City of Santa Fe Wastewater Management Division
Sanitary Sewer Collection System Master Plan

Our Vision

To be recognized as excellent public employees working on innovative assignments at Santa Fe's exceptional Wastewater Plant.

2016

City of Santa Fe Public Utilities

Wastewater Management Division

City of Santa Fe

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EXECUTIVE SUMMARY

The City of Santa Fe's sanitary sewer collection system currently is considered to have adequate capacity to handle future flows for the next twenty years and system improvements will be condition driven and not capacity driven. Although the full build out scenario was evaluated, it is not recommended to upsize capacity based on the full build out analysis for the following reasons:

1. Assumptions for full build out conditions are very difficult to predict since zoning/land use changes over time. The zoning/land use assumption used for full build out conditions are very conservative resulting in high full build out flows.

2. Paradigm Shifts - These shifts can radically change the needs/improvements of the system. A good example of a shift is the water conservation efforts. This has resulted in reduced flows to the collection system. The current flows are similar to flows experienced in 1990. It is anticipated that the City's efforts in water conservation will continue and the 80 gallons per day per capita wastewater discharge will remain the same or be further reduced in the future.

The Wastewater Division completed a condition assessment of the public sanitary sewer collection system by examining:

1. The trunk line sewer network which is comprised of sewer lines twelve (12) inches and larger in diameter.

2. All sewer lines ten (10) inches or less in diameter.

3. Sewer lines located within High Impact areas where a sewer line collapse would have major financial and public impacts.

The Wastewater Division identified concrete pipe as posing a substantial condition risk within the City of Santa Fe's sanitary sewer collection system for the upcoming twenty (20) year time span. Although there will be other pipe material such as clay pipe which will need to be rehabilitated or replaced, the majority of the sewer system which will require improvement will be that constructed using concrete pipe.

Over the past five (5) years, the Wastewater Division has rehabilitated approximately 46,000 feet of pipe within the concrete trunk sewer system that was in the worst condition. There still remains approximately 57,000 feet of concrete trunk sewer pipe and approximately 300,000 feet of concrete sewer pipe ten (10) inches and less in size that requires rehabilitation starting now and continuing over the next twenty (20) years.

The Wastewater Division has outlined a CIP Sanitary Sewer Rehabilitation and Replacement Program that calls for a two (2) million dollar CIP Project every two (2) years over the next twenty (20) years for the rehabilitation/replacement of sewer pipe as its service life expires.

2015 SANIATRY SEWER SYSTEM COLLECTION SYSTEM MASTER PLAN STUDY: PURPOSE

The primary purpose of this study was to evaluate and identify any capacity and conditional deficiencies within the existing sanitary sewer collection system serving the City of Santa Fe sewer service area based upon current and future population projections and their associated wastewater flows. This study also presents;

- Analysis of the City's trunk sewer system based upon size, age, material type and existing condition;
- Analysis of High Impact Areas (High Risk) where a sewer collapse or failure with the associated high remediation costs could have a major impact upon transportation, businesses and the public welfare and safety;
- Condition analysis of all concrete sewer lines;
- Based upon the above listed items, prepare a program for sewer line rehabilitation projects.

EXISTING SEWER COLLECTION SYSTEM: GEOGRAPHIC COMPONENTS

WASTEWATER UTILTIY SERVICE AREA

The City of Santa Fe wastewater collection system currently consists of approximately 359 miles of public sewer pipes that convey wastewater to the City's wastewater treatment plant at 73 Paseo Real located just north of the City's airport. The City's wastewater collection system currently provides service to three (3) jurisdictional regions;

- Presumptive City Limits
- Agua Fria Traditional Historic Community (AFTHC)
- Areas outside the Presumptive City Limits located within Santa Fe County.

In 2008, the governing bodies of the City of Santa Fe and Santa Fe County entered in to the Settlement Agreement of 2008. An outcome of this agreement was that the City of Santa Fe was to provide water and sewer service to those areas within the Presumptive City limits and Santa Fe County was to provide water and sewer service to those areas outside of the Presumptive City Limits.

PRESUMPTIVE CITY LIMITS SEWER SERVICE AREA

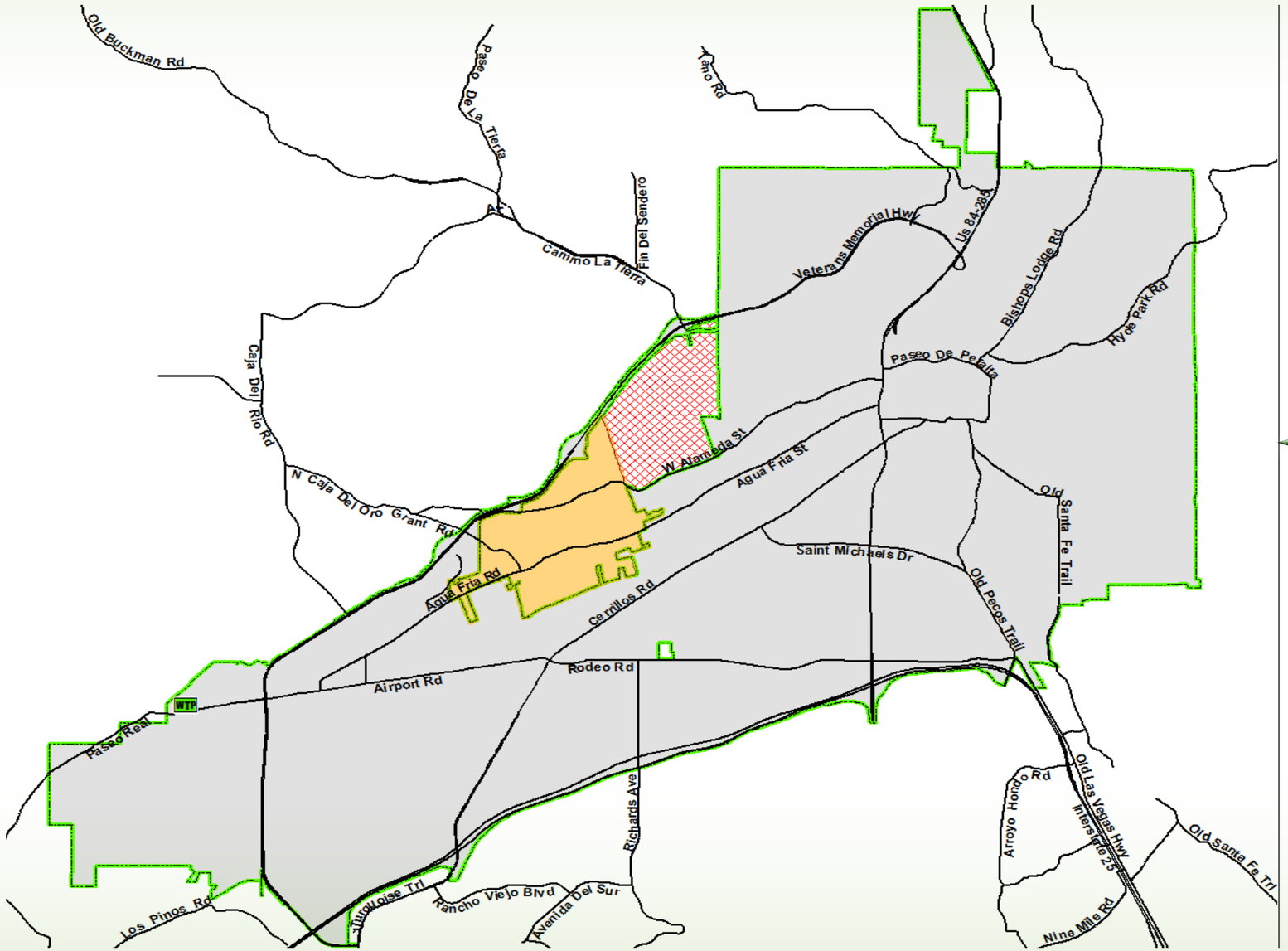
The Presumptive City Limits was created after the Settlement Agreement of 2008. It is an area defined to include those properties currently within the City limits and to include those properties that are currently within Santa Fe County but are scheduled to be annexed into the City limits. On January 1, 2014, Phase 3 of the annexation agreement went into effect adding 13, 200 new residents and 4,100 acres into the City of Santa Fe bringing the City's population to 83,200 as of residents as January 1, 2016 and the total City annexed area to 33,591 acres. There is still one remaining area north of West Alameda (1,066 acres) that has not yet been annexed into the City limits but for purposes of obtaining City water and sewer service this area is to be treated the same as those properties already annexed into the City ***(SEE CITY SERVICE AREA MAP - PAGE 5)***

The Presumptive City Limits defines the boundary for the City of Santa Fe sanitary sewer service area as defined under the terms of the 2008 Settlement Agreement.

AGUA FRIA TRADITIONAL HISTORIC COMMUNITY SERVICE AREA

Agua Fria Village is a "Traditional Historic Community" (THC) within Santa Fe County as designated by the Santa Fe Board of County Commissioners in 1995 and subsequent Santa Fe County Ordinance #1996-16. In the Settlement Agreement of 2008, Santa Fe County is to be responsible for providing water and sewer service to the Agua Fria Traditional Historic Community (AFTHC). The AFTHC population was a little over 2800 people and 1134 housing units (2010 census) and consists of 1,511 acres. The geographic boundary for the AFTHC is contained completely within the Presumptive City Limits. ***(SEE CITY SERVICE AREA MAP - PAGE 5)*** AFTHC does not have its own wastewater treatment or collection system and has historically relied upon the extension of the City's sewer collection system into the AFTHC for treatment by the City's wastewater treatment plant. Because of its central location within the Presumptive City Limits, it is anticipated that all wastewater flows generated by current and future developments in the AFTHC will continue to flow to the City's wastewater treatment plant. The ownership and maintenance responsibilities for the sewer collection system serving the AFTHC are to be taken over by Santa Fe County as per the Settlement Agreement of 2008.

EXISTING SEWER COLLECTION SYSTEM: GEOGRAPHIC COMPONENTS



City of Santa Fe Sewer Service Area

Legend

- Agua Fria Traditional Historic Community
- City Limits
- Presumptive City Limits

City of Santa Fe Public Utilities

Wastewater Management Division

Total City of Santa Fe 33591 Acres
Total Village of Agua Fria 1511 Acres
Presumptive City limits 1066 Acres

0 0.75 1.5 3 Miles

1:68,640

Date: 04/01/2016

EXISTING SEWER COLLECTION SYSTEM: GEOGRAPHIC COMPONENTS

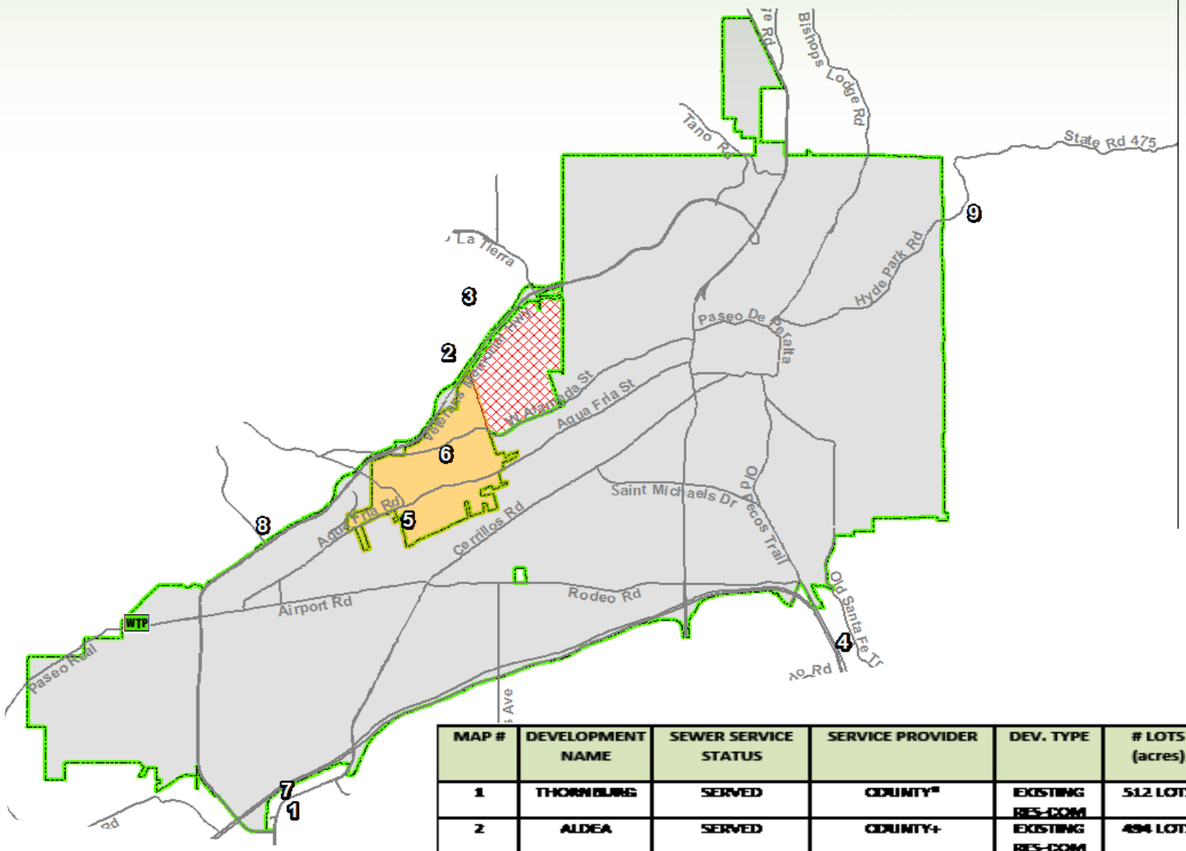
PROPERTIES OUTSIDE THE PRESUMPTIVE CITY LIMITS SERVICE AREA

At the time the 2008 Settlement Agreement took effect, there were existing developments outside of the Presumptive City Limits that were receiving City wastewater collection and treatment service through written agreements approved by City Council. These existing developments are Aldea, Summit South, Thornburg/TTMA and Tessera ***(SEE DEVELOPMENTS OUTSIDE CITY MAP - THIS PAGE).*** These developments are to be transferred and become customers of Santa Fe County for sewer service when the County is able to provide service.

For new properties located outside the Presumptive City Limits that request City sewer service, a separate written agreement between the City of Santa Fe and Santa Fe County is required. The City of Santa Fe established a process through Santa Fe City Code Chapter 22-6.2 whereby connections to the City's sewer collection and treatment system for properties located outside of the Presumptive City Limits can be established under specific conditions, including review by a water/wastewater review team (WWRT) made up of "City and County staff "and submitted for approval by both the governing bodies of the City and County. Developments that have been approved through this process to date are ***(SEE DEVELOPMENTS OUTSIDE CITY MAP - THIS PAGE);***

- Harry's Road House
- Santa Fe Brewery
- Stacy Property in Agua Fria Village
- Senior Campus @ Caja Del Rio
- Thornburg/TTMA

At the time of this study, all the wastewater generated by these properties is treated at the City's wastewater treatment plant.



MAP #	DEVELOPMENT NAME	SEWER SERVICE STATUS	SERVICE PROVIDER	DEV. TYPE	# LOTS (acres)
1	THORNBURG	SERVED	COUNTY*	EXISTING RES-COM	512 LOTS
2	ALDEA	SERVED	COUNTY+	EXISTING RES-COM	494 LOTS
3	TESSERA	SERVED	COUNTY*	EXISTING RES	88 LOTS
4	HARRY'S ROAD HOUSE	SERVED	COUNTY*	RES-COM	14 LOTS (76 AC)
5	VISTA AURORA	SERVED	COUNTY*	RES	26 LOTS
6	AGUA FRIA VILLAGE	SERVED	COUNTY+	RES-COM	(1,511 AC)
7	SANTA FE BREWERY	SERVED	COUNTY*	EXISTING COM	1 LOT
8	SENIOR CAMPUS @ CAJA DEL RIO	APPROVED FOR SERVICE-NOT CONNECTED	COUNTY*	PROPOSED COM	5 LOTS (28 AC)
9	SUMMIT	SERVED	PRIVATE SEWER SYSTEM-DISCHARGES TO CITY SEWER	EXISTING RES	55 LOTS +/-

* Wholesale Customer to City
\+ County Customer but City Currently Maintains Collection System

Developments Outside of City Sewer Service Area

Legend

- Agua Fria Traditional Historic Community
- City Limits
- Presumptive City Limits

City of Santa Fe Public Utilities
Wastewater Management Division

0 1 2 4 Miles

1:92,754

Date: 03/31/2016

EXISTING SEWER COLLECTION SYSTEM: GEOGRAPHIC COMPONENTS

GRAVITY SEWER AND NATURAL DRAINAGE BASINS: CITY OF SANTA FE AND SANTA FE COUNTY

The City of Santa Fe is fortunate to have developed and grown within a natural drainage basin that generally runs in a downhill direction from the northeast to the southwest to the present day location of a single wastewater treatment facility. ***(SEE CITY LIMITS AND DRAINAGE BASIN MAP - PAGE 8)*** This natural drainage feature has allowed for the predominant use of gravity sewer systems to serve properties located within the City's Presumptive City Limits.

Outside of the City's Presumptive City Limits and sewer service area there are two (2) natural drainage basins located within Santa Fe County**.** ***(SEE SF COUNTY DRAINAGE MAP - PAGE 9)*** The boundaries of these two (2) basins located within Santa Fe County basically correspond to the location of Highway 599 to the north and I-25 to the south. Typically, the majority of properties located beyond the Presumptive City Limits north of 599 or south of I-25 require sewer lift stations or pumps to send their wastewater to the City's wastewater treatment facility. The property within these two (2) Santa Fe County drainage basins are defined under the Settlement Agreement of 2008 as areas where Santa Fe County is responsible for providing water and sewer service. These two (2) natural drainage basins contain the Santa Fe County SDA-1 and SDA-2 Sustainable Development Areas. SDA-1 identifies the primary area in which population growth is anticipated to occur in the next ten years, while SDA-2 defines areas subject to infill within existing communities over the next ten years and new development over the next twenty years. If properly planned for, these sewer service basins located within Santa Fe County have the opportunity to be served predominantly by a gravity sewer system similar to the sewer collection system for the City of Santa Fe. This would allow for a gravity sewer collection system that could drain to and be served by a separate wastewater treatment facility or centralized sewer lift station(s) within each basin. The lesser alternative is to have a sewer collection system served by multiple independent sewer lift stations serving multiple developments similar to the 26 sewer lift stations currently serving the City of Rio Rancho, New Mexico. Key disadvantages of sewer lift stations include the high costs to construct and maintain and the potential for odor and noise. Sewer lift stations also require a significant amount of power and are sometimes expensive to upgrade and may create public concern and negative public reactions. The goal should be to utilize gravity sewer systems to the fullest with minimal use of sewer lift stations except when absolutely required.

