Wastewater Master Plan Summary Report

FINAL

Town of Addison Wastewater System Master Plan

LNV Project No. 130306

Submitted to:

Town of Addison

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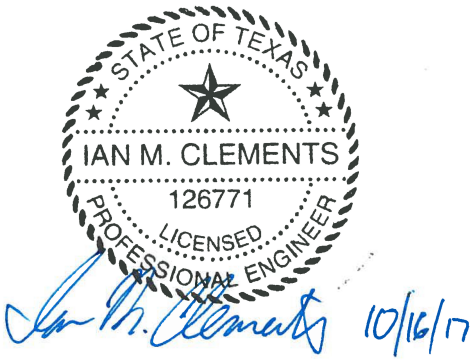
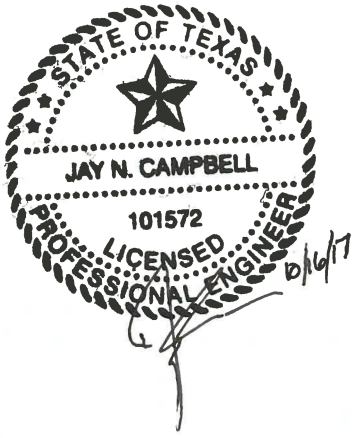




October 16, 2017

Table of Contents

Tables

Figures

Exhibits

Appendices

ES 1 Executive Summary

The Town of Addison (ToA) Wastewater Master Plan Summary Report document summarizes and highlights key aspects from a collection of reports, prepared by LNV, Inc., that evaluated the capacity and condition of many of ToA's wastewater collection system assets.

ES 1.1 Phase 1 and Phase 2 SSES

The Phase 1 Sanitary Sewer Evaluation Survey (SSES) was conducted during fiscal year 2013 and included closed-circuit television (CCTV) inspection of manholes and pipe segments identified to be in "Hot Spot" areas that had known issues or records of customer complaints. The Phase 1 SSES was the initial volume of the Master Plan and was issued in September 2013. The Phase 2 SSES was completed in 2015 and, while similar to the Phase 1 SSES, consisted of smoke testing and visual inspection of lines and manholes in areas suspected of having high Infiltration and Inflow (I/I). The Phase 2 SSES was updated again in 2016 to include results of additional physical survey, the Water Reuse Feasibility Study, and the Airport Evaluation.

ES 1.2 Modeling Report

The Modeling Report includes results of a wastewater collection system hydraulic computer model that simulated the hydraulic capacity and hydraulic performance of the ToA's wastewater collection system and its ability to sustain new growth and additional flow from rainfall derived infiltration and inflow (RDII). The hydraulic model should be updated periodically and could be used to evaluate capacity of lines serving future developments not accounted for in this report.

ES 1.3 Capital Improvement Plan Report

Each one of the previous reports delivered to ToA developed a list of project recommendations that would address and mitigate the deficiencies identified in each report respectively. The Capital Improvement Plan (CIP) Report provides the ToA with a summary listing of the recommended projects and their implementation costs for each basin in the ToA. The cost to rehabilitate the deficiencies identified during the previous efforts are summarized in **Table ES 1**. Each project cost includes a 30% construction contingency and 25% soft costs for design and construction (design fees, contract admin, inspection, insurance, etc.). Each deficiency was prioritized using the "Likelihood of Failure" and "Consequence of Failure", as discussed in detail in the Phase 1 and 2 SSES reports.

Table ES 1: Priority Cost Summary by Basin (All Projects)

BASIN	PRIORITY				Sub-Total by Basin (Priority 1 - 4)
	1	2	3	4	
A	$ -	$ 13,500.00	$ 103,000.00	$ 21,100.00	$ 137,600.00
BDGJ	$ 1,614,000.00	$ 226,400.00	$ 4,195,800.00	$ -	$ 6,037,000.00
C	$ 6,500.00	$ 46,200.00	$ 819,200.00	$ 32,700.00	$ 904,600.00
E	$ 336,200.00	$ 105,000.00	$ 880,200.00	$ 11,300.00	$ 1,332,700.00
F	$ -	$ 136,300.00	$ 1,164,600.00	$ 71,300.00	$ 1,372,200.00
H	$ -	$ 3,100.00	$ 322,700.00	$ 28,800.00	$ 354,600.00
I	$ -	$ -	$ 168,500.00	$ -	$ 168,500.00
K	$ -	$ -	$ 705,500.00	$ 1,100.00	$ 706,600.00
TOTALS	**$ 1,957,000.00**	**$ 531,000.00**	**$ 8,360,000.00**	**$ 167,000.00**	**$ 11,015,000.00**

LNV recommends that Priority 1 and 2 projects totaling $2,488,000 ($1,957,000 + $531,000) be implemented within the next 1 to 3 years. LNV suggests Priority 3 projects totaling $8,360,000 be implemented in the following 3 to 6 years. Priority 4 projects totaling $167,000 should be addressed annually based upon availability of the Addison's Wastewater Fund Accounts for capital improvements budget along with routine maintenance activities. LNV also suggests ToA consider financing options for the Priority 1, 2 and 3 projects.

Overall, the ToA's wastewater system proved to be in very good condition with relatively few capacity improvements required considering the size of the collection system. A map showing all the recommended Capital Improvement Plan projects is presented in **Exhibit 1**.

ES 1.4 Operations and Maintenance Recommendations

The ToA would benefit from an annual CCTV program aimed at compiling a comprehensive inventory of its collections system assets while simultaneously assessing the condition of the assets inventoried. This would build momentum for implementing a recurring cycle of inspection and assessment that would ultimately strengthen the Town's asset management program and result in a more proactive maintenance and repair program. Furthermore, Fats, Oils and Grease (FOG) awareness for the residents of ToA and implementation of Best Management Practices (BMP's) will also have a positive impact on the collection system as a whole.

1 Introduction

The Town of Addison Wastewater Master Plan Summary Report is a "living" document and subject to revision and is intended to unify and summarize all previous master plan efforts as shown in **Table 1**.

Table 1: Master Plan Deliverable Summary

Phase 1 SSES	2013
Phase 2 SSES (Including Phase 1 Update)	2017
Modeling Report	2017
Capital Improvement Plan Report	2017
Master Plan Summary Report	2017

1.1 Purpose

The purpose of this project is to provide the ToA with a Wastewater Master Plan document that identifies, prioritizes, and provides cost estimates for recommended improvements to the Town's wastewater collection system. The recommended improvements are intended to meet TCEQ regulatory requirements, eliminate potential for sanitary sewer overflows (SSOs), improve system performance, eliminate bottlenecks, and provide capacity for future growth. The purpose of this Master Plan Summary Report is to consolidate the results of previous efforts into a manageable document by emphasizing important areas of the previous reports, summarizing the methodology and recommendations of previous reports, and to make further recommendations for improvements or programs that are not included in the capital improvements plan.

1.2 Background

The Phase 1 Sanitary Sewer Evaluation Survey (SSES) was conducted during fiscal year 2013 and consisted of CCTV inspection of manholes and gravity sewer lines that were reported to be in "Hot Spot" areas where the likelihood of blockages and capacity issues were thought to be highest. The Phase 2 SSES was completed in 2015 and was similar to Phase 1 SSES, but did not include CCTV inspection of gravity lines and instead included smoke testing and visual inspection of manholes and the connecting lines. The Phase 2 SSES was updated to include results of additional physical survey, the Water Reuse Feasibility Study, and the Airport Evaluation in 2016. Additional survey and data collection was required to complete the hydraulic model of the ToA's collection system. The Modeling Report was completed in 2017 and detailed the development and use of a hydraulic wastewater model to evaluate collection system capacity and recommended capacity improvements. The subsequent Capital Improvement Plan (CIP) Report was also completed in 2017 and compiled, prioritized, and assigned costs to the recommendations from all previous reports. Detailed methodology, condition assessments,

evaluation criteria, and assumptions that were used in identifying the recommended improvements are discussed in the previously delivered reports listed in **Table 1**. Each of these report documents comprise the overall Wastewater Master Plan. Refer to **Figure 1** for an overview of Addison's wastewater collection system.

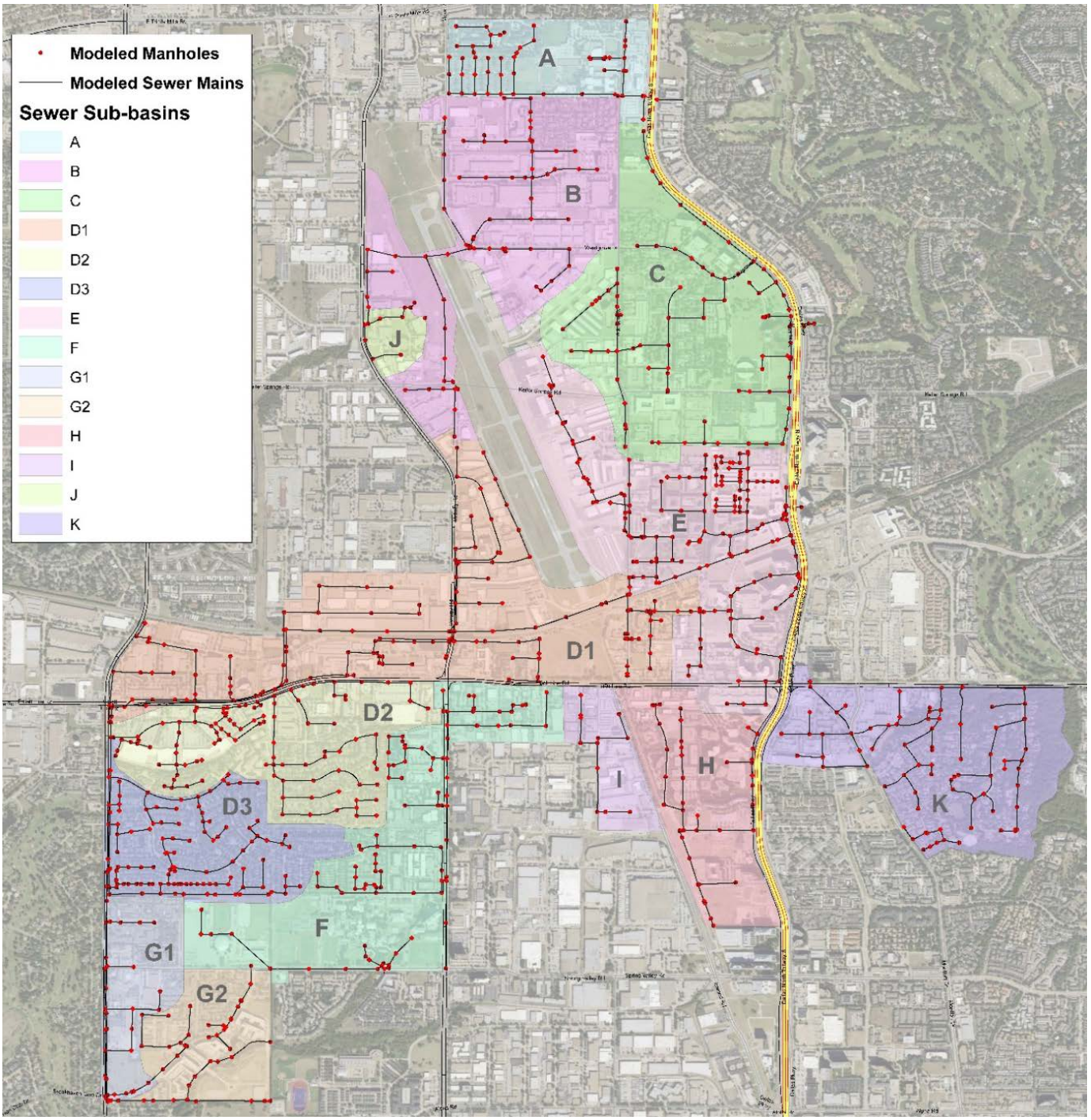


Figure 1: Addison Collection System Overview

2 Sanitary Sewer Evaluation Survey (SSES) Criteria and Results

The Phase 1 SSES report established the Level of Service (LOS) criteria discussed here as a set of baseline performance standards and evaluation criteria for existing and new wastewater collections system assets. LOS criteria are system-specific but always address Capacity, Management, Operation and Maintenance (CMOM) practices, particularly in areas where improvements are most needed and will yield the greatest benefits. Examples include:

- Ensuring adequate system hydraulic capacity for all service areas.
- Eliminating system bottlenecks due to pipe blockages.
- Reducing peak flow volumes through inflow/infiltration (I/I) controls.
- Providing rapid and effective emergency response service.
- Minimizing cost and maximizing effectiveness of CMOM programs.

The criteria discussed in the following sections closely follows the requirements of *TCEQ Rules and Regulations 30 TAC §217*.

2.1 Manholes and Gravity Wastewater Lines

The LOS Criteria for manholes and gravity wastewater lines are summarized below. A full discussion of the following criteria is presented in the Phase 1 and 2 SSES reports.

- Allowable surcharge during peak wet weather flow criteria.
    1. A Hydraulic Grade Line (HGL) not exceeding 3 feet below manhole rim elevation.
- Gravity wastewater pipes flowing full must have:
    1. Minimum flow velocity ≥ 2.0 ft/s
    2. Maximum flow velocity ≤ 10.0 ft/s

The LOS criteria presented in the Phase 1 SSES included an additional criteria of **d/D ≤ 2.0** where d is the depth of the water surface above the flowline of the pipe and D is the Diameter of the pipe. **It is recommended that this criterion be omitted** from the final ToA level of service criteria. This criterion is intended for systems, or portions of systems, that experience wide spread and chronic SSO's resulting from high RDII volumes and peak flow rates. **The ToA does not currently experience chronic or widespread SSO's nor does the hydraulic model predict such conditions**.

Structural integrity of manholes and gravity wastewater lines should be evaluated using the criteria outlined in the Phase 1 SSES report which loosely follows National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP) as summarized in **Table 2**. Additionally, non-PACP capable CCTV cameras may be deployed to conduct initial inspections that can qualitatively classify the manholes and lines and identify assets that need further inspection with PACP capable equipment.

Table 2: NASSCO Defect Grades

Defect Grade	Defect Condition	Rate of Pipe Deterioration
5	Immediate Attention	Pipe has failed or will likely fail within the next 5 years
4	Poor	Pipe will probably fail in 5 to 10 years
3	Fair	Pipe may fail in 10 to 20 years
2	Good	Pipe is unlikely to fail in at least 20 years
1	Excellent	Failure is unlikely in the foreseeable future

For the Town of Addison, the acceptable LOS will be considered as any pipe assigned a NASSCO Defect Grade from 1 to 3. Any pipe with a NASSCO Defect Grade above three will be considered unacceptable and should be scheduled for repair and/or replacement as soon as practicable.

2.2 Lift Stations and Force Mains

The LOS Criteria for Lift stations and force mains are summarized in **Table 3** and **Table 4**. A full discussion of the following criteria is presented in the Phase 1 and 2 SSES reports.

The LOS criteria for force mains includes the same structural and hydraulic integrity requirements and grading criteria used for gravity wastewater lines as discussed in **Section 2.1** and further detailed in the Phase 1 SSES.

Table 3: Force Main Velocity Criteria

Force Main Velocity Requirements			
Number of Lift Station Pumps	**2**	**≥ 3**	**Comments**
Min. Velocity (fps)	3	2	-
Min. Flushing Velocity (fps)	-	5	Must occur once daily
Max. Velocity (fps)	-	6	If velocity is > 6; must certify that pipe can withstand surge pressures

Source: TCEQ Rules and Regulations 30 TAC §217.67

Table 4: Lift Station Pump Cycle Time Criteria

Pump Horsepower	Minimum Cycle Time (*minutes*)
< 50	6
50-100	10
> 100	15

Source: TCEQ Rules and Regulations 30 TAC §217.60(b)(7)

The structural and hydraulic integrity of the wet wells should also be evaluated in a similar fashion as that presented in the manhole LOS discussion and further detailed in the Phase 1 SSES report.

2.3 CCTV Condition Assessment Inventory and Data Gaps

The Phase 1 and 2 SSES reports detail the methods and asset-by-asset results of the condition assessment performed under the scope of work for this Master Plan. As evident in **Table 5**, which provides an overview of lines that have been either CCTV'd or visually inspected, over 54,000 LF of lines were assessed which is equivalent to approximately 18% of the total system. The lines that are listed as "CCTV'd" have had a full PACP inspection done in FY 2013 and the CCTV video is available in the electronic files provided with the Phase 1 SSES report. Lines listed as Inspected were not CCTV'd but were visually inspected in FY 2014 at the connection to the manhole for diameter, material, and debris. A map of the CCTV'd and Inspected lines is included as **Exhibit 4**. Any lines observed to have debris or Fats, Oils, and Grease (FOG) were recommended for cleaning and CCTV inspection. Photos of the "Inspected" lines were provided in the Phase 2 SSES electronic files.

