDON/CITY WATER

Date Rcvd: 7/3/2013
Time Rcvd: 0705
Date Coll: 7/2/2013
Time Coll: 0950
Spec Type: WATER
Coll By: DONOVAN C./GABE
LABER
Location PRECHEM ROOM

Site Location: PRECHEM ROOM
Source Name WELL #6
Source Sampled: WELL
Source: WELL
Tap Location: PRECHEM ROOM
Telephone Numb* 3386668
Type of Sample: RAW
medium water

Final Results

Nitrate	Nitrate-N	<0.2 mg/L	Limit: 10.0
Fluoride		0.54 mg/L	
Chloride		4 mg/L	
Iron, Total		1.88 mg/L	
Manganese		0.37 mg/L	
Sulfate		142 mg/L	
SOLIDS, TOTAL DISS. Standard Method 2540C		540 mg/L	
PH		7.91 pH UNITS	
EPA Method 150.1			
Alkalinity-M		292 mg/L	
Alkalinity-P		0 mg/L	
Bicarbonate		356 mg/L	
Carbonate		0 mg/L	
Conductivity		777 umho/cm	
Calcium		108 mg/L	
Magnesium		34.6 mg/L	
SM3111B			
Hardness (calc)		412 mg/L	
Langlier Index		0.85	
Sodium		29.3 mg/L	
Potassium		4.5 mg/L	

(continued)



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Date: 7/12/2013

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600 N MAIN AVE SUITE 100
SIOUX FALLS, SD 57104

Spec #: E13EC003384
Subm #:
Lab: ENV CHEMISTRY
Tel #: (605) 773-3368

Source
BRANDON/CITY WATER

Specimen Comments:
%error = 3.7/3.7



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Date: 7/12/2013

LABER, GABE-111277
600 N MAIN AVE SUITE 100
SIOUX FALLS, SD 57104

Spec #: E13EC003385
Subm #:
Lab: ENV CHEMISTRY
Tel #: (605)773-3368

Source
BRANDON/CITY WATER

Date Rcvd: 7/3/2013	Site Location: SHOP
Time Rcvd: 0705	Source Sampled: TREATED
Date Coll: 7/2/2013	Source: TREATED
Time Coll: 1000	Tap Location: SHOP
Spec Type: WATER	Telephone Num*: 3386668
Coll By: DONOVAN C./GABE LABER	Type of Sample: TREATED medium water
Location SHOP	

Final Results

Nitrate	Nitrate-N	0.8 mg/L	Limit: 10.0
Fluoride		1.14 mg/L	
Chloride		24 mg/L	
Iron, Total		0.14 mg/L	
Manganese		0.12 mg/L	
Sulfate		128 mg/L	
SOLIDS, TOTAL DISS. Standard Method 2540C		538 mg/L	
PH		7.84 pH UNITS	
EPA Method 150.1			
Alkalinity-M		291 mg/L	
Alkalinity-P		0 mg/L	
Bicarbonate		355 mg/L	
Carbonate		0 mg/L	
Conductivity		824 umho/cm	
Calcium		106 mg/L	
Magnesium		33.3 mg/L	
SM3111B			
Hardness (calc)		402 mg/L	
Langlier Index		0.77	
Sodium		27.3 mg/L	
Potassium		4.6 mg/L	

(continued)



**DIVISION OF
ADMINISTRATION**
Public Health Laboratory

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Pierre, South Dakota 57501-1700
605/773-3368 FAX: 605/773-6129
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Submitter copy to:

* Page 2 of 2*
Date: 7/12/2013

LABER, GABE-111277
600 N MAIN AVE SUITE 100
SIOUX FALLS, SD 57104

Spec #: E13EC003385
Subm #:
Lab: ENV CHEMISTRY
Tel #: (605)773-3368

Source

BRANDON/CITY WATER

Specimen Comments:
%error = 0.3/3.7