LOUVIERS WATER AND SANITATION DISTRICT

CONCEPTUAL WATER AND SEWER MASTER PLAN

NOVEMBER 2020

Prepared By:

TST Infrastructure, LLC
61 Inverness Drive East, Suite 100
Englewood, CO 80112
303.799.5197

002.033.00

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF APPENDICES

I. BACKGROUND AND PURPOSE

A. BACKGROUND

The Louviers Water and Sanitation District (LWSD or District) provides water and sewer service to the Louviers community, located approximately seven miles south of the intersection of Santa Fe Drive and C-470, as shown in Figure 1. Figure 2 shows the current district boundary which encompasses approximately 75 acres, and which also defines the District's service area. A legal description with parcel exhibits is presented in Appendix A.

The District's service area generally includes residential and commercial development in the Louviers community. The Louviers community consists of a total of 110 lots plus two Douglas County Parks, all of which are currently developed. The 110 lots are comprised of 107 residential lots (one of which has two water services), a church, post office, the village club community center and the two Douglas County Parks for a total of 113 water customers. The 2010 census data indicates that 269 people live within the Louviers community, or approximately 2.51 people per residential unit (269 people/107 residential lots).

Louviers was originally a company town for the DuPont Corporation, and the collection and distribution systems were constructed by DuPont. The time of construction of the water and sewer systems is not well documented. Most of the houses in Louviers were constructed in the 1910s, however the earliest documentation of the water and sewer systems is a plat prepared in 1960. It appears that the water and sewer systems were existing at the time the plat was prepared.

In 1960, DuPont platted the Louviers community and conveyed the residential properties to individual owners. At that time, ownership of the water and sewer systems was conveyed to the then newly formed Louviers Mutual Service Company (LMSC), a private utility company owned by the landowners of the Louviers community. From the 1960s through most of the 1990s, investment in its systems was reportedly limited to repairing existing facilities to maintain the system in an operable condition. By the late 1990s and early 2000s, LMSC began to identify the need to upgrade its systems to provide more

reliable service and comply with evolving water and wastewater regulations. As a private service company, LMSC had limited access to financial resources available to governmental agencies providing similar services. In 2008, the Louviers Water and Sanitation District (LWSD or District) was formed and all LMSC assets were transferred to the District, which now owns and operates the systems.

As part of the formation of the District in 2008, a service plan was prepared to identify the services to be provided by the District and the facilities required to provide those services. The Service Plan identified five major system improvements including:

- Wastewater Treatment Improvements required to meet effluent limits for nitrogen and phosphorus. (Complete)
- Constructing a second well to provide water supply redundancy (Complete)
- Improvements to the existing well (Complete)
- Replacement of the entire water distribution system
- Replacement of the entire wastewater collection system

In addition to the Service Plan, the District prepared two significant planning documents to more specifically address the details of the required system upgrades.

- Water System Improvements Preliminary Engineering Report (PER) – 2010 with subsequent updates
- Sanitary Sewer Project Needs Assessment Report (PNA) – 2016 with subsequent updates

Since the early 2000s, LWSD has made a number of improvements to the system including adding a second water storage tank; constructing a land application system for tertiary treatment of wastewater; constructing a second water supply well; and replacing approximately 1900 linear feet (lf) of water and 2650 lf of sewer pipelines. These improvements have helped the District address regulatory compliance issues and reduce repair costs and system outages.

As noted above, the wastewater treatment and well improvements identified in the Service Plan have been completed and the remaining work includes replacement of the water distribution and wastewater collection systems. Small portions of the distribution and collection systems have been replaced, but the 90% of the work that is remaining represents the bulk of the improvements identified in the Service Plan.

The Water System PER and the Wastewater System PNA both provided more detailed planning for their respective improvements. Both reports focused on approaching system improvements in phases that could be accomplished as funding became available. This detailed planning has enabled the District to obtain funding for the initial phases of distribution and collection replacement.

B. PURPOSE

Due to the significant capital investments required for water and sewer infrastructure upgrades, it is essential to develop and maintain long term planning systems that address the District's overall capital requirements. This type of planning enables utilities to project current and future revenue requirements and develop more efficient financial plans to meet its revenue requirements. Long-term capital and financial planning for the entire system is increasingly required by funding agencies and can also be useful for demonstrating the need for special funding assistance. A solid long-term capital improvement plan also provides a basis for evaluating the effect of unplanned occurrences and requirements such as new regulations.

The purpose of this Conceptual Master Plan is to develop an initial framework for the District's long-term capital planning using information developed in the previous planning documents. This plan is intended as a tool for understanding the overall magnitude of the District's planned infrastructure improvements and as a starting point for discussions related to the feasibility and timing of those improvements. Initial development of a master plan is often an iterative process to develop an acceptable balance between scope, timing and financial requirements, and this conceptual master plan should be considered a first step in that process.

II. WATER SUPPLY

The District's water supply is based entirely on non-renewable groundwater from the Denver Basin aquifers. The District has two active wells in the Arapahoe aquifer and does not currently utilize water from the other Denver Basin aquifers. LWSD is currently permitted to withdraw a maximum of 150 AFY from the Arapahoe aquifer with a maximum pumping rate of 250 gpm. In 2006, Lytle Water Solutions (LWS) estimated LWSD's annual water demand at 12.1 MG, or approximately 37 AFY (Lytle Water Solutions, August 29, 2006). The required maximum pumping rate is based on maximum day demand for the system which in 2010 TST estimated to be 70,000 gallons per day, or 49 gpm (Water System Improvements PER, TST Infrastructure, February, 2010). Based on historical use, LWSD's Arapahoe aquifer supply provides sufficient water to meet both annual and maximum day demand.

The Denver Basin aquifers are heavily used throughout Douglas County and surrounding areas and are considered non-renewable resources because the withdrawal rate far exceeds the recharge rate. In its 2006 report, LWS estimated that the static water levels in the Arapahoe aquifer had dropped an average of 11 feet per year in the vicinity of the LWSD wells. Water levels in the aquifers are expected to continue to decline, however the rate at which the decline will actually occur is unknown. What does seem certain, is that at some point in the future, LWSD will need to replace its current water supply.

The District's two existing wells are located in the north and south portions of the District with a separation of approximately 1950 lf. The location of the wells is shown in Figure 3. The south well (Permit No. 18799-F) was originally constructed in 1975 and until 2014, was the sole source of supply. Over the years, performance of the well has degraded with reduced pumping rates and increased sand production and air entrainment. The south well is now used primarily as a backup to the north well (Permit No. 2595-F), which was put in service in 2014. Historically, water from the Arapahoe aquifer required only disinfection to meet applicable drinking water standards. New disinfection systems were installed at each well in 2014 and these systems are expected to provide reliable treatment for the foreseeable future.

In the past two years, the north well has experienced increasing levels of radium, and the District has received an enforcement order from the Colorado Department of Public Health and Environment (CDPHE). The District will be required to bring the system into compliance in a timeframe to be determined after a detailed evaluation of the alternatives. The alternatives are limited and are expected to include installing a radium removal system at the north well or connecting to one of the nearby water systems that provide renewable water supplies to their customers.

While it seems clear that at some point the District will have to replace its current non-renewable water supply, the required timing of that replacement is less clear. Development of a long-term water supply strategy should address the following key considerations:

- The existing Arapahoe aquifer supply is a limited resource and at some point, replacement of this supply will be required. Although the timeframe for resolving the radium issue has not yet been determined, it is reasonable to expect that compliance will be required in a relatively short period of time.
- Water levels in the existing wells are declining, but future rates of decline and the expected life of the existing wells are unknown.
- The north well is relatively new and depending on water levels in the aquifer, could be expected to provide continued service for an extended period.
- The south well is in relatively poor condition and may not provide reliable backup for an extended period.
- At present, nearby Districts seem open to discussions about providing water supply service to Louviers. The initial cost of connecting to another system would be substantially higher than continued use of the existing wells.

III. EXISTING WATER SYSTEM

A. DISTRIBUTION SYSTEM

The distribution system provides water service throughout the service area and includes approximately 16,000 feet of pipe and 18 fire hydrants. The general layout of the distribution system is shown in Figure 3. As previously noted, the age of the distribution system is not well documented but is known to be a minimum of 60 years old and could be as much as 100 years old. Table III-1 presents an inventory of distribution system piping by size:

Table III-1 – Distribution System Inventory

Pipe Size (inches)	Length (feet)
6	3,775
4	4,370
2 ½	1,380
2	2,670
1 ½	1,090
1 ¼	270
1	2,150
¾	570
Total Pipe Length	16,275

Distribution system deficiencies as identified in the 2010 Water Systems Improvements Preliminary Engineering Report include:

- Piping Age: The reliability of existing water distribution piping is marginal based on the age of the system components such as piping, valves, and fire hydrants.
- Multiple Dead-end Lines without Hydrants or Blow-offs: The system has multiple dead-end waterlines without provisions to adequately flush and clean the lines.
- Inadequate Separation from Sanitary Sewers: CDPHE regulations require 10 feet of horizontal separation between water and sewer piping. The configuration of water and sewer systems shown on the 1960 plat does not meet the CDPHE separation requirement.
- Non-Ideal Pipeline Locations: Based on the pipeline routes depicted on the 1960 plat, some waterlines in the system are routed through private residential lots. This

complicates maintenance and repair access due to private surface improvements constructed over pipelines and the resulting impacts to homeowners.

- Inadequate Fire Flow Hydraulic Capacity: The distribution piping does not have sufficient capacity to deliver standard residential fire flows of 1500 gpm. A computer based hydraulic model used to evaluate the fire flow capacity of the existing distribution system indicated that the maximum fire flow available at an existing hydrant located farthest from the water storage tank was 280 gpm while maintaining a 20 pounds per square inch (psi) residual pressure in the system. The system is capable of delivering slightly higher fire flows at other locations but cannot provide 1500 gpm at any point in the system.
- Inadequate Isolation Valves and Pipe Loops: Lots located in the northern half of the community are served by water mains that are not looped which reduces redundancy and operational flexibility. Pipeline breaks in this area could potentially result in a significant number of residents without water service during repair. Lots located in the southern half of the community are serviced by water mains that are looped but do not have the necessary valves to isolate a water main break and maintain service.
- Inadequate Service Line Metering: A majority of the flow meters in the system have exceeded their useful design life and require replacement. Normally, several meters are replaced each year, however the number of original meters and the number of replacement meters was not identified in previous studies. Over time, a significant number of meter pits have been buried due to landscaping or other grading and can no longer be located. One previous study indicated that approximately 75 percent of the lots receiving water service from the District have either original flow meters or meter pits that cannot be located.
- Lead Service Lines: As in many water utilities, water service lines, which convey water from the water main to the house, are owned and maintained by the property owner. Lead service lines can create water quality issues, and some of the older service lines in the system could potentially be constructed with lead pipe. The actual presence of lead service lines has not been confirmed in the field. Although service lines are the responsibility of the property owner, the District is responsible for water quality at the tap inside the building.

In 2014, the District replaced approximately 1900 lf of water main in three sections, as shown in Figure 4. The remaining 14,375 lf of pipeline in the water system remains in the condition noted above.

B. WATER STORAGE

The water storage facility consists of two above-grade 45,000 gallon steel storage tanks located adjacent to one another, southwest of Louviers. Both tanks are 20 feet in diameter with a high water level of 19.5 feet as measured from the base. Both tanks were reportedly in good condition when last inspected.

The tanks have similar elevations and are normally operated at the same water level. This water level establishes the system hydraulic grade line (HGL) and the resulting pressure in the distribution network. The base elevation for both tanks is approximately 5,780 feet.

Water storage deficiencies as identified in the 2010 Water Systems Improvements Preliminary Engineering Report include:

- Inadequate System Pressures: The highest service connection to the distribution system is located at Lot 5 on Hillcrest Drive. The elevation of the service connection is estimated at approximately 5,740 feet. When the storage tanks are full, the elevation difference between the Lot 5 service connection and tank high water level is 60 feet providing an available static pressure of approximately 26 psi. Public water systems are normally designed to provide a minimum static pressure of 40 psi.
- Inadequate Fire Flow Storage: For the residential structures prevalent in Louviers, the International Fire Code requires sufficient water storage capacity to accommodate 1,500 gpm of fire flow over a continuous 2-hour period (180,000 gallons) without utilizing water storage volume dedicated to domestic use. The existing storage volume of 90,000 gallons does not provide the required storage.

IV. SEWER SYSTEM

A gravity sanitary sewer system conveys wastewater from the community to a wastewater treatment lagoon located to the north of the service area adjacent to Plum Creek. As previously discussed for the water distribution system, the actual construction dates for the sanitary sewer collection system are unknown, but the collection system is thought to be a minimum of 60 and potentially closer to 100 years old. Record drawings indicate that the wastewater treatment lagoon was constructed in 1970. A map of the existing collection system is presented in Figure 5, and a drawing showing the location of 2019 sewer replacements is presented in Figure 6.

The collection system includes approximately 10,000 lf of pipe ranging in size from 8" to 12". With the exception of certain local repairs, much of the original system is still in service. Approximately 90% of the sanitary sewer system is comprised of vitrified clay pipe (VCP). Small sections of the system have been replaced with polyvinyl chloride (PVC) pipe.

The existing sanitary sewer pipes are in poor condition. Review of video inspections collected in 2013 of sanitary sewer pipes indicated a variety of deficiencies including tree root penetrations, cracked and broken pipes, pipe offsets, and restricted access due to manhole spacing and lack of manholes at all changes in pipeline directions. Although a detailed inflow and infiltration (I&I) study has not been performed, the potential for I&I is considered high due to the significant number of pipe integrity issues such as root penetration, cracks and broken pipe and joint offsets. Basic system configuration is also deficient due to lack of required separation between sewer lines and other facilities including structures and water lines. A map and tabulation of the sewer system deficiencies noted in the video inspections is presented in Appendix B, along with a map showing replacement priorities based on pipe condition.

In 2016, the District prepared a Preliminary Needs Assessment (PNA) for the sanitary sewer system. The PNA is a planning document which includes evaluation of the existing system and development of alternatives for required system upgrades. The 2016 PNA concluded that due to age and condition, the entire collection system should be replaced and proposed that the replacement occur in four phases based on availability of funding. Phase I of the sewer replacement program was completed in 2019.

Wastewater collected within the District's service area is conveyed to an existing wastewater lagoon for secondary treatment. The facultative lagoon uses only natural aeration for treatment of liquid phase waste. Settled solids are reduced by natural anaerobic processes in the lower portion of the lagoon. Prior to 2009, lagoon effluent was chlorinated and surface discharged directly to Plum Creek. With the promulgation of more stringent effluent limits, the lagoon was unable to provide adequate treatment, in particular for nitrogen and phosphorus. These elements became highly regulated because they are two of the primary nutrients for plant growth and are thought to have significant impact on downstream water quality most notably in Chatfield Reservoir. To address the requirement for removal of nitrogen and phosphorus, the District installed a land application system to provide additional treatment of lagoon effluent. The land application system provides nitrogen and phosphorus removal through plant uptake by the natural vegetation at the site. Since the installation of the land application system, the treatment facility has consistently remained in compliance with the effluent limits in its discharge permit. The land application system is sized conservatively and should be able to provide adequate nutrient removal at lower effluent limits than those currently in effect.

Recent District planning efforts have not identified immediate needs for capital improvements at the wastewater treatment facility. With normal maintenance and repair, the facility is expected to provide adequate wastewater treatment service for the foreseeable future. Perhaps the most likely causes for future improvements would include more stringent effluent limits or pond leakage. Wastewater regulations are continuously evolving and may eventually include limits for parameters not addressed by the current treatment system. The wastewater lagoon is subject to maximum leakage requirements, and during the 2009 upgrades it was demonstrated that the lagoon met the leakage requirements. The existing liner in the pond is a compacted soil liner that may be subject to deterioration due to erosion, root action from plants or other natural causes. In time, upgrading or replacement of the liner may be required. There is currently no ongoing requirement for monitoring liner performance although such a requirement could be triggered by permit renewal or a modification of the existing facility.

V. CAPITAL IMPROVEMENTS

As described in previous sections, the District's water distribution and collection systems are in poor condition and do not provide a level of service that meets current design standards. Records indicate that as early 2001, the District began to investigate the requirements for complete system upgrades. Subsequently, the 2008 Service Plan, the 2010 Water System Preliminary Engineering Report, and the 2016 Wastewater Preliminary Needs Assessment were all based on complete replacement of the water distribution and wastewater collection systems. The capital improvements identified in this Conceptual Master Plan are taken from the 2010 Water System PER and the 2016 Wastewater System PNA. These reports were considered to fairly represent the District's current capital improvement requirements.

The capital improvement costs used in this plan were taken from the 2010 PER and the 2016 PNA and adjusted to reflect current conditions. Small portions of the capital improvements identified in the previous reports have been completed, and the capital costs for those improvements have been adjusted to reflect the remaining scope of work. Costs developed in the previous reports were also adjusted to 2020 dollars using the Engineering News Record Construction Cost Index (CCI). Details of cost adjustments are presented in Appendix C, and the relevant cost estimates from previous planning documents are included in Appendix D.

A. WATER SUPPLY - GENERAL

Two potential projects have been identified to address the District's short term and long-term water supply needs. Short term needs can be addressed by adding additional treatment at the north well, and long-term needs could be addressed by connecting to an adjacent water supplier.

If the District elects or is required to install additional treatment capability at the north well to comply with the CDPHE enforcement order, the existing wells could continue to provide the District's water supply subject to availability of water in the aquifer. Although water levels in the aquifer are dropping there is currently no projection regarding the potential longevity of the expected useful life of the District's wells. However, it must be assumed that at some point a different water supply will be required.

If the existing water supply could be replaced with a renewable supply in a timeframe allowable under the CDPHE enforcement order, implementation of both the short term and long-term supply projects would not be required, resulting in a reduction in the total capital investment for water supply. Aside from the implementation challenges, immediate replacement of the water supply would result in a significant increase in short term capital requirements.

B. SHORT TERM WATER SUPPLY

A preliminary screening of alternatives conducted in 2019 indicated that the most cost-effective option for radium removal at the north well would be installation of an ion exchange system. The project would include construction of a new 500 sf treatment building to house the new process equipment, along with associated grading and piping. The ion exchange process would provide the required level of radium removal without creating a significant liquid waste stream. Ion exchange media would be run to exhaustion and disposed of as a solid waste. The estimated project cost for an ion exchange treatment system is $949,000.

C. LONG TERM WATER SUPPLY

Addressing the District's long-term water supply needs requires replacement of the existing non-renewable groundwater supply with a renewable supply. Due to the challenges involved in developing a renewable water supply and the District's limited resources, it is unlikely that the District could successfully develop its own renewable water supply. The best option for obtaining a renewable water supply would be connecting to another water service provider. Two existing districts, the Roxborough Water and Sanitation District (RWSD) and the Dominion Water and Sanitation District (DWSD) are located in relatively close proximity to LWSD and could potentially provide water service to LWSD. Both RWSD and DWSD have indicated a willingness to consider providing service to LWSD, and both districts have provided estimated costs for providing service. It should be noted that renewable water supplies are limited and in the future, the ability and willingness of adjacent districts to provide service to LWSD could change.

