

PRELIMINARY ENGINEERING REPORT

for

WATER SYSTEM EVALUATION

OWNER:

TOWN OF WILLIAMSBURG

GMS, Inc.
Consulting Engineers

PRELIMINARY ENGINEERING REPORT
FOR
WATER SYSTEM EVALUATION

PROJECT NO. 12061.100

APRIL 2013
FINAL: JUNE 2013

OWNER:

TOWN OF WILLIAMSBURG
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SECTION I

INTRODUCTION

A. PURPOSE AND SCOPE

The Town of Williamsburg is located in Fremont County, Colorado. It was incorporated as a statutory town in 1888. The town provides general municipal services including a central potable water distribution system. Central wastewater service is not provided. Historically and continuing today, wastewater treatment is provided through the use of individual sewage disposal systems (ISDSs) consisting of primarily of septic tanks and leach fields. The water supply historically provided to the community was through the use of ground water wells located within the town.

In 1980, the town entered in an Intergovernmental Agreement (IGA) for treatment and conveyance of its water supply. This agreement, officially titled “Water Facilities Agreement”, created a regional water system that provides for a common raw water supply, water treatment and treated water transmission services by the City of Florence. The original parties to this agreement were the City of Florence, the Town of Williamsburg and the Town of Coal Creek. In 1994, the Town of Rockvale joined the regional water system. Each party in the regional system retains its own water rights and owns and maintains its own water distribution system. Also served by the regional system are the East Florence Water Association and the ADX Florence Federal Correctional Complex (also referred to as the Supermax facility). The regional water system is operated by the City of Florence acting as the lead party for the common water system. A regional water committee made up of two members of each party to the agreement provides advisory direction to the City of Florence who owns and maintains the regional system. The regional water system facilities were originally constructed in 1981 and 1982. The system has undergone numerous upgrades and modifications since that time.

The Town of Williamsburg’s water service area consists exclusively of rural residential customers. The town has grown significantly in population since the regional system was created. Williamsburg’s water distribution system also grew with the land development associated with the population boom.

In general, water system extensions to the Williamsburg distribution system that were made by the area's developers did not follow any specific design or construction standards. This has resulted in a current water distribution system that is generally considered to be substandard, undersized and experiences frequent failures. Due to the shallow depth of bedrock in several areas, piping was installed at minimal depths. Pipe sizes installed are typically too small to adequately serve the number of customer taps connected to a pipeline. Pipe materials used were inconsistent and varied. Pipe trench bedding is often discovered by town maintenance staff to include trash, rubble and debris. Single line extensions that dead end are common. Pipelines were typically not looped, resulting in a predominately branched distribution system. A minimal number of line valves were installed making it necessary to shut down large segments of the service area to facilitate repairs. Fire hydrants are few and extremely limited in flow delivery rates due to the nature of the substandard piping system. Low water pressures and low delivery rates are common in the outer most reaches of the system, especially at higher elevations. No records were kept as to the locations, sizes and material of the piping installed.

The purpose of this Preliminary Engineering Report (PER) is to evaluate the existing potable water distribution system, identifying current deficiencies within the Town of Williamsburg's water distribution system. This report represents an update to the town's 2009 PER. Recommended improvements are presented in this report to mitigate the problems inherent in this troublesome distribution system. Also presented in this report is an evaluation of the financial health of the town's water fund. The financial impacts of the recommended water system improvements are also presented along with the evaluation of potential project funding scenarios.

The scope of this report is limited primarily to the town's water distribution system. The water supply, water treatment, treated water transmission and storage services provided by the regional system have been considered and evaluated in the preparation of this report; however, no recommended changes to the existing regional water system have been made.

B. PLANNING AREA

The Town of Williamsburg is located in south central Colorado within the Upper Arkansas River Basin. The community lies southeast of the City of Florence in the foothills that abut the Wet Mountains and San Isabel National Forest. The general location of the community can be seen on Figure 1 with respect to its relationship to neighboring communities, the Arkansas River, U.S. Highway 50 and the Interstate 25 corridor as well as the cities of Pueblo and Colorado Springs. The base mapping has been taken from the U.S. Geological Survey's base map for the State of Colorado.

The town consists of three square miles, being Sections 23 and 24 of Township 19 South, Range 70 West, and Section 19 of Township 19 South, Range 69 West of the 6th Principal Meridian. The planning area with respect to potable water service is the east half of the Town of Williamsburg. This consists of most of Section 19 and the east quarter of Section 24. The remaining west half of the town is not developed. It consists of steep mountain terrain lying higher than the developed east portion of the town. The western area is not considered to be serviceable by the existing water system. The general planning area can be seen as shown on Figure 2 - Planning Area Map. Base mapping for Figure 2 has been compiled from the Florence, Florence Southeast, Williamsburg and Cañon City, U.S. Geological Survey Quadrangle maps. The figure depicts the area's county roads and state highways as well as Williamsburg's relationship to the City of Florence. The base mapping depicting the Williamsburg area was revised in 1976, prior to the formation of the regional water system and associated recent growth of the town. Thus, the base map shows only the old central portion of town and not the houses and roadways associated with the development that occurred in the 1980s and 1990s. Figure 2 has been annotated to reflect the town's boundaries, the existing developed service area, and portions of the regional water transmission system including the location of the Coal Creek water storage tank.

The original Town of Williamsburg supported significant development associated with the coal mining boom occurring in the area at the turn of the last century. The community's population, much like many of the old mining towns in Colorado, burgeoned with a peak population of 556 people in the year 1910. With the decline in the coal mining industry, the

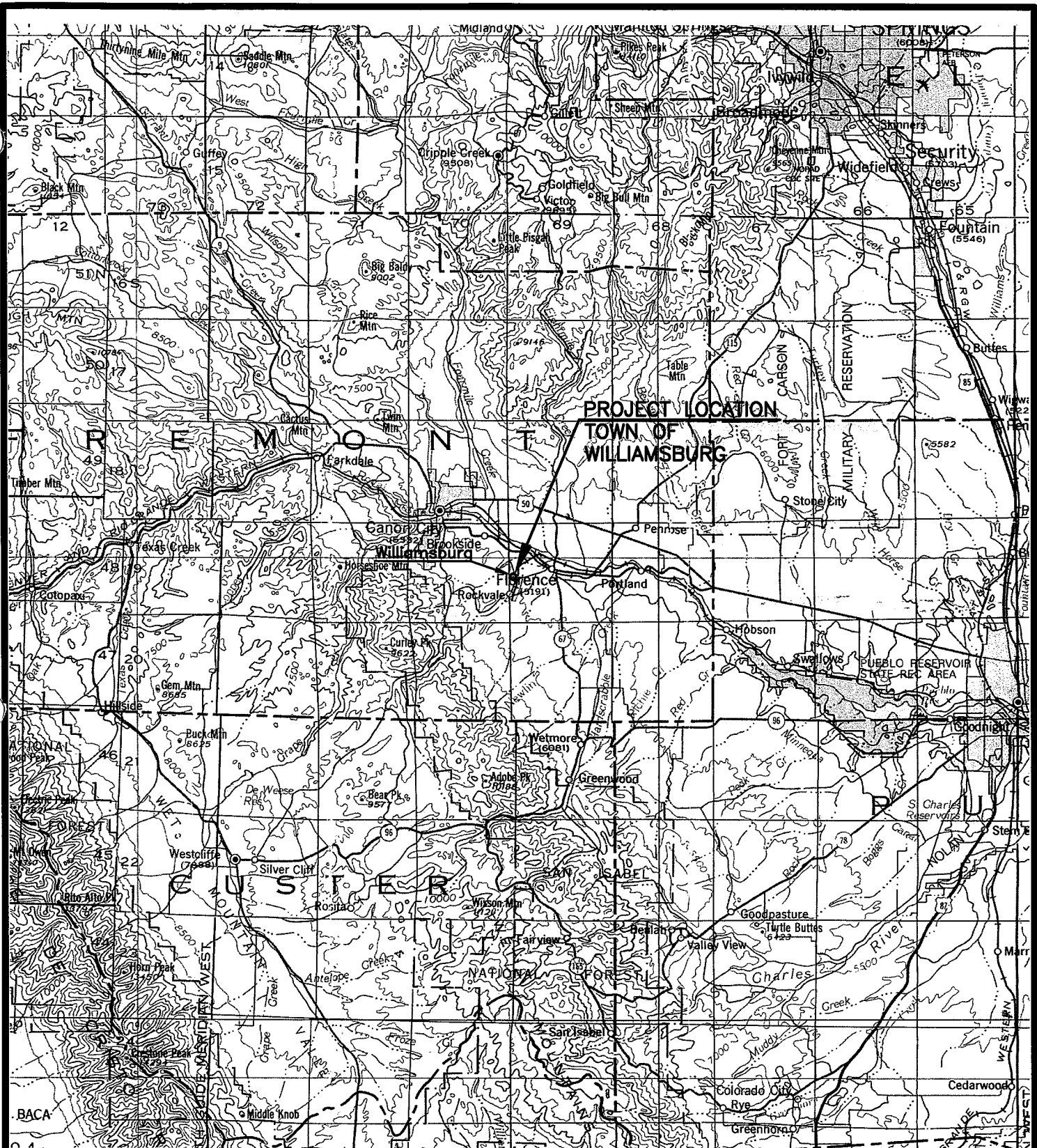


FIGURE 1.DWG

FIGURE 1 LOCATION MAP TOWN OF WILLIAMSBURG

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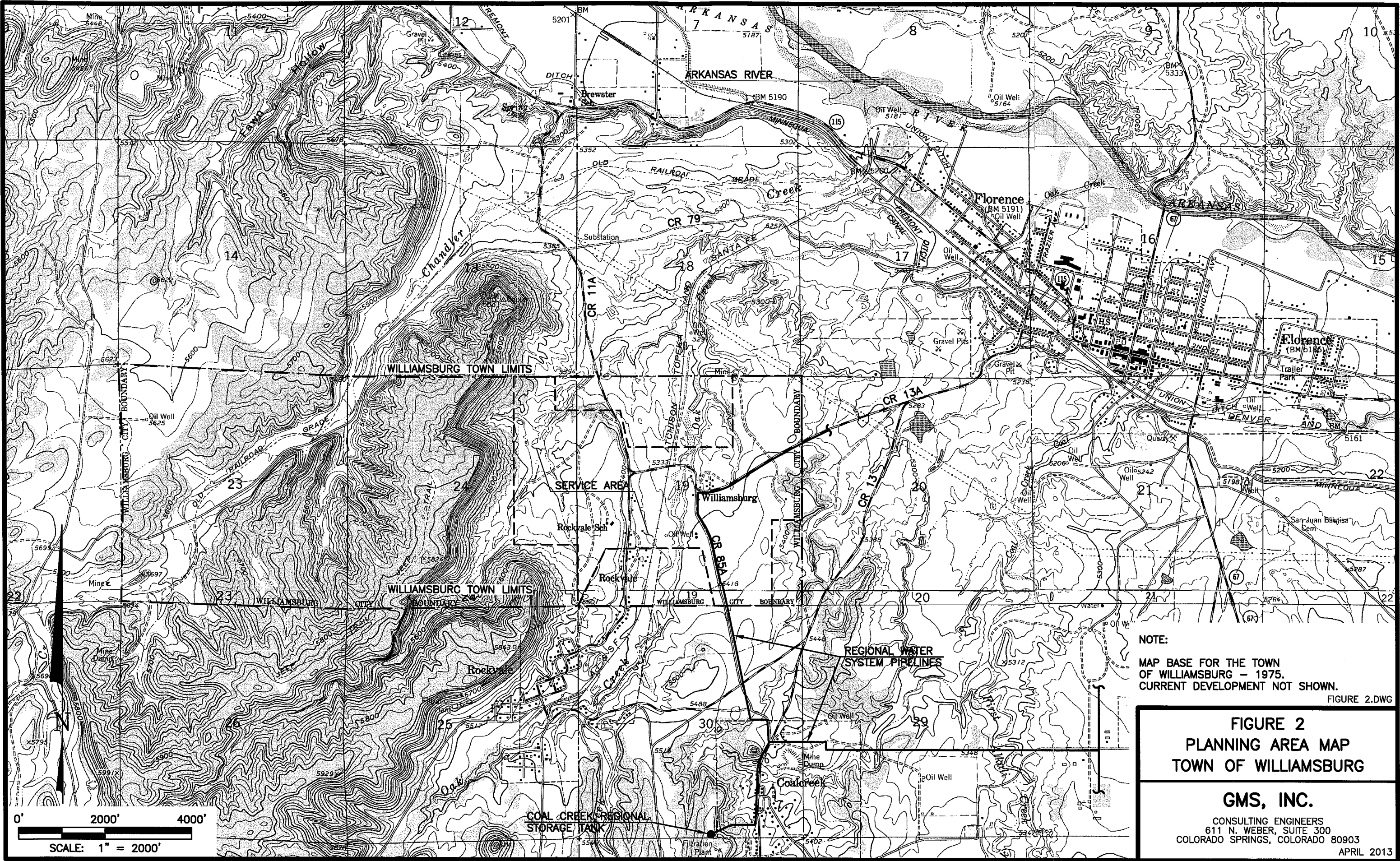
MARCH 2013

SCALE: 1" = 8 MILES

CONTOUR INTERVAL = 500'

Base map from USGS Map of the State of Colorado

G:\WILLIAMSBURG\11100\Water Study\Figure 2.dwg, 11x17, 4/30/2013 2:41:00 PM, sc, IIGMSSV02\WorkCentre 7 PS, 1:1



NOTE:
MAP BASE FOR THE TOWN
OF WILLIAMSBURG - 1975.
CURRENT DEVELOPMENT NOT SHOWN.

FIGURE 2
PLANNING AREA MAP
TOWN OF WILLIAMSBURG

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APRIL 2013

town's population steadily declined down to 72 people in 1980. Few remnants of the boom town remained at that time. One of the historic remaining structures is the Williamsburg School which is currently privately owned and has been converted into apartments. With the formation of the regional water system in 1980, the town rapidly grew from 72 people to 253 people in 1990, and continued on to a peak population in 2000 of approximately 714.

The growth and associated water demand exceeded the town's water rights. Water made available to each individual party by the regional water system is contractually limited in the Water Facilities Agreement to the amount of water rights held by each individual party. In 1999, the City of Florence, the lead entity in the regional water system, filed an injunction in county court to have the Town of Williamsburg stop issuing new water taps because the volume of water delivered to Williamsburg had exceeded its water rights. As a result, the Town of Williamsburg imposed a water tap moratorium in 2000 until sufficient water rights were adjudicated in water court for the existing water services. In a 2010 Water court Decree, the town officially secured sufficient water rights to support the 273 water taps. Currently, a slight surplus of water rights allows the town to issue 12 new water taps. Development that may occur within the town will likely consist of infilling on many of the existing platted, unoccupied lots. No new development west of the existing service area (as depicted on Figure 2) is not anticipated due to the rough terrain, lack of roads and no water service being practically available.

SECTION II

EXISTING SETTING

A. HISTORICAL BACKGROUND INFORMATION

The general front range of Colorado including the Fremont County area was first explored in 1806 when Zebulon Pike conducted an expedition within the region that included exploring the Arkansas River. John Fremont led five expeditions throughout the region between 1842 and 1853 in his efforts to establish a viable route through the mountains as well as collecting information on the area's vegetation and diverse animal population. In 1862, the discovery of oil within the region added to the robust industrial development that was occurring. Coal was discovered in Fremont County in the early part of the civil war (1861-1865). Coal mining became the primary driving force behind the development of Williamsburg and its neighboring communities of Rockvale, Coal Creek and Florence. The continuation of the Denver and Rio Grande Railroad up the Arkansas River Valley was reportedly due to the area's thriving coal mining industry. Fremont County became an incorporated county on November 1, 1861.

The Town of Williamsburg was officially incorporated on April 6, 1888. In the late 1890s and early 1900s, Coal Creek, Florence, Rockvale and Williamsburg were among the most important industrial towns in Colorado. Florence had eight ore mills that processed gold ore from the Cripple Creek - Victor mining district. Coal mines, oil wells and smelting industries were also in operation. The territorial prison was built within Cañon City in 1871. In 1877, the territorial prison became the Colorado State Penitentiary. The ADX Florence Supermax correctional complex located south of Florence opened in November 1994. In addition to the Colorado Department of Corrections and the Federal Bureau of Prisons, major employers within Fremont County include the local school districts and Holcim, Ltd. which manufactures Portland cement. Long after the coal mining industry had subsided, this diversification of employment opportunities has enabled rural Fremont county to maintain its population base. However, with the loss of the coal mining industry, the Town of Williamsburg experienced a severe population decline in the 1920s continuing through 1980. In the 1980s and 1990s, the population of Williamsburg burgeoned in size as a retirement community and bedroom community to Cañon City and Florence.

B. LOCATION

The Town of Williamsburg and its service area are located in southeast Fremont County. As can be seen on Figure 2, the City of Florence is located 1.5 miles to the northeast of the center of Williamsburg. As shown on Figure 1, Cañon City lies approximately six miles to the northwest with the City of Pueblo lying approximately 30 miles to the east of Williamsburg. The majority of the community is located in the Oak Creek drainage basin south of Florence.

County Road 13A enters the east side of town and becomes Quincy Street. Quincy Street connects to County Road 11A running north/south through the town and extends south through Williamsburg to Rockvale. County Road 85A extends south from the center of town to the Town of Coal Creek. State Highway 115 interconnects Cañon City to Florence and is routed northeasterly across U.S. Highway 50 through Penrose, extending onto Colorado Springs. U.S. Highway 50 represents the major transportation corridor along the Arkansas Valley. In this area, the highway is located to the north of the Arkansas River. As can be seen on Figure Nos. 1 and 2, the Arkansas River lies immediately north of the City of Florence. Figure 2 highlights the general topography, the county roadway network, State Highways 115 and 67 and the Arkansas River's relationship to the community. The Cañon City quadrangle map which includes most of the Town of Williamsburg was last updated in 1976. Thus, it does not reflect the significant amount of land development that occurred in the 1980s and 1990s. Current road configurations within the community are shown on Figure 5 - Existing Water System found in the back of this report.

C. WATER RESOURCES

The Town of Williamsburg does not have a central wastewater collection system or wastewater treatment facilities. The town's constituents rely upon ISDS systems for wastewater service.

The developed portion of the community lies within Section 19 and east half of Section 24 as outlined in Figure 2. This developed portion of the town is located in the Oak Creek drainage basin which is tributary to the Arkansas River. The creek is an ephemeral stream, flowing only as a result of precipitation events. Oak Creek runs north, parallel to County

Road 11A bisecting the community on its way to its confluence with the Arkansas River. In this area of the state, surface water sources from the Arkansas River represent the primary source of water supply. Some ground water wells are also used for water supply.

The town holds a 0.665 cubic foot per second (cfs) direct flow right that has a priority date of December 31, 1890. The water is diverted from the Arkansas River at what is referred to as the Williamsburg pipe. This water right has been pooled with other water rights of the parties to the regional water system. The town also owns 140 shares of Union Ditch water rights, recently changed in Water Court Case 99CW149 for municipal use of 0.224 cfs with a November 30, 1861 priority date. Other members of the regional water system include the City of Florence, the Town of Coal Creek and the Town of Rockvale. Although the rights are pooled, each member is limited to a treated water supply based on the individual member's current water rights. Currently surface water is conveyed to the City of Florence's newly constructed South Water Treatment Plant, treated and then transmitted by Florence to the regional water system from which Williamsburg draws. This activity is undertaken as a result of an Intergovernmental Agreement (IGA) between Coal Creek, Rockvale, Williamsburg and the City of Florence. Further discussion of the regional water system and its associated water rights is presented later in this report.

With the community relying upon ISDS systems for its wastewater treatment and disposal, return flows to the Arkansas River Basin come about as a result of leach field drainage into the area soils. Under Regulation 32, the Water Quality Control Commission has designated this segment of the Upper Arkansas River as stream segment No. 3 which is defined as the main stream of the Arkansas River from a point immediately above the confluence with the Lake Creek to the inlet of Pueblo Reservoir. Stream classifications for this segment of the Arkansas River consist of:

Aquatic life: Cold, Class 1

Recreation: Class E

Water Supply

Agriculture

D. PHYSIOGRAPHY

Fremont County falls within the Upper Great Plains province. The plains occur as relatively narrow protrusions extending along the Arkansas River. Within this area, they are bounded by the Wet Mountains on the west and extend downgradient to the Arkansas River. The plains are gently sloping to rolling and are mainly underlain by limestone, shale and sandstone. They have been dissected into narrow deep canyons along the major drainageways. Within the Williamsburg area, with its upstream tributary area backing onto the Wet Mountains, the plains are characterized by long slopes and in the immediate area of Williamsburg, are bisected by Oak Creek and drop gently toward the northeast.