Table 5: SSES CCTV and Inspection Summary

Pipe Diameter (Inches)	Total Inventory (LF)	Percent by Diameter	Private Lines (LF)	Abandoned Lines (LF)	** Active Addison Inventory (LF)	†CCTV'd Lines (LF)	†*** CCTV'd (%)	† Inspected (LF)	†*** Inspected (%)	†CCTV'd or Inspected (LF)	†*** CCTV'd or Inspected (%)
*Under 6	17,105	5%	13,878	51	3,176	687	22%	-	-	687	22%
6	45,917	12%	27,420	-	18,498	3,149	17%	1,170	6%	4,319	23%
8	214,311	57%	21,248	7,561	185,502	11,028	6%	25,956	14%	36,984	20%
10	40,094	11%	893	-	39,201	1,333	3%	7,555	19%	8,888	23%
12	34,738	9%	860	3,419	30,459	1,600	5%	275	1%	1,875	6%
14	274	0%	-	-	274	-	-	-	-	-	-
15	5,153	1%	-	760	4,393	-	-	652	15%	652	15%
16	2,211	1%	-	-	2,211	-	-	-	-	-	-
18	4,924	1%	-	-	4,924	-	-	706	14%	706	14%
21	6,521	2%	-	-	6,521	-	-	363	6%	363	6%
24	7,442	2%	-	-	7,442	-	-	-	-	-	-
30	242	0%	-	-	242	-	-	-	-	-	-
Total	**378,932**	**100%**	**64,300**	**11,791**	**302,841**	**17,797**	**6%**	**36,677**	**12%**	**54,474**	**18%**

* All pipes reported to be smaller than 6-inch were modeled as 6-inch lines.

** Excludes Private and Abandoned Lines

*** Percent of Active Addison Inventory

† Excludes Private Services & Duplicate Inspections

As evident in **Table 5**, there are some considerable data gaps associated with overall CCTV inventory that could be addressed by implementing an annual CCTV inspection program. Having assessed 18% of the system under this scope of work provides a good foundation of field assessment that can be built upon during future CCTV efforts.

A summary of pipe material by diameter is presented in **Table 6**. The materials listed in the table were obtained from either the ToA existing GIS basefile or from field observations made during the Phase 1 and 2 SSES assessments.

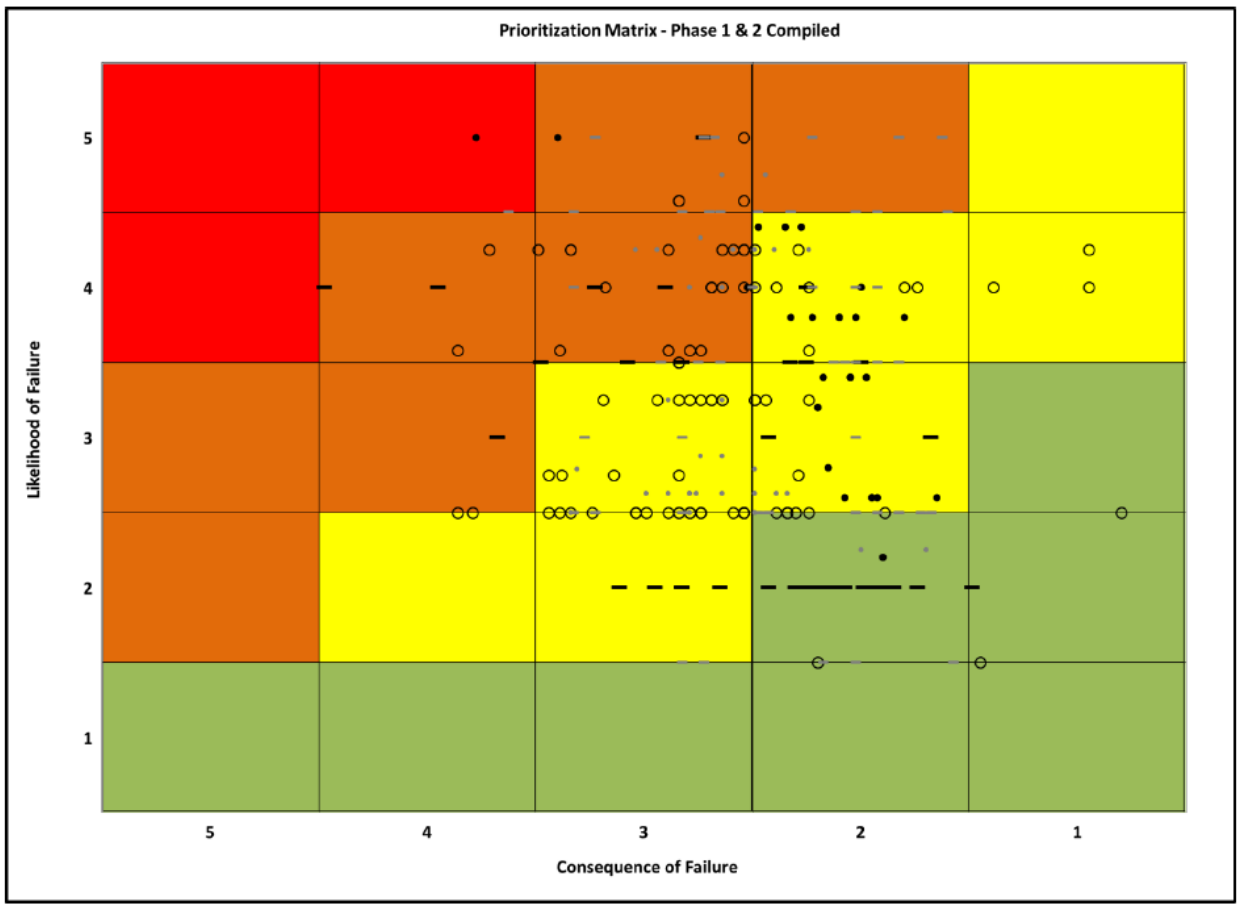
Table 6: Pipe Material Summary

Pipe Diameter (Inches)	Total Inventory (LF)	Iron (%)	Clay (%)	Liner (%)	PVC (%)	Other (%)	Unknown (%)
*Under 6	17,105	2.8%	-	-	20.8%	-	76.4%
6	45,917	-	3.3%	-	15.3%	2.0%	79.4%
8	214,311	0.1%	0.9%	-	27.1%	0.2%	71.5%
10	40,094	-	0.5%	5.1%	29.3%	-	65.0%
12	34,738	-	1.8%	-	19.6%	2.7%	75.9%
14	274	-	-	-	-	-	100.0%
15	5,153	-	-	-	92.6%	-	7.4%
16	2,211	-	-	-	1.8%	13.3%	84.9%
18	4,924	-	-	-	24.8%	-	75.2%
21	6,521	-	8.7%	-	41.1%	-	50.2%
24	7,442	-	-	-	91.5%	-	8.5%
30	242	-	-	-	100.0%	-	-
Total	**378,932**	**0.2%**	**1.3%**	**0.5%**	**27.2%**	**0.7%**	**70.0%**

As evident in **Table 6**, the majority of ToA's collection system assessed under this scope of work is constructed of PVC (27% of the 30% known material). This observation bodes well for future serviceability and condition assessment as PVC is considered to be a very durable and effective material for gravity sewer lines. Conversely, only 30% of the system has had the material of construction documented. This leaves 70% of the ToA system with unknown or unconfirmed material of construction. This data gap could also be addressed by an annual CCTV program.

2.4 Prioritization Matrix

For the ToA SSES analysis, wastewater asset rehabilitation and repair projects were prioritized using a Prioritization Matrix as presented in **Figure 2**. The prioritization matrix accounts for each asset's "Likelihood of Failure" and "Consequence of Failure". Likelihood of failure accounts for an assets physical condition (NASSCO Defect Grade) which includes age, material, performance, regulatory compliance, and LOS criteria adherence. The "Consequence of Failure" criteria identify the type and severity of risk introduced to different aspects of society by the failure of the asset being evaluated. The "Consequence of Failure" categories include operational, economic, public health and environmental risks.



Legend			
	First Priority	○	Phase II MH
	Second Priority	●	Phase II CO
	Third Priority	▬	Phase II Cleaning
	Standard O&M	▬	Phase I Lines
		●	Phase I MH

Figure 2: Example Prioritization Matrix

The prioritization matrix provided a useful tool for determining a baseline priority level for each deficiency identified. The priority levels for some of the Phase 1 SSES manhole improvements were adjusted higher or lower to match the priority of the connecting lines as they were grouped into projects. Additionally, the improvements identified in the airport evaluation and hydraulic model evaluation were prioritized without the use of the prioritization matrix because of the relatively small number of deficiencies identified in each respective evaluation. These are the only instances where the priority level differs from the prioritization matrix results.

2.5 Addison Airport Wastewater Evaluation

To evaluate the wastewater collection system serving the airport LNV reviewed the previous Airport Master Plan which had been completed approximately 10 years prior. LNV staff also obtained and reviewed draft drawings associated with the development of the new Airport

Master Plan from Airport staff and its consultants (Garver, Inc.). The new Airport Master Plan had not been completed at the time of this evaluation (FY2014). The Airport Master Plan information, in conjunction with existing wastewater collection system data, were used to determine possible improvements in the wastewater collection system as a result of the proposed airport development. The new Airport Master Plan was completed in 2016 and the recommended improvements resulting from the FY2014 evaluation were reviewed for consistency with the current Airport Master Plan (Garver, Inc., 2016). The wastewater collection system improvements identified as part of the airport evaluation are summarized in **Table 7**. With the exception of items 2 and 9, these improvements should be completed as needed to support the developments proposed in the Airport Master Plan. Items 2 and 9 are independent of airport development and should be completed as soon as funding is available. A more detailed discussion of the airport evaluation is available in the Phase 2 SSES Report.

Table 7: Airport Improvements Summary

Airport Improvement Item No.	Description	Construction Method	Diameter (inches)	Length (LF)	Priority
1	NEW LINE - Install 800 LF of 8" gravity sewer line along the west side of Addison Road, beginning 200-feet south of the intersection of Addison Rd. and Festival Way into MH13315	Open Cut - New	8	800	3
*2	Replace approximately 1000 LF of existing 8" with new 12" gravity sewer line along Addison Circle and Julian Street.	Pipebursting	12	1,000	1
3	NEW LINE - Install approximately 600 LF of 6" sewer service lateral west along Jimmy Doolittle Dr until reaching the existing 12" interceptor.	Open Cut - New	6	600	3
4	NEW LINE - Install approximately 1500 LF of 8" gravity sewer line beginning at Addison Rd (just south of Glenn Curtiss Dr) and head west until reaching the existing 12" interceptor.	Open Cut - New	8	1,500	3
5	NEW LINE - Install approximately 450 LF of 8" gravity sewer line just north of Keller Springs Rd and beginning at Dooley Rd running east.	Open Cut - New	8	450	3
6	Beginning at Midway Rd and Lindbergh Dr, replace the existing 6" gravity sewer line with an 8" gravity sewer main running east to the end of Lindbergh, approximately 1400 LF.	Pipebursting	8	1,400	3
7	Beginning at Midway Rd and Richard Byrd Dr, run east from Midway and replace the existing 6" gravity sewer line with approximately 1200 LF of an 8" gravity sewer main.	Pipebursting	8	1,200	3
8	Upsize 8-in to 12-in along George Haddaway from MH F0813230 to MH 0813190	Pipebursting	12	400	3
*9	Upsize 6-in to 15-in from MH D0717015 to MH D0717020	Open Cut/ Pipebursting	15	48	1

* Improvement recommendations not dependent on airport development

3 Zoning, Anticipated Developments, and Flow Projections

3.1 Zoning

Figure 3 identifies the ToA's latest zoning map as provided by the ToA Planning Department. It is evident throughout the city that planned developments (PD) should be considered when analyzing sanitary sewer capacity flows. LNV coordinated closely with ToA for any information available on these developments to determine sanitary sewer demands. **Section 3.2** describes these future developments in more detail.

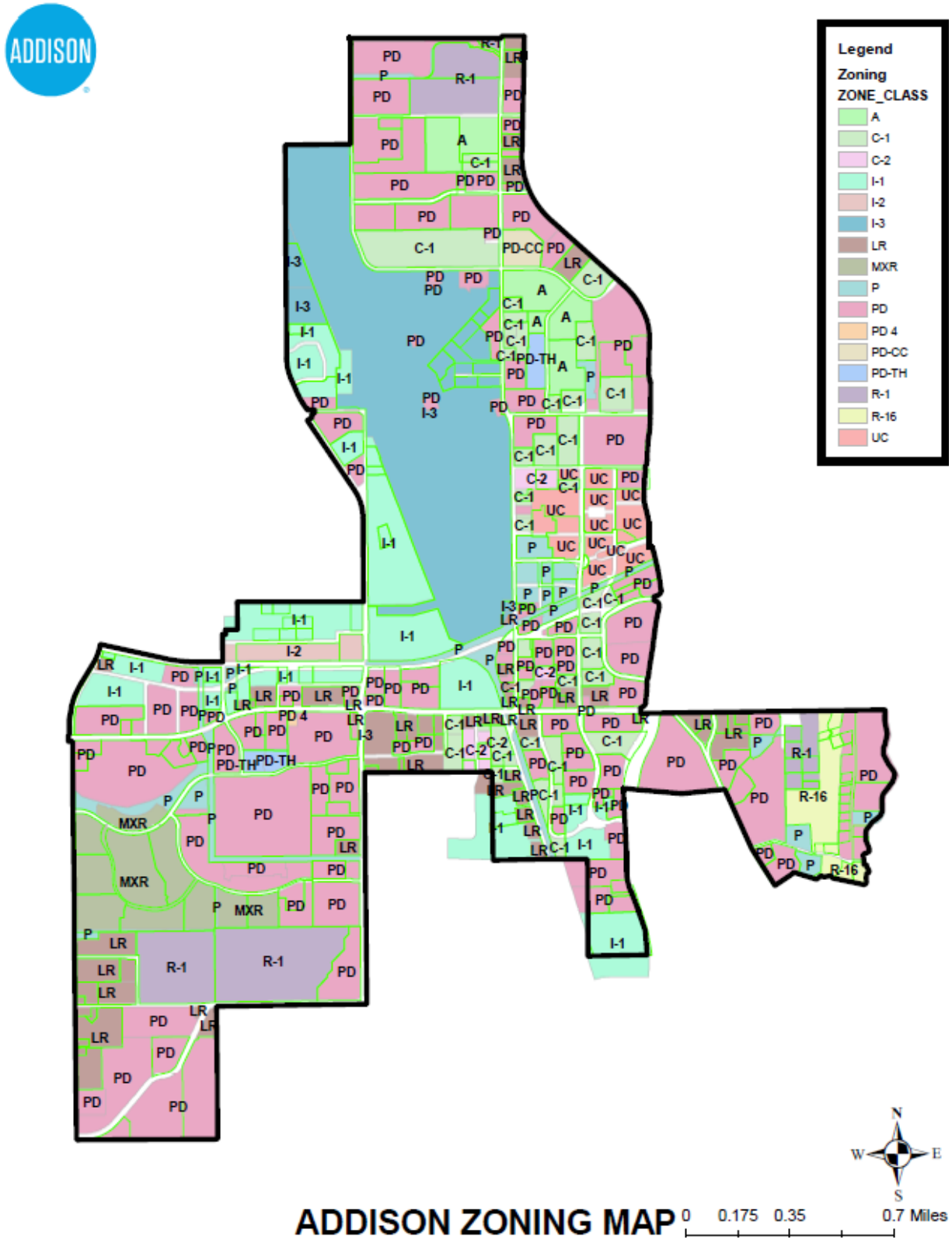


Figure 3: Addison Zoning Map

3.2 Anticipated Developments

The anticipated future developments are presented in **Figure 4** and **Exhibit 3**. The figure also presents the year 2040 full-build-out projected demand nodes for all wastewater demands. Each node is sized in proportion to its respective demand in gallons per day. These developments have anticipated full build-out times ranging from five years to thirty years. The Vitruvian Park development along the south/southwest ToA city limits is a prime example of a phased development that will increase wastewater demands as phases are constructed and occupied. Additional discussion about the hydraulic capacity and recommended improvements for the wastewater lines in the Vitruvian Park area is detailed in **Section 4** and **Exhibit 2**. Due to the large projected wastewater demand in the Vitruvian Park area, manholes and wastewater lines were assigned greater priority in order to reduce SSOs and capacity issues. Some of the Vitruvian development is already constructed but full build-out is not expected until the year 2040. Future wastewater demands are discussed further in **Section 3.3** and the full detailed discussion is available in the Modeling Report. **Table 8** shows the ToA's known proposed developments along with the average daily flows associated with each development.

Table 8: Anticipated Future Development Demand Projections

Basin	Location	Description	Projected Additional ADF	
			Gross (gpd)	*Net (gpd)
A	17101 Dallas Parkway	Hospital Expansion & Medical Office Bldg.	66,600	66,600
C	16600-16700 Dallas Pkwy (DNT & Excel Pkwy)	Apartments, Hotel, Senior Living	129,000	129,000
C	16300-16400 Dallas Parkway	Office Bldg.	50,000	50,000
E	15501 Dallas Parkway	Office Bldg.	50,000	50,000
E	15501 Addison Rd.	Office Bldg.	5,000	5,000
H	15150 Addison Rd.	Hotel	19,800	19,800
H	Quorum and Edwin Lewis	Multifamily Residential	105,000	105,000
H	Landmark and Quorum	Hotel	15,000	15,000
H	14600 Blk Dallas Parkway	Office Bldg.	20,000	20,000
H	14601 Blk Dallas Parkway	Office Bldg.	50,000	50,000
F/BDGJ	Sam's Redevelopment	Mixed Use	477,500	458,811
BDGJ	Vitruvian Park	Mixed Use	2,251,500	1,990,198

* Gross minus demands being replaced by proposed development. Demands assumed to be realized by the year 2040.