RWSD recently made service available to several small communities in the area, and the cost estimates provided indicate that RWSD could provide service to LWSD at a somewhat lower cost than DWSD. In spite of the lower cost, obtaining water supply from RWSD would present certain drawbacks to both RWSD and LWSD. RWSD has already committed the majority of its water supply and providing service to Louviers would utilize nearly all of its remaining supply. Although RWSD currently has no firm commitments for its remaining supply, there are a number of parcels adjacent to RWSD that could require water service in the future. Providing service to Louviers could impact RWSD's ability to provide service to the adjacent parcels. In addition, RWSD's limited supply would eliminate the potential for LWSD to extend service to surrounding areas.

Discussions with DWSD indicate that DWSD has adequate water supply to provide service to LWSD and surrounding areas if desired. The estimated cost to obtain water from DWSD is $4.2M including a water resources fees and a water infrastructure fee. In addition to the fees due to DWSD, LWSD would be required to construct a pipeline to connect the LWSD system to the DWSD system at an estimated cost of $2.38M. The total cost of $6.58M would provide LWSD with potable water service and 1500 gpm fire flow, and would eliminate the need for LWSD to maintain its own water storage.

D. WATER DISTRIBUTION

The 2010 Water System PER indicated that complete replacement would be required to correct the many deficiencies in the distribution system. The proposed replacement project includes installation of approximately 16,700 lf of new water lines with appurtenances including valves, fire hydrants, service line connections and meter pits. A proposed layout for the replacement distribution system is presented in Figure 7. New water pipelines would be a minimum of 8" diameter to enable the system to convey maximum day demand plus a 1500 gpm fire flow. To the maximum extent possible, new pipelines would be installed in public right-of-way, to enable access without impact to private property. Pipeline location would also be selected to provide a minimum of 10 feet of separation between water and sewer lines. The estimated cost for the remaining replacement of the distribution system is $3,142,000.

E. WATER STORAGE

The 2010 Water System PER determined that new potable water storage facilities are required to provide adequate fire storage and increased pressure in the distribution system. The new storage tank would be located at a higher elevation to provide a minimum pressure of 45 psi at the highest customer connection in the distribution system. The approximate location of the proposed storage tank is shown as Option 3 in Figure 8. The proposed storage tank would have a total volume of 250,000 gallons to provide operational storage for maximum day demand (70,000 gallons) and fire storage for 1500 gpm for 2 hours (180,000 gallons). The estimated cost for the new water storage tank is $1,118,000.

F. WASTEWATER COLLECTION

The 2016 Wastewater System PNA indicated correction of collection system deficiencies would require complete replacement of the collection system. The proposed replacement project includes approximately 11,700 lf of new sewer pipelines with appurtenances including manholes and service line connections. A proposed layout for the replacement collection system is presented in Figure 9. New sewer pipelines would range in size from 8” to 12”. To the maximum extent possible, new pipelines would be installed in public right-of-way, to enable access without impact to private property. Pipeline location would also be selected to provide a minimum of 10 feet of separation between water and sewer lines. The estimated cost for the remaining replacement of the collection system is $3,214,000.

G. MINIMUM CAPITAL IMPROVEMENTS

A summary of the required capital improvements for both water and sewer systems is presented in Table V-1.

Table V-1: Minimum Required Capital Improvements

Capital Improvement	Estimated Cost
Short Term Water Supply	$ 949,000
Water Distribution System	$ 3,142,000
Water Storage	$ 1,118,000
Wastewater Collection	$ 3,214,000
TOTAL	**$ 8,423,000**

The costs presented in Table V-1 are intended to represent the minimum infrastructure improvements required based on the 2010 Water System PER and the 2016 Sewer System PNA. Table V-1 is based on previously identified immediate needs and does not include costs for conversion to a permanent water supply or upgrades to existing wastewater treatment systems. Although the need for replacing the existing water supply might be somewhat less urgent than the improvements identified in Table V-1, immediate conversion to a new supply could eliminate the need for short term water supply improvements and reduce the ultimate cost of water supply. Similarly, substantial upgrades or replacement of the existing wastewater treatment system will eventually be required, and when required, connection to a larger, regional system may provide the best solution. While Douglas County has performed conceptual investigations for regional wastewater solutions, there are currently no firm plans for implementation of such a system. Provided the District's existing wastewater treatment system remains in compliance with its discharge permit, continued use of the system will allow time for regional solutions to develop.

H. CAPITAL IMPROVEMENT PLAN

A Capital Improvement Plan (CIP) is essentially a schedule for completing required capital improvements. To develop a CIP, capital improvement projects are prioritized and assigned to an annual schedule based on priority. Project priorities are established based on multiple considerations which can include regulatory compliance requirements; the

need for additional capacity; the need for a higher level of service; condition of existing systems; and availability of funding. Once developed, the revenue requirements identified in the CIP provide a basis for integrating capital improvement planning into the District's long-term financial plan. It is important to note that the CIP shows future projects and upcoming capital requirements only. Past projects are not included in the CIP even though there may be ongoing debt associated with those projects.

The most significant considerations in developing a CIP for LWSD, include regulatory compliance, the physical condition of existing systems, and the District's ability to provide funding. Improvements to the existing water supply to address the CDPHE enforcement order for radium was considered the highest priority project, with work on the project beginning immediately. Distribution system projects were considered the next priority, to improve both the safety and level of service of the drinking water system. Distribution system upgrades would provide adequate separation between water and sewer lines, improve system integrity and reliability, provide adequate delivery pressure throughout the system and provide appropriate fire flow throughout the service area. Collection system improvements were considered the lowest priority because those improvements are based primarily on replacing aging pipelines and reducing the maintenance and repair costs associated with the aging system.

To spread revenue requirements and avoid large increases in water and sewer charges, previous planning documents developed a phased approach for system improvements. Seven replacement projects were planned for the water system with an average cost of approximately $400,000 per project, and four replacement projects were planned for the sewer system with an average cost of approximately $900,000 per project. This approach provides for smaller funding increments and would enable the District to prioritize replacements by area based on system condition. Despite its flexibility, the phased approach could be expected to result in higher overall costs due to preparation of multiple bid packages and obtaining separate project approvals and financing packages. Similarly, overall construction costs are likely to be higher under a phased approach due to duplication of contractor tasks and lack of project scale.

As an alternative to the phased approach, the CIP presented in this plan is based on larger projects that eliminate some of the inefficiencies of smaller projects and could be expected to result in lower overall costs. For example, the CIP proposes replacement of the entire distribution system in a single project, which would require a significant capital outlay in the year the project occurs. The ability to meet the revenue requirements for a project of that size would be dependent upon the District incrementally increasing its fees and charges in the years leading up to the project so that the required rates were already in place when the project is initiated. The net effect to customers would be similar to a series of rate increases to fund multiple smaller projects over the same period of time.

There is no specific standard for the planning period to be addressed by a capital improvement plan, and utilities normally select the planning period to fit their specific needs. Utilities with rapidly changing conditions such as significant growth or redevelopment may elect to use a relatively short planning period such as 5 years. Other utilities with more stable conditions may use a longer planning period such 20 years to better address long term goals. Some utilities may use detailed 5 year plan to better address short term planning and budgeting, and a less detailed 20 year plan to set overall direction. Planning periods seldom exceed 20 years due to increasing uncertainty associated with longer planning periods.

It is important to note that all costs shown in the CIP are shown in 2020 dollars based on current cost estimates. This allows comparison of the cost of different projects and provides a familiar point of reference for current and future charges. Because construction costs increase over time, the estimated costs shown in the plan must be updated on a regular basis, preferably annually. It should also be noted that the monthly charges per customer represent only the charges required to support the improvements in the CIP and are in addition to the District's current charges to customers.

A Capital Improvement Plan based on the projects identified in Table V-1 is presented in Exhibit 1 of Appendix E. The CIP shown in Exhibit 1 is based on a two phased approach to water supply. The initial project in this plan is addition of radium treatment to the north well to address the CDPHE enforcement action related to radium concentration.

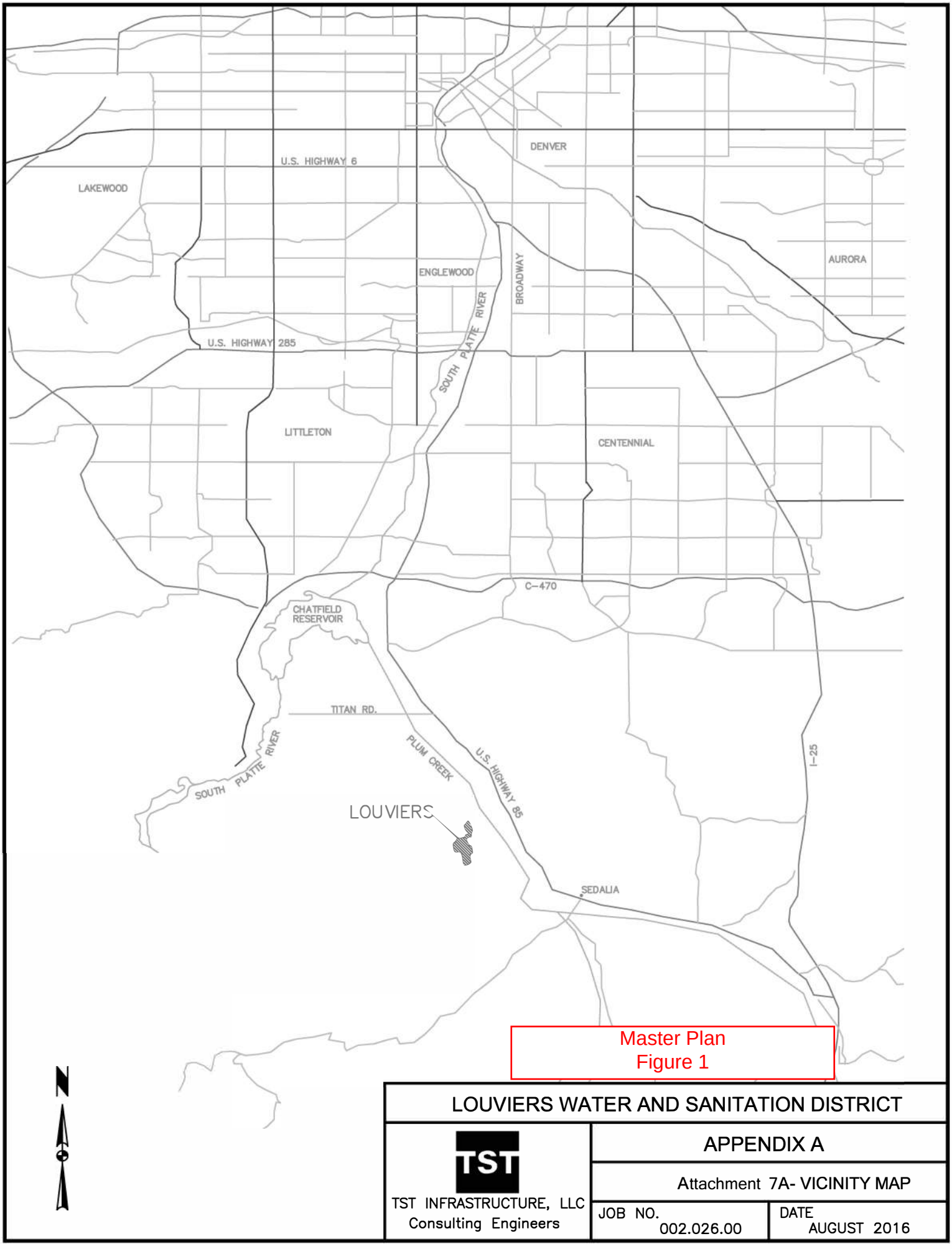
Replacement of the existing water supply with a renewable supply is deferred until the end of the planning period. This approach minimizes the initial rate increases required to support the CIP, and maximizes the use of existing water supply infrastructure. The CIP is based on a 25 year planning period and shows completion of all projects by the end of the planning period. A longer than normal planning period has been used to help minimize the required annual rate increases. In general, major projects are planned to occur at 5 or 6 year intervals during the planning period to spread capital expenditures and allow time for the District to incrementally raise fees and charges in preparation for the next capital project. The scope and schedule of projects in the CIP differs significantly from the previous phased approaches and is intended primarily to present overall capital requirements rather than a specific phasing of projects. If desired, a similar plan could be developed based on the previously established phases.

In addition to showing planned capital expenditures by year, Exhibit 1 presents estimated charges required to support the planned capital improvements. Estimated charges were developed assuming that the District would obtain financing for each capital project in the year the project is scheduled to start. Terms of financing were assumed to be 3% per year for 30 years. Annual debt service was calculated for each financing package and converted to a monthly charge per customer, with a total monthly charge per customer for all completed projects shown for each year in the planning period. The monthly charge per customer ranges from $38 per month at the beginning of the planning period to $595 per month at the end of the 25-year planning period. It should be noted that rates shown in the capital improvement plan were calculated on a monthly basis while the District currently bills on a bi-monthly basis. Bi-monthly billings would be twice the monthly billing rate shown in the CIP. Especially as rates increase significantly, some utilities have experienced greater customer acceptance of rates by changing to monthly billing, and the District may want to consider such a change.

For comparison purposes a second CIP was prepared to show how immediate replacement of the water supply would impact the required customer charges over the planning period. Immediate replacement of the water supply would eliminate the need for the radium treatment and water storage projects, but would require a much larger

initial rate increase. The second CIP is presented as Exhibit 2 in Appendix E. The CIP presented in Exhibit 2 eliminates the radium treatment system for the existing well and the construction of new water storage facilities. The estimated cost of the renewable water supply is increased from the cost shown in Exhibit 1 to include storage in the DWSD System. The time between projects was increased to approximately seven years since fewer projects would be required due to elimination of the radium treatment and water storage projects. The resulting monthly charge per customer ranges from $270 per month at the beginning of the planning period to $535 per month at the end of the 25 year planning period.

FIGURES



Master Plan
Figure 1

LOUVIERS WATER AND SANITATION DISTRICT

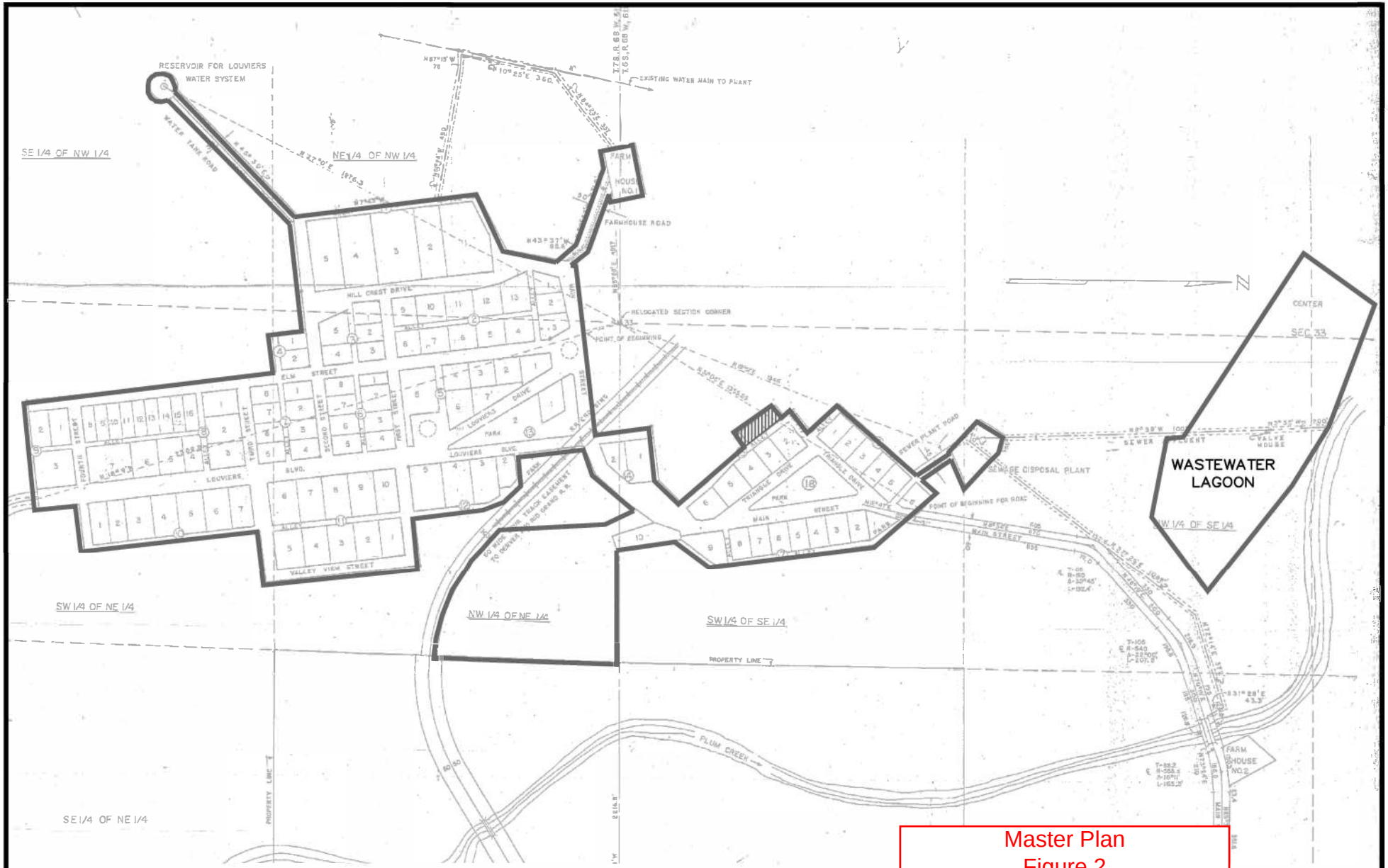
TST INFRASTRUCTURE, LLC
Consulting Engineers

APPENDIX A

Attachment 7A- VICINITY MAP

JOB NO. 002.026.00

DATE AUGUST 2016



Master Plan
Figure 2

LEGEND

LWSD DISRTICT BOUNDARY

LOT 1 BLOCK 15 EXCLUDED

250' 0 250' 500'

SCALE 1"= 500'