City of Santa Fe Drainage Basins Map

Legend

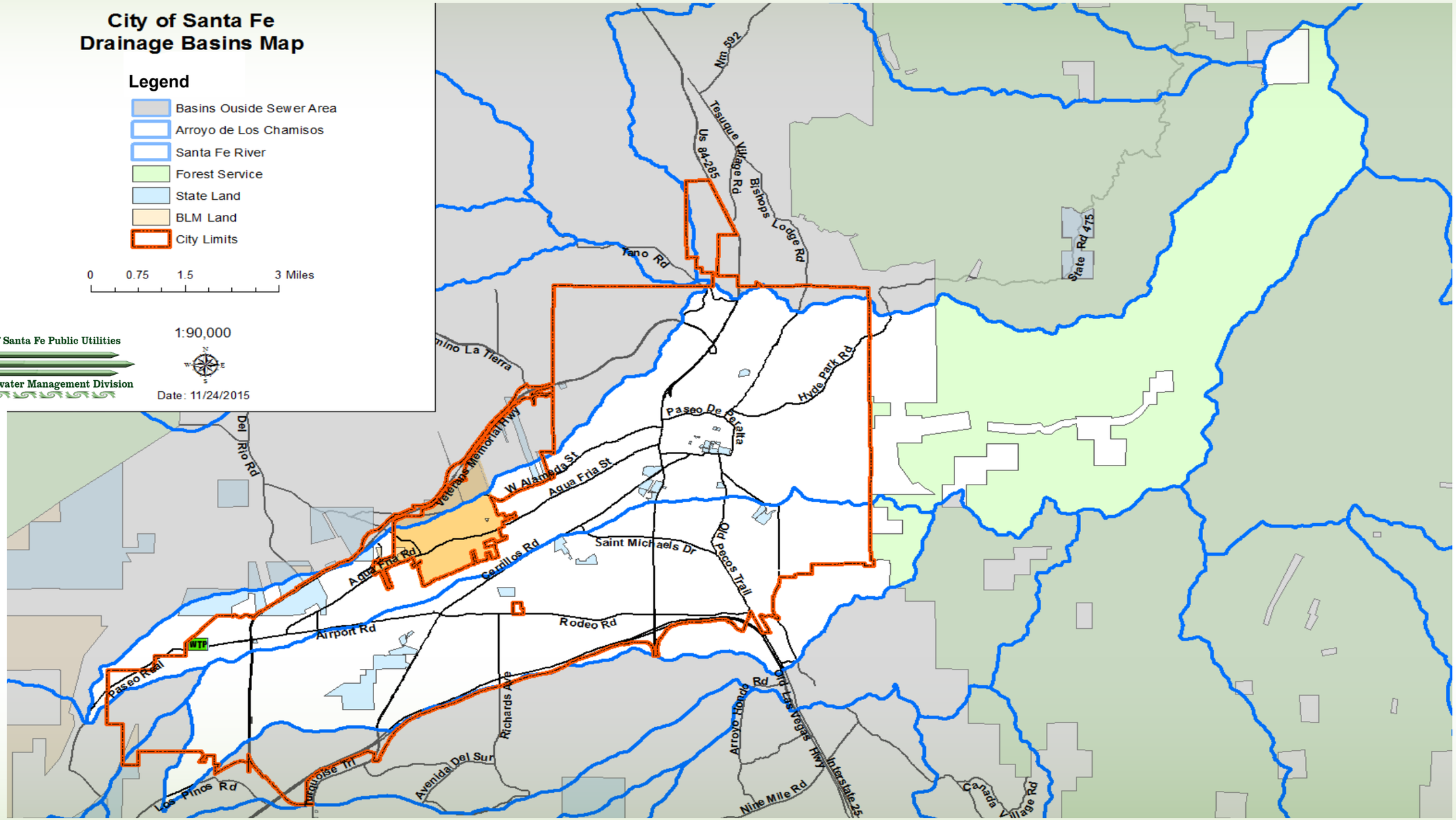
- Basins Ouside Sewer Area
- Arroyo de Los Chamisos
- Santa Fe River
- Forest Service
- State Land
- BLM Land
- City Limits

0 0.75 1.5 3 Miles

1:90,000

City of Santa Fe Public Utilities
Wastewater Management Division

Date: 11/24/2015



County of Santa Fe Drainage Basins Map

Legend

- Santa Fe Water Shed
- City Limits
- Water Shed Basins
- Potential County Area

0 1 2 4 Miles

1:93,000

Date: 11/25/2015

27138 Approx Acres

2707 Approx Acres

Arroyo Hondo 16407ac

WTP

City of Santa Fe Public Utilities

Wastewater Management Division

EXISTING SEWER COLLECTION SYSTEM COMPONENTS

The City's wastewater collection system includes gravity pipes, low pressure sewer pipe systems, sewer lift stations and force mains, manholes, overflow manholes, splitter boxes and diversion or split flow manholes that convey flow from the City's 11 trunk sewer basins to the wastewater treatment plant. The expansion and extension of the City's sewer system is primarily driven by development where the property owner or developer is responsible for the costs associated with extending the public sewer system to serve the property. At this time, the acreage of land parcels, excluding right-of-way, within the City sewer service area and located within 50 feet of a public or private sewer line is 19,804 acres and the acreage of property that is further than 50 feet from a public or private sewer line is 14,626 acres. ***(SEE PROPERTIES SERVED-NOT SERVED MAP - PAGE 12)***

COLLECTION SYSTEM SEWER PIPE: AGE, MATERIAL AND SIZES

PIPE AGE

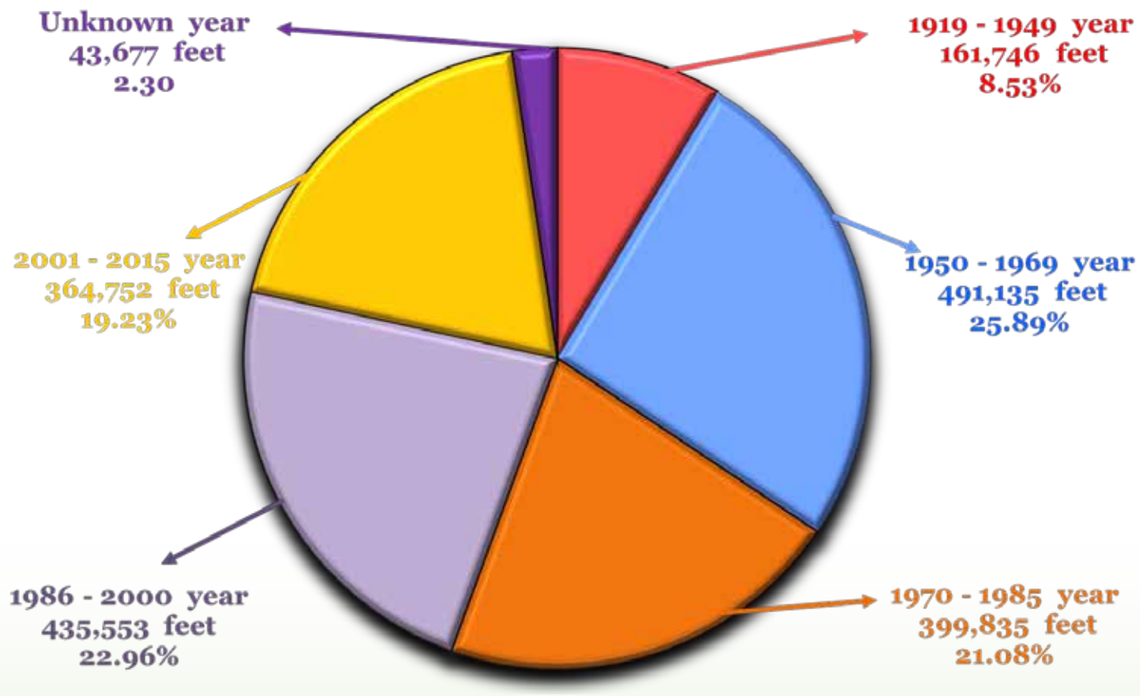
The earliest sewer map that the Wastewater Division possesses dates back to 1919. There is a 1924 map titled "Map of Santa Fe Sewers" that shows the downtown area centered on the plaza with the streets and the sizes of sewer lines indicated. ***(SEE 1924 CITY MAP - PAGE 13)*** It is interesting to note that very few of these early maps indicated the pipe material used but did indicate the line sizes. We now know that the predominant pipe used at that time was clay.

PIPE AGE CHART

YEAR	*LENGTHS (Feet)*	*PERCENT OF TOTAL*
1919-1949	161,746	8.53%
1950-1969	491,153	25.89%
1970-1985	399,835	21.08%
1986-2000	435,553	22.96%
2001-2015	364,752	19.23%
Unknown	43,677	2.30%

The Santa Fe Plaza is the heart of the City and where most of the early growth and development occurred. As development continued it tended to move out from the core area around the Plaza and in a southwest direction. It appears that part of this growth pattern was based upon the natural drainage basin that the City is within and the availability of creating a

CITY OF SANTA FE
PIPE AGE BY
TIME PERIOD
LENGTH IN FEET
PERCENTAGE OF TOTOAL



Source: City of Santa Fe Wastewater Management Division

EXISTING SEWER COLLECTION SYSTEM COMPONENTS

PIPE MATERIAL

As of the date of this study the City's sanitary sewer collection system has 1,896,716 linear feet (359.2 miles) of public sewer lines and 8,972 public sewer manholes. The pipe materials found in the sanitary sewer collection system today consists of the original pipe materials used at the time of the initial pipe installation and the materials that have since been used when the rehabilitation or replacement of the original host pipe was required. The overall types of pipe material found in the City's public sewer collection system are;

- Clay/Vitrified Clay
- Concrete/RCP Concrete
- Poly Vinyl Chloride (PVC)
- High Density Poly Ethylene (HDPE)
- Cured-In-Place-Pipe (CIPP)
- Ductile Iron Pipe (DIP)
- Steel
- Spirolite

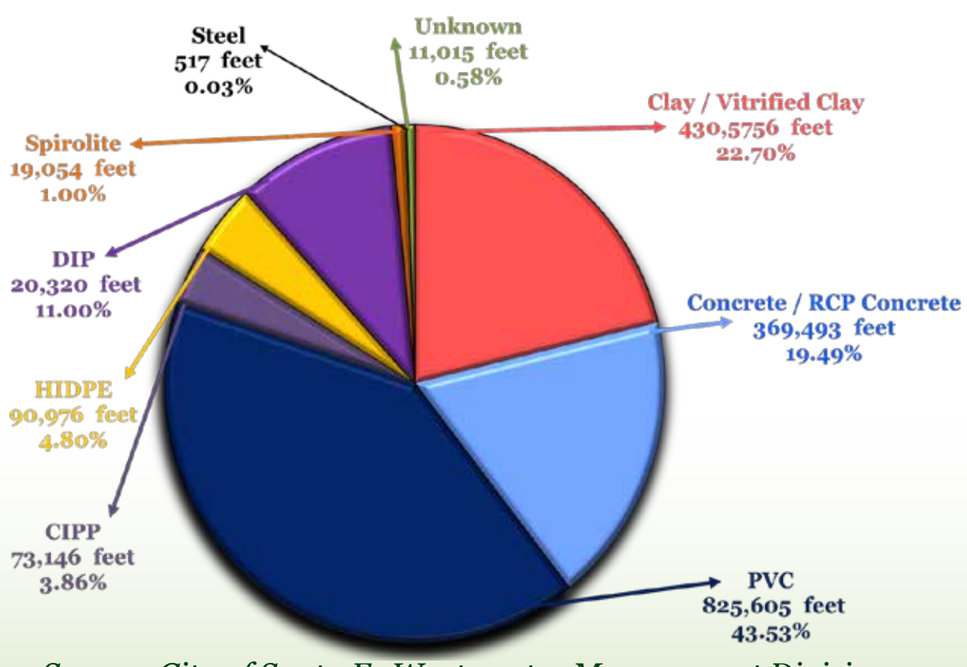
PIPE MATERIAL

MATERIAL	*LENGTHS (Feet)*	*PERCENT OF TOTAL*
Clay/Vitrified Clay	430,575	22.70%
Concrete/RCP Concrete	369,593	19.49%
PVC	825,605	43.53%
CIPP	73,146	3.86%
HDPE	90,976	4.80%
DIP	2,0320	11.00%
Spirolite	19,054	1.00%
Steel	517	0.03%
Unknown	11,015	0.58%
TOTAL ALL PIPES	1,896,716	100%

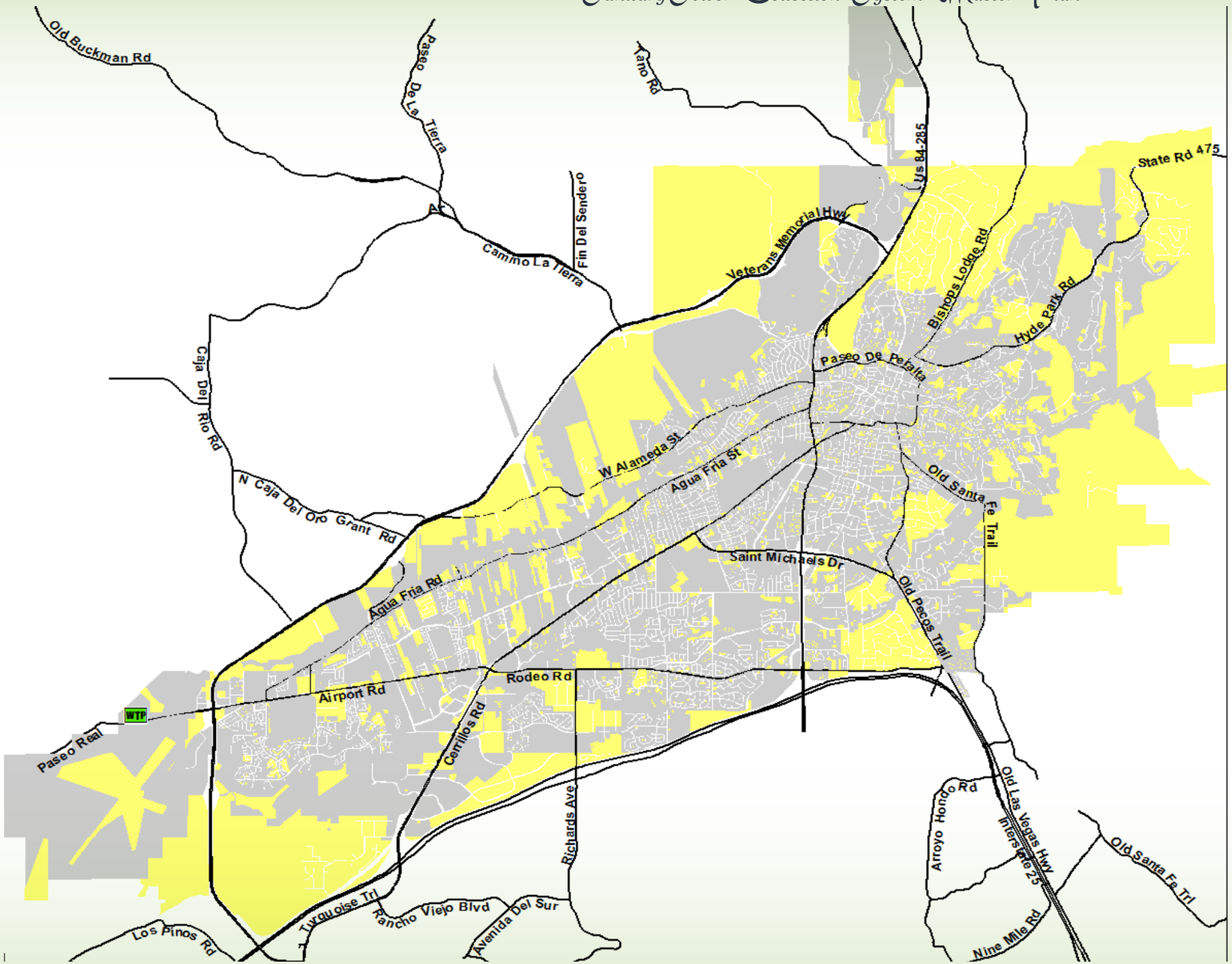
The majority of the sewer pipe materials that have been used at the time of installation for expansion of the City's sanitary sewer collection system have been PVC, clay and concrete. The total lengths of PVC, clay and concrete pipe as a percentage of all sewer pipes within the City's sewer system are 43.52% PVC, 19.49% concrete and 22.70% clay. The combined total of these three (3) pipe materials is 85.72% of the City's total sewer pipe system. Observing the configuration for the use of these three (3) materials correlation can be seen between the age and the type material used; meaning that clay pipe was used in the oldest parts of the City and as the City has expanded, concrete became the predominant pipe followed by the present use of PVC pipe. The Spirolite pipe is a flexible corrugated HDPE pipe that was used for trunk sewer lines. (SEE PIPE MATERIAL MAP - THIS PAGE)

As the gravity sanitary sewer collection system has aged there has been a need to replace or rehabilitate the existing sewer lines. The two materials used that constitute the largest percentage of replaced/rehabilitated sewer pipe material are High Density Poly Ethylene (HDPE) used in the pipe bursting process and Cured-In-Place-Pipe (CIPP) using felt liner tubes impregnated with thermo setting polyester resins. The open trench method for sewer pipe replacement/rehabilitation purposes is not used as often due to the associated higher costs and disruption to the public. When open trench methods are required, PVC pipe is typically used. The steel and ductile iron pipes are typically found at arroyo, bridge and railroad crossings.

CITY OF SANTA FE
PIPE MATERIAL BY LENGTH AND PPERCENTAGE



Source: City of Santa Fe Wastewater Management Division



Property Served and Not Served by City of Santa Fe Sewer

Legend

- Property within 50' of Sewer
- Property not within 50' of Sewer

City of Santa Fe Public Utilities
Wastewater Management Division

Acres Served approx 19,804
Acres Not Served approx 14,626

0 0.75 1.5 3 Miles

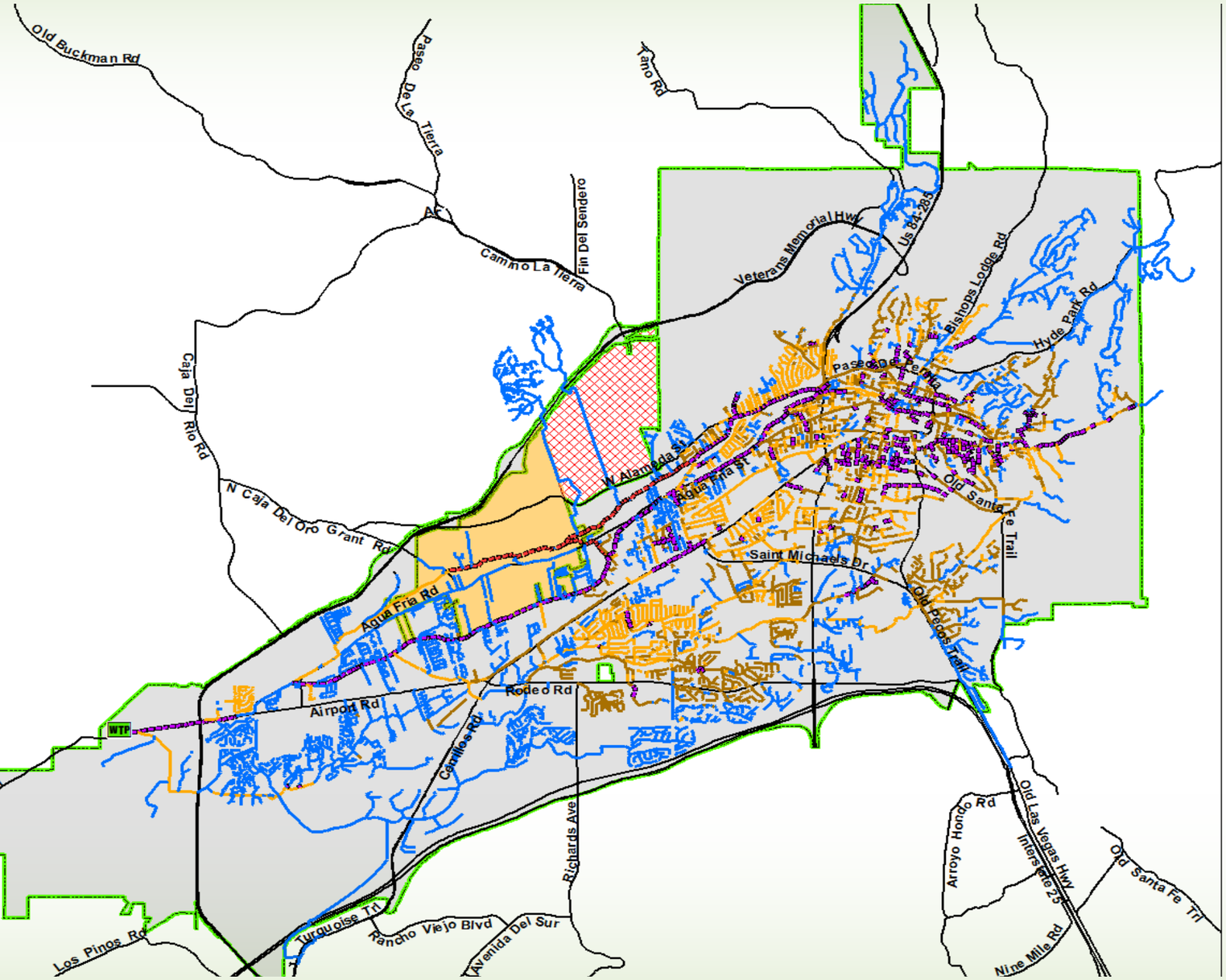
1:68,640

Date: 11/24/2015

City of Santa Fe Public Utilities

Wastewater Management Division

Sanitary Sewer Collection System Master Plan



City of Santa Fe Sewer Material Map

Legend

Sewer lines

PIPMAT

- CIPP/HDPE
- Clay
- Concrete
- PVC
- Spirolite

City of Santa Fe Public Utilities

Wastewater Management Division

0 0.75 1.5 3 Miles

1:68,640

Date: 11/24/2015

EXISTING SEWER COLLECTION SYSTEM COMPONENTS

PIPE SIZES/DIAMETER

The sewer collection system is comprised of pipe of different sizes which are identified by the pipe diameters. Typically the pipe diameter increases as the flow volume in the pipe increases. Much of the earlier pipe that was installed in the City was six (6) inch diameter pipe. The use of this pipe was primarily in the central part of Santa Fe centered on the Plaza and typically before 1950. Today, the minimum pipe diameter that is allowed for a public sewer line is eight (8) inches. The amount of new public sewer pipe installed started to increase in the 1950 to 1970 time period and with it the use of more eight (8) inch pipe. The six (6) and eight (8) pipes are the local collector pipes that "start" the collection of wastewater from local customers and carry it to the larger sized lines as flows increase. It is reasonable that the eight (8) inch pipe size comprises over 73% of all sewer pipes for the City's sewer collection system. The two (2) to four (4) inch pipe is typical for low pressure sewer systems or sewer lift stations which require a smaller diameter pipe.