E. TOPOGRAPHY

The topography within the planning area generally slopes from the southwest to northeast. The immediate drainage is tributary to Oak Creek. The highest elevation within the town's service area (as depicted on Figure 2) is at the south end of Rockrimmon Road near the southwest corner of Section 19 with an elevation of approximately 5,470 feet. The lower elevations occur at the northern end of Oak Creek as it extends through town where elevations approach 5,300 feet. All drainage within the service area is directed to Oak Creek which extends generally north through the community. The western half of the Town of Williamsburg is bisected by a narrow ridge rising 300 to 400 feet above the developed portion of town. This ridge is shown on Figure 2.

F. SOILS

The United States Department of Agriculture through the Natural Resources Conservation Service (NRCS) in corporation with the Colorado Agricultural experiment station and the U.S. Department of Interior, Bureau of Land Management has compiled a detailed soil survey of Fremont County. The most recent documentation was issued effective as of December 1995. This data is also available on NRCS' website. The consultant has reviewed both a hard copy of the study as well as the website data. Figure 3 is taken from the NRCS website and reflects the data contained on Sheet No. 27 of the soil survey of the Fremont County area. The developed east half of the incorporated town has been outlined

on an aerial photo base map to show the delineation of the various soil classifications of the area. The soil type information is relevant as it relates to residential development and the constructability of water mains within the area. The following soil groups have been identified by NRCS' mapping as existing within the east half of the Town of Williamsburg. Soil groups are listed in order of the predominance of the soil group within the developed portion of town. The following provides general information in terms of the characteristics of these different soil classifications.

50 - Kim loam, cool, 3% to 8% slopes

This soil group represents approximately 25% of the soils within the community. This deep, well drained soil is on fans and fan terraces. It formed in alluvium and wind-deposited fine sands and silt. The soil is typically loam to a depth of 60-inches or more. Permeability is moderate in the Kim soil. Runoff is medium to rapid and the hazard of water erosion is moderate to very high. The soil is well suited to homesite development.

64 - Louviers-Travessilla Complex, 20% to 50% slopes

This soil group covers approximately 22% of the Williamsburg planning area, primarily located around Bear Gulch, Cedar Ridge and the south end of Rockrimmon Road. These soils are on hills, ridges, hogbacks and canyon sides. This unit is about 40% Louviers soil and 35% Travessilla soil. The Louviers soil is on side slopes and on the scarp side of hogbacks. The Travessilla soil is on canyon rims, ridges and the upper parts of side slopes and in areas of weather-resistance bedrock on hogbacks. The Louviers soil is shallow and well drained. It formed in residuum derived dominantly from shale and siltstone. The surface layer is typically light brownish gray, very channery clay loam about 3-inches thick. The substratum is mainly clay about 13-inches thick. Shale bedrock is at a depth of about 16 inches. Permeability is slow in the Louviers soil. Runoff is very rapid and the hazard of water erosion is very high. The Travessilla soil is shallow and well drained. It formed in residuum derived dominantly from sandstone. The surface layer is typically light brown channery loam about 4-inches thick. The substratum is channery loam about 10-inches thick. Sandstone bedrock is at a depth of about 14-inches. Permeability is moderate in the

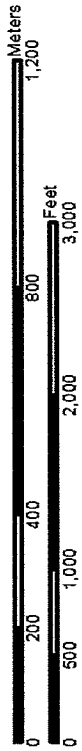


FIGURE 3
SOILS MAP
TOWN OF WILLIAMSBURG



Natural Resources
Conservation Service

SOIL MAP – FREMONT COUNTY AREA, COLORADO

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COLORADO SPRINGS, COLORADO 80903

APRIL 2013

Travessilla soil. Runoff is rapid and the hazard of water erosion is very high. The unit is poorly suited to homesite development. The main constructability limitations are the slope and the depth to bedrock.

81 - Otero fine sandy loam, 3% to 8% slopes

This soil covers approximately 14% of the planning area. This deep, well drained soil is on side slopes and fans. It is formed in alluvium and eolian sands. The surface layer is typically dark grayish brown fine sandy loam about 2-inches thick. The substratum to a depth of 60-inches or more is sandy loam. Permeability is moderately rapid in the Otero soil. Runoff is slow to rapid and the hazard of water erosion is slight to high. The soil is well suited to homesite development.

105 - Shanta loam, dry, 0% to 3% slopes

This soil type comprises approximately 11% of the town and is located along on the west bank of Oak Creek. This deep, well drained soil is on stream terraces. It formed in alluvium. The surface layer is typically grayish brown loam about 27-inches thick. The substratum to a depth of 60-inches or more is stratified sandy clay loam, loam and silty clay loam. Permeability is moderate in the Shanta soil. Runoff is slow and the hazard of water erosion is slight. The soil is well suited to homesite development in areas where flood protection is provided.

121 - Ustic Torriorthents-Sedillo Complex, 15% to 40% slopes

This soil complex comprises approximately 8% of the soils within the planning area of Williamsburg. These soils are on fan terrace edges and hills. The steep terrace edges are formed by deep dissection of the fan terraces by streams. The unit is 70% Ustic Torriorthents and 20% Sedillo soil. The Ustic Torriorthents are on the middle and lower side slopes and the Sedillo soil is on crests and the upper side slopes of terrace edges. The Ustic Torriorthents are shallow to deep and are well drained. They form in residuum and colluvium derived dominantly from thinly bedded sandstone, siltstone and shale. Slopes range from 15% to 40%. The soils are covered by a thin mantle of cobbly alluvium and colluvium. The texture of the underlying material is variable, but it ranges from very

fine sandy loam to silt clay. The characteristics of the Ustic Torriorthents are variable, but in the deeper areas the surface layer is typically dark grayish brown, very gravelly loam about 2-inches thick. The upper 25-inches of the substratum is gravelly clay loam. The lower part to a depth of 42-inches is gravelly loam. Weathered sandstone is at a depth of about 42-inches. Permeability is moderate to slow in the Ustic Torriorthents. Runoff is rapid or very high and the hazard of water erosion is high or very high. The Sedillo soil is deep and well drained. It formed in gravelly and cobbly alluvium derived dominantly from granite. In areas of landslide deposits, the soil formed in material weathered from sandstone and shale. The surface layer is typically dark brown, extremely cobbly loam about 4-inches thick. In many areas that have landslide deposits, the surface is bouldery. The upper part of the subsoil is extremely cobbly sandy clay loam about 6-inches thick. The next 25-inches of the subsoil is mainly extremely stony loam. The lower part of the subsoil and the substratum to a depth of 60-inches or more are loam. Permeability is moderate in the Sedillo soil. Runoff is rapid or very rapid and the hazard of water erosion is high or very high. The unit poorly suited to homesite development. The main limitation is the slope.

72 - Midway-Cascajo Complex, 10% to 40% slopes

This soil complex makes up 6% of the community and is found primarily on the east bank of Oak Creek. These soils are on moderately sloping to steep ridges, knobs, hills and edges of fan terraces that are deeply dissected by streams. The unit is about 60% Midway soil and 20% Cascajo soil. The Midway soil is mainly on the steeper side slopes. The Cascajo soil is mainly on knobs and hills and along the crests of terrace edges. The Midway soil is shallow and well drained. It formed in residuum derived dominantly from shale. Slopes range from 15% to 40%. The surface layer is typically grayish brown, very gravelly clay loam about 3-inches thick. The upper 4-inches of the underlying material is clay. The lower part to a depth of 15-inches is extremely shaly clay. Weathered shale is at a depth of about 15 inches. Permeability is slow in the Midway soil. Runoff is rapid and the hazard of water erosion is high. The Cascajo soil is deep and excessively drained. It formed in gravelly and sandy alluvium. Slopes range from 10% to 40%. The surface layer is typically very dark grayish brown with very gravelly sandy loam about 6-inches thick. The upper 15-inches of the underlying material is extremely cobbly sandy loam. The lower part to a depth of 60-inches or more is extremely cobbly sand. Permeability is moderately rapid or rapid in

the Cascajo soil. Runoff is medium to very high. The unit is poorly suited to homesite development. The main limitations are the depth to shale bedrock and the slope.

G. FLOODPLAIN

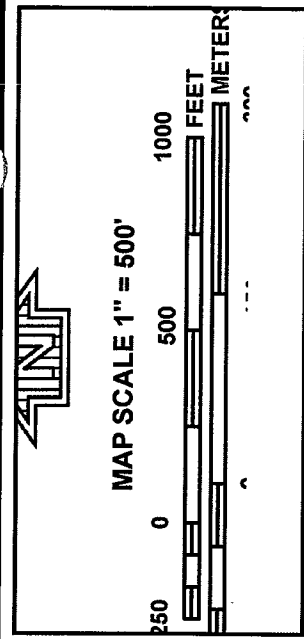
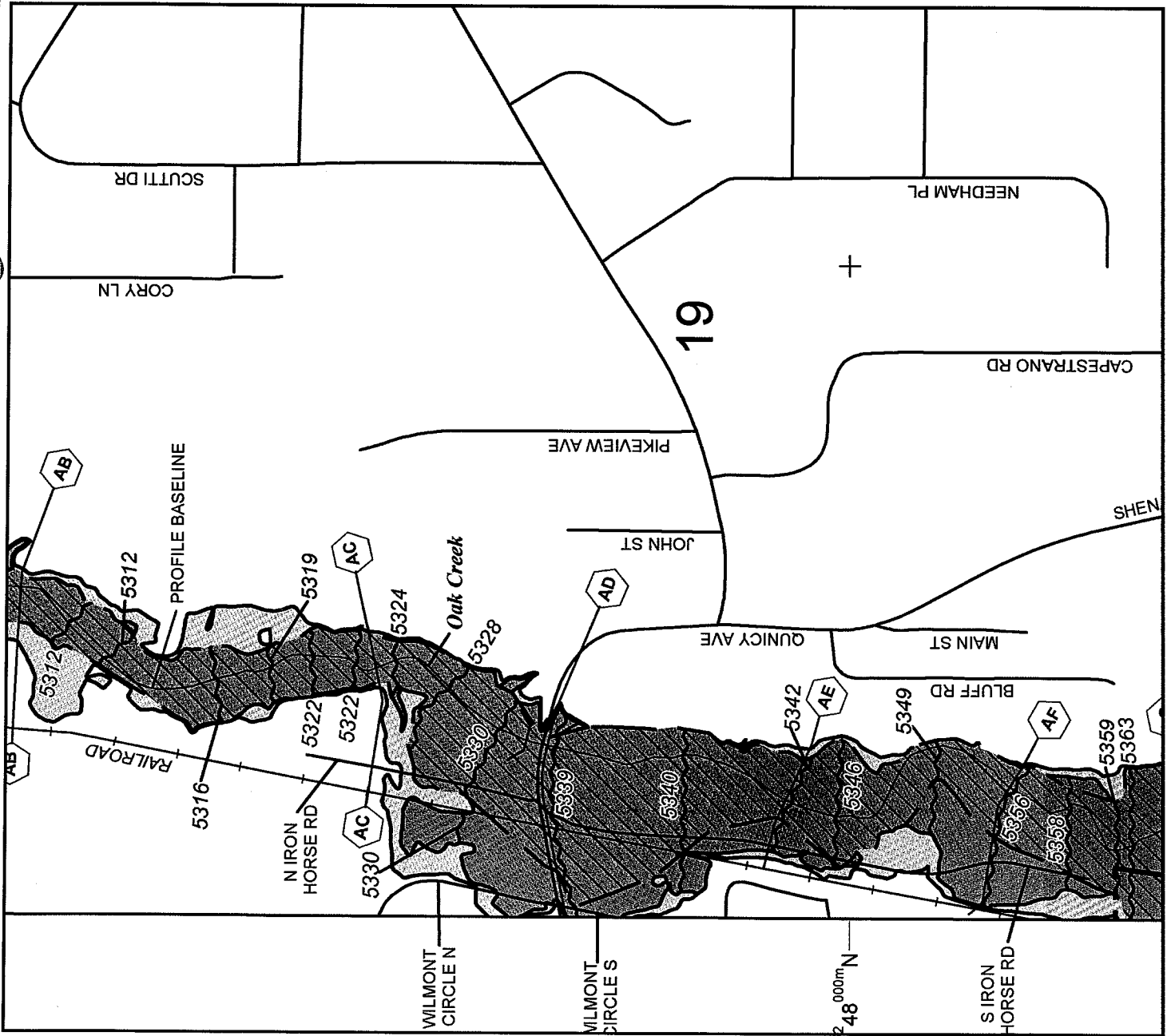
The planning area of Williamsburg generally slopes from the southwest to the northeast. Drainage is channelized to Oak Creek which runs through the center of the community from north to south. Oak Creek is an ephemeral stream.

The Federal Emergency Management Agency (FEMA) has developed Flood Insurance Rate Maps (FIRM) for Fremont County and the Town of Williamsburg. FIRM maps for Williamsburg, dated January 6, 2012, show the 100-year floodplain of Oak Creek being approximately 150 feet wide at the north town limit line; however, the Quincy Avenue bridge represents a constriction to the 100-year flow resulting in flow over the road and a significant backwater condition. At Quincy Avenue, the floodplain is approximately 600 feet wide. Iron Horse Drive south of Quincy Avenue, and a portion of the east half of Wilmont Circle are within the FEMA 100-year floodplain. Based on aerial photography, approximately 20 residential houses are in the 100-year floodplain of Oak Creek. The 100-year floodplain of West Oak Creek is also delineated within the FIRM maps. No existing residential homes appear to be within this delineated floodplain.

Proposed water system improvements within these delineated floodplains consist of pipeline installations within town rights-of-way. No changes will be made within the established floodways. Water distribution system improvements recommended within this report are not specifically intended to benefit those customers within the delineated 100-year floodplain of Oak Creek. FEMA floodplain mapping for Oak Creek and West Oak Creek are shown on the following Figures 4a and 4b.

H. WETLANDS

The U.S. Fish and Wildlife Survey National Wetlands Inventory Mapping was reviewed to determine the types and locations of wetlands within the planning area. The mapping indicates a wetland associated with the main stem of Oak Creek. Otherwise, no wetlands



NFP

FIRM

FLOOD INSURANCE RATE MAP

FREMONT COUNTY, COLORADO

AND INCORPORATED AREAS

PANEL 644 OF 925

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

COMMUNITY	PANEL	SUFFIX
FREMONT CITY OF	00070	044
FREMONT COUNTY	00087	044
FREMONT COUNTY OF	00087	044
WILLIAMSBURG, COLORADO	00028	044

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
08043C064F

MAP REVISED
JANUARY 6, 2012

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes to a flood map which may have been made subsequent to the date on the title block. For the latest information on flood maps, visit the National Flood Insurance Program flood map site at www.fema.gov

FIGURE 4A.DWG

FIGURE 4a

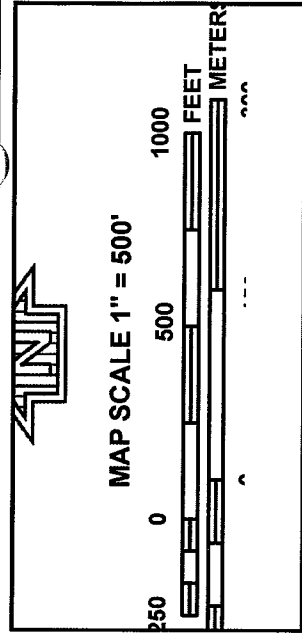
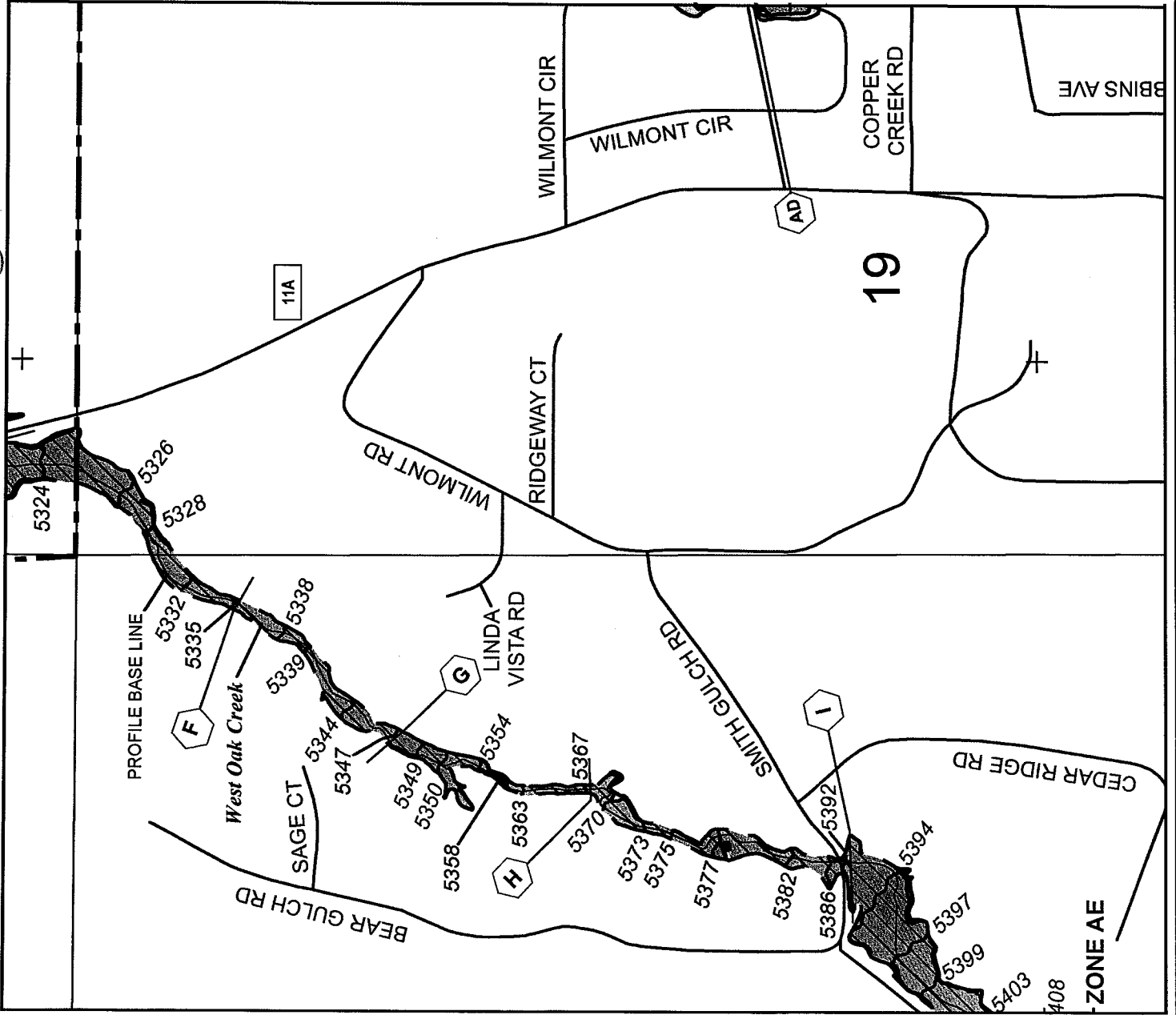
FLOODPLAIN MAP

TOWN OF WILLIAMSBURG

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APRIL 2013



NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0643F
FIRM
FLOOD INSURANCE RATE MAP
FREMONT COUNTY,
COLORADO
AND INCORPORATED AREAS

PANEL 643 OF 825
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

COMMUNITY	NUMBER	PANEL	SUFFIX
FREMONT COUNTY	06007	0643	F
REPUBLIC TOWN OF	06008	0643	F
WILLIAMSBURG	06009	0643	F
TOWN OF	06010	0643	F

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
06043C0643F
MAP REVISED
JANUARY 6, 2012

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It contains the flood hazard information and does not include any changes or endorsements which may be made to the map. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.nfip.fema.gov

FIGURE 4B.DWG

FIGURE 4b
FLOODPLAIN MAP
TOWN OF WILLIAMSBURG

GMS, INC.
CONSULTING ENGINEERS
611 N. WEBER, SUITE 300
COLORADO SPRINGS, COLORADO 80903
APRIL 2013

are delineated within the town limits or its immediate perimeter. The wetlands of Oak Creek are classified as Riverene, Intermittent, Streambed. Any proposed improvements within the potential wetlands areas would be conducted under a Section 404 Nationwide Permit No. 12 for utilities work in coordination with the U.S. Army Corps of Engineers.