LOUVIERS WATER AND SANITATION DISTRICT

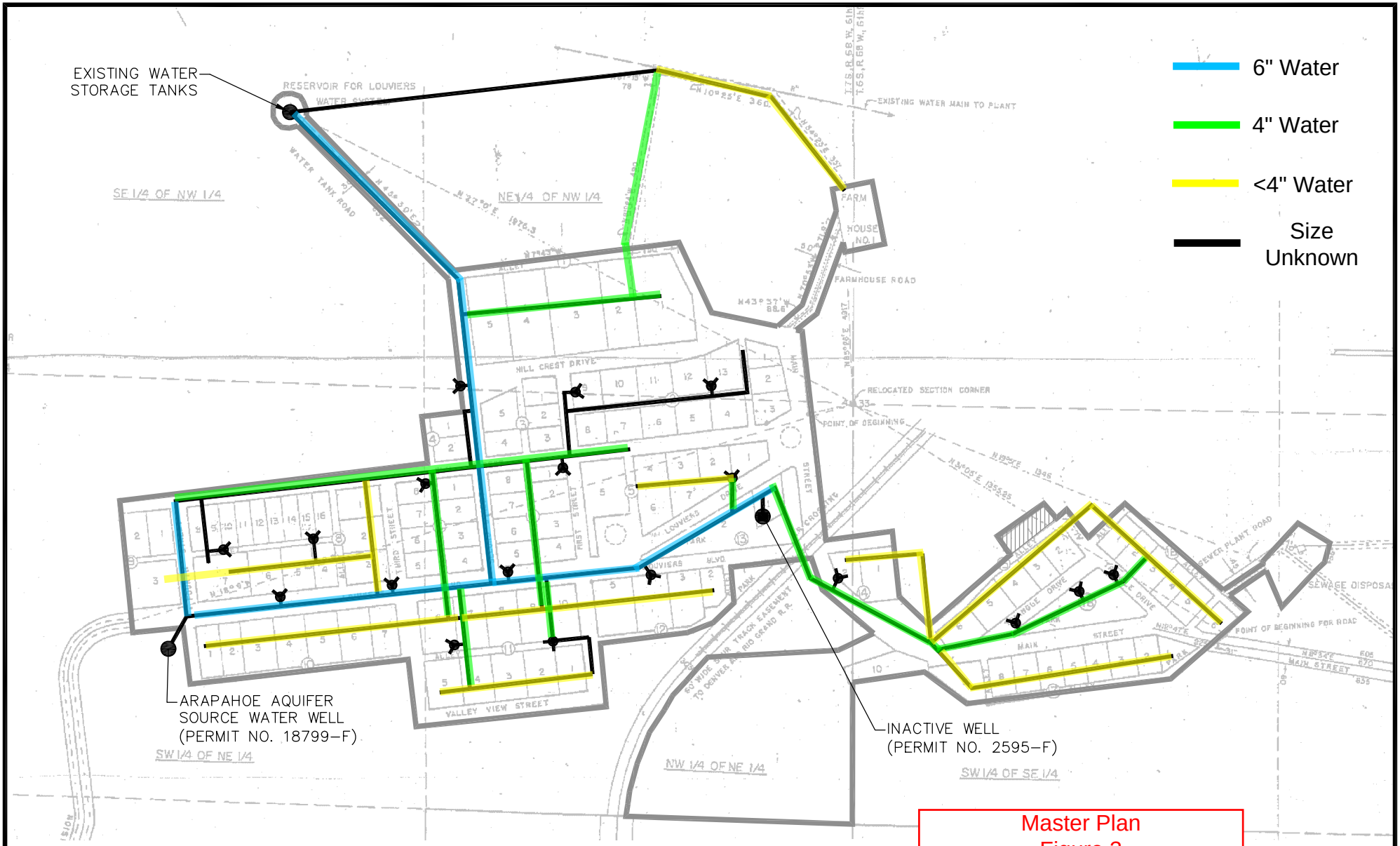
TST INFRASTRUCTURE, LLC
Consulting Engineers

APPENDIX A

Attachment 7B - DISTRICT BOUNDARY

JOB NO. 002.026.00

DATE August 2016



Master Plan
Figure 3

LEGEND

- FIRE HYDRANT
- WATER DISTRIBUTION PIPING
- LWSD DISTRICT BOUNDARY

200' 0 200' 400'
SCALE 1"= 400'

LOUVIERS WATER AND SANITATION DISTRICT

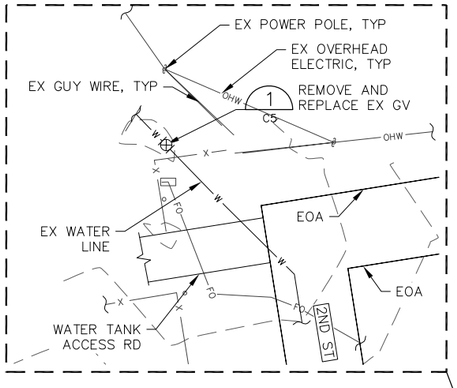
TST INFRASTRUCTURE, LLC
Consulting Engineers

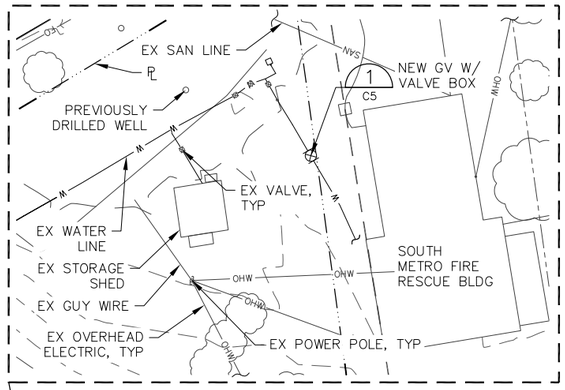
APPENDIX A

EXHIBIT 3 - EX. WATER SYSTEM

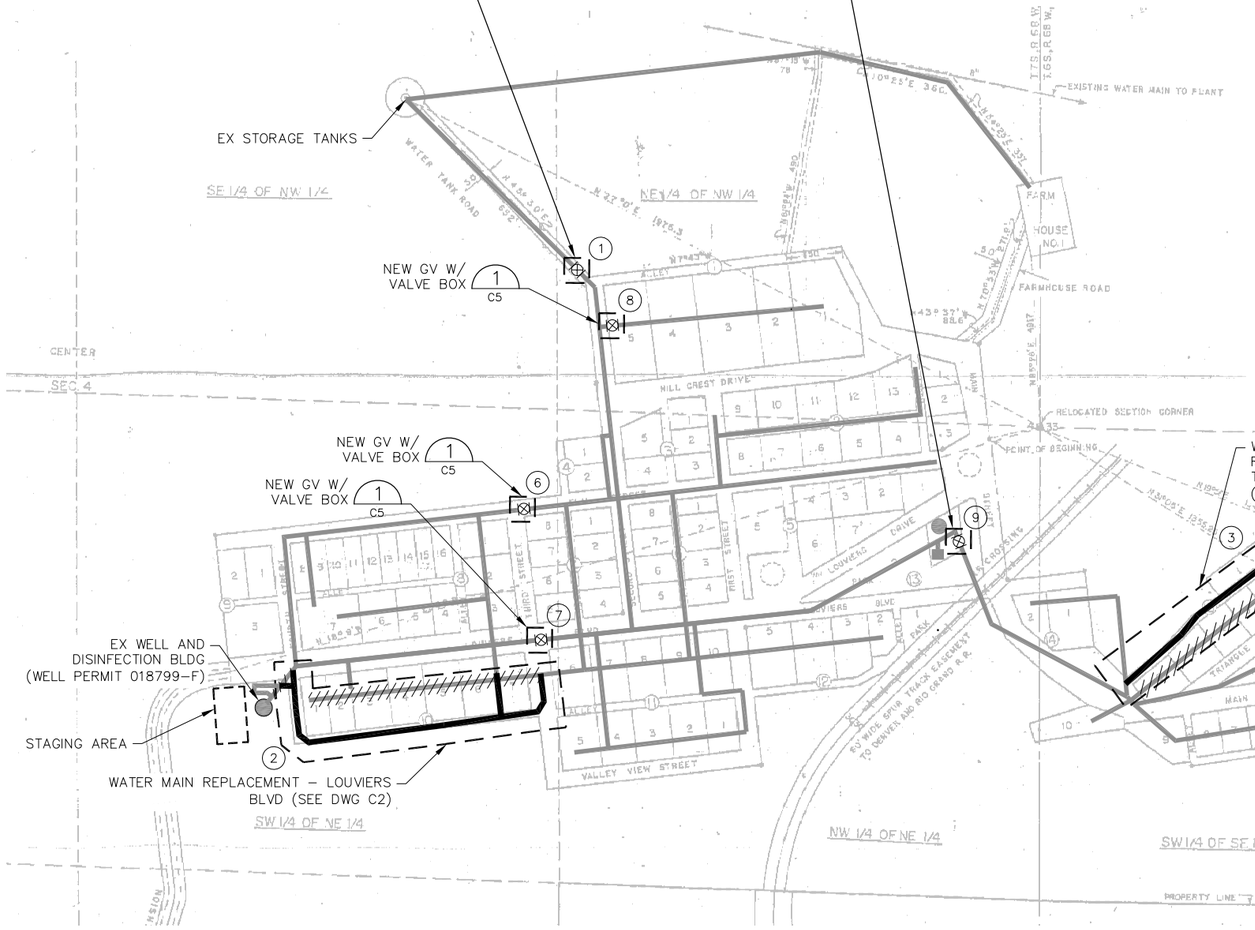
JOB NO. 002.015.00

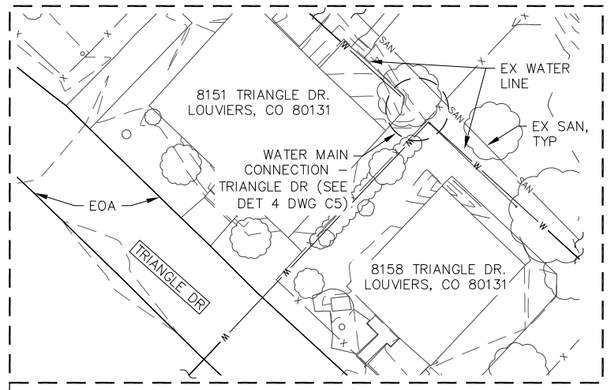
DATE OCT. 2009





PROJECT AREA DESIGNATIONS	
LINE ITEM #	DESCRIPTION
①	VALVE REPLACEMENT – WATER STORAGE PIPELINE
②	WATER MAIN REPLACEMENT – LOUVIERS BLVD
③	WATER MAIN REPLACEMENT – TRIANGLE DR
④	WATER MAIN CONNECTION – TRIANGLE DR
⑤	WATER MAIN CONNECTION – MAIN ST
⑥	VALVE INSTALLATION – 3RD AND ELM STREET
⑦	VALVE INSTALLATION – 3RD AND LOUVIERS BOULEVARD
⑧	VALVE INSTALLATION – WEST HILL CREST DRIVE
⑨	VALVE INSTALLATION – NEW WELL SITE





PROJECT OVERVIEW
NOT TO SCALE

LEGEND

- DISTRIBUTION SYSTEM IMPROVEMENTS
- EXISTING LWSD WATER DISTRIBUTION PIPING
- APPROX PROJECT AREA(S)
- EXISTING WATER MAIN TO BE ABANDONED IN PLACE

NOTE:
SPECIFIC LOCATIONS FOR LINE ITEMS 6,7,8 AND 9 WILL BE DETERMINED IN THE FIELD WITH OWNER AND ENGINEER.

Master Plan
FIgure 4

ISSUED FOR CONSTRUCTION

REVISIONS

By	Date	Description
CPB	11/25/2013	ISSUED FOR BID
SMS	02/03/2014	ISSUED FOR CONSTRUCTION

DESIGNED: ATM/ CPB
CHECKED: ATM
DRAWN: CPB

1 INCH
BARS PLOT 1 INCH x 1 INCH AT FULL SCALE
1 INCH

LOUVIERS WATER AND SANITATION DISTRICT
DISTRIBUTION SYSTEM IMPROVEMENTS

PROJECT OVERVIEW / KEY MAP

DRAWING

TST
TST INFRASTRUCTURE, LLC
Consulting Engineers

DATE: FEBRUARY, 2014
JOB NO.: 002.020.08
LOUVIERS
DRAWING NO.: C1

H:\Working Files\Document Files\Louviers\002.020.08 – DSI Const\Issued For Construction Plans\Sheets\Overall Site Map – C1.dwg, C1, 2/4/2014 4:10 PM

909 LF*
432 LF*
174 LF*
TOP ELM CO
123 LF*
MH27
MH21
473 LF*
3RD CO
404 LF*
65 LF
174 LF*
MH14
MH13
290 LF
225 LF
426 LF
MH11
160 LF
190 LF
301 LF
151 LF
233 LF
314 LF
268 LF
444 LF
MH16
120 LF
MH15
MH9
MH8
MH5
343 LF
MH20
MH19
160 LF
MH18
497 LF*
CO
189 LF
MH10
157 LF
MH17
MH1D (NOT FOUND)
205 LF
MHTD1
160 LF
371 LF
MH0
172 LF
MH1C
248 LF
78 LF
264 LF
450 LF
MH1CC
MH1DD
MH1BB
55 LF
MH1B
MH3
MH2
433 LF
MH1A
MH4
78 LF
39 LF
MH1
163 LF
93 LF
MH2A
LWSD FACULTATIVE LAGOON
N
SW 1/4 OF NE 1/4
NW 1/4 OF NE 1/4
SW 1/4 OF SE 1/4
PROPERTY LINE
PLUM CREEK
FARMHOUSE ROAD
HOUSE NO.1
FARM HOUSE NO.2
POINT OF BEGINNING
RELOCATED SECTION CORNER
VALLEY VIEW STREET
MAIN STREET
SEWER AFFLUENT
DISPOSAL

LEGEND

Ⓢ	SANITARY SEWER MANHOLE
	NO INFORMATION AVAILABLE
	6" VCP
	8" VCP
	12" VCP
	8" P VC

NOTE: PIPE DIAMETER, APPROXIMATE LENGTH, AND MATERIAL INFORMATION FROM 2013 SEWER INSPECTION VIDEOS COMPLETED BY DRC.

* PIPE INFORMATION (DIAMETER AND LENGTH) NOT AVAILABLE FROM SEWER INSPECTION VIDEOS, WAS DETERMINED USING AS-BUILTS.

150' 0 150' 300'
SCALE 1"= 300'

Master Plan
Figure 5

LOUVIERS WATER AND SANITATION DISTRICT

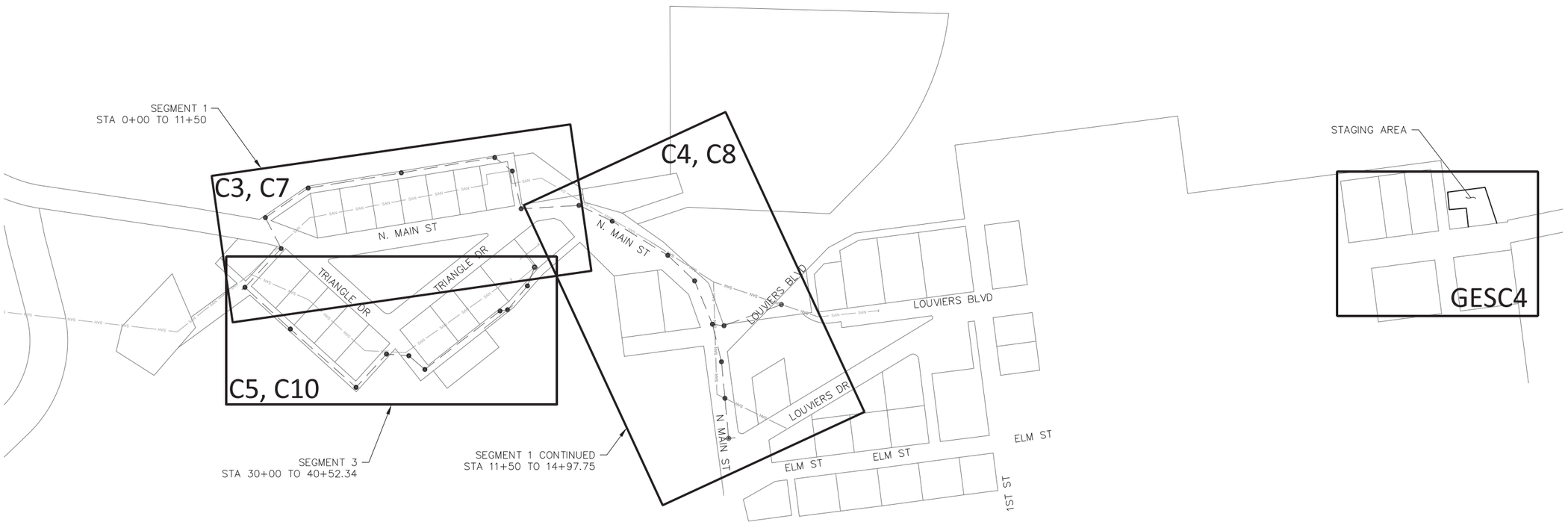
TST INFRASTRUCTURE, LLC
Consulting Engineers

SANITARY SEWER COLLECTION SYSTEM
PROJECT NEEDS ASSESSMENT

Attachment 6 - Existing Collection System Map

JOB NO. 002.026

DATE AUGUST 2016



PROJECT KEY MAP

SCALE: 1" = 150'

LEGEND

- EX. SANITARY SEWER MAIN
- PROPOSED SANITARY SEWER MAIN
- PROPERTY / RIGHT-OF-WAY LINES
- PLAN & PROFILE SHEET BOUNDARY
- PROPOSED SANITARY SEWER MANHOLE

150 0 75 150 300
1 INCH = 150 FEET

Master Plan
Figure 6

AS-BUILTS

REVISIONS	Description	Date	By
	ISSUED FOR BID	5/30/19	CJG
	ISSUED FOR CONSTRUCTION	7/31/19	ACP
	AS-BUILTS	11/21/19	ACP

DESIGNED: MKM
CHECKED: MJG
DRAWN: ACP

1 INCH
BARS PLOT
1 INCH x 1 INCH
AT FULL SCALE
1 INCH

LOUVIERS WATER AND SANITATION DISTRICT
SANITARY SEWER COLLECTION SYSTEM REPLACEMENT
PHASE 1

PROJECT KEY MAP

DRAWING

TST
TST INFRASTRUCTURE, LLC
Consulting Engineers

DATE: NOVEMBER 2019
JOB NO.: 002.026.00
LWSD
DRAWING NO.: KEY

H:\Drawings\Louviers\002.026.00 - WW PNA\Sheets\Front End\Key Map.dwg, KEY, 11/20/2019 4:51 PM

TO WST

EXISTING WATER MAIN TO PLANT

SE 1/4 OF NW 1/4

NE 1/4 OF NW 1/4

WATER TANK ROAD

FARM HOUSE NO. 1

FARMHOUSE ROAD

CENTER SEC. 4

HILL CREST DRIVE

RELOCATED SECTION CORNER

POINT OF BEGINNING

PROPOSED NEW ARAPAHOE WELL

LOUVIERS BLVD.

PARK

MAIN STREET

TRIANGLE DRIVE

SEWER PLANT ROAD

SEWAGE DISPOSAL P

POINT OF BEGINNING FOR HOAP

PROPOSED DISINFECTION FACILITY AND cct PIPING

PROPOSED NEW ARAPHOE WELL

SW 1/4 OF NE 1/4

NW 1/4 OF NE 1/4

SW 1/4 OF SE 1/4

PROPERTY LINE

EXTENSION

60' WIDE FOR TRACK EASEMENT TO DENVER AND RIO GRAND R.R.