The Wastewater Division classifies gravity sewers as local, collector and interceptor (trunk) sewers. The local sewer lines are the six (6) to eight (8) lines that convey flows from the relatively smaller sub-basin areas. These are the lines that typically have the most service connections that collect wastewater from the local customers. The collector sewer lines are the 10 inch lines. These lines collect flows from the local lines and like the local lines can have a large number of sewer service connections. The interceptor or trunk sewer lines are those in the range of 12 to 36 inches. The largest size sewer line in the City currently is 36 inches. These trunk sewer lines collect flows from both the local and collector sewer lines. In the past, sewer service connections to these trunk sewer lines were allowed out of necessity but this practice is no longer allowed without prior Wastewater Division approval. Sewer service connections to these trunk sewer lines are required to be made at a manhole. Two primary reasons for not allowing direct connections to the trunk sewers are;

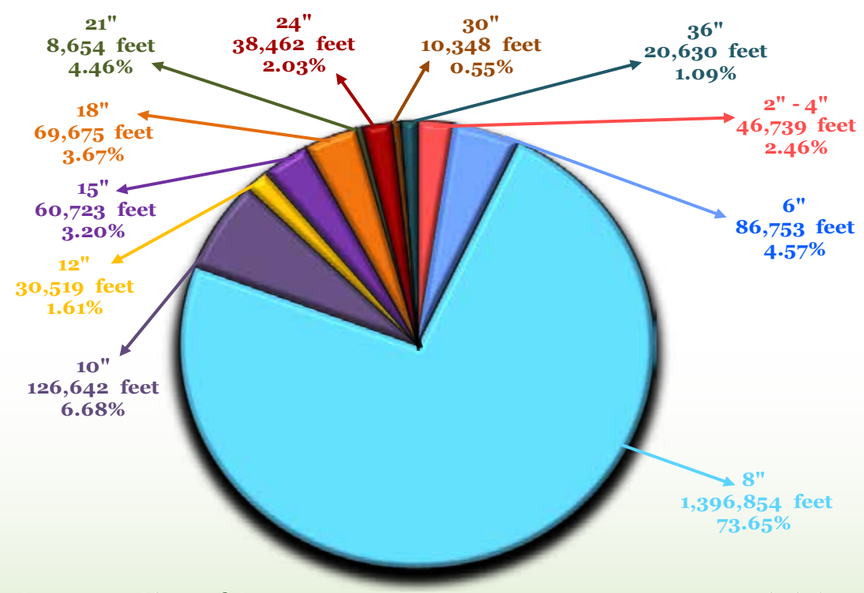
- Due to the larger and constant flow volumes in the trunk sewer lines there is an increased potential for greater damage to a property/residence resulting from a sanitary trunk sewer blockage.

- The introduction of roots into the trunk sewer line through the connection of sewer service lines increases the potential for a blockage in the trunk sewer pipe.

PIPE DIAMETER SIZES

DIAMETER	*LENGTHS (Feet)*	*PERCENT OF TOTAL*
2"-4"	46,739	2.46%
6"	86,753	4.57%
8"	1,396,854	73.65%
10"	126,642	6.68%
12"	30,519	1.61%
15"	60,723	3.20%
18"	69,675	3.67%
21"	8,654	46%
24"	38,462	2.03%
30"	10,348	0.55%
36"	20,630	1.09%

CITY OF SANTA FE
PIPE DIAMETER SIZE BY LENGTH AND PPERCENTAGE



Source: City of Santa Fe Wastewater Management Division

EXISTING SEWER COLLECTION SYSTEM COMPONENTS

LOW PRESSURE SEWER SYSTEMS

Low pressure sewer systems (LPS) were introduced to Santa Fe in the late 1980's originally for use in developments located in mountainous conditions which prohibited the use of gravity sewer. Today there is approximately 52,325 feet of public LPS sewer in the City. The LPS sewer system relies on the fact that a single grinder pump located within each lot is sufficient to discharge through the piping system thus eliminating the need for a larger central sewer lift station. These systems consist of a low flow-high head grinder pump situated within the individual properties. The pump grinds the solids to a point that allows them to pass through a small diameter pipe typically starting at 1-1/4 inches. The low pressure sewer system consist of the pumps, air-vac valves, flushing connections and small diameter pipe typically up to three (3) inches in size with the system discharging to a gravity sewer line or manhole. The pipe material used for low pressure systems has been primarily PVC or HDPE pipe.

SEWER LIFT STATIONS

There are currently four (4) sewer lift stations that the City owns and maintains ***(SEE BASINS, SPLITERS, ETC MAP - PAGE 17)***. They are identified as the;

- Canyon Road Lift Station
- Monte Sereno Lift Station 1
- Aldea Lift Station 1 and
- Aldea Lift Station 2

All the lift stations serve primarily residential communities and they were constructed as part of the community's development. The Aldea and Monte Sereno sewer lift stations were constructed and paid for by these developments and dedicated to the City for ownership and maintenance. The Homeowners Associations (HOA) for Monte Sereno and Aldea Communities do reimburse the City for the maintenance, repair and operational costs of their respective sewer lift stations through a Maintenance Agreement between the City of Santa Fe and the HOA.

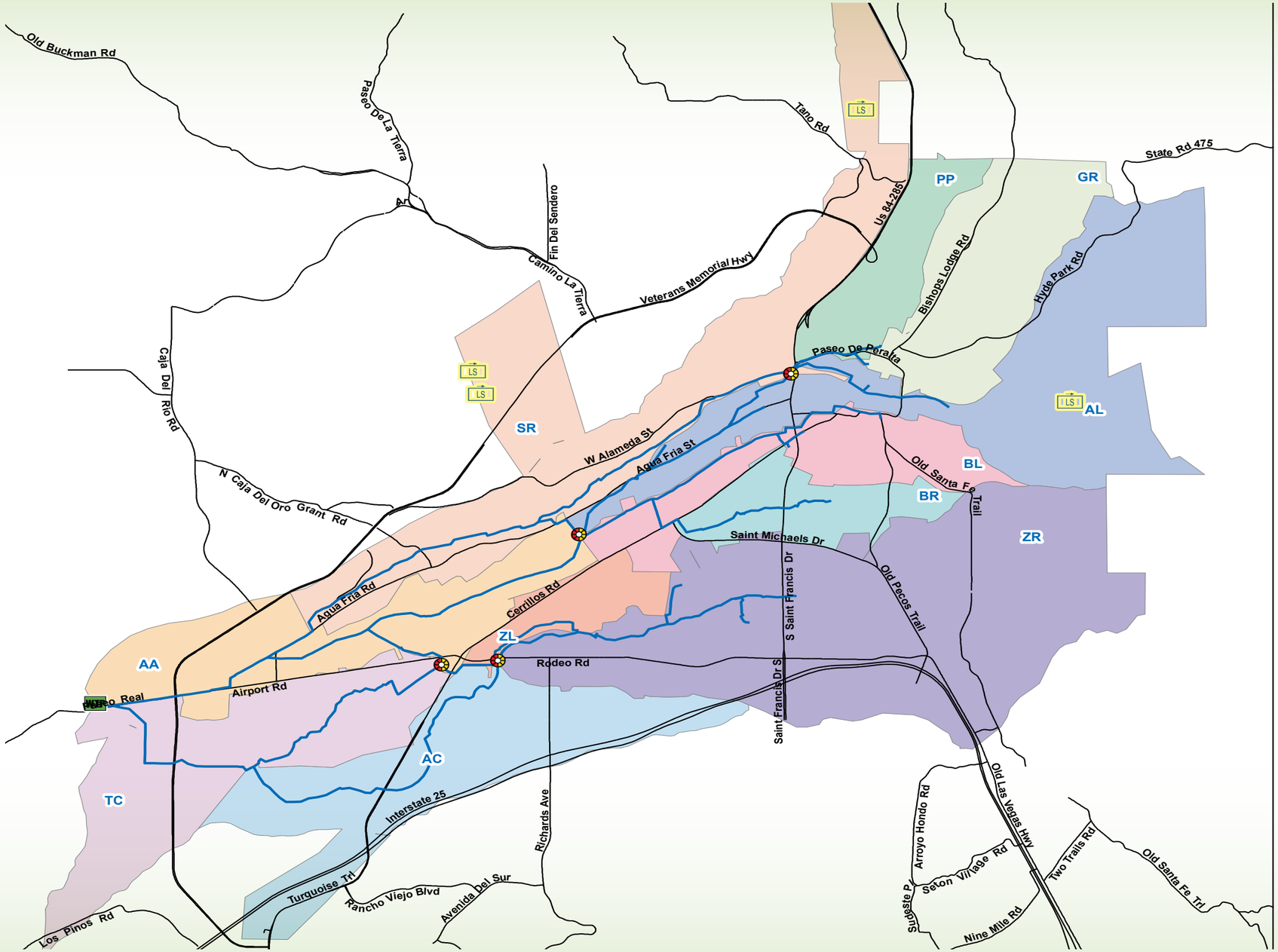
The Aldea sewer lift stations and sewer system is to be transferred to Santa Fe County as per the 2008 Settlement Agreement.

The Canyon Road lift station was built in 1990 and currently serves approximately 60 residential units. It consists of a wet well with two (2) pumps, backup generator, an auto phone dialer and high level-power out alarms. The lift station discharges to an eight inch gravity sewer line in Canyon Road

The Monte Sereno sewer lift station 1 exclusively serves the Monte Sereno Development which is a residential community located on the north side of Santa Fe. The lift station was accepted by the City for ownership in 2014. The existing lift station consists of a wet well with two (2) pumps that are in series with two (2) additional pumps in dry wells. The lift station has a backup generator, an auto phone dialer and high level-power out alarms. The lift station discharges to an eight inch gravity sewer line in Tano Road. There are plans for a future sewer lift station 2 in the Monte Sereno Phase Four (4) plans.

SEWER BASINS-SPLITTER BOXES-SPLITTER MANHOLES-OVERFLOW MANHOLES

The City's trunk sewer line system is divided into eleven (11) basins. The basins are representative of the geographic area that will flow through the existing sewer system network into a section of the trunk sewer line system. The overall trunk sewer line system has two (2) splitter boxes and two (2) splitter manholes and approximately 13 (thirteen) overflow manholes. These structures allow the incoming flow to be diverted to one or both of the two outgoing sewer lines. The splitter boxes have gates that are raised or lowered to control the outgoing flow whereas the splitter manholes rely upon sandbags or in-line plugs to control the outgoing flow. These splitter structures allow for increased or decreased flows into the downstream trunk sewer lines. This ability to increase or decrease flows can be advantageous for sewer line maintenance and inspection, repairs or when blockages occur. The splitter manholes are found in the older core regions of Santa Fe where there are numerous street intersections. These manholes have an outlet pipe in the invert of the manhole going down one street and then another outlet pipe higher up in the manhole that discharges to a different street. The early designers of the City's sewer system were smart to create this feature where if the flow was blocked in one direction it would back up into the manhole and flow out the other pipe ***(SEE BASINS SPLITERS BOX MAP - PAGE 17).***



City of Santa Fe Sewer Basins & Splitter Box Map

Legend

MHTYPE

- Lift Stations
- Splitter Box
- Trunklines

BASIN2

- AA
- AC
- AL
- BL
- BR
- GR
- PP
- SR
- TC
- ZL
- ZR

City of Santa Fe Public Utilities
Wastewater Management Division

0 0.75 1.5 3 Miles

1:68,640

Date: 10/30/2015

WASTEWATER DIVISION COLLECTION SECTION; SEWER LINE MAINTENANCE AND ASSESSMENT

Sanitary sewer line maintenance is essential in preventing stoppages in the sewer collection system with the resultant property damage and adverse impacts to the environment. The Wastewater Management Division works diligently in preventing stoppages. The goal is to have zero stoppages.

The City of Santa Fe's sanitary sewer collection system is comprised of 359 miles of sewer lines and 8,972 Manholes. ***(SEE OVERALL SEWER SYSTEM MAP - PAGE 19)*** This system currently conveys between approximately five (5) to six (6) million gallons of wastewater daily to the City's wastewater treatment facility. The City's sewer service area is divided into 39 sewer maintenance areas ***(SEE MAINTENANCE AREAS MAP - PAGE 20).*** These areas allow for the tracking and identification of maintenance work. They serve as an effective visual aid to define the work area. Maintenance crews are assigned an area to work in before proceeding to another area.

Below is a summary of the Wastewater Division's Collection Section sanitary sewer maintenance programs.

MAINTENANCE LOGS AND THE GEOGRAPHIC INFORMATION SYSTEM (GIS)

Whenever work is performed on the sewer collection system whether for inspection, maintenance or televising purposes, a maintenance log is completed. The information from the maintenance log is entered into an Access data base. This data base information can be linked to a Geographic Information Systems (GIS) program which will graphically display information about the City's sewer system based upon the data stored. A simple example of this would be to show all the sewer lines that were maintained on a certain day or time period. The query is created and all the lines meeting the defined parameters would be highlighted on the map. A weekly review of all sewer line maintenance is conducted utilizing the GIS system. This review is performed by the Collection Section Manager and the Section Supervisors. This review ensures that all sewer lines in a specific area are completed.

The GIS asset management system used today was implemented in 2013 and has been joined to the maintenance database allowing for assessment of historical date. The GIS asset management system has allowed the Collection Section to increase its

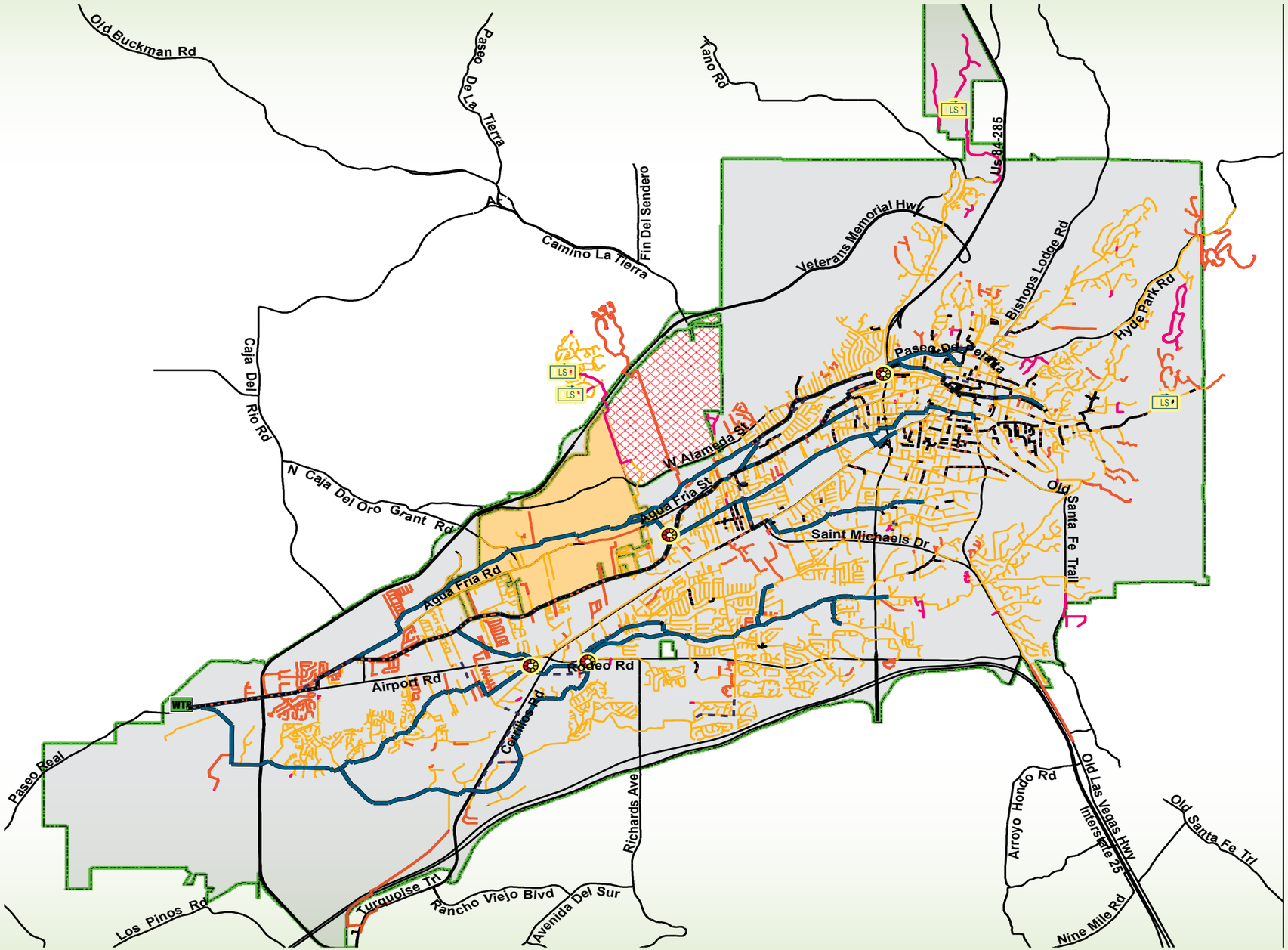
MAINTENANCE CREWS AND EQUIPMENT

The main causes of sewer stoppages are from roots, grease, and debris. A small percentage is due to structural defects. Maintenance strategies for preventing sewer stoppages is mechanical cleaning and chemical root treatment of the sewer lines and manholes, installation of grease traps, implementation of best management practices by the public, and sewer line repair, replacement and rehabilitation.

Mechanical cleaning of the sewer lines and manholes is performed utilizing heavy equipment with cleaning devices that are inserted in the lines to remove roots, grease and any other obstructions.

Below are the resources and descriptions of the equipment used for sewer line maintenance:

- The Wastewater Division's Collection Section has 3 (three) crews specifically assigned to the cleaning of sewer lines. The primary equipment utilized by each maintenance crew consists of; (1) a vactor truck with a high velocity aqua jet rodder/vacuum system and (2) a hydraulic sectional sewer rodder truck.
- Vactors use high pressure water to propel nozzles up the sewer line. These are specialty nozzles designed to clean such items as grease, sand, clear stoppages and remove roots. The Vactor also consists of a high volume vacuum system which removes this debris and any undesired material from the sanitary sewer system during the maintenance function.
- The hydraulic sectional sewer rodder uses several different mechanical cutters to clean sewer lines depending on pipe conditions. The types of cutters used by the rodder are; augers, flexible cutting blades, root saws and porcupine cutters for scrubbing and scraping the pipe to cut roots and grease.