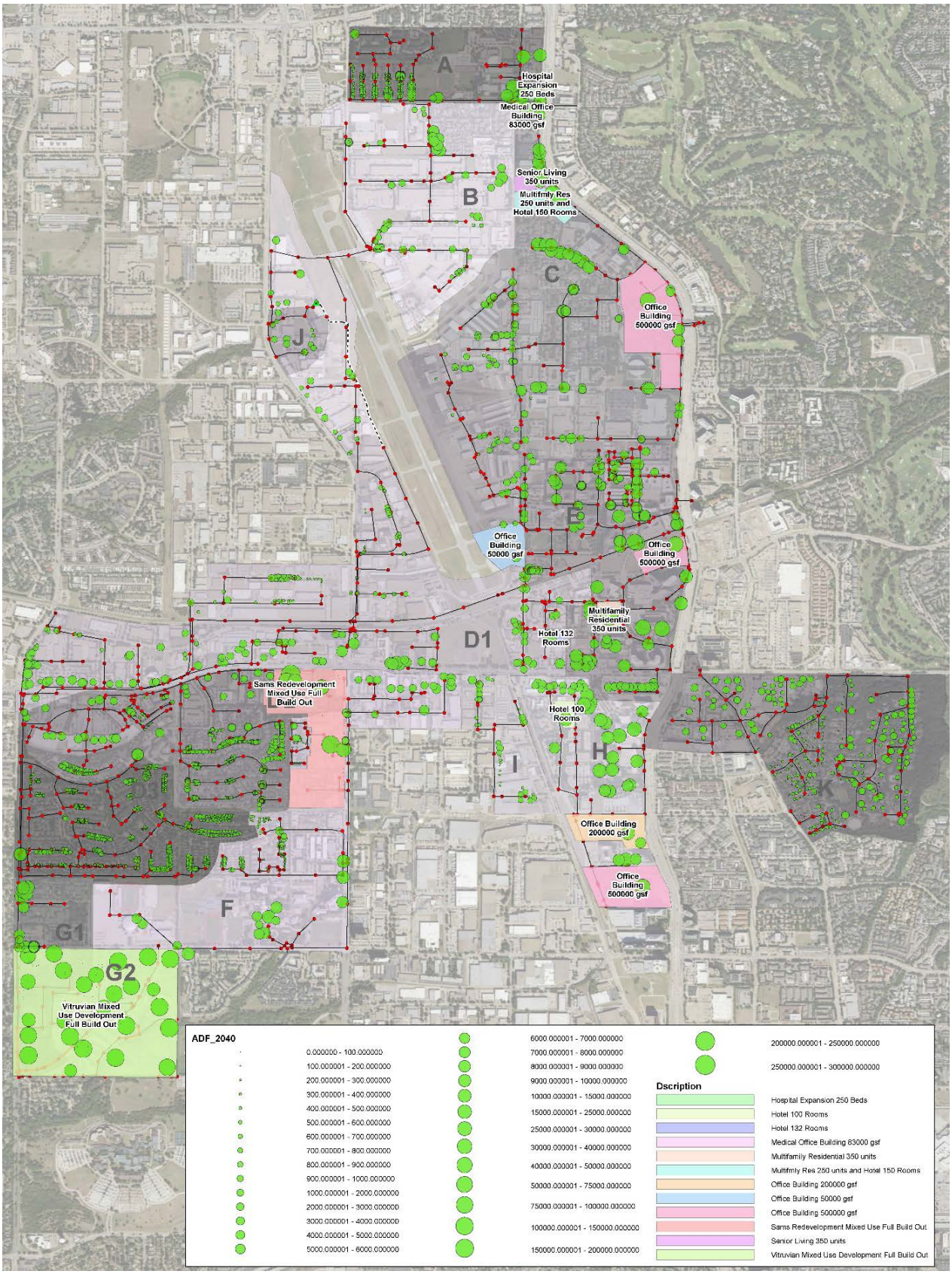


Figure 4: Anticipated Developments and Demand Nodes

3.3 Wastewater Flow Projections

Future wastewater demand projections were developed using the Texas Water Development Board (TWDB) population and water demand projections and by obtaining information about known proposed future developments from ToA staff. The known developments are listed in **Table 8**.

Future wastewater demands were projected for each development by using the design flow criteria published by ToA's Infrastructure and Development Services Department. The design flow criteria were multiplied by the total units proposed for each development to determine total projected wastewater flows for each respective development. The year in which each development is expected to be completed was also accounted for by applying the demands for each development at each development's expected construction completion date. For large developments, such as Vitruvian Park and the Sam's Club redevelopment, the demands were applied in phases that match the proposed completion dates of the developments respective phases. Additionally, because much of Addison is currently developed, many of the known developments are re-development projects which will replace existing buildings and their respective wastewater demands. In these cases, the existing wastewater demands within the developments proposed footprint have been subtracted from projected future demands. For the known proposed developments, Vitruvian Park and Sam's Club Redevelopment represent the most significant future wastewater demands.

The projected wastewater demand is presented in **Figure 5**. The figure presents the demand projection used for modeling scenarios that evaluated system capacity in future years (2020, 2030, and 2040). The figure also presents several demand projection scenarios based on TWDB population projections and various scenarios with slightly different development completion timing.

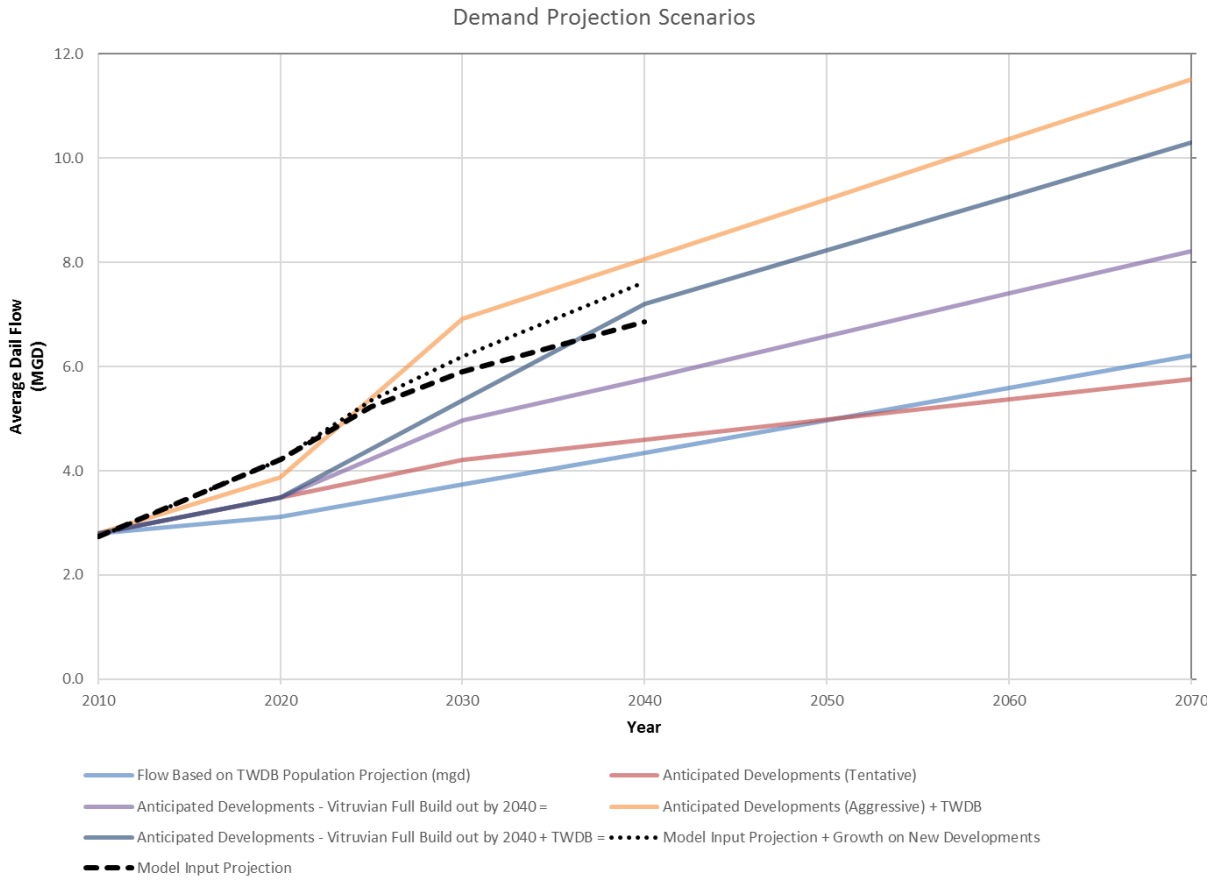


Figure 5: Demand Projection Scenarios

The black dashed line in **Figure 5** is the demand projection numbers that were input into the model and used to evaluate system capacity in future years, in conjunction with the 5-year, 24-hour assessment storm. For year 2040, there is a projected demand of approximately 6.86 MGD.

3.4 Potable Water Demand

Typically, 60-80% of metered water ends up in the sewer system. Detailed water consumption data for the ToA was evaluated and analyzed to produce wastewater usage totals for each billed customer and used to accurately allocate the flows to the correct geographic location within the collection system. A comparison of water consumption to wastewater consumption is presented in **Figure 6**.

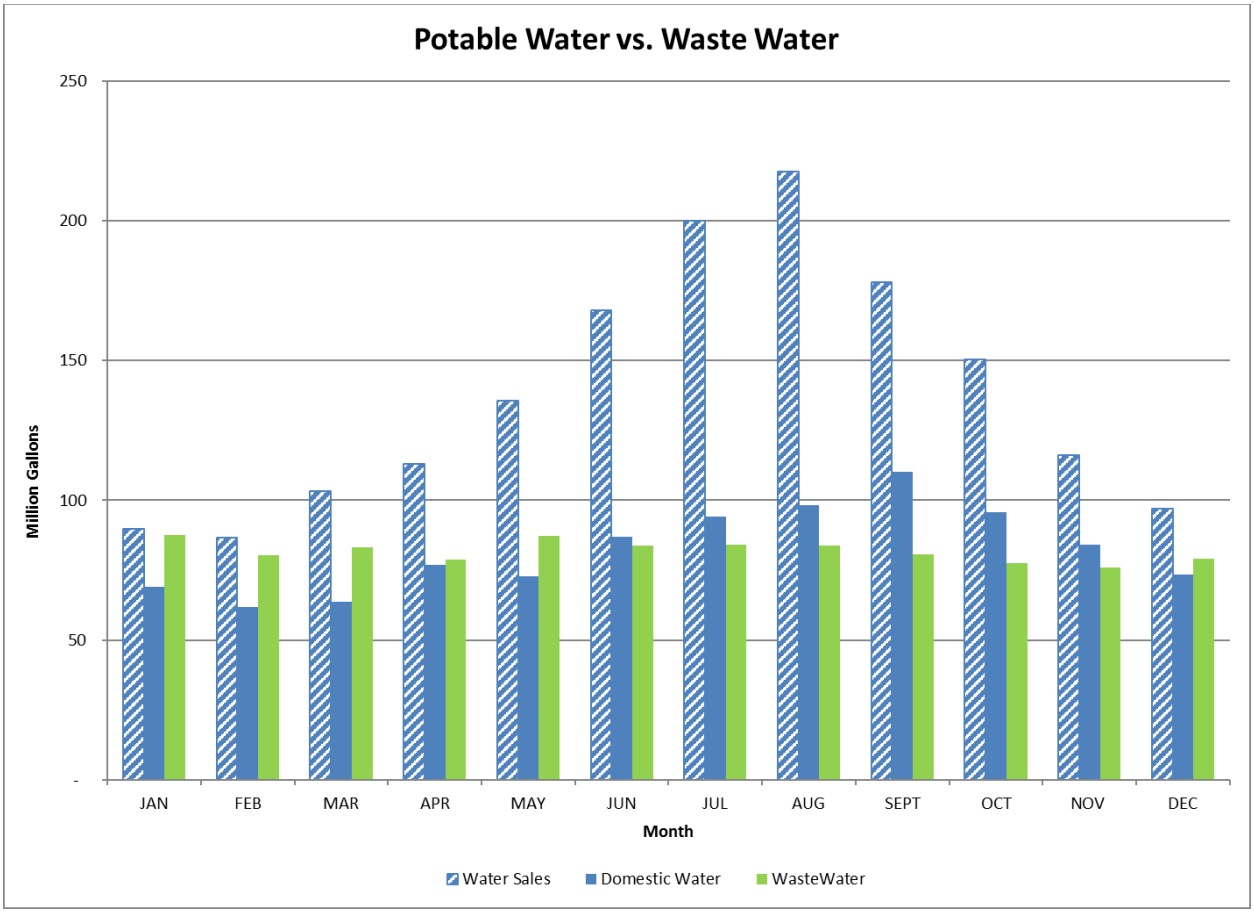


Figure 6: Water and Wastewater Consumption

Domestic Water excludes fire and irrigation billing accounts for the purposes of this discussion. As evident in **Figure 6** some months average more wastewater flow than Domestic Water flow. This is not typical for most systems and suggests more information is needed to determine a reliable water to wastewater ratio. After analyzing DWU, TRA, and the independent temporary flow monitoring data sets along with historical water billing data provided by Town staff, some data discrepancies were identified that should be investigated further and upgrades to the metering facilities should be considered. This is discussed in more detail in Sections 2.4 and 3.3 of the Modeling Report.

Additionally, the water master plan prepared by Bury, Inc. was reviewed for the ToA's existing and projected potable water demands. The Average Daily Demand (ADD), Maximum Daily Demand (MDD), and Peak Hourly Demand (PHD) in MGD are shown below in **Table 9** (Bury, Inc., 2016).

Table 9: Potable Water Demand Projections (Bury, Inc., 2016)

Year	ADD (MGD)	MDD (MGD)	PHD (MGD)
Existing (2015)	4.83	9.81	19.61
5-yr Period (2020)	5.16	10.47	20.95
Buildout	5.29	10.74	21.49

4 Wastewater Collection System Hydraulic Model

The development of a wastewater collection system hydraulic model for the Town of Addison (ToA) is an important step in capital improvement plan (CIP) development and master planning. The hydraulic model developed under the Town of Addison master planning contract with LNV (this project) is a versatile tool which can be used to accurately predict the system response to rainfall events, incoming developments, debris blockages, and proposed improvements.

The hydraulic model consists of the following basic components:

- Physical Model Network (pipes, manholes, lift stations, etc.)
- Dry Weather or "Base" demands (Average daily flow with diurnal curve)
- Wet Weather demands (which represent rainfall derived infiltration and inflow (RDII)

A more detailed discussion of all topics in **Section 4** can be found in the Modeling Report.

4.1 Physical Model Network

The physical model network for the ToA hydraulic model was developed by first obtaining the Town's GIS basemap which provided the starting point for developing the model network. Available record drawings were reviewed and incorporated in to the provided basemap, including lift station configuration and pump curves. Several successive sanitary sewer evaluation surveys (SSES's) were then conducted to both evaluate the system's condition and collect survey data for the Town's existing manholes. The survey data collected included X and Y coordinates along with elevation data for the manhole rim and the invert of the pipes connected to the manhole. The survey data was then overlaid on the Town's basemap and the basemap was updated with the most recent survey data. This updated basemap was used to develop the physical model network. A summary of modeled lines by diameter is presented in **Table 10** and presented graphically in **Exhibit 5**.

Table 10: Modeled Gravity Line Summary

Pipe Diameter (Inches)	Total Inventory (LF)	Percent by Diameter	Private Lines (LF)	Abandoned Lines (LF)	** Active Addison Inventory (LF)	Total Modeled (LF)	*** Modeled (%)
*Under 6	17,105	5%	13,878	51	3,176	1,695	53%
6	45,917	12%	27,420	-	18,498	16,334	88%
8	214,311	57%	21,248	7,561	185,502	160,274	86%
10	40,094	11%	893	-	39,201	37,774	96%
12	34,738	9%	860	3,419	30,459	32,195	106%
14	274	0%	-	-	274	274	100%
15	5,153	1%	-	760	4,393	4,773	109%
16	2,211	1%	-	-	2,211	2,211	100%
18	4,924	1%	-	-	4,924	4,924	100%
21	6,521	2%	-	-	6,521	6,521	100%
24	7,442	2%	-	-	7,442	7,406	100%
30	242	0%	-	-	242	242	100%
Total	**378,932**	**100%**	**64,300**	**11,791**	**302,841**	**274,622**	**91%**

* All pipes reported to be smaller than 6-inch were modeled as 6-inch lines.

** Excludes Private and Abandoned Lines

*** Percent of Active Addison Inventory

As evident in **Table 10**, approximately 91% of all active public collection system gravity lines were modeled with nearly 100% of lines with diameters of 10-inches or larger being modeled. The remaining 9% of active lines that were not modeled are the most upstream line segments of the collection system network having cleanouts as the upstream nodes of the line segment.