I. CLIMATE

Within the community, summers are characterized by hot days and cool evenings. Winter seasons have moderate to cold temperatures. The valley bottom closer to Florence along the Arkansas River tends to be colder as a result of cold air drainage along the valley as opposed to the lower slopes of the adjacent mountains. Based upon data obtained from the National Weather Service, NOAA through the Colorado Climate Center, the nearest weather station is located in Cañon City (Station 051294). That station is sited approximately seven miles northwest of the Town of Williamsburg. The average annual temperature reported at the station is 67.9°F. The lowest average temperature occurs in January and is approximately 49.7°F. The highest average temperature occurs in July and is 89.2°F. Temperatures in the Town of Williamsburg would be slightly lower due to its elevation and location as opposed to that of Cañon City. Precipitation for the period from 1948 through 2012 averaged 12.63 inches annually. Recent precipitation for the years 2005, 2008, 2010 and 2012 have been below average. Average snowfall is 36.2 inches per year. Lake evaporation in this area based upon the Climatic Atlas of the United States averages 38 inches per year. Winds prevail from the west and southwest. Sun shines approximately 80% of the time in the summer and 75% of the time in the winter.

J. VEGETATION

The Town of Williamsburg is situated adjacent to the streambed of Oak Creek in the valley bottom and the adjacent rolling foothills in an area located southwest of the City of Florence. A portion of the southeast quadrant of town, being south of County Road 13A and east of County Road 85A, has been significantly impacted by coal mining activities occurring in the late 1800s and early 1900s. Vegetation of the area is also impacted by the magnitude of rock outcroppings and shallow shale together with the minimal annual rainfall received. These factors all combine to influence the nature of the vegetation community within the area. The area can best be characterized as semi-arid, containing native

grasses and scattered areas of clusters of pinion and juniper. Cottonwoods line the banks of Oak Creek. The native grasses generally include such varieties as Bluegrama, Western Wheatgrass, Needle and Thread, Scribner Needle grass, Sideoats Grama together with limited amounts of Mountain Mahogany and Gamble Oak. Only limited lawns are maintained within the community as a result of the combination of the poor soil conditions, the semi-arid nature of the area and the cost of potable water.

K. WILDLIFE

A combination of both the magnitude of development within the community coupled with its topography impacts to a significant degree available habitat for wildlife. The local drainage bottoms provide enhanced habitat for area wildlife. The area is frequented by cottontail and jackrabbits, scaled quail, mourning doves and a host of a smaller variety of songbirds common to the foothills of Colorado. Mule deer can be found within the areas as well as coyotes and to a lesser degree red fox. No rare or endangered species are known to exist within the planning area.

L. AIR QUALITY AND NOISE

The planning area consists of the east half of the Town of Williamsburg's corporate boundaries. The town is a rural community with primarily residential land uses located in Fremont County. Fremont County has been incorporated into one of the Colorado Department of Public Health and Environment, Air Pollution Control Division's designated regions. The closest air quality monitoring station is sited in Cañon City. The primary constituent monitored at the Cañon City location is particulate matter, specifically particulate matter 10 micrometers in diameter and smaller. This particulate matter is labeled PM₁₀. Cañon City took action beginning in 1988 to address street sweeping issues and maintenance of gravel roads which prior to that time had been responsible for the generation of fugitive dust which was impacting PM₁₀ compliance. At the monitoring location, the most recent available data shows generally good compliance with established particulate matter standards. Air quality in the Williamsburg area is generally viewed as good. Air quality is envisioned to continue into the foreseeable future at acceptable levels.

The noise generated within the community is limited to those normal domestic activities that occur within a rural residential community with limited to no commercial activity. No significant noise generation occurs within the community. The road network in the immediate area consists of county and state highways, none of which are major transportation corridors. Thus, they represent limited noise and air quality impacts. Overall the planning area does not contain any significant noise or air quality problems nor are any anticipated in the future.

M. ENERGY PRODUCTION AND CONSUMPTION

The constituents located within the Town of Williamsburg enjoy the availability of electrical power as provided by Black Hills Energy. Central gas is available in some areas of town; however, residents primarily rely upon propane as the primary source for heating. The community's roots lie in coal production. Currently, the only actively permitted coal mine in Fremont County is the North Field Coal Mine. This mine was issued a mining permit in 2005; however, no active mining appears to have been conducted. In 2010 the mining company applied for a permit from the County Planning Commission for a loadout facility. This underground mine is located one-half mile west of the intersection of County Roads 11A and 79 in Section 13, Township 19 South, Range 70 West. The coal mine will extract high quality coal from seams between 300 and 800 feet deep. Production is estimated at 1,000 tons per day. The coal product would be transported off-site by truck to the proposed loadout facility. Fracking activities in the area are also programmed for the extraction of oil and gas.

N. POPULATION

Fremont County's population base has been significantly influenced by the presence of both state and more recently, federal correctional facilities. A territorial prison was built in Cañon City in 1871. Six years later the prison became the Colorado State Penitentiary. The old original facility in Cañon City is still utilized today; however, substantial correctional facility expansions undertaken by the Colorado Department of Corrections have occurred to the east of Cañon City, north of Florence, lying south of U.S. Highway 50. The correctional facility presence within the county has been bolstered with the construction of the ADX Florence Federal Correctional Complex located south of Florence, in close proximity to Williamsburg. This facility, referred to as Supermax, contains four out of five security levels

for federal facilities. The facility was constructed in the early 1990s and opened in November 1994. This stable employment base coupled with tourism, agriculture and energy related production enables the region to maintain a stable population base. Overall the area supports 13 different correctional facilities. More than half the jobs in Fremont County stem from the corrections industry. In 2000, nine state correctional facilities were located in Cañon City employing 1,554 individuals and three federal facilities were located near Florence employing 993 people. These state and federal facilities collectively hold approximately 9,000 inmates.

The Town of Williamsburg is located in Fremont County. The county is within Planning District No. 13. The District encompasses the eastern mountain counties of Lake, Chaffee, Fremont and Custer. This region of the state had a population base in 2000 of 74,142. The base population increased by 2,063 people as reported in the 2010 census. The increase amounted to a population gain of 2.8%. The following data represents the previous 12 census periods for Fremont County. Also included are population estimates for the year 2011 as provided by the State Demographer's office. Historic census counts are also presented for the incorporated communities of Florence, Coal Creek, Rockvale and Williamsburg, all of which are partners in the regional water system.

TABLE 1
TOWN OF WILLIAMSBURG
HISTORIC POPULATION (PEOPLE)

Census Year	Fremont County (People)	City of Florence (People) ¹⁾	Town of Coal Creek (People) ¹⁾	Town of Rockvale (People) ¹⁾	Town of Williamsburg (People) ¹⁾
1900	15,638	3,728	698	870	337
1910	18,181	2,712	676	1,413	556
1920	17,883	2,629	618	1,249	402
1930	18,896	2,475	435	710	155
1940	19,742	2,632	261	575	97
1950	18,366	2,773	195	380	65
1960	20,196	2,821	206	413	57
1970	21,942	2,846	225	359	75
1980 ³⁾	28,676	2,987	190	338	72
1990	32,273	2,990	157	321	253
2000	46,145	3,653	303	426 ³⁾	714
2010	46,824	3,881	343	487	662
2011 ²⁾	47,375	3,887	343	497	663

- 1) This data pertains to the incorporated town boundaries and does not include out-of-town water customers
2) Estimates based on information provided by the Colorado Department of Local Affairs, State Demographer's Office, November 2012.
3) Regional service area formed in 1980 to serve Florence, Coal Creek and Williamsburg. Rockvale added in 1994.

Upon reviewing the population data for Fremont County as well as Florence, a few general observations can be made. The county population remained fairly stable for the first half of the last century followed by steady consistent growth since 1950. A dramatic increase occurred between 1990 and 2000, in part, influenced by yet again the correctional industry as a result of the Federal Bureau of Prisons opening new U.S. penitentiaries in 1990 and 1994 as well as the Federal correctional complex. Of note, within the 2010 census data is an institutionalized county population of 8,704. The City of Florence has also shown very stable yet slightly increasing population trends since 1930. Williamsburg's population initially peaked in 1910, fell dramatically in the 1920s as a result of the decline in the mining industry, and continued to decline steadily until 1980. The decrease in population over this period is also characteristic of smaller communities losing their population base to the larger communities that provide more services and have more job opportunities and

economic activity. The formation of the regional water system in 1980 opened up the town for development. Residential rural subdivision development within Williamsburg happened quickly. From 1980 to 1990 the town population grew by 350% up to 253 people. In the 1990s growth continued with an increase of 282% raising the population to 714 people. The growth ended in 2000 as a result of the town implementing a water tap moratorium. The effect is reflected in the town's 7.1% population loss through 2011.

The State Demographer's office compiles population forecast for both counties and regions. They do not compile any statistical projections for individual communities or unincorporated portions of individual counties. Population forecasts are based on regional statistical data for births, deaths and migration into and out of an area. The most recent population projection data available from the State Demographer's office, dated November 2012, projects the long-term countywide population to increase at a steady rate through 2035. According to the Demographer's projections, the population for Fremont County over the period from 2010 to 2035 is projected to increase by 37.4%, rising by 7.4% from 2010 to 2015; 7.5% from 2015 to 2020; 6.9% from 2020 to 2025; 6.0% from 2025 to 2030; and 5.1% from 2030 to 2035.

The population base within the town is influenced by factors other than county and regional growth rates. Major factors that have influenced the base population of the community are the availability of potable water as well as the relatively stable retirement base and correctional facility employment. General and professional employment opportunities are also made available in the nearby cities of Cañon City, Florence and Pueblo.

Water supply availability for the town was limited by the water rights held by the town. This condition halted the issuance of water taps in 2000 until sufficient water rights could be secured. Countywide growth rate projection percentages are relatively strong. This would be expected to positively affect the population base of the Town of Williamsburg based on adequate water supplies being available to support growth. Additional town water rights were adjudicated in 2010. The 2011 agreement with the City of Florence allowed for twelve additional water taps based on an evaluation of the town's existing water rights. With an existing population density of 2.43 people per household, this will allow for 29 additional people in town. This additional population is reflected in the town's 2015 population forecast.

A recent Water Court filing by the town would provide rights for 94 additional taps or 228 people. This is presumed to become available after 2015. Therefore, population projections for 2020 through 2035 are based on the State Demographer's office countywide growth rates. Rockvale does not have water rights limitations and thus is projected to increase in population at a rate equal to the countywide growth rate. Coal Creek is in the process of acquiring additional rights to support growth and is currently limited by the Regional Water Supplier to 50 additional taps. This is sufficient to support Coal Creek's growth to 2035 based on countywide projections.

The following table has been developed to present population projections for the City of Florence, the Town of Williamsburg as well as Rockvale and Coal Creek.

TABLE 2
TOWN OF WILLIAMSBURG
REGIONAL POPULATION PROJECTIONS ¹⁾

Year	City of Florence (People) ²⁾	Town of Coal Creek (People) ²⁾	Town of Rockvale (People) ²⁾	Town of Williamsburg (People) ³⁾
2011	3,887	343	497	663
2015	4,114	363	526	692
2020	4,422	390	565	744
2025	4,729	417	605	796
2030	5,012	442	641	843
2035	5,267	465	673	886

- 1) Does not include regional service to the East Florence Water Association and the Federal correctional complex.
- 2) Based on countywide growth rate projections as prepared by the Colorado Division of Local Government, Demography Office, November 2012. Does not include out-of-town service populations.
- 3) Currently limited to a total of 285 water taps. Refer to discussion in this report for future growth limitations.

O. LAND USE AND DEVELOPMENT

The Town of Williamsburg reflects the land use patterns of a typical rural community. As a result of the decline in coal production within the region, commercial activities have slowly been lost. Land use now reflects a residential use pattern throughout the community. Given the close proximity of major commercial centers such as Florence, Cañon City and

Pueblo, commercial activities are not projected to be a major factor within future land use activities within Williamsburg.

The older portion of the community has been developed with typical small lots laid out in a traditional block grid. More recent development has incorporated large residential lots into the community. These larger residential lots are more suitable for on-site ISDS systems. The development boom that occurred in the 1980s and 1990s consisted of several individual subdivisions being added adjacent to county roads. The town does not have a master plan or development standards. Thus, the growth appears to have occurred without macro level planning or overall impact assessments on the community. Roadway, drainage and water system improvements were installed to minimal standards. Development along Oak Creek is within the 100-year floodplain of the creek, specifically along Iron Horse Road and the east half of Wilmont Circle.

According to town representatives, there are several vacant platted lots that could be built upon. Several larger parcels within the planning area of the town are suitable for future residential subdivision activity and development. Future projections are for the continuation of current land use practices consisting primarily of residential development. This potential growth capability is now available with the lifting of the long-standing water tap moratorium. Currently the town can issue up to 12 new water taps. When the currently filed Water Rights Conversion is adjudicated, the town can issue an additional 94 taps beyond the current approved 12 taps.

The west half of the town, consisting of Section 23 and the west half of Section 24 as shown on Figure 2, could potentially be developed. The terrain is rugged. The area is not serviceable from the town's existing water system as it lies much higher in elevation. Thus, adequate water pressures would not be available from the town's water system. A separate water pressure zone or multiple zones would be required along with booster pumping and storage facilities. There are no known plans for developing these areas. For these reasons, the west half of the Town of Williamsburg is not included in the planning area of this study. In the event development activity is proposed in the future in this portion of the Town's limits, the Town would need to adopt adequate standards and design criteria for any water distribution system extension, booster stations, storage facilities and associated water rights. Those costs should be incurred by the developers proposing to

plat and develop this portion of the community. The Town should seek technical assistance at the time of such activities occurring to ensure that the system extensions meet acceptable standards and will not create long term maintenance issues for the community.

P. PUBLIC FACILITIES AND SERVICES

The Town of Williamsburg is a statutory town created under the Colorado Revised Statutes. The town was incorporated in 1888. The town as an incorporated statutory entity provides the general public with the services for which it is empowered including potable water, street maintenance, drainage, municipal parks and related activities. The town is projected into the foreseeable future to continue to provide the current services it provides to its constituents. Private organizations provide the remainder of the public services to the Town of Williamsburg. Black Hills Energy provides electricity. Natural gas service is available in some areas of the town and is provided by Atmos Energy. Most residents, however, rely on propane as the primary source for heating fuel. Several propane dealers service the area including Exxon, All Star, Mar Gas, San Isabel Coop and Blue Flame Gas. CenturyLink Telephone provides telephone service. Cablevision service is available in the area as provided by Optimum Communications. Town roadways and drainage culverts within Williamsburg are maintained by the town. County Roads 11A, 13A and 85A are maintained by the Fremont County Road and Bridge Department.

Q. FEDERAL, STATE OR OTHER ACTIVITIES IN THE PLANNING AREA

At this time no federal or state projects exist or are being undertaken directly within Williamsburg's existing town limits. The existence of state and federal correctional facilities within the region offer excellent opportunities for a solid employment base, but are not directly contributing to the need for the town to upgrade its existing water distribution system. Improvements to the regional water system are ongoing based on recommendations made in the 2002 Florence Regional Water System Master Plan as prepared by The Engineering Company, Fort Collins, Colorado. The Master Plan included 13 recommended projects for the regional system. Currently five of these projects have been completed including the construction of the Town of Florence's new South Water Treatment Plant. The Master Plan's recommended project No. 9 consists of an internal water transmission line within the Town of Williamsburg's system. This is a generalized

recommendation that does not have a specific defined project or scope. Although recommended within the regional system's master plan, costs for this project would be the responsibility of the Town of Williamsburg as the improvements lie outside of the regional transmission system. The recommended internal transmission main was included in the Master Plan to address specific water pressure and delivery problems within Williamsburg's distribution system. Recommended distribution system improvements to address pressure and flow delivery problems in the Williamsburg system are contained within this report.

The Fremont County Commissioners approved a permit for the North Field Coal Mine in 2007. A railroad loadout facility was approved in 2010. The mine facility is located one-half mile west of the intersection of County Roads 11A and 79. This location lies one-half mile north of the Town of Williamsburg. The town has not been requested to provide a water supply for these proposed facilities. No provisions within the recommended improvements have been made to accommodate a water supply to the North Field Coal Mine facilities.

R. REGIONAL WATER SUPPLY SYSTEM

The Town of Williamsburg's water system was historically supplied by ground water wells. A May 1977 water system feasibility study by CE Tech recommended a regional water supply system be established. In 1980, the town entered into an agreement with the City of Florence and the Town of Coal Creek to form a regional water supply system. This Water Facilities Agreement established the ability of the three communities to cooperate and contract with each to provide regional water service and share costs associated with a regional water system including construction, operations and maintenance, and debt service. The agreement was consummated on April 7, 1980.

All three parties to the agreement made available existing individual water rights to the regional water system for diversion, treatment and pumping. Water rights, however, remain under the ownership of each community. Each community is limited to a service supply based on the quantities and priorities of their individual water rights. Each community can add new water services within or outside of the community, just as long as the added demand is covered by the water rights of the individual community and the added demand does not jeopardize the service to other parties of the agreement. Water distribution system facilities within each community's service area remain under the ownership and

responsibility of the respective community. For the Town of Williamsburg, the points of delineation between the regional water system and the town's distribution system are the master meter vaults where treated water is delivered to the town's distribution system. Williamsburg has four points of connection to the regional water system. These master meter vaults are owned by the City of Florence with the cost for their maintenance and repairs being the responsibility of the town.

The City of Florence, being the largest of the three communities in the initial regional water system, took the lead role in the construction of the regional facilities. The city secured a Farmers Home Administration (FmHA) loan and grant in 1981 to finance the construction of the collection, treatment, storage and transmission improvements. The improvements were designed and construction inspection was provided by Gilbert, Meyer & Sams, Inc. All regional water facilities are owned and operated by the City of Florence. All costs incurred by the City of Florence for pumping, treatment, repairs and debt service are shared between the four parties to the Water Facilities Agreement. Debt service is assessed using a debt retirement tap factor based on the number of taps in each community. Operational and maintenance costs are assessed to each community based on its proportionate share of pumping and treatment costs according to the amount of water used by each party. Operation and maintenance cost computations are prepared annually and adjusted each year for deviations in budgeted amounts of the prior year.

The first addendum to the water facilities agreement was approved by all three original communities on May 18, 1981. The purpose of the addendum was to address water rights issues and provide unified support for the filing of three proceedings with the Division 2 Water Court. Water Court Case filing 80CW91 was for conditional surface water rights from the Arkansas River in the amount of 100 cfs. The adjudicated decree on this conditional water right dated February 11, 1985 was for 7.6 cfs. The second filing, Case 80CW92, was for storage rights for the proposed Oak Creek Reservoir in the amount of 2,250 acre feet. This conditional storage right decree was adjudicated on May 26, 1982. The third filing was Case 80CW93 for an alternate point of diversion and change of use of the surface and ground water rights of the three individual parties; and an augmentation plan for the Arkansas River. This addendum also defined water rights exchanges and purchases between the three parties as well as made provisions for individual parties to acquire, lease and use outside water rights. This addendum included a directive to pursue construction of

the regional water system facilities concurrently with the filing of the water rights cases as listed above. This provision in the addendum created a backup scenario such that if water rights of an individual party (specifically Williamsburg and Coal Creek) had not cleared water court, water rights from other parties (Florence) would be made available and at a rate equivalent to that charged by the Southeast Water Conservancy District (SEWCD). Although sold at the low SEWCD rate, actual water provided has historically come from Florence's direct flow rights because SEWCD water cannot be used by nonmembers of the District.

Addendum No. 2 to the water facilities agreement defined annual costs assessed to Williamsburg and Coal Creek for treatment and transmission using costs from the previous year as the basis. This second addendum was approved in January 1984. The third addendum dated October 9, 1984 established a regional water committee as an advisory board to assist each community on water policy and in the negotiation of agreements. Subsequently a set of bylaws was established for the regional water committee. The third addendum also included provisions to use actual water sales data for water assessments if there is a master meter failure. The fourth addendum dated May 2, 1994 added the Town of Rockvale to the regional water system.

The original Agreement on Water Fees was approved and signed by the three parties to the regional water system on November 9, 1982. The agreement established a uniform method for charging and allocating tap fees for new water taps within the service area. Assessment of water fees by each community is to provide 51% of the fee to the regional investment fund. This fund is to be used for capital improvements and major repairs of the regional water system. The remaining 49% of the tap fee remains within the water fund of the town that collected the tap fee. The agreement on water fees was amended six times between 1983 and 2002, primarily to revise the tap fees. The 1988 fourth addendum defined a major repair cost threshold at \$2,500 with major repairs being paid for from the regional investment fund and not from the annual operation and maintenance budget. The Town of Rockvale was added to this agreement in 1994 by addendum No. 5.