City of Santa Fe Sewer Map

Legend

Manholes

MHTYPE

- Lift Stations
- Splitter Box
- Abandoned_Sewer
- RehabbedLines
- TrunkLines
- PrivateSewer
- LowPressureSystem
- Sewer lines

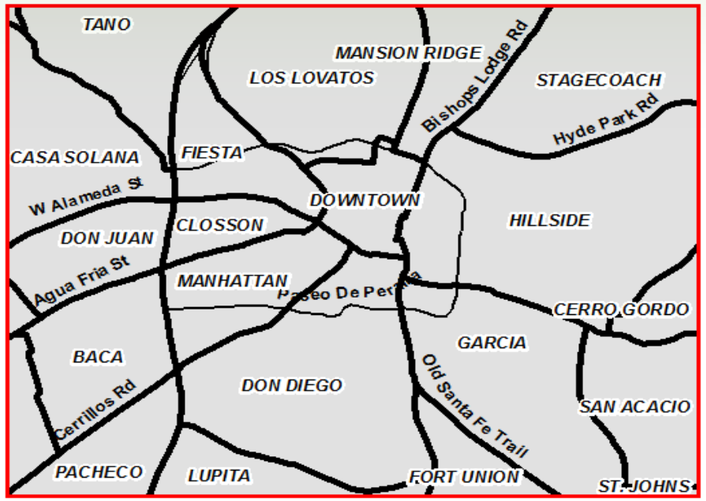
City of Santa Fe Public Utilities

Wastewater Management Division

0 0.75 1.5 3 Miles

1:68,640

Date: 10/30/2015



Inset Map
Downtown Area

City of Santa Fe Maintenance Area Map

Legend

- Maintenance Area
- Agua Fria Traditional Historic Community
- Presumptive City Limits

City of Santa Fe Public Utilities
Wastewater Management Division

0 0.75 1.5 3 Miles

1:68,640

Date: 11/24/2015

WASTEWATER DIVISION COLLECTION SECTION; SEWER LINE MAINTENANCE AND ASSESSMENT

CHEMICAL ROOT CONTROL

Chemical treatment is done by placing herbicidal treated foam in the sewer lines that coats and kills the roots. The Wastewater Division re-instituted this process in 2012 as another measure of root control via a small pilot project. Based on post inspections of the lines and manholes in the pilot project, this process was successful in reducing roots and therefore a larger scale project was completed in 2013. The effects on the roots are estimated to last two (2) to three (3) years. Different sewer line segments were chosen and treated in 2014 and 2016. ***(SEE ROOT CONTROL MAP - PAGE 23)*** The Collection Section will continue to evaluate the effectiveness of the treatments through video inspections at intervals of the treated lines and tracking the number of service calls received for the treated sewer lines.

GREASE CONTROL

One measure for grease control is the requirement for the installation of grease traps at food preparation businesses. The City has in place a wastewater extra-strength surcharge program. This program allows the City to assess a surcharge or additional charges on those users found to be discharging grease or wastewater above the base surcharge parameters. A Wastewater Division inspector monitors and samples these businesses once every two years. A Wastewater Division inspector will meet with each facility to ensure the use of best management practices to prevent grease from entering the sewer system.

SEWER SYSTEM ON-CALL POINT REPAIR PROGRAM

In addition to the larger scale Wastewater Division sewer line rehabilitation projects, the Collection Section utilizes an on-call point repair contract. This program is designed to deal with the emergency as well as the normal repair issues that are discovered during the inspection and maintenance of the sewer system. Typically, a majority of the point repairs are made to the clay pipes. The contract is designed to cover the wide variety of the typical sewer system repairs encountered.

SEWER BACKWATER VALVES

An effective method in preventing damages to properties from City sewer main stoppages is the use of a sewer backwater valve in the sewer service lines. On June 8, 2011, the City of Santa Fe adopted a change to the City's plumbing code requiring sewer backwater valves to be installed on all new and/or repaired sewer service lines. The new code became effective on January 1, 2012. The sewer backwater valve acts as a one way valve. The sewer backwater valve design allows flow from the property into the City's sewer lines and will restrict flow from the City's sewer system back into the property.

SEWER LINE VIDEO INSPECTION

The Wastewater Division's Collection Section has a video camera mounted on a remote control transport/crawler for the purpose of televising the sewer lines. The equipment is mounted in a van along with an on-board computer to store the video information digitally. The camera unit is used for a variety of inspection purposes of the sewer lines such as;

- Assistance with the cleaning of debris from sewer lines
- Assistance with the cleaning of heavily rooted sewer lines
- Inspection of sewer lines for condition assessment
- QA/QC of recently cleaned sewer lines
- Video used by contractors for bidding a Wastewater Division Sewer CIP Rehabilitation Project

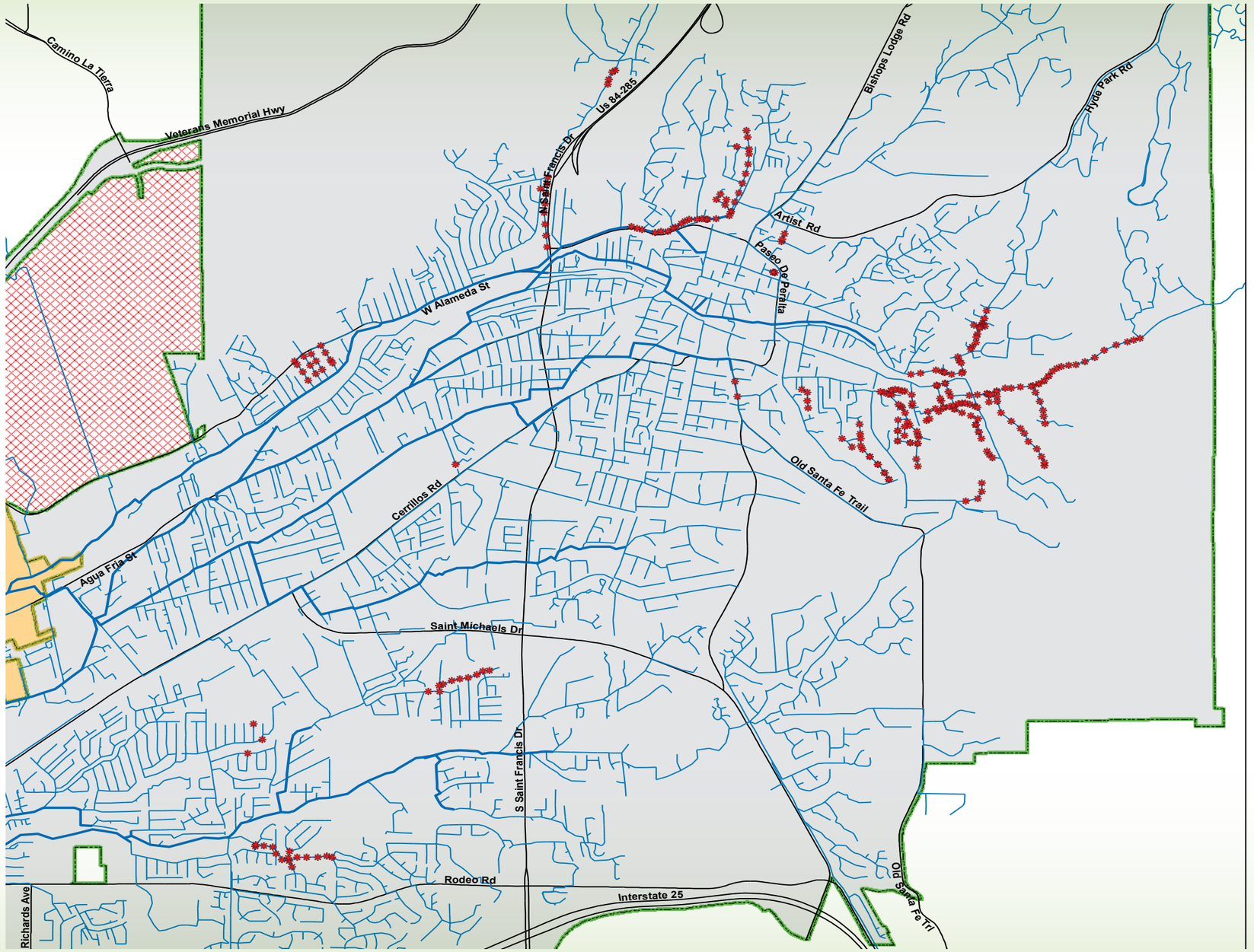
It is these video inspections that primarily discover the broken sections of sewer pipe which require a point repair under the On-Call Point Repair Program. These video inspections were used to assess the condition of the sewer lines in the high impact areas and the trunk sewer lines referenced in this report for evaluation and recommendation of sewer lines as candidates for future CIP rehabilitation projects. Since the advent of digital video, sewer line video can now be stored and accessed rapidly to be used in conjunction with the maintenance history of the sewer lines to more effectively evaluate and determine those sewer lines needing repair, replacement or rehabilitation.

WASTEWATER DIVISION COLLECTION SECTION; SEWER LINE MAINTENANCE AND ASSESSMENT

STORM WATER EROSION CONTROL SITES FOR SEWER LINES AND MANHOLES

The City's sewer collection system is located within a system of natural storm water drainage basins. This geographical feature allows for the predominant use of gravity flow sewer lines to a centralized wastewater plant. To take advantage of these geographical features, portions of the City's sewer system are located within these natural drainage channels such as the Arroyo Chamiso, the Santa River and other smaller drainages. In some cases it is necessary for the sewer lines to cross the channels. It is the nature of these natural channels to change character over time, to meander and erode their embankments and stream beds and encroach upon existing sewer lines if left unchecked. The Wastewater Division currently has identified 20 sites City wide where erosion protection structures for sewer lines and manholes are in place. These sites are graphically identified in the GIS mapping system for identification and tracking purposes. After a rain event a field inspection of these sites is conducted by the Wastewater Division Collection Section to verify the structures integrity and if further protection is needed.

The type of erosion structures used can be classified into two (2) general categories; hard or soft structures. Hard structures would involve construction methods that use gabions, wire enclosed rip-rap or concrete structures. Soft structures utilize a wider variety of natural materials and methods including rock and wood and have a more holistic approach to controlling the natural flows of arroyos and rivers. These approaches can been seen in the Santa Fe river corridor; the soft, natural structures from Saint Francis to Camino Alire and the hard structure of the San Isidro low water crossing. There has been increased research and acceptance for the use of the soft method over the past two decades. The Wastewater Division typically uses soft structures whenever possible to protect its existing sewer lines and manholes. Most maintenance work on erosion structures is done by Wastewater Division collection staff in conjunction with engineering staff.



City of Santa Fe
Root Control Map

Legend

- Root Treatment
- Sewer lines
- Trunklines
- Agua Fria Traditional Historic Community
- City Limits
- Presumptive City Limits

City of Santa Fe Public Utilities

Wastewater Management Division

0 0.275 0.55 1.1 Miles

N W E S

Date: 10/30/2015

SANITARY SEWER COLLECTION SYSTEM: CAPACITY ANALYSIS

The Wastewater Division's internal staff engineers performed the sewer collection system capacity and conditional analysis for this report. An outside firm was contracted to provide flow monitors to be installed in strategically located sewer manholes identified as Points of Interest. Eighteen (18) Points of Interest (POI) were selected within the sewer system. The POI's are locations within the City's sewer service area and where the large tributary areas drain. Fourteen (14) of these POI's were continuously monitored with flow measuring devices from August 9, 2015 through November 23, 2015. ***MAP - PAGE 25,*** shows the POI locations.

During the monitoring period, four (4) separate flow scenarios were evaluated. This could be done since the City's sanitary sewer system has four locations where flow can be fully or partially diverted from one interceptor sewer line to another. These locations are called split flow manholes and split flow boxes. ***MAPS - PAGE 26 - 29,*** show these flow scenarios and split flow locations along with the corresponding dates when the scenario was in-place. The ability to split the flow allows the flow pattern to be varied. The ability to divert the flow is beneficial during sewer line maintenance activities, repairs, and construction.

The monitoring data was used to estimate the per capita use and to determine peak hour flow factors. Based on the data, it is estimated that eighty (80) gallons of wastewater is discharged per person per day. This eighty (80) gallons per capita estimate was used to estimate current flows for the four (4) non-monitored POI sites. The Geographic Information System (GIS) was the tool used to model current and future flows within the sewer service area ***(SEE SEWER SERVICE AREA MAP - PAGE 5)*** by using census, zoning and the sewer system coverages. Exhibits 1 thru 18 show each tributary area for the POI's analyzed. ***(SEE APPENDIX ONE)***

In addition to the POI analyzed, each POI tributary area was reviewed to verify ten (10) inch and smaller diameter lines were adequately sized for existing and future conditions.

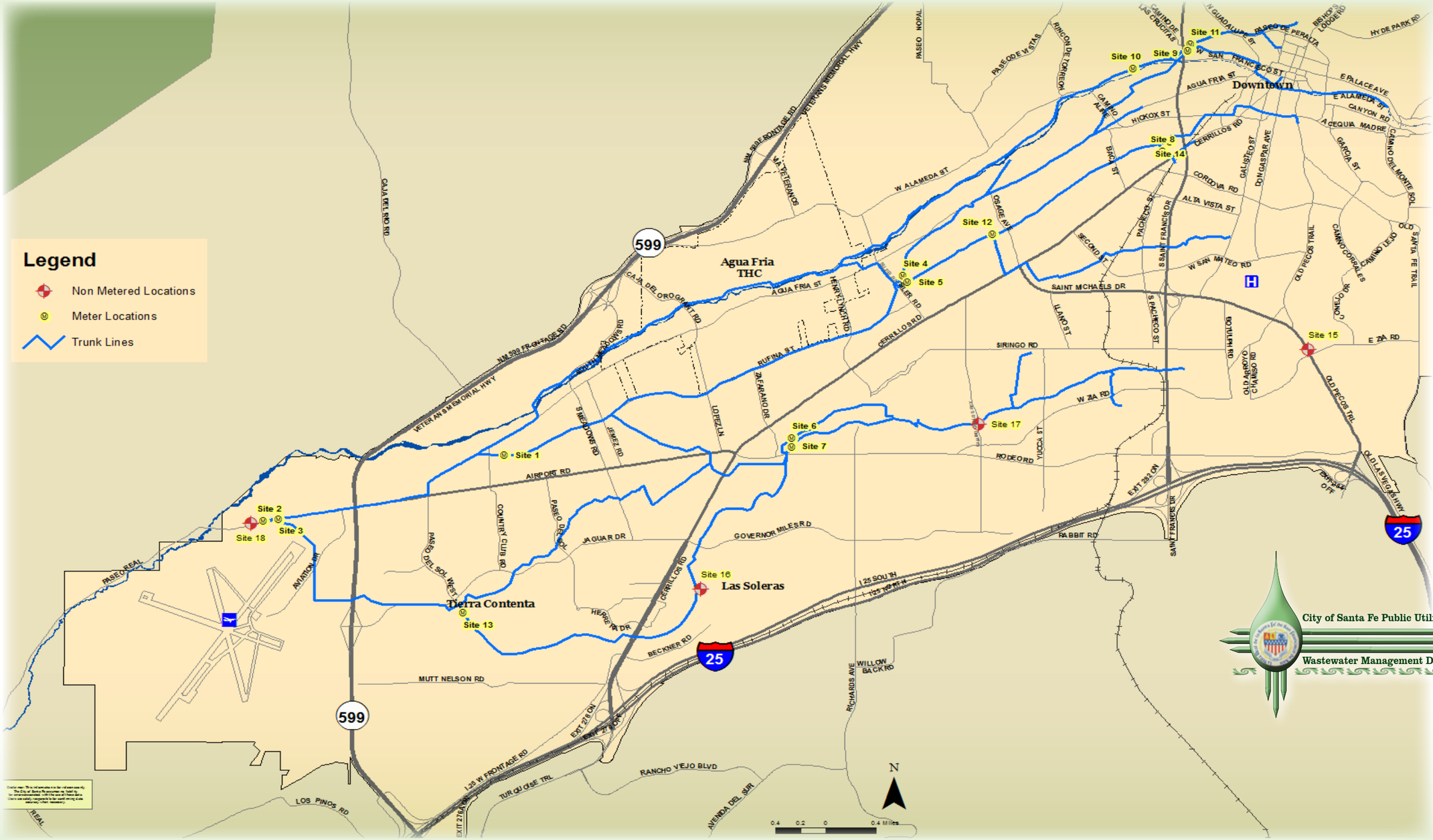
It is important to note this analysis is only an evaluation of the collection system capacity and does not relate to treatment plant capacity. The treatment plant capacity is addressed under the Facility Master Plan.

METHODOLOGY

For each POI, the physical characteristics of the pipe where obtained from as-built plan information or from a field inspection. This information was then used to estimate pipe capacity using the Manning's Equation. The Manning's Equation is a formula used to calculate flow capacity when the sewer system is operating under open channel and laminar flow conditions. Gravity sewer systems generally operate under open channel flow conditions since pipes rarely experience complete submergence which causes pressurized conditions. The flow monitoring data confirmed that the sewer lines are operating under open channel flow conditions.

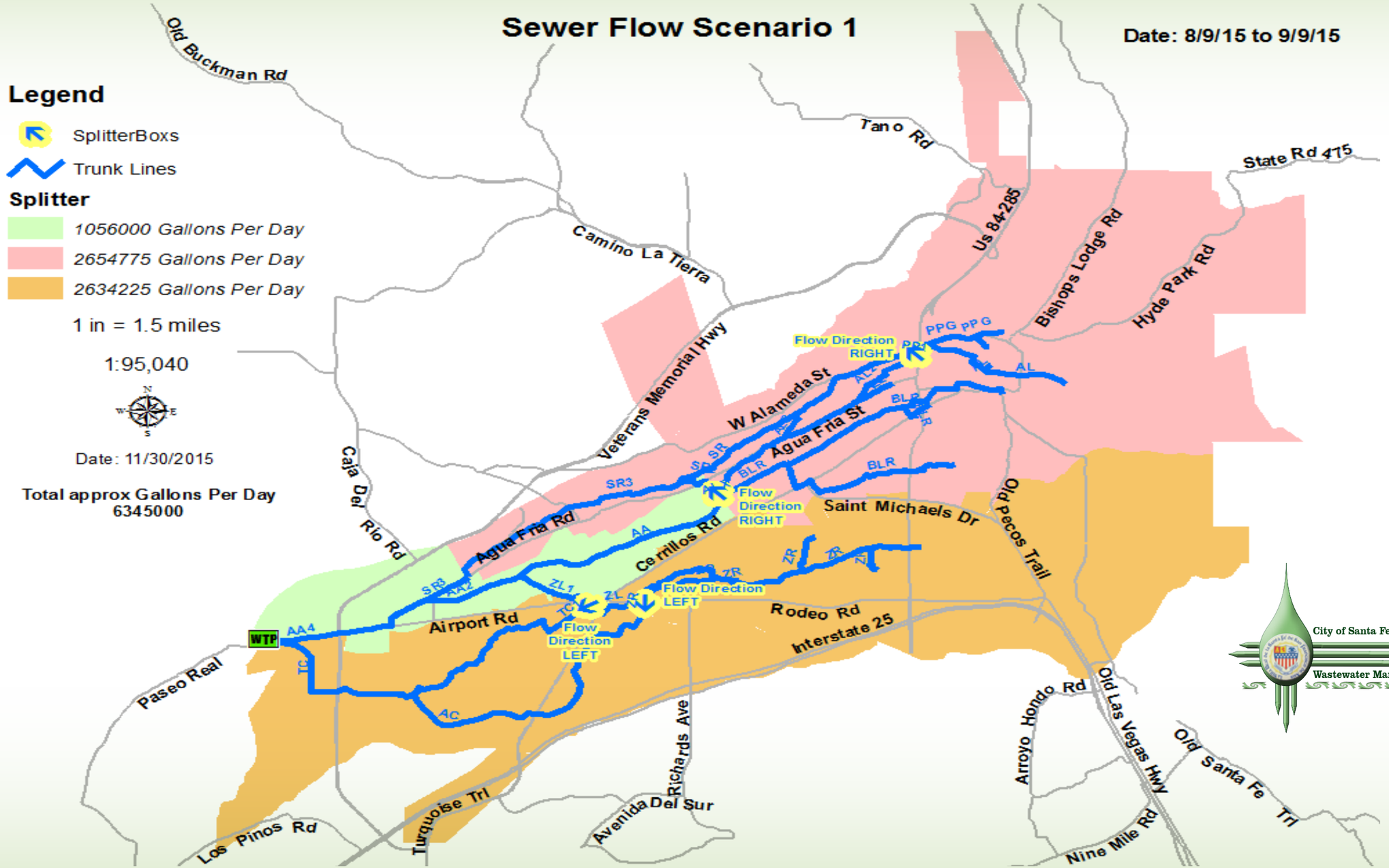
Only eighty-five (85) percent of the pipe capacity was used for the capacity analysis. This reduction in capacity is to factor in the heterogeneous nature of a sewer system. The flattest sewer line segments were chosen for monitoring since the slope of a pipe has a large impact to flow capacity and these flat sections are pinch points in the system. Flat slopes also result in lower velocity flows resulting in laminar flow conditions and more accurate flow data.