VALLEY VIEW STREET

LEGEND

- WELL HEAD
- (1) PROPOSED WATER DISTRIBUTION PIPING (LABELED FOR REPLACEMENT PROJECT)
- EXISTING WATER DISTRIBUTION PIPING
- LWSD DISTRICT BOUNDARY
- LOT 1 BLOCK 15 EXCLUDED

150' 0 150' 300'

SCALE 1"= 300'

Master Plan
Figure 7

LOUVIERS WATER AND SANITATION DISTRICT

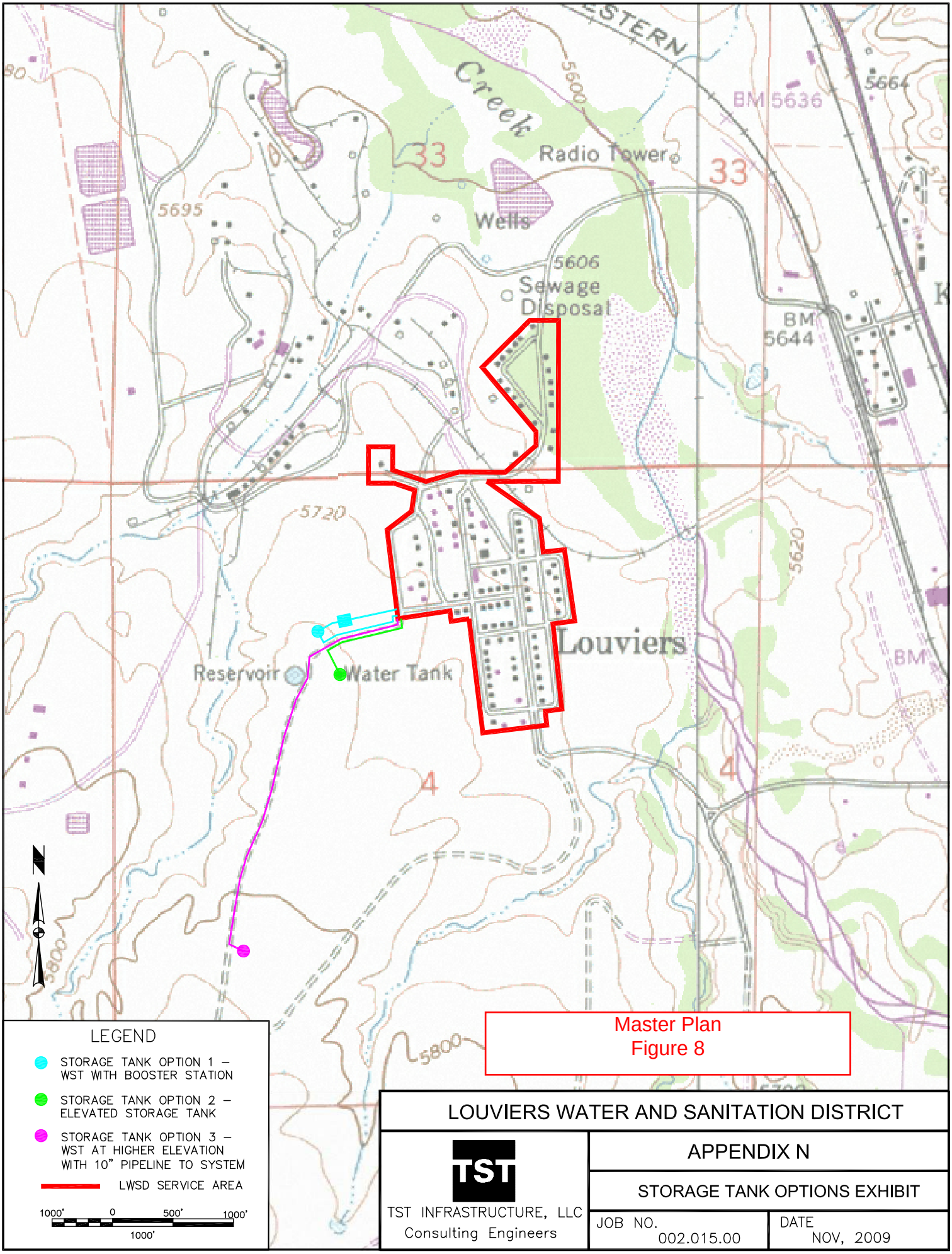
TST INFRASTRUCTURE, LLC
Consulting Engineers

APPENDIX O

PROPOSED DISTRIBUTION SYSTEM

JOB NO. 002.015.00

DATE NOV, 2009



Master Plan
Figure 8

LOUVIERS WATER AND SANITATION DISTRICT

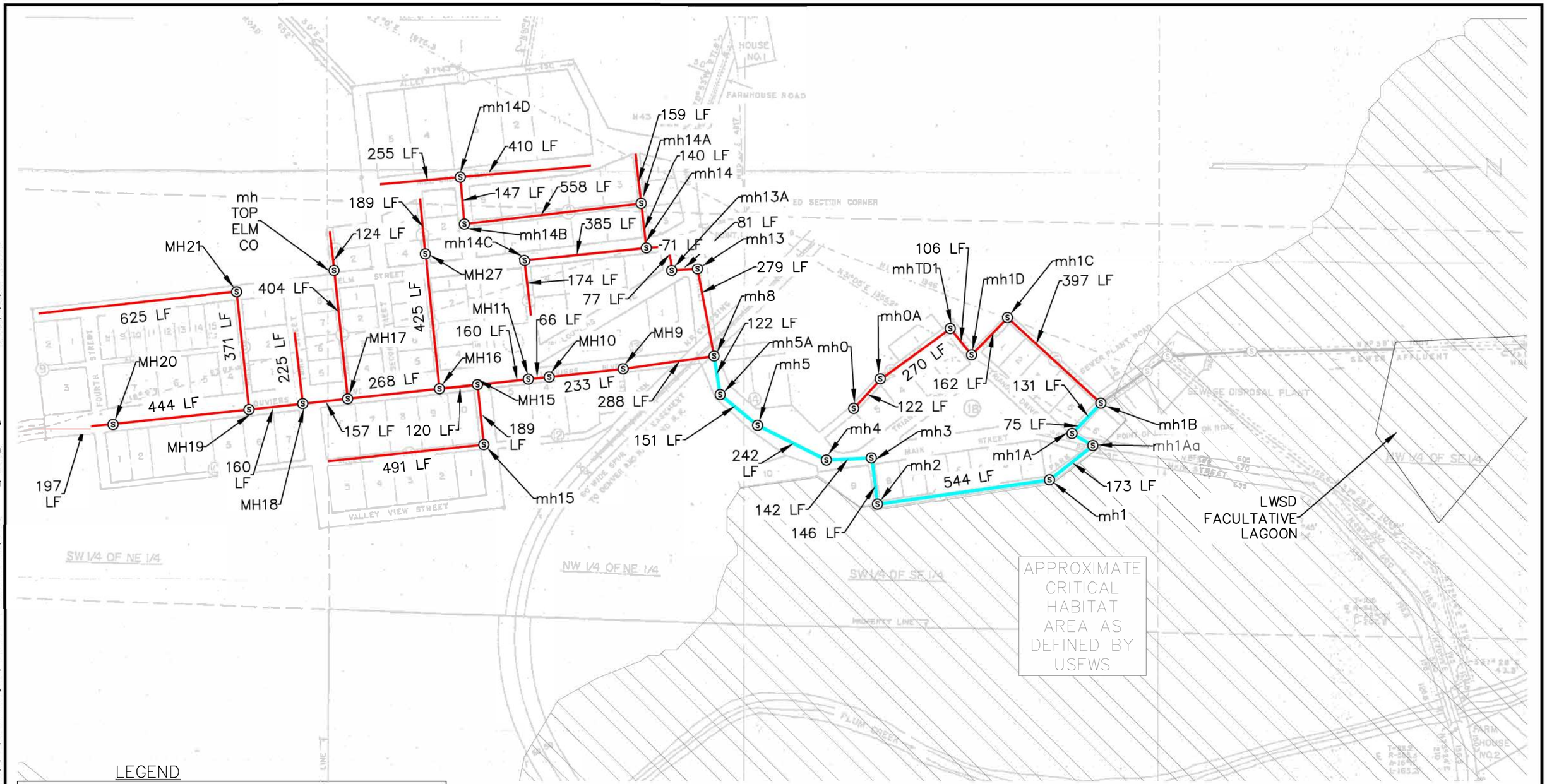
TST INFRASTRUCTURE, LLC
Consulting Engineers

APPENDIX N

STORAGE TANK OPTIONS EXHIBIT

JOB NO. 002.015.00

DATE NOV, 2009



LEGEND

Ⓢ	SANITARY SEWER MANHOLE
MHXX	DENOTES EXISTING MANHOLE LOCATION
mhXX	DENOTES NEW MANHOLE LOCATION
	8" PVC
	12" PVC
Ⓢ	AREAS EXCLUDED DUE TO CRITICAL HABITAT

Master Plan
Figure 9

LOUVIERS WATER AND SANITATION DISTRICT

TST INFRASTRUCTURE, LLC
Consulting Engineers

SANITARY SEWER COLLECTION SYSTEM
PROJECT NEEDS ASSESSMENT

ATTACHMENT 10A - PROPOSED COLLECTION SYSTEM

JOB NO. 002.026

DATE Rev 1 March 2017

H:\Working Files\Document Files\Louviers\002.026.00- WW PNA\Report\Exhibits And Figures\Previous Sewer Deficiencies Exhibits\sewer Deficiencies_priorities_GIS.dwg, OVERALL PROPOSED SYSTEM, 3/29/2017 9:53 AM

APPENDICES

Appendix A

LOUVIERS WATER AND SANITATION DISTRICT
DISTRICT BOUNDARY

NE 1/4 NW 1/4, SE 1/4 NW 1/4, NW 1/4 NE 1/4, SW 1/4 NE 1/4 OF SECTION 4, T. 7 S., R. 68 W., 6TH P.M. DOUGLAS COUNTY AND SE 1/4 SW 1/4, SW 1/4 SE 1/4, SW 1/4 NE 1/4 , NW 1/4 SE 1/4, NE 1/4 SW 1/4, SE 1/4 NW 1/4 OF SECTION 33, T. 6 S., R. 68 W., 6TH P.M. DOUGLAS COUNTY

LEGAL DESCRIPTION: DISTRICT BOUNDARY
A TRACT OF LAND ACROSS A PORTION OF THE NORTHEAST ONE-QUARTER OF THE NORTHWEST ONE-QUARTER, SOUTHEAST ONE-QUARTER OF THE NORTHWEST ONE-QUARTER, NORTHWEST ONE-QUARTER OF THE NORTHEAST ONE-QUARTER, SOUTHWEST ONE-QUARTER OF THE NORTHEAST ONE-QUARTER OF SECTION 4, TOWNSHIP 7 SOUTH, RANGE 68 WEST OF THE 6TH PRINCIPAL MERIDIAN, SAID COUNTY OF DOUGLAS AND STATE OF COLORADO, AND THE SOUTHEAST ONE-QUARTER OF THE SOUTHWEST ONE-QUARTER, SOUTHWEST ONE-QUARTER OF THE SOUTHEAST ONE-QUARTER, NORTHWEST ONE-QUARTER OF THE SOUTHEAST ONE-QAURTER OF SECTION 33, TOWNSHIP 6 SOUTH, RANGE 68 WEST OF THE 6TH PRINCIPAL MERIDIAN, SAID COUNTY OF DOUGLAS AND STATE OF COLORADO, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTHWEST CORNER OF THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 4, TOWNSHIP 7 SOUTH, RANGE 68 WEST OF THE 6TH PRINCIPAL MERIDIAN THENCE SOUTH 06°33' EAST A DISTANCE OF 136.50 FEET TO THE POINT OF BEGINNING #1; THENCE NORTH 82°10' EAST A DISTANCE OF 399.93 FEET; THENCE NORTH 07°31' WEST A DISTANCE OF 212.00 FEET; THENCE NORTH 82°29' EAST A DISTANCE OF 215.00 FEET; THENCE NORTH 44°27' EAST A DISTANCE OF 127.00 FEET; THENCE NORTH 40°50' WEST A DISTANCE OF 128.00 FEET; THENCE NORTH 48°52' WEST A DISTANCE OF 118.00 FEET; THENCE NORTH 38°30' WEST A DISTANCE OF 97.00 FEET; THENCE SOUTH 51°30' WEST A DISTANCE OF 59.00 FEET; THENCE NORTH 38°30' WEST A DISTANCE OF 175.00 FEET; THENCE NORTH 51°30' EAST A DISTANCE OF 59.00 FEET; THENCE NORTH 38°30' WEST A DISTANCE OF 42.72 FEET; THENCE NORTH 51°30' EAST A DISTANCE OF 109.00 FEET; THENCE NORTH 47°53' WEST A DISTANCE OF 154.00 FEET; THENCE NORTH 42°07' EAST A DISTANCE OF 381.04 FEET; THENCE NORTH 36°26' WEST A DISTANCE OF 234.82 FEET; THENCE NORTH 49°04' WEST A DISTANCE OF 98.83 FEET; THENCE NORTH 32°20' EAST A DISTANCE OF 119.00 FEET; THENCE SOUTH 76°55' EAST A DISTANCE OF 68.10 FEET; THENCE SOUTH 46°34' EAST A DISTANCE OF 192.00 FEET; THENCE SOUTH 65°10' WEST A DISTANCE OF 124.85 FEET; THENCE SOUTH 36°26' EAST A DISTANCE OF 149.55 FEET; THENCE NORTH 42°07' EAST A DISTANCE OF 78.04 FEET; THENCE SOUTH 47°53' EAST A DISTANCE OF 104.00 FEET; THENCE SOUTH 35°55' EAST A DISTANCE OF 222.50 FEET; THENCE SOUTH 09°22' EAST A DISTANCE OF 551.00 FEET; THENCE SOUTH 80°38' WEST A DISTANCE OF 8.50 FEET; THENCE SOUTH 09°22' EAST A DISTANCE OF 50.80 FEET; THENCE SOUTH 36°12' WEST A DISTANCE OF 163.00 FEET; THENCE SOUTH 09°22' EAST A DISTANCE OF 245.19 FEET; THENCE NORTH 89°39'48" EAST A DISTANCE OF 430.49 FEET; THENCE SOUTH 01°21'13" WEST A DISTANCE OF 736.23 FEET; THENCE ALONG THE ARC OF A CURVE TO THE RIGHT A DISTANCE OF 464.76 FEET, SAID CURVE HAS A RADIUS OF 686.20 FEET AND A CENTRAL ANGLE OF 38°48'23"; THENCE NORTH 45°31'55" WEST A DISTANCE 160.12 FEET; THENCE NORTH 03°36' EAST A DISTANCE OF 394.80 FEET; THENCE NORTH 18°40' WEST A DISTANCE OF 140.58 FEET; THENCE SOUTH 35°00' WEST A DISTANCE OF 82.85 FEET; THENCE SOUTH 42°06' WEST A DISTANCE OF 163.00 FEET; THENCE SOUTH 70°13' WEST A DISTANCE OF 115.00 FEET; THENCE SOUTH 07°31' EAST A DISTANCE OF 94.00 FEET;

LOUVIERS WATER AND SANITATION DISTRICT		
TST INFRASTRUCTURE, LLC Consulting Engineers	SERVICE PLAN – EXHIBIT B	
	DISTRICT BOUNDARY LEGAL DESCRIPTION	
	JOB NO. 002.012.00	DATE APRIL 2008

LOUVIERS WATER AND SANITATION DISTRICT
DISTRICT BOUNDARY

NE 1/4 NW 1/4, SE 1/4 NW 1/4, NW 1/4 NE 1/4, SW 1/4 NE 1/4 OF SECTION 4, T. 7 S., R. 68 W., 6TH P.M. DOUGLAS COUNTY AND SE 1/4 SW 1/4, SW 1/4 SE 1/4, SW 1/4 NE 1/4 , NW 1/4 SE 1/4, NE 1/4 SW 1/4, SE 1/4 NW 1/4 OF SECTION 33, T. 6 S., R. 68 W., 6TH P.M. DOUGLAS COUNTY

LEGAL DESCRIPTION: DISTRICT BOUNDARY (CONTINUED FROM PAGE 1)

THENCE SOUTH 45°39' EAST A DISTANCE OF 269.00 FEET; THENCE SOUTH 28°31' EAST A DISTANCE OF 77.80 FEET; THENCE SOUTH 07°31' EAST A DISTANCE OF 293.00 FEET; THENCE NORTH 82°29' EAST A DISTANCE OF 197.00 FEET; THENCE SOUTH 07°31' EAST A DISTANCE OF 595.64 FEET; THENCE SOUTH 82°29' WEST A DISTANCE OF 207.00 FEET; THENCE SOUTH 07°31' EAST A DISTANCE OF 677.10 FEET; THENCE SOUTH 82°29' WEST A DISTANCE OF 184.00 FEET; THENCE SOUTH 07°31' EAST A DISTANCE OF 155.00 FEET; THENCE SOUTH 82°29' WEST A DISTANCE OF 430.85 FEET; THENCE NORTH 07°31' WEST A DISTANCE OF 967.50 FEET; THENCE SOUTH 82°29' WEST A DISTANCE OF 145.00 FEET; THENCE NORTH 07°31' WEST A DISTANCE OF 128.50 FEET; THENCE SOUTH 82°29' WEST A DISTANCE OF 134.88 FEET; THENCE SOUTH 82°17' WEST A DISTANCE OF 279.95 FEET; THENCE SOUTH 45°30' WEST A DISTANCE OF 670.16 FEET; THENCE ALONG THE ARC OF A NON-TANGENT CURVE A DISTANCE OF 282.5 FEET, SAID CURVE HAS A BEARING OF SOUTH 48°08'12" WEST A DISTANCE OF 50 FEET TO THE CENTER POINT OF THE CURVE, HAS A RADIUS OF 50 FEET AND A CENTRAL ANGLE OF 323.72°; THENCE NORTH 45°30' EAST A DISTANCE OF 669.63 FEET; THENCE NORTH 07°43' WEST A DISTANCE OF 697.51 FEET; THENCE NORTH 62°01' EAST A DISTANCE OF 238.00 FEET; THENCE NORTH 09°59' EAST A DISTANCE OF 202.24 FEET; THENCE NORTH 43°37' WEST A DISTANCE OF 77.03 FEET; THENCE ALONG THE ARC OF A CURVE TO THE LEFT A DISTANCE OF 46.98 FEET, SAID CURVE HAS A RADIUS OF 98.70 FEET AND A CENTRAL ANGLE OF 27°16'20"; THENCE NORTH 70°53' WEST A DISTANCE OF 283.33 FEET; THENCE SOUTH 77°38' WEST A DISTANCE OF 69.39 FEET; THENCE NORTH 12°22' WEST A DISTANCE OF 125.00 FEET; THENCE NORTH 77°38' EAST A DISTANCE OF 200 FEET; THENCE SOUTH 12°22' EAST A DISTANCE OF 125 FEET; THENCE SOUTH 77°38' WEST A DISTANCE OF 34.87 FEET; THENCE SOUTH 70°53' EAST A DISTANCE OF 201.69 FEET; THENCE ALONG THE ARC OF A CURVE TO THE RIGHT A DISTANCE OF 70.78 FEET, SAID CURVE HAS A RADIUS OF 148.70 FEET AND A CENTRAL ANGLE OF 27°16'20"; THENCE SOUTH 43°37' EAST A DISTANCE OF 40.17 FEET; THENCE NORTH 09°59' EAST A DISTANCE OF 12.64 FEET; THENCE NORTH 83°12' EAST A DISTANCE OF 262.00 FEET; TO THE POINT OF BEGINNING #1.