4.2 Dry Weather Flows

Temporary flow meters were installed near the outfall of all eight (8) of Addison's wastewater collection basins. This metered flow data was then compared to existing Dallas Water Utility (DWU) and Trinity River Authority (TRA) sources of flow data. The flow data was also compared to water consumption data in order to allocate the wastewater usage to each customer in proportion to each customer's potable water consumption. The water billing data provided addresses for each customer so that each customer's respective estimate of wastewater consumption could be accurately distributed spatially throughout the Town.

4.3 Wet Weather Flow

Wet weather flows are produced by rainfall from storm events entering the collection system as Rainfall Dependent Infiltration and Inflow (RDII). The RDII volume can be significant and can typically increase the peak flow in a system by a factor of 3 to 4 times the dry weather peak flow. In some systems, the increase in peak flow can be as high as 6 to 12 times the dry weather peak flow.

The ToA's RDII induced flows were measured, evaluated, and quantified during flow monitoring and model development. Rain gauges were used to measure rainfall totals at five minute intervals at various locations throughout Addison so that the rainfall data could be combined with the flow meter data to quantify the volume per inch of rainfall, and time varying flow pattern, of RDII produced by each recorded storm event. These RDII volumes could then be applied to storm events of various durations and intensities to predict the response of the Town's collection system to more intense storms. The 5-year, 24-hour storm event was used in conjunction with projected flow data to evaluate system hydraulic capacity in 2017 and horizon years 2020, 2030, and 2040. Capacity issues were identified and tabulated along with recommended repairs and costs associated with each capacity issue.

4.4 Hydraulic Capacity Evaluation Recommendation Summary

Some capacity issues identified in the hydraulic model evaluation effort consisted of known system capacity constraints or "bottlenecks" where a larger diameter pipe flows into a reduced diameter pipe causing flows to back up and fill upstream pipes and manholes. Other identified capacity issues were determined in horizon year conditions due to areas where large developments with aggressive growth are anticipated. The areas determined to have capacity issues were identified in the hydraulic model, as manholes which experienced hydraulic grade lines (HGL's) surcharging to within 3 feet or less of the manhole rim putting the manhole at risk of experiencing SSO's. Improvements to the hydraulic capacity of pipes downstream of these manholes were recommended and input into the model to ensure that the proposed improvement sufficiently remedied the hydraulic capacity issue (before and after modeled improvements comparison can be found in **Figure 7** - this capacity improvement takes place in Basin G at Marsh Ln and Vitruvian Way (see **Exhibit 2**)). The recommended improvement for these capacity issues is to upsize the pipe by one or two commonly available pipe diameters utilizing the pipe-bursting method. The estimated cost to repair the hydraulic capacity issues identified during the modeling effort is summarized in **Table 11**.

Table 11: Capacity Constraint Project Cost Summary

WW Service Basin	Potential Capacity Constraint Projects	Estimated Project Cost
Basin G	3	$1,001,918
Basin A, B, C, D, E, F, H, I, K	0	$0

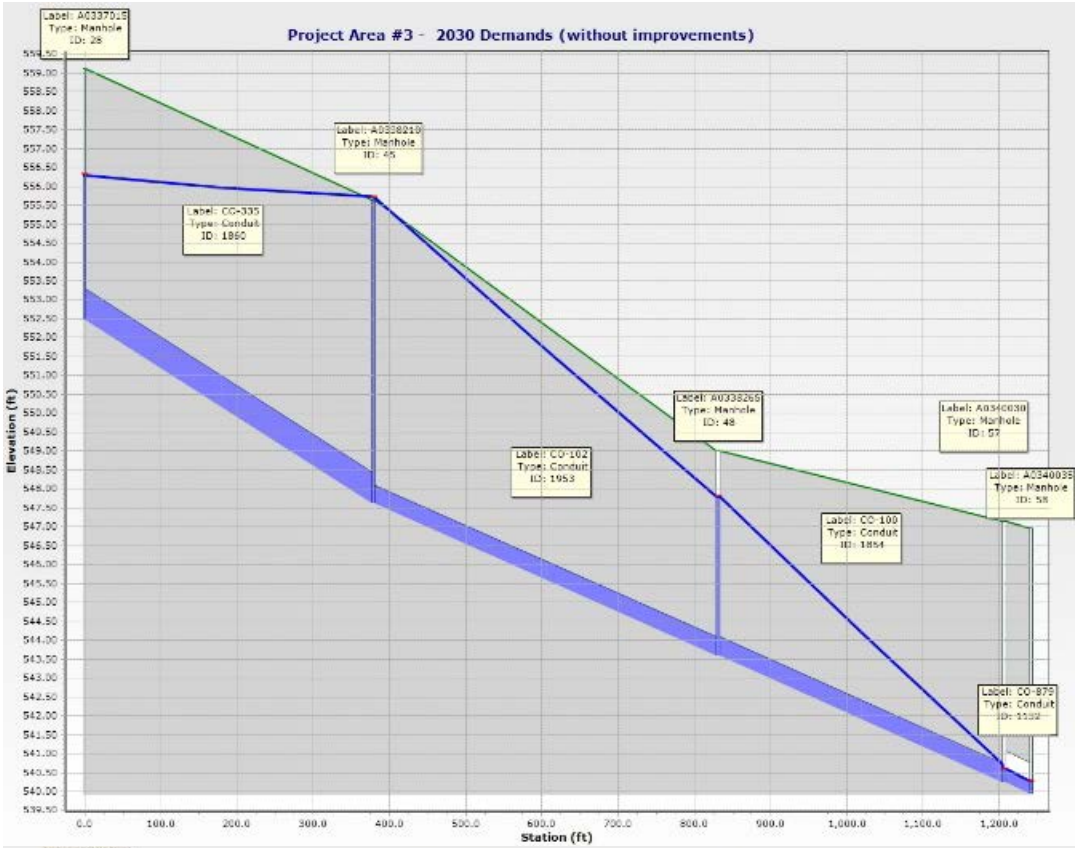


Figure 7: Profile Before and After Recommended Modeling Improvements

The opinion of probable cost of the improvements discussed in this report are based on recent unit cost bid prices for projects in the state of Texas of similar scope to the improvement proposed in this report.

Additionally, many lines were identified that exceeded the TCEQ maximum manhole spacing. Identification of these deficiencies does not require a hydraulic model but nonetheless these deficiencies were identified during the modeling effort. The recommended solution to reduce the manhole spacing is to construct an additional manhole(s) on the line segments that exceed the maximum spacing. The estimated cost to construct the additional manholes required is summarized in **Table 12**.

Table 12: Manhole Spacing Project Cost Summary

WW Service Basin	Number of Manholes to be Installed Per Basin	Estimated Project Cost
Basin A	1	$76,750
Basin B	7	$537,500
Basin C	2	$114,625
Basin D	21	$1,795,375
Basin E	0	$0
Basin F	12	$987,000
Basin G	5	$415,375
Basin H	1	$70,750
Basin I	2	$168,375
Basin J	0	$0
Basin K	8	$696,750

5 Capital Improvement Recommendations

The following section includes a summary of all capital improvements recommended in the Capital Improvements Plan (CIP) Report previously delivered to the Town of Addison. **Table 13** summarizes the recommended CIP projects according to their priority, as determined per **Section 2.4**, and further categorized by basin. A total of 314 improvements were recommended with a total implementation budget cost of $11,015,000.

Table 13 summarizes the project costs for each improvement. A map showing the location of each recommended improvement is included in **Exhibit 1**.

Table 13: Priority Cost Summary by Basin (All Projects)

BASIN	PRIORITY 1	2	3	4	Sub-Total by Basin (Priority 1 - 4)
A	$ -	$ 13,500.00	$ 103,000.00	$ 21,100.00	$ 137,600.00
BDGJ	$ 1,614,000.00	$ 226,400.00	$ 4,195,800.00	$ -	$ 6,037,000.00
C	$ 6,500.00	$ 46,200.00	$ 819,200.00	$ 32,700.00	$ 904,600.00
E	$ 336,200.00	$ 105,000.00	$ 880,200.00	$ 11,300.00	$ 1,332,700.00
F	$ -	$ 136,300.00	$ 1,164,600.00	$ 71,300.00	$ 1,372,200.00
H	$ -	$ 3,100.00	$ 322,700.00	$ 28,800.00	$ 354,600.00
I	$ -	$ -	$ 168,500.00	$ -	$ 168,500.00
K	$ -	$ -	$ 705,500.00	$ 1,100.00	$ 706,600.00
TOTALS	**$ 1,957,000.00**	**$ 531,000.00**	**$ 8,360,000.00**	**$ 167,000.00**	**$ 11,015,000.00**

5.1 Compiled Prioritized Improvements – All Phases

The following list of Appendices consists of all recommended improvements (projects) by line segment or manhole ID and the costs associated per each priority category. Additional detailed cost information (indicating size/length of improvement and cost breakdown schedule) for all 314 recommended improvements are included in the CIP report and its appendices.

- Appendix A - First Priority Project Cost Summary
- Appendix B - Second Priority Project Cost Summary
- Appendix C - Third Priority Project Cost Summary
- Appendix D - Fourth Priority Project Cost Summary

5.2 Capital Improvements – Project Grouping and Coordination for Design and Bid

The ToA has several options for grouping the proposed improvements. However, the total cost of $11,015,000 for all the recommended improvements is much greater than the amount of annual funds typically budgeted for wastewater capital improvements (reported as $500,000). For this reason, LNV suggests the ToA review the CIP with their Financial Advisor to discuss potential financing options before developing and scheduling as individual projects/bid packages.

LNV suggests that the Priority 1 and 2 projects be implemented within the next 1 to 3 years. The Priority 3 projects should be implemented in the following 3 to 6 years. And the Priority 4 projects should be implemented annually using available operating funds beginning the during the next fiscal year's O&M budget. LNV suggests ToA consider financing options for the Priority 1, 2 and 3 projects.

The actual grouping and scheduling of the bid packages must consider other factors besides available funding in the Wastewater Fund. Other factors to be considered when preparing bid packages include condition assessment of: streets; drainage systems; water; gas; electric; fiber

optics; and other utilities within the CIP project. Other ToA master plans and planning documents should be reviewed and considered in conjunction with the Wastewater Master Plan Summary Report's proposed capital improvements. An example of the concern would be a high priority wastewater pipeline that crosses over an old and poor conditioned potable water line that needs to be replaced and is in a street that is also in poor condition and will need to be reconstructed. Hence ToA's other Water, Streets and Drainage Capital improvement Plans must be considered and combined with the Wastewater CIP projects to maximize the effectiveness of the ToA funds by efficiently executing all improvements with one project and avoiding unnecessary expenses due to repeated construction costs while minimizing impacts to the traveling public, business community and citizens of ToA. LNV recommends that the CIP packaging and scheduling of wastewater projects should not be determined solely based on this Wastewater Master Plan Summary Report's results. Due to overlapping proposed developments, the ToA must consider their other master plans and planning documents before determining packaging and before scheduling the implementation of these CIP projects. LNV suggests that ToA develop a new "All Projects Map" that shows the location and types of projects from all master plans. Essentially a map with several screen overlays that shows the various improvements for: street, drainage, water, wastewater and other known projects and development. GIS software would be ideal for this type of "All Projects Map" with each utility or data source being on its own separate layer or shapefile.

5.3 CIP Cost Estimating Methodology

LNV developed construction costs using best available cost estimating data and previous bids from similar construction projects and projects from the surrounding area. An Opinion of Probable Construction Cost (OPCC) was developed for each project that included 30% construction contingency. This contingency was included because the OPCCs are table-top estimates for a conceptual design and therefore, the level of accuracy for the construction costs will have a degree of uncertainty. To implement the project to and through a design and construction phase, additional factors must be addressed to develop the Total Project Cost. The Total Project Costs include construction costs plus additional soft costs elements as follows:

• Design of plans and specifications	10.0%
• Additional Services	5.0%
• Contract Administration	3.0%
• Construction Observation	3.5%
• Testing	2.0%
• Bond Insurance	1.0%
• Miscellaneous (printing, etc.)	0.5%
	25.0% Project Soft Costs

The cost methodology for Phase 2 SSES projects differed slightly and is described in more detail in the following paragraph and previous reports. Improvement recommendations resulting from the Phase 2 SSES were of limited scope, some of which could be performed by Town staff or with limited to no design fee and subsequently included reduced construction and soft costs.

Examples of some of the recommended improvements identified in the Phase 2 SSES include changing out manhole rings and covers, repairing MH chimney cones, replacing clean out caps and pipe cleaning. The Phase 2 SSES project cost information should be reviewed again prior to construction. If contract labor forces will ultimately be required for the Phase 2 SSES projects instead of ToA staff, the project cost estimates will need to be increased accordingly.

6 Funding Options

The two basic forms of funding capital improvements for the Town of Addison's wastewater collection system available are: Debt Financing- receiving loan funds which are paid back over time, and Non-Debt Financing such as Pay as you Go financing which is more relegated to maintenance and emergency repairs or small capital improvements. Other options include: TWDB SRF loans, CDBG grants, Municipal Revenue Bonds and Certificate of Obligation.

6.1 Recommended Financing Options

The recommended options for funding major wastewater collection system capital improvements for the ToA are Municipal Revenue Bond market and to explore the opportunities with the TWDB using their Clean Water State Revolving Fund (CWSRF). The recommended first step would be to discuss this subject with the ToA's Finance Director and Financial Advisor. The TWDB CWSRF may be a great opportunity to save funds based on a lower interest rate but the timing of fund access and control of uses of borrowed funds will be subject to the TWDB requirements and regulations.

7 Treatment Processes and Alternatives

The ToA does not currently own or operate any wastewater treatment facilities. The Town initially expressed interest in using reclaimed or re-use water for irrigation of public spaces and for sale to customers for their private irrigation usage. A water re-use evaluation was performed to determine the feasibility of purchasing re-use water from either DWU/TRA or mining and extracting re-use water from the ToA's collection system through scalping plants. This water re-use development would be intended to augment the Town's future water needs for irrigation and other non-potable purposes at its airport and surrounding area.

7.1 Evaluation of Purchase Re-Use Water

Purchasing re-use water from an existing re-use system would be the simplest method for Addison to obtain the new source of irrigation water if it was readily available. However, the closest re-use source pipeline is over 7.4 miles away from Addison Airport facilities. The Dallas County Urban and Reclamation District (DCURD) built a reuse pipeline (with a hydraulic capacity of 7.1 MGD) in the mid-1980s from the TRA's Central Regional Wastewater System, Wastewater Treatment Plant (WWTP) to the Las Colinas lake system in Irving. DCURD has been using re-use

water to keep the Las Colinas lakes full and using the lakes for irrigation water. The possibility of Addison purchasing re-use water from this system is very remote due to the following:

- DCURD owns the existing re-use pipeline; therefore, Addison would have to negotiate an agreement with DCURD to purchase re-use water, prior to its discharge into the waters of the State. Furthermore, the existing TRA and DCURD re-use contract would have to be re-negotiated to allow Addison to participate.
- The re-use line is over 40 years old and presently TRA does not have to pump the re-use water to the DCURD lakes because the re-use water will gravity flow all the way to the Las Colinas lake system. TRA is reluctant to pump the re-use water for fear from increased pressure in the pipeline and higher flow rate may result in leaks in the pipeline.
- The cost to construct a 7.4+ mile re-use pipeline and pump station from the DCURD re-use pipeline to the ToA would be very expensive (in excess of $4.2 million) with many hurdles such as right of way acquisition, highway and railroad crossings and utility conflicts.

Due to the lack of a re-use pipeline in near proximity to the ToA to connect to (as operated by DWU or the TRA), the purchase of re-use water is not a feasible option.

7.2 Evaluation of Scalping Plants

As there are no nearby re-use transmission systems operated by DWU or TRA, the ToA could produce its own re-use water using “scalping treatment plants” or “water factories”. These are small packaged WWTPs that draw raw wastewater from a nearby wastewater collection system, treat the wastewater to its required levels and pump the re-use water into a storage tank and then to the irrigation site. The produce waste sludge is discharged back into the collection system for treatment at the downstream WWTP. Typically, scalping plants are located adjacent to the irrigation site to reduce the cost for re-use water pipelines and the feasibility will be dependent on the cost of the water scalping plant(s) and the potential for the recycled water to generate revenue.

The main obstacle preventing Addison from developing scalping plant facilities, besides cost effectiveness, is that the current TCEQ permitting process does not allow re-use scalping plant/reclaimed water production facilities for re-use purposes unless the owner of the facility is also the owner of the associated downstream domestic wastewater treatment plant as permitted by TCEQ (see §321.30(d)). In the ToA’s situation this means that DWU or TRA would have to own and operate the scalping plant for Addison. It would seem that this TCEQ requirement would be a stumbling block for Addison to convince either DWU or TRA to agree to such an arrangement. In conversations with TRA representative(s), LNV’s Project Manager, Bart Hines, was told definitively that TRA would not allow and/or operate a scalping plant for Addison. The ToA could also pursue a scalping plant with a new TCEQ/TPDES permit process via no discharge permit, but this permitting process would be expensive and might be a controversial process. Hence developing a scalping plant scenario does not appear feasible at this time.