GIS was used to estimate existing flows for the non-monitored locations and to estimate the full build out flows for these locations. The full build out flows were then compared with pipe capacity to verify if the pipe system has adequate capacity to handle full build out flow conditions during a rain event at peak hour. Full build out flow estimates are based on the assumption that the tributary area for each POI's would develop in a similar manner to the land use patterns of the properties currently being served with sewer within the POI's tributary area. The ten (10) year and twenty (20) year projected flows were based on a 1% annual growth rate.


Legend
Non Metered Locations
Meter Locations
Trunk Lines
Agua Fria THC
Tierra Contenta
Las Soleras
Downtown
Site 1
Site 2
Site 3
Site 4
Site 5
Site 6
Site 7
Site 8
Site 9
Site 10
Site 11
Site 12
Site 13
Site 14
Site 15
Site 16
Site 17
Site 18
599
25
W ALAMEDA ST
AGUA FRIA ST
W SAN FRANCISCO ST
E PALACE AVE
E ALAMEDA ST
CANYON RD
ACEQUIA MADRE
CERRILLOS RD
CORDOVA RD
ALTA VISTA ST
W SAN MATEO RD
SAINT MICHAELS DR
SIRINGO RD
W ZIA RD
E ZIA RD
RODEO RD
AIRPORT RD
JAGUAR DR
GOVERNOR MILES RD
RABBIT RD
BECKNER RD
MUTT NELSON RD
RANCHO VIEJO BLVD
LOS PINOS RD
I-25 W FRONTAGE RD
I-25 SOUTH
I-25 NORTH
OLD PECOS TRAIL
OLD SANTA FE TRAIL
CAMINO LEJO
CAMINO CORRALES
HICKOX ST
BACA ST
GALISTEO ST
DON GASPAR AVE
GARCIA ST
CAMINO DEL MONTE SOL
PACHECO ST
S SAINT FRANCIS DR
ILLANO ST
YUCCA ST
RICHARDS AVE
WILLOW BACK RD
SANTA FRANCIS DR
OLD LAS VEGAS HWY
CAJA DEL RIO RD
PASEO REAL
AVIATION DR
COUNTRY CLUB RD
PASEO DEL SOL WEST
PASEO DEL SOL
TURQUOISE TRL
AVENIDA DEL SUR
N
0.4 0.2 0 0.4 Miles
City of Santa Fe Public Utilities
Wastewater Management Division

Sewer Flow Scenario 1

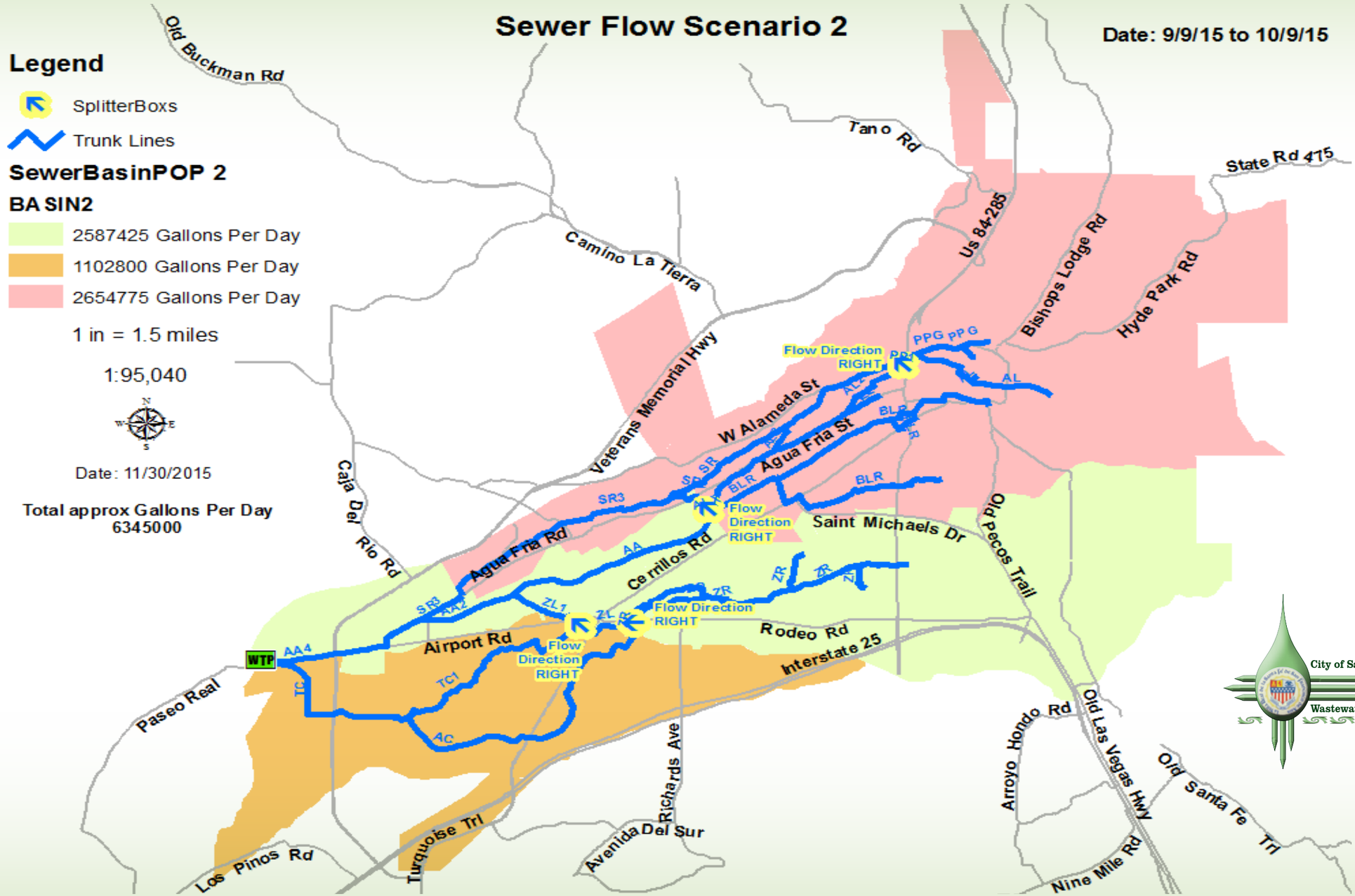
Date: 8/9/15 to 9/9/15



City of Santa Fe Public Utilities
Wastewater Management Division

Sewer Flow Scenario 2

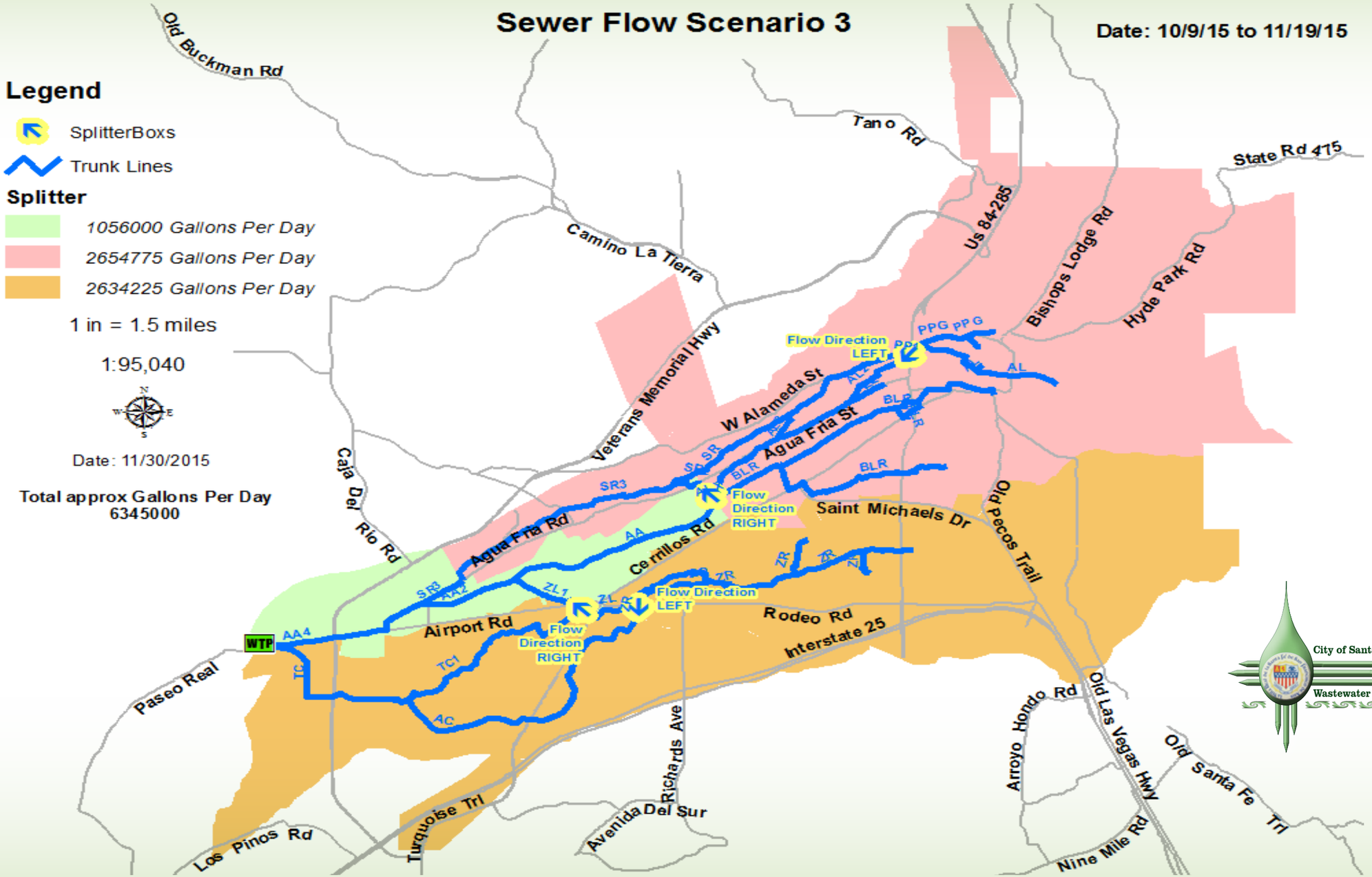
Date: 9/9/15 to 10/9/15



City of Santa Fe Public Utilities
Wastewater Management Division

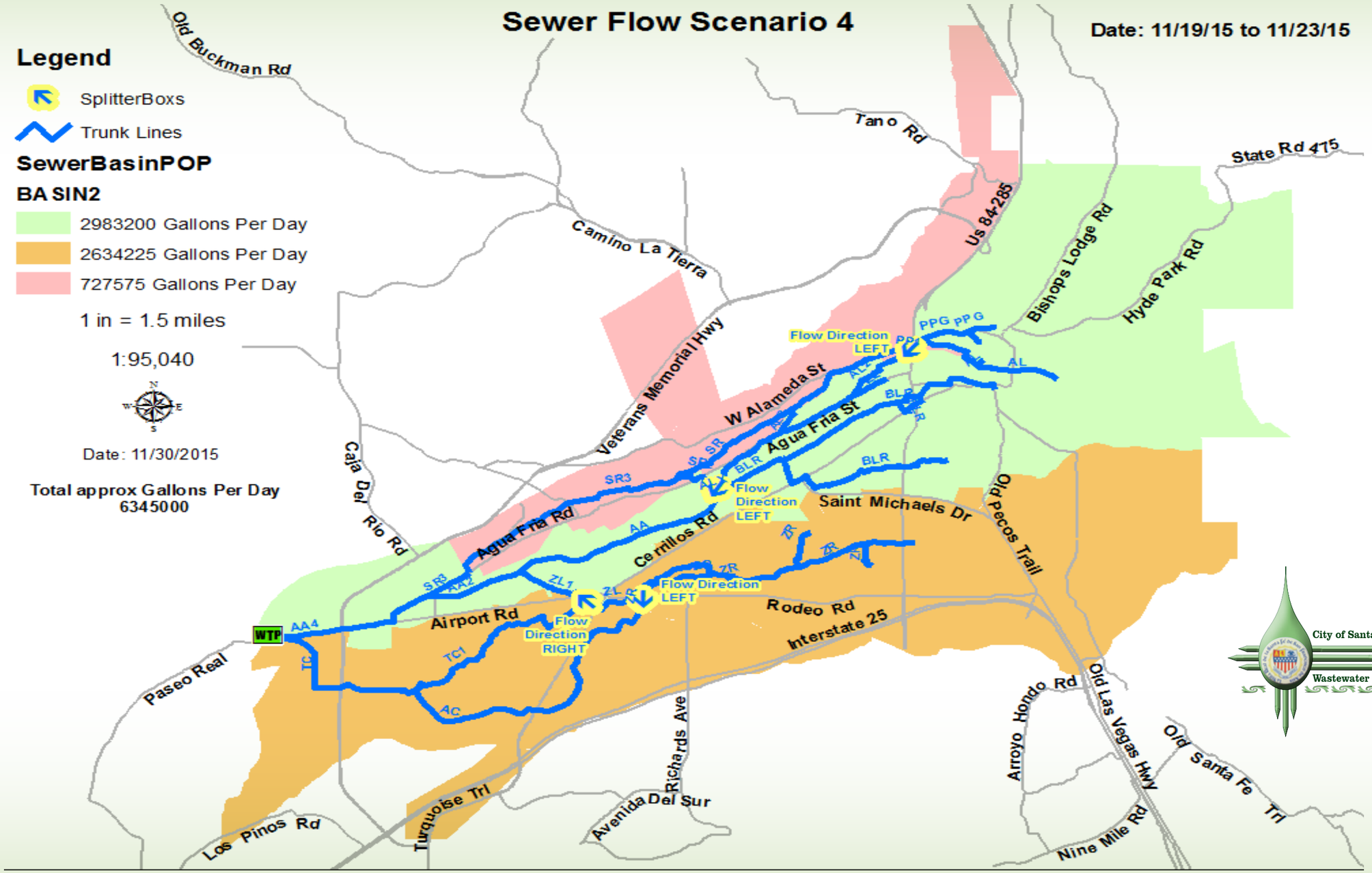
Sewer Flow Scenario 3

Date: 10/9/15 to 11/19/15



Sewer Flow Scenario 4

Date: 11/19/15 to 11/23/15

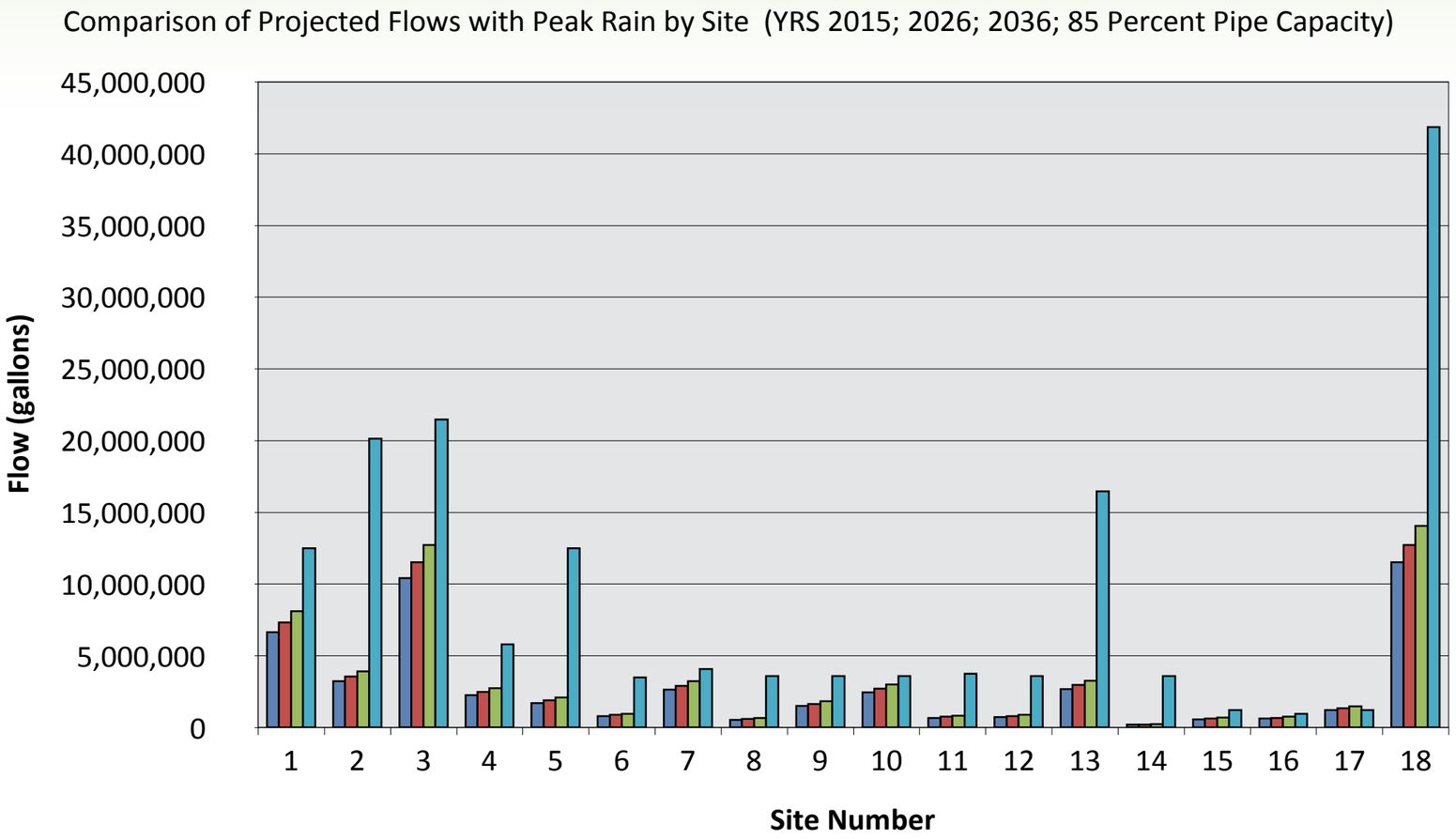


SANITARY SEWER COLLECTION SYSTEM: CAPACITY ANALYSIS

RESULTS

EXISTING FLOWS, 2026 PROJECTED FLOWS AND 2036 PROJECTED FLOWS ANALYSIS

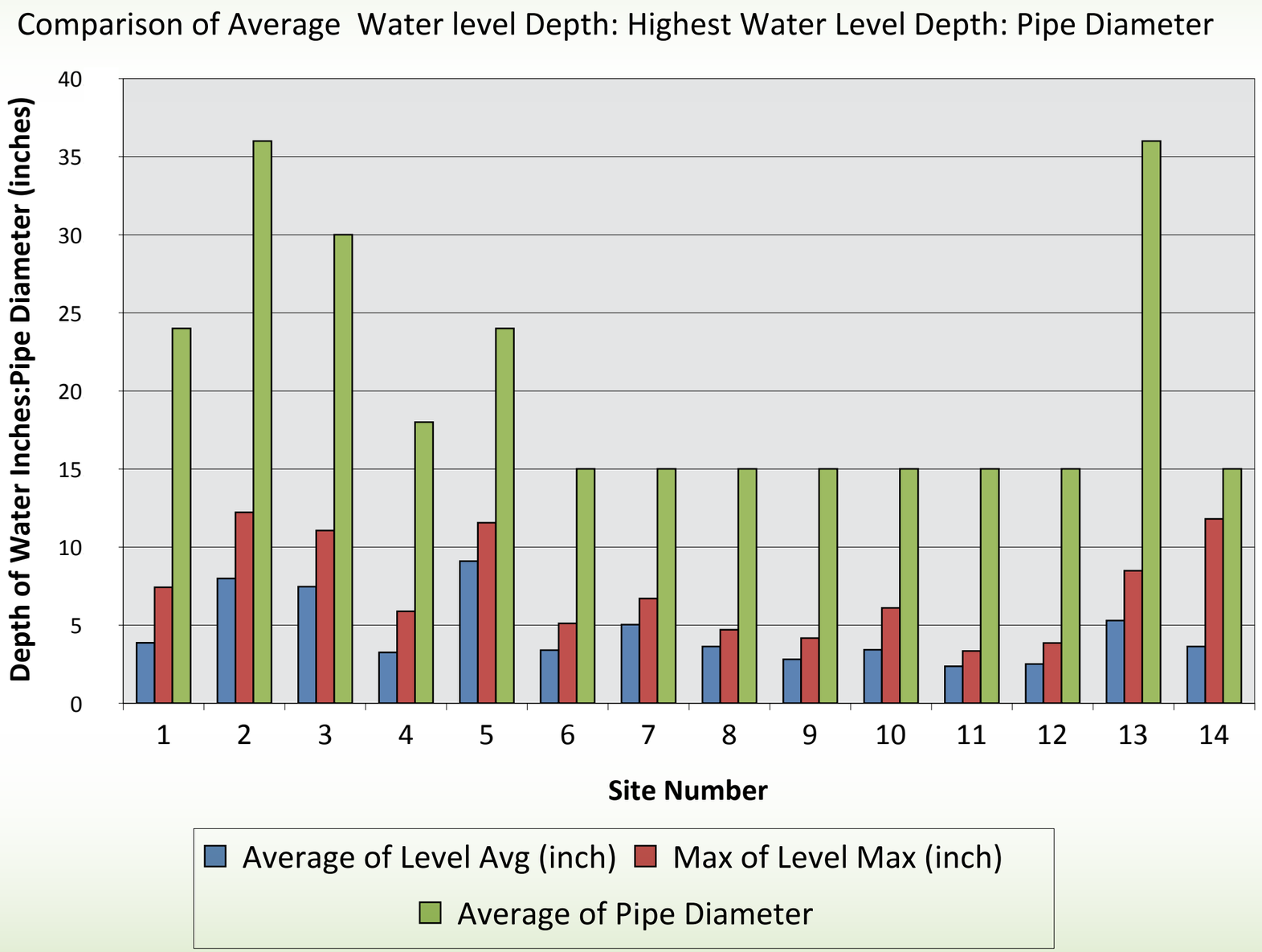
The chart below shows a comparison of existing flows, 2026 projected flows, 2036 projected flows (during a rain event at peak hour) and pipe capacity. The condition of Peak Hourly Flow during a Rain Event is used for the comparison since it is the highest flow that the sewer system will experience. A factor of 2.38 is multiplied to average day flows to estimate this condition. This factor was obtained from the flow monitoring data.