The third major agreement consummated between the parties of the regional water system was the Southfield Water Facilities Agreement. This agreement was approved on December 5, 1988. The agreement was made to construct regional facilities to make water

available for use in the regional water system. The agreement refers to two water project phases. The Phase 1 water project was the installation of a new pipeline from Adobe and Mineral Creek's headwaters to the Town of Florence's south reservoirs. The Florence Southfield Water Treatment Plant (WTP) was constructed in Phase 2 of the water project. This agreement also established a separate regional plant investment fund separate from the original regional investment fund. The Town of Rockvale was added to this agreement by addendum No. 1 in 1994.

In 2004, with the completion of the City of Florence's new Southfield WTP, new bonds were issued to cover the debt of the facility as well as to pay off previous bonds issued for construction of the regional system. Currently the Towns of Williamsburg, Coal Creek and Rockvale are assessed a debt fee on a per tap basis for the Southfield WTP project and a facilities debt retirement factor for the regional water system at a combined rate of \$22.86 per tap per month. The annual operation and maintenance assessment is based on actual water usage. Cost computations are conducted annually in May. For 2012, the Town of Williamsburg was assessed a rate for pumping, treatment and transmission in the amount of \$2.67 per 1,000 gallons delivered. Cost computations in May 2012 indicated that the actual cost for operation and maintenance was slightly higher for the previous year. The supplemental assessment for 2012 of \$334.58 is billed to the Town of Williamsburg over a 12-month period to make up for the 2011 deficit in operation and maintenance costs.

The water rights component and history of the regional water system are quite complex. The 2010 water rights filing 10CW063 with the Water Court has yet to be adjudicated. This discussion focuses primarily on water rights associated with the Town of Williamsburg. Basically, the town is entitled to a delivered water supply volume that does not exceed its water rights. Water Court Case 80CW93 was filed with the Division 2 Water Court at the time of the formation of the regional water system. The filing was for an alternate point of diversion of surface water and ground water rights for each of the three original parties as well as a change of use (to municipal use) and approval of an associated augmentation plan. The filing was adjudicated by decree in 1982. With this, the Town of Williamsburg's ground water rights were changed to a new right referred to as the Williamsburg pipeline right. This right is in the amount of 0.665 cfs having a diversion point at the Florence WTP diversion works and a priority date of December 31, 1890. Note that the diversion point was changed by Case 87CW120 in 1987 to the Minnequa Canal. Because this 1890 right

is almost never in priority from March through November, water supply is provided during these months from the Florence Union Ditch Rights. Up until 2010, Williamsburg paid a nominal \$11.00 per acre-foot for this supplemental supply based on the original water facility agreement provisions. Williamsburg's 1890 water right has historically yielded on average only 37 acre-feet per year. Williamsburg also holds a 1969 ground water supply right of 0.445 cfs and a 1974 direct flow right to Chandler Creek of 0.445 cfs (plus an additional 0.445 cfs of conditional rights). However, these rights are very junior and cannot be relied upon. Thus, they are not considered further.

Water Court Case 99CW149 was filed in Division 2 Water Court in 1999. The filing requested a change in use of the town's Union Ditch water rights from agricultural to municipal. The filing included shares owned by the City of Florence, Coal Creek and Williamsburg. This case was adjudicated in Water Court on July 19, 2010. Following the 2010 decree, an evaluation by Martin and Wood Water Consultants, dated January 6, 2011, determined that these additional water rights were sufficient to support 285 water taps for the Town of Williamsburg. The 2000 water tap moratorium was established at a maximum of 273 taps. Thus, the additional adjudicated rights made up for the town's water rights deficiencies and provided capacity for 12 additional taps. The additional 12 taps as agreed to with the City of Florence, were approved by town resolution in April 2011.

Williamsburg owns an additional 46 shares of Union Ditch Water Rights. These shares require a change of use decree by the Water Court. The change of use has been filed with the Court in Case No. 10CW063 in September 2010. The decree on this filing is pending. According to the January 6, 2011 water rights evaluation, once adjudicated, the additional water rights would provide the town the capacity for 94 additional water taps.

This is only a summary of the town's water rights situation. The full picture of the regional water system is much more complex.

SECTION III

EXISTING WATER SYSTEM FACILITIES

A. BACKGROUND

A field review of the Town of Williamsburg's existing water system was undertaken in the course of this study effort. A list of information requested on the town's water system was provided to town representatives in advance of an on-site meeting. An on-site review of the system was conducted in conjunction with the collection of the requested data by the consultant. Figure 5 in the back of this study has been compiled from the information available with respect to the existing water distribution system. Figure 2 shows the location of a portion of the regional water system including the Coal Creek regional storage tank which is currently not used.

The town's water system was originally constructed well over a century ago during the coal mining boom of the region and the incorporation of the town. The system was supplied by two shallow wells along the west side of Oak Creek. With the formation of the Regional System in 1980 and the subsequent construction of the regional treated water transmission system, the town abandoned its original water supply facilities. The new source of water to the town resulted with burgeoning growth within the town limits during the 1980s and 1990s. Two major problems occurred during this growth period. The town did not have in place any water system design or construction standards. Thus, the distribution system installations to support new residential houses were, in general, constructed to the minimum or below minimum industry standards. Secondly, the town sold water taps in excess of what could be supported by the town's water rights. This resulted with the 2000 court imposed water tap moratorium.

B. WATER SUPPLY

The Town of Williamsburg does not have any water supply facilities that contribute to the Regional Water System. The town has pooled its water rights with other parties in the Regional Water System Agreement. The physical water supply is obtained from a diversion off the Arkansas River via the Minnequa Canal to the Florence North Reservoir, and from the Adobe Creek, Mineral Creek and Newlin Creek pipelines to the Florence Southfield

Reservoirs. The town's water rights consist of a 0.665 cubic foot per second (cfs) Union Ditch right, supplied by the Arkansas River as adjudicated in Division 2 Water Court Case No. 80CW93, with an appropriation date of December 31, 1890. This a relatively junior right that is often out of priority from March through November. The town is also party to 7.6 cfs of water rights from the Arkansas River adjudicated under Case No. 80CW91 with an August 26, 1980 appropriation. This very junior right is typically only available under a free river condition (no calls on the river). Water Court Case No. 80CW93 provides a 7% augmentation credit to Florence, Coal Creek and Williamsburg for Union Ditch diversions above 2.0 cfs. Water Court Case No. 80CW92 was awarded to Florence, Coal Creek and Williamsburg for storage rights. This Court adjudication was intended to accommodate the construction of the Oak Creek Reservoir proposed to be located just north of town; however, the geotechnical investigation of the reservoir site found that construction costs would be prohibitive.

The adjudication of Water Court Case 99CW149 changed the use of 140 Union Ditch shares to municipal use. This raised the 2000 water tap moratorium limit of 273 taps up to 285 taps, providing the town with the ability to issue 12 additional water taps. The pending Water Court Case 10CW063 is intended to change the use of 46 Union Ditch shares owned by the town. This is estimated to provide water rights for 94 additional water taps within the Town of Williamsburg.

C. WATER TREATMENT

Water treatment of the town's water supply is provided by the regional water system. It is operated by the City of Florence. An evaluation of the water treatment facilities was not conducted within this study. An evaluation of water quality provided from the regional system has been reviewed and is discussed later in this report. In general, water treatment provided to the town's raw water is adequate to meet drinking water standards as regulated by the CDPHE. Disinfection contact time provided in the regional transmission piping extending from the two WTPs to the town's distribution system connections appear to be adequate.

D. TREATED WATER STORAGE

Treated water storage for the Town of Williamsburg is primarily provided by the regional water system. The primary regional system storage tank supporting the town's pressure zone is located at the South Field WTP. The new tank holds 2 MG and is located approximately 3.4 miles southeast of town. It is 16 feet higher in elevation than the Coal Creek tank, rendering the Coal Creek tank problematic. Figure 2 depicts the Coal Creek regional storage tank located south of the Town of Coal Creek, west of County Road 13. The Coal Creek tank has been removed from service.

E. TRANSMISSION AND DISTRIBUTION SYSTEM PIPING

The Town of Williamsburg's water distribution system is shown on Figure 5 in the back of this report. The map was compiled by the consultant and reviewed by town representatives to confirm accuracy as best possible. Due to the unregulated installation of most of the system in the 1980s and 1990s, locations of the distribution system facilities shown on Figure 5 are approximate only. Pipe sizes, materials and valves are indicated on the system map where they are known.

Treated water is provided by the regional system's pumping and transmission system. The regional system's piping in close proximity to Williamsburg is shown on Figure 2. A 10-inch transmission main extends south in County Road CR85A (Quincy Street) and continues northeast in CR13A (Central Avenue) to Scutti Drive extending to the regional system's North WTP. The water supply to the town is provided at four metered connections to the transmission main as shown on Figure 5. Master Meter No. 1 is located at Quincy Street and Central Avenue and services all of the town west of Oak Creek. Master Meter No. 2 is located at Scutti Drive and Central Avenue and serves the northeast quadrant of town. Master Meter No. 3 is located at Quincy Street and Capistrano Drive and feeds the south end of town. The fourth connection to the regional system is Master Meter No. 4 located at Quincy Street and Main Street. It feeds the central portion of the town's distribution system. The regional transmission main and four town meter vaults are owned by the regional system and maintained by the City of Florence. Repair costs at the master meter connections are invoiced to the town. The master meters had radio read registers installed in 2003.

The town's distribution system consists of approximately 9.2 miles of piping ranging from 2 inches to 6 inches diameter in size. Approximately 5% of the distribution system is 6-inch diameter, 40% - 4-inch, 15% - 3-inch and 25% - 2-inch in size. Approximately 15% of the distribution system pipe size is not known and is assumed to be 4 inches in diameter. The largest pipe segment is a 6-inch diameter main extending east from Master Meter No. 1, across Oak Creek and continuing east in Copper Creek and Rockrimmon Road to its intersection with Wilmont Road. Pipe materials are typically polyvinylchloride (PVC); however, the type, pressure class and joint types vary. Pipes typically were installed at 4 to 5 feet deep and are located in the shoulder of the roadway. Some areas, however, are reported to have as little as 1 foot of cover on the pipeline. Piping in Central Avenue, Quincy Street and Churchill are reported to be under the pavement.

The town's water system for the most part is not looped. Water mains extend outward from the core of town or Master Meters in a branching fashion. Refer to Figure 5 located in the back of the report. The lack of looping results in reduced flows and pressures during elevated demand conditions as well as potential water quality related issues.

Williamsburg's service area is contained within the regional system's pressure zone D. This pressure zone is fed from the 2 MG South Field WWTP storage tank which has a high water surface elevation of approximately 5,604 feet above msl. Topography with service area within the town ranges from a low of 5,335 msl on the north end of Iron Horse Road, to a high of 5,460 msl on the south end of Rockrimmon Road. Based on a hydraulic grade line of 5,604, available static service pressures within the distribution system range from 62 to 117 pounds per square inch (psi). The majority of the town's service area has a static pressure in the 75 to 95 psi range. These relatively high pressures combined with the questionable piping installations likely contribute to the system's ongoing pipe breaks.

Due to the long dead end and small diameter pipelines common throughout the system, service pressures drop off significantly during high demand conditions. The installation of a booster pump station was begun by the town, but never completed. A buried concrete vault was installed adjacent to the 6-inch main extending east from Master Meter No. 1. The booster system would have been used to increase pressures in the distribution system on the west side of Oak Creek. It is not known why this project was not completed.

Problem areas within the distribution system have been identified by town representatives. Pipe breaks are frequent within the distribution system. From November 2011 through August 2012, the town recorded eleven pipe breaks. These occurred primarily at glued PVC pipe joints that pulled apart. These breaks have been most common in Wilmont Road and Rockrimmon Road.

Low pressure conditions are common along the southern portions of Rockrimmon Road, Bear Gulch Road and Cedar Ridge Road. Static pressure calculations suggest that 58 to 68 psi of pressure would be available; however, as can be seen on Figure 5, the long deadend pipelines serving these areas are small diameter and serve too many customers, resulting in low service pressures during high demand conditions.

The 4-inch pipeline in Copper Creek Road is concrete encased across Oak Creek. This piping is reported to be thin wall PVC with glued joints. This pipeline is reported to require on average, three repairs for breaks every year. Service taps in some areas are reported to fail due to the thin wall PVC in which the tap is made. No specific areas were identified.

A valve at the intersection of Central and Main Street is reported to be broken. The 2-inch dead end line serving Bluff Road also serves the town park for irrigation. When conducting park irrigation, services along Bluff Road have minimal to no service pressure. This phenomenon also occurs throughout the distribution system when the fire department draws fire flow from a hydrant. Again, these pressure problems are primarily related to the lack of looping of the system and the system's small diameter pipelines. Only five existing fire hydrants have calculated flow rates above 500 gpm. These are hydrants Nos. 1, 2, 11, 16 and 23 as shown on Figure 5 in the back of this report.

Valving within the town's extensive distribution system is somewhat lacking. Only those valves known to exist are shown on Figure 5 located in the back of this report. The large spacing between distribution system valves limits the ability of the town operator to shut down a segment of the distribution system for maintenance and repairs, thus requiring large areas to be taken out of service for these activities. The need for additional valving within the distribution system has been identified in conjunction with additional piping

recommendations. This will enhance operational flexibility to maintain the existing components of the system.

Currently the town has 27 fire hydrants located throughout the distribution system. These fire hydrants are shown on Figure 5 located in the back of this report. Fire protection is provided by the Florence Fire Protection District, a volunteer fire department, with a station in Williamsburg. Most hydrants are modern 6-inch barrel type hydrants; however, a few smaller three or four inch barrel hydrants are located within the system. The Town's hydrants have numerous manufacturers making it difficult to maintain an adequate inventory of spare parts.

F. WATER METERS

The Town of Williamsburg requires the installation of meters for all active customers on the water system. Water service is typically extended from the water main in the street to a meter pit, typically located at or near the property line between the main and the customer. All services are ¾-inch in size with a ¾-inch meter. The only exception to this sizing is a 2-inch metered service to the town park. The town does not have any large volume or commercial users. In 2006 and 2007, the Town of Williamsburg conducted a comprehensive meter system replacement program. The old meters were replaced with an Automatic Reading and Billing (ARB) meter system having touch read transmitters located on the underside of the meter pit lid. The new meters were installed with new meter setters having a cartridge type double check valve in the setter. This provides individual backflow protection for the distribution system at each customer's service. New meter pits were also installed. Some customers have individual pressure reducing valves on their service located inside the home due to the relatively high pressures provided in some areas of the distribution system. The new ARB meter system was financed by the meter vendor. The new meters and meter pits were installed by town staff. The ARB system provides the town's operational staff with the ability to read all meters remotely using a touch read data collector. Water meter readings are then downloaded directly into the town's new billing software. This upgrade has resulted in a dramatic savings in the time required by the town staff to read customer meters and generate billing statements. The quantity of unaccounted-for-water, the difference between the quantity of water provided by Florence

and the total metered water sales, dropped dramatically with the installation of the new meters.

Service line materials in the town's water system are primarily Schedule 40 or 80 PVC extending from the main line to the meter. Some older service lines are galvanized iron pipe. From the meter pit to the customer's building, service lines are typically PVC, copper or older galvanized iron pipe. Curb stops on the service lines have been installed on only approximately 30% of the services. The service line is owned and maintained by the town from the main up to the meter pit. From the meter pit to the building being served, the service line is owned by the customer and is the customer's responsibility to maintain.

The town had 266 water service accounts in January 2013. These are billed accounts consisting of both active and inactive users. The town had been under a water service moratorium from 2000 to 2011 with a maximum of 273 taps allowed. In 2011, the town was allowed to issue up to 12 additional water taps. In January 2013, the town had a total of 247 active accounts, 19 inactive but billed accounts, and 7 inactive nonbilled accounts. All customers are metered except for the Town Hall and Town Shop. All customers are billed for water service, except for the two town services and the town park. Therefore, there are a total of 263 billed water users. All customers are charged for water system debt service within the base rate (except for the town services). The town's monthly water rate structure consists of a two-step rate plan. The base rate is for the first 5,000 gallons and includes the regional water system debt service. A surcharge per 1,000 gallons is assessed for usage above the minimum of 5,000 gallons. Additional details and discussion of the water rate structure is presented in the financial assessment section of this report.

Treated water supply meter readings associated with the four regional system master meters are recorded by the City of Florence and are the basis of the billings for monthly treatment and pumping charges assessed to the town.

G. OPERATIONS AND MAINTENANCE

The operation of public water systems is regulated by the Colorado Department of Public Health and Environment (CDPHE). The town water operator holds a Class 1 Distribution Certification. In accordance with regulation No. 100, the town's water system requires a

Colorado water distribution system class “1” certification. A water treatment operator certification is not required by the town. The regional water system operator of responsible charge retains this certification for treatment provided to the town’s water supply.

A review of the water system conducted by the consultant shows that the overall system is in relatively poor operating condition. A significant portion of the distribution system is considered to be substandard based on reports by town representatives following activities related to pipe repairs; however, specific problem segments are not known with the exception of those previously discussed.

The following schedule is a list of routine operation and maintenance activities conducted.

- Conduct distribution system bacteriological and chlorine testing
(by regional system) Monthly
- Read and record user meter readings Monthly
- Conduct system flushing As needed
- Respond to and repair pipe breaks.....As Needed
- Equipment maintenance and service.....As Required
- Conduct water quality testing (by regional system).....Per CDPHE monitoring schedule

SECTION IV

HISTORIC AND PROJECTED WATER CONSUMPTION

An assessment of historic and projected water demands for the Town of Williamsburg is presented in this section. Historic flow data consisting of regional system treated water supply and water sales are used to establish the baseline water use parameters for the town. These parameters were used to project future demands on the water system based on service area population projections.

Monthly water sales totals were provided by the town for the period from February 2011 through December 2012. The total number of water system taps has remained constant at 273 since 2000. Of this total there are 7 inactive, nonbilled taps, 244 active billed taps, 19 inactive billed taps, 2 town unmetered services and the town park's service. The following table presents a total of the monthly water supply delivered to the town from the regional system and the monthly water sales for the period from February 2011 through December 2012.

TABLE 3
TOWN OF WILLIAMSBURG
HISTORIC WATER SYSTEM PRODUCTION AND CONSUMPTION

Month	2011		2012	
	Delivered, MG ¹⁾	Sales, MG ¹⁾	Delivered, MG ¹⁾	Sales, MG ¹⁾
January	6)	6)	1.42	1.01
February	1.11	1.14	1.27	1.04
March	1.38	0.92	1.58	1.17
April	1.59	1.49	1.88	1.45
May	2.00	1.49	2.17	1.85
June	2.83	2.66	2.98	2.33
July	2.94	2.42	3.10	2.40
August	2.88	2.40	2.77	2.14
September	1.95	1.64	2.24	1.73
October	1.64	1.30 ⁶⁾	2.01	1.37
November	1.32	1.14	1.69 ⁶⁾	1.02
December	1.31	0.99	1.50	0.91
Total, MG ¹⁾	20.95	17.60	24.62	18.43
gpd ²⁾	62,710	52,691	67,452	50,506
Unaccounted-for-water, % ³⁾	16.0		25.1	
Service Population	663		663	
gpcd, total ⁴⁾	95		102	
gpcd, sales ⁵⁾	79		76	

1) MG = million gallons

2) gpd = average gallons per day

3) Unaccounted-for-water = water delivered minus water sales divided by delivered. This represents water which is not accounted for

4) gpcd = gallons per capita per day of water delivered to town from regional water system and includes the unaccounted-for-water

5) gpcd = gallons per capita per day of water sales

6) Data not available

As presented in the above table, unaccounted-for-water represents water that is delivered by the regional water system into the town's distribution system that is not measured by the town's customer meters. Unaccounted-for-water within the town's water system declined significantly in 2006 with the installation of the new service meters. For the period from February 2011 to December 2012, unaccounted-for-water averaged 21%. Unaccounted-for-water is primarily attributed to unmetered uses such as fire hydrant usage and pipeline leaks and breaks within

the town's distribution system. These factors are not quantifiable. An unaccounted-for-water value of 15% to 20% is not unreasonable. Values of 30% to 40% are not uncommon. The American Water Works Association recommends an unaccounted-for-water goal of 10% with proactive efforts taken to reach this goal. For the Town of Williamsburg, unaccounted-for-water percentages for 2011 and 2012 at 16.0% and 25.1%, respectively, reflect relatively low values considering the condition of the town's distribution system. Unfortunately, losses of this magnitude reflect a financial impact on the community. All water passing through the master meters into the town's distribution system is paid for on a per 1,000 gallon basis to the City of Florence. Thus, with losses as high as 25%, such reflects 25% of the water invoice received from the City of Florence that has not been sold and generated any revenue, but in turn, has been lost within the system.