EXCLUDING LOT 1 BLOCK 15 IN LOUVIERS SUBDIVISION DOUGLAS COUNTY COLORADO.

THE ABOVE DESCRIBED TRACT OF LAND CONTAINS 65.31 ACRES MORE OR LESS.

AND A TRACT OF LAND ACROSS A PORTION OF THE SOUTHEAST ONE-QUARTER OF THE NORTHWEST ONE-QUARTER, SOUTHWEST ONE-QUARTER OF THE NORTHEAST ONE-QUARTER, NORTHWEST ONE-QUARTER OF THE SOUTHEAST ONE-QUARTER, AND THE NORTHEAST ONE-QUARTER OF THE SOUTHWEST ONE-QUARTER OF SECTION 33, TOWNSHIP 6 SOUTH, RANGE 68 WEST OF THE 6TH PRINCIPAL MERIDIAN, SAID COUNTY OF DOUGLAS AND STATE OF COLORADO.

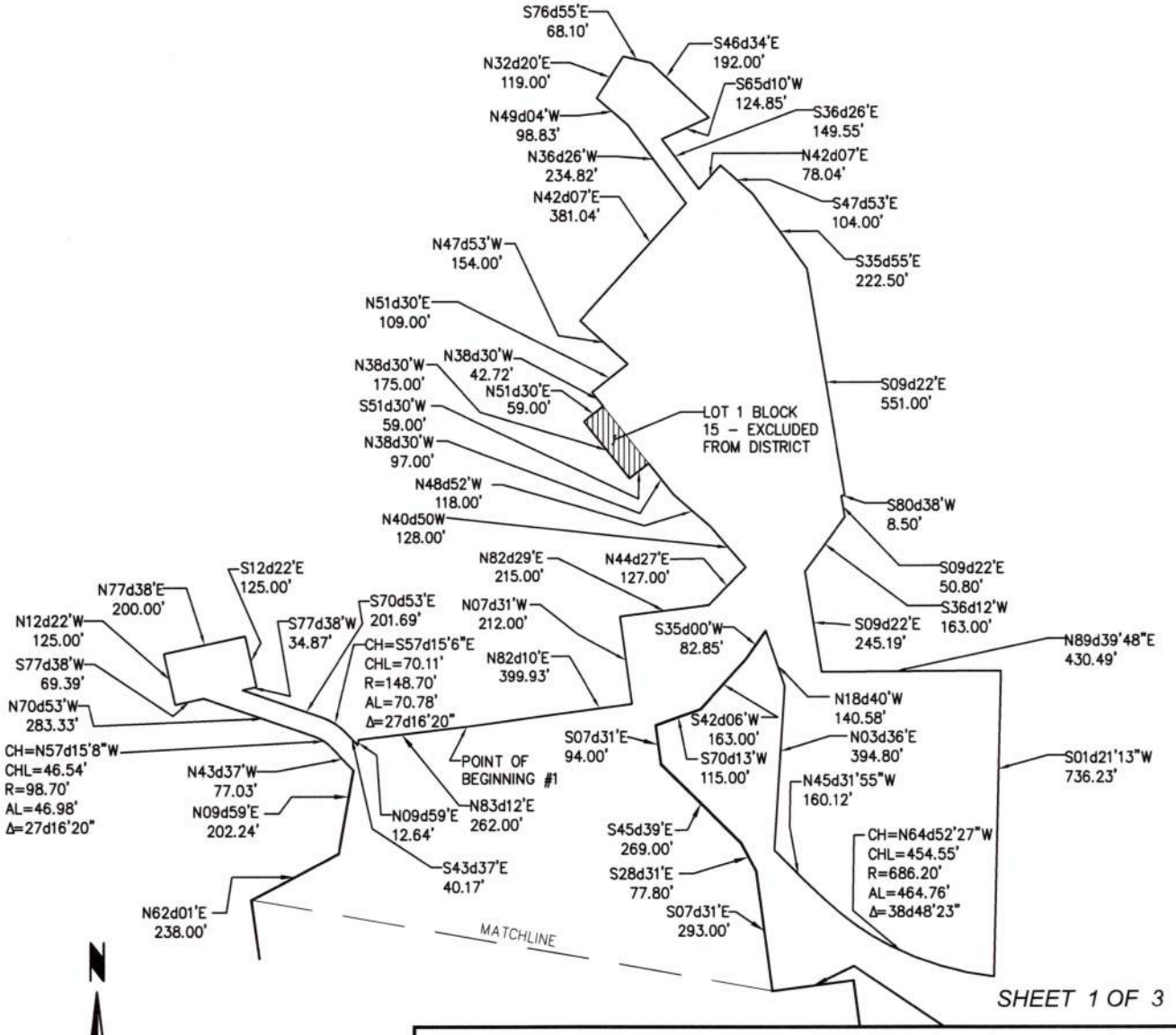
COMMENCING AT THE CENTER QUARTER CORNER OF SECTION 33, TOWNSHIP 6 SOUTH, RANGE 68 WEST OF THE 6TH PRINCIPAL MERIDIAN THENCE NORTH 21°19'19" WEST A DISTANCE OF 228.08 FEET TO THE POINT OF BEGINNING #2; THENCE SOUTH 69°21'43" EAST A DISTANCE OF 478.57 FEET; THENCE SOUTH 58°03'42" EAST A DISTANCE OF 254.59 FEET; THENCE SOUTH 51°27'28" EAST A DISTANCE OF 499.82'; THENCE SOUTH 53°17'30" WEST A DISTANCE OF 343.05 FEET; THENCE NORTH 79°04'04" WEST A DISTANCE OF 293.61 FEET; THENCE NORTH 4°11'45" WEST A DISTANCE OF 60.36 FEET; THENCE NORTH 56°45'02" WEST A DISTANCE OF 806.86 FEET; THENCE NORTH 35°39'15" EAST A DISTANCE OF 321.92 FEET TO THE POINT OF BEGINNING #2.

THE ABOVE DESCRIBED TRACT OF LAND CONTAINS 10.60 ACRES MORE OR LESS.

LOUVIERS WATER AND SANITATION DISTRICT	
TST INFRASTRUCTURE, LLC Consulting Engineers	SERVICE PLAN – EXHIBIT B
	DISTRICT BOUNDARY LEGAL DESCRIPTION
	JOB NO. 002.012.00 / DATE APRIL 2008

LOUVIERS WATER AND SANITATION DISTRICT
DISTRICT BOUNDARY

NE 1/4 NW 1/4, SE 1/4 NW 1/4, NW 1/4 NE 1/4, SW 1/4 NE 1/4 OF SECTION 4, T. 7 S., R. 68 W., 6TH P.M. DOUGLAS COUNTY AND SE 1/4 SW 1/4, SW 1/4 SE 1/4 OF SECTION 33, T. 6 S., R. 68 W., 6TH P.M. DOUGLAS COUNTY

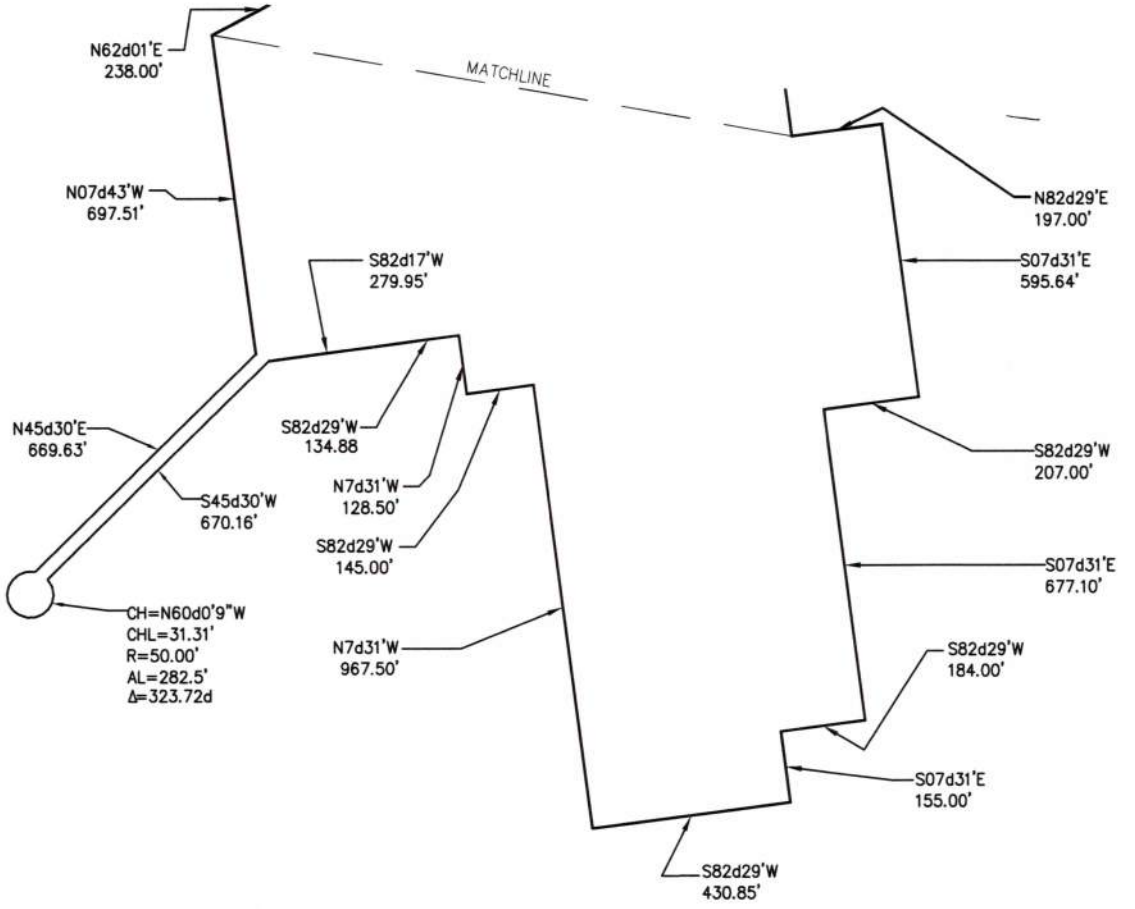


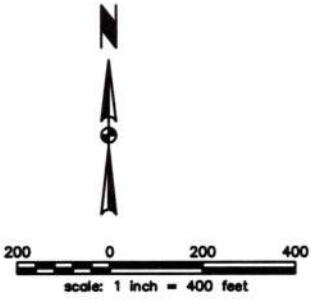
SHEET 1 OF 3

LOUVIERS WATER AND SANITATION DISTRICT		
TST INFRASTRUCTURE, LLC Consulting Engineers	SERVICE PLAN	
	EXHIBIT B – DISTRICT BOUNDARY	
	JOB NO. 002.012.00	DATE APRIL 2008

LOUVIERS WATER AND SANITATION DISTRICT
DISTRICT BOUNDARY

NE 1/4 NW 1/4, SE 1/4 NW 1/4, NW 1/4 NE 1/4, SW 1/4 NE 1/4 OF SECTION 4, T. 7 S., R. 68 W., 6TH P.M. DOUGLAS COUNTY AND SE 1/4 SW 1/4, SW 1/4 SE 1/4 OF SECTION 33, T. 6 S., R. 68 W., 6TH P.M. DOUGLAS COUNTY

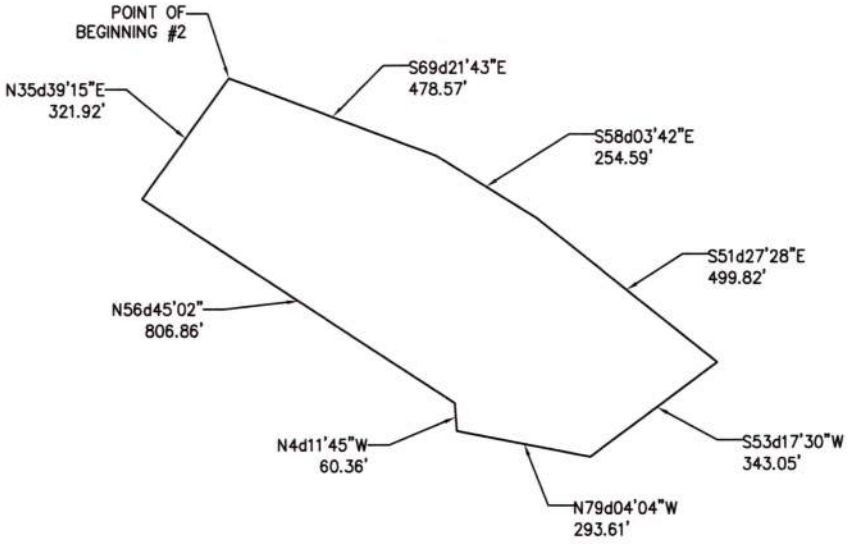


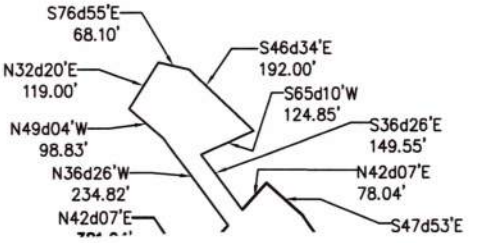


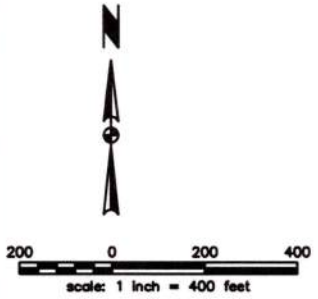
LOUVIERS WATER AND SANITATION DISTRICT		
TST INFRASTRUCTURE, LLC Consulting Engineers	SERVICE PLAN	
	EXHIBIT B – DISTRICT BOUNDARY	
	JOB NO. 002.012.00	DATE APRIL 2008

LOUVIERS WATER AND SANITATION DISTRICT DISTRICT BOUNDARY

NE 1/4 NW 1/4, SE 1/4 NW 1/4, NW 1/4 NE 1/4, SW 1/4 NE 1/4 OF SECTION 4, T. 7 S., R. 68 W., 6TH P.M. DOUGLAS COUNTY AND SE 1/4 SW 1/4, SW 1/4 SE 1/4 OF SECTION 33, T. 6 S., R. 68 W., 6TH P.M. DOUGLAS COUNTY



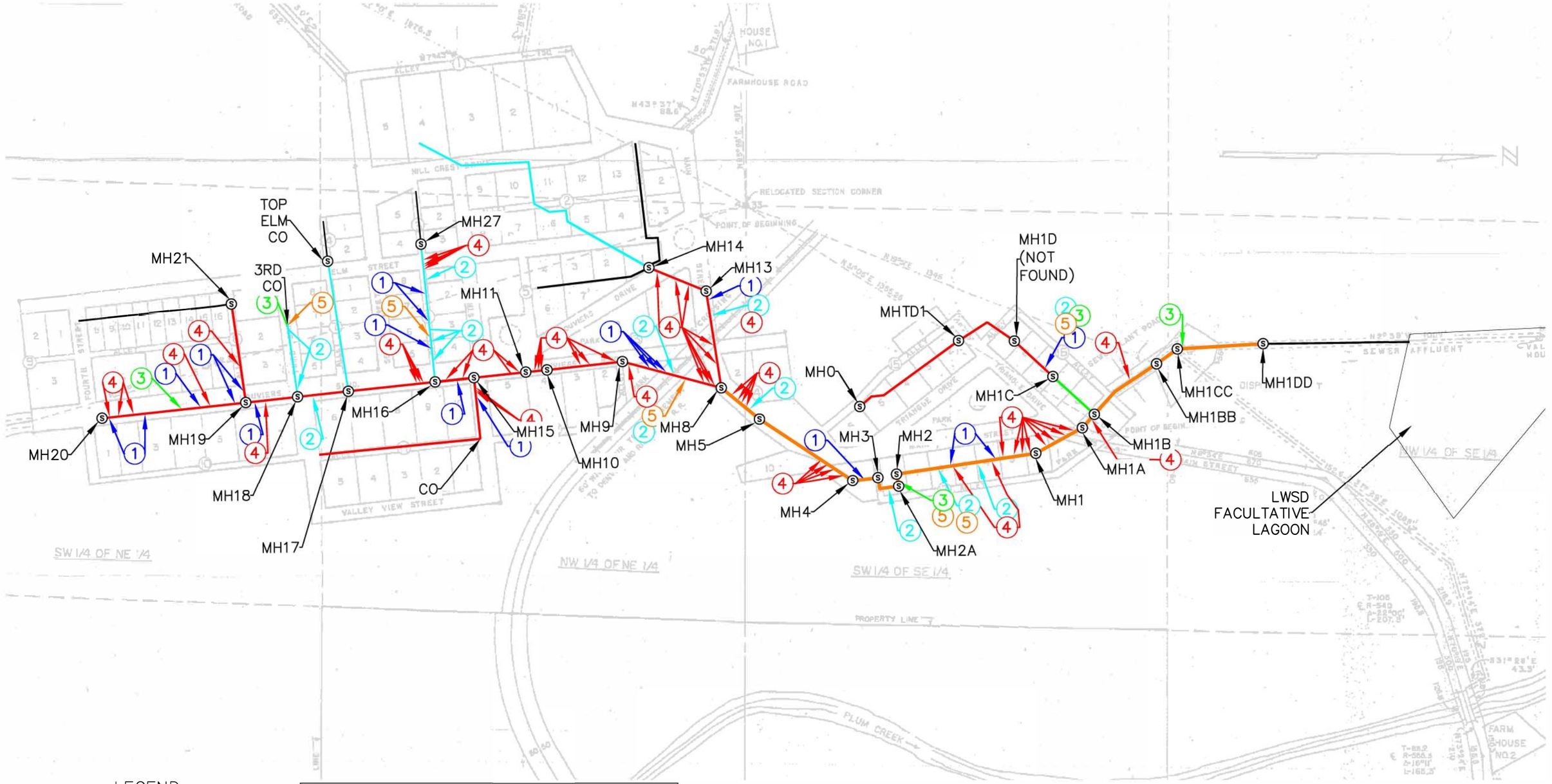




SHEET 3 OF 3

LOUVIERS WATER AND SANITATION DISTRICT		
TST INFRASTRUCTURE, LLC Consulting Engineers	SERVICE PLAN	
	EXHIBIT B – DISTRICT BOUNDARY	
	JOB NO. 002.012.00	DATE APRIL 2008

Appendix B



LEGEND

(1)	BROKEN OR CRACKED PIPE
(2)	OFFSET/SAG
(3)	SLUDGE ACCUMULATION
(4)	ROOTS
(5)	LIMITED ACCESSIBILITY

(S)	SANITARY SEWER MANHOLE
	NO INFORMATION AVAILABLE
	6" VCP
	8" VCP
	12" VCP
	8" PVC

150' 0 150' 300'
SCALE 1"= 300'