SANITARY SEWER COLLECTION SYSTEM: CAPACITY ANALYSIS

Except for Site 17, the analysis shows that that the City's sewer collection system has sufficient capacity to handle current flows, 2026 projected flows, and 2036 projected flows. The capacity for Site 17 can be increased by upsizing a 50 foot segment of pipe from 10 inch diameter to 15 inch diameter. A visual assessment of Site 17 was conducted and the system was adequately handling the flow. Due to a growth rate of 1 percent per year and only fifty (50) acres of developable vacant land remaining in Site 17's tributary area (see chart below), it is recommended that the upsizing of the line segment should be done when the pipe is rehabilitated due to condition.

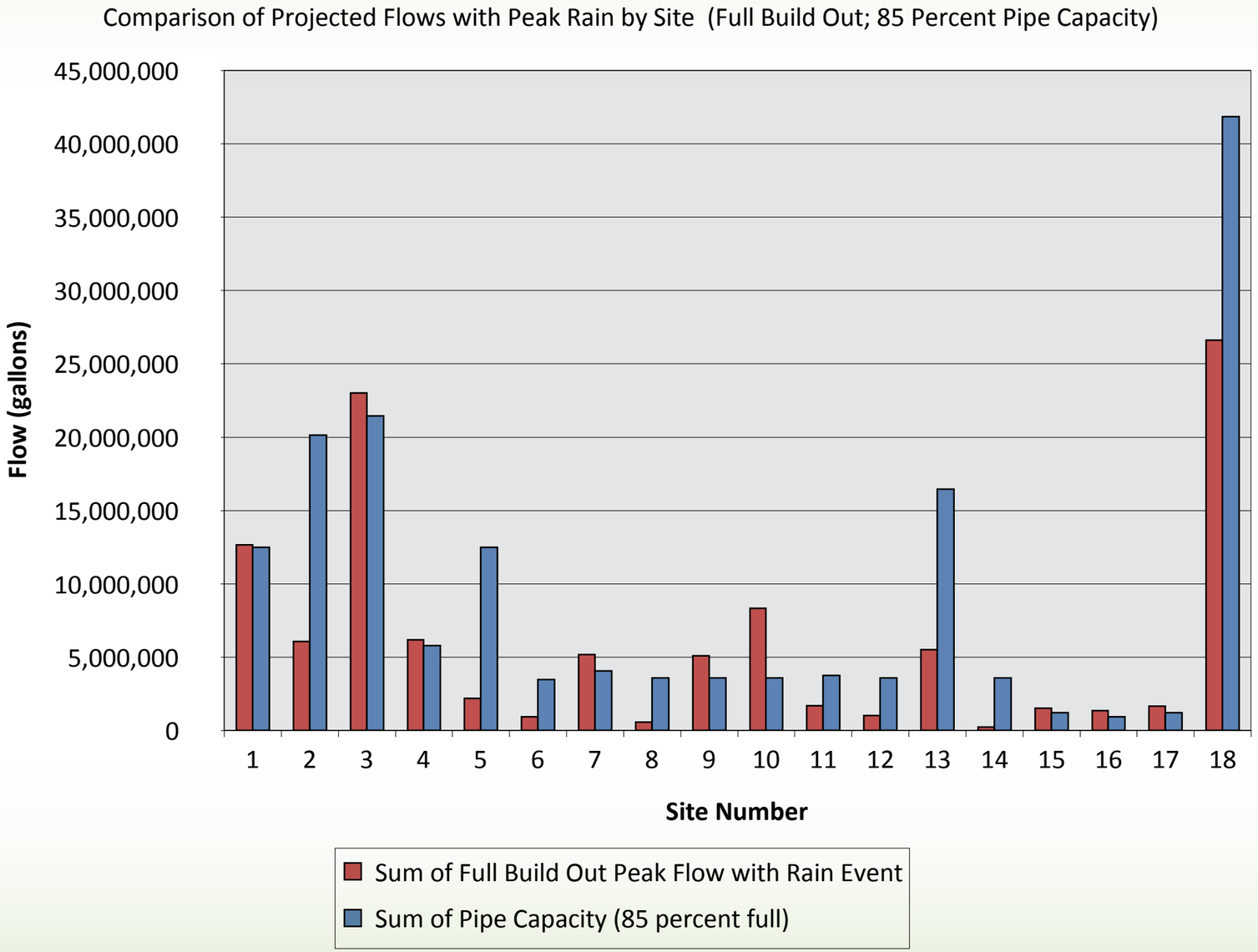
Below is a chart showing the highest water level experienced for each of the monitored sites and the corresponding pipe diameter. Except for Site 14, the highest water levels experienced were less than half pipe.



SANITARY SEWER COLLECTION SYSTEM: CAPACITY ANALYSIS

FULL BUILD OUT ANALYSIS

The chart below shows a comparison of the full build out projected flows of the service area with pipe capacity for each site during a rain event at peak hourly flow.



SANITARY SEWER COLLECTION SYSTEM: CAPACITY ANALYSIS

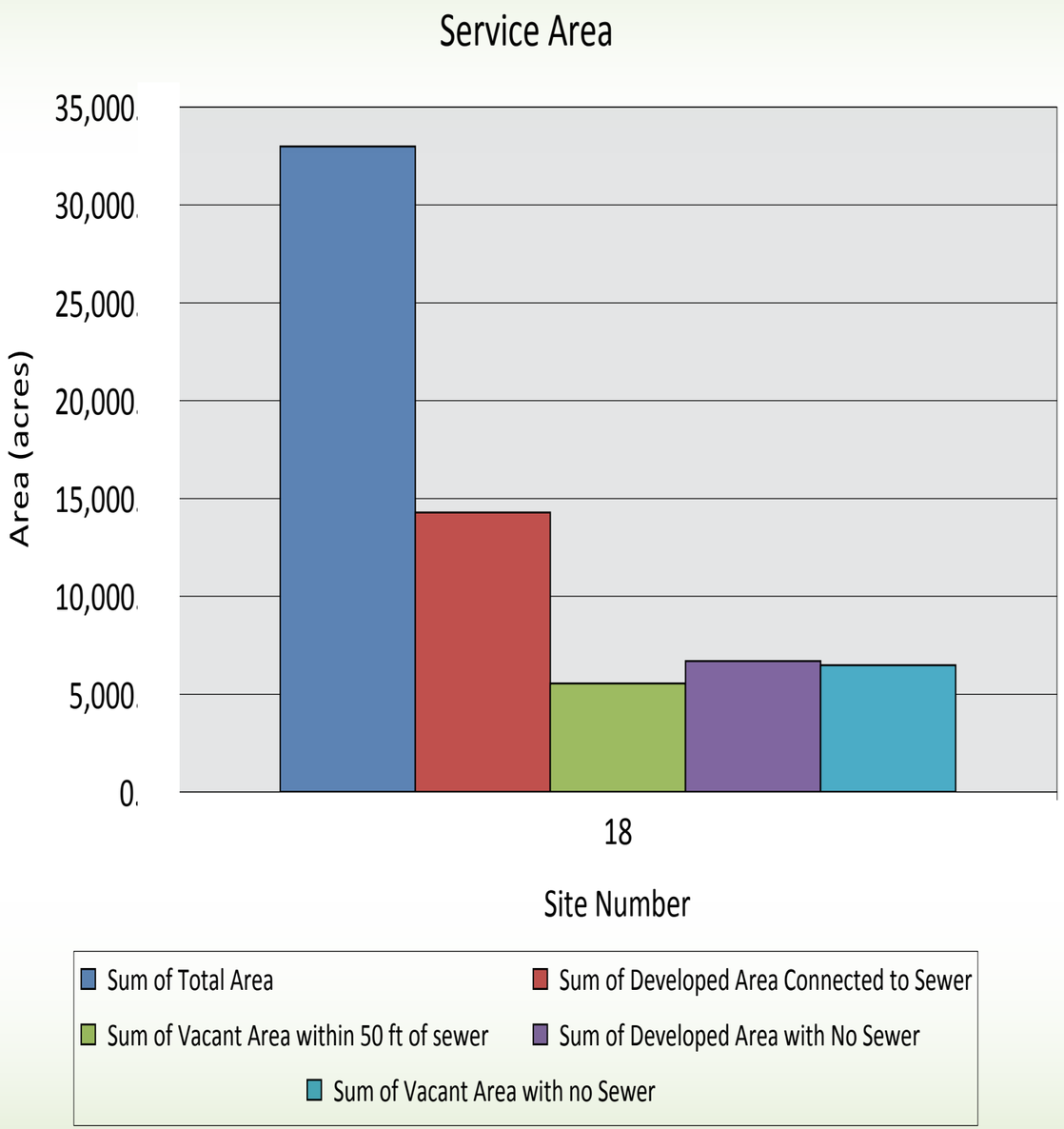
For analyzing purposes, the split flow manholes were assumed to be completely open in the direction being analyzed which results in highest flows for each site. The chart shows that Site 2 has 14 million gallons of residual capacity, while site 1 and site 3 are over capacity. Therefore diverting flows to site 2 by adjusting split flow manholes 3 and 4 will allow site 3 and site 1 to operate below pipe capacity.

As mentioned above in order to estimate the worst case scenario, each site's tributary area flow estimates were based on what sewer lines could drain to the site not taking into account the systems split flow capabilities. In the case of Site 10 and Site 4, these sites have a common area of approximately 5,000 acres. This shared area results in an over estimation of approximately 5,000,000 gallons for the Full Build Out Peak Flow with Rain Event which is the amount the system appears to be under capacity. Therefore, Site 10 and Site 4 will be right at capacity.

The graph shows the system is over capacity for full build out conditions for Sites 7, 9, 15, and 16. It is recommended that these sites be monitored and assessed again in future master plans.

Site 18 is the location where all flows converge at the treatment plant. Based on the graph, 35% pipe capacity remains after receiving full build out peak flow with rain event full. Site 18's tributary area is the City's Sewer Service Area.

To the left is a graph showing the area of properties served and not served (does not include Right Of Way) with sewer within the Service Area. About 43 % percent of the property within the service area is connected to sewer.



SUMMARY

The sewer system has adequate capacity to handle future flows for the next twenty years and system improvements will be condition driven and not capacity driven. Although, the full build out scenario was evaluated it is not recommended to upsize capacity based on the full build out analysis for the following reasons:

1. Assumptions for full build out conditions are very difficult to predict since zoning/land use changes over time. The zoning/land use assumption used for full build out conditions are very conservative resulting in high full build out flows.
2. Paradigm Shifts - These shifts can radically change the needs/improvements of the system. A good example of a shift is the water conservation efforts. This has resulted in reduced flows to the collection system. The current flows are similar to flows experienced in 1990. The City's effort in water conservation will continue and the 80 gallons per day per capita wastewater discharge will be further reduced in the future.

SANITARY SEWER COLLECTION SYSTEM: REHABILITATION HISTORY

REHABILITATION HISTORY

As the sewer collection system of Santa Fe ages, the need for sewer line rehabilitation or replacement increases. It is not simply age alone but the changes caused by the City as it grows and the physical processes occurring over time within the sewer pipe that drives the need for rehabilitation/replacement. Some of the factors that drive this need are:

- Insufficient pipe capacity
- Structural failure of the pipe
- Corrosion issues from hydrogen sulfide
- High replacement costs, disruption to the public and the general health, safety and public welfare due to the location of the sewer pipes within developed areas

Available records indicate that trenchless style sewer line rehabilitation work in Santa Fe can be documented back to 1993 beginning with a pipe bursting project. In 1998 through 2001 the City completed the Three Year Sanitary Sewer Rehabilitation and Replacement Capital Improvement Project CIP 654. The project utilized open trench, pipe bursting and Cured-In-Place-Pipe rehabilitation/replacement methods. This was also the first time the Cured-In-Place-Pipe method was used in the City of Santa Fe. The project utilized an outside engineering firm to survey, video and analyze the City's sewer system to identify the pipe segments needing rehabilitation and to prepare and administer the contract documents. The overall project cost was approximately three (3) million dollars on top of which a substantial percentage went to pay for these engineering services. After the completion of the project the Wastewater Division recognized that it had the staff, equipment and knowledge to complete its own rehabilitation projects without the need for outside engineering services. In 2004, the Wastewater Division successfully issued its first in-house request for bids for CIP 934, a 1.1 million dollar pipe bursting project. The project was unique in that all sewer system analysis, contract documents and project management were completed using Wastewater Division staff. Since this time all subsequent Wastewater Division CIP sanitary sewer rehabilitation/replacement projects put out for public bid have been prepared and managed using Wastewater Division staff. As of the date of this study the following in-house contracts for CIP projects have been executed by the Wastewater Division:

- 2004 CIP 934 – Pipe Bursting – 1.1 million dollars
- 2005 to 2009 CIP 935 – Pipe Bursting – 1.2 million dollars
- 2011 CIP 943 – Cured In Place Pipe (CIPP) – 2.25 million dollars
- 2013 CIP 946 – Cured In Place Pipe (CIPP) -1.17 million dollars
- 2015 CIP 949 – Cured In Place Pipe (CIPP) – 1.63 million dollars

SANITARY SEWER COLLECTION SYSTEM: REHABILITATION HISTORY

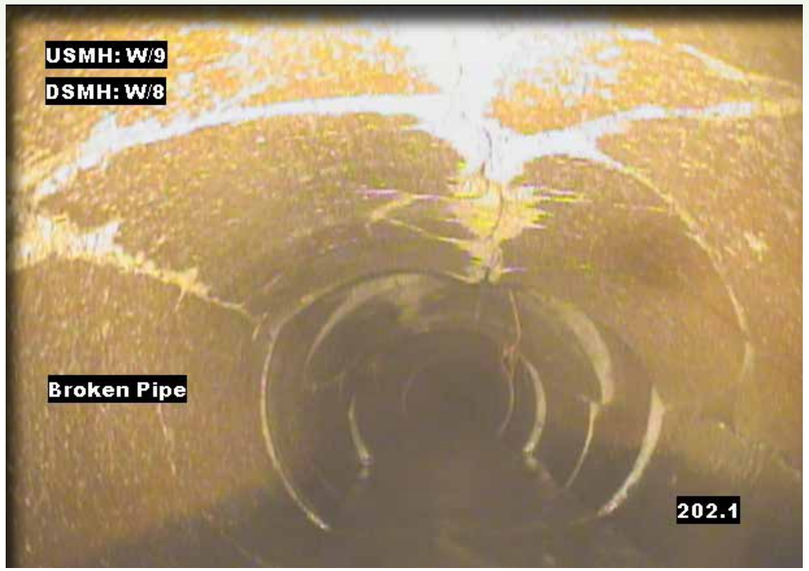
REHABILITATION METHODS-HISTORICAL EVALUATION

Since 1993 the sewer rehabilitation methods that have been used by the City are:

- Open Trench
- Fold and Form
- Pipe Bursting
- Cured-In-Place-Pipe (CIPP)

As of the date of this report there has been approximately 171,620 linear feet of City public sewer pipe rehabilitated or replaced utilizing one of the above list methods. ***(SEE REHABBED SEWER MAP - PAGE 38)*** The fold and form method was used in Santa Fe during the early 1990's. The process involved installing a flexible foldable PVC liner thru the sewer pipe, inflating and heat curing the pipe. The use of the method has not been continued since problems developed later with pipe expansion/contraction and the resulting sewer service connections shifting and offsetting.

Pipe bursting as a rehabilitation method was used in 1993 and 1995 CIP projects and was recognized as a preferable method over the fold and form method. The pipe bursting method also offered the advantages of being able to increase the size of the existing sewer line and was very effective in preventing future root intrusion due to the requirement for replacing and reconnecting a portion of the sewer service lines. In 1998 to 2001, the City's Three Year Sanitary Sewer Rehabilitation and Replacement Capital Improvement Project CIP 654 utilized the open trench and pipe bursting methods and introduced the use of the cured-in-place-pipe method to the City. Much of this work was done in the Plaza and older areas of the City for six (6) and (8) inch diameter clay and concrete pipe installed prior to 1940 utilizing the pipe bursting technique. The pipes in the older portions of Santa Fe were selected for their structural damage and the associated root intrusion problems causing stoppages. Much of the six (6) and eight (8) inch clay and concrete pipe had offset joints and structural issues from cracks to missing pieces of pipe making them difficult to maintain. The pipes were in a condition where even the normal maintenance and cleaning of the sewer lines became problematic. Cleaning and maintenance and inspection equipment would get stuck in the sewer lines and have to be excavated to be removed. Small sections of pipe would collapse during normal maintenance. In addition, there were capacity issues with some of the six (6) inch diameter pipes due to increased development. This project also included the rehabilitation/replacement of 10,456 feet of existing 24 inch trunk sewer line starting at the Wastewater Plant which was increased to a new 30 inch trunk sewer line utilizing the combined methods of pipe bursting and open trench replacement. This section of sewer line replacement was needed to increase the capacity of the existing trunk sewer line serving the Wastewater Plant's current location. The line was replaced from the Wastewater Plant, up Airport Road and continuing up Agua Fria Road to its connection with San Felipe Road.



SANITARY SEWER COLLECTION SYSTEM: REHABILITATION HISTORY

From 2004 through 2009 the pipe bursting method was used almost exclusively for rehabilitation of sewer pipes in the six (6) to ten (10) inch range. Much of this work was in the older parts of the City where the pipe material was concrete or clay and there were issues with flow capacity, structural damage and severe root intrusion. Despite all the advantages of the pipe bursting method, it has a major drawback for its use in the older core area of Santa Fe. The older Santa Fe streets are narrow and the majority of the sewer lines are deeper than the other utilities. Many of the other utilities are overtop of the sewer lines. Excavation in these areas would require long periods of street closures with the resultant major impacts to local businesses and traffic. And there are the archeological requirements for excavating and the impact to historical buildings and nearby utilities from vibration. The use of the pipe bursting process has to be site appropriate.