Based on the 2011 estimated service area population, the per capita water sales was 79 gallons per capita per day (gpcd) in 2011 (11 months only), and 76 gpcd for 2012. These per capita daily average rates of sale are relatively low for a community similar to Williamsburg with no high water usage commercial customers or industrial users. The low per capita water sales rate is an indication of the community's high water rate structure and minimal outdoor irrigation use.

For the purpose of this report, water use projections are based on the average daily water sales in 2012. As previously indicated, unaccounted-for-water within the system has averaged 21% over the twenty-three months of record. This value is expected to drop with the distribution system improvements recommended in this study. Therefore an unaccounted-for-water value of 15% is used for the town's water use projections. The maximum month water delivery occurred in July 2012, totaling 3.10 million gallons. This represents a maximum month factor of 151% of average. Maximum day demand conditions occur during the summertime when conditions are dry and outdoor water usage is elevated. Daily water sales data is not available. Based on the maximum month demand factor of 151%, the maximum day demand peaking factor is estimated at 225% of average day demand. This is a fairly typical value for a community of this size with limited outdoor water use. The highest demand condition that stresses a system the most is the peak hour demand that occurs typically for a short period of time during the maximum day demand condition. Typical peak hour demand factors for a community of this size range from 3.0 to 4.0 times the average day demand. For the purpose of this evaluation, a peak hour demand of 325% of average day has been selected as being representative of this condition.

The following table is a summary of the baseline water use parameters used in this report for the Town of Williamsburg's water system in projecting future water demand conditions.

TABLE 4
TOWN OF WILLIAMSBURG
2012 BASELINE WATER USE PARAMETERS

Parameter	Value
Average daily water Delivered, gpd ²⁾	59,419
Average daily water Sales, gpd ¹⁾	50,506
Unaccounted-for-water, % ³⁾	15.0
Maximum monthly water usage, % ⁴⁾	151
Maximum daily water usage, % ⁴⁾	225
Peak hour water usage, % ⁴⁾	325
Service Area Population, 2012	663
Per Capita Water Delivered, gpcd ²⁾	89.6
Per Capita Water Sales, gpcd ¹⁾	76.2

- 1) Based on 2012 metered water sales data
- 2) Based on a projected reduced unaccounted-for-water value of 15.0%
- 3) Based on an assumed reduction in unaccounted-for-water from 23.0% to 15% with improvements recommended in this study
- 4) Percent of average daily water delivered by regional water system.

Using the baseline water use parameters presented in the above table and population projections from Table 2, the existing and estimated future water demand requirements from the regional water system are presented in the following table.

TABLE 5
TOWN OF WILLIAMSBURG
EXISTING AND PROJECTED DEMANDS ¹⁾

Condition	Population	Average Day Demand ²⁾ , gpd	Maximum Day Demand ³⁾ , gpd	Peak Hour Demand ⁴⁾ , gpm
Existing - 2012	663	59,419	133,700	134
Future - 2015	692	62,000	139,500	140
Future - 2020	744	66,700	150,000	151
Future - 2025	796	71,300	160,500	161
Future - 2030	843	75,600	170,000	171
Future - 2035	886	79,400	178,700	179

- 1) Water delivered by regional water system
- 2) Average day demand = gpcd of delivered water x population
- 3) Maximum day demand at 225% of average day demand.
- 4) Peak hour demand at 325% of average day, divided by 1,440

SECTION V

FUTURE WATER SUPPLY REQUIREMENTS

The regional water system's raw water supply, treatment, pumping and transmission facilities serve the City of Florence and the Towns of Williamsburg, Coal Creek and Rockvale, as well as several additional large customers who are not a party to the regional water system agreement. Figure 2 depicts only a portion of the regional system transmission piping as it loops to the southwest to serve Williamsburg, Coal Creek and Rockvale.

The regional system has two water treatment plants, the North WTP with a capacity of 1.3 million gallons per day (mgd) and the South Field WTP rated at 6 mgd. The system serves multiple pressure zones. The Town of Williamsburg is served by regional pressure zone D. Water storage in this zone is provided by the South Field WTP storage tank with a capacity of 2.0 MG. The South Field WTP storage tank is located approximately 3.4 miles southeast of Williamsburg at the WTP reservoir site.

The regional water system 2002 master plan recommended Williamsburg construct an internal water transmission line to tie together and loop the long dead end piping extending from the north end of Bear Gulch Road to the center of town. A second recommended master plan project for Williamsburg consists of the addition of a booster pump station and transmission main for a future pressure zone serving the high ridge area west of Bear Gulch Road. These are considered to be relatively low priority improvements. New regional system transmission mains are also recommended extending from the South Field WTP storage tank through Coal Creek, then looping south through Williamsburg. As indicated in the master plan, with the construction of the 2.0 MG South Field WTP storage tank and the proposed transmission main extensions, adequate fire flow volumes and flows will be provided to the Town of Williamsburg. This assumes adequate town distribution facilities are available.

Projected water demands for the Town of Williamsburg are presented in Table 5. Existing average day supply requirements of 59,400 gallons per day (gpd) are projected to increase to 79,400 gpd in 2035. This increase is driven by the overall growth projections for Fremont County. Once sufficient water rights are secured to supply growth, water demands within the regional system would be expected to increase at the projected countywide growth rate. The town's water tap moratorium limiting the town to 273 taps was increased to 285 taps in 2011. A

2010 water rights filing is expected to provide an additional 94 taps once adjudicated. This is assumed to occur after 2015.

Water system demands for the regional water system were projected out to the year 2020 within the Regional System Master Plan when prepared in 2002. Demand projections were based on population projections available at that time. Regional system improvements have been recommended to accommodate growth and associated water demand increases. Implementation of those improvements are the responsibility of the regional water system committee and the City of Florence. For the purpose of this study, it is assumed that the regional system will not fall behind in system capacity improvements needed to meet the future demands for the Town of Williamsburg.

The Town of Williamsburg has recently converted 140 shares of Union Ditch water rights in water court under Case No. 99CW149, together with the City of Florence and Town of Coal Creek's Union Ditch shares. The amount of water to be provided as a result of the conversion of the town's Union Ditch shares has resulted in the ability to serve 285 residential taps. These shares are adequate to cover the town's existing 273 taps with a surplus of 12 additional taps to allow for some growth. Williamsburg is currently in the process of converting 46 additional shares of Union Ditch rights under Division 2 Water Court Case 10CW063. Once adjudicated, these rights will provide for approximately 94 additional customer taps.

SECTION VI

EVALUATION OF EXISTING FACILITIES

In evaluating the adequacy and performance of a water system, it is necessary to consider the various discrete elements of the system and how these elements perform together. The Town of Williamsburg's water system is not a typical free-standing system with a self contained supply, treatment, storage and distribution system components. The town does not have either a raw water supply or treatment facilities. Treated water is pumped into the regional system's transmission and storage facilities. The town is connected to the regional transmission system at four metered locations. The water system components owned by the town, for which it is solely responsible, consist only of the town's distribution system. This section of the report does not conduct an evaluation of the regional system's facilities. The regional system appears to be well operated and managed, with a master plan in place that addresses future needs. This section looks at the treated water quality provided by the regional system, regional system storage as it applies to the town, and the town's distribution and metering systems. Recommended water system improvements to the town's facilities are then drawn from this review.

A. WATER QUALITY

The town's treated water supply is provided by the regional system's water treatment plants. The source water is a combination of surface water supplies that include diversions of the Minnequa Canal, Newlin Creek, Adobe Creek, Mineral Creek and the Town of Rockvale's wells. The treated water quality provided to the town is considered to be excellent. Water quality sampling of the treated water leaving the water treatment plants for regulated contaminants and WTP operations are conducted by the City of Florence. Water quality sampling for the Town of Williamsburg's distribution system for bacteria and disinfection byproducts are conducted by the Florence staff. Lead and copper sampling of customer taps is conducted by the town staff. The required sampling frequency varies for each water quality parameter.

Water quality data has been obtained from town representatives consisting of the annual Consumer Confidence Reports for water provided by the regional water system. The annual reports indicate that none of the Environmental Protection Agency's (EPA's)

regulated maximum contaminant levels (MCLs) have been exceeded. In fact, common drinking water contaminants normally present in drinking water were well below detectable levels. Concentrations of barium, fluoride and radionuclides were detected at low levels, well below their MCLs. Nitrate averaged 0.12 mg/l, which is well below the 10.0 mg/l MCL. Sodium has averaged 15 mg/l, which is very low. Overall, treated water quality is considered to be excellent.

Raw water turbidity removal for pathogen protection is the primary treatment objective of the two regional WTPs. In 2012, the maximum single treated water turbidity measurement was 0.099 nephelometric turbidity units (NTUs). Water treatment plant filtration effectiveness is demonstrated if 95% of the turbidity samples each month are less than 0.30 NTU.

The 1998 Stage-1 Disinfection/Disinfection Byproducts Rule, which applies to service populations less than 10,000, establishes a maximum residual disinfection level for chlorine in the distribution system at 4.0 mg/l. In order to demonstrate compliance with this rule, the Town of Williamsburg is required to conduct quarterly distribution system disinfection measurements and submit these reports to the State. Sampling is conducted by the City of Florence. Maximum limits established by the Rule are 0.080 mg/l for total trihalomethanes (TTHM), and 0.060 mg/l for five surrogate haloacetic acids (HAA5). The 2012 monitoring results for these parameters found concentrations of 0.0142 mg/l of TTHM and 0.0279 mg/l of HAA5, substantially under one-half of the established limits. Therefore, the Rule would allow the regional system to conduct reduced monitoring of these contaminants. Distribution system sampling for total coliform and E. coli conducted monthly by the Florence staff consistently result in an “absent” result, indicating that the distribution system is free of bacteriological contamination.

As required by the Lead and Copper Rule, the town staff conducts sampling of selected customer taps every three years. The 90th percentile action level for lead is 0.015 mg/l and 1.3 mg/l for copper. The 2010 results of this sampling survey found concentrations well below the regulated 90th percentile for each parameter.

B. WATER STORAGE

Treated water storage for the Town of Williamsburg is provided by the regional water system with one storage tank located in Williamsburg's pressure zone. The regional system tank consists of the South Field WTP storage tank with a capacity of 2.0 MG. Although this tank is located a considerable distance southeast of town, it is connected by means of the regional system's relatively large diameter looped piping system. The regional storage tank is sited above the town's service area and functions as a conventional gravity storage tank in that it provides pressure to the system as a result of its vertical relationship to it. The tank floats on the system, pressurizing it and meeting water demands as required.

Distribution storage serves several purposes. Total storage needs must be evaluated with consideration given to each individual storage component. The three primary purposes of water storage are:

1. Equalization storage to meet hourly variations in demand.
2. Fire storage to store water for firefighting.
3. Emergency storage to provide a reserve supply for emergency use.

The South Field WTP storage tank, sized at 2.0 MG, was recommended within the regional system master plan in 2002. This storage tank has been constructed and, according to the master plan, was sized to accommodate equalization, fire and emergency storage requirements for the regional system's pressure zone D through the year 2020.

Instantaneous demands placed on a water system are not uniform throughout any given day. The system must be able to supply the peak demands that occur on an hourly basis throughout the day. Water storage is a means whereby the equalization of these heightened demands can be obtained without placing the demand directly on pumping or treatment facilities. Equalization storage for a community the size of Williamsburg typically ranges from 15 to 30% of maximum day demand. As developed earlier in this study, the future 2035 maximum day demand on the system is estimated at 178,700 gallons per day (gpd). Thus, the equalization storage requirement for the town is between 26,800 and 53,600 gallons.

The second component of storage is fire flow. Fire protection within the town is provided by the Florence Fire Protection District. The needed fire storage is estimated using the Insurance Service Office (ISO) guidelines. An ISO evaluation of the town's fire protection system was not available for preparation of this report. ISO evaluates the fire protection capabilities of a community within three different categories consisting of: communications, the fire department and the water system. From this evaluation, a community is given a fire suppression classification ranging from 1 to 10. The evaluation of the water system accounts for 40% of the grading. Needed fire flow for residential housing having a typical separation of greater than 100 feet is 500 gpm per ISO criteria. With the smaller diameter dead end piping provided within the town's distribution system, this fire flow rate is not available within the majority of the town's distribution system. As presented later in this section, existing available fire flow from the town's existing fire hydrants averages 339 gpm. In the determination of the required fire storage component, the needed fire flow of 500 gpm is increased by the maximum day demand flow of 178,700 gpd (124 gpm) and decreased by the projected maximum pumping rate into the system. For the regional system, values for total pumping capacity into the system are approximately 10 MGD, or 7,000 gpm. With the assumption that only one major fire would be occurring within the regional water system, this production capacity of the regional system WTP is sufficient to meet the fire flow demands of the Town of Williamsburg without consideration given to fire storage requirements.

The third factor in sizing storage is an emergency reserve. The reserve has been considered within the regional water system master plan at a level of 24 hours of emergency reserve for the entire regional system.

Therefore, it appears that adequate storage has been considered in sizing of the existing storage facility for not only the main portion of the Town of Williamsburg, but for the entire regional system.

C. DISTRIBUTION SYSTEM

As presented in Section III of this report, the town's distribution system consists of approximately 9.2 miles of piping ranging in size from 2-inches to 6-inches in diameter. Figure 2 shows the configuration of the town prior to joining the regional water system in 1980, prior to the rapid development that occurred in the 1980's and 1990's. Figure 2 defines the older areas of town with structures centered around John Street and Central Avenue, and south along Churchill Street. The 1980 population totaled 72 people. Thus, these areas contain the older, pre-1980 distribution system piping. No piping problems are reported by the town in these older areas, thus, the piping in these areas is considered to be in a relatively good serviceable condition.

The majority of the remaining system is relatively new, being installed from 1980 to 2000. Due to the apparent lack of design and construction standards, and any apparent construction oversight, distribution system extensions in the newer developments were, in general, installed in a poor, substandard manner. Pipe sizes in many areas are too small. Pipe looping is close to nonexistent. In fact, looping appears to have been likely avoided to save on costs. A good example is in the Wilmont Circle area where a loop could have been completed with only a few feet of additional piping. Pipe looping is not easily accomplished in some areas due to shallow bedrock conditions and steep topography.

Pipe bedding uncovered during pipe repairs has been reported at times to consist of construction debris and unacceptable material. This condition likely contributes to some of the pipe breaks. It is not thought to be a wide-spread problem. The typical depth of cover on the piping is 4 to 5 feet; however, this typical depth of cover has been compromised in some locations where bedrock was encountered. The town has indicated that the depth of cover is only 1 foot in some isolated areas.

Service pressures drop dramatically in the long, undersized dead-end pipelines during high demand or fire flow conditions. This limits both service and fire hydrant flow rates.

Poor historical records have been kept by the town as to pipeline locations, sizes, materials, depths and valving. Thus, much of the existing water system map, Figure 5, was compiled from available freehand drawings and operator interviews.

The 2002 regional system master plan includes two recommended projects directly related to the Town of Williamsburg. These are conceptual projects. The first is a pipeline, internal to the Williamsburg distribution system, which would improve system pressures by tying together the north end of Bear Gulch Road to the center of town. The second conceptual recommendation is a new booster pump station and pipeline to serve a high pressure zone associated with development of the ridge above Bear Gulch Road. A detailed assessment of the town's distribution system conducted by the consultant found that the internal pipeline project would provide only limited improvement to the system's pressure problems; however, the number of service points off of the regional system should be reduced from 4 to 1. The booster pump station and pipeline project is very conceptual and is intended to accommodate the future development of the Bear Gulch Ridge area. This master plan recommendation is not included in the recommended water system improvements of this report; however, a plugged pipe stub is proposed for the future Bear Creek ridge pipeline at the intersection of Copper Creek Road and Churchill Street. The elimination of multiple master meters is included in a lower priority group of recommended improvements.

The suggestion has been made by some that the town's existing distribution system should be entirely replaced. This is a costly approach and would likely result in the replacement of existing pipeline segments in good condition. If the existing distribution system was kept as is, the frequency of pipe breaks would likely diminish over time as the most vulnerable substandard installations would break and be repaired using a higher construction standard. This process has been taking place by the town in addressing pipeline breaks over the last decade. This approach unfortunately is time consuming and costly. Improvements to enhance service and fire flow pressures with looping and pipe upsizing will result in system pressures being more consistent and not fluctuating as dramatically as they currently do. Thus, the existing piping that has not been replaced will not be as stressed as it has been in the past. Following this rationale, the recommended approach to upgrading the town's distribution system is, in order of priority:

- Replace identified problematic pipe segments
- Address identified pressure problem areas with looping and/or pipe upsizing
- Address low fire flow conditions at identified locations
- Add fire hydrants in locations that are not currently within the existing fire protection coverage area
- Add system valves to assist with the isolation of piping segments for repair and maintenance
- Add additional pipe blow-offs on pipe dead ends and air release valves at high points, where necessary
- Eliminate multiple regional master meters with larger diameter piping to connect the fragmented service areas of the town

This improvement approach builds on the existing distribution system to address water delivery deficiencies in the most cost efficient manner; however, future pipe breaks within the existing distribution system components that have not been replaced are likely to continue, but should occur at a much less frequent rate. Recognizing this potential, the water system budget needs to make an allowance to pay for pipe breaks within an emergency reserve fund.

Problem areas identified by town staff consist of the following. Refer to Figure 5 in the back of this report for the existing distribution system configuration and Figure 6 in the back of this report for the proposed water system improvements.

1. Bluff Road. This 900-foot segment of 2-inch piping serves 4 houses and the town park's irrigation service. When irrigating the park, little or no pressure is available to houses on Bluff Road. Available fire flow calculated at fire hydrant 11.5 on the south end of Main Street, parallel to Bluff Road, is only 200 gpm (with a 20 psi residual). The solutions to address these deficiencies consist of relocating the park irrigation service to the new proposed 10-inch main extending west across Oak Creek, replacing the 2-inch pipe in Bluff Road with a 4-inch line and looping the south end of the new main in Bluff road to Main Street.

2. Rockrimmon Road. This 2,150-foot segment of 4-inch dead end piping serves 35 houses at the highest elevations within the town's developed service area. At the south end of the road, low service pressures occur during elevated demand conditions. The calculated available fire flow at hydrant 25, at the south end of Rockrimmon, is only 175 gpm. This line cannot easily be looped back into the town's distribution system. The solution to the pressure problem in Rockrimmon, as well as most of the western half of town, starts with the replacement of the existing 6-inch main extending from Master Meter No. 1 to Churchill Street with a 10-inch diameter main. The pipeline in Rockrimmon needs to be replaced with an 8-inch main extending from the intersection with Churchill Street west to Wilmont Road, then south to Boulder Court and with a 6-inch main from Boulder Court south to fire hydrant 25.
3. Bear Gulch Road South and Cedar Ridge Road. Similar to Rockrimmon Road, the customer's served from the water main located in these two roads experience low service pressures at the southern ends. Calculated available fire flow at hydrant 22 on Cedar Ridge Road is only 125 gpm. The solution to this low pressure problem includes looping the ends of these two mains together, as well as the upsizing of the existing pipelines in Smith Gulch Road and Wilmont Road to 8-inch mains.

The following pressure problem areas were identified by the consultant by modeling the distribution system to determine available fire flows to existing hydrants. The discussion of hydrant flows is presented later in this section.

4. Southeast quadrant of town's service area. This area, bounded by Central Avenue on the north and Quincy Street on the west, serves approximately 20 houses on a dead end feed from a single point, Master Meter No. 3. Pipe sizes are not known in this area and are presumed to be 4-inch diameter. The extensive length of piping has the potential to exhibit stagnant water conditions, negatively impacting water quality. The solution to enhance service pressures and system flow circulation for water quality purposes is to loop the dead end pipelines. The north end of Needham Place can be looped to Scutti Drive near Master Meter No. 2. The north end of Capestrano Drive can be looped to John Street. Both of these loops require crossing county road CR13A, Central Avenue.