7.3 Re-Use Feasibility Conclusions

Based upon the evaluation as described above, developing a re-use system for the ToA at its Airport facility and surrounding area is **NOT** feasible at the present time.

8 Recommendations and Conclusions

8.1 Capital Improvements

Overall, the ToA's wastewater system proved to be in good condition with various sewer rehabilitation work recommended for the existing lines. LNV recommends that all the Priority 1 and 2 projects totaling $2,488,000 ($1,957,000 + $531,000) be implemented within the next 1 to 3 years. LNV suggests Priority 3 projects totaling $8,360,000 should be implemented in the following 3 to 6 years, and Priority 4 projects totaling $167,000 should be addressed annually based upon availability of the Addison's Wastewater Fund Accounts for capital improvements budget. LNV also suggests ToA consider financing options for the Priority 1, 2 and 3 projects.

A map showing all of the recommended Addison Wastewater Master Plan CIP projects is illustrated in **Exhibit 1**. More detailed information about each specific project can be found in the CIP report and the other reports previously delivered under this scope of work.

8.2 Wastewater Flow Measurement

As discussed briefly in **Section 3.4** and in detail in the modeling report, there are some discrepancies between the independent flow meters deployed under this scope of work and the permanent DWU and TRA flow meters. There are also irregularities between metered water usage and metered wastewater usage. LNV recommends further independent temporary flow metering in Basin A focused on isolating areas with greater wastewater usage than water usage. Various other flow measurement recommendations are included in the Modeling report that should be considered for implementation.

8.3 Capacity Evaluation

The capacity of the ToA's collections system was evaluated using a computerized wastewater hydraulic model as described in **Section 4**. The scenarios evaluated with the hydraulic model include future wastewater flow projections as well as the predicted RDII response associated with a 5-year, 24-hour rainfall event. The hydraulic model evaluation identified some manholes with HGL's surcharging to within 3-feet of the manhole rim, which indicated a capacity issue downstream of the surcharging manhole. The capacity issues identified by the hydraulic model evaluation are presented in **Exhibit 2** and denoted by the enlarged red, green, and yellow manholes. Pipe bursting to upsize the line immediately downstream of each surcharged manhole was recommended to alleviate the capacity issues.

8.3.1 Model Updates

In addition to the capital improvements recommended in the CIP Report, LNV recommends periodic updates of the hydraulic model and subsequent capacity evaluations. A typical interval for a comprehensive model update is approximately 5 years. LNV also recommends that the ToA perform model updates prior to permitting large developments or re-developments that are not currently identified or accounted for in this report.

8.4 Collection System Maintenance

Maintenance of the collections system is important to preserve hydraulic capacity, level of service, and regulatory compliance. A common goal for collection system maintenance is to shift from reactive to proactive maintenance. In order to achieve this shift all assets must be inventoried, have condition assessed, have deficiencies identified and corrected, and finally assets should be placed on a revolving assessment schedule to identify deterioration and deficiencies developing over time, before the failure of an asset.

8.4.1 Annual CCTV Program and FOG Outreach

As discussed in **Section 2.3**, the ToA would benefit from an annual CCTV program aimed at compiling a comprehensive inventory of its collections system assets while simultaneously assessing the condition of the assets inventoried. This would build momentum for implementing a recurring cycle of inspection and assessment that would ultimately strengthen the Towns asset management program and result in a more proactive maintenance and repair program. The existing system lacks major deficiencies which provides an opportunity for the Town to get out ahead of maintenance and repairs. FOG awareness and implementation of BMP's by the residents of ToA will also have a positive impact on the collection system as a whole. These recommendations are discussed in more detail below.

8.4.2 Annual Inspection and Cleaning Goals

A proactive approach to collection system maintenance involves annual manhole and line inspection and cleaning. Generally, lines that are newly installed or known to be in good condition and are constructed of durable contemporary materials like PVC or HDPE should be inspected once every 10 years. Lines known to be in lesser condition, have debris deposits, root intrusion, or service complaints should be inspected more often. The ToA could consider setting an achievable goal for annual inspection and cleaning. A reasonable starting point is to set the goal of performing CCTV inspections of all lines within the next 10 years or 10% of the lines annually. As lines are CCTV'd they should be inventoried in a GIS database and the condition and material of the line should be noted. Any required cleaning, root removal, or repair discovered during initial CCTV inspection should be noted in the GIS database for each individual line segment. An updated GIS file for manholes, gravity lines, and force mains has been provided with this reports digital files. The GIS files have added CCTV and Inspection observations to the attribute tables of the existing basefile for all manholes or lines assessed.

In order to reduce the cost of CCTV inspection some cities have purchased their own CCTV equipment. The CCTV equipment used for the initial inspection does not need to be fully equipped with the typical PACP coding capabilities as the inspection will not quantify defects or be used for structural integrity scoring. The initial inspection can be a qualitative inspection noting lines as either in good condition or requiring further action. The required action can range from cleaning and re-inspection with full PACP defect coding to root removal or repair and replacement. The City of Denton, Texas provides a good example of this type of program. The ToA system is in very good condition, and as such, the initial inspection will inventory all lines and would be expected to identify a relatively small percentage of lines requiring further action. The City of Denton reports to have reduced CCTV inspection cost by upwards of 80% by purchasing the non PACP inspection equipment and performing the initial inspections with City staff. If the initial inspection determines that further action is required, then PACP inspection, cleaning, or other corrective action can either be contracted out or performed in-house.

8.4.3 Fats, Oils, and Grease (FOG) Outreach

Currently, the ToA follows procedures and enforcement through its Environmental Department (a division of its Development Services Department) in order to minimize FOG in the sanitary sewer system. LNV also recommends that the ToA's residents and commercial kitchens be encouraged to reduce FOG by using best management practices (BMP's) for commercial kitchens. Following the BMP's provides obvious benefits to the ToA collection system as a whole and also provides benefits to each customer who employs the BMP's. FOG awareness and BMP implementation would reduce the likelihood of losing revenue to emergency shutdowns caused by sewage backups and reduces the frequency of required grease trap maintenance for each business that follows the BMP's. A widely used method of communicating FOG best management practices is to include FOG information inserts in the utility bills mailed out to customers. The ToA could consider implementing a FOG billing insert program. Because of the high concentration of commercial restaurants in Addison, grease trap inspection and educational outreach may be helpful in minimizing the commercial contribution of FOG to the ToA collection system.

The ToA currently uses the following chemicals for manhole and system cleaning and maintenance (shown in **Table 14**):

Table 14: Currently Employed Cleaning Products

Asset Type	Cleaner Name	Cleaner Type
WW Manhole	Instakleen	Degreaser
WW Main lines	Magnaflo	Degreaser

8.5 Infiltration and Inflow (I/I) Reduction Initiative

Current infiltration and inflow reduction initiatives from the ToA are on a reactionary basis. When an issue is found, the ToA will typically rehab manholes as needed. The ToA also plans to implement the capital improvements recommended in this document and the CIP report that preceded this document. Many of the recommendations are for repairs that will reduce I/I such as manhole repair and coating, replacement of broken clean out caps, repair of joint offsets and pipe fractures, replacement of inflow inhibitors, and removal of known cross connections with private storm water systems. In essence, the ToA I/I issues are relatively small - once the ToA completes the improvements recommended in the CIP, I/I will be minimal.

8.6 Pre-Treatment for Large Industrial Users

Potable water billing records were analyzed to identify Addison's large volume users (LVU's). No industrial LVU's were identified during the modeling or SSES phases of this project. Most LVU's were either hotel/motels, large multi-family apartment complexes, or restaurants. The hotel/motel and restaurant customers are required to have grease traps installed upstream of their tap into the ToA collection system. This requirement should continue to be enforced by ToA code enforcement. The multifamily residential properties do not generally require pre-treatment.

8.7 Other Programs

Another program that may be beneficial for the ToA is the TCEQ's Sanitary Sewer Overflow Initiative (SSOI) which encourages corrective action before there is harm to human health and safety or the environment. Collection systems that are properly designed, operated, and maintained will collect and transport sewage and industrial wastewater that flow into them to a facility for appropriate treatment. However, SSOs can occur if there is significant I/I, poorly maintained and operated collection systems, or if the system lacks adequate capacity to collect or store flows for treatment. For entities participating in the SSOI program, the benefits of participating are as follows:

- A participating system will not be subject to formal enforcement by TCEQ for most continuing SSO violations, as long as the overflows are addressed by the SSO plan. *Note:* Participation in the TCEQ's SSOI does not preclude federal enforcement action by the Environmental Protection Agency.
- Participation allows the municipality to direct resources towards corrective actions rather than having to pay penalties associated with an enforcement order in addition to the corrective actions.
- Participation ensures that SSOs addressed by the SSO plan will not affect the system's compliance-history rating.

As the ToA's wastewater system is in very good condition and the Town is prompt to reduce and limit I/I, LNV believes that the SSO Initiative program will **not be necessary** for the ToA to pursue. This program is more beneficial for systems with significant I/I resulting from older, poorly constructed, or poorly maintained collection systems.

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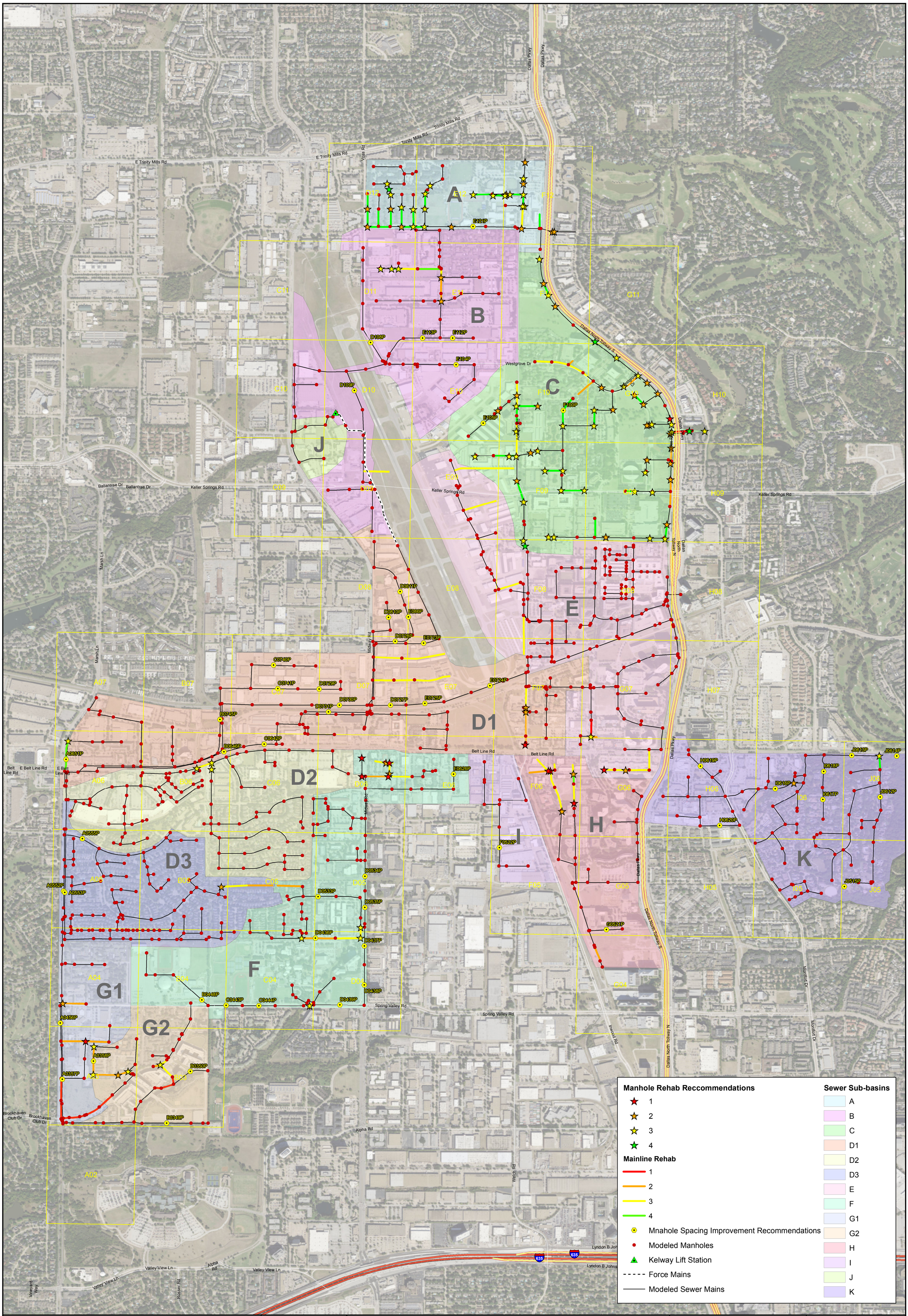
Exhibits &

Appendices

Exhibit 1

Prioritized Improvement Overview



Manhole Rehab Reccommendations

- 1
- 2
- 3
- 4

Mainline Rehab

- 1
- 2
- 3
- 4

- Mnahole Spacing Improvement Recommendations
- Modeled Manholes
- Kelway Lift Station
- Force Mains
- Modeled Sewer Mains

Sewer Sub-basins

A, B, C, D1, D2, D3, E, F, G1, G2, H, I, J, K

0 875 1,750 Feet

LNV engineers | architects | surveyors

TBPE FIRM NO. F-366

ADDISON

N W E S

Addison Wastewater Masterplan Recommended Improvements Overview

Addison, TX

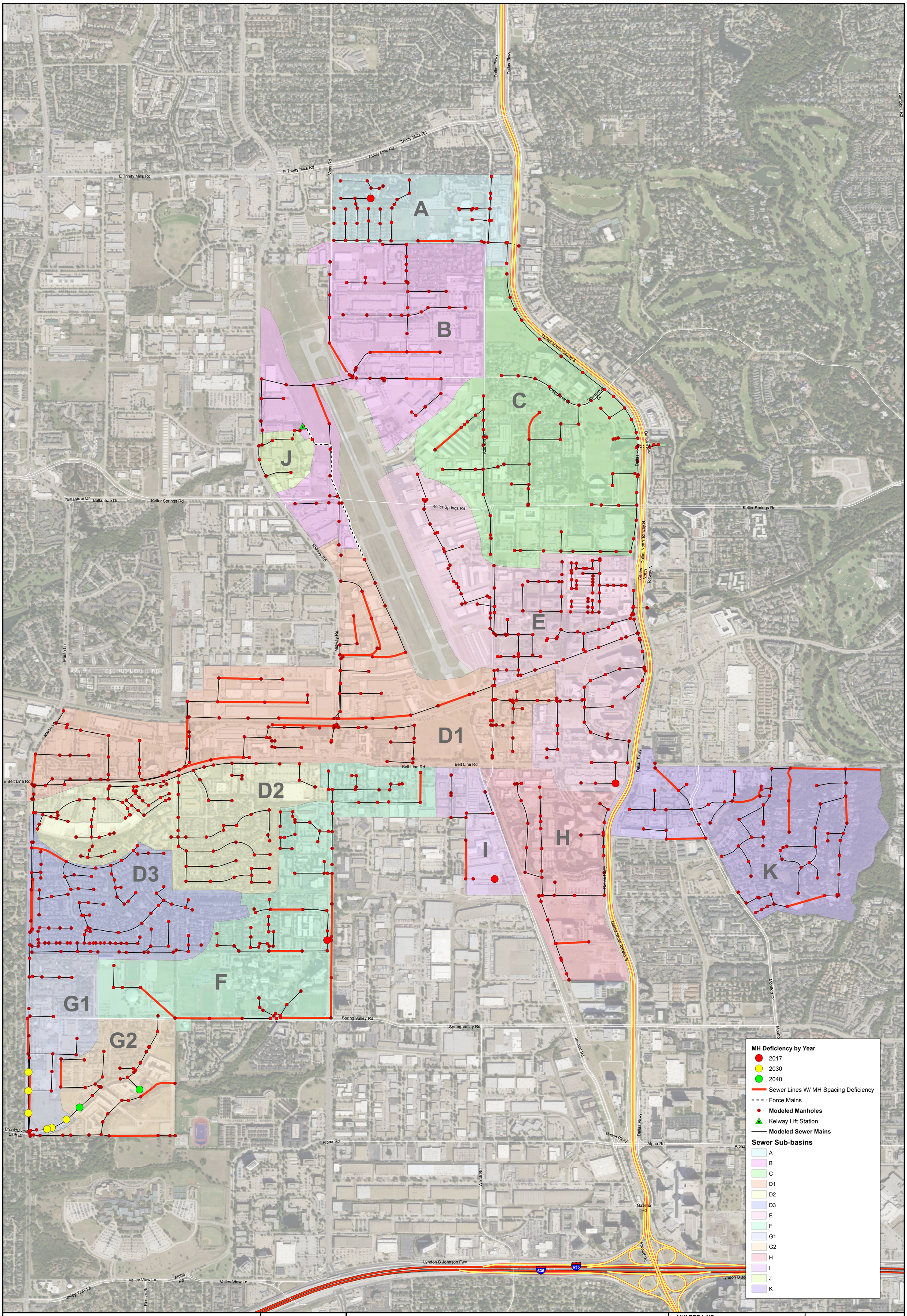
LNV PROJ. NO.	130306
DATE	10/13/2017
SCALE	1 inch = 875 feet
FILE	Addison Sewer_rev2_JWS
DRAFTED	JWS