LOUVIERS WATER AND SANITATION DISTRICT

TST INFRASTRUCTURE, LLC
Consulting Engineers

SANITARY SEWER COLLECTION SYSTEM
PROJECT NEEDS ASSESSMENT

Attachment 6B – SS DEFICIENCIES

JOB NO. 002.026

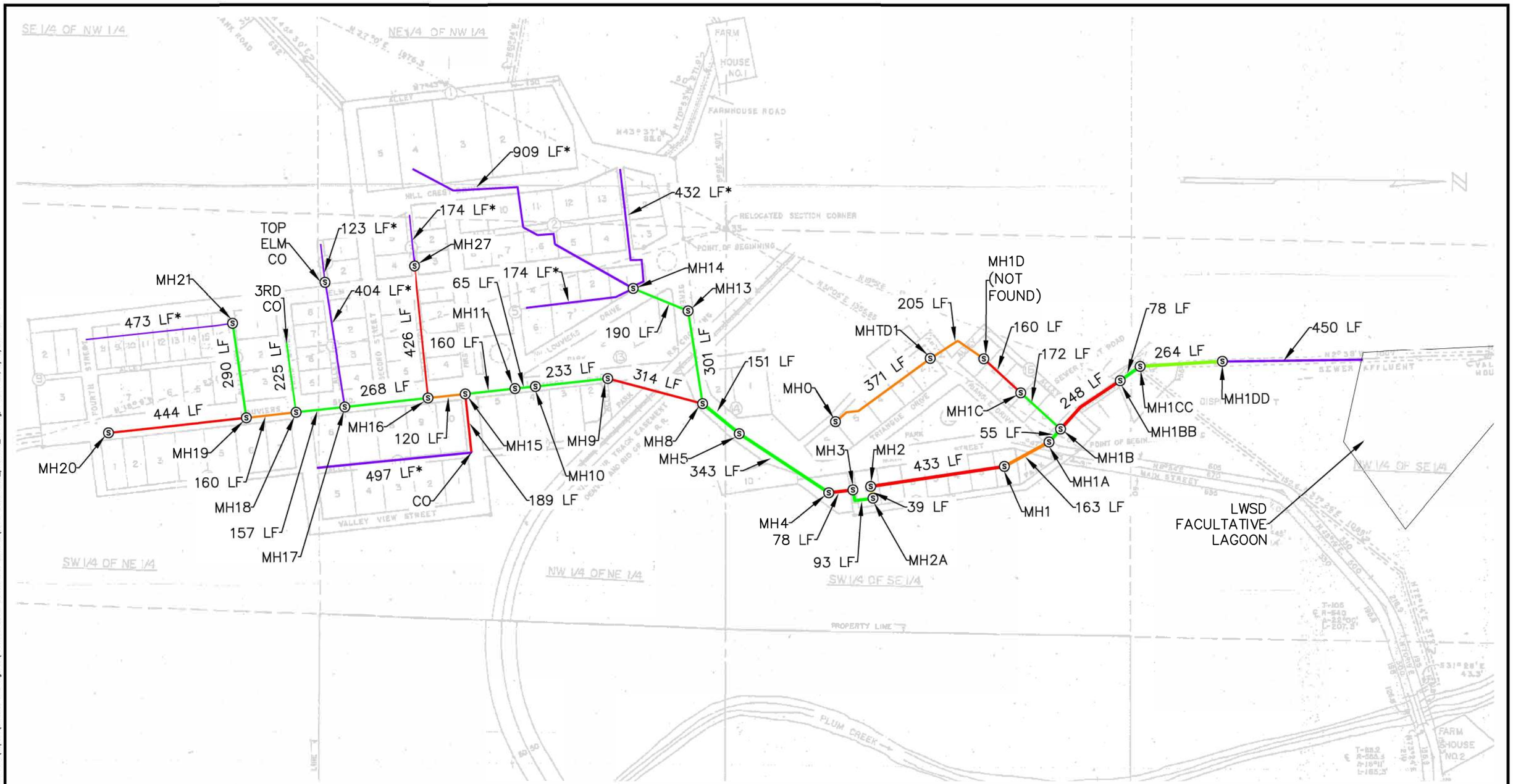
DATE AUGUST 2016

H:\Working Files\Document Files\Louviers\002.026.00- WW PNA\Report\Exhibits And Figures\Previous Sewer Deficiencies Exhibits\sewer Deficincies_priorities_JGS.dwg, PROBLEM POINTS, 8/12/2016 5:07 PM

Attachment 6D

SUMMARY OF LOUVIERS SEWER SYSTEM VIDEO INSPECTIONS							
DRC VIDEO #	Upstream MH	Downstream MH	Pipe Material	Pipe Diameter (in.)	Pipe Length (ft.)	Comments	REPLACEMENT PRIORITY
1	21	19	VCP	6	290	Multiple fractures and root intrusions.	3
2	19	18	VCP	8	160	Multiple fractures and root intrusions.	3
3, 4	20	19	VCP	8	444	Major root intrusions, sludge accumulation, debris, fractured pipe, pieces of pipe missing, voids in pipe, pipeline too damaged for camera to pass through entire length.	1
5	18	17	VCP	8	160	Root intrusion and cracking, pipe decay at one point in pipeline.	3
6, 7	17	16	VCP	8	289	Root intrusion and pipe cracking.	3
8, 9	27	16	VCP	6	396	PVC to VCP connection repairs, pipe decay, pipe sag, multiple fracturing and cracking, exfiltration issue, and major root intrusions.	1
10	16	15	VCP	8	120	Root intrusions and pipe cracking.	3
11	CO	15	VCP	8	207	Sag, root intrusion, fractured and cracked pipe. No cleanout visible, root intrusion at pipe tee.	3
12	15	11	VCP	8	160	Root intrusions of varying sizes, cracking and fractured pipe.	3
13	11	10	VCP	8	65	Cracked and fractured pipe, medium root intrusion.	3
14	10	9	VCP	8	232	Major root intrusions, cracking pipe.	3
15, 16	9	8	VCP	8	304	Root intrusions, circumferential cracking and fractured pipe, vertical offset at 206 feet from upstream manhole, camera unable to pass.	2
17, 18	14	13	VCP	8	166	Circumferential cracking and fractured pipe, root intrusions, service tap 52 feet from upstream manhole inserted too far into mainline.	3
19	13	8	VCP	8	299	Pipe sag and root intrusion.	3
20	8	5	VCP	12	190	Root intrusion and encrustations. Pipe turns at 152 feet from upstream manhole.	3
21	5	4	VCP	12	343	Root intrusion and encrustations, broken pipe at 53 feet from downstream manhole.	3
22	4	3	VCP	12	78	Root intrusion.	3
23, 24	3	2A	PVC	12	94	45 degree bend at 34 feet from upstream manhole	3
25	2A	2	VCP	12	40	Debris blockage 29 feet from upstream manhole.	2
26	2	1	VCP	12	433	Multiple cracking and fractured pipe, encrustations, major root intrusion.	2
27	1	1A	VCP	12	163	Major root intrusion.	3
28	1A	1B	VCP	12	55	Root intrusion.	3
29	3RD CO	18	VCP	6	225	Encrustions, and slight joint offset at one joint. Line is capped 223 feet from downstream manhole. Incoming 6" VCP line at 218 feet from downstream manhole.	3
30	TOP ELM CO	17	VCP	6	404	No information available.	4
31	0	TD1	VCP	8	371	Major root intrusions and encrustations, pipe sag, fractures and cracking, camera unable to pass through at 235 feet from downstream manhole.	2
32	TD1	1D	VCP	8	205	Root intrusion. Video ends after (2) 45 degree bends at 107 feet.	2
33	1D	1C	VCP	8	160	Horizontal offset, pipe sag, debris blockage, root intrusion, and encrustation.	2
34	1C	1B	PVC	8	172	No defects in pipeline.	3
35	1B	1BB	VCP	12	248	Root intrusions, broken pipe, fractures and cracking.	3
36	1BB	1CC	VCP	12	78	Two pipe lengths cracking, fractured.	3
37	1CC	1DD	VCP	12	264	Pipe sag at 196 feet from upstream manhole.	3

1 = HIGHEST REPLACEMENT PRIORITY
2 = MEDIUM REPLACEMENT PRIORITY
3 = LOWEST REPLACEMENT PRIORITY
4 = N / A



LEGEND

(S)	SANITARY SEWER MANHOLE
	HIGHEST PRIORITY SEWER LINE REPLACEMENT
	MEDIUM PRIORITY SEWER LINE REPLACEMENT
	LOWEST PRIORITY SEWER LINE REPLACEMENT
	NO INFORMATION ON SEWER LINE

150' 0 150' 300'
SCALE 1"= 300'

LOUVIERS WATER AND SANITATION DISTRICT

TST INFRASTRUCTURE, LLC
Consulting Engineers

SANITARY SEWER COLLECTION SYSTEM
PROJECT NEEDS ASSESSMENT

Attachment 6C– SS Replacement Priorities

JOB NO. 002.026

DATE AUGUST 2016

H:\Working Files\Document Files\Louviers\002.026.00- WW PNA\Report\Exhibits And Figures\Previous Sewer Deficiencies Exhibits\sewer Deficiencies_priorities_IGS.dwg, PRIORITIES, 8/12/2016 5:07 PM

Appendix C

LWSD
UPDATED CAPITAL IMPROVEMENT COSTS - SUMMARY

		Previous Estimates Adjusted to 2020	Approx. Annual Cost per Lot
WATER SUPPLY			
Radium Treatment System		$ 949,000	$ 465
Renewable Water Supply (w/Fire Flow)		$ 6,580,000	$ 3,015
WATER DISTRIBUTION			
Distribution System Replacement	$ 3,419,000		
Less 2014 Improvements	$ (277,000)		
Remaining Distribution Replacement	$ 3,142,000	$ 3,142,000	$ 1,535
Water Storage Tank Replacement		$ 1,118,000	$ 560
WASTEWATER COLLECTION			
Collection System Replacement	$ 4,011,000		
Less 2019 Improvements	$ (797,000)		
Remaining Collection Improvements	$ 3,214,000	$ 3,214,000	$ 1,580

LWSD
UPDATED CAPITAL IMPROVEMENT COSTS

WATER SUPPLY

Radium Treatment System

Previous Cost Estimate - March, 2019

		Est. Cost
Construction Cost		$ 575,000
Contingency -	25%	$ 144,000
Subtotal		$ 719,000
Admin, Legal, Engineering, Other		$ 214,000
Total - 2019 Estimate		$ 933,000
CCI Jan 2020	11392	
CCI Jan 2019	11203	
CCI Multiplier	1.017	1.017
Total Updated to 2020 Cost		$ 949,000

Connection to DWSD

Previous Cost Estimate - July, 2020 (DC Renewable Water Eval)

Construction Costs

	Est. Cost
Construction Cost w/contingency	$ 1,871,000
	$ -
Subtotal	$ 1,871,000
Admin, Legal, Engineering, Other	$ 509,000
Total Construction Estimate	$ 2,380,000
Water Resources Fee (42 AF)	$ 2,200,000
Water Infrastructure Fee	$ 2,000,000
Total Construction and Fees	$ 6,580,000

(No CCI Adjustment Needed)

LWSD
UPDATED CAPITAL IMPROVEMENT COSTS

WATER DISTRIBUTION

Complete Replacement of Distribution System

Previous Cost Estimate - 2010 Water System PER
(Ref. Distribution Summary Sheet)

		Est. Cost
Construction Cost		$ 1,815,000
Contingency (15%)		$ 275,000
Subtotal		$ 2,090,000
Admin, Legal, Engineering, Other		$ 510,000
Total - 2010 Estimate		$ 2,600,000
CCI Jan 2020	11392	
CCI Jan 2010	8660	
CCI Multiplier	1.315	1.315
Total Updated to 2020 Cost		$ 3,419,000

LWSD
UPDATED CAPITAL IMPROVEMENT COSTS

New Water Storage at Higher Elevation

Previous Cost Estimate - 2010 PER

		Est. Cost
Construction Cost		$ 552,000
Contingency -	15%	$ 83,000
Subtotal		$ 635,000
Admin, Legal, Engineering, Other		$ 215,000
Total - 2010 Estimate		$ 850,000
CCI Jan 2020	11392	

CCI Jan 2010	8660	
CCI Multiplier	1.315	1.315
Total Updated to 2020 Cost		$ 1,118,000
2020 Distribution System Total		$ 4,537,000

WASTEWATER COLLECTION

Complete Collection System Replacement

Previous Cost Estimate - PNA 2016
(Ref. Collection Summary Sheet)

		Est. Cost
Construction Cost		$ 2,379,000
Contingency -	25%	$ 597,000
Subtotal		$ 2,976,000
Admin, Legal, Engineering, Other		$ 592,000
Total - 2016 Estimate		$ 3,568,000
CCI Jan 2020	11392	
CCI Jan 2016	10132	
CCI Multiplier	1.124	1.124
Total Updated to 2020 Cost		$ 4,011,000

Appendix D

Louviers Water and Sanitation District
Well No. 2 Radium Treatment
Conceptual Cost Estimate
March 5, 2019

Option to Add Ion Exchange System

Description	Quantity	Units	Unit Price	Subtotal Cost
General	15	%	$ 720,000	$ 108,000
Sitework				
GESC Materials and Maintenance	3	MO	$ 4,000	$ 12,000
Site Restoration	2,000	SF	$ 3	$ 6,000
Access Drive	50	SY	$ 20	$ 1,000
Yard Pipe	50	LF	$ 80	$ 4,000
Ion Exchange System				
Treatment Unit Column	1	LS	$ 160,000	$ 160,000
Online Startup	1	LS	$ 15,000	$ 15,000
Piping - Materials	1	LS	$ 10,000	$ 10,000
Piping - Installation	1	LS	$ 15,000	$ 15,000
Connections to Ex Piping Systems	2	EA	$ 10,000	$ 20,000
Booster Pump	2	EA	$ 25,000	$ 50,000
Electrical	1	LS	$ 75,000	$ 75,000
New Building				
Building Construction (~ 25' x 20')	500	SF	$ 130	$ 65,000
Building Slab on Grade	25	CY	$ 750	$ 18,750
Mechanical	1	LS	$ 15,000	$ 15,000
Modifications to Existing Structure				
Wall Penetrations for Piping	3	EA	$ 1,500	$ 4,500
Construction Subtotal (nearest $1,000)				**$ 575,000**
Contingency (25%, nearest $1,000)				$ 144,000
Construction Total				**$ 719,000**
Engineering Design and Construction	20	%	$ 719,000	$ 143,800
Approvals	5	%	$ 719,000	$ 35,950
Survey	1	LS	$ 7,000	$ 7,000
Utilities Investigation	3	DAYS	$ 3,000	$ 9,000
Materials Testing	2	%	$ 144,000	$ 2,880
Legal	1	LS	$ 10,000	$ 10,000
Administration	1	LS	$ 5,000	$ 5,000
CDPHE Financial Assurance for Waste Disposal	1	LS	$ 30,000	$ 30,000
Project Total (nearest $1,000)				**$ 933,000**

Annual O & M, Power, and Resin Disposal

Description	Quantity	Units	Unit Price	Subtotal Cost
Ion Exchange System				
Operation & Maintenance, Resin Disposal/Replacement, and Licensing for Treated Water < 11 MGY	1	LS	$ 17,000	$ 17,000
Operation & Maintenance, Resin Disposal/Replacement, and Licensing for Treated Water > 11 MGY	5,000	KGAL	$ 1.50	$ 7,500
Power	6,000	kWh	$ 0.1200	$ 700
Annual O & M, Power, and Resin Disposal (nearest $1,000)				**$ 25,000**

Louviers Water and Sanitation District
Well No. 2 Radium Treatment
Conceptual Cost Estimate
Updated March 11, 2019

Option for Water Service from Roxborough Water and Sanitation District

Description	Quantity	Units	Unit Price	Subtotal Cost
Tranmission Main From Plum Valley Heights to LWSD Tank				
General	15	%	$ 1,000,000	$ 150,000
Pipeline				
4" Direction Drill HDPE	7,000	LF	$ 80	$ 560,000
PRV Vault	1	LS	$ 30,000	$ 30,000
Meter Manhole	1	LS	$ 10,000	$ 10,000
Air Vacuum Valves	4	EA	$ 5,000	$ 20,000
Connection to RWSD	1	LS	$ 10,000	$ 10,000
Connection to LWSD Tank	1	LS	$ 10,000	$ 10,000
GESC Materials and Maintenance	3	MO	$ 4,000	$ 12,000
Site Restoration	3	AC	$ 3,000	$ 9,000
Construction Subtotal (nearest $1,000)				**$ 811,000**
Contingency (25%, nearest $1,000)				$ 203,000
Construction Total				**$ 1,014,000**
Engineering Design and Construction	20	%	$ 1,014,000	$ 202,800
Approvals	5	%	$ 1,014,000	$ 50,700
Geotechnical Investigation	1	LS	$ 7,000	$ 7,000
Survey	1	LS	$ 7,000	$ 7,000
Utilities Investigation	3	DAYS	$ 3,000	$ 9,000
Materials Testing	2	%	$ 1,014,000	$ 20,280
Legal/ROW Acquisition	1	LS	$ 20,000	$ 20,000
Administration	1	LS	$ 5,000	$ 5,000
Construction Project Total (nearest $1,000)				**$ 1,336,000**
RWSD Inclusion Fees (Estimated - No Discussion with RWSD)				
Inclusion Fee (RWSD)	112	EQR	$ 3,200	$ 358,400
RWSD System Development Charge	112	EQR	$ 10,000	$ 1,120,000
Permit Fee	112	EQR	$ 1,650	$ 184,800
			Total	**$ 1,663,200**
RWSD Water Supply Costs (Estimated - No Discussion with RWSD)				
Water Supply	112	EQR	$ 7,000	$ 784,000
			Total	**$ 784,000**
Project Grand Total				**$ 3,783,200.00**

- Project 6: Complete Waterline Loop Number 6 along interior alley ways and streets. Project 6 includes 4 isolation valves for control and maintenance along with replacement and upsizing of approximately 1,400 linear feet of 8" service pipeline and other associated appurtenances. Detailed cost estimates are included in Appendix K.
- Project 7: Complete Waterline Loop Number 7 along Elm Street and the Hillcrest Drive area. Project 7 includes 2 new replacement hydrants, along with replacement and upsizing of approximately 2,000 linear feet of 8" service pipeline and other associated appurtenances. Detailed cost estimates are included in Appendix K.

Note that the replacement sequence will need to be further refined in preliminary design phases of the distribution system improvements.

7.3 - DISTRIBUTION SYSTEM REPLACEMENT COSTS

Total capital cost per distribution system replacement project is presented in Table 13. More detailed cost estimate information is found in Appendix K. Priority levels have been established based largely on the critical need for replacement and safety of the service area. Project 4 was identified as most critical due to the high number of obsolete fire hydrants as well as the overall age of the existing water lines.