5. Northeast quadrant of town's service area. This area, north of Central Avenue around Scutti Drive, serves approximately 28 houses from a single point at Master Meter No. 2. The long 4-inch main in Oak Creek Road stops short of looping back to Scutti Drive. This long dead end main has the potential for stagnant water conditions. Calculated fire flows at the four hydrants in this area are limited due to the 4-inch main and its length. The loop in Oak Creek Drive should be completed to provide better circulation for water quality purposes. The 4-inch main in Scutti Drive from Central Avenue to Oak Creek Drive needs to be replaced with an 8-inch main to provide adequate pressures during high demand conditions and to improve fire flows to hydrants in this area.
6. Wilmont Circle area. This is another area served by undersized, unlooped distribution piping. A single 3-inch line serves approximately 37 houses in this area. Service pressures are drastically reduced during high demand conditions. Calculated available fire flows to hydrants 13, 14 and 15 are severely limited due to pipe sizing and non-looping. As shown on Figure 6, the solution includes a new 4-inch main in Quincy Street extending from Wilmont Circle east to Churchill Street, looping Wilmont Circle south to Quincy Street and Churchill Street to North Wilmont Circle. Service pressures and fire flow at the three existing hydrants in this area are dramatically improved with these improvements.
7. Ironhorse Road South. This long 4-inch diameter dead end pipeline serves approximately 11 houses. Calculated available fire flow to hydrant 12 is limited. The solution consists of either upsizing this line or looping the end west to Robbins Street. A 6-inch diameter loop to Robbins Street is recommended as it provides better fire flow to hydrant 12, as well as reinforces service pressures in Robbins Street.
8. Copper Creek Road. Piping in Copper Creek Road consists of parallel 4-inch and 6-inch pipelines extending west from Master Meter No. 1. The two lines function independently with the 4-inch serving the Wilmont Circle area and the 6-inch extending west to serve the entire service area west of Churchill Street, as well as the Robbins Street-Benton Road area. This 6-inch pipeline serves approximately 176 houses. Service pressures are significantly reduced during high demand conditions. Available fire flow calculations for the west half of town found that these two parallel lines, if connected at the west end, are still undersized. The existing 6-inch main is reported to

be problematic with frequent breaks. It is reported to consist of PVC piping with solvent weld (glued) joints. A single 10-inch line is recommended to replace these two existing parallel lines.

9. Wilmont Road and Smith Gulch Road. Wilmont Road from Rockrimmon Road to Smith Gulch Road has a 3-inch pipeline. This line serves approximately 63 houses and 6 fire hydrants to the west. It is severely undersized. The existing 4-inch line in Smith Gulch is also undersized to provide sufficient flows to existing hydrants. The solution is to replace the two small diameter pipelines with 8-inch piping.

The above recommended improvements will dramatically improve service pressures throughout the distribution system under peak demand conditions, improve water circulation to mitigate potential stagnant water conditions, and will improve available fire flow rates to existing and proposed fire hydrants.

The 27 existing fire hydrants within the town's service area provide fire protection to buildings and structures. Fire hydrants need to be exercised annually to assure that they are in good working condition. Within the existing distribution system, available fire flows to existing hydrants were determined by calculating the pressure loss in the pipelines from the feed point at the connection to the regional system to the individual hydrant. A 20 psi minimum residual pressure was maintained at the hydrant in the flow determination. This is a typical minimum hydrant pressure maintained by a fire pumper truck. Calculated existing hydrant flow rates range from 125 gpm up to 1,100 gpm, averaging 339 gpm for all 27 hydrants. A distribution system hydraulic model was used to determine available fire flows to existing hydrants with the proposed distribution system improvements in place. The resulting increases in flow were significant as shown in the following Table 6. Calculated fire flow deliveries more than doubled averaging 769 gpm for the existing 27 hydrants. All but five of the existing hydrants were able to provide the recommended minimum 500 gpm flow rate. The five existing hydrants that fell short of the 500 gpm level were increased into the range of 325 to 450 gpm. This is considered acceptable due to the extensive piping that would be required to marginally improve their flow rates.

TABLE 6
TOWN OF WILLIAMSBURG
CALCULATED FIRE HYDRANT FLOWS

Hydrant No.	Location	Existing Flow, gpm	Improvements (See List Below)	Improved Flow, gpm
1	John & Central	725	None	725
2	Scutti & Oak Creek	550	A	1500
3	Cory	375	A	525
4	Pinon Ridge - North	325	A, B	600
5	Pinon Ridge & Oak Creek	350	A, B	825
6	Oak Creek - East	275	A, B	950
7	Btwn Capestrano & Needham	325	C, D	700
8	Quale Run - East	225	C, D	375
9	Quale Run - West	225	C, D	675
10	Needham & Central	225	C, D	1500
11	Quincy & Capistrano	1000	None	1000
11.5	Main - South End	200	E	625
12	Iron Horse - South	425	F, G	875
13	Iron Horse - North	175	F, H, I	625
14	North Wilmont	175	F, H, I	600
15	North Wilmont & Quincy	250	F, H, I	1025
16	Churchill & Copper Creek	1100	F	1500
17	Linda Vista & Wilmont	175	F, J	575
18	Smith Gulch & Wilmont	175	F, J, K	1050
19	Smith Gulch & Bear Gulch	150	F, J, K	625
20	Bear Gulch South of Sage	175	F, J, K	450
21	Bear Gulch & Sage	150	F, J, K	325
22	Cedar Ridge	125	F, J, K, L	350
23	Rockrimmon & Cobble	600	F	1100
24	Boulder	250	F, M	425
25	Rockrimmon - South	175	F, M, N	550
26	Needham south of Quale Run	250	C, D	675
Maximum, gpm		1100		1500
Minimum, gpm		125		325
Average, gpm		339		769

Recommended Improvements:

A - New 8" in Scutti - Central to Oak Creek
 B - Loop Oak Creek to Scutti
 C - Loop Needham to Scutti
 D - Loop Capestrano to John
 E - New 4" in Bluff
 F - New 10" in Copper Creek -
 Master Meter No. 1 to Churchill
 G - Loop Iron Horse to Robbins

H - Loop Wilmont/Quincy/Churchill
 I - New 4" in Quincy - Churchill to Wilmont East
 J - New 8" in Wilmont - Rockrimmon to Smith Gulch
 K - New 8" in Smith Gulch - Wilmont to Bear Gulch
 L - Loop to Bear Gulch to Cedar Ridge
 M - New 8" in Rockrimmon - Churchill to Boulder
 N - New 6" in Rockrimmon - Boulder south

Existing fire hydrant locations within the town were reviewed for coverage area. The review was based on a coverage area having a 300-foot radius from the hydrant location. This is a typical coverage distance which is based on a maximum reasonable fire hose laying length. When 600-foot diameter circles are drawn around each hydrant, the determination was made that at several locations within the town, adequate fire hydrant coverage is not available. These gaps in hydrant coverage area were compared to aerial photography of the town to determine where additional fire hydrants are needed to cover existing structures.

Several subdivisions are made up of large lots with some of the houses being from 200 to 600 feet back from the roadway. Thus, it is not practical to provide a fire hydrant within 300 feet of all structures because it would require an individual hydrant for many houses. In consideration of existing house spacing and setbacks, the criteria used to determine the recommendation for a new hydrant was expanded to a 400-foot radius from a hydrant. Also, a new hydrant is not recommended for a single structure lying outside of the 400-foot radius criteria. As a result, 16 new fire hydrants are recommended to be installed in the areas containing existing structures to fill the gaps in the existing fire protection coverage area. These 16 proposed new fire hydrant locations are shown on Figure 6 in the back of this report. Most of the recommended new hydrants are provided with sufficient fire flow rates with the proposed distribution system improvements previously recommended to address pressure and circulation problems. Five of the recommended new hydrants, however, require short new pipeline extensions or upsizing of existing small diameter piping. The recommended new fire hydrants are listed in the following Table 7.

TABLE 7
TOWN OF WILLIAMSBURG
RECOMMENDED NEW FIRE HYDRANT LOCATIONS/FLOWS

Hydrant	Location	Improved Flow, gpm
101	Cory Ln. - North end	400
102	Not Used	
103	Central Ave. & Scutti Dr.	1500 ¹⁾
104	Central Ave. & Pikeview Ave.	825 ¹⁾
105	Copper Creek Rd. & Santa Fe Ave.	1500
106	North Wilmont Cir & Churchill St.	850
107	Cobble Ct.	600 ¹⁾
108	Rockrimmon Rd. - North of Boulder Ct.	950
109	Rockrimmon Rd. - South of Boulder Ct.	700
110	Cedar Ridge Rd.- South of Smith Gulch	500
111	Bear Gulch Rd. South	900 ¹⁾
112	Bluff Rd. & Main St.	1500
113	Robbins St.	925
114	Ridgway Ct.	450
115	Linda Vista	450
116	Wilmont Rd. - South of Smith Gulch	1150
117	Sage Ct.	350 ¹⁾

1) Requires short new pipeline or upsize of existing pipeline.

D. METERS

The four master meters associated with the town's treated water supply are read and recorded to track total treated water provided to the town. Treated water flow data is read and recorded by the City of Florence and used for monthly billings of treated water provided. These meters are considered to be in good operating condition.

In accordance with the regional water system agreement for service, the regional water system has requested that the town reduce the number of master meter service points from the existing four meters to one meter. This requires tying the segmented service areas of the town together. A review of the magnitude of water delivered through each master meter was made. Their locations are shown on Figure 5 located in the back of this report. Over the last two years, Master Meter No. 1 provided 46% of the total delivered flow while Master Meter Nos. 2, 3 and 4 provided 14%, 5% and 35%, respectively. The logical approach is to maintain the regional system connection at Master Meter No. 1, eliminating Master Meter

Nos. 2, 3 and 4. Distribution system piping improvements that would provide for the elimination of the additional master meters would be required. An 8-inch diameter main extending east from Master Meter No. 1 in Central Avenue to Scutti Drive would allow for decommissioning Master Meter No. 2. To the south, decommissioning of Master Meter No. 4 requires an 8-inch main extending in Quincy Street from Master Meter No. 1 to Master Meter No. 2. This line would continue south in Quincy Street to Capistrano Drive in order to eliminate Master Meter No. 3. The Regional Water System is requiring backflow prevention devices on connections to the Regional System's transmission mains. A double check valve assembly is appropriate for such an application. This will require the replacement of the Master Meter No. 1 vault as space is not available in the existing vault. Reducing the master meter connections with the regional system to a single point will simplify the meter reading of the water delivered to the town; however, a single delivery point creates a certain vulnerability, especially with no distribution system storage available within the town. If the master meter were to fail or need to be taken out of service, the town would be out of water. Therefore, the consultant recommends maintaining the connection at Master Meter No. 4 in place for use as a backup connection point for emergency use. The meter in this vault would be removed, but could be re-installed under an emergency backup condition.

All of the town's water customers are metered for individual water use. New meters were installed throughout the distribution system in 2006 and 2007. The metering system is an automatic reading and billing system whereby meters are read using a hand held touch read receiver followed by downloading the meter data into the town's billing software. This new meter system greatly enhances the efficiency of the town's meter reading activities. Currently, the town's metering system is considered to be in good operating condition.

SECTION VII

EXISTING FINANCIAL STATUS OF THE WATER FUND

The Town of Williamsburg adopts a formal budget for each fiscal year for its operating funds, including the general fund, the roads and highways fund, conservation trust fund and the water fund. An annual audit of the town's financial statements is not conducted. An annual audit exemption is filed each year with the state. Such is allowed by Colorado law for communities having an annual budget of less than \$500,000 if the audit exemption is compiled by an independent accountant. It is not known when the last formal audit was conducted for the Town of Williamsburg. The town's fiscal year runs concurrent with the calendar year.

From the data available within the town's audit exemption filings and budgets, an assessment with respect to water fund related revenues and expenditures has been made. These financial statements provide general data which is sufficient to evaluate the financial health of the water fund. Annual financial data of the town's water fund has been provided by the town in the form of the 2008 to 2011 audit exemptions and the 2009, 2011 and 2013 budgets. The budgets also include the estimated revenues and expenditures for the previous year and the actual revenues and expenditures for two years previous to the budget.

The town assesses monthly water charges to all water connections to the system, whether active or not, excluding three town related connections. The primary source of water utility revenue is generated from charges assessed for water sales. The town's current water rate schedule is summarized in the following table:

TABLE 8
TOWN OF WILLIAMSBURG
WATER RATES

Rate Description	Monthly Charge
Base Rate	\$49.00 for zero to first 5,000 gallons
Surcharge Use Rate	\$3.50 per 1,000 gallons above 5,000 gallons

1) Rates imposed on town declared emergency.

The above water rates were last adjusted in August 2011. The town's tap fee schedule for a new ¾" water service is \$5,600 for in-town service. Outside town limit tap fees are two times the in-town fee. In addition, a new service is also charged a \$25 application fee and a \$3,000 system development fee. No new taps appear to have been issued since the implementation of the year 2000 water tap moratorium, even though the ability to issue 12 new taps was approved in 2011. From the town's water tap fee, 51% of the fee is conveyed to the regional water system's capital improvements fund. All existing taps are ¾" in size. The exception is the 2" tap to the town park which is seldom used due to the system pressure problems that its use causes. The tap fee is for access to the distribution system. The customer must pay the town \$1,000 for the installation cost of the service from the main up to and including the meter and meter pit. The customer is then responsible to extend the new service from the meter to the building. The town clerk issues monthly billings for water service.

The town assesses a property tax mil levy. The mil levy for 2012 was 2.239 mils. The assessed valuation of the town in 2012 was \$3,028,209. Thus, the general property tax revenue for 2012 to be collected in 2013 is estimated to total \$6,777. Property tax revenues are channeled into the general fund and are not used within the water fund.

Article X, Section 20 of the Colorado Constitution, commonly known as the Taxpayer's Bill of Rights (TABOR) establishes, taxing, spending, revenue and debt limitations for the State of Colorado and all local governments, including enterprise funds, which are defined as government owned businesses. Revenues received which are in excess of the fiscal year's spending limits must be refunded. This limits the ability of an enterprise fund to receive state tax generated grant funds. The town has not introduced a proposed ballot measure to override the revenue limitations of TABOR. Thus, the town is not currently authorized by its constituents to accept state grant funds generated from state taxes for the purpose of conducting water system improvements. This ballot measure action needs to be undertaken by the town and approved by the residents of Williamsburg to provide the town with greater flexibility in securing funding for the water system improvements recommended within this report.

In order to assess the overall financial health of the water fund, revenues and expenditures within the fund were reviewed. The following table is a summary of the water fund revenues. The fiscal data presented reflects reported revenues as presented in the 2008 and 2010 audit exemptions. Revenues presented in the 2011 and 2013 budgets indicate actual revenues for

2009 and 2011, and estimated revenues for 2012 at a greater level of detail and are used in the table. The 2013 budget revenues are also presented.

TABLE 9
TOWN OF WILLIAMSBURG
WATER SYSTEM REVENUES

Year	Water Sales ¹⁾	Interest ²⁾	Misc. ³⁾	Total
2008 ⁴⁾	\$182,544	\$2,028	\$2,000	\$186,572
2009 ⁵⁾	\$189,630	\$123	\$6,395	\$196,148
2010 ⁴⁾	\$176,982	\$215	\$5,793	\$182,990
2011 ⁶⁾	\$186,850	\$158	\$7,772	\$194,780
2012 ⁷⁾	\$188,000	\$272	\$7,200	\$195,472
2013 ⁸⁾	\$182,000	\$298	\$10,000	\$192,298

- 1) Includes all charges for services
- 2) Includes interest accounted for in water system development fund
- 3) Includes delinquency notices, late charges, connect/disconnect fees, and return check fees
- 4) From Audit exemption filings
- 5) Actual figures from 2011 budget
- 6) Actual figures from 2013 budget
- 7) Estimated figures from 2013 budget
- 8) 2013 budget figures

From the financial data provided, the following table has been compiled to reflect the expenditures incurred within the water fund covering the same period of time as that summarized for revenues. Data from the 2008 and 2010 audit exemption filings was used as well as the actual 2009 and 2011 expenditures from the 2011 and 2013 budgets, estimated expenditures for 2012 from the 2013 budget, and the 2013 budgeted expenditures.

TABLE 10
TOWN OF WILLIAMSBURG
WATER SYSTEM EXPENDITURES

Year	Admin ¹⁾	Water ²⁾ Purchase	Salaries & Benefits	Oper. Maint. & Supplies ³⁾	Meters ⁹⁾	Water Share Lease	Total
2008 ⁴⁾	\$0	\$142,000	\$16,501	\$19,450	\$7,694	-	\$185,645
2009 ⁵⁾	\$8,128	\$108,145	\$20,578	\$8,156	\$36,139	\$342	\$181,488
2010 ⁴⁾	\$3,265	\$119,152	\$28,213	\$2,587	\$0	-	\$153,217
2011 ⁶⁾	\$4,876	\$135,422	\$27,481	\$2,211	\$1,452	\$351	\$171,793
2012 ⁷⁾	\$9,215	\$148,489	\$34,000	\$11,700	\$1,452	\$351	\$205,207
2013 ⁸⁾	\$9,310	\$138,459	\$36,700	\$5,500	\$1,600	\$375	\$191,944

- 1) Administration includes insurance, accounting/legal fees, contract services and general administrative expenditures
- 2) Payment to regional system for water delivery, treatment, pumping and debt assessment
- 3) Includes repairs, maintenance, supplies, water testing and utilities
- 4) From Audit exemption filings
- 5) Actual figures from 2011 budget
- 6) Actual figures from 2013 budget
- 7) Estimated figures from 2013 budget
- 8) 2013 budget figures
- 9) Payment for new meters, including 2009 meter program loan payoff

A comparison of annual total revenues and expenditures presented in the above tables shows revenues exceeding expenditures for the period reviewed with the exception of the year 2012. The deficit resulted, in part, from the purchase of used truck for the water system. Water sales revenues have been fairly consistent since 2008. The base water rate was increased in 2008 from \$41 to \$49 per month. The incremental usage rate per 1,000 gallons over the minimum was increased in 2011 from \$3.00 to \$3.50 per 1,000 gallons. The debt expense for the 2006-2007 meter replacement program was paid off in 2009. Debt payments to the regional water system for capital improvement projects have been included in the monthly water charges assessed by the City of Florence and are included under water purchases in the expenditure table. The Florence assessments represent, on average, 72% or more of the town's total water system expenditures. Depreciation of the town's water system is not considered in the annual audit exemption filings or the annual budgets.

The water system revenue table does not provide information with respect to retained earnings. The 2011 audit exemption filing indicates that the water fund ended the year with \$79,082 in cash and cash equivalents, plus a total of \$101,644 in investment instruments. The investment instrument amount represents the town's emergency reserve fund collected when the

development fees are assessed. These funds are currently tracked as the system development fund. The 2013 budget indicates that the 2012 year end estimated reserves from the system development fund plus the water fund cash reserves totaled \$160,059. This total does not reflect an emergency reserve amount.

As presented previously, the town currently serves 273 users. Over the last two years, the town has had an average of 19 billed customers with zero water usage. These are, however, billed the minimum monthly water rate. The town also has 7 inactive customers that are not billed. Three water services are town related accounts that are not billed. Consequently there are 263 billable accounts. Revenues in 2013 for water sales as listed in the above table are projected to be \$182,000 in total billed water sales. Thus, the average monthly water bill for 2013 is projected to be \$57.67 taking into account the 263 billable users. Water fund expenses in 2013 are projected to total \$191,944. Given the total of 263 billed users and prorating the 2013 budgeted annual operating costs to a monthly operating cost, results in an average monthly cost of \$60.82 per billable user per month to cover: basic operations and maintenance; administrative expenses; and the regional water system charges for water delivery; treatment; pumping and the regional system's debt service.

As previously discussed, the recommended water system improvements consist of replacing known problem areas and addressing water delivery problem areas rather than a wholesale replacement of the entire water system. Therefore, some existing pipelines that were installed with substandard construction methods would be expected to still exist in the system and would likely fail in the future, requiring repair. The town's system development fund currently stands at approximately \$101,644. These funds are available as an emergency reserve. This fund should be maintained at a minimum of \$40,000. The 2012 year end water fund reserves totaled approximately \$68,151 as indicated in the 2013 budget. With the system development fund maintaining a minimum of \$40,000 as an emergency reserve, this would indicate that the town has approximately \$100,000 available as a local cash participation toward the costs associated with the implementation of the improvements recommended within this study.

SECTION VIII

WATER SYSTEM NEEDS AND RECOMMENDED IMPROVEMENTS

The physical components of the Town of Williamsburg's water system have been evaluated within this report. The identified needs are primarily related to the sizing and configuration of the existing distribution system. The 2000 water tap moratorium has been resolved by converting and adjudicating town held water rights. The town is now in compliance with the regional water system agreement to provide sufficient water rights to cover the water supplied to the town. Additional rights are also being sought for conversion in Water Court to allow for town growth above the current limit of 12 additional taps over the existing number of taps.