Exhibit 1

Path: \\atxserver1\Projects\Dallas\Addison\130306 Wastewater Master Plan\002\Design\GIS\DELIVERABLES\Exhibits\Addison Sewer_rev2_JWS.mxd

Exhibit 2

System Deficiencies



MH Deficiency by Year

- 2017
- 2030
- 2040
- Sewer Lines W/ MH Spacing Deficiency
- Force Mains
- **Modeled Manholes**
- Kelway Lift Station
- **Modeled Sewer Mains**

Sewer Sub-basins

- A
- B
- C
- D1
- D2
- D3
- E
- F
- G1
- G2
- H
- I
- J
- K

0 875 1,750 Feet

LNV
engineers | architects | surveyors

TBPE FIRM NO. F-366

ADDISON

N W E S

Addison Wastewater Masterplan System Deficiencies

Addison, TX

LNV PROJ. NO.	130306
DATE	10/18/2017
SCALE	1 inch = 875 feet
FILE	Addison Sewer System Deficiency
DRAFTED	JWS

Exhibit 2

Path: \\atxserver1\Projects\Dallas\Addison\130306 Wastewater Master Plan\002\Design\GIS\DELIVERABLES\Exhibits\Addison Sewer System Deficiency.mxd

Exhibit 3

Anticipated Developments &

2040 Demand Allocation

A
B
C
D1
D3
E
F
G1
G2
H
I
J
K

Hospital Expansion 250 Beds
Medical Office Building 83000 gsf
Senior Living 350 units
Multifmly Res 250 units and Hotel 150 Rooms
Office Building 500000 gsf
Office Building 50000 gsf
Office Building 500000 gsf
Multifamily Residential 350 units
Hotel 132 Rooms
Hotel 100 Rooms
Office Building 200000 gsf
Office Building 500000 gsf
Sams Redevelopment Mixed Use Full Build Out
Vitruvian Mixed Use Development Full Build Out

ADF_2040

0.000000 - 100.000000	6000.000001 - 7000.000000
100.000001 - 200.000000	7000.000001 - 8000.000000
200.000001 - 300.000000	8000.000001 - 9000.000000
300.000001 - 400.000000	9000.000001 - 10000.000000
400.000001 - 500.000000	10000.000001 - 15000.000000
500.000001 - 600.000000	15000.000001 - 25000.000000
600.000001 - 700.000000	25000.000001 - 30000.000000
700.000001 - 800.000000	30000.000001 - 40000.000000
800.000001 - 900.000000	40000.000001 - 50000.000000
900.000001 - 1000.000000	50000.000001 - 75000.000000
1000.000001 - 2000.000000	75000.000001 - 100000.000000
2000.000001 - 3000.000000	100000.000001 - 150000.000000
3000.000001 - 4000.000000	150000.000001 - 200000.000000
4000.000001 - 5000.000000	200000.000001 - 250000.000000
5000.000001 - 6000.000000	250000.000001 - 300000.000000

Dscription

- Hospital Expansion 250 Beds
- Hotel 100 Rooms
- Hotel 132 Rooms
- Medical Office Building 83000 gsf
- Multifamily Residential 350 units
- Multifmly Res 250 units and Hotel 150 Rooms
- Office Building 200000 gsf
- Office Building 50000 gsf
- Office Building 500000 gsf
- Sams Redevelopment Mixed Use Full Build Out
- Senior Living 350 units
- Vitruvian Mixed Use Development Full Build Out

0 875 1,750 Feet

N W E S

LNV
engineers | architects | surveyors

TBPE FIRM NO. F-366

ADDISON

Addison Wastewater Masterplan
Anticipated Developments and 2040 Demand Allocation

Addison, TX

LNV PROJ. NO.	130306
DATE	10/5/2017
SCALE	1 inch = 875 feet
FILE	Addison Sewer_rev10
DRAFTED	JWS

Exhibit 3

Path: \\atxserver1\Projects\Dallas\Addison\130306 Wastewater Master Plan\002\Design\GIS\DELIVERABLES\Exhibits\Addison Sewer_rev10.mxd

Exhibit 4

SSES CCTV & Inspection Inventory

A
B
C
D1
D2
D3
E
F
G1
G2
H
I
J
K

Modeled Manholes
Kelway Lift Station
SSES_Year
<Null>
2013
2014
Force Mains
A
B
C
D1
D2
D3
E
F
G1
G2
H
I
J
K

0 875 1,750 Feet

LNV
engineers | architects | surveyors

TBPE FIRM NO. F-366

ADDISON

N
W E
S

Addison Wastewater Masterplan
SES CCTV & Inspection Inventory

Addison, TX

LNV PROJ. NO.	130306
DATE	10/5/2017
SCALE	1 inch = 875 feet
FILE	Addison Sewer_rev10a
DRAFTED	JWS

Exhibit 4

Path: \\atxserver1\Projects\Dallas\Addison\130306 Wastewater Master Plan\002\Design\GIS\DELIVERABLES\Exhibits\Addison Sewer_rev10a.mxd

Exhibit 5

Modeled Gravity Lines

A
B
C
D1
D2
D3
E
F
G1
G2
H
I
J
K

Modeled Manholes
Kelway Lift Station
Gravity Lines_2040_Max Flow

Modeled

NO
YES
Force Mains

A
B
C
D1
D2
D3
E
F
G1
G2
H
I
J
K

0 875 1,750 Feet

LNV
engineers | architects | surveyors

TBPE FIRM NO. F-366

ADDISON

N
W E
S

Addison Wastewater Masterplan
Modeled Gravity Lines

Addison, TX

LNV PROJ. NO.	130306
DATE	10/5/2017
SCALE	1 inch = 875 feet
FILE	Addison Sewer_rev10a
DRAFTED	JWS

Exhibit 5

Path: \\atxserver1\Projects\Dallas\Addison\130306 Wastewater Master Plan\002\Design\GIS\DELIVERABLES\Exhibits\Addison Sewer_rev10a.mxd

Appendix A

First Priority Project Cost Summary

Priority	Identification /Location Description	Diameter (in)	LF	Construction Cost	Total Project Cost	Priority	Basin	Description
One	**Phase I SSES**							
	E1104365 to E1104330 Excel Pkwy & Addison Rd	8	325	$ 82,000.00	$ 102,500.00	1	B	8" Wastewater Line (Replace) VCP W/ Liner
	E1104390 to E1104365 Excel Pkwy & Addison Rd	8	154	$ 49,000.00	$ 61,300.00	1	B	8" Wastewater Line (Replace)
	E1104330 Excel Pkwy & Addison Rd	48	N/A	$ 7,000.00	$ 8,800.00	1	B	Repair Ring, Cover, and Chimney
	E1104390 Excel Pkwy & Addison Rd	48	N/A	$ 11,000.00	$ 13,800.00	1	B	Clean, Repair, Stop I/I, Seal and Grout
	F0718370 to F0623060 Addison Rd & Belt Line Rd	8	493	$ 125,000.00	$ 156,300.00	1	D1	8" Wastewater Line (Replace) VCP W/ Liner
	F0718370 Addison Rd & Edwin Lewis Dr	48	N/A	$ 9,000.00	$ 11,300.00	1	D1	Clean, Repair, Stop I/I, Seal and Grout
	F0623060 Addison Rd & Belt Line Rd	48	N/A	$ 10,000.00	$ 12,500.00	1	D1	Clean, Remove Roots, Repair and Coat
	A0337010 to A0338050 Marsh Ln & Spring Valley Rd	8	424	$ 107,000.00	$ 133,800.00	1	G1	8" Wastewater Line (Replace) VCP, Taps, Cracks
	A0338050 Marsh Ln & Spring Valley Rd	48	N/A	$ 9,000.00	$ 11,300.00	1	G1	Stop I/I, Repair Seal, And/Or Inj. Grout
	Phase I SSES Priority 1 Sub-Total			**$ 409,000.00**	**$ 511,600.00**			
	Phase II SSES							
	G1008085 to G1008080	21	275	$ 2,860.00	$ 3,300.00	1	C	Pipe Cleaning
	H1008080 to H1008075	21	18	$ 187.20	$ 300.00	1	C	Pipe Cleaning
	G1008042 16251 Dallas Pkwy	48	N/A	$ 520.00	$ 600.00	1	C	Repair Chimney/Cone
	G0911020 50555 Keller Springs Rd	48	N/A	$ -	$ -	1	C	Refer to Manhole Rehabilitation
	G0911025 5057 Keller Springs Rd	48	N/A	$ 1,950.00	$ 2,300.00	1	C	Point Repair - Plug/Remove Drain Conxn
	Phase II SSES Priority 1 Sub-Total			**$ 5,517.20**	**$ 6,500.00**			
	Modeling - Capacity Issues (Proposed Improavements)							
	Section 1 North Vitruvian Trail	10	484	$ 179,500.00	$ 224,400.00	1	G2	Pipeburst to 12" 10'-14' depth
	Section 2 Vitruvian Way	10	1093	$ 375,800.00	$ 469,800.00	1	G2	Pipeburst to 12" 10'-14' depth
	Section 3 South Marsh Ln	6	828	$ 246,400.00	$ 308,000.00	1	G1	Pipeburst to 10" 10'-14' depth
	Modeling - Capacity Issues (Proposed Improvements) Priority 1 Sub-Total			**$ 801,700.00**	**$ 1,002,200.00**			
	Airport							
	Line Item 2 Julian St to Addison Cir	8	1000	$ 268,894.87	$ 336,200.00	1	E	Pipeburst to 12" 10'-14'Depth
	Line Item 9 Wiley Post Rd and Midway Rd	6	50	$ 80,118.14	$ 100,200.00	1	D1	Pipeburst to 15" 14' -18' Depth
					$ -	1		
					$ -	1		
	Airport Priority 1 Sub-Total			**$ 349,013.01**	**$ 436,400.00**			
	SUBTOTAL =			**$ 1,566,000.00**	**$ 1,957,000.00**			

Appendix B

Second Priority Project Cost Summary

Priority	Identification /Location Description	Diameter (in)	LF	Construction Cost	Total Project Cost	Priority	Basin	Description
	Phase I SSES							
	G0723005 to G0718435 Quorum Dr & Belt Line Rd	8	333	$ 84,000.00	$ 105,000.00	2	E	Replace - VCP W/ Cracks
	C0528190 to C0528185 Rive Ln & Plage Ln	8	30	$ 8,000.00	$ 10,000.00	2	D3	Replace - Large Joint offsets
	C0528195A to C0528195 Rive Ln & Plage Ln	8	431	$ 109,000.00	$ 136,300.00	2	F	Replace - Joints, Roots, Taps
	A0433485 Spring Valley Rd & Marsh Ln	48	N/A	$ 15,000.00	$ 18,800.00	2	G1	Repair Chimney, Coat and Seal
	A0433485 to A0433480 Spring Valley Rd & Marsh Ln	8	401	$ 102,000.00	$ 127,500.00	2	G1	Replace - Sags, Joints
	A0338190 Pointe Rd & Vitruvian Way	48	N/A	$ 9,000.00	$ 11,300.00	2	G2	Clean, remove Roots, Repair and Coat
	A0338190 to A0338165 Pointe Rd & Vitruvian Way	6	185	$ 47,000.00	$ 58,800.00	2	G2	Upsize to 8" - Diameter Reduced
	Phase I SSES Priority 2 Sub-Total			**$ 374,000.00**	**$ 467,700.00**			
	Phase II SSES							
	G0436010 to G0436015	15	293	$ 2,666.30	$ 3,100.00	2	H	Pipe Cleaning
	F1007010 to F1007025	8	113	$ 440.70	$ 600.00	2	C	Pipe Cleaning
	G0911015 to G0908100	10	264	$ 1,372.80	$ 1,600.00	2	C	Pipe Cleaning
	G0911055 to G0911040	8	310	$ 1,209.00	$ 1,400.00	2	C	Pipe Cleaning
	G0911040 to G0911030	10	258	$ 1,341.60	$ 1,600.00	2	C	Pipe Cleaning
	F1007080 to G1007050	8	366	$ 1,427.40	$ 1,700.00	2	C	Pipe Cleaning
	G1008020 to G1008010	10	326	$ 1,695.20	$ 2,000.00	2	C	Pipe Cleaning
	G1008042 to G1008055	10	118	$ 613.60	$ 800.00	2	C	Pipe Cleaning
	G1008095 to G1008085	15	35	$ 318.50	$ 400.00	2	C	Pipe Cleaning
	D1201100 17055 Planters Row	48	N/A	$ 520.00	$ 600.00	2	A	Repair Chimney/Cone
	D1201110 17054 Westgrove Dr	48	N/A	$ 520.00	$ 600.00	2	A	Repair Chimney/Cone
	D1201125 17000 Upper Bay Rr	48	N/A	$ 520.00	$ 600.00	2	A	Repair Chimney/Cone
	D1201140 17000 Westgrove Dr	48	N/A	$ 2,311.40	$ 2,700.00	2	A	Realign and Grout Casting (Unpaved)
	E1202125 4400 Blk Sojourn Dr	48	N/A	$ 520.00	$ 600.00	2	A	Repair Chimney/Cone
	F1202005 17225 Addison Rd	48	N/A	$ 2,311.40	$ 2,700.00	2	A	Realign and Grout Casting (Unpaved)
	F1202040 17225 Addison Rd	48	N/A	$ 520.00	$ 600.00	2	A	Repair Chimney/Cone
Two	F1202060 17001 Addison Rd	48	N/A	$ 832.00	$ 1,000.00	2	A	Clean, Repair Pipe Seal and Coat Around Pipe
	F1202135 4800 Blk Sojourn Dr	48	N/A	$ 520.00	$ 600.00	2	A	Repair Chimney/Cone
	F1202150A 17120 Dallas Pkwy	60	N/A	$ 520.00	$ 600.00	2	A	Repair Chimney/Cone
	F1202150B 17120 Dallas Pkwy	60	N/A	$ 520.00	$ 600.00	2	A	Repair Chimney/Cone
	E1007180 4765 Frank Luke Dr	48	N/A	$ 1,774.50	$ 2,100.00	2	C	Re-Bench
	F0910015 16200 Addison Rd	48	N/A	$ 3,009.50	$ 3,500.00	2	C	Realign and Grout Casting (Paved)
	F0910105 16111 Addison Rd	60	N/A	$ 2,961.40	$ 3,500.00	2	C	Replace Casting (Frame and Lid - Unpaved)
	F1007095 16445 Addison Rd	48	N/A	$ 520.00	$ 600.00	2	C	Repair Chimney/Cone
	F1007145 16380 Addison Rd	48	N/A	$ 520.00	$ 600.00	2	C	Repair Chimney/Cone
	F1104335 16800 Blk Dallas Pkwy	48	N/A	$ 520.00	$ 600.00	2	C	Repair Chimney/Cone
	F1104410 No Number Dallas Pkwy	48	N/A	$ 4,752.80	$ 5,500.00	2	C	Replace Casting (Frame and Lid - Unpaved)
	G0908100 16251 Dallas Pkwy	48	N/A	$ 520.00	$ 600.00	2	C	Repair Chimney/Cone
	G0911005 5055 Keller Springs Rd	48	N/A	$ 520.00	$ 600.00	2	C	Repair Chimney/Cone
	G0911015 16251 Dallas Pkwy	48	N/A	$ 520.00	$ 600.00	2	C	Repair Chimney/Cone
	G0911030 16251 Dallas Pkwy	48	N/A	$ 5,389.02	$ 6,200.00	2	C	Clean, Repair and Coat >6 feet deep
	G0911060 16001 Dallas Pkwy	48	N/A	$ 520.00	$ 600.00	2	C	Repair Chimney/Cone
	G0911065 5000 Blk Airport Pkwy	48	N/A	$ 520.00	$ 600.00	2	C	Repair Chimney/Cone
	G1007065 16400 Quorum Dr	48	N/A	$ 520.00	$ 600.00	2	C	Repair Chimney/Cone
	G1008015 No Number Dallas Pkwy	48	N/A	$ 3,508.60	$ 4,100.00	2	C	Clean, Repair and Coat >6 feet deep
	G1008030 No Number Dallas Pkwy	48	N/A	$ 520.00	$ 600.00	2	C	Repair Chimney/Cone
	G1008035 No Number Mary Kay Way	48	N/A	$ 1,352.00	$ 1,600.00	2	C	Repair Chimney/Cone
	G1008045 No Number Mary Kay Way	48	N/A	$ 520.00	$ 600.00	2	C	Repair Chimney/Cone
	G1008050 No Number Quorum Dr	48	N/A	$ 520.00	$ 600.00	2	C	Repair Chimney/Cone
	G1008065 16251 Dallas Pkwy	48	N/A	$ 520.00	$ 600.00	2	C	Repair Chimney/Cone
	G1008070 16251 Dallas Pkwy	48	N/A	$ 520.00	$ 600.00	2	C	Repair Chimney/Cone
	G1008095 16251 Dallas Pkwy	48	N/A	$ 520.00	$ 600.00	2	C	Repair Chimney/Cone
	D1201095 17013 Vinland Dr	48	N/A	$ 1,950.00	$ 2,300.00	2	A	Pont Repair - Remove/Plug Drain Conxn
	F1104335 16771 Dallas North Tollway	48	N/A	$ 325.00	$ 400.00	2	C	Repair Broken Cleanout
	G0911025 5057 Keller Springs Rd	48	N/A	$ 97.50	$ 200.00	2	C	Replace Cleanout Cap
	Phase II SSES Priority 2 Sub-Total			**$ 53,620.22**	**$ 62,800.00**			
	Modeling Improvements							
	N/A			$ -	$ -	2		
	Modeling Improvements Priority 2 Sub-Total			**$ -**	**$ -**			
	SUBTOTAL =			**$ 428,000.00**	**$ 531,000.00**			