Table 11: Summary of Distribution System Replacement Costs

Replacement Project No.	Capital Cost	Priority Level
Project 1	$415,000	3
Project 2	$250,000	6
Project 3	$480,000	2
Project 4	$540,000	1
Project 5	$310,000	5
Project 6	$270,000	7
Project 7	$315,000	4
Total Cost	$2,580,000	

LOUVIERS WATER AND SANITATION DISTRICT
CONCEPTUAL COST ESTIMATE

WORKSHEET 9
DISTRIBUTION SYSTEM REPLACEMENT

Capital Cost - Distribution System Replacement by Project

Description	Quantity	Units	Unit Price	Subtotal Cost
Project 1 distribution piping replacement				
8" Distribution Piping	3300	ft	$ 60	$ 198,000
3/4" service lines (average service 50 ft from main)	12	ea	$ 1,250	$ 15,000
Service meters	12	ea	$ 125	$ 1,500
Meter Pits	12	ea	$ 2,000	$ 24,000
Hydrants	4	ea	$ 5,000	$ 20,000
Valving (isolation valves)	6	ea	$ 1,500	$ 9,000
Asphalt Replacement	7500	sqft	$ 3	$ 22,500
Project 1 Subtotal				$ 290,000
Construction Contingency (15%, rounded to nearest $1000)				$ 44,000
Legal / ROW Acquisition				$ 5,000
Utility Investigations (5% of total Const. Cost)				$ 15,000
Survey				$ 5,000
Geotechnical Investigation				$ 7,000
Design Engineering				$ 34,000
Construction Phase Engineering				$ 20,000
Project 1 Total				$ 420,000
Project 2 distribution piping replacement				
8" Distribution Piping	1400	ft	$ 60	$ 84,000
3/4" service lines (average service 50 ft from main)	16	ea	$ 1,250	$ 20,000
Service meters	16	ea	$ 125	$ 2,000
Meter Pits	16	ea	$ 2,000	$ 32,000
Hydrants	2	ea	$ 5,000	$ 10,000
Valving (isolation valves)	2	ea	$ 1,500	$ 3,000
Asphalt Replacement	8000	sqft	$ 3	$ 24,000
Project 2 Subtotal				$ 175,000
Construction Contingency (15%, rounded to nearest $1000)				$ 26,000
Utility Investigations (5% of total Const. Cost)				$ 9,000
Survey				$ 5,000
Geotechnical Investigation				$ 4,000
Design Engineering				$ 20,000
Construction Phase Engineering				$ 16,000
Project 2 Total				$ 255,000
Project 3 distribution piping replacement				
8" Distribution Piping	2700	ft	$ 60	$ 162,000
3/4" service lines (average service 50 ft from main)	20	ea	$ 1,200	$ 24,000
Service meters	20	ea	$ 125	$ 2,500
Meter Pits	20	ea	$ 2,000	$ 40,000
Hydrants	4	ea	$ 5,000	$ 20,000
Valving (isolation valves)	5	ea	$ 1,500	$ 7,500
Asphalt Replacement	30000	sqft	$ 3	$ 90,000
Project 3 Subtotal				$ 346,000
Construction Contingency (15%, rounded to nearest $1000)				$ 52,000
Utility Investigations (5% of total Const. Cost)				$ 17,000
Survey				$ 5,000
Geotechnical Investigation				$ 5,000
Design Engineering				$ 30,000
Construction Phase Engineering				$ 30,000
Project 3 Total				$ 485,000

Capital Cost - Distribution System Replacement by Project

Description	Quantity	Units		Unit Price		Subtotal Cost
Project 4 distribution piping replacement						
8" Distribution Piping	4000	ft	$	60	$	240,000
3/4" service lines (average service 50 ft from main)	24	ea	$	1,000	$	24,000
Service meters	24	ea	$	125	$	3,000
Meter Pits	24	ea	$	2,000	$	48,000
Hydrants	5	ea	$	5,000	$	25,000
Valving (isolation valves)	2	ea	$	1,500	$	3,000
Asphalt Replacement	12000	sqft	$	3	$	36,000
Project 4 Subtotal					$	379,000
Construction Contingency (15%, rounded to nearest $1000)					$	57,000
Utility Investigations (5% of total Const. Cost)					$	19,000
Survey					$	5,000
Geotechnical Investigation					$	7,000
Design Engineering					$	38,000
Construction Phase Engineering					$	35,000
Project 4 Total					$	540,000
Project 5 distribution piping replacement						
8" Distribution Piping	1900	ft	$	60	$	114,000
3/4" service lines (average service 50 ft from main)	8	ea	$	1,250	$	10,000
Service meters	8	ea	$	125	$	1,000
Meter Pits	8	ea	$	2,000	$	16,000
Hydrants	2	ea	$	5,000	$	10,000
Valving (isolation valves)	4	ea	$	1,500	$	6,000
Asphalt Replacement	20000	sqft	$	3	$	60,000
Project 5 Subtotal					$	217,000
Construction Contingency (15%, rounded to nearest $1000)					$	33,000
Utility Investigations (5% of total Const. Cost)					$	11,000
Survey					$	5,000
Geotechnical Investigation					$	5,000
Design Engineering					$	26,000
Construction Phase Engineering					$	18,000
Project 5 Total					$	315,000
Project 6 distribution piping replacement						
8" Distribution Piping	1400	ft	$	60	$	84,000
3/4" service lines (average service 50 ft from main)	24	ea	$	1,000	$	24,000
Service meters	24	ea	$	125	$	3,000
Meter Pits	24	ea	$	2,000	$	48,000
Hydrants	0	ea	$	5,000	$	-
Valving (isolation valves)	4	ea	$	1,500	$	6,000
Asphalt Replacement	8000	sqft	$	3	$	24,000
Project 6 Subtotal					$	189,000
Construction Contingency (15%, rounded to nearest $1000)					$	28,000
Utility Investigations (5% of total Const. Cost)					$	9,000
Survey					$	5,000
Geotechnical Investigation					$	5,000
Design Engineering					$	19,000
Construction Phase Engineering					$	15,000
Project 6 Total					$	270,000

Capital Cost - Distribution System Replacement by Project

Description	Quantity	Units		Unit Price		Subtotal Cost
Project 7 distribution piping replacement						
8" Distribution Piping	2000	ft	$	60	$	120,000
3/4" service lines (average service 50 ft from main)	16	ea	$	1,000	$	16,000
Service meters	16	ea	$	125	$	2,000
Meter Pits	16	ea	$	2,000	$	32,000
Hydrants	2	ea	$	5,000	$	10,000
Valving (isolation valves)	0	ea	$	1,500	$	-
Asphalt Replacement	13000	sqft	$	3	$	39,000
Project 7 Subtotal					$	219,000
Construction Contingency (15%, rounded to nearest $1000)					$	33,000
Utility Investigations (5% of total Const. Cost)					$	11,000
Survey					$	5,000
Geotechnical Investigation					$	5,000
Design Engineering					$	25,000
Construction Phase Engineering					$	17,000
Project 7 Total					$	315,000
Replacement Projects 1-7 Total					**$**	**2,600,000**

Note: Preliminary Sketches and Calculations are included at the end of this Appendix section.

LOUVIERS WATER AND SANITATION DISTRICT **WORKSHEET 11**
CONCEPTUAL COST ESTIMATE **STORAGE OPTION 3**

Capital Cost - Water Storage Option 3, New Storage Tank at Elevated Site

Description	Quantity	Units		Unit Price		Subtotal Cost
250,000 gallon concrete water storage tank						
Tank slab, walls and deck ($1.00/gallon)	250,000	gal	$	1.5	$	375,000
Piping to Distribution System (10" DI pipe)	2500	ft	$	70	$	175,000
Valving	2	ea	$	1,000	$	2,000
Construction Subtotal					$	552,000
Construction Contingency (15%, rounded to nearest $1000)					$	83,000
Legal / ROW Acquisition					$	5,000
County Site Improvement Plan Submittal					$	10,000
Utility Investigations	4	days	$	2,500	$	10,000
Survey					$	10,000
Geotechnical Investigation					$	14,000
Design Engineering					$	93,000
Construction Phase Engineering					$	73,000
Project Total					**$**	**850,000**

Annual O/M Cost - Storage Option 3

Description	Quantity	Units		Unit Price		Subtotal Cost
Materials/Supplies						
Tank Cleaning (once every five years)	1	ls	$	800	$	800
Access Road Maintenance	1	ls	$	1,000	$	1,000
Supply Pump Electricity	2000	kw-hrs	$	0.10	$	200
Subtotal					$	2,000
Contingency (15%, rounded to nearest $1000)					$	-
Annual O/M Cost					**$**	**2,000**
Use					**$**	**2,000**

Note: Preliminary Sketches and Calculations are included at the end of this Appendix section.

Louviers Water and Sanitation District
Sanitary Sewer Collection System Project Needs Assessment

Alternative 3 Cost Estimate Summary

Phase	Cost
1	$813,297.50
2	$1,148,818.75
3	$726,325.00
4	$877,048.13
Total	$3,565,489.38

Louviers Water and Sanitation District
Sanitary Sewer Collection System Project Needs Assessment

Alternative 3 Phase 1 Cost Estimate

Description		Quantity	Units	Unit Price	Cost
GENERAL					
	Traffic Control	217	lf	$ 15.00	$ 3,255.00
	GESC Permit	1	ls	$ 2,500.00	$ 2,500.00
	ROW Permit	1	ls	$ 2,500.00	$ 2,500.00
SANITARY SEWER					
	Service Lines/Service Line Reconnection	21	ea	$ 2,000.00	$ 42,000.00
	8" PVC Sanitary Sewer, 0 to 12 Feet Deep	1057	lf	$ 90.00	$ 95,130.00
	12" PVC Sanitary Sewer, 0 to 12 Feet Deep	2180	lf	$ 100.00	$ 218,000.00
	Manhole Removal + Cap	11	ea	$ 2,000.00	$ 22,000.00
	Manhole Assembly	15	ea	$ 6,000.00	$ 90,000.00
ASPHALT AND FLATWORK					
	Asphalt Surface Removal (Include Saw Cutting)	193	sy	$ 10.00	$ 1,930.00
	Asphalt Surface Replacement	1351	syi	$ 11.00	$ 14,861.00
	Gravel Removal	2284	sy	$ 5.00	$ 11,420.00
	Gravel Replacement	2284	sy	$ 5.50	$ 12,562.00
GRADING, EROSION, AND SEDIMENT CONTROL					$ 26,000.00
SUBTOTAL CONSTRUCTION					$ 542,158.00
	25% Contingency				$ 135,539.50
TOTAL CONSTUCTION					$ 677,697.50
DESIGN AND ADMIN FEES					
	Engineering Fees	1	ls	$ 101,654.63	$ 101,700.00
	Legal Fees	1	ls	$ 20,330.93	$ 20,300.00
	Administrative Fees	1	ls	$ 13,553.95	$ 13,600.00
PROJECT TOTAL					**$ 813,297.50**

Louviers Water and Sanitation District
Sanitary Sewer Collection System Project Needs Assessment

Alternative 3 Phase 2 Cost Estimate

Description		Quantity	Units	Unit Price	Cost
GENERAL					
	Traffic Control	3251	lf	$ 15.00	$ 48,765.00
	GESC Permit	1	ls	$ 2,500.00	$ 2,500.00
	ROW Permit	1	ls	$ 2,500.00	$ 2,500.00
SANITARY SEWER					
	Service Lines/Service Line Reconnection	28	ea	$ 2,000.00	$ 56,000.00
	8" PVC Sanitary Sewer, 0 to 12 Feet Deep	2736	lf	$ 90.00	$ 246,240.00
	12" PVC Sanitary Sewer, 0 to 12 Feet Deep	515	lf	$ 100.00	$ 51,500.00
	Manhole Removal + Cap	2	ea	$ 2,000.00	$ 4,000.00
	Manhole Assembly	11	ea	$ 6,000.00	$ 66,000.00
ASPHALT AND FLATWORK					
	Asphalt Surface Removal (Include Saw Cutting)	2890	sy	$ 10.00	$ 28,900.00
	Asphalt Surface Replacement	20230	syi	$ 11.00	$ 222,530.00
	Gravel Removal	0	sy	$ 5.00	$ -
	Gravel Replacement	0	sy	$ 5.50	$ -
GRADING, EROSION, AND SEDIMENT CONTROL					$ 37,000.00
SUBTOTAL CONSTRUCTION					$ 765,935.00
	25% Contingency				$ 191,483.75
TOTAL CONSTUCTION					$ 957,418.75
DESIGN AND ADMIN FEES					
	Engineering Fees	1	ls	$ 143,612.81	$ 143,600.00
	Legal Fees	1	ls	$ 28,722.56	$ 28,700.00
	Administrative Fees	1	ls	$ 19,148.38	$ 19,100.00
PROJECT TOTAL					**$ 1,148,818.75**

Louviers Water and Sanitation District
Sanitary Sewer Collection System Project Needs Assessment

Alternative 3 Phase 3 Cost Estimate

Description		Quantity	Units	Unit Price	Cost
GENERAL					
	Traffic Control	1324	lf	$ 15.00	$ 19,860.00
	GESC Permit	1	ls	$ 2,500.00	$ 2,500.00
	ROW Permit	1	ls	$ 2,500.00	$ 2,500.00
SANITARY SEWER					
	Service Lines/Service Line Reconnection	28	ea	$ 2,000.00	$ 56,000.00
	8" PVC Sanitary Sewer, 0 to 12 Feet Deep	2429	lf	$ 90.00	$ 218,610.00
	Manhole Assembly	8	ea	$ 6,000.00	$ 48,000.00
ASPHALT AND FLATWORK					
	Asphalt Surface Removal (Include Saw Cutting)	1177	sy	$ 10.00	$ 11,770.00
	Asphalt Surface Replacement	8239	syi	$ 11.00	$ 90,629.00
	Gravel Removal	982	sy	$ 5.00	$ 4,910.00
	Gravel Replacement	982	sy	$ 5.50	$ 5,401.00
GRADING, EROSION, AND SEDIMENT CONTROL					$ 24,000.00
SUBTOTAL CONSTRUCTION					$ 484,180.00
	25% Contingency				$ 121,045.00
TOTAL CONSTUCTION					$ 605,225.00
DESIGN AND ADMIN FEES					
	Engineering Fees	1	ls	$ 90,783.75	$ 90,800.00
	Legal Fees	1	ls	$ 18,156.75	$ 18,200.00
	Administrative Fees	1	ls	$ 12,104.50	$ 12,100.00
PROJECT TOTAL					**$ 726,325.00**

Louviers Water and Sanitation District
Sanitary Sewer Collection System Project Needs Assessment

Alternative 3 Phase 4 Cost Estimate

Description		Quantity	Units	Unit Price	Cost
GENERAL					
	Traffic Control	2179	lf	$ 15.00	$ 32,685.00
	GESC Permit	1	ls	$ 2,500.00	$ 2,500.00
	ROW Permit	1	ls	$ 2,500.00	$ 2,500.00
SANITARY SEWER					
	Service Lines/Service Line Reconnection	36	ea	$ 2,000.00	$ 72,000.00
	8" PVC Sanitary Sewer, 0 to 12 Feet Deep	2707	lf	$ 90.00	$ 243,630.00
	Manhole Assembly	5	ea	$ 6,000.00	$ 30,000.00
ASPHALT AND FLATWORK					
	Asphalt Surface Removal (Include Saw Cutting)	1937	sy	$ 10.00	$ 19,370.00
	Asphalt Surface Replacement	13559	syi	$ 11.00	$ 149,149.00
	Gravel Removal	469	sy	$ 5.00	$ 2,345.00
	Gravel Replacement	469	sy	$ 5.50	$ 2,579.50
GRADING, EROSION, AND SEDIMENT CONTROL					$ 28,000.00
SUBTOTAL CONSTRUCTION					$ 584,758.50
	25% Contingency				$ 146,189.63
TOTAL CONSTUCTION					$ 730,948.13
DESIGN AND ADMIN FEES					
	Engineering Fees	1	ls	$ 109,642.22	$ 109,600.00
	Legal Fees	1	ls	$ 21,928.44	$ 21,900.00
	Administrative Fees	1	ls	$ 14,618.96	$ 14,600.00
PROJECT TOTAL					**$ 877,048.13**

Douglas County
Louviers Water and Sanitation District
Renewable Water Feasibility Study
Conceptual Cost Estimate
Alternate 1A - RWSD Full Water Supply with no Fire Flow
Updated July 22, 2020

Description	Quantity	Units	Unit Price	Subtotal Cost
Tranmission Main From Plum Valley Heights to LWSD Tank				
Pipeline				
Connection to RWSD	1	EA	$ 10,000	$ 10,000
Connection to LWSD System	1	EA	$ 10,000	$ 10,000
Disconnect Wells	2	EA	$ 10,000	$ 20,000
4" Direction Drill HDPE	8,300	LF	$ 80	$ 664,000
PRV Vault	1	EA	$ 12,000	$ 12,000
Meter Vault	1	EA	$ 80,000	$ 80,000
Air Vacuum Valves	4	EA	$ 7,000	$ 28,000
Blowoff Valves	4	EA	$ 3,000	$ 12,000
DI Bends, Reducers, and Restraints	12	EA	$ 500	$ 6,000
4" Gate Valves	4	EA	$ 2,000	$ 8,000
Site Restoration/Revegetation	1.00	AC	$ 8,000	$ 8,000
ROW Permit - Pipe	8,300	LF	$ 1	$ 6,391
ROW Permit - Street Cut Bore	26	EA	$ 75	$ 1,950
Construction Subtotal (nearest $1,000)				**$ 866,000**
Staging Area/GESC (nearest $10,000)	2	%	$866,000	$20,000
Overhead (nearest $10,000)	10	%	$866,000	$90,000
Profit (nearest $10,000)	5	%	$866,000	$40,000
Mobilization/Bonds/Insurance (nearest $10,000)	5	%	$866,000	$40,000
Contingency (nearest $10,000)	25	%	$866,000	$220,000
Construction Total				**$ 1,276,000**
Engineering Design and Construction (nearest $1,000)	15	%	$ 1,276,000	$ 191,000
Approvals (nearest $1,000)	5	%	$ 1,276,000	$ 64,000
Geotechnical Investigation (nearest $1,000)	1	LS	$ 10,000	$ 10,000
Survey	1	LS	$ 20,000	$ 20,000
Utilities Investigation (nearest $1,000)	3	DAYS	$ 3,000	$ 9,000
Materials Testing (nearest $1,000)	2	%	$ 1,276,000	$ 26,000
Legal/ROW Acquisition (nearest $1,000)	2	%	$ 1,276,000	$ 26,000
Administration (nearest $1,000)	1	%	$ 1,276,000	$ 13,000
Construction Project Total (nearest $10,000)				**$ 1,640,000**
RWSD Fees				
Inclusion Fee (RWSD)	134	EQR	$ 3,200	$ 428,800
RWSD System Development Charge	134	EQR	$ 21,350	$ 2,860,900
			Total	**$ 3,289,700**
Project Grand Total (nearest $10,000)				**$ 4,930,000.00**

Douglas County
Louviers Water and Sanitation District
Renewable Water Feasibility Study
Conceptual Cost Estimate
Alternate 1B - RWSD Full Water Supply with Fire Flow
Updated July 22, 2020