Typically water system improvements are prioritized into the categories of protection of public health, public safety, system reliability, and operations and maintenance. The identified deficiencies of the town's water distribution system stem primarily from substandard design and construction. The existing system's piping is undersized, poorly installed in areas, and not looped. An insufficient number of fire hydrants and line valves have also been identified. These deficiencies and necessary improvements generally fall into the categories of system reliability and public safety. Currently low service pressures under high demand or fire flow conditions make the town's distribution system vulnerable to cross connection contamination. This vulnerability has been addressed, in part, within the town's meter replacement project which included the installation of double check valves in the new meter yokes. However, the cross-connection vulnerability remains a concern from potential pipe break conditions. Thus, the recommended improvements to enhance system pressures can also be categorized as a public health protection improvement.

As previously indicated, the suggestion has been made that the town's entire distribution system be replaced. This approach, however, would likely result with the replacement of a sizable percentage of the system that would be considered in good serviceable condition and would border on cost prohibitive. The approach taken in the assessment of the needed water system improvements is to: start with the existing piping system and address the deficiencies of specific problematic piping segments; followed by addressing pressure problem areas; then enhancing fire protection coverage; adding system valving; and finally tying the fragmented sections of the distribution system together and eliminating the multiple regional system feed points. This is considered to be the most cost effective approach to upgrading the town's water

system. Within this approach, continued, yet less frequent pipe failures should be expected in the existing piping segments remaining in service. The need for an emergency reserve fund to address this anticipated maintenance issue is discussed in the financial section of this report. System components of water supply, treatment, transmission and storage are owned and operated by the regional water system and are considered to be in good operating condition.

Infilling growth within the community will be accommodated by the existing water system's components. Any potential new development occurring either inside or outside of the town boundaries where a water system extension would be required, should be undertaken on the basis of the developer constructing the needed system water extensions per industry standards at the developer's expense. The town should provide adequate criteria for the design, material and installation requirements for any system extensions. All aspects of an extension should be subject to the town's review and approval. The town needs to develop and adopt water system design and construction standards. Upon completion of new, developer installed water system facilities, once acceptable to the town, these new facilities would be dedicated to the town. The recommended water system improvements presented within this report are not intended for the purpose of supporting future developments of the town, but are required to enable the town to provide safe, reliable service pressures and fire protection within its existing service area.

The distribution system's recommended improvements identified in this report have been grouped into five priorities. The first priority is to address specific problem areas within the distribution system that are known to be substandard. This category includes only one identified pipeline segment consisting of the installation of a new 10-inch main extending from Master Meter No. 1 at the intersection of Quincy Street and Central Avenue extending west across Oak Creek and continuing west in Copper Creek Road to Churchill Street. This first priority of work also includes a new meter and meter pit service to the town park.

The second priority of recommended improvements includes 13 new and replacement pipeline segments necessary to improve system pressures and flow circulation throughout the existing service area.

The third priority grouping of recommended improvements addresses improving fire flow deliveries to existing hydrants with five short pipeline segments as well as the installation of 16 new hydrants necessary to provide sufficient fire protection coverage throughout town.

The fourth priority grouping includes the addition of four distribution system valves in existing piping necessary to isolate segments of piping for repair as necessary, a new blow-off at the east end of Central Avenue for system flushing, and four air vacuum release valves at high points in the existing piping system. Air vacuum release valves are necessary to prevent air binding problems within the system.

The fifth priority grouping consists of tying together the fragmented segments of the town's distribution system and eliminating three of the four regional system's service points and associated master meters. The remaining service point would be Master Meter No. 1. This meter vault will need to be replaced to accommodate the backflow prevention device required by the Regional System. The consultant recommends that Master Meter No. 4 be taken offline by removing the meter, but remain serviceable for emergency use if Master Meter No. 1 fails or needs to be taken out of service for repair.

The following table presents the project cost estimates for these five priorities of recommended improvements. Each has been costed as if it was a freestanding project. Detailed pipeline cost estimates are presented in Appendix A in the back of this report.

TABLE 11
TOWN OF WILLIAMSBURG
PRIORITY ONE IMPROVEMENTS - REPLACE PROBLEM AREAS

Item	Location	Description ¹⁾	Total Cost
a.	Copper Creek Rd. - MM#1 to Churchill	New 10" Piping	\$124,450
Subtotal preliminary cost			\$124,450
Project contingencies @ 15%			18,668
Engineering design/contract administration			15,315
Construction observation based on 45 calendar days (stand alone project)			33,000
Other Engineering ²⁾			56,000
Administrative expenses (Advertising, Legal Counsel, Bond Counsel, Audit) (stand alone)			11,000
Priority One - Total preliminary construction cost estimate			\$258,433

1) Refer to Appendix A in the back of this report for detailed construction cost estimate.

2) Other engineering costs include: Easement/right-of-way evaluations, geotechnical investigation including borings, Environmental Report, reproduction, CDBG funding, Drinking Water Revolving Fund funding, Advance Planning grant, CDPHE approvals, Technical Managerial Financial Capacity Assessment and Permits.

TABLE 12
TOWN OF WILLIAMSBURG
PRIORITY TWO IMPROVEMENTS - UPGRADE LOW PRESSURE AREAS

Item	Location	Description ¹⁾	Total Cost
a.	Scutti Dr. - Central to Oak Creek	New 8" Piping	\$45,300
b.	Oak Creek - Loop to Scutti	New 4" Piping	\$8,720
c.	Needham Pl. - Loop to Scutti	New 6" Piping	\$37,940
d.	Capestrano Dr. - Loop to John	New 6" Piping	\$29,300
e.	Bluff Rd.	New 4" Piping	\$54,280
f.	Iron Horse South - Loop to Robbins	New 6" Piping	\$30,100
g.	Churchill - Loop to North Wilmont Cir.	New 4" Piping	\$24,780
h.	Quincy St. - Churchill to Wilmont Cir east	New 4" Piping	\$62,180
i.	Rockrimmon - Churchill to Wilmont Rd.	New 10" Piping	\$65,660
j.	Wilmont Rd. - Rockrimmon to Smith Gulch	New 8" Piping	\$63,720
k.	Smith Gulch Rd. - Wilmont to Bear Gulch	New 8" Piping	\$71,690
l.	Rockrimmon Rd. - Wilmont to south end	New 8" and 6" Piping	\$113,230
m.	Cedar Ridge Rd. - Loop to Bear Gulch	New 4" Piping	\$24,080
Subtotal preliminary cost			\$630,980
Project contingencies @ 15%			94,647
Engineering design/contract administration			56,600
Construction observation based on 120 calendar days (stand alone project)			88,000
Other Engineering ²⁾			68,000
Administrative expenses (Advertising, Legal Counsel, Bond Counsel, etc.) (stand alone)			13,000
Priority Two - Total preliminary construction cost estimate			\$951,227

1) Refer to Appendix A in the back of this report for detailed construction cost estimates.

2) Other engineering costs include: Easement/right-of-way evaluations, geotechnical investigation including borings, Environmental Report, reproduction, CDBG funding, Drinking Water Revolving Fund funding, Advance Planning grant, CDPHE approvals, Technical Managerial Financial Capacity Assessment and Permits.

TABLE 13
TOWN OF WILLIAMSBURG
PRIORITY THREE IMPROVEMENTS - ADDITIONAL FIRE HYDRANTS/LINE WORK

Item	Location	Description ¹⁾	Total Cost
a.	Cory Ln. - North end	New Hydrant	\$4,000
b.	Central Ave. & Scutti Dr.	New Hydrant and Piping	\$33,831
c.	Central Ave. & Pikeview Ave.	New Hydrant and Piping	\$24,936
d.	Copper Creek Rd. & Santa Fe Ave.	Hydrant included in Priority 1	\$0
e.	North Wilmont Cir & Churchill St.	Hydrant included in Priority 2	\$0
f.	Cobble Ct.	New Hydrant and Piping	\$25,100
g.	Rockrimmon Rd. - North of Boulder Ct.	Hydrant included in Priority 2	\$0
h.	Rockrimmon Rd. - South of Boulder Ct.	Hydrant included in Priority 2	\$0
i.	Cedar Ridge Rd.- South of Smith Gulch	New Hydrant	\$4,000
j.	Bear Gulch Rd. South	New Hydrant and Piping	\$21,800
k.	Bluff Rd. & Main St.	Hydrant included in Priority 2	\$0
l.	Robbins St.	New Hydrant	\$4,000
m.	Ridgway Ct.	New Hydrant	\$4,000
n.	Linda Vista	New Hydrant	\$4,000
o.	Wilmont Rd. - South of Smith Gulch	Hydrant included in Priority 2	\$0
p.	Sage Ct.	New Hydrant and Piping	\$25,160
Subtotal preliminary cost			\$150,827
Project contingencies @ 15%			22,624
Engineering design/contract administration			18,340
Construction observation based on 60 calendar days (stand alone project)			44,000
Other Engineering ²⁾			45,000
Administrative expenses (Advertising, Legal Counsel, Bond Counsel, etc.) (stand alone)			13,000
Priority Three - Total preliminary construction cost estimate			\$293,791

1) Refer to Appendix A in the back of this report for detailed construction cost estimates.

2) Other engineering costs include: Easement/right-of-way evaluations, Environmental Report, reproduction, CDBG funding, Drinking Water Revolving Fund funding, Advance Planning grant, CDPHE approvals, Technical Managerial Financial Capacity Assessment and Permits.

TABLE 14
TOWN OF WILLIAMSBURG
PRIORITY FOUR IMPROVEMENTS - ADDITIONAL LINE VALVES, BLOW-OFFS AND AIR
VACUUM/RELEASE VALVES

Item	Location	Description ¹⁾	Total Cost
a.	Central Ave - east end	New Blowoff	\$2,000
b.	Oak Creek Dr.	New Line Valve and ARV	\$6,400
c.	Capestrano Dr.	New Line Valves	\$3,200
d.	Needham Pl.	New ARV	\$4,800
e.	Quincy St. & Central Ave.	New Line Valve	\$1,600
f.	Rockrimmon Rd.	New ARV	\$4,800
g.	Cobble Ct.	New ARV	\$4,800
Subtotal preliminary cost			\$27,600
Project contingencies @ 15%			4,140
Engineering design/contract administration			6,350
Construction observation based on 30 calendar days (stand alone project)			22,000
Other Engineering ²⁾			45,000
Administrative expenses (Advertising, Legal Counsel, Bond Counsel, etc.) (stand alone)			11,000
Priority Four - Total preliminary construction cost estimate			\$116,090

1) Refer to Appendix A in the back of this report for detailed construction cost estimates.

2) Other engineering costs include: Easement/right-of-way evaluations, geotechnical investigation including borings, Environmental Report, reproduction, CDBG funding, Drinking Water Revolving Fund funding, Advance Planning grant, CDPHE approvals, Technical Managerial Financial Capacity Assessment and Permits

TABLE 15
TOWN OF WILLIAMSBURG
PRIORITY FIVE IMPROVEMENTS - DECOMMISSION MASTER METERS

Item	Location	Description ¹⁾	Total Cost
a.	Remove and replace Master Meter #1 including new vault with double check backflow prevention device		\$32,000
b.	Decommission Master Meter #2	New 8" Pipeline	\$82,860
		Remove meter, vault, and plug piping	\$6,000
c.	Decommission Master Meter #4	New 8" Pipeline	\$44,560
		Remove meter, vault, and plug piping	\$6,000
d.	Decommission Master Meter #3	New 6" Pipeline	\$127,880
		Remove meter, vault, and plug piping	\$6,000
Subtotal preliminary cost			\$305,300
Project contingencies @ 15%			45,795
Engineering design/contract administration			32,057
Construction observation based on 45 calendar days (stand alone project)			32,800
Other Engineering ²⁾			68,000
Administrative expenses (Advertising, Legal Council, Bond Council, etc.) (stand alone)			11,000
Priority Five - Total preliminary construction cost estimate			\$494,952

1) Refer to Appendix A in the back of this report for detailed construction cost estimates.

2) Other engineering costs include: Easement/right-of-way evaluations, geotechnical investigation including borings, Environmental Report, reproduction, CDBG funding, Drinking Water Revolving Fund funding, Advance Planning grant, CDPHE approvals, Technical Managerial Financial Capacity Assessment and Permits.

The following is a summary of the total project costs associated with the improvements recommended herein for the four priorities as freestanding projects.

TABLE 16
TOWN OF WILLIAMSBURG
SUMMARY OF PROJECT COSTS

Description	Total Costs
Priority One - Replace Problem Areas	\$258,433
Priority Two - Upgrade Low Pressure Areas	951,227
Priority Three - Additional Fire Hydrants	293,791
Priority Four - Additional Line Valves, Blowoffs, and Air Release Valves	116,090
Priority Five - Decommission Master Meters	494,952
Grand Total Estimated Project Costs	\$2,114,492

The total cost for all five priorities undertaken as individual free standing projects is estimated to be \$2,114,492. A combined water project consisting of all priorities represents an opportunity to

reduce the overall project cost. Soft cost savings in construction observation, engineering design, construction administration, other engineering, bond counsel, legal counsel, advertising and audit expenses are estimated to total approximately \$388,625. Thus, the estimated combined project cost would be \$1,725,867. The first four priorities of improvements are considered to be essential for a reliable and safe water distribution system. The fifth priority is not necessary to meet these goals, but will provide the town with a whole, freestanding distribution system that is not reliant on the regional system to deliver water through the town. Thus, the recommendation is made that consideration be given to conducting all of the improvements recommended within this report.

Operational and maintenance cost impacts will result with the proposed improvements; however, the overall impact is expected to be positive. Current activities related to distribution system repairs will be reduced with the installation of new and replacement piping, and the resulting more consistent pressures within the entire system.

SECTION IX

FINANCIAL IMPACTS OF THE RECOMMENDED IMPROVEMENTS

The recommended water system improvements contained within this study address the water system needs of the Town of Williamsburg through a comprehensive replacement and rehabilitation program associated with the town's water distribution system. Recommended distribution system improvements have been grouped into five priorities consisting of: replacement of problem pipeline segments; improvements to upgrade low pressure areas; additional fire hydrants; system valves; and tying the distribution system together. The first four priorities of work represent significant deficiencies within the town's distribution system. The fifth priority of work, tying the distribution system together and eliminating three of the four regional system master meters, is highly recommended. The estimated total cost of the five priorities of construction as freestanding projects is \$2,114,492. Due to the duplication of soft costs, if all priorities were combined into a single project, an estimated savings of \$388,625 would be realized, thus reducing the combined project cost to approximately \$1,726,000.

The second scenario is that of a project consisting of only the first four priorities of work and retaining the multiple points of regional system service. These first four priorities of work if conducted as a single project, realizing the individual priority savings in soft costs, represent an estimated project cost of \$1,394,000.

The CDPHE Drinking Water Construction Grants program historically provided grant funds for projects listed on the Division's priority list for water providers serving populations of less than 5,000 people. Financial need is determined by the Department of Local Affairs (DOLA) criteria. The Town of Williamsburg's water system related needs are included on this eligibility list. Due to the state's revenue shortfalls over the past few years, funding for the CDPHE Drinking Water Construction Grants program has been denied or rescinded by the state legislature. With the passage of Referendum C in November 2005, this program received \$1,500,000 in August of 2006 for use statewide. The program has not been funded by the State Legislature since then. Funding will not occur within the State's 2012 nor the 2013 fiscal years.

USDA Rural Development has been a program that was utilized frequently in the past; however, at this point given their 40-year amortization schedule and corresponding interest rates, limited grant availability, coupled with extensive frontend expenditures, this funding sources has fallen

out of favor. As this is considered to be the funding source of last resort, the town would be much better served pursuing other state related programs.

Several other funding programs exist which have proven recently to be much more attractive to communities within the implementation of their infrastructure improvement projects. The following details the other programs.

The State of Colorado in their administration of the Community Development Block Grant (CDBG) program and the Energy and Mineral Impact Assistance (EMIA) program utilize different funding guidelines than those of Rural Development. The state does not utilize average water rates as a firm guideline around which additional debt burden has to be incurred as does Rural Development. The following highlights the general criteria of the state programs.

The CDBG's Public Facilities program, based on federal guidelines, requires that more than 51% of the community fall within the low to moderate income category to be eligible for this funding source. CDBG still uses the 2000 census income data to establish eligibility for this criteria. Data for the Town of Williamsburg shows that 56.3% of the population base falls within the low to moderate income category. Based upon the low to moderate income percentage within the community, the town would qualify for CDBG assistance. Administrative costs for this source of funding are higher as there are significant regulatory requirements that must be addressed. CDBG administrative costs have been included in the project cost estimates presented in this report. A typical CDBG assistance contract under the small cities program on a project of this nature historically fell in the range of \$100,000 to \$300,000. The upper limit has been increased to \$600,000. DOLA in their administration of this funding source over the last few years has established a December 1st application deadline. Thus, this source of funding represents a viable approach for the town. CDBG assistance does, however, carry Davis-Bacon wage requirements. These requirements mandate minimum predetermined wages for various job classifications. The impact of Davis-Bacon wages has been integrated into the cost estimates prepared for the recommended improvements.

Another DOLA administered program that has been used in the past by the town is DOLA's Energy and Mineral Impact Assistance (EMIA) program. This program has loan funds available at an interest rate of 5% with a 20-year amortization schedule. Grant funds are also available. Competition for this funding is statewide. Applications run on a cyclical basis. Maximum grant

amounts on this form of assistance have been significantly increased beyond the prior \$500,000 cap. DOLA has now structured their program such that three tiers of funding levels exist. Tier II consists of a funding bracket extending from \$200,000 to \$2,000,000 in requested assistance. This would be the tier that could potentially be sought by the town. A local match is desired at a minimum of 25%, preferably 50% of the project's costs unless extenuating circumstances exist. Administration requirements associated with this funding source are minimal. Given the magnitude of funds that would be requested, the application would normally be considered within DOLA's scheduled committee cycle. The recent practice of transferring available funding within the EMIA program to the State's general fund to cover shortfalls has been discontinued. The EMIA program is now receiving applications on December 1st, April 1st and August 1st. This is a viable program for the community to pursue.

Another potential funding source is the use of the Colorado Water Resources and Power Development Authority's (CWR&PDA) Drinking Water Revolving Fund (DWRP) as a key component of the funding package, specifically the Disadvantaged Communities Program (DCP). This was a 3-year pilot program had funds available starting in January 2005. Its success has resulted in its extension. The program historically provided loan funds only, but in the recent past, loan forgiveness (grant) funds have also been available through this program. The next funding cycle has a June 15th submission deadline for the application. Within that funding cycle, loan forgiveness will be considered. The forthcoming June 15th cycle has limited loan forgiveness funds available statewide. Given the nature of the improvements proposed for Williamsburg, the work will fall in a Category Five classification. Given both the limited availability of loan forgiveness funds coupled with the town's water improvement classification, no loan forgiveness proceeds will be available. This eliminates the needs to be forced into the June 15th cycle in which a significant number of applications will occur. Applications are accepted on a cyclical basis with the forthcoming submission deadline in August.

Two eligibility categories have been established for this program. Category One is for communities with a population of less than 5,000 with a median household income between 80% and 61% of the Colorado statewide median household income (includes metropolitan areas). The Colorado Department of Local Affairs staff have changed their methodology on the determination of median household income. Staff is now taking data secured through the American Community Survey (ACS) organization for communities within Colorado. The most recent data, 2011, shows the state median household income level at \$57,685. Thus, Category

One represents income levels between \$46,148 and \$35,188. Eligible entities in this category can obtain 30-year loans for water projects of up to \$2,000,000 at 50% of the direct loan rate which is currently at 2.0%. Thus, 50% of the direct loan rate is 1.0%. Category Two is for similar size communities with a median household income at or less than \$35,188 and offers a 0% loan rate.

American Community Survey data for the Town of Williamsburg documents a year 2011 median household income of \$41,250 with a margin of error of \pm \$9,012, or 21.85%. Thus, the town would qualify for the Category One interest rate loan funds of 1.0%. With the income data margin of error being greater than 20%, the town would be encouraged to conduct an income survey to determine if Williamsburg could qualify for the Category Two, 0% loan funds.

One of the current criteria established within the loan covenants for this funding source is that the town's water rate structure be established such that a minimum of 10% of excess revenues exist over and above the actual loan payment amount. The unique administrative related costs with this funding source including bond counsel, local legal counsel, an Environmental Report and a Technical, Managerial and Financial (TMF) Capacity Assessment have been included within the project cost estimates. This program historically did not require Davis-Bacon wages. Given the federal government's administrative changes that occurred in 2008, this program now requires Davis-Bacon wages. The impact of Davis-Bacon wages has been integrated into the cost estimates prepared for the project.

The following table has been developed to depict potential funding scenarios for the implementation of two project scenarios. The scenarios shown are based on a DWRF direct loan administered by the CWR&PDA at the current loan rate of 1% coupled with an estimated EMIA grant. DOLA historically has not provided CDBG and EMIA funding on the same project. The following table provides potential costs for two different project scenarios.