Appendix C

Third Priority Project Cost Summary

Priority	Identification /Location Description	Diameter (in)	LF	Construction Cost	Total Project Cost	Priority	Basin	Description
	Phase I SSES							
	F0718305 to F0718370 Addison Rd & Edwin Lewis Dr	8	86	$ 22,000.00	$ 27,500.00	3	D1	Replace - Grease Depos.
	F0718305 Addison Rd & Edwin Lewis Dr	48	N/A	$ 9,000.00	$ 11,300.00	3	D1	Clean, Remove Roots, Repair and Coat
	G0723015 to G0723005A Quorum Dr & Belt Line Rd	8	150	$ 38,000.00	$ 47,500.00	3	E	Replace - Grease Depos.
	B0621205 to B0621145 Belt Line Rd & Surveyor Blvd	8	200	$ 63,000.00	$ 78,800.00	3	D2	Replace
	D0622100 Midway Rd & Belt Line Rd	48	N/A	$ 1,000.00	$ 1,300.00	3	F	Install Missing Cleanout Cap
	D0622165 Midway Rd & Beltway Dr	48	N/A	$ 10,000.00	$ 12,500.00	3	F	Clean, Remove Roots, Repair and Coat
	F0623105 to F0623140 Landmark Blvd & Belt Line Rd	8	300	$ 76,000.00	$ 95,000.00	3	H	Replace - Joint Offsets
	F0623140A to F0623140 Landmark Blvd & Belt Line Rd	8	327	$ 83,000.00	$ 103,800.00	3	H	Replace - Various Sags
	F0623140 Landmark Blvd & Belt Line Rd	48	N/A	$ 12,000.00	$ 15,000.00	3	H	Clean, Repair, Coat, Constr. Re-Bench
Three	F0623155 Landmark Blvd & Belt Line Rd	48	N/A	$ 15,000.00	$ 18,800.00	3	H	Clean, Repair, Coat, Constr. Re-Bench
	F0623295 Landmark Blvd & Belt Line Rd	48	N/A	$ 15,000.00	$ 18,800.00	3	H	Clean, Repair, Coat, Constr. Re-Bench
	G0624025 to G0624050A Belt Line Rd & Dallas N Tollway	8	192	$ 71,000.00	$ 88,800.00	3	E	Replace - Sags, Grease
	I025050 Oaks North Dr & Trafalger Ct	48	N/A	$ 8,000.00	$ 10,000.00	3	E	Clean, Remove Roots, Repair and Coat
	B0527300 Rive Ln & Azure Ln	48	N/A	$ 18,000.00	$ 22,500.00	3	D3	Repair Pipe Seal, And/Or Inj. Grout
	B0527300 to C0528190 Rive Ln	8	438	$ 111,000.00	$ 138,800.00	3	D3	Replace - Roots & Joint Offsets
	C0434075 to C0434070 Hornet Rd & Midway Rd	8	139	$ 36,000.00	$ 45,000.00	3	F	Replace - Sags, Grease
	C0434070 to D0434065 Hornet Rd & Midway Rd	8	439	$ 111,000.00	$ 138,800.00	3	F	Replace - Joints, Fractures, Sags
	D0434065 to D0434060 Hornet Rd & Midway Rd	8	15	$ 4,000.00	$ 5,000.00	3	F	Replace - Sags, Grease
	D0434060 to D0534010 Hornet Rd & Midway Rd	8	215	$ 50,000.00	$ 62,500.00	3	F	Replace - Future Replacement
	A0432015 to A0433485 Spring Valley Rd & Marsh Ln	8	67	$ 17,000.00	$ 21,300.00	3	G1	Replace - Sags
	A0338050 to A0338055 Marsh Ln & Spring Valley Rd	8	400	$ 101,000.00	$ 126,300.00	3	G1	Replace - Taps, material Change
	A0338070 to A0338195 Marsh Ln & Spring Valley Rd	8	569	$ 144,000.00	$ 180,000.00	3	G2	Replace - Diameter Reduced
	A0338195 to A0338190 Marsh Ln & Pointe Rd	8	424	$ 107,000.00	$ 133,800.00	3	G2	Replace - Diameter Reduced
	Phase I SSES Priority 3 Sub-Total			**$ 1,122,000.00**	**$ 1,403,100.00**			
	Phase II SSES							
	D0434325 to C0434350	15	94	$ 855.40	$ 1,000.00	3	F	Pipe Cleaning
	G0436005 to G0436010	15	40	$ 364.00	$ 500.00	3	H	Pipe Cleaning
	F1202110 to F1202135	10	448	$ 2,329.60	$ 2,700.00	3	A	Pipe Cleaning
	F1007020 to F1007015	8	288	$ 1,123.20	$ 1,300.00	3	C	Pipe Cleaning
	F1007015 to F1007025	8	292	$ 1,138.80	$ 1,400.00	3	C	Pipe Cleaning
	F1007025 to F1007040	8	302	$ 1,177.80	$ 1,400.00	3	C	Pipe Cleaning
	F1007040 to F1007041	8	70	$ 273.00	$ 400.00	3	C	Pipe Cleaning
	F1007095 to F1007165	8	227	$ 885.30	$ 1,100.00	3	C	Pipe Cleaning
	F1007060 to F1007095	8	269	$ 1,049.10	$ 1,300.00	3	C	Pipe Cleaning
	F1007205 to F1007235	8	160	$ 624.00	$ 800.00	3	C	Pipe Cleaning
	F1007235 to F0910020	8	497	$ 1,938.30	$ 2,300.00	3	C	Pipe Cleaning
	G1007212 to G1007210	8	125	$ 487.50	$ 600.00	3	C	Pipe Cleaning
	C0434350 None Spring Valley Rd	48	N/A	$ 3,920.49	$ 4,600.00	3	F	Repair Chimney/Cone
	J0625005 None Beltline Rd	48	N/A	$ 7,291.65	$ 8,400.00	3	K	Install Manhole Insert
	D1201035 17200 Westgrove Dr	48	N/A	$ 1,352.00	$ 1,600.00	3	A	Repair Chimney/Cone
	D1201070 17119 Planters Row	48	N/A	$ 195.00	$ 300.00	3	A	Replace Lid
	D1201085 17072 Upper Bay Rr	48	N/A	$ 520.00	$ 600.00	3	A	Repair Chimney/Cone
	D1201095 17060 Vinland Dr	48	N/A	$ 520.00	$ 600.00	3	A	Repair Chimney/Cone
	D1201120 17000 Vinland Dr	48	N/A	$ 520.00	$ 600.00	3	A	Repair Chimney/Cone
	E1201055 17119 Winward Ln	48	N/A	$ 520.00	$ 600.00	3	A	Repair Chimney/Cone
	E1201090 17061 Winward Ln	48	N/A	$ 715.00	$ 900.00	3	A	Repair Chimney/Cone
	E1201115 17001 Winward Ln	48	N/A	$ 520.00	$ 600.00	3	A	Repair Chimney/Cone
	E1202045 17200 Westgrove Dr	48	N/A	$ 1,755.00	$ 2,100.00	3	A	Realign and Grout Casting (Paved)
	E1202070 17001 Addison Rd	48	N/A	$ 520.00	$ 600.00	3	A	Repair Chimney/Cone
	E1202080 17001 Addison Rd	48	N/A	$ 520.00	$ 600.00	3	A	Repair Chimney/Cone
	F1202030 17101 Dallas Pkwy	48	N/A	$ 520.00	$ 600.00	3	A	Repair Chimney/Cone
	F1202050 17101 Dallas Pkwy	48	N/A	$ 1,352.00	$ 1,600.00	3	A	Repair Chimney/Cone
	F1202055 17001 Addison Rd	48	N/A	$ 650.00	$ 800.00	3	A	Install Chimney Seal
	F1202075 17001 Addison Rd	48	N/A	$ 1,352.00	$ 1,600.00	3	A	Repair Chimney/Cone
	F1202100 17101 Dallas Pkwy	48	N/A	$ 5,132.61	$ 6,000.00	3	A	Repair Chimney/Cone
	F1202110 17101 Dallas Pkwy	48	N/A	$ 520.00	$ 600.00	3	A	No Rehabilitation Recommended
	E0910040 4501 Ratliff Ln	48	N/A	$ 1,352.00	$ 1,600.00	3	C	Repair Chimney/Cone
	F0810245 4798 Airport Pkwy	48	N/A	$ 832.00	$ 1,000.00	3	C	Clean, Repair Pipe Seal and Coat Around Pipe
	F0910010 16200 Addison Rd	48	N/A	$ 520.00	$ 600.00	3	C	Repair Chimney/Cone
	F0910020 16301 Addison Rd	48	N/A	$ 520.00	$ 600.00	3	C	Repair Chimney/Cone
	F0910030 4750 Ratliff Ln	48	N/A	$ 1,352.00	$ 1,600.00	3	C	Repair Chimney/Cone
	F0910065 4851 Keller Springs Rd	48	N/A	$ 520.00	$ 600.00	3	C	Repair Chimney/Cone
	F0910070 4849 Keller Springs Rd	48	N/A	$ 1,235.00	$ 1,500.00	3	C	Realign and Grout Casting (Paved)
	F0910130 4950 Keller Springs Rd	48	N/A	$ 747.50	$ 900.00	3	C	Install T-Cone Stopper or Cleanout Cap
	F0910135 4851 Keller Springs Rd	48	N/A	$ 780.00	$ 900.00	3	C	Install Manhole Insert
	F0910150 16051 Addison Rd	48	N/A	$ 832.00	$ 1,000.00	3	C	Clean, Repair Pipe Seal and Coat Around Pipe
	F0910220 4901 Airport Pkwy	48	N/A	$ 832.00	$ 1,000.00	3	C	Clean, Repair Pipe Seal and Coat Around Pipe
Three	F0910225 15920 Addison Rd	48	N/A	$ 520.00	$ 600.00	3	C	Repair Chimney/Cone
	F1007165 16415 Addison Rd	48	N/A	$ 1,352.00	$ 1,600.00	3	C	Repair Chimney/Cone
	F1007215 No Number Ledgemont Ln	48	N/A	$ 520.00	$ 600.00	3	C	Repair Chimney/Cone
	F1007235 16415 Addison Rd	48	N/A	$ 520.00	$ 600.00	3	C	Repair Chimney/Cone
	F1104055 16885 Dallas Pkwy	48	N/A	$ 520.00	$ 600.00	3	C	Repair Chimney/Cone
	F1104370 16771 Dallas Pkwy	48	N/A	$ 520.00	$ 600.00	3	C	Repair Chimney/Cone
	G0911020 5505 Keller Springs Rd	48	N/A	$ 520.00	$ 600.00	3	C	Repair Chimney/Cone
	G0911045 5057 Keller Springs Rd	48	N/A	$ 520.00	$ 600.00	3	C	Repair Chimney/Cone
	G0911050 5055 Keller Springs Rd	48	N/A	$ 520.00	$ 600.00	3	C	Repair Chimney/Cone
	G0911070 5000 Blk Airport Pkwy	48	N/A	$ 520.00	$ 600.00	3	C	Repair Chimney/Cone
	G0911076 5000 Blk Airport Pkwy	48	N/A	$ 520.00	$ 600.00	3	C	Repair Chimney/Cone
	G1007175 16001 QUORUM DR	48	N/A	$ 2,405.00	$ 2,800.00	3	C	Realign and Grout Casting (Paved)
	G1007210 16400 Westgrove Dr	48	N/A	$ 520.00	$ 600.00	3	C	Repair Chimney/Cone
	G1008005 16475 Dallas Pkwy	48	N/A	$ 520.00	$ 600.00	3	C	Repair Chimney/Cone
	G1008010 5000 BLK Westgrove Dr	48	N/A	$ 520.00	$ 600.00	3	C	Repair Chimney/Cone
	G1008020 No Number Westgrove Dr	48	N/A	$ 520.00	$ 600.00	3	C	Repair Chimney/Cone
	G1008055 16251 Dallas Pkwy	48	N/A	$ 1,352.00	$ 1,600.00	3	C	Repair Chimney/Cone
	G1008060 16251 Dallas Pkwy	48	N/A	$ 2,405.00	$ 2,800.00	3	C	Install Chimney Seal
	G1008085 16251 Dallas Pkwy	48	N/A	$ 520.00	$ 600.00	3	C	Repair Chimney/Cone
	D1201060 17100 Vinland Dr	48	N/A	$ 97.50	$ 200.00	3	A	Replace Cleanout Cap
	D1201060 17112 Vinland Dr	48	N/A	$ 97.50	$ 200.00	3	A	Replace Cleanout Cap
	D1201065 17101 Upper Bay Rd	48	N/A	$ -	$ -	3	A	No Repair Recommended
	D1201065 17084 Upper Bay Rd	48	N/A	$ 97.50	$ 200.00	3	A	Replace Cleanout Cap
	D1201075 17078 Knots Landing	48	N/A	$ 97.50	$ 200.00	3	A	Replace Cleanout Cap
	D1201075 17085 Knots Landing	48	N/A	$ 97.50	$ 200.00	3	A	Replace Cleanout Cap
	D1201075 17112 Knots Landing	48	N/A	$ 97.50	$ 200.00	3	A	Replace Cleanout Cap
	D1201080 17078 Westgrove Dr	48	N/A	$ -	$ -	3	A	No Repair Recommended
	D1201080 17090 Westgrove Dr	48	N/A	$ 97.50	$ 200.00	3	A	Replace Cleanout Cap
	D1201080 17112 Westgrove Dr	48	N/A	$ 97.50	$ 200.00	3	A	Replace Cleanout Cap
	D1201095 17049 Vinland Dr	48	N/A	$ 97.50	$ 200.00	3	A	Replace Cleanout Cap
	D1201100 17006 Planters Row	48	N/A	$ 97.50	$ 200.00	3	A	Replace Cleanout Cap
	D1201100 17001 Planters Row	48	N/A	$ 97.50	$ 200.00	3	A	Replace Cleanout Cap
	D1201105 17054 Knots Landing	48	N/A	$ 97.50	$ 200.00	3	A	Replace Cleanout Cap
	D1201105 17030 Knots Landing	48	N/A	$ 97.50	$ 200.00	3	A	Replace Cleanout Cap
	D1201110 17048 Westgrove Dr	48	N/A	$ -	$ -	3	A	No Repair Recommended
	D1201110 17036 Westgrove Dr	48	N/A	$ -	$ -	3	A	No Repair Recommended
	E1201055 17119 Winward Ln	48	N/A	$ 97.50	$ 200.00	3	A	Replace Cleanout Cap
	E1201055 17085 Winward Ln	48	N/A	$ -	$ -	3	A	No Repair Recommended
	F0910220 4901 Airport Pkwy	48	N/A	$ 97.50	$ 200.00	3	C	Replace Cleanout Cap
	F1007015 16479 Dallas North Tollway	48	N/A	$ -	$ -	3	C	No Repair Recommended
	F1007060 16400 Blk Addison Rd	48	N/A	$ 1,950.00	$ 2,300.00	3	C	Point Repair