In 2010, the Wastewater Division executed an in-house project utilizing New Mexico State Grant Funds to be used for the design and installation of new public water and sewer lines for an existing community located across from Frenchy's Park. The project design called for the connection of a new 8 inch sewer line to the existing 18 inch concrete trunk sewer line in Agua Fria Road. Upon trying to make the connection to this existing trunk sewer line, it was discovered that the existing 18 inch concrete line was severely damaged from corrosion caused by hydrogen sulfide. The subsequent investigation of this concrete trunk sewer line showed that there were sections where the crown of the pipe had completely corroded to the point of exposing the earth above the pipe. Because of this one incident the Wastewater Division determined immediately to become proactive in its investigation of the City's trunk sewer line system.

The continued investigation of the City's concrete trunk sewer lines indicated that there was deterioration of the City's concrete trunk sewer pipes in several of the major trunk sewer lines. During the investigation of the trunk lines, which involved TV camering and the cleaning of the sewer lines, a section of 15 inch concrete pipe collapsed in Alameda Road near the Casa Solana shopping center in May of 2012. It took twenty one (21) consecutive days working around the clock, excavation, monitoring, traffic control and by-pass pumping to complete the repair work utilizing open trench excavation. It caused disruption to the public and businesses and cost nearly a half million dollars to replace approximately 800 feet of pipe in Alameda Road as a result of this one collapse. One very important fact and lesson was learned by the Wastewater Division staff from this experience; the repair of a sewer line collapse in a major roadway or other high impact area is far more expensive and disruptive than rehabilitating the sewer line before it collapses.

Other lessons gained by this experience were improved methods and techniques that are required to respond to a sewer line collapse. After the sewer line collapse, internal group brainstorming meetings were held with the Collection and Engineering sections of the Wastewater Division to evaluate our performance, where our weaknesses were as well as our strengths and how we could improve. Also, equipment necessary and used when dealing with a sewer line collapse or overflow was identified and assembled for quick mobilization and response; items such as generators, night lights, additional lengths of pump suction and discharge hose, hose clamps, radio chargers, flashlight chargers, portable gas powered water pumps and so on. Most of this equipment now fits in an enclosed trailer which can be delivered to the site for immediate use.

SANITARY SEWER COLLECTION SYSTEM: REHABILITATION HISTORY

PIPE BURSTING AND CURED-IN-PLACE PIPE: THE CURRENT METHODS FOR REHABILITATION

Pipe bursting and CIPP sewer rehabilitation methods have been used in Santa Fe for more than 20 years. During this time the Wastewater Division has had the opportunity to gain first-hand experience as to the advantages and disadvantages of each method. As mentioned earlier, pipe bursting is not the end-all, cure–all method for every situation. No method is. The pros and cons of each method must be evaluated against the type of work to be accomplished and its location. The Wastewater Division recognizes that sewer line rehabilitation technology is always improving and requires keeping abreast of the changing technology.

Open trench excavation of sewer lines for rehabilitation purposes is a last resort. It generally takes longer, costs more and is typically the most disruptive method to employ.

PIPE BURSTING: PROS AND CONS

The following are some of the pros of the pipe bursting method using high density polyethylene pipe (HDPE) for sewer line rehabilitation/replacement:

- HDPE pipe has a service life of 100 plus years
- Smooth interior
- The HDPE pipe is fusion welded making for a continuous run of pipe with no gasket joints between manholes
- Pipe bursting allows for increasing the size of the original host pipe.
- Can help eliminate sags or bellies in the existing host pipe
- When sewer service reconnections are involved, the replacement of the service connections helps reduce or eliminate root intrusion and infiltration/ exfiltration problems
- Can eliminate infiltration/exfiltration of the sewer pipe
- It is generally less expensive than open trench replacement
- It is generally faster and less disruptive to the public and businesses than open trench methods
- Does not require extensive pipe cleaning prior to installation
- The pipe bursting technology has been in use for over three decades. This has allowed for incorporation of the technology by Contractors which leads to competitive bids

The following are some of the cons of the pipe bursting method using high density polyethylene pipe (HDPE) for sewer line rehabilitation/replacement:

- Requires excavation of insertion pits and service line reconnection pits with the associated costs and disruption to the public and businesses at the work site
- Requires by-pass pumping
- Generally costs more than the cured-in-place-pipe replacement methods
- Generally takes more time to complete work than the cured-in-place-pipe replacement methods
- May not be appropriate for use on deteriorated pipe
- Can cause ground heaving
- Can have a negative impact on surrounding utilities and structures
- Archeological concerns from excavation
- Vibrational/compaction concerns to surrounding buildings and utilities

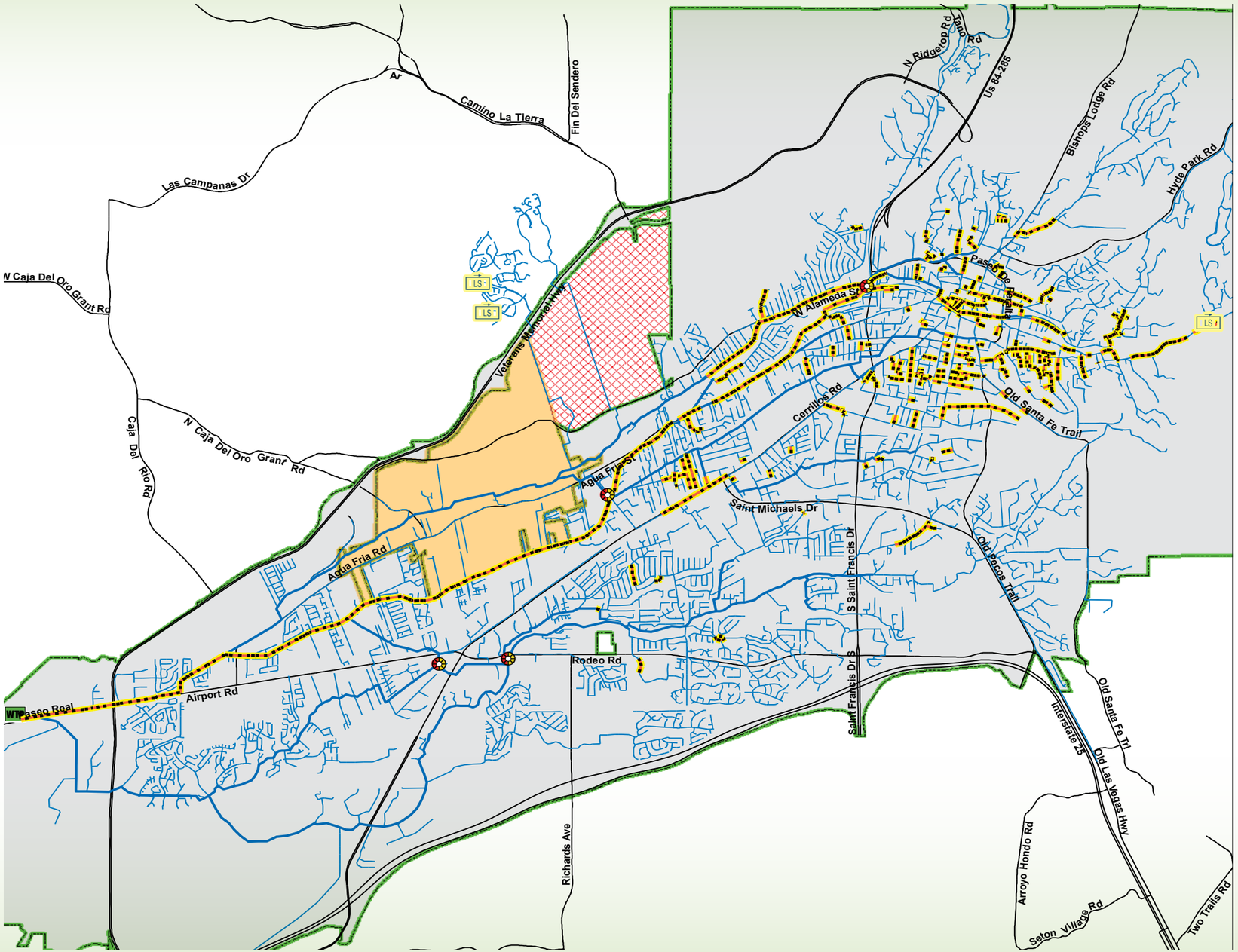
CURED IN PLACE PIPE: PROS AND CONS

The following are the pros of the Cured In Place Pipe (CIPP) method using a resin impregnated liner cured using steam, hot water or UV light for sewer line rehabilitation:

- Has a minimum design life of 50 years
- Is generally less expensive than open trench or pipe bursting methods
- Service line connections can be reinstated from inside the host pipe without excavation
- Complete installation of the liner is possible within a 24 hour time period
- Smooth interior
- No joints
- CIPP technology has been in use for over three decades. This has allowed for incorporation of the technology by Contractors which leads to competitive bids.
- It tends to decrease issues with root intrusion and infiltration/exfiltration of the sewer pipe
- No digging aids in archeologically sensitive sites and buildings
- No impacts to existing utilities in immediate area

The following are the cons of the Cured In Place Pipe method using a resin impregnated liner cured using steam or hot water for sewer line rehabilitation:

- Protruding services must be removed
- Requires cleaning of the existing sewer line
- Smell associated with curing process
- By-pass pumping required
- Potential for roots to re-enter sewer main line through sewer service connections



City of Santa Fe
Rehabbed Sewer Map

Legend

MHTYPE

- Lift Station
- Splitter Box
- RehabbedLines
- Trunklines
- Agua Fria Traditional Historic Community
- City Limits
- Presumptive City Limits

City of Santa Fe Public Utilities

Wastewater Management Division

0 0.5 1 2 Miles

N W E S

Date: 10/30/2015

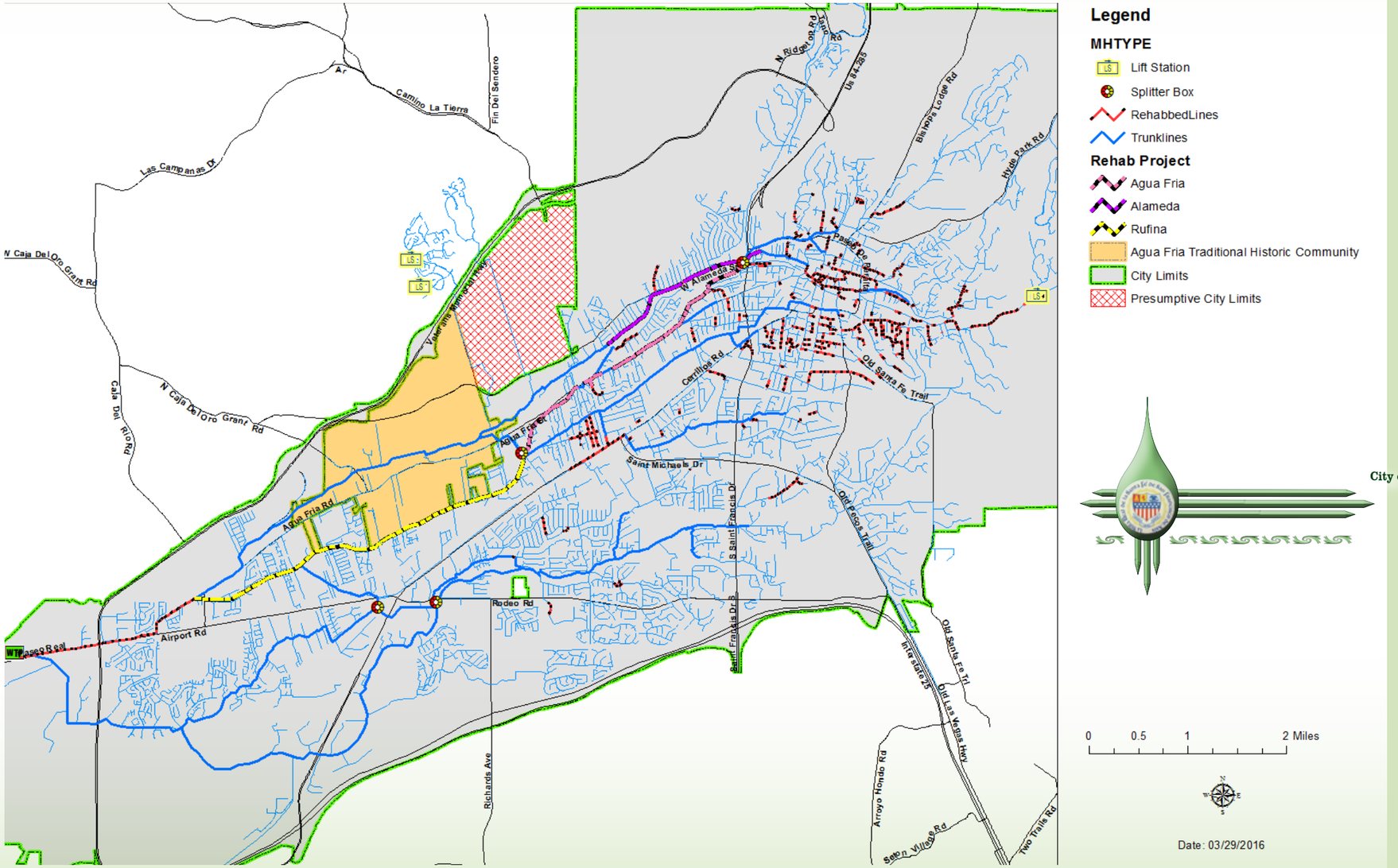
SANITARY SEWER COLLECTION SYSTEM: CONDITION ASSESSMENT

Starting in 2010, the Wastewater Division's emphasis for sewer line rehabilitation became primarily focused on concrete trunk sewer lines. Prior to this time sewer line rehabilitation had focused upon sewer lines installed before 1950 and which were located more in the central, older portions of the City of Santa Fe. Historically, trunk sewer lines were assessed through manhole inspections to verify flow levels and to look for evidence of surcharging. Because of the high flow volumes, the trunk lines were thought to be self-cleaning and too large for a blockage. Historically, the trunk sewer lines had not been prone to stoppages. The industry as a whole tended to view sewer trunk lines as self-scouring and therefore there was little incentive to maintain and inspect. Also, trunk sewer lines are difficult and expensive to clean, extremely difficult to televise and most work has to be performed at night when the flows are low.

In 2010, the Wastewater Division became aware that there was a corrosion problem with a concrete trunk sewer line segment in Agua Fria Road. This discovery led to a subsequent inspection process and identification of three (3) concrete trunk sewer line networks that suffered from the same type corrosion problem. ***(SEE MAP - THIS PAGE)*** These trunk sewer line networks were identified as the;

- Agua Fria Trunk Sewer Line
- Alameda Trunk Sewer Line
- Rufina Street Trunk Sewer Line

All three were concrete lines were in the advanced stages of deterioration. It was decided by the Wastewater Division to utilize the Cured-In-Place Pipe (CIPP) method as the most appropriate and cost effective method to use. In September 2011, the Agua Fria trunk sewer line rehabilitation project was started and as of June 2015, 45,813 feet or 8.7 miles of combined 15 inch to 30 inch diameter sewer lines for the three trunk sewer line networks identified above were completed and rehabilitated.



SANITARY SEWER COLLECTION SYSTEM: CONDITION ASSESSMENT

TRUNK SEWER LINES: CONDITION ASSESSMENT

There is approximately 240,000 feet of trunk sewer lines ranging from 12 to 36 inches in diameter within the City of Santa Fe sewer collection system. The majority of the pipe materials used for the trunk sewer lines have been clay, concrete, PVC and HDPE. The Wastewater Division has record drawings for the majority of the City's trunk sewer system which indicates the age and the type material used for the pipe. The CIPP, PVC, Spirolite and HDPE pipe comprise 54% of the City's trunk sewer system. This means that 54% of the City's current trunk sewer system is of a material type that has a long service life remaining, estimated in excess of 50 years. Clay pipe (13.62%) and concrete pipe (29.30%) combined comprise approximately 43% of the trunk sewer system. ***(SEE CHART THIS PAGE)***

The clay and concrete trunk sewer lines are the sewer lines that need to be assessed for their overall condition and their need for repair or rehabilitation. The first condition evaluated is the extent of corrosion damage caused by the sulfuric acid produced from hydrogen sulfide gas. The second condition used for evaluating these sewer pipes is their overall structural condition; items such as cracks, holes in the pipe, partially collapsed pipe, root intrusion and offset joints. Clay pipe shows little or no corrosion from hydrogen sulfide while concrete pipe and ferrous metals can be severely corroded by it. Video inspection of 95 year old clay pipe in Santa Fe has shown little or no harmful effects from hydrogen sulfide while the concrete pipe can be corroded to the point of non-existence in the presence of hydrogen sulfide. For clay pipe, structural defects are typically the reason for requiring rehabilitation. Because the clay pipe used in the City's sewer system does not corrode and is in better condition than the City's concrete sewer lines, the clay pipe was not included in the present conditional assessment. The Wastewater Division's experience has been that clay pipe tends to have localized structural issues where the repair may be made by replacing a small section of the existing pipe whereas concrete pipe tends to have global issues throughout its entire length depending on age and other factors and the repair can require the replacement of the entire section of pipe from one manhole to the next.

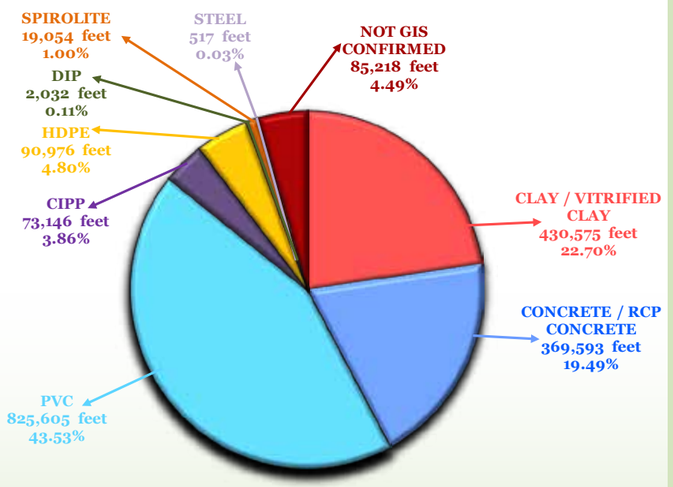
The available record drawings for the trunk sewer system were reviewed. Factors such as the type of pipe material (Clay, HDPE, PVC) or pipe age allowed sections of the trunk sewer system to be evaluated and removed from the list of trunk sewer line sections requiring rehabilitation. The remaining trunk sewer line segments were checked against a data base of digital sewer video inspections dating back to 2009. These sections of sewer line were identified and graphically represented within the Wastewater Division's GIS sewer mapping system to determine what additional sections needed to be videoed. It is not necessary to video inspect all sections of the concrete trunk sewer lines to determine their condition. A small percentage of video inspections conducted within strategically selected sewer lines can provide an accurate assessment of what is occurring for other sections of the sewer line. For the concrete trunk sewer lines, the GIS map was used to select locations causing turbulence with features known to increase the release and uptake of hydrogen sulfide. These were areas of a horizontal directional change of the pipes at the manholes or sections of steep sloped pipe changing to a flat slope. Along with the earlier completed videos, strategic sections of concrete trunk sewer were identified for video inspection and evaluation as part of this report.