TABLE 17
TOWN OF WILLIAMSBURG
RECOMMENDED WATER SYSTEM IMPROVEMENTS
POTENTIAL PROJECT FINANCING SCENARIOS

Component	Scenario One (Priorities 1 - 4)	Scenario Two (Priorities 1 - 5)
Project Cost	\$1,394,000	\$1,726,000
CWR&PDA Loan ¹⁾	\$604,000	\$826,000
Local Town Cash Contribution	\$100,000	\$100,000
EMIA Grant ²⁾	\$690,000 ⁷⁾	\$800,000 ⁷⁾
Current Average Expense ³⁾ (EDU/mo)	\$60.82	\$60.82
New Debt Service ⁴⁾ (EDU/mo)	\$7.41	\$10.14
Reserve Requirement ⁵⁾ (EDU/mo)	\$0.74	\$1.01
Average Monthly Water Bill ⁶⁾ (EDU/mo)	\$68.96	\$71.97

- 1) The DWRF DCP loan amount.
- 2) Estimate of potential grant through the DOLA-EMIA program.
- 3) Current expense based on 2013 budgeted expenses of \$191,944 divided by 12 months and 263 billable EDUs.
- 4) A DWRF loan with a 30-year amortization period and a 1% loan rate with an annual payment of \$23,404 for Scenario No. 1 and \$32,006 for Scenario No. 2.
- 5) New debt service's mandatory reserve requirement based on 10% of new loan amount.
- 6) Sum of the three monthly EDU amounts representing the average water bill.
- 7) An CDBG grant could be pursued which would lower the grant funding from that shown.

The project funding projected in the above table is based on a 1%, 30-year loan by CWR&PDA for each scenario combined with \$100,000 of local cash match and an Energy and Mineral Impact Assistance grant. The local cash match component of the potential funding package is shown at \$100,000 from the Water System Development Fund and the Water System Enterprise Fund.

Based on the 2013 budgeted expenses in the water utility, water rates would need to be increased. The average monthly water bill per EDU is \$57.67 per month based on 2013 budgeted sales revenues of \$182,000. This average monthly water bill compares with the average 2010 statewide monthly household water bill of \$47.33 as reported by the Colorado Department of Local Affairs. Thus, under the above scenarios water rate increases of approximately \$11.29 (Scenario No. One with Priorities 1-4) to \$14.30 (Scenario No. Two with Priorities 1-5) per EDU per month would be required to support the new debt burden and associated reserve. Of note is that the projected rate increases shown above includes \$3.15 in the form of an increase to bring the average monthly income per user per month up to the

budgeted expenses per user per month. Thus, with respect to Scenario No. 1, the actual rate increase required as a result of implementing the project is \$8.15, whereas the corresponding rate increase necessary to implement Scenario No. 2 is \$11.15. The resulting average monthly household water bill would remain above the 2010 statewide average for both scenarios.

The above funding figures are projections only. The actual loan amount will depend upon the outcome of the discussions held with the funding agency, the funding level at which this agency is willing to participate in the project, and the amount of loan the town desires to pursue. Through the use of available funding sources, the project can be made a reality.

SECTION X
PLAN OF ACTION

A plan of action and schedule has been developed for the water improvements recommended herein. The following table has been developed based upon the normal progression of a project of this nature. The table is based on utilizing CWR&PDA loan funds combined with DOLA-EMIA grant funds and a local cash match.

TABLE 18
PLAN OF ACTION AND IMPLEMENTATION SCHEDULE

Scheduled Event	Date
Submit Preliminary Engineering Report to Town	May 2013
Submit PER to CDPHE	July 2013
Respond to CDPHE PER comments	August 2013
Submit CWR&PDA funding application	August 2013
Submit DOLA-EMIA grant application	August 2013
Obtain CWR&PDA funding commitment	October 2013
Obtain DOLA-EMIA funding commitment	November 2013
Authorize design preparation	December 2013
Submit plans and specifications to CDPHE for review	March 2014
Obtain CDPHE approval	May 2014
Advertise project for bid	May 2014
Bid opening	June 2014
Project award	June 2014
Initiate construction	July 2014
Completion of construction	November 2014

The above schedule realistically represents the required timeline for implementation of the recommended improvements. Significant activity must occur prior to the initiation of design and construction. This activity focuses on securing the necessary funds together with completing, submitting to, and obtaining approvals from the CDPHE on various submittals including the PER, environmental report, and plans and specifications. Time has been allotted in the schedule for CDPHE's review time for the submittals.

This plan of action and schedule is a dynamic activity that will require modifications and refinements as the project evolves. A delay in one activity will result in subsequent delays in following activities. Securing adequate funding in a timely manner will be crucial not only to maintaining the schedule, but ultimately in implementing the needed improvements.

APPENDIX A - CONSTRUCTION COST ESTIMATES

Town of Williamsburg
Proposed Distribution System Improvements

Estimated 2013 Unit Construction Costs

Description	Unit Cost
10" Piping Concrete Encased Creek Crossing	\$150 / LF
10" Piping Replacement	\$51.00 / LF
8" Piping Replacement	\$43.00 / LF
6" Piping Replacement	\$38.00 / LF
4" Piping Replacement	\$34.00 / LF
6" Piping New	\$38.00 / LF
4" Piping New	\$34.00 / LF
4" Gate Valve on Existing Pipe	\$1,600 / EA
10" Gate Valve New	\$2,600 / EA
8" Gate Valve New	\$1,900 / EA
6" Gate Valve New	\$1,400 / EA
4" Gate Valve New	\$1,300 / EA
3" Gate Valve New	\$1,200 / EA
2" Gate Valve New	\$1,000 / EA
Pavement Replacement	\$40.00 / SY
Service Reconnect	\$400 / EA
Connect to Existing Piping	\$1,300 / EA
Hydrant, Lateral and Valve on Existing Pipe	\$4,000 / EA
Hydrant, Lateral and Valve New	\$3,500 / EA
Blow-off	\$2,000 / EA
Air Vacuum Release Valve and Vault	\$4,800 / EA
New 2" Park Service w/ Existing Meter	\$2,200 / EA

These unit costs for recommended distribution system improvements are used in the construction cost estimate tables presented in the Town's Preliminary Engineering Report For Water System Improvements.

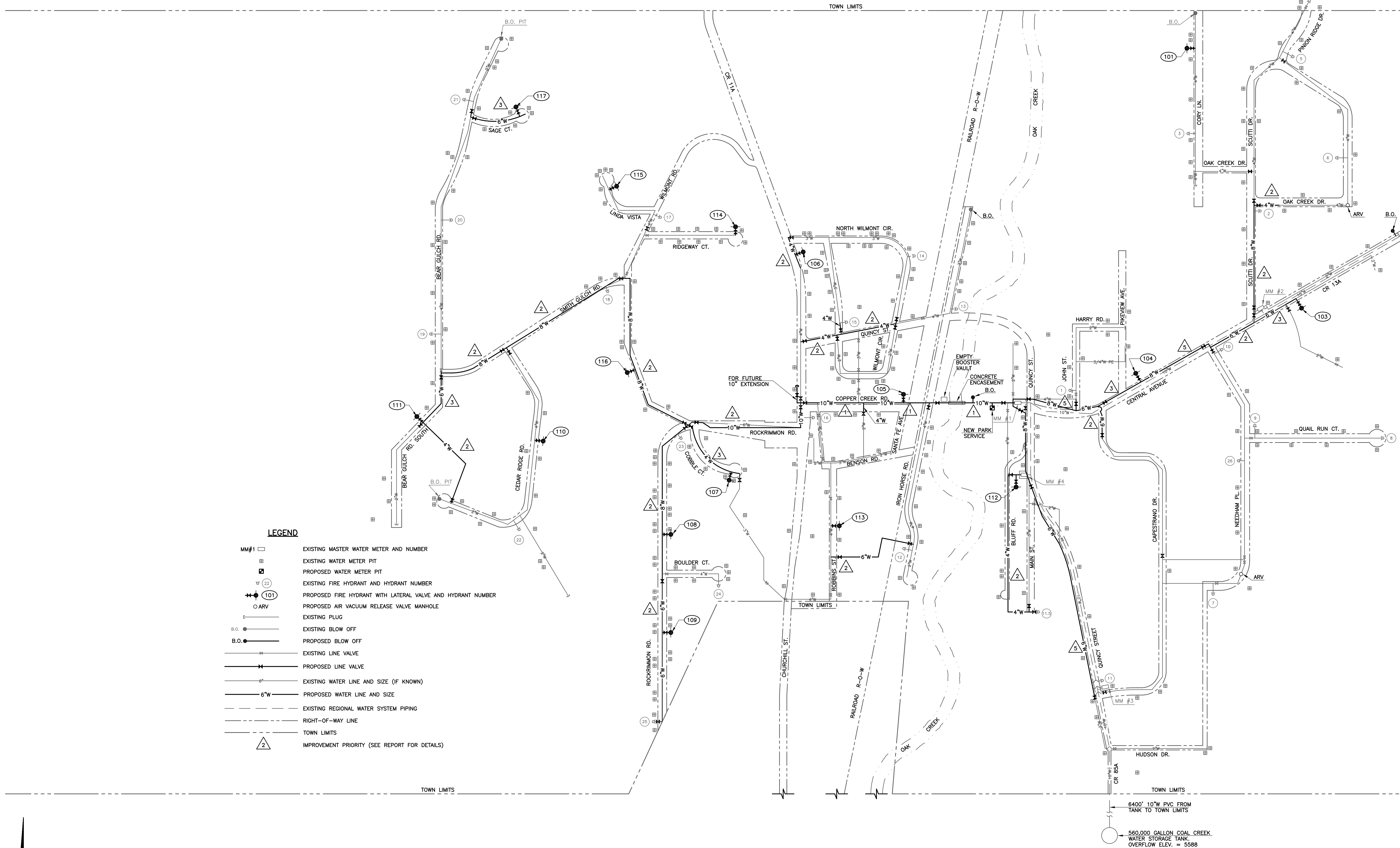
LF - Lineal Foot
EA - Each
SY - Square Yard

Town of Williamsburg
DISTRIBUTION SYSTEM IMPROVEMENTS - 2013 CONSTRUCTION COST ESTIMATE

Location	10" Piping Creek Crossing, LF	10" Piping Replace Existing, LF	8" Piping Replace Existing, LF	6" Piping Replace Existing, LF	4" Piping Replace Existing, LF	6" Piping New, LF	4" Piping New, LF	4" Valve on Existing Pipe, EA	10" Valve New, EA	8" Valve New, EA	6" Valve New, EA	4" Valve New, EA	3" Valve New, EA	2" Valve New, EA	Pavement Replacement (8' wide), SY	Service Reconnect, EA	Connect to Existing Piping, EA	Hydrant on Existing Pipe, EA	Hydrant New, EA	Blowoff, EA	Air Release Valve and Vault, EA	New 2" Park Service w/ Existing Meter, EA	Total Cost
Unit Cost	\$150	\$51.00	\$43.00	\$38.00	\$34.00	\$38.00	\$34.00	\$1,600	\$2,600	\$1,900	\$1,400	\$1,300	\$1,200	\$1,000	\$40.00	\$400	\$1,300	\$4,000	\$3,500	\$2,000	\$4,800	\$2,200	
Priority 1 - Replace Problem Areas																							
Copper Creek Rd. - MM#1 to Churchill	100	1450					30		4			3			22	3	8		1	1		1	\$124,450
Total	100	1450					30		4			3			22	3	8		1	1		1	\$124,450
Priority 2 - Upgrades for Low Pressure Areas																							
Scutti Dr. - Central to Oak Creek			800						1		2					3	4						\$45,300
Oak Creek - Loop to Scutti							180				1						1						\$8,720
Needham Pl. - Loop to Scutti						460				2					409		1						\$37,940
Capestrano Dr. - Loop to John						470				2					151		2						\$29,300
Bluff Rd.					1220						2	2	1			4	3		1				\$54,280
Iron Horse South - Loop to Robbins						650					2						2						\$30,100
Churchill - Loop to North Wilmont Cir.							250					1			222		2		1				\$24,780
Quincy St. - Churchill to Wilmont Cir east					100		650					2	1	2	577		6						\$62,180
Rockrimmon - Churchill to Wilmont Rd.		980							2						187	1	2						\$65,660
Wilmont Rd. - Rockrimmon to Smith Gulch			1240							1						6	2		1				\$63,720
Smith Gulch Rd. - Wilmont to Bear Gulch			1430							2		1				3	3						\$71,690
Rockrimmon Rd. - Wilmont to south end			1130	1030						1	2					28	2		2				\$113,230
Cedar Ridge Rd. - Loop to Bear Gulch							670					1											\$24,080
Total		980	4600	1030	1320	1580	1750		2	5	8	10	2	2	1546	45	30		5				\$630,980
Priority 3 - Additional Fire Hydrants																							
101 Cory Ln. - North end																		1					\$4,000
102 Cory Ln. - South end																		1					\$4,000
103 Central Ave. & Scutti Dr.				340										1	378		1		1				\$33,831
104 Central Ave. & Pikeview Ave.				260											289				1				\$24,936
105 Copper Creek Rd. & Santa Fe Ave.	Included in Priority 1																						
106 North Wilmont Cir & Churchill St.	Included in Priority 2																						
107 Cobble Ct.					450							2				6	1		1				\$25,100
108 Rockrimmon Rd. - North of Boulder Ct.	Included in Priority 2																						
109 Rockrimmon Rd. - South of Boulder Ct.	Included in Priority 2																						
110 Cedar Ridge Rd.- South of Smith Gulch																		1					\$4,000
111 Bear Gulch Rd. South				400										1		2	1		1				\$21,800
112 Bluff Rd. & Main St.	Included in Priority 2																						
113 Robbins St.																		1					\$4,000
114 Ridgway Ct.																		1					\$4,000
115 Linda Vista																		1					\$4,000
116 Wilmont Rd. - South of Smith Gulch	Included in Priority 2																						
117 Sage Ct.				420						1				1		5	1		1				\$25,160
Total				1420	450					1	2			3	667	13	4	6	5				\$154,827
Priority 4 - Line Valves, Blowoffs, and Air Release Valves																							
Central Ave - east end																			1				\$2,000
Oak Creek Dr.								1													1		\$6,400
Capestrano Dr.								2															\$3,200
Needham Pl.																					1		\$4,800
Quincy St. & Central Ave.								1															\$1,600
Rockrimmon Rd.																					1		\$4,800
Cobble Ct.																					1		\$4,800
Total								4												1	4		\$27,600
Priority 5 - Decommission Master Meters																							
Master Meter #2			1800	-260		-690				4	-2				844	1	2						\$82,860
Master Meter #4			500							1					444	2	2						\$44,560
Master Meter #3						1600					1			2	1422	4	4						\$127,880
Total			2300	-260		910				5	-1			2	2710	7	8						\$255,300
Grand Total	100	2430	4600	2450	1770	1580	1780	4	6	5	9	15	2	5	2235	61	42	6	11	2	4	1	\$1,193,157

Town of Williamsburg
DISTRIBUTION SYSTEM IMPROVEMENTS - 2013 CONSTRUCTION COST ESTIMATE

Location	10" Piping Creek Crossing, LF	10" Piping Replace Existing, LF	8" Piping Replace Existing, LF	6" Piping Replace Existing, LF	4" Piping Replace Existing, LF	6" Piping New, LF	4" Piping New, LF	4" Valve on Existing Pipe, EA	10" Valve New, EA	8" Valve New, EA	6" Valve New, EA	4" Valve New, EA	3" Valve New, EA	2" Valve New, EA	Pavement Replacement (8' wide), SY	Service Reconnect, EA	Connect to Existing Piping, EA	Hydrant on Existing Pipe, EA	Hydrant New, EA	Blowoff, EA	Air Release Valve and Vault, EA	New 2" Park Service w/ Existing Meter, EA	Total Cost
Unit Cost	\$150	\$51.00	\$43.00	\$38.00	\$34.00	\$38.00	\$34.00	\$1,600	\$2,600	\$1,900	\$1,400	\$1,300	\$1,200	\$1,000	\$40.00	\$400	\$1,300	\$4,000	\$3,500	\$2,000	\$4,800	\$2,200	
Priority 1 - Replace Problem Areas																							
Copper Creek Rd. - MM#1 to Churchill	100	1450					30		4			3			22	3	8		1	1		1	\$124,450
Total	100	1450					30		4			3			22	3	8		1	1		1	\$124,450
Priority 2 - Upgrades for Low Pressure Areas																							
Scutti Dr. - Central to Oak Creek			800						1		2					3	4						\$45,300
Oak Creek - Loop to Scutti							180				1						1						\$8,720
Needham Pl. - Loop to Scutti						460				2					409		1						\$37,940
Capestrano Dr. - Loop to John Bluff Rd.						470				2					151		2						\$29,300
Iron Horse South - Loop to Robbins					1220						2	1				4	3		1				\$54,280
Churchill - Loop to North Wilmont Cir.						650				2							2						\$30,100
Quincy St. - Churchill to Wilmont Cir east							250				1				222		2		1				\$24,780
Rockrimmon - Churchill to Wilmont Rd.		980			100		650		2			2	1	2	577		6						\$62,180
Wilmont Rd. - Rockrimmon to Smith Gulch			1240							1						6	2		1				\$65,660
Smith Gulch Rd. - Wilmont to Bear Gulch			1430							2		1				3	3						\$63,720
Rockrimmon Rd. - Wilmont to south end			1130	1030						1	2					28	2		2				\$71,690
Cedar Ridge Rd. - Loop to Bear Gulch							670					1											\$113,230
Total		980	4600	1030	1320	1580	1750		2	5	8	10	2	2	1546	45	30		5				\$24,080
																							\$630,980
Priority 3 - Additional Fire Hydrants																							
101 Cory Ln. - North end																		1					\$4,000
102 Cory Ln. - South end																		1					\$4,000
103 Central Ave. & Scutti Dr.				340										1	378		1		1				\$33,831
104 Central Ave. & Pikeview Ave.				260											289				1				\$24,936
105 Copper Creek Rd. & Santa Fe Ave.	Included in Priority 1																						
106 North Wilmont Cir & Churchill St.	Included in Priority 2																						
107 Cobble Ct.					450							2				6	1		1				\$25,100
108 Rockrimmon Rd. - North of Boulder Ct.	Included in Priority 2																						
109 Rockrimmon Rd. - South of Boulder Ct.	Included in Priority 2																						
110 Cedar Ridge Rd.- South of Smith Gulch																		1					\$4,000
111 Bear Gulch Rd. South				400										1		2	1		1				\$21,800
112 Bluff Rd. & Main St.	Included in Priority 2																						
113 Robbins St.																		1					\$4,000
114 Ridgway Ct.																		1					\$4,000
115 Linda Vista																		1					\$4,000
116 Wilmont Rd. - South of Smith Gulch	Included in Priority 2																						
117 Sage Ct.				420						1				1		5	1		1				\$25,160
Total				1420	450					1	2			3	667	13	4	6	5				\$154,827
Priority 4 - Line Valves, Blowoffs, and Air Release Valves																							
Central Ave - east end																				1			\$2,000
Oak Creek Dr.								1													1		\$6,400
Capestrano Dr.								2															\$3,200
Needham Pl.																					1		\$4,800
Quincy St. & Central Ave.								1															\$1,600
Rockrimmon Rd.																					1		\$4,800
Cobble Ct.																					1		\$4,800
Total								4												1	4		\$27,600
Priority 5 - Decommission Master Meters																							
Master Meter #2			1800	-260		-690			4	-2					844	1	2						\$82,860
Master Meter #4			500						1						444	2	2						\$44,560
Master Meter #3						1600				1				2	1422	4	4						\$127,880
Total			2300	-260		910			5	-1				2	2710	7	8						\$255,300
Grand Total	100	2430	4600	2450	1770	1580	1780	4	6	5	9	15	2	5	2235	61	42	6	11	2	4	1	\$1,193,157



1. BASEMAPPING HAS BEEN COMPILED FROM NOVEMBER 1999 MAP BY GREAT DIVIDE ENGINEERING & SURVEYING, CANON CITY, CO. WATER FACILITY LOCATIONS AND PIPE SIZES FROM TOWN PROVIDED HAND DRAWINGS AND FIELD RECONNAISSANCE.
2. WATER FACILITIES ARE SHOWN IN APPROXIMATE LOCATIONS ONLY AND MAY NOT REFLECT ACTUAL CONDITIONS.
3. PLATTED RIGHTS-OF-WAY WITHOUT IMPROVED ROADS NOT SHOWN.

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