Priority	Identification /Location Description	Diameter (in)	LF	Construction Cost	Total Project Cost	Priority	Basin	Description
Three	F1007060 16400 Blk Addison Rd	48	N/A	$ 325.00	$ 400.00	3	C	Repair Broken Cleanout
	F1007060 16400 Blk Addison Rd	48	N/A	$ 97.50	$ 200.00	3	C	Replace Cleanout Cap
	F1202030 17275 Addison Rd	48	N/A	$ 97.50	$ 200.00	3	A	Replace Cleanout Cap
	F1202095 17001 Addison Rd	48	N/A	$ 97.50	$ 200.00	3	A	Replace Cleanout Cap
	F1202110 17001 Addison Rd	48	N/A	$ -	$ -	3	A	No Repair Recommended
	G0911075 16001 Dallas North Tollway	48	N/A	$ 97.50	$ 200.00	3	C	Replace Cleanout Cap
	G0911075 15851 Dallas North Tollway	48	N/A	$ 97.50	$ 200.00	3	C	Replace Cleanout Cap
	G1008020 16475 Dallas North Tollway	48	N/A	$ 97.50	$ 200.00	3	C	Replace Cleanout Cap
	G1008070 16251 Dallas North Tollway	48	N/A	$ -	$ -	3	C	No Repair Recommended
	Phase II SSES Priority 3 Sub-Total			**$ 69,800.74**	**$ 84,100.00**			
	Modeling - New Manholes (Proposed Improvements)							
	E121P	48	N/A	$ 61,400.00	$ 76,800.00	3	A	Additional Manhole W/ Bypass
	E112P	48	N/A	$ 27,400.00	$ 34,300.00	3	B	Additional Manhole W/ Bypass
	D108P	48	N/A	$ 61,800.00	$ 77,300.00	3	B	Additional Manhole W/ Bypass
	E104P	48	N/A	$ 63,300.00	$ 79,200.00	3	B	Additional Manhole W/ Bypass
	E113P	48	N/A	$ 64,200.00	$ 80,300.00	3	B	Additional Manhole W/ Bypass
	J0614P	48	N/A	$ 71,400.00	$ 89,300.00	3	B	Additional Manhole W/ Bypass
	D109P	48	N/A	$ 80,100.00	$ 100,200.00	3	B	Additional Manhole W/ Bypass
	E105P	48	N/A	$ 25,900.00	$ 32,400.00	3	C	Additional Manhole W/ Bypass
	F100P	48	N/A	$ 65,800.00	$ 82,300.00	3	C	Additional Manhole W/ Bypass
	D0810P	48	N/A	$ 26,200.00	$ 32,800.00	3	D1	Additional Manhole W/ Bypass
	E0723P	48	N/A	$ 31,700.00	$ 39,700.00	3	D1	Additional Manhole W/ Bypass
	B0745P	48	N/A	$ 59,600.00	$ 74,500.00	3	D1	Additional Manhole W/ Bypass
	E086P	48	N/A	$ 61,800.00	$ 77,300.00	3	D1	Additional Manhole W/ Bypass
	E0724P	48	N/A	$ 61,900.00	$ 77,400.00	3	D1	Additional Manhole W/ Bypass
	A0651P	48	N/A	$ 62,100.00	$ 77,700.00	3	D1	Additional Manhole W/ Bypass
	D0811P	48	N/A	$ 62,400.00	$ 78,000.00	3	D1	Additional Manhole W/ Bypass
	C0740P	48	N/A	$ 63,100.00	$ 78,900.00	3	D1	Additional Manhole W/ Bypass
	B0646P	48	N/A	$ 63,200.00	$ 79,000.00	3	D1	Additional Manhole W/ Bypass
	C0642P	48	N/A	$ 63,600.00	$ 79,500.00	3	D1	Additional Manhole W/ Bypass
	D0727P	48	N/A	$ 64,300.00	$ 80,400.00	3	D1	Additional Manhole W/ Bypass
	D0728P	48	N/A	$ 65,100.00	$ 81,400.00	3	D1	Additional Manhole W/ Bypass
	E0725P	48	N/A	$ 66,900.00	$ 83,700.00	3	D1	Additional Manhole W/ Bypass
	D0729P	48	N/A	$ 67,300.00	$ 84,200.00	3	D1	Additional Manhole W/ Bypass
	C0741P	48	N/A	$ 67,800.00	$ 84,800.00	3	D1	Additional Manhole W/ Bypass
	D0730P	48	N/A	$ 74,800.00	$ 93,500.00	3	D1	Additional Manhole W/ Bypass
	D0731P	48	N/A	$ 80,800.00	$ 101,000.00	3	D1	Additional Manhole W/ Bypass
	A0555P	48	N/A	$ 65,500.00	$ 81,900.00	3	D3	Additional Manhole W/ Bypass
	A0553P	48	N/A	$ 123,700.00	$ 154,700.00	3	D3	Additional Manhole W/ Bypass
	D0533P	48	N/A	$ 58,200.00	$ 72,800.00	3	F	Additional Manhole W/ Bypass
	C0444P	48	N/A	$ 59,300.00	$ 74,200.00	3	F	Additional Manhole W/ Bypass
	E0626P	48	N/A	$ 59,900.00	$ 74,900.00	3	F	Additional Manhole W/ Bypass
	C0443P	48	N/A	$ 60,300.00	$ 75,400.00	3	F	Additional Manhole W/ Bypass
	D0534P	48	N/A	$ 60,900.00	$ 76,200.00	3	F	Additional Manhole W/ Bypass
	D0535P	48	N/A	$ 62,900.00	$ 78,700.00	3	F	Additional Manhole W/ Bypass
	D0436P	48	N/A	$ 64,700.00	$ 80,900.00	3	F	Additional Manhole W/ Bypass
	D0437P	48	N/A	$ 69,100.00	$ 86,400.00	3	F	Additional Manhole W/ Bypass
	D0438P	48	N/A	$ 71,400.00	$ 89,300.00	3	F	Additional Manhole W/ Bypass
	D0439P	48	N/A	$ 73,100.00	$ 91,400.00	3	F	Additional Manhole W/ Bypass
	B0448P	48	N/A	$ 74,900.00	$ 93,700.00	3	F	Additional Manhole W/ Bypass
	A0456P	48	N/A	$ 68,100.00	$ 85,200.00	3	G1	Additional Manhole W/ Bypass
	A0357P	48	N/A	$ 106,700.00	$ 133,400.00	3	G1	Additional Manhole W/ Bypass
	B0349P	48	N/A	$ 29,200.00	$ 36,500.00	3	G2	Additional Manhole W/ Bypass
	A0358P	48	N/A	$ 63,400.00	$ 79,300.00	3	G2	Additional Manhole W/ Bypass
	B0350P	48	N/A	$ 64,900.00	$ 81,200.00	3	G2	Additional Manhole W/ Bypass
	G0521P	48	N/A	$ 56,600.00	$ 70,800.00	3	H	Additional Manhole W/ Bypass
	A0552P	48	N/A	$ 63,800.00	$ 79,800.00	3	I	Additional Manhole W/ Bypass
	F0522P	48	N/A	$ 70,900.00	$ 88,700.00	3	I	Additional Manhole W/ Bypass
	J0515P	48	N/A	$ 63,700.00	$ 79,700.00	3	K	Additional Manhole W/ Bypass
	H0619P	48	N/A	$ 63,800.00	$ 79,800.00	3	K	Additional Manhole W/ Bypass
	J0612P	48	N/A	$ 64,800.00	$ 81,000.00	3	K	Additional Manhole W/ Bypass
	I0618P	48	N/A	$ 68,800.00	$ 86,000.00	3	K	Additional Manhole W/ Bypass
	I0616P	48	N/A	$ 70,200.00	$ 87,800.00	3	K	Additional Manhole W/ Bypass
	H0620P	48	N/A	$ 70,500.00	$ 88,200.00	3	K	Additional Manhole W/ Bypass
	I0617P	48	N/A	$ 72,600.00	$ 90,800.00	3	K	Additional Manhole W/ Bypass
	J0613P	48	N/A	$ 83,000.00	$ 103,800.00	3	K	Additional Manhole W/ Bypass
	Modeling - New Manholes (Proposed Improvements) Priority 3 Sub-Total			**$ 3,548,800.00**	**$ 4,438,400.00**			
	Modeling - Capacity Issues (Proposed Improvements)							
	N/A			$ -	$ -	3		
	Modeling - Capacity Issues (Proposed Improvements) Priority 3 Sub-Total			**$ -**	**$ -**			
	Airport							
	Line Item 1 Addison Rd btw Addison Cir and	8	800	$ 258,437.28	$ 323,100.00	3	E	New line (Open Cut) 10'-14' Depth
	Line Item 3 Jimmy Doolittle Dr	8	600	$ 193,620.06	$ 242,100.00	3	E	New line (Open Cut) ≤ 6'
	Line Item 4 Glenn Curtiss Dr	8	1500	$ 528,861.24	$ 661,100.00	3	C	New line (Open Cut) ≤ 6'
	Line Item 5 North Dooley Rd	8	450	$ 195,631.82	$ 244,600.00	3	B	New line (Open Cut) 10'-14'Depth
	Line Item 6 Lindbergh Dr btw Midway Rd and South	6	1400	$ 317,168.77	$ 396,500.00	3	D1	Pipeburst to 8" ≤6'Depth
	Line Item 7 Richard Byrd Dr	6	1200	$ 318,181.40	$ 397,800.00	3	D1	Pipeburst to 8" 6'-10'Depth
	Line Item 8 George Haddaway Dr	8	400	$ 134,929.60	$ 168,700.00	3	E	Pipeburst to 12" 6'-10' depth
	Airport Priority 3 Sub-Total			**$ 1,946,830.17**	**$ 2,433,900.00**			
	SUBTOTAL =			**$ 6,688,000.00**	**$ 8,360,000.00**			

Appendix D

Fourth Priority Project Cost Summary

Priority	Identification /Location Description	Diameter (in)	LF	Construction Cost	Total Project Cost	Priority	Basin	Description
	Phase I SSES							
	D0622175 Midway Rd & Beltway Dr	48	N/A	$ 15,000.00	$ 18,800.00	4	F	Clean, Remove Roots, Repair and Coat
	D0622155 Midway Rd & Beltway Dr	48	N/A	$ 12,000.00	$ 15,000.00	4	F	Clean, Remove Roots, Repair and Coat
	D0622125 Midway Rd & Belt Line Rd	48	N/A	$ 12,000.00	$ 15,000.00	4	F	Clean, Remove Roots, Repair and Coat
	D0622130 Midway Rd & Belt Line Rd	48	N/A	$ 18,000.00	$ 22,500.00	4	F	Repair Chimney, Coat and Seal
	F0623165 Landmark Blvd & Belt Line Rd	48	N/A	$ 8,000.00	$ 10,000.00	4	H	Clean, Remove Roots, Repair and Coat
	F0623270 Landmark Blvd & Belt Line Rd	48	N/A	$ 15,000.00	$ 18,800.00	4	H	Clean, Repair Ring, Cover, Chimney, & Coat
	G0624060 Quorum Dr & Belt Line Rd	48	N/A	$ 1,000.00	$ 1,300.00	4	E	Install Missing Cleanout Cap
	G0624055 Quorum Dr & Belt Line Rd	48	N/A	$ 8,000.00	$ 10,000.00	4	E	Clean, Stop I/I, Repair Seal, & Grout, Coat
	Phase I SSES Priority 4 Sub-Total			**$ 89,000.00**	**$ 111,400.00**			
	Phase II SSES							
	J0625020 to J0625005	8	225	$ 877.50	$ 1,100.00	4	K	Pipe Cleaning
	D1201085 to D1201125	8	400	$ 1,560.00	$ 1,800.00	4	A	Pipe Cleaning
	D1201095 to D1201120	8	350	$ 1,365.00	$ 1,600.00	4	A	Pipe Cleaning
	D1201105 to D1201135	8	349	$ 1,361.10	$ 1,600.00	4	A	Pipe Cleaning
	D1201110 to D1201140	8	348	$ 1,357.20	$ 1,600.00	4	A	Pipe Cleaning
	D1201080 to D1201110	8	309	$ 1,205.10	$ 1,400.00	4	A	Pipe Cleaning
	D1201125 to D1201120	8	200	$ 780.00	$ 900.00	4	A	Pipe Cleaning
	D1201120 to E1201115	8	188	$ 733.20	$ 900.00	4	A	Pipe Cleaning
	D1201100 to D1201130	8	350	$ 1,365.00	$ 1,600.00	4	A	Pipe Cleaning
	D1201140 to D1201135	8	196	$ 764.40	$ 900.00	4	A	Pipe Cleaning
	D1201135 to D1201130	8	198	$ 772.20	$ 900.00	4	A	Pipe Cleaning
	E1201055 to E1201090	8	293	$ 1,142.70	$ 1,400.00	4	A	Pipe Cleaning
	E1201050 to E1201055	8	83	$ 323.70	$ 400.00	4	A	Pipe Cleaning
	E1202070 to E1202065	8	281	$ 1,095.90	$ 1,300.00	4	A	Pipe Cleaning
	F1202050 to F1202110	8	233	$ 908.70	$ 1,100.00	4	A	Pipe Cleaning
	F1202055 to F1202050	8	230	$ 897.00	$ 1,100.00	4	A	Pipe Cleaning
	E1202080 to F1202075	8	203	$ 791.70	$ 1,000.00	4	A	Pipe Cleaning
	F1202133 to F1202132	8	252	$ 982.80	$ 1,200.00	4	A	Pipe Cleaning
	E0910035 to F0910030	8	267	$ 1,041.30	$ 1,200.00	4	C	Pipe Cleaning
Four	E1007185 to E1007180	8	84	$ 327.60	$ 400.00	4	C	Pipe Cleaning
	F0910030 to F0910020	8	133	$ 518.70	$ 600.00	4	C	Pipe Cleaning
	F0910070 to F0910065	6	294	$ 1,146.60	$ 1,400.00	4	C	Pipe Cleaning
	F0910130 to F0910135	8	370	$ 1,443.00	$ 1,700.00	4	C	Pipe Cleaning
	F0910150 to F0910105	8	407	$ 1,587.30	$ 1,900.00	4	C	Pipe Cleaning
	F1007145 to F1007165	8	350	$ 1,365.00	$ 1,600.00	4	C	Pipe Cleaning
	F1007165 to F1007190	8	189	$ 737.10	$ 900.00	4	C	Pipe Cleaning
	F1007200 to F1007205	8	56	$ 218.40	$ 300.00	4	C	Pipe Cleaning
	F1007190 to F1007205	8	154	$ 600.60	$ 700.00	4	C	Pipe Cleaning
	F1007105 to F1007215	8	737	$ 2,874.30	$ 3,400.00	4	C	Pipe Cleaning
	F1104335 to F1104370	8	269	$ 1,049.10	$ 1,300.00	4	C	Pipe Cleaning
	G0910170 to G0910210	8	398	$ 1,552.20	$ 1,800.00	4	C	Pipe Cleaning
	G0911035 to G0911050	8	165	$ 643.50	$ 800.00	4	C	Pipe Cleaning
	G0911070 to G0911060	8	268	$ 1,045.20	$ 1,300.00	4	C	Pipe Cleaning
	G1007210 to G1007175	10	318	$ 1,653.60	$ 2,000.00	4	C	Pipe Cleaning
	G1008043 to G1008042	8	100	$ 390.00	$ 500.00	4	C	Pipe Cleaning
	G1008035 to G1008045	8	245	$ 955.50	$ 1,100.00	4	C	Pipe Cleaning
	D1201045 17200 Westgrove Dr	48	N/A	$ 325.00	$ 400.00	4	A	Replace Cleanout Casting/Cover (Unpaved)
	F0813005 4798 Airport Pkwy	48	N/A	$ 97.50	$ 200.00	4	C	Install T-Cone Stopper or Cleanout Cap
	G1104440 16479 Dallas Pkwy	48	N/A	$ 520.00	$ 600.00	4	C	Repair Chimney/Cone
	H1008075A 16200 Dallas Pkwy	60	N/A	$ 650.00	$ 800.00	4	C	Repair Manhole Wall / Lift Holes
	H1008080 16200 Dallas Pkwy	48	N/A	$ 7,091.66	$ 8,200.00	4	C	Repair Chimney/Cone
	D1201065 17090 Upper Bay Rd	48	N/A	$ -	$ -	4	A	No Repair Recommended
	D1201080 17078 Westgrove Dr	48	N/A	$ -	$ -	4	A	No Repair Recommended
	D1201110 17054 Westgrove Dr	48	N/A	$ -	$ -	4	A	No Repair Recommended
	D1201120 17001 Vinland Dr	48	N/A	$ -	$ -	4	A	Refer to Manhole Rehabilitation
	E1201055 No Number Winward Ln	48	N/A	$ -	$ -	4	A	Refer to Manhole Rehabilitation
	E1201090 17001 Winward Ln	48	N/A	$ -	$ -	4	A	No Repair Recommended
	F0910220 4901 Airport Pkwy	48	N/A	$ -	$ -	4	C	Refer to Manhole Rehabilitation
	F0910220 4900 Airport Pkwy	48	N/A	$ -	$ -	4	C	No Repair Recommended
	F1007095 16415 Addison Rd	48	N/A	$ -	$ -	4	C	No Repair Recommended
	F1102300 16901 Dallas North Tollway	48	N/A	$ -	$ -	4	A	No Repair Recommended
	F1104410 16600 Dallas North Tollway	48	N/A	$ -	$ -	4	C	Refer to Manhole Rehabilitation
	F1202030 17311 Dallas Pkwy	48	N/A	$ -	$ -	4	A	Refer to Manhole Rehabilitation
	F1202050 17089 Dallas Pkwy	48	N/A	$ -	$ -	4	A	Refer to Manhole Rehabilitation
	F1202110 17101 Dallas Pkwy	48	N/A	$ -	$ -	4	A	Refer to Manhole Rehabilitation
	G0911005 5057 Keller Springs Rd	48	N/A	$ -	$ -	4	C	Refer to Manhole Rehabilitation
	G1008030 16200 Blk Dallas North Tollway	48	N/A	$ -	$ -	4	C	Refer to Manhole Rehabilitation
	Modeling							
	N/A				$ -	4		
	Phase I SSES Priority 4 Sub-Total			**$ 46,116.36**	**$ 54,900.00**			
	SUBTOTAL =			**$ 136,000.00**	**$ 167,000.00**			