Currently, for the City's trunk sewer system there is 76,253 feet of known trunk sewer concrete pipe remaining. Of this amount there are 13,050 of feet concrete pipe that was installed as part of the Tierra Contenta CIP trunk sewer line extension in 1987. Additionally, there is 12,210 feet of concrete pipe that was installed as part of the Agua Fria Phases 1 and 2 SR Trunk Sewer Rehabilitation project in 1987. Because the age of these two concrete sewer line systems is less than 30 years and spot checks indicate a good pipe condition, they were removed as current candidates for rehabilitation. These lines should be evaluated again with the next Master Plan. After the above listed lines were removed from the evaluation list, there remains 50,993 feet of known concrete trunk sewer line that should be rehabilitated within the next 10 years. These concrete trunk sewer lines are identified as the BR, ZR, BL, ZL and AL trunk sewer lines (SEE MAP 19)

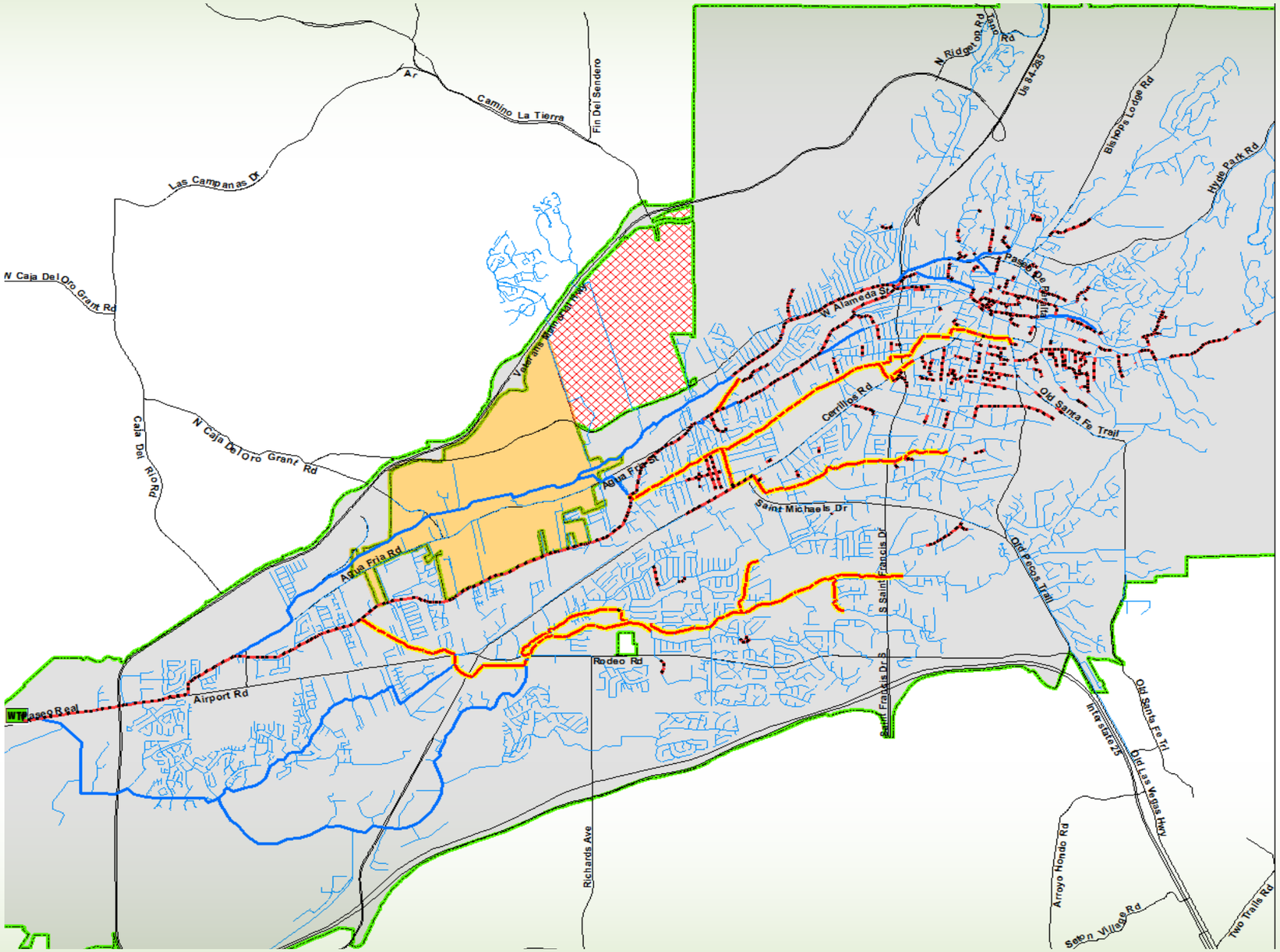
PIPE MATERIAL FOR PIPES 12" AND GREATER IN SIZE

MATERIAL	LENGTH (FEET)	PERCENT OF TOTAL
Clay/Vitrified Clay	430,575	22.70%
Concrete/RCP Concrete	369,593	19.49%
PVC	825,605	43.53%
CIPP	73,146	3.86%
HDPE	90,976	4.80%
DIP	2,032	0.11%
Spirolite	19,054	1.00%
Steel	517	0.03%
Not GIS Confirmed	85,218	4.49%
TOTAL ALL PIPES	1,896,716	100%

CITY OF SANTA FE
PIPE MATERIAL FOR PIPES 12" AND GREATER BY LENGTH AND PERCETAGE



Source: City of Santa Fe Wastewater Management Division



City of Santa Fe Future Rehabilitation Sewer Map

Legend

- RehabbedLines
- Future Rehab
- Trunklines
- Agua Fria Traditional Historic Community
- City Limits
- Presumptive City Limits

City of Santa Fe Public Utilities

Wastewater Management Division

0 0.5 1 2 Miles

Date: 03/29/2016

SANITARY SEWER COLLECTION SYSTEM: CONDITION ASSESSMENT

HIGH IMPACT AREA SANITARY SEWER LINES: IDENTIFICATION AND CONDITION ASSESSMENT

The cost of excavation to replace a collapsed sewer line going through a major intersection such as Saint Francis and Cerrillos Road can be ten times or greater than the cost would be if the sewer line had been identified and rehabilitated using trenchless technology prior to the collapse. This means what could have been a $70 to $100/foot trenchless technology sewer rehabilitation project is now a $700 to $1000/foot open trench method sewer line replacement project. This information is based upon the costs for an event that occurred when a 15 inch truck sewer line collapsed in Alameda Street near Saint Francis in May 2013.

For the purposes of this report a high impact area is a sewer line with one or more of the following characteristics;

- Passes under an arterial roadway, going from one side to the other and would require road closure to replace;
- Passes through the intersection of two arterial roads and would require the intersection closure to replace;
- Passes under a railroad track;
- The layout of the sewer line(s) in an arterial road would require the closure of all lanes going in one direction.

Based upon these criteria fifty-nine (59) sites were identified. (SEE APPENDIX ONE) The fifty-nine (59) sites were comprised of ninety-eight (98) separate sewer line segments. A sewer line segment is defined as the pipe located between two (2) manholes. Often there is more than one sewer line segment within the site. A conditional ranking system was used based upon the video inspections of the sewer line segments. After the video review it was determined that all the clay sewer line segments for which videos were available did not require rehabilitation. There is also PVC or ductile iron sewer line segments which because of their remaining service life were not considered for rehabilitation. The ranking system used was as follows;

RANK 1	CONCRETE PIPE REQUIRING REHABILITATION IN THE NEXT 1 TO 5 YEARS
RANK 2	CONCRETE PIPE REQUIRING REHABILITATION IN THE NEXT 5 TO 10 YEARS
RANK 3	CLAY PIPE – NO REHABILITATION REQUIRED
RANK 4	PVC OR DUCTILE IRON PIPE - NO REHABILITATION REQUIRED
RANK 5	NEEDS TO BE VIDEOED

The rankings for the ninety-eight (98) sewer lines segments comprising the fifty-nine (59) High Impact sites were as follows;

Rank 1 Totals = 20 Rank 2 Totals = 17 Rank 3 Totals = 28
Rank 4 Totals = 12 Rank 5 Totals = 21

Thirty-seven (37) of the sewer line segments are concrete and need to be rehabilitated in the upcoming one (1) to ten (10) year time period, forty (40) sewer line segments are a pipe material that does not require rehabilitation and twenty-one (21) sewer line segments still need to be videoed and assessed. A total of twenty-three (23) High Impact sites were removed from the rehabilitation list because all the sewer line segments within the site are in good condition, twenty-six (26) Hi Impact sites have sewer line segments within them in need of rehabilitation in the next ten (10) years and ten (10) High Impact sites need to be videoed and assessed.

CONTINUING SANITARY SEWER LINE CONDITION ASSESSMENT PROGRAM

As mentioned earlier, the Wastewater Division is increasing its use of the data management features of its Geographic Information Systems (GIS) program. All information about the City's sewer collection system such as type pipe, size, depth, age, location and condition can be stored, accessed and managed with the GIS. Information obtained from maintenance logs and video inspections are stored. Analysis that would have taken weeks or days can now be completed in a day or less. As the assessment program for the City's sewer collection system continues the information obtained will be stored in the GIS database. The analytical tools available through GIS will allow the Wastewater Division to make informed prioritized decisions regarding sewer system Capital Improvement Projects.

CONCRETE SANITARY SEWER LINE CONNECTIONS TO TRUNK SEWER LINES: IDENTIFICATION AND CONDITION ASSESSMENT

As noted earlier, concrete pipes are particularly susceptible to corrosion from hydrogen sulfide production. The Wastewater Division recognizes that connection of a concrete sewer line to a trunk sewer line is a point of increased attack for this corrosion. Video evidence has shown that a concrete line may exhibit mild to moderate corrosion along its length but then exhibit severe corrosion within a certain distance of its connection to a trunk sewer line. As this corrosion issue is typically limited to only concrete pipe, the Wastewater Division has currently identified seventy six (76) concrete sewer line connections to trunk sewer lines within the City's sewer collection system. These seventy six (76) pipe segments have been given a priority to be televised and evaluated as it is anticipated that these pipe segments will exhibit greater corrosion than the rest of the concrete pipe. Both pipe bursting and CIPP rehabilitation methods can be performed on the sewer pipe segments from one manhole the next. This means you can rehabilitate a section of line now and do the remainder of the associated line segments when they require rehabilitation. These seventy six (76) pipe segments will be videoed, assessed and added to our Capital Improvement Projects program as needed.

SANITARY SEWER COLLECTION SYSTEM: CONDITION ASSESSMENT

CONCRETE SANITARY SEWER LINES: IDENTIFICATION AND CONDITION ASSESSMENT

The City of Santa Fe's sewer collection system has approximately 300,000 feet of six (6) to ten (10) inch diameter concrete sewer pipe. To attempt a repair or a new sewer service connection to a concrete sewer line segment in the advanced stage of deterioration can trigger having to replace the entire length of sewer line by open trench excavation from one sewer manhole to another. The concrete pipe is so frail that making a secure replacement connection to the existing pipe is not possible. This is how a small repair can turn into a major replacement project. Concrete sewer pipe is dispersed throughout the City in various locations. Similar to the High Impact areas reviewed above, much of this concrete sewer line is located in the arterial and secondary roadways of Santa Fe. A collapse or failure of one of these lines may not have the same impact intensity as the High Impact areas but replacing them would require a partial road closure or lane reduction, great expense and disruption to the general public and businesses. An example of this would be a concrete sewer line in Cerrillos Road that would require the closure of one to two lanes of traffic in one direction with the associated access restriction to local businesses. The Wastewater Division will continue to use the GIS Assessment program to identify and evaluate the 299,533 feet of known concrete sewer line in our sewer collection system for the addition of these sewer lines to our Capital Improvement Projects program.

UNCONFIRMED SANITARY SEWER PIPE MATERIAL

There still remains approximately 85,218 feet of sewer lines for which the pipe material remains unconfirmed or unknown. Unfortunately, just opening the sewer manhole and looking inside often does not allow you to determine the pipe material. As part of the Wastewater Division's 2016/2017 CIP Budget, funds have been requested for a pole camera. The pole camera is a HD digital recording zoom camera with lights that allows the camera to be placed at the sewer line opening and view the pipes interior. The pole camera will allow the Wastewater Division to quickly, efficiently and safely conduct these sewer line and manhole inspections for the unconfirmed lines. The pole camera will be used for QA/QC of our existing sewer lines for confirmation of material type where no video records are available. The GIS system will be updated and the video information will become part of our GIS Assessment program where the information can be accessed and reviewed.

CLAY SANITARY SEWER PIPE

Clay pipe comprises over 430,000 feet of the City's approximately 1,900,000 feet of sewer pipe. The factors that require a repair or replacement/rehabilitation for clay pipe are not caused by pipe corrosion but rather are structural issues such as cracks, holes in the pipe sections, partially collapsed pipe and severe root intrusion. The clay pipe system can typically be maintained and repaired using traditional sewer maintenance methods that include conventional cleaning methods and repairs that can usually be confined to a short section of pipe. The repair/replacement of a short section of clay pipe typically will not trigger the replacement of an entire section of pipe between manholes like concrete pipe. The Wastewater Division's maintenance strategy for clay pipe is geared more toward detecting the structural defects for remediation by standard cleaning methods, root control measures or performing a "spot" repair to a short section of pipe. These spot repairs are performed by a contractor under a competitively bid contract for on-call services with the Wastewater Division. However, there are times when it is determined due to the pipes depth, location, existing utilities in the area and other factors that the clay pipe is added to the Wastewater's Division Capital Improvement Projects program for rehabilitation with trenchless technologies.

SANITARY SEWER COLLECTION SYSTEM CIP REHABILITATION & REPLACEMENT PROGRAM: ESTIMATED COSTS, TIMELINES AND BUDGET

The City of Santa Fe's sanitary sewer collection system is comprised of pipes of varying size, material and age. A goal of this master plan was to complete a condition assessment of the existing sanitary sewer collection system with the purpose of identifying those portions of the sewer collection system that have or are close to reaching the end of their useful service life.

Two (2) condition concerns for sanitary sewer pipe are;

1. Factors such as root intrusion, missing or badly cracked pipe, grease , debris, etc. that cause obstructions within the sewer lines with the resultant blockages and overflows and;
2. Structural material failures which can lead to a collapse and cause blockages, overflows and require replacement of the pipe at a high cost.

It is apparent that the PVC, HDPE and Spirolite pipe materials within the collection system still have long service lives remaining and can be kept free of obstructions with routine maintenance. Clay pipe is prone to cracks and root intrusion identified in condition 1 above and typically requires more routine maintenance than the plastic pipes. Clay pipe has not exhibited the structural failure from corrosion as seen with some of the concrete pipes within the system. Clay pipe will crack and fail but to repair this type of failure typically does not require global replacement or rehabilitation of the entire sewer line segment as concrete pipe often will. Of the sewer pipe materials found in the sewer collection system, concrete pipe currently exhibits the greatest conditional risk and immediate need for a replacement/rehabilitation program. The video evidence indicates that much of the remaining concrete pipe has reached the end of its service life or will do so in the next twenty (20) years.

Below is a list of CIP projects and their associated present day costs for the rehabilitation of concrete pipe that has been identified within the sanitary sewer collection system. The costs are based upon bid prices from the three (3) previous CIP rehabilitation projects the Wastewater Division completed using the Cured-In-Place-Pipe method.

CIP PROJECTS

The City's trunk sewer system is comprised of approximately 51,000 feet of concrete pipe that requires rehabilitation to be completed within the next ten (10) years because of corrosion and the increased risk of structural failure of the pipe. ***(SEE TABLE)***

CITY WIDE CONCRETE TRUNK SEWER LINES 12" AND LARGER REQUIRING REHABILITATION WITHIN THE NEXT 10 YEARS ESTIMATED COSTS FOR REHABILITATION WITH THE CIPP PROCESS

SIZE (in.)	LENGTH (ft.)	COST/FOOT	TOTAL COST
12	13,152	$55	$723,360.00
15	11,980	$60	$718,800.00
18	22,387	$70	$1,567,090.00
21	364	$90	$32,760.00
24	3,110	$95	$295,450.00
TOTAL	50,993		$3,337,460.00
TRAFFIC CONTROL @ 10%			$333,746.00
CONTINGENCIES @ 20%			$667,492.00
SUBTOTAL			$4,338,698.00
NMGRT 8.3125%			$352,844.61
TOTAL			$4,691,542.61

Within the City's sewer collection system, twenty-six High Impact sites have been identified with concrete sewer pipe that requires rehabilitation to be completed within the next ten (10) years because of corrosion and the increased risk of structural failure of the pipe. ***(SEE TABLE)***

HIGH IMPACT AREAS - ESTIMATED COSTS FOR SEWER LINES TO BE REHABILITATED WITH CIPP PROCESS

SIZE (in.)	LENGTH (ft.)	COST/FOOT	TOTAL COST
6	200	$55	$11,000.00
8	5,782	$45	$260,190.00
10	768	$50	$38,400.00
12	611	$55	$33,605.00
15	1,018	$60	$61,080.00
18	959	$70	$67,130.00
21	0	$90	$0.00
24	0	$95	$0.00
TOTAL			$471,405.00
TRAFFIC CONTROL @ 30%			$141,421.50
CONTINGENCIES @ 20%			$94,281.00
SUBTOTAL			$707,107.50
NMGRT 8.3125%			$57,505.52
TOTAL			$764,613.02

SANITARY SEWER COLLECTION SYSTEM CIP REHABILITATION & REPLACEMENT PROGRAM: ESTIMATED COSTS, TIMELINES AND BUDGET

In addition to the concrete pipe identified in the City's trunk sewer system, the City's sewer collection system is comprised of approximately 300,000 feet of concrete pipe sized ten (10) inches or less that requires rehabilitation to be completed during the next twenty (20) years because of corrosion and the increased risk of structural failure of the pipe. Because the age and rate of corrosion for this concrete pipe varies, a portion of the 300,000 feet of concrete pipe still has a service life remaining but this service life is not expected to exceed twenty (20) years. (SEE TABLE)

CITY WIDE CONCRETE SEWER PIPE 10" AND SMALLER REQUIRING REHABILITATION WITHIN NEXT 20 YEARS WITH CIPP PROCESS

SIZE (in.)	LENGTH (ft.)	COST/FOOT	TOTAL COST
6	20,000	$55	$1,100,000.00
8	258,000	$45	$11,610,000.00
10	24,000	$50	$1,200,000.00
TOTAL	302,000		$13,910,000.00
TRAFFIC CONTROL @ 10%			$1,391,000.00
CONTINGENCIES @ 20%			$2,782,000.00
SUBTOTAL			$18,083,000.00
NMGRT 8.3125%			$1,470,599.98
TOTAL			$19,553,599.98

CIP REHABILITATION & REPLACEMENT PROGRAM

The Wastewater Division has identified concrete pipe as posing a substantial condition risk within the sewer collection system for the upcoming twenty (20) year time span. There will be other pipe segments of differing material that will be identified in the future by the on-going sewer line maintenance and assessment program and these lines will be added to the CIP Rehabilitation & Replacement Program. It is fortunate that the concrete pipe was not installed at the same time and that it does not corrode at the same rate. This fact is what allows for a time projection of 20 years for rehabilitating the existing concrete pipe system.

The combined cost of the ten (10) year program for the trunk sewer lines and High Impact sewer lines is $5,456,155.63 dollars. The cost of the twenty (20) year program for the ten (10) inch and smaller diameter concrete sewer lines is $19,553,599.98. The total amount in today's dollars for the twenty (20) year program comprised of the three (3) CIP Projects listed above is $25,009,756.

The proposed budget for the CIP Rehabilitation & Replacement Program is to allocate two (2) million dollars in fiscal year 2016/2017. Thereafter, the budget plan is to complete a two (2) million dollar CIP Rehabilitation & Replacement Project every two (2) years. The CIP Project bid documents and construction administration would be performed by Wastewater Division staff. The two (2) year time interval between CIP projects allows for a realistic time to complete one project and prepare for the next. ***(SEE TABLE)***

TOTAL YEARS	0	2	4	6	8	10
FISCAL YEAR	2016/2017	2018/2019	2020/2021	2022/2023	2024/2025	2026/2027
AMOUNT SPENT IN FISCAL YEAR	1.5 MILLION	2 MILLION	2 MILLION	2 MILLION	2 MILLION	2 MILLION
TOTAL CUMULATIVE AMOUNT	1.5 MILLION	3.5 MILLION	5.5 MILLION	7.5 MILLION	9.5 MILLION	11.5 MILLION

At the completion of the 2026/2027 fiscal year, 11.5 million dollars in funds will have been spent. Approximately 5.5 million dollars will have been used for completing the concrete sewer trunk lines and High Impact lines identified above. The remaining 6 million dollars goes toward the continuing rehabilitation of the smaller diameter concrete sewer lines. Many of these concrete sewer lines are within major non-residential roads such as Cerrillos Road, Saint Francis Drive, Old Santa Fe Trail and Paseo de Peralta. These lines and others would be evaluated and ranked according to risk and condition as part of the on-going sewer collection system assessment program.

REPAIR AND MAINTENANCE

EROSION

WASTEWATER PLANT

Santa Fe Wastewater Management
Mission Statement

It is the primary mission and objective of the Wastewater Management Division to ensure that all sanitary sewage produced within the City's service area is collected, conveyed and treated in compliance with local, state and federal regulations and guidelines, and to protect the public's environment health/safety, and welfare. It is also this division's primary mission to provide these services to the public and to do so within budget.

City of Santa Fe Public Utilities

Wastewater Management Division

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