Description	Quantity	Units	Unit Price	Subtotal Cost
Tranmission Main From Plum Valley Heights to LWSD 8" Main				
Pipeline				
Connection to RWSD	1	EA	$ 15,000	$ 15,000
Connection to LWSD System	1	EA	$ 15,000	$ 15,000
Disconnect Wells	2	EA	$ 10,000	$ 20,000
12" Pipe	6,300	LF	$ 120	$ 756,000
PRV Vault	1	EA	$ 20,000	$ 20,000
Meter Vault	1	EA	$ 120,000	$ 120,000
Air Vacuum Valves	7	EA	$ 7,000	$ 49,000
Blowoff Valves	6	EA	$ 5,000	$ 30,000
DI Bends, Reducers, and Restraints	6	EA	$ 2,000	$ 12,000
12" Gate Valves	4	EA	$ 4,000	$ 16,000
Site Restoration/Revegetation	1.00	AC	$ 8,000	$ 8,000
ROW Permit - Pipe	6,300	LF	$ 1	$ 4,851
ROW Permit - Street Cut Bore	25	EA	$ 75	$ 1,875
Construction Subtotal (nearest $1,000)				**$ 1,068,000**
Staging Area/GESC (nearest $10,000)	2	%	$1,068,000	$20,000
Overhead (nearest $10,000)	10	%	$1,068,000	$110,000
Profit (nearest $10,000)	5	%	$1,068,000	$50,000
Mobilization/Bonds/Insurance (nearest $10,000)	5	%	$1,068,000	$50,000
Contingency (nearest $10,000)	25	%	$1,068,000	$270,000
Construction Total				**$ 1,568,000**
Engineering Design and Construction (nearest $1,000)	15	%	$ 1,568,000	$ 235,000
Approvals (nearest $1,000)	5	%	$ 1,568,000	$ 78,000
Geotechnical Investigation (nearest $1,000)	1	LS	$ 10,000	$ 10,000
Survey	1	LS	$ 20,000	$ 20,000
Utilities Investigation (nearest $1,000)	3	DAYS	$ 3,000	$ 9,000
Materials Testing (nearest $1,000)	2	%	$ 1,568,000	$ 31,000
Legal/ROW Acquisition (nearest $1,000)	2	%	$ 1,568,000	$ 31,000
Administration (nearest $1,000)	1	%	$ 1,568,000	$ 16,000
Construction Project Total (nearest $10,000)				**$ 2,000,000**
RWSD Inclusion Fees				
Inclusion Fee (RWSD)	134	EQR	$ 3,200	$ 428,800
RWSD System Development Charge	134	EQR	$ 28,066	$ 3,760,844
			Total	**$ 4,189,644**
Project Grand Total (nearest $10,000)				**$ 6,190,000.00**

Douglas County
Louviers Water and Sanitation District
Renewable Water Feasibility Study
Conceptual Cost Estimate
Alternate 2A - DWSD Full Water Supply with no Fire Flow
Updated July 22, 2020

Description	Quantity	Units	Unit Price	Subtotal Cost
Tranmission Main From Plum Valley Heights to LWSD Tank				
Pipeline				
Connection to DWSD	1	EA	$ 10,000	$ 10,000
Connection to LWSD System	1	EA	$ 10,000	$ 10,000
Disconnect Wells	2	EA	$ 10,000	$ 20,000
4" Direction Drill HDPE	9,600	LF	$ 80	$ 768,000
PRV Vault	1	EA	$ 12,000	$ 12,000
Meter Vault	1	EA	$ 80,000	$ 80,000
Air Vacuum Valves	3	EA	$ 7,000	$ 21,000
Blowoff Valves	3	EA	$ 5,000	$ 15,000
DI Bends, Reducers, and Restraints	9	EA	$ 2,000	$ 18,000
4" Gate Valves	4	EA	$ 2,000	$ 8,000
Site Restoration/Revegetation	1.00	AC	$ 8,000	$ 8,000
ROW Permit - Pipe	9,600	LF	$ 1	$ 7,392
ROW Permit - Street Cut Bore	21	EA	$ 75	$ 1,575
Construction Subtotal (nearest $1,000)				**$ 979,000**
Staging Area/GESC (nearest $10,000)	2	%	$979,000	$20,000
Overhead (nearest $10,000)	10	%	$979,000	$100,000
Profit (nearest $10,000)	5	%	$979,000	$50,000
Mobilization/Bonds/Insurance (nearest $10,000)	5	%	$979,000	$50,000
Contingency (nearest $10,000)	25	%	$979,000	$240,000
Construction Total				**$ 1,439,000**
Engineering Design and Construction (nearest $1,000)	15	%	$ 1,439,000	$ 216,000
Approvals (nearest $1,000)	5	%	$ 1,439,000	$ 72,000
Geotechnical Investigation (nearest $1,000)	1	LS	$ 10,000	$ 10,000
Survey	1	LS	$ 20,000	$ 20,000
Utilities Investigation (nearest $1,000)	3	DAYS	$ 3,000	$ 9,000
Materials Testing (nearest $1,000)	2	%	$ 1,439,000	$ 29,000
Legal/ROW Acquisition (nearest $1,000)	2	%	$ 1,439,000	$ 29,000
Administration (nearest $1,000)	1	%	$ 1,439,000	$ 14,000
Construction Project Total (nearest $10,000)				**$ 1,840,000**
DWSD Fees				
Water Resources Fee - 42 acre-feet	1	LS	$ 2,200,000	$ 2,200,000
Water Infrastructure Fee	1	LS	$ 1,950,000	$ 1,950,000
			Total	**$ 4,150,000**
Project Grand Total (nearest $10,000)				**$ 5,990,000.00**

Douglas County
Louviers Water and Sanitation District
Renewable Water Feasibility Study
Conceptual Cost Estimate
Alternate 2B - DWSD Full Water Supply with Fire Flow
Updated July 22, 2020

Description	Quantity	Units	Unit Price	Subtotal Cost
Tranmission Main From Plum Valley Heights to LWSD 12" Main				
Pipeline				
Connection to DWSD	1	EA	$ 15,000	$ 15,000
Connection to LWSD System	1	EA	$ 15,000	$ 15,000
Disconnect Wells	2	EA	$ 10,000	$ 20,000
12" Direction Drill HDPE	8,000	LF	$ 120	$ 960,000
PRV Vault	1	EA	$ 20,000	$ 20,000
Meter Vault	1	EA	$ 120,000	$ 120,000
Air Vacuum Valves	6	EA	$ 7,000	$ 42,000
Blowoff Valves	5	EA	$ 5,000	$ 25,000
DI Bends, Reducers, and Restraints	11	EA	$ 2,000	$ 22,000
12" Gate Valves	4	EA	$ 4,000	$ 16,000
Site Restoration/Revegetation	1.00	AC	$ 8,000	$ 8,000
ROW Permit - Pipe	8,000	LF	$ 1	$ 6,160
ROW Permit - Street Cut Bore	28	EA	$ 75	$ 2,100
Construction Subtotal (nearest $1,000)				**$ 1,271,000**
Staging Area/GESC (nearest $10,000)	2	%	$1,271,000	$30,000
Overhead (nearest $10,000)	10	%	$1,271,000	$130,000
Profit (nearest $10,000)	5	%	$1,271,000	$60,000
Mobilization/Bonds/Insurance (nearest $10,000)	5	%	$1,271,000	$60,000
Contingency (nearest $10,000)	25	%	$1,271,000	$320,000
Construction Total				**$ 1,871,000**
Engineering Design and Construction (nearest $1,000)	15	%	$ 1,871,000	$ 281,000
Approvals (nearest $1,000)	5	%	$ 1,871,000	$ 94,000
Geotechnical Investigation (nearest $1,000)	1	LS	$ 10,000	$ 10,000
Survey	1	LS	$ 20,000	$ 20,000
Utilities Investigation (nearest $1,000)	3	DAYS	$ 3,000	$ 9,000
Materials Testing (nearest $1,000)	2	%	$ 1,871,000	$ 37,000
Legal/ROW Acquisition (nearest $1,000)	2	%	$ 1,871,000	$ 37,000
Administration (nearest $1,000)	1	%	$ 1,871,000	$ 19,000
Construction Project Total (nearest $10,000)				**$ 2,380,000**
DWSD Fees				
Water Resources Fee - 42 acre-feet	1	LS	$ 2,200,000	$ 2,200,000
Water Infrastructure Fee	1	LS	$ 2,000,000	$ 2,000,000
			Total	**$ 4,200,000**
Project Grand Total				**$ 6,580,000.00**

Appendix E

EXHIBIT 1

LOUVIERS WATER AND SANITATION DISTRICT
20 YR CAPITAL IMPROVEMENT PLAN
(INITIALLY WELLS, FUTURE RENEWABLE WATER SUPPLY)

	Project Cost	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	Total
Water Supply																											
Radium Treatment System - Design	200,000	50,000	150,000																								$ 200,000
Radium Treatment System - Construction	749,000			749,000																							$ 749,000
Connection to Renewable Supplier - Design	490,000																								190,000		$ 190,000
Connect to Renewable Supplier - Construction & Fees	5,500,000																									5,500,000	$ 5,500,000
Water Distribution																											
Distribution System Replacement - Design	$ 300,000								300,000																		$ 300,000
Distribution System Replacement - Construction	$ 2,842,000									2,842,000																	$ 2,842,000
Water Storage Tank Replacement - Design	$ 200,000													200,000													$ 200,000
Water Storage Tank Replacement - Construction	$ 918,000														918,000												$ 918,000
Sewer																											
Collection System Replacement - Design	$ 400,000																		400,000								$ 400,000
Collection System Replacement - Construction	$ 2,814,000																			2,814,000							$ 2,814,000
TOTAL	$ 14,413,000	$ 50,000	$ 150,000	$ 749,000	$ -	$ -	$ -	$ -	$ 300,000	$ 2,842,000	$ -	$ -	$ -	$ 200,000	$ 918,000	$ -	$ -	$ -	$ 400,000	$ 2,814,000	$ -	$ -	$ -	$ -	$ 190,000	$ 5,500,000	$ 14,113,000
Capital Requirements			$ 1,000,000						$ 3,300,000					$ 1,200,000					$ 3,400,000					$ 6,500,000		
Debt Service 2021 Issue ($1,000,000; 30 years; 3%)			$51,019.26	$51,019.26	$51,019.26	$51,019.26	$51,019.26	$51,019.26	$51,019.26	$51,019.26	$51,019.26	$51,019.26	$51,019.26	$51,019.26	$51,019.26	$51,019.26	$51,019.26	$51,019.26	$51,019.26	$51,019.26	$51,019.26	$51,019.26	$51,019.26	$51,019.26	$51,019.26	$51,019.26	
Debt Service 2027 Issue ($3,300,000; 30 years; 3%)									$168,363.56	$168,363.56	$168,363.56	$168,363.56	$168,363.56	$168,363.56	$168,363.56	$168,363.56	$168,363.56	$168,363.56	$168,363.56	$168,363.56	$168,363.56	$168,363.56	$168,363.56	$168,363.56	$168,363.56	$168,363.56	
Debt Service 2032 Issue ($1,200,000; 30 years; 3%)														$61,223.11	$61,223.11	$61,223.11	$61,223.11	$61,223.11	$61,223.11	$61,223.11	$61,223.11	$61,223.11	$61,223.11	$61,223.11	$61,223.11	$61,223.11	
Debt Service 2037 Issue ($3,400,000; 30 years; 3%)																			$173,465.48	$173,465.48	$173,465.48	$173,465.48	$173,465.48	$173,465.48	$173,465.48	$173,465.48	
Debt Service 2043 Issue ($6,500,000; 30 years; 3%)																									$331,625.19	$331,625.19	
Annual Debt Service for CIP			$51,019.26	$ 51,019.26	$ 51,019.26	$ 51,019.26	$ 51,019.26	$ 51,019.26	$ 219,382.82	$ 219,382.82	$ 219,382.82	$ 219,382.82	$ 219,382.82	$ 280,605.93	$ 280,605.93	$ 280,605.93	$ 280,605.93	$ 280,605.93	$ 454,071.41	$ 454,071.41	$ 454,071.41	$ 454,071.41	$ 454,071.41	$ 454,071.41	$ 785,696.60	$ 785,696.60	
No. Connected EQRs			110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	
Annual Cost per EQR			$ 463.81	$ 463.81	$ 463.81	$ 463.81	$ 463.81	$ 463.81	$ 1,994.39	$ 1,994.39	$ 1,994.39	$ 1,994.39	$ 1,994.39	$ 2,550.96	$ 2,550.96	$ 2,550.96	$ 2,550.96	$ 2,550.96	$ 4,127.92	$ 4,127.92	$ 4,127.92	$ 4,127.92	$ 4,127.92	$ 4,127.92	$ 7,142.70	$ 7,142.70	
Cost per Month per EQR for CIP			$ 38.65	$ 38.65	$ 38.65	$ 38.65	$ 38.65	$ 38.65	$ 166.20	$ 166.20	$ 166.20	$ 166.20	$ 166.20	$ 212.58	$ 212.58	$ 212.58	$ 212.58	$ 212.58	$ 343.99	$ 343.99	$ 343.99	$ 343.99	$ 343.99	$ 343.99	$ 595.23	$ 595.23	
Annual Increase Required for Next Project (%)				28%						5%					10%					10%							
Monthly Charge for CIP			$ 38.65	$ 49.47	$ 63.32	$ 81.05	$ 103.75	$ 132.80	$ 169.98	$ 178.48	$ 187.41	$ 196.78	$ 206.62	$ 216.95	$ 238.64	$ 262.51	$ 288.76	$ 317.63	$ 349.40	$ 384.34	$ 422.77	$ 465.05	$ 511.55	$ 562.71	$ 618.98	$ 618.98	
Increase in Monthly Charge by Year			$ 38.65	$ 10.82	$ 13.85	$ 17.73	$ 22.70	$ 29.05	$ 37.18	$ 8.50	$ 8.92	$ 9.37	$ 9.84	$ 10.33	$ 21.69	$ 23.86	$ 26.25	$ 28.88	$ 31.76	$ 34.94	$ 38.43	$ 42.28	$ 46.50	$ 51.16	$ 56.27	$ -	

NOTES:
1. Basis of CIP
   Continued use of existing well to maximize investment.
   Defer renewable water supply until estimated extinction of groundwater supply.
2. Significant Assumptions
   Aquifer life of approximately 20 years (200 ft available, average drop 10 ft per year).
   Useful life of well > 20 years with appropriate maintenance/pump replacement.
3. Required rates shown as monthly charges. (Bi-Monthly Billing = Monthly Charge X 2).

EXHIBIT 1

LOUVIERS WATER AND SANITATION DISTRICT
20 YR CAPITAL IMPROVEMENT PLAN
(RENEWABLE WATER SUPPLY)

	Project Cost	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	Total
Water Supply																											
Connection to Renewable Supplier - Design	580,000		580,000																								$ 580,000
Connect to Renewable Supplier - Construction & Fees	6,000,000			6,000,000																							$ 6,000,000
Water Distribution																											
Distribution System Replacement - Design	$ 300,000									300,000																	$ 300,000
Distribution System Replacement - Construction	$ 2,842,000										2,842,000																$ 2,842,000
Sewer																											
Collection System Replacement - Design	$ 400,000																400,000										$ 400,000
Collection System Replacement - Construction	$ 2,814,000																	2,814,000									$ 2,814,000
TOTAL	$ 12,936,000	$ -	$ 580,000	$ 6,000,000	$ -	$ -	$ -	$ -	$ -	$ 300,000	$ 2,842,000	$ -	$ -	$ -	$ -	$ -	$ 400,000	$ 2,814,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 12,936,000
Capital Requirements			$ 7,000,000							$ 3,300,000							$ 3,400,000										
Debt Service 2021 Issue ($7,000,000; 30 years; 3%)			$357,134.82	$357,134.82	$357,134.82	$357,134.82	$357,134.82	$357,134.82	$357,134.82	$357,134.82	$357,134.82	$357,134.82	$357,134.82	$357,134.82	$357,134.82	$357,134.82	$357,134.82	$357,134.82	$357,134.82	$357,134.82	$357,134.82	$357,134.82	$357,134.82	$357,134.82	$357,134.82	$357,134.82	
Debt Service 2028 Issue ($3,300,000; 30 years; 3%)										$168,363.56	$168,363.56	$168,363.56	$168,363.56	$168,363.56	$168,363.56	$168,363.56	$168,363.56	$168,363.56	$168,363.56	$168,363.56	$168,363.56	$168,363.56	$168,363.56	$168,363.56	$168,363.56	$168,363.56	
Debt Service 2035 Issue ($3,400,000; 30 years; 3%)																	$173,465.48	$173,465.48	$173,465.48	$173,465.48	$173,465.48	$173,465.48	$173,465.48	$173,465.48	$173,465.48	$173,465.48	
Annual Debt Service for CIP			$ 357,134.82	$ 357,134.82	$ 357,134.82	$ 357,134.82	$ 357,134.82	$ 357,134.82	$ 357,134.82	$ 525,498.38	$ 525,498.38	$ 525,498.38	$ 525,498.38	$ 525,498.38	$ 525,498.38	$ 525,498.38	$ 525,498.38	$ 698,963.86	$ 698,963.86	$ 698,963.86	$ 698,963.86	$ 698,963.86	$ 698,963.86	$ 698,963.86	$ 698,963.86	$ 698,963.86	$ 698,963.86	
No. Connected EQRs			110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	
Annual Cost per EQR			$ 3,246.68	$ 3,246.68	$ 3,246.68	$ 3,246.68	$ 3,246.68	$ 3,246.68	$ 3,246.68	$ 4,777.26	$ 4,777.26	$ 4,777.26	$ 4,777.26	$ 4,777.26	$ 4,777.26	$ 4,777.26	$ 4,777.26	$ 6,354.22	$ 6,354.22	$ 6,354.22	$ 6,354.22	$ 6,354.22	$ 6,354.22	$ 6,354.22	$ 6,354.22	$ 6,354.22	$ 6,354.22	
Cost per Month per EQR for CIP			$ 270.56	$ 270.56	$ 270.56	$ 270.56	$ 270.56	$ 270.56	$ 270.56	$ 398.11	$ 398.11	$ 398.11	$ 398.11	$ 398.11	$ 398.11	$ 398.11	$ 398.11	$ 529.52	$ 529.52	$ 529.52	$ 529.52	$ 529.52	$ 529.52	$ 529.52	$ 529.52	$ 529.52	$ 529.52	
Annual Increase Required for Next Project (%)				6%							4%																
Monthly Charge for CIP			$ 270.56	$ 286.79	$ 304.00	$ 322.24	$ 341.58	$ 362.07	$ 383.79	$ 406.82	$ 423.10	$ 440.02	$ 457.62	$ 475.92	$ 494.96	$ 514.76	$ 535.35	$ 535.35	$ 535.35	$ 535.35	$ 535.35	$ 535.35	$ 535.35	$ 535.35	$ 535.35	$ 535.35	$ 535.35	
Increase in Monthly Charge by Year			$ 270.56	$ 16.23	$ 17.21	$ 18.24	$ 19.33	$ 20.49	$ 21.72	$ 23.03	$ 16.27	$ 16.92	$ 17.60	$ 18.30	$ 19.04	$ 19.80	$ 20.59	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	

NOTES:
1. Basis of CIP
   Immediate replacement of groundwater supply with renewable supply.
   Discontinue use of existing wells.
2. Significant Assumptions
   Renewable supply is available from DWSD or RWSD.
3. Required rates shown as monthly charges. (Bi-Monthly Billing = Monthly Charge X 2).